ARPEE AUTOMATIC TIMING SYSTEM

INSTRUCTION MANUAL
(MULTI BEAM TIMING WITH KC KEW ATP 301 TIMER AND PRINTER)
(Timer Software Version 5.19)

ARPEE Automatic Timing Systems are designed and manufactured
in Australia by RP Developments and KC Kew Electronics.
Timer software developed by Zaltec Pty Ltd

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1   DESCRIPTION OF TIMING SYSTEM

1.1   GENERAL

The ARPEE Automatic Timing System consists of a steel-framed gate structure located along the Finish Line, which supports a series of infra-red light beams to detect the competitors crossing the line. Signals from the light beams trigger the KC Kew Timer to record the times. The Timer is started automatically by a signal generated as the starting gun is fired, and fed to the Timer via a radio signal. Rubber safety covers are fitted to the finish gate components.

The system has been designed to operate from a 240 volt AC supply, but the timer has an internal heavy-duty rechargeable battery, that automatically provides continuity of operation in the event of failure (or unavailability) of the 240 volt supply. The battery will provide up to 10 hours operation from a fully charged condition.

The KC Kew Timer has been customised to operate with the ARPEE Auto Finish system.

1.2   TIMER

Details of the KC Kew ATP 301 Timer and associated printer are given in Appendix A.

1.3   AUTOMATIC STARTING SYSTEM (if applicable)

The AUTO START system operates from a modified cap-type starting gun (JEX 202). A switch mounted in the gun casing closes when the gun is fired. This sends a signal via radio link to start the Timer. The Timer will ignore further start signals until the Timekeeper has reset the system ready for the next event.
Further details of the Radio Auto-start are given in Appendix B.

1.4 AUTOMATIC FINISHING SYSTEM

The AUTO-FINISH system uses a steel Finish Gate assembly to support a number of Light Beam Detector Boxes and reflectors. Each detector box has two vertical columns of infra-red sensors set in opposite sides of the box, so that each box covers two adjacent lanes of the track. There are four infra-red sensors in each vertical column, spaced approximately 20cm apart.

Each infra-red sensor transmits a beam of infra-red light to the opposite side of the lane, where it is reflected by a reflector and returned to a receiver mounted in the same sensor.

The arrangement gives four infra-red beams at different heights across each lane of the track. When the first beam is cut by the competitor crossing the finish line nothing happens. It is only when a second beam is cut that a signal to stop the corresponding lane of the Timer is generated. This prevents an outstretched hand from giving a false result.

The Light Beam Detector Boxes are connected by cable to the Timer. Each box contains a beeper that beeps if any of the light beams are not being reflected correctly. Adjustment of the light beams is covered in the following instructions.

When automatically timing 400 metre events, it is possible for the Lane 1 competitor to interrupt a light beam when getting set for the start. This would cause the light beam unit to beep, which could distract the competitor. To avoid any problems, the timekeeper, or an assistant, can use a special hand-held pushbutton to suppress the Lane 1 sensors until after the competitor has started.

2   ASSEMBLY INSTRUCTIONS

SETTING UP THE ARPEE AUTOMATIC TIMING SYSTEM

STEP 1 AUTO FINISH FRAME – THE UPRIGHTS

Lay the uprights on the ground along the track in line with the lane markings and with the feet approximately on the finish line.

Key Points:
- For circular track operation, one upright is different to the rest in that it is removable, having one section fitted inside another so that it can slide up and down. The two sections are bolted together. When the bolt is temporarily removed, the upright can be lowered and removed from its position. This removable upright is positioned between Lanes 1&2 and can be removed to leave those two lanes free for long distance events while still using the remaining lanes for auto timing.

STEP 2 AUTO FINISH FRAME – THE TOP RAIL ASSEMBLY

Assemble the top rail on the ground across the track in a position near to the tops of the uprights.

Key Points:
- The top rail consists of four sections for an 8-lane system, five sections for a 10-lane or six sections for a 12-lane. The sections fit together and are fixed by a bolt and wing nut at each socket joint.
- There are two end sections of slightly different lengths and two, three or four identical intermediate sections.
- The end sections are identified by the 'upright' socket at the extreme end.
- Either end section can be positioned at the inside track end of the assembly, and the intermediate sections are fully interchangeable. Note; In some instances where the lane widths are not uniform, the top rail sections have specific positions and cannot be interchanged. In this case the lane numbers are marked on each top rail section to indicate the correct position.
- It is easiest to fit the top rail sections together while they are laying flat on the ground as this offers the best alignment of the jointing sockets.
- The wingnuts do not have to be tight as they only have to prevent the bolts from coming out.

STEP 3 FITTING THE TOP RAIL

Move the assembled top rail so that it is laying on the ground adjacent to the top of the uprights and then fit the end of each upright into the corresponding socket.

Key Points:
• Make sure that the pivoting foot of each upright is pointing upwards when fitted into the top rail socket so that it will be pointing along the track when the upright is raised to the vertical position.
• If you don't happen to have a tall member in the assembly team, it might be a good idea to fit the Lane Number frames and boards to the top rail before the finish gate frame is raised. But only if there is negligible wind.

STEP 4 RAISING, SECURING AND ADJUSTING THE FINISH GATE FRAME

Raise the frame by lifting the top rail in an arc until the uprights are vertical, and then secure it by means of the steel braces. There are 10 braces for an 8-lane system and 12 braces for a 10-lane and 14 braces for a 12-lane system.
Fit a pair of braces on the lugs at each end of the frame and at each section joint along the frame where the fixing lugs are located.
To fit a brace, hold the bottom end at least half a metre off the ground while you fit the hole near the top end of the brace over the lug on the top rail. Make sure the lug goes all the way into the hole before lowering the bottom end to the ground.
It is important to raise the bottom of the brace off the ground when fitting and removing, otherwise it will jam on the lug and could be damaged.

Adjust the position of the feet of the uprights so that they are all in line and on the rear edge of the finish line. Then look along the length of the frame and adjust the position of the braces so that the uprights are vertical and the top rail is straight.

Key Points:
• Before raising the frame, lay the braces on the ground in the positions they will occupy. This will make it easier to lift and fit the braces once the frame is in the upright position.
• Use at least three people for an 8 or 10-lane frame and four for a 12-lane, evenly spaced along the length of the top rail, to raise the frame and fit the braces.
• **The end pairs of braces must be angled out at about 45 degrees (like the corner guy rope of a tent) to prevent sideways movement of the frame.**

STEP 5 FITTING THE LANE NUMBER BOARDS
Fit a Lane Number Mounting Frame (with the appropriate number board) on the top rail approximately in the centre of each lane. The lane number board hooks onto the mounting frame and must be able to swing freely.
The number board mounting frames have a lug on the back for holding the cable loom, which runs across the top-rail. Make sure that the lug is on the rear side of the frame.

STEP 6 FITTING THE LIGHT BEAM DETECTOR BOXES

Fit a Light Beam Detector Box to every second upright (ie. between Lanes 1&2, 3&4, 5&6, 7&8 plus 9&10 and 11&12, if applicable).

Key Points:
- All the boxes are identical, so it doesn't matter which box is placed in which position.
- The boxes are usually mounted on the front side of the finish gate frame, but it depends on the direction of the lane numbering. **THE BOXES MUST ALWAYS BE MOUNTED ON THE SIDE OF THE FRAME WHICH, WHEN YOU ARE FACING THE FRAME, GIVES LANE 1 ON YOUR LEFT**. See Figure 2.1. Make sure that that the end of the box marked 'TOP' is at the top.

NOTE: This point is critical, otherwise the light beams will be out of sequence and will not correspond to the correct lanes.

- To cater for a wide range of competitor heights (as experienced at Little Aths), set the second lowest beam at a height of about 90cm, making sure that it is not above head height for the shortest competitor. The beams can be raised and lowered during the program if required, but for general use this height should be satisfactory.
- After the detector box is mounted on the upright, fit the safety cover before plugging in the cable. Refer to Appendix B for details of the safety covers.
- Do not worry too much about the alignment of the light beams at this point as adjustment will have to be made once the reflectors and cables are installed.
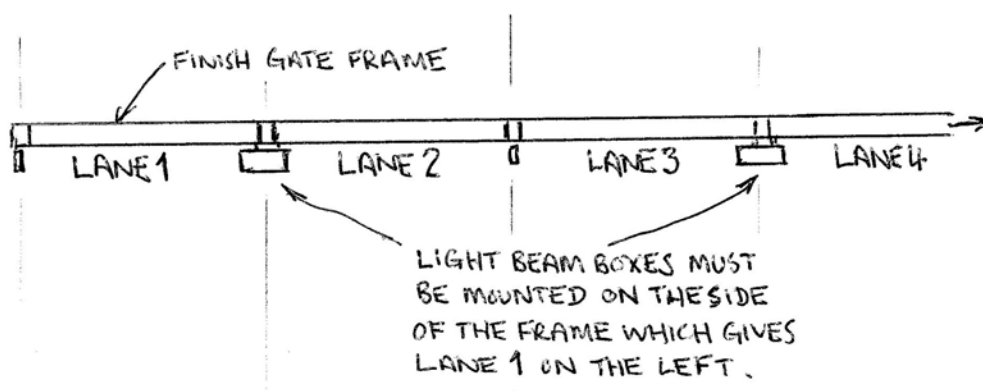

Figure 2.1 Plan View of Light Beam Detector Box.

STEP 7 CONNECTING THE LIGHT BEAM DETECTOR BOX CABLES

Connect the cable loom between the Timer and the Detector Boxes.

Key Points:
- One end of the cable loom has the four, five or six plugs bunched together. This end connects to the Timer.
- The cables are different lengths and the plugs are colour coded as follows:

Red	Lanes 1&2
White	Lanes 3&4
Blue	Lanes 5&6
Yellow	Lanes 7&8
Green	Lanes 9&10 (if applicable)
Black	Lanes 11&12 (if applicable)

- The cable loom runs across the top-rail and is held in position by the lug on the number board mounting frame above each lane. An appropriately coloured tape is fitted at the point on the loom where each cable drops down to the respective detector box. Loosely wrap the excess cable around the upright to keep it tidy.
- Connect the cable plug through the hole in the back of the safety cover (if fitted) into the 5-pin socket near the top of the light beam detector box. Note: If the socket is not near the top of the box then it is upside down.
- If 400 metre events are going to be run, the 'Lane 1 suppression cable' will have to be connected between the Lane 1-2 light beam detector box and the Timekeeper position. The special single-pin RCA socket for this cable is also located near the top of the box adjacent the main cable socket.

