JERROLD®
a GENERAL INSTRUMENT company

INSTRUCTION SHEET

435-667

SOLID-STATE

SINGLE-CHANNEL VHF AMPLIFIERS Model SMA-*

U/L-listed

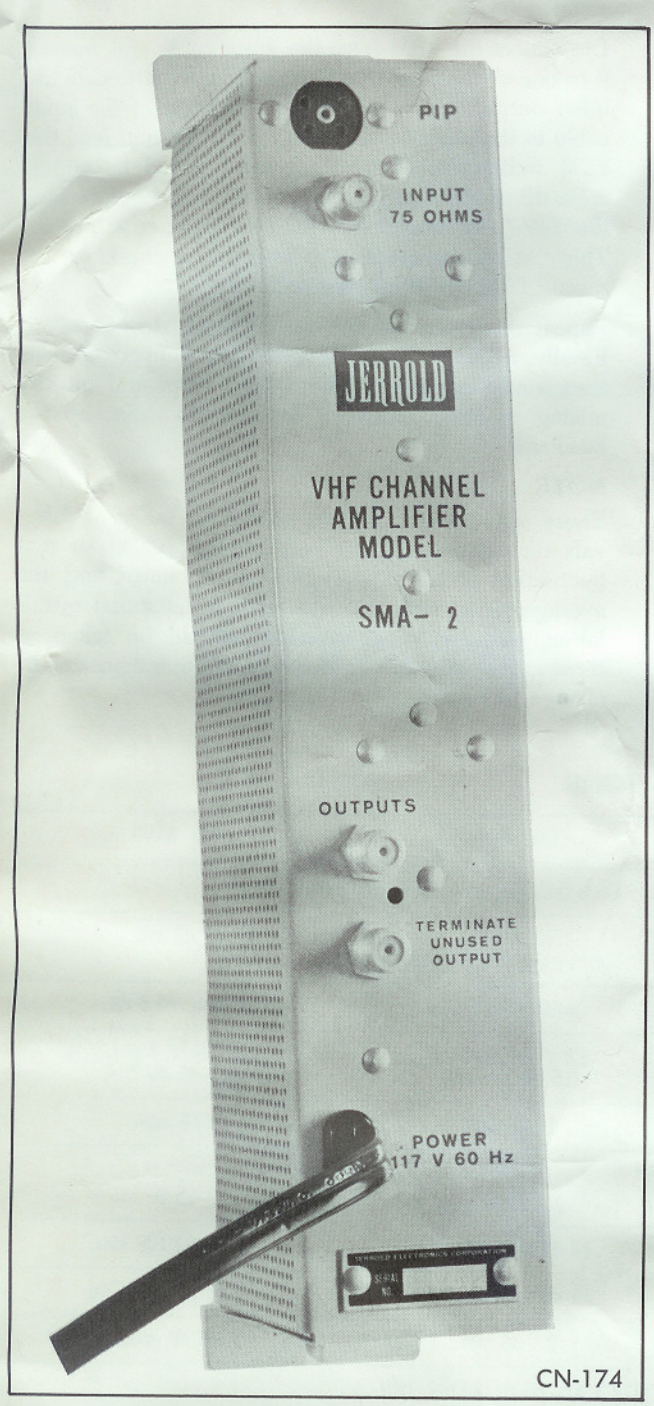


Fig. 1—Typical SMA-* Strip

DESCRIPTION

Models SMA-* are high-gain, dual-output, strip amplifiers designed for head-ends of master antenna or closed-circuit systems, distributing vhf television channels or f.m. sound.

Outstanding features are high overload capability, excellent frequency stability, and low power consumption. In addition, each amplifier has its own built-in d.c. power supply with line cord and plug, working directly from a 117 V a.c. outlet. The input circuitry permits the use of plug-in attenuation pads Models PIP-* for reduction of the input signal level over a range of 15 dB in 3-dB steps, in accordance with system requirements. Bridged output terminals allow interconnection of amplifiers directly or through appropriate mixing networks in order to derive a common broadband output. Three F-659 cable connectors are shipped with each unit.

