

INSTRUCTION MANUAL FOR

AUDIO TESTER

MODEL 651S

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1. GENERAL

1.1 The Model 651S Audio Tester is a compact, portable instrument consisting of an oscillator, an AC voltmeter, a distortion meter, an impedance meter, and other units required for testing of audio equipment.

2. SPECIFICATION

Nomenclature: Audio Tester
Model No.: 651S

(1) Oscillator

Oscillating frequencies: 20, 40, 100, 400, 1k, 2.5k,
 5k, 7.5k, 10k, 15k, and
 20 kHz (11 fixed frequencies), sine wave

Frequency accuracy: Within $\pm(2\% + 1 \text{ Hz})$

Output impedance: $600 \Omega + 20\%$, single-ended

Output level: 0 dBv (1 V rms) or over,
(600Ω load)

Output response: 20 Hz - 20 kHz, within
 $\pm 1 \text{ dB}$

Output control: Fixed attenuator.... 0, -20,
 -40 dB
 Continuously variable range..
 40 dB or over

Output distortion:	100 Hz - 20 kHz ... 0.2% or less
Frequency stability:	20, 40Hz 0.5% or less Within $\pm 1\%$ of F.S. for $\pm 10\%$ line voltage variation
Output level stability:	Within $\pm 0.5\%$ of F.S. for $\pm 10\%$ line voltage variation

(2) AC Voltmeter

Measuring ranges:	3 mV - 300 V F.S., 1,3 sequence, 11 ranges
Accuracy:	Within $\pm 3\%$ of F.S. at 1 kHz
Frequency response:	20 Hz - 200 kHz, within $\pm 3\%$
Input impedance:	1 M Ω
Stability:	$\pm 0.5\%$ of F.S. for $\pm 10\%$ line voltage variation
Scale:	r.m.s. value of sine wave, dBv value

(3) Distortion Meter

Measuring frequencies:	400, 1k, 10 kHz (3 fixed freq.)
Measuring range:	0.1 - 10%
Range:	0.3, 1, 3, 10, 100% (SET), 5 ranges without balance control
Input impedance:	100 k Ω (single-ended)

Input control:

Fixed attenuator ... 0, -20, -40 dB (3 steps)
Continuously variable range ... approx. 22 dB

(4) Impedance Meter

Measuring frequency: at 1 kHz $\pm 5\%$

Measuring ranges: $\times 1$ (0 - 200 Ω)
 $\times 10$ (0 - 2 k Ω)
 $\times 100$ (0 - 20 k Ω)

Accuracy: $\pm 10\%$ of F.S.

Power applied to the under test:

15 mW or over (at $\times 1$
range, 600 Ω)

(5) Power requirements: 117 V $\pm 10\%$, 50/60 Hz AC,
approx. 9 VA

(6) Ambient temperature and humidity: The above performance
specification is satisfied
for ambient temperature of
+5 to +35 $^{\circ}\text{C}$ and humidity
30 - 80%.

3. OPERATION METHOD

3.1 EXPLANATION OF THE FRONT PANEL

(Refer to Fig. 3-1.)

- (1) POWER: Push-button switch for instrument main power ON-OFF control. As the button is depressed and locked, the power is turned ON; as it is depressed again, the power is turned OFF.
- (2) OSC OUTPUT: These binding-post terminals deliver the output of the internal oscillator. The GND terminal (white) is connected to the chassis through a 10-ohm resistor.
- (3) (4) OUTPUT CONT: For adjustment of the oscillator output. Switch (4) is for coarse adjustment and knob (3) for fine adjustment.
- (5) FREQUENCY (Hz): This switch is for selection of oscillating frequency.
- (6) RANGE: This switch is for range selection for AC voltage measurement and distortion measurement.
- (7) INDICATION: This switch is for selection of the function to be measured, from five functions as below.

