

AKAI STEREO TUNER

MODEL AT-2400

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SECTION 1

SERVICE MANUAL

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I. TECHNICAL DATA

FM TUNER SECTION

FREQUENCY RANGE		88 MHz to 108 MHz
SENSITIVITY (IHF)		1.8 μ V
CAPTURE RATIO		1.0 dB
SELECTIVITY (IHF)		More than 80 dB
IMAGE REJECTION		More than 90 dB (98 MHz)
IF REJECTION		More than 100 dB (98 MHz)
SPURIOUS REJECTION		More than 100 dB (98 MHz)
AM SUPPRESSION		55 dB
SIGNAL TO NOISE RATIO		75 dB
HARMONIC DISTORTION	MONO	Less than 0.2% (100% modulation)
	STEREO	Less than 0.3% (100% modulation)
TUNING INDICATOR		Signal Strength meter and Center Tuning meter
MUTING		Level Control (5 μ V to 100 μ V)/Switchable to ON-OFF
STEREO SEPARATION		More than 42 dB (1 kHz)
SUB CARRIER SUPPRESSION		More than 65 dB
OUTPUT VOLTAGE	VARIABLE	From 0 mV to 1.6V
	FIXED	0.77V (100% modulation)
ANTENNA INPUT IMPEDANCE		300 ohms balanced, 75 ohms unbalanced

AM TUNER SECTION

FREQUENCY RANGE		520 kHz to 1,605 kHz
SENSITIVITY (IHF)		180 μ V/m (bar antenna), 15 μ V (external antenna)
SELECTIVITY (IHF)		More than 30 dB
IMAGE REJECTION		More than 55 dB (1,000 kHz)
IF REJECTION		More than 45 dB
SIGNAL TO NOISE RATIO		More than 50 dB
OUTPUT VOLTAGE	VARIABLE	From 0 mV to 550 mV
	FIXED	250 mV (30% modulation)
ANTENNA		Built-in ferrite bar antenna

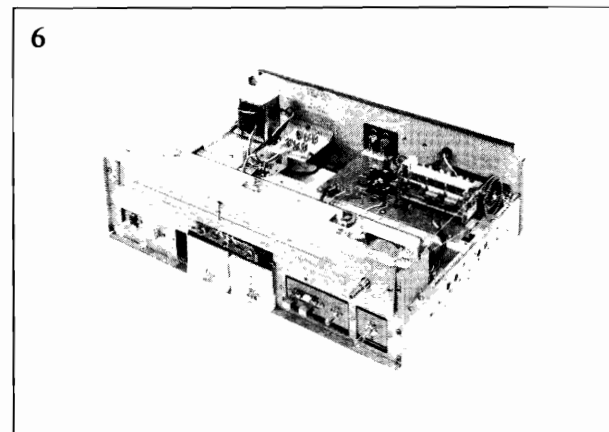
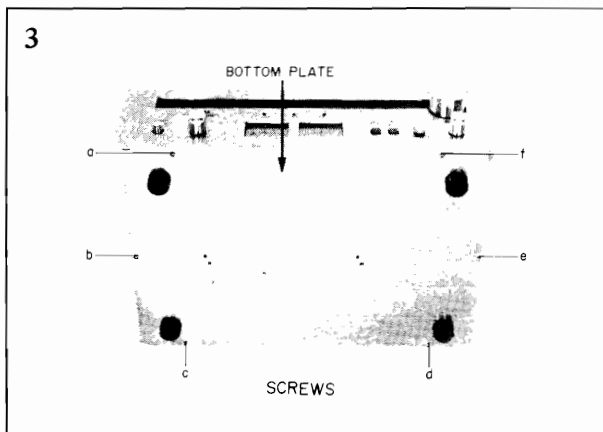
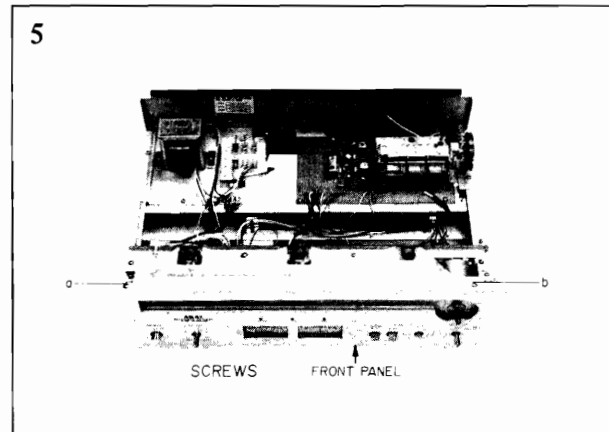
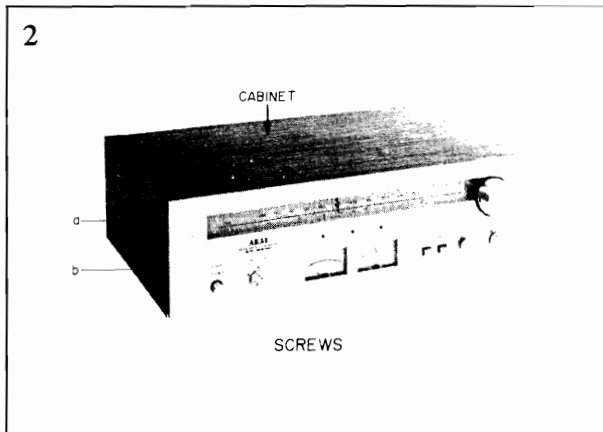
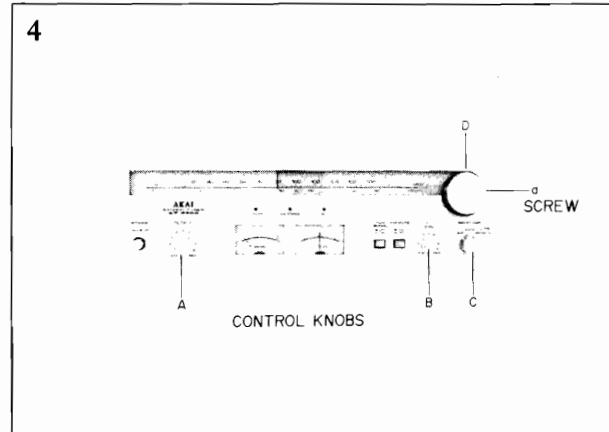
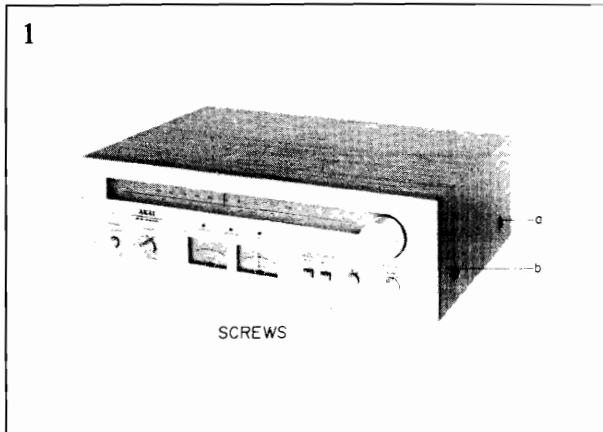
MISCELLANEOUS

SEMI-CONDUCTORS		Transistors: 12. Diodes: 9, FETs: 1, ICs: 4
POWER REQUIREMENTS		CSA, UL and LA models: 120V, 60 Hz CEE models: 220V, 50 Hz Other models: 110/220/240V, 50~60 Hz Switchable
DIMENSIONS		440(W) \times 141(H) \times 336(D) mm (17.3 \times 5.6 \times 13.2) inches
WEIGHT		6.6 kg (14.5 lbs)

* For improvement purposes, specifications and design are subject to change without notice.

II. DISMANTLING OF UNIT

In case of trouble, etc. necessitating disassembly, please disassemble in the order shown in photographs. Reassemble in reverse order.



III. CONTROLS

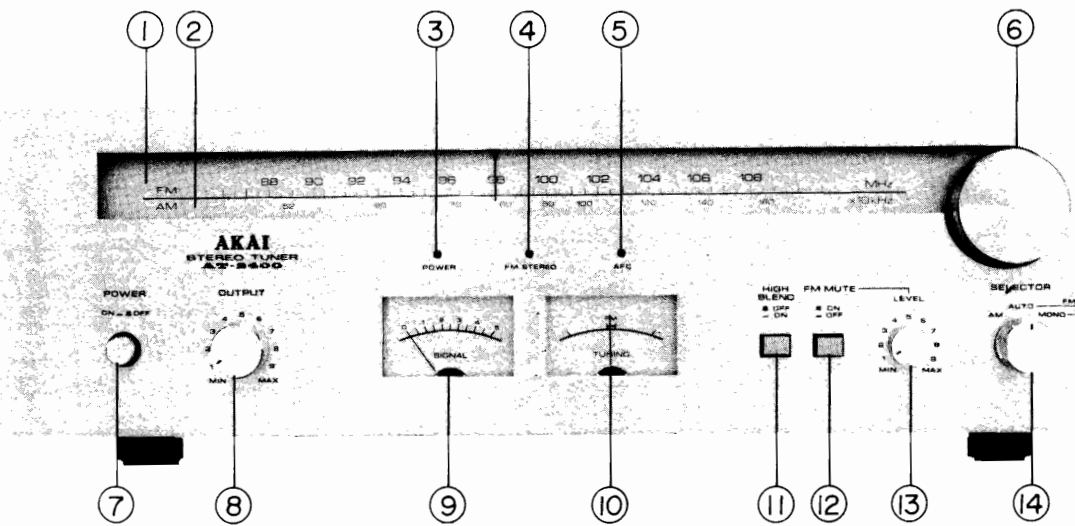


Fig. 1 Controls

1. FM DIAL SCALE
2. AM DIAL SCALE
3. POWER INDICATOR LAMP
4. FM STEREO INDICATOR LAMP
5. AFC INDICATOR LAMP
6. TUNING KNOB
7. POWER SWITCH

8. OUTPUT LEVEL CONTROL
9. SIGNAL STRENGTH METER
10. FM TUNING METER
11. HIGH BLEND SWITCH
12. FM MUTE SWITCH
13. FM MUTE LEVEL ADJUSTER
14. INPUT SELECTOR AM, FM AUTO, FM MONO

