GR 1551-C Sound Level Meter.max

CONTENTS

Handbook of Noise Measurement

This 282-page book, by Dr. A. P. G. Peterson and Ervin E. Gross, Jr., of the General Radio Engineering Staff, covers thoroughly the subject of noise and vibration measurement. Copies are available from General Radio at $1.00 each, postpaid in the United States and Canada.

Type 1551-C Sound-Level Meter

Q

GENERAL RADIO COMPANY
300 Baker Avenue
West Concord, Massachusetts USA 01781
Form 1551-0110-Q
ID-1276
December, 1968

SPECIFICATIONS

Sound-Level Range: From 24 to 150 dB (re 20 $\mu N/m^2$).

Frequency Characteristics: Four response characteristics, A, B, C, or 20 kHz, as selected by panel switch. The A-, B-, and C-weighting positions are in accordance with USA Standard S1.4-1961 and IEC Publication 123, 1961. Frequency response for the 20-kHz position is flat from 20 Hz to 20 kHz, so that complete use can be made of very wide-band microphones such as the 1551-P1 Condenser Microphone Systems.

Microphone: GR Type 1560-P5. Accessory condenser microphone is available.

Sound-Level Indication: Sound level is indicated by the sum of the meter and attenuator readings. The clearly marked, open-scale meter covers a span of 16 dB with calibration from −6 to +10 dB. The attenuator is calibrated in 10-dB steps from 30 to 140 dB above 20 $\mu N/m^2$.

Calibration Accuracy: When amplifier sensitivity has been standardized, the absolute accuracy of sound-level measurements at 500 Hz is within ± 1 dB and at all frequencies is in accordance with the USA Standard.

Panel adjustment is provided for standardizing amplifier gain with internal calibration circuit.

Absolute acoustic sensitivity is factory calibrated at 500 Hz. Microphone response and sensitivity are measured in a free field from 20 Hz to 15 kHz by comparison with a WE 640AA laboratory-standard microphone with calibration traceable to the National Bureau of Standards. Complete electrical frequency-response measurements are made on each instrument.

The 1562-A Sound-Level Calibrator or the 1559-B Microphone Reciprocity Calibrator can be used for making periodic over-all acoustic checks.

Output: 1.4 V behind 7000 Ω (panel meter at full scale). The output can be used to drive analyzers, recorders, oscilloscopes, and headphones. Harmonic distortion (panel meter at full scale) <1%.

Input Impedance: 25 MΩ in parallel with 50 pF.

Meter: Rms response, and fast and slow meter speeds in accordance with USA S1.4-1961 and IEC 123, 1961.

Environmental Effects

Temperature and Humidity: Microphone is not damaged at temperatures from −30 to +95°C and relative humidities from 0 to 100%. When standardized by its internal calibration system or a 1562 Sound-Level Calibrator, the instrument will operate within catalog specifications (for panel-meter indications above 0 dB) over the temperature range of 0 to 60°C and the relative humidity range of 0 to 90%.

Magnetic Fields: When exposed to a 60-Hz, 1-oersted (80 A/m) field, the sound-level meter will indicate 60 dB (C weighting) when oriented for maximum sensitivity to the magnetic field.

Electrostatic Fields: Aluminum case provides sufficient shielding, so that normally encountered electrostatic fields have no effect.

Vibration: Case is fitted with soft rubber feet and amplifier is resiliently mounted for vibration isolation. When the instrument is set on its feet on a shake table and vibrated at 10 mils pk-pk displacement over the frequency range of 10 to 55 Hz, the unwanted signals generated do not exceed an equivalent C-weighted sound-pressure level of 45 dB when motion is vertical, 60 dB when motion is lengthwise, or 40 dB when motion is sidewise.

SPECIFICATIONS (Con't)

GENERAL

Power Supply: Two 1½-V size D flashlight cells and one 67½-V battery (Burgess XX45 or equivalent) are supplied. An ac power supply, the Type 1262-B, is available.

Accessories Supplied: Telephone plug.

Accessories Available: 1551-P2 Leather Case (permits operation of instrument without removal from case), 1562 Sound-Level Calibrator, 1560-P95 Adaptor Cable for connecting output to 1521-B Graphic Level Recorder.

Mounting: Aluminum cabinet.

Dimensions (width x height x depth): 7¼ x 9¼ x 6⅛ in. (185 x 235 x 160 mm).

Weight, Net, 7¾ lb (3.6 kg); shipping, 16 lb (7.5 kg), batteries incl. Add 2 lb for leather case.

For a more detailed description, refer to *General Radio Experimenter,* August 1961.

U. S. Patent No. 3,012,197

Figure 1.
Type 1551-C Sound-Level Meter.
Inset shows Type 1262-B Power Supply attached.

TABLE OF CONTENTS

Section 1
INTRODUCTION

1.1 PURPOSE. The Type 1551-C Sound-Level Meter (Figure 1) is the basic instrument of the General Radio sound-measuring system. This instrument conforms to all requirements of the ASA American Standard Specification for General Purpose Sound-Level Meters. An accurate, portable, low-priced meter, it indicates the sound-pressure level at its microphone in terms of a standard reference level (0.0002 μbar).[1]

In addition to its primary use as a Sound-Level Meter, the Type 1551-C can be used as a highly sensitive ac voltmeter. With the microphone sensitivity adjustment (paragraph 4.8) set at -55.5 and the attenuator switch set at 30, the meter has a full-scale sensitivity of 30 microvolts. Voltages to be measured can be applied to the microphone connector through a Cannon three-terminal plug.

1.2 DESCRIPTION.

1.2.1 GENERAL. The major components of the Sound-Level Meter are a nondirectional microphone, a calibrated attenuator, an amplifier, an indicating meter, and weighting networks to modify the amplifier frequency response.

1.2.2 MICROPHONE. The Type 1560-P5 Microphone supplied with the Type 1551 Sound-Level Meter is a new piezoelectric ceramic microphone developed expressly for sound-level meter use. Several features of the Type 1560-P5 make it an excellent microphone for sound-level measurements:

[1] 0.0002 μbar = 20μN/m^2; cps = Hz.

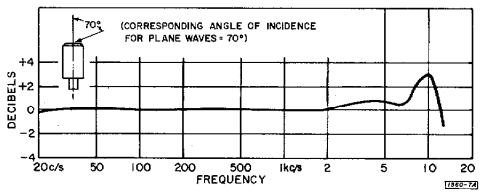


Figure 2.
Frequency response of Type 1560-P5 Microphone to sounds of random incidence.

1. a frequency characteristic (see Figure 2) carefully controlled in manufacture to give flat response to sounds of random incidence from 20 cps to 12 kc,

2. rugged, dependable design, capable of withstanding wide climatic changes (from -30° to 200° F in temperature, from 0 to 100% relative humidity),

3. low temperature coefficient of sensitivity, with minimal change in output voltage from 0° to 200° F,

4. low temperature coefficient of internal impedance; the cable correction is not affected by temperature at the microphone.

The nominal internal impedance of the microphone is 380 pf.

1.2.3 CONTROLS AND CONNECTORS. The controls and connectors on the panel of the Sound-Level Meter are listed below.

TABLE 1. CONTROLS AND CONNECTORS

Name	Type	Function
Attenuator	12-position selector switch	Selects meter range.
CAL	Thumb-set adjustment	Electrical internal calibration or gain adjustment.
METER-BATTERIES	5-position selector switch	Selects fast or slow meter response; provides battery checks.
WEIGHTING	5-position selector switch	Selects weighting.
OUTPUT	Phone jack	Output connection.
On-Off	Switch built into microphone arm	Turns instrument on and off (with battery power only).
None	6-terminal Jones receptacle	Connection to Type 1262-B Power Supply.

1.3 POWER SUPPLY.

1.3.1 BATTERIES. Two Type D flashlight batteries supply the filament (A) power, and one 67-1/2-volt portable-radio-type B battery supplies the plate (B) power for the instrument. Contact is made to each battery by spring terminals, and all batteries are secured by a screw-down bracket.

1.3.2 AC POWER SUPPLY. The Type 1262-B Power Supply (refer to section 5) can be used to operate the Sound-Level Meter from a 115-volt ac line. When the Type 1262-B is used, its own power switch, rather than the microphone switch on the Type 1551-C, controls application of power to the Sound-Level Meter.

1.4 CARRYING CASE. Available for use with the Sound-Level Meter is a leather carrying case with shoulder straps. A hole in the back of this case matches the tapped hole in the back of the Sound-Level Meter so that the instrument can be secured in the case for field use. The cover flaps of the case are equipped with a luggage-type fastener to keep them closed over the panel and with snap buttons to hold them open when the instrument is in use.

Section 2

OPERATING PROCEDURE

2.1 PRELIMINARY CHECKS.

2.1.1 BATTERY CHECK. To check batteries, set the METER-BATTERIES switch to FIL-1, turn the instrument on by raising the microphone, and check that the meter pointer is within the area marked BAT on the meter face. Turn the METER-BATTERIES switch to FIL-2 and then to PL, similarly checking that the meter pointer falls in the white BAT area for each position.

Filament batteries should last 6 to 7 days at 8 hours a day, or 30 to 35 days at 2 hours a day. Plate batteries should last 12 to 14 days at 8 hours a day, or 60 to 70 days at 2 hours a day.

2.1.2 CALIBRATION CHECK. Before using the Sound-Level Meter, make the following simple calibration check. (This check calibrates the amplifier of the Sound-Level Meter, but does not include a check on the microphone.)

a. Turn the instrument on.

b. Set the attenuator switch to 130 CAL (i.e., with the pointer on the knob toward the window).

c. Set the WEIGHTING switch to CAL, and check that the meter pointer falls within the white area marked CAL on the meter face. If not, set it there by adjusting the CAL thumbset control.

2.1.3 ACOUSTICAL CALIBRATION. The following over-all acoustical calibration can be made with the 1562 Sound-Level Calibrator. This calibration checks the microphone sensitivity as well as the amplifier sensitivity.

Perform the calibration check as described in paragraph 2.1.2. Then set the WEIGHTING switch to FLAT. Turn on the calibrator and set its frequency to 500 cps. Place the calibrator over the microphone. The sound-level meter should read 114 ±0.5 dB (refer to paragraph 2.2). Switch the calibrator to each of its other frequencies. If the reading of the sound-level meter at 1000 cps is not between 113 and 115 dB, and/or if the readings at the various frequencies vary by more than ± 1 dB, it is possible that the microphone has been damaged; it should then be checked independently.

When the microphone is known to be in good condition, the gain of the sound-level meter can be calibrated by setting the meter reading to 114 dB at 1000 cps by means of the CAL control.

The above calibration will be made free of charge for any GR sound-level meter delivered to one of the General Radio offices listed elsewhere in this manual.

2.2 OPERATING PROCEDURE.

a. Turn the instrument on by raising the microphone (battery power) or by turning on the Type 1262-B (ac power).

b. Adjust the WEIGHTING switch for the desired frequency response. Refer to paragraph 2.3.

c. Adjust the attenuator switch for an on-scale deflection of the indicating meter. The sound level in decibels is the algebraic sum of the readings of attenuator dial and meter.

d. Set the METER-BATTERIES switch to FAST or SLOW depending on the type of meter response desired. The fast response is suitable for most noise measurements and for measuring minimum and maximum values of fluctuating sounds. The SLOW position provides a high degree of damping for measuring the average value of fluctuating sounds.

2.3 SELECTION OF WEIGHTING NETWORK. Many early noise criteria specified weighted sound levels, using this rule of thumb: A weighting for sound levels from 24 to 55 db, B for levels from 55 to 85 db, and C for levels from 85 to 140 db. (The appropriate range was selected after a preliminary C-weighted measurement.) More recent opinions favor selection of weighting network on the basis of the type of noise measurement; for instance, A weighting is often preferred for speech-interference measurements, while B is recommended for surveys of traffic noise. In the absence of specific weighting requirements, it is usually helpful to take measurements on all three weighting networks. For a full discussion of weighting networks, refer to the General Radio Handbook of Noise Measurement. Response curves for the various weighting networks, equalized for microphone response, are given in Figure 3.

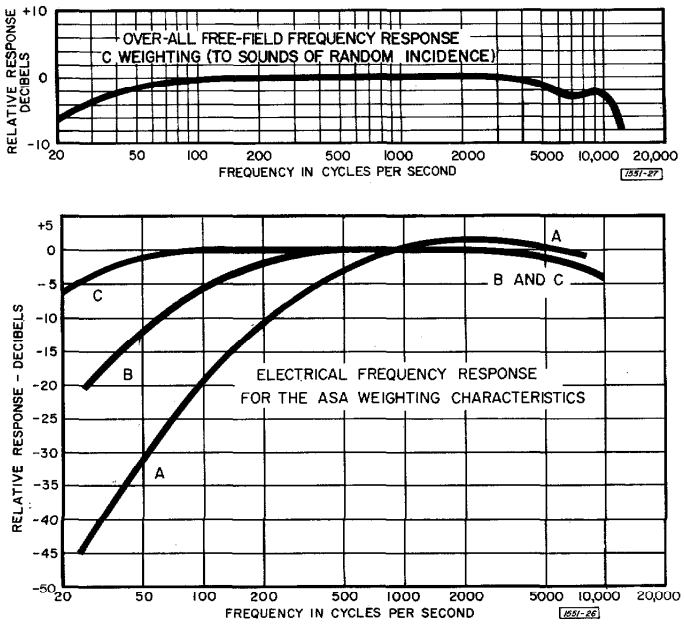


Figure 3. Typical Acoustical and Electrical Response Curves for Type 1551-C.

