〈R42-232-0〉

Service Manual

AM/FM STEREO RECEIVER

SX-828/ KUW, FVZW, FW

NOTE
MODEL SX-828 COMES IN THREE VERSIONS DISTINGUISHED AS FOLLOWS:

Round label on rear panel	Voltage	Type
KUW	120V only	UL approved (U.S.A.)
FVZW	5-position selector	FTZ approved (West Germany)
FW	5-position selector	General export model

〈72A02MBID〉

PIONEER®

CONTENTS

1. SPECIFICATIONS

SEMICONDUCTORS	
FETs	6
ICs	4
Transistors	57
Diodes	37
POWER AMPLIFIER SECTION	
Music Power Output (IHF)	270W (4Ω), 180W (8Ω)
Continuous Power Output	95W/95W (4Ω)
(1kHz: each channel driven)	70W/70W (8Ω)
Continuous Power Output	75W + 75W (4Ω)
(1kHz: both channels driven)	60W + 60W (8Ω)
Power Output in the Range of 20Hz to 20kHz (both channels driven)	54W + 54W (8Ω, Harmonic distortion less than 0.5%)
Harmonic Distortion	Less than 0.5% (Continuous power output) Less than 0.03% (8Ω, 35W/35W power output)
Intermodulation Distortion	Less than 0.5% (Continuous power output) Less than 0.03% (8Ω, 35W/35W power output)
Power Bandwidth (IHF)	10Hz to 60kHz (8Ω, Harmonic distortion Less than 0.5%)
Frequency Response	5Hz to 80kHz, ±1dB
Input Sensitivity/Impedance (1kHz, Continuous power output)	500mV/50kΩ
Speakers	4 to 16Ω
Damping Factor	40 (8Ω, 1kHz)
PREAMPLIFIER SECTION	
Output Voltage	500mV (Rated output), 4V (Max.)
Harmonic Distortion	Less than 0.1%
Frequency Response	10Hz to 40kHz, ±1dB
Input Sensitivity/Impedance (1kHz, for rated output)	PHONO 1 MAG 2.7mV/50kΩ PHONO 2 MM 2.7mV/50kΩ MC 115μV/30Ω (with PHONO INPUT transformer "PP-402") MIC 2.6mV/50kΩ AUX 200mV/100kΩ TAPE MONITOR 1, 2 200mV/100kΩ
Recording Output	TAPE REC 1, 2 (Pin jack) 200mV TAPE REC (DIN connector) 35mV
BASS Control	−10dB, +10dB/100Hz
TREBLE Control	−10dB, +10dB/10kHz
LOW Filter	−3dB/60Hz (12dB/oct.)
HIGH Filter	−3dB/6kHz (12dB/oct.)
Equalization Curve	PHONO: RIAA S.T.D.
Loudness Contour	+10dB/100Hz, +6dB/10kHz with Volume Control set at −40dB position.
Muting	−20dB
Hum and Noise (Short circuit, IHF network)	PHONO More than 85dB AUX More than 95dB

FM TUNER SECTION

Frequency Range	88MHz to 108MHz 87.5MHz to 108MHz (FTZ approved)
Usable Sensitivity (IHF)	1.7μV
Capture Ratio (IHF)	1.5dB
Selectivity (IHF)	More than 75dB
Image Rejection	More than 95dB (98MHz)
IF Rejection	More than 100dB (90MHz)
Spurious Rejection	More than 100dB (98MHz)
AM Suppression	50dB
Signal-to-Noise Ratio	70dB
Harmonic Distortion	Mono: Less than 0.2% (100% Mod.) Stereo: Less than 0.4% (100% Mod.)
Tuning Indicator	Signal strength type and Center tuning type
Muting	Switchable to ON-OFF
Stereo Separation	More than 40dB (1kHz)
Sub Carrier Suppression	More than 50dB
De-emphasis switch	50μsec., 75μsec. (FW model only)
Antenna Input	Impedance 300Ω balanced and 75Ω unbalanced

AM TUNER SECTION

Frequency Range	525kHz to 1,605kHz
Usable Sensitivity (IHF)	10μV
Selectivity (IHF)	More than 35dB
Image Rejection	More than 85dB (1,000kHz)
IF Rejection	More than 80dB
Signal-to-Noise Ratio	More than 50dB
Antenna	Built-in ferrite loopstick antenna

MISCELLANEOUS

Power Requirements	120V 60Hz or 110V, 120V, 130V, 220V and 240V (Switchable) 50–60Hz
Power Consumption	370W (Max.)
AC Outlets	Switched 1, Unswitched 2
Dimensions (overall)	19 1/8 in./485 mm (width) 5-15/16 in./150 mm (height) 14 3/4 in./375 mm (depth)
Weight Without package	32 lb 10oz/14.8 kg
With package	39 lb 3oz/17.8 kg

Furnished Parts

FM T-type Antenna		1
Fuse 1.5A	(5 line voltage model)	1
3A		2
Pin plug		2
Speaker plug		6
Hexagonal wrench		1
Polishing cloth		1
Operating instructions		1

NOTE: Specifications and the design subject to possible modification without notice due to improvements.

2. FRONT PANEL FACILITIES

SPEAKERS SWITCH

A combination of the power ON/OFF switch and the speaker system selector switch.

POWER OFF:	The equipment is off.
A:	The speaker system plugged into the A speaker sockets is in operation.
SPKR OFF:	All speaker systems off. Useful for listening through headphones.
B:	The speaker system plugged into the B speaker sockets is in operation.
C:	The speaker system plugged into the C speaker sockets is in operation.
A+B:	Both speaker systems A and B are in operation.
A+C:	Both speaker systems A and C are in operation.

