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DSI INSTRUMENTS INCORPORATED
9550 CHESAPEAKE DRIVE
SAN DIEGO, CALIFORNIA 92123
714-565-8402

DSI

DSI INSTRUMENTS INC.

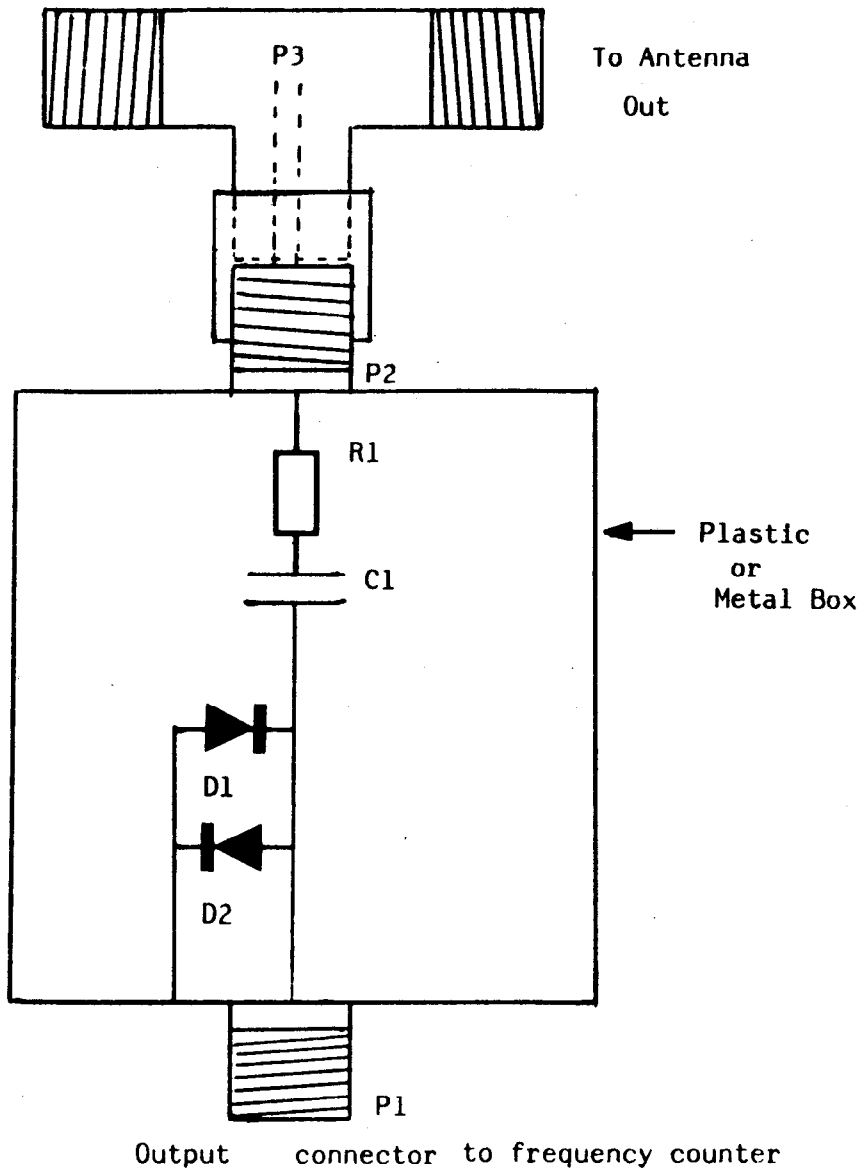
R F Tap Off Box

160 Meters to 450 MHZ

1 Watt to 250 Watts

From Transmitter
IN

To Antenna
Out



R1 50 Ohms 1/4 Watt
C1 5 pf 1KV
D1 D2 1N914
P1 P2 S0239 Flange Connector
P3 PL259 T connector

Note: Diodes to ground
Note: Do not exceed 250 watts input

DSI INSTRUMENTS INC.
9550 CHESAPEAKE DRIVE
SAN DIEGO, CA. 92123

MANUFACTURER OF ELECTRONIC INSTRUMENTS

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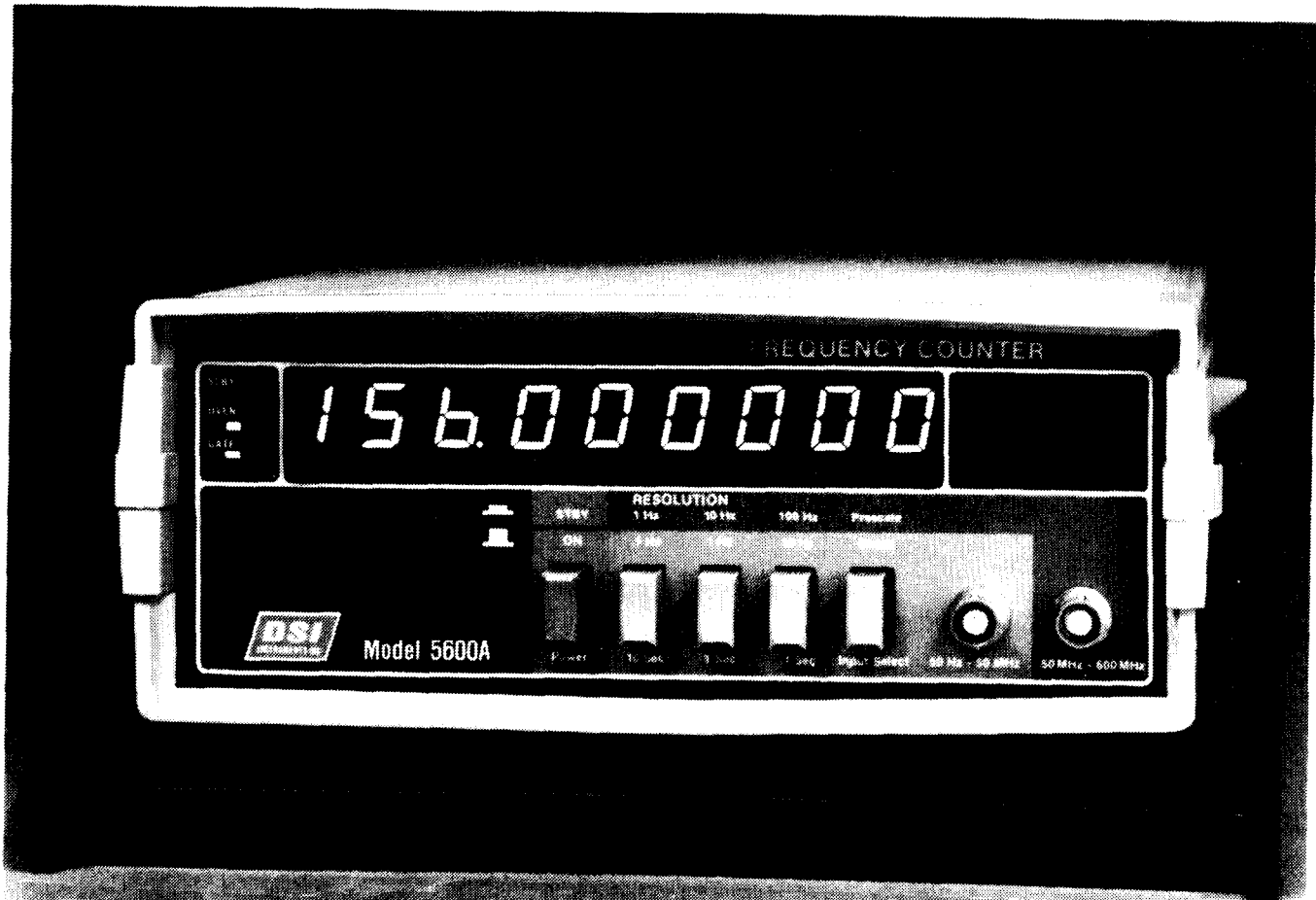
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*** SECTION 1 INTRODUCTION ***

YOU ARE THE PROUD OWNER OF A DSI MODEL 5600A FREQUENCY COUNTER WHICH HAS BEEN DESIGNED AND MANUFACTURED TO THE STRICTEST STANDARDS. ADVANCED MOS/LSI CIRCUITRY HAS BEEN INCORPORATED TO GUARANTEE YEARS OF RELIABLE OPERATION AS WELL AS PROVIDE THE EXCEPTIONAL ELECTRICAL PERFORMANCE INHERENT IN THESE UNITS.

THE 5600A FEATURES A 1/2 INCH LARGE RED LED DIGITAL DISPLAY, DIRECT FREQUENCY READINGS FROM 50 HZ TO 512 MHZ, SELECTABLE RESOLUTION, AND DIRECT AND PRESCALED INPUTS. THE COUNTER MAY BE USED WITH AM, CW, FM, AND SSB.

THE 5600A ALSO FEATURES A STANDARD 10 MHZ CRYSTAL TIMEBASE ENCLOSED IN A PROPORTIONAL OVEN WITH .2 PPM ACCURACY. ALL TIMEBASES ON FACTORY ASSEMBLED UNITS ARE SET WITH STANDARDS WHICH ARE TRACEABLE TO NATIONAL BUREAU OF STANDARDS.



*** SECTION 2 SPECIFICATIONS ***

DSI MODEL 5600A FREQUENCY COUNTER

PERFORMANCE.....

FREQUENCY RANGE	NON-PRESCALED	50 HZ TO 50 MHZ
	PRESCALED	30 MHZ TO 512 MHZ
SENSITIVITY	10 MV TYP	50 HZ TO 25 MHZ NON-PRESCALED
	25 MV TYP	25 MHZ TO 50 MHZ NON- PRESCALED
	10 MV TYP	30 MHZ TO 250 MHZ PRESCALED
	50 MV TYP	250 TO 450 MHZ PRESCALED
RESOLUTION	NON-PRESCALED	10 HZ / 1 HZ / 0.1 HZ
	PRESCALED	1 KHZ / 100 HZ / 10 HZ
TIMEBASE	10 MHZ	PROPORTIONAL OVEN CONTROL, PROVISION FOR EXTERNAL INPUT AND OUTPUT
ACCURACY	.2 PPM	10 TO 40 DEGREES CELSIUS
AGING	.1 PPM	PER MONTH TYPICAL
INPUT IMPEDANCE	NON-PRESCALED	1 MEGOHM / 30 PF
	PRESCALED	50 OHMS / 25 PF

GENERAL.....

