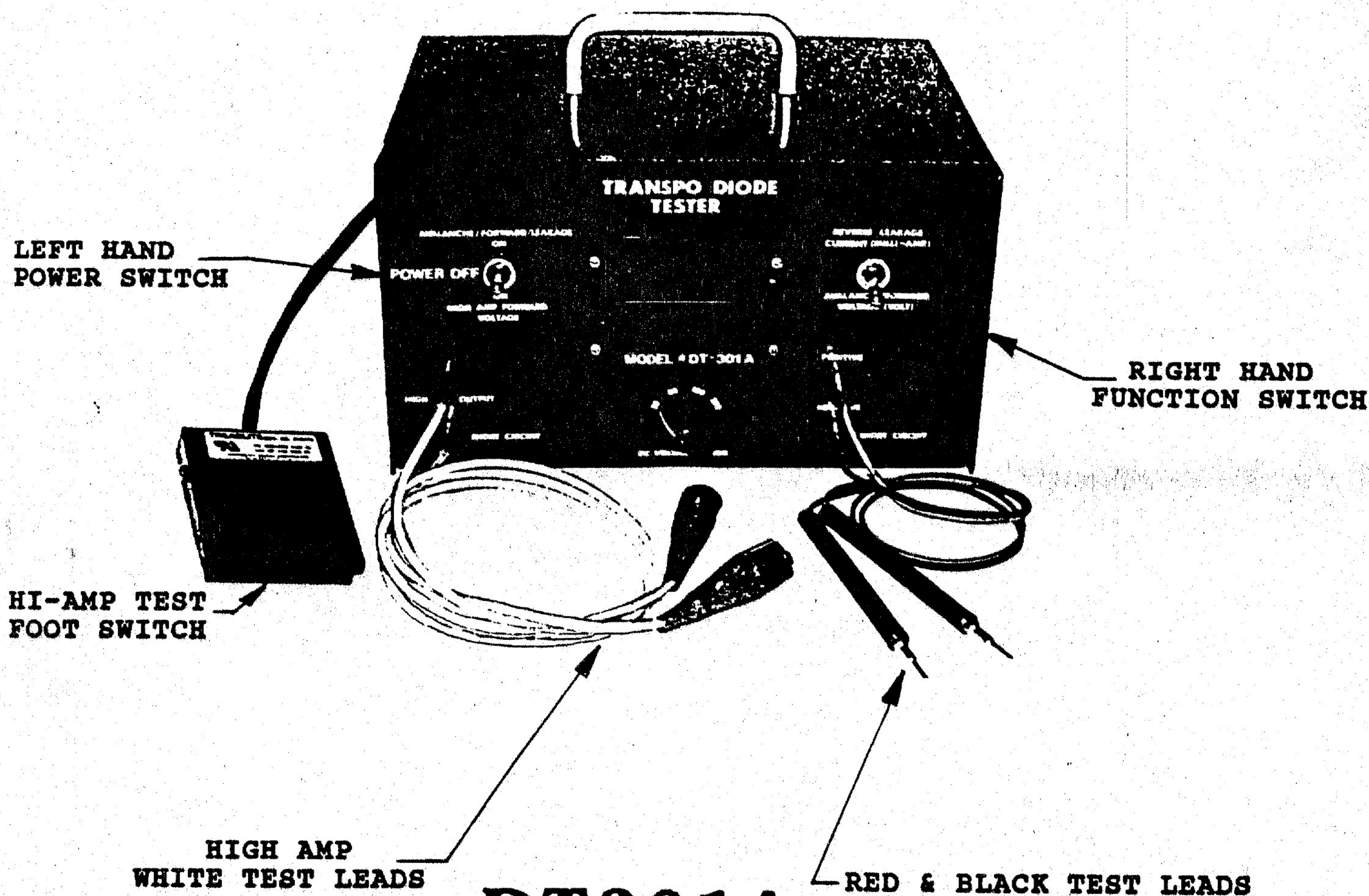




DT301A

DIODE TESTER

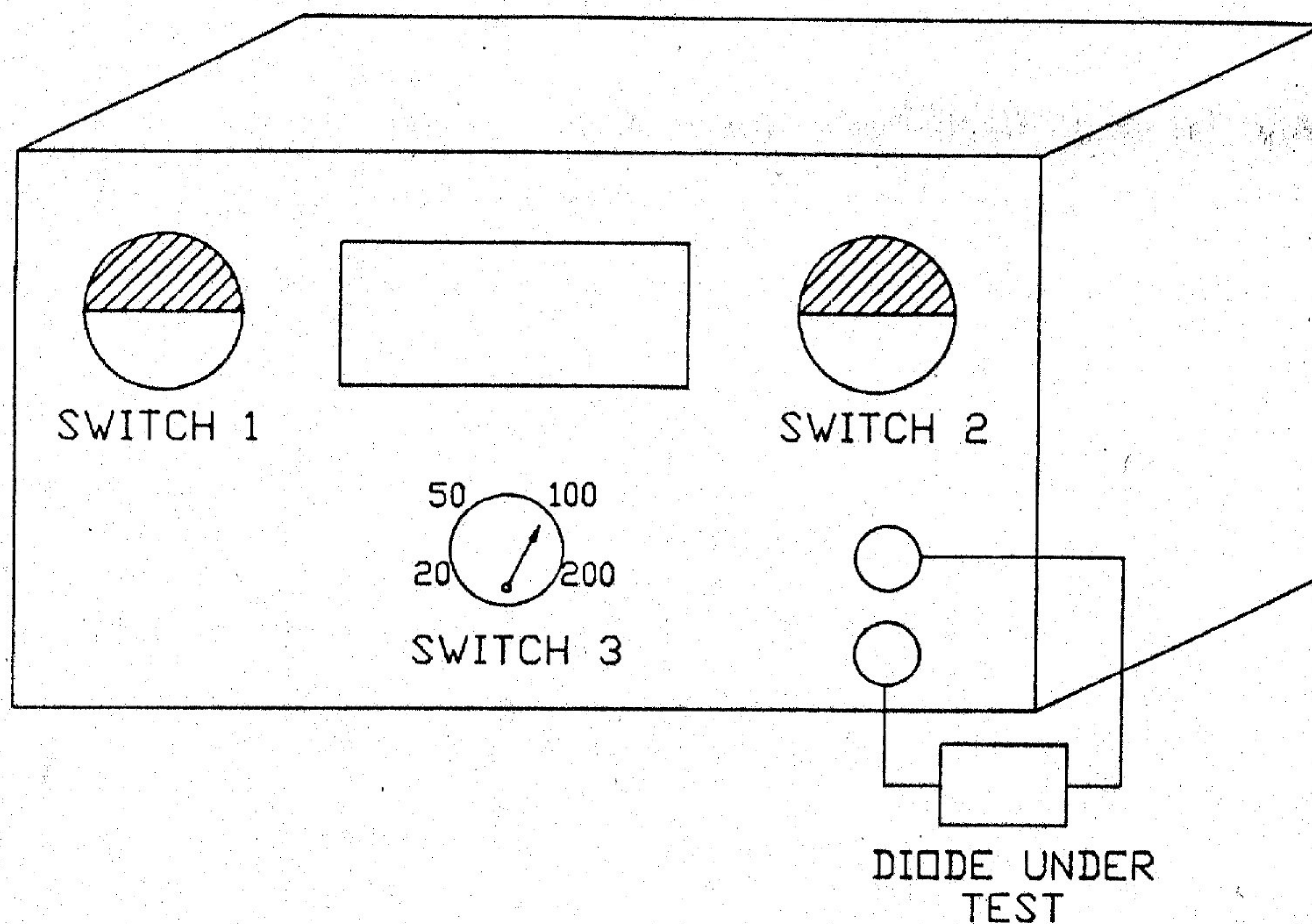
PERFORMANCE SPECIFICATION

MODEL:	DT-301A
INPUT:	110V AC 50-60 Hz, 6 Amp
LOW AMPERE TEST:	50 MILLI-AMP
HIGH AMPERE TEST:	25 AMPERE
REVERSE LEAKAGE READING:	0-1.999 MILLI-AMP
OUTPUT VOLTAGE:	20.0, 50.0, 100.0 200.0 VOLTS
DISPLAY:	HIGH INTENSITY BRIGHTNESS LED (3 & 1/2 DIGITS)
HIGH AMP REMOTE CONTROL:	DEAD MAN SWITCH TO PREVENT ELECTRICAL SHOCKS
SIZE:	LEADS: ALL DETACHABLE HEIGHT 10.5", WIDTH 7.5" & DEPTH 6"
WEIGHT:	16 LBS.
WARRANTY TERM:	LIFETIME (For Transpo customers on record)

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DT301A REVERSE LEAKAGE TEST FOR CONVENTIONAL RECTIFIERS (LIKE 10SI)

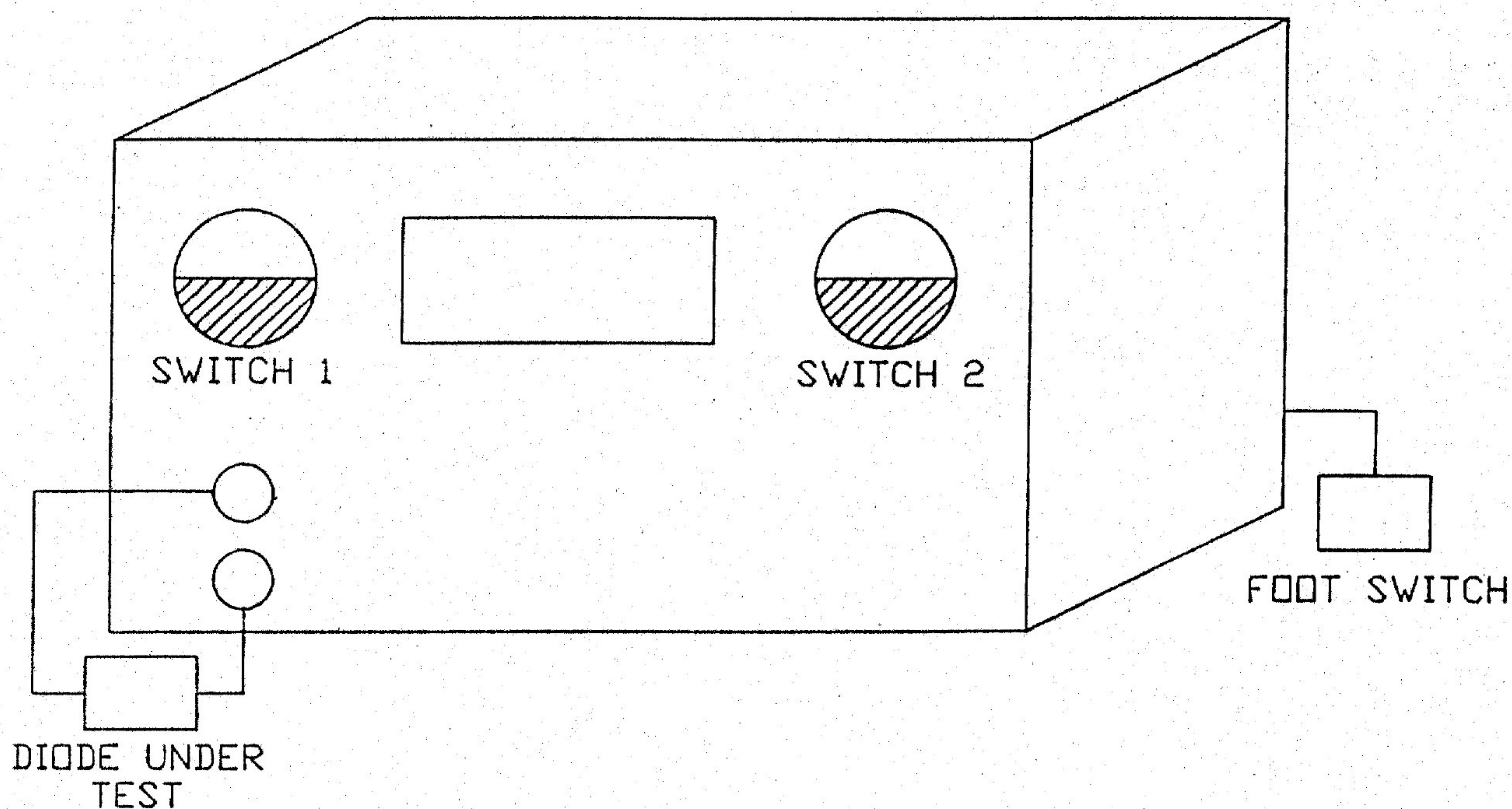


1. SET SWITCHES #1 AND #2 TO UPPER POSITION.
2. SET SWITCH #3 TO 100 VOLTS.
3. - IF TESTING A POSITIVE DIODE:
 - * BLACK TEST LEAD TO THE STATOR
 - * RED TEST LEAD TO THE POSITIVE HEATSINK.
- IF TESTING A NEGATIVE DIODE:
 - * RED TEST LEAD TO THE STATOR.
 - * BLACK TEST LEAD TO THE NEGATIVE HEATSINK.

TEST RESULTS:

METER SHOULD READ 0.040 MILLI-AMP OR LESS.

DT301A HIGH AMP TEST SET-UP (NOT FOR DIODE TRIO)

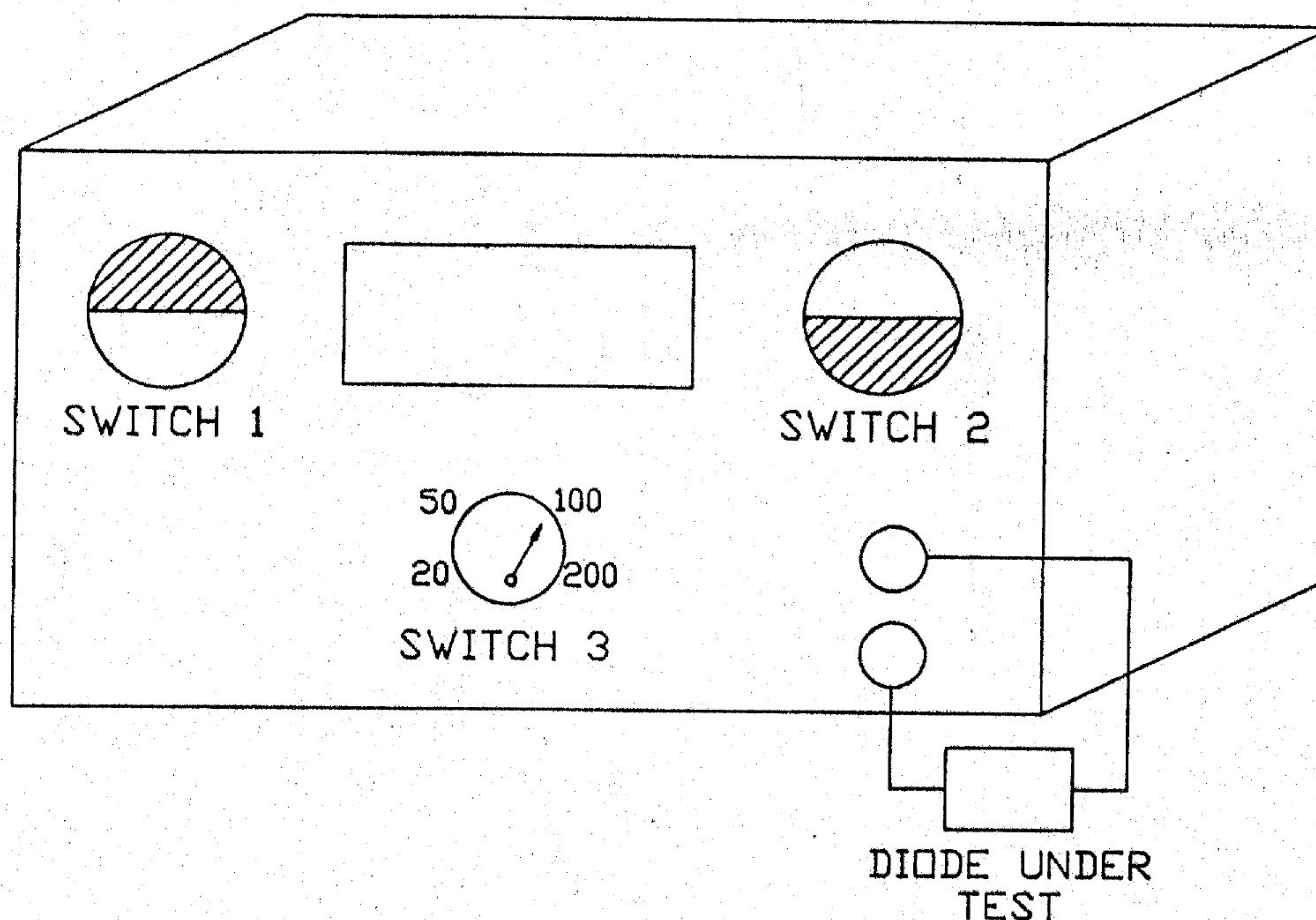


1. SET SWITCHES #1 AND #2 TO THE BOTTOM POSITION.
2. CONNECT WHITE TEST LEADS ACROSS A DIODE (POLARITY OF DIODE DOES NOT MATTER).
3. PRESS FOOT SWITCH FOR MAXIMUM PERIOD OF 2 TO 5 SECONDS.