If the Sound-Level Meter is to be used with an analyzer or recorder, set the WEIGHTING switch to 20 kc or to C. When an extended-range microphone is used in place of the microphone supplied with the instrument, use the 20 kc position.

2.4 SOUND ANALYSIS AND RECORDING. The low-distortion output-amplifier circuit of the Sound-Level Meter was designed especially for use with the Type 1558-A Octave-Band Analyzer and Type 1564-A Sound and Vibration Analyzer. Other analyzers, such as the Type 1900-A Wave Analyzer, can also be used. Connect the input of the analyzer or recorder to the OUTPUT phone jack on the Sound-Level Meter. For greatest accuracy, the impedance connected to the output circuit of the Sound-Level Meter should be about 20,000 to 25,000 ohms. The output impedance is 7000 ohms, and output voltage is 1.1 V into 20,000 ohms, 1.5 V open-circuit. Any load impedance can be connected across the output terminals.

The output system of the Sound-Level Meter can be used to drive a Type 1521 Graphic Level Recorder to obtain permanent records of

sound measurements, or to operate a magnetic tape recorder to obtain field records that may be studied and analyzed later in the laboratory.

When recording or analyzing, set the attenuator switch so that the meter reads +6 db or more, if possible, to utilize the maximum dynamic range. If the meter reading falls below +6 db, it is sometimes desirable to set the attenuator switch one step lower, even if the meter pointer goes off scale as a result.

The internal calibration system of the Sound-Level Meter makes available, at the OUT jack, the 1000-cycle signal useful for setting the level of an analyzer or recorder to match that of the Sound-Level Meter.

2.5 EXTENSION CABLE. The Type 1560-P73* 25-foot Extension Cable can be used to permit operation of the microphone at some distance from the meter. The extension cable introduces about 7 db loss. For best measurements this cable insertion loss should be determined by calibration with a Type 1562 Calibrator.

2.6 WIDE-RANGE MICROPHONES. The over-all frequency response characteristic of the Type 1551-C, with the WEIGHTING switch set at 20 kc, is essentially flat from 20 cps to 20 kc. (See Figure 4.) This permits use of such wide-range microphones as those used in the Types 1551-P1L and 1551-P1H Condenser Microphone Systems.

The Type 1551-P1L uses the Altec 21-BR-150 Condenser Microphone, useful over the sound-pressure range from 50 to 150 db. The Type 1551-P1H uses the Altec Type 21-BR-180 Microphone, useful from about 70 to 170 db. (When using the Type 1551-P1L, set the meter to 121 rather than 120 db in the calibration described in paragraph 2.1.3. When using the Type 1551-P1H, set the meter to 101 db and thereafter add 20 db to meter readings.) These microphones have a good frequency response from 20 cps to 18 kc.

*Also supplied as part of the Type 1560-P34 Tripod and 25-ft Cable Assembly.

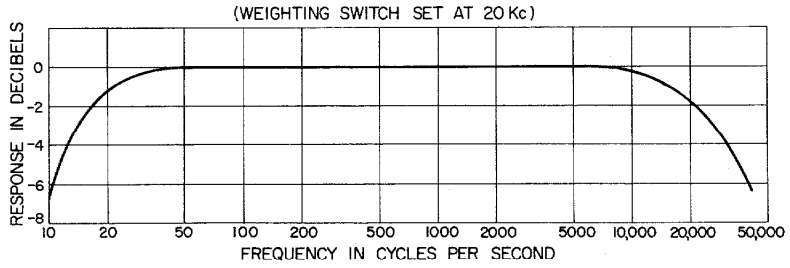


Figure 4.
Frequency Response of Type 1551-C Amplifier with WEIGHTING switch at 20 kc.

Also useful with the Type 1551-C over the range from 80 to 200 db is the Massa Type M-141F Standard Microphone, a piezoelectric microphone available from the Massa Laboratories Inc, Hingham, Mass. Its response is reasonably uniform up to 30 kc.

2.7 USE OF HEADPHONES. If desired, a set of headphones can be plugged into the OUTPUT jack to monitor the sound being measured.

2.8 BACKGROUND NOISE. When possible, sound measurements should be made with negligible background noise - at least 10 db below the level being measured. However, this is not always possible, and Figure 5 is convenient in determination of errors caused by background noise.

2.9 MICROPHONICS. When high-intensity sound fields are being measured, it is good practice to use the microphone on the end of a cable (refer to paragraph 2.5) and to keep the Sound-Level Meter well removed from the sound field. This is especially true if the high-level noise contains frequencies of 1000 cps or higher. The following quick check will determine whether the tubes in the Type 1551-C are being excited microphonically: remove the microphone head, set the WEIGHTING switch to A, and check that there is no meter reading with the attenuator switch set at 70 db or higher.

At sound levels below 140 db no special vibration precautions should be necessary. The amplifier is resiliently mounted, vacuum tubes are resiliently mounted on the amplifier board, the amplifier cover is specially treated to reduce airborne sound transmission, and the instrument sits on soft rubber-feet.

When the Sound-Level Meter, with microphone replaced by an equivalent electrical impedance, is subjected to pure-tone sounds at a sound-pressure level of 100 db re 0.0002 μbar at each frequency between 100 and 8000 cps, the output level in each octave band is at least 30 db below that for full-scale meter reading with the attenuator set for 100 db full-scale meter reading.

The Type 1551-C, with its microphone mounted on the panel microphone post, can measure sound pressure levels up to 140 db within the tolerances allowed in ASA S1.4, 1961. When the microphone is mounted on a cable, the maximum safe sound pressure level for the microphone is 150 db.

With an auxiliary high-level microphone separated from the Sound-Level Meter by a long cable to protect meter and operator from intense sound fields, levels up to 200 db can be measured.

2.10 ENVIRONMENTAL EFFECTS.

2.10.1 TEMPERATURE AND HUMIDITY. The Type 1560-P5 Microphone is not damaged at temperatures from -30° to +95° C and relative humidities from 0 to 100%. When standardized by its internal calibration system or a Type 1562 Sound-Level Calibrator, the Type 1551-C will operate within catalog specifications (for panel-meter indications above 0 db) over the temperature range from 0 to 60 C and the relative-humidity range from 0 to 80%.

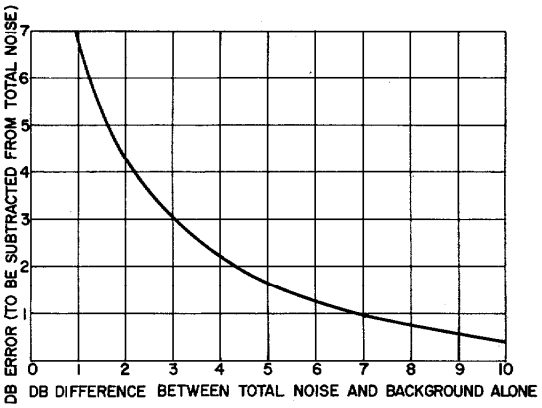
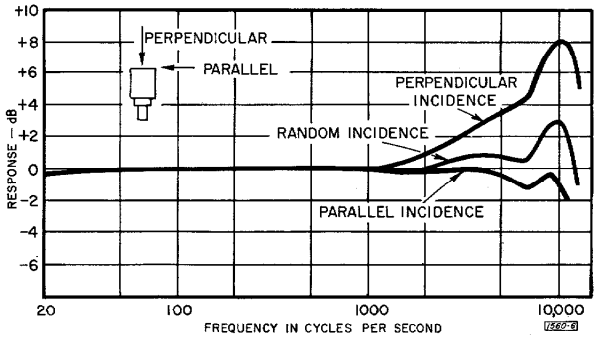


Figure 5.
Effect of Background
Noise on Measurement.

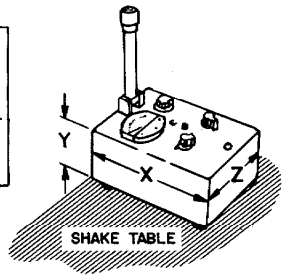
Figure 6.
Frequency Response as a
Function of Incidence,
Type 1560-P5 Microphone.



The internal impedance of the microphone is capacitive, 475 pf at 25° C, varying from 445 to 510 pf from 0 to 50° C.

2.10.2 **VIBRATION.** The Type 1551-C case is fitted with soft rubber feet and the amplifier compartment is resiliently mounted for vibration isolation. When set on its rubber feet on a shake table and vibrated over the frequency range of 10 cps to 55 cps, the motion transmitted to the amplifier generates unwanted signals. The magnitude of these signals is listed in the table below.

peak-to-peak displacement (inches)	direction of vibration		
	x	y	z
	maximum meter reading(db)		
0.030	65	70	55
0.010	45	60	40



2.10.3 MAGNETIC FIELDS. When exposed to a time-varying magnetic field of 1 oersted, the Type 1551-C will indicate 60 db when oriented for maximum sensitivity to the magnetic field.

2.10.4 ELECTROSTATIC FIELDS. The Type 1551-C is completely enclosed in an aluminum case so that the instrument is not affected by the electrostatic fields which are normally encountered.

2.11 VIBRATION PICKUP. It is often possible to measure the vibration amplitude, velocity, or acceleration of radiating surfaces. Useful vibration measurements can often be obtained where high ambient sound levels make acoustical measurements impossible. For vibration frequencies between 20 and 2000 cps, the Type 1551-C will operate as a vibration meter when used with a Type 1560-P11B Vibration Pickup System. With a Type 1560-P11S2 Vibration Pickup System (refer to the General Radio Experimenter, Volume 36, Number 11, November 1962), the Type 1551-C can be used for vibration measurements between 20 and 10,000 cps.

Refer to the General Radio Handbook of Noise Measurement for further information on vibration measurements.

Section 3

CALIBRATION

3.1 GENERAL. The calibration (acoustical and electrical) of the Type 1551-C Sound-Level Meter is carried out with pure tones. The Sound-Level Meter calibration is adjusted for random incidence sounds with the microphone mounted on the panel microphone post.

Microphone calibrations are made at 0 degrees (perpendicular incidence) in a free field with the microphone at the end of a cable. All microphone calibrations supplied by General Radio are at 0 degrees incidence. A correction curve is supplied to convert from 0 degrees to random-incidence response.

3.2 OBSERVER INFLUENCE. When measurements are made in reverberant or semireverberant fields, the observer and Sound-Level Meter case have a very small effect on the microphone response. Under free-field conditions and with a single sound source, both the observer and the case can have a large effect on microphone response (refer to the General Radio Handbook of Noise Measurement). These effects can be minimized if the instrument is held in front of the observer, with the observer oriented so that the sound passes in front of him at right angles to the axis of the Sound-Level Meter and its microphone.

For greatest accuracy it is recommended that the microphone be mounted on a tripod and connected to the Sound-Level Meter by an extention cable to keep the observer and the meter case out of the sound field being measured.

3.3 PREFERRED ANGLE OF INCIDENCE. When measurements are made on sounds in reverberant fields, the angle of incidence of sounds reaching the microphone is indeterminant. In this case there is no preferred angle of incidence between the microphone and the sound source. When measurements are made on a source in a free field, an angle of incidence of 70 degrees between the axis of the microphone and the sound source will approximate random response.

3.4 AUXILIARY CALIBRATION. The Type 1551-C has an internal calibrating system for quick checks on the electrical circuit of the instrument. This system connects the output of the amplifier to the input through an appropriate attenuator, filter, and limiter to produce a predetermined oscillation amplitude when the amplifier gain is correct. This system checks the electrical operation only and does not check the microphone. To make an acoustical check on the calibration of the instrument, the Type 1562 Acoustic Calibrator is recommended. This is a closed coupler with a driving loudspeaker that produces a known sound pressure level at the microphone.

3.5 METER CIRCUIT. The meter circuit used in the Sound-Level Meter, while not a true rms indicator, indicates much more closely to the rms value than have meters in earlier instruments. The meter circuit combines an average-reading circuit with a peak-reading circuit to create a "quasi-rms" indicating circuit. Since the rms value of most waveforms falls above the average value but below the peak value, a portion of the peak indication added to the average value of a given waveform should result in an rms indication. The meter circuit is designed to approximate rms values for various types of waveforms.

Table 2 below shows the db difference between the indication of a true rms meter and that of the Type 1551-C Sound-Level Meter for several test signals. In the column headed "db Fluctuation . . . . . etc" the signal consists of two tones, one at 1000 cps set for a convenient meter indication. The other tone is within a few cycles of 3000 cps and has 30 percent of the amplitude of the first. A true rms meter will show no fluctuation with this type of signal. The column headed "For Two-Signal Addition" refers to the two-signal test outlined in ASA Standard Z24.3-1944.

With pulses of constant height but varying length, the Type 1551-C Sound-Level Meter indicates the rms value within ±1 db until the pulse duration becomes as short as 1/25 that of a square wave.

TABLE 2.

Type Meter	*db Fluctuation with Phase Changes at 30% 3rd Harmonic*	*Difference in Meter Indication and RMS Decibels*		
		For Two-Signal Addition	*For Square Waves*	*For Noise*
1551-C	0.45	+.05	+0.1	−0.25

Section 4
SERVICE AND MAINTENANCE

4.1 GENERAL. We warrant that each new instrument manufactured and sold by us is free from defects in material and workmanship, and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or component that is found within the two-year period not to meet these standards after examination by our factory, Sales Engineering Office, or authorized repair agency personnel, will be repaired, or, at our option, replaced without charge, except for tubes or batteries that have given normal service.

