

TT RACER

TT Racer is a spectacular motorcycle racing simulation which gives you the exhilarating experience of riding a Grand Prix bike. The challenge is not easy as you are racing against 15 other determined riders on the 12 famous circuits.

Riding Grand Prix bikes is a very skilful and demanding business with only about ten top riders in any class being capable of winning the world championship. So . . . helmets and leathers at the ready, with practice you could be the first to the winning flag and the World Championship.



FEATURES

- Spectacular over-the-handlebars
- 3D display.
- All 12 Grand Prix tracks.
- All 4 solo Grand Prix classes.
- 4 different levels of competition.
- Race against 15 other bikes including up to 7 of your friends (with networking).
- Full Grand Prix season points scoring.
- Practice time decides start position.
- Adjustable bike characteristics.
- Different race distances.
- Pit area for tyre changes and refuelling.
- Solid filled track side graphics.
- Saves race position table and bike characteristics.

Read what Suzuki's top riders Paul Lewis and Kevin Schwantz have to say about this spectacular simulation!



“I didn't think there was anything to compare with the real thing but TT Racer comes mighty close. Even with my considerable experience and knowledge of the tracks I still had to work hard to win. TT Racer gets my vote for thrills – I still can't believe how realistic it is!”

Paul Lewis

“The graphics amazed me, not to mention the uncanny 'feel' of the bike. I really had to use my wits to stay with it. Overtaking other riders and then watching them fall behind in my wing mirror was quite an experience. Very impressive – almost as thrilling as the real thing. ”

Kevin Schwantz



LOAD “ ”

MAIN MENU

A-Z SET RIDERS INITIALS – the players initials are used on the race positions table. If a mistake is made, this may be corrected by returning to the title page and repeating the entry procedure.

1 ENGINE SIZE – the four solo Grand Prix classes.

2 RACING COMPETITION – this sets the speed of the computer controlled opposition riders, and how difficult it is to crash your bike. CLUB level has been made very easy to enable the novice to get used to the controls and the different tracks. This difficulty increases on each level so GRAND PRIX racing is as realistic as possible.

3 SELECT TRACK – all 12 tracks for the 1986 Grand Prix season.

4 NUMBER OF LAPS – this can be from a short 1 lap race to a long 99 laps. When the Grand Prix distance option is selected the number of laps for this track and engine size are set. If the track does not hold this Grand Prix race then the lap length is set to one.

5 EVENT –

TRACK sets racing on the selected track.

SEASON will take you racing in the correct order on all of the tracks for this engine size and build up a world championship points total.

PRACTICE allows you to set up your bikes performance and handling variables and set a practice lap time to improve your position on the starting grid.

6 NUMBER OF EXTERNAL BIKES ON NETWORK

– this selects the number of friends you are racing against. Each external rider requires a Sinclair Spectrum and an Interface 1. The computers are connected together by the Interface 1 network.

7 TERMINAL NUMBER ON NETWORK – each external bike on the network must be given a different terminal number. Terminal 1 is used as the controlling terminal for setting the menu page and holding or resetting the game.

8 JOYSTICK CONTROLS – keyboard or appropriate joystick interface.

9 SOUND CONTENT –

ALL – gives title page and game sound.

GAME – sound in game.

NONE – no sound.

0 SAVE/VERIFY/LOAD – this saves, verifies and loads the lap record tables, bike performance characteristics and the menu selection to allow you to save and resume a racing session at any time. Loading or verifying can be aborted at any time by pressing the SPACE key.

Note: Changing your name (KEYS A-Z), engine size (KEY 1) or competition level (KEY 2) all reset the practice lap time.

INSTRUMENTS

PITBOARD – is displayed on the top line of the screen and holds the following information:

POS 14 – gives your current position compared to the other riders.

A/B 23/16 – is updated once per lap, displaying the time in seconds to the nearest rider ahead and behind you. The ahead time is updated as you cross the start line and the behind time when the next rider crosses the line.

LAP 10/28 – displays the lap number you are on and the total number of laps for the race.

TIME 1:04.08 – indicates your current lap time.

REC 1: 38.42/1:28.20 – Your best lap time in this race or during practice and the tracks' lap record.

DASHBOARD – The basic racing instrument panel consists of handlebars with clutch and brake levers, twistgrip throttle, rev counter and temperature gauge. The additional instrument of gear number has been added as it makes racing on a computer far easier. If the road instrument option is selected this adds speedometer, fuel gauge; mirrors and tyre wear indicator.