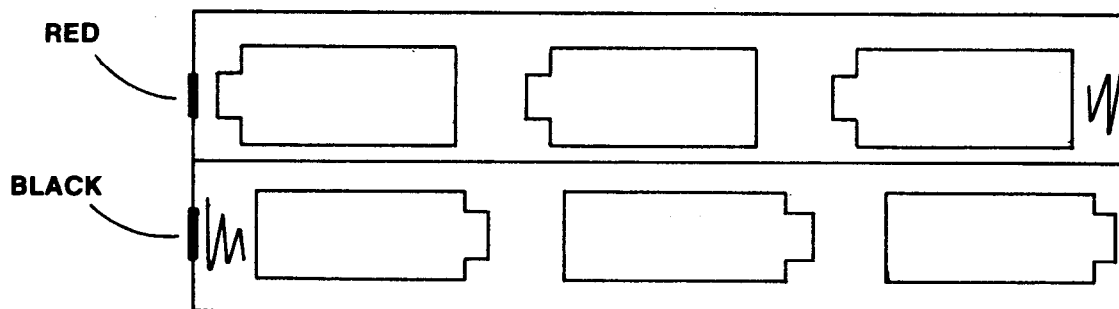
DISPLAY	9 DIGIT RED LED, 1/2 INCH SEVEN SEGMENT DISPLAYS, LEADING ZERO SUPPRESSION
OPERATING TEMP.	10 TO 40 DEGREES CELSIUS
INPUT CONNECTORS	TWO BNC, PRESCALED AND NON-PRESCALED
POWER REQUIRED	9 TO 14 VOLTS DC 115 VOLTS AC WITH OPTIONAL AC ADAPTER BATTERY PACK: 6 "C" CELLS ALKALINE BATTERIES RECOMMENDED OR BA-56 NI-CAD RECHARGEABLE BATTERIES CURRENT REQUIREMENTS: 120 MA STANDBY, 400 MA MAXIMUM
DIMENSIONS	HEIGHT: 3 1/4 INCHES WIDTH: 9 INCHES DEPTH: 9 INCHES WEIGHT: WITHOUT BATTERIES, 1 LB. INCLUDING BATTERIES, 3 LB.
OPTIONS	AUDIO SCALER, VHF RF PREAMP, RECHARGEABLE BATTERY PACK

* * * * * SECTION 3 UNPACKING AND SETTING UP * * * * *

THE 5600 IS PACKAGED AND SHIPPED IN A CUSTOM MOLDED STYROFOAM BLOCK CONTAINING RECESSES FOR THE INSTRUMENT, ANTENNA, AND BATTERY ELIMINATOR. THIS PACKAGING PROVIDES PROTECTION WHICH MINIMIZES THE POSSIBILITY OF DAMAGE IN SHIPMENT. IN ADDITION, EACH ITEM IS INDIVIDUALLY PACKAGED IN A HEAVY VINYL BAG FOR PROTECTION AGAINST DUST, DIRT, AND MOISTURE. WE RECOMMEND THAT ALL PACKAGING BE SAVED IN THE EVENT THE INSTRUMENT MUST BE STORED OR SHIPPED AT SOME FUTURE DATE.

INSTALLATION OF BATTERIES.....

1. REMOVE THE FOUR MACHINE SCREWS SECURING THE TOP AND BOTTOM OF THE CASE.
2. REMOVE THE CASE TOP.
3. INSTALL SIX "C" CELL BATTERIES AS SHOWN IN THE SKETCH BELOW.
BE SURE TO OBSERVE POLARITY MARKINGS MOLDED INTO THE BATTERY BOX.
4. REASSEMBLE CASE.



BATTERY LIFE.....

DSI RECOMMENDS THE USE OF ALKALINE BATTERIES. BECAUSE BATTERY LIFE IS AFFECTED BY DISCHARGE RATES, THE FOLLOWING INFORMATION IS SUPPLIED AS A ROUGH GUIDE ONLY.

1. CONTINUOUS OPERATION (NON-STANDBY), 8 HOURS
2. INTERMITTENT OPERATION (APPROX 1/2 HOUR PER DAY), 1 MONTH

- - - C A U T I O N - - -

IF THE COUNTER IS TO BE STORED FOR AN APPRECIABLE PERIOD OF TIME, THE BATTERIES SHOULD BE REMOVED TO PREVENT DAMAGE TO THE INSIDE OF THE INSTRUMENT.

BATTERY ELIMINATOR (OPTIONAL ACCESSORY).....

THE DSI BATTERY ELIMINATOR IS A SELF-CONTAINED DC POWER SUPPLY WHICH PLUGS INTO ANY 50/60 HZ 110 VAC OUTLET AND PROVIDES APPROXIMATELY 9.0 VOLTS DC TO THE COUNTER THROUGH THE JACK ON THE REAR OF THE INSTRUMENT. IT MAY BE USED EVEN WITH BATTERIES INSTALLED IN THE COUNTER BECAUSE THE JACK IS PROVIDED WITH A SWITCH WHICH AUTOMATICALLY DISCONNECTS THE INTERNAL BATTERY PACK.

NOTE: THE OPEN CIRCUIT VOLTAGE OF THE BATTERY ELIMINATOR IS 15 - 18 VDC.

USER FURNISHED POWER SUPPLY.....

ANY RIPPLE FREE SUPPLY OF 9 VDC TO 13 VDC CAPABLE OF SUPPLYING 400 MA MAY BE USED. USE A 2.5 MM POWER PLUG WIRED WITH POSITIVE CENTER.

- W - A - R - N - I - N - G -

* DO NOT FEED MORE THAN 10 VOLTS RMS DIRECTLY TO INPUT CONNECTORS *

THE 5600A FREQUENCY COUNTER CAN BE USED IN SEVERAL DIFFERENT MODES:

ANTENNA	1 MHZ - 50 MHZ 30 MHZ - 500 MHZ	SEE FIGURE 1
THROUGH T-TAP	3 MHZ - 50 MHZ 30 MHZ - 500 MHZ	SEE FIGURE 2
DIRECT FROM RF OR AUDIO OSCILLATOR	50 HZ - 50 MHZ 30 MHZ - 500 MHZ	NON-PRESCALED PRESCALED
SNIFFER OR DIRECT PROBE	3 MHZ - 50 MHZ 30 MHZ TO 500 MHZ	NON-PRESCALED PRESCALED

A SIMPLE SNIFFER PROBE MAY BE CONSTRUCTED AS FOLLOWS:

MATERIALS REQUIRED: 1 BNC CONNECTOR
3 FEET RG-58 COAX CABLE
5" HEAT SHRINKABLE TUBING

TO MAKE THE PROBE, FIRST ATTACH A FEMALE BNC CONNECTOR TO ONE END OF THE COAXIAL CABLE FOLLOWING THE CONNECTOR MANUFACTURER'S INSTRUCTIONS. THE OTHER END OF THE COAX IS PREPARED AS FOLLOWS:

1. MAKE A CLEAN FLUSH CUT AT THE END OF THE CABLE SO THAT A MINIMUM OF INNER CONDUCTOR SHOWS.
2. REMOVE THE OUTER INSULATION AND BRAIDED SHIELD FOR A DISTANCE OF THREE INCHES BACK FROM THE END OF THE WIRE. LEAVE INNER INSULATION INTACT.
3. USE A PIECE OF HEAT SHRINKABLE TUBING TO COVER THE ENTIRE END, INCLUDING THE EXPOSED ENDS OF THE SHIELD. MAKE SURE THAT THE INNER CONDUCTOR IS ALSO COVERED BY THE HEAT SHRINKABLE TUBING. THIS LAST STEP IS NECESSARY TO PREVENT EITHER THE CONDUCTOR OR THE SHIELD FROM MAKING ELECTRICAL CONTACT WITH ANY ENERGIZED SECTION OF THE TRANSMITTER UNDER TEST.

IN USE, THE CONNECTOR END OF THE SNIFFER PROBE IS ATTACHED TO THE APPROPRIATE INPUT CONNECTOR. THE OTHER END OF THE PROBE IS PLACED IN AN AREA CONTAINING 1/2 WATT MINIMUM OF RF ENERGY, SUCH AS NEAR THE OUTPUT STAGE OF THE TRANSMITTER UNDER TEST.

A DIRECT CONTACT PROBE CAN BE MADE BY ADDING AN RC NETWORK TO THE END OF THE COAX CENTER CONDUCTOR AS SHOWN IN THE SKETCH ON THE NEXT PAGE. HEAT SHRINKABLE TUBING SHOULD BE USED OVER THE CAPACITOR AND RESISTOR OR THE NETWORK SHOULD BE MOUNTED IN A PLASTIC PROBE HANDLE.

NOTE THAT ALL THE ABOVE APPLICATIONS INVOLVE TRANSMIT FREQUENCIES ONLY. THERE IS NO SIMPLE, CONVENIENT WAY TO READ RECEIVE FREQUENCIES WITH THE 5600A. IT WAS DESIGNED FOR READING TRANSMIT FREQUENCIES ONLY.

OPERATING INSTRUCTIONS CONTINUED.....

SNIFFER PROBE DETAIL....

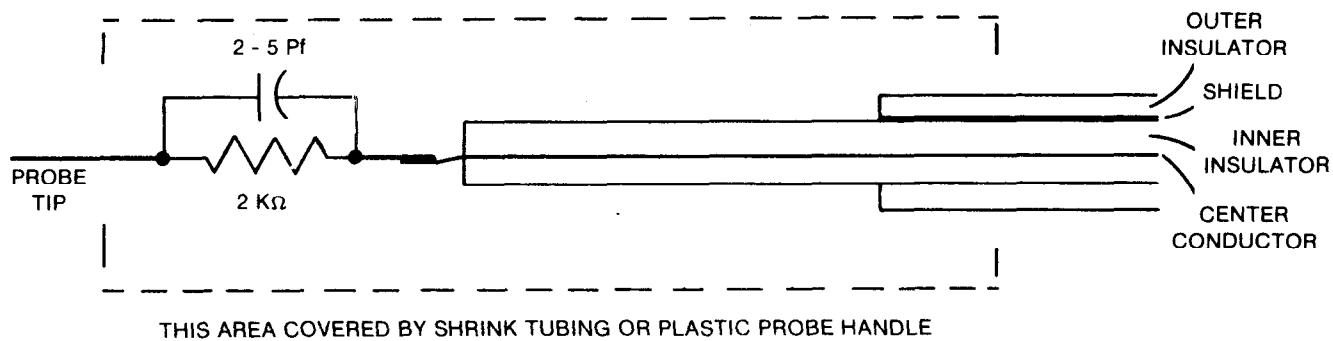
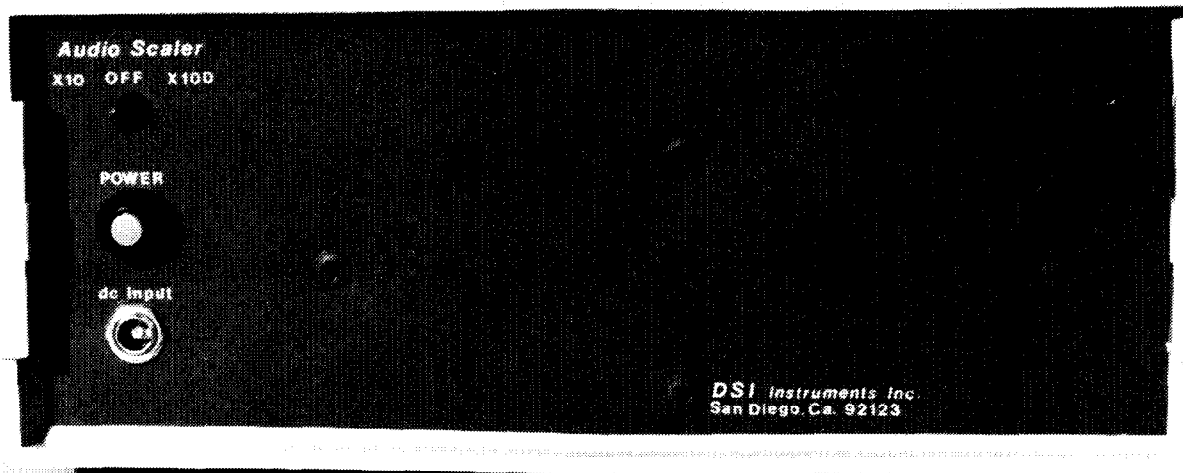


FIGURE 1. . . .



