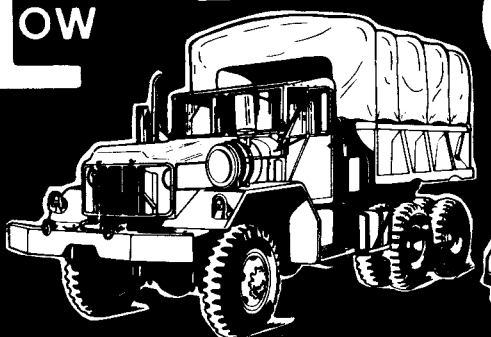
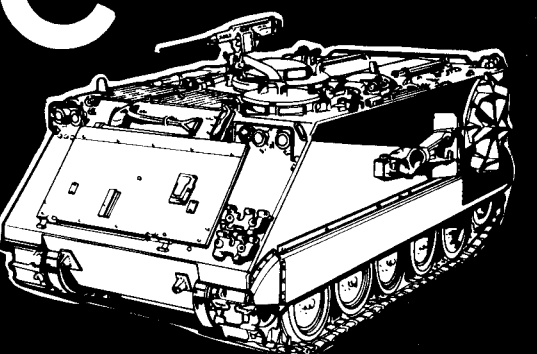
TM9-4910-509-10

OPERATOR'S MANUAL for

LOW VOLTAGE CIRCUIT TESTERS





1 APRIL 1975

Wheeled and Tracked Vehicle Mechanics . . .
Know Your
LOW VOLTAGE CIRCUIT TESTER

Which one? All are capable of doing the job

Now is the time to get it off the shelf and get acquainted with it. The LVCT can make you a topnotch vehicle electrical troubleshooter

It's a well known fact that over half of the charging system components turned in for replacement are good! This means the LVCT is not being used

You can use any model LVCT to test a vehicle battery, starting, or charging system. The tests will pinpoint your electrical trouble and put an end to unnecessary removal and turn-in of good parts

Read and heed all notes pertaining to your LVCT

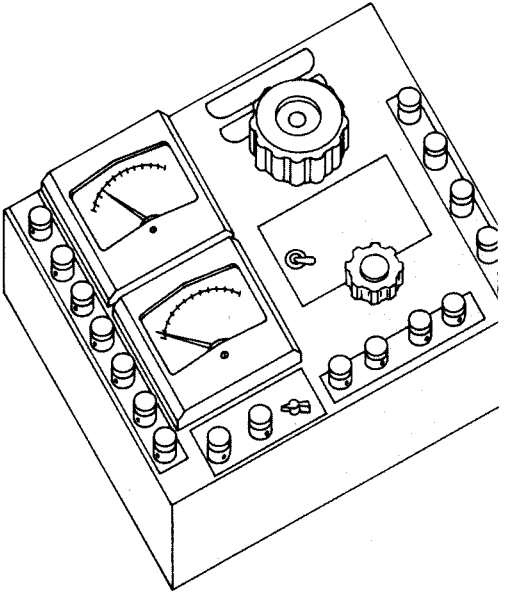
TABLE OF CONTENTS

TABLE OF CONTENTS-Continued

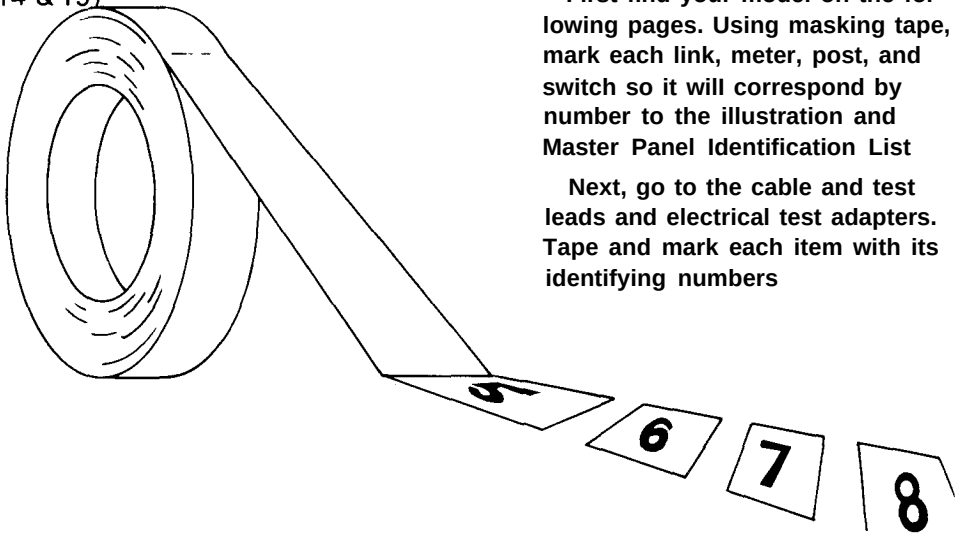
Here's the set up:

Each model LVCT in the organizational tool sets is shown and identified by manufacturer and model number. Identical connections and controls are identified by identical key numbers on illustrations and in text

Although all LVCT's are capable of doing the same job, they are not physically alike. The display panels differ in type and arrangement of links, meters, posts, and switches. Electrical circuits in the LVCT's are not identical! This is why all items do not appear on all testers. The LVCT Master Panel identification List (page 5) identifies each item



The respective LVCT cables and test leads are also listed and identified with a specific number (pages 14 & 15)



Each electrical test adapter is also listed and identified (pages 16, 17, & 18

First find your model on the following pages. Using masking tape, mark each link, meter, post, and switch so it will correspond by number to the illustration and Master Panel Identification List

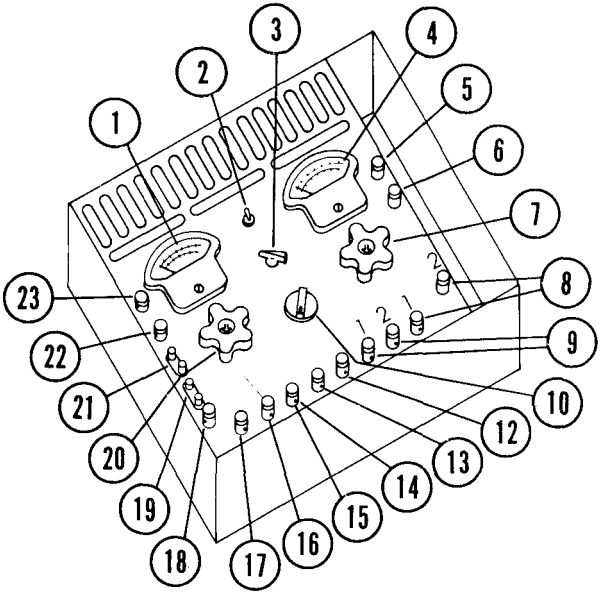
Next, go to the cable and test leads and electrical test adapters. Tape and mark each item with its identifying numbers

LVCT MASTER PANEL IDENTIFICATION LIST

1 - Ammeter
2 - Load Bank Switch
3 - Voltmeter Selector Switch
4 - Voltmeter
5 - Voltmeter Positive Post
6 - Voltmeter Negative Post
7 - Field Rheostat Control Knob
8 - Field Rheostat Posts 1 & 2
9 - ¼-Ohm Resistor Posts 1 & 2
10 - Load Bank Control, Fine
11 - Load Bank 6-Volt Post
12 - Load Bank 12-Volt Post
13 - Load Bank 24-Volt Post
14 - Load Bank Common Post
15 - Ammeter Common Post
16 - Ammeter -100 Amp Post
17 - Ammeter -50 Amp Post
18 - Ammeter -10 Amp Post
19 - Load Bank Link, 12-Volt
20 - Load Bank Control, Coarse
21 - External Shunt Disconnect Link
22 - External Shunt Negative Post
23 - External Shunt Positive Post

