VOL. 15 No. 2 JANUARY 15, 1941

PACKARD ELECTROMATIC CLUTCH

OWNER'S INSTRUCTIONS

The Electromatic Clutch, supplied on 1941 Packard cars as factory-installed special equipment at extra cost, is a vacuum-electric mechanism which provides automatic operation of the clutch.

The driver uses the accelerator pedal and shifts gears in the usual way but without touching the clutch pedal. All clutch engagements and disengagements are accomplished by the Electromatic mechanism smoothly, quickly and automatically. Even when stopping, it is not necessary to touch the clutch pedal.

Lock-out Switch—The instrument board switch marked "Electroclutch" is provided to lock out the Electromatic Clutch. When the switch is pushed in, the Electromatic mechanism is made operative. Pulling the lock-out switch knob out makes the mechanism inoperative and re-establishes the conventional manual operation of the clutch pedal. The lock-out switch may be operated with the car standing or at any engine or car speed.

Starting Engine—Engines of cars equipped with the Electromatic Clutch are started in the same manner as conventional cars. (See Owner's Manual, page six.) The Electromatic mechanism does not become operative until after the engine has started. When starting the engine, the gear shifter lever must be in the neutral position or the clutch pedal depressed until the engine starts.

Cold Weather Starts—During cold weather, the clutch pedal should be depressed with the foot when starting the engine, the same as with a conventional car. This relieves the engine of the drag created by the cold congealed oil in the transmission and will assure quicker starting and less drain on the battery.

During the warm-up period before the engine is running smoothly, the operation of the Electromatic Clutch may be a little too rapid and it is suggested that the operation be delayed by a slight restraining pressure of the foot on the clutch pedal until the car is in motion.

If preferred, until the operator has become accustomed to cold weather starting, the Electromatic mechanism may be locked out and the conventional method of foot operation used. When the engine has warmed up and is running smoothly, the Electromatic Clutch may be engaged by pushing in the lock-out switch.

Driving with the Electromatic Clutch—After the engine has been started and the lock-out switch on the instrument board is pushed in, the Electromatic Clutch starts to function and the operation of the clutch is automatic. Move the gear shift lever into the "low" or "reverse" position and when the accelerator pedal is depressed, the car will move away smoothly. Further gear shifting is accomplished by releasing the accelerator pedal and moving the gear shifter to the next position. It is not necessary to touch the clutch pedal.

When it is desired to stop as when approaching a traffic signal, simply lift the foot from the accelerator pedal and apply the brake. While waiting for the light to change, move the gear shifter lever to the "low" or "second speed" position and when the light changes, depress the accelerator.

On level roads, starting may be done in second gear. On hills or slight grades, it is recommended that low gear be used for starting in order to reduce clutch wear. Although it is possible with the Electromatic Clutch to start the car in high gear, this practice causes rapid clutch wear and is not recommended. The Electromatic Clutch action has deliberately been made rough, when starting in high gear, to discourage this practice.

Descending Hills in Second Gear—If it is desired to use the engine as a brake when descending a grade in second gear, the Electromatic Clutch must be locked out. Shift into second gear when starting down, then pull out the lock-out switch. When the bottom of the grade is reached, push in the lock-out switch, re-engaging the Electromatic Clutch and shift into high in the usual way.

EXPLANATION OF OPERATION

Briefly the operation of the Electromatic Clutch is as follows:

A power cylinder "6" Fig. 1 actuated by inlet manifold vacuum is employed to operate the clutch. The power cylinder is connected to the standard clutch linkage in such a manner that either the manual (clutch pedal) or Electromatic Clutch control can be used at will.

When the vacuum of the inlet manifold is admitted to the power cylinder, the piston moves into the cylinder and disengages the clutch. When the vacuum is shut off and air is admitted to the cylinder reducing the vacuum on the piston head, the piston moves out of the cylinder engaging the clutch.

The rate of clutch engagement is controlled entirely by the rate of air bleed into the vacuum cylinder and not by the manifold vacuum. So long, therefore, as there is sufficient manifold vacuum to withdraw the power piston and disengage the clutch, variations in inlet manifold vacuum, due to engine condition, will not affect the operation of the Electromatic Clutch.

