SANGEAN

EUROPE

Service Manual

ATS-909

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SPECIFICATION

FM

TEST ITEM	CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range	Min.	87.5	± 0.15	MHz
	Max.	108.0	± 0.15	
Intermediate Frequency		10.70	± 0.15	MHz
Maximum Sensitivity	90 MHz		16	dBμ
	98 MHz		16	
	106 MHz		16	
Usable Sensitivity	90 MHz	16	22	dBμ
	98 MHz	16	22	
	106 MHz	16	22	
Image Rejection	106 MHz	36	30	dB
I.F. Rejection	90 MHz	60	50	
3dB Limiting (1 mV)	98 MHz	18	24	dBμ
Minimum Output		0.6	3	mV
Tuning Indication Sens. (2nd. dot)		18	24	dBμ
Auto. Scan. Stop. Sens.			24	
Stereo Indicator Sens.			24	
Stereo Separation (1 kHz)		25	20	dB
Spurious Rejection			50	dB
S/N Ratio		50	44	dB
Alter. Channel Select.			25	dB
Am. Suppression (66 dBμ)			30	dB
** Output Power		350	300	mW
T.H.D. (75 kHz dev.)		2	4	%
Overload Capacity			106	dBμ
Calibration			±100	kHz
* Lowest Battery Voltage		3.9	4.2	V
Audio Fidelity -3dB (W/Pre-emphasis)			150 8K	Hz
Tone Action 10kHz/1kHz Volume At Center Position		+7.5	+3	dB
		-22	-16	

Supply Voltage : DC 6 V | R.O. : 50 mW | Load : 8 ohm | Modulation : 1 kHz/22.5 kHz Dev.

MW

TEST ITEM	CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range	Min.	520	± 1	kHz
	Max.	1710	± 1	
Intermediate Frequency	1st. IF	55845		kHz
	2nd. IF	450	± 1	
Maximum Sensitivity	600 kHz		58	dBμ/m
	1000 kHz		56	
	1400 kHz		56	
Usable Sensitivity	600 kHz	58	64	dBμ/m
	1000 kHz	56	62	
	1400 kHz	56	62	
Image Rejection	1400 kHz	36	30	dB
I.F. Rejection (450 kHz)	1000 kHz		50	
Selectivity (±10 kHz)			40	dB
Bandwidth (wide) 6dB		7	4-8	kHz
Bandwidth (narrow) 6dB		4.5	2.5-6	kHz
T.H.D. (5 mV)		2	4	%
*Lowest Battery Voltage		3.9	4.2	V
Tuning Indication Sensitivity (2nd. dot)		56	60	dBμ/m
Auto. Scan. Stop. Sens.		56	62	dBμ/m
S/N Ratio (5 mV)			32	dB
Tone Action (3 kHz)	1000 kHz	10	6	dB
Audio Fidelity (-6dB)			150	Hz
			2100	Hz
**Output Power				mW
Overload Capacity		350	300	
A.G.C.F.O.M			100	dBμ/m
			50	dB
Calibration			±1	kHz
			±1	
			±1	
A.C.A. (±10 kHz)			28	dB
Whistle Modulation (5mV/M)			15	%

Supply Voltage : DC 6 V	R.O. : 50 mW	Load : 8 ohm	Modulation : 1000 Hz/30% MOd.

LW

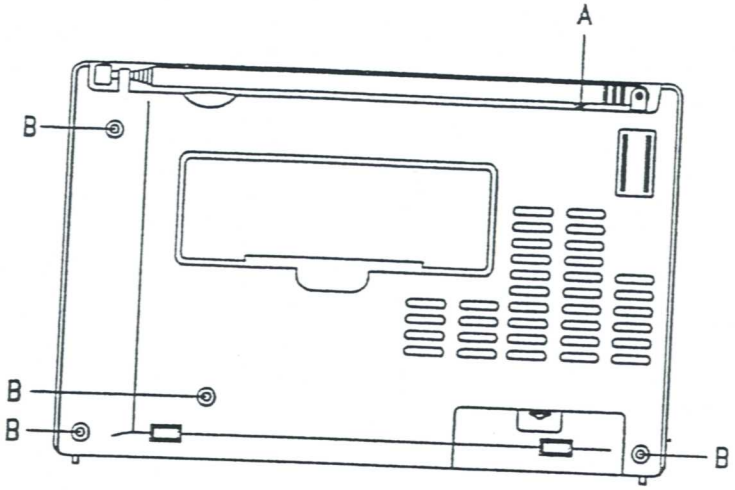
TEST ITEM	CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range	Min.	153	± 1	kHz
	Max.	519	± 1	
Intermediate Frequency	1st. IF	55845		kHz
	2nd. IF	450	± 1	
Maximum Sensitivity	180 kHz		68	dBμ/m
	225 kHz		66	
	279 kHz		64	
Usable Sensitivity	180 kHz	68	74	dBμ/m
	225 kHz	66	72	
	279 kHz	64	70	
Image Rejection	279 kHz	30	24	dB
I.F. Rejection (450 kHz)	225 kHz		50	
Selectivity (±10 kHz)	225 kHz		40	dB
Bandwidth (wide) 6dB				kHz
Bandwidth (narrow) 6dB				kHz
T.H.D. (5 mW)		2	4	%
*Lowest Battery Voltage		3.9	4.2	V
Tuning Indication Sensitivity (2nd. dot)			70	dBμ/m
Auto. Scan. Stop. Sens.			72	dBμ/m
S/N Ratio (5 mV)			24	dB
Tone Action (3 kHz)				dB
Frequency Response (-6 dB)			150	Hz
			2.1	kHz
**Output Power				mW
		350	300	
Overload Capacity			106	dBμ/m
A.G.C.F.O.M				dB
Calibration	180 kHz		±1	kHz
	225 kHz		±1	
	279 kHz		±1	
Supply Voltage : DC 6 V	R.O. : 50 mW	Load : 8 ohm	Modulation : 1000 Hz/30% Mod.	

SW

TEST ITEM	CONDITION	NOMINAL	LIMIT	UNIT
Tuning Range	Min.	1711	± 1K	kHz
	Max.	29999	± 1K	
Intermediate Frequency	1st. IF	55845		kHz
	2nd. IF	450	± 1	
Maximum Sensitivity	3900 kHz		22	dBμ/m
	15100 kHz		18	
	25600 kHz		18	
Usable Sensitivity	3900 kHz	22	28	dBμ/m
	15100 kHz	18	24	
	25600 kHz	18	24	
Image Rejection	15100 kHz	42	36	dB
I.F. Rejection (450 kHz)	15100 kHz	76	60	
Selectivity (±10 kHz)	15100 kHz		50	dB
Bandwidth (wide) 6dB		6	4-8	kHz
Bandwidth (narrow) 6dB		4.5	3-7	kHz
T.H.D. (60 dBμ)		2	4	%
*Lowest Battery Voltage		3.9	4.2	V
Tuning Indication Sensitivity (2nd. dot)			24	dBμ/m
Auto. Scan. Stop. Sens.			26	dBμ/m
S/N Ratio (60 dBμ)			40	dB
RF Gain Control		25	±6	dB
Audio Fideiity (-6dB)			150	Hz
			2200	Hz
**Output Power				mW
			300	
Overload Capacity		86	80	dBμ/m
A.G.C.F.O.M (86 dBμ)			60	dB
Calibration	3900 kHz		±1	kHz
	15100 kHz		±1	
	25600 kHz		±1	
A.C.A. (±10 kHz)	15100 kHz		28	dB
SSB/CW Sens. (S/N=10 dB)	15100 kHz	-3	+3	dBμ/m

Supply Voltage : DC 6 V | R.O. : 50 mW | Load : 8 ohm | Modulation : 1000 Hz/30% Mod.

DISASSEMBLY INSTRUCTIONS



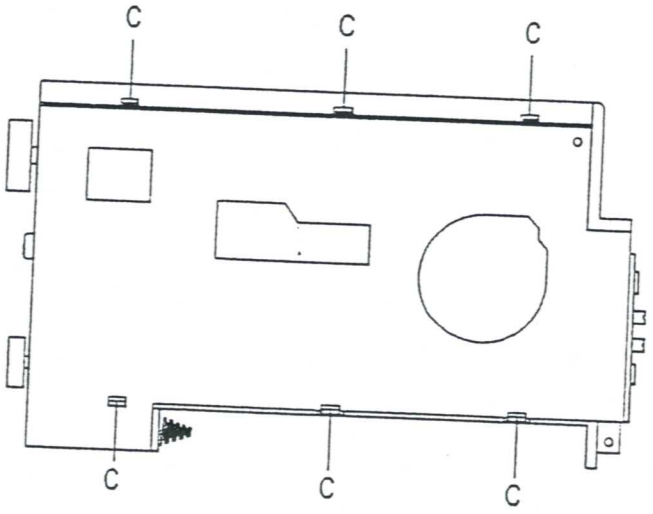
TO REMOVE BACK COVER

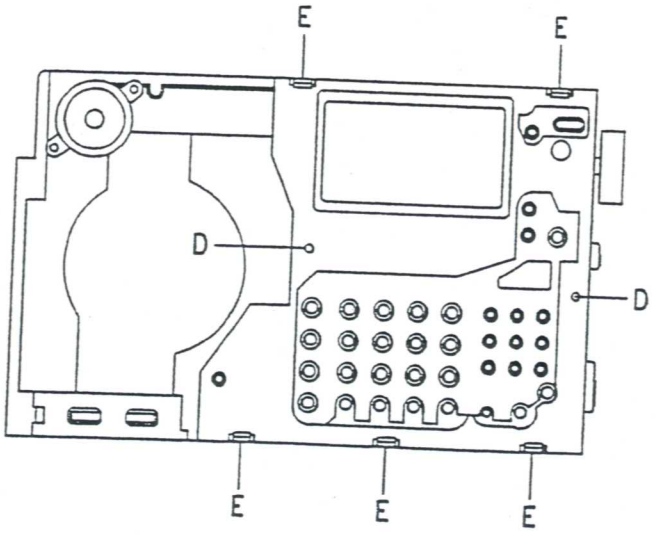
a. Unscrew 1 screw A.
and 4 PTP screws B.

b. Separate Front and Back cabinet.

