

# TERRAPLANE HUDSON

## *Service*

### AND TECHNICAL INFORMATION

Vol. 1 JANUARY • FEBRUARY • MARCH, 1934 No. 2

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Keep your copies of "Terraplane Hudson Service" in a binder where the information contained can be preserved for ready reference. In this issue is described a special binder designed for the purpose which may be obtained directly from the factory.

Order your binder now and file each issue as received. Binder has fittings for standard punching and hence may be used for filing reference sheets and other service data.

Remember that issues are numbered consecutively and each is provided with an index for quick reference to all items previously covered.

## Radio Merchandising

With the introduction of the 1934 Terraplanes and Hudsons an opportunity in the sale of Radio was presented which we never have had before. Few car manufacturers have lent their design and engineering so completely to merchandising as has been done by the Hudson Motor Car Company this year. Both in the selection of the set for performance as well as compact and easy installation at the factory and in the field, a splendid job has been done.

A survey of the radio industry on the activity of last year very definitely showed a rapidly growing public interest in car radio. Despite certain retarding influences of 1933, a remarkable number of units were sold. Its public acceptance and the desire of owners that favorite programs, current news and sport events not be denied them when traveling or just pleasure riding in their cars indicate a very large market in 1934.

It would be preferable, of course, if all cars could be scheduled from the factory radio equipped, but realizing that cars in the main are sold from showroom models and demonstrators, and that the dealer cannot anticipate the preference of his prospects a variety in stock is necessary. Therefore, a supplementary program has been introduced so that radio merchandising may be treated as an accessory so far as our Distributors and Dealers are concerned.

This announcement was made in our general letters of February 8th to the entire field organization. Certain pertinent points can well be repeated for the purposes of complete clarification. All tax is absorbed by the factory. Freight transportation charges are prepaid from Detroit to any city and to any Distributor or Dealer in the United States when orders are received here for five or more sets to be shipped on a single order to one

given point. In the event that the sets must be shipped by express on the quantity basis, the factory will absorb that part of the transportation expense equal to the freight charges.

The above arrangement as to tax and freight expense is considerably to the advantage of the Distributor's and Dealer's profit. That part of the plan, as outlined in the bulletins, which makes possible a lower net on quantity purchases likewise makes quite a contribution to your gross profit. Therefore, it is decidedly to your advantage to study your requirements closely and see if you can place your orders on the above basis.

We think you are in a very favorable position as regards competition. There are no other sets manufactured where the controls and dial are adapted to our instrument panel. The design of the support between the steering column and the dash was purposely engineered for acceptance of the separate bracket which goes with every set and which holds the receiver in place. The installation is compact and sturdy, does not interfere with leg room and allows plenty of space for present or future heater equipment. Other sets do not lend themselves to the comfort, appearance or performance as does the Terraplane-Hudson unit.

We stress this information because you have little to fear from competition if the presentation of this radio is properly made. Its price, with any comparable six-tube set, is one of the lowest on the market. Even though you do not deliver every car radio equipped, try to leave your owners with a future desire for it and follow them up at intervals to keep this interest alive. Place a copy of the Feature Mailing Booklet on Radio in the hands of every retail salesman because of its helpful suggestions in making presentations.

## Removing and Replacing Cylinder Heads

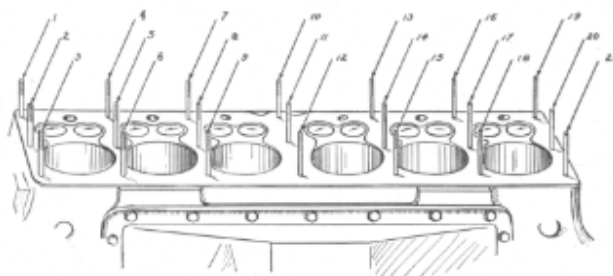


Figure A

Be careful to avoid damaging the machined surfaces of head and cylinder block. A tight head may be loosened by cranking the engine with the starter

or hand crank. Before doing this, leave a stud nut on loose at front and rear to prevent the head being lifted completely off. The compression will loosen the head, which can then be pried off further with a screwdriver or blunt chisel.

In using a screwdriver to pry off the head, always insert it at a point where it can do no damage. A good point at which to pry is the exposed edge of the expansion plug holes in the side of head. In rare cases, it may be necessary to pull the head off by means of a chain hoist and two eye-bolts (Service tool No. J232) screwed into spark plug holes. If necessary to strike the head with a hammer in order to ease it off the studs, use only a rawhide hammer.

Be sure that the surfaces of both head and block are in good condition, and free from particles of dirt and carbon. If trouble is suspected, check each surface with a long straightedge.

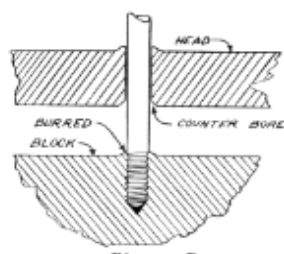


Figure B

A condition which may be encountered in cars which have seen considerable service is shown in Fig. "B." It will be noted that the stud has thrown up a burr around the top of the threaded portion. When this happens, it is plain that the gasket will be pinched tightly at this point, but that there will be little pressure on the gasket

over its wider area. The remedy for this condition is to slightly counter bore the stud holes in the head, as indicated in the picture.

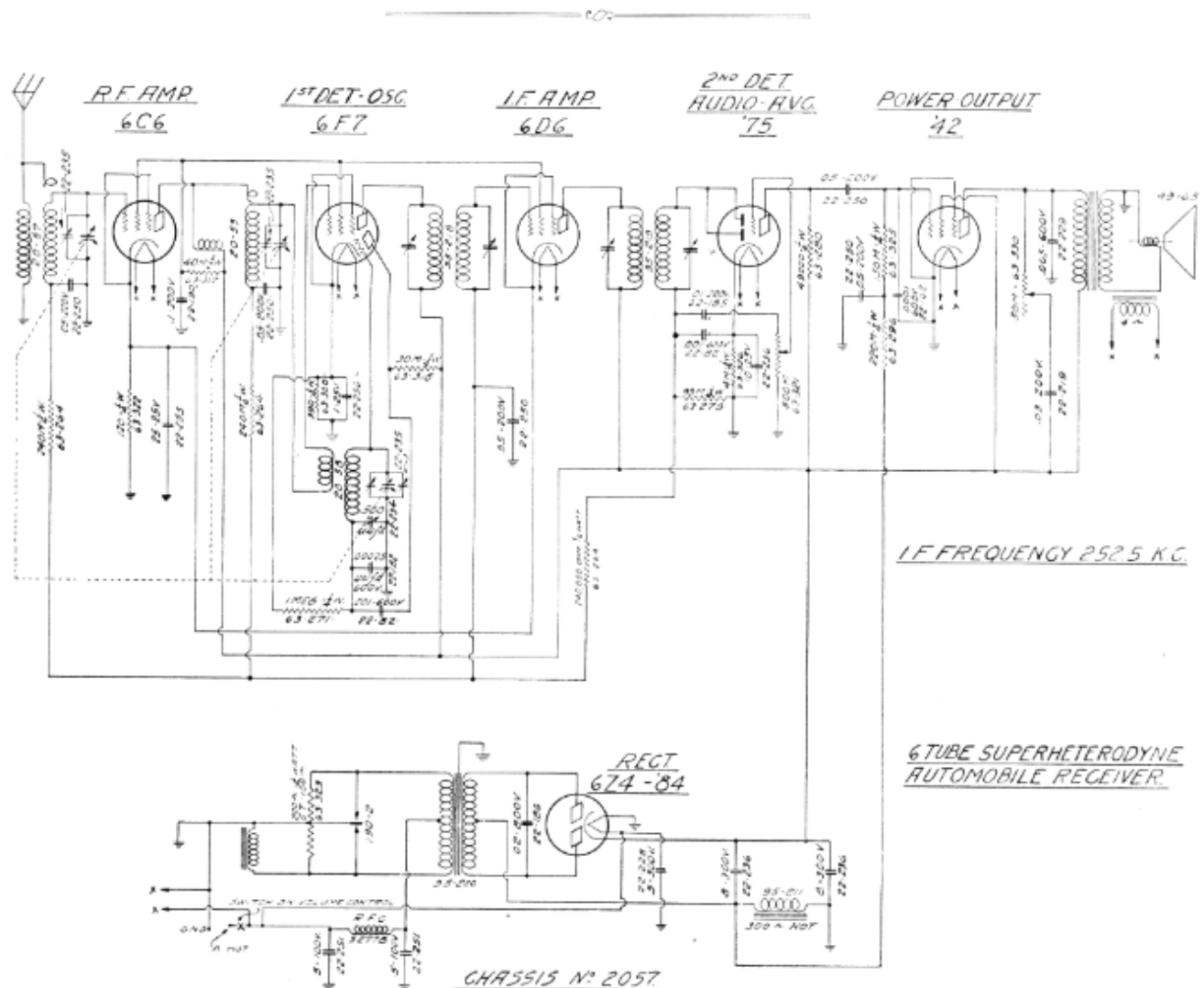
Install new gasket on the block so that the letters on the gasket are uppermost.

After the cylinder head has been set down on the gasket, put on all the stud nuts and turn them down finger tight. Then tighten the nuts very carefully, each a little at a time, so that one particular nut never gets excessive tension. The following plan has proven very satisfactory. This explanation applies to the twenty-one nuts of the Terraplane six-cylinder engine; and the same system can be used on the thirty nuts of the eight-cylinder engine.

Start with middle nut, No. 11 in the illustration, Fig. "A." Pull nut down until it is just snug—or just starts to take hold. Pull down, in sequence, 11-8-5-2-14-17-20, just snug. Go back to No. 11, and pull down *fairly tight*, 11-10-12-8-7-9-14-13-15-5-4-6-17-16-18-2-1-3-20-19-21.

Go back to No. 11, and in the same order as before, 11-10-12-8-7-9, etc., pull all nuts down *tight*.

Run the engine to warm up, and *while warm*, tighten nuts again in the same order.



Circuit Diagram, Terraplane Hudson Receiver

# Instructions for Adjusting Worm and Roller Steering Gear

(Hudson 123" Wheelbase Models)

## Adjustment of Worm Bearings

Loosen four worm cover screws  $\frac{1}{8}$ " inch, Fig. 1. Use a knife to separate the top shim, passing blade all the way around between shims, care being taken not to mutilate the remaining shims. Remove only one shim at a time between inspections, to remove end play. Care should be taken not to set up stiffness in worm bearings.

It is important the drag link be removed from steering gear ball arm in order to effect a satisfactory inspection of other adjustments and alignment of gear in car. Now revolve hand wheel to determine if any stiffness exists. If so, too many shims have been removed or gear is misaligned in car.