CLUTCH LEVER – animated lever on the left handlebar to show when the clutch is pulled in. This disconnects the engine from the back wheel.

BRAKE LEVER – animated lever on the right handlebar to show when the front brake is applied.

THROTTLE – the throttle opening is displayed as a red line next to the throttle twistgrip on the right hand handlebar.

REV COUNTER – displays the engine revs per minute (RPM) as an analog dial with needle and a digital readout. When the engine revs are below The maximum permitted by 1000 RPM or less the dial changes to yellow. It changes to red when the maximum permitted RPM is exceeded.

TEMPERATURE GAUGE – gives engine temperature. When the top of the bar is yellow the temperature is normal. If it is blue or red care must be taken not to exceed maximum RPM or the engine may seize.

GEAR NUMBER – displays the gear the bike is in.

SPEEDOMETER – displays the bikes speed in miles per hour (MPH), as an analog dial and a digital readout.

FUEL GAUGE – amount of fuel in fuel tank.

MIRRORS – when an opposition bike is less than 64 feet behind you, it is displayed in the appropriate mirror.

TYRE WEAR INDICATOR – gives front and back tyre wear by changing colour as the tyres wear. When the colour is dark blue the tyre is almost worn out. The indicator will flash when the tyre has blown out and you will crash.

RIDING CONTROLS

For maximum control and enjoyment it is recommended to play this game with a joystick.

JOYSTICK FORWARD or KEYS: 7, O, P, ↑

OPEN THROTTLE – increases engine power to accelerate and increase speed.

JOYSTICK BACKWARD or KEYS: 6, O, L, ↓

APPLY BRAKE – slows bike down.

JOYSTICK LEFT or KEYS 5, A, Z, ←

LEAN LEFT – turns bike to the left.

JOYSTICK RIGHT or KEYS: 8, S, X, →

LEAN RIGHT – turns bike to the right.

FIRE BUTTON or KEY: SPACE

CHANGE GEAR & CLUTCH OPERATION – momentary pressing will change up a gear if the brake is off and the engine is less than 2500 RPM from maximum revs, or change down a gear if the brake is applied or the engine is more than 2500 RPM from maximum revs. Holding the fire button will pull in the clutch disconnecting the engine

from the back wheel. This allows the engine revs to change very rapidly which is useful for doing quick starts and pulling wheelies.

SYM-SHIFT & B

RESET – aborts the race and returns to title page.

H – HOLD – freezes the race.

F – INVERT SKY & TRACK COLOURS – set track and sky colours.

G – CHANGE TRACK COLOUR – stops attribute contention.

PITSTOP – RACING

R – REFUEL – fills the bikes petrol tank.

T – CHANGE TYRES – changes the bikes tyres.

PITSTOP – PRACTICE

1–6 – SET UP GEAR RATIOS – sets each of the six gears individually with a new ratio. 1 = lowest (slowest top speed, fastest acceleration), 5 = highest (fastest top speed, slowest acceleration).

S – SET STEERING SPEED – alters the bikes steering head angle which changes the speed the bike leans at. 1 = slowest, 5 = fastest

T – SET UP TYRE TYPE – selects the tyre type.

1 = most grip, fastest wear, 5 = least grip, slowest wear.

A – AUTOMATIC GEAR CHANGE – switches on and off the automatic gear change.

R – ROAD INSTRUMENTS – switches between racing and road bike instrument panel.

RACING

STARTING

The start light sequence is red when there is less than 10 seconds to the start and green to start. When the light changes to green the engine can be started by pushing forward the joystick which opens the throttle. When the engine has started, high engine revs can be quickly built up by holding down the fire button which pulls in the clutch. If the engine revs stay at zero the engine has not started, which means the fire button must be released and the start procedure repeated. When the engine revs are about 10,000 RPM let out the clutch by releasing the fire button and the bike will accelerate forwards rapidly. When the rev counter reaches the red line change gear by momentarily pressing the fire button. Over revving the engine will make the engines temperature rise. If the engine overheats, there is a danger it will seize and make you crash the bike. Most of a racing engines power is developed over quite a narrow rev band (9000–12500 RPM on 500cc), which means that if the revs drop below this level in a high gear, even opening the throttle to the maximum, will not stop the revs from dropping as there is not enough power to accelerate. To speed up, you will need to change down one or more gears.