TO REMOVE MAIN PCB

a. Release Main PCB from hooks C to remove it.



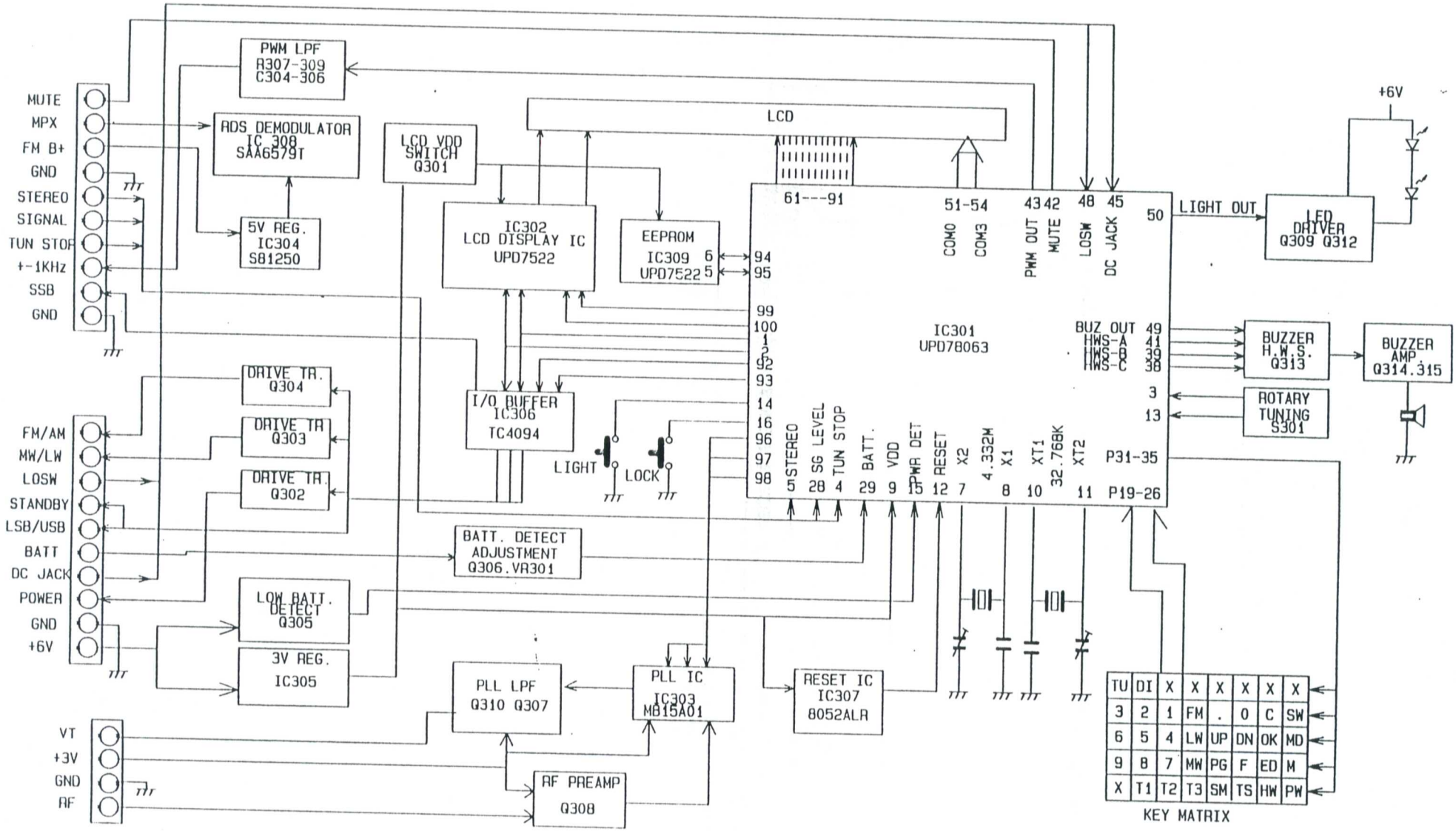


TO REMOVE CONTROL PCB

a. Unscrew 2 screws D.

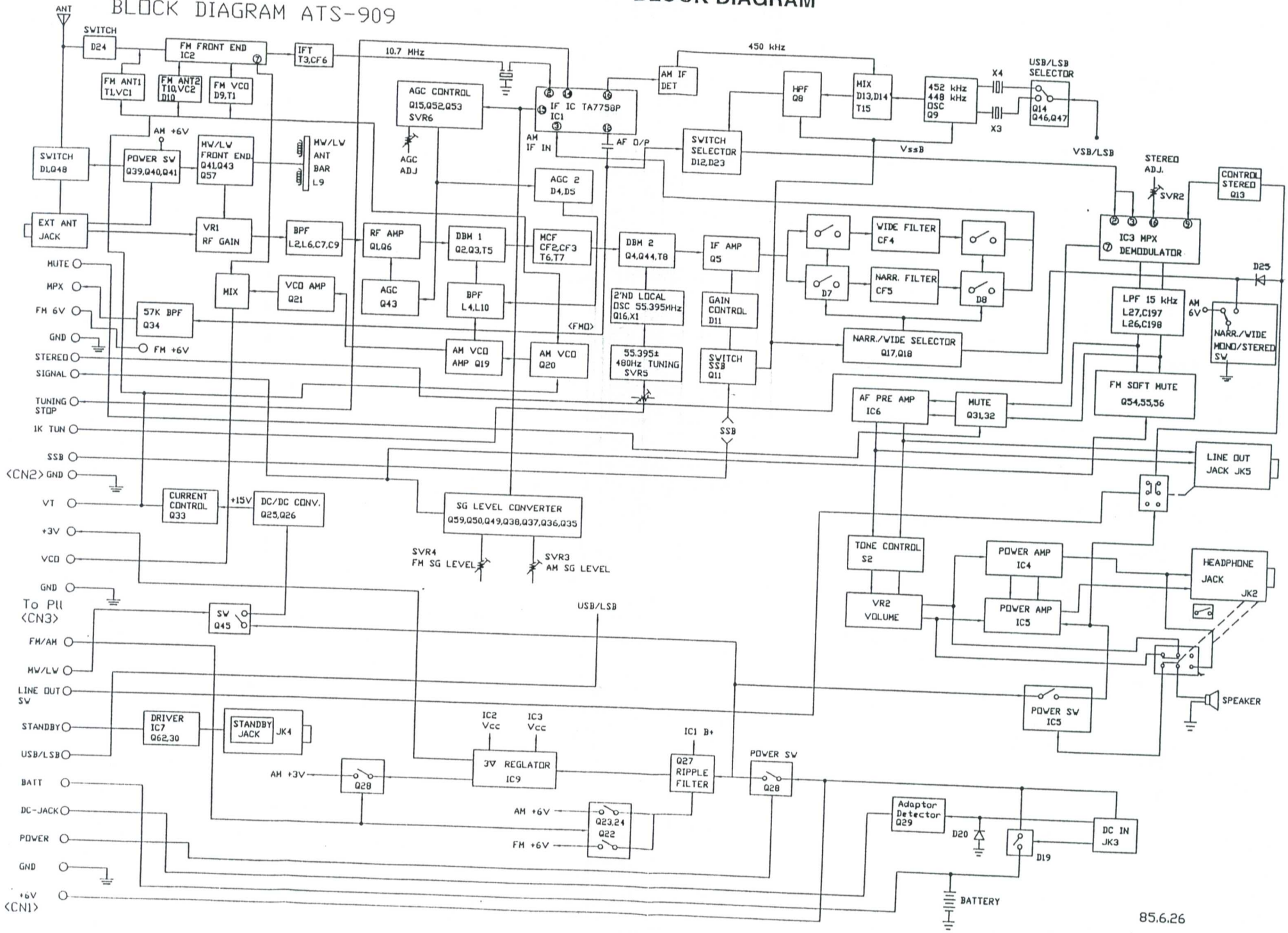
b. Release Control PCB from hooks E to remove it.

