

```
*****
*
*          SERVICE MANUAL          *
*
*          DIGITAL SOUND LEVEL METER  *
*
*
*          MODEL: SL-4001          *
*
*****
```

1. PARTS LIST
2. CALIBRATING PROCEDURE
3. TROUBLE SHOOTING STRATEGY
4. PCB LAYOUT
5. CIRCUIT DIAGRAM

A. EDIT DATE : 6/1/91
B. MODIFY DATE:
C. MODIFY DATE:

LUTRON ELECTRONIC ENTERPRISE CO., LTD.

ELECTRICAL PARTS LIST OF SL-4001
DIGITAL SOUND LEVEL METER

PAGE. 2

DATE: 6/1/91

- NOTE: 1. WHEN IT IS NECESSARY TO REPLACE ANY OF THE ELECTRICAL COMPONENTS SPECIFIED IN THIS PARTS LIST, USE COMPONENTS OF EQUAL OR BETTER SPECIFICATIONS.
2. ALL THE PARTS DESCRIBED IN THIS ELECTRICAL PARTS LIST ARE SUBJECT TO CHANGE DUE TO ENGINEERING CHANGES FOR IMPROVEMENT.
3. FOR ORDERING SPARE OR REPLACEMENT PARTS, REFER TO THE PARTS DESCRIPTION FOR EACH ITEM.

CIRCUIT REF. NO.	DESCRIPTION	RATING	REMARKS
=====			
CAPACITORS			

C1	METAL FILM	.01uF/50V	(Mini type)
C2	MYLAR	.022uF/50V	
C3	CERAMIC	.001uF/50V	
C4	CERAMIC	.001uF/50V	
C5	MYLAR	.0022uF/50V	
C6	MYLAR	.0022uF/50V	
C7	CERAMIC	.1uF/50V	(MONOLITHIC CERAMIC)
C8	ELECTROLYTIC	4.7uF/50V	(Mini type)
C9	TANTALUM	2.2uF/50V	
C10	ELECTROLYTIC	1uF/50V	
C11	ELECTROLYTIC	4.7uF/50V	(Mini type)
C12	ELECTROLYTIC	1uF/50V	(Mini type)
C13	ELECTROLYTIC	1uF/50V	(Mini type)
C14	METAL FILM	.1uF/50V	(Mini type)
C15	METAL FILM	.1uF/50V	(Mini type)
C16	CERAMIC	.1uF/50V	(MONOLITHIC CERAMIC)
C17	METAL FILM	.1uF/50V	(Mini type)
C18	CERAMIC	0.001uF/50V	
C19	ELECTROLYTIC	47uF/16V	
C20	ELECTROLYTIC	4.7uF/50V	(Mini type)
C21	CERAMIC	100pF/50V	
C22	ELECTROLYTIC	4.7uF/50V	(Mini type)
C23	ELECTROLYTIC	4.7uF/50V	(Mini type)
C24	TANTALUM	10uF/35V	
C25	TANTALUM	10uF/35V	
C26	ELECTROLYTIC	1uF/50V	(Mini type)
C27	ELECTROLYTIC	220uF/16V	
C28	TANTALUM	33uF/50V	
C29	CERAMIC	200pF/50V	
C30	METAL FILM	.1uF/50V	(Mini type)
C31	METAL FILM	.1uF/100V	
C32	METAL FILM	.22uF/50V	(Mini type)
C33	TANTALUM	10uF/35V	
C34	METAL FILM	.1uF/50V	(Mini type)
C35	METAL FILM	.47uF/50V	(Mini type)

