

**SPEEDZONE  
MOTORSPORTS  
THRILL PARK**

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**NITRO ALLEY**

**BY:**

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## OVERVIEW

Nitro Alley is a state of the art amusement ride that will give the average person the opportunity to drive a real dragster.

Nitro Alley consists of four individually operated dragsters. Each dragster is powered by a 350 cubic inch 300 horsepower motor and is fueled by propane. Each dragster is designed for one person.

Nitro Alley's overall track is 32 feet wide and 400 feet in length. Of this, the first 40 feet is the starting area followed by 195 feet of racing area with the remaining 165 feet used for the braking area.

Nitro Alley's track is comprised of four separate lanes. Each lane has its own rail system. This rail system guides the dragster down the track and therefore eliminates the need for steering.

Nitro Alley has redundant sensors on the rail for each lane to provide additional safety. These sensors determine the position of the dragster in each lane.

Nitro Alley's brakes are operated using solenoid valves and pressure control sensors that are located inline with the individual lane brakes and housed in air panels. The individual lane brakes operate in unison.

Nitro Alley has nine sets of stopping brakes with three sets of emergency brakes for each lane. These brakes are capable of stopping the dragster within the designated area. In the event of a catastrophic brake failure, the three emergency brakes are controlled separately from the stopping brakes and always remain closed. At the end of the track, crossing each lane, is a safety net.

Nitro Alley has two sets of starting brakes with one emergency brake for each lane. These brakes are used to hold the dragster in the starting area and to stop it in the starting area when backing up. These brakes are capable of stopping the dragster within the designated area. In the event of a catastrophic brake failure, the emergency brake is controlled separately from the starting brakes and is always closed when the dragster is backing up. At the start of the track, behind each tire, is a safety pole.

Nitro Alley is controlled by a sophisticated industrial computer system. This "master" computer system monitors all track sensors, controls all braking, displays the elapsed time, and communicates with the dragster's on board "slave" computer system using radio frequency modems.

Nitro Alley's dragsters each have an on board "slave" computer system that is in constant communication with the "master" computer system. This on board "slave" computer

systems monitors and controls all functions of the dragster. If the dragster's on board "slave" computer system loses communication with the "master" computer system, the dragster is automatically shut down.

Nitro Alley is controlled from the operators console which is located across from the starting line. The ride operator controls when the ride is to be dispatched and can shut down each dragster or all the dragsters immediately if a problem should occur.

Nitro Alley requires three people to operate the ride. One person must remain at the operators console at all times during ride operation. One person is to be located at the end of the track and the other will assist the people getting into the dragsters and will check the seat belts before the ride is dispatched.

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## THEORY OF OPERATION

### OBJECTIVE

To achieve the lowest possible elapsed time from the green light. The elapsed time is accurate to 1/1000<sup>th</sup> of a second.

### SUMMARY OF EVENTS

1. When selected lanes and dragsters are active, the ride operator can dispatch the ride.
2. When the ride is dispatched a signal is sent to each active lane and each active dragster to enable the controls.
3. The starting tree lighting sequence will begin and the driver will be given control of the dragster.
4. The starting brakes are opened to allow the dragster to leave the starting area.
5. The driver will depress the accelerator until crossing the finish line.
6. At some point, the driver can shift into high gear.
7. Prior to the finish line, the dragster's throttle and control of the dragster is removed from the driver.
8. Upon crossing the finish line, the elapsed time will be displayed/updated.
9. Upon crossing the finish line, the dragster is automatically shifted into neutral.
10. The dragsters are automatically stopped in the braking area.
11. Once stopped, the dragsters are shifted into reverse and reverse throttle is automatically applied.
12. The dragsters are automatically returned to the starting area.
13. When all active dragsters have returned to the starting area the dragsters will be shifted into neutral.
14. The ride is now ready to be dispatched or drivers exchanged for a new race.

