

A consolidated collection of original Ford electrical & vacuum diagrams with illustrations

This product includes

- Colorized wiring diagrams
- Vacuum diagrams
- Vol. III 1972 Car Shop Manual, Electrical
- Electrical Illustrations
- How to Read Wiring Diagrams training course

...and much more!!





Example of colorized diagrams

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Forel Publishing Company, LLC 3999 Peregrine Ridge Ct. Woodbridge, VA 22192 Email address: webmaster@ForelPublishing.com Website: http://www.ForelPublishing.com



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Note from the Editor

This product was compiled using several original Ford Motor Company publications. In some cases, there are slight differences between publications, so it is important to compare between diagrams, schematics, or illustrations. The contents of this product were extracted from: *1972 Wiring and Vacuum Diagrams* (Form FD-7795P-72), *1965/1972 Ford Car Master Parts and Accessory Catalog* (Form FP-7635B), 1972 Car Shop Manual (Volume III, FORM 7098-72-3), and *How to Read Wiring Diagrams* (FD-7943-G, January 1968).

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ATTENTION

Please Read This



It is important to note that there may be errors in the diagrams, even though they are original Ford publications. Below are two examples of possible errors because the color code on the page diagram does not match the master Car Standard Wire Code Chart. If your vehicle has a color coded wire that does not match a diagram you should consult the other diagrams contained in the manual for a possible match.



Example of possible errors



The color coded wiring diagrams are provided for illustration purposes only. Only the wire number should be used for the identification of the wire itself. The color coding of the wires in the product may not match the actual colors of the wires in the vehicle. In some cases, the colors have been altered to provide a visual contrast (i.e. the color white has been shaded to make it more visible). As stated in the paragraph above, there are some variation and/or differences between the original Ford wiring diagrams. If your vehicle has a color coded wire that does not match a diagram you should consult the other diagrams contained in the manual for a possible match.

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Source Document Ford Publication Form 7795P-72



FOREWORD

This book contains wiring and vacuum diagrams for a p Ford and Lincoln-Mercury car lines and all Ford trucks.

Both wiring and vacuum diagram replacement sheets will be released as required to keep the book current.

All vacuum systems are contained in a separate section.

This book is divided by vehicles. Refer to the applicable section as follows:

- Pinto
- + Maverick and Corret
- Mustang
- * Couger
- Torino and Montego
 Ford and Meteor
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- Mercury
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- Mark IV
- + Lincoln
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- + P.Series
- + F-100-350 Series
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HOW TO USE THE WIRING DIAGRAMS

Each electrical circuit is illustrated in a clear and easy to follow style.

There are 7 steps that should be followed to use this diagram to diagnose electrical problems.

- · Verify the complaint
- · Befer to the Index for system location
- · Locate inoperative system on schematic
- · Identify other systems on the circuit
- · Isolate the problem area
- · Correct the problem
- · Operate the corrected system

VERIFY THE COMPLAINT

To diagnose a customer complaint "Back Up Lights Dun't Work" the first thing we should do is verify the complaint.

If both lights do not work, refer to the INDEX on page 1 of the vehicle schematic.

REFER TO THE INDEX

An INDEX is provided on page 1 to locate the inoperative components.

See LAMPS — BACK-UP on the INDEX. The INDEX lists the location of the pert on the drawing. The drawing is set up like a road map. For example: the Finto Back-up lights are located at 3-40. To locate 3-40 on the schematic, find the number 40 at the top of he illustration.

Now, find the letter J on the side of the illustration. Follow the number and the letter until they intersect. The part will be within an inch or two of the intersection.

LOCATE INOPERATIVE SYSTEM

Generally, the power supply for all components on this drawing comes from the top of the page and over to the battery at the left.

The ground for each component is always toward the bottom of the drawing.

There are symbols used on this drawing that are explained as follows:

 Ground symbols are shown in Figure 1. A ground wire connected away from the component is identified by a code G1 or G2, etc. The location of the remote ground is listed in the GROUND CODES chart and the bottom of the page.