- OSC VOLT: The internal oscillator output is directly connected to the meter. The oscillator output voltage can be read on the meter without requiring any external connections.
- VOLT: The meter indicates the AC voltage applied to the INPUT terminal.
- DIST/DIST-SET: This position is for measurement of distortion factor of the signal of the tested equipment connected to the input terminal.
- IMP: This position is for measurement of impedance of the load connected to Zx terminal.

- (8) DIST FREQ: This switch selects distortion measuring frequency, from three points of 400 Hz, 1 kHz, and 10 kHz.
- (9) INPUT: The signal to be measured is applied to this terminal from the tested equipment. The GND terminal (black) is directly connected to the chassis.
- (10)(11) DIST SET: These are used to adjust the input level at the full scale when distortion measurement is made. Switch (11) is for coarse adjustment and knob (10) is for fine adjustment.

- (12) LOAD: This terminal is connected in parallel with that of (9).
- (13) Zx: For impedance measurement, the tested object is connected to this terminal.
- (14) IMPEDANCE: This switch is for impedance measuring range selection.
- (15) ADJ: This knob is used for ∞ CHECK of the meter pointer when INDICATION selector (7) is set in the IMP position.

3.2 EXPLANATION OF THE SIDE PANEL

(Refer to Fig. 3-2.)

- (16) Power cord: The power cord is connected to this connector. Observe the correct direction in mating the connectors.
- (17) FUSE: This fuse holder contains a 0.5-ampere regular-type glass-tube fuse.

