SOLID STATE AM/FM STEREO RECEIVER

SX-990

FVW

INSTALLATION, OPERATION AND SERVICE MANUAL

Including PARTS LIST, CIRCUIT DIAGRAMS, TROUBLESHOOTING AND MOUNTING TEMPLATE

PIONEER®

PIONEER

FEATURES

- **HIGH-PERFORMANCE FM TUNER**
  An FET (field-effect transistor) is used in the radio-frequency amplifier to attain a high sensitivity and selectivity. Further, four ICs (integrated circuits) are used for the intermediate frequency amplifier to eliminate interference and noise.
- **BUILT-IN EXCELLENT FM MPX CIRCUIT**
  This switching circuit having excellent separation and frequency response is built in for reproduction of reality music.
- **BUILT-IN HIGHLY-SENSITIVE FERRITE ANTENNA FOR AM RADIO RECEPTION**
  The ferrite antenna provides high-sensitivity reception of AM broadcast programs.
- **SPECIAL CIRCUITRY FOR VERSATILITY**
  The high output given by strictly selected transistors, two sets of loudspeaker terminals and phono terminals, and the provision for using a microphone make Model SX-990 suitable for the professional use as well as the family use.
- **A VARIETY OF ACCESSORIES**
  Accessories include the program lamps that indicate the program being played, the tuning meters vertically arranged for facilitating selection of an FM broadcast program, the loudspeaker selector switch, tape monitor switch, etc., all for enjoyable use of Model SX-990.
- **ELEGANTLY DESIGNED FRONT PANEL**
  Newly designed knobs are uniquely arranged on the silver tone panel.

LINE VOLTAGE SELECTION AND FUSE

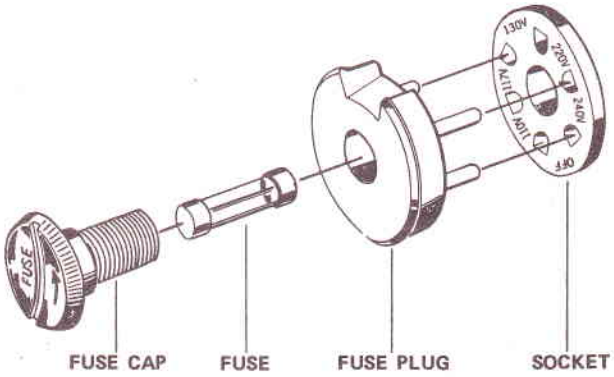
SWITCHING LINE VOLTAGE SETTING AND FUSE

In order to remove the fuse, turn the fuse cap located on the line voltage selector switch in the direction indicated by an arrow. Then remove the fuse plug from the unit. Put the fuse plug back so that the proper line voltage marking can be seen through the cut in the edge of the plug.
Whenever the set position of the selector switch is changed, check the rating of the fuse. A 1-ampere fuse is to be used for either 220V or 240V operation and 2-ampere fuse for any of 110V, 117V, or 130V operation. If the rating of the fuse is proper, install the fuse in the fuse cap.

FUSE REPLACEMENT

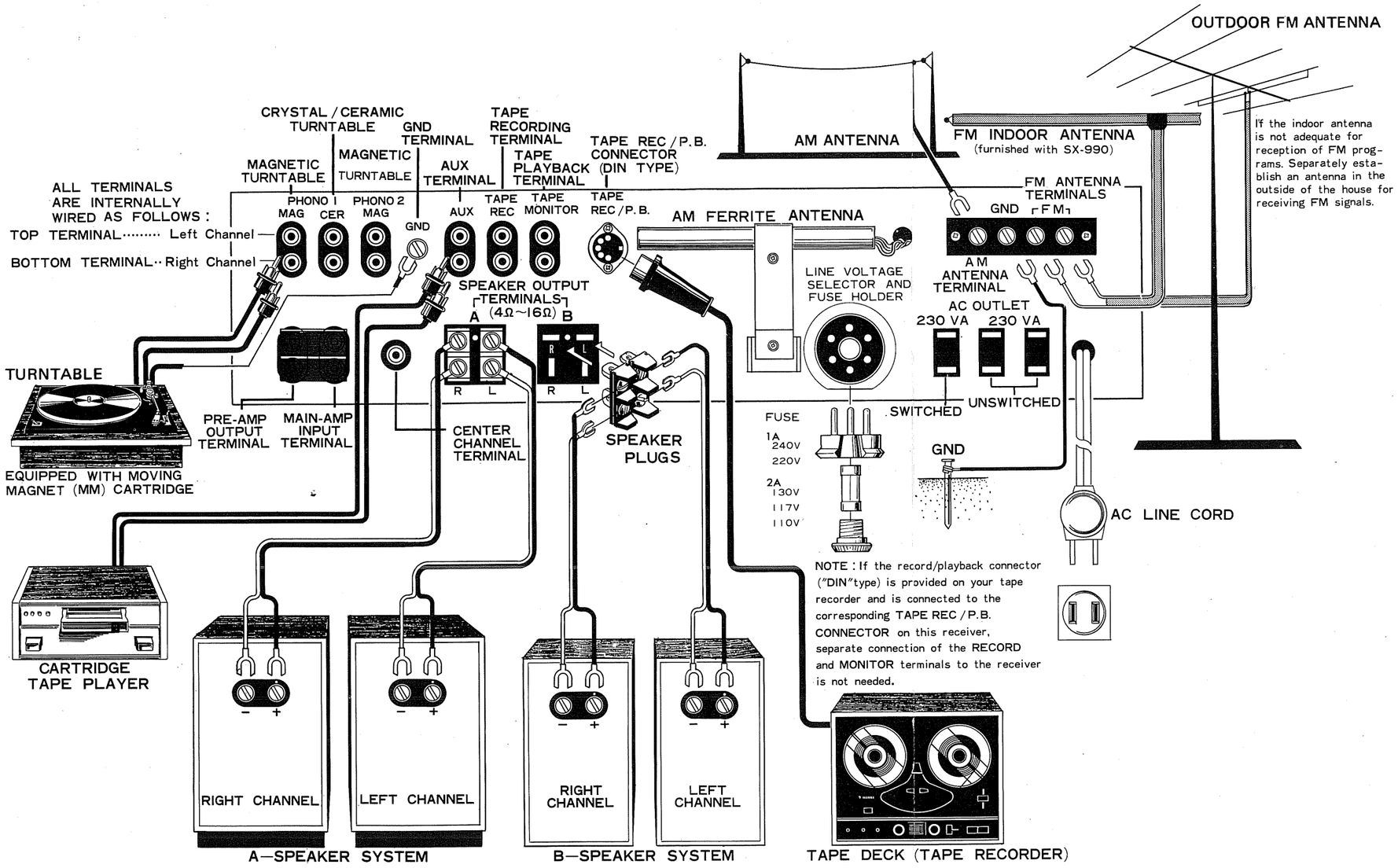
When the fuse is blown, remove the fuse cap and replace the fuse with a new one.

Fig. 1



Take off the fuse cap by turning it with a coin, etc. in the direction indicated by the arrow mark.

REAR CONNECTIONS



NOTE : If the record/playback connector ("DIN"type) is provided on your tape recorder and is connected to the corresponding TAPE REC / P.B. CONNECTOR on this receiver, separate connection of the RECORD and MONITOR terminals to the receiver is not needed.

NOTE : 1. When only one set of speaker system is connected to the SX-990. The speaker impedance may be 4 to 16 ohms.
2. Do not short the SPEAKER TERMINALS.

Fig. 2

STEREO SYSTEM

The SX-990 is a general-purpose stereo amplifier. Connect to it the loudspeaker systems (two or four), turntable, tape recorder, etc., which are separately available.

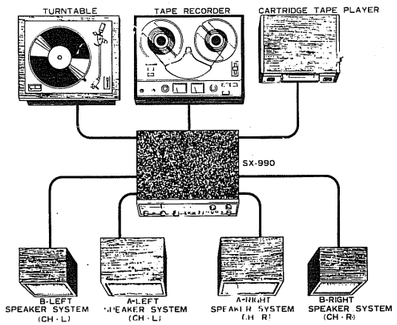


Fig. 3

INSTALLATION

For installation of the stereo system, select a place meeting the following:

- Well ventilated, and free from moisture and dust
- Unexposed to direct sunlight
- Far from heat radiators (space heaters, etc.)
- Stable without incurring vibrations

LISTENING ROOM

- When the stereo system is installed, listen to music according to the connection and operation instructions described below.
- The reproduced sound is very different depending on the size of the room, the furniture arrangement in the room, and the materials of walls, floor and ceiling.
  Generally, the reproduced sound fills the room if the room has a low ceiling and hard floor, or the room has a small length and a hard wall opposing loudspeakers. This undesirable acoustic condition can be much alleviated by laying a carpet on the floor for the former room and by covering the wall with a thick curtain for the latter room. It is also an effective solution to change the arrangement of furniture for irregular reflection of the loudspeaker sound.

CONTROLS AND SWITCHES ON THE FRONT PANEL

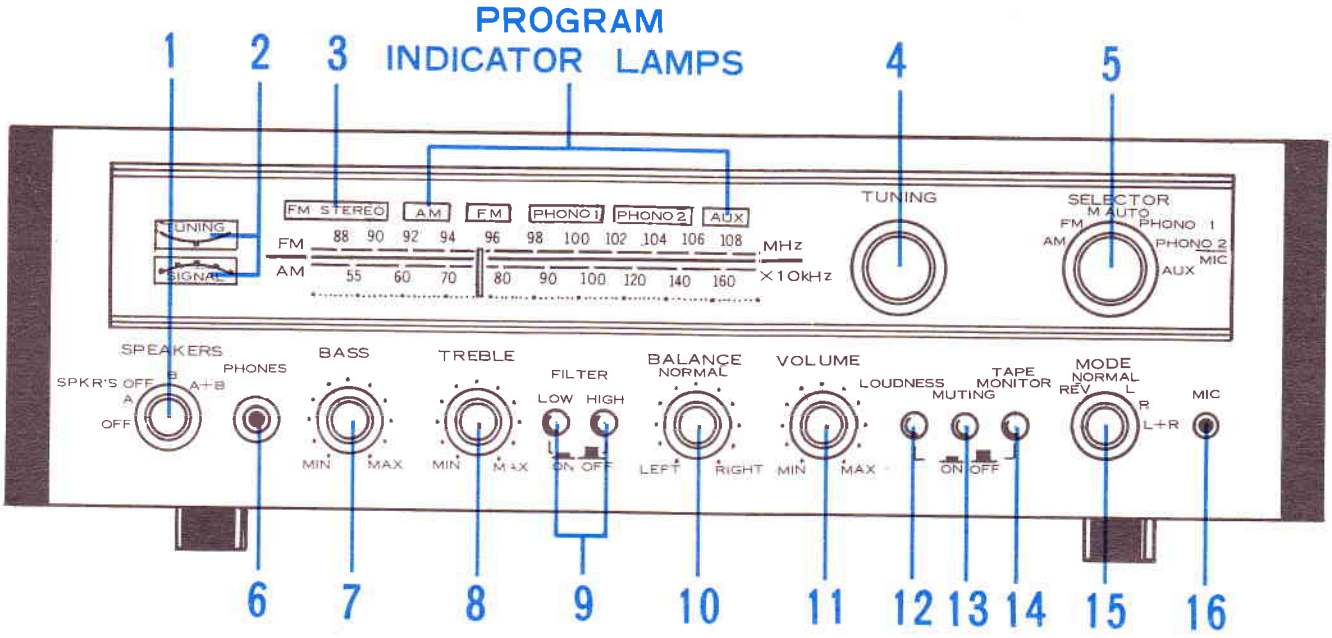


Fig. 4

1. SPEAKERS SWITCH

A combination of the power on/off switch and the loudspeaker system selector switch.

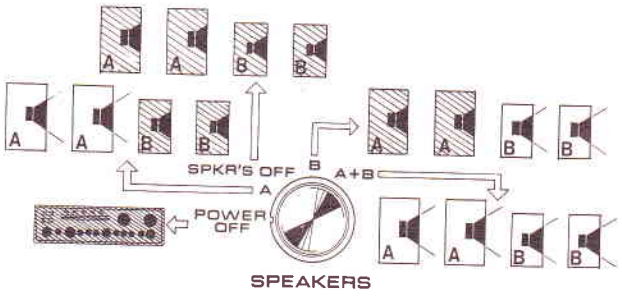


Fig. 5

POWER OFF: .....The equipment is deenergized. The power supplied from the SWITCHED AC outlet (36) is discontinued simultaneously.

A: .....Sound is reproduced from the loudspeaker system connected to the SPEAKER OUTPUT A terminals (31 and 32).

SPKR OFF: ..... Loudspeakers stop sounding. This position is selected when using a stereo headphone.

B: .....The loudspeaker system connected to the SPEAKER OUTPUT B terminals (33 and 34) is put in operation.

A + B: ..... The loudspeaker systems connected to SPEAKER OUTPUT A and B terminals are put in operation.

2. TUNING METERS

When tuning the receiver to an AM broadcasting station, adjust the TUNING knob (4) so the pointer of the lower one of the meters deflects largely rightward.

When tuning the receiver to an FM broadcasting station, adjust the TUNING knob so the pointer of the lower meter deflects largely rightward and, in addition, the pointer of the upper meter is at the center.

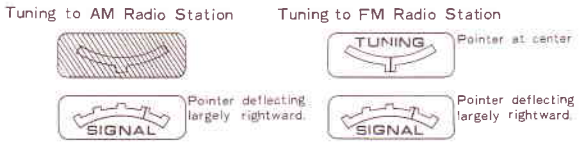


Fig. 6

3. FM STEREO INDICATOR

This lamp is lit during reception of an FM stereo program.

4. TUNING KNOB

The knob for tuning the receiver to an AM or FM broadcasting station. Adjust the knob for the best tuning while observing the tuning meters (2).

5. SELECTOR SWITCH

The switch for selecting the program source.

AM: ..... For reception of an AM program.

FM MONO: ..... For reception of an FM monaural program.