BLOCK DIAGRAM



ATS-909 CONTROL PCB CIRCUIT BLOCK

BLOCK DIAGRAM



ALIGNMENT INSTRUCTIONS

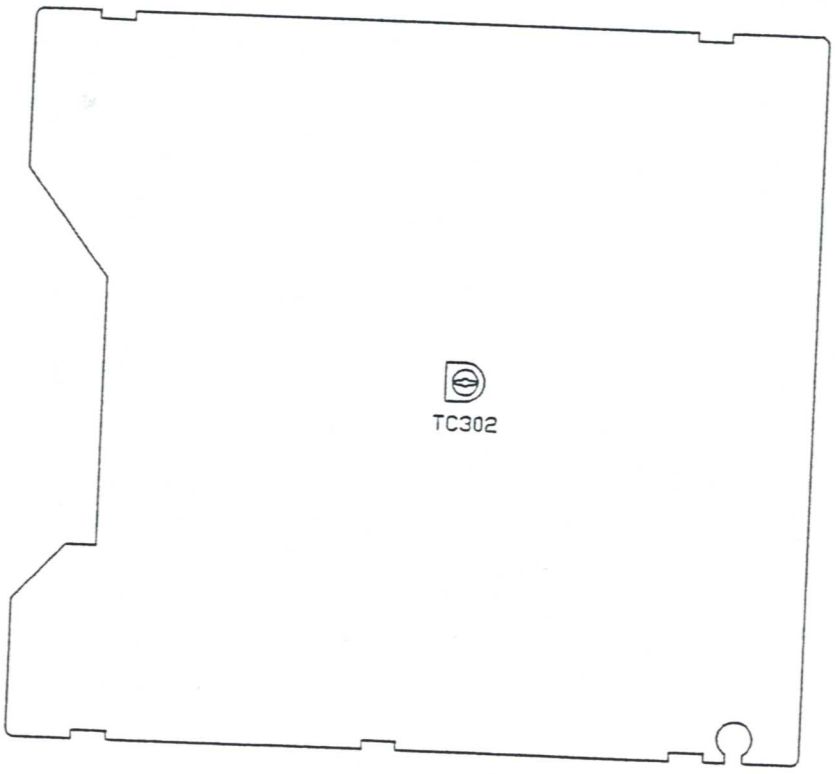
(1) ALIGNMENT FOR CLOCK TIME ACCURACY

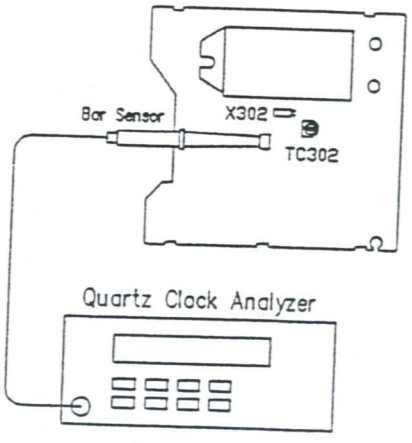
a. Required Instrument
Quartz Clock Analyzer

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	RADIO OFF	(1) Turn the radio to OFF and Set keylock function to ON position. (2) Bar sensor of quartz clock analyzer close to X302 and adjust TC302 to reach the range of zero error (±7.6ppm or ±20 sec/month)
ADJUSTMENT	TC302	

c. Instrument Connection





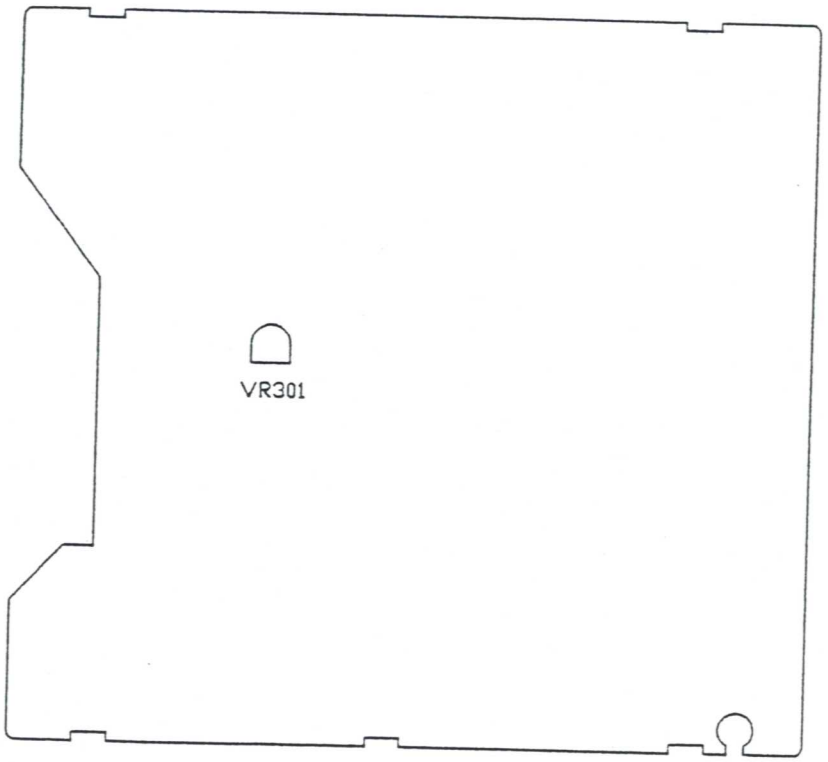
(2) ALIGNMENT FOR INDICATION LEVEL OF BATTERY

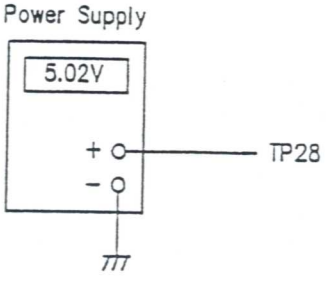
a. Required Instrument
Digital Voltage Meter (DVM)
DC Power Supply With Voltage Meter

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	153 kHz	(1) Take off the batteries and connect 5.02VDC of DC power supply to TP28 and GND. (2) Checking battery level should be appear 4 scales at all 7 scales zebra when radio power from ON to OFF. (3) When can't meet specification that adjust VR301 and recheck STEP(2) until the scale is corrected.
BAND	LW	
AM MODE	AM	
ADJUSTMENT	VR301	

c. Instrument Connection





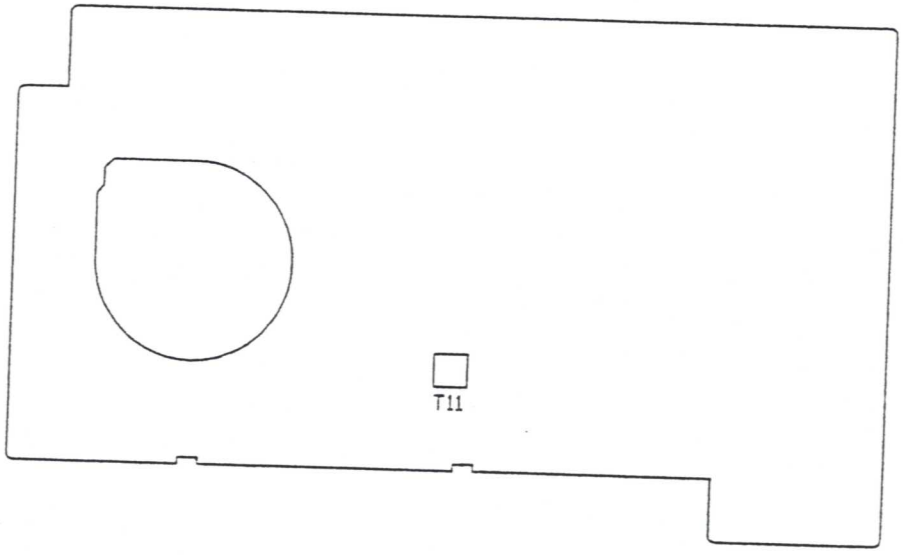
(3) ALIGNMENT FOR TUNING VOLTAGE OF FM BAND

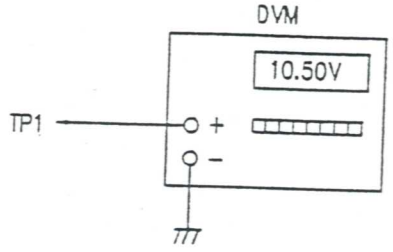
a. Required Instrument
Digital Voltage Meter (DVM)

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	108 MHz	(1) Turn the radio to ON and Set receiving frequency to 108 MHz. (2) Connect a DVM to TP1 and GND. (3) Adjust T11 to read correct value 10.2V ~ 10.8V from DVM.
BAND	FM	
TONE	NORM	
ADJUSTMENT	T11	

c. Instrument Connection





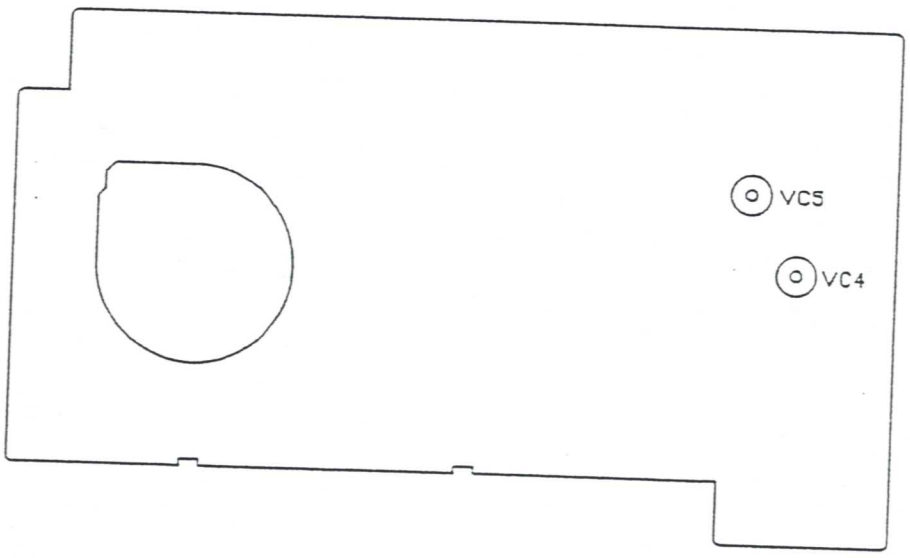
(4) ALIGNMENT FOR 452KHZ / 448 KHZ OSCILLATOR