CORNERING

When approaching a corner pull back on the joystick to apply the brakes and change down the gears by momentarily pressing the fire button. The bike is then leaned over left or right to take the corner by pushing the joystick left or right.

Corners of more than 90 degrees have been highlighted with a trackside arrow at their start,

showing the corners direction. The screen's border flashing red and cyan indicates that you are on the edge of the track and grass. This is bumpy as you can see from the horizon pitching and the edge friction is greater than the track's which means you will tend to slow down. Persistantly sitting on the track edge may also result in you crashing the bike.

CRASHING

Failure to negotiate a corner may result in you crashing. Your bike will go on its side, engine revs will go up to maximum where the back wheel is off the ground and dirt will fly past. If there are no lines across the screen your bike is not too badly damaged which means you can continue the race. To restart, close the throttle so the engine revs die. After the engine has stopped, pick up your bike with the joystick, so the horizon becomes flat, change into first gear, lean away from the track edge and start the bike. If there are lines across the screen, your bike is too badly damaged for you to carry on, and this is the end of your race.

OPPOSITION BIKES

There are 15 opposition bikes, which can all be computer controlled, or up to 7 of them can be your friends by networking Spectrums together. The computer controlled opposition bikes are determined top riders who rarely crash and will take evasive action to stop you crashing into them whenever possible as they are keen to finish the race.

When several computers are networked together a game cannot be started until the network has been correctly configured with regard to the number of terminals and each one having a unique number. If there is an error the computers will give an error message on the bottom line of the menu page. "NO TERMINAL(S) n" means that the terminal number "n" is missing from the network. "MULTIPLE TERMINALS n" means that more than one terminal has the number "n". When the set up is correct the message "MASTER TERMINAL GAME SELECTION" appears on a green background. Terminal 1 is the master terminal that controls the game. It sets all the other terminal's menus so that you are all racing on the same track under the same conditions. It also controls the Hold, Continue and Reset commands during racing. Each rider has a view of the track and the other riders. When you are overtaking your friend, his bike will pass from in front to behind you and will appear in front on his display. At the end of the race the master terminal compiles all of the bike positions, the fastest lap time and transmits this to all terminals.

WINNING

The first rider to cross the finishing line on the last lap is the winner of the race. All rider positions are displayed in the race positions table at the end of the race and if you have achieved a new lap record this is displayed on the lap table. Your position on the pit board may differ slightly at the end of the race from your finishing position if any other bike has finished at the same time as you. This is because the computer will double check a close finish to determine who crossed the finish line first. When a season of racing has been selected world championship points are awarded

as follows: 1st = 15 pts, 2nd = 12 pts, 3rd = 10 pts, 4th = 8 pts, 5th = 6 pts, 6th = 5 pts, 7th = 4pts, 8th = 3 pts, 9th = 2 pts, 10th = 1 pt and 11th to 16th = 0 pts. As the season progresses, a running total of world championship points are built up in the race positions table. The rider with the most points at the end of the season is the World Champion.

PIT STOPS

When you are in a long race it may be necessary to call into the pits to refuel or fit new tyres to the bike. A call into the pits is made by pulling up alongside them, less than 4 feet from the right hand side of the track. When your speed is zero the pit menu page will be displayed. If you pull into the pits during practice, the bike performance setup page will be displayed instead of the refuelling and tyre change page.

PRACTICE AND BIKE SET UP

This is used to obtain a good practice lap time and set up your bikes performance. The better your practice lap record the nearer you will be placed to the front of the starting grid. To achieve pole position your practice time will need to be better than the current lap record.

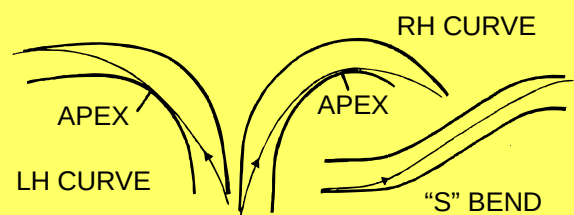
Each racing track places different demands on a racing bike. In order to get the best from it, it has to be set up for that track. On the tracks with many slow curves the emphasis will be on fast acceleration, hence low gearing, and tracks with a few fast curves and long straights the reverse is true as top speed is more important for fast lap times. Fast steering is not as stable or controllable as slow steering but it enables changes of direction to be made more quickly which is important on twisty circuits, particularly on "S" bends. The choice of tyres will be largely decided by the length of your race and how many pit stops for tyre changes you make.

