REFERENCE SHEETS

1936 Hudson Models

I n d e x

1936 Hudson Terraplane Brakes

Hydraulically Controlled Duo-Servo
Single Anchor Type

The hydraulic system consists of a compensating type master cylinder attached to the frame left side member under the hood and operated by a rod from the brake pedal, four double piston wheel cylinders mounted on the brake backing plates and the connecting tubing.

When the brake pedal is depressed, fluid is pushed out of the master cylinder into the wheel cylinders, separating the pistons and applying the brakes. When the foot is removed from the pedal the brake shoe springs return the wheel cylinder pistons to their normal position, forcing the fluid back through the lines into' the master cylinder.

The rear wheel brakes are also connected for mechanical operation through cable and conduit connections to the hand brake and the foot pedal. The mechanical linkage from the foot pedal is such that it follows the hydraulic actuation and becomes effective only if the hydraulic system fails. The hand brake is located under the instrument panel to the left of the steering column and is of the direct action type, with the exception of Terraplane DeLuxe Models without Electric Hand which have the conventional hand lever to the right of the transmission shifting lever.

The movement from both the hand brake and the foot pedal is transmitted to a rotary equalizer mounted under the center of the frame "X" member, to which the rear brake operating cables are also attached. An adjustable pedal push rod (10), Figure 1, provides an adjustment for determining the amount that the mechanical application of the rear brakes will lag behind the hydraulic application. Normally only hydraulic application is made when the foot pedal is depressed.

THE MASTER CYLINDER

Description

The master cylinder, Figure 2, consists of a supply tank cast integral over the master cylinder proper, in which compensating features are incorporated.

This unit performs two supplementary functions. Its first function is to maintain a constant volume of fluid in the system at all times, regardless of expansion (heat) or contraction (cold). The second function is its action as a pump during the bleeding operation.

The return to released position of piston (2), Figure 2, and cup (4) is much faster than the return of the fluid through outlet (10) into the master cylinder. A momentary vacuum is created in the cylinder barrel and additional fluid is drawn into the system from the reservoir through the drilled holes in piston (2) and past the lip of cup (4). The pressure exerted on the fluid by the brake shoe retracting springs is sufficient to lift valve (16) off its seat to permit the fluid from the lines to return into the master cylinder. Any excess is returned by port (3) into the reservoir; thus we have a cylinder full of fluid for the next brake application.

It is imperative that rod (1), Figure 2, which is attached to brake pedal operating rod, be adjusted for clearance where it seats in piston (2), so that there is 1/4" free movement of brake pedal pad before the pressure stroke starts.

This will permit cup (4), Figure 2, to be clear of port (3) when piston (2) is in its released position; otherwise the compensating action of the master cylinder will be destroyed and the brakes will drag.

Secondary cup (5) prevents fluid from leaking out of master cylinder into boot (7). Supply tank filler cap (11) is conveniently located, accessible under the left side of engine hood for checking fluid level. Supply tank should be kept at least half full of fluid. CAUTION: Before removing supply tank filler cap (11), Figure 2, extreme care must be used to prevent dirt from entering the master cylinder.

The use of other than Genuine Hudson Hydraulic fluid or the introduction of oil with a mineral base into the system will cause the rubber parts to swell and become inoperative. Grit and abrasive substances permitted to enter into the fluid reservoir will cause the cylinder barrel to become scratched and pitted. When either of these conditions occurs it becomes necessary to remove master cylinder for inspection.

Disassembly

After removing the master cylinder from the car, the unit is disassembled as follows:

Remove large boot strap (12), Figure 2, that fastens boot to cylinder casting. This permits removal of boot, link and small boot strap. With a sharp-pointed screwdriver remove retainer spring (13) from its groove. This permits the removal of internal parts. Rubber parts and cylinder bore are then checked.

If inspection shows cylinder walls scratched or pitted it becomes necessary to have the cylinder walls boned to renew the highly polished surface necessary for efficient operation. All Wagner Branches have the equipment necessary to recondition cylinders.

After cylinder has been boned and new cups procured, it is recommended that reassembly be made in the following manner:

Wash castings and parts in clean alcohol, dip casting and parts in Genuine Hudson Hydraulic fluid for lubrication purposes. Install valve (16) and return spring (9) as shown in Figure 2. Assemble primary cup (4), piston assembly (2) and piston ring (8). Snap retainer spring in groove. Assemble boot and link in place and replace large boot strap. Unit is now ready for installation on car.

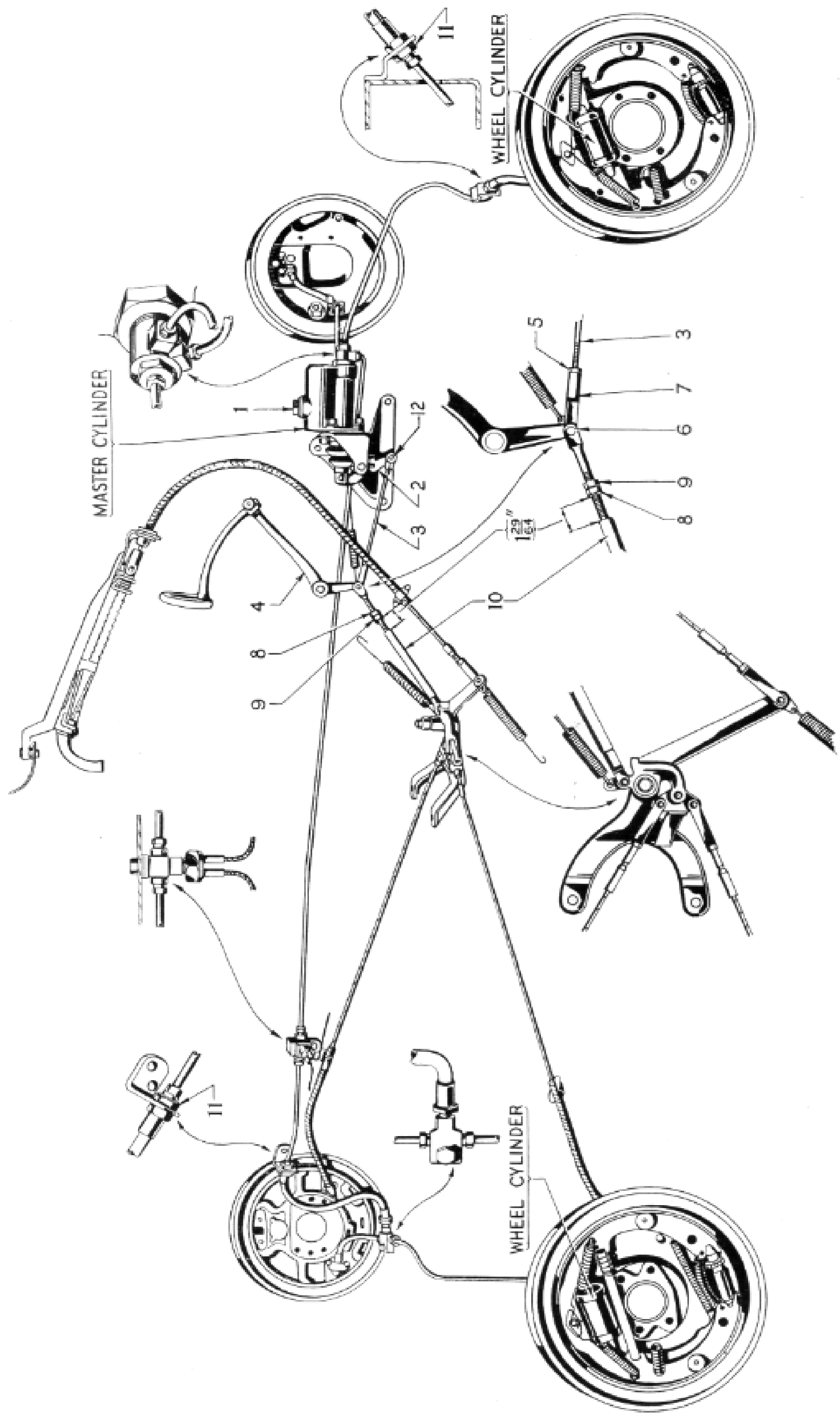
WHEEL CYLINDER
MASTER CYLINDER
WHEEL CYLINDER
1
2
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Figure 1

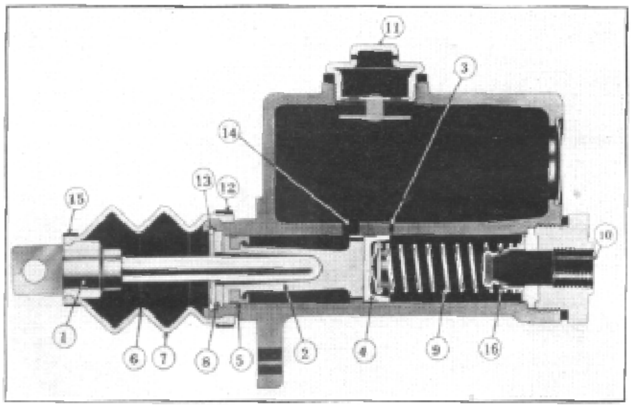


Figure 2

WHEEL CYLINDER

Description

The wheel cylinder is the unit which changes the applied hydraulic pressure into mechanical force. The wheel cylinder, Figure 3, is composed of casting (1), boots (2), opposed pistons (3), opposed cups (4), and cup return spring (5). At the uppermost position and between the piston cups is a bleeder connection used to expel air from the system.

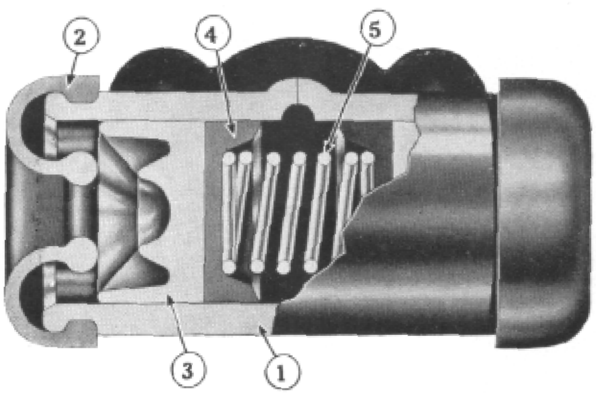


Figure 3

To remove wheel cylinder for inspection, honing or repairs:

Disconnect tube from hose at frame bracket. Remove hose lock nut (11), Figure 1, at frame bracket. Remove the two cylinder fastening screws (G), Figure 4, on rear of shield. Place piston clamp on wheel cylinder as shown in Figure 5. Remove brake shoe retracting springs (3-5-15), Figure 6, which permits shoes to move outward. Remove connecting links (12) between cylinder pistons and brake shoes. Cylinder and hose may be withdrawn as a unit.

Disconnect tube from cylinder fitting. Remove the two cylinder fastening screws (G), Figure 4, on rear of shield. Place piston clamp on wheel cylinder as shown in Figure 5. Remove brake shoe retracting springs and connecting links. Cylinder may then be withdrawn.

Disassembly

To disassemble wheel cylinder (Figure 3), remove rubber boots (2). Pistons (3), cups (4), and spring (5) may then be removed for inspection. Cylinder walls may also be checked

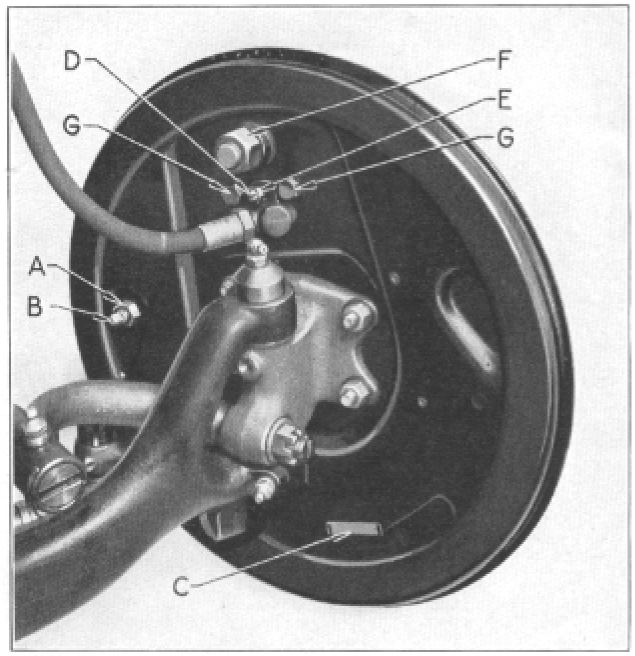


Figure 4

Before reassembling cylinder all parts must be washed in clean alcohol. Dip all parts in Genuine Hudson Hydraulic

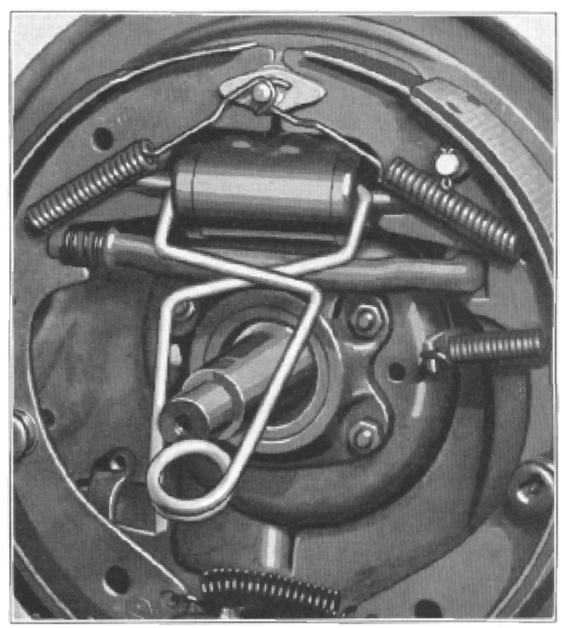


Figure 5

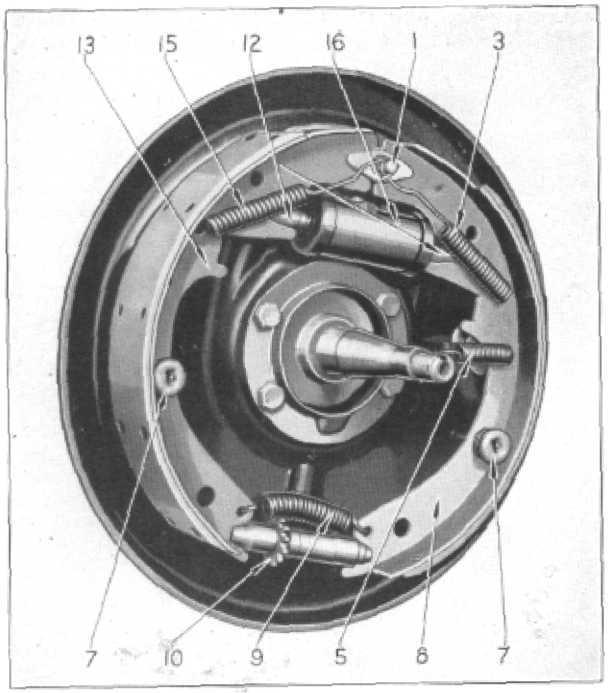


Figure 6—Front Brake Assembly

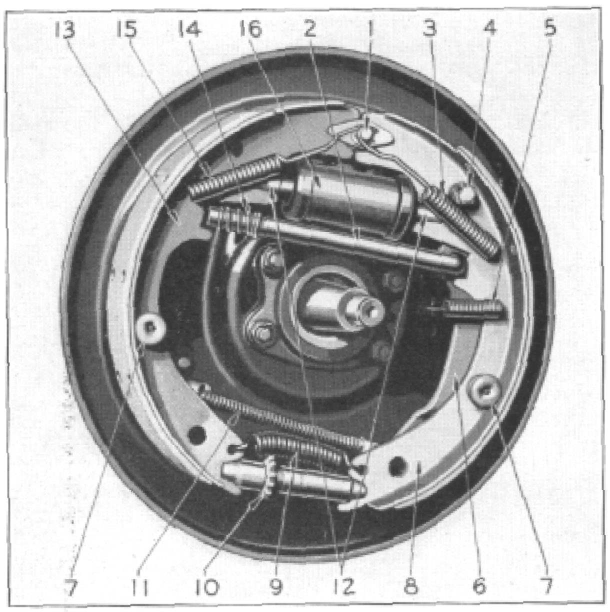


Figure 6—Rear Brake Assembly

1. Anchor Pin
2. Parking Brake Link
3. Secondary Shoe Retracting Spring
4. Parking Brake Lever Pivot
5. Eccentric Spring
6. Parking Brake Lever
7. Shoe Hold-down Spring
8. Secondary Shoe
9. Adjusting Screw Spring
10. Adjusting Screw
11. Parking Brake Cable
12. Wheel Cylinder Link
13. Primary Shoe
14. Parking Brake Link Spring
15. Primary Shoe Retracting Spring
16. Wheel Cylinder

Hudson Hydraulic fluid and reassemble as shown in Figure 3.

BLEEDING THE LINE

Description

Whenever a main pipe line is removed from the master cylinder or the supply tank becomes empty, then the brake system must be bled at all four wheels. Whenever a line is disconnected from any individual wheel, then that wheel cylinder ONLY must be bled. The bleeding operation should be performed at only one wheel cylinder at a time and repeated at the other wheel cylinders, if necessary.

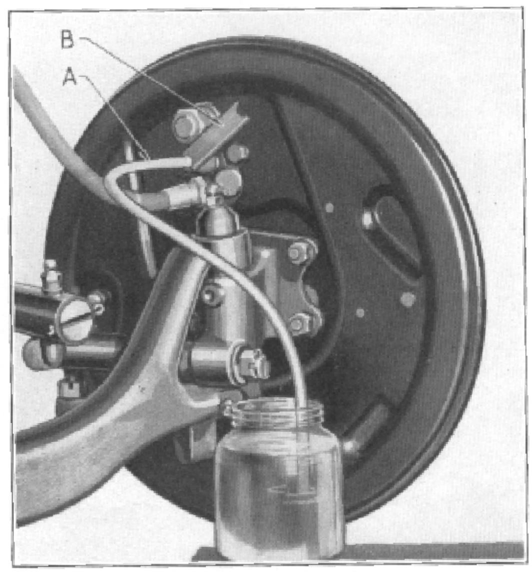


Figure 7

Fill the filling bottle (J-713), Figure 9, with Genuine Hudson Hydraulic brake fluid, put nozzle in reservoir and open filler bottle valve before commencing this operation. This will keep tank half full of fluid during bleeding operation. If the filling bottle is not used, fill the reservoir with Hudson Hydraulic fluid and keep at least half full during bleeding operation.

Remove screw (D), Figure 4, from end of bleeder valve and attach bleeder tube (J-628), Figure 7. Allow tube to hang in clean container, such as a pint mason jar. With bleeder wrench (J-627) (B, Figure 7), unscrew bleeder valve three-quarters of a turn and depress foot pedal by hand, allowing pedal to return to released position slowly. This gives a pumping action which forces fluid through tubing and out at wheel cylinders, carrying with it any air that may be present. *CAUTION: After brake pedal is depressed, it must be allowed to return slowly; otherwise air may be drawn into system.*

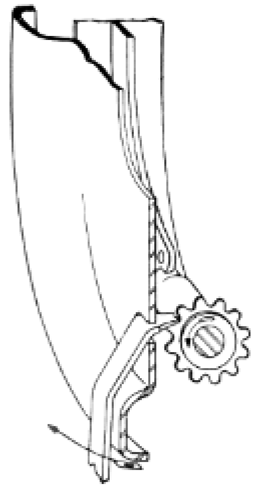


Figure 8
Move Wrench in Direction of Arrow to Tighten Brakes

Watch flow of fluid from hose (the end of which should be kept below surface of fluid in pint jar) and when all air bubbles cease to appear close bleeder connection.

Fluid withdrawn in "bleeding" operation should not be used again. Fluid should be replenished in supply tank after each cylinder is bled if filling bottle (J-713) is not used. Should supply tank be drained during bleeding operation, air will enter the system and “re-bleeding” will then be necessary at all four wheels. When bleeding operation is completed, supply tank must be refilled. Inspect for correct fluid level each one thousand miles.

Adjustment of Brake Pedal

Check to see that the pedal return spring holds the bottom of lever (2), Figure 1, against the stop. If the pedal shank touches the toe board in the fully released position or has more than 3/8” clearance, loosen lock nut (5), Figure 1, on the cylinder connecting link. Remove clevis pin (12) from bottom of bell crank (2). Turn connecting link to increase length until clevis pin (12) just enters the rod with the pedal shank 1/4” from the toe board and the bell crank against its stop. Reinsert clevis pin (12) in bottom of bell crank (2) and tighten lock nut (5).

Adjustment of Pedal Push Rod

With equalizer bar against stop, loosen lock nut (8) and turn adjusting nut (9) until rear face is 1-29/64 inches from front end of push rod (10) as shown in Figure 1. Tighten lock nut. This adjustment is important to obtain proper mechanical follow-up to the hydraulic operation of the rear brakes.

Brake Shoe Adjustment

There are only two points of adjustment in the braking system to compensate for brake lining wear. The Eccentric Adjustment (B), Figure 4, centralizes the brake shoes in the drum. The Adjusting Screw (10), Figure 6, takes up the clearances between the lining surfaces and the brake drums.

Adjustment for Wear Only

(1) Jack up all wheels clear of the floor.

(2) Remove clevis pins which attach rear wheel cables to equalizer bar.

(3) After uncovering adjusting holes (C), Figure 4, and feeler gauge holes in brake drums, AT EACH WHEEL: Loosen eccentric lock nut (A and insert .010” feeler gauge between the lining of secondary (eccentric controlled) shoe and brake drum. Turn the eccentric adjustment (B) in the direction of forward wheel revolution until .010' feeler is just snug at anchor and adjusting ends of secondary shoe. Tighten eccentric lock nut.

The clearance at both ends of secondary shoe should not vary more than .003”. Should the variation be greater than this it will be necessary to relocate the anchor pin as outlined in paragraphs 10 to 17. (In case of clearance variation it is desirable that clearance at the anchor end be less than at the adjusting end.) DO NOT ADJUST THE ANCHOR PIN UNLESS THIS INSPECTION SHOWS IT NECESSARY.

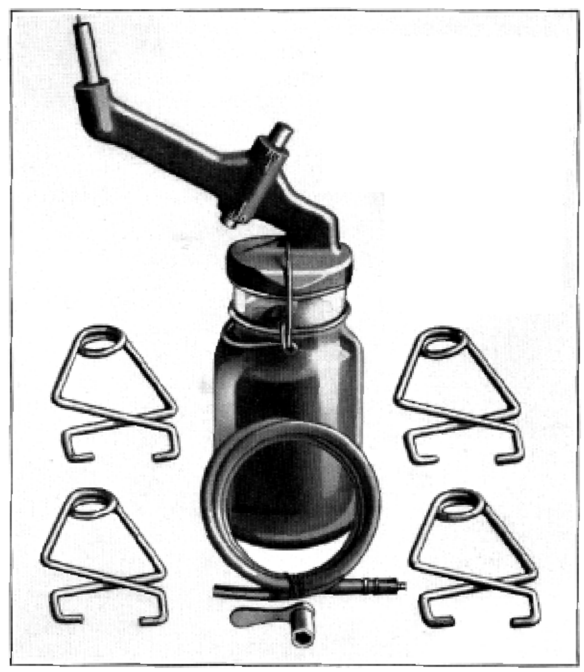


Figure 9

J-713 Filler bottle-$3.95
J-627 Bleeder valve wrench-$0.35
J-628 Bleeder tube assembly-$0.35
HMO-145 Wheel cylinder clamps (set of four)-$1.00
Order tools from Hinckley-Myers Company, Jackson, Mich.

(4) Spread the brake shoes by means of the notched adjusting screw (Figure 8) until the shoes are expanded against the brake drum so drum can just be turned by hand.

(5) Pull hand brake lever until equalizer bar plate is 1/8” from stop, Figure 1.

(6) Pull rear brake cables tight and adjust ends so clevis pins just enter holes in plate. The rear face of the equalizer plate must be parallel to the face of the stop after this adjustment is made.

(7) Release hand brake.

(8) Release adjusting screw at each wheel until the brakes are just free of drag and replace feeler gauge hole covers and wheels.

(9) Lower car and test for balance of hand brake on brake testing machine or road. The adjusting screws can be turned two or three notches to balance the mechanical operation without affecting the balance of the hydraulic operation. Always loosen adjusting screw on tight brakes rather than tighten adjusting screw on loose brake to get balance. This is to safeguard against one or more dragging brakes.

Complete Brake Adjustment
(Including lubrication of rear brake cables)

NOTE: This complete brake adjustment is to be followed in cases where an inspection, as covered in paragraph 3, shows that adjusting for lining wear only will be inadequate, or where new shoes have been installed.

(10) 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 parking brake cable ramp, shoe support ledges on backing plate, eccentric, shoe ends and all moving parts at frictional contact points.

11) During inspection or disassembly of brakes, the hydraulic portion of the system should be left intact so that bleeding of the lines will not be required. This is easily accomplished by putting HMO-145 wheel cylinder clamps on the wheel cylinders, Figure 5, before disconnecting the brake shoe retracting springs. The brake pedal must NOT be depressed at any time when brake drums are not in place.

(12) Anchor pins are sliding, or radially adjustable. After the car has been jacked up, and the drums and shoes removed and reinstalled as recommended, continue as follows:

(13) Disconnect rear brake cables at the equalizer bar.

(14) When lubricating cable and conduit assemblies, be careful not to force excess lubricant into the brake assembly. Unfasten conduit abutment brackets, clean exposed portion of cable, slip conduit toward cross shaft, exposing that portion of cable which is sheathed by conduit. Clean this portion of cable and lubricate freely with Bendix cable lubricant.

(15) Reassemble conduits, leaving equalizer bar clevises disconnected. Conduit ends MUST BE FIRMLY BOTTOMED IN ABUTMENT BRACKETS.

(16) At all four wheels, loosen the anchor pin nut one turn and tap anchor pin slightly in necessary direction with a soft hammer, turning 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 16-INCH WRENCH. Tighten eccentric lock nut.

(17) Continue adjustment as outlined in paragraphs 4 to 9, inclusive.

Brake Maintenance Hints

1. Pedal Goes to Floor Board.

Cause:

a. Normal wear of lining.
b. Leak in system.
c. Air in system.
d. No fluid in supply tank.

Remedy:

a. When brake linings become worn it is necessary to set the shoes into closer relation to brake drums. This condition is usually accompanied by the remark from the driver that it is necessary to PUMP the pedal several times before a brake is obtained. Shoes should be set to .010" clearance. Do not disturb anchor pins when making this adjustment. Adjustment must be made while drums are cool.

b. A connection leak in the system will allow the pedal, under pressure, to go to the toe board gradually. A cup leak does not necessarily result in loss of pedal travel, but will be indicated by a loss of fluid in the supply tank. If no leaks are found at wheels or connections, remove master cylinder and check bore of barrel for score or scratches.

c. Air In the system will cause a springy, rubbery action of the pedal. Should a sufficient quantity be Introduced into the system, the pedal will go to toe board under normal pressure. System should be bled.

d. The fluid level in the supply tank should be checked. Should the tank become empty, air will be introduced into the system, necessitating bleeding.

2. All Brakes Drag.

Cause:

a. Mineral oil in system.
b. Port hole (3), Figure 2, closed.

Remedy:

a. The introduction into the system of any oil of a mineral base, such as engine oil, kerosene, or the like, will cause the cups to swell and distort, making it necessary to replace all rubber parts. Flush system with alcohol and refill with Genuine Hudson Hydraulic brake fluid.

b. Directly ahead of the master cylinder piston cup (when in normal release position) is a relief port. It is imperative that this port be open when the brakes are released. Should this port (3), Figure 2, be blocked by piston cup not returning to its proper release position, the pressure in the system will gradually build up and the brakes drag.

3. One Wheel Drags.

Cause:

a. Weak brake shoe return spring.

b. Brake shoe set too close to drum.

c. Cups distorted.

d. Loose wheel bearings.

Remedy:

a. Replace spring.

b. Readjust shoes to proper clearance.

c. If in repairing wheel cylinders, kerosene, gasoline and other fluids are used as a cleaner instead of alcohol, the cups will swell and distort. The return action of the shoes will be retarded and the brake drum will heat. Replace cups and wash unit in alcohol and dip all parts in Hudson Hydraulic brake fluid before reassembling.

d. Tighten bearings.

4. Car.Pulls to One Side.

Cause:

a. Oil-soaked lining.

b. Shoes improperly set.

c. Backing plate loose on axle.

d. Different makes of lining.

e. Tires not properly inflated.

f. Incorrect caster angle.

Remedy:

a. Replace with new Hudson lining of correct type. Grease-soaked linings cannot be salvaged by washing or cleaning.

b. The construction of the brake is such as to cause a slight pull or drift if shoes are improperly set on the front wheels. On the rear wheels there will be no drift noticed, but one wheel will slide before the other. Readjust the shoes to proper clearance.

c. Loose backing plate permits the brake assembly to shift on the locating bolts. This shifting changes the predetermined centers and causes unequal efficiency. Tighten backing plates and readjust shoes.

d. Different makes of linings have different braking efficiency. Two different makes, one with high efficiency and one with low efficiency, would cause car to pull to one side. Use Genuine Hudson brake lining.

e. All tires should be properly inflated.

f. Check front axle for caster. 5. Springy, Spongy Pedal.

Cause:

a. Brake shoes not properly adjusted.

b. Air in system.

Remedy:

a. Adjust brakes.

b. Consult remedy "d" under No. 1.

6. Excessive Pressure on Pedal, Poor Stop.

Cause:

a. Brake shoes not properly adjusted.

b. Improper lining.

c. Oil in lining.

d. Lining making partial contact.

e. Improper adjustment of pedal rod (10), Figure 1.

Remedy

a. Adjust brakes.

b. Replace with new linings of same type, as improper grades of brake linings lose their gripping qualities after a few thousand miles. As the frictional quality decreases, the pressure on the brake pedal is naturally increased to get the equivalent stop.

c. Clean or replace lining.

d. Remove high spots.

e. Adjust nuts (8) and (9), Figure 1, as covered under "Adjustment of Pedal Push Rod."

7. Light Pressure on Pedal, Severe Brakes.

Cause:

a. Brake shoes not properly adjusted.

b. Loose backing plate on axles.

c. Grease-soaked lining.

Remedy:

a. Adjust brakes.

b. Consult remedy "c" under No. 4.

c. Consult remedy "a" under No. 4.

CAUTION:

DON'T use a substitute for Hudson Hydraulic brake fluid. Substitutes are not suitable for this system.

DON'T allow grease, paint, oil or brake fluid to come in contact with brake lining.

DON'T clean rubber parts or inside of cylinders with anything but clean alcohol. Don't use kerosene or gasoline.

DON'T reline one wheel with a different type of lining than is used on the others, as you cannot expect satisfactory brake performance if this is done.

DON'T allow the supply tank to become less than half full of brake fluid.

DON'T attempt to salvage used brake fluid.

Use Genuine Parts

All parts, brake fluid and brake linings are to be obtained from the Hudson Motor Car Company and all complaints and problems reported to its Service Department through Hudson distributors.

Genuine parts will carry Wagner and Lockheed names and no others should be used.

You may be solicited to purchase substitutes for the above items, the use of which may result in unsatisfactory, unsafe brakes and the voidance of the Hudson warranty.

Brake Fluid

Hudson Hydraulic brake fluid is prepared by the Wagner Electric Corporation, manufacturers of Lockheed Hydraulic brakes, with an exact knowledge of the requirements and the dangers of substitution.

It is therefore important to use only Genuine Hudson Hydraulic fluid and thus avoid damage to brake system.

Hudson Hydraulic brake fluid Is put up in convenient containers and should be secured through the Hudson Parts Department.

Brake Service Tools

The tools required to properly service 1936 Hudson and Terraplane brakes, are few and not expensive. They are, however, essential from a standpoint of time-saving and in the hydraulic system of preventing contamination of the brake fluid.

J-713 Filler Bottle ---Price $3.95

The oil level should never be allowed to get below the half full point in the master cylinder reservoir. If the reservoir is filled too full, fluid will be lost, due to expansion.

The filler bottle will fill the reservoir to the correct level - no more. Just insert the neck of the bottle in the reservoir opening and push the valve open. When air bubbles cease to appear in the bottle the reservoir is full. Saves time--saves fluid.

When bleeding lines, leave the filler bottle neck in the reservoir. As fluid is bled out it will be replaced from the bottle. This prevents the possibility of draining the reservoir which would require re-bleeding of all lines.

J-628 Bleeder Tube Assembly-Price $0.35

This tube prevents brake fluid from getting on brake parts during the bleeding operation. By putting the end of the tube below the level of liquid in a glass container the air bubbles rising to the surface as the brake pedal is depressed indicates that air is in the line and continued bleeding is necessary.

J-627 Bleeder Valve Wrench-Price $0.35

This is a socket wrench which slips over the bleeder hose to engage the hexagon head of the bleeder valve.

HMO- 145 Wheel Cylinder Clamps (Set of Four)-Price $1.00

When the brake shoe retracting springs are removed the spring in the wheel cylinder will separate the pistons. This will cause a vacuum which will cause air to be drawn in around the piston cups and require bleeding of the lines. The wheel cylinder clamps have sufficient tension to hold the pistons together and should always be put in place before the shoe retracting springs are removed.

HM- 13985 Eccentric and Star Wheel Wrench-Price $0.20

This tool will speed up the adjusting of the eccentric and the shoe adjustment.

J-784 Anchor Pin Wrench-Price $1.40

This is a strong alloy steel box wrench with plenty of purchase to tighten the anchor pin nuts securely.

Place tool orders with the Hinckley-Myers Company, Jackson, Michigan.

Front Axle Alignment
Steering Gear and Spring Suspension

The front axle, the steering gear and the spring suspension are all important factors in obtaining proper handling of an automobile. Because of their relation in this respect they should all be treated together in service operations. The servicing of these units will be divided into four sections as follows:

Section 1. Disassembly, repair and reassembly of front axle.

Section 2. Removal, disassembly, reassembly and installation of springs and stabilizer.

Section 3. Disassembly, repair, reassembly and adjustment of steering gear.

Section 4. Front wheel alignment and steering corrections.

Sections 1, 2 and 3 deal with the operations pertaining to the units individually, while Section 4 deals with the inter-related effects and final adjustment for correct steering and roadability.

SECTION 1 - FRONT AXLE

Removal of Front Axle

1. Jack up front of car with a roller jack under the front axle and place two stand jacks under the frame side rail just back of the torque arm frame brackets, Figure 1. Lower roller jack until car weight is held on stand jacks but leave roller jack in place to support front axle.

2. Pry off front wheel outer and inner hub caps, pull spindle nut cotter keys.

3. Remove spindle nuts, spindle washer, outer bearing cage and front wheels and brake drum assemblies.

4. Remove nuts from four bolts holding brake backing plate to spindles.

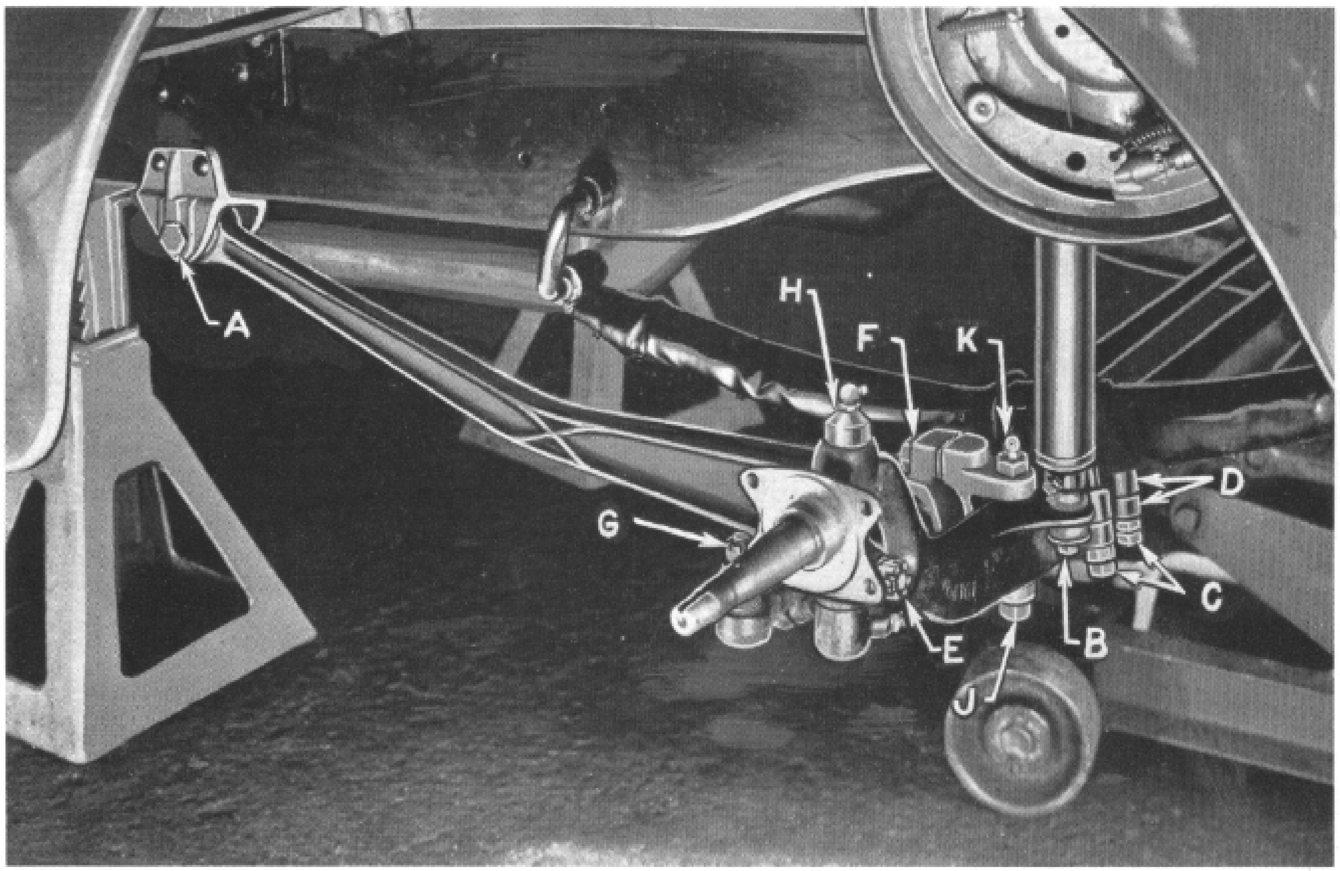


Figure 1

5. Remove brake backing plates and hang on fender supports with books made from heavy wire, Figure 1.

6. Remove cotter keys from inner ends of bolts (A) which attach torque arms to frame brackets, remove nuts and press out bolts using press J-885, Figure 2. NOTE: Due to the rubber grommets clinging to the bolt a constant pressure is required to remove and reinsert the bolt.

7. Remove nuts (B), Figure 1, grommet seats and grommets from bottom shock absorber mounting studs.

8. Remove cotter key from front end of drag link, unscrew plug, remove ball seat and remove drag link from steering arm.

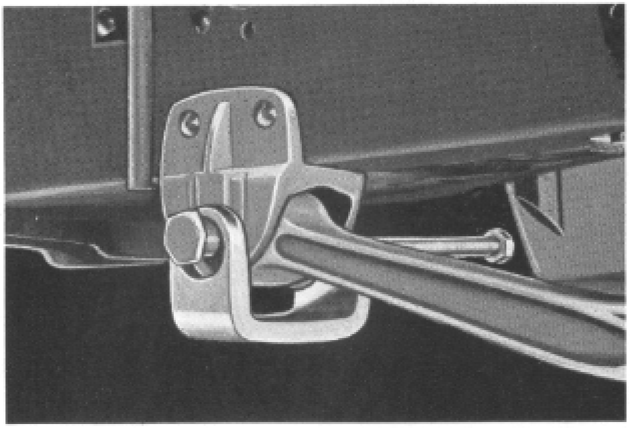


Figure 2

9. Remove spring U bolt nuts (C) (4 each side and remove spring seat caps (D).

10. Lower roller jack until axle is clear of spring and remove axle assembly from under car.

REBUILDING FRONT AXLE

Replacement of Spindle Pins and Bushings

NOTE: It is not necessary to remove the axle from under the car for this operation.

