TECHNICAL GUIDE FOR SERVICE

TROUBLE SHOOTING METHODS

COMPLETELY DEAD UNITS—NO POWER—NO LIGHTS

PIONEER®

SERVICE DEPARTMENT
INTERNATIONAL DIVISION

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FOR

COMPLETELY DEAD UNITS — NO POWER — NO LIGHTS

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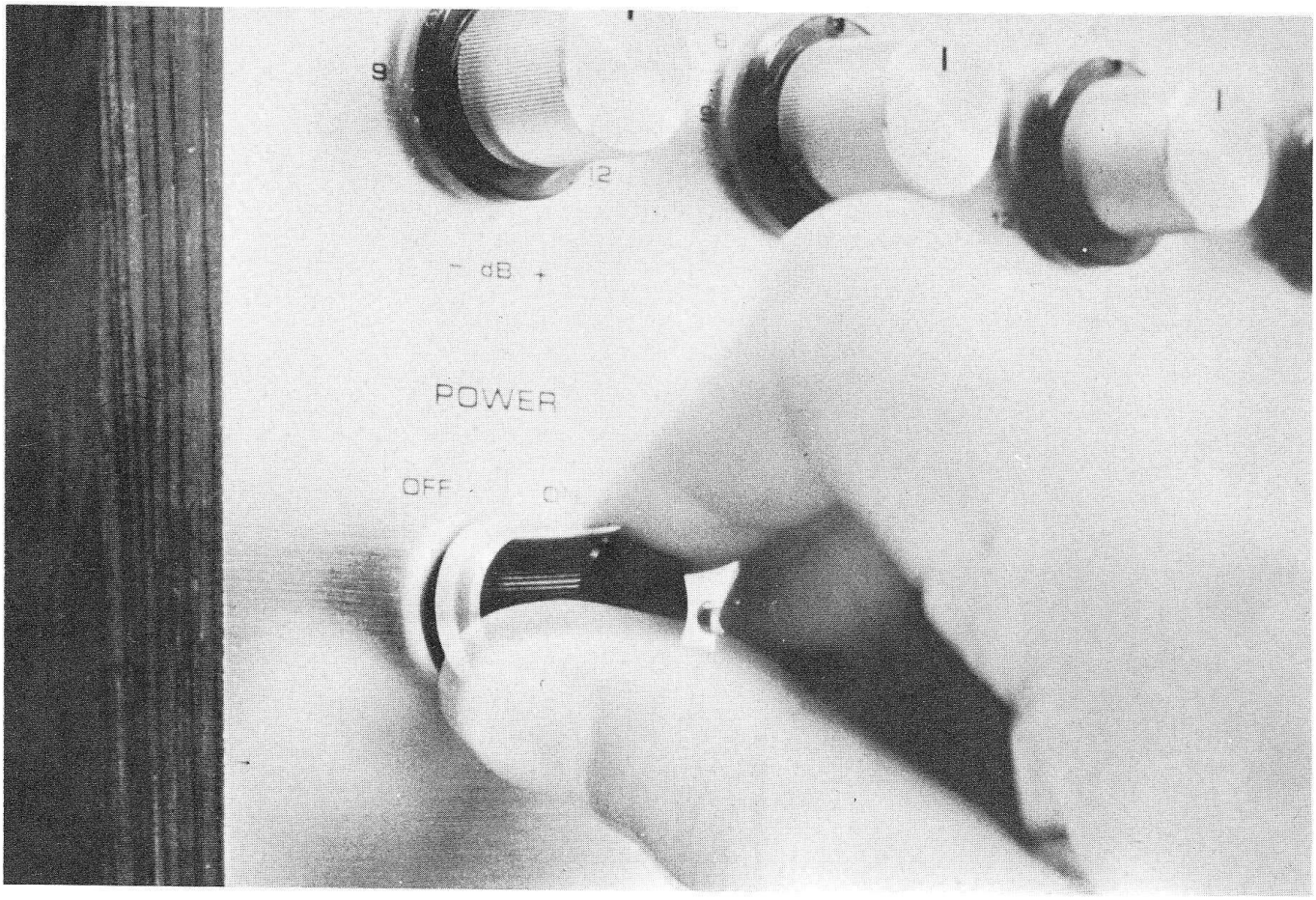
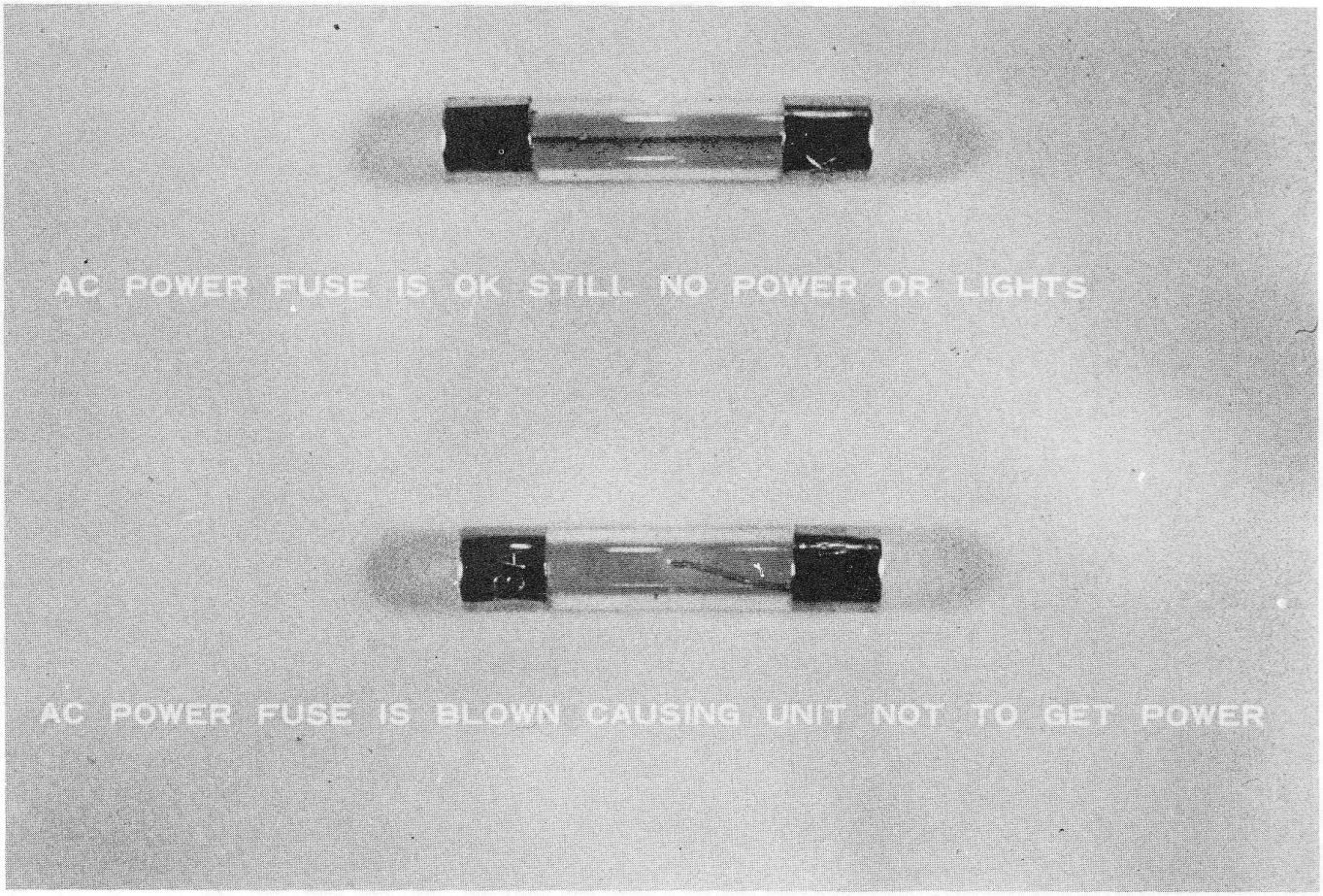


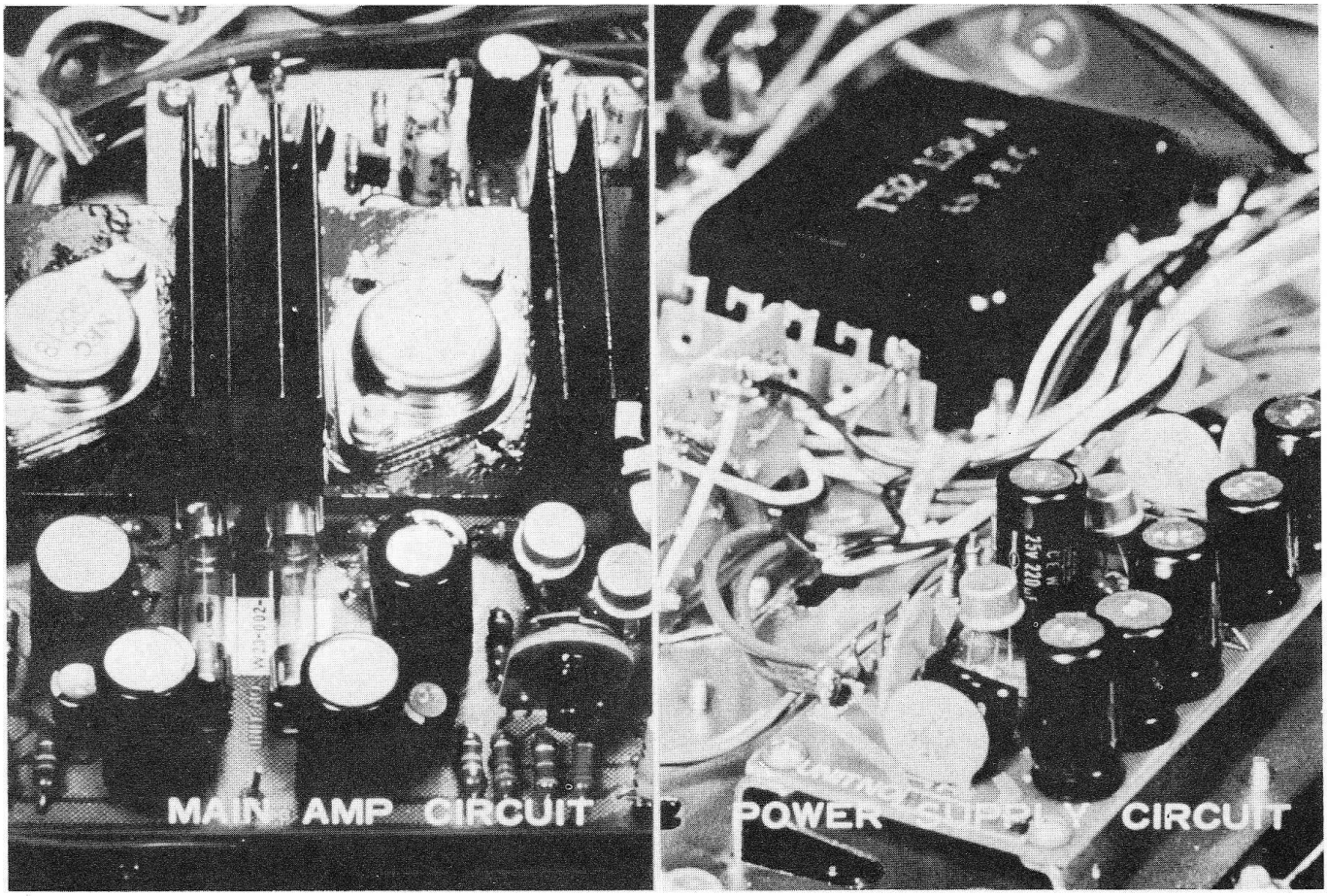
3. WHEN THE STEREO RECEIVER OR AMPLIFIER WILL NOT OPERATE AS THE POWER SWITCH IS TURNED ON, ONE OR MORE PROBLEMS MAY BE POSSIBLE ALTHOUGH IT LOOKS LIKE A SIMPLE TROUBLE.



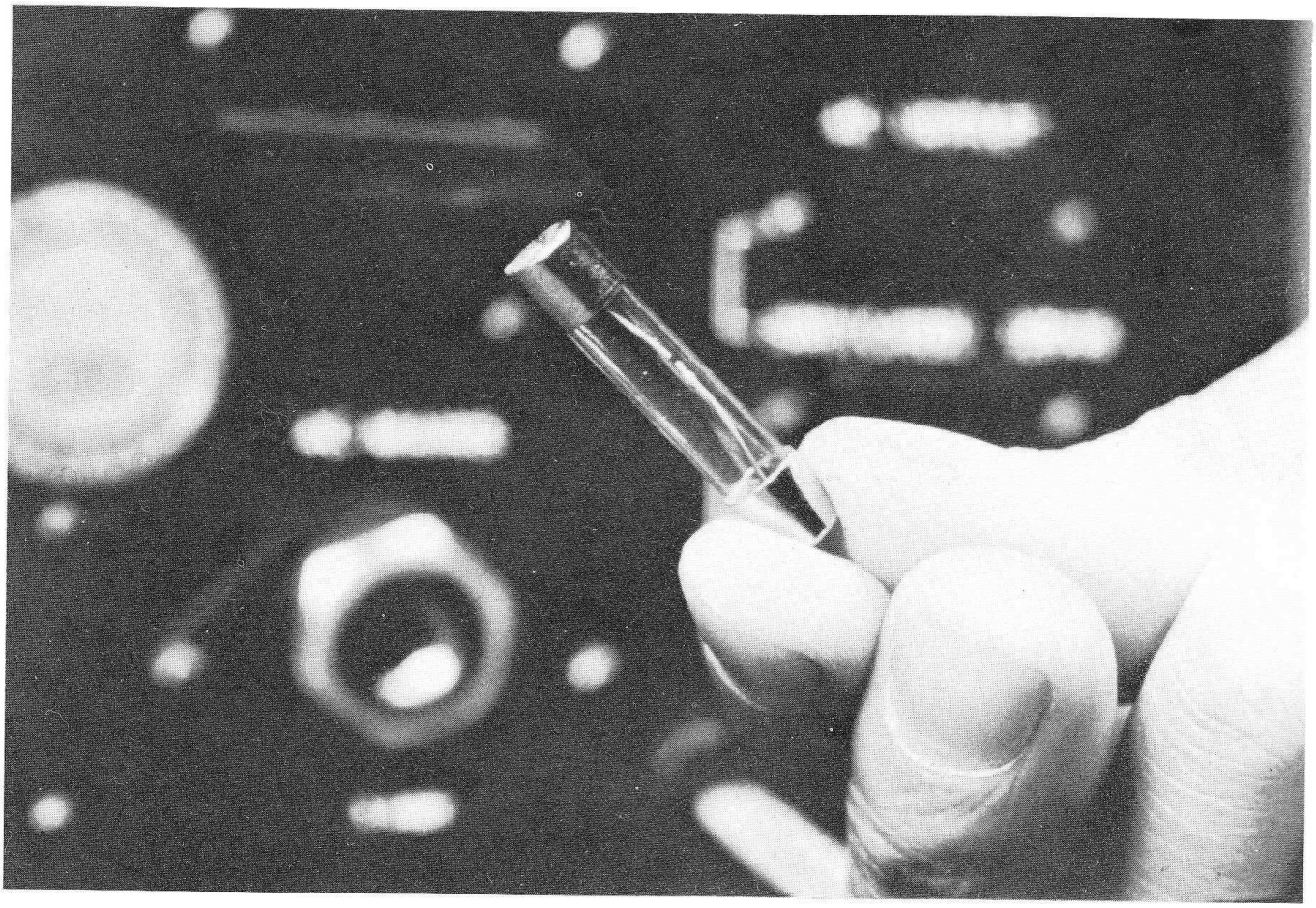
4. FAILURES CAN BE GENERALLY CLASSED IN TWO CATEGORIES.

A. WHEN POWER IS APPLIED, NO SOUND IS HEARD THROUGH SPEAKERS AND NO PANEL LAMPS OR NO OTHER LIGHTS ARE ON. THAT IS THE POWER FUSE IS BLOWN.

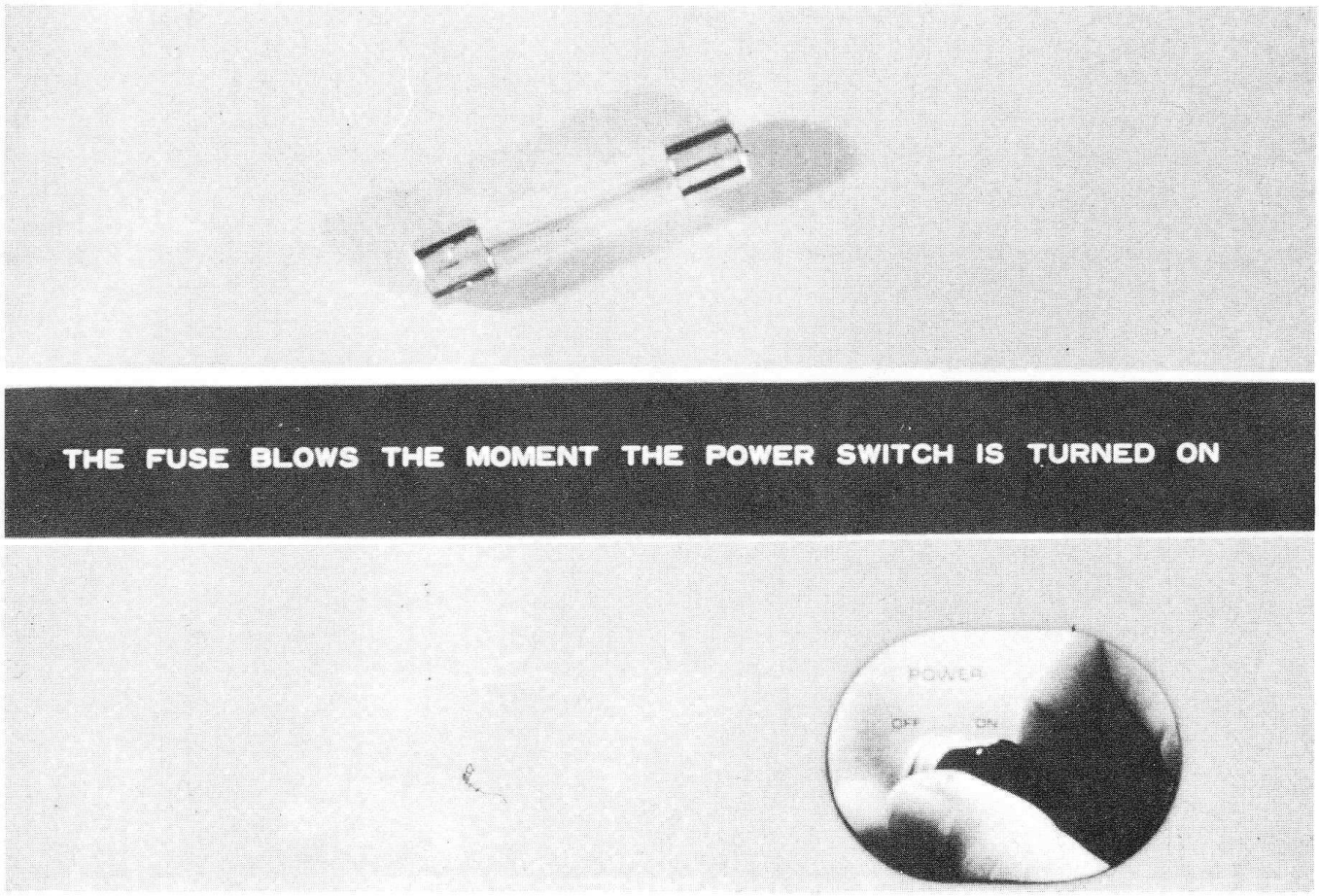
B. WHEN POWER IS APPLIED, NO SOUND IS HEARD BUT PANEL LAMPS ARE ON AND EVERYTHING ELSE APPEARS NORMAL. THAT IS THE POWER FUSE IS NOT BLOWN.



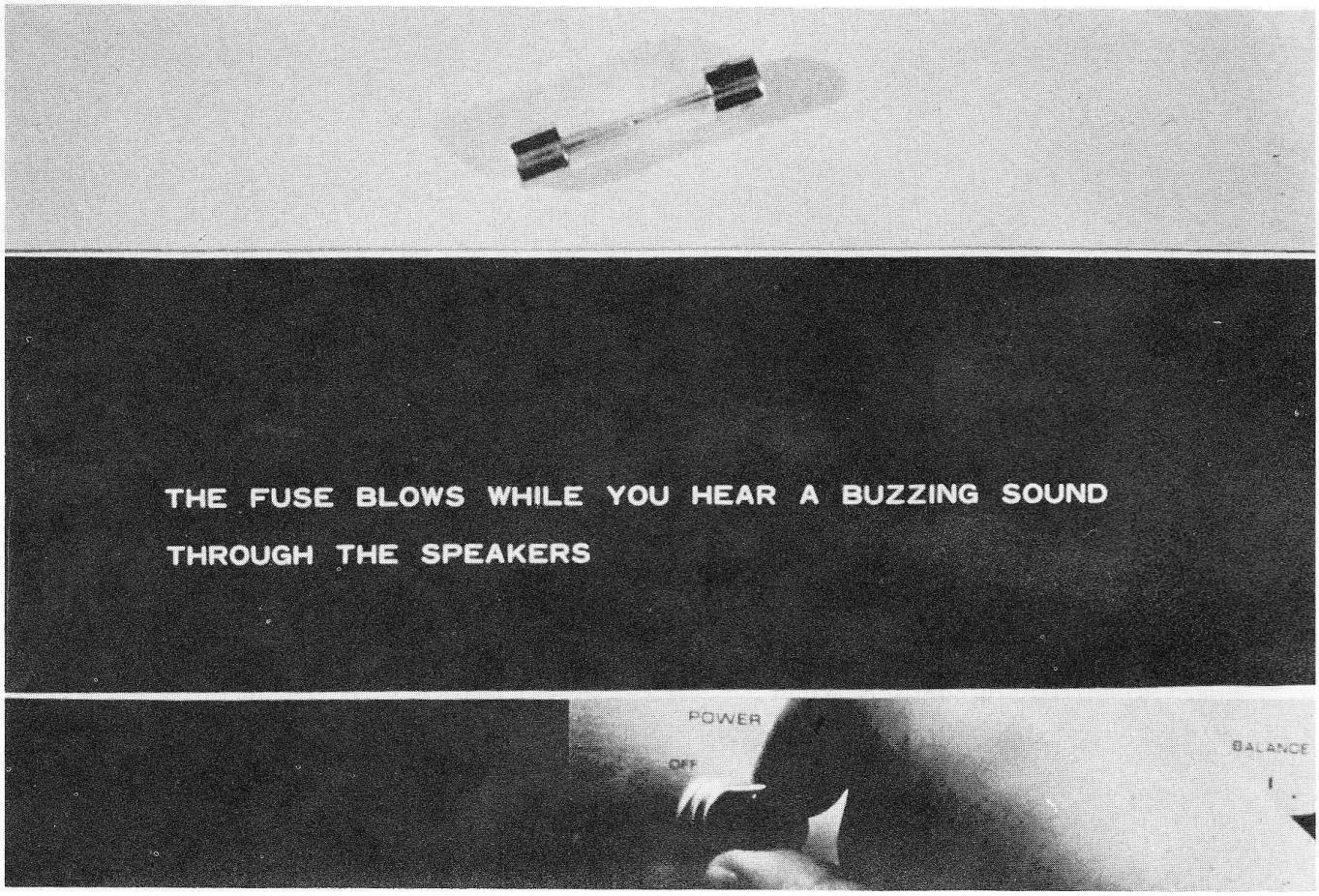
5. WHEN THE FUSE DOES NOT BLOW, THE TROUBLE IS IN THE POWER SUPPLY CIRCUIT IN MOST CASES. HOWEVER, WHEN THE FUSE BLOWS THEN THE GENERAL CASE OF THE TROUBLE WILL BE IN EITHER THE POWER SUPPLY OR THE MAIN AMP CIRCUIT.



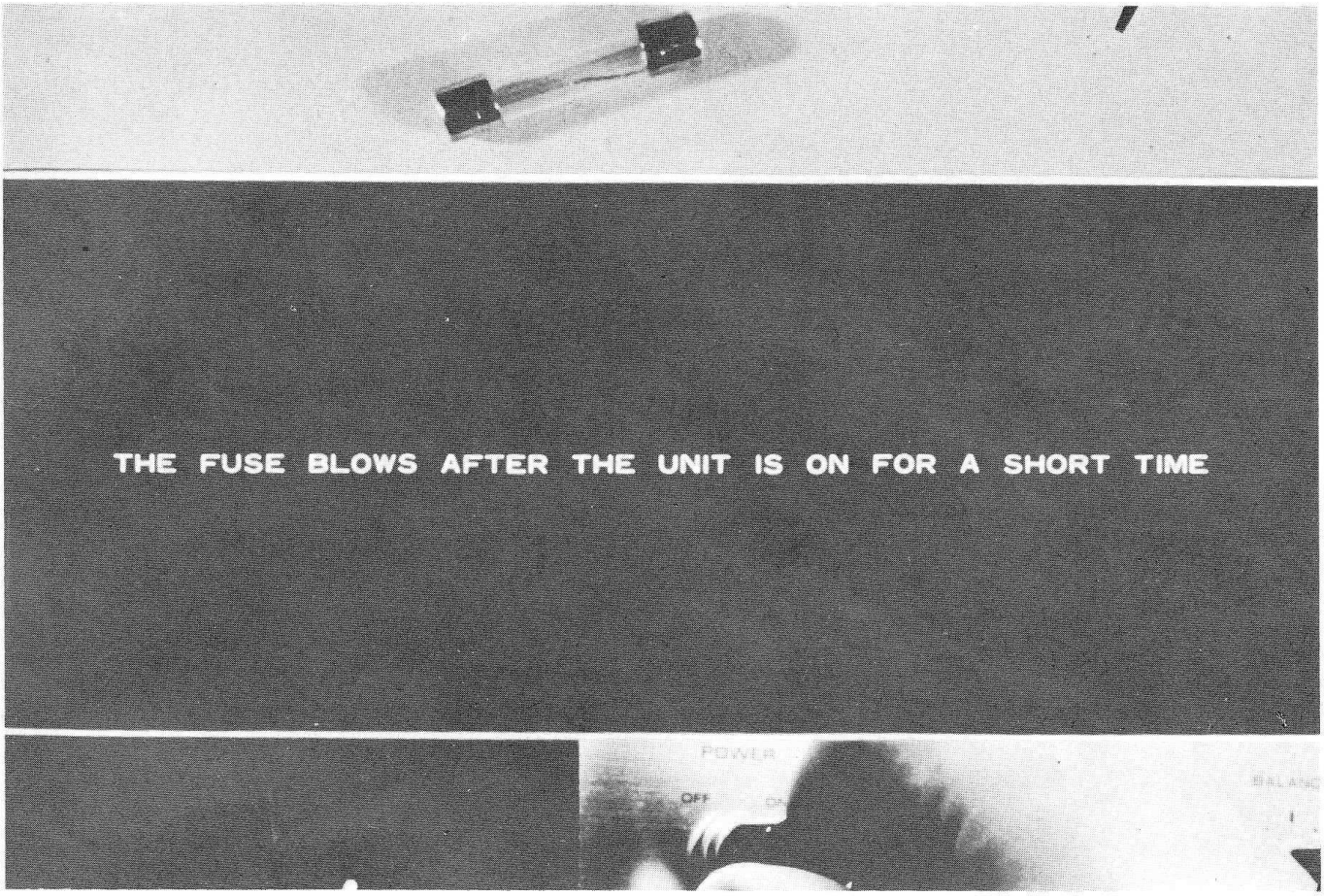
6. IN CASE THE FUSE BLOWS, HOW THE FUSE BLOWS WILL ALSO TELL US THE NATURE OF THE PROBLEM.



