

Service Manual

AM/FM STEREO TUNER

TX-1000/KUW, FW, FVZW

NOTE

MODEL TX-1000 COMES IN THREE VERSIONS DISTINGUISHED AS FOLLOWS:

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

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1 • SPECIFICATIONS

SEMICONDUCTORS

FETs	4
ICs	6
Transistors	30
Diodes	19

FM TUNER SECTION

Frequency Range	87.5MHz to 108MHz
Usable Sensitivity (IHF)	1.7 μ V
Capture Ratio (IHF)	1.5dB
Selectivity (IHF)	More than 70dB
Image Rejection	More than 90dB (98MHz)
IF Rejection	More than 90dB (98MHz)
Spurious Rejection	More than 95dB (98MHz)
AM Suppression	55dB
Signal-to-Noise Ratio	70dB
Harmonic Distortion	Mono: Less than 0.3% (100% Mod.) Stereo: Less than 0.3% (100% Mod.)
Tuning Indicator	Signal strength type and Center Tuning type
Muting	Switchable to ON-OFF (with level control)
FM De-emphasis	50 μ S, 75 μ S Selectable (FW only)
Stereo Separation	More than 40dB (1kHz)
Sub Carrier Suppression	More than 50dB
Noise Filter	Switchable to ON-OFF
Output Voltage	Controllable, from 2.4V to 80mV (100% Mod.)
Antenna Input	Impedance 300 Ω balanced and 75 Ω unbalanced.
Multipath Terminals	Vertical and Horizontal

AM TUNER SECTION

Frequency Range	525kHz to 1,605kHz
Usable Sensitivity (IHF)	8 μ V
Selectivity (IHF)	More than 30dB
Image Rejection	More than 80dB (1,000kHz)
IF Rejection	More than 75dB
Signal-to-Noise Ratio	More than 55dB (30% Mod.)
Output Voltage	Controllable, from 1.8V to 60mV (100% Mod.)
Antenna	Built-in Ferrite Loopstick Antenna

AUDIO SECTION

Recording Output/Impedance	750mV/2.5k Ω (FM 100% Mod.)
Headphone Output	30mW/8 Ω (FM 100% Mod.)
Level Control	AM and FM

MISCELLANEOUS

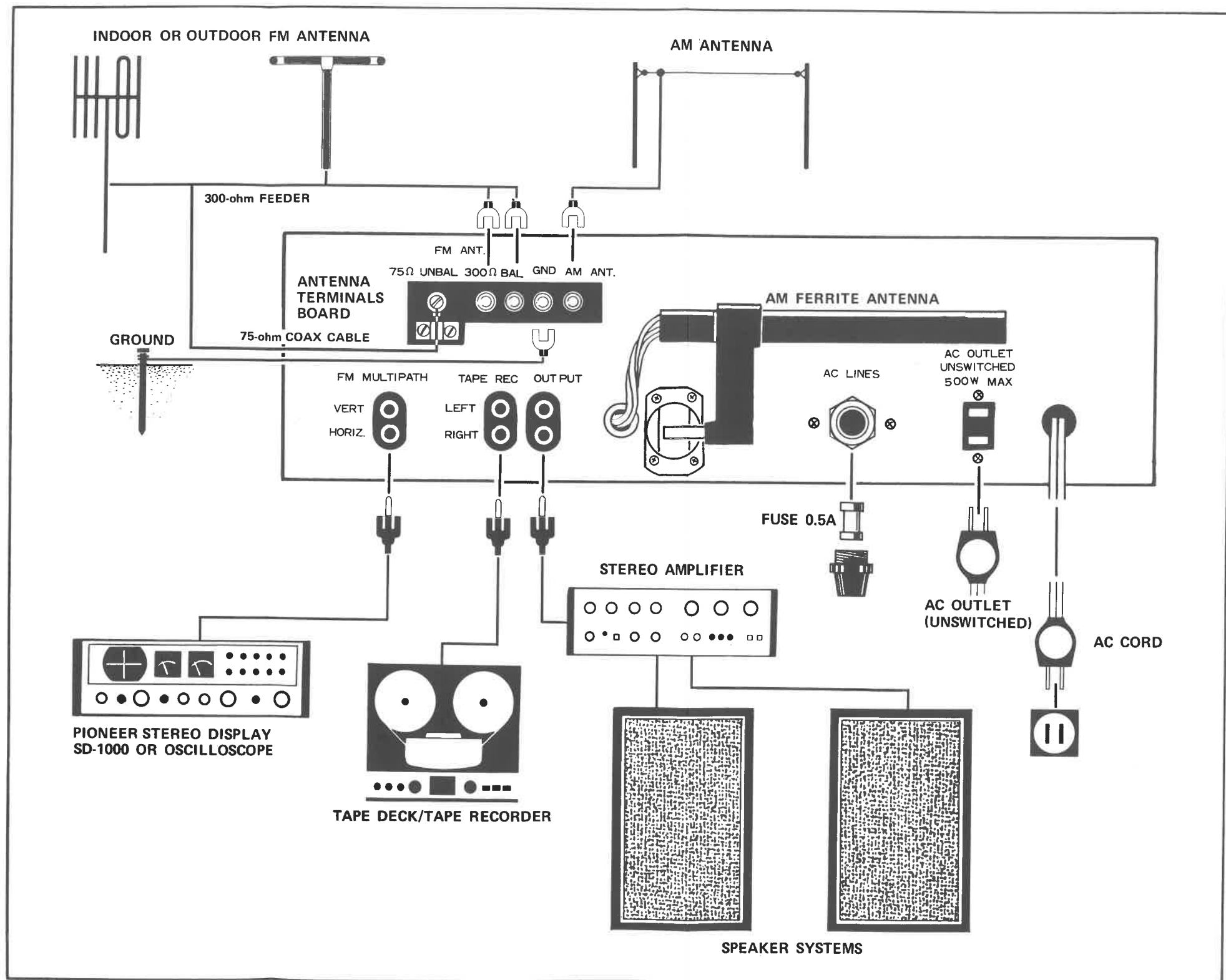
Power Requirements	FVZW, FW; 110V, 120V, 130V 220V and 240V (Switchable) 50 to 60Hz KUW; 120V 60Hz
Power Consumption	27W (Max.)
Dimensions (overall)	16- $\frac{15}{16}$ in./430mm (width) 5- $\frac{11}{16}$ in./145mm (height) 13- $\frac{9}{16}$ in./345mm (depth)
Weight	Without package 19lb/8.6kg With package 23lb, 5oz/10.6kg

- Specifications and design subject to possible modification without notice due to improvements