This can be done by proceeding as follows either with the axle removed from the car or after operation 1 to 5 inclusive under removal of front axle. The special tools required are shown in Figure 3.

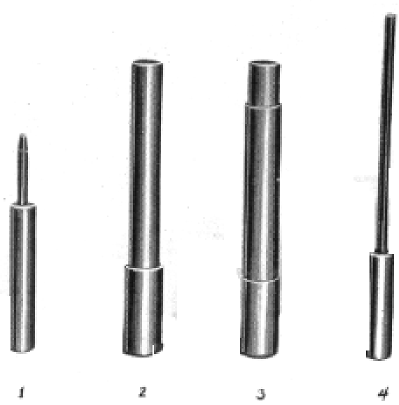


Figure 3

11. Remove tie rod end stud nuts (G), Figure 1, and disconnect tie rod from right and left steering arms.

12. Remove the cotter keys and nuts (E), Figure 1, from the front ends of the steering arms and remove the arms from the spindles.

13. Remove the Zerk oilers from the top of the pivot pin upper bushing (H), Figure 1.

14. Insert driver J-479-1 (1-Figure 3) through hole in upper bushing and drive spindle pin down, forcing out expansion plug at bottom of spindle, then insert driver J-479-2 (4-Figure 3) and drive pivot pin out.

NOTE: Remove spindle pin carefully so that the five ball bearings are not lost.

15. Support the axle end solidly and drive upper bushing out with a copper hammer.

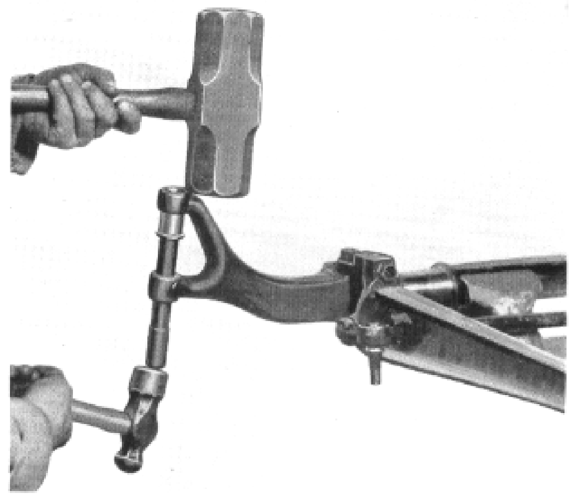


Figure 4

16. Insert driver J-469-2 (3-Figure 3) into lower bushing and drive it out.

17. Install: new upper bushing, using driver J-469-2 (3-Figure 3), as shown in Figure 4. The top of the axle center yoke must be well supported.

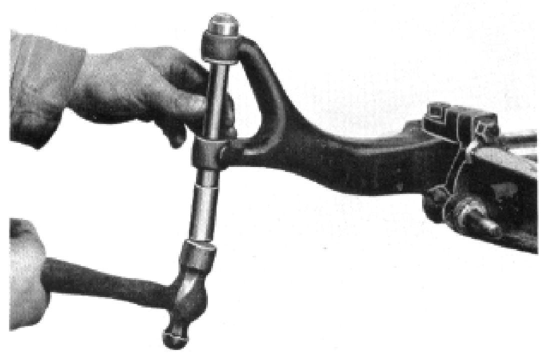


Figure 5

18. Install new lower bushing, using driver J-469-1 (2 - Figure 3), as shown in Figure 5.

NOTE: The bushings are hardened and ground and require no reaming after being put in place.

Lubricate inside of bushings and top of spindle pin with viscous grease before inserting spindle pin.

19. Put the spindle in place with sufficient shims under

from bottom about 3/4 of the way with the keyway in line with the keyway in the steering arm hole in the spindle.

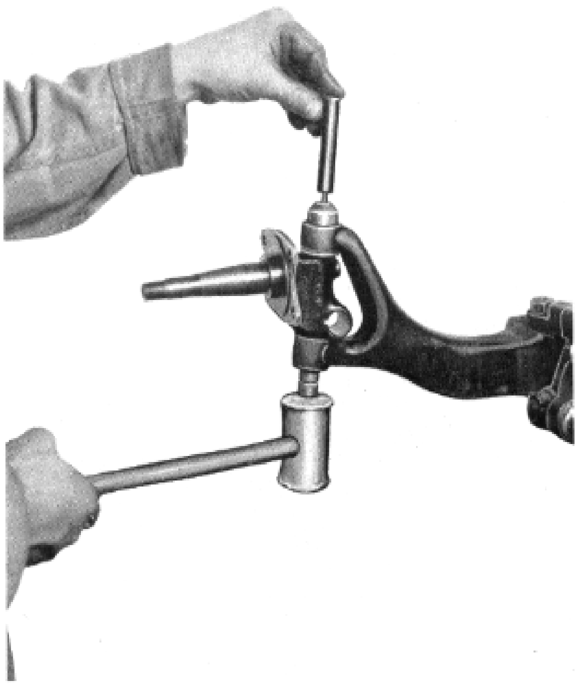


Figure 6

20. Drop 5 new ball bearings through the pressure fitting hole in the top bushing and insert driver J-479-1 as shown in Figure 6 to insure keeping the balls on their race and drive the pin in until the keyways line up.

21. Assemble the steering arms to the spindle with keys and nuts. Tighten nuts securely and insert cotter keys.

NOTE: Spindles must turn free without perceptible drag.

22. Install expansion plugs in bottom of spindles.

Removal and Installation of Torque Arms

23. Remove the torque arm pivot bolt nut (J), Figure 1, and unscrew* pivot bolt (K). Remove torque arm.

*NOTE: The bolt (K) is threaded into the bottom fork of the yoke on early production cars only.

24. Put torque arm yoke in place on axle and insert pivot bolt (K) and screw* into lower yoke, drawing up tight.

25. Put nut (J) on bolt and tighten securely.

26. Reinstall tie rod.

NOTE: The tie rod ends should be free enough to permit the stud to be turned by grasping it with the hand. Replace worn or tight tie rod ends with new ones. After ' the tie rod has been installed a pressure of from 3 to 5 pounds applied to the ball of the left hand steering arm should turn the spindles. If greater effort than this is required, steering will be hard and an excess amount of caster may be required to overcome this drag to prevent car wander.

Installation of Front Axle

27. Put axle assembly on roller jack and roll into position under car.

28. Lubricate the upper and lower halves of the spring seat, put upper halves in place on axle and raise axle into position under springs.

29. Put spring U bolts and lower halves of spring seats in place and install nuts (C), Figure 1, on U bolts.

NOTE: Before installing jam nuts on U bolts lift rear end of torque arm. It should fall slowly under its own weight. Readjust U bolt nuts if necessary. Tight spring seat bearing will restrict spring action and cause hard driving, while with loose bearings the proper axle alignment cannot be held.

30. Insert two rubber grommets in eyes of each torque arm and insert bracket bolts (A) through bracket and grommets, using J-885 bracket bolt press. Install nuts and insert cotter keys.

31. Connect drag link to steering arm and connect shock absorbers.

32. Install brake backing plates.

33. Lubricate the bearings of each wheel with 4 ounces of bearing grease and install wheel and brake drum assemblies and hub caps.

NOTE: The axle must now be checked for caster, toe-in and steering geometry. This is covered in Section 4.

SECTION 2 - SPRINGS AND STABILIZER Removal of Springs (front or rear)

The axle (front or rear) should be supported on a roller jack, while the chassis frame side rails should be supported on stand jacks.

34. . Remove spring U bolt nuts (C), Figure 1.

35. Disconnect lower end of shock absorbers (B), Figure 1.

36. Lower roller jack until axle is free of spring.

37. Unscrew frame bracket threaded bushing at front and rear of spring and remove spring from under car.

Disassembly of Spring

38. Clamp spring in vise so that center bolt is just outside of vise jaw.

39. Unscrew shackle threaded bushing.

40. Cut spring leaf clips and remove.

41. Remove center bolt nut and bolt.

42. Open vise and disassemble spring.

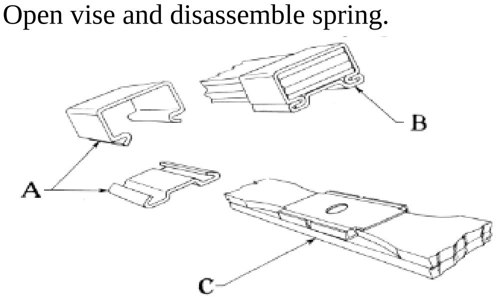


Figure 7

Assembly of Spring

NOTE: The second leaf of the front springs is made in two pieces. The outer end of each piece is formed around the eye of the main leaf, while the inner ends of each are guided by a plate (Sketch C), Figure 7, through which the center bolt passes. This plate should be assembled between the second and third leaves with the flanges upward to guide the inner ends of the second leaf.

43. Lubricate leaves with graphite grease and assemble in proper order with a piece of 1/4" rod passing through the center bolt hole of each leaf. Clamp in vise and draw leaves together, aligning them as the vise is tightened.

NOTE: The rear end of front springs and the front end of rear springs is the long end measured from the center bolt hole to the center of the spring eye. The rebound leaf of the rear spring is assembled to the rear. All leaves which are not equal length from the center bolt hole to both ends are assembled with the long end to the long end of the assembled spring.

44. Insert center bolt and tighten nut.

45. Put service spring clips (Sketch A), Figure 7, over spring leaves from top and slide clip cover in place on bottom (Sketch B), Figure 7.

46. Lock spring clip joints with a hammer.

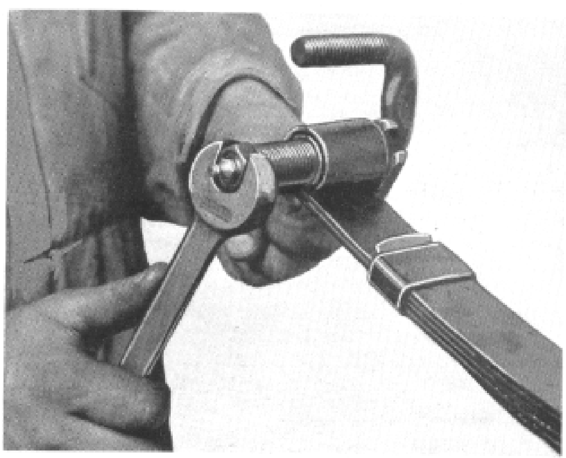


Figure 8

47. Insert one end of spring shackle through main leaf eye and place the spacer (J-524) between the spring eye and shackle as shown in Figure 8.

48. Start threaded bushing on shackle thread and draw tight into spring eye.

Install Spring on Car

49. Put spring in position under car with the shackles passing through the frame brackets. (The front eye of the rear spring is passed over the threaded bracket pin.)

50. Locate shackle with J-524 spacer as in (47) and start threaded bushing on shackle and draw tight into bracket (at front of rear spring hold J-524 spacer on bracket threaded stud back of spring eye to give correct spring position while drawing bushing into place in spring eye).

NOTE: The use of a spacer of proper thickness is necessary to insure the bushing being threaded far enough on the shackle but not far enough to bottom the thread in the bushing as the shackle moves in normal operation.

51. Replace the spring U bolts and nuts and reconnect shock absorbers.

NOTE: It is essential that the threaded bushings fit tight in the Spring eyes. Sidewise movement of the springs due to the loose bushings or movement due to loose U bolts will cause car wander and erratic brake action.

HEAVY DUTY STABILIZER BAR

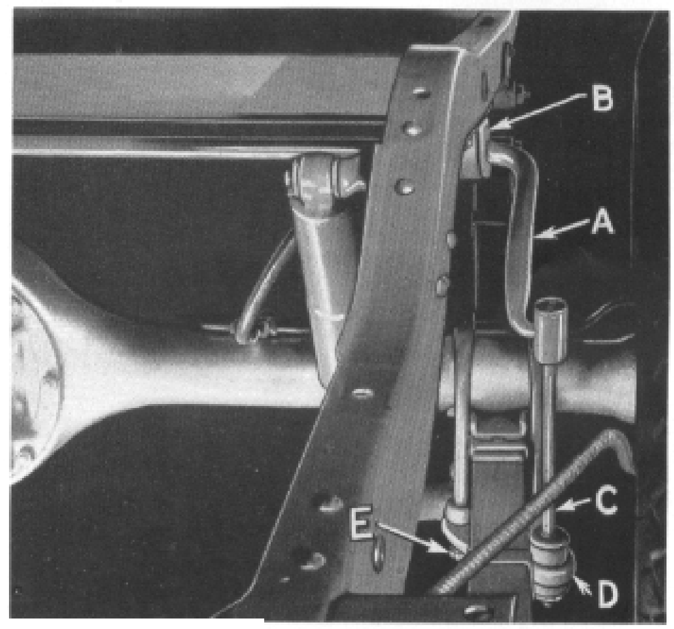


Figure 8A

Disassembly

52. Jack up rear axle and remove right rear wheel.

53. Remove nuts at bottom of connecting link (C)

54. Remove rubber bearing mounting clamp bolt nuts (13) and remove assembly.

Assembly

55. Slip the two large rubber blocks (B) on to the bar (A). To facilitate assembling, use gasoline on rubber parts. Never use grease or oil.

56. Remove the threaded plug in the large end of the connecting links (C) and install one rubber cushion. (Cup up.)

57. Assemble the links to the rod, place the upper cushion in the socket (Cup down) and insert the threaded plugs.

58. Tighten plug flush with the top of link and insert cotter key.

59. Insert bar with links assembled under car, starting from the right side and passing over the tail pipe.

60. Assemble the bar to the chassis frame by using the two clamps over the rubber blocks (13) and bolting thru the holes

bolting through the holes located about 4 to the rear of the spring bumper in the lower flange of the frame side rails. (Do not tighten bolts.)

61. Remove the nuts (E) from the front ends of the rear spring clips or "U" bolts and install mounting plates (D). These must be installed so that the large eyes will be to the outside of the rear springs, and toward the front of the car. Use 1/2" lock-washers and 1 nut on each clip and tighten securely.

62. Place flanged washer over lower end of link against stop lugs.

63. Press upper rubber cushion used at lower end of link over spacer tube so that top will be flush with top of spacer tube.

64. Slide this assembly over lower end of link so that top of rubber cushion and tube will be seated against the upper flanged washer. Do this on each side.

65. Insert lower ends of tube spacers through the eyes in the mounting plates on each side and press lower rubber cushions over lower ends of tube spacers.

66. Place lower flanged washers against bottom of lower rubber cushions and tighten nuts securely.

SECTION 3 - STEERING GEAR

Removal of Steering Gear

67. Unscrew horn button collar and remove with button.
68. Disconnect horn wire at terminal at bottom of steering column and withdraw wire and cup from tube.
69. Remove steering wheel nut and remove wheel with (J-739) steering wheel puller.
70. Disconnect battery negative terminal from the battery, also wires at starting motor terminal and solenoid switch.
71. Remove two bolts in starting motor mounting flange and remove starting motor.
72. Disconnect electric hand jack at bottom of jacket tube.
73. Loosen the steering column clamp at bottom of jacket tube and remove jacket tube.
74. Remove the pitman arm nut and lock-washer.
75. Remove pitman arm, using HM-871 pitman arm puller.
76. Remove the three steering gear mounting stud nuts from outside of chassis frame side member and remove steering gear.

Disassembling Steering Gear

77. Remove three cover nuts (A), Figure 9, and jam nut (E) and eccentric adjusting sleeve (F).
78. Withdraw housing cover and sector shaft.

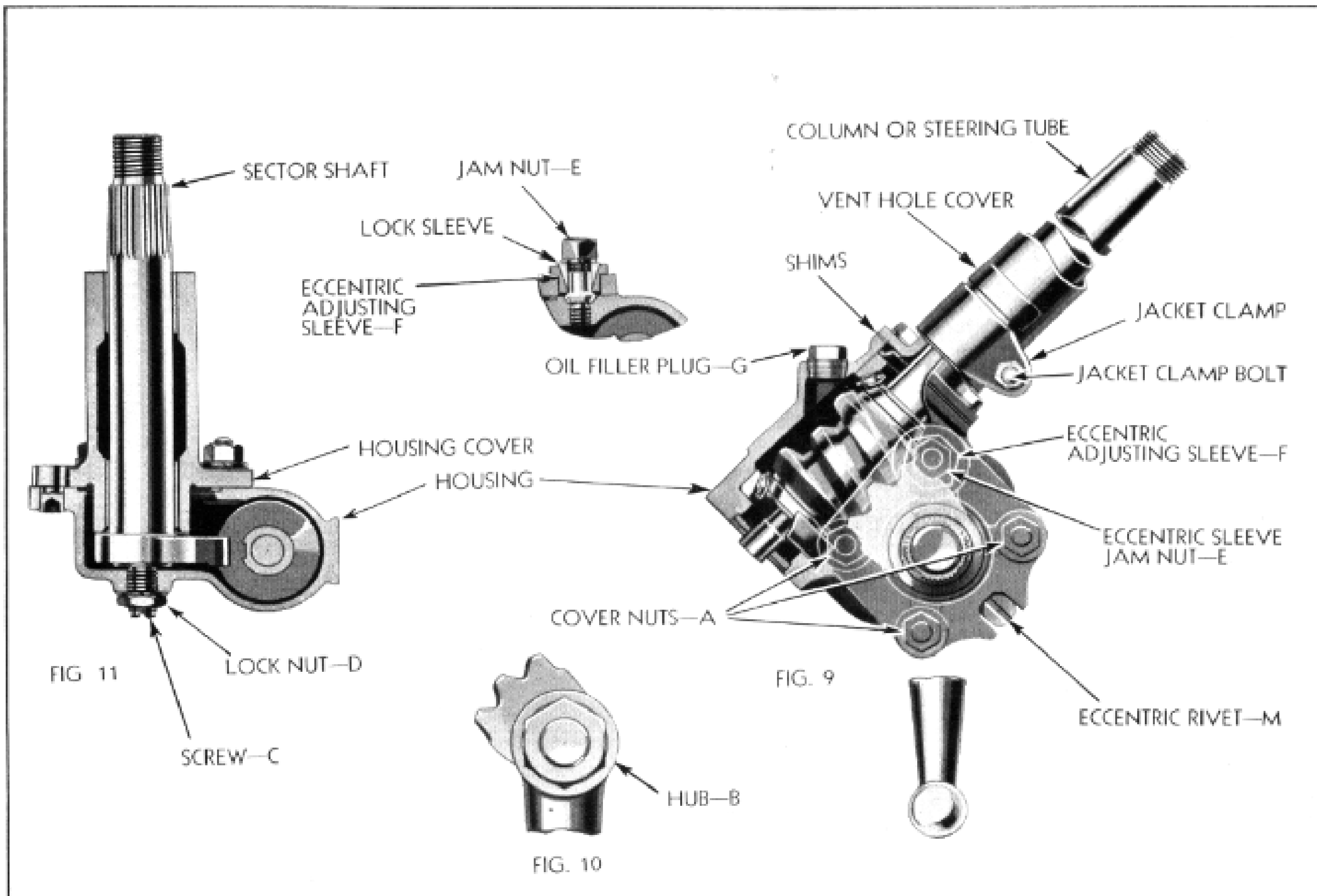


FIG 11

FIG. 9

FIG. 10

79. Remove nuts on studs holding worm shaft upper bearing cover to housing.

80. Remove cover and shims and withdraw main tube and worm, drawing with it upper bearing spacer, race and bearing.

81. Remove lower bearing cage.

82. Inspect all parts.

A. Bearing rollers and races must not show pits or wear

B. Bearing races on worm must not be worn.

C. Pressure faces of worm should be polished but show no irregular wear.

D. Sector teeth should be polished but show no irregular wear.

E. Sector shaft must not be scored.

F. Sector shaft bearings must not be scored and must fit sector shaft without appreciable radial looseness.

G. The main tube must be straight.

NOTE: All worn or damaged parts should be replaced with new ones. The used worm can be fitted to a new main tube, but if a new worm is needed a new main tube must also be installed. Never remove a worm from a main tube as it cannot again be pressed on the used tube and held securely.

Reassembling Steering Gear

83. Press worm lower bearing cup in housing.

84. Lubricate worm lower bearing cage with gear oil and put in place.

85. Put worm and main tube assembled in place, following with upper bearing cage (well lubricated) bearing cup and spacer.

86. Select shim pack to give no end play but still permit turning with not more than 1/2 pound pressure exerted at rim of steering wheel when the nuts are drawn down tight on the cover.

87. Dip sector and shaft in gear lubricant, insert in housing cover and assemble cover with eccentric sleeve (F), lock sleeve and jam nut (E), also cover nuts (A) with lock-washers.

88. Put steering wheel and pitman arm in place and tighten nuts.

89. See that housing cover nuts (A) and jam nut (E), Figure 9, are tightened securely.

90. Turn hand wheel to either extreme and back an eighth of turn. Gripping ball arm at hub (B), Figure 10, shaft should rotate freely without a particle of end play.

91. Back off nuts (A), Figure 9, one-quarter turn and eccentric jam nut (E) one-half turn.

92. Turn steering wheel to its mid-position of travel with trade marked spoke (trade mark impressed into under face of spoke opposite keyway) to point straight downward. This brings the sector into mesh at the high point of the worm.

93. Turn the eccentric adjusting sleeve (F), Figure 9, 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 just felt at end of ball arm, being sure to finish movement of eccentric adjustment sleeve (F) in clockwise direction.

94. Turn hand wheel throughout full travel to test for free operation. If too tight, turn eccentric adjusting sleeve (F)

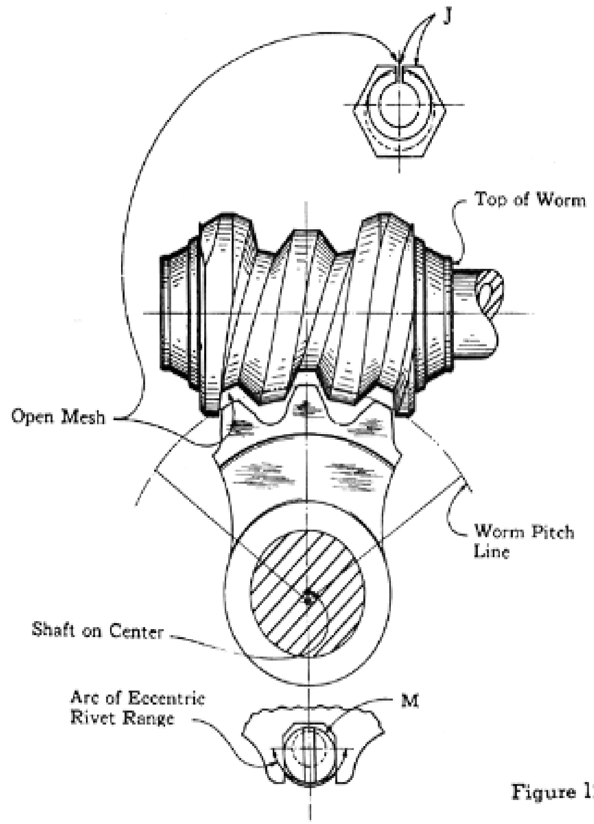


Figure 12

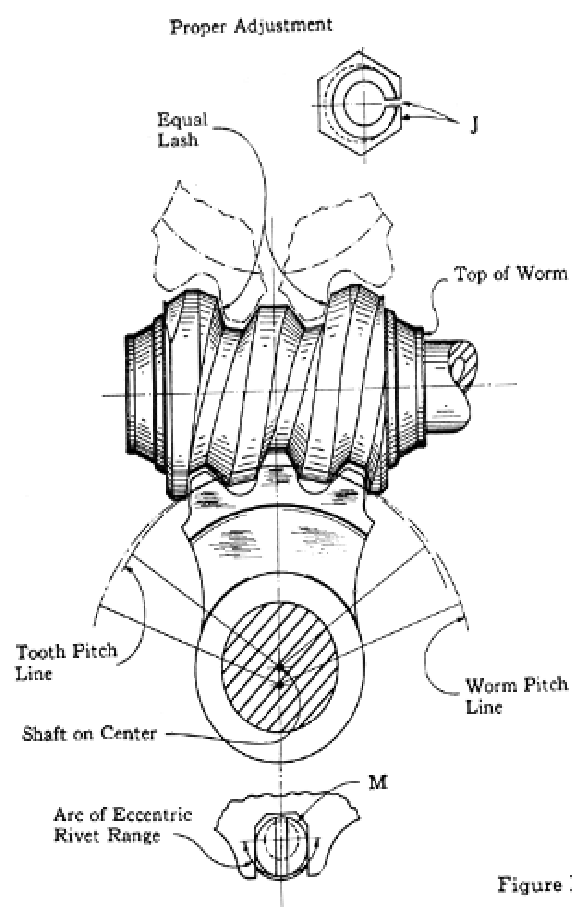


Figure 13

counterclockwise to free and readjust more carefully.

95. Tighten eccentric adjusting sleeve jam nut (E) securely first and follow likewise with housing cover nuts (A). Very important.

NOTE: 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.

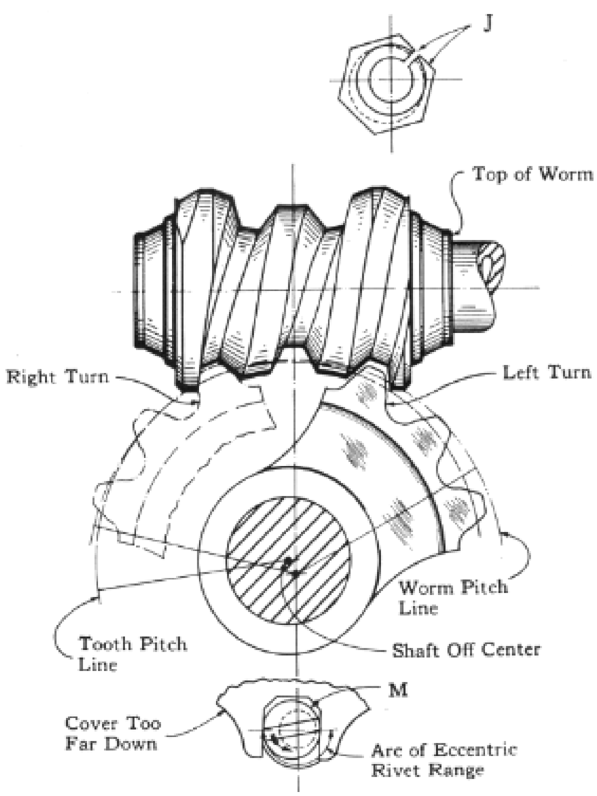
When the sector teeth are properly centralized in relation to the worm thread, there should be an equal amount of lash in the mesh of these parts at % turn of hand wheel each side of mid-position previously described. If this is not the case, correct as follows:

96. Turn column 1/3 revolution to the right and shake the steering arm to note the amount of play or lash at this point.

97. Now turn column 1/3 revolution to the left (which is in reality 1/3 revolution to left of center) and shake arm. Lash at this position should be same as when turned to right of center.

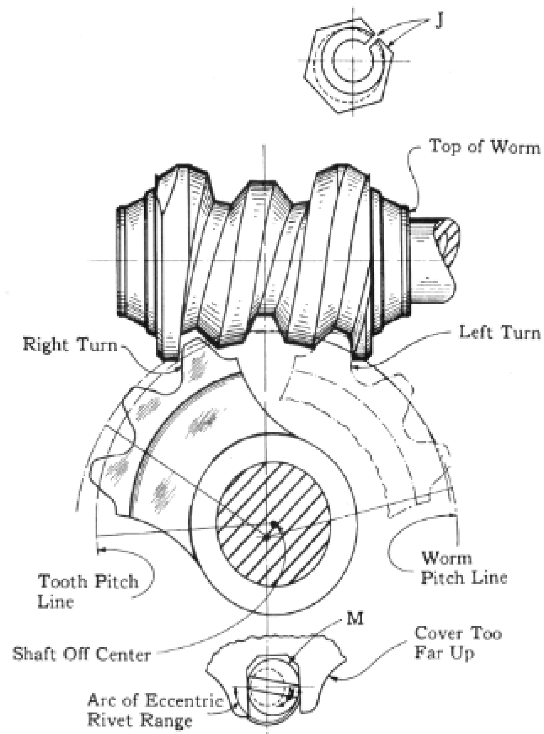
98. If there is more lash at left, turn eccentric rivet (M) slightly in counter-clockwise direction. (See Figure 14.)

99. If the lash is more at right, turn eccentric rivet (M) in clockwise direction. (See Figure 15.)



Turn Counter-Clockwise to Correct

Figure 14



Turn Clockwise to Correct

Figure 15

After these positions have been equalized, adjust for proper mesh of shaft teeth in worm as described under paragraphs 91 to 95, inclusive.

100. After making final adjustment, securely tighten eccentric sleeve jam nut (E), Figure 9, then follow by tightening housing cover nuts (A). It is important that the eccentric sleeve jam nut (E) be tightened first.

101. The gear should move from the high point in either direction when a load of I-1/2 to 3 pounds is applied at the steering wheel rim. If more load is required, the gear mesh is adjusted too tight or the sector shaft is bound in the bearing or by the end play adjusting screw.

102. Fill housing to level of filler plug with SAE 110 EP gear oil for summer or SAE 90 EP for winter.

103. Insert steering column main tube through hole in toe board and sector shaft through hole in frame side member with three mounting bolts passing through elongated holes in frame.

104. Install plain washers, lock-washers and nuts in frame bracket mounting bolts, turning up until the nuts just start compressing the lock-washers.

105. Install steering column jacket tube over steering column main tube and secure by tightening jacket clamp bolt at bottom of tube.

106. Secure column to dash bracket with bracket cap and two screws.

107. Install steering wheel and tighten nut.

108. Insert horn wire and connect terminal at bottom of gear.

109. Install horn button and collar.

110. Install pitman arm lock-washer and nut - tighten securely.

111. Turn steering wheel from right to left several times to align column and tighten three steering gear frame bracket nuts on outside of frame side members.

112. Connect rear end of drag link to pitman arm.

113. Set steering gear on high point by turning steering wheel to middle of its travel with trade marked spoke pointing down. Front wheels should be straight ahead. If wheels are not straight ahead, bend the pitman arm as described in paragraphs 166-169, Section 4. (See note bottom page 11.)

114. Install starting motor.

115. Reconnect wires at starting motor terminal and solenoid and reconnect battery cable to negative battery terminal.

NOTE: The front end alignment is checked with the Jiffy caster and camber gauge and turning angle plates available through the Hinckley-Myers Company of Jackson, Michigan. When these are used it is important that the car is level. A level section of the floor should be marked with zone line paint for the position of the front wheels while checking. Wooden blocks 1-1/4" thick should be placed under the rear wheels to compensate for the height of the turning angle plates.

SECTION 4 - FRONT END ALIGNMENT

116. Inflate all tires-front 24 pounds, rear 30 pounds.

117. Tighten all spring U bolt nuts.

118. Test shackle threaded bushings with pinch bar for looseness in spring eyes.

119. Disconnect bottom of shock absorbers and check control-the lower portion of the shock absorbers should move up and down under a steady pressure but should resist a sudden downward jerk. Remove and fill if necessary.

120. Jack up front axle.

121. Check spindle pins and bushings for wear and tie rod and drag link ends for looseness. See that torque arm rubbers are in good condition.

122. Loosen torque arm pivot bolt nut (J), Figure 1. Tighten pivot bolt (K). Tighten nut (J) securely.

123. Disconnect rear end of drag link from pitman arm. Wheels should turn free throughout their travel.

124. Lower front wheels in straight ahead position onto turning angle plates (J) and apply the brakes with a pedal jack. A pull or a push of 45 pounds on the drag link should turn the wheels in either direction. If greater pull is required to turn the wheels, lubricate the front axle parts. If this does not reduce the pull required, remove the wheels and tie rod and check as in note under paragraph 26, Section 1.

125. Loosen the frame bracket bolts just enough to allow gear to shift in frame to line up at angle determined by height of setting at instrument board gear bracket and re-tighten frame bolts.

126. Loosen the instrument board gear bracket and allow it to shift to match gear column position and re-tighten. This will correct any possible misalignment of gear column.

127. See that housing cover nuts (A) and jam nut (E), Figure 9, are tightened SECURELY.

128. Turn hand wheel to either extreme and back an eighth of turn. Gripping ball arm at hub (B), Figure 10, shaft should rotate freely without a particle of end play.

129. Adjust as required by means of adjustment screw (C), Figure 11, at side of the housing next to motor. Be sure to lock SECURELY with locknut (D), Figure 11, and reinspect end play and freedom.

130. Turn hand wheel to the mid-position of its complete travel or turning limits. (Drag link previously disconnected.) Hand wheel has a trade mark or large depression 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.

131. Loosen housing cover nuts (A), Figure 9, ONE-QUARTER turn and eccentric sleeve jam nut (E), Figure 9, one-half turn.

132. Turn the eccentric adjusting sleeve (F), Figure 9, clockwise very gradually, checking at each movement the amount of lost motion still existing at the ball arm. Adjust to point where lash can just be felt at end of the ball arm, being sure to finish movement of eccentric adjustment sleeve (F) in clockwise direction.

133. Turn hand wheel throughout full travel to test for free operation. If too tight, turn eccentric adjusting sleeve (F) counter-clockwise to free and readjust as above more carefully.

134. Tighten eccentric adjusting sleeve jam nut (E) SECURELY FIRST and follow likewise with housing cover nuts (A). Very important.

NOTE: 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. If this is not the case, correct as in paragraphs 96 to 99, Section 3.

135. A pull of 1-1/2 to 3 pounds at the rim of the steering wheel should turn it in either direction from the "high point."

136. Reconnect drag link to pitman arm.

137. Set wheels in straight ahead position and adjust scales on turning angle plates to zero.

138. Remove outer and inner hub caps from front wheels.

139. Remove left hand spindle nut and washer and install jiffy caster and camber gauge as shown in Figure 16 so that level bubble is between gauge lines when pointer is set at zero.

Figure 16

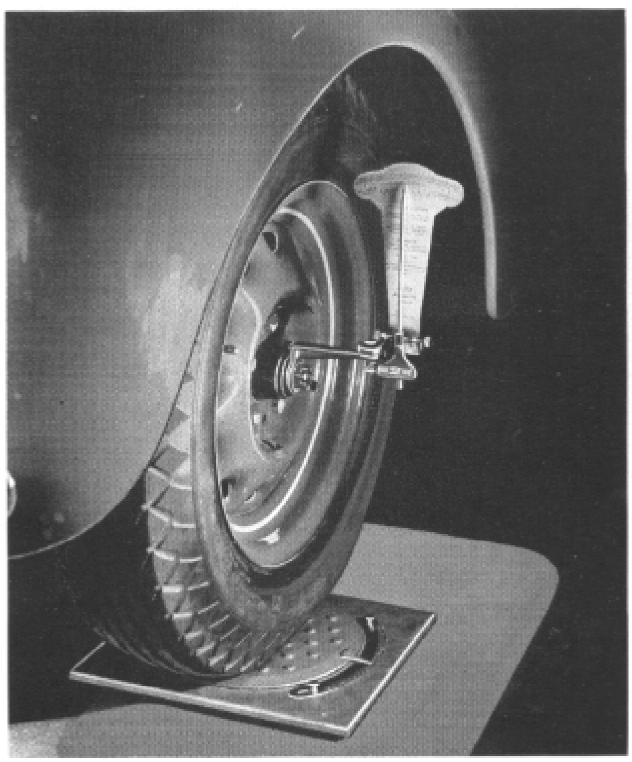


Figure 17

140. Turn the head of the jiffy gauge so that it is parallel to the axle as shown in Figure 17 with wheels still straight ahead and adjust the pointer with the thumbscrew until the level bubble is between the lines on the glass. The reading taken on the lower scale is the camber of the left wheel. A reading toward the wheel is positive and away from the wheel is negative camber; the correct camber is 1º to 1-1/2º positive. If camber is insufficient or reversed, check spindle pin inclination as follows:

141. Turn the head of the jiffy gauge parallel to the wheel as shown in Figure 18 and turn wheels to left until pointer on left turning angle plate points to 25º.

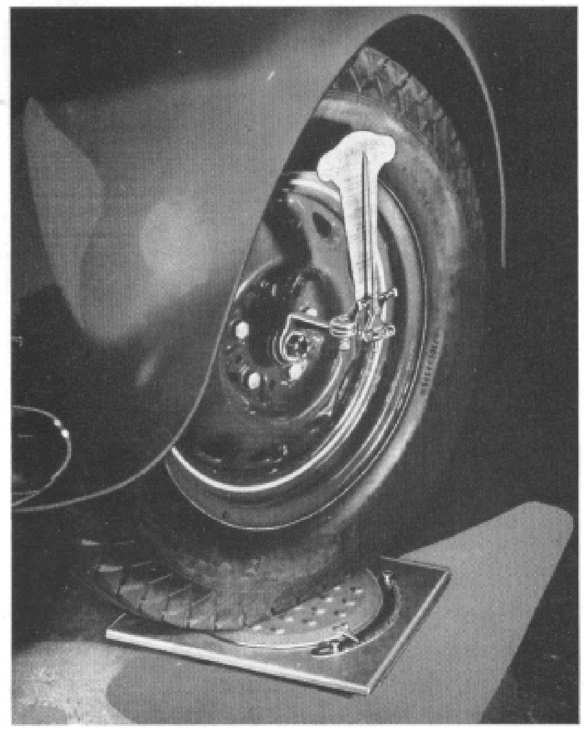


Figure 18

142. Set pointer on zero and turn gauge on spindle until level.

143. Turn left wheel to right 25º and adjust level. The pointer reading on the top scale is the king pin inclination. This should be seven degrees. NOTE: If the king pin inclination and the camber are off in approximately the same amount (for example, camber 1/2º, king pin inclination 6º), it is probably due to worn spindle pin bushings. If camber is off and king pin inclination is correct, the spindle is bent.

If spindle pin inclination and camber are both off an equal amount and there is no play in spindle pin, the axle center is bent. Camber should not be more than the specified 1-1/2º; however, a decrease in caster, if spindle pins are not loose in the bushings, is not detrimental to steering unless an actual reverse camber exists.