7. THE FUSE BLOWS THE MOMENT THE POWER SWITCH IS TURNED ON.

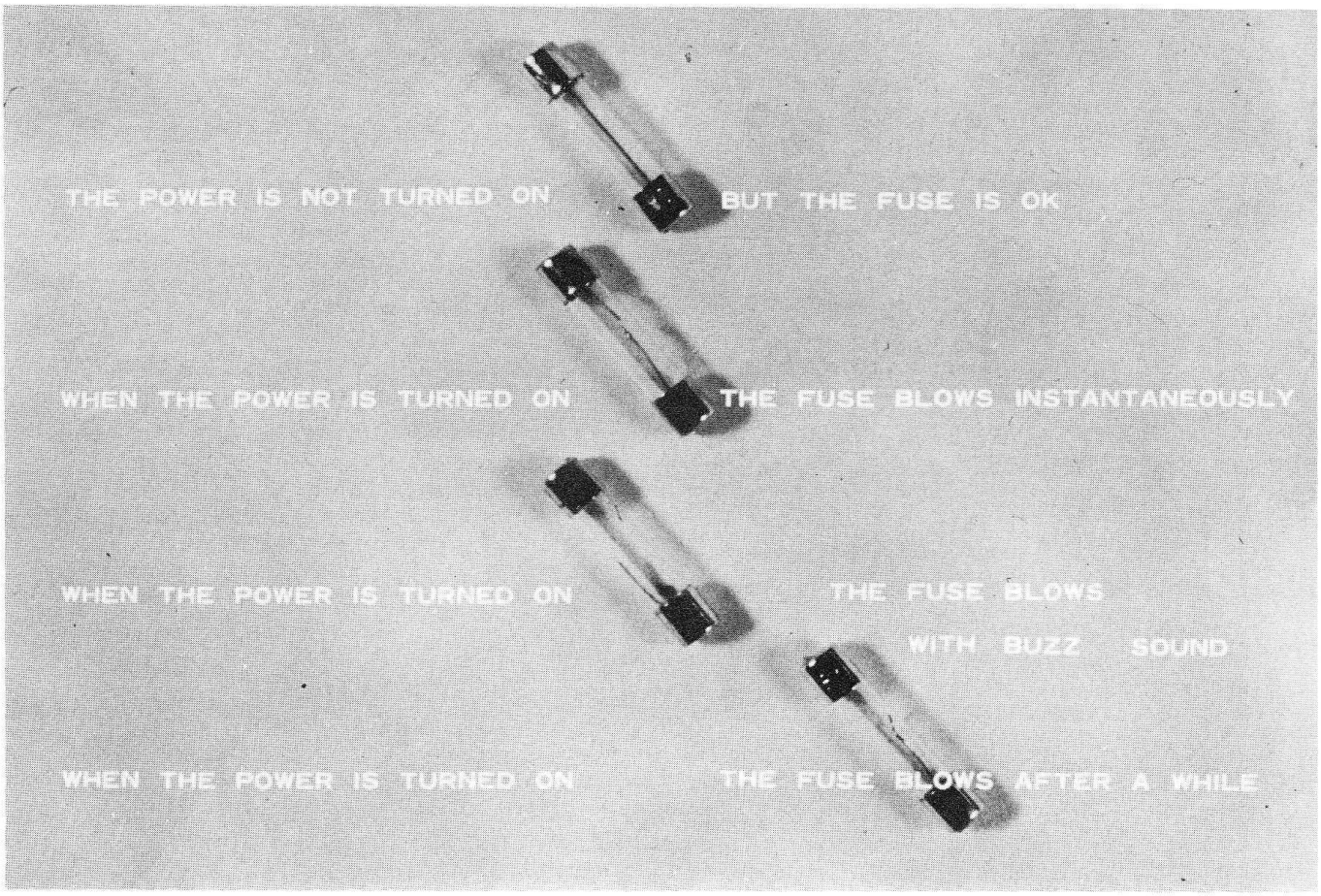


8. THE FUSE BLOWS WHILE YOU HEAR A BUZZING SOUND THROUGH THE SPEAKERS.

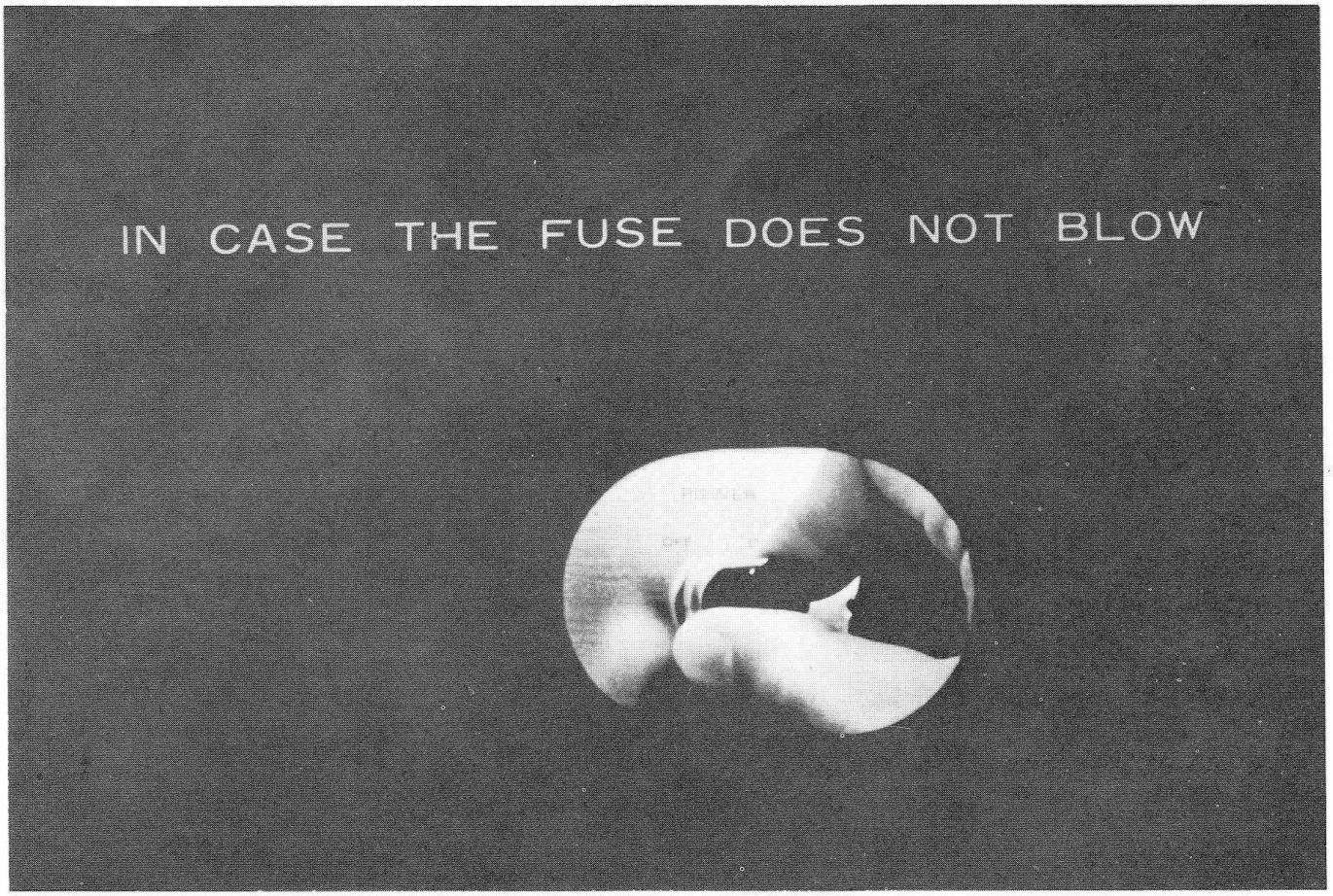


9. THE FUSE BLOWS AFTER THE UNIT IS ON FOR A SHORT TIME . . .

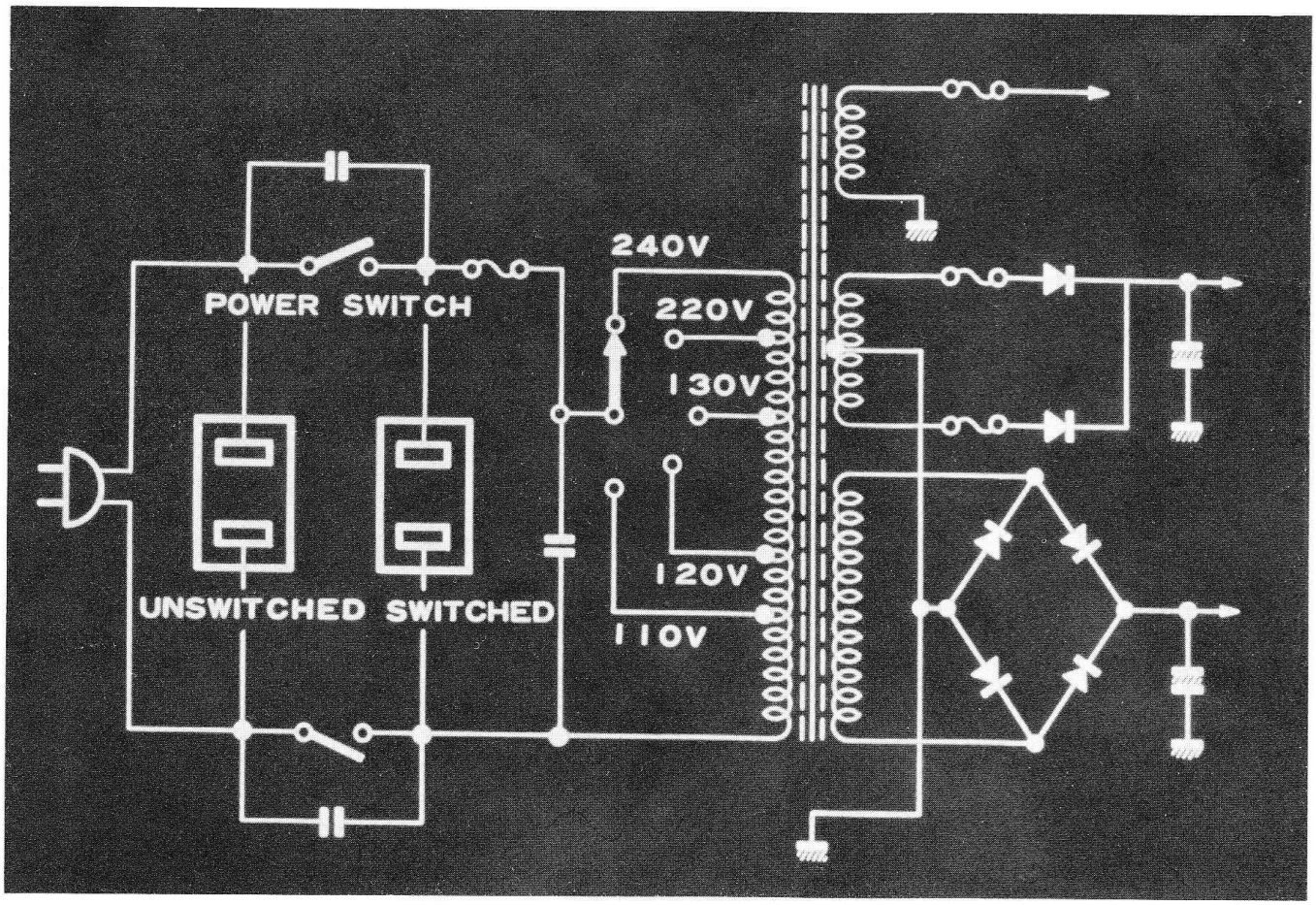
WELL, THERE ARE SEVERAL WAYS HOW THE FUSE BLOWS.



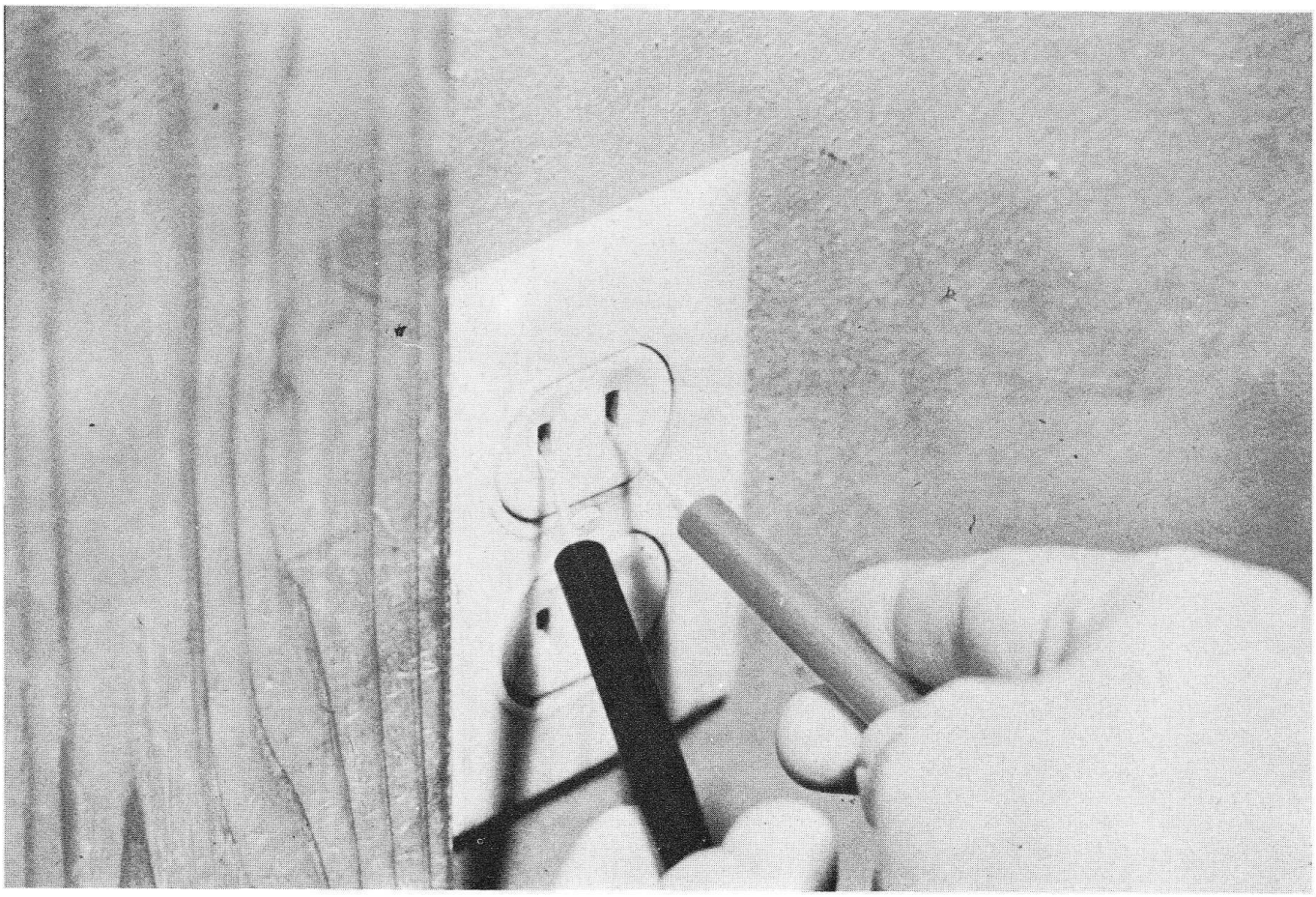
10. IF WE OBSERVE CAREFULLY WHAT CONDITION OCCURS DURING YOUR CHECK OUT OF THE UNIT WE CAN GAIN MANY CLUES AS TO THE NATURE OF THE TROUBLE.



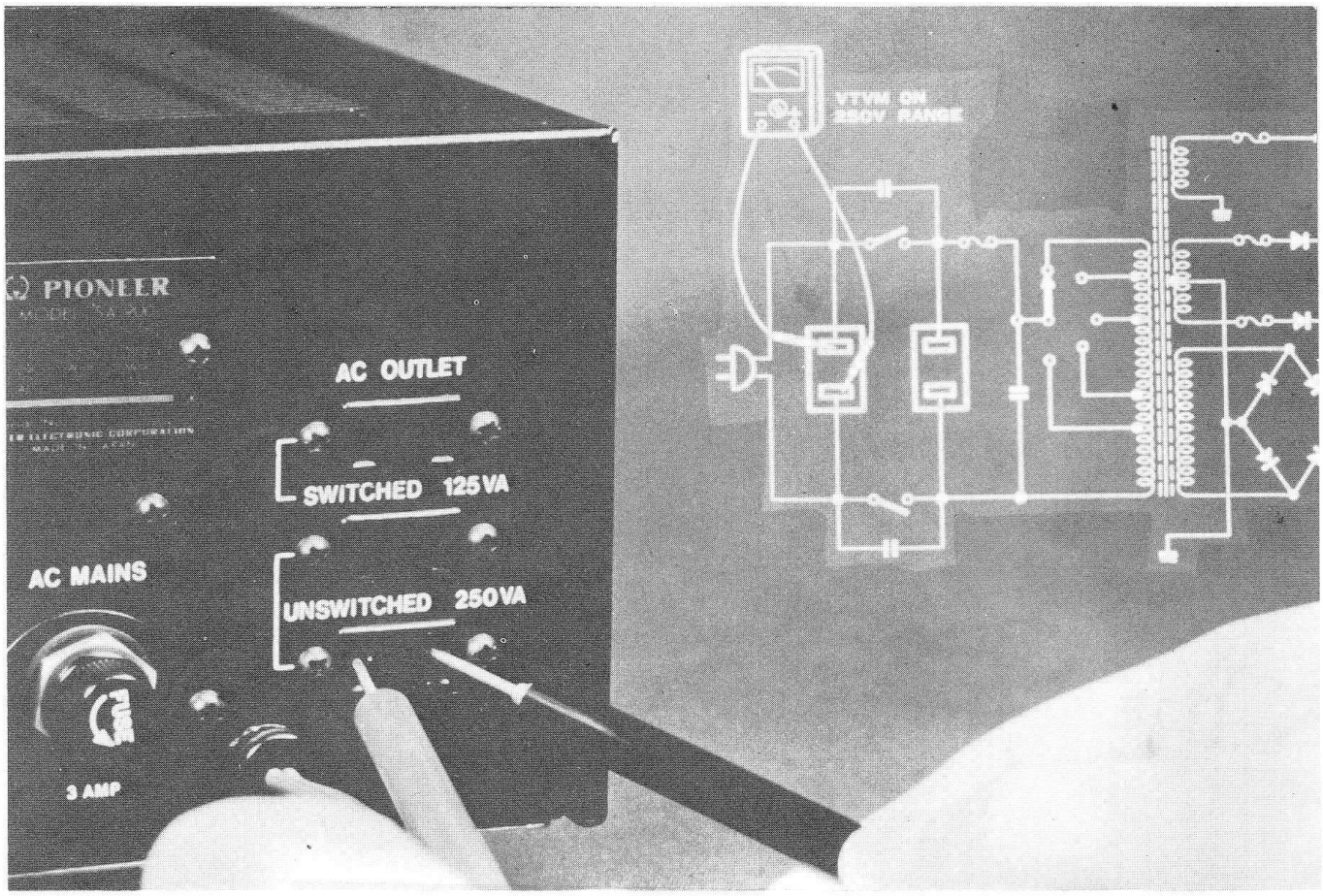
11. HEREAFTER WE WILL FOLLOW A LOGICAL TROUBLE SHOOTING PROCEDURE TO LOCATE THE DEFECT. IN CASE THE FUSE DOES NOT BLOW.



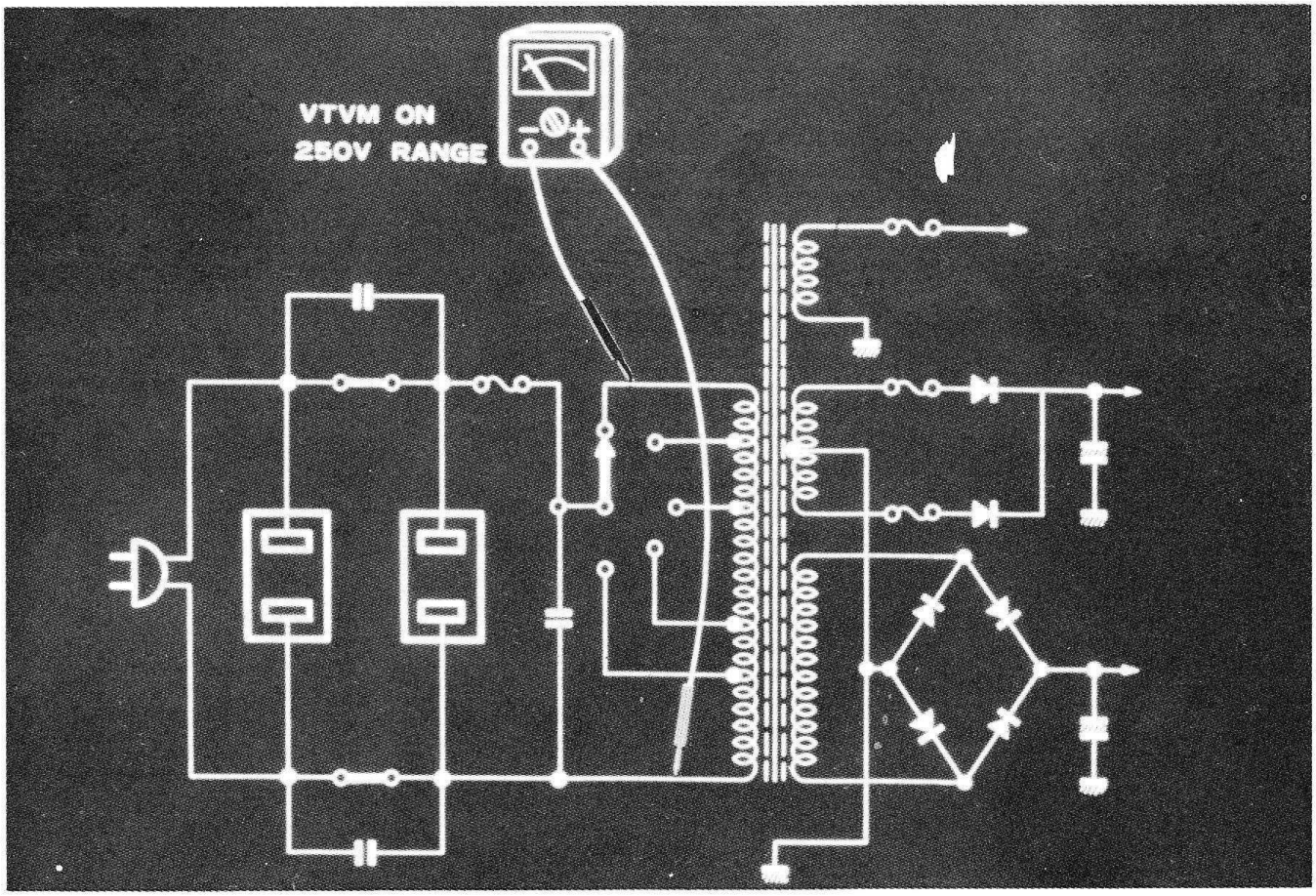
12. IF THE FUSE DOES NOT BLOW BUT THE UNIT STILL WILL NOT COME ON AT ALL. THEN GENERALLY THE PROBLEM WILL BE IN THE PRIMARY POWER CIRCUIT.



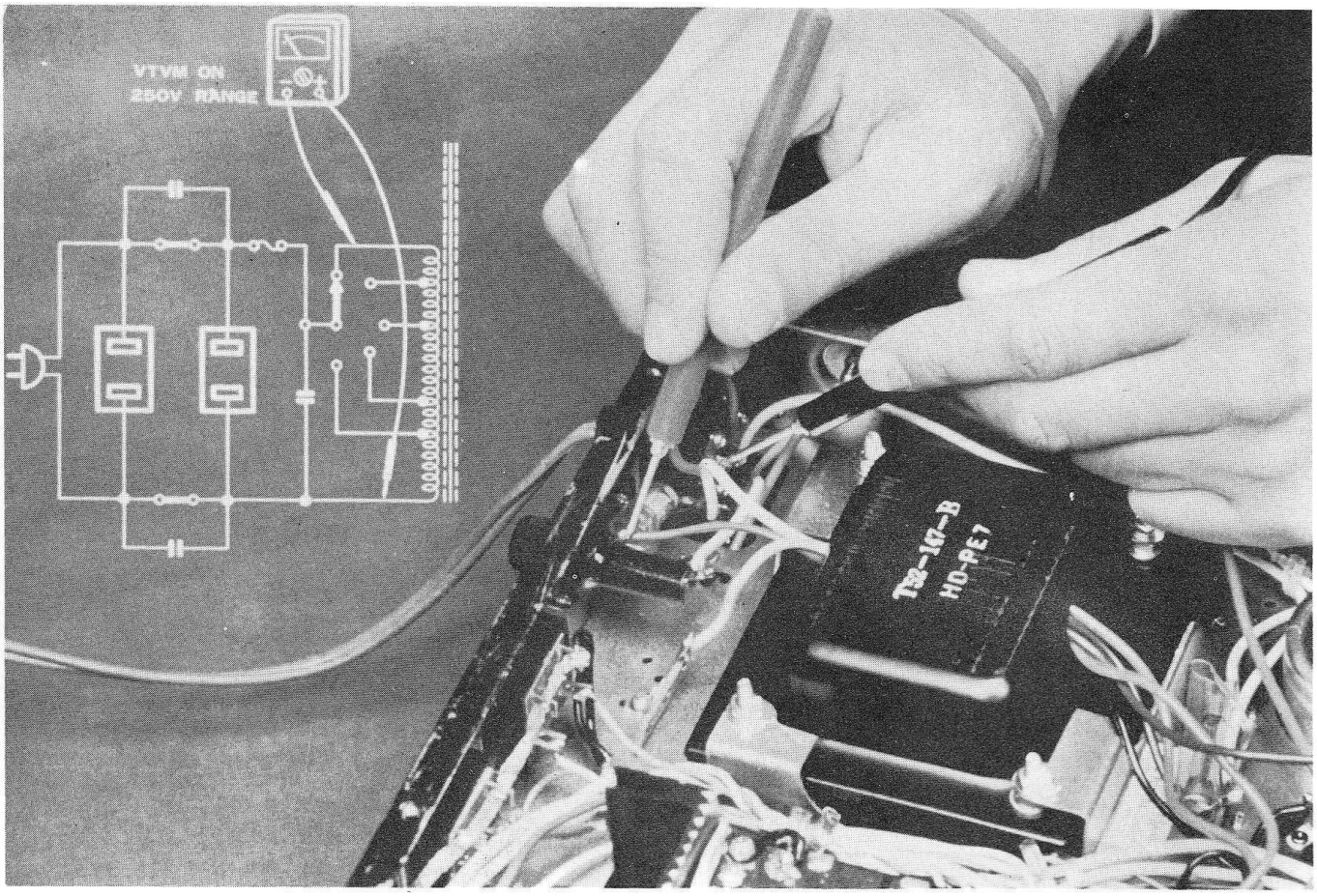
13. MEASURE THE LINE VOLTAGE TO SEE IF YOU ARE GETTING AC VOLTAGE OUT OF THE CORD. USE A VTVM ON 250V SCALE.



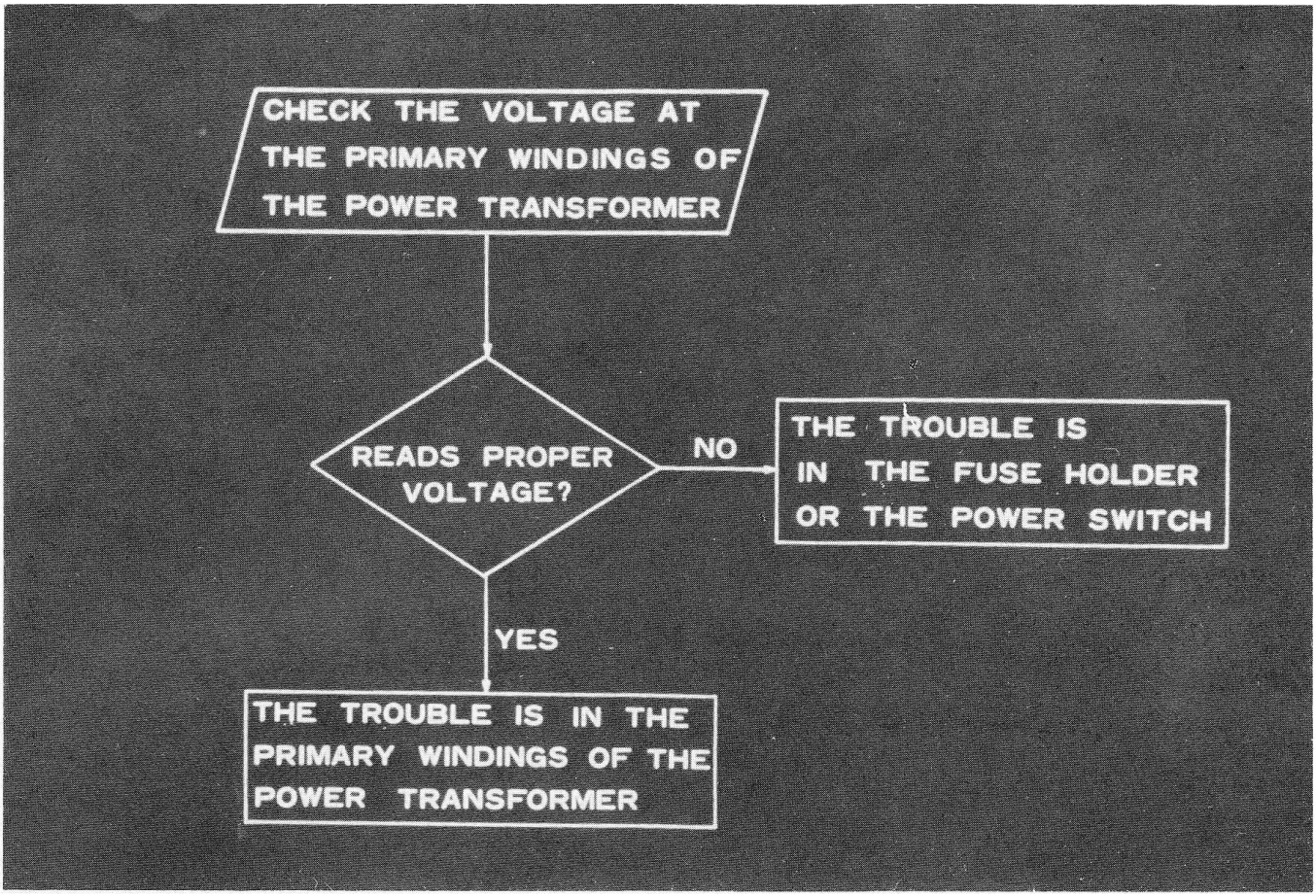
14. NEXT, LOOK ON THE REAR APRON OF THE RECEIVER, NEAR THE POINT WHERE THE A.C. CORD ENTERS THE UNIT. MOST UNITS HAVE ONE OR TWO AC SOCKETS, USUALLY ONE WILL BE LABELLED "SWITCHED" AND ONE WILL BE LABELLED "UNSWITCHED". TAKE A VTVM, SET TO THE PROPER RANGE, AND CHECK TO SEE IF THE LINE VOLTAGE IS PRESENT AT THE "UNSWITCHED" AC SOCKET. IF VOLTAGE IS PRESENT THEN YOUR POWER CORD AND WIRING ARE OK. IF THE VOLTAGE IS NOT PRESENT, THEN CHECK FOR A POOR PLUG AT THE END OF THE CORD, LOOK FOR A BROKEN WIRE IN THE CORD.



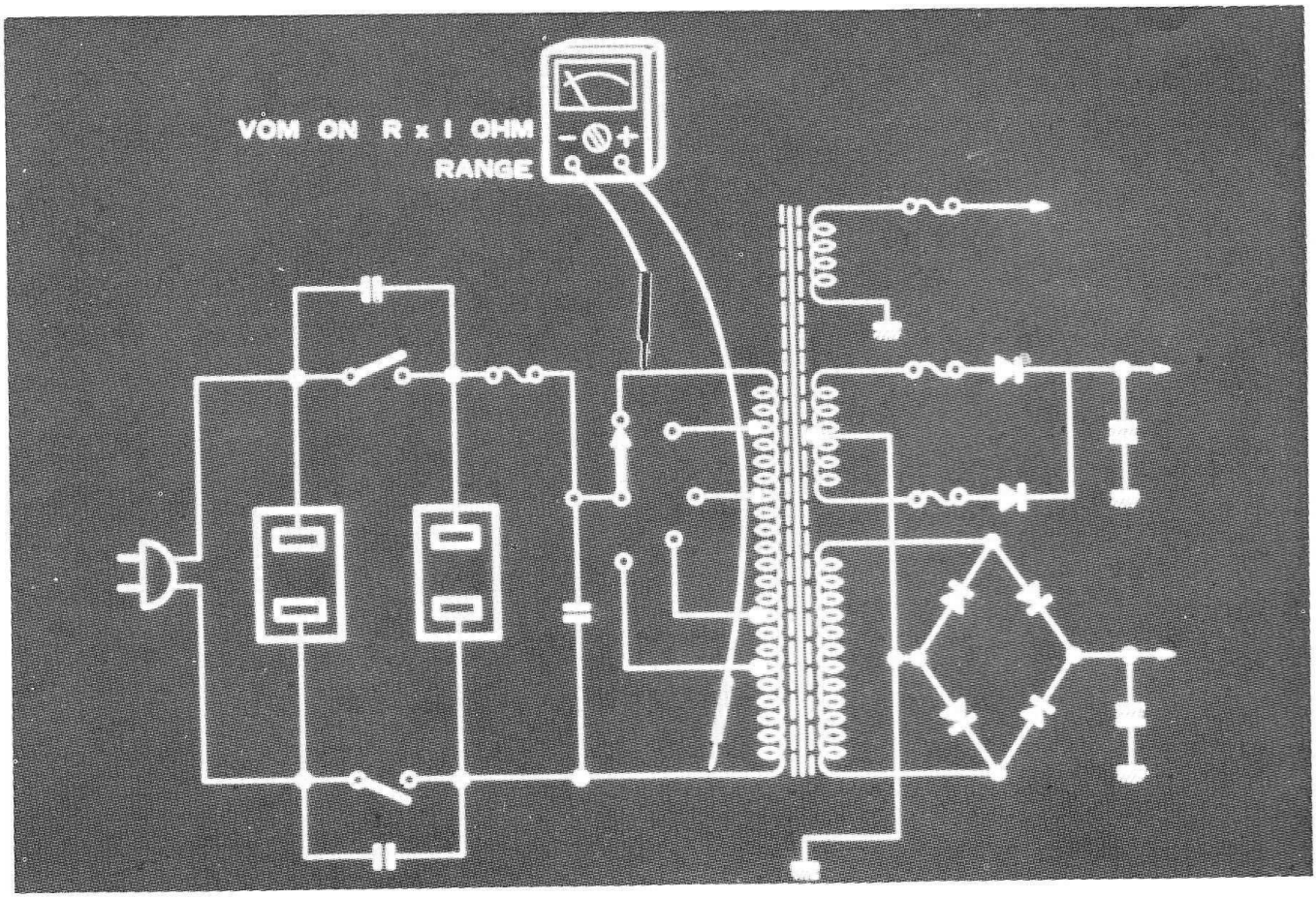
15. IF VOLTAGE IS PRESENT IN THE "UNSWITCHED" SOCKET, THEN CHECK VOLTAGE ACROSS THE PRIMARY WINDING OF THE POWER TRANSFORMER. USE A VTVM ON 250V RANGE.



