SANGEAN™

ATS-818

A World of Listening

PLL SYNTHESIZED WORLD BAND RECEIVER

The SANGEAN ATS-818 is the WORLD'S ONLY Portable World Band Receiver offering more features and performance than many expensive table top Short Wave Receivers.

* All SW Bands from 120m to 11m
* Radio/Buzzer Clock Alarm
* BFO for Single Side Band & CW
* Continuous AM Coverage from 150-29999KHz plus FM 87.5-108MHz
* 45 Memory Presets
* AM Wide/Narrow Filter
* Dual Time Display for Local and UTC Time
* Adjustable Sleep Timer
* RF Gain Control
* Dual Conversion Receiver
* Signal Strength & Battery Indicator
* Tone Control & Safety Lock

* Five Tuning Methods: Direct frequency Input, Auo Scan, Manual Scan, Memory Recall, Rotary Dial

SPECIFICATIONS	FREQUENCY	2.300-2.495MHz(120m) 3.200-3.400(90m) 3.900-4000(75m) 4.750-5.060(60m) 5.950-6.200MHz(49m) 7.100-7.300(41m) 9.500-9.900(31m) 11.650-12.050(25m) 13.600-13.800(21m) 15.100-15.600(19m) 17.550-17.900(16m) 21.450-21.850(13m) 25.670-26.100(11m)	
SEMI-CONDUCTORS: 1 LSI, 12 IC's, 8 FET's, 48 Trans., 45 Diodes, 2 LED		OUTPUT PWR: 800mW	SPKR: 4 inch, 4 ohm
BATTERIES: 4/1.5VDC "D" Size Radio Power & 3/1.5VDC AA Back-Up Power		ACCESSORIES: AC Adapt, Ext. Antenna Adapt, Shortwave HandBook	

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Service Manual

ATS-818

CONTENTS

SPECIFICATIONS

FM

TEST ITEM	CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range	Min.	87.5	± 0.15	MHz
	Max.	108.0	± 0.15	MHz
Intermediate Freq.		10.7	± 0.15	MHz
Max. Sens.	90MHz		18	dBμ
	98MHz		18	dBμ
	106MHz		18	dBμ
Usable Sens. (S/N 30dB)	90MHz	18	24	dBμ
	98MHz	18	24	dBμ
	106MHz	18	24	dBμ
Dial Calibration	90MHz		± 100	kHz
	98MHz		± 100	kHz
	106MHz		± 100	kHz
Audio Fidelity -3dB (W/Pre-emphasis)	98MHz		150	Hz
	98MHz		8K	Hz
3dB Limiting (1mV)	98MHz	18	24	dBμ
Image Rejection	106MHz	36	30	dB
I. F. Rejection	90MHz	60	50	dB
Spurious Rejection	98MHz		50	dB
T. H. D. (75kHz. Dev.)	98MHz	2	4	%
Lowest Battery Voltage	98MHz	3.9	4.2	V
Max. Output Power	98MHz			mW
Output Power At 10% T. H. D.	98MHz		700	mW
Alter. Channel Select. 100μV	98MHz		25	dB
Stereo Indicator Sens.	98MHz		24	dBμ
Tuning indicator Sens. (2nd. dot)	98MHz		24	dBμ
Stereo Separation (1kHz)	98MHz	25	20	dB
Auto Scanning Stop Sens.	98MHz		24	dBμ
Overload Capacity	98MHz		100	dBμ
AM. Suppression (66dBμ)	98MHz		30	dB
Min. Output	98MHz		3	mV
Tone Action (10kHz)	98MHz		18	dB
S/N (22.5kHz Dev.)	98MHz	50	44	dB
Supply Voltage: DC 6V R.O.: 50mW	Load: 4 ohm	Modulation: 1kHz/22.5kHz Dev.		

MW

TEST ITEM	CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range	Min.	520	± 5	kHz
	Max.	1620/1710	± 5	kHz
Intermediate Freq.	1st. IF	55845	± 1	kHz
	2nd.IF	450		
Max. Sens.	600kHz		58	dBμ/m
	1000kHz		56	dBμ/m
	1400kHz		56	dBμ/m
Usable Sens. (S/N 20dB)	600kHz	58	64	dBμ/m
	1000kHz	56	62	dBμ/m
	1400kHz	56	62	dBμ/m
Dial Calibration	600kHz		± 5	kHz
	1000kHz		± 5	kHz
	1400kHz		± 5	kHz
Audio Fidelity (-6dB)	1000kHz		150	Hz
	1000kHz		2100	Hz
A. C. A. (± 10kHz)	1000kHz		28	dB
T. H. D. (5mV)	1000kHz	2	4	%
A.G.C. F.O.M.	1000kHz		40	dB
Image Rejection	1400kHz		26	dB
I. F. Rejection (450kHz)	1000kHz		40	dB
Whistle Modulation (5mV/m)	2IF/3IF		15	%
Lowest Battery Voltage	1000kHz	3.9	4.2	V
Hum Modulation (5mV)	1000kHz			dB
Tuning Indicator Sens. (2nd. dot)	1000kHz		58	dBμ/m
Auto Scanning Stop Sens.	1000kHz		60	dBμ/m
Tone Action (3kHz)	1000kHz			dB
S/N Ratio (5mV)	1000kHz		32	dB
Current Consumption				
Output Power At 10% T.H.D.	1000kHz		700	mW
Overload Capacity (30% Mod 10% T.H.D.)	1000kHz		100	dBμ/m
Bandwidth 6dB (Wide)	1000kHz	7	4 ~ 9	kHz
Bandwidth 6dB (Narrow)	1000kHz	4.5	2.5 ~ 7	kHz
Supply Voltage: DC 6V R.O.: 50mW	Load: 4 ohm	Modulation: 1kHz 30% Mod.		

SW

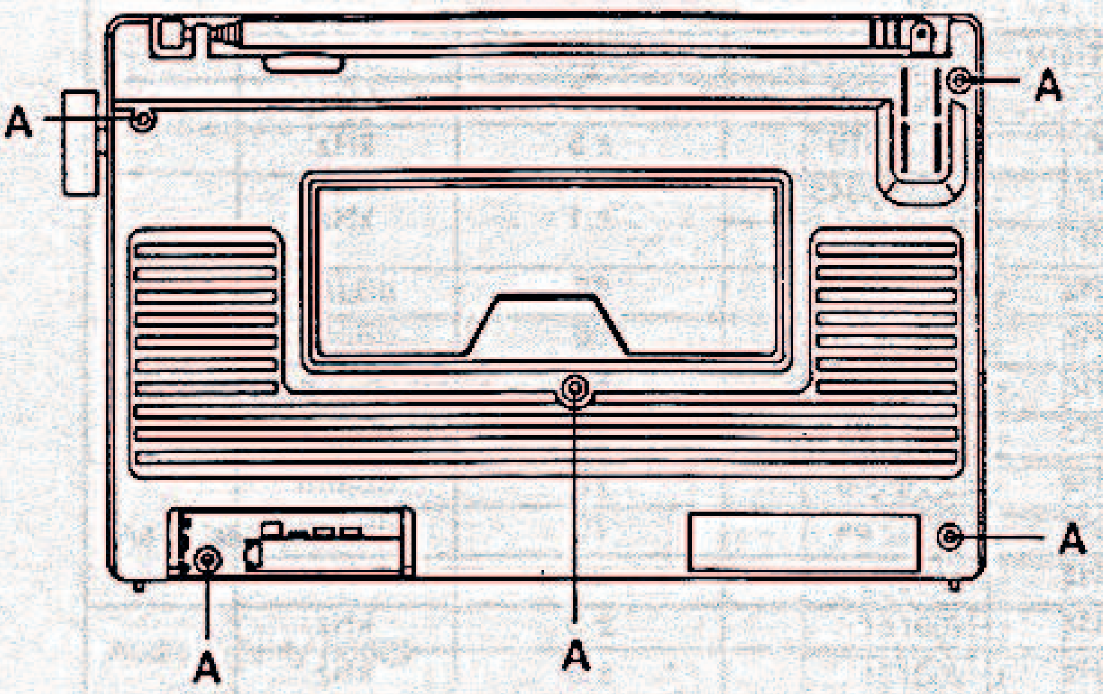
TEST ITEM	CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range	Min.	1621/1711	± 5	kHz
	Max.	29999	± 5	kHz
Intermediate Freq.	1st. IF	55845	± 1	kHz
	2nd. IF	450		
Max. Sens.	2300kHz		24	dBμ
	15100kHz		22	dBμ
	25600kHz		22	dBμ
Usable Sens. (S/N 20dB)	2300kHz	22	28	dBμ
	15100kHz	22	28	dBμ
	25600kHz	22	28	dBμ
Dial Calibration	2300kHz		± 5	kHz
	15100kHz		± 5	kHz
	25600kHz		± 5	kHz
Audio Fidelity (-6dB)	15100kHz		150	Hz
	15100kHz		2200	Hz
A. C. A. (± 10kHz)	15100kHz		28	dB
T. H. D. (60 dBμ)	15100kHz	2	4	%
A.G.C. F.O.M. (86 dBμ)	15100kHz		50	dB
Image Rejection	15100kHz	26	20	dB
I. F. Rejection (450kHz)	15100kHz		50	dB
Whistle Modulation (5mV)	2IF/3IF			%
Lowest Battery Voltage	15100kHz	3.9	4.2	V
Hum Modulation (5mV)	15100kHz			dB
Tuning Indicator Sens. (2nd. dot)	15100kHz		24	dBμ
Auto Scanning Stop Sens.	15100kHz		26	dBμ
RF Gain Control	15100kHz	25	± 6	dB
S/N Ratio (60 dBμ)	15100kHz		40	dB
SSB/CW Sens. (S/N = 10 dB)	15100kHz	-3	+ 3	dBμ
Output Power At 10% T.H.D.	15100kHz		700	mW
Overload Capacity (30% Mod 10% T.H.D.)	15100kHz	86	80	dBμ
Bandwidth 6dB (Wide)	15100kHz	7	4 ~ 9	kHz
Bandwidth 6dB (Narrow)	15100kHz	4.5	3 ~ 7	kHz
Supply Voltage: DC 6V R.O.: 50mW	Load: 4 ohm	Modulation: 1kHz 30% Mod.		

LW

TEST ITEM	CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range	Min.	150	± 5	kHz
	Max.	519	± 5	kHz
Intermediate Freq.	1st.IF	55845	± 1	kHz
	2nd.IF	450		
Max. Sens.	173kHz		68	dBμ/m
	218kHz		66	dBμ/m
	281kHz		64	dBμ/m
Usable Sens. (S/N 20dB)	173kHz	68	74	dBμ/m
	218kHz	66	72	dBμ/m
	281kHz	64	70	dBμ/m
Dial Calibration	173kHz		± 5	kHz
	218kHz		± 5	kHz
	281kHz		± 5	kHz
Lowest Battery Voltage	218kHz	3.9	4.2	V
Hum Modulation (5mV)	15100kHz			dB
Tuning Indicator Sens. (2nd. dot)	218kHz		70	dBμ/m
Auto Scanning Stop Sens.	218kHz		72	dBμ/m
Tone Action (3kHz)	1000kHz			dB
S/N Ratio (5mV)	218kHz		24	dB
Supply Voltage: DC 6V R.O.: 50mW	Load: 4 ohm	Modulation: 1kHz 30% Mod.		

Note : Nominal specs represent the design specs. All units should be able to approximate these-some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable ; in no case should a unit fail to meet limit specs.

DISASSEMBLY INSTRUCTIONS



TO REMOVE BACK COVER

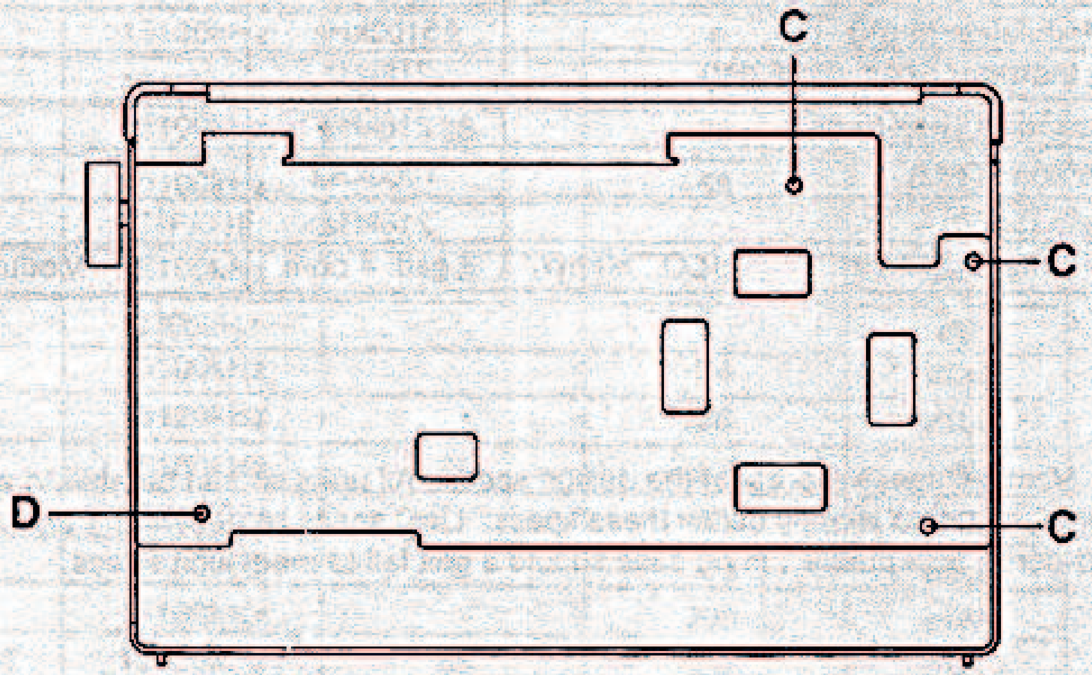
a. Unscrew 5 screws A.

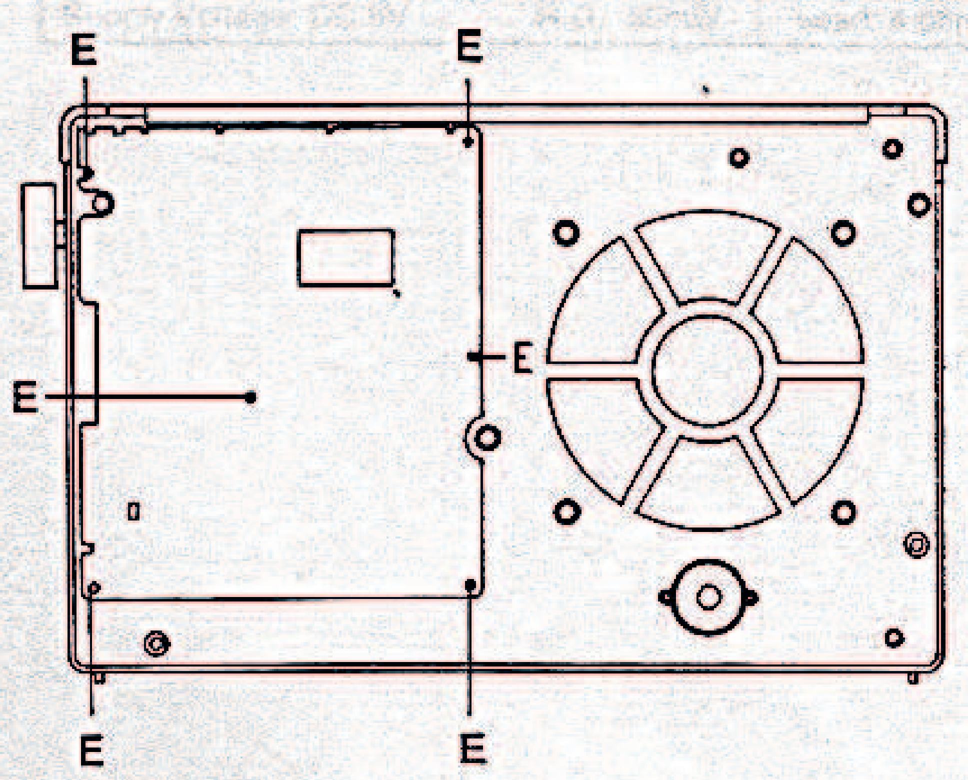
b. Separate front and back cabinet.

TO REMOVE MAIN PCB

a. Remove 3 screws C.

b. Remove Main PCB and 1 screw D.



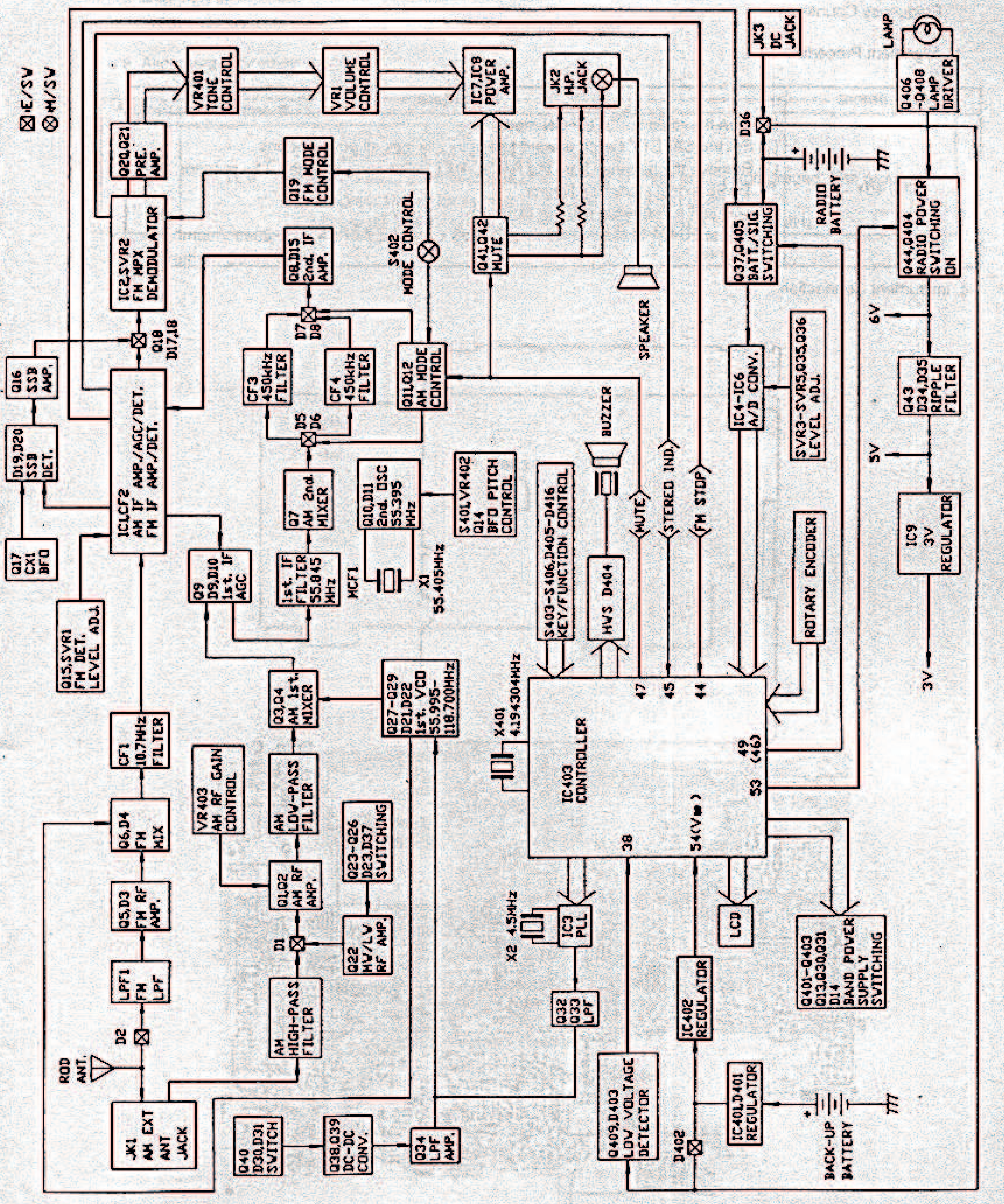


TO REMOVE CONTROL PCB

a. Remove 5 screws E.

b. Remove Control PCB.

BLOCK DIAGRAM



ALIGNMENT INSTRUCTIONS

Note: (1) All test points are shown on schematic diagram.
(2) Load in fresh batteries before any alignment procedures.

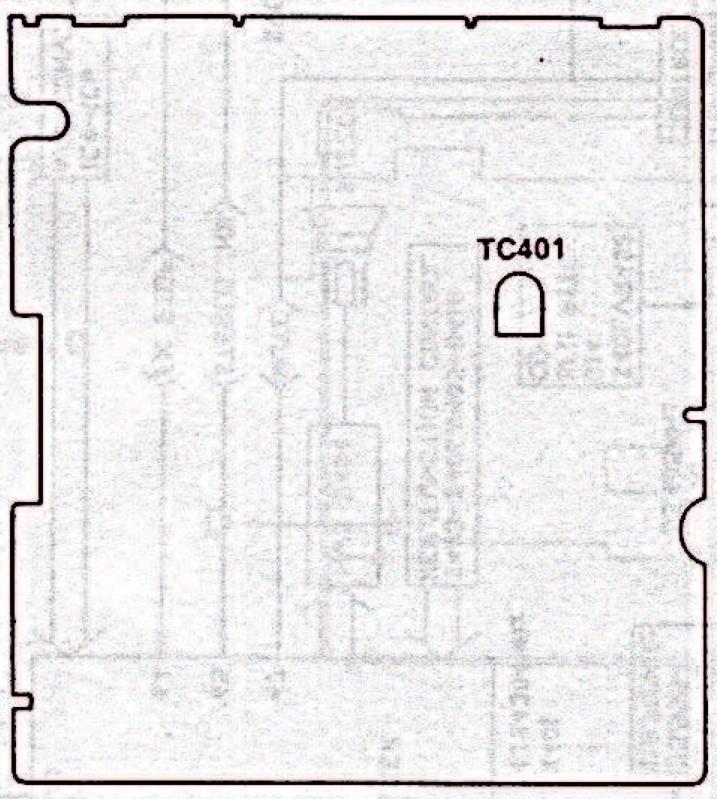
(1) ALIGNMENT FOR CLOCK TIME ACCURACY

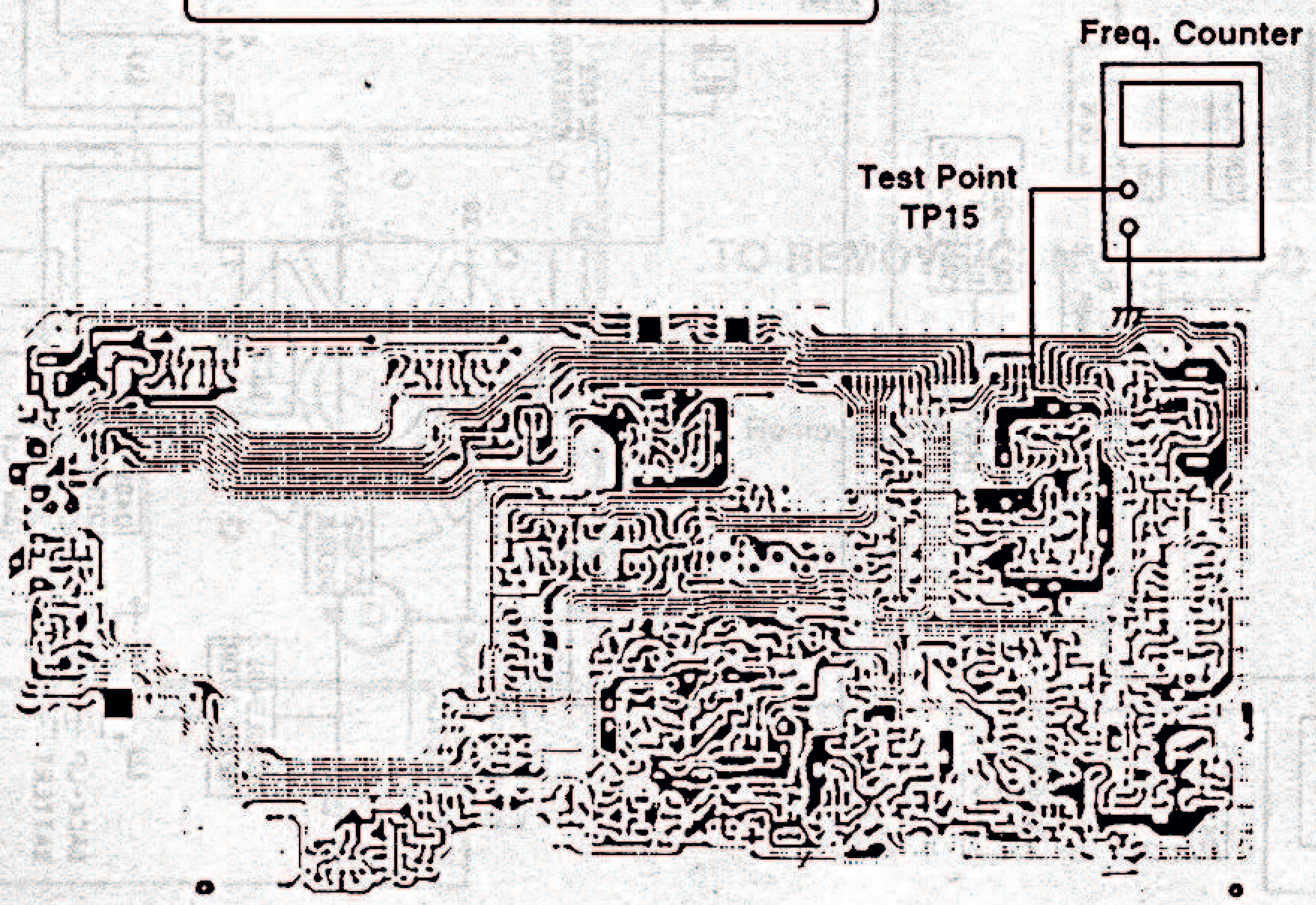
a. Required Instrument
Frequency Counter

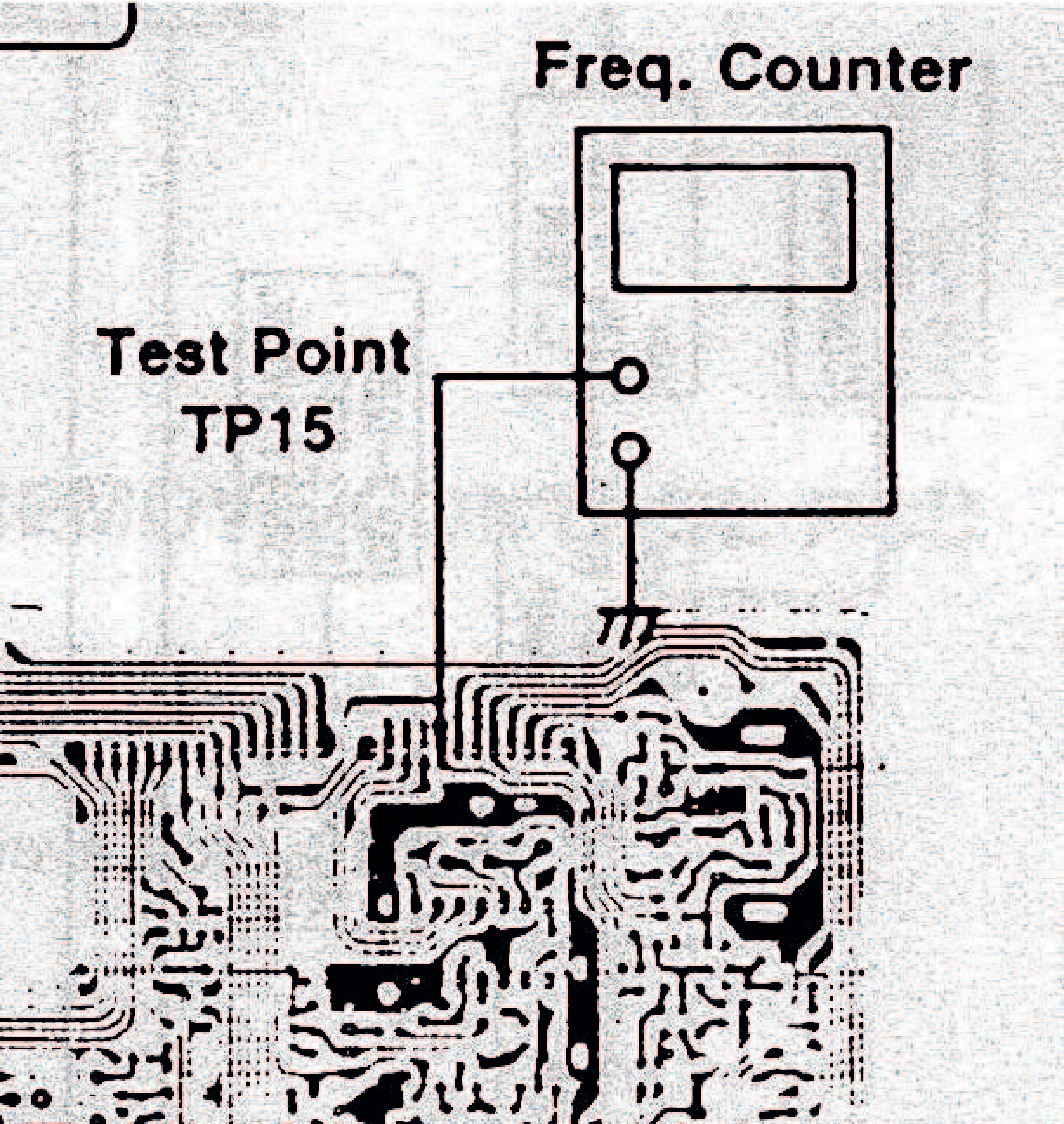
b. Alignment Procedure

Adjustment	Procedure
TC 401	(1) Turn the radio to SLEEP ON mode. (2) Set the SAFETY switch upward to electrically lock all push buttons. (3) Remove the batteries from the RADIO BATTERY compartment. The monitor TIME BASE signal starts functioning. (4) Connect a frequency counter to TP 15. (5) Adjust TC401 to reach a reading 524288 ± 4Hz (± 7.6PPM or ± 20sec/month) on counter.

c. Instrument Connection






Freq. Counter
Test Point
TP15

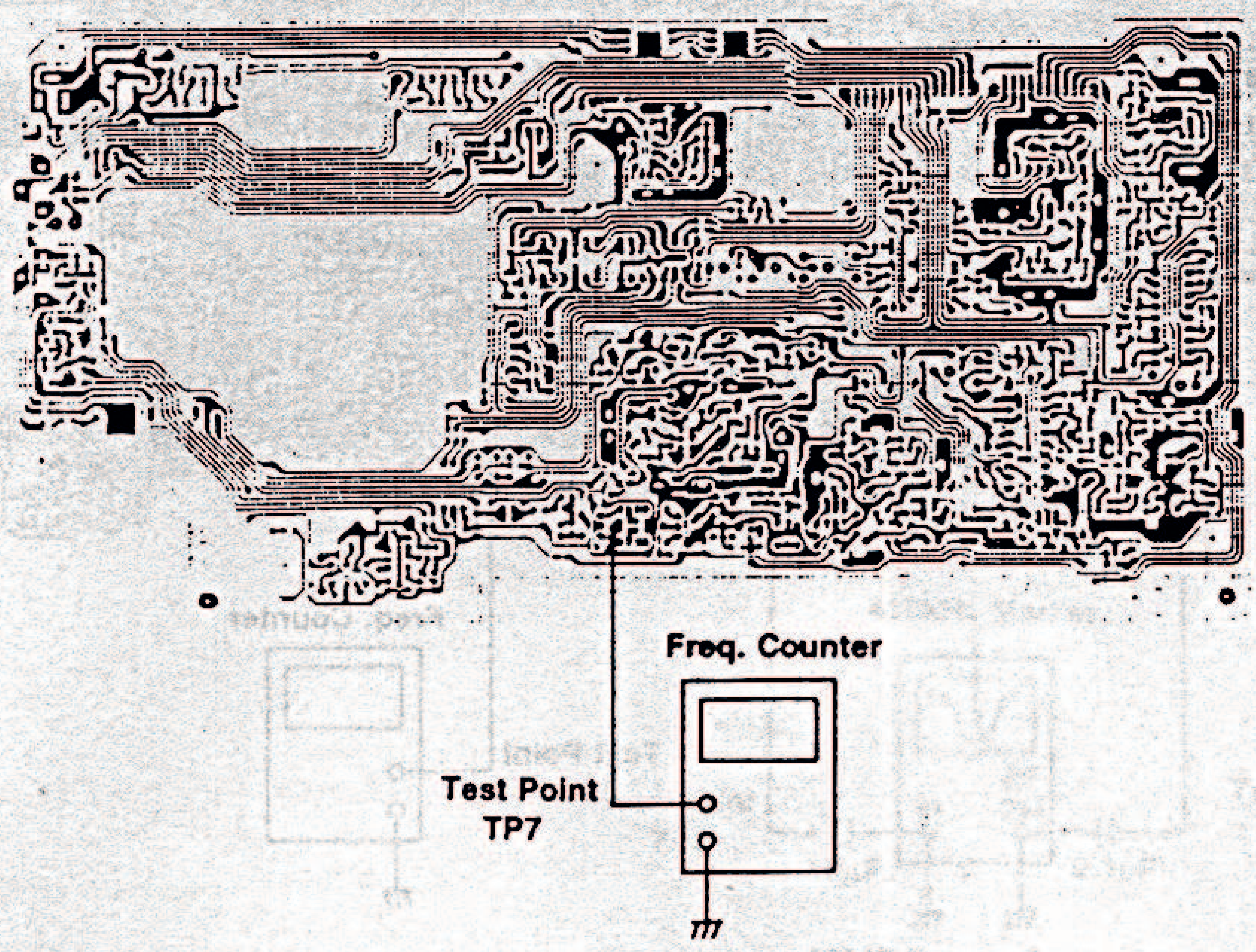
(2) **ALIGNMENT FOR PLL FREQUENCY**

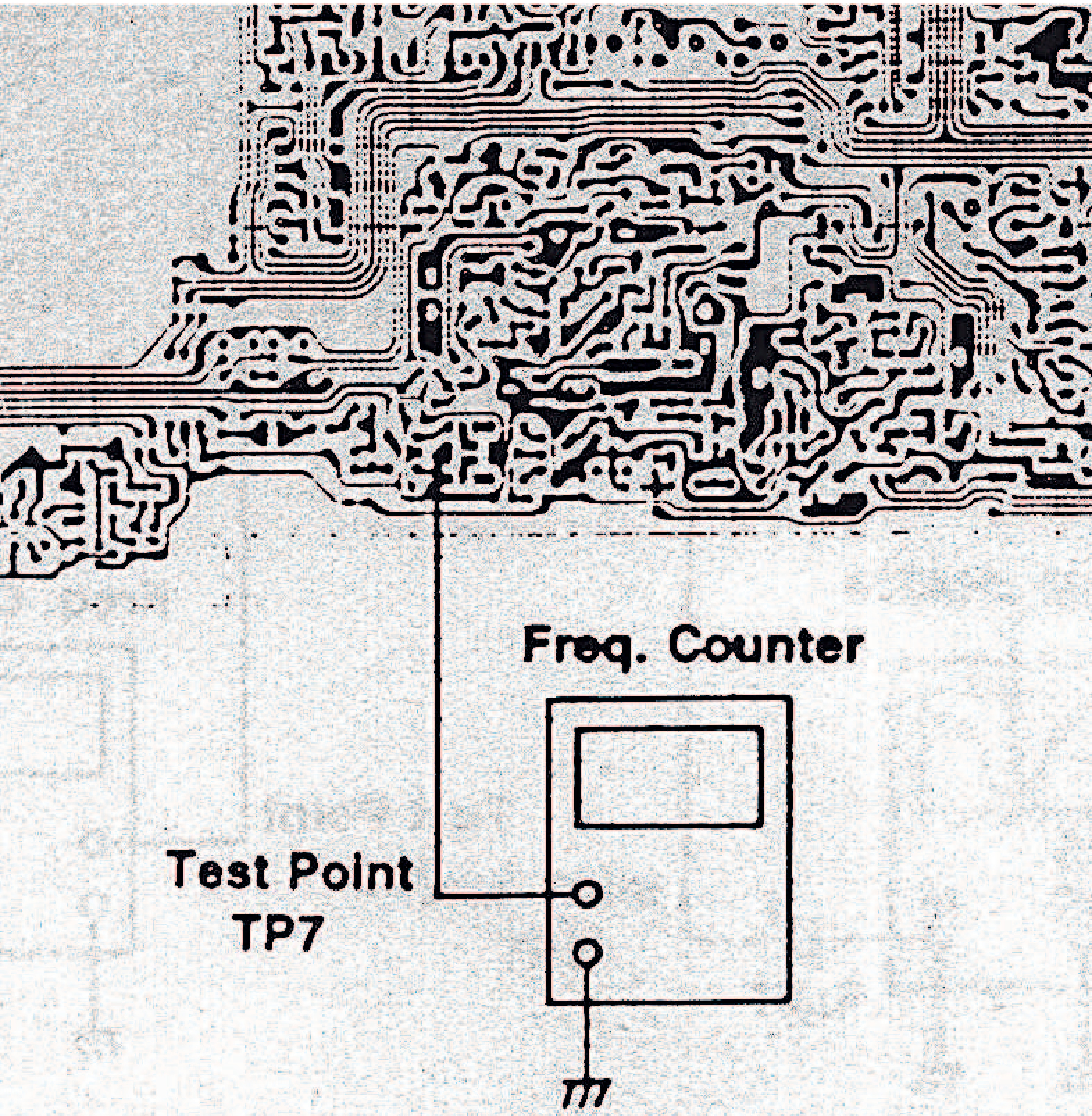
a. Required Instrument
   Frequency Counter

b. Alignment Procedure

Mode	Adjustment	Procedure
FM	TC4	(1) Turn the radio ON. (2) Select the tuner frequency at 108 MHz. (3) Connect the test probes of frequency counter to TP7 and ground. The ground point should be as near as possible to the test point TP7 (4) Adjust TC4 to have a reading of 118.69975MHz-118.70025MHz.