TEST RESULT

METER SHOULD READ 1.1 VOLTS OR LESS FOR A ACCEPTABLE DIODE.

DT301A FORWARD VOLTAGE DROP



1. SET SWITCH #1 TO UP, #2 TO BOTTOM, AND #3 TO 100 VOLTS.
2. - IF CONVENTIONAL DIODE (LIKE 10SI), CONNECTING THE RED AND BLACK TEST LEAD ACROSS A DIODE:
 - * IN ONE DIRECTION METER WILL READ THE FORWARD VOLTAGE DROP (UP TO 1.1 VOLTS IS ACCEPTABLE).
 - * IN OTHER DIRECTION, METER WILL NOT CHANGE.
- IF AVALANCHE DIODE (CS ALTERNATORS), CONNECTING THE RED AND BLACK TEST LEAD ACROSS A DIODE:
 - * IN ONE DIRECTION, METER WILL READ THE FORWARD VOLTAGE DROP (UP TO 1.1 VOLTS IS ACCEPTABLE).
 - * IN OTHER DIRECTION, METER WILL READ BETWEEN 24 - 32 VOLTS FOR A ACCEPTABLE AVALANCHE DIODE.

1. RECEIVING INSPECTION

A. Box should include:

- | | |
|---|----------------------------|
| A1. (1) DT-301 Diode Tester | A4. (2) White test leads |
| A2. (1) Anode test lead & probe (RED) | A5. (1) Instruction manual |
| A3. (1) Cathode test lead & probe (BLACK) | |

2. SET-UP

- A. Plug the unit into properly grounded 110-120 volt, 50-60 Hz AC outlet.
- B. Plug red test probe A2 into red receptacle marked "POSITIVE".
- C. Plug black test probe A3 into black receptacle marked "NEGATIVE".
- D. Plug white test leads A4 into "HIGH AMP. OUTPUT" receptacles.

3. EQUIPMENT FUNCTION TEST.

USE THIS TEST SEQUENCE TO VERIFY THAT YOUR TEST MACHINE IS OPERATING CORRECTLY BEFORE TESTING ANY DIODES. MAKE SURE THAT THE RED AND BLACK TEST PROBES ARE NOT IN CONTACT WITH EACH OTHER.

- A. Set the left hand power switch and the right hand function switch to the "UP" position. The reverse leakage light should turn on and the digital meter should light up and read .000.
- B. Set the right hand function switch to the "DOWN" position. The Avalanche/Forward light should turn on. Rotate the DC voltage range switch to 20, 50, 100 and 200 volts and the meter should read approximately 20.0, 50.0, 100.0 and 199.0 volts respectively. Readings may vary ± 1 volt on 20 to 100 volts scale and - 5 volts on 200 volts scale.
- C. Set the left hand power switch and the right hand function switch to the "DOWN" position. The Avalanche/Forward light should turn on and the meter should read approximately .000 volts. A fluctuation of .001 to .010 is ok.

WARNING: Always hold test probes by the insulated handles. Never touch probe tips, as high voltage is present during certain tests. Persons with pacemakers, heart conditions or other neurological conditions are cautioned to use care when operating this test equipment.

DIODES

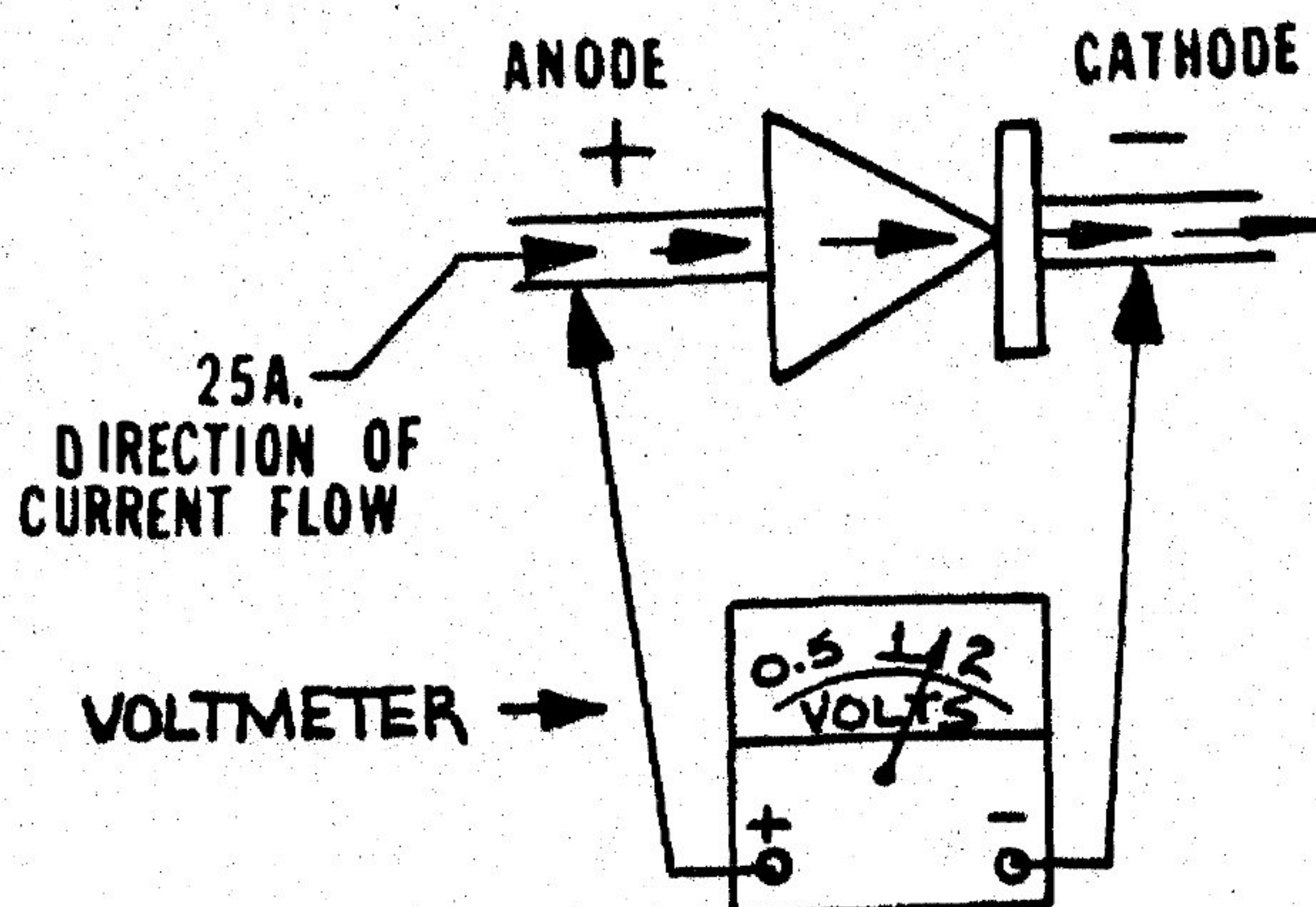
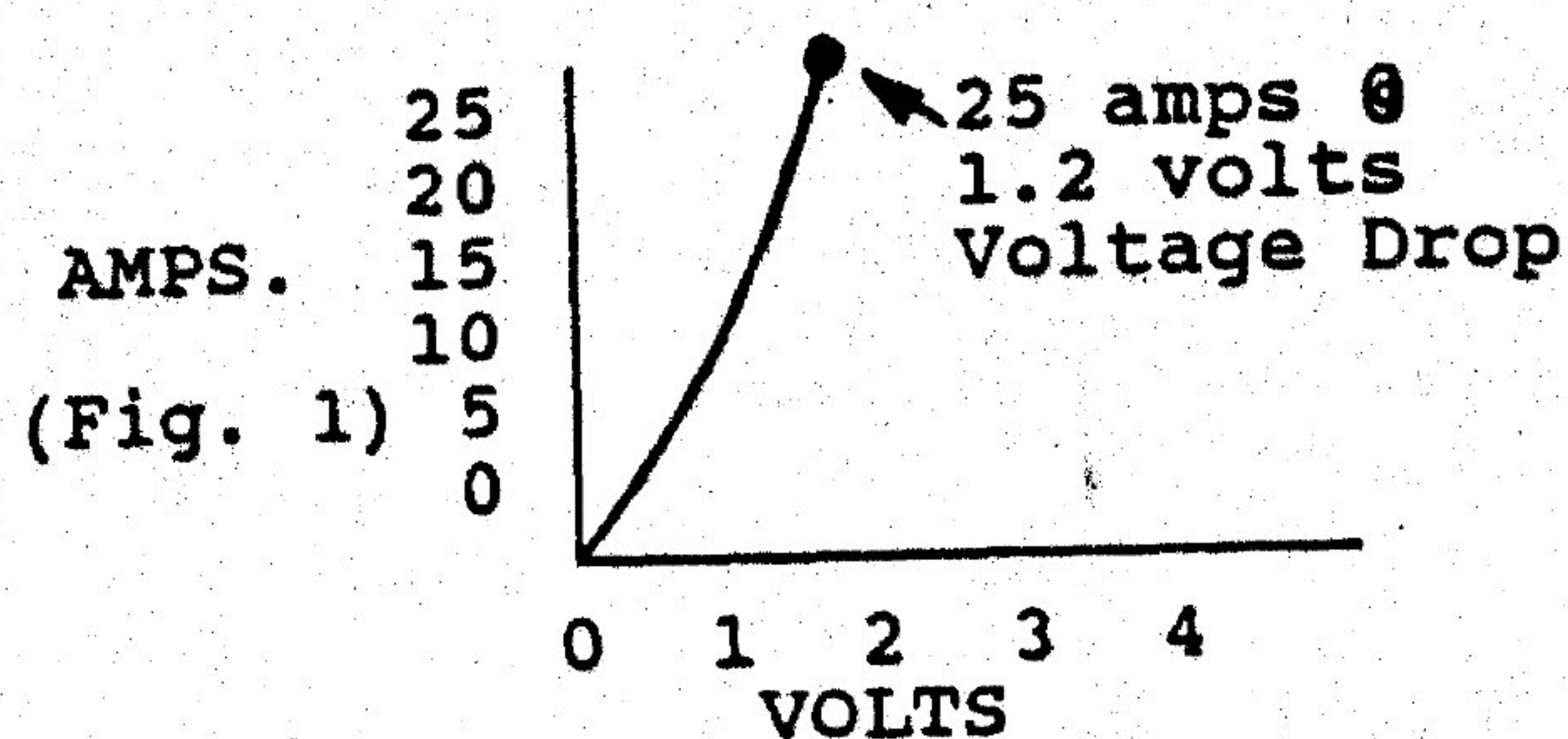
A diode is a semiconductor device that has numerous applications in automotive electronics, including alternators, regulators, computers and control networks. Various types of diodes are used in these applications and range from small signal switching diodes to high power rectifiers with power ratings of up to 150 amperes. Some diode applications entail: switching, zener, rectifier and inductor suppression. Zener diodes range from low power and low voltage to high power and high voltage.

The rectifier variety starts with conventional semiconductor technology that is ideal for three phase rectifiers in alternators. These rectifiers feature slow switching with fair efficiency and competitive pricing that reflects the high volume applications. As diodes advance in performance such as higher switching speed to gain rectification efficiency, price also increases correspondingly. The Schottky diode is next in rectification efficiency and it is unique in that the forward voltage drop at maximum current (up to 85 amps.) is only 0.7 volts. However, the price is significantly higher and major drawback is the reduced break-down voltage. This type of diode is found in emergency vehicles where less heat and higher field performance is critical.

Recently, the Avalanche diode has surfaces for the CS alternator series from General Motors. The Avalanche diode functions to rectify the stator output and limit transient voltages that exceeds twenty-six volts (26v). Caution is recommended to limit the leakage test voltage to 20 volts on this type of diode because at 26 volts the diode will conduct backwards. Diode chips and buttons are becoming more prevalent in recent applications. The heatsink and soldering process greatly determines the rectification capability of these parts. Over the years ultrasonic welding has resulted in a better field performance as evident by the Delco 10SI and 27SI rectifiers.

DIODE FORWARD VOLTAGE DROP

Forward voltage drop is the amount of voltage consumed by the diode when it is turned on. An excessive voltage drop results in a decrease in the output of an alternator and an indication that a diode is in a weakened or damaged state. Figure 1. shows a Voltage-Current (V-I) characteristics of a diode in a conducting mode. Observe that as current is increased the forward voltage is increased until it reached approximately one volt nominal. For instance a 25 ampere diode in a 10SI Delco alternator, reached 1.2 volts maximum forward voltage drop at 25 amperes.



A. TEST PROCEDURE: HIGH AMPERE FORWARD VOLTAGE DROP (not for trio application)

1. Set the left hand Power switch down to the High Amp. Forward Voltage position.
2. Set the right hand Function switch down to the Avalanche/Forward Voltage position.
3. Connect the white test leads (for high amp. test only) to the left hand high amp. receptacles of tester. Attach the white test leads across each diode if separate or when testing diodes in a rectifier bridge use the stator connection and the respective positive or negative heatsink. Test each stator connection and both heatsinks. It makes no difference which lead goes to the cathode or anode as the white leads are carrying AC voltage when this test is being made. When testing output diodes of a rectifier bridge do not touch across any diode trios that might be present on the unit.
4. Remove your hands from the test clips and then press the foot pedal.
5. At this point approximately 25 amperes is applied to the diode and the meter will indicate the Forward Voltage Drop. Since the diode Forward Voltage Drop is a function of Forward Current, a voltage drop of 1.2 volts is typical for a 25 ampere rectifier diode when the high amp test described above is used. See page 6 for more information.

* NOTE: If the diode is not rated for at least 25 amperes, or if the diode does not have proper heatsinking, prolonged testing will result in damage.