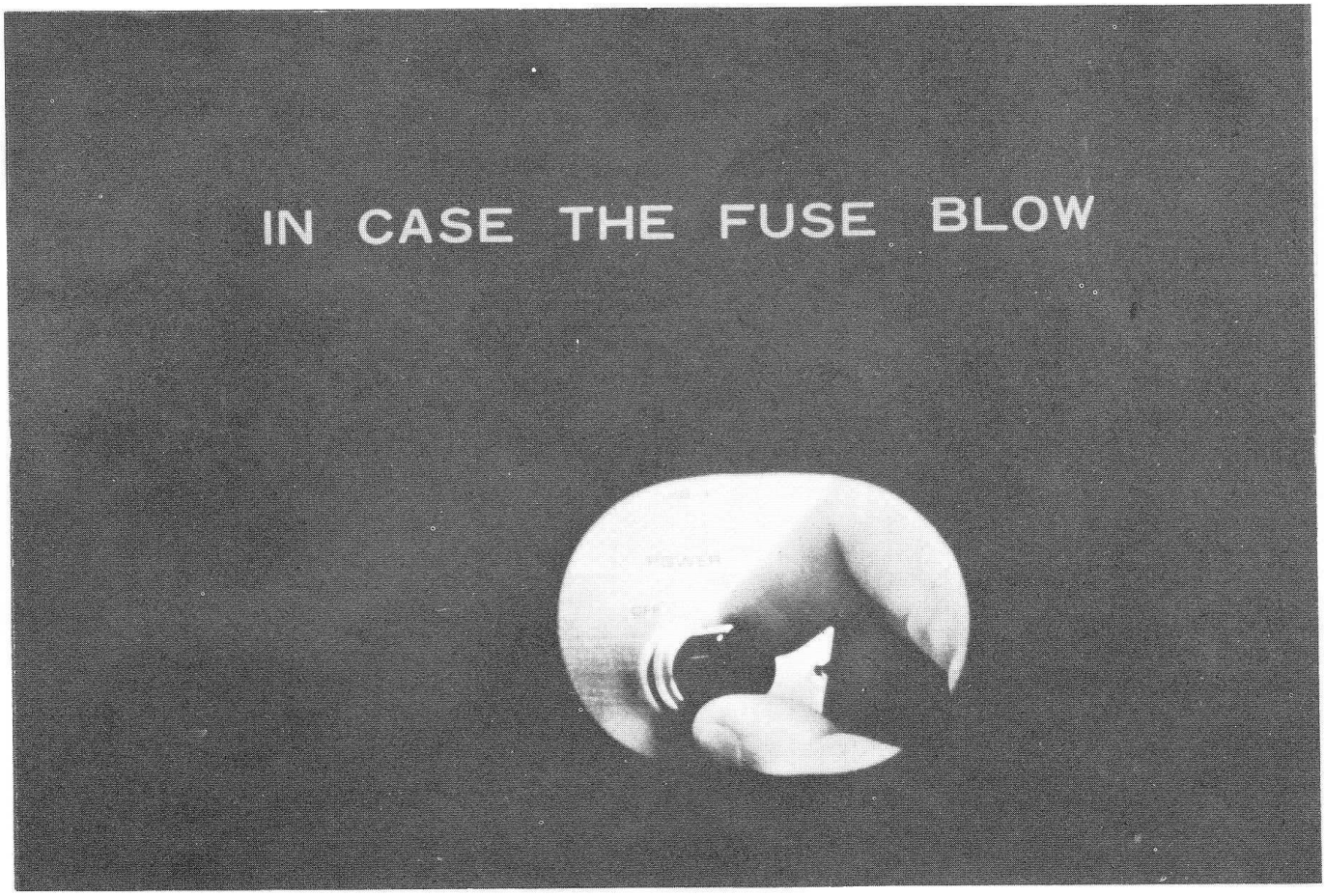
16. IF YOU DO NOT GET A READING, THEN THE FUSE HOLDER OR POWER SWITCH IS DEFECTIVE. IF YOU READ THE PROPER VOLTAGE, THEN THE PRIMARY WINDING OF THE POWER TRANSFORMER MUST BE OPEN.



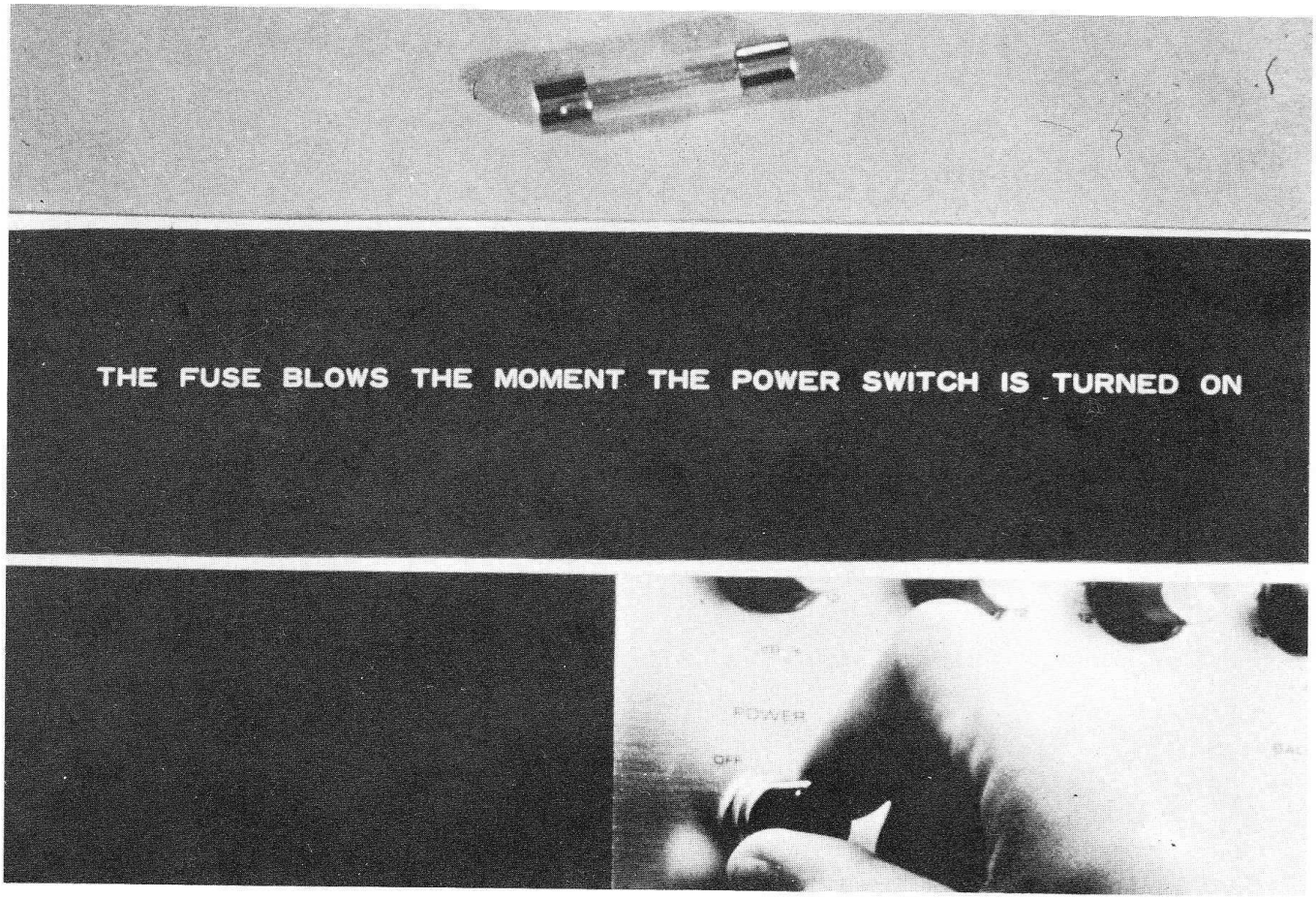
17. CHECK THE VOLTAGE AT THE PRIMARY WINDING OF THE TRANSFORMER. IF IT READS THE PROPER VOLTAGE THEN THE PRIMARY WINDING IS DEFECTIVE. IF IT DOES NOT READ PROPERLY THEN THE FUSE HOLDER OR THE POWER SWITCH IS DEFECTIVE.



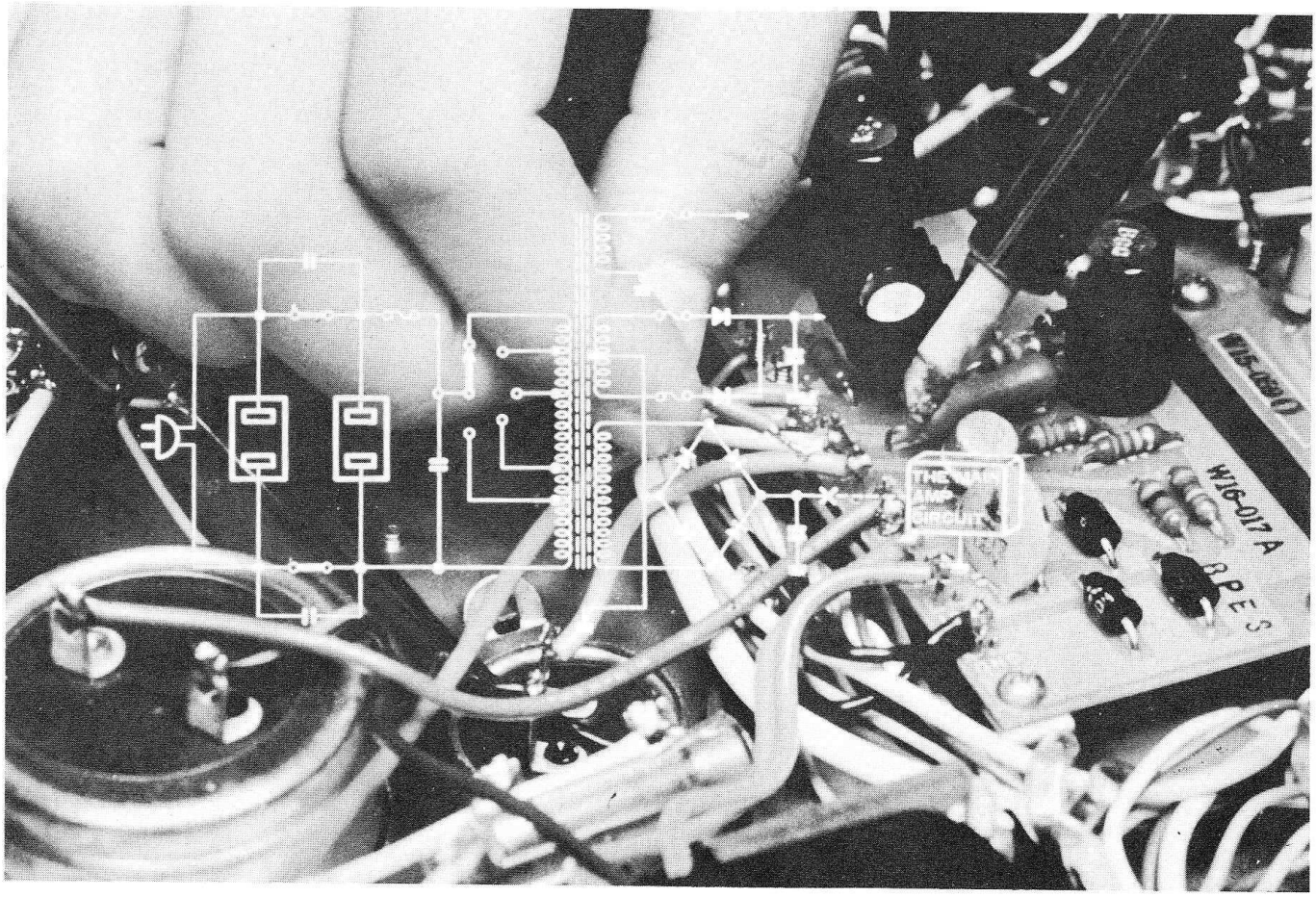
18. TO CHECK THE PRIMARY WINDING, UNPLUG THE MAIN POWER FROM THE WALL, THEN MEASURE THE CONTINUITY ACROSS THE PRIMARY WINDING-USING A VOM ON Rx1 OHM RANGE. WHENEVER YOU CHECK THE CONTINUITIES, PLEASE BE SURE TO UNPLUG THE AC CORD FROM THE WALL. YOU SHOULD GET A READING OF APPROXIMATELY 30-300 OHMS. IF THE READING IS INFINITY THEN THE PRIMARY WINDING IS OPEN.



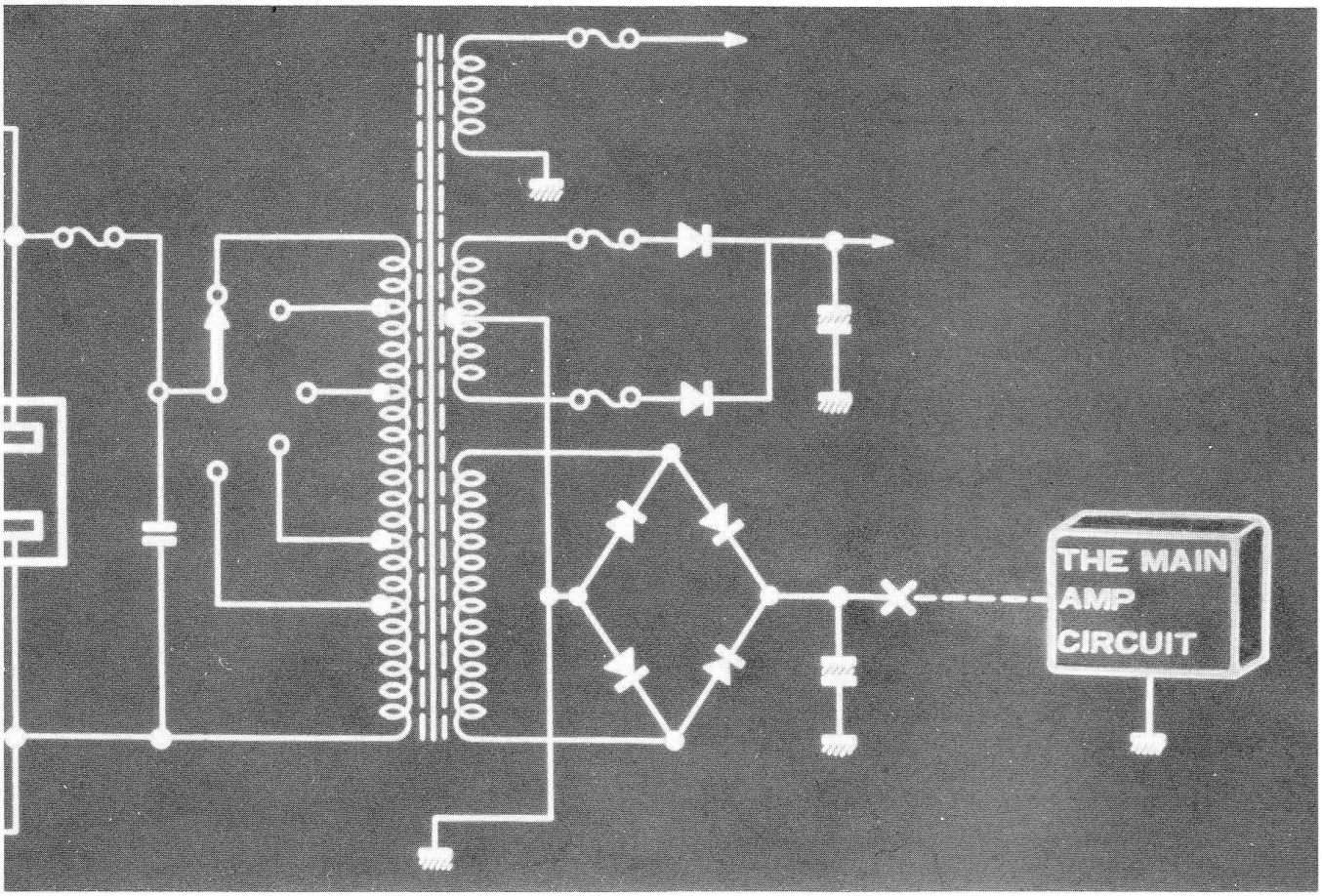
19. WHEN YOU HAVE A BLOWN FUSE THE PROBLEM MAY BE IN THE POWER SUPPLY OR THE MAIN AMP CIRCUITS.



20. LET US FIRST CONSIDER THE CASE WHEN THE FUSE BLOWS AS SOON AS POWER IS TURNED ON.

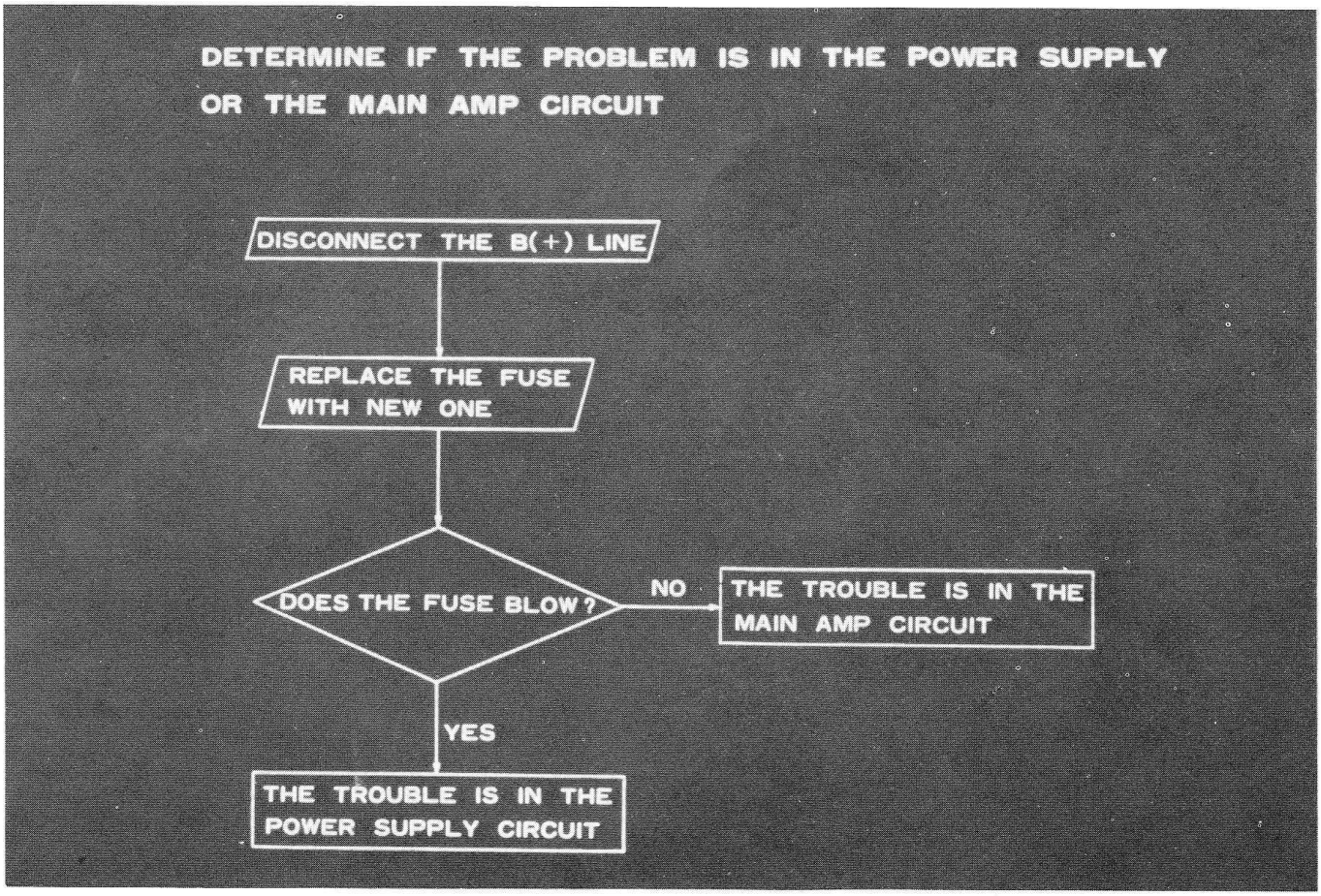


21. TO DETERMINE IF THE PROBLEM IS IN THE POWER SUPPLY OR THE MAIN AMP CIRCUIT, DISCONNECT THE B(+) LINE TO THE MAIN AMP.

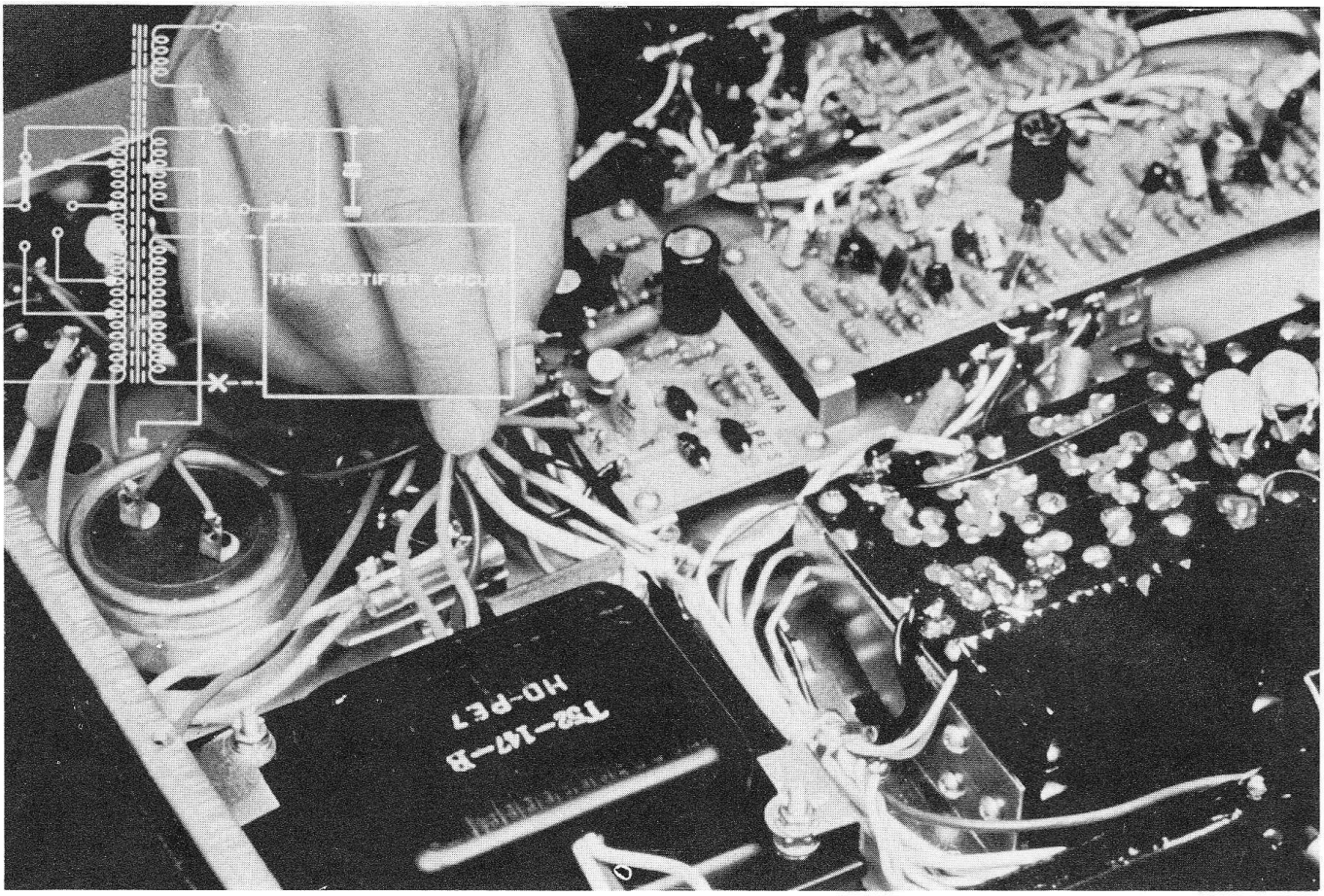


22.

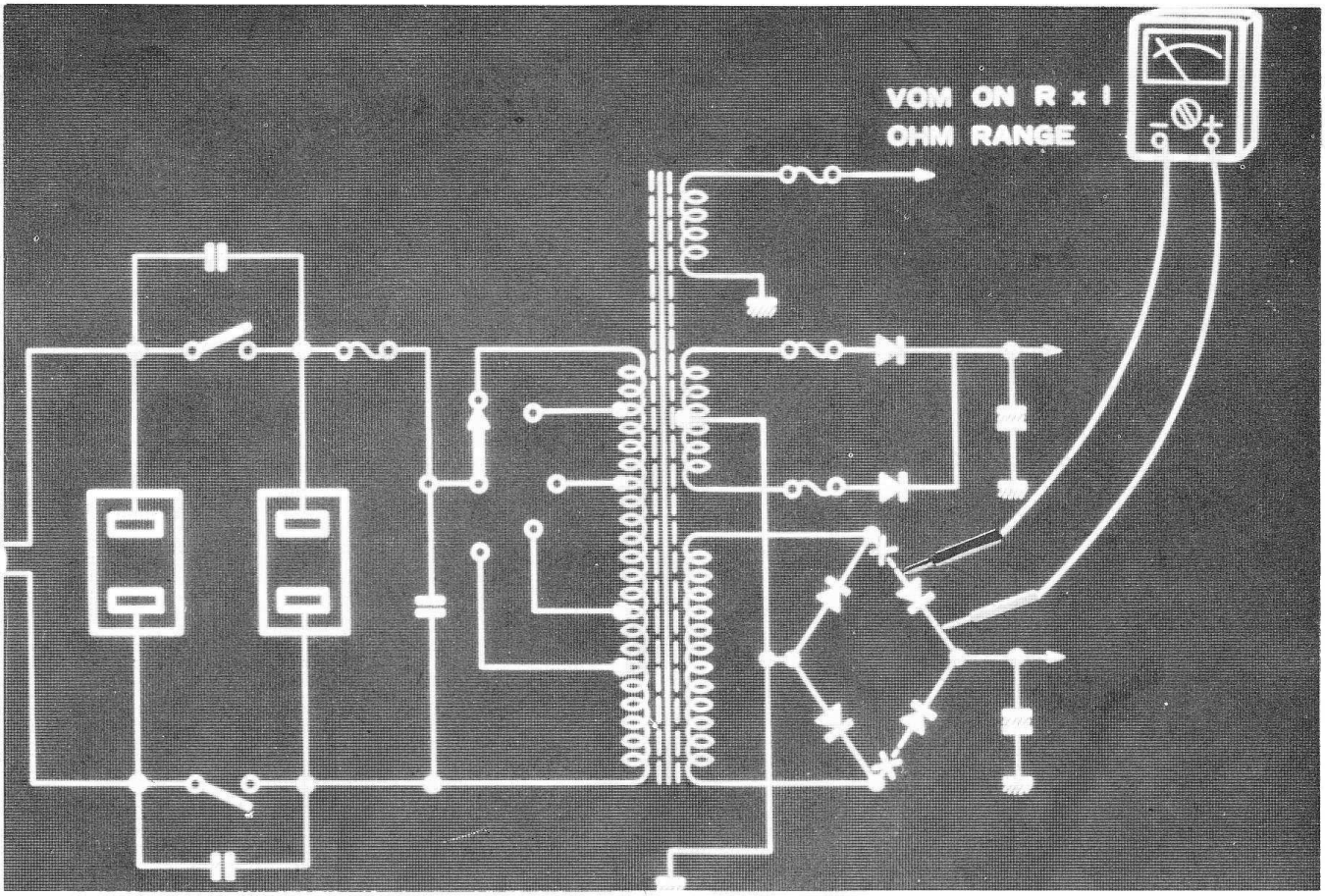
REPLACE THE BLOWN FUSE AND APPLY POWER TO THE UNIT. IF THE FUSE BLOWS AGAIN, THE POWER SUPPLY IS AT FAULT. IF IT DOES NOT, THE PROBLEM LIES IN THE MAIN AMP.



