TF26

TOUCH TONE CRICKET

SERVICE MANUAL

SENCORE

"the all american line"

SAFETY REMINDERS

When testing electronic equipment, there is always a danger present. Unexpected high voltages can be present at unusual locations in defective equipment. The technician should become familiar with the device that he is working on and observe the following precautions.

1. When making test lead connections to high voltage points, remove the power. If this cannot be done, be sure to avoid contact with other equipment or metal objects. Place one hand in your pocket as a safety precaution and stand on an insulated floor to reduce the possibility of shock.

2. Discharge filter capacitors before connecting test leads to them. Capacitors can store a charge that could be dangerous to the technician.

3. Be sure your equipment is in good order. Broken or frayed test leads can be extremely dangerous and can expose the technician to dangerous potentials.

4. Remove the test leads immediately after the test has been completed to reduce the possibility of shock.

5. Do not work alone when working on hazardous circuits. Always have another person close by in case of accident. Remember, even a minor shock can be the cause of a more serious accident, such as falling against the equipment, or coming in contact with high voltages.

TABLE OF CONTENTS

DESCRIPTION

INTRODUCTION

The time spent looking up the basing diagram of a transistor, or determining the correct basing by trial and error is time wasted. In most instances, the technician is not interested in exacting measurements of the transistor, only that it is good or bad. With the TF26 Touch Tone Cricket, there is no need to know the basing diagram, polarity, or even if the device under test is a transistor or FET. The Cricket uses an exclusive computer logic circuit to determine if the transistor or FET will invert a square wave input. Six pushbuttons and a polarity switch are used to provide all possible combinations of connections. Just hook the leads in any order, and press the buttons. Cricket will "chirp" to tell you everything is cricket when you hit the right combinations. The transistor is bad if Cricket does not chirp.

FEATURES

* Test any transistor or FET, in or out of circuit, with no technical knowledge.
* Requires no reference or set up book.
* Automatic lead coding and polarity selection.
* Simple pushbutton test.
* Audio "chirp" as well as visual indication.
* Checks ICBO, IECO, IEBO, and ICEO leakage automatically.

SPECIFICATIONS

TYPE DEVICES TESTED:	Diodes, transistors, and single gate FET's.
TEST VOLTAGES:	
GAIN TEST:	V_{CE} - Plus or minus 5V V_{BE} - 3 volts peak to peak, centered on zero re-reference.
LEAKAGE TEST:	V_{CB} - 5 volts

TEST CURRENTS FOR GAIN TEST:	I_C - 10mA max. 2 - 3mA average continuous I_B - 7mA max. 3mA average continuous.
SEMICONDUCTOR COMPLIMENT:	7 - 1N4148; 2 - 2N5172; 1 - 2N4248; 1 - 10 volt zener; 1 - LM3900 Quad op-amp;1 - SN7400 Quad NAND gate.
METER LIGHT:	1 - No. 47 Pilot Lamp
SIZE:	Height: 10" (25.4cm) Weight: 4 lbs. (1.8Kg) Width: 5 1/2" (13.8cm) Depth: 3 1/2" (8.9cm)

CONTROLS

(1) **POLARITY SWITCH:** This slide switch selects the polarity of the test voltages applied to the device under test. Normal operating procedure is to set the switch to the NPN position for NPN transistors or N channel FET's, and to the PNP position for PNP transistors or P channel FET's. However, if the correct polarity is not known, no damage will result to the device under test if the switch is in the wrong position.

(2) **FUNCTION SWITCH:** This slide switch selects either the gain or leakage tests. The gain test may be performed with the transistor in or out of circuit, but the leakage test may be performed out of circuit only.

(3) **TEST SWITCHES:** The six pushbutton switches on the keyboard apply the test voltage to the elements of the device under test. The table in Fig. 5 shows the lead coding of the 6 pushbuttons.

CONNECTIONS

The TF26 Cricket uses either a front panel mounted transistor socket, or test leads terminated with E-Z-Mini-Hook connectors for connection to the transistor under test. To use the E-Z-Mini-Hook con-

Fig. 1 TF26 Transistor Tester

nector, use the thumb and first two fingers to squeeze the collar towards the ball of the connector, and hook the spring loaded hook to the lead of the device being tested. Release the pressure on the collar, and the E-Z-Mini-Hook will remain securely connected to the lead.

OPERATION

GAIN TEST

The gain test on a transistor or FET with the TF26 Cricket is actually simpler than testing a tube. There is no need to know the transistor basing, polarity, or even if it is an FET or a transistor, just hook the leads in any combination and press the buttons. To make a gain test on a transistor or FET, proceed as follows:

1. Remove power from the equipment containing the device being tested, and discharge all power supply filter capacitors.

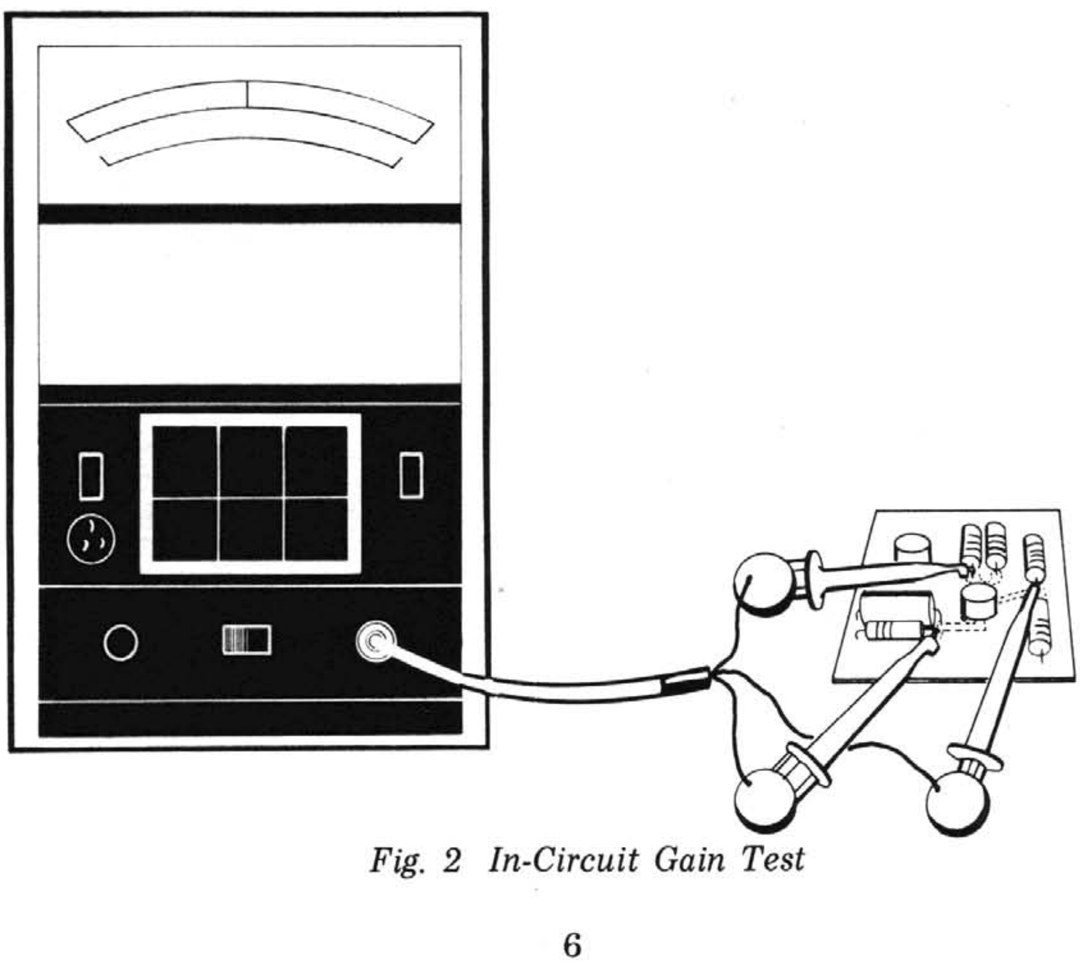


Fig. 2 In-Circuit Gain Test

2. Turn the power on to the TF26 and connect the test leads to the leads of the device being tested. It is not necessary to determine the basing of the transistor, as the touch tone circuit will do it for you. If the device being tested is a plug-in device, you may use the front panel mounted transistor socket.

3. Select the GAIN test, and press each of the six test buttons in turn. If the Cricket does not chirp and indicate in the good area of the meter, select the opposite polarity and press the test buttons again. If the Cricket doesn't chirp, the device is probably bad. It is advisable to retest the "bad" transistor after removing it from the circuit to isolate the remote instances where a good transistor will test "bad" in a certain circuit. A good FET and most good transistors will test good on two of the test buttons. Some special devices will test good on only one button. If it is desired to determine the exact basing of the device and whether it is a transistor or an FET refer to the section of this manual on determining basing.

