

SMARTDISPLAY PARALLEL-COURSE AUTOMATIC TIMING SYSTEM

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1.0 INTRODUCTION

Thank you for your selection of the SMARTDISPLAY Dual-tandem self timer system. Your system is backed by a one-year warranty on parts and workmanship. If, through normal use, you should experience any difficulty with your system, contact Reliable Racing Supply immediately to arrange for either replacement or repair of the component at fault.

The SMARTDISPLAY system is designed for automatic DUAL-ET racing, giving an instant score accurate to 1/100 of a second on its digital read-out for both "red" and "blue" course. All timing functions exist internal to the SMARTDISPLAY. Start, finish, and reset signals are managed by the display board.

"DUAL-ET" OPERATION allows you to start a pair (or "heat") of racers, and before they finish, start another pair.

The SMARTDISPLAY has two operating modes:

AUTO mode has a time-out feature which resets a running clock at 70 seconds if the racer has not finish by then. In other words, the racer(s) must finish within 70 seconds, or the display will automatically reset. This feature is designed to provide automatic resets in the event of a "fallen racer." Also, in AUTO-RESET MODE, an "automatic finish gate disarm" feature exists. Unwanted finish signals are automatically blocked for the first 15 SECONDS of each racer's run by the display's computer. This is designed to help eliminate the possibility of a previous fallen racer disturbing the present racer's time. This mode is recommended for shorter race courses where the fastest skiers will clock times beyond 15 seconds, and the slowest skiers well within 70 seconds.

In the MANUAL operation mode, the clock is allowed to count indefinitely. There is no automatic finish gate disarm. The system can be manually reset for DNF's by a push-button at the start. This mode is recommended for longer course conditions, or when the start operator wants greater control over the flow of racing.

The mode is selected by a 2-position toggle switch found on the display's connector plate. Set the switch position before turning the unit on. UP is for AUTO MODE, and DOWN is for MANUAL.

1.1 SITE SELECTION

When considering your race site for this system, keep in mind the importance of being able to see the entire course from the start. Since some systems have no method of indicating time at the start, or whether the skiers in front have actually finished, the operator or skier(s) will need to rely on sight to determine if it is safe to start the next racer(s).

Other factors to keep in mind are: good access from lifts, visibility from lifts and/or base lodge, moderate terrain (suitable for a broad range of skier abilities), and access to AC power at the finish (and start if using the Delux System with a display up top).

1.2 SYSTEM COMPONENTS

SMARTDISPLAY TIMER/DISPLAY BOARD
UPHILL JUNCTION BOX
DOWNHILL JUNCTION BOX
INFRARED FINISH GATE(S)
FINISH MOUNTING BRACKET(S)
STARTING GATE(S)
FINISH CABLE(S)
START CABLE(S)
AC CORD(S)
HAND-HELD RESET BUTTON

OPTIONAL: START DISPLAY MODULE

The system requires an 8-CONDUCTOR COMMUNICATION CABLE, which is customer supplied.

2.0 INSTALLATION OF SYSTEM COMPONENTS

Refer to the "System Layout" drawing for proper placement of the system components on the hill.

2.1 SMARTDISPLAY

The display unit should be located in close proximity beyond the finish line so that it is visible to the competitors once they have completed their runs and stopped. Place the unit on a shelf or platform and make sure it is well secured to avoid falling due to wind or collision, or hang the display using the eye bolts located on each end of the display.

If possible, we recommend you build a display enclosure with a Plexiglas front, to protect the unit from direct moisture. Organize a hinged door that can be padlocked at night, to protect the unit from vandalism. Put the hinge on the bottom of the door so that the door swings down to open. This way, you can attach a promotional banner or sign on the inside of the door.

It's a good idea to have the display(s) facing uphill beyond the finish line, so that the skiers will see them as they cross the finish line. They will be sure to see their times!

2.1.1 POWER CONNECTION

An AC cord is provided for connection to a standard household 120 VAC outlet. A 12 VDC battery may be connected to the jack labeled "+12 VDC" if AC is not available.

DO NOT CONNECT BOTH AC AND DC AT THE SAME TIME.

Make sure the AC source is well filtered and grounded.

