Collins 76F-3 Speaker/Amplifier

Rockwell International

unit instructions

Collins Government Telecommunications Division

Printed in USA

523-0757628-002218
1 March 1965

1. General Description

1.1 PURPOSE OF THE 76F-3.

The 76F-3 Speaker/Amplifier increases low-level audio signals and converts them to audible information. To aid the operator of a multiple-band (h-f, vhf, uhf, etc.) communications system to identify which frequency band is being used for communication, where more than one 76F-3 is installed, an external indicating lamp on the 76F-3 will light when an audio signal is present in that particular 76F-3.

1.2 DESCRIPTION OF THE 76F-3. (See figure 1.)

The 76F-3 measures 7-11/16 by 6 by 4-3/4 inches and weighs 3.8 pounds. Quick-release fasteners are located on both the top and bottom for convenient, secure, well mounting. A SPEAKER VOLUME control, INDICATOR SENSITIVITY ADJUSTMENT, RECEIVER SIGNAL INDICATOR, and air RELIEF VALVE are mounted on the top. The RELIEF VALVE relieves air pressure and ensures proper speaker operation. The valve must be closed to make the 76F-3 watertight while fording.

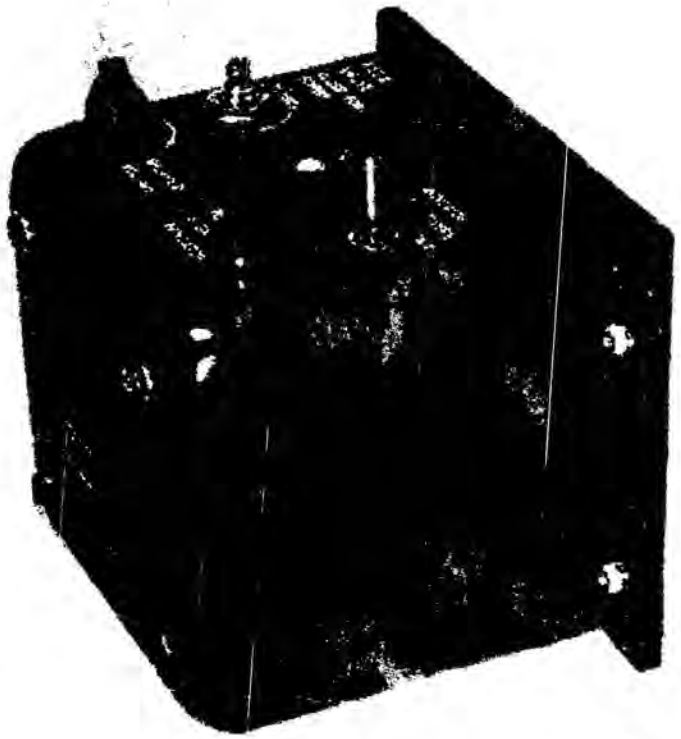

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Figure 1. 76F-3 Speaker/Amplifier

2. Installation.

See figure 2 for outline and mounting drawing. Connecting cable should not exceed 25 feet.

3. Principles of Operation. (Refer to figure 4.)

A low-level audio input is applied to pin D of J1, dropped across R3 and R1, and applied to the base of Q1. The signal is amplified and applied through transformer T1 to the power amplifiers, Q2 and Q3. Thermistors RT1 and RT2 are provided to prevent crossover distortion at low temperatures. The amplified signal is applied to the 8-ohm speaker. Gain is controlled by the SPEAKER VOLUME control, R1.

The audio signal is also used to light the indicating lamp. The low-level audio input is dropped across resistors R13 and R14, and applied to the base of Q4. Resistor R14, the INDICATOR SENSITIVITY ADJUSTMENT, is provided to regulate the audio level at which illumination of DS1 occurs under various input level conditions. The signal is amplified and applied through a rectifier (CR1) to the base of Q5. This negative voltage cuts off Q5 which applies positive d-c potential to the base of Q6. Q6 then conducts, providing a path to ground for the +28 volt d-c through the lamp. The lamp then lights.

