

**SERVICE MANUAL**

# **FISHER**

# **FM-2100**

**STEREO TUNER**



*WORLD LEADER IN HIGH QUALITY STEREO*

# SPECIFICATIONS

## FM TUNER SECTION

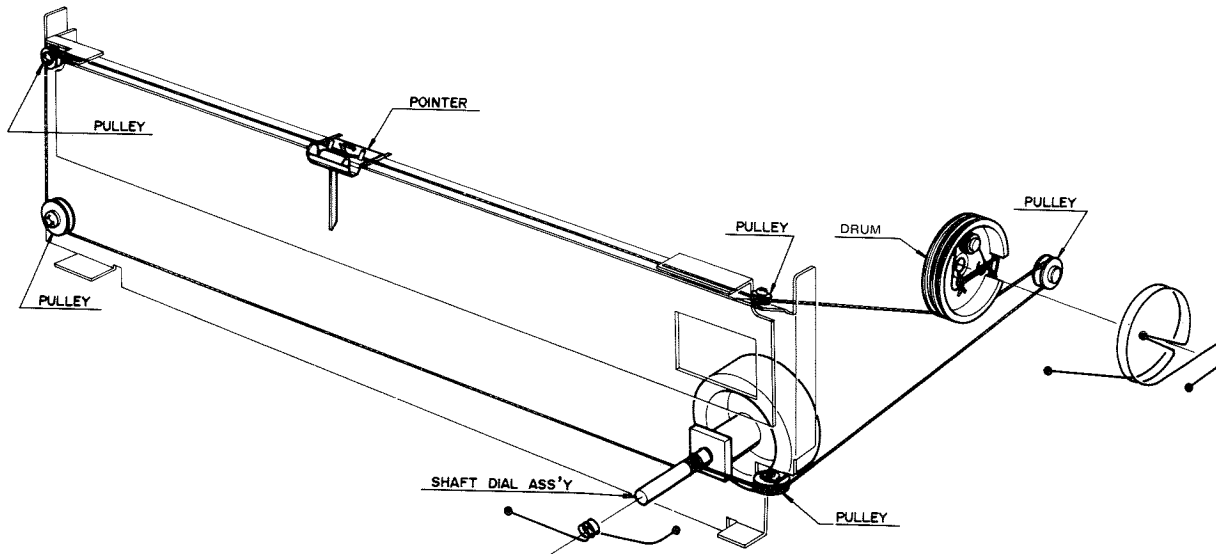
Frequency Range	88-108MHz
Usable Sensitivity	Mono 2.8 $\mu$ V Stereo 7 $\mu$ V
50dB Quieting Sensitivity	Mono 5 $\mu$ V Stereo 65 $\mu$ V
Signal/Hum + Noise (1mV at Ant.)	Mono 65dB Stereo 60dB
Signal/Hum + Residuals (1mV at Ant)	Mono 65dB Stereo 60dB
THD (1mV at Ant.)	Mono 0.5% Stereo 0.8%
AM Suppression (30% 400Hz AM)	55dB
Spurious Response (fe + 1/2 FIF)	50dB
Alternate Channel Selectivity	60dB
Image Response	50dB
IF Rejection (Unbalanced)	70dB
Capture Ratio	2dB
Stereo Separation at:	
100Hz	25dB
1000Hz	35dB
10000Hz (Hi-Blend (Off/On))	25dB
19kHz Suppression	60dB
38kHz Suppression	55dB
SCA Suppression	55dB
Spurious MPX Triggering:	
9.5kHz pilot carrier	$\pm$ 200kHz
4.75kHz pilot carrier	$\pm$ 200kHz
2.375kHz pilot carrier	$\pm$ 200kHz

Audio at Rated Output	$\pm$ 2dB
Minimum deviation required to trigger stereo beacon	6.7kHz
Stereo Trigger Sensitivity	5 $\mu$ V
Muting Threshold	30 $\mu$ V
Audio Frequency response Deviation from STD De-Emphasis 50Hz - 15kHz	Mono $\pm$ 3dB Stereo $\pm$ 3dB
Stereo Channel Balance	$\pm$ 3dB
Dial calibration error	$\pm$ 250kHz
Oscillator drift, warmup and $\pm$ 10% line voltage change (88 - 108MHz)	$\pm$ 60kHz
Maximum antenna signal for 0.5% THD	3V

## AM TUNER SECTION

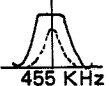
Frequency Range	535-1605kHz
IHF Usable Sensitivity (20dB)	
600kHz	400 $\mu$ V/m
1000kHz	400 $\mu$ V/m
1400kHz	400 $\mu$ V/m
Signal to Noise and Hum Ratio at 100mV/m	50dB
Image Response	40dB
IF Rejection	35dB
Selectivity $\pm$ 10kHz	25dB
Spurious Response 455kHz to 30MHz (Limit)	50dB
Rated Output Mod. 80% 100mV/m Ant.	$\pm$ 2dB
Volume Sensitivity	400 $\mu$ V/m