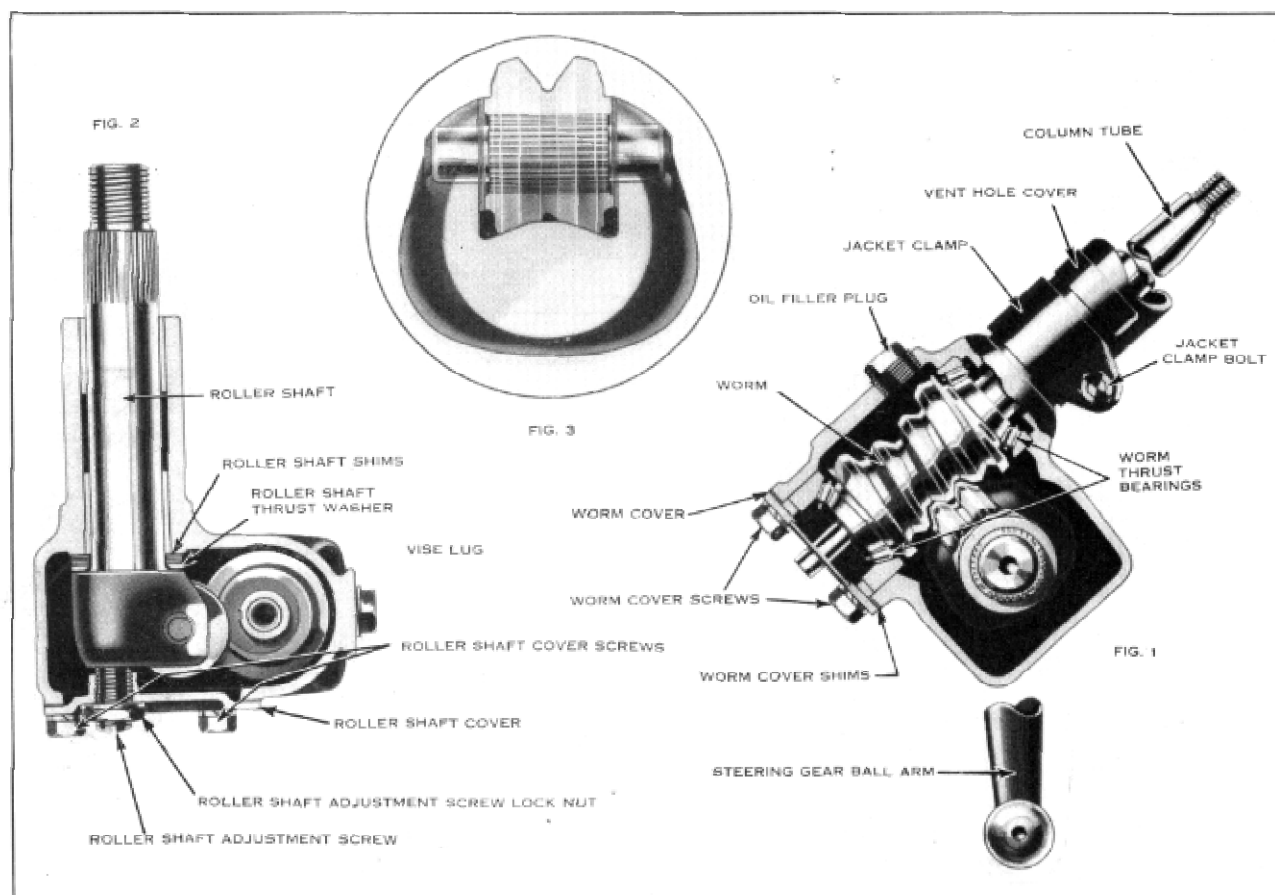
## Adjustment for End Play of Roller Shaft

Turn hand wheel to either extreme and back an eighth of turn. Gripping ball arm at hub, roller shaft should rotate freely without particle of end

play. If any end play exists, adjust as required by means of roller shaft adjustment screw, Fig. 2, at back of housing. Be sure to lock *securely* with lock nut, Fig. 2, and reinspect for end play and free rotation throughout whole gear movement.

## Inspection for Proper Mesh of Shaft Roller in Worm

(Never make inspection for proper mesh, without first correcting roller shaft and column adjustments.) Turn hand wheel to the mid-position of its complete travel or turning limits. (Drag link previously disconnected.) Hand wheels have a trade mark on the underneath side of the spoke that should now point straight down. Place this marked spoke in correct position and shake ball arm to determine amount of lost motion. If this lost motion exceeds one-thirty-second of an inch, roller shaft adjustment should be made. In which case, gear must be removed from car.



Sectional Drawing of Worm and Roller Steering Gear

### Adjustment of Roller Shaft Mesh in Worm

Adjustment for closer mesh of the shaft roller with the worm or, in other words, elimination of excessive play at this point, is accomplished by the removal of shims which are in place behind the roller shaft thrust washer. The position of roller contact with worm is offset from the centerline of worm, hence when a shim is removed, the roller is moved into closer mesh with the worm.

Holding gear in vise and with column to right of vise, remove roller shaft, Fig. 2, care being taken that all roller shaft shims remain on roller shaft, so none will drop into housing behind worm, which may cause interference with proper gear operations. Remove jacket, Fig. 1, from gear housing and replace hand wheel on column.

Select, through trial, the proper amount of shims to produce not more than .006 inch play measured at end of ball arm, and without heavy drag on hand wheel. Remove only one shim from roller shaft, Fig. 2, and insert roller shaft in housing. Then turn hand wheel nearly to left stop. Now hold roller shaft in place with thumb pressure on head end of roller shaft, and revolve hand wheel to the right until shaft roller is in center of worm. (Do not reverse turn to left.) Still holding roller shaft in place, grip splined end of roller shaft with other hand and try to rotate it. If any play exists remove another shim and repeat operation until play felt by hand in center of gear is removed.

When proper amount of shims have been selected, turn hand wheel close to either stop and reassemble roller shaft cover, Fig. 2, tighten screws securely. (Drive ball arm on roller shaft.) Now loosen roller shaft adjustment screw locknut, Fig. 2, until all end play in roller shaft has been removed, when gear shaft is rotated in this lash position near end of worm. Lock roller shaft adjustment screw locknut, Fig. 2, and reinspect gear for freedom of operation throughout and absence of end play in roller shaft adjustment.

### Reassembling and Alignment of Gear

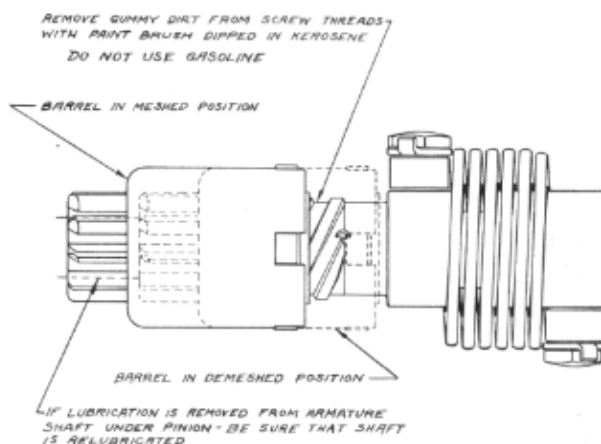
When replacing jacket tube, use only castor oil for lubricating jacket tube bushing. Correct alignment necessary for proper steering is obtained by tightening the steering gear frame bracket bolts only finger tight, thus permitting gear to shift in frame while jacket tube bracket is secured to dash brace. Before connecting rear end of drag link to steering gear ball arm, check for tight spots by swinging front wheels from right to left throughout their turning radius.

A welt, Part No. 111009, is now being used between the rear fenders and the body to prevent water leakage at this point. The welt starts at the running board and is continuous around the rear of body to opposite running board. Welts can be installed by loosening the fender bolts and the bolts holding the rear dust shield. Slot the welt from the hole to edge so that it can be pushed in place and when bolts are drawn up it will be securely held.

## Cleaning the Bendix Starter Drive

Failure of the Bendix Drive to engage the flywheel gear in cold weather indicates the presence of gummy dirt on the screw threads of the Bendix Drive, which should be cleaned off in the following manner:

Press the starter button and release quickly. Repeat until the Bendix pinion is fully meshed with the flywheel gear. With a paint brush dipped in kerosene, brush the screw threads back of the pinion, rotating same slightly. *Very little kerosene should be used. Never use gasoline because it removes all lubrication.*



Start the engine several times in order to work the kerosene into the gum on the screw threads of the Bendix Drive. It is desirable to remove excessive kerosene, after cleaning, by brushing with a dry brush or wiping with a clean cloth.

While the Bendix Drive can be cleaned without removing the starter, it is recommended that the starter be removed before cold weather each year and the screw threads cleaned according to the above instructions.

*Never wash the whole Bendix Drive in kerosene or gasoline.* Clean only the screw threads. In case the lubrication is cleaned off of the armature shaft under the pinion, it should be relubricated.

The Eclipse Machine Company, of Elmira, New York, who manufacture the device, recommend Gre-dag No. 31½ for relubrication. Do not apply lubricant to the screw threads.

Front door locks have been redesigned so that less movement of the latch bar is required to "trip" the lock when the door is closed. Should any trouble be experienced in failure to "spring" to unlocked position when door is closed with handle inadvertently left in "locked" position, this condition can be corrected by springing the door hinges to move the door forward, thus reducing the clearance between latch and striker plate.

# Instructions for Adjusting Worm and Sector Steering Gear

(Terraplane and Hudson 116" Wheelbase Models)

## Removing Up and Down or End Play in Column

A takeup spring is provided between the upper worm thrust bearing and the housing cap which automatically takes up all ordinary play or looseness that might develop. A further adjustment, which may be necessary after long service, is possible by means of shims placed between the cap and the housing. To adjust, proceed as follows:

Loosen jacket tube clamp bolt and move clamp upward about  $\frac{3}{8}$ ".

Loosen instrument board bracket clamp bolt at jacket tube and work tube downward against housing cap.

Remove housing cap screws and work cap and jacket tube up as far as possible.

Remove one or more thin shims, as necessary, and reassemble parts.

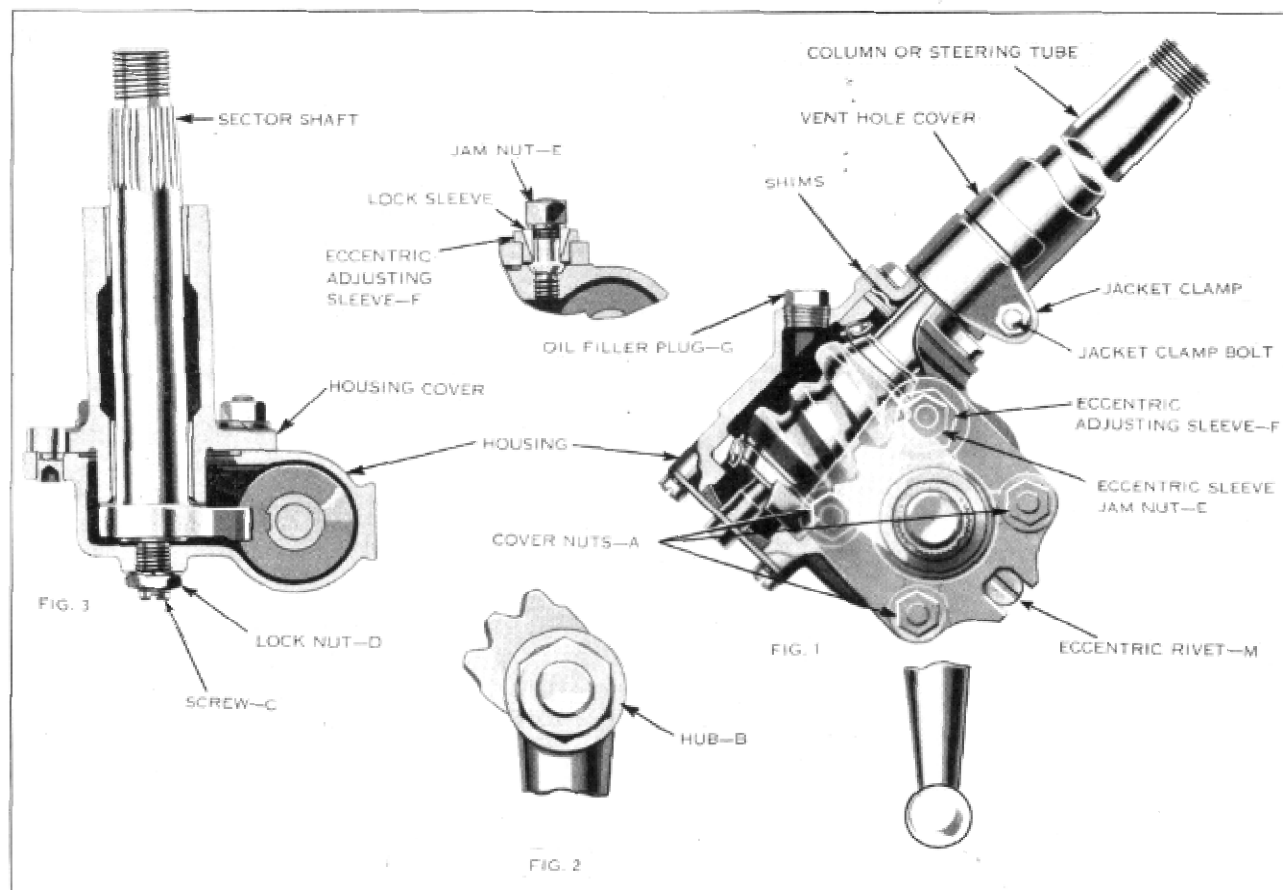
Check to make sure adjustment is correct.