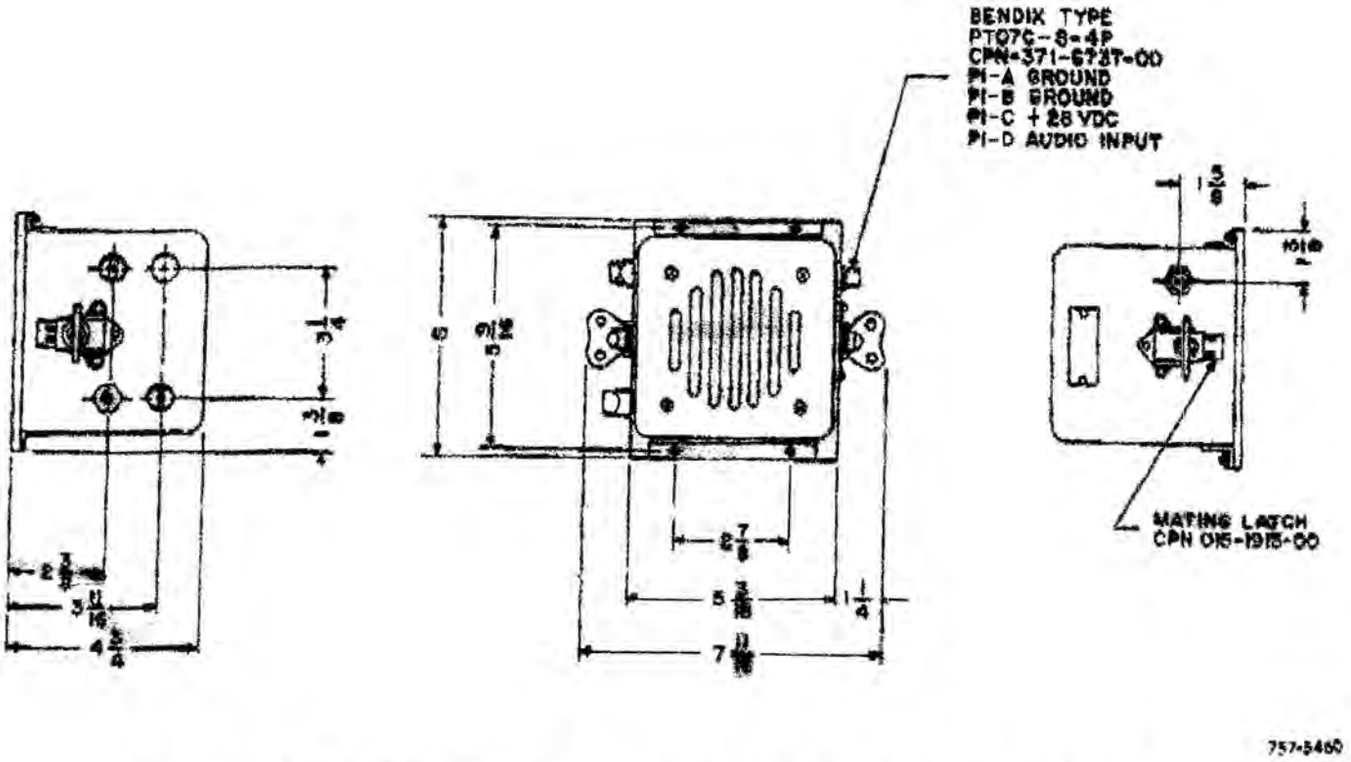

Figure 2. 76F-3 Speaker/Amplifier, Outline and Mounting Drawing

4. Maintenance.

4.1 TEST EQUIPMENT REQUIRED.

See table 1 for a list of test equipment required.

TABLE 1
TEST EQUIPMENT REQUIRED

EQUIPMENT	MANUFACTURER
A-c vtvm	Hewlett-Packard 400D (Fluke 910A)
Resistor, 8-ohm, 4-watt	
Power supply, +28-volt	Harrison Labs 865B
Audio generator	Hewlett-Packard 200CD (AN/URM-127)

70 ma current drain

4.2 PERFORMANCE TEST. at full output

a. Set SPEAKER VOLUME control fully clockwise.

b. Apply 28 volts d-c across pins C and B of J1.

c. Apply 0.5 volt rms audio signal to pin D of J1, and listen for the signal to come from the speaker.

d. Disconnect power.

e. Disconnect the speaker from the amplifier by disconnecting the negative side of C6 from the terminal board. Clip an 8-ohm, 4-watt resistor between the negative lead of C6 and ground.

f. Connect the HP-400D Vacuum-Tube Voltmeter across the 8-ohm load.

g. Apply the 28 volts across pins C and B of J1, and set the HP-200CD to 1 kc. Move the SPEAKER VOLUME control fully clockwise. Adjust the HD-200CD output until 4 volts rms appears across the 8-ohm load. Read the input voltage. The input voltage should not be more than 0.7 volt rms. A higher input voltage indicates low gain.

h. Move the SPEAKER VOLUME control fully counterclockwise, and measure the output voltage on the vtvm. The voltage should not exceed 0.015 volt.

i. If gain is not sufficient, check the transistors.

j. Reconnect the negative lead of C6 to the terminal board, and reassemble the 76F-3.

k. Apply 28 volts d-c across pins C and B of J1.

l. Connect the HP-200CD across the 8-ohm pins D and B of J1.

m. Connect the HP-400D across the 8-ohm load.

n. Adjust the HP-200CD for 1 kc at 2 volts rms. Set INDICATOR SENSITIVITY ADJUSTMENT fully clockwise.

o. Slowly turn INDICATOR SENSITIVITY ADJUSTMENT counterclockwise, and observe that the lamp stays on with steady brightness until near counterclockwise position of the INDICATOR SENSITIVITY ADJUSTMENT is reached.

p. Return the INDICATOR SENSITIVITY ADJUSTMENT fully clockwise. Adjust the level of the HP-200CD until the RECEIVER SIGNAL INDICATOR lamp goes out. This level, as measured with the HP-400D, should be approximately 0.10 volt rms.