ELECTRICAL PARTS LIST OF SL-4001
 DIGITAL SOUND LEVEL METER

PAGE. 3

DATE: 6/1/91

=====

CIRCUIT REF. NO.	DESCRIPTION	RATING	REMARKS
---------------------	-------------	--------	---------

=====

RESISTORS

R1	CARBON FILM	2.2M	1/4W	5%
R2	METAL FILM	180K	1/4W	1%
R3	METAL FILM	4.02M	1/4W	1%
R4	METAL FILM	1M	1/4W	1%
R5	METAL FILM	10K	1/4W	.5%
R6	METAL FILM	1M	1/4W	1%
R7	CARBON FILM	330K	1/4W	5%
R8	METAL FILM	25.5K	1/4W	1%
R9	METAL FILM	47K	1/4W	1%
R10	CARBON FILM	150K	1/4W	5%
R11	CARBON FILM	150K	1/4W	5%
R12	METAL FILM	10K	1/4W	1%
R13	METAL FILM	10K	1/4W	.5%
R14	METAL FILM	68K	1/4W	1%
R15	METAL FILM	39.2K	1/4W	1%
R16	METAL FILM	330K	1/4W	1%
R17	METAL FILM	39.2K	1/4W	1%
R18	METAL FILM	330K	1/4W	1%
R19	METAL FILM	100K	1/4W	.5%
R20	METAL FILM	261K	1/4W	1%
R21	METAL FILM	2K	1/4W	1%
R22	METAL FILM	4.12K	1/4W	1%
R23	METAL FILM	1K	1/4W	.5%
R24	METAL FILM	100K	1/4W	.5%
R25	CARBON FILM	10M	1/4W	5%
R26	METAL FILM	6.04K	1/4W	1%
R27	METAL FILM	10K	1/4W	.5%
R28	METAL FILM	6.04K	1/4W	1%
R29	METAL FILM	1K	1/4W	.5%
R30	METAL FILM	2K	1/4W	1%
R31	METAL FILM	16.4K	1/4W	1%
R32	CARBON FILM	560K	1/4W	5%
R33	CARBON FILM	10M	1/4W	5%
R34	METAL FILM	39.2K	1/4W	1%
R35	CARBON FILM	330K	1/4W	5%
R36	CARBON FILM	150K	1/4W	5%
R37	CARBON FILM	33K	1/4W	5%
R38	METAL FILM	51K	1/4W	1%
R39	CARBON FILM	100K	1/4W	5%
R40	METAL FILM	10K	1/4W	.5%

ELECTRICAL PARTS LIST OF SL-4001
DIGITAL SOUND LEVEL METER

PAGE.4

DATE:6/1/91

CIRCUIT REF. NO.	DESCRIPTION	RATING	REMARKS
R41	METAL FILM	15K 1/4W	1%
R42	METAL FILM	20K 1/4W	1%
R43	METAL FILM	10K 1/4W	.5%
R44	METAL FILM	10K 1/4W	.5%
R45	METAL FILM	100 1/4W	0.5%
R46	METAL FILM	4.7K 1/4W	1%
R47	METAL FILM	10K 1/4W	.5%
R48	METAL FILM	10K 1/4W	.5%
R49	METAL FILM	1K 1/4W	.5%
R50	METAL FILM	4.7K 1/4W	1%
R51	METAL FILM	10K 1/4W	.5%
R52	METAL FILM	267 1/4W	1%
R53	METAL FILM	3.3K 1/4W	1%
R54	METAL FILM	100K 1/4W	.5%
R55	METAL FILM	10K 1/4W	.5%
R56	METAL FILM	330K 1/4W	1%
R57	METAL FILM	10K 1/4W	.5%
R58	METAL FILM	11K 1/4W	1%
R59	CARBON FILM	1M 1/4W	5%
R60	CARBON FILM	100K 1/4W	5%
R61	CARBON FILM	100K 1/4W	5%
R62	CARBON FILM	68K 1/4W	5%
R63	METAL FILM	39.2K 1/4W	1%
R64	CARBON FILM	10M 1/4W	5%
R65	METAL FILM	2K 1/4W	1%
R66	METAL FILM	470K 1/4W	1%
R68	METAL FILM	10K 1/4W	.5%
R69	CARBON FILM	10M 1/4W	5%
R71	METAL FILM	68K 1/4W	1%
R72	METAL FILM	10K 1/4W	.5%
R73	CARBON FILM	15K 1/4W	5%
R74	METAL FILM	2.74K 1/4W	1%

VARIABLE RESISTOR

VR2	VARIABLE RESISTOR	4.7K	6mm
VR3	VARIABLE RESISTOR	10K	6mm
VR4	VARIABLE RESISTOR	22K	6mm
VR5	VARIABLE RESISTOR	4.7K	6mm
VR6	VARIABLE RESISTOR	4.7K	6mm
VR7	VARIABLE RESISTOR	4.7K	6mm
VR8	VARIABLE RESISTOR	2.2K	6mm
VR9	VARIABLE RESISTOR	47K	6mm
VR10	VARIABLE RESISTOR	1M	6mm