LEAKAGE TEST

The leakage test on a transistor is nearly the same as the grid leakage test of a tube. It is possible for a transistor or FET to have good gain, and still not work in the circuit because the leakage upsets the DC circuit values. To make the leakage test, proceed as follows:

1. Remove the transistor from the circuit and plug the device into the front panel mounted transistor socket or connect the test leads to the leads of the device. Make the gain test and note which two test buttons results in a good indication.

2. Switch to the LEAKAGE test, and press the two buttons that gave a good gain test. This makes the ICBO and ICEO leakage measurements of transistors or the IGDO and IGSO leakage of FET's. These leakages should measure zero for FET's and small silicon transistors. High power silicon and small germanium transistors may indicate up to 100uA leakage, while germanium power transistors may indicate up to 3,000uA and still be acceptable.

3. Press the remaining four buttons. Two of these buttons will result in a full scale leakage reading and the other two may or may not indicate leakage depending on the transistor. A junction FET will

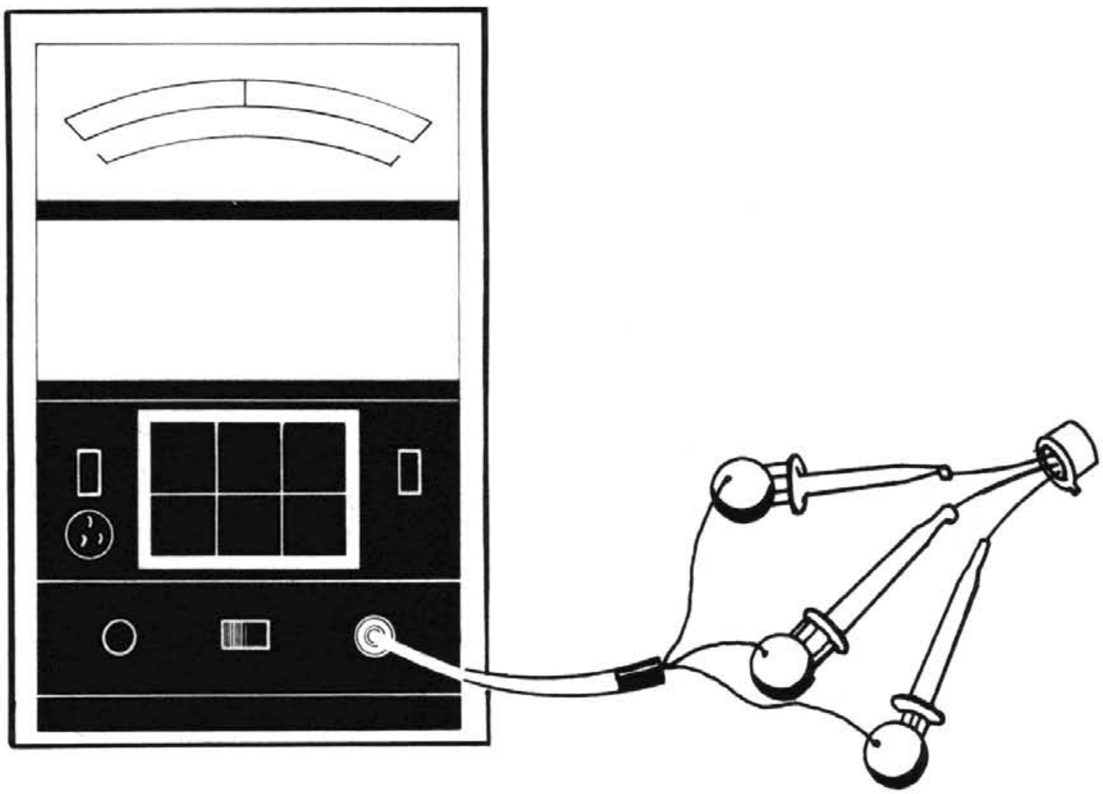


Fig. 3 Leakage Test

indicate full scale on all four remaining buttons, while a MOS FET should indicate leakage on only two buttons. If you desire to determine the exact type leakage for a particular transistor refer to the LOCATING LEAKAGE section of this manual.

DETERMINING BASING

If the device being tested tests good on two of the test buttons, it is either a standard transistor or an FET. To determine if the device is a transistor or FET and the basing diagram if it is a transistor, it is necessary to insert a resistor in series with the base/gate lead. The value of this resistor will depend on the transistor being tested, but the minimum value to use is 10K. If the device still tests good on two buttons, the value of the resistor will have to be increased in 10% steps (10, 12, 15, etc.) until it tests good on only one button. If the device is still testing good on two buttons with a 100K resistor in series with the base, it is an FET. Since the source and drain are interchangeable on an FET, it is not possible to determine the exact basing. To determine the basing on a transistor, proceed as follows:

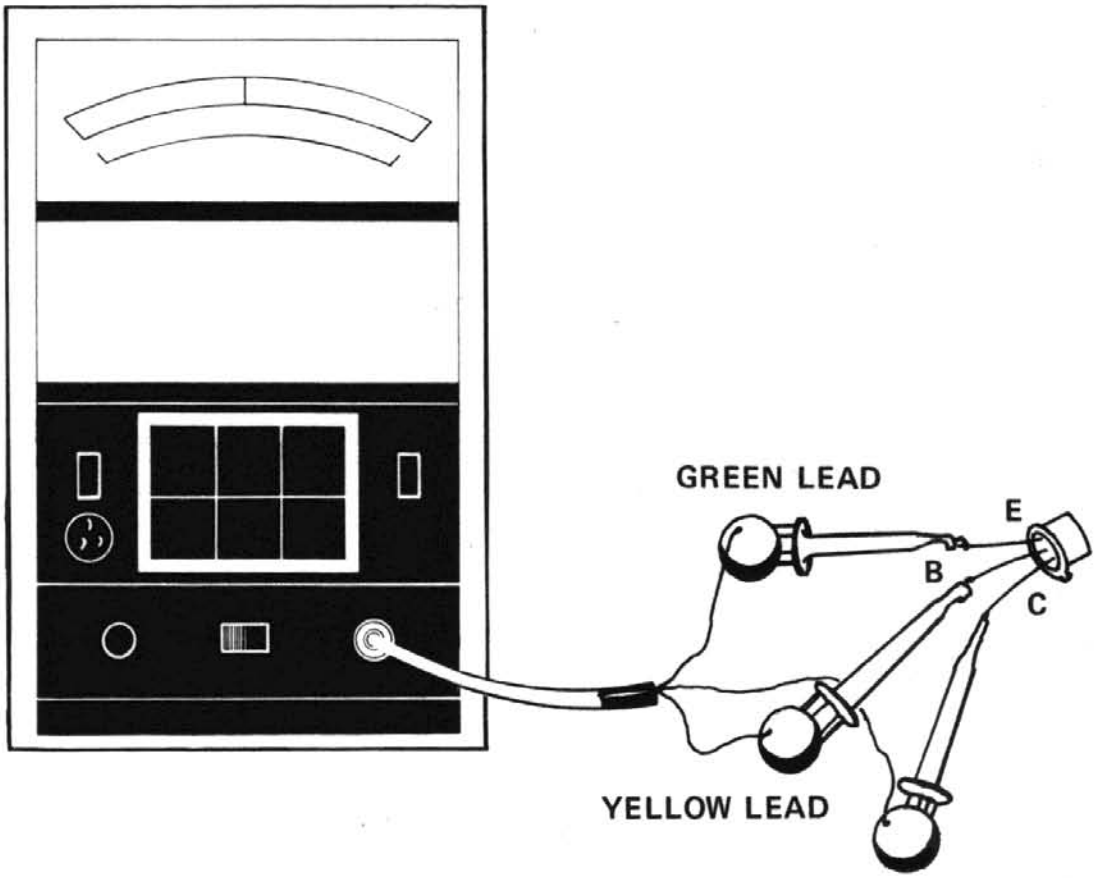


Fig. 4 Determining Basing

1. With the transistor out of circuit, connect the TF26 and determine which two test buttons produce a good indication.

2. Refer to the table in Fig. 5 to determine the base lead, and connect a 10K resistor in series with it.

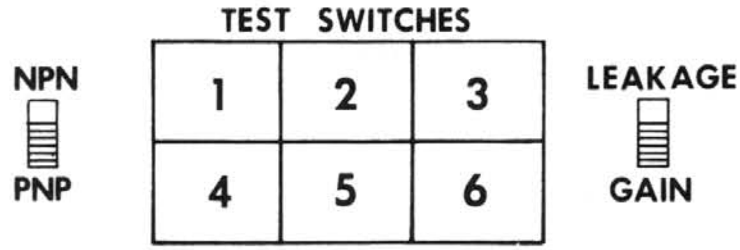
3. Retest the transistor and note which test button produces a good indication. Increase the value of the base resistor as necessary until the transistor tests good on only one button. Note the button that produces a good indication.