ALLEN ELECTRIC AND EQUIPMENT CO

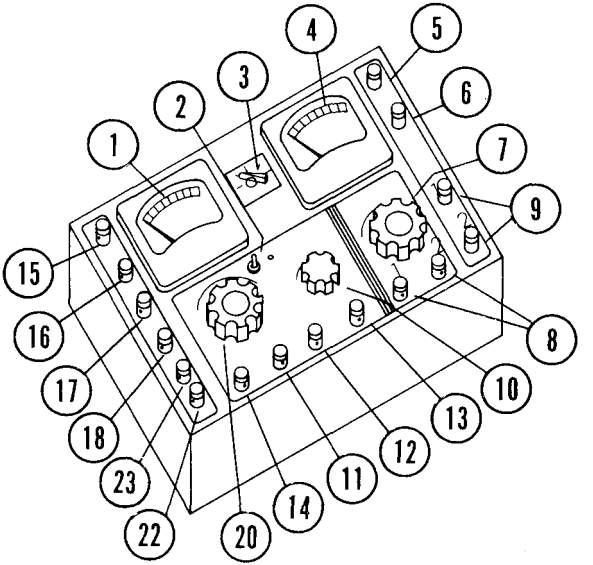
model 30-92



19-Close for 12v only
21-Open for ext shunt only

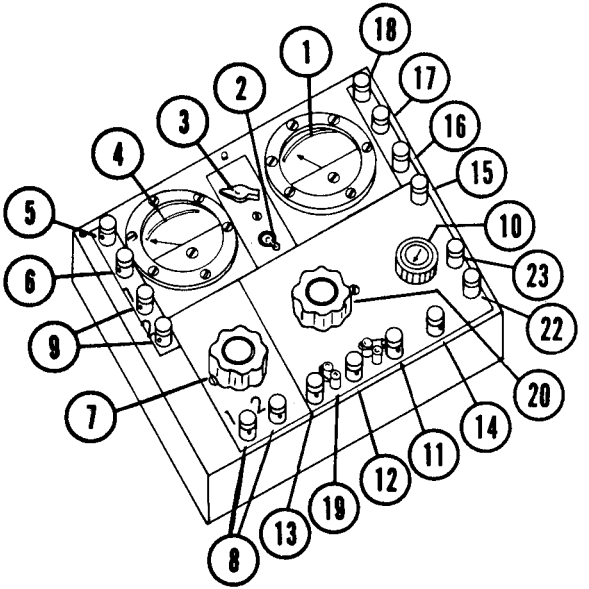
No #11 post

ELECTRO MECHANISMS CORP model 1060



No #19 or #21 links

RAM METER INC model 62F151



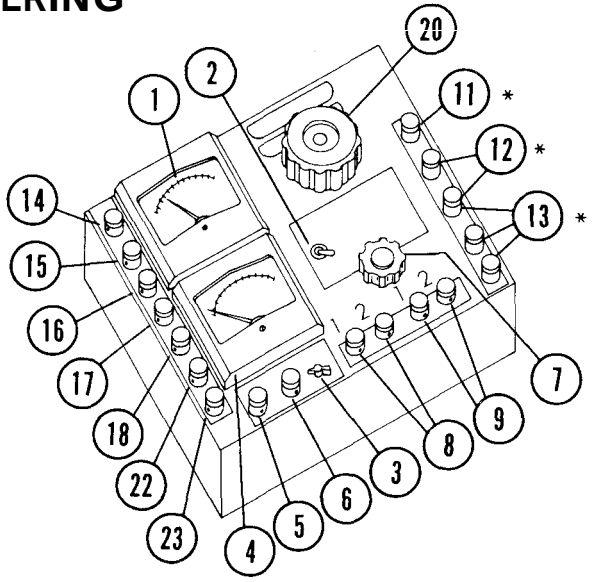
11 - For 6-volt operation, close 6v link

12 - For 12-volt operation, close 12v link

13 - For 24-volt operation, turn load bank coarse knob 20 to position 1. Position 1 has no control during 6-or 12-volt operation

No #21 link

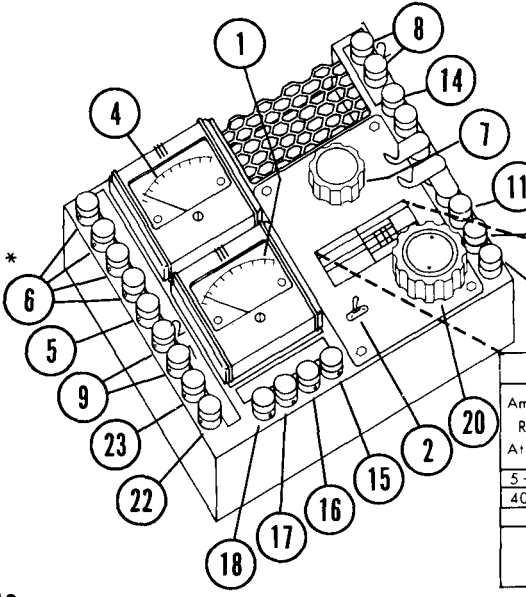
AUTO TEST INC model 10308 & ATOMIC ENGINEERING model TV 100



***LOAD BANK CONNECTIONS**
11, 12, 13
Hook red ammeter lead C3 to post that pertains to the output of the circuit being tested, Common post is #14

No #10 post, #19 or #21 link

HEYER PRODUCTS CO model 128



* NO SELECTOR SWITCH #3
USE APPLICABLE POST #6

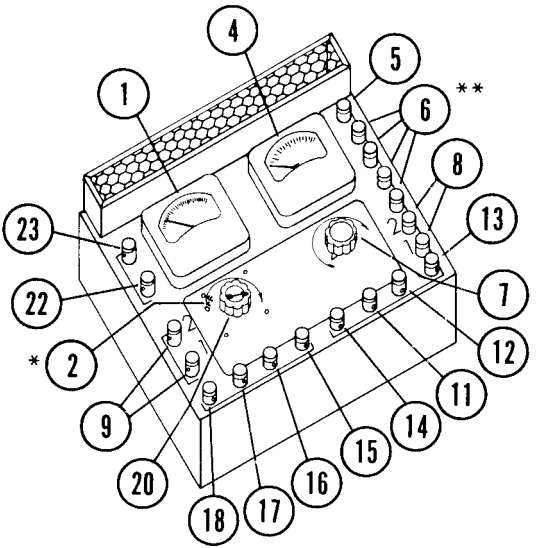
LOAD BANK POSTS

Close or open links depending on the output of the circuit being tested (see chart)

No #10 post, #19 or #21 link

6 VOLTS				12 VOLTS				24 VOLTS			
Ampere Range At 7.5 V	LINK 1	2	3	Ampere Range At 15 V	LINK 1	2	3	Ampere Range At 30 V	LINK 1	2	3
5 - 40	O	C	C	5 - 20	O	O	C	5 - 15	O	O	O
40 - 100	C	C	C	20 - 55	O	C	C	15 - 25	C	C	O
				55 - 100	C	C	C	25 - 40	O	O	C
O - LINK OPEN C - LINK CLOSED								35 - 45	C	O	C
								45 - 70	O	C	C
								70 - 100	C	C	C

SUN ELECTRIC CORP model LVR-3A



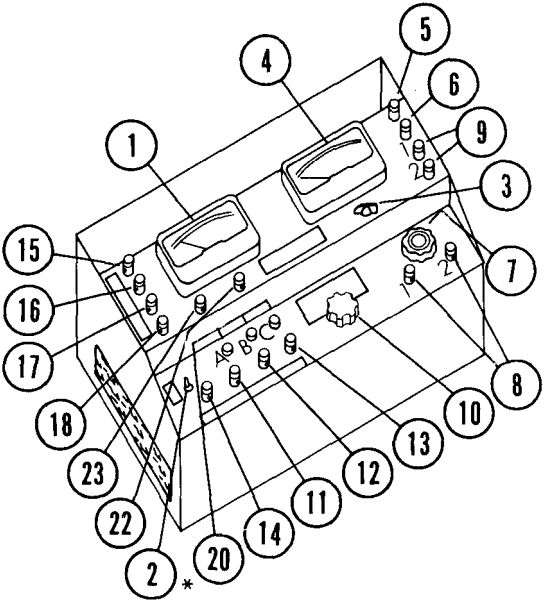
***2 - LOAD BANK SWITCH**
Load bank is turned off when arrow points to OFF (fully counterclockwise)

****NO SELECTOR SWITCH #3**
USE APPLICABLE POST #6

No #10 post, #19 or #21 link

AUSTIN CONTINENTAL INDUSTRIES INC

model 1060A



***20-LOAD BANK CONTROLS**

- **A - 6-volt contact control**
- **B - 12-volt contact control**
- **C - 24-volt contact control**

When using the load bank

1. **Turn 6-volt control fully clockwise**
2. **To increase load, turn 12-volt control clockwise**
3. **For a further increase, turn the 24-volt control clockwise**
4. **If further adjustment is needed to get your voltage or amperage measurement, adjust with 10-ohm load bank control 10**

No #19 and #21 links

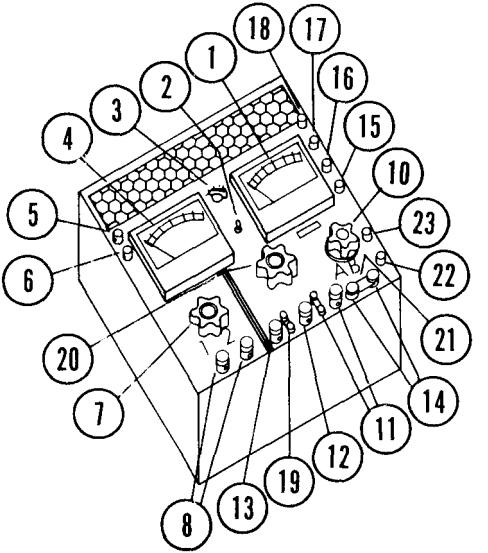
RAM METER INC model 70G11

11 - For 6-volt operation, close 6v link
- For 12-volt operation, close 12v link
13 - For 24-volt operation, turn load bank coarse control 20 to position 1

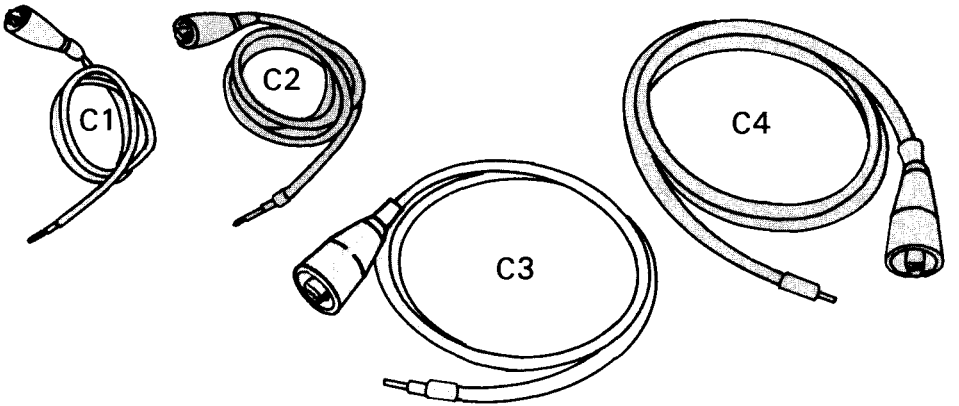
***14 - Open link when using external shunt or ammeter and load bank separately**

When using load bank only, open link and use 14B
When using ammeter only, open link and use 14A

