SPRING BRAKE ACTUATOR

(Air/hydraulic Models)

Description

A spring brake actuator is secured to a bracket on the rear axle casing, the fork end of the pull rod operates the lever of the brake compensator mechanism.

The pull rod is operated by the piston and power springs in the actuator. In the "OFF" position the hand control valve supplies compressed air to a piston that compresses the power springs to release the brake.

In the "ON" position, compressed air is released allowing the springs to expand and apply the brakes mechanically.

A 'Wind-off' is incorporated in the actuator to release the rear brakes if it is required to move the vehicle when a fault in the air system or hand control valve will not release the brakes in the normal way.

Wind-off Mechanism

In the event of a failure in the compressed air system, or a fault in the hand control valve or quick release valve such that insufficient air pressure is supplied to the piston chamber, the rear brakes will be held 'on' by the power spring. The wind-off mechanism is provided to enable the pull rod to be extended and release the brakes so that the vehicle can be moved.

Warning: The vehicle must not be driven on public roads with the mechanism wound back. Any attempt to drive it would be illegal and dangerous.

Spring Brake Actuator – To Wind-off

Chock the wheels, couple the vehicle to the towing unit with a rigid tow bar, and apply the parking brake on the towing unit.

Release the clip and roll back the gaiter from the pull rod. Mark the position of the locknut relative to the pull rod. Slacken the locknut and rotate the pull rod sleeve clockwise, ensuring the pull rod does not turn in the fork end.

Initial movement will relax the power springs, then the pull rod will lengthen to release the rear brakes.

The wind-off mechanism must be reset to the original condition by reversing the procedure when the appropriate repairs have been completed.

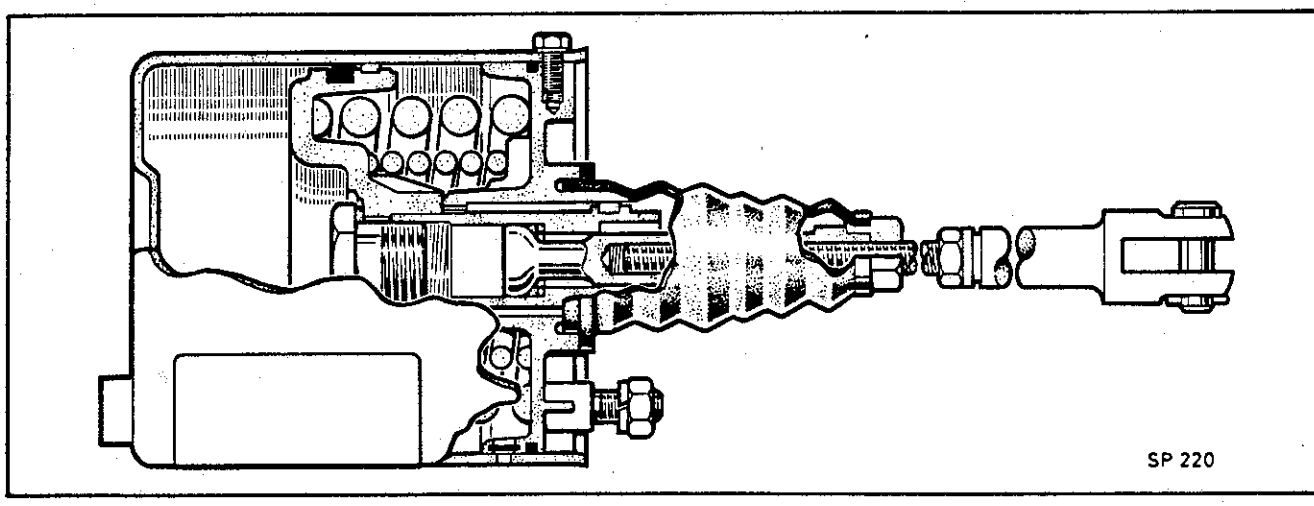


Fig. 1 *Sectional view of spring brake actuator*

Spring Brake and Compensator (Air/Hyd.)