## DIAL CORD STRINGING





# ADJUSTMENT

## AM ADJUSTMENT

Step	Adjusting circuit	Connection		SG. frequency	Position of tuning dial	Adjustment	V.T.V.M. Oscilloscope
		Input	Output				
1	IF	Connect sweep generator to VC4.	Connect oscilloscope to test point TP4.	455 KHz	Near max. capacity of VC. at position with no signal.	AM 1st 9-20970 (Red, Blue) AM DET 9-21110	
2	RF	Connect standard loop antenna to output terminal of SG. Place receiver 2 feet from loop antenna	Connect V.T.V.M. to TP4.	600 KHz (400Hz, 30% modulation)	600 KHz	AM ANT 9-21083 AM OSC 9-20700	Max.
3				1400 KHz (400Hz, 30% modulation)	1400 KHz	TC4 TC5	Max.
4	Repeat adjustments.						

1. Variable capacitor completely closed.
2. Set the dial pointer to very left line dial scale.
3. Connect sweep generator, SG, V.T.V.M. and oscilloscope.
4. Function switch to "AM".
5. Use a screwdriver with plastic grip for all adjustments.

## FM ADJUSTMENT

Step	Adjusting circuit	Connection		SG. frequency	Position of tuning dial	Adjustment	V.T.V.M. Oscilloscope
		Input	Output				
1	IF	Connect sweep generator to test point TP0 through 0.01 $\mu$ F	Connect oscilloscope to test point TP1.	10.7 MHz (none modulation)	Near max. capacity of VC. at position with no signal.	IFT in FRONT END	
2	Ratio Det.		Connect oscilloscope to test point TP2.			FM DET 9-20850 (Pink) 9-20860 (Blue)	
3	RF	Connect FM SG. to FM ANT terminals.	Connect V.T.V.M. to TP1	90 MHz (400 Hz, 30% modulation)	90 MHz	TC1 TC2 TC3	Max.
4				106 MHz (400 Hz, 30% modulation)	106 MHz		Max.
5	Repeat adjustments.						