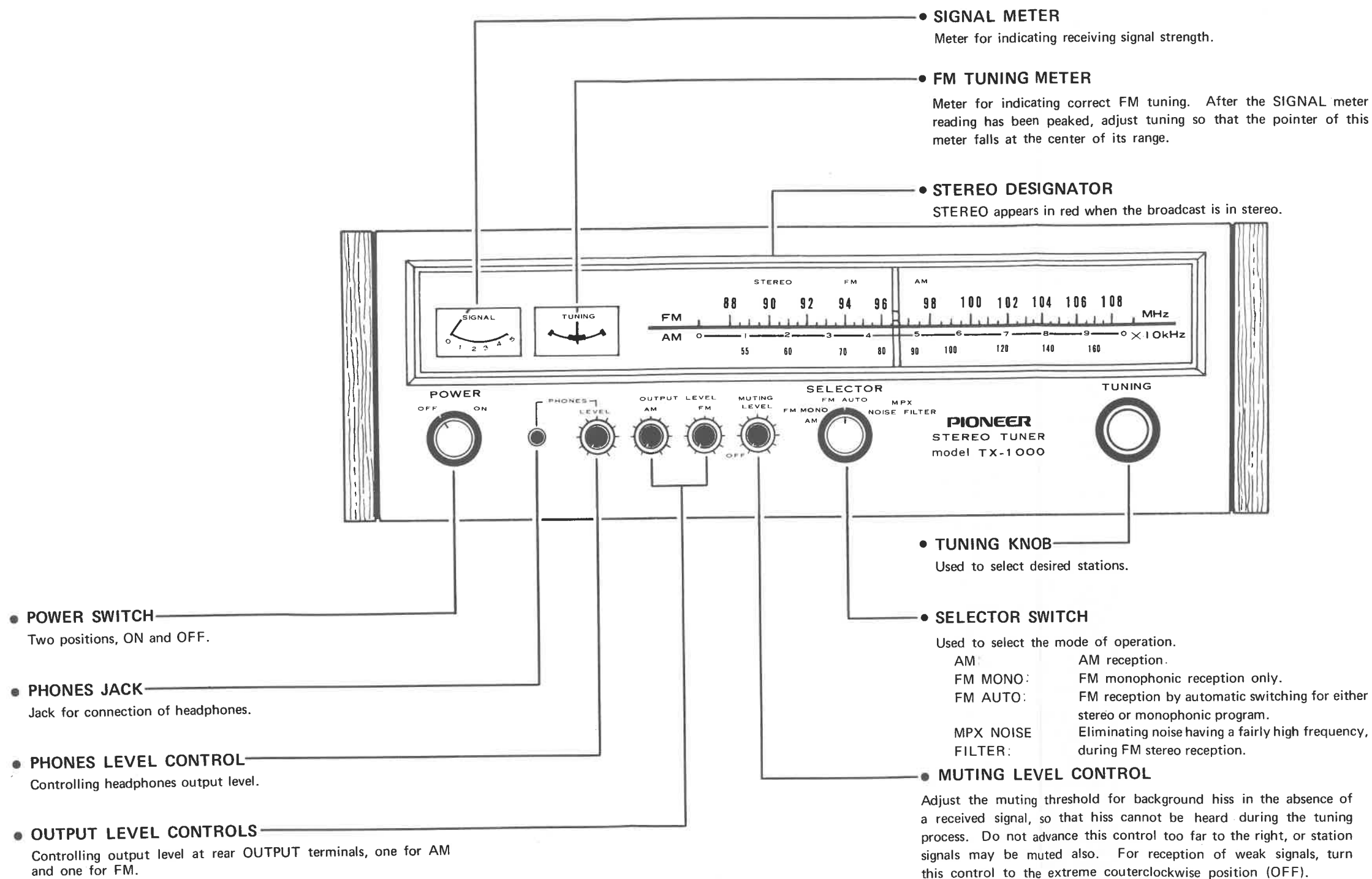


Photo 1

2 • CONNECTION DIAGRAM



3 • FRONT PANEL FACILITIES

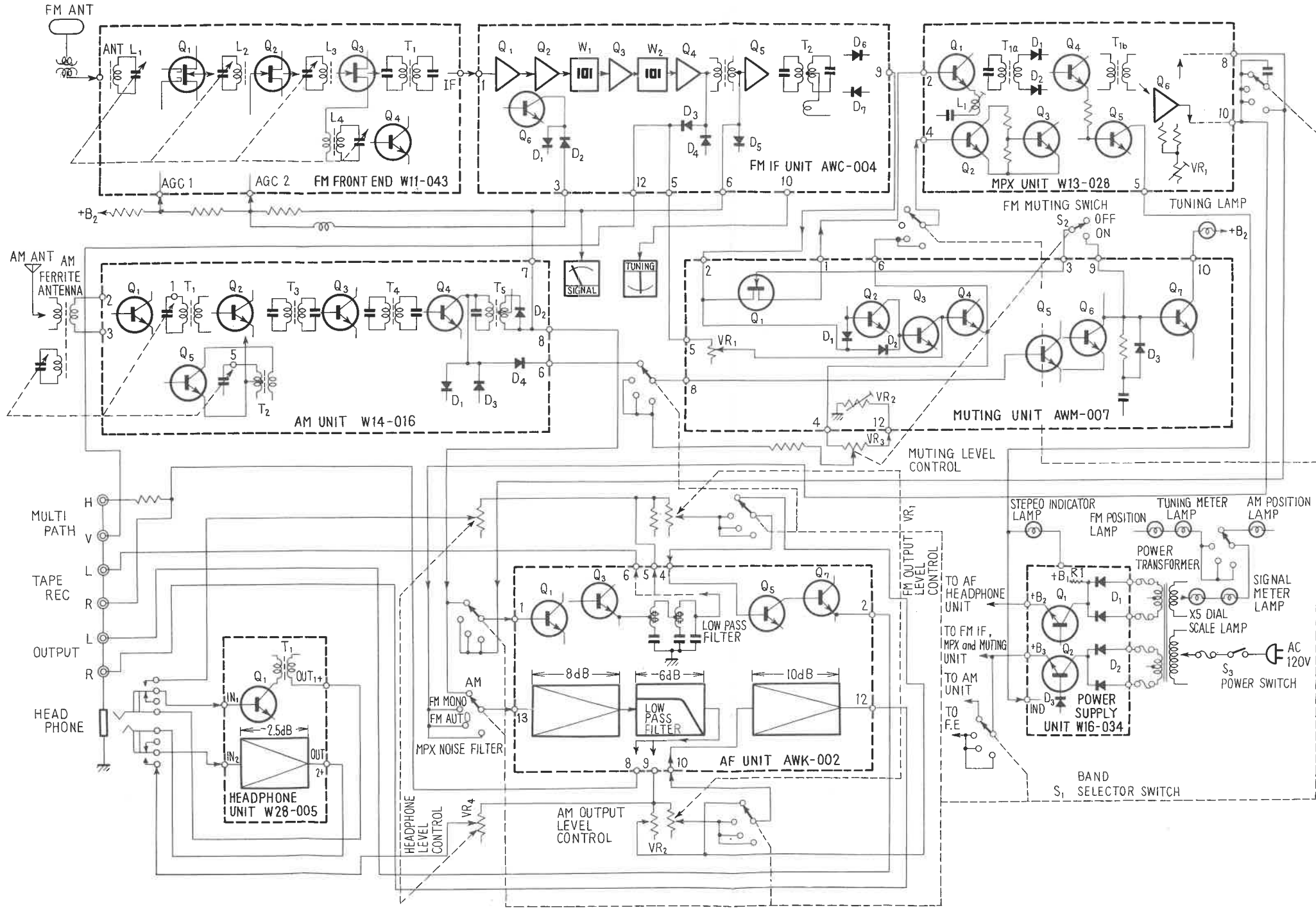


NOTE: The output level controlling by these knobs has no effect on the TAPE REC output level.

4 • CIRCUIT DESCRIPTION

4.1 BLOCK DIAGRAM

As shown in the block diagram, the TX-1000 comprises the following stages and circuits.



4-2 ANTENNA CIRCUIT

FM: The antenna signal enters the tuner through the antenna terminals of 300Ω (for ribbon-type antenna feeder) or 75Ω (for coaxial antenna cable). The 75Ω input enters the front end directly, the 300Ω balanced input passes through impedance matching coil L2.

AM: The ferrite loop-stick antenna coil serves as inductance for the top tuning circuit.

4-3 FM FRONT END (W11-043)

The front end consists of two tuned RF amplifiers Q1 and Q2, converter Q3, and split-type heterodyne oscillator Q4. The oscillator frequency is varied from 98.7 to 118.7MHz and serves as source for the converter, Q3. There, the amplified 88-108MHz RF input signal is mixed with the 98.7-118.7MHz oscillator signal to produce an IF of 10.7MHz. The top RF amplifier utilize a dual-gate MOS type FET (Q1), and AGC voltage is applied to one gate of Q1 and one gate of the next FET, Q2. This control voltage is obtained from the IF amplifier PCB through a rectifier circuit.

4-4 FM IF AMPLIFIER (AWC-004)

The 10.7MHz output from T1 of the front end is supplied to the IC bandpass filter (10.7MHz) Q1. The output from this filter enters the next IC amplifier and Q6, which has a rectifier on its collector side to produce the AGC control DC voltage at pin 3.

Q2-Q5, the sharp bandpass crystal filters W1 and W2, and the tuned circuit of T1 provide amplification and limiting of the 10.7MHz IF signal. The trigger voltage for the muting circuit and the vertical-axis visual multipath detector output are taken from the 3rd stage (Q4) output. The final stage on this circuit board is the discriminator, a ratio type detector. Its output includes, in the case of an MPX stereo program, the L+R, L-R and 19kHz pilot signals.

4-5 MUTING CIRCUIT (AWM-007)

This circuit consists of a gate circuit FET Q1, a block of DC amplifiers Q2, Q3, Q4, Schmitt circuit Q5 and Q6, and a simple DC amplifier (Q7) for the dial pointer lamp. Detector output from pin 9 of the IF PCB enters Q1 and, through a rectifier, Q2 and Q3. The gate of Q1 and the collector of Q6 are controlled by the MUTING ON/OFF switch.

When detuned, the ratio detector output at pin 9 of the IF amplifier PCB has positive or negative DC voltage, which makes Q2 or Q3 conductive, depending on its polarity. On the other hand, a voltage determined by IF strength is supplied from pin 5 of the IF PCB to pin 5 of the muting PCB and controlled by the semi-fixed $100k\Omega$ VR (muting threshold level control). The master muting level control ... it is located on the front panel ... is connected between pins 4 and 12. Pin 8 is connected to the slider of the front-panel muting level control.

The control voltage to pin 5 then goes to the base of Q4. These two kinds of trigger voltage, beside turning Q4 on and off, also alternately switch the Schmitt circuit of Q5 and Q6. This operation causes a voltage variation on pin 9 and opens and closes the FET Q1 gate when the muting switch is set to ON.

The output of the gate circuit FET is taken from the source side of Q1 because there is no output to the MPX circuit when Q1 is off, Q7 operates as an electronic switch for the dial pointer lamp.

D3 and the charge capacitor at pin 9 form a shunt circuit to eliminate bursts of noise which occur at the border between tuning and detuning.

4-6 MPX DECODER (W13-028)

The composite signal of an FM MPX broadcast, containing L+R, L-R and 19kHz pilot signals, is supplied from the muting PCB to Q1 of the MPX UNIT. This stage serves as a tuned amplifier for 19kHz and as an impedance changer to match the signal supplied to the switching circuit (IC Q6). The primary winding of the collector load of Q1 is tuned to 19kHz, the secondary winding is connected to the full-wave rectifier D1, D2. The 19kHz pilot carrier is converted into a 38kHz ripple current of double frequency. Q4 operates as a class B amplifier for this 38kHz ripple signal, and a 38kHz tuned transformer eliminates harmonics from the 38kHz ripple to obtain a clean sine wave for switching L and R. The Q2, Q3 circuit functions as a sensor that detects whether a broadcast is stereophonic or monophonic (when the selector switch is at FM AUTO position).

IC Q6 works as an amplifier to cancel out crosstalk. The 330Ω VR1 is for adjustment of channel separation.

4-7 AM TUNER (W14-016)

The AM tuner section employs one RF amplifier, a heterodyne oscillator, two 455kHz IF amplifiers and a detector. Except for the different frequency, the method of conversion to 455kHz IF is the same as in the FM front end.

AGC voltage, taken from the collector of Q4 through diode, is delivered to Q3 and back to Q2 converter base through Q1. Q1 operates as a DC amplifier to obtain sufficient AGC.

4-8 AUDIO AMPLIFIER (AWK-002)

Each of the audio amplifiers for the two stereo channels consists of two directly coupled stages. A low pass filter between the two amplifier stages eliminates 38kHz switching leakage. The output from the MPX decoder, selected by the selector switch, is supplied to pins 1 and 13. The output from this amplifier is available at the output jacks. The signal for the headphone amplifier and the REC outputs is taken from the output side of the low pass filter.

4-9 HEADPHONE AMPLIFIER (W28-005)

This is a small linear power amplifier with a matching transformer for low-impedance headphone output. A special feature is that, when the headphone plug is pulled from the phone jack, the whole stage is disconnected from the signal path.

4-10 POWER SUPPLY (W16-034)

The power transformer has two windings -- one to supply about 30V through ripple filter Q1 for the audio section, the other to supply 12V regulated voltage through ripple filter Q2 for the tuner section. The power supply circuit therefore also has two rectifiers and two ripple filters. Voltage +B1 is taken from the input capacitor through R1 (560 Ω) and used for the front panel stereo indicator lamp only. This +B1 voltage is about 30V when the lamp is off and should be about 8V when the lamp lights, because of the voltage drop across 560 Ω .

5 • DISASSEMBLY

5.1 WOODEN CASE

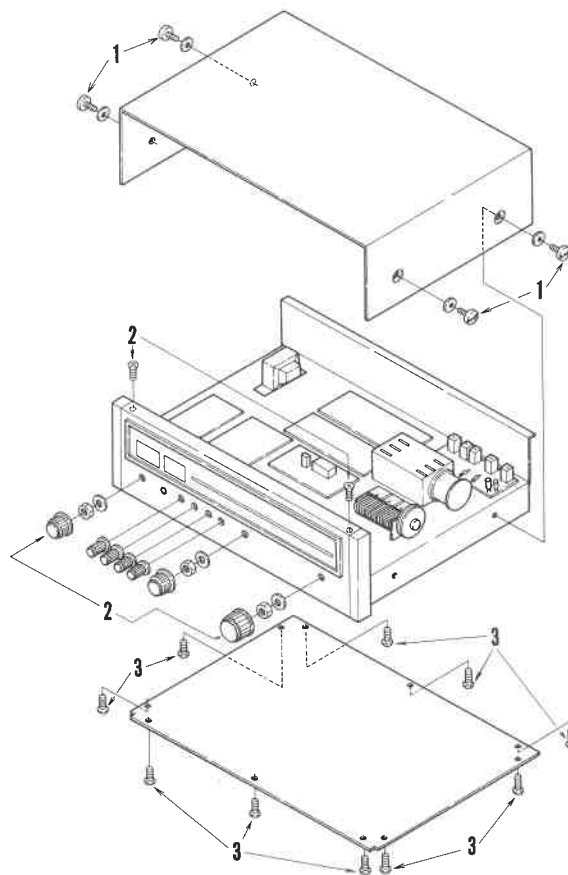
Remove the 4 screws from the sides of the wooden case. Pull the case backward off the tuner housing.

5.2 FRONT PANEL

Pull off all knobs, then remove nuts and washers of the POWER, SELECTOR and TUNING controls. The front panel can now be removed.

5.3 BOTTOM PLATE

The bottom plate can be removed after loosening the 10 screws.



● Numbers indicate order of disassembly.