## MAINTENANCE MODE

1. At the operators console turn the "mode" select key switch to the "maintenance" position. The message display will read "maintenance mode."
2. This enables limited controls of the brakes and allows the brakes to be operated manually for testing. **(No dragsters will run in this position.)**
3. If for any reason a dragster stops in the emergency stopping brakes, the only way to open the brakes will be to follow these steps.
4. At Remote Panel 1 (RP1) with the "jog enable" key switch held on, the "jog starting brake" and "jog emergency brake" buttons are enabled. With the key switch held on, press either jog button to open the brakes. The brakes will only remain open if the key switch and push button are held on.
5. At Remote Panel 2 (RP2) with the "jog enable" key switch held on, the "jog finish brakes" and "jog emergency brakes" buttons are enabled. With the key switch held on, press either jog button to open the brakes. The brakes will only remain open if the key switch and push button are held on.
6. The brakes should be tested regularly to verify correct operation.

## RUN MODE (Opening Procedures)

1. Complete the daily inspection sheet for the ride.
2. At the Ride Control Center (RCC) turn the "power" key switch to the "on" position and verify that the white "power on" light is illuminated. If this light is not illuminated, check to see that the incoming power is turned on at the power source. **(See power requirements.)** When completed and during ride operation the key is to be removed. **(Only supervisory personnel should possess this key.)**
3. At the RCC turn the "ride" key switch to the "on" position and verify the blue "ride on" light is illuminated. This will energize the contactor housed inside the RCC which will then apply power to both remote panels, operators console and the time displays/lane signs. When completed and during ride operation the key is to be removed.
4. At the air compressors, open the main air valve to fill the main air line.
5. At the operators console verify that the "mode select" key switch is in the "off" position and all "lane" E-Stop buttons are pressed in. The "master" E-Stop button must be pulled out.
6. At Remote Panel 1 (RP1) turn the "jog enable" key switch to the "right" and hold for five seconds. This will cause the first starting brakes, the second starting brakes, and the starting emergency brakes to open. These brakes will remain open until the "mode select" key switch on the operators console is turned to the "maintenance" or "run" modes. When completed and during ride operation the key is to be removed.
7. Remove the safety poles for each lane and slowly push each dragster into position. The correct position is when the dragsters battery box is mid point in the emergency starting brake.
8. At the operators console (OC) turn the "mode select" key switch to the "run" position. This will close all the starting brakes and the message display will read "Run Mode." When completed and during ride operation the key is to be removed.
9. Error messages may appear and corrective actions may be needed. The operator needs to read each message to determine what the error is and take the necessary corrective action. The message display can display multiple messages, but not at one time. Each message will be displayed and the next message will not appear until the previous message has been cleared. To clear the error message, the ride operator must press the "reset" button and hold it for approximately two seconds. **(See error messages.)**
10. When the dragsters are in the correct position and the corresponding "lane" E-Stop is pulled out, the "pre-stage" lights on the starting trees will be illuminated. This will indicate that the dragster is in the correct "starting/pre-stage" position.
11. Walk each lane and verify that no obstructions are present.

**RUN MODE**  
**(Closing Procedures)**

1. Make sure that all dragsters are stopped in the starting brakes in the "starting/pre-stage" position.
2. At the operators console press in each "lane" E-Stop button.
3. At the operators console (OC) turn the "mode select" key switch to the "off" position. The message display will read "Nitro Alley, Pro/Drag." When completed the key is to be removed.
4. At each dragster turn the toggle switch to the "off" position and the main battery switch to the "off" position.
5. At Remote Panel 1 (RP1) turn "jog enable" key switch to the right and hold for five seconds. This will open the first starting brakes, the second starting brakes, and the starting emergency brakes. These brakes will remain open until the "mode select" key switch on the operators console is turned to the "maintenance" or "run" modes. When completed the key is to be removed.
6. Remove the safety poles for each lane and slowly push each dragster into the shop storage area.
7. At the RCC turn the "ride power" key switch to the "off" position and verify the blue "ride on" light is not illuminated. This will de-energize the contactor housed inside the RCC which will then remove power to both remote panels, operators console and the time displays/lane signs. When completed and during ride operation the key is to be removed. **(Only supervisory personnel should possess this key.)**
8. At the air compressors close the main air valve.

