

THE RELIABLE RACING SUPPLY

MODEL 2s AUTOMATIC TIMER

OWNER'S MANUAL

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1.0 GENERAL

Congratulations on your choice of the RRS Model IIs Timer. Your timer was designed with two benefits in mind for you:

1. HIGH PRODUCTIVITY
2. EXTREME EASE OF OPERATION

The IIs timer is a computerized device which allows almost hands-free operation during the event. The timer can interface with a personal computer for race-data management. The user can enjoy the benefits of an inexpensive, easy to use device, that can perform timing jobs at any level of simplicity or sophistication according to the user's needs.

SOME OF THE UNIQUE FEATURES OF THE IIS TIMER:

- Automatic arming and disarming of start and finish inputs reduces the chance of human error during the event.
- Built in printer output connector.
- The selectibility of race parameters such as type of race, automatic finish gate disarm, automatic finish time display periods.
- Interfacibility with any PC via the standard RS232 communications protocol. Check with RRS for currently available software.
- 12 VDC operation allows operation at any location.

RRS offers a full compliment of accessories, including mechanical or infrared start and finish gates, Spectator displays, Radio systems for remote signalling, and phone communication sets.

2.0 PRELIMINARIES

2.1 UN-PACKING

Remove your timer from the packaging material and inspect it for damage or deformaties. If there are any problems, call RRS to make arrangements for an exchange. Be sure to document which shipping company delivered the unit and exactly when it was delivered.

2.2 FRONT PANEL FEATURES

1. LIQUID CRYSTAL DISPLAY shows times accurate to 1/1000 of a second. Also used to show lane status (number of racers on course) in DUAL and TANDEM modes.
2. LANE INDICATORS show which lane the current information on the LCD pertains to: RED (A) or BLUE (B).
3. CIRCUIT TEST SWITCHES allow operator to manually input starts and finishes.
4. RACE MODE DIAL. Select type of race (DUAL DIFFERENTIAL, TANDEM, or DUAL) before turning power on.
5. DISPLAY SELECT DIAL. Use during race to show time-of-day or running time-of-race. Select "A" for single Giant Display output, or "B" for two Giant Display output (dedicated Red and Blue).
6. DISPLAY DURATION DIAL. Display finish time information for 4, 7, or 10 seconds on LCD and GIANT DISPLAY. Select before turning power on.
7. AUTOMATIC FINISH DISARM DIAL. Timer automatically disarms finish gates for pre-selected period from when racer starts. Reduces possibility of false finish due to untimely crossing of finish line by spectator or fallen racer. Set before turning power on.
8. MANUAL FINISH DISARM SWITCH is used to block out unwanted finishes occurring beyond the automatic finish disarm period.
9. RESET BUTTONS. In TANDEM and DUAL modes, RESET B is used to abort the running time of the racer(s) closest to the finish line, and RESET A is used to reset the clock(s) in the event of a false start.

2.3 REAR PANEL FEATURES

1. POWER ON/OFF SWITCH.
2. DC INPUT JACK. 5mm OD x 2.1mm ID. Tip = +12, ring = ground.
3. INPUT BANANA JACKS allow outside world connection of START, FINISH, RESET inputs, and output signal loop for GIANT DISPLAY.
4. RS-232 CONNECTOR. Tip = transmit, ring = ground.
5. PRINTER CONNECTOR. DB25S standard parallel port.

2.4 SETTING UP

It is best to set up and operate your timer indoors whenever possible. If the timer is to be used outdoors, make every effort to keep moisture away from the unit. In temperatures below 10 degrees fahrenheit, you will notice some sluggishness in the LCD. Although most of the internal componentry is rated for wide temperature use, try to avoid extremely cold or hot environments.

Your timer is designed for desk or table top use. The slope-front chassis will provide easy viewing of the LCD. Make sure your connections to the "outside world" (ie. comm. cabling, power supplies, displays, etc.) are secure, and arrange the wires so that they won't be tripped over or pulled. To avoid fatigue on connectors and accidental disconnection, keep all cabling somewhat loose, never taught.

ALWAYS REMEMBER THAT YOUR TIMER IS AN INSTRUMENT, AND SHOULD BE HANDLED WITH UTMOST CARE! When the timer is not in use, store in a dust-free, warm and dry place.

2.4.1 SELECTION OF CABLING

Often times, long transmission of signals and data are required via communication cable. In skiing applications this is especially true. Solid or stranded wires, ranging between 18 and 22 gauge are recommended. Try to avoid MULTI-PAIRED cabling since it is difficult to match up conductors between both ends. MULTICONDUCTOR cable is recommended because each conductor has a non-duplicated color for easy identification at both ends of the cable. An overall aluminum shield is recommended for long distance communication of data, but not required for sending start, finish, or reset signals.