OPERATING THE COUNTER.....

1. MAKE SURE BATTERIES ARE INSTALLED OR CONNECT UNIT TO AC ADAPTER OR DC POWER SUPPLY.
2. TURN POWER ON (PUSH BUTTON SWITCH AT RIGHT REAR OF CABINET). WHEN THE FRONT PANEL POWER SWITCH IS IN THE STANDBY POSITION, ONLY THE OVEN IS ENERGIZED. THIS FEATURE IS PROVIDED TO MINIMIZE BATTERY DRAIN AND STILL ALLOW THE OSCILLATOR TO REMAIN WARMED, STABILIZED, AND READY FOR OPERATION. WHEN THE OVEN HAS REACHED OPERATING TEMPERATURE, THE OVEN INDICATOR ON THE FRONT PANEL WILL COME ON.
3. TURN ON FRONT PANEL POWER SWITCH.
4. SELECT APPROPRIATE INPUT MODE, I. E. DIRECT OR PRESCALED.
5. SELECT RESOLUTION DESIRED. THIS IS ACHIEVED WITH THREE RIGHT-HAND INTERLOCKED PUSH-BUTTON SWITCHES. THE LEGEND ABOVE THE SWITCHES INDICATES THE VALUE OF THE LEAST SIGNIFICANT DIGIT DISPLAYED.
FOR EXAMPLE:
 - A. DIRECT INPUT, 1ST SWITCH DEPRESSED. THE LAST DIGIT DISPLAYED WILL BE .1'S OF HZ.
 - B. PRESCALED INPUT, 3RD SWITCH DEPRESSED. THE LAST DIGIT DISPLAYED WILL BE 1000'S OF HZ.

ALL LEADING ZEROS ARE SUPRESSED TO AVOID CONFUSION.

OPERATING INSTRUCTIONS CONTINUED.....

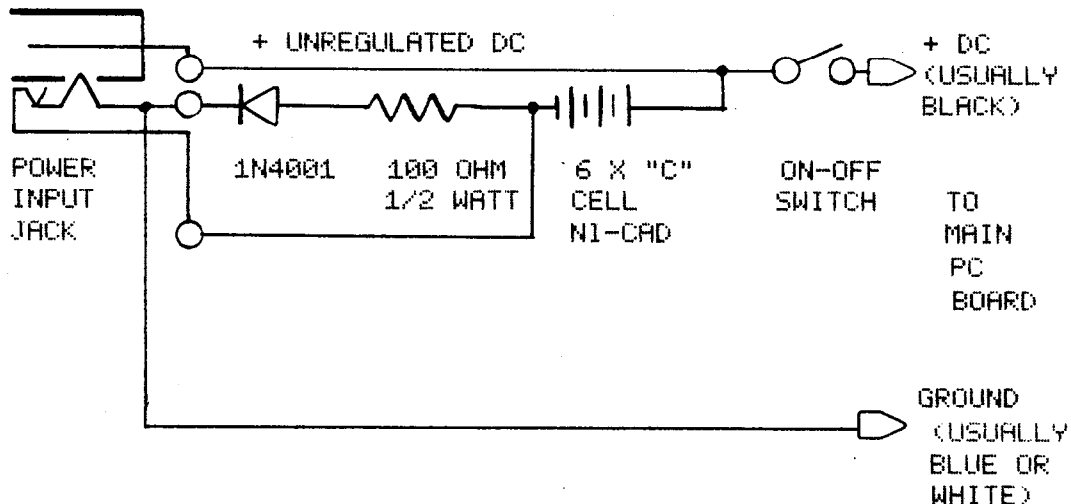
USE OF THE AUDIO SCALER

***** THIS SECTION NOT COMPLETE AT THIS TIME *****

OPERATING INSTRUCTIONS CONTINUED.....

USE AND CARE OF NI-CAD BATTERY PACK (OPTIONAL ACCESSORY)...

THE DSI BA-56 RECHARGEABLE BATTERY PACK IS A COMPLETE ASSEMBLY CONSISTING OF A BACKPLATE, BATTERY CASE, ON-OFF SWITCH, POWER INPUT JACK AND SIX "C" CELL NI-CAD RECHARGEABLE BATTERIES. IF YOU ARE INSTALLING THE BA-56 YOURSELF, YOU WILL HAVE TO DISASSEMBLE THE COUNTER, REMOVE THE OLD BACKPLATE/BATTERY ASSEMBLY THEN INSTALL THE NEW BA-56 ASSEMBLY. BE SURE TO WIRE THE BA-56 ASSEMBLY IN THE SAME WAY THE 'OLD' ASSEMBLY WAS WIRED. IF IN DOUBT, DOUBLE CHECK THE WIRING BY REFERRING TO THE SCHEMATIC AND/OR THE PICTURES IN THIS MANUAL.



USING YOUR 5600A WITH RECHARGEABLE BATTERIES IS USUALLY JUST AS SIMPLE AS USING THE COUNTER WITH REGULAR BATTERIES OR THE AC ADAPTER. THERE ARE A FEW THINGS YOU SHOULD KNOW ABOUT NI-CAD BATTERIES AND ABOUT OUR BA-56 IN PARTICULAR.

CHARGING.....

THE BATTERY PACK IS WIRED FOR AUTOMATIC TRICKLE CHARGING FROM THE DSI AC-9 AC ADAPTER. THIS ADAPTER IS WELL SUITED FOR MAINTAINING THE NI-CADS AT CONSTANT FULL CHARGE OR FOR RECHARGING THEM OVERNIGHT.

THE OUTPUT VOLTAGE FROM THE AC ADAPTER IS NOT 'REGULATED' VERY WELL. UNDER NO LOAD OR LIGHT LOAD (0-100 MA), THE VOLTAGE IS USUALLY AROUND 14-18 VOLTS. THE 5600A, WHEN TURNED <OFF> OR IN <STANDBY> DRAWS LESS THAN 100 MA. THIS VOLTAGE, SUPPLIED TO THE BATTERIES THROUGH A 100 OHM CURRENT LIMITING RESISTOR IS PERFECT FOR A REASONABLY 'FAST' CHARGE (16-24 HOURS). WHEN THE COUNTER IS TURNED <ON>, OUTPUT FROM THE ADAPTER IS LOADED DOWN TO AROUND 9-11 VOLTS. THIS VOLTAGE, SUPPLIED TO THE BATTERIES THROUGH THE 100 OHM RESISTOR IS SUFFICIENT TO MAINTAIN A 'FLOAT' CONDITION ON THE NI-CADS (CHARGE CURRENT APPROX. 10-30 MA).

** NOTE ** IF YOU ARE RUNNING THE COUNTER FROM A WELL-REGULATED 12 VOLT DC SOURCE, THE BATTERIES MAY TAKE LONGER TO RECHARGE (24-48 HOURS). THIS IS BECAUSE THE CHARGE CURRENT IS ONLY APPROX. 50 MA.

NI-CAD BATTERY INSTRUCTIONS CONTINUED.....

DISCHARGE.....

THE NI-CAD CELLS IN THE BA-56 HAVE 1200 MILLIAMPERE-HOURS OF CAPACITY. THIS GIVES THEM ABOUT 3 TO 10 HOURS OF USE DEPENDING ON AMBIENT TEMPERATURE, NUMBER OF DIGITS DISPLAYED AND WHETHER NON-PRESCALED OR PRESCALED INPUTS ARE USED.

IT IS A GOOD IDEA TO RECHARGE THE BATTERIES AS SOON AS POSSIBLE AFTER USE. ALSO, TRY NOT TO LEAVE THE COUNTER TURNED <ON> WITH 'DEAD' NI-CADS AS THIS MAY LEAD TO REVERSE CHARGING OF THE CELLS. UNDER MOST CIRCUMSTANCES, REVERSED CELLS MAY BE RESTORED TO NORMAL SIMPLY BY RECHARGING FOR AN EXTRA FEW HOURS.

ON BATTERY LIFE.....

NI-CAD CELLS NORMALLY CAN BE RECHARGED 100 TO 500 TIMES. NORMAL LIFE OF THE CELLS IS ABOUT 1 TO 3 YEARS. OUR WARRANTY COVERS THE PACK FOR 90 DAYS ONLY, USUALLY ENOUGH TIME FOR DEFECTIVE CELLS TO SHOW UP. IF YOUR BATTERY PACK WILL NOT ACCEPT A CHARGE, THERE ARE A FEW THINGS YOU CAN DO BEFORE RETURNING THE ASSEMBLY TO THE FACTORY. OPEN THE COUNTER, INSPECT THE BATTERY PACK ASSEMBLY FOR LOOSE CONNECTIONS. LOOK CLOSELY AT THE CELLS. IF ANY OF THEM ARE LEAKING OR "GROWING HAIR" AROUND THE SEAMS, REMOVE THE CELL(S) AND TRY REPLACING THEM IF YOU HAVE NI-CAD CELLS AVAILABLE.

IF YOU ARE CONVINCED THE BATTERY ASSEMBLY IS DEFECTIVE, AND IT IS WITHIN THE WARRANTY, CALL THE FACTORY FOR A RETURN AUTHORIZATION. IF YOU HAVE TO DEPEND ON THE COUNTER TO OPERATE ON NI-CADS, YOU MIGHT CONSIDER PURCHASING A SPARE BA-56 ASSEMBLY JUST FOR A BACKUP. (PRICE: AS OF OCTOBER 1979, \$24.95 + SHIPPING).

A FEW WORDS OF CAUTION.....

**** DO NOT **** UNDER ANY CIRCUMSTANCES, DISPOSE OF NI-CAD BATTERIES IN A FIRE. THEY MAY EXPLODE. DO NOT MIX ALKALINE BATTERIES WITH NI-CAD CELLS IN THE BA-56 ASSEMBLY. DO NOT INSTALL ALKALINE BATTERIES IN THIS ASSEMBLY WITHOUT REMOVING THE RECHARGING CIRCUIT (THE 1N4001 AND THE 100 OHM RESISTOR). ALKALINE BATTERIES ARE NOT DESIGNED FOR RECHARGING AND MAY EXPLODE IF CURRENT IS FORCED INTO THEM.

FOR LOTS MORE INFORMATION ON NI-CAD'S, GENERAL ELECTRIC PUBLISHES A BOOK, "NICKEL-CADMIUM BATTERY APPLICATION ENGINEERING HANDBOOK", PUBLICATION NO. GET-3148A. AVAILABLE FROM GENERAL ELECTRIC COMPANY, P. O. BOX 861, GAINSVILLE, FLORIDA 32602.

