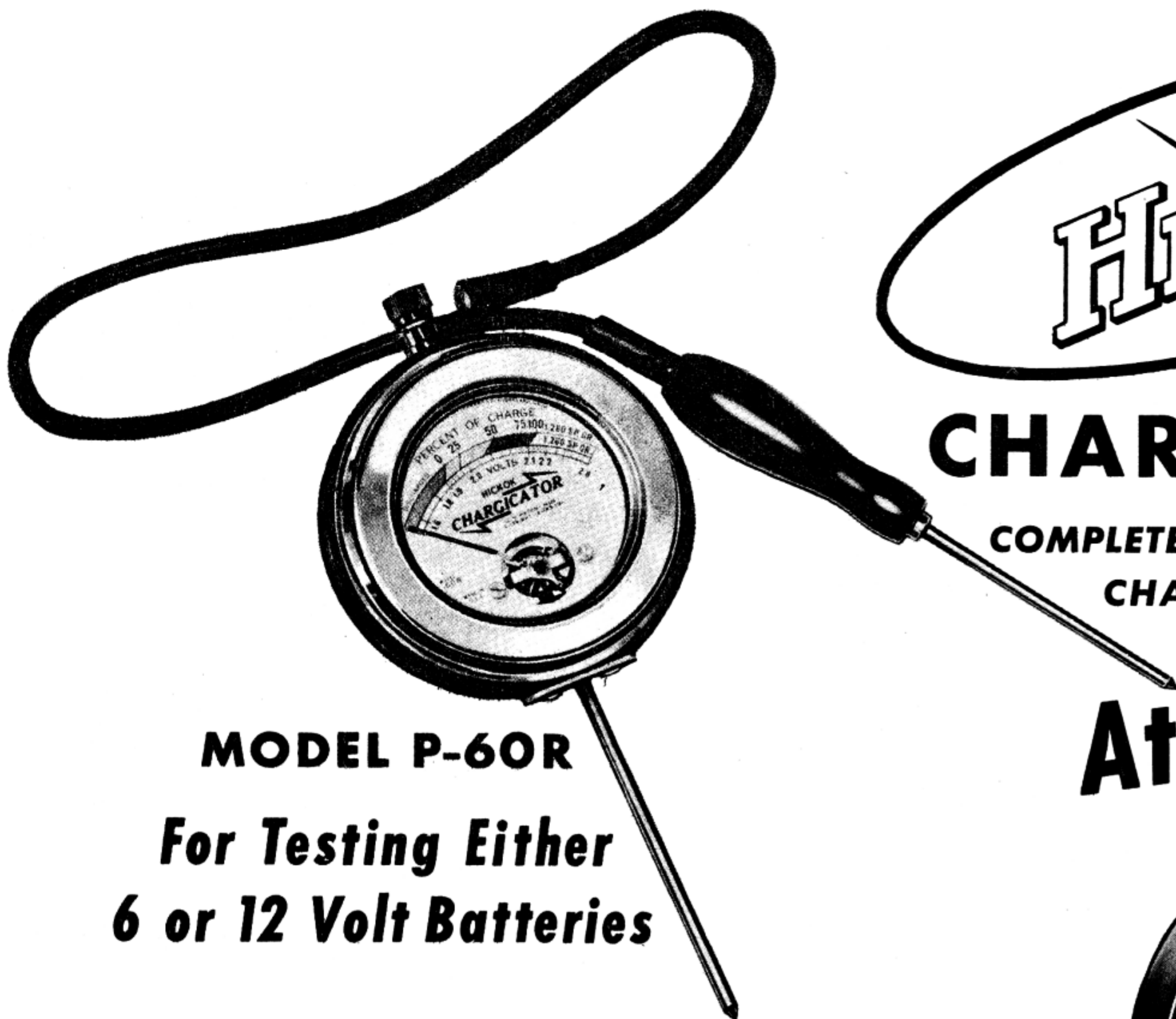


**HICKOK**

**CHARGICATOR**

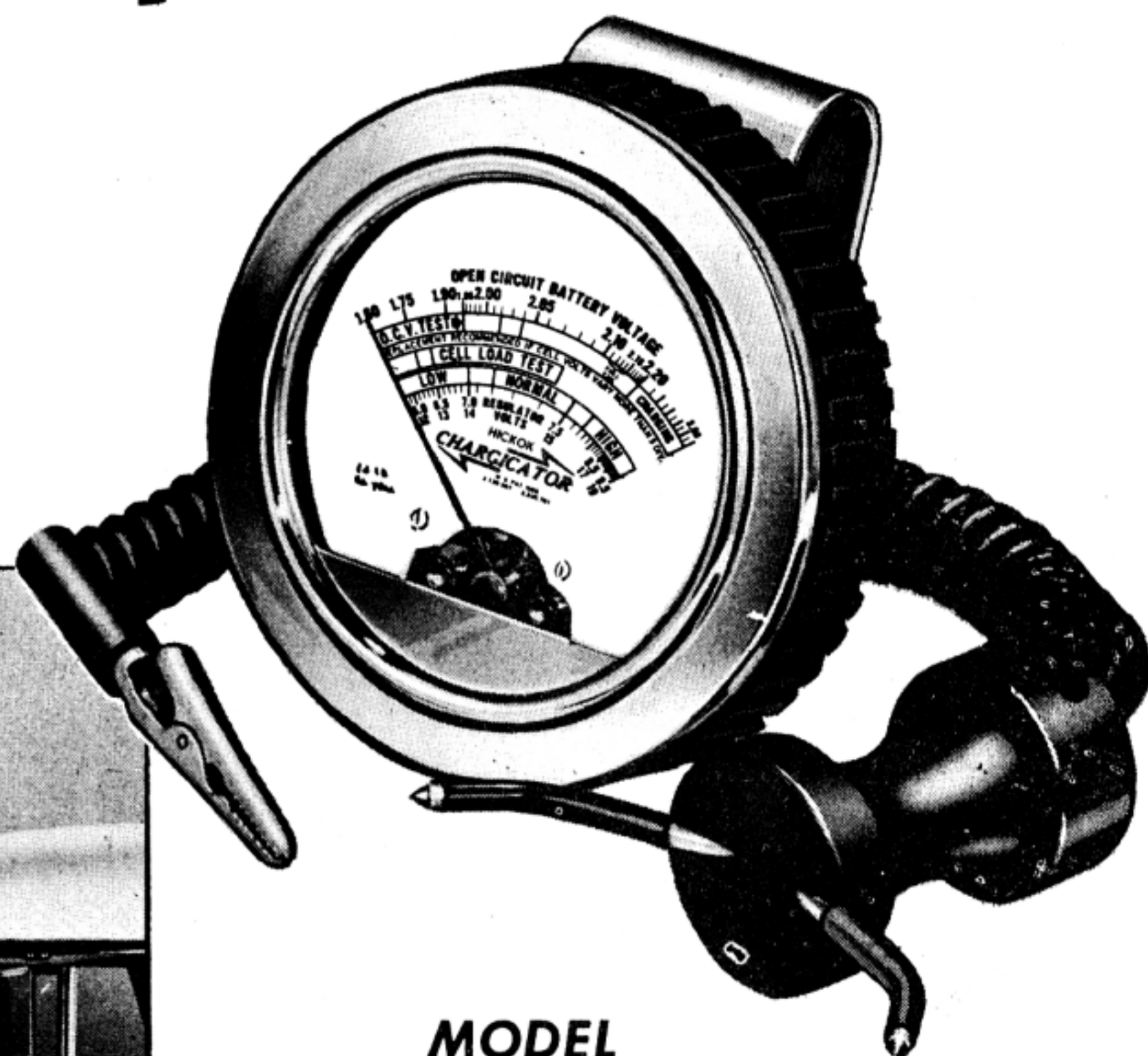
COMPLETE BATTERY and CHARGING CIRCUIT TEST . . .

**At a Glance**



**MODEL P-60R**

**For Testing Either  
6 or 12 Volt Batteries**



**MODEL  
48P-4 B**

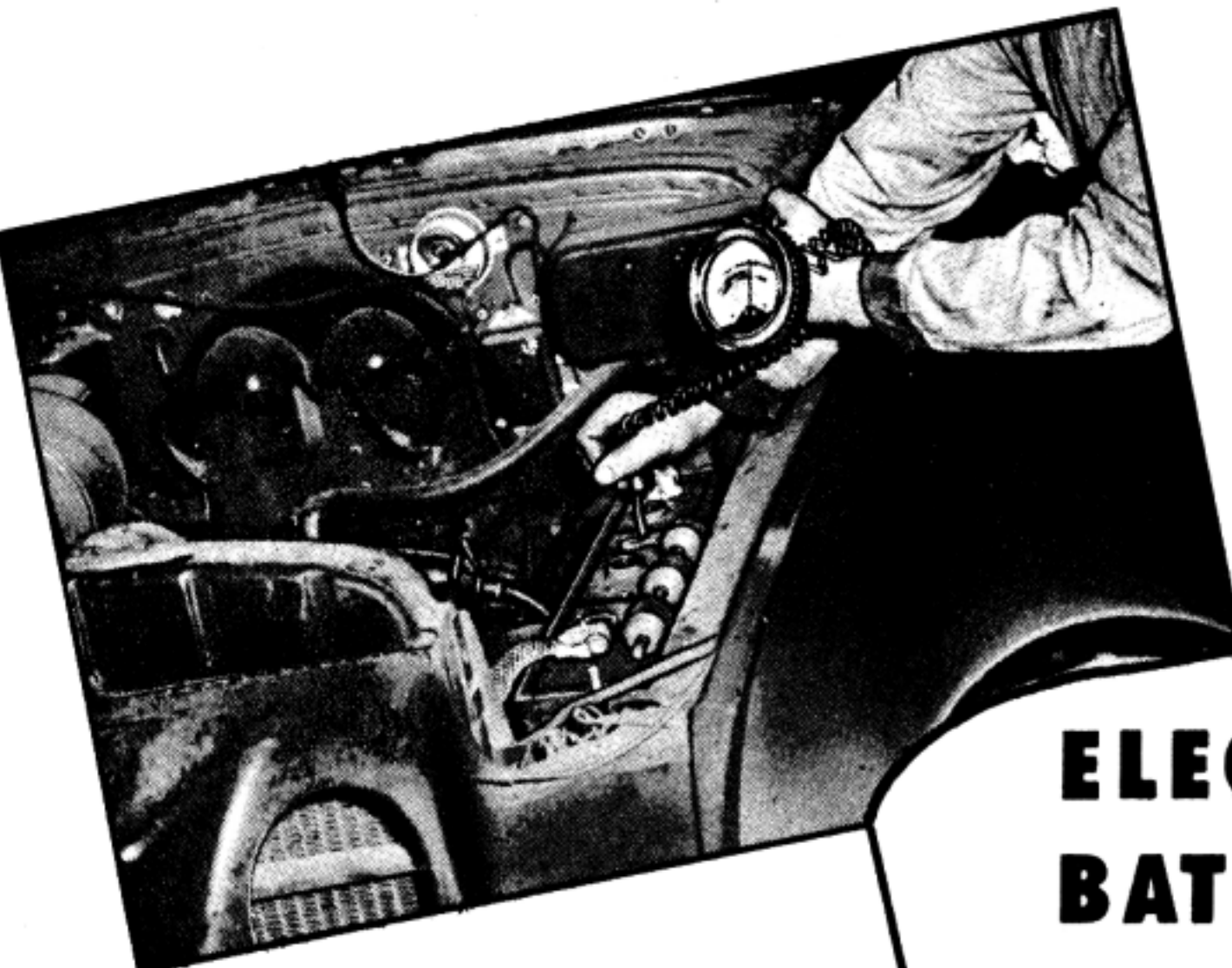
**For Testing Either  
6 or 12 Volt Systems  
and Batteries**