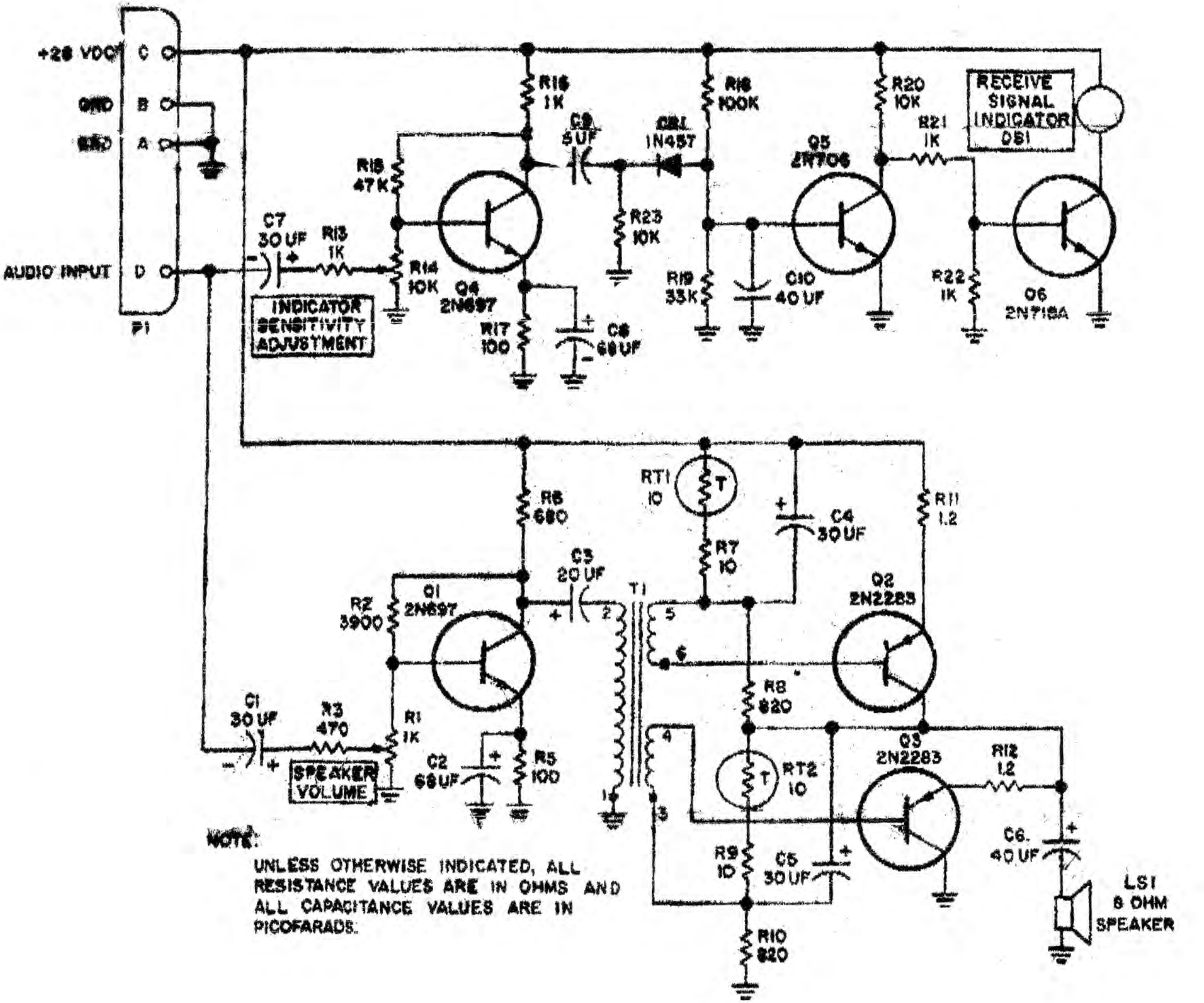

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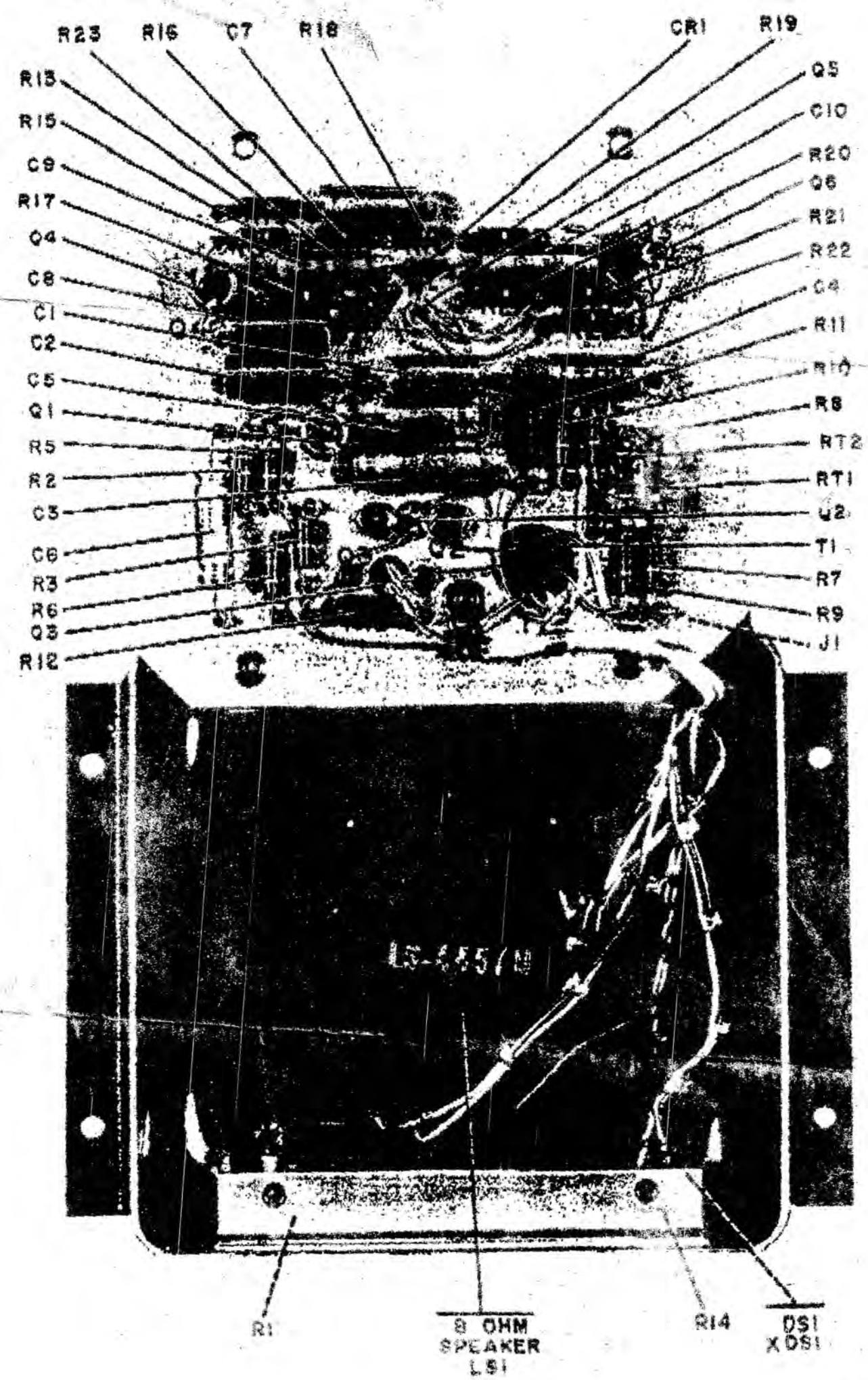
Figure 4. 76F-3 Speaker/Amplifier, Schematic Diagram


R23
R16
C7
R18
CR1
R19
R13
Q5
R15
C10
C9
R20
R17
Q6
Q4
R21
C8
R22
C1
C4
C2
R11
C5
R10
Q1
R8
R5
RT2
R2
RT1
C3
J2
C6
T1
R3
R7
R6
R9
Q3
J1
R12
R1
8 OHM
SPEAKER
LS1
R14
DS1
XDS1

RELIEF
VALVE
CLOSE FOR
FORDING ONLY

CLOSED

INDICATOR
ENSITIVITY
DJUSTMENT

SPEAKER
VOLUME

RECEIVE
SIGNAL
INDICATOR


RW69V
1R2
R12
R6
R5
R11
RT1
SPRAGUE +
20-50 D.C.
SPRAGUE +
SPRAGUE +
SPRAGUE +
KEMET
68-20DC
SPRAGUE
6504+
400UN3
SPRAGUE +
SPRAGUE +
6747
Q5
R18
CR1
C7
C9