Fig. 1 - Graund Symbols

 Wire color code is shown in Fig. 2. Wiring Color Codes are listed at the bottom of the drawing. The Standard Wiring Color Codes are listed behind them instructions.

1408

Fig. 2 --- Wiee Calar Code

If a vehicle specific wire color in a connector does not match the diagram shown, it can usually be identified by comparing the other colors shown at the wire connectors. Specific wire color deviations in the monufacturing of a wire harness are usually for a short duration.

 Harriets number is shown in Figure 3. The 5 or 5 digit number near the wire indicates the wire harriets back part number.



 Wire Connector identification code is shown in Figure 4. The key for the connector codes is located at the bottom of the wiring diagram.



Fig. 4 - Wire Connector Code

 Male connector symbol is illustrated in Figure 5. The symbol used for the diagram and chart is shown.



Fig. 5 - Male Connector Colles

Female connector symbol is shown in Figure 6.



Fig. 6 - Female Contector Codes



 Splice is shown in Figure 7. A splice is a common point where two wires are joined together. Location of splice is at bottom of schematic page.





- Heavy lines for the wires indicate a direct to battery feed.
- Heavy dashed lines indicate an ignition ewitch accessory feed.
- The number located after the wire color code (16) indicates wire gauge size.

IDENTIFY OTHER SYSTEMS ON CIRCUIT

Now that the inoperative back-up light system has been located on the diagram, we should note the other systems that use the same power supply.

At J-40 on the diagram, follow back-up light wire 140 to wire connector C-38. Note radio power comes from connector C-38. To determine if power is available at C-38, turn on the radio.

If the radio works, the problem is between connector C38 and the splice at the back-up lights (harnese 14405).

If the radio doesn't work, the problem is between the connector C-38 and the fuse panel.

ISOLATE PROBLEM AREA

Now to trace a back-up light problem such as between connector C-38 and the back-up lights, we can check for power at connector C-52. To identify the specific terminals at connector C-52, refer to the Wire Connector Code Chart at the bottom of the page.

I-2

The Connector Code Chart illustrates the connector C-52 (Fig. 8). It is a 4-wire connector black in color unless otherwise specified and located at the lower opening of the L-H, cowl side.

Check connector C-52 for power, If it is OK, the problem is between connector C-52 and the galice at the back-up lights.

If power is not available at consector CS2, the problem is between connectors C 52 and C 38.



Fig. 8 -- Cannector C-52

CORRECT THE PROBLEM

Use standard continuity tests for open circuits and short circuit tests to find the specific problem.

Repair or replace the electrical component that is malfunctioning.

OPERATE CORRECTED SYSTEM

It is a good practice to operate the system after a repair has been made to see if it now works.

BULB AND FUSE CHART

A built and fuse chart is included on the first page of this schematic for your convenience.

CAR STANDARD WIRE COLOR CODE CHART

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100.7	TOTAL TURN SIGNAL LAND	LT CREEN WHITE STRIPE		113	STARTING MOT	TOR TO STARTING MOTOR RELAY	
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ALL	TAD TUDE SIGNAL LAND	OBANGELT BULLE STRIPE		116	VACHUREDOOR	LINE SATEN TO FOLEWOUP IL OPEN	
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CAR STANDARD WIRE COLOR CODE CHART (CONTINUED)

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volume III electric

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1972 car shop manual

volume 3 electrical

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FOREWORD

This manual is divided into five volumes: 1. Chassis; 2. Engine; 3. Electrical; 4. Body; 5. Maintenance and Lubrication. These volumes should provide Service Technicians with complete information covering normal service repairs on all 1972 model passenger cars built by the Ford Companies in the U.S. and Canada. As changes in the product occur, this information will be updated by Technical Service Bulletins. When issued, T.S.B. information always supersedes the information in the manual.

Information in each volume is grouped by system or component plus "General Service" part which contains information common to several similar components.

The table of contents on the first page of each volume indicates the general content of the book and provides a handy tab locator to make it easy to find the first page of each "Group." That page will contain an index to "Parts" and the first page of each "Part" contains a detailed index which gives page location for each service operation covered. Page numbers are consecutive in each "Part."