The two-year warranty stated above attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible. If the difficulty cannot be eliminated by use of the following service instructions, please write or phone our Service Department (see rear cover), giving full information of the trouble and of steps taken to remedy it. Be sure to mention the serial and type numbers of the instrument.

Before returning an instrument to General Radio for service, please write to our Service Department or nearest Sales Engineering Office, requesting a Returned Material Tag. Use of this tag will ensure proper handling and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

4.2 REMOVAL OF INSTRUMENT FROM CABINET. To remove the instrument from its cabinet, remove the two large black screws from the bottom of the cabinet and lift the cover off.

4.3 TUBE FAILURE. As tubes age, one or more of them may become open-circuited. Check the filament resistance with an ohmmeter between pins 3 and 5 of the tube base (see Figure 8). Make sure that the ohmmeter current through the filaments is less than 10 ma.

4.4 TUBE REPLACEMENT. For access to tubes, remove the two Phillips-head screws that attach the cover of the amplifier compartment, and lift off the cover. The tubes are held in place between rubber pads on the amplifier shelf and on the inside of the cover.

When replacing a tube, cut the leads on the new tube to between 5/16 and 3/8 inch before inserting the tube in the socket. Install the tube so that the red dot on the tube base is on the same side as that on the socket.

4.5 BATTERY REPLACEMENT. To replace any of the batteries, remove the black screw that secures the holding bracket. (See Figure 9.) After the bracket is removed, the batteries can be withdrawn and replaced. Observe proper polarity as marked, when replacing batteries.

4.6 REPLACEMENT OF BIAS CELL. For access to the bias cell, remove the two studs and washers from the ends of the amplifier etched-circuit board. Pivot the amplifier shelf upward to expose the bias cell. To remove the bias cell, first pull the contacting clip sideways and away from the bias cell. The bias cell can then be unscrewed and replaced. When returning the amplifier shelf to its original position, be careful that all wires are free and that none will be pinched between shield and chassis.

4.7 SOLDERING OF CONNECTIONS TO CABLE WIRES. The plastic insulation on the wires in cables and on many interconnecting leads melts easily, and extreme caution is advised in soldering connections. If the wire is held with pliers near the spot to be soldered, heat will be carried away from the insulation, helping to avoid melted insulation.

4.8 MICROPHONE SENSITIVITY ADJUSTMENT. An internal sensitivity control is adjusted in the General Radio laboratory to match the characteristics of the microphone sent with each meter. If a microphone with a different sensitivity is substituted for that furnished, set this adjustment (see Figure 9) to indicate the new microphone sensitivity. Also, a check of acoustical calibration should be made by the method outlined in paragraph 2.1.3.

4.9 INTERNAL NOISE. Internal noise should not normally affect readings with the attenuator switch set at 40 or higher. If desired, the following procedure can be used to determine how much noise is generated in the instrument. Remove the microphone, and connect a 380-pf capacitor across terminals 1 and 3 of the microphone socket. This capacitor and its connecting leads must be completely shielded in a metal can connected to either the metal part of the microphone socket or to terminal 1, which is grounded. The connection is identical to that shown in Figure 7, except that a short circuit replaces the oscillator.

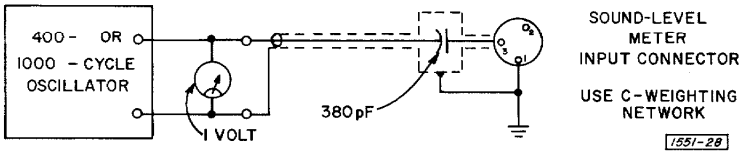


Figure 7. Circuit for Calibrating Amplifier Gain.

Be certain that there is no external pickup of any stray fields. The meter on the instrument should not read above -6 with the attenuator

switch set at 30, the WEIGHTING switch at C, and the METER BATTERIES switch at FAST.

Internal noise can be caused by the bias cell, B50, or by the batteries. Tube noise is generally caused only by V50 or V52, which can be interchanged with V51 or V53 or replaced if less noise is required. It may be necessary to try several tubes to achieve a satisfactory reduction in noise. Typical noise levels are given in the following table.

TYPICAL INTERNAL SIGNAL-TO-NOISE RATIOS
C WEIGHTING
(db BELOW FULL SCALE - SET FOR -60 db MICROPHONE)

1551-C Attenuator Setting db	All Pass 20 cps - 20 kc	NOISE LEVELS - db OCTAVE BAND - cps									
		31.5	63	125	250	500	1000	2000	4000	8000	16000
30	17	25	26	28	30	30	30	28	26	27	29
40	27	35	36	38	40	41	40	38	36	37	39
50	37	45	46	48	50	51	50	48	46	47	48
60	46	55	56	58	60	61	60	58	56	56	57
70	52	64	64	67	68	68	67	65	63	62	59
80	54	73	73	74	74	73	71	68	65	63	60
90	55	78	77	77	75	73	71	68	66	63	60
100	55	80	78	78	76	74	71	68	66	63	60
110	54	79	76	76	73	71	69	67	65	63	60
120	55	80	78	78	76	74	71	68	66	63	60
130	55	79	76	77	75	73	70	68	66	63	60
140	55	80	77	78	76	74	71	68	66	63	60

4.10 AMPLIFIER GAIN. With the Sound-Level Meter set for normal operation with C weighting, apply a 1.0-volt, 400- or 1000-cycle signal to the microphone socket through a shielded 380-pf capacitor, as shown in **Figure 7. The meter reading should agree with that given below for the sensitivity of the microphone used. (Microphone sensitivity is listed at the front of this manual, as well as on a label inside the instrument.)**

1560-P3 (98108) Microphone Sensitivity db re 1 volt/μbar	Type 1551-C reading
-62	136
-61	135
-60	134
-59	133
-58	132
-57	131

4.11 TEST VOLTAGES AND RESISTANCES. The table on the following page lists dc voltages and resistances between tube and transistor pins and ground, as measured with a vacuum-tube voltmeter. For voltage measurements, set the attenuator to 130 CAL, the WEIGHTING switch to A, and the METER-BATTERIES switch to FAST. For resistance measurements, remove batteries and ground terminals 2, 3, and 4 of socket S02.

TABLE OF VOLTAGES AND RESISTANCES.

TUBE (TYPE)	PIN	FUNC-TION	VOLTS DC		RES TO GND
			BTRY	1262-B	
V50	1	P	15.0	15.5	890 k
(CK512AX)	2	S	15.0	15.5	890 k
	3	C	0.71	0.7	16
	4	G	-1.40	-1.41	*
	5	C	0	0	0
V51	1	P	16.0	16.1	320 k
(CK512AX)	2	S	14.1	14.2	940 k
	3	C	1.45	1.41	0
	4	G	0	0	1 M
	5	C	0.72	0.71	16
V52	1	P	9.4	9.1	850 k
(CK512AX)	2	S	9.4	9.1	850 k
	3	C	0.76	0.76	16
	4	G	-0.48	-0.48	18 M
	5	C	0	0	0
V53	1	P	21.5	20.5	340 k
(CK512AX)	2	S	14.9	14.3	1.21 M
	3	C	1.44	1.4	0
	4	G	0	0	18 M
	5	C	0.76	0.73	16
V54	1	P	17.2	16.3	123 k
(CK6418)	2	S	17.6	17.0	400 k
	3	C	1.48	1.42	0
	4	G	-0.35	-0.35	18 M
	5	C	0	0	0
V55	1	P	14.5	13.9	100 k
(CK6418)	2	S	21.5	20.7	270 k
	3	C	1.47	1.37	0
	4	G	-0.22	-0.22	18 M
	5	C	0	0	0
TR1	1	E	14.3	13.0	30 k
(2N1372)	2	B	14.2	12.9	96 k
	3	C	0	0	0
RX51	K		40.2	39.7	—
S02	4		65.0	59	—

*Do not attempt to measure (bias cell in circuit).

PARTS LIST

Ref. No.	Description	GR Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
CAPACITORS					
C1	Mica, 330 pF ±2% 500 V	4690-3200	00656	CM20E, 300 pF ±2%	
C2	1 – 4 pF	1551-0420	24655	1551-0420	5905-858-4049
C3	Trimmer, 7 - 45 pF	4910-0100	72982	TSAN300, 7-45 pF	5910-799-9275
C4	Mica, 30 pF ±2% 500 V	4690-0400	00656	CM20E, 30 pF ±2%	
C5	Mica, 90.0 pF ±2% 500 V	4690-1201	00656	CM20E, 90.9 pF ±2%	
C7	Plastic, 0.0033 µF ±2% 200 V	4860-7350	84411	663UW, 0.0033 µF ±2%	
C8	Mica, 178 pF ±2% 500 V	4690-2217	00656	CM20E, 178 pF ±2%	
C9	Mica, 178 pF ±2% 500 V	4690-2217	00656	CM20E, 178 pF ±2%	
C10	Plastic, 0.0332 µF ±2% 100 V	4860-7868	84411	663UW, 0.0332 µF ±2%	
C11	Mica, 220 pF ±2% 500 V	4690-2700	00656	CM20E221G	5910-931-4153
C12	Wax, 0.47 µF ±10% 100 V	5010-3600	80183	78P4741S3	5910-448-5765
C13	Electrolytic, 60 µF 25 V	4450-2900	56289	D17872	5910-799-9280
C15	Ceramic, 12 pF ±5% 500 V (NPO)	4400-3200	00656	Type CL-1, 12 pF ±5%	5910-705-6442
C16	Mica, 35 pF ±2% 500 V	4690-0600	00656	CM20E, 35 pF ±2%	5910-731-1750
C19	Mica, 0.001 µF ±5% 500 V	4580-0100	14655	5A, 0.001 µF ±5%	5910-052-7016
C20	Mica, 0.001 µF ±5% 500 V	4580-0100	14655	5A, 0.001 µF ±5%	5910-052-7016
C21	Mica, 0.0012 µF ±5% 500 V	4580-0200	14655	5A, 0.002 µF ±5%	
C22	Mica, 0.001 µF ±5% 500 V	4580-0100	14655	5A, 0.001 µF ±5%	5910-052-7016
C23	Plastic, 0.00158 µF ±1% 200 V	4860-7319	84411	663UW, 0.00158 µF ±1%	
C50	Wax, 0.1 µF ±10% 100 V	5010-2700	56289	78P10491S3	5910-448-5758
C51	Wax, 1 µF ±10% 100 V	5010-3700	80183	78P10571S3	5910-615-5255
C52	Electrolytic, 50 µF 50 V	4450-2200	80183	50 µF +100-10%	5910-799-9283
C53	Wax, 0.22 µF ±10% 100 V	5010-3300	80183	78P22411S3	5910-448-5777
C54	Wax, 0.1 µF ±10% 100 V	5010-2700	56289	78P10491S3	5910-448-5758
C55	Wax, 0.22 µF ±10% 100 V	5010-3300	80183	78P22411S3	5910-448-5777
C56	Wax, 0.22 µF ±10% 100 V	5010-3300	80183	78P22411S3	5910-448-5777
C57	Electrolytic, 30 µF 100 V	4450-1900	37942	95947G7S23C10X3	5910-708-5191
C58	Wax, 0.01 µF ±10% 100 V	5010-1600	80183	78P1031S3	5910-448-5788
C59	Wax, 0.1 µF ±10% 100 V	5010-2700	56289	78P10491S3	5910-448-5758
C60	Wax, 0.1 µF ±10% 100 V	5010-2700	56289	78P10491S3	5910-448-5758
C61	Wax, 0.01 µF ±10% 100 V	5010-1600	80183	78P1031S3	5910-448-5788
C62	Wax, 0.22 µF ±10% 100 V	5010-3300	80183	78P22411S3	5910-448-5777
C63	Wax, 0.47 µF ±10% 100 V	5010-3600	80183	78P4741S3	5910-448-5765
C64	Plastic, 0.0606 µF ±2% 100 V	4860-8213	84411	663UW, 0.0606 µF ±2%	
C65	Wax, 1 µF ±10% 100 V	5010-3700	80183	78P10571S3	5910-615-5255
C66	Wax, 0.047 µF ±10% 100 V	5010-2100	56289	78P4731S3	
C67	Wax, 0.47 µF ±10% 100 V	5010-3600	80183	78P4741S3	5910-448-5765
C68	Wax, 0.47 µF ±10% 100 V	5010-3600	80183	78P4741S3	5910-448-5765
C69	Wax, 0.47 µF ±10% 100 V	5010-3600	80183	78P4741S3	5910-448-5765
C70	Electrolytic, 16 µF 150 V	4450-0200	37942	D33104	5910-829-3313
C71	Ceramic, 3.3 pF ±10% 500 V	4400-0400	78488	GA, 3.3 pF ±10%	5910-708-5197
RESISTORS					
R1	Film, 22.9 MΩ ±1% 1 W	6182-5229	03888	PT1000, 22.9 MΩ ±1%	
R2	Film, 2.17 MΩ ±1% 1/2 W	6450-4217	75042	CEC, 2.17 MΩ ±1%	
R3	Film, 333 kΩ ±1% 1/8 W	6250-3333	75042	CEA, 333 kΩ ±1%	
R4	Film, 1.0 MΩ ±1% 1/8 W	6250-4100	75042	CEA, 1 MΩ ±1%	5905-646-5678
R5	Film, 659 kΩ ±1% 1/8 W	6250-3659	75042	CEA, 659 kΩ ±1%	
R6	Film, 73.2 kΩ ±1% 1/8 W	6250-2732	75042	CEA, 73.2 kΩ ±1%	5905-655-1982
R7	Film, 500 kΩ ±1% 1/8 W	6250-3500	75042	CEA, 500 kΩ ±1%	5905-783-8446
R8	Film, 159 kΩ ±1% 1/8 W	6250-3159	75042	CEA, 159 kΩ ±1%	
R9	Film, 108 kΩ ±1% 1/8 W	6250-3108	75042	CEA, 108 kΩ ±1%	
R10	Film, 50 kΩ ±1% 1/8 W	6250-2500	75042	CEA, 50 kΩ ±1%	
R11	Film, 154 kΩ ±1% 1/8 W	6250-3154	75042	CEA, 154 kΩ ±1%	
R12	Film, 15.9 kΩ ±1% 1/8 W	6250-2159	75042	CEA, 15.9 kΩ ±1%	
R13	Film, 169 kΩ ±1% 1/8 W	6250-3169	75042	CEA, 169 kΩ ±1%	5905-892-6921
R14	Film, 7.32 kΩ ±1% 1/8 W	6250-1732	75042	CEA, 7.32 kΩ ±1%	5905-578-0994
R15	Film, 63.3 kΩ ±1% 1/8 W	6250-2633	75042	CEA, 63.3 kΩ ±1%	
R16	Film, 216 kΩ ±1% 1/8 W	6250-3216	75042	CEA, 216 kΩ ±1%	
R17	Film, 100 kΩ ±1% 1/8 W	6250-3100	75042	CEA, 100 kΩ ±1%	5905-577-6743
*R18	Composition, 100 kΩ ±5% 1/2 W	6100-4105	01121	RC20GF104J	5905-195-6761
R20	Composition, 110 kΩ ±5% 1/2 W	6100-4115	01121	RC20GF114J	5905-279-1867
R21	Composition, 75 kΩ ±5% 1/2 W	6100-3755	01121	RC20GF753J	5905-279-3495
R23	Composition, 620 kΩ ±5% 1/2 W	6100-4625	01121	RC20GF624J	5905-221-5841
R24	Composition, 3 kΩ ±5% 1/2 W	6100-2305	01121	RC20GF302J	5905-279-1751
R25	Composition, 11 kΩ ±5% 1/2 W	6100-3115	01121	RC20GF113J	5905-279-2667
R26	Composition, 3 kΩ ±5% 1/2 W	6100-2305	01121	RC20GF302J	5905-279-1751
R27	Composition, 3 kΩ ±5% 1/2 W	6100-2305	01121	RC20GF302J	5905-279-1751
R28	Film, 16.9 kΩ ±1% 1/2 W	6250-2169	75042	CEA, 16.9 kΩ ±1%	5905-806-8487
R29	Film, 16.9 kΩ ±1% 1/2 W	6250-2169	75042	CEA, 16.9 kΩ ±1%	5905-806-8487
R30	Composition, 820 kΩ ±5% 1/2 W	6100-4825	01121	RC20GF824J	5905-221-5848
R31	Composition, 20 kΩ ±5% 1/2 W	6100-3205	01121	RC20GF203J	5905-192-0649
R32	Composition, 43 kΩ ±5% 1/2 W	6100-3435	01121	RC20GF433J	5905-279-3498
R33	Composition, 24 kΩ ±5% 1/2 W	6100-3245	01121	RC20GF243J	5905-279-1878
R34	Potentiometer, composition 50 kΩ ±10%	6010-1400	01121	JU, 50 kΩ ±10%	5905-055-3046
R35	Composition, 330 kΩ ±5% 1/2 W	6100-4335	01121	RC20GF334J	5905-279-2519
R36	Composition, 24 kΩ ±5% 1/2 W	6100-3245	01121	RC20GF243J	5905-279-1878
R37	Composition, 51 kΩ ±5% 1/2 W	6100-3515	01121	RC20GF513J	5905-279-3496
*R38	Potentiometer, composition 100 kΩ ±10%	6010-1700	01121	JU, 100 kΩ ±1%	5905-797-1054
R39	Potentiometer, composition 100 kΩ ±20%	6040-1000	01121	FWC, 100 kΩ ±20%	5905-958-7949
R40	Composition, 1.0 MΩ ±5% 1/2 W	6100-5105	01121	RC20GF105J	15905-192-0390