4. Refer to the table in Fig. 5 to determine the basing of the transistor.

LOCATING LEAKAGE

In some cases, it may be desirable to determine the exact nature of leakage in a transistor. With the touch tone test switches on the

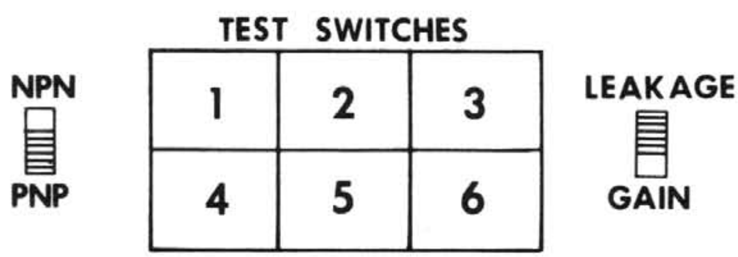
TF26 Cricket, there is no need to connect to the transistor four different ways, the test switches do it for you. To locate the exact nature of the leakage, proceed as follows:



	TEST SWITCHES											
LEAD COLOR	1		2		3		4		5		6	
GREEN	E	S	B	G	C	D	C	D	B	G	E	6
YELLOW	B	G	C	D	E	S	B	G	E	S	C	D
RED	C	D	E	S	B	G	E	S	C	D	B	G
	TRANSISTOR OR FET BASING COMBINATIONS											

Fig. 5 Transistor Basing Combinations

1. Determine the basing of the transistor or FET, connect the green test lead to the emitter, the yellow test lead to the base and the red lead to the collector. If the device is an FET, connect the yellow test lead to the gate and the red lead to either the source or the drain. Connect the green lead to the remaining element of the FET.



	TEST SWITCHES					
LEAD COLOR	1	2	3	4	5	6
GREEN E/S	I_{CBO}	I_{BEO}	I_{ECO}	I_{EBO}	I_{CEO}	I_{BCO}
YELLOW B/G	/	/ *	/ *	/	/	/
RED C/D	I_{GDO}	I_{SGO}	I_{DSO}	I_{GSO}	I_{SDO}	I_{DGO}

Fig. 6 Leakage Currents for Properly Connected Transistor

 * Corrected by Mike Parry Feb 17, 2008

2. Refer to Fig. 6 and press the test button corresponding to the desired leakage test. Note that for regular transistors, buttons numbers 2 and 6 will produce a full scale leakage indication, corresponding to the conduction of the forward biased base-emitter and base-collector junctions respectively. Junction FET's will produce a full scale reading on buttons 2 and 6 corresponding to the forward conduction of the gate diode; and on buttons 3 and 5 corresponding to the current flow through the low resistance source-drain channel. MOS or IG FET's should only produce a full scale reading on buttons 3 and 5; corresponding to the current flow through the channel. Fig. 7 contains a table which establishes guidelines for limits of leakage currents to be expected on good devices.

TYPE OF DEVICE	BUTTON 1 I_{CBO} (GDO)	BUTTON 2 I_{BEO} (SGO)	BUTTON 3 I_{ECO} (DSO)
Small Si. Transistor	0-.1uA	3000uA	0-.1uA
Large Si. & Small Ge. Transistor	1-50uA	3000uA	1-50uA
Large Ge. Transistor	10-3000uA	3000uA	10-3000uA
JFET	0uA	3000uA	3000uA
MOSFET	0uA	0uA	3000uA

TYPE OF DEVICE	BUTTON 4 I_{EBO} (GSO)	BUTTON 5 I_{CEO} (SDO)	BUTTON 6 I_{BCO} (DGO)
Small Si. Transistor	0-.1uA	0-1uA	3000uA
Large Si. & Small Ge. Transistor	1-50uA	10-500uA	3000uA
Large Ge. Transistor	10-3000uA	100-3000uA	3000uA
JFET	0uA	3000uA	3000uA
MOSFET	0uA	3000uA	0uA

Fig. 7 Maximum Leakages for Good Transistors and FET's

3. The following is an explanation of which leakage is measured with each test button, and its importance to the operation of the transistor or FET:

Button 1: ICBO is the leakage current that flows in a transistor when a voltage is applied between the collector and base, with the emitter open and the collector-base junction reverse biased. (Collector positive with respect to base for NPN transistor.) Its effect is similar to grid leakage in a tube in that even a small amount will upset the DC bias in the circuit. In an FET, this leakage is called IGDO, and its effect on the DC bias of the circuit is even greater than for transistor ICBO. When making this leakage measurement, press the button carefully and note any up-scale deflection of the meter. Even a very small up-scale deflection should be cause to reject a small silicon transistor or FET. Larger silicon and small germanium transistors may safely indicate up to 50uA of leakage, while some special high power germanium transistors may indicate up to 3,000uA and still be within manufacturers specifications.

Button 2: IBEO in transistors is the current that flows through the forward biased base-emitter junction. (Base positive with respect to the emitter for an NPN transistor.) This button should produce a full scale indication for transistors. For FET's this leakage would be called ISGO and indicate full scale for junction FET's and zero for MOS or IG FET's.

Button 3: IECO is the leakage current that flows in a transistor when a voltage is applied between emitter and collector with the base open. (Emitter positive with respect to collector for an NPN transistor.) IECO is a measurement of the transistors ability to block reverse voltage, such as would be encountered in circuits with an inductive load in the collector. In FET's, this current would be called IDSO and should indicate full scale because of the normal conduction of the low resistance drain-source channel.

Button 4: IEBO is the leakage current that flows in transistors when a voltage is applied between emitter and base, with the collector open and the emitter-base junction reverse biased. (Emitter positive with respect to base for NPN transistor.) IEBO is most important in pulse circuits, where the base is driven deep into reverse bias and the leakage current could influence the pulse shaping circuits. In a FET, this leakage is called IGSO, and is a measurement of leakage current that flows from gate to source, with the gate source junction reverse biased for junction FET's. Even a small up-scale deflection should be cause to reject a small silicon transistor or any FET. Larger silicon and small germanium transistors may safely indicate up to 50uA of leakage, while some special high power germanium transistors may indicate up to 3,000uA and still be within manufacturers specifications.

Button 5: ICEO is the leakage current that flows in a transistor when a voltage is applied between the collector and the emitter, with the base open. (Collector positive with respect to emitter for an

NPN transistor.) Excessive ICEO will cause a transistor to operate unreliably in any circuit, however, the transistors most prone to this type leakage are high power types such as those used in audio output circuits and power supply regulators. In FET's this current would be called ISDO and should indicate full scale because of the normal conduction of the low resistance source-drain channel.

Button 6: IBCO in transistors is the current that flows through the forward biased base-collector junction. (Base positive with respect to the collector for an NPN transistor.) This button should produce a full scale indication for transistors. For FET's this leakage would be called IDGO, and indicate full scale for junction FET's and zero for MOS and IG FET's.

CHECKING DIODES

The leakage test on the TF26 provides a simple, accurate method of determining the front to back ratio of a diode or rectifier. The test switches allow out of circuit measurement of both forward and leakage currents with no need to reconnect the diode.

1. Set the polarity switch to the NPN position and the function switch to LEAKAGE.

2. Connect the red test lead to the anode of the diode and the yellow lead to the cathode.

3. Press button number 1 to measure the forward current. The forward current should indicate at or near full scale.

4. Press button number 6 to measure the leakage current. The leakage current should indicate at or near zero on the leakage scale.

CIRCUIT DESCRIPTION

THEORY OF OPERATION OF TF26 GAIN TEST

The operation of the TF26 gain test represents a unique approach to the testing of transistors and FET's. The test depends on a good transistors or FET providing a signal polarity reversal from input to output when operating with the emitter or source common.

A 2KHz square wave is generated by IC1B and coupled to the base or gate of the device under test by the test switches. The test switches also connect Vc from the power supply to the collector or drain, and ground the emitter or source. If the device under test is good, the collector signal voltage developed at the junction of R18 and R19 will be 180 degrees out of phase with the base signal.