## Adjustment of End Play in Cross Shaft

See that housing cover nuts (A) and jam nut (E) Fig. 1, are tightened *securely*. Turn hand wheel to either extreme and back an eighth of turn. Gripping ball arm at hub (B) Fig. 2, shaft should rotate freely without particle of end play. Adjust as required by means of adjustment screw (C) Fig. 3, at side of housing next to motor. Be sure to lock *securely* with locknut (D) Fig. 3, and reinspect end play and freedom.

## Adjustment for Proper Mesh of Sector Teeth in Worm

Turn hand wheel to the mid-position of its complete travel or turning limits. (Drag link previously disconnected.) Hand wheels have a trade mark on the underneath side of the spoke that should now point straight down. Place this marked spoke in correct position and shake ball arm to determine amount of lost motion. Loosen housing cover nuts



Sectional Drawing of Worm and Sector Steering Gear

(A) Fig. 1, one quarter turn and eccentric sleeve jam nut (E) Fig. 1, one-half turn. Turn the eccentric adjusting sleeve (F) Fig. 1, clockwise very gradually, checking at each movement the amount of lost motion still existing at the ball arm. (Adjust to point where lash can be felt at end of ball arm.) Be sure to finish movement of eccentric adjustment sleeve (F) in clockwise direction. Turn hand wheel throughout full travel to test for free operation. If too tight, turn eccentric adjusting sleeve (F) counterclockwise to free and readjust as above more carefully. Tighten eccentric adjusting sleeve jam nut (E) **SECURELY FIRST** and follow likewise with housing cover nuts (A).

The worm is generated in such manner that close mesh with SECTOR teeth is provided at the mid-position or place corresponding to the straight ahead driving range with gradual relief toward the extremes. Since any normal wear is most pronounced at mid-position, this provision allows for subsequent adjustment without fear of binding toward the extremes.

When the SECTOR teeth are properly centralized in relation to the worm thread, there should be an equal amount of lash in the mesh of these parts at 1/3 turn of hand wheel each side of mid-position previously described.

## Corrections in December Issue

### Page 2

Under "ENGINE CHARACTERISTICS" you will find "composite type" standard on models "KU," "LU," "LL" and "LLU." This should read "KU," "LL" and "LLU." We included "LU" in error.

### Page 5

Immediately above drawing of carburetor assembly change "lower" to "higher." This sentence will then read, "On a warm day, if the temperature of the carburetor is higher than 75° F., the valve may be slightly open."

### Page 7

Under "DISTRIBUTOR CONTACT POINTS" add—

*Very important:* The contact point gap adjustment of .020" applies to Terraplanes only. The eight-lobe cam used in the Hudson distributor necessitates an operating clearance of .013" to .015". Adjustment to this clearance, however, should be made only after 1,000 to 1,500 miles of running or after initial wear has taken place on fibre block.

## Universal Joint Service

### To Disassemble

The Needle Bearings are locked in position in the Yokes (2 and 3) with Lock Rings (7) in a recessed groove. These Lock Rings need merely be squeezed together with a pair of pliers, for removal. This allows the Needle Bearing Assembly (6) to be removed from the Yokes (2 and 3) by first tapping on the exposed face of one of the Needle Bearing Cages, until the opposite Needle Bearing Assembly comes out. Then tap the exposed end of the Journal (5) until the opposite Bearing is free. The other two bearing assemblies are removed in the same manner.

The Journal is now free for removal, and by sliding same to one side of the Yoke, the end of the

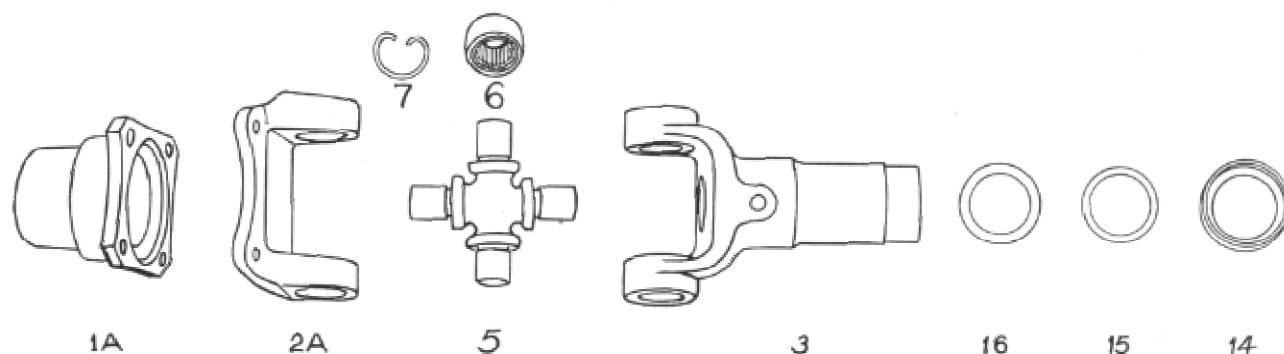
Trunnion Bearing will now be free to tip and clear the lug on the Yoke, and can be completely removed from the assembly.

Reassembling merely reverses the above process.

### Lubrication

These Joints are lubricated when assembled at the Factory and the Needle Bearings should need infrequent attention. New lubricant (160 S. A. E.) should be added at approximately 15,000-mile intervals.

The sliding Spline Shaft should be lubricated with a good grade of grease or oil every 2,000 miles. A plug is provided for this purpose in the side of the Sleeve Yoke (3).





# Bendix Duo Servo Brakes

## General Adjustment Instructions

**THE BRAKE CONTROL SYSTEM:** The proper functioning of the brake control system is of vital importance. A freely operating brake control system permits its return to the maximum released position and a longer period of operation can be expected before readjustment is necessary. No backlash should be present at the brake pedal or at the operating lever of each brake. When shortening linkage to remove backlash do not expand shoes away from anchor pins. The cam should just come into contact with the ends of the brake shoes.

**LUBRICATION:** The brake pedal and cross shaft bearings, cross shaft supports, clevis connections and other frictional parts of the braking system should be lubricated every 1,000 miles of car service to insure their free return to the stops provided. Lubrication of the cable and conduit control is described in paragraphs 11 and 12.

**RETURN SPRINGS:** To hasten the release action of a brake control system that has been in service some time, the uninformed mechanic will sometimes install additional return springs at various points in the brake control system. This is detrimental to satisfactory brake performance, will increase the pedal pressure and is entirely unnecessary. It will usually be found that correct lubrication, and proper adjustment, will produce satisfactory operation of the brake control system. Check all return springs. Replace, if found weak or broken.

**POINTS TO BE INSPECTED:** A new car should go into service with the brake control system bearings well lubricated, each wheel free of brake drag and the four brakes balanced. It is desirable that the braking system be broken in carefully just the same as the other mechanisms of the car. The spring clips holding the chassis springs to the axle should be tight. The wheel bearings should be accurately adjusted to prevent brake drag due to loose bearings. Satisfactory braking performance can only be obtained when all four brakes are functioning alike. When only one-fourth of the total pedal travel remains at the end of a heavy brake application an adjustment for brake lining wear should be made. It is very essential that the parking brake system be effective at all times.

**OILY OR GREASY BRAKE LINING:** Much braking trouble will be avoided if the lubrication of the rear axle and front wheel bearings is held to correct amount and not overdone. When it is found that the brake lining has become excessively saturated with oil or grease, heavy pedal pressure or possibly sensitive brake action will result and the only cure is replacing the brake lining. If the molded lining becomes not overly saturated with

the lubricant it may be possible to remove the lubricant from the lining with the use of high test gasoline.

## Adjustment for Wear Only

There are only two adjustments which compensate for brake lining wear. These points are at the brakes proper and are as follows:

**THE ECCENTRIC ADJUSTMENT:** (Fig. 1.) (This adjustment centralizes the brake shoes in the brake drum.)

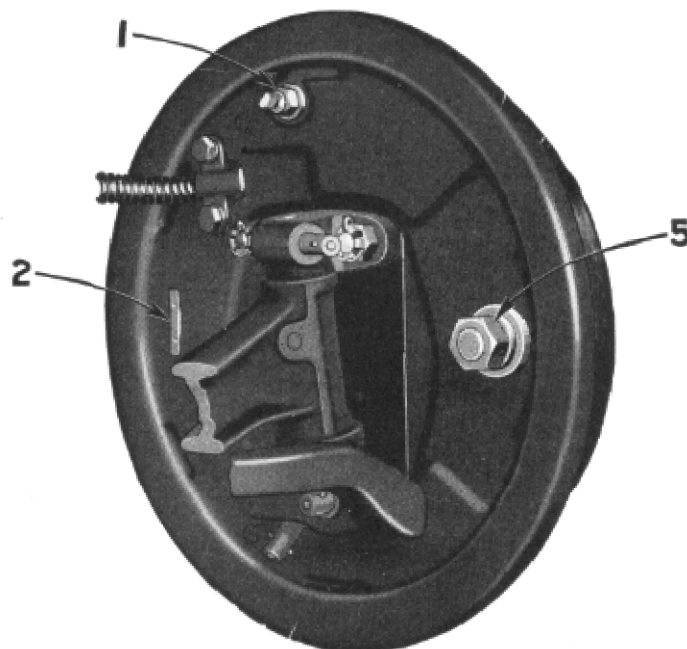


Figure 1—Left Front Brake

**THE ADJUSTING SCREW:** (Fig. 2.) (This adjustment centralizes the clearance between the brake lining surface and brake drum to compensate for lining wear.)

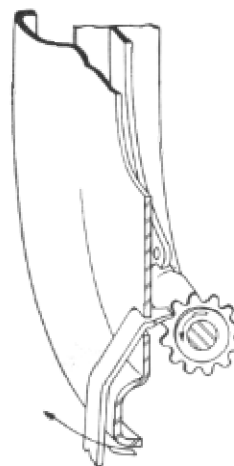


Figure 2



Do not make any adjustments in the brake control system to compensate for brake lining wear. Remember the only adjustments for lining wear are at the brake shoes, and not in the control system.

#### Adjustment Should Be Made as Follows:

1. Jack up all four wheels in a safe manner.
2. Remove adjusting hole covers from brake backing plates and inspection hole covers from brake drums.
3. Lubricate brake pedal, hand brake lever, cross shaft bearings, overrunning linkage and all clevises. See that pedal, hand lever, and cross shaft operate freely and that linkage returns sharply to release stop when pedal and hand lever are released.
4. Inspect brake cables. If loose or unequal follow instructions in paragraphs 10, 14 and 15.

NOTE: What may appear to be loose (sagging) cables may be the result of the cables not returning properly due to lack of lubrication in the conduits.

5. **AT ALL WHEELS:** Loosen eccentric locknut on eccentric adjustment and insert .010" feeler gauge between the lining of top shoe and brake drum. Turn the eccentric adjustment in the direction of forward wheel revolution until .010" feeler is just snug at anchor and adjusting ends of top shoe. Tighten eccentric locknut.

