Service-Information

Group 33 Rear Wheel Drive	October 1983	Bulletin No.: 33 008 83 (2085)

- For U.S.A. and Canada Only -

RE: "NIVOMAT" SELF-LEVELING SHOCKS FOR BMW MOTORCYCLES

Dear Dealer:

To improve riding comfort, the R100RT is equipped with "Nivomat" shocks as standard equipment.

They can be used on all other BMW motorcycles from /5 models to the present except the R65, R65LS, R80GS and the R80ST.

These Nivomats have been developed for BMW by Boge.

Nivomats offer the following advantages:

The motorcycle remains at constant ride height up to its allowable (rated) load limit. Ground clearance and spring travel remain unchanged, even when increasing the load, and the headlight beam does not require readjustment.

There is no need to make spring preload adjustments as with standard spring/damper shocks.

Nivomats have a consistent damping action. This benefits the ride and road holding at high speeds.

Operating Principle:

The Nivomat is a combined spring and damper shock. The damping action is as on a gas-filled damper; the suspension is adjusted automatically to suit the load on the motorcycle. It is relatively soft for solo riding and becomes progressively harder as the load increases.

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Operating Instructions:

Nivomat spring/damper shocks adapt automatically to increasing load: For solo riding, the spring is fairly soft, but stiffens up as the load increases. This feature is very desirable for motorcycle riding. Extension and contraction of the Nivomat actuates a built-in pump, which pre-loads an integral gas spring to the extent necessary to compensate for the load on the motorcycle. This pumping continues up to the maximum load limit specified for the motorcycle.

If there is no load on the motorcycle, it will stay in the normal static-load position. Any increase in load (rider, passenger, luggage) causes the suspension to yield initially, so that as the ride starts, suspension travel is limited.

However, the built-in pump soon builds up the necessary pressure to raise the motorcycle back to its designed height, which is maintained almost constant by a complex regulating mechanism.

If the load on the axle is relieved, the motorcycle initially rises as with the conventional suspension, but drops immediately afterward to the design height and remains there.

If this reduction in load occurs, for example, because the rider has extended his legs (stretching when stopped at a traffic light) so that the suspension is not supporting his body weight, the following will occur: the Nivomat units will raise the motorcycle to its unladen static height. When the damper rod is fully extended, a relief bore is exposed and allows the Nivomat to compress again to the motorcycles design height.

When the trip is continued and the rider's weight is again on the motorcycle, the Nivomats are initially compressed by the load. This means that when the trip is started again, the spring rate of the Nivomats may be (depending on the road surface) insufficient to prevent the suspension from bottoming. As soon as the pumping actions starts, the motorcycle will return to its ride height.

Testing:

"Nivomat" units can be checked at a standstill by simulating movement of the suspension. After placing a load on the motorcycle sufficient enough to compress the suspension, the rear of the motorcycle should be pumped up and down a number of times (at least 20 - 25 strokes, each 15 - 20 mm) to simulate the pumping action. This should raise the motorcycle to its design height. The Nivomats are now fully operational.

The time needed (while riding) to raise the motorcycle after an increase in load depends on the road surface. To obtain the correct ride height on a smooth road takes longer than on a rough road. Once the correct level is reached, a complex mechanism ensures the level is maintained.

Important Notes:

After a passenger and/or luggage is added to the motorcycle, the suspension may bottom several times before it has been pumped up to the correct ride height.

When stopped at a traffic light or in a traffic jam and if the rider or passenger lower their legs to the ground/or after the front suspension diving action caused by hard braking, the Nivomat's control system will reduce the internal pressure. As the load is increased again (motorcycle ridden away from a standstill), the pumping action described must first take place before the gas springs can be raised to a pressure equivalent to the load on the motorcycle.

A light film of oil may be noticed on the piston rod. This does not indicate any malfunction.

Operation of the Nivomats can be checked while the motorcycle is at a standstill by placing a load above the rear wheel (not more than specified) and compressing the rear suspension by hand as described before to simulate the pumping-up action.

Note:

If this test proves positive, but the motorcycle reverts to its correct ride height very slowly when ridden or does not reach the correct height at all, check that the additional spring as described in S.I. 33 007 82 (2062) is installed.

No credit will be given for Nivomats returned as faulty under warranty if the additional spring is missing.

If the allowable rear wheel load limit is exceeded, a safety valve prevents excessive pressure from building up so that the full ride height cannot be reached.

Should a defect occur and the Nivomat must be replaced, replacement of both Nivomat units is not necessary. However, only install units with the same part number.

Important Changes:

During 1981, the damping of Nivomat units was changed to a softer rating (for solo riding comfort).

In January 1982, the additional spring referred to in S.I. 33 007 82 (2062) was put on production units.

The following versions are now in use with the characteristics stated:

Item	Part Number	Lower Mounting Eye Silver	Lower Mounting Eye Black	Damping	Identification on Mounting Eye	Additional Spring
1	33 53 1 238 216	X		hard		no
2	33 53 1 238 216		X	hard		yes
3	33 53 1 301 545		X	soft	I	no
4	33 53 2 301 545		X	soft	L	yes
5	33 53 2 301 545		X	soft		yes

Item 1: Standard equipment until summer of 1981.

Item 2: Converted to additional spring at BMW or BMW motorcycle dealer according to SI 33 007 82 (2062).

Item 3: Standard equipment from the summer of 1981 until introduction of additional spring.

Item 4: Standard equipment after January 1, 1982, (code letters from L onwards in alphabet).

Item 5: Converted to additional spring by BMW motorcycle dealer according to SI 33 007 82 (2062).