* * * * * SECTION 5 - THEORY OF OPERATION * * * * *

THE 5600A MAY BE DIVIDED INTO SEVEN SECTIONS BY FUNCTION AS FOLLOWS:

1. TIMING AND CONTROL
2. INPUT SIGNAL CONDITIONING AND AMPLIFICATION
3. SIGNAL GATE
4. COUNTER
5. DISPLAY LATCHES AND DRIVERS
6. DISPLAY
7. POWER SUPPLY / BATTERY PACK

A PRECISE CLOCK FREQUENCY IS PROVIDED BY THE OVENIZED OSCILLATOR PORTION OF THE TIMING/CONTROL SECTION. THE OSCILLATOR FREQUENCY IS DIVIDED DOWN FURTHER BY THE DIVIDERS TO PROVIDE VERY PRECISE GATE TIMES.

THE GATE DRIVE IS USED TO OPEN AND CLOSE A GATE WHICH CONTROLS THE INPUT FROM THE SIGNAL CONDITIONING SECTION TO THE COUNTER SECTION. IT ALSO PROVIDES STROBE AND RESET SIGNALS TO THE COUNTER SECTION.

THE SIGNAL CONDITIONING SECTION AMPLIFIES AND THEN SQUARES UP THE INPUT SIGNAL. IT ALSO DIVIDES THE VHF INPUT SIGNAL DOWN TO A LOWER FREQUENCY WHICH CAN BE COUNTED BY LSTTL COUNTERS.

THE SEQUENCE OF EVENTS IN THE FUNCTION OF THE COUNTER IS AS FOLLOWS:

STARTING AT TIME ZERO THE TIMING AND CONTROL SECTION DELIVERS A SIGNAL TO THE CONTROL GATE WHICH OPENS IT FOR THE TIME DURATION OF THE GATE PERIOD. DURING THE TIME THE GATE IS OPEN A PULSE TRAIN FROM THE SIGNAL CONDITIONING SECTION IS FED DIRECTLY INTO THE COUNTER.

THE COUNTER ACCUMULATES AND STORES THE NUMBER OF PULSES RECEIVED DURING THE GATE PERIOD. WHEN THE GATE CLOSSES THE PULSE TRAIN IS SHUT OFF AND THE COUNTER TRANSFERS THE ACCUMULATED DATA TO THE LATCH AND DRIVER SECTION WHICH CAUSES THE LED'S TO DISPLAY THE DATA STORED IN THE LATCH.

WHILE THIS DATA IS BEING DISPLAYED THE GATE OPENS AGAIN AND A NEW PULSE TRAIN IS ACCUMULATED AND STORED IN THE COUNTER.

WHEN THE GATE CLOSSES, THE DATA IS TRANSFERRED FROM THE COUNTER SECTION TO THE LATCH AND DRIVER SECTION AND THE INFORMATION IN THE DISPLAY IS INSTANTLY UPDATED.

THE BATTERY PACK OR EXTERNAL POWER SUPPLY PROVIDES POWER TO A 5 VOLT REGULATOR ON THE MAIN PC BOARD WHICH IN TURN PROVIDES POWER TO ALL THE REST OF THE CIRCUITRY.

REFER TO BLOCK DIAGRAM, PAGE 17, AND SCHEMATIC, PAGE 22.

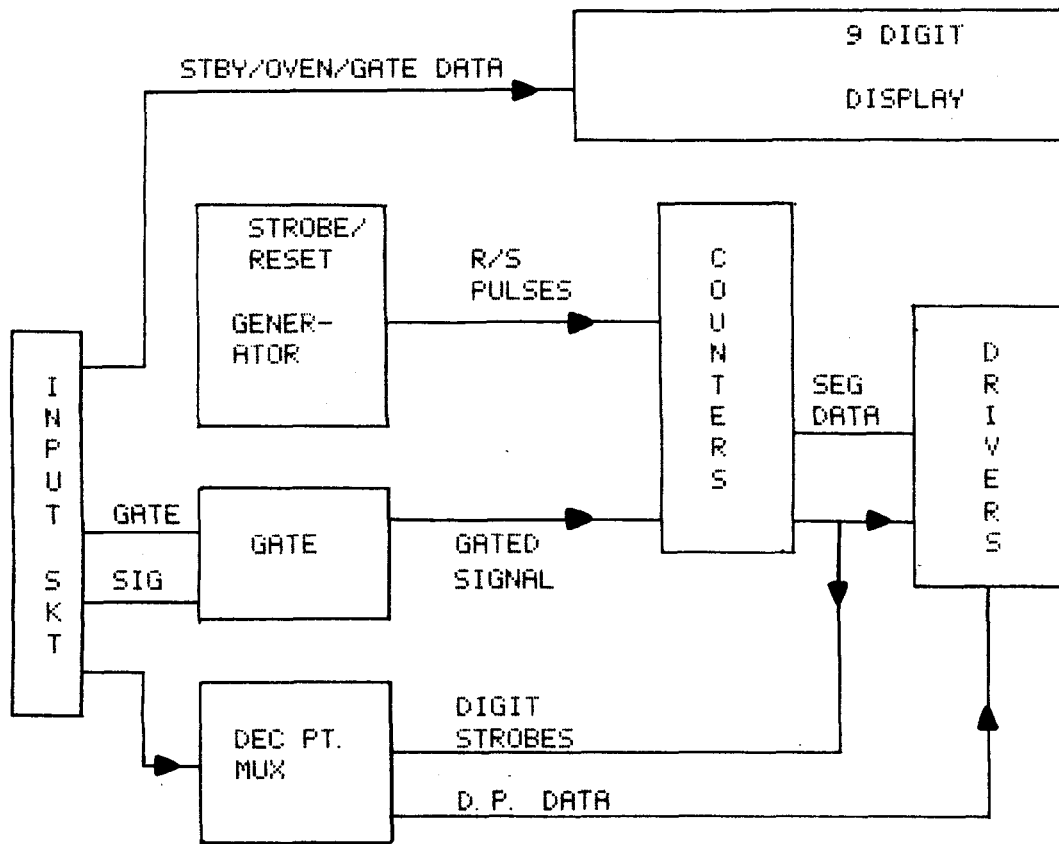
DEAR 5600A MANUAL USER:

PAGES 13 THROUGH 17 AND THE SCHEMATICS ARE CURRENTLY BEING PREPARED. EITHER A NEW, COMPLETE MANUAL WILL BE MAILED TO YOU OR THE SHEETS MISSING WILL BE MAILED VERY SOON. PLEASE DO NOT CALL US ABOUT THE MISSING PAGES, AS YOU WILL BE TOLD JUST WHAT IS PRINTED HERE.

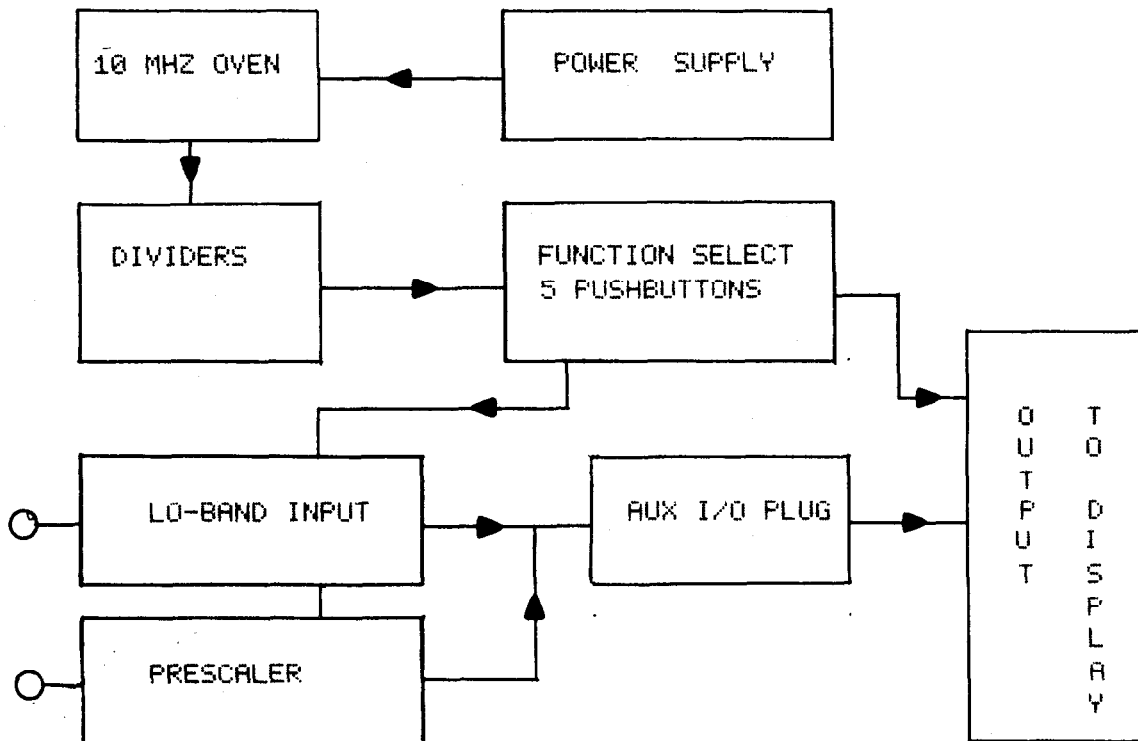
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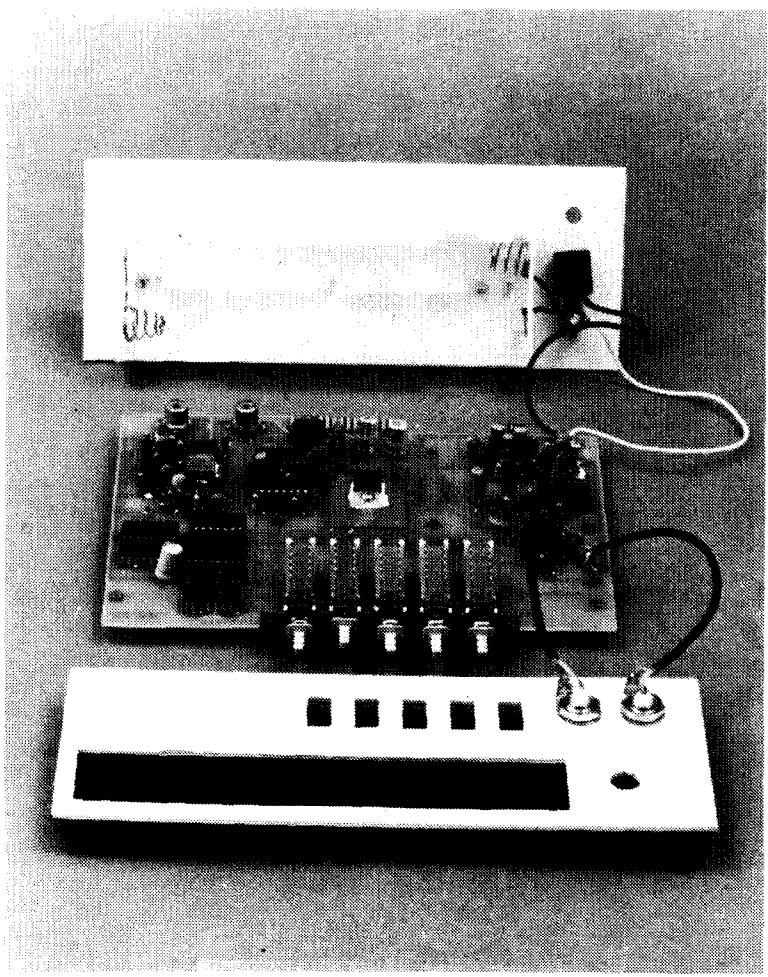
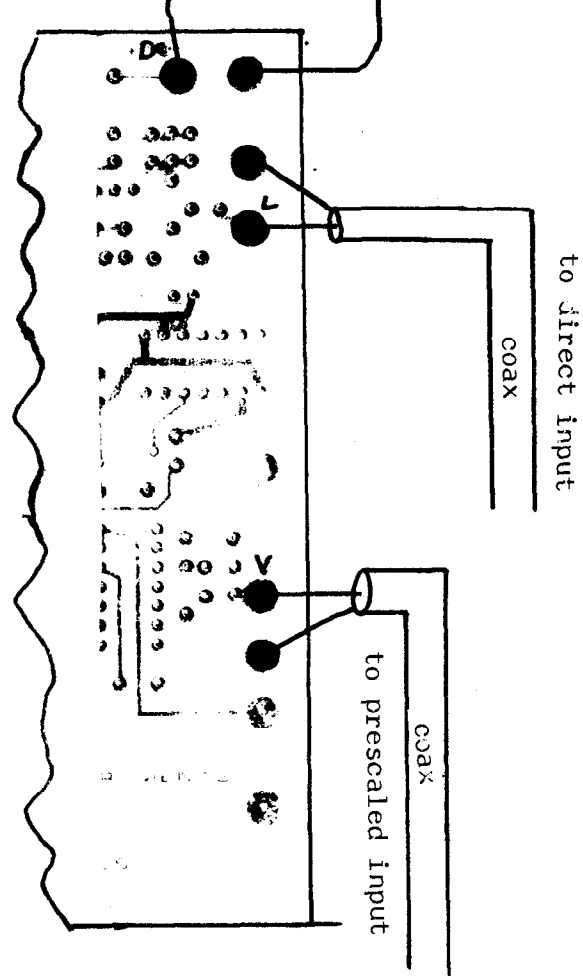
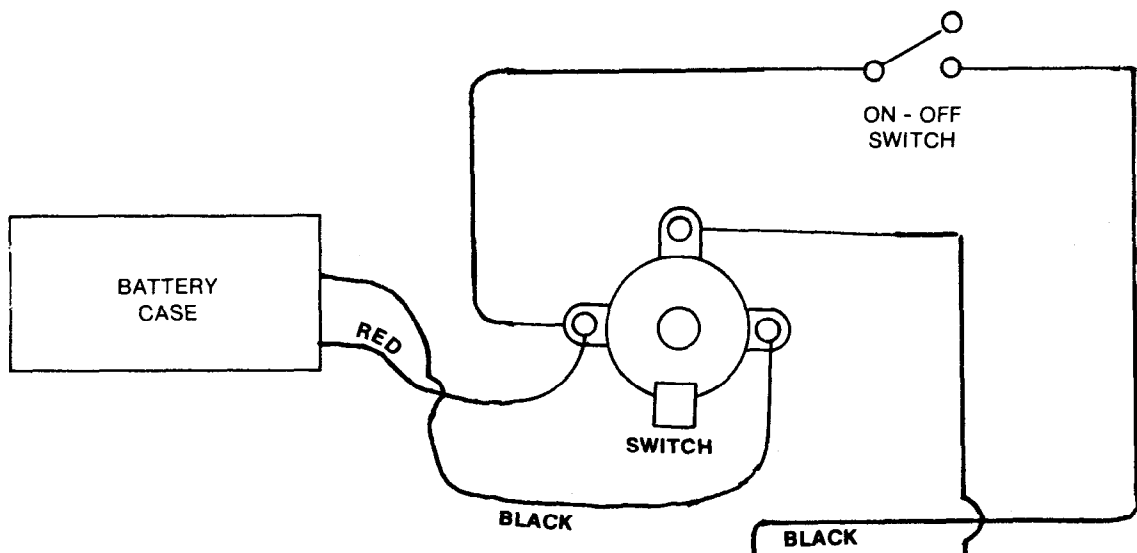
DSI INSTRUMENTS INCORPORATED
OCTOBER 25, 1979

