Bethesda Softworks, 1370 Piccard Drive, Suite 120, Rockville, MD 20850

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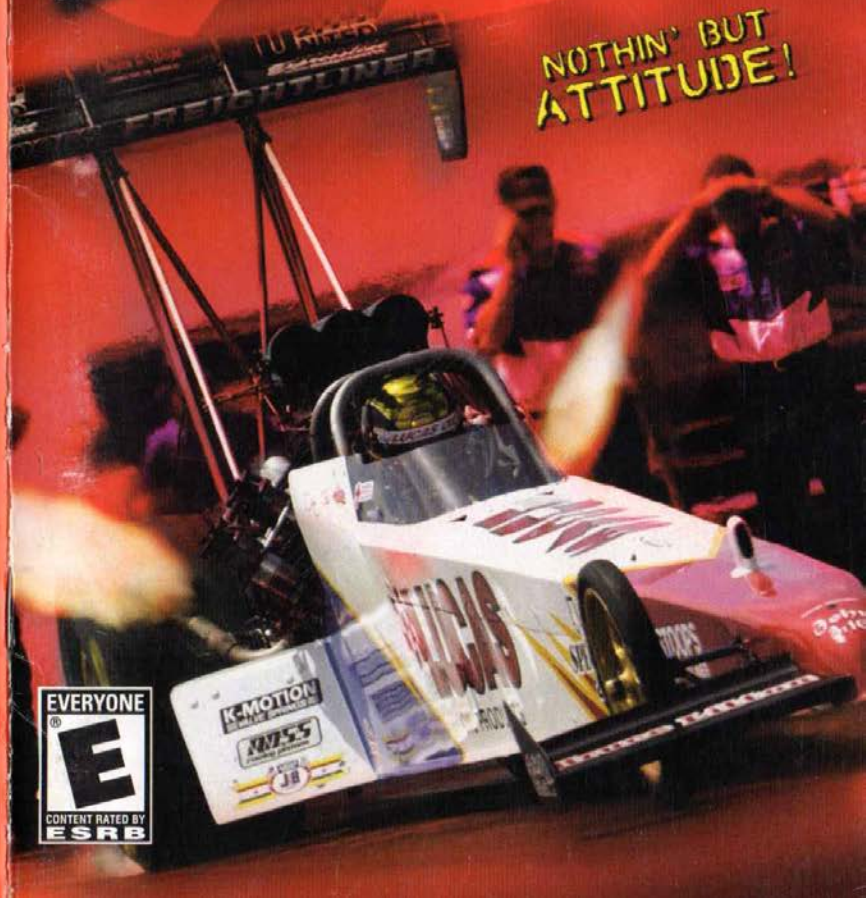
IHRA MOTORSPORTS

DRAG RACING 2

NOTHIN' BUT ATTITUDE!



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A very small percentage of individuals may experience epileptic seizures when exposed to certain light patterns or flashing lights. Exposure to certain patterns or backgrounds on a television screen or while playing video games, including games played on the PlayStation 2 console, may induce an epileptic seizure in these individuals. Certain conditions may induce previously undetected epileptic symptoms even in persons who have no history of prior seizures or epilepsy. If you, or anyone in your family, has an epileptic condition, consult your physician prior to playing. If you experience any of the following symptoms while playing a video game – dizziness, altered vision, eye or muscle twitches, loss of awareness, disorientation, any involuntary movement, or convulsions – IMMEDIATELY discontinue use and consult your physician before resuming play.

WARNING TO OWNERS OF PROJECTION TELEVISIONS:

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- Do not bend it, crush it or submerge it in liquids.
- Do not leave it in direct sunlight or near a radiator or other source of heat.
- Be sure to take an occasional rest break during extended play.
- Keep this compact disc clean. Always hold the disc by the edges and keep it in its protective case when not in use. Clean the disc with a lint-free, soft, dry cloth, wiping in straight lines from center to outer edge. Never use solvents or abrasive cleaners.