Operation

Hand Control Valve ON or Air System Drained

The air in the piston chamber will be open to atmosphere at the quick release valve. The power springs will force the piston towards the front of the actuator. This force will be transferred through the piston shaft, thrust bolt, wind-off sleeve and pull rod to the compensator lever and cables, applying the rear brakes.

Hand Control OFF

Compressed air via the hand control valve is supplied to the piston chamber, moving the piston rearward and compressing the power spring. The force on the sleeve and pull rod is relieved. The brake shoe return spring can return the brake shoes, cables and compensator lever to the off position.

Maintenance

Check the mounting nuts for security. Check the tightness of the air pipe connection, and the air pipe for chafing and damage.

Check that the drain flap in the base of the body is free from dirt and obstruction.

Examine the clevis pin in the fork for excessive wear or buckling, and the pull rod for chafing.

Examine the gaiter for splits and signs of perishing or hardening. Renew if any fault is found, as a faulty gaiter can allow the entry of water and dirt which can seriously affect the performance of this highly stressed unit.

Check the actuator cylinder for dents, which might cause the piston to jam and the brakes to fail.

At the time stated in the Maintenance Schedule fit a replacement actuator unit, or remove and overhaul it completely.

Note: The power springs MUST be renewed at this service interval either by fitting new springs or exchanging the unit.

Operating Test

Chock the wheels, fully charge the air system and stop the engine.

Have an assistant operate the hand control valve in the cab so that the action of the brake actuator and compensator can be closely observed.

Operate the hand control valve several times from OFF to ON and check that the pull rod moves out and in promptly without binding, also the compensator lever and cables.

Listen for any clicking or scraping noises in the actuator that may be caused by a broken power spring.

Pressure Test

Move the hand control valve to the ON position, fully charge the air system again and stop the engine.

Note the pressure fall, if any, on the air pressure gauge over a period of thirty seconds.

Move the hand control valve to OFF and again note the pressure drop over thirty seconds after the gauge has stabilised from the brake application.

If the pressure drop is greater than before, there is a leak within the actuator or its supply line that must be rectified.

Leak Test

Chock the wheels, fully charge the air system and move the hand control valve to OFF.

Brush soap solution around the drain flap port and the pipe connection.

Leakage from the drain flap port must not exceed a 10 mm (0.4 in) soap bubble in five seconds. Leakage in excess of this indicates a faulty piston sealing ring that must be rectified.

Leakage from the pipe connection is not permissible.

Spring Brake Actuator – To Remove

Chock the wheels, fully charge the air system and place the hand control valve in the 'OFF' position.

If air pressure is not available, remove the clip and roll back the gaiter, slacken the locknut and turn the wind-off sleeve clockwise until the brakes are free. ENSURE THAT THE PULL ROD DOES NOT TURN IN THE FORK END.

Remove the split pin and clevis pin from the fork end of the pull rod and compensator lever.

Move the hand control valve SLOWLY to the ON position.

Warning: Check that the pull rod retracts as the air is exhausted from the unit. Piston seizure, with a possibility of sudden release of power spring pressure, can be dangerous, and requires extra care when dismantling the unit.

Disconnect the flexible air pipe connection at the actuator. Plug both open ends to prevent the entry of dirt.

Release the locknuts securing the actuator to the mounting bracket, and remove the actuator.

To Dismantle

Special Tools	
Tool	MS 61
Adaptor	CD 61-7 A

Warning: It is dangerous to attempt to dismantle the spring brake actuator without the special tool and its adaptors. The power spring is designed to exert the force required to hold a fully laden vehicle. Unless the spring pressure is released using the special tools – **and only the special tools** – serious injury to the operator can result.

Ensure that the threads of Tool MS 61 are clean and well lubricated. Set distance between top and bottom plates to 584 mm (23 in), ensure the plates are parallel and lock in position.