ELECTRICAL PARTS LIST OF SL-4001
DIGITAL SOUND LEVEL METER

PAGE.5

DATE:6/1/91

=====

CIRCUIT REF. NO.	DESCRIPTION	RATING	REMARKS
---------------------	-------------	--------	---------

=====

INTEGRATE CIRCUITS

U1	A/D CONVERTER		ICL7106
U2	QUARD EXCLUSIVE - OR GATE		4070
U3	DUAL OP AMP.		TL062
U4	DUAL OP AMP.		TL062
U5	VOLTAGE QUARD COMPARATORS		LM339N
U6	OP AMP		uA741
U7	OP AMP		uA741
U8	OP AMP		uA741
U9	DUAL OP AMP.		TL062
U10	dB/TRUE RMS CONVERTER		AD636J

DIODES, ZENERS, TRASISTORS

D1	SWITCHING DIODE	1N4148	
D2	SWITCHING DIODE	1N4148	
D3	SWITCHING DIODE	1N4148	
D4	SWITCHING DIODE	1N4148	
D5	SWITCHING DIODE	1N4148	
Q1	FET TRANSISTOR	2SK30A	
Q2	NPN TRANSISTOR	2SC1815	
Q3	NPN TRANSISTOR	2SC1815	
Q4	FET TRANSISTOR	2SK30A	

DISPLAY

LCD1	SL4001 LCD DISPLAY, 18 mm(0.7") digit size, 3 1/2 digits.		
------	---	--	--

SOUND SENSOR

X 1	SL-4001 SOUND PICK UP MICROPHONE		LJ596-C
-----	----------------------------------	--	---------

SWITCHS

SW1	SL-4001 POWER OFF/ON(DC)/ON(AC) SELECT SWITCH		
SW2	SL-4001, 94 dB/A WEIGHTING/C WEIGHTING SELECT SWITCH		
SW3	RANGE SELECT SWITCH		
SW4	SLOW/FAST/MAX HOLD SELECT SWITCH		

 THE CALIBRATING PROCEDURE OF
 SOUND LEVEL METER SL-4001

SW1-----Power switch & Output type selector
 SW2-----A/C weighting & Calibration selector
 SW3-----Range selector
 SW4-----Fast/Slow/Max. hold selector

1. PREPARE A SOUND LEVEL CALIBRATOR THAT CAN GENERATE "94.0 dB" OUTPUT.

SLIDE SW1 TO THE "ON(AC)" POSITION.

SLIDE SW2 TO THE "A" POSITION.

SLIDE SW3 TO THE "50-100 dB" POSITION.

SLIDE SW4 TO THE "SLOW" POSITION.

- a. INSERT THE "MICROPHONE" OF SL4001 INTO THE OUTPUT SOCKET OF CALIBRATOR.
- b. PREPARE AN DMM & SET TO "AC 2V" MEASURE RANGE. MEASURE J1 VOLTAGE FROM DMM & ADJUST VR3 UNTIL DMM GET AC530 mV READING.
- c. ADJUST VR6 UNTIL THE DISPLAY READING SHOW "94.0".

2. PREPARE A SOUND LEVEL CALIBRATOR THAT CAN GENERATE "94.0 dB" OUTPUT.

SLIDE SW1 TO THE "ON(AC)" POSITION.

SLIDE SW2 TO THE "A" POSITION.

SLIDE SW3 TO THE "80-130 dB" POSITION.

SLIDE SW4 TO THE "SLOW" POSITION.

- a. INSERT THE "MICROPHONE" OF SL4001 INTO THE OUTPUT SOCKET OF CALIBRATOR.
- b. ADJUST VR5 UNTIL THE DISPLAY READING SHOW "94.0".

3. PREPARE A SOUND LEVEL CALIBRATOR THAT CAN GENERATE "94.0 dB" OUTPUT.

SLIDE SW1 TO THE "ON(AC)" POSITION.

SLIDE SW2 TO THE "C" POSITION.

SLIDE SW3 TO THE "50-100 dB" POSITION.

SLIDE SW4 TO THE "SLOW" POSITION.

- a. INSERT THE "MICROPHONE" OF SL4001 INTO THE OUTPUT SOCKET OF CALIBRATOR.
- b. CHECK IF THE DISPLAY READING VALUES KEPT WITHIN 93.0 - 95.0 dB.

4. PREPARE A SOUND LEVEL CALIBRATOR THAT CAN GENERATE "94.0 dB" OUTPUT.

SLIDE SW1 TO THE "ON(DC)" POSITION.

SLIDE SW2 TO THE "A" POSITION.