RACING TECHNIQUES

The way to win races is to consistently achieve the fastest lap time. The most important way to achieve this is by taking corners correctly. Cornering consists of the co-ordination of several different actions.

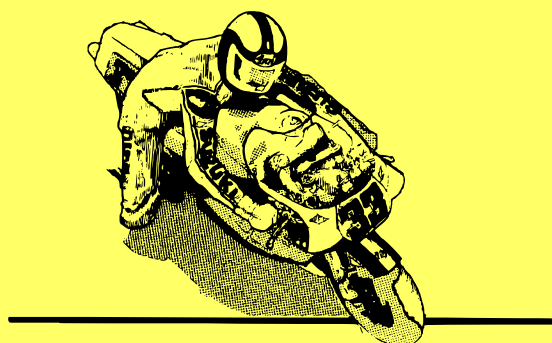
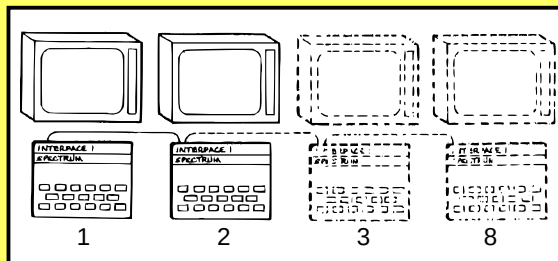
- i) Positioning yourself at the entrance of the corner for the fastest line through,
- ii) Braking to a suitable cornering speed and selecting the appropriate gear,
- iii) Leaning to take that line,
- iv) Accelerating as you exit from the corner.

The correct points for carrying out each of these operations have to be found by trial and error. The track side objects and the centre line are useful reference points for repeating cornering conditions consistently. The diagrams show several different corners and the fastest lines through them.



NETWORKING

TT Racer offers the unique option on the Sinclair Spectrum of connecting up to 8 machines together, so you can race against your friends. The computers are networked using Sinclair Interface 1's as shown in the diagram. For further connection information please refer to the Sinclair ZX Spectrum Microdrive and Interface 1 Manual.



ACKNOWLEDGEMENTS

Digital Integration would like to thank Heron Suzuki Racing for their invaluable assistance during the design and development of TT Racer. We would like to thank in particular Garry Taylor and Paul Lewis for their help.

All information stated herein is accurate to the best of our knowledge. Although considerable effort has been used in achieving a realistic simulation, approximations have been made due to the limitations of the computer and certain technical data not being available to the public.

REFERENCES

The following books provided much useful information and knowledge for the development of TT Racer and are recommended for further reading on racing technology and techniques.

The Art and Science of Motor Cycle Road Racing, by Peter Clifford. Hazleton, ISBN 0 905138 24 4.

A Twist of the Wrist (The Motorcycle Road Racers Handbook), by Keith Code. Acrobat, ISBN 0 918226082.

Speedbikes, by Mick Wollett. B. T. Batsford, ISBN 0 7134 1294 1.

Motorcycle Chassis Design (The Theory and Practice), by Tony Foale and Vie' Willoughby. Osprey, ISBN 0 85045 560 X.

Motocourse 1984-85, Hazleton, ISBN 0 905138 333.

Motocourse 1985-86, Hazleton, ISBN 0 905138 392.