## STARTING THE DRAGSTER

1. At each dragster to be used, turn the "main" battery switch to the "on" position. Then turn the toggle switch to the "on" position.
2. At the operators console pull out the "lane" E-Stop for each dragster to be used, press the "reset" button and hold for three seconds. The E-stops for the lanes not to be used, must remain pressed in.
3. The "ready to start" light on the dragster should be illuminated. This light indicates that the dragster is in the correct starting position and communicating with the RCC. The dragster can only be started in the starting position! **(If light is not illuminated go to trouble shooting guide.)**
4. Press the start button to start the dragster.

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## DISPATCHING THE DRAGSTER

1. Verify that the "ready to race light" is illuminated. If the light is not illuminated, the dragsters can not be dispatched. **(See trouble shooting.)**
2. Proceed with the dispatch. Depress the dispatch 1 and dispatch 2 buttons simultaneously.
3. The track sequence will start. The starting brakes will open, the stage lights will come on. After a one second pause, the lighting sequence will begin.
4. As the starting brakes open the dragster sequence will start. The dragster will shift into low gear, the shift stop will activate and the throttle will be enabled. The drivers now have control of the dragster.
5. The driver will race down the track to the finish line.
6. The ride operator must remain at the console during the entire ride. In the event that anything goes wrong, the ride operator has the ability to shut down any dragster or all dragsters.

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## RACE FINISHED

1. As the driver accelerates down the track and passes the fuel shut off sensors, the throttle is disabled. (These sensors are located thirty feet before the finish line and at the finish line. These sensors consist of two clusters of four proximity switches which are located on the rail and one photo proximity switch which is located on the dragster itself.)
2. The dragster crosses the finish line and is shifted into neutral.
3. The time for each lane will be displayed after all dragsters racing have crossed the finish line. If the driver red lights no time will be displayed. (0.000)
4. The dragster is stopped automatically.
5. The finish line brakes will open five seconds after all dragsters have crossed the finish line.
6. The dragster is shifted into reverse.
7. Reverse throttle is applied and the dragster will back up to the starting line automatically. The dragsters will not back up if the starting brakes are open.
8. The finish line brakes will close when all active dragsters backing up have passed by the fuel shut off sensors which are located thirty feet from the finish line.

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## PRE-STARTING DRAGSTER FOR NEXT RACE

1. As dragsters back up, they will be stopped in the second starting brakes.
2. When all active dragsters have stopped in the second starting brakes, the brake opening sequence will begin.
3. The emergency starting brake will always remain closed.
4. The second starting brake will open allowing the dragsters to back up prior to entering the first starting brake.
5. Approximately five seconds after the second starting brake has opened the first starting brake will open allowing the dragsters to back up prior to entering the emergency brake.
6. As all dragsters enter the pre-stage proximity sensors the reverse throttle will be disabled, the dragster will be shifted into neutral and the first and second starting brakes will close.
7. The dragsters are now pre-staged for the next race.

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## ERROR MESSAGES

At the operators console (OC) and ride control center (RCC) there are message displays that will display error messages. The following describes all possible messages that can be displayed. The result, possible cause, and corrective actions are also explained.

**Message:** Main Air Pressure Low.

**Result(s):** The entire ride is shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** The main air supply has fallen below the minimum psi required to operate the ride.

