

## Bendix Manual Slack Adjusters

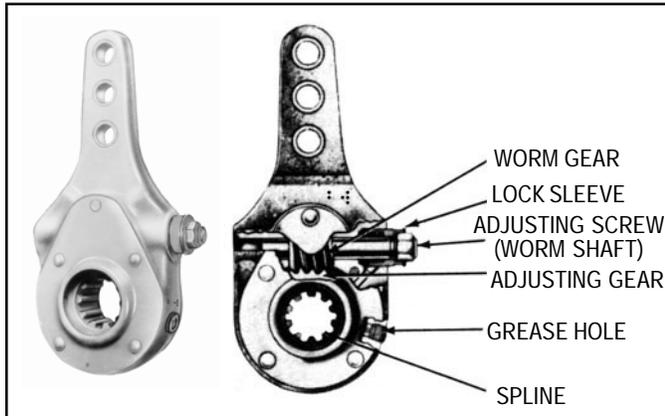


FIGURE 1 - POSITIVE LOCK TYPE SLACK ADJUSTER

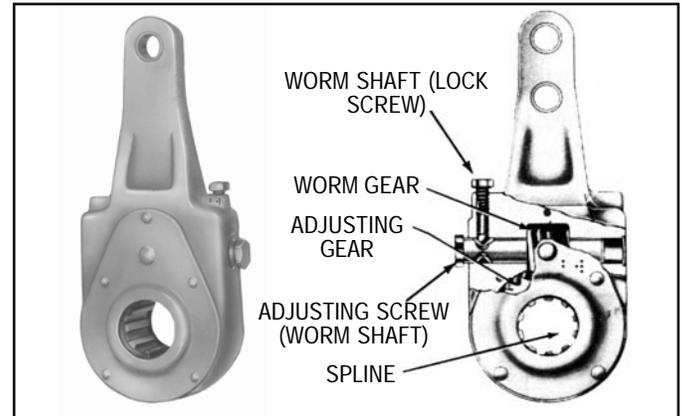


FIGURE 2 - BALL INDENT TYPE SLACK ADJUSTER

### DESCRIPTION

In an s-cam type foundation brake, the final link between the pneumatic system and the foundation brake is the slack adjuster. The arm of the slack adjuster is fastened to the push rod of the chamber with a yoke, and the slack adjuster spline is installed on the brake cam shaft.

Primarily, the slack adjuster is a lever, converting the linear force of the air chamber push rod into a torque which turns the brake cam shaft and applies the brakes.

Standard slack adjusters contain four basic components; the body, worm, gear and adjusting screw. The adjusting screw is provided to adjust the slack caused by the wear of the brake lining.

All slack adjusters utilize the worm and gear principle and, fundamentally, differ only in torque limit specifications; A type 20 slack adjuster has a limit of 20,000 inch pounds torque, a type 30 slack adjuster has a limit of 30,000 inch pounds torque, etc.

Slack adjusters are manufactured with various arm lengths and various configurations; straight, offset, etc. to satisfy various installation requirements. Splines are available in several different types and sizes.

### OPERATION

When the brakes are applied, air pressure forces the air chamber diaphragm and push rod to move; this rotates the slack adjuster, which in turn rotates the cam shaft. This causes the "S" cam to spread the brake shoes which contact the brake drum.

When the brakes are released, air pressure is exhausted from the air chamber. The chamber return spring and the brake shoe return springs return the brake cam, cam shaft, slack adjuster and chamber push rod to the released position.

### ADJUSTING MECHANISM

The adjusting mechanism of a slack adjuster consists of an adjusting screw (worm shaft), worm and slack adjuster worm gear. Turning the adjusting screw nut on the end of the worm shaft rotates the worm shaft and worm. The worm meshes with and rotates the slack adjuster worm gear which is connected to the brake cam by a splined cam shaft. The turning of the slack adjuster worm gear rotates the cam shaft and brake cam, spreading the brake shoes, compensating for brake lining wear.

There are two types of adjusting mechanisms used on Bendix slack adjusters currently manufactured. The light to medium torque rated slack adjusters (Fig. 1) use a positive lock mechanism consisting of a spring loaded lock sleeve, which when positioned properly, engages the adjusting screw nut, preventing the adjusting screw (worm shaft) from rotating.