No #9 post

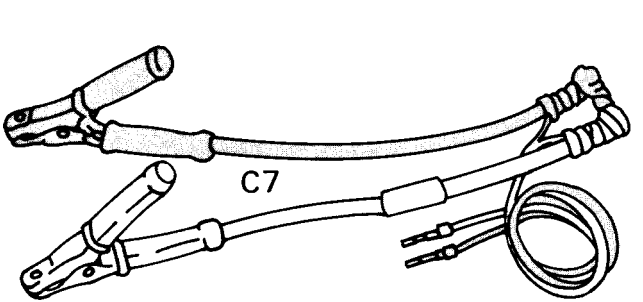


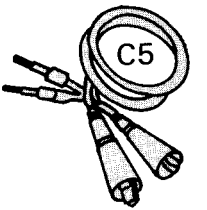
METER TEST LEADS and CABLES



C1 - Voltmeter Positive Lead
C2 - Voltmeter Negative Lead

C3 - Ammeter Positive Lead
C4 - Ammeter Negative Lead





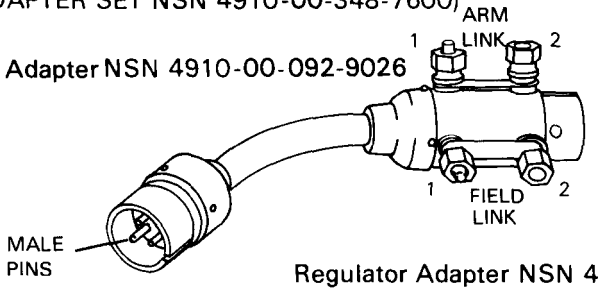
C5 - Field Rheostat Leads (2)
C6 - Jumper Lead
C7 - Ext Shunt, Pos & Neg Leads

NOTE
Before use, make continuity check of all test leads and cables with ohmmeter; zero ohms should be obtained

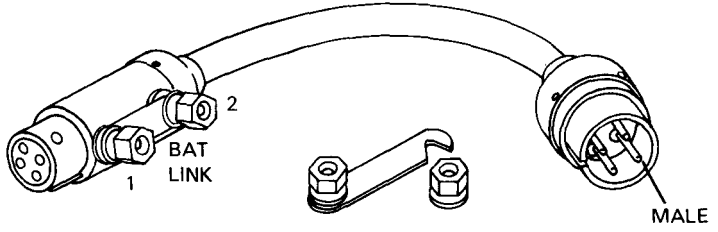
ELECTRICAL ADAPTERS

(FROM ADAPTER SET NSN 4910-00-348-7600)

Generator Adapter NSN 4910-00-092-9026

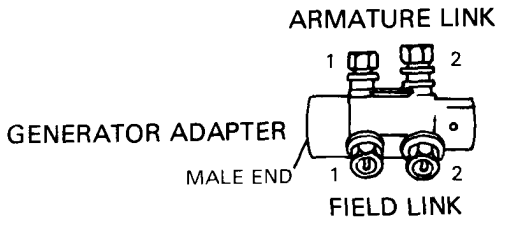


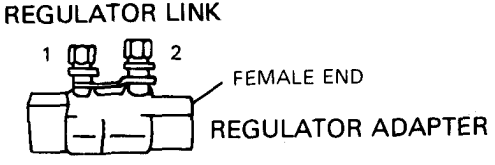
Regulator Adapter NSN 4910-00-092-9025



ALTERNATE ELECTRICAL TEST ADAPTERS

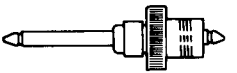
(FROM ADAPTER SET, ENGINE ELECTRICAL TEST NSN 4910-00-348-7600)



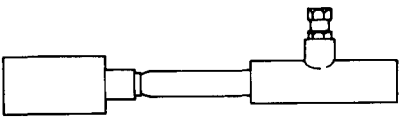


TEST ADAPTERS NOT USED

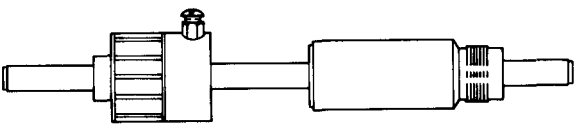
(For Generator / Regulator Tests)



Distributor Primary Adapter
NSN 4910-00-356-7492



Ignition Unit Adapter
NSN 4910-00-356-7508

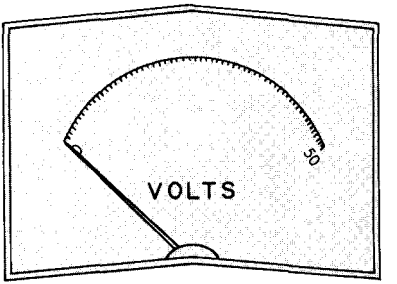


Spark Plug Adapter
NSN 4910-00-356-7504

READING THE MULTISCALE METERS

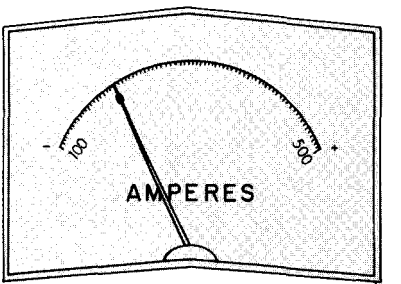
VOLTMETER:

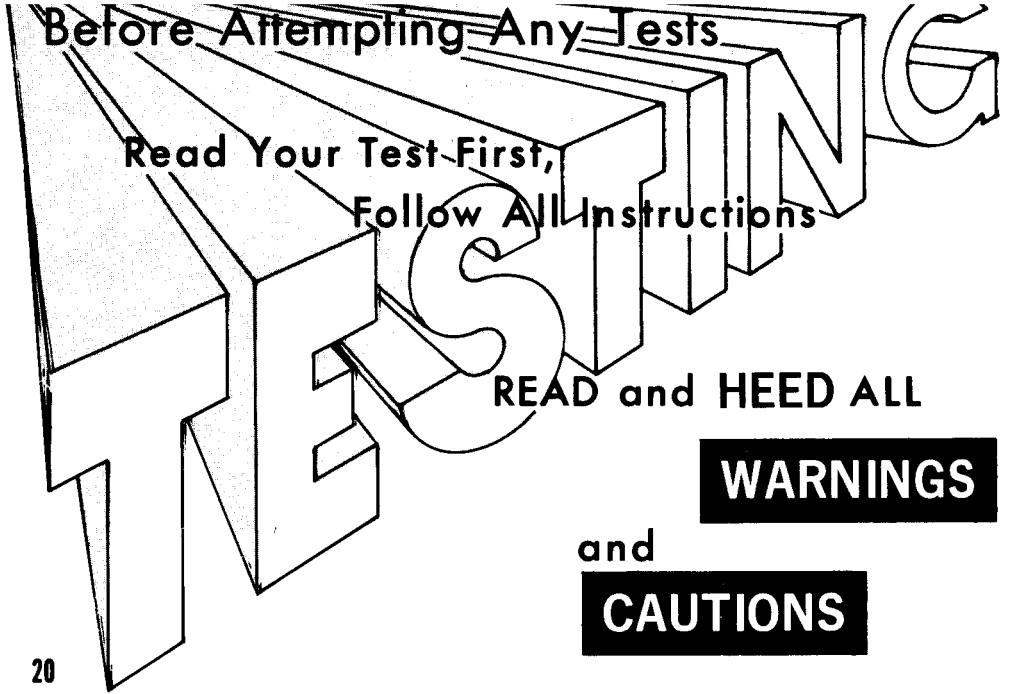
Switch Position	Read Scale Ending With
50 volt	50
20 volt	20
10 volt	10
1 volt	1



AMMETER:

Hookup- Common & Post	Read Scale Ending With
- 100A	100
- 50A	50
- 10A	10
-500A EXT SHUNT	500




Before Attempting Any Tests
Read Your Test First,
Follow All Instructions
TESTING
READ and HEED ALL
WARNINGS
and
CAUTIONS

Wheeled and Tracked Vehicle Tests

Remember These Points:

WARNING

Amperage produced by a vehicle charging system is high enough to cause severe personal injury

CAUTIONS

Before performing a test involving the generator or alternator, check the V-belt. If it slips, you can get false voltmeter and ammeter readings (tighten if necessary)

Before doing any test on a vehicle charging system, start and run engine to warm it up and smooth out the system. Ten to fifteen minutes at 1000 to 1200 rpm should do

Before connecting generator or regulator adapter, remove battery ground cable to keep from causing a short and further damaging system. Always remove negative battery terminal from battery post first and always reconnect last

Never let a hot wire flop and strike any metal part of vehicle. This includes flashing to test for a hot wire

Before hooking up the LVCT or changing hookup, make certain load bank switch (2) is off and control knobs (10) and (20) are turned completely counterclockwise (off)

After each test, turn field rheostat (7) completely counter-clockwise to remove current from generator, then turn off load bank switch (2)

Each model LVCT has its own load bank duty and cooling cycle. This is normally 3 minutes on and 27 minutes off (for cooling), based on a full load capacity (100 amps). For lesser load application, the ON-OFF cycle can be reduced accordingly

Follow the test sequence as given and eliminate minor electrical problems first

Now take your LVCT with the marked-in numbers and make your test hookup according to the identification numbers given for each test. THE LVCT IS A FINE PIECE OF EQUIPMENT. TAKE CARE OF IT AND IT WILL HELP YOU

BATTERY ELECTROLYTE SPECIFIC GRAVITY TEST

WARNING **Battery electrolyte is an acid. Severe burns may result if precautions are not taken to avoid contact with skin**

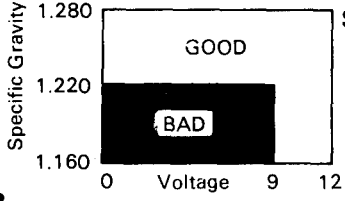
1. Using a hydrometer, draw enough fluid from battery cell to allow indicator to float freely
2. Read indicator with your eye approximately level with fluid and note your readings

NOTE: Readings taken while looking at indicator from a sharp angle are very inaccurate

