

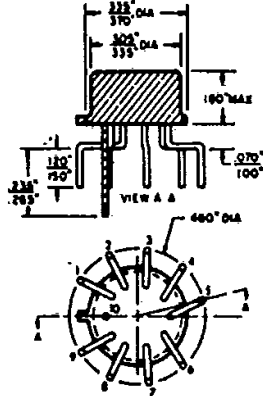


# ECG704

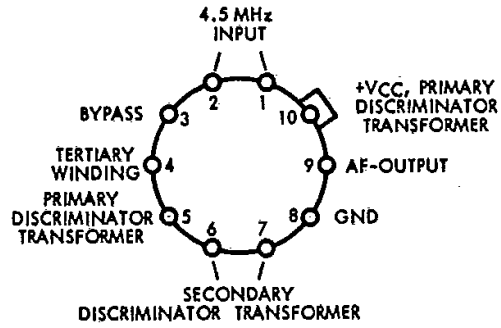
TV SOUND IF  
T-77-07-07

### FEATURES & APPLICATIONS:

- exceptionally high gain:  
power gain at 4.5 Mc/s — 75 dB typ.
- excellent limiting characteristics —  
input limiting voltage (knee)  
= 300  $\mu$ V typ. at 4.5 Mc/s
- excellent AM rejection: > 50 dB  
at 4.5 Mc/s
- high audio-voltage recovery —  
220 mV typ. at 4.5 Mc/s,  
25 kc/s deviation
- wide frequency capability — 100 kc/s  
to > 20 Mc/s
- comprehensive circuit functions:  
if amplifier, AM and noise limiter,  
FM detector, audio preamplifier



OPERATING-TEMPERATURE RANGE . . . -55 to +125 °C  
 STORAGE-TEMPERATURE RANGE . . . . -65 to +200 °C  
 MAXIMUM INPUT-SIGNAL VOLTAGE:  
 Between Terminals 1 and 2 . . . . .  $\pm 3$  V  
 MAXIMUM DEVICE DISSIPATION . . . . . 300 mW  
 RECOMMENDED MINIMUM DC  
 SUPPLY VOLTAGE (VCC) . . . . . 5.5 V



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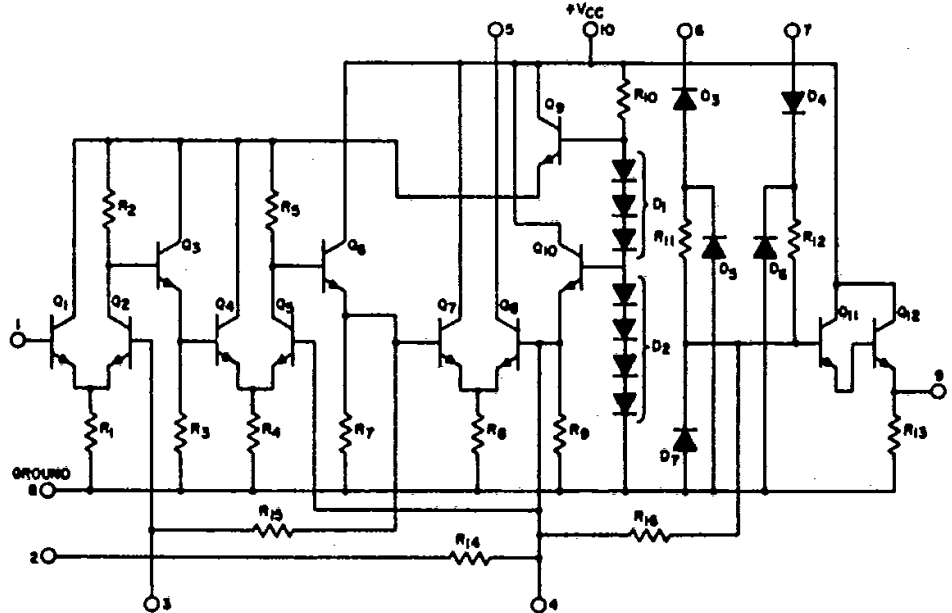


Fig. 1

ABSOLUTE-MAXIMUM VOLTAGE LIMITS AT  $T_A = 25^\circ C$

Indicated voltage limits for each terminal can be applied under the specified voltage conditions for other terminals. All voltages are with respect to ground (Terminal 8).