PHONES JACKS (1, 2)

Use these to plug in stereo headphones.
A full selection of high-performance headphones is available from Pioneer.

BASS & TREBLE CONTROL

Used for adjusting bass and treble.
Clockwise (Counterclockwise) rotation of these controls from the FLAT position will boost (diminish) tone. Also, only the left (right) channel can be adjusted by turning the front (rear) part of the knob while holding the other part in place.
Adjustment of both channels or only the left channel is made by click-stops. For normal listening, set to the FLAT position.

FILTER SWITCHES

LOW:	Setting this switch to ON will eliminate low noise such as record rumble, hum, etc. Leave it at OFF unless the filter is required.
HIGH:	Setting this switch to ON will eliminate high noise such as record scratch, tape hiss, static noise from fluorescent lamps, etc. Leave it at OFF unless the filter is required.

BALANCE CONTROL

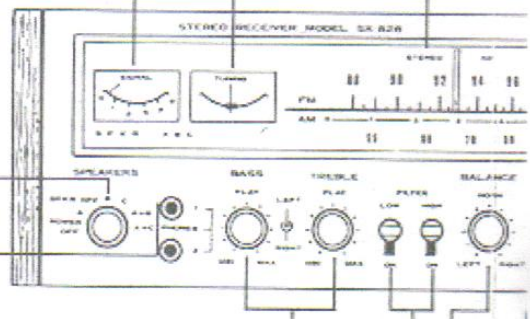
Adjust the stereo balance. When the volume of the right channel speaker is smaller, turn the knob clockwise toward RIGHT; when left channel volume is smaller, turn the knob counterclockwise toward LEFT. For normal listening, set it to the NORM position.

VOLUME CONTROL

The volume increases when this knob is turned clockwise.

SIGNAL METER

This meter indicates the optimum tuning point for AM and FM stations. Maximum deflection to the right indicates that the station has been properly tuned in.



LOUDNESS SWITCH

When listening at low volume level, set this switch to ON. This emphasizes the extreme ends of the sound spectrum, giving a more natural sound contour.

AUDIO MUTING SWITCH

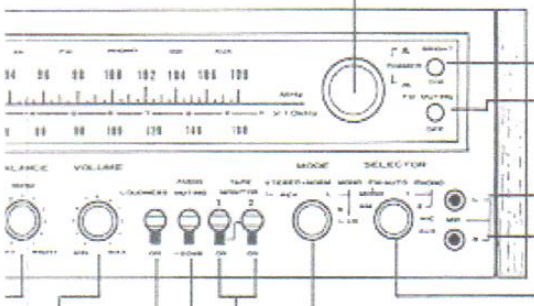
In position –20dB, the volume will be attenuated by 20dB.
For restoring the volume to its former level, set the switch to the OFF position.

FM TUNING METER

When tuning in an FM station, use this meter to make the tuning perfect. After the desired station has been properly tuned in with the SIGNAL METER, adjust the TUNING KNOB so that the needle comes to the center.

FM STEREO INDICATOR

This lamp lights when an FM stereo broadcast is being received.



TUNING KNOB

Used to tune in the desired station.

NOTE: If the setscrews holding the TUNING KNOB should ever become loose, they can be tightened with the supplied L-shaped hexagonal wrench.

DIMMER SWITCH

The brightness of the front panel illumination is controllable by this switch. The front panel becomes dimmer when the switch is pushed in.

FM MUTING SWITCH

This switch is used to suppress noise between FM stations when tuning. When receiving weak stations, this switch should be kept OFF because it would suppress the desired station signal at the same time. Note that this switch is OFF when it is pushed in, and ON when released.

MIC JACKS

Connect the microphone plugs to these jacks. Only high-impedance, dynamic microphones with standard plugs (6.4ϕ) should be used. A selection of high-performance dynamic microphone is available from Pioneer.

TAPE MONITOR SWITCHES (1 and 2)

These switches are set to ON for monitoring of a recording in progress or playback of recorded tapes with tape decks.

1: This switch is set to ON for using a tape deck plugged into the TAPE 1 MON and TAPE 1 REC jacks or the TAPE 1 REC/P.B. connector.

2: This switch is set to ON for using a tape deck plugged into the TAPE 2 MON and TAPE 2 REC jacks.

NOTE: For phonograph records or broadcasts, leave these switches in OFF position. If either of these switches is set to ON, no sound will be heard.

MODE SWITCH

This selects the mode of reproducing sound.

STEREO REV:	Stereo, with the input signals of the left and right channels reversed.
STEREO NORM:	Normal stereo.
MONO L:	Playing the input signals of only the left channel through the left and right speakers.
MONO R:	Playing the input signals of only the right channel through the left and right speakers.
MONO L+R:	Monophonic reproduction, mixing the input signals of the left and right channels.