The clearance at both ends of top shoe should not vary more than .003". Should the variation at both ends be greater than .003" it will be necessary to relocate anchor pin as outlined in paragraph 13. (In case of clearance variation it is desirable that clearance at anchor end of shoe be less than at adjusting end.) **DO NOT ADJUST ANCHOR PIN UNLESS THIS INSPECTION SHOWS IT NECESSARY.**

6. **AT ALL WHEELS:** Expand the brake shoes by turning notched adjusting screw toward rim of backing plate, using Bendix adjusting tool or screwdriver (inserted through backing plate), moving outer end of tool toward center of wheel. (Fig. 2.) When light brake drag is felt on brake drum, release adjusting screw until brake drum is completely free of brake drag.

7. Depress brake pedal with pedal jack or tighten hand lever until wheel with the least brake drag can just be turned over by hand. Then back off the adjusting screw on the tight brakes until the brake drag is alike on all four wheels. Pedal reserve should not be less than one half of the total pedal stroke. Recheck adjustments if pedal reserve is less than this.

8. Reassemble the covers at each drum inspection and adjusting hole.

9. Lower car and test on brake testing machine or road. **ALWAYS LOOSEN ADJUSTING SCREW ON TIGHT BRAKES RATHER THAN**

**TIGHTEN ADJUSTING SCREW ON LOOSE BRAKES.** This is a safeguard against a car going into service with one or more brakes too tight.

#### Complete Brake Adjustment

NOTE: This complete brake adjustment is to be followed in cases where an inspection, as in paragraph 5, shows that an adjustment for lining wear only will be inadequate or where new shoes have been installed.

When a complete brake adjustment is required it is recommended that all brake drums be removed and brakes cleaned and inspected as to lining condition. After cleaning with a stiff brush and air hose, Bendix Lubriplate grease should be lightly applied to cable ramp, shoe support ledges on backing plate, eccentric, shoe ends and all moving parts at frictional contact points.

After the car has been jacked up, and the drums and shoes removed and reinstalled as recommended, continue as follows:

10. Disconnect all cables at the cross shaft.
11. Lubricate cable and conduit assemblies at 5,000-mile intervals. Unfasten conduit abutment brackets, clean exposed portion of cable, slip conduit through frame exposing that portion of cable which is sheathed by conduit. Clean this portion of cable, lubricate freely with Bendix cable lubricant.

Another method of lubricating brake cables is to use the special fitting illustrated on page 31. When using this method, however, it will be necessary to remove wheels and brake drums to make sure that no lubricant has been forced into the brake proper.



Figure 4  
Sliding Adjustment Type Anchor

12. Reassemble conduits, leaving cross shaft clevises disconnected. Conduit ends **MUST BE FIRMLY BOTTOMED IN ABUTMENT BRACKETS.**

13. BRAKE ANCHOR PINS. (Fig. 1-5). At all four wheels loosen the anchor pin nut one turn and tap anchor pin slightly in necessary direction with a soft hammer, and turn the eccentric in the direction of forward wheel rotation to give the specified clearances of .010" at the adjusting screw end and .010" at the anchor end of the shoe against which the eccentric operates. **TIGHTEN THE ANCHOR PIN NUT AS TIGHT AS POSSIBLE WITH A SIXTEEN-INCH WRENCH.** Tighten eccentric locknut.

14. At each end of the four wheels spread shoes by means of notched adjusting screw until the shoes are expanded against brake drum so drum can just be turned by hand.

1. Primary Shoe
2. Adjusting Screw
3. Adjusting End of Shoe
4. Secondary Brake Shoe
5. Anchor Pin
6. Primary Shoe Return Spring
7. Cable Return Spring
8. Backing Plate
9. Adjusting Screw Spring
10. Secondary Shoe Return Spring
11. Operating Lever Anti-Rattle Spring
12. Operating Lever
13. Brake Shoe Hold Down Spring
14. Eccentric

Primary and secondary brake shoes are marked with a "P" and "S" respectively. Irrespective of the position in which the brake assembly is mounted on the axle, the primary shoe is always the one "ahead" of the anchor in the direction of the forward rotation of the drum, and transmits servo action to the secondary shoe during a forward braking application. In reverse braking the opposite brake action takes place. The heavier shoe return spring must always be attached to the shoe which "hides" the brake operating lever.

15. Pull cables tightly toward cross shaft levers to remove all cable slack and lost motion at cam levers. Adjust clevises so that pins will barely enter clevises and cross shaft levers easily (all four cables). Lock clevis jam nuts and insert clevis pin cotters. **THIS PROCEDURE INSURES THAT SHOES ARE NOT EXPANDED AWAY FROM THE ANCHOR PIN WHILE CABLES ARE BEING ADJUSTED.**

16. At all wheels release adjusting screw until brakes are just free of drag.

17. Continue adjustments as outlined in paragraphs 7, 8 and 9.

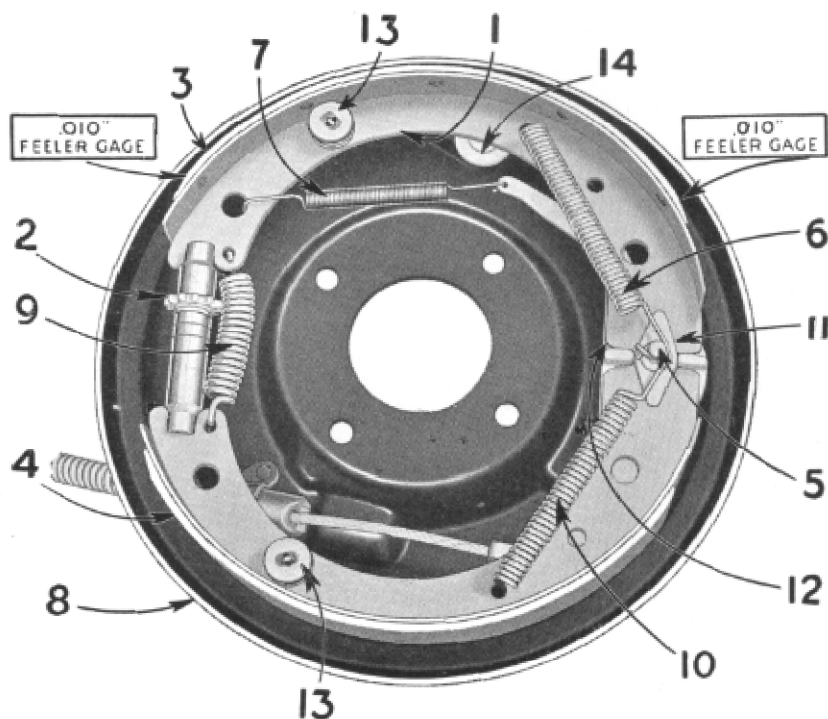


Figure 3—Left Rear Brake  
Brake Control System

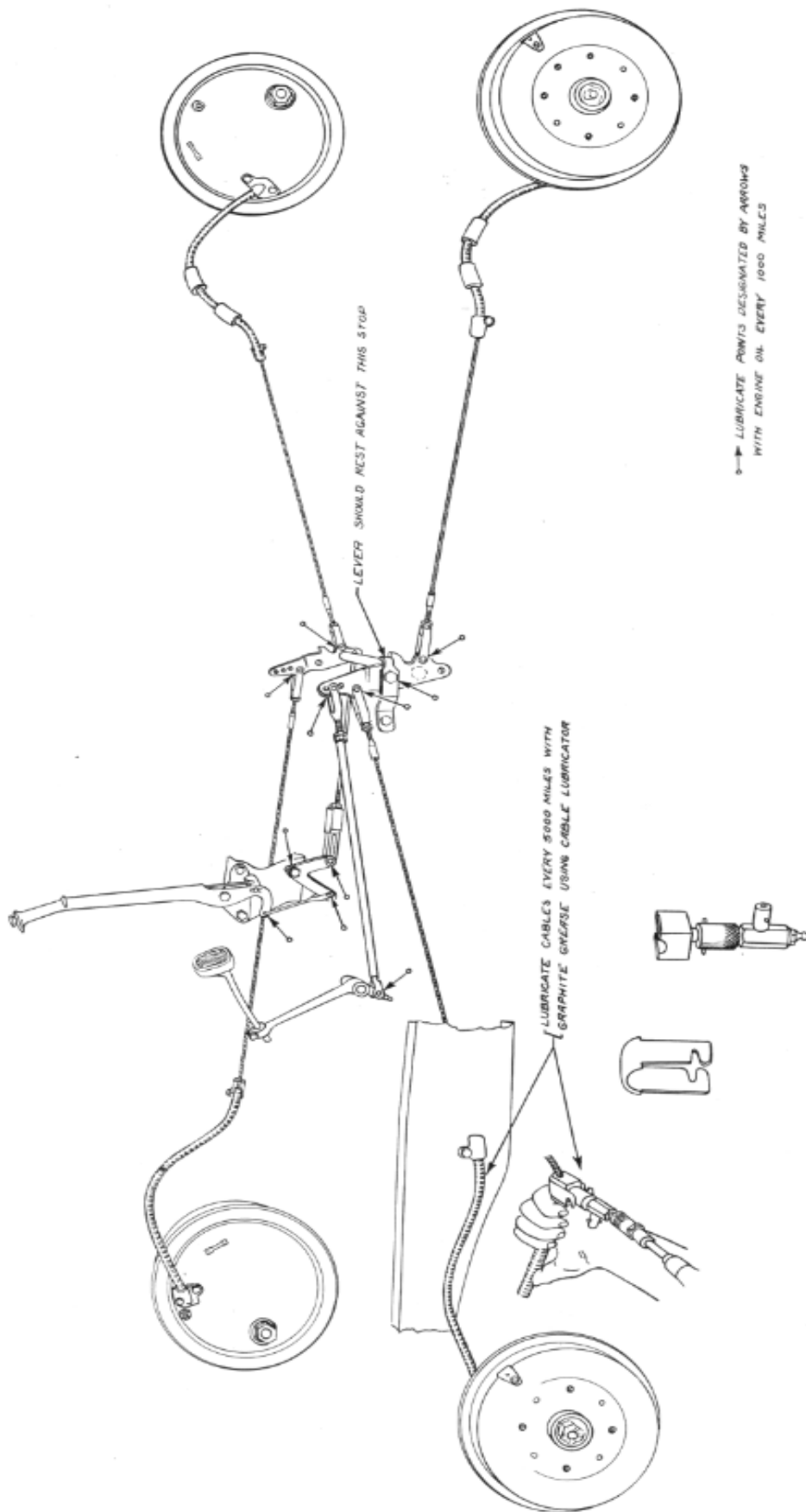
## Hot Water Heater Installation

(1934 Models)

We are frequently asked, "Can we add another thermostat to the circulating system?" or "what can we do to increase the heat output?" If alcohol is used as an anti-freeze medium, nothing can be done as the standard thermostat installation opens at the safe maximum for alcohol mixtures. If the owner will use a non-volatile anti-freeze medium, however, capable of standing sustained heat, such as Prestone or glycerin mixtures, then heat output may be materially improved in the following manner:

Procure from the Factory Parts Department, a special thermostat, part No. 46414, list price \$2.00. Install this in place of the production thermostat. This special unit maintains a temperature in the water circulating system of the engine of from 160° to 180°.

The owner should retain the old unit and have it reinstalled in the spring. The special thermostat should be used only during the colder months of the year.



