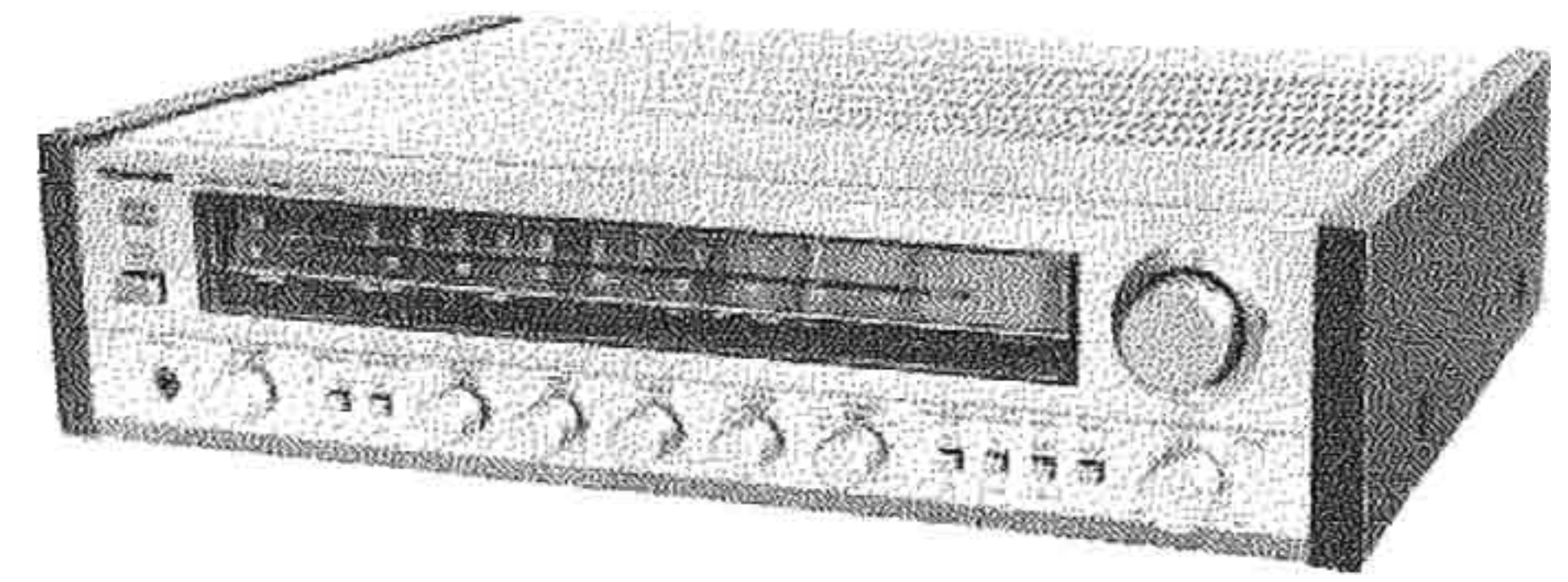


# TOSHIBA

## SERVO LOCKED STEREO RECEIVER

# SA-5000



### SPECIFICATIONS

#### POWER OUTPUT

Continuous Power Output is 50 watts per channel, min. RMS at 8 ohms from 20 to 20,000 Hertz with no more than 0.03% total harmonic distortion.

#### AMPLIFIER SECTION

Power output	
20 Hz ~ 20 kHz Both channel driven:	60W x 2 4 ohms
1 kHz Both channel driven:	55W x 2 8 ohms 65W x 2 4 ohms
Total harmonic distortion:	at 8 ohms
Rated power output:	0.03% (8 ohm)
1W:	0.02%
Intermodulation distortion:	0.03%
Damping factor:	30
Input (Sensitivity/Impedance)	
PHONO:	2.5 mV/47K ohms
AUX:	150 mV/47K ohms
TAPE 1, 2:	150 mV/47K ohms
PHONO Overload level:	240 mV rms at 1 kHz
Output level	
TAPE REC 1, 2:	150 mV
Frequency response	
PHONO (RIAA Equalization):	20 Hz to 20 kHz $\pm 0.3$ dB
AUX, TAPE:	10 Hz to 60 kHz $\begin{matrix} +1 \\ -2 \end{matrix}$ dB
Tone control	
BASS:	$\pm 10$ dB, (100 Hz)
TREBLE:	$\pm 10$ dB, (10 kHz)
Loudness contour	+8 dB (100 Hz), +4 dB (10 kHz)
Signal to noise ratio (IHF short-circuited A network, rated power)	
PHONO:	78 dB
AUX, TAPE:	95 dB
Filter	
SUBSONIC:	16 Hz $-6$ dB/oct.

#### FM TUNER SECTION

Usable sensitivity:	Mono 10.3 dBf (1.8 $\mu$ V)
50 dB Quieting sensitivity:	Mono 16.3 dBf (3.6 $\mu$ V) Stereo 38.3 dBf (45 $\mu$ V)
Signal to noise ratio:	Mono 78 dB, Stereo 72 dB
Distortion	
1 kHz:	Mono 0.08%, Stereo 0.15%
Frequency response:	20 Hz to 15 kHz $+0.5$ dB, $-2$ dB
Capture ratio:	1.0 dB
Alternate channel selectivity:	75 dB
Spurious response ratio:	75 dB
Image rejection ratio:	60 dB
IF Rejection ratio:	90 dB
AM Suppression ratio:	50 dB
Stereo separation:	45 dB (1 kHz), 30 dB (30 Hz to 15 kHz)

#### AM TUNER SECTION

Sensitivity:	300 $\mu$ V/m (IHF, ferrite antenna)
Selectivity:	35 dB
Signal to noise ratio:	50 dB
Image rejection ratio:	45 dB

#### MISCELLANEOUS

Power requirements:	AC 120 V 60 Hz
Power consumption:	220 watts(UL) 2.7 A(CSA)
Dimensions (W x H x D):	450 x 116 x 370 (mm)
Weight:	9.5 kg

Specifications are subject to change without notice.

TA, TC

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# FRONT PANEL

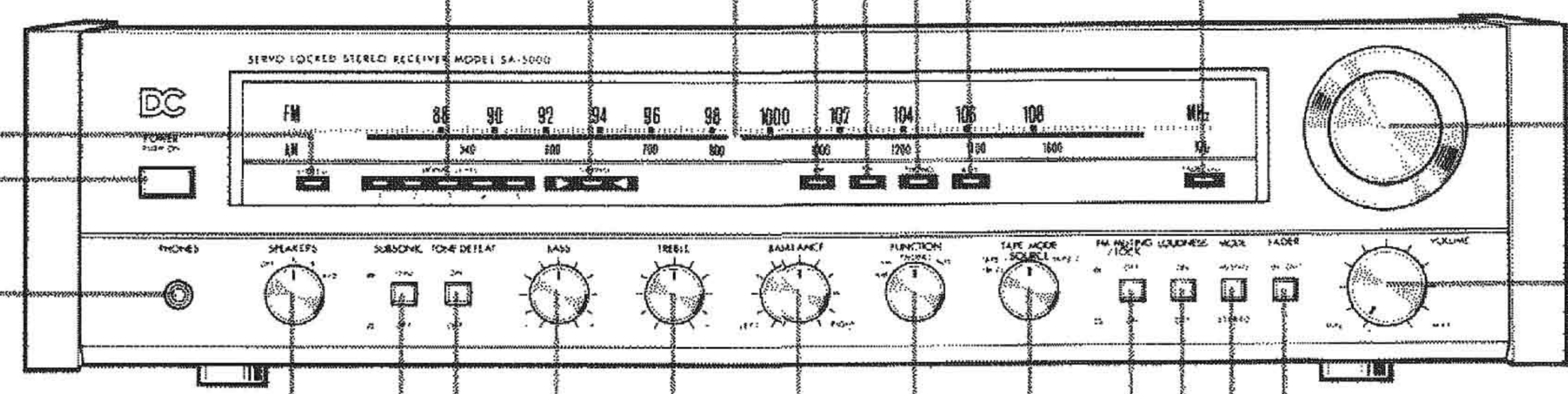


Figure 1.

## ■ TUNING INDICATOR

The red arrows of the tuning indicator light up to indicate from which direction a broadcast is being approached. When the broadcast has been tuned precisely to the center, the red arrows will go out. At this point, release the tuning knob and the servo lock circuitry will automatically locate and lock onto the optimum tuning point at which time the center green LED will light up (FM muting/lock switch must be ON). This indicator does not operate for AM broadcasts.

## ■ SIGNAL INDICATOR

These LEDs light up to indicate the strength of the signal being received, more LEDs lighting up for increasingly stronger signals.

## ■ FM STEREO INDICATOR

This lights up when a stereophonic FM broadcast is received.

## ■ POWER SWITCH

Depress this switch to turn on power; depress once more to turn power off.

## ■ PHONES JACK

Used for connecting stereo headphones. A wide variety of high quality headphones is available from TOSHIBA.

## ■ SPEAKER SWITCH

**OFF:** Sound from headphones only.

**A:** Sound from speakers connected to terminals A on the rear panel.

**B:** Sound from speakers connected to terminals B on the rear panel.

**A + B:** Sound from both pairs of speakers (if connected).

## ■ SUBSONIC FILTER SWITCH

This filter reduces the ultra low frequency noise due to various causes, notably record warp. Frequencies below 16 Hz are attenuated by 6 dB/oct when this switch is on.

## ■ TONE DEFEAT SWITCH

This push-button switch must be left in the OFF (□) position when making bass and treble tone adjustments. Depress to the ON (⊣) position to assure flat (unaltered) tone response.

## ■ BASS AND TREBLE CONTROLS

Adjust for desired bass and treble tone response. Leave both controls in the center 0 position for a flat tone response. Turn clockwise to boost, and counterclockwise to diminish tone response by up to 10 dB.

## ■ BALANCE CONTROL

Adjust left and right channel balance depending on listening room conditions. When this control is turned clockwise, the left channel is decreased, and when turned counterclockwise, the right channel is decreased.

## ■ FUNCTION SWITCH

Selects the desired program source.

**AM:** AM reception

**FM:** FM reception with automatic switching for stereo or mono broadcasts

**PHONO:** For playing records

**AUX:** For the component connected to the AUX input jacks.

## ■ TUNING POINTER

This pointer indicates the frequency to which the unit is tuned.

## ■ PROGRAM SOURCE INDICATOR

## ■ FADE OUT INDICATOR

This lights up to indicate that the volume has been faded out.

## ■ TUNING KNOB

Rotate this knob to tune in the desired radio broadcast. During FM reception, touching this knob deactivates the servo lock tuning function while releasing it activates the servo lock automatic tuning.

## ■ VOLUME CONTROL

For adjusting the volume level of the speakers and headphones.

## ■ FADER SWITCH

Pushing this switch in will alternately cause the volume to fade out and fade in. Use the fade out function to temporarily lower volume to reduce the sound produced when the stylus is placed on a record or any other unpleasant sounds. Depress again to activate the fade in function to raise the volume back to the level set by the volume control. The fade indicator lights up to show that the volume has been faded out, it turns off as soon as the volume is faded in again. Fade out decreases volume by approximately 40 dB. If volume is turned up during fade out, a slight amount of sound will be audible; this is not a malfunction of the unit.

## ■ MODE SWITCH

Selects either stereo or mono reception.

**STEREO:** Leave this switch in the STEREO position for normal operation.

**MONO:** Left and right channel signals will be blended together and heard through both speakers; even stereo broadcasts will be heard in mono. Use this setting to improve reception of weak stations.

## ■ LOUDNESS SWITCH

In the ON (⊣) position, low and high frequencies are enhanced to compensate for the frequency response of the human ear at low volume levels.

## ■ FM MUTING/LOCK SWITCH

Turn this switch ON (□) to suppress the interstation noise heard between stations while scanning the dial. However, because weak broadcasts will be suppressed along with the static by the muting circuit, it must be turned OFF (⊣) to receive weak stations. Turning this switch ON also allows the servo lock to operate while turning if OFF prevents the servo lock from functioning. This switch has no effect on AM reception.

# CONNECTION DIAGRAM

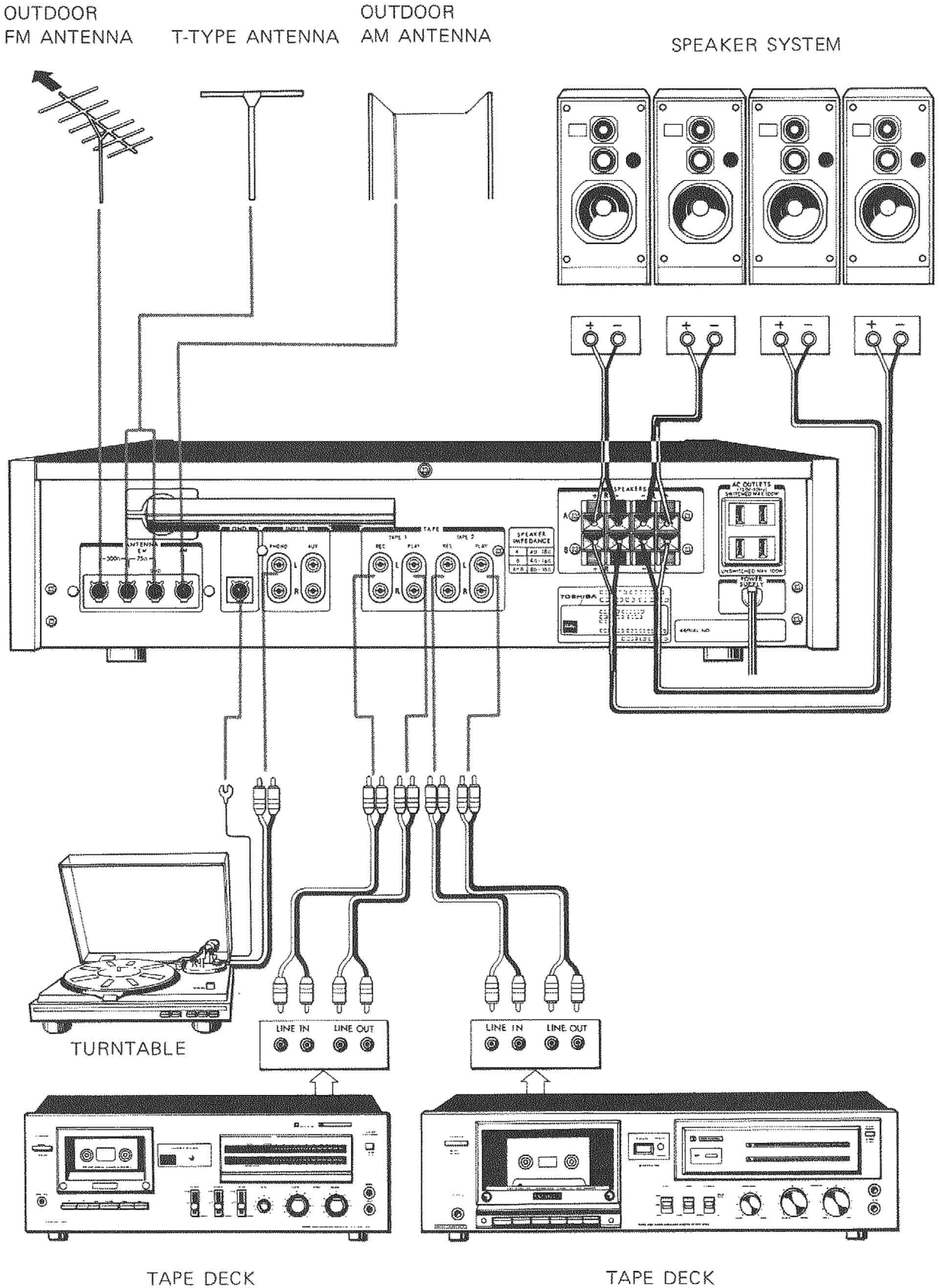


Figure 2.

# FEATURES

## ■ LOW DISTORTION HIGH OUTPUT DC POWER AMP

This ICL, OCL DC power amp has a dual FET first stage, differential second stage with stabilized current load and Darlington pure complementary single push-pull output stage employing high output high voltage overload resistance power transistors. The result is an amplifier section that delivers 50W + 50W of clean power into 8 ohm speakers from 20 Hz to 20,000 Hz with only 0.03% total harmonic distortion. That means fine quality music with a wide range of speaker systems, especially the new generation of Toshiba SS series speakers.

## ■ CONVENIENT ELECTRONIC FADER CIRCUIT

This innovative fader function provides -40 dB volume attenuation to eliminate clicks, crackles and other unwanted momentary noises.

## ■ SOPHISTICATED CIRCUITRY USED THROUGHOUT

The SA-5000, though competitively priced, contains the kind of circuitry is usually found on the most advanced and expensive high fidelity amplifiers. All stages are directly coupled to provide crisp bass, smooth treble and brilliant transients. A fully complementary transistor configuration, balanced twin power lines, and an output capacitor-less (OCL) output stage provide pure, clean response over the entire audio spectrum. A specially matched pair of massive 10,000 $\mu$ F capacitors insures excellent transient response, stability and balance all the way to maximum output levels.

## ■ SUPERB PHONO DYNAMIC RANGE -240mV RMS

The maximum allowable PHONO input is a remarkable 240mV RMS (1 kHz). This was realized through the use of low noise ICs capable of withstanding high voltages. The result is a PHONO section with an extremely wide dynamic range.

## ■ TOUCH SENSOR SERVO LOCKED TUNING

A servo lock circuit is employed to guarantee you get the best sound quality possible from FM broadcasts. The servo lock does this by automatically locating and locking onto the optimum tuning point (the point at which distortion is minimized). To make this system easy to operate, it is connected to a touch sensor tuning knob that makes troublesome fine tuning adjustments much easier and far more accurate.

## ■ SENSITIVE FM RECEPTION

The advanced front-end design, incorporating dual gate MOS FETs (field-effect transistors), RF amplification and a 3-gang frequency linear variable capacitor (two-gang for AM) provides extremely high sensitivity (1.8 $\mu$ V IHF) and low intermodulation distortion. And the excellent quieting characteristics allow for reception of even distant stations with a good S/N ratio. Both a 300 $\Omega$  balanced feeder and 75 $\Omega$  co-axial cable connector are provided for the antenna.

## ■ TOP QUALITY RECEPTION OF LOCAL STATIONS

A special high-density IC ensures top performance and high reliability for the all-important IF stage. Equipped with three two-element ceramic filters with excellent flat group delay characteristics, the SA-5000's razor-sharp selectivity will separate even the most closely spaced stations on the dial.

## ■ PHASE LOCKED LOOP (PLL) STEREO DECODER

The stereo multiplex decoder is the key to FM stereo quality. The advanced PLL circuitry of the SA-5000 ensures optimum separation between the two stereo channels and low distortion by "locking" onto the stereo pilot signal. By using a single IC, TOSHIBA has replaced a host of individual components with one highly reliable PLL unit. This unit is virtually unaffected by changes in temperature and humidity, and will offer uniformly superb performance through many years of trouble-free use.

## ■ BEFORE SWITCHING POWER ON

It is vital that controls and switches are set as specified as follows before turning on the power switch in order to avoid spontaneous overload of the speaker system and other receiver components.

1. The volume control is set to MIN (turn counterclockwise).
2. The bass, treble and balance controls are set approximately at the center.
3. The tape mode switch is set to SOURCE.
4. The mode switch is in the STEREO (◻) position.
5. The FM muting/lock switch is ON (◻).
6. The subsonic filter and tone defeat switches are in the OFF (◻) position.

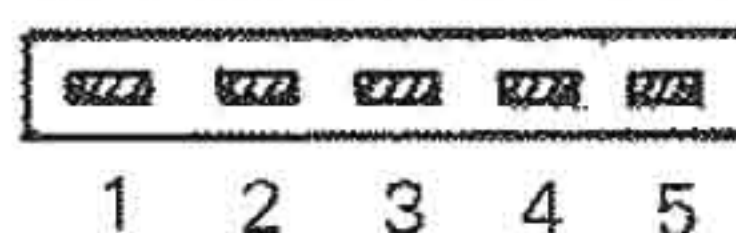
**Note:** The interval after the switch is turned to "on" until the sound is heard.

This set does not produce the sound of the program source in about 3 ~ 6 seconds after the power is turned to "on". If the FUNCTION switch or the VOLUME is turned immediately after the sound is heard, loud noises may be produced, but it is not because of a fault. Turn these after a few seconds.

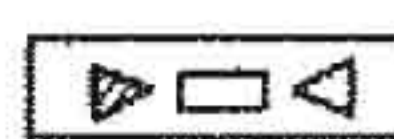
## ■ FM BROADCAST RECEPTION

1. Set the function switch to the FM position.
2. Move the FM muting/lock switch to the ON (◻) position.
3. Rotate the tuning knob until the tuning pointer is aligned with the frequency of the desired station. Fine tune until the maximum number of signal level indicator LEDs is lit and both red tuning indicators have gone off.
4. Now release the tuning knob; the servo lock will automatically lock on to the optimum tuning point and the central green tuning indicator LED will light up to show that the servo lock is operating. If it is a stereo broadcast, the stereo indicator will light up, too.
5. Adjust the volume, bass, treble and balance controls, as well as the loudness control switch and the filters, to obtain the desired volume and tone quality.

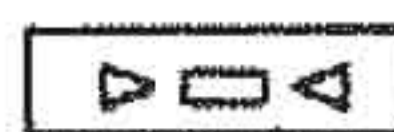
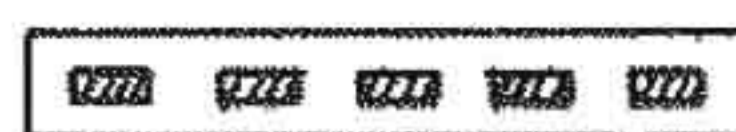
## SIGNAL LEVEL



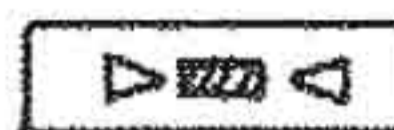
## TUNING



station is being approached from the left



optimum tuning point (no LEDs lit)



servo lock circuit is operating (tuning knob released)

Figure 3.

**Note:** The central green LED will not come on when the FM muting/lock switch is in the OFF (◻) position.

## ■ AM BROADCAST RECEPTION

1. Set the function switch to the AM position.
2. Rotate the tuning knob until the tuning pointer is aligned with the frequency of the desired station. Fine tune until the maximum number of signal strength indicator LEDs is lit.

**Note:** The tuning indicator, stereo indicator, FM muting/lock switch and touch sensor servo locked tuning circuit do not operate during AM reception.

## ■ PLAYING RECORDS

1. Set the function switch to the PHONO position.
2. Operate the record player.
3. Adjust the volume, bass, treble and balance controls, as well as the loudness control switch and the filters, to obtain the desired volume and tone quality.

## ■ PLAYING COMPONENTS CONNECTED TO THE AUX JACKS

When a cartridge deck or other component is connected to the AUX terminals on the rear panel, follow the procedure given below:

1. Set the function switch to the AUX position.
2. Operate the component connected to the AUX terminals.
3. Adjust the volume, balance, treble and bass controls, and the loudness and filter switches, to obtain the desired volume and tone quality.

## ■ TAPE DECK OPERATIONS

### ● Playback

1. Connect the line output(s) of the tape deck(s) to the TAPE PLAY (1 and/or 2) jacks and move the tape mode switch to the TAPE 1 (or TAPE 2) position.
2. Prepare the tape deck for playback.
3. Adjust the volume, bass, treble and balance controls, as well as the loudness switch according to your taste.

- Note:**
1. When the tape mode switch is set to the TAPE 1 or TAPE 2 position, a tape can be played back regardless of the setting of the function switch.
  2. Always keep the tape mode switch in the SOURCE position, except when playing back a tape.

### ● Recording

Connect the line input of the tape deck to TAPE REC (1 or 2) of the receiver, and move the tape mode switch to SOURCE. Select the program source to be recorded on the tape deck by setting the receiver function switch as desired. The output of the receiver to the TAPE REC terminals (1 and 2) is maintained at a constant level, regardless of the position of the volume control. The tape deck should therefore be adjusted to the desired recording level and fidelity.

1. Set the function switch to the desired program source.
2. Start playing the program to be recorded.
3. Start the tape deck recording mode, checking that the proper recording level is maintained.
4. During recording, it is not necessary to adjust the volume, tone and balance controls of the receiver as they have no effect on the recording.

When both TAPE 1 and TAPE 2 terminals are connected to tape decks, simultaneous recording of the same program source takes place.

## ■ TAPE MONITORING

When recording with a tape deck connected to the TAPE 1 (or TAPE 2) terminals, if the tape deck is equipped with a monitoring mechanism, monitoring of the recording is possible by moving the tape mode switch from the SOURCE position to the TAPE 1 (or TAPE 2) position.

## ■ TAPE DUPLICATION

A recorded tape can be copied onto another tape in its entirety, or can be edited by duplicating only the portions which are desired.

### ● Duplication from TAPE 1 to TAPE 2 (Fig. 8)

1. Set the tape mode switch to TAPE 1 ► 2.
2. The tape deck connected to TAPE 1 should be played and the tape deck connected to TAPE 2 should be used to record.

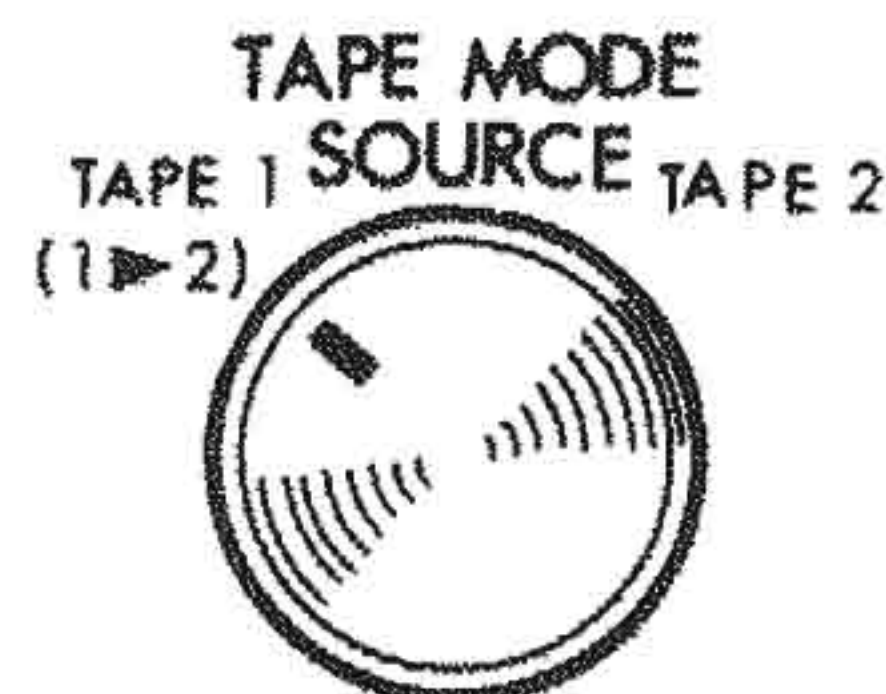


Figure 4.

# DISASSEMBLY INSTRUCTIONS

## CABINET REMOVAL

1. Detach the cabinet by removing 5 screws (A), (B) and (C).

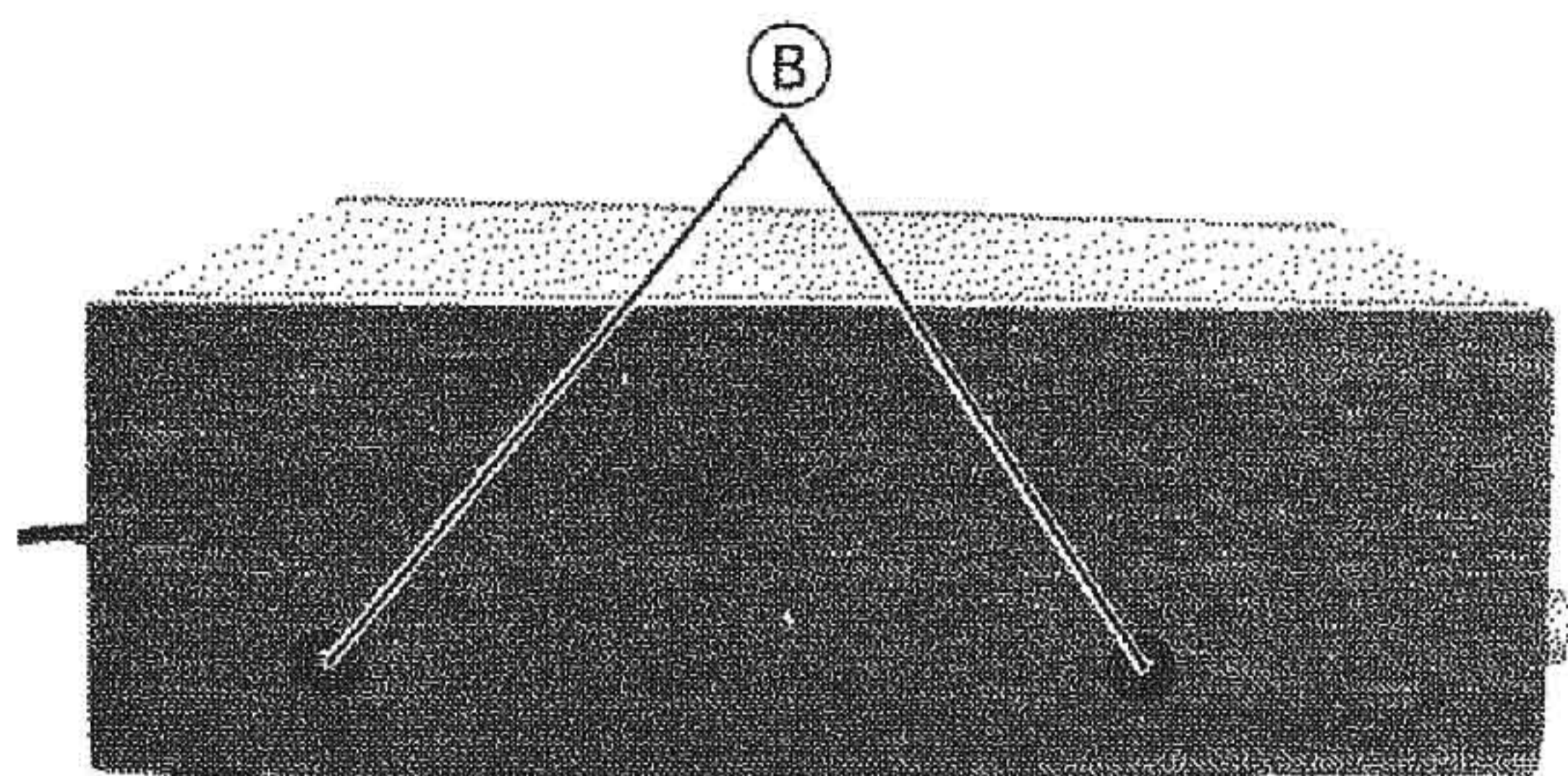


Figure 6.