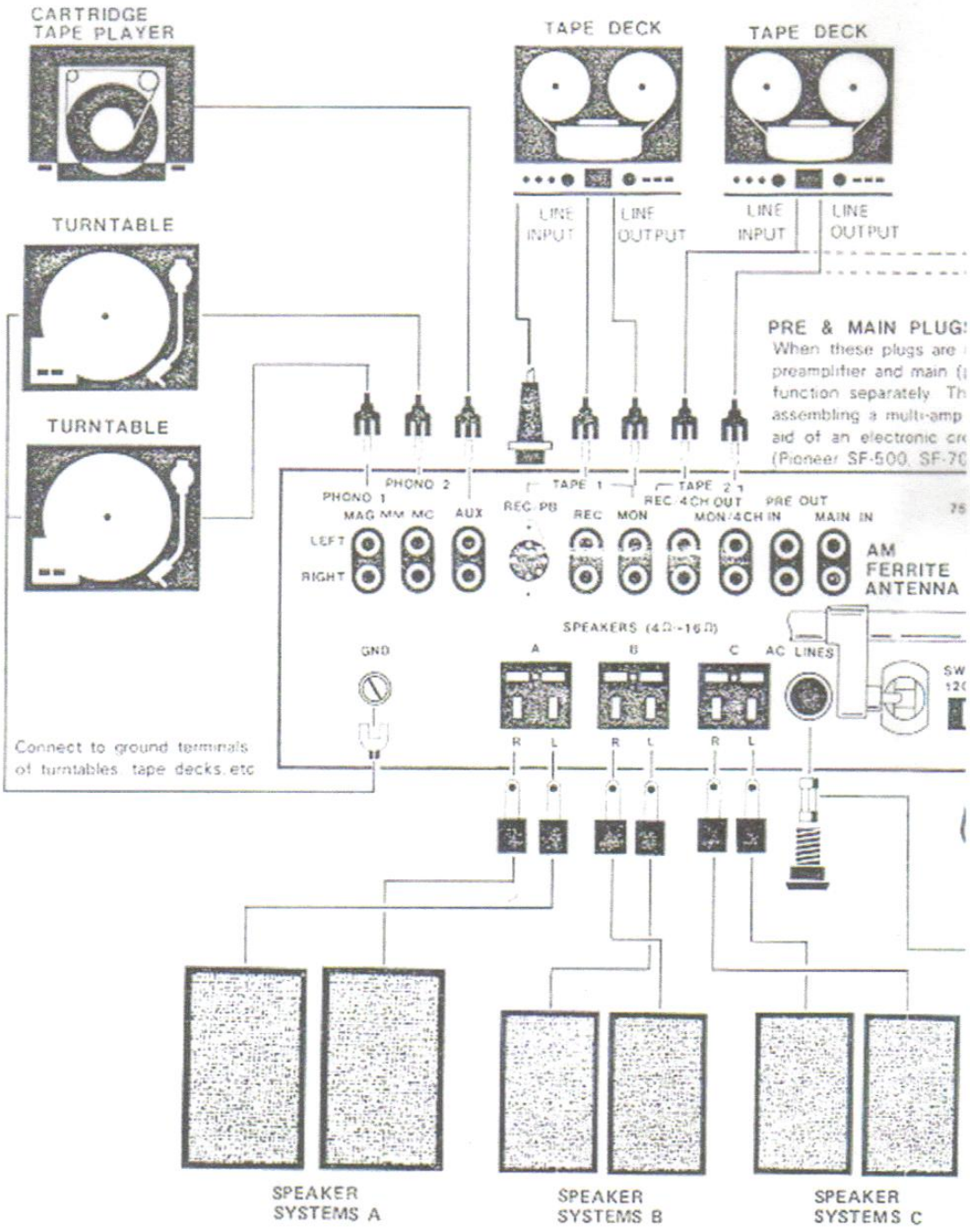
SELECTOR SWITCH

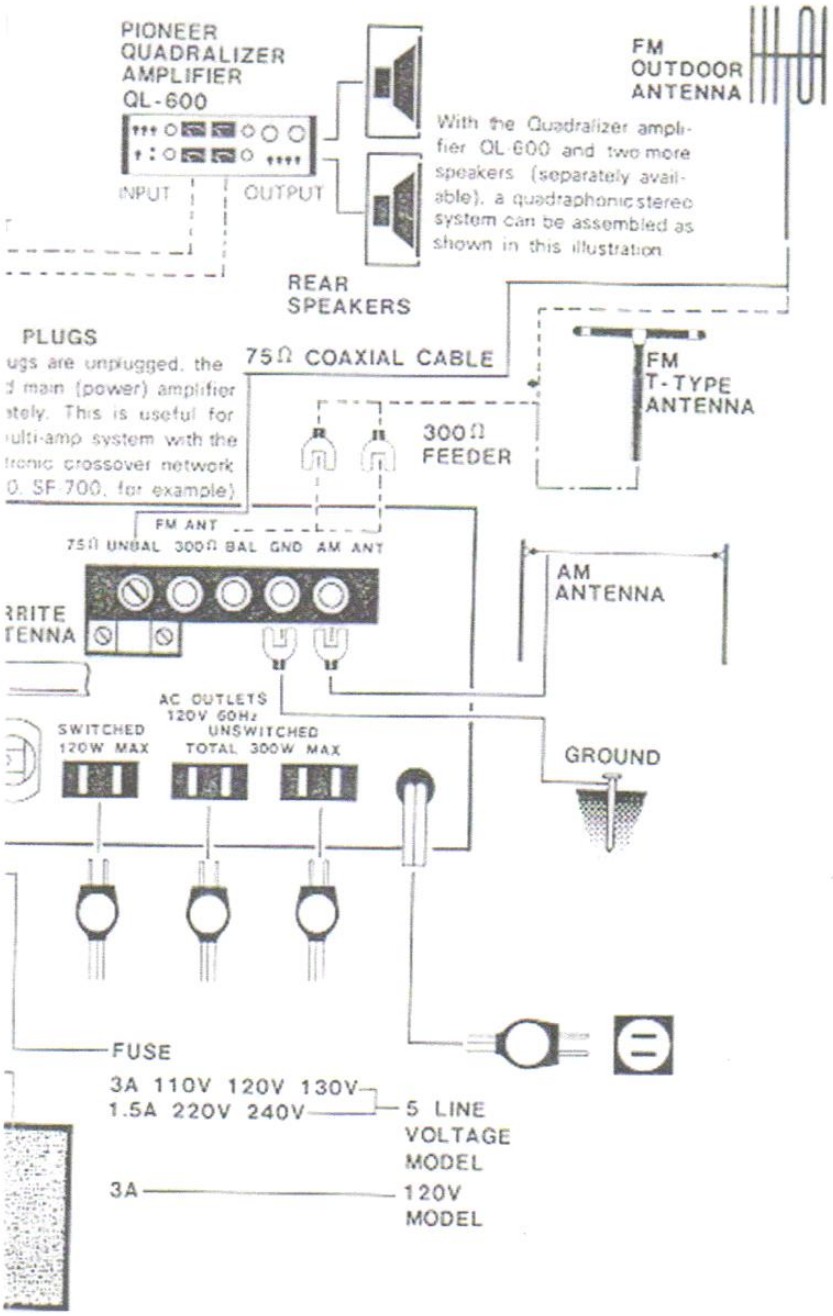
Choose the program source.