The base signal from the 2KHz oscillator is amplified by IC1C, and the collector signal is amplified by IC1D. The outputs of IC1C and IC1D are coupled to an exclusive "OR" gate that provides an output to the meter and speaker only when the two input signals are 180 degrees out of phase, providing both audio and visual indication of a good transistor. R20 is added to the circuit to insure that with the leads open, or with a defective transistor connected, the signal at the junction of R18 and R19 will be in phase with the base signal.

POWER SUPPLY

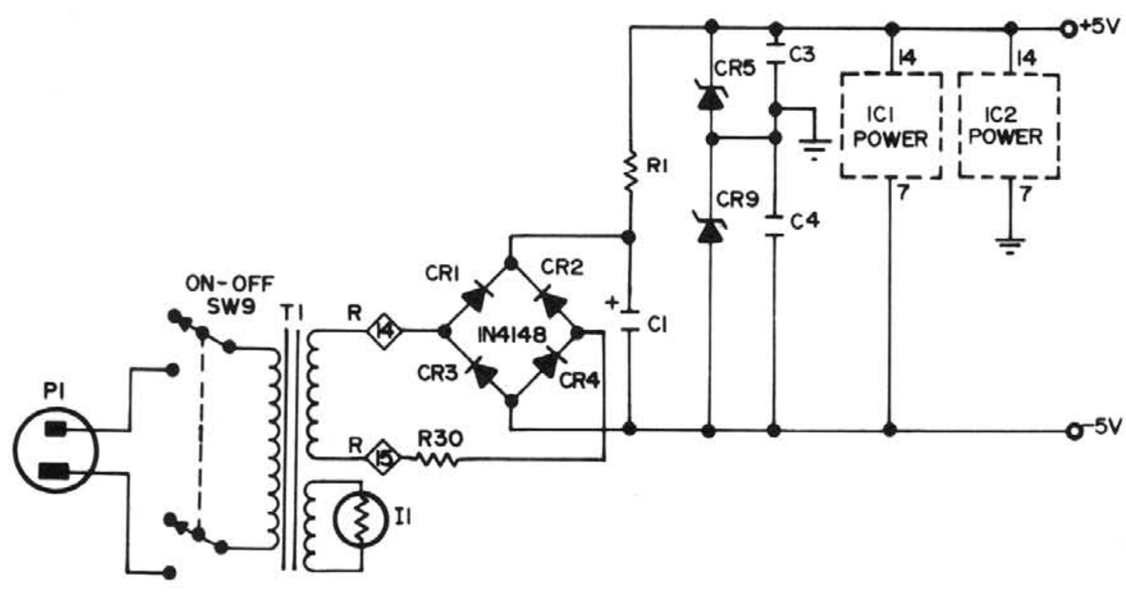


Fig. 8 Power Supply

The secondary voltage of T1 is rectified by CR1-4 and filtered by C1 to produce 16 volts DC. R30 has been included as a surge limiting resistor to protect diodes CR1-CR4 during the initial charging of capacitor C1 when power is applied to the circuitry of the TF26. The 16 volts developed is regulated by zener diodes CR5 and CR9 to produce plus and minus 5 volts for the operation of the TF26 circuitry. Resistor R1 limits the current to the diodes CR5 and CR9.

The plus and minus 5 volt outputs of the supply have additional filtering by capacitors C3 and C4.

2KHz OSCILLATOR AND SIGNAL AMPLIFIER

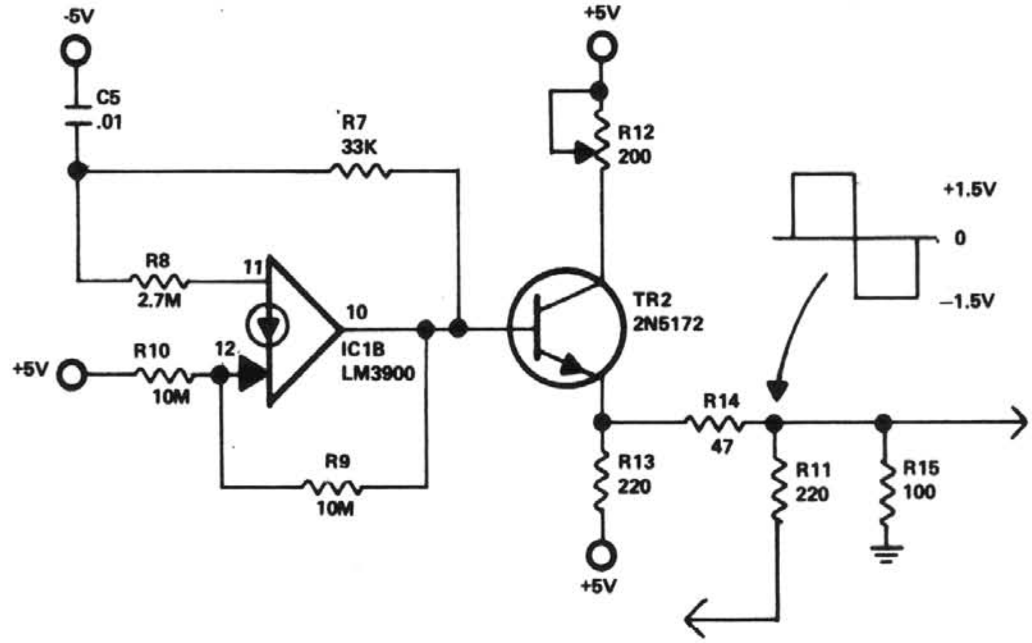


Fig. 9 2KHz Oscillator and Signal Amplifier

IC1B is connected as a square wave oscillator operating at approxmately 2KHz. The frequency of operation is determined by R7 and C5. The magnitude of the output signal is set by the ratio of R10 and R9. TR2 functions as an emitter follower providing a low impedance source of the 2KHz signal. R12 is a calibration adjustment that is factory adjusted so that the 2KHz square wave at the junction of R14 and R15 is centered on the zero reference.

The 2KHz signal is coupled by R11, SW8 and the test switches to the base of the transistor under test. It is also coupled to the non-inverting input of IC1D by R20, C6, and R22. The resistance of R20 is large compared to R18 and R19, so that when testing a good transistor, the inverted signal from the collector of the transistor under test easily overides the in-phase signal from R20. If R20 were not in the circuit, the TF26 would indicate gain with no transistor connected, because the input of IC1D would stay high, while the input of IC1C switched from high to low.

IC1C amplifies the signal applied to the base of the transistor under test. The amplified signal from the output of IC1C is coupled by

R27 to inputs 1 and 10 of IC2. IC1D amplifies the signal from the collector of the transistor under test. The amplified signal from the output of IC1D is coupled by R28 to inputs 2 and 4 of IC2.

LOGIC CIRCUIT AND INDICATOR DRIVE

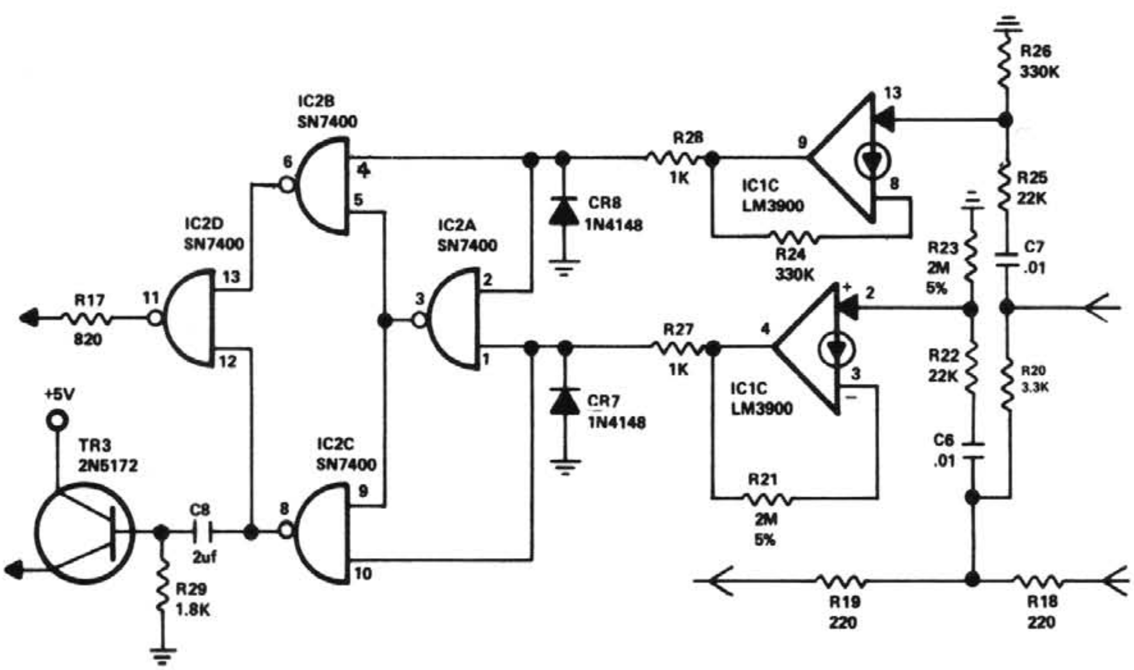


Fig. 10   Logic Circuit and Indicator Drive

The logic circuitry of IC2 is the heart of the TF26. It is here that the base and collector signals from the transistor under test are compared, and the differentiation made between a good and a bad transistor. IC2 is actually a quad, two-input "NAND" gate wired as an exclusive "OR" gate. The truth table for the "NAND" gate shows that the only time that the output of the gate is zero is when both inputs are positive.