TECHNICAL SPECIFICATIONS

500cc – HERON SUZUKI XR70RV

RIDERS:	Paul Lewis (Aus), Niall Mackenzie (GB), Kevin Schwantz (USA)
ENGINE:	Water-cooled, reed valve, square four, two-stroke
BORE/STROKE:	56mm x 50.6mm
CAPACITY:	498cc
MAX. POWER:	135 BMP @ 12,500 RPM
FUEL USAGE:	6.5km per litre (18.4 miles per gallon)
CARBS:	4 x 38mm round slide Mikuni
IGNITION:	Hitachi CDI
PLUGS:	Nippon Denso Racing
CLUTCH:	Dry Cintered Bronze Multiplate
GEARBOX:	6 Speed
MAX SPEED:	290kph (180 mph)
ACCEL:	0-97kph (0-60 mph) in 3.4 seconds
CHASSIS:	Heron Suzuki design group, Ciba-Geigy carbon fibre honeycombe composite sandwich with alloy swingarm
LENGTH:	2032mm (80")
WIDTH:	559mm (22")
HEIGHT:	1118mm (44")
SEAT HEIGHT:	762mm (30")
WHEELBASE:	1422mm (56")
HEAD ANGLE:	Typically 23.6 degrees
SUSPENSION:	front: Kayaba telescopic forks rear: Full Floater with adjustable rebound and compression White Power unit
WHEELS:	front: Marvic magnesium alloy 3.50 x 16" or 3.50 x 17" rear: Marvic magnesium alloy 5.50 x 17"
TYRES:	front: 12/60 x 16" Michelin radial rear: 18/67 x 17" Michelin radial
BRAKES:	front: Twin AP Racing 310 mm discs with AP Racing 4 piston caliper rear: Single AP Racing 210 mm carbon fibre disc with AP Racing caliper
WEIGHT:	125kg with oil and water
YEAR:	Chassis 1985, Engine 1986.

250CC – SILVERSTONE ARMSTRONG

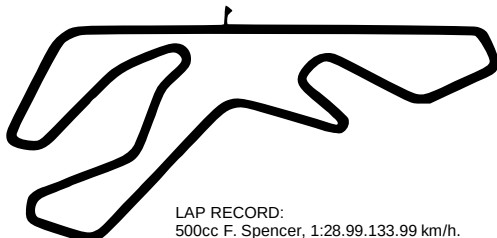
RIDER: Niall Mackenzie (GB), Donnie McLeod (GB)
ENGINE: Water-cooled, disc valve, 2-cylinder, two-stroke Rotax
BORE/STROKE: 54mm x 54.5mm
CAPACITY: 250CC
MAX POWER: 80 BMP @ 13,200 PRM
FUEL USAGE: 7.8km per litre (22 miles per gallon)
CARBS: 2 x 37.2mm Dell 'Orto
IGNITION: Motoplat CDI
PLUGS: NGK
CLUTCH: Multiplate dry
GEARBOX: 6 Speed
MAX SPEED: 257kph (160 mph)
MAX ACCEL: 0-97kph (0-60 mph) in 4.2 seconds
CHASSIS: Moulded Armstrong, carbon fibre composite
LENGTH: 1981 mm (78")
WIDTH: 419mm (16.5")
HEIGHT: 991mm (39")
SEAT HEIGHT: 737mm (29")
WHEELBASE: 1351 mm (53.2")
SUSPENSION: front: 40mm Forcella ITALLIA telescopic forks
rear: Armstrong monoshock mounted horizontally on carbon fibre swinging arm
WHEELS: front: Marvic magnesium alloy 3.00 x 17"
rear: Marvic magnesium alloy 3.50 x 17"
TYRES: front: 3.25 x 4.25 x 16" Dunlop crossply
rear: 3.50 x 5.25 x 17" Dunlop radial
BRAKES: front: Twin Brembo 280mm discs with Brembo 4 piston caliper
rear: Single Zanzani 180mm disc with Brembo 2 piston caliper
WEIGHT: 91.5kg with oil and water
YEAR: 1986

TRACK DIAGRAMS

1 km = 0.621 miles

1. SPAIN – JAMARA

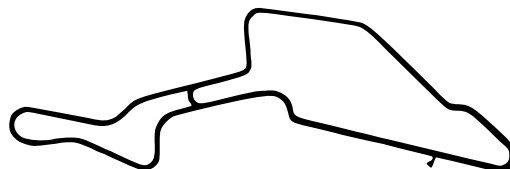
LENGTH: 3.312 km/2.058 miles
 NO. OF LAPS: 500cc – 37, 250cc – 31,
 125cc – 28, 80cc – 22.



LAP RECORD:
 500cc F. Spencer, 1:28.99, 133.99 km/h.
 250cc M. Wimmer, 1:31.05, 130.97 km/h.
 125cc F. Gresini, 1:35.47, 124.90 km/h.
 80cc J. Martinez, 1:38.50, 121.05 km/h.