TERMINAL	VOLTAGE LIMITS		VOLTAGE CONDITIONS AT OTHER TERMINALS									
			1	2	3	4	5	6	7	8	9	10
1	-3	+3	-	Same as 1	Do Not Apply External Voltage	+2.5 to +10	+10	Same as 4	Same as 4	Ground	AF Output	+10
2	-3	+3	Same as 2	-		+2.5 to +10	+10	Same as 4	Same as 4	Ground	AF Output	+10
3	-3	+3	-3 to +3	Same as 1		+2.5 to +10	+10	Same as 4	Same as 4	Ground	AF Output	+10
4	+2.5	+10	-3 to +3	Same as 1		-	+10	Same as 4	Same as 4	Ground	AF Output	+10
5	0	+13	-3 to +3	Same as 1		+2.5 to +10	-	Same as 4	Same as 4	Ground	AF Output	+10
6	+2.5	+10	-3 to +3	Same as 1		Same as 6	+10	-	Same as 4	Ground	AF Output	+10
7	+2.5	+10	-3 to +3	Same as 1		+2.5 to +10	+10	Same as 4	-	Ground	AF Output	+10
8	-3	+10	-3 to +3	Same as 1		+2.5 to +10	+10	Same as 4	Same as 4	Ground	AF Output	+10
9	0	+10	-3 to +3	Same as 1		+2.5 to +10	+10	Same as 4	Same as 4	Ground	-	+10
10	0	+13	-3 to +3	Same as 1		+2.5 to +10	+10	Same as 4	Same as 4	Ground	AF Output	-
CASE	INTERNALLY CONNECTED TO TERMINAL No.8 (GROUND TERMINAL)											

BLOCK DIAGRAM OF TYPICAL TELEVISION RECEIVER USING INTEGRATED-CIRCUIT SOUND-IF AMPLIFIER AND DETECTOR SECTION

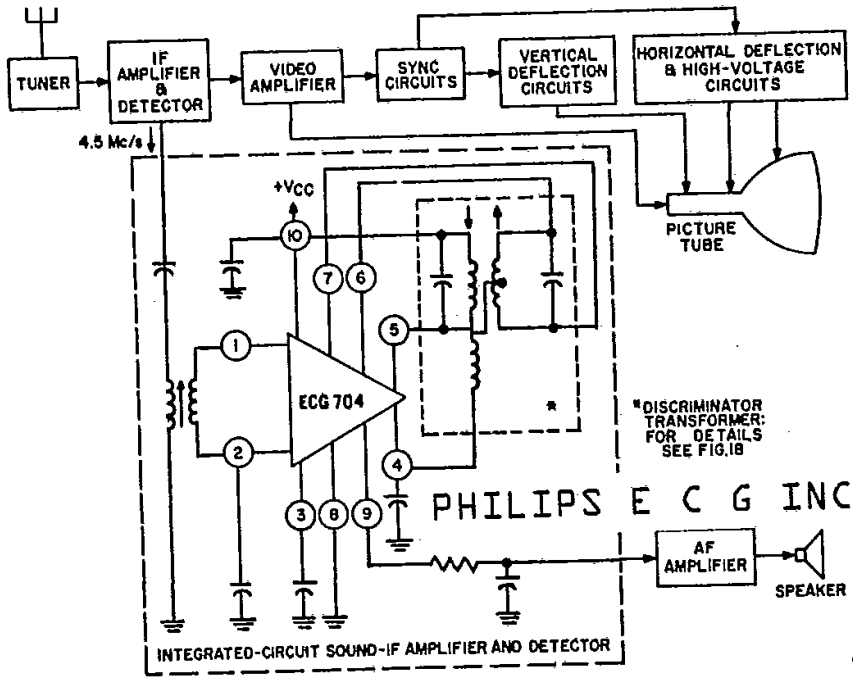
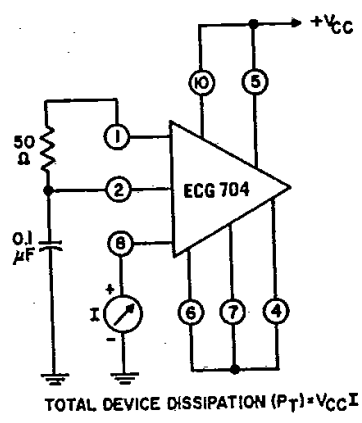