AM:	AM reception.
FM MONO:	FM monophonic reception only.
FM AUTO:	FM reception with automatic switching for either stereo or monophonic programs.
PHONO 1:	For playing records on a turntable plugged into the PHONO 1 jacks.
PHONO 2:	Same as above, for PHONO 2 jacks.
MIC:	Microphone sound can be reproduced.
AUX:	For playing signals fed to the AUX jacks.

NOTE: If the front panel inscriptions of your unit become dirty, clean them with volatile fluid (chemical thinner, pure alcohol, etc.). In this case, the letters on the front panel may be blotted. Wipe out them with a soft dry cloth, however they will still remain unerased.

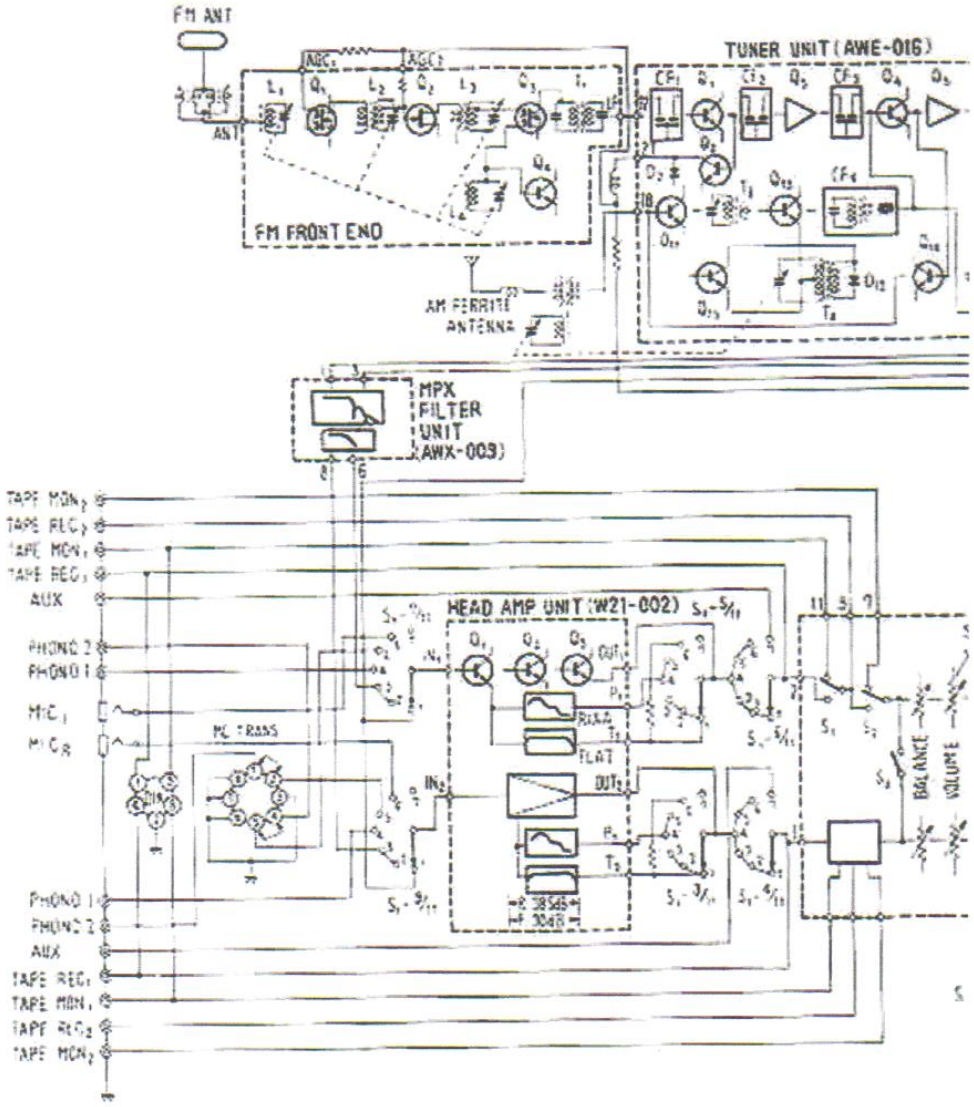
3. CONNECTION DIAGRAM