## Brake Control System

# Front Axle Alignment

1. Specifications given are for vehicle *unloaded* and apply to both standard axle and Axleflex equipped cars.

Camber .....	$1\frac{3}{4}^{\circ}$ to $2\frac{1}{4}^{\circ}$
Caster .....	$2\frac{1}{2}^{\circ}$ to $3\frac{1}{2}^{\circ}$
(Should be equal within $\frac{1}{2}^{\circ}$ at both wheels)	
King Pin .....	$7^{\circ}$
King Pin plus Camber Angle.....	$8\frac{3}{4}^{\circ}$ to $9\frac{1}{4}^{\circ}$
Toe-in .....	0 to $\frac{1}{8}''$
Wheel Eccentricity (total)...	$\frac{1}{16}''$
Wheel Wobble (total).....	$\frac{3}{32}''$

## Procedure

2. The following procedure is outlined as each adjustment has its effect on correct front end performance.

- (1) Inflate all **FOUR TIRES** to the recommended pressures.
- (2) Check both front wheels for runout and eccentricity.
- (3) Balance front wheel assembly, including hub and tire. Use balancing stand. (See page 12.)
- (4) Front wheel bearings should be checked and adjusted.
- (5) Check king pins and bushings for looseness. If worn badly, replace with new parts.
- (6) Check shock absorbers for proper action.

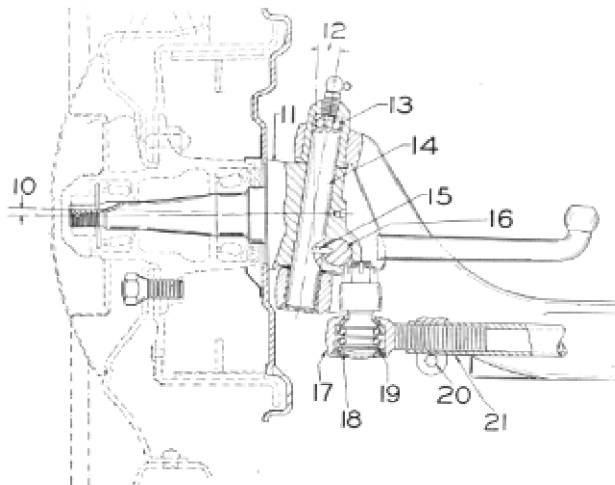


Figure 1

- (7) Check tie rod ends (17) for looseness. Fig. 1. Tie rod end can be raised slightly, compressing spring (18). Do not confuse this with defective joint. If too much play exists, it may indicate that ball race is sticking. If so, joint should be replaced.
- (8) Check drag link for looseness.
- (9) Tighten spring U bolts.
- (10) Check spring shackle bolts for looseness.
- (11) Check steering gear. There should be no perceptible backlash in the steering wheel with the front wheels straight ahead.

## 3. Adjusting Steering Gear

- (1) The two taper roller bearings on the worm shaft are spring adjusted.
- (2) Remove end play in the cross shaft by screwing in adjusting screw not shown on engine side of steering gear housing.
  - (a) Screw in until all end play is removed, then back off just sufficiently to prevent binding.
  - (b) Tighten locknut.
- (3) Adjustment between worm and roller.
  - (a) On the 123" wheelbase models, the bearings are anti-friction and should require infrequent attention. For complete information on this gear, see page 24.
  - (b) On the 116" wheelbase models, the mesh is adjusted by moving the housing cover.

## To Adjust

- (1) Jack up front wheels. Place in straight ahead position.
- (2) Disconnect drag link from steering gear arm.

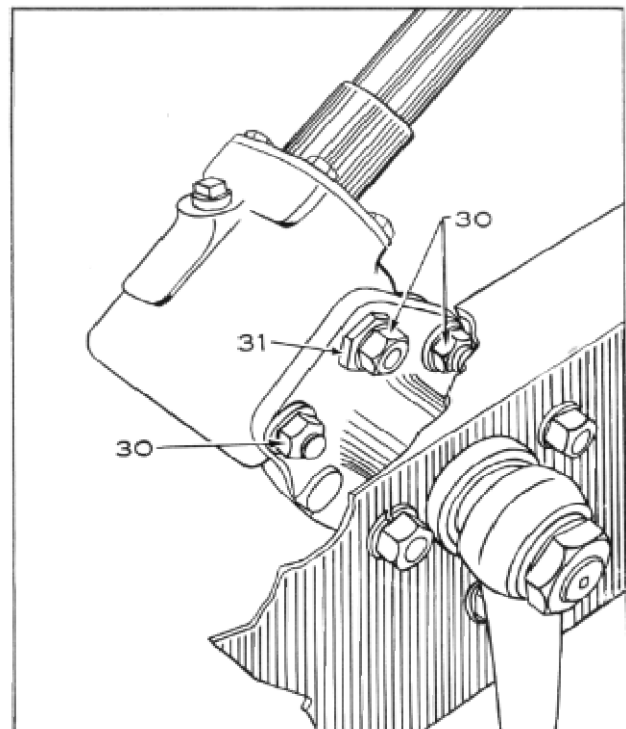


Figure 2

- (3) Loosen the four nuts (B) Fig. 2 (one not shown) on the housing cover studs one-quarter turn.
- (4) Turn the eccentric (C) Fig. 2 clockwise by gradual stages, checking the backlash by moving the steering gear arm.

- (5) Tighten nuts (B) Fig. 2 when backlash has been removed. First drag up on the nut on eccentric (C). Follow by tightening other three.
- (6) Turn steering wheel to extreme positions, right and left. If tight spots are noted, reduce clearance until tight spots are eliminated.

#### 4. Caster, Camber and King Pin Inclination Figure 1.

If the camber angle (10) is not between the specified limits, add the king pin angle (12) to the camber angle (10) to see that the sum of these is within specification. If the total angle is not correct there is probably a condition of worn king pin bushings, or a bent steering knuckle body (11). Replace worn or bent parts before correcting the camber. *Do not attempt to straighten bent parts by heating or by use of improper equipment.*

#### 5. To Correct Camber

- (2) Bend end of axle member outside of spring pad.
- (2) If member cannot be corrected cold by the use of proper equipment, replace with new part.

#### 6. To Correct Caster

- (1) If out a slight amount due to spring sag or other causes, insert shim of the proper degree between spring and spring pad. Lock shim in place.
- (2) The Parts Department supply the following shims for caster correction:
  - (a) Part No. 45777 shim  $1\frac{1}{2}^{\circ}$ .
  - (b) Part No. 44097 shim  $3\frac{1}{2}^{\circ}$ .
  - (c) Part No. 45970 shim  $4^{\circ}$ .
  - (d) Part No. 44098 shim  $5\frac{1}{2}^{\circ}$ .

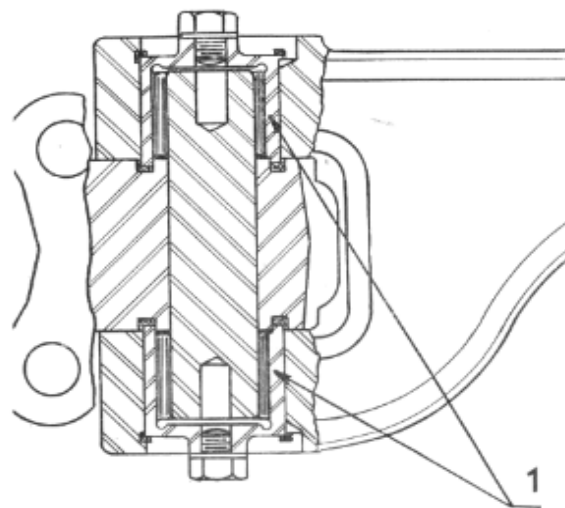


Figure 3

#### 7. Toe-in

- (1) With wheels straight ahead 0 to  $\frac{1}{8}''$ .
- (2) Toe-in is adjusted by means of shortening or lengthening the tie rod (21) Fig. 1.
  - (a) Loosen clamp bolts (20) Fig. 1 on tie rod ends.
  - (b) Turn bottom of tie rod tube toward rear to reduce toe-in.
  - (c) Turn bottom tie rod tube toward front to increase toe-in.

#### 8. Axleflex Front Axle

The center section of the Axleflex front axle is composed of two (2) I-beam members mounted on needle bearings (1) Fig. 3 lubricated and sealed and should not require further lubrication.

## Generating System

You are frequently asked what advantage is obtained by ventilating the generator and mounting a fan thereon, and the purpose of the voltage regulator.

Ventilation plays a very important part in altering the characteristics of the generator. The output of the generator in terms of amperes or watts is dependent, to considerable extent, on the internal temperature attained. A cold generator has always considerably more output than the same generator when running under operating temperatures, even though no alteration whatsoever has been made to the position of the third brush.

Ventilation of the generator, therefore, serves to prevent the generation of excessive heat, thus enabling the output to be increased without increasing the size of the generator, or endangering the wiring, and also tends to reduce the amount of fall off, or drop, in output under operating temperatures

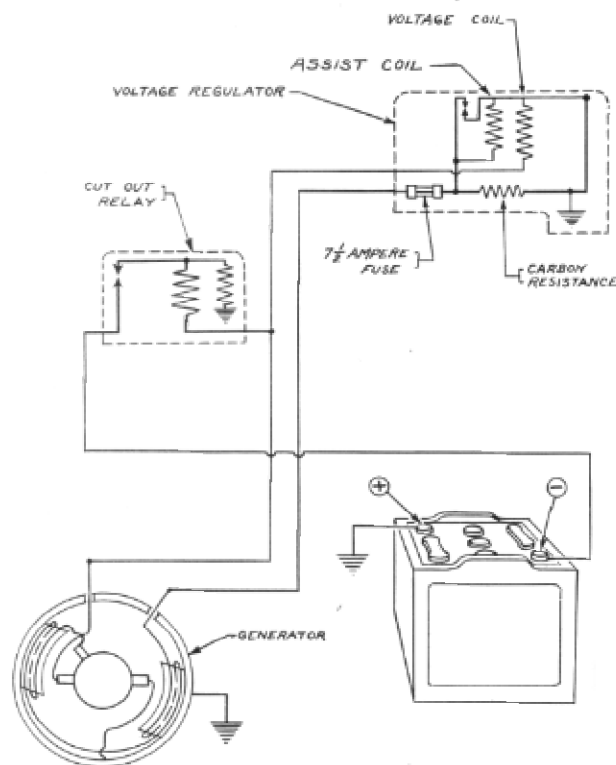
because the normal internal temperature of the ventilated generator will be lower than the conventional non-ventilated type.

To accomplish its purpose, the amount of air circulated through the generator need not be great, a gentle flow of air being all that is necessary. The flow of air is to the fan, not away from it as might be supposed, and hence the cooler air currents are first drawn by the commutator, which is the hottest portion of the generator, and then by the armature and field windings, finally being dispelled at the fan.

The voltage regulator is a very important addition to the electrical system. It tends to correct a very bad characteristic of the conventional third brush generator not fitted with voltage regulation. This characteristic is the fact that without voltage regulation the charging rate is always lower when the state of charge of the battery is low and high

when the state of charge of the battery is likewise high.

It will be immediately recognized that conditions should be reversed, i. e., the charging rate of the generator should be high when the battery charge is low and should taper off and assume a lower rate as the battery becomes fully charged. The regulator accomplishes this in a very ingenious manner. (Please refer to the diagram.)



In the voltage regulator there are two windings that magnetically control an armature which, in turn, will make and break the contact points indicated. The main winding is called the voltage coil. The other winding is known as the assist coil. Both of these coils are made of alloy wire which has a high temperature coefficient.

The armature has fastened to it a strip of thermostatic bi-metal, the free end of this strip being used for the support of the armature spring. This bi-metal is so placed that when its temperature increases the spring tension on the armature will decrease, and conversely, in cold weather when the temperature of the bi-metal is lower, the spring tension on the armature will be increased.

The necessity for this arises from the fact that the characteristics of the storage battery are entirely different in cold weather (temperature at freezing or below) than what they are in the summer time. When the storage battery is warm, it is active, readily takes a charge and does not build up high voltage in the line.

In the winter time, however, it is electrically inert. When the temperature of the battery is low a

very high resistance is built up, which, in turn, builds up the voltage in the generating system, so difficulty through burnt out lamp bulbs or blued distributor contact points might readily exist.

The voltage regulator, therefore, not only has to compensate for the condition or state of charge of the battery, but also for temperature as well. The bi-metal strip acting on the armature spring tension makes the compensation for different temperatures or seasons.