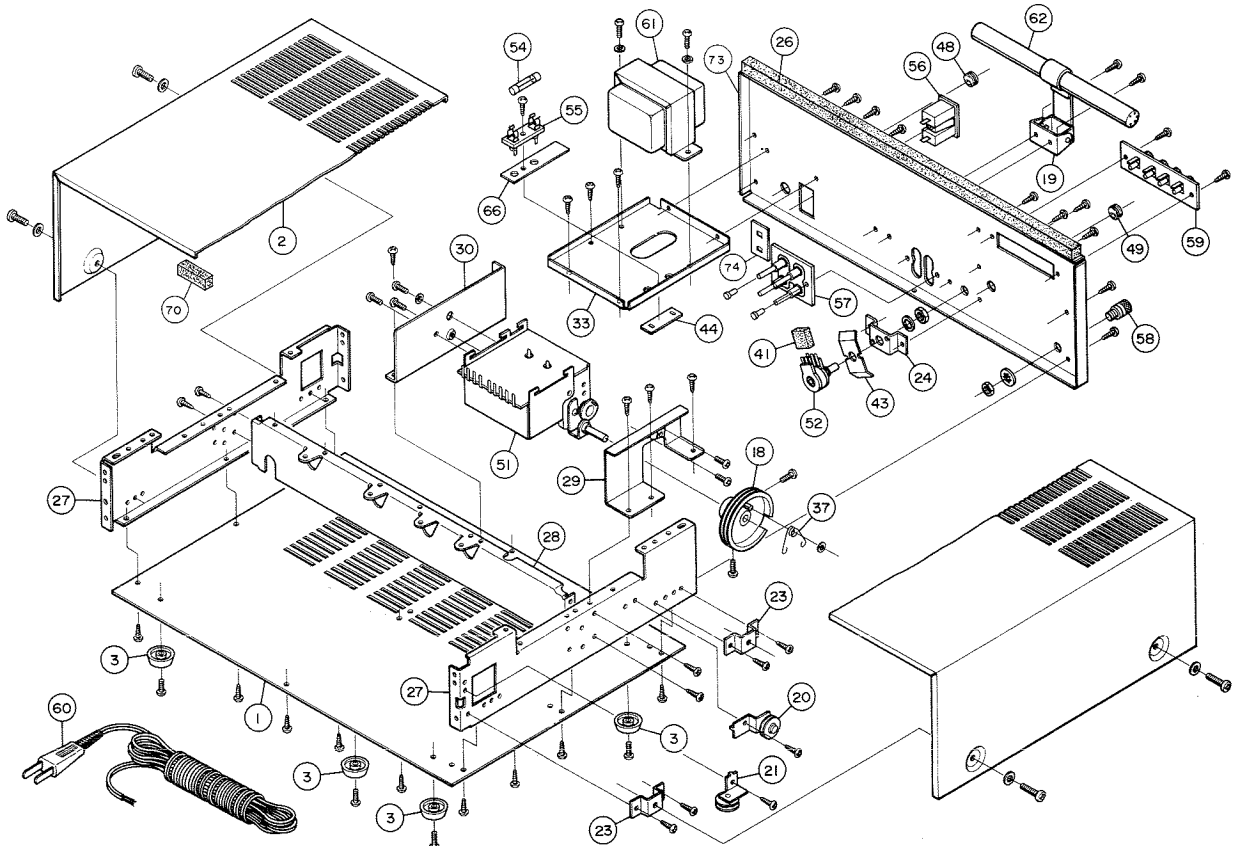
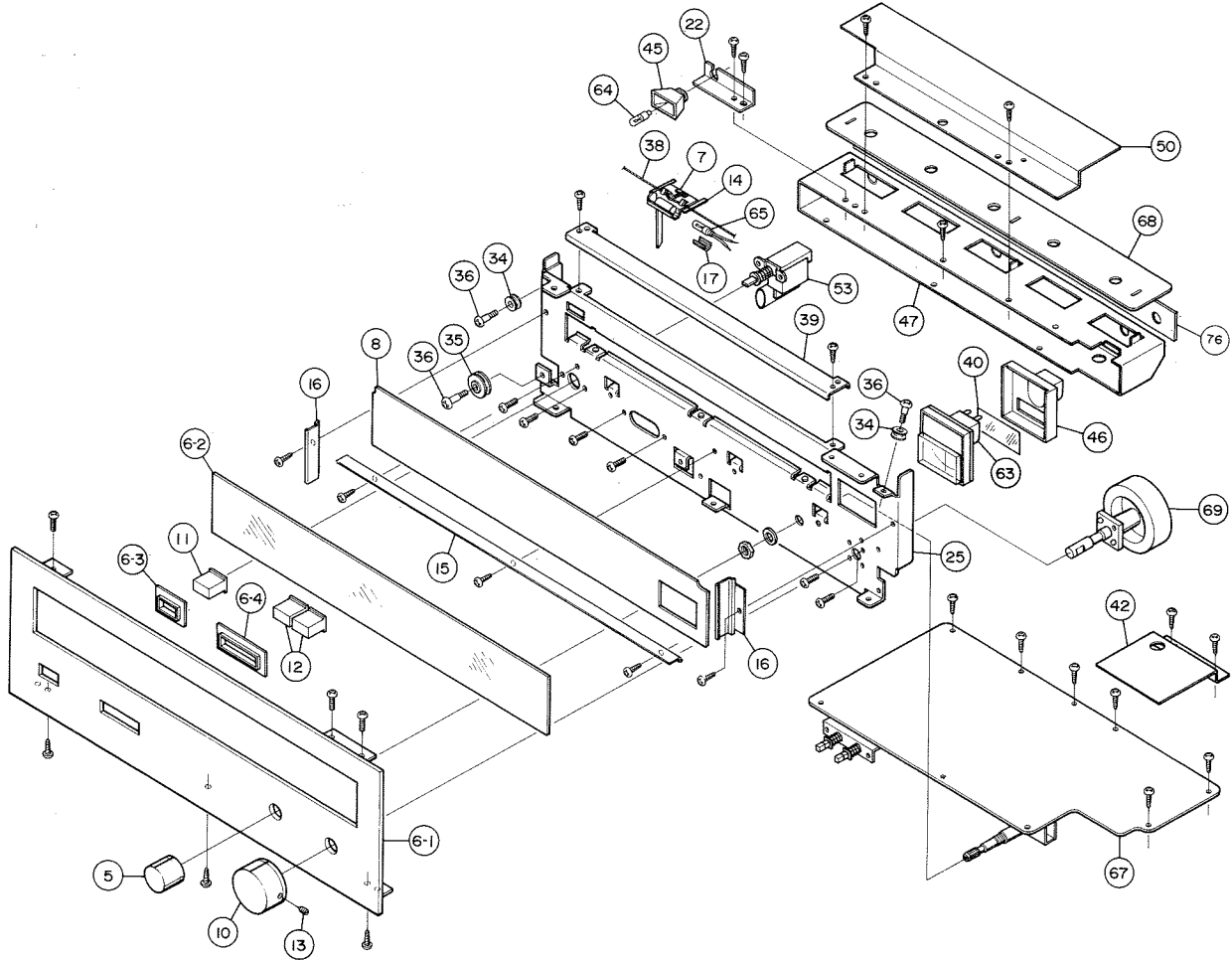
1. Variable capacitor completely closed.
2. Set the dial pointer to very left line of dial scale.
3. Connect sweep generator, FM SG, V.T.V.M. and oscilloscope. FM ANT. input impedance is 300 ohm.
4. Function switch to "FM MONO."
5. Use a screwdriver with plastic grip for all adjustments.