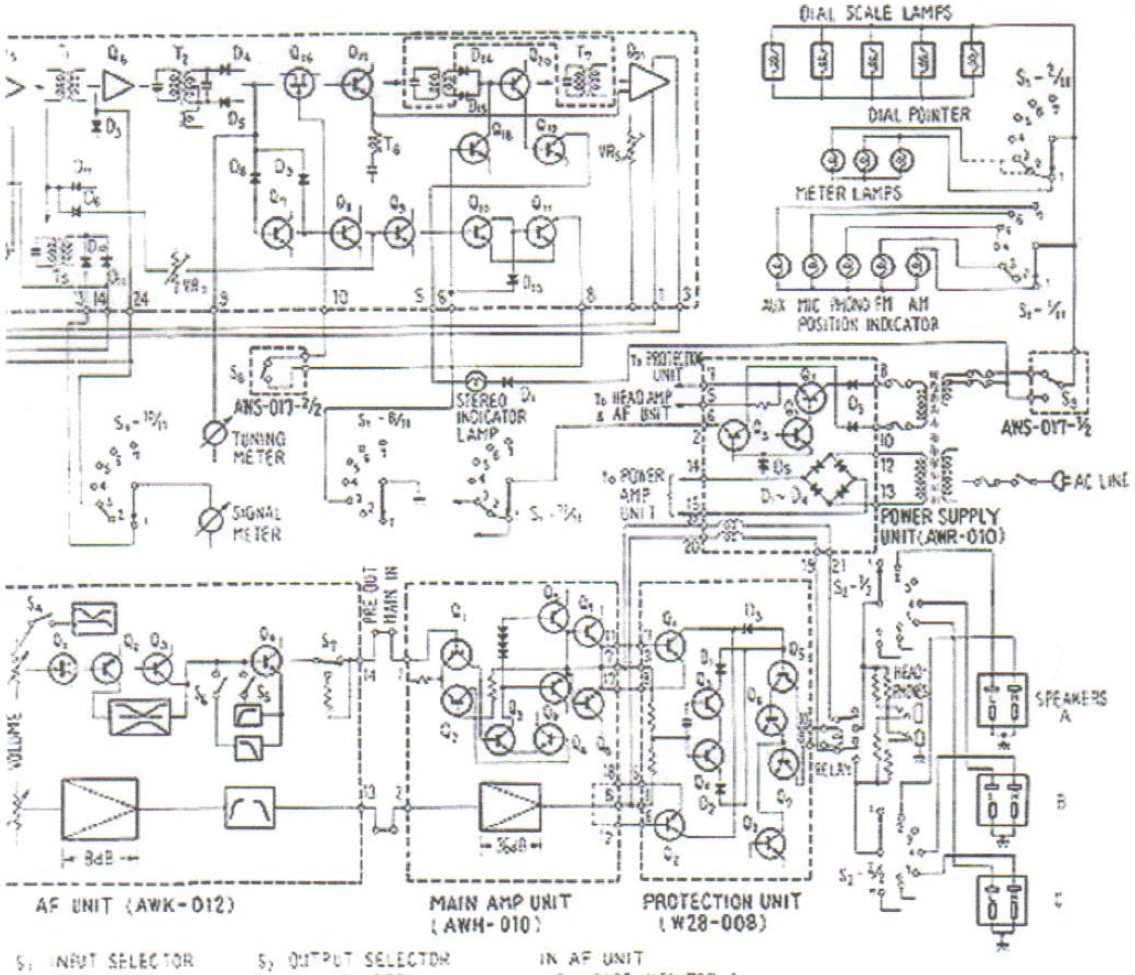



PIONEER
QUADRALIZER
AMPLIFIER
QL-600
INPUT
OUTPUT
REAR
SPEAKERS
With the Quadralizer amplifier QL-600 and two more speakers (separately available), a quadraphonic stereo system can be assembled as shown in this illustration.
FM
OUTDOOR
ANTENNA
PLUGS
ugs are unplugged, the
d main (power) amplifier
stely. This is useful for
ulti-amp system with the
tronic crossover network
0, SF-700, for example)
75Ω COAXIAL CABLE
300Ω
FEEDER
FM
T-TYPE
ANTENNA
FM ANT
75Ω UNBAL 300Ω BAL GND AM ANT
RRITE
TENNA
AM
ANTENNA
AC OUTLETS
120V 60Hz
SWITCHED
120W MAX
UNSWITCHED
TOTAL 300W MAX
GROUND
FUSE
3A 110V 120V 130V
1.5A 220V 240V
5 LINE
VOLTAGE
MODEL
3A
120V
MODEL