To make reference easier, information has been broken down into smaller units so that essentially there is now one "Part" for each component or system. Group numbers indicate the volume in which the group may be found.

EXAMPLE: 11-02-21

Volume 1 – Group 11; Part 02; Page 21

The descriptions and specifications in this manual were in effect at the time this manual was approved for printing. Ford Marketing Corporation reserves the right of discontinue models at any time, or change specifications or design, without notice and without incurring obligation.



Service Publications Section

GROUP

Identification Codes

PART 30-01 Car Identification Codes

OFFICIAL VEHICLE IDENTIFICATION NUMBER

The official Vehicle Identification Number (VIN) (Fig. 1) for title and registration purposes is stamped on a metal tab that is fastened to the instrument panel close to the windshield on the driver's side of the car and is visible from outside.

VEHICLE CERTIFICATION LABEL

The Vehicle Certification Label (V.C. Label) (Fig. 1) is attached to the rear face of the driver's door, except Pinto, Maverick and Comet 2-Door Sedans, where the label is attached to the left door lock pillar. The upper half of the label contains the name of the manufacturer, the month and year of manufacture and the certification statement.

The V.C. label also contains the Vehicle Identification Number. This number is also used for warranty identification of the vehicle. The first number indicates the model year. The letter following the model year number indicates the manufacturing assembly plant. The next two numbers designate the Body Serial Code followed by a letter expressing the Engine Code.



The last six digits of the Vehicle Identification Number indicate the Consecutive Unit Number of each unit built at each assembly plant. The Consecutive Unit Numbers begin as follows:

100,001-Ford, Torino, Mustang, Thunderbird, Maverick and Pinto. 500,001-Mercury, Meteor.

Montego, Cougar, Comet. 800,001-Lincoln Continental

and Continental Mark IV.

The remaining information on the V.C. Label consists of pertinent vehicle identification codes:

The BODY code is two numerals and a letter identifying the body style.

The COL (color) code is a number and letter indicating the exterior paint color code.

The TRIM code consists of a number-letter combination designating the interior trim.

The AXLE code is a number or letter indicating the rear axle ratio and standard or locking type axles.

The TRNS. code is a number or

letter indicating the type of transmission, numerals for manual and letters for automatic.

The DSO code consisting of two numbers designates the district in which the car was ordered and may appear in conjunction with a Domestic Special Order or Foreign Special Order number when applicable. Ford of Canada DSO codes consist of a letter and a number. The following chart provides the

District and Assembly Plant Codes.

Identification Data—District and Plant Codes

ASSEMBLY PLANT CODES

DISTRICT CODES

Code Letter	District	LINCOLN-MERCURY		
A	Atlanta	Code	District	
R	Oakville (Canada)	11	Boston	
с	Mahurah	15	New York	Dis
E	Manwan	16	Philadelphia	FOF
f	Dearborn	17	Washington	
G	Chicago	21	Atlanta	N
н	Lorain	22	Dallas	
J	Los Angeles	23	Jacksonville	A
κ	Kansas City	26	Memphis	1
Ν	Norfolk	31	Buffalo	4
Р	Twin Cities	32	Cincinnati	
p	San Jose	33	Cleveland	
		34	Detroit	
5	Allen Park	41	Chicago	
τ	Metuchen	42	St. Louis	
$U \ \ldots \ldots \ldots \ldots$	Louisville	46	Twin Cities	
W	Wayne	51	Denver	
Χ	St. Thomas	52	Los Angeles	
Υ	Wixom	53	Oakland	
7	St. Louis	54	Seattle	
<u>.</u>			Home Office Reserve	
BICT CODES		90	Export	

T CODES

F CANADA

Mercury Code	Region	Fòrd Code
A1	Central	B1
A2	. Eastern	B2
A3	. Atlantic	ВЗ
A4	Midwestern	B4
A6	. Western	B6
A7	Pacific	B7
t2	Export	12