Clutch Control Valve—The rate of air bleed into the vacuum cylinder and hence the rate of clutch engagement is controlled by a pressure regulating valve called the clutch control valve "11" Fig. 1 located in the vacuum line between the inlet manifold and power cylinder. The clutch control valve is a compound valve which regulates the rate of air bleed to provide the desired clutch engagement action as well as the proper engine speed synchronization. One element, the spool, is connected through a compound linkage to the accelerator pedal. Another element, the sleeve, is actuated by a spring loaded vacuum diaphragm which is subjected to a vacuum equal to that in the power cylinder.

As the accelerator is depressed, the two elements in the valve move in relation to each other to shut off the vacuum supply and bleed air into the power cylinder at such a rate as to automatically provide the proper rate of clutch engagement for all normal operating conditions.

Electromatic Relay—A three unit relay "4" Fig. 1 mounted under the bonnet on the front side of the dash is provided to operate the solenoid controls. In operation, closing a switch completes the circuit and causes a light current to flow through the relay. This current energizes a coil in the relay, closing a set of contact points, allowing a heavy energizing current to flow through the solenoid circuit.

For the purpose of this description, further reference to the relay will be omitted. When it is stated that operating a certain switch energizes or de-energizes a certain unit, it must be remembered that the action is accomplished through the relay. The one exception to this is the second speed switch.

Direct Speed Solenoid—A solenoid shut-off valve "3" Fig. 1 is built into the vacuum supply line at the clutch control valve. When the solenoid is de-energized, the valve is closed, shutting off the vacuum supply to the power cylinder, thus making the Electromatic mechanism inoperative. The direct speed solenoid valve is controlled electrically through the lock-out, direct speed, accelerator and governor switches.

Lock-out Switch—The Electromatic Clutch may be locked out, made inoperative, by means of the instrument board switch marked "Electroclutch," "5" Fig. 1. When the knob is in the "out" position the switch points are open, thus breaking the circuit and de-energizing the direct speed solenoid valve. This makes the Electromatic mechanism inoperative through shutting off the vacuum supply to the power cylinder. In this position the lock-out switch overrules all other control switches. In the "in" position the switch points are closed, energizing the direct speed solenoid, making the Electromatic mechanism operative. For certain phases of operation this solenoid is de-energized by other controls.

Low and Reverse Solenoid—A slower rate of clutch engagement is required when starting in low and reverse than when starting in second and high. In order to obtain two ranges of clutch engagement, the low and reverse solenoid "1" Fig. 1 is provided. When energized, the solenoid pushes a plunger forward increasing the load of the clutch control valve diaphragm spring retarding the rate of clutch engagement. The solenoid is energized only when the gear shifter is in low or reverse. When in neutral, second or high, the solenoid is de-energized.

Low and Reverse Switch—The low and reverse solenoid is controlled by the low and reverse switch "7" Fig. 1 which is operated by the low and reverse transmission shifter rail. Contact points in the switch are closed energizing the low and reverse solenoid only when in low and reverse. When the shifter lever is in neutral, the switch is open and the solenoid is de-energized.

Governor Switch—With only the controls described so far, the clutch would be disengaged and the car would "free-wheel" every time the accelerator pedal was released. A governor switch "8" Fig. 1 is employed to lock out the Electromatic mechanism and prevent free-wheeling in high gear at speeds above 17 miles per hour. The governor is similar to that used with the Aero-Drive except that there are two sets of points, the Electromatic Clutch points marked "EC" and the Aero-Drive points marked "AD".

