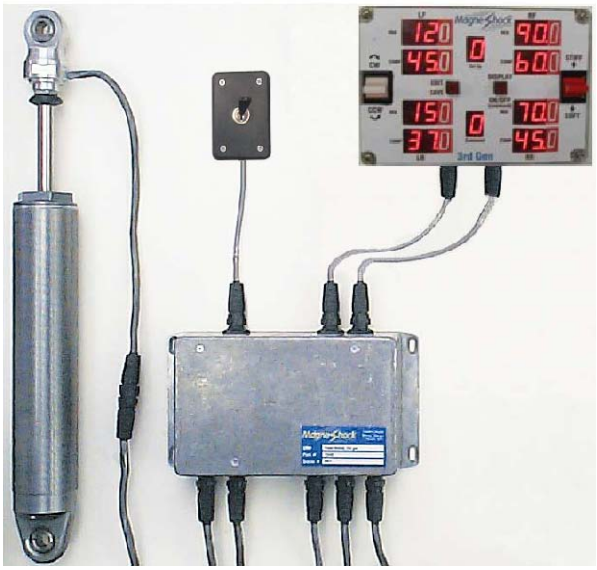
3rd Gen MagneShocks™ for Oval-Track & Road-Racing

What is a 3rd Gen MagneShock™ ?

- The MagneShock™ is an "intelligent *Computer Controlled* ULTRA-adjustable" shock absorber (damper) system.
- It is MUCH MORE than any double, triple or even six-way adjustable shock! It allows you to actually ***"tailor"*** the shape of the Force-Velocity curve – by merely inputting the damping you want at five (5) different velocities.
- You can set the ENTIRE damping curve on one or ALL 4 SHOCKS simultaneously to settings YOU determine. And, you can save it all as a "SETUP".
- You can save up to five (5) SETUPs. And, call any of these SETUPs up with a Remote-Switch, instantly changing ALL 4 shocks to the settings you previously determined, whenever you like.
- It has UNIQUE "damping bump-stops" for both Rebound & Compression - you can program the points, near the limits of travel, where the damping force will increase to FULL-STIFF to help prevent Bottoming-out & Topping-out.
- It uses Magneto-Rheological (M-R) fluid (instead of oil).
- It uses solid-state electronic control instead of mechanical control.



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. Defining the Force-Velocity "curve" of each shock,
   B. Defining complete shock "setups",
   C. Setting position of "Damping Bump-Stops" & other shock parameters
   D. Letting you see what all these settings are.
4. The REMOTE Switch mounts in the cockpit for "in-race" adjustments.
   It will instantly change all four (4) shocks to any pre-defined "setup".

USUALLY you need buy only one set of shocks.
The Controller adjusts them to any desired damping over a very wide range.

Features:

- The Programmer adjusts the shocks individually, in both Rebound & Compression, to ANY desired Force-Velocity curve.
- You can define five (5) points on the Force-Velocity curve – including at ZERO velocity!
- Response curves that are IMPOSSIBLE on conventional shocks are easy on MagneShocks.
- You can SAVE a complete "SETUP" for ANY situation (all 4 shocks adjusted EXACTLY as you desire).
- You can have five (5) "saved" SETUPS at any one time.
- You can INSTANTLY "recall" any SETUP (change all 4 shocks) by the use of the REMOTE switch.
- 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 – 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.
- UNIQUE "damping-bump-stops", for both Rebound & Compression, built-in.
  You can define points, at the extremese of shock travel, where each shock becomes FULL-STIFF.
  This helps prevent the shocks from Bottoming or Topping out – improves the handling on rough tracks & helps save the suspension system.
- All changes made on the Programmer are in REAL-TIME – with the car running or not.
- You can disconnect and remove the Programmer during the 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 or 16V systems - Simply connect the Controller to the ignition or accessories switch so it is on when the engine is on.
- It can be attached to the dash with Velcro for on-track testing & adjustments – then easily removed, if desired, for a race.
- The MagneShock™ is relatively fade-free and insensitive to heat when compared to conventional shocks
- Even very stiff MagneShocks can be make soft when you take them on or off the car (with a flick of the "Minimize" switch). This makes them really easy to work with, particularly if you normally run any of your shocks very stiff - stiff shocks can be very difficult to change .
- 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.

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What are the **Advantages** of 3rd Gen MagneShocks?