Fig.2

DISSIPATION TEST SETUP



TOTAL DEVICE DISSIPATION ( $P_T$ ) =  $V_{CC} I$

Fig.3

DISSIPATION vs. TEMPERATURE

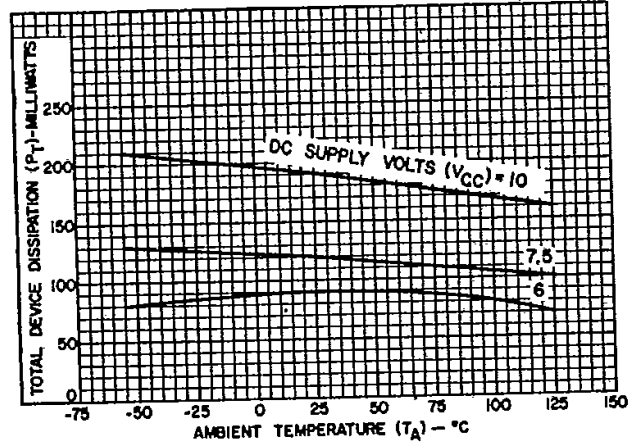
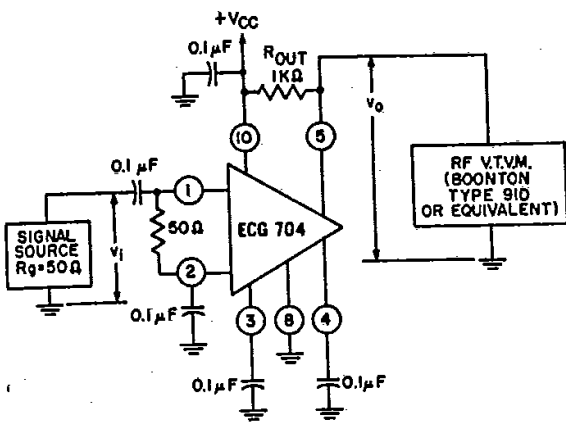


Fig.4

VOLTAGE-GAIN TEST SETUP



PROCEDURE:

- 1) Set input frequency at desired value,  $v_i = 100 \mu V$  rms.
- 2) Record  $v_o$ .
- 3) Calculate Voltage Gain A from  $A = 20 \log_{10} v_o/v_i$ .
- 4) Repeat Steps 1, 2, and 3 for each frequency and/or temperature desired.

