



SR5

Radical Owners Manual



Radical Sportscars

SR5



SPORTSCARS

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Dear Radical Owner

Many thanks for purchasing a Radical SR5 sportscar.

Whether you intend running your car at trackdays, entering it in sprints and hillclimbs, or competing in the wide range of circuit racing available to you, one thing remains constant. A well-maintained and prepared sportscar will ensure that you get the maximum performance and reliability that Radical is renowned for the world over.

Radicals have covered hundreds of thousands of trackday, test day and racing miles. This manual highlights many of the lessons and tips we have learned. Do not start your car until you have read it.

Your Radical has been designed with one objective – to give you the ultimate driving pleasure!

Happy driving

Mick Hyde

Mick Hyde
For Radical Motorsport Ltd



Figure 1 - Radical SR5 at Dubai Autodrome (September 2007)

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PREPARATION FOR SHAKE-DOWN

Before taking to the track, it is important that you carry out a thorough spanner check, paying particular attention to all hoses, connections and suspension fixings, brake bias etc.

The oil level must be checked using the dip stick supplied. The level must be maintained between the top two marks when hot, and between the bottom two marks when cold. **The level should be checked AFTER running the engine, and holding the revs at 3,000rpm for ten seconds, to allow the oil to be scavenged back. The engine should be turned off, to check the level.**

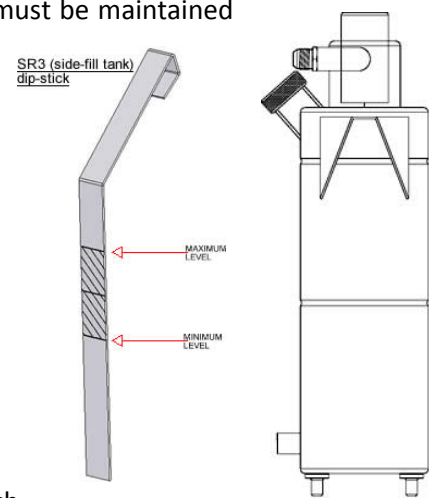
Radical recommend Silkolene Pro R synthetic-based racing oil (or similar if this brand is not available).

Warning

Do not rev the engine more than 3,000rpm (one yellow light on the dash) until the oil is warm. When cold the oil can run at 100psi, which may damage the oil cooler.

In the brake and clutch master cylinders, use only high temperature racing brake fluid.

The engine cooling system uses a 50:50 anti-freeze / water mixture. The level should be to the top of the swirl pot.



DRIVING POSITION

The combined driver and passenger seat may be adjusted forward and backward to suit individual drivers. Please note: The seat belt crutch strap will also need adjusting.

The position of the pedals can also be adjusted by a) adjusting the pedal face, b) adjusting the pedal angle and c) by moving the pedal pivot shaft. Please note that c) will require changing the master cylinder push-rods.

If your SR5 is fitted with a Powertec PS2 pneumatic power shifter, please refer to the separate manufacturers operating instructions.

CHECK ALL FLUID LEVELS

- Check that oil is visible in the oil tank. (The exact level can only be checked once the engine is warm – see starting procedure.)
- Check the brake and clutch reservoir.
- Check that coolant level is to the top of the swirl pot.

RECOMMENDED LUBRICANTS & FLUIDS

Engine oil:	Silkolene Pro R 15/50 (or similar)
Gearbox:	use Silkolene BOA 90LS limited-slip gear oil
Master Cylinders:	Silkolene Prorace 2000 brake fluid (DOT 4 or similar)
Fuel:	98 octane unleaded or 100 octane race fuel (CAM 2 or 108 octane in the US)
Coolant:	50/50 mixture of water/anti-freeze

STARTING THE ENGINE

1. Always start the engine with a laptop connected to the ECU so that all engine parameters can be monitored during warm-up.
2. Check oil is visible in oil tank. Check water level in swirl pot. The actual oil level does not matter at this point, because an amount of oil has drained back into the engine – this returns to the tank when the engine is started.
3. Crank engine to get oil pressure with ignition coils disconnected.
4. Connect coils and turn ignition on. Start engine with no throttle, let engine idle at approximately 2,000-3,000rpm. Check oil pressure is at 60psi minimum.
5. When engine water temperature reaches 50°C, rev engine several times to over 3,000rpm and turn off.
6. Immediately check oil level with dip stick.