The amplifiers are contained in perforated housings for good ventilation and are designed for vertical installation side by side on a mounting plate Jerrold Model MP-7. The mounting plate in turn is designed to accept additional units such as splitters and traps, and can be mounted on a standard relay rack or installed in an equipment cabinet.

Models SMA-* are the solid-state advance of the well-known Jerrold PMA-* tube type series and can be used not only in new systems but also for expanding or modernizing existing PMA-* systems, or replacement of individual PMA-* units.

INSTALLATION

1. **Mounting:** Each SMA-* amplifier strip is mounted with two #6 x ½ round-head, self-tapping screws (shipped with the SMA-*) on a mounting plate, Jerrold Model MP-7. Where a different arrangement is planned, the necessary mounting hardware will have to be procured separately.

   Model MP-7 will accept eight amplifier strips side-by-side and a number of accessory units. A typical lay-out example is given in Fig. 2. Note that the recommended installation method is to mount the strips in two groups of non-adjacent channels. The strips in each group can be jumpered directly; the outputs of the two groups are then combined in a hybrid mixing network such as Jerrold Model 1596A to

derive a common broadband output for distribution.

Where a more complex head-end equipment requires additional units and mounting space for them, a mounting plate Jerrold Model MP-2 designed for that purpose can be ordered.

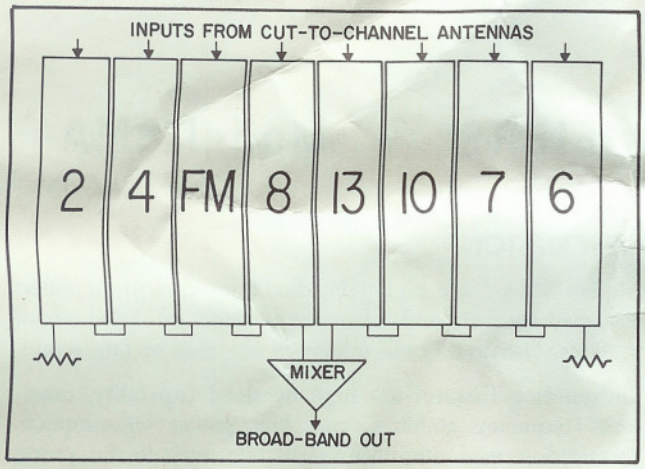


Fig. 2—Typical Multi-Channel Layout

2. **Cabling:** Mount one of the three F-659 coaxial connectors on the input cable, the other two connectors on the output and jumper cable respectively. Complete details for the preparation of cable ends and installation of connectors are given in Jerrold Instruction Sheet 435-650 enclosed in the accessory package shipped with each SMA-*.

   Where only one output terminal on the SMA-* is used, terminate the second terminal by a Jerrold Model TR-75F.

   Prepare the cables and jumpers for all other SMA-* strips in the same manner.

3. **Signal Tests:** First connect the line cord and plug of the SMA-* to its associated a.c. outlet. Then connect a field strength meter (tunable r.f. voltmeter)—such as Jerrold Model 720B or 727—to the input cable. Tune the FSM to the visual carrier frequency of the relevant tv channel, or to the f.m. channel if such is the case, and check the signal level in dBmV (see Note below).

   If the average input signal level plus the specified amplifier gain exceed the recommended output level, replace the factory-mounted Model PIP-0 attenuation plug-in pad on the SMA-* by a pad with a rating that will reduce the output approximately to the recommended level.

   Disconnect the FSM from the input cable and connect it to one of the SMA-* output terminals; terminate the other output with a TR-75F. Then connect the input cable to the input terminal on the SMA-* and read the FSM indication. The output level should be within ±1½ dB of the recommended level; if it is not, replace the PIP-* by one that will give the desired result. Then, as an insurance test, repeat the check on the second SMA-* output terminal.

   Repeat this procedure for every SMA-* strip installed. Finally, connect all output cables and jumpers to their associated terminals on the SMA-* strips and on any mixing or other networks designed to make up the head end.

   NOTE:

   These signal measurements should be taken at intervals throughout at least one 24-hour period so that fluctuation of signal strength may be noted and the average signal strength calculated. After initial installation, additional measurements should be taken at three-month intervals to determine fluctuations due to change in seasons.