IV. PRINCIPAL PARTS LOCATIONS

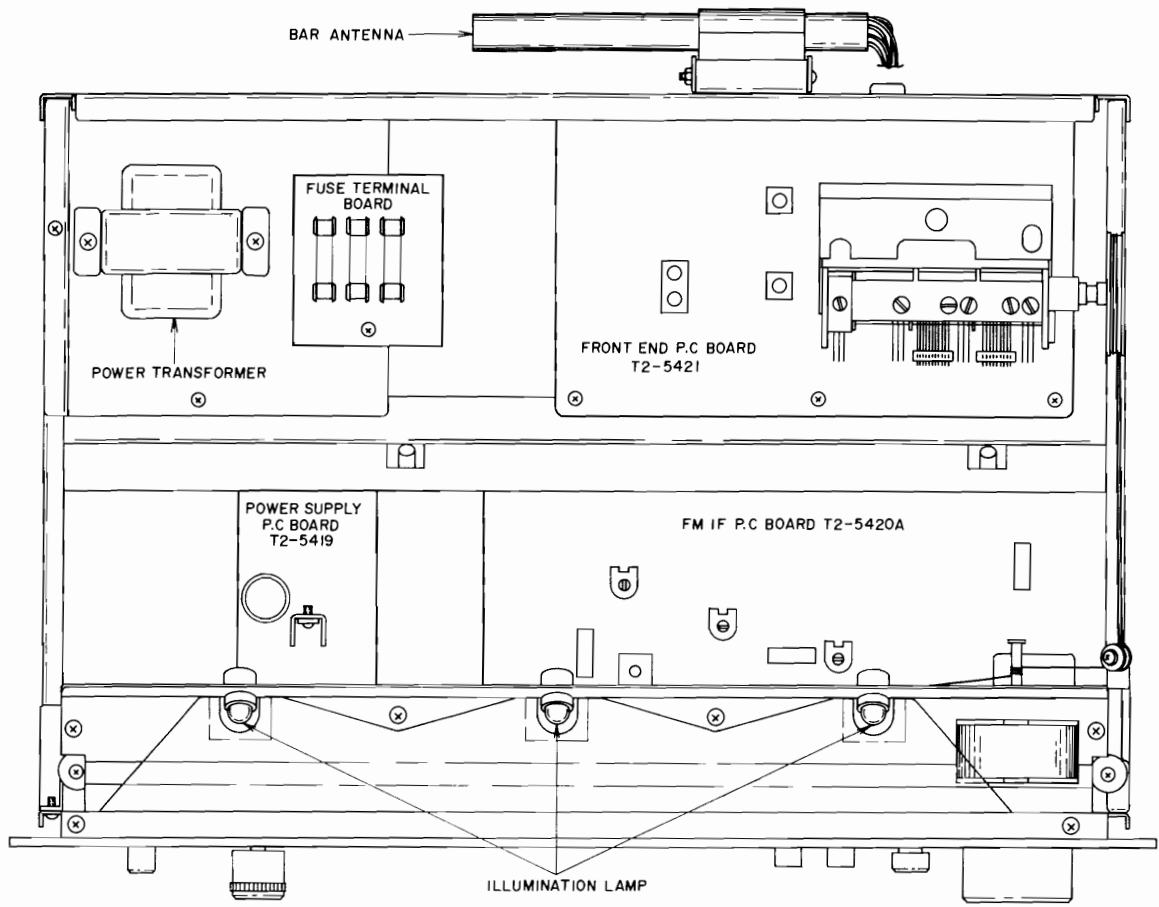


Fig. 2 Top View

V. OPERATING PRINCIPLES OF QUADRATURE DETECTION SYSTEM

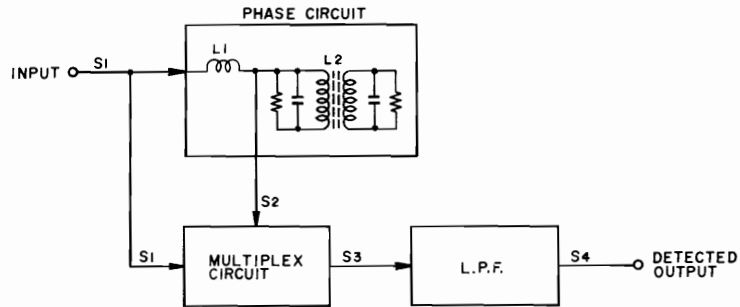


Fig. 3 Quadrature Detection Block Diagram

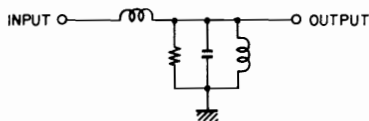


Fig. 4 Single Tuning Type

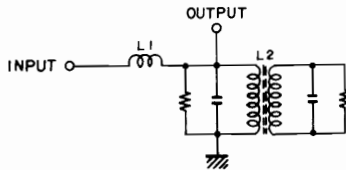


Fig. 5 Double Tuning Type

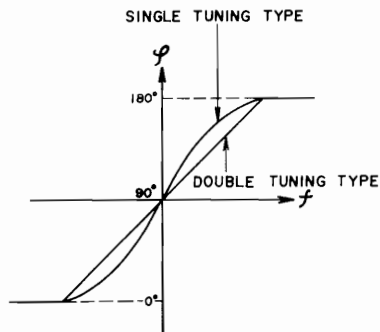


Fig. 6 Tuning Curve

The Quadrature Detection Circuit is comprised of a Phase Circuit, a Multiplier Circuit and a Low Pass Filter (L.P.F.) as shown in Fig. 3.

There are two types of Phase Circuits, the Single tuning type shown in Fig. 4 and the Double tuning type shown in Fig. 5. However, because with the double tuning type there is less frequency deviation in relation to carrier frequency, linearity is improved as shown in Fig. 6, and phase distortion is reduced this type phase circuit is employed in the AT-2400.

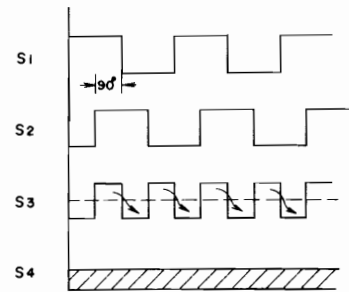


Fig. 7 Output at Non-modulation

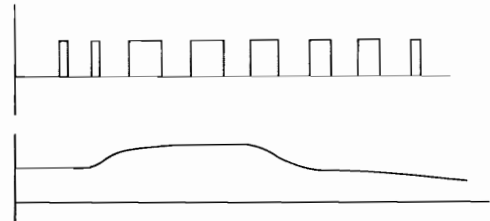


Fig. 8 Output at Modulation Time

Input signal S1 is divided into the part which enters the direct multiplier circuit and the part which passes the phase circuit and enters the multiplier circuit. The signal supplied to the phase circuit is always 90° phase delayed at L1. Also because at Non-modulation time, L2 is tuned to 10.7 MHz, if modulation is applied and S1 is changed from 10.7 MHz, phase deviation at L2 will take place proportionately in relation to this changed part and this becomes S2 signal which is delayed in relation to S1.

At Non-modulation, because as shown in Fig. 7, input signal S1 and 90° phase delayed (by means of L1) signal S2 are switched by means of the multiplier circuit, the output signal becomes S3.

Because this S3 passes the low pass filter and becomes S4 fixed direct current, the detector output is zero.

Then, when modulation is applied, because the switched output is varied according to the degree of modulation, and the output which passed the low pass filter becomes the pulsating current part as shown in Fig. 8, detector output is obtained.

VI. OPERATING PRINCIPLES OF PLL CIRCUIT EMPLOYED IN STEREO DEMODULATION CIRCUIT

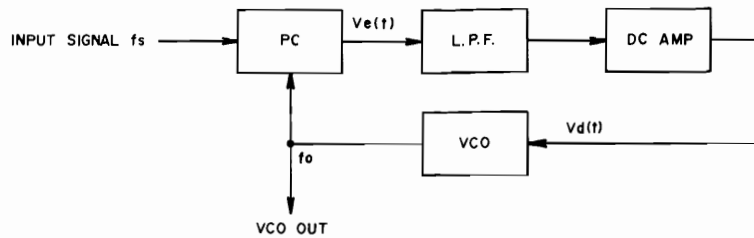


Fig. 9 PLL Circuit

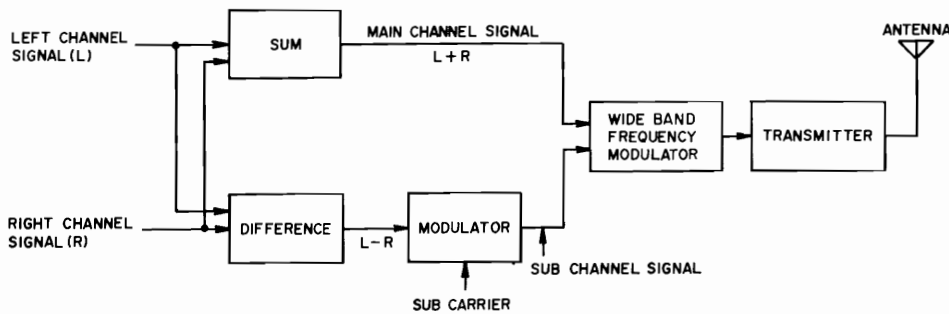


Fig. 10 FM Broadcasting System Diagram

To separate FM stereo broadcast signal received to data into left and right signals, a 19 kHz pilot signal was successively multiplied to form a 38 kHz signal and stereo separation was effected from this. However, with this multiplier system, change in coils due to wear occurred and adjustment points were numerous, etc. Therefore, this model employs a newly developed PLL circuit which produces an exceedingly accurate 38 kHz switching signal.

1. PLL CIRCUIT OPERATION

PLL circuit is a kind of feedback circuit and is comprised of a Phase Comparator (PC), a Low Pass Filter (LPF), a Direct Current Amplifier (DC Amp), and a Voltage Control Oscillator (VCO) as shown in Fig. 9. The PC compares input signal F_s and VCO oscillator output and generates the difference in signal voltage $V_e(t)$ proportionately to this phase deviation. This $V_e(t)$ passes LPF and the DC Amp. and becomes control voltage. This control voltage supplied to VCO and VCO oscillation frequency is DC controlled. When there is no input signal F_s , because there is also no $V_e(t)$, control voltage $V_d(t)$ becomes zero, and VCO maintains a * free-running oscillation frequency. When a signal enters, VCO oscillation frequency F_o is controlled to narrow the difference between F_s by means of feedback as described above, and the PLL circuit assumes a synchronous condition. This is referred to as input signal lock. (In case the difference between F_o and F_s is too large, the differential signal frequency becomes high and is reduced at the LPF.