Clean the exterior of the actuator and mark the relative positions of the cylinder and body to assist correct re-assembly.

Remove one stud from actuator base to allow actuator to be fitted to MS 61.

Remove air line elbow from cylinder to allow fitting of adaptor CD 61-7 A.

Remove the fork end, locknut, gaiter clip and gaiter from pull rod.

As an additional safeguard fit a suitable size tube and washer over the pull rod, locate the tube on the actuator end face and secure with the pull rod locknut (Fig. 2).

Position the actuator in Special Tool MS 61 with the mounting studs through the baseplate, secure with nuts and washers.

Assemble Special Tool Adaptor CD 61-7 A as follows. Screw the three legs into the plain ring with the angled bore towards the legs. Position the second plate, boss uppermost and secure with nuts and washers. Lubricate the bore of the adaptor and locate on the centre screw. Wind down the centre screw until the adaptor PRESSES LIGHTLY on the cylinder case.

Using the top plate secure the assembly in a vice.

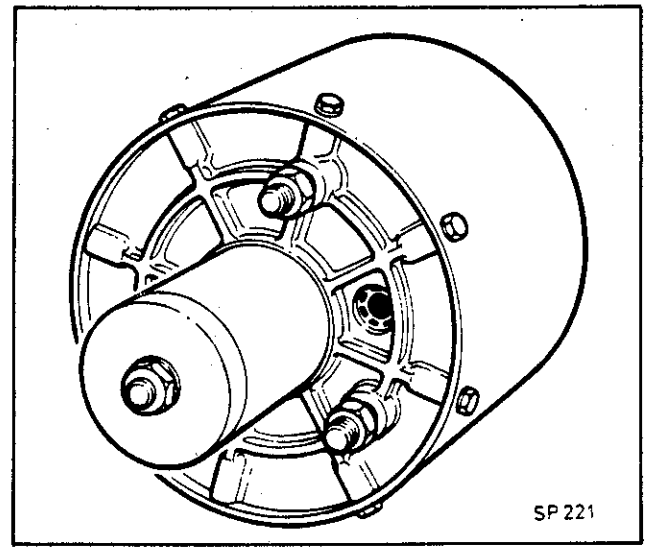


Fig. 2 *Safety tube in position*

Spring Brake and Compensator (Air/Hyd.)

Remove the setscrews around the cylinder casing (Fig. 3).

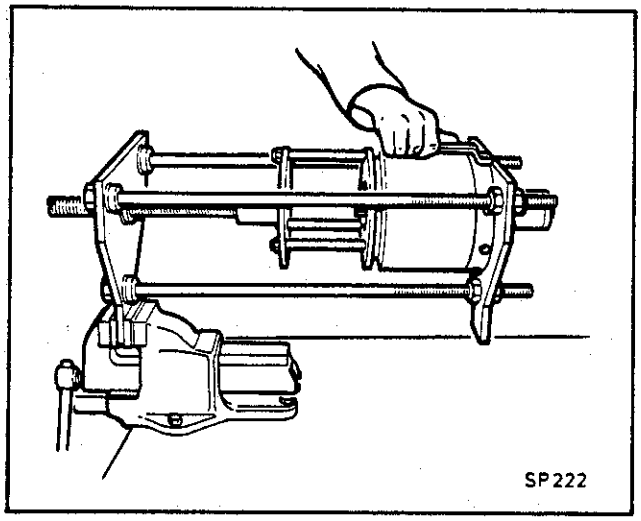


Fig. 3 *Removing cylinder setscrews.*

Connect an air line to the inlet port, turn the centre screw anti-clockwise at the same time injecting air to remove the cylinder casing. Remove the air line and cylinder (Fig. 4) when the spring has extended to its free length.