SPECIFICATIONS

	HIGH-BAND	LOW-BAND	F.M. BAND
PASSBAND	6 MHz, any v.h.f. television channel or f.m. band		
GAIN	40 dB min.	40 dB min. (Level control by use of PIP-* plug-in pads)	33 dB min.
FLATNESS	within ±0.5 dB	within ±0.5 dB	within ±1.5 dB
OUTPUT CAPABILITY	1.0 V (60 dBmV) at 0.5 dB sync clip	1.0 V (60 dBmV) at 0.5 dB sync clip	44 dBmV, 3 chs. for —46 dB 2A-B
NOISE FIGURE	10 dB max.	10 dB max.	9 dB max.
TERMINALS: IMPEDANCE	75 Ω	75 Ω	75 Ω
INPUT MATCH	16 dB min. ret. loss	16 dB min. ret. loss	10 dB (92-108 MHz)
OUTPUT MATCH	16 dB min. ret. loss	16 dB min. ret. loss	16 dB (92-108 MHz)
INSERTION LOSS	0.5 dB max.	0.5 dB max.	0.5 dB max.
POWER REQUIREMENT	117 V a.c., 60 Hz, 80 mA, 10W		

MAINTENANCE

GENERAL

The solid-state design and low power consumption make the SMA-* units virtually maintenance-free. Routine system maintenance will consist mainly of periodical checks of signal levels and on firmness of cable connections.

Should it ever happen that an amplifier becomes inoperative, it is best to replace it by a spare unit so that there will be only a minimum of interruption in signal distribution. The faulty unit can then be returned to Jerrold where it will be repaired at no charge under warranty conditions; otherwise it will be repaired at a nominal charge.

Where the user has the necessary instruments and the skilled personnel for bench-testing and repairing an inoperative amplifier, the circuit descriptions, schematic diagrams, and replacement parts lists given here will help in tracing the faulty component.

CAUTION:

An amplifier under test must be equipped with a PIP-0 pad. In no case should the input and output filter components be tampered with, nor does the replacement of a transistor in the amplifier circuitry require a retuning of the frequency-dependent components.

CIRCUIT DESCRIPTIONS

A. GENERAL

The SMA-* circuitry consists of:

a. A well-filtered, full-wave rectifier, d.c. power supply;

b. A tuned-to-channel input filter with plug-in attenuation pad facility;

c. A tuned-to-channel dual output filter;

d. A 3-stage amplifier in the case of low-band and f.m. channel strips, or a 4-stage amplifier in the case of high-band channel strips.

Input and output terminals are matched to a 75-ohm impedance for connection of coaxial cables.

B. LOW-BAND AND FM STRIPS (see Dwg. E863-166)

1. POWER SUPPLY

The d.c. supply consists of line voltage transformer T4, conventional full-wave rectifier made up of CR1, CR2, C25 and C26, filter network C20 and R14, and smoothing capacitor C17. This power supply delivers a −15 V d.c. potential to the amplifier circuitry and has a 3-wire line cord and plug for connection to a 117 V a.c. outlet with ground terminal.

2. INPUT CIRCUITRY

The input signal is applied at terminal J1 and is passed through a pad—plugged in at J2—to a series/parallel LC network consisting of L1, L2, C3, C1, L3, C4, C2, L4, C5, and L5. This 3-section bandpass filter is factory-tuned to one of the low-band tv channels, or to the f.m. band, as required by the user.

3. AMPLIFIER CIRCUITRY

From the input filter the signal is coupled by C6 to the base of the first amplifier stage Q1. This and the following stages Q2 and Q3 employ cascaded NPN transistors arranged in a common-emitter configuration. Capacitors C9, C12, C15, and toroidal transformers T1, T2, and T3 are employed between stages and at the output for impedance coupling. All three stages have current feedback, with unbypassed emitter resistors R4 and R8 employed in the first and second stage. The first and third stages also have voltage feedback from the collectors through resistors R2 and R10 to the base coupling capacitors C6 and C12 respectively. Base bias is developed across the relevant resistor pairs R1, R3, R6, R7, and R11, R12. Transistor operating stability is achieved by RC networks in the emitter circuits, namely R5, C8; R9, C11; and R13, C14 respectively.