However, because the VCO control voltage does not change, PLL will not stay within the * lock range). Because of the ability of the signal interference removing LPF to accumulate the previous voltage in case the PLL deviates from within the lock range due to certain interference, the original condition is quickly reinstated.

* Free running frequency: Oscillating frequency when there is no input signal.

* Lock range: At the condition in which the VCO oscillation frequency is locked to the input signal, the lock range is the oscillating frequency in which when the input signal changes, the PLL maintains it's input signal lock condition. Accordingly, in case F_s is changed inside the PLL lock range, VCO oscillation frequency always follows this, and a no frequency deviation and no phase difference signal is obtained. In other words, VCO oscillation frequency can be locked to F_s .

2. STEREO DEMODULATION CIRCUIT

As shown in Fig. 10, for FM broadcasts, the sum signal (L+R) consists of left signal (L) and right signal (R) and the audio frequency band of this signal in its original form is frequency modulated.

On the other hand, the difference signal of both (L-R) is changed to high frequency through the use of the sub carrier, and is referred to as the sub channel signal. The carrier is further frequency modulated and sent to the FM stereo transmitter.

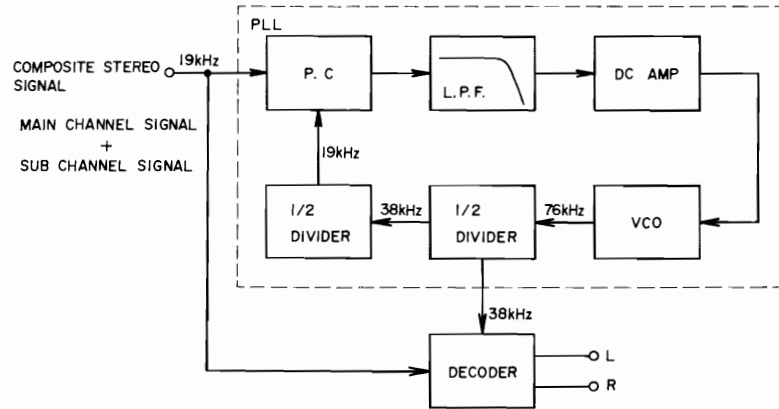


Fig. 11 MPX IC Function

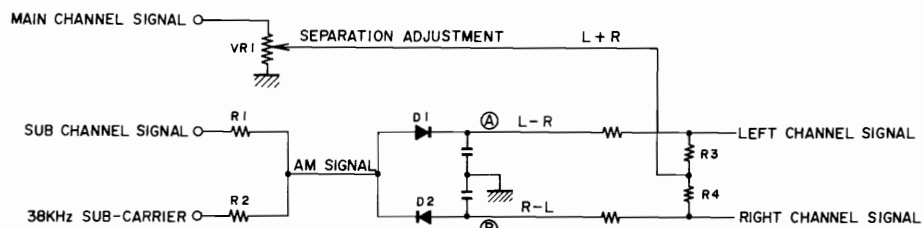


Fig. 12 Multiplex Decoder

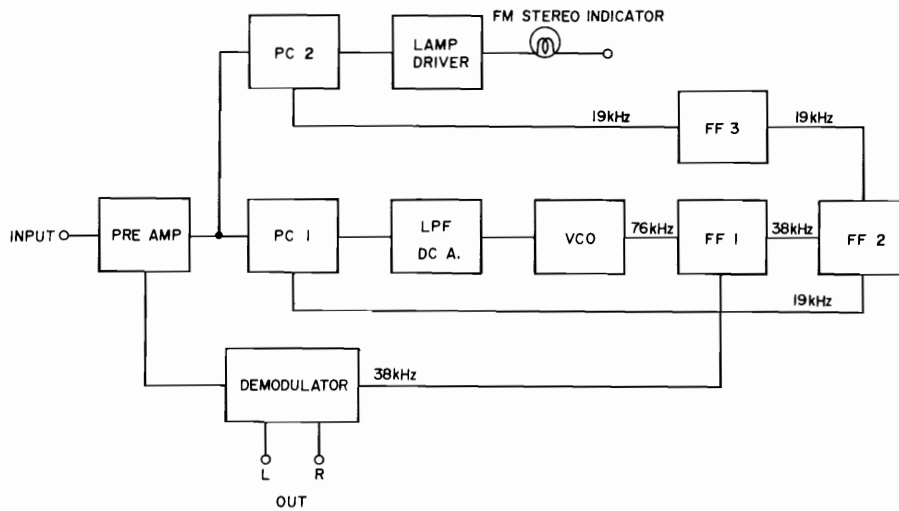


Fig. 13 LA-3350 Function System Diagram

Accordingly, for composite stereo signal demodulation, the sub carrier used for demodulation at the transmitter must be the same uniform 38 kHz signal as the frequency and phase. If the 38 kHz waveform is asymmetrical, channel separation will become poor. At the PLL employed MPX stereo demodulator circuit, as shown in Fig. 9, first a 76 kHz signal is oscillated and when this passes the divider, a symmetrical 38 kHz signal is obtained.

This 38 kHz sub carrier is supplied to the multiplex decoder together with the sub channel of the composite stereo signal. At the multiplex decoder, left and right channel audio signals are separated in order as shown in Fig. 12.

The 38 kHz sub carrier composited with the sub channel signal of which the carrier part was removed

when sub channel signal and sub carrier passed R1, R2 produces the regular AM wave. Then, because this envelope is detected by mutually reverse polarity connected diodes D1 and D2, L-R signal is emitted at point A and R-L signal at point B.

Also, because main channel signal (L+R) is supplied to R3, R4 center point, A B point voltage is added and subtracted and becomes

$$(L+R) + (L-R) = 2L \text{ (left channel)}$$

$$(L+R) + (R-L) = 2R \text{ (right channel)}$$

The level of the main channel signal (L+R) can be adjusted by means of variable resistor VR(VR1) for optimum separation.

Thus, the function of actually employed PLL IC LA-3350 is shown in Fig. 13.