We will now explain just how the regulator works. First, you will have noted that Terraplane and Hudson generators have two terminals whereas the conventional generator has only one. The second terminal on the Terraplane and Hudson generators is the terminal of the field winding which is grounded to the generator frame in conventional designs.

A wire is brought from this field terminal to the voltage regulator because the amount of current output of the generator is determined by the voltage and current flow through the field winding. This flow will be changed by the regulator, when it is desirable that a change should be made, in the following way:

If the points in the regulator are closed, maximum voltage will be imposed upon the field winding and the output will be high. If the battery becomes fully charged and the voltage increases, the voltage coil in the regulator will be energized sufficiently to open the contact points and the field current will now have to travel through the carbon resistance, which is located at the bottom of the regulator. This will reduce the output to a little more than one-half.

If, for any reason, the battery charge goes down, the voltage will naturally go down with it, there will not be enough energy to hold the armature and regulator open, so the points will close and the generator will immediately charge at its maximum capacity. Variations in temperature will be largely compensated for by the thermostatic strip referred to previously.

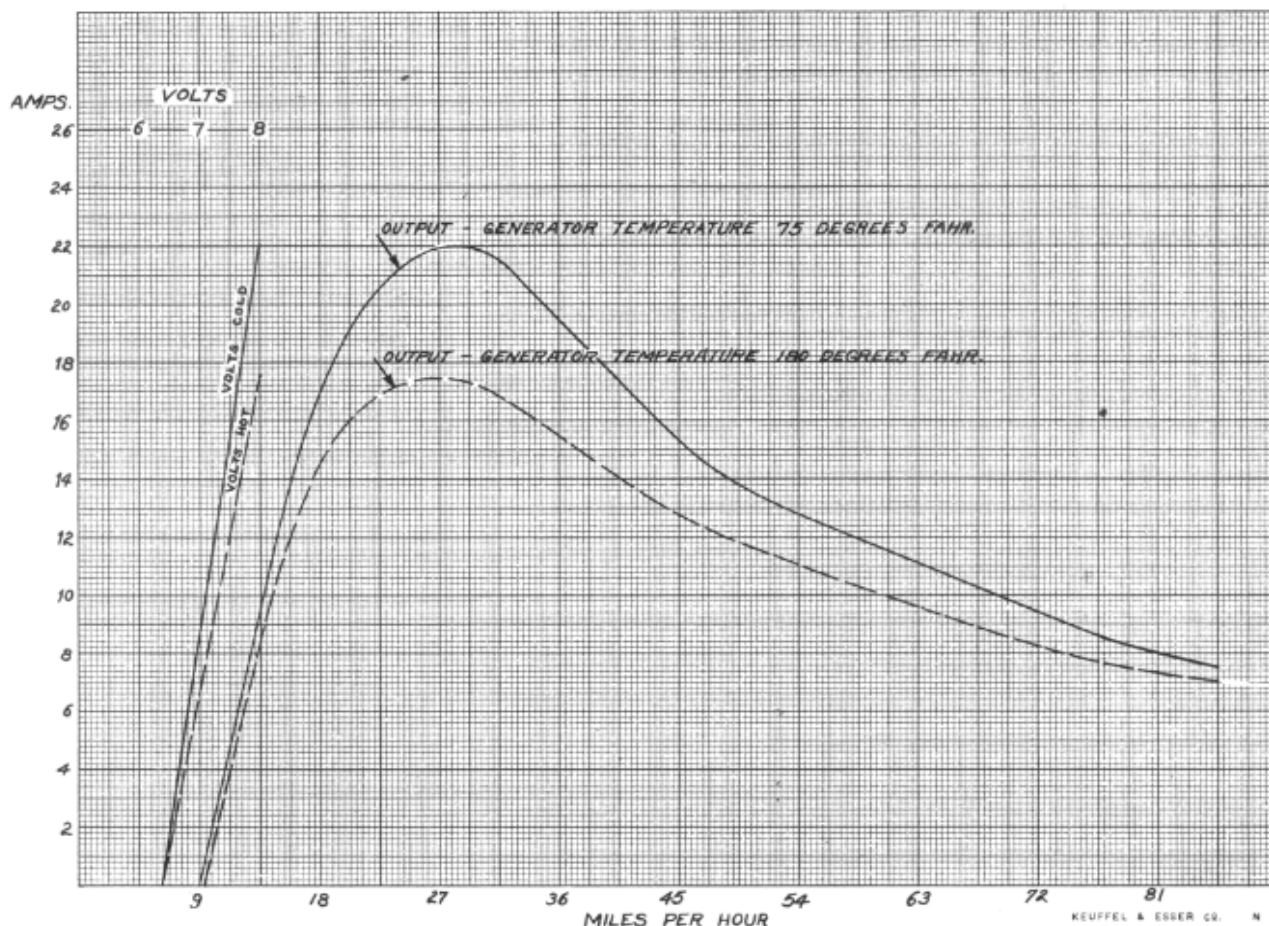
There is one feature of the voltage regulator that tends to give still more assurance of a trouble-proof electrical system and that is the fact that when the radio is turned on or the bright lights the drop in voltage is always sufficient to cut the regulator into the full charge position, so the generating system is immediately cut in to deliver the extra current being consumed by radio, lights, or both, as the case may be.

Reference to the output curve of the generator indicates that a very high output can be obtained at the peak of a correspondingly high output throughout the driving range. This system will serve to keep the storage battery in good condition and with ample gravity or state of charge under operating conditions which could hardly be considered as normal. It will not, however, do the impossible and the batteries in cars operated only at

night and with headlamps on full, radio going, et cetera, may have to be charged from an outside source occasionally.

Charging rates are adjustable by the position of the third brush as in the conventional generator.

The only precautionary measure to be taken is to ground the field terminal on the generator when taking a reading so that the reading obtained will be the maximum output. Charging rates should not be set higher than twenty-two amperes when the generator is cold, as illustrated in the output curve.



If you are located at high altitude, the climatic control (automatic choke) on the carburetor may be set leaner than standard factory setting to improve idling of a cold engine. One point leaner on the scale is approximately correct for each 1,600 feet above sea level.

*Example:* Altitude 5,000 feet, setting approximately 3 points lean.

Tie rod rattle in a new car may be caused by a tight fit of the lower bearing race in the housing, preventing the spring from holding the race against the balls.

Should a car fitted with radio and spark plug suppressor equipment evidence any tendency to miss

at idling speed or to foul spark plugs, it will indicate that spark plug gaps are too close. Increase to .025" or slightly more if necessary.

### Headlamp Focusing

Supplementing the instructions on page 15 covering headlamp adjustment:

In order to insure against meeting or driving beams being too high, it is necessary to put the equivalent of a full passenger load in the rear seat when focusing the lamps in accordance with the dimensions given in the previous article (page 15). This will, of necessity, cause the driving beam to be lower when there are front seat passengers only, but the procedure is necessary in order to meet the requirements of law in the majority of states.



# Terraplane Road Levelers

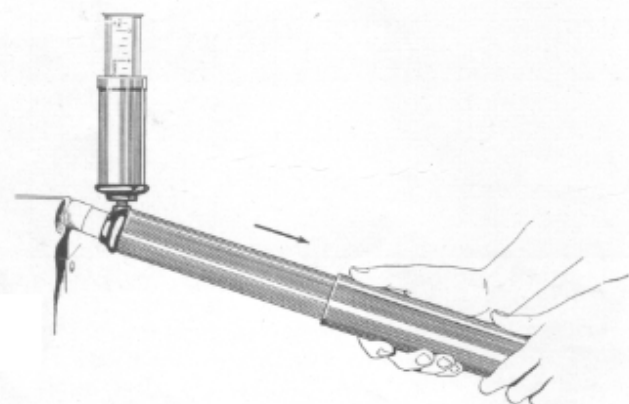
The "Road Levelers" used on Terraplane models are manufactured by the Monroe Auto Equipment Company, of Monroe, Michigan.

The "Road Levelers" will practically require no servicing other than the replacement of rubber grommets, when necessary, and the replacement of cushion fluid at intervals. The manufacturer advises replacing the fluid at 5,000-mile intervals.

This is suggested as a precautionary measure, as the exact time interval will be dependent very largely on the nature of service to which the car is subjected. For example, a car driven only approximately 5,000 miles within a year should certainly have the cushion fluid replaced. On the other hand, a car driven 2,000 to 3,000 miles a month might operate for several months without the necessity of exchanging or making additions.

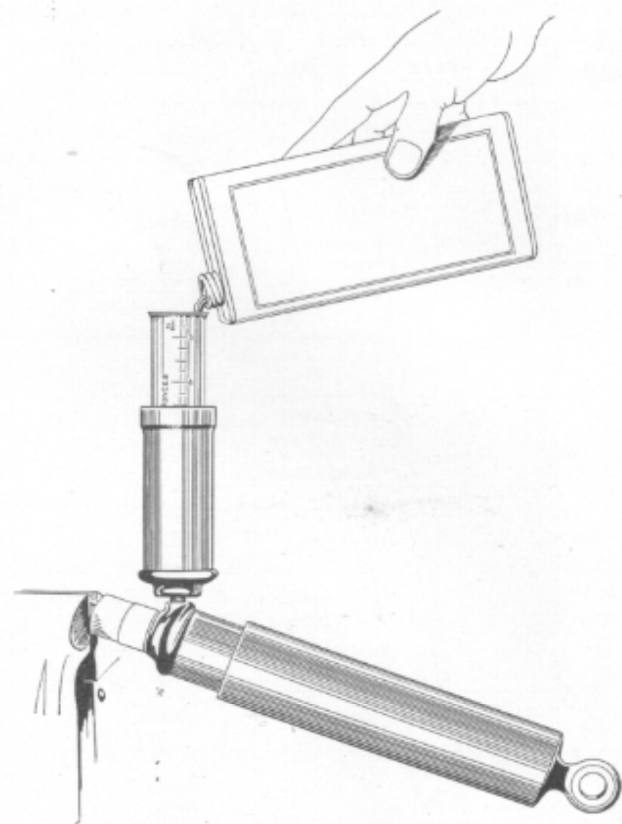
When refilling, it is necessary to proceed as follows (see illustration 1):

1. Remove unit from car.
2. Clean all dirt from around filler plug and filler plug hole, and remove plug and gasket.



3. Pump all old fluid out of the unit.
4. Clamp base of unit in a vise with filler hole up. Compress the unit, and screw the Monroe filler measuring cup into the filler plug hole.
5. The sliding member in this cup is graduated so that a predetermined amount of fluid can be injected into each shock absorber. The front shock absorbers require exactly three and one-half ounces of fluid and the rear units four and one-half ounces.
6. When the measuring cup has been properly set for the type of shock absorber and filled with

fluid, the shock absorber should be pulled to the extended position (see illustration 2) which will immediately suck in all the fluid.