FM AUTO: ..... For automatically selective reception of stereo or monaural FM program.

PHONO 1..... For playing a disk record by using the turntable connected to the PHONO 1 terminals (17).

PHONO 2/MIC: For playing a disk record by using the turntable connected to the PHONO 2 terminals (18) or for using a microphone by inserting its cord plug into the MIC jack (16). (When the microphone is connected to the jack, the turntable connected to the PHONO 2 terminals cannot be used.)

AUX: ..... For using the cartridge tape player, reproducing the TV audio output, or operating other equipment connected to the AUX terminals (20).

When the SELECTOR switch is operated, the program indicator lamp corresponding to the selected source lights.

6. PHONES JACK

When using a stereo headset, insert its plug into this jack. For the headset to be used with Model SX-990, PIONEER's Model SE-20, SE-30 or SE-50 is recommended.

- When a longer cord is required for the stereo headset, use PIONEER's Model JB-23 extension cord separately available.
- When desiring to connect two stereo headsets, use PIONEER's Model JB-22 "Y" cord separately available.

7. BASS CONTROL

When this knob is turned clockwise, bass is increased; when turned counterclockwise, decreased. With the knob set to the center, the frequency response curve is flat. The center and outer knobs of this double knob are friction-coupled with each other, and the tone of both left and right channels can be adjusted simultaneously by turning either knob. The center knob is for the left channel, and the outer knob is for the right channel. When adjusting the tone of only one of the channels, turn the knob for that channel while holding the other knob by the other hand.

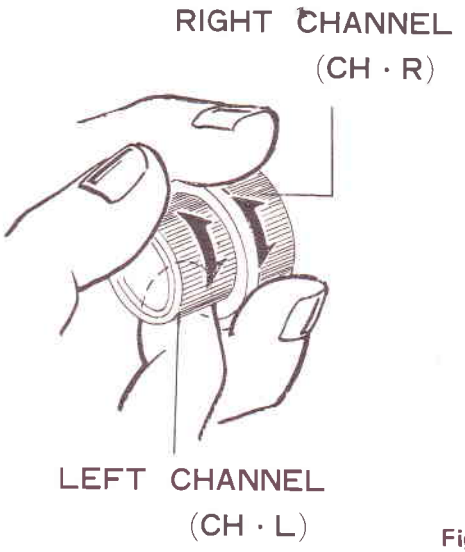


Fig. 7

8. TREBLE CONTROL

Use of this knob is similar to that of the BASS control knob (7).

9. FILTER SWITCHES

LOW: A switch for suppressing low-frequency noise or hum.

HIGH: A switch for suppressing high-frequency noise.

These switches are of the pushbutton type. When once the button is pressed, the switch turns on, and when pressed once again, it turns off.

10. BALANCE CONTROL

This knob is used for adjusting the stereophonic balance. When the volume of the right channel loudspeaker is smaller, turn the knob clockwise toward RIGHT; when left channel volume is smaller, counterclockwise toward LEFT.

Fig. 8

11. VOLUME CONTROL

The volume increases when the knob is turned clockwise.

12, 13 and 14 are push-button switches. Switches turn on when once the push-buttons are depressed; turn off when depressed again.

12. LOUDNESS SWITCH

With this switch turned on when the sound volume is low, insufficiencies of bass and treble are compensated for. When the sound volume is high, it is recommended to keep this switch turned off.

13. MUTING SWITCH

Turning on this switch, the noise generated when tuning the receiver to an FM station can be eliminated. If Model SX-990 is used where the FM field strength is low, keep this switch turned off since the program sound is also suppressed with the switch turned on.

14. TAPE MONITOR SWITCH

Turn on this switch for listening to or monitoring only the signal reproduced by a tape deck (or tape recorder). When not using the tape deck (or tape recorder), keep this switch turned off. Otherwise, loudspeakers will not sound.

15. MODE SWITCH

Functions as follows:

REV ..... Stereo, with left and right channel input signals exchanged for each other.

STEREO ... Normal stereo

L ..... Monaural play with only the left channel input signal fed to both channel loudspeakers.

R ..... Monaural play with only the right channel input signal fed to both channel loudspeakers.

L + R ..... Monaural play with both left and right channel input signals mixed together and reproduced from both channel loudspeakers.

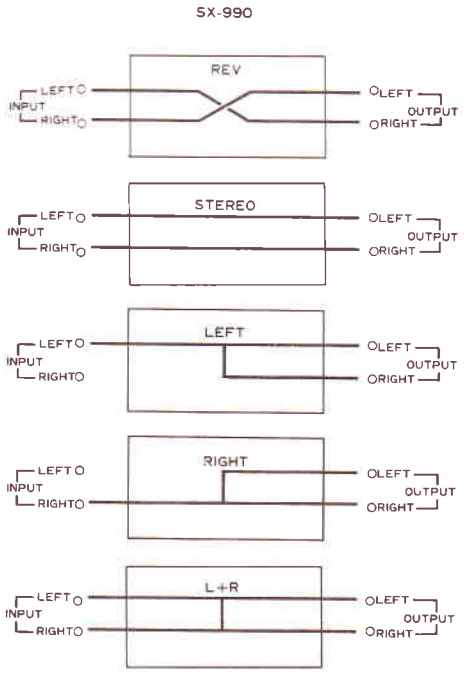


Fig. 9

16. MIC (MICROPHONE) JACK

When a microphone is connected to this jack, the signal fed from the turntable connected to the PHONO 2 terminals (18) on the rear panel is disconnected.

TERMINALS AND CONNECTORS ON THE REAR PANEL :

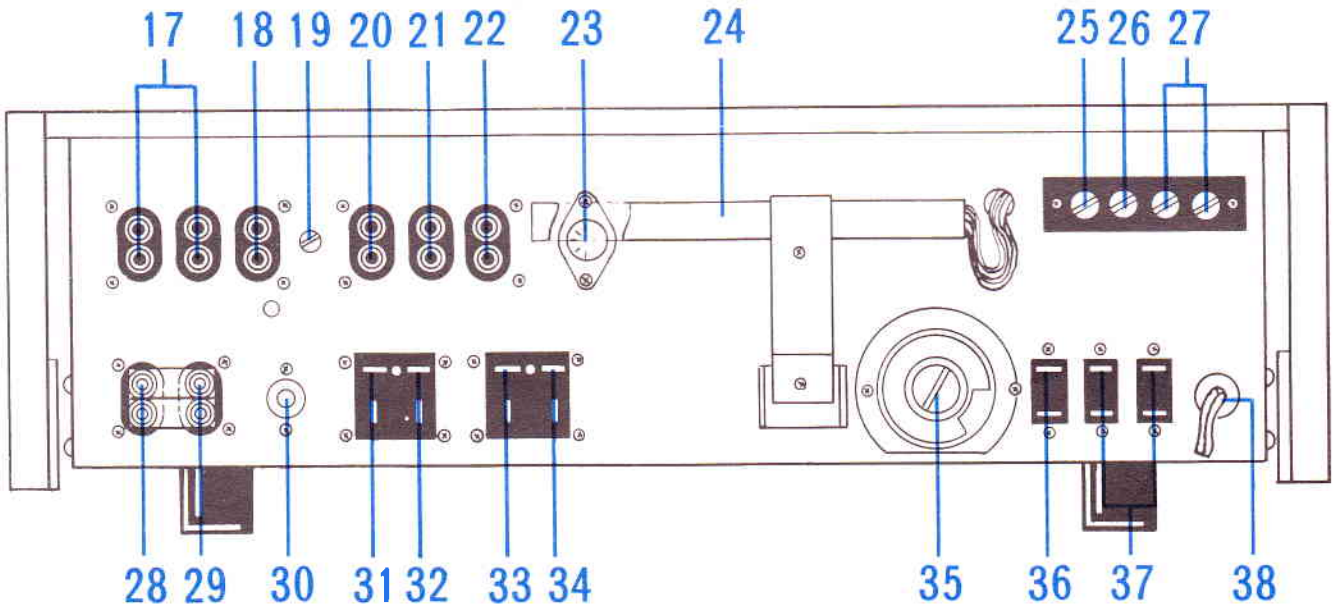


Fig. 10

The upper ones of the terminals 17, 18, 20, 21, 22, 28 and 29 are for the left channel respectively; the lower ones, for the right channel.

17. PHONO 1 TERMINALS

MAG: ..... Connect here a turntable equipped with a moving magent cartridge.

CER: ..... Connect here a turntable equipped with a ceramic or crystal cartridge.

NOTE: Two turntable cannot be connected to the MAG and CER terminals simultaneously.

18. PHONO 2 MAG TERMINALS

Connect here a turntable equipped with a moving magnet cartridge.

19. GND (GROUND) TERMINAL 1

If the turntable or other equipment used with Model SX-990 is provided with a ground wire, connect the wire to this terminal.

20. AUX. (AUXILIARY) INPUT TERMINALS

Connect here the output of a cartridge tape player.

21. TAPE MON TERMINALS (TAPE PLAY-BACK INPUTS)

Connect the line output or monitor output of tape deck (or tape recorder) to these terminals.

22. TAPE REC TERMINALS (TAPE RECORDING OUTPUTS)

Connect the line input of a tape deck (or tape recorder). Signal is always supplied to these terminals while SX-990 is working; however, the signal

cannot be controlled with the VOLUME (11), BALANCE (10), TREBLE (8) or BASS (7) control on the front panel.

23. TAPE REC/PB CONNECTOR (DIN TYPE)

If the tape deck (or tape recorder) to be used with Model SX-990 is provided with a record/playback connector of the DIN type, the tape deck (or tape recorder) can be connected to Model SX-990 for both recording and playback (and monitor) by simply connecting the DIN cable.
When this cable is used, connections to terminals (21) and (22) are unnecessary.

The detail of connection is shown on page 10. Connection of tape deck (or tape recorder)".

24. AM FERRITE ANTENNA

Where the field strength is high, adjust the direction of this ferrite antenna for good reception, without using an external antenna. If good reception cannot be obtained, see page 9. "Antenna Connection and Grounding".

25, AM ANTENNA INPUT TERMINAL

Connect a lead wire or outdoor AM antenna to this terminal if the ferrite antenna (24) cannot get good reception.

26. GND (GROUND) TERMINAL 2

Connect a ground wire to this terminal.

27. FM ANTENNA INPUT TERMINALS

Connect an FM antenna to these terminals.

NOTE: For the details of AM antenna, FM antenna and grounding, see "Antenna connection and grounding" on page 9.

28. PRE-AMP OUTPUT TERMINALS

The output of preamplifier stage, which is the signal having passed the tone control circuit is always supplied to these terminals.

29. MAIN-AMP INPUT TERMINALS

These are input terminals of the power amplifier stage of Model SX-990.

The PRE—AMP OUTPUT (28) and MAIN-AMP INPUT (29) terminals are connected to each other with the jumper plugs. With these plugs removed, the preamplifier and power amplifier stage of Model SX-990 can be used apart. This system is convenient for composing a multi-amplifier system and other purposes.

30. CENTER CHANNEL OUTPUT TERMINAL

The signals of left and right channels are mixed together and supplied to this terminal at all times. The terminal may be used for composing a 3-D system or connecting a center-channel amplifier.

31. & 32. SPEAKER OUTPUT A TERMINALS

Model SX-990 is designed to permit connection of two sets of stereo loudspeaker systems.
Connect the first set of loudspeaker system (system A) to these terminals; the right channel to terminal (31) and the left channel to terminal (32).

33. & 34. SPEAKER OUTPUT B TERMINALS

Connect the right channel loudspeaker of the second loudspeaker system (system B) to terminal (33) and the left channel loudspeaker of this system to terminal (34).

For connection of loudspeakers to the SPEAKER OUTPUT A and B terminals, the plugs supplied as accessories must be used. Follow the instructions under "Connection of loudspeaker system" on page 9, for the correct use of the plugs.

35. LINE VOLTAGE SELECTOR AND FUSE HOLDER

This selector is used for setting the SX-990 to suit the line voltage to be supplied. It also serves as a fuse holder.
For the selector setting and fuse replacement procedures, refer to the article "LINE VOLTAGE SELECTION AND FUSE". (Page 1)

36. SWITCHED AUXILIARY AC OUTLET

A power of 230 VA can be supplied to a turntable or other equipment from this outlet. The power supply is turned on and off corresponding to the turning-on and off operations of the SPEAKERS switch (1) on the front panel.

37. UNSWITCHED AUXILIARY AC OUTLET

The power outlet also having a capacity of 230 VA total. The power from this outlet is supplied regardless of the operation of the SPEAKERS switch (1).

38. AC POWER CORD

After all the external equipment is connected to Model SX-990, connect this cord to a commercial power outlet having a sufficient capacity.

CONNECTION OF LOUDSPEAKER SYSTEM

- To connect a loudspeaker, take out a speaker connector plug from the accessories bag, and connect it to the leads of the loudspeaker as illustrated in Fig. 11.
  Be sure to connect them for the correct polarity.
- When the plugs have been connected to loudspeakers, connect the plug of the right channel loudspeaker to the SPEAKER OUTPUT A terminal (31) and that of the left channel loudspeaker to the SPEAKER OUTPUT A terminal (32). (See Fig. 2.)
- When using an additional loudspeaker system, connect the speaker connector plugs to the loudspeakers as described above, and connect the plug of the right channel loudspeaker to the SPEAKER OUTPUT B terminal (33) and that of the left channel loudspeaker to the SPEAKER OUTPUT B terminal (34).