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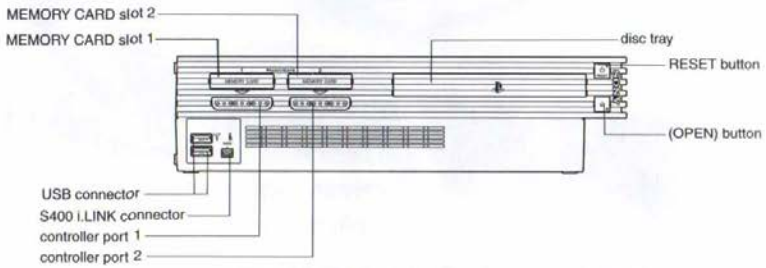
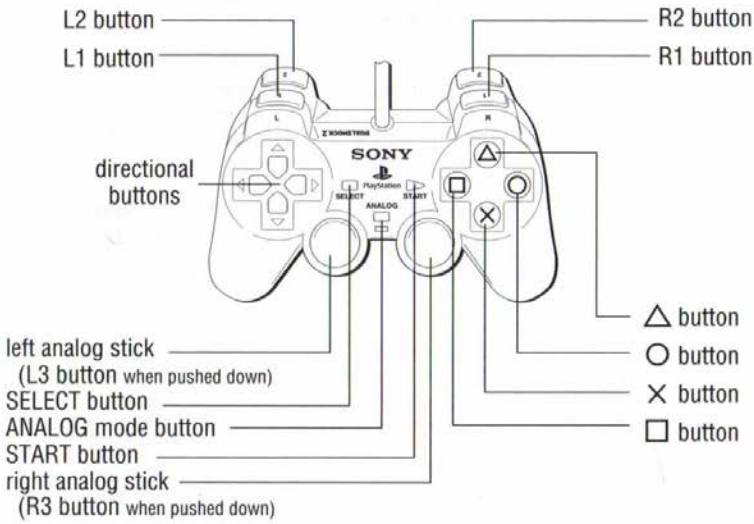
GETTING STARTED



Set up your **PlayStation®2 computer entertainment system** according to the instructions in its Instruction Manual. Make sure the MAIN POWER switch (located on the back of the console) is turned on. Press the RESET button. When the power indicator lights up, press the open button and the disc tray will open. Place the **IHRA Drag Racing 2** disc on the disc tray with the label side facing up. Press the open button again and the disc tray will close. Attach game controllers and other peripherals, as appropriate. Follow on-screen instructions and refer to this manual for information on using the software.

STARTING UP

DUALSHOCK®2 ANALOG CONTROLLER CONFIGURATIONS



RACING

Overview Of Drag Racing

A drag race is an acceleration contest between two vehicles from a standing start, over a measured distance. The accepted standard for that distance is either a quarter-mile (1,320 feet) or an eighth-mile (660 feet). A drag racing event is a series of such two-vehicle, tournament-style eliminations. The losing driver is eliminated, and the winning driver progresses to the next round until one driver remains.

The contests are started by means of an electronic device consisting of multicolored starting lights commonly called a "christmas tree." On each side of the tree are seven lights: two small amber lights at the top, followed in descending order by three larger amber bulbs, a green bulb, and a red bulb.

Three light beams cross the starting-line and connect to track-side photocells, which are wired to the tree and electronic timers in the control tower. As the front tires of a vehicle break the first light beam, or pre-stage beam, the pre-stage light on the tree indicates that the car is approximately six inches from the actual starting line. As the racer rolls forward into the stage beam, the front tires are positioned exactly on the starting line. The stage bulb is lit on the tree, indicating the vehicle is ready to race. When both vehicles are fully staged, the starter will activate the tree, and each driver will focus on the three large amber lights on his or her side of the tree.

Depending on the type of racing, all three large amber lights will flash simultaneously, followed four-tenths of a second later by the green light, called a "pro tree." Alternately, the three bulbs will flash consecutively five-tenths of a second apart, followed five-tenths later by the green light, called a "competition tree," or "full tree."

On each run, elapsed time and speed are monitored to determine performance. When vehicles leave the staging beams, they activate an elapsed-time clock, which is stopped when the vehicle passes the finish line. The start-to-finish time is the vehicle's elapsed time (E.T.). Each lane is timed independently. Speed is measured in a 60-foot "speed trap" that ends at the finish line.

The first vehicle that crosses the finish line wins, unless, as in some categories, it runs quicker than its dial-in or index. A racer also may be disqualified for leaving the starting line too soon (red-lighting), leaving the lane boundary (crossing the centerline, touching the wall or guardrail, or hitting a track fixture such as the photocells), or failing to stage.

THE MENU INTERFACE

IHRA Drag Racing 2 features a unique interface that allows you to quickly access the options, features, and information in the game. The interface is made up of a Main Menu bar, a Sub-menu bar, and a Gadget Window. The Main Menu bar is located in the upper left corner of the screen. A Sub-menu bar appears whenever an option in the Main Menu is selected. A Gadget Window appears when a Sub-menu option is selected. The Gadget Window contains useful descriptions, help information, and options that can be adjusted by the user.