PARTS LIST (Cont)

Ref. No.	Description	GR Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
RESISTORS (Cont)					
*R50	Composition, 430 kΩ ±5% 1/2 W	6100-4435	01121	RC20GF434J	5905-279-2518
R51	Composition, 110 kΩ ±5% 1/2 W	6100-4115	01121	RC20GF114J	5905-279-1867
R52	Film, 1 MΩ ±1% 1/8 W	6250-4100	75042	CEA, 1MΩ ±1%	5905-646-5678
R53	Composition, 910 kΩ ±5% 1/2 W	6100-4915	01121	RC20GF914J	5905-221-5853
R54	Composition, 33 kΩ ±5% 1/2 W	6100-3335	01121	RC20GF333J	5905-171-1998
R55	Film, 290 kΩ ±1% 1/8 W	6250-3290	75042	CEA, 290 kΩ ±1%	
*R56	Composition, 18 MΩ ±5% 1/2 W	6100-6185	01121	RC20GF186J	5905-279-2503
*R57	Composition, 750 kΩ ±5% 1/2 W	6100-4755	01121	RC20GF754J	5905-279-1759
R58	Composition, 100 kΩ ±5% 1/2 W	6100-4105	01121	RC20GF104J	5905-195-6761
R59	Composition, 18 MΩ ±5% 1/2 W	6100-6185	01121	RC20GF186J	5905-279-2503
*R60	Composition, 680 kΩ ±5% 1/2 W	6100-4685	01121	RC20GF684J	5905-171-2000
R61	Composition, 1.2 MΩ ±5% 1/2 W	6100-5125	01121	RC20GF125J	5905-190-8874
R62	Composition, 330 kΩ ±5% 1/2 W	6100-4335	01121	RC20GF434J	5905-279-2518
R63	Composition, 18 MΩ ±5% 1/2 W	6100-6185	01121	RC20GF186J	5905-279-2503
R64	Composition, 390 kΩ ±5% 1/2 W	6100-4395	01121	RC20GF394J	5905-279-2517
*R65	Composition, 110 kΩ ±5% 1/2 W	6100-4115	01121	RC20GF114J	5905-279-1867
R66	Potentiometer, composition 2.5 kΩ ±10%	6040-1700	01121	FWC, 2500 Ω ±10%	
*R67	Composition, 300 Ω ±5% 1/2 W	6100-1305	01121	RC20GF301J	5905-279-5481
R68	Composition, 10 kΩ ±5% 1/2 W	6100-3105	01121	RC20GF103J	5905-185-8510
R69	Composition, 220 kΩ ±5% 1/2 W	6100-4225	01121	RC20GF224J	5905-192-0667
R70	Composition, 18 MΩ ±5% 1/2 W	6100-6185	01121	RC20GF186J	5905-279-2503
R71	Composition, 2.4 MΩ ±5% 1/2 W	6100-5245	01121	RC20GF245J	5905-279-2512
R72	Composition, 300 kΩ ±5% 1/2 W	6100-4305	01121	RC20GF304J	5905-185-6859
R73	Composition, 100 kΩ ±5% 1/2 W	6100-4105	01121	RC20GF104J	5905-195-6761
R74	Composition, 120 kΩ ±5% 1/2 W	6100-4125	01121	RC20GF124J	5905-192-3981
R75	Composition, 470 kΩ ±5% 1/2 W	6100-4475	01121	RC20GF474J	5905-279-2515
R76	Composition, 10 kΩ ±5% 1/2 W	6100-3105	01121	RC20GF103J	5905-185-8510
R77	Composition, 20 kΩ ±5% 1/2 W	6100-3205	01121	RC20GF203J	5905-192-0649
MISCELLANEOUS					
B1	Battery, 1-1/2 V Type D cell	8410-0200	77542	2LP	
B2	Battery, 1-1/2 V Type D cell	8410-0200	77542	2LP	
B3	Battery, 67-1/2 V	8410-2300	09823	XX45	
B50	Battery, 1-1/2 V	4020-0100	90303	BC4	
D1	Diode, type 1N34A (S)	6082-1003	82389	#111	
D2	Diode, type 1N34A (S)	6082-1003	40931	MEDS-105	6625-708-5186
D3	Diode, type 1N34A (S)	6082-1003	71785	P-302-AB	
D4	Diode, type 1N34 A (S)	6082-1003	58854	IN34A(S)	5961-170-4430
D5	Diode, type 1N645	6082-1016	58854	IN34A(S)	5961-170-4430
D6	Diode, type 1N645	6082-1016	58854	IN34A(S)	5961-170-4430
J1	Jack	4260-1500	58854	IN34A(S)	5961-170-4430
M1	Meter, 100 μa dc	5730-1050	24446	IN645	5961-944-8222
PL1	Plug		24446	IN645	5961-944-8222
Q1	Transistor, type 2N1372	8210-1372	86800	IN976B	5960-854-8469
RX51	Diode, type 1N967B	6083-1020	76854	179901-H4C	
S1	Switch	7890-1600	76854	179901-H4C	
S2	Switch	7890-1600	24655	7890-1530	5930-708-5199
S3	Switch	7890-1530	24655	1551-0450	5930-708-5198
S4	Switch,DPST	1551-0450	24655	4230-2840	
SO1	Socket	4230-2840	71785	S-306-AB	
SO2	Socket	4230-3500	01295	2N1372	
V50	Tube	8370-1400	94144	CK512AX	5960-581-9593
V51	Tube	8370-1400	94144	CK512AX	5960-581-9593
V52	Tube	8370-1400	94144	CK512AX	5960-581-9593
V53	Tube	8370-1400	94144	CK512AX	5960-581-9593
V54	Tube	8380-6418	94144	CK6418	5960-537-3967
V55	Tube	8380-6418	94144	CK6418	5960-537-3967

*Must be Allen-Bradley.

MECHANICAL PARTS LIST

Fig. 8 Ref.	Name	Description	GR Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stk. No.
1	Microphone	Piezoelectric-Ceramic	1560-9605	24655	1560-9605	
2	Knob Asm.	Knob, attenuator; includes bushing 4140-0300	5530-1200	24655	5530-1200	5355-926-5196
3	Knob Asm.	Knob, WEIGHTING; includes bushing 4140-0300	5500-0400	24655	5500-0400	5355-051-6594
4	Thumbset	CAL control	5540-2500	24655	5540-2500	
5	Support	Black rubber	5260-1600	24655	5260-1600	
6	Knob Asm.	Knob, METER/Batteries; includes bushing 4140-0300	5500-0400	24655	5500-0400	5355-051-6594
7	Meter Cover*	ME3-701 Cover; Dark Gray Mask	5720-3712	24655	5720-3712	
8	Foot	Block rubber	5250-1902	24655	5250-1902	
(Hidden)						
9	Handle	Leather strap handle	1551-0460	24655	1551-0460	

*When ordering, please specify manufactured by Weston or Honeywell.