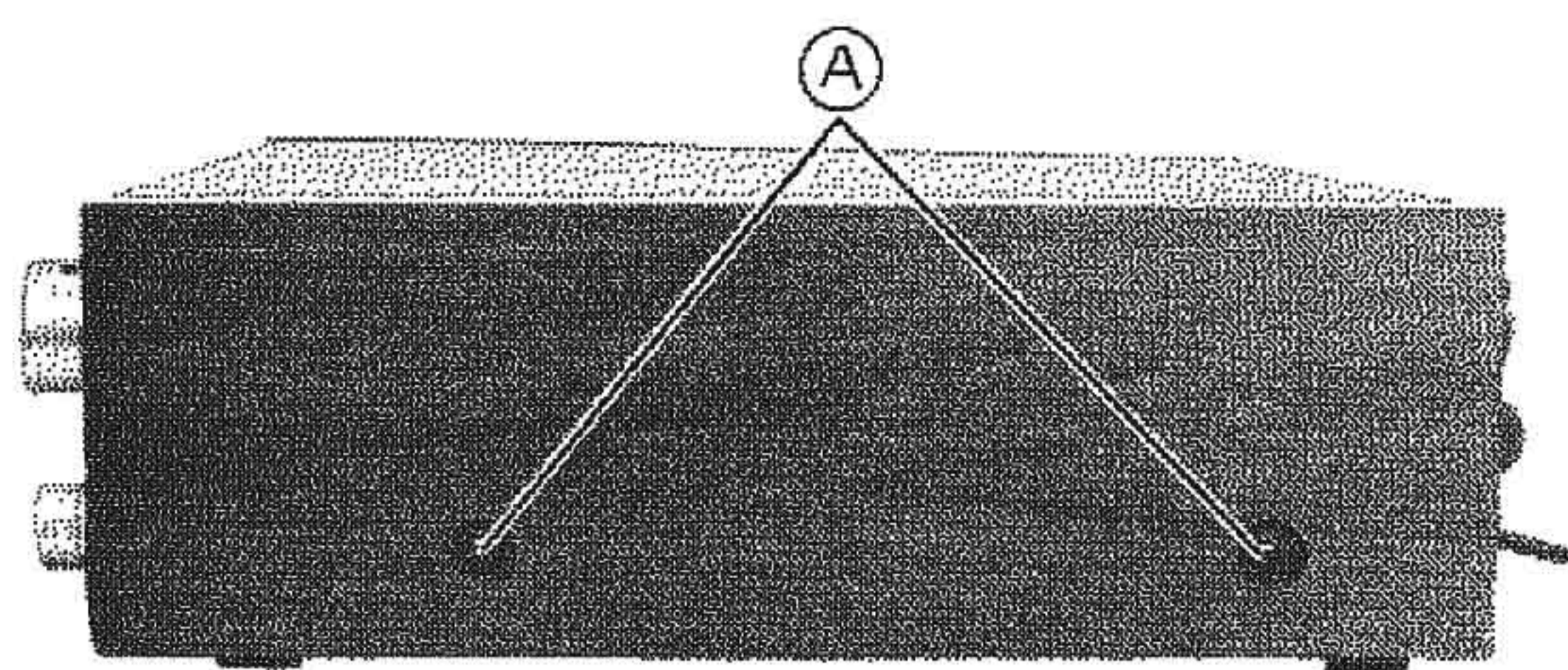


Figure 5.

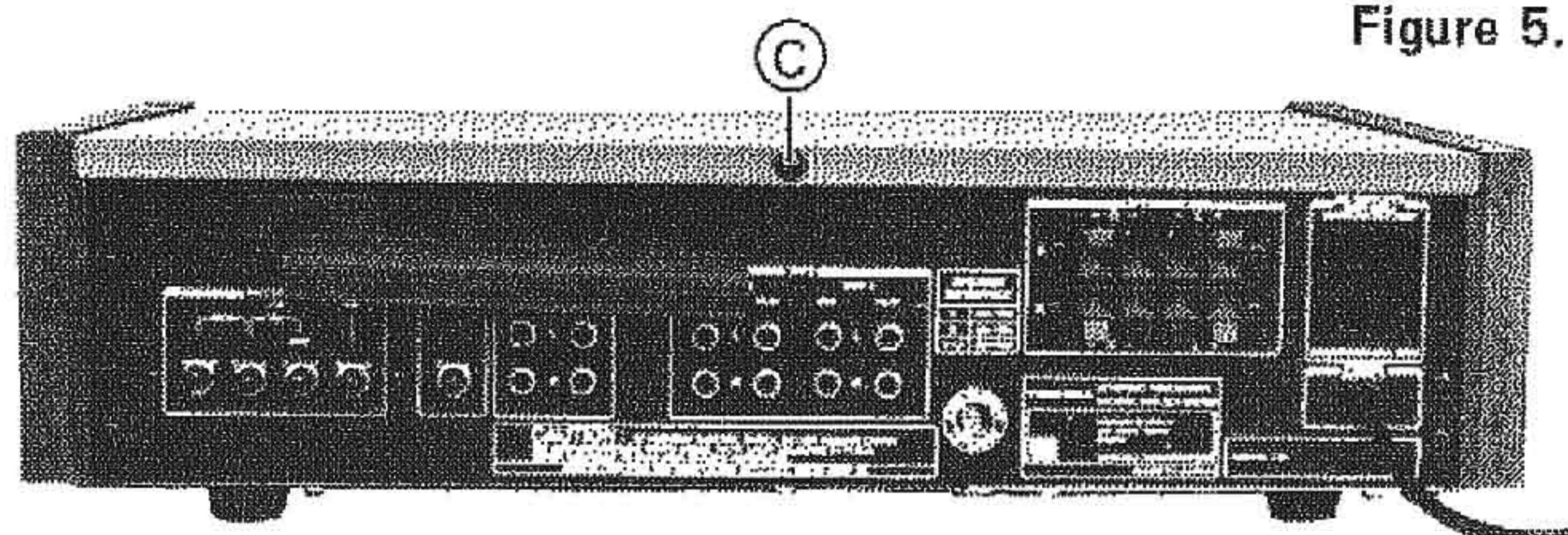


Figure 7.

## TUNING KNOB REMOVAL

- Remove the knob by removing 1 screw (G).

## FRONT PANEL REMOVAL

1. Detach the cabinet.
2. Remove the tuning knob.
3. Remove 7 knobs (D).
4. Detach the front panel by removing 6 screws (E) and (F).

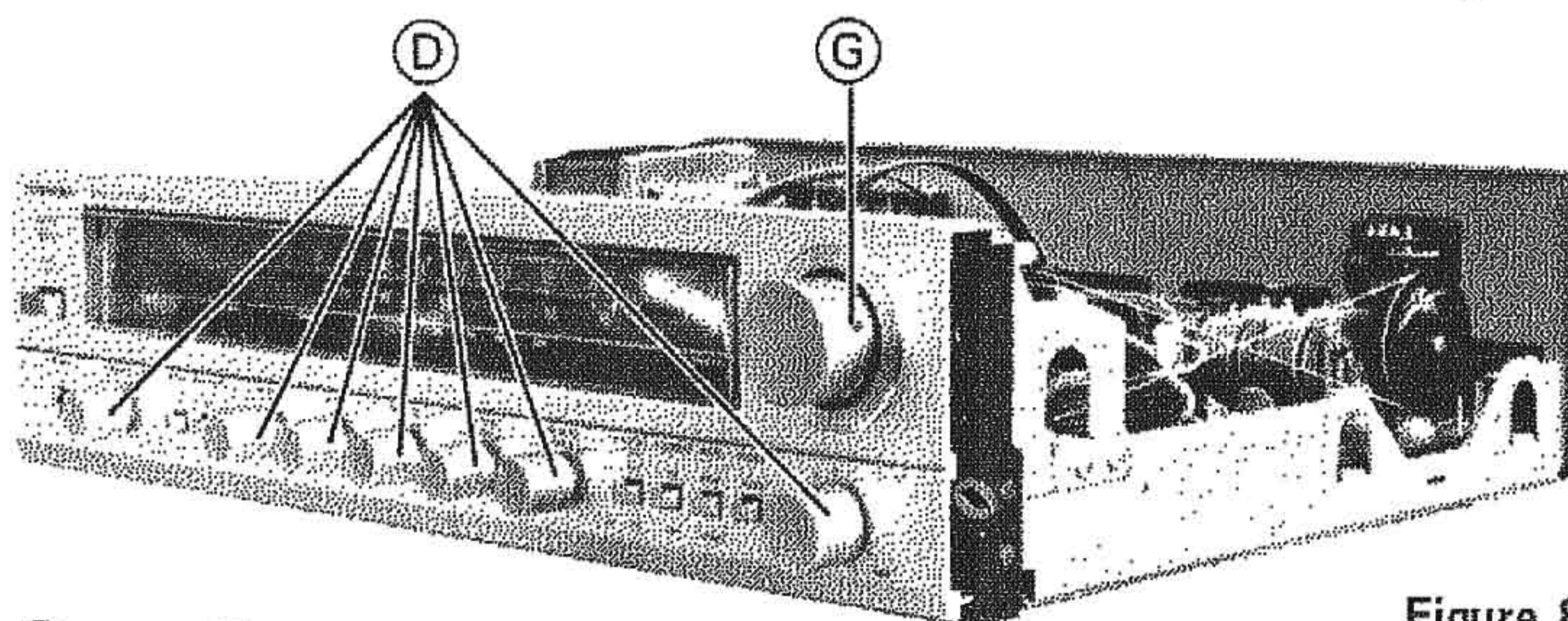


Figure 8.

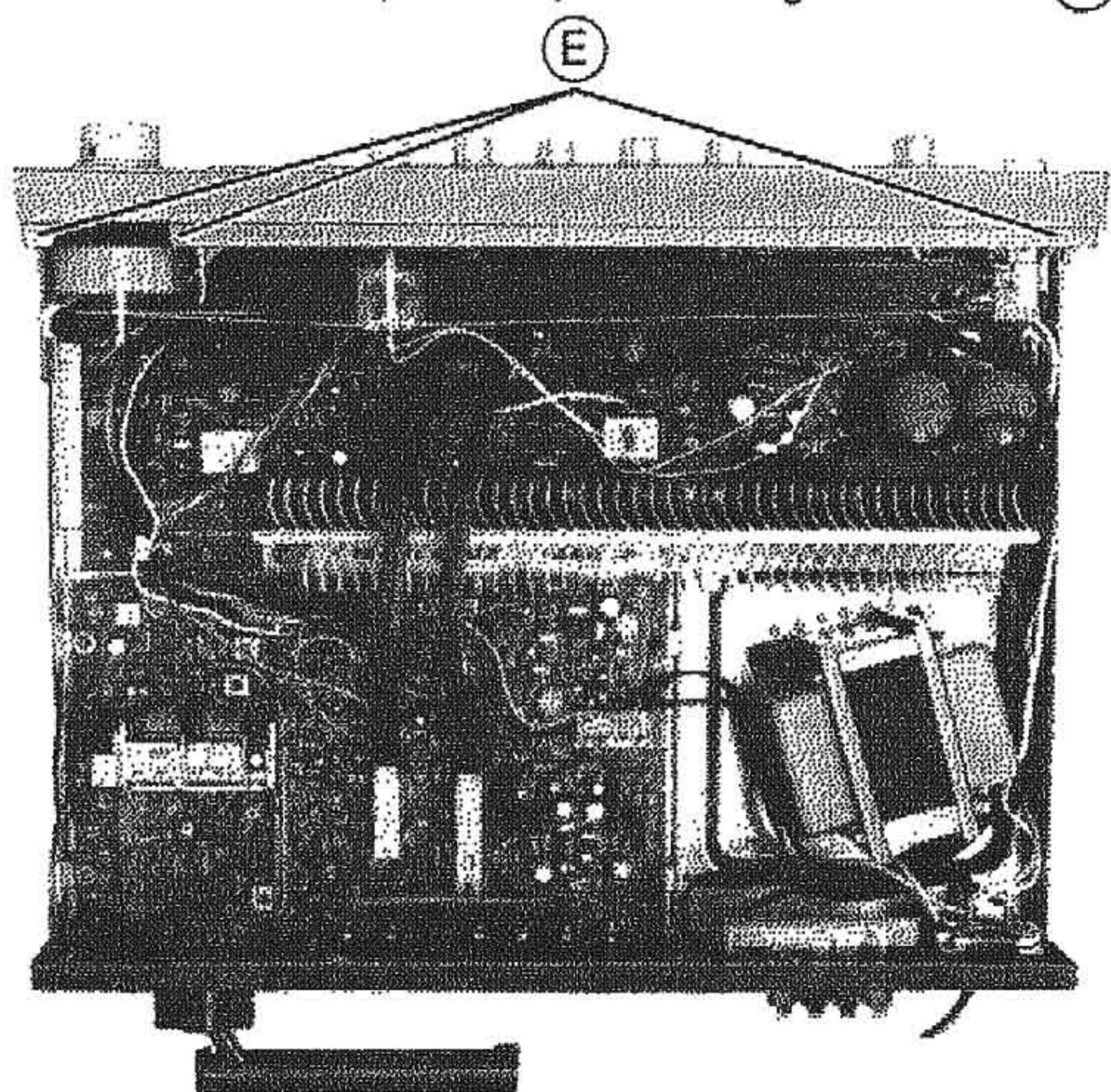


Figure 9.

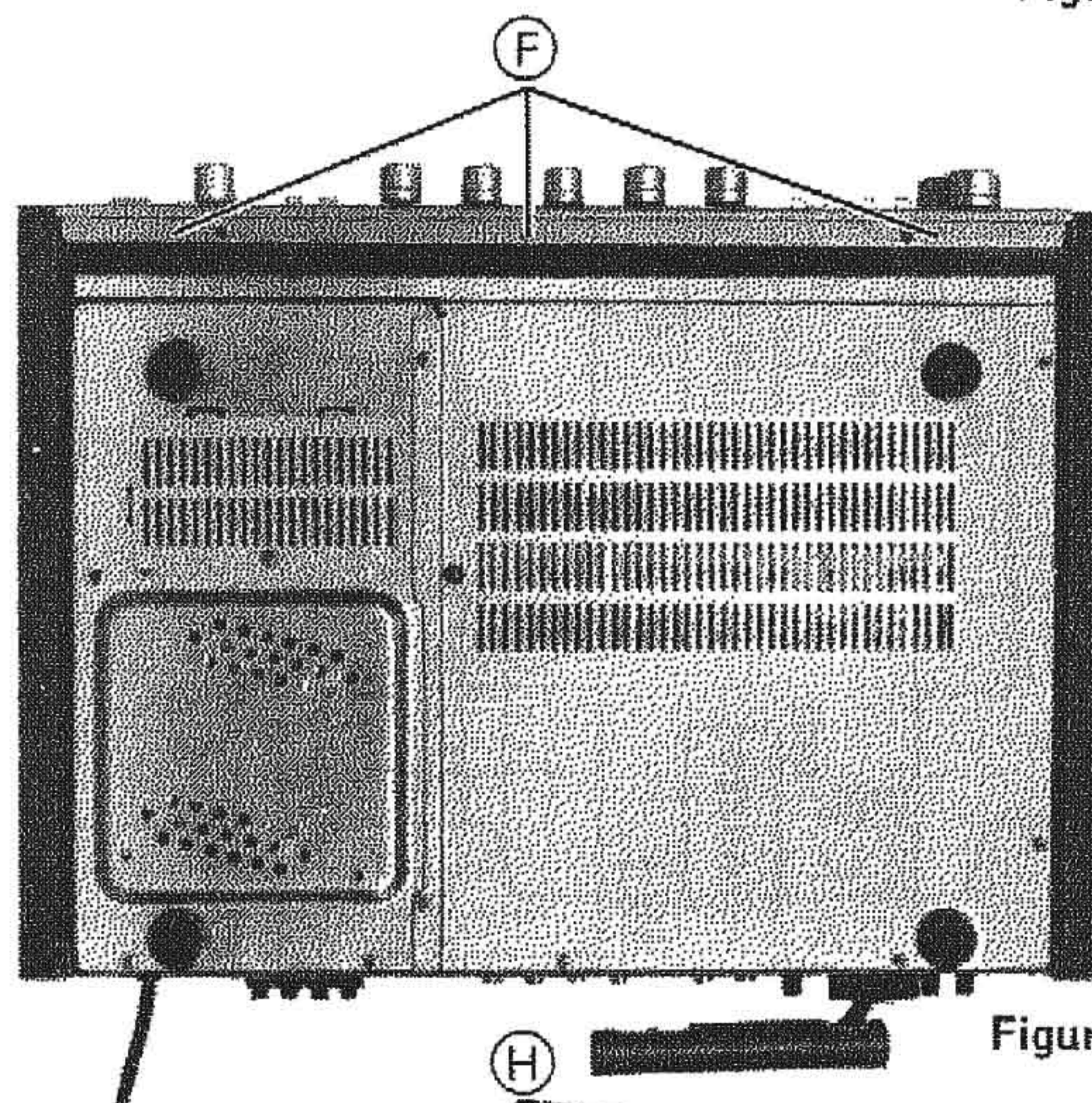


Figure 10.

## BOTTOM BOARD REMOVAL

- Detach the bottom board by removing 9 screws (H).

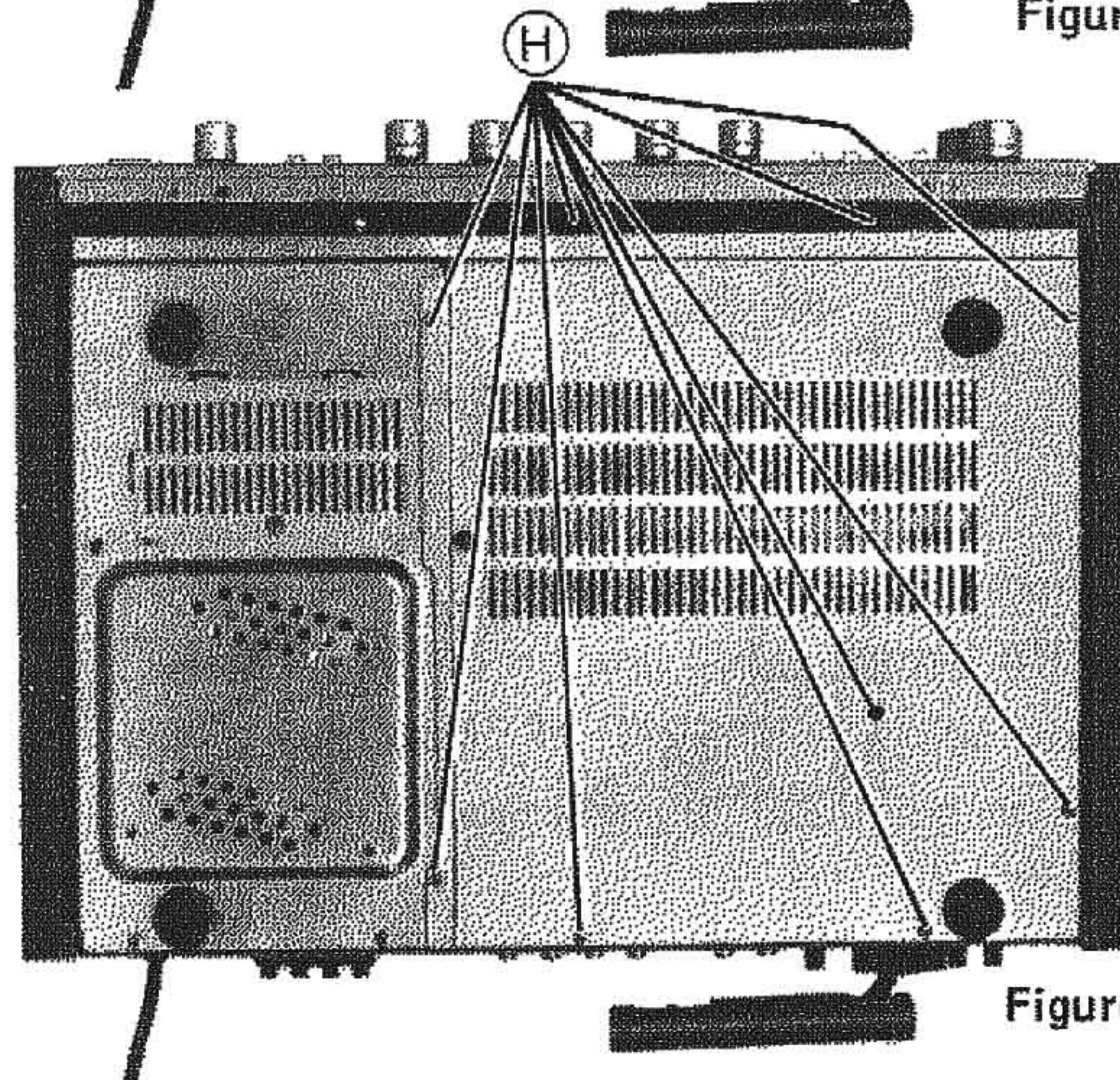


Figure 11.



# BLOCK DIAGRAM

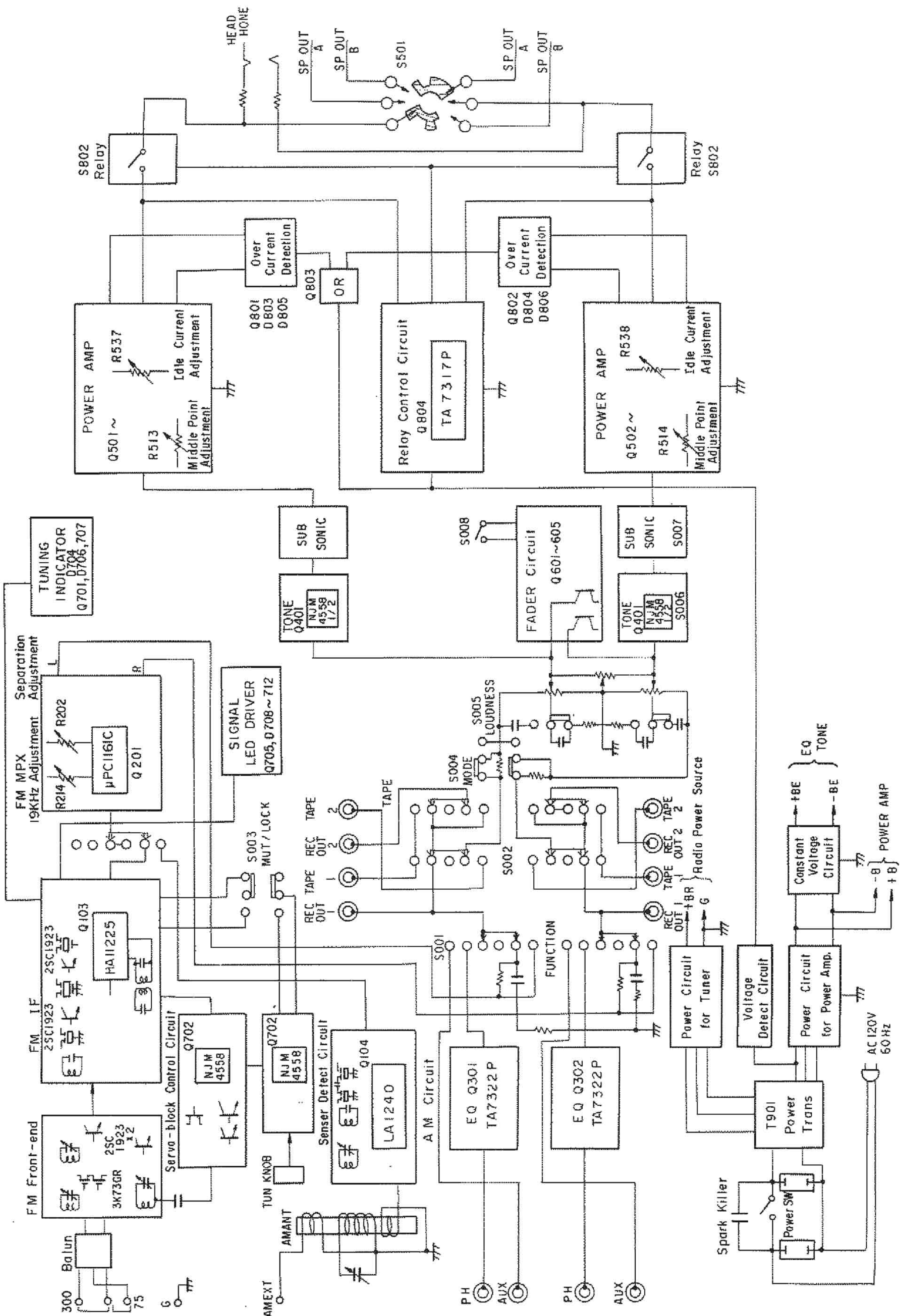


Figure 12.

# TECHNICAL POINTS

## 1. Servo-Lock Mechanism

### Circuit Configuration

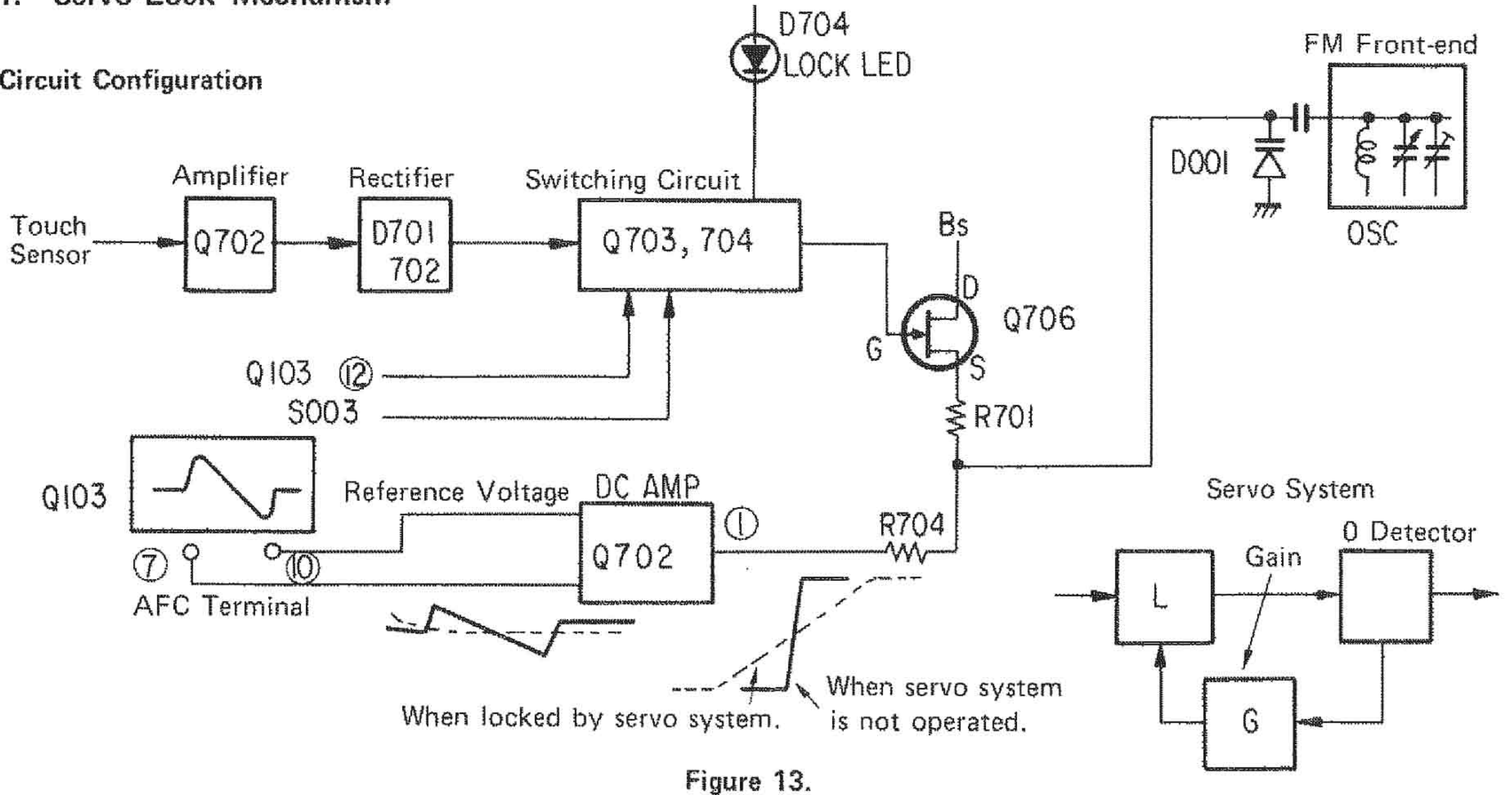


Figure 13.

### Operation (Lock status)

- When the broadcast frequency is properly tuned, there will be no voltage difference across the AFC output terminals of the FM IF stage (pin nos.7 & 10 of Q103 [HA11225]). If, however, the tuned frequency is displaced, a  $\pm$  voltage proportional to the amount of displacement is generated. If the LOCK OFF switch has not been pressed, or a hum signal is received from the sensor, this voltage is amplified by DC AMP and applied to the front-end to control the voltage of the tuning capacitor. In this case, Q706 and Q703 will be off, and Q704 will be on.

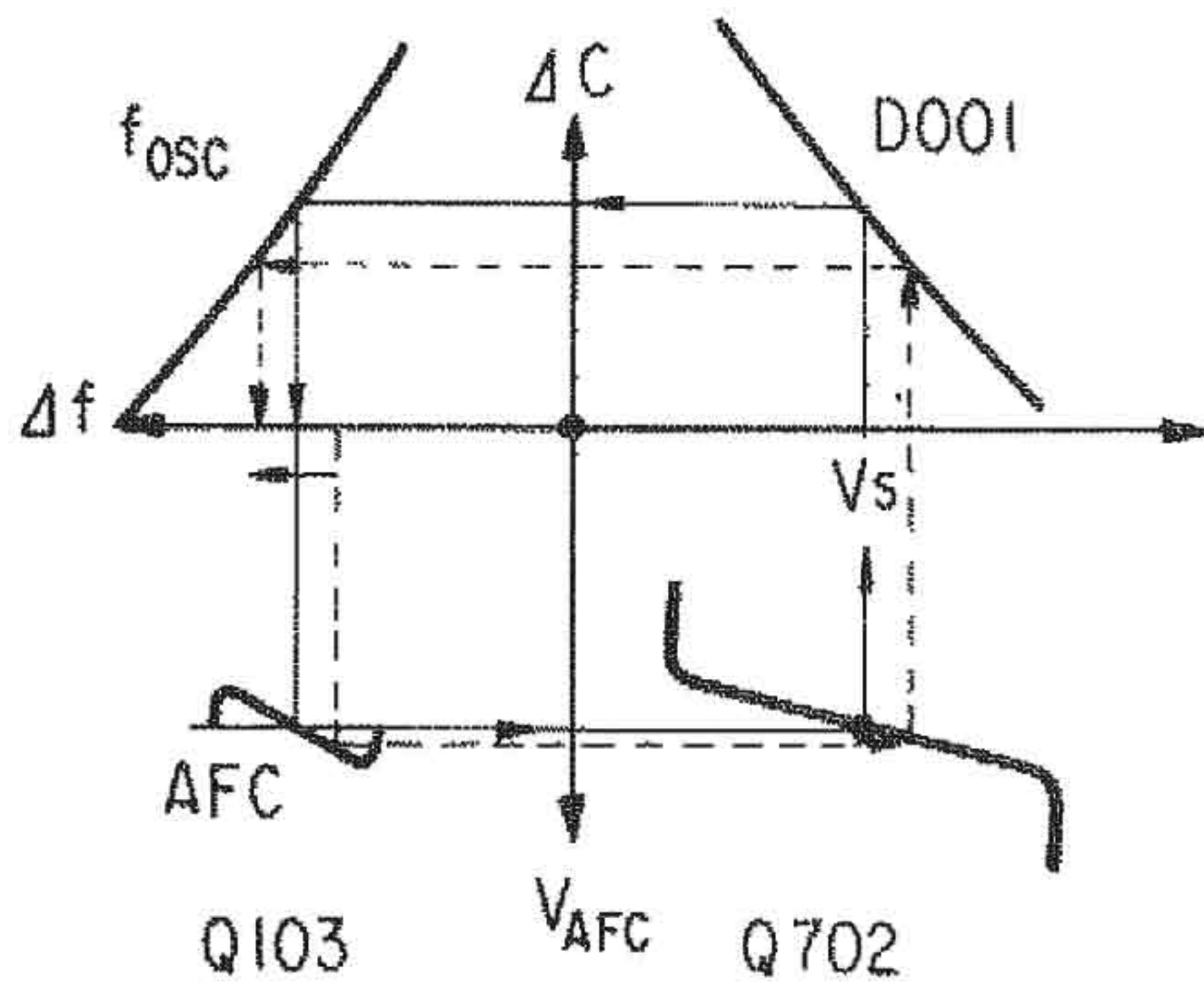


Figure 14.