The headings on the main menu are as follows:

Race
Tracks
Shop
Analyze
Options

Race

The race section is where racing action is setup and initiated.

Practice
Practice is simply a single, solo run down the selected track. A timecard is given at the end of the run. No rules are in effect.

Single Race
A single race is a practice race against a random computer opponent or against a human opponent. The race is subject to the selected rule set. Timecards are provided at the end of the run.

Event
An event is a series of single races set up in a ladder sequence.

Season
To race a season, the user must first setup a list of tracks that will comprise the season in the Tracks menu. Season racing will feature one event per listed track. Each event is run as in a single event, but at the end points are awarded and are accumulated over the season to determine an overall winner. Points are awarded differently for heads-up and bracket events. Point tiebreakers are determined by the driver with the most wins.

Conditions
Conditions encompass the environmental conditions during a race. Conditions affect the performance of the car as well as the visual presentation of the track. As the humidity rises and the barometer falls, clouds or fog will exist. Clouds will generally stay for the duration of the race. Fog should come and go as temperature changes.

Weather
Weather conditions affect the performance of the vehicle. For example, engine performance and aerodynamics are affected by the density of the air. The weather can be selected from preset weather conditions, including fully dynamic (e.g., conditions change during the course of the event). The user may also specify the following:

Humidity: Humidity is a measure of the water vapor content of the air. A value of 100% means that the air is fully saturated and it is raining.

Wind Direction: Wind direction is measured relative to magnetic north, 0 being due north, 180 due south, etc.

Wind Speed: Wind speed is measured in miles per hour (mph).

Barometer: Barometric pressure is a measure of the density of the air measured in millimeters of mercury. The range is 25 to 40mm.

Altitude: Altitude is measured in feet above sea level. A value of 0 is at sea level. It is possible to have an altitude below sea level.

Temperature: This is the air temperature as measured at the entrance to the intake system. Temperature is in degrees Fahrenheit (F) and has a range of 40 to 110 degrees.

Rules
The rules section allows the user to select from the IHRA's pre-defined sets of classes and rules, or the user can create their own custom rule set.

Tracks

The tracks in **IHRA 2** are real tracks around the country that host IHRA events. A track is selected by choosing the "Track" top-level menu. The user can select the track to be used for single-event racing or compile a list of tracks for use during a season.

Single Event
To select a single event track, select the sub-menu item "Single Event." The screen will display the currently selected track and its description by default. Scroll through the available tracks using the ◀ or ▶. When the desired track is displayed, press the select button and the current track will become the selected track.

Season List
To select the list of tracks that season racing will use, select the "Season" sub-menu item. The screen will display the current track window (as in the single-event selection), but the description area is replaced by a list box showing the currently selected season (by default the list will contain all the tracks in the game). To remove a track from the list, select the track in the list and select "remove." To add a track, scroll through the available tracks using the ◀ and ▶ and select "add" when the desired track is displayed.

Shop

Chassis: Configures the body style, paint job, and loads the default profile for a selected car.

Engine: Configures the block, pistons, and valves.

Transmission: Configure Gear Set and Clutch for your selected transmission.

Suspension: Configure Coil, Spring, and Steering suspension components

Tires: Adjust size, density, and width of tires.

Devices: Adjust Throttle Stops, Delay Box, Rev. Limiter, and Shift Lights.

Inspection: Examine your car for compliance with the current rules set.

Options

Player

Under the Player tab, you can customize the player name, preset choice of parachute release and burnout staging, and your dashboard display.

Player: This will be the driver name on the selected car.

Parachute: Allows you to select whether the parachute will be opened automatically or manually. The control to release the parachute is customizable from the Controls Setup section.

Stage: Allows you to choose if the car will automatically pre-stage and stage before a race. If Auto is selected, you will not control the car until you disengage the autostage.

Dashboard: The dashboard in IHRA 2 is represented as a cluster of gauges that "float" on top of the 3D display. This configuration allows the user to customize the gauges that are displayed. Any item checked will be displayed.

Speedometer: Indicates the speed of the vehicle.

Tachometer: Indicates the RPM of the engine.

Oil pressure: Indicates the oil pressure. A low oil pressure is an indicator of engine problems.

Oil temperature: Indicates the temperature of the oil. A high temperature indicates a problem with the engine.

Water Temperature: Indicates the temperature of the water that is used as an engine coolant. A high temperature indicates a problem.

Transmission Temperature: Indicates the temperature of the transmission. A high temperature indicates that the clutch may be slipping too much or that an improperly sized torque converter is being used.

