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International Harvester

Service Manual for FARMALL

Electrical Systems

Service® Manual

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INTERNATIONAL HARVESTER
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SERVICE MANUAL

TESTING & SERVICING GENERATORS, REGULATORS, ALTERNATORS, STARTERS

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File this Manual, GSS-1052C-2, after Divider Tab GSS-1052

Destroy Service Manual GSS-1052C-1 (W/Rev. No. 3).

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11. Always use a safety bar to block hydraulic cylinders. Never rely on the machine hydraulic system to hold when working on loaders, etc. A hydraulic line or cylinder could fail or someone could accidently strike the control levers causing the loader to fall.

12. Electrical storage batteries give off highly inflammable hydrogen gas when charging and continue to do so for some time after receiving a steady charge. Do not under any circumstances allow an electric spark or an open flame near the battery. Always disconnect a battery cable before working on the electrical system.

13. Hydraulic fluid escaping under pressure can have enough force to penetrate the skin. Hydraulic fluid may also infect a minor cut or opening in the skin. If injured by escaping fluid, see a doctor at once. Serious infection or reaction can result if medical treatment is not given immediately.

Do not attempt to repair or tighten hoses that are under pressure, when the boom is raised, or with the tractor engine running. Cycle all hydraulic control valves to relieve all pressure before disconnecting the lines or performing other work on the hydraulic system. Make sure all connections are tight and hoses and lines are in good condition before applying pressure to the system. To locate a leak under pressure, use a small piece of cardboard or wood. Never use hands.

14. Handle gasoline with care - it is highly flammable:

(a) Use approved gasoline container.

(b) Never remove the fuel tank cap or fill the fuel tank when the engine is running, is hot, or indoors. Also, do not smoke when working around flammable fuel.

(c) When refueling, keep the hose and nozzle of the funnel and container in contact with the metal of the fuel tank to avoid the possibility of an electric spark igniting the fuel. Do not overfill the fuel tank - overflow creates fire hazard. Wipe up spilled gasoline.

(d) Replace fuel tank cap securely.

15. Always use a protective fixture when inflating tubeless tires that have been repaired or are loose on the rim. Do not inflate over 30 psi to seat the tire bead.

16. Use pullers to remove bearings, bushings, gears, cylinder sleeves, etc. when applicable. Use hammers, punches and chisels only when absolutely necessary. Then, be sure to wear safety glasses.

17. Be careful when using compressed air to dry parts. Use approved air blow guns, do not exceed 30 psi, wear safety glasses or goggles and use proper shielding to protect everyone in the work area.

18. Do not wear rings, wrist watches or loose fitting clothing when working on machinery, they could catch on moving parts causing serious injury. Wear sturdy, rough-soled work shoes. Never adjust and/or service a machine in bare feet, sandals or sneakers.

19. Excessive or repeated skin contact with sealants or solvents may cause skin irritation. In case of skin contact, remove sealant or solvent promptly by washing with soap and water.

IMPORTANT: The above is only a partial list of safe work rules. In addition, always refer to the Operator's Manual for the specific machine for additional safe work rules regarding the machine operation.

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TOOL NUMBER	DESCRIPTION
06-562	Volt/Ohm Multi - Tester
15-404-3	Starting & Charging System Tester
15-537A	Charging System Analyzer
15-407-3	Ohmmeter
15-407-2	Rectifier - Diode Tester
or	
15-407-4	Rectifier - Diode - Ohms Tester
15-405	Delco Remy Alternator Tool Set - For alternators with external voltage regulator
06-570-2	Niehoff Alternator Rotor Bearing Removal Tool
06-570-1	Niehoff Alternator Rotor Installing Tool

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SECTION 4

15-901	Electrical Test Kit (Consists of the following:
15-901-1	Low Voltage Circuit Tester
15-901-2	Cold Circuit Tester with Batteries
06-562	Volt/Ohm Multi - Tester
15-404-3	Starting & Charging System Tester
15-407-1	Armature Tester (Growler)
15-411-1	Armature Lathe with Motorized undercutter and less electric drive motor - 317 mm (12 1/2 in) maximum space between chucks
or	
15-411-2	Armature Lathe with motorized undercutter and less electric drive motor - 572 mm (22 1/2 in) maximum space between chucks
or	
15-411-3	Armature Lathe with manual undercutter and less electric drive motor
15-411-4	Electric Drive Motor, 186.4W (1/4 H.P.) - 115 Volt - 60 Cylce, Used with previously listed armature lathes
----------	Nippondenso Cranking Motor Armature Shaft Bearing Removal or Installation Drivers
----------	Prestolite Cranking Motor Solenoid Plunger Shaft Adjusting Nut Adapter
----------	Prestolite Cranking Motor Drive Pinion Gear Interference Block

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Section 1

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GENERAL TEST PROCEDURES

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Fundamentals of Testing

When searching for the cause of trouble with electrical circuits it is desirable to obtain all the symptoms possible from the operator. A few pertinent questions asked of the operator may give you valuable clues as to the cause of the problem. Under questioning of the operator a chance remark may reveal the cause of the problem to the alert serviceman. Don't miss this important source of information.