With a good transistor connected to the TF26, the base signal coupled into input 1 of IC2A will be out of phase with the collector signal coupled into input 2. Since both inputs of IC2A are never positive at the same time, the output at pin 3 remains positive. The positive output from pin 3 is coupled into input pin 5 of IC2B and input pin 9 of IC2C. IC2B and IC2C then function as inverters, coupling the inverted base and collector signals into the inputs of IC2D. Since both inputs of IC2D are never positive at the same time, the output pin 11 remains positive. This positive output is coupled to M1, resulting in a good transistor indication. The square wave signal at output 8 of IC2C is amplified by transistor TR3 to operate the speaker for an audible indication of a good transistor.

With a bad transistor connected to the TF26, the inputs of IC2A will be in phase, resulting in a square wave output at pin 3 that is 180 degrees out of phase with the input. This out of phase square wave is coupled to the inputs of IC2B and IC2C along with the in-phase signals from the base and collector. Since both inputs of IC2B and IC2C are never positive at the same time, the outputs of IC2B and IC2C are always positive. The positive outputs of IC1B and IC1C are coupled to the inputs of IC2D, resulting in a zero output from IC1D. The zero output is coupled to meter M1, resulting in a bad transistor indication. Output 8 of IC2C is always positive, no signal is coupled into the audio transistor and speaker, indicating a bad transistor. R6 is a zero adjust control that is factory adjusted to null out the slight output offset from IC2D.

LEAKAGE TEST

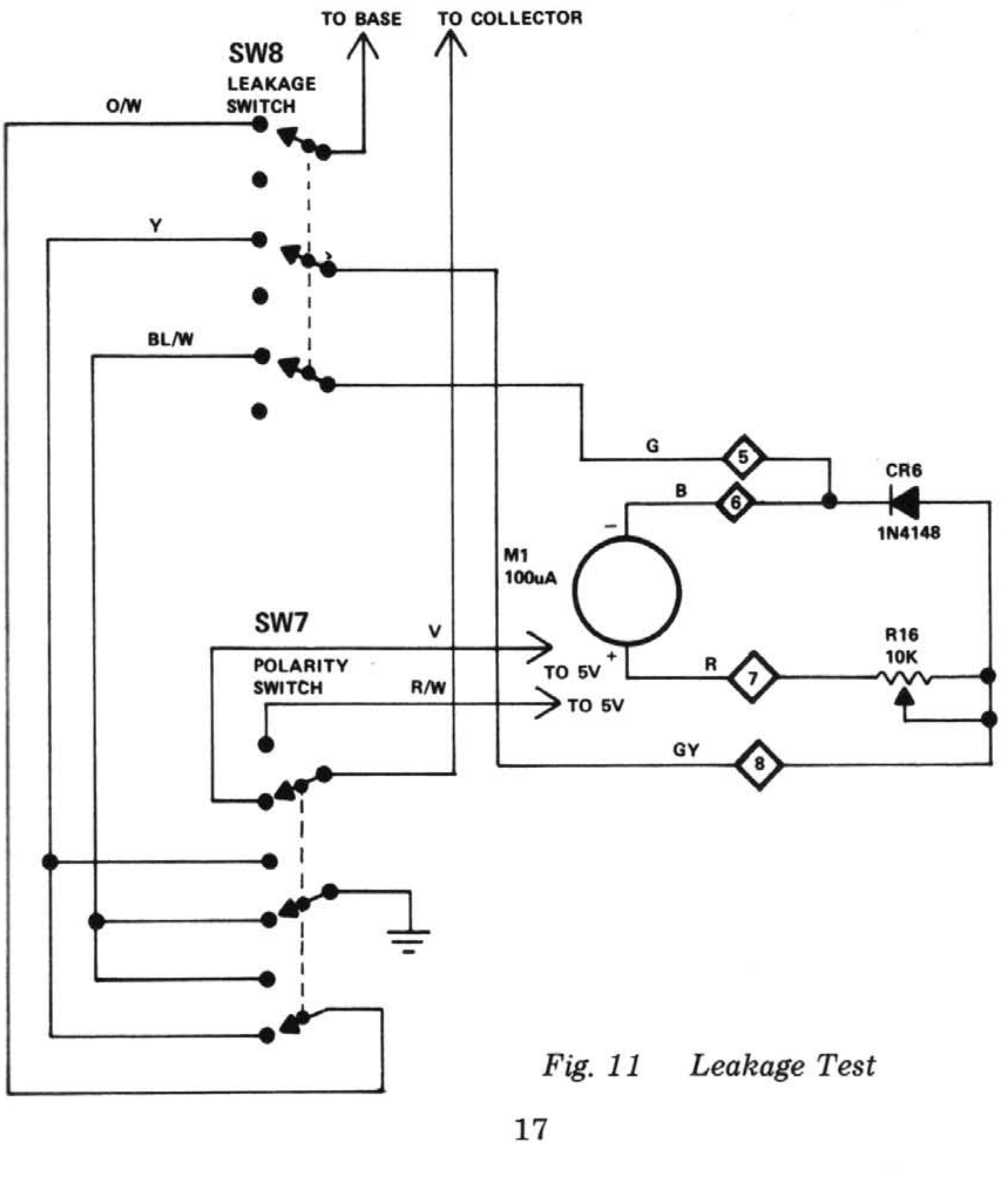


Fig. 11 Leakage Test

The collector lead of the transistor under test is connected through R17 and R18 to plus or minus 5 volts by one section of SW7 with the remaining sections of SW7 providing for polarity reversal. The base lead of the transistor under test is connected to ground through M1 by SW8 to indicate the leakage current through the transistor.

CR6 provides meter compression and R16 is a calibration adjustment to set the full-scale leakage sensitivity at 3000uA. The emitter lead is disconnected from the circuit by one section of SW8.

DISSASSEMBLY INSTRUCTIONS

P.C. BOARD FOR SERVICE

1. Remove the case by first storing the leads and closing the lead compartment door. Remove the four chrome screws from the side of the case, and lift the case off.

2. Remove the two screws that hold the PC board to the back of the chassis.

3. Remove the two and four pin molex connectors from the left side of the large PC mounted connector, and slide the PC board out of the right side of the unit.

4. Place the PC board over the meter, and reconnect the molex connectors removed in step 3. The PC board is now ready for service.

METER AND SPEAKER REPLACEMENT

1. Remove the case as in Step 1 of the previous instructions.

2. Disconnect the four pin molex connector that carries the meter and speaker wires from the right side of the PC board. (If the PC board is to be removed for service, it will also be necessary to disconnect the two and four pin molex connectors from the left side of the large PC board mounted connector.

3. Remove the two screws from the center back of the chassis and the two from the top that hold the bracket, and lift the bracket out of the chassis. Lift the top of the meter, and bend the top of the chassis slightly, so that the bracket clears the switch assembly.

SWITCH AND LEAD COMPARTMENT ASSEMBLY

1. Remove the case in Step 1 of the previous instructions.

2. Place the unit face down on a flat surface and remove all the screws from the top and rear of the chassis. Lift the chassis up and off.

3. To remove either or both of the switch boards, first unsolder its connecting wires, then remove the mounting screws, and finally, separate the switch board to one side and tilt it slightly so that the pushbuttons clear the mounting bracket.

CALIBRATION INSTRUCTIONS

STATIC METER ZERO

With the power off to the TF26, use a small screwdriver, and adjust the static meter zero screw on the rear of the meter to position the meter pointer to the zero on the left edge of the scale.

Fig. 12 Location of Zero Adjustments

ELECTRICAL METER ZERO

Turn the TF26 on, select the GAIN test. Using a small screwdriver adjust the horizontal PC pot available through the hole in the rear of the case to position the meter pointer to the zero on the left hand edge of the scale.