**Corrective Action(s):** Verify that air compressors are on and functioning properly. Verify the main air valve to the ride is on. Verify that the main air pressure control is properly calibrated. (See **pressure control calibration.**)

**Message:** Emergency Stop Activated On Ride Control Center.

**Result(s):** This will shut down the entire ride. The message will be displayed until the problem is corrected.

**Possible Cause(s):** The E-Stop button located on the ride control center was pressed in.

**Corrective Action(s):** Determine why the E-Stop button was pressed and correct the problem(s) at once.

**Message:** Emergency Stop Activated On Operator's Console.

**Result(s):** This will shut down the entire ride. The message will be displayed until the problem is corrected.

**Possible Cause(s):** The E-Stop button located on the operators console was pressed in.

**Corrective Action(s):** Determine why the E-Stop button was pressed and correct the problem(s) at once.

**Message:** Low Air Pressure Air Panel 1.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 2.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 3.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 4.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 5.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 6.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 7.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 8.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 9.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 10.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 11.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 12.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Low Air Pressure Air Panel 13.

**Result(s):** All brakes are closed and all running dragsters are shut down immediately. The warning buzzer on the operators console will sound and the message will be displayed until the problem is corrected.

**Possible Cause(s):** This may be caused by lack of main air pressure, blown air line or leaky brake, faulty exhaust solenoid valve or improperly adjusted air regulator or pressure control.

**Corrective Action(s):** Verify main air pressure is present. Repair any blown air lines or air leaks. Verify that the solenoid valve is working properly. Verify that the air pressure regulator and pressure control is set to the proper air pressure. **(See pressure control calibration.)**

**Message:** Engine Overheat Lane 1.

**Result(s):** The dragster will remain operating. The warning buzzer on the operators console will sound and the message display will continue until the engine temperature falls.

**Possible Cause(s):** The motor is overheating.

**Corrective Action(s):** Verify that the engine is operating at a safe temperature. Verify that the electric fans are operating. Verify that the overflow bottle has fluid. If engine exceeds 230° - 250°, shut the dragster off until the temperature falls.

**Message:** Low Oil Lane 1.

**Result(s):** The dragsters motor will be shut down immediately. The warning buzzer on the operators console will sound and the message display will continue until the engine oil pressure is returned.

**Possible Cause(s):** The oil pressure in the motor has fallen below 15 psi for more than 20 seconds.

**Corrective Actions(s):** Verify that the motor has oil and is at the correct level.

**Message:** Low Gear Shift Error Lane 1.

**Result(s):** The dragster will remain operating. The warning buzzer will sound and the message display will continue until the problem is corrected.

**Possible Cause(s):** The dragster did not shift into low gear or the low gear sensor was not satisfied.

**Corrective Action(s):** Verify that the CO<sub>2</sub> bottle is full. Verify correct operation of the low gear solenoid valve. (See **manual testing**.) Verify correct operation of the low gear sensor and adjust if necessary. (See **low gear sensor adjustment**.)

**Message:** Neutral Shift Error Lane 1.

**Result(s):** The dragster will remain operating. The warning buzzer will sound and the message display will continue until the problem is corrected.

**Possible Cause(s):** The dragster did not shift into neutral or the low gear sensor was not satisfied.

**Corrective Action(s):** Verify that the CO<sub>2</sub> bottle is full. Verify correct operation of the shift solenoid valve. (See **manual testing**.) Verify correct operation of the neutral sensor and adjust if necessary. (See **neutral sensor adjustment**.)

**Message:** Engine Overheat Lane 2.

**Result(s):** The dragster will remain operating. The warning buzzer on the operators console will sound and the message display will continue until the engine temperature falls.

**Possible Cause(s):** The motor is overheating.

**Corrective Action(s):** Verify that the engine is operating at a safe temperature. Verify that the electric fans are operating. Verify that the overflow bottle has fluid. If engine exceeds 230° - 250°, shut the dragster off until the temperature falls.

**Message:** Low Oil Lane 2.

**Result(s):** The dragsters motor will be shut down immediately. The warning buzzer on the operators console will sound and the message display will continue until the engine oil pressure is returned.