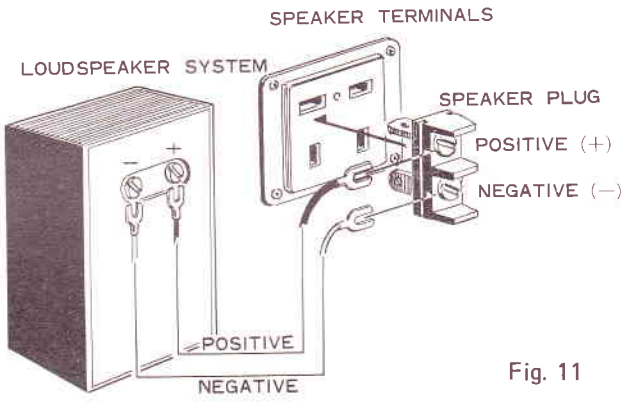


Fig. 11

ANTENNA CONNECTION AND GROUNDING

FM ANTENNA

When using Model SX-990 at a place of low field strength or distant from the station, select the most suitable FM antenna as follows:

- Use the accessory T-type indoor antenna when using Model SX-990 within a wooden building near the FM radio station. Connect the free and of the vertical section of the antenna to the FM antenna terminals (27) as shown in Fig. 12.
  Expand the horizontal section of the antenna, and determine its direction for good reception while actually receiving a broadcast program. Fix the horizontal section on a wall or other place in the determined direction. For the operating procedure, see "Reception of FM broadcasts" on page 11.
- When using Model SX-990 at a long distance from the station, or within a building, install an outdoor FM antenna, and connect it to the FM antenna terminals (27) as in Fig. 13.
  The FM antenna is various in type, consisting of 3 to 7 elements. Select the optimum antenna by consulting a nearby radio, TV or hi-fi equipment sales store.

AM ANTENNA

When using Model SX-990 near the broadcasting station or inside a wooden building, connection of an external AM antenna is unnecessary. Adjust the direction of the AM ferrite antenna (24) located on the rear panel for the best radio reception while actually listening to broadcasts, referring to "Reception of AM broadcasts" on page 11.

- If good radio reception cannot be attained with the AM ferrite antenna (24), use the accessory AM lead wire antenna. Connect one end of the antenna to the AM antenna terminal (25), and expand the wire along a wall of the room. (See Fig. 12.)
- If input is still not enough, install an AM antenna outdoors instead of using the lead wire antenna. (See Fig. 13).

NOTE: A standard AM outdoor antenna can be formed by purchasing PVC wire from an electric appliance store and installing it 25 feet (7.5 m) above the ground for a horizontal length of 50 feet (15 m), with a feeder line 30 feet (10 m) long. These antenna dimensions need not be so precise, and may be as large as allowable by the place of installation. However, the height of the horizontal section of the antenna should not be too low to attain a good antenna effect.

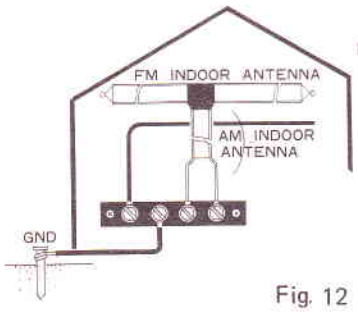


Fig. 12

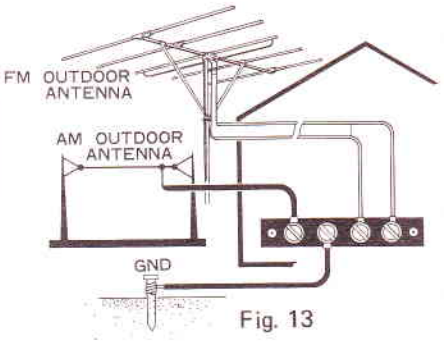
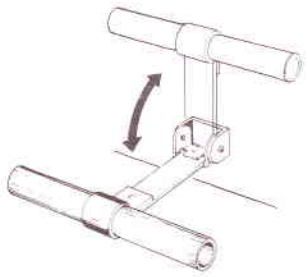


Fig. 13



AM FERRITE ANTENNA

GROUNDING

- Whether or not Model SX-990 is grounded does not much affect the performance of the equipment. However, grounding is recommended for stabilization of the performance.
- Connect to the GND terminal 2 (26) a ground conductor leading to the earth.

CONNECTION OF TURNTABLE

- If the turntable to be used is equipped with a moving magnet cartridge, connect the output cords of the turntable to the MAG terminals of PHONO 1 (17) on the rear panel; if equipped with a ceramic cartridge, to the CER terminals of PHONO 1 (17).
  Connect the left channel output cords of the turntable to the upper terminal, and the right channel output cord to the lower terminal.
  When using a monaural turntable, its output cord may be connected to either upper or lower terminal.
- To use two turntables both having a moving magnet cartridge, connect one to the PHONO 1 MAG terminals (17) and the other to the PHONO 2 – MAG terminals (18).

NOTE: 1. When desiring to use a turntable equipped with a moving coil (MC) cartridge, use a matching transformer for MC cartridge, or a separate head amplifier for connection of the turntable to MODEL SX-990.

2. The output cords of some turntables are provided with plugs which do not meet the input terminals of Model SX-990. In such a case, replace the plugs with the pin plugs contained in the accessories bag.

CONNECTION OF TAPE DECK (TAPE RECORDER)

- The tape deck to be connected to Model SX-990 should have a record/playback preamplifier built-in, such as PIONEER's Model T-600, T-500.
- The tape recorder to be connected should have output terminals (line output) for external amplifier, or tape monitor terminals.

CONNECTION FOR TAPE RECORDING

Connect the LINE INPUT terminals of the tape deck (or tape recorder) to the TAPE REC terminals (22) on the rear panel. For this connection, use the cords accessory to the tape deck (or tape recorder). The upper terminal is for the left channel, and the lower one is for the right channel. If the tape recorder is monaural, connect it to the upper terminal.

CONNECTION FOR TAPE PLAYBACK (OR TAPE RECORDING MONITOR)

Connect the LINE OUTPUT or tape monitor terminals of the tape deck (or tape recorder) to the TAPE MON terminals (21). Use of the terminals is similar to that for the connection for recording described above.

USE OF RECORD/PLAYBACK CONNECTOR

If the tape deck (or tape recorder) is equipped with a record/playback connector of the DIN type, connect the connector to the TAPE REC/P.B. connector (23) by using the DIN cable that is separately available. In this case, connections as described in "Connection for tape recording" and "Connection for tape playback (or tape recording monitor)" above are unnecessary.

CONNECTION OF CARTRIDGE TAPE PLAYER

When using a cartridge tape player, such as PIONEER's Model H-60, connect its output to the AUX terminals (20) on the rear panel.

RECEPTION OF BROADCAST

- Set the SPEAKERS switch (1) to the "A" position after ensuring the following:
  1. The BALANCE knob (10) is in the NORMAL (center) position.
  2. The VOLUME knob (11) is in the MIN position (turned fully counterclockwise).
  3. The TAPE MONITOR switch (14) is set to OFF.
  4. The MODE switch (15) is set to the STEREO position.

RECEPTION OF FM BROADCAST

1. Set the SELECTOR switch (5) to the FM AUTO position.
2. Turn on the MUTING switch (18). (Keep the switch turned off, if the field strength is low).
3. While observing the pointer deflection of the tuning meters (2), tune the receiver to the desired station by adjusting the TUNING knob (4).
   The best radio reception is attained when the pointer of the lower tuning meter deflects largely rightward , and the pointer of the upper tuning meter indicates the center.
   When the tuned-in station is broadcasting a stereo program, the FM stereo indicator (3) lights, and Model SX-990 operates automatically for stereo broadcast reception. If the received program is monaural, the indicator does not light, and the equipment operates for monaural broadcast reception.
4. When the desired station has been tuned in, turn the VOLUME control (11) gradually clockwise for the desired volume. Adjust the BASS (7) and TREBLE (8) controls as desired.

- If Model SX-990 is used very far from the broadcasting station, or where external noise is high, the noise is suppressed and better reception can be attained by keeping the SELECTOR switch (5) set to the FM MONO position. With the switch in this position, however, a stereo program is received as a monaural program.
- If good radio reception cannot be attained by the operations instructed in Items 1 through 4 above, reconsider the antenna, referring to "Antenna connection and grounding", on page 9.

RECEPTION OF AM BROADCAST

1. Set the SELECTOR switch (5) to the AM position.
2. While observing the pointer deflection of the tuning meter (2), tune the receiver to the desired station by adjusting the TUNING knob (4).
   The best radio reception is attained when the pointer of the lower tuning meter deflects largely rightward.
3. When the desired station has been tuned in, adjust the VOLUME (11), BASS (7) and TREBLE (8) controls for desired volume and tone.

- If good reception cannot be attained by the operations instructed in items 1 through 3 above, reconsider the antenna, referring to the "Antenna connection and grounding", on page 9.
- When the broadcasting station is very near, a much distorted sound may result from the high field strength. If this occurs, shorten or remove the antenna connected to the AM antenna terminal (25) for the best radio reception.

PLAY OF DISK RECORD

1. Set the SELECTOR switch (5) to the PHONO 1 position, when operating the turntable connected to the PHONO 1 terminals (17) on the rear panel. Set the switch to the PHONO 2/MIC position when operating the turntable connected to the PHONO 2 terminals (18).
2. If the turntable to be operated is monaural, set the MODE switch (15) to the "L" or "R" position.
3. Adjust the VOLUME (11), BASS (7) and TREBLE (8) controls for desired volume and tone.

PLAY OF CARTRIDGE TAPE

1. Set the SELECTOR switch (5) to the AUX position.
2. The succeeding procedure is identical with its counterpart of "Play of disk record" above.

USE OF MICROPHONE

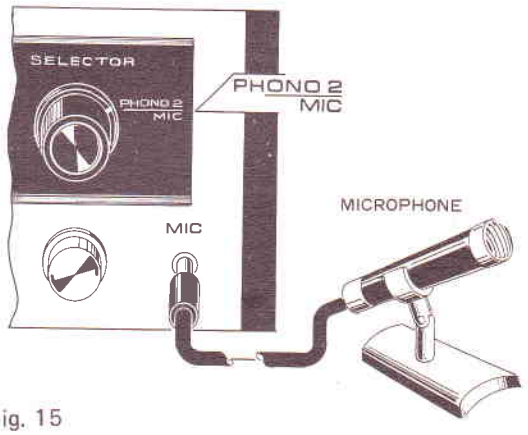


Fig. 15

1. Set the SELECTOR switch (5) to the PHONO 2/MIC position.
2. Insert the microphone plug to MIC jack (16).
3. Speak into the microphone. Adjust the volume and tone as desired. When the microphone is used near the loudspeaker system, do not increase the volume too much, or howling may occur.

When a microphone is connected to Model SX-990, the turntable connected to the PHONO 2 terminals cannot be used. The equipment operates for monaural reproduction regardless of the position which the MODE switch (15) is set to.

RECORDING AND PLAYBACK WITH TAPE DECK(OR TAPE RECORDER)

RECORDING

The same signal as that reproduced from loudspeakers is always supplied to the TAPE REC terminals (22). According to the program source desired to be recorded, operate the SELECTOR switch (5) and MODE switch (15), referring to "Reception of broadcast" and "Play of disk record". The signal does not concern the VOLUME, BASS or TREBLE controls of Model SX-990. Adjust the recording level with the controls provided on the tape deck (or tape recorder).

NOTE: If a monaural tape recorder is used, either channel signal only can be recorded.

PLAYBACK

Turn on the TAPE MONITOR switch (14), and adjust the VOLUME (11), BASS (7) and TREBLE (8) controls for desired volume and tone.

- When the TAPE MONITOR switch (14) is in the "ON" position, the position to which the SELECTOR switch (5) is set is unrelated to the equipment operation.

TAPE MONITOR

When using a 3-head tape deck (or tape recorder) for recording, monitor can be conducted as follows:

- Turn on the TAPE MONITOR switch (14) and the after-recording signal will be monitored.
- Turn off the switch, and the before-recording signal will be monitored.

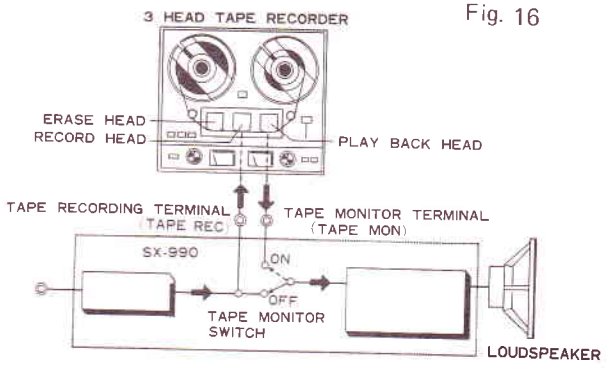


Fig. 16

IN ADDITION TO THE FOREGOING, MODEL SX-990 CAN ALSO BE USABLE AS FOLLOWS

- MULTI-AMPLIFIER SYSTEM

A multi-amplifier system can be composed by using a two- or three-division band-pass filter and one or two stereo power amplifiers besides Model SX-990.

a) Remove the plugs which connect the PRE-AMP output terminals (28) to the MAIN-AMP INPUT terminals (29).

b) Connect the PRE-AMP OUTPUT terminals to the input terminals of the dividing band-pass filter, and the MAIN-AMP INPUT terminals to the output terminals of one of the dividing band-pass filters.

c) Connect the input of the other stereo power amplifiers to the output terminals of the other dividing band-pass filters.

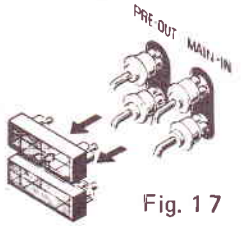


Fig. 17

- INTEGRATE STEREO SYSTEM

By connecting one or more of PIONEER's Model IS-60, IS-70 or IS-80 units, which are separately available, to the PRE-AMP OUTPUT terminals (28) for both left and right channels, respectively, an integrate stereo system having minimum sound distortion can be composed. Also, a PA system to be used in a large place can be formed by using several power systems with MODEL SX-990.

- 3-D STEREO SYSTEM

A 3-D stereo system can be produced by connecting to the CENTER CHANNEL OUTPUT terminal (30) a power amplifier equipped with a low-pass filter (f = 150 to 250 Hz).

- CENTER-CHANNEL LOUDSPEAKER SYSTEM

By connecting a power amplifier and loudspeaker to the CENTER CHANNEL OUTPUT terminal (30) and placing the loudspeaker at the center between the left and right channel loudspeakers, the "hole effect" of stereo sound can be prevented.