RESTARTING PROCEDURE

1. Ideally, the engine is started 45 minutes prior to going on track. Turn off when the water temp. reaches 85°C and allow heat to soak into the engine. Restart 10 minutes before going on track and get the temperature to 75°C.
2. The oil level should be checked every hour of running and it should be topped up to the level indicated above.

RUNNING THE ENGINE

Do not run the engine under load if:-

- a) oil temperature is below 60°C
- b) oil temperature is above 120°C
- c) water temperature is below 60°C
- d) water temperature is above 100°C
- e) oil pressure when up to temperature at 4,000rpm is under 50psi.

The oil pressure when the engine is started from cold should run at 90psi at 4,000rpm. When up to temperature the oil pressure should read 60psi at 4,000rpm.

Maximum engine revs:- 8,600 rpm

The rev limiter is set to 8,600 rpm. Persistent use of the rev limiter will damage the engine.

The engine oil and filter should be changed every six (6) hours of running.

Do not attempt to adjust slow running speed, or any other engine parameter without a laptop connected to the ECU running the customer version of LIFE Systems software (available from Powertec).

It is important to log the number of hours the engine is run. The engine should run for no more than 30 racing hours before being returned to the factory for a rebuild. If the engine is stressed less (i.e. trackday or road use) the car should be returned to the factory every 30 hours for a rolling road dynamometer test. Engines which are not raced, regularly cover 90 hours without requiring attention (providing they are not over-revved. Particular care and attention should be paid to the down-shifts).

Note: In the event that the engine stalls, the ignition master switch must be turned off and then on again (after a two second delay) to reset the ECU.



Figure 2 Radical SR5 at Magny Cours

GEARBOX

GEARBOX MAINTENANCE

The SR5 is supplied with a Hewland JFR six-speed sequential transaxle. Hewland transaxles should have the crown wheel / pinion and gear dogs inspected for signs of wear after every event. (Refer to the manufacturers manual for inspection and repair procedures.)

Crownwheel & pinion: 12:34

Crownwheel & pinion ratio: 2.833:1

GEARING

Ratios in the SR5 are not controlled, so can an may be changed to suit different circuits. The 'short' set listed below is an option for tighter tracks (i.e. Brands Hatch). A gear ratio chart for calculating suitable ratios is available at: www.hewland.com. Please refer to Hewland gearbox manual or website: www.hewland.com for changing gear ratios.

STANDARD SR5 GEAR RATIOS

FOR CARS BUILT BEFORE 16/11/2007

Gear	Part no.:	Ratio
1 st	CS-1608-12:35	2.917
2 nd	FTR-15:33-HUB	2.200
3 rd	FTR-17:31-STD	1.824
4 th	FTR-15:25-STD	1.667
5 th	FTR-17:25-STD	1.471
6 th	FTR-18:24-STD	1.333

FOR CARS BUILT AFTER 16/11/2007

SR5 Ratios – 16" rear wheels ¹		
Gear	Short (option for tight tracks)	Long (fitted as standard)
1 st	12:38 68mph	12:38 68mph
2 nd	14:33 91mph	14:33 91mph
3 rd	15:29 111mph	16:30 108mph
4 th	15:26 122mph	17:27 135mph
5 th	17:27 136mph	17:25 147mph
6 th	16:24 143mph	18:25 154mph

SR5 Ratios – 13" rear wheels ²		
Gear	Short (option for tight tracks)	Long (fitted as standard)
1 st	12:35 65mph	12:35 65mph
2 nd	15:34 84mph	15:33 87mph
3 rd	15:27 106mph	17:30 108mph
4 th	16:25 121mph	16:24 128mph
5 th	19:27 134mph	18:24 144mph
6 th	18:24 142mph	21:26 153mph

¹ Rev limit set to 8,500rpm

² Rev limit set to 8,200

SEQUENTIAL GEAR CHANGE – HEWLAND JFR

The SR5 is supplied with the gear selection set to “pull lever back to shift up the box” and “push lever forward to shift down the box”. To engage neutral from 1st gear lift the lever gently on the right hand side of the seat and push the gear lever forward once, to find reverse push forward again with the small lever still lifted. The order is R, N, 1, 2, 3, 4, 5, 6.