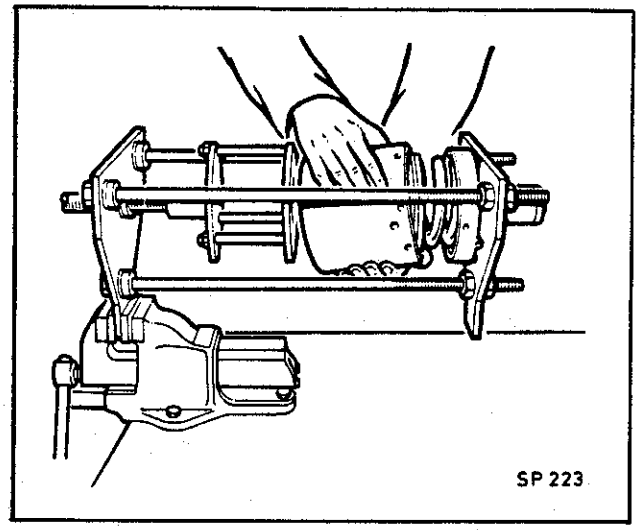


Fig. 4 *Removing cylinder casing*

Wind down the centre screw until the adaptor locates on the face of the piston, centralise, and continue turning to compress the spring. Stop when there is approximately 2 mm (0.08 in) gap between the piston face and the end cover (viewed through the spring). On no account should these faces be pressed together as damage to the components could result.

Carefully remove the nut, washer and tube from the pull rod. Unscrew and remove pull rod.

Hold the now exposed end of the piston shaft by means of a spanner on the two flats provided and, using a standard socket and wrench, through the legs of the adaptor, unscrew and remove the piston shift bolt and sealing washer (Fig. 5). Loctite is applied to the bolt threads on assembly, so a tap may be required to free it.

Turn the centre screw anti-clockwise until the springs are fully released, dismantle as required (Fig. 6).

Remove the body from the base plate.

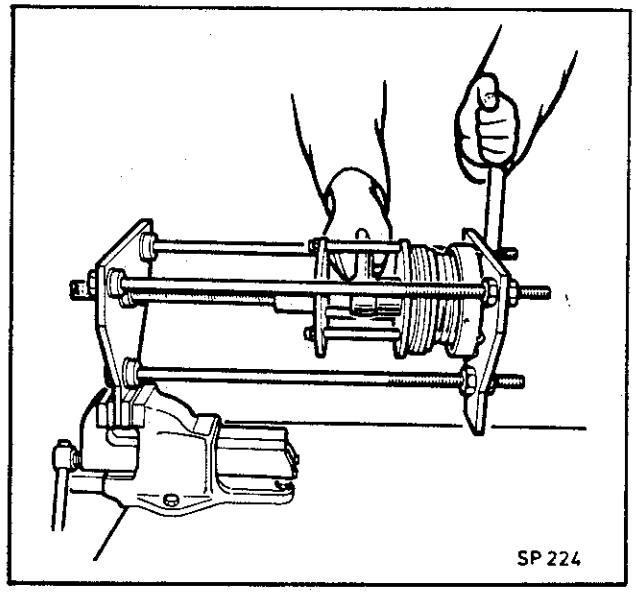


Fig. 5 *Removing piston shaft nut*

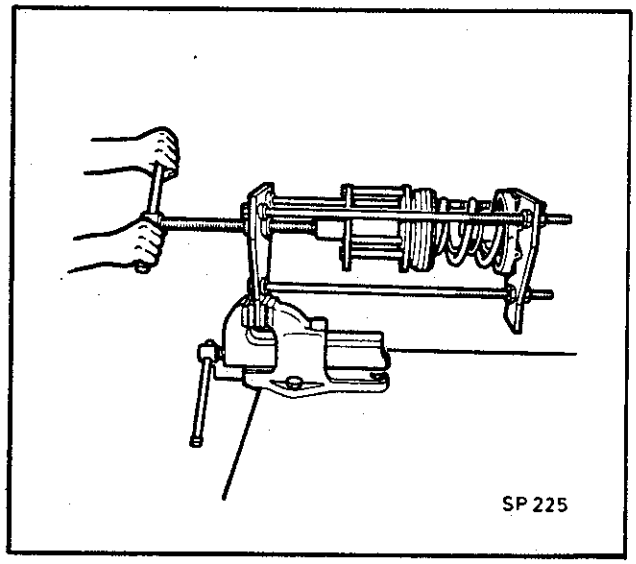


Fig. 6 *Releasing piston springs*

Spring Brake and Compensator (Air/Hyd.)