2.1.2 CONNECTION TO DOWNHILL JUNCTION BOX

The display interfaces with the rest of the system through the 9-pin connector located on the right-side of the display. This connector mates with the pig-tail leading from the Downhill Jct. Box. Secure the connection using the hand screws on the male end coming from the junction box. Make sure there is no tension on the cable. Use some form of strain-relief on the cable to avoid accidental removal.

HAVE A QUALIFIED ELECTRICIAN PERFORM PROPER INSTALLATION OF ALL CABLING AND CONNECTIONS.

Perform all wiring (as below) before first turning display on.

2.2 JUNCTION BOXES. Refer to drawings illustrating spatial arrangements of start & finish areas.

The junction boxes serve two purposes: 1) to terminate the customer-supplied communication cable in a proper manner, and 2) to provide proper connections feeding all system components.

2.2.1. LOCATION OF DOWNHILL JUNCTION BOX.

The Downhill Junction Box should be located approximately 60' downhill from the finish line, and within 10' uphill of the Display(s).

2.2.2 LOCATION OF UPHILL JUNCTION BOX (see fig. C)

The Uphill Junction Box should be located between the two start gates, and underneath the start display if in use.

2.2.3 MOUNTING OF JUNCTION BOXES

Mount the junction boxed to a post or flat surface using 1/4" lag bolts through the 4 pre-drilled holes provided inside the box.

2.2.4. INSTALLATION OF COMMUNICATION CABLE INTO UPHILL AND DOWNHILL JUNCTION BOXES

We recommend an 8-conductor, direct-buriable cable. 19-gauge solid conductors are preferred. 24-gauge is the minimum diameter for proper operation. Contact RRS if you need help locating this kind of cabling.

The wiring configuration of the communication cable in both Downhill and Uphill Junction boxes is as follows:

DESIG.	FUNCTION	TERMINAL STRIP (inside jct box)	
PAIR #1:	GROUND	-----> O O	
	START RED	-----> O O	
PAIR #2:	START BLUE	-----> O O	----->to displays &
	FINISH RED	-----> O O	devices
PAIR #3:	FINISH BLUE	-----> O O	
	DNF RESET	-----> O O	

Follow these steps:

1. Feed plenty of cable through the un-used water-tight connector on the bottom of the junction box.
2. Strip away approx. 4" of insulation to expose the paired conductors. Do this at both ends (top and the bottom) of the cable.
3. Label each pair at both ends (top and bottom) of the cable, making sure that the pairs correspond according to color; (ex: green and white = pair #1, blue and white = pair #2, etc.).
4. Strip away 1/2" of insulation from each wire conductor.
4. Securely fasten each wire to the appropriate location on the terminal strip.
5. Tighten the water-tight connector on to the cable using pliers or adjustable wrench. Make sure it is good and snug on the cable.
6. Perform a continuity test to assure that each conduction is good, and to verify that both top and bottom boxes are wired identically.

2.3 START GATES

2.3.1 MOUNTING THE START GATES

The start gates mount to 2 x 4 or 4 x 4 posts using the hand-screw provided. Mount them approx. 2' above snow level. The switches will actuate in a clockwise rotation of the wand, and therefore should be mounted to the right of the skier, so that the skier pushes the wand out as he starts. Install the mounting posts in the dirt or snow at least 10' apart.

2.3.2 CONNECTING THE START GATES

On the start cables provided, locate the ends where the banana plugs are the same color (red/red, and blue/blue). These ends will plug into the Uphill Junction Box. Make the appropriate connections to the Junction Box. Secure the cable using some form of strain-relief.

Bury your cables leading from the Uphill Junction Box leading to the first start location, and leading from the first to second start location.

The ends of each cable are color-coded red and blue. The "red" cable will plug into your "red" course start gate, and "blue" to blue course.

Make all banana plug connections to the Start Gates, respecting color-codes (black to black, red or blue to green).

2.3.3 OPERATION OF THE START GATES

The start gates will actuate upon a 15 degree rotation of the wand. Be sure to orient them so that an "outward rotation" causes a clicking sound. Since little force is required to move the wand, make sure the skiers are careful positioning their poles to avoid false starts.

2.4 FINISH GATES

Infrared detectors are provided with the system. Each detector gate is comprised of 1) infrared sensor, 2) reflector, and 3) mounting brackets for sensor and reflector.