The heavier torque rated slack adjusters (Fig. 2) utilize the lock ball or plunger and worm shaft indent principle adjustment lock. The lock ball or plunger must engage the indent on the worm shaft after the adjustment is completed. An audible metallic click can be heard when engagement is made.

**Using the Positive Lock Slack Adjuster Mechanism: (Fig. 1)**

Wipe the adjusting screw nut and locking sleeve area clean. Position wrench or socket over the adjusting screw and disengage the locking sleeve by depressing the lock sleeve. Make the necessary adjustment by turning the adjusting screw with the locking sleeve depressed.

When adjustment is completed, the adjusting screw nut should be positioned so the locking sleeve engages the adjusting screw nut, thus locking the adjusting screw in place. **DO NOT ATTEMPT TO TURN THE ADJUSTING SCREW WITHOUT FULLY DEPRESSING THE LOCK SLEEVE.**

**Using the Ball Indent Slack Adjuster Mechanism: (Fig. 2)**

Before proceeding with adjustment, measure distance from top of lock screw head to slack adjuster body.

To adjust, back off lock screw (counter clockwise) and make necessary adjustment by turning the adjusting screw. After adjustment is complete, retighten lock screw, making certain that lock ball is engaged on the plunger shaft. (Proper engagement can be confirmed by checking the measurement from the top of the lock screw head to the slack adjuster body. It should be the same before and after the adjustment.)

**PROCEDURE**

Vehicle brakes should normally be adjusted using the vehicle or brake manufacturer’s recommendations. If they are not available, the following can be used:

1. Bring the vehicle to rest on a level surface and chock the wheels.
2. Mechanically release (“cage”) the spring brakes.

**BRAKE ADJUSTMENT CHECK**

**A. PREFERRED METHOD**

Determine the brake chamber size. Make a 100 psi application to the service brakes and measure the push rod stroke. Using the chart (Fig. 3) compare the actual chamber stroke to the recommended maximum stroke to determine if brake adjustment is required.

CLAMP RING TYPE CHAMBER DATA (Dimensions in inches)					
Type	Effective Area (Sq. In.)	* Outside Diameter	Max. Stroke	Max. Stroke With Brakes Adjusted	Max. Stroke at Which Brakes Should Be Readjusted
6	6	4-1/2	1-5/8	Should	1-1/4
9	9	5-1/4	1-3/4	be as	1-3/8
12	12	5-11/16	1-3/4	short as	1-3/8
16	16	6-3/8	2-1/4	possible	1-3/4
20	20	6-25/32	2-1/4	without	1-3/4
24	24	7-7/32	2-1/4	brakes	1-3/4
30	30	8-3/32	2-1/2	dragging	2
36	36	9	3		2-1/4

\*Dimensions listed do not include capscrew head projections for rotochambers and bolt clamp projections for clamp type brake chambers.

FIGURE 3

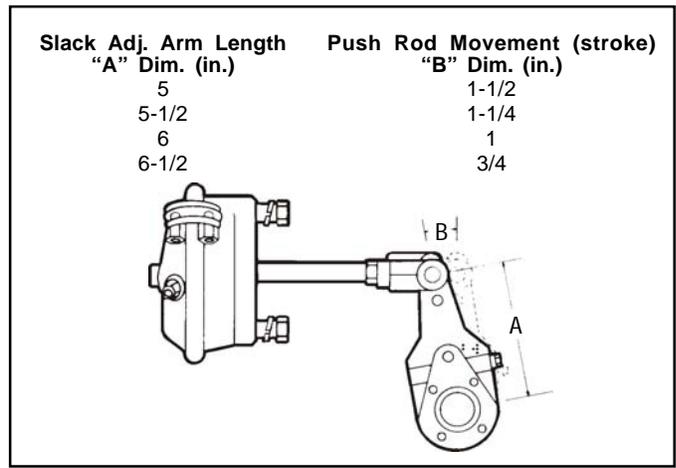


FIGURE 4

**B. ALTERNATE METHOD**

Determine the slack adjuster arm length (Dim. A). Measure push rod movement (stroke) by manually extending push rod until brake shoes contact drum. Refer to chart (Fig. 4). If Dim. “B” is greater than allowable stroke indicated brakes need to be adjusted.