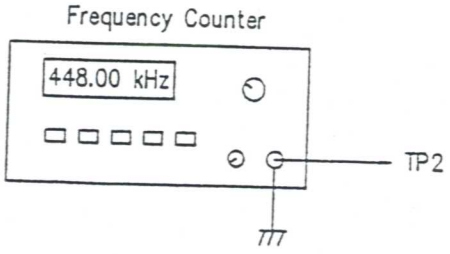
a. Required Instrument
Frequency Counter

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	15.1 MHz	(1) Connect a frequency counter to TP2. (2) Turn the radio to ON and set AM mode to "USB". (3) Adjust VC5 to have a reading specification frequency 452 kHz ± 30 Hz. (4) Set AM mode to "LSB" condition. (5) Adjust VC4 to have a reading specification frequency 448 kHz ± 30 Hz.
BAND	SW	
AM MODE	USB/LSB	
TONE	NORM	
RF GAIN	MAX.	
ADJUSTMENT	VC5 VC4	

c. Instrument Connection





(5) ALIGNMENT FOR FM IF DETECTION

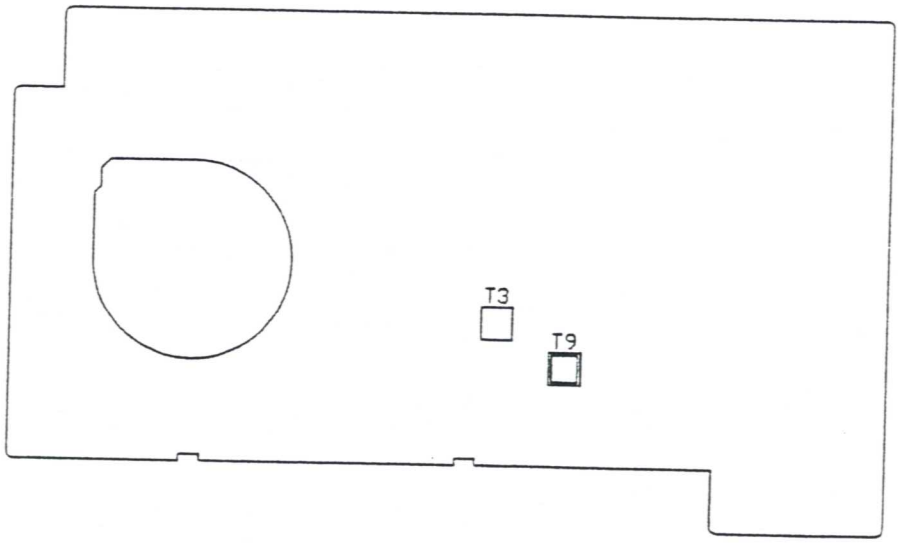
a. Required Instrument

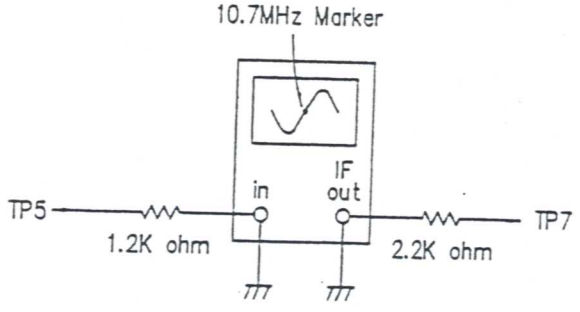
FM IF Sweep Generator With Scope

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	98 MHz	(1) Turn the radio to ON. (2) Connect the input of the FM IF Sweep Generator in series with a 1.2K ohm resistor to test point TP5. (3) Connect the IF output of the FM IF Sweep Generator in series with a 2.2K ohm resistor to test point TP7. (4) Adjust T3 and T9 to have a maximum output and the best symmetrical S curve with respect to the center marker frequency of 10.7MHz.
BAND	FM	
STEREO/ MONO	STEREO	
ADJUSTMENT	T3 T9	

c. Instrument Connection





AM/FM Radio IF sweepscope

(6) ALIGNMENT FOR FM STATION DETECTION

a. Required Instrument

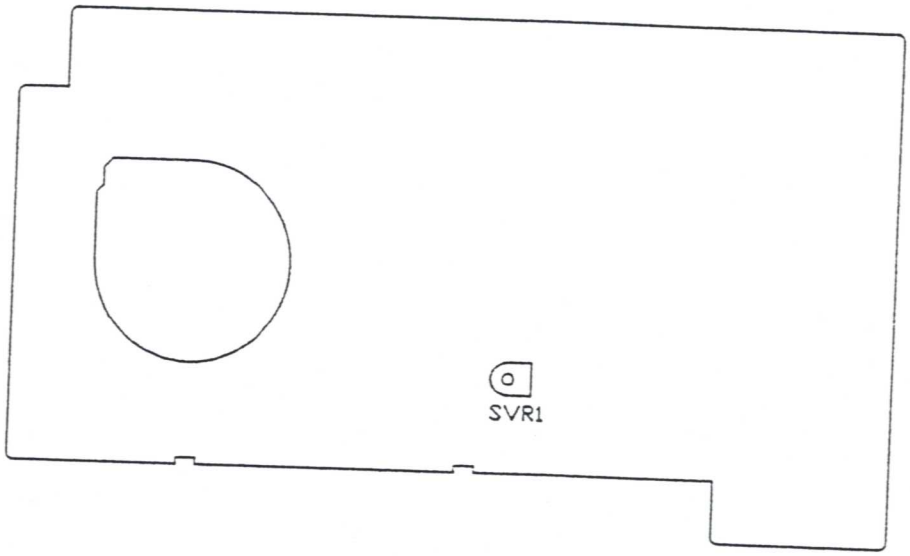
Digital Voltage Meter (DVM)

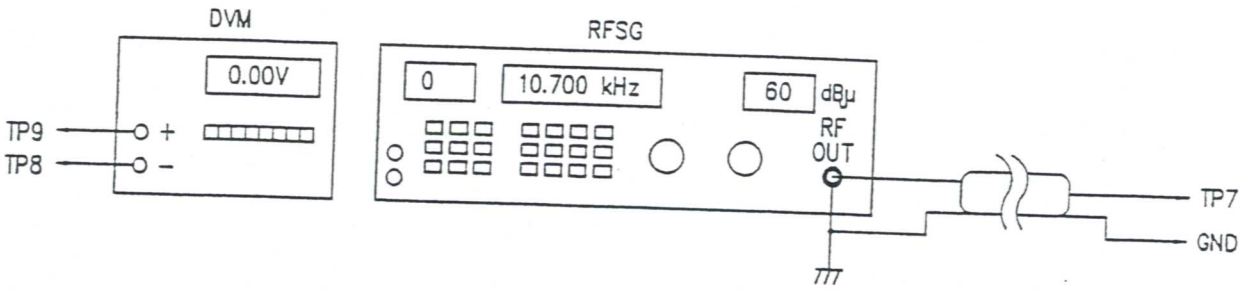
FM RF Signal Generator (RFSG)

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	98 MHz	(1) Set RFSG frequency to 10.7MHz and output level to 60 emf/dB μ without modulation. (2) Connect the RFSG output to TP7. (3) Connect a DVM to TP8 and TP9. (4) Adjust SVR1 to get DC voltage value within $\pm$0.3V between TP8 and TP9.
BAND	FM	
STEREO/ MONO	STEREO	
ADJUSTMENT	SVR1	

c. Instrument Connection





(7) ALIGNMENT FOR FM SENSITIVITY

a. Required Instrument

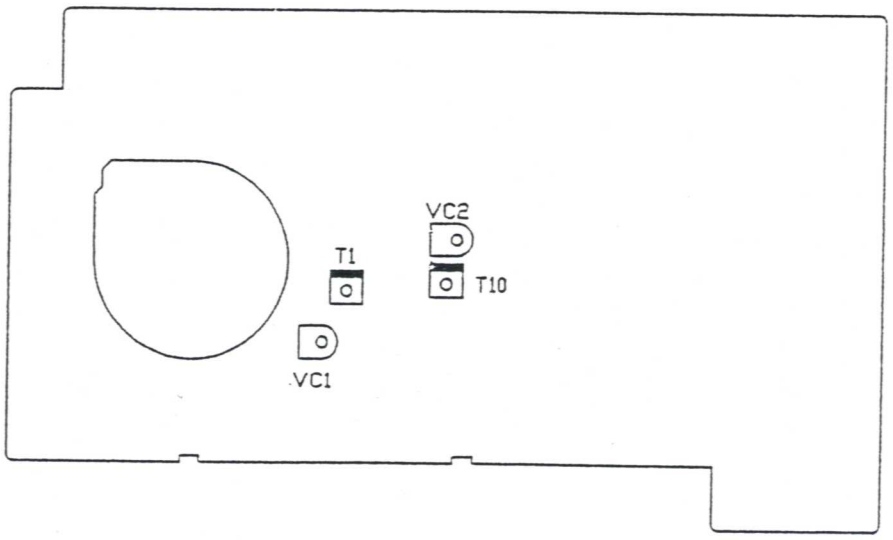
FM RF Signal Generator (RFSG)