THE SENSORS USE 3 "AA" BATTERIES. TO PRESERVE BATTERY POWER, TURN THE SENSORS OFF AT THE END OF EACH DAY, AND STORE THEM INSIDE AT NIGHT.

Read the factory-supplied manual on the infrared detectors for information on battery and alignment indicators.

A 100' 2-pair cable is provided which connects both sensors to the Downhill Junction Box. Respect the color-coding when making your connections.

2.4.1 INSTALLATION AND OPERATION OF FINISH GATES

Install three mounting posts, 25 feet apart and approximately 10 feet above the snow. These will be used to mount your sensors and reflectors. The center post should be "permanent." Both sensors will mount to the center post facing out in opposite directions toward the two outside posts.

Install the mounting brackets on the DOWNHILL SIDE of the posts about 3 feet above snow level. The brackets should be mounted one above the other, about 3" apart. Attach the bracket using the hand-screws.

Mount the brackets for the reflectors on the outside posts, using the same procedures as above. Attach the reflectors and point them toward the center post.

Attach the sensors to the camera-head screws of the mounting brackets in the proper orientation pointing toward the reflectors on the outside posts.

Bury the cable coming from the Downhill Junction box clear to the center post. Use conduit if possible to protect cable from skiers and grooming equipment. Leave extra cable at the center post to compensate for rising snow levels. Attach the cable to the center post using an approved form of strain-relief.

Make the proper connections to both sensors, respecting color coding.

To align each sensor to its respective reflector, loosen the camera-head screw until the device moves freely in your hand in a 360 degree fashion. Keep your eye on the indicator on the back of the sensor housing. When the red indicator goes away, the unit is in alignment. Use deliberate up and down, and side to side motions to narrow in on the reflector. When you find the target, carefully tighten the camera-head screw. The indicator should be off continuously. Use your hand to break the beam a few times. You should see the indicator light up each time as your hand passes through the beam.

With all connections having been made, and both sensors in alignment, you are ready to commence the racing activity.

(TURN TO THE NEXT PAGE)

SMARTDISPLAY DUAL ELAPSED-TIMING FUNCTION
"ET"

3.0 SYSTEM OPERATION

Once all connections have been made, and you are certain that the junction box wiring is correct at both locations (top and bottom), and your infrared sensors are in alignment, you can turn your display board(s) on.

3.1 INITIALIZATION OF DISPLAY

Turn the power switch ON to the up position. The display will "wave" through and blank all digits. After a few seconds, the display will show 0.00. It is ready now to accept start impulses.

3.2 RUNNING THE RACE

The SMARTDISPLAY with dual-et mode will allow two head-to-head races on course at one time. A typical race will operate in the following way:

1. Have two racers get ready in the start gates. Give them a command to start.

As the skier(s) pass through their respective start gates. The display will begin to count up. If using a single display at the finish, the left-most digit indicates which course time is being shown. A small-case "r" signifies red course, and a small-case "b" signifies blue course.

IT IS IMPORTANT THAT BOTH RACERS SHOULD START WITHIN 5 SECONDS OF EACH OTHER TO BE CONSIDERED A DUAL "HEAT."

2. Immediately after two racers have started, get two more ready in the start gates. As the first two racers approach the finish, you may give the command for the next two racers to start. Repeat this process as long as racers are available to go. You may send one or two racers during a "heat."

3. As the first two racers cross their respective finish lines, the display will show a finish time (for seven seconds) for the first racer to finish. It will then automatically show the time for the other course for seven seconds, then resume the running time for the next heat.

3.2.1 DNF RESET FOR FALLEN RACER(S):

Use the DNF RESET only if:

1. One racer has fallen and will not continue through his finish gate, and the other racer has already finished.
2. Both racers have fallen and will not continue through their respective finish gates.

The display will reset BOTH COURSES, and resume the running time of the next pair if already on course). If no racers are on course, the display(s) will show 0.00.

USE THE DNF RESET FUNCTION ONLY IF YOU ARE SURE BOTH RACERS DURING A HEAT HAVE EITHER FINISHED OR FALLEN AND WILL NOT CONTINUE.

If a racer or pair has accidentally tripped the start wand, or false started and wish to start over, you must let the preceding finish before using the reset function to clear the clocks, in preparation for a new start.