VII. TUNER SECTION ADJUSTMENT

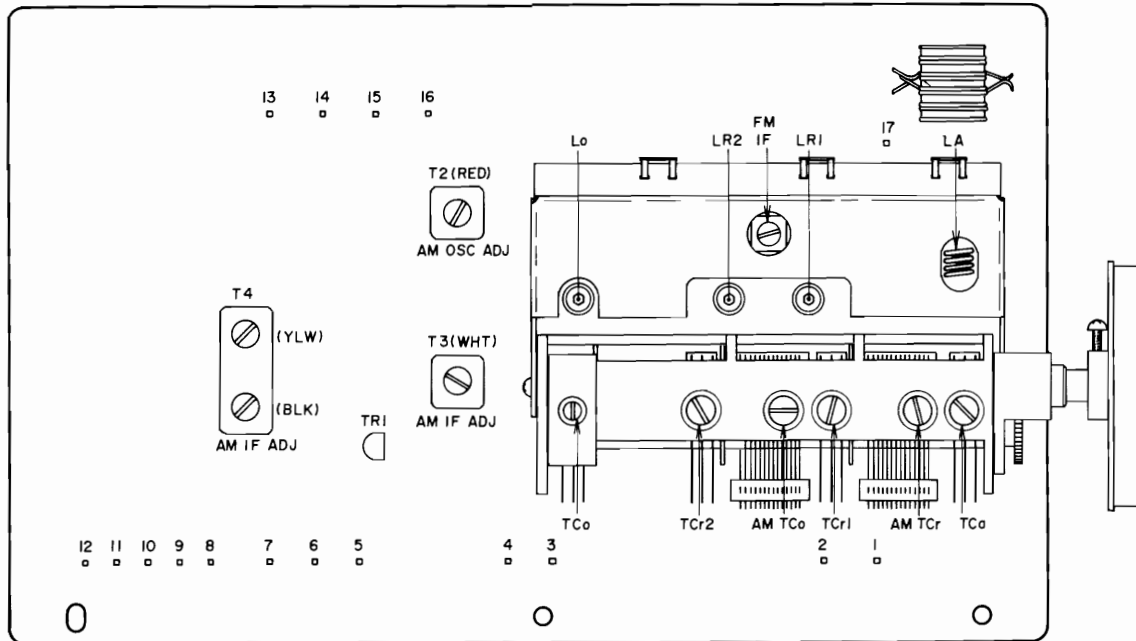


Fig. 14 Front End P.C Board T2-5421

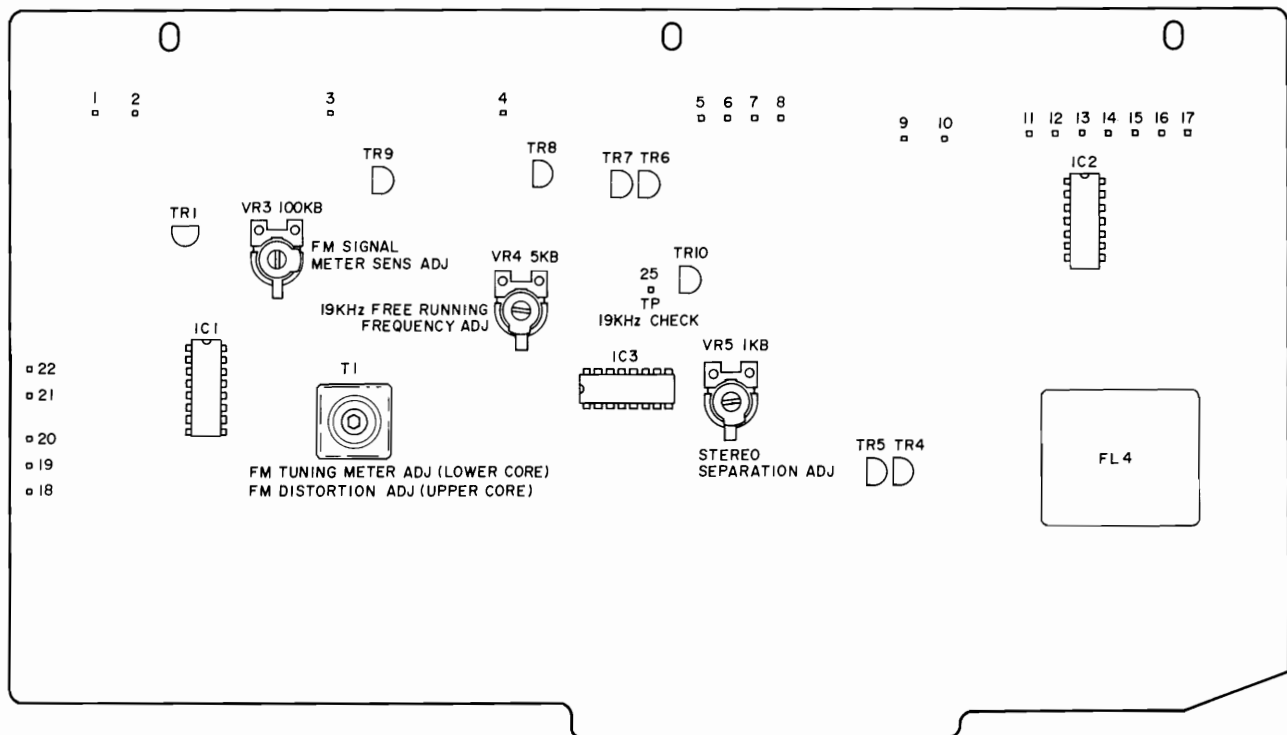


Fig. 15 FM IF P.C Board T2-5420A

1. FM TUNER SECTION ADJUSTMENT (Refer to Fig. 14 and 15)

Step	Adjustment Item	Adjustment Part	Result	Remarks
1	Front End IF Coil	IF Coil (Front End)	Maximum Noise Level	Set Selector to FM. Set FM Mute to OFF. Tune only noise without interference of broadcasting.
2	Tuning Meter centering	T-1 Lower side core (FM IF P.C Board)	Center indication of tuning meter	Same as above
3	Distortion factor adjustment	T-1 Upper side core	Less than 0.2% distortion factor	108 MHz, 60 dB (MONO) input. Less than 0.2% on both channels.
4	Confirmation of tuning meter indication			If tuning meter indication is not at center position, repeat Step-2, Step-3 above.
5	Frequency Coverage Adjustment	TCo (High range) Lo (Low range) (Front End)	error: within ± 250 kHz	108 MHz, 88 MHz, 60 dB (MONO) input.
6	Sensitivity Adjustment	TCr, TCa (High range) Lr, La (Low range) (Front end)	Less than 3% distortion factor	108 MHz, 88 MHz, Less than 10 dB (MONO) input.
7	PLL IC Free Running Frequency Adjustment	VR4 5 kB (FM IF P.C Board)	19.00 kHz	FM Mute switch to "ON", Frequency counter to pin 25. (FM IF P.C Board)
8	Stereo Indicator Lighting Confirmation			98 MHz, 60 dB (stereo) input Failure of stereo indicator to light means that stereo broadcasts are not being received.
9	Stereo separation Adjustment	VR5 1 kB (FM IF P.C Board)	More than 42 dB	98 MHz, 60 dB (stereo) L ch input. Distortion factor must be less than 0.3%.
10	Stereo Separation Adjustment		More than 42 dB	98 MHz, 60 dB (stereo), R ch input. Distortion factor must be less than 0.3%, and if it exceeds 0.3%, adjust the coil in STEP-1 within half a turn.
11	Signal Meter Indication adjustment	VR-3 100 kB (FM IF P.C Board)	Needle Indicates "4.8" on scale	98 MHz, 100 dB (MONO) input.
12	Confirmation of tuning meter indication		Center indication of tuning meter	

Note-1 In the event that the distortion factor in STEP-6 is not less than 3%, re-adjust Front End Trimmers TCr, TCa, Lr, & La to obtain a minimum average distortion factor at 88, 98 & 108 MHz. (same distortion factor at all 3 points).

Note-2 Free running frequency of the PLL IC must be an exact 19.00 kHz.

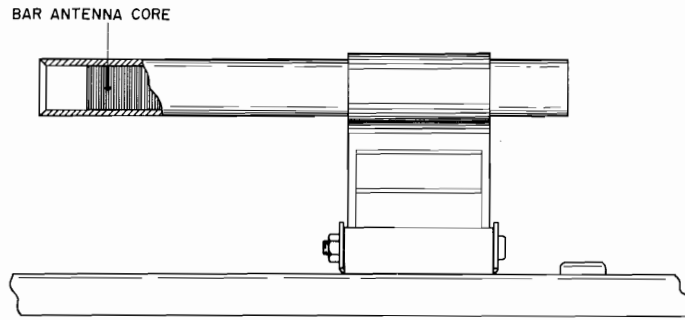


Fig. 16 Bar Antenna

2. AM TUNER SECTION ADJUSTMENT (Refer to Fig. 15 and 16)

Step	Adjustment Item	Adjustment Part	Result	Remarks
1	Low range frequency coverage	T-2 (red) (Front End P.C Board)	Error: within 2%	Set selector to AM. 520 kHz optional input.
2	Low range sensitivity	Bar antenna core, T-4 (YLW, BLK) T-3 (WHT) (Front End P.C Board)	Maximum Sensitivity	520 kHz optional input.
3	High range frequency coverage	AM TCo Trimmer Condenser (Front End)	Error: within 2%	1,400 kHz optional input.
4	High range sensitivity	AM TCr Trimmer Condenser (Front End)	Maximum Sensitivity	1,400 kHz optional input.
5	Scale and sensitivity confirmation			Repeat Steps 1 through 4 two or three times.