DISTRICT CODES FORD

District District Code Code Code District Boston 33 Detroit Oklahoma City 11 Buffalo Los Angeles 41 Chicago New York 42 Cleveland 72 San Jose Pittsburgh 43 Milwaukee Salt Lake City 14 73 Newark 45 Lansing 74 Seattle Philadelphia 16 46 Indianapolis 75 Phoenix 17 Washington 47 Cincinnati 76 Denver 52 Dallas B3 21 Atlanta Government 53 Home Office Reserve 22 Charlotte Kansas City 84 23 54 Memphis Omaha 85 American Red Cross Jacksonville 24 St. Louis 87 Body Company 25 Richmond 56 Davenport 89 Transportation Services 26 New Orleans 57 Houston 90-99 Export 28 Louisville 58 Twin City

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GROUP

Charg	ging	System
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Charging System General Service	31-01-01	G.P.D. Side Terminal Alternator	31-12-01
PART 31-02		PART 31-21	
Batteries	31-02-01	Leece-Neville 65-Ampere Alternator	31-21-01
PART 31-10		PART 31-40	
G.P.D. Rear Terminal Alternator	31-10-01	Alternator Electro-Mechanical Regulator	31-40-01

PART 31-01 Charging System General Service

COMPONENT INDEX	Page	COMPONENT INDEX	Page
DESCRIPTION AND OPERATION Fuse Link – Charging System REMOVAL AND INSTALLATION Fuse Link Replacement	01-01 01-02	TESTING Charging System Fuse Link Continuity Test	01-01 01-02

1 DESCRIPTION AND OPERATION

CHARGING SYSTEM FUSE LINK

The fuse link is a short length of insulated wire integral with the engine compartment wiring harness. It is several wire gages smaller than the circuit that it protects. Production fuse links are the color of the circuit being supplied by the fuse link. Service fuse links are green or black depending on usage. All fuse links have a flag moulded on the wire or on the terminal insulator. Color identification of the flag or connector is Red—18 Ga. wire, Orange—16 Ga. wire, or Green—14 Ga. wire. Fig. 1 shows fuse link installations.

The fuse link burns out, thus protecting the alternator or wiring, when heavy current flows, such as when a booster battery is connected incorrectly or a short to ground occurs in the wiring harness.

A burned out link may have bare wire ends protruding from the insulation, or it may only have expanded or bubbled insulation with illegible identification. If it is hard to determine if the link is burned out, perform a continuity test.

2 TESTING

CHARGING SYSTEM



pere at 30 to 65 amperes to permit correct measurement of the alternator and regulator. The meters on Rotunda equipment should be calibrated once a year and the date of calibration stamped on the meter face. It is recommended that this practice be followed by all technicians in order to maintain their meters at acceptable accuracy. Certain tests outlined in the following Parts are illustrated in schematic and in pictorial form. The schematic illustrates the internal connections of the Rotunda equipment so that these connections can



FIG. 1 Fuse Link Installation

be duplicated when the illustrated equipment is not available. The various circuits involved in the tests can be selected by means of switches without the necessity of changing connections when the illustrated equipment is used. This reduces the time required to test units and circuits on the vehicle.

Where applicable, the tests are divided into On The Vehicle and On The Test Bench procedures. Either procedure can be followed depending on the equipment available for the tests.

Trouble shooting or diagnosis is required before actual repairs can be made in the electrical system. Even where an obvious fault makes the replacement of a unit necessary, you must still find out why the unit failed. The trouble shooting procedures given in the Electrical Systems Diagnosis Manual will aid in making a correct diagnosis. When a trouble is diagnosed correctly, unnecessary repairs are prevented, the time the vehicle is out of service will be decreased, and the repairs that are made will be permanent.

FUSE LINK CONTINUITY TEST

1. On the Cougar, Mustang, Thunderbird, Lincoln Continental and Continental Mark IV, make certain first that the battery is OK, then turn on the headlights or any accessory. If the headlights or accessory do not operate, the fuse link is probably burned out.

2. On the Ford, Mercury, Me teor, Torino, Montego, Maverick, Comet and Pinto, there are two fuse links (Fig. 1). Use the same procedure as in step 1 to test the fuse link that protects the vehicle equipment.