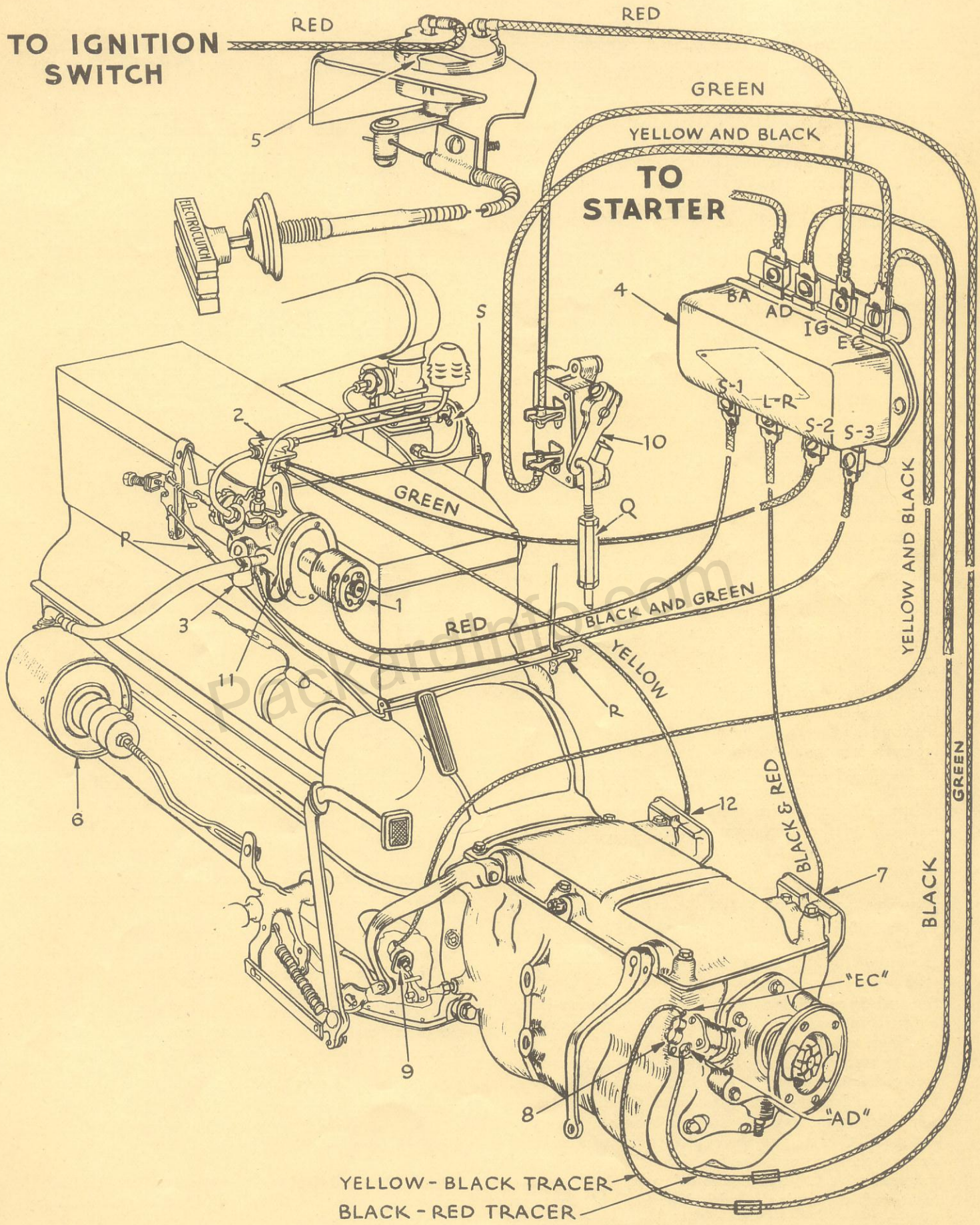

Figure 1—Schematic diagram of Electromatic Clutch.

Below the governed speed of 17 miles per hour, the "EC" points are closed, completing the circuit through the lock-out switch and energizing the direct speed solenoid. At the governed speed, the "EC" points open and the "AD" points close. Opening the "EC" points breaks the circuit to the direct speed solenoid, de-energizing it and thus cutting off the vacuum from the power cylinder, preventing clutch disengagement. The "AD" points control the Aero-Drive engagement and perform other functions in the Electromatic Clutch operation, which will be described later.

Direct Speed Switch—With the governor making the Electromatic mechanism inoperative, it would be impossible to shift gears above the governed speed without some device to overrule the governor. The direct speed switch "9" Fig. 1 is provided for this purpose. When the switch points are closed, it completes a circuit around the "EC" points of the governor switch energizing the direct speed solenoid and making the Electromatic Clutch operative, thus overruling or cancelling the effect of the governor. The direct speed switch is mounted on a bracket so that it is operated by the second and high gear shifting lever. The switch points are open when the direct (high) gear is engaged and closed at all other times. The switch is adjusted so that the first movement of the gear shifter lever out of the high gear position closes the contact points, thus permitting clutch disengagement before any movement of the transmission lever takes place.

Accelerator Switch—The function of the accelerator switch "10" Fig. 1, located under the bonnet on the front side of the dash, is to prevent possible excessive clutch plate wear due to slippage when operating in high gear below the governed speed, by locking out the Electromatic Clutch. When the accelerator switch points are open, it opens the circuit to the direct speed solenoid, de-energizing it and making the Electromatic Clutch control inoperative. The switch is set so that the contact points are closed when the accelerator pedal is fully released. As the accelerator is depressed, the contact points open when the slack in the linkage has been taken out but before the carburetor throttle starts to open. The accelerator switch is connected in series with the "EC" points of the governor switch and in parallel with the direct speed switch so that the direct speed switch will overrule or cancel the effect of the accelerator and "EC" governor switch in all but direct (high) gear.