**Sell More Batteries**

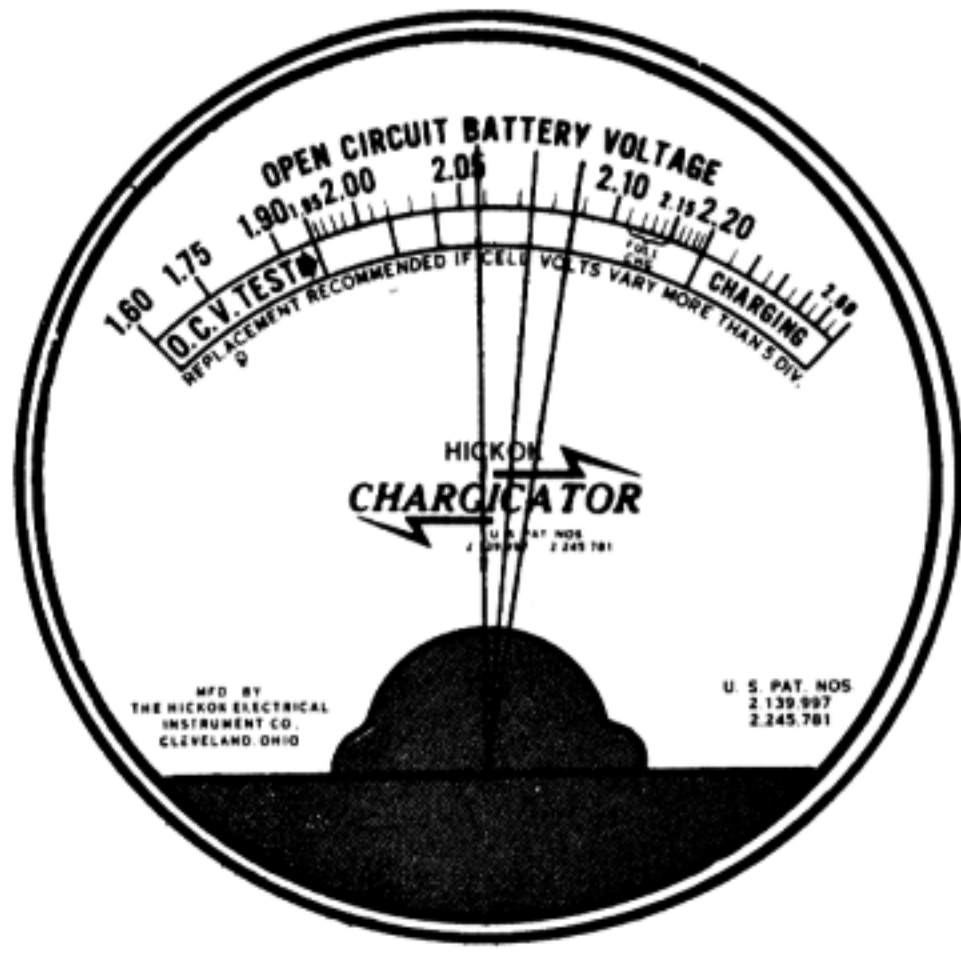
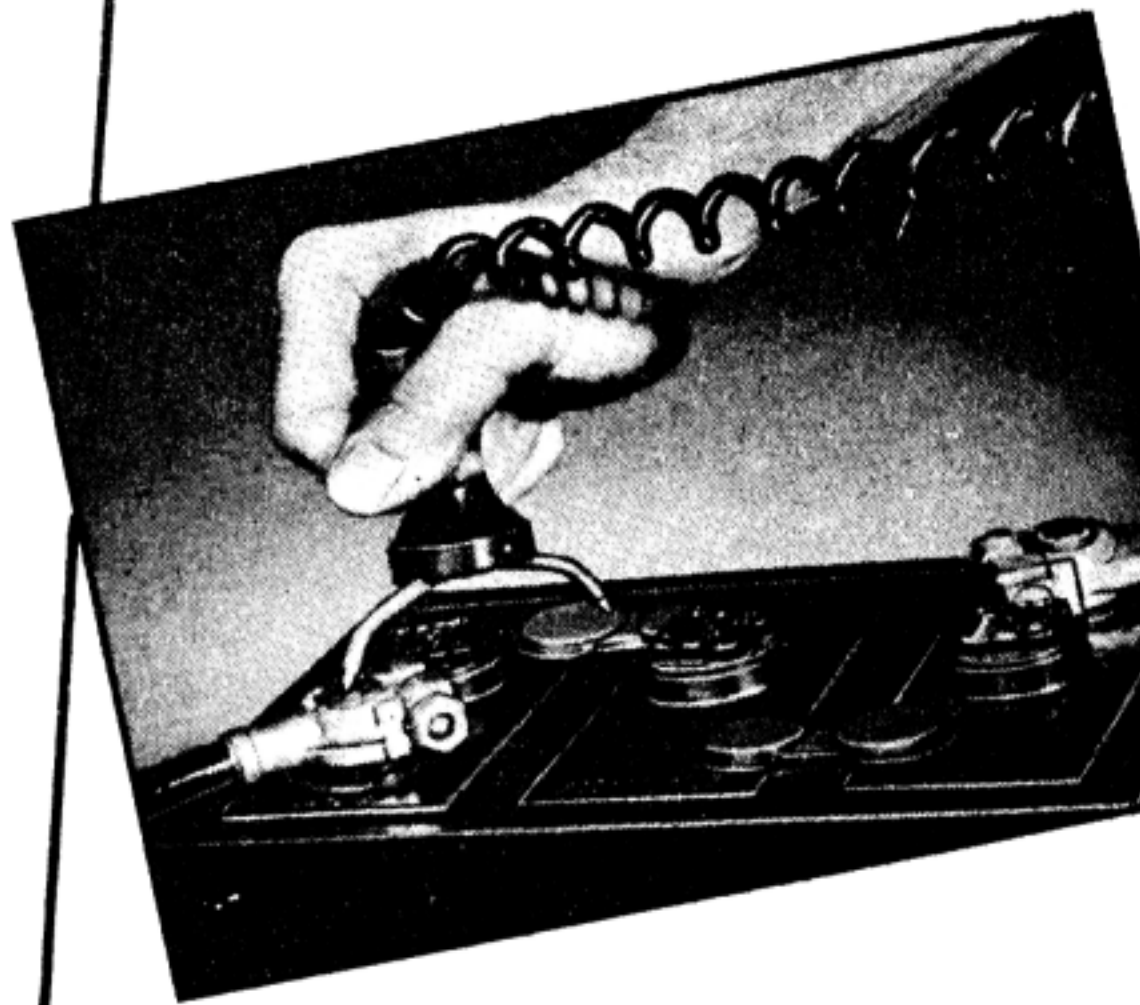
- Predict Battery Failure
- Sell More Recharges
- Build Customer Loyalty
- Locate Faulty Cables
- Identify Short Circuits
- Test Battery under Load
- Check Voltage Regulator
- Increase Battery Sales
- Clean . . . Fast . . . Complete Test
- Guaranteed Quality





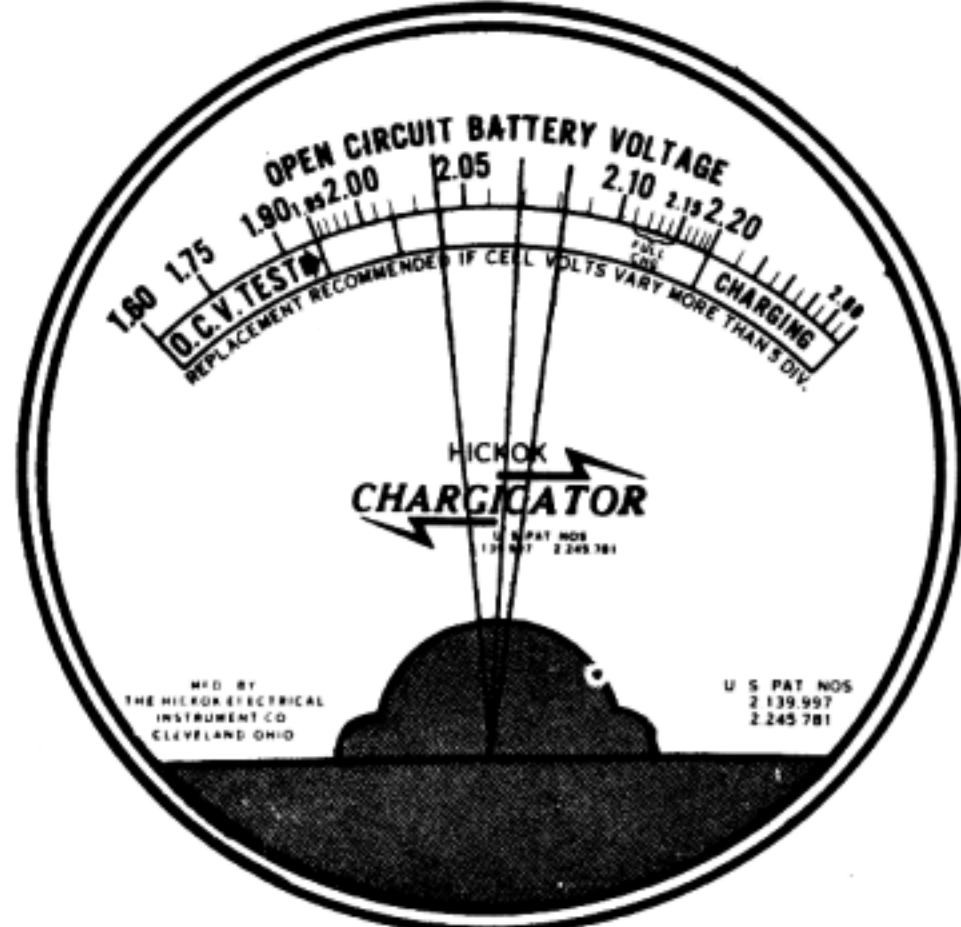
## ELECTRICALLY MEASURES BATTERY CONDITION

The newest instrument designed to improve battery servicing is the Hickok Electrical Storage Battery Charger. This instrument measures the state of charge in a lead-acid storage battery, instantly and accurately. It's handier, cleaner and quicker than a hydrometer and avoids acid damage to clothing. This new instrument also provides a complete test of all other factors affecting the life or condition of a battery. Its large multi-colored scale is accurately calibrated for easy and instant reading in testing either 6 or 12 volt batteries. These simple and quickly made tests, as outlined below, are aimed to avoid starting failure, build customer good will, and increase your battery sales.



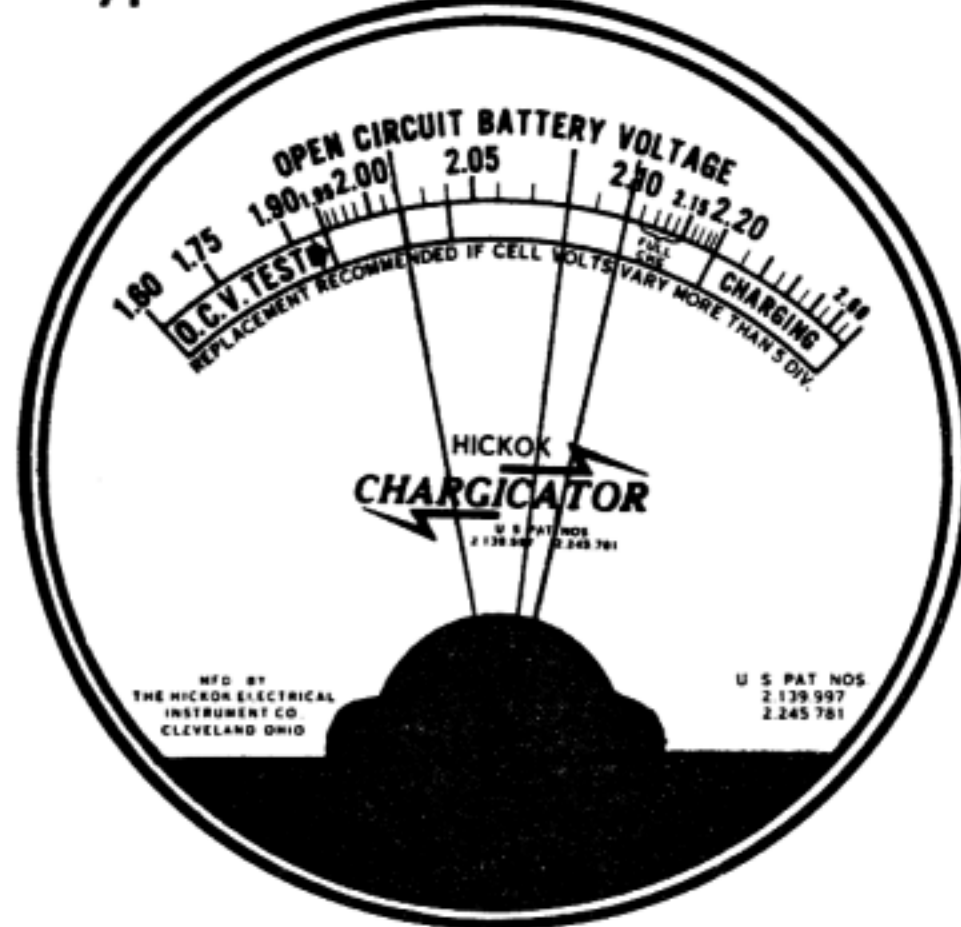
### GOOD

If the individual cell readings are even (varying less than 5 scale divisions) and all readings are above the 2.05 charged line, BATTERY IS SATISFACTORY.



### RECHARGE

If the individual cell readings are even (varying less than 5 scale divisions) and any one reading or all are below the 2.05 line, BATTERY NEEDS RECHARGE. After recharge, make the load test and other tests described on following pages.



### REPLACE

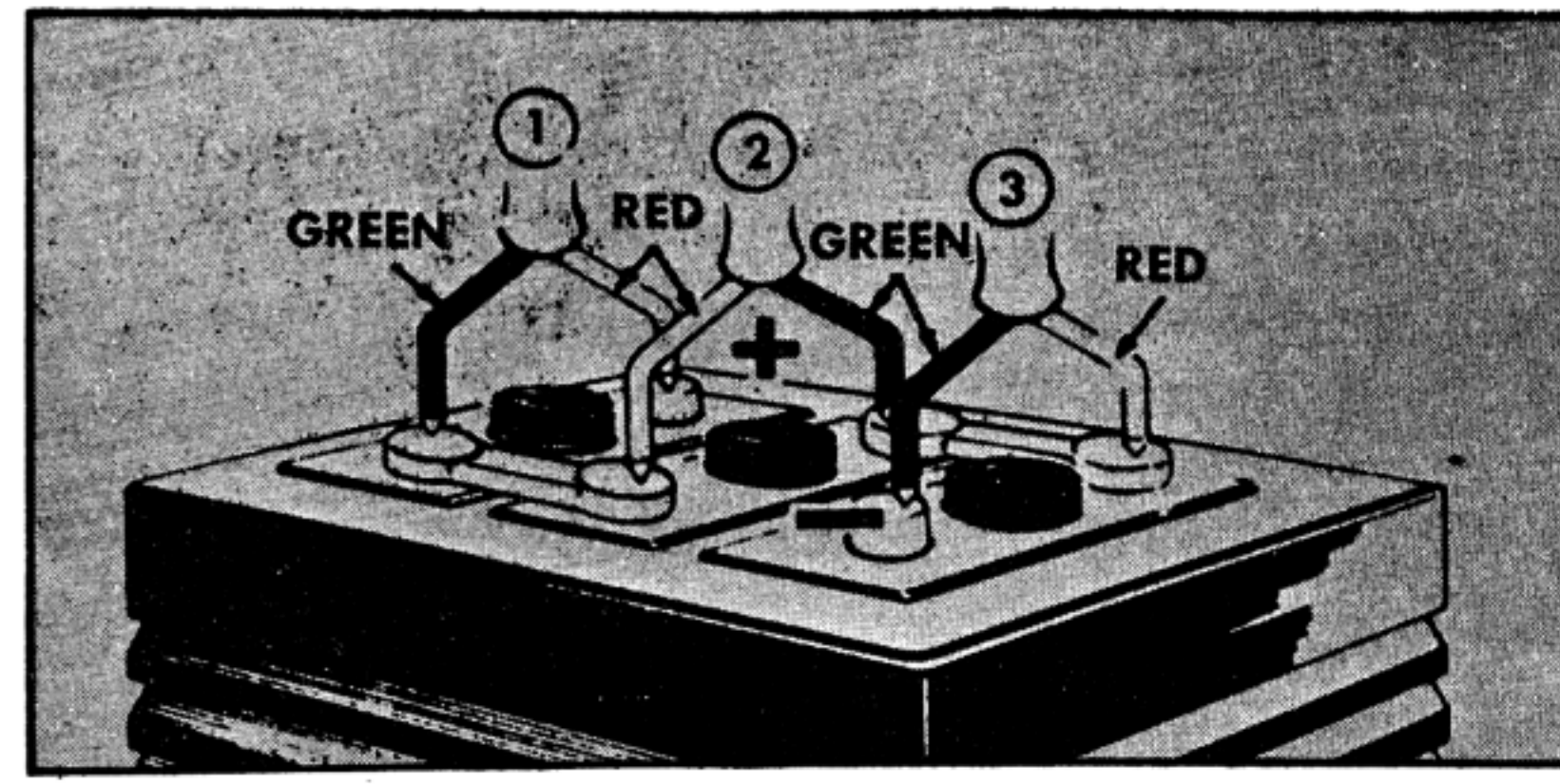
If readings vary 5 scale divisions or more, BATTERY IS NEARING END OF ITS USEFUL LIFE. To avoid starting failure, recommend replacement.

