# INSTRUCTION MANUAL

## KS-19602 L1 AMPLIFIER

Manufactured for the

**WESTERN ELECTRIC CO.**

by

**McINTOSH LABORATORY, INC.**

2 Chambers Street, Binghamton, N. Y.

## DESCRIPTION

The KS-19602 L1 amplifier is a general purpose program amplifier capable of providing 25 watts of power output. It has been designed to meet telephone company requirements as a line, distribution, or power amplifier. It can also be used for general monitoring and similar services to supply audio power to loudspeakers or other equipment.

## SPECIFICATIONS

| | |
|---|---|
| POWER SUPPLY: | 117/125 volts 50/60 cps. |
| POWER CONSUMPTION: | 50 to 100 watts. |
| POWER OUTPUT: | 25 watts continuous (+44dbm), 20 to 20,000 cps with less than 0.5% harmonic distortion. |
| INPUT IMPEDANCE: | 150 ohms balanced or unbalanced, 600 ohms balanced or unbalanced, 10,000 ohms bridging. |
| MAXIMUM INPUT LEVEL: | +10dbm for 150 ohm or 600 ohm input, +34dbm for bridging input. |
| GAIN: | 66db ±2db for 150 ohm or 600 ohm inputs, 42db ±2db for bridging input. |
| FREQUENCY RESPONSE: | 20 to 15,000 cps ±0.5db, 20 to 20,000 cps +0.5db, -1.0db |
| HARMONIC DISTORTION: | Less than 0.5% 20 to 20,000 cps at 25 watts output or less. |
| INTERMODULATION DISTORTION: | Less than 0.5% if instantaneous peak power is below 50 watts. |
| SIGNAL TO NOISE RATIO: (unweighted) | 88db or better. |
| NOISE AND HUM: (unweighted) | At least -44dbm. |
| DAMPING FACTOR: | About 10. |
| OUTPUT IMPEDANCES: | 1, 4, 8, 16, 150, 200, 600 ohms 70.7 volts may be obtained from the 200 ohm output. |

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|---|---|
| **SIZE:** | 19" relay rack mounting, 5 1/4" vertical rack space, 10" deep with 5 1/4" in front and 4 3/4" to the rear of mounting surface. |
| **FINISH:** | Light gray. |
| **WEIGHT:** | 33 pounds. |
| **TUBES:** | 1 each 6AV6, 1 each 12AU7, 1 each 12BH7, 2 each 7591. |
| **FUSE:** | 1.5 Amperes, Slo-Blo. |

## INSTALLATION

### LOCATION:

The KS-19602 L1 amplifier will operate satisfactory at normal ambient room temperature. Continuous operation in locations of high ambient temperature (over 100°F) is not recommended. Care should be taken when mounting the amplifier to provide sufficient ventilation for adequate cooling.

### INPUT CONNECTION:

Input connections are made to the input terminals located at the rear of the amplifier. Make connections to these terminals as follows:

| INPUT IMPEDANCE | CONNECT TO |
|---|---|
| 150 ohms | 4 and 5 |
| 600 ohms | 3 and 4, center tap is 5 |
| 10,000 ohms bridge | 1 and 2 |
| Circuit Ground | 6 |
| Chassis Ground | 7 |

It will be noted that the amplifier circuit and chassis grounds are brought to separate terminals on the input terminal strip. This system is provided so as to allow flexibility in grounding the amplifier to avoid "ground loops" with resulting noise and hum. The amplifier is normally supplied with terminals 6 and 7 strapped together.

### OUTPUT CONNECTIONS:

Output connections are made to the output terminals located at the rear of the amplifier. Make connections to these terminals as follows:

| OUTPUT IMPEDANCE | CONNECT TO | JUMPER |
|---|---|---|
| 1 ohm | 2 and 4 | 2-3, 4-5 |
| 4 ohm | 2 and 5 | 3-4 |
| 8 ohm | 2 and 6 | 3-4 |
| 16 ohm | 2 and 7 | 3-4 |
| 150 ohm | 8 and 9 | |
| 200 ohm (70.7 volts) | 9 and 10 | |
| 600 ohm | 8 and 11 | |

A "circuit ground" terminal is provided on the output terminal strip, terminal 1.

POWER CONNECTIONS:

The amplifier operates from a nominal 117/125 volt 50/60 cps power line. A six foot three conductor power cord (third conductor is ground) is supplied attached to the amplifier. Plug this cord into a suitable power receptical.