## FM MPX ADJUSTMENT

Step	Adjusting circuit	Connection		Position of tuning dial	Adjustment	
		Input	Output			
1	PLL IC FO (19KHz) Adjustment	None	Connect Frequency counter or synchroscope to TP5.		Adjust VR202 (50K) so that 19KHz may be indicated on the frequency counter or synchroscope.	
2	FM STEREO Signal Separation	Connect FM stereo SG to FM ANT terminals. 19 KHz signal ON. Main channel, sub channel signal ON. Add 1000 Hz signal from L Ch.	Connect V.T.V.M to output terminal (R channel).	Near max. capacity of VC. at position with no signal	VR203 (10K-B)	V.T.V.M. Min.
		Connect FM stereo SG to FM ANT terminals. 19 KHz signal ON. Main channel, sub channel signal ON. Add 1000 Hz signal from R Ch.	Connect V.T.V.M. to output terminal (L channel)			
3	Repeat steps 1, 2. Set at position with max. channel separation.					

1. Variable capacitor completely closed.
2. Connect FM stereo SG and V.T.V.M.
3. Function switch to "FM AUTO".
4. Use a screw-driver with plastic grip for all adjustments.

# EXPLODED VIEW



## PARTS LIST

Ref. No.	Part No.	Description
<b>CHASSIS</b>		
1	1312110515402	Bottom Cover
2	1312141013301	Top Cover
3	1312180112900	Leg
5	EK1310100131402	Knob Assembly, Function
6	1310101619803	Dress Panel Assembly
7	1310301115400	Dial Pointer Assembly
8	1312120127100	Dial Scale
10	EK1312160134501	Knob, Tuning
11	EK1312160134800	Knob, Power Switch
12	EK1312160134900	Knob, Push Switch
69	1310300317200	Tuning Shaft Assembly
18	1310300210800	Drum Assy., Tuning Gang
19	1310300811701	Antenna Mounting Bracket
<b>ELECTRICAL PARTS</b>		
51	FE4125920321	Front End
52	RV4222924690	Variable Resistor, 5K ohms Output Level
53	SP4231923900	Power Switch
54	FL51313-4	Fuse 0.5 Amp 250V Slo-Blo
55	EA4235921062	Fuse Holder
56	JK4235921960	AC Outlet
60	2740241	Line Cord
61	TD4251923344	Power Transformer
62	LA4257921083	AM Antenna
63	MC4511920400	Meter, Tuning/Signal Strength
64	LM4612920156	Lamp, Stereo Indicator 6V 25mA
65	LM4612920145	Lamp, Pilot 6.3V 140mA
67	PB1310400163103	FM/AM Tuner PCB Assembly
68	PB1310400162200	Dial Lamp PCB Assembly
C401	CK22359-1	Cap. Cer. 0.01MF 500V +100 -0%
R401	RF25DC102J	Res. Dep. Carb. 1K ohms 5% 1/4W
57	JK423592201	Jack Connector, Output
59	ET4237921460	External Antenna Connector
<b>TUNER P.C.B. ASSY PARTS</b>		
VR201	RV4222923450	Variable Resistor 50K ohms
VR202	RV4222924700	Variable Resistor 50K ohms
VR203	RV4222924710	Variable Resistor 10K ohms
CF201	ZK4227920150	Low Pass Filter
CF202	ZK4227920240	Ceramic Filter
CF203		
	SP4231923980	Switch Push, Muting MPX Noise Filter
L3	SR4231923990	Switch, Function
L1,L2	LC4253920230	Coil, 100μH
	LC4253920240	Coil, 1000μH
	ZZ4256920850	IF Transformer Discriminator
	ZZ4256920860	IF Transformer Discriminator
	ZZ4256920970	IFT, AM 1st
	ZZ4256921110	IFT, AM 2nd
	ZZ4256921120	IFT, FM Muting Filter
C203	LC4258920700	Osc. Coil, AM
	C1BBDZ204TY	Cap. Semiconductor 0.2MF 12V +80 -20%
C223	CE1252522	Cap. Elect. 22MF 16V
C256	CECDY330/16	Cap. Elect. 330MF 16V
C262	CE402470519	Cap. Elect. 470MF 16V
C251	CS22340-5	Cap. Sint. Alum. 1MF 16V
C231	CS22340-2	Cap. Sint. Alum. 0.22MF 16V
C215	CE402100629	Cap. Elect. 10MF 25V
C221,	CE1252615	Cap. Elect. 4.7MF 25V
C268,		
C269		
C261	CE22342-23	Cap. Elect. 1000MF 25V
C260,	CE1252633	Cap. Elect. 330MF 25V
C263		
C253,	CS22340-2	Cap. Sint. Alum 0.22MF 25V
C265		
C254	CS22340-4	Cap. Sint. Alum 0.47MF 25V
C240	CK0248631	Cap. Cer. 1pf 50V ±0.25pf
C205	CK22344-7	Cap. Cer. 7pf 50V ±0.25pf
C220	CK22344-32	Cap. Cer. 10pf 50V ±0.25pf
C216	CK0248691	Cap. Cer. 200pf 50V 10%
C213,	CK22347-6	Cap. Cer. 300pf 50V 10%
C214		