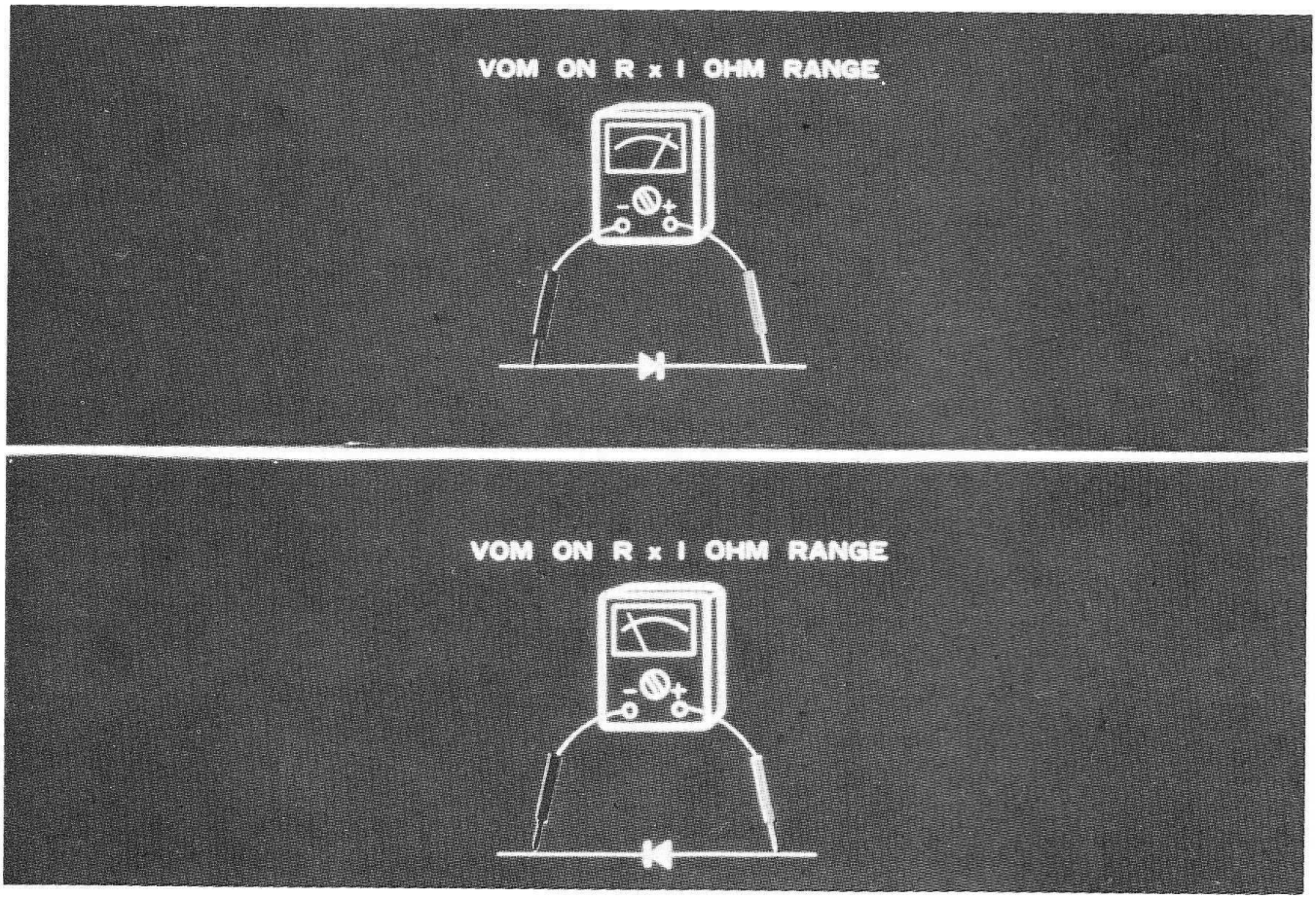
23. DETERMINE IF THE PROBLEM IS IN THE POWER SUPPLY OR THE MAIN AMP CIRCUIT. DISCONNECT THE B(+) LINE, REPLACE THE BLOWN FUSE. DOES THE FUSE BLOW AGAIN? IF "YES", THE PROBLEM IS IN THE POWER SUPPLY. IF "NO", THE PROBLEM IS IN THE MAIN AMP CIRCUIT.



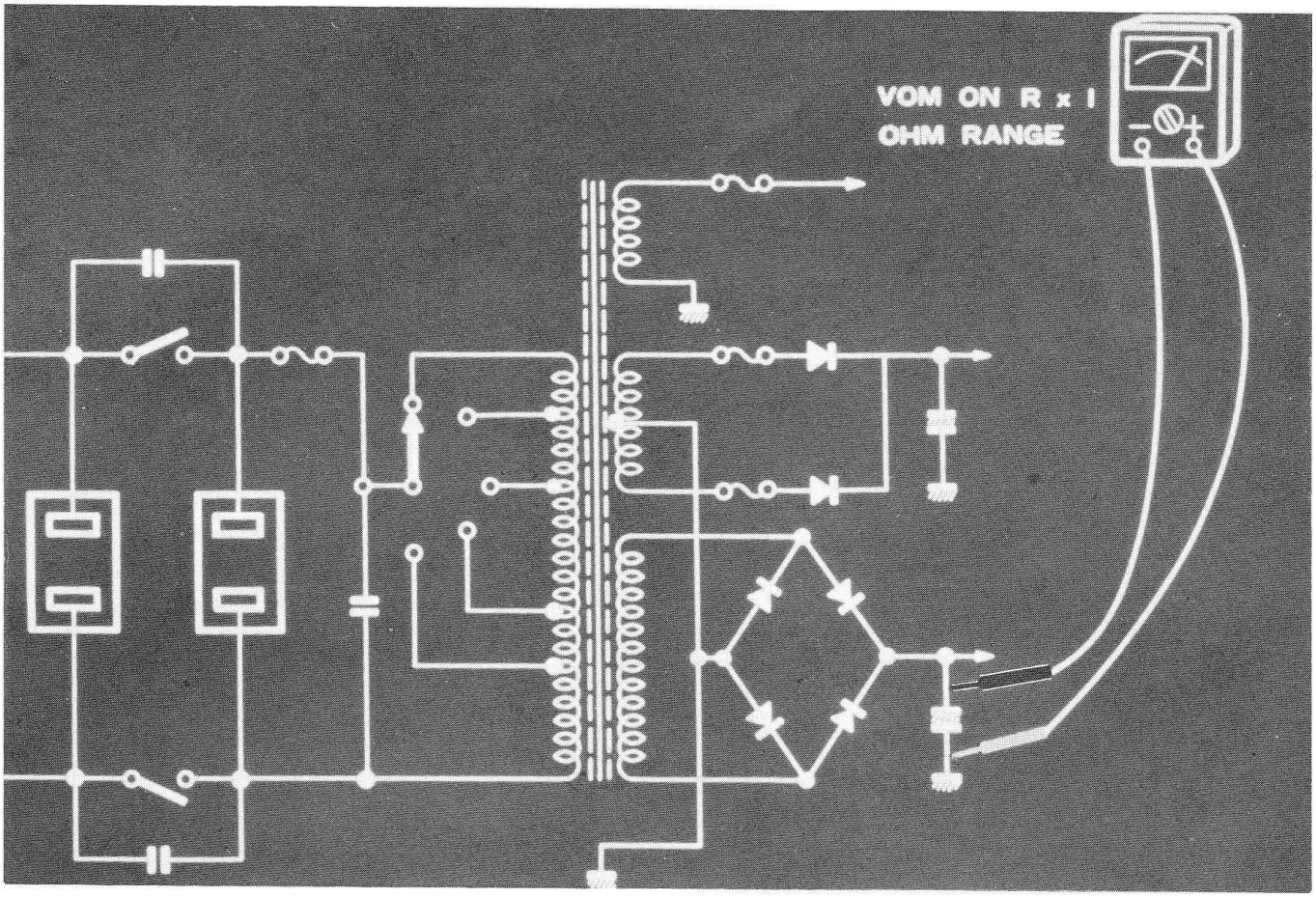
24. TO CHECK THE POWER SUPPLY CIRCUIT, DISCONNECT THE RECTIFIER CIRCUIT FROM THE SECONDARY WINDING OF THE TRANSFORMER. TURN ON THE UNIT WITH A GOOD FUSE INSTALLED. IF THE FUSE BLOWS THE FAILURE IS IN THE TRANSFORMER OR THE NOISE PREVENTION CAPACITOR.



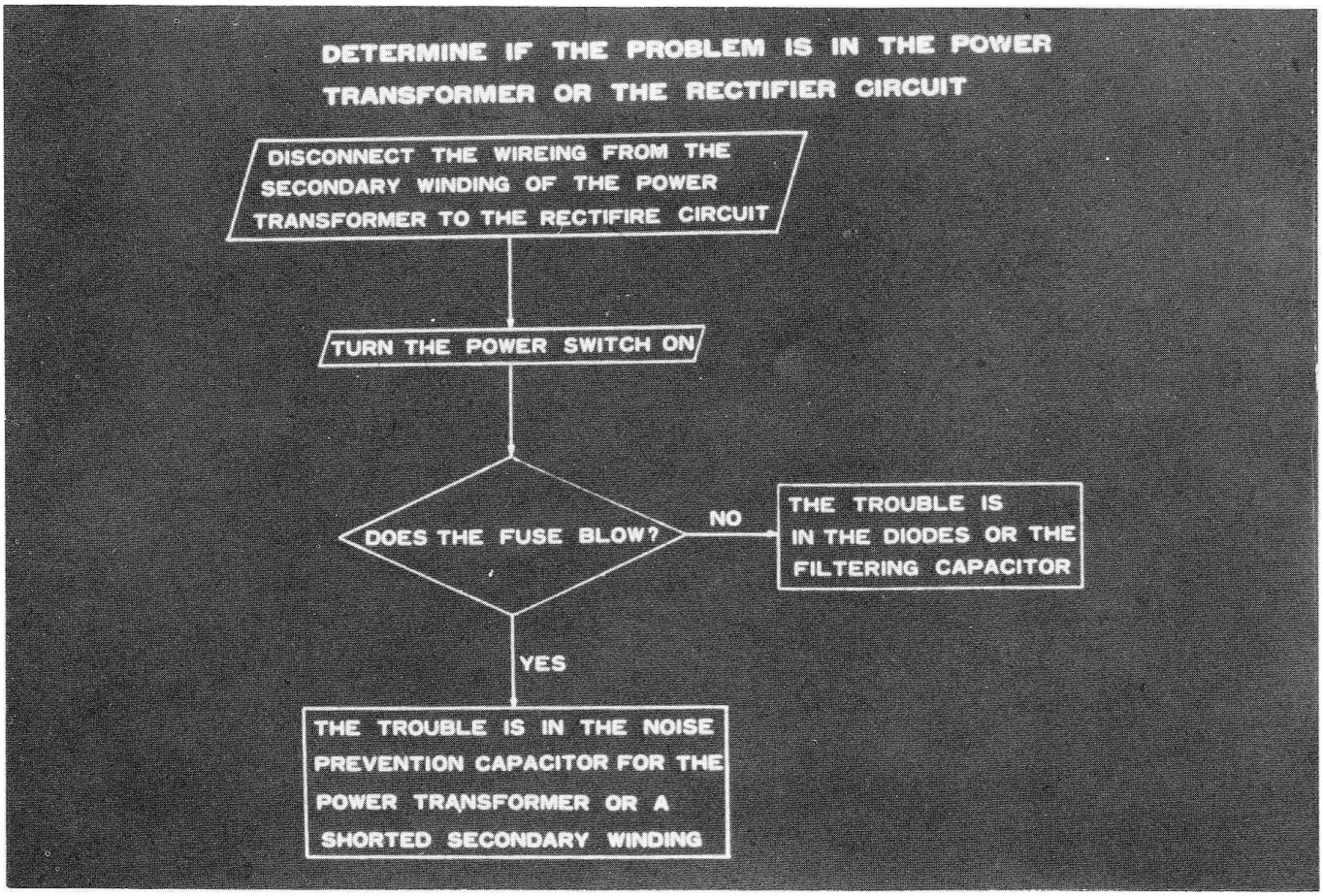
25. IF THE FUSE DID NOT BLOW IN THE PREVIOUS CHECK, THEN YOUR NEXT STEP IS TO CHECK THE DIODES IN THE RECTIFIER CIRCUIT FOR SHORTS.



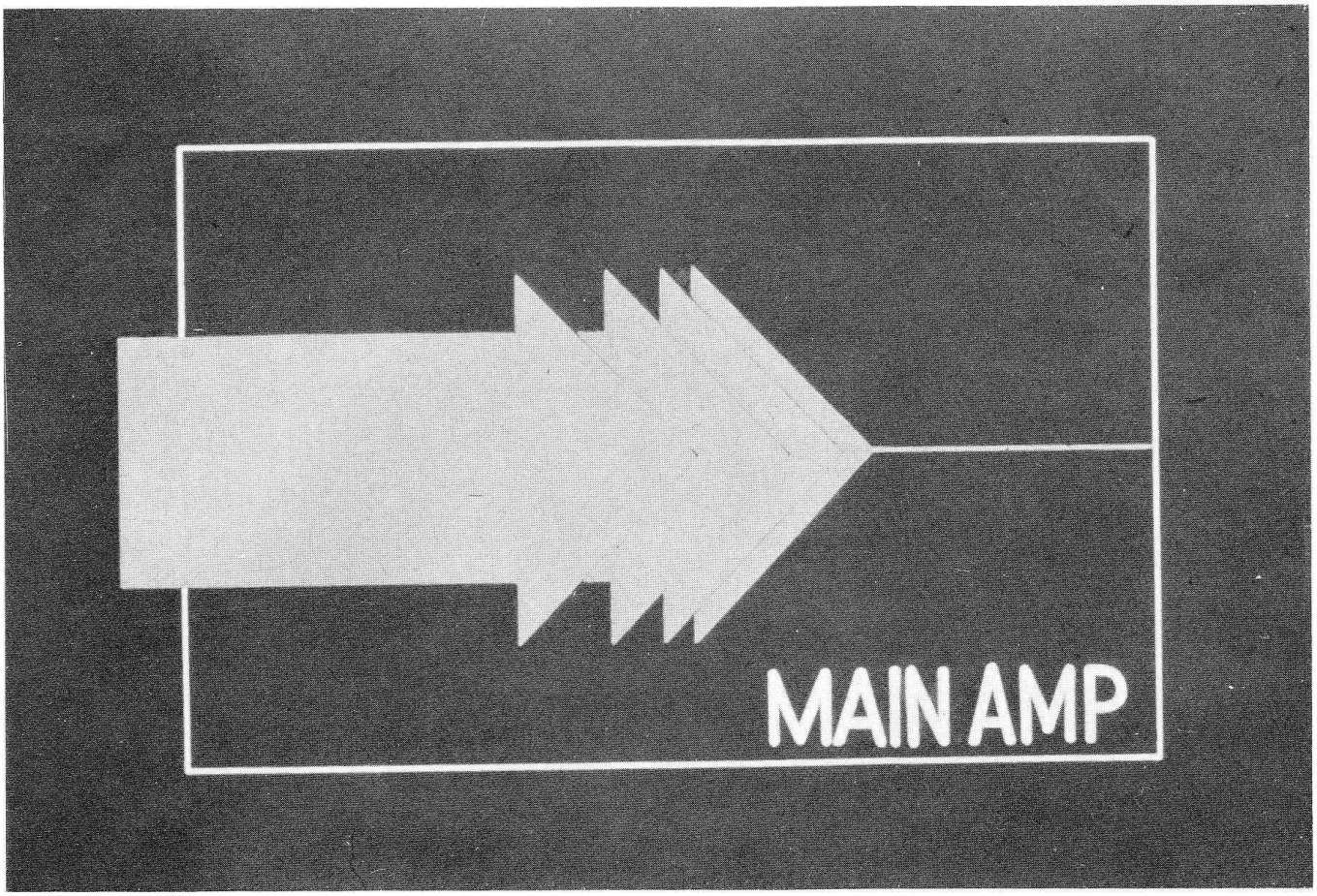
26. TO CHECK DIODES, SET THE VOM ON Rx1 OHM RANGE AND PLACE YOUR TEST LEADS ACROSS THE DIODES. YOU SHOULD GET A READING OF SEVERAL OHMS IN FORWARD DIRECTION AND INFINITY IN REVERSE DIRECTION.



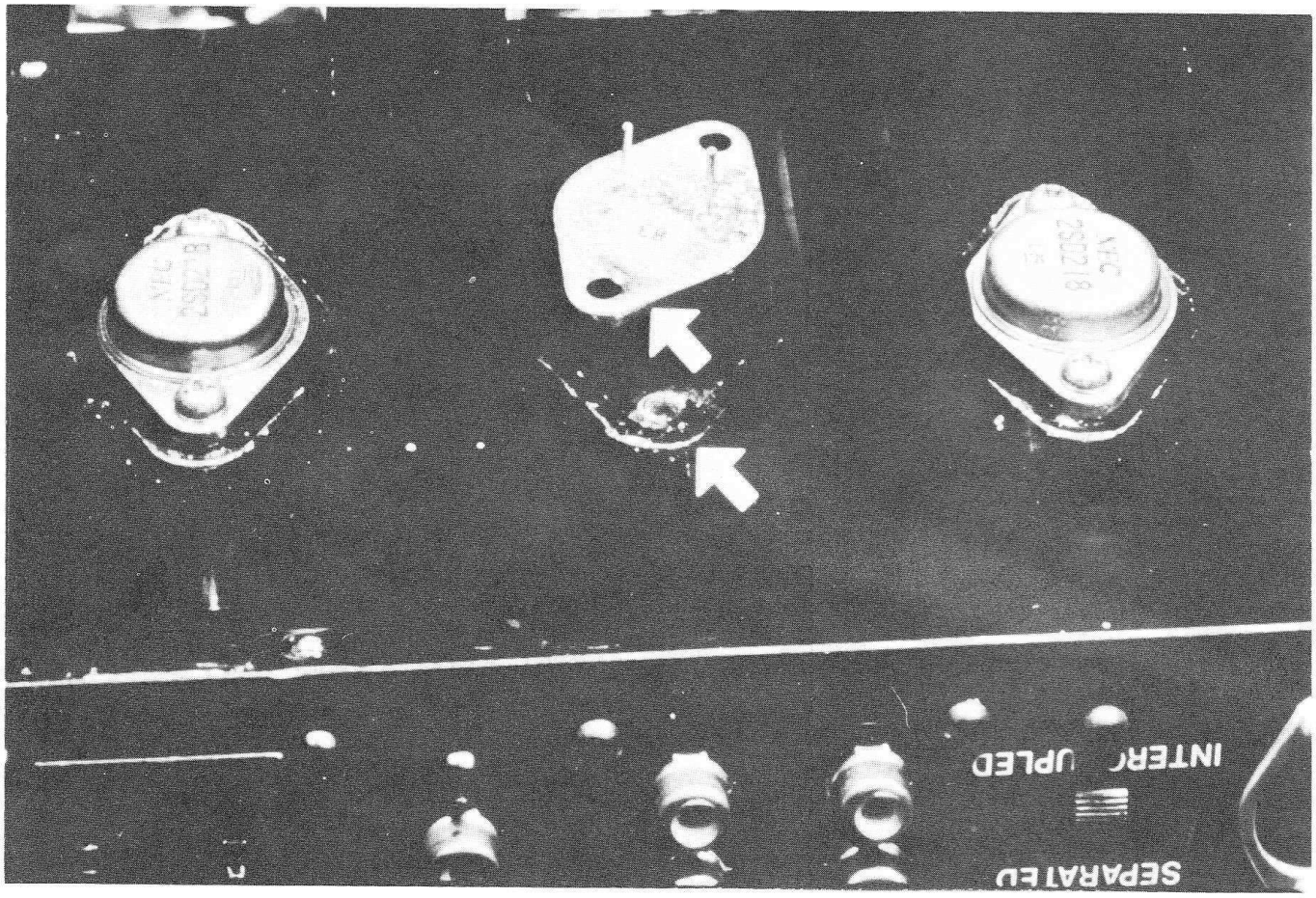
27. THIS IS A RATHER RARE CASE BUT THE FILTER CAPACITOR CAN BE LEAKING OR SHORTED. TO CHECK THE CAPACITOR, SET THE VOM ON Rx1 OHM RANGE THEN PLACE THE TESTER LEADS ACROSS THE CAPACITOR. IF IT IS GOOD, THE VOM FIRST SWINGS TO ZERO THEN SLOWLY GOES BACK UP TO INFINITY. IF YOU GET A STEADY ZERO OR SEVERAL OHMS, THEN THE CAPACITOR IS SHORTED.



28. DETERMINE IF THE PROBLEM IS IN THE POWER TRANSFORMER OR THE RECTIFIER CIRCUIT. DISCONNECT THE WIRING FROM THE SECONDARY WINDING OF THE POWER TRANSFORMER TO THE RECTIFIER CIRCUIT. TURN THE POWER SWITCH ON, DOES THE FUSE BLOW? IF "YES", THE TROUBLE IS IN THE NOISE PREVENTION CAPACITOR FOR THE POWER TRANSFORMER OR A SHORTED SECONDARY WINDING. IF "NO," THE TROUBLE IS IN THE DIODES OR THE FILTER CAPACITOR.

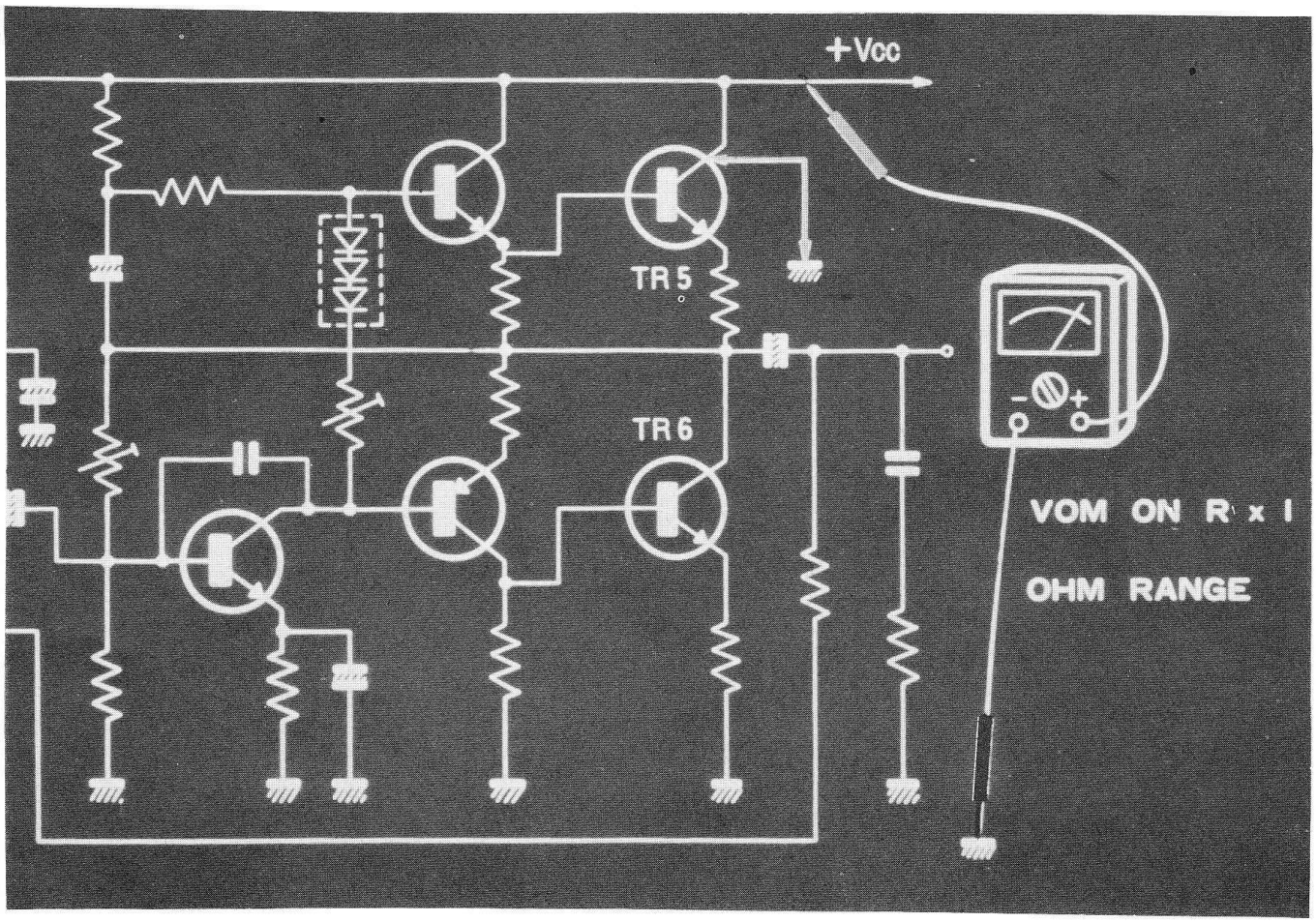


29. IF THE PREVIOUS TEST HAVE NOT LOCATED THE PROBLEM THEN THE FAULT IS PROBABLY IN THE MAIN AMP CIRCUIT DUE TO EXCESSIVE CURRENT FLOWING INTO THE MAIN AMP.

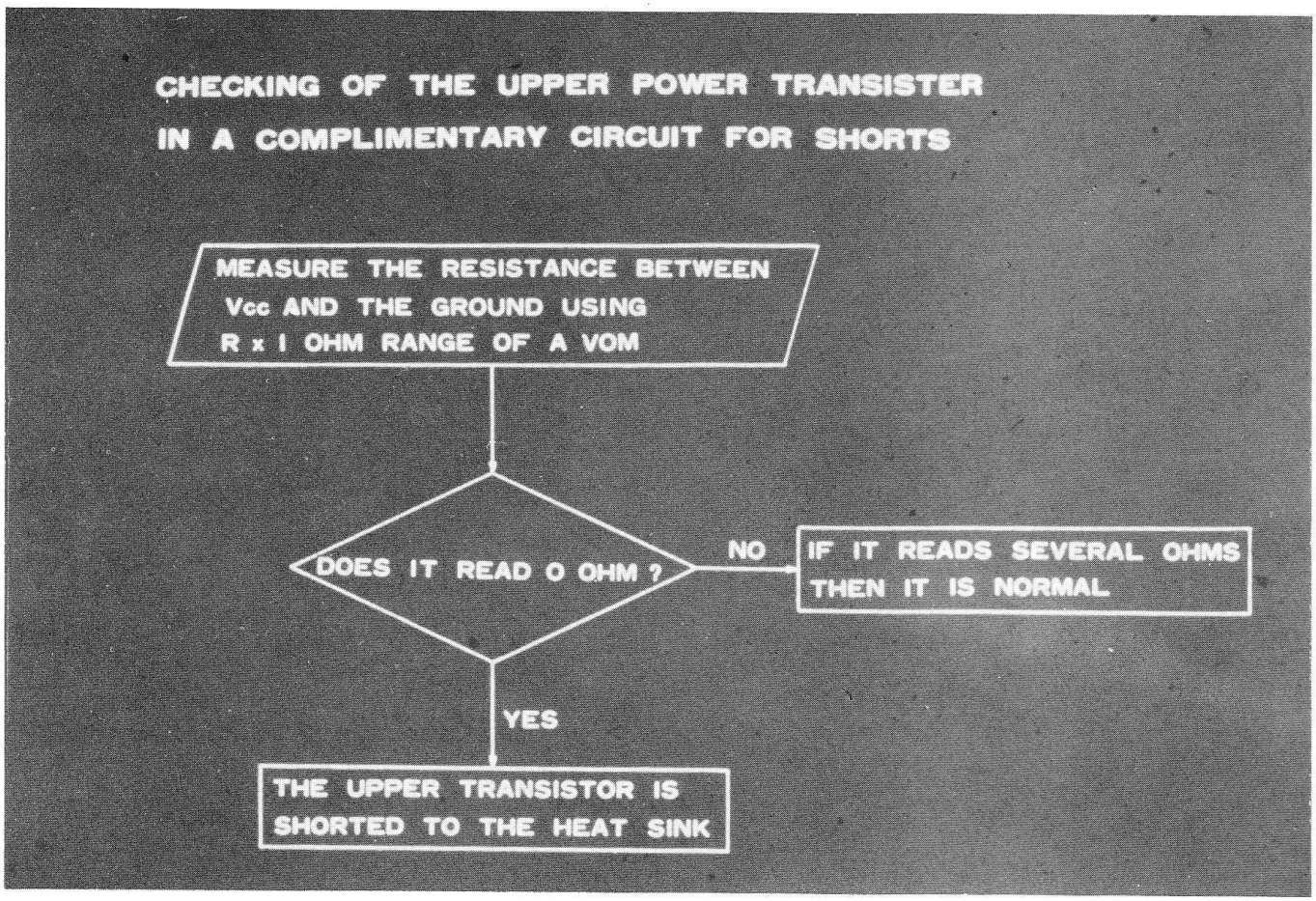


30.

AS AN EXAMPLE WE WILL LOOK AT THE SYMPTOMS OF A SHORT CIRCUIT BETWEEN THE COLLECTOR OF A POWER TRANSISTOR AND THE HEAT SINK ITS MOUNTED UPON.

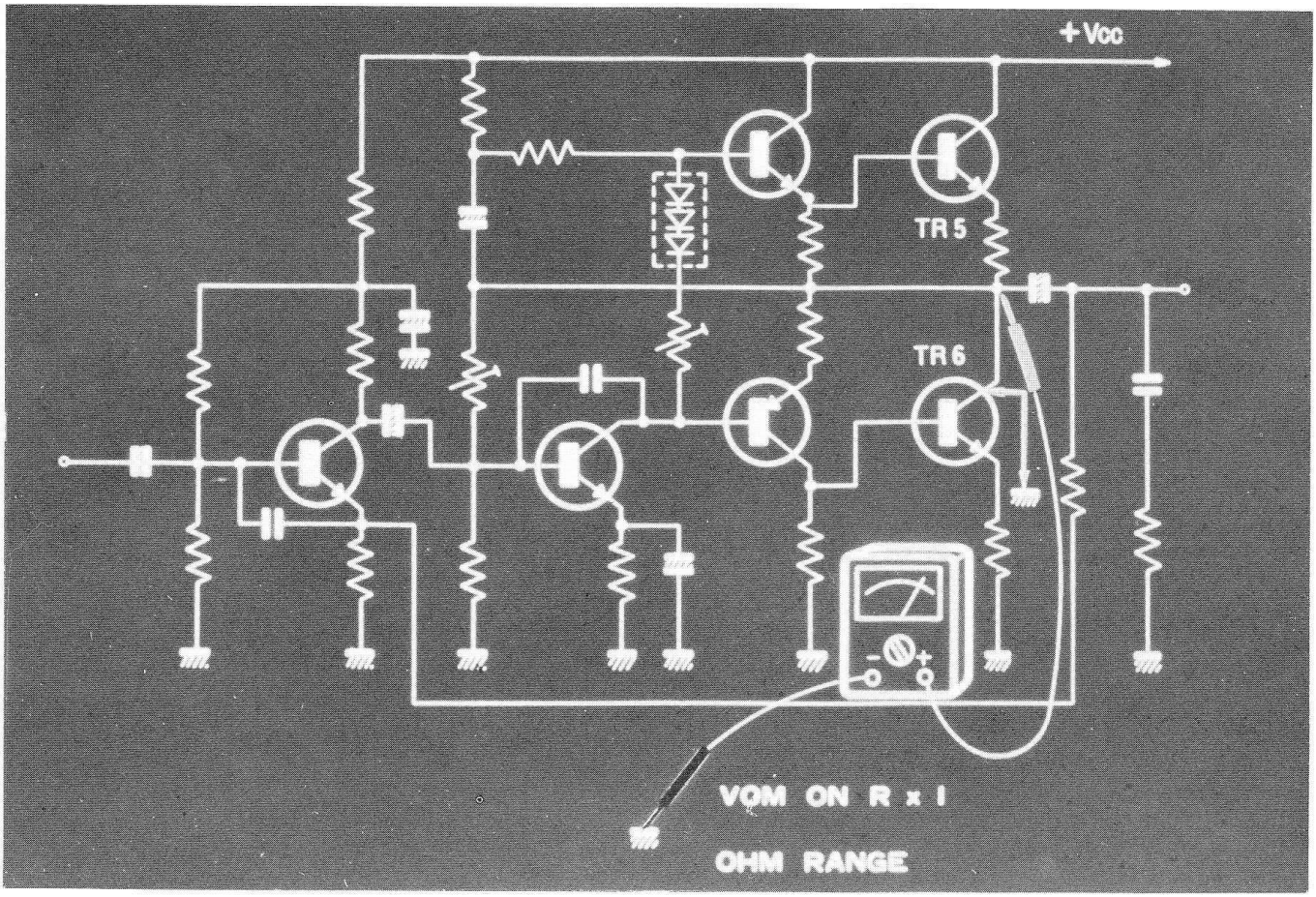


31. TO LOCATE THE PROBLEM, MEASURE THE RESISTANCE FROM VCC TO GROUND. YOUR VOM SHOULD BE SET ON Rx1 OHM RANGE. ZERO RESISTANCE INDICATES A SHORT TO THE HEAT SINK OF TR5. IN THIS MEASUREMENT, THE POWER SUPPLY CIRCUIT SHOULD BE DISCONNECTED WITH THE MAIN AMP CIRCUIT.