VIII. TUNING CORD THREADING

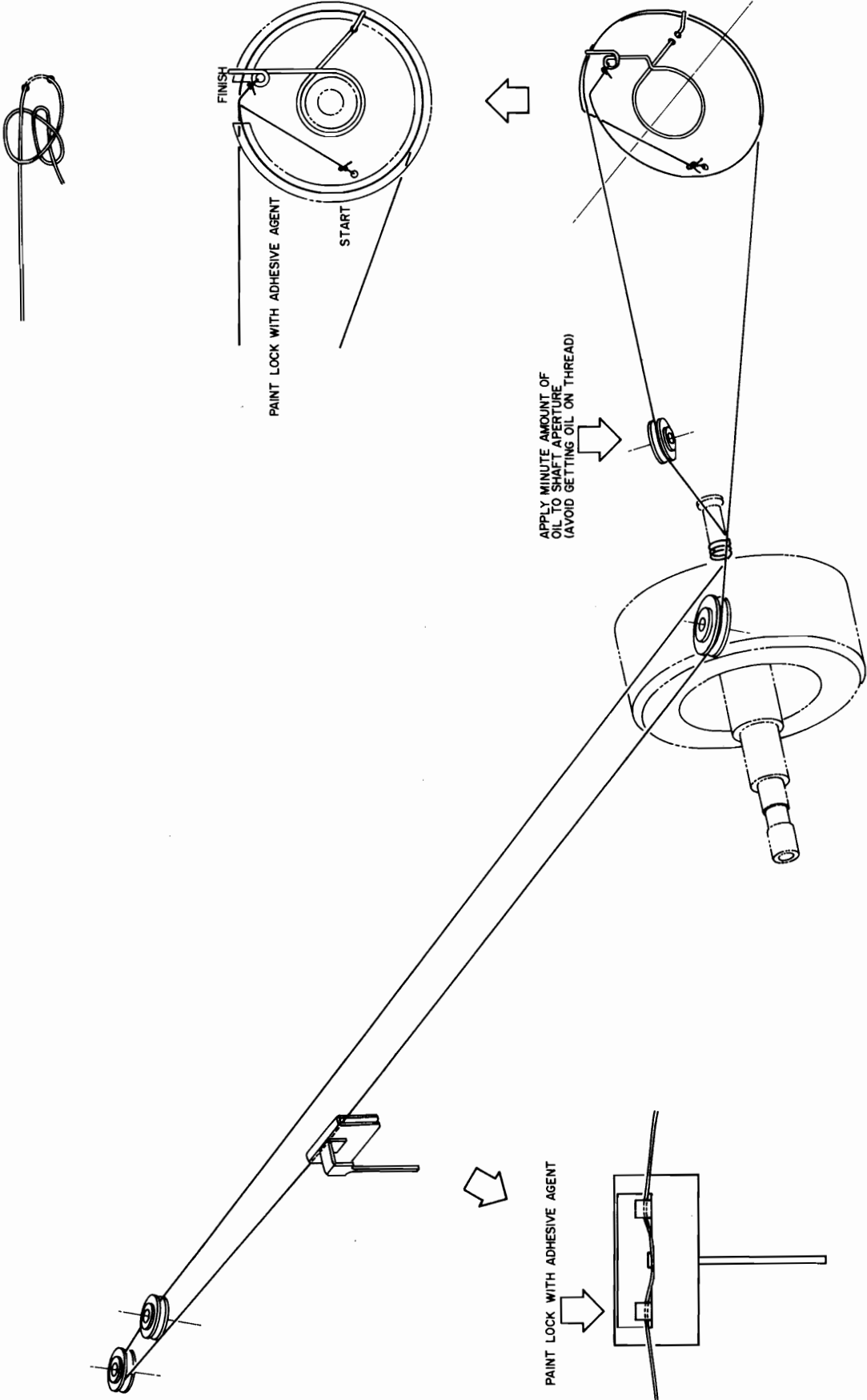
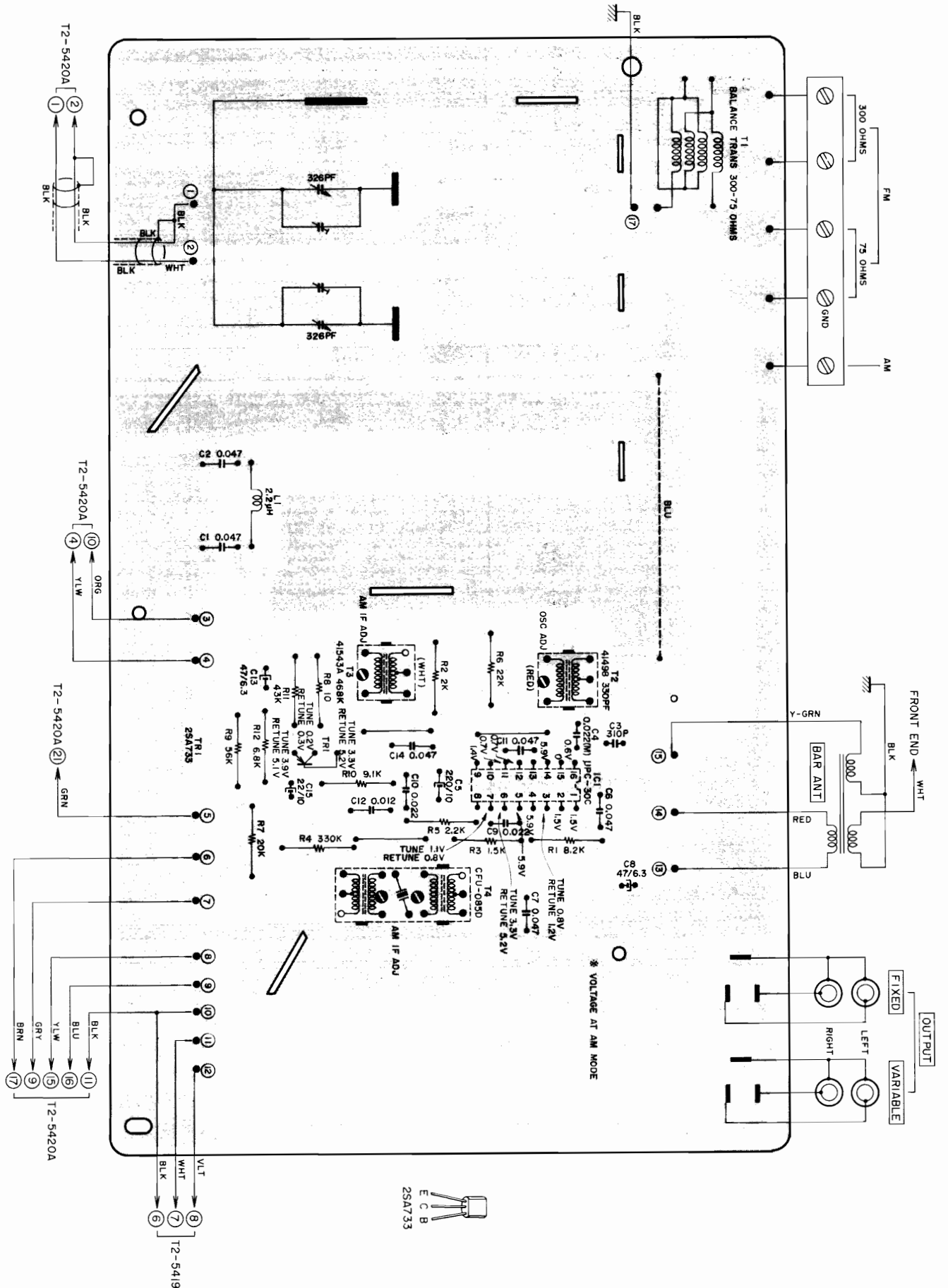
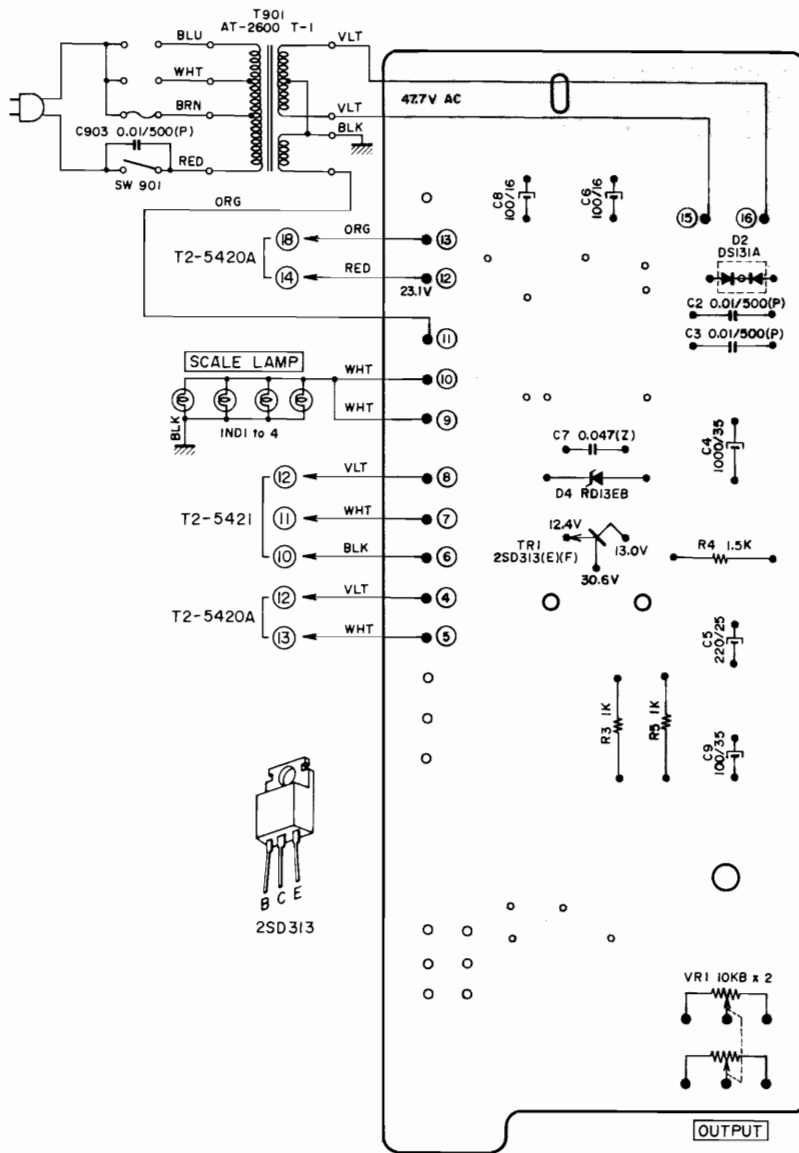


Fig. 17 Tuning Cord Threading

2. FRONT END P.C BOARD T2-5421



3. POWER SUPPLY P.C BOARD T2-5419



MEMO

MEMO

MEMO

SECTION 2

PARTS LIST

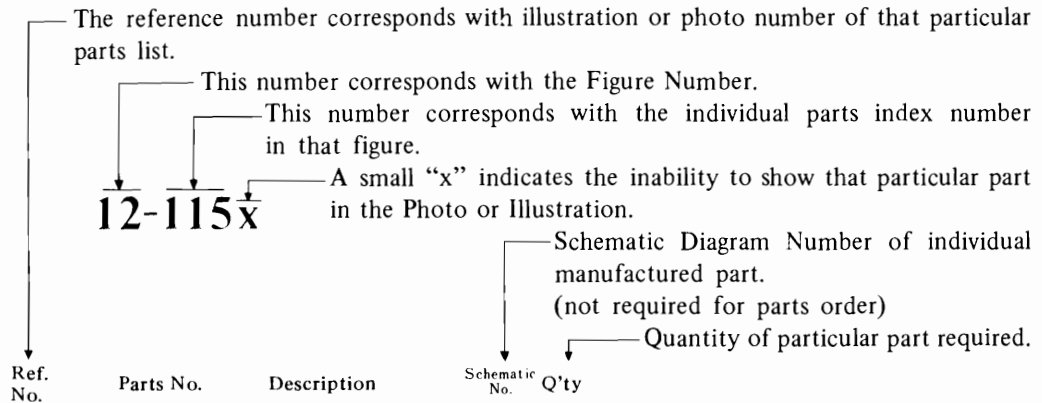
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5.	LED P.C BOARD (T2-5420B) BLOCK	25
6.	ASSEMBLY BLOCK	26
7.	FINAL ASSEMBLY BLOCK	28
8.	LIST OF INTERCHANGEABLE SEMICONDUCTORS	29
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Resistor and Capacitor which is not listed in this parts list, please refer to COMMON LIST FOR SERVICE PARTS.

HOW TO USE THIS PARTS LIST

1. This parts list is compiled by various individual blocks based on assembly process.
2. When ordering parts, please describe parts number, serial number, and model number in detail.
3. How to read List



FLYWHEEL BLOCK #13				
Ref. No.	Parts No.	Description	Schematic No.	Q'ty
12-115x	800425	Flywheel Block Assy. Comp.	RDG #13	1
12-116	244506	Flywheel Only	RD-233	1
12-117x	244754	Felt, Flywheel	RD-275	1
12-118	251324	Main Metal Case	RD-236	1
12-119	253080	Main Metal	RD-237	1

4. The symbol numbers shown on the P.C. Board list can be matched with the Composite Views of Components of the Schematic Diagram or Service Manual.
5. Please utilize separate "Common List for Service Parts" for Resistor Parts orders.
6. The shape of the parts and parts name, etc. can be confirmed by comparing them with the parts shown on the Electrical Parts Table of P.C. Board.
7. Both the kind of part and installation position can be determined by the Parts Number. To determine where a parts number is listed, utilize Parts Index at end of Parts List.
It is necessary first of all to find the Parts Number. This can be accomplished by using the Reference Number listed at right of parts number in the Parts Index. (meaning of ref. no. outlined in Item 3 above).
8. Utilize separate "Price List for Parts" to determine unit price. The most simple method of finding parts Price is to utilize the reference number.

CAUTION:

1. When placing an order for parts, be sure to list the parts no. model no., and description. There are instances in which if any of this information is omitted, parts cannot be shipped or the wrong parts will be delivered.
2. Please be careful not to make a mistake in the parts no. If the parts no. is in error, a part different from the one ordered may be delivered.

1. RECOMMENDED SPARE PARTS LIST

Because, if the parts listed below are on hand, almost any repair can be accomplished, we suggest that you stock these Recommended Spare Parts items.