## INDIVIDUAL CELL TEST

### USE TOP SCALE MARKED "OPEN CIRCUIT VOLTAGE"

To quickly and correctly detect battery condition or state of charge, make this two-minute test.

1. Turn on headlights for 90 seconds to remove surface charge. (While checking oil, radiator or filling gas tank.)
2. Turn lights off. Wait approximately one minute for cells to stabilize. Then place dual prod of tester on each battery cell and read cell condition individually. See typical readings below.



# TESTING THE VOLTAGE REGULATOR

## Testing the Rate of Charge

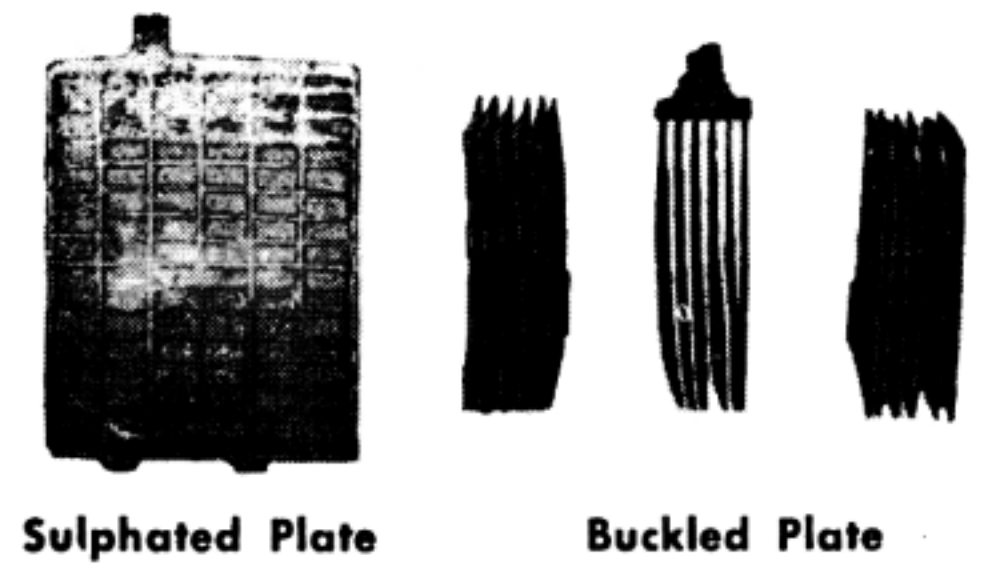
The operation of the voltage regulator controls the life of a battery. If set too high, the battery can quickly be ruined through overheating causing gas, corrosion, and crumbling of plates. If set too low, battery charge will soon fall below minimum power requirements, as well as cause complete battery failure due to buckled plates or sulphated plates.

The following procedure will quickly identify operating condition of the voltage regulator.

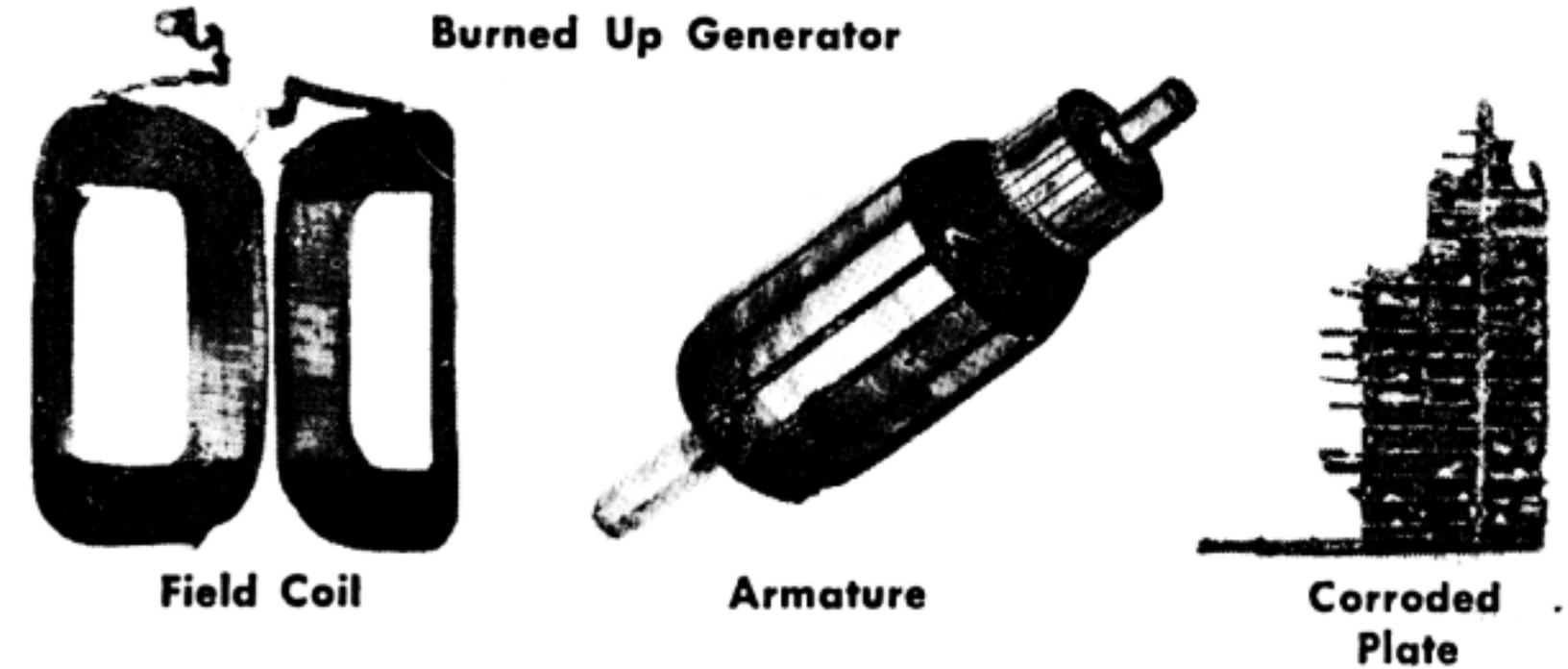
Note: Bottom scale for regulator voltage test is 12 volt systems. Be sure to set switch for the system to be tested.

(Model 48P-4B or Model 150 only)

## UNDERCHARGING



## OVERCHARGING



Excessive battery overcharge or undercharge is costly. The Voltage Tester warns of battery overload, overcharge, or undercharge in time to prevent damage.

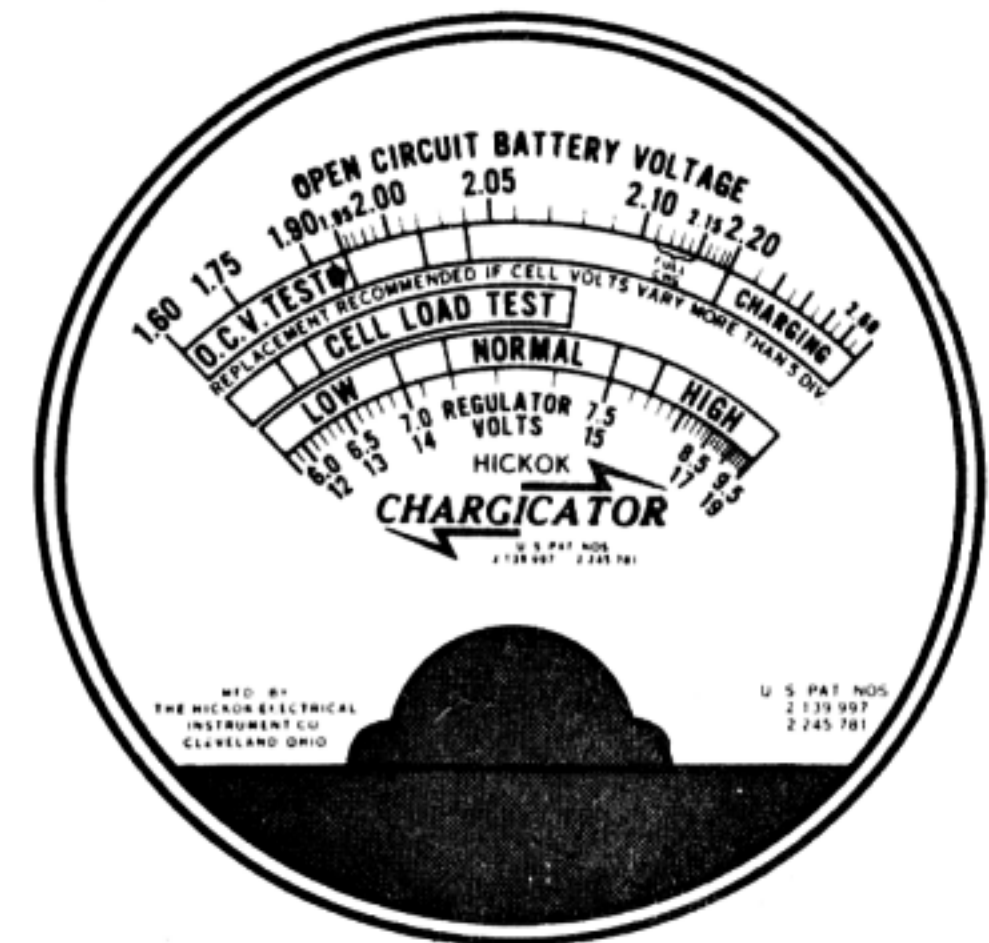
## 1 See that average cell reading is 2.08 volts or higher...

Individually test all battery cells and note the average reading. Average cell reading of the battery must be at or above 2.08 volts (80%) charge before an accurate regulator voltage test can be made.

(Model 48P-4B or Model 150 only)

## USE BOTTOM SCALE MARKED "REGULATOR VOLTS"

Read bottom scale on meter in making voltage regulator test. If reading is between 7.0 and 7.5 volts regulator is O.K. (If battery is 12 volt type. A reading from 14 to 15 shows regulator is O.K.).



## 2 Ground the tester...

Ground the HICKOK Chargicator by clip fastening the third wire to some part of the car frame (See Figure 1:). This procedure then establishes the same circuit polarity as the ground strap on the battery.