144. Turn the wheels back to the straight ahead position and reset the jiffy gauge as in paragraph 139, Figure 16.

145. Turn the wheels to the right until the pointer on the left turn plate is at 25º, level the gauge with the adjusting

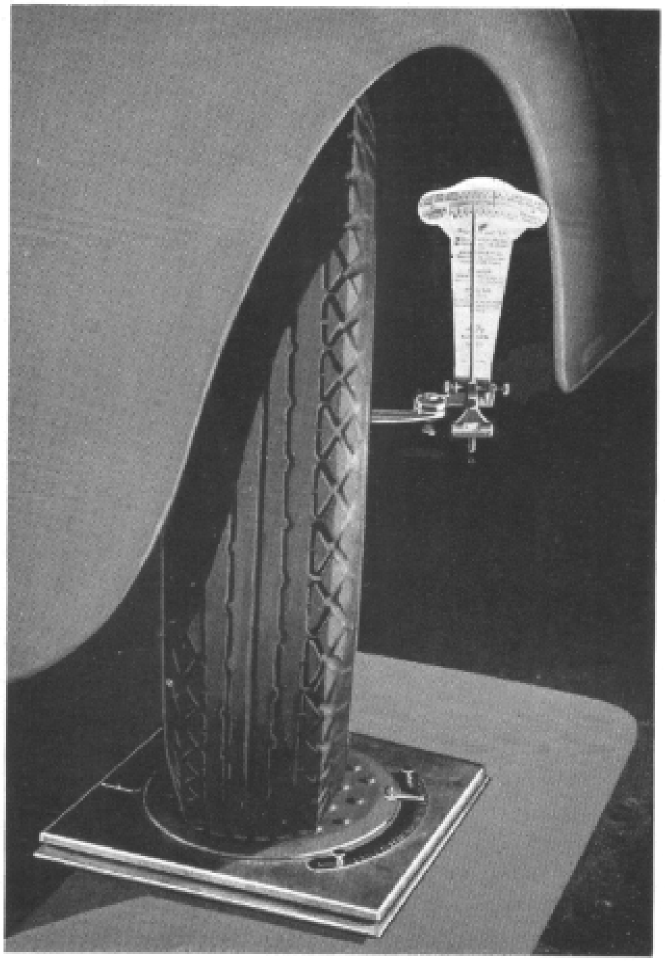


Figure 19

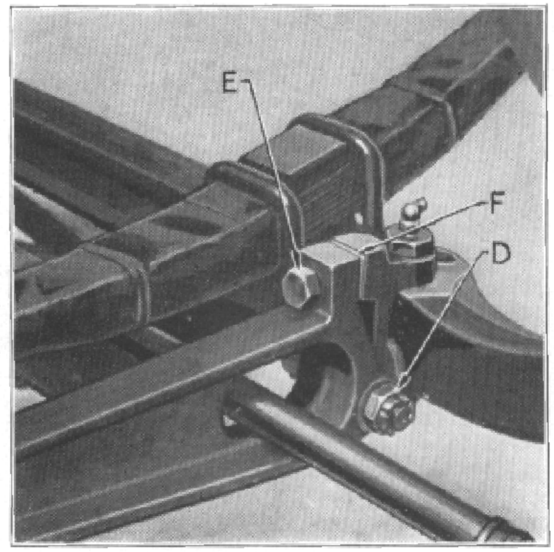


Figure 20

screw and take the reading of the pointer on the upper scale.

146. Turn the left wheel 25º to the left and level the gauge and take the reading on the upper scale (Figure 19). If both readings are on the same side of zero, subtract the one from the other to get the caster angle of the left wheel. If the two readings are on opposite sides of zero, add them to get the caster angle. Readings toward the wheel are positive and away from the wheel are negative caster angle.

147. Repeat operations 139 to 146 inclusive on the right wheel, turning the wheels so that the pointer of the right turn plate reads 25º to the right for the first caster reading and 25º to the left for the second caster reading.

148. If the caster is less than 3-1/2 or more than 4-1/2, remove the cotter key from the horizontal bolt (D) attaching the torque arm to the axle yoke and loosen nut. (Figure 20.)

149. Remove capscrew (E) and shim (F). To increase caster, decrease thickness of shim. To decrease caster, increase thickness of shim. A change~ of .060" in shim thickness will change the caster approximately one degree. The shim thickness used on both sides of a car should always be the same. Unequal shim thickness will cause the car to lean.

150. Install new shim, replace capscrew (E), tighten horizontal bracket bolt nut (D) and insert cotter key.

151. Remove jiffy gauge and replace spindle washer and nut, adjust bearing and insert cotter key.

152. Repeat operation (30) to (33) inclusive to recheck caster.

153. Turn left wheel to left 20º. Right wheel as indicated by point on turning angle plate should be 17º to left.

154. Turn right wheel to right 20º. Left wheel should now be 17º to the right.

If wheels do not turn to the corresponding angles, recheck tk rod ends for looseness and steering arms to see that they are drawn tightly into the spindles. If no looseness is found, the steering arms are bent and should be replaced.

155. Raise front end of car and remove turning angle plates and lower car. Release brake and roll rear wheels off blocks.

156. Pull car forward by bumper about 10 feet with wheels in straight ahead position to be "sure all parts have assumed their normal road position.

157. Place toe-in gauge back of front wheels with rod against inside felloe band of right wheel and ends of sliding head against outside edge of felloe band of left wheel.

158. Be sure thumbscrew of both sliding head and rod are tight. Move sliding collar to which scale is attached out against standard bracket. Make a chalk mark on tire in line with sliding head.

159. Remove toe-in gauge and pull car forward (not backward) with front bumper until chalk mark is at height of toe-in gauge standard at front of wheel.

160. Put toe-in gauge in place as in Figure 21 with rod against inside edge of right felloe and sliding head in line with outside edge of left felloe at chalk mark on tire.

161. Loosen sliding head lock-screw and push head against edge of felloe. Tighten lock-screw.

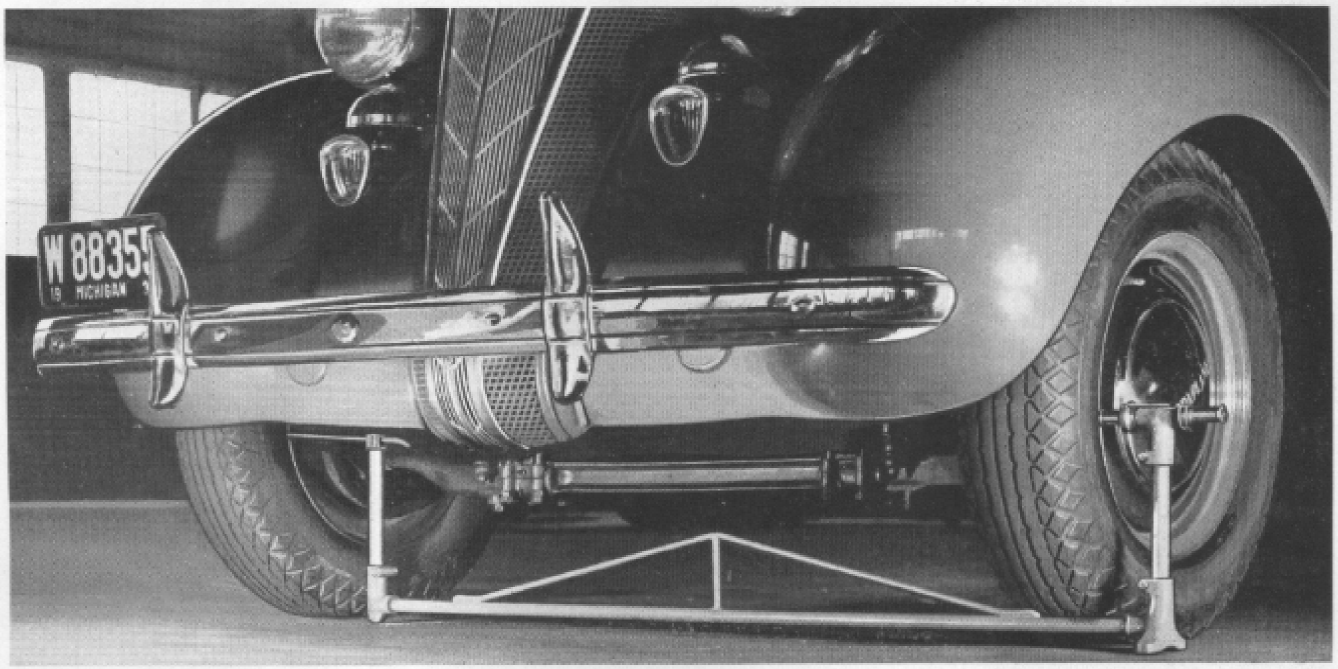


Figure 21

162. The scale reading at the inner edge of the standard bracket is the toe-in in inches. This should be zero to 1/8º, preferably 1/8º.

163. To adjust the toe-in, loosen the clamp bolt nuts on the tie rod ends and turn the tie rod with a Stillson wrench. Pulling the wrench handle forward at the bottom decreases toe-in.

164. After getting correct toe-in, tighten tie rod end clamp bolt nuts.

165. Set wheels straight ahead and check steering wheel to see that trade marked spoke is pointing straight down. If spoke is more than 2” either way from the straight down position the steering gear pitman arm must be bent.

NOTE: Whenever the thickness of shims between the torque arms and brackets are changed to increase or decrease caster it is necessary to put the steering gear back on the high point.

166. Disconnect the rear end of the drag link from the pitman arm.

167. Wrap the ball of the pitman arm in wet rags.

168. While dripping water on the rags, heat the pitman arm about 2" above the ball with a torch until color begins to show.

169. Bend the arm as necessary with a bending bar such as a connecting rod aligning bar.

NOTE: For each inch the trade-marked spoke of steering wheel is off to the right bend* the arm backward .04” or approximately 3/64” and a like amount forward for each inch the spoke is off to the left

NOTE: The pitman arm ball is hardened and must be protected from heat to retain its hardness. Under no circumstances should the arm be bent without disconnecting the drag link, as the ball cannot be properly protected and even the ball seats spring may be softened.

170. Reconnect the drag link to the pitman arm lubricate

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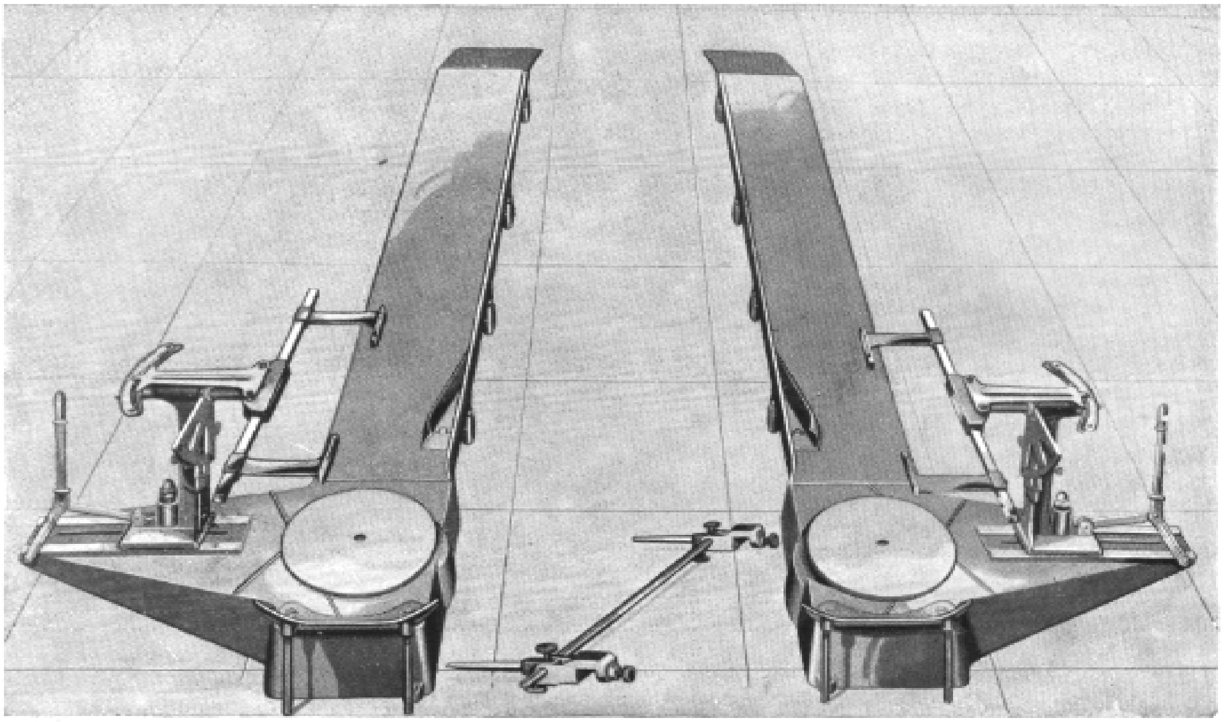
*NOTE: Beginning with the car numbers listed below an adjustable drag link is used, making it unnecessary to bend the pitman arm. The adjustment is made possible by shims placed at both sides of the ball seats in the rear socket of the drag link. By removing shims from the rear of the seats and placing them in front, the drag link is lengthened. Shortening is obtained by removing shims from in front of the seats and placing to the rear. The shims provide 3/4' total adjustment.

151694 Drag Link Assembly (adjustable) replaced 150102 Drag Link Assembly with and after 6110394 (Terraplane De Luxe) except cars numbered from 6110601 to 6110650 inclusive; with and after 623419 (Terraplane Custom) except cars numbered from 623506 to 623661 inclusive.

151698 Drag Link Assembly (adjustable) replaced 150104 Drag Link Assembly with and after 633110 (Hudson 6) except cars numbered 633153 to 633185 inclusive; 641008 (Hudson 8 - 120" W. B. De Luxe) except cars numbered 641134 to 641135 inclusive; (Hudson 8 - 120" W. B. Custom); 661791 (Hudson 8 - 127" De Luxe); 671681 (Hudson 8 - 127" Custom).



HMO-20—$285.00

Runway Type Wheel Aligner

This all-in-one runway type of aligner is designed particularly for the larger shop with a sufficient potential of wheel aligning business to justify the purchase of this type of equipment. It is speedy in operation, accurate in its readings and checks with the weight of car either on or off the wheels.

Checks Scientifically-Caster, Camber, King Pin Inclination, Toe-In, Turning Radius. All readings are direct.

Requires very little floor space. Easily installed because of adjustable leveling legs on runways and leveling screws on checking units.

Complete operating instructions furnished with equipment

Front Axle, Steering Gear, and Alignment Tools and Equipment

J-885	Torque Arm Bolt Press	$ 2.90
J-469-1-2	Spindle Bushing Remover and Replacer Set	2.15
J-479-1-2	Spindle Pin Remover Set	1.40
J-524	Spring Shackle Spacer	1.50
J-739	Steering Wheel Puller	5.50
HM-871	Pitman Arm Puller	3.85
J-751	Turning Angle Indicators (Set of two)	25.00
J-800	Jiffy Caster and Camber Gauge	15.00
J-710-H	Toe-in Gauge	12.50
HMO-20	Runway Type Wheel Aligner	285.00
HMO-72	Wheel Balancer	39.75
HMO-8	Wheel Balancing Weights (Box of 50)	8.75
J-134	Brake Pedal Depressor	3.75

Place orders for tools and equipment with the Hinckley-Myers Co., Jackson, Michigan

Carburetor and Fuel Pump Servicing
1936 Hudsons and Terraplanes

Carburetor Servicing is an important part of every engine tune-up. To properly service a carburetor, the purpose of each part must be known and adjustments must be complete and carefully made. Inaccurate adjustments will not give satisfactory car performance or gasoline mileage. Make complete adjustments accurately.

The carburetor Is simply a mixing chamber for gasoline and air. There are, of course, provisions for controlling the quality or richness of the mixture so that it will be correct for all conditions of operation.

The carburetor used on 1936 Hudsons and Terraplanes is the Carter Model W-1 with the following features:

(1) Down Draft Type
(2) Triple Venturi
(3) Climatic Control (except Terraplane de luxe)
(4) Automatic Slow and Fast Idle
(5) Anti-Percolating Unit
(6) Positive Action Accelerating Pump
(7) Slow Throttle Retard

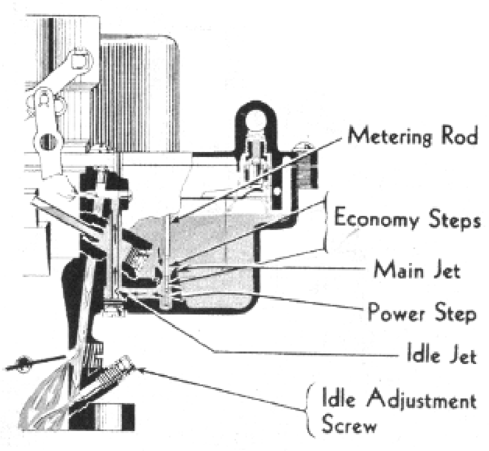


Figure 1

Figure 1 shows the passages for both the gasoline and air for normal operation from idle speed to maximum speed. The gasoline enters at the top of the float chamber through the float needle valve. The float controls this valve, allowing only enough gasoline to enter to maintain the gasoline to the correct level.

The gasoline passes from the float chamber through the main fuel supply jet, through the passages in the carburetor body to the main nozzle and also into the idle jet.

The mouth of the main nozzle and idle jet are slightly higher than the normal level of fuel in the float chamber so that fuel will stand near the end of the nozzle but will not run out.

Low Speed Operation

When the engine is cranked with the throttle in the position shown in Fig. I (idle setting) a vacuum is created below the throttle. This causes air under atmosphere pressure to push past the edge of the throttle, however, the volume that can pass is so small that it will not cause high enough velocity past the main nozzle to pick up any fuel.

The vacuum below the throttle valve, however, also causes air to flow in to the idle inlet port through the small passage to the right of the carburetor throat, picking up gasoline from the idling jet and delivering it into the carburetor throat through the upper idle outlet port just below the throttle and the lower outlet port in which the idle adjustment screw is located. This is a rich mixture of fuel which mixes with the air passing the throttle to give a correct mixture for starting and idling.

The quality of the mixture is determined by the setting of the idle adjusting screw, while the quantity is determined by the amount of the upper outlet port exposed below the throttle valve.

As the throttle is opened, more of the upper idle port is exposed allowing more mixture to enter the carburetor and also increasing the amount of air passing the throttle. This increases the engine speed.

As the amount of air passing the throttle increases, the velocity of the air past the main nozzle is increased so that fuel is drawn out of the nozzle into the air stream.

The opening of the throttle allows the manifold vacuum to extend upward so that the difference in vacuum between the idle inlet port and outlet ports is decreased and the flow of air through the idle bypass is decreased. At speeds above 20 m.p.h. no fuel is supplied through the idle by-pass. The idle adjustment, therefore, has no effect on performance or gasoline consumption at speeds above 20 m.p.h.

High Speed Operation

The fuel from the main nozzle is atomized in the primary venturi, Fig. 2, and kept centrally located in the air stream by the surrounding blanket of air passing into the secondary venturi and again into the main venturi -offering a triple protection against liquid fuel coming into contact with the walls of the carburetor where it is hard to atomize. This insures against liquid fuel being drawn into the manifold.

In Fig. 1, it will be noted that with the throttle in the idling position, the metering rod is at its lowest position, while with the throttle wide open as in Fig. 2 the metering pin has been raised to its highest position. In the lowest position the largest section of the pin is in the main jet so that fuel flow is restricted to give an economical mixture for normal running. As the pin metering rod is raised by opening the throttle the smaller section of the pin comes into the jet for proper fuel delivery for average road driving speeds, while with wide open throttle the smallest section of the rod is in the main jet giving a mixture for maximum power for acceleration, hill climbing and maximum speed. (The metering rod used on the Hudson 8 has only two steps.)

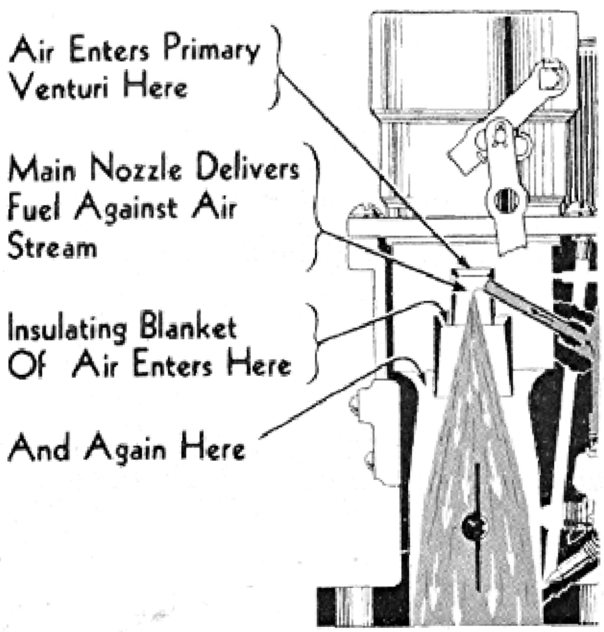


Figure 2

The position of the metering rod in respect to throttle opening is very important. If the change from one stop to the other is not at correct throttle opening it will cause poor gasoline mileage, poor performance, and flat spots in acceleration.

The Accelerating Pump

The maximum amount of gasoline available through the main jet is not sufficient for rapid acceleration so provision is made by means of an accelerating pump to force extra fuel into the main venturi when the accelerator is depressed rapidly. Fig. 3 shows a sectional view through the acceleration pump.

As the throttle is closed the plunger moves upward drawing gasoline out of the float chamber through the screen, through the inlet ball check valve and into the pump cylinder, the air pocket always remaining between the fuel and the plunger.

The slightest opening of the throttle moves the plunger down, compressing the air and causes an immediate discharge of fuel past the outlet ball check valve and through the jet which points downward into the main venturi. When the throttle is fully opened, the discharge is continued for a number of seconds by the air compressed between the plunger and the fuel.

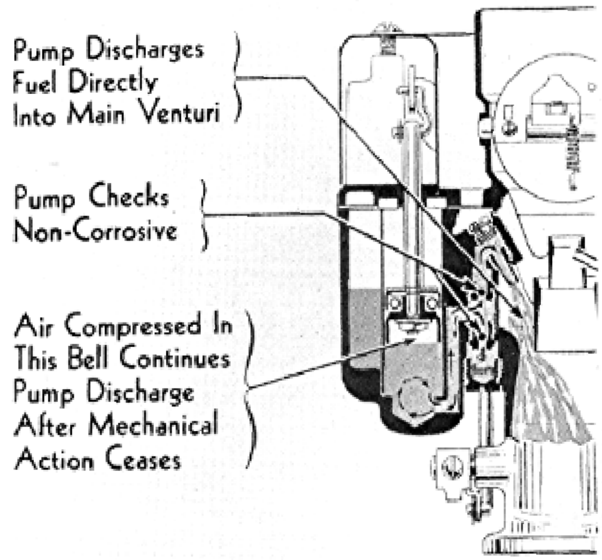


Figure 3

When the pump is not delivering fuel a disc check valve, in the upper passage plug above the accelerating jet, opens, allowing air to be drawn from the float chamber preventing a vacuum in the pump passages so that no fuel can be delivered from the accelerating pump jet except by the pump action.

Anti-Percolating Unit

While a car is being driven the carburetor is kept cool by the large volume of air passing through it and the heat absorbed in the atomization of the fuel.

When the car and engine is stopped the cooling system is not able to carry off the heat stored up in the engine parts and it is radiated into the air under the hood. The carburetor absorbs this heat so that in hot weather or after hard driving the fuel in the float chamber may boil. The vapor bubbles will rise and those being trapped in the passage to the main nozzle will push gasoline ahead of them and out of the nozzle into the venturi. As the bubbles continue to form the gasoline is forced out and collects in the manifold until the float chamber is empty. This flooded manifold condition makes re-starting of the engine difficult.

To prevent this action, which is known as percolation, an anti-percolating valve, Fig. 4, is incorporated in the carburetor.

The valve opens and closes a vent which connects directly at the bottom of the main nozzle and carries off any vapor bubbles which may form so that gasoline is not forced out of the nozzle.

The valve is opened by the throttle linkage when the throttle closes to the idling position and closes with the slightest opening of the throttle.

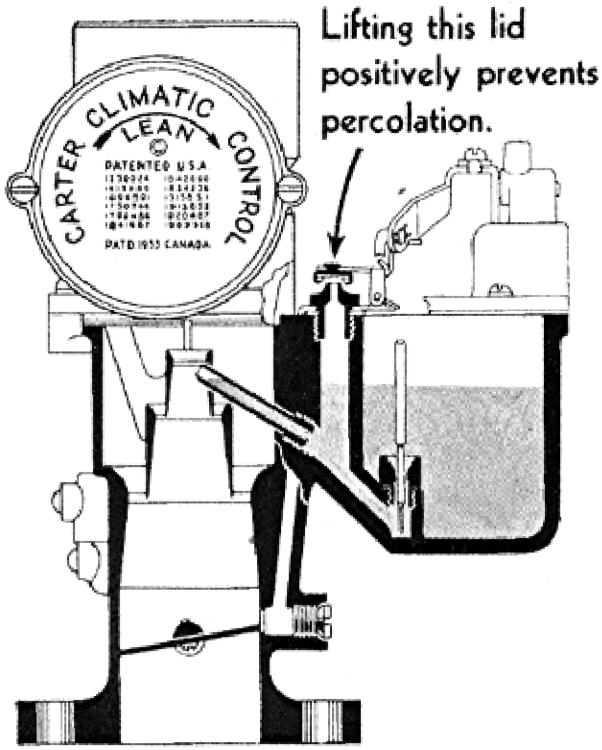


Figure 4

Slow Closing Throttle

When driving at high speeds with open throttle there is a rapid flow of gasoline through the carburetor. If the throttle is suddenly closed, cutting off the flow of air to the engine, the gasoline will contine flowing due to its inertia and result in a momentary rich mixture which may cause the engine to run enevenly or even stall.

By preventing the throttle from closing rapidly when pressure is released from the accelerator pedal, this gasoline is used without causing uneven running of the engine.

Slow closing of the throttle is accomplished by the use of a plunger operating in a cylinder in the carburetor float chamber. As the throttle is opened the plunger moves upward and gasoline passes the check ball valve in the stem of the plunger and also through the small hole in the stem just below the check valve, filling the cylinder below the plunger full of gasoline. When the pressure is relieved from the accelerator pedal the throttle spring attempts to close the throttle, however, the check ball goes to its seat and the speed of closing of the throttle is retarded as the gasoline below the plunger can escape only through the small hole in the plunger stem.

Climatic Control

The climatic control is an integral part of the carburetor and consists primarily of two major assemblies: the thermostatic coil spring and the piston plate housing assembly. The thermostatic coil spring assembly consists of cover, insulators and spring (Figure 6).

The housing assembly consists of the piston plate housing, choke shaft, lever, screen and piston.

The operation of the climatic control depends on intake manifold vacuum and exhaust manifold heat.

On initial starting, as the engine fires, the vacuum created in the intake manifold tends to pull the piston down, exerting tension on the thermostatic spring and opening the choke valve far enough for initial running. Hot air is drawn through the stove on the exhaust manifold, through the connecting pipe and entering the housing through the screen, and passing around the piston to the intake manifold. As the heat increases around the thermostatic spring, the spring loses its tension allowing the choke to open gradually.

After it reaches full open position it will remain open by its own weight. When the engine is stopped the thermostatic spring cools off allowing choker to close.

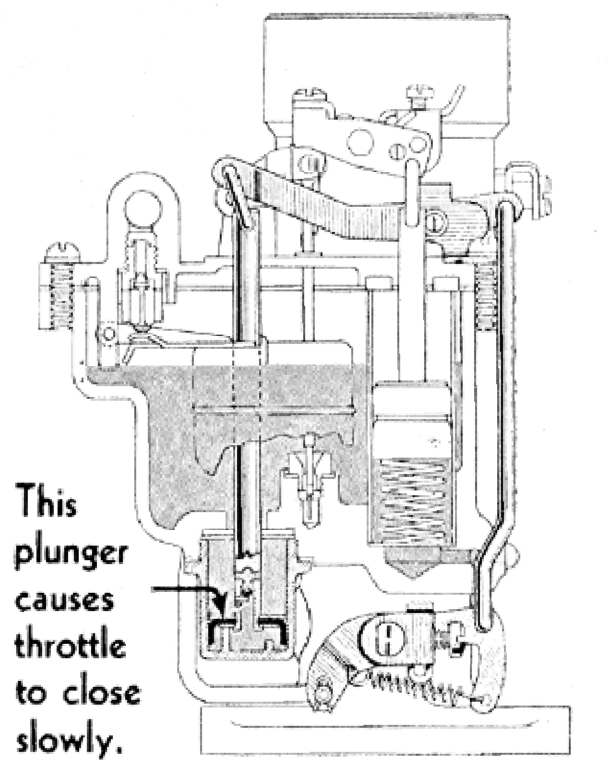


Figure 5

Slow and Fast Idle

When the choke valve is closed by the climatic control a bar falls down behind the throttle adjusting screw holding it off its seat so that the throttle is held open sufficiently to give an idle speed of approximately 15 m.p.h. This gives the correct throttle opening for starting and prevents the engine stalling during the warm up period. As the engine warms up and the choke valve opens, the high idle bar is raised so that the throttle can close to its normal idle position.

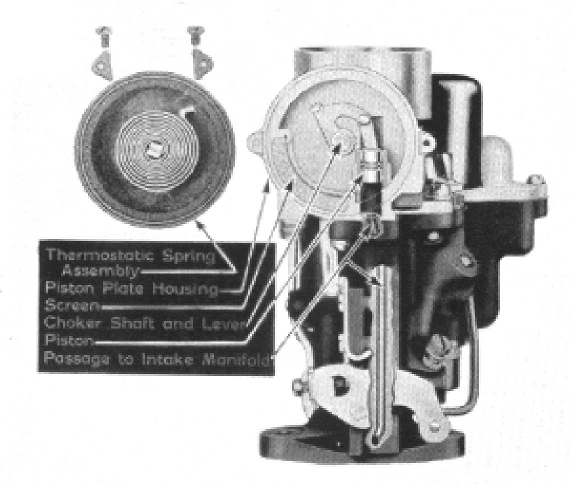


Figure 6

Disassembly

When disassembling or reassembling the carburetor, particularly when removing or installing plugs and jets, always use screw drivers that fit the screw slots. Improper screw drivers or improper handling will damage the parts with the possibility of partial clogging of passages either due to the damage or shavings cut off the parts. The Hudson Tune-Up Kit J-819-A includes four special screw drivers to handle the carburetor work as well as the special gauges necessary for adjustment.

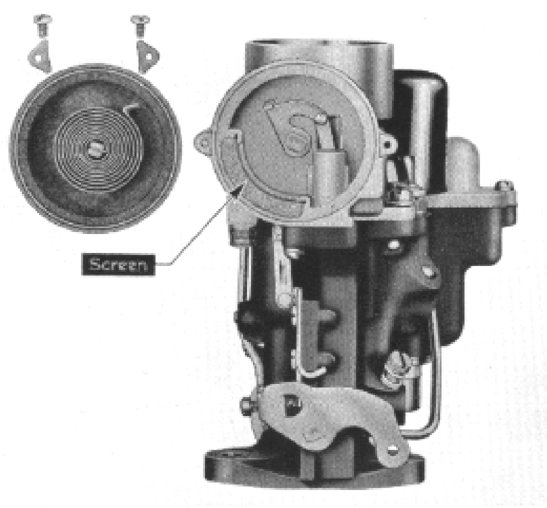


Figure 7

After the carburetor is off the car proceed with the disassembly as follows:

1. Remove dust cover, lock washer and attaching screw (Fig. 8).

2. Remove both pin springs (lower and upper) on connector rod, to remove rod, on front of carburetor.

3. Remove pin spring and connector link that connects accelerating plunger to operating arm.

4. Remove both attaching screws on fast idle bar.

5. Remove main nozzle plug and nozzle. Do not lose nozzle gasket, or plug washer (copper). *Main nozzle must always be removed before removing air horn assembly.*

6. Remove both attaching screws on air horn. Do not lose lock washers.

7. Remove bowl cover attaching screw, that holds throttle retard plunger arm and bracket assembly. Remove assembly. Also remove pin springs from plunger connector link.

8. Remove attaching screw that holds air horn assembly from lower side of air horn (under climatic control housing). Then remove air horn assembly.

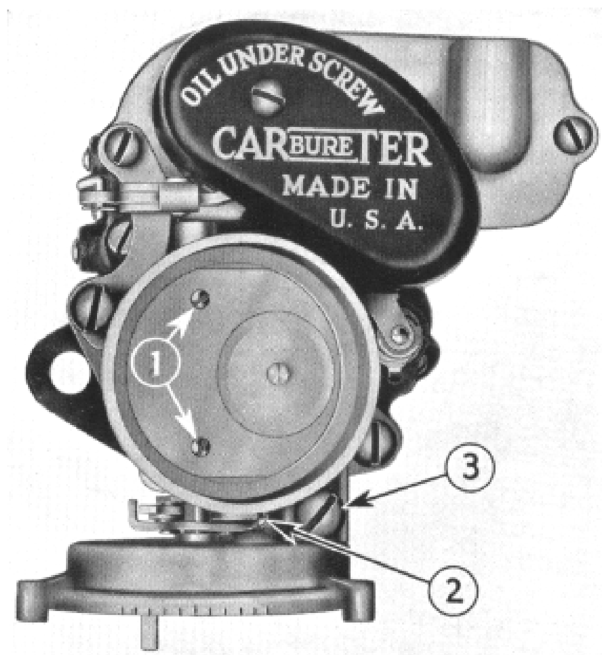


Figure 8

9. Remove pin spring and connector link that connects throttle retard plunger shaft to pump arm assembly.

10. Remove pin spring and unhook metering rod spring, then remove metering rod and disk from bowl cover.

11. Remove pin spring and throttle shaft dog spring (front of throttle shaft) to remove throttle connector rod.

12. Remove bowl cover attaching screw, bowl cover, and lift off bowl cover gasket. Remove pump arm and countershaft assembly by revolving one-half turn on bowl cover. Remove float, pin and pump cylinder bushing gasket and needle and seat from bowl cover.

13. Remove accelerating pump plunger assembly and pump spring.

14. Remove metering rod jet and gasket assembly.

15. Remove anti-percolating plug and rocker arm assembly with a $\frac{7}{16}''$ wrench.

16. Remove disk check plug assembly and pump jet (top of body at back right).

17. Remove dash pot plunger, cylinder and gasket with $\frac{7}{8}''$ wrench.

18. Loosen up screw to remove throttle shaft arm and throttle shaft dog. (Front of throttle shaft.)

19. Remove low speed jet. Do not lose copper washer. (Front below anti-percolating valve.)

20. Remove accelerating pump ball check passage plug, strainer and both intake and discharge ball check assemblies. Do not lose copper washer from plug.

21. Remove throttle valve screws, valve, throttle shaft and lever assembly.

22. Remove idle port plug, idle adjustment screw and spring.

To Disassemble Climatic Control Assembly

1. Remove both cover attaching screws and housing retainers, to remove thermostatic coil and housing assembly. Fig. 7.

2. Remove strainer screen. Fig. 7.

3. Remove choker valve screws (1) and choker valve assembly. Fig. 8.

4. Loosen clamp screw (2) Fig. 8 on choker lever and screw assembly and bend lip under screw with screw driver so it will pass over the portion of choke shaft which is not milled flat. Choker lever assembly can easily be removed if this lip is properly compressed.

5. Remove choker piston lever, link and shaft assembly. Fig. 9.

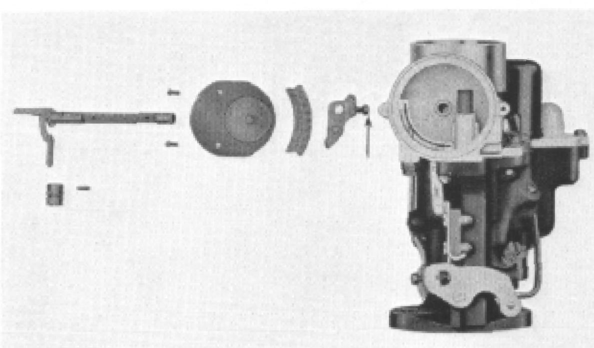


Figure 9

6. Remove suction passage gasket from air horn.

7. Don't remove screw (3) Fig. 8 that holds air horn and piston housing together. These parts are lined reamed at the factory. If they are removed line them up with shaft and valve so valve, shaft and piston works freely.

To Reassemble

Before reassembling carburetor, clean casting and all carburetor parts with clean gasoline, using a clean pan. Do not immerse cork parts in gasoline. Then blow through all passages in casting with compressed air. Blow off each part before installing it in carburetor. Use all new gaskets.

Check all parts to carburetor specifications (see chart of jets and metering pin sizes, page 9). If any carbon is in the bore of the carburetor, remove it before installing parts.

1. With carburetor body flange facing up, install throttle shaft and lever assembly. Then back out throttle lever adjusting screw. If throttle shaft is worn or lever is loose on shaft replace it.

2. Install throttle valve using *new* valve screws. The trade mark on the throttle valve should be facing up and to the idle port side. With the valve screws loose, tap throttle valve lightly to centralize it in the bore of carburetor. Hold valve in place with fingers. Then securely tighten screws. Be sure throttle lever adjusting screw is backed off so valve can seat.

3. Install throttle shaft dog on front end of throttle shaft and then throttle shaft arm and screw assembly. Set arm so throttle will move freely and tighten screw. If holes in arm or dog are worn replace the parts.

4. Install low speed jet. Be sure copper washer is seated in casting, and metering hole in low speed jet is opened. Install tightly so low speed jet seats at both ends. If low speed jet shows wear, replace with new.

5. Install accelerating pump discharge ball check assembly first and then intake ball check assembly. Be sure checks seal. They can be tested before installation by blowing the ball against the seat. Ball should work freely. If they leak or ball sticks, replace them. Install tight so they seat in casting. Be sure copper washer is seated in casting and then install ball check strainer in plug and plug in casting. If strainer is clogged or damaged replace it.

6. Use dash pot loading cylinder (included in tune-up kit) and install throttle retard dash pot plunger assembly into dash pot cylinder. Then install dash pot cylinder gasket and tighten cylinder using $\frac{7}{8}''$ wrench. If leather shows wear or damage, replace dash pot plunger assembly.

7. Install idle hole plug, idle adjusting screw and spring. No copper washer is used on plug. If idle adjusting screw is burred, replace it. Adjust idle screw $\frac{1}{2}$ turn open from seat.

8. Install main jet assembly. Use a new gasket soaking it in warm water for 15 minutes before installing. If metering rod or jet shows wear, replace metering rod jet and metering rod.

9. Install accelerating pump spring first and then pump plunger and rod assembly, using loading cylinder (included in tune-up kit). Put a little castor oil around leather to keep it from becoming dry so leather will seal in pump cylinder. If leather is cracked or worn replace. Be sure plunger nut is tight so pump leather does not leak on plunger assembly.

10. Install acceleration pump jet tightly. Be sure hole in jet is open. Check disc check assembly. Be sure disc check works free in seat and holds when

blowing against it. If either pump jet or disc check assembly shows wear, replace it. Be sure cross hole in casting leading into bowl of carburetor between pump jet and the disc check assembly is open.

11. Replace bowl cover if it shows wear or is bent or warped.

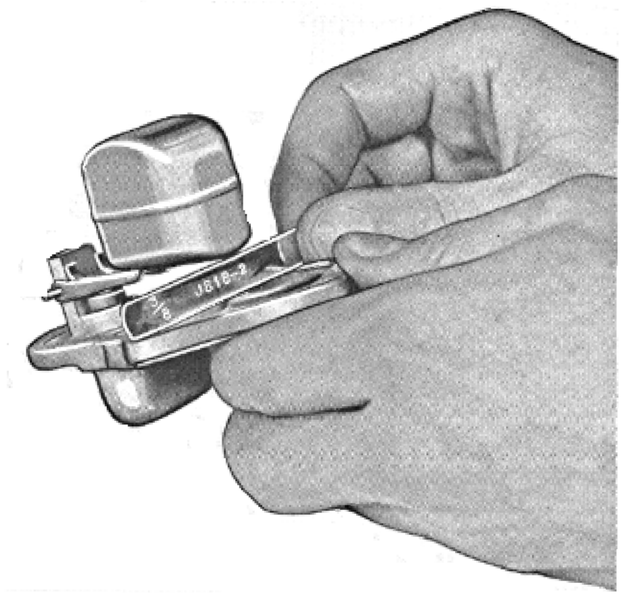


Figure 10

12. Install float valve needle seat assembly, using a new gasket which has been soaked in warm water, in bowl cover and insert needle into needle seat. Install float and lever assembly and pin. Then set float level using float level gauge to carburetor specifications of $\frac{3}{8}''$, Fig. 10. Be sure the gauge rests on the cover gasket flange. Adjustment is obtained by bending the lip on float arm which contacts needle. Do not bend on float in adjusting it as damage will result. If intake needle or seat shows wear or damage, replace both. If holes in float or float pin are worn or out of round, or float is loaded with gas, replace float. Float pin should be replaced if it shows wear. Install a new pump cylinder bushing gasket in bowl cover. Install pump arm and counter shaft assembly on bowl cover. If hole in arm is worn or out of round, or countershaft is loose on arm, replace assembly. Be sure vent hole is opened in bowl cover. (Below countershaft.)