4.0 SERVICE PROCEDURES

Should difficulty arise out of normal operation of your system, follow the basic trouble-shooting techniques below to determine the cause of the problem. When you have exercised all known procedures, call Reliable Racing Supply for help. Ask for the TIMING SERVICE DEPARTMENT. A technician will help you determine the problem, and may recommend you perform certain tests to gather more data, or will recommend a remedy. If a solution cannot be achieved over the phone, a course of action will be advised.

4.1 TROUBLE-SHOOTING

The following are typical symptoms of problems along with what to check if they arise. In testing the system, it is best to perform start and finish tests on one course, and then the other. This will help you to isolate the problem.

All inputs, START, FINISH, and RESET, work on normally open circuits. You can test each function by jumping GROUND to each of the inputs at either of the junction boxes. You can use a multimeter to test voltage for each input. The voltage between ground and each input should be 5 volts DC. If you are not getting a clean 5 volts, you either have bad continuity in the wire, or you have a short to ground somewhere in the cabling.

1. DISPLAY WILL NOT INITIALIZE when turned on. In other words, the wave of zeros do not appear then disappear in the normal fashion on power-up.

-If using AC, make sure plugs are secure to outlet and to display's jack.

-If using 12 VDC from a battery, make sure polarity is respected and that connections are secure.

-Check the fuse. If blown, replace with 3AG, 250 volt, 1 amp Slo-blow fuse.

2. CAN'T GET DISPLAY TO START ON EITHER OR BOTH COURSES.

-Check START banana plug connections. Are they snug?

-Is the connection secure to the Uphill Junction box?

-Check your communication cable wiring.

3. CAN'T GET A FINISH ON EITHER OR BOTH COURSES.

-Are all connections secure between scanners and display?

-Are start and finish gates on the same side of the hill in terms of red course, blue course orientation?

-Check alignment of both scanners. Are the indicators in the blue zone? Are the batteries fresh?

Refer to section 5.0 for more technical information to help you trouble-shoot the system.

4.2 RETURN SHIPPING

If you must ship any component to an RRS service center, please follow these steps:

-Contact RRS for a return authorisation.

-Make sure the component is protected using bubble-wrap, foam peanuts, or other protective packaging. Use extra protection around connectors or other delicate protrusions.

-Make sure the box is well marked with your address and with the address of the nearest RRS service center. Include phone numbers. Mark boxes FRAGILE! DO NOT DROP.

-Include in the box a letter describing the symptoms of failure. Make sure you include a contact name and phone number, along with return shipping STREET ADDRESS (no P.O. box numbers!).

-Ship freight pre-paid via UPS, Federal Express.

-Specify your desired return ship method, and when the unit is needed back.

We will do our best to meet your schedule.

5.0 TECHNICAL INFORMATION

SMARTDISPLAY

Time base: crystal oscillator, 1/100 second accuracy. +/- 10ppm.
On board computer: Z80 microprocessor with 32K ROM and 16K RAM.
Time display method: five electromechanical seven-segment digits.
Power supply: internal conversion of 120VAC to 12VDC, or 12VDC
 direct feed from battery. Diode protected against
 reversed polarity.
Inputs: start red, start blue, finish red, finish blue, DNF
 reset, DNS reset, auto reset 60 seconds. (total of 7).
Input operation: normally open circuits, floating at 5 VDC logic
 level. Signal received when logic level is
 grounded via working contact switch or
 open-collector transistor. Opto-isolated.

CONNECTORS:

START INTERFACE (9-pin "D"-TYPE) DB9S

Pin designation:

1=FINISH (BLUE)
2=FINISH (RED)
3=START (BLUE)
4=START (RED)
5=GROUND (COMMON)
6=RESET (FALSE START)
7=RESET (DNF)
8=AUTO RESET FUNCTION
9=NO CONNECTION

DC JACK: Co-axial DC type. 5mm OD, 2.5mm ID.
 TIP = +12, RING = GROUND.

SERIAL INPUT JACK: TIP = data (+), RING = data ground (-)

INFRARED PHOTOCCELL:

Optics: pulsed infrared retro-reflective.
Power: 1.5 VOLTS from 1 internal C alkaline cell.
Logic: working contact (open collector), dark operate.
Range: 70' max. 40' optimum.
Beam diameter: .50"

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