Fig.5

1-Mc/s VOLTAGE GAIN vs. TEMPERATURE

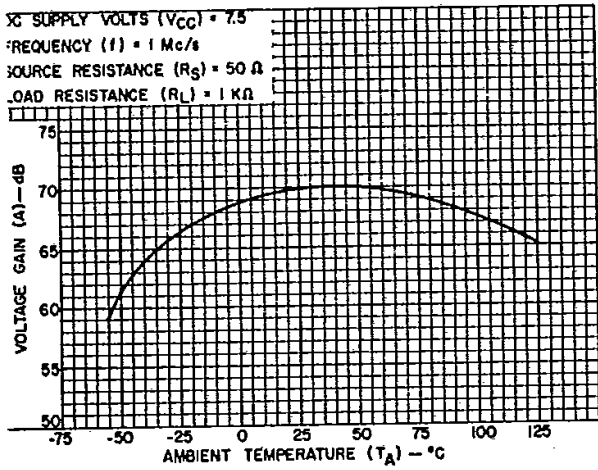


Fig.6

VOLTAGE GAIN vs. FREQUENCY

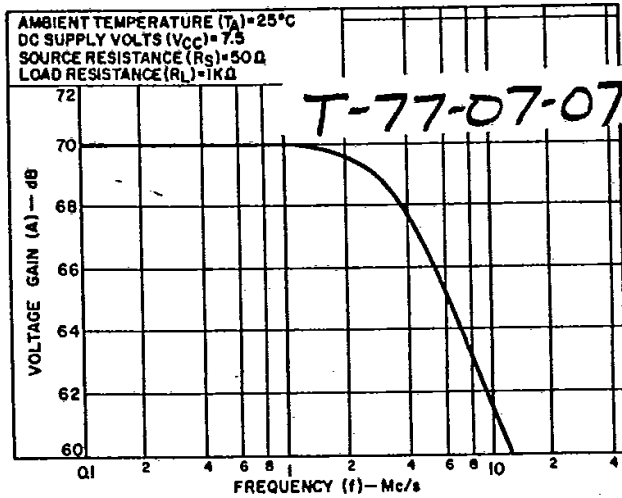


Fig.7

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INPUT-IMPEDANCE COMPONENTS TEST SETUP

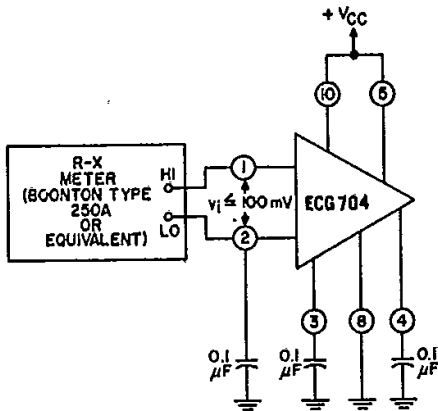


Fig.8

INPUT-IMPEDANCE COMPONENTS vs. FREQUENCY

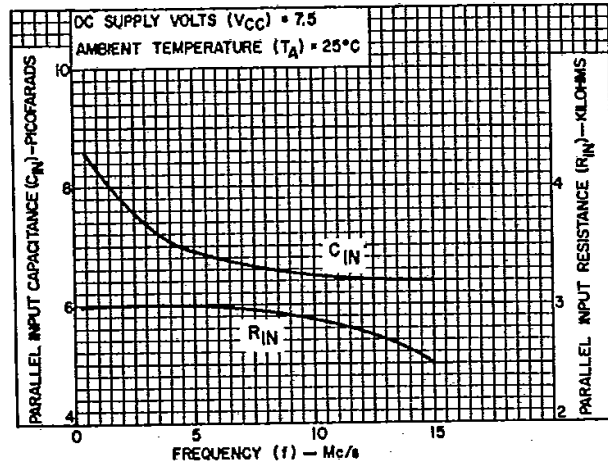


Fig.9

OUTPUT-IMPEDANCE COMPONENTS TEST SETUP

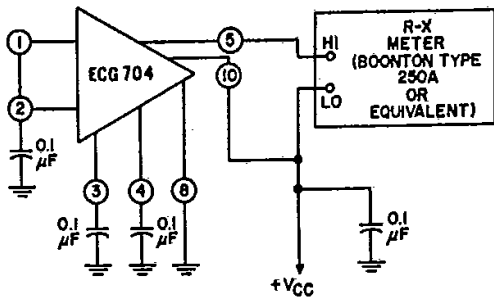


Fig.10

OUTPUT-IMPEDANCE COMPONENTS vs. FREQUENCY

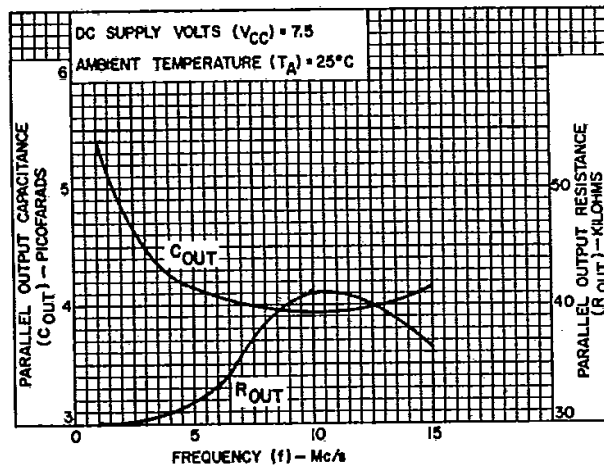
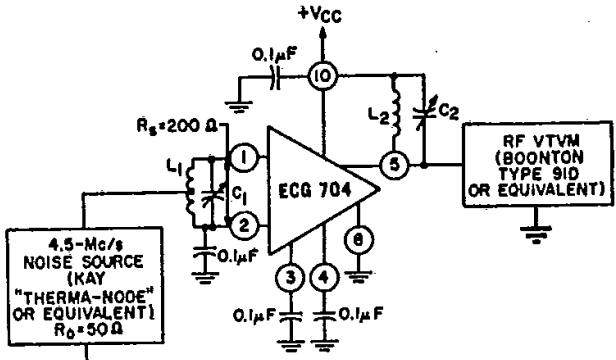