Second Speed Solenoid Valve—With the car being operated in second gear under widely varying throttle openings, an offensive lurch would result if the clutch were permitted to engage rapidly the instant the accelerator pedal was depressed. The lurch would result from the sudden decrease in car speed when the clutch was engaged before the engine speed had been brought up to car speed, thus causing the engine to act as a brake to decrease the car speed. The function of the second speed solenoid valve "2" Fig. 1 is to delay the clutch engagement until the engine speed is increased to correspond to the car speed, thus accomplishing a smooth engagement without lurch. The second speed solenoid valve is an electrically operated choke placed in the air bleed line. When energized, it restricts the rate of air bleed to the power cylinder and so slows up the rate of clutch engagement.

The second speed solenoid is energized and the choke functions only when driving in second gear above the governed speed. Under all other conditions, the solenoid is de-energized and the air bleed line is open and free of restriction at this point.

In order that the second speed solenoid valve will be energized only when driving above the governed speed in second gear, it is connected in series with the "AD" points of the governor switch and the second speed switch.

AD Governor Switch Points—The "AD" points in the governor switch control a coil in the relay which, when energized, closes a set of points in the second speed solenoid valve circuit. The "AD" governor switch points are closed only when the car is operating above the governed speed. Below this speed the points open de-energizing the relay and opening the circuit. With the "AD" points closed, current will flow through the circuit, energizing the second speed solenoid only if all other switches in the circuit are closed.

Second Speed Switch—The second speed switch "12" Fig. 1, mounted on the second and high gear transmission shifter rail, is connected in series with the second speed solenoid. This switch has but one set of points, which are closed to complete the circuit only when the second speed gears are engaged. At all other times, the points are open and the second speed solenoid de-energized.

GENERAL INSTRUCTIONS

Air Cleaner—The air cleaner on the air bleed line is of the dry type and should not be oiled. Do not attempt to wash filter. Replace filter when dirt accumulation is excessive.

Hose and Piping—Use extreme care when servicing the unit to see that no dirt, oil or grease gets into the hose or piping.

Power Cylinder—The leather seal on the piston of the power cylinder is oiled at assembly. No reserve of oil should be added to the power cylinder. If piston becomes sticky as indicated by a rough jerky motion of the piston rod, remove piston from cylinder, dip in Bendix Vacuum Cylinder Oil, or equal, and reassemble.

Accelerator and Throttle Linkage—It is most important that all accelerator linkage be free so that it will return to the closed position immediately when the accelerator pedal is released.

Clutch Control Valve—These valves are carefully calibrated to the model car on which they are installed. Do not attempt to install a valve on a model other than that for which it was intended.

ADJUSTMENTS

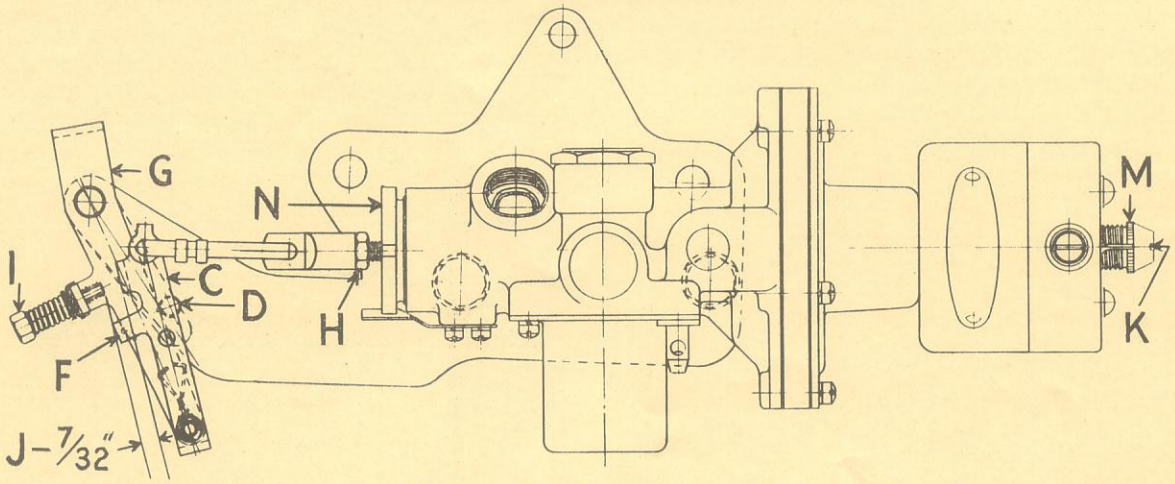

Figure 2—Electromatic Clutch Control Valve showing principal points of adjustment.