3. Test all cells of battery and note readings. High to low difference shall be 0.030 points maximum
4. At 80°F electrolyte temperature, each cell of a fully charged battery should read 1.280 maximum. At 80°F, a battery is discharged if it reads less than 1.220 (See chart A)
5. Temperature affects specific gravity. Each 10°F variation from 80°F will change specific gravity 0.004 (See chart B)

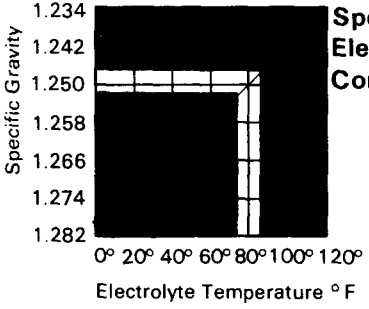
WHY? . . . To determine the approximate state of charge and how much energy is available from battery

CHART A

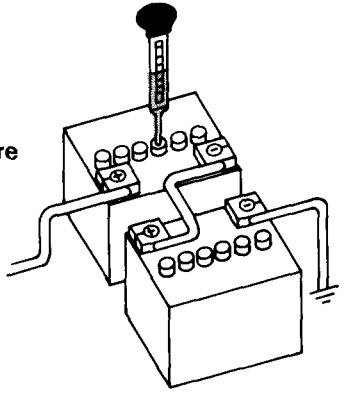


Specific Gravity to Voltage

CHART B



Specific Gravity to Electrolyte Temperature Conversion



BATTERY SYSTEM LOAD TEST

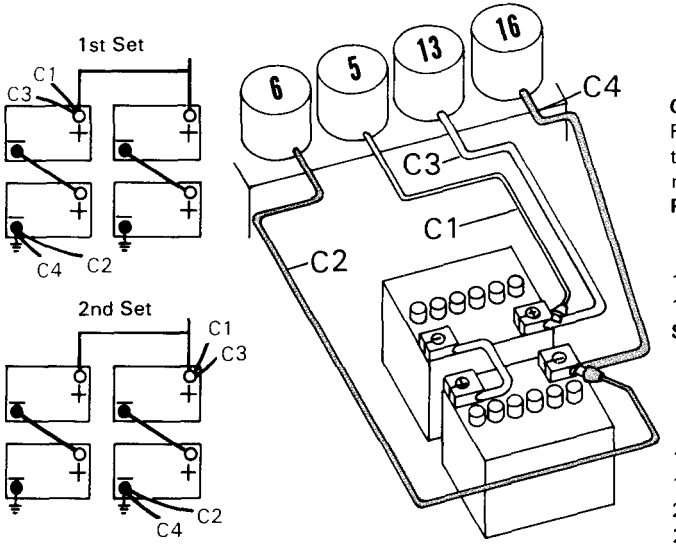
TEST. . .

1. **Voltage switch (3) to 50 volts**
2. **Load bank switch (2) to ON**
3. **Turn knobs (10) and (20) clockwise to increase current draw to, 80 to 100 amps as indicated on ammeter. Voltage should not drop below 18 volts in 15 seconds on a 24-volt system. Hold it just long enough to read voltmeter (4) and remove load**
4. **Voltmeter (4) should read 24v to 26v (24v system) before and after load test**
5. **If battery system does not check out, you'll have to make individual battery tests to find the faulty one**
6. **On systems having more than two batteries, test each series set separately. (See illustrations)**

CAUTION

Load bank duty and cooling cycle is normally 3 minutes on and 27 minutes off for cooling

WHY? . . . To test all batteries under load at one time to see if they're all good and working as a team



CAUTION
Remove neg (-) battery terminal first and reconnect last

POSTS USED
5 - Voltmeter +(to bat +)
6 - Voltmeter -(to bat -)
13 - Load Bank +24V(to bat +)
16 - Ammeter -100A(to bat -)

SWITCHES & KNOBS
Start Position
2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

INDIVIDUAL BATTERY TEST

TEST FIRST BATTERY

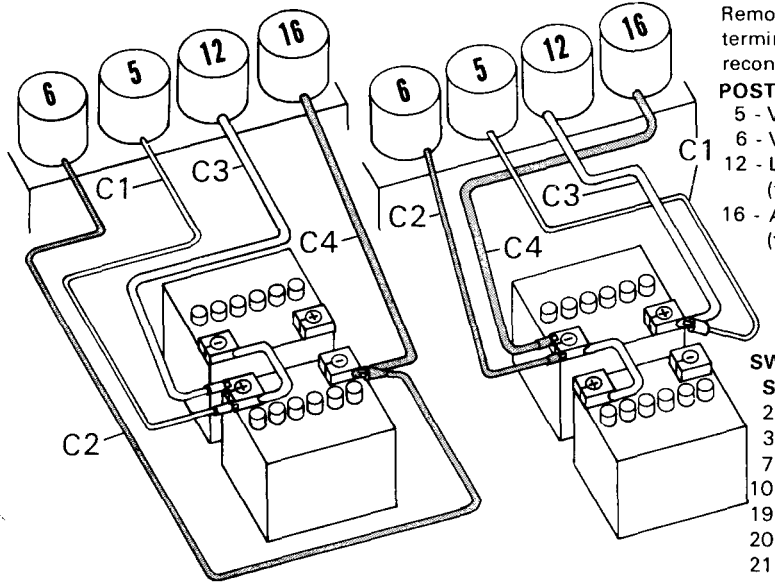
1. Voltage switch (3) to 20 volts
2. Load bank switch (2) to ON
3. Turn knobs (10) and (20) clockwise to increase current draw to 80 to 100 amps indicate on ammeter. Voltage should not drop below 9v in 15 seconds on a 24v system. Hold it just long enough to read voltmeter (4) and remove load
4. Voltmeter (4) should read 12v to 13v (24v system) before and after load test

NOW TEST THE OTHER BATTERY

1. Turn all controls to the OFF position. Disconnect and connect cables to other battery and repeat test
2. Batteries should not differ more than 2 volts

NOTE: If more than two batteries in system, test each one individually until bad one is found. Use same LVCT hookups; just move test leads C1 and C3 to positive post and C2 and C4 to negative post of next battery

WHY? . . . To find faulty battery so it can be replaced



CAUTION
Remove neg (-) battery terminal first and reconnect last

POSTS USED
- 5 - Voltmeter +(to bat +)
- 6 - Voltmeter -(to bat -)
- 12 - Load Bank +12V (to bat +)
- 16 - Ammeter -100A (to bat −)

SWITCHES & KNOBS
Start Position
- 2 - OFF
- 3 - Full Left (ccw)
- 7 - Full Left (ccw)
- 10 - Full Left (ccw)
- 19 - Closed
- 20 - Full Left (ccw)
- 21 - Closed

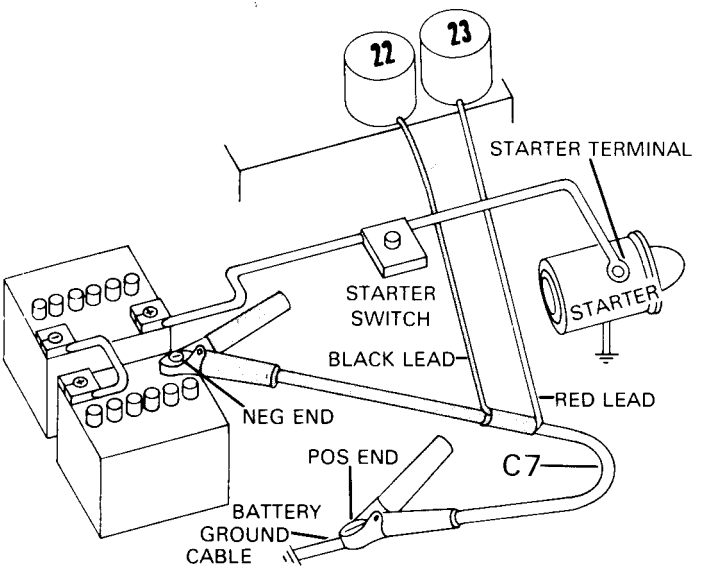
STARTER AMPERAGE DRAW TEST

CAUTION **Do not use this equipment with starters which draw over 500 amps**

TEST . . .

1. **Install external shunt C7. Open link (21). Make certain connections are as shown**
2. **Vehicle ignition switch OFF, gear shift in neutral, and parking brake set**
3. **Have a buddy crank engine with starter switch**
4. **While engine is cranking, ammeter (1) shall not exceed amperage specified for your vehicle. Excess amperage means a faulty starter**
5. **After test, put ground cable back on battery and close link (21)**

WHY? . . . To see if starter amperage draw is normal with engine at operating temperature, but NOT running



CAUTION

Remove battery neg (-) terminal first. Connect C7 cable to ground cable next. Then connect leads to LVCT. Connect C7 lead to battery neg (-) terminal last

POSTS USED

22 - EXT Shunt
23 - EXT Shunt

SWITCHES & KNOBS

Start Position

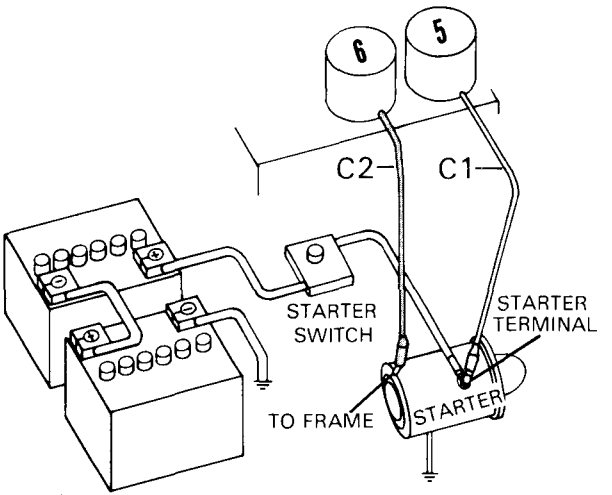
2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Open

STARTER VOLTAGE TEST

TEST . . .