** CRITICAL COMMENT: Due to the large variety of heatsinks, it is difficult to establish a definite test time limit before damage occurs. Hence we recommend a five (5) second test time interval - 25 amperes is a very stringent test.

6. An open diode will not give any readout on this digital meter.
7. A shorted diode will turn on the short circuit light and the meter will read +0.00

B. TEST PROCEDURE: LOW AMPERE FORWARD VOLTAGE DROP

1. Set the left hand power switch "UP" to the Avalanche/Forward/Leakage position.
2. Set the right hand function switch "DOWN" to the Avalanche/Forward Voltage position.
3. Connect the black test probe to the cathode of the diode. On a trio diode the cathode is the end with the silver colored ring.

4. Connect the red test probe to the anode of the diode.
*(anode is the positive side and the cathode is the negative side of a diode.)
5. With a good diode the meter will indicate approximately 0.6 volts for Forward Voltage.
6. With an open diode the display will not change, but continue to read the voltage range selected on the digital meter.
7. A shorted diode will cause the short circuit light to turn on and the meter will read +0.00.

REVERSE LEAKAGE

Excessive leakage in a diode results in battery drain and is an indication of a faulty diode. Reverse leakage is current that leaks through the diode junction in the reverse direction. In some integral regulated alternators with too much leakage will cause the regulator to turn on and drain the battery.

C. TEST PROCEDURE: REVERSE LEAKAGE

1. Set the left hand power switch up to Avalanche/Forward/Leakage position.
2. Set the right hand function switch up to the "Reverse Leakage Current" position.
3. Connect the red test probe to cathode of diode. (Cathode is Neg.)
4. Connect the black test lead to anode of diode. (anode is Pos.)
5. Set the voltage range selector to proper diode voltage rating position. (refer to information listed on page 6).
6. The meter will indicate reverse leakage of diode in milli-amp scale.

1 milli-amp (MA) = 0.001 Amp. or 1/1000 of one amp.

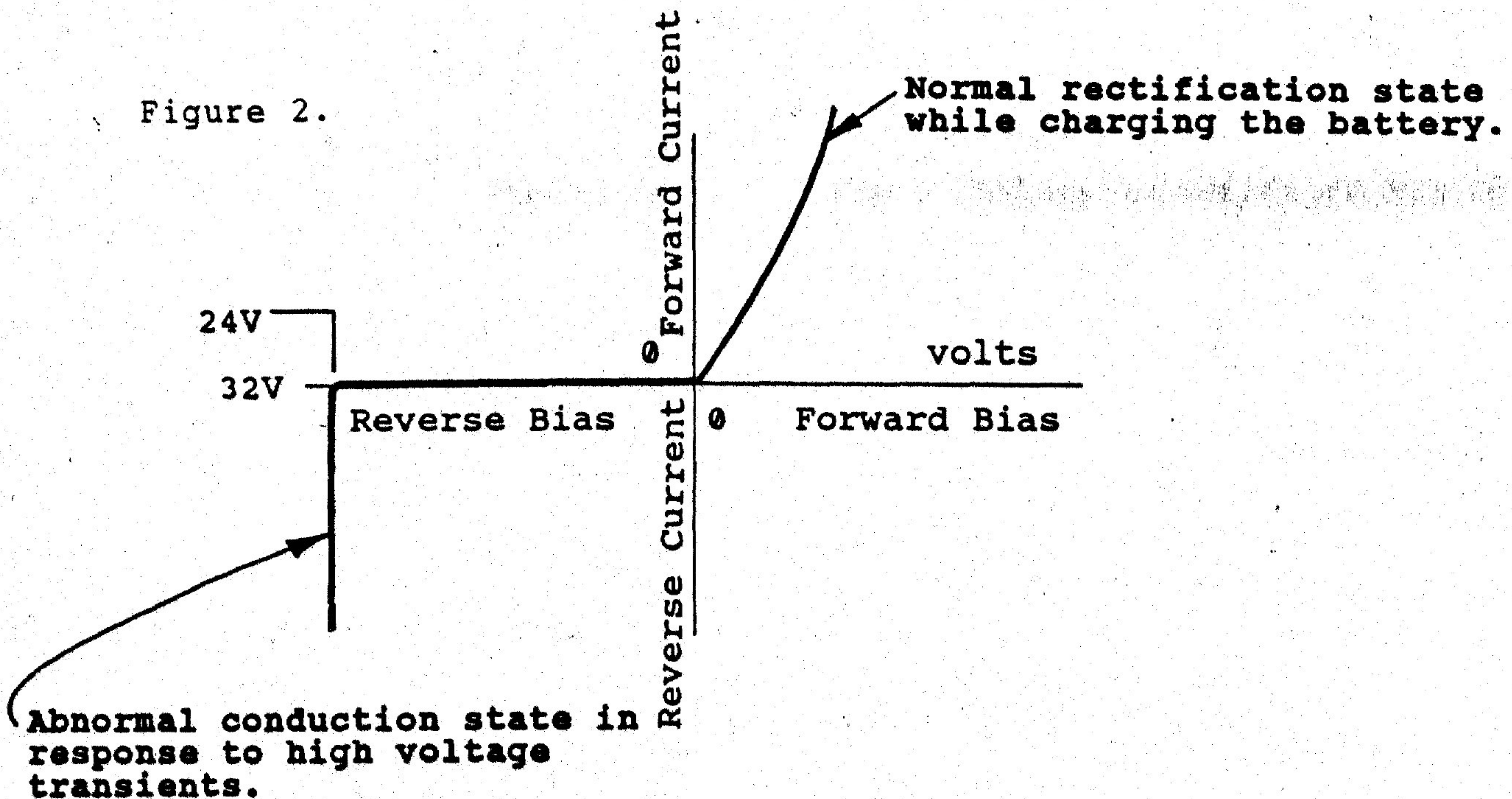
The DT-301A tester will detect maximum reverse leakage current of 2 milli-amps. The meter will indicate +1. for leakage above 2 MA. and also shorted diodes.

See page 6 thru 8 for more information

AVALANCHE VOLTAGE (TRANSIENT SUPPRESSION VOLTAGE)

Avalanche diodes are used to suppress transients in the automotive system. These devices operate in the forward mode as standard rectifiers and as zener diodes in the reverse mode. They protect computer electronics from over-voltage transient spike conditions. The avalanche/zener diodes follow the same V-I characteristics of a conventional diode (fig. 1) in the forward biased condition. In the reversed biased condition, the diode does not conduct until a large spike exceeds the critical avalanche/zener voltage and then the diode conduct as shown in Figure 2.

Figure 2.



D. TEST PROCEDURE: AVALANCHE (SHUT DOWN) VOLTAGE TEST

1. Set left hand power switch up to Avalanche/Forward/Leakage position.
2. Set the right hand function switch down to "Avalanche/Forward" voltage position.
3. Connect the red test probe to cathode of diode. (cathode is Neg.)
4. Connect the black test probe to the anode of diode. (anode is Pos.)
5. Set the voltage selector switch to 50 volts.
6. The meter will indicate 24-32 volts for a good avalanche diode.

See page 6 thru 8 for more information

GENERAL INFORMATIONDATA

The following data is provided as a sample guide for your use. Information can also be found in Motorola's Rectifier Data book (1988 issue, Rev 3). Users are at liberty to set their own acceptance test parameters when using the DT-301A tester and are testing known good or new diodes.

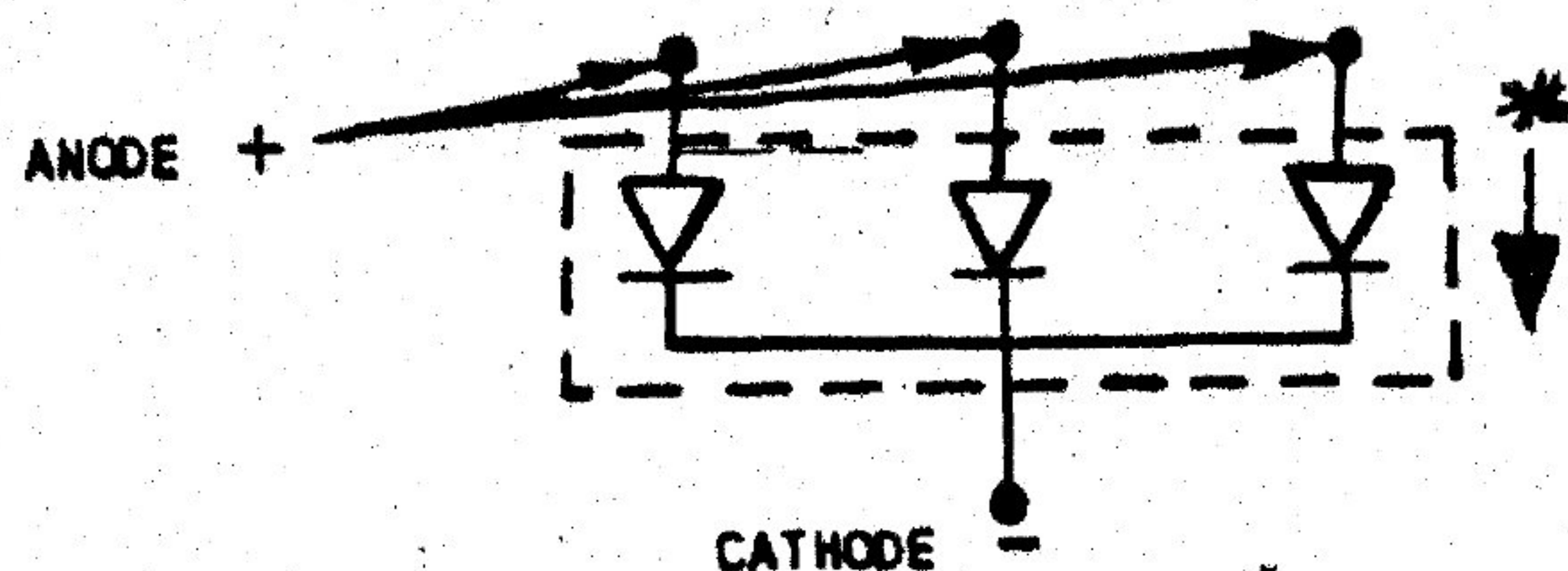
<u>DIODE PART NUMBER</u>	<u>MAX. REVERSE LEAKAGE IN MILLI-AMPS AT VOLTAGE SETTING ON TESTER</u>	<u>MAX. FORWARD VOLTAGE (VOLT)</u>
IN4004 MOTOROLA 400V, 1A (TRIO APPLICATIONS)	0.1 @ 200V	0.6V @ ONLY LOW AMPS
MR2501 MOTOROLA 100V, 25A (10 SI APPLICATIONS) DELCO 10SI	0.1 @ 100V	1.1V @ 25 AMPS
MBR7535 MOTOROLA 200V, 75A (SCHOTTKY DIODE)	120 @ 20V *SCHOTTKY DIODES LEAK MORE THAN ANY OTHER TYPE	0.6 @ 25 AMPS
MR1122 MOTOROLA 200V, 150A DELCO 50DN	1.5 @ 200V	1.0V @ 25 AMPS
MUR5020 MOTOROLA 200V, 150A LEECE NEVILLE	0.2 @ 200V	1.15V @ 25 AMPS
MR2540 MOTOROLA 35A & 50A AVALANCHE DIODE CS144, CS130 & CS121	0.0002 @ 20V	1.05 @ 25 AMPS

NOTE: THE DIODE IS TO BE CONSIDERED GOOD & REUSABLE IF DIGITAL METER INDICATES APPROXIMATIONS GIVEN OR LOWER.

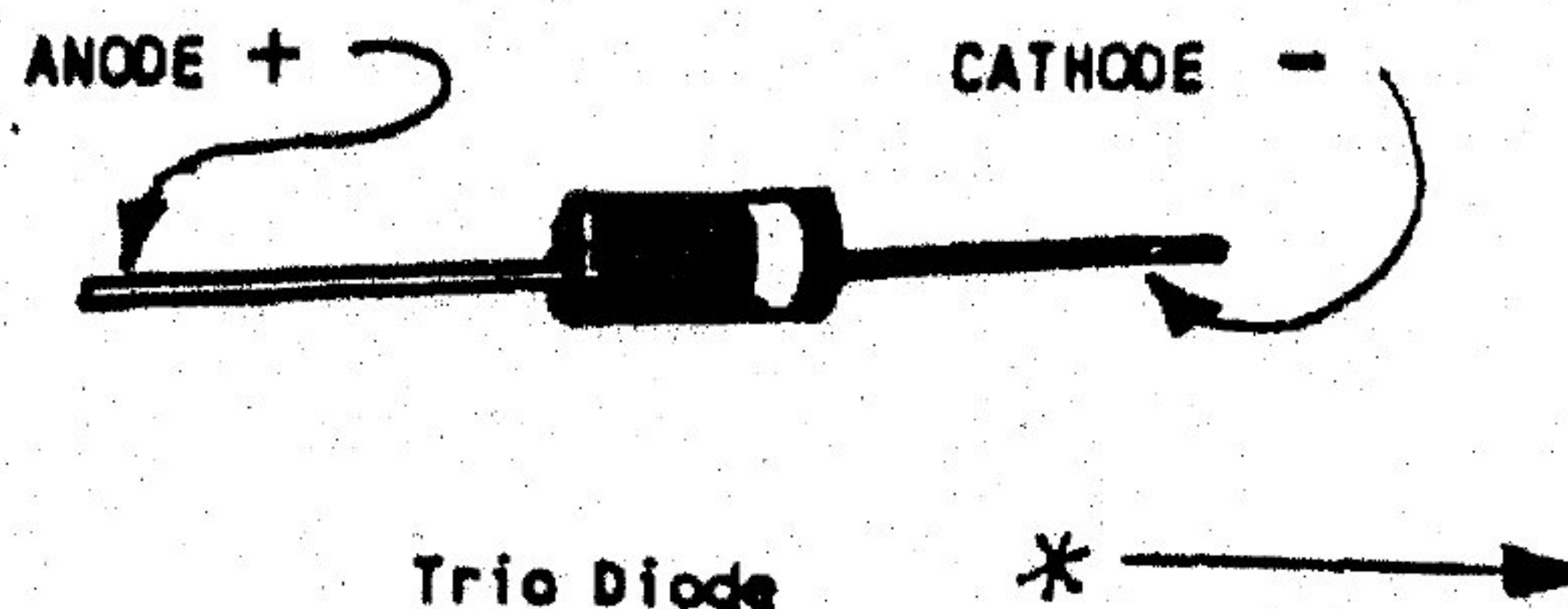
GENERAL INFORMATION

LOW AMP FORWARD VOLTAGE DROP TEST

(FOR DIODE TRIOS ONLY, DO NOT USE HIGH AMP TEST ON DIODE TRIOS)