Shift light: A user definable light that comes on at an RPM level. IHRA allows two different shift points to be selected by you.

Gear indicator: Indicates the current gear.

Trans-brake indicator: Indicates that the trans-brake is engaged. The trans-brake will prevent torque from being transferred to the wheels by locking the transmission in 1st and reverse gears at the same time.

Three-step indicator: Indicates the state of the three-step. The three-step is a rev limiter used to prevent over-revving the engine.

Line-lock indicator: Indicates that the line-lock is engaged. The line-lock will lock the brakes on only the front tires, allowing the rear tires to rotate freely. Line-lock is used primarily for doing a burnout.

Nitrous Indicator: This indicates when nitrous oxide injection is activated.

Christmas Tree Display: This is the starting light display. The display will be on the left or right depending on the lane you are assigned.

Tire traction: This indicates the temperature of the tires and its effect on the force applied relative to how much the tires can withstand. As temperature increases, the color on the graph will change. Blue is cold, green is optimal, yellow means you are approaching an above-optimal temperature, and red indicates overheated tires.

Distance gauge: Before a race begins, the distance gauge indicates the distance to the start line (and pre-stage light).

Christmas Tree: Shows a close-up view of the "Christmas tree."

Controls

Controller Selection:
Select the controller port used by the current player profile.

Steering: The Steering slider allows adjustment of how the control input is handled. Using the Linear control method will allow the same amount of controller movement for an equal amount of game response. The Non-Linear control method will allow less game response the closer the controller is to the centered position. Altering between the two modes can be useful if you feel the controls seem too sensitive for your play style.

Default Controls

Action	Controller
Steer Left	**Left analog stick** Left
Steer Right	**Left analog stick** Right
Accelerate	**Left analog stick** Up
Brake	**Left analog stick** Down
Shift Up	▲ **button**
Shift Down	▼ **button**
Reverse	□ **button**
Trans-brake	X **button**
Three-step	◀ **button**
Line-lock	O **button**
Nitrous	▶ **button**
Parachute	△ **button**
Reset View	**R2 button**
Quick View	**R1 button**
Zoom in	**L2 button**
Zoom out	**L1 button**
Next Camera	**R3 button**
Pitch Camera Up	**Right analog stick** Up
Pitch Camera Down	**Right analog stick** Down
Look Camera Left	**Right analog stick** Left
Look Camera Right	**Right analog stick** Right
Race Menu	**START button**

Settings

The Settings window contains options for adjusting how "realistically" **IHRA 2** plays, volume control, and graphics details. The Settings window is accessed by selecting Options from the Main Menu and then selecting the Settings tab.

The following options are available under Game:

Ability Level: Specifies the skill level of the computer-controlled players. The value relates the ability of the computer players as compared to a pro-level driver. The value can range from Rookie to Pro.

Number Of Racers: Allows the user to specify the total number of players entered into events. This includes both human and computer players. This parameter only applies to event and season racing. Values can range from 2 (you and an opponent) to 64.

Play Videos: Indicates whether the video segments are played at the end of the race.

Damage: Controls the realism of the damage to the engine (blown engines). Options are: None, Partial, and Full. These options correspond to no damage, minimal engine damage, and full damage to engine components.

Audio Volume
The Audio Volume portion of the window contains options for adjusting the relative volume of various sounds. All volumes are expressed in percentage of full volume. Ranges are from 0 (no sound) to 100% (full volume). The following options are available:

Master: The overall volume. This will automatically reduce the volume of all the sounds.

Engine: Changes your car's engine volume.

Tire Squeal: Changes the tire squeal volume.

Crash: Changes the crash sounds volume.

Opponent: Changes the opponent's engine volume.

Announcer: Changes the volume of the announcer's voice.

Menus: Changes the volume of the menu sounds.

Music: Changes the volume of the music.

BUILDING A CAR

IHRA 2 allows the user to modify nearly every aspect of the vehicle through the "Shop." The Shop is accessed by selecting Shop from the Main Menu or during a race by selecting the Shop button.

The following sections of the vehicle can be modified through the shop:

Chassis: Selection and modification of the chassis and aerodynamics.

Engine: Customize the engine.

Transmission: Modify the type and setup of the transmission and gears.

Tires: Select the parameters of the tire.

Suspension: Customize the suspension.

Devices: Set parameters for the delay box, throttle stop, two-step, and dial-in.

Loading and Saving Setups

IHRA 2 allows you to load and save multiple setups that include all information for the Chassis, Engine, Transmission, Wing, Tires, Suspension, and Devices.