GEARBOX OIL

With oil cooler: 2.2 litres

Without oil cooler 1.7 litres

FLAT-SHIFT

If your SR5 is fitted with a flat-shift system, the clutch need not be operated going up the gearbox.

PNEUMATIC POWER SHIFT

If your SR5 is fitted with a Powertec pneumatic paddle-actuated power shift system, please refer to the manufacturers operating instructions.

BEDDING-IN BRAKES

The car comes fitted with carbon metallic brake pads. To bed in the brakes and achieve maximum stopping power, a film of carbon must be transferred to the discs

Gently apply brakes 6 to 8 times at medium speed. Increase speed to simulate race conditions, and apply brakes hard a further 6 to 8 times.

Allow brakes to cool for 15 minutes. Do not apply brakes whilst stationary during cooling down period.

Use only Radical recommended brake pads.

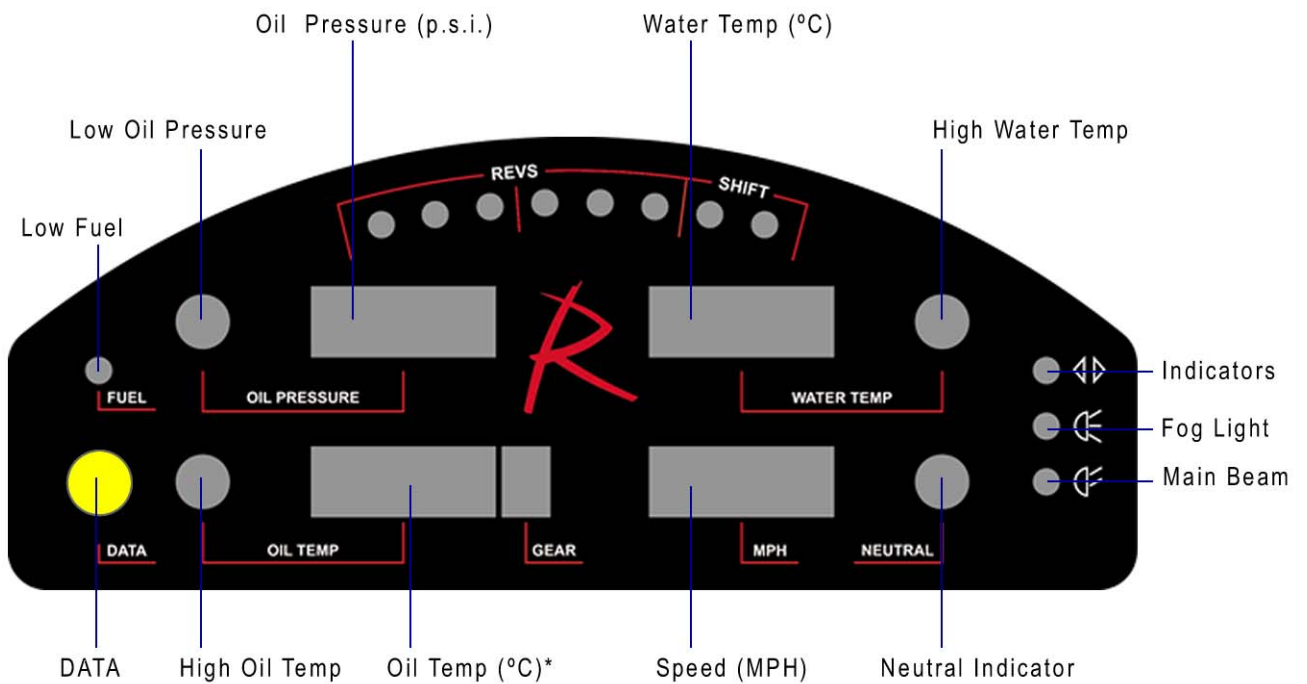
FUEL

Tuned engines in the USA should only be run on racing fuel such as cam2, or a minimum of 108 octane. We do **NOT** recommend mixing octane boosters with pump fuel.