DELCO REMY TRIO

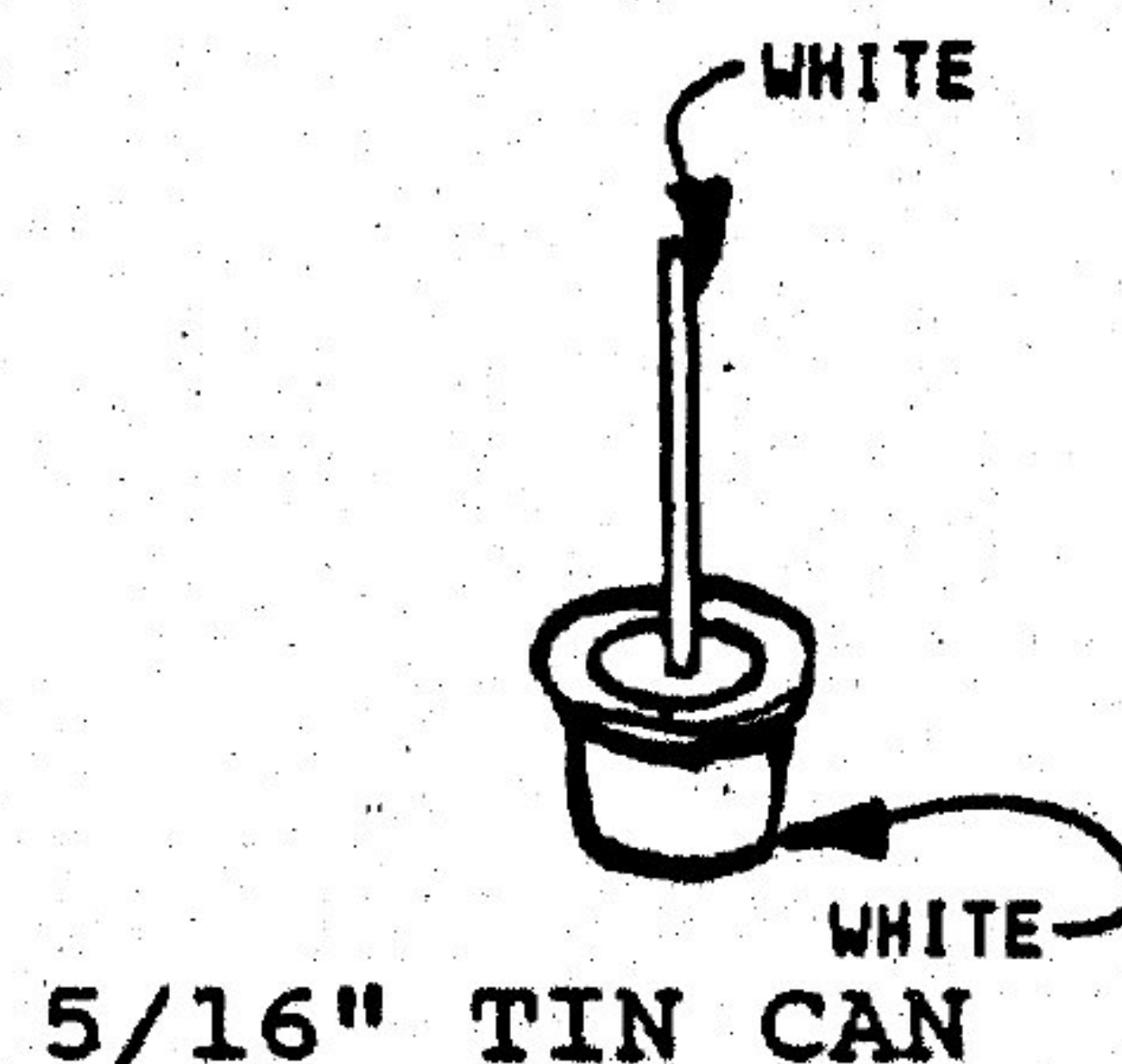
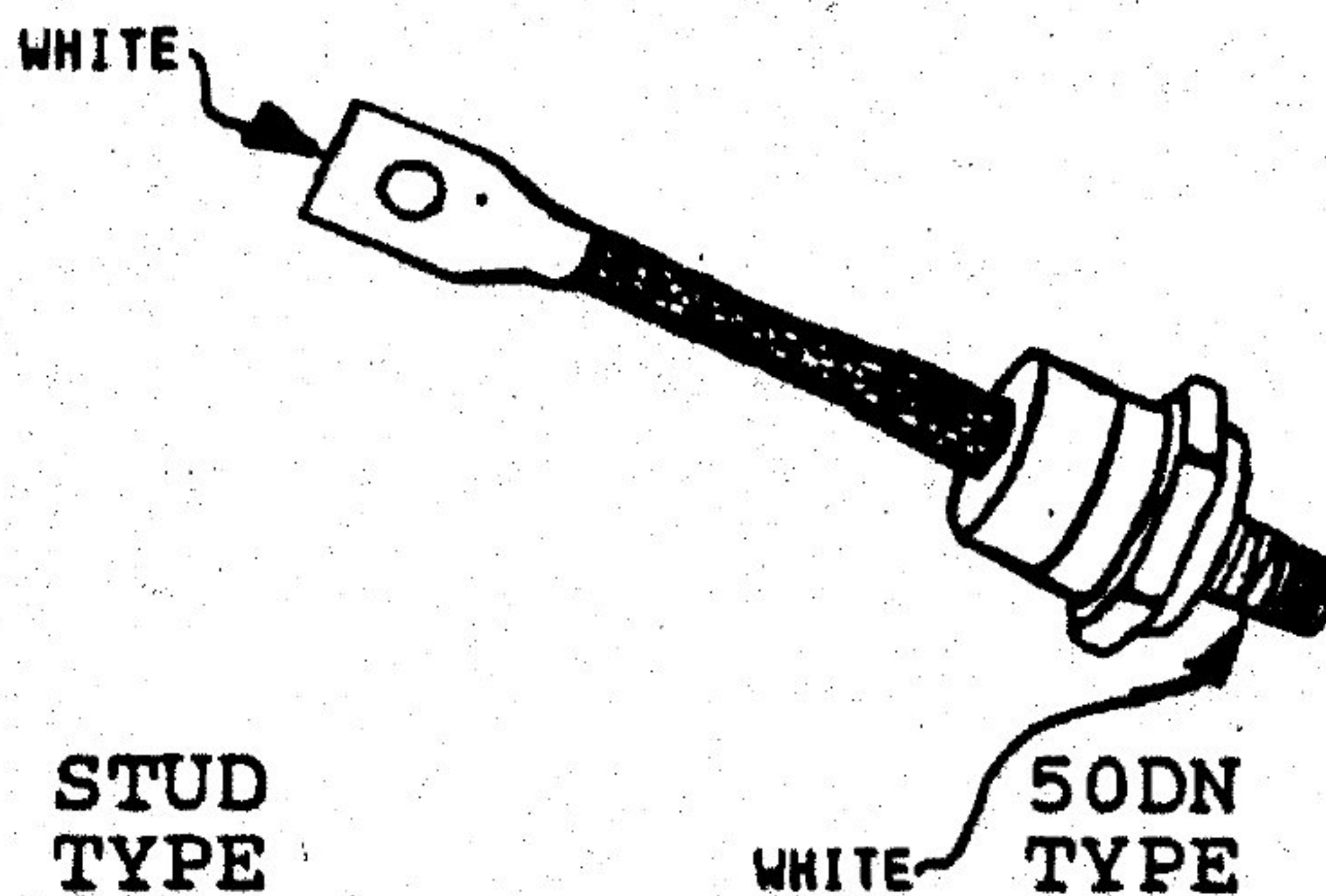
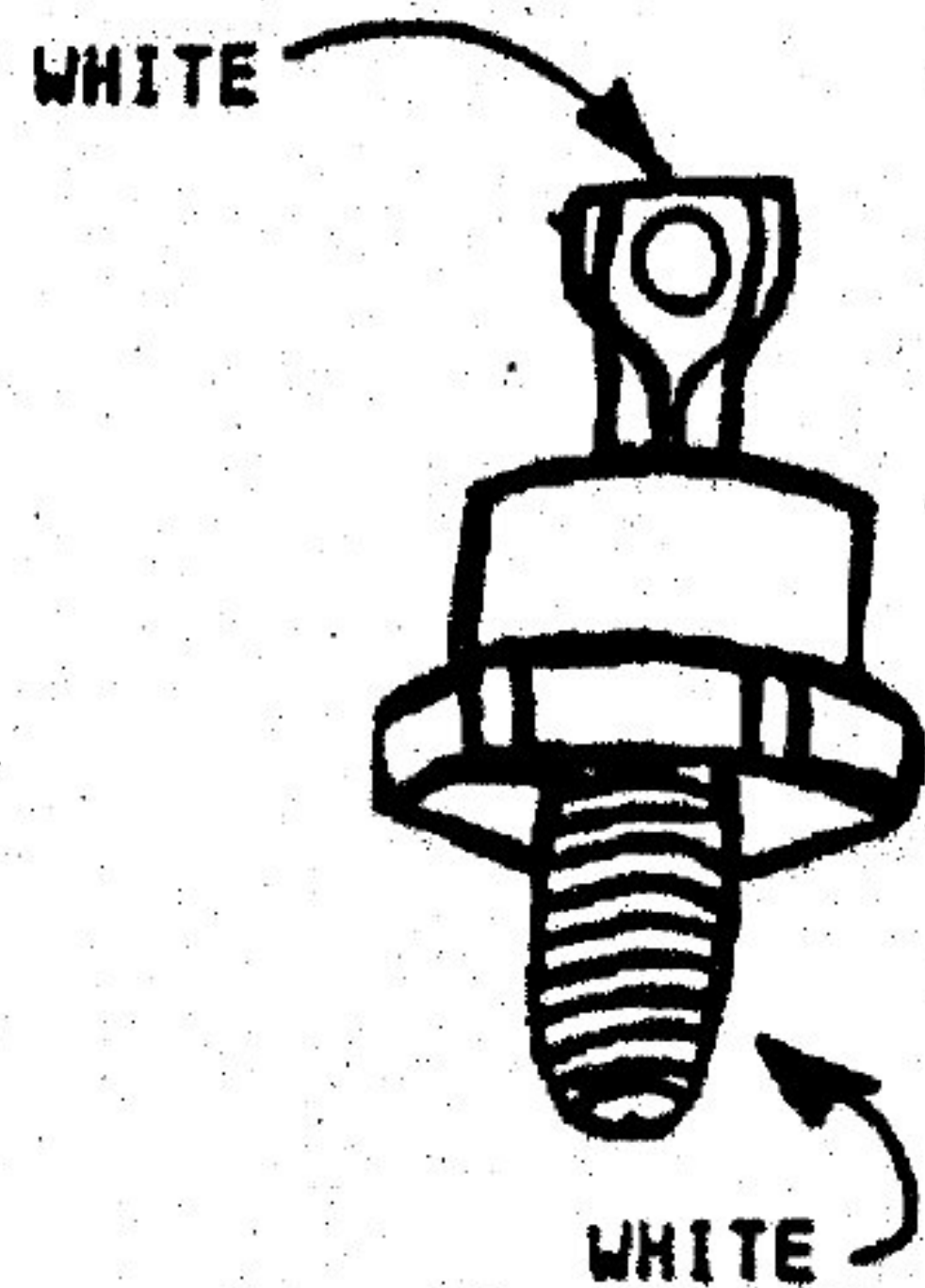
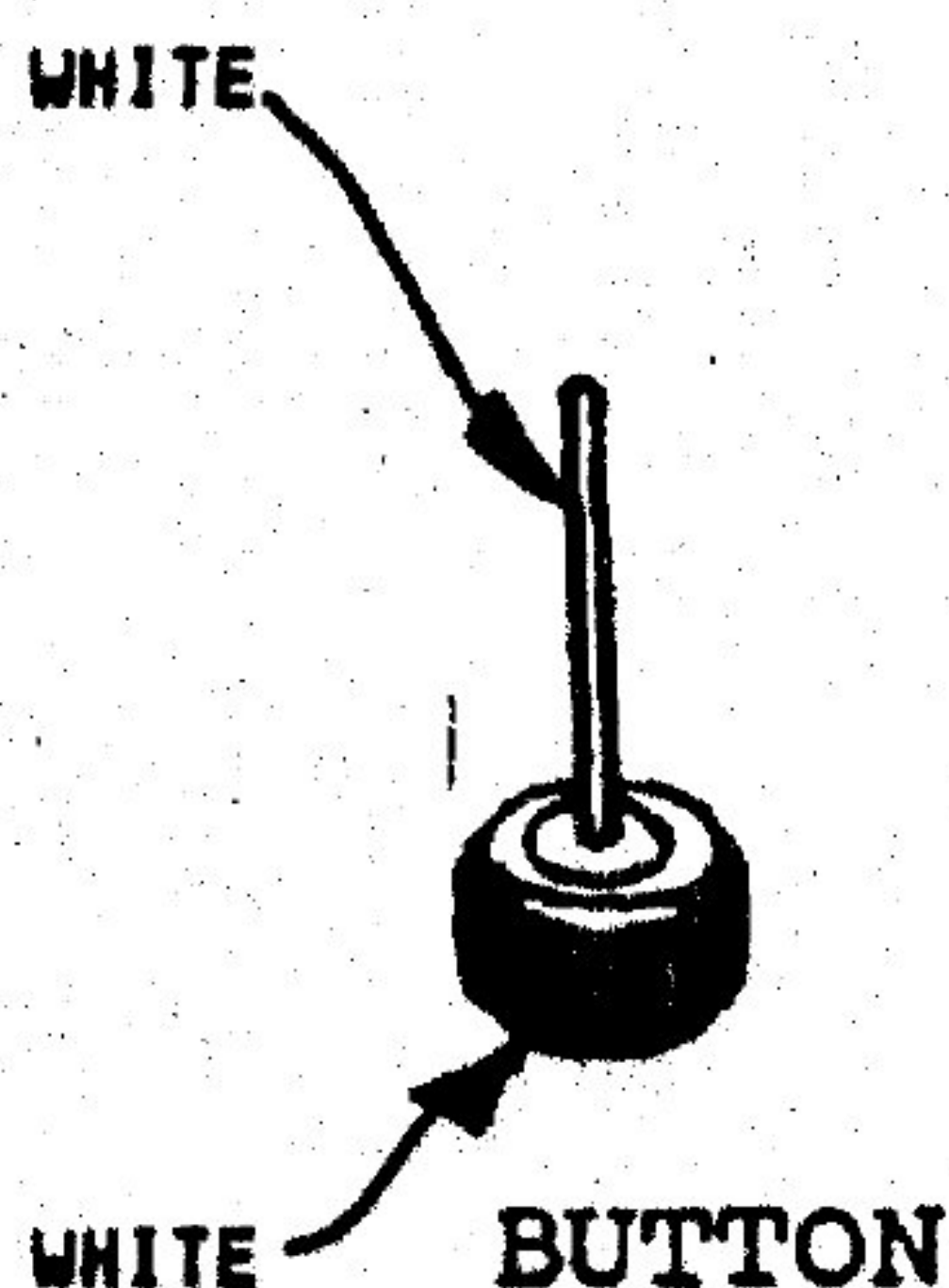