Inspection and Overhaul

Clean all parts in solvent and blow dry.

Examine the cylinder, body and piston for cracks and damage.

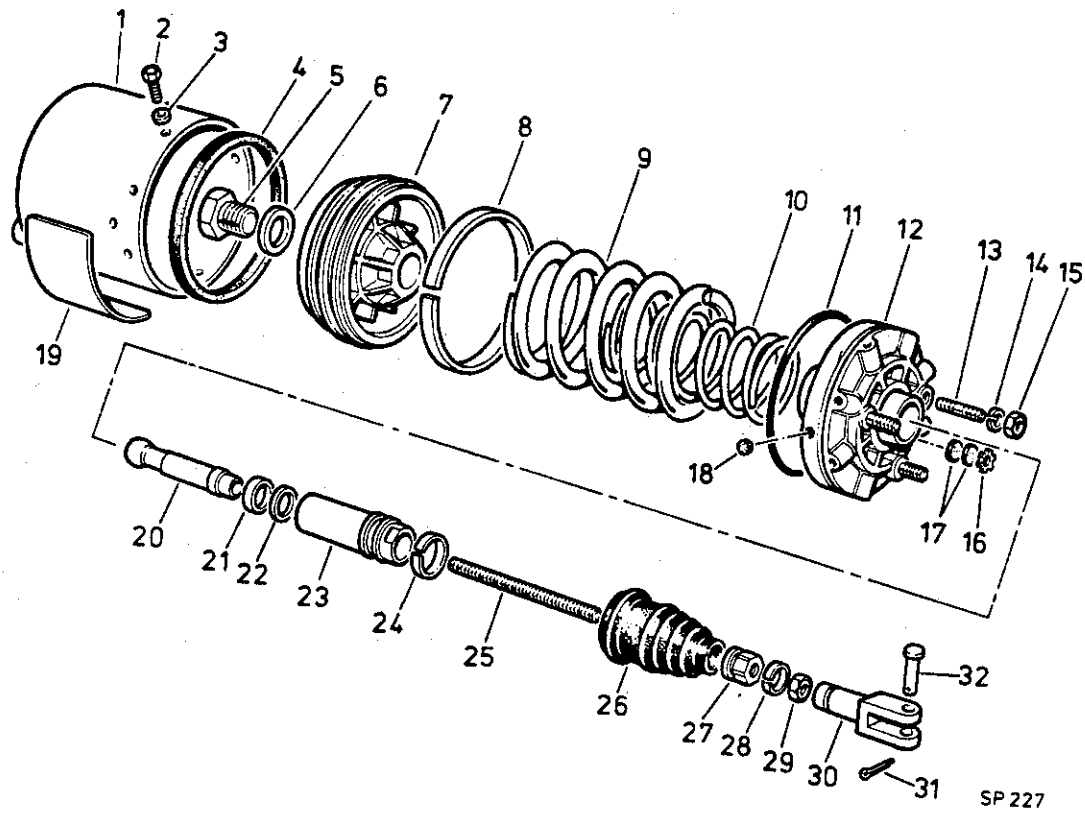
Check all sliding surfaces for excessive wear or scores.

Check that the pull rod is not bent, and that the fork end and clevis pin are not unduly worn.

Check all threads and studs for damage or stretch, with particular attention to the piston shaft, bolt, wind-off sleeve and pull rod.

Renew all sealing rings, bearing rings, breather element, drain flap and gaiter.