7. Reassemble the filler plug, using a new filler plug gasket.

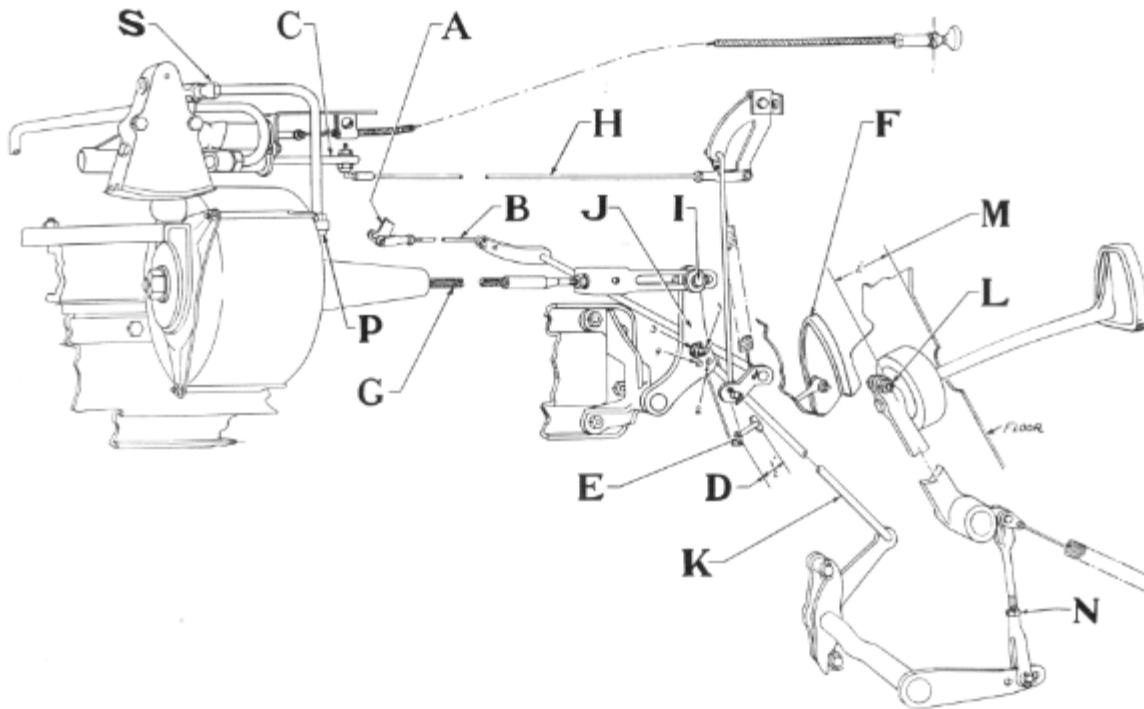
**NOTE:** Monroe Refill Kits and shock absorber filler cups No. T-255 (as illustrated) may be procured from the Monroe Auto Equipment Company of Monroe, Michigan, at reasonable prices. The Refill Kit will service all previous models of Monroe shock absorbers and includes one gallon of cushion fluid.

**REPLACING RUBBER GROMMET:** New grommets can be installed by lining a grommet up with the retaining hole in the end of the shock absorber, and placing the grommet into this hole with the aid of a vise.

**FLUID LEAKS:** Should leakage occur at the filler plug, it is merely necessary to replace filler plug gasket and tighten the plug securely.

## Adjustment of Vacuum Clutch Control

(All Models—1934 Terraplanes and Hudsons)



## Lubrication

All clevis pins and accelerator control valve plungers should be kept clean and lubricated with light oil periodically.

The cylinder should be lubricated with approximately one ounce Bendix Vacuum Cylinder Oil every 5,000 miles, introduced by removing the bleed tube connection (P) in the cylinder head.

The cushion control valve should be lubricated at 5,000-mile intervals with light oil, introduced by removing the adjusting screw and spring (S).

## General Adjustments

1. Connect rod (K) to hole (No. 3) in lever (J). Use hole (No. 4) only when proper adjustment is not possible due to extreme clutch wear. Holes (Nos. 1 and 2) are available for similar adjustment when this installation is made on a 1933 Terraplane six- or eight-cylinder car.

2. Adjust clutch throwout clevis rod end to give 2" dimension as shown when clutch is engaged. Measure this as in (M) from center of clamp bolt (L) to underside of floor board. Lower end of clevis

rod end is connected to middle hole  
in lever.

3. Pull clutch control cable (G) against stop toward rear of car. Control plunger (C) must be pushed forward (in) to allow cable (G) to travel back fully.

4. Adjust length of cable (G) to give  $\frac{7}{8}$ " to  $15/16$ " play between center of clevis pin (I) and rear of slot.

5. Pull control plunger (C) out against stop. Adjust length of rod (H) so there will be a positive pull on plunger (C) against its stop with

$\frac{1}{2}$ " clearance between bottom of floor board and center of throttle lever pin (E) as shown in (D).

6. Adjust length of throttle rod (B) so that clevis pin is 3/16" from back edge of slot in lever (A).

In normal operation of the automatic clutch, the clutch should engage smoothly when accelerator pedal is depressed. If the clutch grabs, shorten the cable (G) one-half turn at a time. If clutch slips too long, causing the motor to race, lengthen cable (G) by one-half turn at a time.

## Cushion Control Valve Adjustment

The effect of the cushion control valve is most noticeable on fast starts, and it should be adjusted last after normal adjustments have been made. With car in first gear make a wide open start. If too much slippage is noted, tighten adjusting screw (S) located midway between the two pipes, which increases spring pressure against closure of pendulum valve. If start is rough and jerky, loosen adjusting screw (S). Tighten locknut after adjustment.

# Electrical Gauges

These instructions apply to Gasoline, Oil Level and Radiator Water Level Gauges. For easy identification we will hereafter refer to the Instrument Panel Units as Receivers and the Gasoline Tank Unit, Oil Pan Unit and Radiator Unit as Senders.

Receivers of one type are not interchangeable with those of another type. This also applies to the Senders. A Receiver of one type can be used for checking another Receiver, however. This also applies to Senders. Although the different types of Receivers and Senders are not interchangeable, this equipment on the 1934 Terraplane is identical with that used on the 1934 Hudson and the same part can be used for servicing either car. (This does not, of course, apply to the Oil Level Gauge parts as these are standard equipment on Hudson models only.)

## Necessary Equipment for Checking an Installation

1. One extra Receiver (preferably Gasoline or Water Level).
2. One extra Sender (preferably Gasoline or Water Level).
3. Two 4' lengths of insulated wire equipped with clip terminals at each end.

*Caution: Do not replace any unit until standard tests have been made which definitely prove it to be defective or damaged. Handle all units carefully; they are instruments.*

## To Check Sender

1. Disconnect wire at Sender and connect it to extra Sender. Ground extra Sender to car frame and turn on Ignition Switch. (See illustration No. 1.)
2. Move float of extra Sender from empty to full position and watch action of the Receiver while doing this. (Allow 10 to 15 seconds for Receivers to read full scale.)
3. If Receiver registers correctly with extra Sender, then
  - (a) Original Sender is improperly grounded (because of paint or grease) and this must be corrected, or
  - (b) If car is radio equipped the condenser attached to Sender may be "shorted." This would cause over-reading whenever Ignition Switch was on. Condenser can be checked by disconnecting wire leading from same to Sender. If gauge operates correctly with Condenser disconnected, then replace Condenser.  
*Caution: Use only genuine Hudson Condensers. Any other may damage the gauge system.*
  - (c) Original Sender is damaged or defective and must be replaced.
4. If Receiver performs the same with extra Sender as it did with the original Sender, then check wiring.



Illustration 1

## To Check Wiring

1. If wire connecting Sender to Receiver is broken or grounded, repair or replace.  
If both wiring and Sender check okeh, then check the Receiver.

## To Check Receiver

1. Disconnect wires from Receiver being checked and attach to extra Receiver. Turn on Ignition Switch. (See Illustration No. 2.)
2. If extra Receiver reads correctly (this may be in the reverse direction, depending upon type of Receiver used for checking), then replace Receiver.

(Continued on page 39)

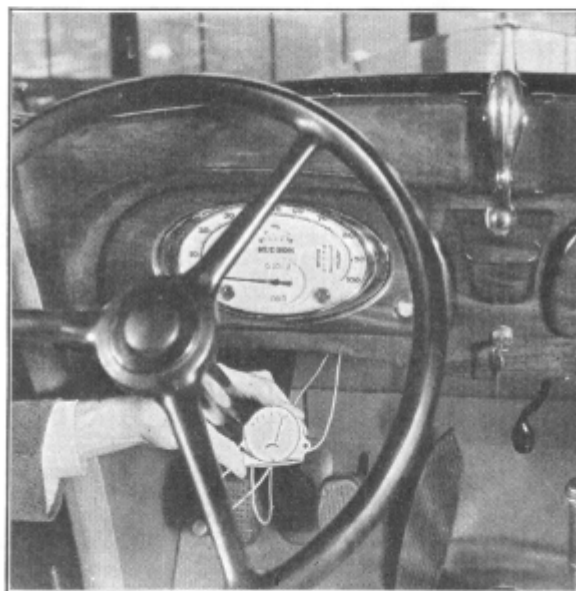


Illustration 2

# The Owner Follow-Up System

Recently the Field Service Development Department sent you a folder outlining a system for use in recording Terraplane, Hudson and Essex owners in your sphere of service influence. Particular attention was paid to the simplicity of the card to be used, what you can hope to accomplish through the information from a parts and service objective and how it will effectively lend itself in the future to any new and used car sales program.

In this business of selling maintenance our viewpoints become a little distorted, either because we refuse to face the facts or we will not take the necessary measures to assure our business of at least a certain given percentage of customer patronage. Even if either or both reasons are the cause of our condition we continue to fret about the absence of volume, low profit from the operation, and dissatisfaction on the part of owners in the type of service we render. It is safe to state that our entire attitude is largely responsible for the latter.

But we can do something about it and once a follow-up system is installed a certain short period of the day can be allotted to keeping it operating efficiently and with very tangible results. Your first move is to get the cards and whatever binders are required. The next and important one is to buy an up-to-date "simon pure" registration list of Terraplane-Hudson-Essex owners. Do not depend upon your old records and lists. Start from scratch and take nothing for granted.

Segregate the owners in two ways. Set up those having cars not over three years old in your active list and arrange them alphabetically according to the index in the binders. These are the ones you want to press for patronage and each one should be looked at as an outstanding service prospect. But for the purpose of active effort you do not want to strangle your binders or discourage your efforts by placing the owners of the older cars in this file.

We do not want to forget or disregard the other group which is represented in the earlier model records. These owners may come in of their own volition and by so doing indicate a desire to be customers. Our main point is that the first group should be concentrated upon because they represent the greatest potential of possible revenue. The

names of the older car owners should be recorded on the cards but not filed in the active binders. Keep these cards separate, but alphabetically arranged in a box or desk to be transferred into the main file if they show any signs of activity.

After the system is set up, assign a certain man to keep it alive, to call the owners and to record the transactions as the work orders come through for each day's business. Select one of your organization who knows how to smile into the telephone and who is capable of "taking it" when the occasion requires. *Remember the Value of the Record Lies in How It Is Kept Up and with the Man Who Is Responsible for Its Use.*

Earlier in this article we spoke about the value of this record as it can relate to new and used car sales. It should be a gold mine of prospects if the information is complete. And from what follows you can see how important it is to have our customers continuously coming to our stations. Any owner operating his car thirty, thirty-five or forty thousand miles does not remember the entire expense of maintenance and probably never figures out his cost per mile of operation.

Here's where the system is again effective. Good live retail men will keep in periodic contact with the follow-up man so they can watch the climbing mileages on cars of record, particularly those they may have sold themselves. From time to time they can figure out the total cost against the mileages and have figures at hand to show these owners. These figures are convincing and very well prove what ownership of Terraplanes and Hudsons means to them in the way of economy, a rather strong selling point in the new car presentation.

Say that deals are made and certain cars come into the used car department—the same figures can be a part of the story to create interest with used car prospects. When the cars are sold they remain in the live file but are transferred to the new names and filed accordingly for follow-up with the new owners.

**THE VALUE OF THIS SYSTEM TO YOUR BUSINESS IS WELL WORTH ITS LOW COST AND THE EFFORT TO KEEP IT UP.**

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## Electrical Gauges—To Check Receiver

(Continued from page 38)

3. If *extra* Receiver reads the same amount as original Receiver, then
  - (a) Previous checks were not properly made or
  - (b) Installation was okeh to begin with.

Note: There are four clips which hold the instrument panel in position. By removing the nuts holding these clips the entire panel can be removed from the front of the instrument board. This is the easiest method to get at the various instruments for replacement purposes, particularly so in instances where the car is radio equipped.