The setup Load and Save are accessed from the Chassis window under the Shop. To load a file, select **Load** and select a file from the list. When the file is selected, the file's description will appear in the Description area. Select **Load** to retrieve the setup.

WARNING: Loading a setup will overwrite and replace the current setup. To save a setup, select **Save** and type a name in the Name area and a description in the Description area. Select **Save** to commit the setup to your memory card (8 MB) (For PlayStation®2).

NOTE: Your changes made in the Shop are automatically saved when exiting the Shop. You don't have to save a setup unless you want a permanent copy of the current setup.

Handicapped Racing

A handicap starting system is used to equalize competition in certain categories. Basically, this system enables vehicles of varying performance potential to compete on an equal basis. The anticipated elapsed times for each vehicle are compared, and the slower of the two cars is given a head start equal to the difference of the two E.T.s.

Through this system, virtually any vehicle can be paired in a competitive drag race.

Here's how it works. Car A has been timed at 14.78, 14.74, and 14.76 seconds for the quarter-mile, and the driver feels that a dial-in of 14.75 is appropriate. Meanwhile, the driver of car B has recorded elapsed times of 12.27, 12.22 and 12.26 on the same track and he has opted for a dial-in of 12.25. Accordingly, car A will get a 2.5-second headstart over car B when the tree counts down to each car's green light. If both vehicles cover the quarter-mile in exactly the predetermined E.T., the win will go to the driver with the best reaction time (quickest reaction to the green light on the tree).

However, if a driver runs faster than his or her dial-in, it is called a "breakout" and the driver is disqualified. If both drivers run quicker than their dial-in, the win goes to the driver who breaks out the least. A foul start, or red-light, takes precedence over a breakout. A driver who red-lights is automatically disqualified even if the opponent ends up breaking out.

A modified form of Handicapped racing is found in several classes where both cars leave the starting line at the same time but are limited to a fixed E.T. These classes use a pro tree and require greater skill in managing top end driving (see Driver's School).

A Pro start is where both lanes' lights activate at the same time.

Note that your vehicle does not have to physically conform to the E.T.s in order to race in the class. For example, your car may be physically capable of running an 8.90 E.T. but you are still allowed to run in the 10.9 class. However, you must make sure your run is at or over 10.90 E.T. or you will breakout and lose. Sometimes this involves hitting the brakes at the finish line to win (see Driver's School). Class selection is made when selecting a race type from the Race menu.

Classes

The Rules window, accessed from the Race sub-menu, is where you setup and determine the class of racing. A racing "class" usually refers to a set of rules or restrictions that a car must conform to in order to qualify. In **IHRA 2**, you can choose from many preset classes or you can create your own custom class by specifying various restrictions.

Building a list of rules that a car must "pass" in order to compete creates a class. The list of available rules is displayed in the upper right of the Rules window. The lower left window is the list of rules for the class. Most rules have one or more parameters that must be specified when added to the list. To add a rule, select it from the Available Rules list and select **Insert**. To remove a rule from the list, select it and select **Remove**. To modify the parameters of a rule, select the rule and select **Edit**. You can change the order of the rules by selecting a rule and selecting the up or down arrow.

Rules can also be used as conditional check. For example, if you wanted a class to allow both blown and nitrous cars but wanted the nitrous cars to have a weight advantage, you would need to specify the blown or nitrous rules differently. To do this add the "blowers" rule and then add the "minimum weight per CID" rule. Now select the right arrow. The "blowers" rule becomes a test and the "minimum weight per CID" rule is only in effect if the "blowers" test is true. Most of the rules can be used as tests. There can also be multiple levels of indentation. Very complex rules can be built in this way.

To setup or select an existing race rules or class, open the Rules window by selecting the Rules option from the Race sub-menu. The window shows existing or saved classes. To select an existing class, click on a name. The description of the class will show above the selection window. If this is the class you're looking for, select **Load**.

Once you have your class modified, you will want to save it. First, select Save from the Rules window. Type in a new name for the class by selecting the name window (located above the list of existing classes) and then type in the new name. Next, specify a file name to save it as by typing in the box below the list of classes. When ready, select **Save**. The new class is ready to be used.

When restrictions are in place, the Inspection window (accessible from the Shop sub-menu) will alert you with a message when your car does not meet the requirements of the class. You can then individually adjust the components or settings of your car until you do not violate any of the class restrictions.

THE BURNOUT

The burnout is an important stage in preparing a vehicle for racing. Besides being a spectacular display of power, the burnout is necessary to bring the tires up to optimal temperatures and thus, optimal grip.

