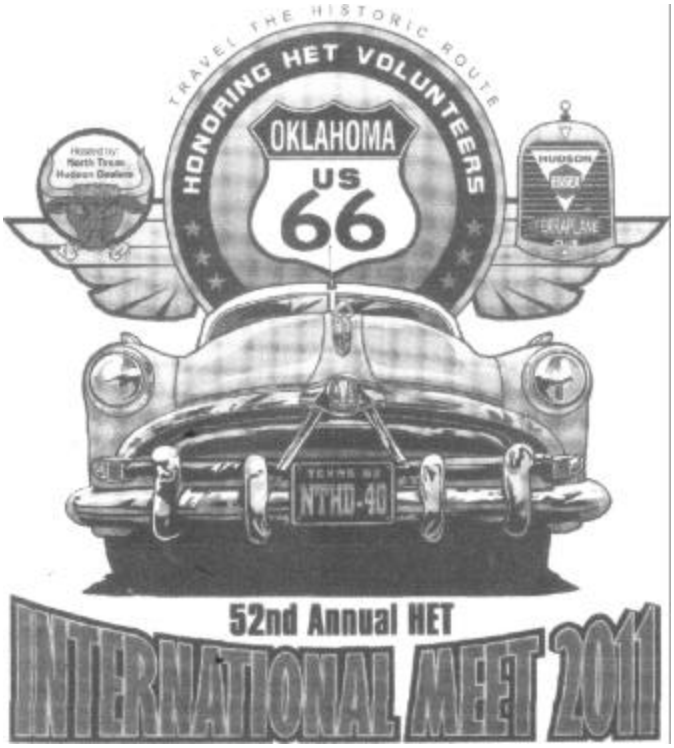
Hudson

Basic Electrical Trouble Shooting
HET International Meet 2011



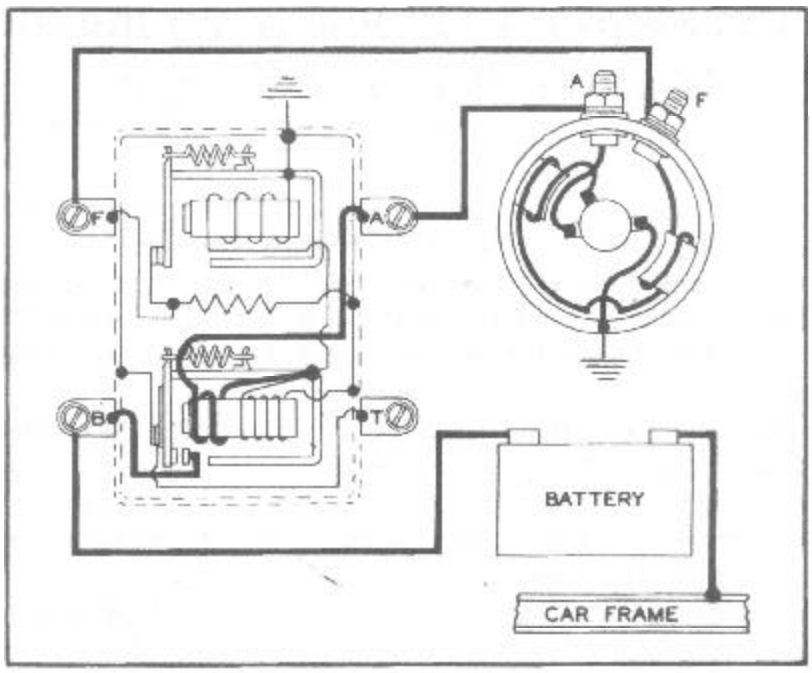
NOTE

The material contained in this brochure was a handout for an electrical technical session at the H-E-T International Meet in Oklahoma City, OK, July 2011.