Fig. 1

5.1 PARTS LAYOUT

TOP VIEW

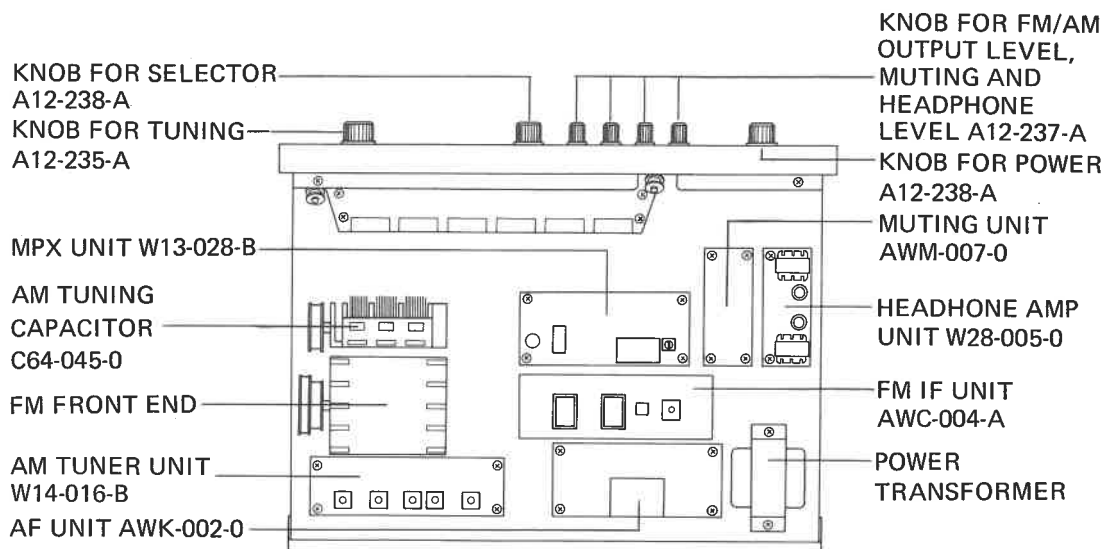


Fig. 2

BOTTOM VIEW

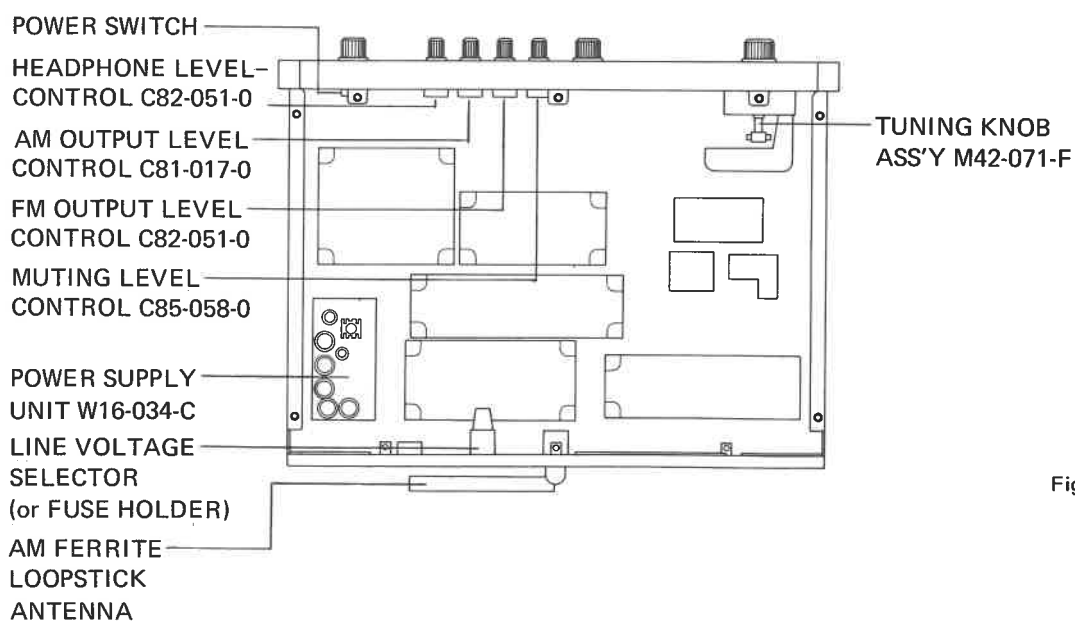


Fig. 3

6 • DIAL CORD STRINGING

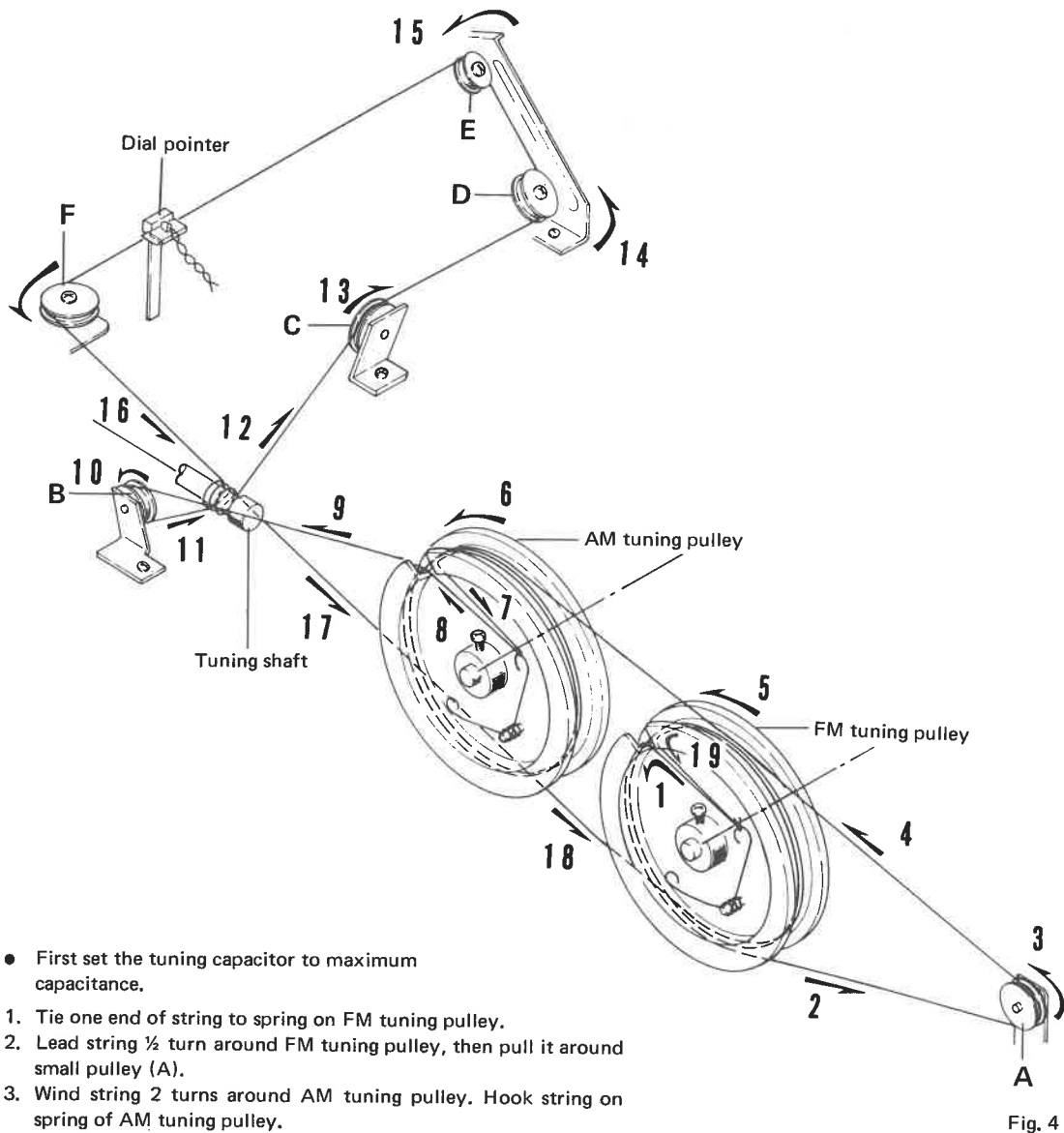


Fig. 4

- First set the tuning capacitor to maximum capacitance.
1. Tie one end of string to spring on FM tuning pulley.
 2. Lead string $\frac{1}{2}$ turn around FM tuning pulley, then pull it around small pulley (A).
 3. Wind string 2 turns around AM tuning pulley. Hook string on spring of AM tuning pulley.
 4. Pull string around small pulley (B), then wind string 3 turns around tuning shaft.
 5. Lead string around small pulleys C, D and E, then fasten string to dial pointer (clip).
 6. Lead string around small pulley (F), then return to FM tuning pulley.
 7. Wind string 2 turns around FM tuning pulley.
 8. Finally, tie end of string to remaining side of spring on FM tuning pulley.
 9. Tune receiver to high end. Fasten dial pointer to string so that it indicates high end on dial scale.

7 • PERFORMANCE CHECKS AND ALIGNMENTS

7.1 FIELD CHECKS

a. VISUAL CHECK

Check antenna and audio output connections, condition and positioning of antenna and leads, also control settings and tuning accuracy (possibly tuned to image frequency!).

b. OPERATION CHECKS

Often the following simple checks will reveal the main source of trouble.

In regard to tuning circuits, IF stage, front end:

- When tuning to an FM station, does the signal meter peak at the precise moment when the tuning meter zeroes?
If so, does this position deliver optimum sound?

In regard to muting performance:

- Is inter-station noise completely eliminated when muting level control is turned up?

In regard to mechanical tuning accuracy:

- Is there any play between tuning knob and dial pointer?

In regard to pilot carrier and sub-carrier amplifier in decoder circuit:

- Does FM stereo indicator lamp flicker when an FM MPX broadcast is tuned in?

7.2 DC VOLTAGE AND CURRENT CHECKS

Set the controls and make connections as follows:

- Disconnect output leads.

- Front panel control settings

SELECTOR FM AUTO
MUTING LEVEL OFF
PHONE LEVEL MINIMUM
AM, FM OUTPUT LEVELS ... MINIMUM
TUNING ANY POSITION WITHOUT
SIGNAL METER DEFLECTION
POWER OFF

- Remove wooden case and bottom plate. (See paragraph on disassembly on page 11.)

- Connect power cord, turn power on.

- Check DC voltages according to the following table.

Keep the AC source voltage within $\pm 3\%$ of reference voltage and use high impedance V.T.V.M.

STAGE	*MAKE MEASUREMENT AT	VOLTAGE	REMARKS
POWER SUPPLY UNIT (W16-034)	AC4 → AC3 AC1 → AC2	AC34.5V AC54V	0.5A fuses between each terminal and tap of transformer.
	B1 → E1 B2 → E1 B3 → E1 Q1 Collector → E1 Q2 Collector → E1	23.5V $\pm 2V$ 32V $\pm 3V$ 12.5V $\pm 1V$ 34.5V $\pm 3V$ 18.5V $\pm 2V$	
HEADPHONE UNIT (W28-005)	Q1 (L)/Q2 (R) Emitter → E	0.9V $\pm 0.2V$	
AF UNIT (AWK-002)	Q7 Emitter → PIN 3 Q8 Emitter → PIN 11	14.5V $\pm 1V$	
	Q3 Emitter → PIN 3 Q4 Emitter → PIN 11	11.5V $\pm 1V$	

MPX UNIT (W13-028)	Q1 Emitter → PIN 1 Q4 Emitter → PIN 1 IC PIN 4 → PIN 1 IC PIN 12 → PIN 1	$2.1V \pm 0.5V$ 0V 1.6V 1.4V 4.7V 1.1V 1.4V	Disconnect antenna, detune. When tuned to an FM stereo signal and stereo indicator lamp is on. Disconnect antenna, detune. When tuned to an FM stereo signal and stereo indicator lamp is on. Disconnect antenna, detune. When tuned to an FM stereo signal and stereo indicator lamp is on.
FM IF UNIT (AWC-004)	IC Q5 PIN 4 } → PIN 7 IC Q5 PIN 5 } IC Q4 PIN 4 } → PIN 7 IC Q4 PIN 5 } IC Q3 PIN 4 → PIN 7 IC Q3 PIN 5 → PIN 7 IC Q2 PIN 4 → PIN 7 IC Q2 PIN 5 → PIN 7 IC Q1 PIN 4 → PIN 7	12V 12.5V 9.3V 12.5V 9.7V 11.1V 11.3V	
MUTING UNIT (AWM-007)	Q4 Collector → PIN 11 Q6 Collector → PIN 11	10V 0.1V 5.5V 0.2V	Tuned Detuned Tuned Detuned
FM FRONT END (W11-043)	Use DC milliammeter, put +B terminal and lead wire in series.	$20mA \pm 5mA$	Set SELECTOR to FM AUTO position.
AM TUNER UNIT (W14-016)	All collector, emitter, base voltages as shown in schematic diagram. All values measured against ground terminal PIN 10 on the PCB, tolerance is $\pm 20\%$.		Set SELECTOR to AM position.

* Refer to 8. SCHEMATIC DIAGRAMS AND PCB PATTERNS on page 19.

7.3 ALIGNMENT PROCEDURES

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.

1. REQUIRED INSTRUMENTS

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

2. FM 10.7MHz ALIGNMENT (AWC-004)

- Confirm +B voltage and current for 12V $\pm 1V$ which should be 30mA to 49mA at pin 4 of the IF PCB.
- Disconnect coaxial cable from pin 1 (input).
- Connect 10.7MHz sweep generator to pins 1 (hot) and 2 (ground). Set controls as follows:
Center frequency: 10.7MHz
Sweep bandwidth: $\pm 200\text{kHz}$
Output: 55dB (500 μV)
- Connect vertical scope input to pin 6.
- Align core of T1 for maximum gain and symmetry to obtain scope pattern as in Fig. 5.
- Raise generator output gradually to 80dB (10mV), repeat step "e" realignment for each output level, if necessary.
- Disconnect one side of C31. Disconnect oscilloscope.
- Connect scope input to pin 9.
- Set generator output back to 55dB (500 μV).
- 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. 6.
- Reconnect C31.
- Reconnect input coaxial cable to pin 1.