SIGNAL BALANCE

Select the PNP GAIN function and connect a DC - coupled oscilloscope to the yellow test lead, connect the green test lead to common. Adjust R12 such that the 2KHz signal is symmetrical above and below zero reference.

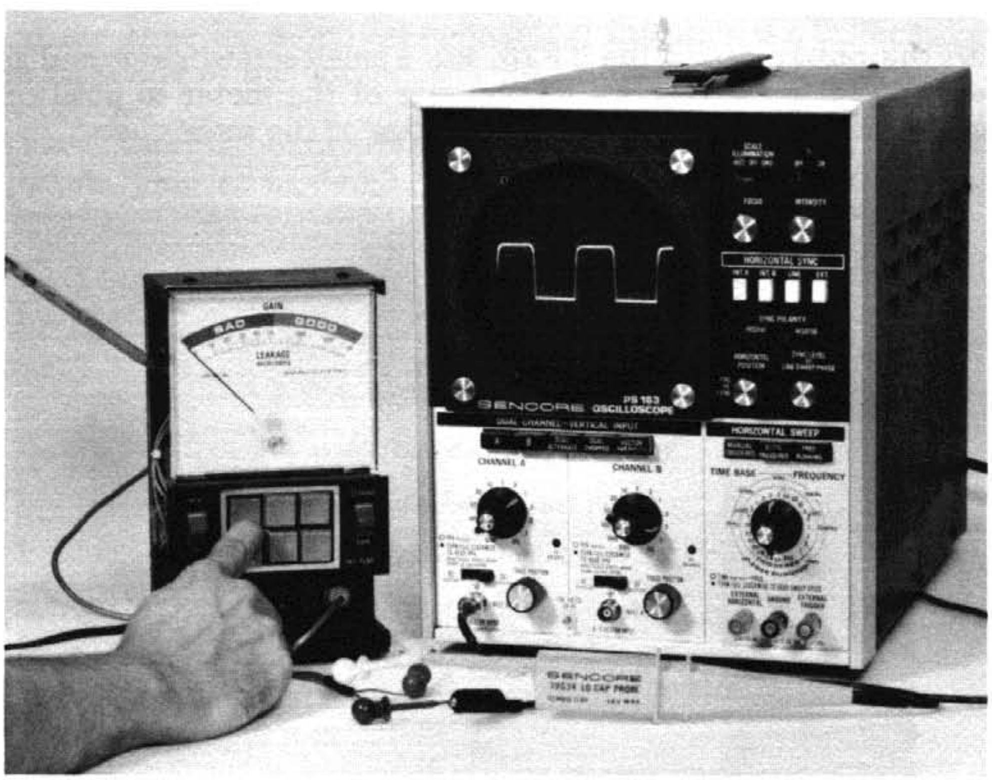


Fig. 13 Signal Balance

LEAKAGE CALIBRATION

Connect a DC milliameter and a 2K variable resistor in series between the red and yellow test leads. Connect the positive lead of the milliameter to the red test lead. Select the LEAKAGE function and NPN polarity. Remove the sliding meter door from the case, by spreading the bottom edges, and lay it across the meter in the same position as it would be with the case on. Press button 1, and adjust the external variable resistor until the external milliameter reads 3mA. Adjust R16 to position the TF26 meter pointer to full scale (3K) on the leakage scale.

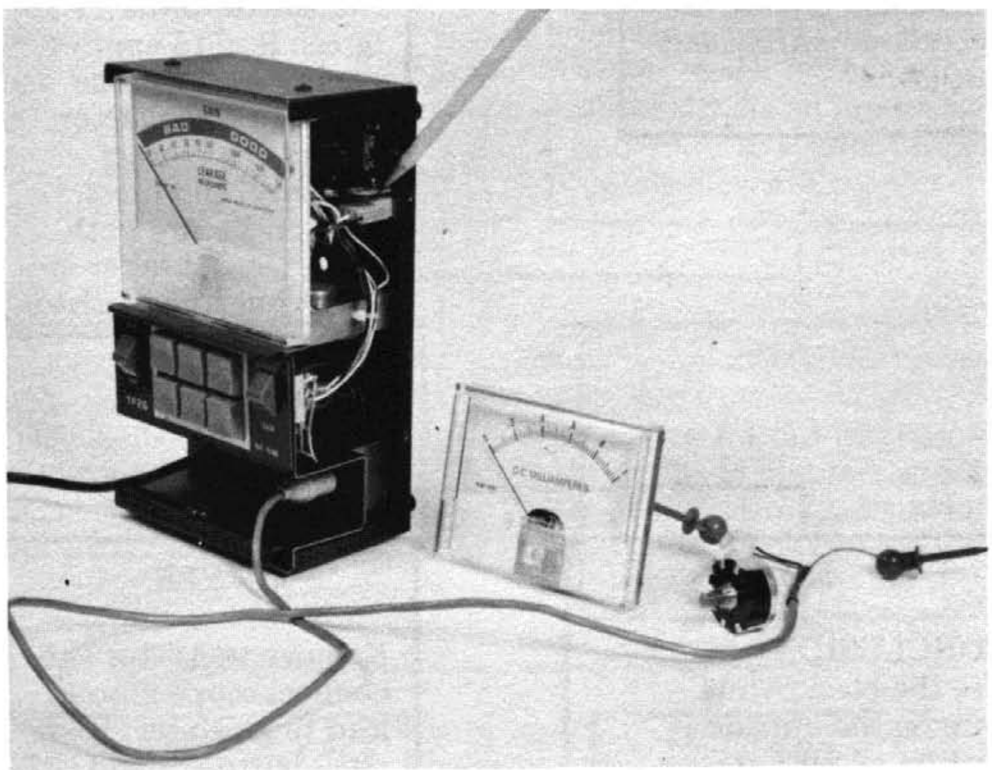


Fig. 14 Leakage Calibration

TROUBLE CHARTS

GAIN TEST INOPERATIVE

Check test leads by shorting all three leads, switching to leakage and pressing all 6 buttons in sequence. Do all buttons indicate full scale?

NO

CONCLUSION:
Check and replace as necessary: wiring and test leads.

YES

Connect a know good transistor to the TF26: green lead to emitter, yellow lead to base, and red lead to collector. Select the correct polarity, and press button 1. Are both meter and speaker indications inoperative?

NO

CONCLUSION:
Use the black/white wire on the outside section of SW8 as ground, and with button 1 pushed, check for plus 5 volts at pin 11 of IC2 and 5 volt 2KHz pulses at pin 12. If both signals are present, troubleshoot defective indicator circuit. If one signal is missing, replace IC2.

YES

Remove transistor and connect scope ground lead to green test lead, press button 1, and measure signal on yellow and red leads. Does yellow lead measure 3 vp-p and red lead measure .1 vp-p?

NO

CONCLUSION:
Using black/white wire above as reference, and starting at base of TR2, locate where 2KHz signal is lost.

YES

Connect known good transistor to TF26: green lead to emitter, yellow lead to base, and red lead to collector. Select the correct polarity, press button 1, and using the black/white wire on SW8 for a reference and a dual trace scope, check for out of phase signals on inputs 2 and 13 of IC1. Are proper signals present?

NO

CONCLUSION:
Use scope to locate where 2KHz signal is lost

YES

Check for out of phase signals at inputs 1 and 2 of IC2. Do signals swing from -.5 volts to 3 volts DC?

NO

CONCLUSION:
Trace signal back to output pins 9 and 4 of IC1. If no output at pins 9 and 4, and power supply connections are good, replace IC1.

YES

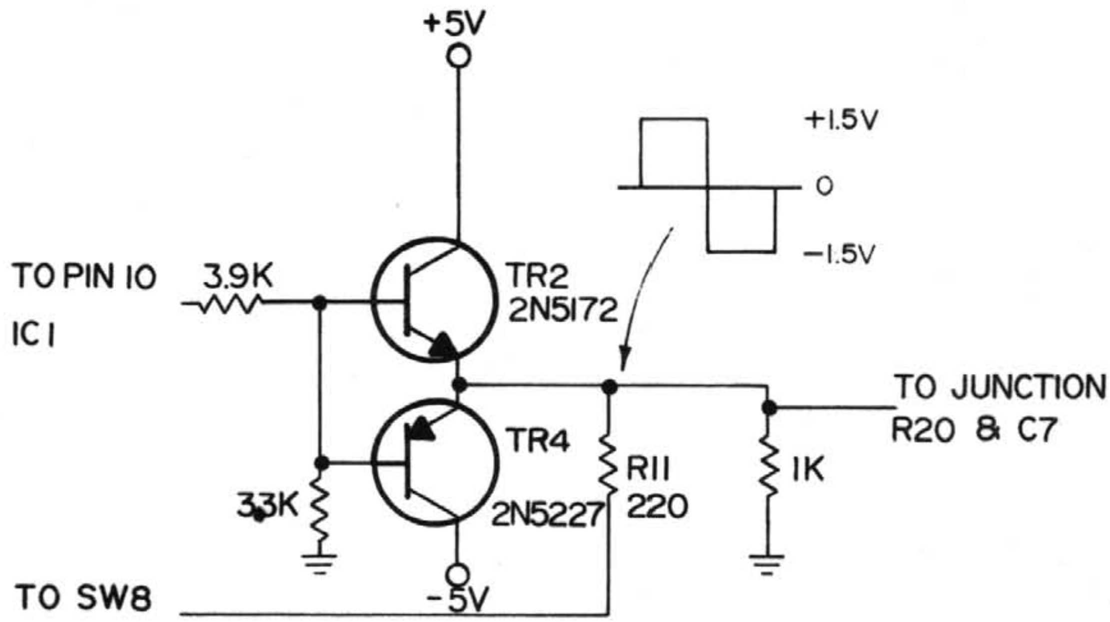
CONCLUSION:
If power supply voltages are normal, replace IC2.