PIONEER

SPECIFICATIONS

Transistors, ICs and Diodes

Tuner Section	FET	1
	ICs	5
	Transistors	16
	Diodes	14
Audio Section	Transistors	25
	Diodes, etc.	5

Audio Section

Circuitry	Single ended push pull
Music Power Output	8Ω 100 watts total (IHF rating) 4Ω 130 watts total
Continuous Power Output (each channel driven)	35W/35W 8Ω
Continuous Power Output (both channel driven)	28W + 28W 8Ω 30W + 30W 4Ω
Harmonic Distortion	Less than 0.5% (at 1 kHz rated output)
Frequency Response	±3 dB, from 10 Hz to 100k Hz (Overall)
Power Bandwidth	15 Hz to 40 kHz (AUX)
Hum & Noise (at rated output)	MAG: better than 80 dB AUX: better than 100 dB
Inputs Impedance and Audio Sensitivity (for rated output)	MAGnetic PHONO: 3.3 mv. 50 kΩ (1 kHz) CERamic PHONO: 24 mv. 100 kΩ (1 kHz) MICrophone: 5 mv. 100 kΩ (1 kHz) TAPE MONITOR: 200 mv. 100 kΩ (1 kHz) AUXiliary: 200 mv. 100 kΩ (1 kHz) MAIN INput: 530 mv. 100 kΩ (1 kHz)
Output Terminals and jacks	Speakers: 4 to 16 ohms Stereo headphones jack. Simultaneous tape recording jacks, equipped with TAPE MONITOR switch. Tape recording/playback jack (DIN standards). Pre Output jacks, Center Channel jack.
Equalization Curves	PHONO: RIAA
Tone Controls	BASS: boost 11 dB, cut 16.5 dB (at 50 Hz) TREBLE: boost 10 dB, cut 9.5 dB (at 10 kHz)
Filters	LOW: cut 8 dB (at 50 Hz) HIGH: cut 7.5 dB (at 10 kHz)
Loudness Contour	Switchable to ON-OFF, boost 12 dB at 50 Hz, boost 9 dB at 10 kHz, with VOLUME control set at −40 dB

FM Section

Circuitry	Front end using an FET and 4-gang variable capacitor, IF amplifier 4 IC
Frequency Range	87.5 to 108 MHz
IHF Usable Sensitivity	1.7 μv.
Image Rejection	87 dB (at 98 MHz)
Signal to Noise Ratio	62 dB (IHF rating)
Antenna Input	300 ohms (balanced)

Multiplex Section

Circuitry	Time-switching type demodulator FM Mono Stereo Automatic selection
Channel Separation	42 dB (at 1 kHz)

AM Section

Circuitry	Superheterodyne
Frequency Range	525 to 1605 kHz
IHF Usable Sensitivity	18μV.
Image Rejection	77 dB (at 1000 kHz)
Antenna Input	Built-in Ferrite Loopstick Antenna

Power Supply, Etc.

Line Requirements	110, 117, 130, 220 and 240 volts. (switchable), 50 – 60 Hz 210VA, 190 watts (Max)
Dimensions	Overall 18" 1/16 459 mm (W) 5" 11/16 145 mm (H) 14" 2/1 369 mm (D)
Weight	without package 25 lb. 2 oz 11.4 kg with package 29 lb. 2 oz 13.2 kg

CONDITIONS FREQUENTLY MISTAKEN FOR MALFUNCTION

Noise: There are a variety of noises relating to the operation of a hi-fi unit. These are generally divided into two types; (1) the unit is faulty (a transistor or part has deteriorated) and (2) an external source of noise is adding noise to the unit.
When a hi-fi unit produces an unpleasant noise, it is often assumed that the unit is faulty, but statistical records indicate that the majority of noises produced in hi-fi acoustic units result from external sources of noise. Due to the inherent high sensitivity and the high fidelity in reproduction, the unit amplifies and reproduces extraneous noises, however small, into definite output noise. If your receiver produces a noise, check according to the following table and trace out the source of noise for the appropriate corrective action.

	Symptom	Suspected Source of Noise	Diagnosis and Remedy
When Listening to Broadcast	Continous or intermittent noise like jjjjjj or zzzzzz.	• Static (lightning) • Fluorescent lamp, motor, or thermostat may be used in house or in the vicinity of the house.	In many cases, it is very difficult to remove the source of noise. In order to make the radio input larger than the noise level, set up a good outdoor antenna and make a complete grounding.
	When a station is tuned in, hum is mixed in the program.	• Poor fluorescent lamp, motor, or electric heater may be used in house or near the house.	Reversing the line plug may occasionally alleviate this noise problem. Usually it is very difficult to eliminate the noise.
	Hissing sound noise in AM (Medium wave) reception.	• The frequency of an adjacent station is interfering with that of the station being tuned in (10kHz beat interference). • TV set is on in the same house with the receiver.	Impossible to remove such interference. If the cause of such noise is in the TV set, increase the distance between the TV set and receiver.
	Static noise in FM reception (in particular, when automobiles run close to the house).	• White noise generated from automobile engines. • Radio frequency sewing machine or welding machine being used near your house.	In an area surrounded by hills or high buildings, the FM input signals are very weak. Thus the noise limiter in the circuit loses its function. Set up an outdoor FM antenna having many reflector elements.
	Reception of FM stereo program contains more noise than FM mono program.	• Note that the service area covered by an FM stereo broadcast is about 50% of that of a regular mono broadcast.	Increasing FM input signal may alleviate this problem. Use an exclusive FM outdoor antenna instead of the indoor T-type antenna.
When Playing Records	Hum or buzz. When switched to radio reception, the noise disappears.	• Poor connection of shielded wire (a). • Jack connection is loose. (b) • Line cord or fluorescent lamp is near the shielded wire. (c) • Poor grounding. (d) • HAM transmitting station or TV transmitting station is near your house. (e)	Correct the conditions stated in (a), (b), (c) or (d). In case of (e), report it to an official activity.
	Output tone quality is poor and mixed with noise. Treble is not clear.	• Stylus is worn out. (a) • Record is worn out. (b) • Dust adheres to stylus. (c) • Stylus is improperly mounted. (d) • Stylus pressure is not proper. (e) • The TREBLE level is too high.	Check (a) through (e) and correct the condition. Lower the TREBLE level.

Watch for the following conditions; these are also apt to be mistaken for malfunction.

	Symptom	Suspected Source of Noise	Diagnosis and Remedy
	Power is not turned on although the power switch is set to ON.	• Fuse is blown. (a) • Line plug is loose. (b)	Check (a) and (b) and correct the condition.
	In playing a record, increasing the volume causes howling.	• Distance between the turntable and the speakers is too short. • The place on which the turntable or speakers are set is unstable.	Change the distance or rearrange the installation of the unit and speakers. (Installing the turntable on a firm, solid stand may alleviate this problem.) Do not increase the BASS sound level excessively.

ALIGNMENT INSTRUCTIONS

ALIGNMENT OF FM SECTION

Disconnect OUTPUT terminal of front end from IN terminal of IF unit

Position of Switch: SELECTOR ····· FM MONO

MUTING ····· OFF

Volume Control Setting: Fully Counterclockwise

STEPS	Input		Level	Dial Setting	Output Equipment Connections	Alignment	
	Equipment Connections	Frequency				Adjust	Remarks
1	Sweep Generator IN terminal of IF unit	10.7MHz	40dB		Oscilloscope Ⓜ terminal	T_1 of IF Unit T_2 T_3	Adjust for maximum sensitivity and symmetrical characteristics
2			80dB			Check symmetry of curve	
3	Remove electrolytic capacitor C_{12} (of FM IF Unit 4.7μF) in detector circuit						
4	Sweep Generator IN terminal of IF unit	10.7MHz	40dB		Oscilloscope OUT terminal	T_4 of IF Unit	Adjust the primary core of T_4 so that slope of straight portion of "S" curve will become the steepest and adjust the secondary core so that the center of "S" curve will concide with the center of the marker.
5	Connect OUTPUT terminal of fronted to IN terminal of IF unit						
6	Sweep Generator TP of Front-end	10.7MHz	40dB	Point of no interference as near as 88MHz	Oscilloscope Ⓜ terminal	T_2 of frontend	Adjust for maximum sensitivity and symmetrical characteristics
7			80dB			Check symmetry of curve	
8			40dB		Oscilloscope OUT terminal	T_4 of IF Unit	Adjust similarly to STEP 4.
9	Connect electrolytic capacitor C_{12} (4.7μF)						
10	Signal Generator FM Antenna terminal	90MHz	20dB (400Hz 30%)	90MHz	Oscilloscope V.T.V.M. OUT terminal	L_5 of frontend	Adjust for maximum deflection
11		106MHz		106MHz		CT_4 of frontend	
12	Repeat STEPS 10 and 11 several times						
13	Signal Generator FM Antenna terminal	90MHz	10dB (400Hz 30%)	90MHz	Oscilloscope V.T.V.M. OUT terminal	L_1, T_1, T_2 of frontend	Adjust for maximum deflection
14		106MHz		106MHz		CT_1, CT_2, CT_3 of frontend	
15	Repeat STEPS 13 and 14 several times						

ALIGNMENT OF MPX SECTION

Position of Switch: SELECTOR FM AUTO
MUTING OFF
Volume Control Setting: Fully Counterclockwise
Input Signal: Main (L+R) 40.5KHz Deviation (60%)
19KHz Pilot 7.5KHz Deviation (10%)

STEPS	Circuit to be adjusted	Input		Connect VTVM	Alignment	
		Connections	Signal		Adjust	Remarks
1	Separation	MPX SG to FM Antenna terminal	Sub (L-R)	AC VTVM REC teminal L or R	L_1	Adjust for maximum deflection.
2			L or R		VR_1	Adjust for minimum deflection of the other channel.

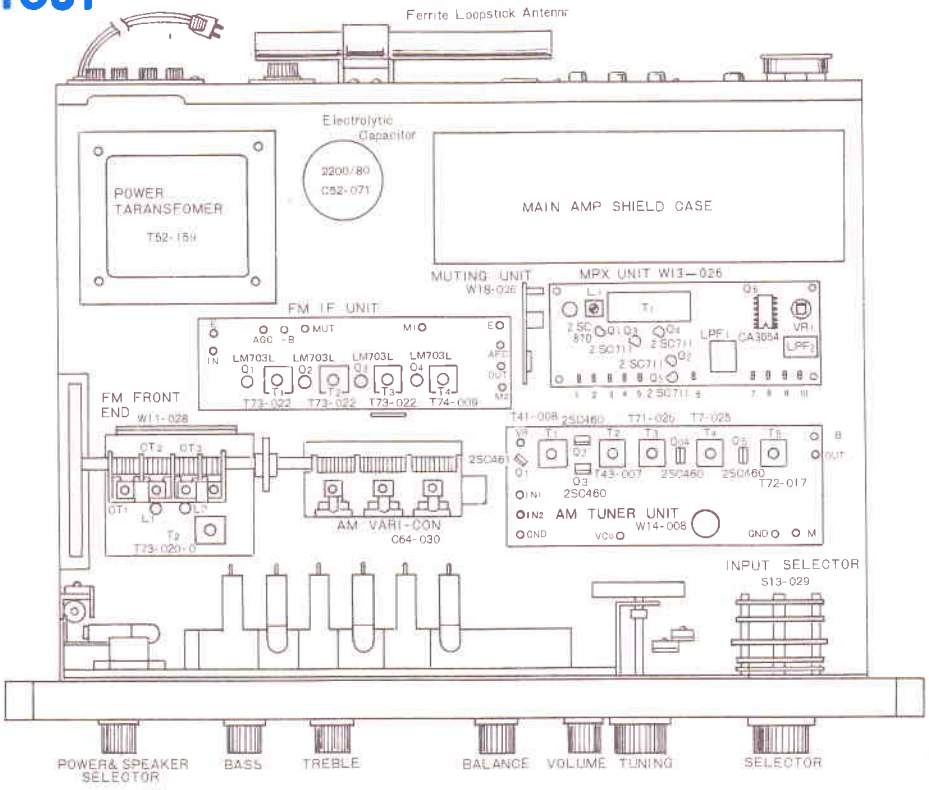
ALIGNMENT OF AM SECTION

Position of Switch: SELECTOR ..... AM
Volume Control Setting: Fully Counterclockwise

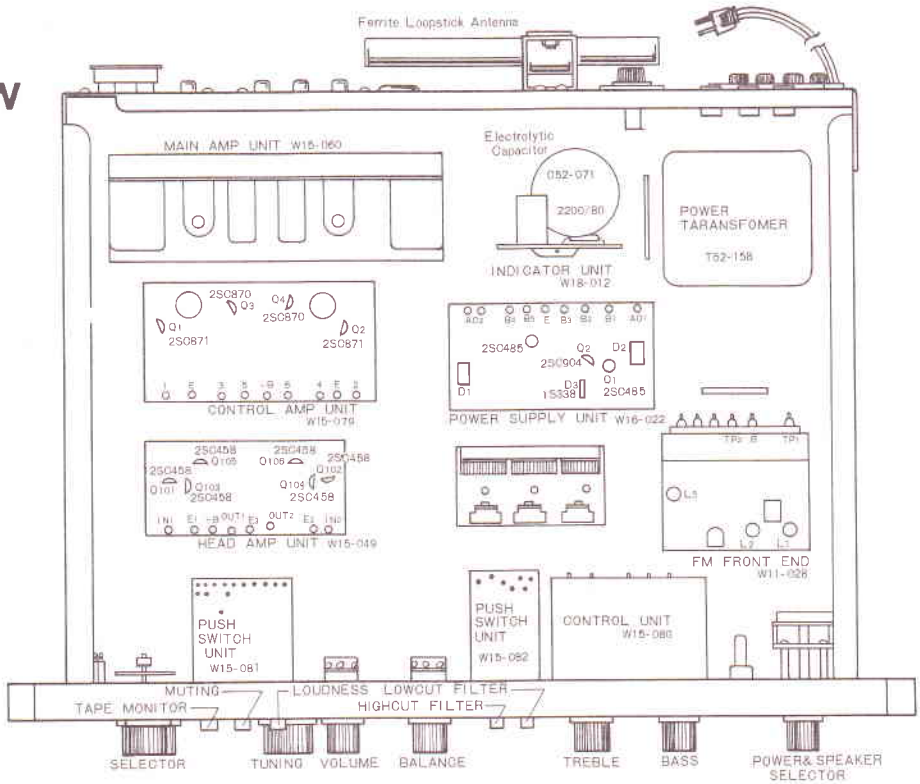
STEPS	Input			Dial Setting	Output Equipment Connections	Alignment	
	Equipment Connections	Frequency	Level			Adjust	Remarks
1	Sweep Generator TP_1	455KHz	50dB	Point of no interference as near as 535KHz	Oscilloscope OUT terminal	T_3, T_4, T_5	Adjust for maximum sensitivity and symmetrical characteristics
2	Signal Generator Antenna through dummy	600KHz	70dB (400Hz 30%)	600KHz	AC V.T.V.M. OUT terminal	T_2	Adjust for maximum deflection
3		1400KHz		1400KHz		CT_3	
4	Repeat STEPS 2 and 3 several times						
5	Signal Generator Antenna terminal through dummy	600KHz	30dB	600KHz	AC V.T.V.M. OUT terminal	T_1, Ferrite Antenna (Adjusting core)	Adjust for maximum deflection
6		1400KHz		1400KHz		CT_1, CT_2	
7	Repeat STEPS 5 and 6 several times						