C

4. BLOCK DIAGRAM

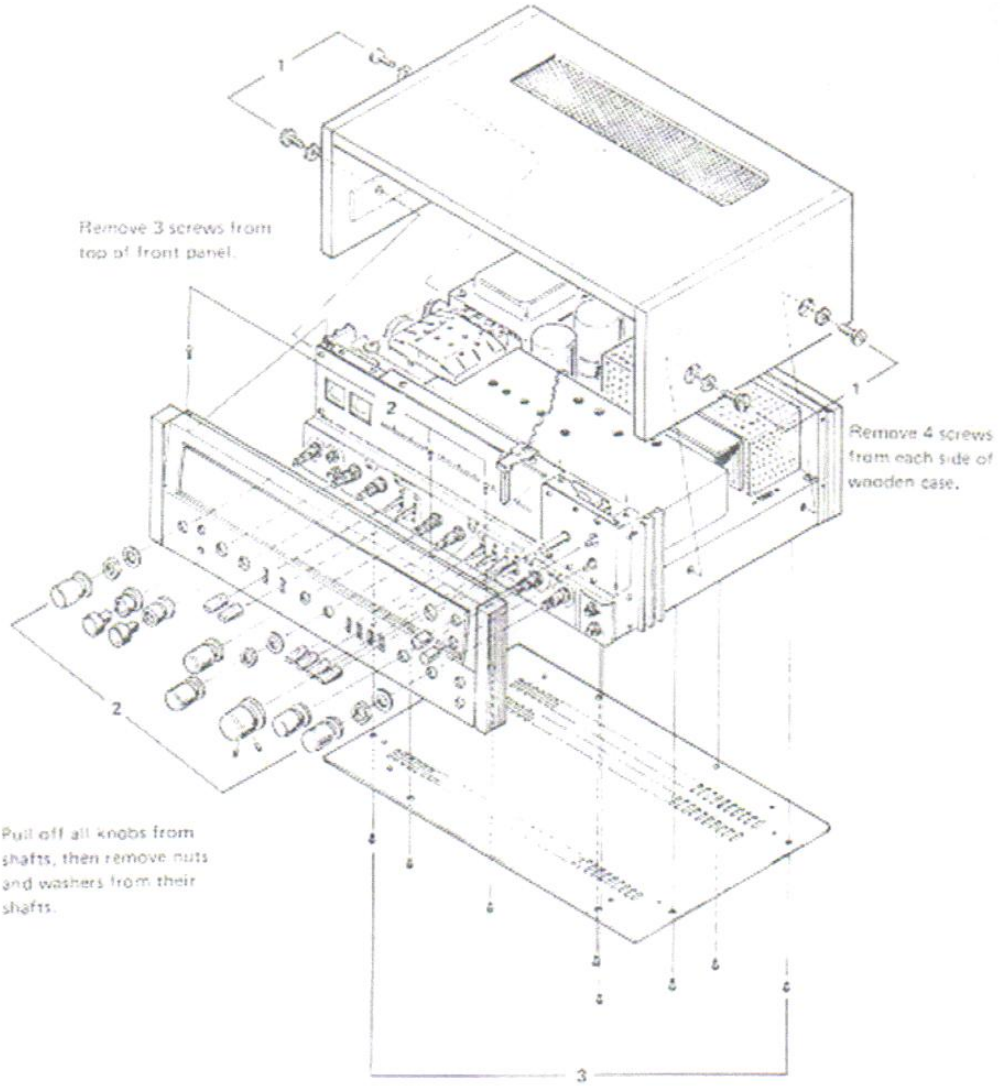




S_1 INPUT SELECTOR	S_2 OUTPUT SELECTOR	IN AF UNIT
1 AM	1 POWER OFF	S_1 TAPE MONITOR 1
2 FM	2 SPEAKER A	S_2 TAPE MONITOR 2
3 FM AUTO	3 SPEAKER OFF	S_3 MODE
4 PHONO 1	4 SPEAKER B	S_4 LOUDNESS
5 PHONO 2	5 SPEAKER C	S_5 LOW FILTER
6 MIC	6 SPEAKER A+B	S_6 HIGH FILTER
7 AUX	7 SPEAKER A+C	S_7 AUDIO MUTING

5. DISASSEMBLY

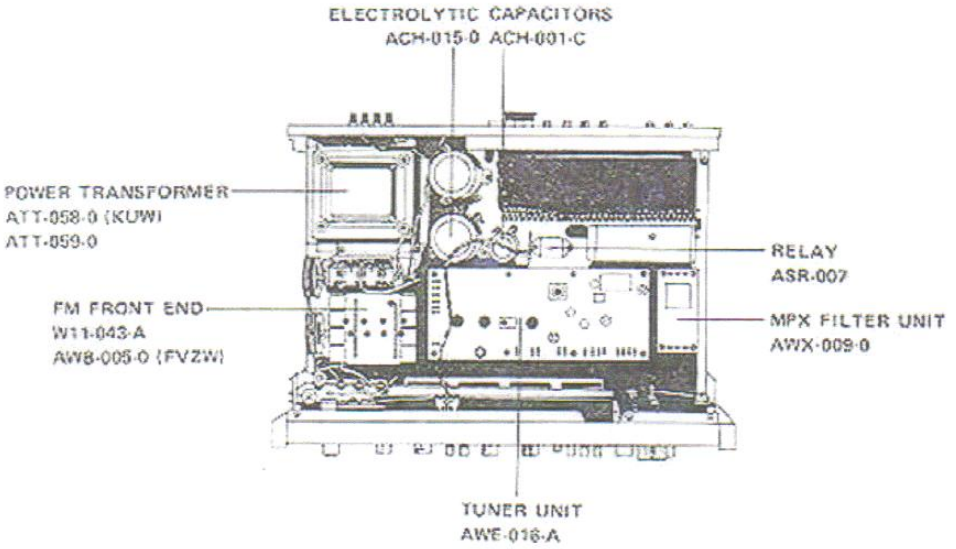
• Numbers indicate order of disassembly.