3. WEST GERMANY – NEW NURBURGRING

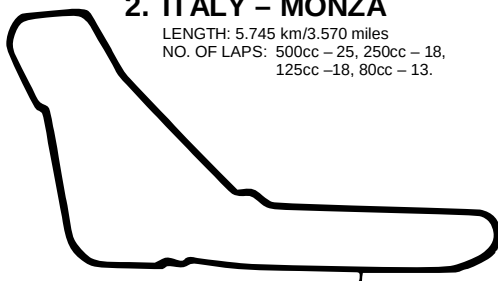
LENGTH: 4.542 km/2.822 miles
 NO. OF LAPS: 500cc – 30, 250cc – 25,
 125cc – 23, 80cc – 18.



LAP RECORD:
 500cc E. Lawson, 1:43.24, 159.18 km/h.
 250cc A. Mang, 1:46.90, 152.97 km/h.
 125cc L. Cadalora, 1:51.73, 146.35 km/h.
 80cc I. McConnachie, 1:57.01, 139.74 km/h.

2. ITALY – MONZA

LENGTH: 5.745 km/3.570 miles
 NO. OF LAPS: 500cc – 25, 250cc – 18,
 125cc – 18, 80cc – 13.



LAP RECORD:
 500cc M. Baldwin, 1:49.31, 191.03 km/h.
 250cc S. Pans, 1:57.16, 178.22 km/h.
 125cc F. Gresini, 2:04.57, 167.90 km/h.
 80cc I. McConnachie, 2:10.90, 159.50 km/h.

4. AUSTRIA – SALZBURGRING

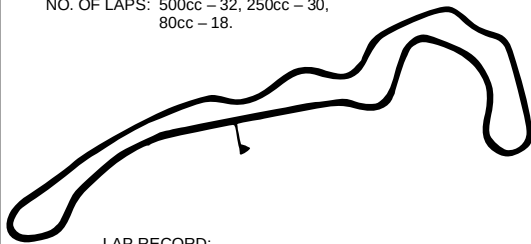
LENGTH: 4.241 km/2.635 miles
 NO. OF LAPS: 500cc – 30, 250cc – 25,
 125cc – 23, 80cc – 18.



LAP RECORD:
 500cc R. Mamola, 1:18.11, 195.44 km/h.
 250cc F. Spencer, 1:23.27, 183.25 km/h.
 125cc F. Gresini, 1:28.13, 173.14 km/h.
 80cc S. Dorflinger, 1:36.22, 158.56 km/h.

5. YUGOSLAVIA – RIJEKA

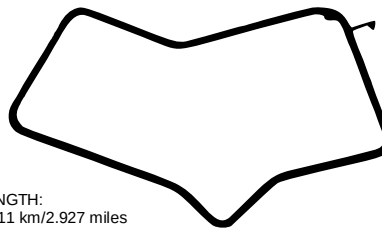
LENGTH: 4.168 km/2.590 miles
NO. OF LAPS: 500cc – 32, 250cc – 30,
80cc – 18.



LAP RECORD:
500cc E. Lawson, 1:31.78, 163.48 km/h.
250cc C. Lavado, 1:33.43, 160.60 km/h.
80cc J. Martinez, 1:40.14, 149.80 km/h.

9. BRITAIN – SILVERSTONE

LENGTH:
4.711 km/2.927 miles
NO. OF LAPS: 500cc – 28, 250cc – 24,
125cc – 20, 80cc – 15.

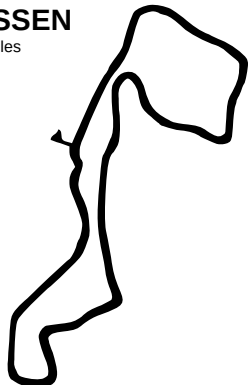


LAP RECORD:
500cc K. Roberts, 1:28.20, 192.27 km/h.
250cc C. Sarron, 1:33.40, 181.55 km/h.
125cc A. Nieto, 1:38.41, 172.31 km/h.
80cc S. Dorfinger, 1:43.13, 164.43 km/h.

6. HOLLAND – ASSEN

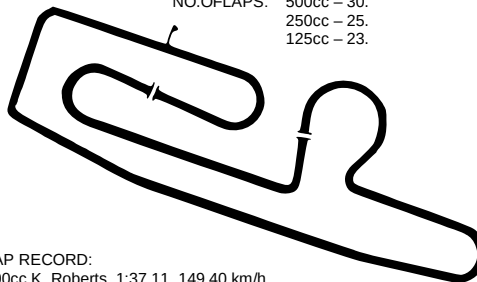
LENGTH: 6.134 km/3.812 miles
NO. OF LAPS: 500cc – 20,
250cc – 18,
125cc – 16,
80cc – 12.