To test the fuse link that protects the alternator, make certain that the battery is OK then check with a voltmeter for voltage at the BAT terminal of the alternator. No voltage indicates that the fuse link is probably burned out.

4 **REMOVAL AND INSTALLATION**

FUSE LINK REPLACEMENT

1. Procure the proper service fuse link for the vehicle being repaired (Fig. 1). The two fuse links shown have an eyelet terminal for a 5/16-inch stud on one end. When the terminal is not required, cut off the fuse link as close to the terminal as possible and strip approximately 3/8-inch of insu lation from the cut end.

2. Disconnect the battery ground cable.

3. Disconnect the fuse link and/or fuse link eyelet terminal from the battery terminal of the starter relay. On the Thunderbird, Lincoln Continental and the Continental Mark IV, the fuse link is looped outside of the wire harness behind the point at which the harness is clipped to the right rocker cover above the starter.

4. Cut the fuse link and the splice(s) from the wire(s) to which it is attached.

5. Splice and solder the new fuse link to the wire(s) from which the old link was cut. Use rosin core solder. Wrap the splice(s) completely with vinyl electricians tape.

6. Securely connect the eyelet terminals (if any) to the battery stud on the starter relay.

7. Install the repaired wiring as before using existing clips if provided.

8. Connect the ground cable to the battery.



PART 31-02 Batteries

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SPECIFICATIONS TESTING With Rotunda Battery-Starter Tester (ARE 16-31)	02-02	TESTING – Cont. With Rotunda Cell Analyzer (SRECA-200)	02-01

2 TESTING

Tests are made on a battery to determine the state of charge and also the condition. The ultimate result of these tests is to show that the battery is good, needs recharging, or should be replaced.

If a battery has failed, is low in charge, or requires water frequently, good service demands that the reason for this condition be found. It may be necessary to follow trouble shooting procedures to locate the cause of the trouble. Refer to the Ford Car and Truck Diagnosis Manual for battery diagnosis procedures.

Hydrogen and oxygen gases are produced during normal battery operation. This gas mixture can explode if flames or sparks are brought near the vent openings of the battery. The sulphuric acid in the battery electrolyte can cause a serious burn if spilled on the skin or spattered in the eyes. It should be flushed away with large quantities of clear water.

Particular care should be used when connecting a booster battery in order to prevent sparks. Be certain to connect positive terminal to positive terminal and negative terminal to negative terminal.

Before attempting to test a battery, it is important that it be given a thorough visual examination to de termine if it has been damaged. The presence of moisture on the outside of the case and/or low electrolyte level in one or more of the cells are indications of possible battery damage. Original equipment batteries have a single one-piece cover which completely seals the top of the battery and the individual cell con-





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FIG. 1 Battery Capacity Test Outline

TESTS USING THE ROTUNDA CELL ANALYZER (SRECA-200)

The Rotunda Cell Analyzer (SRECA-20%) measures the individual cell voltages by inserting probes into the cell openings. Follow the instructions provided with the unit.

A battery can also be tested by determining its ability to deliver current. This may be determined by conducting a Battery Capacity Test. Fig. 1 shows the battery capacity test in outline form.

TESTS USING THE ROTUNDA BATTERY—STARTER TESTER ARE 16-31

Battery Capacity Test

A high rate discharge tester (Rotunda Battery-Starter Tester ARE 16-31) in conjunction with a voltmeter is used for this test.

1. Turn the control knob on the Battery Starter Tester to the OFF position.

2. Turn the voltmeter selector

switch to the 20-volt position.

3. Connect both positive test leads to the positive battery post and both negative test leads to the negative battery post. The voltmeter clips must contact the battery posts and not the high rate discharge tester clips. Unless this is done, the actual battery terminal voltage will not be indicated.

4. Turn the load control knob in a clockwise direction until the ammeter reads three times the ampere hour rating of the battery. (A 45 ampere-hour battery should be tested at 135 amperes load).

5. With the ammeter reading the required load for 15 seconds, note the voltmeter reading. Avoid leaving the high discharge load on the battery for periods longer than 15 seconds.