Trio Diode

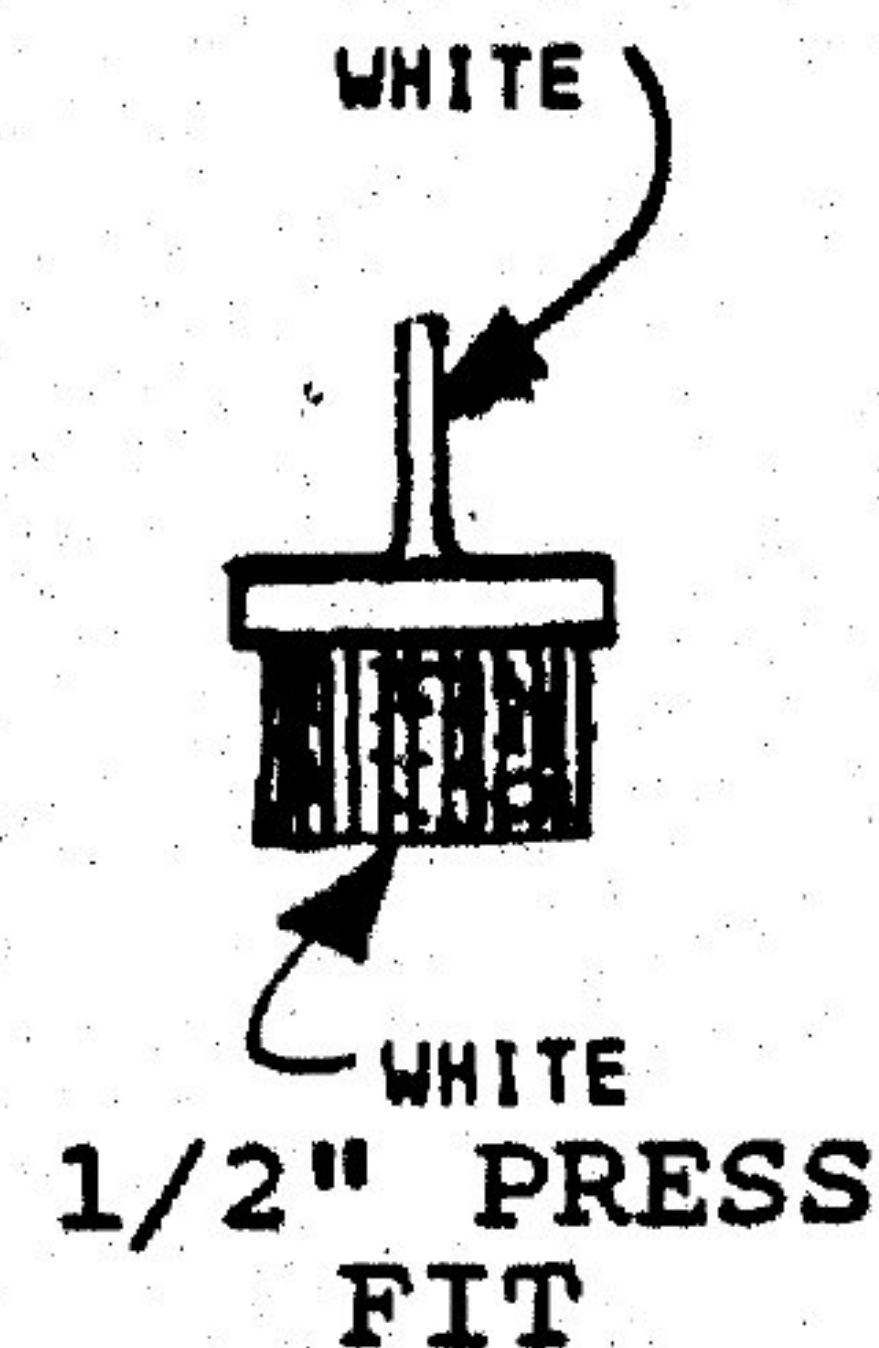
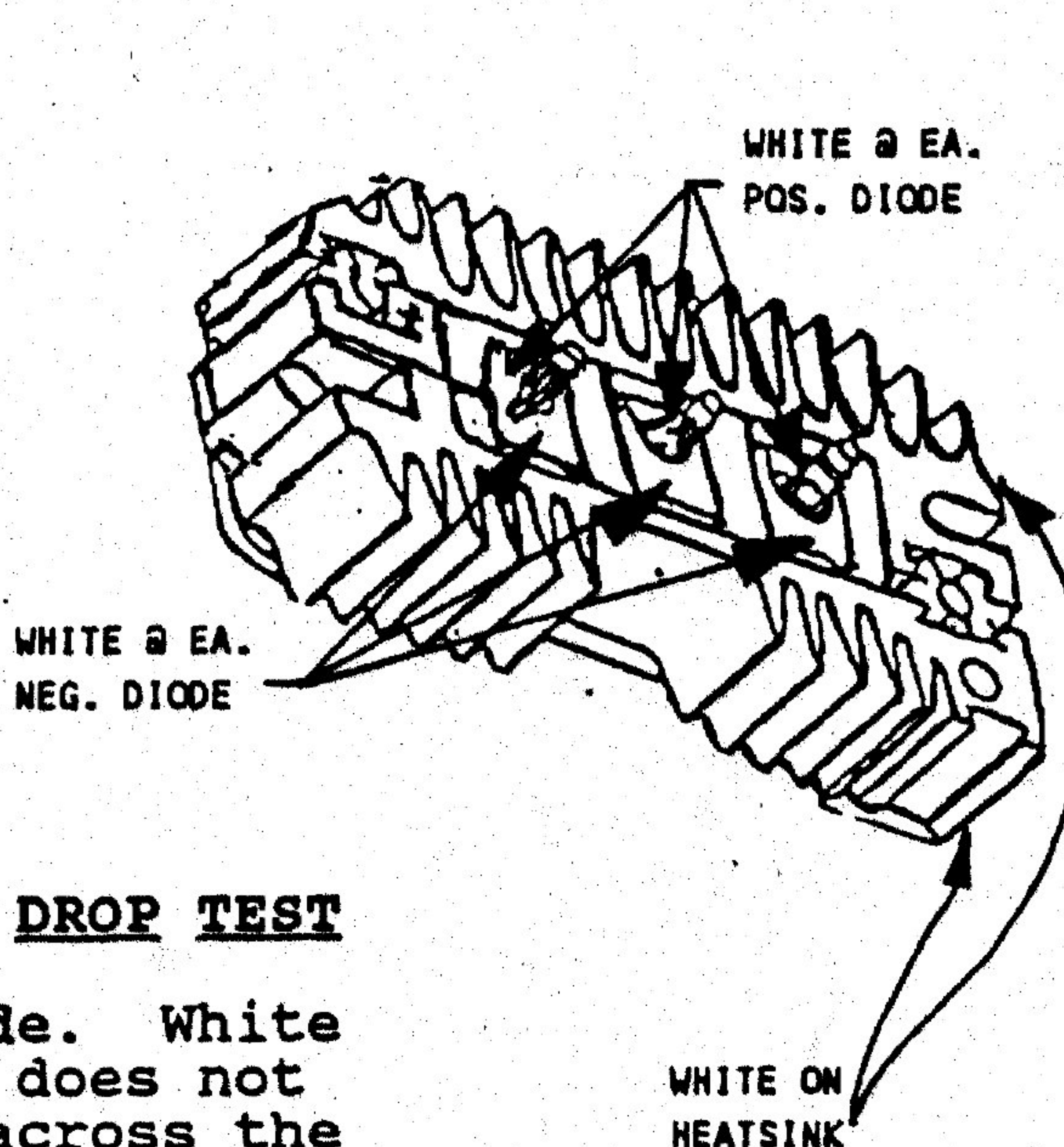
FOR BIAS

*DIRECTION OF CURRENT FLOW

For this test red and black leads are across the diode. Place red on anode and black on cathode.



1081 TYPE RECTIFIER
NEG. GND
6 DIODES
(CHECK ALL 6)



25A HIGH AMP FORWARD VOLTAGE DROP TEST

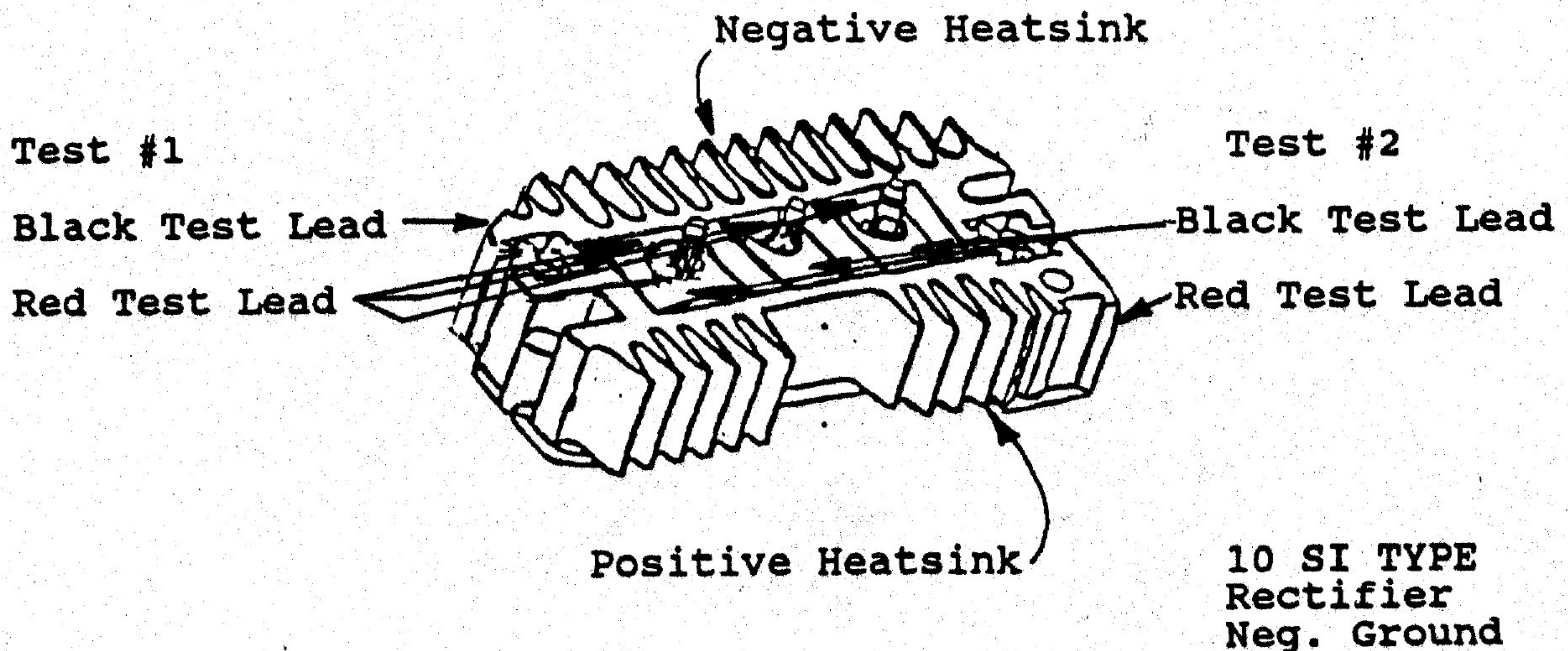
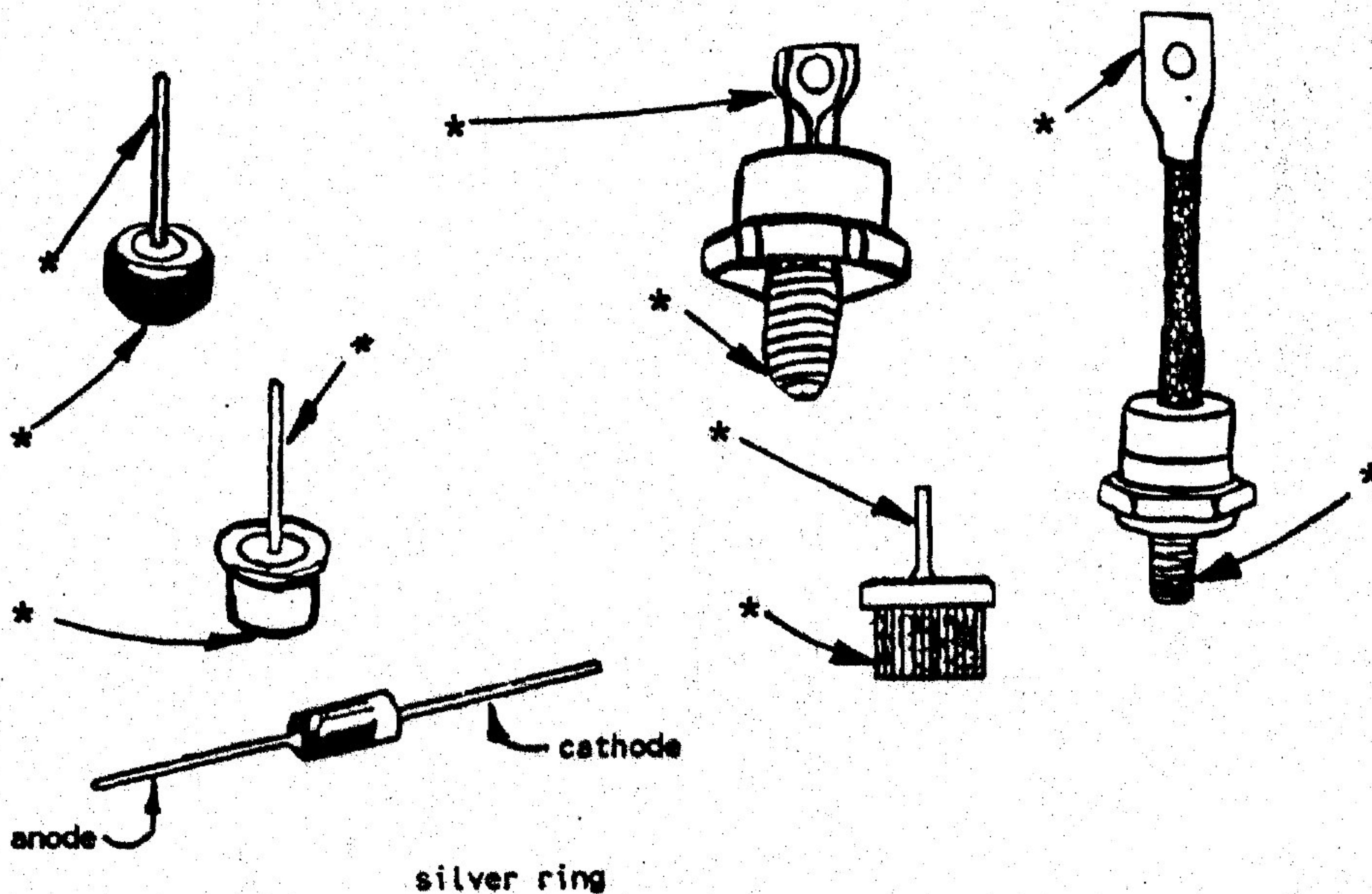
Use 2 white wires across diode. White wires carry AC voltage so it does not matter which test lead goes across the anode & cathode for this test only. The diode will block the AC voltage in one direction and conduct in the other direction. When the diode conducts in the forward bias direction the meter will give the forward voltage drop.

GENERAL INFORMATION

HIGH VOLTAGE REVERSE LEAKAGE TEST (Test for reverse leakage by using high voltage DC in reverse direction to that of forward bias.)