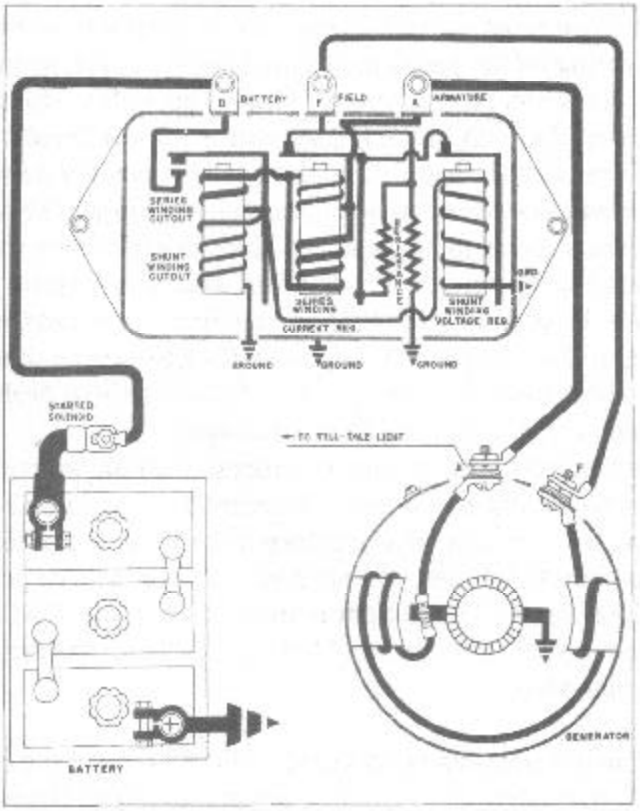
Presented by H-E-T member Lew Bird, No. Texas Chapter

Basic Steps on Trouble Shooting the Hudson Electrical System

1. Look over the wiring and the charging system. Is there corrosion at the battery terminals or other connections? Check for loose connections, ground straps between the engine and battery, ground straps from the frame and the engine.
2. Is the system not charging? Is the battery old or maybe low on water? For the battery to reach full charge the generator has to charge at a higher rate of voltage than the battery.
3. Buy an inexpensive volt-ohm meter. You can then check if the generator is charging at a higher voltage when at a fast idle. This simple test can tell you if the generator and regulator are actually doing their job or if the battery is defective.
4. With the voltmeter check the voltage of the battery at the battery terminals with the engine not running. Then check again with the engine at fast idle. The voltage at the terminals should be higher, if not than there is a problem with either the generator, regulator or the wiring. Example: A fully charged 6-volt battery is about 6.5 volts. If you check the battery voltage and the battery is only about 6- volts or lower, start and run the engine at a fast idle. Then check the battery again; the rate of charge should be higher than what the battery was before.
5. If the battery is not at full charge and the charging rate is not higher than the battery voltage than most likely the generator, regulator or wiring is at fault.
6. How can the wiring be the problem? Remember a bad connection, a loose connection or corrosion on any wire terminal is enough to stop 6-volt.
7. Part of the electrical circuit of the Hudson car is the car frame. The ground straps between the frame and the battery and the one between the frame and the engine are very important. They need to be clean, and very tight. The area on the frame where they connect needs to be clean and shiny down to bare metal.
8. Has the Hudson been sitting for a long time? The battery could be the problem. Check the water level and clean the terminals first. Fully charge the battery with a portable charger. If the battery has been idle for a long time, it may not take a charge. If not change out the battery. Then if there is still a problem with the charging system, check the charging rate voltage.
9. If you purchase an inexpensive volt-ohm meter, read the instructions. If checking voltage, the meter setting has to be on the correct voltage position. When using the ohm setting there cannot be any voltage present on the wiring being check.
10. The most important thing first, you need to look over the car before anything else. Most of the time the problem is right in front of our faces. Bad battery, corrosion and bad connections are the results of letting the car set to long and not driving them on a regular basis.



1940 - 1950



1951-1954

Trouble Shooting Hudson Voltage Regulator

Caution: Do Not Use This Method On Automobiles With Alternators

The first thing to do is to check the electrical system. It is very important that all connections are tight and clean. Corrosion by itself is enough to stop six volts.

- Clean the battery terminals; make sure they are shiny and tight.
- Check the ground strap from the battery to frame, and from the frame to the engine.
- Check the wiring between the battery, regulator, starter and all terminals.
- Check the water level in the battery is the battery defective from age or abuse.

After checking the electrical system and you are sure there are no defects. You can determine if the old regulator is causing the trouble.

You can localize the trouble without removing the regulator. Just by using a piece of copper wire. First polarize the regulator. Without starting the engine momentarily touch the two ends of the wire, one end to the "A" or "Gen" terminal and the other end to the "B" terminal of the regulator. By doing this you will match the polarity of the generator to the battery.

Is the Charge too high?

- First thing check and make sure the battery water level is correct. Run the engine f or a few minutes at a fast idle, without turning on the lights or accessories. Then momentarily remove the regulator lead from the "F" terminal of the regulator.
- If the charging rate drops to zero, replace the regulator. If not, the generator or wiring is at fault.