Fig.11

**NOISE FIGURE TEST SETUP**



$L_1 = 82 \mu\text{H}$ , center-tapped  
 $L_2 = 2.36 \mu\text{H}$   
 $C_1, C_2 = \text{Arco Type 423 padder, or equivalent}$

Fig. 12

**NOISE FIGURE vs. DC SUPPLY VOLTAGE**

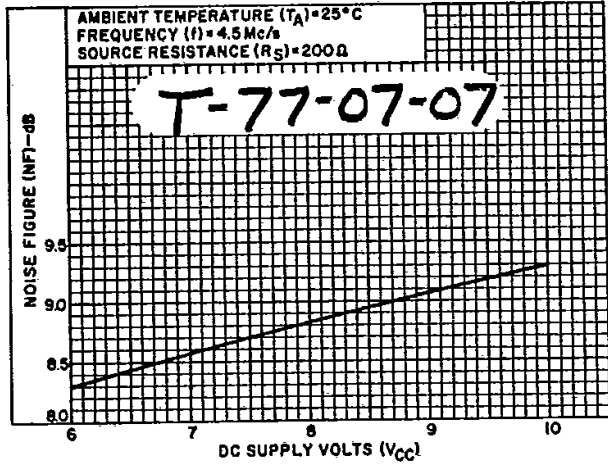
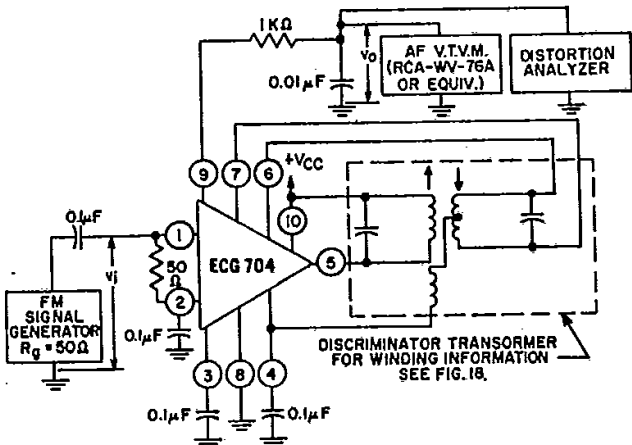


Fig. 13

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**INPUT LIMITING VOLTAGE, RECOVERED AF VOLTAGE, AND TOTAL HARMONIC DISTORTION TEST SETUP**



**PROCEDURE:**

- A - Recovered-AF Voltage Output:
  - 1) Set input frequency = 4.5 Mc/s,  $v_i = 100 \text{ mV rms}$ , modulating frequency = 1 kc/s, frequency deviation =  $\pm 25 \text{ kc/s}$ .
  - 2) Record  $v_o$  as Recovered-AF Voltage Output.
- B - Input Limiting Voltage (Knee):
  - 1) Repeat Steps A1 and A2, using  $v_i = 100 \text{ mV rms}$ .
  - 2) Decrease  $v_i$  to the level at which  $v_o$  is 3 dB below its value for  $v_i = 100 \text{ mV}$ .
  - 3) Record  $v_i$  as Input Limiting Voltage (Knee).