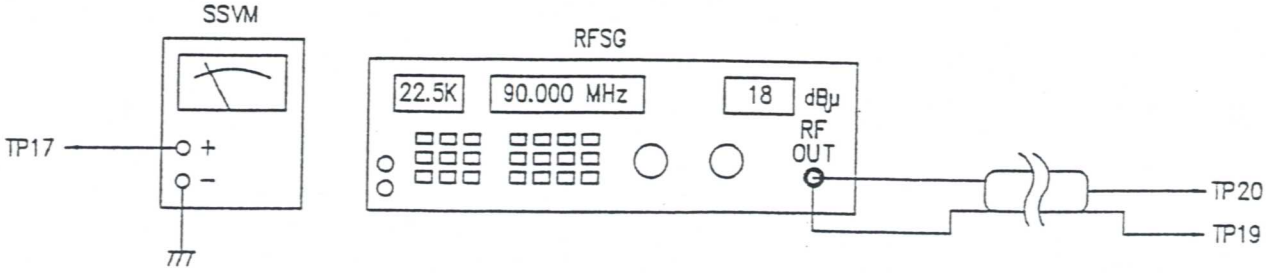
SSVM

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	90/106 MHz	(1) Turn the radio to ON and set tone switch to norm. (2) Connect SSVM to the speaker out (TP17). (3) Connect a FM RFSG to the input terminal of the ANT IN (TP20) and GND (TP19). (4) Set the RFSG to 90 MHz with 22.5 kHz deviation and 1kHz moudulation. (5) Tune the radio frequency to 90 MHz. Adjust T10 and T11 to have a maximum reading on the SSVM. (6) Return the radio frequency to 106MHz, adjust VC1 and VC2 to have a maximum reading on the SSVM. (7) Repeat steps (5) and (6) until the best sensitivity on these two frequency is formed.
BAND	FM	
TONE	NORM	
STEREO/ MONO	STEREO	
ADJUSTMENT	T10,VC1 T11,VC2	

c. Instrument Connection





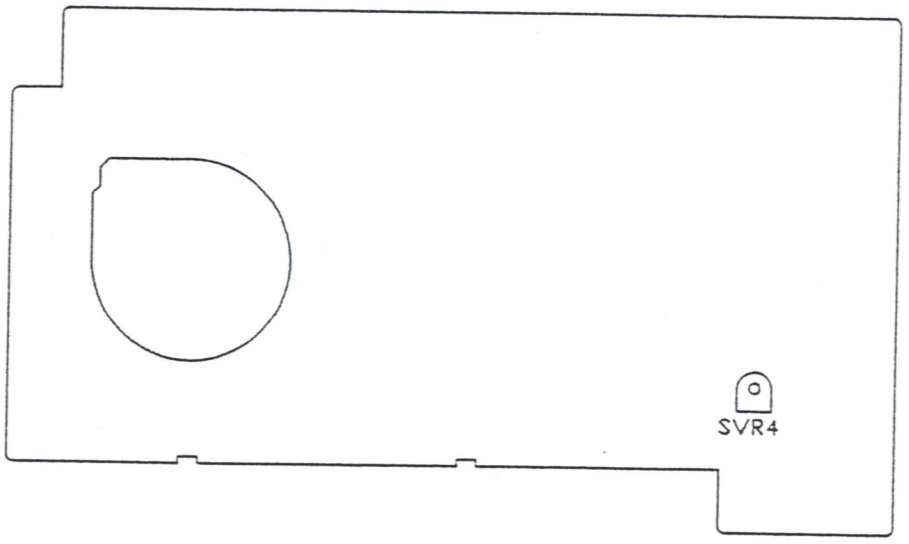
(8) ALIGNMENT FOR FM SIGNAL LEVEL INDICATION

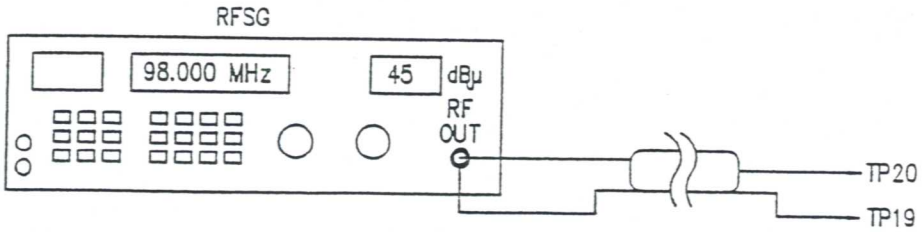
a. Required Instrument
FM RF Signal Generator

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	98 MHz	(1) Turn the radio to ON and tune receiving frequency to 98 MHz. (2) Set the RFSG output level to 45 emf/dB μ. (3) Adjust SVR4 to indicating full scale of signal level (4) Reduce the RFSG output level to 43 emf/dB μ. (5) Adjust SVR4 to reach 6 scales of signal level. (6) Repeat step (3)~(5) to meet it's request.
BAND	FM	
TONE	NORM	
STEREO/ MONO	STEREO	
ADJUSTMENT	SVR4	

c. Instrument Connection





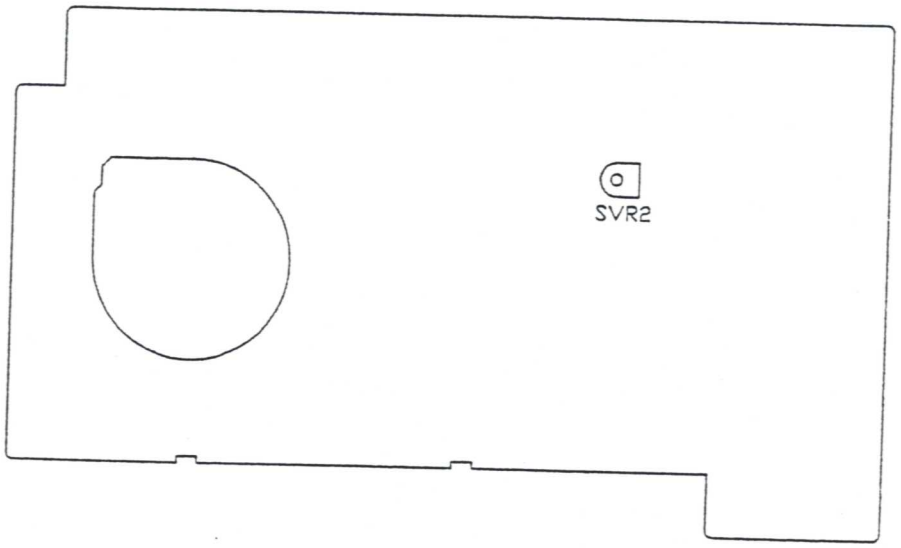
(9) ALIGNMENT FOR FM MPX

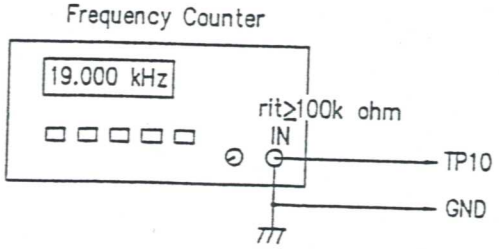
a. Required Instrument
Frequency Counter

b. Alignment Procedure

Setting		Procedure
BAND	FM	(1) Turn the radio to ON and set the (MONO/STEREO) switch to STEREO. (2) Turn the radio frequency to a avoid receiving any signal or station. (3) Insert a headphone plug into the headphone jack (JK2) (4) Connect a frequency counter to TP10 and GND. (5) Adjust SVR2 to have a reading of 18.95 kHz ~ 19.05 kHz on the frequency counter.
STEREO/ MONO	STEREO	
ADJUSTMENT	SVR2	

c. Instrument Connection





(10) ALIGNMENT FOR AM 2ND LOCAL OSCILATOR

a. Required Instrument

RF Signal Generator (RFSG)