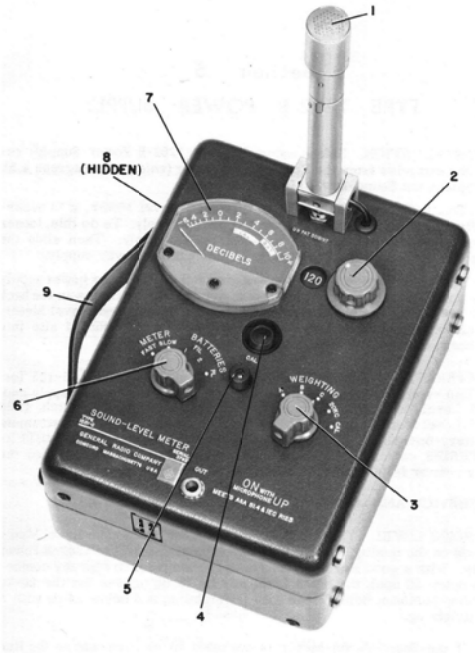
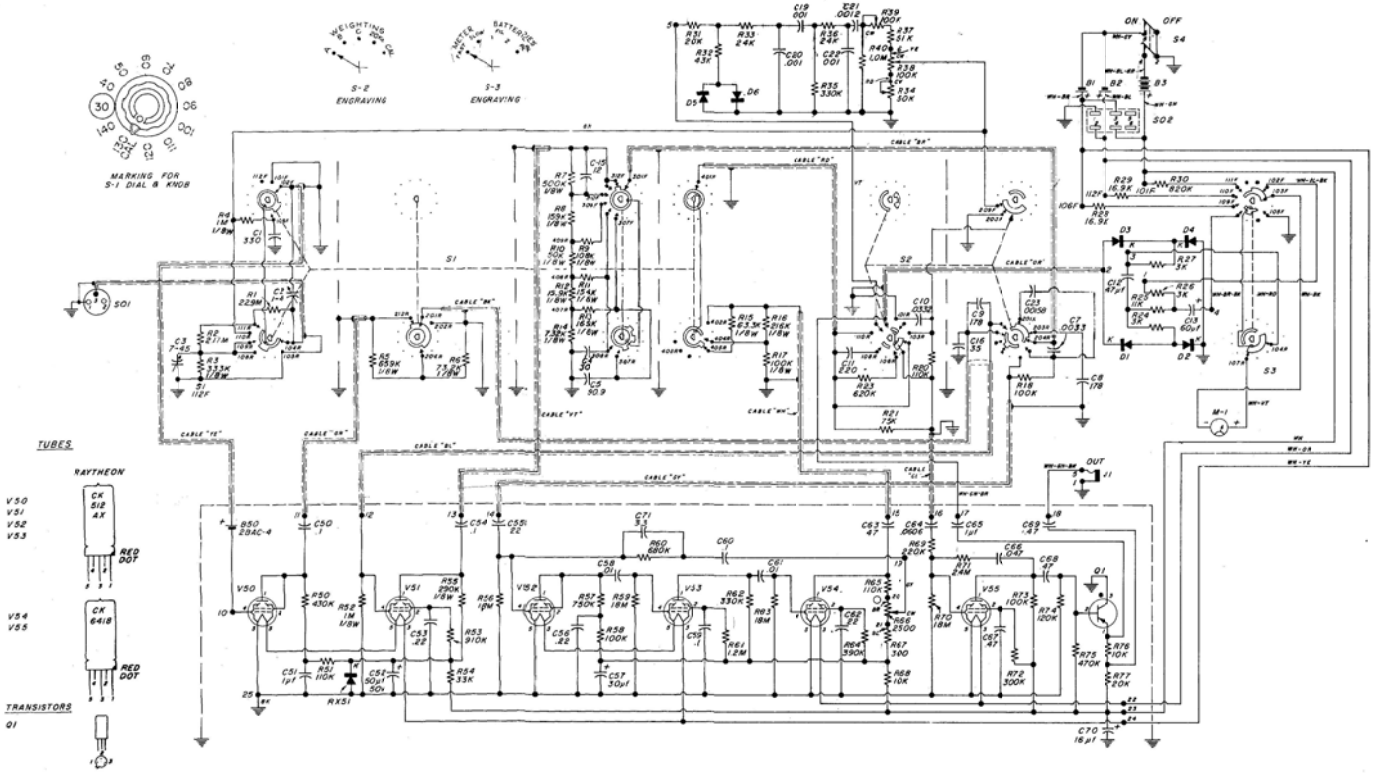


Figure 8. External mechanical parts of the Sound-Level Meter.



Rotary switch sections are shown as viewed from the panel end of the shaft. The first digit of the contact number refers to the section. The section nearest the panel is 1, the next section back is 2, etc. The next two digits refer to the contact. Contact 01 is the first position clockwise from a strut screw (usually the screw above the locating key), and the other contacts are numbered sequentially (02, 03, 04, etc), proceeding clockwise around the section. A suffix F or R indicates that the contact is on the front or rear of the section, respectively.

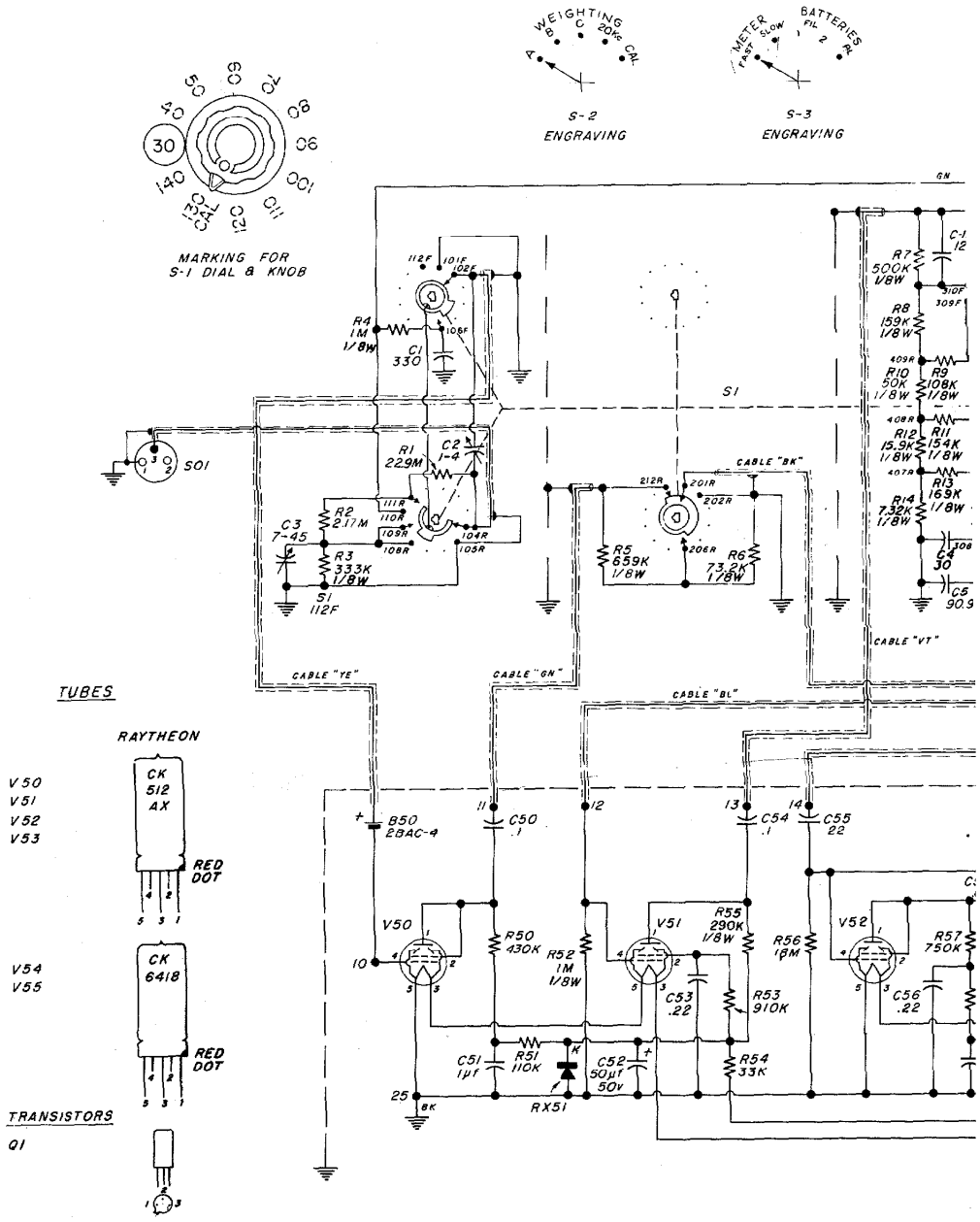
NOTE:
RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED
RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED
K=1000 OHMS M=1 MEGOHM

CAPACITANCE VALUES ONE & OVER IN MICRO MICROFARADS, LESS THAN ONE IN MICROFARADS UNLESS OTHERWISE NOTED.

⊛ SCREW DRIVER ADJUSTMENT
○ PANEL CONTROL

Figure 9. Schematic Diagram, Type 1551-C Sound-Level Meter.

Figure 8. External mechanical parts of the Sound-Level Meter.



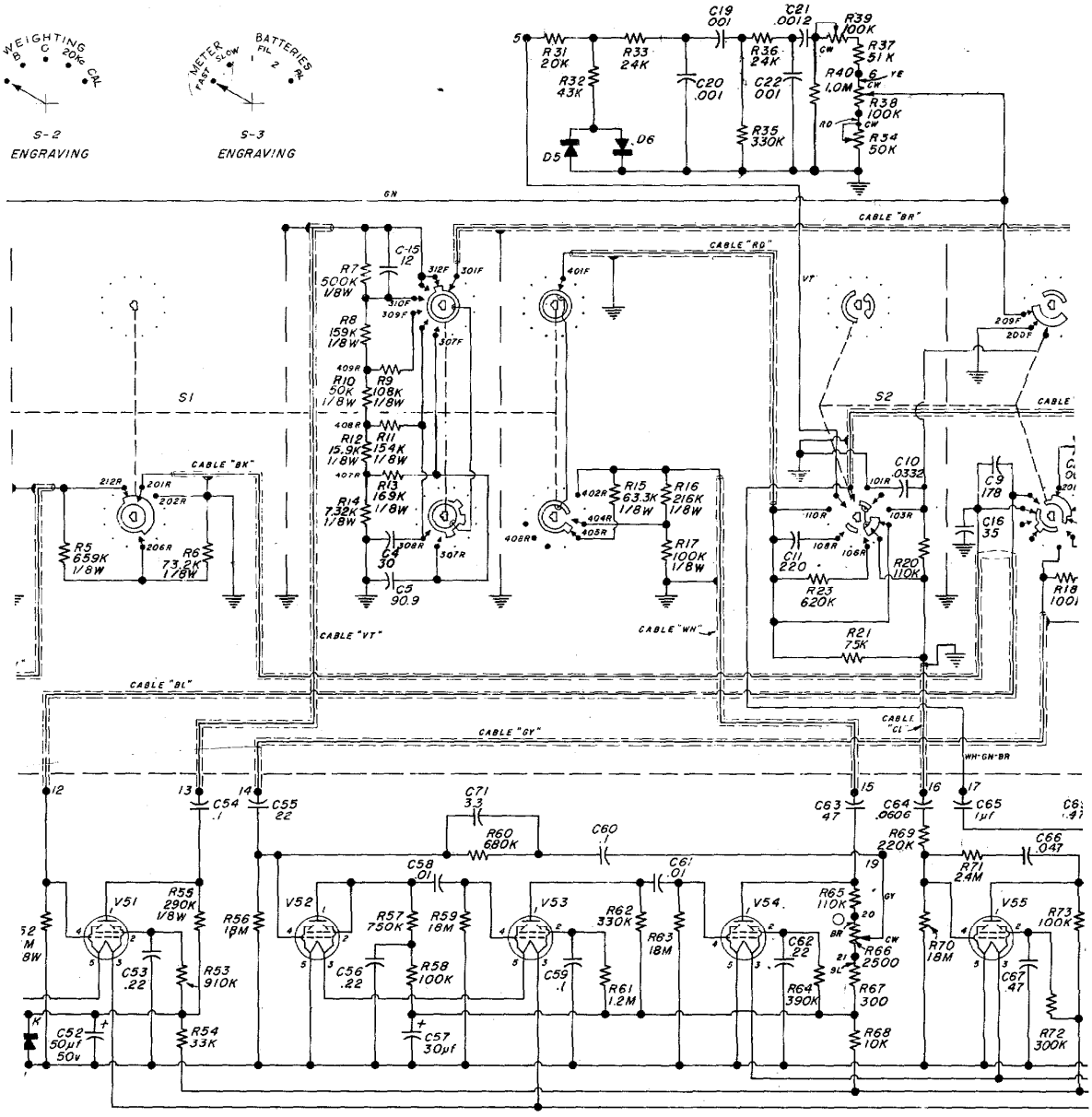
Rotary switch sections are shown as viewed from the panel end of the shaft. The first digit of the contact number refers to the section. The section nearest the panel is 1, the next section back is 2, etc. The next two digits refer to the contact. Contact 01 is the first position clockwise from a strut screw (usually the screw above the locating key), and the other contacts are numbered sequentially (02, 03, 04, etc), proceeding clockwise around the section. A suffix F or R indicates that the contact is on the front or rear of the section, respectively.

NOTE:

RESISTORS 1/2 WATT UNLESS OTHERWISE SPE
RESISTANCE IN OHMS UNLESS OTHERWISE
K = 1000 OHMS M = 1 MEGOHM

CAPACITANCE VALUES ONE & OVER IN MICRO
LESS THAN ONE IN MICROFARADS UNLE
OTHERWISE NOTED.

⌀ SCREW DRIVER ADJUSTMENT
○ PANEL CONTROL



NOTE:

RESISTORS 1/2 WATT UNLESS OTHERWISE SPECIFIED
RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED
K = 1000 OHMS M = 1 MEGOHM

CAPACITANCE VALUES ONE & OVER IN MICRO" MICROFARADS,
LESS THAN ONE IN MICROFARADS UNLESS
OTHERWISE NOTED.