STEP 8 FITTING THE LIGHT BEAM REFLECTORS AND ALIGNMENT OF THE LIGHT BEAM SYSTEM

It is important that care is taken when setting up the light beam system to ensure that correct operation occurs every time. Final adjustment of the light beams and reflectors is carried out during the system test, which is covered in STEP 10.

Key Points:
- All the reflectors are identical so they can be placed in any position.
- Fit the reflectors to the remaining uprights making sure that they are at the same height as the adjacent light beam unit. The end with the metal cap is the top.
- Fit the safety covers to the reflectors (if they had been removed). Refer to Appendix C for details of the safety covers.
- Make sure that the Light Beam Detector Boxes are aligned with the finish line so that the light beams are parallel to the line and not skewed. See Figure 2.2.
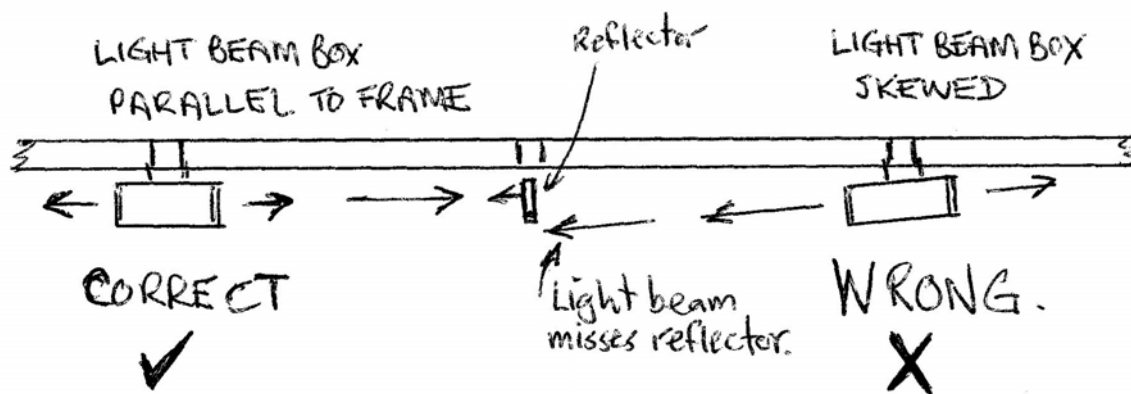
Figure 2.2 Correct and Incorrect Alignment of Light Beam Detector Box.

STEP 9. CONNECTING THE AUTO START (if applicable)
There are three types of auto-start available-
- Cable Connection- where a cable connects the modified cap-type starting gun to the electronic timer,
- Wireless Connection- where a radio signal, produced when the modified starting gun is fired, starts the timer, and
- Fully Electronic Starting where the starting gun is replaced by a pushbutton that initiates an audible "beep" for the start. The start signal is transmitted to the timer by radio link.

Cable Connection- The auto start consists of a cable reel with 200 metres of cable, which connects between the specially modified starting gun at the start position and the Timer. The reel of cable is unwound around the inside of the track (or across the arena if appropriate) to the start position.

The starting gun plugs into the cable socket on the reel near the winding handle and must always be unplugged before moving the cable reel to prevent the starting gun cable from becoming tangled around the reel.

Key Points:
- To prevent the Timer from being pulled off the table if someone happens to strain the auto start cable, wind the end of the cable around the leg of the table a few times, leaving sufficient length to connect the plug to the Timer.
- Connect the plug on the auto start cable to the cable socket labelled "GUN" on the Timer.
- Do not run the cable out to the start position until the testing, covered in Step 10, has been completed.
- Connect the starting gun to the cable reel using the socket near the winding handle and cock the start hammer but do not load a cap.
- If the auto start cable has to cross the track, run it across the top of the finish gate frame.

Wireless Connection- Full instructions for the radio auto-start are given in Appendix B. The auto start consists of a small transmitter box at the start position into which the starting gun is plugged. A receiver at the timer end is built into the timer. Short aerials attach to both the transmitter and the receiver. The transmitter has its own rechargeable battery, which must be maintained in a charged condition. The receiver takes its power from the timer battery.

Key Points:
- Connect the aerials to the transmitter and the receiver. Make sure that the aerial cable is plugged into the socket at the rear of the timer panel.
- Switch the transmitter on and check that the battery indicator is glowing green.
- Connect the starting gun to the transmitter. Do not load a cap until all the testing is completed.

STEP 10. FINAL ADJUSTMENT OF THE LIGHT BEAMS AND TESTING OF THE SYSTEM

The following procedure is vital and can only be performed after the system has been set up in accordance with the preceding assembly instructions.

Step 1 If you have 240 volt AC power supply available, plug the charger into the supply. Connect the plug on the charger cable into the CHG (Charge) socket on the side panel of the Timer. Switch on the 240 volt power supply. The charger has a red indicator lamp to indicate when the 240 volt supply is ON.

Step 2 Switch the Timer ON. If any of the Light Beam Detector Boxes emits a pulsing beep it means that the light beams are not properly aligned with the reflectors (see Figure 2.2), or the height needs adjustment. If difficulty is experienced in alignment, you can identify the offending beam(s) by observing the red indicator lamp visible through the hole **behind** each individual infra-red sensor. **The red lamp glows when the beam is not being reflected properly.** You will have to remove the safety cover to observe the indicator lamps.

Step 3 Check the timer display screen to confirm the following-
- That the timer is in the reset (WAITING) condition. If it is running, it probably means that a start signal has been applied. If you are using cable-connected auto-start, it could be that the gun hammer is not cocked.
- That the timer is in LANE mode. If not, access the menu program and adjust the TIMING MODE to LANE.
- That the battery charge indicator is indicating full charge. If not, alert the timekeeper to monitor it.
- That the required starting system (RADIO, CTK, GUN) is active. If not, access the menu program and switch on, as appropriate, STARTING GUN, STARTING CTK, RADIO START SYSTEM.
- That the INHIBIT indicator is not displayed. If it is, access the menu program and switch off the TIMING INHIBIT INPUT.

Step 4 Fire the starting gun (without a cap) and observe that the Timer starts. If it does not start and you have a cable connection, check the auto start cable connections. If they appear to be OK, determine whether it is the cable reel or

the gun at fault by connecting the gun directly into the "GUN" socket on the Timer. If the gun is faulty, use the spare gun and arrange for repairs to the faulty one. If the cable is faulty, use the CTK pushbutton for manual starting until repairs have been completed.

If you have a wireless connection and the timer does not start when the gun is fired, check that the transmitter is switched on. The indicator lamp should be glowing green. If it is red then the transmitter battery needs charging. If still no response, check the gun as outlined above.

<u>Step 5</u> With the Timer running, get an assistant to walk through each finish gate in turn, starting at Lane 1.

Observe that each lane stops as the beam is broken. The Timer and the light beam detector box will both beep.

Check that the sequence is correct by printing the result of the test. If the sequence is not correct it means that the cable connections are interposed or that one or more of the light beam detector boxes have been connected on the wrong side of the frame or have been placed upside down.

<u>Step 6</u> Once the system has been proven to be operating correctly, if you are using a cable connected starting gun, disconnect the starting gun from the cable reel and run the cable out to the initial start position. Connect the starting gun to the reel and test that the auto start is still operating correctly.

3 OPERATING INSTRUCTIONS FOR AUTOMATIC TIMING

3.1 *INSTRUCTIONS FOR TIMEKEEPER*

IMPORTANT NOTE: Always switch the timer OFF before removing or inserting plugs. This will reduce the risk of faults occurring.

These instructions assume that the system has been set up and tested as detailed in the previous section. The system should be retested if you have any concern about its correct operation.

Familiarise yourself with the details of the ATP 301 Timer, given in Appendix A, page 21 of this manual. The Trouble-shooting section (page 18) should assist with resolving problems.

PREPARATION

If the timer is to be powered from the 240 volt supply, the charger should be connected and switched on.

Before commencing any timing it is essential to check that the timer is set up with the required characteristics. With the timer in the reset (waiting) condition, the display screen indicates the current settings of the critical characteristics.

The critical items are-

- Battery Condition- should be indicating full charge (or close to it) on the bar indicator. If not, it should be monitored in case action is required. If the timer will not switch on and a warning message momentarily appears on the screen, it means that the battery voltage is below the level to operate the system. It will be necessary to charge the battery or connect an external battery.
- Clock Setting- should be correct date and time. If not, adjust it in the menu program,
- Timing Mode (Lane, Multi, Single or Split)- must suit the requirements of the race to be timed. Refer to details in Appendix A, under 'Description of ATP 301 Timer'.
- Available Starting Methods (Radio, Cable-connected Gun or CTK button)- the required systems must be switched on in the menu program,
- Header Information and Printout Format- as to whether Age, Event, Heat Number, etc. print as a header on the result sheet. Selections are made through the menu program. If you are downloading the race results to a PC, you will have to consider whether you need header information in the download. In a 'comma delimited' download, the selected header information is downloaded, irrespective of the print format selected.
- Timing Inhibit function- which blocks all stop signals, is a very handy feature in a few specific circumstances, but it should not be switched on unless specifically required. It is controlled through the menu program.

The final preparation when first setting up or when any change is made to the timing arrangement is to do a simulated race, testing the start system, the auto-finish system and the timer. This is quickly and easily done by starting the timer by the normal means, then walking a 'slalom' through each of the gates from Lane 1 upwards and finally printing the result to check the correct order of finish and the required header information.

TIMING AN AUTO-FINISH EVENT (USING THE FINISH GATES)
STEP 1. CHECK THE TIMER MODE. The timer must be in LANE MODE or MULTI MODE for auto-finish timing. Lane mode is normal and prints the results in place (finish) order. Multi mode prints the results in lane order, with corresponding times but no placings.

STEP 2. CHECK THAT THE TIMER IS IN THE RESET (WAITING) CONDITION. The timer must be in the reset (waiting) condition before it can be started. It automatically resets after the results of an event have been initially printed. It can also be reset after a false start via the RESET and ENTER buttons.

STEP 3. CHECK THE HEADER DETAILS. If selected header information (Age, Event, Heat) is being used on the result sheet, the timekeeper has to regularly use the MENU program to edit the values.

STEP 4. SIGNAL THE STARTER. The timekeeper must indicate to the starter that the timer is reset so that the latter knows it is safe to start the next event.