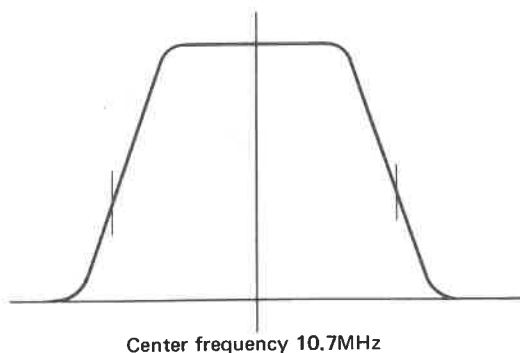


Fig. 5

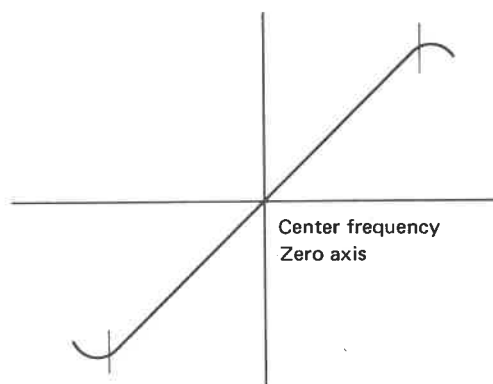


Fig. 6

3. FM FRONT END ALIGNMENT

- Confirm +B current (drain $20\text{mA} \pm 5\text{mA}$).
- Connect FM signal generator output to 300Ω antenna input. Insert a 150Ω resistor in series with each lead, as shown in Fig. 7.
- Connect AC VTVM to either L or R of TAPE REC jacks on rear panel.
- Adjust generator for 400Hz, 100% modulation.
- Set SELECTOR switch on front panel to FM MONO position.
- Adjust generator frequency and tuning dial to 90MHz. During the following adjustments, keep the generator output as low as possible.
- Adjust L4 core first, then adjust cores of L1, L2, L3 for maximum reading on VTVM and so that tuning meter indicates center position.
- Set generator frequency and tuning dial to 106MHz.
- Adjust trimmer capacitor CT4 first, then adjust CT1, CT2, CT3 for maximum reading on VTVM and so that tuning meter indicates center position.
- Repeat these alignments several times until satisfactory readings are obtained.
- Finally, adjust T1 core for maximum reading on VTVM.

From generator



To 300Ω Antenna terminals

Fig. 7

4. FM MPX DECODER ALIGNMENT

- Set SELECTOR switch on front panel to FM AUTO position.
- Connect RF output of FM multiplex signal generator to 300Ω antenna input, with a 150Ω resistor in each lead as shown in Fig. 7.
- Adjust MPX generator as follows:

Signal mode	Deviation
L+R (main)	40.5kHz
19kHz (pilot)	7.5kHz
- Connect AC VTVM to TAPE REC jack on rear panel.
- Set generator signal mode to L-R (sub), adjust core of L1 (located on MPX PCB) to obtain maximum reading on VTVM.
- Set generator signal mode to L. Adjust VR1 (located on MPX PCB) for minimum crosstalk on R channel TAPE REC output.
- Set generator signal mode to R. Repeat above adjustment for minimum crosstalk on L channel.

5. MUTING THRESHOLD LEVEL ALIGNMENT

- Set SELECTOR switch to FM MONO position.
- Turn MUTING LEVEL control to maximum position.
- Connect FM signal generator to 300 Ω antenna inputs through 150 Ω resistors as shown in Fig. 7.
- Connect AC VTVM to TAPE REC output jack.
- Set output level of generator to 25dB (20 μ V), with ± 22.5 kHz deviation, and 400Hz or 1kHz modulation.
- Tune tuner accurately to generator frequency.
- Adjust VR1 on muting circuit PCB exactly on the borderline between muting and non-muting.

6. AM 455kHz ALIGNMENT

- Set SELECTOR switch on front panel to AM position.
- Connect 455kHz sweep generator to test-point TP1 through 0.1 μ F capacitor. Adjust generator output level to 60dB (1mV).
- Connect vertical oscilloscope input to TAPE REC jack.
- Set tuning dial to high end position.
- Adjust cores of T3, T4 and T5 for maximum gain and symmetrical pattern on oscilloscope.

7. AM TRACKING ALIGNMENT

- Set SELECTOR switch on front panel to AM position.
- For this alignment, bottom plate and AM circuit shield plate must be installed.
- Set signal generator to AM function, 30% modulation with 400Hz. Connect loop antenna to generator RF output and place near tuner's ferrite core antenna. See Fig. 8.
- Connect VTVM to TAPE REC jack.
- Keep generator as low as possible for minimum VTVM reading.
- Tune generator and tuner to 600kHz. Adjust core of T2 on AM circuit PCB for maximum VTVM reading, then adjust core of T2 and ferrite antenna.
- Re-tune generator and tuner to 1,400kHz.
- Adjust trimmers of variable capacitor indicated in Fig. 9 to obtain maximum VTVM reading.

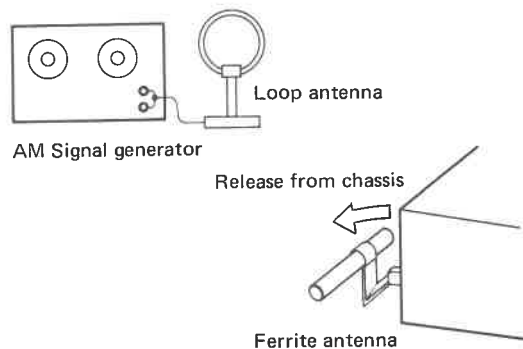
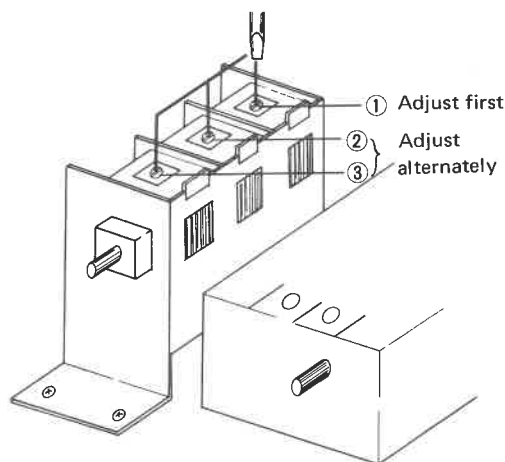


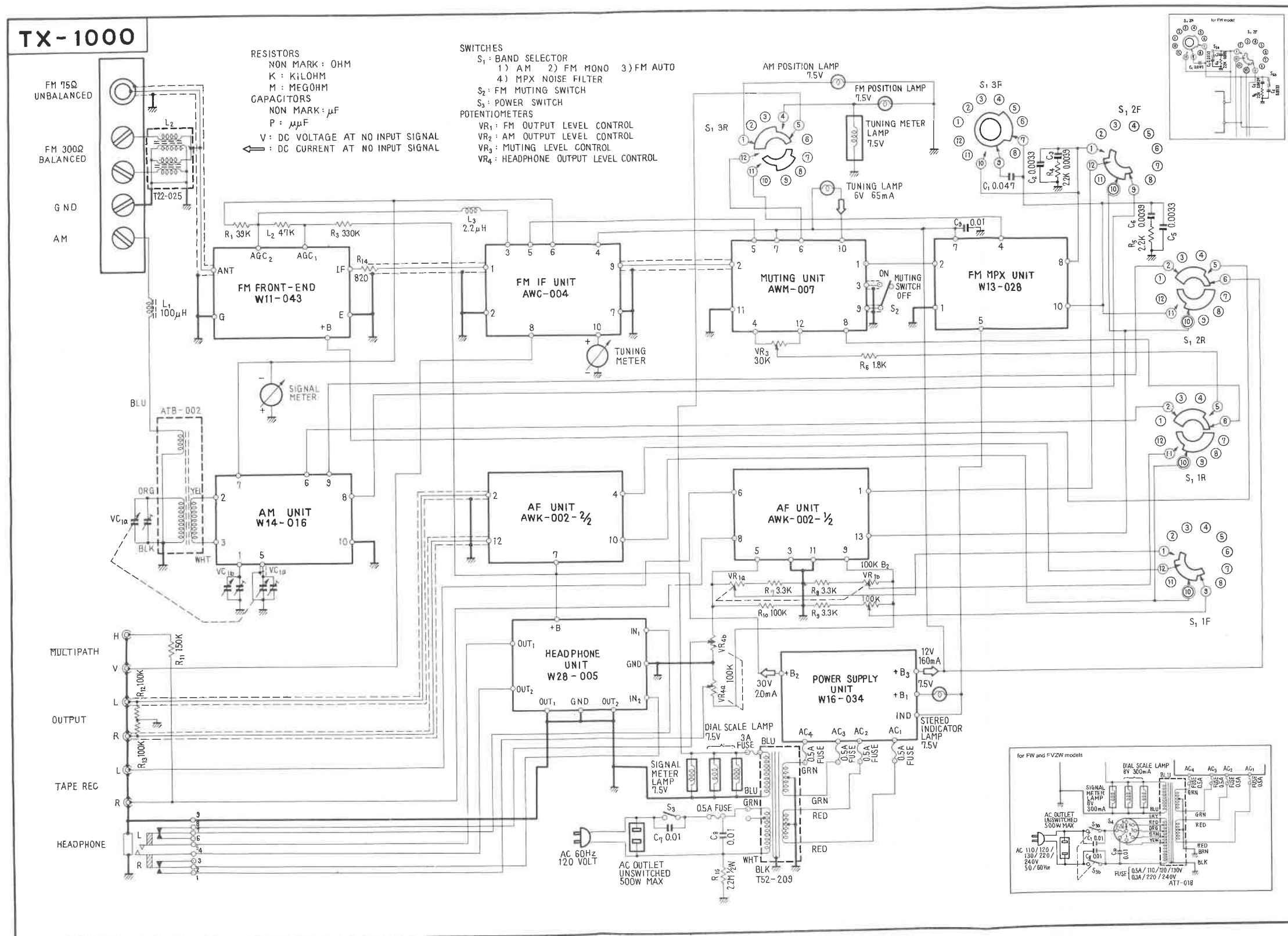
Fig. 8



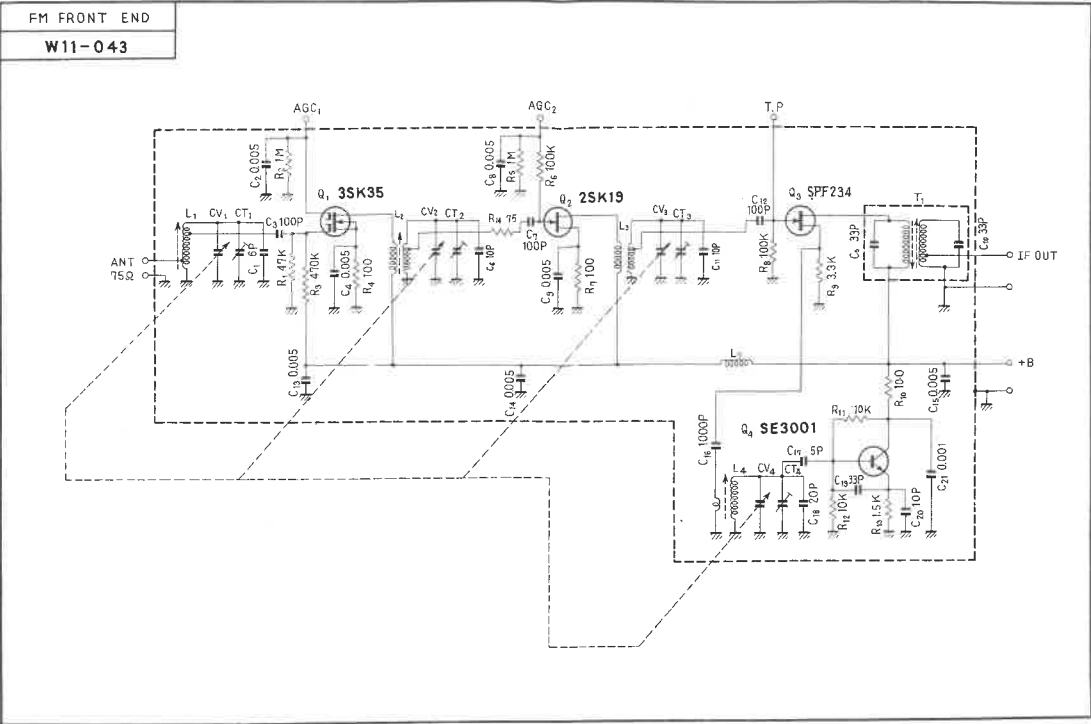
- Numbers indicate order of alignments.