NOTE: The power springs can be re-used at the first year or 80,000 km (50,000 miles) overhaul, providing that the entire spring surface is completely free from any rust before cleaning. If the springs are not in perfect condition new ones must be fitted.



1	CYLINDER	12	BODY	23	PISTON SHAFT
2	SETSCREW	13	STUD	24	BEARING RING
3	WASHER	14	SPRING WASHER	25	PULL ROD
4	SEALING RING	15	NUT	26	GAITER
5	PISTON SHAFT BOLT	16	RETAINER	27	NUT
6	WASHER	17	BREATHER ELEMENT	28	CLIP
7	PISTON	18	DRAIN FLAP	29	LOCKNUT
8	BEARING RING	19	LABEL	30	YOKE
9	POWER SPRING (LARGE)	20	WIND-OFF SLEEVE	31	SPLIT PIN
10	POWER SPRING (SMALL)	21	PULL ROD SEAT	32	YOKE PIN
11	SEALING RING	22	SLIP WASHER		

Fig. 7 *Details of spring brake actuator*

Spring Brake and Compensator (Air/Hyd.)

To Re-assemble

Lubricate with Rocol E1A grease all the new sealing rings, bearing rings, all sliding and load bearing surfaces, the entire surface of the springs. The threads of the piston shaft and bolt must be clean and dry.

Fit the bearing rings to the piston shaft and piston.

Install the sealing ring in its groove in the piston so that the lips are pointing away from the skirt.

Fit the sealing ring, drain flap and breather element to the body.

Assemble the pull rod seat and slip washer on the pull rod. Insert the pull rod into the piston shaft. Screw the pull rod into the sleeve until it stops and then unscrew the rod two or three turns.

Refit the body to the base plate.

Position the two power springs and piston in the Special Tool. Gradually wind the centre screw clockwise to compress the springs, checking that both springs are centralised and correctly positioned. Compress the springs until there is a gap of approximately 2 mm (0.08 ins.) between piston face and cover.

Use locally manufactured wedges (Section MA040) positioned so as to bring the piston and body bores into line (Fig. 8). When the bores appear lined up, and feel parallel, offer up the piston shaft and try the fit. Do not force the entry of the shaft, but leave in position whilst fine adjustment is made on the wedges. The piston shaft bearing ring must be carefully compressed to avoid damage whilst entering the body bore. Screw in the piston shaft bolt and sealing washer using Loctite 572.

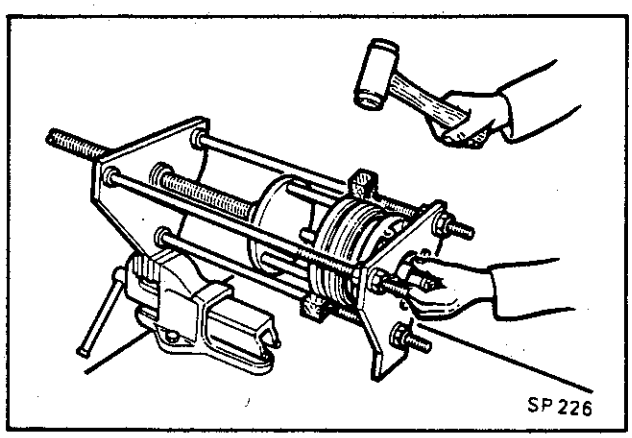


Fig. 8 *Using wedges to align piston and bores*

As an additional safeguard refit the tube and washer on the pull rod.

Wind back the centre screw. Align the marks on the cylinder and body, slide the cylinder onto the body taking care not to damage sealing ring. Refit the setscrews around the cylinder, torque tighten to Data figure.

Remove the tube and washer from the pull rod.

Refit the air pipe elbow to the cylinder.

Using an air line, check that the actuator operates correctly.

Refit the fork end, locknut, gaiter clip and gaiter to pull rod. Do not fit gaiter at this stage.

Remove the actuator from the tool and refit the stud.