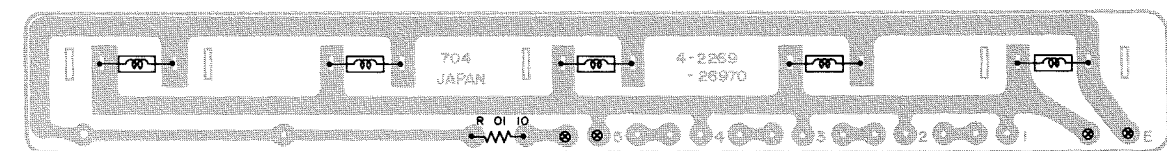
Ref. No.	Part No.	Description
<b>TUNER P.C.B. ASSY PARTS</b>		
C255	CK22347-8	Cap. Cer. 500pf 50V 10%
C248,	CY22335-12	Cap. Mylar 0.022MF 50V 20%
C249,		
C270		
C250	CY22335-22	Cap. Mylar 0.047MF 50V 20%
C246,247,	CE22342-2	Cap. Elect. 1MF 50V
252,257,		
244,245,		
233,266,		
267		
C218	C1HSEJ341A	Cap. Styrol 340pf 50V 5%
C219	CK22349-1	Cap. Cer. 0.01MF 50V 20%
C201,202,	CK22348-1	Cap. Cer. 0.05MF 50V +80 -20%
204,206,		
207,208,		
209,210,		
211,212,		
217,222,		
224,225,		
226,227,		
228,229,		
230,232,		
234,235,		
236,237,		
238,239,		
241,242,		
243,264,		
271,273,		
274,275		
C258,259	CK22359-1	Cap. Cer. 0.01MF 50V +100 -0%
D211,212	TR1N4002	Diode 1N4002
D214	TRRD13A	Diode RD13A
IC201	TRTA7061AP	IC TA7061AP
IC202	TRBA1310	IC BA1310
R226,232,	RF25DC101J	Res. Dep. Carb. 100 ohms 5% 1/4W
256		
R204,214,	RF25DC102J	Res. Dep. Carb. 1K ohms 5% 1/4W
215,246,		
265,261,		
282		
R219,234,	RF25DC103J	Res. Dep. Carb. 10K ohms 5% 1/4W
247,250,		
R242,266,	RF25DC104J	Res. Dep. Carb. 100K ohms 5% 1/4W
R212	RF25DC122J	Res. Dep. Carb. 1.2K ohms 5% 1/4W
R254,255	RF25DC123J	Res. Dep. Carb. 12K ohms 5% 1/4W
R209	RF25DC124J	Res. Dep. Carb. 120K ohms 5% 1/4W
R201	RF25DC151J	Res. Dep. Carb. 150 ohms 5% 1/4W
R249,231	RF25DC152J	Res. Dep. Carb. 1.5K ohms 5% 1/4W
R262,238	RF25DC153J	Res. Dep. Carb. 15K ohms 5% 1/4W
R253	RF25DC154J	Res. Dep. Carb. 150K ohms 5% 1/4W
R240	RF25DC183J	Res. Dep. Carb. 18K ohms 5% 1/4W
R211,223	RF25DC221J	Res. Dep. Carb. 220 ohms 5% 1/4W
R224,225,	RF25DC222J	Res. Dep. Carb. 2.2K ohms 5% 1/4W
245,251,		
239,264,		
268		
R222	RF25DC224J	Res. Dep. Carb. 220K ohms 5% 1/4W
R208	RF25DC272J	Res. Dep. Carb. 2.7K ohms 5% 1/4W
R230	RF25DC273J	Res. Dep. Carb. 27K ohms 5% 1/4W
R275,276	RF25DC274J	Res. Dep. Carb. 270K ohms 5% 1/4W
R203,207,	RF25DC331J	Res. Dep. Carb. 330 ohms 5% 1/4W
213,227		
R228,243,	RF25DC332J	Res. Dep. Carb. 3.3K ohms 5% 1/4W
277,278		
R233	RF25DC333J	Res. Dep. Carb. 33K ohms 5% 1/4W