Parts No.	Parts Nomenclature	Reference
BA212343	Power Supply P.C Board Comp. T2-5419	
BA212275	FM IF P.C Board Comp. T2-5420A	
BC212793	Case T2-5418	Same as AT-2600
BD212231	Front Panel Block Comp. AT-2400 (U)	
BT214716	Power Transformer AT-2600T-1	Same as AT-2600
BT444137	Balum Trans 75-300 ohms	Same as AT-2600
BZ212332	Front End P.C Board Comp. T2-5421	With Front End
EE214683	Bar Antenna	
EL245700	Lamp 8V 300 mA (600m/mx2)	Same as AT-2600
EM214784	Signal Meter D18B11R	
EM214773	Tuning Meter B188B12B	Same as AT-2600
ES242346	Power Switch JP01	Same as AT-2600
ES225088	Push Switch 2F-0005FF3220	
ES214637	Rotary Switch SR26N 1-4-3 30 KC	Same as AT-2600
EV219993	Volume V16L4G3N 10 kB	Same as AT-2600
EV214672	Volume V16L4PHN 100 kB	Same as AT-2600
SB233717	Push Button (Square) M2-5429	
SK224886	Power Knob M2-5021	Same as AT-2600
SK240063	Selector Knob M2-5428	Same as AT-2600
SK646828	Tuning Knob (Small) AA-5252	Same as AT-2600
SK647548	Single Knob (Small) CJ-6031	Same as AT-2600
TA214468	Front End FB622U11	

2. FM, IF P.C BOARD (T2-5420A) BLOCK

Symbol No.	Parts No.	Description	Schematic No.	Q'ty
2-1	BA212275	FM, IF P.C Board Comp. (T2-5420A)		1
2-IC1	EI650586	IC LA-1230	45-8-152	1
2-IC2	EI697871	IC LA-3122	45-8-185	1
2-IC3	EI650597	IC LA-3350S	45-8-153	1
2-TR1	ET618873	Transistor 2SC930(E)(F)	45-1-185	1
2-TR4to10	ET635220	Transistor 2SC945L(K)(P)	45-1-85	7
2-D1	ED624903	Silicon Diode 1S2473	45-3-28	1
2-D4	ED417442	Germanium Diode 1N34A	45-3-14	1
2-D5, 6	ED624903	Silicon Diode 1S2473	45-3-28	2
2-T1	EO650608	Discr Coil MV4-FLC-20000	23-1-243	1
2-FL1to3	ER650430	Ceramic Filter SEE-10.7 MA-8-Z	53-1-102	3
2-FL4	ER656908	Block Filter FB3201	53-1-103	1
2-L1	EO650610	Inductor 144LZ 18 μ H(J)	23-1-240	1
2-VR2	EV214672	Vol. V16L4PHN 100 kB	36-6-26	1
2-VR3	EV650891	Semi-fixed/Vol. V10K8-4-2 50 kB	36-10-250	1
2-VR4	EV499364	Semi-fixed/Vol. V10K8-4-2 5 kB	36-10-250	1
2-VR5	EV484863	Semi-fixed/Vol. V10K8-4-2 1 kB	36-10-250	1
2-SW2	ES214637	Rotary SW. SR26N1-4-3 30 kC	25-6-101	1
2-SW3	ES225088	Push SW. 2F-0005FF3220	25-5-228	1
2-2	ZS422076	Screw, pan head 3x5		2
2-C10	EC523282	Solid Aluminum/C. (Vert. Type) 0.1 μ F(M) 25WV	24-19-2	1
2-C37	EC215065	Solid Aluminum/C. (Vert. Type) 0.47 μ F(M) 16WV	24-19-2	1
2-C38	EC223582	Solid Aluminum/C. (Vert. Type) 0.22 μ F(M) 16WV	24-19-2	1

3. FRONT END P.C BOARD (T2-5421) BLOCK

Symbol No.	Parts No.	Description	Schematic No.	Q'ty
3-1	BA212332	Front End P.C Board Comp. (T2-5421)		1
3-IC1	EI650362	IC μ PC30C	45-8-151	1
3-TR1	ET557965	Transistor 2SA733(Q)(R)	45-1-124	1
3-J1	EJ212995	4P Pin Jack JPJ345 1A	31-1-169	1
3-T1	BT444137	Balum Trans. 75 ohms-300 ohms	23-1-129	1
3-T2	EO650395	OSC. Coil RWR-41498A	23-4-34	1
3-T3	EO650373	AM-IF Trans. RLC-41543A 468 kHz	23-1-242	1
3-T4	EO650384	AM-IF Trans. CFU-085-D 468 kHz	23-1-241	1
3-L1	EO539820	Peaking Coil 2.2 μ H(K)	23-1-187	1
3-2	TA214468	Front End FB622U11	57-2-40	1

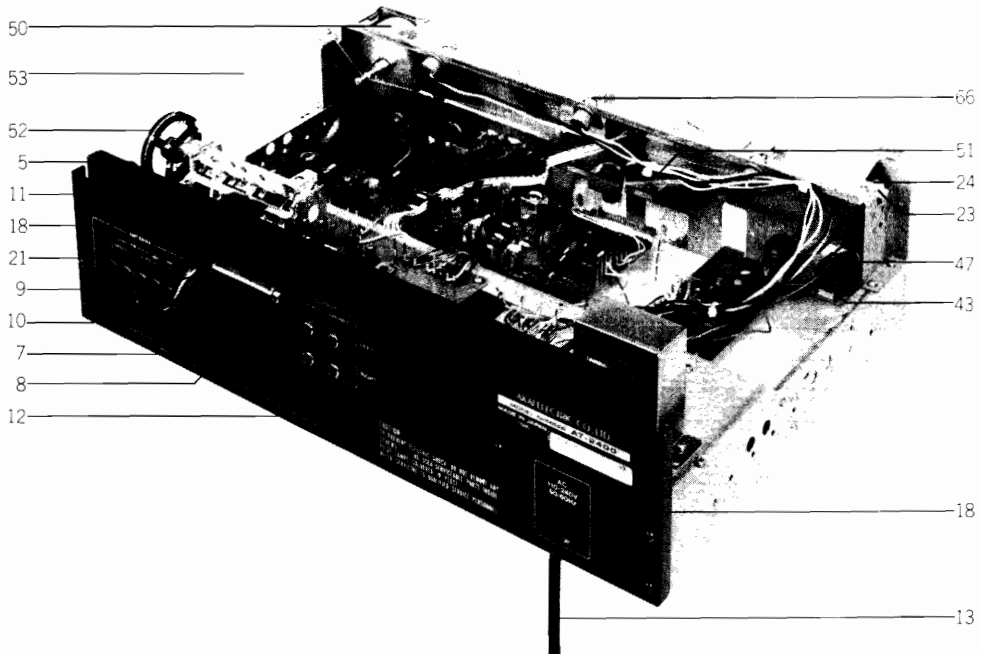
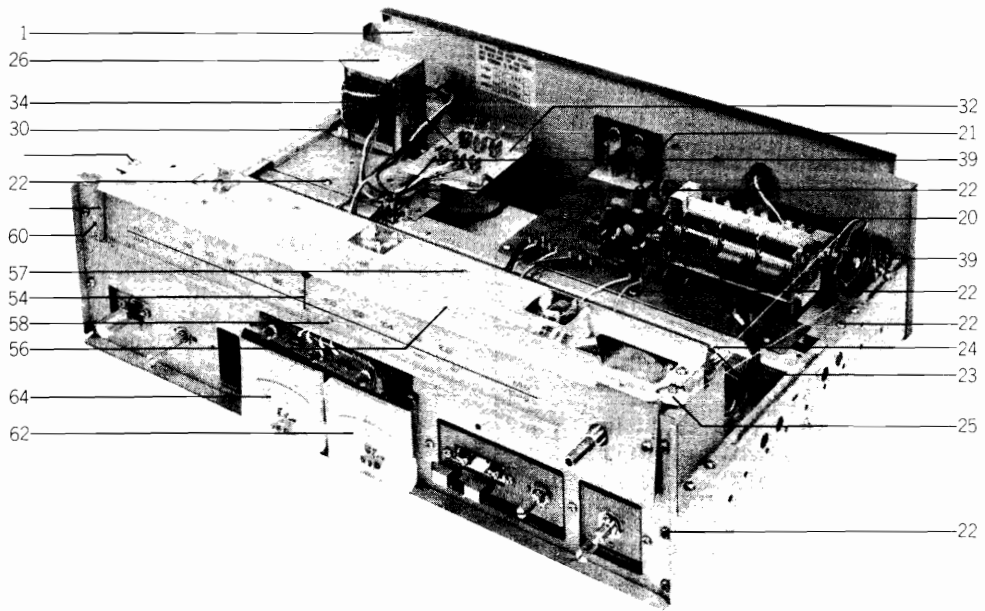
4. POWER SUPPLY P.C BOARD (T2-5419) BLOCK

Symbol No.	Parts No.	Description	Schematic No.	Q'ty
4-1	BA212343	Power Supply P.C Board Comp. (T2-5419)		1
4-TR1	ET402682	Transistor 2SC1061(C)	45-1-96	1
4-D2,3	ED223547	Silicon Diode DS131A	45-2-67	2
4-D4	ED223558	Zener Diode RD13E(B)	45-6-72	1
4-VR1	EV219993	Vol. V16L4G3N 10 kB	36-22-21	1
4-2	ZS325495	Tapping Screw #2 3x6(BR)		1

5. LED P.C BOARD (T2-5420B) BLOCK

Symbol No.	Parts No.	Description	Schematic No.	Q'ty
5-1	EA212962	LED P.C Board	T2-5420B	1
5-D1to3	ED694091	LED SEL-105RC	45-15-12	3

