



3rd Gen “SDS” MagneShocks™ for Oval-Track & Road-Race

What is a 3rd Gen “SDS” MagneShock™? (Selective Damping System)

MagneShock™ is a Computer Controlled ULTRA-adjustable shock system – much more than any double, triple or even 6-way adjustable shock!

- “SDS” stands for Selective Damping System. You can INSTANTLY select from 50 different Pre-Programmed REBOUND-Force-Velocity Curves and from 50 more COMPRESSION curves (2,500 different possible curves) to EXACTLY tune for every conceivable track condition.
- These include the most common “numbered” curves, that most all racers are familiar with, Koni curves (which are quite LINEAR on REB), several Specials (UNIQUE to MagneShocks – IMPOSSIBLE on others) and several groups of ever more Degressive curves (more & more low speed damping).
- You can set the REB & COMP curve for EACH of all 4 SHOCKS to settings YOU determine – IN SECONDS. And, you can save all 4 as a “SETUP”.
- You can save up to five (5) complete 4-shock SETUPS. And, you can change to any of these SETUPS with a flick of a Remote-Switch, instantly changing ALL 4 shocks to the settings you previously determined, whenever you like.



All 8 different TYPES of “Curves” are shown here

- If you have ONE MagneShock you have over 2500 shocks! The shock is whatever the Controller tells it to be. No re-valving or manual adjustments.
- **NO NEED to:** [buy lots of shocks](#), [buy & wait for custom shocks](#), [buy lots of shock parts](#), [re-valve shocks](#), [buy a shock dyno](#), [hire a shock-man!](#)
- All you need is 4 MagneShocks (and maybe a spare or two).

The MagneShock SYSTEM is composed of 4 basic components (& the cables in between them).

- 1.. The CONTROLLER box is the “Brains”. It tells each shock what damping to have at all times.
- 2.. The SHOCKS look like conventional shocks (except for the cable on top).
- 3.. The PROGRAMMER box is used for:
 - A. Selecting the desired Force-Velocity “curve” of each shock,
 - B. Defining complete 4-shock “setups”,
 - C. Setting position of “Damping Bump-Stops” & other shock parameters
 - D. Letting you see what all your settings are.
- 4.. The REMOTE Switch(s) mount in the cockpit for “in-race” adjustments. You can instantly change all four (4) shocks to any pre-defined “setup”.

Features:

- The Programmer adjusts each of the shocks individually, in both Rebound & Compression, to ANY desired Force-Velocity curve.
- Each Pre-Programmed Force-Velocity curve is defined by the desired damping force at five (5) velocities – including at ZERO velocity!
- Response curves that are IMPOSSIBLE on conventional shocks are easy on MagneShocks.
- The 2-position switch can be mounted on the steering wheel so the driver can easily flip it with his thumb (without getting distracted). This is very useful when both turns of an Oval are different. Most road courses have ONE hairpin – one flick and you can be PERFECT there!
- The 5-position Rotary Remote-switch can be mounted on the dash to call any of the five (5) “setups” anytime you desire.
- If desired, both the 2-position & the 5-position switch can be mounted at the same time.
- UNIQUE “damping-bump-stops”, for both Rebound & Compression, built-in. They’re kind of like bumpers but **THEY DON’T BOUNCE BACK!** You can define points, at BOTH extremes of shock travel, where each shock becomes FULL-STIFF. Bottoming-out can be handled to a degree with rubber bump-stops. Dealing with topping-out was usually impossible. This helps prevent the shocks from Bottoming OR Topping out – improves the handling on rough tracks & helps save the suspension system.
- The Programmer can be attached to the dash with Velcro for on-track testing & adjustments – then easily removed, if desired, for a race or anytime you are not actually programming. The Programmer can be easily read in bright sunlight or at night.
- Very low current draw (averages about 1 ampere for the entire system – MAX of 2 amps).
- Operates on standard 12, 16 or 24V systems - Simply connect the Controller to the ignition or accessories switch so it is on when the engine is on.
- The MagneShock™ is relatively fade-free and insensitive to heat - when compared to conventional shocks – heat & cold have MUCH LESS effect.
- Stiff shocks can be very difficult to change. Even stiff MagneShocks can be made soft when you take them on or off the car (hold the “Minimize” switch down for 4 seconds). This makes them really easy to work with, particularly if you normally run any of your shocks very stiff.
- Shocks with more or less damping “RANGE” (proportionally much stiffer or much softer) are available on special order.
- Software development is “continuous” - updates for the Programmer will be available to all for a modest cost.