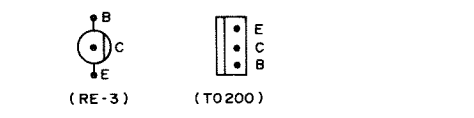
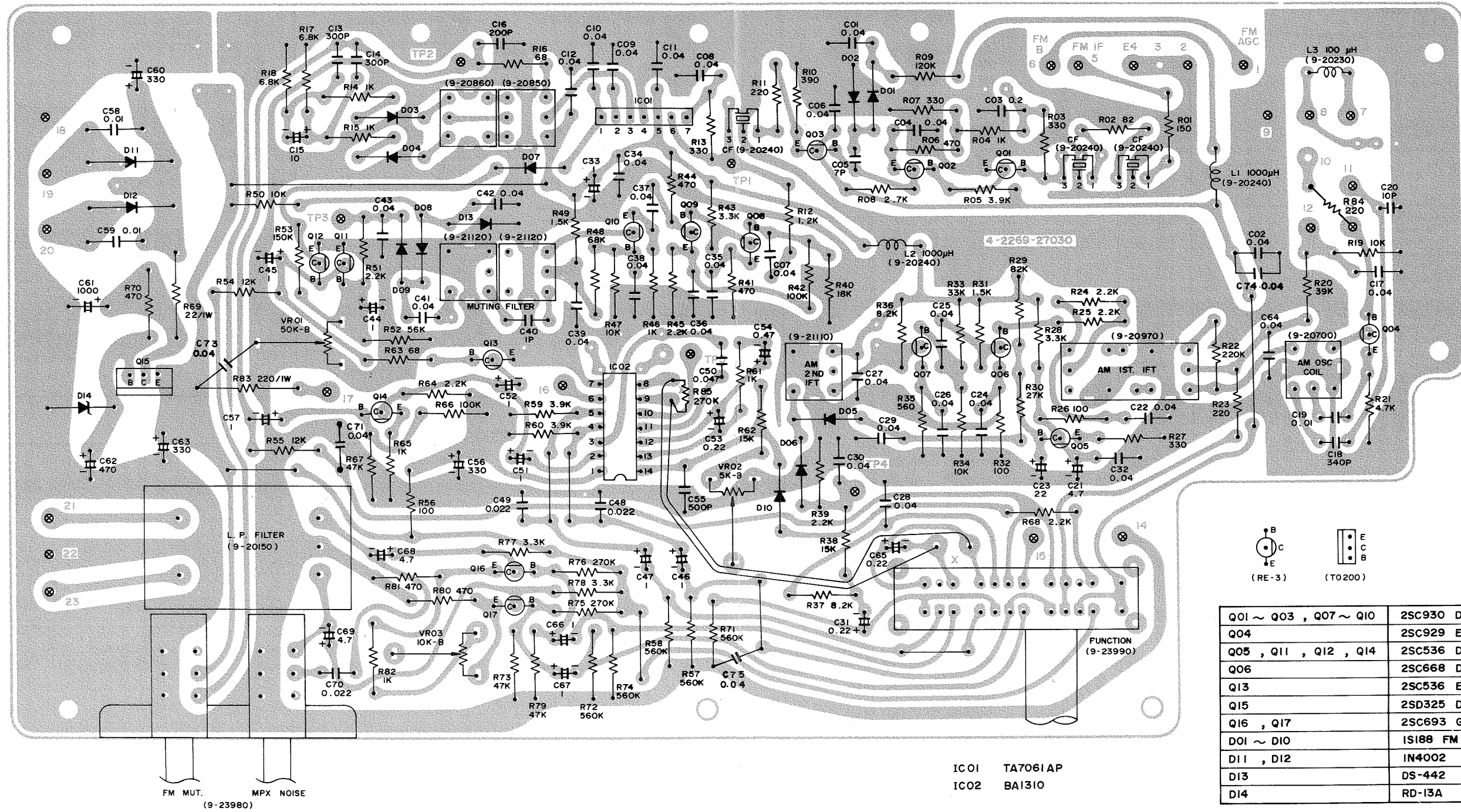
## PARTS LIST

Ref. No.	Part No.	Description
<b>TUNER P.C.B. ASSY PARTS</b>		
R210	RF25DC391J	Res. Dep. Carb. 390 ohms 5% 1/4W
R205,259,	RF25DC392J	Res. Dep. Carb. 3.9K ohms 5% 1/4W
260		
R220	RF25DC393J	Res. Dep. Carb. 39K ohms 5% 1/4W
R244,270,	RF25DC471J	Res. Dep. Carb. 470 ohms 5% 1/4W
206,241,		
280,281		
R221	RF25DC472J	Res. Dep. Carb. 4.7K ohms 5% 1/4W
R267,273,	RF25DC473J	Res. Dep. Carb. 47K ohms 5% 1/4W
279		
R235	RF25DC561J	Res. Dep. Carb. 560 ohms 5% 1/4W
R252	RF25DC563J	Res. Dep. Carb. 56K ohms 5% 1/4W
R257,258,	RF25DC564J	Res. Dep. Carb. 560Kohms 5% 1/4W
271,272,		
274		
R216,263	RF25DC680J	Res. Dep. Carb. 68 ohms 5% 1/4W
R217,218	RF25DC682J	Res. Dep. Carb. 6.8K ohms 5% 1/4W
R248	RF25DC683J	Res. Dep. Carb. 68K ohms 5% 1/4W
R202	RF25DC820J	Res. Dep. Carb. 82 ohms 5% 1/4W
R236,237	RF25DC822J	Res. Dep. Carb. 8.2K ohms 5% 1/4W
R229	RF25DC823J	Res. Dep. Carb. 82K ohms 5% 1/4W