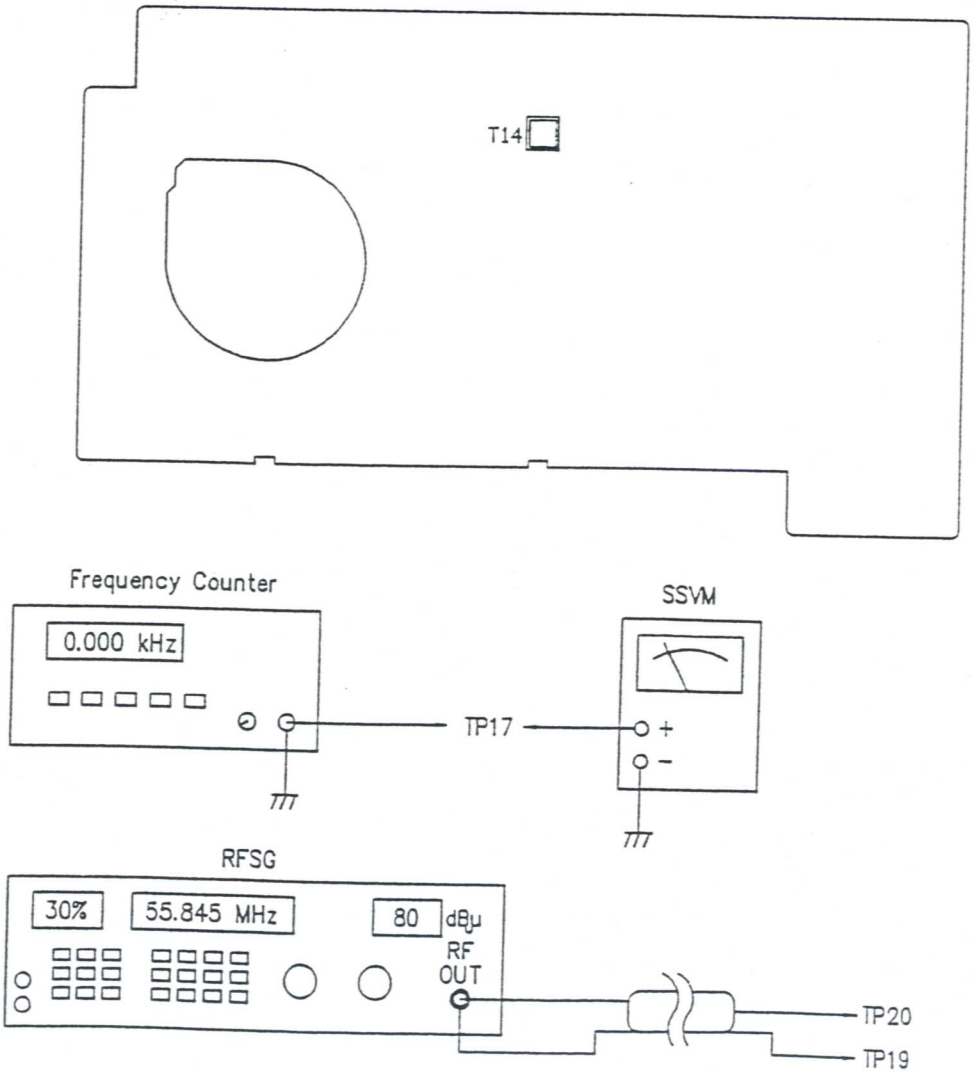
Frequency Counter

DVM

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	15.1 MHz	(1) Set RFSG output level to 80 emf/dB μ and frequency to 55.845 MHz with modulation 1 kHz 30%. (2) Turn the radio to ON and set AM mode to "AM". (3) Turn the radio receiving frequency to 15.1 MHz. (4) Connect RFSG output to ANT IN (TP20). (5) Adjust T14 to get 1 kHz maximum level output of the speaker. (6) Change RFSG output freqency to 55.843MHz. (7) Change AM mode to "LSB" mode. (8) Check TP13 to have a reading on DVM 1.5V±0.05. (9) Set keylock function to ON. (10) Adjust T14 to get the speaker ouput tone beat below 50 Hz.
BAND	SW	
AM MODE	LSB	
TONE	NORM	
WIDE/NARR. MONO	WIDE	
RF GAIN	MAX.	
ADJUSTMENT	T14	

c. Instrument Connection



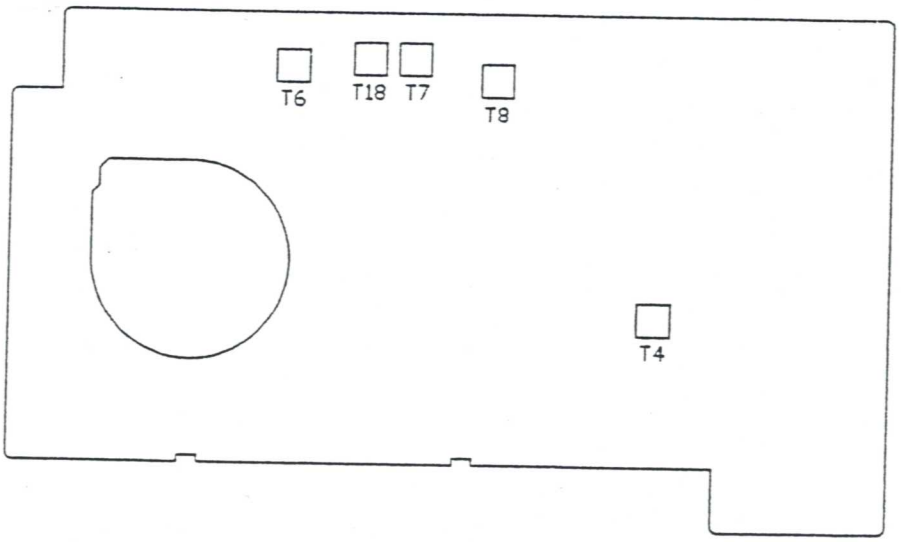
(11) ALIGNMENT FOR AM SENSITIVITY

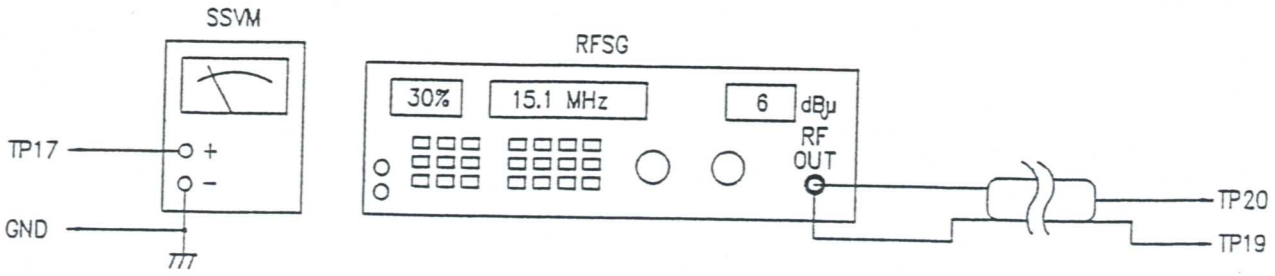
a. Required Instrument
RF Signal Generator
SSVM

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	15.1 MHz	(1) Turn the radio to ON and tune receiving frequency to 15.1 MHz. (2) Set RF Gain VR1 to Max. and slide Wide/Narr. switch to WIDE. (3) Feed a signal with 1 kHz 30% modulation from RFSG into ANT IN (TP20). (4) Adjust T4,6,7,8,18 to have maximum 1 kHz output level on SSVM.
BAND	SW	
AM MODE	AM	
TONE	NORM	
RF GAIN	MAX.	
WIDE/NARR.	WIDE	
ADJUSTMENT	T4,6,7,8 T18	

c. Instrument Connection





(12) ALIGNMENT FOR 450 kHz TRAP

a. Required Instrument

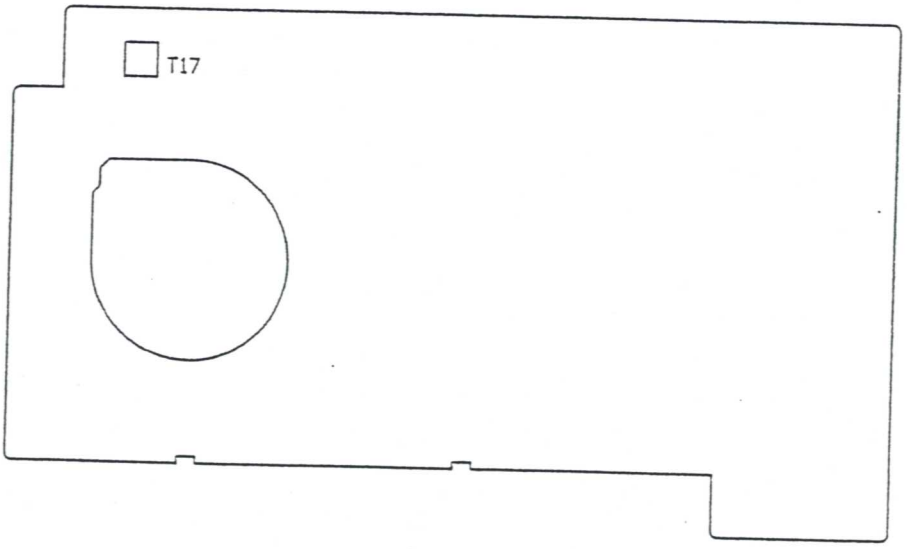
RF Signal Generator With Loop Antenna

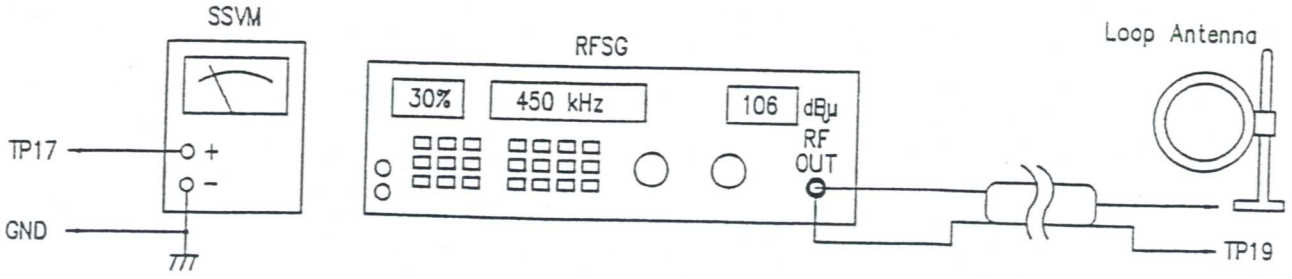
SSVM

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	450 kHz	(1) Turn the radio ON and tune the receiving frequency to LW 450 kHz. (2) Feed a 450 kHz signal with 1 kHz 30% modulation to loop antenna. (3) Connect a SSVM to speaker output (TP17). (4) Adjust T17 to get minumum reading of SSVM.
BAND	LW	
AM MODE	AM	
TONE	NORM	
WIDE/NARR. MONO	WIDE	
RF GAIN	MAX.	
ADJUST MENT	T17	