6. If the voltmeter reading is 9.6 volts or more, the battery has good output capacity and will readily accept a charge, if required. Check the specific gravity. If the specific gravity reading is

1.230 or below, add water if necessary and charge the battery until it is fully charged (Fig. 1). Always disconnect the battery ground cable when charging the battery.

The battery is fully charged when the cells are all gassing freely and the specific gravity ceases to rise for three successive readings taken at hourly intervals. Additional battery testing will not be necessary after the battery has been properly charged.

7. If the voltage reading obtained during the capacity test is below 9.6 volts, check the specific gravity of each cell.

8. If the difference between any two cells is more than 50 points (0.050), the battery is not satisfactory for service and should be replaced.

9. If the difference between cells is less than 50 points (0.050), the battery should be charged according to the charging schedule in Section 9. Batteries that are completely discharged may not accept a fast charge. If this is found, the battery should be slow charged until the charge rate goes up and it will accept the fast charge. This may require up to four hours of slow charge. In some cases the electrolyte level may be too low to obtain a specific gravity reading. In such cases water should be added until the electrolyte level just covers the ring in the filler well, then charge the battery at 35 amperes for the maximum charging time indicated in Section 9 for the capacity of the battery being tested.

10. After the battery has been charged, repeat the capacity test. If the capacity test battery voltage is still less than 9.6 volts, replace the battery. If the voltage is 9.6 volts or more, the battery is satisfactory for service.

11. If the battery is found to be discharged only, check for a loose fan belt, loose electrical connections and charging system performance.

9 SPECIFICATIONS

BATTERIES

Allowable Battery High Rata Charge Time Schedule						Battary Freezing Temperatures				
Specific	Charge Rate	Battery Capacity - Ampere Hours					Specific Gravity	Freezing Temp.	Specific Grevity	Freezing Temp
Gravity		45	54 8 55	70 & 73	20	25	1.280	90 ⁰ F	1.150	+ 5°F
Trancing	Amperes			70 8 73	00		1,250	-62 ⁰ F	1.100	+19 ⁰ F
1.125-1.150 U	35	65 min.	80 min,	100 min.	115 min.	125 min.	1 200	-160F	1.050	+270F
1,150-1,175	35	50 min.	65 min.	80 min,	95 min.	105 min,	1.200	10 1	1.000	
1,175-1.200	35	40 min.	50 min.	60 min.	70 min.	75 min.	Battery Ampere Hours		Number of Plates	
1.200-1.225	35	30 min.	35 min.	45 min.	50 min.	55 min,				
Above 1.225	5	0	0	Ø	0		45		54	
A 14 al a c. a. 4' a c.		1105			L	┸──┥┟	54		66	
() If the specific gravity is below 1.125, use the indicated high rate of charge for the 1.125 specific gravity, then charge at 5 amperes until the specific						55		66		
gravity reaches 1.250 at 80° F.						70		78		
\odot Charge at 5 ampere rate only until the specific gravity reaches 1.250 at 80° F.						73		78		
③ At no time during the charging operation should the electrolyte temperature						80		78		
exceed 130 ^o F.						85		90		

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PART 31-10 G.P.D. Rear Terminal Alternator

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ADJUSTMENTS Drive Belt DESCRIPTION AND OPERATION DISASSEMBLY AND OVERHAUL All Alternators Except 65 Ampere 65-Ampere Alternator REMOVAL AND INSTALLATION SPECIFICATIONS	10-08 10-01 10-08 10-11 10-08 10-14	TESTING Alternator Tests With Rotunda (ARE 20-22) Tester Alternator Tests With Rotunda (ARE 27-38) Tester Diode Test Field Open or Short Circuit Test Output Test Stator Neutral Voltage Test Stator Open or Grounded Circuit Test	10-02 10-02 10-06 10-03 10-02 10-02 10-02 10-06

1 DESCRIPTION AND OPERATION

The alternator charging system is a negative (-) ground system, and consists of an alternator, a regulator, a charge indicator, a storage battery, a fuse link and associated wiring. Refer to the Wiring Diagram Manual, Form. 7795P-72, for schematics and locations of wiring harnesses.