Fig. 9

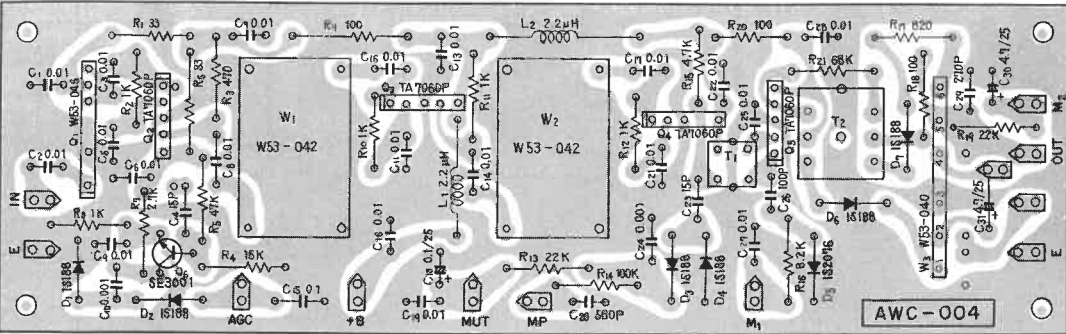
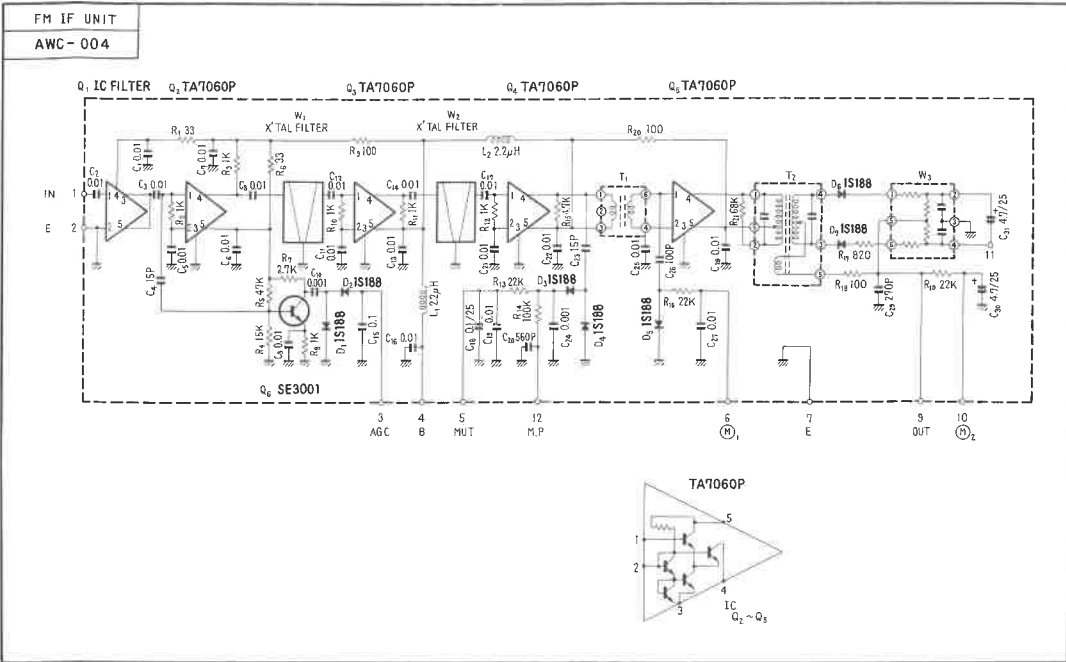
8 • SCHEMATIC DIAGRAMS AND PCB PATTERNS



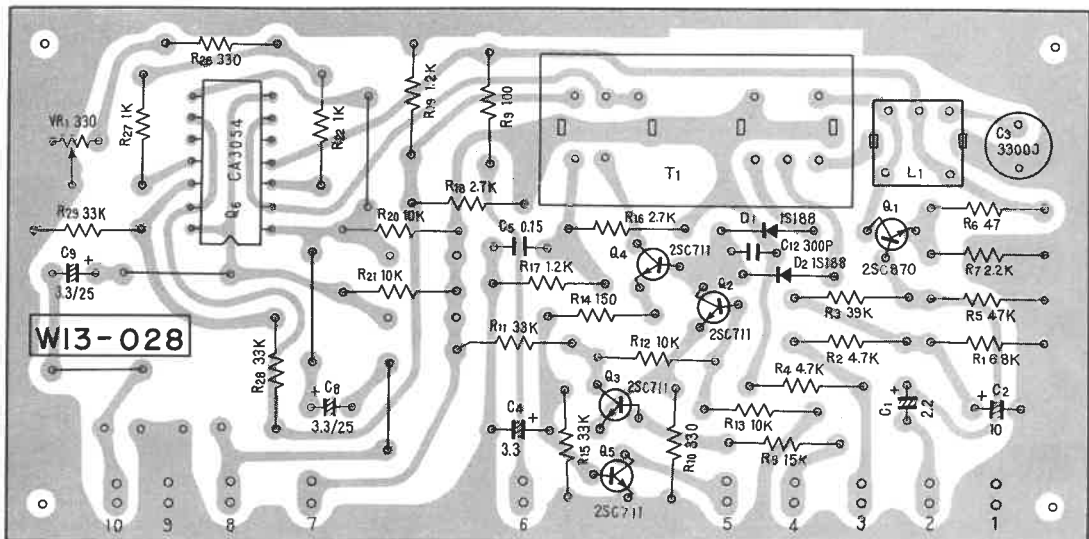
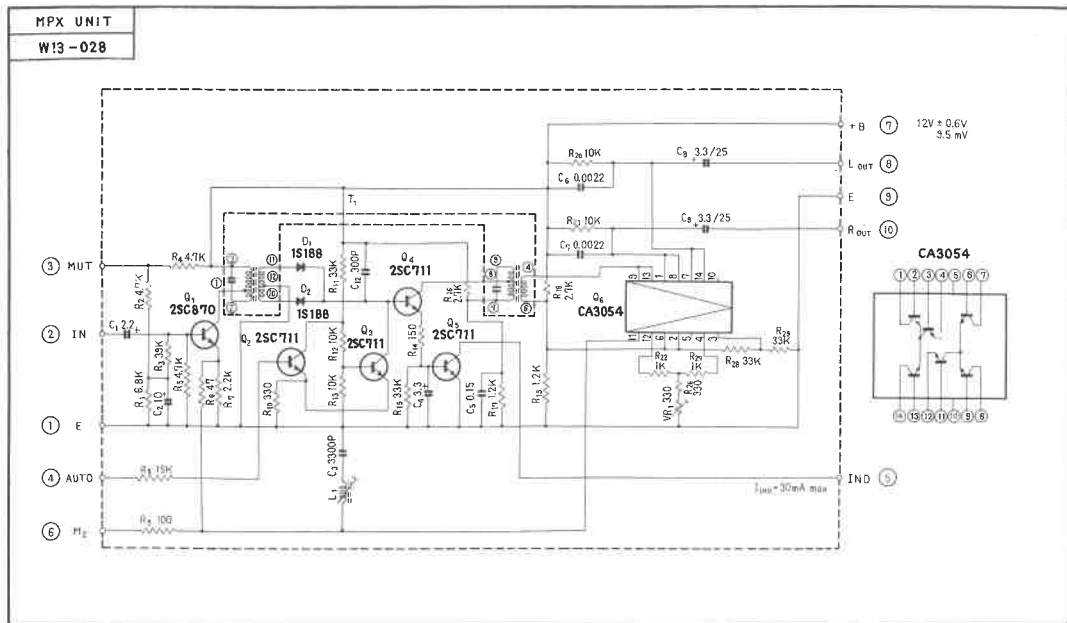
FM FRONT END (W11-043)



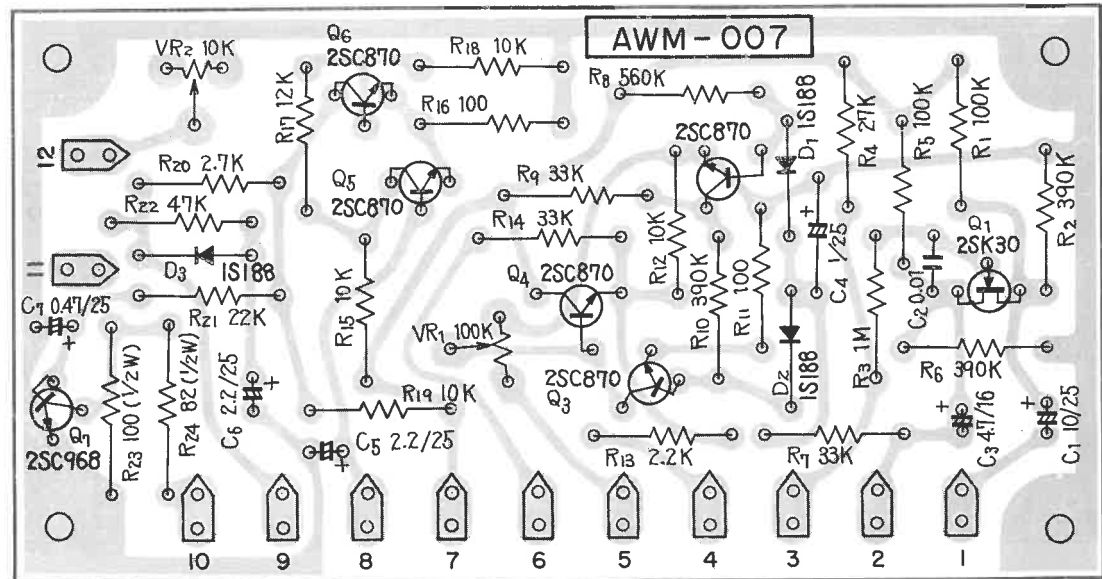
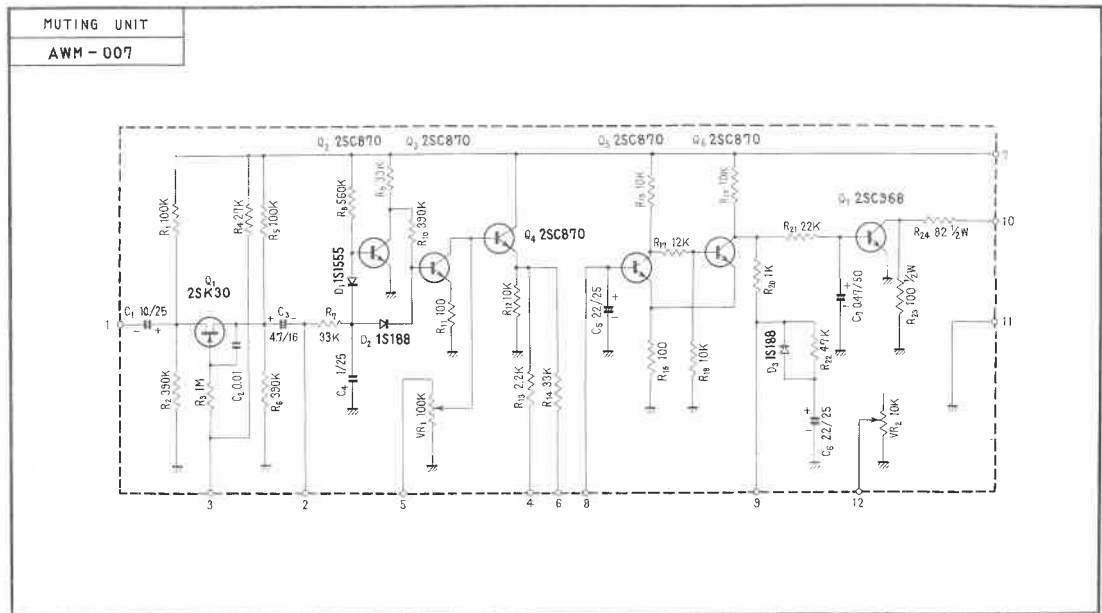
FM IF UNIT (AWC-004)



MPX UNIT (W13-028)