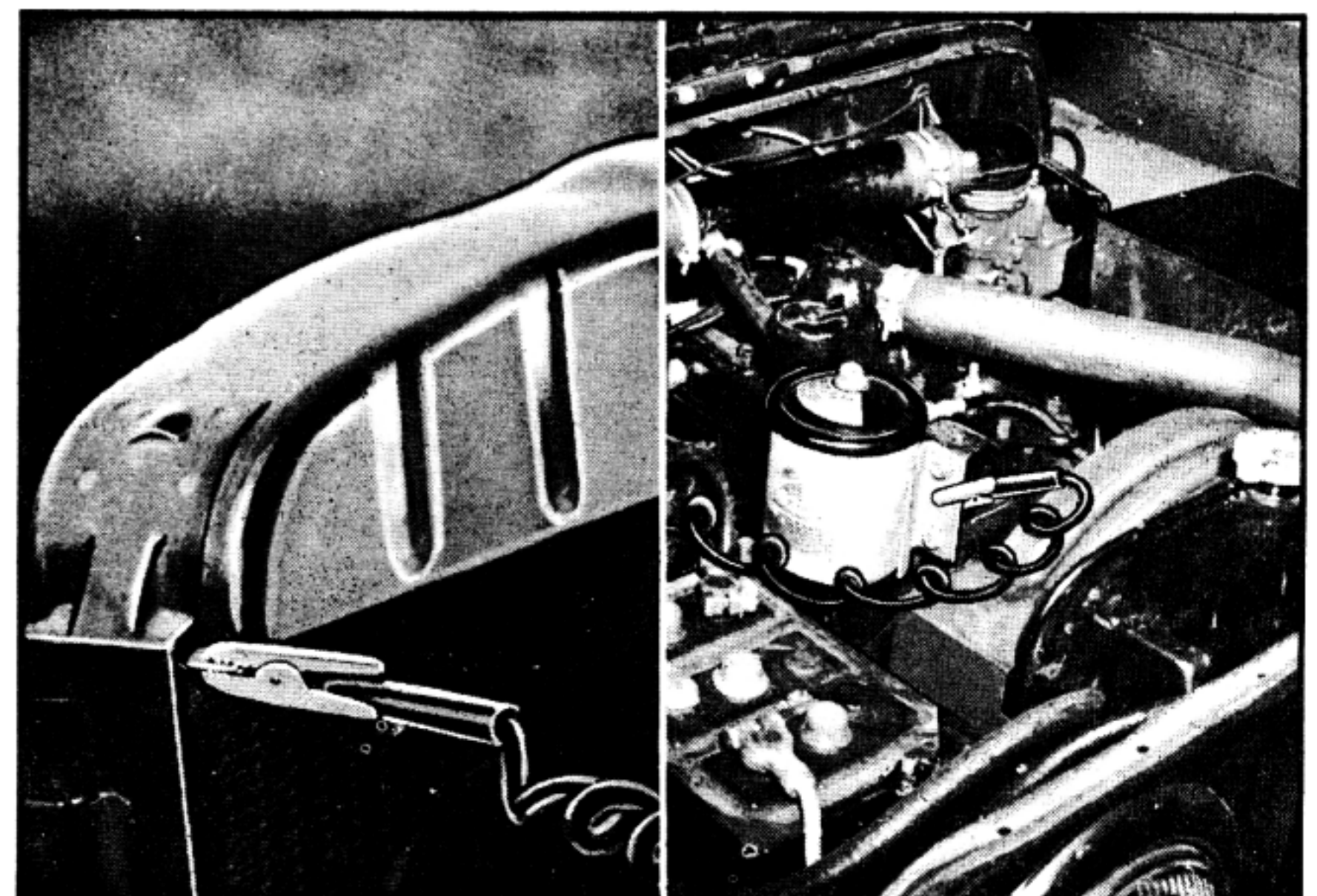


Figure 1: Grounding for Voltage Regulator test.



For 6 or 12 volt batteries

(Model 48P or Model 150 only)

### 3 Locate Battery Terminal Lug...

Locate battery terminal lug on voltage regulator by touching each of the 3 regulator lugs with instrument prod, (one at a time). Use red prod if battery is negative grounded, or green prod if battery is positive grounded. The terminal that causes meter needle to move is the battery terminal. (See Figure 2.)

(Model 48P-4B or Model 150 only)

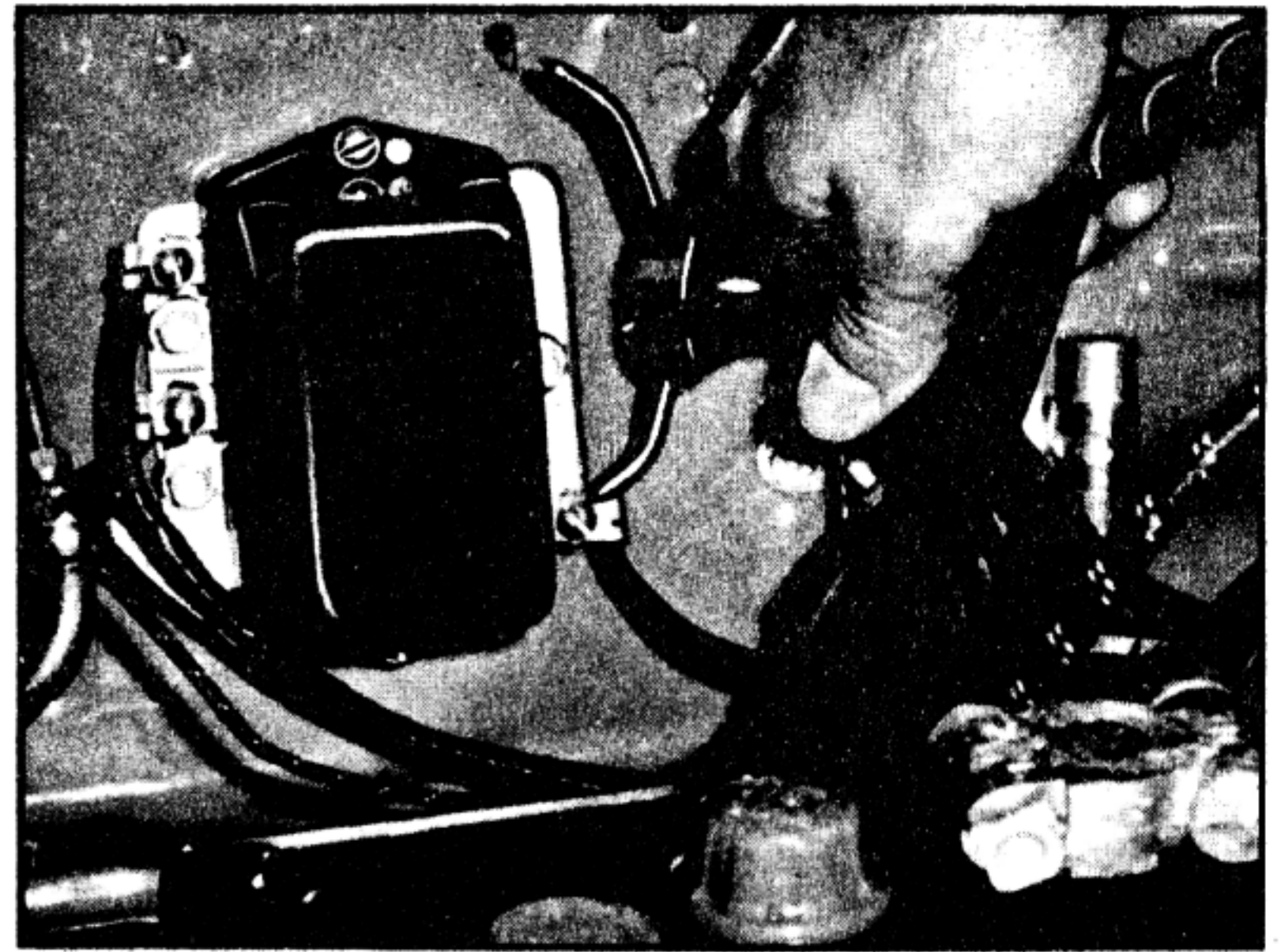


Figure 2: Identifying battery terminal lug for Voltage Regulator test.

### 4 Start Engine...

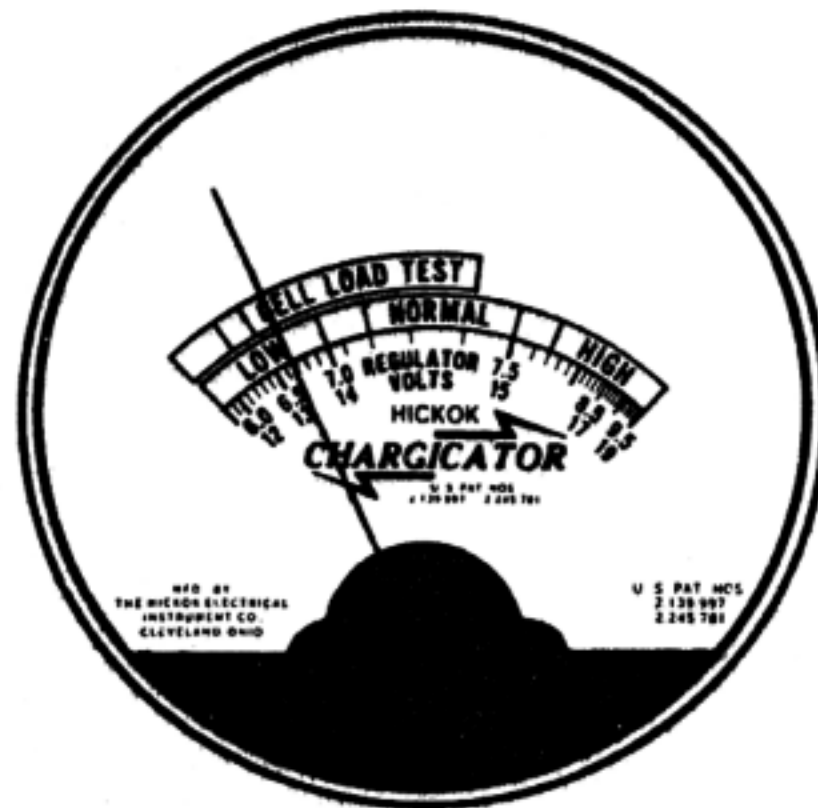
Start the engine and let it run at fast idle for about 5 minutes, or until voltage regulator is warm to touch. Then, with engine still running at the same speed, touch battery terminal lug of the voltage regulator with the proper instrument prod as established in Number 3 procedure above.

### 5 Take Voltage Reading...

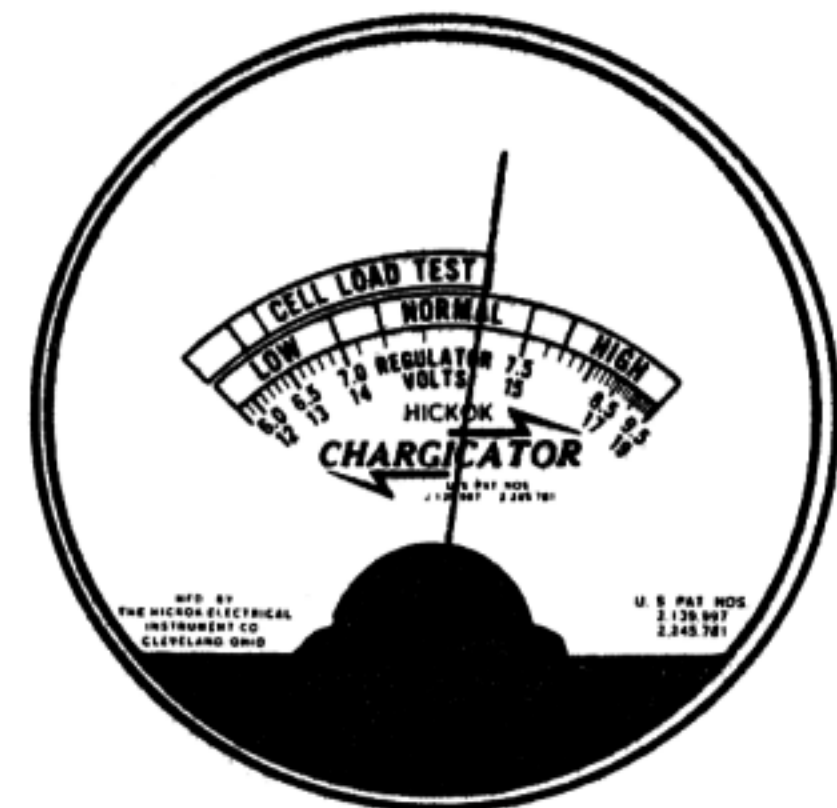
- (a) If meter reading is higher than 7.5 volts, (6 volt system) suggest replace or adjust voltage regulator. (See Scale 1: below.)
- (b) If meter reading is below 7.0 volts, (See Scale 2: below) make further check of charging system as outlined on Page 6.
- (c) If meter reading is between 7.0 and 7.5 volts, regulator is O.K. (See Scale 3: below.)



Scale 1: TOO HIGH



Scale 2: TOO LOW



Scale 3: O.K.

### Testing New Stock Batteries...

At least every 30 days all new stock batteries should be tested. A slow charge should be given any battery which tests below 2.05 otherwise such batteries may be damaged by shelf life, will not register serviceable, and may fail within the warranty.

A stock battery that has dropped to a reading of 2.05 or lower will not respond satisfactorily to a fast charge. Therefore, it is recommended that battery be slow charged. To obtain the best results from a new battery it should read at least 90% or better on the "Open Circuit" (Top Scale) before it is installed in the car.

### Guarantee...

The Hickok Chargicator is a highly accurate and dependable instrument that is manufactured with the precision of a very fine watch. It is guaranteed against defects in material and workmanship for a period of 90 days from date of shipment to original user. If this tester becomes inoperative—forward the tester to The Hickok Electrical Instrument Co., 10514 Dupont Avenue, Cleveland 8, Ohio. Tag the tester with your return address, package well and include a letter advising service needed. Tester will be repaired and returned to you C.O.D.