**BRAKE ADJUSTMENT**

**A. PREFERRED METHOD**

Raise the vehicle wheel that is to be adjusted off the ground so that it turns freely. Turn the slack adjuster adjusting mechanism until the brakes begin to drag. Adjustment is then backed off until the wheel turns freely. This adjustment method will result in the shortest possible actuator stroke without the brakes dragging.

**B. ALTERNATE METHOD**

Regardless of the brake chamber size or the slack arm length adjust the slack adjuster so that there is 3/8" travel of the push rod when manually extended to contact the brake shoes to the brake drum. After adjustment, check for brake drag by gently striking the brake drum with a hammer. When the brake shoes are away from the drum, a ringing sound will be heard. A dull sound indicates brake drag and requires readjustment until the drag is eliminated.

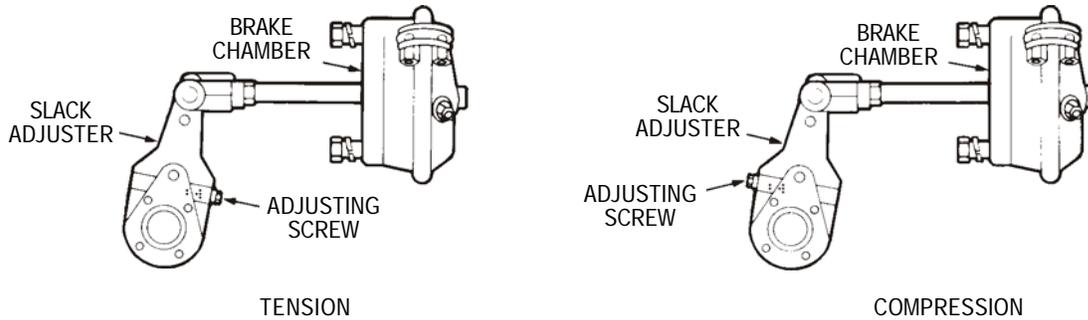
NOTE: If the brakes cannot be adjusted per the above instructions inspect the foundation brake and drum for worn or damaged components.

**PREVENTIVE MAINTENANCE**

Every month, 8000 miles or 300 operating hours; check push rod travel. Stroke should be short as possible without brakes dragging or chamber rod binding. Adjust if necessary.

Every six months, 500,000 miles or 1800 operating hours; lubricate slack adjuster with chassis lube N.L.G.I. grade 1 or 2. Apply a sufficient amount of grease to completely fill body cavity.

## SLACK ADJUSTERS MOUNTED IN TENSION OR COMPRESSION



PROVIDED THE MAXIMUM TORQUE RATING IS NOT EXCEEDED, BENDIX SLACKS CAN BE MOUNTED IN EITHER DIRECTION AND STILL MEET THE ENGINEERING TEST SPECIFICATION (50K CYCLES AT MAXIMUM RATED LOAD). COMPRESSION MOUNTING IS RECOMMENDED AND WILL YIELD A LONGER SERVICE LIFE.

NOTE: Some Bendix slack adjusters were manufactured without a lubrication provision in the body; however, the slack adjuster may be lubricated through the cover as follows:

1. Remove rubber plugs from both covers and discard.
2. Determine which side of slack adjuster is accessible for lubrication and install washer (Pc. No. 230156) and grease fitting (BW Pc. No. 244017) Alemite #1625 using Alemite tool #5254 to press grease fitting firmly in place in cover.
3. Install steel plug (Pc. No. 244400) in other cover, making certain it is firmly in place.
4. Lubricate slack adjuster. Apply a sufficient amount of grease to completely fill body cavity.

### SERVICE TESTS

1. Apply brakes and check that slack adjusters rotate freely and without binding.
2. Release brakes and check that slack adjusters return to the released position without binding.
3. With brakes released, check that the angle formed by the slack adjuster arm and actuator push rod is greater than 90 degrees. All slack adjusters should be set at this same angle.
4. With brakes applied, check that the angle formed by the slack adjuster arm and actuator push rod is still slightly greater than 90 degrees. All slack adjusters should be set at this same angle.

