

## KS-19220, LIST 2 AMPLIFIER

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. ELECTRICAL CHARACTERISTICS . . . . .	1
3. EQUIPMENT DESCRIPTION . . . . .	2
4. FUNCTIONAL DESCRIPTION . . . . .	2

### 1. GENERAL

1.01 This section describes the KS-19220, List 2 amplifier (SD-99724-01).

1.02 The KS-19220, List 2 amplifier (see Fig. 1) is a plug-in type, 2-stage, transistorized, adjustable gain amplifier designed to provide amplification of low-level voice-frequency signals. The amplifier has two high-impedance inputs: (a) a low-level input for operating from a magnetic head, a low-level microphone, or equivalent source, and (b) an interstage input for operation through an external transformer from a recording source. The amplifier is designed to operate into loads of 1600 ohms or higher, and the output circuit may be connected to have an internal impedance of 1600 ohms or a low impedance (approximately 250 ohms).

1.03 The amplifier is equipped with a screwdriver-operated continuously variable gain control. Provisions are also made to enable the use of an external gain control and for connecting external resistors to reduce the maximum gain of the amplifier. The amplifier requires 48 volts dc and is intended to operate from a central office talk battery.

1.04 Some typical uses of the KS-19220, List 2 amplifier are:

- (a) As a low-level, voice-frequency amplifier in KS-19601, L1 amplifier.
- (b) As a recorder input amplifier in KS-19219, L1 amplifier.
- (c) As a voice-frequency amplifier in KS-19328, L1 amplifier.

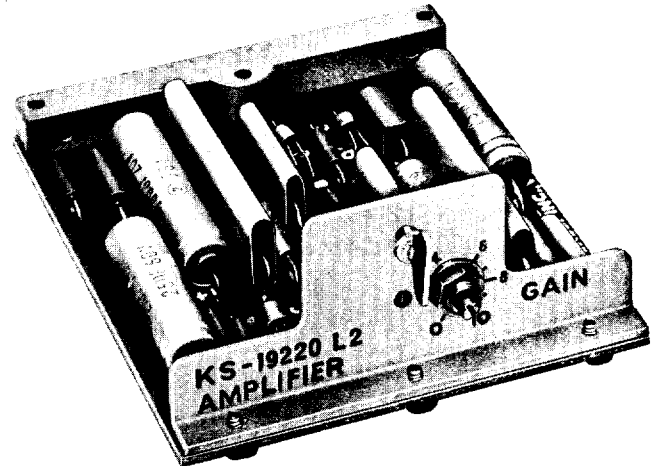


Fig. 1 — KS-19220, List 2 Amplifier

### 2. ELECTRICAL CHARACTERISTICS

2.01 The following are typical electrical characteristics of the KS-19220, L2 amplifier.

- (a) **Power Requirements:** 17 milliamperes at 48 volts dc.
- (b) **Input Circuit 1:** Terminals C and A unbalanced; input impedance varies between approximately 30,000 and 120,000 ohms depending upon the setting of gain control and characteristics of the transistors in the input stage.
- (c) **Input Circuit 2 (Interstage):** Terminals J and A unbalanced; input impedance approximately 10,000 ohms. Low side of circuit (terminal A) is at battery potential (—48 volts dc).
- (d) **Output Circuit 1:** Terminals P and M unbalanced; designed to operate into load impedance of 1600 ohms or higher; internal output impedance 1600 ohms. Low side of circuit (terminal M) is at battery potential (—48 volts dc).

(e) **Output Circuit 2:** Terminals P and N unbalanced; designed to operate into load impedance of 1600 ohms or higher; internal output impedance approximately 250 ohms. Low side of circuit (terminal N) is at approximately -35 volts dc.

(f) **Gain:** Input terminals C and A to output terminals P and M or P and N approximately 0.0008 volt in for 4 volts out, open circuit at 1000 cps (for a gain of approximately 74 db). Input terminals (interstage) J and A to output terminals P and M or P and N approximately 0.2 volt in for 4 volts out; open circuit at 1000 cps (for a gain of approximately 26 db).

(g) **Frequency Response:** Within 0 to -1 db of 1000 cps at 150 cps and within 0 to -2 db of 1000 cps at 5000 cps.

(h) **Output Noise:** 0.025 volt maximum at output terminals P and M.

### 3. EQUIPMENT DESCRIPTION

**3.01** The KS-19220, L2 amplifier (see Fig. 1) is a 2-stage transistor amplifier. It consists of circuit components mounted on a printed circuit board with the amplifier circuits terminated in a KS-16345, L1 connector plug. This arrangement enables the amplifier to be plugged into various amplifier assemblies equipped with a mating connector jack (KS-16345, L2).

**3.02** A metal faceplate is attached to the front of the printed wiring board. This faceplate provides mounting for the gain control potentiometer. The faceplate also serves as a mounting bracket and is equipped with a hand-operated pin latch which is designed to lock into an assembly bracket and hold the amplifier in place. The overall dimensions of the amplifier unit are approximately 3-3/4 inches wide by 3-1/3 inches deep by 1-1/2 inches high.

### 4. FUNCTIONAL DESCRIPTION

**4.01** A schematic of the KS-19220, L1 amplifier is shown in Fig. 2. This amplifier is a 2-stage RC-coupled amplifier employing two transistors in each stage in a Darlington configuration.

**4.02** The input is through terminals C (high side) and A (low side). The Darlington configuration in the first stage provides a high-impedance input for operation from a high-impedance source. When the amplifier is operated from a low-impedance source, an external input transformer is required. The Darlington configuration in the second stage minimizes coupling losses between stages. The amplifier is normally operated from a -48 volt dc talk battery with positive ground. Signal ground terminal A is at -48 volts dc and dc isolation is required.