PARTS LAYOUT

TOP VIEW



BOTTOM VIEW



PARTS LIST

CAPACITORS

IN μF, 10% TOLERANCE UNLESS OTHERWISE NOTED
P:μμF

Symbol	Description				Part No.
C1	Ceramic	3P	±0.5P	50V	
C2	Electrolytic	220		3V	
C3	Mylar	0.0015		50V	
C4	Electrolytic	2200		80V	C52-085-0
C5	Ceramic	0.01	+80% −20%	DC1.4KV	C43-003-0
C6	Ceramic	0.01	+80% −20%	DC1.4KV	C43-003-0
C7	Ceramic	0.01	+80% −20%	DC1.4KV	C43-003-0
C8	Mylar	0.001		50V	
C9	Mylar	0.001		50V	
C10	Ceramic	0.04	+80% −20%	50V	CKDYZ403Z50
	Variable capacitor for AM tuner Unit				C64-030-0

RESISTORS

IN OHM 10% TOLERANCE, ¼W UNLESS OTHERWISE NOTED K:KΩ, M:MΩ

Symbol	Description				Part No.
R1	Carbon film	150K			
R2	Carbon film	150K			
R3	Carbon film	100K			
R4	Carbon film	100K			
R5	Carbon film	1M			
R6	Carbon film	1M			
R7	Carbon film	68K			
R8	Carbon film	68K			
R9	Carbon film	470			
R10	Carbon film	470			
R11	Carbon film	150		3W	
R12	Carbon film	150		3W	
R13	Carbon film	6.8K			
R14	Carbon film	6.8K			
R15	Carbon film	1M			
R16	Carbon film	470			
R17	Carbon film	68K			
R18	Carbon film	68K			
	Compound Part for REC. terminal				W52-004-0

COILS AND TRANSFORMERS

Symbol	Description	Part No.
	Power Transformer	T52-158-0
	Matching Transformer	T61-041-B
	Matching Transformer	T61-041-B
	AM Ferrite Loopstick Antenna	T42-024-A
	Heater Choke Coil	T24-026-0
	Choke Coil	T24-030-0

SWITCHES

Symbol	Description	Part No.
S1	SELECTOR Switch	S13-029-0
S2	MODE Switch	S14-035-0
S3	SPEAKERS Switch	S11-022-A
	LINE VOLTAGE Selector	S11-018-0

POTENTIOMETERS

Symbol	Description	Part No.
VR1	500KΩ dual, VOLUME	C85-054-0
VR2	500KΩ dual, BALANCE	C85-048-0

MISCELLANEOUS

Symbol	Description	Part No.
	FM FRONT END	W11-028-C
	FM IF Unit	W12-032-D
	MPX Unit	W13-026-0
	AM TUNER Unit	W14-008-0
	MUTING Unit	W18-026-0
	INDICATOR Unit	W18-012-0
	HEAD Amp Unit	W15-049-A
	CONTROL Amp Unit	W15-079-0
	CONTROL Unit	W15-080-0
	PUSH Switch Unit (A)	W15-081-A
	PUSH Switch Unit (B)	W15-082-0
	MAIN Amp Unit	W15-060-B
	POWER SUPPLY Unit	W16-022-0
	Front Panel	M21-323-G
	Dial Pulley	M42-027-A
	Foot	M61-017-0
	Wooden Case	M52-119-D
	Dial Glass	A33-084-A
	Dial Pointer	A31-090-C
	Tuning Meter (lower)	A91-009-D
	Tuning Meter (Upper)	A91-008-D
	Knob, Selector	A12-163-0
	Knob Tuning	A12-165-0
	Knob, Speakers, Volume, Balance, Mode	A12-120-B
	Knob, Bass, Treble (L)	A12-168-0
	Knob, Bass, Treble (R)	A12-016-0
	6P Input Terminal	K22-013-C
	4P Input Terminal	K21-010-E
	1P Input Terminal	K21-005-C
	4P Antenna Terminal	K11-018-0
	Pilot Lamp (for Dial Glass)	E22-017-0
	Pilot Lamp (for Selector Position, FM Stereo indicator)	E22-021-0
	Pilot Lamp (for Tuning Meter)	E22-002-0
	Fuse 1A	E21-004-0
	Socket for AC OUTLET	K82-007-B
	Jack for Speaker	K73-003-A
	Jack for Microphone	K72-020-0
	Jack for Headphone	K72-021-B
	Pilot Lamp Socket	K42-003-0
	Fuse Holder 1P	K91-005-0
	Connector 5P	K93-003-B

FM FRONT END (W11-028)

CAPACITORS

Symbol	Description				Part No.
C1	Ceramic	0.001	+100% −0	25V	
C3	Ceramic	6P	±0.25P	50V	
C4	Ceramic				C47-005-A
C5	Ceramic				C47-005-A
C6	Ceramic	10P	±0.5P	50V	
C7	Ceramic	10P	±0.5P	50V	
C8	Ceramic	10P	±0.5P	50V	
C9	Ceramic	5P	±0.5P	50V	
C10	Ceramic				C47-004-O
C11	Ceramic	1P			C43-002-O
C12	Ceramic				C47-005-A
C13	Ceramic	0.01	+100% −0	25V	
C14	Ceramic				C47-005-A
C15	Ceramic	5P	±0.5P	50V	
C16	Ceramic	5P	±0.5P	50V	
C17	Ceramic	7P	±0.5P	50V	
C18	Ceramic				C64-036-B
C19	Ceramic				C47-005-A
C20	Ceramic				C47-005-A
CV1	Vriable Capacitor for FM tuner unit (4gang)				C64-036-B
CV2					C64-036-B
CV3					C64-036-B
CV4					C64-036-B
CT1					C64-036-B
CT2					C64-036-B
CT3					C64-036-B
CT4	Cylinder trimmer				C45-004-B

RESISTORS

Symbol	Description				Part No.
R1	Carbon film	100K		1/8W	
R2	Carbon film	1M		1/8W	
R3	Carbon film	220		1/8W	
R4	Carbon film	3.9K		1/8W	
R5	Carbon film	22K		1/8W	
R6	Carbon film	1K		1/8W	
R7	Carbon film	220		1/8W	
R8	Carbon film	8.2K		1/8W	
R9	Carbon film	2.2K		1/8W	
R10	Carbon film	1.5K		1/8W	
R11	Carbon film	22K		1/8W	
R12	Carbon film	22K		1/8W	
R13	Carbon film	3.3K		1/8W	

COILS AND TRANSFORMERS

Symbol	Description				Part No.
T1	FM Antenna Coil				T22-013-B
T2	FM IF Transformer				T73-020-O
L1	RF coil				T21-013-B
L2	RF coil				T23-026-D
L3	RF choke coil				T24-028-O
L4	RF choke coil				T24-028-O
L5	OSC Coil				T23-032-B

DIODE AND TRANSISTORS

Symbol	Description	Part No.
Q1	2SK22-Y FET	
Q2	2SC461 Ⓑ Transistor	
Q3	2SC461 Ⓐ Transistor	
D1	1S85 Variable Capacitance Diode	

FM IF UNIT (W12-032)

CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	0.01	50V	CKDYZ 103P 50
C2	Ceramic	0.01	50V	CKDYZ 103P 50
C3	Ceramic	0.01	50V	CKDYZ 103P 50
C4	Ceramic	0.01	50V	CKDYZ 103P 50
C5	Ceramic	10P	50V	CCDSL 100K 50
C6	Mylar	0.1	50V	CQMA 104K 50
C7	Ceramic	10P	50V	CCDSL 100K 50
C8	Ceramic	0.01	50V	CKDYZ 103P 50
C9	Ceramic	0.01	50V	CKDYZ 103P 50
C10	Ceramic	10P	50V	CCDSL 100K 50
C11	Ceramic	0.01	50V	CKDYZ 103P 50
C12	Ceramic	0.01	50V	CKDYZ 103P 50
C13	Ceramic	3P	50V	CCDSL 030C 50
C14	Electrolytic	1	50V	CEMX IMF 50V
C15	Ceramic	0.01	50V	CKDYZ 103P 50
C16	Ceramic	0.01	50V	CKDYZ 103P 50
C17	Ceramic	100P	50V	CCDSL 101K 50
C18	Ceramic	0.01	50V	CKDYZ 103P 50
C19	Ceramic	0.01	50V	CKDYZ 103P 50
C20	Electrolytic	4.7	16V	CEMX 4R7MF 16V
C21	Ceramic	100P	50V	CCDSL 101K 50
C22	Electrolytic	4.7	16V	CEMX 4R7MF 16V
C23	Electrolytic	1	25V	CSYA IMF 25V

RESISTORS

Symbol	Description	Part No.
R1	Carbon film 820	RF¼PS 820-K
R2	Carbon film 10K	RF¼PS 10K-K
R3	Carbon film 47K	RF¼PS 47K-K
R4	Carbon film 100	RF¼PS 100-K
R5	Carbon film 1K	RF¼PS 1K-K
R6	Carbon film 47K	RF¼PS 47K-K
R7	Carbon film 1K	RF¼PS 1K-K
R8	Carbon film 47K	RF¼PS 47K-K
R9	Carbon film 100	RF¼PS 100-K
R10	Carbon film 18K	RF¼PS 18K-K
R11	Carbon film 2.7K	RF¼PS 2R7K-K
R12	Carbon film 22K	RF¼PS 22K-K
R13	Carbon film 100	RF¼PS 100-K
R14	Carbon film 22K	RF¼PS 22K-K
R15	Carbon film 220K	RF¼PS 220K-K
R16	Carbon film 820	RF¼PS 820-K

SEMICONDUCTORS

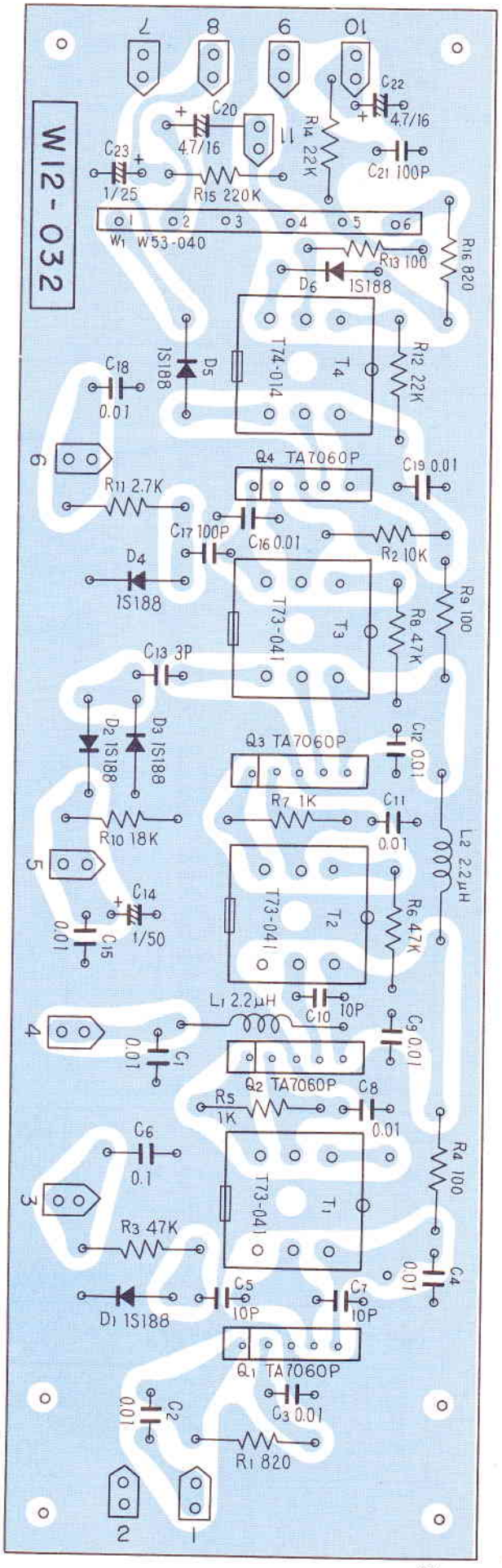
Symbol	Description	Part No.
D1	1S188 FM-1 or 1N60 Diode	
D2	1S188 FM-1 or 1N60 Diode	
D3	1S188 FM-1 or 1N60 Diode	
D4	1S188 FM-1 or 1N60 Diode	
D5	1S188 FM-1 or 1N60 Diode	
D6	1S188 FM-1 or 1N60 Diode	
Q1	TA7060P-R or W IC	
Q2	TA7060P-R or W IC	
Q3	TA7060P-W IC	
Q4	TA7060P-W IC	