Fig. 14

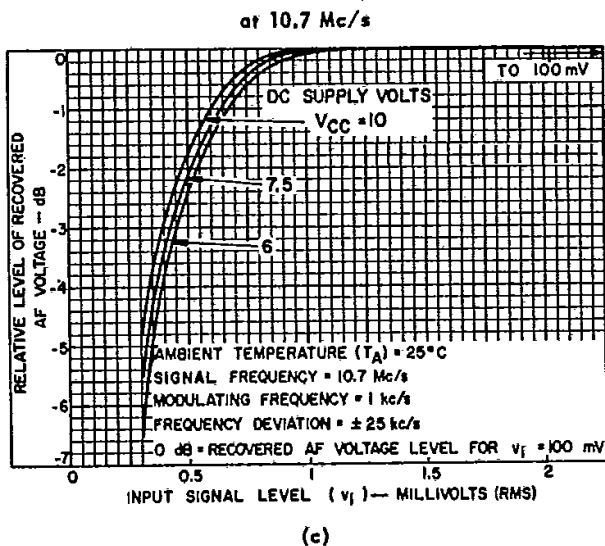
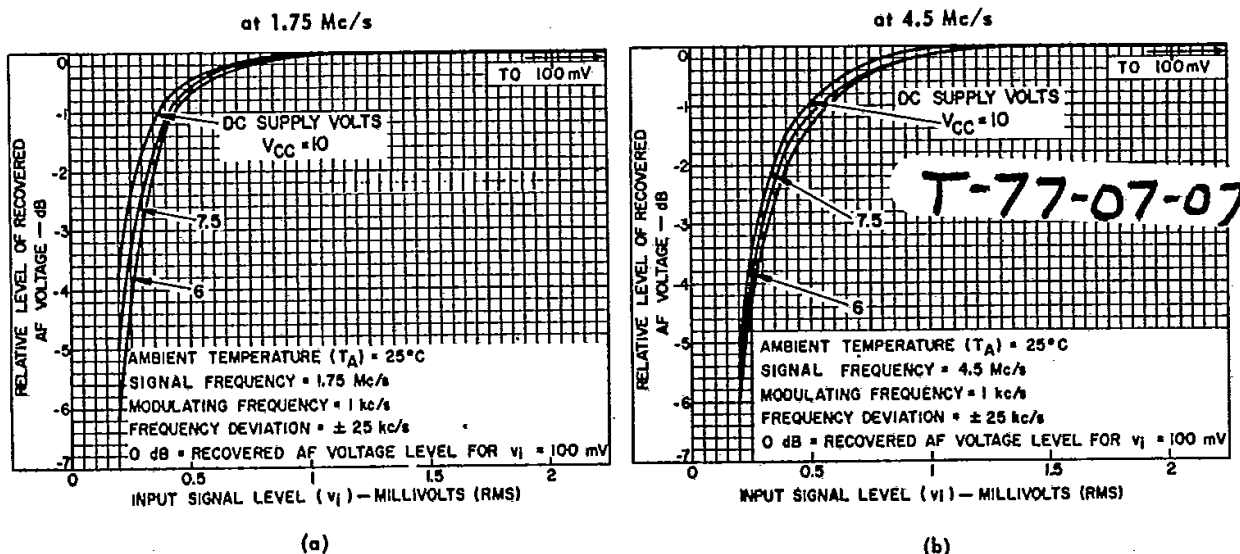
ELECTRICAL CHARACTERISTICS