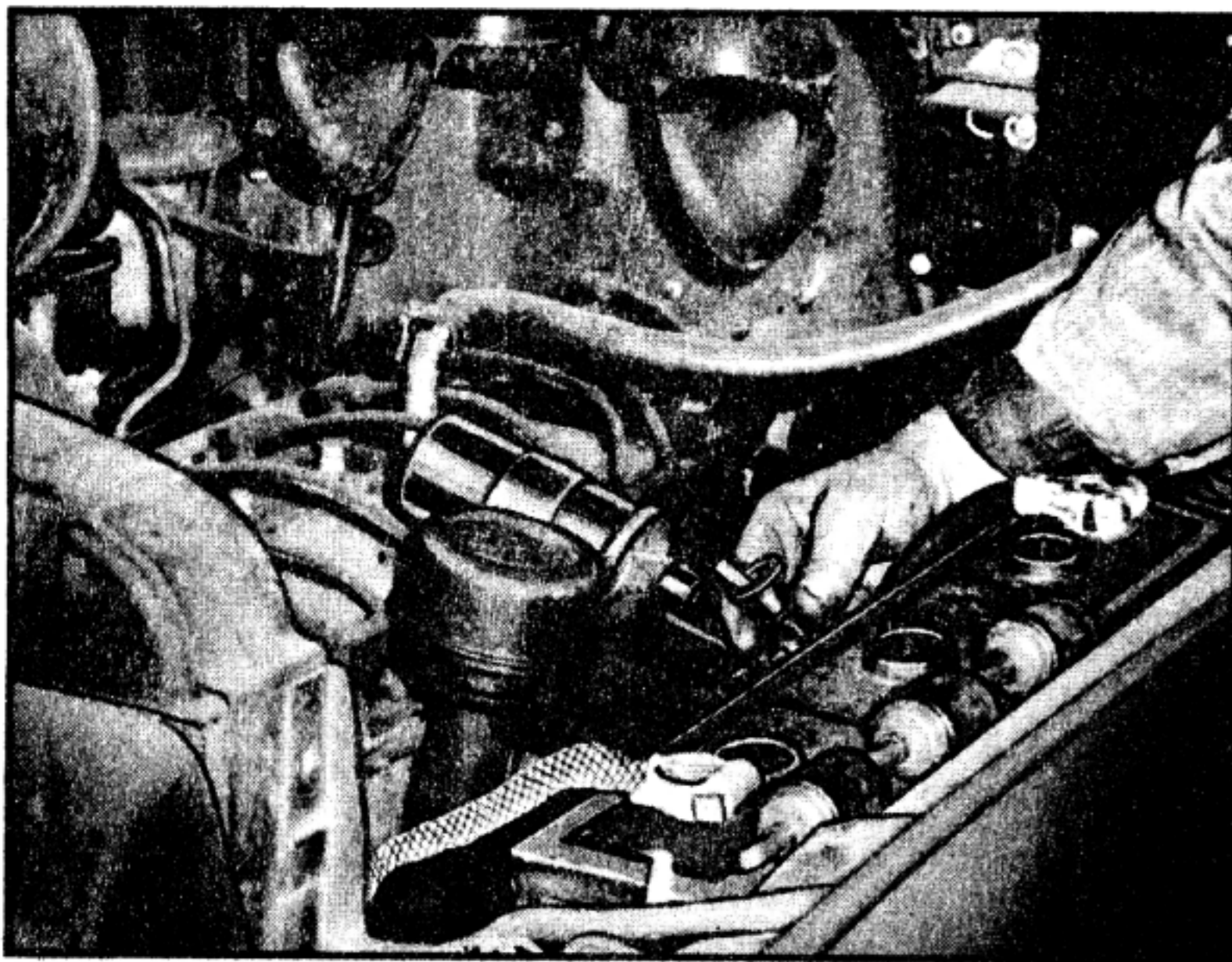


Figure 3: Disconnect distributor lead for load test.

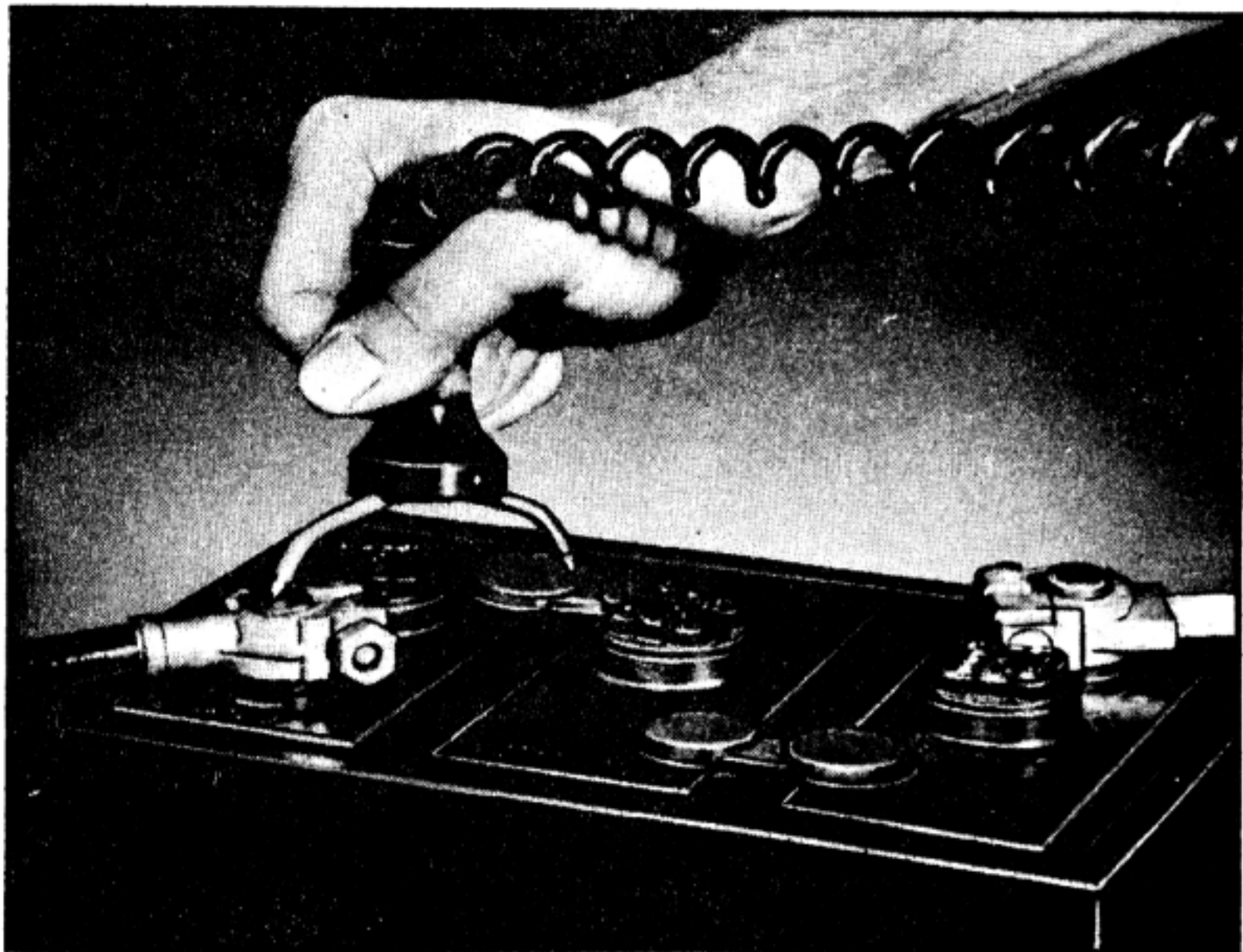


Figure 4: Take reading of each cell while starter is turning over engine.

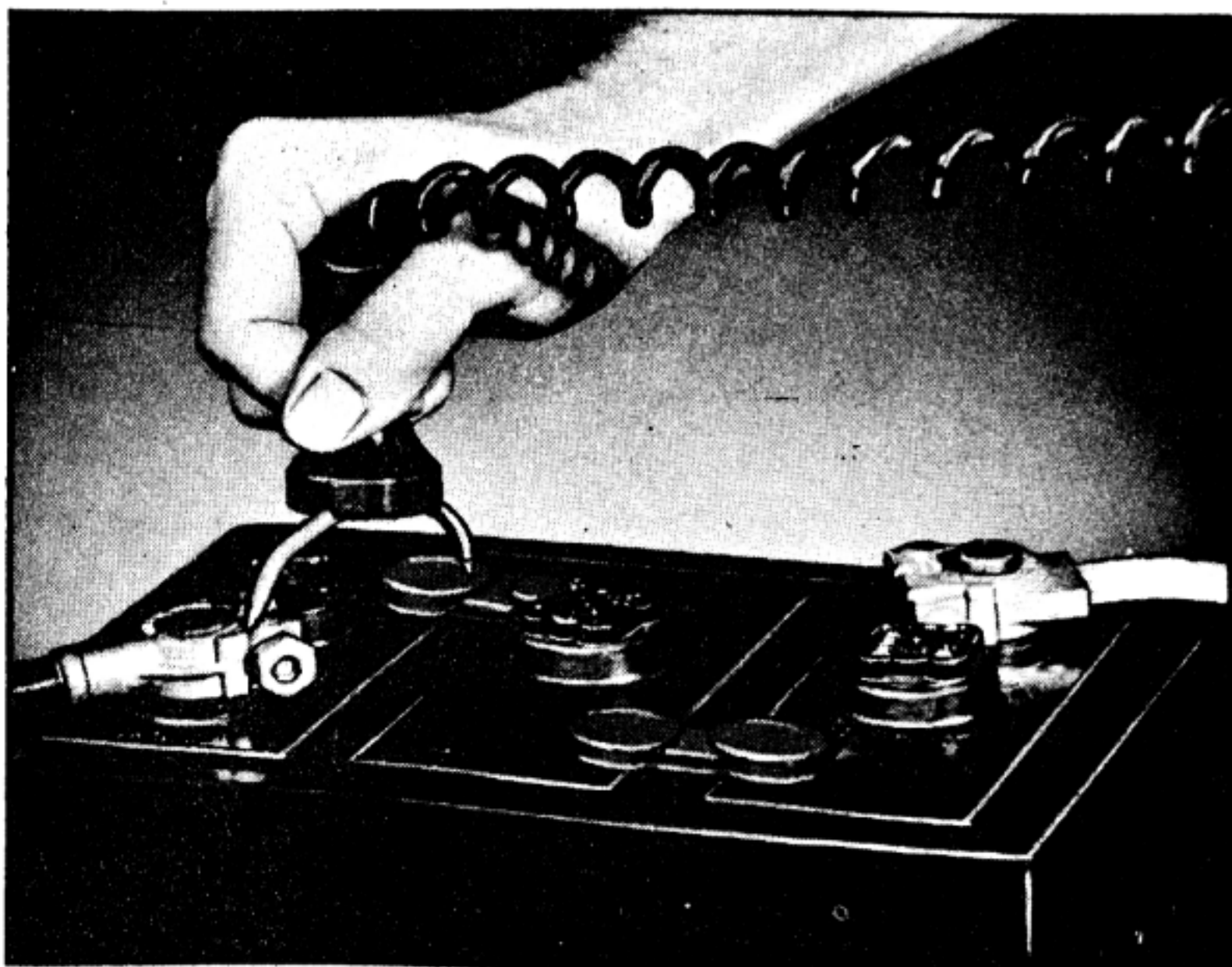


Figure 5: Testing cable connections.

# THE LOAD TEST...

USE SCALE MARKED "LOAD"



It is important to make a load test (capacity) when you detect cell differences of as much as five points on the top scale during the open circuit battery test. Some batteries, with a variation of 5 scale divisions, have internal trouble that will show up immediately when a load test is made.

The load test is also valuable after a battery has been recharged to determine whether it is worn out or still capable of giving satisfactory service.

(Model 48P-4B or Model 150 only)

## PROCEED AS FOLLOWS . . .

1. Warm up the car engine to proper operating temperature.
2. Turn ignition switch off or disconnect distributor lead and crank engine with starter for 20 seconds without starting engine. This will remove what is known as surface charge and thereby provide a more accurate test.
3. On late model cars with starter-switch and ignition-lock as one unit, it is necessary to disconnect coil-to-distributor wire so as to allow starter to crank engine without starting it. (See Figure 3.)
4. Take readings of each cell, using top left scale marked "LOAD" while starter is turning engine over. Be sure tester prods contact battery cell posts and not cable terminals. (See Figure 4.)
5. After completion of cell readings as described, and with starter still engaged, move the instrument prod from the battery terminal post to cable terminal (see Figure 5), and check for any difference in readings. If the voltage drops, you know there is a poor cable terminal connection. Remove and clean the cable connection. Repeat test, and if voltage still drops suggest a cable replacement.

## RECOMMEND . . .

1. Replacement of battery if the reading on any cell is in the red section. Battery is very near the end of its useful life.
2. Battery is OK if the readings are all in the green scale.

**FAST...CLEAN..**

# THE HIGH RESISTANCE TEST for CABLES and CONNECTIONS

(Model 48P-4B or Model 150 only)

Make the high resistance test when previous tests show that battery has no serious variation in cell readings and generator and voltage regulator are OK —

## BUT...

1. Lights get unusually dim when engine idles.
2. Battery runs down regularly and won't stay charged in the vehicle.
3. Battery won't crank engine satisfactorily even though fully charged.

## PROCEED AS FOLLOWS . . .

1. Connect tester same as for voltage regulator test and with engine running (25-30 mph) do the following three things.
  - (a) Read actual voltage at battery terminal of regulator (Figure 6:). Use bottom scale and make sure switch on back of tester is set for 6 or 12 volt system (whichever is needed for test).
  - (b) Connect alligator clip to grounded terminal and move prod to ungrounded terminal of battery. (Figure 7:)
  - (c) Then compare voltage at the regulator with voltage at the battery.
2. Clean, inspect and tighten all connections if readings differ by 3 scale divisions or more on regulator volt scale (Bottom scale).
3. If difference in readings is less than 3 scale divisions high resistance is not evident, so test for short circuits as outlined below.

## TESTING FOR SHORT CIRCUITS

If you have followed the procedure explained so far and have not yet located the cause of the battery trouble, there may be a short circuit in the car's electrical system. Find out for sure by doing the following:

1. Turn off entire electrical system including ignition.
2. Remove from battery, the cable leading to ground.
3. Connect alligator clip to ground strap (Figure 8).
4. Touch instrument prod to battery post from which ground cable was removed. (Red prod if post is positive, etc.) See Figure 9.
5. If there is no deflection of the meter needle you can be sure that there is no constant short. If there is a deflection, suggest a complete check of car's electrical wiring.
6. If no short circuit is evident and trouble persists, recommend that electrical system be checked by an ignition specialist.

After using this fine instrument a few times any operator can make the complete series of tests on battery and charging system in a small fraction of the time it has taken to read the instruction procedure. Your recommendations based on the results of these tests are accurate. You will win the confidence of your customers. They will rely on your advice when backed up with a scientific instrument that is 4 times as accurate as conventional hydrometers that are messy and unconvincing to a customer.