A burnout is accomplished by first rolling forward through a portion of the track behind the start line called the "water box" or "bleach box" (bleach was sometimes used to soften the tires). The driver then proceeds to put on only the front brakes using a device called a "line-lock." The engine RPMs are then brought up, and the clutch is engaged if applicable, until the rear tires begin to spin. The throttle is held open a moment longer as the line-lock is let go. The car will roll forward as the throttle is disengaged.

The driver is also allowed to do "dry" burnouts, which consist of opening the throttle on the dry track without engaging the line-lock. The car lurches forward, further warming the tires and clutch.

THE STAGING

Staging takes place after the vehicle's tires are adequately warmed up with a burnout. Staging is detected through the use of light beams and photocells or infrared that detect when the tire breaks the beam. The vehicle moves forward until the small yellow light or lights on the top of the christmas tree (pre-stage lights) are lit. Once pre-staged, the vehicle is inched forward (about six inches) until the second yellow light or lights on the christmas tree (stage lights) are lit. Once one opponent has staged, the other opponent has a limited time, about 15 seconds, to complete staging and be ready to race. At this point, the drivers must be prepared for the tree to begin its countdown at any time.

It is possible to continue to roll forward out of the pre-stage lights so that only the stage light is lit. This is called "deep staging," and there are benefits and trade-offs to doing it. On the positive side, you are a few inches closer to the finish line and your roll out time (see Glossary) will be shorter and thus your reaction time will be better. On the negative side, your E.T. will be slower because you will have less of a rolling start and will be leaving the start line at a lower speed. There are also some psychological advantages to deep staging that may distract your opponent just enough to give you the better reaction time and a win.

NOTE: You are given a limited amount of time to stage your car (about 2 minutes). If you do not stage within this time, the other car will be allowed to make the run as if it were a bye and you will be eliminated.

THE RACE

Once both opponents are staged, there will be a random amount of time before the race begins (usually only a few seconds). During this time, the car should be put in the proper gear and the trans-brake engaged which will prevent the transmission from transferring power to the wheels. If a two-step (rev limiter) is used, the two-step should be engaged and the throttle planted to the floor. Otherwise the RPMs should be brought up to near the maximum torque's RPM.

If starting with a full tree, each light will illuminate .500 seconds apart. The reaction timer starts as the third amber light illuminates and stops when the car leaves the stage beam. Thus, a perfect reaction time on a full tree would be .500. In most cases, wait for the second or third amber light to flash before releasing the trans-brake and planting the throttle. If you decide to use a delay box, the actual light used to release the trans-brake is programmable.

If starting from a pro tree, all three amber lights will illuminate together followed .400 seconds later by the green light. Depending on your starting style and use of a delay box, you will probably release the trans-brake as soon as the amber lights flash. As your reaction times improve you will need to adjust your release time and possibly use a delay box, to help prevent red-lighting.

Once a race is under way, there is not much left to do but correct the car's direction through steering and hit the shift points. Care must be taken not to over-rev the engine or smoke the tires. If the tires begin to smoke, the driver must back off the throttle in order to regain traction. As the car nears the finish line, the driver must decide if he is under the dial-in time. Sometimes it is necessary to hit the brakes, called "dumping," at the finish line in order to not breakout. In general, you should always try to get to the finish line first, but if you and your opponent both breakout, the one who breaks out the least will win. As you can see, it gets pretty busy at the finish line. This is a part of Bracket racing that few people are aware of or are good at. It takes a lot of practice to be good at the top end. See the Driver's School section for more racing pointers.

A similar set of information is also displayed about your opponent. You can use this information to compare the two runs and see what you did better or determine where you need improvement.

The 60ft times are dependent upon traction, gearing, launch RPM, and staging depth. The 60ft times will not vary greatly with horsepower fluctuations due to the environment. Tire temperature and pressure will help optimize traction.

After the 60ft times, the 330 and 660ft times will indicate how well the car is pulling through the gears. These times, for the most part, are affected by gearing, engine horsepower, and, to a lesser extent, the weather.

The distance after the 660ft mark and the finish line is a measure of the brute horsepower the engine produces. Variables such as weather, camshaft timing, and valve overlap have a large effect on the top end speed.

Loading and Saving Games

During an event or a season, the game can be saved at any time. To save a game, select the Save Game option from the pre-race menu and type a name and description.

You can also load a game at any time. Care must be taken when loading a game because the car setup and player statistics are set to the values present when the game was saved. This means that if you save a game and then participate in another event, then reload the game, it will be as if you never raced the second event. To Load a game, select Load from the Race tab.