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CHARACTERISTICS	SYMBOLS	TEST CONDITIONS				LIMITS				TYPICAL CHARACTERISTICS CURVES	
		SETUP & PROCEDURE	FREQUENCY f	DC SUPPLY VOLTAGE V <sub>CC</sub>	AMBIENT TEMPERATURE T <sub>A</sub>	ECG 704			UNITS		
		Fig.	Mc/s	volt's	°C	Min.	Typ.	Max.			Fig.
Total Device Dissipation*	P <sub>T</sub>	3	-	6	-55	73	80	120	mW	4	
					+25	73	90	110	mW		
					+125	60	70	110	mW		
		3	-	7.5	-55	106	130	170	mW	4	
					+25	106	120	150	mW		
					+125	90	100	150	mW		
		3	-	10	-55	165	210	250	mW	4	
					+25	165	190	230	mW		
					+125	150	160	230	mW		
Voltage Gain**	A	5	1	6	-55	50	55	-	dB	6	
					+25	60	66	-	dB		
					+125	50	61	-	dB		
		5	1	7.5	-55	55	59	-	dB	6	
					+25	65	70	-	dB		
					+125	55	65	-	dB		
		5	1	10	-55	55	61	-	dB	6	
					+25	65	71	-	dB		
					+125	55	66	-	dB		
		5	-	4.5	7.5	+25	60	67	-	dB	7
				10.7	7.5	+25	55	60	-	dB	
		Input-Impedance Components:	PHILIPS E C G INC								
Parallel Input Resistance	R <sub>IN</sub>	8	4.5	7.5	+25	-	3	-	kΩ	9	
Parallel Input Capacitance	C <sub>IN</sub>	8	4.5	7.5	+25	-	7	-	pF	9	
Output-Impedance Components:	I 7 E D										
Parallel Output Resistance	R <sub>OUT</sub>	10	4.5	7.5	+25	-	31.5	-	kΩ	11	
Parallel Output Capacitance	C <sub>OUT</sub>	10	4.5	7.5	+25	-	4.2	-	pF	11	
Noise Figure	NF	12	4.5	7.5	+25	-	8.7	-	dB	13	
Input Limiting Voltage (Knee)	v <sub>i(lim)</sub>	14	4.5	7.5	+25	-	300	400	μV	15	
Recovered AF Voltage	v <sub>o(af)</sub>	14	4.5	6	+25	-	155	-	mV	15	
				7.5	+25	135	188	-	mV		
				10	+25	-	220	-	mV		
Amplitude-Modulation Rejection	AMR	16	4.5	7.5	+25	-	50	-	dB	-	
Discriminator Output Resistance	R <sub>O(disc)</sub>	-	4.5	7.5	+25	-	60	-	Ω	-	
Total Harmonic Distortion	THD	14	4.5	7.5	+25	-	1.8	-	%	17	

\* Total current drain may be determined by dividing P<sub>T</sub> by V<sub>CC</sub>.

\*\* Recommended minimum dc supply voltage (V<sub>CC</sub>) is 5.5 V.  
Nominal load current flowing into terminal 5 is 1.5 mA at 7.5 V.

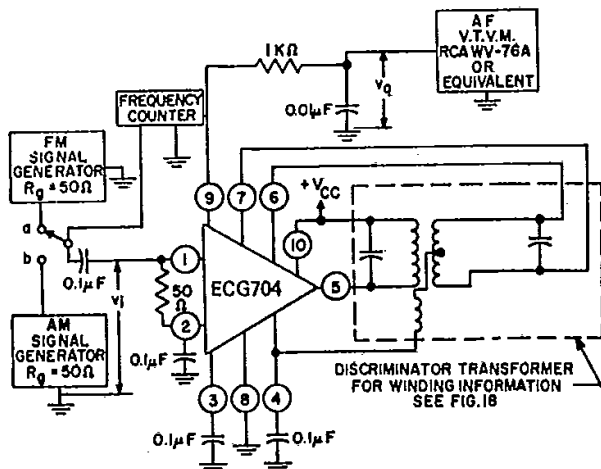


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Fig. 15

AM-REJECTION TEST SETUP



PROCEDURE:

- 1) With Switch S in position "a", set input frequency = 4.5 Mc/s,  $v_i = 10$  mV rms, modulating frequency = 1 kc/s, frequency deviation = ± 25 kc/s.
- 2) Record  $v_o$ .
- 3) Place Switch S in position "b", and set input frequency = 4.5 Mc/s,  $v_i = 10$  mV rms, modulating frequency = 1 kc/s, % modulation = 50.
- 4) Measure  $v_o$ , and record value in dB below value in Step 2 as AM Rejection.