SLIDE SW3 TO THE "50-100 dB" POSITION.

SLIDE SW4 TO THE "SLOW" POSITION.

- a. INSERT THE "MICROPHONE" OF SL4001 INTO THE OUTPUT SOCKET OF CALIBRATOR.
- b. PREPARE AN DMM & SET TO "DC 2V" MEASURE RANGE. MEASURE J1 VOLTAGE FROM DMM & ADJUST VR2 UNTIL DMM GET DC940 mV READING.

 THE CALIBRATING PROCEDURE OF
 SOUND LEVEL METER SL-4001

5. SLIDE SW1 TO THE "ON(DC)" POSITION.
 SLIDE SW2 TO THE "94 dB(CAL)" POSITION.
 SLIDE SW3 TO THE "50-100 dB" POSITION.
 SLIDE SW4 TO THE "SLOW" POSITION.
 ADJUST VR4 UNTIL THE DISPLAY READING SHOW "94.0".

6. SLIDE SW1 TO THE "ON(DC)" POSITION.
 SLIDE SW2 TO THE "A" POSITION.
 SLIDE SW3 TO THE "50-100 dB" POSITION.
 SLIDE SW4 TO THE "SLOW" POSITION.
 TO PUT THE "MICROPHONE" CLOSE TO THE "OUTPUT SOCKET" OF THE CALIBRATOR UNTILL THE DISPLAY READING OF SL-4001 SHOW "70.0 dB". SLIDE THE SW3 TO THE "30-80 dB". ADJUST VR7 UNTIL THE DISPLAY READING SHOW "70.0".

7. SLIDE SW1 TO THE "ON(DC)" POSITION.
 SLIDE SW2 TO THE "A" POSITION.
 SLIDE SW3 TO THE "30-80 dB" POSITION.
 SLIDE SW4 TO THE "SLOW" POSITION.

 TO PUT THE "MICROPHONE" CLOSE TO THE OUTPUT SOCKET OF THE CALIBRATOR UNTIL THE DISPLAY READING OF SL-4001 SHOW "79.5 dB". ADJUST VR10 UNTIL THE DISPLAY SHOW THE OVER-RANGE MARKER " ▲ " ON LEFT SIDE OF LCD.

8. SLIDE SW1 TO THE "ON(DC)" POSITION.
 SLIDE SW2 TO THE "A" POSITION.
 SLIDE SW3 TO THE "80-130 dB" POSITION.
 SLIDE SW4 TO THE "SLOW" POSITION.

 TO PUT THE "MICROPHONE" CLOSE TO THE OUTPUT SOCKET OF THE CALIBRATOR UNTIL THE DISPLAY READING OF SL-4001 SHOW "80.5 dB". ADJUST VR9 UNTIL THE DISPLAY SHOW THE OVER-RANGE MARKER " ▲ " ON LEFT SIDE OF LCD.

9. SLIDE SW1 TO THE "ON(DC)" POSITION.
 SLIDE SW2 TO THE "A" POSITION.
 SLIDE SW3 TO ANY RANGE.
 SLIDE SW4 TO THE "MAX HOLD" POSITION.
 CHECK IF THE "MAX HOLD" FUNCTION IS UNDER NORMAL CONDITION.

10. CHECK IF THE LOW BATTERY INDICATOR WILL BE LIT WHEN THE BATTERY VOLTAGE AROUND DC 6.4 V to 6.9 V.

THE TROUBLE SHOOTING STRATEGY
SOUND LEVEL METER. SL-4001

1. LOW BATTERY INDICATOR HAVE PROBLEM:
CHECK BATTERY, R34, R38, R69, D2, C3, PIN 8/PIN 9/PIN 14 OF U5,
PIN 11/PIN12/PIN 13 OF U2.
2. OVER-RANGE INDICATOR displayed within the right
measuring range:
CHECK R33, R36, VR10, R35, R37, VR9, C17, R10, R11,
D3, D4, C4, PIN 1/PIN 2/PIN 4/PIN 5/PIN 6/PIN 7 OF U5,
PIN 1/PIN 2/PIN 3 OF U2.
3. IF THE "MAX. HOLD" FUNCTION CAN NOT OPERATION:
CHECK D5, R66, C34, R64, R65, C32, R5, R1, D1, R2, R3, R4, C2, Q4,
Q1, PIN 10/PIN1/PIN 13 OF U5, PIN 5/PIN 6/PIN 7 OF U3, R71.