It is recommended that long lengths of communication cable be terminated at both ends using a junction box or barrier strip.

For most applications, 6 or 8 conductor cable is appropriate.

2.4.2 POWER SOURCE

Your timer comes equipped with a device called a POWER SUPPLY that converts 115 VOLTS AC into 12 VOLTS DC.

ONLY 12 VOLTS DC IS TO BE APPLIED TO THE TIMER.
APPLYING 115 VAC DIRECTLY TO THE TIMER WILL RESULT IN SERIOUS DAMAGE.

If commercial power (115 VAC) is not available at the race site, then ANY 12 VOLT BATTERY can be used. We recommend a car or snowmobile battery. Make sure you respect polarity when connecting to the timer! RRS offers a portable 12-volt 6 amp/hour rechargeable battery as well (call for details).

2.4.3 INPUT CONNECTIONS

The IIs timer accepts banana plug connections to the outside. Provided are banana plugs which you attach to the communication cable or finish line cables. Each input has a black binding post associated with it called COMMON.

All inputs to the timer work on a NORMALLY OPEN SWITCH. For example, the red jack labelled START A and the black COMMON binding post directly below it represents an open circuit. When the circuit is closed, a start occurs.

Although there are several COMMON connections on the back of the timer, only one COMMON CONDUCTOR is required in your communication cable, and can service any combination of start inputs. With your communication cable properly terminated, the common line can be fanned out to all the required input posts or switches.

It is recommended that you use the BANANA PLUGS provided to terminate each conductor to be plugged into the jacks. Each banana plug can be labeled as to its function (ie. START A) for easy reference in the future.

2.4.5 GIANT DISPLAY CONNECTION

Included in the banana jack array mentioned in section 2.4.3 are two binding posts, a black one labeled COMMON and a yellow one labelled DISPLAY. A cable assembly is included with the GIANT DISPLAY (optional), one end of which has BLACK and a YELLOW banana plugs pre-wired. Simply insert the yellow plug to the yellow jack, and black plug to the black jack.

2.4.6 RS-232 CONNECTION

Since the IIs timer does not receive information, a two-way jack is provided with transmit and ground. You can purchase a custom-made RS232 cable from RRS which will have the appropriate plug for your PC. The IIs timer transmits serial data under the following parameters:

2400, 8, N, 1 (2400 baud, 8-bit, no parity, 1 stop)

3.0 FUNCTIONS

The MODEL IIs TIMER, unlike many other timers, has specific timing functions controlled by computer software written expressly for the purpose of simplifying the task of race timing. Many operator motions, like arming and disarming of inputs, resetting clocks for new competitors, and searching for finish information on the display, are handled automatically by the timer's computer. The operator is called upon to manipulate the timer only when an "abort" is necessary. For example, during the course of a ski race, when a racer starts and finishes per normal (without incident), the operator does not have to remember to arm a start gate and a finish gate, and remember to reset the clock for the next competitor. Only in the event of a racer not finishing or a false start does the operator have to touch something on the console. Thus the possibility of human error is minimized.

The explanation of the timing modes in this section, along with the flow charts in the next section, will demonstrate that race timing with the IIs timer is a very simple task. It is recommended that you familiarize yourself with each timing mode using the flow charts in the next section and the CIRCUIT TEST buttons located on the front panel, before running an actual race.

3.1 WHAT TO DO BEFORE TURNING POWER ON

Before turning the power on to run a race, you must make selections using the following dials:

RACE MODE: Select either DUAL DIFFERENTIAL, TANDEM, or DUAL race.

DISPLAY DURATION: Select how long you want finish time information to appear on the display, either 1, 10, or 15 seconds.

FINISH DISARM: This dial selects the amount of time beyond when the racer starts that the finish line will be automatically "turned off."

Determine a value that is around 5 seconds less than what the fastest times will be on the course. For instance, if a "pacesetter" can ski the course in 30 seconds, then the FINISH DISARM setting should be 25.

DISPLAY SELECT: Select SET/TIME-OF-DAY before power-up if you want starts and finishes to be referenced to the time-of-day on a printer. Select position A to start the time-of-race from zero when the first racer starts. For those using two external displays (red and blue course displays), set this dial to position B before power up.

3.2 SET/TIME-OF-DAY

This feature is useful only for the TANDEM mode, so that start and finish impulses can be referenced to the current time-of-day for verification purposes.