4. OUTPUT CIRCUITRY

The output from the collector of Q3 is applied to a frequency filter consisting of series/parallel LC network C15, C18, L9, C16, L10, and C19. This filter too is factory-tuned to the required tv channel or to the f.m. band. From the filter the signal is coupled through L11 to a signal-splitting circuit C21, C22, C23, and C24 from where the two outputs are presented at terminals J3 and J4. Capacitor C23 is tuned to match the impedances at J3 and J4 to 75 ohms.

C. HIGH-BAND STRIPS (see Dwg. E863-167)

1. POWER SUPPLY

Except for component designations on the schematic circuit diagram, the circuitry of the power supply and its d.c. output is exactly the same as that in the low-band/f.m. strips.

2. INPUT CIRCUITRY

The input signal is applied at terminal J1 and first passed through a pad – plugged in at J2 – from where it goes through a 3-section bandpass filter. Here too series/parallel LC components are employed, consisting of L1, L2, C4, C5, C1, L3, C6, C7, C2, L4, C8, C9, and C3. This filter is factory-tuned to the high-band channel specified by the user.

3. AMPLIFIER CIRCUITRY

From the input filter the signal is coupled through C10 to the base of the first amplifier stage Q1. This and the following three stages Q2, Q3, and Q4 have the same basic circuit configuration as the amplifier stages in the low-band/f.m. channel

strips. Four NPN transistors are employed in a cascaded common-emitter circuitry. All inter-stages and the output stage have capacitors and toroidal transformers for impedance coupling: T1, C14; T2, C18; T3, C22; and T4, are the components involved. All stages have current feedback through R4, R9, R14, and R18 respectively. Equally, all stages have voltage feedback through R1, R6, R11, and R20 respectively. Base bias for each transistor is developed across the relevant resistor pairs R2, R3; R7, R8; R12, R13; and R16, R17. Again, transistor operating stability is achieved by RC networks: C11, C12, R5 for Q1; C15, C16, R10 for Q2; C19, C20, R15 for Q3; and C23, C24, R19 for Q4, in the respective emitter circuits.

4. OUTPUT CIRCUITRY

From the collector of Q4 the output is inductively coupled through L17 to a 2-section bandpass filter consisting of series/parallel LC networks involving C27, L14, C28, C29, and L15. This filter too is factory-tuned to the specified high-band channel. From the filter the signal is passed through T5 and L16 which splits the signal energy equally for 75-ohm impedance dual output presentation at terminals J3 and J4.