What are the Advantages of 3rd Gen MagneShocks?

Testing time can be reduced dramatically.

You can learn more in a TEN-MINUTE test session than you could in a whole day of on-track testing with a shock-man, a dyno and a trailer full of shocks.

You can select a “Setup” for a corner, test it, flick a switch to change to another “Setup” and then go try that corner again until you have it right.

You can test 5 complete different “setups” in ONE test session!

Any “setup” can be changed (in all or in part) later, whatever you desire – as many times as you want.

When race-time comes you will BE READY!

Each of your fine-tuned “setups” can be recalled ANYTIME – even DURING the race.

A “remote switch” will select any “Setup” you have “saved”.



MagneShock™ Div. of Arre Industries Inc.
Phone: 770-451-8694

5410 New Peachtree Rd.
www.magnEshocks.com

Atlanta, GA 30341
dick@magnEshocks.com



You can make a separate “setup” to compensate for many track conditions or “situations”:

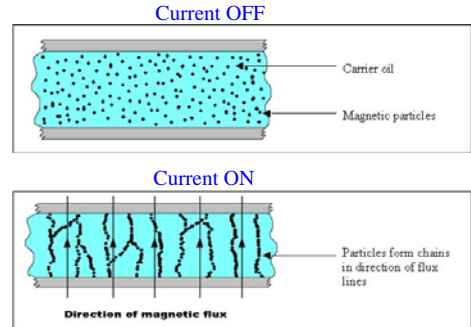
1. The corners on many oval-tracks are different on each end. Make a “setup” for each end – no need to give up one end or make any compromises. Mount a 2-position Remote-switch on the steering wheel – you can easily change from one “setup” to the other with your thumb for each corner.
2. Every road-course has a hairpin (that you normally have to GIVE UP! – Loose ONE Second usually!) You make a “setup” SPECIFICALLY for the hairpin. When everybody is “slipping & sliding” you can GAIN a SECOND - STUCK & GONE!
3. Many tracks can be counted on to get looser (or sometimes tighter) as the race progresses. On some tracks it comes as a “surprise”. You never know IF it will happen, WHEN it will happen or HOW MUCH it will change. You can have a “setup” (or 2) READY - to tighten (or loosen) the car. You can make the change EXACTLY WHEN you want it.
4. On longer races the tires often change enough to dramatically change the handling. You can have a “setup” ready to compensate.
5. You can make last-minute changes. When the track changed quickly you used to be SCREWED! Now, an ENTIRE “setup” can be changed in SECONDS.
6. Overall costs are far lower. MagneShocks cost no more than top-end regular shocks (except for a 1-time Purchase of the Controller & electricals). You will save THOUSANDS every year (in some cases every RACE).
7. MagneShocks will make you MORE MONEY! Think about the TENS of THOUSANDS of dollars you “COULD” have made if you had EXACTLY the shocks you needed - WHEN you wanted them!

M-R Fluid

The M-R fluid is basically composed of micron size particles of iron suspended in an oil base. In a magnetic field the iron particles form chains, stick together the fluid appears thicker. The stronger the field - the harder these particles stick together and the more viscous the fluid acts. Instead of controlling damping by varying an orifice or spring loaded valves, MagneShocks INSTANTLY & ELECTRONICALLY change the viscosity of the fluid. M-R fluid’s viscosity can be changed continuously; actually as fast as the magnetic field changes. The piston contains a single orifice, through which the M-R fluid passes, and an electromagnet. The controller varies the magnetic field of the electromagnet and the damping force varies proportionally. The MagneShock™ has NO moving parts (like valves, springs, etc.) other than the piston and rod itself. Reaction time is very fast (usually only a few milliseconds).