WARNING

The fuel filter will require changing after the initial run. It is located to the left of the engine.

DASHBOARD



REV INDICATOR

Yellow 3 - 4 - 5, Green 6 - 7 - 8, Red 8.2 - 8.5

* Temperatures are not displayed until the fluids reach 45°C.

When ignition is switched on, the dash runs through a test display.

High temperatures or low pressures will trigger a large warning light adjacent to the gauge it is indicating.

With ignition on, press the data button to show maximum revs to date (last two digits not shown). The maximum recorded revs display may be reset by the factory, or by an approved Radical distributor.

CENTRE-LOCK HUB NUTS

Anodised **RED** for left-hand side,

Anodised **BLUE** for right-hand side.

Torque Setting – 200 ft lbs

AIR JACKS

Cars fitted with air jacks are supplied with an air lance, which is inserted into a valve at the rear of the car. The lance requires connection to a bottled air supply, and the pressure should be regulated to 250-300lb

GENERAL SETUP PROCEDURE – FLAT PATCH

1. check scales are flat and zeroed
2. disconnect anti-roll bars
3. reset (zero) shocks absorbers
4. set tyre pressures
5. check front pushrods are equal length
6. check front spring pre-load is set correctly
7. ballast car for driver
8. set ride height (procedure below)
9. set cambers
10. set toes
11. set corner weights by adjusting rear spring platforms (ensure they are not pre-loaded).
12. re-connect anti-roll bars, ensuring they have no pre-load
13. reset shock absorbers to centre settings
14. remove ballast
15. check that front diffuser is level, both front-to-rear and left-to-right, and is set to the correct ground clearance

SUSPENSION GUIDE – DRY SETUP

The car is set up at the factory but, the final settings should be arrived at by testing for the particular driver's preference and the particular circuit. Try to check the tyre temperatures for balance across the contact patch within one minute of a fast lap. The inside edge can be 10°-15° higher than the outer edge on radial ply slick tyres.

Front:		
Ride Height:	85mm	
Diffuser height:	55mm (min)	
Pre-load (no. of turns):	6	
Shock settings:	Avo: 6	
	Intrax: centre of range	
Tyre pressure (Dunlop):	Hot: 24-28psi	
	Cold: 16-18psi	
Spring rate:	7" × 300lb	
Camber:	-2½° to -3½°	
Toe in:	2mm - 3mm overall	
Nik-link:	Medium	

Rear:		
Ride Height:		75mm
Pre-load (no. of turns):		0
Shock settings:	Avo: 8	
	Intrax: centre of range	
Tyre pressure (Dunlop):	Hot: 24-28psi	
	Cold: 16-18psi	
Spring rate:	7" × 350lb	
Camber:		-2° to -3°
Toe in:		2mm - 3mm
Nik-link:		medium

Note: Measure the ride height at front of the chassis and at the seat back bulkhead, (below rollover bar) with the driver seated and three gallons of fuel in the tank.

STEERING RACK SET UP PROCEDURE

To make sure your steering rack is set correctly and running freely we have set out a simple set up procedure.

1. Loosen the top 16mm Allen screw and lock nut completely.
2. Loosen the four 6mm Allen screws around the steering input shaft and rotate the knurled ring anticlockwise to loosen the steering rack shaft.
3. The steering rack shaft should now be free to rotate in the rack housing. Turn the knurled ring clockwise while rotating the rack in the housing back and forth until all the movement has gone, with the rack correctly adjusted you should be able to feel a tiny amount of rotational movement, tighten the four 6mm Allen screws.
4. Tighten the top 16mm Allen screw until just tight and back off one Allen key flat, tighten the lock nut.
5. The rack is now set correctly and should move freely from side to side with no tight spots.