**Possible Cause(s):** The oil pressure in the motor has fallen below 15 psi for more than 20 seconds.

**Corrective Actions(s):** Verify that the motor has oil and is at the correct level.

**Message:** Low Gear Shift Error Lane 2.

**Result(s):** The dragster will remain operating. The warning buzzer will sound and the message display will continue until the problem is corrected.

**Possible Cause(s):** The dragster did not shift into low gear or the low gear sensor was not satisfied.

**Corrective Action(s):** Verify that the CO<sub>2</sub> bottle is full. Verify correct operation of the low gear solenoid valve. (See manual testing.) Verify correct operation of the low gear sensor and adjust if necessary. (See low gear sensor adjustment.)

**Message:** Neutral Shift Error Lane 2.

**Result(s):** The dragster will remain operating. The warning buzzer will sound and the message display will continue until the problem is corrected.

**Possible Cause(s):** The dragster did not shift into neutral or the low gear sensor was not satisfied.

**Corrective Action(s):** Verify that the CO<sub>2</sub> bottle is full. Verify correct operation of the shift solenoid valve. (See manual testing.) Verify correct operation of the neutral sensor and adjust if necessary. (See neutral sensor adjustment.)

**Message:** Engine Overheat Lane 3.

**Result(s):** The dragster will remain operating. The warning buzzer on the operators console will sound and the message display will continue until the engine temperature falls.

**Possible Cause(s):** The motor is overheating.

**Corrective Action(s):** Verify that the engine is operating at a safe temperature. Verify that the electric fans are operating. Verify that the overflow bottle has fluid. If engine exceeds 230° - 250°, shut the dragster off until the temperature falls.

**Message:** Low Oil Lane 3.

**Result(s):** The dragsters motor will be shut down immediately. The warning buzzer on the operators console will sound and the message display will continue until the engine oil pressure is returned.

**Possible Cause(s):** The oil pressure in the motor has fallen below 15 psi for more than 20 seconds.

**Corrective Action(s):** Verify that the motor has oil and is at the correct level.

**Message:** Low Gear Shift Error Lane 3.

**Result(s):** The dragster will remain operating. The warning buzzer will sound and the message display will continue until the problem is corrected.

**Possible Cause(s):** The dragster did not shift into low gear or the low gear sensor was not satisfied.

**Corrective Action(s):** Verify that the CO<sub>2</sub> bottle is full. Verify correct operation of the low gear solenoid valve. **(See manual testing.)** Verify correct operation of the low gear sensor and adjust if necessary. **(See low gear sensor adjustment.)**

**Message:** Neutral Shift Error Lane 3.

**Result(s):** The dragster will remain operating. The warning buzzer will sound and the message display will continue until the problem is corrected.

**Possible Cause(s):** The dragster did not shift into neutral or the low gear sensor was not satisfied.

**Corrective Action(s):** Verify that the CO<sub>2</sub> bottle is full. Verify correct operation of the shift solenoid valve. **(See manual testing.)** Verify correct operation of the neutral sensor and adjust if necessary. **(See neutral sensor adjustment.)**

**Message:** Engine Overheat Lane 4.

**Result(s):** The dragster will remain operating. The warning buzzer on the operators console will sound and the message display will continue until the engine temperature falls.

**Possible Cause(s):** The motor is overheating.

**Corrective Action(s):** Verify that the engine is operating at a safe temperature. Verify that the electric fans are operating. Verify that the overflow bottle has fluid. If engine exceeds 230° - 250°, shut the dragster off until the temperature falls.

**Message:** Low Oil Lane 4.

**Result(s):** The dragsters motor will be shut down immediately. The warning buzzer on the operators console will sound and the message display will continue until the engine oil pressure is returned.

**Possible Cause(s):** The oil pressure in the motor has fallen below 15 psi for more than 20 seconds.

**Corrective Action(s):** Verify that the motor has oil and is at the correct level.

**Message:** Low Gear Shift Error Lane 4.

**Result(s):** The dragster will remain operating. The warning buzzer will sound and the message display will continue until the problem is corrected.