COILS AND TRANSFORMERS

Symbol	Description	Part No.
L1	RF Choke Coil	T24-028-A
L2	RF Choke Coil	T24-028-A
T1	FM IF Transformer	T73-041-O
T2	FM IF Transformer	T73-041-O
T3	FM IF Transformer	T73-041-O
T4	FM IF Transformer	T74-014-O

COMPOUND PART

Symbol	Description	Part No.
W1	for FM Detector Circuit	W53-040-O



MPX UNIT (W13-026)

CAPACITORS

Symbol	Description				Part No.
C_1	Electrolytic	2.2		50V	
C_2	Electrolytic	10		10V	
C_3	Styrol	3300p	±5%		C15-011-0
C_4	Electrolytic	3.3		25V	
C_5	Mylar	0.15		50V	
C_6	Mylar	2200p		50V	
C_7	Mylar	2200p		50V	
C_8	Electrolytic	0.47		50V	
C_9	Electrolytic	0.47		50V	
C_{10}	Mylar	1500p		50V	
C_{11}	Mylar	1500p		50V	

RESISTORS

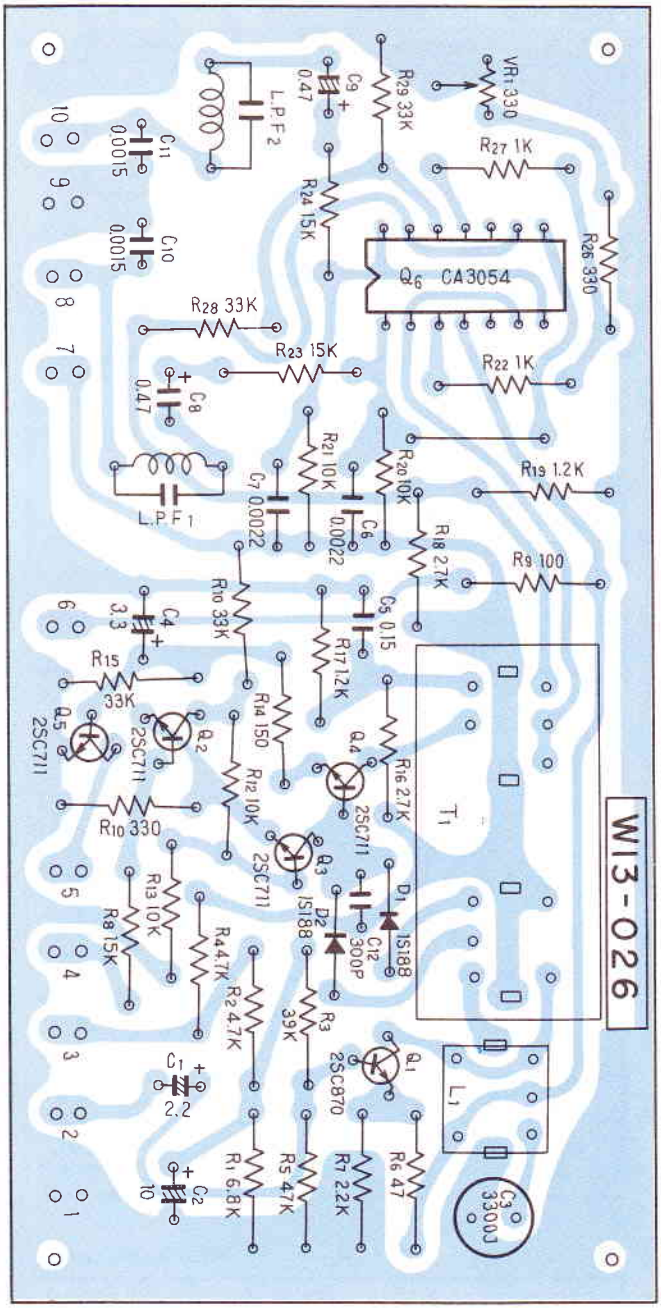
Symbol	Description				Part No.
R_1	Carbon film	6.8K			
R_2	Carbon film	4.7K			
R_3	Carbon film	39K			
R_4	Carbon film	4.7K			
R_5	Carbon film	47K			
R_6	Carbon film	47			
R_7	Carbon film	2.2K			
R_8	Carbon film	15K			
R_9	Carbon film	100			
R_{10}	Carbon film	330			
R_{11}	Carbon film	33K			
R_{12}	Carbon film	10K			
R_{13}	Carbon film	10K			
R_{14}	Carbon film	150			
R_{15}	Carbon film	33K			
R_{16}	Carbon film	2.7K			
R_{17}	Carbon film	1.2K			
R_{18}	Carbon film	2.7K			
R_{19}	Carbon film	1.2K			
R_{20}	Carbon film	10K			
R_{21}	Carbon film	10K			
R_{22}	Carbon film	1K			
R_{23}	Carbon film	15K			
R_{24}	Carbon film	15K			
R_{26}	Carbon film	330			
R_{27}	Carbon film	1K			
R_{28}	Carbon film	33K			
R_{29}	Carbon film	33K			

DIODES AND TRANSISTORS

Symbol	Description	Part No.
D_1	1S188 FM-1 Diode	
D_2	1S188 FM-1 Diode	
Q_1	2SC870-F or E Transistor	
Q_2	2SC711-F or E Transistor	
Q_3	2SC711-F or E Transistor	
Q_4	2SC711-F or E Transistor	
Q_5	2SC711-F or E Transistor	
Q_6	CA3054 IC	

COILS AND TRANSFORMER

Symbol	Description	Part No.
L_1	19kHz Coil	T75-023-0
T_1	MPX Transformer	T75-026-0
LPF_1	38kHz Filter	T75-015-A
LPF_2	38kHz Filter	T75-015-A



MUTING UNIT (W18-026)

CAPACITORS

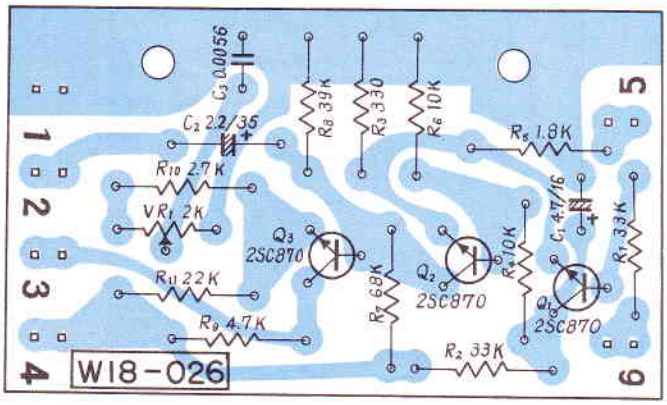
Symbol	Description				Part No
C_1	Electrolytic	4.7		16V	
C_2	Electrolytic	2.2		35V	
C_3	Mylar	0.0056	±20%	50V	

RESISTORS

Symbol	Description		Part No
R_1	Carbon film	33k	
R_2	Carbon film	33k	
R_3	Carbon film	330	
R_4	Carbon film	10k	
R_5	Carbon film	1.8k	
R_6	Carbon film	10k	
R_7	Carbon film	68k	
R_8	Carbon film	39k	
R_9	Carbon film	4.7k	
R_{10}	Carbon film	2.7k	
R_{11}	Carbon film	22k	

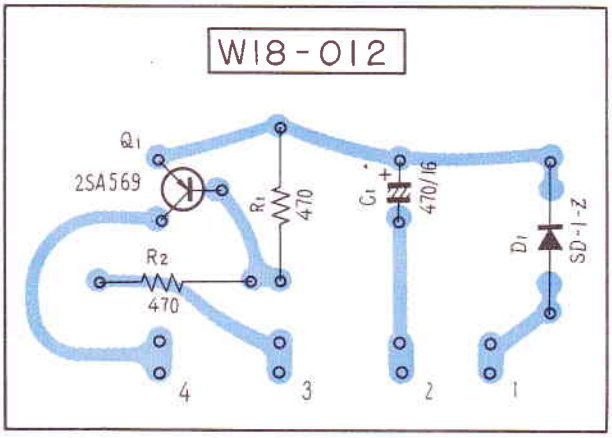
TRANSISTORS

Symbol	Description	Part No
Q_1	2SC870	
Q_2	2SC870	
Q_3	2SC870	



INDICATOR UNIT (W18-012)

Symbol	Description				Part No
	CAPACITOR				
C_1	Electorolytic	470		16V	
	RESISTORS				
R_1	Carbon film	470			
R_2	Carbon film	470			
Q_1	2SA569-G Transistor				
D_1	SD-1Z Diode				



AM TUNER UNIT (W14-008)

CAPACITORS

Symbol	Description				Part No.
C1	Ceramic	0.04	+100% −0	25V	
C2	Ceramic	0.04	+100% −0	25V	
C3	Ceramic	0.04	+100% −0	25V	
C4	Ceramic	0.04	+100% −0	25V	
C5	Ceramic	0.04	+100% −0	25V	
C7	Mylar	0.01	±20%	50V	
C8	Styrol	410P		50V	
C9	Ceramic	0.04	+100% −0	25V	
C10	Ceramic	0.04	+100% −0	25V	
C11	Ceramic	0.04	+100% −0	25V	
C12	Ceramic	0.04	+100% −0	25V	
C13	Ceramic	0.04	+100% −0	25V	
C14	Electrolytic	10		10V	
C15	Ceramic	0.04	+100% −0	25V	
C16	Electrolytic	10		16V	
C17	Ceramic	0.04	+100% −0	25V	
C18	Ceramic	0.04	+100% −0	25V	
C19	Ceramic	3P		50V	
C20	Ceramic	47P		50V	
C21	Ceramic	0.04	+100% −0	25V	
C22	Electrolytic	220		16V	
C23	Ceramic	0.04	+100% −0	25V	
C24	Mylar	0.004	±20%	50V	
C25	Mylar	0.002	±20%	50V	

RESISTORS

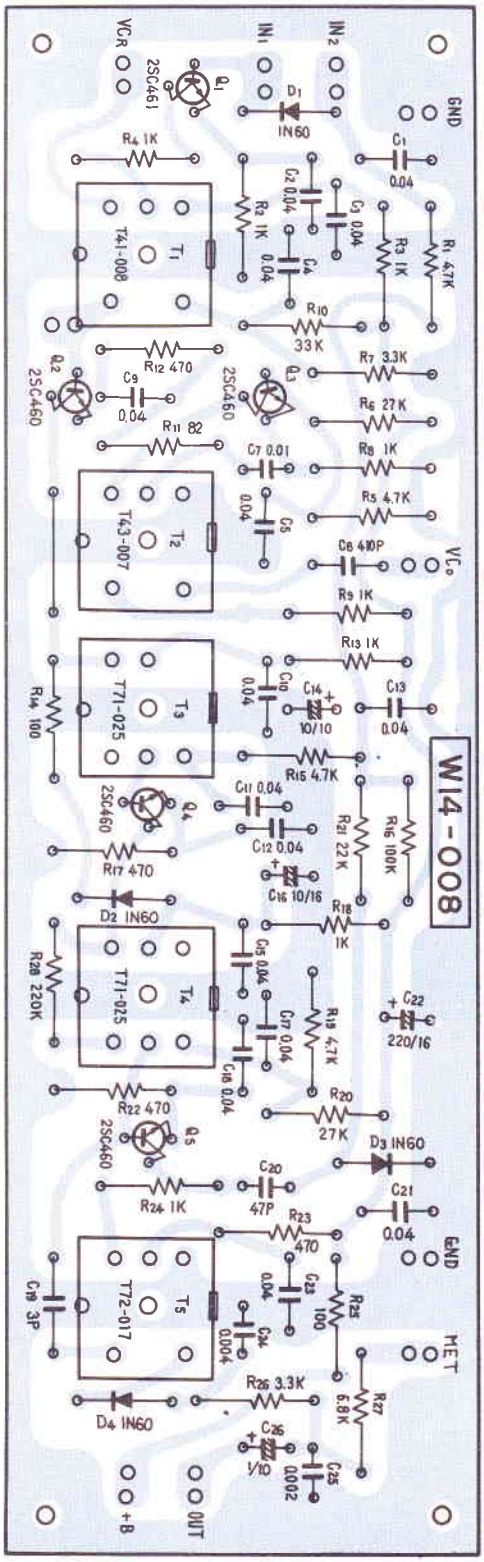
Symbol	Description				Part No.
R1	Carbon film	4.7K			
R2	Carbon film	1K			
R3	Carbon film	1K			
R4	Carbon film	1K			
R5	Carbon film	4.7K			
R6	Carbon film	22K			
R7	Carbon film	3.3K			
R8	Carbon film	1K			
R9	Carbon film	1K			
R10	Carbon film	33K			
R11	Carbon film	82			
R12	Carbon film	470			
R13	Carbon film	1K			
R14	Carbon film	100			
R15	Carbon film	4.7K			
R16	Carbon film	100K			
R17	Carbon film	470			
R18	Carbon film	1K			
R19	Carbon film	4.7K			
R20	Carbon film	27K			
R21	Carbon film	22K			
R22	Carbon film	470			
R23	Carbon film	470			
R24	Carbon film	1K			
R25	Carbon film	100			
R26	Carbon film	3.3K			
R27	Carbon film	6.8K			
R28	Carbon film	220K			

COILS AND TRANSFORMERS

Symbol	Description				Part No.
T1	MW RF Coil				T41-008-0
T2	MW OSC Coil				T43-007-0
T3	AM IF Transformer				T71-025-0
T4	AM IF Transformer				T71-025-0
T5	AM IF Transformer				T72-017-0

DIODES AND TRANSISTORS

Symbol	Description	Part No.
Q1	2SC461-A Transistor	
Q2	2SC460-A Transistor	
Q3	2SC460-A Transistor	
Q4	2SC460-A Transistor	
Q5	2SC460-A Transistor	
D1	1N60 Diode	
D2	1N60 Diode	
D3	1N60 Diode	
D4	1N60 Diode	