If the oscillator frequency is on the low side, the Q103 AFC output voltage will also be low. This voltage is amplified by Q103, resulting in a high voltage being applied to the D001 variable capacitance diode. With the capacitance consequently reduced, the oscillator frequency will be increased.

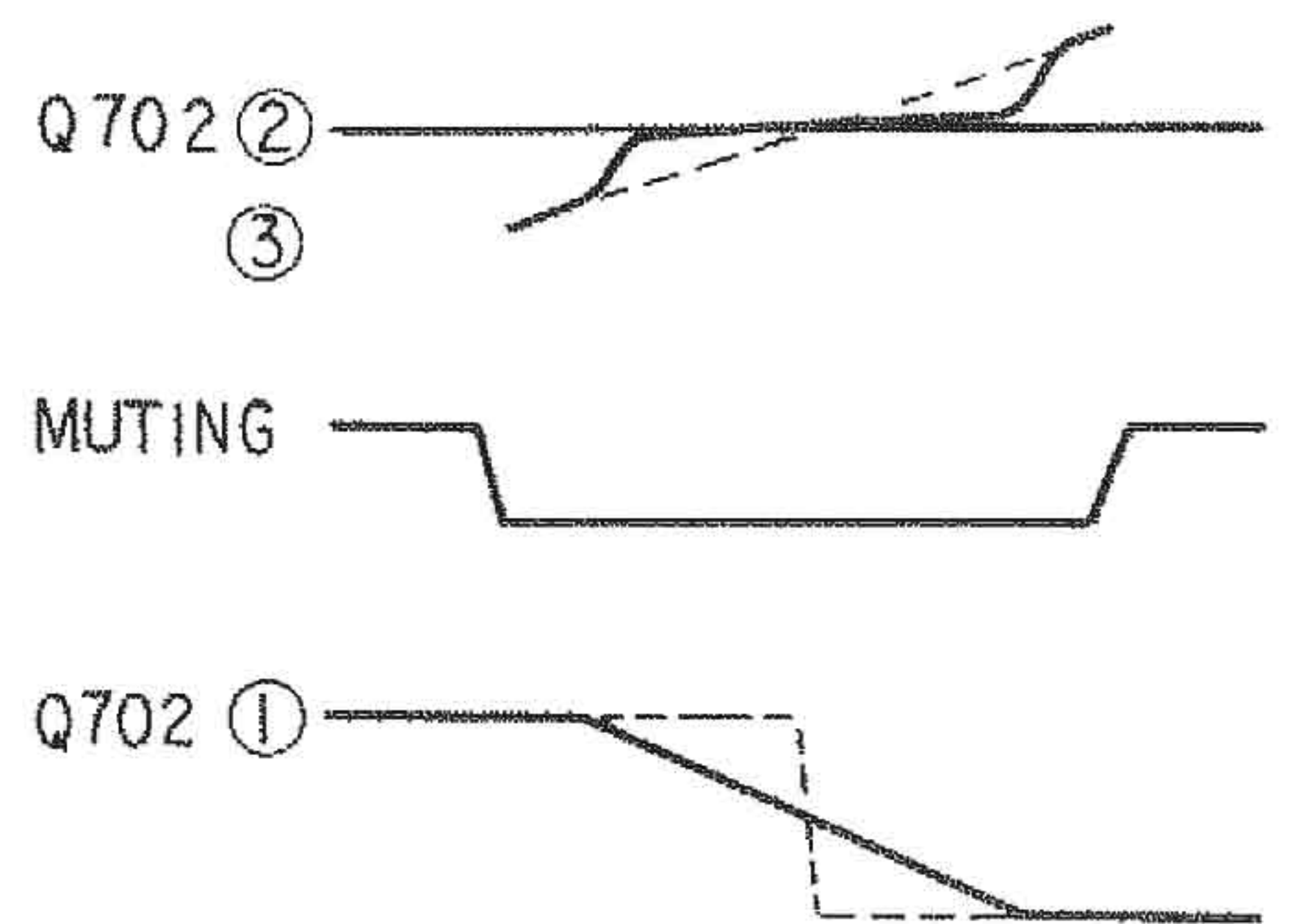


Figure 15.

### Operation (non-lock status)

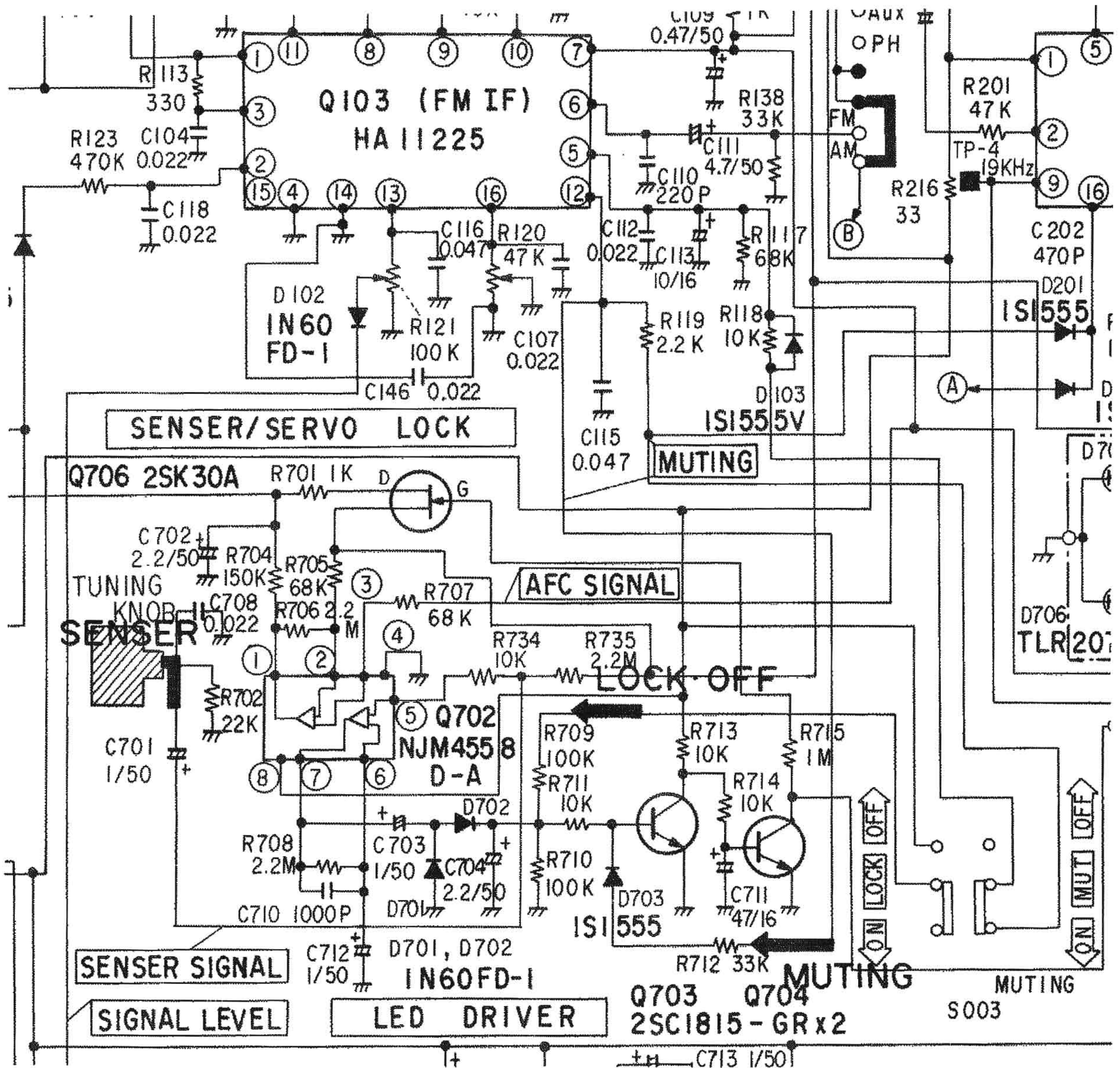
- When a muting output signal is produced as a result of a hum signal being received from the sensor, or when LOCK OFF is pressed, or when the tuned frequency has drifted, Q703 is turned on and Q704 turned off, resulting in Q706 being turned on to connect to the reference voltage on pin no.10 of Q103 [HA11225] via R701. The servo mechanism will thus be switched off, and any subsequent changes in the Q702 pin no.1 output voltage will have no effect.

## Operation (Sensor)

(3) The hum noise induced when the sensor is touched by hand is AC amplified by Q702, and the voltage then doubled and rectified by D701 and D702, and finally applied to the base of Q703, resulting in this transistor being turned on. Q702 is an amplifier of very high gain, operating at 100% NF in terms of DC, but virtually as an open loop in terms of AC.

C710 is used to prevent oscillation. Without this capacity, it would not be possible to apply the servo lock.

C711 is used to prevent the generation of buzz noise when the servo lock is released by the sensor.



## 2. Fader Circuit Operation

### Circuit Configuration

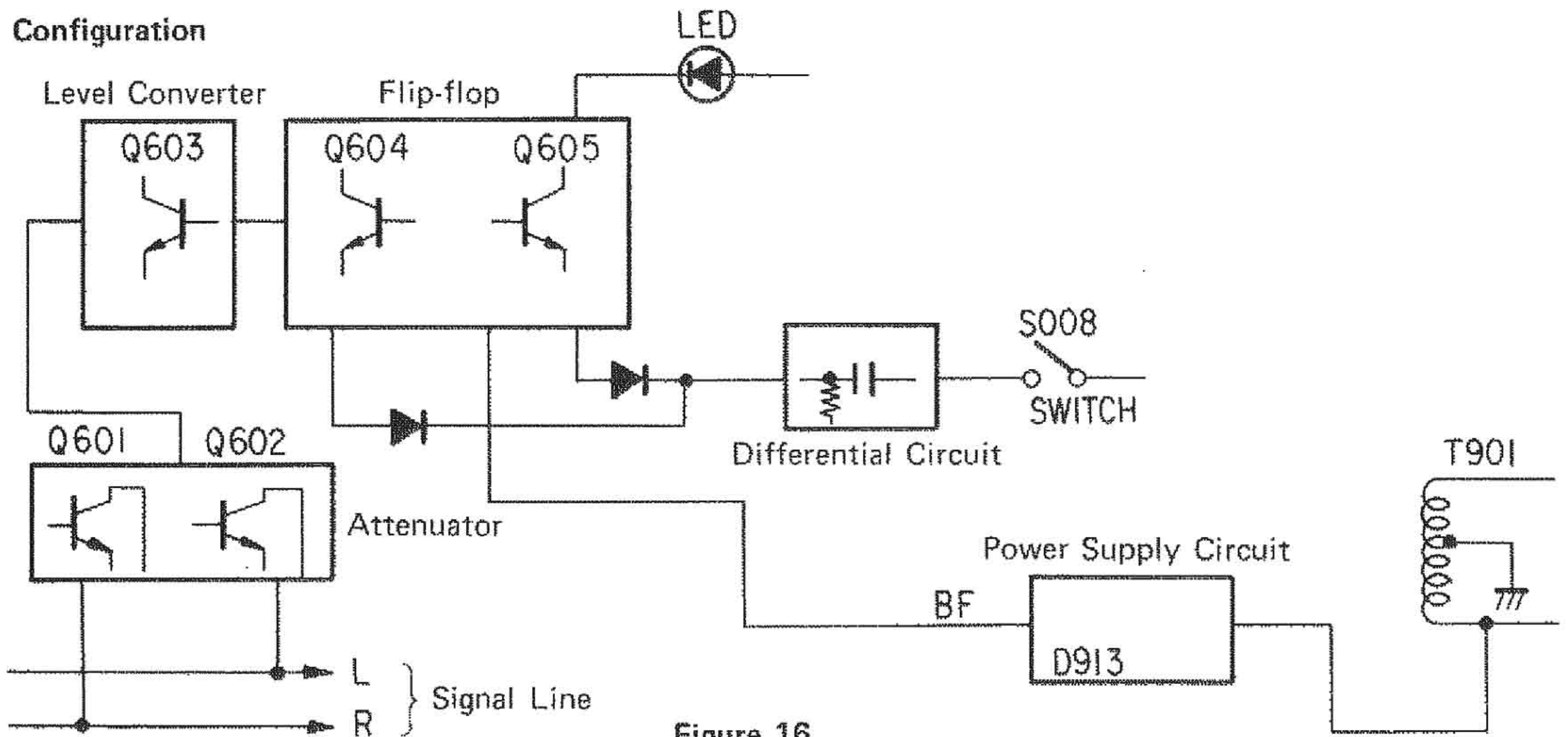


Figure 16.

### Operation

When the power switch is turned on, the FF circuit consisting of Q604 and Q605 will always be initialized by the rising curve of the BF power supply obtained independently from the AC B line via the R613 and R610 transistor base resistors, resulting in Q604 being turned on and Q605 being turned off.

When the FADER switch is pressed, (a) line is dropped to  $-B$ , differentiated by C603 and C604, and then passed via D601 and D602 to trigger Q604 and Q605.

The pulse width is limited by R608 and R616 (both  $10K\Omega$ ), thereby making the width of the off transistor base narrower.

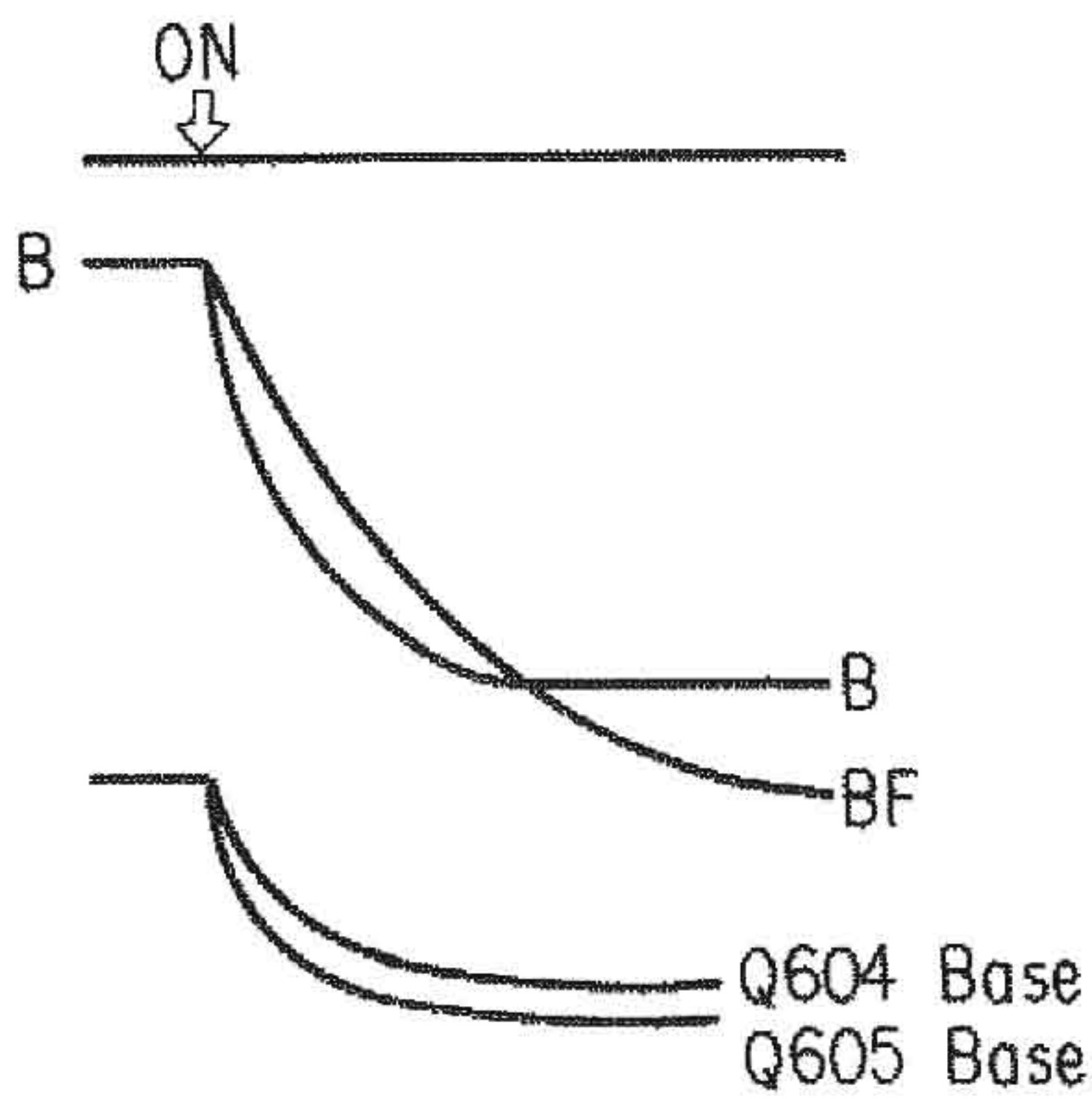


Figure 17.

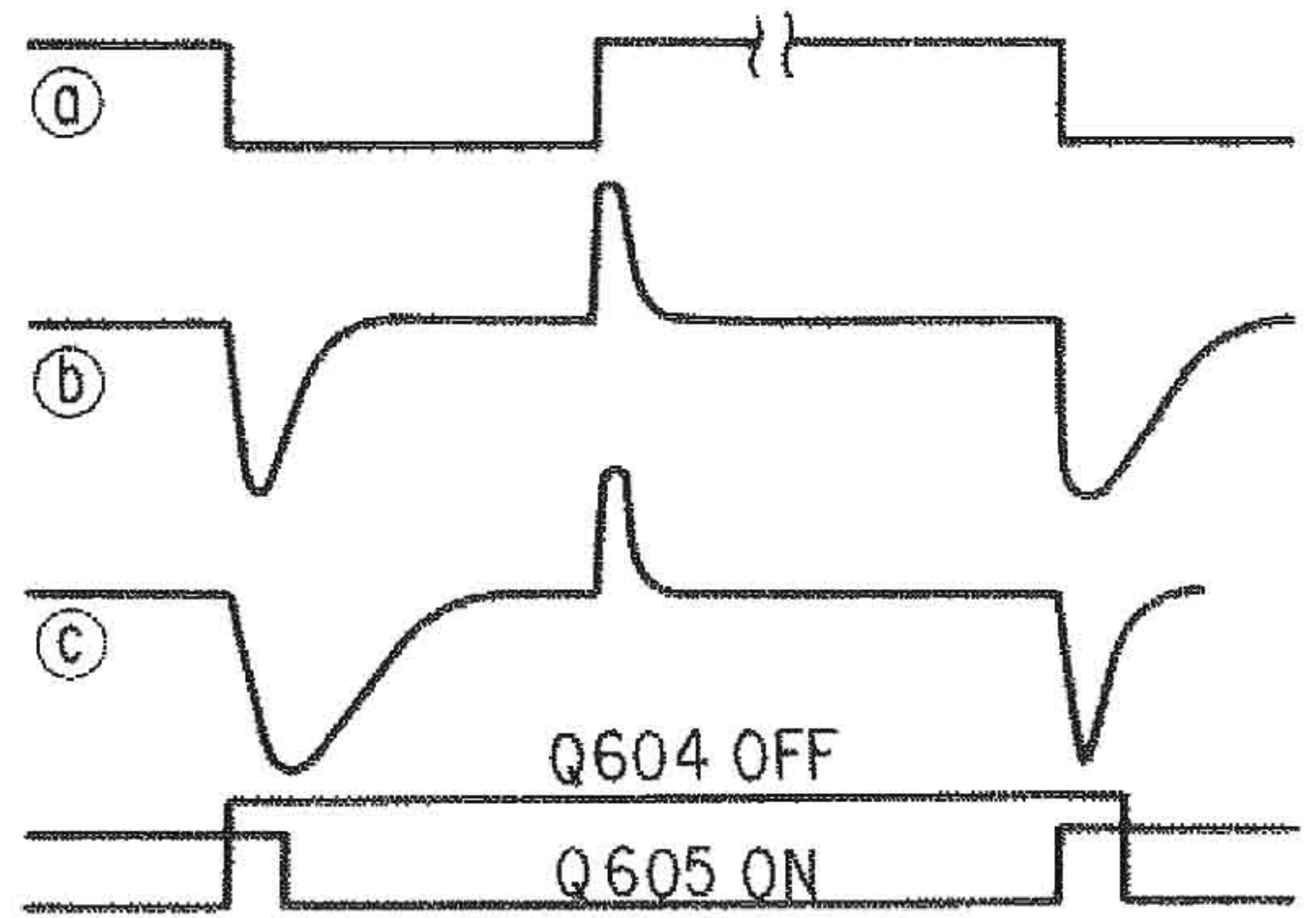


Figure 18.

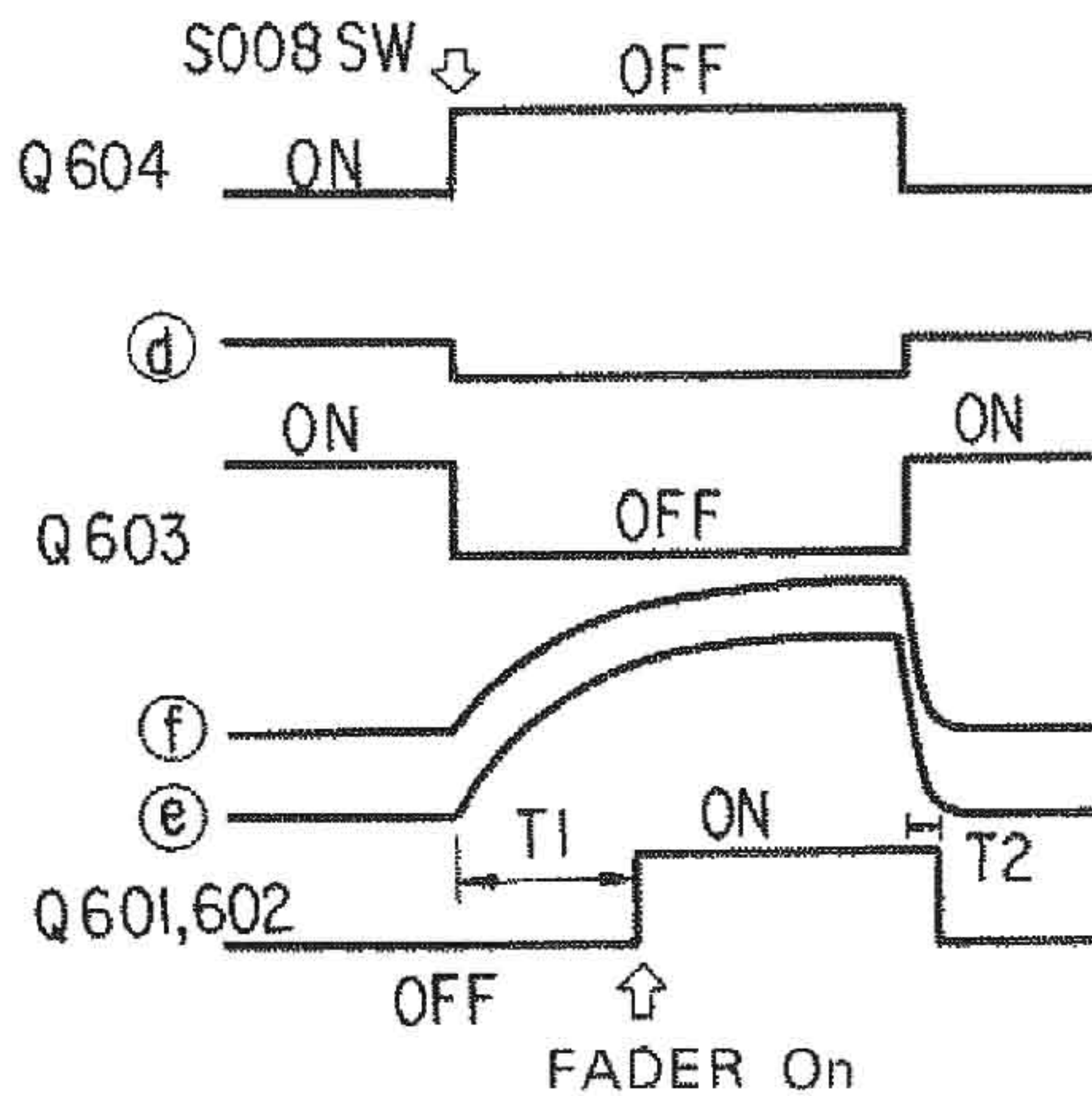


Figure 19.

This flip-flop (FF) circuit turns Q603 on and off by the changing voltage at point (d) on the Q604 emitter. When Q603 is on, the voltage at point (f) is divided by the values of R601 and  $R603 + R605$ , resulting in a voltage of approximately  $-1.0V$  being applied to the bases of Q601 and Q602. Since both transistors are thus turned off, a high impedance condition is achieved. When the FADER switch is pressed, Q604 is turned off and Q603 turned on, resulting in the point (f) voltage being increased according to the time constant (due to C602, R603 and R601). Q601 and Q602 will thus be turned on, thereby attenuating the signal by low impedance shorting of the signal line.

The standard value for T1 is approximately 1.5 sec. If both be turned on, resulting in C602 being charged up (T2). The voltage at point (f) is thus restored to the initial state, resulting in the re-appearance of the line

signal. When the power switch is turned off, the BF line power is cut before the main B line power, resulting in the point (g) voltage being dropped to zero. If Q604 is already off at this time, it will always be turned on by this voltage change. The FADER LED will thus be extinguished immediately when the power is switched off since there will be no residual voltage being applied to the LED.

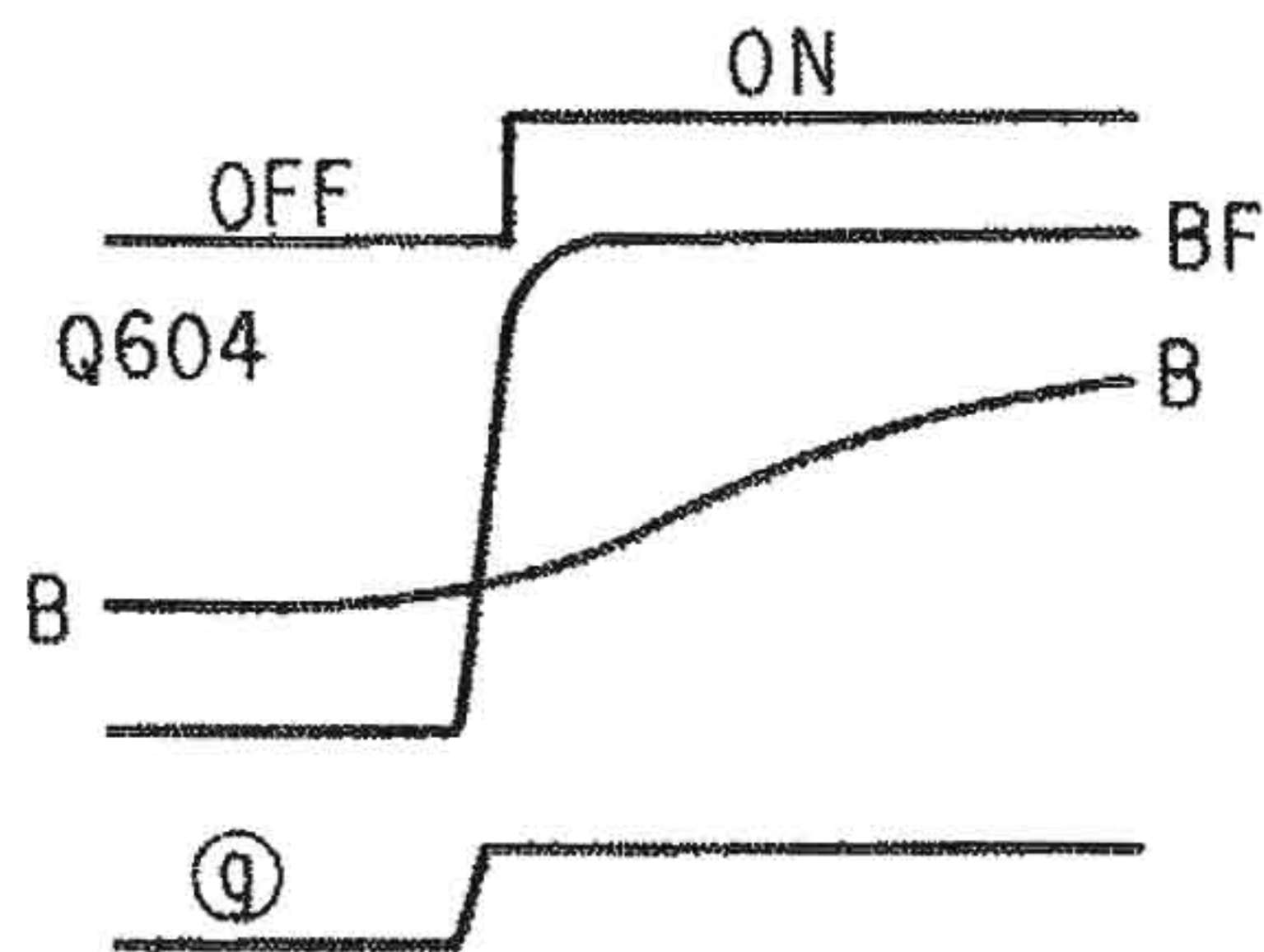
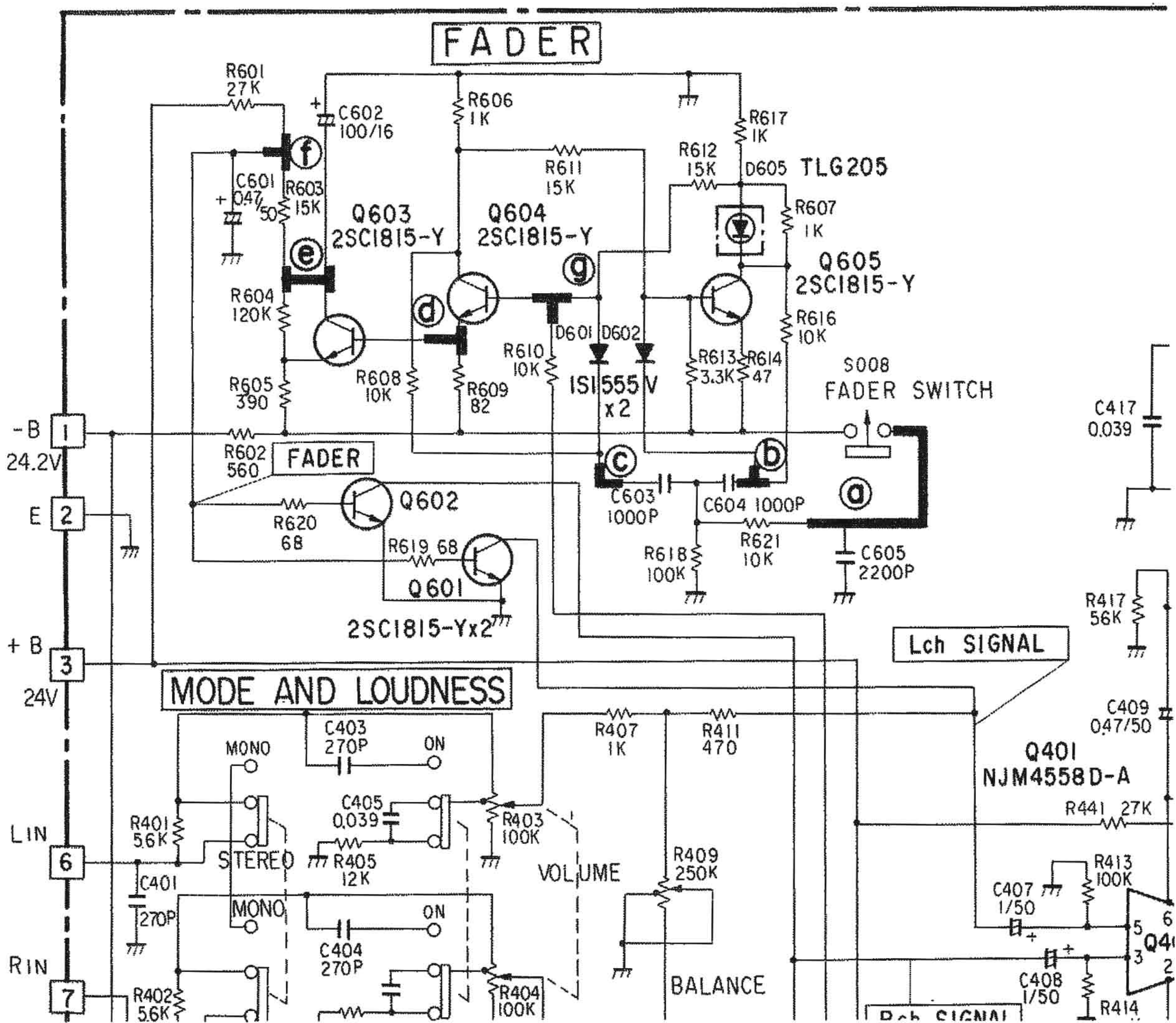


Figure 20.