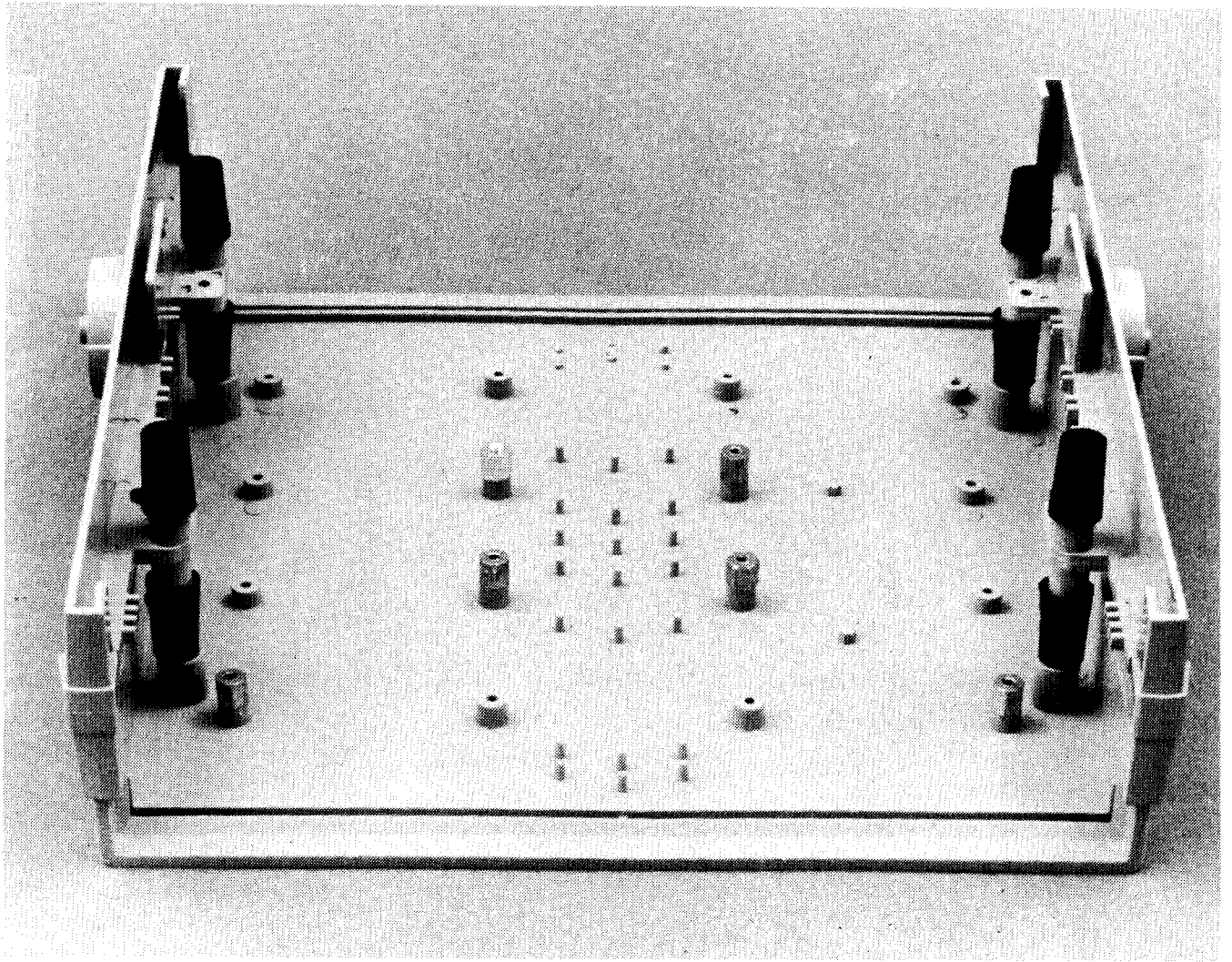
DISPLAY BOARD.....



MAIN PC BOARD.....







* * * * * MODEL 5600A KIT ASSEMBLY INSTRUCTIONS * * * * *

IMPORTANT: IT IS RECOMMENDED THAT YOU FAMILIARIZE YOURSELF WITH THIS INSTRUMENT BY READING THE INSTRUCTION MANUAL PRIOR TO ASSEMBLING THE KIT.

TOOLS REQUIRED:

1. SMALL SCREWDRIVERS, BOTH STRAIGHT AND PHILLIPS HEAD
2. LARGE AND SMALL DIAGONAL CUTTERS
3. WIRE STRIPPERS
4. NEEDLE OR FLAT NOSE PLIERS
5. LOW WATTAGE OR CONTROLLED TEMPERATURE SOLDERING IRON WITH SMALL TIP SUITABLE FOR USE ON PRINTED CIRCUIT BOARDS
6. X-ACTO KNIFE
7. NUT DRIVERS OR SMALL ADJUSTABLE WRENCH

----- C A U T I O N -----

EXTREME CARE MUST BE EXERCISED WHEN SOLDERING TO PRINTED CIRCUIT BOARD TRACES. EXCESSIVE HEAT OR LONG TIMES AT HIGH TEMPERATURE MAY DESTROY THEM.

ASSEMBLY PROCEDURE ...

PRELIMINARY:

REMOVE CABINET FROM PACKING AND SEPARATE THE TWO HALVES. UNWRAP THE PARTS CONTAINED IN THE CABINET. CHECK PARTS RECEIVED IN THE KIT AGAINST PARTS LIST. IN THE EVENT THAT MAJOR PARTS ARE MISSING, RETURN THE KIT TO THE FACTORY FOR REPLACEMENT.

A. FRONT PANEL SUBASSEMBLY

- () 1. CUT RG-174 COAX CABLE INTO TWO PIECES, ONE 6 1/2", THE OTHER 4 1/2". DRESS LEADS IN THE CUSTOMARY MANNER FOR CONNECTION TO THE P. C. BOARD AND BNC CONNECTORS.
- () 2. BOTH BNC CONNECTORS MUST BE SLIGHTLY MODIFIED AS FOLLOWS:
CUT THE CENTER CONDUCTOR TERMINAL OFF APPROXIMATELY 1/32" ABOVE THE INSULATOR AND SOLDER THE CENTER CONDUCTOR OF THE RG-174 TO THE CENTER TERMINAL AS PER THE SKETCH BELOW. SOLDER THE GROUND BRAID TO THE SOLDER LUG PROVIDED AFTER BENDING THE SOLDER LUG AS SHOWN IN THE SKETCH.

ASSEMBLY INSTRUCTIONS CONTINUED...