13. Lay bowl cover gasket on body casting. Install bowl cover, tighten bowl cover with attaching screws and lock washer pulling screws down evenly.

14. Install pump connector link and pin spring. Pump has three settings: long stroke for extremely cold temperature, center and short stroke for summer or hot temperatures.

Metering Rod Adjustment

15. Correct setting of metering rod is important. Metering rod position should be checked when carburetors are serviced or when leaner than standards rods are installed. Correct procedure is as follows:

Insert gauge (Part T109-25) (included in tune-up kit) in place of metering rod, seating beveled end in metering rod jet. Hold gauge vertical to insure seating. Fig. 11.

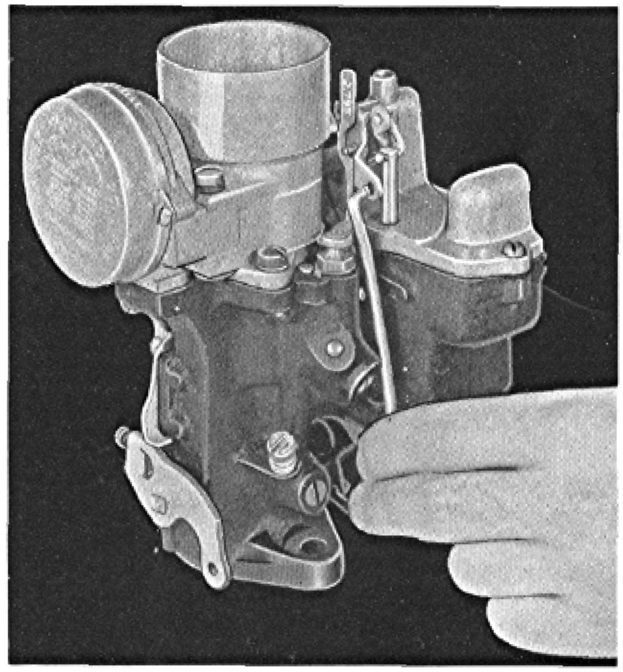


Figure 11

Metering rod pin in pump arm should rest on top of gauge with throttle fully closed (adjusting screw backed off) and upper end of connector rod centering freely in its hole in pump arm. If it does not, bend lower end of throttle connector rod so that top end centers freely in hole.

16. Remove gauge, replace metering rod and disc and metering rod spring. Be sure metering rod is in jet. If metering rod shows wear, replace it.

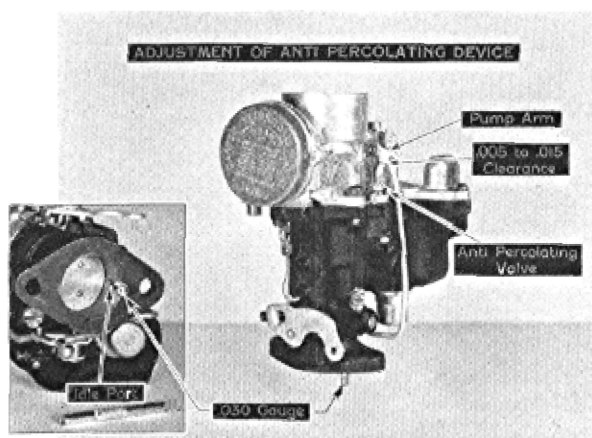


Figure 12

Anti-Percolating Valve Adjustment

17. Install anti-percolating plug and rocker arm assembly using $\frac{7}{16}''$ wrench. To adjust anti-perco-

lator: set throttle valve at .030″ opening between edge of valve and bore of carburetor on same side as port hole. Use a gauge .030″ diameter (tool J-882 included in tune-up kit). Be sure to place gauge in front of idle port hole (insert Fig. 12). Adjust rocker arm for .010″ clearance (plus or minus .005″) between rocker arm lip and pump arm (Fig. 12). Check with narrow feeler gauge.

To Assemble Air Horn

18. Install fast idle block and link assembly on choker lever pin and screw assembly.

19. Install choker piston lever, link and shaft assembly. At the same time install parts from operation No. 18. Then tighten up screw on choker lever. These parts must work freely.

20. Install choker valve assembly and use new choker valve screws. With the choker valve screws loose, tap choker valve assembly lightly to centralize it in the air horn, then securely tighten screws. Choker valve should move freely in air horn.

21. Install strainer screen in piston housing. If strainer is dirty, damaged or clogged, replace.

22. Install new suction passage gasket in piston housing casting.

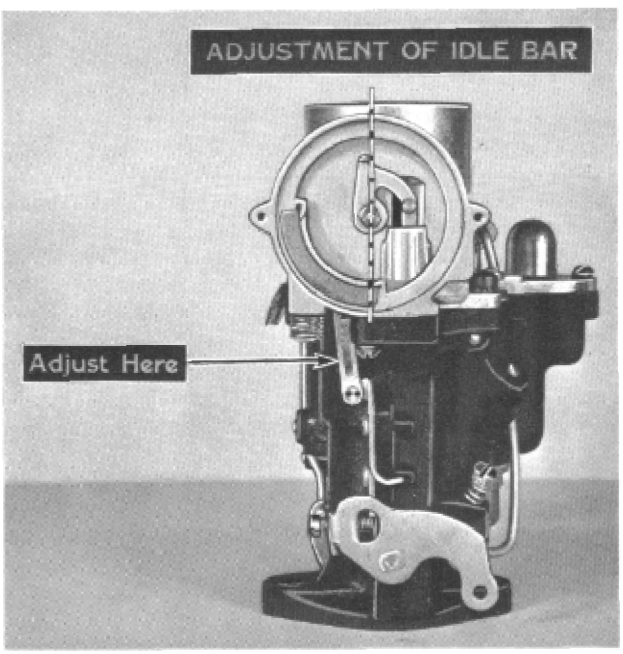


Figure 13

23. Install air horn assembly and throttle retard dash pot arm and bracket assembly by removing one of the bowl cover attaching screws. Tighten air horn and bowl cover attaching screws and lock washer.

24. Install attaching screw and lock washer beneath piston plate housing.

25. Install connector link on throttle retard dash pot plunger shaft and dash pot arm and bracket assembly, and then insert pin spring.

26. Install dash pot connector rod and pin springs being sure of placing the bend in arm towards the flange. Rod connects dash pot arm and bracket assembly to throttle shaft dog. If rod shows wear or damage, replace.

27. Install fast idle block attaching screws tightly. If fast idle block does not move freely replace screws with new, or if necessary, replace fast idle block assembly.

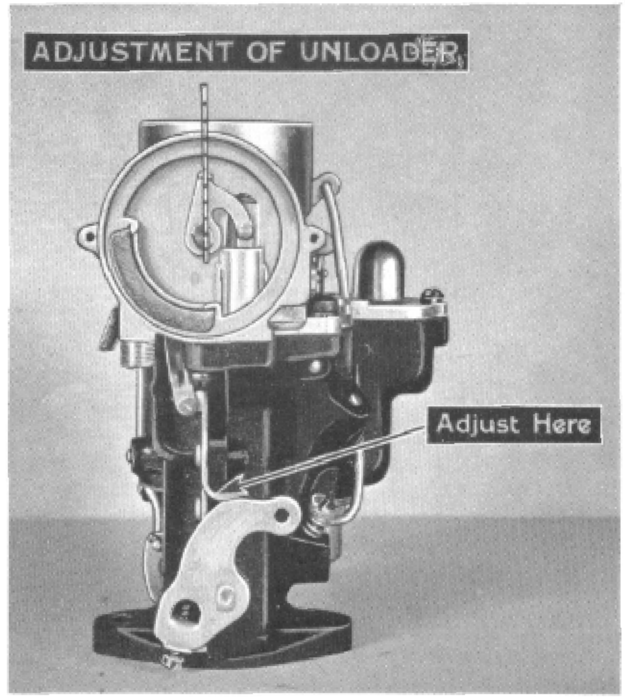


Figure 14

Adjusting Fast Idle Link

28. Adjust length of fast idle link to pull fast idle block free of throttle adjusting screw point when piston lever on choker shaft is in line with center marking on housing (Fig. 13). Lower edge of choker valve in this position is $\frac{7}{16}$″ from inner wall of air horn. Length of fast idle link may be varied by opening or closing crimped portion. (Fig. 13). In most cases this will not be necessary as the metal is rigid and factory settings will not be altered.

Adjusting Unloader

29. Adjust curved lip on fast idle block to open choker valve to position described in operation No. 28 at wide open throttle. (Fig. 14).

Assembling Climatic Control

30. Check thermostatic housing and coil assembly. If cork insulating strip has shrunk or is damaged, install new strip. If balance of assembly shows damage entire unit must be replaced.

31. Install thermostatic housing and coil assembly with word "Climatic" at bottom and turn counter-clockwise until center marking on piston housing is aligned with mark on thermostat housing.

32. Install housing retainers and attaching screws and tighten securely.

33. Adjust lip of choker lever so that with choker wide open and throttle wide open, choker is held in wide open position. Care should be taken that spring is in the groove between pin and lever. When throttle is closed, choker valve releases.

34. Check to see that old main nozzle gasket has been removed. Install new nozzle gasket on nozzle and install nozzle tightly. If nozzle has been damaged, replace. If the nozzle is not drawn securely into position with one new gasket it will cause excessive gas consumption due to leakage around the nozzle and a lower than normal nozzle position.

35. See that copper washer is properly placed in casting and install nozzle plug.

36. Pack dust cover attaching screw hole in bowl cover with graphite grease and install dust cover and attaching screw and lock washer.

Carburetor is now ready for installation on manifold.

Service Notes

If carburetor loads up after considerable service, float level should be checked. Wear on lip of float lever will raise float level. Float level may be reset by bending lip of float lever down to raise float level or bending lip up to lower float level. Only a very slight bend is needed. (See Fig. 10.)

If motor stalls while idling, reset throttle adjusting screw and idle adjustment screw ½ to 1 turn open. If these adjustments do not correct the trouble, remove low speed jet and clean thoroughly with compressed air. Examine and see that jet seats air tight in body casting, top and bottom. If not, replace with a new jet of identical specification. Never change a low speed jet from one carburetor to another.

A clogged pump jet is indicated by increased resistance on foot throttle. Pump jet should be removed and cleaned with compressed air, which, in many cases, will remove the dirt or lint. However, it is usually advisable to replace the pump jet, as its cost is nominal. All jets and ball checks must be seated gasoline tight.

Poor acceleration may be due to damaged or worn plunger leather in accelerating pump, loose plunger, corrosion or sediment in pump cylinder or bent pump arm (parts which may be replaced at small cost). Pump stroke is adjustable for high or low temperatures. Set to longest stroke for extreme cold weather, medium stroke for moderate weather, short stroke for extreme hot weather driving.

If plunger is removed from accelerating cylinder always use loading tool in reassembling to avoid damage to plunger leather.

Action of climatic control during warm up period is affected by grade of fuel used.

Make no adjustment until motor is cold.

If cold motor shows a tendency to run lean during the warm up period turn housing counter-clockwise one mark at a time to richen it until desired results are obtained.

If cold engine has a tendency to load or run rich during the warm up period, revolve choke housing clockwise one mark at a time to lean it out, until desired results are secured.

These adjustments should be made with care and between adjustments motor must be thoroughly cooled off. At least four hours should be allowed to cool motor.

Metering Rods, Jets, Nozzles and Gaskets for 1936

These parts are essential wherever any type of carburetor service is handled. They are obtainable only through the Carter Carburetor Corp., of St. Louis, and their distributors.

	Terraplane	Terraplane	Hudson 6	Hudson 8
Car Model Number	61	62	63	64-65-66-67
Carburetor Model	331 S	329 S	329 S	330 S
Mounting Flange Size	1¼"	1¼"	1¼"	1¼"
PART NAME				
Idle Jet	11–135	11–135	11–135	11–135
Main Nozzle	12–190	12–190	12–190	12–191
Main Nozzle Gasket	20–34	20–34	20–34	20–34
Metering Rod—Standard	75–119	75–106	75–106	75–159
Metering Rod—Lean	75–100	75–100	75–100	75–164
Metering Rod Jet	120–51S	120–51S	120–51S	120–67S
Metering Rod Jet Gasket	20–26	20–26	20–26	20–26
Accelerating Pump Jet	48–35	48–35	48–35	48–36
Accelerating Pump Inlet Check Valve	122–17S	122–17S	122–17S	122–17S
Accelerating Pump Outlet Check Valve	122–11S	122–11S	122–11S	122–11S
Accelerating Pump Disc Check Valve	122–29S	122–29S	122–29S	122–57S
Accelerating Pump Strainer	30–17	30–17	30–17	30–17
Accelerating Pump Plunger and Rod Assembly	64–28S	64–28S	64–28S	64–28S
Accelerating Pump Cylinder Bushing Gasket—Upper	20–29	20–29	20–29	20–29
Float Needle and Seat Assembly	25–33S	25–33S	25–33S	25–42S
Float Needle Seat Gasket	20–22	20–22	20–22	20–22
Idle Adjustment Screw	30A–39	30A–39	30A–39	30A–39
Anti-Percolating Cap and Rocker Arm Assembly	184–11S	184–11S	184–11S	184–11S
Anti-Percolator Plug Gasket	20–36	20–36	20–36	20–36
Throttle Retard Dash Pot Gasket	20–50	20–50	20–50	20–50
Climatic Control Suction Passage Gasket		20–59	20–59	20–59
Climatic Control Strainer		30–23	30–23	30–23
Float Bowl Cover Gasket	121–27	121–27	121–27	121–27
Plug Washer	136–19	136–19	136–19	136–19
Plug Washer	136–20	136–20	136–20	136–20
Plug Washer	136–27	136–27	136–27	136–27
Pin Spring	150A–10	150A–10	150A–10	150A–10

Fuel Pump

The fuel pump is of the diaphragm type operated by an eccentric on the camshaft. The rotation of the camshaft eccentric actuates arm A, Fig. 15, which pulls lever C and Diaphragm D downward against the pressure of spring E creating a vacuum in pump chamber F.

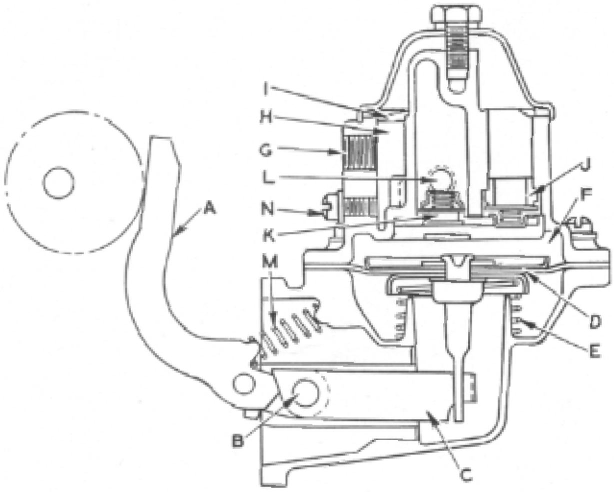


Figure 15

During the suction stroke the discharge valve K is held down against its seat while the inlet valve J is pulled down from its seat by the vacuum.

The vacuum created causes fuel to flow from the supply tank, through inlet G, up through screen I and down through the inlet valve J into the pump chamber F.

As the diaphragm raises due to the pressure of spring E, the inlet valve raises to its seat while the outlet valve K is forced upward and the fuel flows through the outlet L to the carburetor.

When the carburetor bowl is filled, the float in the carburetor will shut off the needle valve, thus creating a pressure in the pump chamber F. This pressure will hold diaphragm D down against the pressure of spring E where it will remain inoperative until the carburetor requires more fuel and the needle valve is opened.

It should be noted that the arm A is hinged to lever C so that lever C can be moved down but cannot be raised by lever A. Spring M simply causes the arm A to follow the cam which it does without moving lever C unless lever C is pulled upward by the diaphragm spring. The pump, therefore, delivers fuel under the pressure of the spring E and only as required by the carburetor to maintain the proper level in the float chamber.

Fuel Pump Performance

It is essential that the fuel pump deliver sufficient fuel to supply the requirements of the engine under all operating conditions and that it maintain sufficient pressure in the line between the fuel pump and carburetor to prevent boiling and vapor lock. Excessive pressure will hold the carburetor float needle valve off its seat and cause a high gasoline level in the float chamber and excessive gasoline consumption will result.

The pump used on 1936 Hudson and Terraplane engines should deliver a minimum of 10 gallons of gasoline per hour at an engine speed of 3950 r.p.m. (approximately 80 m.p.) and develop a pressure while supplying the carburetor with fuel from 1 to 3 pounds*. The highest pressure will be obtained at idling speed and the lowest at top car speed.

Fuel Pump Tester

Testing equipment has been developed by various manufacturers to determine the performance of the fuel pump, some checking the suction side from vacuum and some delivery side for pressure. Some equipment also checks the output but usually requires running the engine on the starter or from an external fuel source while the fuel delivered by the pump is caught in a measure.

The vacuum testing equipment in itself is not reliable since it is possible to show a vacuum on the inlet side without the pump being capable of delivering fuel. Such would be the case with a pump inlet valve blocked open or leaking badly.

The things we really are interested in are the quantity of fuel the pump can deliver and the pressure under operating conditions. Equipment for this purpose has been developed to take these readings without disturbing the functioning of the fuel system

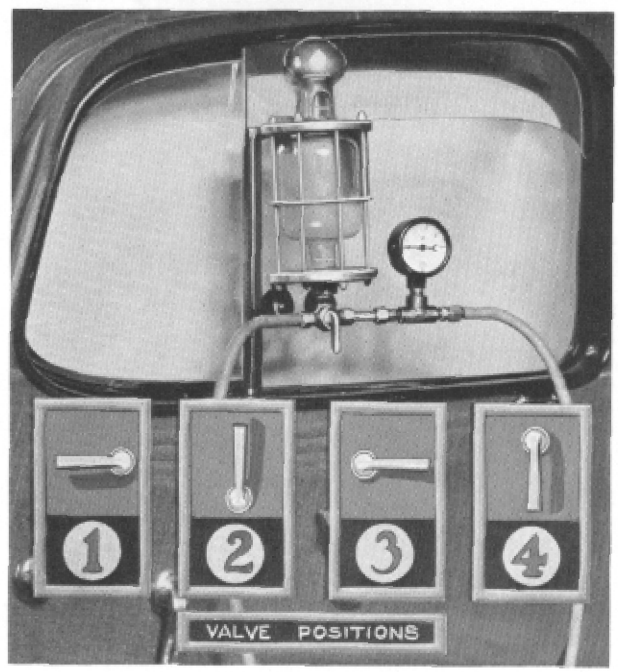


Figure 16

and also to permit the engine to be operated in the shop or on the road at any speed, using fuel from the car supply tank. The readings of both pressure and output can be taken from the driver's seat.

This equipment consists simply of a pressure gauge connected into the inlet line of the Gas Per Mile Gauge and can be used to test the fuel pump in conjunction with gasoline mileage tests. This equipment is shown in Fig. 16. The gas per mile gauge is tool number J-750-T listed at $8.50, while the fuel pump testing gauge (with fittings) is tool number J-891 listed at $2.25. Both are available through the Hinckley Myers Co., of Jackson, Michigan.

Fuel Pump Testing

To use the testing equipment remove the fuel line from the fuel pump to the carburetor. Put the testing equipment in place as shown in Fig. 16 and connect the hose from the rear to the fuel pump outlet and the hose from the front to the carburetor inlet.

Delivery Pressure

Turn the valve to position number 3 (Fig. 16) and start the engine. With the valve in this position the pump will deliver fuel directly to the carburetor and the delivery pressure will be shown on the gauge. This should be not less than one pound and not more than three pounds*. At the lower engine speeds the hand on the gauge will fluctuate when the carburetor needle valve opens to admit gasoline while at the higher speeds the flow into the carburetor is more constant and the gauge reading will be constant.

*Note: Pressures to be taken only at normal level of gauge mounted on door.

Fuel Delivery

By turning the valve to position number 1 (Fig. 16) the gauge glass will be filled with gasoline while fuel is still being supplied direct to the engine. By noting the time required to pump the gauge glass full (1/10 gallon between top and bottom graduations) the rate of delivery can be determined.

When the engine is running at idling speed, the fuel pumped direct to the carburetor can be disregarded as the quantity is very small. If the time required to fill the gauge is more than 36 seconds a high speed test should be made on the road.

The road test should include the following at a speed of at least 60 miles per hour.

1—With valve in position number 3, the pressure gauge should show at least one pound pressure.

2—With the valve in position number 1, the gauge should be filled in at least one minute.

3—With gauge filled turn valve to position number 4 and make a gasoline mileage test at the same speed at which test 2 was made to be sure the engine is not taking an excessive amount of gasoline. Excessive gasoline consumption will increase the time required to fill the gauge.

Note: The time allowed in (2) is based on the pump delivering 10 gallons per hour and the engine using four gallons per hour or 15 miles per gallon at 60 miles per hour. If 10 miles per gallon is obtained at 60 miles per hour it will require 90 seconds to fill the gauge if the pump is delivering 10 gallons per hour.

Although timing is the accurate means of determining the fuel flow, it is sufficient in cases where the car can be driven with wide open throttle to see that the gauge can be filled which insures against starvation of the engine when it requires its maximum fuel supply.

In some cases it may be more convenient to check mileage instead of time. With the car driven at a constant speed of 60 miles per hour the gauge should be filled in test (2) in not more than one mile of driving.

Fuel Pump Trouble Chart

CONDITION	EVIDENCED BY	REMEDY
1. Broken Rocker Arm (A)	No fuel delivery—visible	Replace Rocker Arm
2. Broken Rocker Arm Spring (M)	Erratic action—visible	Replace Spring
3. Worn Links (A-B-C)	Insufficient fuel supply	Replace Links and Pins
4. Broken Diaphragm Spring (E)	No fuel supply	Replace Spring
5. Weak Diaphragm Spring (E)	Insufficient fuel supply, low pressure	Replace Spring
6. Punctured Diaphragm (D)	Gasoline leak at vent-hole in bottom of pump body	Replace Diaphragm
7. Leakage at Diaphragm Flange	Visible	Tighten cover screws evenly and securely
8. Leak at Intake or Outlet Valve	Insufficient (or no) fuel delivery, low pressure	Replace Valves and Gaskets
9. Plugged Filter Screen	Insufficient (or no) fuel delivery, low pressure	Replace Filter Screen—remove Plug N and flush sediment Chamber.
10. Leaking Cover Gasket	Visible—insufficient or no fuel delivery	Tighten cover screw and replace Gasket if necessary
11. Leaking Tank to Pump Line	Visible—insufficient or no delivery	Tighten connections or replace lines as necessary
12. Restricted Tank to Pump Line	Low pressure—low delivery	Clean or replace line
13. Excessive Gasket Thickness between Pump and Crankcase Flange	Low pressure—low delivery	Use $\frac{1}{64}$-inch gasket only
14. Incorrect Diaphragm Spring	Incorrect gauge reading	Replace spring

To Disassemble the Fuel Pump

1. Remove the cover plate screw and gasket.
2. Remove the cover plate and cover plate gasket.
3. Remove the screen (I) from the top of the valve cover.
4. Remove the rocker arm pin (B) driving it out with a punch from either side of the housing.
5. Remove the rocker arm (A) rocker arm spring (M) and the rocker arm link (C).
6. Remove the six screws from the valve cover and remove the cover, diaphragm assembly (D) and diaphragm spring (E).
7. Remove the three screws from the valve cover plate and remove the valve plate.
8. Remove the inlet (J) and outlet (K) valves and valve springs and the valve cover gasket.

Assembling Fuel Pump

Note: Clean all parts in clean gasoline before assembly and check all parts carefully for wear.

1. Install the outlet valve spring in the valve spring retainer, and the inlet valve over the inlet valve seat place the inlet valve spring over the inlet valve.
2. Assemble the valve cover plate and gasket in place and install the three screws.
3. Assemble the diaphragm spring (E) in the housing and install the diaphragm in place.
4. Place the valve cover assembly over the diaphragm and install the six screws. Draw the screws down evenly when tightening.
5. Assemble rocker arm link in body and to the diaphragm rod.
6. Install rocker arm (A) and rocker arm pin (B).
7. Install rocker arm spring (M).
8. Install the screen (L) in the top of the valve cover.
9. Install the cover plate gasket in the cover plate and assemble the cover plate to the valve cover.
10. Install cover plate screw and gasket.

Hudson-RCA Victor
Model CB-6

SIX-TUBE, DE LUXE AUTOMOBILE RECEIVER

SERVICE NOTES

Manufactured By

RCA VICTOR DIVISION

RCA Manufacturing Company, Inc.

Camden, N. J., U. S. A.

For

Hudson Motor Car Company

DETROIT, MICH., U. S. A.

Radio Kit—1936—Hudson and Terraplane

MODEL CB-6

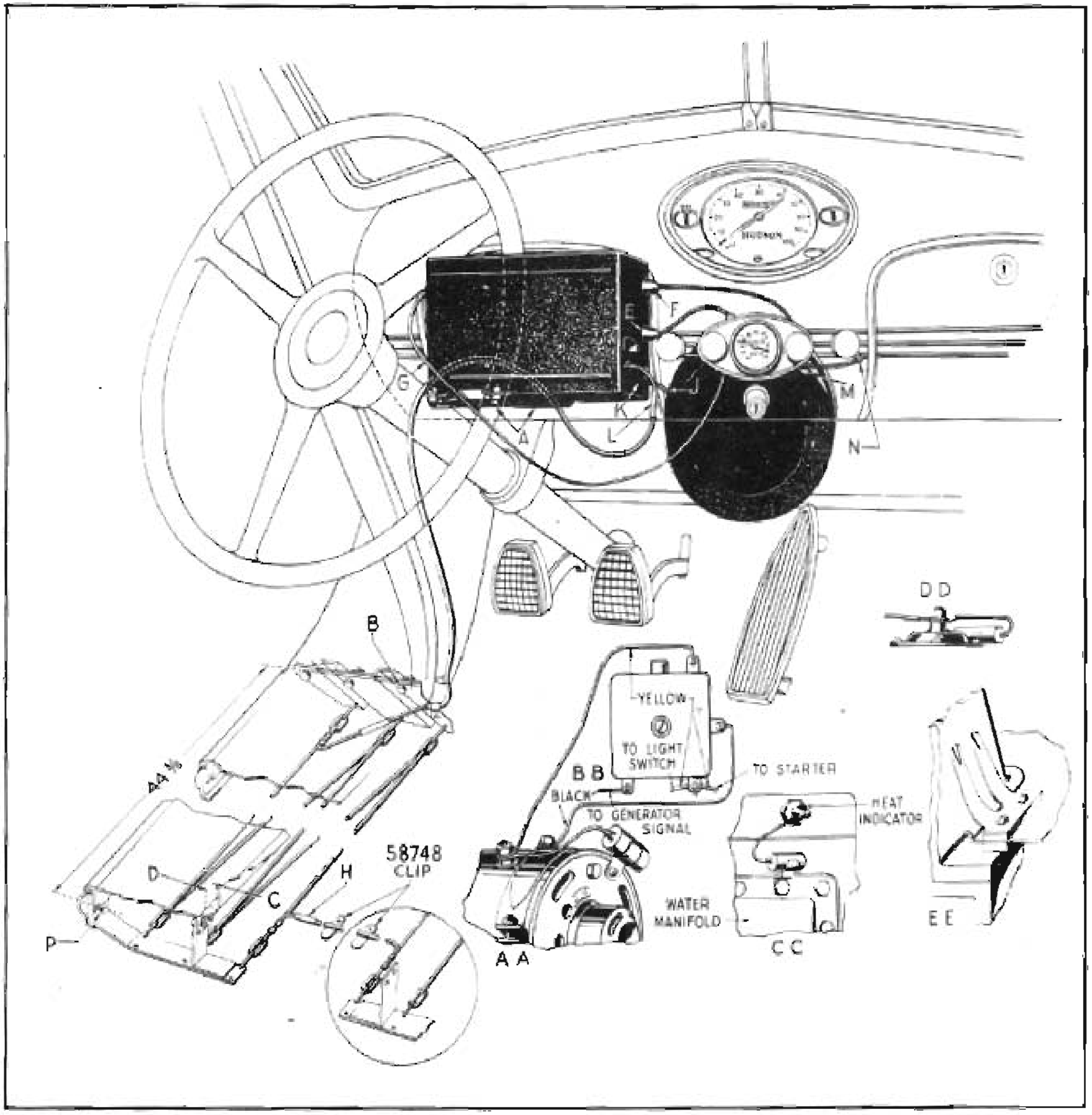


Figure A—Mounting Details and Connections

The Radio Kit, Part No. 152018 Includes:—

- 1—Receiver Complete
- 1—Speaker Complete
- 1—Control Head complete with cables
- 1—Pilot Light Bulb
- 1—Feed Cable Assembly and Fuse
- 1—Aerial Assembly and Brackets
- 1—Aerial Lead In with shield and clip
- 1—Distributor Suppressor
- 2—Small Condensers (one required on Terraplane Deluxe Models)
- 1—Large Condenser
- 1—Ground Strap
- 3—Ground Forks
  Bolts, Nuts, Screws and Lock Washers for mounting units

In order to complete the installation on Terraplane Deluxe Models, a Charge Control (Part No. 47979) is required in addition to the Radio Kit.

HUDSON-RCA VICTOR MODEL CB-6

Six-Tube, De Luxe, Superheterodyne, Automobile Receiver

SERVICE NOTES

Electrical Specifications

TUBE COMPLEMENT

(1) RCA-6D6 .... Radio Frequency Amplifier
(2) RCA-6A7 .... Oscillator and First Detector
(3) RCA-6D6 .... Intermediate Amplifier
(4) RCA-85 ... Detector, A-F Amplifier, and A.V.C.
(5) RCA-6C5 .... Driver
(6) RCA-6A6 .... Power Output Amplifier

TUNING RANGE .... 540 kc. to 1600 kc.

OUTPUT RATING

Maximum .... 9.0 Watts
Undistorted .... 6.0 Watts

LOUDSPEAKER

Type .... Electrodynamic
Impedance (v.c.) .... 3.0 ohms at 400 cycles

POWER RATING

Supply Voltage .... 6.3 Volts (Storage Battery)
Current Drain .... 7.6 Amperes at 6.3 Volts
Fuse Protection .... 15 Amperes

PILOT LAMP .... Mazda No. 51, 7.5 Volts

ALIGNMENT FREQUENCIES

I-F Transformers .... 260 kc.
Oscillator Coil .... 600 kc. and 1400 kc.
Detector Coil .... 1400 kc.
Antenna Coil .... 1400 kc.

Mechanical Specifications

RECEIVER UNIT

Height .... $6\frac{7}{8}$ Inches
Width .... $10\frac{1}{16}$ Inches
Depth .... $7\frac{3}{16}$ Inches
Mounting .... $\frac{5}{16}$ Inch Cap Screws (two)

SPEAKER UNIT

Diameter .... $8\frac{3}{4}$ Inches
Depth .... 5 Inches
Cone Diameter .... 8 Inches
Mounting .... $\frac{5}{16}$ Inch Stud (one)

OPERATING CONTROLS

(1) Operating Switch—Volume Control (2) Tuning Control (3) High-Frequency Tone Control

TUNING DRIVE RATIO .... 12 to 1

WEIGHT

Receiver, Speaker and Accessories Complete .... 30 Pounds
Complete Equipment Packed for Shipment .... 34 Pounds

General Description

This instrument consists of a separated three-unit assembly which includes: (1) a six-tube chassis with self-contained power conversion system; (2) an electrodynamic loudspeaker; and (3) an operating control head.

The receiver is compactly housed in a substantial metal case. There are removable covers to permit ready access to the under and top sides of the chassis. Two mounting studs are used for supporting this unit to the steering column bracket on the car.

The loudspeaker mechanism is encased in a cylindrical metal housing. Field and voice coil connections from this unit to the receiver are by means of a shielded cable. A single support stud is attached at the rear of the speaker case for mounting purposes.

The main operating controls are located on the remote control unit, which mounts on instrument panel of the car. A subordinate high-frequency tone control is mounted on the receiver case. Flexible shafts interconnect the remote control knobs and the controlled devices within the receiver housing.

Radio Installation-Operation

1—Lift floor mat and install three ground forks (Part No. 151210) to front, rear and left of floor board opening so that spring fingers contact transmission control housing. (See Insert EE.) The paint must be removed from the floor panel and transmission tower to provide good electrical contact. A spacer (Part No. 151435) should be placed under each ground fork and the parts secured to the floor board with six screws (Part No. 71648) and three tapping plates (Part No. 151436).

2—Remove finish plate from center of instrument panel—attached with studs and nuts on back of panel.

3—Put the Radio Receiver in place on top of the steering column support bracket with the control shaft connections E and F on the right, and secure with two cap screws "A." On right-hand drive models, the receiver is mounted with the control shaft connections to the left.

4—Punch a hole through the front dash pad, using the 3/8" hole located just above the center of the dash reinforcement ribs as a guide.

5—Place wooden spacer on speaker mounting stud and insert stud through hole in dash and dash pad, securing with a washer and nut on the engine side of dash.

6—Remove the control knobs from the control head, and also the nuts located behind the knobs. Insert control head from back of panel, securing by replacing nuts, and then replace control knobs.

7—Insert the driving tongue of the control cable from the right (tuning) knob into the upper socket F and tighten nut. Insert the driving tongue of the control cable from the lower (volume) knob into the socket and tighten nut. NOTE: On right-hand drive installations the long control cable should be attached to the volume (left) control knob.

8—Insert speaker lead plug "J" into case.

9—Attach wire G to socket at left end of case.

10—Attach feed wire to Battery Terminal of the lighting switch "N" and connect to socket "M," to the back of the control head, being sure that fuse is in place in socket.

11—Remove the three running board to front fender bolt nuts and install front antenna bracket on front of running board and fender flange.

12—Measure 44 3/8" from front bracket along running board moulding reinforcement and punch mark 1/4" from bottom of reinforcement. Drill 3/16" hole and tap 1/4-20.

13—Measure 43 1/8" (B to C) from front bracket along running board inner flange and drill a 5/32" hole through the running board and dust apron flanges—1/2" above the bottom. Drill another 5/32" hole (D) 1 1/4" to the rear of the first.

14—Repeat operations 11-12-13 on opposite running board and mount rear antenna brackets.

15—Mount the right-hand antenna, starting at the inner hole of the rear bracket with the hook near the long lead, which goes across the car, attaching all hooks in order and stretching to insert last hook in outer hole of front bracket.

16—Mount the left-hand antenna starting at the inner hole of the rear bracket with the end opposite the lead-in, working back and forth and stretching to attach the last hook to the outer hole of the front bracket.

17—Connect the right- and left-hand antennas with a bolt and nut (H) with the lead passing over the propeller shaft. Cover the connection with rubber cement and rubber tape. Secure cross lead to bottom body panel with two No. 58748 clips and drive screws to hold it away from the propeller shaft.

18—Insert the lead-in through the hole in body floor panel in line with left front door, front pillar post, leading up behind kick panel behind radio receiver and connect to socket "L." Secure lead-in to front bracket with the bolt and nut.

19—Attach one small condenser on gasoline tank gauge unit with one unit mounting screw, attaching condenser terminal to gauge unit terminal. (Insert "DD.")

20—Attach one small condenser to upper rear cap screw in engine water manifold and attach condenser terminal to terminal of water temperature gauge element. (Insert "CC.") NOTE: This condenser not required on Terraplane Deluxe models unless Accessory Temperature Gauge is installed.

21—Attach large condenser to cap screw at rear of generator and connect condenser terminal to generator "A" terminal. (Insert "AA.")

22—Install 48763 ground strap from the front muffler bracket to chassis frame. The paint must be removed from points of attachment to insure good electrical contact.

23—Install suppressor in central terminal of distributor.

24—When installing radio on Terraplane Deluxe models with air-cooled generator, mount generator charge regulator in place of relay with two screws to two threaded holes in cowl side panel provided for the purpose. Fuse cap should be on upper face. Remove ground cup from generator "F" terminal. See illustration inserts for wiring diagram. Connect "FLD" terminal on side of charge regulator to "F" terminal (engine side) of generator. Adjust generator output to 22 amps., cold—17 amps., warm.

25—Turn on volume and tune set to a known local station. Adjust the dial hand to give correct dial reading by turning knurled knob on back of control head.

CIRCUIT ARRANGEMENT

The schematic and wiring layouts of the electrical circuit are shown in Figures 2 and 3, respectively. From these diagrams it may be seen that six Radiotrons are incorporated in the basic superheterodyne circuit. In sequence, there is an r-f stage, a dual first detector-oscillator stage, a single i-f stage, a second detector-audio amplifier-a.v.c. stage, a driver stage, and a class "B" output stage. The power supply system contains a mechanical interrupter and rectifier. The following circuit features are of particular importance:

Noise Filter—Reduction of ignition interference and similar disturbances are brought about by filter arrangements in the antenna input circuit and the "A" battery input lead. This antenna filter, L-1, C-1, and C-2, is a "low-pass" type, having an acceptance band below 1600 kc. The inductance L-2 is for the purpose of shunting out power line hum pickup.

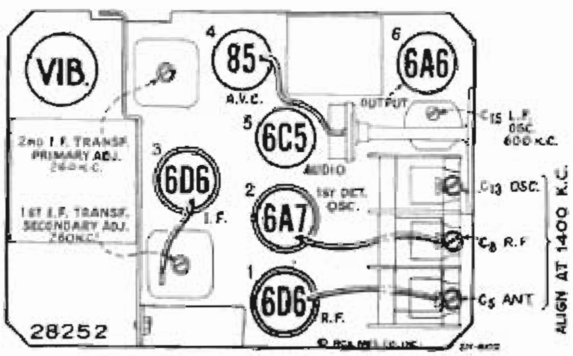


Figure 1—Radiotron Locations

Tuned Circuits—There are seven resonant circuits in the radio frequency end of the receiver. The r-f, first dectector, and oscillator grid circuits are tuned by a three-gang tuning condenser. The remaining tuned circuits consist of the primary and secondary windings of the i-f transformers, which resonate with fixed condensers and are tuned by adjustable iron cores to a nominal frequency of 260 kilocycles.

Detection—Detection takes place as a result of the rectifying action of one of the diodes of the RCA-85 tube, the current being developed through resistors R-20 and R-21. The audio component of this current is coupled through capacitor C-23 to the one megohm volume control R-9. The arm of this volume control is connected to the grid of the RCA-85 tube, thus giving a means of continuously varying the voltage input to the audio amplifier.

A.V.C.—The a.v.c. diode of the RCA-85 tube is coupled through capacitor C-25 to the primary of the second i-f transformer. Due to the rectifying action of this diode, a current is developed through resistor R-13. The d-c voltage drop in this resistor is used for automatically regulating the control grid bias of the r-f, first detector, and i-f stages, the voltage being applied through a suitable filter network. Due to the fact that the a.v.c. diode returns through resistor R-13 to a point which is 15 volts negative with respect to its cathode, the a.v.c. action is delayed until the input signal reaches a predetermined level. This gives more uniform output for widely varying signal strengths into the antenna.

Audio System—As mentioned under "Detection", the audio component of the detected signal is selected from the manual volume control and applied to the control grid of the RCA-85 tube. The plate circuit of this tube is connected through capacitor C-27 to the control grid of the driver tube, an RCA-6C5. The plate circuit of the driver tube is coupled through the driver transformer T-1 to the control grids of the class "B" output tube, RCA-6A6. This tube is coupled through the output transformer T-2 to the loudspeaker.