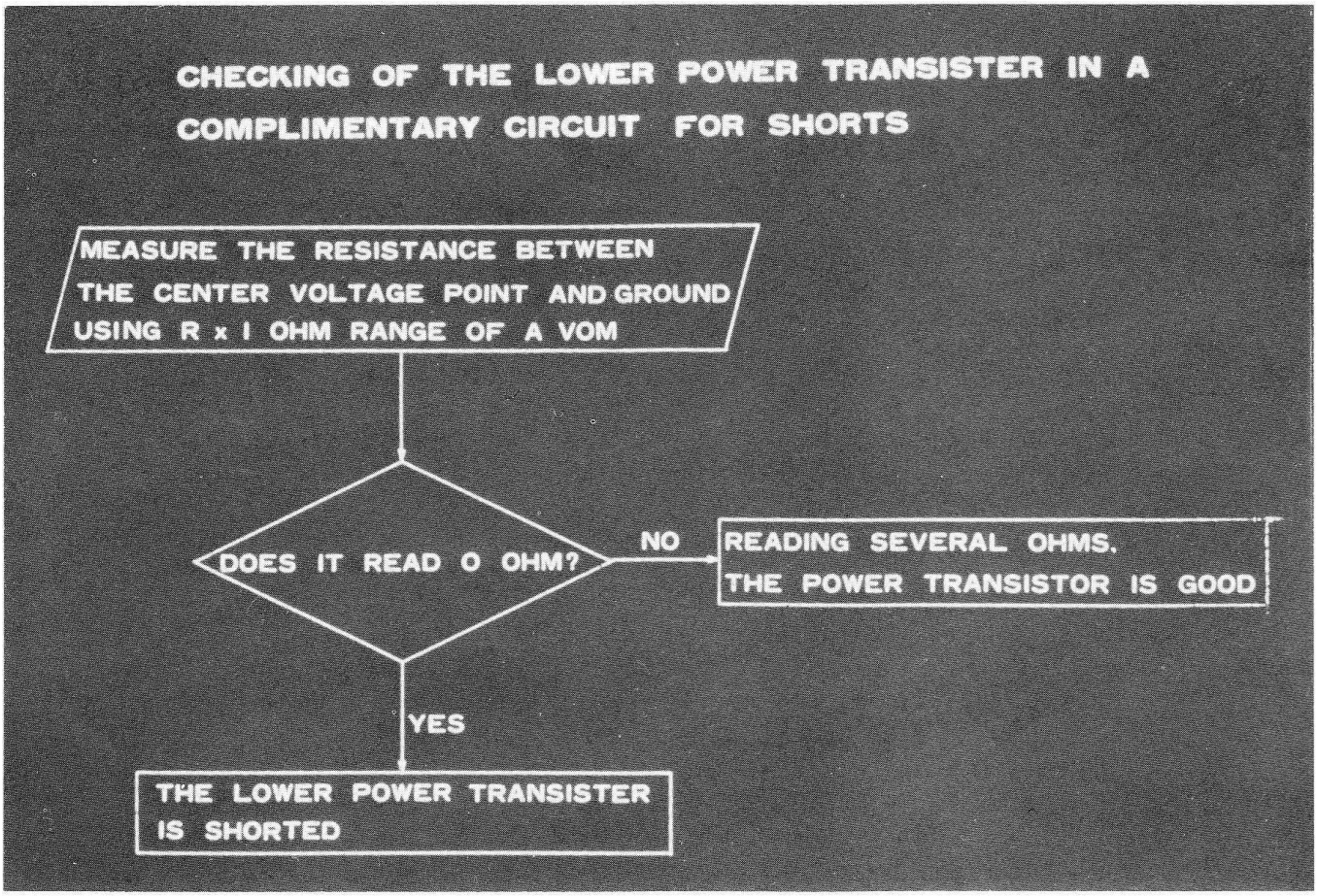


32. CHECKING THE UPPER POWER TRANSISTOR IN A COMPLIMENTARY CIRCUIT.

MEASURE THE RESISTANCE BETWEEN VCC AND THE GROUND USING Rx1 OHM RANGE OF A VOM. DOES IT READ ZERO? IF "YES", THE UPPER TRANSISTOR IS SHORTED TO THE HEAT SINK. IF "NO", THE TRANSISTOR IS GOOD.

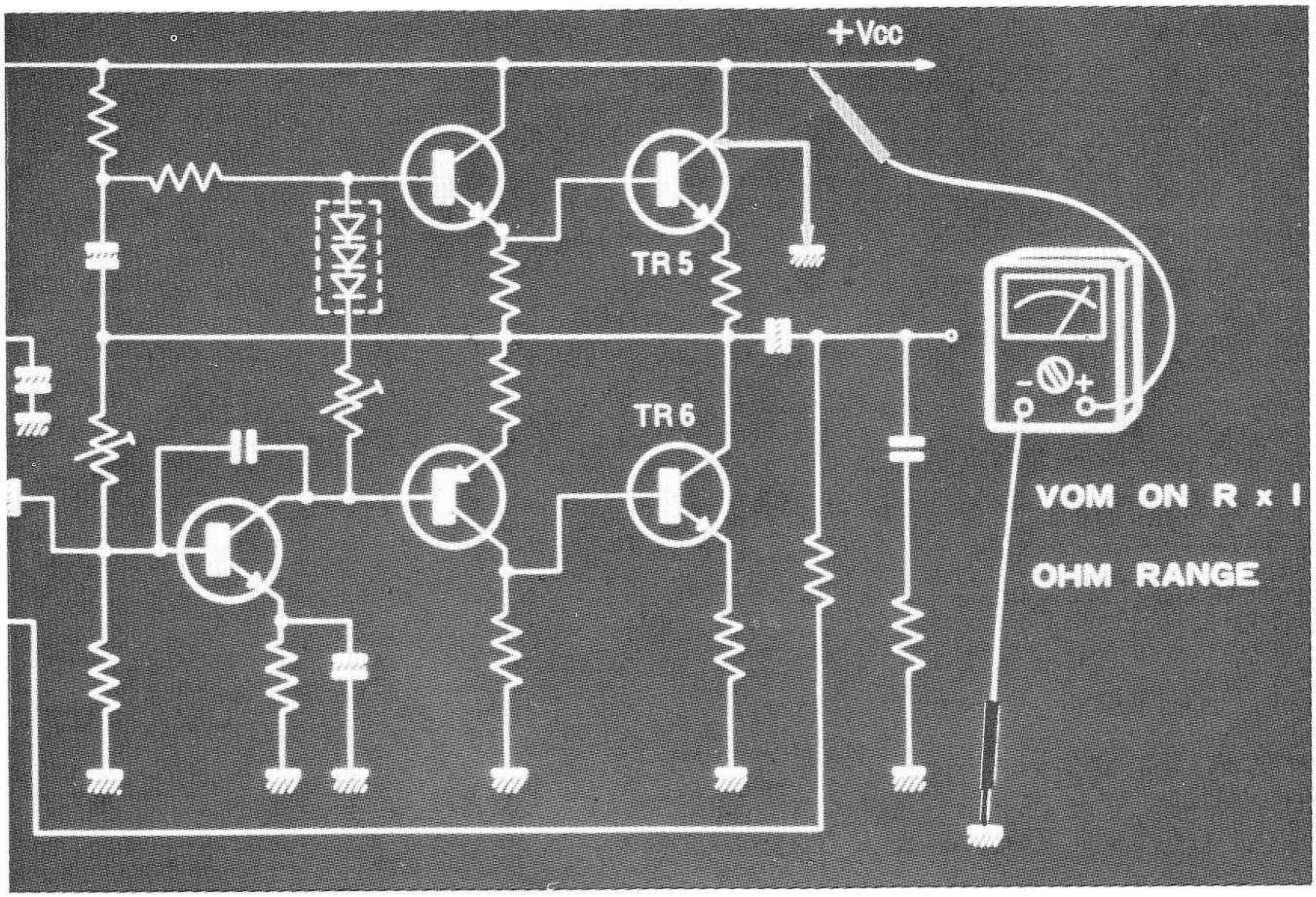


33. TO CHECK THE LOWER POWER TRANSISTOR, MEASURE THE RESISTANCE BETWEEN THE CENTER AND GROUND WITH A VOM SET ON THE Rx1 OHM RANGE. A ZERO READING INDICATES A SHORTED LOWER TRANSISTOR.

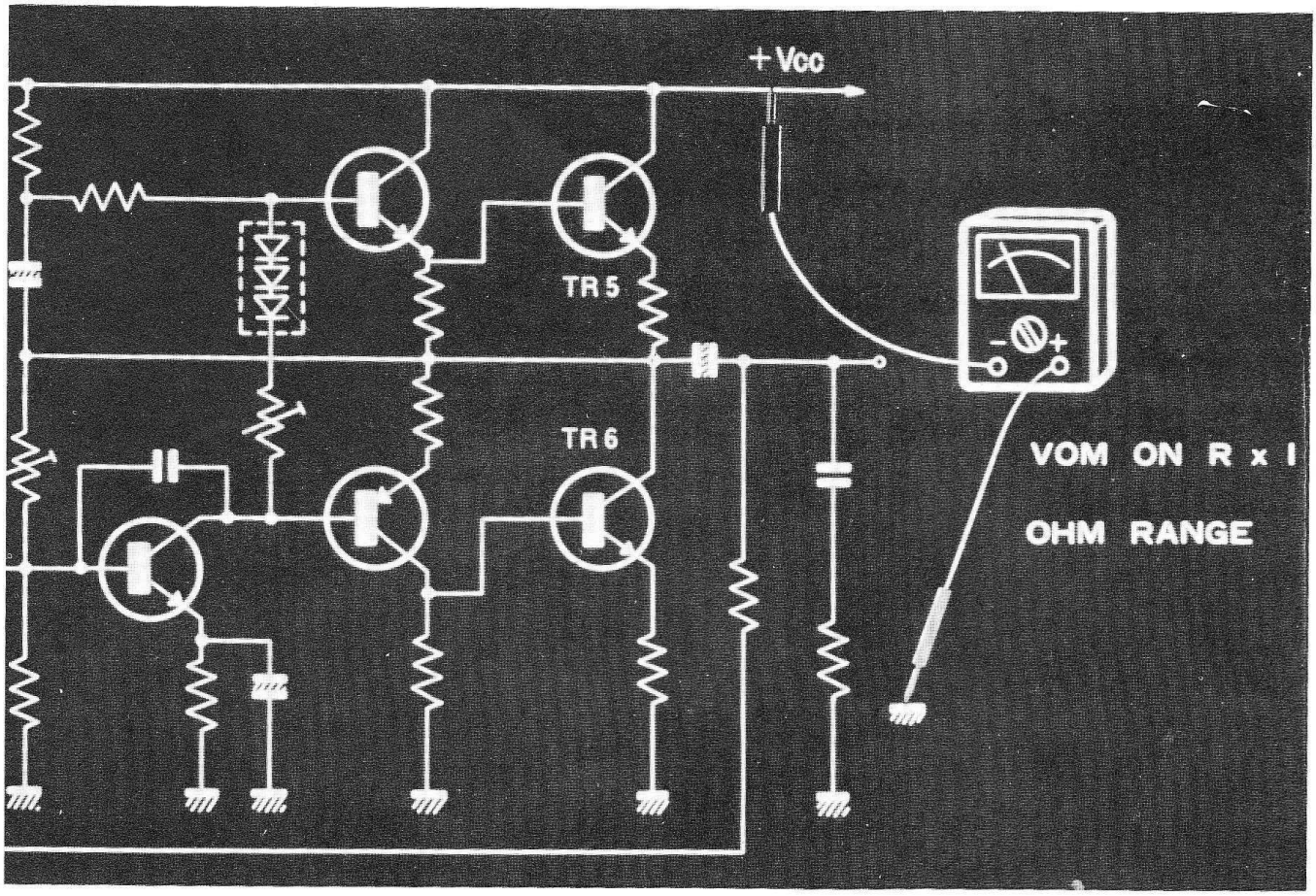


34. CHECKING THE LOWER POWER TRANSISTOR IN A COMPLIMENTARY CIRCUIT FOR SHORTS.

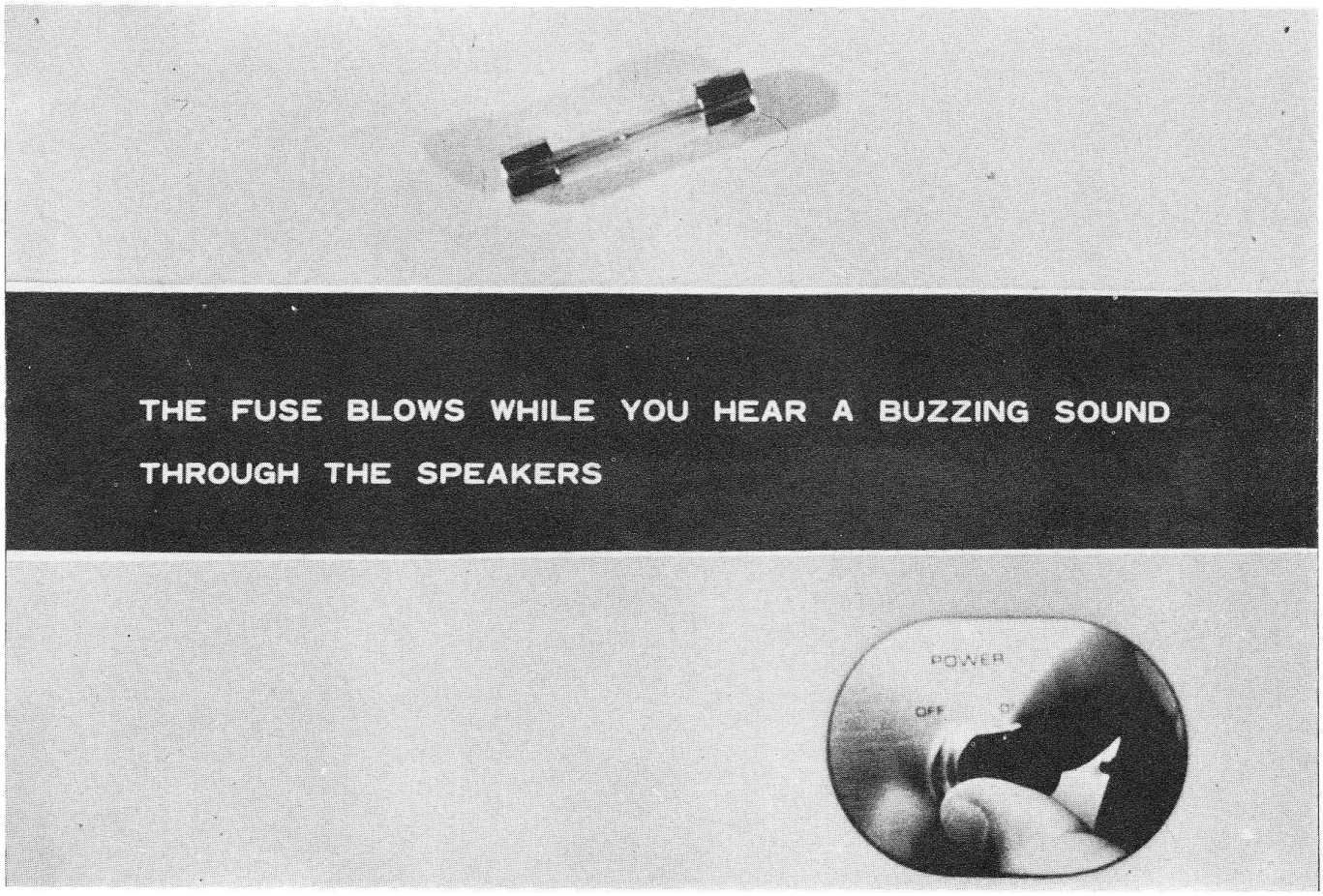
MEASURE THE RESISTANCE BETWEEN THE CENTER VOLTAGE POINT AND THE GROUND USING Rx1 OHM RANGE ON A VOM. DOES IT READ ZERO OHM? IF "YES", THE LOWER POWER TRANSISTOR IS SHORTED. IF "NO," THE POWER TRANSISTOR IS GOOD.



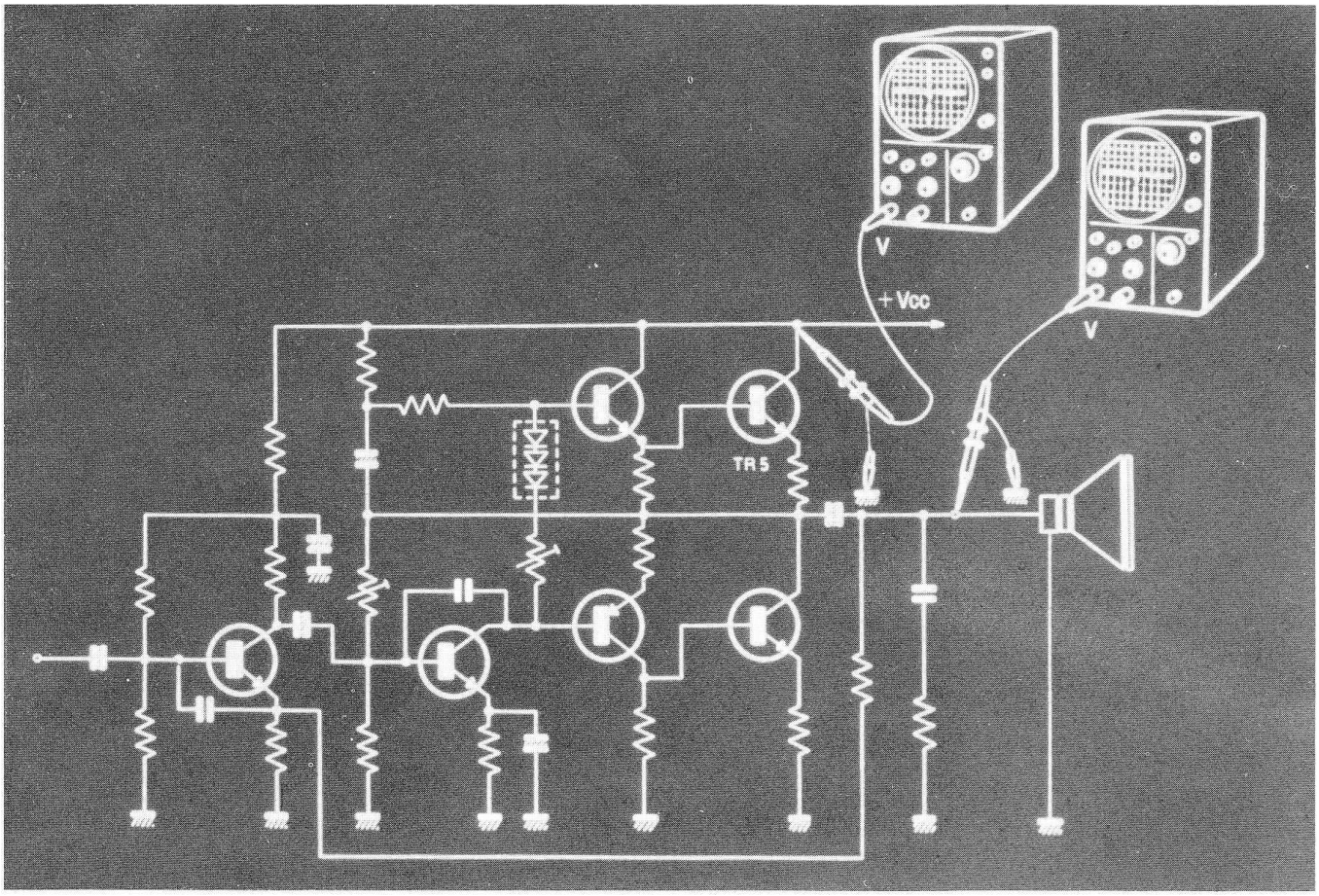
35. NOW WE WILL CONSIDER A CASE WHERE A SHORT OCCURS BETWEEN THE COLLECTOR AND EMITTER IN BOTH TRANSISTORS AT THE SAME TIME. USE YOUR VOM SET ON Rx1 OHM RANGE AND TAKE A READING.



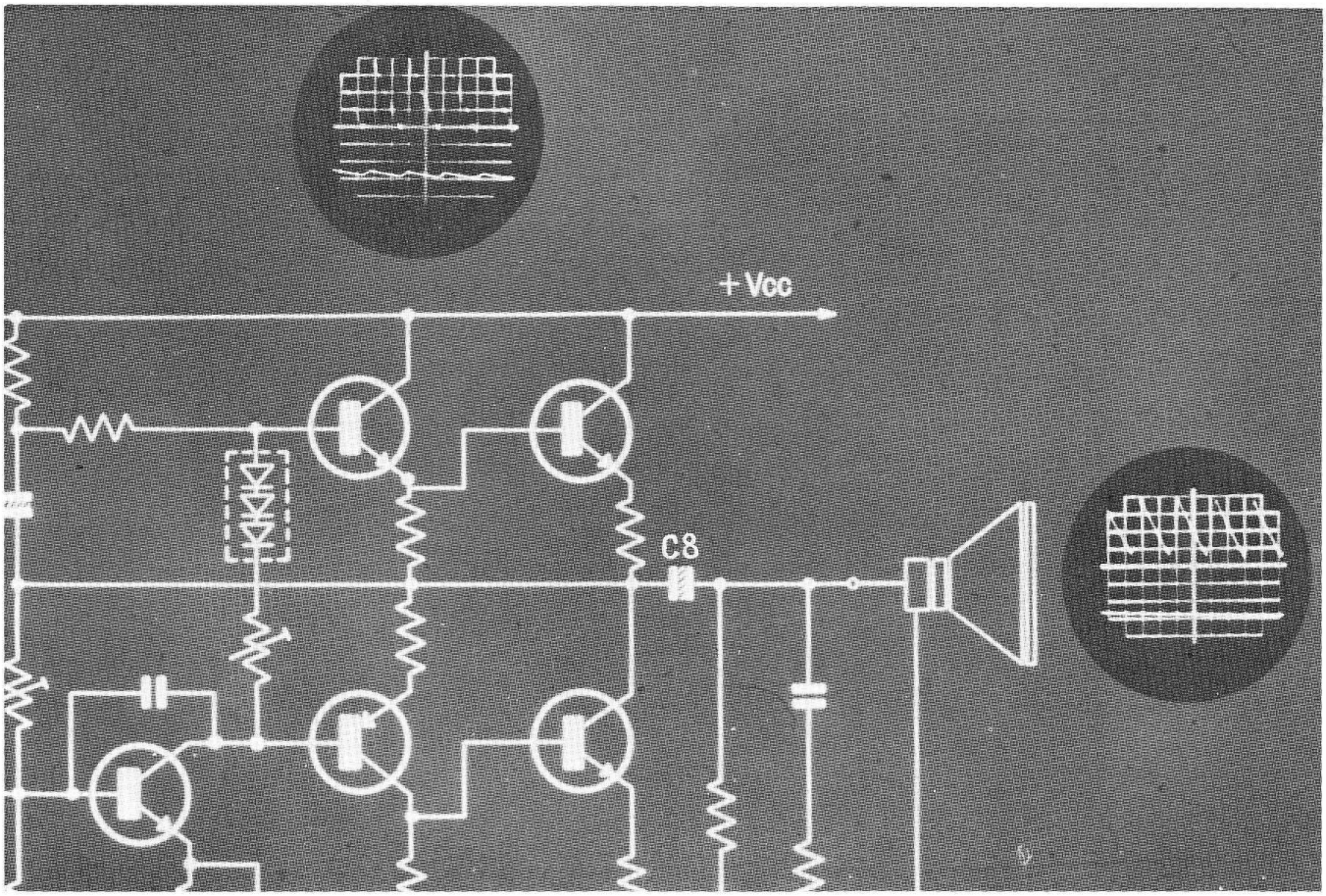
36. NOW REVERSE THE POLARITY OF THE TEST LEADS AND TAKE ANOTHER READING. IF THIS READING IS EQUAL TO THE SUM OF BOTH EMITTER RESISTORS THEN BOTH TRANSISTORS ARE SHORTED.



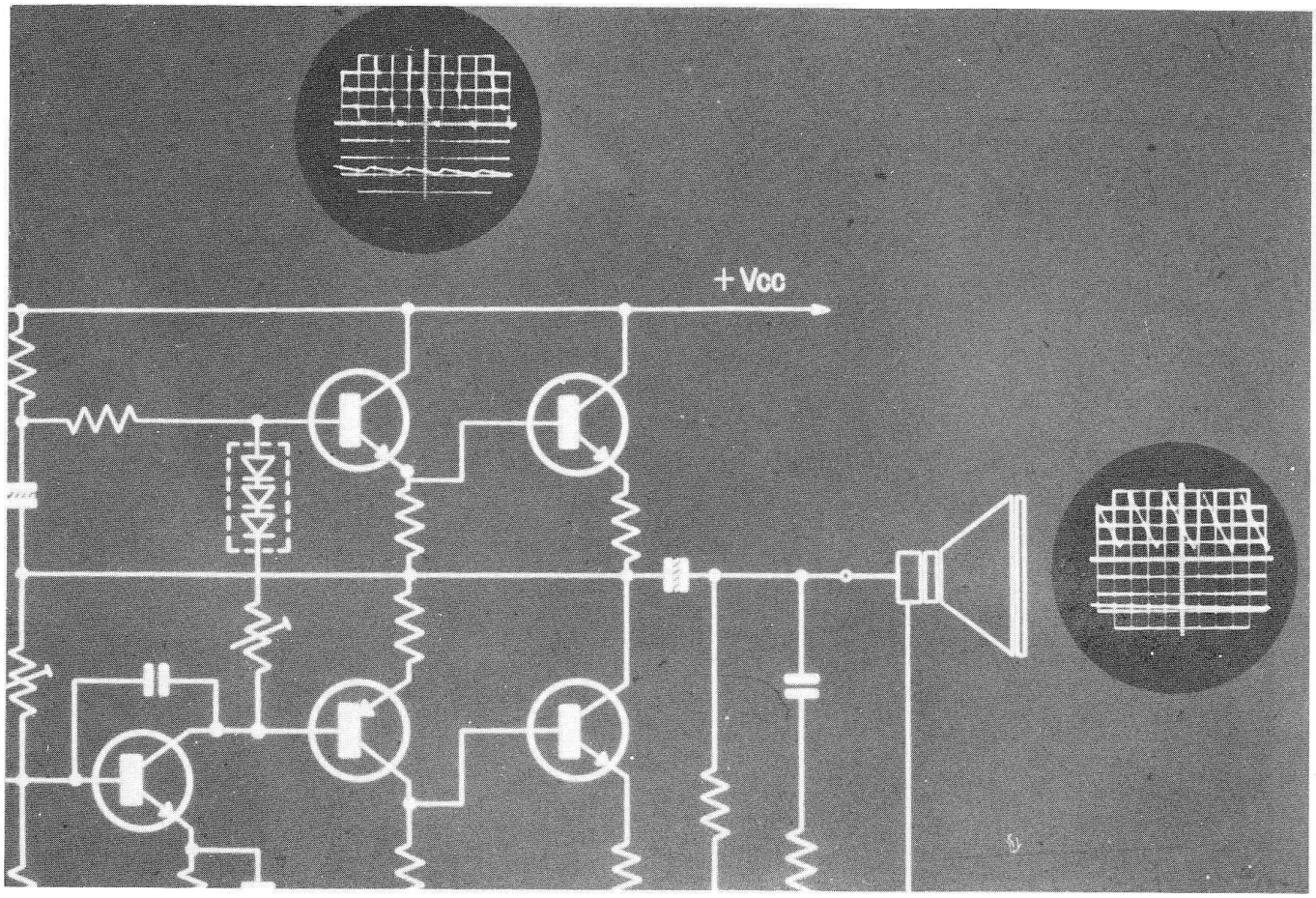
37. NEXT, WE WILL LOOK AT A CIRCUIT THAT DOES NOT BLOW FUSE, BUT BEFORE THE FUSE QUITS YOU HEAR A BUZZING NOISE THROUGH THE SPEAKER. THE BUZZING IS DUE TO A CURRENT OVERLOAD ON THE POWER SUPPLY. THIS OVERLOAD INCREASES THE A.C. RIPPLE COMPONENT IN THE POWER CIRCUIT AND THIS IS WHAT YOU HEAR IN THE SPEAKER.



38. WHEN YOU HEAR BUZZING OF THIS NATURE, IT IS A GOOD INDICATION THAT THE UPPER TRANSISTOR TR5 IS SHORTED. THIS CAN BE VERIFIED WITH AN OSCILLOSCOPE.