c. Instrument Connection




Freq. Counter
Test Point
TP7

(3) ALIGNMENT FOR AM 2ND LOCAL OSC

a. Required Instrument

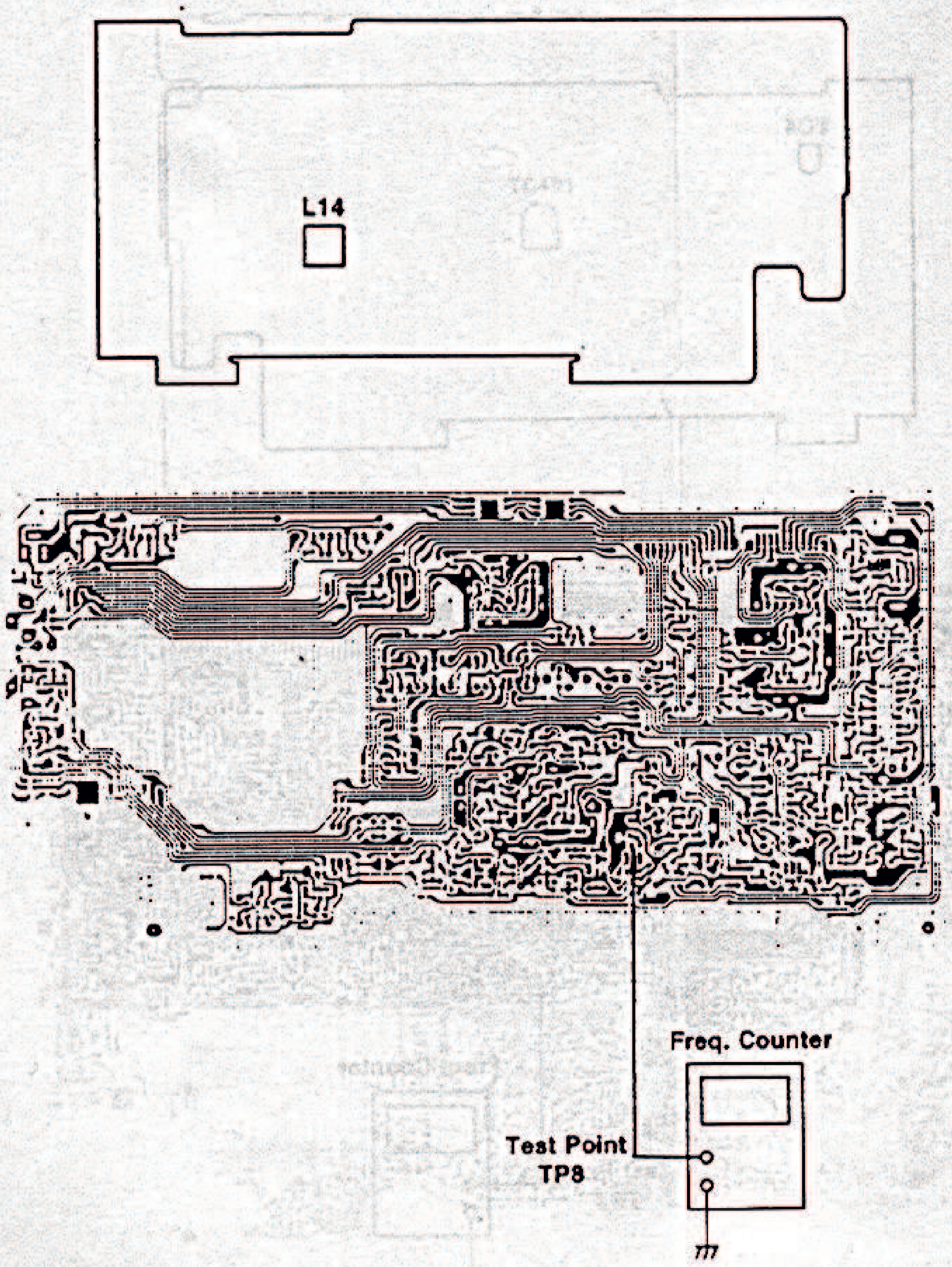
Frequency counter with higher impedance probe.

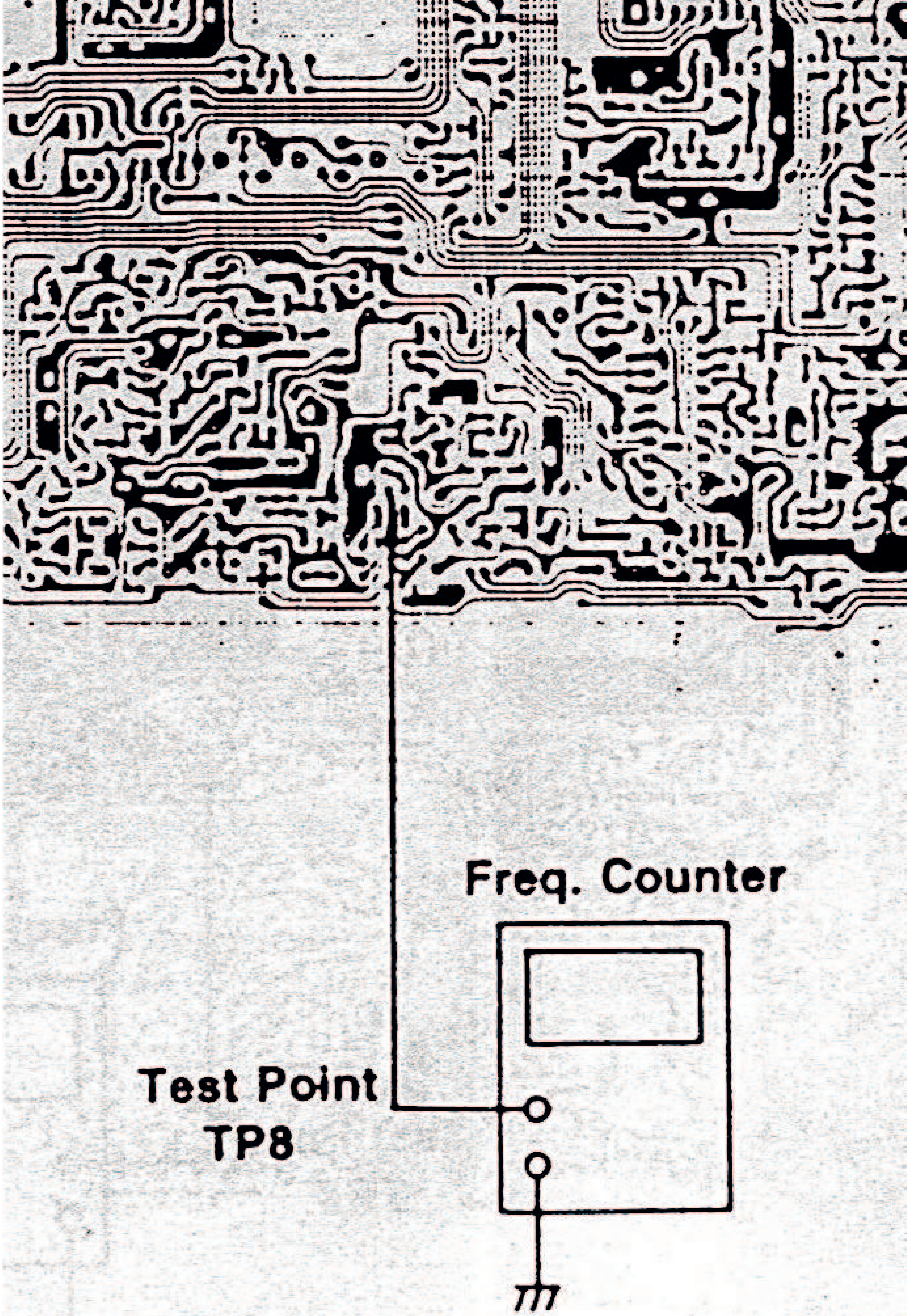
b. Alignment Procedure

Mode	Adjustment	Procedure
AM	L14	(1) Turn the radio ON. (2) Tune the frequency far away from any station to avoid interference. (3) Connect the test probes of frequency counter to TP8 and ground. (4) Adjust L14 to have a reading of 55.39485MHz-55.39515MHz.

Caution : A loading effect could emerge in the circuit if inserted with a lower impedance probe of frequency counter.

c. Instrument Connection




Freq. Counter
Test Point
TP8

(4) ALIGNMENT FOR AM 2ND IF

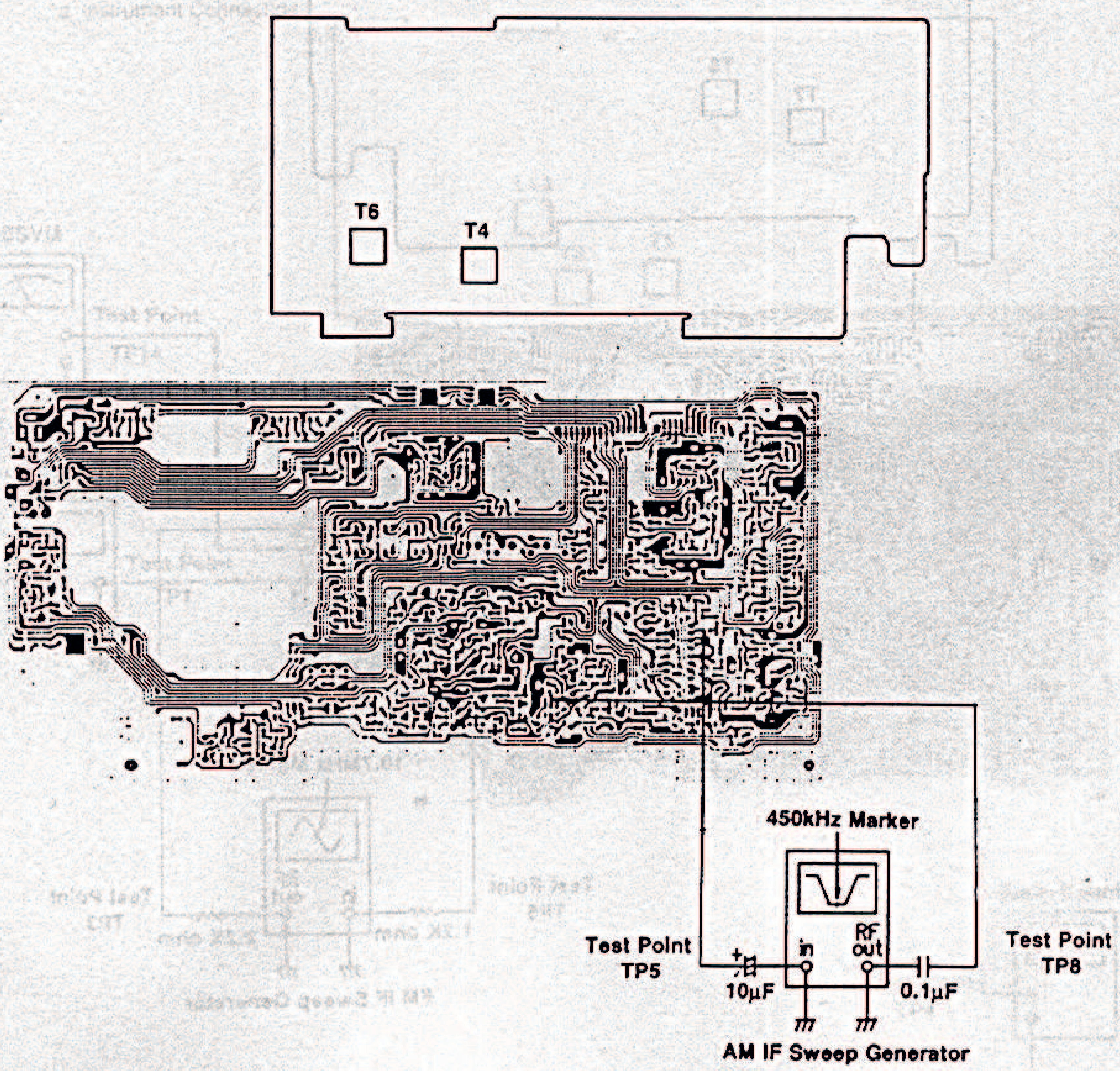
a. Required Instrument

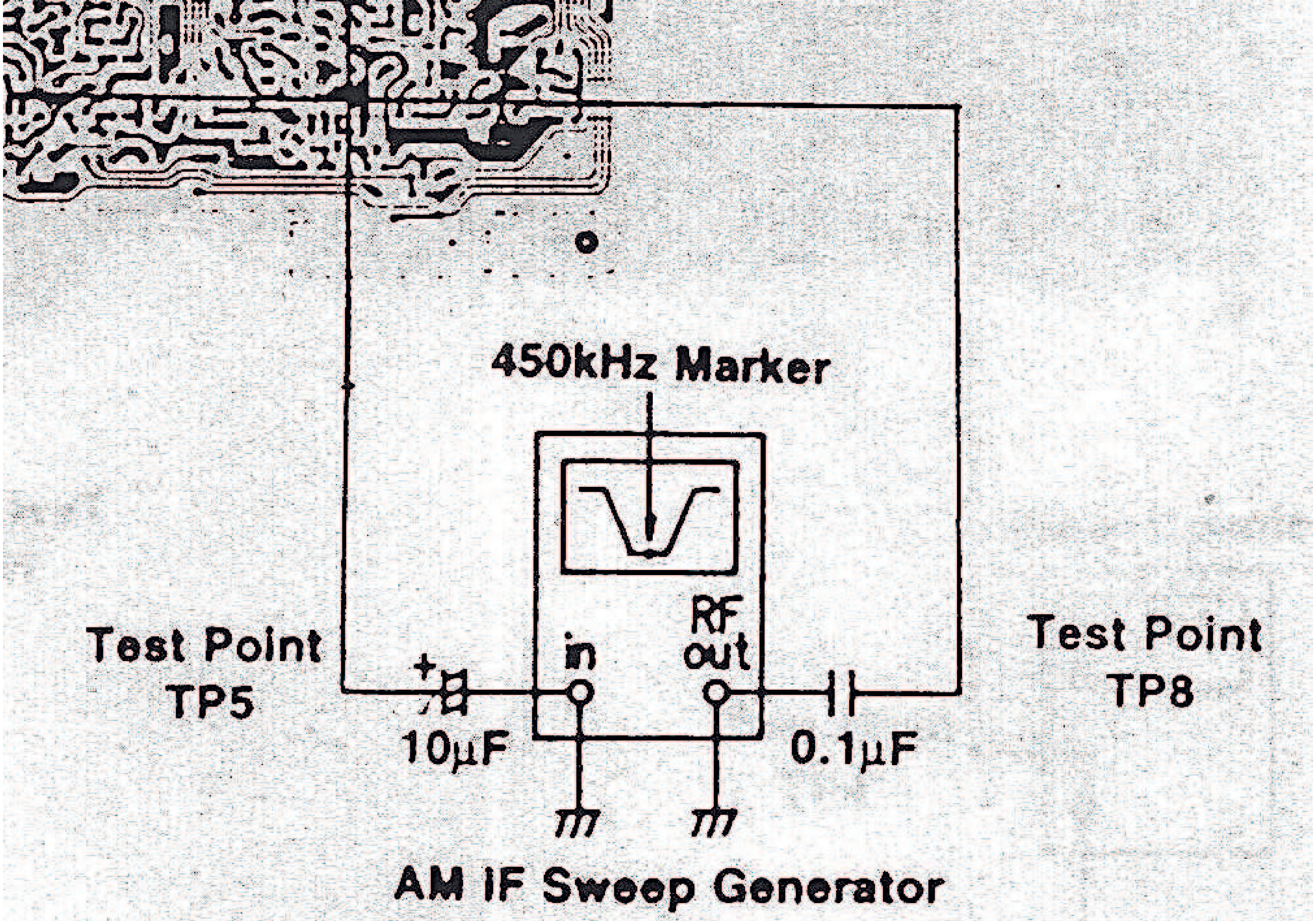
AM IF Sweep Generator with Scope

b. Alignment Procedure

Mode	Adjustment	Procedure
AM	T 4 T 6	(1) Turn the radio ON. (2) Set the bandwidth switch to WIDE position. (3) Connect the input terminal of AM IF sweep generator in series with a capacitor of 10µF to the test point TP5. (4) Connect the RF output terminal of AM IF sweep generator in series with a capacitor 0.1µF to another test point TP8. (5) Adjust T4 to have a max. output with a marker frequency of 450kHz on the sweep scope. (6) Adjust T6 to have a max. output with a marker frequency of 450kHz on the sweep scope. (7) Repeat (5) and (6) until a max. 450kHz output is reached.

c. Instrument Connection




450kHz Marker
Test Point
TP5
10µF
in
RF
out
0.1µF
Test Point
TP8
AM IF Sweep Generator

(5) ALIGNMENT FOR FM IF

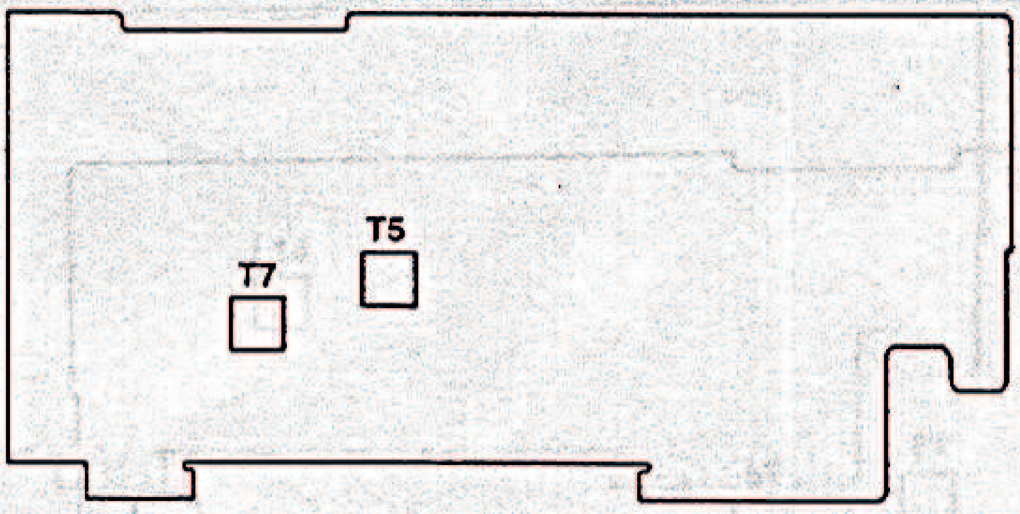
a. Required Instruments

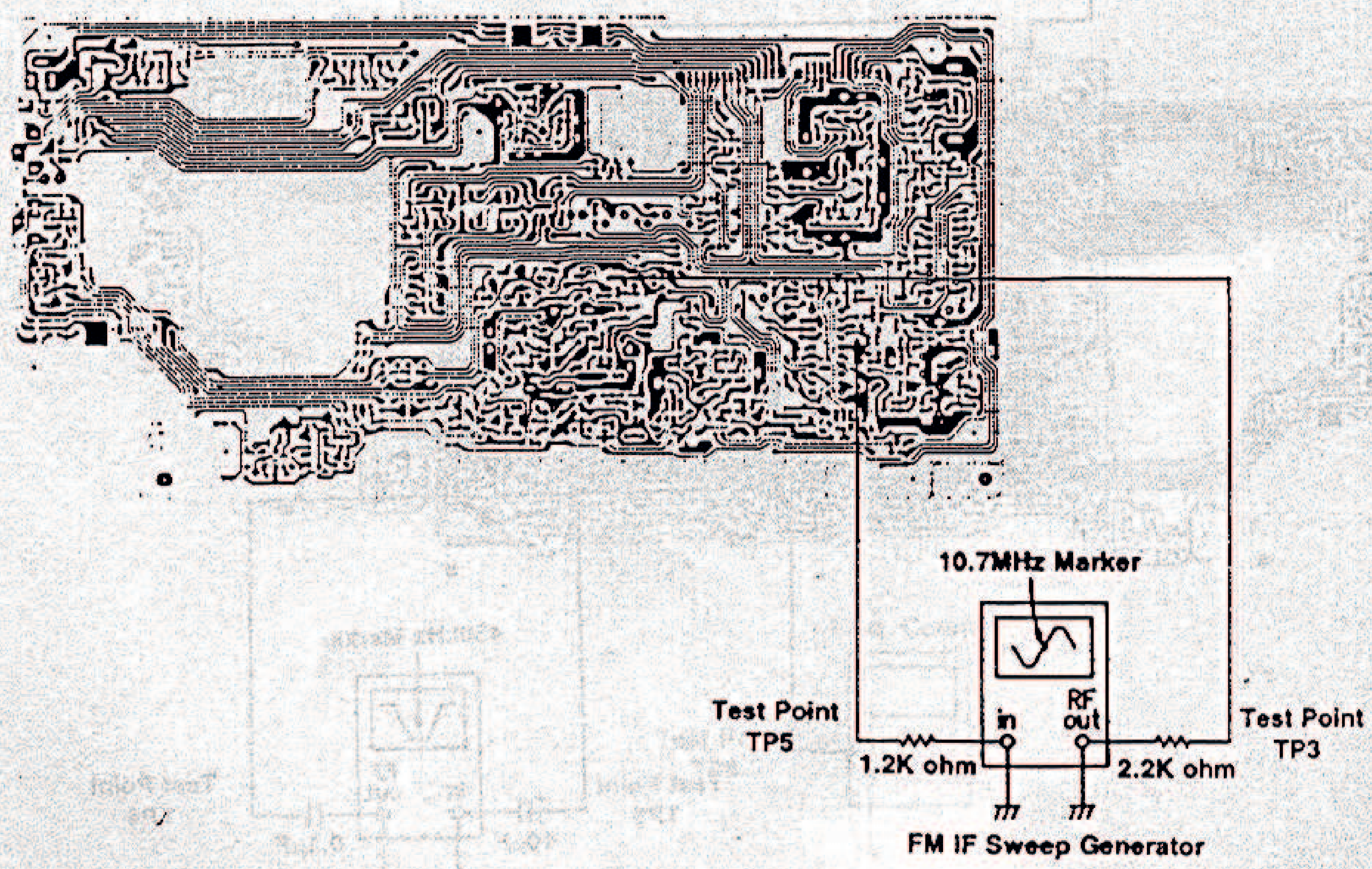
FM IF Sweep Generator with Scope.

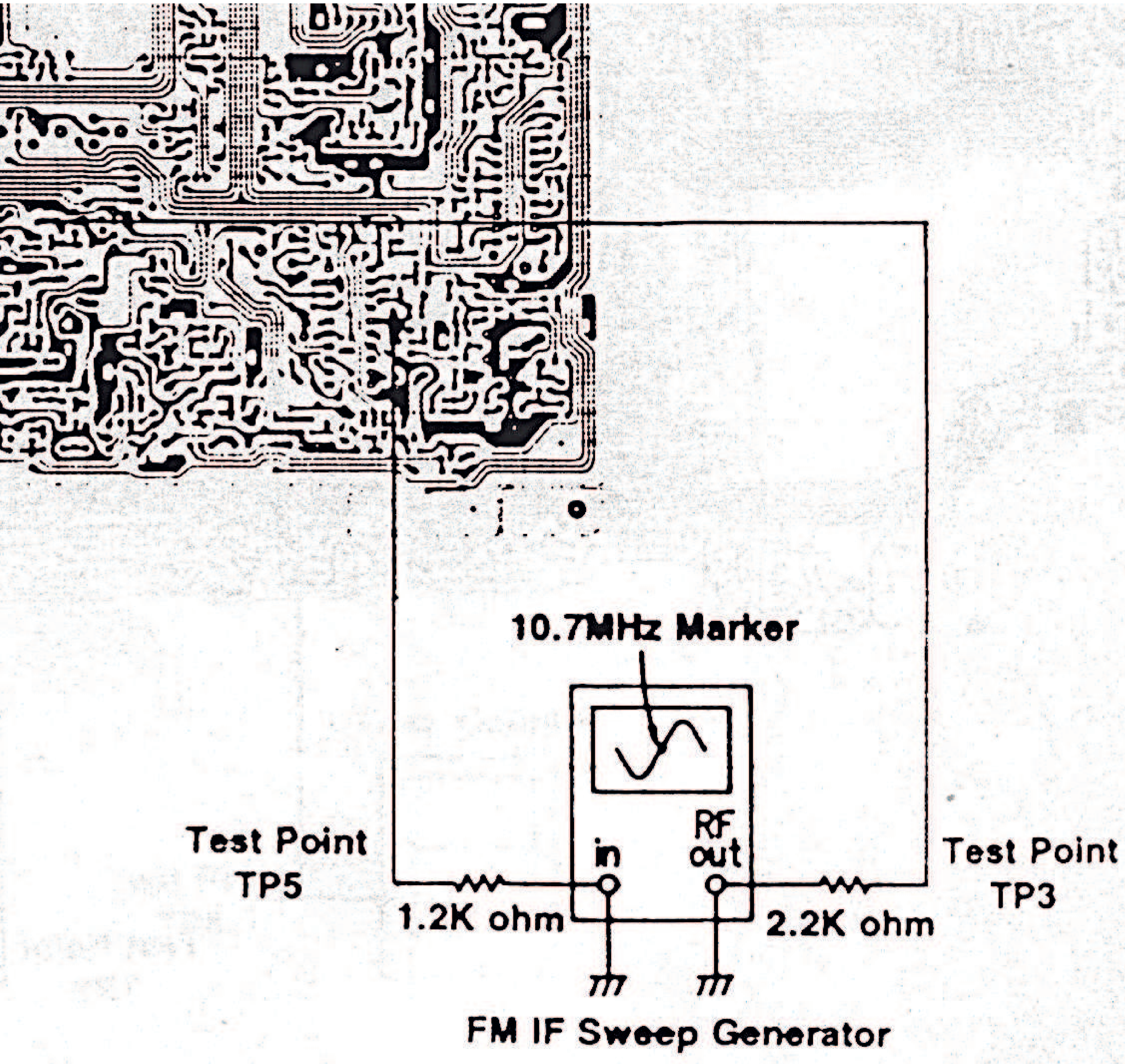
b. Alignment Procedure

Mode	Adjustment	Procedure
FM	T5 T7	(1) Turn the radio ON. (2) Connect the input of FM IF sweep generator in series with a resistor of 1.2K ohm to the test point TP5. (3) Connect the RF output of FM IF sweep generator in series with a resistor of 2.2K ohm to another test point TP3. (4) Adjust T5 and T7 to have a max output and best symmetrical S curve with respect to the center marker frequency of 10.7MHz.

c. Instrument Connection






10.7MHz Marker
RF
in
out
Test Point
TP5
1.2K ohm
2.2K ohm
Test Point
TP3
FM IF Sweep Generator