### 3. Relay Protector Circuit

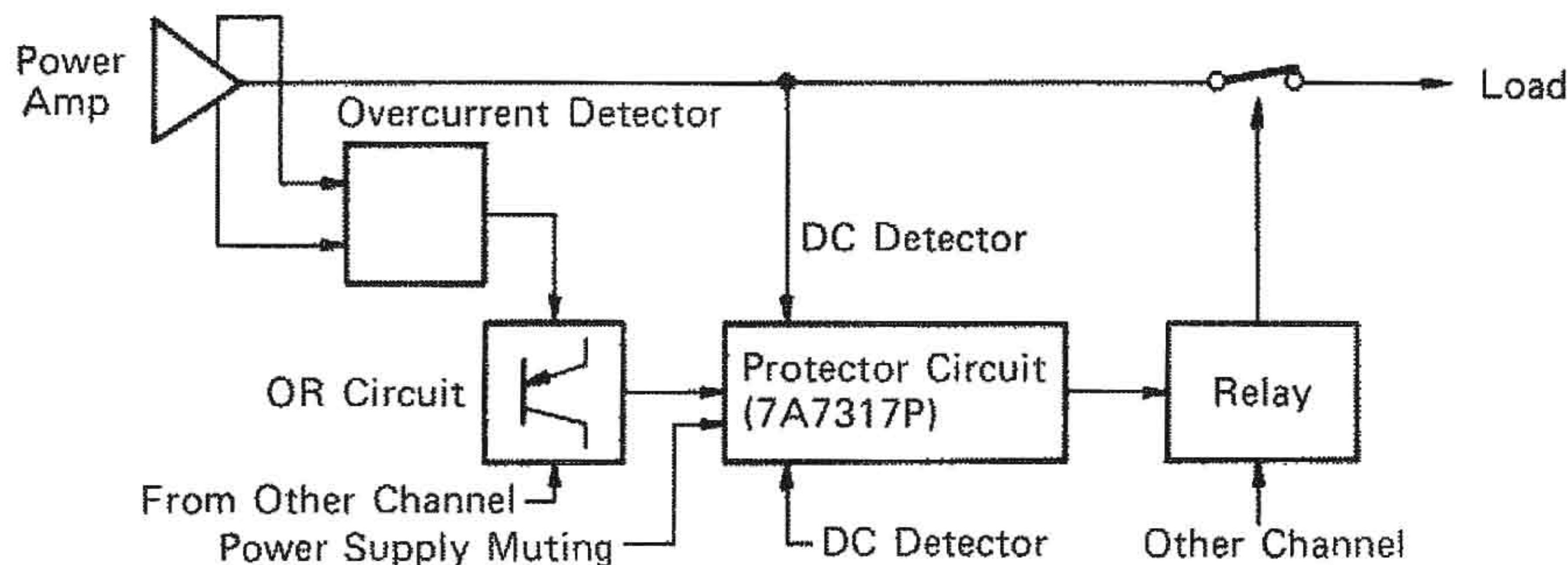


Figure 21.

The functions of the relay drive protector circuit (TA7317P) include DC output detection, and power muting when the power supply is turned on (with externally connected power supply muting circuit). In addition, by also including an overcurrent detector circuit, the presence of overcurrents in both channels will be protected, and the relay subsequently opened to protect the power amplifier stage.

#### Overcurrent Detector Circuit

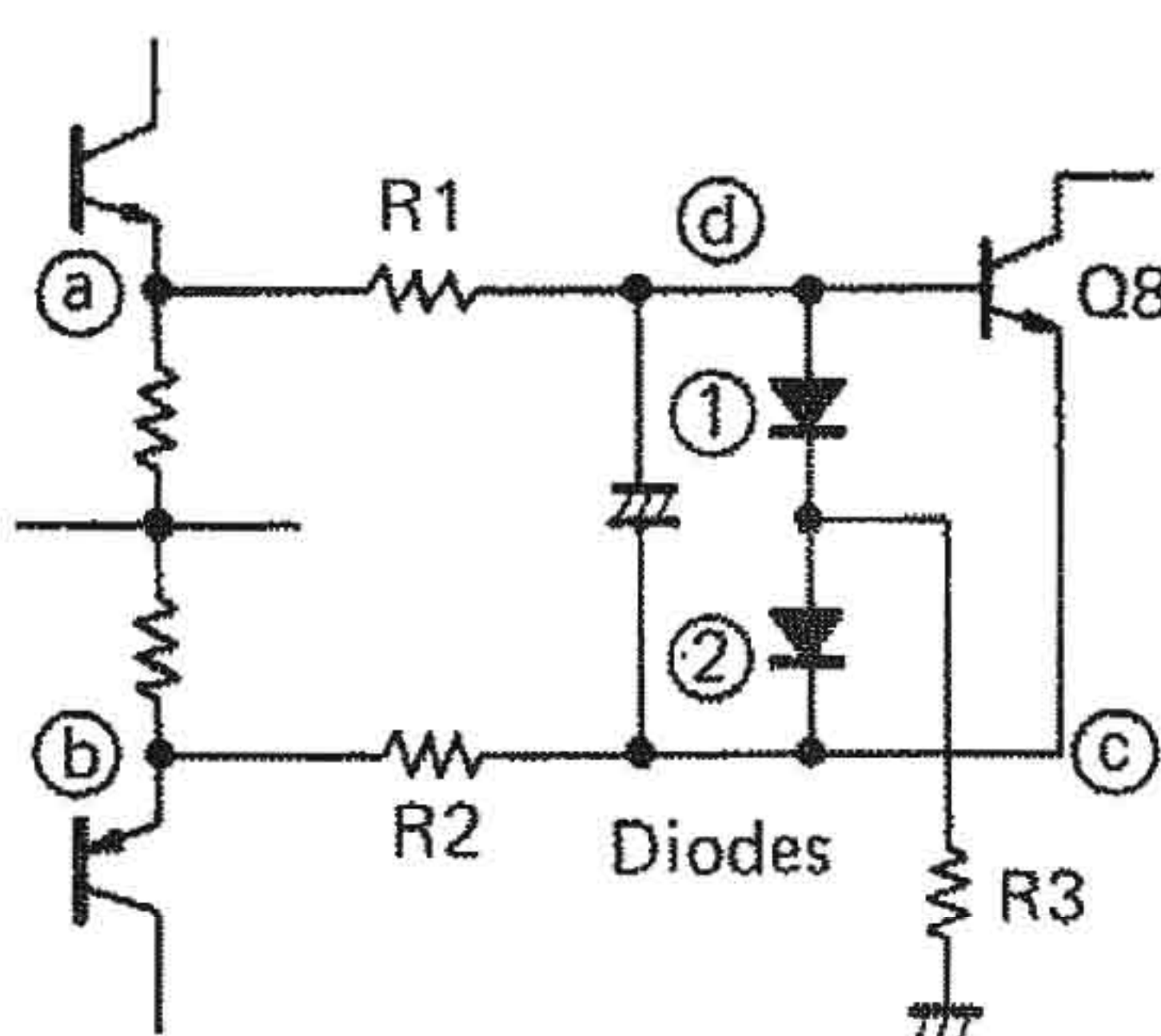


Figure 22.

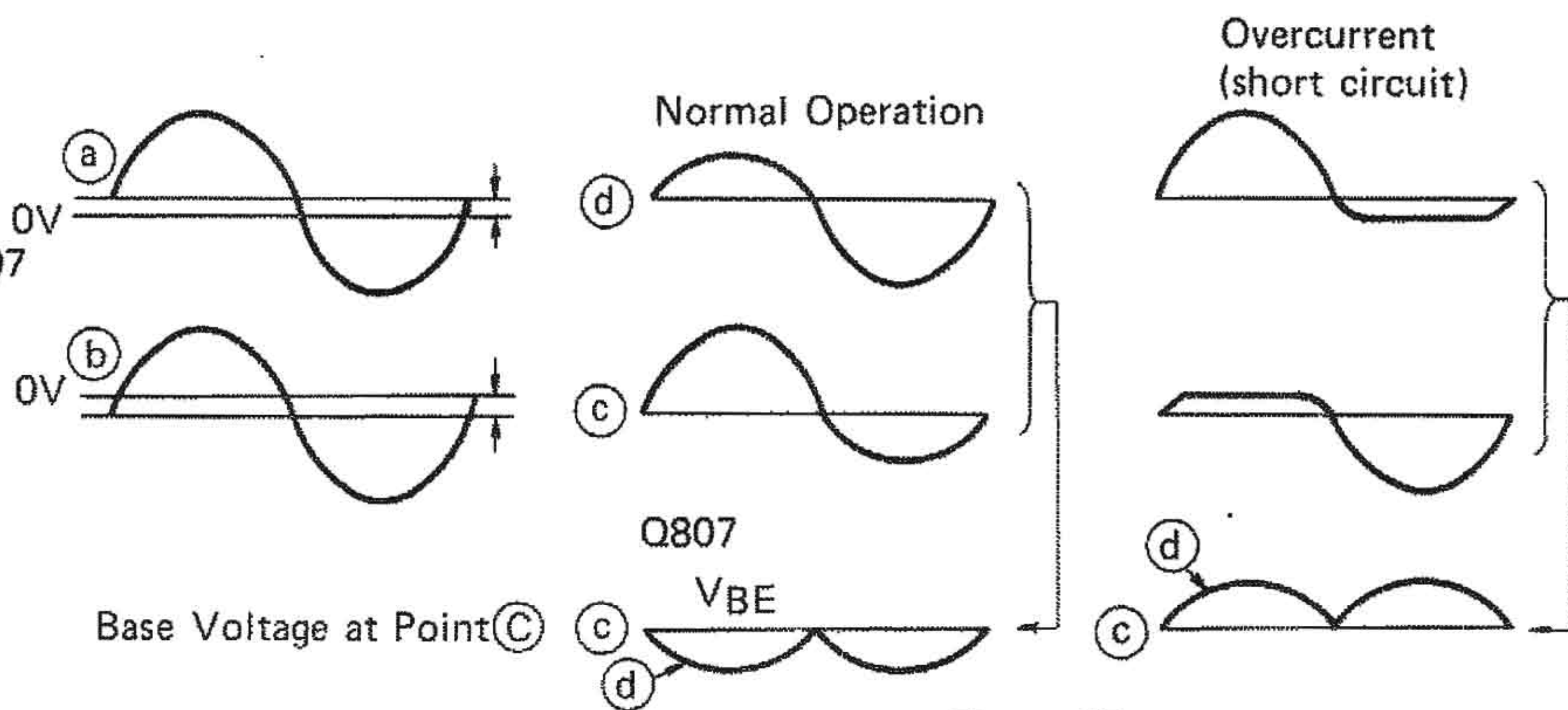


Figure 23.

The voltage waveforms for each point shown above are the waveforms obtained when an output signal is present. In combination with R1/R3 and R2/R3, diodes 1 and 2 apply a reverse voltage across the base-emitter of Q807, resulting in loss of detector sensitivity at high output voltage levels.

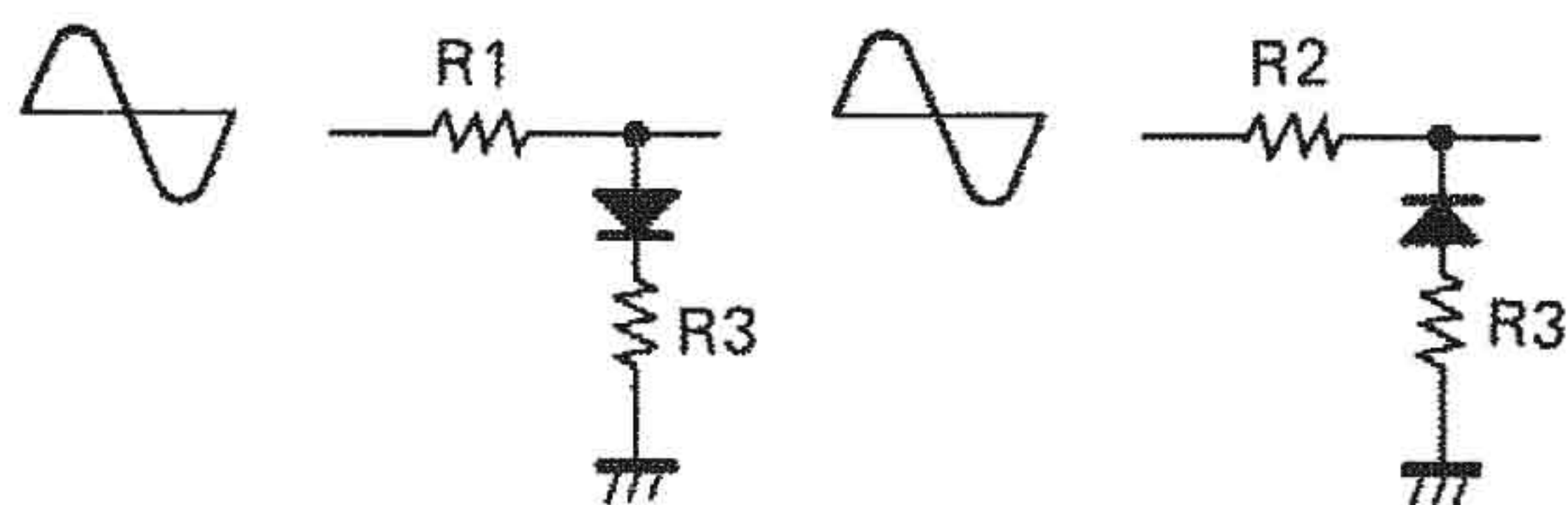


Figure 24.

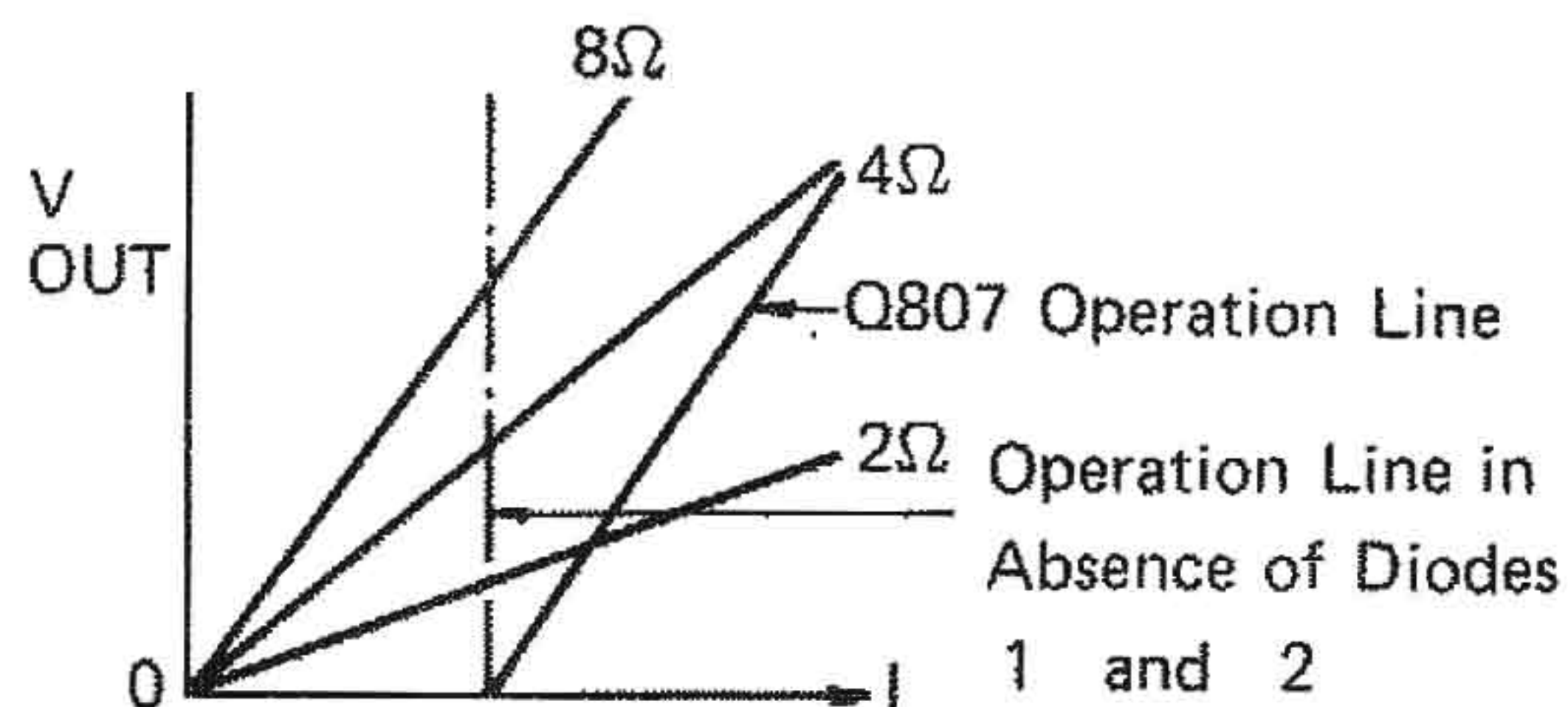


Figure 25.

In the case of a short circuit, or when the load is small, the circuit will operate at sufficiently low operating ranges, but will not operate at 4Ω or 8Ω even when the output voltage reaches maximum level.

# CIRCUIT ADJUSTMENTS

## TUNER P.C. BOARD

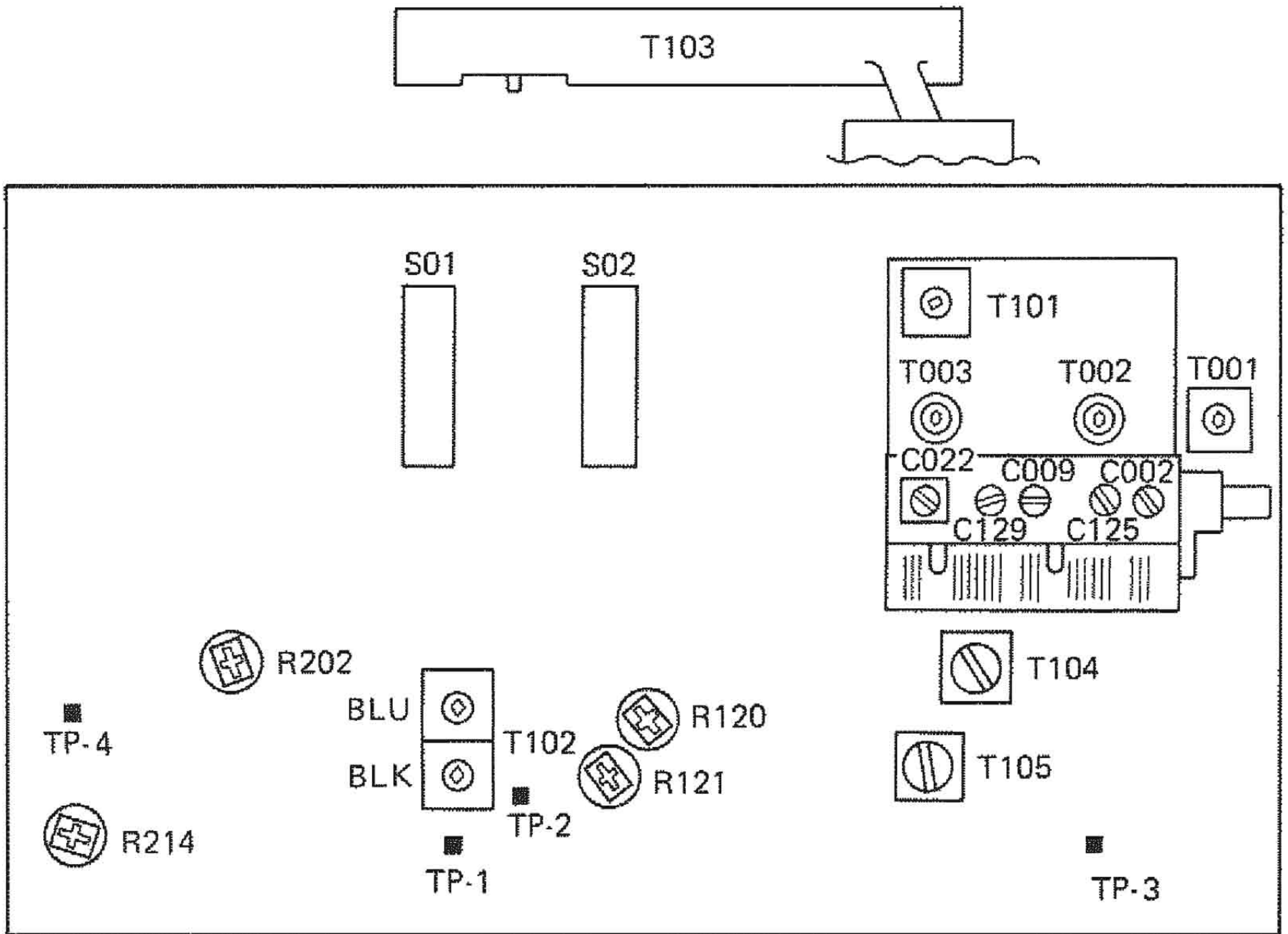


Figure 26.

## MAIN AMP P.C. BOARD

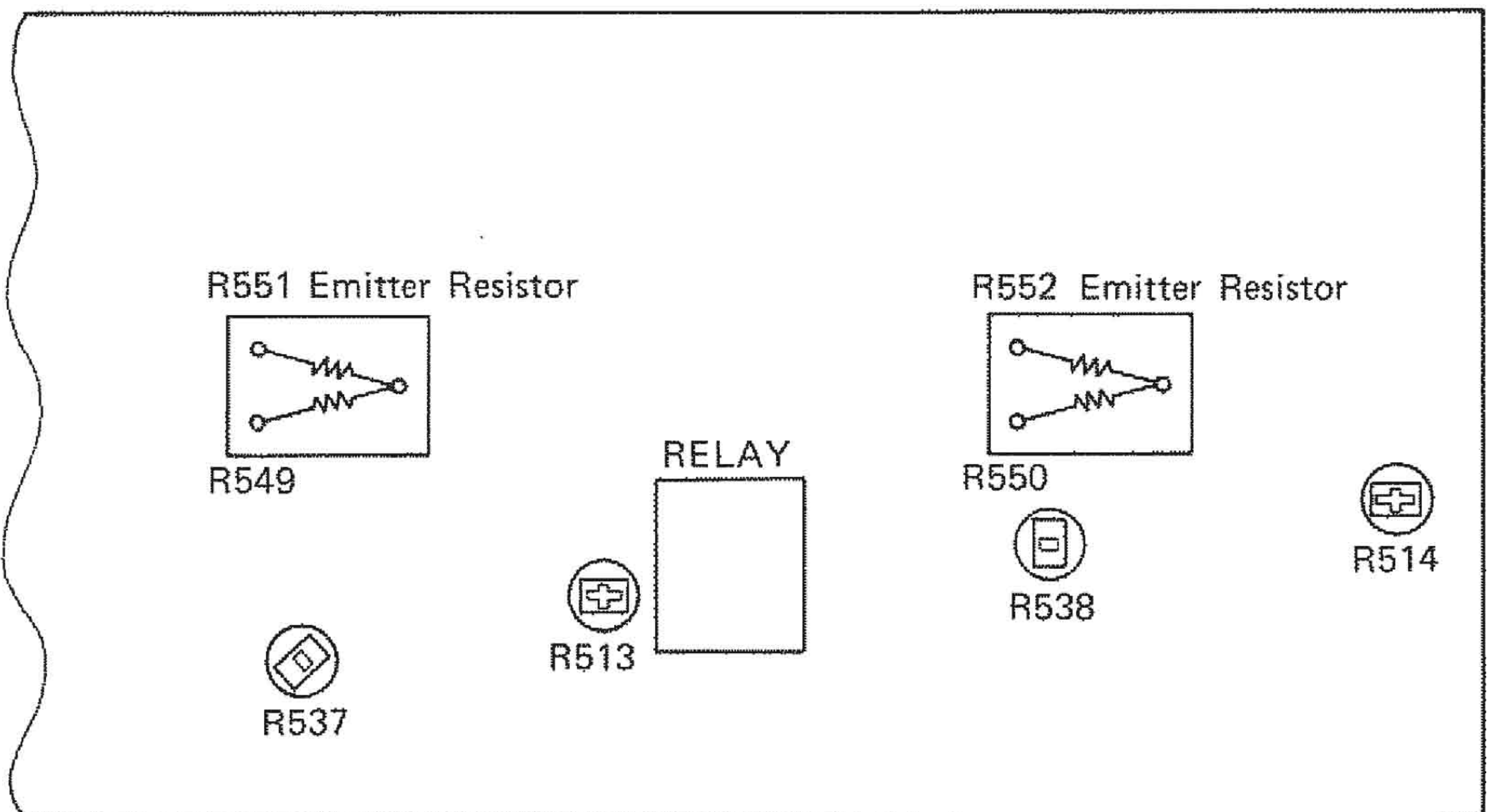


Figure 27.

## AM ADJUSTMENT

Test equipments/Tools required

1. Signal generator
2. Sweep generator
3. Test loop antenna
4. VTVM
5. Adjusting screwdriver
6. Adjusting screwdriver (Use to antenna core)
7. Oscilloscope

## IF ADJUSTMENT

Step	Adjustment	Remarks
IF Response	T105	Adjust for scope pattern with specified marker (460 kHz) as illustrated in Fig. 28.

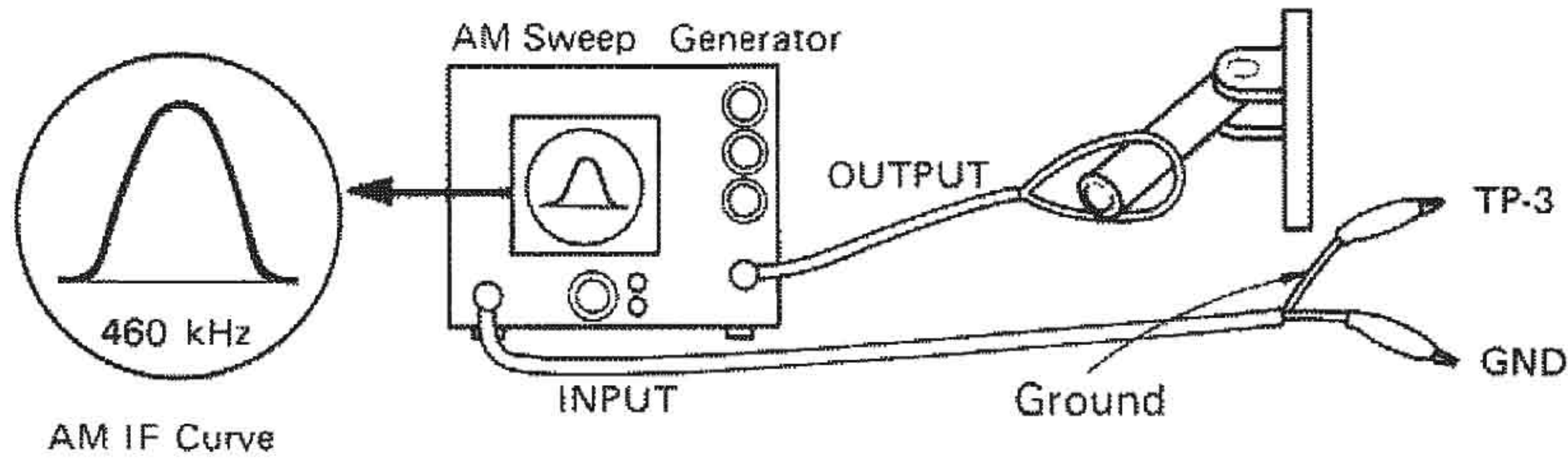


Figure 28.