- () 3. PEEL THE PROTECTIVE BACKING FROM THE ADHESIVE SIDE OF THE INSTRUMENT PANEL FACE AND APPLY TO THE PLASTIC FRONT PANEL. *** CAUTION *** EXERCISE EXTREME CARE IN LINING UP THE PANEL FACE AND THE FRONT PANEL. THIS IS BEST DONE BY ALIGNING THE BOTTOMS OF THE RECTANGULAR SWITCH OPENINGS AND THE ROUND INPUT CONNECTOR OPENINGS.

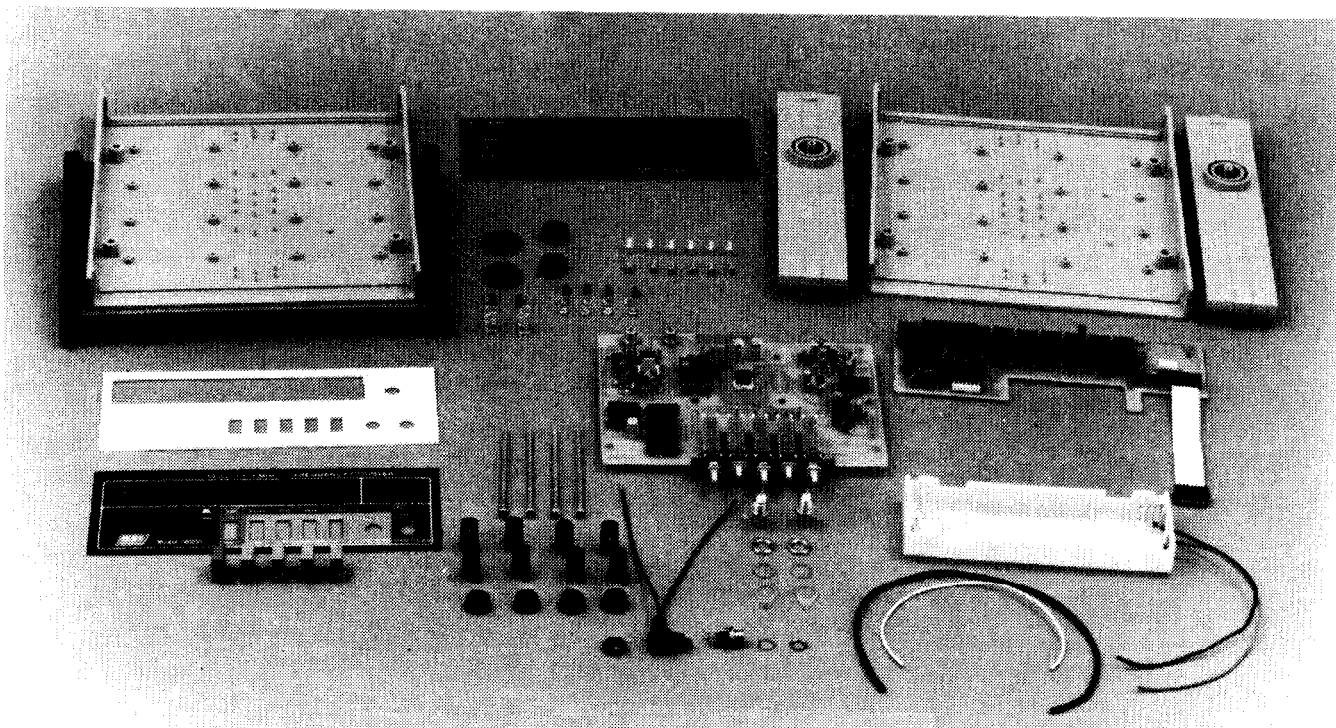
NOTE: IF PANEL FACE DOES NOT GO ON PERFECTLY IT CAN BE PEELED OFF AND RE-INSTALLED SEVERAL TIMES. IN SOME CASES IT MAY BE NECESSARY TO TRIM THE PANEL FACE AROUND THE OUTSIDE CIRCUMFERENCE OF THE PANEL AND/OR AROUND THE SWITCH OPENINGS. THIS IS EASILY DONE WITH AN X-ACTO KNIFE OR RAZOR BLADE.

- () 4. INSERT THE BNC INPUT CONNECTORS IN THE FRONT PANEL AND INSTALL THE HARDWARE IN THE FOLLOWING SEQUENCE:
1. SOLDER LUG
 2. LOCKWASHER
 3. NUT

BE SURE THE SOLDER LUG POINTS TO THE BOTTOM OF THE PANEL AND THAT THE BNC WITH THE SHORT LEAD IS IN THE RIGHTMOST HOLE.

B. REAR PANEL SUBASSEMBLY

- () 1. TRIM THE RED AND BLACK LEADS FROM THE BATTERY CASE TO 1.5 INCHES AND STRIP AWAY 1/8" OF INSULATION.
- () 2. TRIM THE LEFT LEAD (WHEN VIEWED FROM THE REAR) OF THE ON - OFF SWITCH TO 3/4". STRIP THE END.
- () 3. INSTALL THE POWER INPUT JACK AND SWITCH AS SHOWN IN THE SKETCH.
- () 4. INSTALL THE BATTERY CASE ON THE REAR PANEL USING 4-40 FLATHEAD SCREWS.
- () 5. WIRE THE BATTERY CASE, SWITCH AND POWER INPUT JACK AS SHOWN IN THE SKETCH.

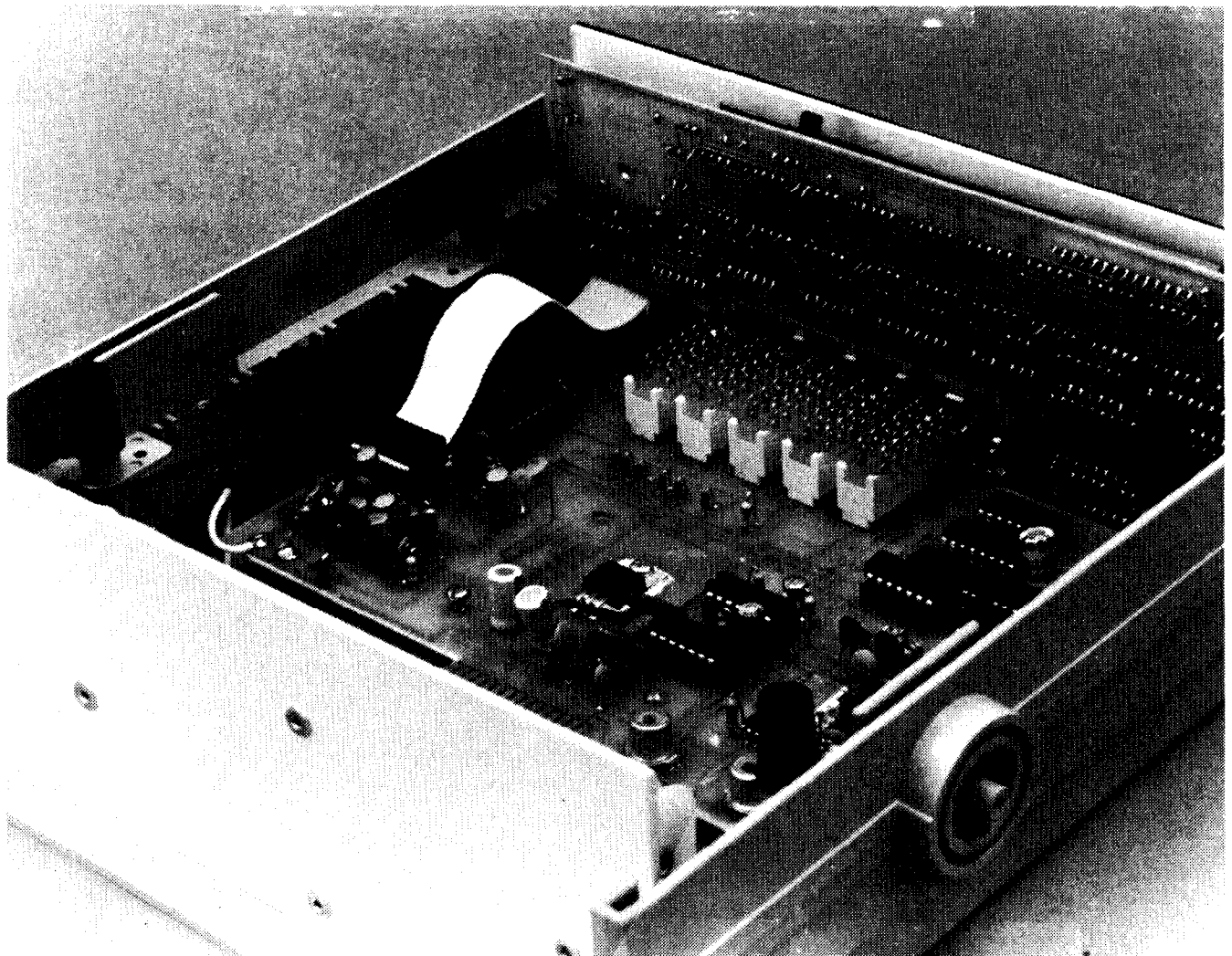


ASSEMBLY INSTRUCTIONS CONTINUED...

C. MAIN CASE ASSEMBLY

- () 1. SCREW SIX 1/4" HEX STANDOFFS INTO STANDOFF BASES IN THE CASE BOTTOM.
- () 2. INSTALL SIDES OF CABINET WITH 8 BLACK SPACERS.
HINT: IT IS SOMETIMES HELPFUL TO APPLY A DROP OF GLUE TO THE SPACERS AND INSTALL THEM ON THE SIDES PRIOR TO FITTING THE SIDES TO THE CASE BOTTOM.
- () 3. SOLDER THE INPUT COAX WIRES AND THE GROUND SHIELD TO THE MAIN BOARD AS SHOWN IN THE PHOTOGRAPH. SOLDER THE DC IN AND GROUND LEADS FROM THE REAR PANEL AS SHOWN IN THE SKETCH AND PHOTO.
** CAUTION ** THE BLACK LEAD FROM THE ON - OFF SWITCH IS POSITIVE.
- () 4. SLIDE FRONT AND REAR PANELS AND MAIN BOARD INTO THE CASE BOTTOM. ATTACH MAIN BOARD TO 6 METAL STANDOFFS WITH 4-40 MACHINE SCREWS.

THIS COMPLETES ASSEMBLY OF THE COUNTER.



***** SECTION 10 PARTS LIST *****

INTEGRATED CIRCUITS....

1 - 7805 REGULATOR
 2 - 75492 DIGIT DRIVER
 2 - 74LS196 COUNTER
 1 - 74196 COUNTER
 2 - 74LS00 QUAD NAND
 2 - 4011 CMOS QUAD NAND
 1 - 4013 CMOS DUAL D FF
 1 - 4051 8 INPUT MUX
 4 - 4518 COUNTER
 1 - 4511 BCD - 7 SEG DRIVER
 1 - 4520 BINARY COUNTER
 1 - LM3911 TEMP CONTROLLER
 1 - DS1020 PRESCALER
 1 - LS7031 LSI COUNTER

TRANSISTORS....

6 - 2N2222A NPN
 2 - 2N2907 PNP
 2 - 2N5179 NPN
 1 - SC700 OR MPF102A FET

DIODES.....