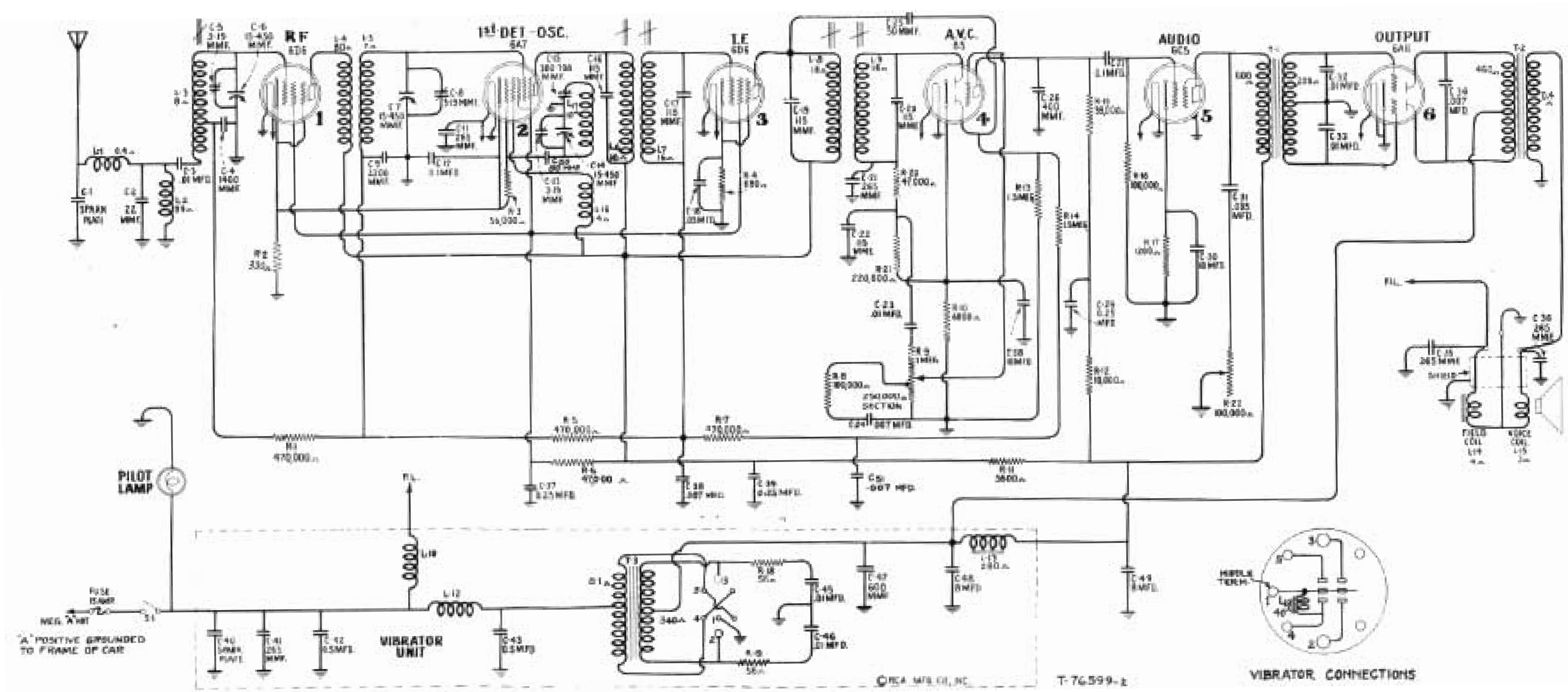
SERVICE DATA

Regular maintenance will assure proper operation of this receiver over an extensive period of life. It should, therefore, receive the same routine inspections and adjustments as are accorded the mechanical and electrical systems of the car. The following service information suggests procedure to be applied in locating and repairing faults which may develop and affect the operation of the receiver.

Defects External To Receiver

Interference—Failure or disconnection of spark-suppressing capacitors at gas gauge, temperature indicator, and generator will allow the ignition interference produced at such points to be radiated and picked up by the receiver. Defects in the ignition system not only affect operation of the car, but will produce radio interference as well. The system should, therefore, be thoroughly checked and repaired if necessary. The three pairs of bonding fingers attached to the floor boards which contact the transmission control cover, and the bonding strap from muffler front bracket to chassis frame side member for noise reduction, may develop loose connections and cause intermittent noise level in the receiver. In checking the receiver for noisy operation, it is also wise to make sure that interference is not being caused by disturbing electrical devices which are not part of, but are in vicinity of, the car.

Battery—Corroded terminals at the storage battery will usually result in low voltage at the receiver and consequent low sensitivity. Noise may also be generated by this condition. Battery conditions will be reflected in the motor operation as well as that of the radio.



RF
6D6
1st DET-OSC.
6A7
I.F.
6D6
A.V.C.
85
AUDIO
6C5
OUTPUT
6A6
PILOT LAMP
VIBRATOR UNIT
NEG. "A" BAT.
"A" POSITIVE GROUNDED TO FRAME OF CAR
©RCA MFG. CO., INC.
T-76599-2
VIBRATOR CONNECTIONS

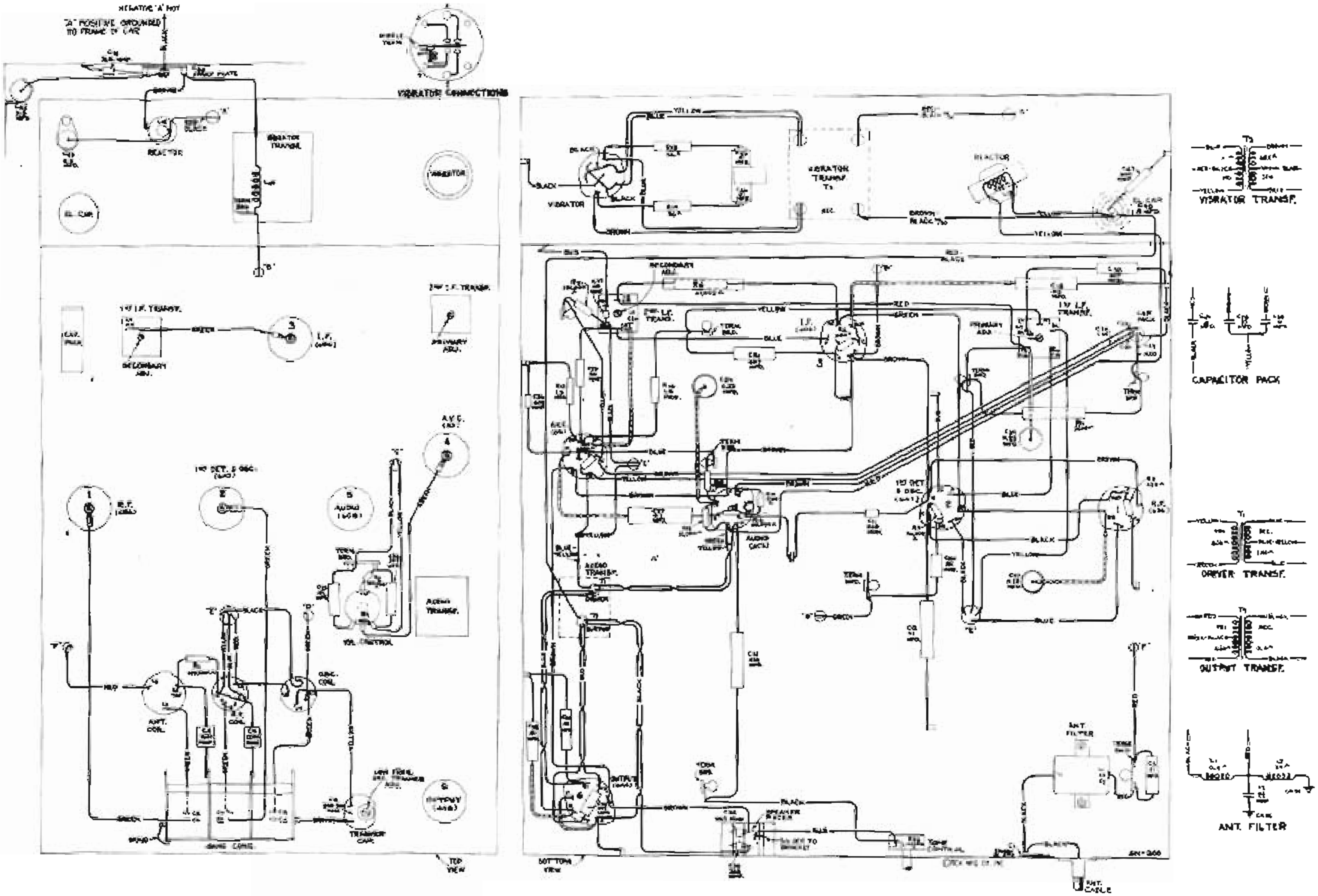


Figure 3—Chassis Wiring Diagram

Antenna—Vibration may occasionally cause the antenna connections to become loose or broken. These should be carefully checked and repaired, if necessary. Corrosion due to weather is also deleterious at these points. Each connection should be thoroughly cleaned, to assure solid contact at all times. The grounding point of the antenna lead shield is at the front, left, running board bracket. This point of connection should not be changed, since its position on the car is very critical in regard to interference. The ground connection to the case of the receiver should be kept in secure connection to the frame of the car at all times; if loose, it may cause intermittent operation of the receiver, loss of sensitivity, or will produce noisy reception.

Defects Within Receiver

Total Inoperation—Failure to operate may be due to one or more causes. When a receiver is found in such condition, its parts should be checked as follows:

(a) FUSE—May be burned out or making poor contact. In case of burnout, replace with a fuse of equivalent rating. If second fuse fails, remove receiver from car and investigate condition of interrupter and receiver circuits.

(b) TUBES—Dismount the receiver and remove top cover. Check to see that all tubes are correctly placed in their proper sockets. One or more tubes may be defective. To determine their condition, remove them from the receiver and test with standard tube-testing equipment. If such equipment is unavailable, substitute the tubes with others known to be in good condition. It is not advisable to test the tubes while in the receiver, due to measurement errors which would result from the associated circuits.

(c) INTERRUPTER—Improper operation of the power supply interrupter is usually evidenced by reception of "sputtering noise." To check, remove the antenna connection and advance the receiver volume control (engine off). An increase in noise will usually indicate that the interrupter is in poor condition. Further investigation should be made by substitution of the interrupter with one known to be in good condition. No adjustments should be attempted on this unit. The operation of the interrupter and the associated rectifier system may also be proved normal by measurement of the filter output voltage, which should read steady at approximately 275 volts (d-c). The points of test are indicated by Figure 6.

(d) CIRCUIT—Failures within the basic circuits of the receiver may be isolated by a systematic test procedure. The receiver and speaker should be removed from the car and placed where they will be readily accessible. Covers of the top and bottom of the receiver housing should be removed. Continuity tests should be made to ascertain the condition of the speaker voice coil and field circuits as well as that of the cable interconnecting the receiver and speaker. Battery voltage should then be applied to the equipment, the operating switch turned to "On" and voltage measurements made at the receiver circuits to determine whether or not the power system is functioning properly. If no voltage or incorrect voltage is indicated at the filter output, individual tests should be

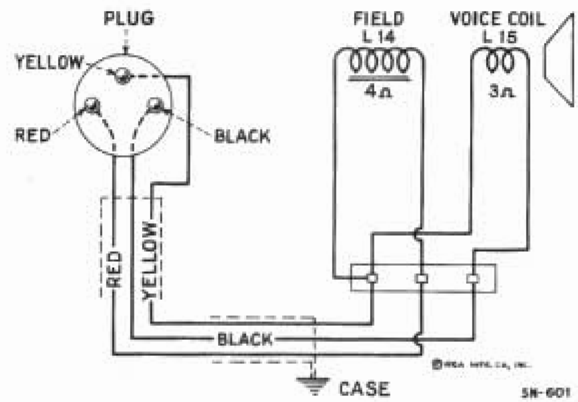


Figure 4—Loudspeaker Schematic and Wiring

made on the "A-Hot" wiring, power transformer, interrupter, and filter reactor to locate the defective part. If proper voltage is indicated at the filter output, then a thorough voltage analysis of the receiver circuit is in order. Figure 6 gives the values which should be obtained on a receiver in normal operating condition. Deviations from the specified values may be as much as $\pm$ 20% before the operation of the receiver is appreciably affected. The absence or erratic reading of one or more of the voltages will indicate a fault in the particular circuit under test; in which case each transformer, resistor, capacitor, choke, and conductor of the circuit should be individually checked for open circuit, short circuit, and grounding. Reference to the diagram, Figure 2, will give the values of the circuit elements and their schematic relations. Figure 3 illustrates the physical locations of the parts and the color coding of the wiring. Defective parts should be renewed only with genuine factory tested replacements.

Intermittent Operation—Operation may sometimes be irregular. In the majority of cases, the source of such trouble is at a connection or within a tube. Exchange of the tubes is the most definite method of tracing tube defects of this sort. A connection which is intermittent cannot be readily disclosed by regular test methods. Each connection of the complete system of wiring should be carefully inspected and checked to assure that it is secure. Intermittent or distorted reception may occasionally be caused by a partially defective resistor, capacitor, or winding. This type of defect is difficult to isolate; however, the suspected parts should be carefully checked for proper value, leakage, shorted turns, etc. Should it be impossible to locate the fault by such a method, the receiver should be placed in operation and allowed to operate at full volume for several hours. The weakened or defective part will generally fail completely under such condition and its identification can be established by the regular continuity or voltage tests.

Alignment Procedure

All of the adjustable circuits of this receiver have been properly aligned at the factory to give correct performance, and their settings should remain intact indefinitely when the receiver is used under ordinary conditions. However, necessity for readjustment may occasionally occur from continued extremes of climate, tampering, purported alteration for service purposes, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the receiver to be insensitive, non-selective, and subnormal in respect to tone quality. Such indications will usually exist simultaneously.

In readjusting the tuning circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the RCA Stock No. 9595, will be required as the source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. Two indication methods are applicable. One requires use of cathode-ray oscillograph equipment, and the other requires a voltmeter or glow type of indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave image which represents the resonance characteristics of the circuits being tuned. This type of alignment is possible through use of apparatus such as the RCA Stock No. 9558 Frequency Modulator and the RCA Stock No. 9545 Cathode-Ray Oscillograph. Alignment by the output meter method should be indicated by an instrument such as the RCA Stock No. 4317 Neon Glow Indicator. The two procedures are outlined as follows:

OUTPUT METER ALIGNMENT

Place the receiver in operation, with its two covers removed. Attach the output indicator across the loudspeaker voice coil circuit or across the output transformer primary. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test oscillator output control so that the signal level is as low as possible and still observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6D6) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Adjust the frequency of the oscillator to 260 kc. Tune the receiver to a point where no interference is received from the heterodyne oscillator or local stations.

(b) Adjust the two screws (attached to iron cores) of the second i-f transformer, one on top and one on bottom, until maximum output is produced by the indicating device.

(c) Remove the oscillator from the i-f tube input and connect it between the control grid cap of the first detector tube (RCA-6A7) and chassis-ground, using the 0.25 mfd. capacitor as previously. Allow its tuning to remain at 260 kc. Tune the receiver to avoid interference as in (a).

(d) Adjust the two screws of the first i-f transformer for maximum (peak) receiver output. The indication for this adjustment will be broad, due to the "flat-top" characteristic of the i-f system. The two screws should, therefore, be very carefully adjusted so that the indicator remains fixed at maximum as the oscillator is shifted through a range 2 kc. above and below its normal setting of 260 kc. An irregular double-peaked indication is to be avoided.

R-F Adjustments

NOTE: To eliminate vibrator interference, it may be advisable to replace the bottom cover before making the r-f adjustments.

(a) Check the calibration of the dial scale of the remote control unit by rotating the tuning control until the variable condenser plates are in full mesh (maximum capacity). This will carry the dial pointer to its minimum frequency position. The knurled shaft at the rear of the control box should then be turned until the dial pointer sets exactly on the last graduation at the low-frequency end of the dial scale.

(b) Connect the output of the test oscillator to the antenna-ground terminals of the receiver with a 150 mmfd. capacitor in series with the antenna lead. There should be a shunt capacitor of 50 or 60 mmfd. from the antenna lead at the receiver to ground. Tune the oscillator to 1400 kc. Allow the output indicator to remain attached to the receiver output.

(c) Tune the receiver so that the dial reading is 1400 kc. Then adjust the oscillator, detector, and antenna coil trimmers, C-13, C-8, and C-5 respectively, tuning each to the point producing maximum indicated receiver output.

(d) Shift the oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. The oscillator series trimmer, C-15, should then be adjusted, simultaneously rocking the receiver tuning control backward and forward through the signal until maximum (peak) receiver output results from the combined operations. The adjustment of C-13 should be repeated as in (c) to correct for any change in its alignment due to the adjustment of C-15.

NOTE: The antenna coil has an iron core which is adjusted at the factory for the correct inductance. **This adjustment should not be disturbed.**

CATHODE-RAY ALIGNMENT

Attach the cathode-ray oscillograph vertical input terminals to the second detector output, with the "Hi" connected to the junction of the two resistors, R-20 and R-21, and the "0" connected to the receiver chassis. Advance the vertical amplifier gain control of the oscillograph to full-on, allowing it to remain at such position for all adjustments. Turn the vertical "A" amplifier to "On." Set the oscillograph power switch to "On" and adjust the intensity and focusing controls to give a sharply defined spot on the screen. Interconnect the frequency modulator impulse generator terminals to the oscillograph "Ext. Sync." terminals, as shown by Figure 5.

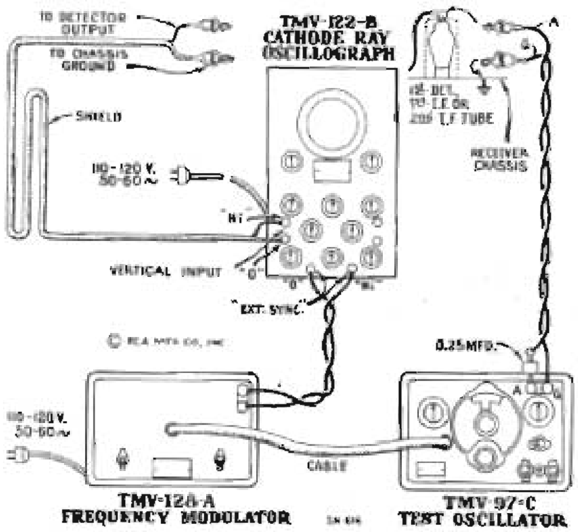


Figure 5—Alignment Apparatus Connections

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6D6) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Tune the oscillator to 260 kc., place its modulation switch to "On" and its output range switch to "Hi." The frequency modulator must not be connected to the oscillator for the preliminary adjustments.

(b) Set the cathode-ray oscillograph horizontal "B" amplifier to "Timing" and the synchronizing switch (timing) to "Int." Place the synchronizing input and frequency controls to about their mid-positions. Turn the range switch to its No. 1 position.

(c) Increase the output of the oscillator until a deflection is noticeable on the oscillograph screen. The figure obtained represents several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave image formed (400-cycle waves) to be spread completely across the screen by advancing the horizontal "B" gain control. The image should be synchronized and made to remain motionless by adjustment of the synchronizing input and frequency controls.

(d) Adjust the two screws (attached to iron cores) of the second i-f transformer, one on top and one on bottom, to produce maximum vertical deflection of the oscillographic wave which is present on the screen. This adjustment places the transformer in exact resonance with the 260 kc. signal.

(e) The sweeping operation should follow, using the frequency modulator. Shift the oscillograph synchronizing switch to "Ext.", change its range switch to No. 2 position and set the frequency control to its mid-position. Place the frequency modulator in operation, with its sweep range switch in the "Lo" position. Interconnect the test oscillator and frequency modulator with the special shielded patch cord provided. Turn the oscillator modulation switch to "Off."

(f) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. These waves will be identical in shape, but will be totally disconnected and appearing in reversed positions. They will have a common base line, which is discontinuous. Adjust the frequency and synchronizing input controls of the oscillograph to get the proper waves and to make them remain motionless on the screen. Continue increasing the oscillator frequency until the forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will obtain at an oscillator setting of approximately 360 kc.

(g) With the images established as in (f), readjust the two screws on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(h) Without altering the adjustments of the apparatus, shift the output connections of the oscillator to the input of the i-f system, i. e., between the first detector (RCA-6A7) control grid and ground. Regulate its output so that the amplitude of the oscillographic image is approximately the same as used above for adjustment (g) of the second i-f transformer.

(i) The two first i-f transformer adjustment screws, one on top and one on bottom, should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

(a) Calibrate the scale of the receiver by rotating the tuning control until the variable condenser is at full mesh, and then turning the knurled shaft at the rear of the control box to bring the dial pointer to the last graduation at the low-frequency end of the scale.

(b) Attach the output of the test oscillator to the receiver input, i. e., between the antenna and ground terminals, with a 150 mmfd. capacitor in series with antenna lead. There should be a shunt capacitor of 50 or 60 mmfd. from the antenna lead at the receiver to ground. Accurately tune the oscillator to 1400 kc. The oscillograph should be left connected to the second detector output circuit as for the above i-f adjustments. Return the synchronizing switch to its "Int." position and turn the range switch to its No. 1 position.

(c) Tune the receiver to a dial reading of 1400 kc. Then regulate the oscillator output so as to increase the amplitude of the waves on the oscillograph screen to a conveniently observable size. The several waves of detected signal, as appearing on the screen, should be synchronized by operation of the synchronizing and frequency controls. Trimmers, C-13, C-8, and C-5, of the oscillator, detector, and antenna coils should then be adjusted so that each causes maximum vertical deflection (amplitude) of the images.

(d) The oscillator modulation should then be turned to "Off" and the frequency modulator placed in operation, connected to the oscillator with the shielded patch cord. Change the oscillograph synchronizing switch to "Ext.", set its range switch to its No. 2 position and the frequency control slightly above its mid-position.

(e) Increase the frequency of the test oscillator gradually, until the point is reached where the two similar, distinct and separate wave images appear on the screen and become coincident at their highest points. This will occur at an oscillator setting of approximately 1500 kc. These waves should be synchronized on the oscillograph screen by careful readjustment of the synchronizing and frequency controls. Readjust trimmers, C-13, C-8, and C-5, to produce complete coincidence at maximum amplitude of the two waves.

(f) Disconnect the frequency modulator from the oscillator. Place the modulation switch of the oscillator to "On" and tune the oscillator to 600 kc. Set the synchronizing switch of the

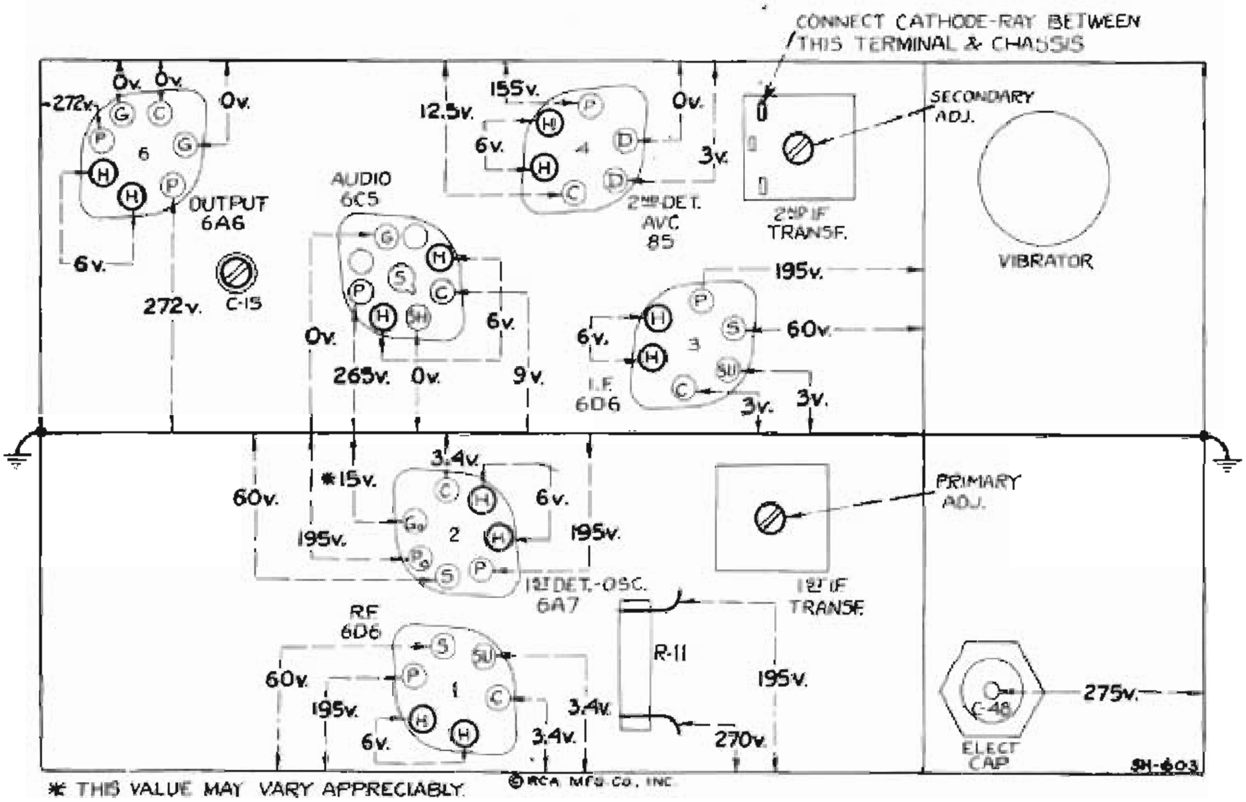


Figure 6—Radiotron Socket Voltages to Chassis

(Measured at 6.3 volts battery supply—Volume Control Maximum—No Signal) oscillograph to "Int." and turn the range switch to No. 1 position.

(g) Tune the receiver station selector control so as to pick up the 600 kc. signal, disregarding the dial reading at which it is best received.

(h) Change the oscillograph synchronizing switch to "Ext." and place the oscillator modulation switch to "Off." Interconnect the frequency modulator and oscillator with the special shielded patch cord. Return the range control of the oscillograph to its No. 2 position and set the frequency control slightly above its mid-position.

(i) Shift the test oscillator to its 200-400 kc. range and tune it to the point at which the forward and reverse waves show on the oscillograph screen. This condition will obtain at an oscillator setting of approximately 230 kc. The signal obtained from the oscillator for this adjustment will be the third harmonic of 200 kc. An increase in the oscillator output may be necessary. The trimmer C-15 should then be adjusted to the point which produces maximum amplitude of the oscillographic images. It will not be necessary to rock the tuning control for this adjustment, inasmuch as the frequency modulator is varying the signal in an equivalent manner.

(j) Retune trimmers C-13, C-8, and C-5 as in (c), (d), and (e) to correct for any change in high-frequency alignment which may have been caused by the adjustment of C-15.

After the receiver has been replaced in the car, it may be necessary to make a final correction of the dial pointer by tuning in a station of known frequency and adjusting the pointer by means of the knurled shaft on the rear of the control head.

Tuning Condenser Drive

Smooth control should be obtained over the entire tuning range of the variable condenser. If irregularity is present, check the action of the gear mechanism for binding or backlash at every point within the tuning range. A bind may be due to improper mesh between the worm gear and the large gears on the condenser shaft. To correct such a condition, loosen the two screws holding the gear plate and adjust the mesh of the gears to a position which gives smooth operation. Gear backlash is prevented by the small compression spring between the two large gears on the rotor shaft.

Interrupter

The mechanical interrupter used in the power system is constructed with a plug-in base, so as to be easily removed from the receiver. Its adjustments have been correctly set during manufacture by means of special equipment. In cases of faulty operation of the interrupter, a renewal should be made.

Radiotrons

Deterioration of tubes and their approach to failure is usually evidenced by noisy or intermittent operation, loss of sensitivity and distorted tone quality. When suspected as faulty, the tubes should be removed from the receiver and checked with standard tube testing apparatus. It is not feasible to test the tubes while in the receiver, due to measurement inaccuracies which would result from the effects of the circuits.

Receiver Housing

The screws holding the receiver chassis to the case must all be in place and tightly installed, inasmuch as they appreciably affect the ground resistance of the assembly and will consequently have a bearing on the amount of ignition noise received.

Radiotron Socket Voltages

Operating conditions of the basic circuits of this instrument may be determined by measuring the voltages applied to the tube elements. Figdre 6 shows the voltage values from the socket contacts to ground and appearing across the heater contacts (H-H). Each value as specified should hold within ± 20% when this instrument is normally operative, with all tubes intact and rated voltage applied. Variations in excess of this limit will usually be indicative of trouble.

The voltages given on this diagram are actual measured voltages, and are obtained with the voltmeter load in the circuit.

To fulfill the conditions under which the d-c voltages were measured requires a 1,000-ohm-per-volt d-c voltmeter having ranges of 10, 50, 250, and 500 volts. Voltages below 10 volts should be measured on the 10-volt scale; between 10 and 50 on the 50-volt scale; between 50 and 250 on the 250-volt scale; and above 250 on the 500-volt scale.

For meters of the 1,000-ohm-per-volt type, but ranges other than above, use the nearest ranges to those specified. If the range is higher the voltage may be higher, if the range is lower the voltage may be lower; either condition depending on the percentage of circuit current drawn by the meter.

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Hudson Stock No.	RCA Stock No.	DESCRIPTION
		RECEIVER ASSEMBLIES
BO 151315	11130	Capacitor—Adjustable capacitor—C15
BO 152064	11289	Capacitor—50 mmfd.—C25
BO 152065	12270	Capacitor—80 mmfd.—C50
BO 152066	8076	Capacitor—115 mmfd.—C22
BO 152067	11998	Capacitor—115 mmfd.—C16, C17, C19, C20
BO 152068	11181	Capacitor—265 mmfd.—C11, C21, C35, C36, C41
BO 151317	11171	Capacitor—400 mmfd.—C26
BO 152069	4210	Capacitor—600 mmfd.—C47
BO 152070	12268	Capacitor—1,400 mmfd.—C4
BO 152071	12269	Capacitor—2,200 mmfd.—C9
BO 151320	5148	Capacitor—.007 mfd.—C24, C34, C38, C51
BO 152072	4858	Capacitor—.01 mfd.—C3, C23, C32, C33
BO 151324	5196	Capacitor—.035 mfd.—C31
BO 152073	4836	Capacitor—.05 mfd.—C18
BO 151326	4841	Capacitor—0.1 mfd.—C12, C27
BO 152074	12237	Capacitor—0.25 mfd.—C29, C37, C39
BO 151329	11418	Capacitor—0.5 mfd.—C42
BO 152075	5019	Capacitor—0.5 mfd.—C43
BO 152076	12234	Capacitor—8.0 mfd.—C48
BO 152077	12233	Capacitor Pack—Comprising 2 sections of .01 mfd.—C45, C46
BO 152078	12238	Capacitor Pack—Comprising one 8 mfd. and two 10 mfd. sections—C28, C30, C49
BO 152079	12235	Coil—Choke coil—L12
BO 152080	12223	Coil—Antenna Coil—L3
BO 152081	12224	Coil—R. F. Coil—L4, L5
BO 152082	12225	Coil—Oscillator Coil—L16, L17
BO 152083	12220	Condenser—3 gang variable tuning condenser—C5, C6, C7, C8, C13, C14
BO 152084	12006	Core—Adjustable core for I. F. Trans. Stock No. 12228 or No. 12229
BO 152085	12289	Coupling—Station selector flexible shaft coupling
BO 152086	12239	Filter—Antenna filter—L1, L2, C2
BO 152087	12221	Gear—Large gear for tuning condenser—located on condenser shaft
BO 152088	12222	Gear—Worm gear, screw and locknut for variable condenser
BO 152089	12242	Guide—Station selector shaft guide
BO 152090	12232	Reactor—Filter reactor—iron core—L13
BO 152091	5034	Resistor—56 ohm—carbon type—½ watt—R18, R19—Package of 5
BO 152092	12481	Resistor—330 ohms—insulated—¼ watt—R2—Package of 5
BO 152093	12262	Resistor—680 ohms—insulated—¼ watt—R4—Package of 5
BO 152094	12267	Resistor—1200 ohms—insulated—¼ watt—R17—Package of 5
BO 152095	8097	Resistor—5600 ohms—carbon type—2 watts—R11
BO 152096	12265	Resistor—6800 ohms—insulated—¼ watt—R10—Package of 5
BO 152097	12288	Resistor—10,000 ohms—insulated—¼ watt—R12—Package of 5
BO 152098	12266	Resistor—39,000 ohms—insulated—¼ watt—R15—Package of 5
BO 152099	12073	Resistor—47,000 ohms—carbon type—1 watt—R6—Package of 5
BO 151352	5132	Resistor—47,000 ohms—carbon type—1/10 watt—R20—Package of 5
BO 152100	12286	Resistor—56,000 ohms—insulated—¼ watt—R3—Package of 5
BO 152101	12263	Resistor—100,000 ohms—insulated ¼ watt—R16—Package of 5
BO 152102	11281	Resistor—100,000 ohms—carbon type—1/10 watt—R8—Package of 5
BO 152103	12264	Resistor—220,000 ohms—insulated—¼ watt—R21—Package of 5
BO 152104	12285	Resistor—470,000 ohms—insulated—¼ watt—R1—Package of 5
BO 152105	11452	Resistor—470,000 ohms—carbon type—1/10 watt—R5, R7—Package of 5
BO 152106	12287	Resistor—1.5 megohms—insulated—¼ watt—R13, R14—Package of 5
BO 151360	3584	Ring—Retaining ring for RF or oscillator coil
BO 152107	12290	Shield—6D6 or 6A7 radiotron shield
BO 151363	3623	Shield—R.F. or oscillator coil shield
BO 152108	12227	Socket—8 contact radiotron socket
BO 152109	4786	Socket—6 contact 6D6 or 85 radiotron socket
BO 152110	4787	Socket—7 contact 6A7 radiotron socket
BO 152111	12241	Socket—6 contact vibrator socket
BO 152112	12243	Socket—7 contact output (6A6) radiotron socket
BO 152113	12226	Stud—Variable tuning condenser mounting stud assembly
BO 152114	12228	Transformer—First intermediate frequency transformer—L6, L7, C16, C17, R5, R7
BO 152115	12229	Transformer—Second intermediate frequency transformer—L8, L9, C19, C20, C21, R20
BO 152116	12230	Transformer—Audio transformer pack comprising driver and output transformer—T1, T2
BO 152117	12231	Transformer—Vibrator power transformer—T3
BO 152118	12236	Vibrator—Complete
BO 152119	12240	Volume Control—R9
		CONTROL HEAD AND FLEXIBLE SHAFT ASSEMBLY
BO 152120	12279	Bezel—Station selector dial crystal and bezel assembly
BO 152121	12277	Box—Control box complete—less cables, flexible shafts, and knobs
BO 152122	12280	Cover and Switch-Control Box Back Cover and Switch Assembly
BO 152123	12281	Dial Assembly—Station selector dial scale, indicator pointer, shaft and gear assembly
BO 71406	5023	Fuse—15 Amperes—Package of 5
BO 152124	12278	Gear—Station selector idler gear—for control box
BO 152125	4290	Insulator—Fuse connector insulator—Package of 10
BO 151398	11445	Knob—Station selector or volume control knob—Package of 5
BO 71641	11765	Lamp—Dial Lamp—Package of 5

REPLACEMENT PARTS (Continued)

Hudson Stock No.	RCA Stock No.	DESCRIPTION
BO 152126	12273	Lead—A lead and bracket complete with male section of fuse connector—connects control box switch to fuse connector
BO 152127	12274	Lead—A lead—complete with female section of connector—connects control box switch to receiver
BO 152128	12276	Lead—A lead—complete with female section of fuse connector—less fuse and fuse insulator—connects car A terminal to fuse connector
BO 152129	12271	Shaft—Station selector flexible shaft assembly
BO 152130	12272	Shaft—Volume control flexible shaft assembly
BO 152131	12282	Shaft—Volume control shaft for control box
BO 152132	12283	Shaft—Station selector shaft and gear for control box
BO 152133	12275	Socket—Dial lamp socket and lead
BO 151761	11349	Spring—Retaining spring for knob—Stock No. 11445—Package of 5
BO 152134	12284	Spring—Retaining spring for station selector or volume control shafts or idler gear in control box—Package of 10
		MISCELLANEOUS ASSEMBLY
BO 152135	12291	Body—Fuse connector body—Package of 10
BO 152136	4287	Body—Antenna connector body—Package of 10
BO 152137	12253	Bolt—5/16—18 x ¾" hex head bolt with lockwasher for receiver mounting—Package of 10
BO 152138	4288	Cap—Antenna or fuse connector cap—Package of 10
BO 151402	11447	Capacitor—0.25 Mfd.—Gas Gauge Capacitor
BO 152021	12256	Capacitor—0.25 Mfd.—Temperature Gauge Capacitor
BO 152022	12255	Capacitor—0.5 Mfd.—Generator capacitor
BO 152139	12244	Cover—Receiver housing top cover (nearer flexible shaft ferrule)
BO 152140	12245	Cover—Receiver housing bottom cover
BO 152141	12247	Fastener—Plug fastener for receiver top cover—Package of 10
BO 151726	4286	Ferrule—Antenna or fuse connector ferrule and bushing—Package of 10
BO 152142	12246	Housing—Receiver housing complete with top and bottom covers
BO 151397	4132	Knob—Tone Control knob
BO 152143	12250	Lead—Shielded Antenna Cable—chassis end with section of connector
BO 152144	12251	Lead—"A" lead—complete with male section of connector—(chassis end)
BO 152145	4393	Screw—Set screw for tone control knob—8-32 x 5/16 Headless—Package of 10
BO 152146	12252	Screw—No. 8 self-tapping hex head screw—used on receiver housing—Package of 10
BO 152147	12248	Socket—3 contact socket and bracket assembly for reproducer cable
BO 151724	4284	Spring—Antenna or fuse connector spring—Package of 10
BO 151399	11446	Suppressor—Distributor suppressor
BO 152148	12249	Tone Control—R22
BO 151725	4285	Washer—Antenna or fuse connector insulating washer—Package of 10
		REPRODUCER ASSEMBLIES
BO 152149	12259	Cable—3 conductor shielded reproducer cable complete with 3 contact male connector
BO 152150	12258	Coil—Field—L14
BO 152151	12257	Cone—Reproducer cone—L15
BO 152152	11984	Connector—3 contact male connector for reproducer cable
BO 152153	12260	Housing—Reproducer housing complete
BO 152154	9656	Reproducer—Complete with housing, cable and plug—less mounting stud
BO 152155	9657	Reproducer—Complete, less housing, cable and plug
BO 152156	12254	Stud—Reproducer mounting stud assembly comprising 1 stud, 1 spacer, 2 lockwashers and 2 nuts.

SERVICE TEST EQUIPMENT

RCA CATHODE RAY OSCILLOGRAPH

The RCA Cathode Ray Oscillograph is a complete self-contained unit designed for service and experimental applications. It includes two power supplies (one for the Cathode Ray Tube and one for the amplifier), vertical and horizontal amplifiers, saw-tooth timing frequency generator and six tubes, including the RCA-906 Cathode Ray Tube (3-inch).

Through the use of two wide-frequency-range high-gain amplifiers, the sensitivity is guaranteed at 2 volts d-c per inch for both vertical and horizontal deflection. The amplifiers have flat frequency characteristics between 20 and 90,000 cycles ± 10 percent. The amplifier gain is approximately 40.

A linear saw-tooth timing-frequency oscillator with a special synchronizing circuit is an integral part of the RCA Oscillograph. The frequency range extends from 20 to 15,000 cycles and permits the examination of a single cycle up to 15,000 cycles or the examination of six cycles up to the limit of the amplifier—90,000 cycles.