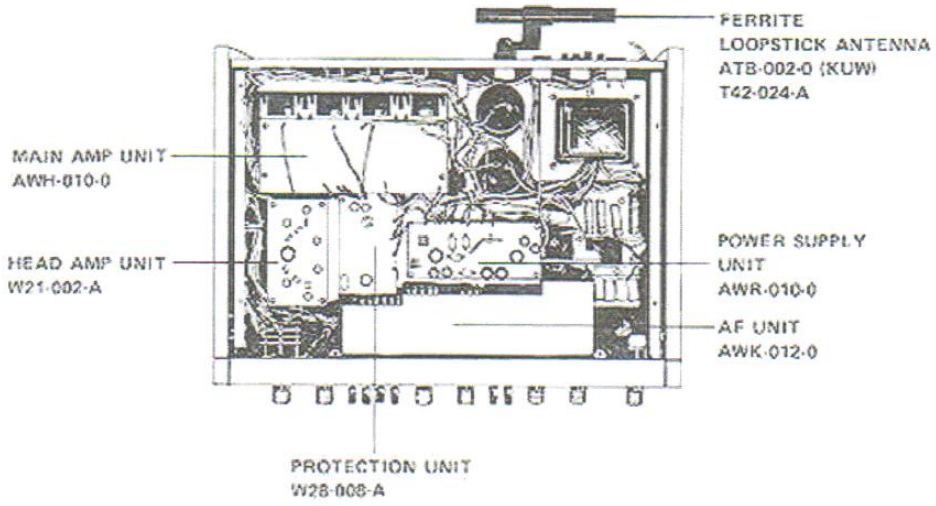
NOTE: RE-ASSEMBLY can be made in reverse order of the above DISASSEMBLY procedure.

6. PARTS AND PCB LOCATION

- TOP VIEW

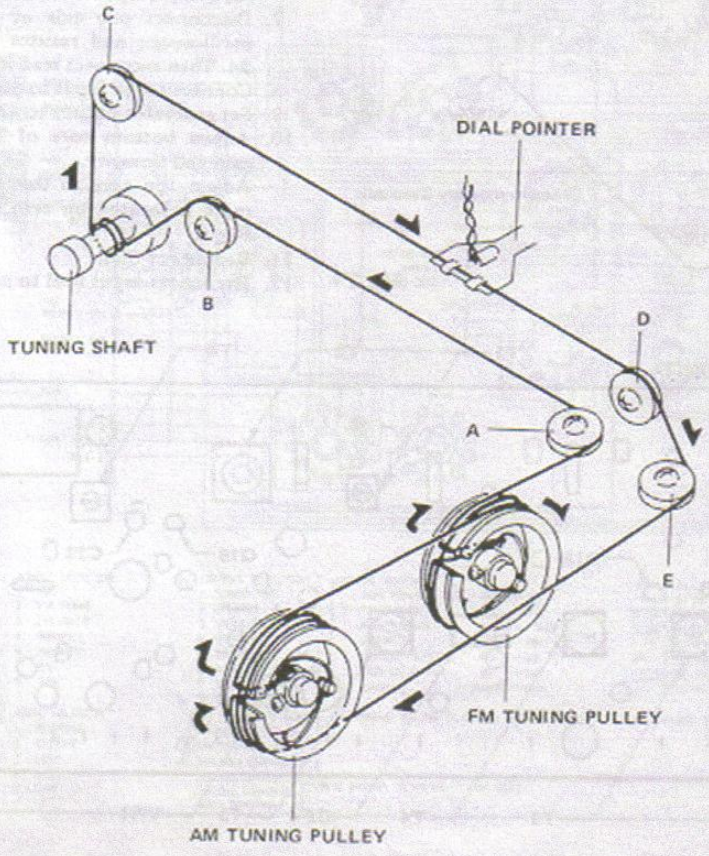


- BOTTOM VIEW



7. DIAL CORD STRINGING

1. Set the both AM and FM tuning capacitors to maximum capacitance.
2. Tie one end of the string to the spring on the AM tuning pulley.
3. Wind the string 1/4 turn around the AM tuning pulley, then wind it 2 turns around the FM tuning pulley.
4. Hook the string to the spring on the FM tuning pulley.
5. Lead the string around the small pulleys A and B.
6. Wind the string 2 turns around the tuning shaft.
7. Lead the string around the small pulleys C and D, then fasten it to the dial pointer.
8. Lead the string around the small pulley E, and wind it 2 turns around the AM tuning pulley.
9. Finally, tie the end of the string to remaining side of the spring on the AM tuning pulley.
10. Tune receiver to low end. Fasten dial pointer to the string so that it indicates low end on dial scale.



8. ALIGNMENT PROCEDURE

The following alignments are required only in very rare cases and should never be attempted without the proper test equipment. Also, only non-metallic tools must be used.

8.1 REQUIRED INSTRUMENT

- Sweep generator: Center marker frequencies 10.7MHz, 455kHz
- Oscilloscope: Flat to 250kHz minimum
- AC VTVM
- AM/FM signal generator
- FM multiplex signal generator, preferably with RF output