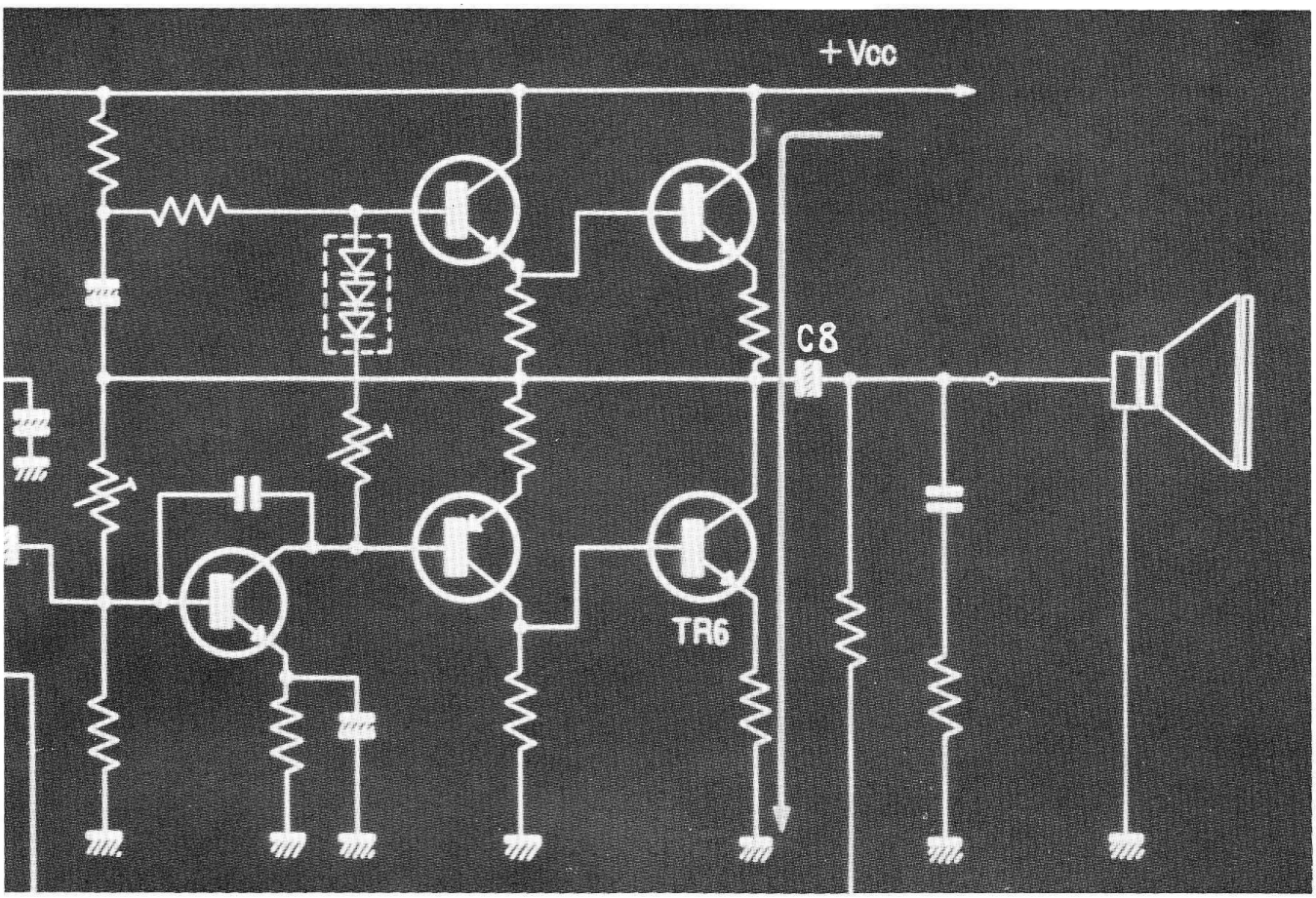


39. SINCE THE UPPER TRANSISTOR IS SHORTED IT OVERLOADS THE POWER SUPPLY AND CAUSES HUM IN THE SPEAKER. THE REASON YOU SUSPECT THE UPPER TRANSISTOR TR5 AND NOT TR4 IS BECAUSE TR5 HANDLES THE POSITIVE COMPONENT OF THE SIGNAL BEING AMPLIFIED. THE ONLY PLACE THE RIPPLE COMPONENT CAN GO IS THROUGH THE COUPLING CAPACITOR C-8 AND THE SPEAKER TO GROUND. THIS IS WHY WHEN YOU HEAR A BUZZING SOUND THROUGH THE SPEAKER YOU SUSPECT THE UPPER TRANSISTOR OF THE PAIR IS SHORTED.

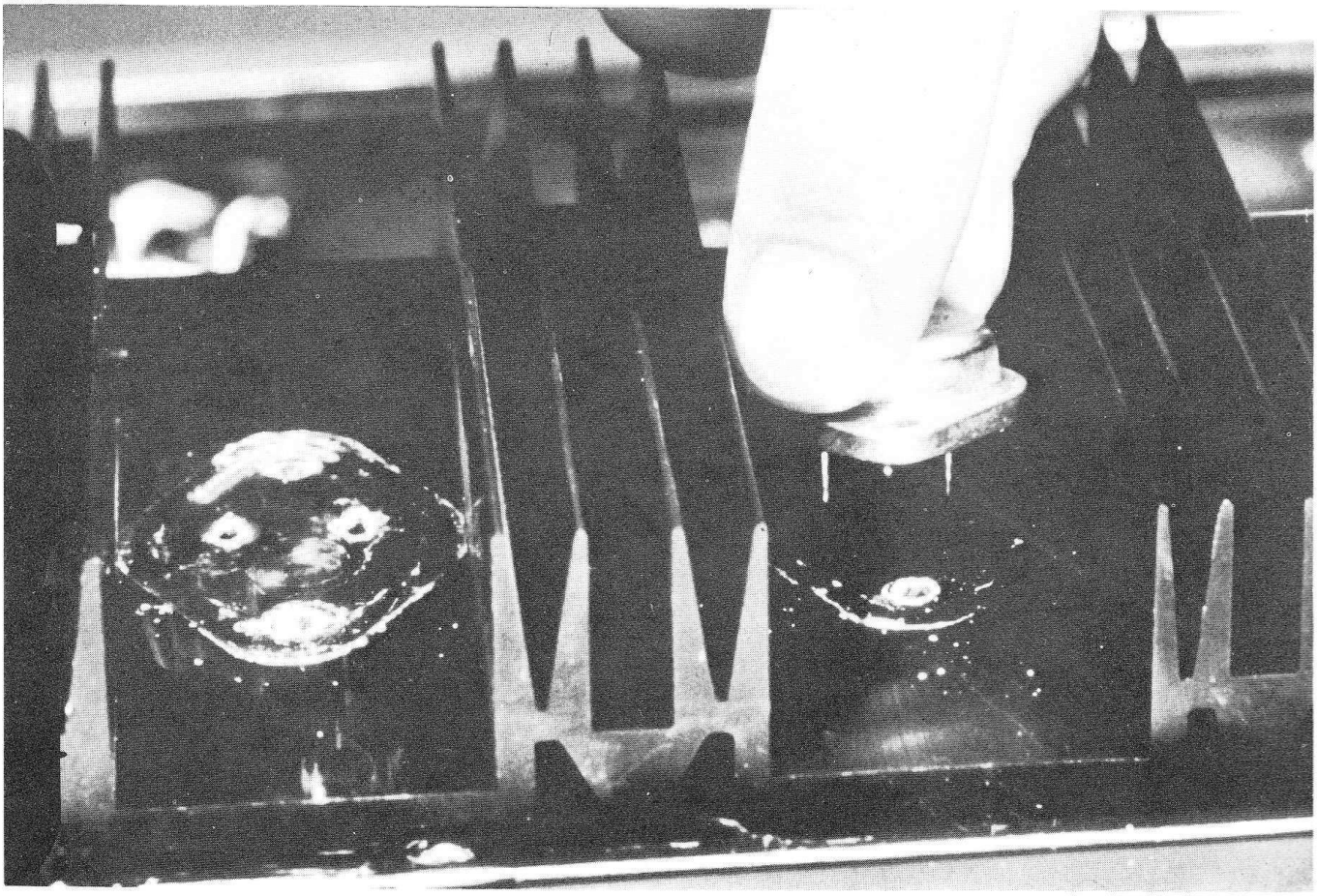


40.

IF THE SHORT OCCURS IN THE LOWER TRANSISTOR TR4,YOU PROBABLY WILL NOT HEAR A BUZZING SOUND THROUGH THE SPEAKER.

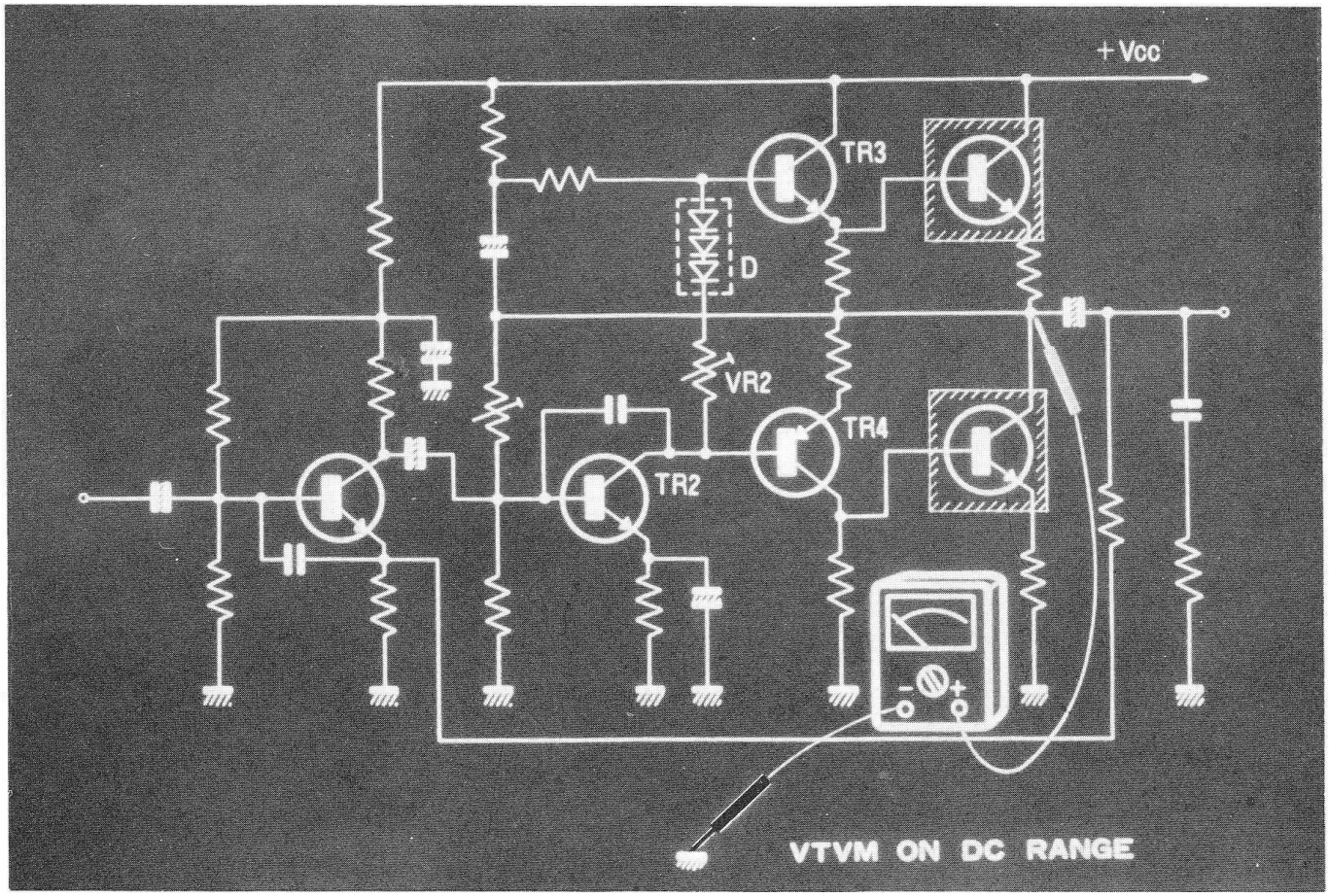


41. THIS IS BECAUSE INSTEAD OF THE RIPPLE COMPONENT GOING THROUGH C-8 AND THE SPEAKER, IT GOES RIGHT THROUGH TR-6 AND R-15 TO GROUND.

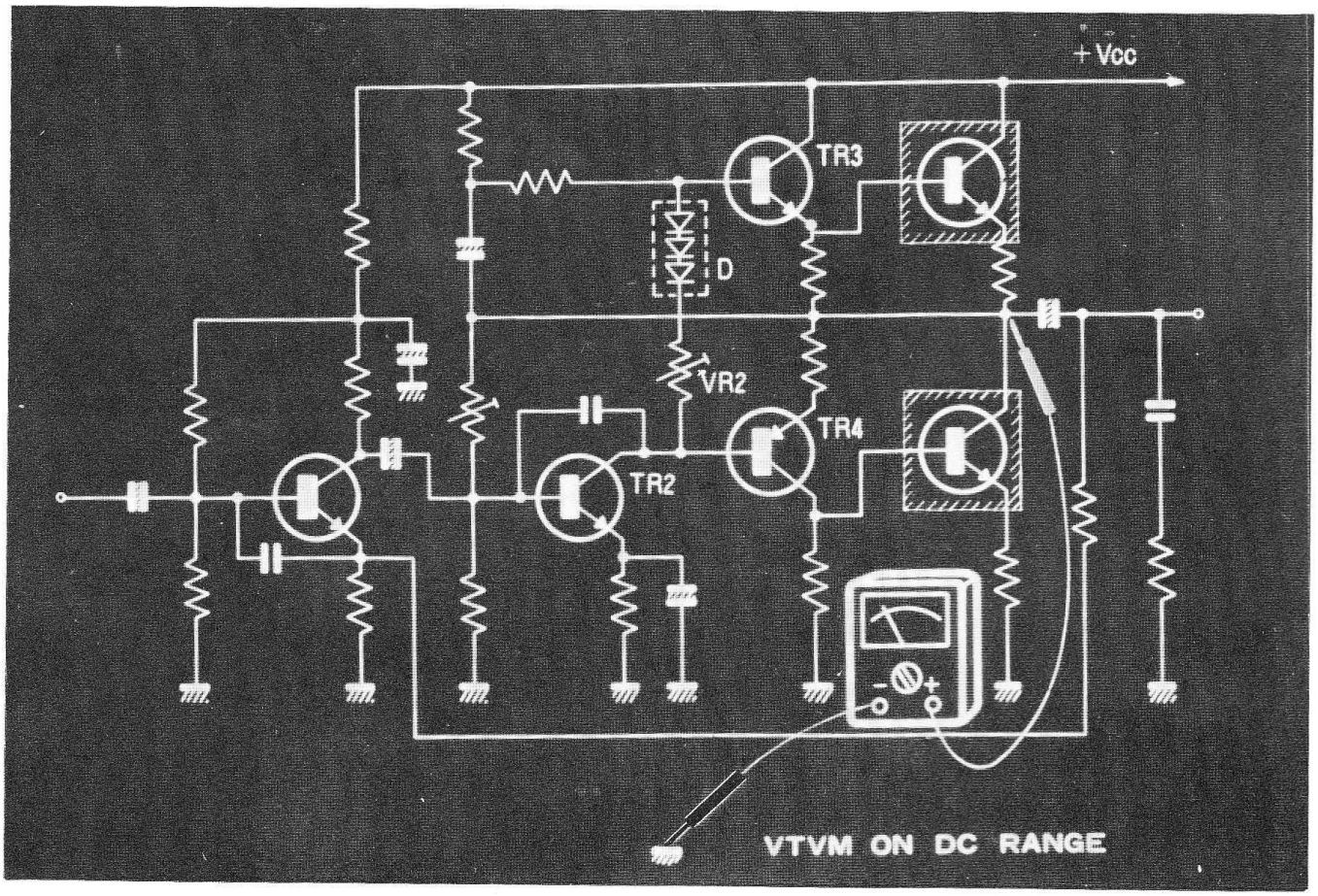


42.

IF NO NOISE IS PRODUCED, THEN YOU MUST REMOVE BOTH OUTPUT TRANSISTORS TR-5 & TR-6. LEAVE THE SPEAKERS CONNECTED AND AGAIN TURN ON THE POWER AND LISTEN TO SEE IF THE BUZZING STILL OCCURS.

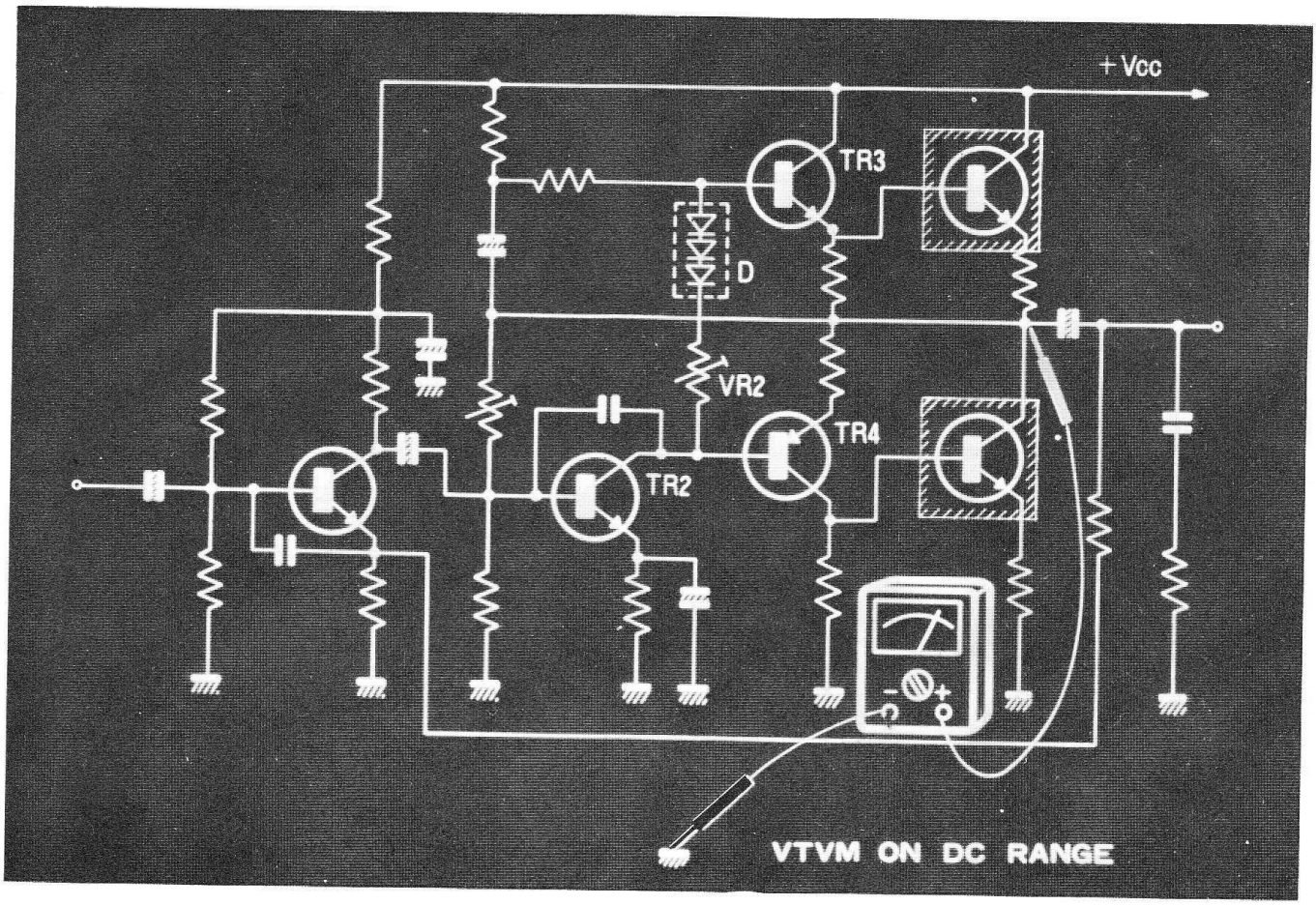


43. IF YOU DO NOT HEAR BUZZING THEN MEASURE THE CENTER VOLTAGE. IF IT READS EXACTLY ½ OF VCC THEN THE CIRCUIT IS WORKING NORMAL. YOU CAN SUSPECT THAT EITHER ONE OF THE POWER TRANSISTORS YOU JUST REMOVED IS DEFECTIVE.

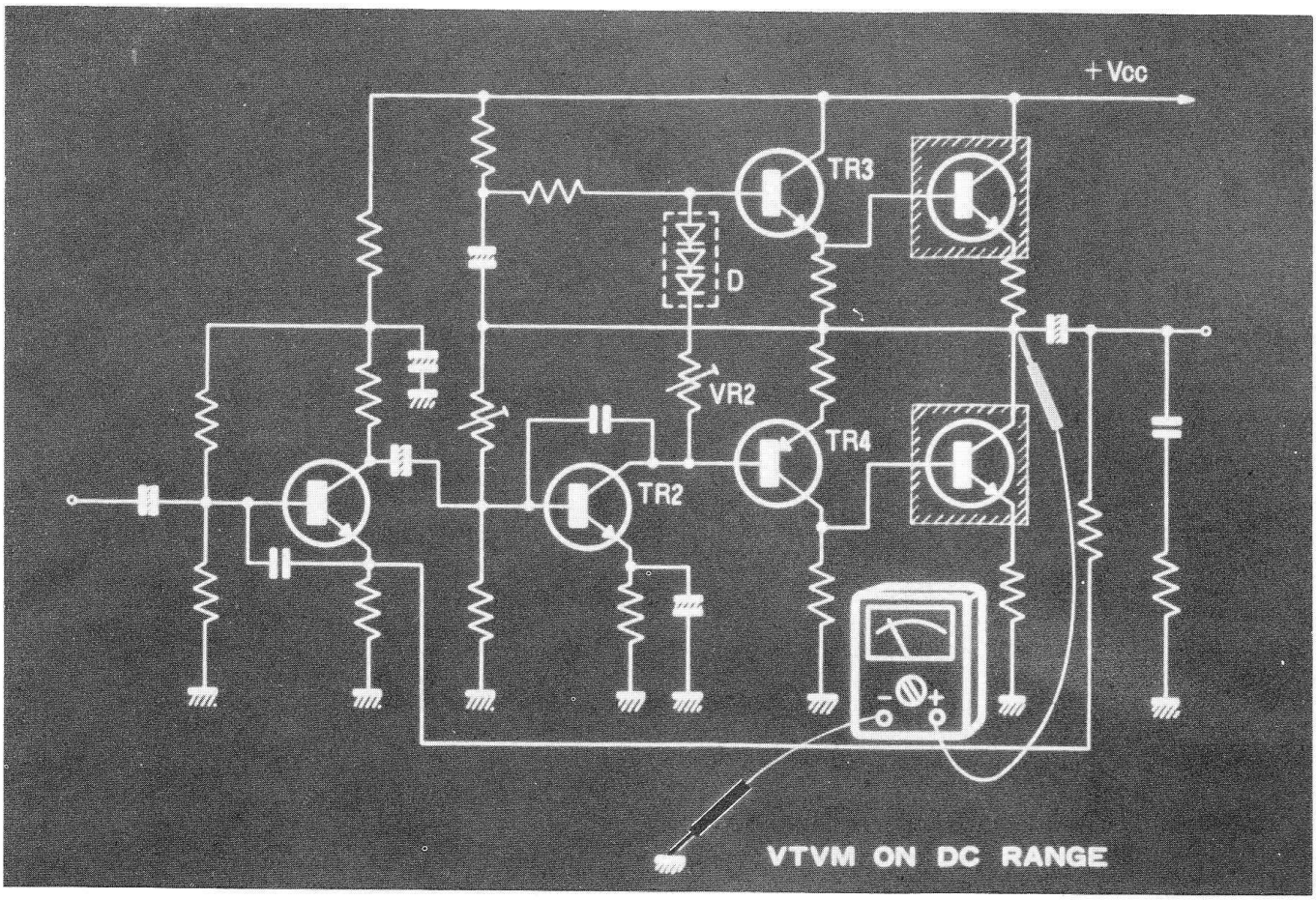


44. IF YOU DO HEAR BUZZING, THEN EXCESSIVE CURRENT MUST BE FLOWING THROUGH THE DRIVER STAGE.

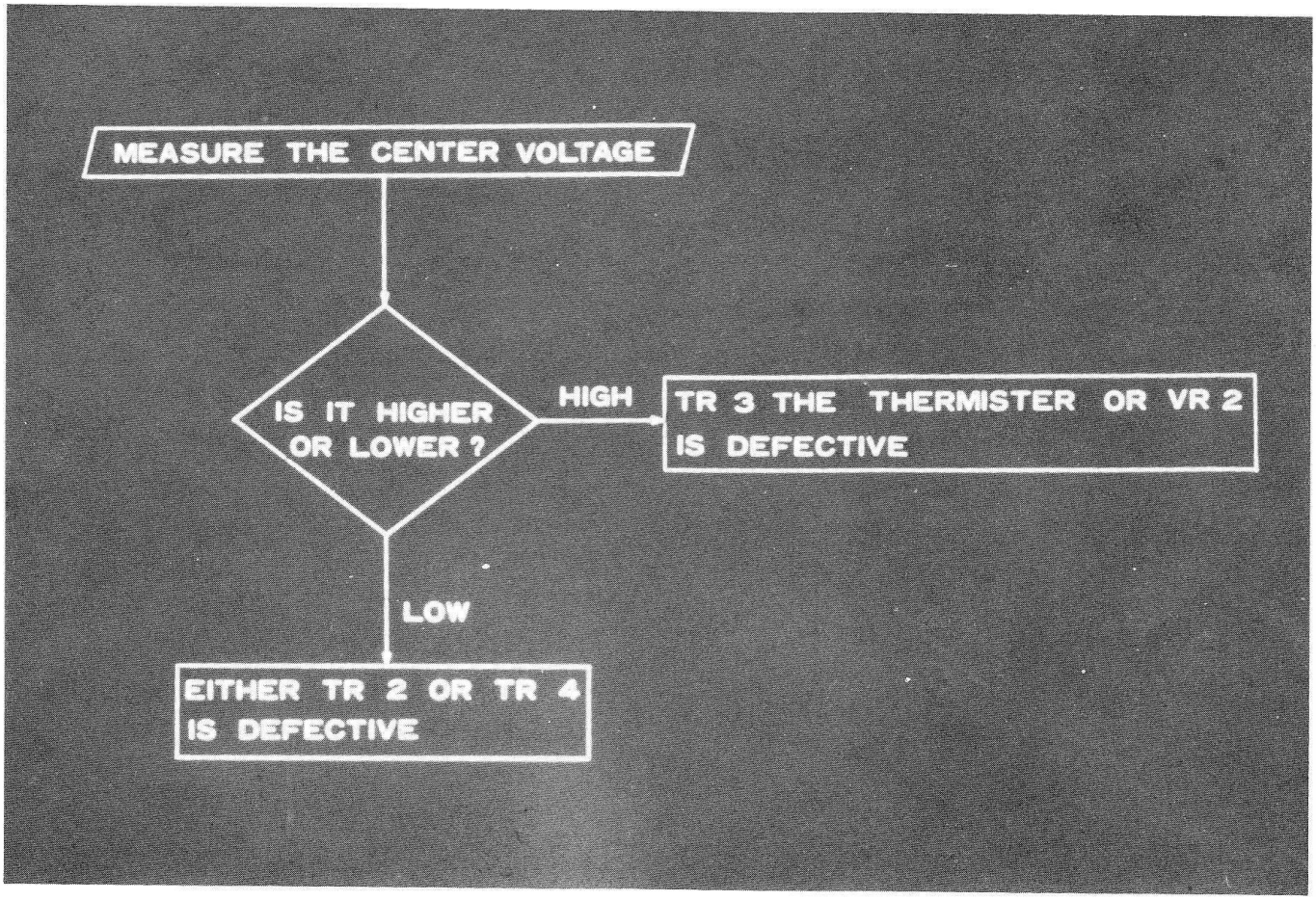
TO CHECK THE DRIVER STAGE, SET YOUR VTVM ON DC RANGE. MEASURE THE VOLTAGE OF THE CENTER POINT. DO THIS QUICKLY TO AVOID FURTHER UNNECESSARY DAMAGE TO THE UNIT.



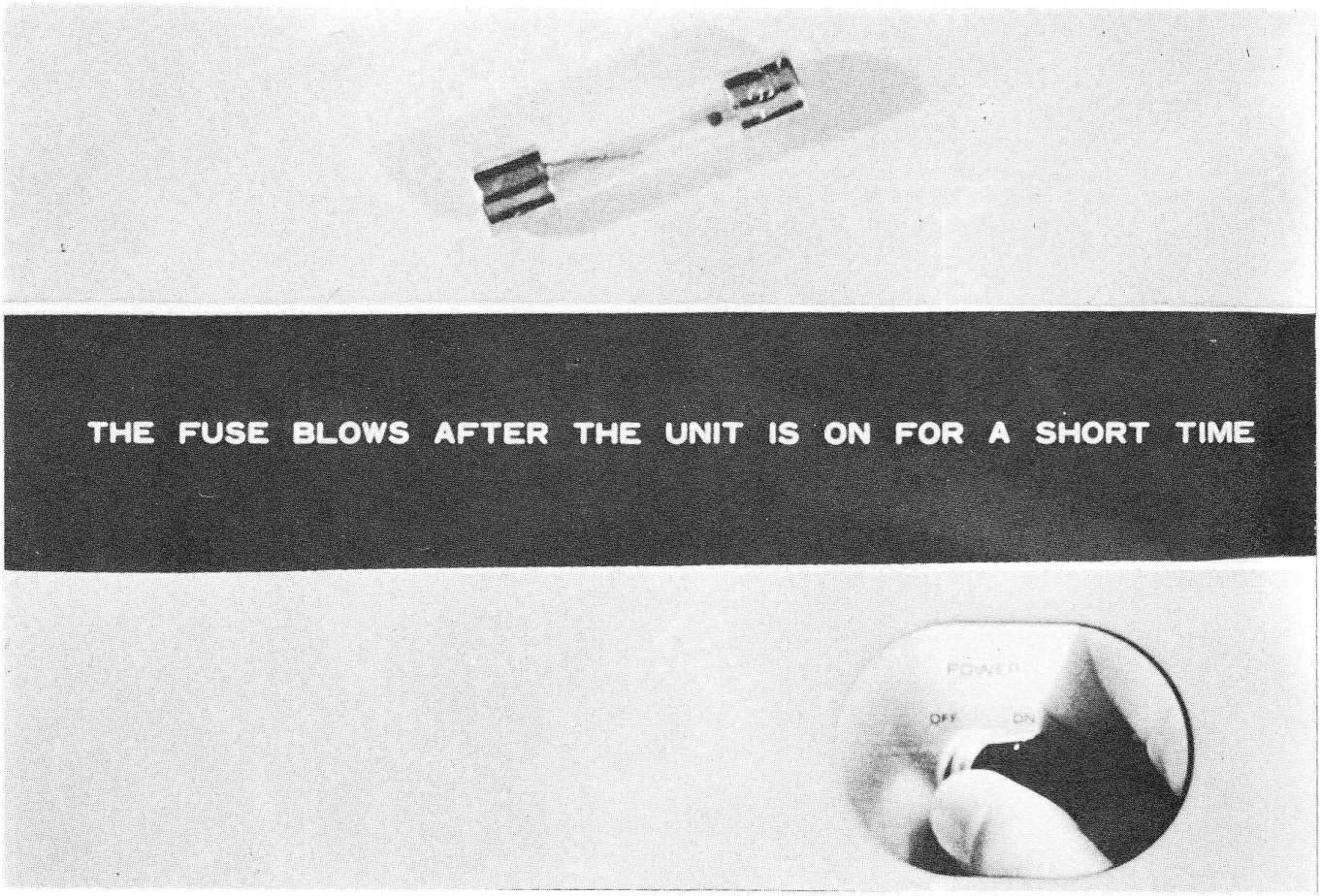
45. IF THE VOLTAGE READING IS HIGHER THAN ½ VCC, THEN TR-3 IS DEFECTIVE, OR THE TEMPERATURE COMPENSATING ELEMENT OR VR2 IS OPEN.