SCHEMATIC AND PARTS LIST SENCORE TF26

THE IDEA PEOPLE
SENCORE
3200 SENCORE DRIVE, SIOUX FALLS, SOUTH DAKOTA 57107

TF26 SCHEMATIC ADDENDUM

The circuit for the TF26 Touch Tone Cricket has been revised to yield a more precise square wave output from the oscillator. TR2, R11, R12, R13, R14, and R15 have been replaced with the components shown in the schematic below. This partial schematic is to replace the section of Form 860 that includes the parts listed.



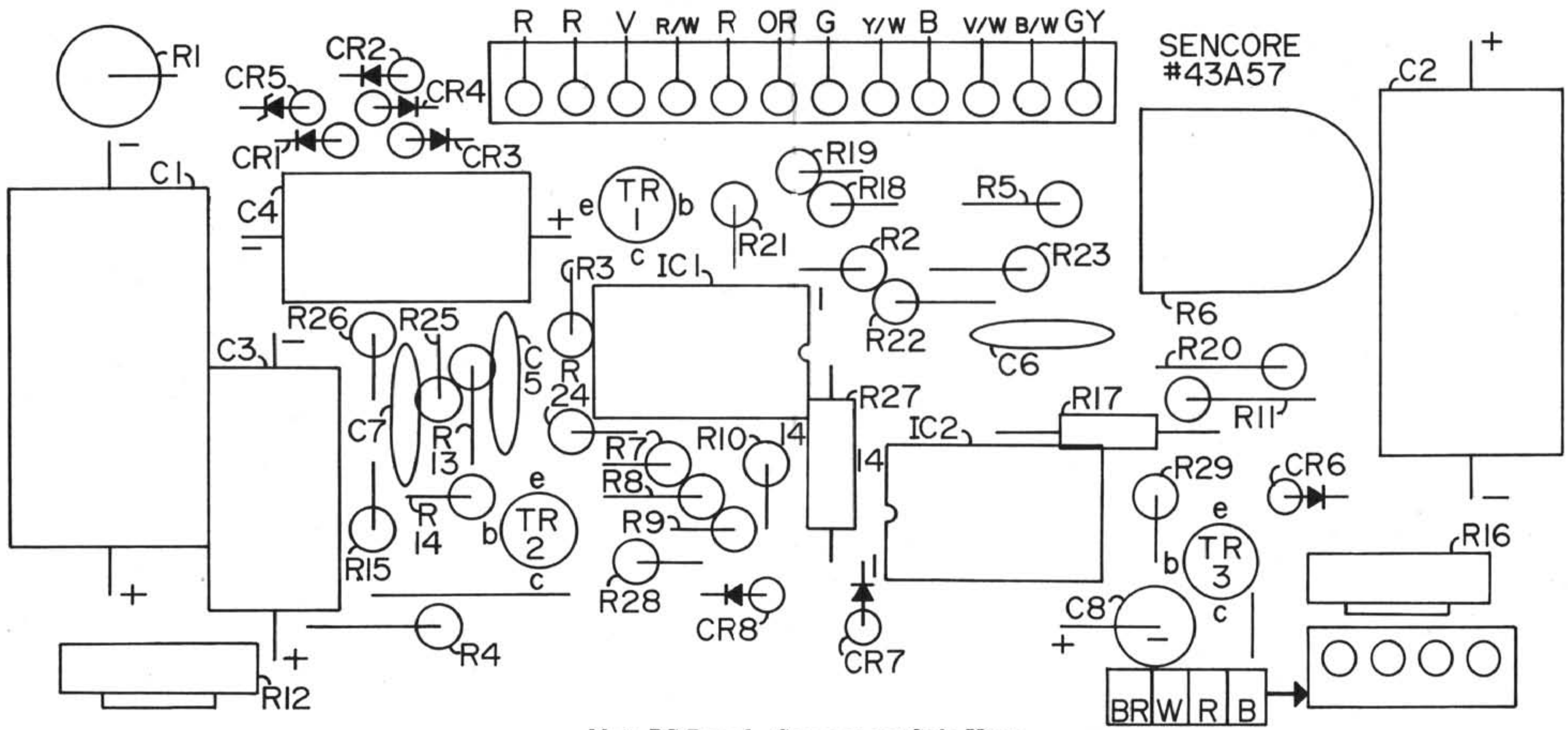
TF26 PARTS LIST

SCHEMATIC REF. NO.	PART NO.	DESCRIPTION	PRICE
CR1,2,3,4 6,7,8,	50C5-2	Diode, 1N4148	.25
CR5,9	50C4-13	Diode, Zener, 5.1v, 5% 1w	.50
IC1	69G9	I.C. LM3900, Quad Op Amp	2.50
IC2	69G10	I.C. SN7400, Quad AND I.C.	1.25
J1	26G185	Socket	1.25
LS1	48G2	Speaker, 2"	7.25
M1	23C49-A	Meter, 100uA, 1900 Ohms	20.00
SW1-6	25A186	Switch, Pushbutton 4P2P	3.25
SW7	25G187	Switch, Slide 3P2P	1.00
SW8	25G185	Switch, Slide 4P2P	1.25
SW9	25G3	Switch, Slide 2P2P	.50
T1	28B56	Transformer	3.50
TR2,3	19A4-1	Transistor, 2N5172	.50
	110C293	Case Wrap Riveted Assy.	5.50
	110B294	Meter Door Riveted Assy.	1.50
	110A295	Lead Storage Door Rivet Assy.	1.50
	108B84	Front Panel Riveted Assy.	10.00
	8B84-C	Front Panel	2.50
	139G70	Test Lead Assembly.	7.50
	68G12R	Probe EZ Hook, Red w/Gray Lead	2.25
	68G12Y	Probe EZ Hook, Yellow w/Gray Lead	2.25
	68G12G	Probe EZ Hook, Green w/Gray Lead	2.25

143A57	Main P.C. Board Assy.	27.25
143A58-1	Pushbutton P.C. Board Assy. (Top)	7.75
143A58-2	Pushbutton P.C. Board Assy. (Bottom)	7.75
110B296	Case Bottom Assembly	4.50
21A44	Glamour Cap, Slide Switch	.25
21A58	Pushbutton	.25