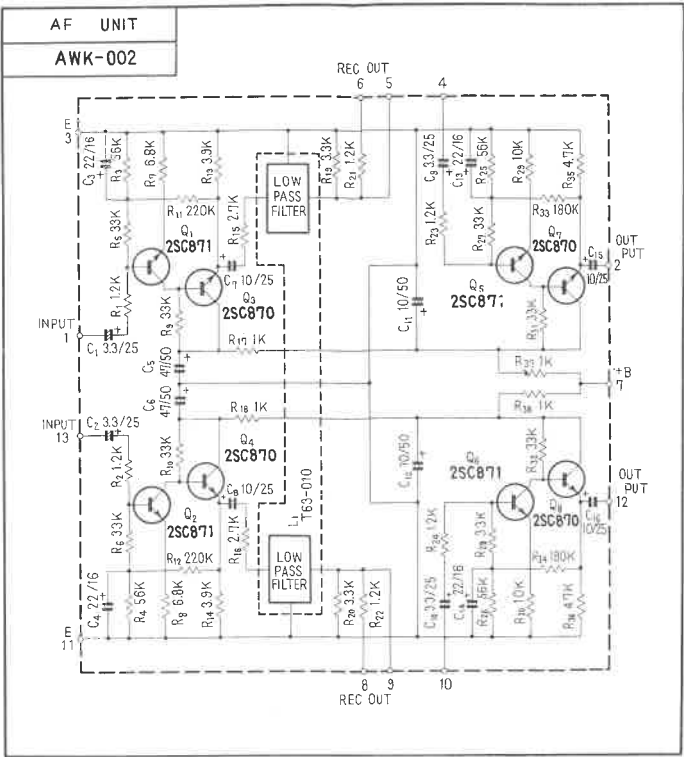
MUTING UNIT (AWM-007)



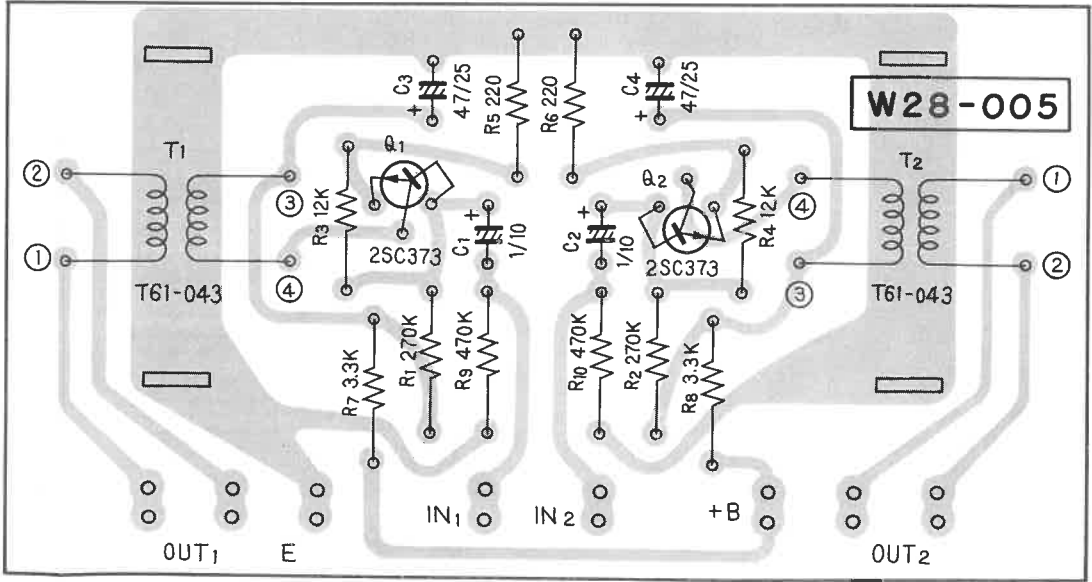
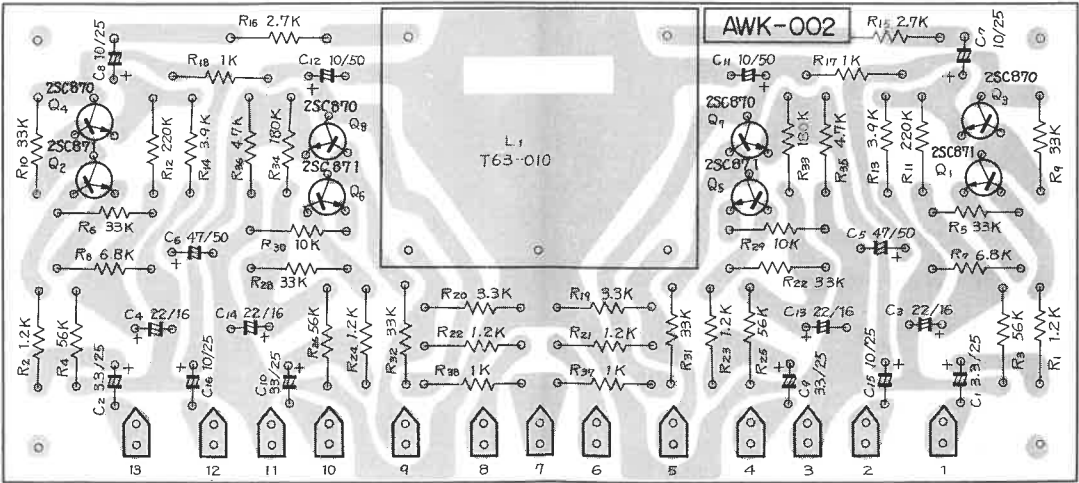
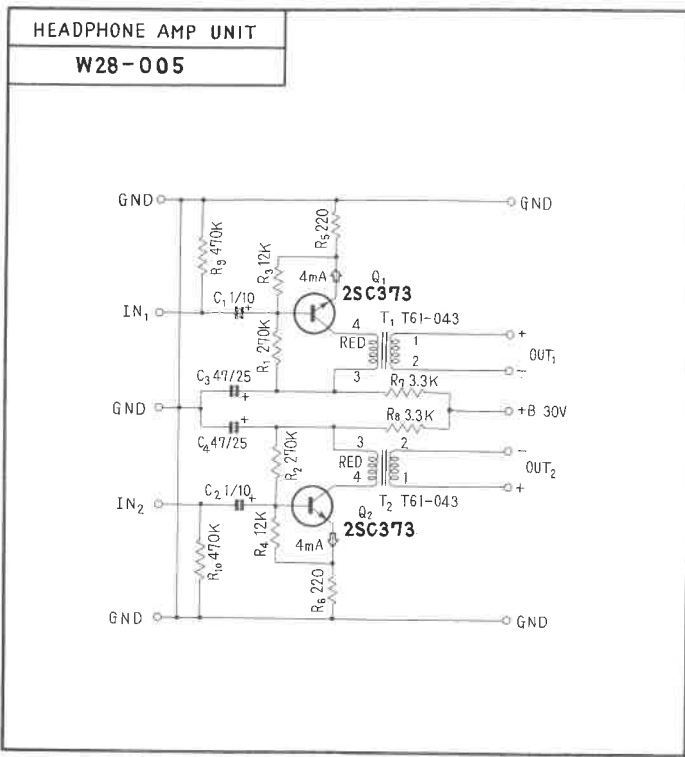
AM TUNER UNIT
W14-016



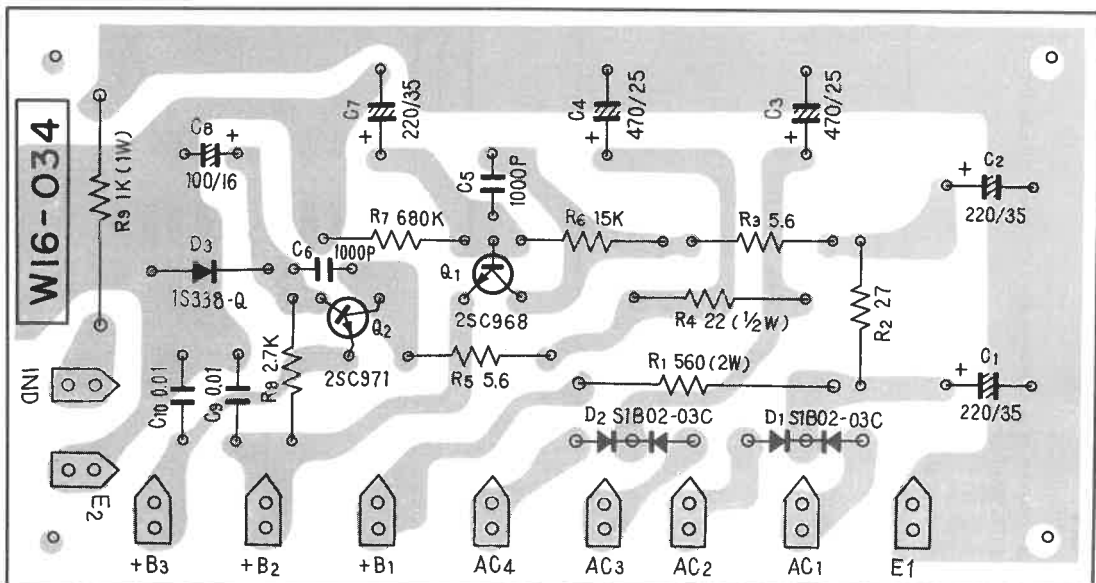
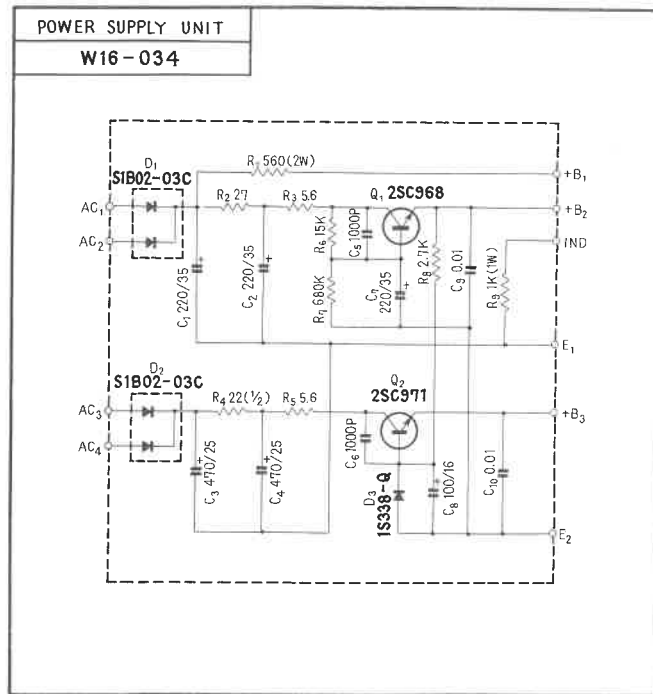
AF UNIT (AWK-002)



HEADPHONE UNIT (W28-005)



POWER SUPPLY UNIT (W16-034)



9 • PARTS LIST

Only this parts list (pages 30 and 31) is exclusively used for KUW model, but other lists are common to FW and FVZW models.

CAPACITORS

IN μ F, UNLESS OTHERWISE NOTED, p: μ F.

Symbol	Description	Part No.
C1	Mylar 0.0047 50V	CQMA 472K 50
C2	Mylar 0.0033 50V	CQMA 332K 50
C3	Mylar 0.0039 50V	CQMA 392K 50
C4	Ceramic 10p 50V	CCDSH 100F 50
C5	Mylar 0.0033 50V	CQMA 332K 50
C7	Ceramic 0.01 DC 1.4kV	C43-003-0
C8	Oil 0.01 800V	ACE-001-A
C9	Ceramic 0.01 50V	CKDYF 103Z 50

RESISTORS

IN Ω , $\frac{1}{2}$ W UNLESS OTHERWISE NOTED, k:k Ω , M: M Ω .