6. PHOTO OF ASSEMBLY BLOCK

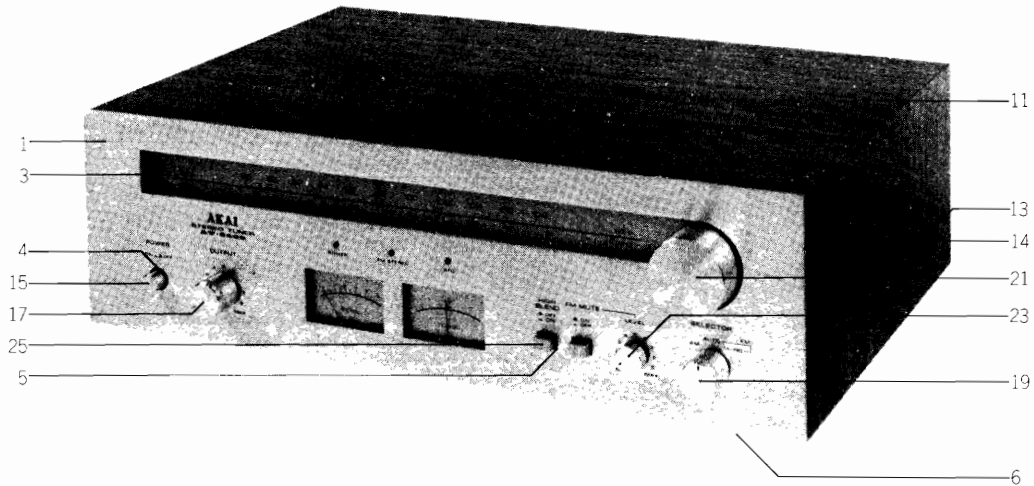


6) ASSEMBLY BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty	Ref. No.	Parts No.	Description	Schematic No.	Q'ty
REAR PANEL BLOCK									
6-1	SP212692	Rear Panel A	T2 5411		6-52	MI650136	Dial Wheel D45 N01008	2-15-11	1
			T2 5412	1	6-53	TA207347	Thread 2m		1
6-2x	SP212714	Rear Panel C (CEE, VDE)	T2 5411		6-54	TA223334	Pointer AT-2200	T2 5025	1
			T2 5413	1	6-55x	TA288718	Pointer (BL) AT-2200-BL	T2 5025	1
6-3x	SP212703	Rear Panel B (CSA)	T2 5411		6-56	MZ212826	Illumination Plate	T2-5415	1
			T2 5412	1	6-57	ZS225134	Tapping Screw #2 3x10(Pan), w/washer		2
6-4x	SP212725	Rear Panel DB (BEAB)	T2 5411		6-58	SE212848	Scale Plate	T2-5416	1
			T2 5413	1	6-59x	TA288415	Scale Plate (C) (BL)	T2-5416	1
6-5	TA530910	Antenna Channel	91-5029	1	6-60	ML223143	Light Stop Angle	T2-5026	1
6-6x	ZS447761	Tapping Screw #2 3x6(BR) (Black)		7	6-61x	TA288731	Shadow Angle (BL)	T2-5026	1
6-7	TA378268	Antenna Holder	AA 5552	1	6-62	EM214773	Tuning Meter B18B12B	46-1-139	1
6-8	ZS552600	Screw, pan head 4x50		1	6-63x	EM288450	Tuning Meter (BL) B18B42B	46-1-159	1
6-9	ZW273914	Spring Washer		2	6-64	EM214784	Signal Meter D18B11R	46-1-140	1
6-10	ZW420682	Washer (Nylon) D4.2x9x0.5t		2	6-65x	EM288461	Signal Meter (BL) D18B41R	46-1-158	1
6-11	ZW413188	Nut M4, #1		1	6-66	EL214806	Lamp (Cord Type) 8V 300MA (400mmx2)	28-2-55	4
6-12	EE214683	Bar Antenna	55-1-35	1	6-67x	ER239646	Solid/R. RCH1/2W 2.2M(K)	35-5-11	1
6-13	EW540123	AC Cord (CUL) 2.5M	26-3-20	1	6-68x	ZW273881	Earth Lug		1
6-14x	EW516600	AC Cord (CEE) VM-0065	26-3-28	1	6-69x	ZW273892	Toothed Lock Washer		1
6-15x	EW516475	AC Cord (CSA) 2.5M	26-3-20	1	6-70x	ZS417150	Screw, pan head 4x6		1
6-16x	EW604585	AC Cord (BSI)	26-3-37	1	6-71x	ZW413188	Nut M4, #1		1
6-17x	EW604618	AC Cord (VDE) VM-0064	26-3-34	1					
6-18	EZ631945	Strain Relief SR-4N-4	2-7-49	2					
6-19x	EZ246936	Strain Relief (BEAB) SR-6W-1	2-7-8	1					
6-20	EZ655187	5P Antenna Terminal Plate	32-1-69	1					
6-21	ZW698308	Nylon Rivet (FNPR) 3x5.5 (Black)	2-7-54	4					
ASSEMBLY BLOCK									
6-22	ZS325495	Tapping Screw #2 3x6 (BR)		32					
6-23	MR530662	Roller B	91-5009	3					
6-24	ZS530673	Roller Screw A	91-5010	4					
6-25	MR530651	Roller A	91-5008	1					
6-26	BT214716	Power Trans. AT-2600T-1	38-4-449	1					
6-27x	BT239422	Power Trans. AT-2600T-3 (CEE, VDE)	38-4-451	1					
6-28x	BT239400	Power Trans. AT-2600T-2 (CSA, AAL)	38-4-450	1					
6-29x	BT239433	Power Trans. AT-2600T-4 (BEAB)	38-4-452	1					
6-30	EZ486617	Trans. Reinforcement Plate B	LF-5222	2					
6-31x	ZS447840	Tapping Screw #2 3x8 (BR)		5					
6-32	EJ223514	3P Fuse Holder (Large) A (Lugging Type)	40-1-97	1					
6-33x	EJ239455	Fuse Holder, AT-4S (Small) (CEE, BEAB, VDE)	40-1-140	1					
6-34	EF214727	Fuse SS-2 0.5A 250V	39-1-56	1					
6-35x	EF375658	Fuse (T Type) 200 MAT (CEE, BEAB, VDE)		1					
6-36x	EF695766	Fuse (SEMKO Type) 315 MAT (CEE, BEAB, VDE)	39-1-53	2					
6-37x	EF371698	Fuse ST-4 0.5A (CSA, ALL)	39-1-28	2					
6-38x	EF277413	Fuse ST-2 2A (CSA, AAL)	39-1-63	1					
6-39	EJ551035	Wrapping Terminal, 4P T-5251	32-1-36	2					
6-40x	ZW273802	Toothed Lock Washer		1					
6-41x	ZS422076	Screw, pan head 3x5		3					
6-42x	ZS462194	Tapping Screw #2 3x8(PAN) W/washer		6					
6-43	ES224436	Push SW. JP01	25-5-221	1					
6-44x	ES242346	Push SW. JP17 (CEE, BEAB, VDE)	25-5-224	1					
6-45x	ES239218	Push SW. JP01 (TV-4) (CSA, AAL, BEAB)	25-5-222	1					
6-46x	ZS379350	Screw, pan head 3x6		2					
6-47	EC204671	Ceramic/C. DD31-6 0.01μF(P) 500WV	24-5-66	1					
6-48x	EC565896	Ceramic/C. DP6600YM 0.01μF(P) 1.4kVW (CSA)	24-5-58	1					
6-49x	EC286198	Ceramic/C. AL-10 0.01μF(Z) 125WV (CSA)	24-5-69	1					
6-50	MI214762	Flywheel	13-2-9	1					
6-51	MZ223154	Meter Illumination	T2-5024	1					

When ordering parts, Please describe Parts Number, Description, and Model Number in detail.

7. PHOTO OF FINAL ASSEMBLY BLOCK



7) FINAL ASSEMBLY BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
FRONT PANEL BLOCK				
7-1	BD212231	Front Panel Block Comp.		1
7-2x	BD287965	Front Panel Block Comp.(BL)		1
7-3	SZ212850	Front Plate	T2-5403	1
7-4	MZ224627	Push Button Bush A	M2-5004	1
7-5	SE233987	Escutcheon	M2-5430	2
ASSEMBLY BLOCK				
7-6	SP233695	Bottom Plate B	M2-5425	1
7-7x	SZ645243	Circular Foot A CA	CA-6014	4
7-8x	ZS565942	Tapping Screw #2 4x8(Pan)		4
7-9x	ZS325495	Tapping Screw #2 3x6(BR)		4
7-10x	ZS447840	Tapping Screw #2 3x8(BR)		2
7-11	BC212793	Case	T2-5418	1
7-12x	BC288382	Case (BL)	T2-5418	1
7-13	ZW548010	Spot Facing Washer	MU-6028	4
7-14	ZS558090	Screw, binding head 4x14		4
7-15	SK224886	Power Knob AT-2200	M2-5021	1
7-16x	SB236970	Power Knob-BL	MU-6320	1
7-17	SK646817	Single Knob	AA-5250	1
7-18x	SK281564	Single Knob (BL)	AA-5250	1
7-19	SK240063	Selector Knob	M2-5428	1
7-20x	SK281597	Selector Knob (BL)	M2-5428	1
7-21	SK646828	Tuning Knob (Small)	AA-5252	1
7-22x	SK288393	Tuning Knob (Small) (BL)	AA-5252	1
7-23	SK647548	Single Knob (Small)	CJ-6031	1
7-24x	SK288404	Single Knob (Small) (BL)	CJ-6031	1
7-25	SB233717	Push Button (Square)	M2-5429	2
7-26x	SB288720	Push Button (Square) (BL)	M2-5429	2

When ordering parts, Please describe Parts Number, Description, and Model Number in detail.

8. LIST OF INTERCHANGEABLE SEMICONDUCTORS

As far as service in concerned, in case the original parts cannot be obtained, the interchangeable parts listed below can be substituted.

Original Parts			Interchangeable Parts	
Description	Parts No.	Utilizing P.C Board	Description	Parts No.
2SA733 (Q) (R)	ET557965	T2-4521	2SA564 (Q) (R)	ET538154
2SC930 (E) (F)	ET618873	T2-4520A	2SC454 (B) (C) 2SC372	ET591366 ET440954
2SC945L (K) (P)	ET635220	T2-4520A	2SC1647 (R) (S) 2SC711 (G) 2SC536 (E) (F)	ET658181 ET399870 ET370607
2SD313 (E) (F)	ET452531	T2-5419	2SD571 (L) (M)	ET655356
1N34A	ED219464	T2-5420A	1S188AM 1N60	ED562386 ED428264
1S2473	ED624903	T2-5420A	1S2473VE 1S1588	ED560913 ED557447
DS131A	ED223547	T2-5419	10DC1 (BLK)	ED329130
SEL105RC	ED656357	T2-5420B		
LA1230	EI650586	T2-5420A		
LA3122	EI697871	T2-4520A		
LA3350A	EI650597	T2-4520A		
μ PC-30C	EI650362	T2-4521		