1. **Set voltage switch (3) to 50 volts**
2. **Vehicle ignition switch OFF, gear shift in neutral, and parking brake set**
3. **Have your helper crank engine with starter switch**
4. **While engine is cranking, voltmeter (4) should show 18 volts or more**
5. **If less, there is a voltage loss due to high resistance. You'll have to test each cable and its connection. Go to Starter System Cable and Connection High Resistance Test**

WHY? . . . To see if there is high resistance (voltage drop) in starter cables or ground circuit (batteries at full charge and starter operating correctly). Voltage loss means a bad cable or connection



POSTS USED
- **5 - Voltmeter +**
- **6 - Voltmeter -**

SWITCHES & KNOBS

Start Position
- **2 - OFF**
- **3 - 50 volts**
- **7 - Full Left (ccw)**
- **10 - Full Left (ccw)**
- **19 - Open**
- **20 - Full Left (ccw)**
- **21 - Closed**

STARTER SYSTEM CABLE & CONNECTION HIGH RESISTANCE TESTS

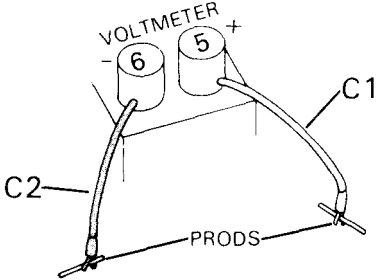
TEST . . .

1. Test across each connection and cable at points shown until high resistance is found
2. Use prods (tenpenny nails) clamped in each voltmeter lead alligator clip
3. Vehicle ignition switch OFF, gear shift in neutral, and parking brake set
4. Press prods hard at each bare metal point for good contact
5. Have helper crank engine with starter switch
6. While engine is cranking, see if voltmeter (4) needle moves. If not . . .

   Switch (3) to 10 volts. Still no movement . . .

   Switch (3) to 1 volt
7. If reading is more than 0.1 volt, it's a bad cable or connection
8. Clean bad connections, reassemble and tighten, or replace the bad cable. Test again

WHY? . . . If during starter voltage test, the voltmeter registers less than 18 volts and batteries checked above 18 volts, these tests will find the high resistance cable or connection. Any high resistance connection must be removed. Have the mating surfaces cleaned, reassembled, and tightened. If it's a cable, replace it



CAUTION: Do not crank engine over 30 seconds. If you do, let starter motor cool before cranking again

Switch (3) to 20 volts after each test is completed

POSTS USED

5 - Voltmeter +
6 - Voltmeter -

SWITCHES & KNOBS

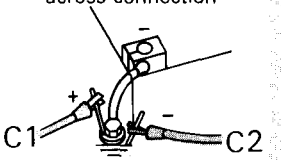
Start Position

2 - OFF
3 - 20 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

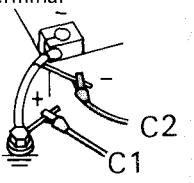
. . . more High Resistance Tests . . . . . .

BATTERY GROUND CABLE AT FRAME :

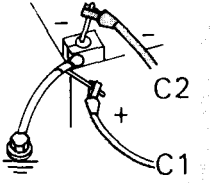
Cable end to frame across connection



Cable terminal to terminal

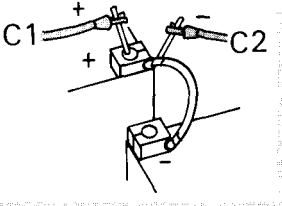


Cable terminal to battery (-) post

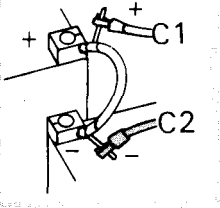


BATTERY INTERMEDIATE CABLE:

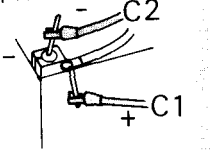
Battery (+) post to cable terminal



Cable terminal to terminal



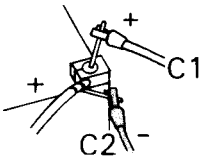
Cable terminal to 2nd battery (-) post



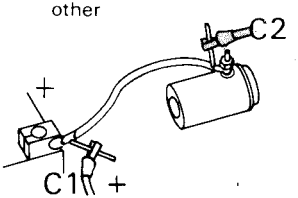
(TEST EACH SET OF BATTERIES IF MORE THAN TWO)

BATTERY TO STARTER POST CABLE:

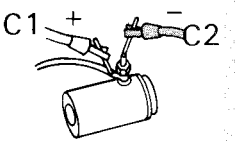
2nd battery (+) post to cable terminal



Cable one end to other

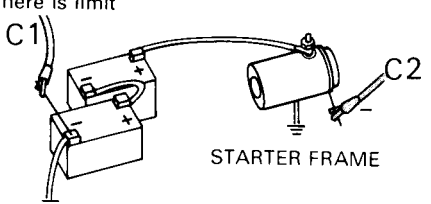


Cable end to starter post

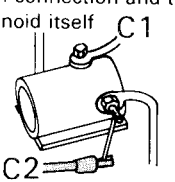


STARTER GROUND CIRCUIT:

0.2 - volt reading here is limit



If there is a solenoid in the system, test across each connection and the solenoid itself



GENERATOR OUTPUT TEST

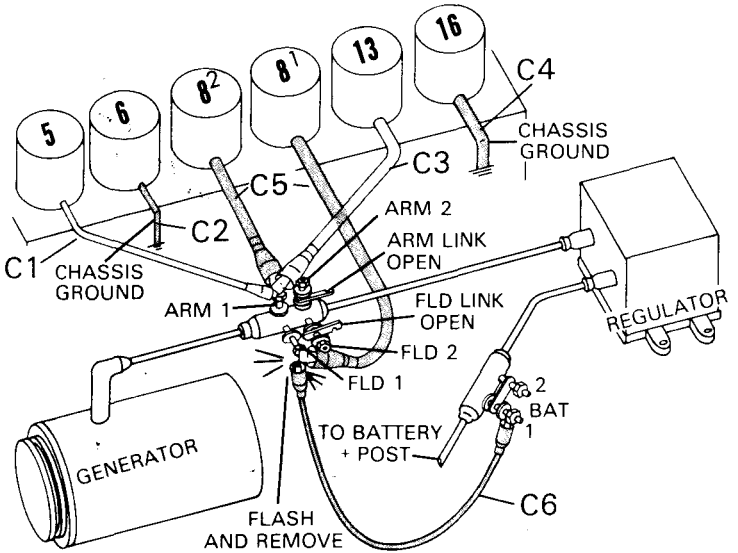
FIRST . . . ADAPTER HOOKUP

1. Remove the battery system ground cable and connect adapters
2. Reconnect battery ground cable after adapter hookup
3. Generator adapter links OPEN
4. Regulator adapter link CLOSED
5. Polarize generator by connecting jumper lead C6 to regulator adapter terminal 1. Flash the other end to generator adapter field terminal 1. Remove jumper lead

TEST . . .

1. Start and run engine at 1000 to 1200 rpm
2. Turn field rheostat (7) clockwise slowly until voltmeter reads 30 volts
3. Load bank switch (2) to ON
4. Turn coarse load bank knob (20) clockwise slowly until ammeter (1) reads specified output
5. keep adjusting knobs (7), (10), and (20) until you get proper amperage at 30 volts
6. If you can't get these readings, either your generator drive belts are loose or the generator is faulty

WHY? . . . To test generator output and drive belt(s) for Slippage. (Run engine at 1000 to 1200 rpm during test)



CAUTION

Remove neg (-) battery terminal first and reconnect last

POSTS USED

- 5 - Voltmeter +
- 6 - Voltmeter -
- 8 - Rheostat #1
- 8 - Rheostat #2
- 13 - Load Bank 24V
- 16 - Ammeter - 100A

SWITCHES & KNOBS

Start Position

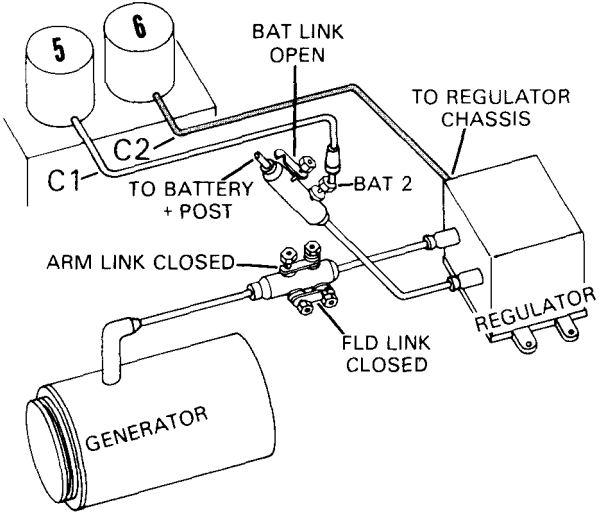
- 2 - OFF
- 3 - 50 volts
- 7 - Full Left (ccw)
- 10 - Full Left (ccw)
- 19 - Open
- 20 - Full Left (ccw)
- 21 - Closed

Above 80°F . . . . . 27.0 to 27.5 volts
0°F to 80°F . . . . . 27.5 to 28.0 volts
Below 0°F . . . . . 28.0 to 28.5 volts

TEST . . .