Setup Tips

Setting up the car is one of the most difficult, most rewarding, and most fun parts of drag racing. The total car setup involves many components. The most important and modifiable areas are Engine, Transmission, Tires, and Suspension.

Engine

There are two engine outputs that the drag racer is concerned with: torque and horsepower. Torque is the raw force the engine generates. It's the kick in the pants you feel when you step on the gas. Horsepower is what gives you top end speed.

Torque is generated mainly through the size of the engine, compression ratio, and type and timing of the camshaft. Horsepower is a direct function of torque and engine RPM. It is affected more by modifications to the induction and exhaust systems. For the most part, a drag racing engine should have its peak horsepower further in the RPM range.

Using the simulation in **IHRA 2**, you can build nearly any naturally aspirated engine. It is possible and entertaining to input the parameters of a known engine and see how it will respond to different changes. In theory, it is possible to use the changes in a real car and experience similar results. If you build a large engine and have trouble dealing with the torque of the engine transfer (the car will roll to one side), increase the rear springs and the rear anti-roll bar. Also, lowering the center of gravity will help with the car's stability.

Transmission
The transmission consists of a series of gears and a coupling device. The device is either a torque converter, a clutch, or a combination of both. Gear selection is relatively straightforward. Gears should be selected so that the engine is working as much as possible around its peak torque and, in top gear, at its maximum horsepower.

The gear chart is extremely useful in selecting the right gears and shift points. On the chart, each gear is shown with its corresponding speed at RPM. The chart is useful in several ways. The most common use is determining shift points. Each gear is graphed and the intersection from each gear to the maximum torque is drawn (the small vertical lines). Where the line starts down is the optimal shift RPM. Optimal shift points allow the engine to reach maximum horsepower and then drop the engine to optimal or peak torque RPM at a shift. The gears should be adjusted so that both cases are as close as possible. The chart's other useful purpose is gearing for the top end. The top end gear should allow the engine to operate near peak horsepower at the end of the run (1/4 or 1/8th mile). Gear selection becomes a little more complicated once a torque converter or clutch is factored in.

A torque converter uses impellers and a dense fluid to transfer torque from the engine to the transmission. This has several benefits including torque multiplication, reducing the need for a broad range of gears, and not being able to stall the engine. Torque converters can be customized to work effectively with your engine. The multiplication factor is produced because of the configuration of the input and output impellers. The lockup is the RPM at which the torque converter is "locked" to the RPM of the engine. The higher the lockup, the higher the engine can rev before the engine begins to get bogged down. Because of the fluid coupling, the torque converter has a certain amount of loss. The Slip parameter is the amount of slip in the converter. If you want the converter to "lockup" like a manual clutch, a zero slip can be entered.

The manual/automatic transmission settings are a little tricky. In manual mode, the SLIP setting is the maximum amount you want the clutch to slip up until the LOCK rpm. A good value is SLIP=60 and LOCK=4000. In automatic mode, these variables are the typical slip and lock values for torque converters.

Tires
Tires are arguably the most important and least understood aspect of drag racing. All of the interaction between the tire and the ground occur in a relatively small contact patch. **IHRA 2** allows extensive modeling of the tire and allows you to customize the tire's grip curve both longitudinally and laterally.

For the most part, drag racing tires are concerned with longitudinal forces. Longitudinal forces are directly linked to tire load, shape, pressure and temperature.

Tire load is more or less controlled by the placement of the center of gravity. Ideally, all the weight of the car should be transferred to the rear tires under acceleration. Under full acceleration, the tires should be able to handle the full torque of the engine or the tires will break loose and spin, thus losing traction.

Drag tires generally have low pressures. This allows for the tire to distort under acceleration and produce a larger contact patch. This is also what causes the wrinkled sidewall famous in drag racing.

Tire temperature is controlled only through a pre-race burnout. Burnout time should be consistent and controlled. The most important parameters on the tire window are the Peak, Stiffness, and Slope. The Peak value is the tire's maximum grip. This peak grip is directly related to the amount of weight on the tire. The Stiffness controls the initial shape of the tire curve and is related to the Slope parameter. The Slope determines how fast the tire's grip is generated. The other parameters should be adjusted so that the tire curve peaks and maintains a peak before falling off. The more distinct the curve peak is, the less consistent the tire will be.

Suspension
The main purpose of a drag racing suspension is to keep the car stable and allow the car to keep the rear tires glued to the ground. Keeping the tires glued to the ground requires the suspension to allow weight to be transferred to the rear tires predictably and as quickly as possible.