ALTERNATOR

The alternator is belt driven from the engine. Current is supplied from the alternator-regulator system to the rotating field of the alternator through two brushes to two slip rings.

The alternator produces power in the form of alternating current. The alternating current is rectified to direct current by six diodes (eight diodes in 61 ampere alternators). The alternator regulator automatically adjusts the alternator field current to maintain the alternator output voltage within prescribed limits to correctly charge the battery. The alternator is self current limiting.

If a charge indicator lamp is used in the charging system (Fig. 1), the system operation is as follows: when the ignition switch is turned ON, a small electrical current flows through the lamp filament (turning the lamp on) and through the alternator regulator to the



regulator field relay closes. This puts the same voltage potential on both sides of the charge indicator lamp causing it to go out. When the field relay has closed, current passes through the regulator A terminal and is metered to the alternator field.

If an ammeter is used in the charging system (Fig. 2), the regulator I

terminal and the alternator stator terminal are not used. When the ignition switch is turned ON, the field relay closes and electrical current passes through the regulator A terminal and is metered to the alternator field. When the engine is started, the alternator field rotates causing the alternator to operate. The ammeter indicates current flow into



FIG. 1 Alternator Charging System—Indicator Light

(charge) or out of (discharge) the vehicle battery.

Fuse links are included in the charging system wiring on all models (Part 31-01). This fuse link is used to prevent damage to the wiring harness and alternator if the wiring harness should become grounded, or if a booster battery is connected to the charging system with the wrong polarity.



2 TESTING

Refer to the Ford Car and Truck Diagnosis Manual for diagnosis of the alternator charging system.

Check the alternator drive belt and adjust it to specification (Section 9 of this part), before proceeding with any tests. Check and tighten all connectors at the starter relay and battery.

TESTS USING THE ROTUNDA ARE 20-22 ALTERNATOR REGULATOR TESTER

The general procedure is to connect the tester (Fig. 3) to the charging system, start the engine, make two tests, and then compare the pattern of lights that appear on the tester to each set of patterns shown in Figs. 4 and 5. Follow the instructions given with the ARE 20-22 tester.

TESTS USING THE ROTUNDA ARE 27-38 VOLT-AMP- ALTERNATOR TESTER



equipment to the alternator system, as the alternator output terminal is connected to the battery at all times.

Alternator Output Test On Engine

When the alternator output test is conducted off the car, a test bench must be used. Follow the procedure given by the test bench equipment manufacturer. When the alternator is removed from the vehicle for this purpose, always disconnect the battery ground cable as the alternator output connector is connected to the battery at all times,

To test the output of the alternator on the vehicle, proceed as follows:

Test Procedure

1. Check the alternator drive belt tension. Place the transmission in neutral or park and apply the parking brake. Make the connections and tester knob adjustments as shown in Fig. 6 (Output Test). Be sure that the field rheostat knob is at the OFF position at the start of this test.

2. Close the battery adapter switch. Start the engine, then open the battery adapter switch.

3. Increase the engine speed to approximately 2000 rpm (use a tachometer following the manufacturers instructions). Turn off all lights and electrical accessories.

4. Turn the field rheostat clock-

wise until 15 volts is indicated on the voltmeter upper scale. Turn the master control clockwise until the voltmeter indicates between 11 and 12 volts. Holding the master control in this position, turn the field rheostat clockwise to its maximum rotation. Turn the master control counter clockwise until the voltmeter indicates 15 volts. Observe the ammeter reading. Add 2 amperes to this reading to obtain alternator output. If rated output (Section 9 of this part) cannot be ob tained, increase the engine speed to 2900 rpm and repeat this step.

5. Return the field rheostat knob to OFF, release the master control knob, and stop the engine. Disconnect the test equipment, if no further tests are to be made.

If the alternator output is not O.K., it will be necessary to remove the alternator from the vehicle and perform the necessary bench tests to locate the defect.