c. Instrument Connection





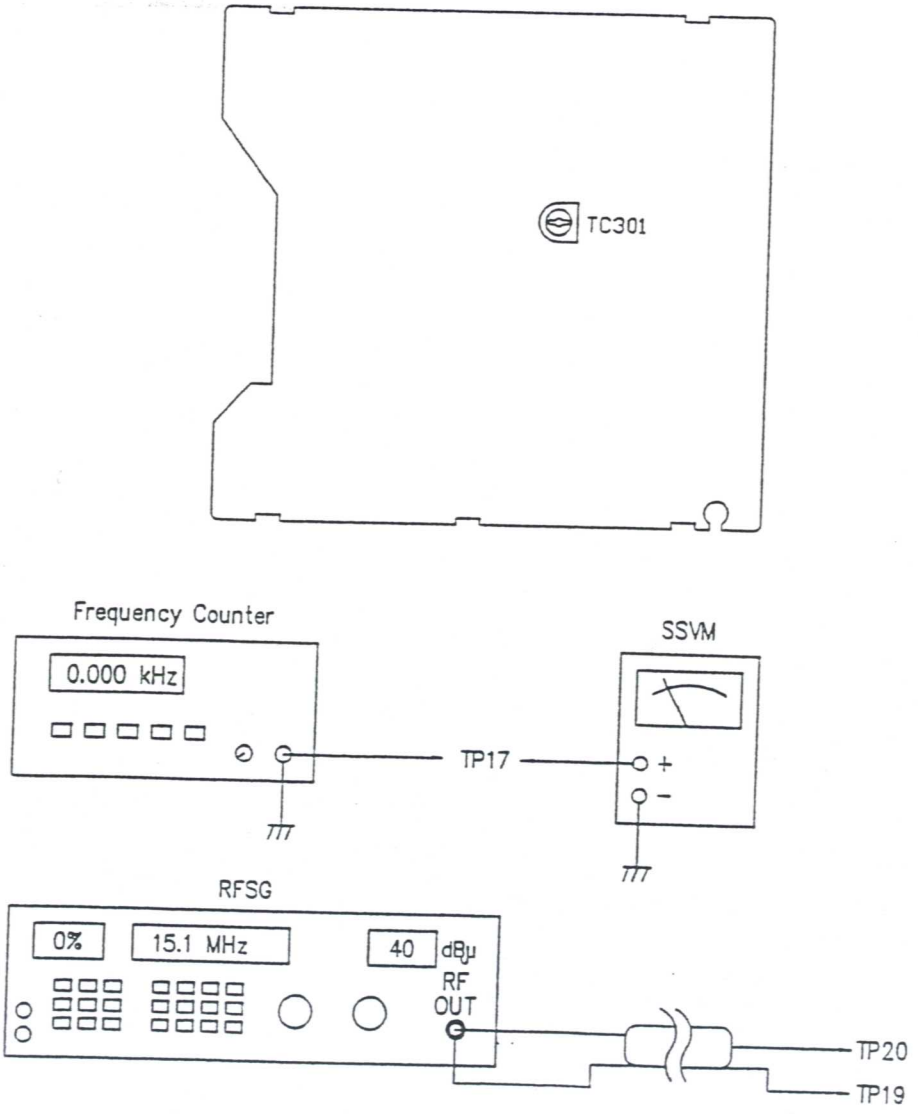
(13) ALIGNMENT FOR TIME BASE OF FREQUENCY

a. Required Instrument
RF Signal Generator
Frequency Counter

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	15.1 MHz	(1) Connect a RFSG to ANT IN (TP20) and set frequency to 15.1 MHz and output to 40 emf/dB μ without modulation. (2) Set AM mode to LSB mode and volume turn to maximum. (3) Tune the radio receiving frequency to 15.1 MHz by 10 key or tuning up/down and set keylock to ON. (4) Adjust TC301 to get the speaker output tone beat below 50 Hz.
BAND	SW	
AM MODE	LSB	
TONE	NORM	
WIDE/NARR. MONO	NARR.	
RF GAIN	MAX.	
ADJUSTMENT	TC301	

c. Instrument Connection



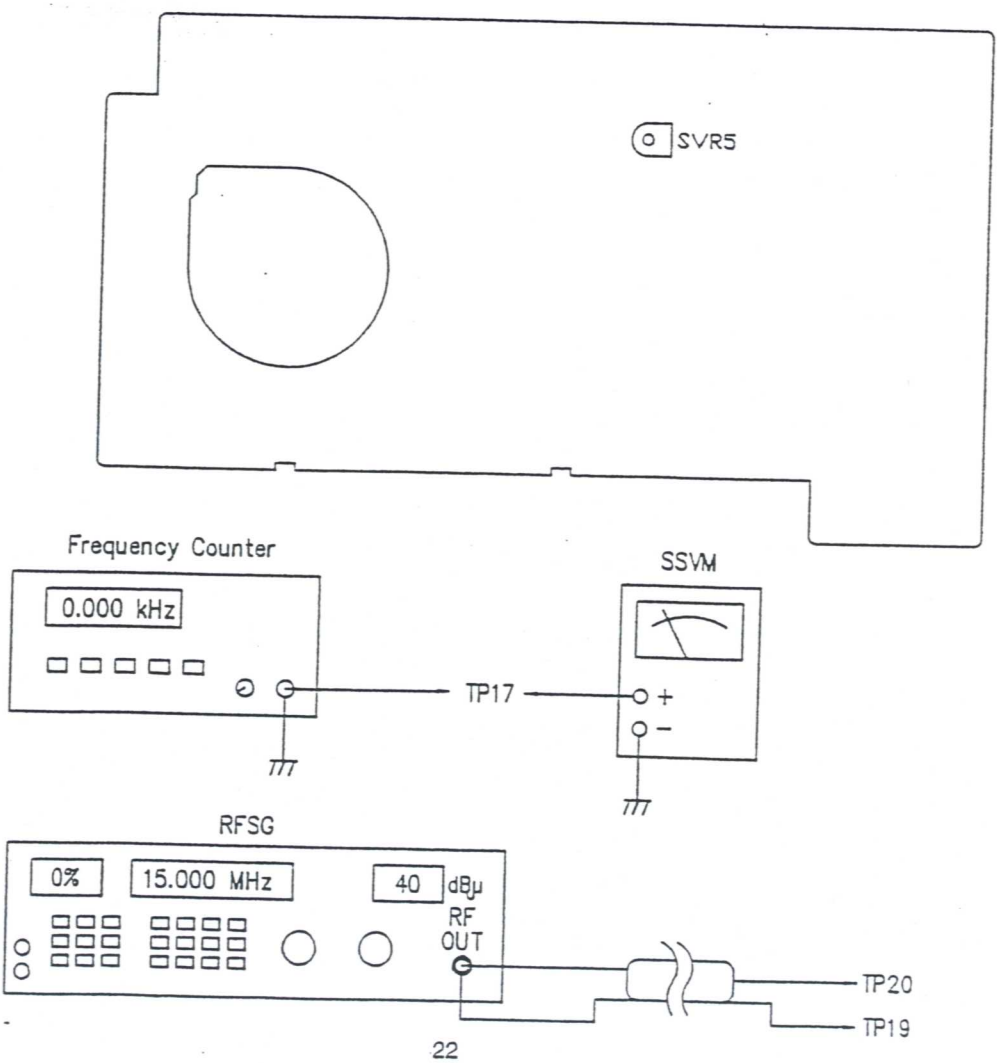
(14) ALIGNMENT FOR USB/LSB FINE TUNING

a. Required Instrument
RF Signal Generator
Frequency Counter

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	15.1 MHz	(1) Turn the radio to on and tune the recieving frequency to 15.1 MHz. (2) Set the AM mode to "USB" mode. (3) Set the tuning step to "SLOW". (4) Connect a RFSG to ANT IN (TP20) and set RF output to 15.1 MHz 40 emf/dB μ without modulation. (5) Connect a frequency counter to speaker output (TP17). (6) Adjust SVR5 to have a reading of 40Hz±10Hz increment while rotary tuning change the recieving frequency from 15.1 MHz to 15.101 MHz.
BAND	SW	
AM MODE	USB	
TONE	NORM	
WIDE/NARR. MONO	NARR.	
RF GAIN	MAX.	
TUNING STEP	SLOW	
VOLUME	CENTER POSITION	
ADJUSTMENT	SVR5	

c. Instrument Connection



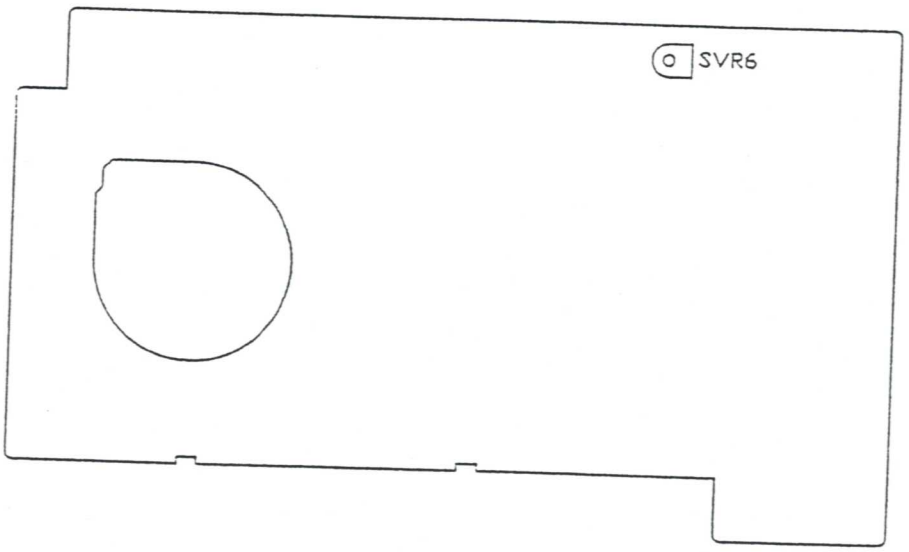
(15) ALIGNMENT FOR AM AGC

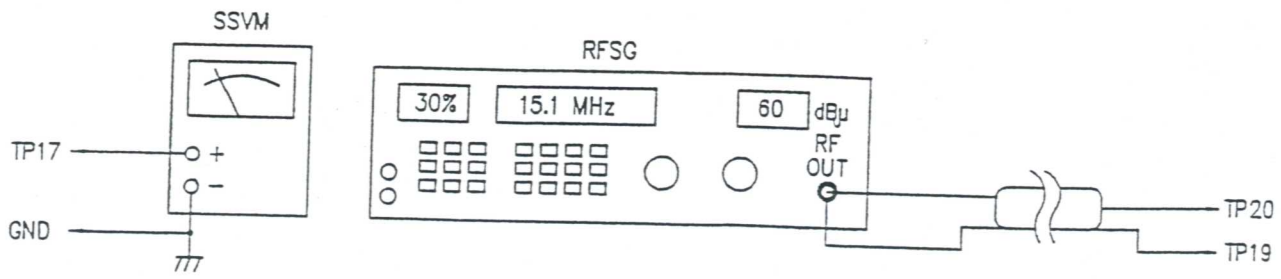
a. Required Instrument
RF Signal generator
Digital voltage Meter (DVM)