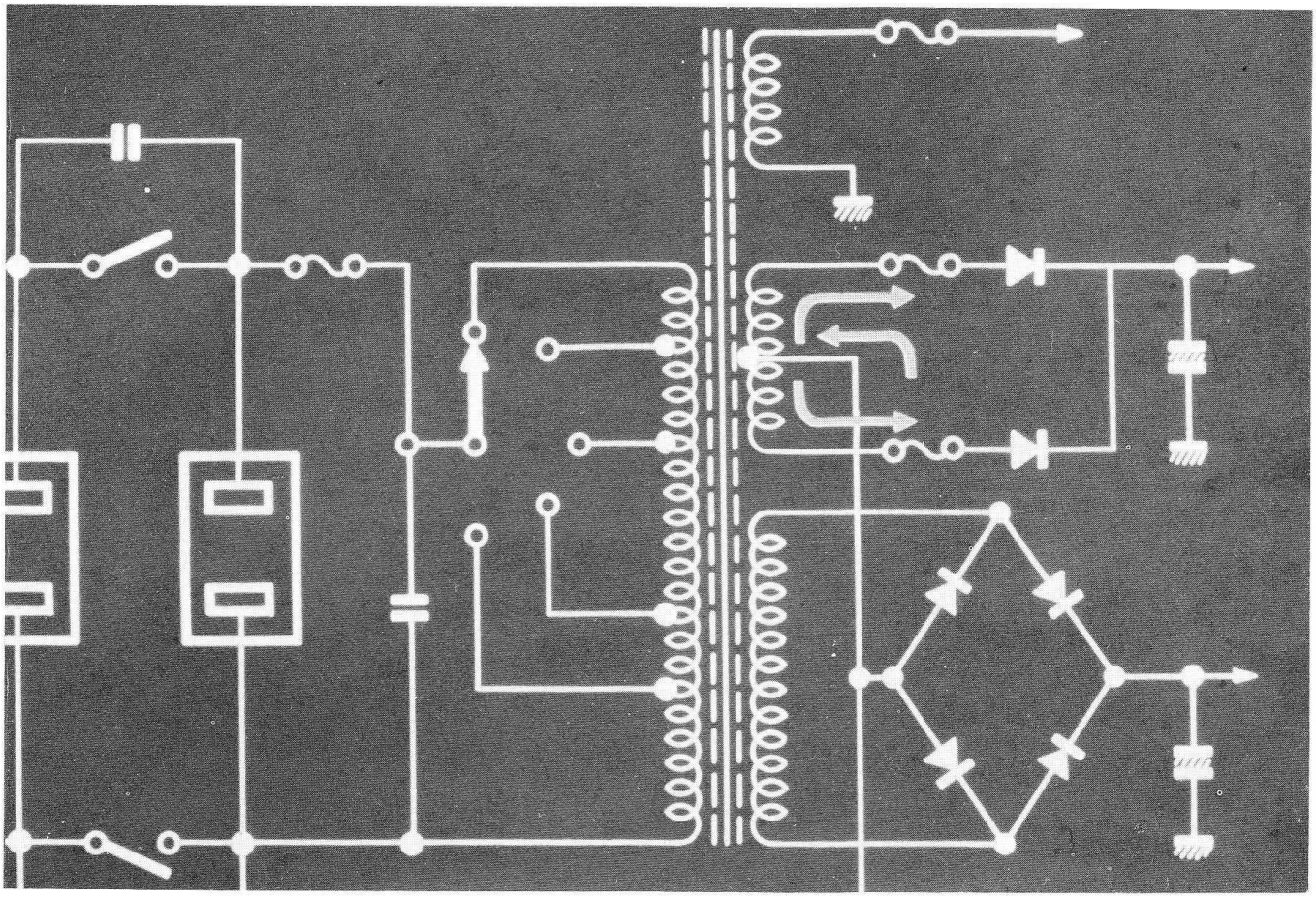
46. A VOLTAGE READING LOWER THAN ½ VCC INDICATES A FAILURE OF TR-2 OR TR-4.



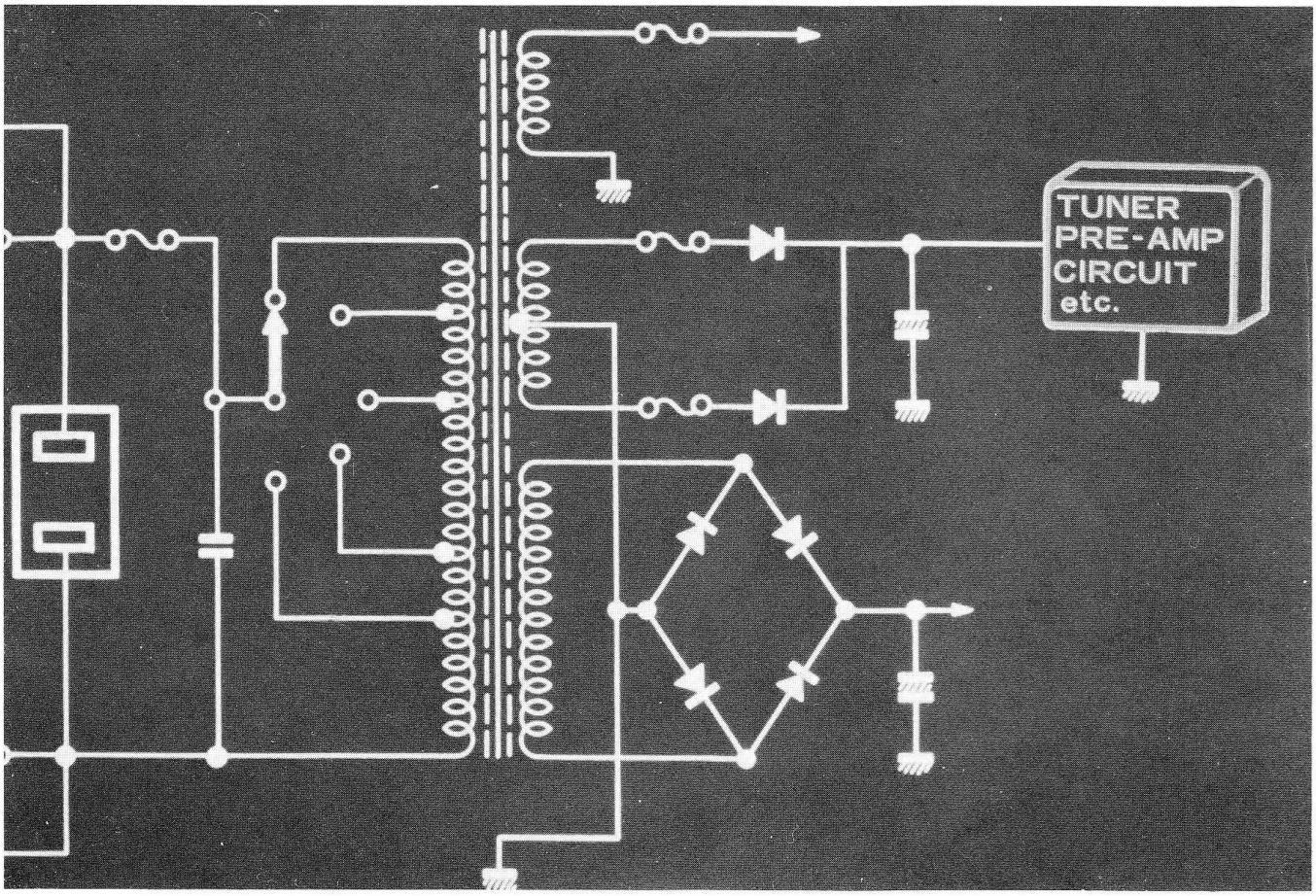
47. MEASURE THE CENTER VOLTAGE. IS IT HIGHER OR LOWER THAN ½ VCC? IF IT IS HIGHER THEN TR-3, THE THERMISTER OR VR2 IS DEFECTIVE. IF IT IS LOWER, THEN TR2 OR TR4 IS DEFECTIVE.



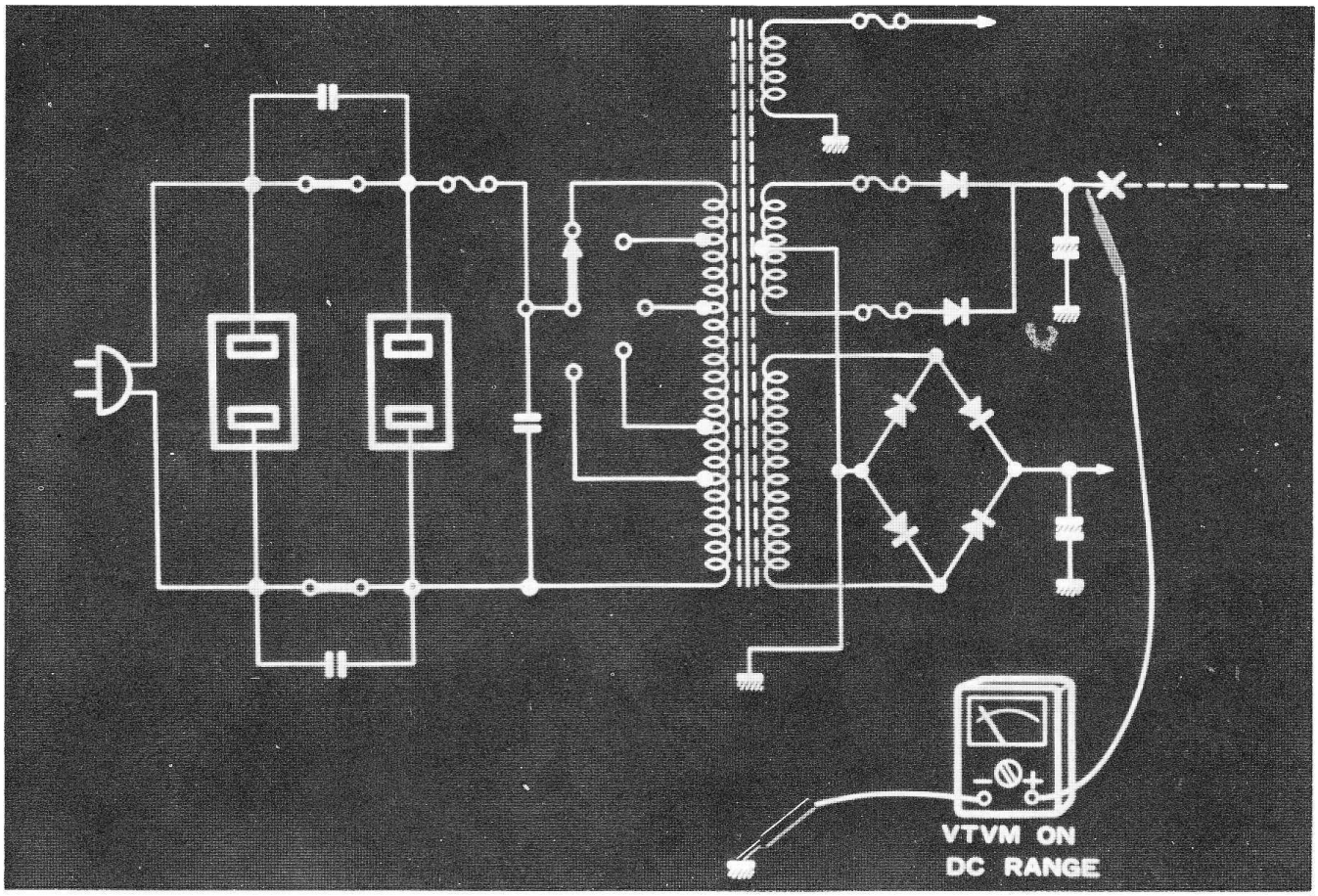
48. NOW WE WILL SEE WHAT MAY BE WRONG IF YOU HAVE A UNIT THAT WILL BLOW FUSES SOME TIME AFTER IT IS ON.



49. HERE AGAIN THE PROBLEM MAY BE IN THE POWER SUPPLY. THE SECONDARY SIDE OF THE POWER TRANSFORMER MAY BE OVER-LOADED.

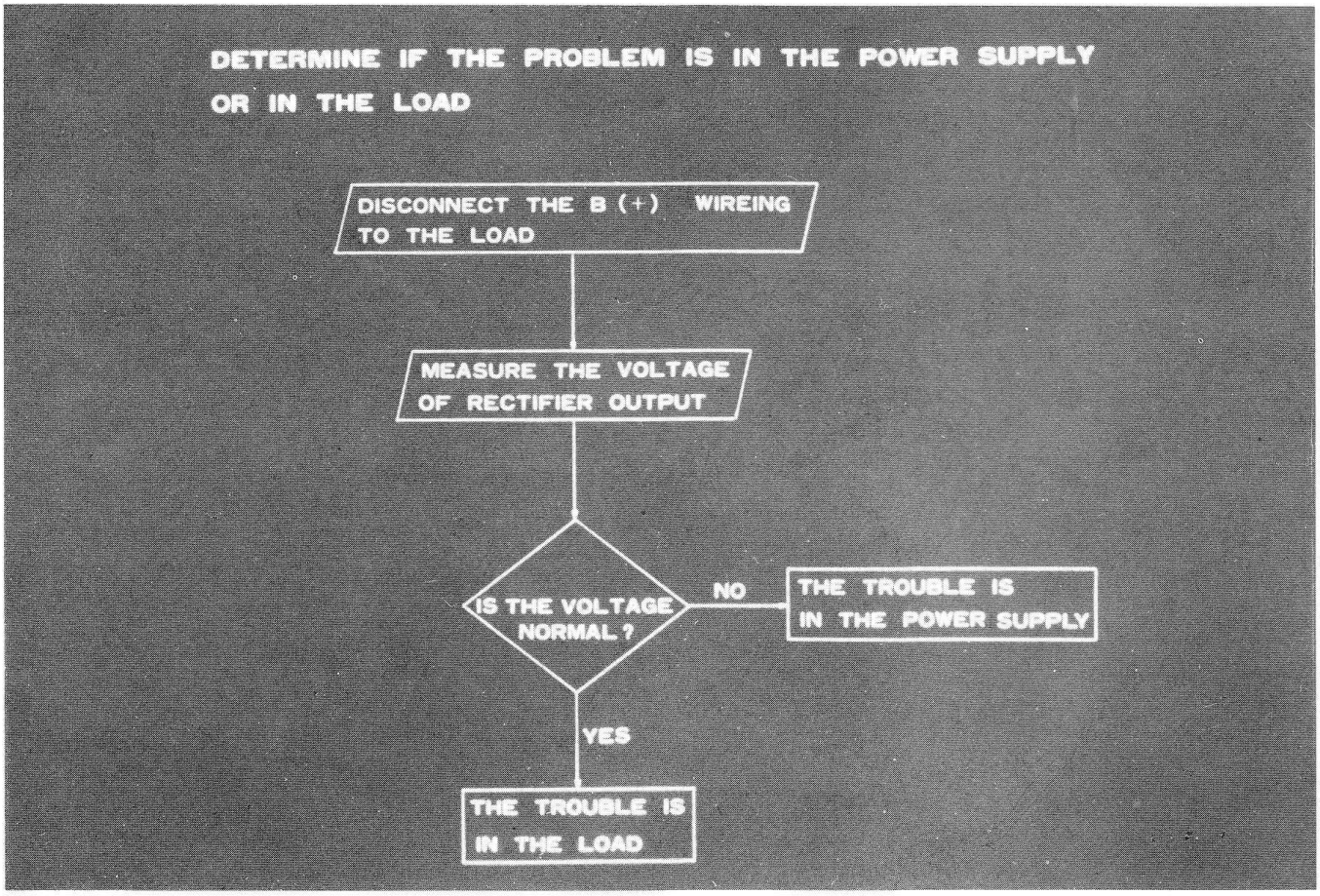


50. THIS OVERCURRENT MAY BE CAUSED BY A SHORTED SECONDARY, A DEFECTIVE DIODE, OR A SHORTED FILTER CAPACITOR.



51. TO DETERMINE IF THE PROBLEM IS IN THE RECTIFIER SIDE OR THE LOAD SIDE OF THE POWER SUPPLY, REMOVE THE B(+) LINE WHICH IS CONNECTING THE LOAD TO THE POWER SUPPLY.

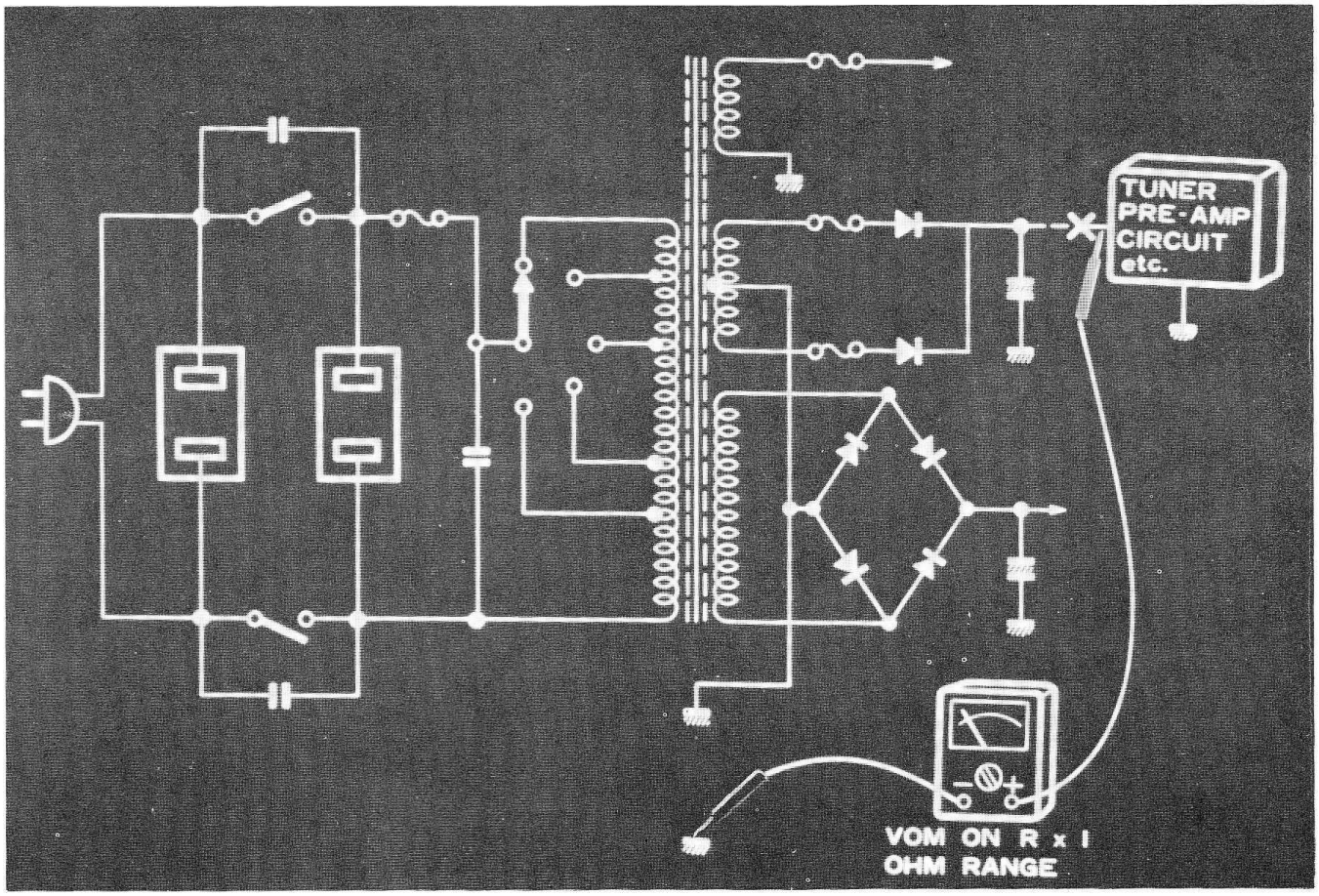
USING YOUR VTVM ON THE 100V D.C. RANGE TAKE A READING OF THE POWER SUPPLY OUTPUT VOLTAGE. IF THE READING IS NORMAL THEN THE PROBLEM IS IN THE LOAD SIDE AND IF NOT THE PROBLEM LIES IN THE POWER SUPPLY.



52.

DETERMINE IF THE PROBLEM IS IN THE POWER SUPPLY OR IN THE LOAD.

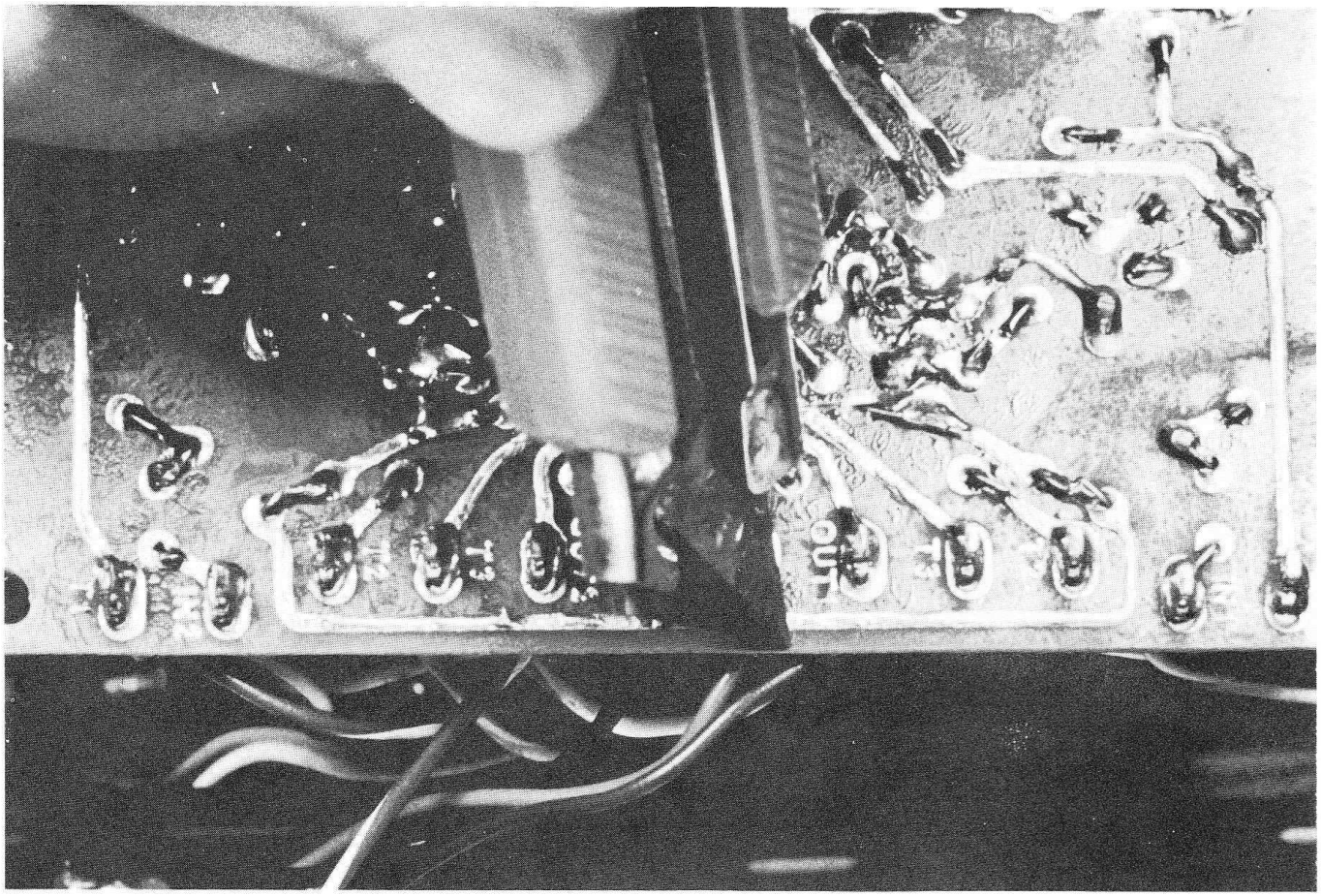
DISCONNECT THE B(+) LINE TO THE LOAD. MEASURE THE VOLTAGE OF THE RECTIFIER OUTPUT. IS THE VOLTAGE NORMAL? IF "YES", THE TROUBLE IS IN THE LOAD. IF "NO", THEN THE TROUBLE IS IN THE POWER SUPPLY.



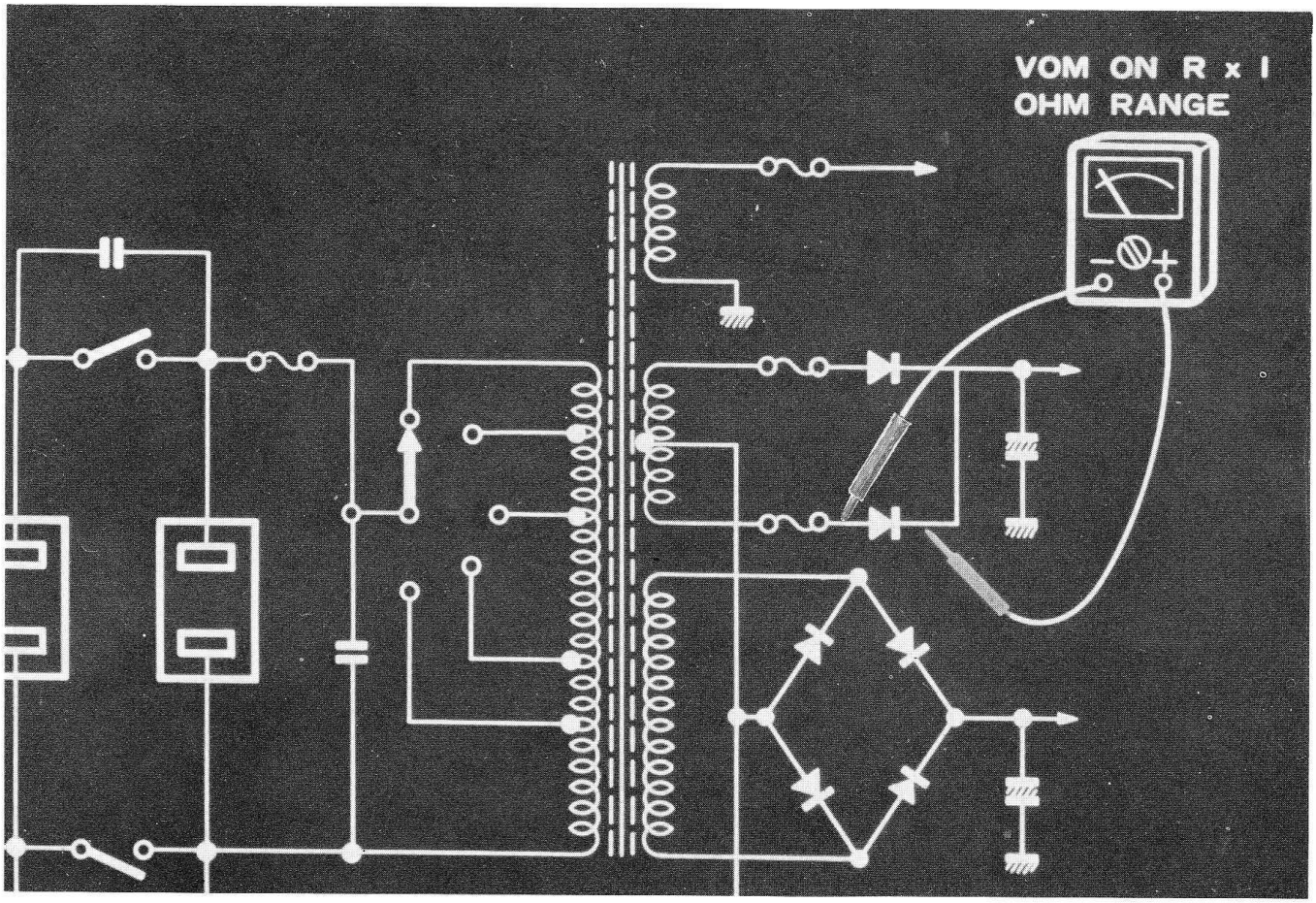
53.

IN CASE OF AN APPARENT LOAD SIDE FAILURE, MEASURE THE RESISTANCE OF THE OUTPUT OF THE RECTIFIER CIRCUIT USING Rx1 OHM RANGE ON THE VOM. BE SURE NO POWER IS ON.