## FREQUENCY COVERAGE AND TRACKING ADJUSTMENT

Step	Adjusting Circuit	Connection		SG Frequency	Position of Tuning Dial	Adjustment	VTVM
		Input	Output				
1	OSC (Frequency Coverage)	Connect signal generator to test loop.	Connect VTVM to Speaker terminal A.	515 kHz (400 Hz 30% MOD.)	Tune to 515 kHz signal	T104	Maximum
2				1640 kHz (400 Hz 30% MOD.)	Tune to 1650 kHz signal	C129	
Repeat steps 1 and 2.							
3	OSC (Frequency Coverage)	Connect signal generator to test loop.	Connect VTVM to Speaker terminal A.	600 kHz (400 Hz 30% MOD)	Tune to 600 kHz signal		Adjust for no scale error.
4				1400 kHz (400 Hz 30% MOD)	Tune to 1400 kHz signal		
Repeat steps 3 and 4. If any error is present, repeat steps from 1 to 4.							
5	ANT (Tracking)	Connect signal generator to test loop.	Connect VTVM to Speaker terminal A.	600 kHz (400 Hz 30% MOD.)	Tune to 600 kHz signal	Ferrite Ant. Coil T103	Maximum
6				1400 kHz (400 Hz 30% MOD.)	Tune to 1400 kHz signal	C125	
Repeat steps 5 and 6.							

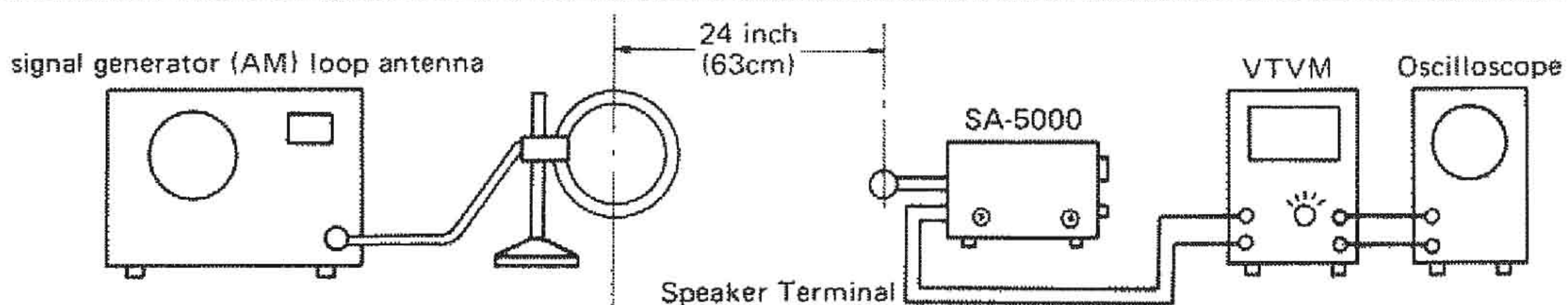


Figure 29.



## FM ADJUSTMENT

Test equipments/Tools required

- |                     |                                |                  |
|---------------------|--------------------------------|------------------|
| 1. Distortion meter | 5. FM dummy antenna (300 ohms) | 9. Adjusting bar |
| 2. Signal generator | 6. Dummy load resistor         | 10. Tuning meter |
| 3. Osilloscope      | 7. Network                     |                  |
| 4. VTVM             | 8. Adjusting screwdriver       |                  |

Step	Adjusting Circuit	Connection		SG Frequency	Position of Tuning Dial	Adjustment	
		Input	Output				
1	IF Distortion Adjustment (MONO)		Connect Tuning Meter to TP-1, 2		No signal	IT10 (BLK Color)	Adjust tuning meter pointer so as to keep center.
2	OSC (Frequency coverage)	Connect FM signal generator to FM antenna terminal.	Connect VTVM to speaker terminal.	87.3 MHz	Tune to 87.3 MHz signal	T003	Maximum
3				109.0 MHz	Tune to 109.0 MHz signal	C022	
Repeat steps 2 and 3.							
4	RF (Tracking)	Connect FM signal generator to FM antenna terminal.	Connect VTVM to speaker terminal.	88 MHz	Tune to 88 MHz signal	T002 T001	Maximum
5				108 MHz	Tune to 108 MHz signal	C009 C002	
Repeat steps 4 and 5.							
6	IF Distortion Adjustment (MONO)	Connect FM signal generator to FM antenna terminal. Connect the modulator to signal generator.	Connect VTVM, oscilloscope and distortion meter to speaker terminal. Connect Tuning Meter to TP-1, 2	SG 98 MHz	Tune to 98 MHz signal	T102 (BLU Color)	Distortion Minimum
7	IF Distortion Adjustment (MONO)					T102 (BLK Color)	Adjust tuning meter pointer so as to keep center.
Repeat steps 6 and 7.							
8	Distortion Adjustment (Stereo)	Connect FM signal generator to FM antenna terminal. Connect the modulator to signal generator.	Connect VTVM, oscilloscope and distortion meter to speaker terminal.	SG 98 MHz	Tune to 98 MHz signal	T101	Distortion Minimum

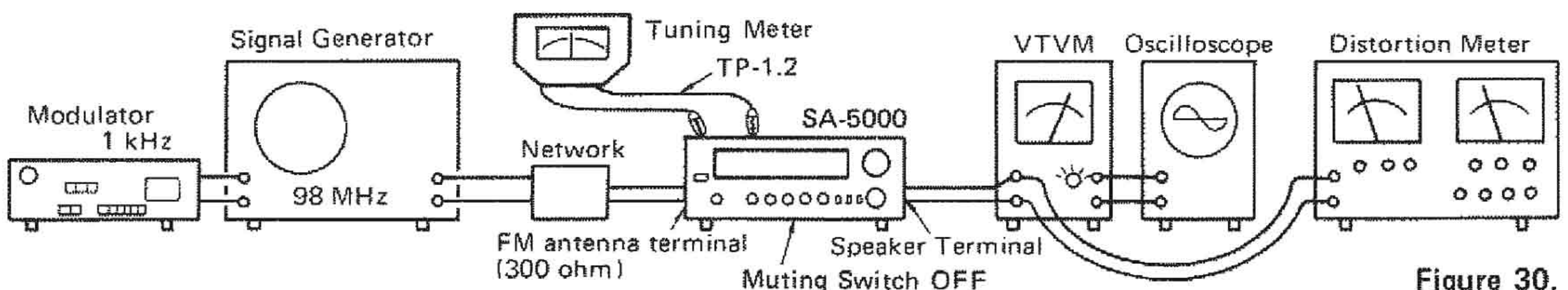


Figure 30.

## FM MPX ADJUSTMENT

### Test Equipments/Tools required

1. Frequency counter
2. Signal generator
3. Stereo modulator
4. VTVM
5. 300 ohm FM dummy antenna
6. Oscilloscope

Pilot signal adjustment	Connect a frequency counter to the Test Point (TP-4), and adjust the R214 for 19 kHz reading counter with no-signal input.
Separation adjustment	Receive the stereo signal and adjust the R202 for maximum channel separation. Note: Signal frequency: 98 MHz Frequency deviation: Pilot Signal 7.5 kHz L and R signals: 33.75 kHz

## SIGNAL METER ADJUSTMENT (FM)

Connection	Signal Generator	Adjustment
Connect signal generator to FM antenna terminal. See figure 31.	Frequency: 98 MHz SG output: 60 dB	Adjust the R121 so that the signal meter indicates 4.5 ~ 5.0

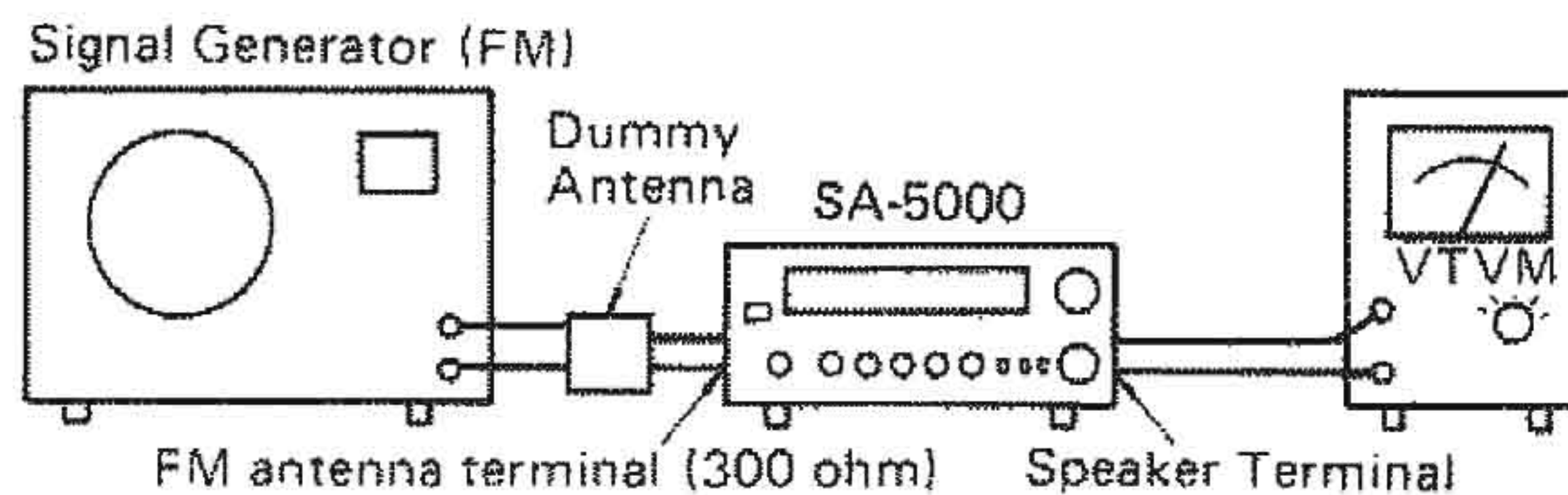


Figure 31.

## MUTING LEVEL ADJUSTMENT

Connection	Signal Generator	Adjustment
Connect signal generator to FM antenna terminal. See figure 31.	Frequency: 98 MHz SG output: 20 dB	Muting Switch ON Position. Adjust the R120 so that the signal appear.

## IDLING ADJUSTMENT

### R Channel

1. Connect a tester to test Pins A(-) and A(+). Figure 32.
2. Adjust the semi-fixed Resistor (R538) until the tester indicates within  $6.5\text{mV} \pm 2\text{mV}$ .

### L Channel

3. Connect a tester to test Pins B(-) and B(+). Figure 32.
4. Adjust the semi-fixed Resistor (R537) until the tester indicates within  $6.5\text{mV} \pm 2\text{mV}$ .

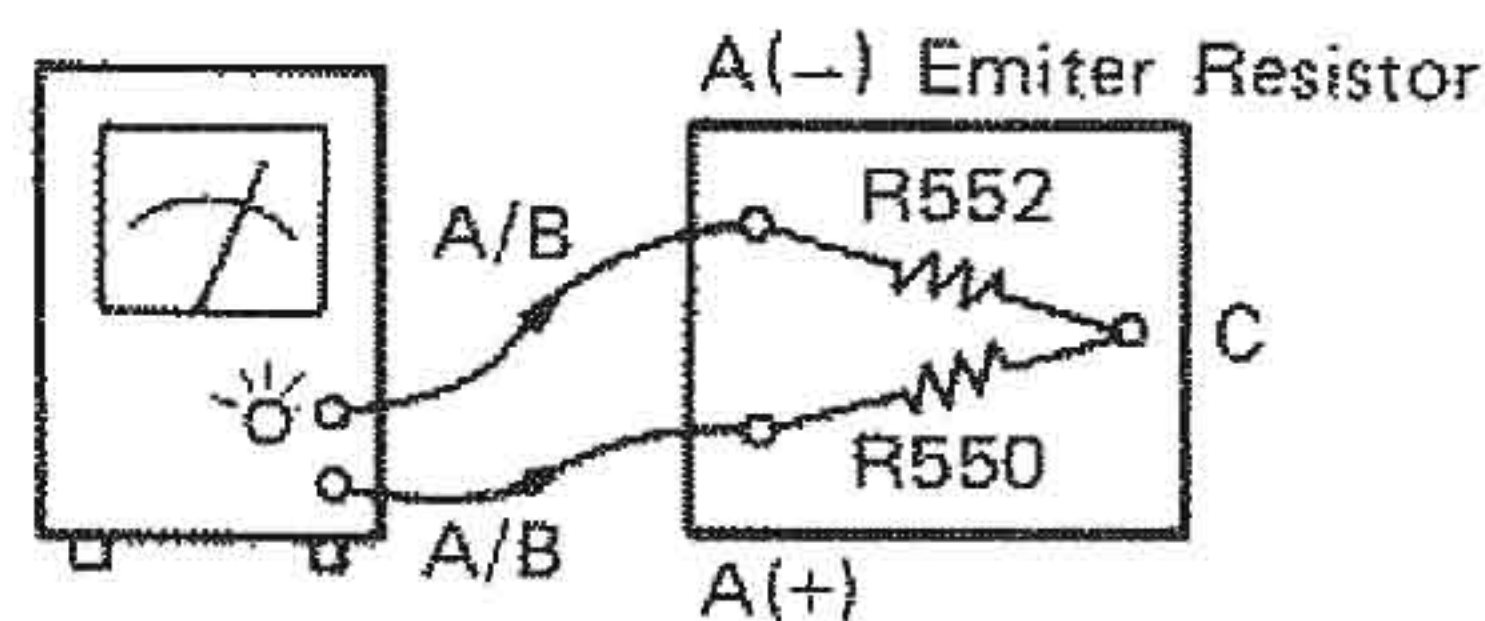


Figure 32.

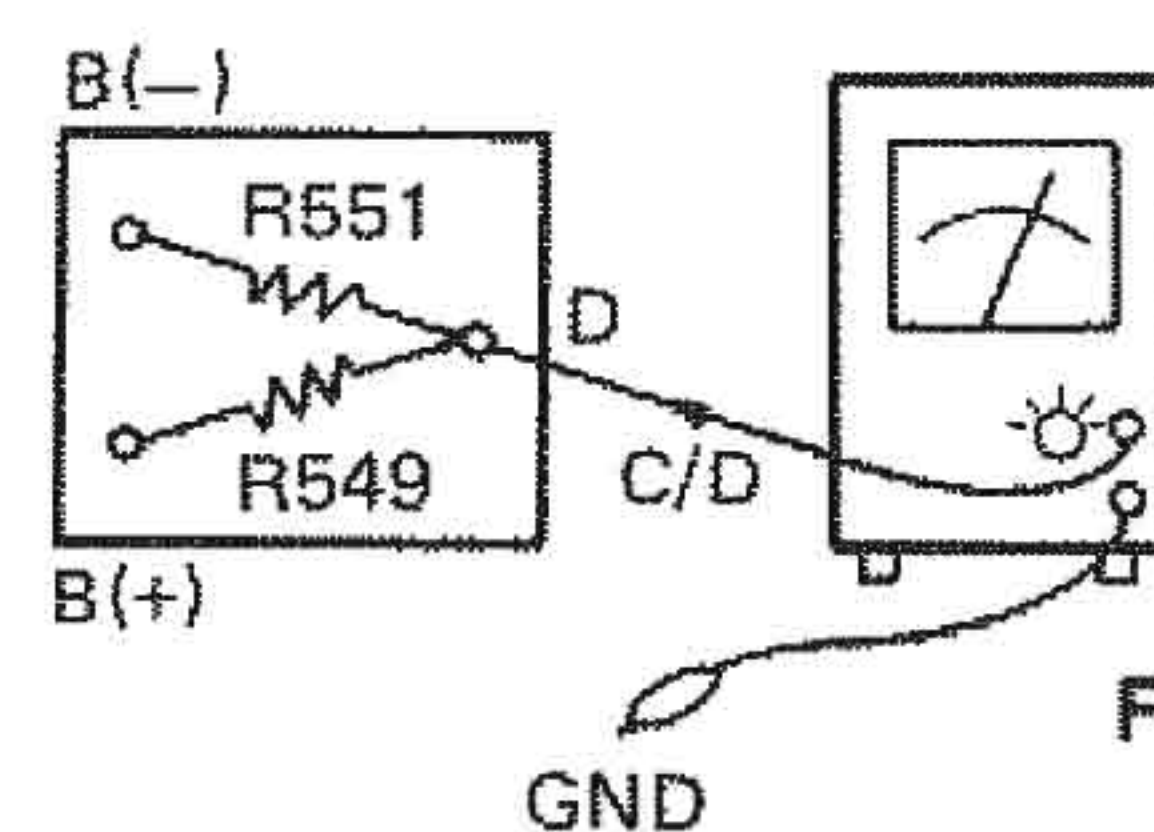


Figure 33.

## CENTER VOLTAGE ADJUSTMENT

### R Channel

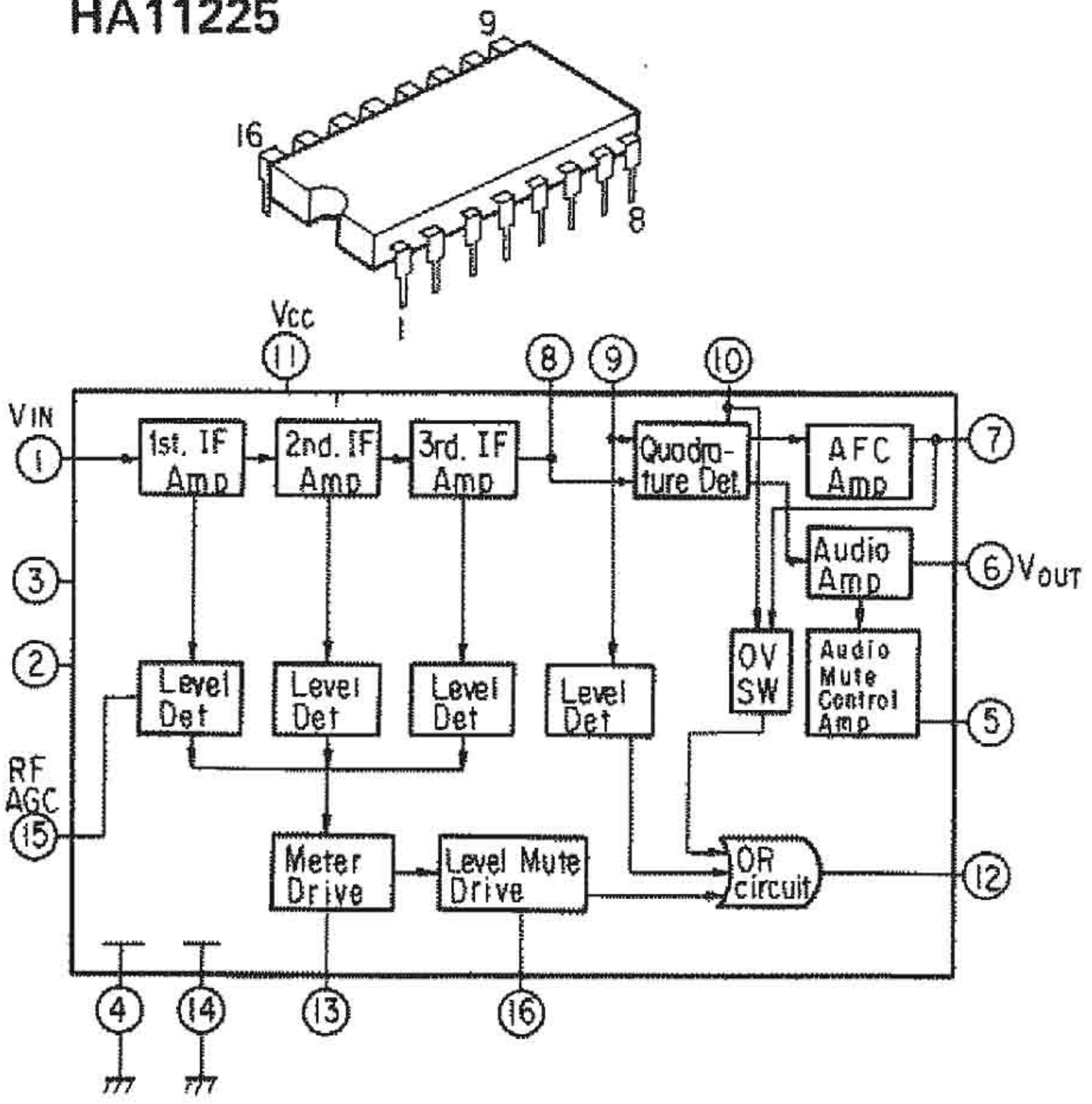
1. Connect a tester to Point C. Figure 33.
2. Adjust the semi-fixed Resistor (R514) until the tester indicates within  $\pm 10\text{mV}$ .

### L Channel

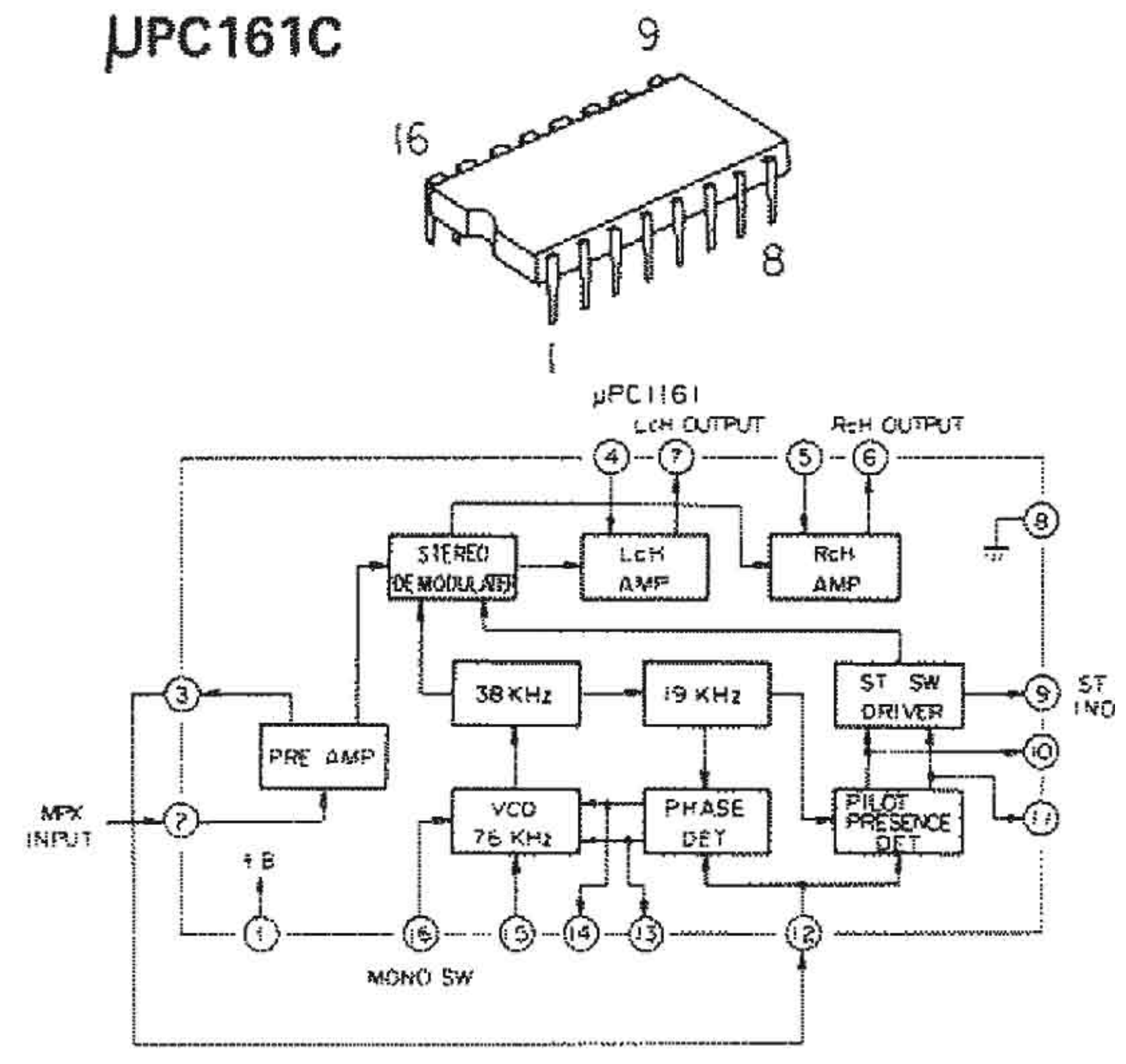
3. Connect a tester to Point D. Figure 33.
4. Adjust the semi-fixed Resistor (R513) until the tester indicates within  $\pm 10\text{mV}$ .

# IC BLOCK DIAGRAM

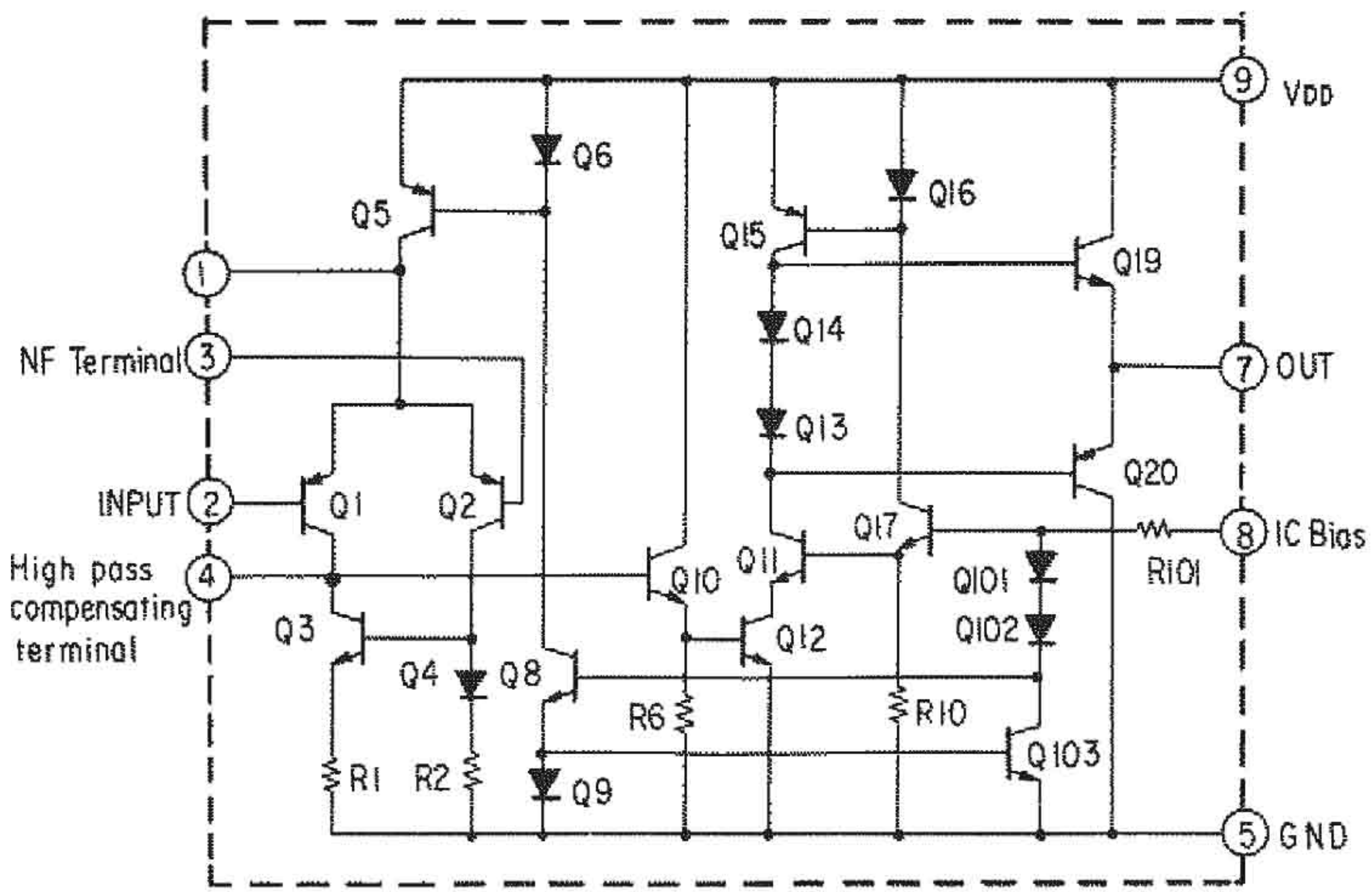
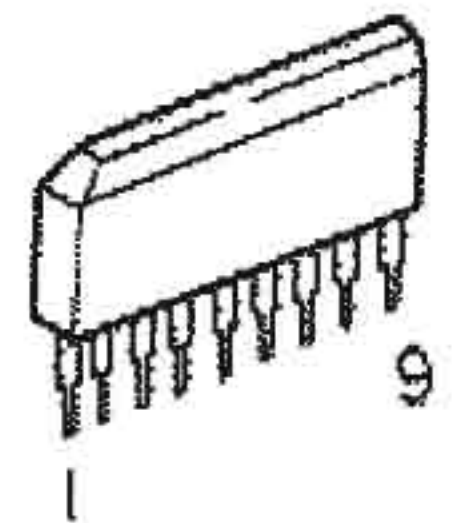
**HA11225**