STEP 5. START THE TIMER AND/OR OBSERVE THE RACE. If auto-start is being used, the timekeeper observes the auto-start of the timer and then waits for the last competitor to finish before printing the results.
If manual start is being used, the timekeeper has to watch for the gun-smoke and press the CTK pushbutton to start the timer. He/she then waits for the last competitor to finish before printing the results.
In the event of a false start, press the RESET button followed by the ENTER button. The heat counter and the race counter do not increment when the timer is reset this way.
In all situations it is important for the timekeeper to closely observe the race for abnormalities, such as competitors running out of their lane, as this can require adjustment to the results. If two competitors finish through the same gate, both times will be recorded but the placings and lane numbers may have to be adjusted on the result sheet.
The timekeeper can record multiple manual times using the CTK pushbutton. All such times are listed as "CTK times" and do not identify the lanes involved. Usually the timekeeper might do a manual check time on first place, if anything.

STEP 6. PRINT THE RACE RESULTS. Make sure the last competitor has finished before pressing the PRINT and ENTER buttons.
Under normal circumstances, where auto-start and auto-finish are being used, the PRINT and ENTER buttons are the only buttons the timekeeper has to use.

SPECIAL NOTE ABOUT 400 METRE EVENTS
If the event is 400 metres (on a 400m track) and there is a competitor in Lane 1, he/she could interrupt a light beam while getting ready for the start. This would cause the sensor unit to beep, which could be distracting. To avoid the problem, the Lane 1 sensor unit can be suppressed using the specially provided brown cable with a gold plug at one end and a red pushbutton at the other. The gold plug must be connected to the gold socket located next to the main socket near the top of the Lane1-2 sensor

unit. Keep the pushbutton pressed while the Lane 1 competitor is getting ready and release it after the start.

SPECIAL NOTE ABOUT THE TIMER INHIBIT FUNCTION
The inhibit function, accessed through the timer menu program, disables all the stop circuits until it is released by pressing a pushbutton plugged into the inhibit socket on the timer side panel. Examples of its use are-

- Where the circular track is shorter than 400 metres, if a 400 metre event is run in lanes, all competitors have to pass through the gates after the start. This would register a pointless time for each lane, unless the inhibit function is on.
- If running shuttle relays, the times of all but the last runner can be inhibited.
- In certain situations where it may be difficult to control congestion and movement of non-competitors around the finish line, the inhibit function can be used to block out all unwanted times until the competitors are approaching the line.

The inhibit function can be very useful, but it is unforgiving if the timekeeper forgets to switch it off before the competitors finish. The timer display screen indicates when the inhibit function is on, both in the reset and the running conditions. Also, in the running condition, the timer beeps twice every four seconds to serve as a reminder to the timekeeper that the inhibit function is on.

SPECIAL NOTE ON WET WEATHER OPERATION
The ARPEE Automatic Timing System can be operated in wet weather provided care is taken to keep the electronic timer dry. With the finish gates, if excessive water gets into the sensor boxes it may temporarily affect the operation but there will be no adverse long-term effects. The main problem with wet weather operation is the effect of water droplets on the reflector surface or the sensor lens. This can cause the infra-red light beams to be dispersed rather than reflected back to the sensor. If there is a problem the affected sensor unit will beep as if it is out of alignment. To overcome the problem gently wipe the surfaces with a soft paper towel or a tissue.

MANUALLY TIMING A LONG DISTANCE EVENT
The timer must be in SINGLE MODE or SPLIT MODE for long distance timing. Split mode is only used where boys and girls are running in the same race.
The timer must be in the reset (waiting) condition before it can be started. It automatically resets after the results of an event have been initially printed. It can also be reset after a false start via the RESET button.
The timekeeper must indicate to the starter that the timer is reset so that the latter knows it is safe to start the next event.
If auto-start is being used, the timekeeper observes the auto-start of the timer and then, at the finish of the event, uses the CTK pushbutton to time each competitor crossing the finish line. Up to 100 competitors can be timed in the SNGLE mode. After the last competitor has finished the results can be printed.
If boys and girls are running together (split mode) the second pushbutton must be plugged into the Lane 1-2 input socket (colour coded red). The CTK pushbutton is

then used to time the boys and the second pushbutton is used for the girls. Up to 50 boys and 50 girls can be timed in the SPLIT mode.

If manual start is being used, the timekeeper has to watch for the gun-smoke and press the CTK pushbutton to start the timer. From then on, the procedure is the same as for auto-start.

3.2 INSTRUCTIONS FOR FINISH MARSHALS

STEP 1 Collect a set of Lane Number Disks and lay them on the ground in the middle of the respective lanes about five metres beyond the finish line. This allows the competitors to pick up their appropriate disk as they run on after crossing the finish line. The disk identifies the lane each competitor finished in.

STEP 2 If required, one Finish Marshall should collect a stopwatch and prepare to independently time first place as a check time for record purposes.

As soon as each event is finished, Check Timekeeper should advise the Chief Timekeeper of the winning Lane Number and the Time.

STEP 3 Any remaining Finish Marshals (not involved in check timekeeping) should position themselves during the running of the event so that they can:

i. Observe the competitors in the final stages of the event to ensure that lane-crossing hasn't resulted in two competitors potentially finishing in the same lane. If they do, the Chief Timekeeper must be notified so that the result sheet can be corrected.
ii. Observe the competitors after they run through the finish line to check that they pick up their correct Lane Number Disk.

STEP 4 One Finish Marshall (usually the one with the loudest and most authoritative voice!) should marshal the competitors after the event and direct them to line up, with their Lane Number Disks, in lane order at the Recording Table.

STEP 5 Return to **STEP 1** if further events are to be run.

STEP 6 At the completion of the day's events, assist with the packing up of the equipment.

3.3   INSTRUCTIONS FOR STARTER

Important Note: As soon as you arrive at a new start position or if there has been a long break in the race program, in conjunction with the timekeeper, always do a test start by firing the gun (without a cap) before the first race.

STEP 1 Assist the Start Marshall to position the competitors at the starting line.

STEP 2 Ensure that each competitor clearly understands what lane he/she is running in, and that he/she must stay in, and finish in, the correct lane.

NOTE: If lane changing occurs and two competitors finish in the same lane, the result sheet has to be corrected and the program is slowed down. Hence the need to stress the importance of staying in the correct lane.

STEP 3 Keep things moving at the start end of the track so that you can immediately respond to the 'ready' signal from the Timekeeper by acknowledging the signal and starting the next event with minimum delay.

STEP 4 If using a cable-connected auto start system, as soon as possible after starting an event, re-cock the hammer of the starting gun so that it is ready for loading a fresh cap. Until you have cocked the hammer the Timekeeper cannot reset the Timer.

STEP 5 At the completion of the day's events, clean the starting gun and assist with the packing up of the Auto Start cable (if used). Make sure that the starting gun plug is removed from the socket on the cable reel before winding the reel. In the case of wireless connection, make sure the radio transmitter is switched off and the gun is unplugged from the transmitter.

3.4   INSTRUCTIONS FOR COMPETITORS

It is vital that children be properly introduced to the use of the automatic finishing system. The key points to be covered are:

1. No Lane Changing - Competitors must finish in the same lane number in which they start. Otherwise they may not get a time for the event.

2. After crossing the finish line, each competitors must pick up the coloured Lane Number Disk for the LANE in which he/she finished, and then proceed to be marshalled in the line and in lane order at the recording table. When requested by the Recorder, the competitor should present the Lane Number Disc and provide the required details.

4 TROUBLE-SHOOTING

REMEMBER, TO AVOID TRIPPING THE PROTECTION CIRCUITS ALWAYS SWITCH THE TIMER OFF BEFORE REMOVING OR INSERTING PLUGS.

SYMPTOM: There is no response from the timer when the POWER button is pressed, even when the charger is connected and switched on.

PROBABLE CAUSE: The timer battery is completely flat or faulty, or there is an internal fault in the timer.

Note: The Projecta AC900 charger has a protection circuit that prevents it from operating if the battery voltage is below 6 volts. Therefore connecting it to a completely flat battery (where the voltage is less than 6 volts) will have no effect.

ACTION: Move the timer to a convenient car and connect it to the car battery using the special external battery clip leads supplied. The car battery doesn't have to be disconnected from the vehicle.

Press the POWER button. If there is still no response from the timer it's likely there's an internal fault. Contact RP Developments for further advice.

If, when the POWER button is pressed, the timer starts up OK then the problem is the internal battery. If you don't have a 240 volt power supply in a convenient location, the quickest solution would be to remove a car battery and use it as an external supply to power the timer for the program.

If there is a 240 volt AC power supply from which you can operate the timer, leave the timer connected to the car battery for ten minutes (to get the battery voltage up to at least 6 volts), then transfer it back to the track and operate it from the 240 volt power supply using the charger.

Alternatively, if there is no convenient car battery available, but you have a 240 volt power source, you can temporarily use the small black charger (used for charging the auto-start transmitter battery) to get the timer battery voltage up to 6 volts and then use the normal charger. Plug it into the timer CHG socket and switch it on for about 15 minutes, then disconnect it and restore the normal Projecta charger.

SYMPTOM: The timer switches on but the battery indicator is showing much less than full charge, even after charging.

PROBABLE CAUSE: The charger is faulty or the battery is faulty or there is a fault in the timer.

ACTION: Connect the charger to the timer and switch both on. If the timer battery indicator is the same as before, switch both the timer and the charger off. Disconnect the charger, move the timer to a convenient car and connect it to the car battery using the special external battery clip leads supplied. The car battery doesn't have to be disconnected from the vehicle.

Switch the timer on and check the battery indicator. If it is still the same as before, there must be a fault in the timer. If it is indicating full charge, the problem is in the charger or the timer battery. Leave the timer connected to the car battery for 10 minutes, then disconnect it and check whether the timer battery indicator shows a higher charge than it did initially. If it does, the charger must be faulty. If it is still the same as before, the battery is faulty.

Contact RP Developments as soon as possible for further advice and action.

SYMPTOM: The timer is on, but the automatic finish gates are not functioning, i.e. there is no beep when one or more of the beams is interrupted.
PROBABLE CAUSE: There is a fault in the finish gate wiring or in the timer.
ACTION: Switch the timer off. Remove all but one of the colour-coded plugs (that connect to the finish gate cable loom) from the side panel of the timer. Switch the timer on and check whether the finish gate that is still connected is working.