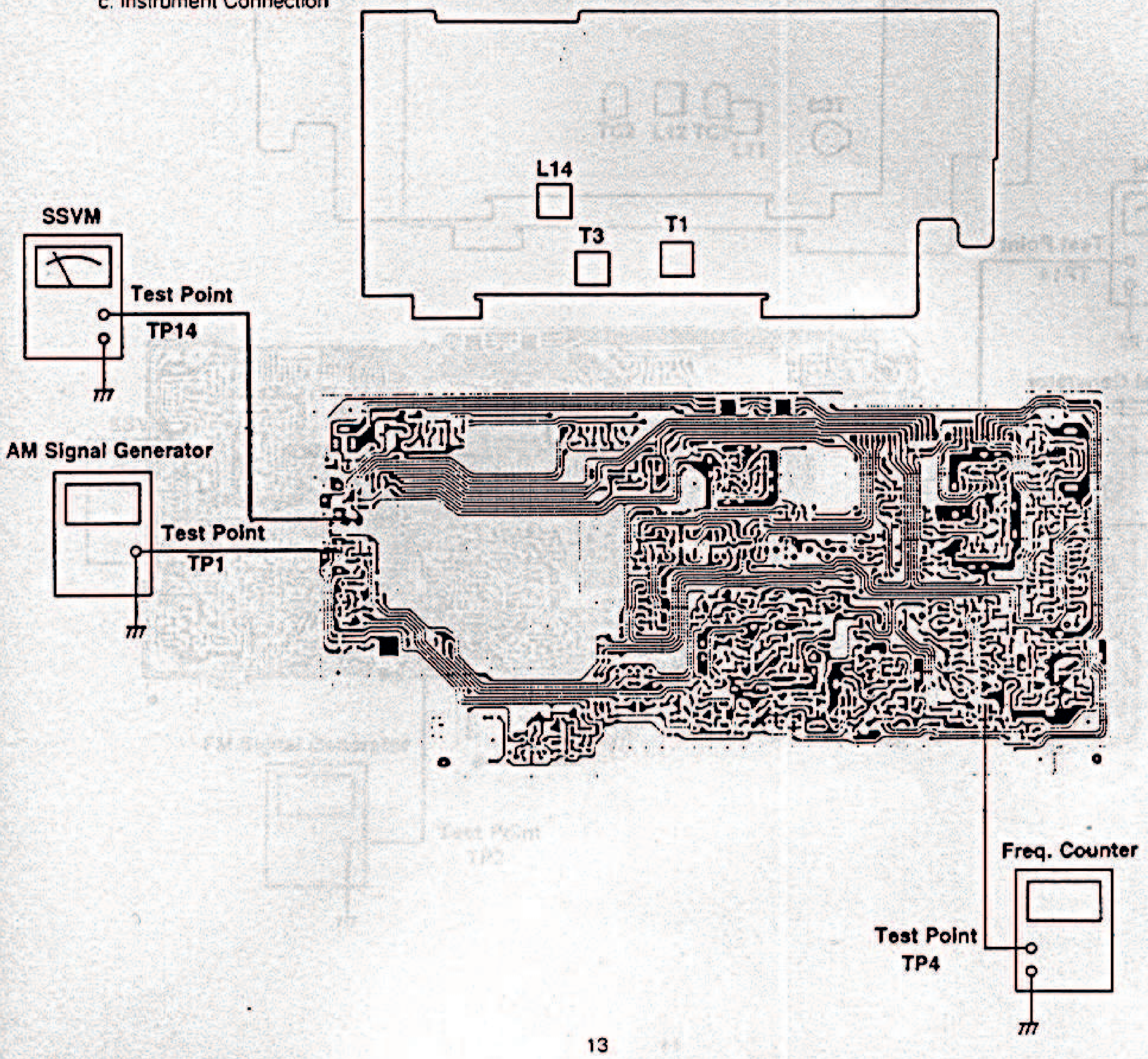
(6) ALIGNMENT FOR AM SENSITIVITY

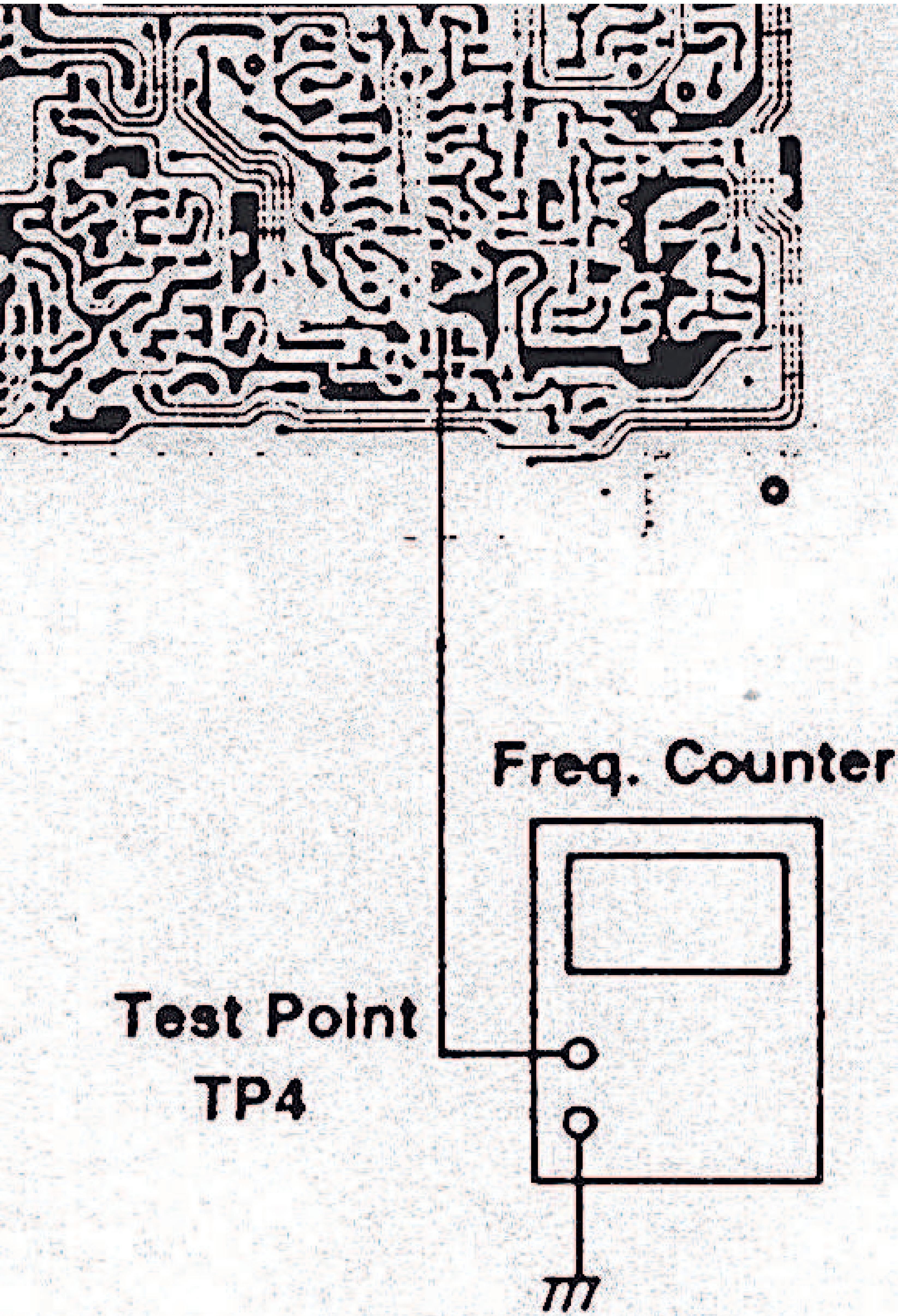
a. Required Instruments
- AM Signal Generator
- SSVM
- Frequency Counter

b. Alignment Procedure

Mode	Adjustment	Procedure
AM	T1 T3 L14	(1) Turn the radio ON. (2) Set the bandwidth switch to WIDE and RF GAIN VR to MAX position. (3) Tune the radio band frequency to 15.100MHz. (4) Feed a signal with modulation from AM signal generator output to the test point TP1 and connect a SSVM to speaker (TP14). (5) Tune the generator frequency exactly the same as that of the radio frequency displayed. (6) Adjust T1 and T3 to have a max. audio output. (7) Connect the probe of frequency counter at the test point TP4. (8) Adjust L14 to meet the specification frequency 450kHz ± 0.15kHz. (9) Remove the counter and repeat (6) to (8) until the specification frequency is met.

c. Instrument Connection





Freq. Counter
Test Point
TP4

(7) ALIGNMENT FOR BFO

a. Required Instruments

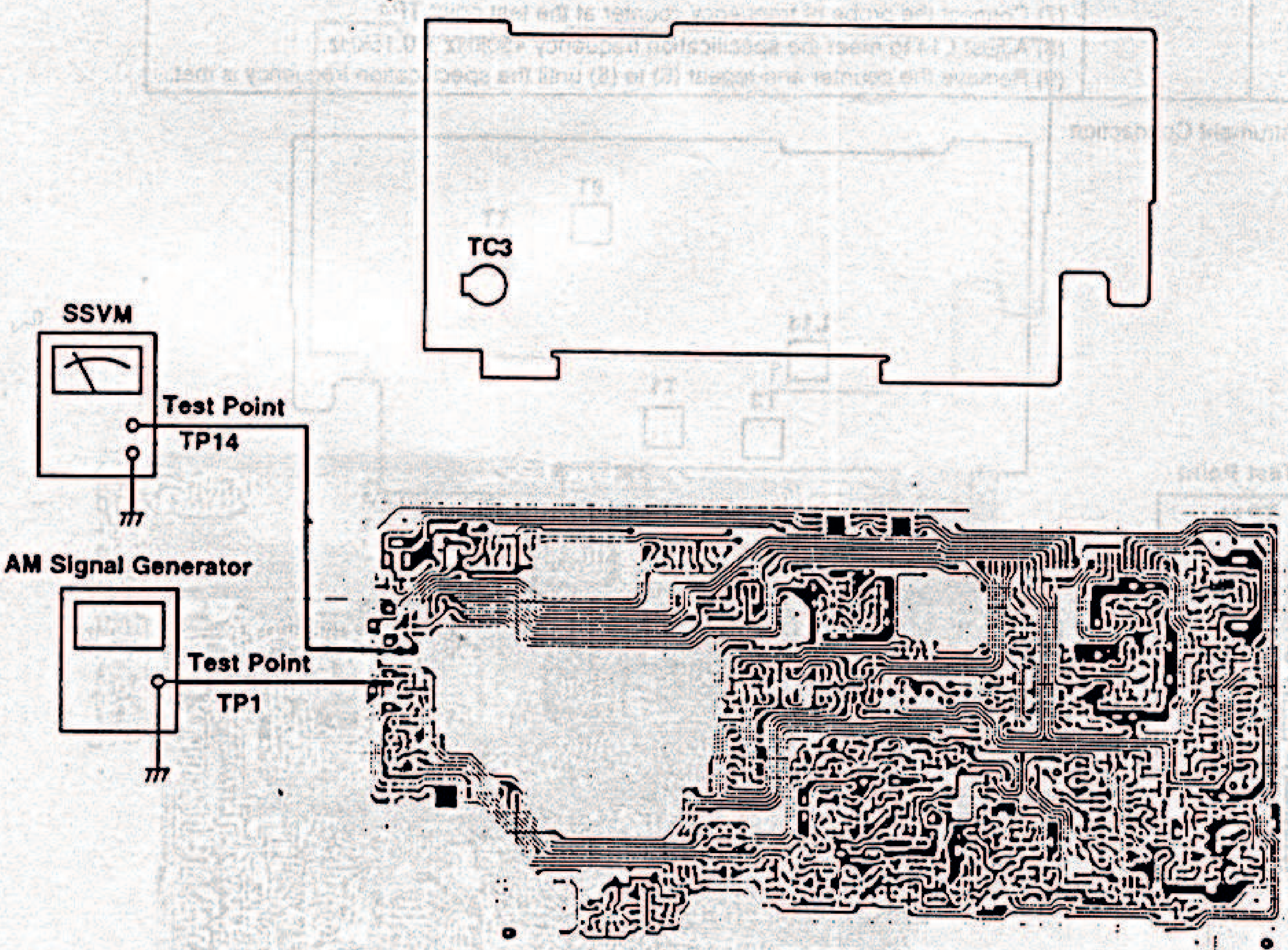
AM Signal Generator

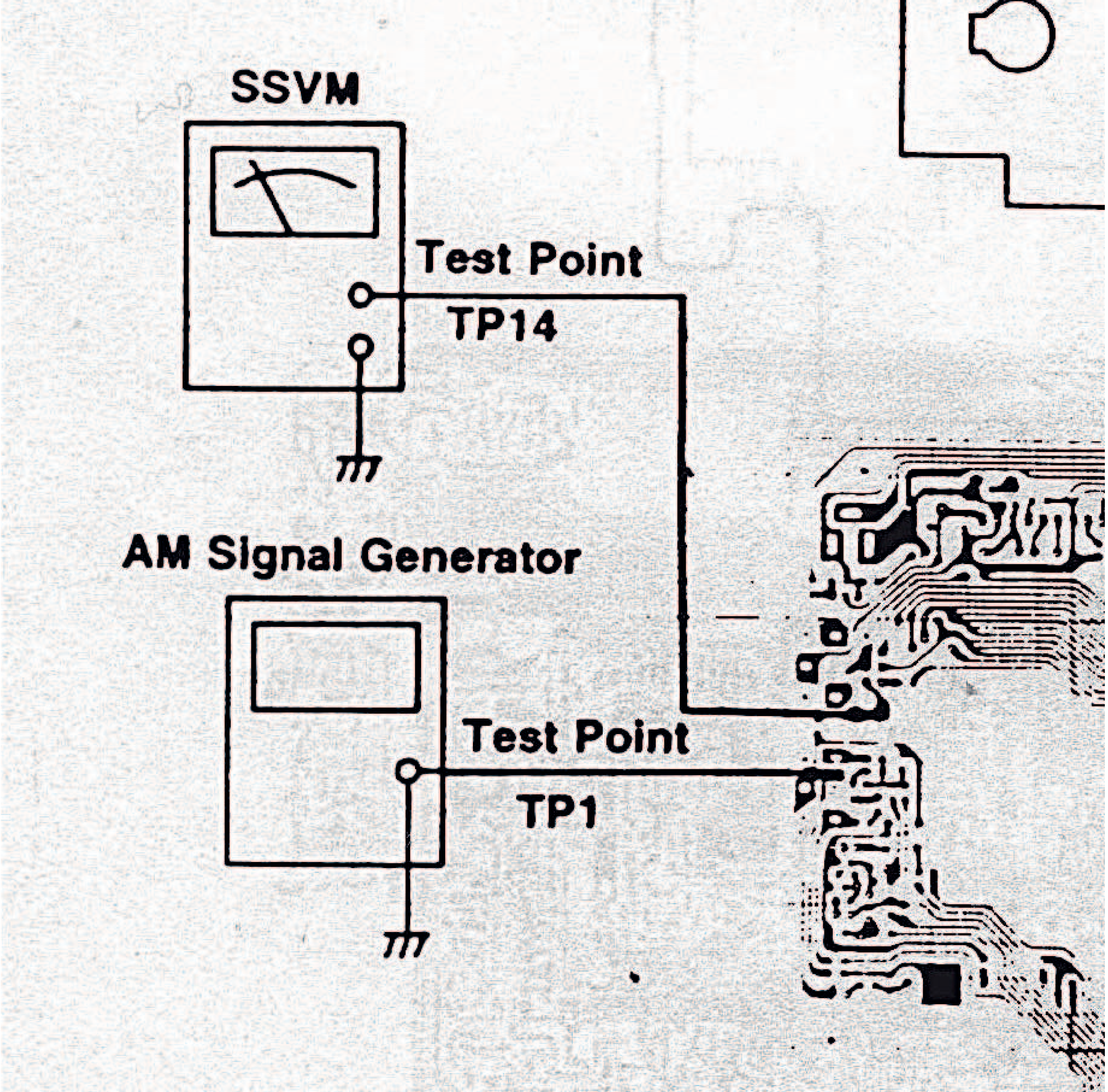
SSVM

b. Alignment Procedure

Mode	Adjustment	Procedure
AM	TC3	(1) Turn the radio ON. (2) Set the BFO switch to ON and BFO pitch to center position. (3) Tune the radio band frequency to 15.100MHz. (4) Feed a signal without modulation from AM signal generator output to the test point TP1 and connect a SSVM to speaker (TP14). (5) Tune the generator frequency exactly the same as that of the radio frequency displayed. (6) Adjust TC3 to have a minimum reading on SSVM.

c. Instrument Connection




SSVM
Test Point
TP14
AM Signal Generator
Test Point
TP1

(8) ALIGNMENT FOR FM SENSITIVITY

a. Required Instruments

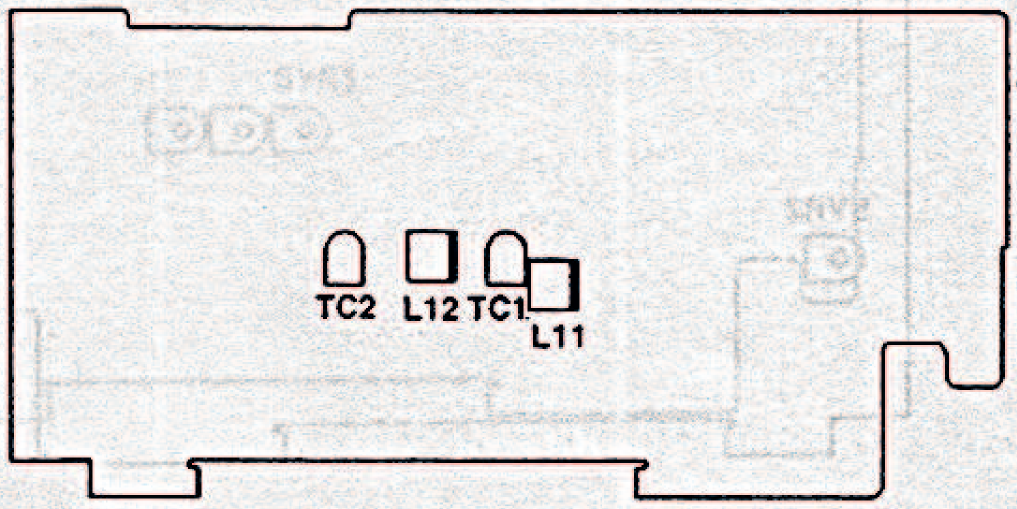
FM Signal Generator

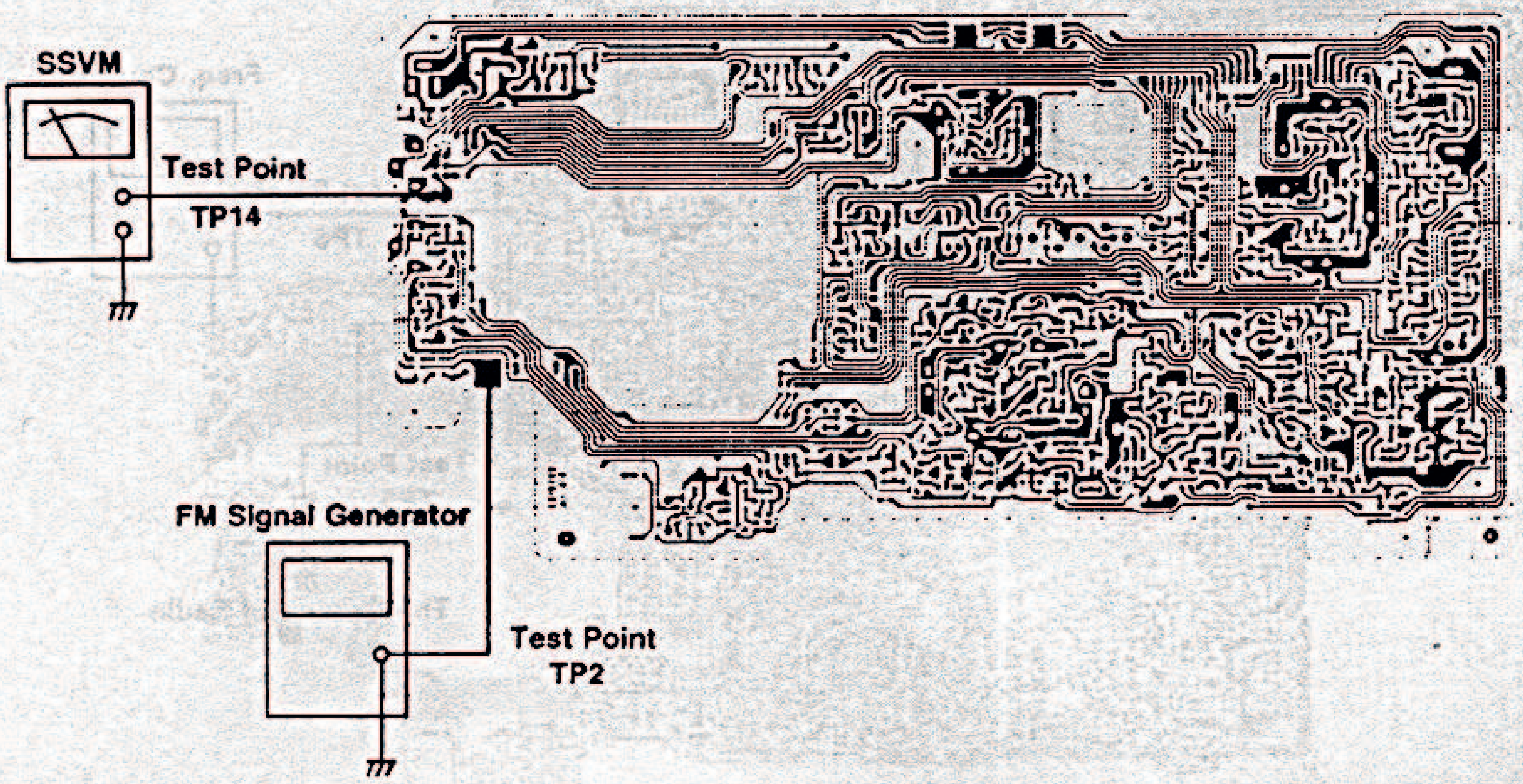
SSVM

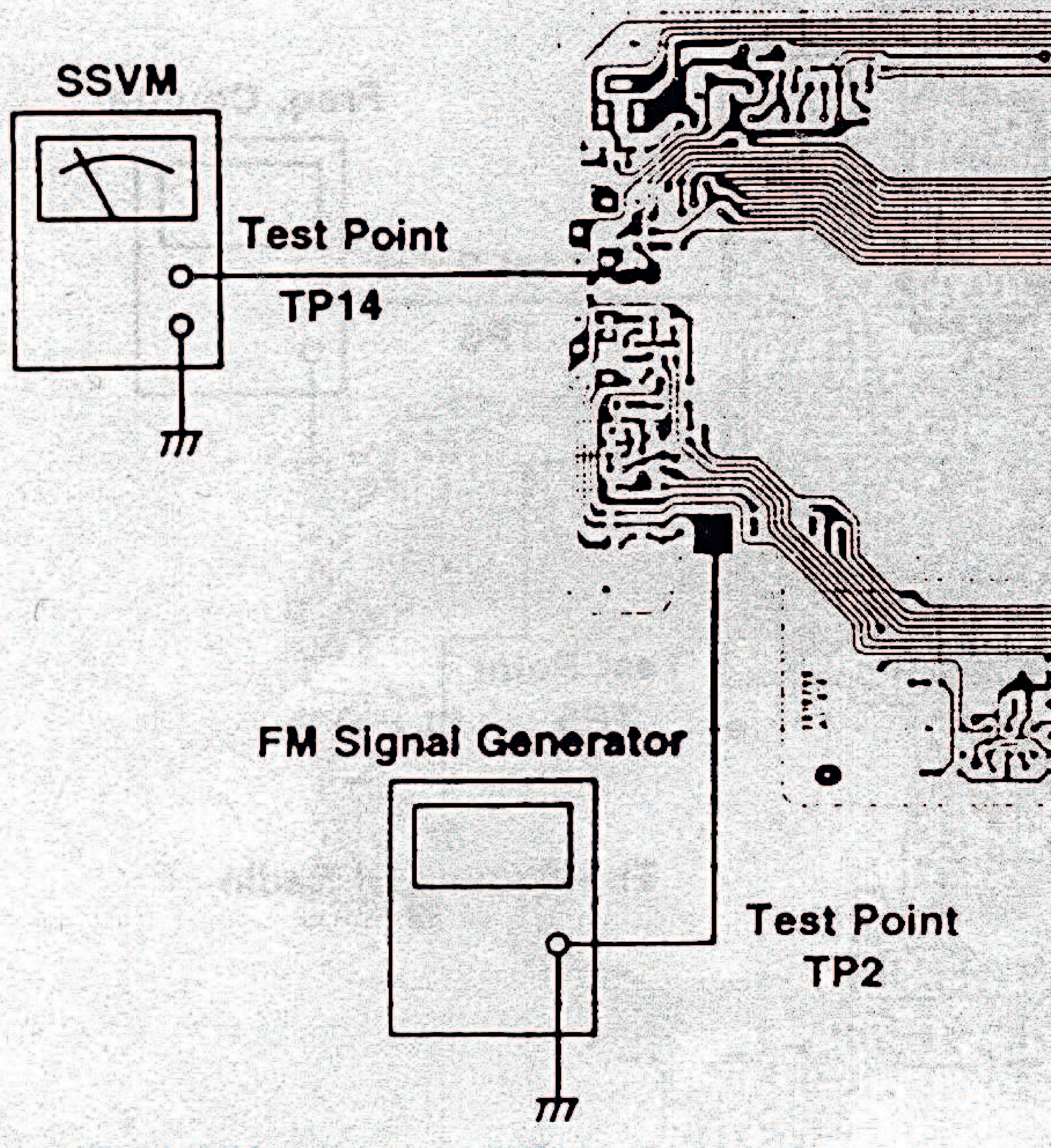
b. Alignment Procedure

Mode	Adjustment	Procedure
FM	L11. L12 TC1. TC2	(1) Turn the radio ON. (2) Connect a SSVM to speaker (TP14). (3) Connect a FM signal generator to the input terminal of Rod Ant. (TP2). (4) Set the signal generator to 22.5kHz deviation with 1kHz modulation. (5) Tune the radio band frequency to 90MHz and adjust L11, L12 to have a max. reading on SSVM. (6) Return the radio band frequency to 106MHz and adjust TC1, TC2 to have a max. reading on SSVM. (7) Repeat (5) and (6) until a best sensitivity on these two frequencies are formed.

c. Instrument Connection






SSVM
Test Point
TP14
FM Signal Generator
Test Point
TP2

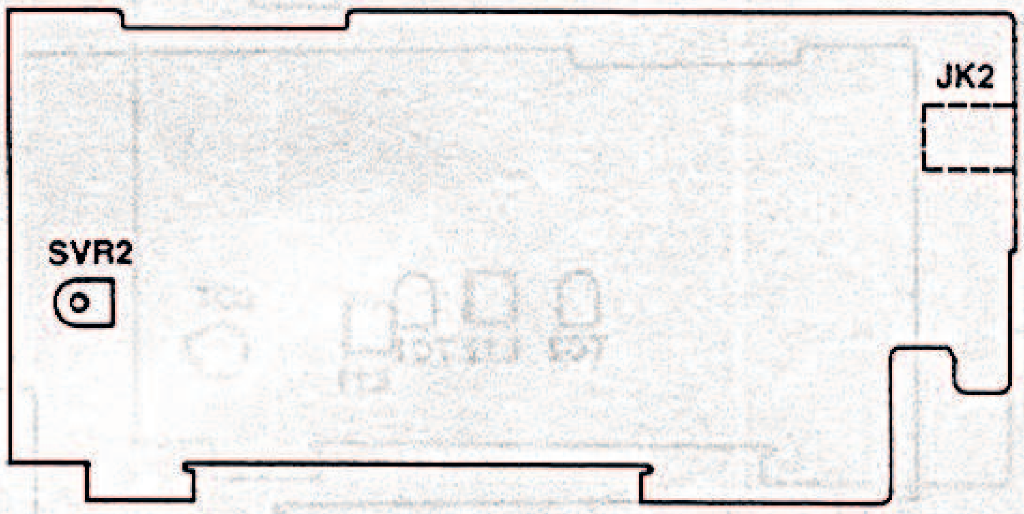
(9) ALIGNMENT FOR MPX

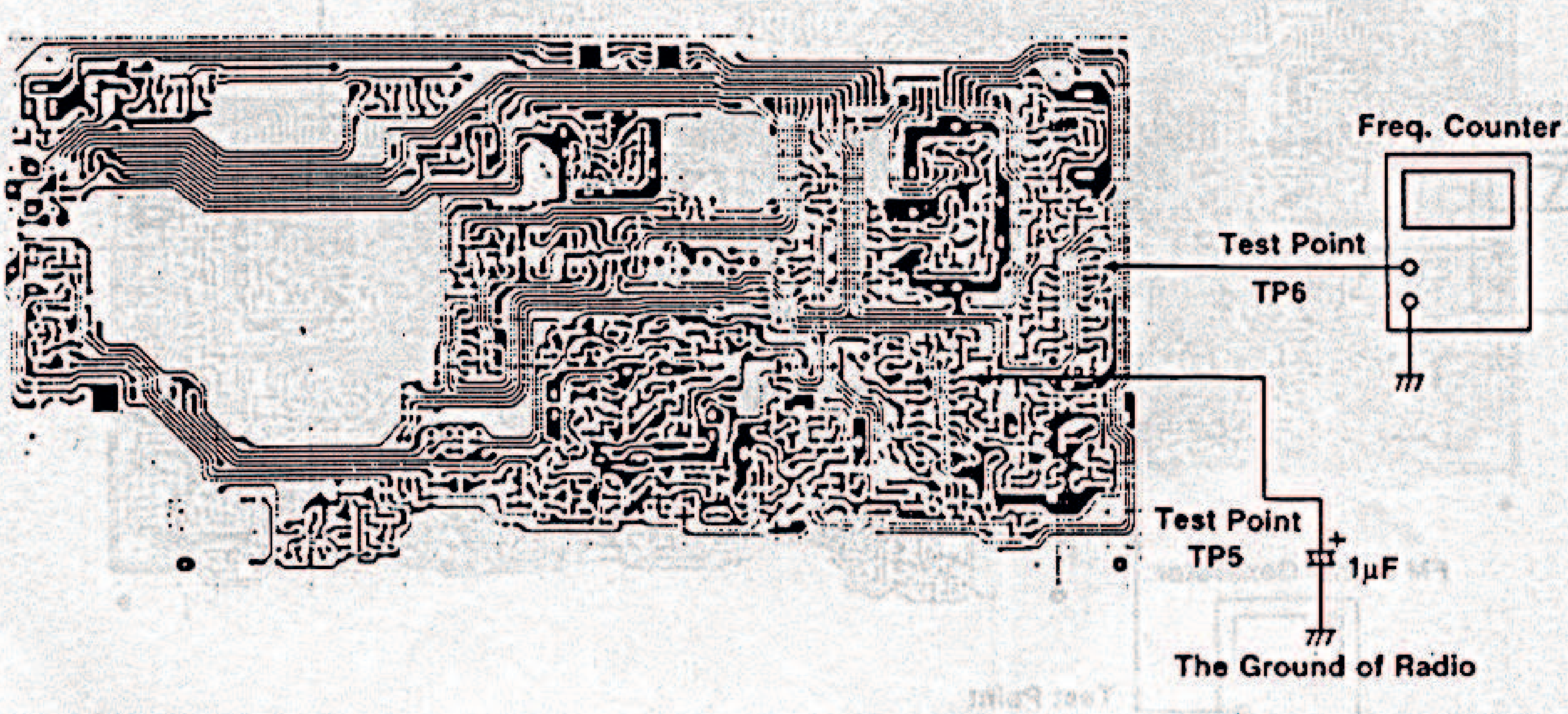
a. Required Instrument
   Frequency Counter

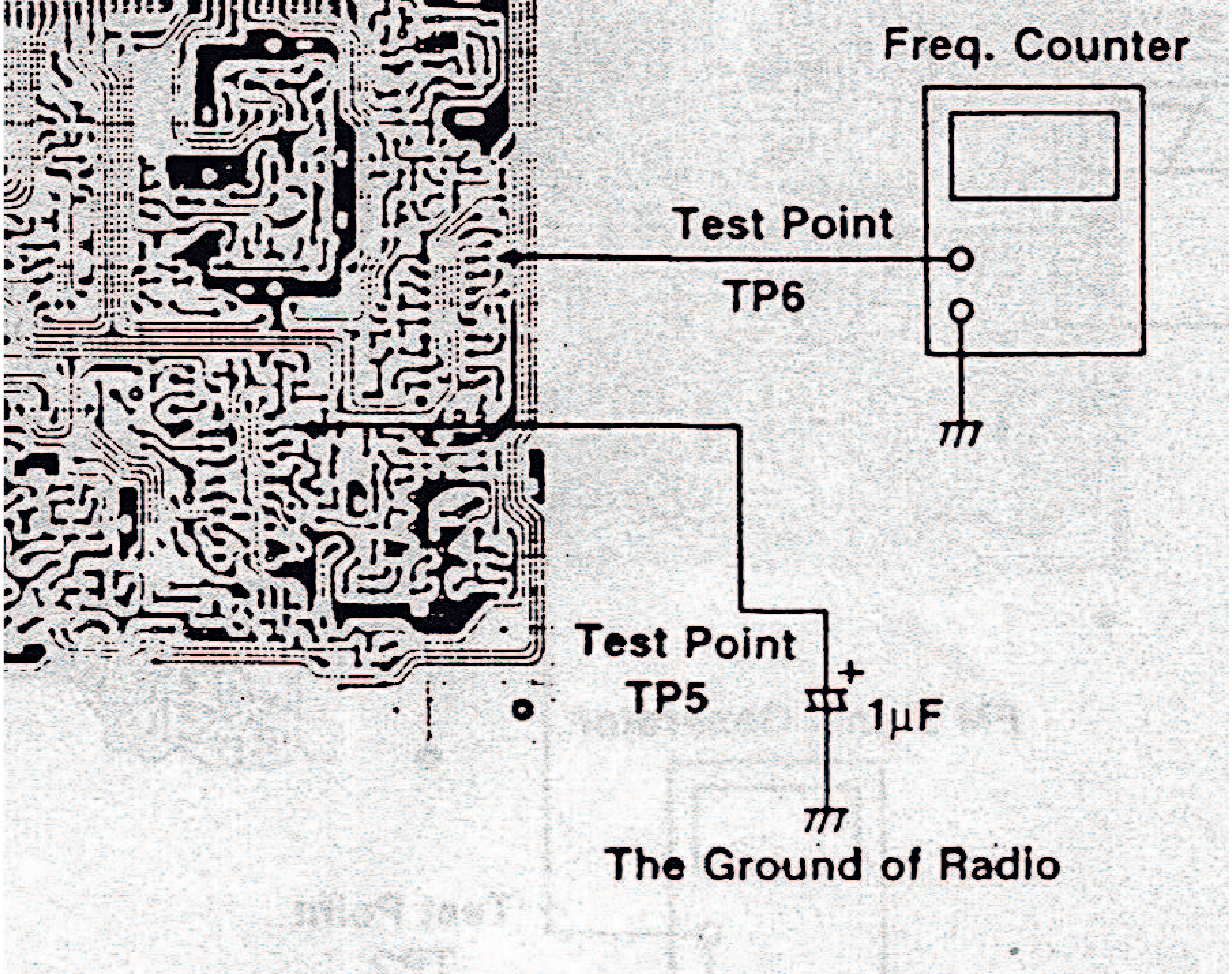
b. Alignment Procedure

Mode	Adjustment	Procedure
FM	SVR2	(1) Turn the radio ON. (2) Set the FM mode switch to STEREO position. (3) Insert a plug of headphone into the HEADPHONE JACK (JK2) (4) Connect the test point TP5 in series with a capacitor of 1μF to ground. (5) Connect a frequency counter to TP6. (6) Adjust SVR2 to have a reading of 18.95kHz-19.05kHz on frequency counter.

c. Instrument Connection






Freq. Counter
Test Point
TP6
Test Point
TP5
+
1μF
The Ground of Radio

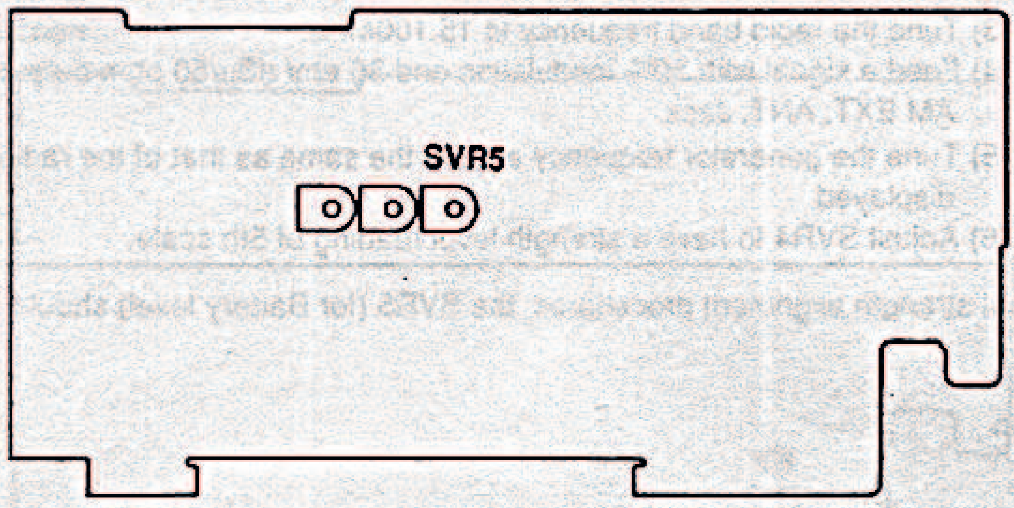
(10) ALIGNMENT FOR INDICATION LEVEL OF BATTERY