Symbol	Description	Part No.
R1	Carbon film 82k	RD $\frac{1}{4}$ PS 823K
R2	Carbon film 47k	RD $\frac{1}{4}$ PS 473K
R3	Carbon film 330k	RD $\frac{1}{4}$ PS 334K
R4	Carbon film 2.2k	RD $\frac{1}{4}$ PS 222K
R5	Carbon film 2.2k	RD $\frac{1}{4}$ PS 222K
R6	Carbon film 1.8k	RD $\frac{1}{4}$ PS 182K
R7	Carbon film 3.3k	RD $\frac{1}{4}$ PS 332K
R8	Carbon film 3.3k	RD $\frac{1}{4}$ PS 332K
R9	Carbon film 3.3k	RD $\frac{1}{4}$ PS 332K
R10	Carbon film 100k	RD $\frac{1}{4}$ PS 104K

Symbol	Description	Part No.
R11	Carbon film 150k	RD $\frac{1}{4}$ PS 154K
R12	Carbon film 100k	RD $\frac{1}{4}$ PS 104K
R13	Carbon film 100k	RD $\frac{1}{4}$ PS 104K
R14	Carbon film 820	RD $\frac{1}{4}$ PS 821K
R15	Carbon film 2.2M $\frac{1}{2}$ W	RD $\frac{1}{2}$ PS 225K

SWITCHES

Symbol	Description	Part No.
S1	Selector Switch	S13-044-0
S3	Power Switch	ASA-008-0

POTENTIOMETERS

Symbol	Description	Part No.
VR1	FM Output Level Control	C82-051-0
VR2	AM Output Level Control	C81-017-0
VR3	Muting Level Control	C85-058-0
VR4	Headphone Level Control	C82-051-0

COILS AND TRANSFORMERS

Symbol	Description	Part No.
L2	Impedance Matching Transformer	T22-025-A
L3	Choke Coil	T24-028-B
	AM Ferrite Loopstick Antenna	ATB-002-0
	Power Transformer	T52-209-C

MISCELLANEOUS

Symbol	Description	Part No.
	Power Supply Unit	W16-034-C
	FM Front End	W11-043-0
	FM IF Unit	AWC-004-A
	MPX Unit	W13-028-B
	AM Tuner Unit	W14-016-B
	Muting Unit	AWM-007-0
	Headphone Amp Unit	W28-005-0
	AF Unit	AWK-002-0
	Front Panel Ass'y	ANB-058-0
	Wooden Case	M52-139-C
	Tuning Knob Ass'y	M42-071-F
	AF Ferrite Loopstick Antenna Holder	W72-092-B
	*Dial Pulley (for Tuning Capacitor) Ass'y	M42-080-A
	Dial Pulley	M42-009-B
	Foot	AEC-012-0
	Pulley (small)	M42-054-0
	Knob for Tuning	A12-235-A
	Knob for Selector and Power	A12-238-A
	Knob for FM/AM Output Level, Muting and Headphone Level	A12-237-A
	Signal Meter	A91-017-C

Symbol	Description	Part No.
	Tuning Meter	A91-016-C
	Dial Glass	AAG-006-A
	Dial Pointer	AAF-004-A
	4P Input Terminal Board	K21-010-E
	2P Input Terminal Board	K21-009-D
	Antenna Input Terminal Board	K11-043-B
	Headphones Jack	K72-020-0
	Pilot Lamp for Dial Glass	E22-017-A
	Pilot Lamp for Tuning and Signal Meters	E22-032-0
	Pilot Lamp for Program Indicator	AEL-002-0
	Fuse 0.5A	E21-028-0
	Fuse 0.5A (for protection)	AEK-005-0
	AM Tuning Capacitor	C64-045-0
	Spare AC Outlet	AKP-002-0
	Pilot Lamp (for Dial Glass) Socket	K91-005-A
	Screw to fix Wooden Case	B11-041-A
	AC Power Cord	D11-003-E
	Operating Instructions	ARB-004-0
	Packing Case	AHD-015-0
	Protector for Packing	H11-070-B
	Accessoris Bag (A-7)	E11-062-0
	Accessoris Bag (B-31)	E11-113-0
	FM T-type Antenna	D52-013-0
	Fuse 3A	AEK-003-0
	Fuse Holder	K96-007-A

NOTE

This parts list is for the KUW model, the FW or FVZW model uses some different parts as follows;
for FW model

CAPACITORS

Symbol	Description	Part No.
C1	Mylar 0.0047 50V	COMA 472K 50
C3	Mylar 0.0039 50V	COMA 392K 50
C4	Ceramic 10p 50V	CCDSH 100F 50
C6	Mylar 0.0039 50V	COMA 392K 50
C7	Ceramic 0.01 DC 1.4kV	C43-003-0
C8	Oil 0.01 800V	ACE-001-A
C9	Ceramic 0.01 50V	CKDYF 103Z 50
C10	Ceramic 0.01 DC 1.4kV	C43-003-0

RESISTOR

R15..... vacant

SWITCHES

Symbol	Description	Part No.
S1	Selector Switch	S13-044-0
S3	Power Switch	S11-016-A
S4	Line Voltage Selector	AKR-001-0

COILS AND TRANSFORMERS

Symbol	Description	Part No.
	AM Ferrite Loopstick Antenna	T42-024-A
	Power Transformer	ATT-018-B

MISCELLANEOUS

Symbol	Description	Part No.
	FM Front End	AWB-005-0
	Dial Pointer	A31-099-A
	Pilot Lamp for Program Indicator	E22-025-A
	Fuse 0.3A	E21-028-0
	Fuse 0.5A (for protection)	E21-019-A
	Spare AC Outlet	K82-012-A
	Accessoris Bag (A-5)	E11-060-0
	Operating Instructions	ARB-003-0
	Packing Case	AHD-013-0

for FVZW model

CAPACITORS

Symbol	Description	Part No.
C1	Mylar 0.0047 50V	COMA 472K 50
C2	Mylar 0.0033 50V	COMA 332K 50
C3	Mylar 0.0039 50V	COMA 392K 50
C4	Ceramic 10p 50V	CCDSH 100F 50
C5	Mylar 0.0033 50V	COMA 332K 50
C6	Mylar 0.0039 50V	COMA 392K 50
C7	Ceramic 0.01 DC 1.4kV	C43-003-0
C8	Ceramic 0.01 DC 1.4kV	C43-003-0
C9	Ceramic 0.01 50V	CKDYF 103Z 50
C10	Ceramic 0.01 DC 1.4kV	C43-003-0

RESISTOR

R15 vacant

SWITCHES

Symbol	Description	Part No.
S1	Selector Switch	S13-044-0
S3	Power Switch	S11-016-A
S4	Line Voltage Selector	AKR-001-0
S5	De-emphasis Switch	S41-022-A

COILS AND TRANSFORMERS

Symbol	Description	Part No.
	AM Ferrite Loopstick Antenna Power Transformer	T42-024-A ATT-018-B

MISCELLANEOUS

Symbol	Description	Part No.
	Dial Pointer Pilot Lamp for Program Indicator Fuse 0.3A Fuse 0.5A (for protection) Spare AC Outlet	A31-099-A E22-025-A E21-028-0 E21-019-A K82-012-A
	Accessoris Bag (A-5) Operating Instructions Packing Case	E11-060-0 ARB-009-0 AHD-014-0

FM IF UNIT (AWC-004)

CAPACITORS

Symbol	Description	Part No.	
C1	Ceramic	CKDYF 103Z 50	
C2	Ceramic	CKDYF 103Z 50	
C3	Ceramic	CKDYF 103Z 50	
C4	Ceramic	CCDSL 150K 50	
C5	Ceramic	CKDYF 103Z 50	
C6	Ceramic	CKDYF 103Z 50	
C7	Ceramic	CKDYF 103Z 50	
C8	Ceramic	CKDYF 103Z 50	
C9	Ceramic	CKDYF 103Z 50	
C10	Ceramic	CKDYF 102Z 50	
C11	Ceramic	CKDYF 103Z 50	
C12	Ceramic	CKDYF 103Z 50	
C13	Ceramic	CKDYF 103Z 50	
C14	Ceramic	CKDYF 103Z 50	
C15	Mylar	QOMA 104K 50	
C16	Ceramic	CKDYF 103Z 50	
C17	Ceramic	CKDYF 103Z 50	
C18	Electrolytic	CSSA 0R1M 25	
C19	Ceramic	CKDYF 103Z 50	
C20	Ceramic	CKDYB 561K 50	
C21	Ceramic	CKDYF 103Z 50	
C22	Ceramic	CKDYF 103Z 50	
C23	Ceramic	CCDSL 150K 50	
C24	Ceramic	CKDYF 102Z 50	
C25	Ceramic	CKDYF 103Z 50	

Symbol	Description	Part No.	
C26	Ceramic	100p	50V
C27	Ceramic	0.01	50V
C28	Ceramic	0.01	50V
C29	Ceramic	270p	50V
C30	Electrolytic	4.7	25V
C31	Electrolytic	4.7	25V

RESISTORS

Symbol	Description	Part No.	
R1	Carbon film	33	RD¼PS 330K
R2	Carbon film	1k	RD¼PS 102K
R3	Carbon film	470	RD¼PS 471K
R4	Carbon film	15k	RD¼PS 153K
R5	Carbon film	47k	RD¼PS 473K
R6	Carbon film	33	RD¼PS 330K
R7	Carbon film	2.7k	RD¼PS 272K
R8	Carbon film	1k	RD¼PS 102K
R9	Carbon film	100	RD¼PS 101K
R10	Carbon film	1k	RD¼PS 102K
R11	Carbon film	1k	RD¼PS 102K
R12	Carbon film	1k	RD¼PS 102K
R13	Carbon film	22k	RD¼PS 223K
R14	Carbon film	100k	RD¼PS 104K
R15	Carbon film	4.7k	RD¼PS 472K
R16	Carbon film	8.2k	RD¼PS 822K
R17	Carbon film	820	RD¼PS 821K
R18	Carbon film	100	RD¼PS 101K
R19	Carbon film	22k	RD¼PS 223K
R20	Carbon film	100	RD¼PS 101K
R21	Carbon film	68K	RD¼PS 683K

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	IC Filter	W53-046-A
Q2	TA7060P-R IC	
Q3	TA7060P-R IC	
Q4	TA7060P-W IC	
Q5	TA7060P-W IC	
Q6	SE3001 Transistor	
D1	1S188 FM-1 Diode	
D2	1S188 FM-1 Diode	
D3	1S188 FM-1 Diode	
D4	1S188 FM-1 Diode	
D5	1S188 FM-1 Diode	
D6	1S188 FM-1 Diode	
D7	1S188 FM-1 Diode	

COILS AND TRANSFORMERS

Symbol	Description	Part No.
L1	RF Choke Coil	T24-028-A
L2	RF Choke Coil	T24-028-A
T1	IF Transformer	T73-029-0
T2	IF Transformer	T74-003-A

COMPOUND PARTS

Symbol	Description	Part No.
W1	Crystal Filter	W53-042-A W53-042-A
W2	Crystal Filter	
W3	Compound Part for FM Detector Circuit	
		W53-040-0

MPX UNIT (W13-028)

CAPACITORS

Symbol	Description	Part No.
C1	Electrolytic	CE A 2R2P 50
C2	Electrolytic	CE A 100P 16
C3	Styrol	C15-011-0
C4	Electrolytic	CE A 3R3P 25
C5	Mylar	CQMA 154K 50
C6	Mylar	CQMA 222K 50
C7	Mylar	CQMA 222K 50
C8	Electrolytic	CE A 3R3P 25
C9	Electrolytic	CE A 3R3P 25
C10	Mylar	CQMA 392K 50
C11	Mylar	CQMA 392K 50
C12	Ceramic	CCDSL 301K 50

RESISTORS

Symbol	Description	Part No.
R1	Carbon film	RD¼PS 682K
R2	Carbon film	RD¼PS 472K
R3	Carbon film	RD¼PS 393K
R4	Carbon film	RD¼PS 472K
R5	Carbon film	RD¼PS 473K
R6	Carbon film	RD¼PS 470K
R7	Carbon film	RD¼PS 222K
R8	Carbon film	RD¼PS 153K
R9	Carbon film	RD¼PS 101K
R10	Carbon film	RD¼PS 331K

COIL AND TRANSFORMER

Symbol	Description	Part No.
L1	19kHz Coil	T75-023-0
T1	MPX Transformer	T75-026-0

POTENTIOMETER

Symbol	Description	Part No.
VR1	Semi-fixed	C92-065-A

AM TUNER UNIT (W14-016)

CAPACITORS

Symbol	Description	Part No.
C1	Ceramic	0.04
C2	Electrolytic	10
C3	Ceramic	0.04
C4	Ceramic	0.04
C5	Electrolytic	22
C6	Ceramic	0.04
C7	Ceramic	0.04
C8	Ceramic	0.04
C9	Ceramic	0.04
C10	Mylar	0.01

Symbol	Description	Part No.
R11	Carbon film	33k
R12	Carbon film	10k
R13	Carbon film	10k
R14	Carbon film	150
R15	Carbon film	33k
R16	Carbon film	2.7k
R17	Carbon film	1.2k
R18	Carbon film	2.7k
R19	Carbon film	1.2k
R20	Carbon film	10k
R21	Carbon film	10k
R22	Carbon film	1k
R23	Carbon film	330
R24	Carbon film	1k
R25	Carbon film	33k
R26	Carbon film	33k