TO SET THE CURRENT TIME OF DAY:

1. Make sure DISPLAY SELECT dial is in SET/TIME-OF-DAY position before turning power on.
2. After power-up, press the RESET B button to advance the minutes. Press the RESET A button to advance the hours.
3. Set a time which is one minute beyond your "master clock." When your "master clock" (your wristwatch, etc.) approaches your preset time, turn the DISPLAY SELECT dial to A. Doing so will start the internal time-of-day clock.

You may look at the time of day any time by turning the DISPLAY SELECT dial to TIME-OF-DAY.

If you decide not to set the time-of-day, set the DISPLAY SELECT dial to A before power-up. A time-of-race clock will start when the first start is actuated.

3.3 RACE MODES

3.3.1 TANDEM MODE

This mode is designed to allow up to 4 racers on a single lane or course at any one time. The start input is always ready to accept a new racer on course (up to 4). The left-most digit on the LCD shows the number of racers currently on course. The finish input is armed and disarmed automatically according to the AUTOMATIC FINISH DISARM dial (see section 3.2). Finish times are displayed on the LCD for the duration preset by the DISPLAY DURATION DIAL (section 3.2), after which it automatically resumes information on the next racer. All events (ie. starts, finishes, and resets) are given by the printer as they happen. If you set the TIME-OF-DAY clock before the race, all starts and finishes will be referenced in terms of time-of-day in addition to the actual elapsed time.

The START A input when actuated, starts an internal clock for a racer. The FINISH A input when actuated stops the OLDEST RUNNING clock. The FINISH B input when actuated will give a SPLIT time of the oldest running clock.

!!!!!

The term OLDEST RACER or CLOCK refers to the racer who has been on course the longest. The term YOUNGEST RACER or CLOCK refers to the racer who has just started or has been on course the least amount of time. In this mode, RESET B will RESET the running clock of the OLDEST RACER. Therefore it is to be used only in the event of the racer not finishing the course. RESET A will RESET the running clock of the YOUNGEST RACER, and is used to reset a running clock resulting from a false start.

A RACER WILL EITHER FINISH THE COURSE OR NOT. IT IS VITAL TO DEAL WITH THE OLDEST RACER FIRST BY EITHER LETTING HIM FINISH OR

!!!!!

RESETTING HIS CLOCK BEFORE ALLOWING THE NEXT OLDEST RACER TO FINISH OR BE RESET.

Each start, finish, and reset input has a 5 second "debounce" period attached to it. This is designed to eliminate false starts, finishes, or resets resulting from inefficiencies in switches and scanning devices, therefore protecting the integrity of each running time.

REFER TO SECTION 4 FOR MORE DETAILED OPERATION OF THE TANDEM MODE.

3.3.2 DUAL MODE

This mode is designed for any head-to-head competition using two courses side-by-side. Two sets of head-to-head (dual) races can be on course at any one time. Similar to the TANDEM mode, the start inputs are always armed and will allow up to 2 racers per course at any one time. The left-most digits on the LCD show the number of racers currently on the A (RED) and B (BLUE) course (left to right respectively). Finish gates are armed and disarmed automatically according to the AUTOMATIC FINISH DISARM dial. The LCD shows information pertaining to the OLDEST CLOCK, and automatically resumes information on the NEXT OLDEST CLOCK after a finish or reset.

All start, finish, and reset events are given by the printer as they occur.

The RESET buttons are used to wipe out the running times of a HEAT. A HEAT is one or two starts that occur within 5 seconds of each other on lanes A and B. If only one start is given on A or B, and 5 seconds elapses without a start being given on the other course, that single start is considered a heat. Additional starts become the next, or YOUNGEST HEAT.

!!!!! PRESS RESET B ONLY IF BOTH RACERS IN A HEAT WILL NOT FINISH.

!!!!! IF ONE RACER WILL FINISH AND THE OTHER WON'T, WAIT UNTIL THE RACER THAT WILL FINISH DOES SO BEFORE PRESSING RESET B.

!!!!! USE RESET A ONLY WHEN ONE OR BOTH RACERS IN A HEAT FALSE START, AND ONLY IF BOTH RACERS WILL BE RE-STARTING.

REFER TO SECTION 4 FOR MORE DETAILED OPERATION OF THE DUAL MODE.

3.3.3 DUAL DIFFERENTIAL MODE (SEE APPENDIX A)

3.3.4 DIAGNOSTIC MODE

This mode will allow the operator to quickly determine whether a problem exists in the timer. It can also be used to find line faults in the external wiring of inputs via communication cable. Access the DIAGNOSTIC MODE when:

-After power-up, you hear a continuous beep from the timer.

Use the diagnostics to determine where a continually closed input circuit may exist internal or external to the timer.