Stock No. 9545. . . . . **Net Price $84.50**

RCA TEST OSCILLATOR—TMV-97-C

The RCA Test Oscillator, Model TMV-97-C, is a wide frequency range test oscillator designed primarily for service applications. A copper shielded coil unit gives unusually low leakage, even on the high frequency bands while the output control permits wide variations in output up to 2 milliwatts. The frequency range extends from 90 to 25,000 kc. by means of eight overlapping bands. The frequency range is covered entirely by a fundamental frequency, no harmonics being used. A direct reading dial is guaranteed accurate ± 3% while individual factory calibration, accurate to ± 1%, is available at an additional cost of $5.00.

Other features include a modulation switch and jack for operating either with or without 400 cycle modulation or with external modulation if desired. A jack is connected across the main tuning capacitor which permits ready connection of a Frequency Modulator for oscillograph operation. Operation as a heterodyne frequency meter is also secured by plugging headphones into the modulation jack and placing the modulation switch at the unmodulated position. Stock No. 9595. . . . . **Net Price $34.50**

RCA FREQUENCY MODULATOR

Align your circuits visually with this new RCA Frequency Modulator and the RCA Cathode Ray Oscillograph. Sweeps the r-f voltage of your test oscillator over the resonant frequency of the circuit under test and generates an a-c synchronizing voltage simultaneously. Quick, accurate alignment, just like factory production, is quickly done, eliminating all possibility of error. Motor-driven, balanced tuning capacitor of two ranges and a-c generator driven from same shaft, thereby eliminating screen flicker.

SPECIFICATIONS

Tuning Capacitor—Two sections—each 35 mmfd. Panel switch for connection of either one or both to output. Variable sweep range 22.5 mmfd. or 45 mmfd.

Connecting Cable—14-inch low-capacity connecting cable with plugs.

Generator Frequency—Two cycles per revolution permit positive synchronizing for double-sweep alignment.

Generator Voltage—1.5 volts minimum.

Motor—Repulsion induction type—1550 R.P.M.

Panel Controls—"Hi-Lo" capacity switch, "On-Off" switch, output binding posts and single-circuit jack. Stock No. 9558. . . . . **Net Price $27.50**

RCA TUNING WAND

The RCA Tuning Wand is a special alignment tool which makes possible the checking of alignment in all-wave receivers without disturbing the adjustment of the trimmer capacitors. The tool consists of a bakelite rod having a brass cylinder at one end and a special finely divided iron core at the other end. Inserting the brass cylinder into a coil lowers its inductance, while inserting the iron increases the inductance. Stock No. 6679. **Net Price $1.10**

RCA ALIGNMENT TOOL

The RCA Alignment Tool is a bakelite shaft combination screw driver and socket wrench. The metal screw driver bit is so shaped that the increase in capacity caused by its touching a trimmer screw is offset by the reduction in inductance caused by its shape. The bakelite shaft is 7/32" in diameter, which gives entrance to 1/4" holes, used on older model Radiola receivers.

Stock No. 4160. . . . . **Net Price $0.60**

RCA MANUFACTURING CO., INC., PARTS DIVISION, CAMDEN, N. J.

Hudson and Terraplane Pistons

The pistons used in 1933-4-5 and 6 models of Hudsons and Terraplanes have certain similarities in design which permit consideration of them as a single group.

The pistons are made of aluminum silicon alloy which is light, has a relatively low coefficient of expansion and is hard, presenting a good wearing surface.

The piston skirt is cam ground and tapered when machined, so that it takes a true cylindrical shape when heated, giving maximum bearing area at operating temperatures.

The piston rings are pinned to prevent rotation in the grooves so that they wear-in true to the cylinder contour and remain in a fixed position to maintain a better oil seal.

The pistons used as original equipment in 1933 and 1934 models use two oil and two compression rings above the piston pin, while the 1935 and 1936 pistons have two compression and one oil ring above the pin and one oil ring below the pin.

This later design has been adopted to get the rings further away from the intense heat of combustion so that the oil control is obtained -at a point where the oil is more viscous and easier to control.

This later design is available only in 3" pistons. It is recommended that it be used for replacement in all 3" bore engines where a complete set of new pistons is being installed. The use of one or more of these pistons together with pistons with 4 rings above the piston pin to complete a set in an engine is not recommended due to the difference in weight of the two types.

Selection of Piston Pins

The piston pin bosses in the pistons are diamond bored, giving a very highly finished surface that is true. This is the only method of finishing which will give nearly 100% bearing of the piston pin. This is essential for long life and freedom from piston pin noise.

Due to the finish and the method of selecting the pin, no wear should be experienced in the piston pin boss during the life of the piston. Wear is confined to the piston pin and the connecting rod upper bushing. These parts should be replaced when necessary by proper selection of the pin and reaming of the bushing to size.

When replacing pins, select the pin so that it can be pushed into the piston boss with the heel of the hand when the piston is heated to 200º Fahrenheit.

Heat the piston in boiling water or in an electric furnace. Heating with a blow torch or other concentrated heat or driving the pin in or out of the bosses will distort the piston.

After the proper sized pin is selected, replace the, connecting rod upper bushing and ream or burnish to .0003"

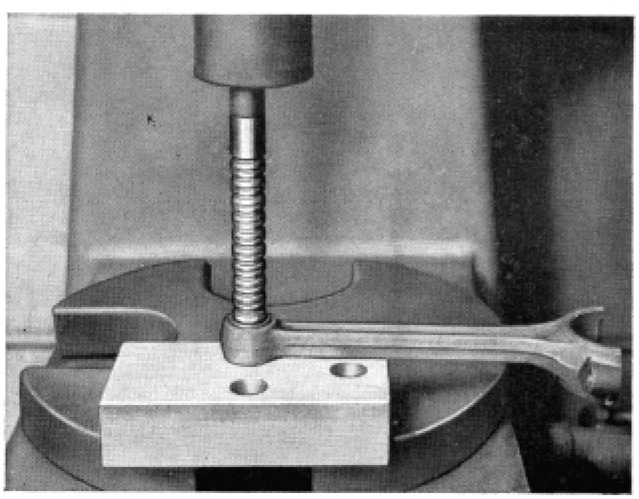


Figure 1

Burnishing Connecting Rod Upper Bushing
Tool No. J-410

Figure 2

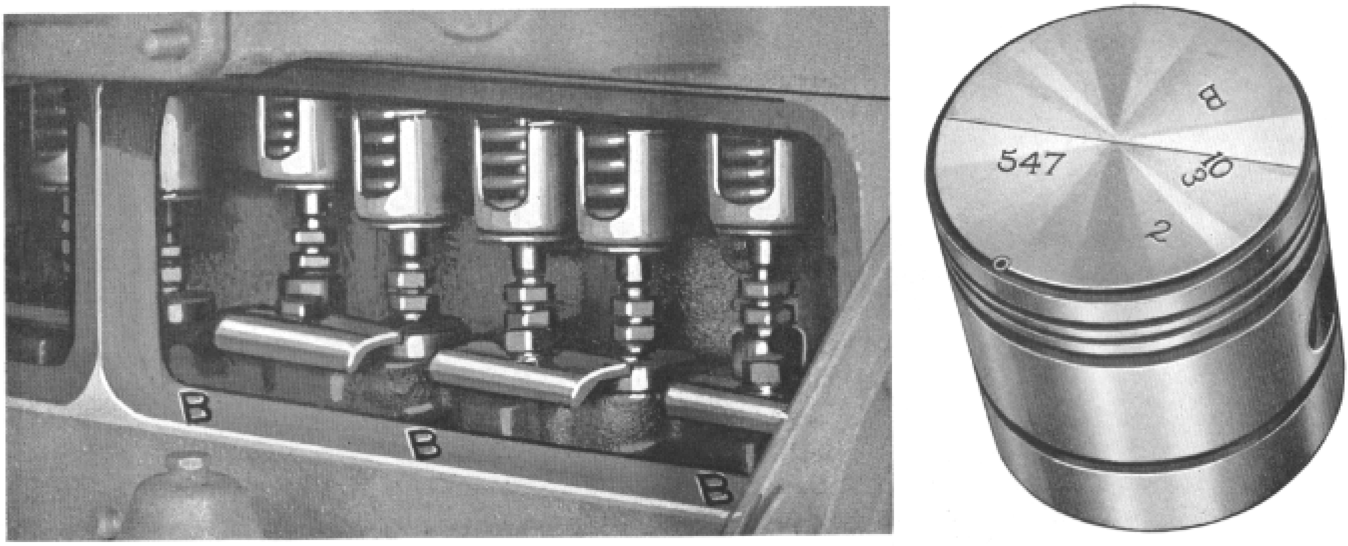


Figure 3

larger than the pin. If this fit is correct the connecting rod will just turn on the pin under its own weight when the rod is held in a horizontal position.

Selecting and Fitting Piston Rings

When fitting the pinned type piston ring, the gap between the ends of the ring and the clearance between the pin and the ends of the ring are equally important.

The rings are cut and notched to accept the pin so that the clearance on the pin is equal to the gap between the ends of the ring (Figure 2). In other words, if the ring is compressed so that the ends come together there will be no clearance on the pin.

If the ends of the ring are filed in fitting the ring it is necessary to file an equal amount in the pin notch to maintain the pin clearance. Filing should, however, not be necessary.

Piston rings of the pinned type are supplied in exact sizes to give a minimum gap of .005” when installed in a cylinder of the size for which the ring is designated. Since it is necessary to hone or otherwise recondition a cylinder bore when oversized pistons are being fitted, they should be brought to an exact size for which piston rings are available. For example, a cylinder may clean up at .009” oversize. However, since no ring is available in this size it is advisable to hone the cylinder to .010” oversize rather than file the gap of a set of .010” oversize rings to permit their use in a .009” oversize cylinder.

The sizes in which piston rings are available are given in Tables No. 1 and No. 2. When ordering rings, both the part number and the size desired should be given on the order.

Selection of Pistons

The code letters stamped on the cylinder block along the lower face of the valve chamber, as shown in Figure 3, designate the original size of each cylinder. The size code letters and piston weight, in ounces and quarter ounces (Figure 3), stamped on the heads of the pistons will help in selecting pistons correctly from stock. In addition to the size and weight marks all original piston installations are numbered to indicate the cylinder block number and the number of the cylinder in which the piston is fitted.

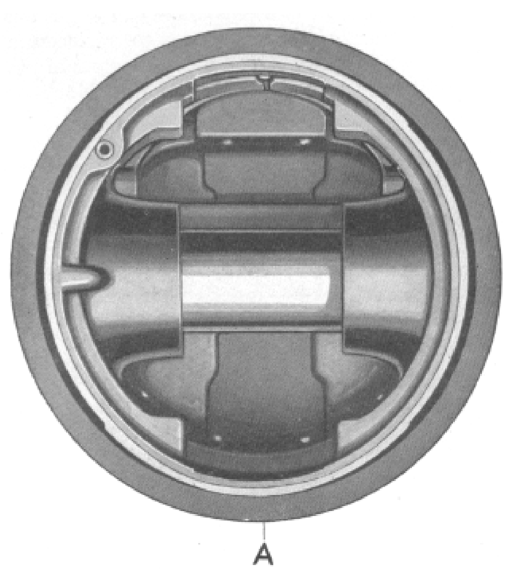


Figure 4

Where a single piston is selected it should be of the same weight as the piston removed. Complete sets of new pistons should always carry the same weight stamp on all pistons. Unequal piston weight will cause rough engine operation.

After selecting a piston by the code letters, place it in the cylinder in which it is to be used with a .0015" feeler directly opposite the skirt slot, as indicated by A, Figure 4. The position of the feeler is important due to the cam grinding of the skirt. If the piston is the correct size, the feeler can be removed by exerting from 3 to 4 pounds pull. J-888-A piston feeler scale (Figure 4) is recommended to measure this pull.

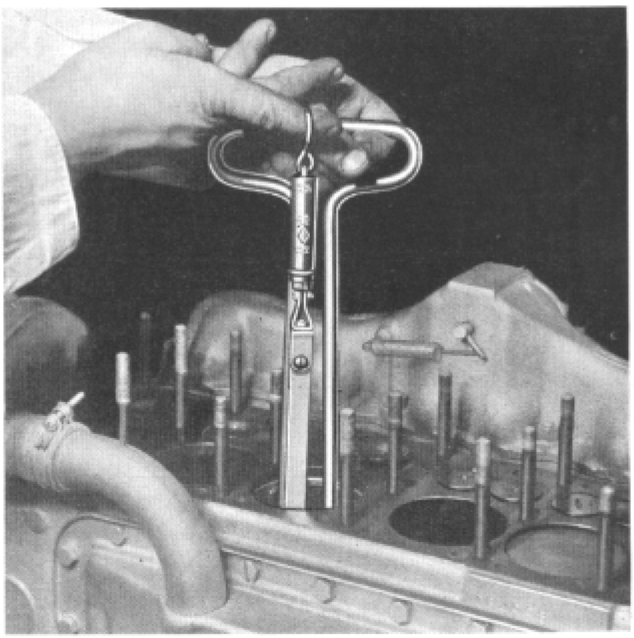


Figure 5

The following tables give the cylinder bore sizes from standard to .020" oversize for which pistons are available. Opposite each cylinder size is given the cylinder code (if any), the code letter of the correct piston size and the piston ring size.

It will be noted that the same ring size may be designated for more than one piston size. It is advisable to hone the cylinder to the smallest dimension for which a given ring is recommended. This gives a minimum piston ring gap. Always check rings to see that the gap is not less than .005".

Table No. 1 gives the sizes of the following parts:

43458 Piston.

43443 Piston Ring - Compression - 2 required per piston.

43445 Piston Ring - Oil Control - Upper - 1 required per piston.

43447 Piston Ring - Oil Control - Lower - 1 required per piston.

37029 Piston Pin and 33332 Connecting Rod Upper Bushing should be used with these parts. The piston pin is available in standard and .002,.005 and .010" oversize.

These parts can be used singly or in complete sets in 1933 Hudson 6, Terraplane 6 and Terraplane 8.

These parts can be used in complete sets only in 1932 Terraplane and 1932 Essex.

TABLE NO. 1

CYLINDER Size	CYLINDER Code	PISTON Code	PISTON RING Size
2.9375	A	B	2.937
2.938	B	B	2.937
2.9385	C	D	2.937
2.939	D	D	2.937
2.9395	E	F	2.937
2.940		F	2.937
2.9415		1	2.940
2.9425		L	2.942
2.9475	AO	BO	2.947
2.948	BO	BO	2.947
2.9485	CO	DO	2.947
2.949	DO	DO	2.947
2.9495	EO	FO	2.947
2.950		FO	2.947
2.9525		LO	2.952
2.9575		BB	2.957
2.9585		DD	2.957
2.9595		FF	2.957

Table No. 2 gives the sizes of the following parts:

Group A

43459 Piston.

43452 Piston Ring - Compression - 2 required per piston.

43454 Piston Ring - Oil Control - Upper - 1 required per piston.

43456 Piston Ring - Oil Control - Lower - 1 required per piston.

These parts should be used for individual replacements (not in sets) in 1933 and 1934 Hudson 8 engines.

See Group B for replacement of complete sets in these engines.

Group B

47097 Piston.

43452 Piston Ring - Compression - 2 required per piston.

43456 Piston Ring - Oil Control - 2 required per piston.

These parts should be used for individual replacements or in complete sets in 1935 and 1936 Hudson 6 Hudson 8 and Terraplane engines, .

These parts should also be used for replacement in complete sets (see group A for individual replacements,) for 1932, 1933 and 1934 Hudson 8, 1934 Hudson 6 and 1934 Terraplane engines.

37029 Piston Pin and 33332 Connecting Rod Upper Bushing should be used with both groups covered by Table No. 2. The piston pins are available in standard, .002, .005 and .010" oversize.

TABLE NO. 2

CYLINDER		PISTON	PISTON RING
Size	Code	Code	Size
3.000	A	B	3.000
3.0005	B	B	3.000
3.001	C	D	3.000
3.0015	D	D	3.000
3.002	E	F	3.000
3.0025		F	3.000
3.004		1	3.003
3.005		L	3.005
3.010	AO	BO	3.010
3.0105	BO	BO	3.010
3.011	CO	DO	3.010
3.0115	DO	DO	3.010
3.012	EO	FO	3.010
3.0125		FO	3.010
3.015		LO	3.015
3.020		BB	3.020
3.021		DD	3.020
3.022		FF	3.020

Fitting Pistons

When checking piston size by the feeler gauge method, take the following precautions:

(1) Remove ridge from top of cylinder with J-592 cylinder Ridge Reamer.

(2) Place feeler gauge in extreme right of cylinder.

(3) Insert piston with wrist pin bosses parallel to crankshaft and unslotted side of skirt to right.

(4) Be sure feeler gauge contacts piston 90' from center line of piston pin bosses.

(5) Measure pull required to remove feeler gauge with a spring scale. Don't guess a thousandth of an inch variation will change the pull on the feeler only a few pounds.

Causes of Excessive Oil Consumption

(1) Scored Cylinders.
(2) Scored Pistons.
(3) Piston Rings weak or broken.
(4) Piston Rings seized in grooves.
(5) Piston Rings loose in grooves.
(6) Oil Return Holes clogged with carbon.
(7) Cylinders out of round.
(8) Improper Grade of Oil.
(9) Poor Oil or Diluted Oil.
(10) Worn Valve Guides.
(11) Poor Ignition.*
(12) Poor Valve Seats.*
(13) Sticking Valves.*
(14) Leaking Cylinder Head Gasket.*

*Poor ignition or poor compression will cause incomplete burning, allowing an accumulation of unburnt gasoline, which will dilute the oil and permit it to pass the piston rings.

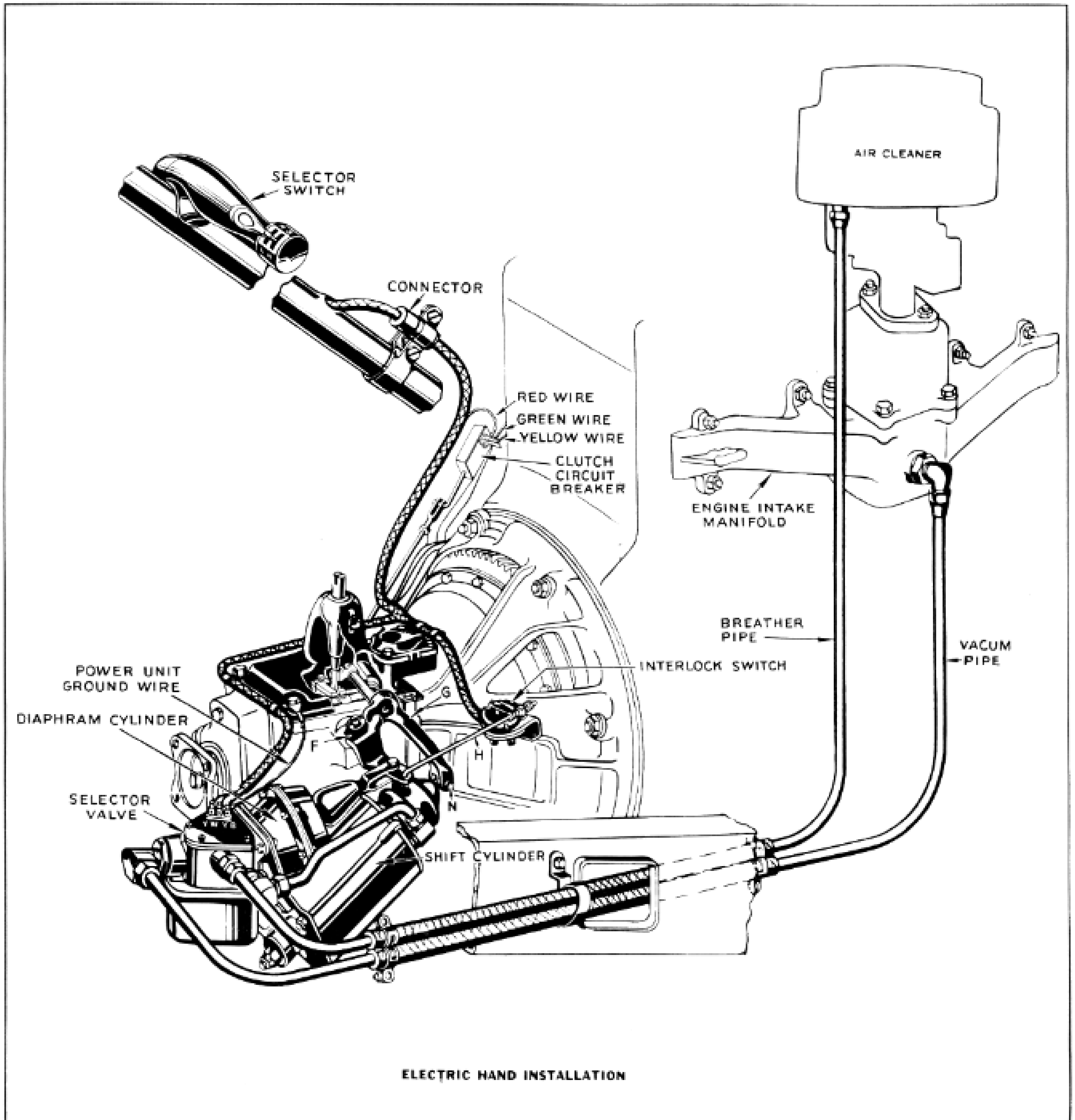
A leaking cylinder head gasket will cause poor compression and in addition may allow water to enter the cylinders and further dilute the oil.

The Electric Hand

The electric hand provides a means of shifting the gears of a conventional selective transmission by mechanical power. The control of the mechanism is electrical, while the power for the shifting is derived from the vacuum of the engine intake manifold.

Clutch Circuit Breaker

When the clutch is engaged the electrical supply circuit to the electric hand is open, so that it is necessary to disengage the clutch before a gear shift can be made. This circuit breaker is operated through linkage to the clutch pedal,



ELECTRIC HAND INSTALLATION

Figure 1

which is adjustable to determine the exact amount of clutch disengagement before the circuit is closed and a shift made and also the amount of clutch engagement before the power is again cut off.

The Selector Switch

The selection of the gear desired in the transmission is made by moving the lever of the selector switch to the corresponding position in the (H) plate of the selector switch housing. This selects the proper circuit to control the shifting mechanism.

The Interlock Switch

This switch interrupts the circuit from the selector switch to the power unit to insure a shift to neutral to permit a cross shift, if this is necessary before the final movement of the shift is made. The switch is mechanically controlled by linkage from the cross shift mechanism. This linkage is adjustable and incorporates a "lost motion" sleeve to insure the completion of the cross shift before the circuit is changed to correspond to the one selected in the selector switch. Without this switch, preselection from one gear to another which requires a cross shift would be impossible, while any shift would have to be made slowly to insure the mechanism following the control movement.

Contact Plate

The contact plate opens the circuit after the shift has been completed. This switch is controlled by a rod connected to the bottom of the shifting lever (A).

POWER UNIT

Solenoids and Valves

The selector switch, interlock switch and contact plate control the electrical connections to 3 solenoids, each of which operates a valve. These valves are connected in the vacuum line from the engine intake manifold and control the vacuum to the cross shift or diaphragm cylinder and power cylinder.

The valves are of the poppet type and are held up by small springs. When a solenoid is energized, the valve which it controls is pulled down.

When the valves are in the upper position, the vacuum line is closed from the engine and the lines to the diaphragm cylinder and power cylinder are open to atmosphere.

When the valves are in their lower position, the vacuum line from the engine is connected to the diaphragm cylinder or power cylinder.

One valve controls the cross shift, one the forward and one the rearward movement of the transmission shifting rails.

Power Cylinder

The power cylinder has a vacuum operated piston which provides the power for the forward and rearward movement for shifting the gears. When the valve (21) in the vacuum line to the rear of the power cylinder is drawn down by its solenoid, opening the vacuum line, the piston moves backward. When the valve (20) in the vacuum line to the front of the power cylinder is drawn down by its solenoid, the piston moves forward. The movement of the piston is transmitted to the shifting lever (A) through the control cross shaft (E) and inner and outer levers.

Cross Shift Cylinder

The cross shift cylinder is of the diaphragm type. A spring (Y), Figure 2, in the cylinder presses the diaphragm forward, which, through connecting linkage (F, G, E), holds the shifting lever (A) of the transmission engaged with the high and second speed shifting rail fork (B), Figure 2. When the valve (22) connected to the cross shift cylinder is drawn down by its solenoid, the diaphragm moves backward, pulling the bellcrank (F) which moves the control shaft (E) to the right to engage the lower end of the shifting lever (A) with the low and reverse shifting rail fork (C). This position is shown in Figure 3.

FUNCTIONING

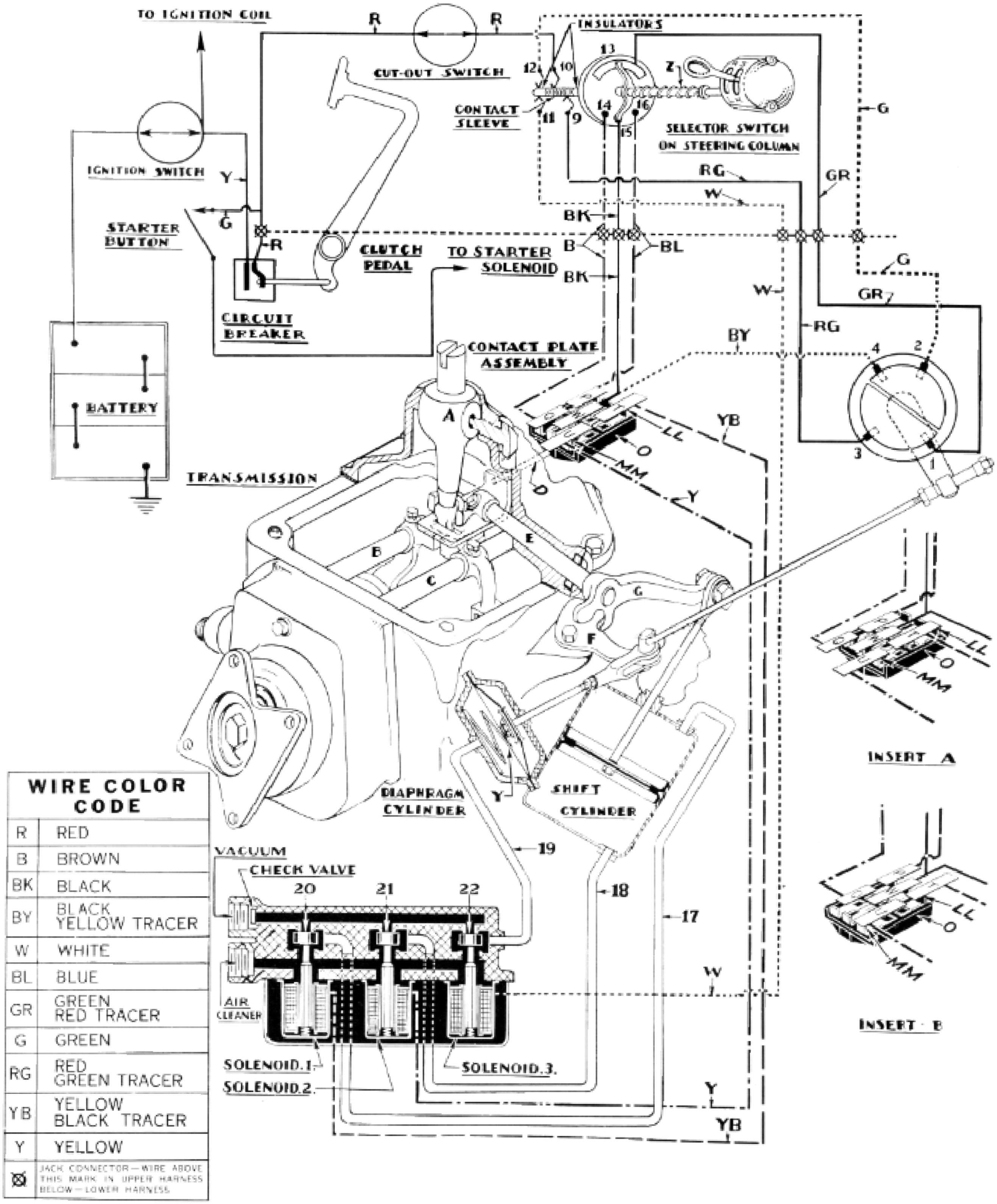
Figure 2 shows the selector in neutral with the lever held to the right by the spring (Z). The transmission is also in neutral and the lower end of the shifting lever (A) is held to the right by the spring (Y) in the diaphragm cylinder, so that it is engaged in the notch of the high and intermediate shifting fork (B).

The valves 20, 21 and 22 are up against their seats so that both the front and rear of the power cylinder and the cross shift cylinder are open to the atmosphere through the air cleaner,

If the clutch is depressed, closing the circuit breaker, the circuit will be closed to 10, through the contact sleeve to 9, to 3 and 1 on the interlock switch to 13 on the selector to 15 to plate (W) of the contact plate. Since the fingers L-L and M-M do not touch the plate (W,), the circuit is open.

If, however, the transmission were in high gear, the contact plate sliding block (0) would have moved forward to the position of insert (A). The fingers (M-M) would be contacting plate (W) and would close the circuit to plate (LT) to solenoid No. 2. The valve 21 would be pulled down connecting the rear of the power cylinder to the vacuum, so that the piston would move backward and, through the linkage (G, E and A), move the shifting rail (B) backward. The rod (D) would also be moved backward, pulling the contact plate sliding block until the fingers (M-M) break contact with the bar (W). When circuit is broken, the valve 21 raises to its seat and the shift is completed to neutral.

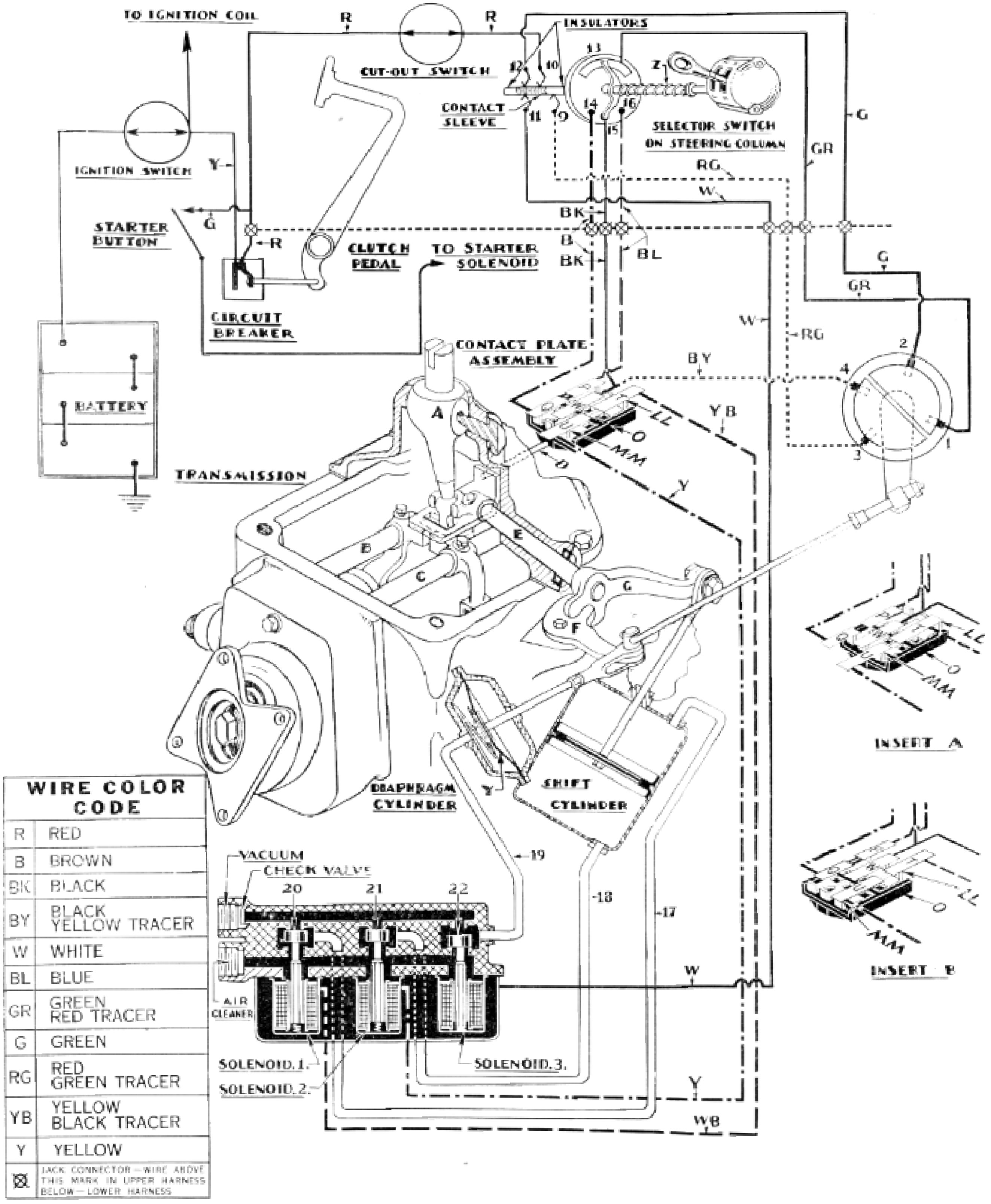
If the transmission had been moved to second gear, the contact plate would have been in the position shown in insert (B) , completing the circuit from (W), through fingers (L-L) to plate (T) to solenoid No. 1, opening the vacuum to the front of the power cylinder so that the



WIRE COLOR CODE

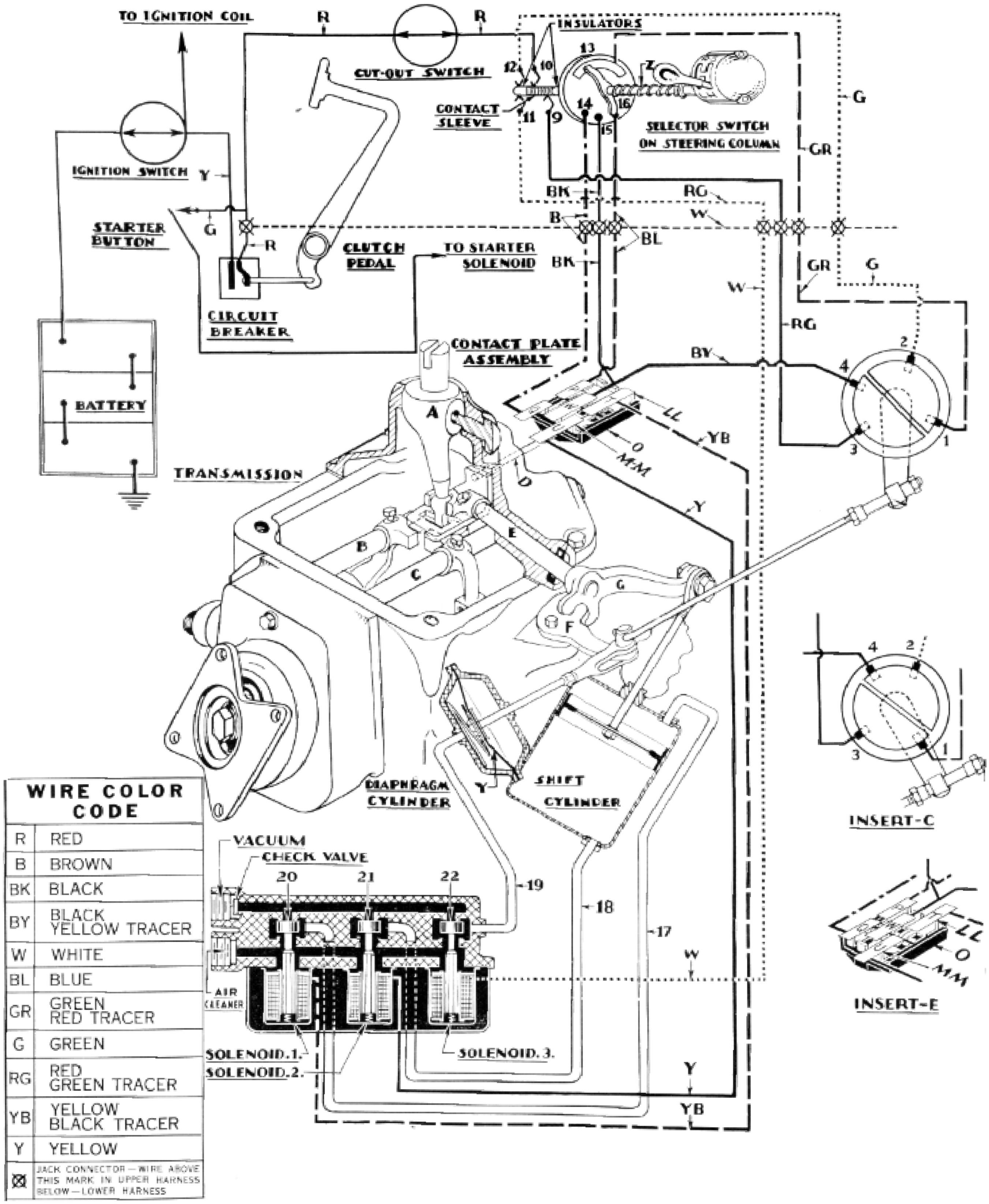
R	RED
B	BROWN
BK	BLACK
BY	BLACK YELLOW TRACER
W	WHITE
BL	BLUE
GR	GREEN RED TRACER
G	GREEN
RG	RED GREEN TRACER
YB	YELLOW BLACK TRACER
Y	YELLOW
⦻	JACK CONNECTOR—WIRE ABOVE THIS MARK IN UPPER HARNESS BELOW—LOWER HARNESS

Figure 2



WIRE COLOR CODE	
R	RED
B	BROWN
BK	BLACK
BY	BLACK YELLOW TRACER
W	WHITE
BL	BLUE
GR	GREEN RED TRACER
G	GREEN
RG	RED GREEN TRACER
YB	YELLOW BLACK TRACER
Y	YELLOW
⊠	JACK CONNECTOR — WIRE ABOVE THIS MARK IN UPPER HARNESS BELOW — LOWER HARNESS

Figure 3



WIRE COLOR CODE	
R	RED
B	BROWN
BK	BLACK
BY	BLACK YELLOW TRACER
W	WHITE
BL	BLUE
GR	GREEN RED TRACER
G	GREEN
RG	RED GREEN TRACER
YB	YELLOW BLACK TRACER
Y	YELLOW
⊠	JACK CONNECTOR — WIRE ABOVE THIS MARK IN UPPER HARNESS BELOW — LOWER HARNESS

Figure 4

piston would be moved forward, bringing the transmission into neutral where the fingers (L-L) would break contact with bar (W) and the shift would be completed to neutral.

Figure 3 shows the same condition as in Figure 2, except the selector lever has been pushed to the left but is still in the neutral position. It will be noted that the circuit from 10 in the selector switch is now completed through the contact sleeve to both 11 and 12.

The circuit from 11 is direct to solenoid No. 3 so that valve No. 22 is drawn down, connecting the cross shift cylinder to the vacuum. The diaphragm has moved backward, rotating bellerank (F) which pulls lever (G), shaft (E) and the lever (A) to the right so that (A) is engaged in the notch of the shifting fork of rail (C) which controls the shift into low and reverse gears.

The circuit from 12 is to 2 and 1 on the interlock switch, to 13 to 15 on the selector switch to bar (W) on the contact plate. Now following the same procedure as under Figure 2 it will be seen that, if the transmission were in low gear, the contact plate would be in the position of insert (A) (same as for high gear), energizing solenoid 2 and the shift would be to neutral. If the transmission were in reverse, the contact plate would be in the position of insert (B) (same as for second gear), energizing solenoid (1) and the shift would be to neutral.

Referring again to Figure 2 it will be seen that if the selector lever is moved to the high gear position (transmission in neutral), the circuit will be completed as before to 13 on the selector switch, then to 16 to (P) on the contact plate through the fingers (L-L) to (T) to solenoid 1 and the shifting rail (B) will be moved forward until the contact plate reaches the position of insert (A) when the fingers (L-L) will move off of bar (P) opening the circuit.