**Possible Cause(s):** The dragster did not shift into low gear or the low gear sensor was not satisfied.

**Corrective Action(s):** Verify that the CO<sub>2</sub> bottle is full. Verify correct operation of the low gear solenoid valve. **(See manual testing.)** Verify correct operation of the low gear sensor and adjust if necessary. **(See low gear sensor adjustment.)**

**Message:** Neutral Shift Error Lane 4.

**Result(s):** The dragster will remain operating. The warning buzzer will sound and the message display will continue until the problem is corrected.

**Possible Cause(s):** The dragster did not shift into neutral or the low gear sensor was not satisfied.

**Corrective Action(s):** Verify that the CO<sub>2</sub> bottle is full. Verify correct operation of the shift solenoid valve. **(See manual testing.)** Verify correct operation of the neutral sensor and adjust if necessary. **(See neutral sensor adjustment.)**

## TROUBLE SHOOTING

**Symptom:** The dragster will not start.

**Solution(s):**

Verify that the fuel tank has fuel.

Verify that the main battery switch is in the "on" position and the toggle switch is in the "on" position.

Verify that the dragster has a fully charged battery. If the battery is too low, the dragster will not start due to a voltage drop to the on board computer and modem. This will cause the dragster to lose communications and this causes an E-Stop condition. (See E-Stop conditions.)

Verify that the "Ready to Start" light on the dragster is illuminated. If this light is not illuminated the dragster is in the E-Stop condition.

Verify at the operators console that the lane E-Stop for the dragster to be used is pulled out. If lane E-Stop was pushed in, the "reset" button must be pressed for approximately three seconds to clear the E-Stop condition.

Verify that the dragster is in the "pre-stage" position. The dragster will not start in any other position. This position can be verified by observing the starting tree indicator lights.

**Symptom:** One or more of the dragsters motors are running but the motors shut off when starting another car.

**Solution(s):**

When starting a dragster, the dragster must establish communications within 10 seconds. If the dragster does not establish communications with the "master" computer system, the "master" computer system will attempt to reestablish communications with the dragster. When this occurs, normal communications are interrupted and the other dragsters will shut off if communication is not restored within 5 seconds.

Verify that the dragster has a fully charged battery. If the battery is too low, the dragster will not start due to a voltage drop to the on board computer and modem. This will cause the dragster to lose communications and this causes an E-Stop condition. (See E-Stop conditions.)

**Symptom:** One or more of the dragsters motors are running but the motors shut off when another lane is selected.

**Solution(s):**

If the lane E-Stop is pulled out and the corresponding dragster's power is not on, the "master" computer system will attempt to establish communications with this dragster. When this occurs, normal communications are interrupted and the other dragsters will shut off if communication is not restored within 5 seconds.

This will cause the dragster to lose communications and this causes an E-Stop condition. (See E-Stop conditions.)

**Symptom:** The master modem located inside the RCC does not appear to be working. Only the "red - P" led is illuminated.

**Solution(s):**

If all lane E-Stops are pressed in the modem will not communicate. Pull out one or more of the lane E-Stop buttons and the modem LED's should begin to flicker rapidly.

**Symptom:** The dragster motor shuts off while driving down the track.

**Solution(s):**

The dragster could be losing communications with the master modem located in the RCC. Check the dragster for loose wire connections by observing the LED's located inside the modem. If the LED's go off when lightly tapping on the case, there is a bad connection inside the modem itself. Do not attempt to correct the problem. Only qualified service personnel should complete the repairs.

The dragster could be losing power to the distributor. Check for loose wires from the E-Stop relay to the distributor. When the dragster is active, 12 VDC should be applied to the "red" wire on the distributor.

**Symptom:** The dragster did not shift into high gear after ride has been dispatched and the shift button has been depressed.

**Solution(s):**

Verify that CO<sub>2</sub> is present.