HOW IT WORKS

MagneShocks use Magneto-Rheological (M-R) fluid (instead of oil). The fluid viscosity (and therefore the damping force) is changed by a magnetic field within the piston. MagneShocks do not need any mechanical orifices or spring loaded valves – it is all done electronically. Each shock is controlled by a computer and each shock contains a very fast and accurate position sensor. Each sensor tells the controller the absolute position of the its shock’s piston (4,000 times per second). The computer’s MCU uses this data to calculate the direction of travel and piston velocity of each shock. The MCU then controls the damping force “automatically” in response to this data. It updates the damping force 4,000 times/second for each shock. It is velocity sensitive, just like a hydraulic shock, but it is also position sensitive. It knows when the suspension is about to bottom out or top out & it automatically increases damping force. This improves handling and minimizes stress, which reduces failures of suspension components. All the force-velocity curves are Selected BY YOU – from within the controller.



Force-Velocity Curves:

Damping is set at FIVE (5) velocities: 0, ½, 1, 3 & 7 in/sec. The Controller linearly interpolates the damping in between these velocities. The “slope” of the curve above 7 in/sec is fixed (how fast it increases damping with increases in velocity). Damping range for Rebound & Compression is about 10:1 at these velocities. Typically, damping at 0 in/sec can range from 15 to 170 lb, damping at ½ in/sec can range from 16 to 180 lb, damping at 1 in/sec can range from 17 to 190 lb, damping at 3 in/sec can range from 26 to 240 lb, damping at 7 in/sec can range from 36 to 320 lb.

All Force-Velocity Curves Show REB over COMP

Fig.1 Shows the MIN & MAX possible dampings available on this shock*. Standard Damping Range (for shock numbers ending in “-20”) Any Force-Velocity curve is possible between these limits! ORANGE is maximum (99) & BLUE is minimum (0.0).

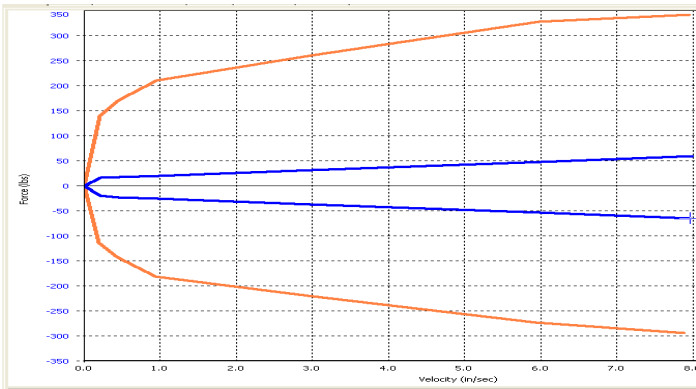
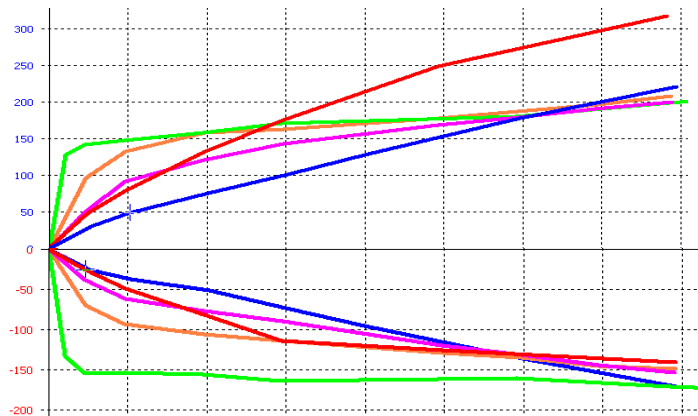


Fig. 2 Represents one of each Group of the “Pre-Programmed” Curves. BLUE is STD #5 Degressive – the most common in auto racing. FUCHSIA is (–5) Double-Degressive – has more low speed damping. ORANGE is (≡5) Triple-Degressive – more low speed yet. LtGREEN is (≡5) NO-Bleed – a nearly “flat” curve. RED is a Koni (L5). REB is LINEAR curve. COMP a bit different



* Shocks with stiffer or softer RANGES are available. The “shape” of the curves and “Max-Min range” will be about the same. But, the FORCE will be “proportionally” more or less (at all velocities).