**4.03** An auxiliary (interstage) input, terminals J (high side) and E (low side), is provided for certain applications such as connecting to a recording source. When this input is used, an external input transformer may be required because terminal E is at -48 volts dc. The auxiliary input is connected to the base of transistor Q3 through capacitor C6. Resistor R10 maintains a constant charge on C6 to prevent transient surges. Resistors R12 and R13 provide degeneration in the emitter circuit of transistor Q4.

**4.04** Two output circuits are provided for operating into loads of 1600 ohms or higher. One circuit, terminals P and M, has an internal impedance of 1600 ohms and the other, terminals P and N, has an internal impedance of approximately 250 ohms. The two outputs should not be used together. The low side of each output is at battery potential and if the outputs are not connected to external circuits at the same potential, isolating transformers must be used.

**4.05** Provisions are made via terminal leads E and K for use of either an internal or an external gain control. Variable resistor R6 may be used as an internal gain control. This resistor

## NOTES:

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICROFARADS. VALUES PRECEDED BY + (PLUS) OR - (MINUS) ARE IN VOLTS.

2. THE VOLTAGES SHOWN REPRESENT TYPICAL DC VALUES FOR A QUIESCENT CONDITION WITH AVERAGE TRANSISTORS AND NOMINAL SUPPLY VOLTAGE. THE VOLTAGES ARE MEASURED FROM POINTS SHOWN TO TERMINAL S USING A VOLTMETER HAVING A RESISTANCE OF 10 MEGOHMS (MINIMUM).

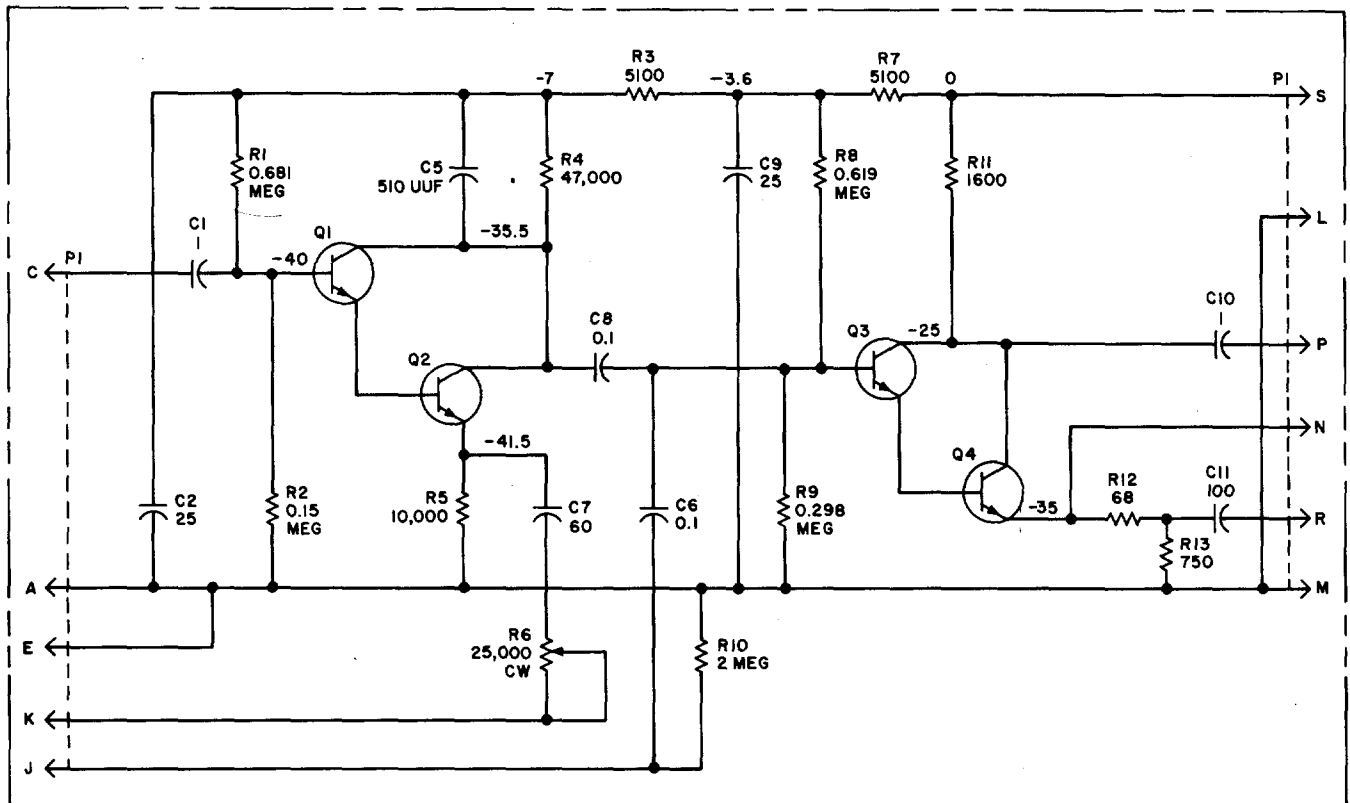


Fig. 2 — KS-19220, List 1 Amplifier — Schematic

varies the emitter feedback of the first stage over a range of approximately 35 db and thus changes the amplifier gain by this amount. When resistor R6 is used, terminals E and K are strapped. An external gain control may be connected across terminals E and K. When an external gain control is used, resistor R6 is set in its maximum clockwise position.

4.06 On the output side, the gain may be reduced approximately 20 db by insertion of an external resistance between the battery supply (-48 v) terminal L and terminal R.

4.07 Terminals S and L provide battery connections; terminal S connects to positive ground and terminal L connects to -48 volts dc.