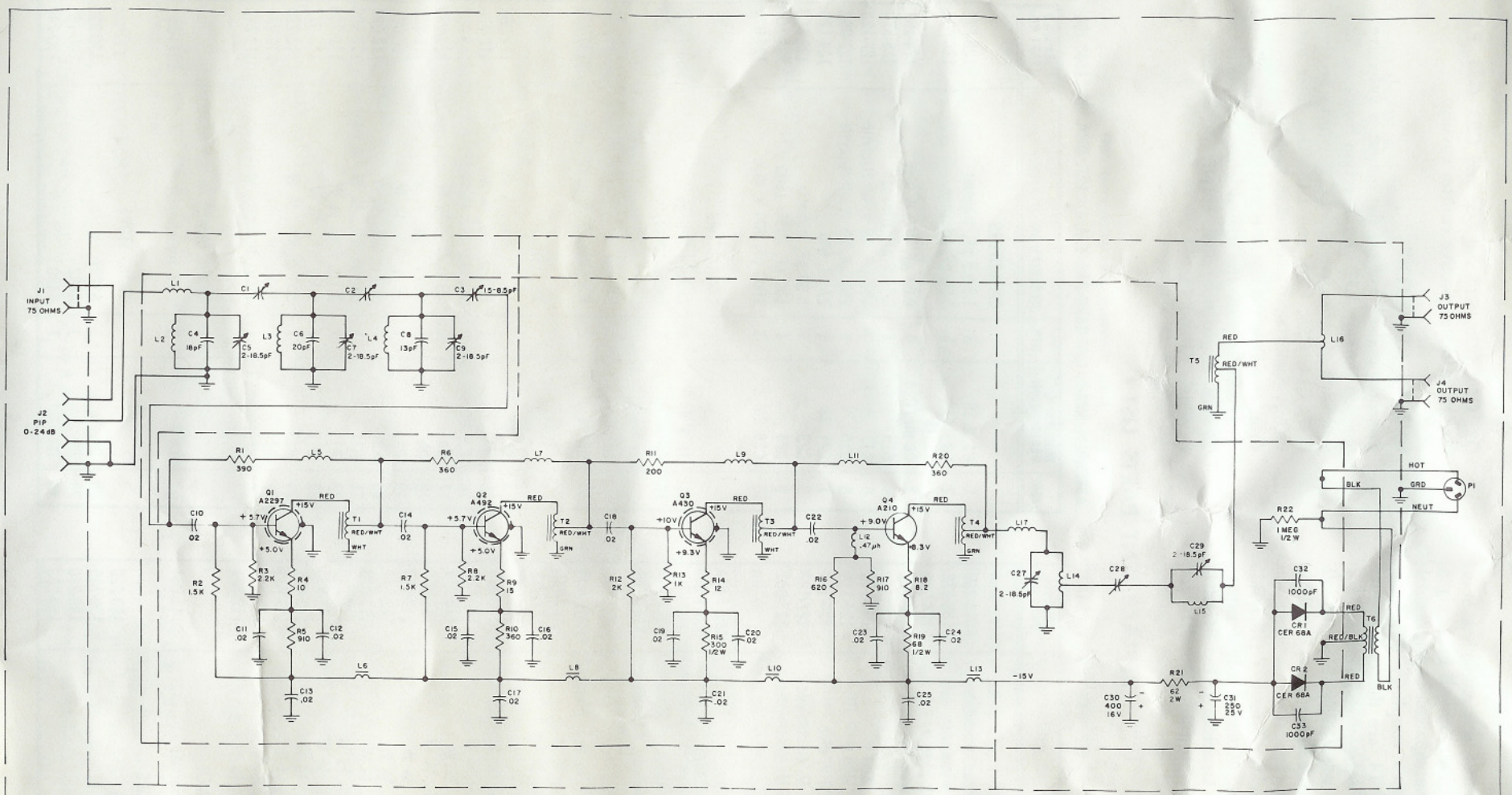
REPLACEMENT PARTS LIST

ASSEMBLY: SMA-*, HIGH-BAND **REF. DWG. NO.: E863-167**

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
			CAPACITORS	
1	C1, 2, 28	3 prs.	Variable plates, assembly	B215-289
2	C3	1	1.5-8.5 pF, trimmer	128-572
3	C4	1	18 pF, ±5%, 500 V	124-079
4	C5, 7, 9, 27, 29	5	2-18.5 pF, trimmer	128-570
5	C6	1	20 pF, 5%, 500 V	124-119
6	C8	1	13 pF, 5%, 600 V	124-115
7	C10 thru 25	16	0.02 μF, 200 V, disc	124-154
8	C30	1	400 μF, 16 V, electrolytic	127-123
9	C31	1	250 μF, 25 V, electrolytic	127-062
			CONNECTORS	
10	J1, 3, 4	3	Chassis fitting	Mod. F-61A
11	—	3	Cable connectors	Mod. F-659
			DIODES	
12	CR1, 2	2	Rectifier, Silicon, CER68A	S137-718
			RESISTORS	
13	R1	1	390 Ω, 5%, ¼ W	112-099
14	R2, 7	2	1.5 kΩ, 5%, ¼ W	112-966
15	R3, 8	2	2.2 kΩ, 5%, ¼ W	112-932
16	R4	1	10 Ω, 5%, ¼ W	112-077
17	R5, 17	2	910 Ω, 5%, ¼ W	112-920
18	R6, 10, 20	3	360 Ω, 5%, ¼ W	112-098
19	R9	1	15 Ω, 5%, ¼ W	112-973
20	R11	1	200 Ω, 5%, ¼ W	112-984
21	R12	1	2 kΩ, 5%, ¼ W	112-930
22	R13	1	1 kΩ, 5%, ¼ W	112-977
23	R14	1	12 Ω, 5%, ¼ W	112-079
24	R15	1	300 Ω, 5%, ½ W	112-293
25	R16	1	620 Ω, 5%, ¼ W	112-998
26	R18	1	8.2 Ω, 5%, ¼ W	112-075
27	R19	1	68 Ω, 5%, ½ W	112-212
28	R21	1	62 Ω, 5%, 2 W	112-211
29	R22	1	1 MΩ, 5%, ½ W	112-737
			TRANSFORMER	
30	T6	1	Line transformer	C141-264
			TRANSISTORS	
31	Q1	1	A2297	130-220
32	Q2	1	A492	130-185
33	Q3	1	A430	130-240
34	Q4	1	A210	130-200