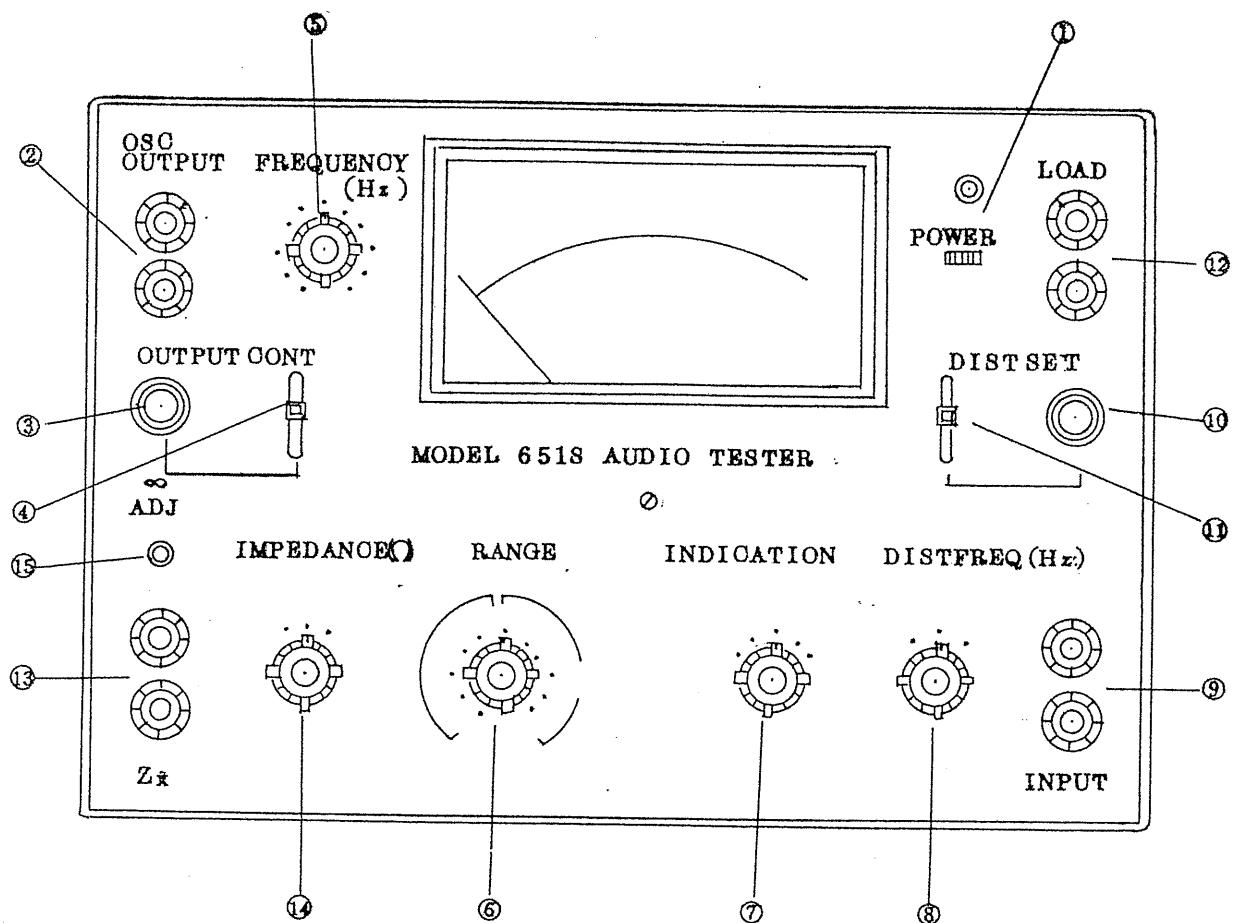


Fig. 3-1 Layout of Front Panel

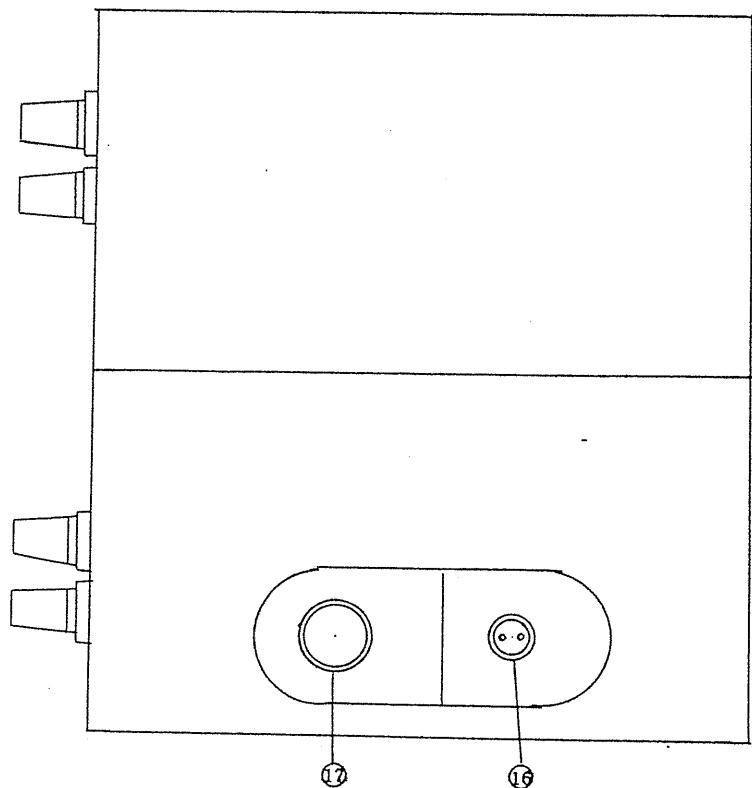


Fig. 3-2 Layout of Side Panel

3.3 PREPARATIONS FOR MEASUREMENT

- (1) Set the POWER switch on the front panel in the OFF state. Connect the power cord (supplied as an accessory) between the Audio Tester and an AC line receptacle.
- (2) Paying attention to the RANGE switch so that the meter pointer is not deflected over-scale, depress the POWER switch to turn ON the tester power. The pointer may deflect at random for approximately 10 seconds after the power is turned ON, but this is a normal operation.
- (3) When movement of the meter pointer is settled, the equipment is ready for measurement.