12 - 1N914
 1 - 1N4002

LEDS.....

10 - DL-500 OR TIL322A

RESISTORS.....

7 - 33 OHM NETWORK	3 - 10 MEG	1 - 5.6 K OHM
4 - 470 OHM	3 - 100 K OHM	1 - 33 OHM
1 - 2200 OHM	1 - 4.7 K OHM	1 - 270 K OHM
2 - 47 OHM	1 - 2.0 K OHM	4 - 1 K OHM
2 - 150 OHM METAL FILM	3 - 10 K OHM	4 - 390 OHM
3 - 1 MEG	4 - 11 K OHM	2 - 330 OHM
1 - 820 OHM	1 - 100 OHM	2 - 22 K OHM
3 - 680 OHM	1 - 330 K OHM	

CAPACITORS.....

3 - .001 UF DISC	9 - .01 UF DISC	1 - .005 UF
2 - .1 UF DISC	3 - .02 UF DISC	1 - 22 PF
1 - 47 PF	4 - 22 UF ELECT.	2 - 47 UF ELECT
1 - 100 PF NPO DISC	1 - 3-25 PF TRIMMER	

MECHANICAL.....

1 - PRINTED CIRCUIT MAIN BOARD	CASE CONSISTING OF:
1 - PRINTED CIRCUIT DISPLAY BOARD	1 - CASE TOP
2 - BNC CONNECTORS FEMALE	1 - CASE BOTTOM
2 - RCA CONNECTORS PC MOUNT	2 - SIDE RAILS
1 - 14 CONDUCTOR HARNESS ASS'Y	1 - BACK PANEL
1 - 5 GANG SWITCH ASSEMBLY	1 - FRONT PANEL
5 - SWITCH BUTTONS	1 - FRONT FACE PLATE
1 - POWER INPUT JACK	8 - SIDE RAIL SPACERS
1 - BATTERY CASE	4 - FEET
1 - ON-OFF SWITCH	4 - LONG 6-32 SCREWS
4 - HEX STAND-OFFS	1 - BAIL ASSEMBLY
4 - 4-40 X 1/4" PAN HEAD SCREWS	
2 - 4-40 X 1/4" FLAT HEAD SCREWS	
2 - 4-40 NUTS	
6 - #4 LOCKWASHERS	
12" - RG-174 COAX CABLE	

**** DSI AUDIO SCALER MODEL AS-100X ****

THE AS-100X AUDIO SCALER IS DESIGNED TO BE USED WITH MOST FREQUENCY COUNTERS TO INCREASE RESOLUTION WHEN READING AUDIO FREQUENCIES. THIS DEVICE IS ACTUALLY A FREQUENCY MULTIPLIER, EMPLOYING PHASED-LOCK LOOP TECHNIQUES TO GENERATE A SIGNAL EITHER 10 OR 100 TIMES THE INCOMING FREQUENCY. THIS SCALER IS POWERED BY IT'S OWN BATTERY, UTILIZES CMOS IC'S FOR LOW POWER CONSUMPTION, AND IS VERY EASY TO USE.

SOME OF THE POSSIBLE USES FOR THE SCALER ARE MEASURING RTTY FREQUENCIES, TOUCH TONES (ONE TONE AT A TIME), PRIVATE LINE SUBAUDIBLE TONES, AND CHECKING BAUD RATES ON COMMUNICATIONS OR COMPUTER SYSTEMS.

SPECIFICATIONS....

INPUT FREQUENCY RANGE	X10	100 HZ - 20 KHZ TYPICAL
	X100	30 HZ - 2000 HZ TYPICAL
INPUT IMPEDANCE		1 MEGOHM / 50 PF
INPUT WAVESHAPES REQUIRED		SINE, TRIANGULAR OR SQUARE
SENSITIVITY		50 MILLIVOLTS RMS TYPICAL 30 HZ - 20 KHZ
OVERLOAD TOLERANCE		CAN WITHSTAND 100 VOLTS PEAK
OUTPUT SIGNAL		8 VOLTS PEAK TO PEAK, CURRENT LIMITED MAY BE SHORTED INDEFINATELY WITHOUT DAMAGING UNIT.
BATTERY REQUIRED		1 - 9 VOLT RECTANGULAR
CURRENT CONSUMPTION		1 - 5 MA
BATTERY LIFE		ESTIMATED 50 TO 250 HOURS
INPUT, OUTPUT CONNECTORS		STANDARD RCA PHONO

BATTERY INSTALLATION....

THE AS-100X REQUIRES A 9 VOLT BATTERY FOR OPERATION. YOU WILL HAVE TO REMOVE THE BOTTOM OF THE CASE TO INSTALL THE BATTERY. CLIP THE BATTERY TO THE BATTERY CONNECTOR, CAREFULLY SLIDE THE BATTERY INTO THE SPACE BETWEEN THE SWITCHES AND CABINET. REPLACE THE CABINET BOTTOM PLATE.

USE OF THE SCALER....

ONE POSSIBLE USE OF THE SCALER IS CHECKING CLOCK TIMEBASES AT 60 HZ OR CHECKING THE POWER LINE FREQUENCY ITSELF.

***** WARNING *****

DO NOT CONNECT THIS DEVICE DIRECTLY TO THE AC POWER LINE. THERE IS A RISK THAT YOU WILL DAMAGE THE UNIT IN ADDITION TO POSSIBLY KILLING YOURSELF. THE SAFE WAY IS TO USE A STEP-DOWN TRANSFORMER TO REDUCE THE LINE VOLTAGE TO A SAFE LEVEL, DOWN TO 12 VOLTS OR LESS. SEE THE DIAGRAM, PAGE 3, FOR A SUGGESTED SETUP. CONNECT THE SCALER'S INPUT TO THE CIRCUIT, OUTPUT TO YOUR FREQUENCY COUNTER'S LOW FREQUENCY INPUT. SELECT 1 HZ RESOLUTION OR 1 SECOND GATE IF YOUR COUNTER HAS ONE. SELECT X100 ON THE SCALER. IF EVERYTHING IS WORKING CORRECTLY, YOU SHOULD SEE A READING OF 6000 ON THE COUNTER. TRY CHANGING THE MULTIPLIER SWITCH ON THE SCALER TO X10. READING SHOULD BE 600. OF COURSE, IF YOU APPLY SIGNAL DIRECTLY TO THE COUNTER, YOU SHOULD READ 60 HZ.

USE OF SCALER. CONTINUED....

OF COURSE, THE SCALER MAY BE USED TO INCREASE THE RESOLUTION OF A COUNTER WHEN READING THE OUTPUT OF AN AUDIO OSCILLATOR. SET UP AN AUDIO OSCILLATOR OR GENERATOR FOR ABOUT 1000 HZ. BE SURE TO HAVE 50 MILLIVOLTS OR MORE OF SIGNAL. FEED THE SIGNAL TO THE SCALER WITH THE SCALER SET TO X10. YOUR COUNTER SHOULD READ EXACTLY 10 TIMES THE INPUT FREQUENCY. NOTE THAT IF THE INPUT FREQUENCY WAS 1005 HZ YOUR COUNTER WOULD DISPLAY 10050 HZ. TRY SWITCHING TO X100. THE READING SHOULD INCREASE TO 10 TIMES IT'S PREVIOUS READING.

WANT TO TRY AN INTERESTING EXPERIMENT? YOU WILL NEED A VARIABLE FREQUENCY AUDIO GENERATOR AND AN OSCILLOSCOPE. CONNECT THE AUDIO TO THE SCALER AS BEFORE. CONNECT THE OUTPUT OF THE SCALER TO THE OSCILLOSCOPE. TRY VARYING THE GENERATOR'S FREQUENCY AND/OR SWITCH BETWEEN X10 AND X100 ON THE SCALER. OBSERVE HOW THE SCALER'S PLL 'HUNTS' FOR THE CORRECT FREQUENCY MULTIPLE.

A SPECIAL NOTE ON MEASURING BELL TELEPHONE TOUCH TONES. THESE TONES ARE DUAL TONES. THIS IS IMPORTANT! THE SCALER CAN ONLY MULTIPLY A SINGLE TONE. IT CAN NOT SEPARATE DUAL TONES. TO MEASURE DUAL TONES, YOU WILL HAVE TO DISABLE ONE OF THE TONES. OFTEN THIS CAN BE DONE BY PRESSING TWO KEYS ON THE PAD SIMULTANEOUSLY.

HAVING TROUBLE ???

IF YOU ARE EXPERIENCING DIFFICULTY WITH THE AUDIO SCALER, CHECK FOR THESE POSSIBLE PROBLEMS:

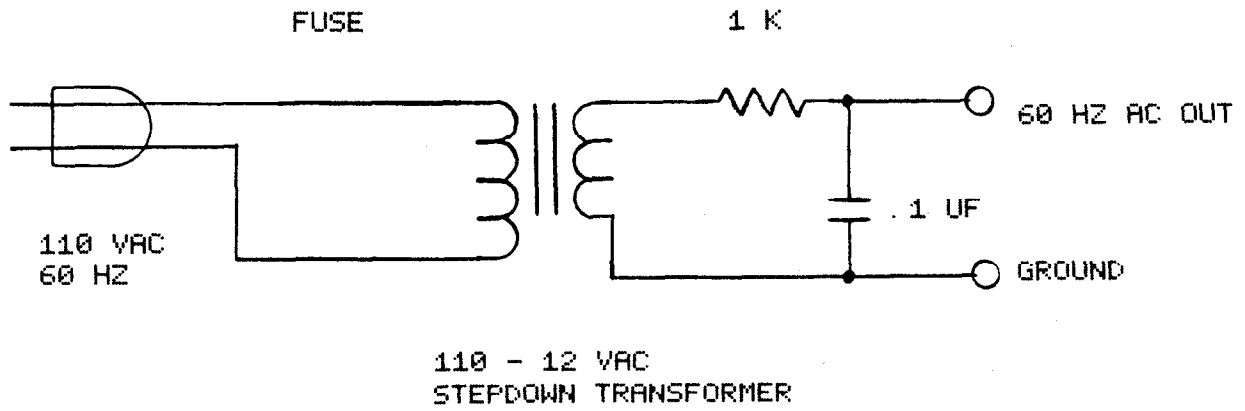
1. DEAD OR VERY WEAK BATTERY
2. INSUFFICIENT SIGNAL (MUST BE >50 MV, <20 VOLTS)
3. INCOMING SIGNAL TOO HIGH OR TOO LOW IN FREQUENCY
(SEE SPECIFICATIONS)
4. TWO OR MORE TONES PRESENT SIMULTANEOUSLY OR INPUT SIGNAL IS SEVERELY CONTAMINATED WITH NOISE.
5. SHORTED OR OPEN INPUT OR OUTPUT CONNECTORS

IF NONE OF THESE PROBLEMS ARE AT FAULT, THE SCALER IS PROBABLY DEFECTIVE. IF THE UNIT IS STILL UNDER WARRANTY (90 DAYS FROM RECEIPT OF UNIT), YOU MAY HAVE IT REPAIRED FREE OF CHARGE BY DSI. PHONE 565-8402 FOR AN RMA# (RETURN MATERIALS AUTHORIZATION). BE SURE TO WRITE THIS NUMBER ON THE OUTSIDE OF THE SHIPPING BOX. YOU MAY ALSO PHONE 800-854-2049, IN CALIFORNIA, 800-542-6253, TOLL FREE. NORMAL SHOP TIME IS ABOUT 2 WEEKS. PLEASE ALLOW ANOTHER WEEK FOR SHIPPING.