To Refit

Fit the actuator to the bracket on the axle and secure with three locknuts. Connect the air pipe.

Lubricate the clevis and pin with H.M.P. grease.

Ensure there is sufficient pressure in the system to operate the actuator.

Support the pull rod clear of the compensator linkage and have an assistant move the hand control valve to OFF.

Pull lightly on the pull rod and check the dimension as shown in Fig. 9. Adjust if necessary by releasing the lcknut and screwing the pull rod in or out.

Tighten the locknut. Recheck that the dimension is correct, that full air is being applied to the actuator, and the pull rod is fully seated within the actuator.

Insert the clevis pin in the fork end of the pull rod and compensator lever. Fit a new split pin.

Refit the gaiter and gaiter clip. Carry out the operating test and leak test. Move the hand control valve to ON and remove the wheel chocks.

COMPENSATOR LINKAGE (Air/hydraulic brakes)

Description

The brake side cables are connected to a compensator shaft that is free to turn in a link pivoted on the rear axle casing. The compensator shaft is splined to the compensator lever that is operated by the pull rod of the spring brake actuator. The braking effort on the pull rod is applied equally to each side cable.

Operation

When air is exhausted from the spring brake actuator by operation of the hand control valve the power spring will force the actuator piston forward, moving the actuator pull rod forward.

The compensator lever will turn in the link, pulling on the side cables to expand the brake shoes in the drums. If there is greater clearance in one brake than the other the link will pivot on the side cable of the brake that is expanded first so that equal effort is applied to both brakes.

Maintenance

Apply lubricant to the two nipples in the compensator assembly at the recommended intervals.

Examine the clevis pins and fork ends for wear and buckling.

Operating Test

Chock the wheels, fully charge the air system and have an assistant to operate the hand control valve from ON to OFF several times.

Observe the compensator linkage. The actuator pull rod and the side cables should move in and out promptly with each brake application and release.

To Remove

Chock the wheels, fully charge the air system and move the hand control valve to OFF.

Remove the split pins and clevis pins from the forks of the side cables and the actuator pull rod.

Remove the locknut from the pivot pin.

Lift out the pivot pin and remove the compensator.

To Dismantle

Mark the relative positions of the lever and shaft.

Remove the pinch bolt and tap the compensator lever from the shaft.

Withdraw the compensator shaft from the link.

Inspection and Overhaul

Thoroughly clean all parts.

Check the shafts and bushes for wear or damage renew as necessary.

To Re-assemble

Thoroughly grease all parts.

Align the marks made on dismantling and refit the compensator lever to the shaft. If new parts are being used, refer to Fig. 9 for the correct angle of compensator lever to the shaft.

Insert and tighten the pinch bolt. Check that the shaft is free to turn in the link without undue end float.

To Refit

Place the assembly in position and secure by inserting the pivot pin through the top of the bracket/compensator.

Fit and tighten the locknut, check that the link is free to turn on the bracket without undue end float. Grease the assembly.

With the air system charged and the hand control valve in the "OFF" position, fit the clevis pins and new split pins to the fork ends.

Check the compensator dimensions and angle as shown in Fig. 9.

Carry out the operating test.

Spring Brake and Compensator (Air/Hyd.)

To Adjust

Chock the wheels, charge the air system and move the hand control valve to OFF.

Remove the split pins and clevis pins from the forks of the side cables.

Check the dimensions shown in Fig. 9.

If the dimensions are incorrect, release the gaiter clip on the actuator pull rod, roll back the gaiter and loosen the locknut of the wind-off sleeve.

Remove the split pin and clevis pin from the fork end and screw the pull rod in or out to obtain the correct dimension.

Note: This is a fine adjustment and only a few turns should be necessary. Tighten the locknut and recheck the dimensions.

Refit the gaiter, clevis pins and new split pins.

Check the actuator operation.

