Impulse G3
Race System

User Guide

PITSCO
E D U C A T I O N

Materials Included

Start gate
Finish gate
4 gate supports
8 steel pull pins
8 gate support screws
Spool of monofilament line
2 launch pods
2 launch triggers (1 red and 1 black)
2 finish detector pigtails
Power supply (12 V, 2.5 A)
2 deceleration towels
Junction box
6' data cable
100' modular cable
2 black line anchors (floor use only; not shown)
Start board with Velcro strips (floor use only)

Make sure all components listed above are present. Report any missing or damaged items to Pitsco Customer Service at 800-358-4983.

Items Required (not included)

| #2 Phillips screwdriver | CO_2 dragsters | Eye protection |
| Duct tape (floor track only) | CO_2 cartridges, 4- or 8-gram | |

Racetrack Safety

The Impulse G3 system, with its low-voltage electronics and launcher safety levers, is a very safe racing system. Still, the following safety rules should be read and strictly followed to prevent injury and car damage.

*   Before cocking the launch pods, make sure everyone is clear of the track. Anyone near the track area while the Impulse G3 is in use should wear eye protection. **Never** lean over the track. Also, make sure the deceleration towels are in place to stop the cars at the end of the track.

*   Move the launch pod safety levers to the On position after cocking the launch pods.

*   **Never** turn the junction box power switch on or connect the power supply when the launchers are already cocked. This could trigger the launchers.

    The launchers should **never** be cocked when the power is off or disconnected from the unit. If the power is shut off or interrupted (due to a power outage, for example) during a race, immediately check the launch pods and uncock if necessary.

*   The Impulse G3 system should be used only with the supervision and guidance of an instructor.

Safety Note

Teachers should provide adequate supervision when leading this activity in the classroom. As needed, teachers should implement general safety requirements, including but not limited to the following: eye protection, proper ventilation, and instruction on the use of hand tools. Furthermore, teachers should implement the safety requirements required by their district and/or state in combination with the safety requirements mentioned in this user guide. Pitsco, Inc. is not responsible for bodily injury or property damage resulting from the misuse of its products or the teacher's failure to implement proper safety measures within the classroom.

Warranty: Pitsco provides a one-year limited warranty against defects in manufacturing on all items purchased. In a warranty situation, Pitsco will arrange for the return of defective items for evaluation. Qualified Pitsco staff will determine warranty coverage and notify the customer. Items under warranty will be repaired or replaced at Pitsco's discretion. Customers will be billed for all costs associated with non-warranty items.

Planning Your Racetrack Setup

Determine a good location for the track setup and take measurements to ensure there is enough space. The track can be almost any length between 30 feet and 80 feet. (If your track is less than 40 feet, you should use "short shot" four-gram CO_2 cartridges.)

Here are some things to think about when planning the racetrack setup:

Actual Racing Distance

Actual racing distance extends from the start line to the finish line. The ideal racing distance is 20 meters (65 feet, 6 inches) because it is approximately 1/20 of a quarter mile. This is useful for making mathematical comparisons to real dragsters. (Metric dragsters are also roughly 1/20 the size of real dragsters.)

Staging Zone

Allow a minimum of four to five feet at the start end for staging cars. A five-foot staging will allow four pairs of cars to be staged behind the launchers. If available, more space can be used to stage more cars. **Note:** If using the FasTrak Elevated Racetrack, the staging zone is predetermined by the length in front of the start gate.

Deceleration Zone

Allow a minimum of four feet past the finish end of the track to stop the cars. A deceleration towel will be placed in each lane approximately two feet behind the finish line to absorb the impact of the speeding cars and bring them to a safe halt. **Note:** If using the FasTrak Elevated Racetrack, the deceleration zone and parking zone (see below) is predetermined by the length behind the finish gate.

Parking Zone

Allow for a parking zone behind the deceleration zone. The parking zone should be the same length as the staging zone so it will accommodate the same number of cars. There should be adequate space to park all of the cars loaded onto the start end of the track without encroaching into the deceleration zone.