**μPC161C**

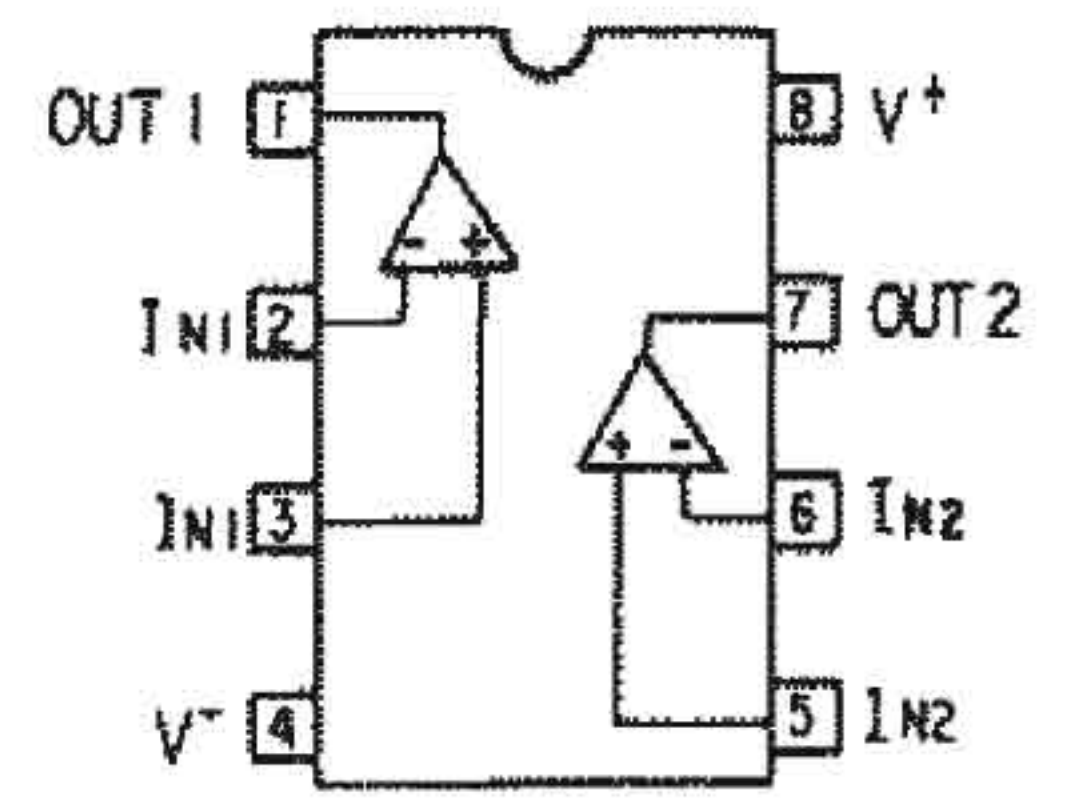


**TA73229**

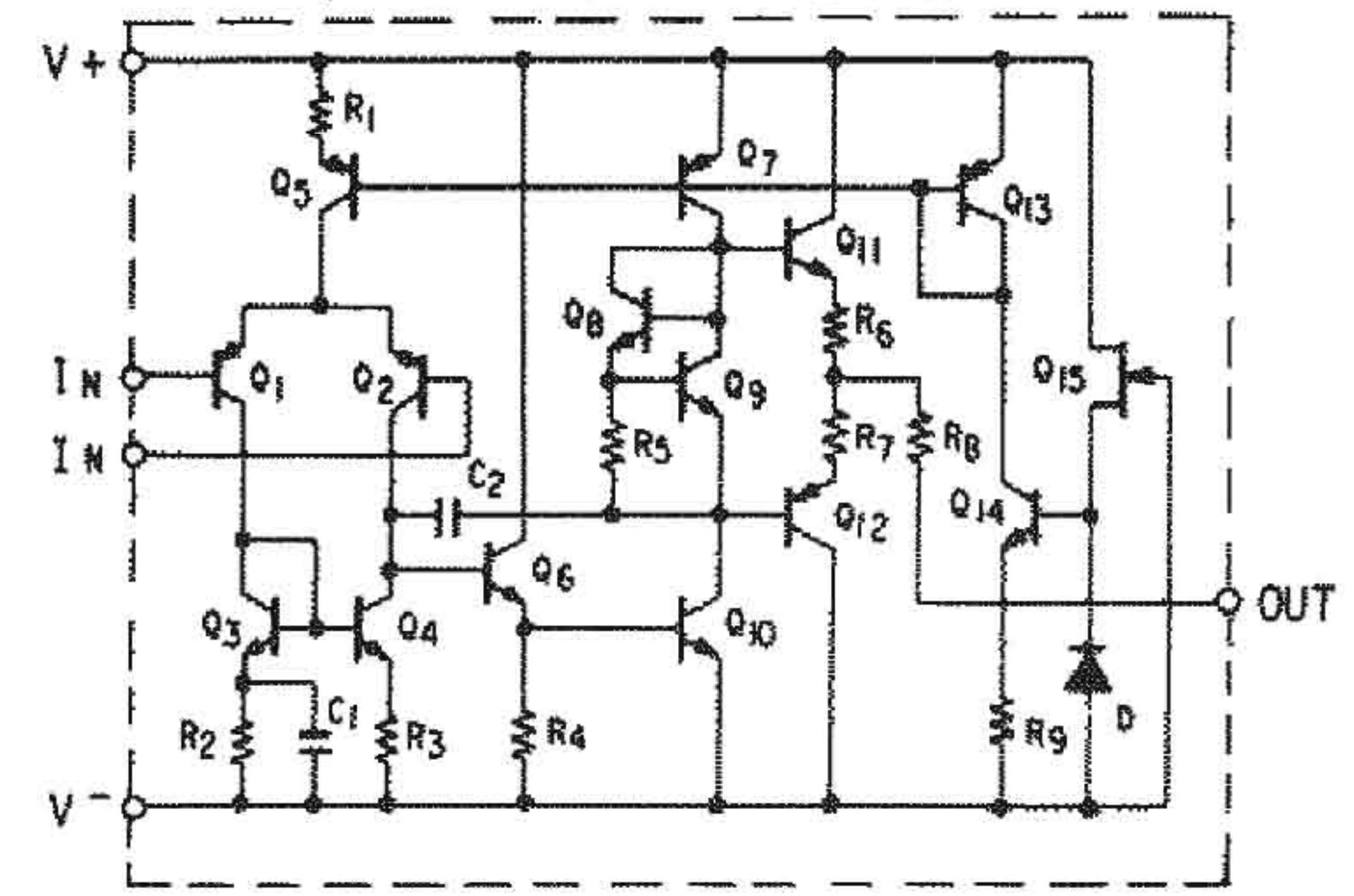


**NJM4558**

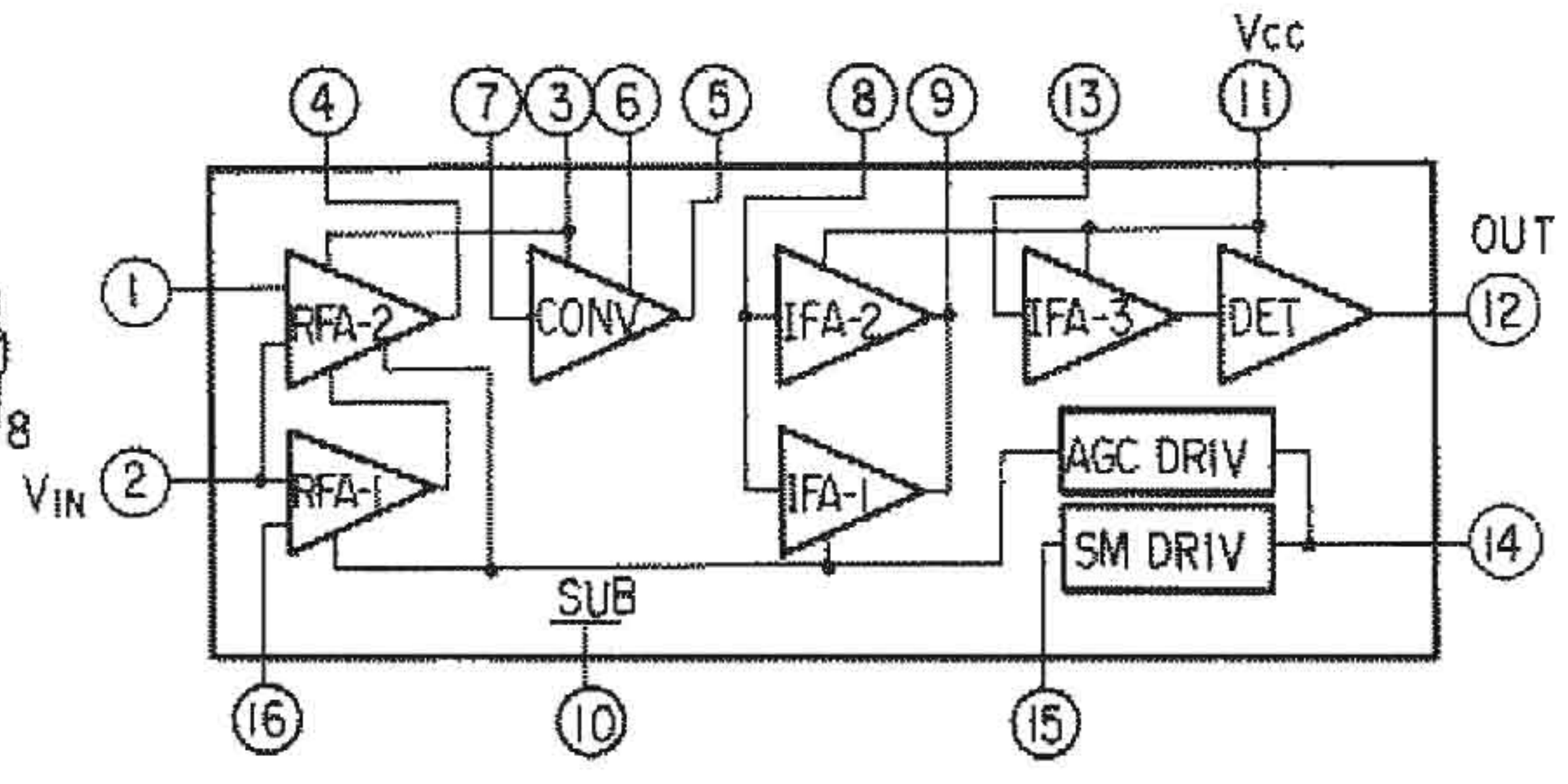
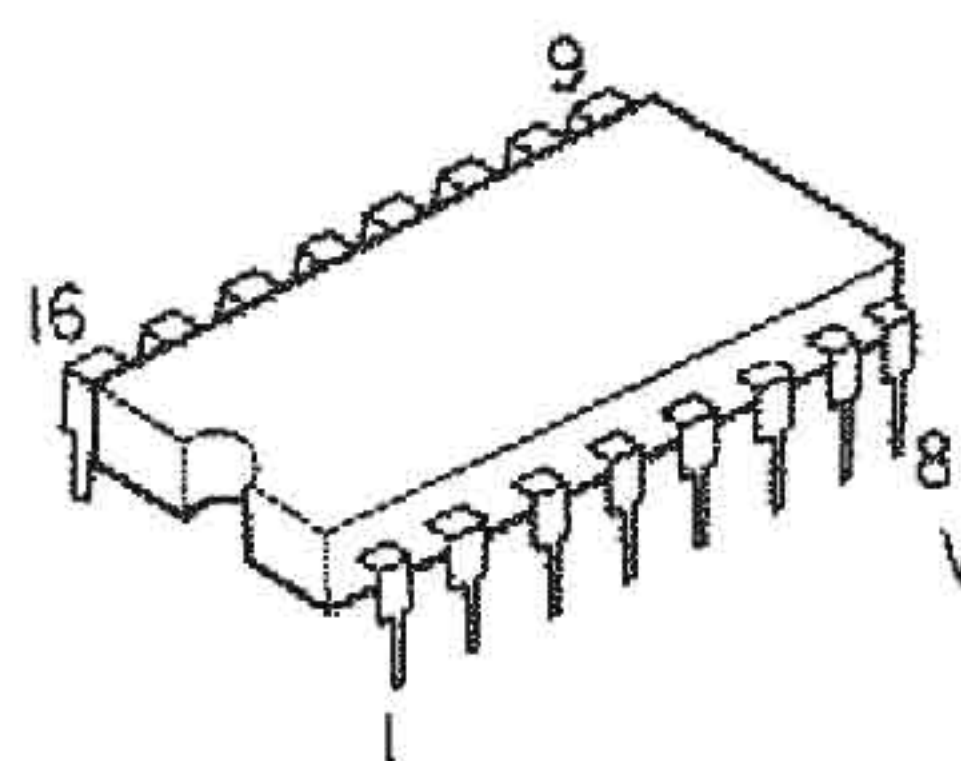
Connection Diagram (Top View)



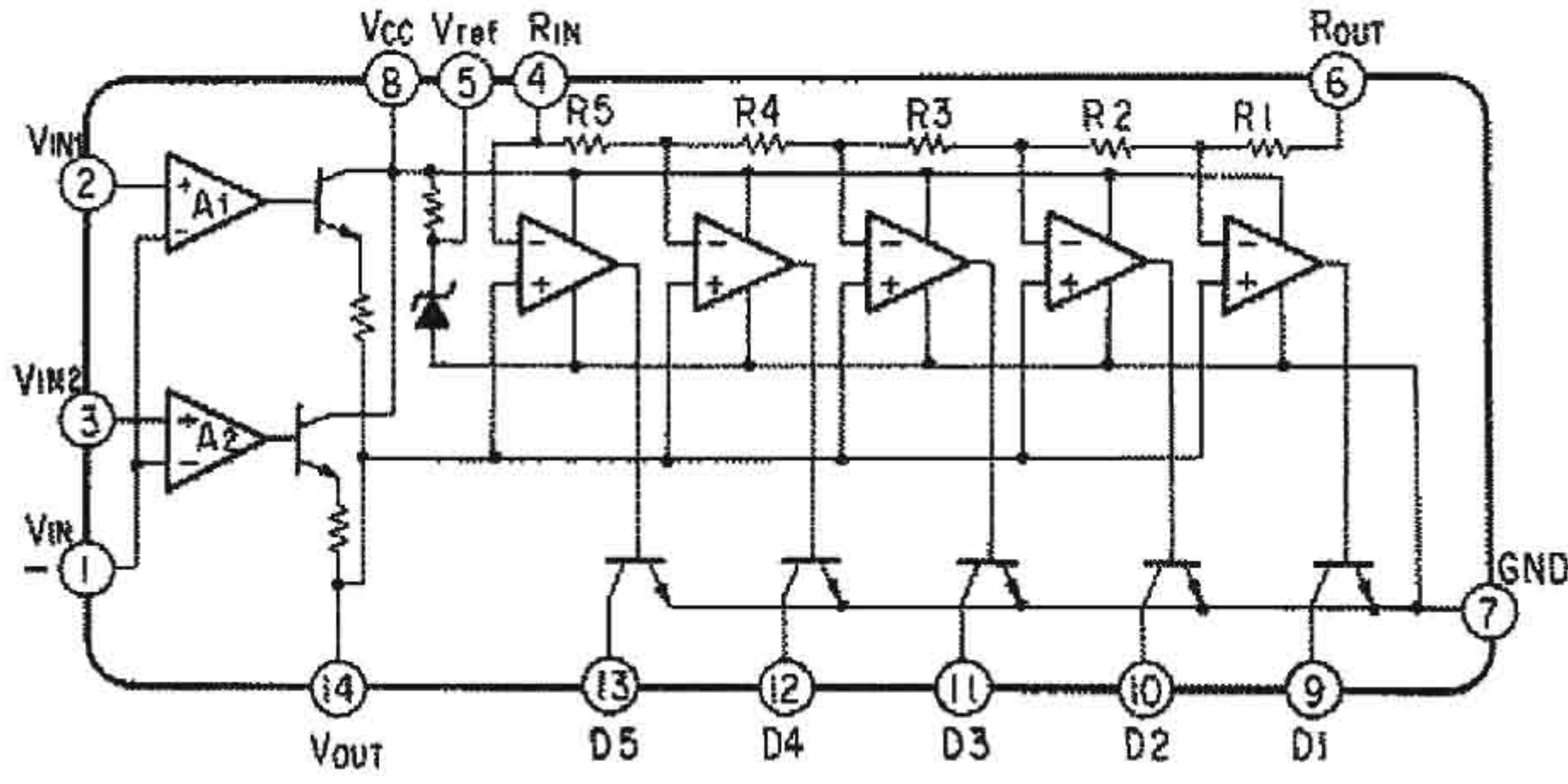
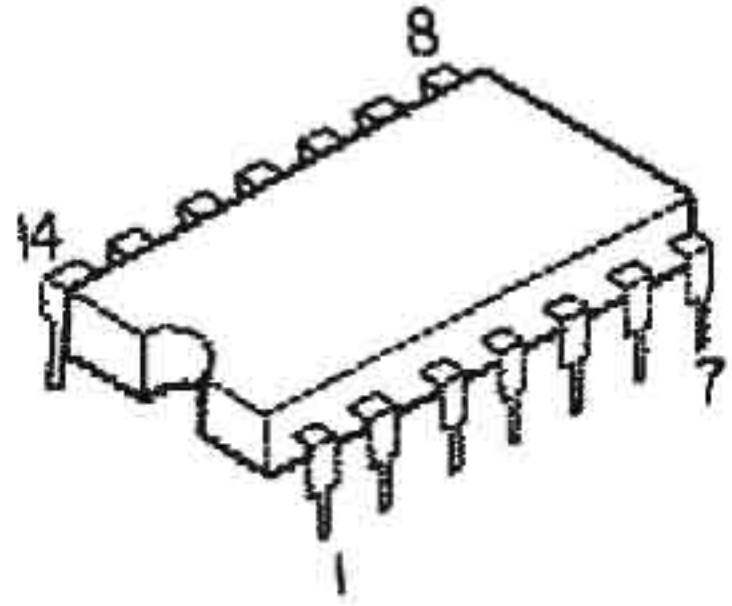
Equivalent Circuit (1/2 Circuit)



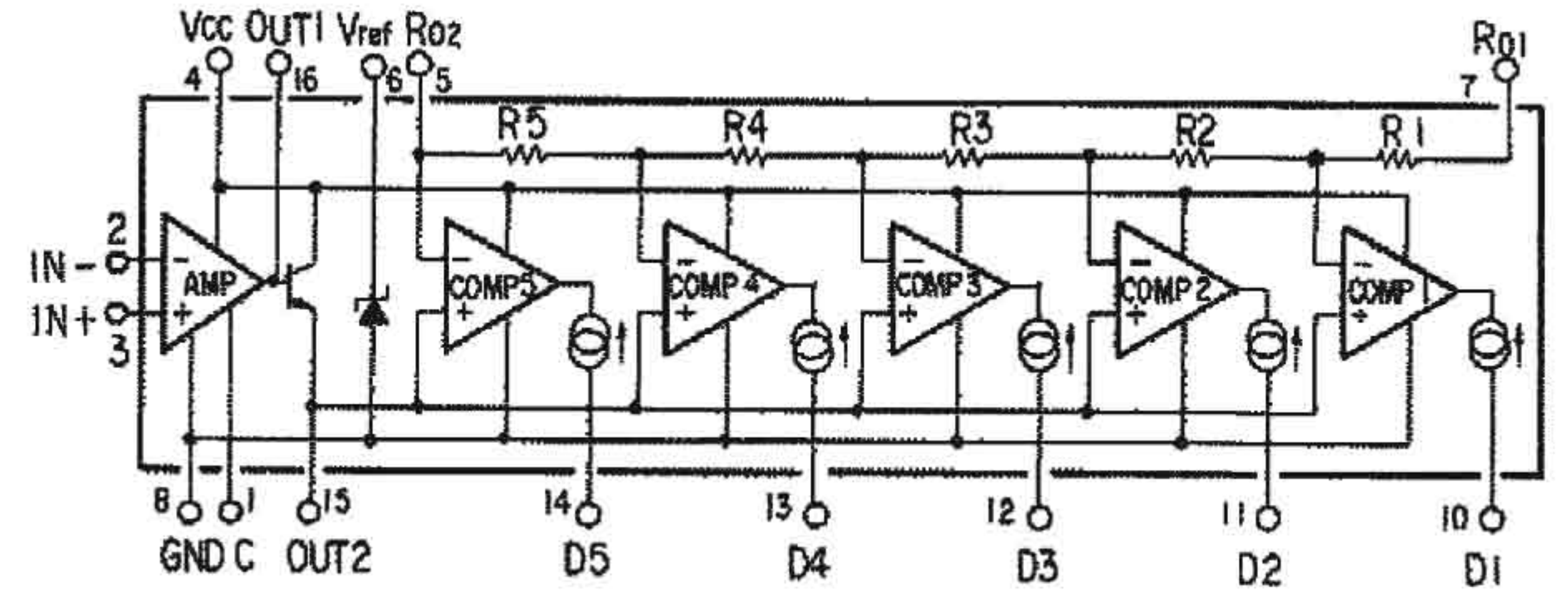
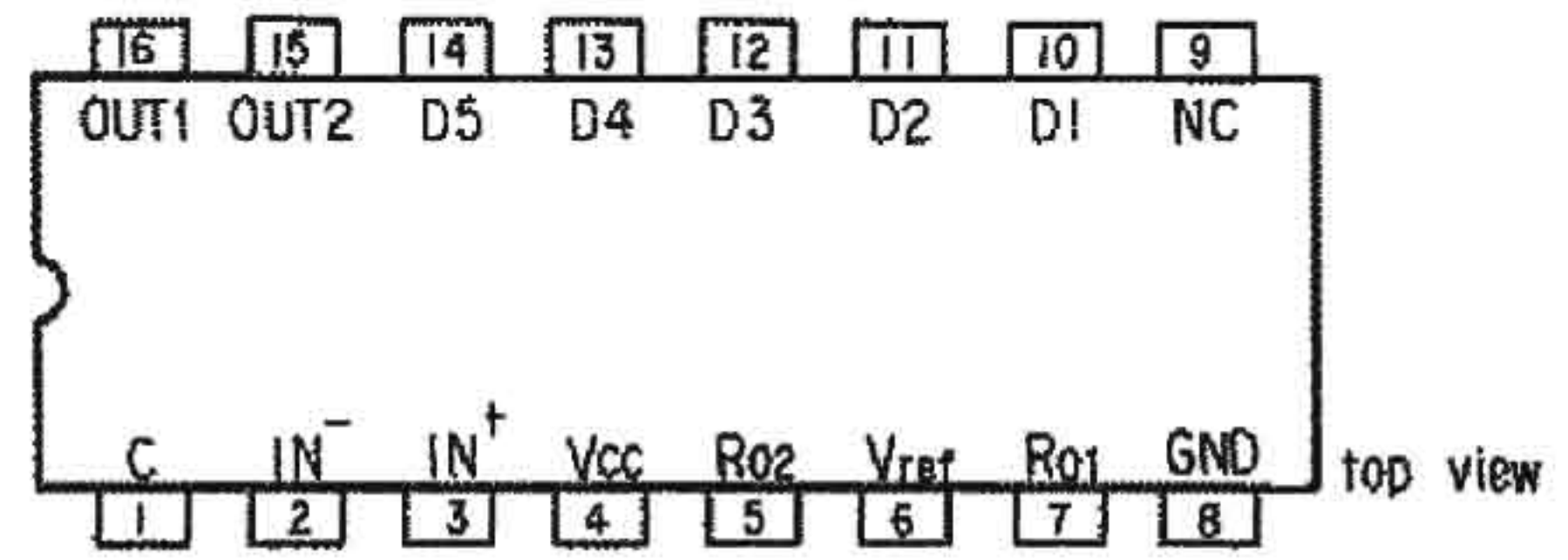
**LA1240**



TA7654P



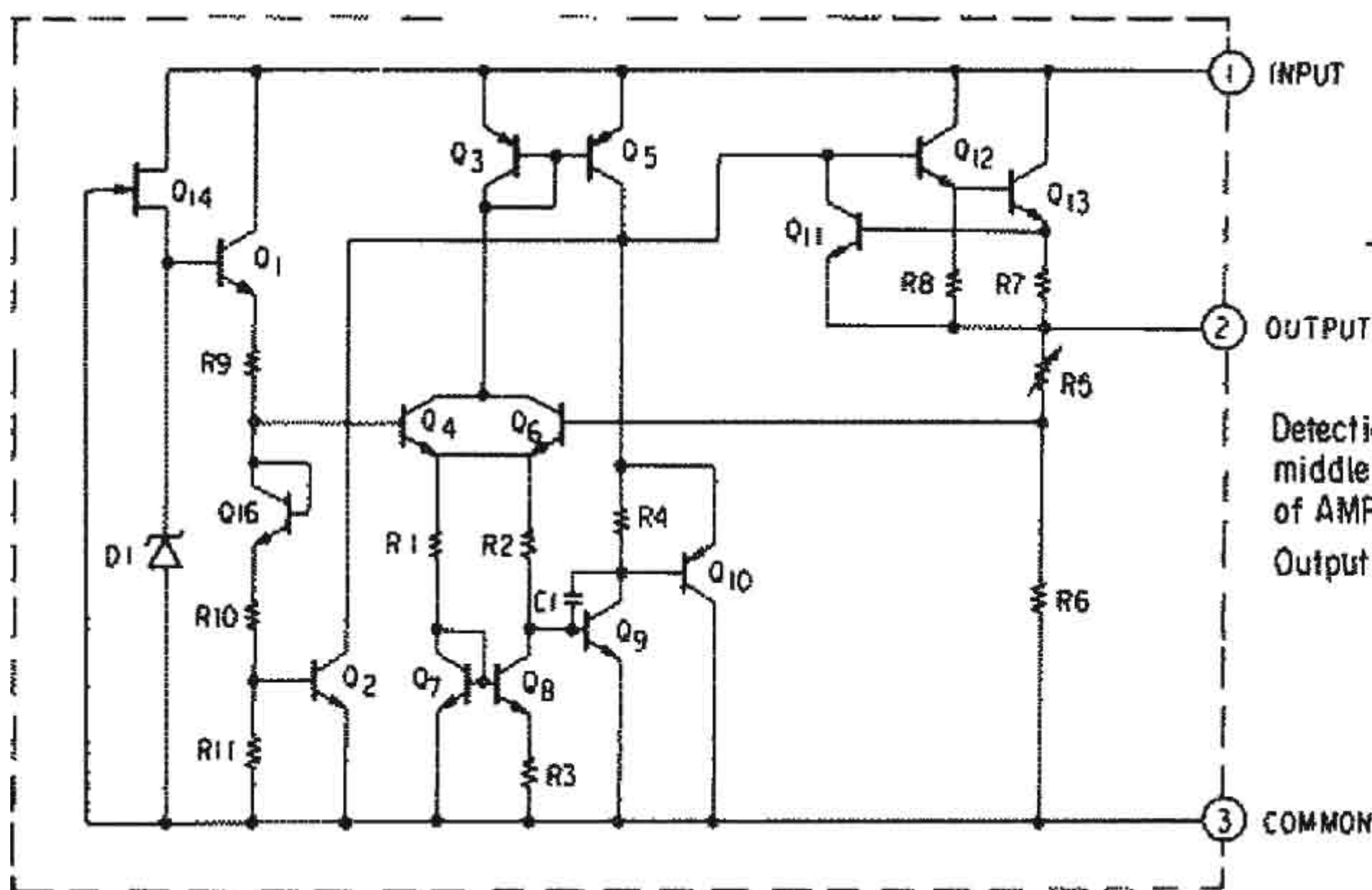
LB1405



TA78L012AP



EQUIVALENT CIRCUIT



TA7317P

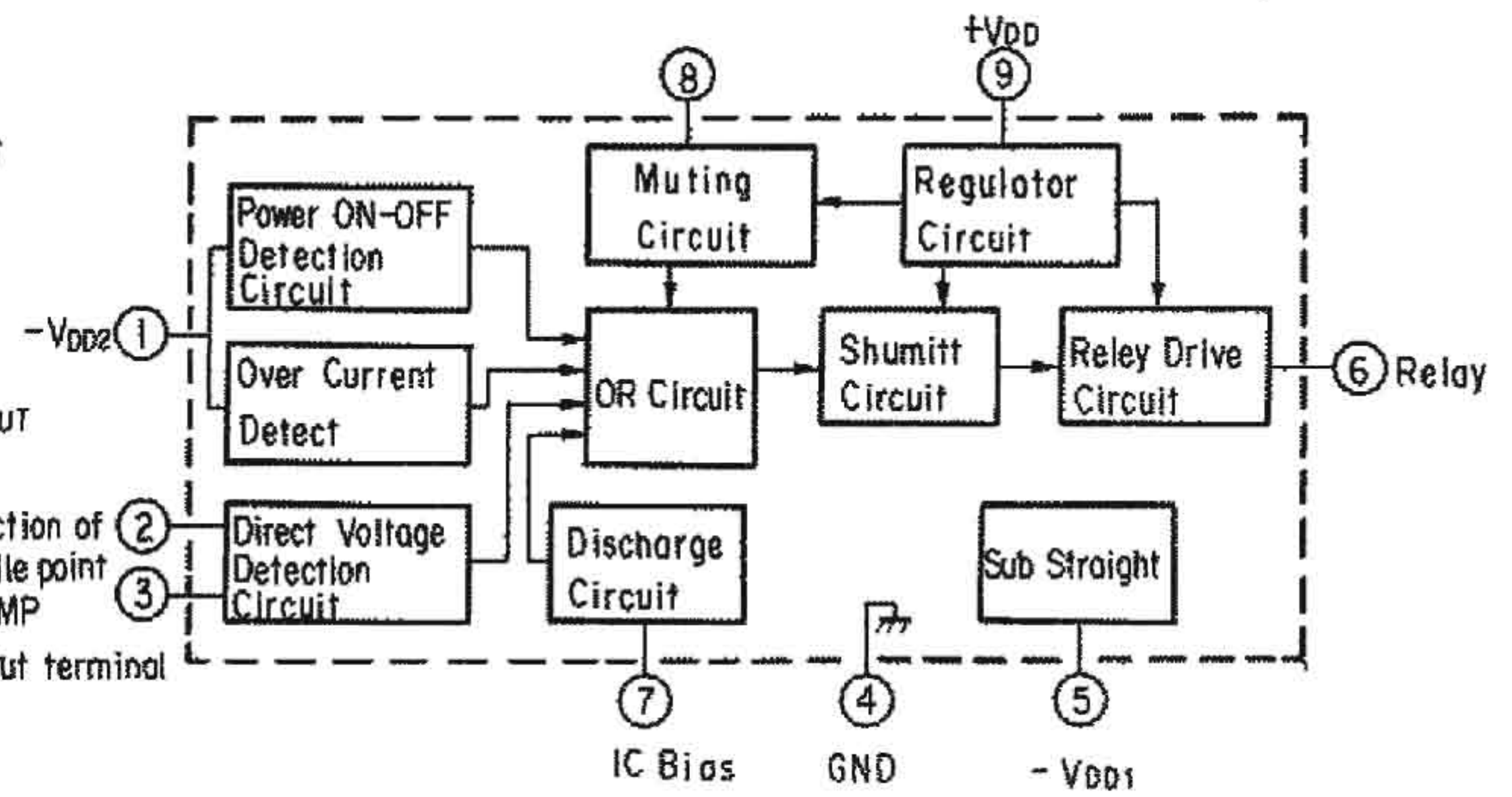
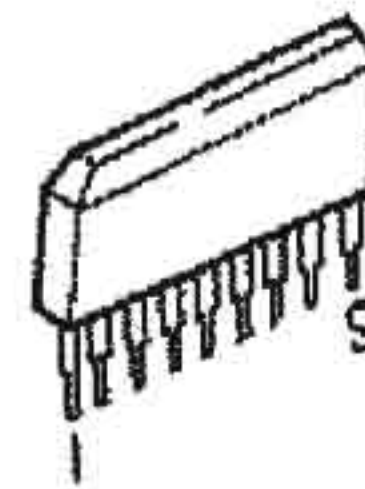


Figure 34.

# ELECTRICAL PARTS LOCATIONS

## LED SIGNAL SCHEMATIC DIAGRAM

This LED SIGNAL DRIVER CIRCUIT is used for units from No.1 ~ to 1500.