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SC870-F	Transistor
Q2	2SC711-F	Transistor
Q3	2SC711-F	Transistor
Q4	2SC711-F	Transistor
Q5	2SC711-F	Transistor
Q6	CA3054	IC
D1	1S188 FM-1	Diode
D2	1S188 FM-1	Diode

RESISTORS

Symbol	Description	Part No.
R1	Carbon film	RD¼PS 223K
R2	Carbon film	RD¼PS 153K
R3	Carbon film	RD¼PS 471K
R4	Carbon film	RD¼PS 101K
R5	Carbon film	RD¼PS 222K
R6	Carbon film	RD¼PS 103K
R7	Carbon film	RD¼PS 332K
R8	Carbon film	RD¼PS 471K
R9	Carbon film	RD¼PS 102K
R10	Carbon film	RD¼PS 102K
R11	Carbon film	RD¼PS 472K
R12	Carbon film	RD¼PS 273K
R13	Carbon film	RD¼PS 102K
R14	Carbon film	RD¼PS 680K
R15	Carbon film	RD¼PS 472K
R16	Carbon film	RD¼PS 104K
R17	Carbon film	RD¼PS 273K
R18	Carbon film	RD¼PS 102K
R19	Carbon film	RD¼PS 154K
R20	Carbon film	RD¼PS 472K
R21	Carbon film	RD¼PS 472K
R22	Carbon film	RD¼PS 223K
R23	Carbon film	RD¼PS 471K
R24	Carbon film	RD¼PS 471K
R25	Carbon film	RD¼PS 101K
R26	Carbon film	RD¼PS 332K
R27	Carbon film	RD¼PS 682K
R28	Carbon film	RD¼PS 101K
R29	Carbon film	RD¼PS 392K
R30	Carbon film	RD¼PS 472K

Symbol	Description	Part No.
C11	Styrol	COSA 411K 50
C12	Ceramic	CKDYZ 403P 25
C13	Electrolytic	CEA 100P 50
C14	Ceramic	CKDYZ 203Z 25
C15	Ceramic	CKDYZ 403Z 25
C16	Ceramic	CKDYZ 403Z 25
C17	Ceramic	CKDYZ 403Z 25
C18	Ceramic	CCDSL 470K 50
C19	Ceramic	CKDYZ 403Z 25
C20	Mylar	QOMA 472Z 50
C21	Ceramic	CKDYZ 472Z 50
C22	Electrolytic	CEA R47P 50
C23	Electrolytic	CEA 221P 50
C24	Ceramic	CKDYZ 403Z 25
C25	Electrolytic	CEA 101P 16
C26	Ceramic	CCDSL 470K 50
C27	Ceramic	CKDYZ 203Z 25

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SC382	Transistor
Q2	2SC460-B	Transistor
Q3	2SC460-B	Transistor
Q4	2SC460-B	Transistor
Q5	2SC460-B	Transistor
D1	1S188 FM-1	Diode
D2	1S188 FM-1	Diode
D3	1S188 FM-1	Diode
D4	1S188 FM-1	Diode

COILS AND TRANSFORMERS

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

MUTING UNIT (AWM-007)

CAPACITORS

Symbol	Description	Part No.
C1	Electrolytic	CEA 100P 25
C2	Electrolytic	CSSA 010M 50
C3	Electrolytic	CSSA 4R7M 16
C4	Ceramic	CKDYF 103Z 50
C5	Electrolytic	CSSA 2R2M 25
C6	Electrolytic	CSSA 2R2M 25
C7	Electrolytic	CSYA R47M 25

POTENTIOMETERS

Symbol	Description	Part No.
VR1	100k, Semi-fixed	C92-047-0
VR2	10k, Semi-fixed	C92-049-0

RESISTORS

Symbol	Description	Part No.
R1	Carbon film	RD¼PS 104K
R2	Carbon film	RD¼PS 394K
R3	Carbon film	RD¼PS 105K
R4	Carbon film	RD¼PS 273K
R5	Carbon film	RD¼PS 104K
R6	Carbon film	RD¼PS 394K
R7	Carbon film	RD¼PS 333K
R8	Carbon film	RD¼PS 564K
R9	Carbon film	RD¼PS 333K
R10	Carbon film	RD¼PS 394K
R11	Carbon film	RD¼PS 101K
R12	Carbon film	RD¼PS 103K
R13	Carbon film	RD¼PS 222K
R14	Carbon film	RD¼PS 333K
R15	Carbon film	RD¼PS 103K
R16	Carbon film	RD¼PS 101K
R17	Carbon film	RD¼PS 123K
R18	Carbon film	RD¼PS 103K
R19	Carbon film	RD¼PS 103K
R20	Carbon film	RD¼PS 102K
R21	Carbon film	RD¼PS 223K
R22	Carbon film	RD¼PS 473K
R23	Carbon film	RD¼PS 101K
R24	Carbon film	RD¼PS 820K

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SK30-Y or GR FET	
Q2	2SC870-F or E Transistor	
Q3	2SC870-F or E Transistor	
Q4	2SC870-F or E Transistor	
Q5	2SC870-F or E Transistor	
Q6	2SC870-F or E Transistor	
Q7	2SC968Y-3 or 2 Transistor	
D1	1S1555 Diode	
D2	1S188 FM-1 Diode	
D3	1S188 FM-1 Diode	

RESISTORS

Symbol	Description	Part No.
R1	Carbon film 270k	RD¼PS 274K
R2	Carbon film 270k	RD¼PS 274K
R3	Carbon film 12k	RD¼PS 123K
R4	Carbon film 12k	RD¼PS 123K
R5	Carbon film 220	RD¼PS 221K
R6	Carbon film 220	RD¼PS 221K
R7	Carbon film 3.3k	RD¼PS 332K
R8	Carbon film 3.3k	RD¼PS 332K
R9	Carbon film 470k	RD¼PS 474K
R10	Carbon film 470k	RD¼PS 474K

HEADPHONE UNIT (W28-005)

CAPACITORS

Symbol	Description	Part No.
C1	Electrolytic 1 50V	CEA 010P 50
C2	Electrolytic 1 50V	CEA 010P 50
C3	Electrolytic 47 25V	CEA 470P 25
C4	Electrolytic 47 25V	CEA 470P 25

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SC373 Transistor	
Q2	2SC373 Transistor	

TRANSFORMERS

Symbol	Description	Part No.
T1	Matching Transformer	T61-043-A
T2	Matching Transformer	T61-043-A

AF UNIT (AWK-002)

CAPACITORS

Symbol	Description	Part No.
C1	Electrolytic 3.3 25V	CEA 3R3P 25
C2	Electrolytic 3.3 25V	CEA 3R3P 25
C3	Electrolytic 22 16V	CEA 220P 16
C4	Electrolytic 22 16V	CEA 220P 16
C5	Electrolytic 47 50V	CEA 470P 50
C6	Electrolytic 47 50V	CEA 470P 50
C7	Electrolytic 10 25V	CEA 100P 25
C8	Electrolytic 10 25V	CEA 100P 25
C9	Electrolytic 3.3 25V	CEA 3R3P 25
C10	Electrolytic 3.3 25V	CEA 3R3P 25
C11	Electrolytic 10 50V	CEA 100P 50
C12	Electrolytic 10 50V	CEA 100P 50
C13	Electrolytic 22 16V	CEA 220P 16
C14	Electrolytic 22 16V	CEA 220P 16
C15	Electrolytic 10 25V	CEA 100P 25
C16	Electrolytic 10 25V	CEA 100P 25

RESISTORS

Symbol	Description	Part No.
R1	Carbon film 1.2k	RD¼PS 122K
R2	Carbon film 1.2k	RD¼PS 122K
R3	Carbon film 56k	RD¼PS 563K
R4	Carbon film 56k	RD¼PS 563K
R5	Carbon film 33k	RD¼PS 333K

Symbol	Description	Part No.
R6	Carbon film 33k	RD¼PS 333K
R7	Carbon film 6.8k	RD¼PS 682K
R8	Carbon film 6.8k	RD¼PS 682K
R9	Carbon film 33k	RD¼PS 333K
R10	Carbon film 33k	RD¼PS 333K
R11	Carbon film 220k	RD¼PS 224K
R12	Carbon film 220k	RD¼PS 224K
R13	Carbon film 3.9k	RD¼PS 392K
R14	Carbon film 3.9k	RD¼PS 392K
R15	Carbon film 2.7k	RD¼PS 272K
R16	Carbon film 2.7k	RD¼PS 272K
R17	Carbon film 1k	RD¼PS 102K
R18	Carbon film 1k	RD¼PS 102K
R19	Carbon film 3.3k	RD¼PS 332K
R20	Carbon film 3.3k	RD¼PS 332K
R21	Carbon film 1.2k	RD¼PS 122k
R22	Carbon film 1.2k	RD¼PS 122K
R23	Carbon film 1.2k	RD¼PS 122K
R24	Carbon film 1.2k	RD¼PS 122K
R25	Carbon film 56k	RD¼PS 563K
R26	Carbon film 56k	RD¼PS 563K
R27	Carbon film 33k	RD¼PS 333K
R28	Carbon film 33k	RD¼PS 333K
R29	Carbon film 10k	RD¼PS 103K
R30	Carbon film 10k	RD¼PS 103K
R31	Carbon film 33k	RD¼PS 333K
R32	Carbon film 33k	RD¼PS 333K
R33	Carbon film 180k	RD¼PS 184K
R34	Carbon film 180k	RD¼PS 184K
R35	Carbon film 4.7k	RD¼PS 472K
R36	Carbon film 4.7k	RD¼PS 472K
R37	Carbon film 1k	RD¼PS 102K
R38	Carbon film 1k	RD¼PS 102K

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SC871-E Transistor	
Q2	2SC871-E Transistor	
Q3	2SC870-F Transistor	
Q4	2SC870-F Transistor	
Q5	2SC871-E Transistor	
Q6	2SC871-E Transistor	
Q7	2SC870-F Transistor	
Q8	2SC870-F Transistor	

RESISTORS

Symbol	Description	Part No.
R1	Wire wound 560	RS2P 561K
R2	Carbon film 27	RD¼PS 270K
R3	Carbon film 5.6	RD¼PS 5R6K
R4	Carbon film 22	RD¼PS 220K
R5	Carbon film 5.6	RD¼PS 5R6K
R6	Carbon film 15k	RD¼PS 153K
R7	Carbon film 680k	RD¼PS 684K
R8	Carbon film 2.7k	RD¼PS 272K
R9	Wire wound 1k	RS1P 102K

FILTER

Symbol	Description	Part No.
L1	Low pass filter	T63-010-0

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SC971-(2) Transistor	
Q2	2SC986-(2) Transistor	
D1	SIB02-03C Diode	
D2	SIB02-03C Diode	
D3	1S338Q Zener diode	

POWER SUPPLY UNIT (W16-034)

CAPACITORS

Symbol	Description	Part No.
C1	Electrolytic 220 35V	CEA 221P 35
C2	Electrolytic 220 35V	CEA 221P 35
C3	Electrolytic 470 25V	CEA 471P 25
C4	Electrolytic 470 25V	CEA 471P 25
C5	Ceramic 0.001 50V	CKDYB 102K 50
C6	Ceramic 0.001 50V	CKDYB 102K 50
C7	Electrolytic 220 35V	CEA 221P 35
C8	Electrolytic 100 16V	CEA 101P 16
C9	Ceramic 0.01 50V	CKDYB 103K 50
C10	Ceramic 0.01 50V	CKDYB 103K 50

CORRECTION AND SUPPLEMENT OF TX-1000 SERVICE MANUAL

1. CORRECTION

Please put in a necessary correction in the text of the TX-1000 service manual on page 18 as follows:

- e. Set output level of generator to 25dB (20 μ V) incorrect
Set output level of generator to 27dB (22 μ V) correct

2. SUPPLEMENT

Please add the following to pages 18 and 31.

To page 18:

5. MUTING THRESHOLD LEVEL ALIGNMENT

- h. Turn **MUTING LEVEL** control to minimum position.
- i. Set output level of generator to 15dB (5.5 μ V), then adjust VR2 on muting circuit PCB exactly on the border line between muting and nonmuting.

To page 31:

MISCELLANEOUS

Symbol	Description	Part No.	
	4P Ground Terminal	K13-047-0	
	Washer (to fix Wooden Case)	B21-011-0	
	Pin Plug	K72-015-A	
	Connection Cord	D51-003-B	
	Connection Cord	D51-004-B	
	AM Lead Antenna	D53-002-A	

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