Is the Charge to low or no Charge?

- Start and run the engine at a fast idle for a few minutes. With the piece of wire touch one end of it to the regulator base and the other end to a good ground. If this corrects the trouble then a good ground is needed to the base of the regulator.
- If no, touch one end of the piece of wire to the "F" terminal of the regulator and the other end of the wire to the nearest ground. If the charge is now coming through or the rate of charge becomes normal, replace the regulator.
- If not, touch one end of the wire to the "A" terminal and the other end to the "B" terminal of the regulator. If the charge is now coming through, replace the regulator. If not, the trouble is in the generator, wiring or battery.

Now if we have determined the regulator is at fault, and also if we have corrected any faults in the electrical system, such as a bad ground or poor connection. We are ready to replace the old regulator.

- First thing remove the hot lead from the battery.
- Remove one at a time each lead from the regulator and mark them.

If possible, examine the old regulator. Burned or struck contacts, coils or resistors burned could be a defect in the electrical system. Make sure all defects are corrected before installing a new regulator.

Install the new Regulator.

- Mounting surface must be clean and shiny. This will insure a good ground. Mount the regulator firmly.

Connecting the new Regulator in the same manner as the original one.

- Be sure the connections are correctly made. If not the new regulator will burn out in a few seconds.
- The generator lead "A" or "Gen" is of heavy wire and will not spark if touched to a ground. Connect the generator lead "A" and any other wires that may have been connected with it to the "A" or "Gen" terminal.
- The battery lead "B" is also of heavy wire and will spark if touched to a ground. Connect the battery lead "B" and any other wires that may have been connected with it to the "B" terminal.
- The field lead "F" is of lighter wire. Connect the field lead "F" to the "F" terminal.
- Connect the lead "T" to the "T" terminal.
- Reconnect the hot lead back to the battery.

Polarizing the Generator

- Momentarily touch the two ends of a piece of copper wire to the "B" and "A" terminals. This will match the generator polarity to that of the battery. The regulator cutout points could vibrate and burn if this is not done.

Check all of the wiring, clean and tighten all connections.

Disclaimer: This information is provided to aid those who are competent to do general automotive electrical work. Use at your own risk. If you question your competence in this area, get competent help.

GENERATOR CHARGING RATE
Models - 21, 22, 24, 25, 24 all cars equipped with Hudson Drive Master
Also used on 1942 Cabriolet except 20T to supply power for lift.
HIGH RATE GENERATOR

Gen. R. P. M.	Eng. R. P. M.	Car M. P. H.	Amp. Cold	Amp. Hot	Volts Cold	Volts Hot
800	457	9	0	0	7.4	7.6
1000	571	11.4	8.5	6.0	6.7	6.6
1200	685	13.7	9.0	6.0	6.7	6.6
1600	914	18.3	22.0	16.0	7.4	7.5
2400	1371	27	36.0	28.0	7.8	7.8
3200	1828	36	41.0	33.9	8.0	8.0
3400	1943	38.9	40.9	33.9	8.0	8.0
3800	2171	43.4	40.0	34.0	8.0	8.0
4000	2285	46	39.9	34.0	8.0	8.0
4800	2742	55	36.0	32.0	7.8	7.7
5600	3200	64	33.0	29.0	7.7	7.7
6400	3657	73	30.0	27.0	7.6	7.7
7200	4114	87	27.9	25.9	7.5	7.6
8000	4571	91	25.0	24.0	7.4	7.5

The maximum HOT charging rate is 3800 Generator R.P.M. which is equivalent to about 2171 engineR.P.M. or 44 M.P.H. car speed.

The maximum COLD charging rate is 3400 Generator R.P.M. which is equivalent to about 1943 engine R.P.M. or 39 M.P.H. car speed.

GENERATOR CHARGING RATE
LOW RATE GENERATOR
Models - 20,28

Gen. R. P. M.	Eng. R. P. M.	Car M. P. H.	Amp. Cold	Amp. Hot	Volts Cold	Volts Hot
800	457	9	0	0	7.4	7.6
1000	571	11.4	1.9	1.7	6.5	6.5
1200	685	13.7	8.3	5.3	6.6	6.6
1600	914	18.3	19.8	15.3	7.1	7.2
2400	1371	27	31.2	24.3	7.9	7.7
3200	1828	36	32.3	27.3	7.9	8.0
3400	1943	38.9	31.3	27.7	7.8	8.0
3800	2171	43.4	29.7	27.2	7.8	8.0
4000	2285	46	28.9	26.9	7.8	8.0
4800	2742	55	25.9	25.0	7.6	7.9
5600	3200	64	23.8	22.3	7.5	7.6
6400	3657	73	23.9	21.0	7.5	7.7
7200	4114	87	20.3	19.8	7.4	7.6
8000	4571	91	19.0	18.2	7.4	7.5

The maximum HOT charging rate is 2900 generator R.P.M. which is equivalent to about 1650 engine R.P.M. or 33 M.P.H. car speed.