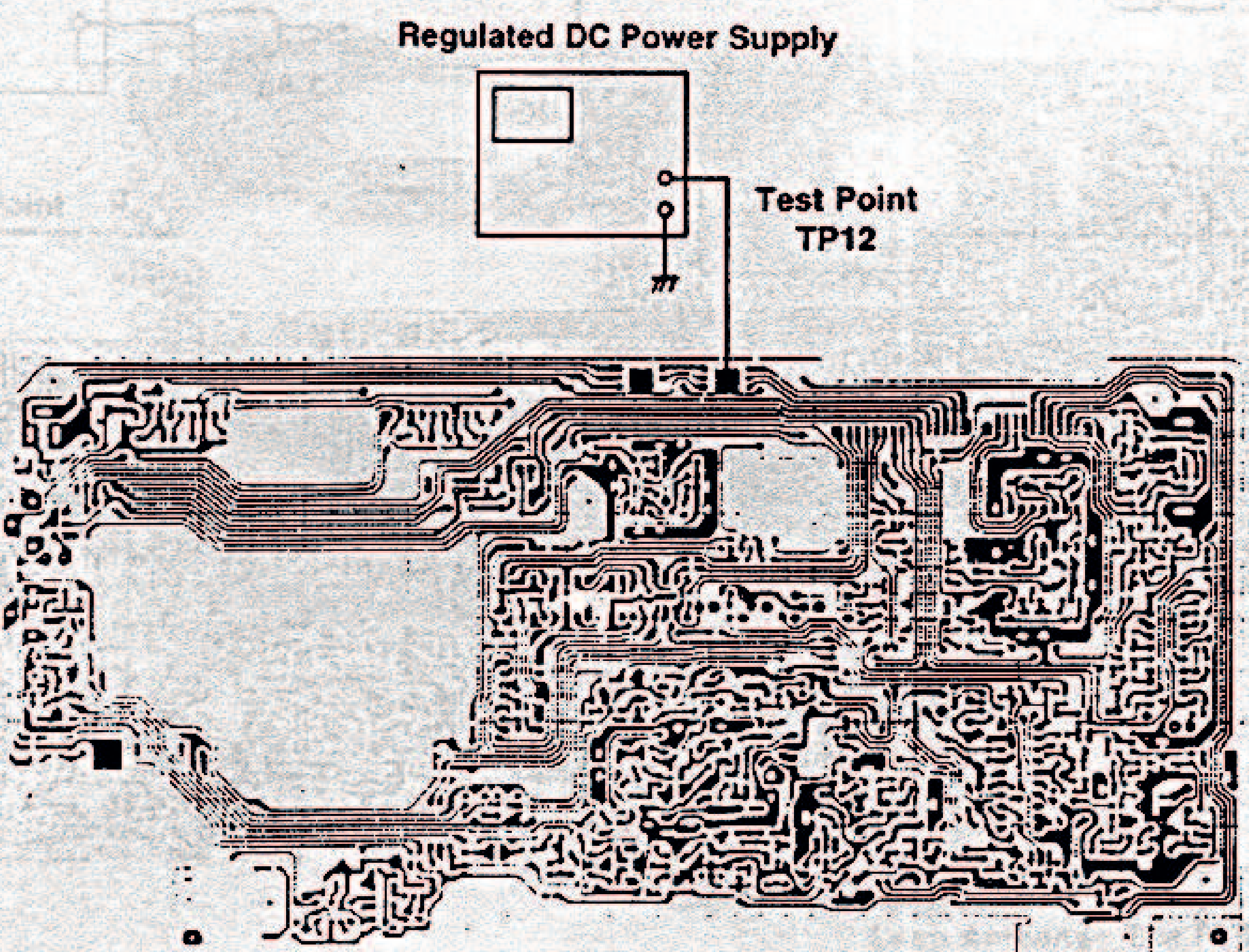
a. Required Instrument
DC Power Supply with voltage meter

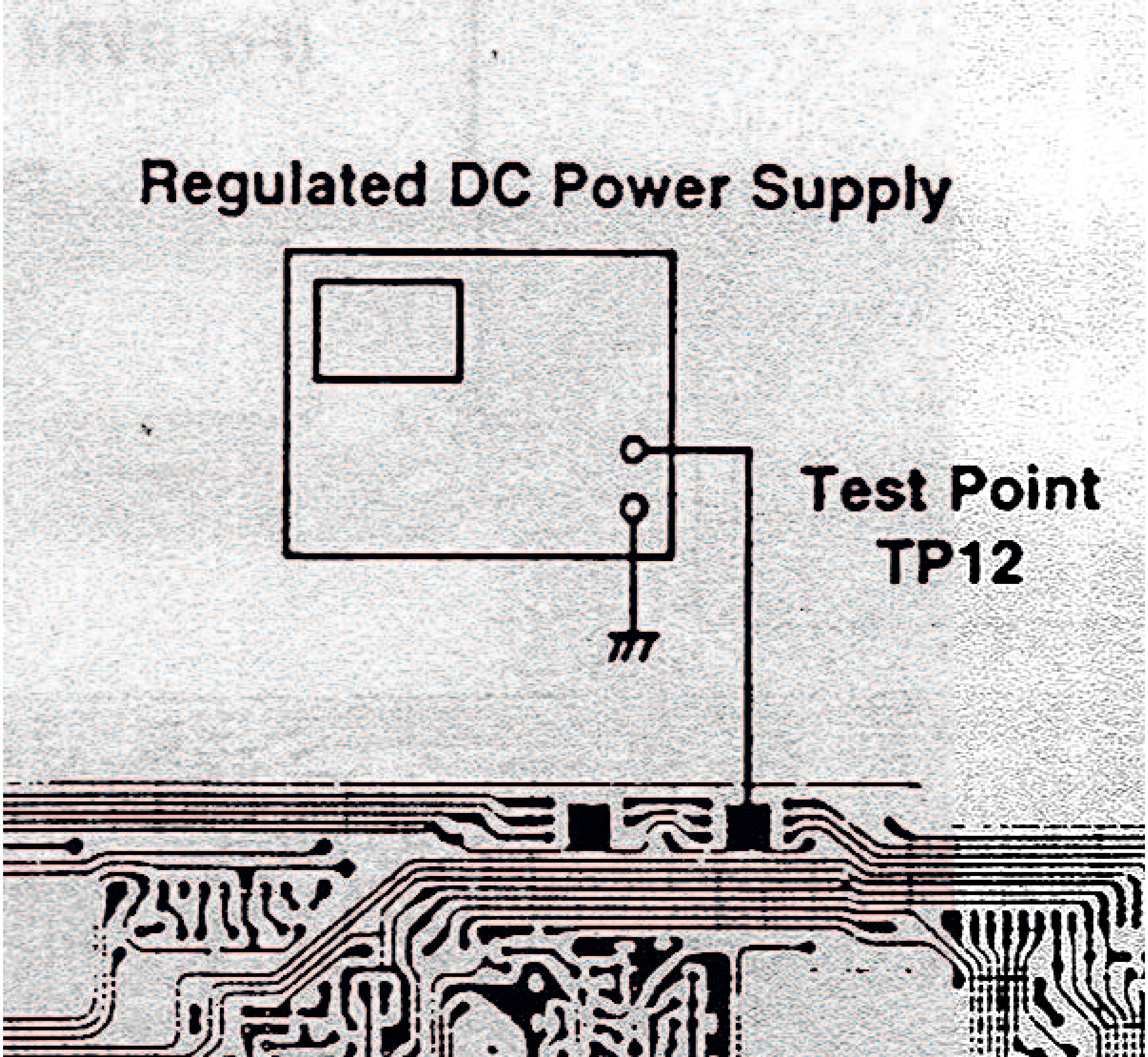
b. Alignment Procedure

Adjustment	Procedure
SVR5	(1) Remove batteries away from the RADIO BATTERY compartment. (2) Connect a DC power supply to the test point TP12. (3) Set the voltage to a reading of 4.4V. (4) Turn the radio ON and adjust SVR5. (5) Push POWER key again to shut off the radio and the BATTERY LEVEL INDICATOR appears for 5 seconds. (6) Repeat (4) and (5) until the level is indicated on the 2nd. scale.

c. Instrument Connection






Regulated DC Power Supply
Test Point
TP12

(11) ALIGNMENT FOR SIGNAL STRENGTH LEVEL

a. Required Instrument
   FM Signal Generator
   AM Signal Generator

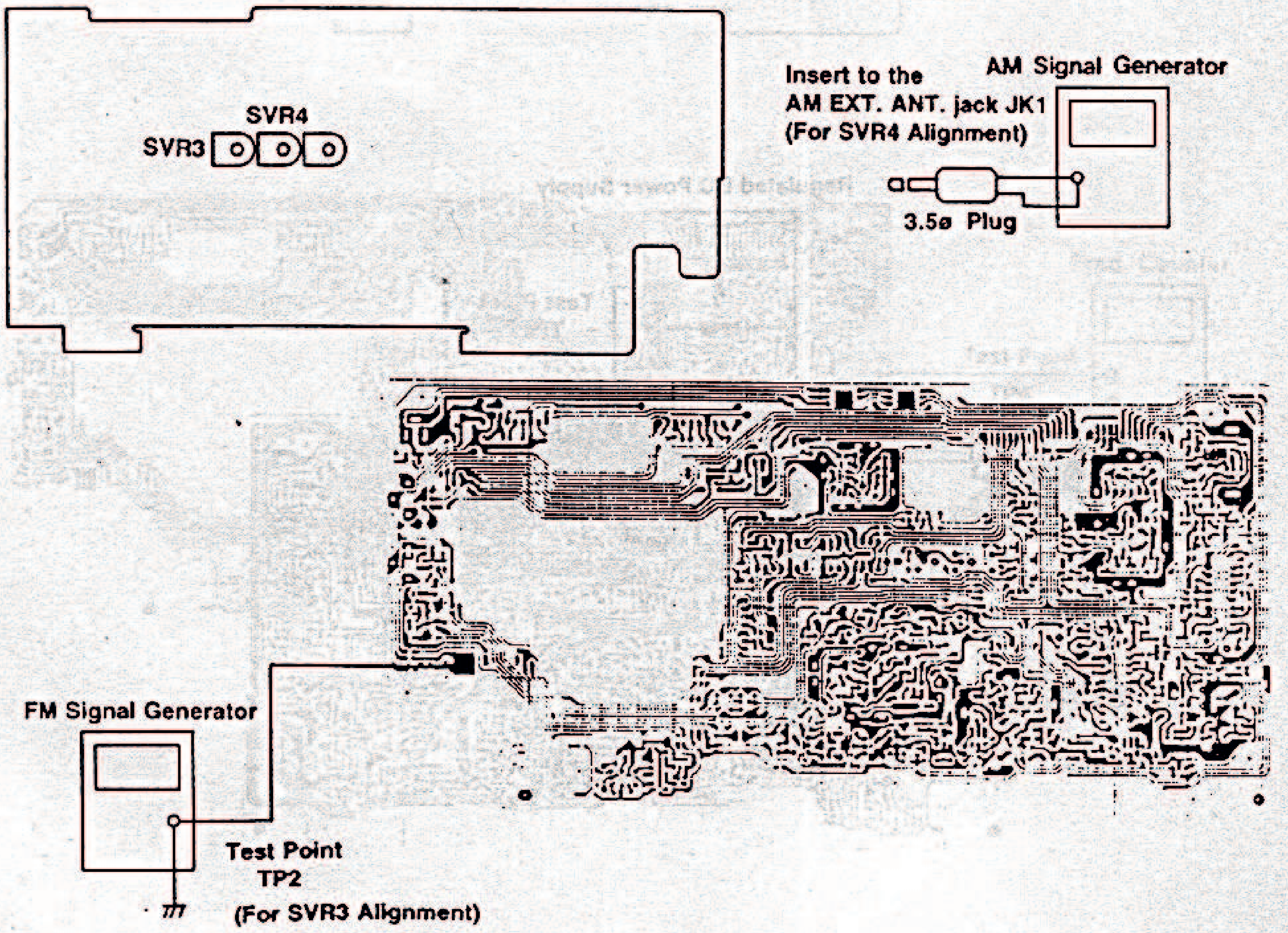
b. Alignment Procedure

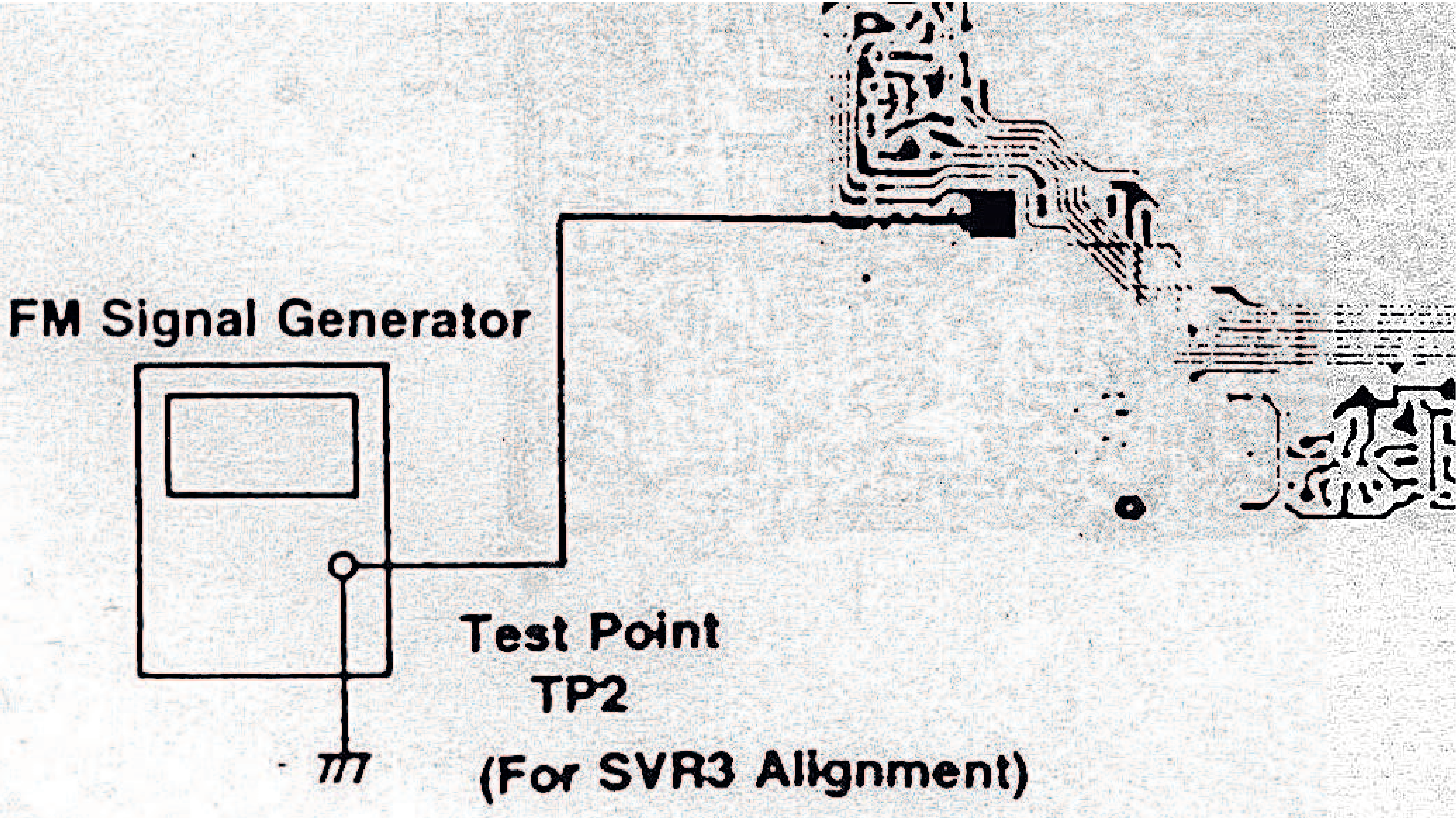
Mode	Adjustment	Procedure
FM	SVR3	(1) Turn the radio ON. (2) Connect a FM signal generator to the input terminal of Rod Ant. (TP2) (3) Set the signal generator to 98MHz with 1kHz Mod, 22.Hz deviation and 36 emf dBμ/75 ohm output level. (4) Tune the radio band frequency to 98MHz and adjust SVR3 to have a strength level reading of 6th scale.

AM	SVR4	(1) Turn the radio ON. (2) Set the bandwidth switch to WIDE and RF GAIN VR to MAX position. (3) Tune the radio band frequency to 15.100MHz. (4) Feed a signal with 30% modulation and 36 emf dBμ/50 ohm output level into the AM EXT. ANT. Jack. (5) Tune the generator frequency exactly the same as that of the radio frequency displayed (6) Adjust SVR4 to have a strength level reading of 5th scale.

Caution : Before these signal strength alignment procedures, the SVR5 (for Battery level) should be in correct position.

c. Instrument Connection




FM Signal Generator
Test Point
TP2
(For SVR3 Alignment)

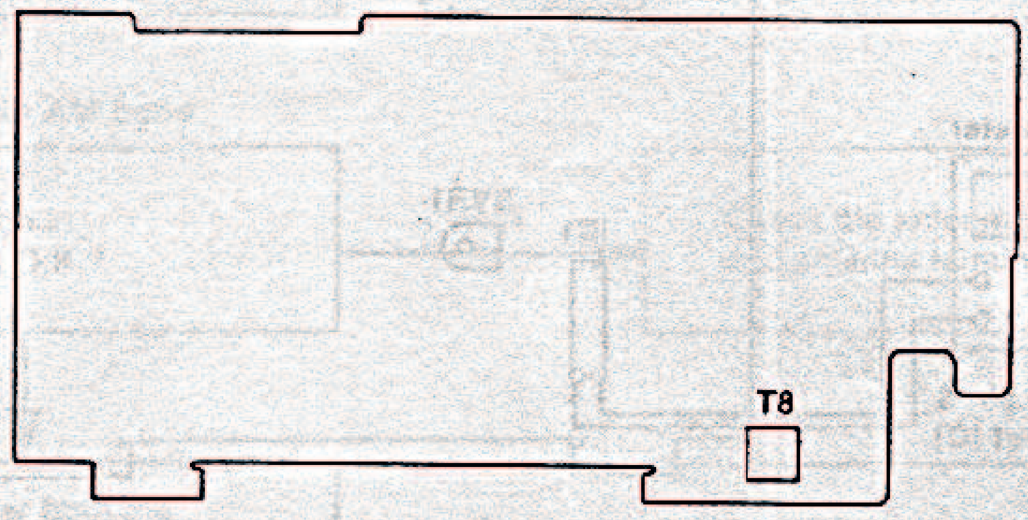
(12) ALIGNMENT FOR 450kHz TRAP

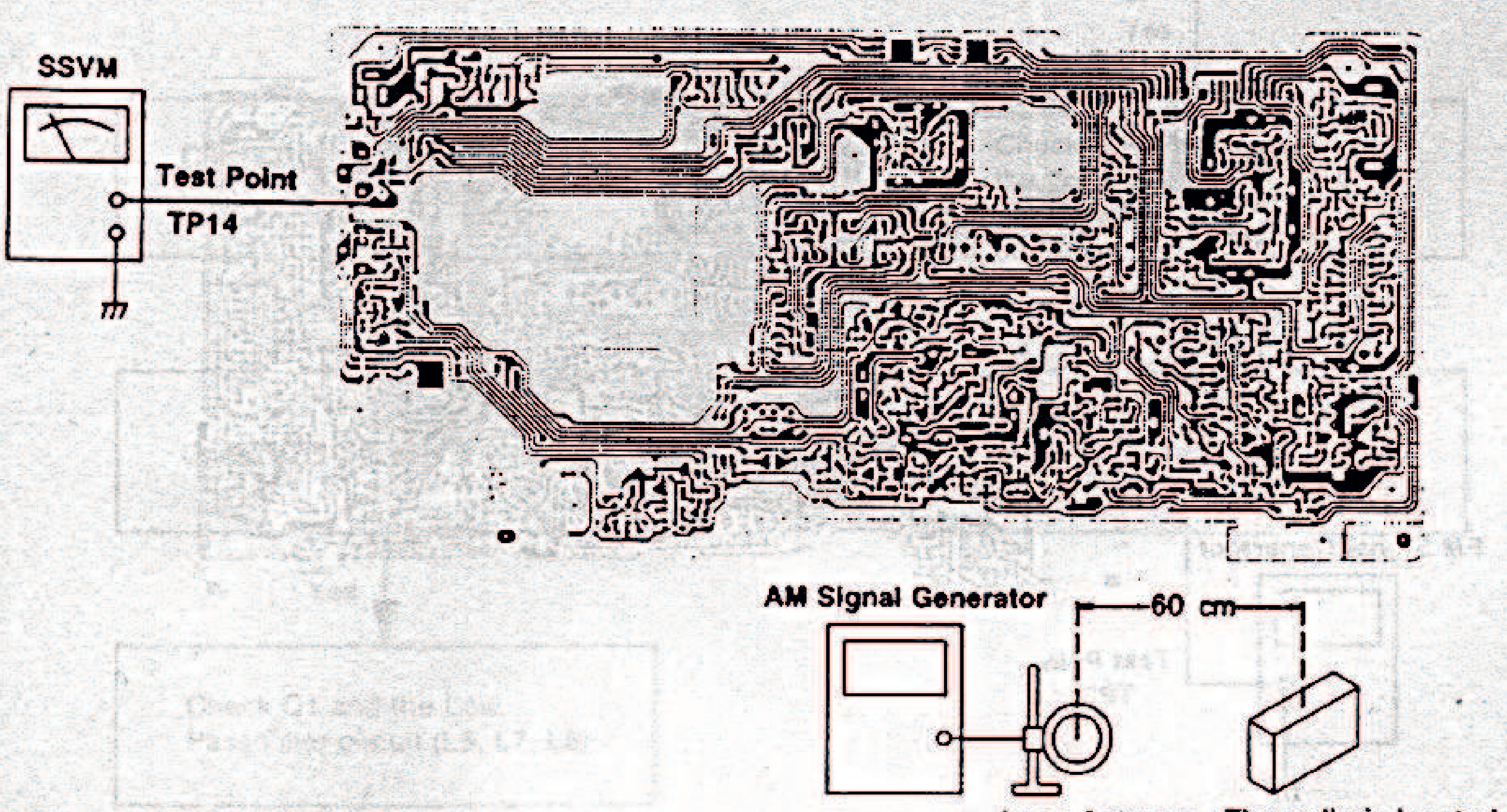
a. Required Instruments
   AM Signal Generator
   Loop Antenna
   SSVM

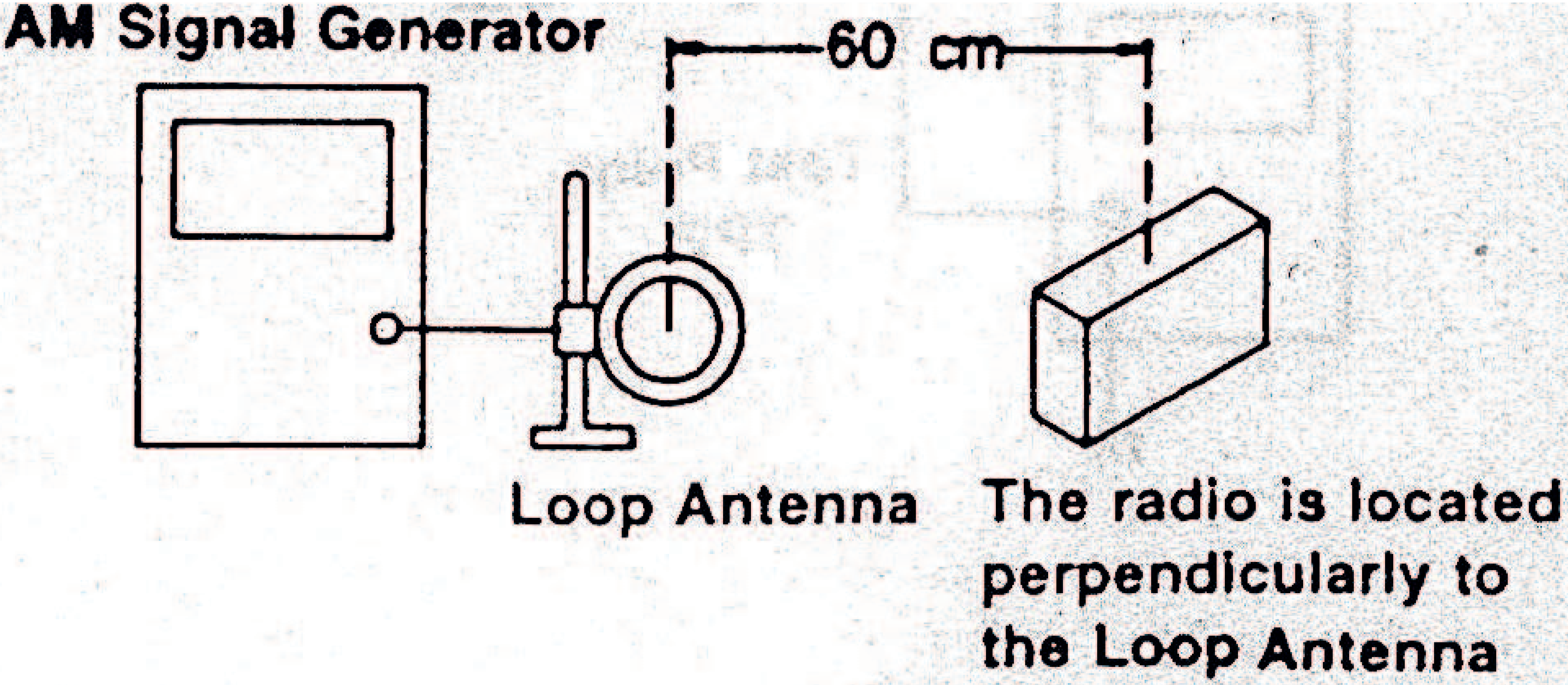
b. Alignment Procedure

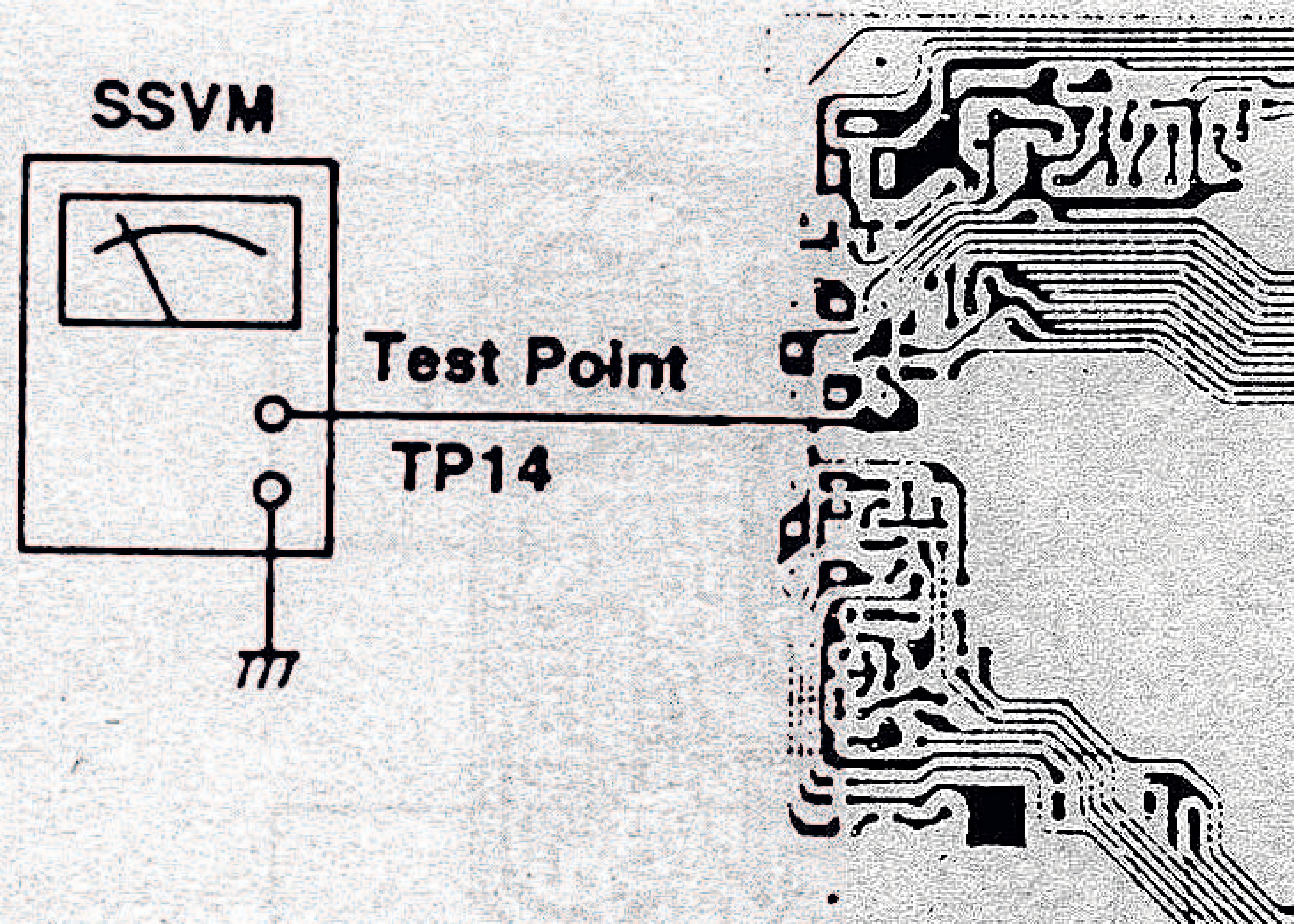
Mode	Adjustment	Procedure
AM	T8	(1) Turn the radio ON. (2) Set the bandwidth switch to WIDE and RF GAIN VR ro MAX position. (3) Tune the radio band frequency to 450kHz. (4) Connect a AM signal generator together with standard loop dummmy antenna and feed a stronger signal to the MW/LW ferrite bar antenna. (5) Tune the generator frequency to 450kHz and set modulation depth to 30%~50% (6) Connect a SSVM to speaker (TP14). (7) Adjust T8 to have a min. audio output.

c. Instrument Connection






AM Signal Generator
60 cm
Loop Antenna
The radio is located
perpendicularly to
the Loop Antenna


SSVM
Test Point
TP14

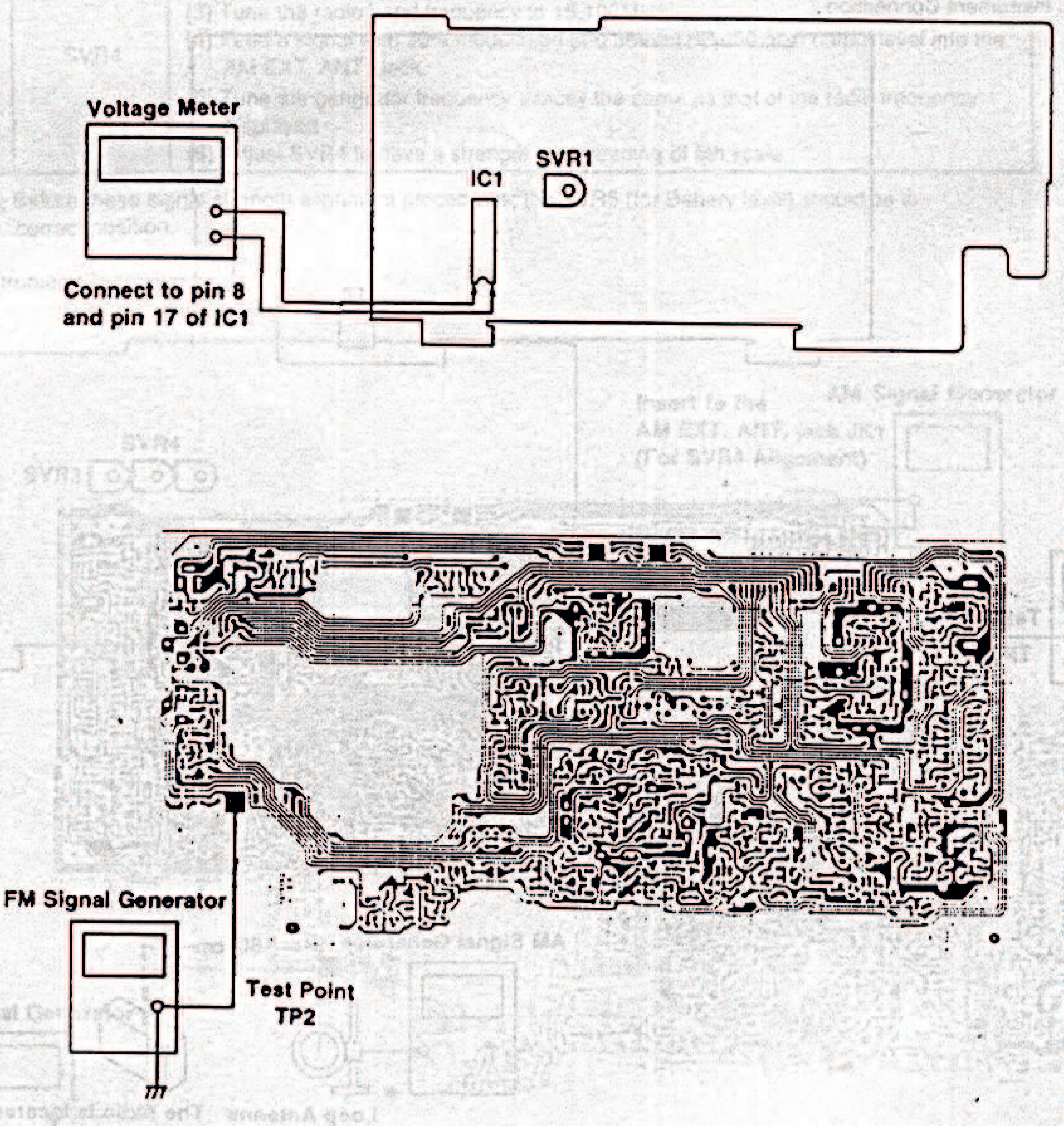
(13) ALIGNMENT FOR FM STATION DETECTION

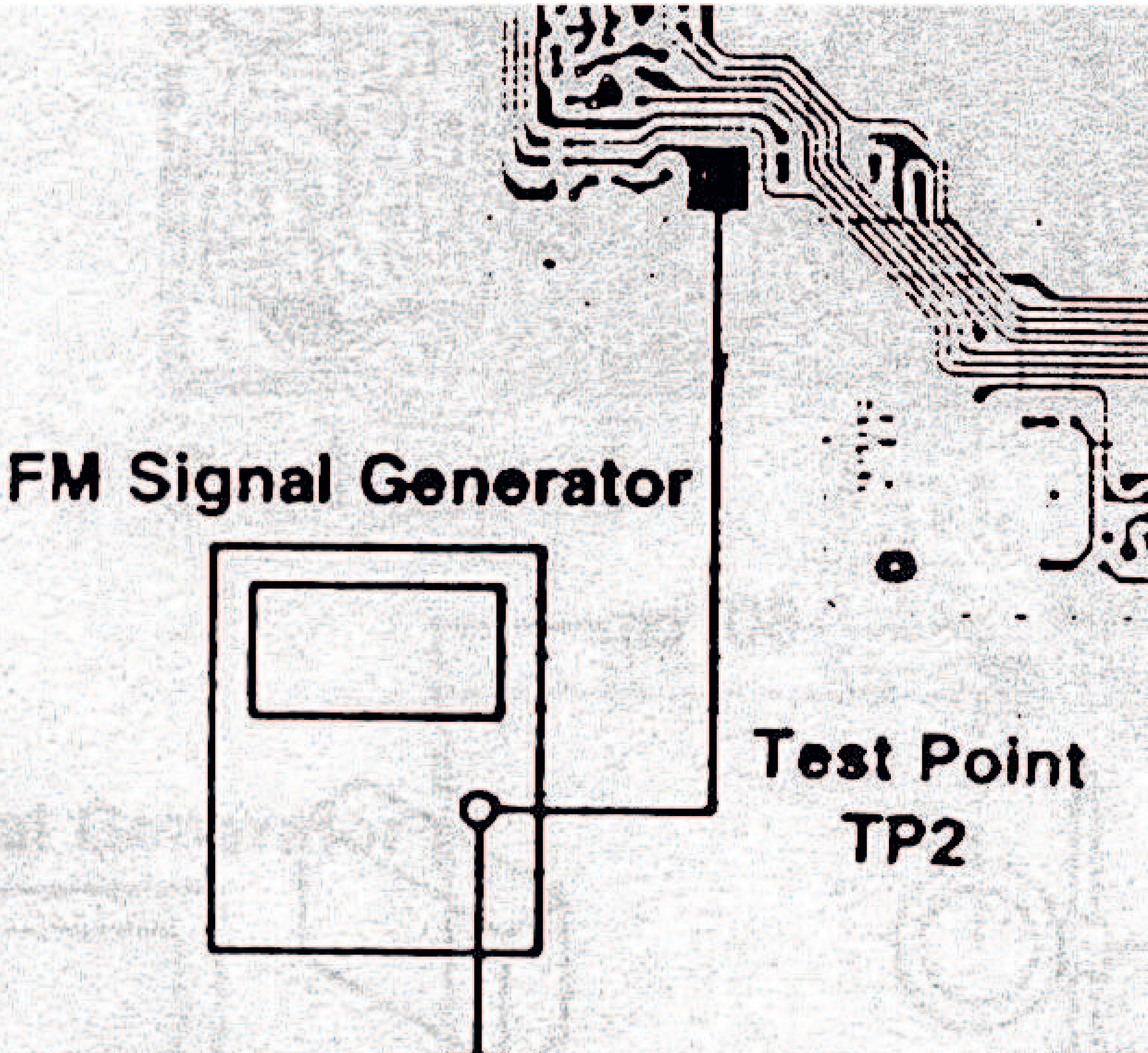
a. Required Instruments
FM Signal Generator
Voltage Meter

b. Alignment Procedure

Mode	Adjustment	Procedure
FM	SVR1	(1) Turn the radio ON. (2) Connect a voltage meter between pin (8) and pin (17) of IC1 TA7758P. (3) Connect a FM signal generator to the input terminal of Rod Ant. (TP2). (4) Set the signal generator to 98MHz with 1kHz Mod. 22.5Khz deviation and 66 emf dBμ/75 ohm output level. (5) Tune the radio band frequency to 98MHz and adjust SVR1 until the voltage difference between pin(8) and pin (17) is less than 0.3 Volt.