## OPERATION

After the above installation procedure has been completed, the amplifier is placed into operation by turning on the power switch. The attenuator controls should then be adjusted to provide the required gain.

## SERVICE INFORMATION

The KS-19602 L1 has been designed for long trouble free operation. All components are of the highest quality and are conservatively operated.

For convenience in servicing the amplifier the following chart of operating voltages and resistances is offered. All voltages are measured using a standard 20,000 ohms per volt meter. Voltages are measured to circuit ground. Resistances are measured to circuit ground with the AC power off and with the input attenuator off. Resistances marked with asterisk (*) are measured to circuit ground with filter capacitor C15A shorted to circuit ground.

## TUBE VOLTAGE AND RESISTANCE CHART

| TUBE TYPE | PIN NUMBER | D. C. VOLTS | RESISTANCE |
|---|---|---|---|
| 6AV6 (V1) | 1 | 0 | 10K |
| | 2 | 1.3 | 3.3K |
| | 3 | --- | 0 |
| | 4 | --- | 0 |
| | 5 | 1.3 | 3.3K |
| | 6 | 1.3 | 3.3K |
| | 7 | 125 | 145K * |
| 12AU7 (V2) | 1 | 310 | 27K * |
| | 2 | 125 | 145K * |
| | 3 | 135 | 18K |
| | 4-5 | --- | 0 |
| | 6 | 310 | 30K * |
| | 7 | 60 NOTE 1 | 2.3M * |
| | 8 | 135 | 18K |
| | 9 | --- | 0 |
| 12BH7 (V3) | 1 | 310 | 22K * |
| | 2 | 27 | 220K |
| | 3 | 44 | 4.7K |
| | 4-5 | --- | 0 |
| | 6 | 310 | 22K * |
| | 7 | 27 | 220K |
| | 8 | 44 | 4.7K |
| | 9 | --- | 0 |
| 7591 (V4 and V5) | 1 | --- | --- |
| | 2 | --- | 0 |
| | 3 | 415 | 41 * |
| | 4 | 415 | 110 * |
| | 5 | 1.2 | 41 |
| | 6 | -16 | 180K |
| | 7 | --- | 0 |
| | 8 | 415 | 110 * |

**NOTE 1:** USE 150 VOLT SCALE. This voltage will measure considerably different if a 20,000 ohm/volt meter is not used.

# REPLACEMENT PARTS LIST
(See Schematic #SC145D140)

| ITEM NO. | RATING | REPLACEMENT DATA |
|---|---|---|
| **Capacitors** | | |
| C1 | 100mf, 12V | Sprague, Type 31D |
| C2 | 680pf, 10% | RMC, Type JL |
| C3 | .22mf, 20%, 400V | Sprague, Type 109P |
| C4 | .047mf, 10%, 600V | Sprague, Type 109P |
| C5 | .047mf, 10%, 600V | Sprague, Type 109P |
| C6 | .22mf, 20%, 600V | Sprague, Type 160P |
| C7 | .22mf, 20%, 600V | Sprague, Type 160P |
| C8 | .47mf, 20%, 200V | Sprague, Type 109P |
| C9 | .47mf, 20%, 200V | Sprague, Type 109P |
| C10 | .01mf, 20%, 600V | Sprague, Type 109P |
| C11 | .01mf, 20%, 600V | Sprague, Type 109P |
| C12 | 150mf, 250V | CD, Type UPE |
| C13 | 150mf, 250V | CD, Type UPE-T |
| C14 | .47mf, 20%, 200V | Sprague, Type 109P |
| C15 | 80-20mf, 450V | CD, Type UP |
| C16 | 10mf, 50V | CD, Type BBR |
| C17 | 22pf, 10% | RMC, Type C |
| C18 | 150pf, 20% | RMC, Type B |
| **Resistors** | | |
| R1 | 4.7K 5% 1/2W | AB |
| R2 | 4.7K 5% 1/2W | AB |
| R3 | 1.5K 5% 1/2W | AB |
| R4 | 120K 5% 1/2W | AB |
| R5 | 82K 5% 1/2W | AB |
| R6 | 4.3K 5% 1/2W | AB |
| R7 | 3.9K 5% 1/2W | AB |
| R8 | 3.9K 5% 1/2W | AB |
| R9 | 3.9K 5% 1/2W | AB |
| R10 | 3.9K 5% 1/2W | AB |
| R11 | 3.6K 5% 1/2W | AB |
| R12 | 3.6K 5% 1/2W | AB |
| R13 | 3.6K 5% 1/2W | AB |
| R14 | 3.3K 5% 1/2W | AB |
| R15 | 1K 5% 1/2W | AB |
| R16 | 750 5% 1/2W | AB |
| R17 | 1.3K 5% 1/2W | AB |
| R18 | 2.4K 5% 1/2W | AB |
| R19 | 4.3K 5% 1/2W | AB |
| R20 | 7.5K 5% 1/2W | AB |
| R21 | 13K 5% 1/2W | AB |
| R22 | 24K 5% 1/2W | AB |
| R23 | 43K 5% 1/2W | AB |
| R24 | 10K 10% 1/2W | AB |
| R25 | 3.3K 10% 1/2W | AB |