(This test can be made with any model Charger)

## ACCURATE...DEPENDABLE...

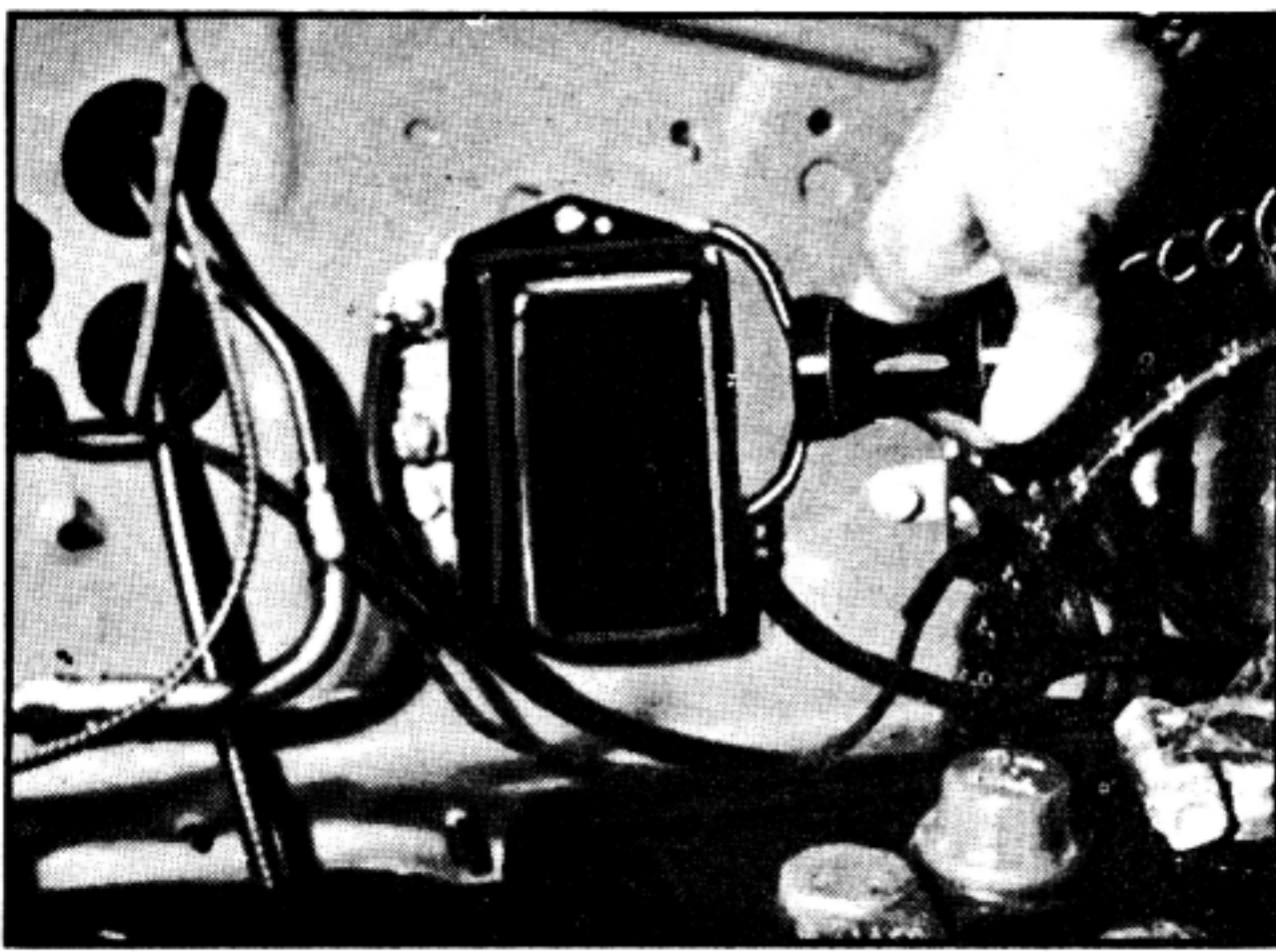


Figure 6: Reading voltage at battery terminal of voltage regulator.

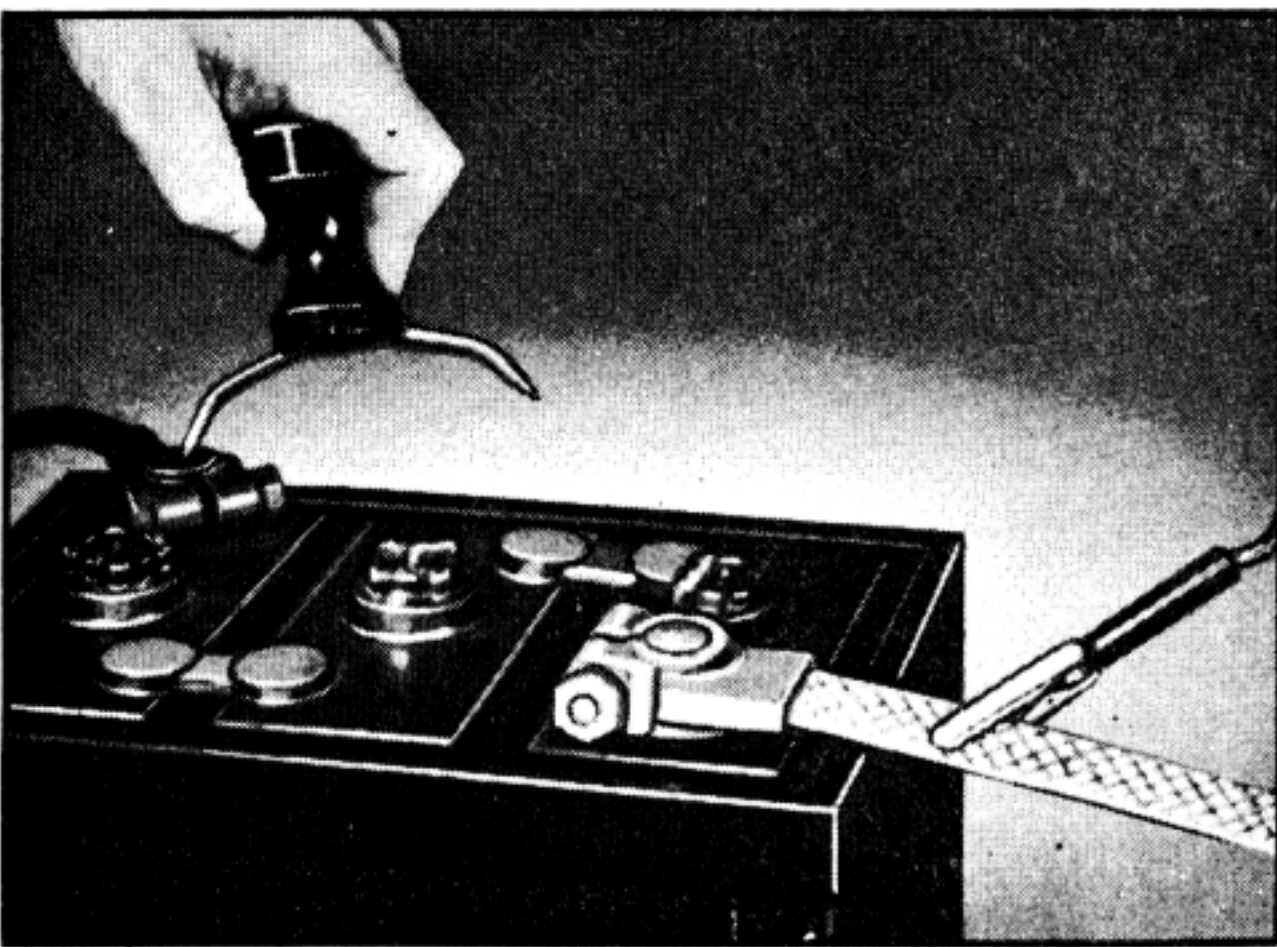


Figure 7: Grounding instrument at battery for voltage comparison.

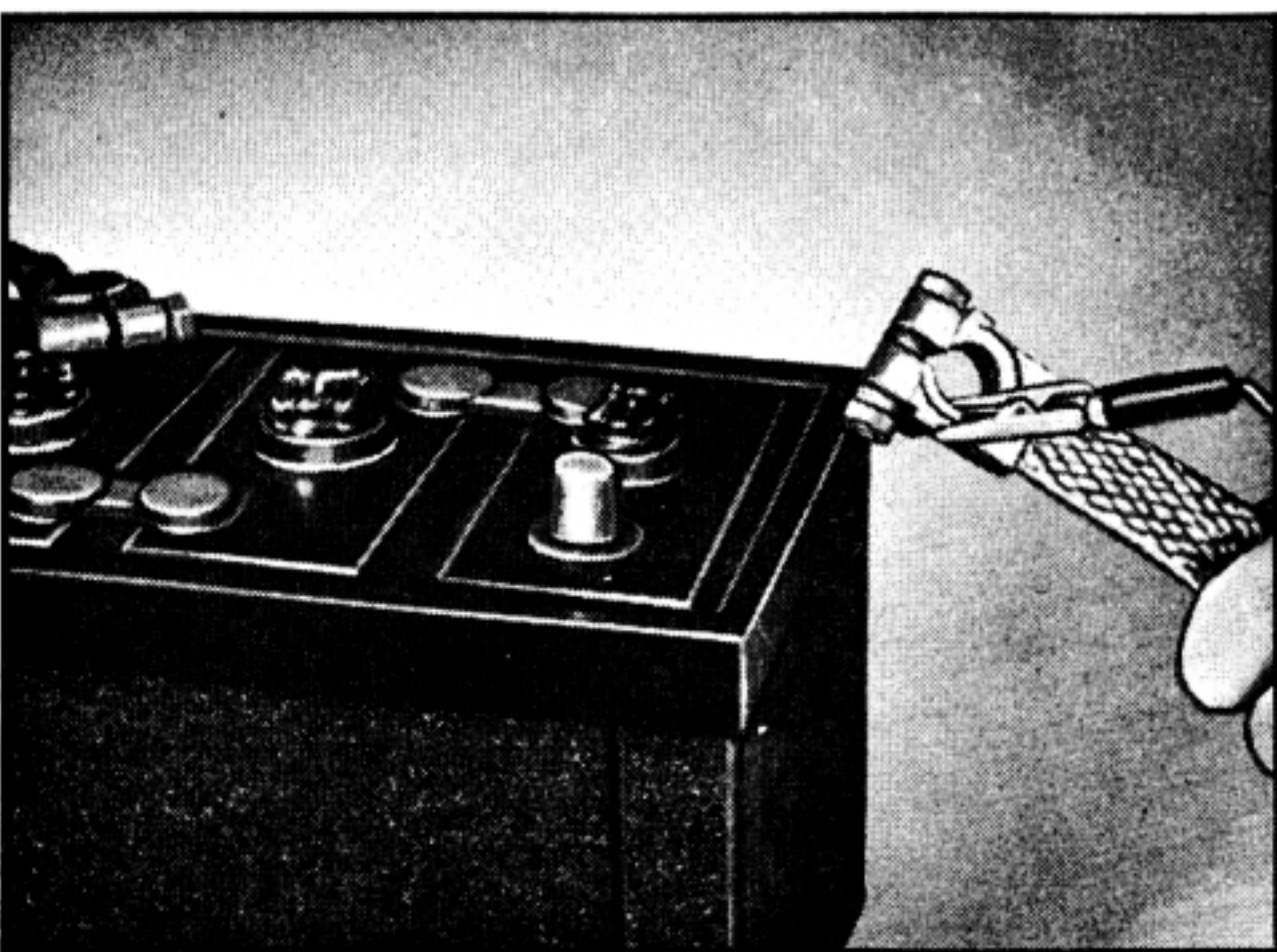


Figure 8: Disconnect cable leading to ground.

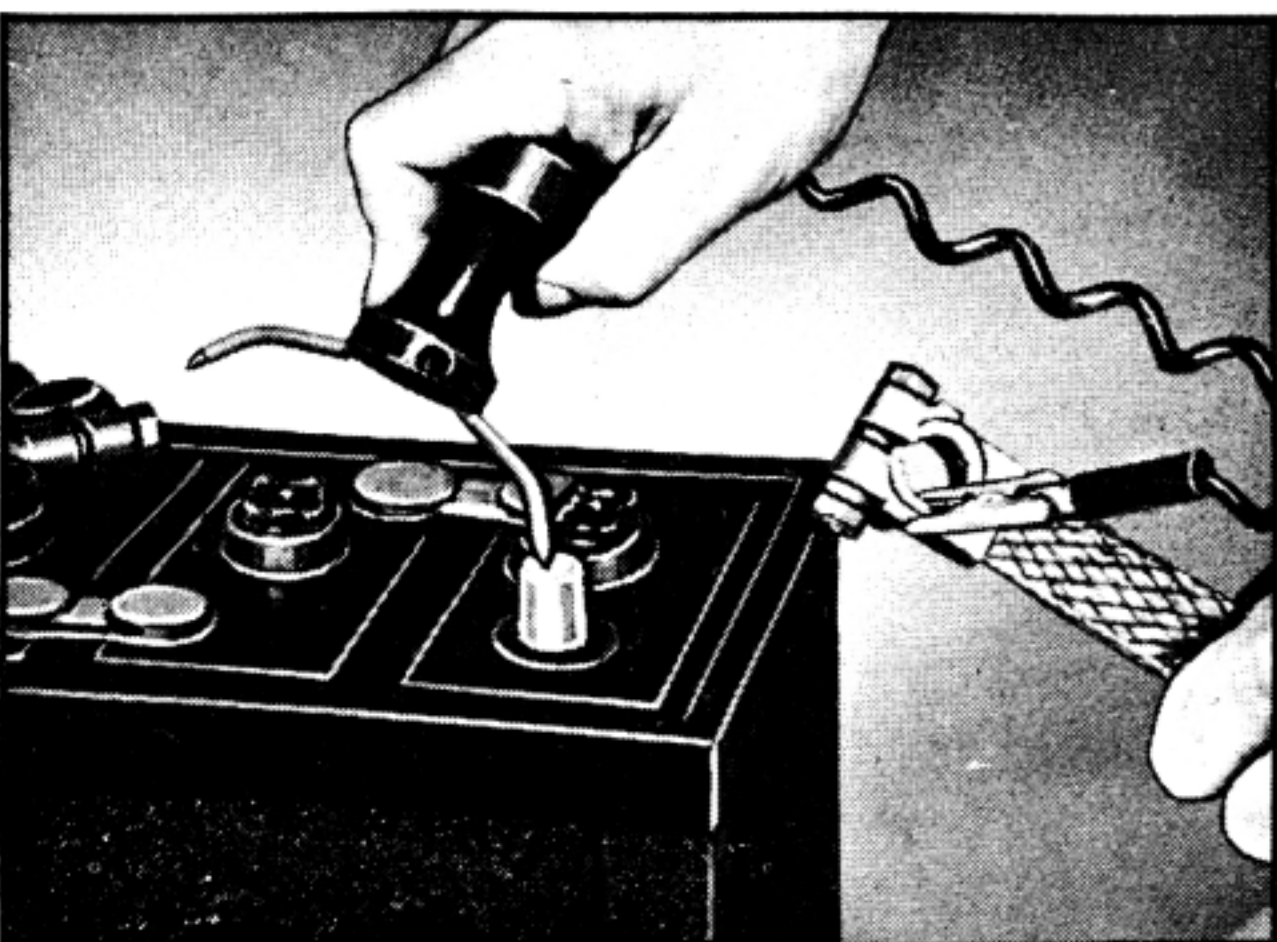


Figure 9: If any reading is evident, short exists.