If it is, progressively connect the remaining plugs, checking each time that the gates are still working. You should be able to identify the faulty cable when the gates stop working. Either isolate that gate or connect a spare cable, if you have one.

If the first gate connected is not working, switch off the timer, disconnect that colour-coded plug and connect one of the others. Switch the timer on and check whether the new gate is working. If it is not there must be a fault in the timer. Immediately contact RP Developments (03 9592 7090 or 0412 344 303) to discuss the problem and arrange repairs.

If the second gate connected is working, the fault must be in the first gate. Isolate it or use a spare cable.

SYMPTOM: One, or more, of the Light Beam Detector Boxes emits a regular beep when the power is on.
PROBABLE CAUSE: The offending unit is slightly out of alignment, or something is blocking one of the light beams, or there are water droplets on the reflector or the lens, or one of the infra-red sensors is faulty.
ACTION: Correct the alignment of the beam(s) as per Figure 2.2 in the Assembly Instructions, or adjust the height of the box or the reflector, if necessary.

If it is impossible to adjust the unit to stop the beeping it could mean there is a problem with one of the infra-red sensors. Immediately contact RP Developments (03 9592 7090 or mobile 0412 344 303) for further assistance.

SYMPTOM: The Timer gives the "start" tone and starts timing after it has been switched on or immediately after being reset.
PROBABLE CAUSE: The CTK pushbutton is stuck, or the auto start system has a fault or, if you have cable-connected auto-start, the hammer on the starting gun may not be cocked (ie. it is not ready for firing), or the gun is faulty.
ACTION: Unplug the CTK pushbutton cable and reset the timer. If the problem is the CTK pushbutton sticking, make sure there is no grit or dirt causing it to stick.
For cable-connected auto-start, if the gun is cocked, remove the plug from the GUN socket. If the problem still exists there must be a fault in the start circuit of the timer. Arrange with RP Developments to have the auto-start system repaired.

SYMPTOM: The Auto Start doesn't start the Timer when the starting gun is fired.
PROBABLE CAUSE: The auto-start radio transmitter has a flat battery or is faulty, or the trigger switch in the starting gun is faulty, or the radio receiver or the timer is faulty.
ACTION: Check the battery indicator on the radio transmitter unit. It must be green, If it is red the battery needs charging. If the transmitter seems OK, check the starting gun and the timer by plugging the gun into the GUN socket on the timer. Make sure the STARTING GUN function in the menu program is switched on. If the gun and timer are OK, there must be a fault in the radio system. Contact RP Developments for advice.

If the gun and timer are OK and you are using a cable auto-start system, check the plug and socket connections in the auto-start cable. Especially check the plug and socket joint halfway along the cable, i.e. at the 100m point.

If the auto start does not work with the gun directly connected to the GUN socket of the timer, try a spare Starting Gun (if available).

If the problem cannot be eliminated, use the manual CTK pushbutton to start the Timer. Contact RP Developments to arrange for repair.

SYMPTOM: No time is registered for a particular lane.
PROBABLE CAUSES: (i) The competitor finished in the wrong lane, i.e. no-one actually finished in the lane in question, or

(ii) The competitor ducked under the second lowest beam, in which case no stop signal is generated, or

(iii) There is a fault in the particular light beam unit or cable.

ACTION: Reset the timer and carry out a test start and stop of the lane in question. If the problem is still present you can determine whether it is in the light beam unit or the cable by swapping two of the units over and carrying out a test start and stop. If the problem is in the light beam unit, the fault will shift with the unit. If the problem is in the connecting cable, the fault will still be in the same position as before. If the cable is at fault, replace it with the spare cable (if one is available). If the light beam unit is at fault, either leave that lane clear of competitors for the remaining events or use the manual CTK pushbutton to time that lane.

SYMPTOM: The times and placings indicated on the digital display, or printed out, appear to be inconsistent with the observed results.
PROBABLE CAUSE: One or more of the cable plugs on the side panel of the Timer are in the wrong positions or one or more of the Light Beam Detector Boxes are either upside down or have been mounted on the wrong side of the frame.
ACTION: Check all the plugs and Detector Boxes. If necessary, refer to STEPS 6 and 7 of the ASSEMBLY INSTRUCTIONS.

SYMPTOM: The race results will not print after an event is finished.
PROBABLE CAUSE: The IMMEDIATE RACE PRINT function is switched off.
ACTION: In the menu program switch on the IMMEDIATE RACE PRINT function.

APPENDIX A

INSTRUCTIONS FOR KC KEW MODEL ATP 301 TIMER

CONTENTS

KC KEW MODEL ATP 301 TIMER

The ATP 301 timer is a precision microprocessor-based timer specifically designed for athletics. When used in conjunction with the ARPEE Automatic Finish System it provides an affordable, accurate and efficient timing system for sprint and middle distance events run in lanes. When used as a manual timer for long distance events it offers a high degree of versatility and convenience for the user.

As well as printing the results, provision is made to immediately download data to a computer, and to store over 400 races in the timer memory for later download, if required.

FEATURES OF THE ATP 301 TIMER

TIMING TO ONE THOUSANDTH OF A SECOND- The timer will display and print measured times to one thousandth of a second, with selectable alternatives of times rounded up to either one hundredth of a second or one tenth of a second.

MULTIPLE TIMES FOR EACH LANE- The timer will record more than one time for each lane. With automatic timing using finish gates, this feature is useful for the odd occasion when a non-competitor may inadvertently pass through a gate whilst an event is in progress, or for the occasion when two competitors pass through the same gate after one has crossed lanes.

STORAGE OF RESULTS IN MEMORY- All race results are stored in memory within the timer and can be downloaded to a computer or reprinted at a later date, if necessary. Up to 400 normal race results can be stored in memory and later downloaded to a PC. The memory can be cleared at any time. Once the memory is full, any further results will overwrite the earliest records.

SIMPLE DOWNLOAD TO COMPUTER- Race results will immediately download to a PC via a separate serial port. Also, a user-accessible program facilitates the later downloading of data to a PC for inclusion in a spreadsheet or database.

SIMPLE TO SET UP AND OPERATE- When switched on, the timer automatically sets up ready for the start of an event. It requires the pressing of two buttons to register and print the results of a race and set up for the next race. Nothing could be simpler.

IMMEDIATE AVAILABILITY OF RACE RESULTS- With auto finish, all results are available immediately the last competitor has crossed the finish line. Results are printed within seconds of the race finishing.

RAPID THROUGHPUT SPEED- The fact that race results are immediately available means that the track can be kept clear of congestion at the finish area. In high pressure situations it is possible for the next race to be started within 15 seconds of a race finishing.

VERSATILE OPERATING MODES- The timer will operate in a number of different modes providing a high degree of flexibility for both automatic and manual timing. These are detailed in DESCRIPTION OF THE ATP 301 TIMER.

COMPLETE PORTABILITY- The timer and the ARPEE auto-finish system are completely portable and will operate all day from an internal battery.

STOP-CIRCUIT INHIBIT CAPABILITY- This feature temporarily disables the timer stop-circuit inputs so that they will not respond to any stop signals. The inhibit control is released before the competitors reach the finish line. A typical application is where the circular track is less than 400 metres. In this case all 400 metre competitors start before the finish line and must pass through the finish gates after the start. Using the inhibit function prevents times being registered when they initially pass through the gates.

The inhibit function also has a condition called 'ON + GATES' in which the sensor units on the finish gates are disabled and will not beep when a beam is interrupted. This is important for shuttle relays where the first runner starts at the finish line and should not be subjected to beeping when getting set for the start.

AUTO SWITCH-OFF FUNCTION- this feature automatically switches off the timer after four hours of inactivity, in other words, if the timer is left on and packed away. This saves the battery being completely flattened.

DESCRIPTION OF THE ATP 301 TIMER

The timer is microprocessor-based with a very precise clock for accurate timing. It obtains power from an internal heavy-duty sealed lead-acid battery, which also powers the printer and the auto-finish gates. The system will operate for at least ten hours on a fully charged battery. The system can also be powered from a 240 volt AC supply, if available, or from an external 12 volt battery, in an emergency.

Most of the operational controls are located on the top panel of the timer and most of the cable connections are located on the side panel.

The timer is housed in an aluminium case, together with the thermal printer.

THE TIMER TOP PANEL

The top panel of the timer has seven function buttons and an LCD display screen. The aerial cable socket (labelled ANT) for the radio auto-start is also located at the rear of the top panel.

The function buttons are-
   POWER button- This switches on and off the power to the timer circuits, the printer and the auto-finish gates.
   A momentary press of the POWER button will switch the timer on, but to switch it off requires the button to be held down for three seconds as the timer counts down to zero. This is purely a precaution against accidental switch off.
   NOTE: If the battery voltage is below the safe operating level of 10.5 volts, the timer will not switch on, and a warning message momentarily appears on the screen.

RESET button- This resets the timer ready to time an event. During normal operation it is not necessary to press the RESET button as the timer automatically resets after the PRINT command has been executed.

The RESET button is used to abort unwanted timing data following a false start. It can also be used to exit from the MENU program.

After a false start, to stop the timer and abort the unwanted data, press the RESET button for about half a second. The timer gives three short beeps and the message "ABORT RACE? ENTER = YES" appears on the display screen for three seconds. If the ENTER button is pressed while the message is displayed, the data is aborted and the timer is returned to the reset (waiting) condition. The heat and race counters do not automatically increment.

If the ENTER button is not pressed, the reset command is cancelled and the timer continues to run.

When in the MENU program, a momentary press of the RESET button at any field (except CLOCK ADJUST) will store the displayed selection for that field and exit the program, returning the timer to the reset (waiting) condition.

MENU button- This provides access to the extensive menu program for setting up the characteristics of the timer. The button is only active when the timer is in the reset (waiting) condition. To gain access to the menu program, press the MENU button for a second or two, to exit press RESET. The first group of fields appears on the display screen and the cursor flashes at the first field. Details of the menu program are provided later in this section.

PRINT button- This facilitates the printing of a race result sheet and the resetting of the timer. If an event has just been completed and the timer is still running, momentarily pressing the PRINT button will cause the timer to give two short beeps and the message "STOP TIMING RACE AND SAVE IT? ENTER = YES." to appear on the display screen for three seconds. If the ENTER button is pressed while the message is displayed, the following events occur-

- The timer stops running, which means no further times for that event will be registered,
- The timer is reset to the waiting condition, ready for the next race,
- The current race results are displayed in the right hand panel of the display screen,
- The current race results are printed, provided the menu option IMMEDIATE RACE PRINT is ON, and
- The race results and the selected header information are stored in the timer memory, and are also immediately sent to the serial port, in case you have a PC attached.