Due to the Electromatic Clutch control being operated by engine vacuum, satisfactory operation cannot be expected unless engine is tuned and adjusted for a smooth even idle. Before Electromatic Clutch control adjustments are attempted, the engine should be warm and idling normally at the equivalent of 8 to 10 MPH.

1. Clutch Pedal Free Play—Adjust clutch pedal free play to two inches. This adjustment should be checked each time the car is in the service station.

2. Accelerator and Throttle Linkage Adjustments:

(a) Adjust carburetor cross shaft lever linkage so that with the throttle operating lever "G" Fig. 2 in contact with stop pin "D," the carburetor throttle lever rests on the idle adjusting screw "S" Fig. 1 and the linkage is free with normal slack.

(b) Adjust accelerator pedal lever at turnbuckle "P" Fig. 1 so that with the lug "F" on clutch control lever "C" holding throttle operating lever "G" against stop pin "D" there is a positive clearance (1/32″ to 1/16″) at the accelerator cross shaft stop "R" Fig. 1.

3. Engine Speed Adjusting Screw Gap—Holding control valve lever stop "F," Fig. 2 against throttle lever "G," adjust engine speed adjusting screw "I" to produce 7/32″ gap at "J."

4. Spool Valve Rod Adjustment (Engine speed at which clutch just starts to engage and the car just starts to move with slight throttle opening.) When making this adjustment the engine should be warmed up and running and the gear shifter lever in neutral.

(a) Depress accelerator pedal to just take up clearance at "J," Fig. 2 then adjust spool rod at "H" into or out of the clevis until the power cylinder piston rod just starts to move out of the cylinder. If the piston rod starts to move before clearance is taken up at "J" screw spool rod out of clevis. If it does not start to move when all clearance is taken up, screw spool rod into the clevis.

(b) To check the adjustment put the gear shifter lever in the low gear position and depress accelerator pedal slowly. Car should start to creep forward at engine speed of approximately 900 RPM. To increase engine speed decrease gap at "J" by turning screw "I" in. To decrease engine speed turn screw out. Adjust screw "I" ¼ turn at time until proper engine speed is obtained.

(c) Recheck engine speed adjusting screw gap "J." If gap has increased or decreased more than 1/32″ from original setting of 7/32″ the spool rod must be readjusted. If gap is too little, screw the spool rod out of the clevis; if too great, into the clevis approximately ½ turn. Recheck as described in (b). Adjust engine speed screw gap and spool rod until with 7/32″ ± 1/32″ gap car just starts to move in low gear at approximately 900 engine RPM.

5. Low and Reverse Engagement—Note: Two adjustments are provided. The Allen head screw "K," Fig. 2 for starts in low and reverse, the knurled head screw "M" for starts in second and high. The first and reverse adjustment "K" alters the second and high adjustment. For this reason the first and reverse adjustment should be made first and a second and high adjustment must always be made following a first and reverse adjustment. Use S.T. 10175 Adjusting Tool.

To check operation of low and reverse solenoid, turn ignition switch "on" (engine need not be running). Move gear shift lever into low gear position and observe action of adjusting screw "K." If it moves into solenoid body action is satisfactory.

(a) If the clutch engagement in low gear is too sharp (grabs) turn Allen head adjusting screw "K" in (¼ turn at a time) until a smooth clutch engagement is obtained, at not to exceed 900 RPM engine speed.

(b) If the clutch engagement in low gear is too gradual (slips) turn Allen head adjusting screw "K" out (one turn at a time) until clutch grabs. Then turn in ¼ turn at a time until a smooth engagement is obtained, at not to exceed 900 RPM engine speed.

Note—Turning the adjustment screws in has the effect of increasing the engine speed. Turning them out, of decreasing it. After making a low and reverse solenoid adjustment, re-check Item 4 and readjust if necessary.

6. Second and High Engagement—This adjustment should never be made until after the low and reverse adjustment Item 5. Car should just start to creep at approximately 700 RPM engine speed when starting in second gear.