| ITEM NO. | RATING | REPLACEMENT DATA |
|---|---|---|
| **Resistors** | | |
| R26 | 1.8K 5% 1/2W | AB |
| R27 | 47 5% 1/2W | AB |
| R28 | 100K 10% 1/2W | AB |
| R29 | 2.2M 10% 1/2W | AB |
| R30 | 18K 10% 1/2W | AB |
| R31 | 27K 5% 1/2W | AB |
| R32 | 30K 5% 1/2W | AB |
| R33 | 2.2M 10% 1/2W | AB |
| R34 | 2.2M 10% 1/2W | AB |
| R35 | 220K 10% 1/2W | AB |
| R36 | 220K 10% 1/2W | AB |
| R37 | 4.7K 10% 1/2W | AB |
| R38 | 56K 10% 1/2W | AB |
| R39 | 100K 10% 1/2W | AB |
| R40 | 100K 10% 1/2W | AB |
| R41 | 56K 10% 1/2W | AB |
| R42 | 22K 5% 1W | AB |
| R43 | 4.7K 5% 1/2W | AB |
| R44 | 4.7K 5% 1/2W | AB |
| R45 | 22K 5% 1W | AB |
| R46 | 68 5% 1/2W | AB |
| R47 | 68 5% 1/2W | AB |
| R48 | 36K 5% 1/2W | AB |
| R49 | 33K 10% 1/2W | AB |
| R50 | 100K 10% 1W | AB |
| R51 | 82K 10% 1/2W | AB |
| R52 | 22K 5% 1/2W | AB |
| R53 | 100 10% 1/2W | AB |
| R54 | 100 10% 1/2W | AB |
| **Miscellaneous** | | |
| F1 | 1.5 Ampere S10-B10 | Bussman, MDL |
| L1 | Filter Choke | McIntosh Lab., 122-022 |
| PILOT | Pilot Lamp Assembly | AMP, 380614-2 |
| S1 | Rotary Switch | McIntosh Lab., 146-069 |
| S2 | Rotary Switch | McIntosh Lab., 146-069 |
| S3 | Slide Switch | Carling, S60-A |
| T1 | Input Transformer | McIntosh Lab., 159-051 |
| T2 | Output Transformer | McIntosh Lab., 159-050 |
| T3 | Power Transformer | McIntosh Lab., 159-049 |
| V1 | Tube, 6AV6 | |
| V2 | Tube, 12AU7 | |
| V3 | Tube, 12BH7 | |
| V4 | Tube, 7591 | |
| V5 | Tube, 7591 | |

| | |
|---|---|
| **Sprague** | Sprague Electric Company, North Adams, Massachusetts |
| **RMC** | Radio Materials Division, P. R. Mallory Company, 4242 West Bryn Avenue, Chicago, Illinois |
| **CD** | Cornell-Dubilier Electronics, 50 Paris Street, Newark, New Jersey |
| **AB** | Allen-Bradley Company, 136 West Greenfield Avenue, Milwaukee, Wisconsin |
| **Bussman** | Bussman Manufacturing Division, McGraw-Edison Company, 2536 West University Street St. Louis, Missouri |
| **McIntosh Lab.** | McIntosh Laboratory, Incorporated, 2 Chambers Street, Binghamton, New York |
| **AMP** | AMP, Incorporated, Harrisburg, Pennsylvania |
| **Carling** | Carling Electric, Incorporated, 505 New Park Avenue, West Hartford, Connecticut |