If the ENTER button is not pressed while the print message is displayed, the print command is cancelled and the timer continues to run.

If the timer is in the running condition (timing an event) but no times have yet been registered for the event, if the PRINT button is momentarily pressed, the message "NO TIMES SAVED IN BUFFER. USE RESET TO STOP RACE" appears on the display screen, and the timer continues to run.

Reprinting the Previous Result- When the timer is in the reset (waiting) condition or in the running condition (timing an event), if the PRINT button is pressed for about three seconds (as opposed to a momentary press), the message "PRINTING SAVED RACE DATA. PRINTING…" appears on the display screen and the race results for the previous event (which are displayed in the right hand panel of the display screen) will be printed. This function does not interfere with the running of the timer.

UP/DOWN buttons- When the timer is in the reset (waiting) condition or in the running condition (timing an event), the UP/DOWN buttons can be used to scroll through the results of the previous event which are displayed in the right hand panel of the display screen. This does not interfere with the operation of the timer.
When the menu program is being accessed, the UP/DOWN buttons facilitate scrolling through the selections for each field of the program.

ENTER button- When the timer is in the reset (waiting) condition, the ENTER button is not active.
When the timer is in the running condition (timing an event), the ENTER button is used to execute the command initiated by the RESET button, namely, to abort the race and reset the timer. This would be required in the case of a false start. Refer to the RESET button for further detail.
Similarly, when the timer is in the running condition (timing an event), the ENTER button is used to execute the command initiated by the PRINT button, namely, to stop and reset the timer and print the results of the race. Refer to the PRINT button for further detail.
When the menu program is being accessed, the ENTER button facilitates the progression from field to field through the program. When pressed at the last field, the menu program is exited and the timer returns to the reset (waiting) condition.

LCD DISPLAY SCREEN
When the timer is in the reset (waiting) condition or in the running condition (timing an event), the display screen is divided into three panels.
When accessing the menu program the entire screen is used to display the various functions and selections. Refer to THE MENU PROGRAM later in this section for details.

RESET (WAITING) CONDITION DISPLAY SCREENS
With the timer in the reset (waiting) condition, the left hand panel displays the status details of the timer, including-
- The current time and date,
- The current condition, i.e. "waiting",
- The number of timer inputs Active/Disabled, if less than the maximum. See Menu Program for further detail,
- The Age Group to be printed in the header, if selected,
- The Event title to be printed in the header, if selected,
- The Heat Number to be printed in the header, if selected,
- The current Mode of operation (Lane, Multi, Single or Split),

- The currently active methods of starting (Radio, CTK button, Gun),
- Indication if the "Inhibit" function is switched on.

The narrow centre panel uses bar-indicators near the top to display the charge condition of the battery and the extent to which the data memory is filled. The remainder of the centre panel displays any timer input that is activated. This serves as an indication to the operator that something may be wrong. For instance, if a sensor unit on the finish gates has been knocked out of alignment, the numbers of the affected lanes will be displayed.

The right hand panel displays the results of the previous race with all the selected header information. The UP/DOWN buttons can be used to scroll through the data.
If there has been no race since the timer was switched on, the right hand panel displays the message "NO DATA TO DISPLAY".

RUNNING CONDITION (TIMING AN EVENT) DISPLAY SCREENS
In the running condition only the left hand panel is different to that for the reset (waiting) condition. The centre panel and the right hand panel are the same as their respective panels in the reset (waiting) condition, except that the data in the right hand panel is updated at the end of the current event when the print command is executed.

In the running condition (timing an event), the left hand panel displays the following-
- The current time and date,
- A running watch (in tenths of a second), initiated by the start signal,
- The means by which the start was initiated (Radio, CTK button or Gun),
- The status of the stop circuits, e.g. "locked" for a set period (usually a couple of seconds) after the start, or "inhibited" if the inhibit function is switched on,
- The elapsed time and the identification of each stop circuit as it is initially triggered. The data is displayed in chronological order down the screen. Note: Any repeat triggering of a stop circuit does not appear in this panel but is displayed in the right hand panel after the print function is executed.

THE TIMER SIDE PANEL
The various cable input/output sockets are located on the right hand side panel of the timer. A label for each socket appears on the right hand edge of the top panel directly above the respective socket.
The various cable inputs/outputs are-

    AUTO-FINISH INPUTS- The cables carrying the "stop" signals generated by the infra-red sensor units on the finish gates are connected to the timer stop circuits via a series of auto-finish sockets, located towards the top of the side panel.

The timer has capacity for 12 lanes of automatic timing and, although labels for 12 lanes appear on the top panel, the number of auto-finish sockets will correspond to the actual capacity of the timer (i.e. 8, 10 or 12).

The auto-finish sockets are colour coded in pairs and the corresponding plugs from the finish gates are similarly colour coded.

CTK PUSHBUTTON INPUT- The socket for the remote CTK (Chief Time Keeper) pushbutton is located at the same level as the auto-finish sockets, towards the rear of the timer.

The CTK pushbutton is used by the chief timekeeper to manually start the timer when auto-start is not being used. It can also be used to register additional manual times during automatic timing, e.g. a check time on first place.

The CTK pushbutton is also used for manual timing when the timer is in the SINGLE or SPLIT mode.

GUN INPUT- If an auto-start gun is connected by cable to the timer it plugs into the GUN input at the rear of the side panel.

CHG (Charger) INPUT- The battery charger for the timer connects to the CHG socket located at the front of the side panel. Also, the emergency External DC Supply clip lead plugs into the CHG socket.

SERIAL PORT- A 9-pin female serial port located towards the front of the side panel is used to transfer data to and from the timer.

INHIBIT INPUT- The gold plated socket near the centre of the side panel that accommodates the pushbutton (usually the CTK pushbutton) that actually disarms the inhibit function after it has been switched on in the menu program. Refer to FEATURES OF THE ATP 301 TIMER for further detail about the inhibit function.

PRINTER PORT- The printer port is not labelled but is located towards the rear of the side panel. The printer remains permanently connected to the port.

THE PRINTER

The printer is a thermal printer that draws its power from the timer battery. It is automatically switched on and off by the timer.

The printer takes standard 57 x 57 <u>thermal</u> cash register rolls. It does not need a ribbon.

The printed result sheet header information can be varied considerably depending on individual requirements. Header information can include as much as Time and Date, Age Group, Event Title, Race Number and Heat Number, or as little as just the Time and Date. Refer to 'MENU PROGRAM', later in this section, for details.

The results can be printed in Place order or Lane order, depending on the selected timer mode.

TIMER OPERATING MODES

The ATP 301 Timer has four modes of operation for different forms of timing. The required mode is selected from the MENU function "TIMING MODE".

It is critical that the timer be set in the correct mode for the particular timing task in hand.

When the timer is switched on and in the reset (waiting) condition, the current mode is displayed towards the bottom of the left hand panel of the display screen. The four modes are LANE, MULTI, SINGLE and SPLIT. Auto-start operates with all modes.

The required mode can be selected via the menu program.

LANE MODE is the normal mode for automatic timing with the finish gates. Race results are displayed and printed in finishing order with the corresponding lane number alongside each time.

Multiple times can be recorded for each lane, once for each time someone passes through the gate while the timer is running. Normally there would be only one time per lane but, accidents do happen, leading to multiple times. For instance, if a spectator inadvertently wanders through a gate while an event is in progress, or if a competitor crosses lanes and finishes through the same gate as another competitor. The timekeeper will have the times and can correct the result sheet.

MULTI MODE is intended for manual timing of sprint events using pushbuttons or a button bar where each timekeeper times a particular placed competitor. However, this mode can also be used for automatic timing with the finish gates, in which case the race results are displayed and printed in lane order (rather than finish order).

SINGLE MODE is for manually timing long distance events using the CTK pushbutton as a single button. Up to 100 competitors can be timed, and their results printed.

SPLIT MODE is for manually timing long distance events where boys and girls are running together. In this case the CTK pushbutton operates as a single button for timing up to 50 boys, and a second pushbutton plugged into the Lane 1-2 input socket (red colour coded) times up to the same number of girls. The race results are displayed and printed listing all the boys in finish order and then all the girls in finish order.

THE MENU PROGRAM

With the Timer switched on, and in the reset (waiting) condition, pressing the MENU button for a second or two provides access to a range of selectable functions for operational flexibility.

There are three screens of functions. Once the first screen is displayed, the MENU button can be used to progress to the second and third screens. Within each screen, the ENTER button is used to progress the cursor through the functions and the UP/DOWN buttons are used to change the selections within each function.

You cannot move the cursor back through the menu functions or screens. If you go past the function you want you must exit and enter the program again.

The MENU program is exited by pressing ENTER at the last field or by pressing RESET at any field. The Timer will automatically exit the MENU function if no activity occurs for one minute and return to the reset (waiting) condition.

After exiting, the selected value for each field will be applied to the operation of the timer until changed by entering the MENU program again. Note: Switching the Timer off and on will not change the selected values.

The values for most of the Menu Functions are either preset or are initially set by the user and usually require no further adjustment. But several functions such as the header information AGE, EVENT and HEAT will require regular adjustment during

operation of the timer, if you intend printing header information. Also, the TIMING MODE will have to be changed if you go from automatic to manual timing.

The various MENU FUNCTIONS are-

AGE - provides a complete range of age groups for displaying and/or printing as header information on the result sheet. If this function is not required there is a blank option that can be selected.

EVENT - provides a range of common track events for displaying and/or printing as header information on the result sheet. If this function is not required there is a blank option that can be selected.

HEAT/FINAL - displays the Heat, Quarter, Semi or Final number (up to 99) as header information on the display screen and the result sheet. This function can be switched off if not required. If switched on, the actual number can be edited. The heat counter increments automatically, except when the timer is RESET after a false start.

RACE - displays an overall event number for the program as header information on the display screen and the result sheet. The number increments automatically, but can be edited at any time. This function cannot be switched off, however if "TIME & DATE" is selected for the PRINTED HEADER TYPE function, the Race Number does not print.

TIMING MODE - selects the operating mode of the timer. It is critical that the correct mode be selected before operating the timing system.
The four modes are LANE, SPLIT, SINGLE and MULTI. They are discussed in detail earlier in this section.

TIMING RESOLUTION - provides the option of displaying and printing times in thousandths, hundredths or tenths of a second. In the case of hundredths and tenths of a second the times are automatically rounded up. Hundredths is the most common selection.