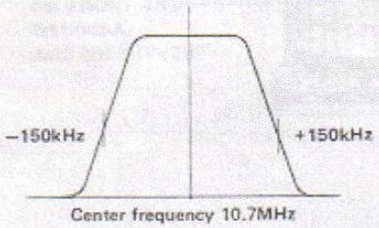


Fig. 1

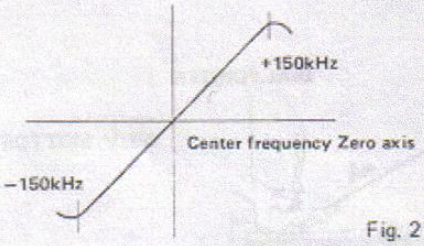


Fig. 2

8.2 FM IF ALIGNMENT

1. Confirm +B voltage and current for 12V ±1V which should be 53mA to 65mA at pin 4.
2. Disconnect leads from pin 22 (input) and 24 (MET), then connect resistor 4.7kΩ as shunted to pin 24 of tuner unit.
3. Connect 10.7MHz sweep generator to pins 22 (hot) and 23 (ground) of tuner unit. Set controls as follows:
   Center frequency: 10.7MHz
   Output: 80dB (10mV)
4. Connect vertical scope input to 24.
5. Align core of T1 for maximum gain and symmetry to obtain scope pattern as in Fig. 1.
6. Vary the generator output gradually from 45dB to 100dB, repeat step 5 realignment for every output level, if necessary.
7. Disconnect one side of C23. Disconnect oscilloscope and resistor 4.7kΩ from pin 24. Then reconnect lead to pin 24.
8. Connect scope input to pin 9.
9. Set generator output to 45dB.
10. Adjust bottom core of T2 for maximum gain and linearity.
    Adjust top core so that center frequency mark is located on zero axis, as shown in Fig. 2.
11. Reconnect C23.
12. Reconnect input lead to pin 22.

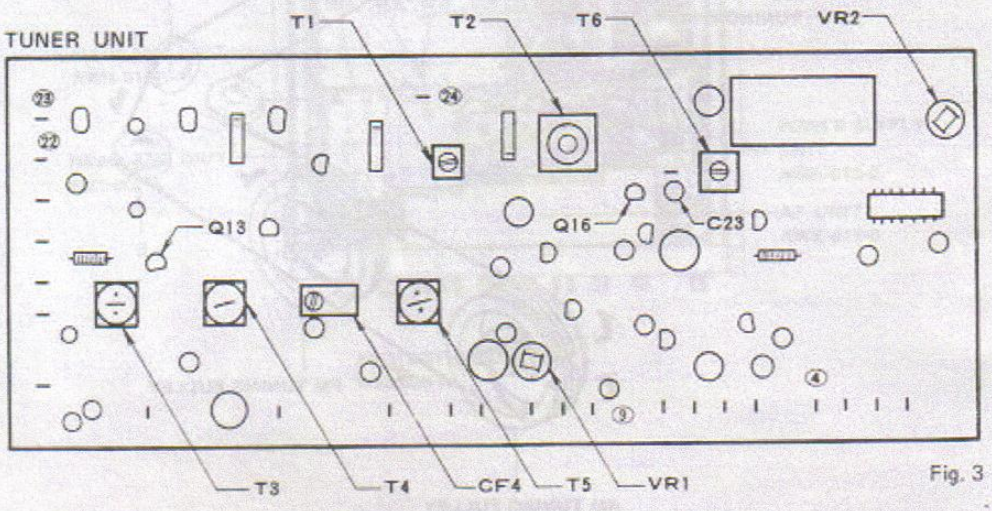
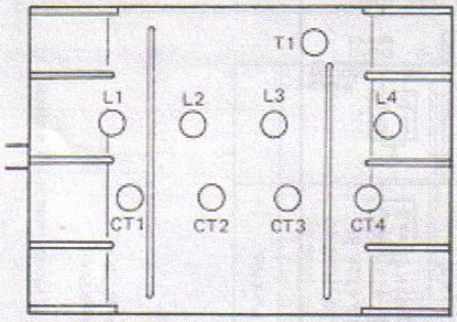


Fig. 3

8.3 FM TRACKING ALIGNMENT

1. Confirm ±Bcurrent (drain 11mA ±1mA).
2. Connect FM signal generator output to 300Ω antenna inputs.
3. Connect AC VTVM to TAPE REC jack on rear panel.
4. Adjust generator for 400Hz, 100% modulation.
5. Set SELECTOR switch on front panel to FM MONO.
6. Adjust generator frequency and tuning dial to 90MHz.
   During the following adjustments, keep the generator output as low as possible.
7. Adjust L4 core first, the adjust cores of L1, L2, L3 for maximum reading on VTVM and so that tuning meter indicates center position.
8. Set generator frequency and tuning dial to 106MHz.
9. Adjust trimmer capacitor CT4 first, then adjust CT1, CT2, CT3 for maximum reading on VTVM.
10. Repeat these alignments several times until satisfactory reading is obtained.
11. Finally, adjust T1 core for maximum reading on VTVM.



FM FRONT END

Fig. 4

8.4 FM MPX DECODER ALIGNMENT

1. Set SELECTOR switch on front panel to FM AUTO.
2. Connect RF output of FM multiplex signal generator to 300Ω antenna inputs.
3. Adjust MPX generator as follows:

Signal Mode	Deviation
L+R	40.5kHz
19kHz (pilot)	7.5kHz

4. Connect AC VTVM to TAPE REC jack on rear panel.
5. Set generator signal mode to L-R (sub) and its output level to 100dB, adjust core of T6 (located on tuner unit) to obtain maximum reading on VTVM.
6. Set generator signal mode to L. Adjust VR2 (located on tuner unit) for minimum crosstalk on R channel TAPE REC output.
7. Set generator signal mode to R. Repeat above adjustment for minimum crosstalk on L channel.

8.5 MUTING THRESHOLD LEVEL ALIGNMENT

1. Set SELECTOR switch to FM MONO.
2. Turn MUTING switch to ON.
3. Connect FM signal generator to 300Ω antenna inputs.
4. Connect AC VTVM to TAPE REC output jack.
5. Set output level of generator to 25dB (20 μV), with ±22.5kHz deviation, and 400Hz or 1kHz modulation.
6. Tune receiver accurately to generator frequency.
7. Adjust VR1 on tuner unit exactly on the borderline between muting and non-muting.