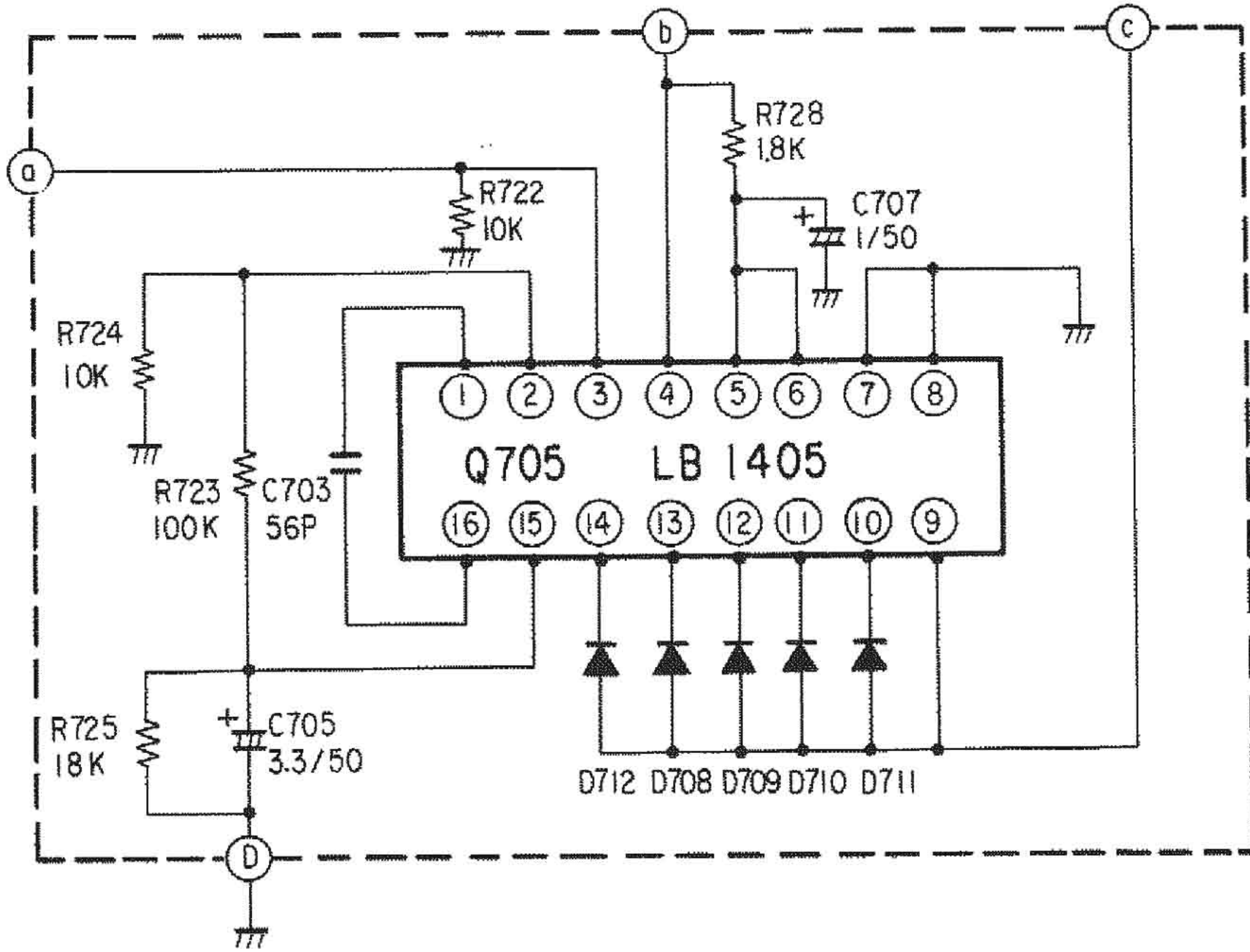


Figure 35.

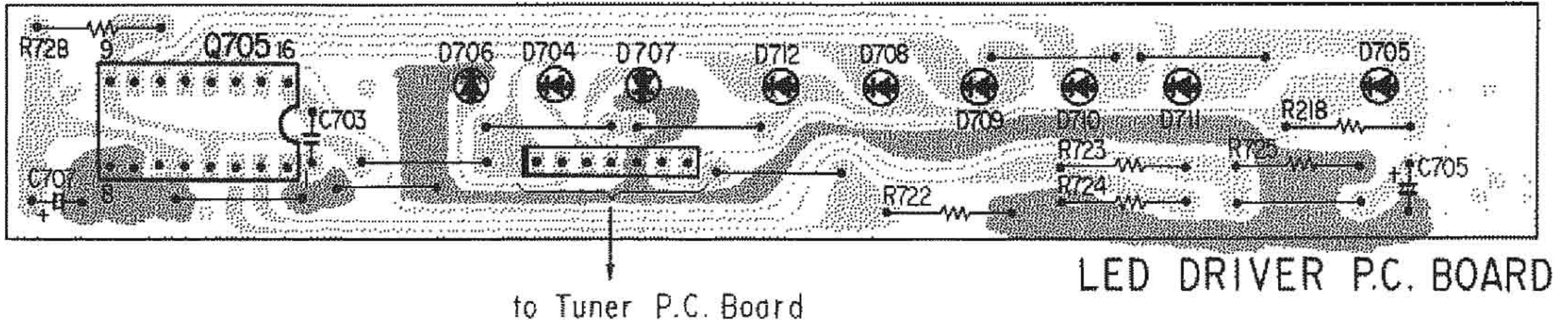
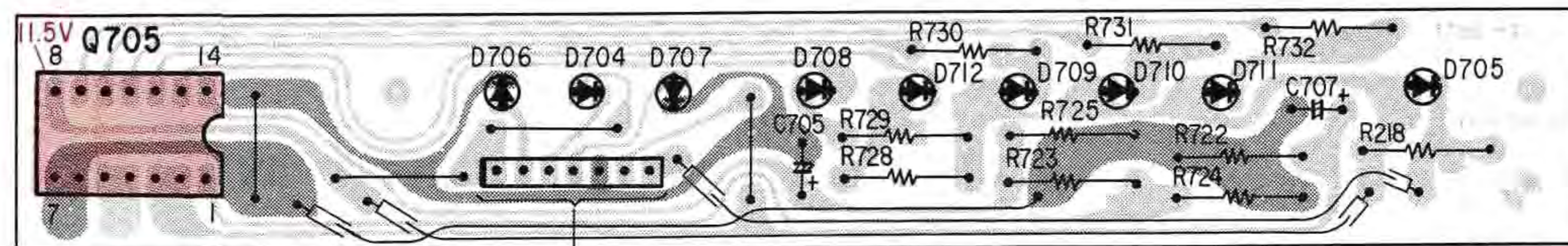


Figure 36.

Symbol No.	Part No.	Description
Q705	22114811	IC, LB1405
D704, 708, 709, 710, 711, 712		Diode, TLG205
D705		Diode, TLR205
D706, 707		Diode, TLR207
C703	22362560	CD, 56pF, 50V, K

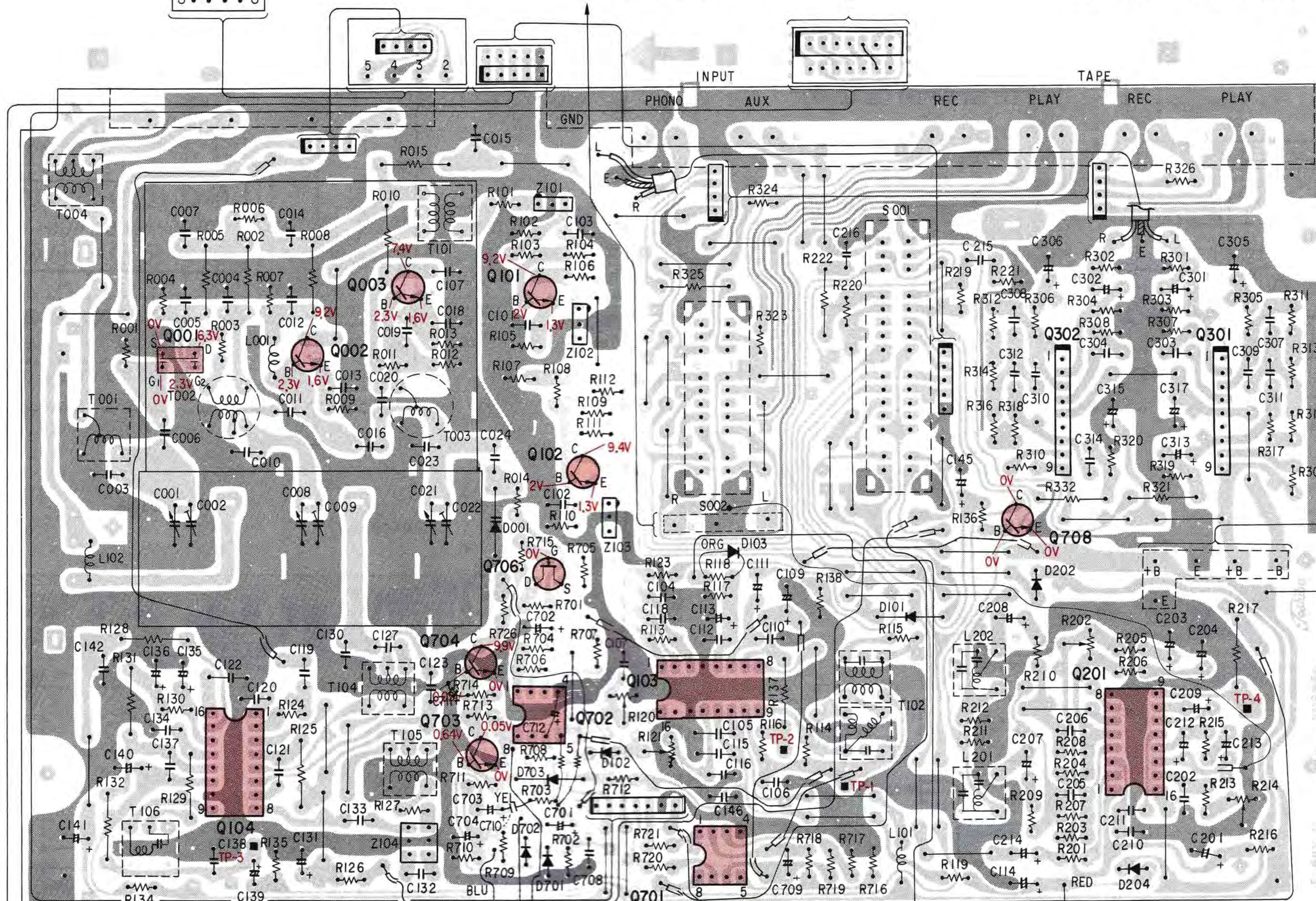
Symbol No.	Part No.	Description
C705	22488339	EL, 3.3mfd, 50V, M
C707	22488109	EL, 1mfd, 50V, M
R218	22545562	5.6K ohm
R722, 724	22545103	10K ohm
R723	22545104	100K ohm
R725	22545183	18K ohm
R728	22545182	1.8K ohm

TUNER P.C. BOARD



LED DRIVER P.C. BOARD

- 2SA970
- 2SA949
- 2SC1815
- 2SC1923
- 2SC2229
- 2SC2240
- TA7317P
- TA7322P
- NJM4558D
- TA7654P
- HA11225
- LA1240
- μPC1161C



Q104

16	1.1V	4.7V	1
15	0V	1.7V	2
14	1.5V	10.6V	3
13	0.66V	8.4V	4
12	1.5V	10.6V	5
11	10.8V	3.4V	6
10	0V	1.3V	7
9	7.5V	2.7V	8

Q301  
Q302

1	—
2	0.43V
3	0.44V
4	-23.4V
5	24.7V
6	—
7	0.09V
8	19.1V
9	24.5V

Q201

8	0V	10.8V	9
7	3.9V	2.3V	10
6	3.9V	2.3V	11
5	8.7V	2.3V	12
4	8.7V	2.3V	13
3	5.5V	2.3V	14
2	2.3V	2.3V	15
1	10.8V	2.6V	16

Q702

1	2	3	4
7.5V	5.7V	5.6V	0V
11.5V	5.6V	5.7V	5.1V
8	7	6	5

Q701

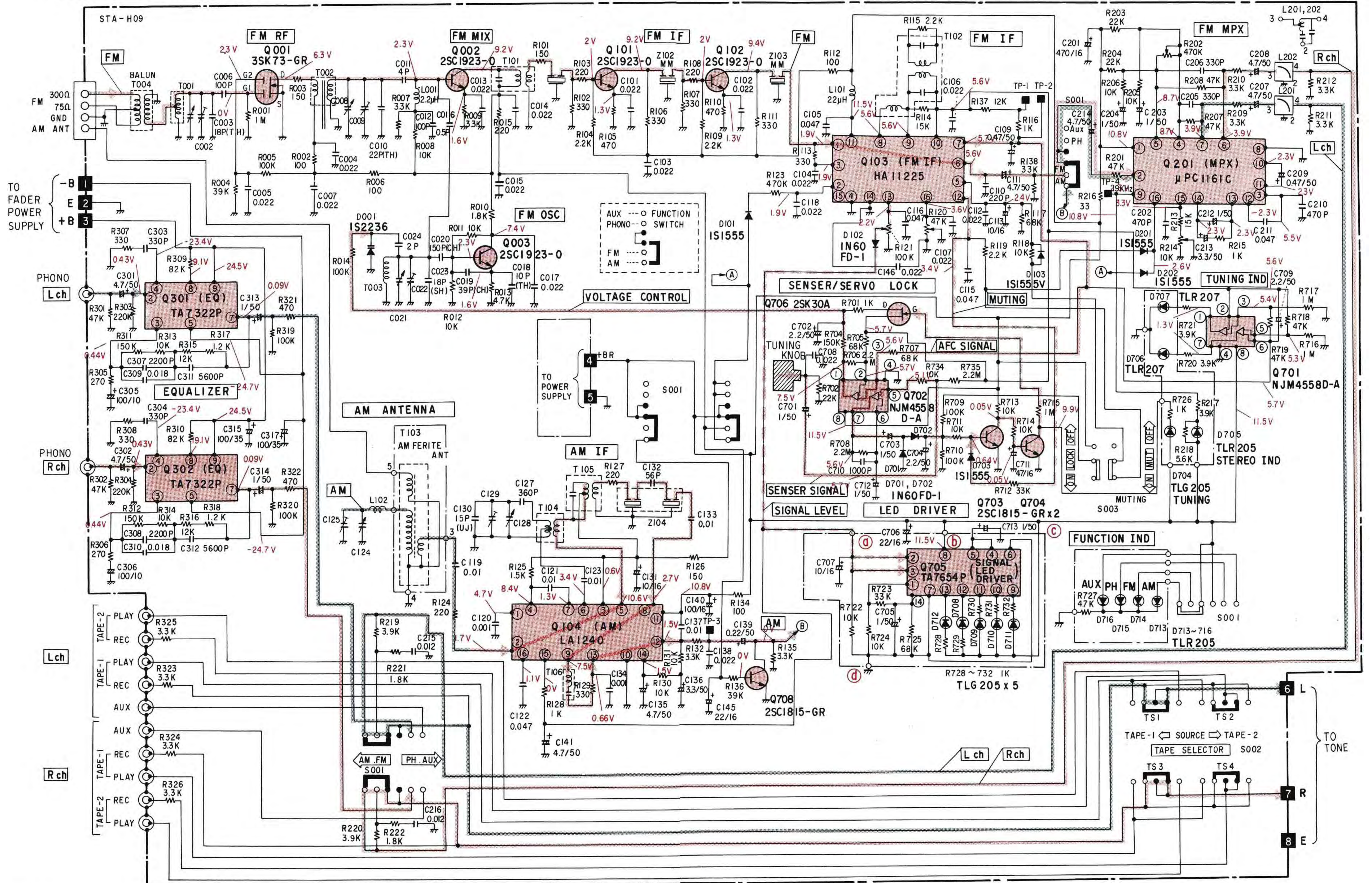
1	2	3	4
1.3V	5.6V	5.4V	0V
11.5V	1.3V	5.7V	5.3V
8	7	6	5

Q103

1	2	3	4	5	6	7	8
1.9V	1.9V	1.9V	0V	2.4V	5.6V	5.7V	5.6V
3.6V	2.4V	0V	2.2V	3.4V	11.5V	5.6V	5.6V
16	15	14	13	12	11	10	9

Figure 38.

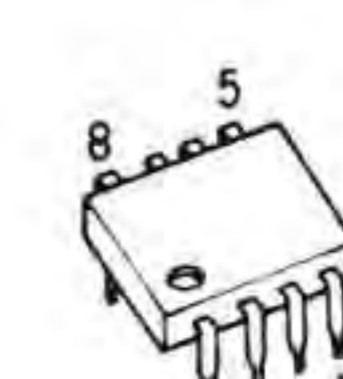
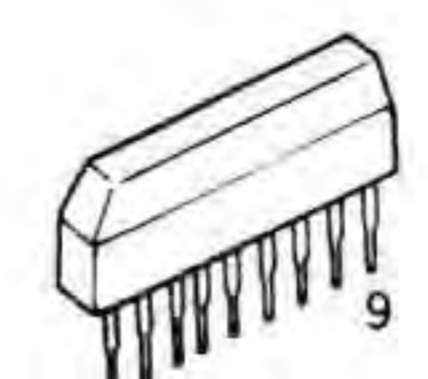

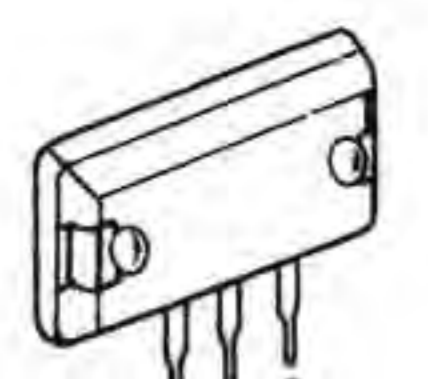
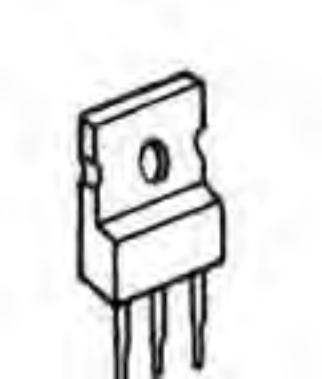

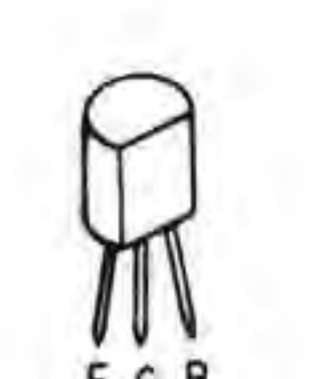
TUNER SCHEMATIC DIAGRAM



**CAUTION:** The  $\Delta$  mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Figure 39.

MAIN AMP P.C. BOARD

-  NJM4558D
-  TA7317P  
TA7322P
-  2SK150
-  2SA1094  
2SC2564
-  2SA814  
2SC1624  
2SD525
-  TA78L012AP
-  2SA970  
2SA949  
2SC1815  
2SC1923  
2SC2229  
2SC2240

Q502

1	2	3	4	5	6	7
17.5V	0V	0.75V	-	0.75V	0V	17.5V

Q804

1	2	3	4	5	6	7	8	9
-0.8V	0.01V	-	0V	0.7V	1.05V	0V	1.2V	2.9V

Q501

1	2	3	4	5	6	7
17.5V	0V	0.75V	-	0.75V	0V	17.5V

Q401

8	14.5V	-0.03V	1
7	-0.03V	0V	2
6	0V	-0.01V	3
5	-0.01V	-14.5V	4

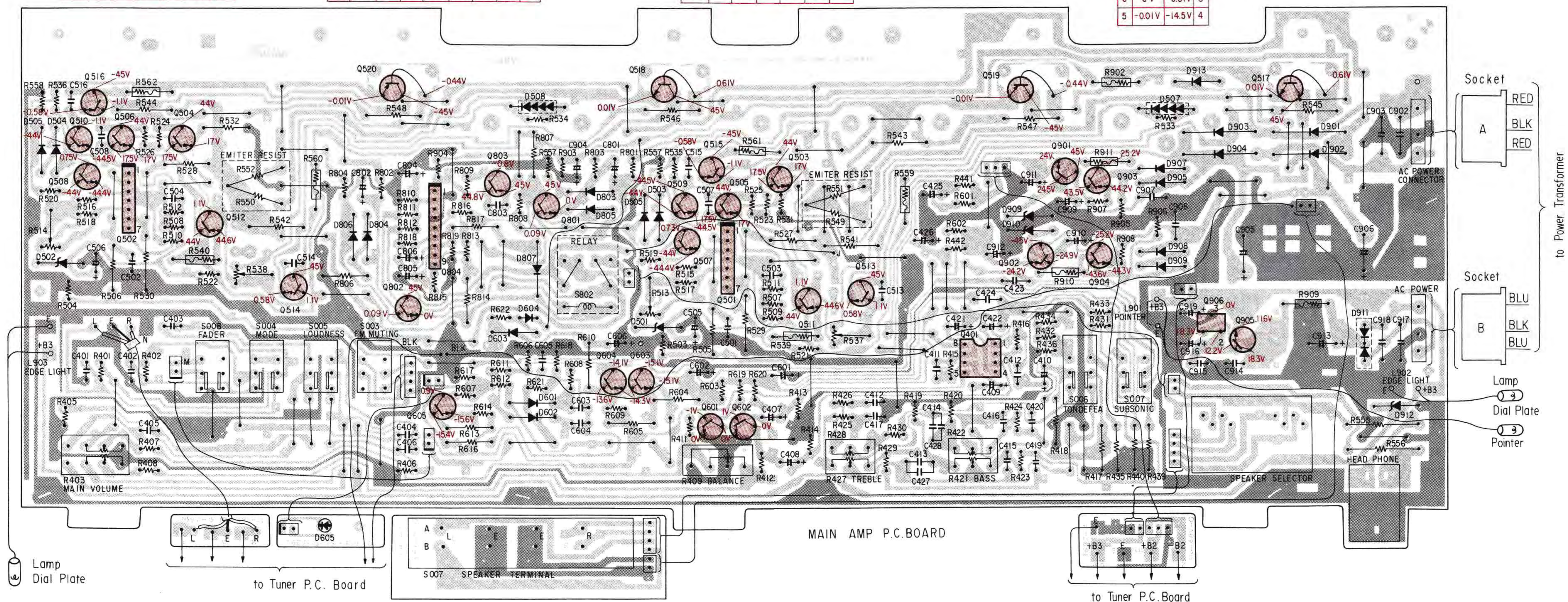
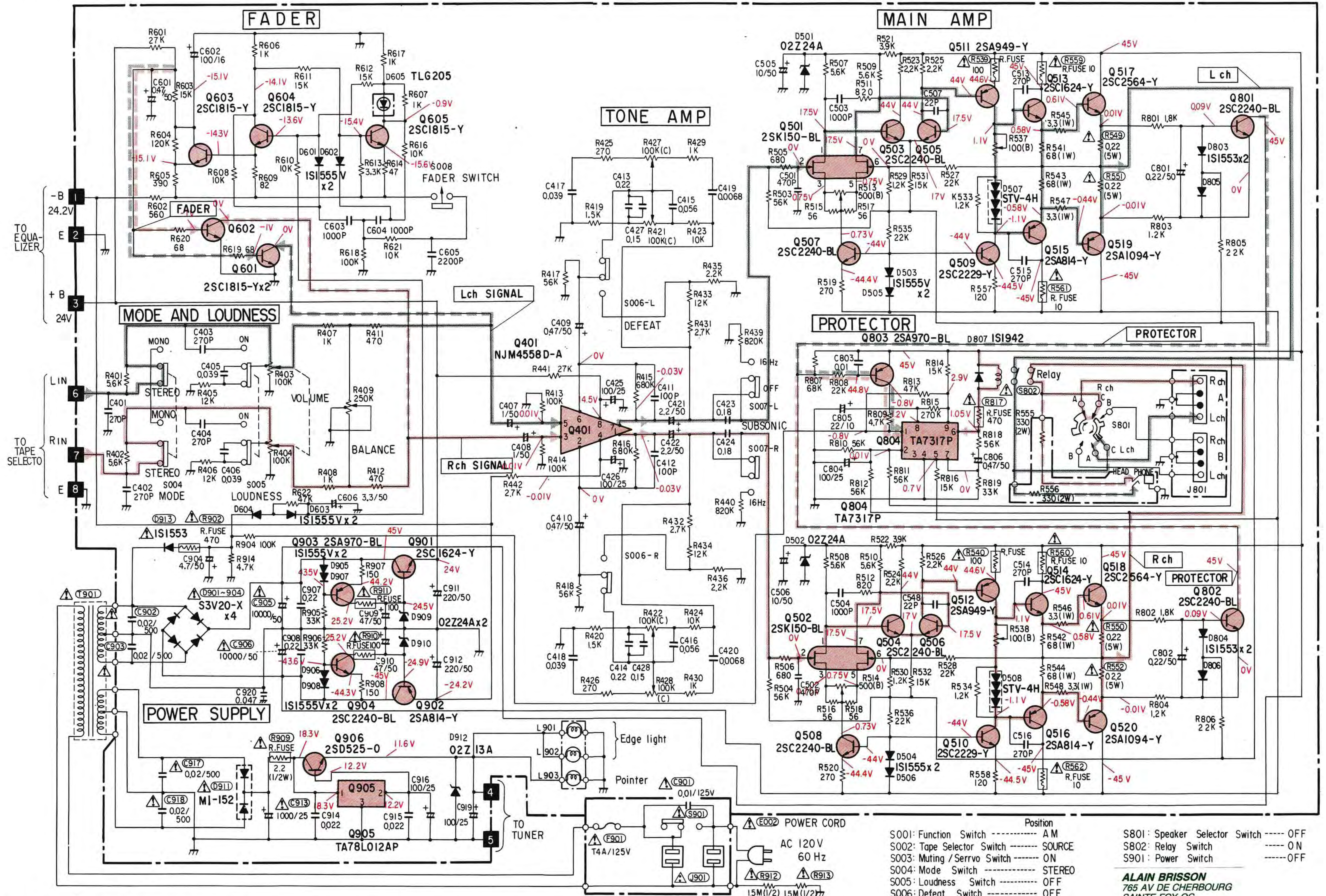


Figure 40.



MAIN AMP SCHEMATIC DIAGRAM



**CAUTION:**  
The  $\Delta$  mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Figure 41.

ALAIN BRISSON  
765 AV DE CHERBOURG  
SAINTE-FOY QC  
G1X 2W4

# POWER SUPPLY P.C. BOARD

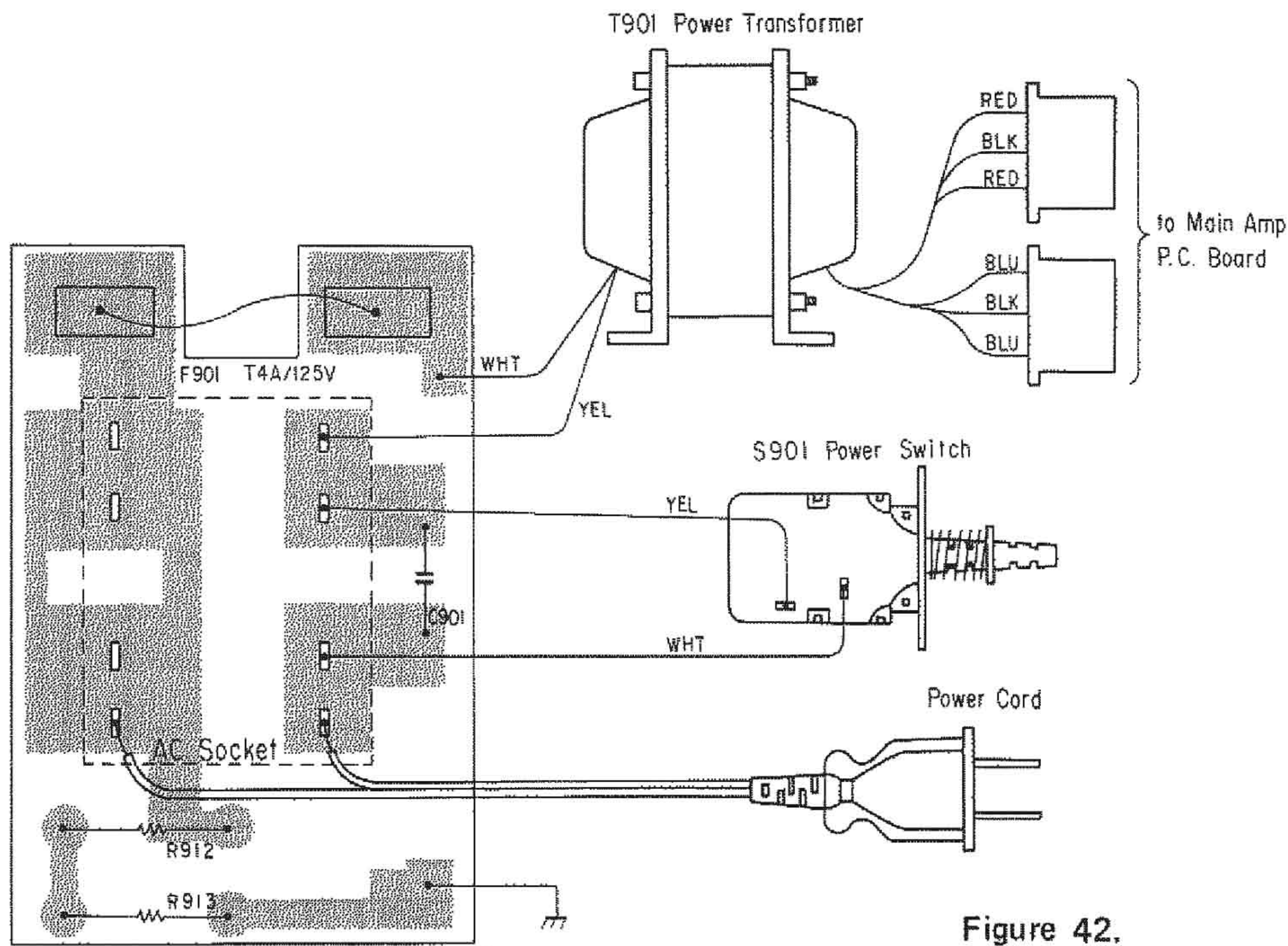
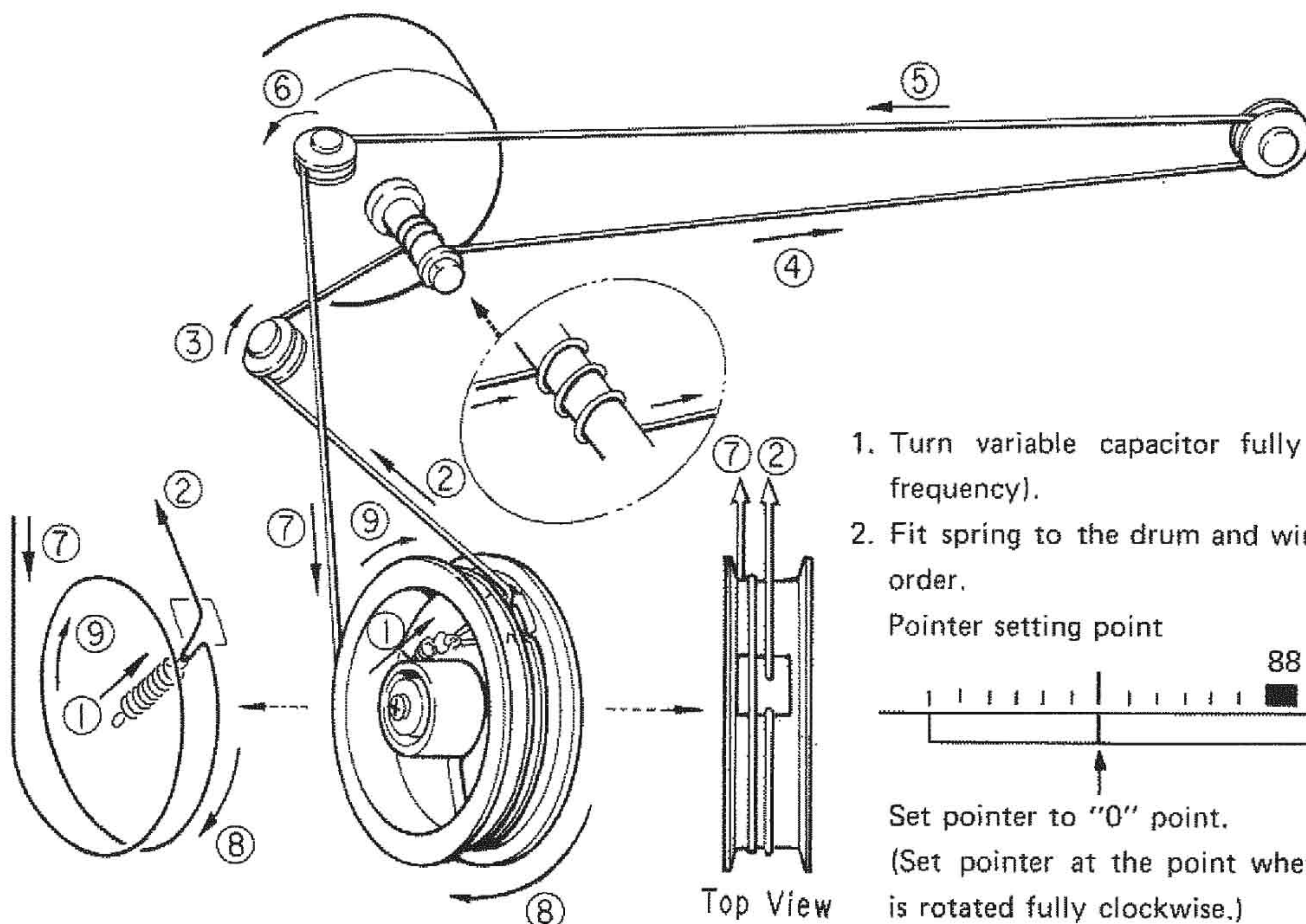
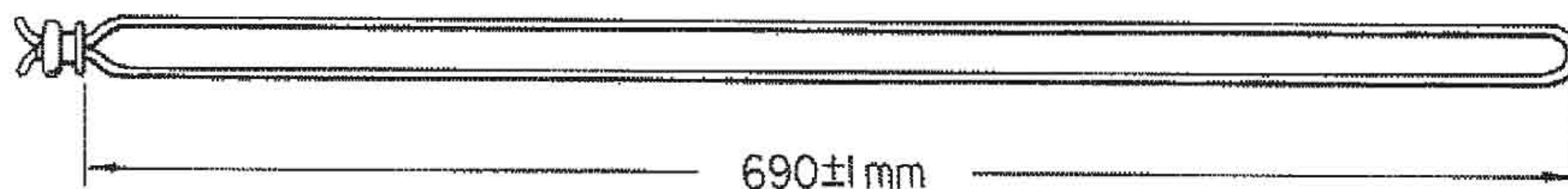


Figure 42.