MAX LANES / GATES / INPUTS – provides the option of reducing the number of timer inputs from the maximum, where all lanes are not being used. It reduces the displayed and printed results, saving paper. Lanes may only be reduced from the maximum down, i.e. you cannot remove lanes 1 & 2 and leave from lane 3 upwards.

STARTING GUN - provides the option of switching on or off the "GUN" input socket on the side panel of the Timer. This input is used for a gun connected by cable to the timer and has nothing to do with the radio linked gun. If the STARTING GUN is OFF, the timer will ignore any input signal at the GUN socket. Unless a cable-connected gun is being used, this function should be off.

STARTING CTK - provides the option of switching on or off the manual start function provided by the CTK pushbutton. In the OFF condition the timer will

not start when the CTK button is pressed. This function is normally switched on.

RADIO START SYSTEM - provides for the selection of either of two radio start systems for those situations where two radio start systems are in operation. This function can also be switched off, in which case the timer will ignore start signals from both radio start systems. If only one radio start system is used, this function should be set at "UNIT 1".

TIMING INHIBIT INPUT - when switched to the 'ON' condition or the 'ON + GATES' condition, this function causes the timer to ignore all input signals to the "stop" circuits, until such time as it is disarmed by applying a momentary short circuit to the "INHIBIT" input socket on the side panel of the timer. The timer then functions as normal. The CTK pushbutton can be plugged into the Timing Inhibit Input and used to disarm the inhibit function.
When the timer is running with the inhibit function on, it gives a double beep every four seconds to warn the timekeeper not to forget to disarm the function before the finish of the event.
In the 'ON + GATES' condition, as well as the timer stop inputs being disabled, the voltage supply to the sensor units on the finish gates is also switched off. This stops the sensor units from beeping when an infra-red light beam is interrupted, which is important for shuttle relay events where the first competitor starts at the finish line and is likely to interrupt the beams when getting set for the start.
The inhibit function is further discussed under "FEATURES OF THE ATP 301 TIMER". It is important that the inhibit function only be switched on for specific requirements.

TIMING DISABLE PERIOD - provides a short 'lockout' period after the timer is started before the stop circuits become operative. Usually a delay of two or three seconds is applied.

TIME DISPLAY ROUNDING - is not a selectable function for athletics purposes. Where rounding is required, all times are automatically rounded up.

PRINTED HEADER TYPE - provides the options of printing header "SELECTIONS" including Age, Event, Heat Number and Race Number. Alternatively, a header "TEMPLATE" of blank lines can be printed for user entry of event details. If header information is not required, this function can be switched off by selecting "TIME & DATE", in which case only the time and date will print as a header on the result sheet.

DOUBLE SPACED PRINT - allows for double spacing when printing the race results. This is not normally required.

IMMEDIATE RACE PRINT – provides for immediate printing of race results, which is normal. However, for testing purposes, to conserve paper, the immediate print can be turned off so that when the PRINT command is executed after the finish of a race, the results do not print but they do appear

in the right hand panel of the display screen. Once there, they can be printed, if necessary, by pressing the PRINT button for about three seconds.

PRINTED COPIES - provides for up to four copies of the result sheet to be printed.

LINES BETWEEN PRINTS - provides for up to 10 lines of paper to be ejected at the end of a print. It also determines the separation between prints when printing multiple copies. The usual setting would be about 4 for conveniently tearing off the result sheet.

PRINTER OFF DELAY - provides for adjustment of the period it takes for the printer to automatically switch off if no action has occurred. It can be adjusted from 010 to 255 seconds. It is usually set at 10 seconds.

DUMP OUTPUT FORMAT - provides the option of downloading data from the timer memory "AS PRINTED" or in a "COMMA DELIMITED" format.

DUMPING BAUD RATE - allows the data transfer baud rate to be set at standard values between 1200 and 115200. It is normally set on 57600.

BUTTON TONES - provides for the audible button tones to be switched on or off. This option is mainly for testing purposes. It is strongly recommended that the tones be left on, as they serve as an effective alert call to the operator.

STARTUP SCREEN TIME - provides for adjustment of the period for which the initial system identification screen is displayed after switching on the timer. The period can be set between 00 and 10 seconds. The normal setting is 5 seconds.

STARTUP GRAPHIC TIME - provides for adjustment of the period for which the 'system owner' identification screen is displayed after switching on the timer. The period can be set between 00 and 10 seconds. The normal setting is 5 seconds.

BACKLIGHT ON TIME - provides for adjustment of the period after which the display screen backlighting automatically switches off if there has been no button action. It can be adjusted from 00 to 30 seconds. It is usually set at 20 seconds.

AUTO POWER OFF TIME – provides for adjustment of the time (in minutes) before the timer automatically switches off, if it is not being used. This function is designed to prevent the battery being flattened if the timer is not switched off after use. It is preset to 240 minutes (four hours).

CLOCK ADJUST - provides for the date and time of the timer clock to be set. When ON, access is given to the clock settings. After adjusting the clock settings you must exit using the ENTER button (and not the RESET button), otherwise the clock changes will not be saved.

POWERING THE TIMER

The internal heavy-duty battery, if properly charged, should have sufficient energy to complete any athletics program of up to ten hours. The battery charges overnight. The battery and battery charging are further discussed under MAINTENANCE FUNCTIONS.

POWERING FROM A 240 VOLT AC POWER SUPPLY- In situations where a 240 volt power outlet exists in the vicinity of the timer location, by connecting the heavy-duty charger (Projecta AC900) to the timer and plugging it into the power outlet, the timer can be operated indefinitely, irrespective of the battery condition.

FUSES- The timer has no external fuses. The internal circuits, the printer and the auto-finish gates are protected by internal fuse links that automatically reset after a fault has been removed.

EMERGENCY EXTERNAL BATTERY- It is most unlikely that the internal battery would fail so, provided reasonable care Is taken with battery charging, the internal battery should adequately meet all timing requirements. However, since emergencies can arise, a special clip lead has been supplied to enable an external 12 volt battery (such as a car battery) to be temporarily connected to the timer via the CHG (Charge) socket.
This action will not adversely affect the car battery.
The special clip lead has a 2 amp fuse and is protected against reverse polarity.

OPERATING THE ATP 301 TIMER
PREPARATION
If the timer is to be powered from the 240 volt supply, the charger should be connected and switched on.
Before commencing any timing it is essential to check that the timer is set up with the required characteristics. With the timer in the reset (waiting) condition, the display screen indicates the current settings of the critical characteristics.
The critical items are-

- Battery Condition- should be indicating full charge on the bar indicator, or close to it. If not, it should be monitored in case action is required,
- Clock Setting- should be correct date and time. If not, adjust it in the menu program. You have to use the ENTER key to exit after adjusting the clock,
- Timing Mode (Lane, Multi, Single or Split)- must suit the requirements of the race to be timed. Refer to details under the earlier section 'Description of ATP 301 Timer',
- Available Starting Methods (Radio, Cable-connected Gun or CTK button)- the required systems must be switched on in the menu program,
- Printout Format- as to whether Age, Event, Heat Number, etc. print as a header on the result sheet. Selections are made through the menu program,

- Timing Inhibit function- which blocks all stop signals, is a very handy feature in a few specific circumstances, but it should not be switched on unless specifically required. It is controlled through the menu program.

The final preparation when first setting up or when any change is made to the timing arrangement is to do a simulated race, testing the start system, the auto-finish system and the timer. This is quickly and easily done by starting the timer by the normal means, then walking a 'slalom' through each of the gates from Lane 1 upwards and finally printing the result to check the correct order of finish and the required header information.

TIMING AN AUTO-FINISH EVENT (USING THE AUTO-FINISH GATES)

The timer must be in LANE MODE or MULTI MODE for auto-finish timing.

The timer must be in the reset (waiting) condition before it can be started. It automatically resets after the results of an event have been initially printed. It can also be reset after a false start via the RESET button.

The timekeeper must indicate to the starter that the timer is reset so that the latter knows it is safe to start the next event.

If auto-start is being used, the timekeeper observes the auto-start of the timer and then waits for the last competitor to finish before printing the results.

If manual start is being used, the timekeeper has to watch for the gun-smoke and press the CTK pushbutton to start the timer. He/she then waits for the last competitor to finish before printing the results.

In all situations it is important for the timekeeper to closely observe the race for abnormalities, such as competitors running out of their lane, as this can require adjustment to the results. If two competitors finish through the same gate, both times will be recorded but the placings and lane numbers will have to be adjusted on the printout.

Under normal circumstances, where auto-start and auto-finish are being used, the PRINT and ENTER buttons are the only buttons the timekeeper has to use. Occasionally the RESET and ENTER buttons might be used to reset after a false start.

If selected header information (Age, Event, Heat) is being used on the result sheet, the timekeeper has to regularly use the MENU program to edit the values.

To assist the timekeeper and to clear the track of competitors after an event, at least one Finish Marshal is required. In some situations, this marshal also places a plastic lane-number disk in each lane before the start of an event for the respective competitor to pick up after crossing the finish line. These disks then identify (for the Recorders entering names against results) the lane in which each competitor finished.

MANUALLY TIMING A LONG DISTANCE EVENT

The timer must be in SINGLE MODE or SPLIT MODE for long distance timing. Split mode is only used where boys and girls are running in the same race.

The timer must be in the reset (waiting) condition before it can be started. It automatically resets after the results of an event have been initially printed. It can also be reset after a false start via the RESET button.

The timekeeper must indicate to the starter that the timer is reset so that the latter knows it is safe to start the next event.

If auto-start is being used, the timekeeper observes the auto-start of the timer and then, at the finish of the event, uses the CTK pushbutton to time each competitor crossing the finish line. After the last competitor has finished the results can be printed.

If boys and girls are running together (split mode) the second pushbutton must be plugged into the Lane 1-2 input socket (colour coded red). The CTK pushbutton is then used to time the boys and the second pushbutton is used for the girls.

If manual start is being used, the timekeeper has to watch for the gun-smoke and press the CTK pushbutton to start the timer. From then on, the procedure is the same as for auto-start.

In split mode, the printer prints out all the boys results followed by the girls results.

MAINTENANCE FUNCTIONS

The ATP 301 timer is a low maintenance device. The only regular maintenance requirement is battery charging, and that only applies if the system is normally operated from the internal battery and not from a 240 volt AC power supply.

The timer has an auto switch-off function that shuts down everything after four hours of inactivity. This helps protect the battery.