HEAD AMP UNIT (W15-049)

CAPACITORS

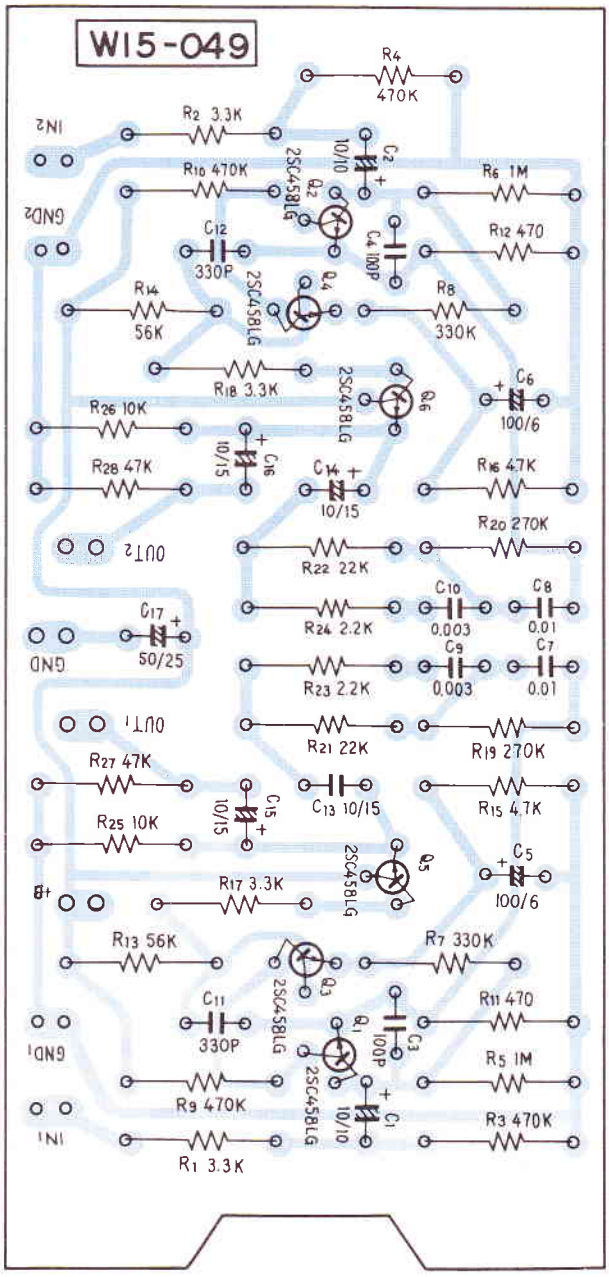
Symbol	Description				Part No.
C1	Electrolytic	10		10V	
C2	Electrolytic	10		10V	
C3	Ceramic	100P		50V	
C4	Ceramic	100P		50V	
C5	Electrolytic	100		6V	
C6	Electrolytic	100		6V	
C7	Mylar	0.01		50V	
C8	Mylar	0.01		50V	
C9	Mylar	0.003		50V	
C10	Mylar	0.003		50V	
C11	Ceramic	330P		50V	
C12	Ceramic	330P		50V	
C13	Electrolytic	10		15V	
C14	Electrolytic	10		15V	
C15	Electrolytic	10		15V	
C16	Electrolytic	10		15V	
C17	Electrolytic	50		25V	

RESISTORS

Symbol	Description				Part No.
R1	Carbon film	3.3K			
R2	Carbon film	3.3K			
R3	Carbon film	470K			
R4	Carbon film	470K			
R5	Carbon film	1M			
R6	Carbon film	1M			
R7	Carbon film	330K			
R8	Carbon film	330K			
R9	Carbon film	470K			
R10	Carbon film	470K			
R11	Carbon film	470			
R12	Carbon film	470			
R13	Carbon film	56K			
R14	Carbon film	56K			
R15	Carbon film	4.7K			
R16	Carbon film	4.7K			
R17	Carbon film	3.3K			
R18	Carbon film	3.3K			
R19	Carbon film	270K			
R20	Carbon film	270K			
R21	Carbon film	22K			
R22	Carbon film	22K			
R23	Carbon film	2.2K			
R24	Carbon film	2.2K			
R25	Carbon film	10K			
R26	Carbon film	10K			
R27	Carbon film	47K			
R28	Carbon film	47K			

TRANSISTORS

Symbol	Description	Part No.
Q1	2SC458LG CorB Transisto	
Q2	2SC458LG CorB Transistor	
Q3	2SC458LG CorB Transistor	
Q4	2SC458LG CorB Transistor	
Q5	2SC458LG CorB Transistor	
Q6	2SC458LG CorB Transistor	



CONTROL AMP UNIT (W15-079)

CAPACITORS

Symbol	Description				Part No.
C1	Electrolytic	0.47		25V	
C2	Electrolytic	0.47		25V	
C3	Ceramic	10P		50V	
C4	Ceramic	10P		50V	
C5	Electrolytic	0.22		25V	
C6	Electrolytic	0.22		25V	
C7	Electrolytic	100		35V	
C8	Electrolytic	100		35V	
C9	Electrolytic	1		16V	
C10	Electrolytic	1		16V	
C11	Mylar	0.0047		50V	
C12	Mylar	0.0047		50V	
C13	Mylar	0.0047		50V	
C14	Mylar	0.0047		50V	
C15	Electrolytic	33		6.3V	
C16	Electrolytic	33		6.3V	
C17	Electrolytic	50		25V	
C18	Electrolytic	50		25V	

RESISTORS Note: LN·····Low Noise

Symbol	Description				Part No.
R1	Carbon film (LN)	1K			
R2	Carbon film (LN)	1K			
R3	Carbon film (LN)	330K			
R4	Carbon film (LN)	330K			
R5	Carbon film (LN)	33K			
R6	Carbon film (LN)	33K			
R7	Carbon film (LN)	8.2K			
R8	Carbon film (LN)	8.2K			
R9	Carbon film (LN)	1K			
R10	Carbon film (LN)	1K			
R11	Carbon film (LN)	1K			
R12	Carbon film (LN)	1K			
R13	Carbon film	2.2K			
R14	Carbon film	2.2K			
R15	Carbon film	6.8K			
R16	Carbon film	6.8K			
R17	Carbon film	6.8K			
R18	Carbon film	6.8K			
R19	Carbon film (LN)	1K			
R20	Carbon film (LN)	1K			
R21	Carbon film	1.8K			
R22	Carbon film	1.8K			
R23	Carbon film (LN)	330K			
R24	Carbon film (LN)	330K			
R25	Carbon film	47K			
R26	Carbon film	47K			
R27	Carbon film (LN)	8.2K			
R28	Carbon film (LN)	8.2K			
R29	Carbon film	1.5K			
R30	Carbon film	1.5K			
R31	Carbon film	330			
R32	Carbon film	330			

TRANSISTORS

Symbol	Description	Part No.
Q1	2SC871-BL	
Q2	2SC871-BL	
Q3	2SC870-GR	
Q4	2SC870-GR	

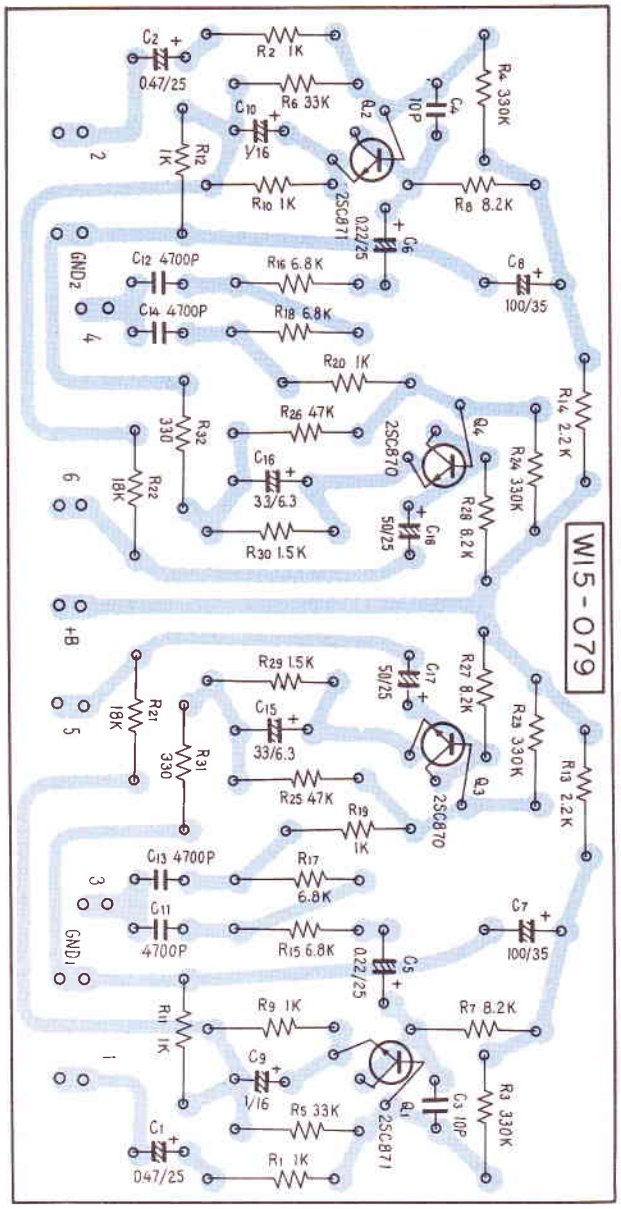
CONTROL UNIT (W15-080)

CAPACITORS

Symbol	Description				Part No.
C1	Electrolytic	3.3		25V	
C2	Electrolytic	3.3		25V	
C3	Mylar	0.0022		50V	
C4	Mylar	0.0022		50V	
C5	Mylar	0.01		50V	
C6	Mylar	0.01		50V	
C7	Mylar	0.033		50V	
C8	Mylar	0.033		50V	
C9	Mylar	0.1		50V	
C10	Mylar	0.1		50V	

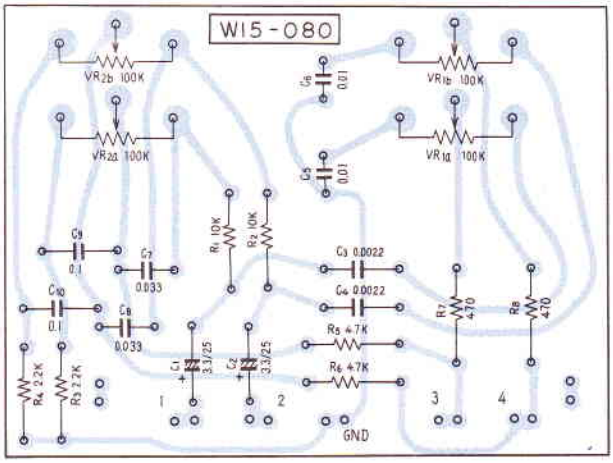
RESISTORS

Symbol	Description				Part No.
R1	Carbon film	10K			
R2	Carbon film	10K			
R3	Carbon film	2.2K			
R4	Carbon film	2.2K			
R5	Carbon film	4.7K			
R6	Carbon film	4.7K			
R7	Carbon film	470			
R8	Carbon film	470			



POTENTIOMETERS

Symbol	Description	Part No.
VR1	100KΩ, dual (Bass Control)	C87-024-0
VR2	100KΩ, dual (TRE LE Control)	C87-024-0



PUSH SWITCH UNIT(A) (W15-081)

CAPACITORS

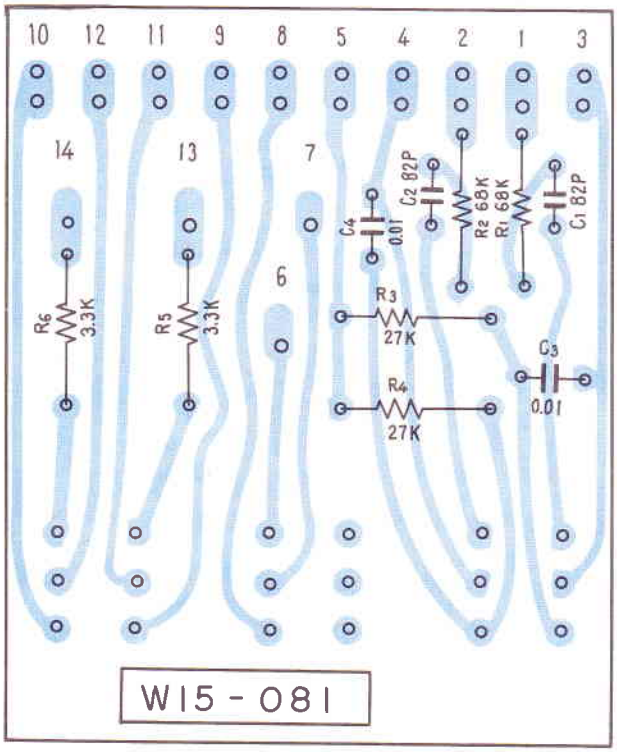
Symbol	Description				Part No.
C1	Ceramic	82P		50V	
C2	Ceramic	82P		50V	
C3	Mylar	0.01		50V	
C4	Mylar	0.01		50V	

RESISTORS

Symbol	Description				Part No.
R1	Carbon film	68K			
R2	Carbon film	68K			
R3	Carbon film	27K			
R4	Carbon film	27K			
R5	Carbon film	3.3K			
R6	Carbon film	3.3K			

SWITCHES

Symbol	Description	Part No.
S1	PUSH Switch	S31-023-0
S2	PUSH Switch	S31-023-0
S3	PUSH Switch	S31-023-0
	Knob for Push Switch	A19-079-0



PUSH SWITCH UNIT(B) (W15-082)