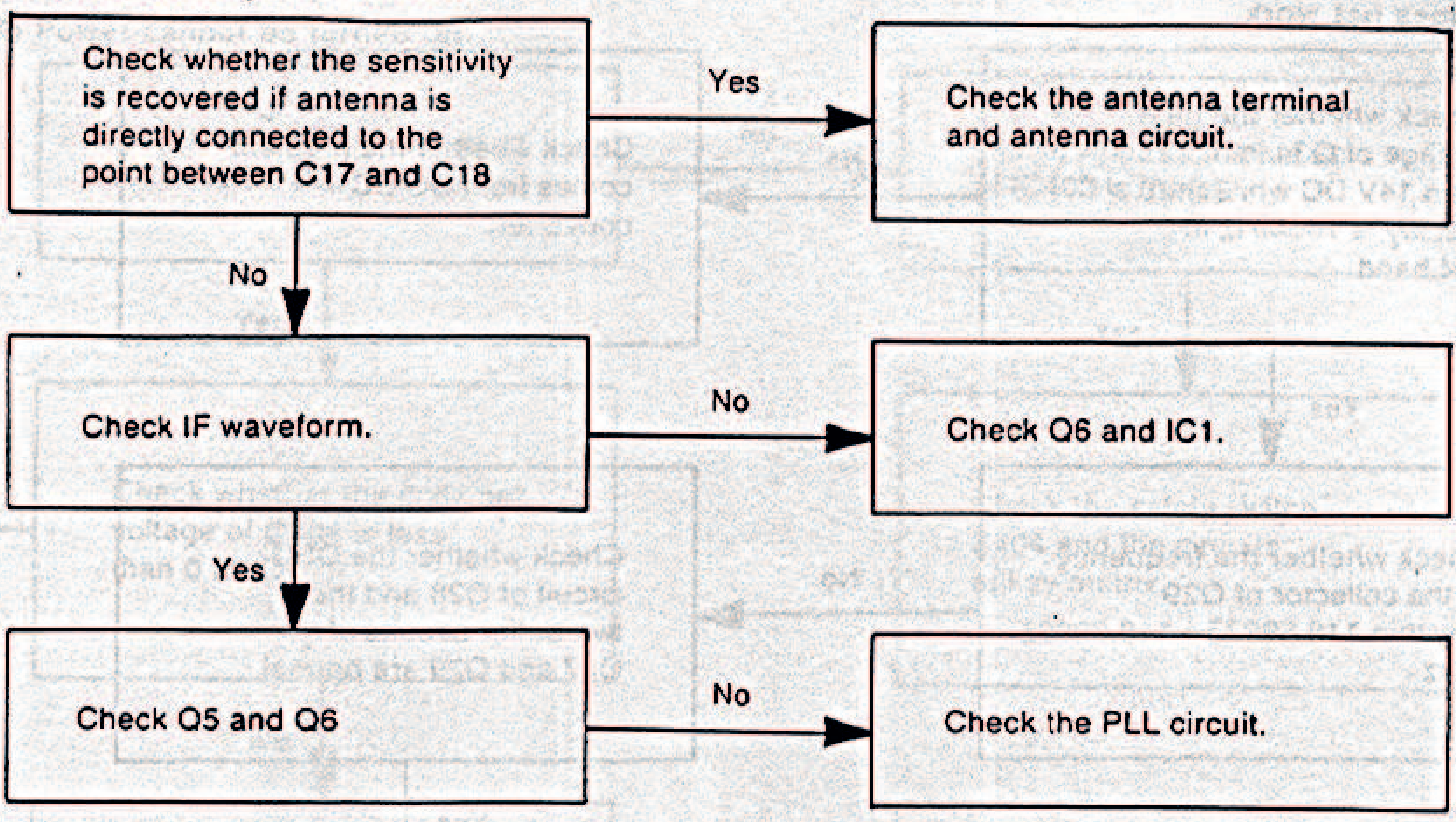
c. Instrument Connection



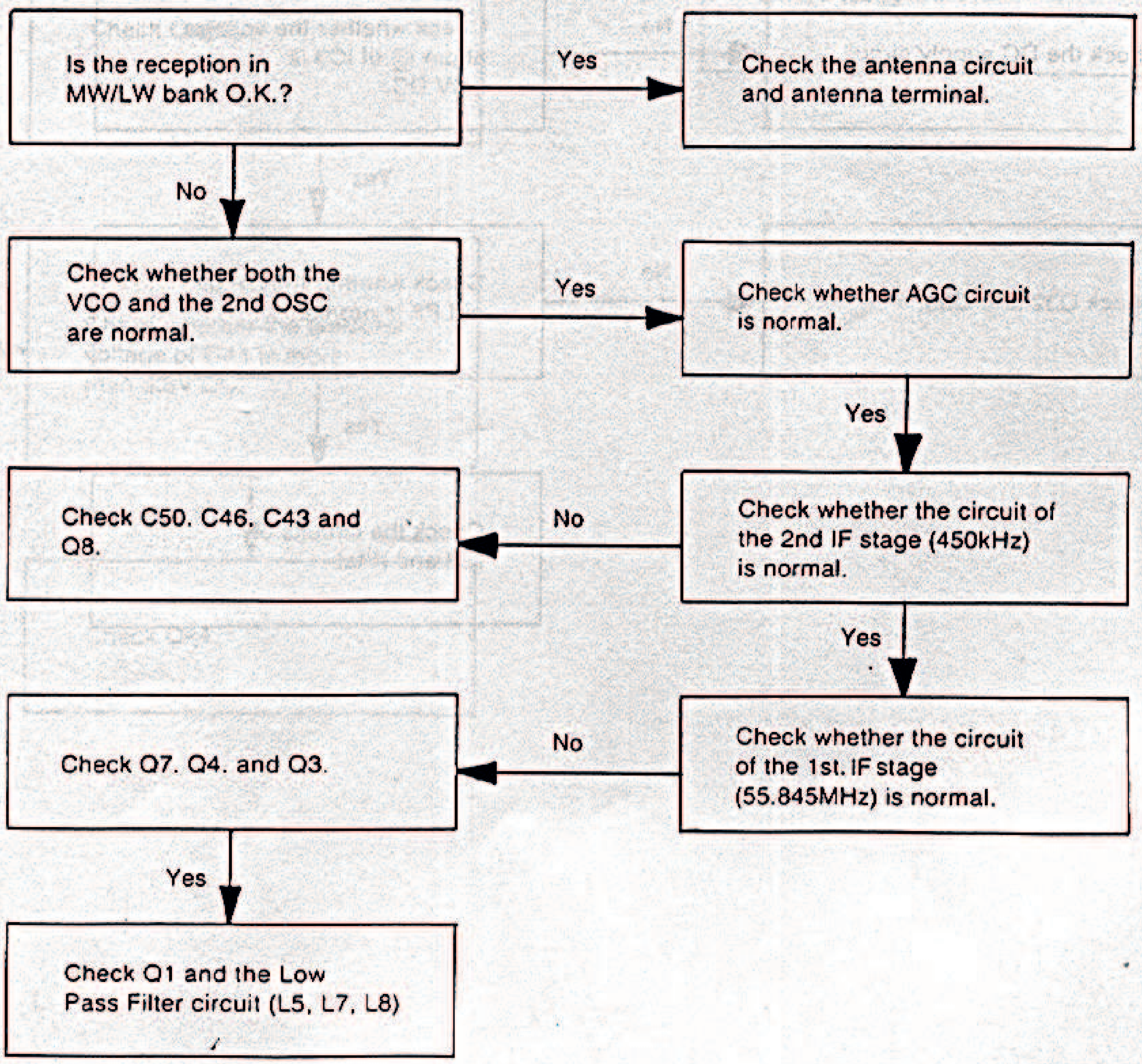

FM Signal Generator
Test Point
TP2

TROUBLESHOOTING FLOW CHART

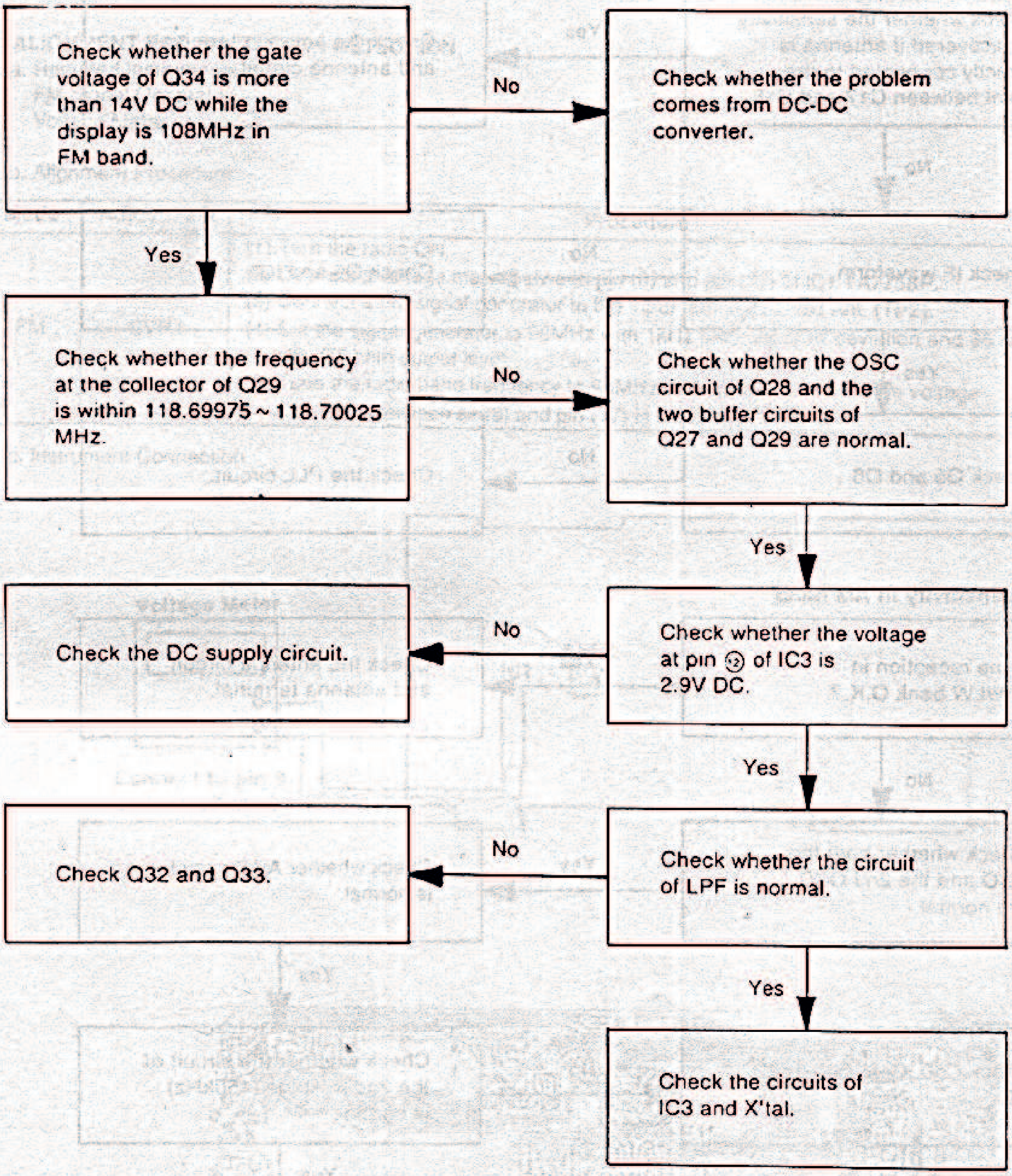
(1) Weak sensitivity on FM mode



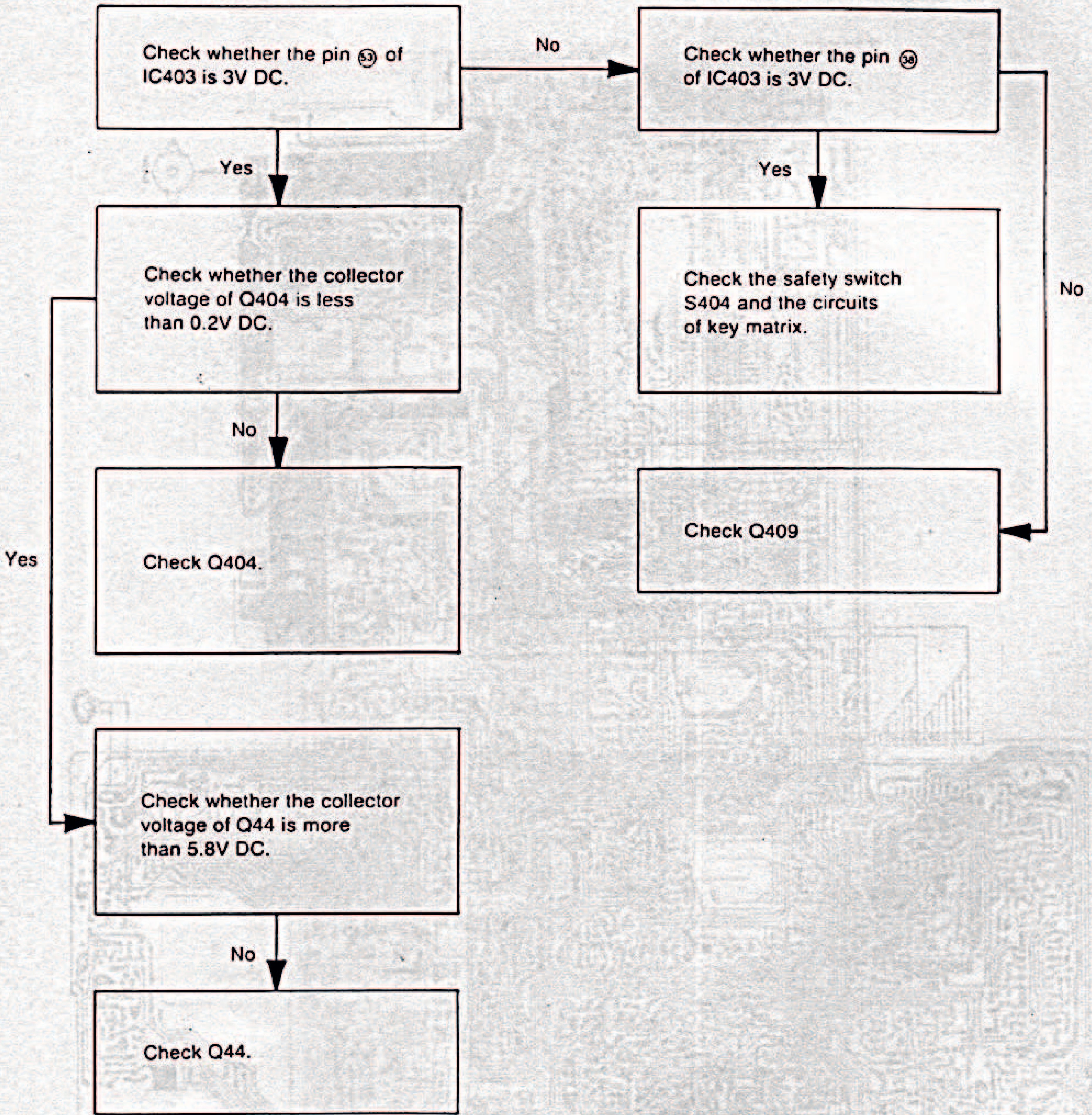
(2) Weak sensitivity in AM band



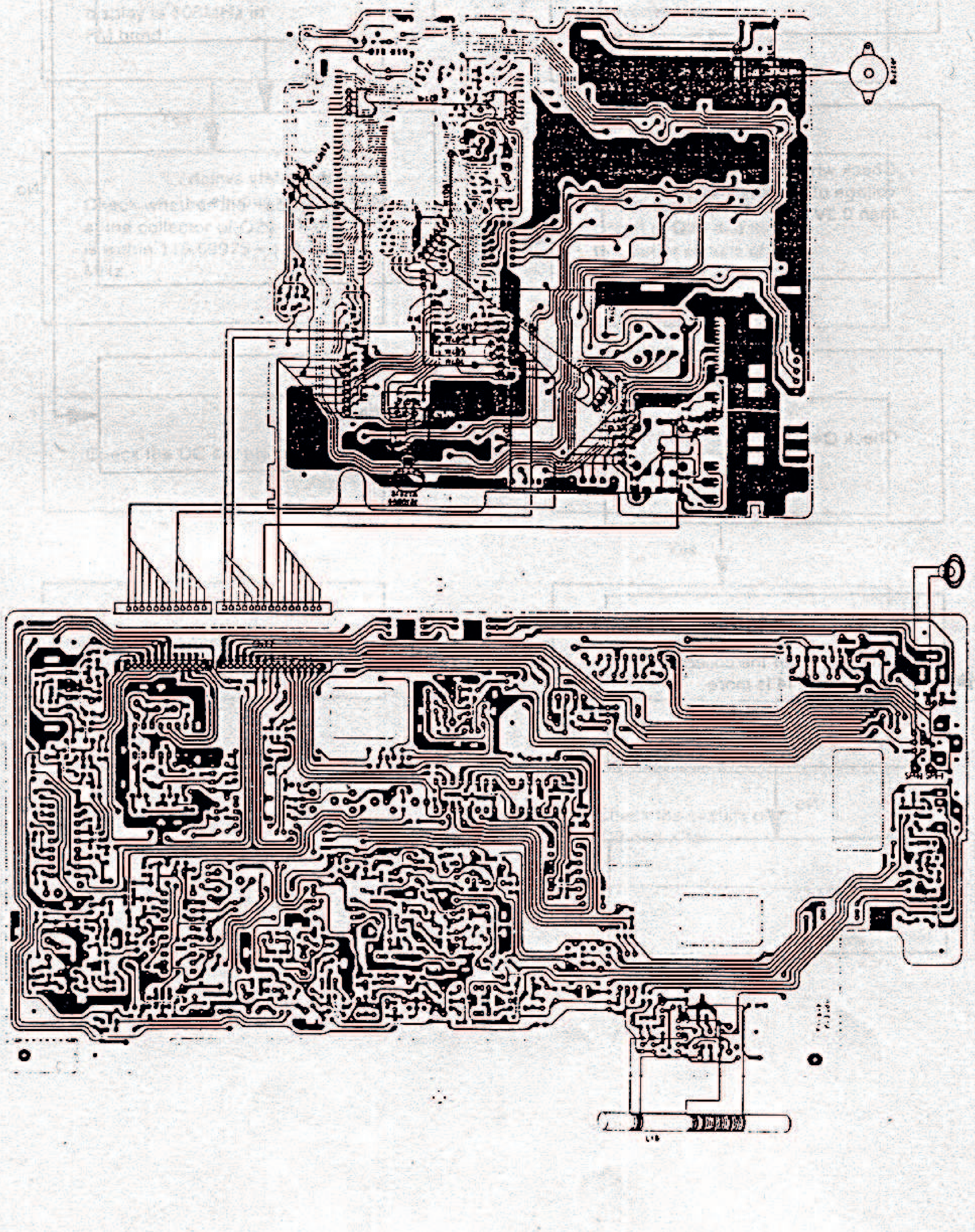
(3) PLL does not work

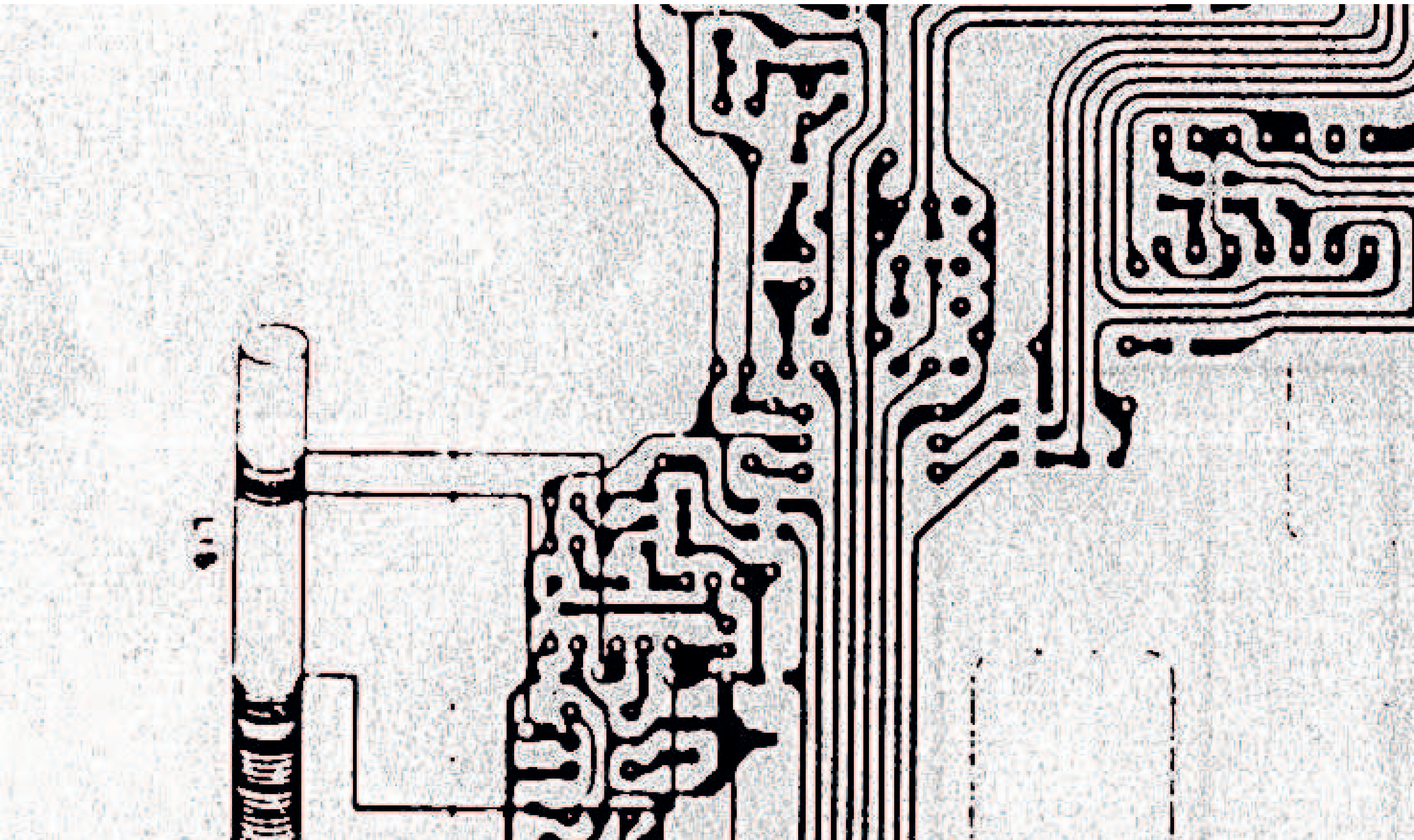


(4) Power cannot be turned on

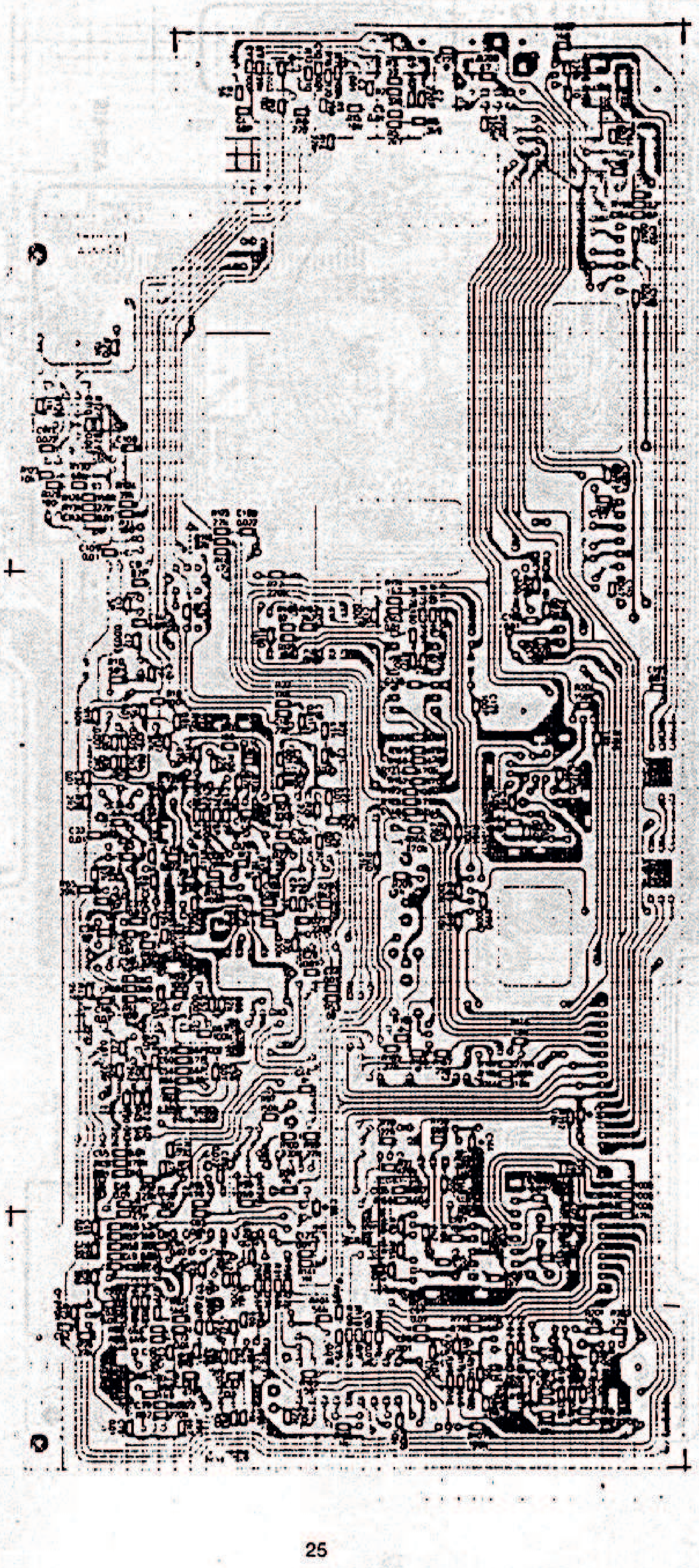


WIRING DIAGRAM

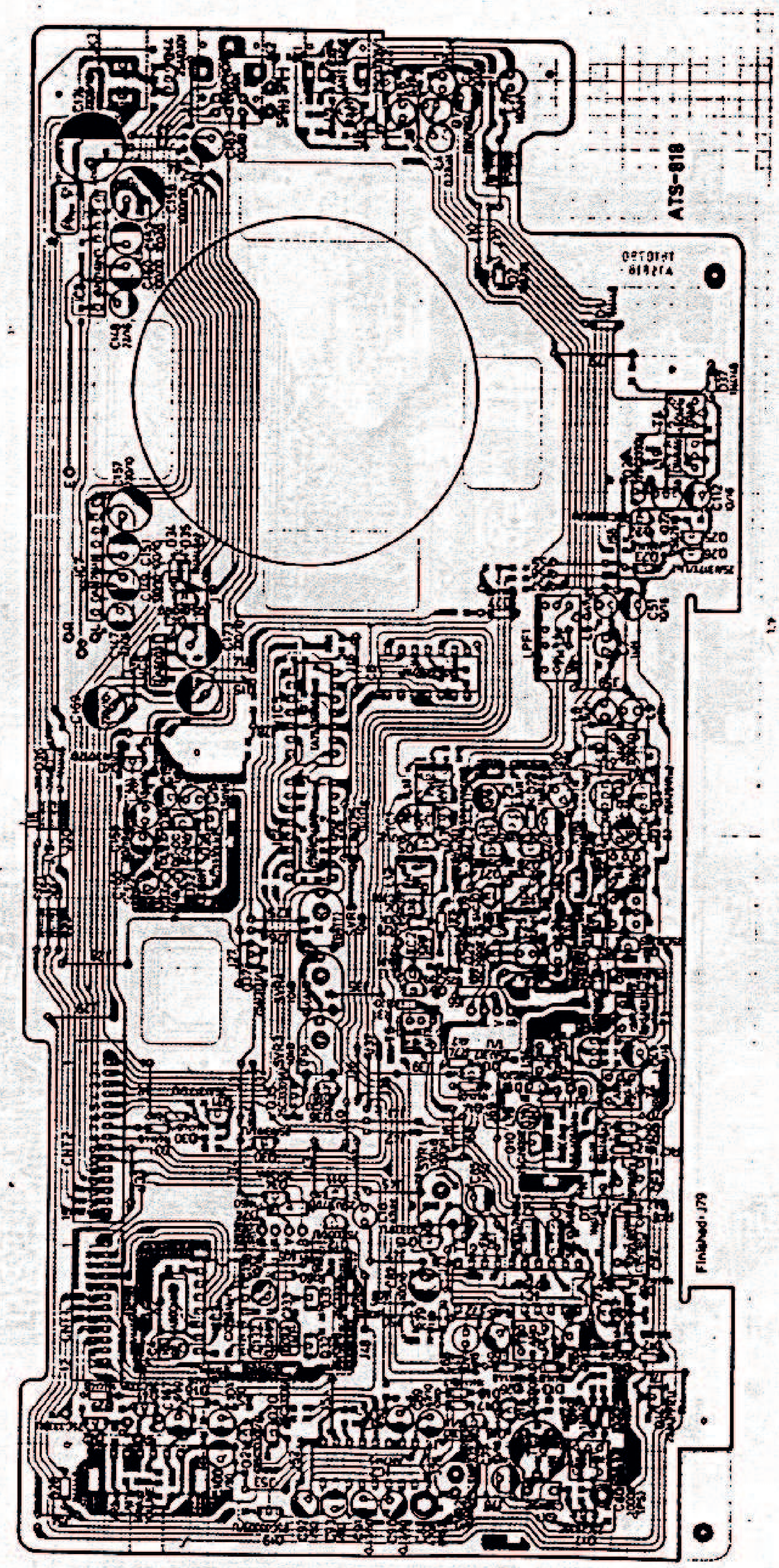


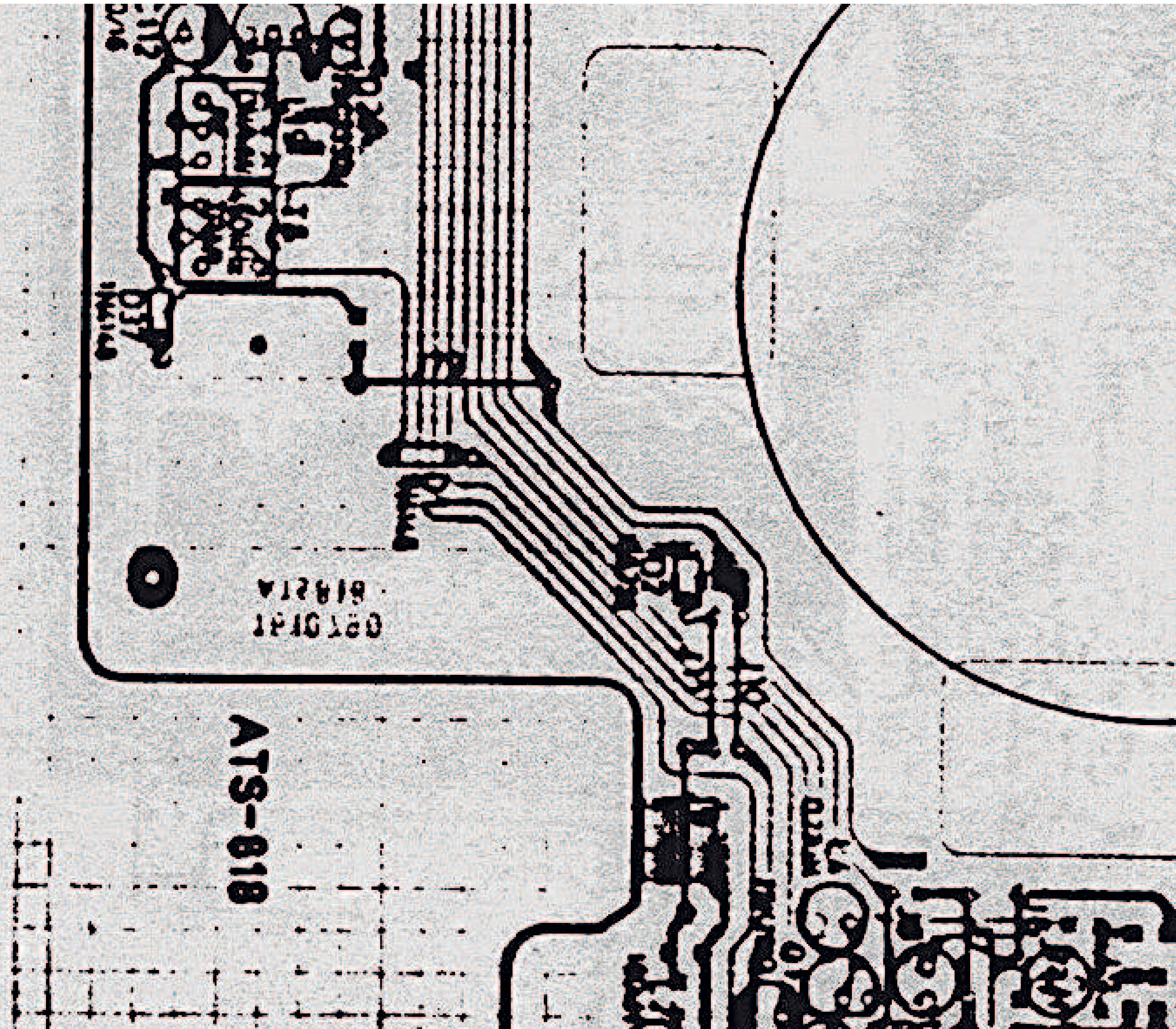


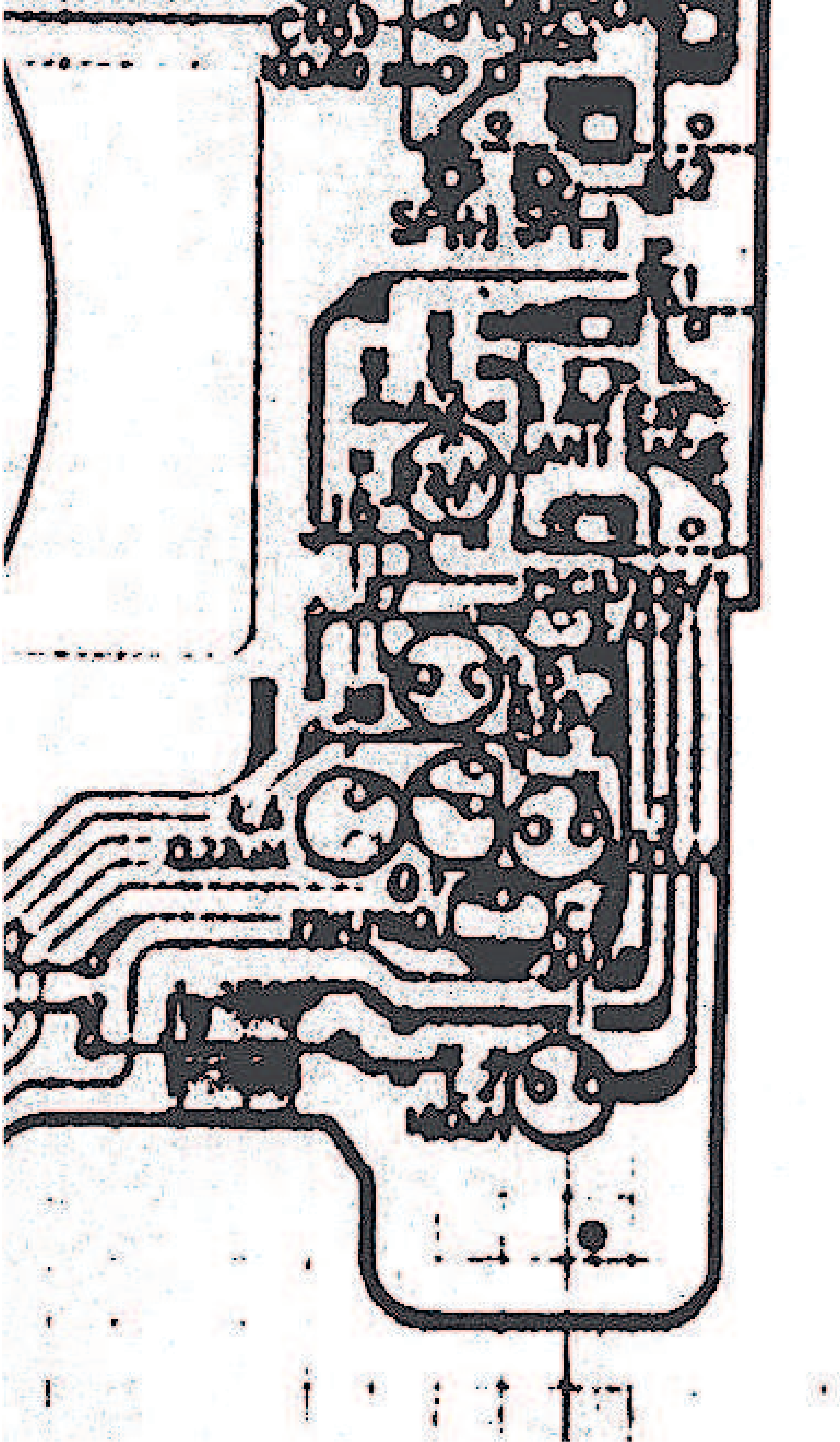
MAIN PCB CHIP SIDE



MAIN PCB TOP VIEW

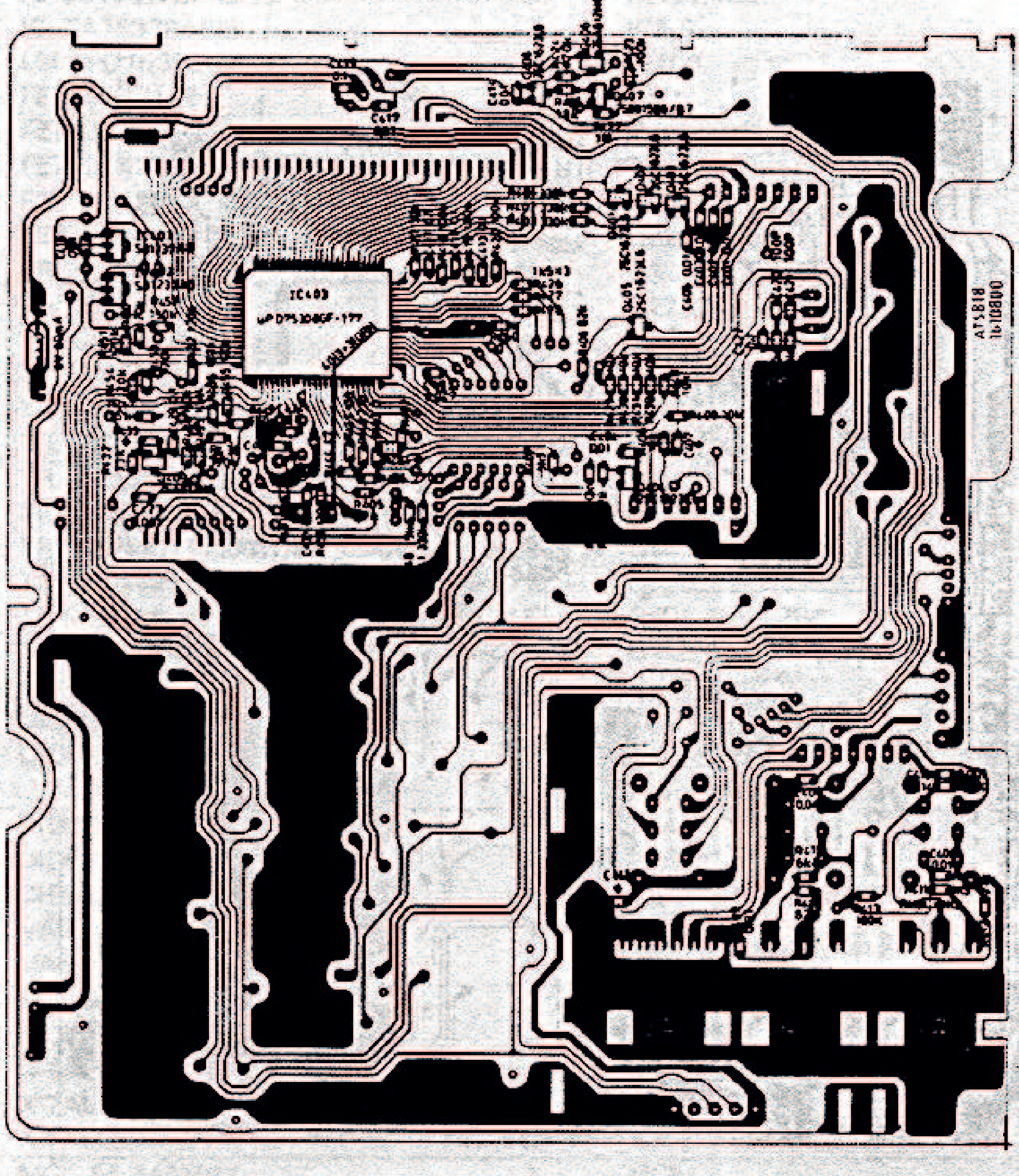



ATS-818

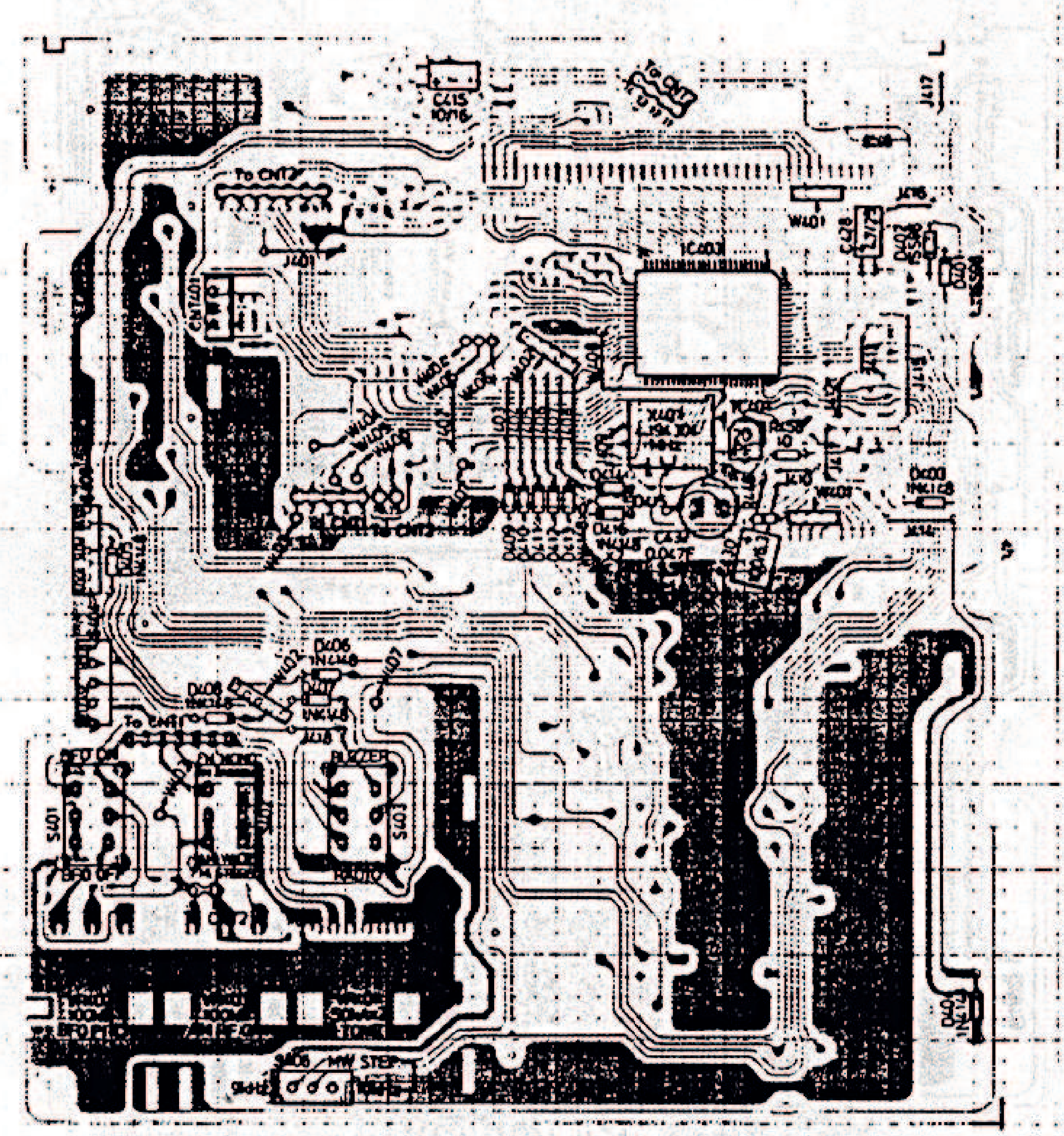


CONTROL PCB CHIP SIDE

ATS 818 Control PCB



CONTROL PCB TOP VIEW



ELECTRICAL PARTS LIST

Part No.	Description	Q'ty	Remark
1010030	IC AN7415	1	IC2
1010140	IC LA5003	1	IC9
1010300	IC TA7758P	1	IC1
1010401	IC CX7961A-1	1	IC3
1011230	IC TC74HC148AP	1	IC4
1011350	IC AN7141N	2	IC7,8
1011370	IC S81237AG-RE-T2	2	IC401,402
1011400	IC TA75339AP/P	2	IC5,6
1000020	LSI uPD75308GF-177	1	IC403
1030001	FET 2SK212E	1	Q5
1030060	FET 2SK291Q	2	Q1,22
1030061	FET 2SK291R	3	Q3,4,7
1030070	FET 2SK381A	1	Q34
1030071	FET 2SK381B	1	Q32
1020181	TR 2SC2999D	1	Q6
1020180	TR 2SC2999E	2	Q27,29
1022000	TR 2SC2839E	4	Q8,10,17,28
1022021	TR 2SC3330U	5	Q24,38,39,41,42
1022020	TR 2SC3330S	2	Q9,33
1020210/1	TR 2SB815 B6/B7	1	Q407
1022020/3	TR 2SC3330S/T	1	Q2
1022023/1	TR 2SC3330T/U	10	Q12,15,16,18-21,23,35,36
1020273/1	TR 2SA1317T/U	9	Q11,13,14,25,26,30,31,37,40
1020230	TR 2SA812 M6(T2)	2	Q406,409
1020240	TR 2SC1623 L6(T2)	6	Q401-405,408
1020250	TR 2SA1020Y	1	Q44
1023000	TR 2SD1012G	1	Q43
1040020	DIODE IN4148	1	D33
1040020T	DIODE IN4148TR	35	D1,5-8,12-14,16-18,22,23,25-31,34-37 404-414
1040030	DIODE 1N60	1	D24
1040040	DIODE 1N60P	2	D19,20
1042010T	DIODE 1SS238	4	D2,9,10,15
1043030	VARACTOR SVC201SP	1	D11
1043060	VARACTOR SVC203(AA1/AA2)	3	D3,4,21
1045090	ZENER UZ-15BH	1	D32
1046000T	DIODE 1SS98-T2	2	D401,402
1650020	X'TAL 55.405MHz	1	X1
1650030	X'TAL 4.500MHz	1	X2
1650071	X'TAL 4.19430MHz	1	X401
1650041	MCF 55.845MHz	1	MCF1
1650061	RESNATOR-451kHz	1	CX1
1660080	CF SFE10.7MA8-A	2	CF1,2
1660170	CF SFP450I	1	CF3
1660360	CF SFR450J	1	CF4
1680030	LAMP3.2 ϕ x13 6V 60mA	1	
1600120	LCD	1	
1610790	PCB A	1	
1610800	PCB B	1	
1130500	FIXED COIL 0.22uH	1	L4
1130800	FIXED COIL 0.39uH	2	L6,15
1130900	FIXED COIL 0.47uH	2	L5,20
1131300	FIXED COIL 1uH	1	L7
1131370	FIXED COIL 1uH	1	L13
1131500	FIXED COIL 1.5uH	1	L8
1131700	FIXED COIL 2.2uH	2	L21,25
1132400	FIXED COIL 8.2uH	2	L23,24
1132900	FIXED COIL 22uH	1	L1
1133300	FIXED COIL 47uH	1	L16
1134000	FIXED COIL 180uH	1	L2

Part No.	Description	Q'ty	Remark
1134100	FIXED COIL 220uH	1	L3
1135100	FIXED COIL 1.5mH	2	L26,28
1120950	ADJ COIL 0950	1	L17
1120990	ADJ COIL 0990	1	T6
1122220	LC FILTER 0247-036	1	LPF1
1122211	ADJ COIL 0258-404-W038B	1	L11
1122200	ADJ COIL 0258-404-W039B	1	L12
1122231	IFT 4143-404-W188	1	T5
1122440	ADJ COIL 0258-404-W040A	1	L22
1122250	IFT 2153-404-W275	1	T7
1122260	ADJ COIL 0237-404-W402	1	T3
1122270	IFT 4140-404-W121	1	T4
1122280	IFT 2150-404-W387B	1	T8
1122420	ADJ COIL 0237-404-W525	1	T1
1122290	ADJ COIL 4140-404-W120A	1	L27
1122300	ADJ COIL 0237-404-W322A	1	L14
1136100	FIXED COIL 10mH	1	L19
1150000	TOROID COIL 720uH	1	L10
1110470	BAR & COIL	1	L18
1630010	SWITCH 1P2C	1	S406
1630620	SWITCH 1P3C	1	S405
1630340	SWITCH 1P2C(H)	1	S404
1630600	SWITCH 2P2C	1	S401
1630600	SWITCH 2P2C	1	S402
1630600	SWITCH 2P2C	1	S403
1640060	JACK HSJ 0914-01-040	1	JK2
1647000	JACK HEC 0470-01-230	1	JK3
1649021	JACK HSJ 0912-01-022	1	JK1
1620240	SPEAKER 4" 4Ω 2W	1	
1625020	PIEZO BUZZER	1	
1730020	ROTARY ENCODER	1	
1310020	VR TONE 50KAx2/50KDx2	1	VR401
1310050	VR GAIN 100KB	1	VR403
1310050	VR BFO 100KB	1	VR402
1310130	VR VOLUME 50KAx2	1	VR1
1320160	SVR 10KB (E)	4	SVR2-5
1320150	SVR 100KB (D)	1	SVR1
1210003	TC 10PF VCT31C213A	1	TC4
1210010	TC 10PF 2222-808-23109	2	TC1,2
1210030	TC 100PF 2222-808-32101	1	TC3
1210050	TC 20PF 2238-808-20123	1	TC401
1700110	CNT HOUSING	1	CNT1
1710120	CNT HOUSING	1	CNT2
1703210	CNT WIRE ASS'Y	1	
1703220	CNT WIRE ASS'Y	1	
1702000	CNT HOUSING	1	CNT401
1703150	CNT WIRE ASS'Y	1	
4447464	NP 474M 50V 5x11	1	C68
4501020	PS 102J 50V	1	C80
4504710	PS 471J 50V	1	C88
4633360	MY 333J 50V	1	C133
4822460	METAL.POLY.C 224J 50V	1	C132
4947300	SUP.C. 473Z 5.5V	1	C432
4139019	CC 390J 50V SL04	1	C181
4110364	CC 103Z 50V F06	1	C433
4110300	CC 103K 25V UAT05	1	C119
4447540S	EL 475M 25V 4x7	1	C428
4410631S	EL 106M 16V 4x7	1	C415
4422460	EL 224M 50V 5x11	1	C90
4447461	EL 474M 50V 5x11	1	C91

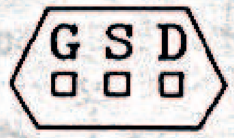
Part No.	Description	Q'ty	Remark
4410560	EL 105M 50V 4x7	1	C159
4410561	EL 105M 50V 5x11	7	C85,92-94,100,101,167
4447562	EL 475M 50V 5x11	1	C124
4447540	EL 475M 25V 4x7	1	C160
4410631	EL 106M 16V 4x7	1	C158
4410632	EL 106M 16V 5x11	8	C8,31,41,51,77,112,115,138
4415650	EL 156M 35V 5x11	1	C66
4422630	EL 226M 16V 5x11	2	C147,148
4447620	EL 476M 10V 5x11	2	C65,89
4410710	EL 107M 6.3V 6x8	1	C430
4410722	EL 107M 10V 6.3x11.2	6	C87,149-152,163
4422720	EL 227M 10V 8x11.2	3	C157,169,173
4410820	EL 108M 10V 10x16	1	C156
4422820	EL 228M 10V 12.5x20	1	C174
4001001	CH CC 010C 50V NPO-A	1	C39
4002001	CH CC 020C 50V NPO-A	4	C13,24,118,126
4005001	CH CC 050C 50V NPO-A	4	C11,26,117,425
4006002	CH CC 060D 50V NPO-A	1	C34
4008002	CH CC 080D 50V NPO-A	2	C38,121
4010002	CH CC 100D 50V NPO-A	2	C17,131
4015001	CH CC 150J 50V NPO-A	1	C129
4018001	CH CC 180J 50V NPO-A	1	C424
4022001	CH CC 220J 50V NPO-A	1	C18
4039001	CH CC 390J 50V NPO-A	2	C128,176
4047001	CH CC 470J 50V NPO-A	3	C47,60,81
4056001	CH CC 560J 50V NPO-A	2	C58,69
4056016	CH CC 560J 50V UJ-A	1	C59
4068001	CH CC 680J 50V NPO-A	2	C4,14
4082001	CH CC 820J 50V NPO-A	3	C9,70,177