Check for correct operation and position of the low gear position sensor. The shift button will only work when the dragster is in low gear. **(See position switch adjustment.)**

Verify that the solenoid valve and cylinder are functioning properly. **(See manual testing.)**

**Symptom:** The dragster shifted into neutral when the shift button was pressed.

**Solution(s):**

Check for correct operation and position of the shift stop position sensor. The shift stop cylinder prevents the transmission to be shifted into neutral from low gear. **(See shift stop position switch adjustment.)**

Verify that the solenoid valve and cylinder are functioning properly. **(See manual testing.)**

**Symptom:** Dragster was dispatched, crossed the finish line and will not go into reverse.

**Solution(s):**

Verify that CO<sub>2</sub> is present.

Check for correct operation and position of the low gear position sensor. This can be verified by input 5 on the first input card.

Verify that the transmission is in neutral. This can be done by observing the position of the transmission shift lever.

Verify that the solenoid valve and cylinder are functioning properly. **(See manual testing.)**

## E-STOP CONDITIONS

### MANUALLY ACTIVATING E-STOP

E-Stop can be activated by pressing the red "E-Stop" buttons at the following locations:

1. Ride Control Center (RCC) E-Stop.
2. Operators Console (OC) Master E-Stop.
3. Operators Console (OC) Lane E-Stops.

The RCC E-Stop will shut down the entire ride. All brakes will close immediately and all dragsters will be shut down.

The Operators Console Master E-Stop will shut down the entire ride. All brakes will close immediately and all dragsters will be shut down.

The Operators Console Lane E-Stops will only shut down the dragster in the corresponding lane. The lane E-Stop must remain pressed in for all dragsters not being used.

### AUTOMATIC ACTIVATION OF E-STOP.

E-Stop automatically occurs during any of the following conditions:

1. Main air pressure is low.
2. Air pressure is low at any air panel for more than the specified time.
3. Communications are lost between the dragster and the RCC.

If the main air pressure goes below the calibrated pressure during operation, an E-Stop condition occurs. This will shut down the entire ride immediately. This E-Stop condition can not be cleared until the main air pressure is restored to the preset pressure. **(See pressure control calibration.)**

If the air pressure at any one of thirteen air panels goes below and remains below the calibrated pressure an E-Stop condition will occur. This will shut down the entire ride immediately. Each air panel has a specified time in which the air pressure must be restored to the preset pressure. **(See pressure control calibration.)**

If communications are lost between the RCC and any active dragster, an E-Stop condition occurs. This will immediately shut down the dragster that lost communications. This condition will clear when communications are restored. **(See trouble shooting.)**

## PRESSURE CONTROL OPERATION

A toggle mechanism operates the snap action switch at a predetermined pressure setting. For the 2-circuit snap action switch the pressure causes the normally closed circuit 1-2 to open and the normally open circuit 3-4 to close. This is known as the trip pressure. When the pressure returns to a lower predetermined setting, the circuit 1-2 will close and circuit 3-4 will open. This is known as the reset pressure. The difference between "trip" and "reset" pressure is the differential.

### GENERAL

Located at the main air source and inside each air panel is a pressure control. This pressure control is tapped directly into the air line to be monitored. Unless otherwise specified, pressure controls shipped from the factory are set at the maximum range pressure and minimum differential. Therefore, these pressure controls must be calibrated for the main air source and each air panel. The ride is designed to operate with a maximum brake pressure of 75 psi. **(It is very critical that these pressure controls are set correctly or ride safety could be compromised.)**

### LOCATIONS

The main air pressure control is located at the air source and simply monitors the air pressure in the main air line.

The air panel pressure controls are located inside the air panel boxes which are on the right hand side of the track and in line with each set of brakes when looking towards the finish line.