RIDE HEIGHT

The ride height may need increasing when carrying a passenger.

CORNER WEIGHTS

For maximum performance, the Radical should have the corner weights accurately set with the driver in situ. The procedure is as follows:-

1. Position the car on a flat, horizontal surface.
2. Equalise all tyre pressures to hot setting, say 28 psi.
3. Take all readings with driver in car, or equivalent weight in the seat.
4. Remove bolt from one end of the front and rear Nik-Link, and adjust shocks to full soft.
5. Set ride height front & rear, then camber front & rear and finally toe-in front & rear.
6. Put car on weight scales, and set corner weights by adjusting spring platforms*. It is usually difficult to achieve identical settings on each corner to within 10%. Ensure that the sum of the diagonal weights are as near as possible.

* When using pre-load, adjustable push rods are used to set ride height and corner weights

7. Re-check ride height and splitter height with the body on.
8. Lock spring platforms.
9. Refit Nik-Links, rear anti-roll bars, reset shocks, remove driver or similar weight, and reduce tyre pressures.
10. You are now ready to "rock & roll".

Note: If you intend carrying a passenger for the majority of the time, the above procedure should be carried out with him/her in the car.

BRAKE BIAS SETTINGS

Set central to two turns towards front (clockwise on the dash adjuster). Further adjustment can be made to suit individual circuits and tyre configurations. Adjust bias to the rear in wet conditions.

GENERAL CAR PREPARATION

To keep your Radical looking at its best the fibreglass and carbon fibre items can be quickly and effectively cleaned with polish, while all chassis, suspension and panel parts can be kept looking new and corrosion-free by wiping them down with a cloth sprayed with WD40.

DRIVING TECHNIQUE

If you are unfamiliar with a sequential shift car, it is recommended that you change gear using the clutch when going both up and down the gearbox. Once you have become familiar with the technique, changing gear going up the box can be achieved by lifting the throttle slightly and simultaneously 'snicking' the gear in, without depressing the clutch. On down-changes it is imperative the driver depresses the clutch and raises the engine speed before engaging the gear. Smooth gear changes can be best achieved by using the 'heel and toe' technique. Only change down one gear at a time.

As with any dog-engagement gearbox, aggressive gearchanges will damage the gear dogs which will result in gear engagement problems. Only use a maximum of 6,000–7,000rpm while getting used to driving your SR5. If you accidentally down-change instead of an up-change you are less likely to over-rev the engine. If you do over-rev the engine, make your way slowly back to the pits and check the yellow recall button on the dash. If you have revved the engine over 9,000rpm, switch off and return the engine to Powertec for inspection immediately.