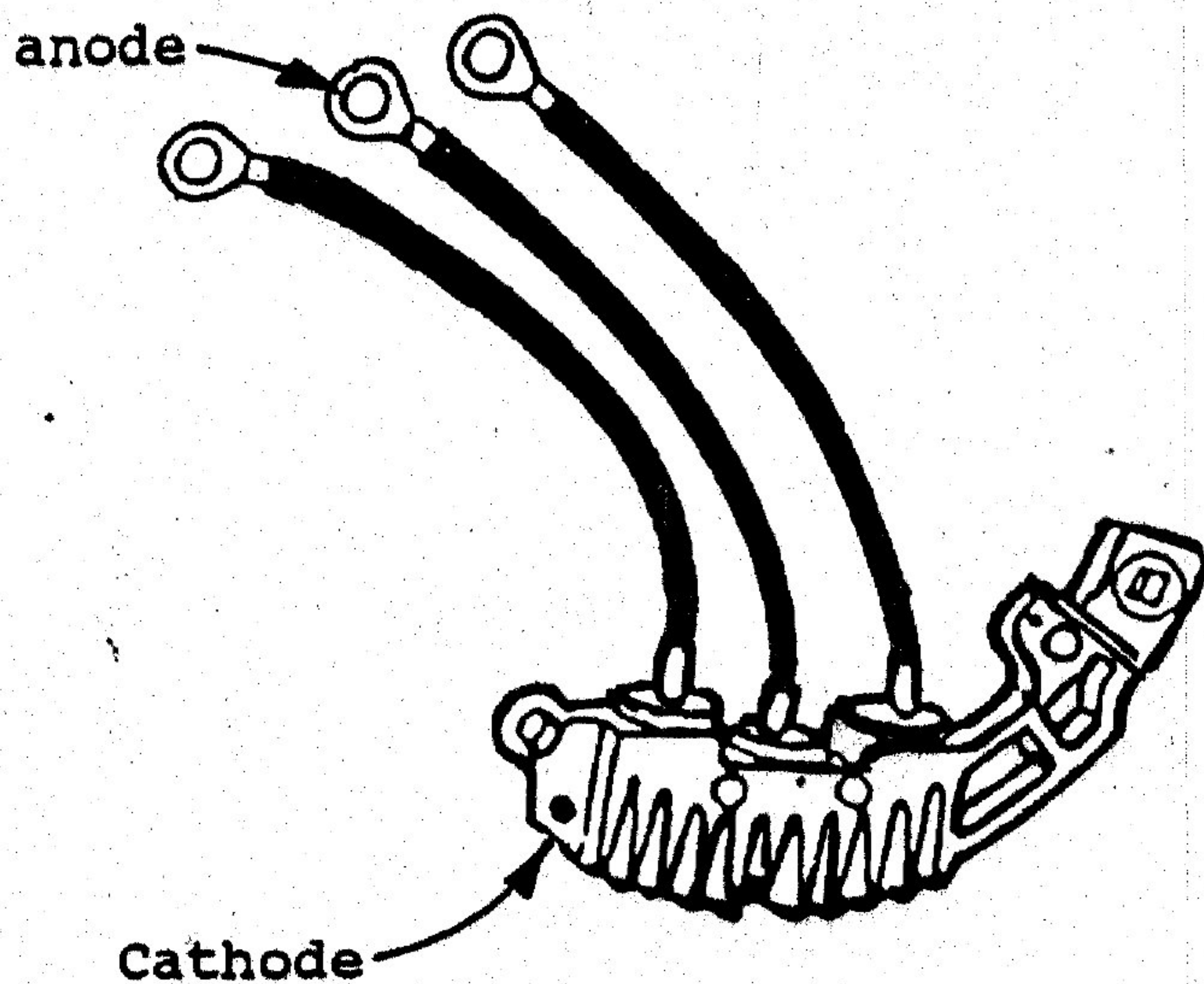
Forward bias is the direction a good diode will conduct current as done in the forward voltage drop test. "Reverse Bias" is the direction a good diode will block current flow. Therefore, the least amount of current leakage in the reverse direction or "Reverse Bias" the better the diode. Zero leakage is most desirable. See page 6 for max. amount of leakage allowable at the given voltage across a diode in the reverse direction.

*To test a diode for leakage place the black lead on the anode and the red lead on the cathode (anode is pos. and cathode is neg.). Also, remember that the diode conducts when a pos. voltage is on the anode and neg. voltage on the cathode. That is why we place a red test lead to neg. and a black test lead to pos. when we are checking for leakage in the reverse direction.

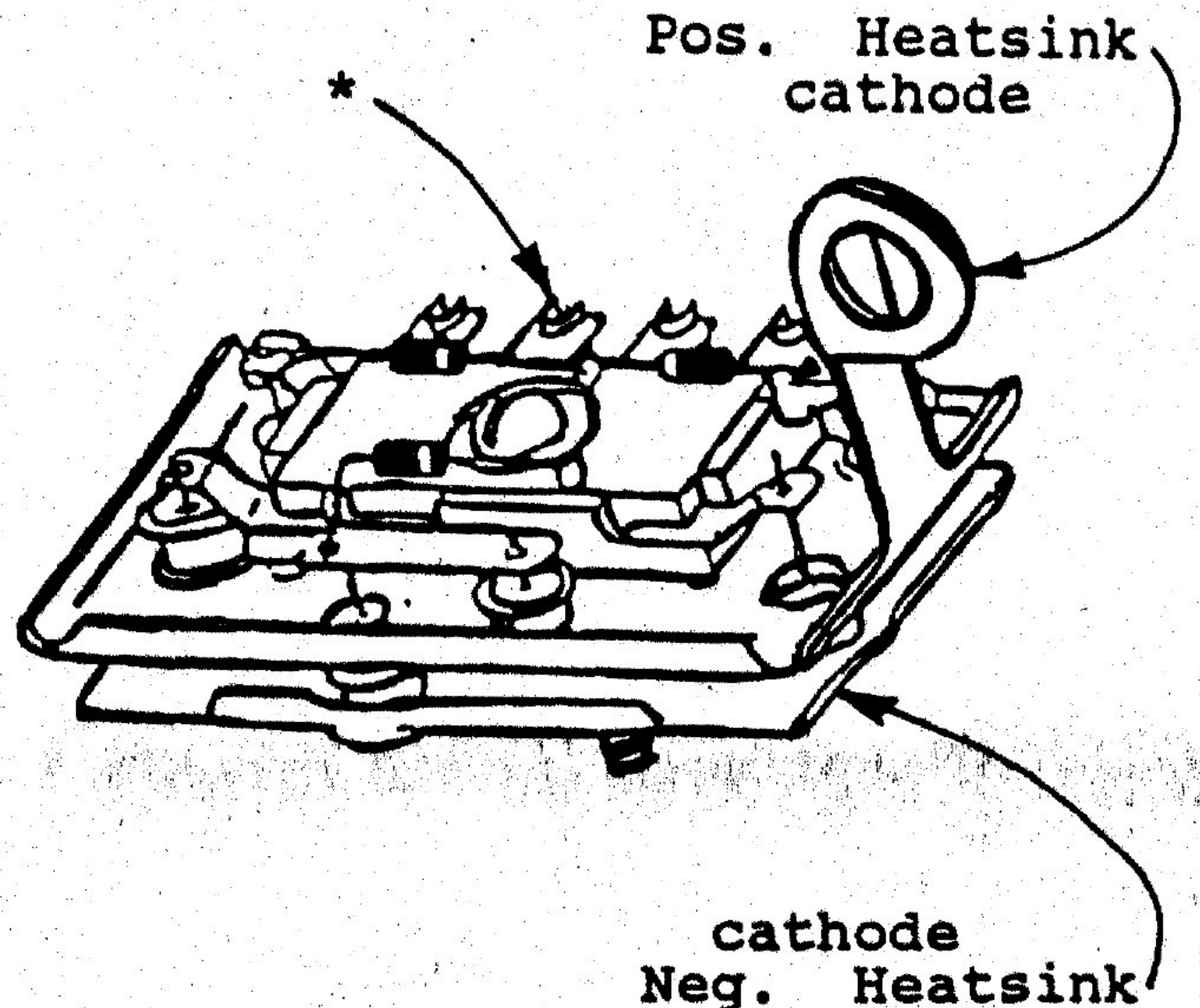


GENERAL INFORMATION

Typical Rectifiers and Heatsinks for reference of anode and cathode
 (*Note: Asterisk denotes stator connection. Anode for Pos. heatsink and cathode for Neg. heatsink).

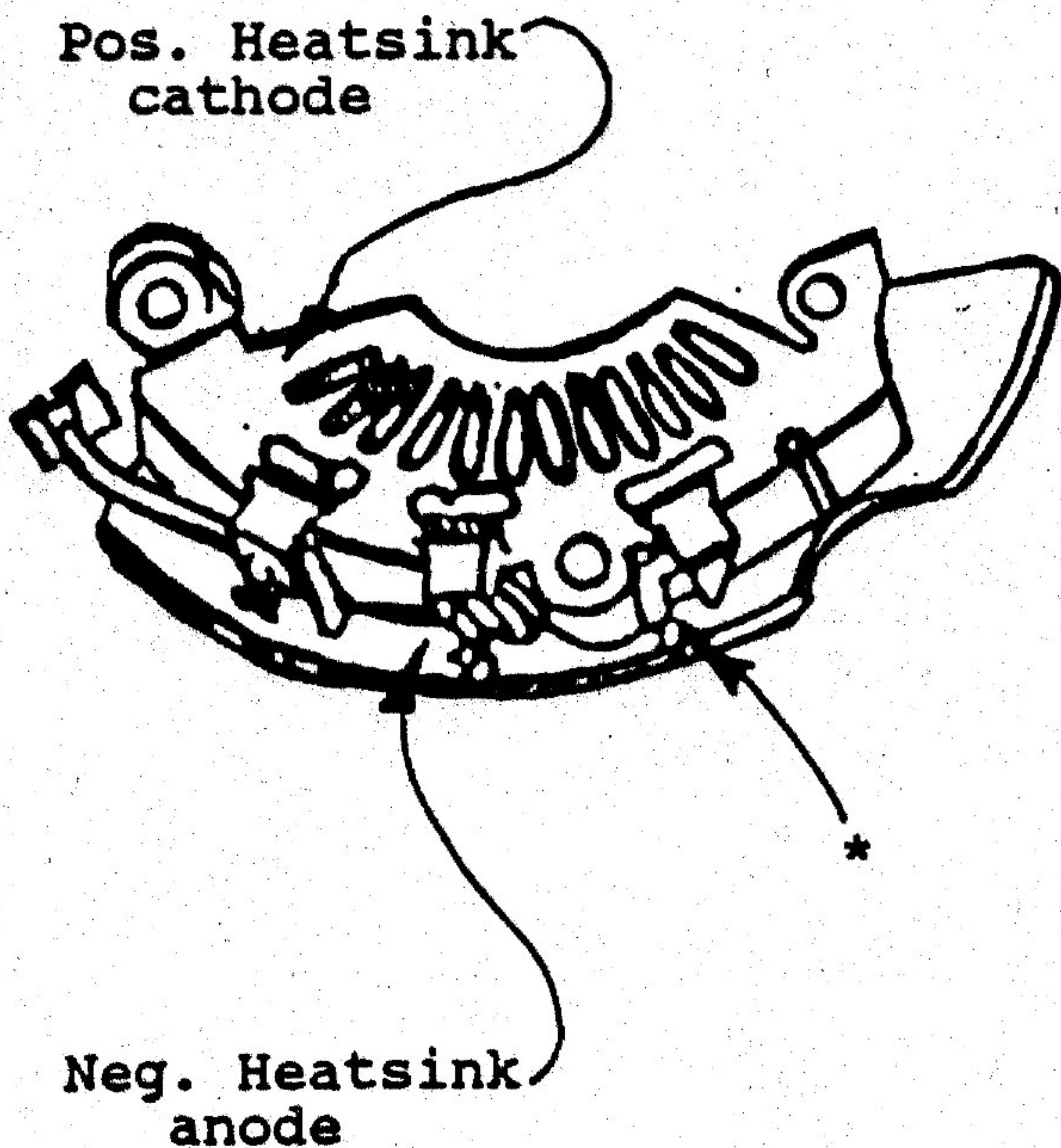


Leece Neville Pos.
 (reverse for Neg. H.S.)