Ref. No.	Part No.	Description
<b>TUNER P.C.B. ASSY PARTS</b>		
R284	RF25DC221J	Res. Dep. Carb. 220 ohms 5% 1/4W
R269	RW200W220J	Res. 22 ohms 1W 10%
R283	O119525	Res. 220 ohms 1W 10%
D201,202,	TR1S188FM	Diode 1S 188FMI-A
203,204,		
205,206,		
207,208,		
209,210		
Q206	TR2SC668D	Transistor 2SC668D
Q205,211,	TR2SC536D	Transistor 2SC536D
212,214,		
Q213	TR2SC536E	Transistor 2SC536E
Q216,217	TR2SC693F	Transistor 2SC693F
Q204	TR2SC929E	Transistor 2SC929E
Q201,202,	TR2SC930D	Transistor 2SC930D
203,207,		
208,209,		
210		
Q215	TR2SD325E	Transistor 2SD325E
D213	TRDS442	Diode DS-442
<b>DIAL LAMP P.C.B. ASSY PARTS</b>		
R01	4235920930 LM4612920280 RF25DC100J	Lamp Holder, Clip Type (2) Lamp 6.3V 250 mA Resistor 10 ohm 10% 1/4W

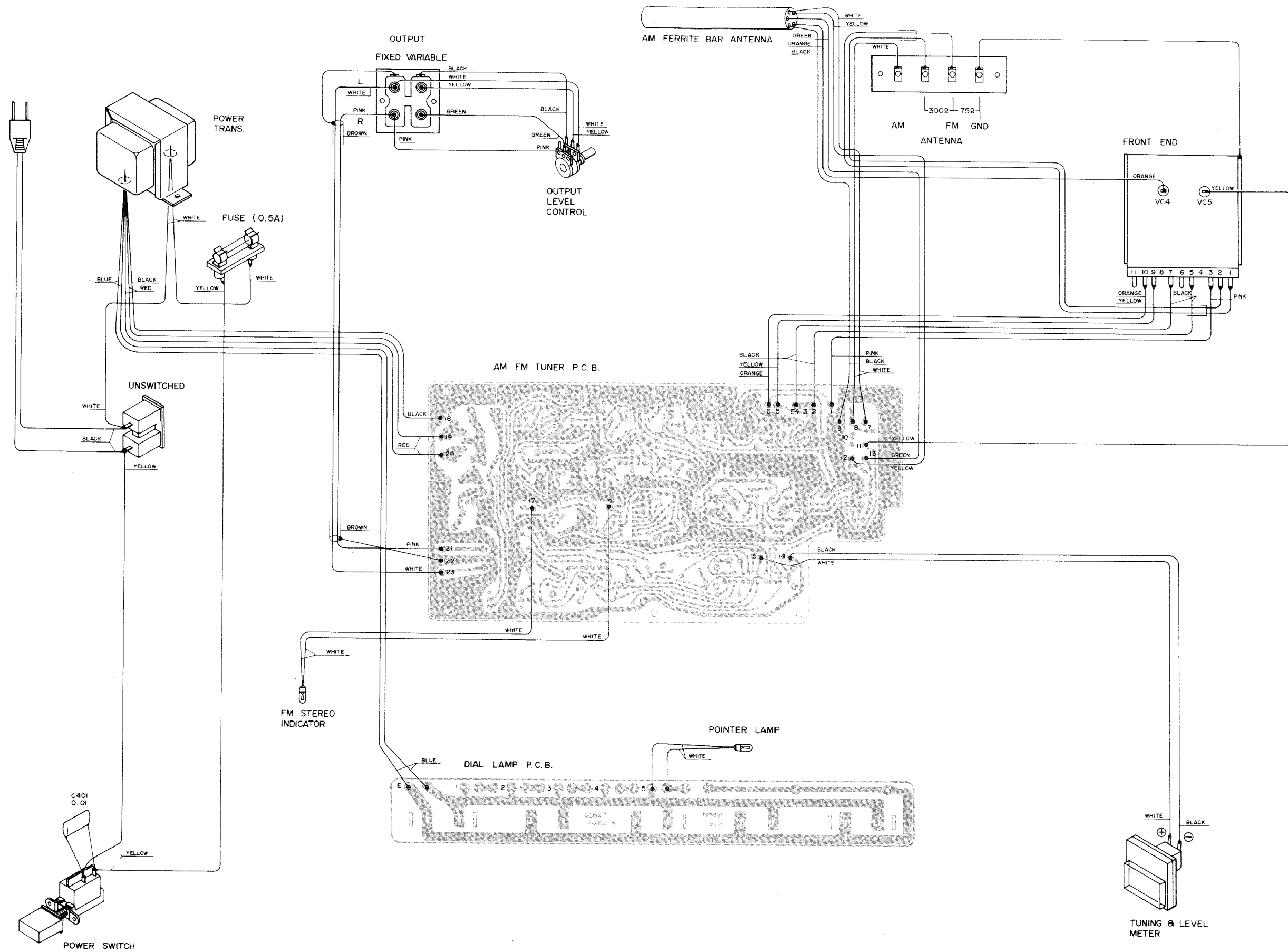