-After power-up, the LCD flashes HELP.

Use the diagnostics to determine which switch or dial is non-functional.

-Inputs (starts, finishes) don't act as expected from rear panel connections.

Use the diagnostics to determine proper wiring to back panel or at the other end of a communication cable.

TO ENTER THE DIAGNOSTIC MODE, press RESET B during power-up, keeping it pressed until the printer starts to print the following:

```
-. /0123456789:;<=>?@  
ABCDEFGHIJKLMNQRST  
UVWXYZ[*]^_'abcdefgh  
ijklmnopqrstuvwxyz{|
```

If the printer does not print the above, turn the power off and and retry making sure the printer on/off switch is turned ON.

If not using the printer, you may press RESET A to go into diagnostics, while skipping the printer test.

When the printer has completed the above test, the LCD will then perform two exercises. First it will show all 1's (11:11:11.11), then 2's (22:22:22.22), and so on through 9. The red lane indicator will turn on, then the blue one, then both. The LCD will then scroll a "1" across the display in the following way until the 1 reaches the left most digit:

```

0:00:0.001
0:00:0.010
0:00:0.100
etc.

```

At the completion of the above exercise, the LCD will assume an array of numbers. Each number shows the status of the switches, dials and inputs from the back panel. The code is given below:

```

X X : X X : X X . X X
---  ---  - -  - -
A    B    C D  E F

```

- A. FINISH DISARM DIAL. By rotating this dial to each setting, the value printed on the timer chassis should appear in these two digits, (either 00, 05, 10, 15, 20, 25, 30, 40, 50, or 60).
- B. DISPLAY DURATION DIAL. By rotating this dial to each setting, the value printed on the timer chassis should appear in these two digits, (either 04, 07, or 10).
- C. TIMING MODE DIAL. By rotating this dial to each setting, a number should appear for each mode, corresponding in this way:

```

1 = DUAL DIFFERENTIAL
2 = TANDEM
3 = DUAL

```

- D. DISPLAY SELECT DIAL. By rotating this dial to each setting, a number should appear and correspond in this way:

```

1 = SET/TIME-OF-DAY
2 = A
3 = B

```

- E. INPUT TEST. Pushing the circuit test and reset buttons on the front panel, or actuating these inputs via the connectors on the back panel either directly or through cabling will cause numbers to appear at this digit location, corresponding as follows:

```

0 = none active
1 = RESET B active
2 = RESET A active
3 = FINISH B active
4 = START B active
5 = FINISH A active
6 = START A active

```

If any number other than 0 is on continually, accompanied by a prolonged beep, and there are no connections made on the back panel of the timer, then contact RRS for guidance.

F. INTERNAL TIMING AND STROBE LINES. If this digit reads 0, then all internal timing and strobe lines are functional.

Most wiring problems will be revealed by performing this diagnostics test. If there are abnormal results that cannot be remedied by correcting external wiring, or other simple measures, then contact RRS for guidance.

4.0 RACE SIMULATION FLOW CHARTS

The following flow charts will help familiarize you with the operation of the various race modes. The operator is called upon to manipulate the CIRCUIT TEST buttons at times when the racer would perform that function himself by crossing a start or finish line. The flow charts are structured to show an "event", what to manipulate on the timer to make the event occur, and what to expect from the LCD and printer once the event has occurred:

4.1 TANDEM RACE (SINGLE COURSE, MORE THAN ONE RACER ON COURSE)

BEFORE POWER-UP:

- set RACE MODE dial on TANDEM.
- set DISPLAY SELECT dial on SET/TIME-OF-DAY.
- set FINISH DISARM dial on 15.
- set DISPLAY DURATION dial on 7.
- make sure printer on/off switch is ON.

TURN POWER ON. Printer will advance once. LCD will go to all 0's.

SET TIME-OF-DAY using RESET A and B buttons.

START TIME-OF-DAY CLOCK by turning DISPLAY SELECT dial to A.

Printer will give initializing message. LCD will go to 0's.

Position A on this dial puts you in AUTO DISPLAY mode. Leave there during race, (you may look at time-of-day at any time, however, by turning the dial to TIME-OF-DAY. After viewing time-of-day, turn back to A).

START FIRST RACER by pushing START A. You may test the 5 second de-bounce feature by pushing the start button a few times within 5 seconds of the first actuation. LCD will start to count up.