1. Start and run engine at 1000 to 1200 rpm (high idle)
   NOTE: Some vehicles can't be started with link on regulator adapter open. If yours is this type, start the engine with the link closed. After engine is started, open link
2. When engine is running smoothly, voltmeter (4) needle should rest between 27.0 and 28.5 volts depending on the vehicle regulator specification

WHY? . . . To test for correct regulator setting. Systems in tactical vehicles should be set according to ambient temperature



CAUTION

Remove neg (-) battery terminal first and reconnect last

POSTS USED

5 - Voltmeter +
6 - Voltmeter -

SWITCHES & KNOBS

Start Position

2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

Above 80°F. . . . . 27.0 to 27.5 volts
0°F to 80°F . . . . . 27.5 to 28.0 volts
Below 0°F . . . . . 28.0 to 28.5 volts

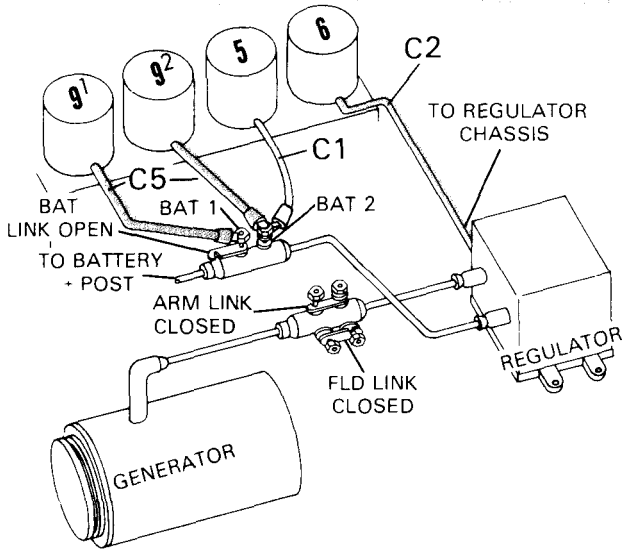
TEST . . .

1. **Start and run engine at 1000 to 1200 rpm (high idle)**

   NOTE: **Some vehicles can't be started with link or regulator adapter open. If yours is this type, start the engine with the link closed. After engine is started, open link.**

2. **When engine is running smoothly, voltmeter (4) needle should rest between 27.0 and 28.5 volts depending on the vehicle regulator specification**

WHY? . . . To test for correct regulator setting with load applied. Systems in tactical vehicles should be set according to the ambient temperature



CAUTION
Remove neg (-) battery terminal first and reconnect last

POSTS USED
- 5 - Voltmeter +
- 6 - Voltmeter -
- 9 - FIX RES #1
- 9 - FIX RES #2

SWITCHES & KNOBS
Start Position
- 2 - OFF
- 3 - 50 volts
- 7 - Full Left (ccw)
- 10 - Full Left (ccw)
- 19 - Open
- 20 - Full Left (ccw)
- 21 - Closed

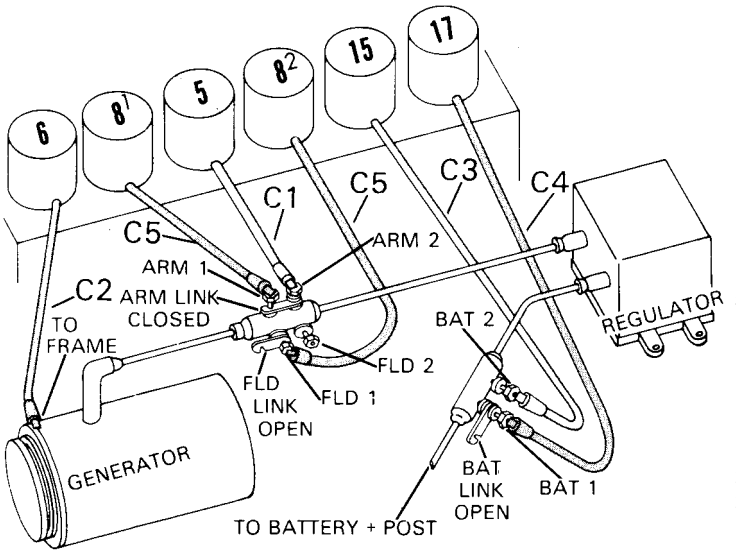
REGULATOR CUTOUT RELAY TEST

CAUTION: Place insulation (cardboard or wood) between the two ammeter cable clips to prevent accidental shorts. Be ready to remove ammeter lead C3 or C4 quickly in step 4 if needle reaches extreme left before relay opens

TEST . . .

1. Start and run engine at 1000 to 1200 rpm (high idle) until smooth
2. Turn field rheostat (7) clockwise slowly. Watch ammeter (1) for needle flick. Voltmeter (4) should read the cutout relay closing voltage between 24.5 and 26.5 volts at needle flick
3. The ammeter will show from 2 to 15 amperes at closing depending on battery condition
4. After you have relay closing voltage turn rheostat (7) counter-clockwise slowly. Watch ammeter (1) needle as it travels left past zero to a point where it jumps back to zero
5. Cutout relay opening amperage is ammeter reading noted just before needle jumps back to zero
6. If relay doesn't close between 24.5 and 26.5 volts or doesn't open between 11 and 15 amperes, replace regulator

WHY? . . . To find closing and opening voltage of generator to battery cutout relay



CAUTION

Remove neg (-) battery terminal first and reconnect last

POSTS USED

5 - Voltmeter +
6 - Voltmeter -
8 - Rheostat #1
8 - Rheostat #2
15 - Ammeter Comm
17 - Ammeter -50A

SWITCHES & KNOBS

Start Position

2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

CURRENT REGULATOR UNIT TEST

TEST . . .

1. **Start and run engine at 1000 to 1200 rpm (high idle)**

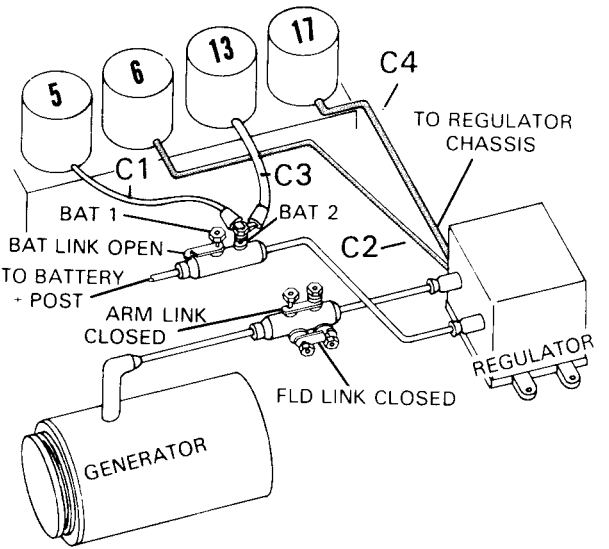
2. **Turn on load bank switch (2)**

3. **Now adjust load bank knobs (10) and (20) slowly until voltmeter (4) shows 27 to 28.5 volts**

4. **Take your ammeter reading and remove load with load bank control knobs (10) and (20). It should have read as specified for the regulator output current**

5. **If your ammeter reading is less than specified for your vehicle, replace the regulator**

WHY? . . . To find out if current regulator is working within limits



CAUTION
Remove neg (-) battery terminal first and reconnect last

POSTS USED
- 5 - Voltmeter +
- 6 - Voltmeter -
- 13 - Load Bank 24V
- 17 - Ammeter -50A

SWITCHES & KNOBS

Start Position
- 2 - OFF
- 3 - 50 volts
- 7 - Full Left (ccw)
- 10 - Full Left (ccw)
- 19 - Open
- 20 - Full Left (ccw)
- 21 - Closed

CHARGING CIRCUIT INSULATED CABLE TEST (Line-Loss Test)

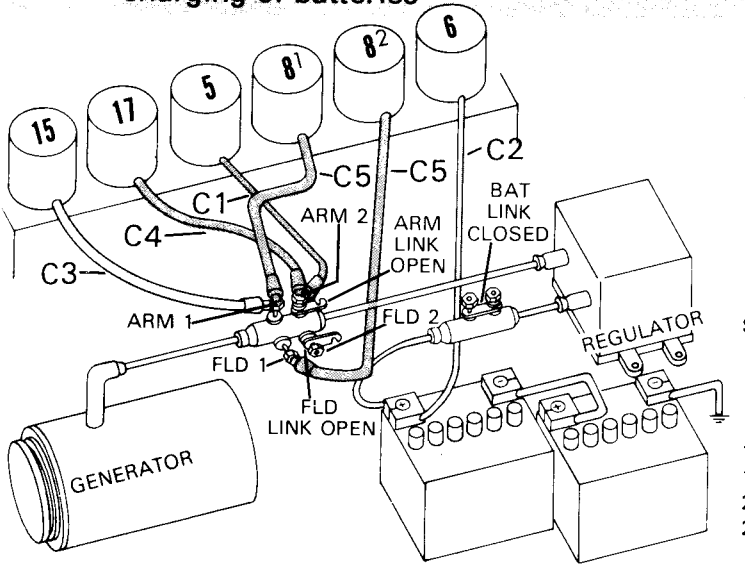
TEST #1 . . .

1. Start and run engine at 1000 to 1200 rpm (high idle)
2. Turn rheostat nob (7) slowly until 20 amperes is indicated on ammeter (1)
3. Turn voltmeter switch (3) to 10-volt position
4. With ammeter (1) showing 20 amperes, voltmeter (4) should not show over 0.8 volts. For a more accurate reading, switch (3) to 1-volt position
5. If voltage is more than 0.8 volts, check both sections of cable for bad connections. Turn all controls off

TEST #2 . . .