CAPACITORS

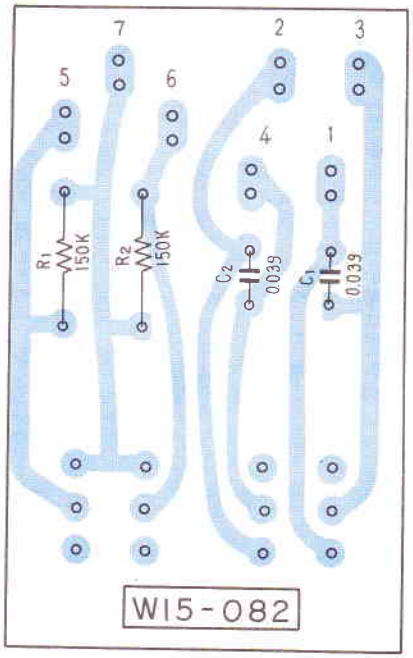
Symbol	Description				Part No.
C1	Mylar	0.039		50V	
C2	Mylar	0.039		50V	

RESISTORS

Symbol	Description				Part No.
R1	Carbon film	150K			
R2	Carbon film	150K			

SWITCHES

Symbol	Description	Part No.
S1	PUSH Switch	S31-023-0
S2	PUSH Switch	S31-023-0
	Knob for PUSH Switch	A17-079-0



MAIN AMP UNIT (W15-060)

CAPACITORS

Symbol	Description				Part No.
C1	Electrolytic	3.3		10V	
C2	Electrolytic	3.3		10V	
C3	Electrolytic	100		50V	
C4	Electrolytic	100		50V	
C5	Electrolytic	3.3		25V	
C6	Electrolytic	3.3		25V	
C7	Electrolytic	100		50V	
C8	Electrolytic	100		50V	
C9	Ceramic	100P		50V	
C10	Ceramic	100P		50V	
C11	Electrolytic	100		3V	
C12	Electrolytic	100		3V	
C13	Electrolytic	1000		35V	C52-068-0
C14	Electrolytic	1000		35V	C52-068-0
C15	Ceramic	47P		50V	
C16	Ceramic	47P		50V	
C17	Mylar	0.022	$\pm^{100\%}_{0}$	50V	
C18	Mylar	0.022	$\pm^{100\%}_{0}$	50V	
C19	Ceramic	100P		50V	
C20	Ceramic	100P		50V	

RESISTORS

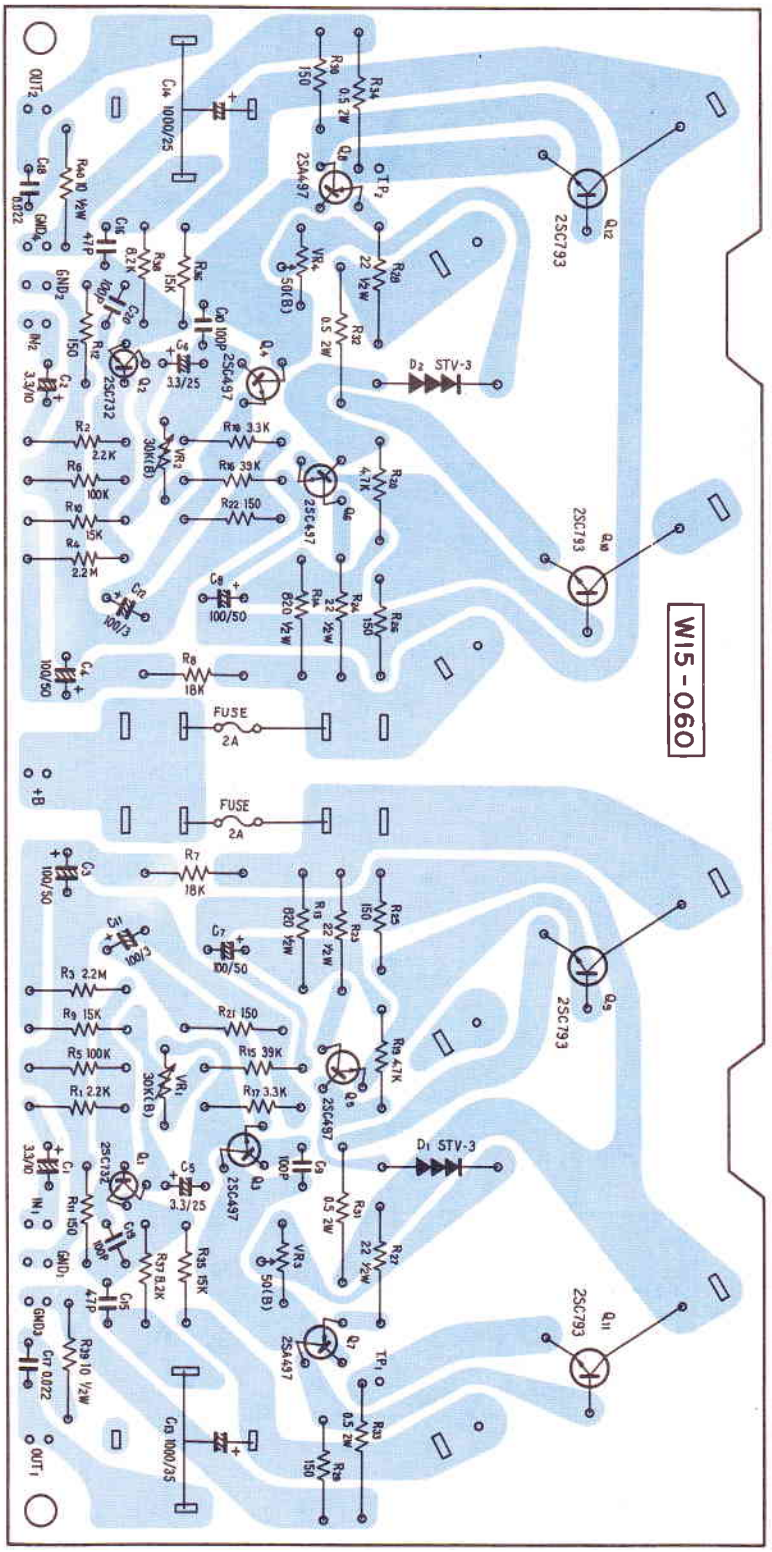
Symbol	Description				Part No.
R1	Carbon film	2.2K			
R2	Carbon film	2.2K			
R3	Carbon film	2.2M			
R4	Carbon film	2.2M			
R5	Carbon film	100K			
R6	Carbon film	100K			
R7	Carbon film	18K			
R8	Carbon film	18K			
R9	Carbon film	15K			
R10	Carbon film	15K			
R11	Carbon film	150			
R12	Carbon film	150			
R13	Carbon film	820		½W	
R14	Carbon film	820		½W	
R15	Carbon film	39K			
R16	Carbon film	39K			
R17	Carbon film	3.3K			
R18	Carbon film	3.3K			
R19	Carbon film	4.7K			
R20	Carbon film	4.7K			
R21	Carbon film	150			
R22	Carbon film	150			
R23	Carbon film	22		½W	
R24	Carbon film	22		½W	
R25	Carbon film	150			
R26	Carbon film	150			
R27	Carbon film	22		½W	
R28	Carbon film	22		½W	
R29	Carbon film	150			
R30	Carbon film	150			
R31	Wire Wound	0.5		2W	
R32	Wire Wound	0.5		2W	
R33	Wire Wound	0.5		2W	
R34	Wire Wound	0.5		2W	
R35	Carbon film	15K		2W	
R36	Carbon film	15K			
R37	Carbon film	8.2K			
R38	Carbon film	8.2K			
R39	Carbon film	10		½W	
R40	Carbon film	10		½W	

DIODES AND TRANSISTORS

Symbol	Description	Part No.
Q1	2SC732 Transistor	
Q2	2SC732 Transistor	
Q3	2SC497-O Transistor	
Q4	2SC497-O Transistor	
Q5	2SC497-O Transistor	
Q6	2SC497-O Transistor	
Q7	2S 497-O Transistor	
Q8	2S 497-O Transistor	
Q9	2SC793-Y Transistor	
Q10	2SC793-Y Transistor	
Q11	2SC793-Y Transistor	
Q12	2SC793-Y Transistor	
D1	STV-3(Varistor)	
D2	STV-3((Varistor)	

POTENTIOMETERS

Symbol	Description		Part No.
VR1	30KΩ, Semifixed		C92-024-B
VR2	30KΩ, Semifixed		C92-024-B
VR3	50Ω Semifixed		C92-043-0
VR4	50Ω Semifixed		C92-043-0



POWER SUPPLY UNIT (W16-022)

CAPACITORS

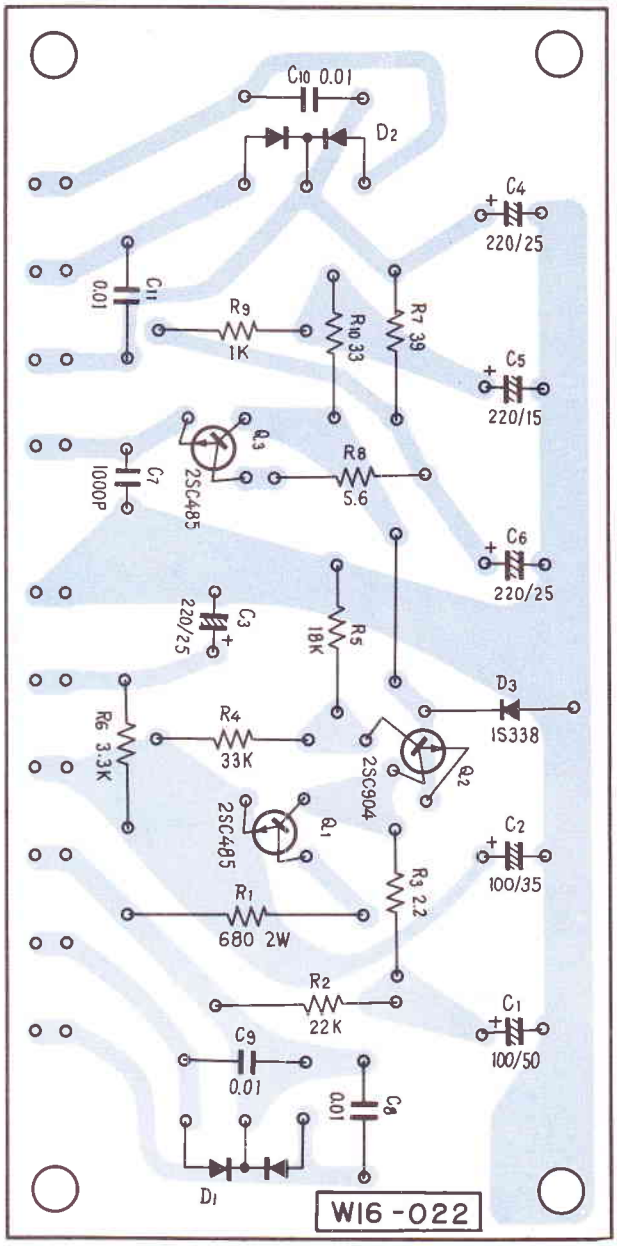
Symbol	Description				Part No.
C1	Electrolytic	100		50V	
C2	Electrolytic	100		35V	
C3	Electrolytic	220		25V	
C4	Electrolytic	220		25V	
C5	Electrolytic	220		15V	
C6	Electrolytic	220		25V	
C7	Mylar	0.001		50V	
C8	Ceramic	0.01	+100% -0	500V	
C9	Ceramic	0.01	+100% -0	500V	
C10	Ceramic	0.01	+100% -0	500V	
C11	Ceramic	0.01	+100% -0	500V	

RESISTORS

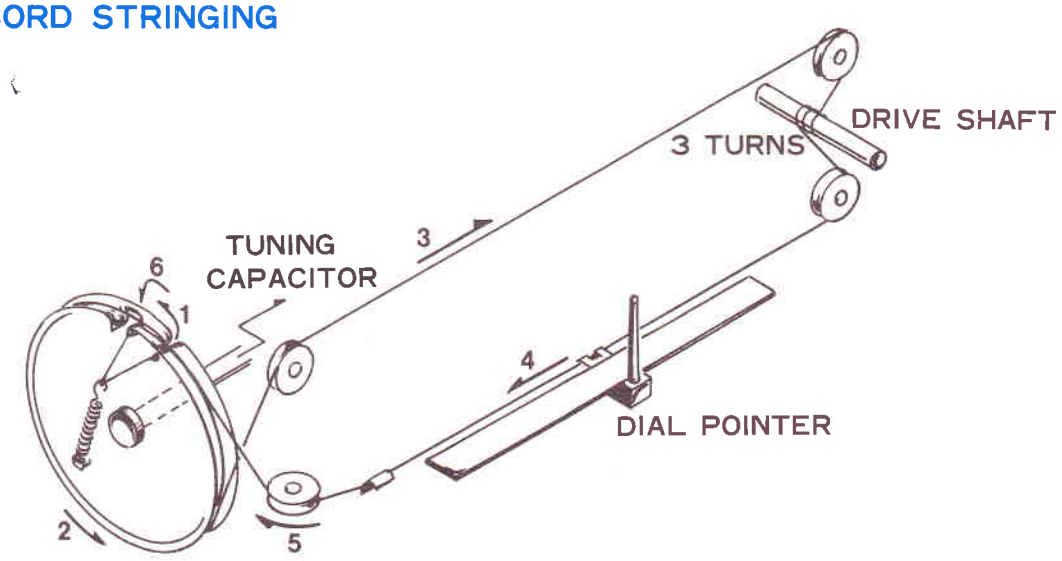
Symbol	Description				Part No.
R1	Carbon film	680		2W	
R2	Carbon film	22K			
R3	Carbon film	2.2			
R4	Carbon film	33K			
R5	Carbon film	18K			
R6	Carbon film	3.3K			
R7	Carbon film	39			
R8	Carbon film	5.6			
R9	Carbon film	1K			
R10	Carbon film	33			

DIODES AND TRANSISTORS

Symbol	Description	Part No.
D1	SIBOZ-03C Diode	
D2	SIBOZ-03C Diode	
D3	1S338Q Zener Diode	
Q1	or 2SC486 Transistor	
Q2	2SC905 Transistor	
Q3	2SC485 Transistor	



DIAL CORD STRINGING



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