1. You don't have to buy a lot of shocks.
   Because you can "tailor" each shock to almost any Force-Velocity curve.
   You will NOT need to buy a "ton" of specially valved shocks.
   You will usually only NEED four (4) MagneShocks (& maybe a spare or two)
2. You do not need to "re-valve" shocks. The programmer will make each shock whatever you want it to be.
3. No waiting, research or extra money for specially valved shocks.
   You can PROGRAM & try curves you'd never dream of BUYING. You can make "useful" curves that are IMPOSSIBLE on conventional shocks.
4. Re-programming a shock takes only seconds. Instead of hours of tedious re-valving work (that can only be confirmed with a shock dyno).
5. There is no need for a "shock-man". You don't need to take apart any shocks – just "program" them. And, you can do it over & over again.
6. There is no need for a shock dyno. Each shock WILL BE whatever you set it to with the Programmer.
7. There is no need for a lot of expensive re-valving/rebuilding parts. Only "electrons" are changed (by the Controller) – and they cost nothing.
8. Testing time can be reduced dramatically.
   You can learn more in a single test session than you could in a whole day of on-track testing with a shock-man and a dyno in your trailer.
9. You can change the shock's damping in "REAL-TIME" with the programmer.
   It can actually be done ON the track
   (but don't even think about doing it while going fast or racing!)
   You can set it for a corner, slow down, stop or pit to change a setting (usually a step at a time) and then go try that corner again until you have it right.
10. You can keep 5 separate shock "setups" at any time (a "setup" is ALL the Rebound & Compression settings of all 4 shocks).
    When you have the shocks set as you like you can SAVE the entire "setup".
    Any "setup" can be changed at a later time to however you desire –
    - as many times as you want
11. Each of these "setups" can be recalled ANYTIME – even DURING the race.
    A "remote switch" will select any "setup" you have already "saved".
12. You can make a separate "setup" to compensate for many things:
    A. The corners on many oval-tracks are different on each end.
    You can make a "setup" for each end of the track – 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.
    B. Every road-course has a hairpin (that you normally have to GIVE UP!)
    You can make a "setup" SPECIFICALLY for the hairpin. When everybody else is "slipping & sliding" you can be STUCK & GONE!
    C. Many tracks can be counted on to get looser (or 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" READY - (or "setups") to tighten (or loosen) the car.
    You can make the change EXACTLY WHEN you want it.
    D. On longer races the tires often change enough to dramatically change the handling.
    You can have a "setup" ready to compensate for this change whenever YOU decide.
    When everyone else is "***feather-footing &praying***" you can be WFO!
13. UNIQUE "damping-bump-stops", for both Rebound & Compression, built-in. Bottoming-out can be handled to a degree with rubber bump-stops. Dealing with topping-out is usually impossible. You can define points, at the extremes of shock travel, where each shock becomes FULL-STIFF. This helps prevent the shocks from Bottoming or Topping out – improves the handling on rough tracks & helps save the suspension system.
14. You can make last-minute changes. When the track changes quickly you are usually SCREWED!
    The damping of a single MagneShock or an ENTIRE "setup" can be changed in SECONDS.
15. Overall costs are far lower.
    MagneShocks cost no more than top-end regular shocks (except you must make a 1-time Purchase of the Controller, Programmer, Remote & Cables).
    You will save THOUSAND$$ every year (in some cases every RACE).
16. MagneShocks will make you MORE MONEY!
    Think about the TEN$, or even HUNDRED$$ of THOUSAND$$ of dollar$$ you "COULD" have made -
    - if you had EXACTLY the shocks you needed - WHEN you wanted them!

HOW IT WORKS

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 (4000 times per second).
The computer's MCU then uses this data to calculate the direction of travel and actual piston velocity of each shock.
The MCU then controls the damping force "automatically" in response to this data.
It updates the damping force 4000 times/second for each shock.
It is velocity sensitive, just like a hydraulic shock, but it is also position sensitive.
The computer knows when the suspension is about to bottom out or top out & it automatically increases damping force.
This improves handling and minimizes the stress on everything – which reduces failures of suspension components.
The force – velocity curve is programmed BY YOU into the controller.

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Force-Velocity Curves:

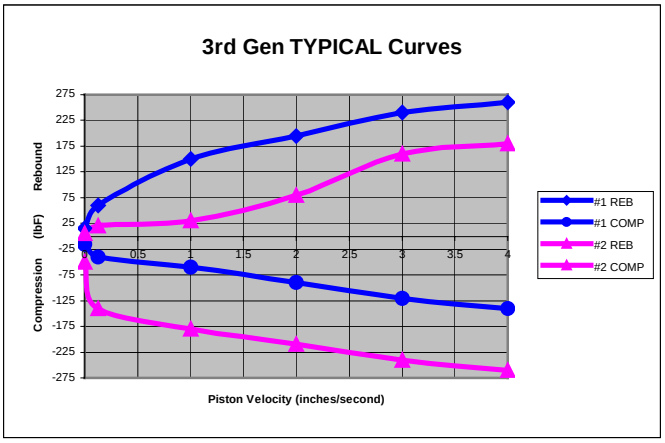
The damping can be adjusted at FIVE (5) velocities: 0, ½, 1, 3 & 7 inches/second.
The Controller linearly interpolates the damping in between these velocities.