1. Remove lead C1 from ARM terminal and connect it to BAT adapter terminal. Repeat steps 2, 3, and 4 of test #1
2. If voltage is more than 0.8 volts, replace cable. If no voltage loss is found, replace cable tested in test #1

WHY? . To find out if insulated cable resistance is causing voltage loss with normal load current. This would cause under-charging of batteries



CAUTION
Remove neg (-) battery terminal first and reconnect last

POSTS USED
- 5 - Voltmeter +
- 6 - Voltmeter -
- 8 - Rheostat #1
- 8 - Rheostat #2
- 15 - Ammeter Comm
- 17 - Ammeter -50A

SWITCHES & KNOBS

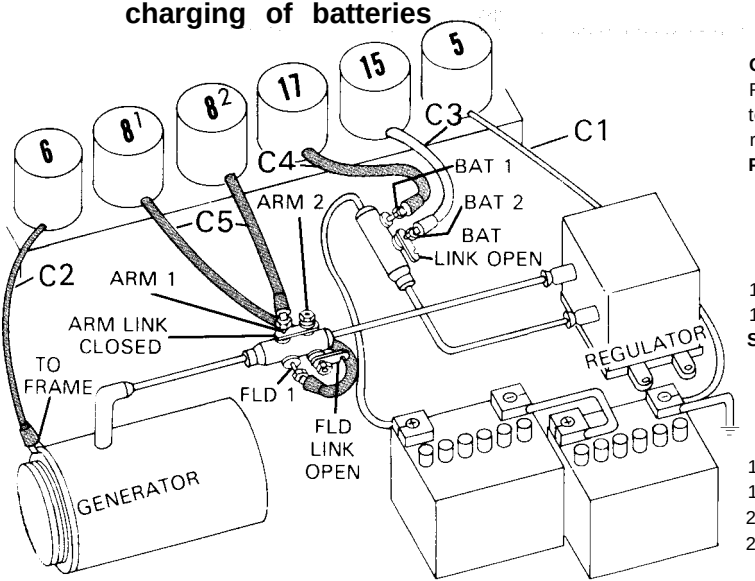
Start Position
- 2 - OFF
- 3 - OFF
- 7 - Full Left (ccw)
- 10 - Full Left (ccw)
- 19 - Open
- 20 - Full Left (ccw)
- 21 - Closed

CHARGING CIRCUIT GROUND LOSS (Resistance) TEST

TEST . . .

1. Start and run engine at 1000 to 1200 rpm (high idle)
2. Set voltmeter switch (3) to 10-volt position
3. Turn rheostat knob (7) slowly clockwise until ammeter (1) reads 20 amperes
4. Now look at voltmeter (4). It should not indicate more than 0.1 volt
5. Set switch (3) to the 1-volt position for a more accurate reading
6. Place switches and knobs in OFF position. Move black voltmeter cable C2 from generator frame and ground to regulator frame. With ammeter (1) showing 20 amperes again, voltmeter (4) should not read more than 0.1 volt
7. If voltmeter (4) shows more than 0.1 volt on either test, look for loose generator or regulator mount, a loose, corroded, or bad battery to ground cable

WHY? . To find out if ground cable resistance is causing voltage loss with normal load current. This would cause under-charging of batteries



CAUTION

Remove neg (-) battery terminal first and reconnect last

POSTS USED

5 - Voltmeter +
6 - Voltmeter -
8 - Rheostat #1
8 - Rheostat #2
15 - Ammeter Comm
17 - Ammeter -50A

SWITCHES & KNOBS

Start Position

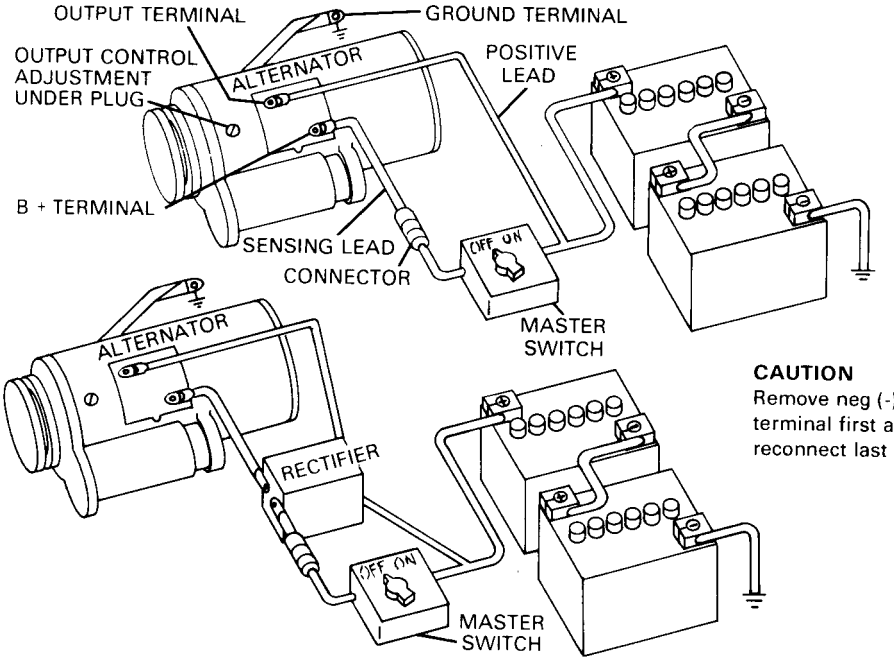
2 - OFF
3 - OFF
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

ALTERNATOR CHARGING SYSTEM 60 AMP AC

Facts of life concerning your Alternator Charging System:

1. **NEVER reverse battery connections! Always hook up the positive (+) to positive (+) and negative (-) to negative (-). Negative wire or lead always goes to alternator frame**
2. **NEVER disconnect voltage regulator sensing lead while the engine is running! If you do, the alternator will burn itself out**
3. **NEVER ground the alternator output terminal! It'll cause an overload and burn out regulator**
4. **NEVER operate the alternator unless a load is connected to output terminal!**
5. **NEVER try to polarize an alternator!**
6. **There are two types of alternator charging systems. In one the rectifier is an internal part of the alternator. In the other the rectifier is an external component**

Here are sketches of the two types of alternator charging systems



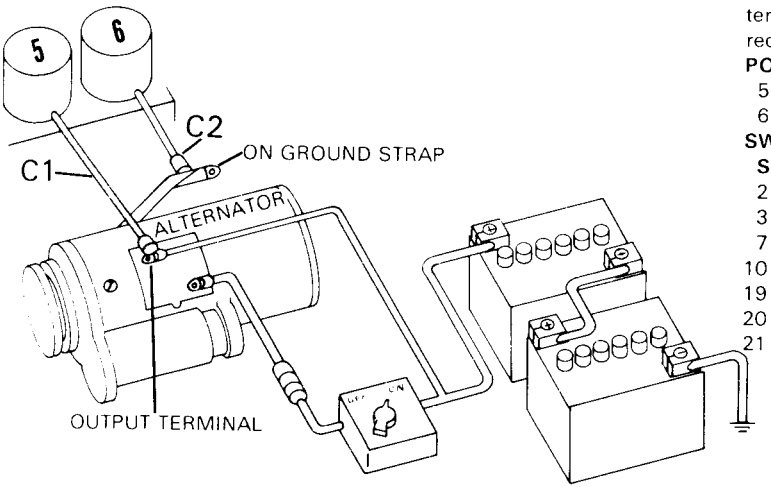
CAUTION
Remove neg (-) battery terminal first and reconnect last

ALTERNATOR OUTPUT TEST #1 (This is a Two-part Test)

TEST . . .

1. Turn on vehicle master switch
2. Start engine and run at 1000 to 1200 rpm
3. Now read voltmeter (4) scale. It should show 27 to 29 volts
4. If voltmeter (4) reads less than 27 volts or more than 29 volts, make a note of reading, then stop engine
5. With engine stopped, turn on master switch and again read voltmeter scale, If reading is the same as it was with engine running, turn off master switch and complete the second part of this test . . .

WHY? . . . To see if alternator voltage is correct. A 28-volt output is needed to keep batteries charged and to operate vehicle electrical accessories



CAUTION

Remove neg (-) battery terminal first and reconnect last

POSTS USED

5 - Voltmeter +
6 - Voltmeter -

SWITCHES & KNOBS

Start Position

2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

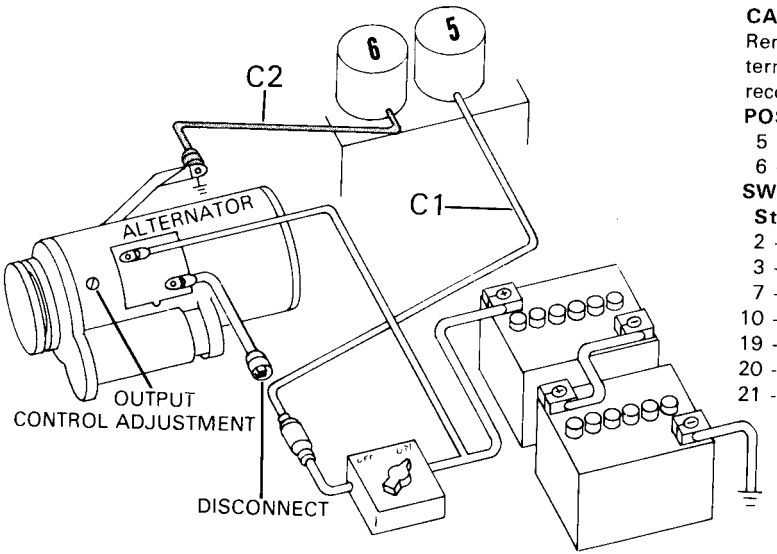
ALTERNATOR OUTPUT TEST #2

TEST . . .