**CAUTION:** A 6-VOLT DIRECT CURRENT APPLIED TO THE RECEIVING INSTRUMENT WILL DESTROY IT. WHEN REMOVING WIRES FROM TERMINAL OF SENDING INSTRUMENT, BE SURE IGNITION SWITCH IS OFF OR AVOID GROUNDING TERMINAL.

*Damaged or defective Receivers and Senders cannot be repaired but must be replaced. Pack these securely in the original container when returning them to us for credit or replacement.*

# A PERSONAL BINDER

In the first issue of "Terraplane Hudson Service" we informed you that all issues would be punched for binding and would be numbered consecutively throughout the year. We also mentioned that a printed index would be incorporated in each issue providing quick reference to all items previously covered. The present issue shows how this is to be carried out, and also how important it is to you to be able to refer to any copy and any page when you have a particular problem. The only



way to do this is to bind the issues as they come through and your book when completed will be a complete manual on mechanical operations. We offer an exceptionally good looking, substantial binder, with your name on it in gold at a very low price. The binder is of sufficient capacity to contain two years' issues and you will have all this valuable information in such shape that you can readily find what you want at any time. The cover is of heavy fabcote—an excellent grade of imitation leather—Spanish finish and the binding is designed for hard service. Your name and initials imprinted in gold. Prices are 60c each or two for a dollar. Order two, one for yourself and one for your shopmate and collect 50c from him. Use the order form enclosed—print name and initials carefully, pin a dollar bill to it and mail to Service Department. Binders will be mailed to the address you give, postage prepaid.

# Radio Servicing with Instruments

On pages 14 and 15 of "Terraplane Hudson Service," we gave you simple radio servicing instructions which could best be accomplished without the use of regular testing equipment. However, the discrepancies indicated constitute the entire range of irregularities which can exist in an automobile radio receiver. We will give below a repetition of possible defects and will also indicate the radio testing instrument used in making the analysis.

The Hickok Electrical Instrument Company of Cleveland, Ohio, have designed for us three superb instruments which constitute the entire testing equipment necessary for completely checking Terraplane-Hudson receivers, all makes of automobile receivers and also house radios. These instruments will be sold at very favorable prices by the Hinckley-Myers Company of Jackson, Michigan, our authorized tool source. A catalog is now in process completely describing them and copies will be mailed you.

We will now detail below the discrepancies which can exist in an automobile receiver and will indicate the instrument used for instantly locating the trouble.

1. Inoperative	Instrument Used	6. Intermittent Operation	Instrument Used
(a) Examine Fuse	Ohmmeter	(a) Loose Radio Supply Connection	Volt-Ohmmeter
(b) Defective Tube	Tube Tester	(b) Defective Tubes	Tube Tester
(c) Loose or Corroded Battery Condition	Observation	(c) Loose Connection in Receiver	Volt-Ohmmeter
(d) Broken Wire in Chassis	Ohmmeter	(d) Broken Tube Socket	Observation
(e) Tube out of Socket	Observation	(e) Short in Antenna or Lead-in	Ohmmeter
(f) Antenna Connection	Ohmmeter		
2. Weak		7. Motor Noise	
(a) Defective Tube	Tube Tester	(a) Defective Suppressor	Ohmmeter
(b) Shorted Antenna	Ohmmeter	(b) Broken Lead or Defective By-pass Condenser at Generator, Coil or Gauge	Ohmmeter
(c) Weak Storage Battery	Voltmeter	(c) Open Ground to Lead-in Shielding	Ohmmeter
(d) Defective Speaker	Ohmmeter		
(e) Defective Vibrator Assembly	Voltmeter	8. Noisy Reception	
(f) Broken Connection	Volt-Ohmmeter	(a) See Motor Noise	Ohmmeter-Observation
3. Distortion		(b) Defective Vibrator	Volt-Ohmmeter
(a) Defective Speaker	Oscillator-Observation	(c) Loose Antenna Connection at Receiver	Observation
(b) Defective Tube	Tube Tester	(d) Loose Fuse Holder	Ohmmeter-Observation
(c) Defective Vibrator	Volt-Ohmmeter	(e) Defective Tubes	Tube Tester
	Oscillator-Observation	(f) Loose Tube Shields	Observation
4. Rattles		(g) Antenna Shorting to Frame	Ohmmeter
5. Dial off Calibration		(h) Natural Disturbances	Elimination
		(i) Loose or Defective Wiring in High or Low Tension Car Wiring	Ohmmeter

## Tube Operation Voltages

Position	Tube	$E_f$	$E_k$	$E_{g^1}$	$E_{g^2}$	$E_{g^3}$	$E_p$
R. F. Amplifier	6D6	5.6	1.5	*	1.5	72	174
1st Det.-Osc.	6F7	5.6	3.5	0	3.5	72	Det. 174 Osc. 130
1. F. Amplifier	6D6	5.6	1.5	*	1.5	72	174
2nd Det. A. V. C.	75	5.6	1.2	0	0	...	156
Power Amp.	42	5.6	0	-11.5	0	174.6	165
Rectifier	6Z4	5.6	174.6	..	..	..	..

f—Filament; k—Cathode;  $g^1$ —Control;  $g^2$ —Suppressor Grid;  $g^3$ —Screen Grid; p—Plate; \*—Depends on applied signal strength. All voltages measured from indicated points to ground. Battery voltage, 6 volts.



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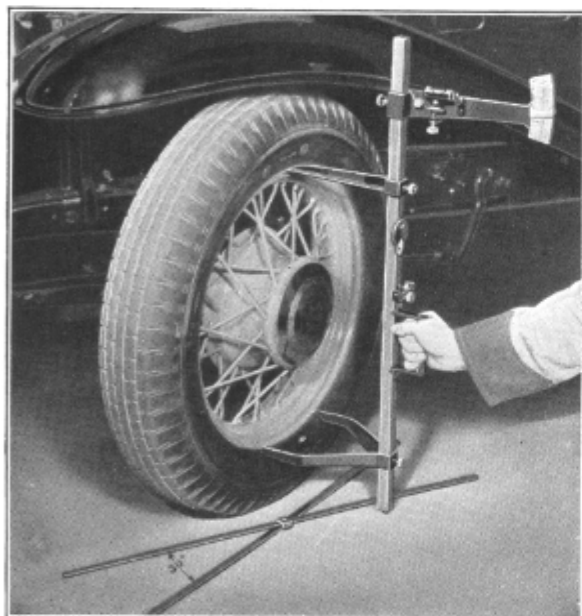
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# Terraplane Hudson Shop Equipment

## Wheel Alignment Checking Equipment



### Combination Camber Caster and King Pin Gauge HMJ-141 \$70.00

Caster and Camber readings are taken with the car weight on the wheels and the vehicle in normal driving position. Readings can also be taken from the spindles with the wheels removed, or from the axle with spindles removed.

To operate, equalize tire pressures and make sure that the floor is perfectly level from front to rear and from side to side. Unless the car is perfectly level, accurate readings cannot be taken.

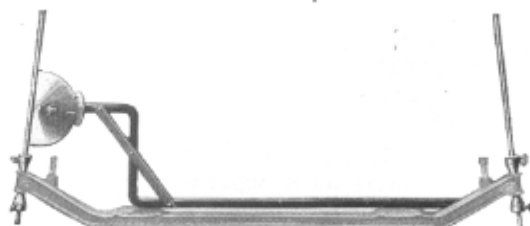
The front wheels should preferably be on turntables in order to eliminate bind in the steering connections when turning the wheels to the thirty-degree angles while checking caster. However, a spot of grease on the floor under each wheel will eliminate bind to a great extent.

Before making any front end checks, adjustment and inspection of play in wheel bearings, steering gear, steering connections and spindles, is an absolute necessity.

### Front Axle King Pin Pitch Checking Fixture

HM-516 \$9.00

For Axle Out of Car Use

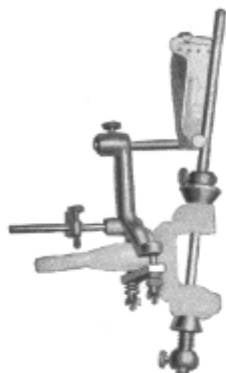


By means of this gauge, all distortion of the axle can be readily determined. The gauge having a nickel-plated protractor arrangement which, when contacting with the centering bars, will register in degrees the pitch and by referring to the standards for pitch of the king bolt of the particular car being checked, the distortion, if any, will be evident. The twist of the axle is determined by sighting across the centering rods.

### Combination Spindle and Steering Knuckle Gauge

J-579 \$15.50

For All Models



Road shocks, curb bumping and sudden braking often causes spindle assembly misalignment. One of the chief causes of tire wear, wandering and shimmy is a bent spindle or its assembly.

Instantly tells you the exact condition of the complete assembly and is the only gauge built that will make checks of both the spindle and steering knuckles.

Accurate readings of total spindle, camber and king-pin inclination are easily and quickly read on the adjustable indicator.

It is always advisable to use this gauge before making an axle camber change, as quite often the unequal wheel camber readings are caused from spindle misalignment rather than axle misalignment.

# Terraplane Hudson Shop Equipment—Continued

## Brake Band Hand Riveter

HM-518 \$7.00

All Models



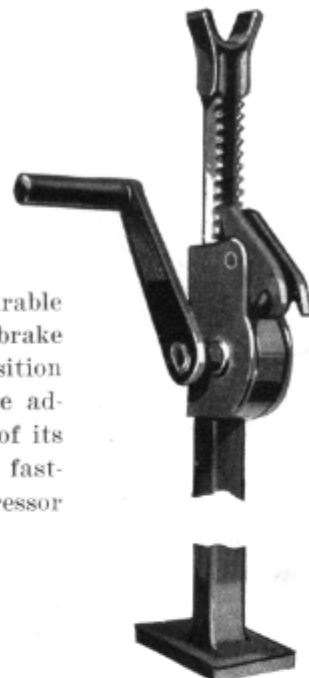
This brake band hand riveting machine is a very suitable tool for removing and replacing rivets on almost any brake bands or brake shoes.

The device is quickly and easily attached to any work bench, takes up very little space, is very easily operated, and has sufficient capacity for relining brakes.

The tool is provided with a knockout punch for removing the old rivets as well as a suitable riveting punch for handling hollow rivets.

## Brake Pedal Depressor

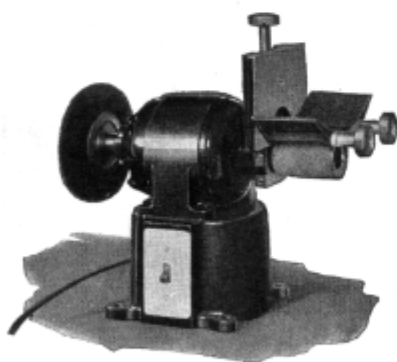
HMJ-134 \$3.75



A very simple and desirable tool for compressing brake pedal to any desired position while checking the brake adjustment. The simplicity of its construction makes it the fastest operating brake depressor on the market.

## Brake Shoe Grinder

HMK-377 \$37.50



This equipment, for use on a bench, is available as a separate item for dealers already owning a Brake Relining Machine. Since there is no way to assure a proper finish to a brake relining job as well as by the use of the Brake Shoe Grinder, this equipment will hold many customers that otherwise might be lost.

Weight 57 lbs.

Size—8" x 17" x 15" high.  $\frac{1}{4}$  H.P.

Motor, A.C. 110-volt, 60 cycle.

Special Motors, \$5.00 extra.

## Brake Shoe Riveter

J-315 \$14.50



*Foot-Operated  
Brake Shoe Riveter*

*A complete stock of special tools and shop equipment for servicing  
Terraplane, Hudson and Essex cars is carried at all times by—*

**HINCKLEY-MYERS COMPANY  
JACKSON, MICHIGAN**

Orders or requests for information or prices on any type of equipment should be mailed directly to them.

*All prices quoted are f. o. b. Jackson, Michigan.*