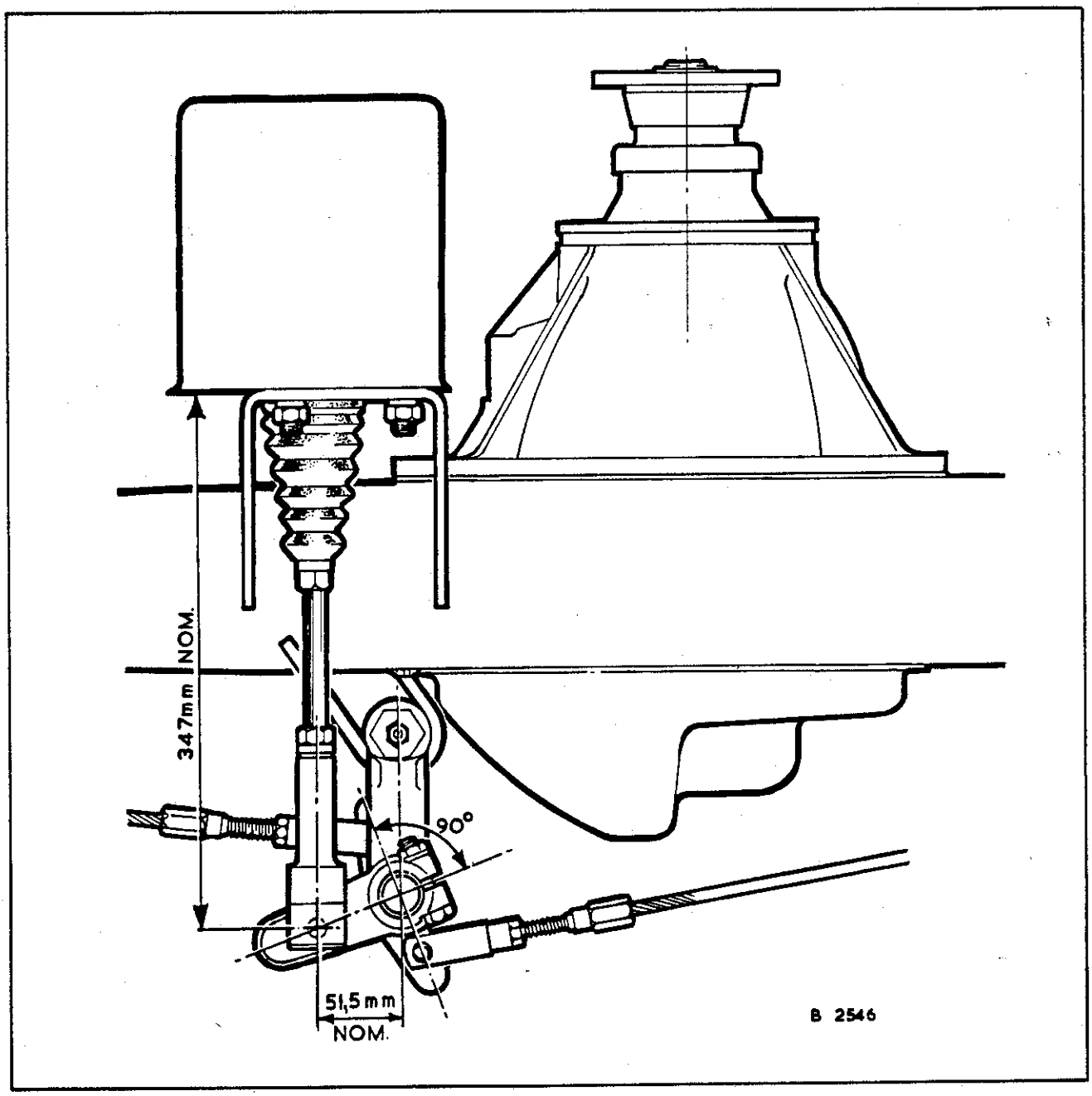


Fig. 9 *Adjustment of actuator pull rod and compensator mechanism.*