ASSEMBLY: SMA-*, LOW-BAND AND F.M. **REF. DWG. NO.: E863-166**

ITEM	SCHEMATIC DESIGNATION	QTY.	DESCRIPTION	JERROLD PART NO.
			CAPACITORS	
1	C1, 2, 18	3	1.5-8.5 pF, trimmer	128-572
2	C3, 4, 5, 16, 19	5	5-60 pF, trimmer	128-563
3	C6 thru C14	9	0.02 μF, 200 V, disc	124-154
4	C15	1	2-18.5 pF, trimmer	128-570
5	C17	1	400 μF, 16 V, electrolytic	127-123
6	C20	1	250 μF, 25 V, electrolytic	127-062
7	C21, 22	2	27 pF, 5%	124-120
8	C23	1	5-60 pF, trimmer	128-563
9	C24	1	100 pF, 20%, 1500 V	124-101
10	C25, 26	2	1000 pF, 200 V, disc	124-020
			CONNECTORS	
11	J1, 3, 4	3	Chassis fittings	Mod. F-61A
12	—	3	Cable connectors	Mod. F-659
			DIODES	
13	CR1, 2	2	Rectifier, Silicon, CER68A	S137-718
			RESISTORS	
14	R1, 6	2	1.5 kΩ, 5%, ¼ W	112-966
15	R2	1	820 Ω, 5%, ¼ W	112-976
16	R3, 7	2	2.2 kΩ, 5%, ¼ W	112-932
17	R4	1	20 Ω, 5%, ¼ W	112-083
18	R5	1	910 Ω, 5%, ¼ W	112-920
19	R8	1	16 Ω, 5%, ¼ W	112-081
20	R9	1	360 Ω, 5%, ¼ W	112-098
21	R10	1	680 Ω, 5%, ¼ W	112-105
22	R11	1	2 kΩ, 5%, ¼ W	112-930
23	R12	1	1 kΩ, 5%, ¼ W	112-977
24	R13	1	300 Ω, 5%, ½ W	112-293
25	R14	1	100 Ω, 5%, 1W	112-234
26	R15	1	1 MΩ, 20%, ½ W	112-743
			TRANSFORMER	
27	T4	1	Line transformer	B141-251
			TRANSISTORS	
28	Q1	1	A2297	130-220
29	Q2	1	A492	130-185
30	Q3	1	A430	130-240



NOTES:

1. UNLESS OTHERWISE SPECIFIED
   (a) ALL CAPACITOR VALUES ARE IN µF
   (b) ALL RESISTOR VALUES ARE IN OHMS, 5%, 1/4 W
2. TRANSISTOR VOLTAGE MEASURED WITH RESPECT TO -15 V BUS, NO SIGNAL, USING A METER OF AT LEAST A 10KΩ/VOLT SENSITIVITY.