An output of 2 to 5 amperes below specification usually indicates an open alternator diode. An output of approximately 10 amperes below specification usually indicates a shorted alternator diode. An alternator with a shorted diode will usually whine, which will be most noticeable at idle speeds.

Stator Neutral Voltage Test-On Engine

The alternator STA terminal is connected to the stator coil neutral or $\frac{1}{2}$



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FIG. 3 ARE 20-22 Tester

center point of the alternator windings (see Figs. 1 and 2). The voltage generated at this point is used to close the field relay in the charge indicator light system.

To test for the stator neutral voltage, disconnect the regulator connector plug from the regulator. Make the connections and tester knob adjustments as shown in Fig. 7.

Start the engine and run it at 1000 rpm (use a tachometer). Turn off all lights and accessories. Rotate the field rheostat clockwise until at least 6 volts

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Field Open Or Short Circuit Test— On Bench

The first part of this test will determine if the alternator portion of the field coil system, consisting of the field coil, the field coil slip rings and the field coil brush assembly is satis factory. The second part of the test will indicate (in case of a field coil system malfunction), which of the above items is causing the malfunction.

Test Procedure

Make the connection as shown in Fig. 6 (Field Open or Short Circuit Test). The current draw, as indicated by the ammeter, should be to specification (Section 9 of this part). If there is little or no current flow, the field or brushes have a high resistance or are open. A current flow consid erably higher than that specified above indicates shorted or grounded field turns or brush leads touching. If the test shows that the field is shorted or open, determine if the field brush assembly or slip rings are at fault.

Disassemble the front housing and rotor from the rear housing and stator and check the resistance of the rotor with the Rotunda ARE 27-42 ohmmeter. Set the ohmmeter multi ply-by knob at 1 and calibrate the ohmmeter as indicated inside the ohmmeter cover.

Contact each ohmmeter probe to a slip ring. The resistance should be 3.5 to 5 ohms. A higher reading indicates a damaged slip ring soldered connection or a broken wire. A lower reading indi-

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HOW TO READ WIRING DIAGRAMS





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HOW TO READ WIRING DIAGRAMS

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INTRODUCTION

NATIONAL SERVICE OFFICE FORD DIVISION



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INTRODUCTION

The Why and Wherefore of Wiring Diagrams

To the uninformed, a wiring diagram — or a wiring assembly — looks like it might take a genius to figure out.

Not so — as you'll find out when you get better acquainted with these subjects.

There're as understandable and logical as a road map and road markers, when you're finding your way on a cross-country drive.

The ability to read a wiring diagram and relate it to a vehicle's wiring system is, of course, an essential part of a modern service technician's skill. And it's growing in relative importance, too, due to owner's increasing demands for the comforts and conveniences supplied by electrically-operated options and accessories. This opens up greater opportunities, for the forward-looking technician.

The Purpose of this Booklet . . .

... is to acquaint you with the systems by which electrical circuits are traced on vehicles. Specifically, it is designed to help you acquire the ability to make your own power checks, quickly and accurately.

Scope of the Booklet

Basically, this is a printed version of the film, "How to Read a Wiring Diagram." It is in no sense a manual of the shop methods by which electrical repairs are made.

It *can* be a helpful guide that can introduce you to the principles of wiring diagrams and vehicle wiring. As you gain experience in reading wiring diagrams, you'll accumulate your own know-how in this important skill. When it becomes "second nature" to you, these pages will have served their purpose — and yours.





To show how to read wiring diagrams — and to explain how they can be used to help you troubleshoot problems in the electrical system is what this booklet is all about. Obviously, these are important subjects.

A LOGICAL APPROACH TO ELECTRICAL DIAGNOSIS



If a customer comes in because his headlights aren't working, you can't just make a snap decision. That's not the *professional way*.



When you go to a doctor, for example, he tries to find out what's *really* wrong with you. He looks beyond the aches and pains you feel, to see what's *causing* the trouble. We call this, *diagnosis*.



Troubleshooting an electrical system calls for diagnosis, too — Your diagnosis. You're the doctor. You must find out what's causing the trouble, and fix it.