If the selector lever is now moved to the second gear position (transmission in high or neutral), the circuit from 13 is to 14 on the selector switch to bar (Q) through the fingers (M-M) to bar (U), to solenoid 2 and the movement of the rail (B) will be backward until the fingers (M-M) move off of bar (Q) opening the circuit as in insert (B).

Referring to Figure 3, the action will be the same for low and reverse as just explained for high and second as the lever (A) is held in engagement with the shifting rail (C) and all other circuits are identical.

Figure 4 shows the selector lever in the high gear position and the transmission in low gear. In order to shift from low to high, the power cylinder piston must first move backward and bring the transmission to neutral. We find that the circuit is correct for this as indicated by the solid lines from 10 to 9 and 3 to 4 on the interlock to bar (W) on the contact plate. The circuit is closed from (W) through the fingers (M-M) to bar (U) to solenoid 2 so that the movement will be backward until the fingers (M-M) break contact with the bar (W) which occurs when the transmission is in neutral.

When the transmission shifting rail (C) reaches the neutral position, the force of the spring (Y) in the diaphragm cylinder will pull the shifting lever (A) to the left into engagement with the notch of the high and second shifting fork (B). As the cross shift is completed the interlock switch will be moved to the position shown in insert (C).

Now the circuit from 3 in the interlock switch is to 1 to 13 to 16 to bar (P) in the contact plate. The contact plate having moved back in coming to neutral (insert E) the contact is now completed from (P) through fingers (L-L) to (T) to solenoid 1 and the piston is moved forward, moving rail (B) forward to the high gear position where the fingers (L-L) open the contact with bar (P) as at the beginning of the shift from low gear.

Had the selector lever been set in the second gear position, Figure 4, the movement to neutral would have been the same as for high gear. From neutral the movement would have been backward to second (instead of forward to high), as the circuit would have been completed from 13 to 14 (instead of to 16) to bar (Q) through (M-M) to (U) to solenoid 2.

Also had the transmission been in reverse instead of low, the contact plate would have been to the rear (insert B) and the circuit from bar (W) would have been through fingers (L-L) to bar (T) to solenoid 1 and the movement would have been forward to neutral.

Figure 5 shows the transmission in high gear and the selector in low gear position. Here again it will be seen that the original circuit (full lines) is through the interlock switch to bar (W) to bring the transmission to neutral. When the lever (A) reaches the neutral position it will be drawn to the right to engage with the fork on shifting rail (C), since the circuit is complete from 11 to solenoid 3 and the interlock switch will be rotated to the position of insert (D).

The circuit from 2 on the interlock switch is now to 1 and follows the path indicated by the broken lines to plate (P) on the contact plate. Since the contact plate has been moved to the neutral position (insert E), the circuit is now completed from (P) through (L-L) to (T) to solenoid 1 so that the shifting rail (C) is moved forward to the low gear position.

Had the selector switch been set in reverse, connecting 13 and 14, the circuit (shown in dot and dash) would have been completed to (Q) through (M-M) to (U) to solenoid No. 2, causing a normal neutral to reverse shift.

MECHANICAL ADJUSTMENT

The entire mechanical adjustment is so important to proper functioning that it should be made carefully with every servicing of the electric hand. The recommended procedure is as follows:

The Clutch Circuit Breaker - 1935

With clutch fully engaged, the pointer on the lever should be in line with the arrow on top of the circuit breaker housing.

To adjust: 1 - When equipped with automatic clutch control-loosen clamp bolt nut on bracket mounted on vac-

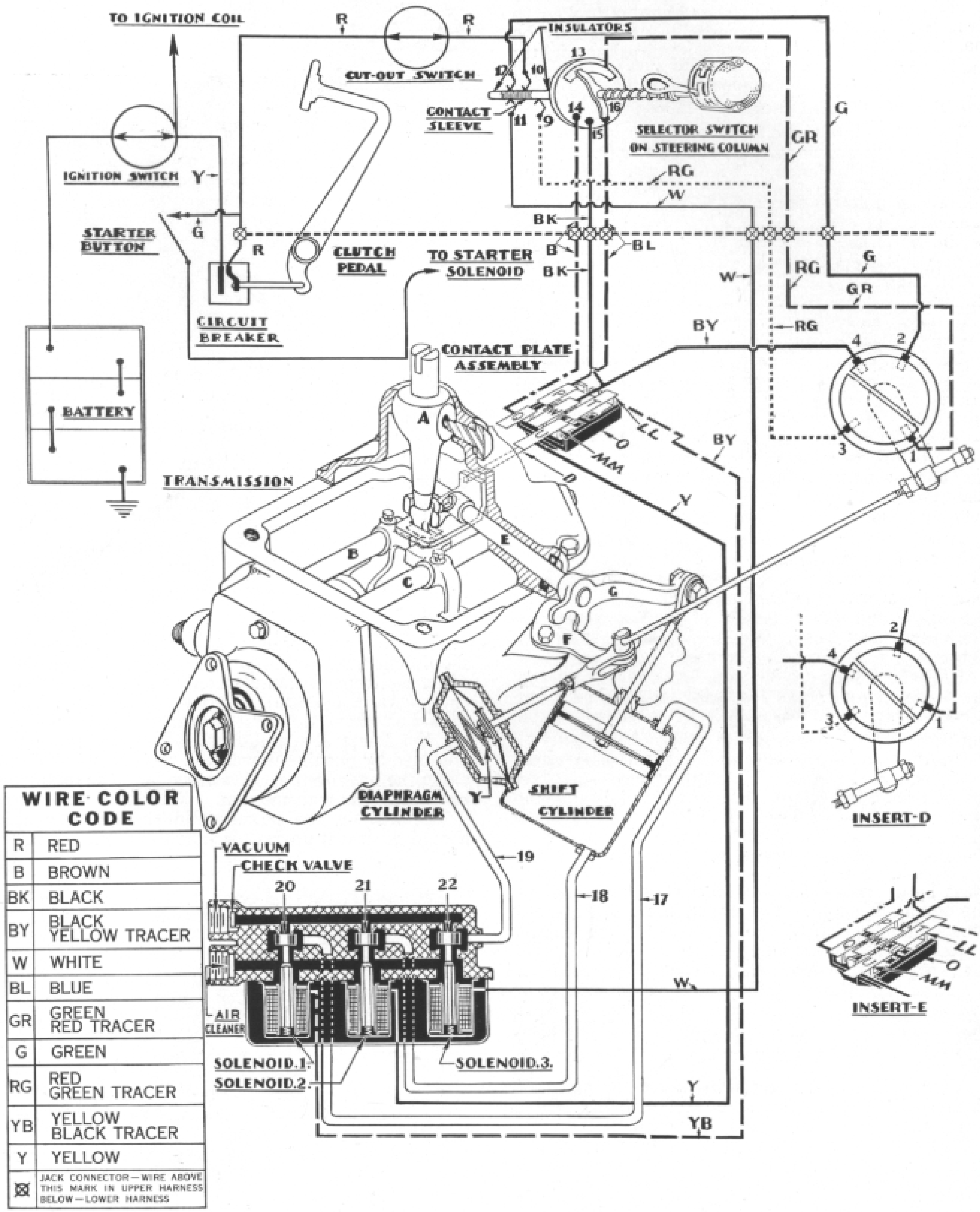

TO IGNITION COIL
CUT-OUT SWITCH
INSULATORS
CONTACT SLEEVE
SELECTOR SWITCH ON STEERING COLUMN
IGNITION SWITCH
STARTER BUTTON
CLUTCH PEDAL
TO STARTER SOLENOID
CIRCUIT BREAKER
CONTACT PLATE ASSEMBLY
BATTERY
TRANSMISSION
DIAPHRAGM CYLINDER
SHIFT CYLINDER
INSERT-D
INSERT-E
VACUUM
CHECK VALVE
AIR CLEANER
SOLENOID.1.
SOLENOID.2.
SOLENOID.3.
WIRE COLOR CODE
R RED
B BROWN
BK BLACK
BY BLACK YELLOW TRACER
W WHITE
BL BLUE
GR GREEN RED TRACER
G GREEN
RG RED GREEN TRACER
YB YELLOW BLACK TRACER
Y YELLOW
JACK CONNECTOR—WIRE ABOVE THIS MARK IN UPPER HARNESS BELOW—LOWER HARNESS

Figure 5

uum clutch rod and slide clip until pointer is in line with arrow. Tighten lock nut.

2-When not equipped with automatic clutch control-remove cotter key from circuit breaker lever pin. Loosen lock nut on operating rod and remove rod end from lever pin. Turn rod end until it will slip on pin with pointer in line with arrow on housing. Insert cotter pin and tighten lock nut.

The position of the circuit breaker lever is important. If the contact is made with too little clutch pedal movement, the clutch will still be engaged when the shift is made and if a gear has been pre-selected the shift will be made while the engine is driving the car. If the contact requires too much pedal movement, the shift will not be completed should the gears butt teeth. It is necessary to have a slight clutch drag before the circuit is broken to turn the gears and insure engagement. It may be necessary, therefore, to set circuit breaker slightly ahead of indicating arrow.

The Clutch Circuit Breaker - 1936

The 1936 clutch circuit breaker hag lost motion built into the switch so that the clutch pedal must be depressed far enough to disengage the clutch before the electric hand circuit is closed, but the circuit will not be opened until the clutch is almost fully engaged. If the clutch is not disengaged before the shift is made, it will cause the gears to clash. Opening of the electric hand circuit before the clutch has started to engage will result in failure of the gears to mesh, if the car is not in motion and the gear teeth strike end to end.

The lock nut (B) should be loosened and yoke (A), Figure 6, on the rod, which operates the clutch circuit breaker should be adjusted so that the clutch pedal must

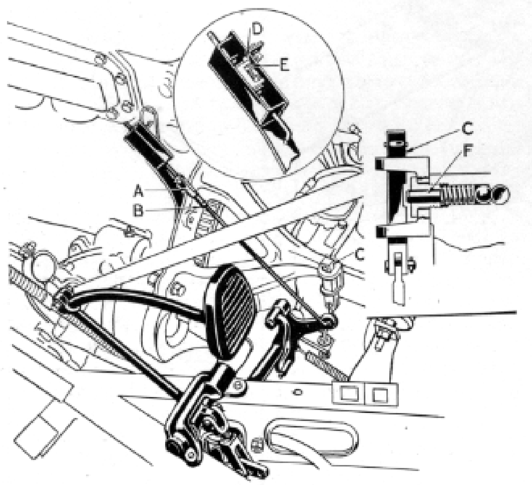


Figure 6

be depressed halfway to the toe board before the circuit is closed. The upper insert in Figure 6 shows the position of the parts inside the circuit breaker at the point where the circuit is closed. (D) is the stationary contact and (E) the sliding contact.

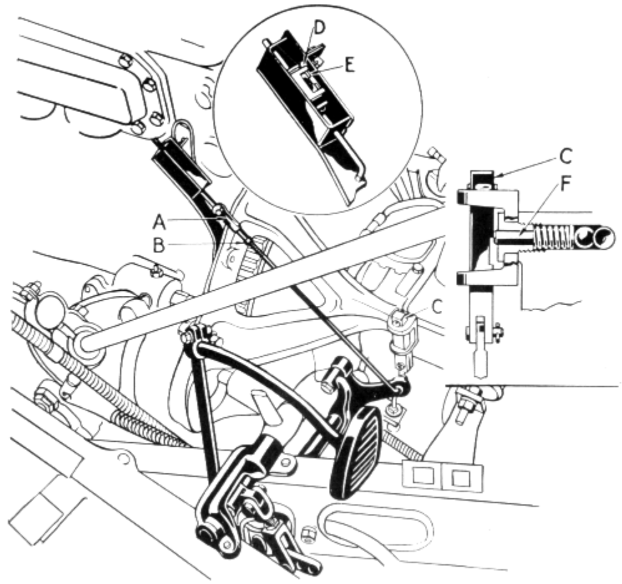


Figure 7

At the time the circuit is closed the transmission shifting rail locks must be released so that the shift can be made. The lower insert in Figure 6 shows the proper position of the lock bar link (C) and plunger (F).

After adjusting the circuit breaker for point of closing, check to be sure that the clutch has begun to take hold before the circuit is opened.

This check is most readily made by running the engine and putting the transmission in low or reverse gear. Allow the clutch pedal to come up slowly.

The car should start to move before the "click" of the cross shaft linkage is heard, indicating that the electric hand circuit has been opened.

The insert of the circuit breaker in Figure 7 shows ,he position of the parts at the point where the circuit is opened, while the shifting rail lock bars must be down, as shown in the lower insert (Figure 7), to insure the transmission being locked in gear before the electric hand power is cut off. This is important to prevent the transmission jumping out of gear.

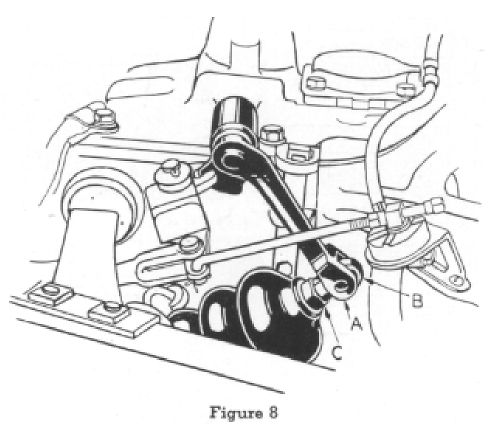


Figure 8

Power Unit Mounting

The power cylinder piston rod (B), Figure 8, should enter the fork (A) in the shifting lever easily when the transmission is in either its forward (high) or rearward (second) position. The power unit should also have sufficient clearance to prevent striking the frame X member. Maximum clearance is obtained by pushing upward on the unit while tightening the nuts on the studs which hold the mounting bracket to the transmission.

The nut on the power cylinder mounting stud should be drawn up just enough to permit the insertion of the cotter key. This provides maximum flexing of the rubber blocks for alignment.

Power Cylinder Piston Rod Adjustment

Remove the clevis pin from the rod eye. With the transmission in high gear and the shifting lever held forward to take up lash it should be possible to pull the piston rod (B) through the lever fork (A) 1/4" farther than the piston where the clevis pin can be inserted. The length of the rod can be adjusted by loosening the lock nut (C) and turning the eye.

The piston rod should then be pushed back and the transmission shifted into second gear. While pushing backward on the shift lever to take up lash in the linkage, the piston rod should be 1/4" farther back than the position where the clevis pin can be inserted. These checks are important to insure sufficient travel of the piston in both directions to complete the shifts.

Cross Shift Control Mechanism

The transmission should be shifted to all gear positions and the contact between the cross shift bellcrank and the

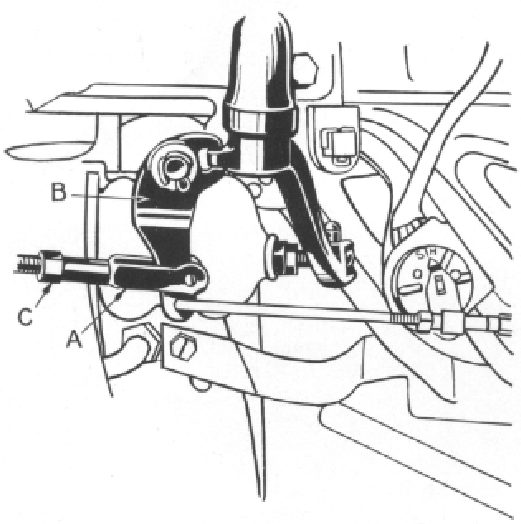


Figure 9

lobe on the power cylinder shifting lever checked to see that there is no binding due to contact at points other than the ends of the bellcrank fork (B), Figure 9.

The movement of the lower shifting lever should also be checked to see that the fulcrum dowel screw does not bind in the groove in the lever ball. Early 1936 production used a dowel screw (35442) which was 21/32" long under the head with a 1/16" plain washer in addition to the lock. Later production used a screv (151787) which is 312' long and the plain washer ii omitted. If no plain washer is in the assembly, be sure the screw is only 21/32" long.

Cross Shift Mechanism Adjustment

With the transmission in high or second gear remove the clevis pin from the diaphragm cylinder rod yoke (A),

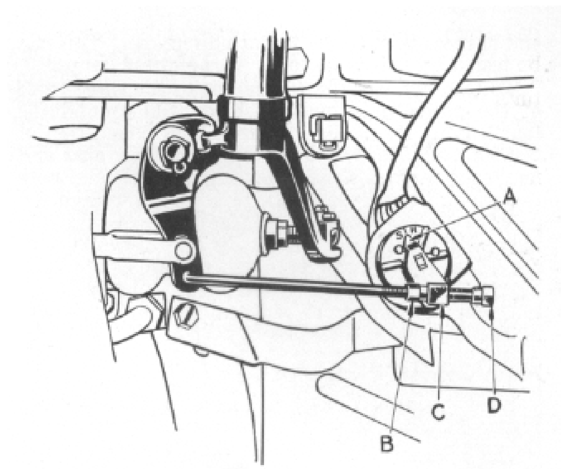


Figure 10

Figure 9. The spring in the cylinder should hold the yoke 1/4" farther forward than the position in which the clevis pin can be inserted.

When loosening or tightening the nut (C) on the diaphragm cylinder rod, be sure the yoke is in place on the bellcrank so that the diaphragm is not twisted and distorted.

Interlock Switch

After the transmission is shifted from low to high or second gear, the pointer (A), Figure 10, on the interlock switch lever should come to rest in line with the mark

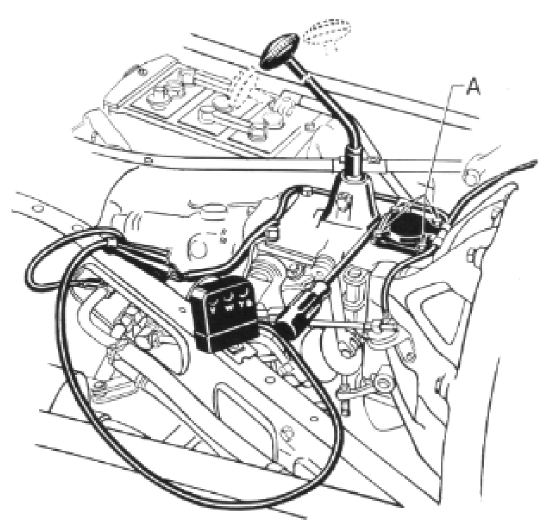


Figure 11

between the letters (S and H) on the switch cover. To adjust, loosen the jam nut (D) on the front end of the interlock switch rod and turn the adjusting sleeve (B), then retighten the jam nut.

When the length is correct, the circuit will change in the interlock switch at the same distance from the end of cross shift travel in both directions. This can be tested by using the lower harness test lamps.

To test, connect the test lamps to the three wires at the power unit junction block and ground the fourth lamp lead. (See Figure 11 for connection of test lamps.) Put the selector lever in low gear and move the manual shifting lever to the left and note the amount of travel before the (YB) lamp lights.

Now put the selector lever in high gear, pull the manual shifting lever to the left and move back to the right slowly and note where the (YB) lamp lights. The amount of travel of the manual lever to complete the cross shift after the lamp has lighted should be the same in both tests.

Main Contact Plate

With the lower harness test lamps connected as in Figure 11, put the selector lever in neutral. Move the manual shifting lever forward toward second until the (YB) lamps light.. then backward toward high until the (Y) lamp lights. The movement from neutral should be the same before either lamp lights.

To equalize the movement, loosen the contact plate screws (A) and slide the plate forward to shorten the movement required to light the (YB) lamp and backward to shorten the movement required to light the (Y) lamp.

Transmission Shifting Rail Lock

The locks on both shifting rails will definitely prevent the transmission from jumping out of gear if they are in the locked position when the shift is completed and the clutch is engaged. If the locks are improperly adjusted or the shift is not complete, the locks cannot perform their normal function and damage to the gear teeth will result. As a final check of your mechanical adjustment, shift the

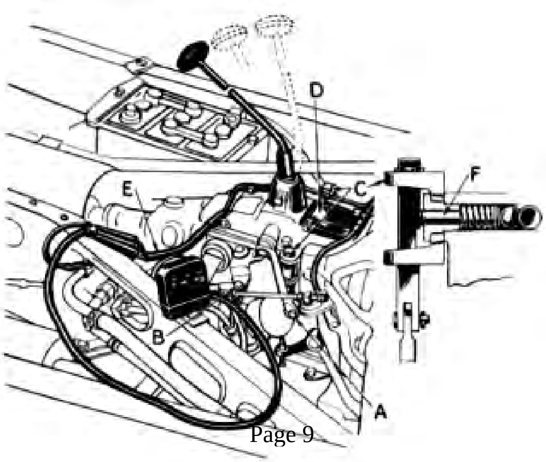


Figure 12

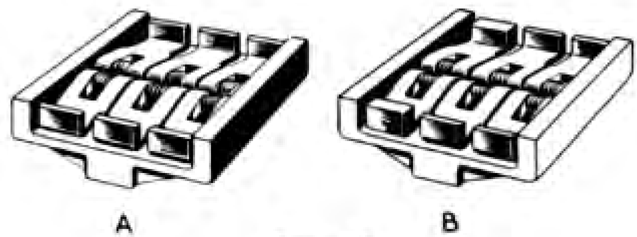


Figure 13

transmission into gear and engage the clutch and see that the lock bars are both down in the locked position. If the locks are not down, first check the lock adjustment, then the power cylinder piston rod length, then the point of breaking contact in the clutch circuit breaker.

If these adjustments are correct and the lock bars do not fall into place when the clutch is released it is probably due to the power being cut off in the contact plate before the shift is completed.

To test the point of cutoff, attach the lower harness test lamps to the lower harness wires (E) and ground the set as shown in Figure 12.

Move the selector lever into low gear and depress the clutch pedal. The (W and YB) lamps will be lighted. Shift the transmission manually toward low gear, just until the (YB) lamp goes out, then release the clutch pedal. The shifting rail lock bars (C) should both drop down. If the one on the right side of the transmission does not go down, pull the shifting lever, with the clutch engaged, to move the gears into complete engagement. If more than a slight movement of the shifting lever is required before the lock bar drops down, an adjustment of the contact plate, replacement of the contact plate sliding block or replacement of linkage in the transmission cover will be necessary.

To determine whether or not an adjustment will correct the conditions, move the selector lever into reverse and depress the clutch pedal. The (W and Y) lamps will now be lighted. Move the shifting lever manually toward reverse gear just until the (Y) lamp goes out. Release the clutch. If the lock bar on the right of the transmission goes down, the contact plate can be moved backward slightly to give a longer contact (or rail travel) in low. If the lock bar does not go down, particularly if it requires considerable additional movement of the shifting lever before the bar goes down, it will be necessary to replace the sliding block or the linkage in the transmission cover.

When replacing the sliding block in a 1935 Hudson or Terraplane use Part No. 48745 which has all of the contact fingers of equal thickness as shown at (A), Figure 13. The need for replacement will be due to bent or worn fingers.

When replacing the sliding block in a 1936 Hudson or Terraplane use Part No. 152197 which has two fingers which are thicker than the other four as shown at (B), Figure 13.

Electric Hand Test Equipment

Kit No. J-813

Figure 14
Using Master Selector Switch to make comparative check of Selector Switch and testing for "shorts"

Figure 15
Testing circuits in lower harness and switches
Insert shows connection of test lamps to lower harness

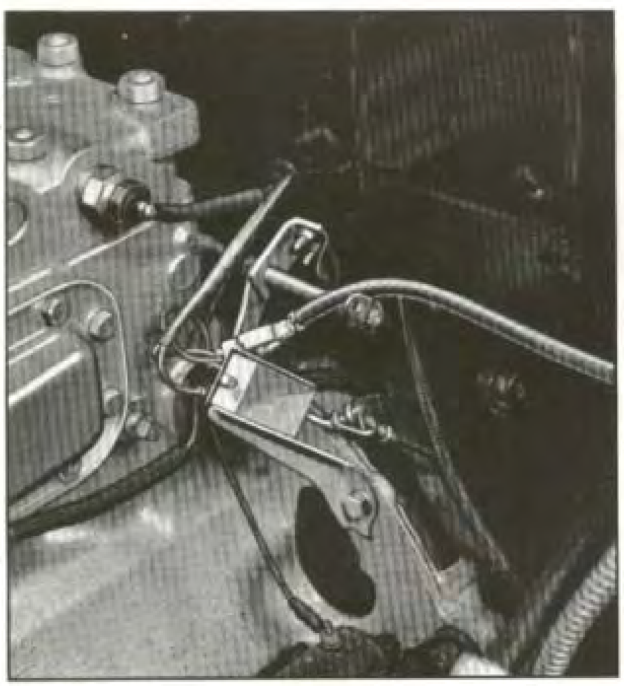


Figure 16
Connection of test cable to clutch circuit breaker .

Figure 17
Using prods at solenoid terminals

Testing the power unit operation and mechanical adjustments

These three tests made in the above order quickly and positively locate electrical or mechanical troubles in the Electric Hand system

TESTING EQUIPMENT

The Electric Hand Testing Kit-No. J-813 is available through the Hinckley-Meyers Co., of Jackson, Michigan, and consists of the following:

1. Master Selector Switch
2. Lower Harness Test Set
3. Power Unit Test Cable

SERVICE OPERATIONS

Preliminary Service Check

The following are to be checked before attempting to make any repairs to the gear shift control mechanism, regardless of the nature of the failure:

1. Be sure cutout switch on selector housing is “on”.
2. Be sure that transmission is free and can be moved into all its positions manually with clutch pedal depressed just enough to close circuit through clutch circuit breaker. (Check by pressing starter button.) Adjust interlock bars on transmission if necessary.
3. If temperatures are encountered low enough to cause the recommended transmission lubricant to excessively retard gear shifting, replace 3 ounces of the lubricant with kerosene.
4. Inspect vacuum line and fittings for leaks.
5. Check wire connections on interlock switch.
6. Make certain that all clevis pins and cotter pins are in place.
7. Inspect junction block on power unit to see that all wires are in place.
8. Make certain that all soldered connections are intact in both portions of steering column jack. (To remove covers, pull back and twist with jack assembled.)
9. Check wiring harness for breaks or damaged insulation.

Quick Test for Short Circuit

With instrument panel lamp lighted, shift into all positions with electric hand. Any appreciable dimming of instrument lamp indicates short circuit in that position.

Gears Are Shifted with Clutch Engaged

Probably short circuit in clutch circuit breaker or improper adjustment of circuit breaker.

1. Check and if necessary adjust clutch circuit breaker.
2. Turn on ignition switch and press starter button; if starter operates with clutch fully engaged, replace circuit breaker.

Complete Failure of Electric Hand to Function

After setting pointer and arrow on circuit breaker in line on 1935 models and the notch in the forward end of the circuit breaker rod flush with the housing on 1936 models, turn on ignition switch, depress clutch pedal and press starter button. If starter functions, circuit is closed through circuit breaker. If starter does not function, attach grounded test lamp to yellow wire terminal of circuit breaker. No light indicates open circuit from ignition switch to circuit breaker. Light indicates circuit breaker circuit open. Replace circuit breaker.

Failure of Electric Hand to Function in Any or All Positions

If a proper circuit is proven through the circuit breaker and operation is still faulty, disconnect the separable jack on the bottom of the steering column and insert the jack from a master selector switch and wire assembly. (This unit does not require any ground.) If the system functions properly when using this selector switch instead of the one mounted on the car, the difficulty is in the selector. See note on page 15 if Master Selector Lamp lights. Do not replace selector until short circuit is removed.

Testing the Shifting Mechanism

1. Connect power unit test cable to the terminal on the clutch circuit breaker to which the red wire is attached. This wire should be hot only when the clutch is disengaged.
2. With the engine running and the clutch disengaged (rear wheels of car jacked up)-touch the front post (YB) of the junction block on the shifting unit with test prod. The transmission should shift into high gear. Touch rear post (Y) and the transmission should shift to second gear.
3. Shift the transmission to neutral manuallyFirst touch center post (W) with the test prod and the cross shift should be made. Still contacting (W), touch front post (YB) with second test prod. The transmission should shift into low. Touch rear post (Y), still contacting (W), and the shift should be made to reverse.

If shift is not made when one of the posts is contacted, connect an accurate ammeter to the hot wire and to the terminal. A current draw of approximately 2.5 amperes indicates that the solenoid is 0. K. A higher amperage indicates a short and a low amperage an open circuit.
CAUTION: A dead short circuit in a solenoid will burn out ammeter if permanent connection is made.

If the current draw is correct, the trouble may be due to the valve plunger sticking in its upward position, a vacuum leakage in the lines or units or a mechanical drag in the mechanism.

Disconnect the shifting cylinder piston rod from the shifting lever or the diaphragm cylinder from the cross shift bell crank. If these do not function after disconnecting the linkage, the entire power unit should be rebuilt.

Testing Circuits in Lower Harness and Switches

If only partial functioning or complete failure is experienced after the Master Selector has been plugged in, test the complete circuits at the solenoid junction block with lower harness test lamp set. (This test must be performed with a Selector Switch known to be O.K.)

A. . Remove the three wires on end of wiring harness from junction block on selector valve.

B. Insert these three wires into clips on lower harness test set, in correct position according to color.

C. Attach ground clip to a clean metal ground on car.

D. Turn ignition switch "on." Turn cutout switch "on" and hold clutch fully disengaged.

E. Place selector lever in neutral. Place transmission in neutral manually. When shift lever is moved a short distance toward "second," test lamp (YB) should light. When shift lever is moved a short distance toward "high," test lamp (Y) should light.

F. With transmission in neutral, move selector lever to low. Test lamp (W) only must light.

G. Transmission remains in neutral. When selector lever is moved into "second" position, test lamp (Y) should light. When selector lever is moved into "high" position, the test lamp (YB) should light. Selector in low or in reverse lamp (W) only should light.

H. As the transmission is shifted manually to correspond to any position chosen at the selector switch, the proper lamps, as indicated in (G), should remain li&ed during the shift. However, lamp (Y) or (YB), whichever is lighted, should go out when the shift is completed. Lamp (W) alone will remain lighted in "low" or "reverse" position.

If, in any of the above tests, the correct lamps do not light or additional lamps are lighted, replace the lower harness.

Test to detect improper plate adjustment. If, after a new lower harness assembly has been installed, either lamp (Y or YB) remains on when transmission is in neutral, in test (E) above, the contact plate is incorrectly adjusted. To

Failures Resulting from Faulty Circuits

See Wiring diagram, Figure 2. *A faulty selector switch may cause any of the failures listed below. A master selector switch should be used when checking control. If control operates perfectly with master selector switch, an investigation of other units is unnecessary.*

Transmission fails to move into:	Faulty circuit through: (See Note)	Transmission fails to move out of:
Any position	Red Wire	Any Position
Any Position	Green Wire with Red Tracer	Any position - except that transmission ay be brought to neutral by moving Selector Switch to opposite side of gate*
Low* Reverse	White Wire or Green Wire**	
Low High	Blue Wire	
Neutral - except when Selector Switch is moved to opposite side of gate***	Black Wire	
Second Reverse	Brown Wire	
Second Reverse	Yellow Wire	Low High
Low High	Yellow Wire with Black Tracer	Second Reverse
Second High	Red Wire Green Tracer	
Certain positions unless started manually	Transmission contact plate assy. Surface of contact bars *must be* carefully cleaned	Certain positions unless started manually
Transmission fails to follow a fast or “pre-selective” shift from a position on the other side (from low to second, or from high to low, for example)	Black Wire with Yellow Tracer	Transmission will follow when Selector Switch is moved very slowly

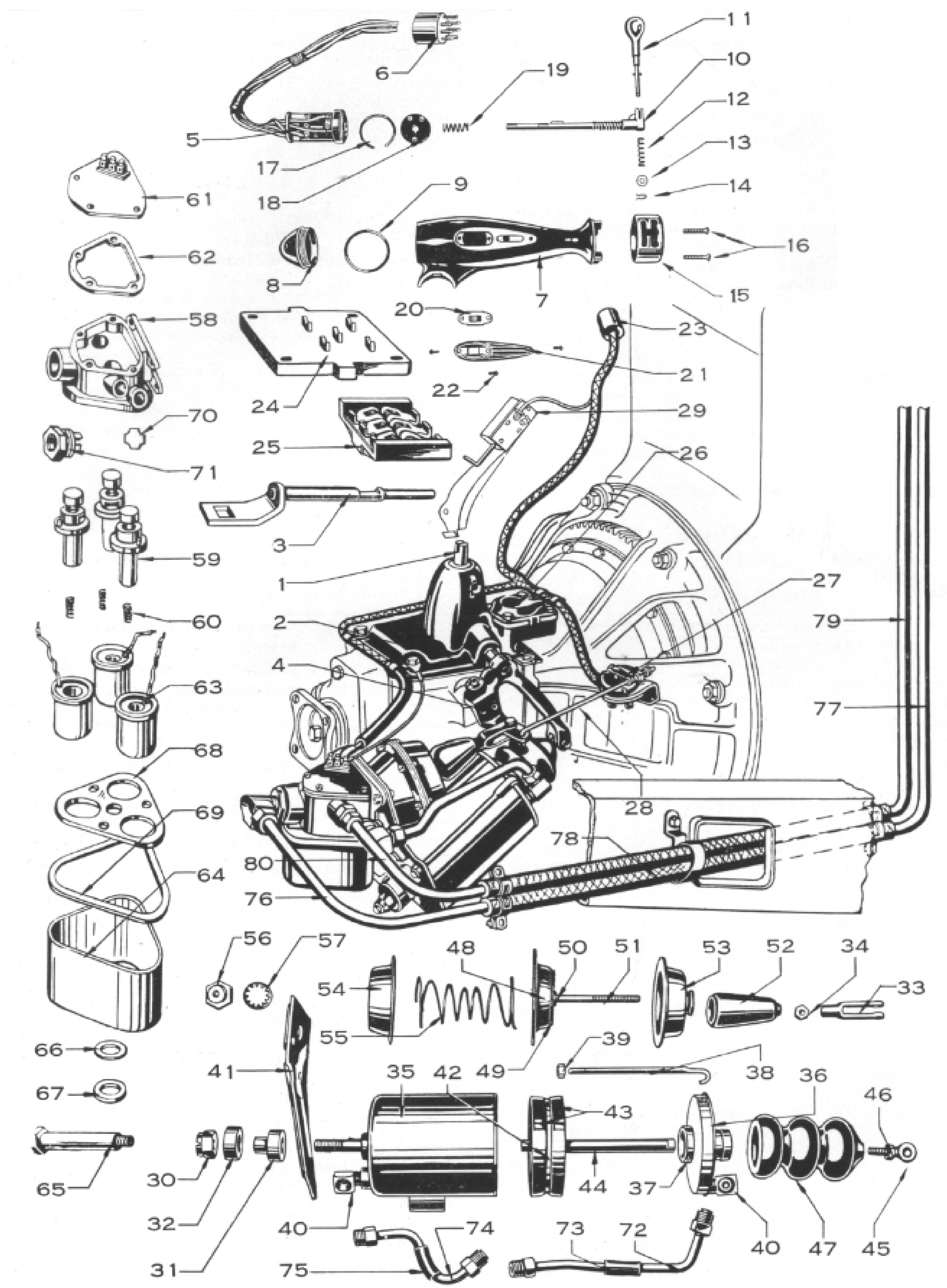


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Figure 18

adjust contact plate, loosen the four screws holding contact plate assembly, then see if plate is free to move back and forth through movement permitted by elongated holes. If not, remove plate from transmission cover and carefully cut off or remove locating dowel pins. Replace contact plate as nearly as possible in its original position and partially tighten the four screws so that plate may be moved to its proper position.

If test lamp (YB) remains lighted when transmission is in neutral, move plate very slightly to the rear until lamp (YB) goes out. If lamp (Y) remains lighted, move block forward.

The proper setting is obtained when the movement of shift lever forward from neutral necessary to bring lamp (YB) on is equal to the backward movement required to bring lamp (Y) on.

To Check Position of Interlock Switch

1. Place the transmission in low gear and the selector switch in high gear and depress the clutch. Lamp (Y) should light and remain lighted until the transmission is shifted (manually) to neutral. Lamp (YB) should be lighted when cross shift to second and high side is completed. If lamp (YB) is lighted before the cross shift is practically completed, the interlock switch is not in proper position and should be adjusted so that the pointer on its lever is in line with the mark on the housing when the transmission is in high gear. If adjustment does not give proper operation, replace the interlock switch.

NOTE: Faulty circuit may be caused by either a short or an open circuit. In most cases, failure will be due to an open circuit, but when a short is encountered, Master Selector Switch fuse will blow. When this occurs, lamp adjacent to fuse should burn at full brilliance. (A 6-8 volt, 32 CP, single contact bulb must be used.) Allow Master Switch to remain in position which caused fuse to blow (i.e., in a position in which bulb burns at full brilliance). Then check faulty circuit for a short. When short is located and eliminated, bulb will burn at approximately half brilliance-which is normal. After short has been eliminated. insert new 7-1/2 ampere fuse and check operation of control in all positions.

(*) If green wire with red tracer is damaged, transmission will not move out of neutral position into any other position, but if it is placed in high position manually, it may be brought to neutral by Selector Lever into "Low." If placed in low manually, it may be brought to neutral by Selector Lever in "high."

(**) If green wire is damaged, shift lever will still move back and forth with Selector Lever as the moved from left to right.

If white wire is damaged, shift lever will remain on the second and high side, even though Selector moved back and forth from right to left.

(***) If black wire is damaged, it is impossible to place transmission in neutral by merely moving Selector Lever to "Neutral." However, if transmission is in either second or high position, it may be placed in neutral by moving Selector Lever to "Neutral" and then as far to the left as possible. Transmission may be moved into and out of every position, except neutral, in the normal manner.

Removal Installation Repair

SELECTOR SWITCH-1936

NOTE: Operations 1 through 10 can be performed without removing the selector from the car or after the selector has been removed.

Selector Lever, Shaft and H Plate

1. Remove 2 screws (16) from H plate cap (15).
2. Hold cap to right and remove washer retainer (14), washer (13), spring (12) and lever (11).
3. Turn selector switch shaft (10) Y4 turn clockwise (from right) and withdraw.
4. Replace parts removed by reversing operations 1, 2 and 3.

Selector Switch Cutout Switch

5. Remove the three screws (22) in the cutout switch plate and remove plate (21).
6. Lift switch and unsolder wires.
7. Replace switch and switch plate by reversing operations 5 and 6.

Connector Assembly (Harness Jack)

8. Remove cap from jack (6) by lifting until lock lug is out of groove in jack base and turn cap 1/4 turn.
9. Separate male and female halves of jack and unsolder wires.
10. Reinstall by reversing operations 8 and 9.

CAUTION: Be sure wires are soldered securely to proper terminals. See Figure 19 for wire color codes.

Selector Switch Assembly-Remove

11. Remove connector (6)-see operations 8 and 9.
12. Remove piece of loom from selector wiring harness.
13. Remove selector switch cap (8) and washer (9).
14. Loosen selector housing mounting bolt nut (inside housing).
15. Slide selector housing downward to remove.
16. Withdraw wires from steering column jacket tube.

Selector Switch Assembly - Install

17. Straighten the eight wires of the selector harness and lay them side by side so that they do not one another. Clips can be used as shown in Figure 20 to hold the wires in position. Feed all eight into the steering column tube side by side.
18. Put the selector housing in position on the steering column so that the head of the mounting bolt enters the hole in the column tube through which the wires pass.

19. Move the selector switch upward so the mounting bolt shank is in the slot in the tube and ten the mounting bolt nut inside the selector housing.

20. Pull the wires down in the column tube so they do not project out of the selector housing install washer (9) and cap (8).

21. Put piece of loom over lower end of wires.

22. Solder wires to terminals of connector (6). See Figure 19 for wire color code. Be sure wires are attached to correct terminals as indicated by code letters on lower face of connector.