### REMOVAL AND INSTALLATION

CAUTION: Before attempting to remove slack adjusters, proper precautions should be taken so that an automatic application of the actuators does not occur while removing or installing slack adjusters, thus causing possible injury. Decreasing air pressure can cause a sudden full brake application without warning. Depending on type of system on vehicle, it may be necessary to drain all air reservoirs or mechanically back off spring brake chambers.

### A. REMOVAL

1. Remove the chamber push rod yoke pin.
2. Remove the retaining mechanism from end of brake cam shaft.
3. Rotate the slack adjuster by turning the adjusting nut.
4. Slide the slack adjuster off of the spline end of the brake cam shaft.

### B. INSTALLATION

1. Install slack adjuster on brake cam shaft so the adjustment screw and grease fitting (if so equipped) are accessible for servicing.
2. Install retaining mechanism on end of brake cam shaft to hold slack adjuster in place.
3. Turn adjusting nut to line up yoke pin hole with arm hole. Install yoke pin and cotter pin.
4. Refer to steps 3 and 4 under "Service Tests" and make sure the proper adjustments are made after installing a slack adjuster.

### SLACK ADJUSTER REPLACEMENT

When replacing one type of slack adjuster with another type, it is necessary to match or exceed the torque rating and match the arm length, yoke pin diameter, offset spline diameter and width. It is also necessary to make certain that there is adequate clearance at release and full stroke.

### DISASSEMBLY AND ASSEMBLY

NOTE: Disassembly and assembly instructions apply only to assemblies with riveted covers. Assemblies with welded covers are considered non-serviceable and are replaced as an assembly.

### TYPE 20 TO 30 WITH POSITIVE LOCK MECHANISM AND RIVETED COVER DISASSEMBLY

1. Remove rivets holding covers.
2. Remove welch plug.

3. Before removing worm shaft, measure height from top of adjusting screw to the slack adjuster body. This measurement is important, as it serves as a reference when the worm shaft is reassembled.
4. Press out worm shaft from worm by pressing in on the end of the worm shaft opposite the adjusting screw nut.
5. Remove worm shaft, worm shaft lock and worm lock spring.
6. Remove worm and slack adjuster worm gear from slack adjuster body.

### **TYPE 35 WITH POSITIVE LOCK MECHANISM**

#### **DISASSEMBLY**

1. Remove retaining ring holding the cover, cover nut and gear in place.
2. Remove set screw in worm nut.
3. Depress worm lock and remove lock nut pin.
4. Remove worm lock and worm lock spring.
5. Unscrew worm nut.
6. Remove worm shaft, worm and gear from slack adjuster body.
7. Before removing worm shaft, measure height from top of adjusting screw to the slack adjusted body. This measurement is important, as it serves as a reference when the worm shaft is reassembled.
8. Press out the worm shaft from worm by pressing on the end of the worm shaft opposite the adjusting screw nut.

### **TYPE 35 AND TYPE 55 (WITHOUT RIVETED COVER) AND BALL INDENT LOCK MECHANISM DISASSEMBLY**

1. Remove cam lock pin, cam lock, thrust washer, plunger spring and plunger.
2. Bend up tab of lock washer and remove worm nut.
3. Remove retaining ring and cover.
4. Before removing worm shaft, measure height from the top of adjusting screw to the slack adjuster body. This measurement is important, as it serves as a reference when the worm shaft is reassembled.
5. Remove worm and shaft and slack adjuster gear.
6. Remove plunger and plunger spring from body.
7. If worm gear is to be pressed from shaft, note dimension from end of shaft to gear before proceeding.

### **TYPE 35, 40, 55 (WITH RIVETED COVER AND BALL INDENT LOCK MECHANISM) DISASSEMBLY**

1. Remove rivets holding the covers.
2. Remove welch plug.
3. Before removing ball indent lock mechanism, measure and note distance from top of lock screw head to slack adjuster body.

4. Remove ball indent lock mechanism screw.
5. Remove spring and ball.
6. Before removing worm shaft, measure height from top of adjusting screw to the slack adjuster body. This measurement is important, as it serves as a reference when the worm shaft is reassembled.
7. Press out worm shaft from worm by pressing on end of worm shaft opposite the adjusting nut.
8. Remove worm and slack adjuster worm gear.

### **CLEANING AND INSPECTION**

Wash all parts in mineral spirits and dry. Inspect parts and replace any part showing signs of wear or deterioration.