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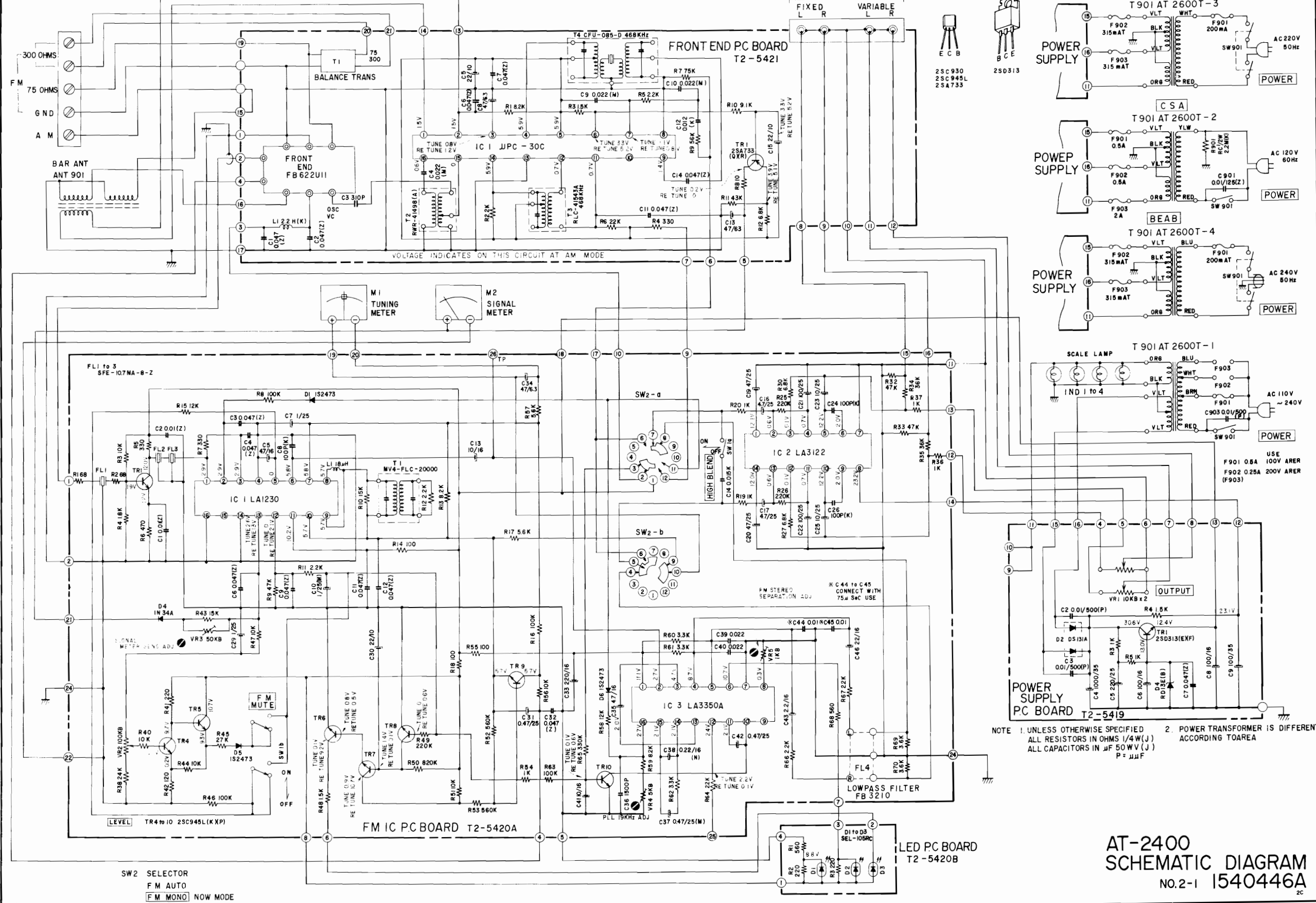
Parts No.	Ref. No. & Symbol No.	Parts No.	Ref. No. & Symbol No.	Parts No.	Ref. No. & Symbol No.	Parts No.	Ref. No. & Symbol No.	Parts No.	Ref. No. & Symbol No.
BA212275	2-1	MR530662	6-23						
BA212332	3-1	MZ212826	6-56						
BA212343	4-1	MZ223154	6-51						
BC212793	7-11	MZ224627	7-4						
BC288382	7-12x	SB233717	7-25						
BD212231	7-1	SB236970	7-16x						
BD287965	7-2x	SB288720	7-26x						
BT214716	6-26	SE212848	6-58						
BT239400	6-28x	SE233987	7-5						
BT239422	6-27x	SK224886	7-15						
BT239433	6-29x	SK240063	7-19						
BT444137	3-T1	SK281564	7-18x						
EA212962	5-1	SK281597	7-20x						
EC204671	6-47	SK288393	7-22x						
EC215065	2-C37	SK288404	7-24x						
EC223582	2-C38	SK646817	7-17						
EC286198	6-49x	SK646828	7-21						
EC523282	2-C10	SK647548	7-23						
EC565896	6-48x	SP212692	6-1						
ED223547	4-D2,3	SP212703	6-3x						
ED223558	4-D4	SP212714	6-2x						
ED417442	2-D4	SP212725	6-4x						
ED624903	2-D1	SP233695	7-6						
ED624903	2-D5,6	SZ212850	7-3						
ED694091	5-D1to3	SZ645243	7-7x						
EE214683	6-12	TA207347	6-53						
EF214727	6-34	TA214468	3-2						
EF277413	6-38x	TA223334	6-54						
EF371698	6-37x	TA288415	6-59x						
EF375658	6-35x	TA288718	6-55x						
EF695766	6-36x	TA288731	6-61x						
EI650362	3-IC1	TA378268	6-7						
EI650586	2-IC1	TA530910	6-5						
EI650597	2-IC3	ZS225134	6-57						
EI697871	2-IC2	ZS325495	4-2						
EJ212995	3-J1	ZS325495	6-22						
EJ223514	6-32	ZS325495	7-9x						
EJ239455	6-33x	ZS379350	6-46x						
EJ551035	6-39	ZS417150	6-70x						
EL214806	6-66	ZS422076	2-2						
EM214773	6-62	ZS422076	6-41x						
EM214784	6-64	ZS447761	6-6x						
EM288450	6-63x	ZS447840	6-31x						
EM288461	6-65x	ZS447840	7-10x						
EO539820	3-L1	ZS462194	6-42x						
EO650373	3-T3	ZS530673	6-24						
EO650384	3-T4	ZS552600	6-8						
EO650395	3-T2	ZS558090	7-14						
EO650608	2-T1	ZS565942	7-8x						
EO650610	2-L1	ZW273802	6-40x						
ER239646	6-67x	ZW273881	6-68x						
ER650430	2-FL1to3	ZW273892	6-69x						
ER656908	2-FL4	ZW273914	6-9						
ES214637	2-SW2	ZW413188	6-11						
ES224436	6-43	ZW413188	6-71x						
ES225088	2-SW3	ZW420682	6-10						
ES239218	6-45x	ZW548010	7-13						
ES242346	6-44x	ZW698308	6-21						
ET402682	4-TR1								
ET557965	3-TR1								
ET618873	2-TR1								
ET635220	2-TR4to10								
EV214672	2-VR2								
EV219993	4-VR1								
EV484863	2-VR5								
EV499364	2-VR4								
EV650891	2-VR3								
EW516475	6-15x								
EW516600	6-14x								
EW540123	6-13								
EW604585	6-16x								
EW604618	6-17x								
EZ246936	6-19x								
EZ486617	6-30								
EZ631945	6-18								
EZ655187	6-20								
MI214762	6-50								
MI650136	6-52								
ML223143	6-60								
MR530651	6-25								

SECTION 3

SCHEMATIC DIAGRAM

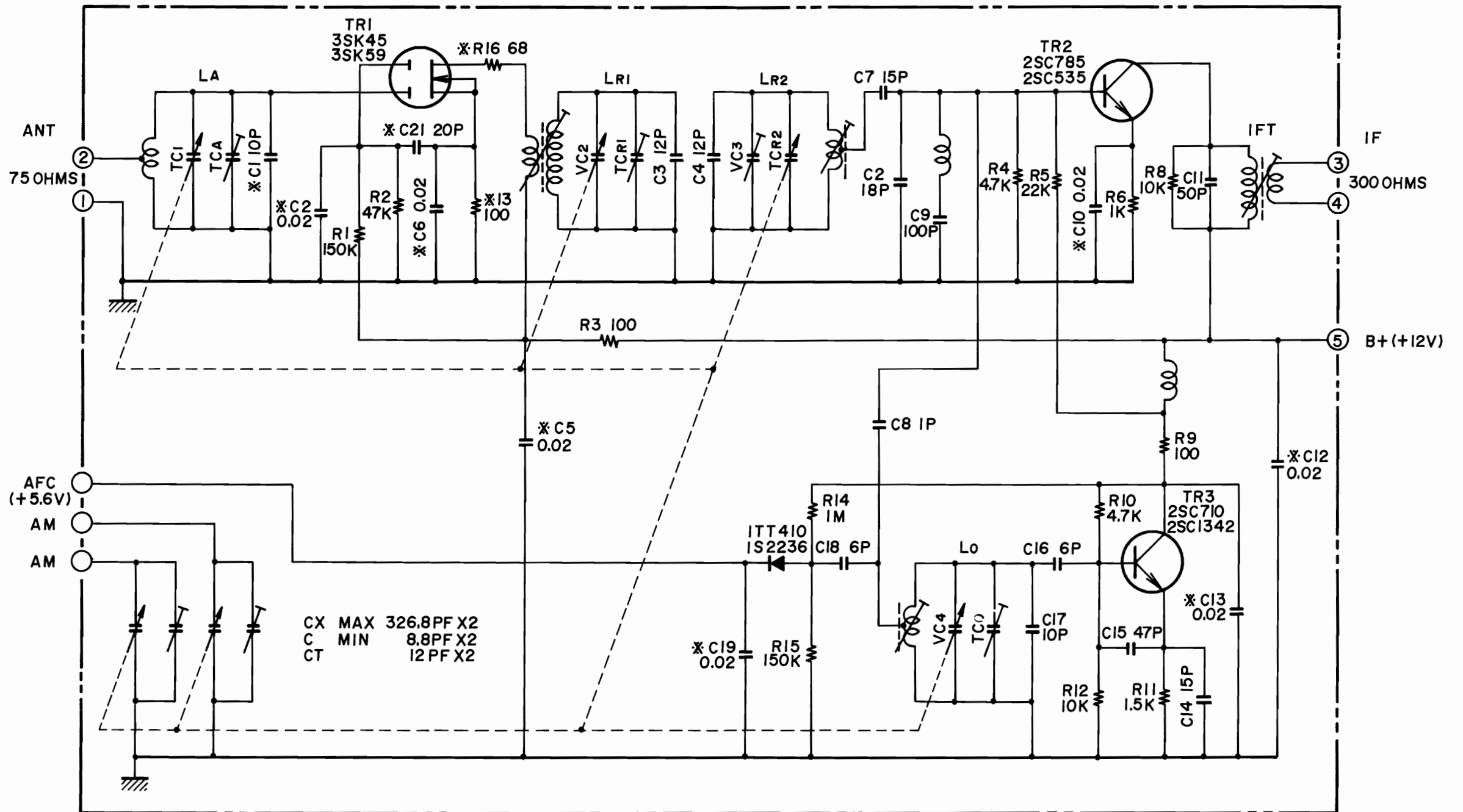
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2. AT-2400 NO. 2-2 1540447A FRONT END FB622U11

AT-2400



AT-2400
SCHEMATIC DIAGRAM
 NO.2-1 1540446A
 2C

AT-2400



AT-2400
 FRONT END FB622U11
 NO. 2-2 1540447A