23. Insert connector into female member attached lower wiring harness.

Selector Switch - Disassembly

24. Remove selector switch from steering column -see operations 11 through 16.

25. Remove 3 cutout switch cover screws (22) and remove plate (21).

26. Lift cutout switch (20) and unsolder wires.

27. Remove cap (8).

28. Pull wires out of end of housing.

29. Press lock ring (17) out of groove in housing by inserting a cotter key puller through the hole to right of cutout switch hole in housing.

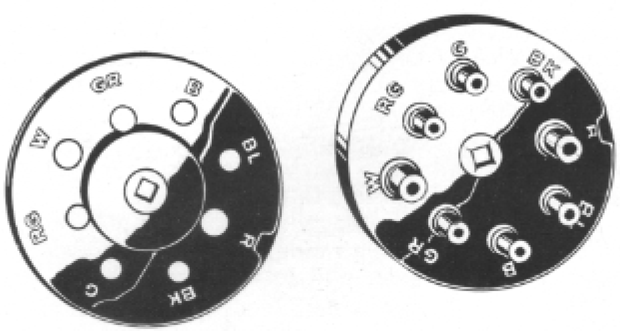


Figure 19

30. Pull wires and switch base (5) out of housing.

31. Remove rotor (18) and spring (19).

32. Remove segment (H plate) (15), lever (11) and shaft (10) (Operations 1, 2 and 3).

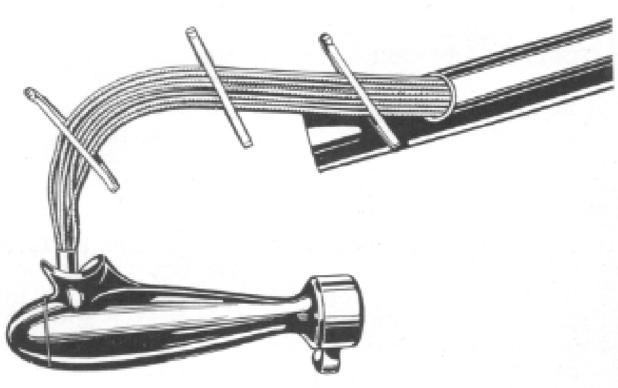


Figure 20

Selector Switch-Reassembling

33. Install selector shaft lever and segment (H plate) by reversing operations 1, 2 and 3.

34. Place rotor spring and rotor on left end of selector shaft. Rotor must be inserted with side with three contacts to left and must slide over tongue on shaft.

35. Insert switch base with tongue engaged in groove in bottom of housing.

36. Insert lock ring, being sure it snaps into the groove in housing.

37. Solder two red wires to terminals of cutoff switch and secure switch in housing with finish plate (21) and screws (22).

38. Feed wires through hole in mounting flange of housing and replace cap (8) and washer (9).

SELECTOR SWITCH-1935

NOTE: Operations Nos. 39 through 49 can be performed without removing the selector assembly from the car or after the assembly has been removed.

Selector Lever, Shaft and H Plate

39. Remove two screws (85) (Figure 22) from H plate cap (84) and remove cap.

40. Turn selector lever Y4 turn clockwise and withdraw lever and shaft.

41. Withdraw washer retainer (14), washer (13), springs (12) and lever (11) from shaft (10).

42. To reassemble, reverse operations 38 through 41.

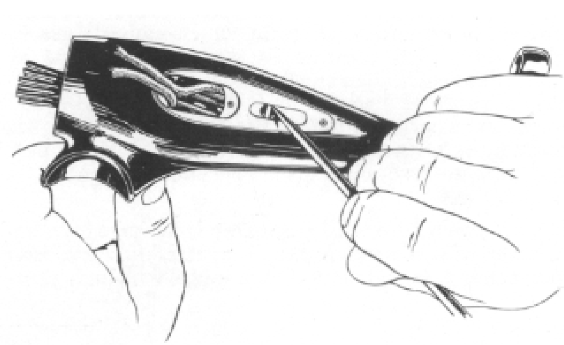


Figure 21

Selector Cutout Switch

43. Remove 2 screws from cutout switch (86).

44. Lift switch out of housing and unsolder red wires from switch terminals.

45. Reassemble by reversing operations 43 and 44.

Selector Switch Base and Rotor

46. Remove four screws (83) from column bracket cap (82).

47. Remove cutout switch (86). See operations 43 and 44.

48. Pry out switch base lock ring (17) and withdraw base (5), rotor (18), spring (19). (See Figure 23.)

49. To reinstall, reverse operations 46 through 48.

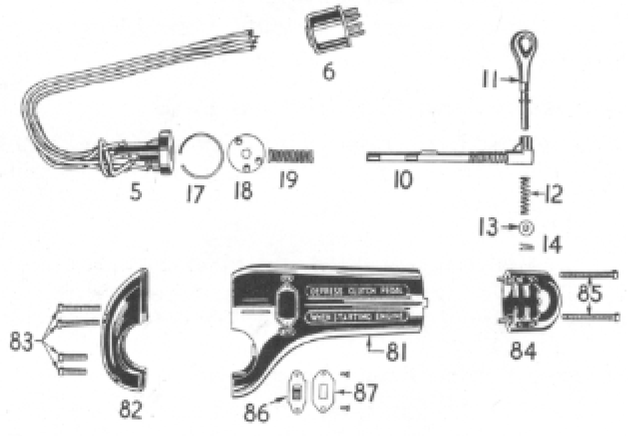


Figure 22

Selector Switch Assembly-Remove

50. Remove cap from jack (6) by lifting until lock lug is out of groove in jack base and turn cap 1/4 turn.

51. Separate male and female halves of jack and unsolder wires.

52. Remove piece of loom from wires at bottom of jacket tube.

53. Remove four screws (83) from column bracket cap (82).

54. Draw wires out of jacket tube.

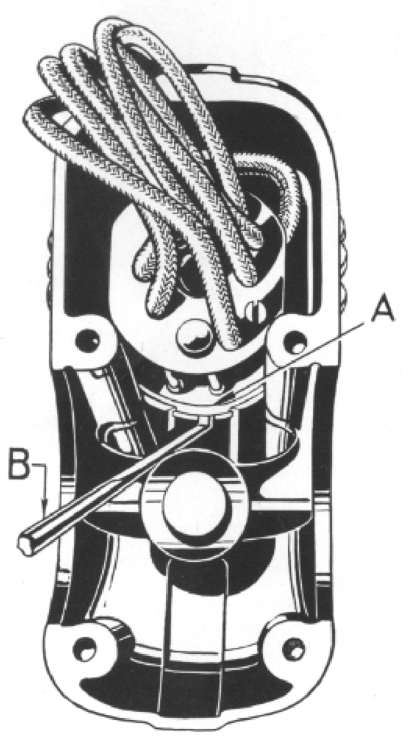


Figure 23

Selector Switch Assembly Install

55. Straighten the eight wires of the selector harness and lay them side by side so that they do not cross one another. Feed all eight wires into the steering column tube side by side. (See Figure 20.)

56. Put the selector in position on the steering column tube and secure with cap (82) and four screws (83).

57. Put piece of loom over lower end of wires.

58. Solder wires to terminals of connector (6). See Figure 19 for wire color codes. Be sure wires are attached to correct terminals as indicated by code letters on lower face of connector.

59. Insert connector into female member attached to lower harness.

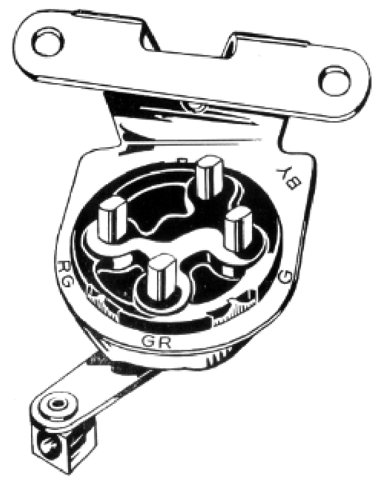


Figure 24

LOWER HARNESS

NOTE: Operations on the lower harness include removal of front floor mat and transmission opening cover.

Removal of Front Mat and Transmission Cover Opening

60. Remove bolts from upper end of clutch and brake pedal levers (under hood) and remove pedals.

61. Loosen screws in front door scuff plates.

62. Remove front mat.

63. Remove cap screws from transmission opening cover and remove cover.

64. Replace by reversing operations 60 through 63.

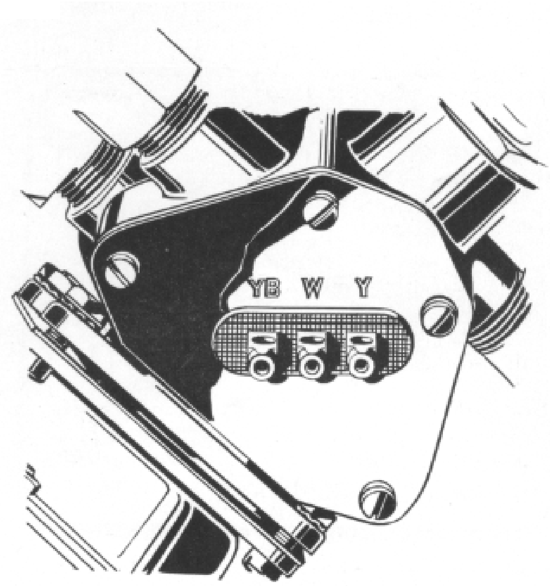


Figure 25

Lower Harness-Removal and Reinstallation

65. Disconnect the upper and lower harness connector jack (23).

66. Disconnect the red wire from the clutch circuit breaker.

67. Remove the four wires from the interlock switch. See Figure 24 for wire color code for proper connections to interlock switch.

68. Remove the four cap screws from the contact plate cover (26).

69. Remove the three transmission cover cap screws to which the lower harness is clipped.

70. Remove the three wires from the selector valve terminal block. See Figure 25 for wire color code for proper connections to terminal block.

71. The lower harness is installed by reversing operations 65 through 70.

Contact Plate and Sliding Block Removal

72. Remove four cap screws holding contact plate cover (26) and lift plate (24) from transmission cover.

73. Remove sliding block (25).

74. If contact plate is to be removed from lower harness the cover can now be raised and the five wires unsoldered.

Contact Plate and Sliding Block-Installation

75. Solder the five wires to the proper terminals of the contact plate as indicated by the wire code stamped on the plate adjacent to the terminals. Figure 26.

76. Insert sliding block (25) into contact plate guides. Be sure the sliding block driving lug is to rear of block where assembled.

77. Insert one ounce of contact plate grease (part 48705) in cavity in transmission cover in which sliding block operates.

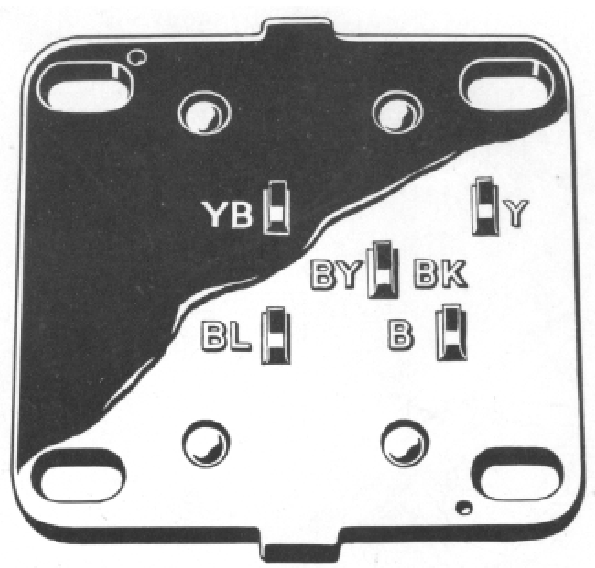


Figure 26

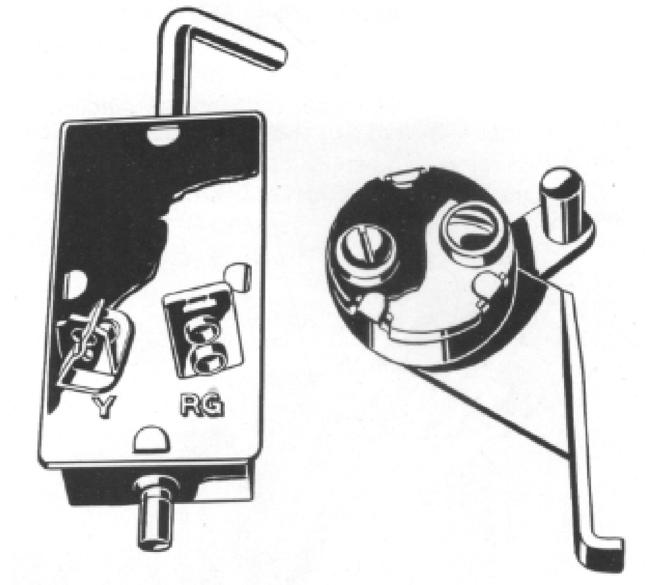


Figure 27

78. Install new contact plate gasket (part 47204).

79. Install contact plate and block assembly, being sure the sliding block driving lug enters the notch in the shift lever (3). See page 10 for information for distinguishing 1935 from 1936 sliding block.

80. Adjust contact plate position (see page 10) and tighten four cap screws securely.

Circuit Breaker - 1936

81. Disconnect the three wires from the circuit breaker terminals.

82. On cars not equipped with automatic clutch, remove the cotter pin from the circuit breaker rod and disconnect from yoke of operating rod.

83. Remove screw which mounts circuit breaker to rear engine support plate.

84. Reinstall circuit breaker by reversing operations 81 through 83. Be sure to install wires in proper terminals as indicated by wire color code letter adjacent to terminals, Figure 27. Adjust circuit breaker (see pages 6 and 8).

POWER UNIT - Removal

All operations on the power unit include removal of front floor mat and transmission opening cover. See operations 60 through 64 inclusive.

85. Remove diaphragm cylinder rod clevis pin and interlock rod (28) cotter pin from cross shaft bellcrank (4).

86. Remove power cylinder rod clevis pin.

87. Remove vacuum hose and air cleaner hose at power unit end.

88. Remove three wires from selector valve terminal block and ground wire at selector valve cover.

89. Remove power unit mounting stud nut (30) and remove power unit from car.

Power Unit Installation

90. Place power unit stud spacer (31) on stud with sleeve to rear.

91. Put power unit in place in bracket and put rubber washer (32) and nut (30) on mounting stud.

92. Tighten nut just enough to permit cotter key to enter hole in stud and insert cotter key.

93. Connect vacuum and air cleaner hose.

94. Connect ground wire from transmission cover capscrew to selector valve cover.

95. Insert three wires from lower harness into proper posts of terminal block as indicated by wire color code. (See Figure 25.)

96. Adjust diaphragm cylinder rod and connect to cross shift bellcrank (4). See page 9 and Figure 9 for adjustment.

97. Adjust power cylinder rod and connect to shifting lever. See page 8 and Figure 8 for adjustment.

98. Connect interlock switch rod (28) to cross shift bellcrank (4) and adjust. See page 9 and Figure 10 for adjustment.

Power Unit Repair

The power unit must be removed from the car before any of the following disassembly operations can be performed. See operations 60 through 64 inclusive and 85 through 98 inclusive.

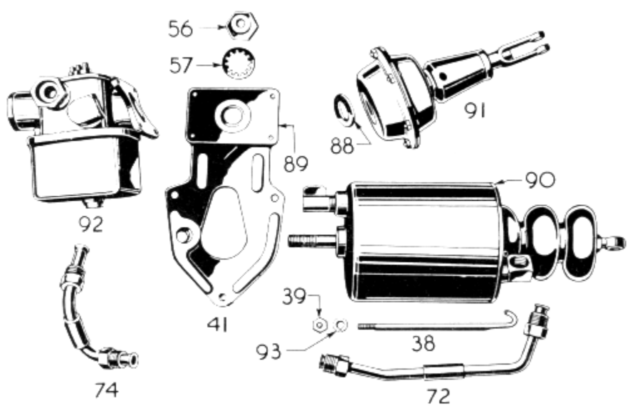


Figure 28

Power Unit Disassembly

99. Remove selector valve to power cylinder pipes (72 and 74). (Figures 18 and 28.)

100. Remove three end plate stay bolts (38) and nuts (39) and remove cylinder from assembly.

101. Remove four screws which mount selector valve body (58) to the mounting bracket (41).

102. Remove diaphragm cylinder mounting plug (56) and washer (57).

103. To reassemble, reverse operations 94 through 97, using a new gasket (88) between the diaphragm cylinder and bracket and a new gasket (89) between the mounting bracket and selector valve body.

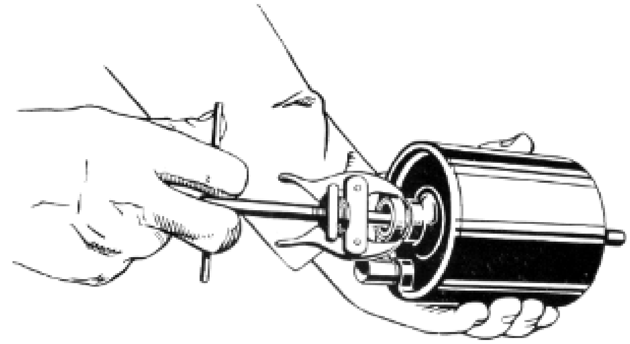


Figure 29

Power Cylinder Disassembly

104. Remove the cylinder end plate, using tool No. HMO 12-1. (See Figure 29.)

105. Remove end plate seal, inner (37) (Figure 18).

106. Remove piston and rod assembly.

107. Remove piston rod nut (94) and disassemble pistons. (See Figure 30.)

108. To reassemble piston, put felt retainer (95) and piston plate (98) on rod, wrap packing ring (96) around retainer with felt (97) over it.

109. Put packing (43) (leather cup) and center plate (42) on to hold felt and packing ring in place.

110. Put second packing (43) (leather cup) and sec plate (98) in place.

111. Wrap packing ring (96) and felt (97) around second felt retainer (95) and put in place inside packing.

112. -Screw nut (94) on rod (44), tighten securely and stake.

113. Saturate packing and felts in Hudson Shock Absorber Oil until leather is soft and pliable and insert piston in cylinder, being careful not to fold back edge of packing.

114. Install new end plate inner seal (37) and end plate gasket on end plate (36).

115. Put end plate in cylinder and draw down securely by tightening nuts (39) on end plate stay bolts (38) when attaching assembly to bracket. To test seal of piston head and rod packing place finger over front pipe connection (40) and pull on piston rod. The rod should not move out except for a slight movement allowed by compression of the air in the cylinder.

Diaphragm Cylinder Disassembly

The diaphragm cylinder can be disassembled either before or after it has been removed from the power unit assembly.

116. Remove rod yoke (33), lock nut (34) and rod guard (52).

117. Remove six bolts from flange of diaphragm and remove diaphragm housing cover and diaphragm assembly.

118. Remove diaphragm rod nut (99) and disassemble diaphragm.

119. To reassemble reverse operations 116-117-118, being sure to stake the diaphragm rod nut. When reassembling the diaphragm cylinder be sure the spring is seated in the flanged plate (100). Hold the diaphragm and rod in so that the spring pressure does not distort the flange of the diaphragm while the bolts are being tightened. Tighten all bolts uniformly to insure a good grip on the diaphragm and an air tight seal. *To test seal push rod in and place finger over mounting hole. If the rod does not move out the seal is tight.*

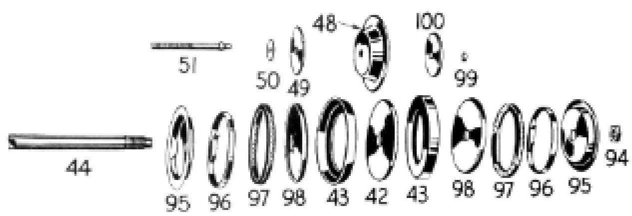


Figure 30

Selector Valve Unit Disassembly

120. Wash unit by brushing with gasoline (do not dip) and blow dry.

121. Remove four screws from cover plate (61).

122. Raise cover plate and unsolder wires from terminal block.

123. Remove solenoid cover stud (65), washer (67), gasket (66) and cover (64).

124. Remove three screws from solenoid retainer (68) and remove retainer and solenoid, being careful not to loosen the springs (60) from the bottom of the valve plunger (59).

125. Remove valve seats and valve assemblies from bodies. If the seats are tight in the housing, tap them out with a blunt bar inserted down through the center holes in the housing. Do not try to remove by pulling on the valve plunger.

126. The rubber valve heads can now be stripped off of the valve plunger washer.

127. Remove check valve nut (71) and check valve (70).

128. Wash all parts except solenoids and valve heads in gasoline and blow dry. Be sure no dirt is allowed to remain in the valve body passages.

129. Reassemble by reversing operations 120 through 128 inclusive. Use new valve heads if old ones are swollen or spongy from being wet with gasoline or are worn or cut. When valves and seats are in place the valves should have from 1/32” to 1/16” movement from the up to the down position. Less movement than 1/32” will cause sluggish performance of the unit.

If solenoids have become wet with gasoline be sure they are thoroughly dried before installing. Always use new cover gasket (62) and solenoid retainer gasket (69) and be sure unit is sealed against entrance of dirt and water.

Lubrication

Remove tube (72) from front of shifting cylinder and insert one ounce of Hudson Shock Absorber Fluid every 15,000 miles. This is required to keep the piston packing soft and pliable.

Electric Hand
For 1936 Hudson andTerraplane

With Serial Numbers Above:

Terraplane Deluxe	6151381	Exceptions 6151401 to 6151779 Inclusive
Terraplane Custom	6213759	Exceptions 6213901 to 6213963 Inclusive
Hudson 6 Custom	638319	Exceptions 638351 to 638470 Inclusive
Hudson 8 Deluxe 120" W.B	644398	Exceptions 644439 to 644464 Inclusive
Hudson 8 Custom 120" W.B	652078	Exceptions 652159 to 652160 Inclusive
Hudson 8 Deluxe 127' W.B	663201	Exceptions None
Hudson 8 Custom 127' W.B	674286	Exceptions None

The changes in the Electric Hand which became effective with the above serial numbers are confined to the power unit, lower harness and transmission control cover.

The Selector and upper harness, clutch circuit breaker and interlock switch remain unchanged and are covered in 1936 Reference Sheet No. 11.

The diaphragm cylinder has been increased in size but has not otherwise been affected.

The power cylinder has been increased in size and a neutral switch and the necessary driving mechanism has been incorporated in the power cylinder head. This neutral switch eliminates the need for the contact plate.

The contact plate has been removed from the transmission control cover simplifying the linkage in this unit and eliminating the wiring in the lower harness which was required for the contact plate.

Functioning

Figure 1 shows the mechanism and wiring of the complete Electric Hand installation. With the selector and transmission in neutral as shown, the circuit is complete to the center terminal of the neutral switch. Since neither point (P) or (Q) contacts the center terminal (W), the circuit is broken at this point and the transmission will remain in neutral.

If the transmission is shifted manually toward high gear, the power cylinder piston will move forward moving the rod (D) which will move point (P) further away from the central contact (W) and allowing point (Q) to come into contact with the central contact. This will close the circuit to solenoid 2, which will pull the valve down admitting vacuum to the rear of the power cylinder. The piston will move backward until contact (Q) is moved away from the central contact (W) which is the neutral position of the transmission.

It will be seen that had the transmission been moved toward second, contact (P) would have closed the circuit with the central contact (W) energizing solenoid No. 1 and moving the piston forward to the neutral position where the circuit would be broken by contact (P) moving away from the central contact.

If high or low gear is selected with the transmission in neutral, the circuit is direct from the selector contact (16) to solenoid No. 1. If second or reverse gear is selected with the transmission in neutral, the circuit is direct from the selector contact (14) to solenoid No. 2.

If the transmission is in high gear and low is selected, the circuit will be direct from (11) on the selector to solenoid No. 3 to obtain the cross shift when neutral is reached.

The circuit from (12) on the selector switch will be to (2) and (4) on the interlock switch and then to the central contact (W) of the neutral switch. Since the transmission is in high gear (piston forward) contact (Q) will close the circuit from the central contact to solenoid -No. 2 and the transmission will move to neutral where the contact with the central contact (W) will be broken, the cross shift will take place, turning the interlock switch so that the circuit is from 2 to I to the selector switch (13) and 16 to solenoid No. 1 and the shift will be completed to low gear.

Had the transmission been in second gear when low was selected, the contact (P) would have been closed with the central contact (W) so that solenoid No. 1 would have been energized bringing the transmission to neutral when the contact would have opened and the shift made to low as before.

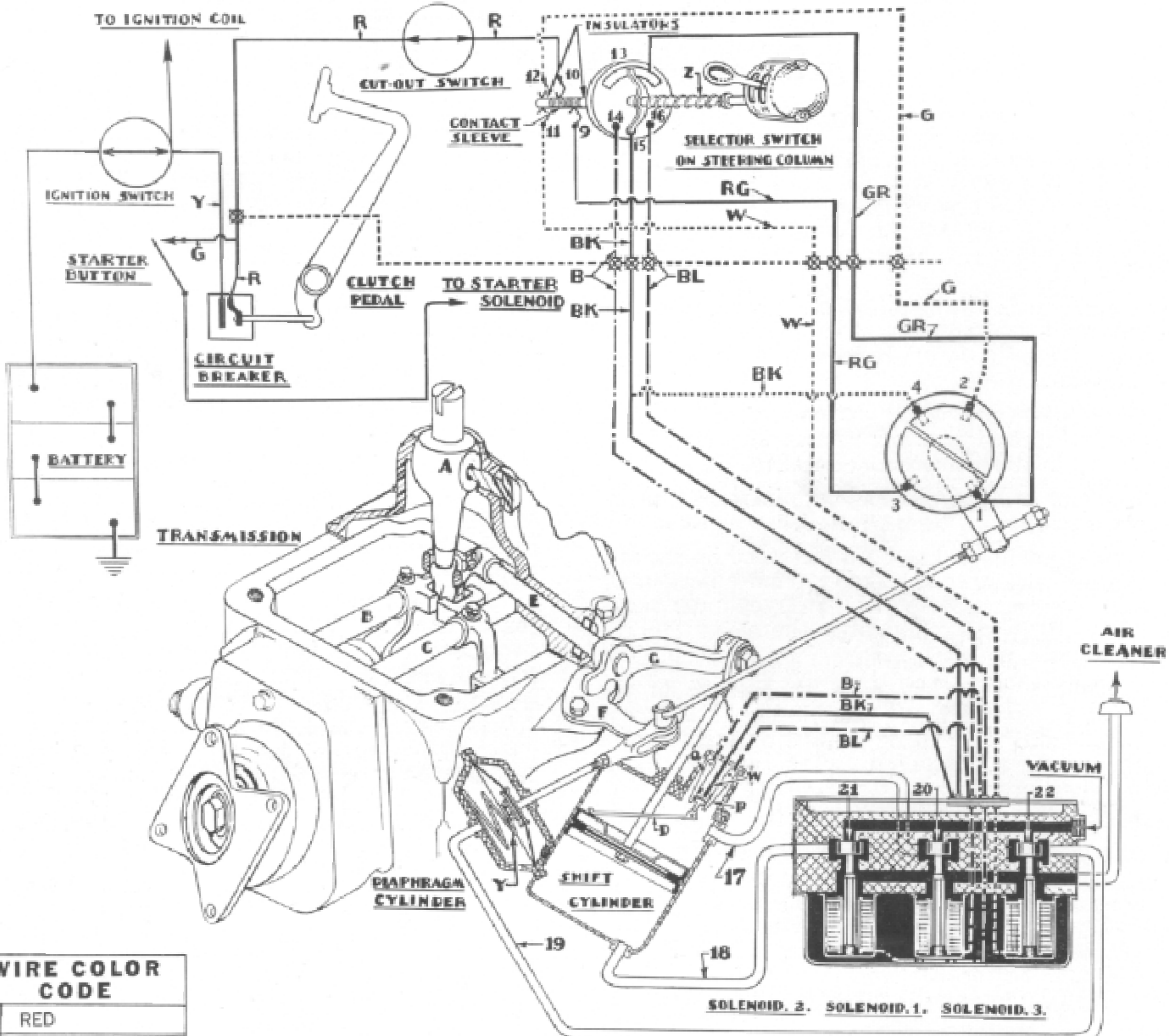
Mechanical Adjustment

All instructions on pages 8 and 9 of reference sheet No. 11 apply to the new equipment except the paragraphs on page 9 under the heading of Power Cylinder Piston Rod Adjustment.

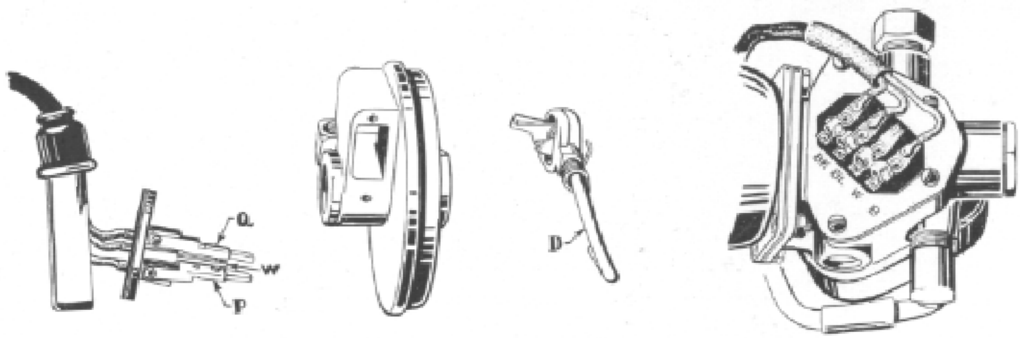
The paragraphs on page 10 under the heading Main Contact Plate do not apply to the new equipment while only the first paragraph on the same page under the heading Transmission Shifting Rail Lock applies.

Power Cylinder Piston Rod Adjustment

To check the adjustment, disconnect the wires of the lower harness from terminals BL, W and B at the solenoid valve cover. Attach the lower harness test lamp with the YB clip to the BL wire, the W clip to the



WIRE COLOR CODE	
R	RED
B	BROWN
BK	BLACK
BY	BLACK YELLOW TRACER
W	WHITE
BL	BLUE
GR	GREEN RED TRACER
G	GREEN
RG	RED GREEN TRACER
⊠	JACK CONNECTOR—WIRE ABOVE THIS MARK IN UPPER HARNESS BELOW—LOWER HARNESS



W wire and the Y clip to the B wire. (See Figure 1 for wire color code). Attach ground wire to chassis.

Put the selector in neutral, turn on ignition and depress clutch (engine not running).

With the manual shift lever shift, move the transmission toward high gear until the Y lamp of the test set lights. Now move the lever toward second gear until the YB lamp lights. The movement from neutral required to light the lamps should be the same. I

Lengthening the piston rod will cause the YB lamp to light with less movement while shortening will cause the Y lamp to light with less movement of the shifting lever.

While adjusting the piston rod length the test lamps can be used and the adjustment made so that the clevis pin can be inserted with the transmission in neutral without either the Y or YB lamps lighting.

An alternate method is to run the engine and hold the clutch pedal down. With all wiring in place and the clevis pin removed from the rod, the piston will be held in the neautral position. The rod can then be adjusted so that the clevis pin can be reinserted with the transmission in neutral.

Testing Equipment

The Electric Hand Testing Kit-No. J-813 which is available through the Hinckley-Myers Co., of Jackson, Michigan, is adaptable to testing this equipment as well as the previous type.

The lamps and clips of the lower harness test kit are lettered to correspond to the original Electric Hand equipment, however BL on the new equipment corresponds to BY on the old as does B to Y while all other markings remain the same.

Testing the Shifting Mechanism

1. Connect power unit test cable to the terminal on the clutch circuit breaker to which the red wire is attached. This wire should be hot only when the clutch is disengaged. Remove the wires from the wire terminals at the selector valve junction block.

2. With the engine running and the clutch disengaged (rear wheels of car jacked up)-touch the (BL) post of the junction block on the shifting unit with test prod. The transmission should shift into high gear. Touch rear post (B) and the transmission should shift to second gear.

3. To shift the transmission to neutral touch front post (BK) with the test prod.

4. Now touch post (W) with the test prod and the cross shift should be made. Still contacting (W), touch post (BL) with second test prod. The transmission should shift into low. Touch rear post (B), still contacting (W), and the shift should be made to reverse.

If the shift is not made when one of the posts is contacted, connect an accurate ammeter to the hot wire and to the terminal. A current draw of approximately 2.5 amperes indicates that the solenoid is 0. K. A higher amperage indicates a short and a low amperage an open circuit.

CAUTION: A dead short circuit in a solenoid will burn out ammeter if permanent connection is made.

If the current draw is correct, the trouble may be due to the valve plunger sticking in its upward position, dirt under the valve, a vacuum leakage in the lines or units or a mechanical drag in the mechanism.

Disconnect the shifting cylinder piston rod from the shifting lever or the diaphragm cylinder from the cross shift ball crank. If these do not function after disconnecting the linkage, the entire power unit should be rebuilt.

Testing Circuits in Lower Harness and Switches

If only partial functioning or complete failure is experienced after the Master Selector has been plugged in and the shifting mechanism is proven 0. K., test the complete circuits at the solenoid junction block with lower harness test lamp set. (This test must be performed with a Selector Switch known to be 0. K.)

A. Remove the three wires of wiring harness from junction block terminals on selector valve marked BL, W and B. Do not remove the wire from the terminal marked BK.

B. Insert these three wires into clips on lower harness test set, in correct position according to color. (131, to YB-B to Y -W to W).

C. Attach ground clip to a clean metal ground on car.

D. Turn ignition switch “on”. Turn cut-out switch "on" and hold clutch fully disengaged.

E. Place selector lever in neutral. Place transmission in neutral manually. When shift lever is moved a short distance toward “second,” test lamp (YB) should light. When shift lever is moved a short distance toward “high,” test lamp (Y) should light.

F. With transmission in neutral, move selector lever to low or reverse. Test lamp (W) only must light.

G. Transmission remains in neutral. When selector lever is moved into "second" position, test lamp (Y) should light. When selector lever is moved into "high" position, the test lamp (YB) should light.

H. As the transmission is shifted manually from neutral to a position chosen at the selector the lamps should light as follows and remain lighted until the clutch pedal is released.

High gear - YB-Second gear - Y-Low and Reverse - W - when cross shift is completed YB lamp will light for low and Y for reverse.

1. With the transmission in high or low gear and the selector in neutral the Y lamp should light. With the transmission in second or reverse and the selector in neutral the YB lamp should light.

If in the above tests, the correct lamps do not light or additional lamps light check (1) the neutral switch operation. (2) the interlock switch position. (3) the lower harness circuits.

To Check Postion of Interlock Switch

1. Place the transmission in low gear and the selector switch in high gear and depress the clutch. Lamp (Y) should light and remain lighted until the transmission is shifted (manually) to neutral. Lamp (YB) should be lighted when cross shift to second and high side is completed. If lamp (YB) is lighted before the cross shift is practically completed, the interlock switch is not in proper position and should be adjusted so that the pointer on its lever is in line with the mark on the housing when the transmission is in high gear. If adjustment does not give proper operation, replace the interlock switch.

CIRCUIT TESTS
Selector Switch and Upper Harness
- Tests made at Jack Prongs -

Selector Position	*Current Supply to-*	*Test lamp should light when connected to-*
(1) Neutral High or Second	R	RG
(2) Low or Reverse	R	G-W
(3) Low or High	G It	
(4) Second or Reverse	GR	B
(5) Neutral	GR	BK

Test No. 1 and 2

No light on test 1 or 2-check "off on" switch, red wire in harness and contact in selector switch.

No light on one but not both tests I and 2-check wire to which test lamp is connected and contact in selector to which that wire is attached.

If lamp lights when connected to terminals other than those indicated-look for short in wiring.

If light flickers as selector is moved from one of the positions to another indicated in test 2, the contact sleeve in the selector is rough or the contact fingers do not have sufficient tension.

Test No. 3, 4 and 5

No light on tests 3, 4 or 5 check GR wire and its connection in the selector.

No light on one of tests (3, 4 or 5) check wire being tested and its connection to selector.

If lamp lights when connected to terminal other than one indicated in table-look for lost motion between selector shaft and contact rotor or short in wires.

Lower Harness

When a "Hot" prod is connected to the female jack terminal as indicated in the left column, the test lamp should light when connected from the terminal or terminals indicated in the other columns (one terminal of test lamp must be grounded).

Plug Jack (Female)	*Interlock Switch*	*Solenoid Terminal*	*Clutch Circuit Breaker*
R			R
BK	BY*	BK	
G	G		
RG	RG		
W		W	
GR	GR		
B		B	
BL		BL	

*The wire is Black (BK) however the terminal on the interlock switch is marked BY.

Failures Resulting From Faulty Circuits

See Wiring diagram. A faulty selector switch may cause any of the failures listed below. A master selector switch should be used when checking the control. If control operates perfectly with master selector switch, an investigation of the other units is unnecessary.

Trans. fails to move into:	*Faulty Circuit through: (See Note)*	*Trans. fails to move out of:*
Any position	Red Wire	Any position
Any position	Green Wire with Red Tracer	Anyposition-except that transmission may be brought to neutral by moving Selector Switch to opposite side of gate*
Low* Reverse	White Wire or Green Wire"	
Low High	Blue Wire	
Neutral - except when Selector Switch is moved to opposite side of gate***	Black Wire	
Second	Brown Wire	
Low High	Blue Wire	Second Reverse
Second	Red Wire	
High	Green Tracer	
Transmission fails to follow a fast or "pre-selective" shift from a position on one side of gate to a position on the other side (from low to second, or from high to low, for example)	Black Wire	Transmission will follow when Selector Switch is moved very slowly

NOTE: Faulty circuit may be caused by either a short or an open circuit. In most cases, failure will be due to an open circuit, but when a short is encountered, Master Selector Switch fuse will blow. When this occurs, lamp adjacent to fuse should burn at full brilliance. (A 6-8 volt, 32 CP, single contact bulb must be used.) Allow Master Switch to remain in position which caused fuse to blow (i. e., in a position in which bulb burns at full brilliance). Then check faulty circuit for a short. When short is located and eliminated, bulb will burn at approximately half brilliance-which is normal. After short has been eliminated, insert new 7Y2 ampere fuse and check operation of control in all positions.

(*) If green wire with red tracer is damaged, transmission will not move out of neutral position into any other position, but if it is placed in high position manually, it may be brought to neutral by moving Selector Lever into "Low." If placed in low position manually, it may be brought to neutral by placing Selector Lever in "high".

(**) If green wire is damaged, shift lever will still move back and forth with Selector Lever as the latter is moved from left to right.

If white wire is damaged, shift lever will remain on the second and high side, even though Selector Lever is moved back and forth from right to left.

(***) If black wire is damaged, it is impossible to place transmission in neutral by merely moving Selector Lever to "Neutral." However, if transmission is in either second or high position, it may be placed in neutral by moving Selector Lever to "Neutral" and then as far to the left as possible. Transmission may be moved into and out of every position, except neutral, in the normal manner.

Removal, Installation and Repair

The details of these operations are covered on page 15 of 1936 Reference Sheet No. 11 except as follows:

(1) A rubber grommet is assembled in the power cylinder pilot pin hole in the mounting bracket before the power unit is mounted.

(2) The lower harness is clipped to the right front and rear and left rear transmission cover screws only.

(3) Before removing the power cylinder end plate-(operation 104, page 19-1936 Reference Sheet No. 11) remove the two screws from the neutral switch cover and withdraw the switch. (See illustration-page 2).

After the end plate has been removed the two screws can be removed from the neutral switch operating bracket and the mechanism removed. When reinstalling the mechanism be sure the gasket is in good condition.

Both the inner and outer piston rod seals can be removed and replaced. When reinstalling the neutral switch in the end plate the operating lever must lie between the two bakelite arms carrying the movable points of the neutral switch.