Fig. 16

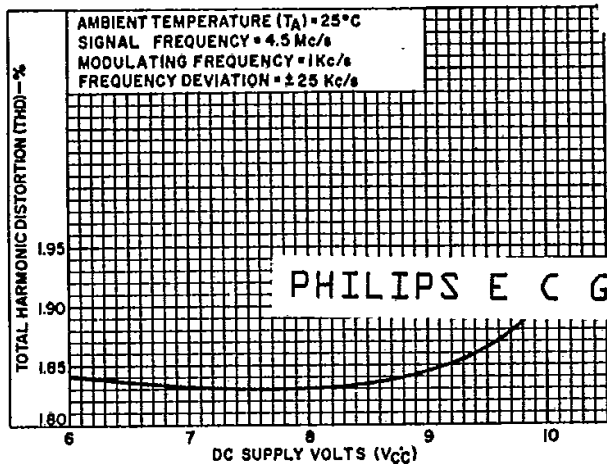


Fig. 17

**DEFINITIONS OF TERMS**

**Total Device Dissipation ( $P_T$ )**

The total power drain of the device with no signal applied and no external load current.

**Voltage Gain (A)**

The ratio of the signal voltage developed at the output of the device to the signal voltage applied to the input, expressed in dB.

**Input Impedance**

The ratio of a change in input voltage to a change in input current, measured at the input terminal of the device, with respect to ground.

**Output Impedance**

The ratio of a change in output voltage to a change in output current, measured at the output terminal of the device, with respect to ground.

**Input Limiting Voltage (Knee) [ $v_i(\text{lim})$ ]**

The input signal voltage which will cause the output signal to decrease 3 dB from its maximum level.

**Recovered AF Voltage [ $v_o(\text{af})$ ]**

The rms value of the AF output voltage of the device produced by a specified frequency deviation of an FM input signal.

**Amplitude-Modulation Rejection (AMR)**

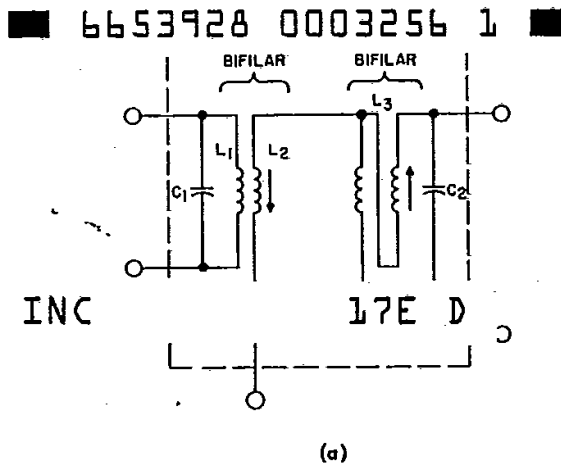
The ratio of the recovered AF output voltage produced by a specified frequency deviation of an FM input signal to the recovered AF output voltage produced by an amplitude-modulated input signal having the same carrier frequency, expressed in dB.

**Discriminator Output Resistance [ $R_O(\text{disc})$ ]**

The ratio of a change in AF output voltage to a change in output current, measured between the output terminal of the device and ground.

**Total Harmonic Distortion (THD)**

The ratio of the total rms voltage of all harmonics to the rms voltage of the fundamental, expressed in per cent. These voltages are measured at the af output terminal of the device, with respect to ground.



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**CONSTRUCTION DETAILS OF DISCRIMINATOR TRANSFORMERS SHOWN IN FIGS. 2, 14 AND 16**

Coil-Form Outside Diameter = 7/32 inch  
 Slugs: Radio Industries, Inc. Type "E" Material, or equivalent  
 Wire Type: "GRIFEZE"\*, or equivalent

Operating Frequency Mc/s	Wire Size (AWG #)	Turns			C <sub>1</sub> pF	C <sub>2</sub> pF
		L <sub>1</sub> <sup>▲</sup>	L <sub>2</sub> <sup>▲</sup>	L <sub>3</sub>		
1.75	40	44	20	44 total (22 bifilar wound)	820	820
4.5	36	18	7	22 total (11 bifilar wound)	560	330
10.7	36	18	18	18 total (9 bifilar wound)	100	100

\* Registered Trade Mark, Phelps-Dodge Copper Products.

▲ wound bifilar.

NOTE: The mutual coupling between L<sub>1</sub> and L<sub>3</sub> is adjusted for the desired degree of linearity.

(b)

Fig. 18