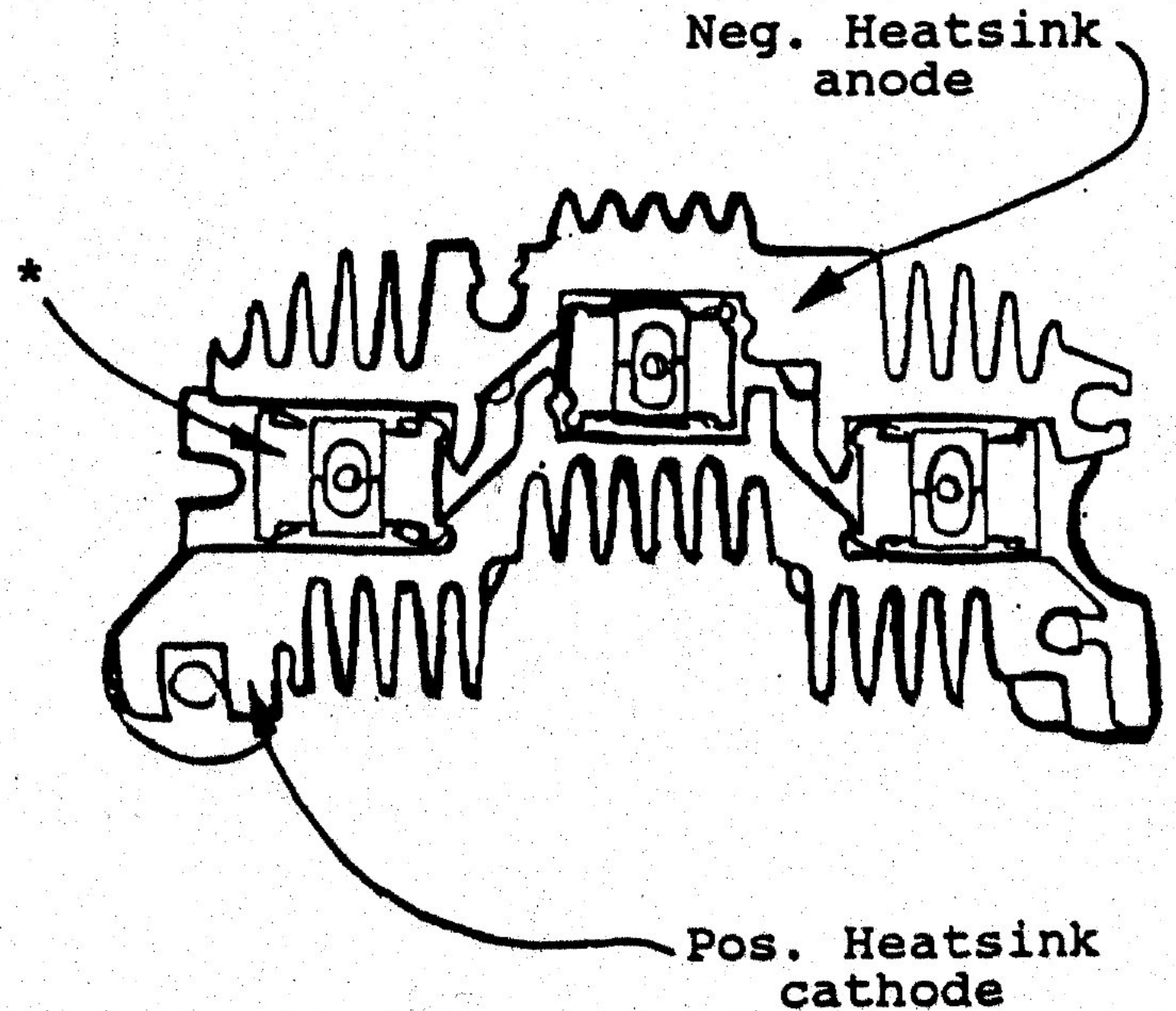
Hitachi Rectifier
 w/Trio

Schematic #3

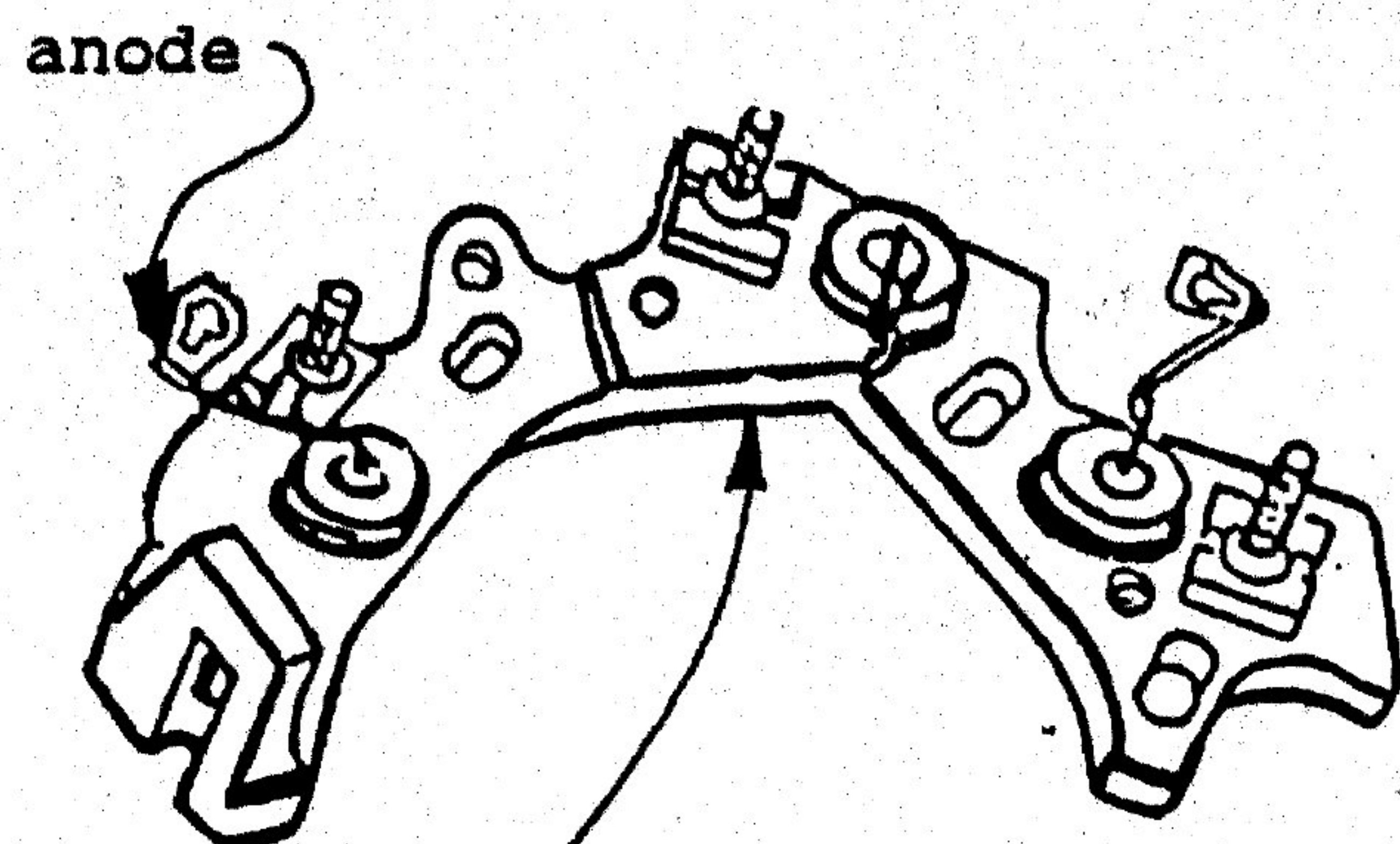


CS130-Avalanche diodes
 Delco Remy
Schematic #2

Schematic #1

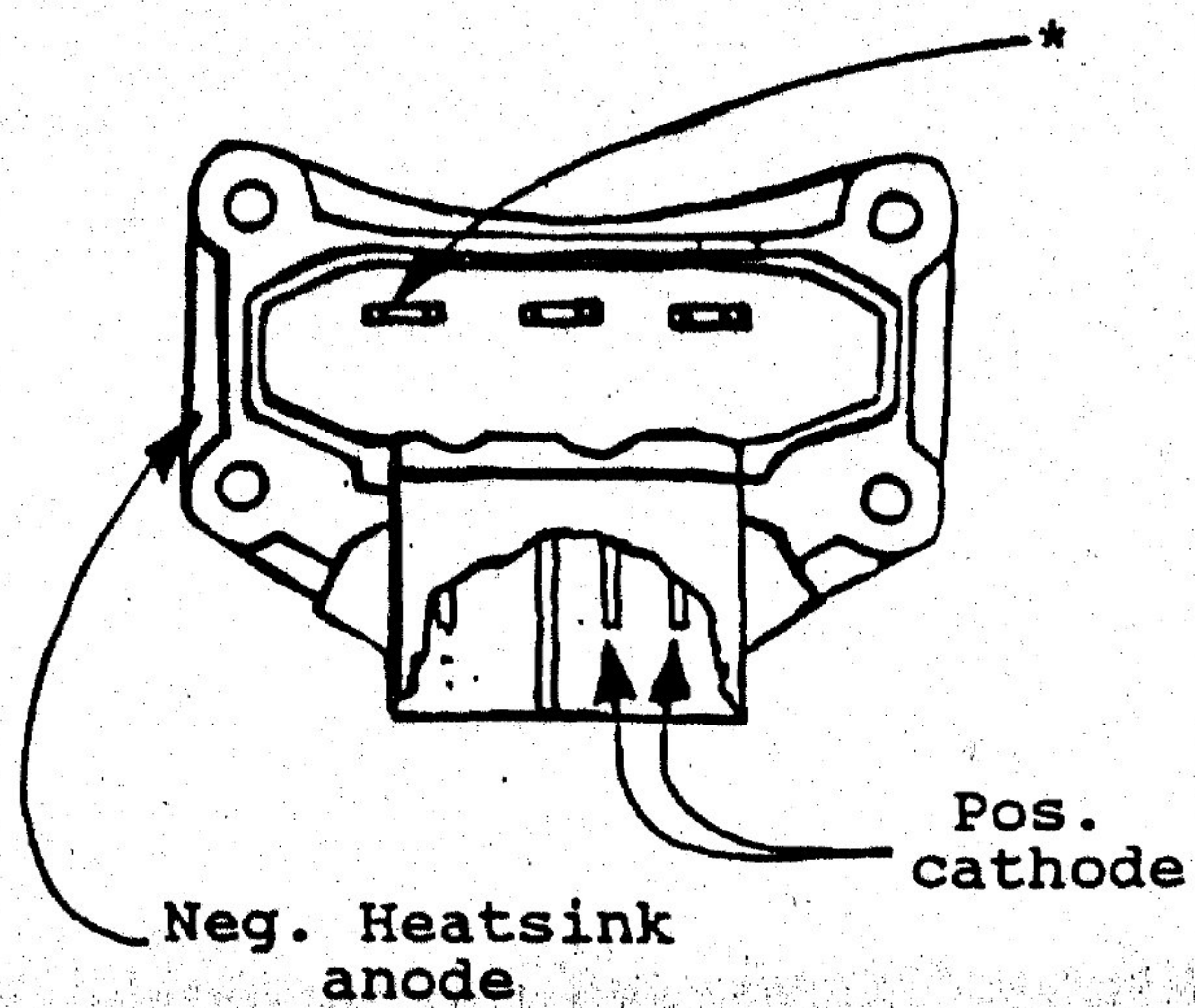


CS144-Avalanche diodes
 Delco Remy
Schematic #2

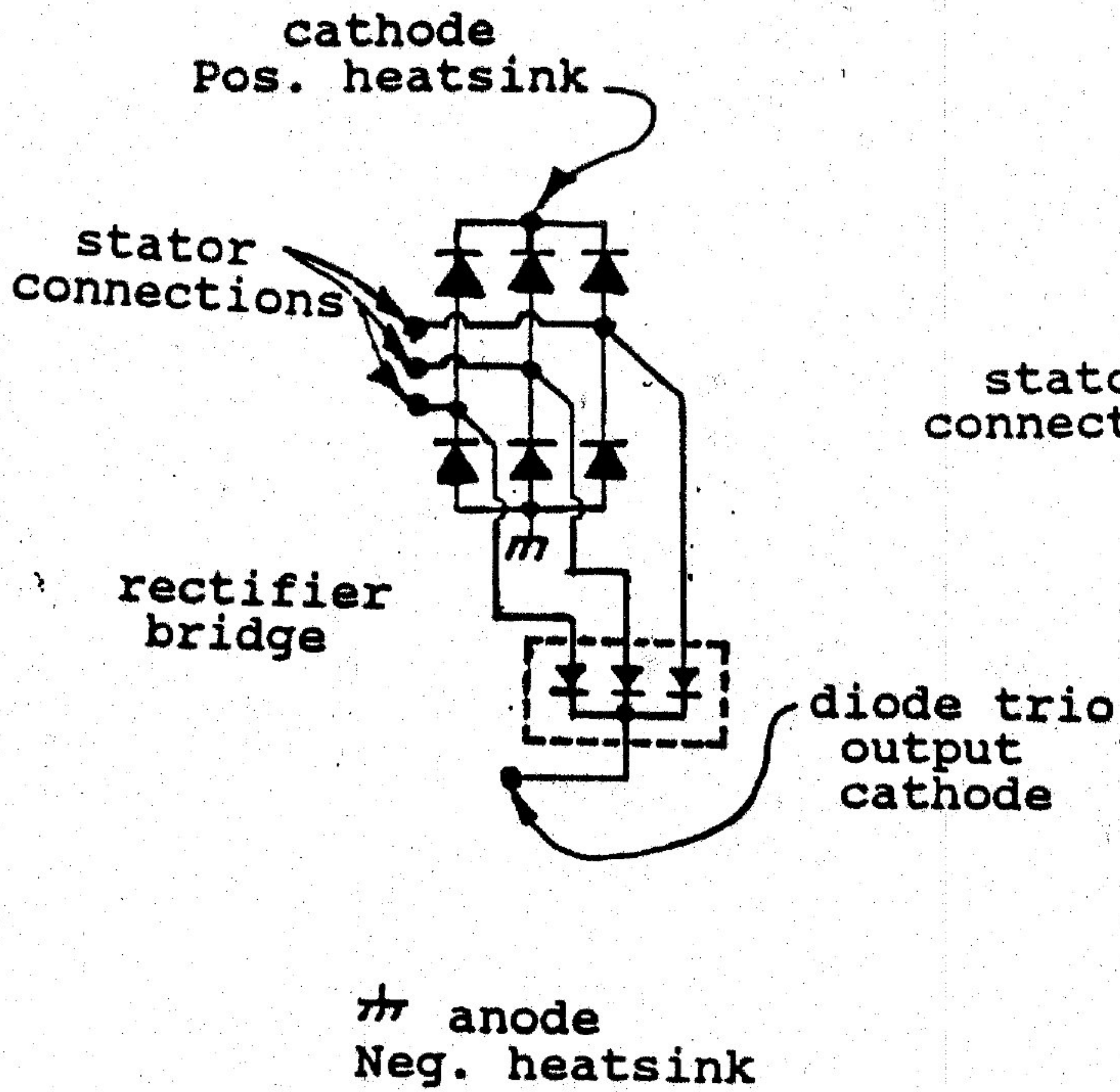
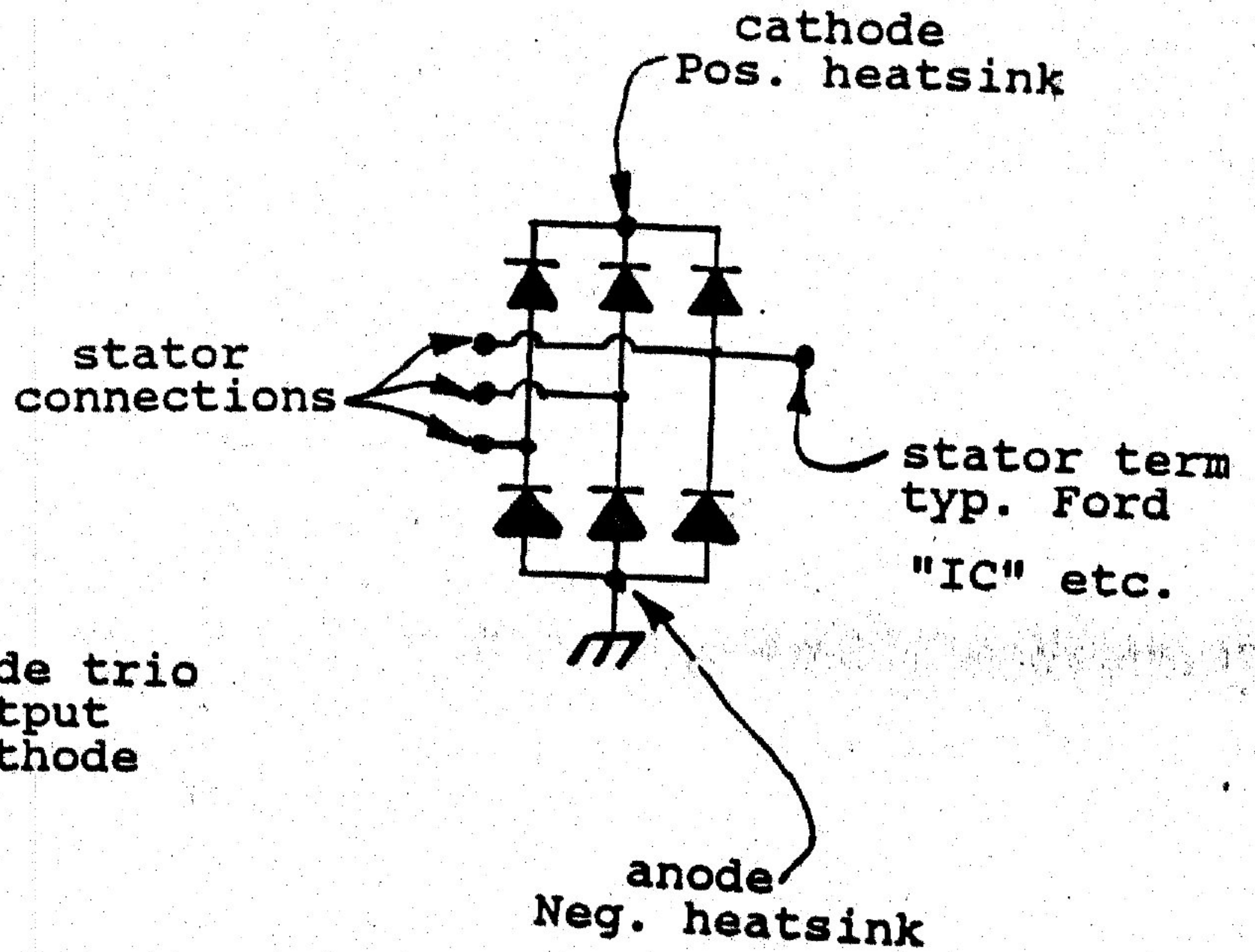
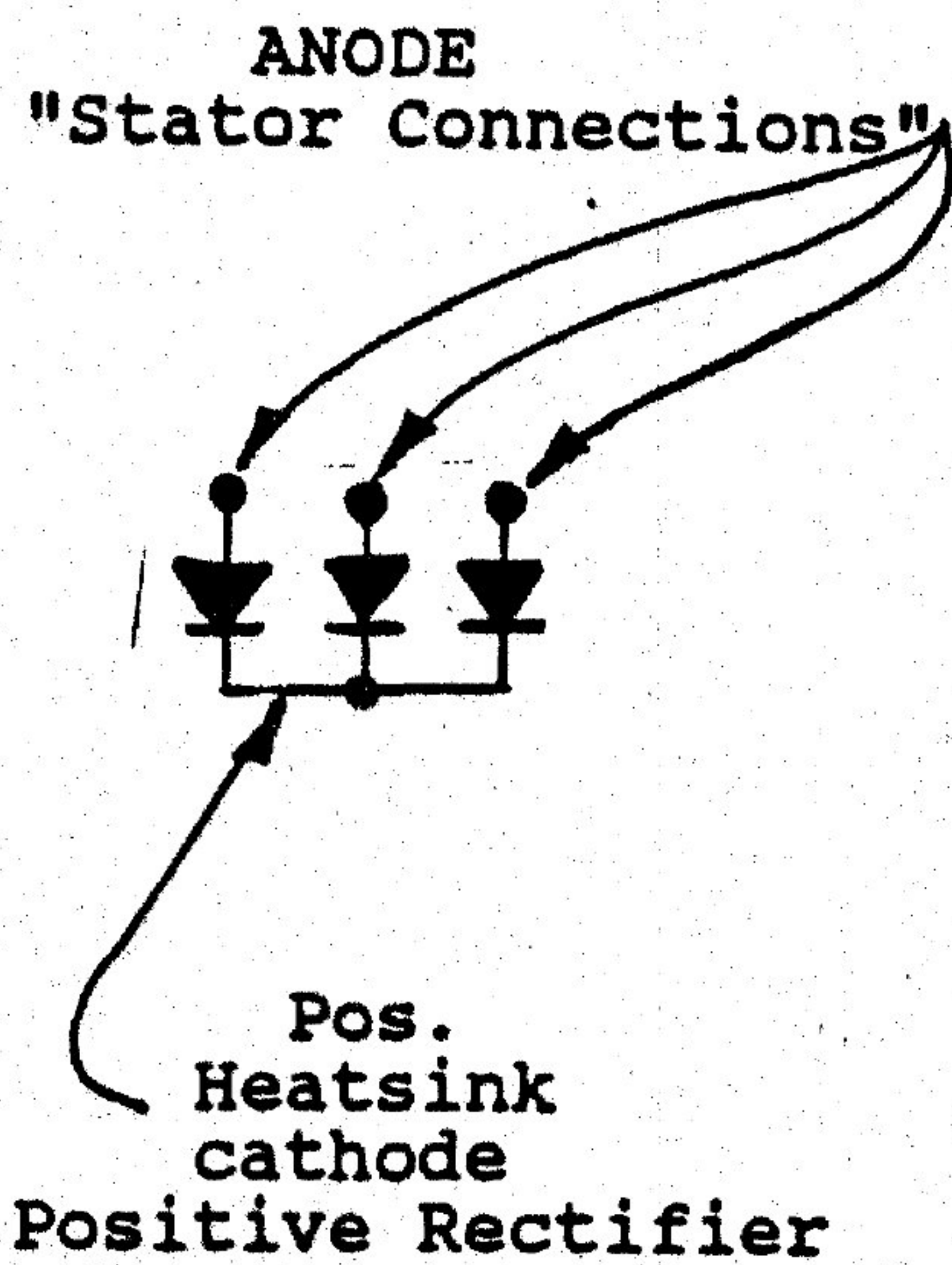
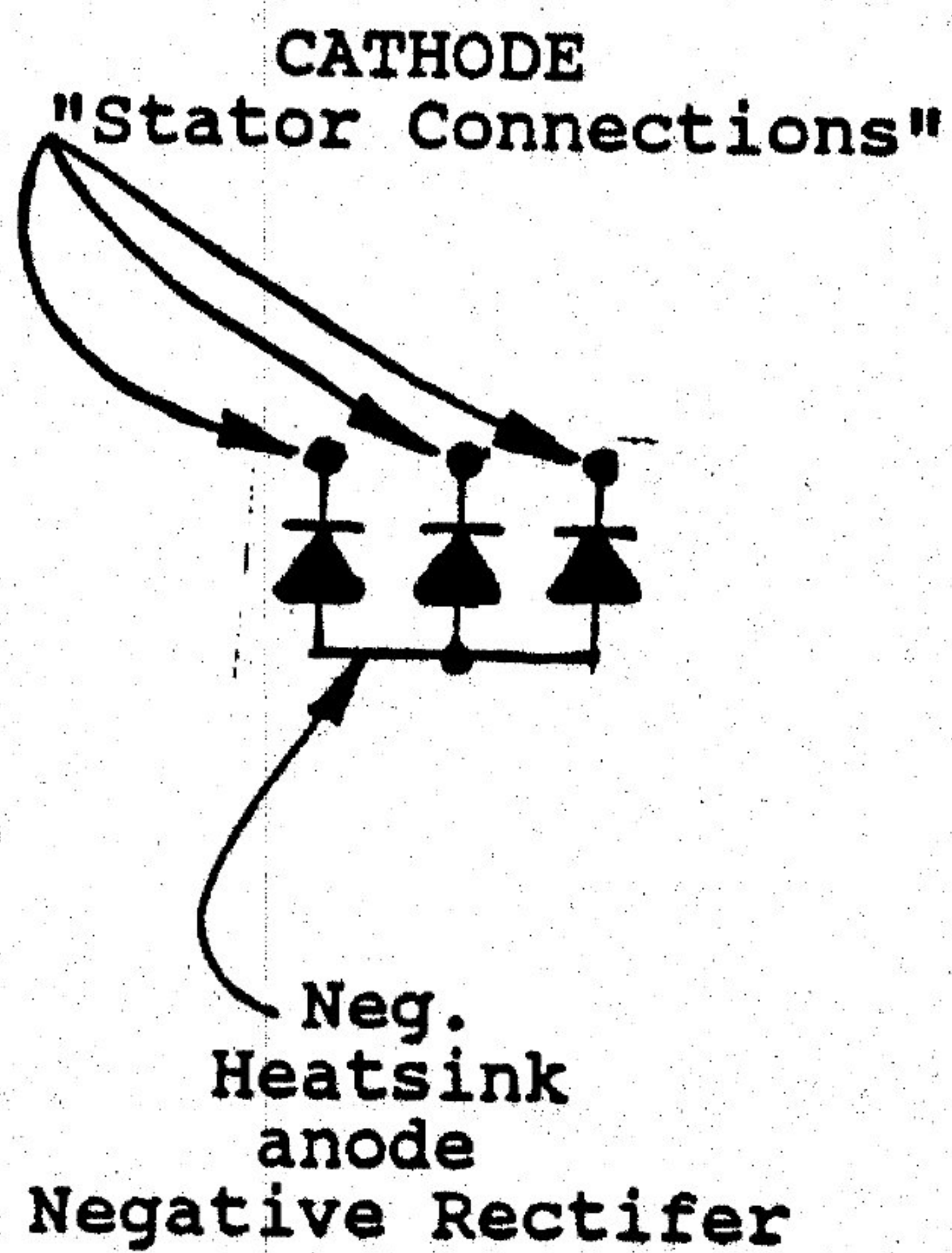
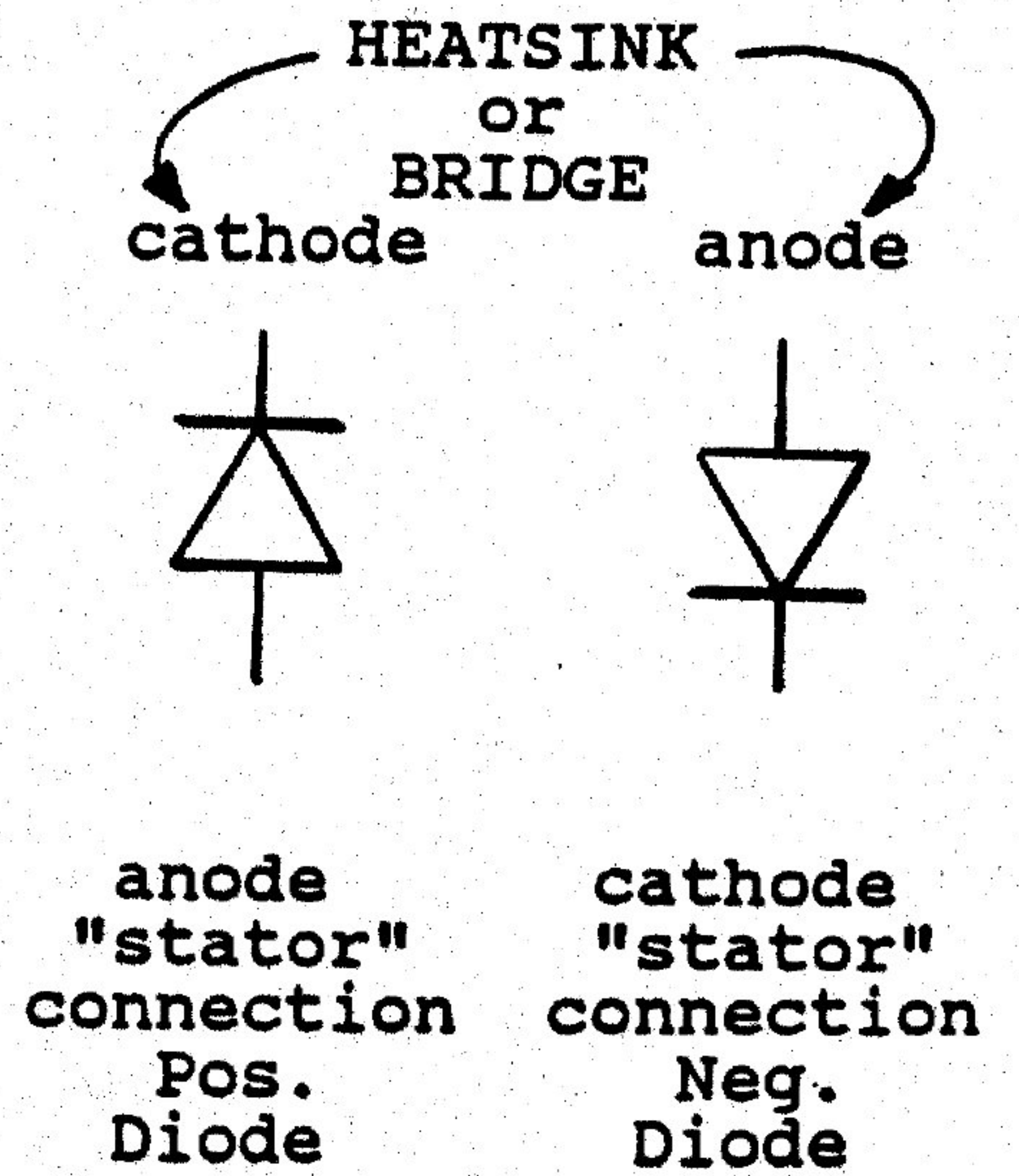


25 SI Pos.
Delco Remy

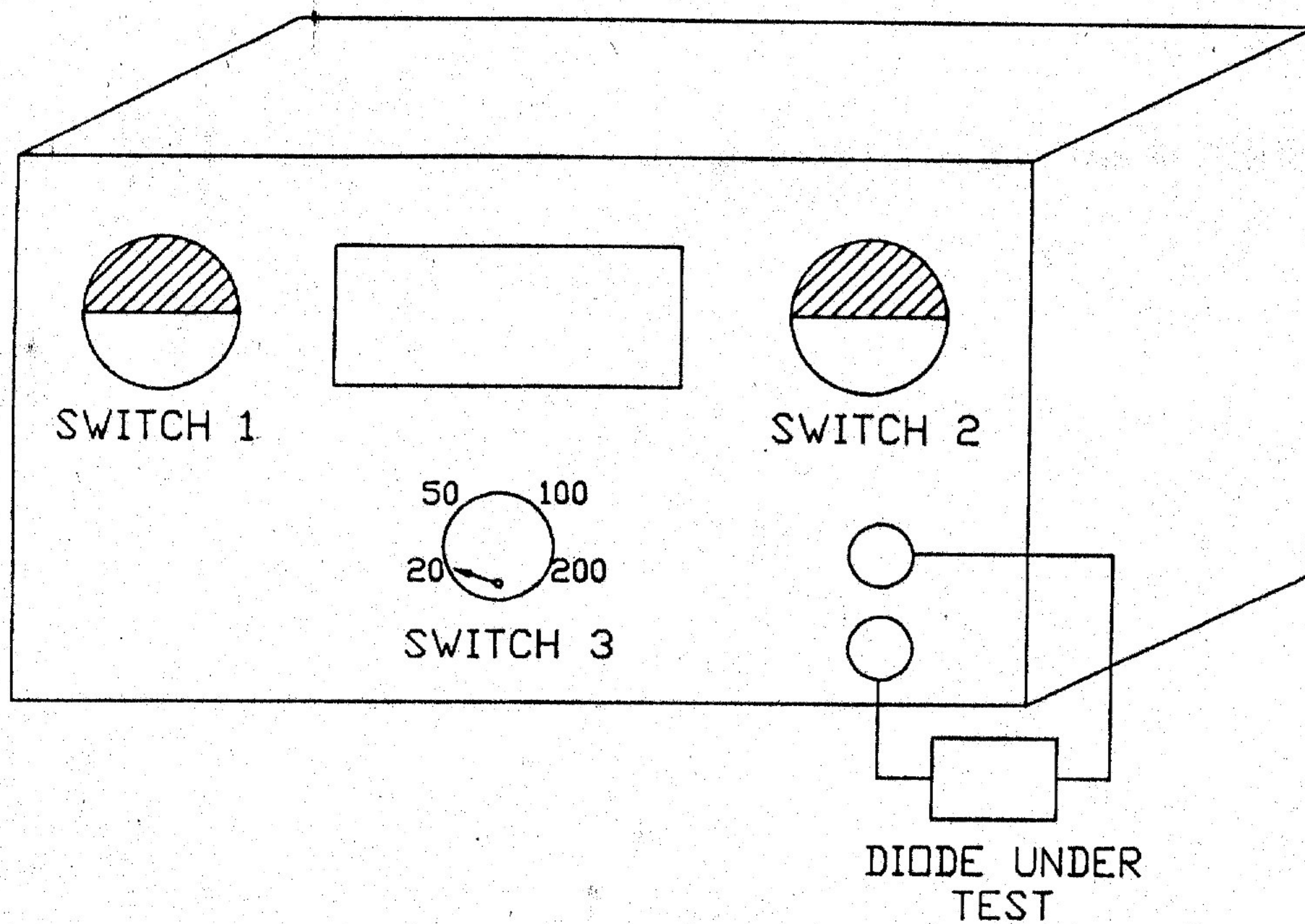
(reverse for Neg. heatsink)
Schematic #3



IAR Ford Rectifier
Schematic #2

TYPICAL RECTIFIER SCHEMATICSSchematic #1Schematic #2Schematic #3Schematic #4

DT301A REVERSE LEAKAGE TEST FOR AVALANCHE DIODE (CS ALTERNATORS)



1. SET SWITCHES #1 AND #2 TO UPPER POSITION.
2. SET SWITCH #3 TO 20 VOLTS.
3. - IF TESTING A POSITIVE DIODE:
 - * BLACK TEST LEAD TO THE STATOR
 - * RED TEST LEAD TO HEATSINK.
- IF TESTING A NEGATIVE DIODE:
 - * RED TEST LEAD TO THE STATOR.
 - * BLACK TEST LEAD TO HEATSINK.

TEST RESULTS:

METER SHOULD READ 0.001 MILLI-AMP OR LESS.