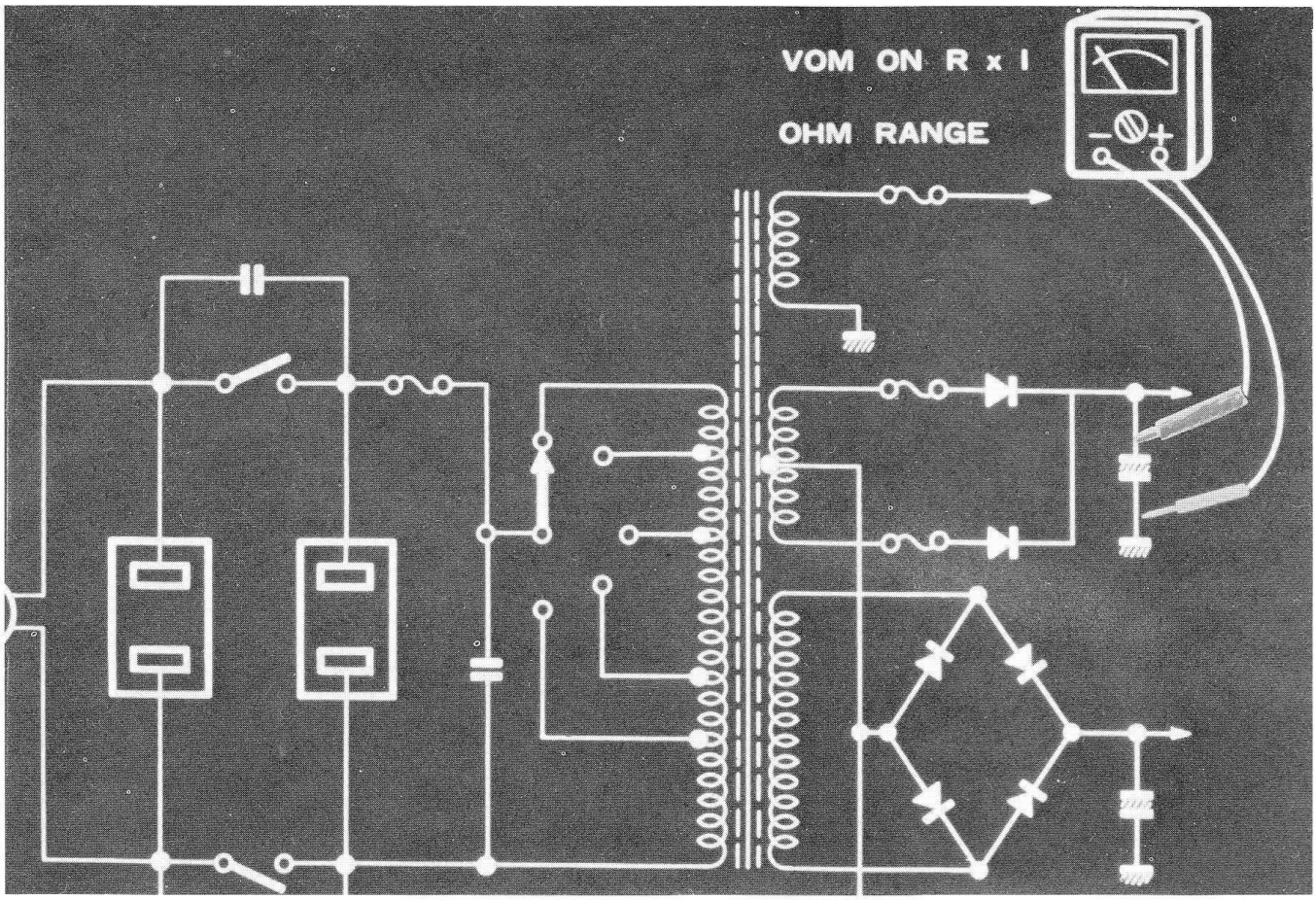
A READING OF SEVERAL HUNDREDS TO SEVERAL THOUSANDS OHMS IS NORMAL. IF YOU READ VERY SMALL OR ZERO OHM, THEN LOOK FOR SOLDER BRIDGES ON THE CIRCUIT BOARDS.



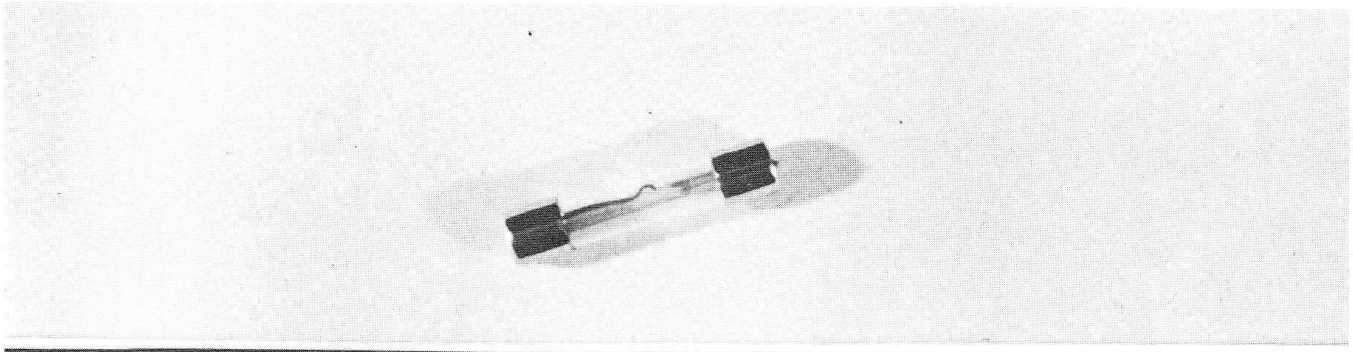
54. WHEN YOU CHECK UNITS THIS WAY, IT CAN BE VERY HELPFUL TO LOCATE THE PROBLEM FROM THE NEIBORHOOD OF THE RECTIFIER CIRCUIT THEN ON TO THE LOAD.



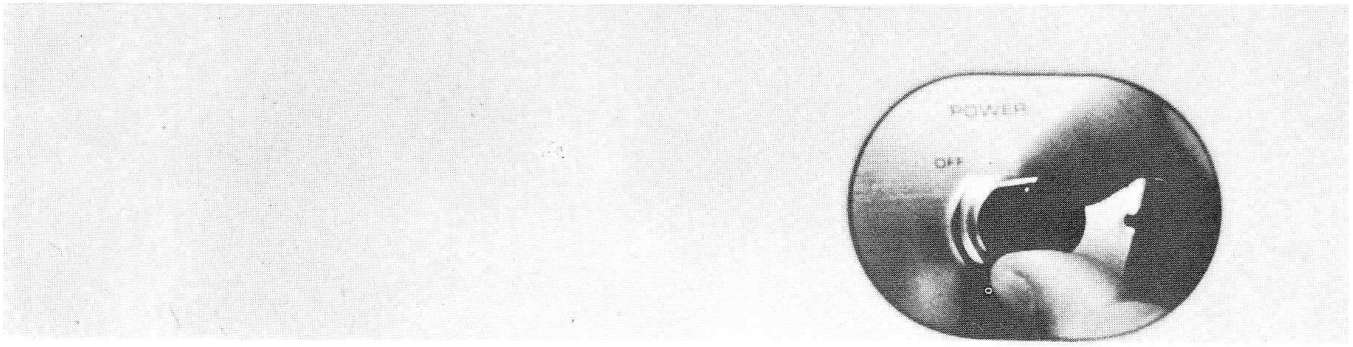
55. IF THE FAILURE IS IN THE POWER SUPPLY, THEN INSURE THAT THE POWER IS OFF AND CHECK THE DIODES FOR SHORTS.



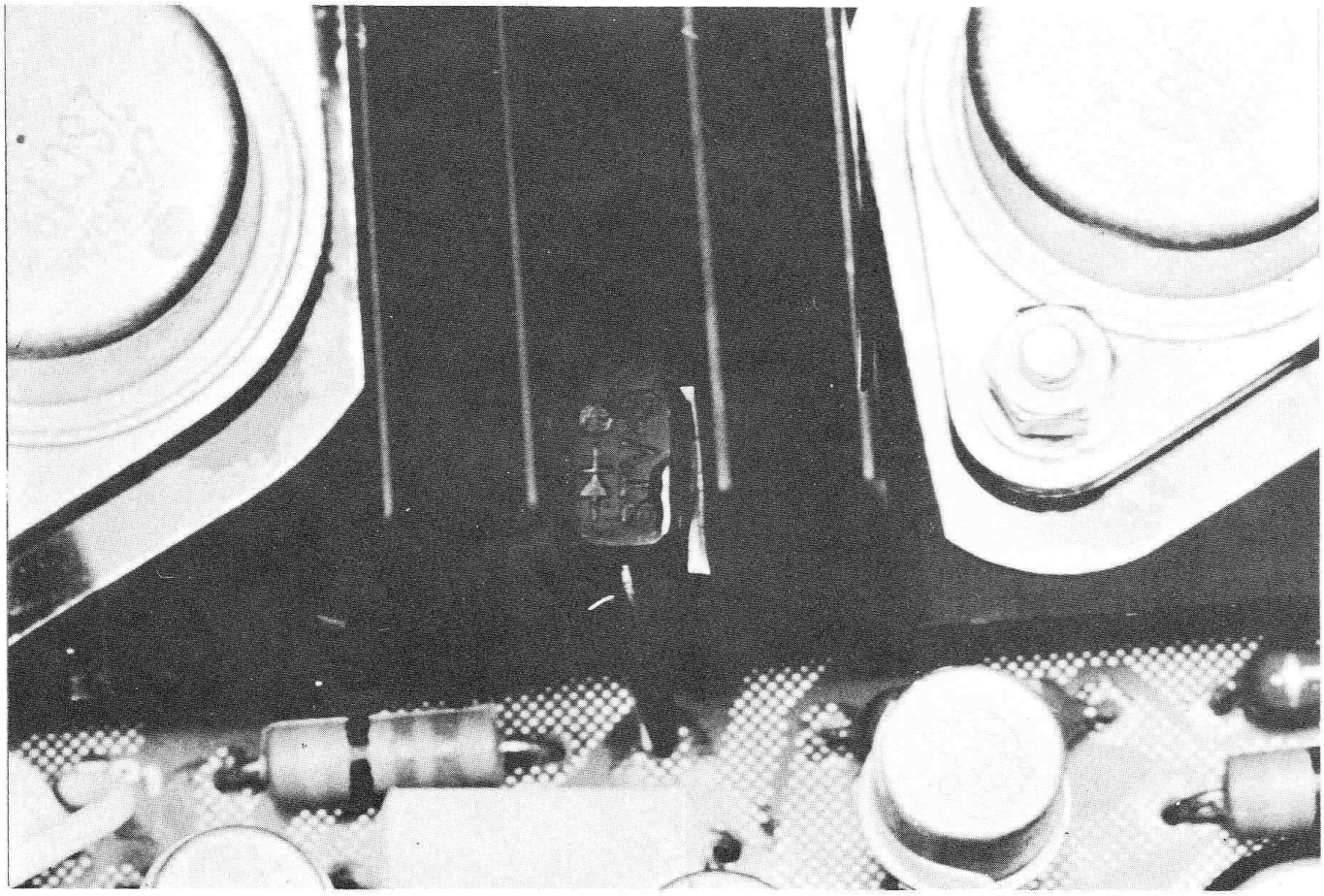
56. IF THEY CHECK OK, THEN TEST THE FILTER CAPACITORS BY PLACING YOUR VOM ON THE Rx1 OHM RANGE, AND PLACE THE TEST LEADS ACROSS THE CAPACITOR. IF THE CAPACITOR IS GOOD, YOUR METER WILL SWING FROM INFINITY TO ZERO AND SLOWLY RETURNS TO INFINITY AGAIN. IF THE CAPACITOR IS SHORTED, IT WILL READ CONSTANT ZERO OR VERY SMALL RESISTANCE.



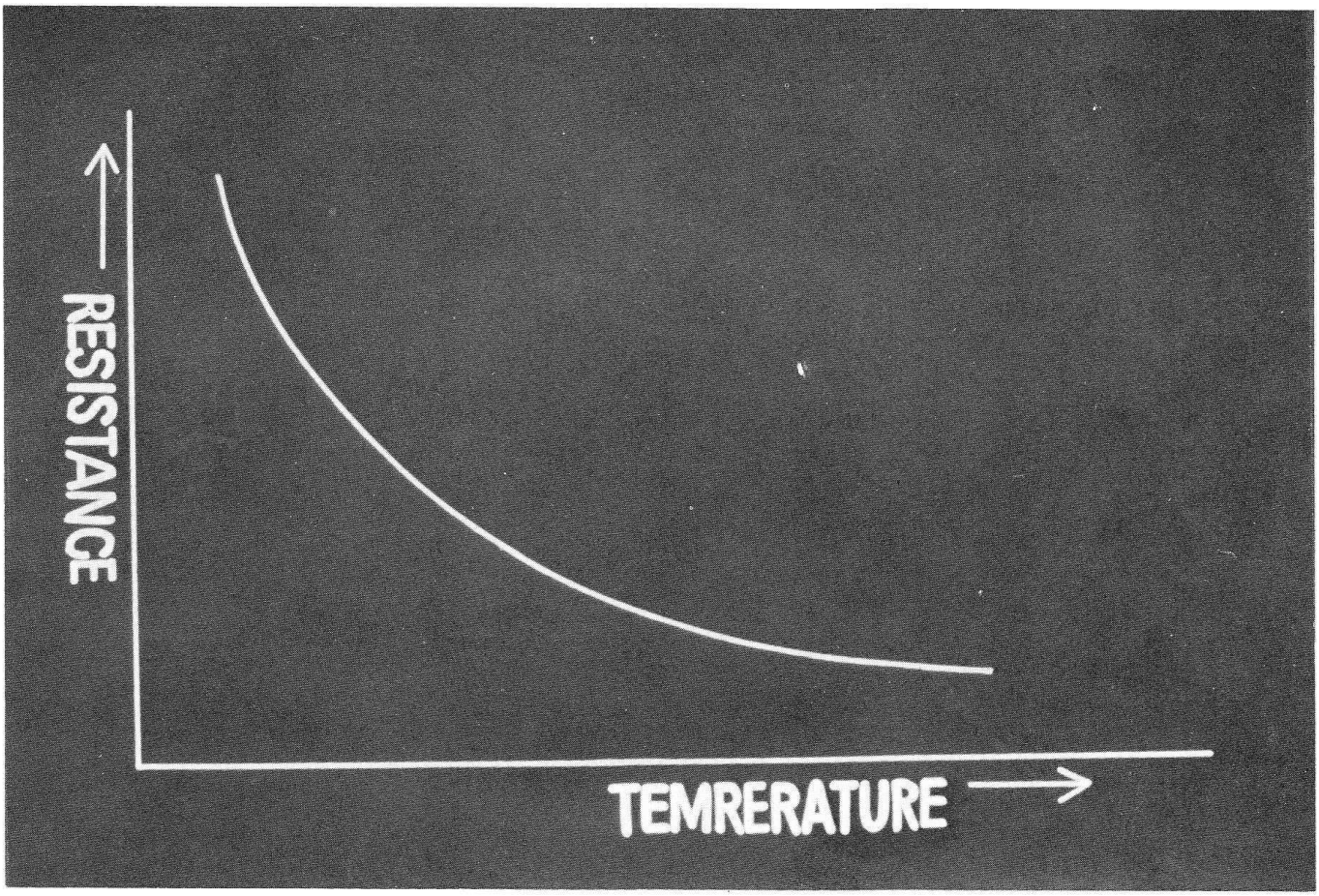
THE FUSE BLOWS AFTER QUITE A WHILE



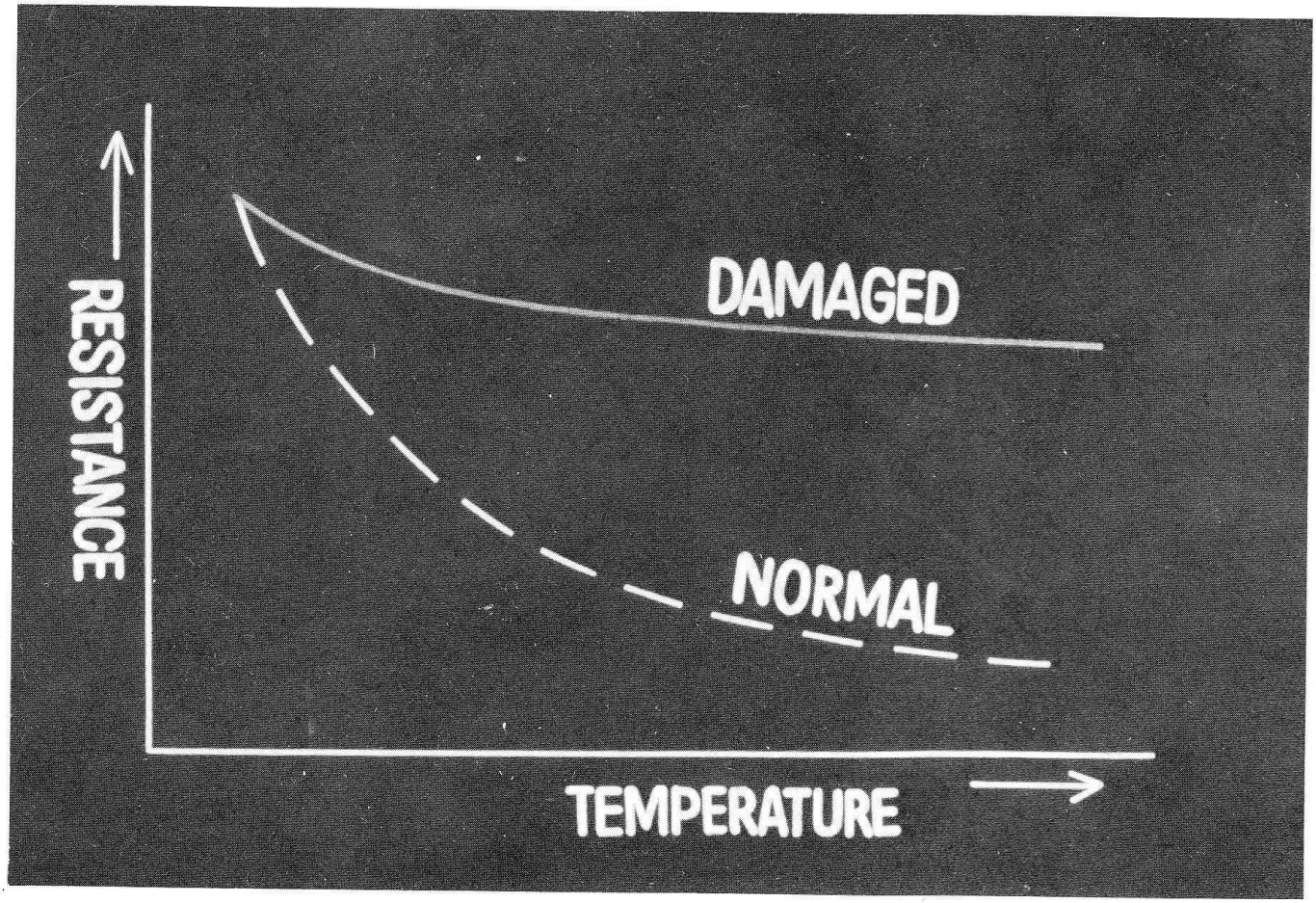
57. ONLY LAST SYMPTOM YOU MAY RUN INTO IS A UNIT THAT WILL BLOW A FUSE ONLY AFTER IT WARMS UP. THE UNIT WILL OPERATE FOR A WHILE AFTER YOU REPLACE THE FUSE.



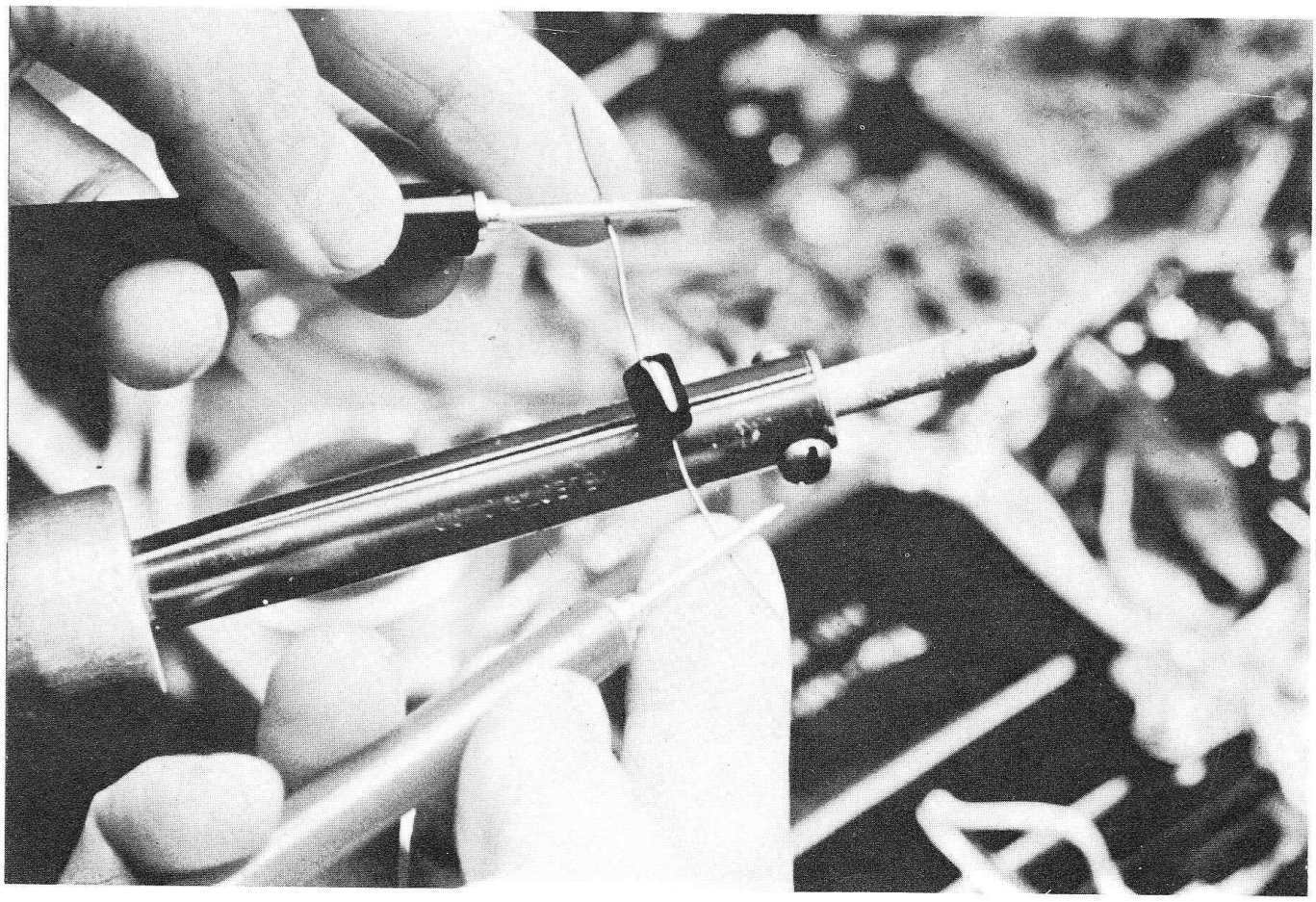
58. HERE YOU WILL SUSPECT THE TEMPERATURE COMPENSATING DIODES ARE DEFECTIVE. THEY SHOULD CHANGE VALUE ACCORDING TO THE TEMPERATURE BUT DEFECTIVE ONES WILL NOT.



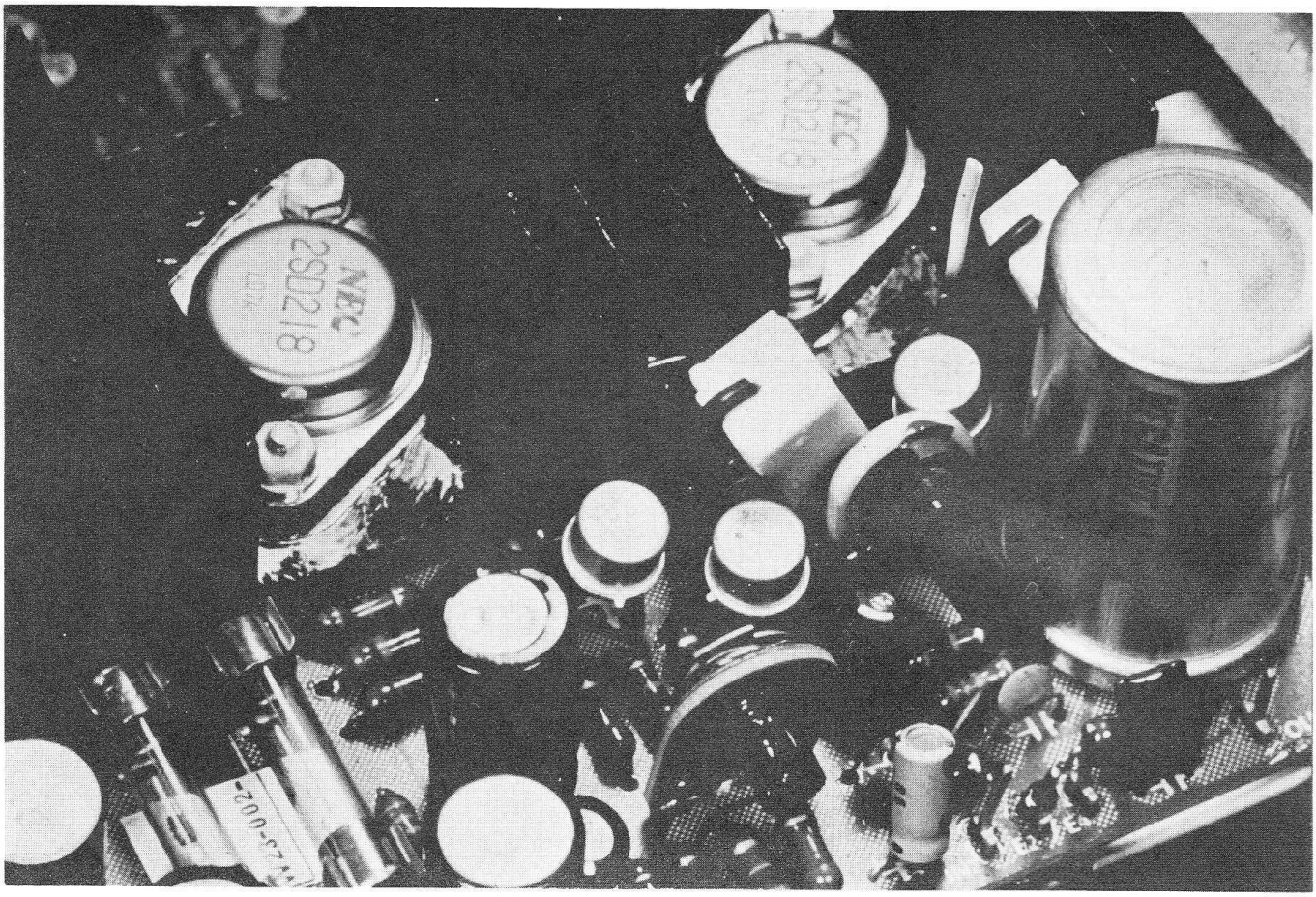
59. A GOOD TEMPERATURE COMPENSATING DIODE DECREASES RESISTANCE WITH INCREASING TEMPERATURE AND THEREFORE COMPENSATE THE BIAS OF THE TRANSISTORS IT IS CONNECTED TO.



60. IF A DIODE IS DAMAGED, ITS RESISTANCE VALUE WILL NOT CHANGE WITH INCREASED TEMPERATURE. IF IT DOES NOT CHANGE, THEN IT WILL NOT CONTROL THE BIAS ON THE TRANSISTOR, THEREFORE LETTING THE TRANSISTOR HEAT UP AND BLOW THE FUSE.

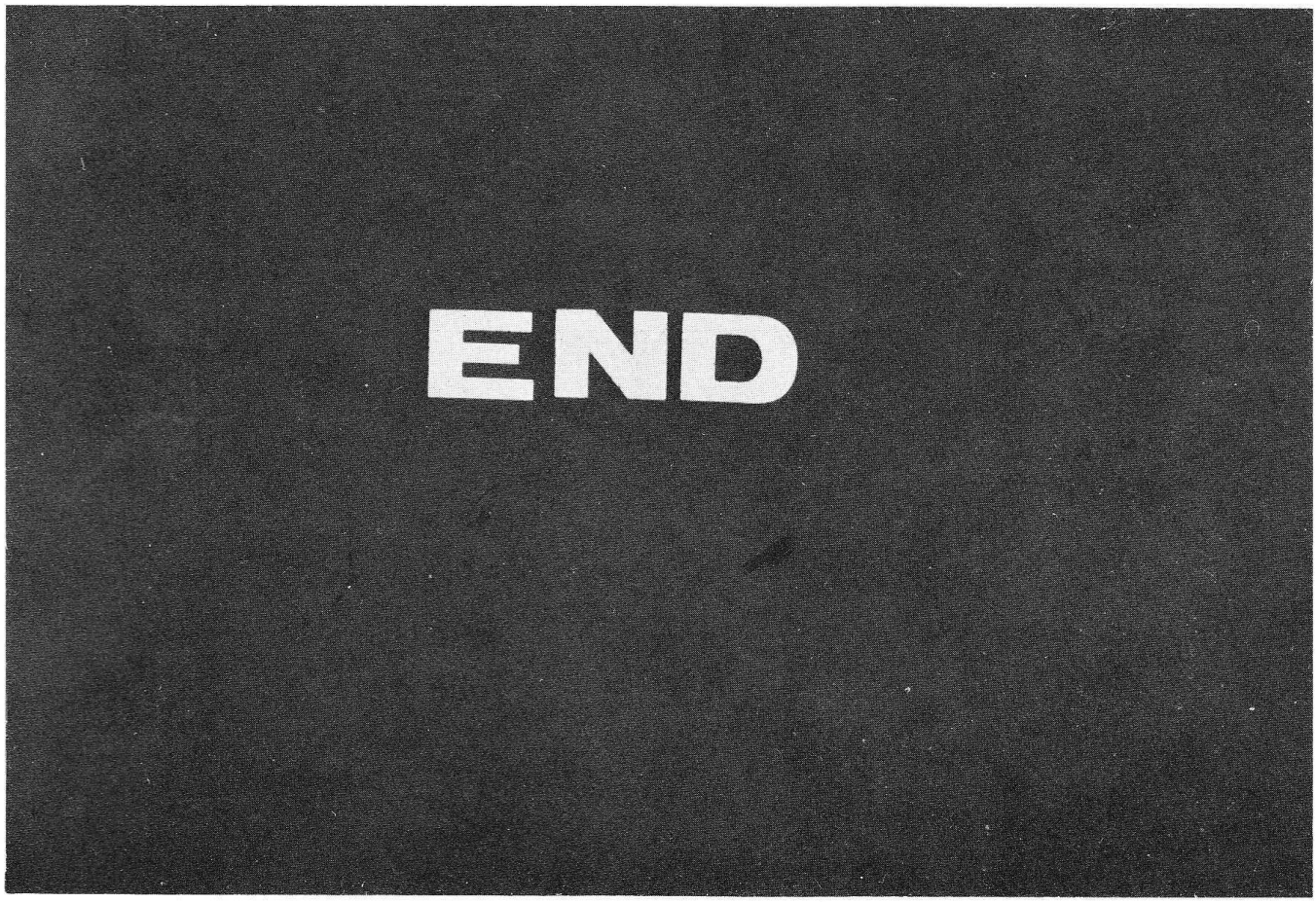


61. TO CHECK THESE DIODES JUST USE YOUR VOM ON THE Rx1 OHM RANGE. CHECK THE RESISTANCE IN A FORWARD BIAS DIRECTION WHILE YOU HEAT THE DIODE WITH YOUR FINGER OR SOLDERING IRON. IF THE RESISTANCE DECREASES AS THE TEMPERATURE RISES THEN THE DIODE IS GOOD. IF THE RESISTANCE DOES NOT CHANGE, IT IS DEFECTIVE.



62. ALL OF THE PROBLEMS JUST OBSERVED ARE REASONS FOR UNITS TO BLOW FUSES. AS YOU HAVE SEEN, THERE ARE QUITE A FEW CAUSES.

IF YOU FOLLOW A LOGICAL TROUBLE SHOOTING PROCEDURE AND OBSERVE THE CLUES GIVEN BY THE FAILED UNIT, YOU WILL QUICKLY AND PROFITABLY REPAIR ANY OF THESE DEFECTIVE UNITS.



63.

– END –

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