4010101	CH CC 101J 50V NPO-A	4	C1,179,420,421
4015101	CH CC 151J 50V NPO-A	1	C162
4022101	CH CC 221J 50V NPO-A	4	C2,27,71,122
4039101	CH CC 391J 50V NPO-A	1	C142
4047101	CH CC 471J 50V NPO-A	2	C106,107
4068119	CH CC 681J 50V SL-A	1	C5
4010219	CH CC 102J 50V SL-A	8	C16,29,30,57,62,134,410,427
4012261	CH CC 122K 50V X7R-A	1	C67
4022261	CH CC 222K 50V X7R-Z	1	C79
4033261	CH CC 332K 50V X7R-A	1	C12
4056261	CH CC 562K 50V X7R-A	1	C74
4010367	CH CC 103K 25V X7R-A	56	C3,6,10,15,19,20,22-3,25,28,32-3,37,40 42,43,45,46,48,49,50,52,53,55,56,61,63 72,73,75,76,78,83,97,98,109,113,114,123 125,127,130,143,166,170,175,401-5,408-9 414,417-8
4018367	CH CC 183K 25V X7R-A	2	C95,96
4022368	CH CC 223K 25V X7R-A	8	C64,84,111,116,155,164,168,180
4033368	CH CC 333M 25V X7R-A	2	C102,103
4047363	CH CC 473M 50V Z5U-A	4	C104,105,145,146
4047371	CH CC 473Z 25V Y5V-A	11	C99,110,135-7,140,153,161,172,406,423
4010471	CH CC 104Z 25V Y5V-A	11	C54,82,141,154,411-3,419,422,429,431
6050712T	RD 1/6W 10J-T	1	R160
6050723T	RD 1/6W 82J-T	2	R36,37
6050735T	RD 1/6W 820J-T	1	R31
6050738T	RD 1/6W 1.5KJ-T	1	R79
6050744T	RD 1/6W 4.7KJ-T	1	R74
6050747T	RD 1/6W 8.2KJ-T	1	R48
6050766T	RD 1/6W 330KJ-T	1	R28
6010512	RD 1/8W 10JSM5	1	R458
6010547	RD 1/8W 8.2KJSM5	1	R47

Part No.	Description	Q'ty	Remark
6160104	CH RD 1/10W 2.2J-A	1	R198
6160112	CH RD 1/10W 10J-A	3	R13,27,193
6160116	CH RD 1/10W 22J-A	2	R26,73
6160118	CH RD 1/10W 33J-A	1	R3
6160120	CH RD 1/10W 47J-A	4	R44,197,200,444
6160121	CH RD 1/10W 56J-A	3	R4,10,103
6160122	CH RD 1/10W 68J-A	1	R53
6160123	CH RD 1/10W 82J-A	3	R127,176,181
6160124	CH RD 1/10W 100J-A	6	R41,63,93,128,133,443
6160125	CH RD 1/10W 120J-A	3	R16,177,459
6160126	CH RD 1/10W 150J-A	3	R11,25,179
6160127	CH RD 1/10W 180J-A	3	R12,178,180
6160128	CH RD 1/10W 220J-A	3	R8,136,442
6160129	CH RD 1/10W 270J-A	2	R175,445
6160130	CH RD 1/10W 330J-A	6	R2,55,58,84,138,206
6160131	CH RD 1/10W 390J-A	1	R9
6160132	CH RD 1/10W 470J-A	4	R33,95,137,139
6160133	CH RD 1/10W 560J-A	3	R149,157,158
6160134	CH RD 1/10W 680J-A	1	R156
6160135	CH RD 1/10W 820J-A	2	R121,122
6160136	CH RD 1/10W 1KJ-A	10	R32,98,105,108,129,135,142,151,183,209
6160137	CH RD 1/10W 1.2KJ-A	3	R69,174,410
6160138	CH RD 1/10W 1.5KJ-A	4	R411,426-428
6160139	CH RD 1/10W 1.8KJ-A	4	R22,90,152,207
6160140	CH RD 1/10W 2.2KJ-A	4	R38,54,155,182
6160141	CH RD 1/10W 2.7KJ-A	3	R5,42,86
6160142	CH RD 1/10W 3.3KJ-A	7	R34,35,50,51,59,154,407
6160143	CH RD 1/10W 3.9KJ-A	4	R6,40,57,96
6160144	CH RD 1/10W 4.7KJ-A	4	R91,109,110,150
6160145	CH RD 1/10W 5.6KJ-A	2	R45,82
6160146	CH RD 1/10W 6.8KJ-A	5	R88,89,115,116,415
6160147	CH RD 1/10W 8.2KJ-A	1	R29
6160148	CH RD 1/10W 10KJ-A	14	R83,106,113,114,123,191,192,408,409 429-431,439,440
6160149	CH RD 1/10W 12KJ-A	2	R201,202
6160150	CH RD 1/10W 15KJ-A	4	R78,210,447,448
6160151	CH RD 1/10W 18KJ-A	5	R15,144,146,196,425
6160152	CH RD 1/10W 22KJ-A	10	R14,46,61,68,70,104,125,131,159,404
6160153	CH RD 1/10W 27KJ-A	7	R52,76,99,185,187,405,412
6160154	CH RD 1/10W 33KJ-A	5	R60,62,80,417,432
6160155	CH RD 1/10W 39KJ-A	7	R1,65,117-120,124
6160156	CH RD 1/10W 47KJ-A	3	R23,102,140
6160157	CH RD 1/10W 56KJ-A	3	R101,153,195
6160158	CH RD 1/10W 68KJ-A	5	R17,66,81,87,130
6160159	CH RD 1/10W 82KJ-A	6	R64,132,134,148,406,416
6160160	CH RD 1/10W 100KJ-A	17	R7,18,20,67,107,143,161-163,172,190 194,413,418-420,423
6160161	CH RD 1/10W 120KJ-A	7	R184,450-455
6160162	CH RD 1/10W 150KJ-A	6	R97,126,204,414,434,457
6160163	CH RD 1/10W 180KJ-A	3	R19,449,456
6160164	CH RD 1/10W 220KJ-A	3	R72,145,147
6160165	CH RD 1/10W 270KJ-A	2	R75,92
6160166	CH RD 1/10W 330KJ-A	11	R21,30,100,189,203,208,401-403,436,441
6160167	CH RD 1/10W 390KJ-A	1	R77
6160168	CH RD 1/10W 470KJ-A	16	R49,71,111,112,164-171,173,424,437,438
6160169	CH RD 1/10W 560KJ-A	1	R421
6160170	CH RD 1/10W 680KJ-A	1	R85
6160172	CH RD 1/10W 1MJ-A	4	R24,94,141,422
6160173	CH RD 1/10W 1.2MJ-A	1	R56
6160174	CH RD 1/10W 1.5MJ-A	1	R435

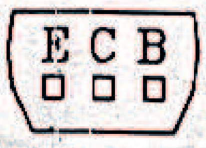
Part No.	Description	Q'ty	Remark
6160194	CH RD 1/10W 0J-A	4	R460-463
8000010	W/JUMP 5(10) 0.6 φ	11	J5,6,12,77,78,410,412,413,416,417,R446
8000030	W/JUMP 7.5(10) 0.6 φ	28	J7,13,14,17,40,46,49,50,52-54,60-63,65-68 70-73,75,76,411,418,D403
8000040	W/JUMP 10(10) 0.6 φ	44	J2-4,8,10,11,15,16,18,19,21-27,30-39,41-45 47,48,51,55-57,59,64,74,401,402,414
8000050	W/JUMP 12.5(10) 0.6 φ	12	J1,9,28,29,58,69,403-408
8000090	W/JUMP 15(10) 0.6 φ	3	J20,79,415
8000140	W/JUMP 25(0) 0.6 φ	1	SP. GRAME-GND
8000140	W/JUMP 25(0) 0.6 φ	1	PCB A GND-GND
8000140	W/JUMP 25(0) 0.6 φ	1	X1-GND
8000140	W/JUMP 25(0) 0.6 φ	1	LCD HOLDER-GND
8092045	W/PVC 120(6+6) GRN	1	AWG22 VCO COVER-PCB C SHIELD
8170415	W/PVC 40(3+3) GRN	1	AWG28 PCB C GND-GND
8170565	W/PVC 45(9+9) GRN	1	AWG28 PCB A (K)
8170765	W/PVC 55(9+9) GRN	1	AWG28 W408
8170862	W/PVC 60(9+9) RED	1	AWG28 W404
8170863	W/PVC 60(9+9) ORN	1	AWG28 W405
8170864	W/PVC 60(9+9) YEL	1	AWG28 W406
8170868	W/PVC 60(9+9) GRY	1	AWG28 W407
8171269	W/PVC 80(9+9) WHT	1	AWG28 W403
8171460	W/PVC 90(9+9) BLK	1	AWG28 PCB A (P)
8171465	W/PVC 90(9+9) GRN	1	AWG28 PCB A VCO (F)
8171469	W/PVC 90(9+9) WHT	1	AWG28 PCB A VT (V)
8171869	W/PVC 110(9+9) WHT	1	AWG28 BACK-UP BATT(−)-M.BATT(−)
8172025	W/PVC 120(3+6) GRN	1	AWG28 SPEAKER(+)
8172029	W/PVC 120(3+6) WHT	1	AWG28 SPEAKER(−)
8132662	W/PVC 150(9+9) RED	1	AWG26 M.BATT(+)-BATT.CONTACT(+)
8132860	W/PVC 160(9+9) BLK	1	AWG26 M.BATT(−)-BATT.CONTACT(−)
8173260	W/PVC 180(9+9) BLK	1	AWG28 PCB A Audio (G)
8173261	W/PVC 180(9+9) BRN	1	AWG28 PCB A Audio (R)
8173268	W/PVC 180(9+9) GRY	1	AWG28 PCB A Audio (L)
8174065	W/PVC 220(9+9) GRN	1	AWG28 PCB A Audio (E)
8725350	W/4 70(6+6) P=2.0 GRY	1	W401
8650010	W/5 90(6+6) P=2.0 GRY	1	W402

SEMICONDUCTOR LEAD IDENTIFICATIONS

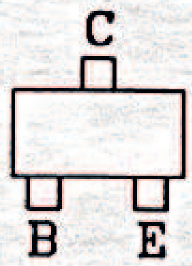
Transistors



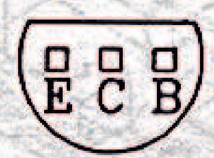
2SK212E



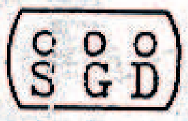
2SC2839E
2SD1012G
2SA1317T/U
2SC2999D/E
2SC3330S/T/U