The maximum COLD charging rate is 3300 generator R.P.M. which is equivalent to about 1886 engine R.P.M. or 38 M.P.H. car speed.

SECTION 2 ENGINE TUNE-UP SPECIFICATIONS

	All Models
Cylinder Compression	Minimum, 100 lbs.
Vacuum, Intake Manifold	17-20" Hq.
Valve Tappet Clearance (Hot), 6 and 8 Cylinder:	
Intake	Six Cyl.-.010"; 8 Cyl.-.008"
Exhaust	Six Cyl.-.012"; 8 Cyl.-.010"
Battery Specific Gravity	1 285

Starter Motor	MODEL 4B	MODELS 5B, 6B, 7B and 8B
Cranking Voltage	5.0 Volts, 68 Max. Amps.	5.0 Volts, 65 Max. Amps.
Cranking Amperage (Engine Warm)	Approximately 160 Amps at 120 RPM	Approximately 160 Amps at 120 RPM
Stall Test:		
Volts	2.0 Volts	2.0 Volts
Amperes	280 Max Amps	335 Max Amps
Torque	4.4 Min. Ft. Lbs	6.0 Min. Ft. Lbs
Condenser Capacity	20-.25 mfd	20-.25 mfd
Coil Amperage Draw:		
Engine Stopped	5.0 Amps	4.5 Amps
Engine Idling	1.5-2.0 Amps	2.5 Amps

Distributor	MODEL 4B	5B, 6B, 7B	8B
Point Gap	.020"	.020"	.017"
Cam Angle (Dwell)	38°	38º	27°
Spring Tension	17-20 oz.	17-20 oz.	17-20 oz
Vacuum Advance:	5° at 12" Hq 10º at 1200 RPM	4º at 8" Hq 9° at 2000 RPM	4° at 16" Hq 17.5° at 1700 RPM

Generator Output:	
RPM Cold 870; Hot 950	6.4 Volts 0 amps.
RPM Cold 1800; Hot 2000	8.0 Volts 35 amps.
Voltage Regulator:	
Cutout Relay points Close	6.4-7.0 Volts
Cutout Relay points Open	4 1-4.8 Volts (after 15 amp. charge) or 4.0-6.0 amps. Reverse Current
Voltage Regulator Operates	7.2-7.4 Volts 35 Amperes at 70° F.
Spark Plug Gap	032"
Fuel Pump Pressure:	
Carter	3-1/2 - 4-1/2 lbs.
A.C.	3-4 lbs.
Fuel Pump Vacuum	6" Hq.
Fuel Pump Volume	
Carter	1 quart 60 seconds @ 500 RPM
A.C.	1 pint 45 seconds @ 500 RPM

Carburetor:	MODELS WA1-649-S WA1-968-S WA1-990-S	WGD-776-S	WGD-773-S
Float Setting	1/2"	3/16"	3/16"
Pump travel	16/64"	5/16"	5/16"
Idle Adjustment	1/2 to 1-1/2 turns open	1/2 to 1-1/2 turns open	1/2 to 1-1/2 turns open
Climatic Control	Set at index WA1-649-S WA1-968-S One point lean WA1-990-S	Set at index	Set one point lean

FUEL LEVEL AND WATER TEMPERATURE GAUGES

Fuel Level Gauge

The fuel level gauge used on all Hudson cars and illustrated in Figures 1 and 2, is of the electric type using bi-metal arms on which heating coils are wound in both the tank and the dash unit.

The two heating coils are connected in series and the gauge circuit is completed to ground through a set of contacts in the tank unit (one of which is mounted on the bi-metal arm). The feed wire on the dash unit is connected to the accessory terminal of the ignition switch so that the gauge registers only with the ignition on.