The line drawing which follows shows the design features of the Nivomat unit.

The Nivomat consists of an oil-filled actuating cylinder, containing a damper piston (5) attached to a piston rod (12). The cylinder is surrounded by a chamber filled partly with oil and partly with gas. This is divided by an intermediate bulkhead into the high-pressure chamber (8) and the low-pressure chamber (2).

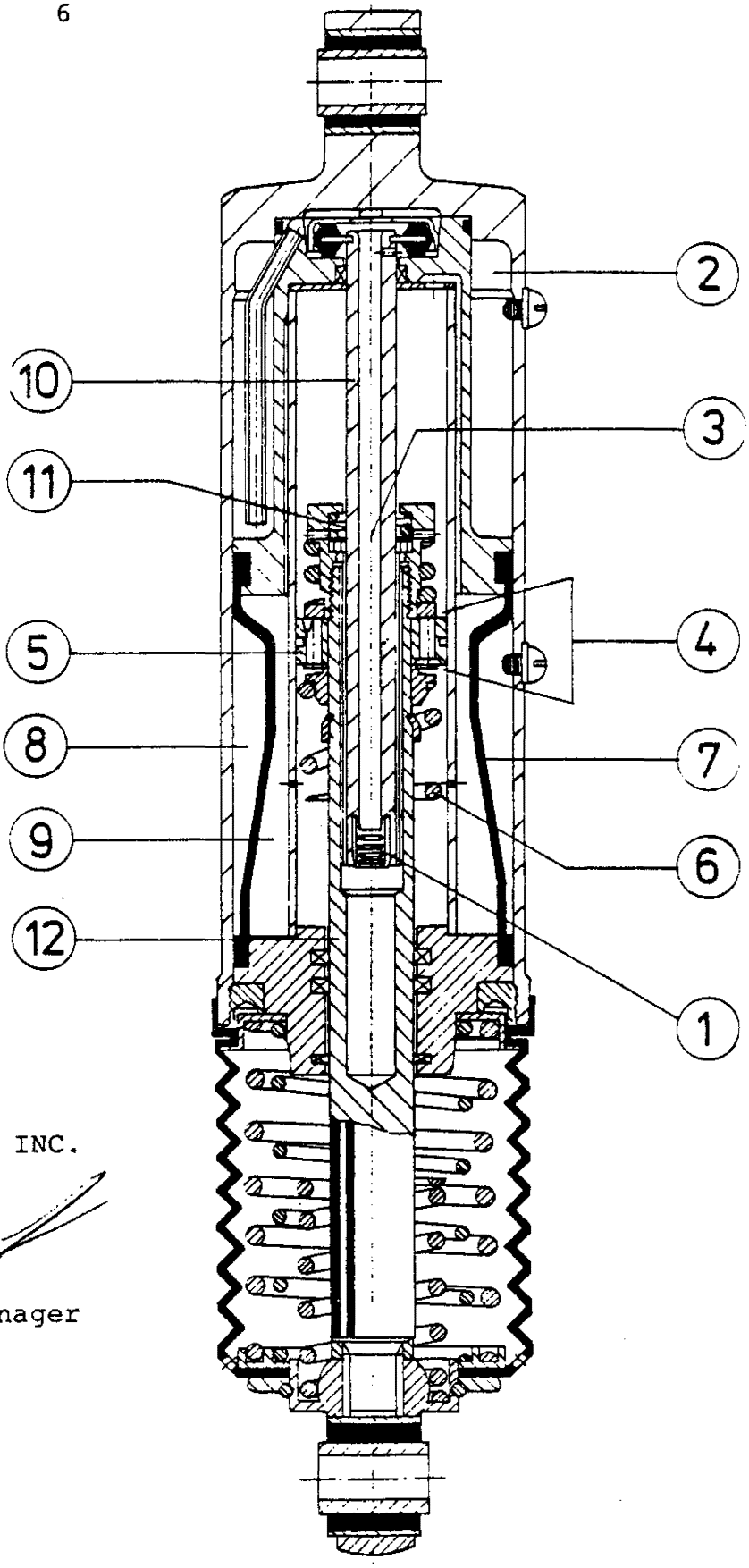
The gas in the high-pressure chamber is separated from the oil by a rubber diaphragm (7), and is preloaded by a greater or lesser amount of oil according to the load on the unit. The compressed gas provides the spring force exerted by the Nivomat.

At the top of the housing, the pump rod (10) is rubber mounted. Together with the hollow piston rod, it forms the oil pump.

When the load on the vehicle increases, the suspension is compressed in the normal way. As the vehicle moves away, relative movements occur between the wheel and the frame, caused by road surface irregularities. These actuate the pump, which discharges oil from the low-pressure chamber (2) by way of a suction pipe, the hollow pump rod (10), the intake valve (1) and the pump check valve (11) into high-pressure chamber (9). The effect is to compress the gas (8) in the high-pressure chamber, increase pressure in the working section of the unit and raise the spring force acting on the piston rod, so that the vehicle is raised to its specified ride height again.

Once this height has been reached, a control sleeve opens control passage (3); oil continues to be pumped through the unit, but then flows back to the low-pressure chamber. The control passage is extremely restricted and, therefore, has no influence on the dynamic behaviour of the spring/damper unit. The Nivomat has a damping action similar to a single-tube, gas-filled damper. Damper tube (5) is equipped with spring-loaded damper valves (4).

As pressure increases, the pumping action itself provides an additional load-dependent damping effect, which is added to that produced by the piston.



Sincerely,

BMW OF NORTH AMERICA, INC.

Richard Dampf
National Technical Manager

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