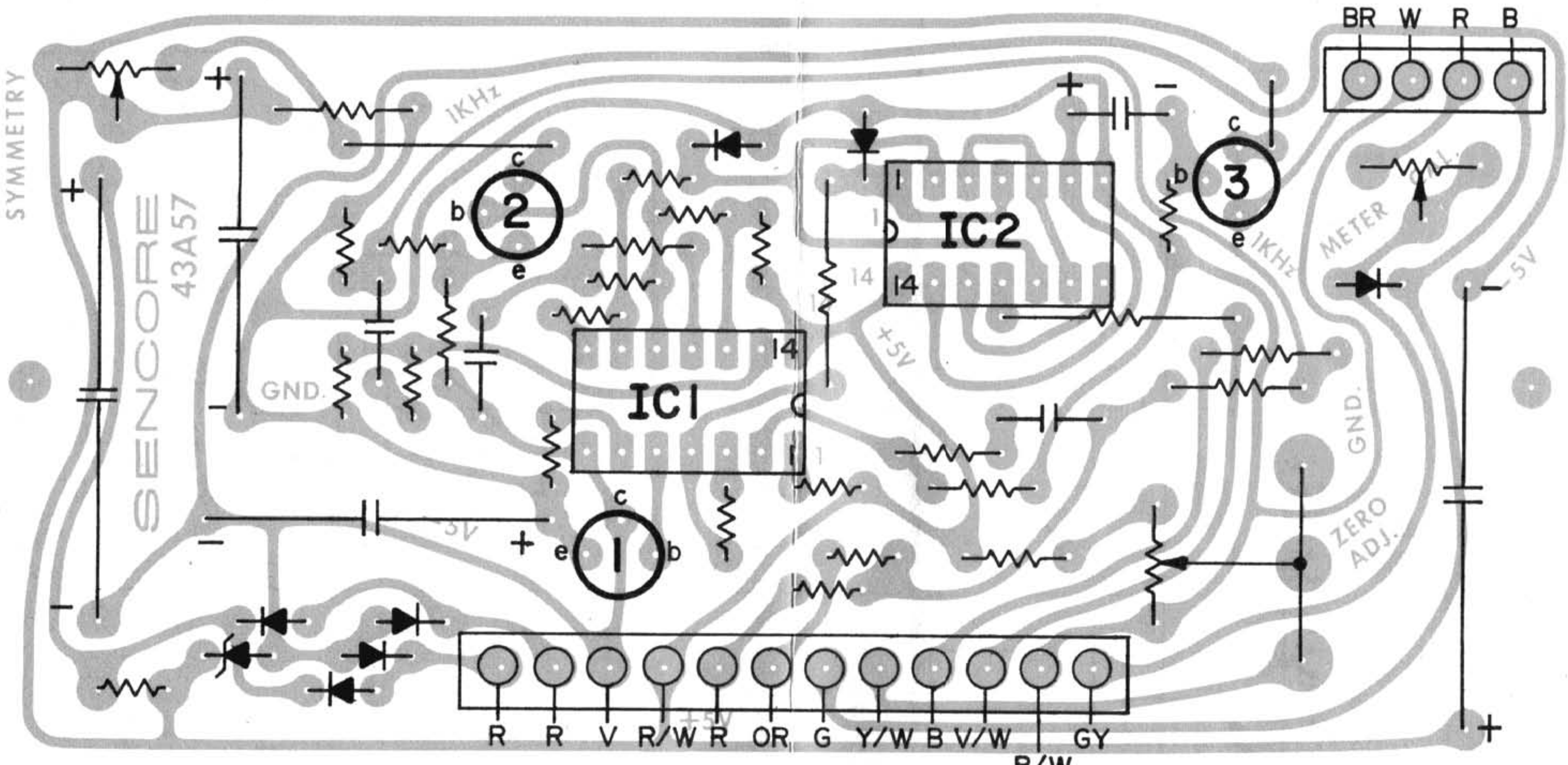
Prices in effect at date of printing and are subject to change without notice.

When ordering parts, please specify model number, part number and description. Service and parts invoices are C.O.D. Please include remittance (check or money order) with your order to save C.O.D. charges. Minimum billing $3.00.

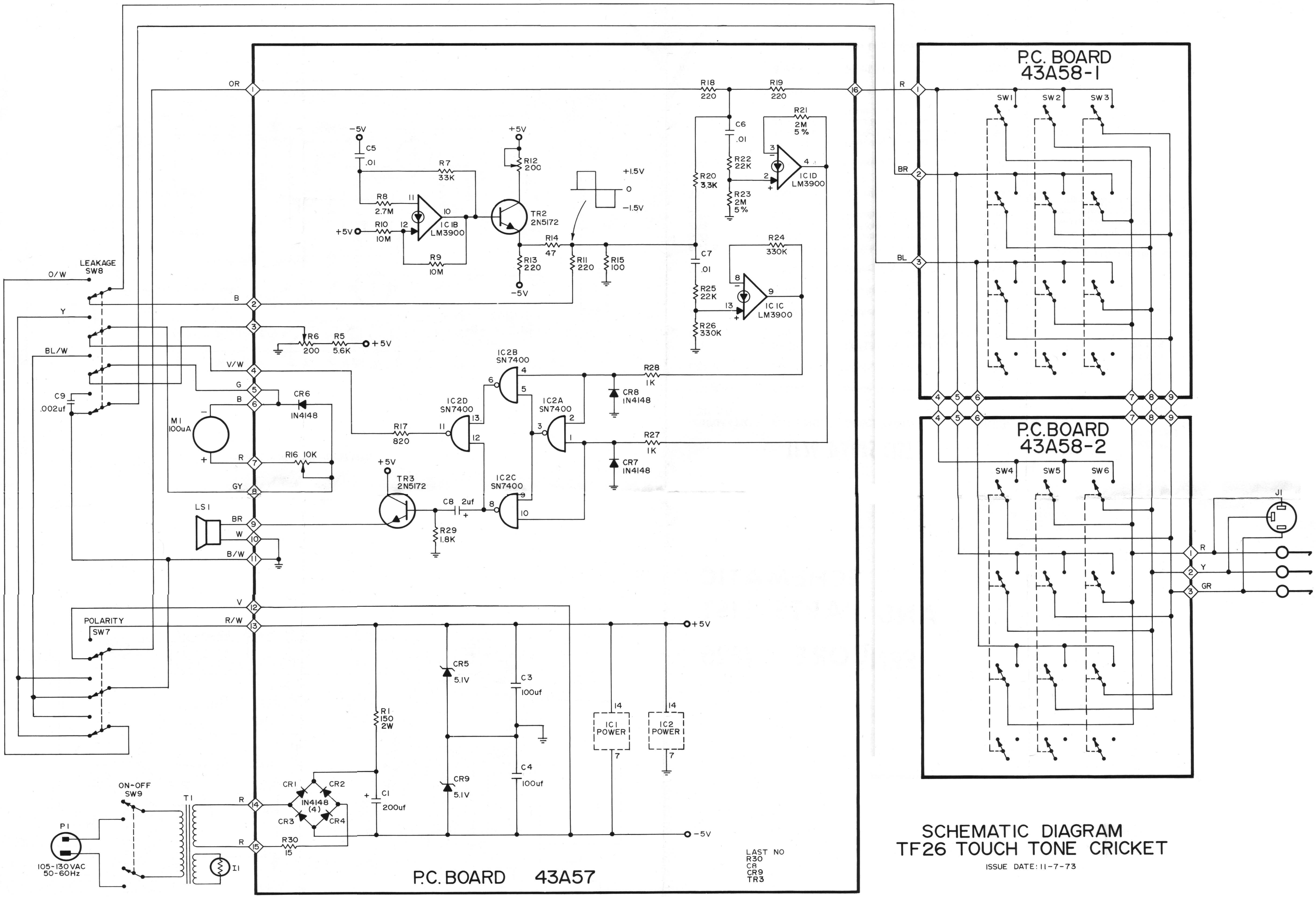


Main PC Board - Component Side View

BOARD LEGENDS



Main PC Board - Foil Side View



SCHEMATIC DIAGRAM
TF26 TOUCH TONE CRICKET

ISSUE DATE: 11-7-73

SERVICE AND WARRANTY

You have just purchased the finest transistor tester on the market today. The Sencore TF26 has been inspected and tested twice at the factory and has passed a rugged use test by our Quality Assurance Department to insure the best quality instrument to you. If something should happen, the TF26 is covered by a standard 90 day warranty as explained on the warranty policy enclosed with your instrument.

Sencore has six regional offices to serve you. Instruments to be serviced should be returned to the nearest regional office by UPS if possible. Parcel post should only be used as a last resort. Instruments should be packed with the original packing materials or equivalent, and double boxed to insure safe arrival at the regional office. The display carton IS NOT an acceptable shipping container. When returning an instrument for service, be sure to state the nature of the problem to insure faster service.

If you wish to repair your own TF26 Transistor Tester, we have included a schematic, trouble charts, and parts list. Any of these parts may be ordered directly from the regional office nearest you.

We reserve the right to examine defective components before an in warranty replacement is issued.

SENCORE REGIONAL OFFICES:

East Central Sales & Service
4105 Duke Street
Alexandria, Va. 22304
703 751-3556

Central Sales & Service
2711 B Curtis Street
Downers Grove, Illinois 60515
312 852-6800

Western Coast Sales & Service
833 Mahler Road
Burlingame, California 94010
415 697-5854

Central West Sales & Service
3200 Sencore Drive
Sioux Falls, South Dakota 57107
605 339-0100

Southeastern Sales & Service
2459 Roosevelt Hway Suite B-9
College Park, Ga. 30337
404 768-0606

Northeastern Sales & Service
1593 H Central Avenue
Albany, New York 12205
518 869-0996

THE IDEA PEOPLE
SENCORE
3200 SENCORE DRIVE, SIOUX FALLS, SOUTH DAKOTA 57107

FORM 859
Printed in U.S.A.