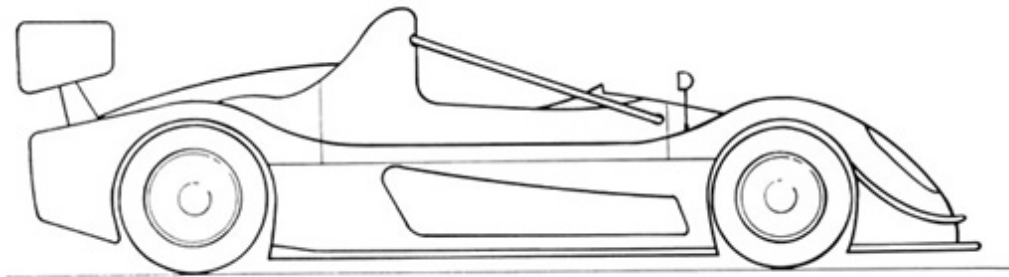
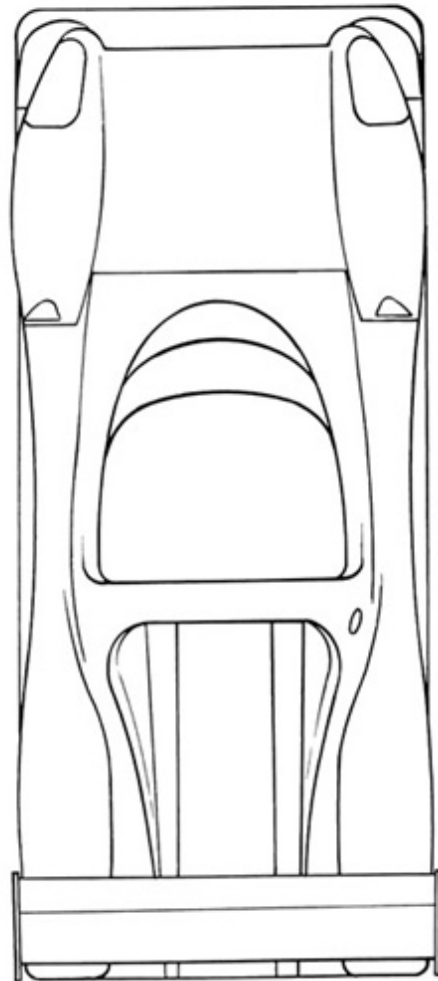
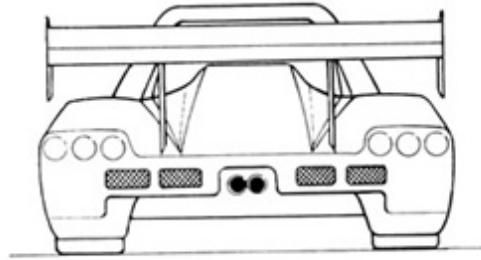
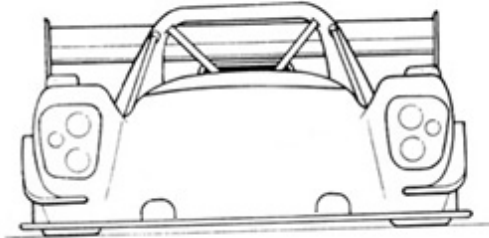
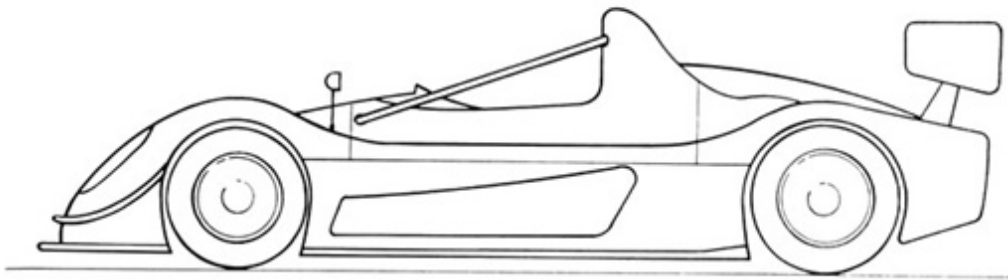
Ensure that the tyres and brakes are fully up to temperature before pushing hard.

The Radical SR5 has phenomenal braking performance and will carry considerable speed into a corner. Practice braking hard, but come off the brakes smoothly and concentrate on carrying speed into a corner. On exiting the corner, the throttle should be fed in progressively.

Driving smoothly is the secret to quick lap times.

One final tip: **CHECK YOUR OIL LEVEL BEFORE EVERY RUN!** The SR5 can pull over 2.5g when cornering. If you do not have the correct oil level, even with a dry sump motor, you risk starving the engine of oil, with expensive consequences.

SR5 DECAL DESIGN SHEET



COMPONENT 'LIFING' CHART –

As the performance of our cars increases and the number of hours racing the cars complete grows, we are able to more accurately predict the lifespan of a car's components. Please see below, the revised 'Radical Component Lifespan Chart'.

The chart gives the recommended life expectancy of components under 'normal, on-track racing conditions'. If some of your racing time is done 'off-track' or you hit kerbs, pot holes or other cars – hard, then you will need to considering reducing the timescales recommended. On the other hand, more 'gentle' trackday use will obviously extend the recommended time!