Floor Setup

1. At the start and finish ends of the track location, fasten the black line anchors to the floor with duct tape (Figure 1). Place the sides with the anchor screws toward the *inside* of the race area.

2. Locate the monofilament line. Folding over the thread 8 to 12 inches, tie a loop in the end of the line (Figures 2a-c).

Figure 1

Figures 2a, b, and c

3. Hook the loop over one of the screws on the line anchor (Figure 3).

4. Walk to the opposite end of the track, allowing the line to unreel from the spool as you go. Extend the line just past the anchor and cut it.
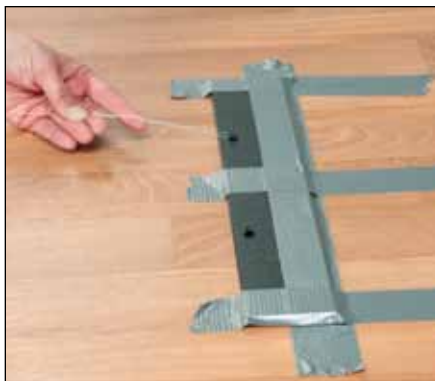
5. Tie another loop at this end of the line so the loop is approximately 24 inches short

Figure 3

Figure 4

of reaching the anchor screw. The line should be tightly stretched. A tight line helps prevent cars from going off course as they race down the track. Cut off any excess line extending from the loop's knot. **Note:** If the track is shorter than 80 feet, 24 inches short of the anchor screw might make the line too tight. If so, tie the loop a little closer to the anchor.
Tip: The lines for both lanes should have close to the same tension.

Figure 5

6. Repeat Steps 2-5 for the other lane.

7. Place the start board in position, sliding it under the two monofilament lines (Figure 4). Align the Velcro strips on the board with the two monofilament lines. Set up the launch pods and other G3 components as indicated below (Figure 5).

Race System Setup

The following instructions apply whether you are running a race on the floor or on the FasTrak Elevated Raceway. However, the pictures show the system on the FasTrak.

1. Assemble the start and finish gates by attaching the legs of each gate with the four screws, screwing two in each side of the gate (Figure 6). **Caution:** Do not overtighten the screws.

2. If using the FasTrak, insert four of the pull pins into the holes on both sides of each finish gate leg (Figure 7). Place the Start gate over both lanes so the pins rest on top of the track (if applicable) and so the gate is a little past the starting line (Figure 8).

Figure 6

Figure 7

Figure 8

3. Place the finish gate over both lanes at the finish end of your elevated track or floor track. Place the gate on the track so the pins rest on top of the track sides, if applicable (Figure 9).

4. Insert the finish detector pigtails into the hole that is on each leg of the Finish gate (Figure 10). Note the positions of the emitter bulbs on either side of the emitter tube, which is the tube that hangs down from the center of the finish gate. Insert the detector for Lane 1 in the upper socket and insert the Lane 2 detector in the lower socket, corresponding to the position of the emitter bulbs. The detectors should be aligned with the emitter bulbs (Figure 11).
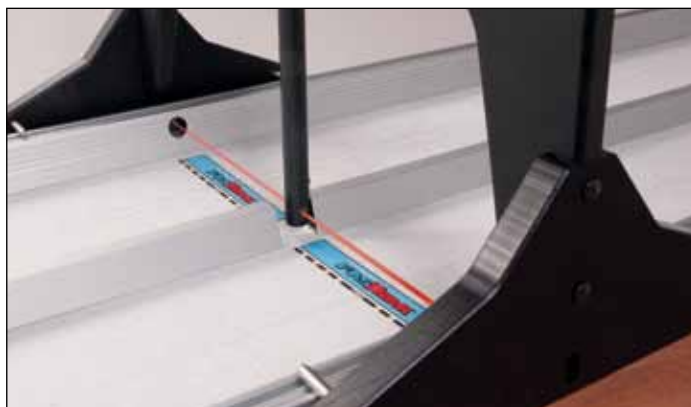

Figure 9

Figure 10

Figure 11

5. Plug the other end of each detector pigtail into the jacks labeled "Detector" on the sides of the back of the Finish gate (Figure 12). When facing the back of the Finish gate, the Lane 1 detector goes in the right jack, and the Lane 2 detector goes in the left jack.