In general make the simplest tests first - it takes very little time and may reveal the source of the trouble. A loose connection, for example, can be discovered simply by feeling of it.

Many problems can be located with nothing more than a voltmeter and ammeter. An experienced serviceman will always have one on hand. The voltmeter is a particularly useful instrument because voltage readings may be taken without disturbing the circuit. This is very desirable since loosening a connection may well destroy the evidence. For example, if you remove the battery condition you may well find that the battery is okay. Then when you reinstall the battery cables to make further checks you find that the problem no longer exists and you wonder what you did to fix it. A better way would have been to use a voltmeter first and find out where the trouble is.

A suitable voltmeter is one that has a scale which has a voltage range required to cover the system to be checked. It should also have a scale that will measure accurately in tenths of one (1) volt.

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Battery Check

When checking any electrical circuit for malfunction, the condition of the battery should be checked first. This should be done on the vehicle with a voltmeter as follows:

1. Measure terminal voltage of the battery (Fig. 1).

a. A fully charged 12V battery should read 12.4 - 12.6 V.

b. A battery with surface charge (recently on charge) - up to 13V.

c. If terminal voltage is 12V or less battery is discharged or is defective. A battery in this condition should be removed, fully charged and rechecked, following the instructions in Section 7.

2. Place a load on the battery either by cranking the engine or with the Starting & Charging System Tester, 15-404-3 set to three (3) times the ampere hour rating of the battery and read the voltage after 15 seconds. If battery voltage drops below 9 volts (12V battery) or 4-1/2V (6V battery) in 15 seconds - battery is defective or badly discharged. Remove battery, recharge and recheck condition before reinstalling.

3. Check voltage drop across the battery cable connections.

a. With load on battery (cranking motor engaged) measure voltage drop between battery terminal and cable clamp. (Fig. 2). When checking negative terminal reverse voltmeter leads to keep meter from reading backwards.

b. If voltage drop exceeds 0.1V the connection should be cleaned.

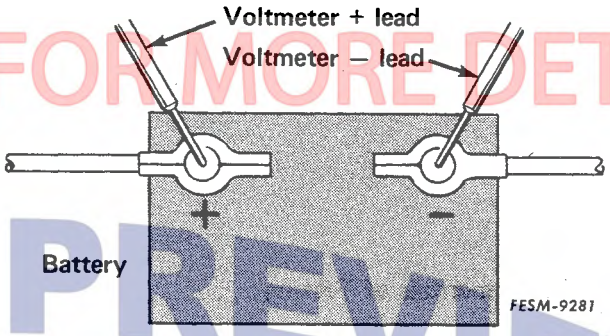

Fig. 1 — Checking battery terminal voltage.

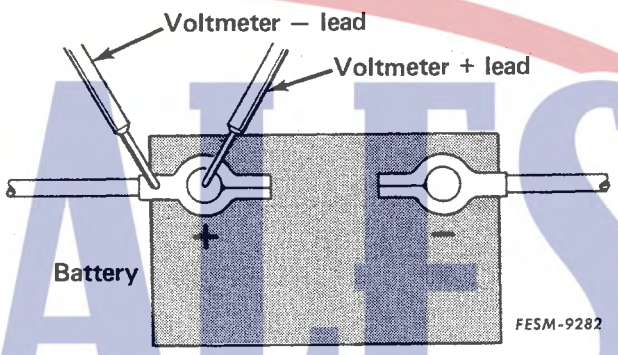

Fig. 2 — Checking voltage drop.

Voltage drop is an indication of resistance present in circuit and can be determined with a voltmeter at any point in a circuit provided current is flowing in the circuit. This can be done in a similar manner as shown in Fig. 2. The resistance in a wire can be determined also by placing voltmeter leads at each end of wire when current is flowing through it.

When battery and battery terminal connections have been determined to be good then the rest of the circuit in question may be checked.

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