POWER SUPPLY P.C. BOARD

## DIAL CORD RESTRINGING



1. Turn variable capacitor fully counterclockwise (high frequency).
  2. Fit spring to the drum and wind the cord in numerical order.
- Pointer setting point
- 88
- 540
- Set pointer to "0" point.  
(Set pointer at the point where the variable capacitor is rotated fully clockwise.)

Figure 43.

# CABINET EXPLODED VIEW

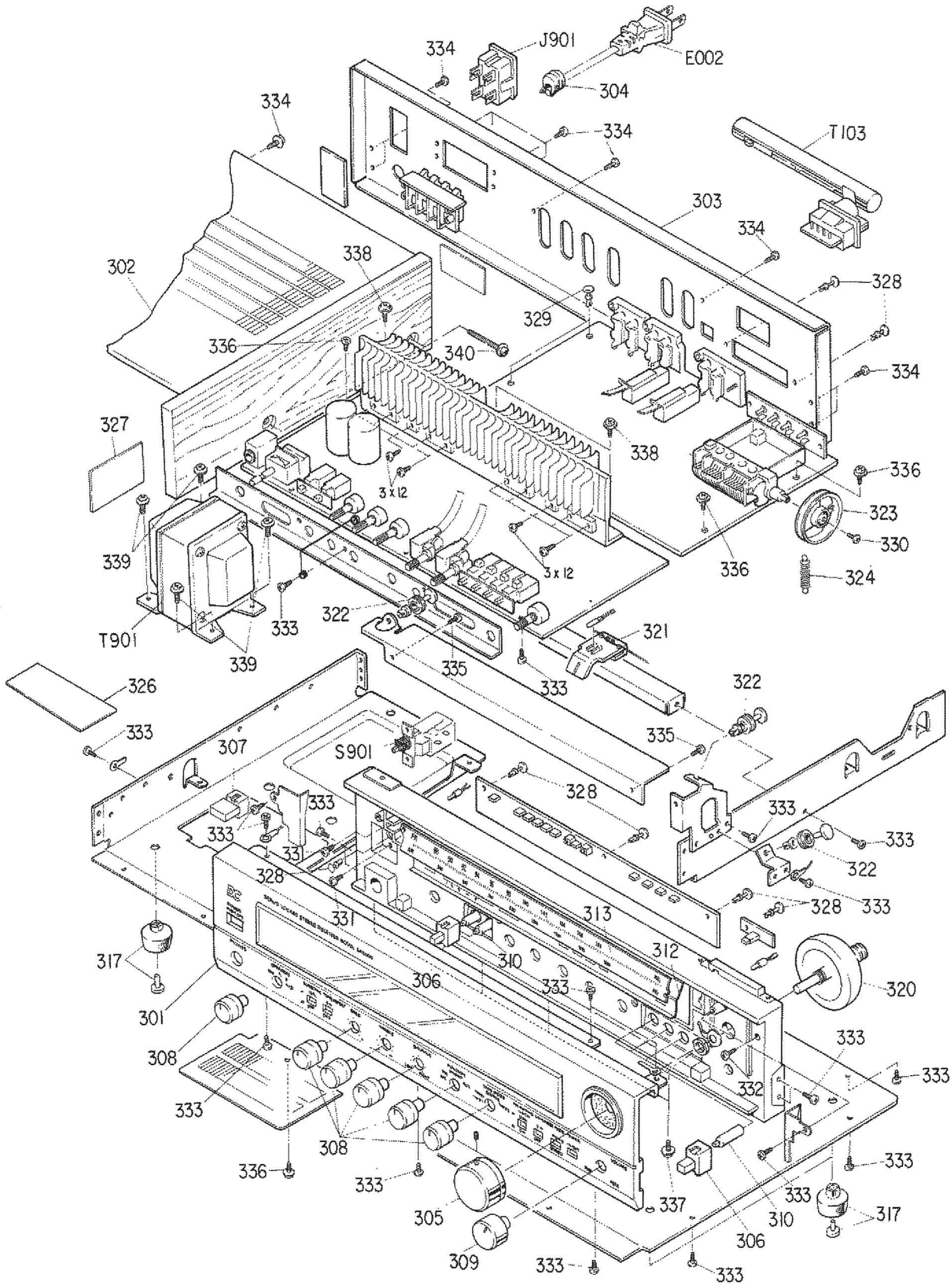




Figure 44.

Note: Excluded Parts in the Parts List are not available as replacement parts.

# PARTS LIST

**CAUTION:** The  mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part No.	Description
<b>CABINET PARTS</b>		
301	20017144	Front Panel Ass'y (TA)
	20017153	Front Panel Ass'y (TC)
302	20815197	Cabinet Ass'y
303	22712495	Jack Plate (TA)
	22712542	Jack Plate (TC)
 304	25845120	Bush, Power Cord
305	22826281	Knob, Tuning
306	22826279	Knob, Push
307	22826280	Knob, Power
308	22826290	Knob, Level
309	22826291	Knob, Volume
310	22755389	Joint, Knob
312	22848316	Dial Decoration
313	22836379	Dial Plate
317	22828056	Leg
320	22749258	Tuning Shaft Ass'y
321	22741324	Pointer Ass'y
322	22742217	Pulley Ass'y
323	20042057	Drum
324	20866009	Spring, Drum
326	22906139	Label, FTC (TA)
327	22950885	Caution Label
328	22705022	Rivet, Plastic, 3 $\phi$ x 5.5mm
329	22705034	Rivet, Plastic, 3.5 $\phi$ x 5.5mm
330	22707323	Screw, 2.6 $\phi$ x 8mm, BID
331	22701325	Screw, 3 $\phi$ x 8mm, BID
332	22701237	Screw, 3 $\phi$ x 6mm, Tapping
333	22707115	Screw, 3 $\phi$ x 8mm, Tapping
334	22701326	Screw, 3 $\phi$ x 8mm, Tapping, BLK
335	22707276	Screw, 3 $\phi$ x 12mm, Tapping
336	22701436	Screw, 3 $\phi$ x 8mm, TPAN
337	22707590	Screw, 3 $\phi$ x 8mm, TPAN
338	22701434	Screw, 3 $\phi$ x 10mm, TPAN
339	22707610	Screw, 4 $\phi$ x 6mm, BID
340	22707184	Screw, 4 $\phi$ x 25mm, TPAN, BLK
<b>TRANSISTORS, IC'S &amp; DIODES</b>		
Q001		Transistor, 3SK73-GR
Q002, 003		Transistor, 2SC1923-O
Q101, 102		Transistor, 2SC1923-O
Q103	22114689	IC, HA11225
Q104	22114810	IC, LA1240
Q201	22114627	IC, $\mu$ PC1161C
Q301, 302		IC, TA7322P

Symbol No.	Part No.	Description
Q401	22114470	IC, NJM4558D-A
Q501, 502		Transistor, 2SK150-GR-Y/BL
Q503, 504,		Transistor, 2SC2240-BL
505, 506,		
507, 508		
Q509, 510		Transistor, 2SC2229-Y
Q511, 512		Transistor, 2SA949-Y
Q513, 514		Transistor, 2SC1624-Y
Q515, 516		Transistor, 2SA814-Y
Q517, 518		Transistor, 2SC2564-Y
Q519, 520		Transistor, 2SA1094-Y
Q601, 602,		Transistor, 2SC1815-GR
603, 604,		
605		
Q701, 702	22114470	IC, NJM4558D-A
Q703, 704		Transistor, 2SC1815-GR
Q705		TA7654P (More than 1501)
	22114811	IC, LB1405 (NO 1 to 1500)
Q706		Transistor, 2SK30A-O
Q708		Transistor, 2SC1815-GR
Q801, 802		Transistor, 2SC2240-BL
Q803		Transistor, 2SA970-BL
Q804		IC, TA7317P
Q901		Transistor, 2SC1624-Y
Q902		Transistor, 2SA814-Y
Q903		Transistor, 2SA970-BL
Q904		Transistor, 2SC2240-BL
Q905		IC, TA78L012AP
Q906		Transistor, 2SD525-O
D001		Diode, 1S2236
D101, 103		Diode, 1S1555V
D102	22115603	Diode, 1N60FD-1
D201, 202		Diode, 1S1555V
D501, 502		Diode, 02Z24A
D503, 504,		Diode, 1S1555V
505, 506		
D507, 508	22115424	Diode, STV-4H
D601, 602,		Diode, 1S1555V
603, 604		
D605		Diode, TLG205
D701, 702	22115603	Diode, 1N60FD-1
D703		Diode, 1S1555V
D704, 708,		Diode, TLG205
709, 710,		
711, 712		
D713, 714,		Diode, TLR205
715, 716,		
705		
D706, 707		Diode, TLR207

Symbol No.	Part No.	Description
D803, 804, 805, 806		Diode, 1S1553
⚠ D807		Diode, 1S1942
⚠ D901, 902, 903, 904	22115496	Diode, S3V20-X
D905, 906, 907, 908		Diode, 1S1555V
D909, 910		Diode, 02Z24A
⚠ D911	22115427	Diode, MI-152
D912		Diode, 02Z13A
⚠ D913		Diode, 1S1553

#### COILS & TRANSFORMERS

L001, 102	22291082	Coil, Choke, 2.2 $\mu$ H
L101	22241024	Coil, Choke, 22 $\mu$ H
L201, 202	22135032	Coil, Low-pass Filter
T001	22292073	Coil, Antenna, (FM)
T002	22294407	Coil, RF (FM)
T003	22295062	Coil, Oscillator (FM)
T004	22290013	Coil, Balun
T101	22265727	Transformer, IF (FM)
T102	22267383	Transformer, Detector (FM)
T103	22242746	Coil, Antenna, (AM)
T104	22245288	Coil, Oscillator (AM)
T105	22264757	Transformer, IF (AM)
T106	22264744	Transformer, IF (AM)
⚠ T901	22223775	Transformer, Power (With Fuse)

#### ELECTRICAL PARTS

S001	22195568	Switch, Remote, FM/AM/PH/AUX
S002	22195553	Switch, Slide, TAPE 1/PATE 2
S003	22195541	Switch, Push, MUTING
004		MODE
005		LOUDNESS
008		FADE
S006	22195616	Switch, Push, DEFEAT
007		SUBSONIC
S801	22195542	Switch, Rotary, SPEAKER
⚠ S802	22148657	Relay Switch, 24V
⚠ S901	22195226	Switch, Push, Power
J001	22162465	Terminal, Antenna, 4P
J301	22163808	Jack, US12PIN
J801	22162457	Terminal, Speaker
J802	22163676	Jack, 6 $\phi$ , Headphone
⚠ J901	22167846	AC Socket, 2P
Z101, 102, 103	22153065	Filter, Ceramic, SFE10.7 (FM)
Z104	22153082	Filter, Ceramic, SFZ460A (AM)

Symbol No.	Part No.	Description
N901, 902	22113491	Lamp, 14V, 80mA, Dial Plate
N903	22113490	Lamp, 14V, 50mA, Pointer
⚠ F901	22144369	Fuse, T 4A/125V
E001	22165036	Holder, Fuse (T 4A)
⚠ E002	22176573	Cord, Power, EPUC
E003	22195545	Remote Wire (S001)
E004	22195544	Remote Wire (S002)

#### CAPACITORS

C =  $\pm 0.25\mu\text{F}$ , D =  $\pm 0.5\mu\text{F}$ , J =  $\pm 5\%$ , K =  $\pm 10\%$ , M =  $\pm 20\%$ ,  
Z =  $\begin{matrix} +80\% \\ -20\% \end{matrix}$

ABBREVIATIONS: CD = Ceramic Disk, EL = Electrolytic,  
MY = Mylar, PP = Polypropylene  
NP = Non Polarity

C001, 008, 021, 124, 128	22307102	Variable, VC-5-327
C003	22360159	CD, 18pF, 50V, J, TH
C004	22342223	CD, 0.022mfd, 50V, Z
C005	22342223	CD, 0.022mfd, 50V, Z
C006	22362101	CD, 100pF, 50V, K
C007	22342223	CD, 0.022mfd, 50V, Z
C010	22360160	CD, 22pF, 50V, J, TH
C011	22361409	CD, 4pF, 50V, D
C012	22362101	CD, 100pF, 50V, K
C013	22342223	CD, 0.022mfd, 50V, Z
C014	22342223	CD, 0.022mfd, 50V, Z
C015	22342223	CD, 0.022mfd, 50V, Z
C016	22361508	CD, 0.5pF, 50V, D
C017	22342223	CD, 0.022mfd, 50V, Z
C018	22360314	CD, 10pF, 50V, D, TH
C019	22360137	CD, 39pF, 50V, J, CH
C020	22360132	CD, 15pF, 50V, J, CH
C023	22360153	CD, 18pF, 50V, J, SH
C024	22360077	CD, 2pF, 50V, C
C101	22342223	CD, 0.022mfd, 50V, Z
C102	22342223	CD, 0.022mfd, 50V, Z
C103	22342223	CD, 0.022mfd, 50V, Z
C104	22342223	CD, 0.022mfd, 50V, Z
C105	22342473	CD, 0.047mfd, 50V, Z
C106	22342223	CD, 0.022mfd, 50V, Z
C107	22342223	CD, 0.022mfd, 50V, Z
C109	22488478	EL, 0.47mfd, 50V, M
C110	22362221	CD, 220pF, 50V, K
C111	22488479	EL, 4.7mfd, 50V, M
C112	22342223	CD, 0.022mfd, 50V, Z
C113	22485100	EL, 10mfd, 16V, M
C115	22342473	CD, 0.047mfd, 50V, Z
C116	22342223	CD, 0.022mfd, 50V, Z
C118	22342223	CD, 0.022mfd, 50V, Z
C119	22342103	CD, 0.01mfd, 50V, Z

Symbol No.	Part No.	Description
C120	22343102	CD, 0.001mfd, 50V, M
C121	22342103	CD, 0.01mfd, 50V, Z
C122	22342473	CD, 0.047mfd, 50V, Z
C123	22342103	CD, 0.01mfd, 50V, Z
C127	22321050	PP, 360pF, 50V, J
C130	22360177	CD, 15pF, 50V, J, UJ
C131	22485100	EL, 10mfd, 16V, M
C132	22362560	CD, 56pF, 50V, K
C133	22342103	CD, 0.01mfd, 50V, Z
C134	22343102	CD, 0.001mfd, 50V, M
C135	22488479	EL, 4.7mfd, 50V, M
C136	22488339	EL, 3.3mfd, 50V, M
C137	22342103	CD, 0.01mfd, 50V, Z
C138	22371223	MY, 0.022mfd, 50V, J
C139	22488228	EL, 0.22mfd, 50V, M
C140	22485101	EL, 100mfd, 16V, M
C141	22488479	EL, 4.7mfd, 50V, M
C145	22485220	EL, 22mfd, 16V, M
C146	22342223	CD, 0.022mfd, 50V, Z
C201	22485471	EL, 470mfd, 16V, M
C202	22321053	PP, 470pF, 50V, J
C203, 204	22488109	EL, 1mfd, 50V, M
C205, 206	22321049	PP, 330pF, 50V, J
C207, 208	22488479	EL, 4.7mfd, 50V, M
C209	22488478	EL, 0.47mfd, 50V, M
C210	22321053	PP, 470pF, 50V, J
C211	22371473	MY, 0.047mfd, 50V, J
C212	22488109	EL, 1mfd, 50V, M
C213	22488339	EL, 3.3mfd, 50V, M
C214	22488479	EL, 4.7mfd, 50V, M
C215, 216	22371123	MY, 0.012mfd, 50V, J
C301, 302	22467479	EL, 4.7mfd, 50V, L
C303, 304	22321049	PP, 330pF, 50V, J
C305, 306	22483101	EL, 100mfd, 10V, M
C307, 308	22371222	MY, 2200pF, 50V, J
C309, 310	22371183	MY, 0.018mfd, 50V, J
C311, 312	22371562	MY, 5600pF, 50V, J
C313, 314	22468109	EL, 1mfd, 50V, L
C315	22487101	EL, 100mfd, 35V, M
C317	22487101	EL, 100mfd, 35V, M
C401, 402	22362271	CD, 270pF, 50V, K
C403, 404	22362271	CD, 270pF, 50V, K
C405, 406	22371393	MY, 0.039mfd, 50V, J
C407, 408	22488109	EL, 1mfd, 50V, M
C409, 410	22488478	EL, 0.47mfd, 50V, M
C411, 412	22362101	CD, 100pF, 50V, J
C413, 414	22371224	MY, 0.22mfd, 50V, J
C415, 416	22371563	MY, 0.056mfd, 50V, J
C417, 418	22371393	MY, 0.039mfd, 50V, J
C419, 420	22371682	MY, 0.0068mfd, 50V, J
C421, 422	22488229	EL, 2.2mfd, 50V, M
C423, 424	22371184	MY, 0.18mfd, 50V, M
C425, 426	22486101	EL, 100mfd, 25V, M

Symbol No.	Part No.	Description
C427, 428	22371154	MY, 0.15mfd, 50V, J
C501, 502	22349471	CD, 470pF, 50V, J
C503, 504	22321057	PP, 1000pF, 50V, J
C505, 506	22488100	EL, 10mfd, 50V, M
C507, 508	22361220	CD, 22pF, 50V, J
C513, 514	22362271	CD, 270pF, 50V, K
C515, 516	22362271	CD, 270pF, 50V, K
C601	22488478	EL, 0.47mfd, 50V, M
C602	22485101	EL, 100mfd, 16V, M
C603	22349102	CD, 1000pF, 50V, K
C604	22349102	CD, 1000pF, 50V, K
C605	22371222	MY, 2200pF, 50V, J
C606	22488339	EL, 3.3mfd, 50V, M
C701	22488109	EL, 1mfd, 50V, M
C702	22488229	EL, 2.2mfd, 50V, M
C703	22488109	EL, 1mfd, 50V, M
C704	22488229	EL, 2.2mfd, 50V, M
C705	22488109	EL, 1mfd, 50V, M
C706	22485220	EL, 22mfd, 16V, M
C707	22485100	EL, 10mfd, 16V, M
C708	22342223	CD, 0.022mfd, 50V, Z
C709	22488229	EL, 2.2mfd, 50V, M
C710	22343102	CD, 1000pF, 50V, K
C711	22445470	EL, 47mfd, 16V
C712	22488109	EL, 1mfd, 50V, M
C713	22485109	EL, 1mfd, 50V, M
C801	22488228	EL, 0.22mfd, 50V, M
C802	22488228	EL, 0.22mfd, 50V, M
C803	22371103	MY, 0.01mfd, 50V, J
C804	22486101	EL, 100mfd, 25V, M
C805	22485220	EL, 22mfd, 16V, M
C806	22488478	EL, 0.47mfd, 50V, M
⚠ C901	22340140	CD, 0.01mfd, AC125V
⚠ C902	22340032	CD, 0.02mfd, 500V, Z
⚠ C903	22340032	CD, 0.02mfd, 500V, Z
C904	22488479	EL, 4.7mfd, 50V, M
⚠ C905, 906	22440371	EL, 10000mfd, 50V
C907, 908	22371224	MY, 0.22mfd, 50V, J
C909, 910	22488470	EL, 47mfd, 50V, M
C911, 912	22488221	EL, 220mfd, 50V, M
⚠ C913	22486102	EL, 1000mfd, 25V
C914	22342223	CD, 0.022mfd, 50V, Z
C915	22342223	CD, 0.022mfd, 50V, Z
C916	22486101	EL, 100mfd, 25V, M
⚠ C917, 918	22340032	CD, 0.02mfd, 500V, Z
C919	22486101	EL, 100mfd, 25V, M
C920	22342473	CD, 0.047mfd, 50V, Z
<b>RESISTORS</b>		
Resistors are Carbon film 1/4W, ±5%, unless otherwise noted. K = 1000 M = 1000000		
R001	22555105	1M ohm

Symbol No.	Part No.	Description
R002	22555101	100 ohm
R003	22555151	150 ohm
R004	22555393	39K ohm
R005	22555104	100K ohm
R006	22555101	100 ohm
R007	22555332	3.3K ohm
R008	22555103	10K ohm
R009	22555332	3.3K ohm
R010	22555182	1.8K ohm
R011	22555103	10K ohm
R012	22555103	10K ohm
R013	22555472	4.7K ohm
R014	22555104	100K ohm
R015	22555221	220 ohm
R101	22555151	150 ohm
R102	22555331	330 ohm
R103	22555221	220 ohm
R104	22555222	2.2K ohm
R105	22555471	470 ohm
R106	22555331	330 ohm
R107	22555331	330 ohm
R108	22555221	220 ohm
R109	22555222	2.2K ohm
R110	22555471	470 ohm
R111	22555331	330 ohm
R112	22555101	100 ohm
R113	22555331	330 ohm
R114	22555153	15K ohm
R115	22555222	2.2K ohm
R116	22555102	1K ohm
R117	22555683	68K ohm
R118	22555103	10K ohm
R119	22555222	2.2K ohm
R120	22658441	47K ohm, B, Semi-fixed Variable
R121	22658394	100K ohm, B, Semi-fixed Variable
R123	22555474	470K ohm
R124	22555221	220 ohm
R125	22555152	1.5K ohm
R126	22555151	150 ohm
R127	22555221	220 ohm
R128	22555102	1K ohm
R129	22555331	330 ohm
R130	22555103	10K ohm
R131	22555103	10K ohm
R132	22555332	3.3K ohm
R134	22555101	100 ohm
R135	22555332	3.3K ohm
R136	22555393	39K ohm
R137	22555123	12K ohm
R138	22555333	33K ohm
R201	22555473	47K ohm

Symbol No.	Part No.	Description
R202	22658282	470K ohm, B, Semi-fixed Variable
R203, 204	22555223	22K ohm
R205, 206	22555103	10K ohm
R207, 208	22555473	47K ohm
R209, 210	22555332	3.3K ohm
R211, 212	22555332	3.3K ohm
R213	22555153	15K ohm
R214	22658257	10K ohm, B, Semi-fixed Variable
R215	22555102	1K ohm
R216	22555330	33 ohm
R217	22555392	3.9K ohm
R218	22555562	5.6K ohm
R219, 220	22555392	3.9K ohm
R221, 222	22555182	1.8K ohm
R301, 302	22555473	47K ohm
R303, 304	22555224	220K ohm
R305, 306	22555271	270 ohm
R307, 308	22555331	330 ohm
R309, 310	22555823	82K ohm
R311, 312	22555154	150K ohm
R313, 314	22555103	10K ohm
R315, 316	22555123	12K ohm
R317, 318	22555122	1.2K ohm
R319, 320	22555104	100K ohm
R321, 322	22555471	470 ohm
R323, 324	22555332	3.3K ohm
R325, 326	22555332	3.3K ohm
R401, 402	22555562	5.6K ohm
R403, 404	22620024	100K ohm, B, Variable, Main Volume
R405, 406	22555123	12K ohm
R407, 408	22555102	1K ohm
R409	22620020	250K ohm, W, Variable, Balance
R411, 412	22555471	470 ohm
R413, 414	22555104	100K ohm
R415, 416	22555684	680K ohm
R417, 418	22555563	56K ohm
R419, 420	22555152	1.5K ohm
R421, 422	22651526	100K ohm, C, Variable, Bass
R423, 424	22555103	10K ohm
R425, 426	22555271	270 ohm
R427, 428	22651526	100K ohm, C, Variable, Treble
R429, 430	22555102	1K ohm
R431, 432	22555272	2.7K ohm
R433, 434	22555123	12K ohm
R435, 436	22555222	2.2K ohm
R439, 440	22555824	820K ohm
R441, 442	22555272	2.7K ohm
R503, 504	22555563	56K ohm
R505, 506	22555681	680 ohm

Symbol No.	Part No.	Description
R507, 508	22555562	5.6K ohm
R509, 510	22555562	5.6K ohm
R511, 512	22555821	820 ohm
R513, 514	22658260	500 ohm, B, Semi-fixed Variable
R515, 516	22555560	56 ohm
R517, 518	22555560	56 ohm
R519, 520	22555271	270 ohm
R521, 522	22555392	3.9K ohm
R523, 524	22555222	2.2K ohm
R525, 526	22555222	2.2K ohm
R527, 528	22555223	22K ohm
R529, 530	22555122	1.2K ohm
R531, 532	22555153	15K ohm
R533, 534	22555122	1.2K ohm
R535, 536	22555223	22K ohm
R537, 538	22658292	100 ohm, B, Semi-fixed Variable
⚠ R539, 540	22500122	100 ohm, Fusible
⚠ R541, 542	22570260	68 ohm, 1W, Metal Oxided Film
⚠ R543, 544	22570260	68 ohm, 1W, Metal Oxided Film
⚠ R545, 546	22570349	3.3 ohm, 1W, Metal Film
⚠ R547, 548	22570349	3.3 ohm, 1W, Metal Film
⚠ R549, 551	22500258	0.22 ohm, 5W (Pair) Emitter Resistor
⚠ R550, 552	22550258	0.22 ohm, 5W (Pair) Emitter Resistor
⚠ R555, 556	22570313	330 ohm, 2W, Metal Oxided Film
R557, 558	22555121	120 ohm
⚠ R559, 560	22500130	10 ohm, Fusible
⚠ R561, 562	22500130	10 ohm, Fusible
R601	22555273	27K ohm
R602	22555561	560 ohm
R603	22555153	15K ohm
R604	22555124	120K ohm
R605	22555391	390 ohm
R606	22555102	1K ohm
R607	22555102	1K ohm
R608	22555103	10K ohm
R609	22555820	82 ohm
R610	22555103	10K ohm
R611	22555153	15K ohm
R612	22555153	15K ohm
R613	22555332	3.3K ohm
R614	22555470	47 ohm
R616	22555103	10K ohm
R617	22555102	1K ohm
R618	22555104	100K ohm
R619	22555680	68 ohm
R620	22555680	68 ohm

Symbol No.	Part No.	Description
R621	22555103	10K ohm
R622	22555473	47K ohm
R701	22555102	1K ohm
R702	22555223	22K ohm
R704	22555154	150K ohm
R705	22555683	68K ohm
R706	22555225	2.2M ohm
R707	22555683	68K ohm
R708	22555225	2.2M ohm
R709	22555104	100K ohm
R710	22555104	100K ohm
R711	22555103	10K ohm
R712	22555333	33K ohm
R713	22555103	10K ohm
R714	22555103	10K ohm
R715	22555105	1M ohm
R716	22555105	1M ohm
R717	22555105	1M ohm
R718	22555473	47K ohm
R719	22555473	47K ohm
R720	22555392	3.9K ohm
R721	22555392	3.9K ohm
R722	22555103	10K ohm
R723	22555333	33K ohm
R724	22555103	10K ohm
R725	22555683	68K ohm
R726	22555102	1K ohm
R727	22555472	4.7K ohm
R728	22555102	1K ohm
R729	22555102	1K ohm
R730	22555102	1K ohm
R731	22555102	1K ohm
R732	22555102	1K ohm
R734	22555103	10K ohm
R735	22555225	2.2M ohm
R801, 802	22555182	1.8K ohm
R803, 804	22555122	1.2K ohm
R805, 806	22555223	22K ohm
R807	22555683	68K ohm
R808	22555223	22K ohm
R809	22555472	4.7K ohm
R810	22555563	56K ohm
R811	22555563	56K ohm
R812	22555563	56K ohm
R813	22555473	47K ohm
R814	22555153	15K ohm
R815	22555274	270K ohm
R816	22555153	15K ohm
⚠ R817	22500114	470 ohm, Fusible
R818	22555563	56K ohm
R819	22555333	33K ohm
⚠ R902	22500114	470 ohm, Fusible
R904	22555104	100K ohm



Symbol No.	Part No.	Description
R905	22555333	33K ohm
R906	22555333	33K ohm
R907	22555151	150 ohm
R908	22555151	150 ohm
⚠ R909	22500202	2.2 ohm, 1/2W, Fusible
⚠ R910	22500122	100 ohm, Fusible
⚠ R911	22500122	100 ohm, Fusible
⚠ R912	22563155	1.5M ohm, 1/2W, Composition (TA)
⚠ R913	22563155	1.5M ohm, 1/2W, Composition (TA)
R914	22555472	4.7K ohm
<b>ACCESSORIES</b>		
	22124461	Feeder Ass'y
	22902691	Owner's Manual

**TOSHIBA CORPORATION**  
2-1, GINZA 5-CHOME, CHUO-KU, TOKYO 104, JAPAN