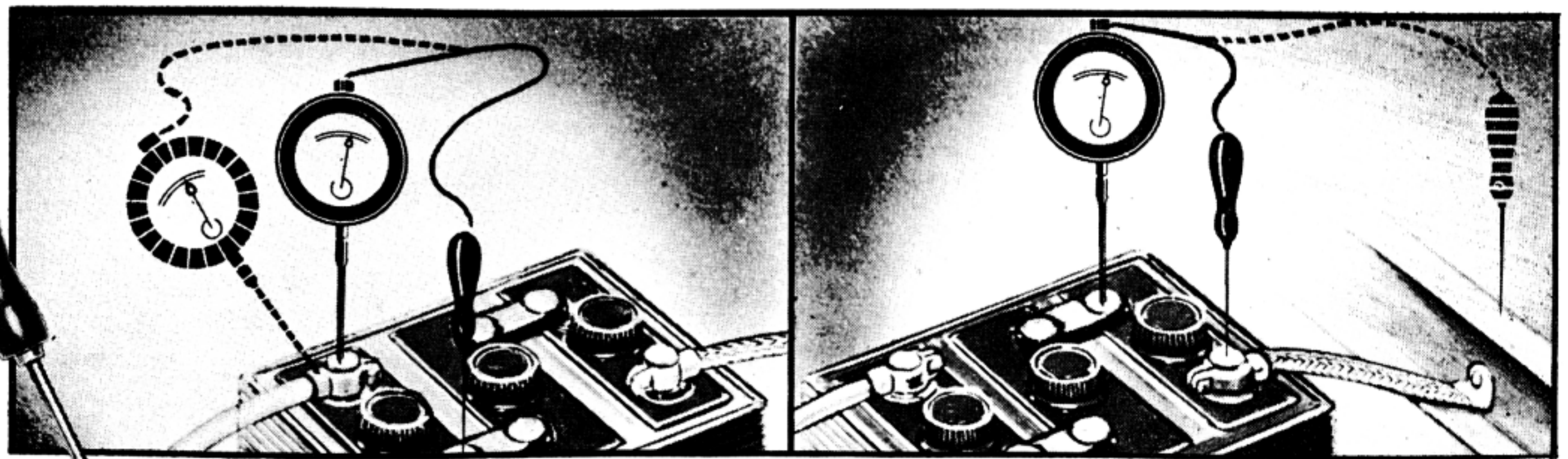
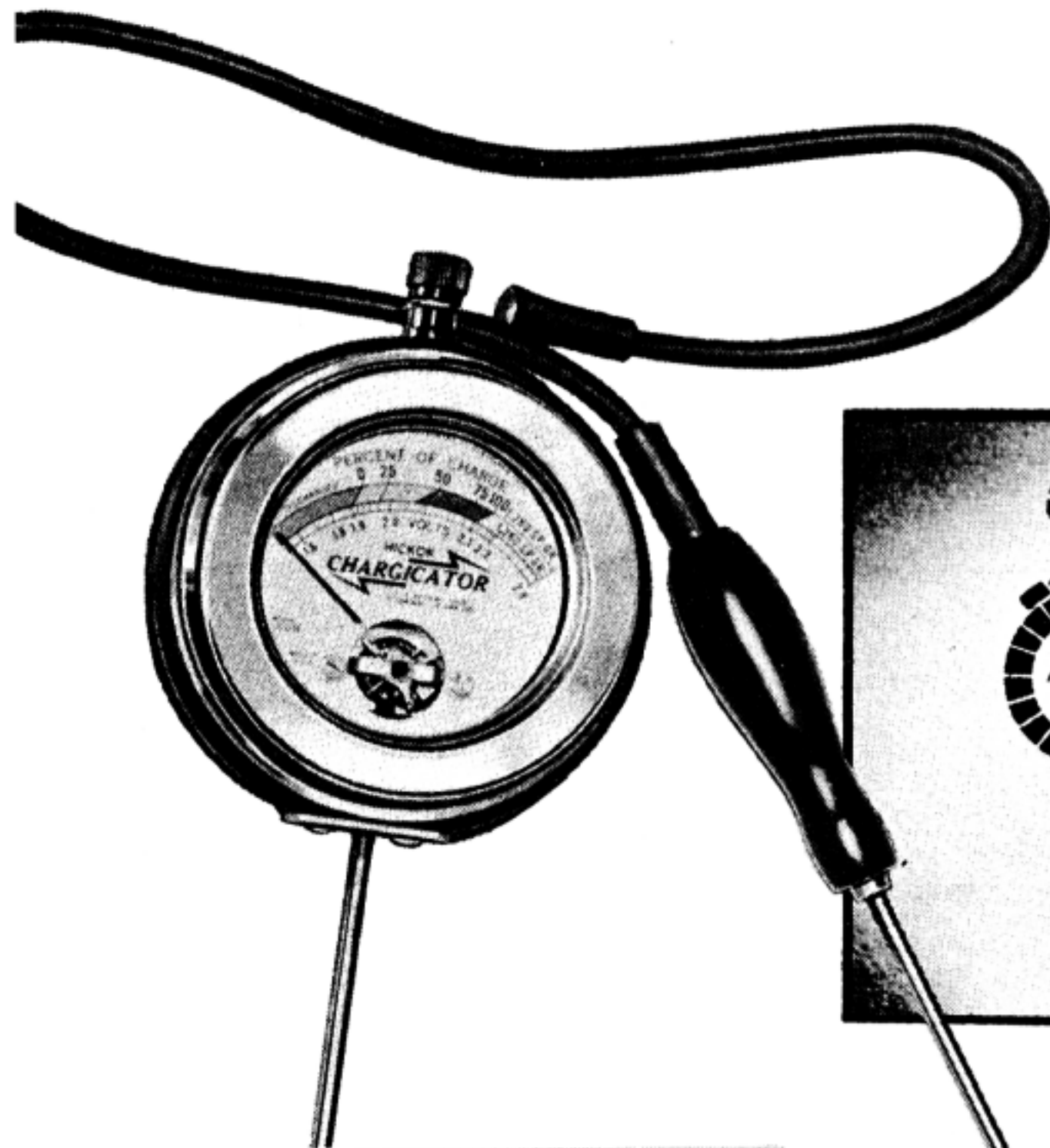
## GAS STATION Model for Maximum Visibility and Convenience

Complete battery and charging circuit test. Flush mounted meter quickly shows percent of charge or actual volts on a large multi-colored dual-scale. Rubber base protects car fender. Glass jar and syringe built-in for handy water service. Telescopic prod lead neatly retracts out of the way. You'll find the HICKOK Chargicator will greatly increase your profits with a fast, dependable, complete battery and charging circuit test.

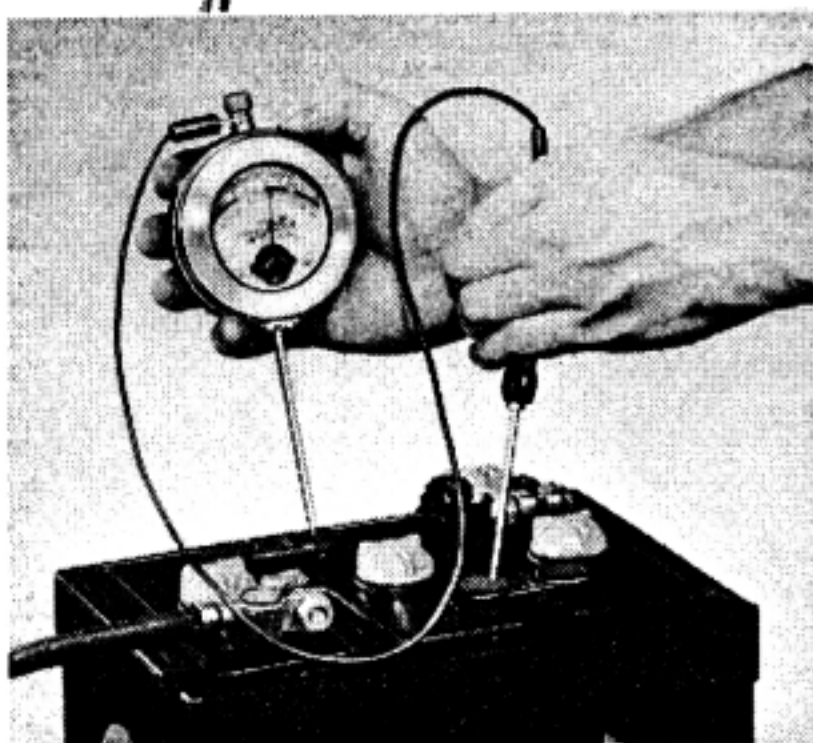
### Model 150

(Described in detail on inside pages.)

# PORTABLE CHARGICATOR



Provides handy accurate test for poor cable connections.



30 second, individual cell test.

Instantly reveals battery condition by measuring state of charge of individual cells.

Eliminates slow, sloppy hydrometer readings.

Separate prods speed test for faulty battery cables.

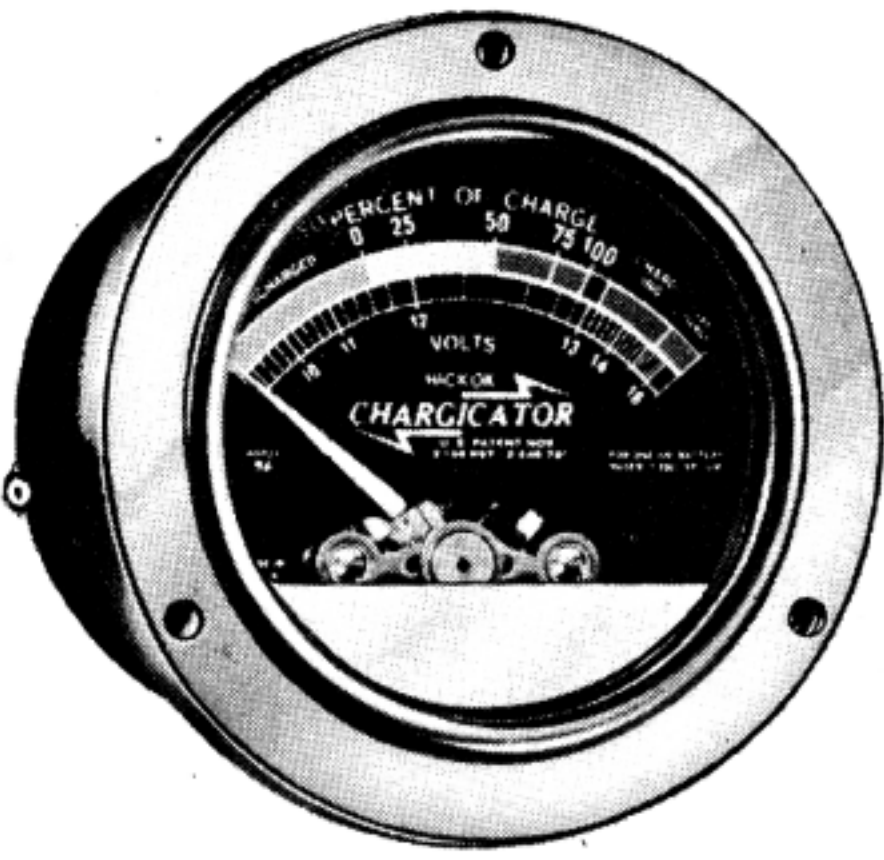
Dual scale shows percent of charge or actual volts.

Dependable, light and handy. Tests battery in any car, anywhere.

Draws no power from battery.