2SA812M6
2SC1623L6
2SB815B6/B7



2SA1020Y

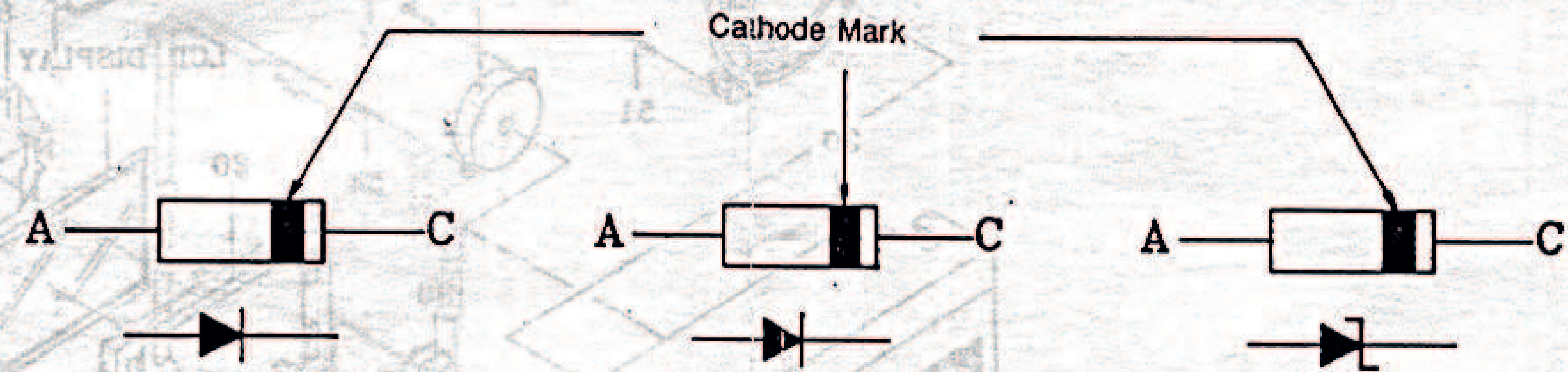


2SK381A/B

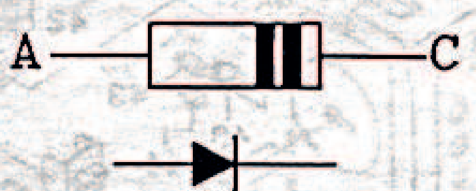
2SK291Q/R

(E: Emitter C: Collector B: Base S: Source G: Gate D: Drain)

Diodes



IN60 1SS238 UZ-15BH

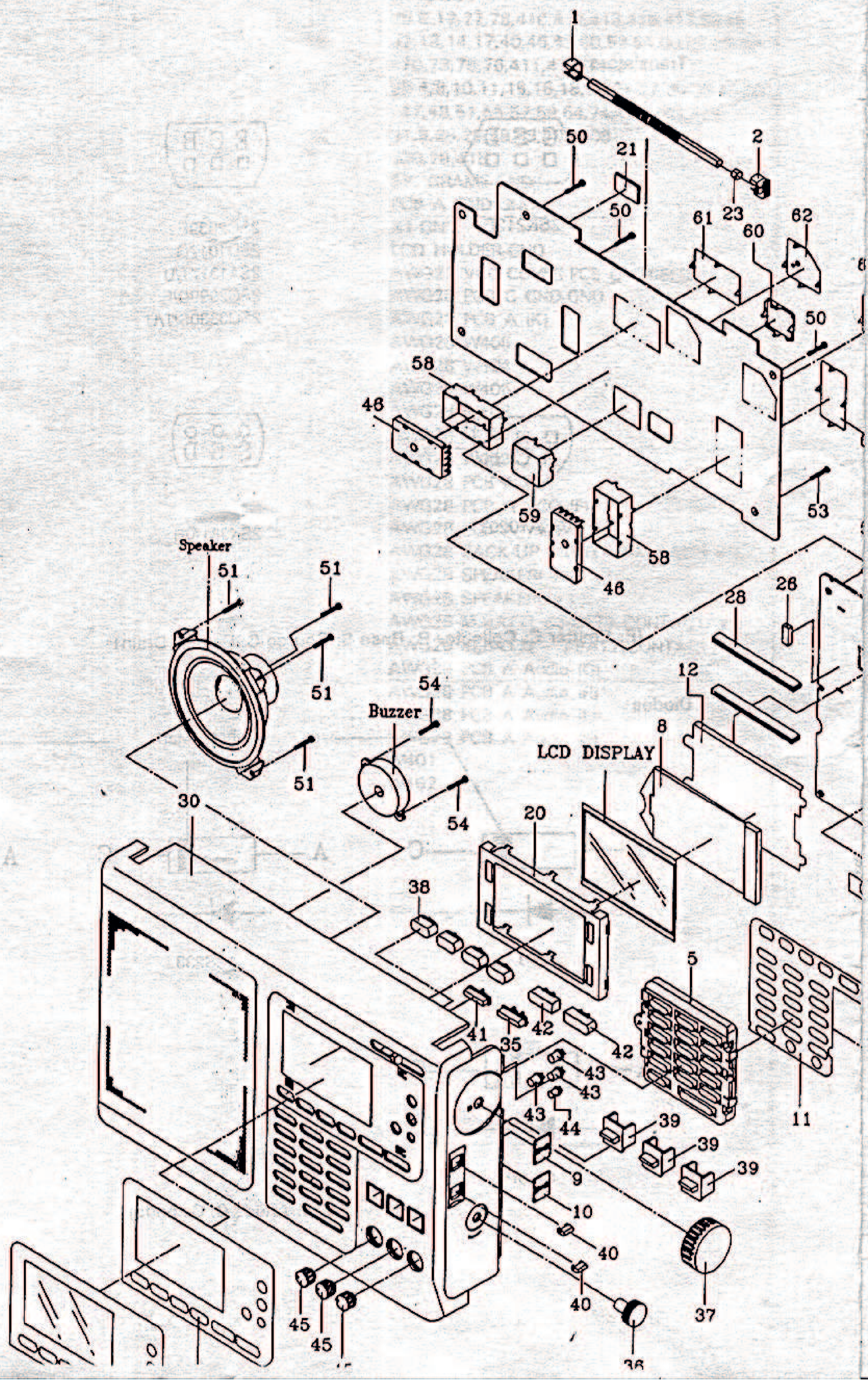


IN60P

(A: Anode C: Cathode)

33B

EXPL



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Speaker
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Buzzer
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LCD DISPLAY
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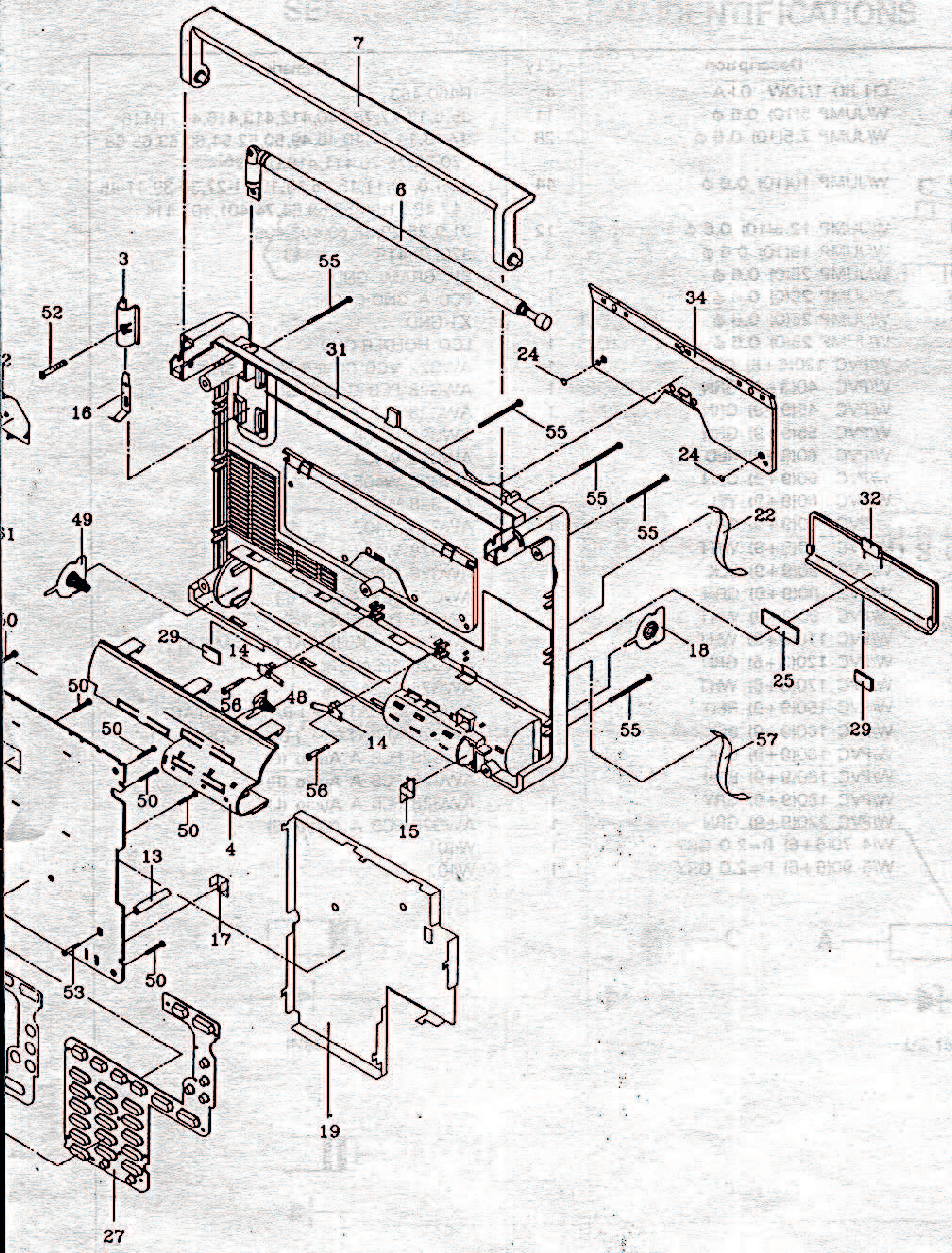
ODE VIEW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MECHANICAL PARTS LIST

Ref No.	Description	RS Part No.	Mfr Part No.
1	ANT. BAR HOLDER (L)		2018070
2	ANT. BAR HOLDER (R)		2018080
3	ROD ANT. HOLDER		2018100
4	BATTERY HOUSING CASE		2065000
5	----- KEY KNOB PANEL ASS'Y -----		07916602
	KEY KNOB PANEL		2065010
	KEY KNOB HOLDER		2065030
	KEY KNOB ASS'Y		3156501
6	ROD ANT.		3606502
7	HANDEL		2065050
8	LCD ILLUMINATOR		2065070
9	SLIDE KNOB HOLDER (B)		3086501
10	SLIDE KNOB HOLDER (A)		3076501
11	KEY BOARD SHIELD		2166010
12	LCD SHIELD PLATE		2366050
13	PCB SUPPORTER		2165040
14	BATTERY CONTACT		2165060
15	BATTERY CONTACT (−)		2165070
16	RID ABT. CONNECTOR		2165080
17	BATTERY TERMINAL		2165090
18	BATTERY CONTACT (−)		2165140
19	SHIELD PLATE		2165150
20	LCD HOLDER		2165170
21	P.C.B. HEMELON		2256000
22	RIBBON		2258020
23	ANT. BAT FIXED SPONGE		2318000
24	EVA CUSHION		2365010
25	EVA CUSHION		2365020
26	LAMP EVA SPACER		2365040
27	KEY BOARD RUBBER		2465000
28	CONDUCTIVE RUBBER		2465010
29	PU FOOT		2465030
30	----- FRONT CABINET ASS'Y -----		
	FRONT CABINET		3016601
	SPEAKER GRILL		3436601
	HEMELON		2266000
31	BACK COVER		3036501
32	BATTERY COVER		3046501
33	LCD WINDOW		3056501
34	BACK SUPPORTER		3066501
35	POWER KNOB		3106501
36	VOLUME KNOB		3116501
37	TUNING KNOB		3126501
38	BAND KNOB		3136501
39	SLIDE KNOB (B)		3166501
40	SLIDE KNOB (A)		3176501
41	LIGHT KNOB		3186501
42	MANUAL TUNING KNOB		3196501
43	TIME SET KNOB		3206501
44	DUAL TIME KNOB		3216501
45	ROTARY KNOB		3276501
46	VOC SHIELD		2149501
47	DIAL PLATE		3426501
48	BA. CONDUCTOR		2104501
49	BATTERY CONTACT		2165130
50	TP SCREW 2.6x8 PW NI		9152082
51	TP SCREW 3x8 PW NI		9153082
52	M SCREW 3x6 P NI		9003062
[illegible]	[illegible]		

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Ref No.	Description	RS Part No.	Mfr Part No.
55	TP SCREW 2.6x16 P ZK		9102161
56	TP SCREW 2.6x8 P NI		9102082
57	RIBBON		2265010
58	VCO SHIELD (FRAME)		2149041
59	DC/DC SHIELD (UP)		2149020
60	DC/DC SHIELD (DOWN)		2149030
61	1ST OSC SHIELD		2166020
62	2ND OSC SHIELD		2166030

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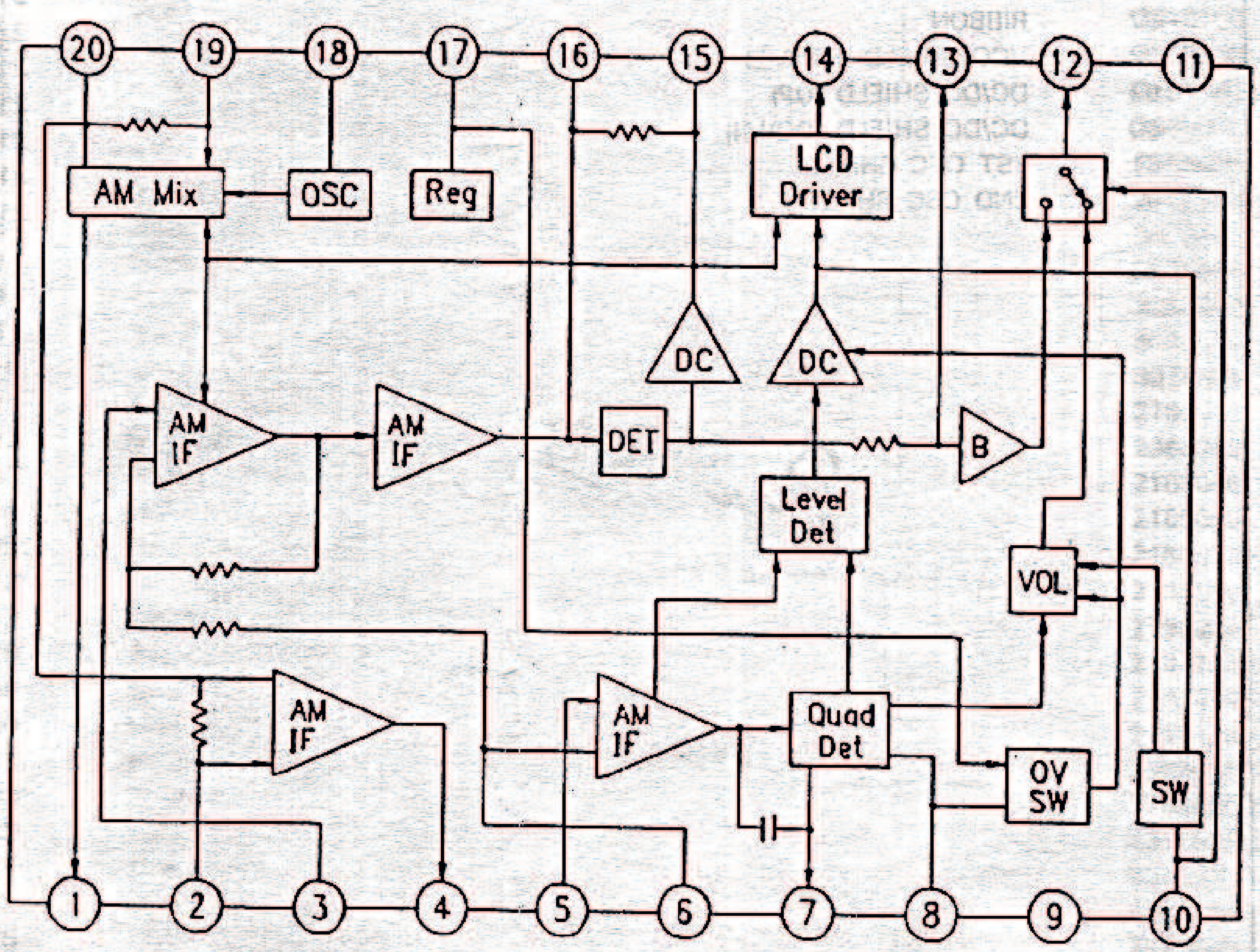
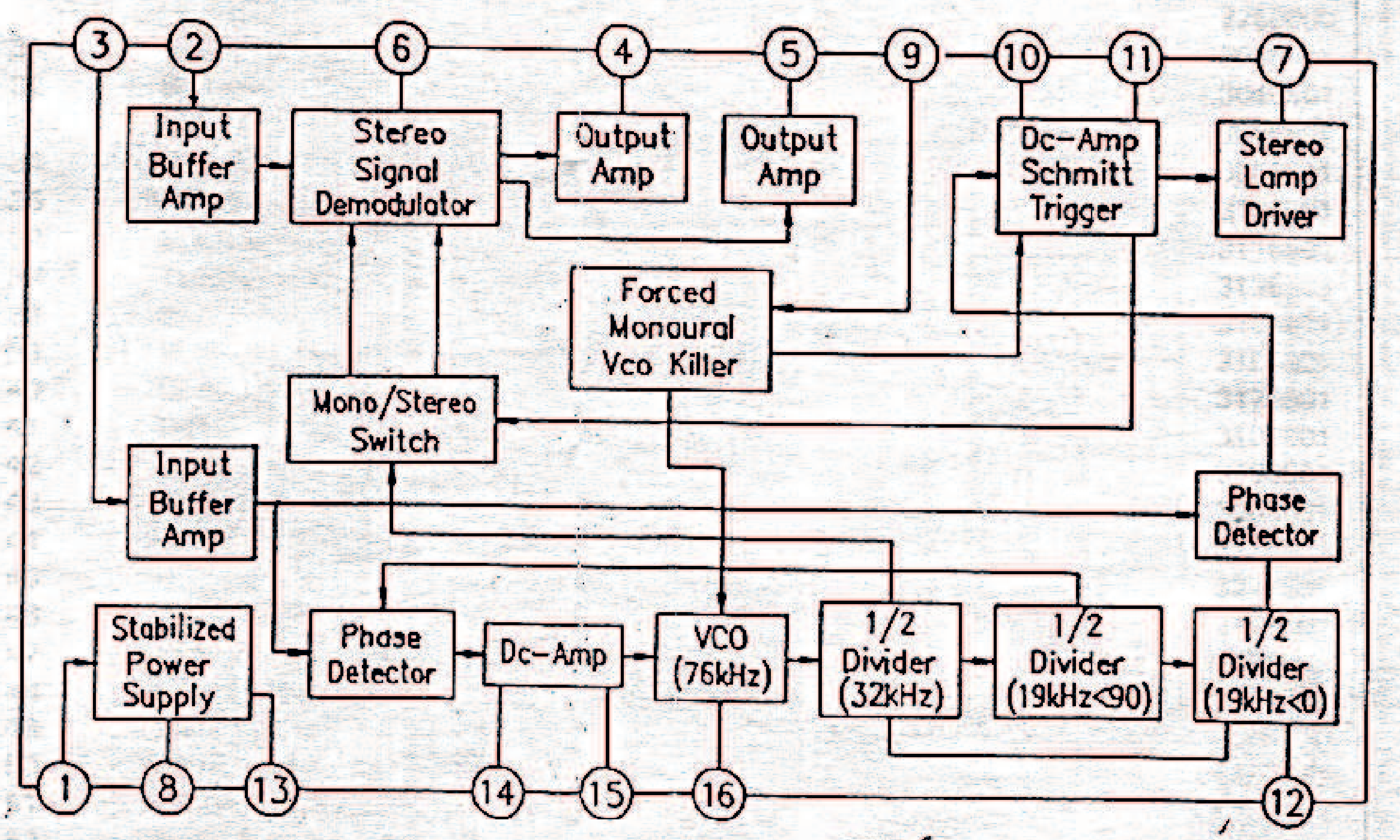
IC CIRCUIT BLOCK DIAGRAM

(1) IC1-TA7758P



(2) IC2-AN7415



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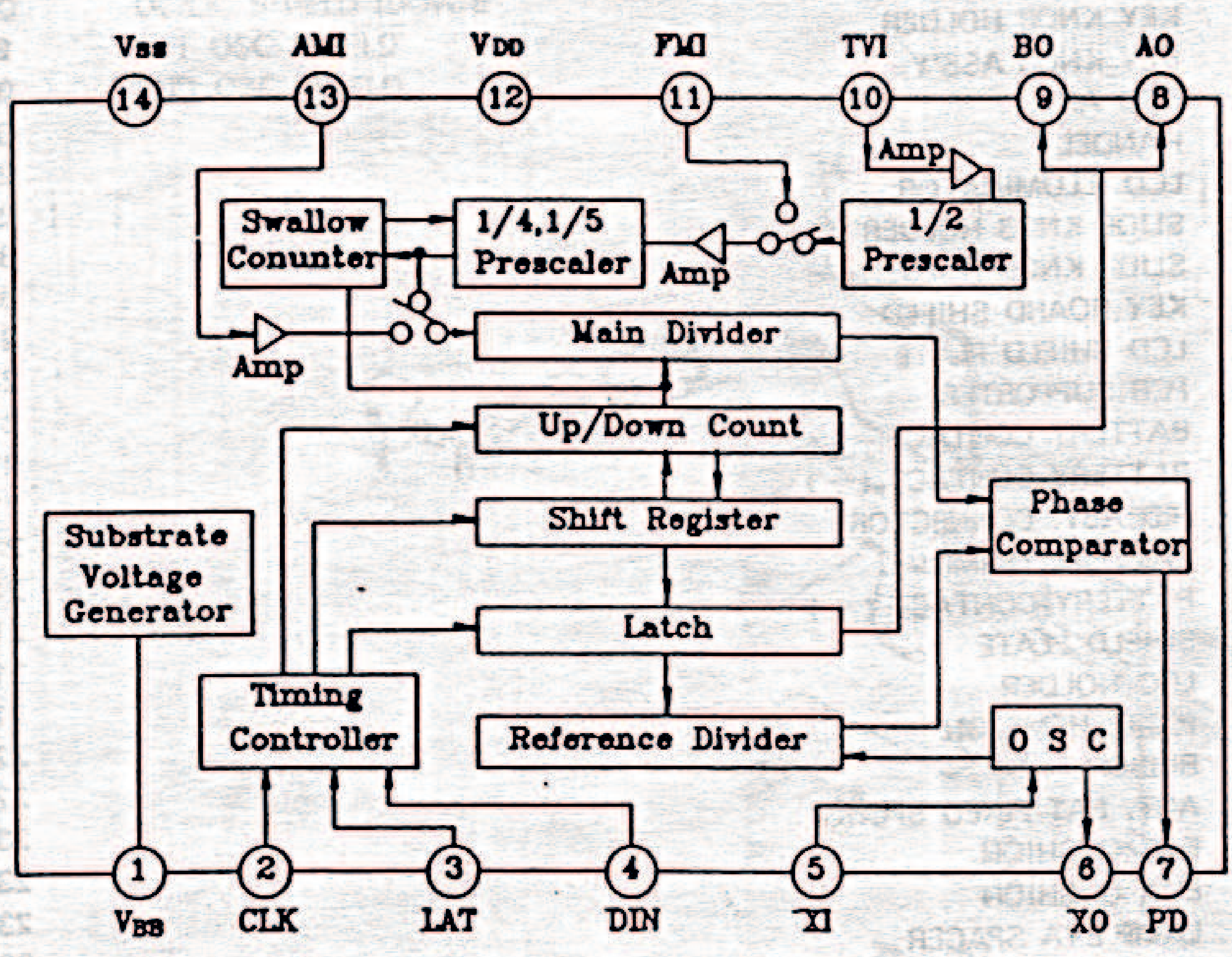
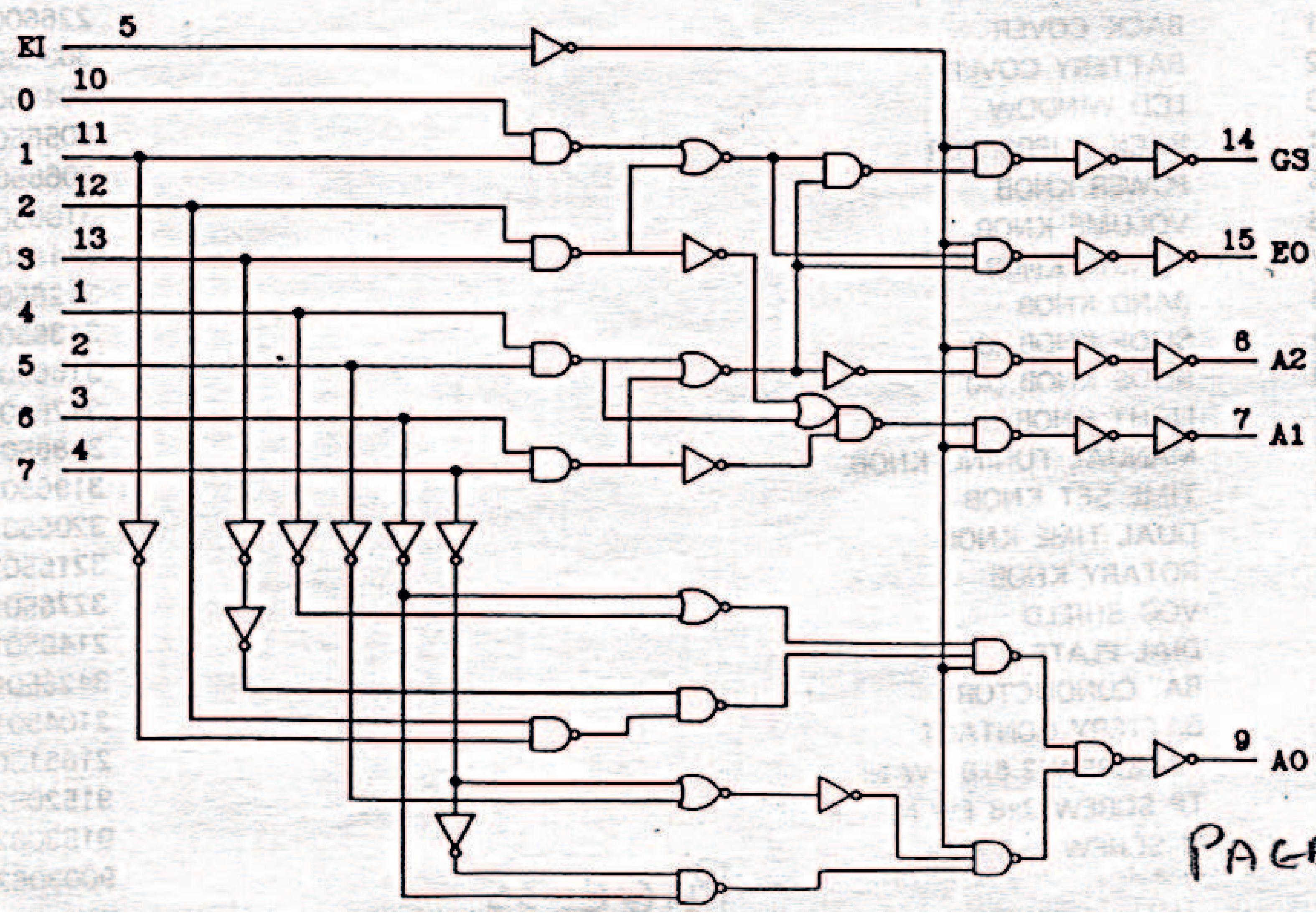
(3) IC3-CX7961A-1