## DIAL LAMP P.C.B. ASSEMBLY



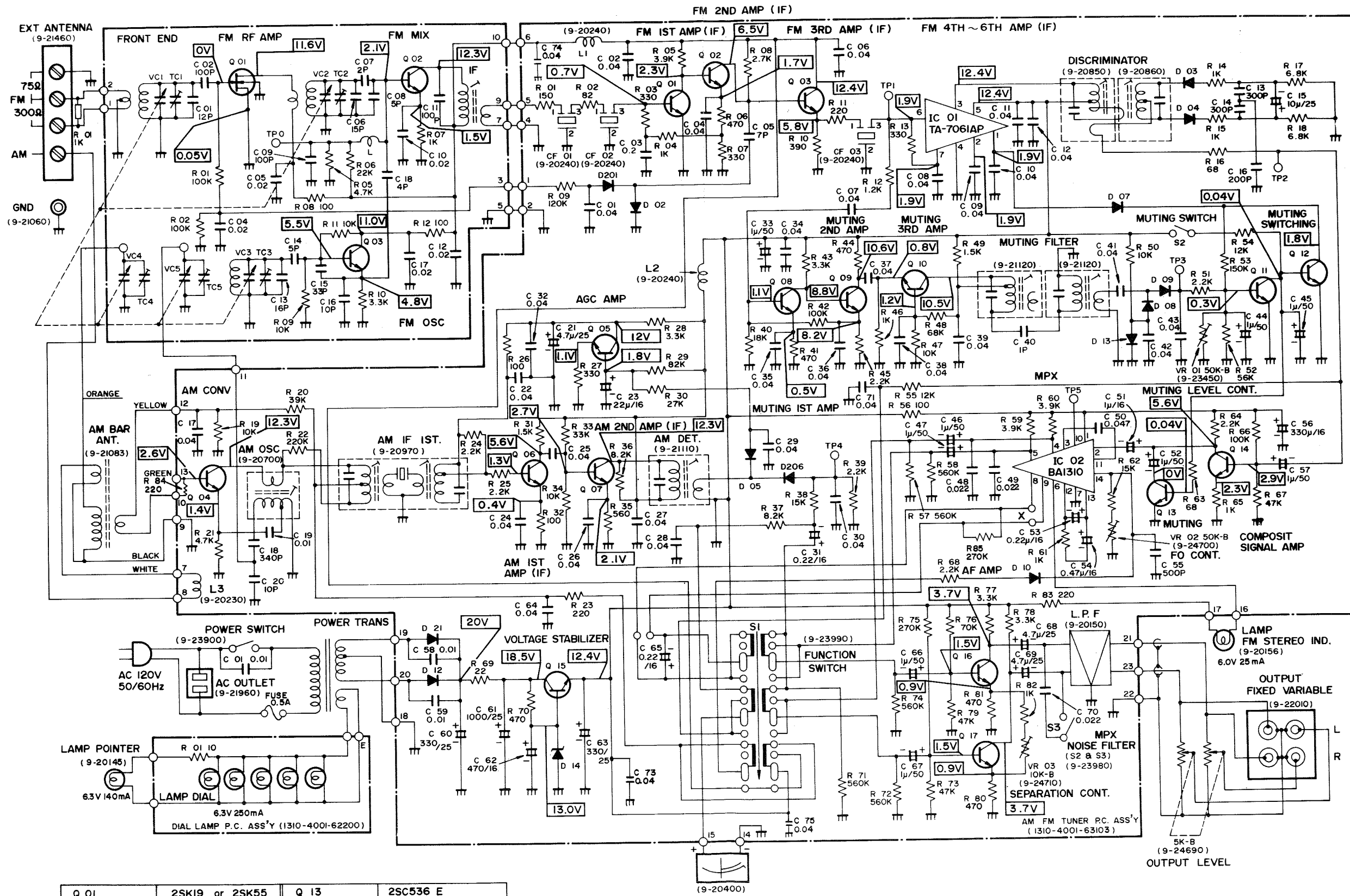


Q01 ~ Q03 , Q07 ~ Q10	2SC930 D or E
Q04	2SC929 E
Q05 , Q11 , Q12 , Q14	2SC536 D or E
Q06	2SC668 D or E
Q13	2SC536 E
Q15	2SD325 D or E
Q16 , Q17	2SC693 G
D01 ~ D10	1S188 FM I
D11 , D12	1N4002
D13	DS-442
D14	RD-13A

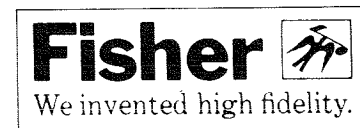
IC01 TA7061AP  
IC02 BA1310



**SCHEMATIC DIAGRAM**



Q 01	2SK19 or 2SK55	Q 13	2SC536 E
Q 02 , Q 03	2SC535	Q 14	2SC536 D or E
Q 01 ~ Q 03	2SC930 D or E	Q 15	2SD325 D or E
Q 04	2SC929 E	Q 16 , Q 17	2SC693 FU
Q 05	2SC536 D or E	D 01 ~ D 10	1S188 FM-1
Q 06	2SC668 D or E	D 11 , D 12	1N4002
Q 07 ~ Q 10	2SC930 D or E	D 13	DS-442
Q 11 , Q 12	2SC536 D or E	D 14	RD-13A



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