### CALIBRATION

The main pressure control must be calibrated so the main air line never goes below 75 psi. This pressure control simply monitors the air source and will shut down the ride immediately if the pressure control is not satisfied. This pressure control is calibrated with a minimum differential. **(See pressure control calibration.)**

The air panel pressure controls located inside the air panels are used in conjunction with the "close" brake solenoid valves. When the air pressure to the brakes falls below the calibrated pressure, the "close" brake solenoid valve is turned "on" until the calibrated pressure is reached and then the "close" brake solenoid valve is turned "off." This method insures that the desired brake pressure is maintained. These pressure controls are calibrated with a 5 psi differential. **(See pressure control calibration.)**

## PRESSURE CONTROL ADJUSTMENT

### PRESSURE CONTROL ADJUSTMENT LOCATIONS

The operating range pressure adjustment is located externally. On the top end of the pressure control is a threaded adjustment screw and locking nut.

The differential pressure adjustment is located internally. With the cover off, the adjustment screw is located on the right hand side of the pressure control.

**OPERATING RANGE ADJUSTMENT:** Turn lock nut on adjustment screw counterclockwise to loosen. Turn range adjustment screw clockwise to raise upper and lower pressure settings. To decrease the upper and lower pressure settings, turn screw counterclockwise. The approximate upper pressure setting is shown by an indicator in the left window between the calibration scales on the nameplate. When the proper setting is reached, tighten the lock nut on the adjustment screw clockwise.

**DIFFERENTIAL ADJUSTMENT:** Remove the front cover. When the differential screw is flush with the enclosure base, the control will function at minimum differential. To increase the differential, turn adjustment screw clockwise. This will decrease the lower setting only. The higher setting will not change. Similarly, to decrease the differential turn the differential adjustment screw counterclockwise. This will raise the lower setting only.

## PRESSURE CONTROL CALIBRATION

### OPERATING PRESSURE

1. The pressure control must be tapped into the air line going to the brakes along with a pressure gauge.
2. With the ride in "run" mode, turn the range adjustment screw clockwise to increase the air pressure to the brakes. As you increase the air pressure, the "close" brake solenoid valve will turn "on" to fill the line with this pressure. The pressure to the brakes is determined by observing the pressure gauge and not the operating range window on the cover of the pressure control. Do this until the desired pressure is reached.
3. When the desired pressure is set, cycle the brakes a few times to verify that the pressure control is properly filling the brake line with the desired air pressure.
4. After the desired brake pressure is reached, tighten the lock nut on the operating range adjustment screw.
5. The pressure control is now calibrated for the desired "trip" pressure. This means that pressure control will now turn "off" the "close" brake solenoid valve when the desired brake line air pressure is achieved.

### DIFFERENTIAL

1. Take the cover off of the pressure control.
2. With the ride in "run" mode, turn the differential adjustment screw clockwise to increase the pressure control differential. This differential needs to be set to 5 psi. This is most easily done by purposely letting air leak from the brake air line.
3. Observe the pressure gauge, it should be losing pressure slowly. Adjust the differential adjustment screw so the pressure switch will activate after 5 psi has been lost according to the pressure gauge.
4. When the desired differential is set, cycle the brakes a few times to verify that the pressure control "resets" according to this 5 psi differential.
5. The pressure control is now calibrated for the desired "reset" pressure. This means that pressure control will now turn "on" the "close" brake solenoid valve and fill the brake line with additional air pressure until the desired "trip" pressure is achieved.

## POWER REQUIREMENTS

This ride utilizes three 120 VAC circuits for operation. These circuits include: ride control power, courtesy outlet power, and time display/lane sign power. All three circuits are switched though a contactor housed inside the RCC and should remain on at all times.

The first circuit provides power to the Ride Control Center (RCC) at all times. It also provides power to Remote Panel 1 (RP1), Operators Console (OC) and Remote Panel 2 (RP2) when the "ride" key switch is turned "on."

The second circuit provides power to the courtesy outlets located inside the RCC, RP1 and RP2. This circuit remains off until the "ride" key switch is turned "on."

The third circuit provides power to the time displays and lane signs. This circuit remains off until the "ride" key switch is turned "on."

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