THE INTERNAL BATTERY AND BATTERY CHARGING

Regular battery charging should only be required if the timing system is normally operated from the internal battery. If the system is normally operated from a 240 volt AC power supply (using the charger), the battery should automatically be kept well charged.

The battery in the timer is a heavy-duty 12 volt, 7 amp-hour sealed lead-acid battery. The total drain on the battery averages about 0.7 amps, which theoretically means with a fully charged battery the system should operate for about 10 hours.

Sealed lead-acid batteries do not suffer from memory effect (as NiCad batteries do) so charging can take place at any stage. Also, the heavy-duty charger supplied (Projecta AC900, 12v, 900mA) will automatically switch to "trickle charge" mode once the battery is fully charged. This keeps the battery charge topped up without causing any damage. It means that the period for which the battery is left on charge is not critical, although at least eight hours will be required if it is fairly flat.

It is good practice to keep the battery well charged even if the timer is not going to be used for a while.

The condition of the battery is indicated on the display screen when the timer is on. A small battery charge bar-indicator appears in the top centre of the screen. It is completely black when the battery is fully charged and progressively becomes clear from the right hand end as the charge depletes. When the indicator is completely clear, the battery is in urgent need of charging and the reliability of continued operation would be in doubt. At that stage it would be wise to connect an external 12 volt battery, such as a car battery, using the special clip leads supplied. Fortunately, with the heavy-duty internal battery, this situation should never arise unless charging has been seriously neglected.

INSTRUCTIONS FOR BATTERY CHARGING

The battery, if it is in good condition, after charging should hold its charge for many days. Even so, charging is best carried out as close as practicable to when the timer is to be used. For example, it could be left on charge overnight the night before.

If the battery is fairly flat, charging could take up to eight hours.

STEP1. Switch off the timer and connect the small black plug at the end of the Projecta AC900 charger cable to the CHG socket on the timer side panel, near the front.

STEP 2. Plug the charger into a standard 240 volt AC power outlet and switch it on.
Observe that the left hand indicator on the charger is glowing red, indicating that the charger is on. The middle indicator on the charger should also be glowing yellow, indicating that the battery is charging.

STEP 3. When the battery is fully charged the right hand indicator on the charger will glow green. It is not necessary to immediately disconnect the charger as it will happily just keep the battery charge topped up until it is convenient for it to be disconnected.
When ready, switch off the charger and remove the small black plug from the CHG socket on the timer.

STEP 4. After five or ten minutes switch the timer on and check the battery charge bar-indicator in the top centre of the display screen. The indicator should be completely black, indicating a fully charged battery. In some cases the black bar might not extend all the way across to the right hand end of the indicator, but if it doesn't extend more than 80 percent of the way across, it may require further checking.

UTILITY PROGRAMS

DOWNLOADING DATA TO A PC AND CLEARING THE TIMER MEMORY
Background Information
After each race, when the PRINT function is executed, the current race results and any selected header information are automatically saved into the timer memory for later download to a PC. At the same time, the data is also automatically transferred to the serial port for immediate download to a PC, if connected. The following procedures are applicable to both functions.
The timer memory has capacity to store the results of at least 400 races, which should cater for any athletics program. The available memory space can be monitored by the status bar-graph on the timer display screen.
Should the memory fill up, any new data will overwrite the oldest data in the memory.

Functions of the Downloader Program
The downloader program is accessed by holding down the MENU button and switching the timer on. It allows you to recall all the data currently saved in the memory of the timer and to dump it to the serial port for downloading to a PC. The memory can also be cleared of data.
Since all the data in memory is dumped, if the program is used on a regular basis it is important to clear out the timer memory once the data has been downloaded.
The data in the timer memory can be dumped in two basic formats, 'AS PRINTED' and 'COMMA DELIMITED'.

None of the data can be changed from what was originally recorded but, with the 'AS PRINTED' format, some variation is available in terms of the quantity of header information included with the downloaded race results. This variation is determined by the PRINT HEADER TYPE function in the timer menu program, which is accessible from the downloader program.

The COMMA DELIMITED format is fixed and includes all header fields as well as race result data.

The formats are covered in more detail under FORMAT OPTIONS later in this section.

The data can be downloaded as many times as required in either format and with any of the possible variations.

Although, to maintain the integrity of the timer data, no provision is made within the downloader program to alter any of the results or the header values set at the time of the race, once the data is downloaded to the PC, normal editing functions would apply, and are totally outside the control of the downloader program.

Requirements for Downloading

You will need a straight through serial cable for connection between the serial port of your PC and the 9-pin female serial port on the timer.

You will also need a serial terminal program such as Windows 'Hyper Terminal'. Note: Hyper Terminal is accessed under 'Start / All Programs / Accessories / Communications / Hyper Terminal', but it is an optional Windows installation and may have to be added to your PC by 'add/remove programs'.

If the data is to be transferred into a spreadsheet or database, it is assumed that whoever set it up will be able to extract whatever data is required from the download.

Format Options

The timer menu program is available to set the format of the downloaded data. It can also be used to vary the amount of header information downloaded in the 'AS PRINTED' format

The key menu functions are the 'DUMP OUTPUT FORMAT', which determines the basic format of the download (either 'AS PRINTED' or 'COMMA DELIMITED') and the 'DUMPING BAUD RATE', which sets the rate at which the data is downloaded.

'AS PRINTED' Format:

This output format allows you to dump the data in the same format as the result display in the right hand panel of the display screen, and as printed after the race. All the header information as it appeared for the race is available for dumping, whether it was originally printed out or not.

None of the header information can be altered, but the amount of header detail dumped can be varied using the PRINTED HEADER TYPE function in the menu program, in the same way that it is used for printing.

Example of 'AS PRINTED' format with PRINTED HEADER TYPE set at 'SELECTIONS':

> The example is for a 12-lane event with three additional times (lanes 2, 3 and 6). There was a dead heat for tenth place between lanes 8 and 9. The event was Race No.1. The timer was in LANE mode. It was run at 10.22am on 7/10. The distance was 60 metres run by Under 6 girls (or perhaps super-girls

judging from the times, but it is only an example). It was Heat No.1. The Chief Timekeeper (CTK) recorded a manual time of 8.29 secs. Lane 3 was first in a time of 5.34 secs. and so forth. Lanes 8 and 9 dead heated for 10th place. The three additional times may have been spectators, excited by such a superb performance, running through the gates after the competitors, before the timekeeper stopped the timer by executing the PRINT command.

```
        1    LANE
Run  10:22 07/10
U6G      60M     H 1
      00:08.29 CTK
01)  00:05.34 L03
02)  00:06.02 L02
03)  00:06.76 L06
04)  00:07.84 L01
05)  00:08.78 L04
06)  00:10.28 L05
07)  00:12.14 L12
08)  00:13.12 L11
09)  00:13.13 L10
10)  00:13.96 L08
  =  00:13.96 L09
12)  00:14.70 L07
  *  00:15.93 L03
  *  00:16.17 L02
  *  00:17.74 L06
```

Note: '=' is the dead heat character. '*' indicates an additional time for that lane.

'COMMA DELIMITED' format:

This format dumps all the results and the header information for each race in a set comma delimited format for easier importing to data bases and spread sheets. The header information is fixed and no options are available from the menu program.

All the data for each race is contained in a single line terminated with an end of line sequence. All fields are separated by a comma ','. Empty fields contain no data, e.g. ',,'.

The set order of fields is-

- time of event,
- date,
- race number,
- timer mode,
- age,
- event,
- heat (or final),
- heat number,
- timing data starting with the CTK time followed by the rest in finish order.

The timing data gives-

- place number (00 for CTK time). Additional times have '*' as place number,
- time in minutes, seconds and fractions of a second format, i.e. 'MM:SS.F', 'MM:SS.FF', 'MM:SS.FFF' depending on the selected timing resolution for the race,
- lane number (prefixed L for LANE mode and B for MULTI mode), etc, and
- end of line sequence, after the last result.

The dead heat check character is not shown in comma delimited format due to the fixed output format.

Here is the same example as above in COMMA DELIMITED format:

```
10:22,07/10/05,1,LANE,U6G,60M,H,1,00,00:08.29,CTK,1,00:05.34,L03,2,00:06.02
,L02,3,00:06.76,L06,4,00:07.84,L01,5,00:08.78,L04,6,00:10.28,L05,7,00:12.14
,L12,8,00:13.12,L11,9,00:13.13,L10,10,00:13.96,L08,11,00:13.96,L09,12,00:14
.70,L07,*,00:15.93,L03,*,00:16.17,L02,*,00:17.74,L06,
```

Using the Downloader Program

To start the downloader program- With the timer OFF, hold down the MENU button and press the POWER button. Keep the MENU button pressed until the downloader main menu appears.

The options in the main menu are-

> RESET button- Used to erase all data in memory. During a download if you press it for about two seconds you can abort the download process.

> PRINT button- Starts the dump with the presently selected settings if you confirm the message box. A count of races dumped will be shown on the screen during the process.

> POWER button- Used to exit the downloader program and switch the timer off. The normal 3-second power down sequence applies.

> MENU button- Gives access to the timer menu program for setting the parameters of the download. Most of the functions in the menu program will not be required for the downloader program. The applicable functions are all located on the second of the three menu screens, they are-
> > PRINTED HEADER TYPE
> > DUMP OUTPUT FORMAT
> > DUMPING BAUD RATE

These three functions have been referred to earlier in this section.

Procedure for Downloading:

Step 1. Connect the serial cable between your PC and the ATP301 timer.

Step 2. Set up your serial terminal program on your PC at the same baud rate as set in the menu program on the timer. If you are using Windows Hyper Terminal, on the first occasion you will have to set up and save a new connection. You can call it 'Timer Downloader' or any other name that takes your fancy. Select an icon if you wish. Select your Coms Port. In the 'Port Settings' window select-

Bits per second	57600
Data bits	8
Parity	None
Stop bits	1
Flow Control	None

When the Hyper Terminal window appears, select 'Transfer' and 'Capture Text'. The 'Capture Text' window appears. Nominate, or use 'Browse' to locate, the file location to which the data will be downloaded. Click the Start box.