(a) If engagement is too sharp (grabs) turn knurled head screw "M," Fig. 2 in (1/4 turn at a time) until a smooth engagement is obtained, at not to exceed 700 RPM engine speed.

(b) If engagement is too gradual (slips) turn adjusting screw "M" out (one turn at a time) until clutch grabs. Then turn in (1/4 turn at a time) until a smooth engagement is obtained, at not to exceed 700 RPM engine speed.

7. Full Throttle Engagement—This adjustment should be made on the road making full throttle starts in second gear. The adjustment should be made just as sharp as possible without causing engine stumble upon full clutch engagement.

(a) Screw body plug "N," Fig. 2 out until clutch grabs. Then turn in one notch at a time until smooth engagement is obtained without engine stumble.

(b) If engine races excessively (clutch slips) during the intermediate portion of the engagement, back out second and high adjusting nut "M" to reduce slip.

8. Shift Down from High—Make the adjustment at direct speed switch "9," Fig. 1 located on outside of transmission case under second and direct speed shifter lever, using test light such as Ignition Timing Light S.T. 724.

(a) Remove wire from terminal and clip to one lead of test light. Clip other lead to switch terminal.

(b) Place steering column gear shifter lever in high gear position.

(c) Turn on ignition switch but do not start engine. Test light should not be lighted.

(d) Move steering column gear shifter lever toward the neutral position. Light should come on after all slack in linkage is taken up and just before transmission lever moves out of the detent. Adjust the switch bracket until light indicates switch is opening and closing properly. To make switch close (light come on) sooner, rotate bracket to move switch toward front of car.

9. Accelerator Switch—Make the adjustment at accelerator switch control rod turnbuckle "Q" Fig. 1, using test light such as Ignition Timing Light S.T. 724.

(a) Remove either wire from switch terminal and clip one lead of test light to the switch terminal where the wire was removed.

(b) Clip other lead of test light to the battery terminal on the relay box.

(c) With ignition switch turned "off" and accelerator pedal fully released, the light should burn.

(d) Depress accelerator pedal slowly. The test light should go off just after the stop on the control valve lever "J" Fig. 2 contacts the engine speed adjusting screw "I" on the throttle operating lever, but before the carburetor throttle lever starts to move.

Note: Adjusting screw should be set to 7/32" clearance before making this test.

If test light goes off too soon, shorten the control rod at the turnbuckle. If test light does not go off until the carburetor throttle starts to open, lengthen rod at the turnbuckle.

10. Final Check of Adjustment—Recheck operation on road. Readjust according to previous instructions if clutch slip is found to be excessive under any condition of clutch engagement.