CAUTION **DO NOT START ENGINE!**

1. Turn on master switch
2. Now read voltmeter (4). It should read 23 to 25 volts. If it reads low or zero, repair or replace master switch
3. When you get a 24-volt reading, turn OFF master switch, disconnect red voltmeter lead C1 from sensing lead connection, and reconnect lead between the master switch and alternator
4. Now repeat the hookup on test no. 1. Turn on master switch and run engine at 1000 to 1200 rpm. The voltmeter should show 28 volts (or voltage designated by your vehicle specification)
5. To adjust voltage output, remove plug from front flange and adjust until voltmeter (4) shows 28 volts. Turning screw counterclockwise increases output voltage, while clockwise decreases it
6. If alternator cannot be adjusted, replace it

WHY? . . . To see if alternator sensing lead from master switch is bad or if the alternator needs replacing



CAUTION
Remove neg (-) battery terminal first and reconnect last

POSTS USED
5 - Voltmeter +
6 - Voltmeter -

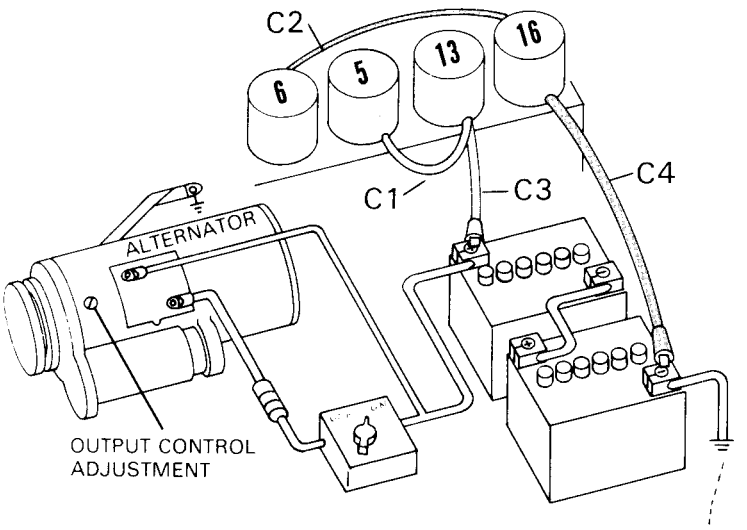
SWITCHES & KNOBS
Start Position
2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

ALTERNATOR LOAD TEST

TEST . . .

1. Turn master switch on
2. Start and run engine at 1000 to 1200 rpm
3. Turn load bank switch (2) on
4. Turn load bank knobs (10) and (20) slowly until ammeter (1) shows amperes specified in vehicle specifications
5. Now look at voltmeter (4). It should show voltage specified in vehicle specification. If it's less, turn alternator output adjustment screw counterclockwise and raise the output voltage specified
6. If it will not adjust to voltage specified, but Output Tests #1 and #2 were OK, then you'll need to test battery to alternator cable and ground circuit for high resistance that could be causing a voltage drop

WHY? . . . To see if alternator output capacity is OK under load



CAUTION

Remove neg (-) battery terminal first and reconnect last

POSTS USED

5 - Voltmeter +
6 - Voltmeter -
13 - Load Bank 24V
16 - Ammeter -100A

SWITCHES & KNOBS

Start Position

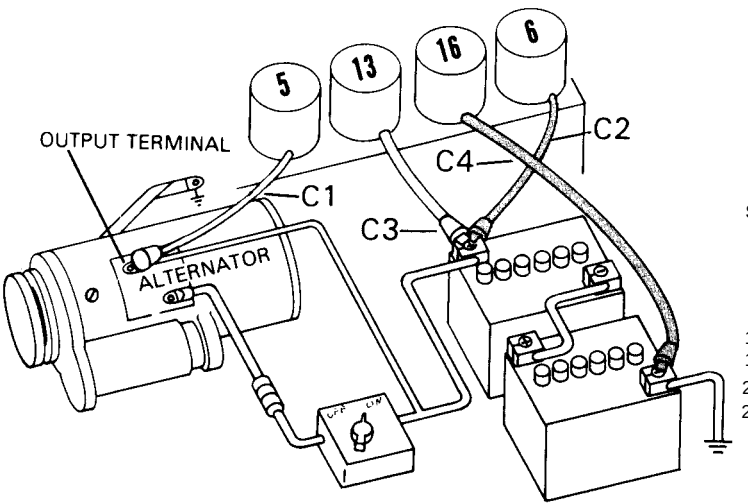
2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

ALTERNATOR TO BATTERY CABLE TEST

1. Start and run engine at 1000 to 1200 rpm
2. Turn load bank switch (2) on
3. Adjust load bank knobs (10) and 20 until ammeter (1) shows 60 amperes
4. Turn voltmeter switch (3) to 20. . . then 10 . . . and finally 1-volt position until you get a reading on voltmeter (4) If reading is more than 1.0 volt, turn OFF engine you have a voltage loss
5. Examine all connections and the cable itself between alternator and batteries for looseness, corrosion, frayed wires, bad cuts or dirt. After cleaning, tightening, or replacing bad cable, test again. The limit is 1.0 volt
6. If you still get more than 1.0 volt . . .

   Disconnect black voltmeter lead C2 from the battery + post and hook it to alternator ground terminal bolt. Now take red voltmeter lead C1 from alternator output terminal and touch it to alternator cable at terminal block . . . then at the starter switch . . . and at the battery. At each point, watch for a sudden voltage jump. If you find such a point, you've found the trouble. If each point has a drop of 1.0 volt or less and alternator output is still less than 27 volts, your next step is to test the alternator ground cable

WHY? . . . To find a bad connection or cable with high resistance causing excessive voltage drop



CAUTION

Remove neg (-) battery terminal first and reconnect last

POSTS USED

5 - Voltmeter +
6 - Voltmeter -
13 - Load Bank 24V
16 - Ammeter -100A

SWITCHES & KNOBS

Start Position

2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

ALTERNATOR GROUND CABLE TEST

TEST . . .

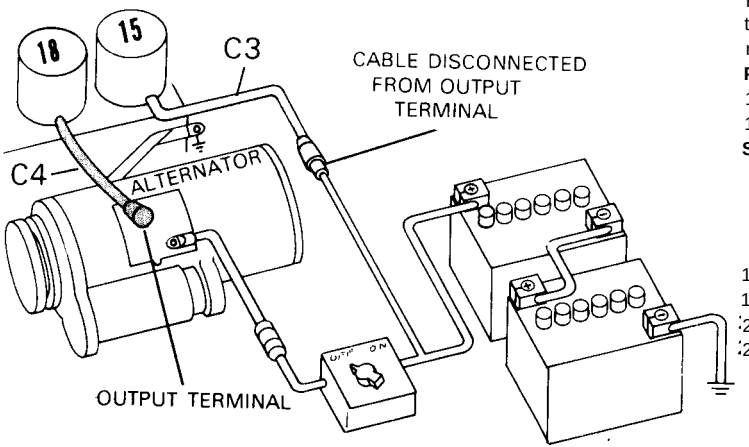
1. **Start and run engine at 1000 to 1200 rpm**
2. **Turn load bank switch (2) on**
3. **Adjust load bank knobs (10) and (20) until ammeter (1) reads 60 amperes**
4. **Turn voltmeter switch (3) down scale until voltmeter (4) reads 0.1 volt. If it reads more than 0.1 volt, clean and tighten all connections**
5. **Repeat alternator output test. If output cannot be adjusted to at least 27.5 volts after all cables have checked OK, replace the alternator**

RECTIFIER LEAKAGE (Integrity) TEST

TEST . . .

1. **DO NOT start engine! Keep master switch OFF**
2. **Touch black ammeter cable C4 to the alternator output terminal. The ammeter needle should only show a slight movement at contact. Any reading of needle after contact means there's current leakage in alternator. Replace alternator**

WHY? . . . To see if alternator has internal leakage.
If it does, it'll discharge the batteries.
Replace a leaky alternator



CAUTION

Remove neg (-) battery terminal first and reconnect last

POSTS USED

15 - Ammeter Comm
18 - Ammeter -10A

SWITCHES & KNOBS

Start Position

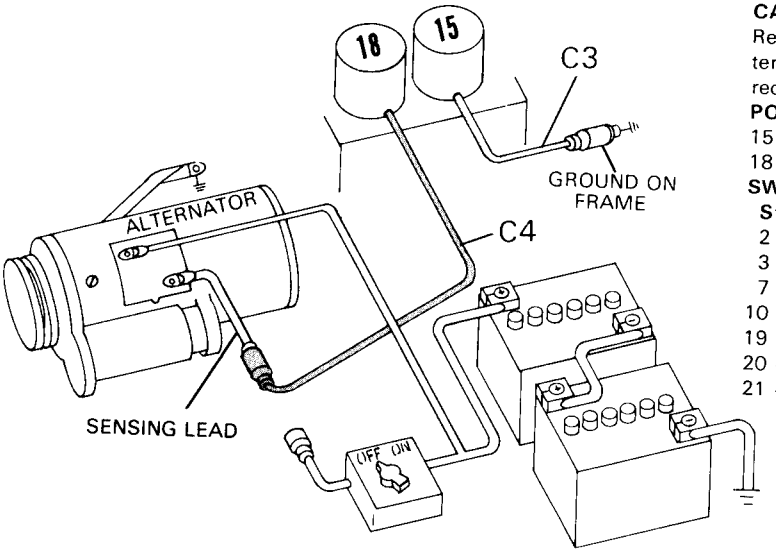
2 - OFF
3 - OFF
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

SENSING INPUT (Integrity) TEST

TEST . . .

1. **DO NOT start engine! Keep master switch OFF**
2. **Touch black ammeter cable C4 to sensing lead connector. Ammeter needle should show only a slight movement at contact. Any reading of needle after contact means there's current leakage. Replace the sensing lead or alternator**

WHY? . . To see if alternator sensing input has internal leakage. If it does, it'll discharge the batteries. Replace a leaky alternator



CAUTION
Remove neg (-) battery terminal first and reconnect last

POSTS USED
15 - Ammeter Comm
18 - Ammeter -10A

SWITCHES & KNOBS
Start Position
2 - OFF
3 - 50 volts
7 - Full Left (ccw)
10 - Full Left (ccw)
19 - Open
20 - Full Left (ccw)
21 - Closed

NOTES:

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DID WE GET OUR WIRES CROSSED ?

Electrify Our Thinking DA Form 2028

Send in your positive and negative ideas !

COMMANDER
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The Adjutant General

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