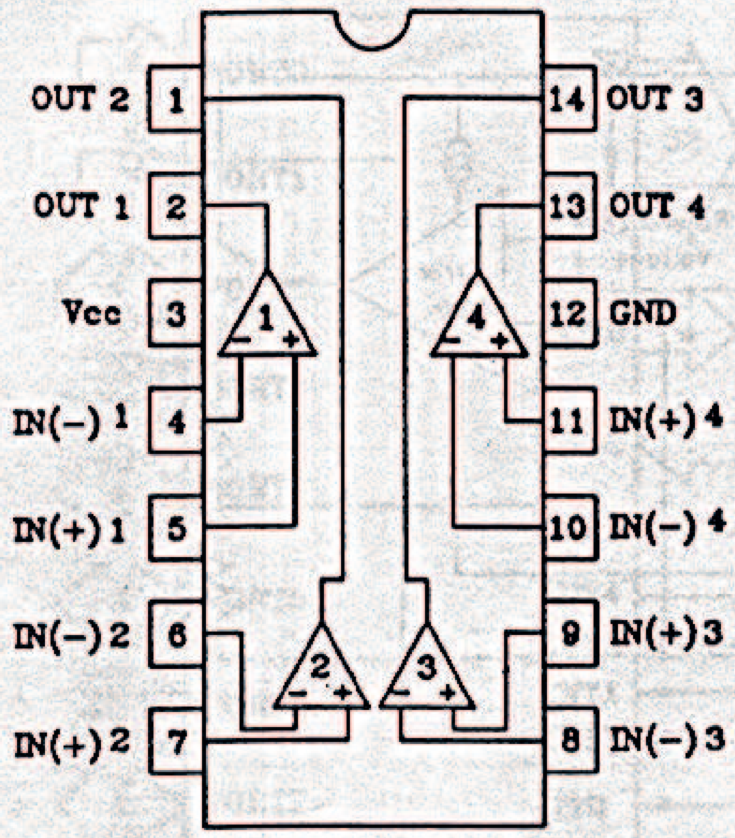


(4) IC4-TC74HC148AP

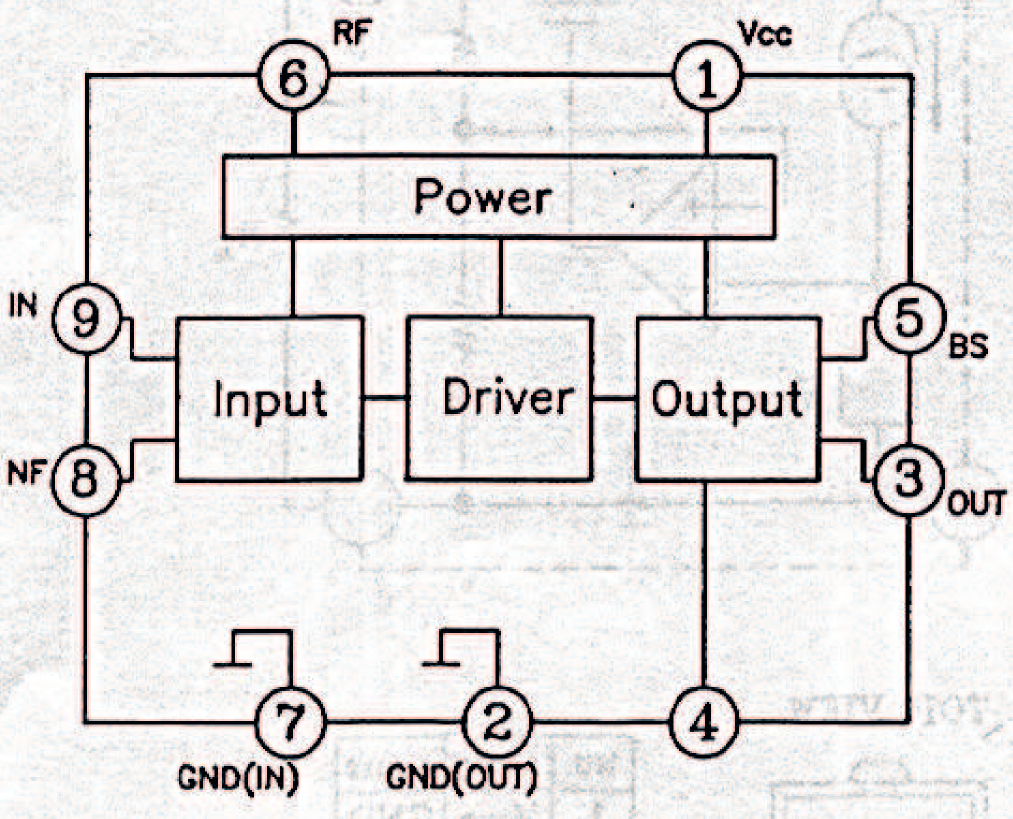


PAGE 36B

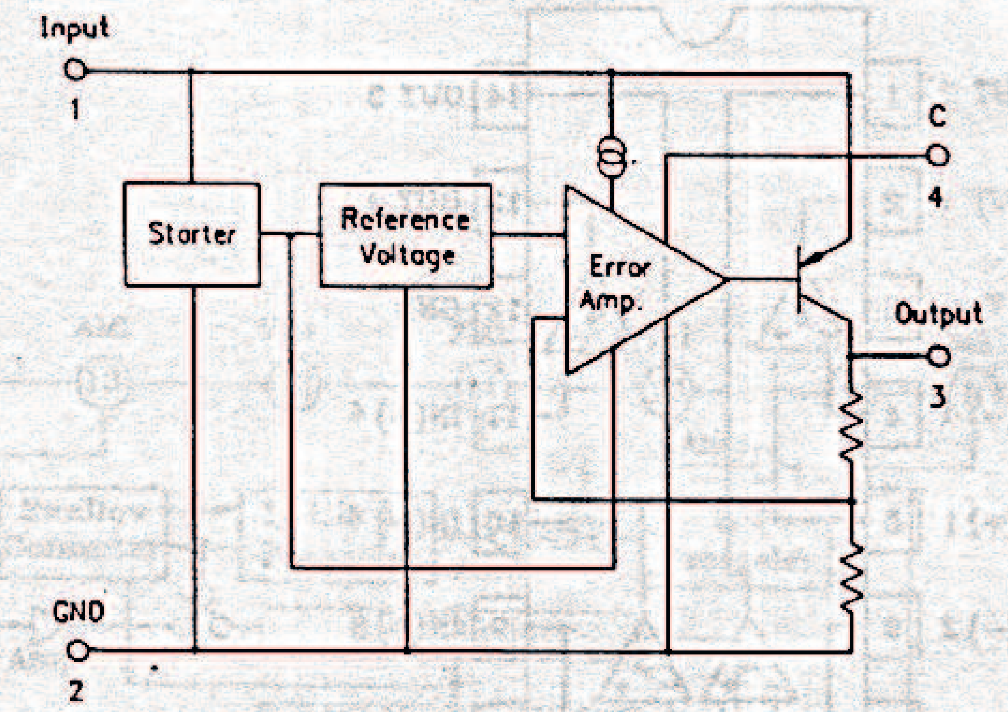
(5) IC5,6-TA75339AP/P



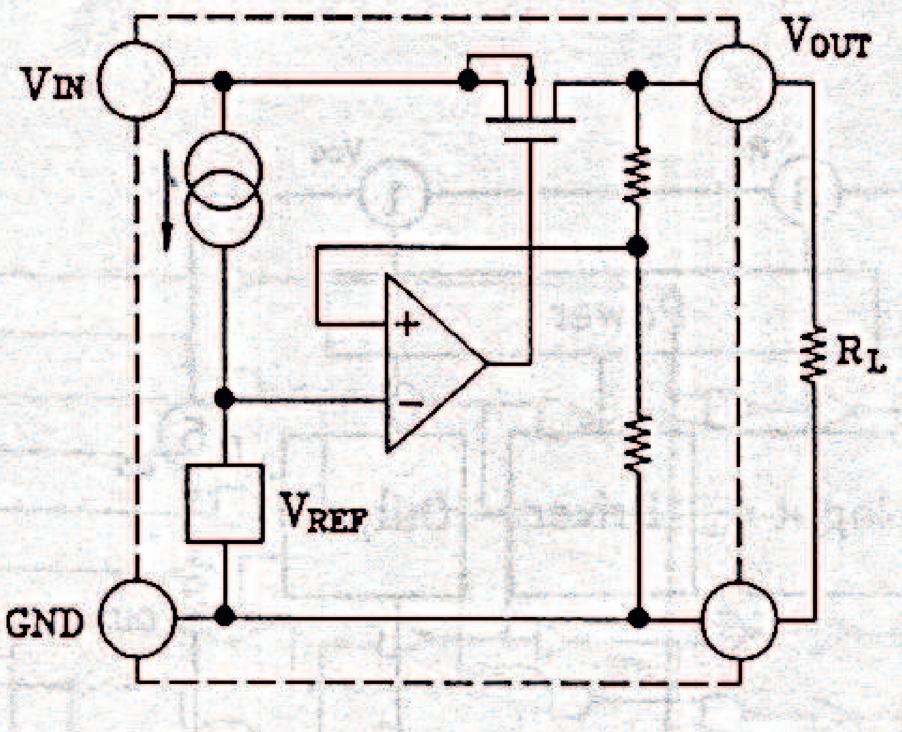
(6) IC7,8-AN7141N



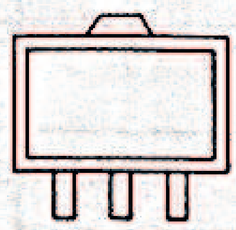
(7) IC9-LA5003



(8) IC401,402-S81237AG-RE-T2

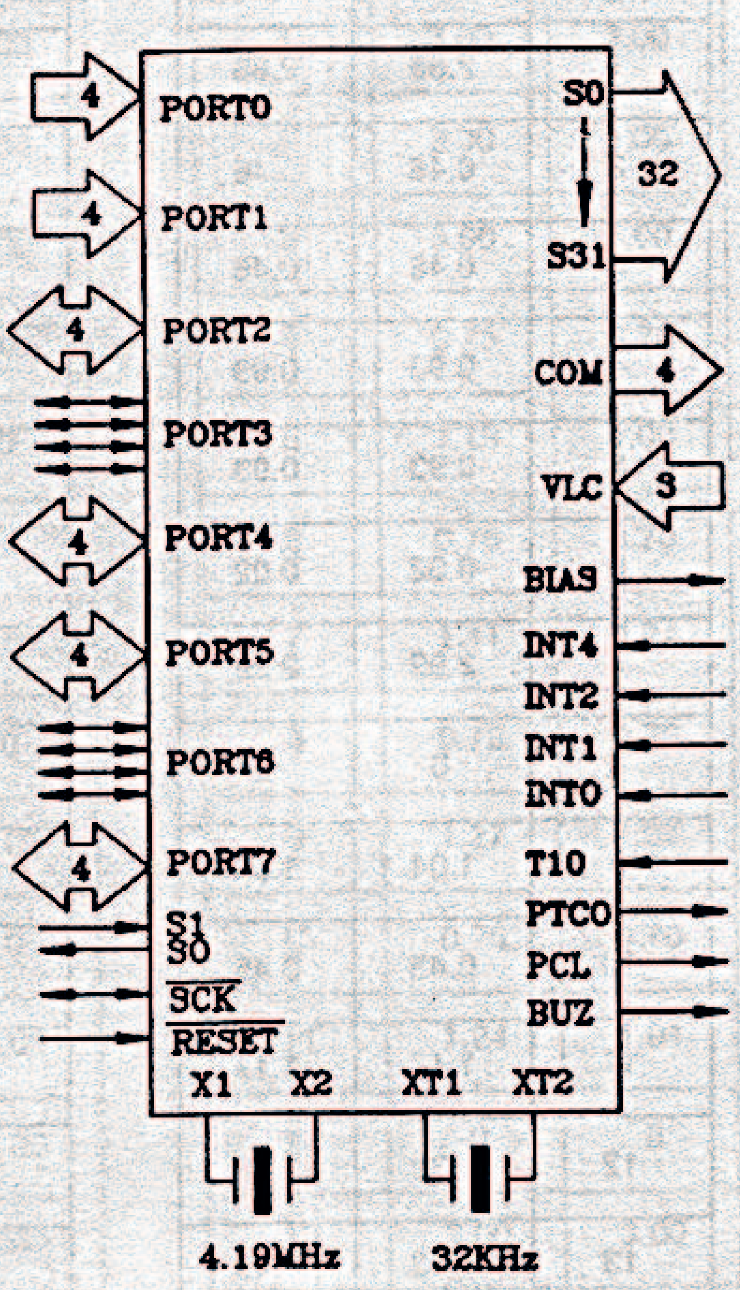


TOP VIEW



NO.	S-802	S-812
1	V_{OUT}	GND
2	GND	V_{IN}
3	V_{IN}	V_{OUT}

(9) IC403-UPD75308GF-177



ICS' & TRANSISTORS' VOLTAGE LIST

IC1

PIN NO.	FM	AM
1	4.39	3.80
2	1.66	1.66
3	1.83	1.60
4	1.27	1.79
5	1.38	1.60
6	1.38	1.60
7	5.04	4.99
8	2.60	2.25
9	5.05	5.00
10	4.93	0
11	0	0
12	1.50	1.59
13	0	2.35
14	2.97	2.97
15	1.12	1.08
16	1.12	1.08
17	2.38	2.33
18	1.77	1.46
19	1.66	1.66
20	1.66	1.66

IC2

PIN NO.	FM	AM
1	2.86	2.86
2	0.46	0.46
3	0.46	0.46
4	0.93	0.93
5	0.93	0.93
6	0.02	0.02
7	2.99	2.99
8	0	0
9	1.04	1.04
10	0.45	0.45
11	1.17	1.17
12	1.32	1.32
13	1.43	1.43
14	1.15	1.15
15	1.15	1.15
16	0.02	0.02

IC3

PIN NO.	FM	AM
1	-1.38	-1.37
2	0	0
3	0	0
4	3.00	3.00
5	1.20	1.20
6	1.11	1.11
7	0.68	0.69
8	0.01	0.01
9	0.01	0.01
10	0	0
11	1.40	1.39
12	2.88	2.88
13	0	0
14	0	0

TESTING CONDITION :

1. WITHOUT ANY INPUT SIGNAL AND SETTING VOLUME TO MIN.
2. SPEAKER MODE.
3. EXTERNAL ANT. IS NOT USED.
4. AM IS RECEIVED BY 150KHZ AND PUT ON THE WIDE BW, BFO OFF & AM RF GAIN IS MAX.
5. FM IS RECEIVED BY 98MHZ AND PUT ON THE STEREO POSITION.
6. LOAD IN RADIO BATTERY 6.0V AND BACK UP BATTERY 4.5V.
7. UNIT OF MEASURE : VOLTS.

IC4

PIN NO.	FM	AM
1	3.00	3.00
2	3.00	3.00
3	3.00	3.00
4	3.00	3.00
5	0	0
6	3.00	3.00
7	3.00	3.00
8	0	0
9	3.00	3.00
10	0	0
11	3.00	3.00
12	3.00	3.00
13	3.00	3.00
14	0	0
15	3.00	3.00
16	3.00	3.00

IC5

PIN NO.	FM	AM
1	3.00	3.00
2	3.00	3.00
3	3.00	3.00
4	0.75	0.70
5	1.19	1.00
6	0.75	0.70
7	1.11	0.94
8	0.75	0.70
9	1.27	1.07
10	0.75	0.70
11	1.24	1.04
12	0	0
13	3.00	3.00
14	3.00	3.00

IC6

PIN NO.	FM	AM
1	3.00	3.00
2	0	0
3	3.00	3.00
4	3.00	3.00
5	0.75	0.70
6	0.75	0.70
7	1.05	0.88
8	0.75	0.70
9	0.97	0.82
10	0.75	0.70
11	0.94	0.79
12	0	0
13	3.00	3.00
14	3.00	3.00

IC401

PIN NO.	FM	AM
1	0	0
2	4.50	4.50
3	5.85	5.85

IC402

PIN NO.	FM	AM
1	0	0
2	5.85	5.85
3	3.00	3.00

IC9

PIN NO.	FM	AM
1	5.10	5.05
2	0	0
3	3.00	3.00
4	4.35	4.30

IC7

PIN NO.	FM	AM
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0

IC8

PIN NO.	FM	AM
1	5.95	5.95
2	0	0
3	3.15	3.15
4	0.62	0.62
5	5.65	5.65
6	5.90	5.90
7	0	0
8	1.33	1.33
9	0.02	0.02

IC403

PIN NO.	FM	AM
1 ~ 15	LCD SEGMENT	
16	1.57	1.57
17	3.6	0
18	0	3.6
19	0	0
20	0	0
21 ~ 24	LCD back plane	
25	3.60	3.60
26	3.22	3.22
27	2.15	2.15
28	1.08	1.08
29	3.60	3.60
30	0	0
31	0	0
32	0	0
33	0	0
34	0	0
35	0	0
36	0	0
37	3.4	3.4
38	3.65	3.65
39	3.60	3.60
40	3.60	3.60
41	3.60	3.60
42	3.00	3.00
43	3.00	3.00

IC403

PIN NO.	FM	AM
44	2.95	2.95
45	2.85	2.85
46	0	0
47	0	0
48	0	0
49	0	0
50	0	0
51	0	0
52	0	0
53	3.60	3.60
54	3.60	3.60
55	0	0
56	3.60	3.60
57	0	0
58	1.75	1.75
59	1.80	1.80
60	3.60	3.60
61	3.60	3.60
62	3.60	3.60
63	3.60	3.60
64	3.60	3.60
65	3.60	3.60
66	3.60	3.60
67	3.60	3.60
68	3.60	3.60
69~80	LED SEGMENT	

		FM	AM
Q1	S	0	0.43
	G	0	0
	D	0	3.85
Q2	E	0	0
	B	0.64	0.64
	C	0	0.01
Q3	S	0	0.92
	G	0	0
	D	0	3.55
Q4	S	0	0.92
	G	0	0
	D	0	3.55
Q5	S	0	0
	G	0	0
	D	4.02	0
Q6	E	0	0
	B	0.65	0
	C	4.00	0
Q7	S	0	0.78
	G	0	0
	D	0	4.34
Q8	E	0	0.09
	B	0	0.74
	C	0	1.95
Q9	E	0	0
	B	0.29	0.29
	C	3.00	3.00

		FM		AM
Q10	E	0		0
	B	0		0.65
	C	0		1.40
Q11	E	0		4.91
	B	0.01		4.35
	C	0		0.01
Q12	E	0		0
	B	0.56		0
	C	0.01		4.35
Q13	E	3.00		3.00
	B	4.35		2.32
	C	0		2.98
Q14	E	0	2.98	2.98
	B	0	2.98	2.32
	C	0	0	2.96
Q15	E	0		0
	B	0.64		0
	C	0.01		2.25

		FM	AM	SSB/CW
Q16	E	0	0	0.11
	B	0	0	0.74
	C	0	0	2.03
Q17	E	0	0	0
	B	0	0	0.69
	C	0	0	1.75
Q18	E	0	0	0
	B	0	0	0.62
	C	3.00	3.00	0.01

		FM	AM
Q19	E	2.85	2.85
	B	3.45	3.45
	C	2.86	2.86
Q20	E	0.37	0.37
	B	1.02	1.02
	C	2.45	2.45
Q21	E	0.37	0.37
	B	1.02	1.02
	C	2.45	2.45
Q22	S	0	0.37
	G	0	0
	D	0	4.20
Q23	E	0	0
	B	0	0.64
	C	0	0.04
Q24	E	0	0
	B	0	0.04
	C	0	0
Q25	E	0	4.91
	B	0	4.22
	C	0	4.85
Q26	E	0	4.91
	B	0	4.78
	C	0	4.22
Q27	E	0	0
	B	0.75	0.75
	C	2.64	2.64

		FM	AM
Q28	E	0.75	0.75
	B	1.40	1.40
	C	1.68	1.68
Q29	E	0	0
	B	0.74	0.74
	C	2.04	2.04
Q30	E	5.10	5.05
	B	4.93	4.29
	C	0	4.91
Q31	E	5.10	5.05
	B	4.36	5.30
	C	4.99	0
Q32	S	0.93	0.94
	G	0.68	0.69
	D	2.63	2.63
Q33	E	0	0
	B	0.60	0.61
	C	9.3	1.2
Q34	S	10.15	1.97
	G	9.97	1.78
	D	14.90	2.77
Q35	E	0	0
	B	0.66	0
	C	0.02	1.16
Q36	E	0	0
	B	0	0.66
	C	1.38	0.02

		FM	AM
Q37	E	6.00	6.00
	B	6.00	6.00
	C	0.75	0.70
Q38	E	0	0
	B	0.53	0
	C	0.68	0
Q39	E	0	0
	B	0.68	0
	C	5.81	0
Q40	E	5.97	5.97
	B	5.27	5.96
	C	5.87	0
Q41	E	0	0
	B	0	0
	C	0	0
Q42	E	0	0
	B	0	0
	C	0	0
Q43	E	5.10	5.05
	B	5.84	5.83
	C	5.97	5.97
Q44	E	6.00	6.00
	B	5.31	5.31
	C	5.97	5.97

		FM	AM
Q401	E	0	0
	B	0.61	0
	C	0.07	5.30
Q402	E	0	0
	B	0	0.61
	C	4.93	0.07
Q403	E	0	0
	B	0	0
	C	0.46	5.96
Q404	E	0	0
	B	0.66	0.66
	C	0.07	0.07
Q405	E	0	0
	B	0	0
	C	6.00	6.00
Q406	E	6.00	6.00
	B	6.00	6.00
	C	0	0
Q407	E	6.00	6.00
	B	5.99	5.99
	C	0	0
Q408	E	0	0
	B	0	0
	C	5.99	5.99
Q409	E	4.25	4.25
	B	3.70	3.70
	C	4.2	4.2

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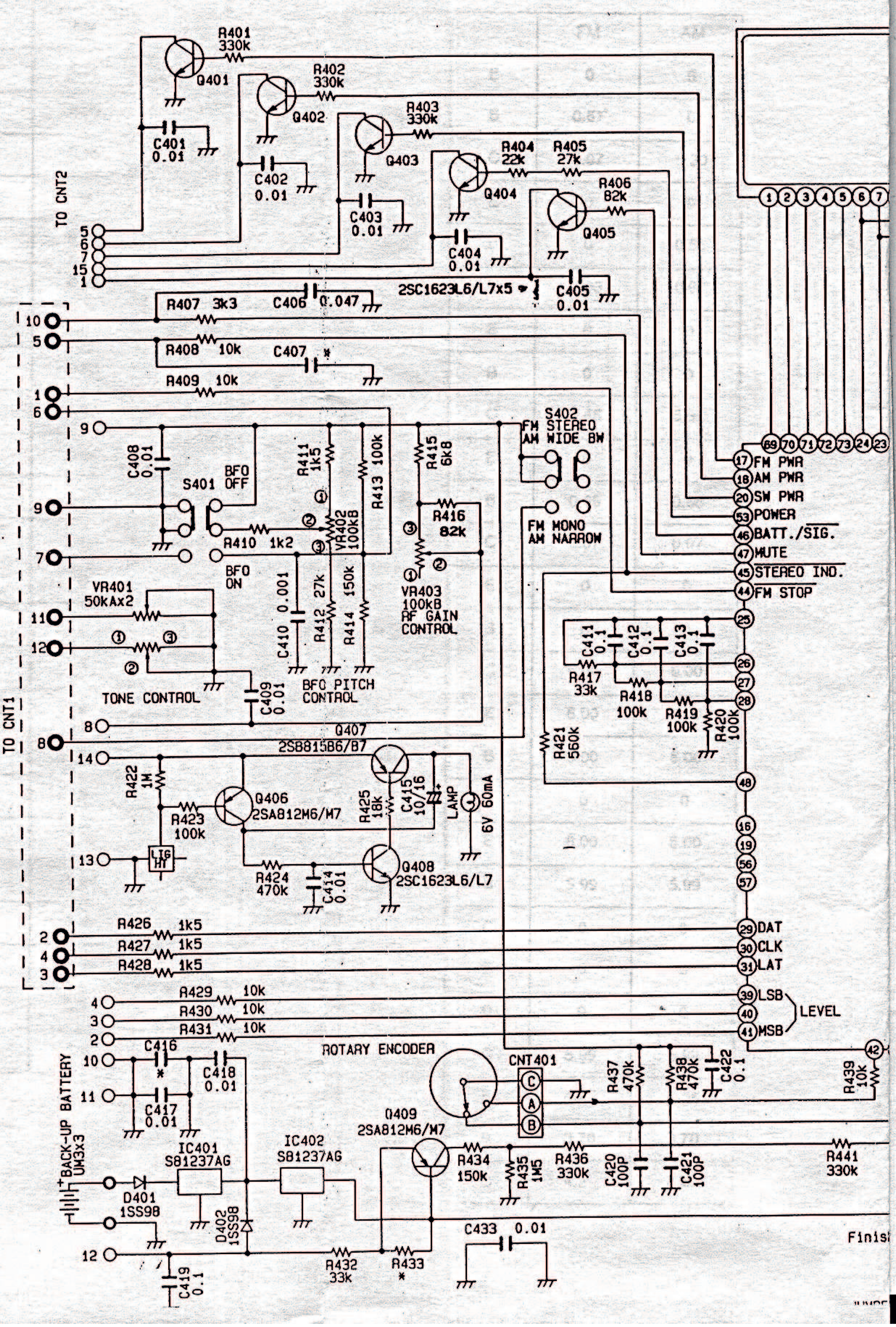
SCHEM



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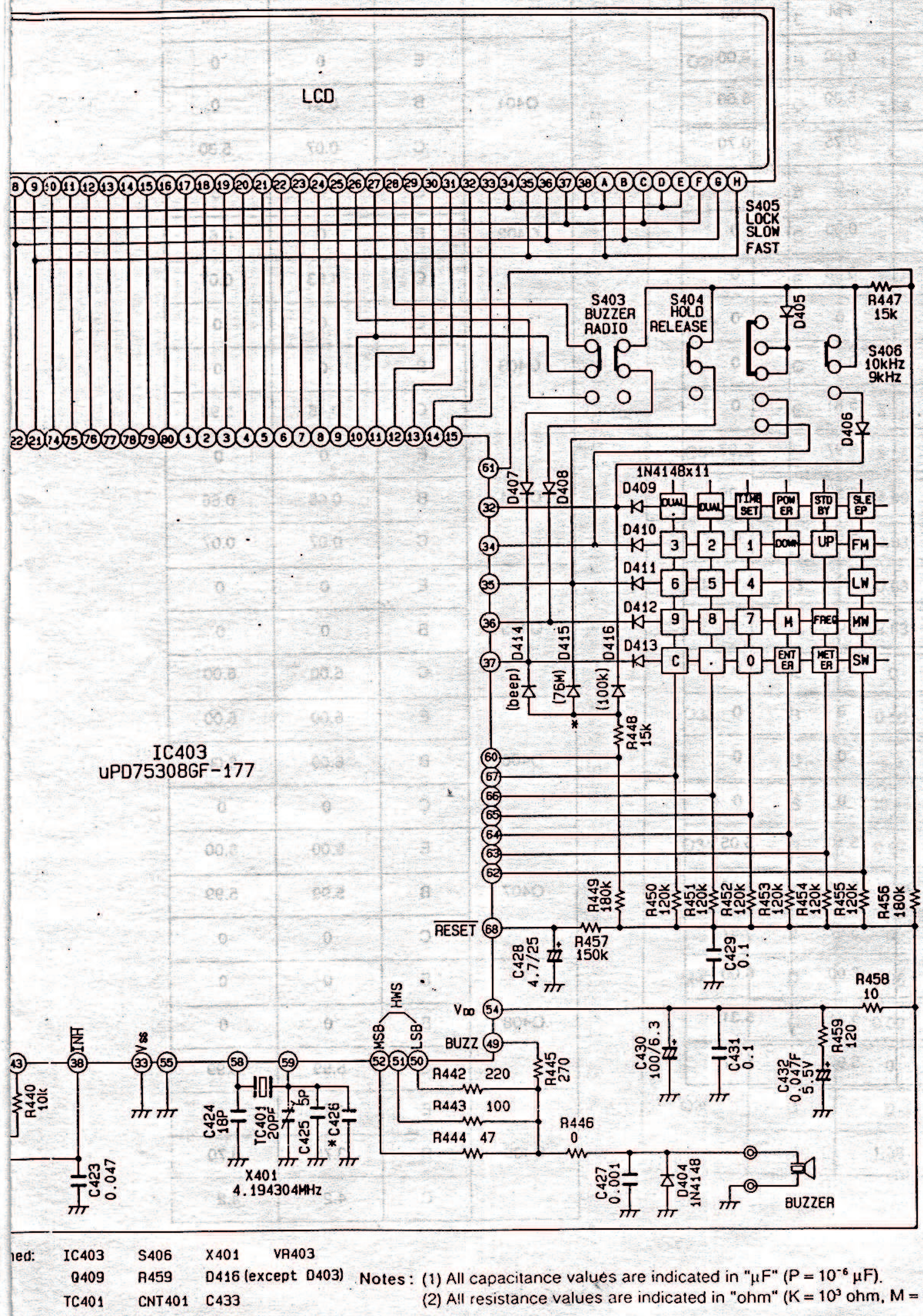
ATIC DIAGRAM



ned: IC403 S406 X401 VR403
Q409 R459 D416 (except D403)
TC401 CNT401 C433

Notes: (1) All capacitance values are indicated in "μF" (P = 10^{-6} μF).
(2) All resistance values are indicated in "ohm" (K = 10^3 ohm, M = 10^6 ohm).

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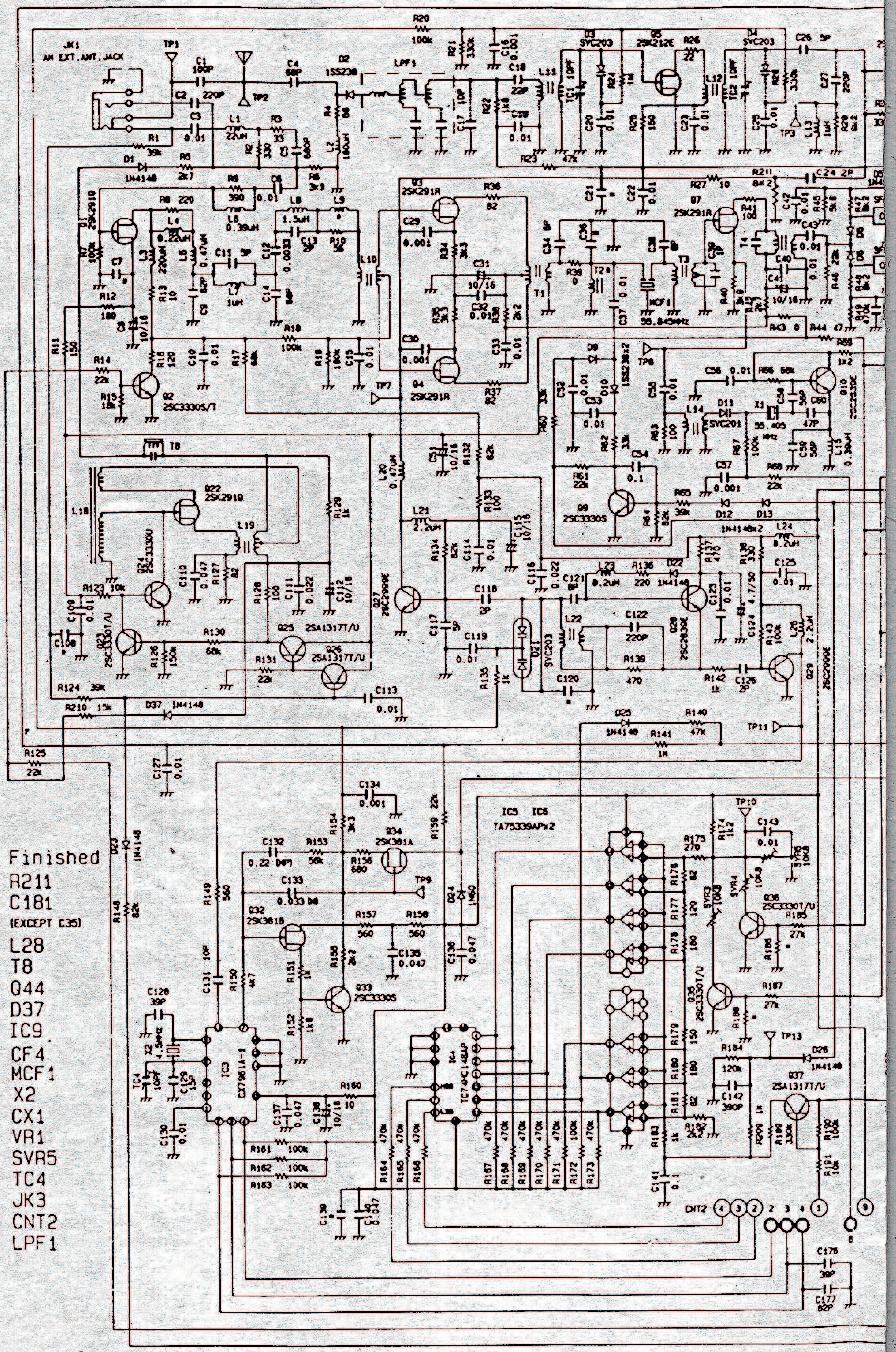
SCHEMATIC DIAG



Finished
R211
C181
(EXCEPT C35)
L28
T8
Q44
D37
IC9
CF4
MCF1
X2
CX1
VR1
SVR5
TC4
JK3
CNT2
LPF1

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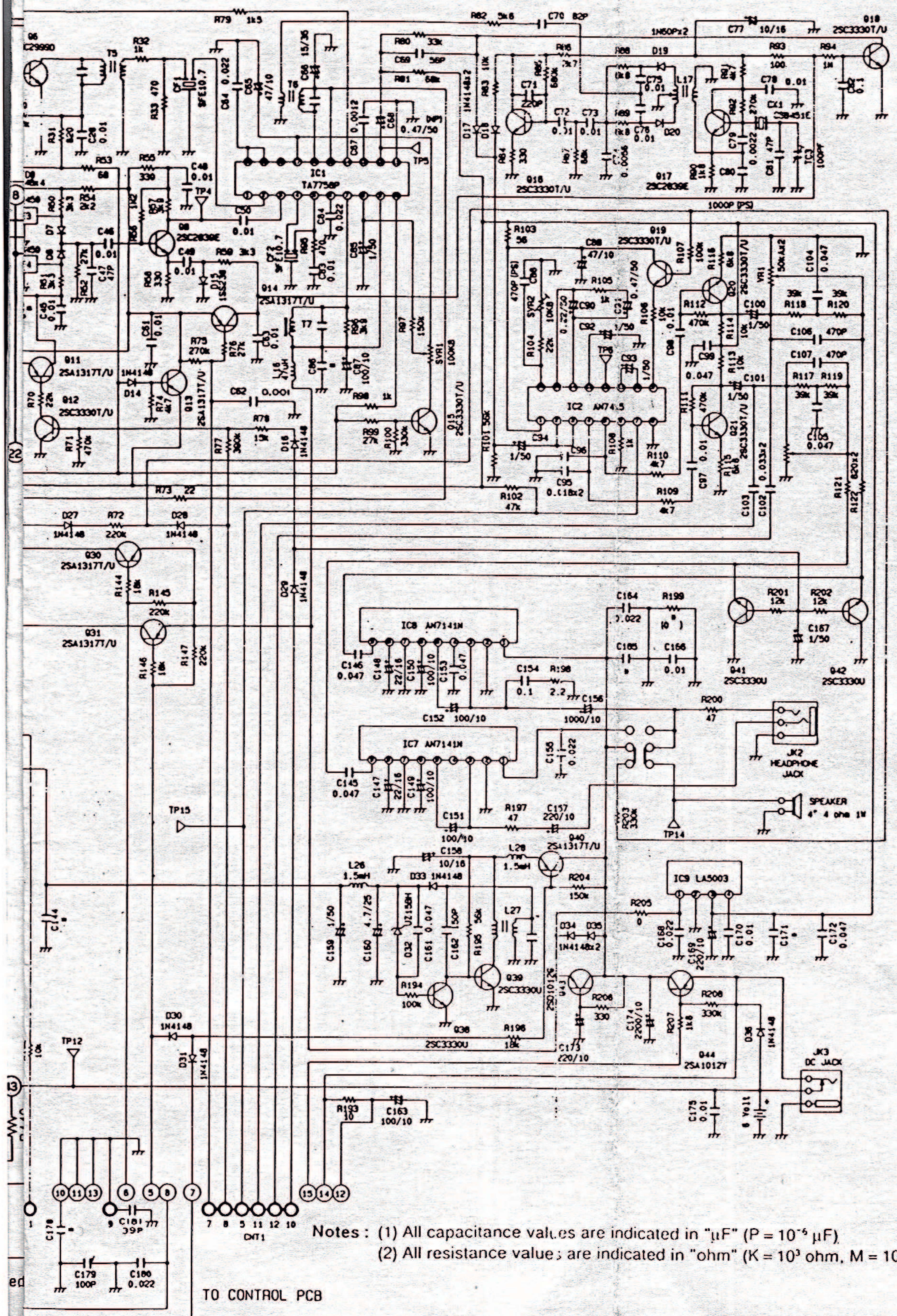
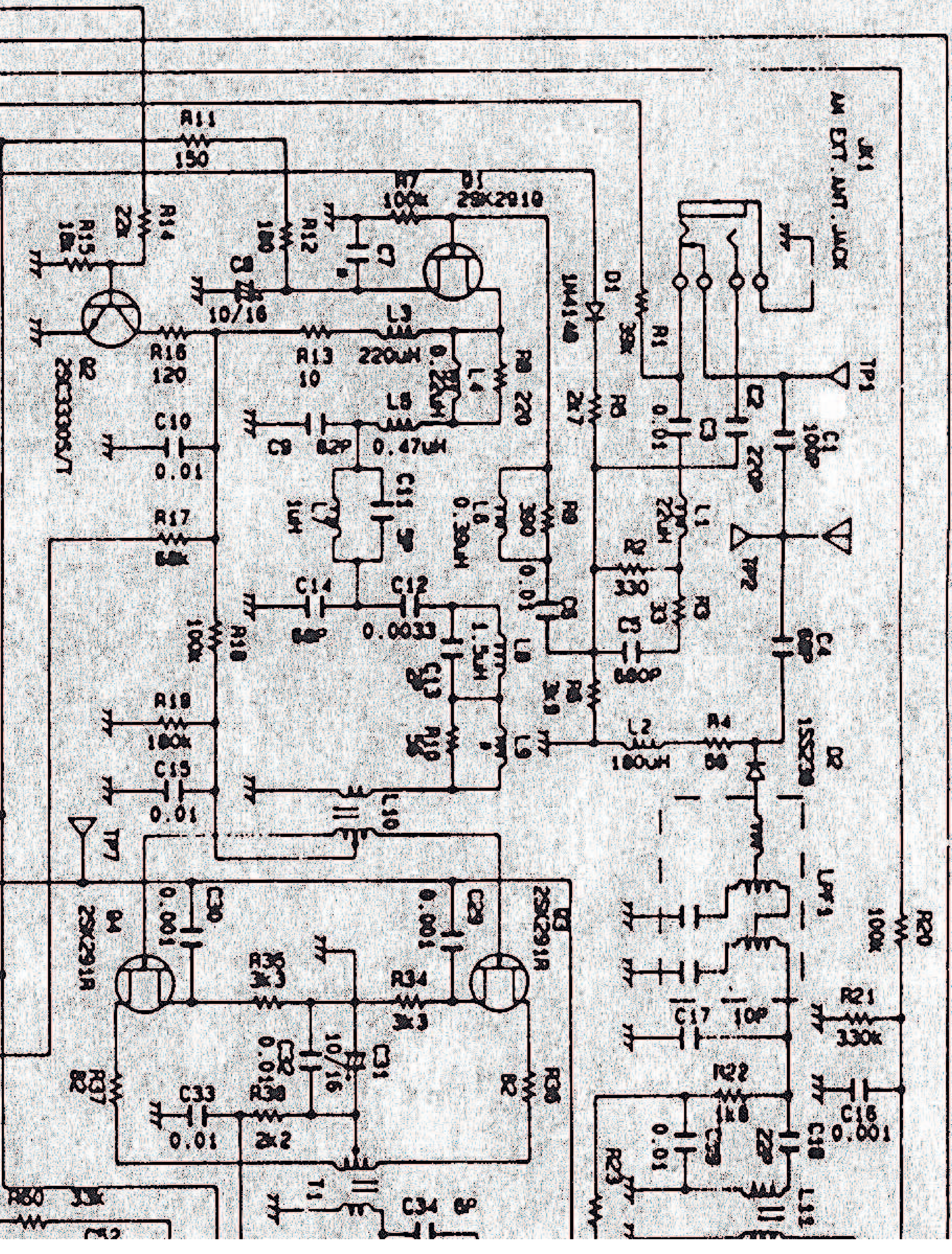


Notes : (1) All capacitance values are indicated in "μF" ($P = 10^{-6}$ μF).
(2) All resistance values are indicated in "ohm" ($K = 10^3$ ohm, $M = 10^6$ ohm).

TO CONTROL PCB



R11
150
R13
10
L3
220uH
R16
120
L8
0.47uH
C10
0.01
R17
C14
C12
0.0033
R19
180k
C15
0.01
L2
180uH
R4
R35
3k3
R34
3k3
C33
0.01
R38
2k2
R21
330k
R22
C16
0.001
C17
10P
R20
100k
2SK291R
JK1
AM EXT.ANT.JACK
TP1