The rear suspension should be set up to be stiff enough to allow the full weight of the car to be transferred onto the rear tires without the body or wheelie bars hitting the ground. Using slightly stiffer springs on the side receiving the weight (usually the right) can compensate for weight transfer due to engine torque (lateral transfer).

Front suspension should be set up to allow for the quickest and safest weight transfer to the rear. In general, the front spring rates should be increased to help weight transfer.

Driver's School

Drag racing is all about reaction time. In Heads-up drag racing, this is more or less the case, but in Bracket-style racing, there is an additional factor to deal with — the Top End or finish!

Reaction time is important to any style of drag racing. For most people, reaction time is believed to be simply the time that elapses from the green light to the time the driver reacts. In fact, it is much more complex than this.

The "official" definition of reaction time is the time it takes the car to leave the stage beam after the green light is lit. In reality, in order to get a good reaction time the driver must "react" to the second or third yellow light. The reasons for this are complex and involve many factors. Statistically, human reaction time is in the range of .200 seconds so, without leaving before the green light would mean that the best reaction time possible would be in this range.

Probably the largest of factor contributing to reaction time is called "rollout distance." Rollout distance is the distance the car must roll forward before the stage beam will be unbroken. This distance will take a certain amount of time to cover and the driver will need to compensate by leaving earlier. What all this means is that a driver will need to practice in order to "dial-in" his reaction time to compensate for both these (and other) factors.

Here are the top 5 tips for developing consistent and good reaction times.

1. Stage in the same position each time. This will make the rollout distance predictable. A good way to do this is to slowly roll forward into the pre-stage beam, stop, and then roll very slowly forward into the stage beam. You should be very close to the same spot each time.

2. Make sure your car is setup the same for each run. It is not a good idea to make changes to your vehicle once you have dialed it in for a race. Also, changing transmissions or tires can have dramatic effects on the way your car reacts off the line. Make these changes before you dial in.

3. Use the two-step or, at the very least, keep your launch RPM the same each time you race. Since your engine torque varies through the RPM range, it is best to keep your launch RPM near the peak torque. If you go over or under, it will vary the time it takes the car to react.

4. Use the delay box to compensate for your reaction time. Program the box so that you can leave on one of the amber lights (the first is statistically the best). If you don't want to use the delay box, plan on leaving off the third amber light and saying a word to yourself such as "start" before accelerating.

5. Develop a routine that you follow each time you race. This helps keep things under control and your mind focused on the race and not worrying about which button you changed the trans-brake to. Also, do your burnout for the same amount of time each run. Tire temperature can have a broad effect on grip and thus reaction time.

The main point to remember is to be consistent. Not having a great inherent reaction time does not lose races. Being inconsistent does.

TOP END CLINIC

Top end tactics are only applicable to Bracket-style racing. Some believe that top end tactics are just a way to compensate for being inconsistent at the start. While this may be true, there are definitely good reasons to employ tactics at the finish line. Top end racing is arguably more difficult than starting line. At the starting line, you can employ many consistent and measurable tactics to improve reaction time. At the top end, it requires more of an instinctual response.

In Bracket racing, the general objective is to get to the finish line first while either not going over your dial-in or, in the case of a double breakout, by going over your dial-in by the least amount. There is no timer or indicator telling you if you are going to break-out. You must rely on your instincts to tell you if you should take action by slowing down at the finish line, called "dumping."

Dumping involves getting off the gas or even hitting the brakes before the finish line to keep yourself from breaking out or breaking out less than your opponent. Here are the basic "rules" for dumping your opponent:

1. If you are obviously going to lose the race to the finish, your only bet is to dump and hope that your opponent breaks out making you the winner.

2. If you think you are going to breakout, you may decide to let your opponent cross the line first by backing off the gas.

3. If you think your opponent had a better reaction time and you are equal at the finish you may decide to dump and let your opponent cross the line first. His chances of breaking out will be greater than yours.

How do you judge who will cross the finish first? Here are some tactics to help make a better judgment:

1. At the start line, pick an object on the screen that lines up with the front (or any distinct part) of your opponent's car. As you near the finish line, make sure this point is in front or behind you with a quick glance.

2. Use the overhead (helicopter) view. With the overhead view, the front of the car may extend past the front tires differently on different cars, making it hard to judge the actual distance.

3. Use the distance gauge, which indicates within a few feet where your opponent is. This may be cheating a little but it makes up for the lack of sensations that actually occur while racing a real car.

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