3.4 OPERATING PROCEDURES

- (1) Oscillator
 - (a) Set the oscillating frequency with the FREQUENCY selector switch (5).
 - (b) Set the OUTPUT CONT switch (4) and knob (3). Set the INDICATION selector switch in the OSC VOLT position and read the meter which indicates the oscillator output voltage.
- (2) AC Voltmeter
 - (a) Set the INDICATION selector switch (7) in the VOLT position. Read on the meter the input voltage (sine wave AC, r.m.s. value) applied to the INPUT terminal.

(b) When measurement is made in the unit of dB_V which employs 1 V as the reference level for 0 dB, use the dB_V scale which is used in common for all ranges.

(3) Distortion Meter

(a) FREQUENCY (Hz) (5): Any one of 400, 1k, or 10 kHz.

(b) RANGE (6): SET position of % range (blue)

(c) INDICATION (7): DIST SET

(d) DIST FREQ (Hz) (8): The same frequency with that of Item (a) above.

The above settings may be made in any order. However, pay attention so that the meter pointer is not badly deflected over-scale.

(e) Set the meter pointer in the "1.0" position of the % scale by adjusting the DIST SET (10) and (11).

(f) INDICATION (7): Select the DIST position.

(g) Lower gradually (in the order of 10%, 3%,) the RANGE switch from the SET position, observing the meter indication. Read the meter on the % scale.

(4) Impedance Meter

(a) Z_x terminal (13): Open

- (b) IMPEDANCE (Ω) (14): Set at full scale.
- (c) INDICATION (7): Set in the IMP position.

After the above settings, so adjust the ∞ ADJ knob that the meter pointer indicates the ∞ CHECK position.

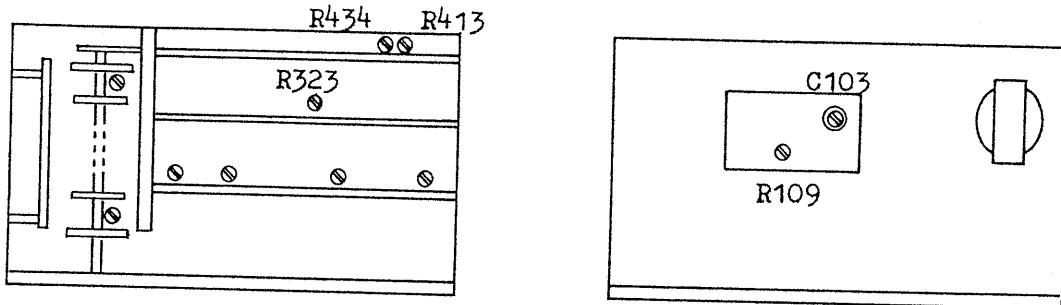
- (d) Connect the measured object to the Zx terminal, and read the meter on the scale.

Note 1: Each time the range is changed with the IMPEDANCE (Ω) selector (14), perform the ∞ CHECK operation.

Note 2: Whenever the tester is not used for impedance measurement, set the INDICATION selector switch (7) in a position other than the IMP position.

4. MAINTENANCE

To remove the top and bottom plates in order to gain access to the chassis, pull out the casing from the leather bag and remove the eleven clamping-screws located top and bottom and right and left facing the panel.



The Audio Tester is delivered to the customer after accurate adjustments and stringent tests. When the tester has become not to satisfy the specified performances after a long period of use or after repairing, make adjustment and calibration referring to the above illustration and the schematic diagram.

R434: For adjustment of +15 V and -15 V power supplies for the oscillator and impedance meter.

R413: For adjustment of supply voltage of the circuits other the above (for printed boards A-1, A-2, and A-3).

R323: For adjustment of meter full scale, by varying negative feedback ratio.

- R109: For meter adjustment, apply a calibration signal of 3 mV (400 Hz) to the input terminal, set the RANGE switch in the 3 mV position, so adjust potentiometer R323 that the pointer is deflected to the full scale and, then, turn the RANGE switch to the 1 V position and apply a calibration voltage of 1 V, and so adjust this potentiometer R109 that the pointer is deflected to the full scale.
- C103: This trimmer capacitor is for adjustment of frequency response characteristics of the indicating meter circuit.