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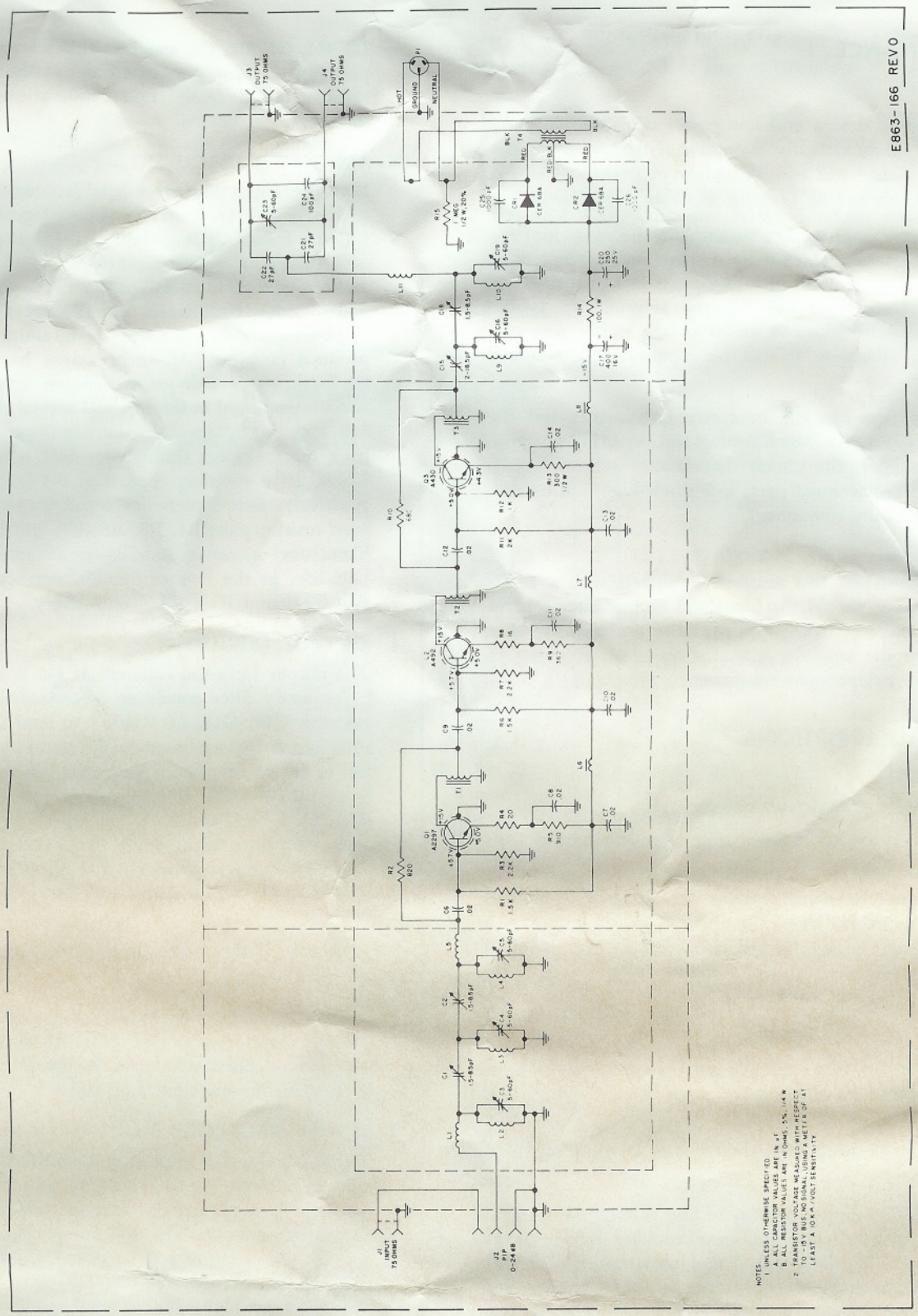

WARRANTY

Each unit of Jerrold Equipment is warranted for 90 days against original factory imperfections in material and workmanship.

In the event any unit of equipment should fail in service during this period, pack the complete defective unit carefully, attach a letter stating the reasons the unit was believed to be defective, and return it to our Service Department, Jerrold Electronics Corp., 15th Street and Lehigh Avenue, Phila., Pa. 19132, prepaying transportation charges. It shall be repaired or replaced at no charge.

Such service or repairs as may be necessary as the result of abuse or accident are not included in the warranty. In the event of any service breakdowns after the warranty period, this unit may be returned for repairs at a nominal charge.

JERROLD ELECTRONICS CORPORATION
EDUCATIONAL AND COMMUNICATIONS SYSTEMS DIVISION
Philadelphia, Pa. 19105

Published by the Jerrold Electronics Corp., Engineering Laboratory Publications Dept.
LKEE, 12/69 Printed in U.S.A. 435-667 ® 8016