The slope of the curve above 7 in/s is fixed (how fast it increases damping with increases in velocity).
The damping range for Rebound & Compression ia about 10:1 at any of these 5 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.

Fig. 1 - **Standard** Damping Range
This represents the MIN & MAX possible dampings available on this shock.

You can select anything desired, at 0, ½, 1, 3 & 7 in/sec,
in between these limits (between the BLUE lines for Rebound,
between the Violet lines for compression).

* Shocks with stiffer or softer RANGES are available.
The relative "shape" of the curve "limits" will be about the same.
But, the FORCE will be "proportionally" more or less (at all velocities).



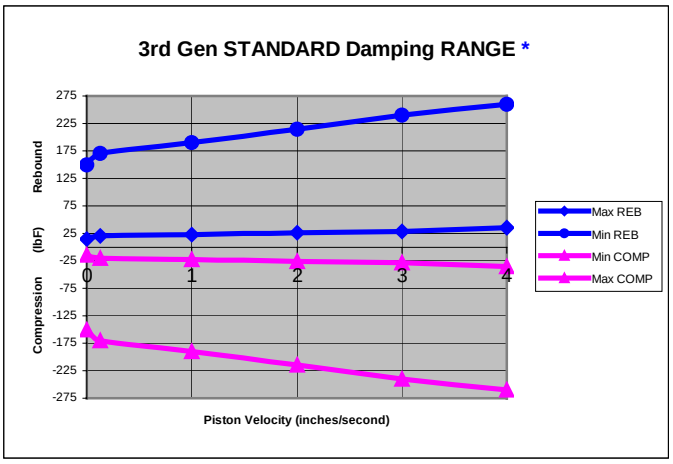


Fig. 2 This represents some **"TYPICAL"** Curves used on racecars.

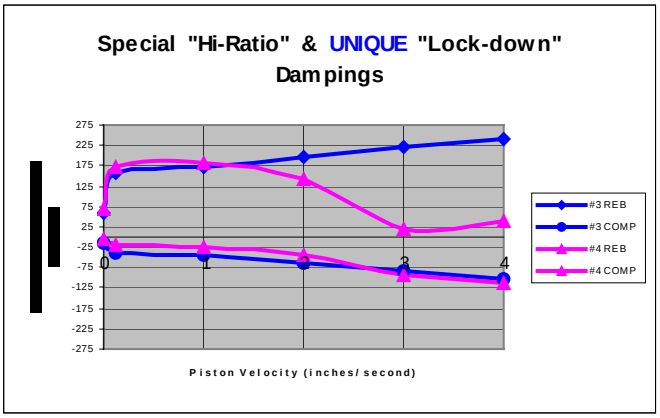
The BLUE one has more REB than COMP & is "typically" progressive.

The VIOLET one starts out with very Soft REB & very stiff COMP
but it becomes nearly 50-50 by 4 in/sec.

Fig. 3 This represents some **UNIQUE** & unusual curves.

The BLUE one has a high RATIO (Reb/Comp) & very little "slope".

The VIOLET one is simply IMPOSSIBLE with a conventional shock.



ONLY MagneShocks can get SOFTER as velocity goes up!

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M-R Fluid

The M-R fluid is basically composed of micron size particles of iron suspended in an oil base.
In the presence of a magnetic field these iron particles want to form chains & stick together.
The stronger the field - the harder these particles stick together.
This phenomenon changes the apparent viscosity of the M-R fluid, which, in turn, changes the damping force of the shock.
M-R fluid's viscosity can be changed continuously; actually as fast as the magnetic field changes.
The piston contains an 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).

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

Part No.	Description	Mountings	Ext.	Comp.	Stroke
5243-20	Older cars with short shocks; Cars with IFS & IRS suspensions	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**	**1/2" ID Brgs**	**19.35**	**13.24**	**6.11**
5280-20	Cars with longer stroke rear shocks	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 ½" ID spherical bearings on both ends (5/8" wide ball)

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 -
- 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 if desired.

Any type of shock mounting is available on special order.

Shocks with a stiffer or softer damping range are also available.

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