### **TYPE 20 TO 30 WITH POSITIVE LOCK MECHANISM AND RIVETED COVER ASSEMBLY**

1. Place worm and worm gear in slack adjuster body.
2. Position and press the worm shaft, worm shaft lock and spring into the worm and slack adjuster body. The recess in the worm shaft lock must be lined up with the pin in the slack adjuster body before pressing into position. Make certain that when pressing the worm shaft into the body that the height measurement between the top of the adjusting screw and slack adjuster body is the same before and after removal.
3. Install covers and rivet securely.
4. Install new welch plug in body.
5. Lubricate as outlined in "Preventive Maintenance" section.

### **TYPE 35 WITH POSITIVE LOCK MECHANISM ASSEMBLY**

1. Press worm shaft into worm. Care should be exercised to be sure the worm shaft is pressed into the proper dimension.
2. Install the worm shaft, worm and gear in the slack adjuster body.
3. Make certain that when pressing the worm shaft into the body that the height measurement between the top of the adjusting screw and slack adjuster body is the same before and after removal.
4. Install worm lock guide pin in worm nut.
5. Screw the worm nut into slack adjuster body.
6. Install worm lock and worm lock spring over worm shaft and adjusting screw nut.
7. Depress worm lock and install lock nut pin in adjusting screw nut.
8. Install set screw in worm nut.
9. Assemble cover and cover nut to the body by installing the retaining ring.
10. Lubricate slack adjuster as outlined in "Preventive Maintenance" section.

### **TYPE 35 AND TYPE 55 (WITHOUT RIVETED COVER) AND BALL INDENT LOCK MECHANISM ASSEMBLY**

1. Install plunger spring and plunger in body.
2. Install slack adjuster gear in body.
3. If worm was removed from shaft, new worm should be pressed on shaft noting dimension as instructed in No. 4 of disassembly procedure.
4. Install worm and shaft. Worm and shaft must be run in so that the worm fully engages slack adjuster worm gear. Make certain that when pressing the worm shaft into the body that the height measurement between the top of the adjusting screw and slack adjuster body is same before and after removal.
5. Install cover and retaining ring in groove of body.
6. Install new lockwasher on worm nut in body and tighten. Bend up at least 2 tabs of lockwasher, one of which should fit in groove of body.
7. Install plunger spring, thrust washer and plunger in lock hole.
8. Install cam lock in body. Install pin.
9. Lubricate slack adjuster, as outlined in "Preventive Maintenance" section.

### **TYPE 35, 40, 55 (WITH RIVETED COVER AND BALL INDENT LOCK MECHANISM) ASSEMBLY**

1. Place worm and worm gear in slack adjuster body.
2. Press the worm shaft into the worm. The indents in the worm shaft must be lined up with the ball lock hole. Make certain that when pressing the worm shaft into the body that the height measurement between the top of the adjusting screw and slack adjuster body is the same before and after removal.
3. Install covers and rivet securely.
4. Install ball, spring and ball indent lock mechanism. Turn adjusting screw, allowing ball to fully engage indent in shaft. Check for full engagement by tightening lock mechanism screw to same dimension as noted in step #3 of "Disassembly" instructions.
5. Before installing welch plug, grease bottom of shaft. Install new welch plug.
6. Lubricate slack adjuster as outlined in "Preventive Maintenance" section.

### **TEST OF REBUILT SLACK ADJUSTERS**

After lubricating rebuilt slack adjuster (see "Preventive Maintenance" section), all moving parts of the slack adjusters should rotate freely and not bind. With slack adjuster installed in vehicle, refer to "Service Test" section. Check that rebuilt slack adjuster functions properly.

### **GENERAL SAFETY GUIDELINES**

#### **WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:**

When working on or around a vehicle, the following general precautions should be observed at all times.

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels. Always wear safety glasses.
2. Stop the engine and remove ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically charged components.
3. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
4. If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning **ANY** work on the vehicle. If the vehicle is equipped with an AD-IS® air dryer system or a dryer reservoir module, be sure to drain the purge reservoir.
5. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
6. Never exceed manufacturer's recommended pressures.
7. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
8. Use only genuine Bendix® replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.

9. **Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.**
10. **Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.**
11. **For vehicles with Antilock Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.**