LAP RECORD:
500cc W. Gardner, 2:14.28,
164.44 km/h.
250cc M. Wimmer, 2:19.07,
158.78 km/h.
125cc F. Gresini, 2:26.43,
150.01 km/h.
80cc T. McDonnachie,
2:30.79,
146.43 km/h.



10. SWEDEN – ANDERSTORP

LENGTH: 4.031 km/2.505 miles
NO. OF LAPS: 500cc – 30,
250cc – 25,
125cc – 23.

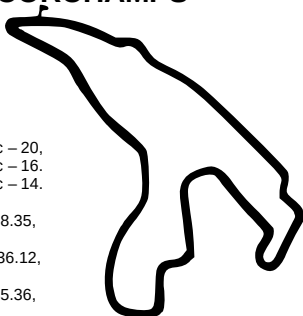


LAP RECORD:
500cc K. Roberts, 1:37.11, 149.40 km/h.
250cc A. Mang, 1:41.64, 142.78 km/h.
125cc R. Torino, 1:46.94, 135.72 km/h.

7. BELGIUM – SPA FRANCORCHAMPS

LENGTH:
6.940 km/4.312 miles
NO. OF LAPS: 500cc – 20,
250cc – 16,
125cc – 14.

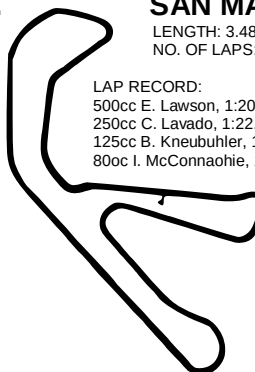
LAP RECORD:
500cc E. Lawson, 2:28.35,
168.41 km/h.
250cc R. Spencer, 2:36.12,
160.03 km/h.
125cc A. Aulinger, 2:45.36,
151.09 km/h.



11. SAN MARINO – MISANO

LENGTH: 3.488 km/2.167 miles
NO. OF LAPS: 500cc – 35, 250cc – 30,
125cc – 28, 80cc – 22.

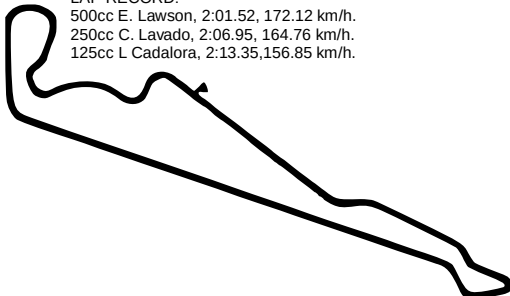
LAP RECORD:
500cc E. Lawson, 1:20.46, 156.06 km/h.
250cc C. Lavado, 1:22.46, 152.2.8 km/h.
125cc B. Kneubuhler, 1:25.14, 147.48 km/h.
80cc I. McConnaohie, 1:30.99, 138.00 km/h.



8. FRANCE – PAUL RICARD

LENGTH: 5.180 km/3.210 miles
NO. OF LAPS: 500cc – 21, 250cc – 18, 125cc – 16.

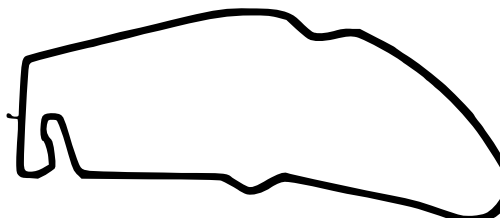
LAP RECORD:
500cc E. Lawson, 2:01.52, 172.12 km/h.
250cc C. Lavado, 2:06.95, 164.76 km/h.
125cc L. Cadalora, 2:13.35, 156.85 km/h.



12. WEST GERMANY – HOCKENHEIM

LENGTH: 6.787 km/4.217 miles
NO. OF LAPS: 125cc – 14, 80cc – 11.

LAP RECORD:
125cc A. Nieto, 2:26.00, 167.34 km/h.
80cc S. Dorfinger, 2:39.84, 152.81 km/h.



PIT BOARD AND INSTRUMENT