⌀ SCREW DRIVER ADJUSTMENT
○ PANEL CONTROL

Figure 9. Schemati
Type 1551-C Sound-L

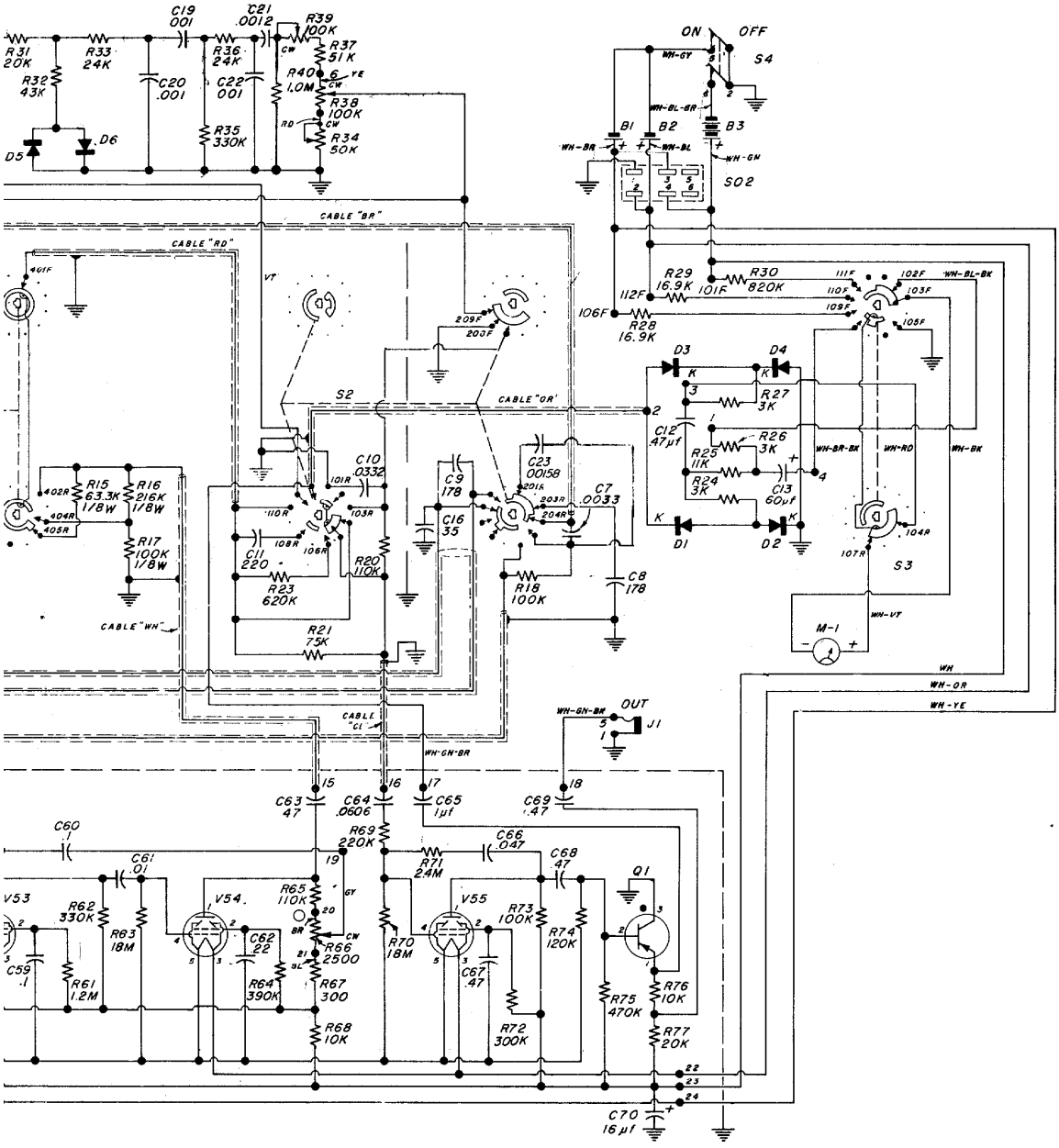


Figure 9. Schematic Diagram,
Type 1551-C Sound-Level Meter.

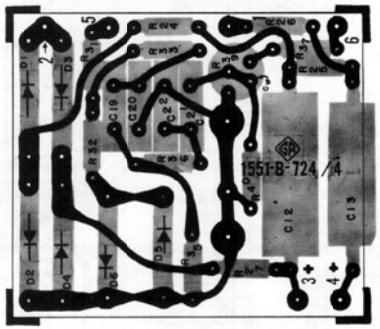
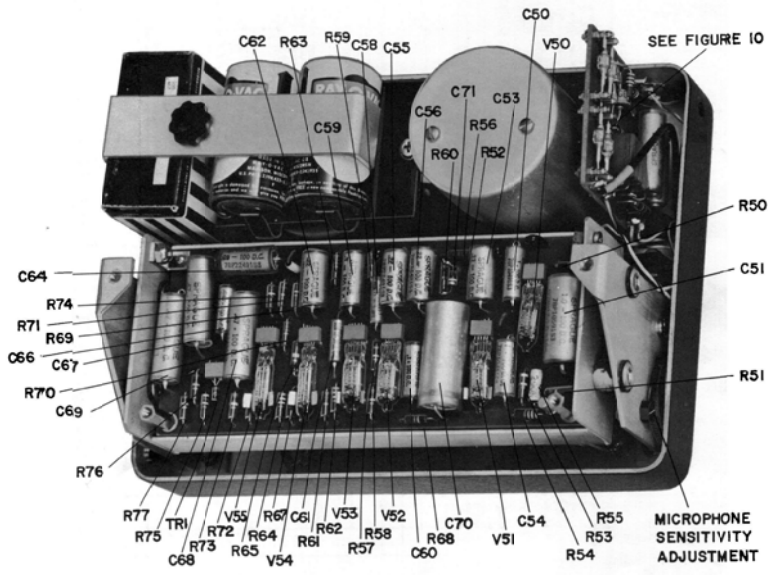


Figure 11. Component Layout on Etched Board. Complete board is P/N 1551-2201.

NOTE

The number shown on the foil side of the board is not the part number for the complete assembly. The assembly number is given in the caption.

Figure 10.
Interior View, Type 1551-C
Sound-Level Meter.



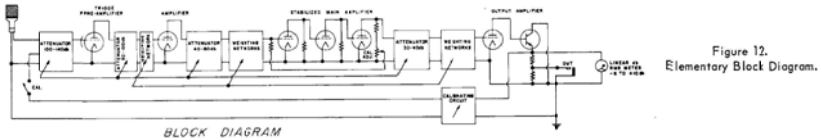


Figure 12.
Elementary Block Diagram.

Section 5

TYPE 1262-B POWER SUPPLY

5.1 INSTALLATION. Before using the Type 1262-B Power Supply, remove the batteries from the Sound-Level Meter (refer to paragraph 4.5), and replace the Sound-Level Meter in its case.

To attach the power supply to the Sound-Level Meter, it is necessary first to remove the cover from the power supply. To do this, loosen the two 10-32 screws at the ends of the power supply. Then slide the cover off, i.e., away from the engraved panel of the power supply.

Two 1/4-28 binder-head screws are used to attach the power supply to the Sound-Level Meter. Insert these screws through holes in the back of the power supply and mating threaded holes in the Sound-Level Meter. The six-terminal male connector in the power supply should slip into the receptacle on the Sound-Level Meter.

5.2 OPERATION. Connect the Type 1262-B input plug to a 105-125 (or 210-250) -volt, 50- 60-cycle power source. Turn the Power Supply and Sound-Level Meter on by means of the power supply on-off switch. (The Sound-Level Meter's on-off switch functions only when the instrument is battery-operated.) To check for proper operation, set the METER-BATTERIES switch to PL and FIL, checking that for each position the meter pointer falls within the white BAT area on the meter face.

5.3 SERVICE AND MAINTENANCE. Refer to paragraph 4.1.

5.4 NOISE LEVEL. The internal noise level of the Sound-Level Meter depends on the quality of the power line supplying the Type 1262-B Power Supply. With a good line (i.e., no transient humps or frequency components below 50 cps), the noise level will be 28 db or less for the 20-kc weighting position, below 26 db with C weighting, and below 24 db with A or B weighting.

If the Sound-Level Meter is operated in an area where the line voltage fluctuates abruptly and repeatedly (e.g. near devices such as spot welders), the internal noise level will appear to be higher than the values listed above.

Figure 10.
Interior View, Type 1551
Sound-Level Meter.

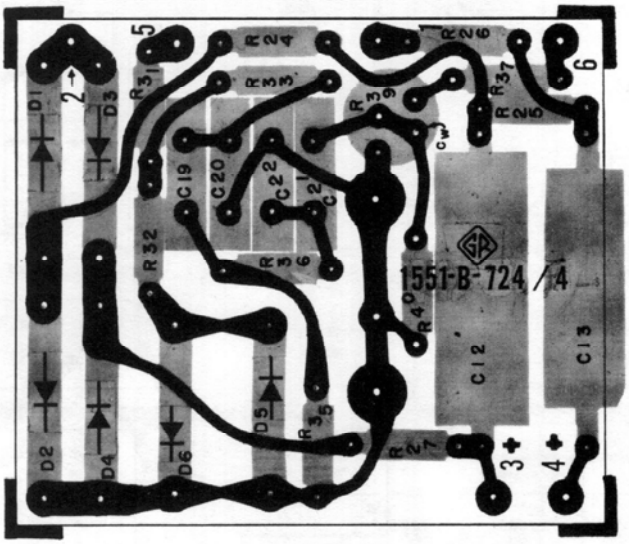
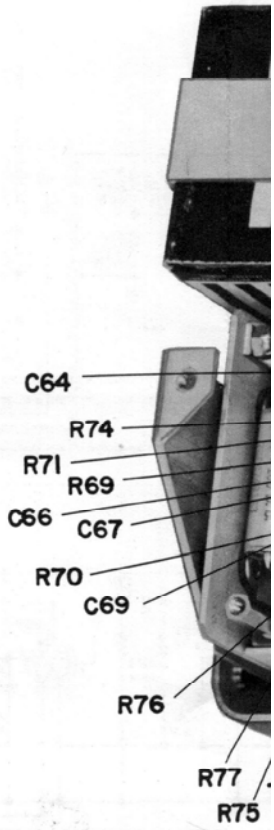
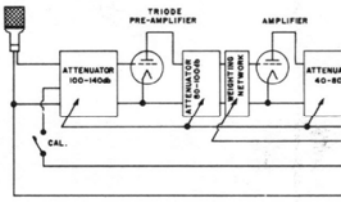


Figure 11. Component Layout on Etched Board.
Complete board is P/N 1551-2201.

NOTE

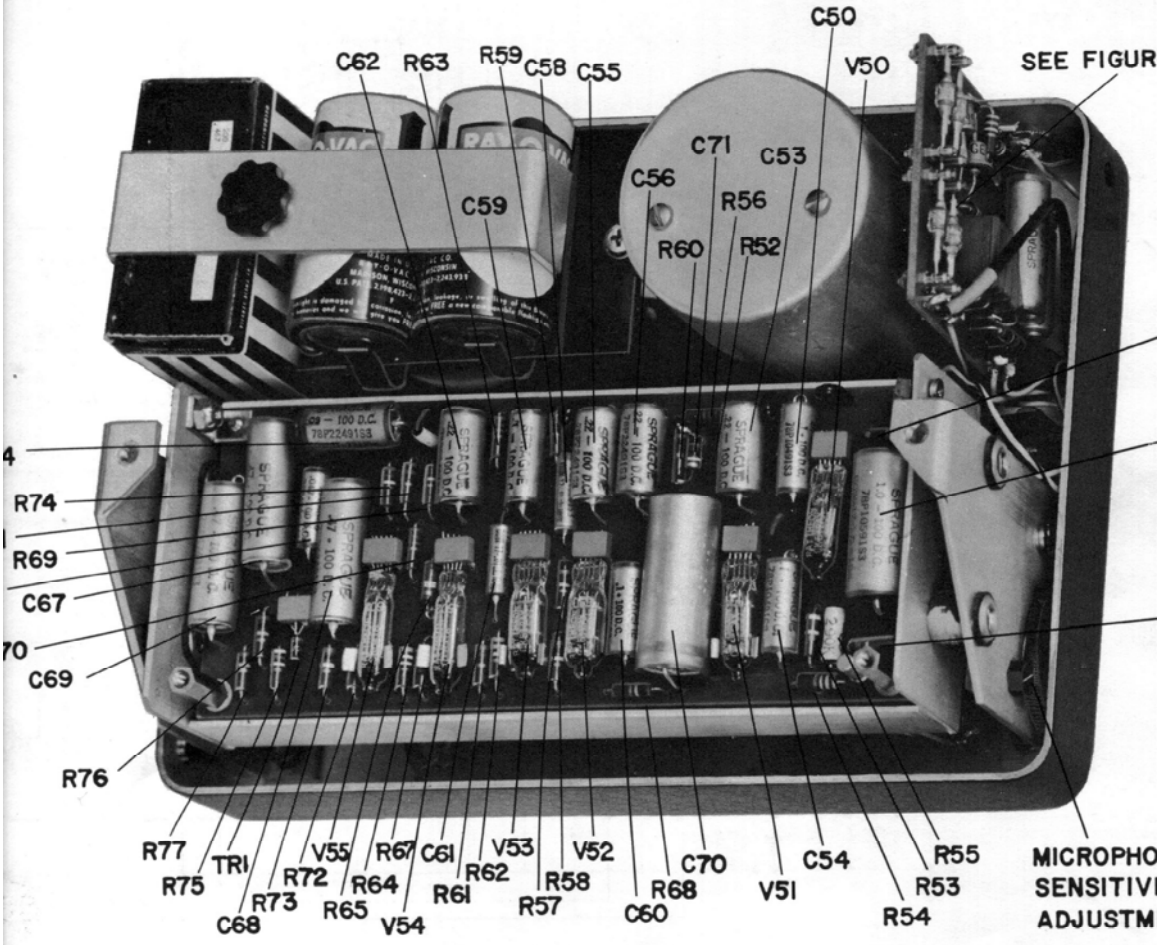
The number shown on the foil side of the board is not the part number for the complete assembly. The assembly number is given in the caption.