Printer will say:

START 001 XX:XX:XX.XXX (start time-of-day)

START 2ND RACER by pushing START A. Printer will say:

START 002 XX:XX:XX.XXX

3RD RACER FALSE STARTS (push START A). Printer will say:

START 003 XX:XX:XX.XXX

WIPE OUT FALSE START by pushing RESET A. Printer will say:

DNS 003

START 3RD RACER by pushing START A. Printer will say:

START 003 XX:XX:XX.XXX

SPLIT TIME FOR FIRST RACER (push FINISH B). LCD will show time for 7 seconds.

Printer will say: SPLIT 001 XX:XX:XX.XXX

FINISH FIRST RACER by pushing FINISH A beyond 15 second mark. LCD will show time for 7 seconds. Printer will say:

FIN 001 XX:XX:XX.XXX (finish time-of-day)
e XX.XXX (elapsed time)

START FOURTH RACER by pushing START A. Printer will say:

START 004 XX:XX:XX.XXX

2ND RACER WILL NOT FINISH. Push RESET B. LCD will resume running time of 3rd racer. Printer will say:

DNF 002

NOTE: The left-most digit on the LCD will show the number of racers currently on course. Be sure to notice this when performing the above exercise.

4.2 DUAL RACE (PARALLEL SLALOM, ELAPSED TIME ON BOTH COURSES)

BEFORE POWER-UP:

- set RACE MODE dial on DUAL.
- set DISPLAY SELECT dial on A.
- set FINISH DISARM dial on 10.
- set DISPLAY DURATION dial on 7.
- make sure printer on/off switch is ON.

TURN POWER ON. Printer will give initializing message, LCD will go to all 0's.

START FIRST HEAT by pushing START A then B within 5 seconds of each other.

LCD will show running time of red lane since he started first,
(RED LANE INDICATOR will be illuminated).

Printer will say: START RED 001
START BLU 001

START 2ND HEAT by pushing START B then A within 5 seconds of each other.

Printer will say: START BLU 002
START RED 002

FINISH FIRST HEAT by pushing FINISH B then FINISH A.
BLUE LANE INDICATOR will illuminate and blue time will show for 7 seconds.

RED LANE INDICATOR will then illuminate and the red time will show for 7 seconds, then resume running time of 2nd heat, blue course.

Printer will say: FIN BLU 002 XX:XX.XXX
FIN RED 002 XX:XX.XXX
DIF BLU XX.XXX THIRD HEAT OF 1 FALSE STARTS

(push START A). Printer says:

START RED 003
printer will advance after 5 seconds.

WIPE OUT FALSE START by pushing RESET A. Printer will say:

DNS RED 003

RE-START 3RD HEAT OF 1 by pushing START A. Printer will say:

START RED 003

BLUE RACER OF 2ND HEAT FINISHES (push FINISH B). BLUE LANE INDICATOR will illuminate, LCD will show finish time for 7 seconds, then resume running time of RED racer of same (2nd) heat.

Printer will say: FIN BLU 002 XX:XX.XXX

RED RACER OF 2ND HEAT FALLS. Push RESET B to wipe out running time. LCD will resume running time of RED racer of 3rd heat. Printer will say:

DNF RED 002

NOTE: Left-most two digits of LCD show number of racers currently on RED and BLUE courses (left to right respectively). Be sure to notice this when performing the above exercises.

4.3 DUAL DIFFERENTIAL (MARGIN OF VICTORY) SEE APPENDIX A

5.0 TECHNICAL

5.1 SPECIFICATIONS

Central Processing Unit	CMOS Z80 microprocessor
Memory	48K ROM, 16K RAM
Time Base	2.4767 mhz crystal, oscillator/divider
Accuracy	.001 second
Inputs	Normally open, opto-isolated
Outputs	Serial ASCII @ 2400 baud, opto-isolated 8 bit characters, no-parity.
Power Consumption	150 milliamps
Operating Voltage	12 to 16 volts DC
Dimensions	8" x 10" x 3" (L x W x H)
Weight	3 lbs.

5.2 SERVICE PROCEDURES

IF YOU HAVE A PROBLEM, FOLLOW THESE STEPS:

1. Call RRS and ask for the timing department. Explain the nature of the problem. The technician may recommend certain steps for you to try if the problem sounds obvious. Follow his recommendations and let him know your results. 2. If the problem cannot be solved over the phone, the technician will recommend you return the timer. Carefully package the unit and include a letter explaining the problem.

3. Send the timer POST PAID to: RELIABLE RACING SUPPLY
ATTN: TIMING DEPT.
643 UPPER GLEN ST.
QUEENSBURY, NY 12804

For even quicker turn-around time, use express shipping services. We recommend you insure the package.

WE THANK YOU FOR PURCHASING THE MODEL 2s TIMER, AND WISH YOU MANY
SUCCESSFUL RACES!

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