Fig. 3 This represents the full range of STD Valvings (Degressive)

BLUE=#9 ORANGE=#8 LtGREEN=#7
 FUCHSIA=#6 RED=#5 DkBLUE=#4
 LtBLUE=#3 VIOLET=#2 DkGREEN=#1

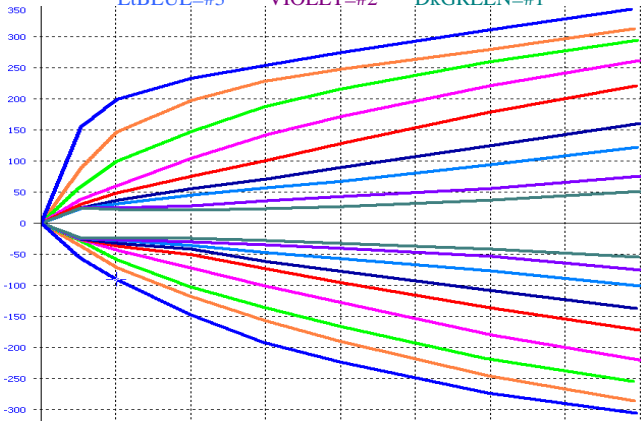
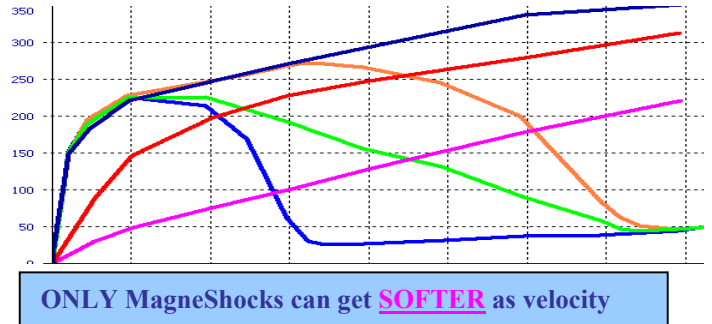


Fig. 4 These are UNIQUE & unusual "Drop-Off" REBOUND curves.

BLUE=d1 Drops-off from 1 to 3in/s,
 LtGREEN=d2 Drops-off from 2 to 7 in/s,
 ORANGE=d4 Drops-off from 4 to 7 in/s.
 (these are simply IMPOSSIBLE with a conventional shocks)
 (these are also available for COMPRESSION curves)
 DkBLUE=FullION RED=#8 FUCHSIA=#5 (for comparisons)



ONLY MagneShocks can get SOFTER as velocity

Fig. 5 Double-Degressive valvings (more low-speed damping than "STD")

BLUE=#9 ORANGE=#8 LtGREEN=#7 FUCHSIA=#6
 RED=#5 DkBLUE=#4 LtBLUE=#3

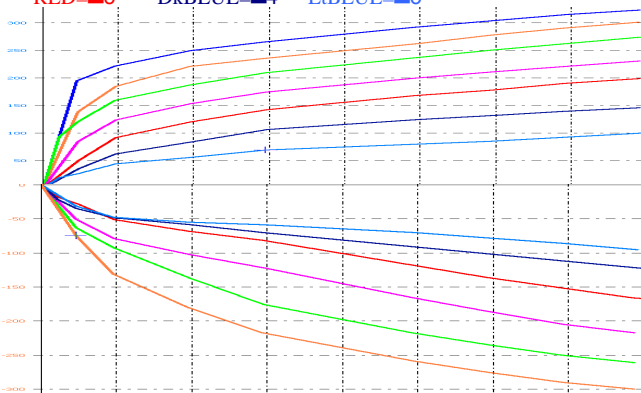


Fig. 6 These are UNIQUE & "Bump-Delayed" COMPRESSION curves

BLUE=b.1. starts UP from soft at 1 in/s & reaches #8 at 3 in/sec
 ORANGE=b.2. starts UP from soft at 2 in/s & reaches #8 at 7 in/sec
 LtGREEN=b.4. starts UP from soft at 4 in/s & reaches #8 at 7 in/sec
 DkBLUE=b1 starts UP from soft at 2 in/s & reaches #5 at 3 in/sec
 FUCHSIA=b2 starts UP from soft at 2 in/s & reaches #5 at 7 in/sec
 RED=b4 starts UP from soft at 4 in/s & reaches #5 at 7 in/sec
 DkGREEN=FullION VIOLET=#8 LtBLUE=STD #5 (for comparisons)