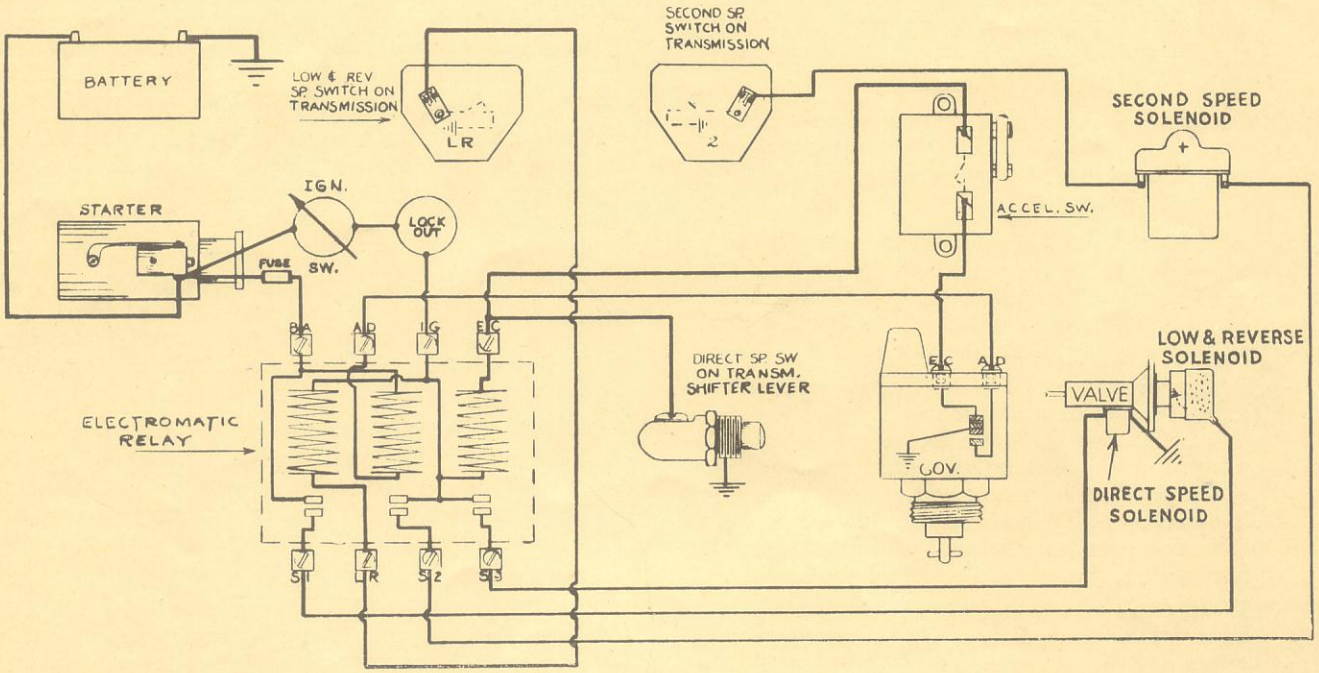

Figure 3—Electromatic Clutch current diagram.

ELECTRICAL CHECK

No. 1—FUSE:

Location—on wire from starter to "BA" post on eight-post relay on engine side of dash. Fuse inside metal container. (If fuse is good, go to step No. 2.)

Blown fuse indicates:

A. Two relay terminals may be shorted on dash, the "BA" and "S1" posts being the more critical.

B. Wire from fuse to "BA" post may be shorted. (1) Remove wire from relay post "BA." (2) Replace fuse. (3) Put one clip of the test light on the wire end and ground the other clip on the dash. (4) Move the harness back and forth to check for any momentary shorts. Light should burn but not blink.

C. Relay may be shorted. (1) Remove grounding clip from the dash and touch the relay post "BA." If light burns, the post or internal wiring of the relay is shorted. Replace relay. (2) Replace wire on relay post "BA" before making other tests.

No. 2—TO CHECK SWITCHES:

A. Direct Speed Switch—Turn on ignition key. Without starting engine, depress accelerator pedal to open accelerator switch, and so break the circuit to the governor. Move the gear shifter lever back and forth from high gear to neutral. There should be a click in the relay when the contact "makes" and "breaks." See Adjustments, Item 8.

B. Low and Reverse Switch—Turn on ignition key. Without starting engine, move gear shifter lever back and forth from neutral to low and from neutral to reverse. There should be a click when contact is made going into gear and a click when contact "breaks" coming out of gear. See Adjustments, Item 5.

C. Second Speed Switch—Remove yellow wire from second speed solenoid and clip one lead of test light to it. Clip other lead of test light to starter hot post. Light should burn when gear shifter lever is put into second gear and go out when in neutral.

D. Accelerator Switch—See Adjustments, Item 9.

E. Governor Switch—"AD" points—Disconnect wire from "AD" relay post. Clip one lead of test light to wire just removed and other to "AD" relay post. Light should not burn with ignition switch off or on. "EC" points—Disconnect wires from both "AD" and "EC" relay post. Clip one lead of test light to wire removed from "EC" relay post and other lead to "AD" relay post. Put gear shifter lever in high gear position. Light should burn.

F. Lockout Switch—Ground one test light clip to the dash and the other clip to the "IG" relay post. With the ignition key "on," lockout switch should turn light off when in the out position.

NOTE—DO NOT ATTEMPT TO REPAIR THESE SWITCHES. REPLACE IF DAMAGED.

No. 3—CHECK RELAY:

A. "S-2" Center Winding—Clip light to relay post "BA." Touch other test light clip to relay post "AD." If light burns, there is a short in the "S-2," center winding of the relay, or the governor "AD" contact points are stuck in the closed position. See Electrical Checks No. 2, Item E.

B. "S-3" Winding—With the ignition key off clip one lead of test light to relay "BA" post and other to "IG" post. Light should burn. (1) Put gear shifter in high gear and disconnect one wire from accelerator and wire from relay "LR" post. If light continues to burn, "EC," "IG" or "LR" relay posts are grounded, the "S-3" or "S-1" windings are grounded or there is a ground in the lockout switch or wiring to it. (2) Replace accelerator switch wire. Light should burn. If it does not, move gear shift lever to neutral. If light burns, there is a bad connection in the governor switch "EC" points or in the accelerator switch. If the light does not burn the "S-3" relay winding is broken or the direct speed switch is not closing properly.