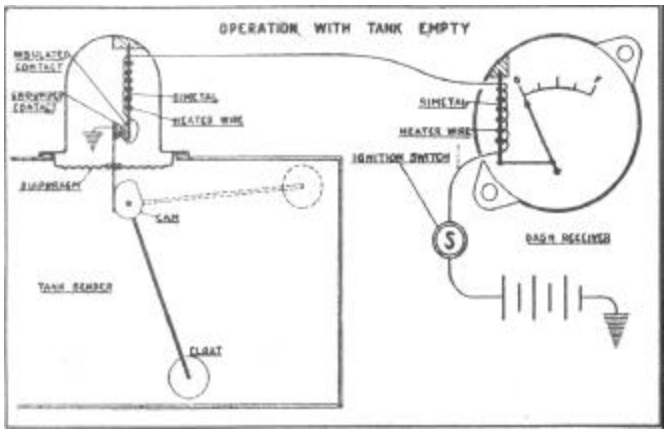


Fig. 1—Fuel gauge operation with tank empty.

The ground contact in the tank unit is mounted on a movable arm (arm mounted through diaphragm, forming the lower cover of tank unit and flexes diaphragm as it is moved). The lower end of the ground contact arm is actuated by a cam on the upper end of the float rod pivot. When the float moves up to follow the gasoline the cam moves the arm so that contact pressure and the length of time contacts remain closed is increased.

When the tank contacts are closed a current flows through the heating coils of both the tank and the dash units. This causes the bi-metal arm in the dash unit to bend, moving the needle, and showing a reading on the dash unit. At the same time the heating coil in the tank unit causes its bi-metal arm to bend, opening the contacts and interrupting the current flow. When this occurs the heating action stops and the cooling of the bi-metal arm causes it to flex in the opposite direction and again close the contacts. In operation this cycle takes place very rapidly and a steady reading is obtained on the dash unit.

Fuel Level Gauge Checking

If the fuel level gauge becomes inoperative it is recommended that an extra tank unit be used for testing. If there is any question about the test tank unit being correct then hook it up in series with a receiver known to be correct and 6 volts of electric current. Operate the tank unit by hand and see if the receiver reads zero with tank unit float in bottom position and full with tank unit float in the top position. Use two ten-foot lengths of insulated wire equipped with clip terminals at each end. These lengths will permit the checking by one person in front of the dash unit.

Do not remove either the dash or tank units in the car until the tests have been completed that proves them in need of replacement.

1. Disconnect the lead of the tank unit on the car and connect this lead to the test tank unit and ground this tank unit to the car frame. Turn on ignition switch and operate tank unit float by hand. With the float of the tank unit at the bottom position the dash unit should register at the bottom mark on the dial, see Figure 1. Move float rod up to top position and the dash unit being checked should move to top mark on the dial, as shown in Figure 2. Allow one minute for dash unit pointer to come to rest.

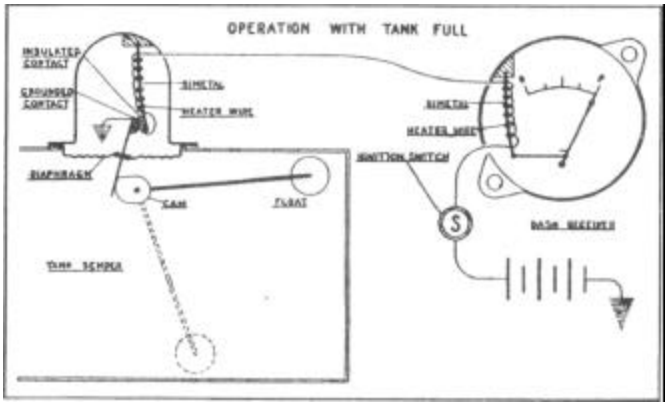


Fig. 2—Fuel gauge operation with tank full.

2. The tank unit is grounded through the case. Check up the ground connections. See that paint and grease are removed under the flange and that surfaces are making good contact.
3. If the car is radio equipped, check the condenser on the tank unit. If the condenser is shorted it will cause the dash unit to over read. When replacing condenser it is preferable to use one of .10 micro-farad capacity but up to .50 can be used to cut out radio interference.
4. If the ground (see paragraph 2) and condenser (see paragraph 3) are correct then replace the tank unit and see if this has corrected the difficulty.
5. If the dash unit does not operate or fails to operate correctly then check the wire lead to the dash unit and replace the wire if faulty.
6. If the wiring is satisfactory then replace the dash unit and check it with the tank on the car. If the dash unit fails to operate then replace the tank unit. CAUTION: Do not attempt the repair or calibration of any dash unit or tank unit as this is not practical.