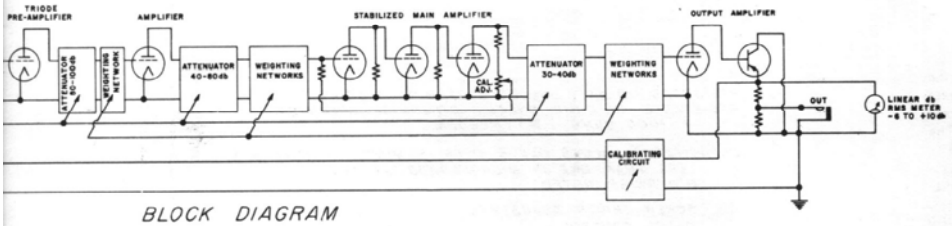




BLOCK

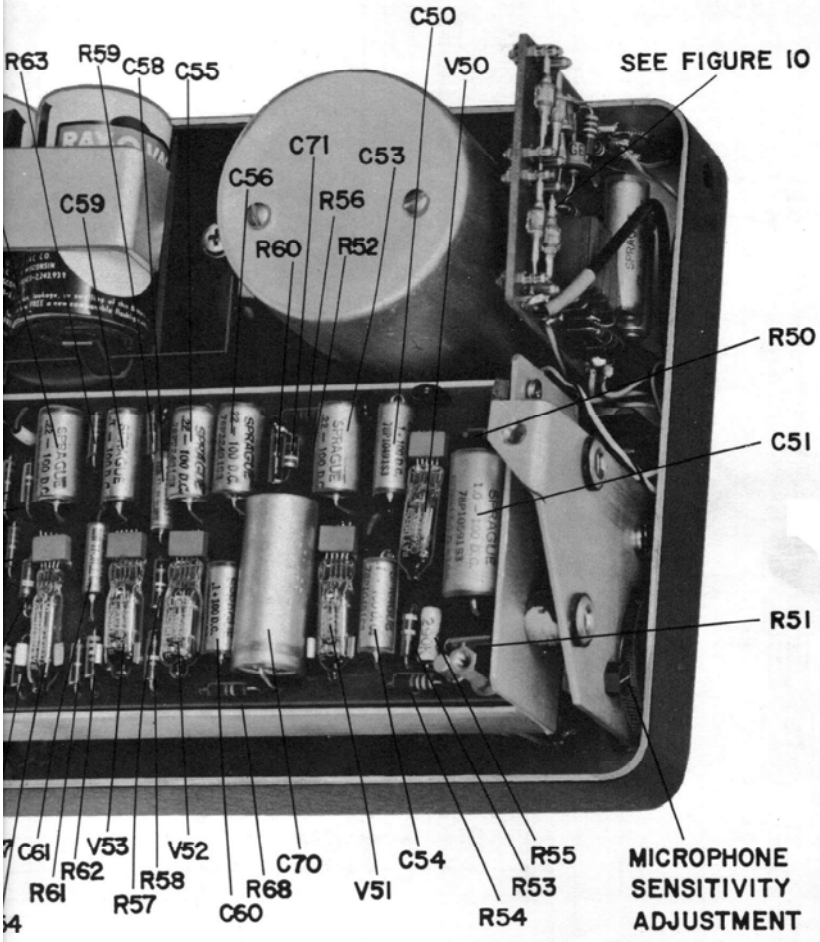
Figure 10.
terior View, Type 1551-C
Sound-Level Meter.





BLOCK DIAGRAM

Figure 12.
Elementary Block



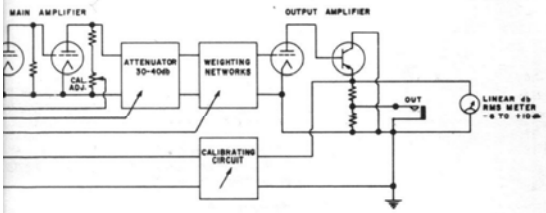


Figure 12.
Elementary Block Diagram.

Section 5
TYPE 1262-B POWER SUPPLY

5.1 INSTALLATION. Before using the Type 1262-B Power Supply, remove the batteries from the Sound-Level Meter (refer to paragraph 4.5), and replace the Sound-Level Meter in its case.

To attach the power supply to the Sound-Level Meter, it is necessary first to remove the cover from the power supply. To do this, loosen the two 10-32 screws at the ends of the power supply. Then slide the cover off, i.e., away from the engraved panel of the power supply.

Two 1/4-28 binder-head screws are used to attach the power supply to the Sound-Level Meter. Insert these screws through holes in the back of the power supply and mating threaded holes in the Sound-Level Meter. The six-terminal male connector in the power supply should slip into the receptacle on the Sound-Level Meter.

5.2 OPERATION. Connect the Type 1262-B input plug to a 105-125 (or 210-250) -volt, 50- 60-cycle power source. Turn the Power Supply and Sound-Level Meter on by means of the power supply on-off switch. (The Sound-Level Meter's on-off switch functions only when the instrument is battery-operated.) To check for proper operation, set the METER-BATTERIES switch to PL and FIL, checking that for each position the meter pointer falls within the white BAT area on the meter face.

5.3 SERVICE AND MAINTENANCE. Refer to paragraph 4.1.

5.4 NOISE LEVEL. The internal noise level of the Sound-Level Meter depends on the quality of the power line supplying the Type 1262-B Power Supply. With a good line (i.e., no transient humps or frequency components below 50 cps), the noise level will be 28 db or less for the 20-kc weighting position, below 26 db with C weighting, and below 24 db with A or B weighting.

If the Sound-Level Meter is operated in an area where the line voltage fluctuates abruptly and repeatedly (e.g. near devices such as spot welders), the internal noise level will appear to be higher than the values listed above.

1262-B PARTS LIST

Ref. No.	Description	GR Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
CAPACITORS					
C1A	Electrolytic, 300 μF 35 V	4450-2400	37942	2021149S4C10X1	5910-822-2691
C1B	1200				
C2A	Electrolytic, 2400 μF 15 V	4450-4200	37942	20-21339-99-6	
C2B	1200				
C2C	200				
C3A	Electrolytic block, 100 μF 100 V	4460-1500	80183	DFP, 200/10C/100 μF	5910-822-2692
C3B	100				
C3C	Electrolytic, 300 μF 35 V	4450-2400	37942	2021149S4C10X1	5910-822-2691
C4A					
C4B					
PILOT LAMP					
P1	115 V	8390-0600	24446	NE-51	6240-223-9100
RESISTORS					
R1	Composition, 100 kΩ ±5% 1/2 W	6100-4105	01121	RC20GF104J	5905-195-6761
R2	Composition, 200 Ω ±5% 1/2 W	6100-1205	01121	RC20GF201J	5905-279-2674
R3	Composition, 130 Ω ±5% 1/2 W	6100-1135	01121	RC20GF131J	5905-252-5436
R4	Composition, 43 Ω ±5% 1/2 W	6100-0435	01121	RC20GF430J	5905-279-1887
R5	Composition, 47 Ω ±5% 1/2 W	6100-0475	01121	RC20GF470J	5905-252-4018
R6	Composition, 180 Ω ±5% 1/2 W	6100-1185	01121	RC20GF181J	5905-279-3514
R7	Composition, 1.5 kΩ ±5% 1/2 W	6100-2155	01121	RC20GF152J	5905-841-7461
R8	Composition, 1.5 kΩ ±5% 1/2 W	6100-2155	01121	RC20GF152J	5905-841-7461
R9	Composition, 51 kΩ ±5% 1/2 W	6100-3515	01121	RC20GF513J	5905-279-3496
R10	Composition, 220 Ω ±5% 1/2 W	6100-1225	01121	RC20GF221J	5905-279-3513
R11	Composition, 430 Ω ±5% 1/2 W	6100-1435	01121	RC20GF431J	5905-279-3512
RECTIFIERS					
RX1		6080-2800	77638	2J9	
RX2		6080-2700	77638	6YI	
RX3		6080-2900	77638	6J2	
RX4		6080-2500	77638	IY2	
RX5		6080-2600	77638	3YI	
SWITCH					
S1	Toggle	7910-1300	04009	83053-SA	5930-909-3510
TRANSFORMER					
T1		0746-4310	24655	0746-4310	

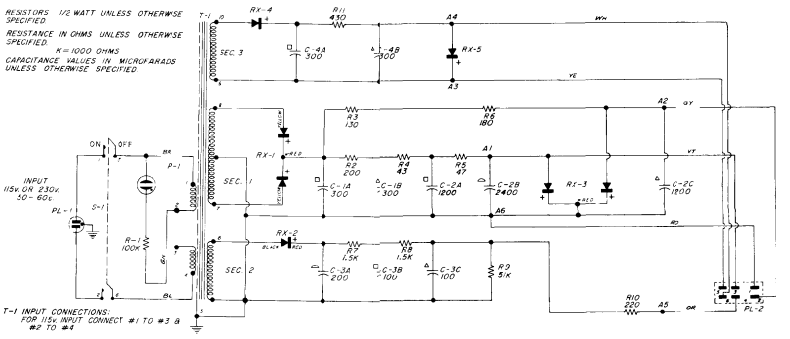


Figure 13. Schematic Diagram, Type 1262-B Power Supply.

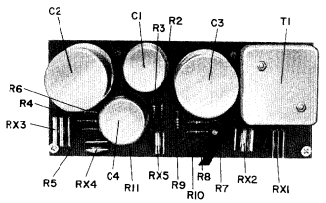


Figure 14. Layout of Components on Etched Board.

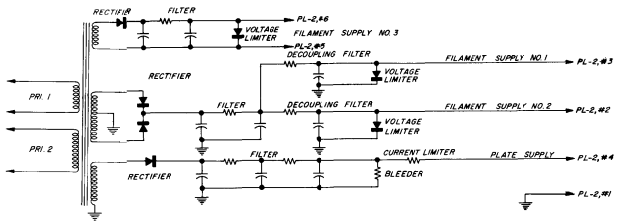


Figure 15. Elementary Schematic Diagram.

1262-B PARTS LIST

Ref. No.	Description	GR Part No.	Fed. Mfg. Code	Mfg. Part No.	Fed. Stock No.
CAPACITORS					
C1A C1B	Electrolytic, 300 μF 35 V	4450-2400	37942	2021149S4C10X1	5910-822-2691
C2A C2B C2C	1200 Electrolytic, 2400 μF 15 V 1200	4450-4200	37942	20-21339-99-6	
C3A C3B C3C	200 Electrolytic block, 100 μF 100 V 100	4460-1500	80183	DFP, 200/100/100 μF	5910-822-2692
C4A C4B	Electrolytic, 300 μF 35 V	4450-2400	37942	2021149S4C10X1	5910-822-2691
PILOT LAMP					
P1	115 V	8390-0600	24446	NE-51	6240-223-9100
RESISTORS					
R1	Composition, 100 kΩ ±5% 1/2 W	6100-4105	01121	RC20GF104J	5905-195-6761
R2	Composition, 200 Ω ±5% 1/2 W	6100-1205	01121	RC20GF201J	5905-279-2674
R3	Composition, 130 Ω ±5% 1/2 W	6100-1135	01121	RC20GF131J	5905-252-5436
R4	Composition, 43 Ω ±5% 1/2 W	6100-0435	01121	RC20GF430J	5905-279-1887
R5	Composition, 47 Ω ±5% 1/2 W	6100-0475	01121	RC20GF470J	5905-252-4018
R6	Composition, 180 Ω ±5% 1/2 W	6100-1185	01121	RC20GF181J	5905-279-3514
R7	Composition, 1.5 kΩ ±5% 1/2 W	6100-2155	01121	RC20GF152J	5905-841-7461
R8	Composition, 1.5 kΩ ±5% 1/2 W	6100-2155	01121	RC20GF152J	5905-841-7461
R9	Composition, 51 kΩ ±5% 1/2 W	6100-3515	01121	RC20GF513J	5905-279-3496
R10	Composition, 220 Ω ±5% 1/2 W	6100-1225	01121	RC20GF221J	5905-279-3513
R11	Composition, 430 Ω ±5% 1/2 W	6100-1435	01121	RC20GF431J	5905-279-3512
RECTIFIERS					
RX1		6080-2800	77638	2J9	
RX2		6080-2700	77638	6YI	
RX3		6080-2900	77638	6J2	
RX4		6080-2500	77638	IYI	
RX5		6080-2600	77638	3YI	
SWITCH					
S1	Toggle	7910-1300	04009	83053-SA	5930-909-3510
TRANSFORMER					
T1		0746-4310	24655	0746-4310	