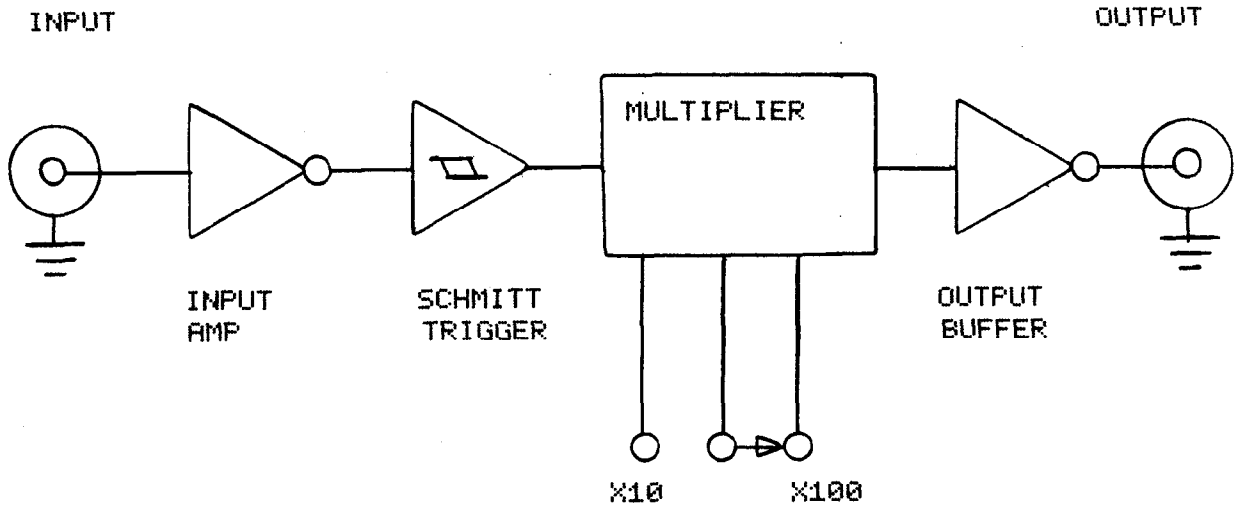
IF THE SCALER IS OUT OF WARRANTY, AND YOU DO NOT WANT TO REPAIR IT YOURSELF, YOU MAY SEND IT TO DSI FOR SERVICE. CALL FOR RMA# FIRST. RETURN THE SCALER WITH A CHECK OR MONEY ORDER FOR \$15.00 TO COVER THE COST OF THE REPAIR AND RETURN SHIPPING. THIS PRICE SUBJECT TO CHANGE. ASK FOR EXACT PRICE WHEN PHONING.

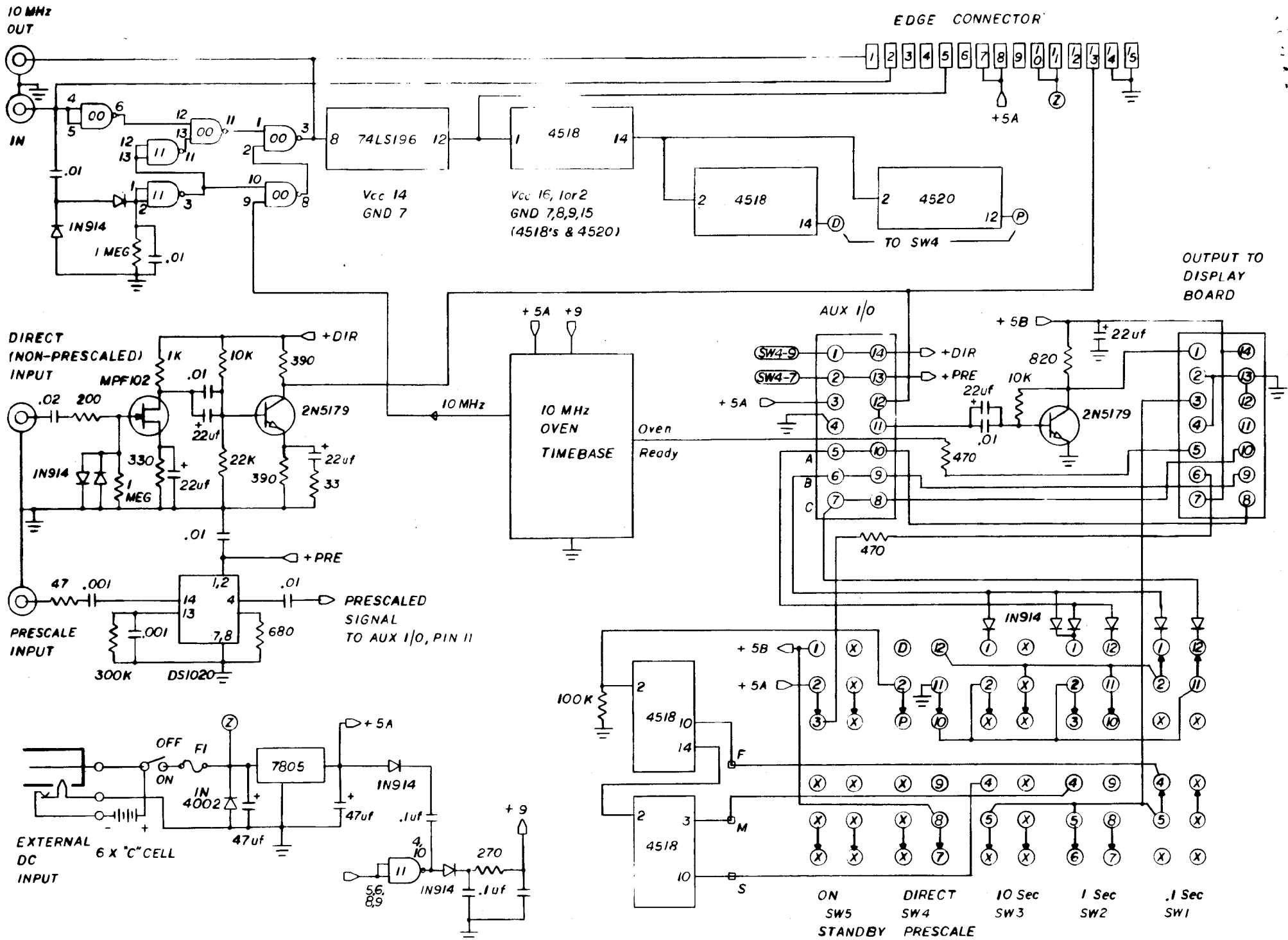
HAPPY SCALING !!!

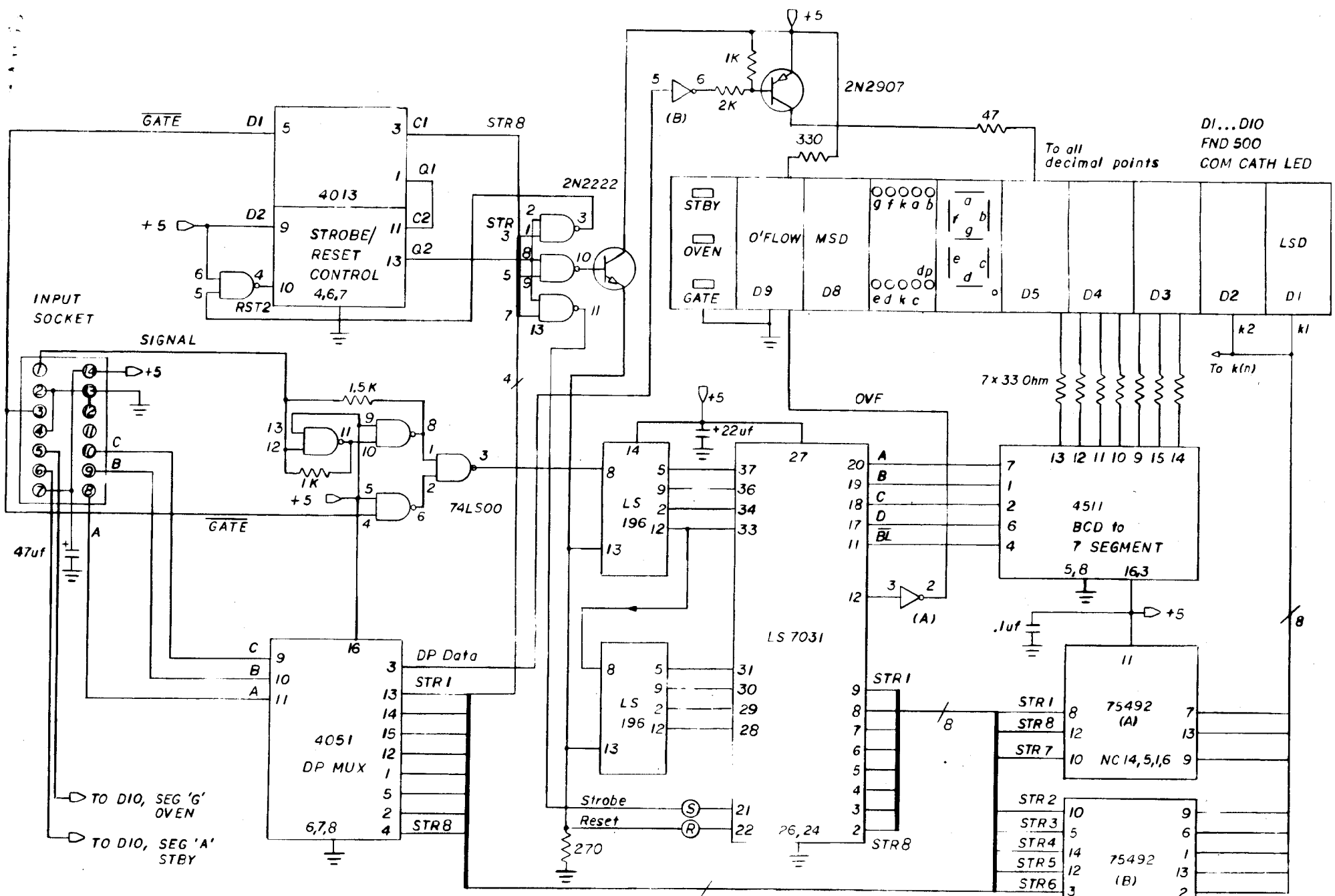
USING THE AS100X TO MEASURE 60 HZ POWER LINE FREQUENCY....



AS-100X BLOCK DIAGRAM....







'LS196'S,
 Vcc - 14
 GND - 3,4,7,10,11
 ALSO, CONNECT 5 To 6

DSI INSTRUMENTS INC.
 MODEL 5600A
 OCT. 1979 DISPLAY BOARD