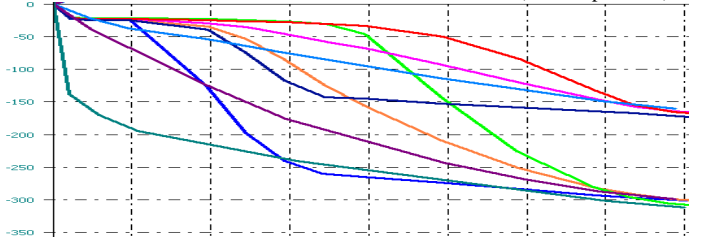


Fig. 7 Triple-Degressive valvings (more low-speed than "Double")

BLUE=#8 ORANGE=#7 LtGREEN=#6 FUCHSIA=#5
 RED=#4 DkBLUE=#3

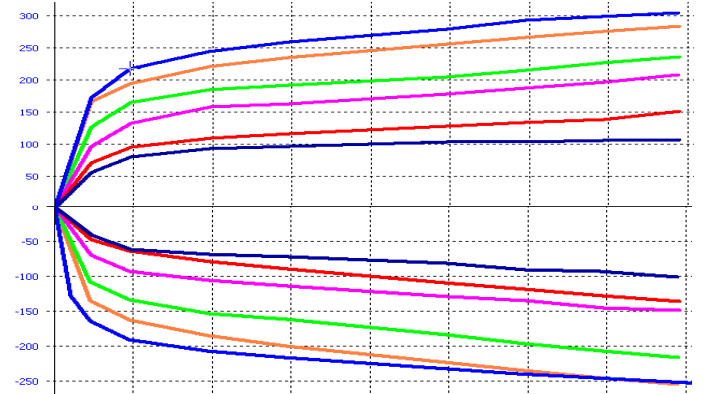


Fig. 8 NO-BLEED Degressive valvings (more low-speed than "Triple")

BLUE=#8 ORANGE=#7 LtGREEN=#6 FUCHSIA=#5
 RED=#4 DkBLUE=#3 LtBLUE=#2 VIOLET=#1

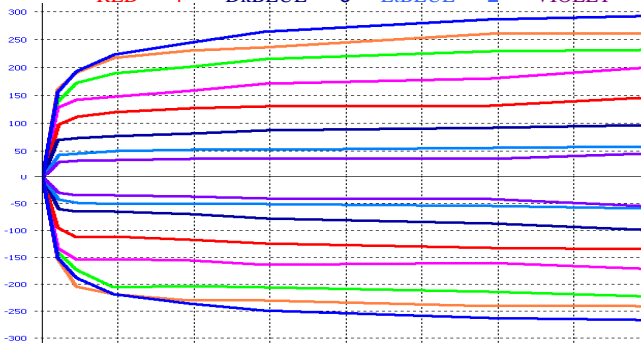


Fig. 9 Koni LINEAR Rebounds

BLUE=L7 ORANGE=L6 LtGREEN=L5 FUCHSIA=L4
 RED=L3 DkBLUE=L2 LtBLUE=L1.
 30-9414 only (SOFT REAR):
 VIOLET=L4 DkGREEN=L3 BROWN=L2 TITANIUM=L1

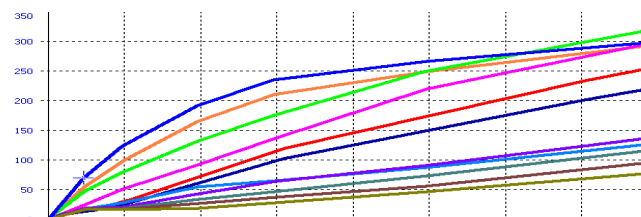
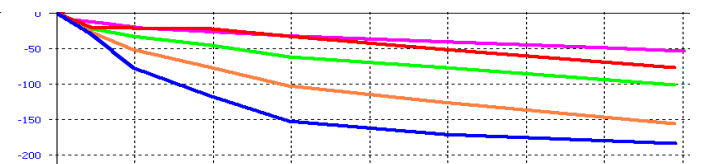