Step 3. Switch on the timer downloader program by holding down the MENU button and pressing the POWER button. Keep holding down the MENU button for a few seconds until the Downloader Main Menu appears.
Step 4. Press the MENU button for a second or two and enter the timer menu program to set up or check the parameters of the download. Press RESET to exit the menu program. Note: Details of the menu program can be found in the section 'MENU PROGRAM' elsewhere in this manual.
Step 5. Start the download by pressing the PRINT button followed by the ENTER button.
Step 6. Check that the data has downloaded to the PC. It is advisable to back it up.
Step 7. Once satisfied that the data has transferred OK to the PC, clear the timer memory by pressing the RESET button followed by the ENTER button.
Step 8. Switch off the timer.
Step 9. Exit the Hyper Terminal program on the PC.

UPGRADING THE TIMER SOFTWARE
Functions of the Upgrade Program
The upgrade program facilitates the replacement of the software program that operates the timer. This may be required from time to time to-

- correct the occasional "bug" found in the software. Being a new program, despite exhaustive testing, it is possible for some time that bugs might show up. They may not always be obvious in normal operation but still need to be fixed,
- add general enhancements to the program. It is intended that the functionality of the timer will be improved on an ongoing basis, providing additional or improved features to users, and
- add specific enhancements or expansions to the timer. In time, there may be a number of "optional" enhancements available to users.

How the Upgrade is Facilitated
The ATP 301 Timer program is approximately 130 kilobytes. When an upgrade is required, the modified program is emailed to you. You save it into your PC and then transfer it to the timer via the serial port, using the Windows Hyper Terminal program, or equivalent.
Each ATP 301 timer has a unique serial number that identifies it for a software upgrade. The upgrade program for one timer will not load into any other timer.
The default settings and the data stored in the timer memory are not affected by the upgrade.

Requirements for Upgrading the Software
You will need a straight through serial cable for connection between the serial port of your PC and the 9-pin female serial port on the timer.
You will also need a serial terminal program such as Windows 'Hyper Terminal'. Hyper Terminal is accessed under 'Start/All Programs/Accessories/Communication/ Hyper Terminal', but it is an optional Windows installation and may have to be added to your PC by 'add/remove' programs.

Procedure for Upgrading the Software

Step 1. Download the upgrade file from your email and store it on the hard drive of your PC.

Step 2. Connect the serial cable between the serial port of your PC and that on the side panel of the timer.

Step 3. Access Windows Hyper Terminal. The first time you come to do a software upgrade you will have to set up and save a new connection in Hyper Terminal. You can call it 'Timer Upgrade' or any other name that takes your fancy. Select an icon if you wish. Select your Coms Port. In the 'Port Settings' window select-

Bits per second	57600
Data bits	8
Parity	None
Stop bits	1
Flow Control	None

When the Hyper Terminal window appears, select 'Transfer' and 'Send File'. The 'Send File' window appears. Use 'Browse' to locate the upgrade file and select it. Nominate 'Xmodem' for the Protocol. Do not click the 'Send' box until the timer has been set up to receive the file.

Step 4. Access the timer upgrade program as follows: With the timer off, hold down both the 'UP' and 'DOWN' buttons and then press the 'POWER' button. The timer display screen will start to flash on and off.

In the Hyper Terminal window on your PC, a series of 'S's should begin to appear.

Step 5. In the 'Send File' window on your PC, click the 'Send' box to start the transfer.

When the transfer is complete, the timer will automatically switch to the Reset (Waiting) condition.

Step 6. Exit the Hyper Terminal program on your PC and disconnect the serial cable.

APPENDIX B

INSTRUCTIONS FOR THE OPERATION OF THE ARPEE AUTO-START SYSTEM WITH RADIO LINK

DESCRIPTION

The system uses a UHF coded radio signal transmitted when the starting gun is fired to initiate the starting of the electronic timer. A receiver installed in the timer decodes the radio signal and produces an output to start the timer.

The starting gun is the same modified gun used for cable-connected auto-start. It plugs into a small battery-powered transmitter mounted on the starting stand or on a tripod in the vicinity of the starter.

The radio auto start can be isolated by switching it off in the timer menu program (refer to the previous Appendix A).

Where two radio auto-start systems are supplied for operation in the same vicinity, they are designated Unit 1 and Unit 2, and have different codes to avoid any mutual interference. The timer can be switched to either unit.

The timer also has a GUN input for the connection of a cable-connected gun. This input is not required for the radio start.

TRANSMITTER

The transmitter can be secured to the starting stand or, if there is no stand, to the tripod mounting-pad using the screw attached to the pad. The tripod screw fits into the threaded hole in the bottom of the transmitter unit.

The aerial fits onto the mounting socket on the top of the transmitter case. The base of the aerial should be gripped firmly when fitting or removing it.

The starting gun plug fits into the socket on the side of the transmitter.

If the tripod is used, the legs should be extended to full height unless strong winds prevail, in which case it might be more stable if it is lower to the ground.

On the underside of the transmitter unit is a red power switch, which turns "ON" when the top (with the white dot) is pressed.

On the front panel of the transmitter is a small indicator lamp. When the transmitter is switched ON, the lamp glows green when the battery is near full capacity and changes colour to red as the battery becomes flat. If the indicator glows red, the unit will still operate for a while but the battery should be re-charged as soon as possible.

A special 7.2v NiCad charger is supplied to charge the transmitter battery. The charging socket is located on the underside of the transmitter. A flat battery should re-charge in about 14 hours. The transmitter must be switched OFF when charging. Experience will determine, but at least two half-day programs should be achieved from a fully charged battery.

Adjacent to the battery indicator lamp on the front panel of the transmitter is a larger indicator lamp that flashes bright white when the transmitter sends the radio signal. If the front panel of the transmitter is pointed towards the finish line, it is possible for the check timekeeper (if one is used) to observe the flash, which reinforces observance of the smoke from the gun.

RECEIVER

The radio receiver is located under the timer panel and is powered by the main timer battery when the timer is switched on. The aerial screws onto the mounting bracket

fitted to the top left side of the timer case lid. The aerial cable plugs into a socket in the back centre of the timer panel.

RADIO INTERFERENCE OR MALFUNCTION
The radio auto-start system, with its coded signal, has been designed to avoid interference from other radio sources. However, the strong signal generated by some hand-held transceivers could swamp the auto-start signal if the hand-held transceiver was actually transmitting in the vicinity of the timer when a start signal came through. This could prevent the timer from starting when the gun is fired. It is suggested that the timekeeper avoids transmitting from his/her transceiver when a race is about to start.

If it is suspected that the radio auto-start system is not functioning properly, the plug in the GUN socket can be removed and a cable auto start system connected, if available.

OPERATING THE STARTING SYSTEM
STARTER
The transmitter must be located within five metres of the starting position so that the cable to the gun is not strained. There should be reasonable line of sight between the transmitter and the receiver in the timer. Avoid locating the transmitter behind metal screens.

When arriving at a new starting position, always carry out a test before starting the first event. This must be done in conjunction with the timekeeper and can be done without a cap in the gun.

There is no need to re-cock the hammer of the gun immediately after each event (as occurs with a cable connected gun).

TIMEKEEPER
Make sure the aerial is connected to the socket on the timer case lid. Also make sure the aerial lead is plugged into the 'ANT' (antenna) socket at the rear of the timer top panel.

If you are using a model ATP 201 timer, check that the radio auto start plug is connected to the GUN input.

If you are using a model ATP 301 timer, check that the radio auto start is switched on by observing the term RAD in the bottom left corner of the reset (waiting) screen. If not, then go into the menu program and switch it on. Refer to the previous Appendix A.

APPENDIX C

INSTALLATION INSTRUCTIONS FOR THE SAFETY COVERS FOR QUAD-BEAM SENSOR UNITS AND REFLECTORS

The purpose of the covers is to minimize the risk of injury to any competitor who accidentally knocks the equipment, and to provide a degree of weather-proofing in the event of torrential rain. Photograph 1 shows the arrangement.

INSTALLATION OF THE SENSOR UNIT COVER

The sensor unit cover is installed and removed each time the equipment is used. It must be installed after the sensor unit has been mounted on the upright but before the cable plug is connected and before the sensor unit is aligned.

The cover (Photograph 3) fits around the sensor unit and the steel upright and is secured by a zipper behind the upright.

To avoid difficulty in getting the zipper started, make sure the zipper pull mechanism is completely at the top of the zipper and that the free side of the zipper is fully engaged in the pull mechanism until the ends of the two sides are perfectly in line at the top (See Photograph 4). To make it easier to engage the two sides of the zipper, it is suggested that the top of the cover initially be located around the upright about 5cm (2 inches) above the sensor unit. The zipper can then be partially done up (for a distance of about 10cm) and the cover gently eased down until the top is in contact with the sensor unit. The zipper can then be completely done up.

Gently manipulate the cover to ensure that the holes in the sides line up with the individual sensors. The cable plug can then be connected through the hole in the rear of the cover.

INSTALLATION OF THE REFLECTOR COVER

The reflector cover (Photograph 2) is a strip of rubber material that is attached to the reflector frame by means of three Velcro pads. This allows removal of the cover from the reflector frame for storage (if preferred).

If the cover has not previously been attached to the reflector, the first job is to adhere the base part of each Velcro pad to the reflector frame. The adhesive is already coated on the pad and is exposed by peeling off the plastic film. Leave the base part of the Velcro pad attached to the cover. Start with the Velcro pad that is very near the end of the cover. This goes on the top of the reflector frame. Peel the plastic film off the pad, without separating the two parts of the pad. Position the end of the cover over the top of the reflector so that it evenly overlaps each side and then firmly press it onto the reflector top. Repeat the process for the other two Velcro pads, one of which will end up roughly halfway down the front of the reflector frame and the other near the bottom of the of the frame. Keep the cover slightly stretched when fitting the second and third pads so that it is not too floppy when attached.

Once adhered to the frame the two parts of the pads will separate when the cover is pulled away from the frame.

INSTALLATION OF THE RUBBER SLEEVING FOR THE FINISH GATE FRAME

If supplied, the 2 metre lengths of sleeving are for the braces. If the braces have a screw and wing nut you will have to feed the sleeving on from the other end. It is suggested that you stick a bit of masking tape (or similar) around the end to cover the spike while the sleeve is being fitted. A roll of yellow tape (supplied) can be used to apply some bands to improve visibility and safety. See Photograph 1.

The short lengths of rubber sleeving are for the bottom section of the uprights. Where a removable upright is being used you will have to cut a slit in the sleeve to allow the bolt and wing nut to be fitted.

STORAGE OF THE SAFETY COVERS

The covers can be stored on the sensors and reflectors if required, however, if they are wet then they should be removed and allowed to dry separately.