6. Plug the cord from the emitter tube into the jack labeled "Emitter" on the back of the Finish gate (Figure 13).

Figure 12

Figure 13

7. Insert the end of the 100-foot modular cable into the jack labeled "Finish Gate" on the Start gate (Figure 14).

8. Routing the cable in the conduit on the side of the track, unroll the cable and extend it to the Finish gate (Figure 15).

9. Plug the other end of the cable into the jack labeled "Finish Gate" on the Finish gate (Figure 16).

Figure 14

Figure 15

Figure 16

10. Plug the straight end of the 6' data cable into the jack labeled "Start Gate" on the junction box (Figure 17). Plug the angled end into the junction box (Figure 18).

Figure 17

Figure 18

11. Plug the ends of the launch pods into the Pod 1 (for Lane 1) and Pod 2 (for Lane 2) connections on the junction box (Figure 19). Plug the ends of the launch triggers into the Button 1 (Lane 1) and Button 2 (Lane 2) (Figure 20).

Figure 19

Figure 20

12. Plug the power supply into the junction box where it is labeled "12 VDC" (Figure 21). Plug the other end into a standard wall outlet.

Figure 21

Figure 22

13. Place a launch pod on top of the monofilament line in each racing lane (Figure 22).

Prelaunch Setup

1. Locate the two deceleration towels. Fold the towels in half lengthwise one time and then roll them up in lengths the width of a track lane. Place one towel in each lane on the finish end (Figure 23).

2. One lane at a time, detach each racing lane's monofilament line from the Start end anchor (Figure 24). Thread the line through the screw eyes of the car – thread the front screw eye first, and then the rear screw eye (Figure 25). Reconnect the line to the anchor (Figure 26). **Note:** If you wish to stage several cars behind the launch pods, do so before reconnecting the line to the anchor.

Figure 23

Figure 24

Figure 25

Caution: Cars **must** be threaded onto the monofilament lines, which should be stretched tightly onto the screw eyes. This prevents cars from coming off the track during the race.

Figure 26

3. Pick up the launch pods and slide the dragster in front of it (Figure 27).

Figure 27

Figure 28

4. Make sure both launch pods are in the uncocked position before powering up the system. (Switching on the power with the launch pods cocked could prematurely launch the cars.) Now cock the pods by turning the knob on the side of each pod so it is flipped in the horizontal position (Figure 28).

5. Push the Safety button to the On position (Figure 29). This will prevent accidental launches.

6. Move the switch on the side of the junction box to the On position (Figure 30). The displays on the start gate should light. If the red lights are lit on the Finish gate, then the detectors are not aligned correctly. Move the emitter tube forward or back until it is adjusted so the red lights turn off.

Figure 29

Figure 30

Figure 31

7. Insert a Pitsco CO_2 cartridge in each dragster. Make sure the cartridge is fully seated in the car's cartridge hole. Position the cars at the start line. The front of the cars should be aligned with the start line (Figure 31).

8. Position the launch pods at the rear of the cars so the firing sleeve engages the neck of the CO_2 cartridges (Figure 31). This may require a height adjustment to the launch pods using the thumb screws on the front of each pod (Figure 32).

Figure 32

9. Secure the launch pods in place using the Velcro fastener (Figure 33).

10. Back each car into its pod, making sure each car's cartridge is engaged in the firing sleeve. The cars are now ready to launch. Follow the directions below for either manual or auto launching.

Figure 33

Figure 34

Manual Launching

This mode enables competitors to individually fire their own cars. The competitors' reaction times – or the start times – are a factor in the race. **Caution:** Do not unplug any of the race system components while using the system.

1. Set the mode lever on the front of the junction box to Manual (Figure 34).

Figure 35

Figure 36

2. Make sure everyone is clear of the track.

3. Ready the competitors – each should have his or her trigger and be attentive to the "Christmas tree" display on the start gate (Figure 35). The pod should be cocked from Step 4 of the Prelaunch Setup.