### Model P-60R

**Model 48P-4P** . . . As illustrated on front cover is available as a handy dual-prod portable.



# Chargicator

for dash board mounting

CONTINUOUSLY INDICATES COMPLETE...  
... BATTERY CIRCUIT CONDITION

## HOW TO READ YOUR CHARGICATOR

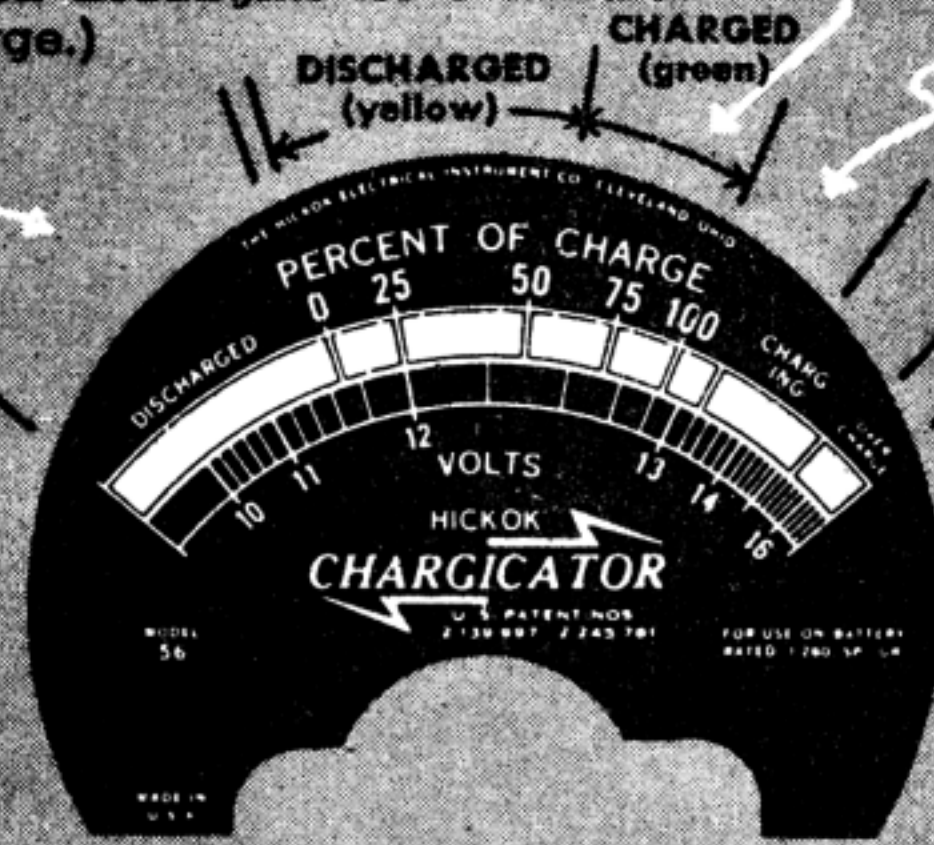
**BATTERY CONDITION WHEN AT REST:**  
Battery is idle and has not been used for the past 30 minutes. (If battery has received charge within past 30 minutes, turn on headlights for 3 minutes to remove surface charge.)  
Read as follows:

A good battery properly charged reads 75-100%.

Readings here indicate gas (surface charge), turn on headlights for 3 minutes and read again. (Needle above green section.)

Readings here show battery is being charged or was recently charged at a high rate, or too much acid unnecessarily added to electrolyte. Any readings here are questionable.

Readings here indicate a dead battery. (No reading may indicate a disconnected meter.) Could be undercharging, or a short in electrical system, or worn out battery. (Red Section.) Charge battery and if needle stays in "red," battery is worn out or defective.

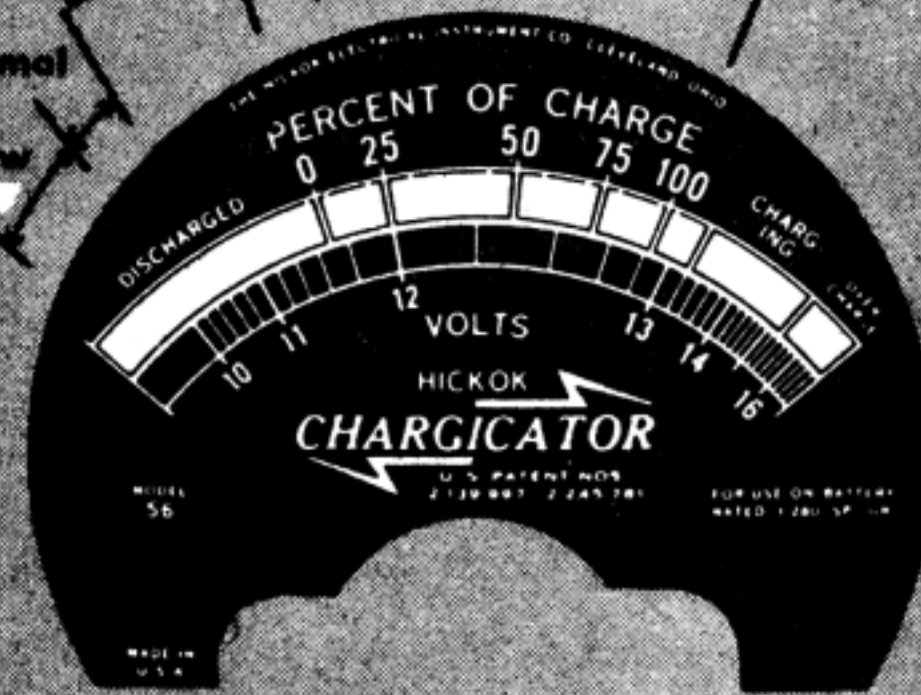


*Dial Shown...  
... Actual Size*

**BATTERY IN USE:**  
(Charging or under starter load.)

Engine running at normal speed for several minutes, and pointer gets in here means battery is not charging. Check voltage regulator; if O.K., check generator.

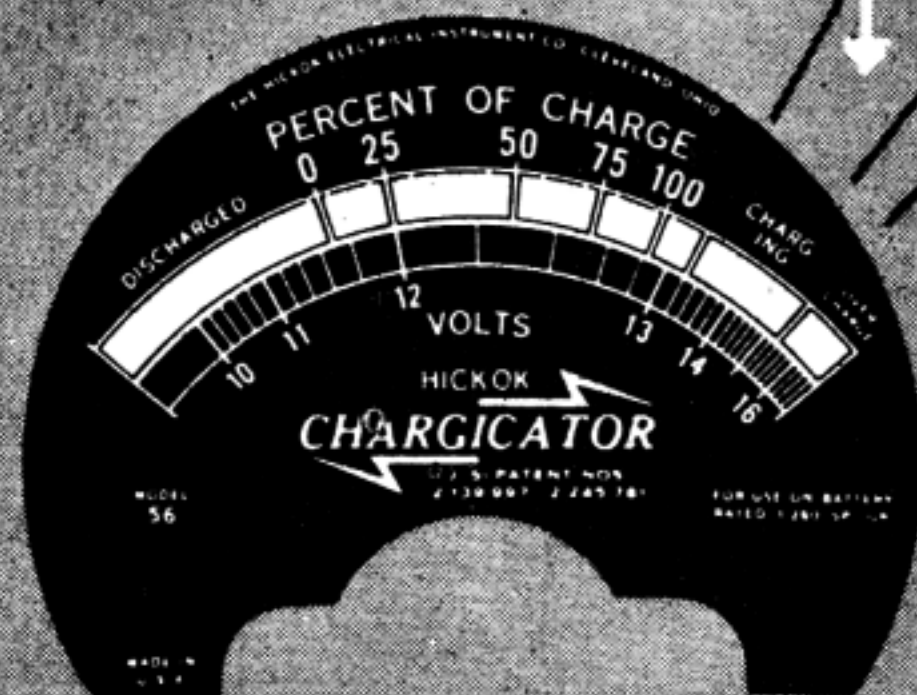
Readings here while starter is cranking engine indicate battery is nearly worn out or is too small. Consistently lower readings indicate battery is losing its capacity. Note: Make sure battery is fully charged before condemning it.



Engine running at maximum charging speed long enough to charge up battery, as indicated by ammeter, and with all electrical accessories turned on, pointer should stay in green section. If not, battery or generator is too small or voltage regulator is set too low. A worn out battery will also cause low reading.

With all electrical accessories off, run engine to maximum charging rate as indicated by ammeter. If voltage regulator is properly set, pointer should fall in top half of this green section. If not, have regulator checked. (Battery must be fully charged for this test.)

Accurately calibrated 5-color dial is easy to read instantly.



Danger... overcharge caused by incorrectly adjusted or defective voltage regulator. Battery will needlessly lose water and quickly wear out if this condition continues. (Needle in red section.)

(Suitable for any car with 6 v. or 12 v. battery)

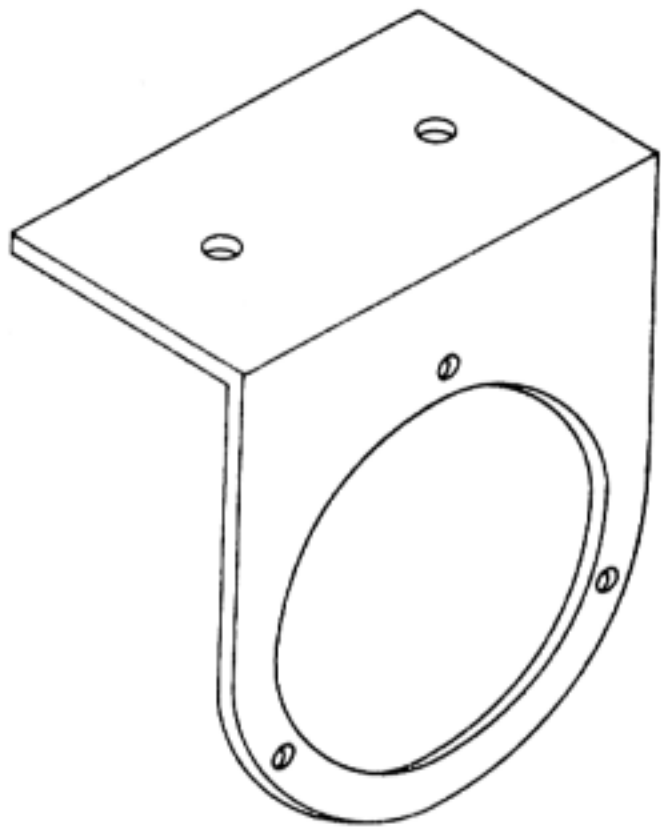
## OUTSTANDING FEATURES

- LENGTHENS battery life.
- Checks battery under load.
- Warns approach of battery failure.
- Checks operation of voltage regulator.
- Checks operation of generator.
- Constantly indicates state of battery charge in 0 to 100%.
- Draws no power from battery.
- Is continuously connected, no switches necessary.
- Warns of battery overcharge or overdischarge in time to prevent damage.
- Attractive multi-colored scale is instantly read accurately.
- Easily installed by direct connection to battery. Connectors furnished.

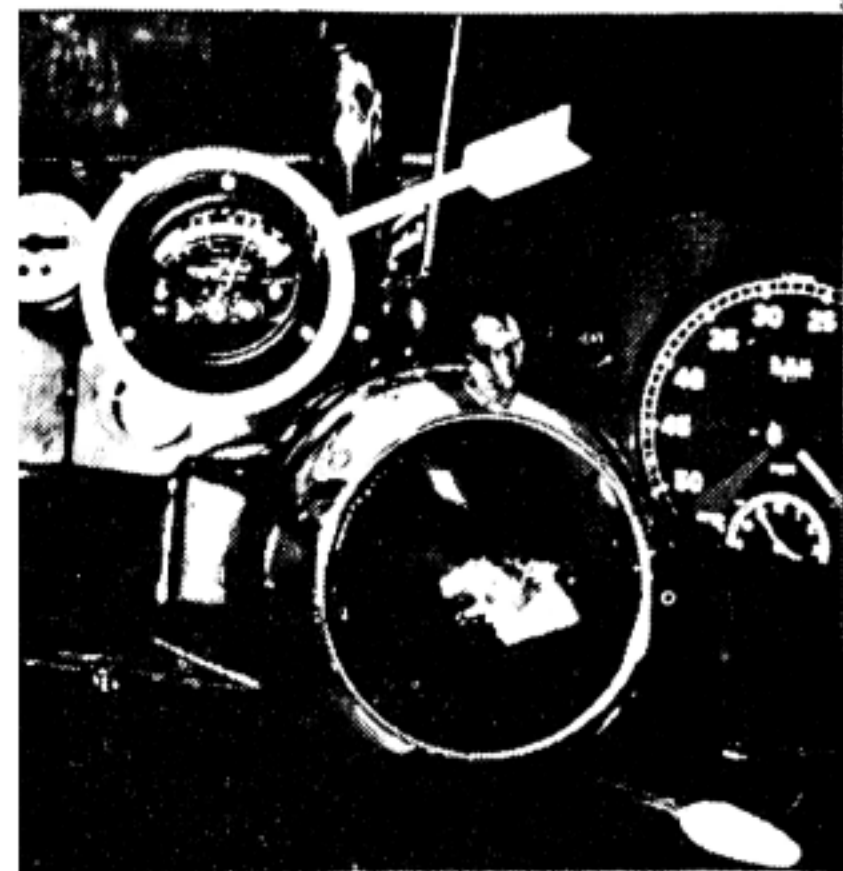
The Hickok Chargicator is so useful and dependable that users report they now wonder how they ever got along without it. The Chargicator has been used by motor mechanics for years in checking batteries and charging systems. Now, the Model 56 Dash-Board Chargicator is available as an attractive, permanent installation to increase the safety of motoring. Ideal for use in any car with mobile radio. Highest quality throughout—the Chargicator has many times the accuracy of your other conventional and standard dash-board instruments. Low in price—you can afford it today.

**NOTE:** In ordering, specify 6 volt or 12 volt model.

## UNIVERSAL BRACKET



Universal mounting bracket is provided. Attractive and neat... fits all cars. Complete connections and instructions are furnished for easy installation.



Chargicator installation in Mark VII Jaguar. (12 v.)

**THE HICKOK ELECTRICAL INSTRUMENT CO.**

10514 Dupont Avenue • Cleveland 8, Ohio

Form: Comp Chrg 3555T  
Code: 2490-227

Litho. in U. S. A.





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Vintage Schematics and Publications**

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