Install new unit whenever the old one is found inoperative. Order from Hudson Parts Department.

7. To install a new dash unit first remove the wiring to the fuel and temperature instrument cluster. There are three wires, one is the hot lead from the ignition circuit and numbers two

and three are the leads to the fuel gauge tank unit and to the water temperature gauge engine unit.

8. Remove cluster from the panel by removing three nuts top and sides.
9. Remove the lock nuts holding the bus bars and insulating shield from the dash unit and then remove the dash unit.
10. Install the new dash unit, being careful to locate it properly so that the notches in the insulator are centered.
11. Replace insulator shield, lock nuts and bus bars. Tighten securely.
12. Before replacing cluster, test to make certain that no short exists. Check from each instrument terminal to the case. If there is a circuit the instruments are not properly located as stated in paragraph 11. Correct this condition before proceeding.
13. Replace the cluster in the panel.
14. Replace the three wires—see paragraph 7.

CAUTION: When handling the instrument cluster be careful of the pointers and the dials.

Water Temperature Gauge

Like the fuel level gauge, the water temperature gauge used on all Hudson models is of the electric type using bi-metal arms on which heating coils are wound in both the engine unit and the dash unit.

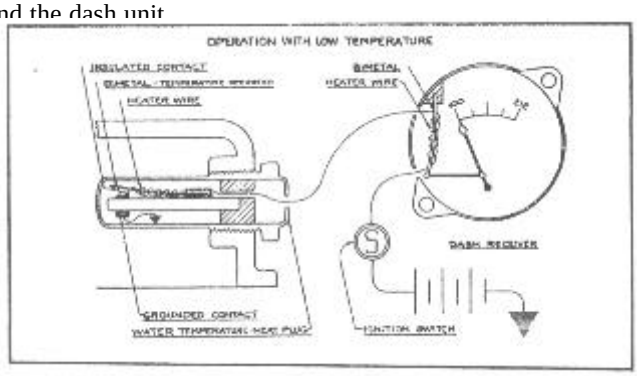


Fig. 3—Temperature gauge—low temperature operation.

The engine unit consists of a fixed grounded contact so positioned that the bi-metal against which it presses is bent mechanically.

At low temperatures, considerable heat is required to make this bi-metal bend away from the grounded contact. With the temperature of the engine cooling water low, all of this heat must be made electrically and this same current flowing through the heater wire of the dash unit creates an equal amount of heat there and results in bending of the dash unit bi-metal, causing the pointer to show a low temperature reading. (See Figure 3.)

As the cooling water temperature rises the heat of it aids in bending the engine unit bi-metal. Less heat is generated electrically and the resulting bending of the dash unit bi-metal is less. This gives a high temperature reading. (See Figure 4.)

One wire connects the engine unit to the dash unit.

The same testing and replacing instructions apply as for the Fuel Level gauge.

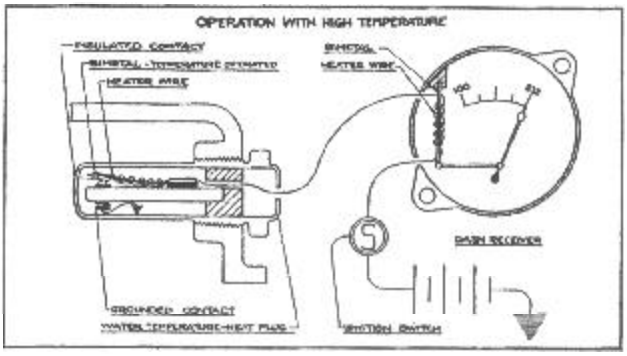


Fig. 4—Temperature gauge—high temperature operation.

Temperature Gauge—Instrument Panel Unit

The Fuel and Temperature cluster assembly is attached by three screws.

The at rest position of the indicator hand is at the "H" or hot end of the dial.

A cylinder head temperature element is at the left side of the cylinder head at the rear and it is connected to the water temperature indicator on the instrument panel.

All wiring connections should be tight both at the cylinder head temperature element and at the indicator.

It is impossible to repair or adjust either the element or the indicator.

The New Rear Deck Lock Mechanism seems to be of a special interest to T. H. Stambaugh, left, Director, National Service Operations, and W. A. Mortensen, President, Aaron DeRoy Motor Car Co., at the product presentation meeting in Detroit on July 19th.