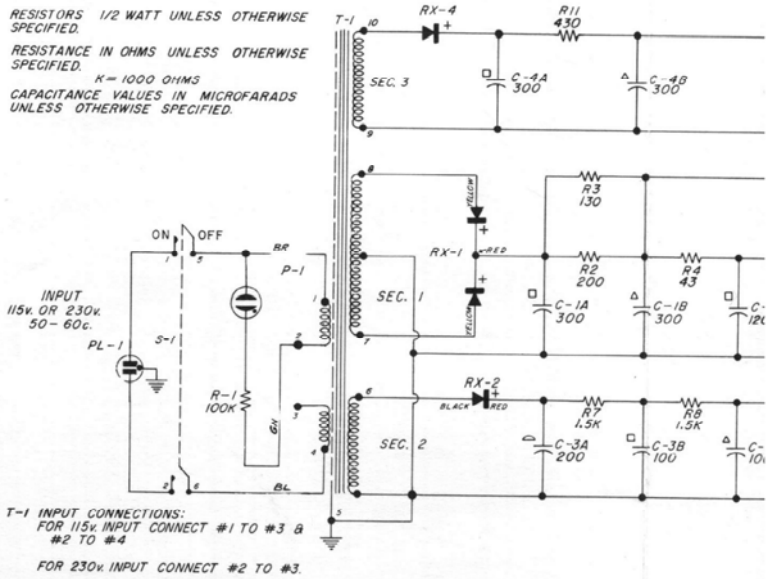


Figure 13. Schematic Diagram, Type

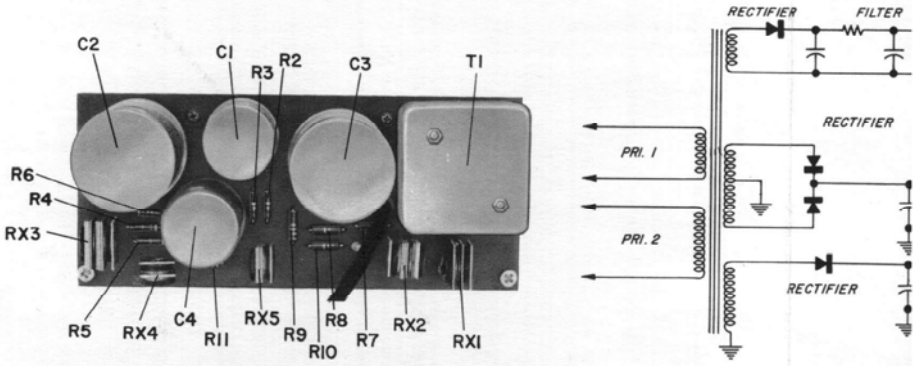
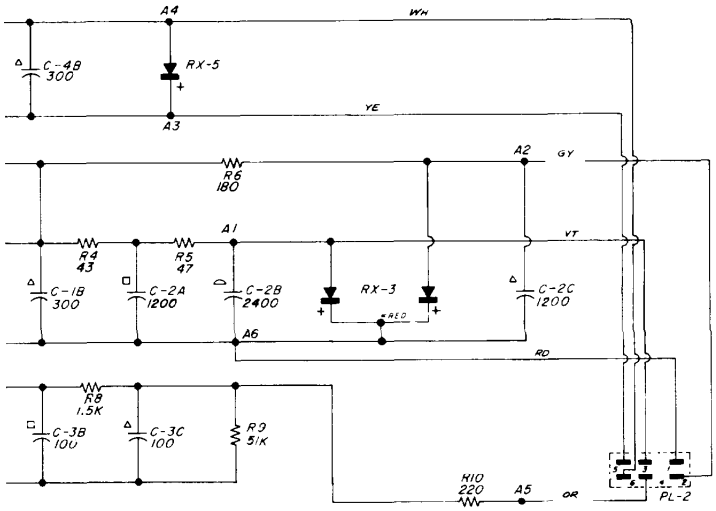


Figure 14. Layout of Components on Etched Board.



c Diagram, Type 1262-B Power Supply.

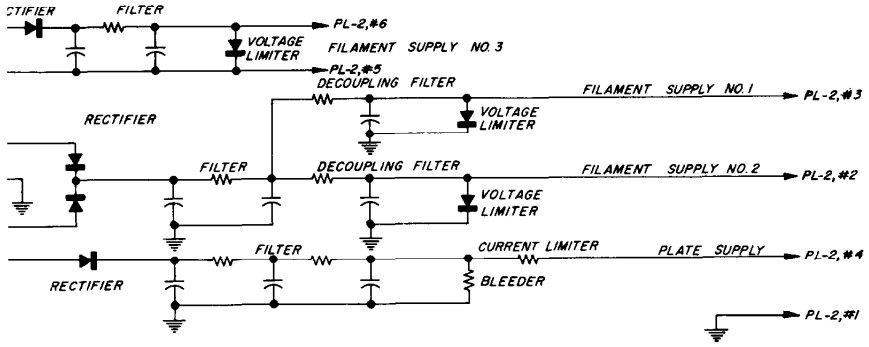


Figure 15. Elementary Schematic Diagram.

FEDERAL MANUFACTURER'S CODE

From Federal Supply Code for Manufacturers Cataloging Handbooks H4-1 (Name to Code) and H4-2 (Code to Name) as supplemented through August, 1968.

Code	Manufacturer
00192	Jones Mfg. Co, Chicago, Illinois
00194	Walsco Electronics Corp, L.A., Calif.
00434	Schweber Electronics, Westburg, L.I., N.Y.
00656	Aerovox Corp, New Bedford, Mass.
01009	Alden Products Co, Brockton, Mass.
01121	Allen-Bradley, Co, Milwaukee, Wisc.
01295	Texas Instruments, Inc, Dallas, Texas
02114	Ferroxcube Corp, Saugerties, N.Y. 12477
02606	Fenwal Lab Inc, Morton Grove, Ill.
02660	Amphenol Electron Corp, Broadview, Ill.
02768	Fastex, Des Plaines, Ill. 60016
03508	G.E. Semicon Prod, Syracuse, N.Y. 13201
03636	Grayburne, Yonkers, N.Y. 10701
03888	Pyrofilm Resistor Co, Cedar Knolls, N.J.
03911	Clairex Corp, New York, N.Y. 10001
04009	Arrow-Hart & Hegeman, Hartford, Conn. 06106
04713	Motorola, Phoenix, Ariz. 85008
05170	Engr'd Electronics, Santa Ana, Calif. 92702
05624	Barber-Colman Co, Rockford, Ill. 61101
05820	Wakefield Eng, Inc, Wakefield, Mass. 01880
07126	Digitron Co, Pasadena, Calif.
07127	Eagle Signal (E.W. Bliss Co), Baraboo, Wisc.
07261	Avnet Corp, Culver City, Calif. 90230
07263	Fairchild Camera, Mountain View, Calif.
07387	Birtcher Corp, No. Los Angeles, Calif.
07595	Amer Semicond, Arlington Hts, Ill. 60004
07828	Bodine Corp, Bridgeport, Conn. 06605
07829	Bodine Electric Co, Chicago, Ill. 60618
07910	Cont Device Corp, Hawthorne, Calif.
07983	State Labs Inc, N.Y., N.Y. 10003
07999	Borg Inst., Delavan, Wisc. 53115
08730	Vemaline Prod Co, Franklin Lakes, N.J.
09213	G.E. Semiconductor, Buffalo, N.Y.
09408	Star-Tronics Inc, Georgetown, Mass. 01830
09823	Burgess Battery Co, Freeport, Ill.
09922	Burndy Corp, Norwalk, Conn. 06852
11236	C.T.S. of Berne, Inc, Berne, Ind. 46711
11599	Chandler Evans Corp, W. Hartford, Conn.
12040	National Semiconductor, Danbury, Conn.
12498	Crystalonics, Cambridge, Mass. 02140
12672	RCA, Woodbridge, N.J.
12697	Clarostat Mfg Co, Inc, Dover, N.H. 03820
12954	Dickson Electronics, Scottsdale, Ariz.
13327	Solitron Devices, Tappan, N.Y. 10983
14433	ITT Semicondictors, W.Palm Beach, Fla.
14655	Cornell-Dubilier Electric Co, Newark, N.J.
14674	Corning Glass Works, Corning, N.Y.
14936	General Instrument Corp, Hicksville, N.Y.
15238	ITT, Semiconductor Div, Lawrence, Mass.
15605	Cutlet-Hammer Inc, Milwaukee, Wisc. 53233
16037	Spruce Pine Mica Co, Spruce Pine, N.C.
17771	Singer Co, Diehl Div, Somerville, N.J.
19396	Illinois Tool Works, Pakton Div, Chicago, Ill.
19644	LRC Electronics, Horseheads, N.Y.
19701	Electra Mfg Co, Independence, Kansas 67301
21335	Fafnir Bearing Co, New Briton, Conn.
22753	UID Electronics Corp, Hollywood, Fla.
23042	Avnet Electronics Corp, Franklin Park, Ill.
24446	G.E., Schenectady, N.Y. 12305
24454	G.E., Electronics Comp, Syracuse, N.Y.
24455	G.E. (Lamp Div), Nela Park, Cleveland, Ohio
24655	General Radio Co, W. Concord, Mass. 01781
26806	American Zettlet Inc, Costa Mesa, Calif.
28520	Hayman Mfg Co, Kenilworth, N.J.
28959	Hoffman Electronics Corp, El Monte, Calif.
30874	I.B.M, Armonk, New York
32001	Jensen Mfg. Co, Chicago, Ill. 60638
33173	G.E. Comp. Owensboro, Ky. 42301
35929	Constanta Co, Mont, 19, Que.
37942	P.R. Mallory & Co Inc, Indianapolis, Ind.
38443	Marlin-Rockwell Corp, Jamestown, N.Y.
40931	Honeywell Inc, Minneapolis, Minn. 55408
42190	Muter Co, Chicago, Ill. 60638
42498	National Co, Inc, Melrose, Mass. 02176
43991	Norma-Hoffman, Stanford, Conn. 06904
49671	RCA, New York, N.Y. 10020
49956	Raytheon Mfg Co, Waltham, Mass. 02154
53021	Sangamo Electric Co, Springfield, Ill. 62705
54294	Shallcross Mfg Co, Selma, N.C.
54715	Shure Brothers, Inc, Evanston, Ill.
56289	Sprague Electric Co, N. Adams, Mass.
59730	Thomas and Betts Co, Elizabeth, N.J. 07207
59875	TRW Inc, (Accessories Div), Cleveland, Ohio
60399	Torrington Mfg Co, Torrington, Conn.
61637	Union Carbide Corp, New York, N.Y. 10017
61864	United-Carr Fastener Corp, Boston, Mass.
63060	Victoreen Instrument Co, Inc, Cleveland, O.
63743	Ward Leonard Electric Co, Mt. Vernon, N.Y.
65083	Westinghouse (Lamp Div), Bloomfield, N.J.
65092	Weston Instruments, Newark, N.J.
70485	Atlantic-India Rubber, Chicago, Ill. 60607
70563	Amperite Co, Union City, N.J. 07087
70903	Belden Mfg Co, Chicago, Ill. 60644
71126	Bronson, Homer D, Co, Beacon Falls, Conn.
71294	Canfield, H.O. Co, Clifton Forge, Va. 24422
71400	Bussman (McGraw Edison), St. Louis, Mo.
71468	ITT Cannon Elec, L.A., Calif. 90031
71590	Centralab, Inc, Milwaukee, Wisc. 53212
71666	Continental Carbon Co, Inc, New York, N.Y.
71707	Coto Coil Co Inc, Providence, R.I.
71744	Chicago Miniature Lamp Works, Chicago, Ill.
71785	Cinch Mfg Co, Chicago, Ill. 60624
71823	Darnell Corp, Ltd, Downey, Calif. 90241
72136	Electro Motive Mfg Co, Wilmington, Conn.
72259	Nytronics Inc, Berkeley Heights, N.J. 07922
72619	Dialight Co, Brooklyn, N.Y. 11237
72699	General Instr Corp, Newark, N.J. 07104
72765	Drake Mfg Co, Chicago, Ill. 60656
72825	Hugh H. Eby Inc, Philadelphia, Penn. 19144
72962	Elastic Stop Nut Corp, Union, N.J. 07083
72982	Erie Technological Products Inc, Erie, Penn.
73138	Beckman Inc, Fullerton, Calif. 92634
73445	Amperex Electronics Co, Hicksville, N.Y.
73559	Carling Electric Co, W.Hartford, Conn.
73690	Elco Resistor Co, New York, N.Y.
73899	JFD Electronics Corp, Brooklyn, N.Y.
74193	Heinemann Electric Co, Trenton, N.J.
74861	Industrial Condenser Corp, Chicago, Ill.
74970	E.F. Johnson Co, Waseca, Minn. 56093
75042	IRC Inc, Philadelphia, Penn. 19108
75382	Kulka Electric Corp, Mt. Vernon, N.Y.
75491	Lafayette Industrial Electronics, Jamica, N.Y.
75608	Linden and Co, Providence, R.I.
75915	Littelfuse, Inc, Des Plaines, Ill. 60016
76005	Lord Mfg Co, Erie, Penn. 16512
76149	Mallory Electric Corp, Detroit, Mich. 48204
76487	James Millen Mfg Co, Malden, Mass. 02148
76545	Mueller Electric Co, Cleveland, Ohio 44114
76684	National Tube Co, Pittsburg, Penn.
76854	Oak Mfg Co, Crystal Lake, Ill.
77147	Patton MacGuyer Co, Providence, R.I.
77166	Pass-Seymour, Syracuse, N.Y.
77263	Pierce Roberts Rubber Co, Trenton, N.J.
77339	Positive Lockwasher Co, Newark, N.J.
77642	Ray-O-Vac Co, Madison, Wisc.
77630	TRW, Electronic Comp, Camden, N.J. 08103
77638	General Instruments Corp, Brooklyn, N.Y.
78189	Shakeproof (Ill. Tool Works), Elgin, Ill. 60120
78277	Sigma Instruments Inc, S.Braintree, Mass.
78488	Stackpole Carbon Co, St. Marys, Penn.
78553	Tinnerman Products, Inc, Cleveland, Ohio
79089	RCA, Rec Tube & Semicond, Harrison, N.J.
79725	Wiremold Co, Hartford, Conn. 06110
79963	Zierick Mfg Co, New Rochelle, N.Y.
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81143	Isolantite Mfg Corp, Stirling, N.J. 07980
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81350	Joint Army-Navy Specifications
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