4. Move the launch pod safety levers to the Off position (Figure 36).

5. When ready, press the Start button on top of the junction box (Figure 37). The Christmas tree lights will activate. The three top pairs of yellow bulbs will light in succession, followed by the pair of green lights. The speed and pattern of these lights varies from launch to launch. Competitors should activate their launch triggers by pushing the button on the end of the triggers when the lights turn green.

Figure 37

And They're Off!

After the triggers are activated, the cars will be launched down the track (Figure 38). When the cars cross the finish line (Figure 39), the finish gate will indicate the winning lane with blinking red lights.

The start gate will display the race times and reaction times. The winning times will flash.

Figure 38

Figure 39

In Case of a Red Light

If a competitor activates the launch trigger too early (before the green lights come on), his or her car will not launch. The Finish Time on the Start gate will read "dnf," which means "did not finish" (Figure 40).

Then, the bottom red lamp for that lane will light. This is known as a "red light" start (see arrow in Figure 40).

Figure 40

Auto Launching

This mode fires both cars simultaneously. **Caution:** Do not unplug any of the race system components while using the system.

1. Set the mode lever on the junction box to Auto (Figure 41). Make sure everyone is clear of the track. The pod should be cocked from Step 4 of the Prelaunch Setup.

2. Move the launch pod safety levers to the Off position (Figure 42).

3. To start the launch, press the Start button on the junction box (Figure 43). The "Christmas tree" lights on the start gate will begin their sequence. When the green pair of bulbs light, the cars will be launched.

Figure 41

Figure 42

And the Winner Is

The finish gate indicates the winning lane with a pair of blinking red lights.

The start gate displays both race times in the windows labeled "Finish Time." The winning time will flash (Figure 44).

Figure 43

Launch Practice

The Impulse G3 can be used to hone launching skills without actually firing cars off the line. This is a useful activity for perfecting the launch technique and reducing reaction time.

To conduct a launch practice, skip the entire prelaunch setup process. Proceed with the manual launch as described in Steps 1-5 on page 9. The start gate will display reaction times for both lanes. The finish time windows will continue counting until the Start button is pressed. Both launch triggers must be activated before the system will reset.

Winning time

Figure 44

After the Launch

As the cars reach the end of the track, they should strike the towels and come to a safe halt.

Finish End
1. Move the towels aside and roll the cars to the end of the parking area.
2. Replace the towels in their positions behind the finish gate.

Start End
3. Lift the launch pods and roll the next pair of staged cars to the starting line.
4. Follow Steps 3-10 of the Prelaunch Setup procedure on pages 8-9 to prepare the next pair of cars.

IMPORTANT: To prevent possible injury from an accidental launch, do not cock the launch pods until the finish crew has signaled they are ready.

5. When the prelaunch setup is complete, press the Start button to begin the next launch sequence.

Running a Race

This section will help you run a race efficiently and safely. You should select several responsible individuals to help run the race. Each race team member should be assigned a task and should have a clear understanding of their responsibilities. Also, review the racetrack safety rules on pages 2-3 with the team members.

Running a race takes teamwork. As few as two people can run a race, but a team of four or more can run it more efficiently. A race team consists of two crews.

A start crew must do the following tasks:
*   Thread the cars onto the monofilament line, staging several pairs of cars to be on deck.
*   Position the cars at the start line and conduct the prelaunch setup.
*   Launch the cars (if using auto mode).
*   Roll the next pair of cars into position to prepare for the next launch.
*   Reload the staging area with another heat of cars.

A finish crew must do the following tasks:
*   Position the towels at the finish line to safely stop the cars.
*   Park the cars after the run and replace the towels.
*   Signal the start crew when ready to proceed with the next run.
*   Unload the track after the staged cars for that heat have completed their runs. This entails detaching the monofilament lines from the finish end anchor and removing the cars.