C. "S-1" Winding—With ignition key off and test light clipped to "BA" and "IG" posts, disconnect one wire from accelerator switch. Put gear shifter lever in high gear position. Remove wire from relay "LR" post. Grounding post should cause light to burn. If it does not "S-1" winding is broken.

No. 4—TO CHECK SOLENOIDS:

A. Second Speed Solenoid—(1) Clip light to starter "hot post" and being sure that ignition key is off and shifter lever is in neutral, touch both terminals of second speed solenoid valve. If light burns, a short in windings or terminal insulation is indicated. (2) Check continuity by clipping the loose light clip to one terminal and grounding the other terminal with ignition key "on." A light indicates that windings are continuous.

B. First and Reverse Solenoid—Clip one terminal of test light to starter hot post and touch other clip to terminal on the low and reverse solenoid. If the windings are continuous, light will burn. Remove wire from first and reverse solenoid at back of control valve. Clip light to end of wire, ground other clip and turn on ignition key. Light should burn when relay post "LR" is grounded or gear shift lever put in low or reverse position. See Adjustments, Item 5, for Solenoid Check.

C. Direct Speed Solenoid—Clip one terminal of test light to starter hot post and touch other clip to terminal on the direct speed solenoid. If the windings are continuous, light will burn. To check wiring to direct speed solenoid on bottom of control valve, ground one light clip and touch the other to the terminal on the solenoid. When the ignition key is "on," the light should burn. If light does not burn, the "EC" points in the governor are open, or the accelerator switch is out of order. Check each for continuity. See Electrical Check, Item 2, D and E.

MECHANICAL CHECK

COMPLAINT	REMEDY
1. Engine speed *too high* when making a part throttle start in low and reverse. Clutch has tendency toward excessive slipping.	1. Turn the engine speed screw forward (1/4 turn at a time) until the engine reaches a speed of approximately 900 RPM at the initial engagement point. Recheck gap and adjust spool rod if necessary—See Adjustments, Items 3, 4, 5.
2. Engine speed *too low* when making a part throttle start in low and reverse. Clutch has tendency toward excessive grabbing.	2. Turn the engine speed screw in (1/4 turn at a time) until the engine reaches a speed of approximately 900 RPM at the initial engagement point. Recheck gap and adjust spool rod if necessary—See Adjustments, Items 3, 4, 5.
3. Excessive clutch *slippage* after shift has been made into second and high gear. Engine speed too high immediately after gears have been shifted.	3. Adjust knurled head screw in low and reverse solenoid. See Adjustments, Item 6.
4. Clutch engagement *too severe* after a shift has been made into second and high. Engine speed *too low* immediately after the gears have been shifted.	4. Adjust knurled head screw in low and reverse solenoid. See Adjustments, Item 6.
5. Car free-wheels in high gear above 17 MPH.	5. Direct speed switch at transmission shifter lever not contacting. Plunger on switch should be compressed 1/8" when hand shift lever is in the high speed position.
6. Clutch will not release when attempting to shift from high to second above a car speed of 17 MPH, but otherwise satisfactory in operation.	6. Check operation of direct speed switch on transmission. Switch should make contact on first movement of transmission shifter lever rod, before any movement of the shifter lever itself takes place.
7. When shifting from high to second, a "lurch" results on full throttle opening. When driving in second gear and releasing the foot from the throttle momentarily, the car "lurches" when the throttle is harshly depressed again.	7. Check second speed solenoid valve to see if it is functioning properly. Check above governed speed in second gear.
8. Clutch engagement is not positive when driving in high gear with very small throttle opening below the governed speed of approximately 17 MPH.	8. Throttle switch on dash is inoperative or improperly adjusted. Readjust as per the instructions.
9. Clutch has too much slip on full throttle starts in all gears.	9. Move the front end valve body plug out one turn. If grab is too severe, screw the plug in 1/4 turn at a time until the engagement is satisfactory. The plug is screwed out first and then screwed in to prevent the clutch from overheating during the process of adjustment due to excessive slipping.
10. Clutch has too much *grab* on full throttle starts in all gears.	10. Screw the front end valve body plug in, 1/4 turn at a time until engagement becomes satisfactory.
11. Excessive accelerator pedal movement before the clutch starts to engage.	11. Adjust engine speed screw gap to 7/32" plus or minus 1/32". See Adjustments, Items 3, 4, 5.

PRINTED IN U.S.A.