One new addition to the list is the wing support stays, the life of these is greatly shortened if the wing is used to push, and particularly pull the car around in the pit lane, garages and trucks. It works perfectly to support the wing and the downforce generated in the direction intended, and not at an angle to the centre-line of the vehicle.

<u>COMPONENT</u>	<u>HOURS</u>	<u>ACTION</u>
Engine	30	Rebuild
Gearbox	10	Inspect
Gearbox	30	Rebuild
Suspension Bushes	30	Replace
Suspension Rose Joint	30	Replace
Front Upright including Hub	50	Replace
Front Wishbones	60	Inspect/replace
Rear Upright	50	Replace
Rear Hub	50	Replace
Rear Wishbone	60	Inspect/replace
Drive Shafts	30	Replace
Calipers	60	Rebuild
Brake Discs	10	Inspect/replace
Shock Absorbers	60	Rebuild
Steering Rack	50	Inspect/rebuild or replace
Brake Master Cylinder	60	Inspect/replace
Wing Support Stays	60	Inspect/replace
Fuel Tank	remove & inspect annually	

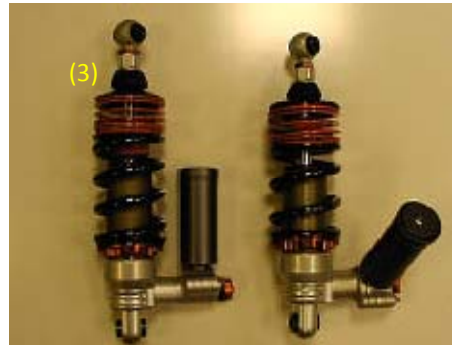
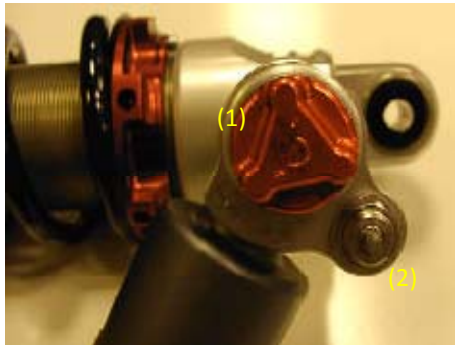
If you own and drive the car, but do not prepare or run it yourself, it is your responsibility to be sure that the engineer who does has a copy of this manual, and has read it.

INTRAX DAMPER INFORMATION

3 WAY ADJUSTABLE DAMPER INFORMATION

All the adjustments work independently allowing you to find the right set-up.

- (1) Red adjuster on canister:- High-speed compression, 50 clicks turn clockwise for more damping.
- (2) Small 4 mm screw:- Low speed compression, 18 clicks turn clockwise for more damping.
- (3) Black adjuster on spindle eye: Rebound, turn clockwise for more damping.



COMPRESSION ADJUSTMENT:

HIGH SPEED:

1. It controls fast corners. When damping rate is increased the car feels like it has got stronger springs.
2. Increase step-by-step 5 clicks at the time, the fine-tuning by one click.
3. Rain: open +/- 10 clicks from best dry setting.

LOW SPEED:

4. It controls roll in the car and will help to make the tyres working when there is less grip.
5. Increase step-by-step 1-2 clicks at the time.
6. Rain: open +/- 2 clicks from best dry setting.

REBOUND ADJUSTMENT:

REBOUND:

Front: By finding the right set-up you can dial out under steer, during testing 5 clicks at the time.

Rear: For maximum traction, don't go over the top, keep the rear moving.

INTRAX DAMPERS - SPRING CHART

Part No.	Length (mm)	Rate (N/mm)	Rate (lbf/in)
SP001	80	120	685
SP002	80	140	799
SP003	80	150	857
SP004	100	110	628
SP005	100	120	685
P006	100	130	742
SP007	100	140	799
SP008	100	150	857
SP009	100	160	914
SP010	100	170	971