In addition, you may need a race official who records times and keeps track of elimination brackets.

Let's Communicate!
Effective communication between crews is essential when conducting a race. The finish crew should signal the start crew when they are ready to proceed with the next run. The start crew should NOT cock the launch pods until they have received the ready signal from the finish crew. The start crew should also make sure everyone is clear of the track before starting the launch sequence.

These steps are necessary to prevent injury during a race. They also help to prevent damage to cars. Running a race is simple and fun, but race team members should be attentive, keep safety foremost in their minds, and communicate with each other clearly.

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FASTRAK ELEVATED RACETRACK
A Pitsco Exclusive

Pitsco's elevated racetrack has been redesigned to provide an even better alternative to racing metric dragsters on the floor. The FasTrak simplifies the process of conducting races and improves viewing for spectators. Our racetrack is strong and durable. Check out these new features:

- Overlapping rail system with track keys that secure tightly with thumbscrews ensures flush joints between each track section for a level and smooth track.
- Redesigned track supports ensure even height and level sit.
- Laminated MDF surface is strong and durable.
- Custom-extruded aluminum rails for excellent strength, a built-in conduit along the length of the track that keeps cables off the floor, and eight-foot track panels for easy handling and storage

The track simulates to scale a quarter-mile racetrack. Because metric dragsters are about one-twentieth the size of real dragsters, the track's racing distance, from the start to the finish line, is 20 meters – one-twentieth of a quarter mile. This simplifies mathematical comparisons to real race cars.

A staging area behind the start gate is big enough to position four to five cars in each lane. Adequate deceleration distance is provided at the end of the track for cars crossing the finish line.

The FasTrak package includes 11 sections, each 7-1/2 feet long, and 12 legs. The start/finish gate hardware is sold separately. Compatible with Impulse G3 and GII, Pulse Plus, and the EZ Start Raceway.

37989 FasTrak Elevated Racetrack

FasTrak shown as a short track with Impulse G3.

Axle press head

Hub press

Wheel and axle press

Axle height holes
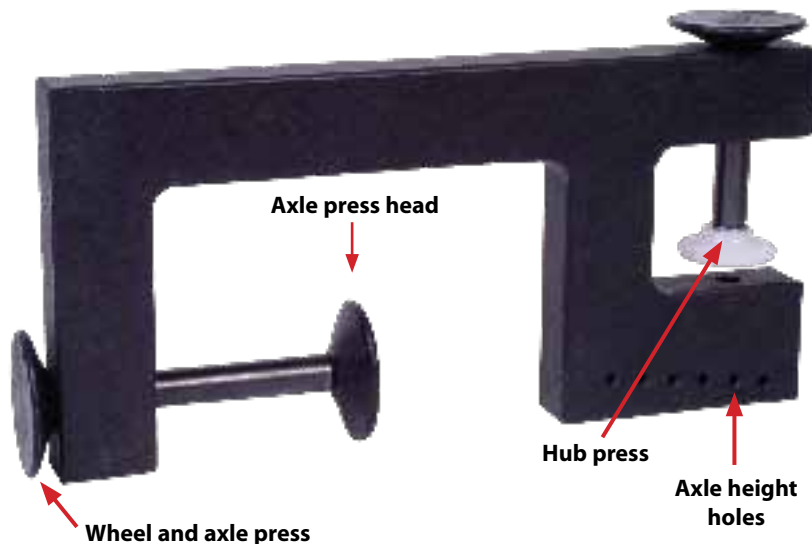
WHEEL DEAL
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The Pitsco Wheel Deal is the ideal tool for CO_2 dragster wheel assembly. The Wheel Deal is a hand tool designed with two comfortable presses, one for hub insertion into a wheel, the other for final assembly of the wheels, washers, and axles on the dragster. We've even included axle height locators as an added feature. No more stubborn hubs, broken wheels, or difficult axles!

The Wheel Deal is a unique four-in-one tool that simplifies the following tasks of dragster building:

- Marking axle height accurately
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- Mounting wheels on car (reducing car damage)

25500 Wheel Deal

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