Fig. 10 Koni DEGRESSIVE Compressions

BLUE=L7 ORANGE=L6 LtGREEN=L5 FUCHSIA=L4
 30-9414 only (SOFT REAR): VIOLET=L4





TYPICAL Shock Dimensions & Uses: (NOTE: We do not have STRUTS at this time)

Valving CODES
5 =STD Degressive
.5 =Double-Degressive
=4 =Triple-Degressive
≡4 =NO Bleed
L5 =Koni (most)
└ 4 =Koni (soft 9" rear)
d1 =Drop-Off
b2 =Bump-delayed

Part No.	Description	Mountings	Ext.	Comp.	Stroke
5243-20	Older cars with short shocks; Cars with IFS & IRS suspensions (5")	1/2" ID Brgs	15.51	11.23	4.28
5261-10	Front of cars that require VERY STIFF shocks	1/2" ID Brgs	19.35	13.24	6.11
5261-20	Front or Rear of MOST racecars (7")	1/2" ID Brgs	19.35	13.24	6.11
5280-20	Cars with longer stroke rear shocks (9")	1/2" ID Brgs	23.18	15.23	7.95
5295-20R	Cars with extremely long shocks- Uses REMOTE Reservoir	1/2" ID Brgs	24.68	15.23	9.45
5239-15SB	Front of lowered/racing GM & Ford type suspensions	stud/barpin	14.21	10.30	3.91
5243-15SB	Front of std-height/racing GM & Ford type suspensions	stud/barpin	14.98	10.70	4.28
5243-15SD	Front of std-height/racing early Mustang/AMC type suspensions	stud/dual-stud	14.64	10.36	4.28
5267-20BE	Rear of lowered/racing most GM (Monte Carlo etc) suspensions	barpin/eye	19.35	13.24	6.11
5267-20BS	Rear of lowered/racing 70-82 Camaro suspensions	barpin/stud	18.82	12.71	6.11
5267-20SE	Rear of lowered/racing 67-69 Camaro, big Ford suspensions	stud/eye	18.82	12.71	6.11
5267-20SS	Rear of lowered/racing early Mustang etc. suspensions	stud/eye	18.29	12.18	6.11

Shock Absorber:

Piston, Rod & Floating-piston are the ONLY moving parts – no valves, springs, discs, needles, knobs, checks or other moving parts
 Bore: 48mm
 Rod: 14mm (303 stainless steel)
 Shock Body: 54mm OD (6061-T6 aluminum)
 Threaded body accepts old Carrera™ & ARS™ coil-over kits (very fast threads - 1/4" pitch)
 Mono-tube "gas pressure" design with floating piston
 Gas pressure: as required for damping range - usually 100 - 150 psi
 Standard mountings are 1/2" ID spherical bearings on both ends (5/8" wide ball). Other sizes & types available.



Controller: Aluminum box (1.5 lb) is 8-1/2 x 4-3/4 x 3-1/4", Can be mounted anywhere in the car – - MUST be grounded to the chassis.

Programmer: Plastic box is 6-3/4 x 4-3/4 x 2-1/4", need not be mounted in the car, does not need a ground.

Cables: Each shock cable is usually about 9' and the others are shorter. Other lengths are available upon request. Connectors are high quality, light plastic, water resistant, twist-lock types with gold plated contacts.



Remote Switch: Both 2-position and 5-position switches are available. The 2-position switch is normally mounted on the Steering-Wheel so you can switch between two SETUPS with a "flick" of your thumb. The 5-position switch is usually mounted on the dash where you can select any of the five (5) SETUPS at will. Both switches can be mounted at the same time.



Any type of shock mounting is available on special order. Shocks with a stiffer or softer damping range are also available.

Carrera is a trademark of QA1. ARS is a trademark of Advanced Racing Suspension Dampers covered under US Patents 5,277,281 and 4,877,699 and 5,878,851 and 6,095,486