b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	15.1 MHz	(1) Tune the radio to ON. (2) Connect the RFSG to ANT IN (TP20) and set frequency to 15.1 MHz with 1kHz modulation. (3) Connect a DVM to TP22. (4) Set RFSG output level to 60 emf/dB μ. (5) Adjust SVR6 to have a reading of 1.58 V ~ 1.62 V on DVM.
BAND	SW	
AM MODE	AM	
TONE	NORM	
WIDE/NARR. MONO	WIDE	
RF GAIN	MAX.	
ADJUSTMENT	SVR6	

c. Instrument Connection





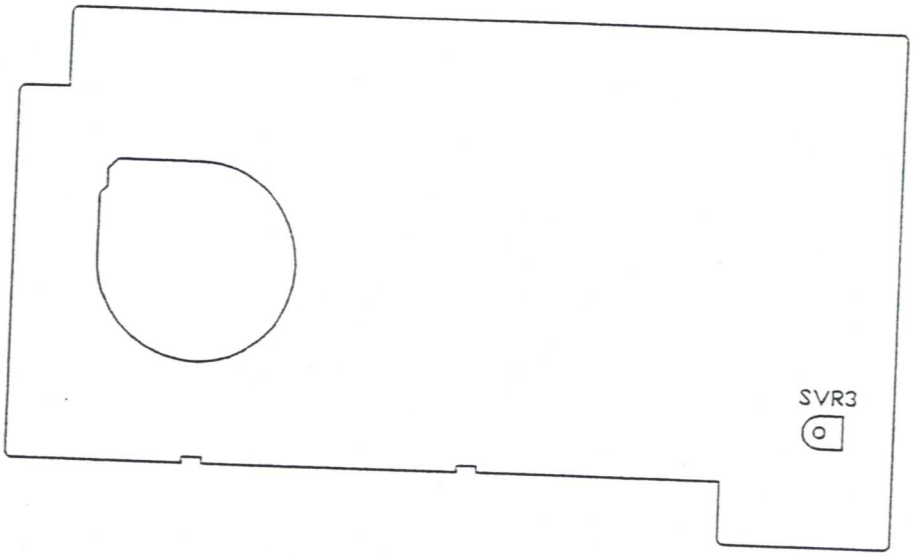
(16) ALIGNMENT FOR AM SIGNAL LEVEL INDICATION

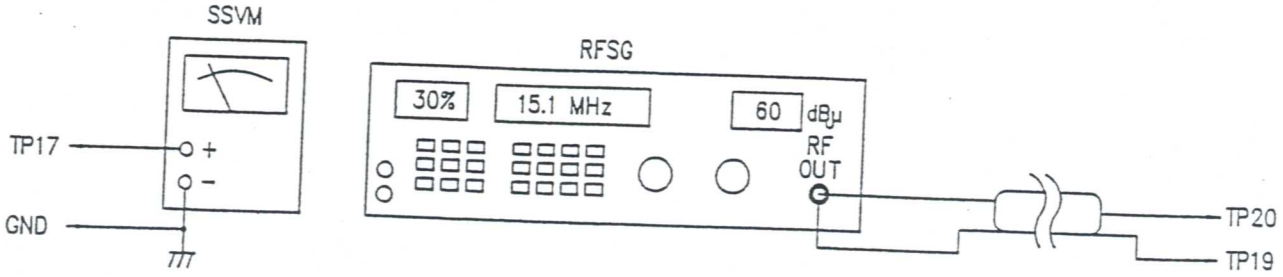
a. Required Instrument
RF Signal Generator

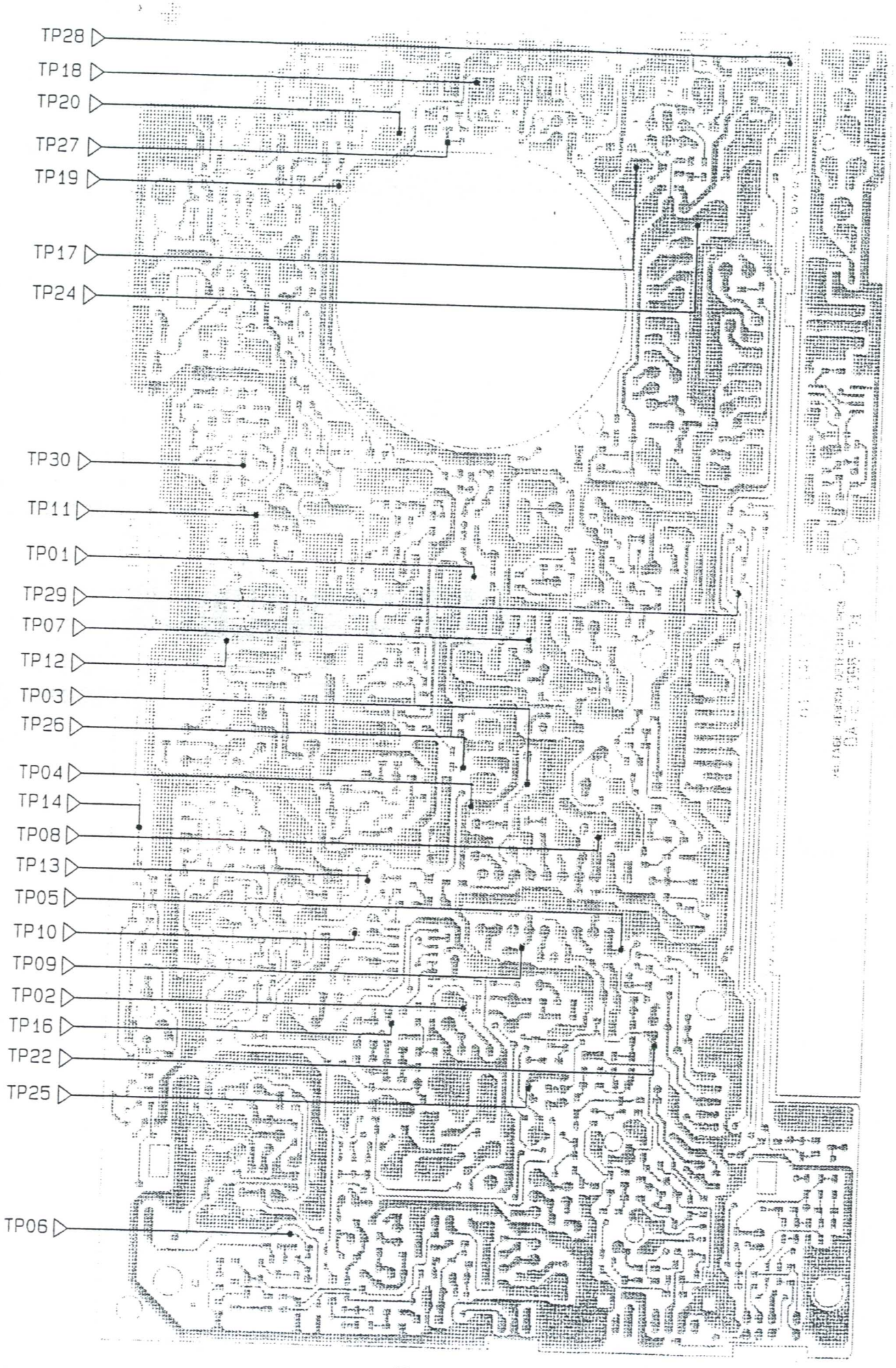
b. Alignment Procedure

Setting		Procedure
RECEIVING FREQUENCY	15.1 MHz	(1) Set the RFSG frequency to 15.1 MHz with 1kHz 30% modulation. (2) Turn the radio to on and tune the receiving frequency to 15.1 MHz. (3) Connect the RFSG to ANT IN (TP20) and set the output level to 12 emf/dB μ . (4) Adjust SVR3 to have 2 scales of all 7 scales on signal level zebra. (5) Check RF input level is 60 emf/dB μ that the signal level zebra should be appear full scale. (6) repeat step (4),(5) to meet it's requested.
BAND	SW	
AM MODE	AM	
TONE	NORM	
WIDE/NARR. MONO	WIDE	
RF GAIN	MAX.	
ADJUSTMENT	SVR3	

c. Instrument Connection

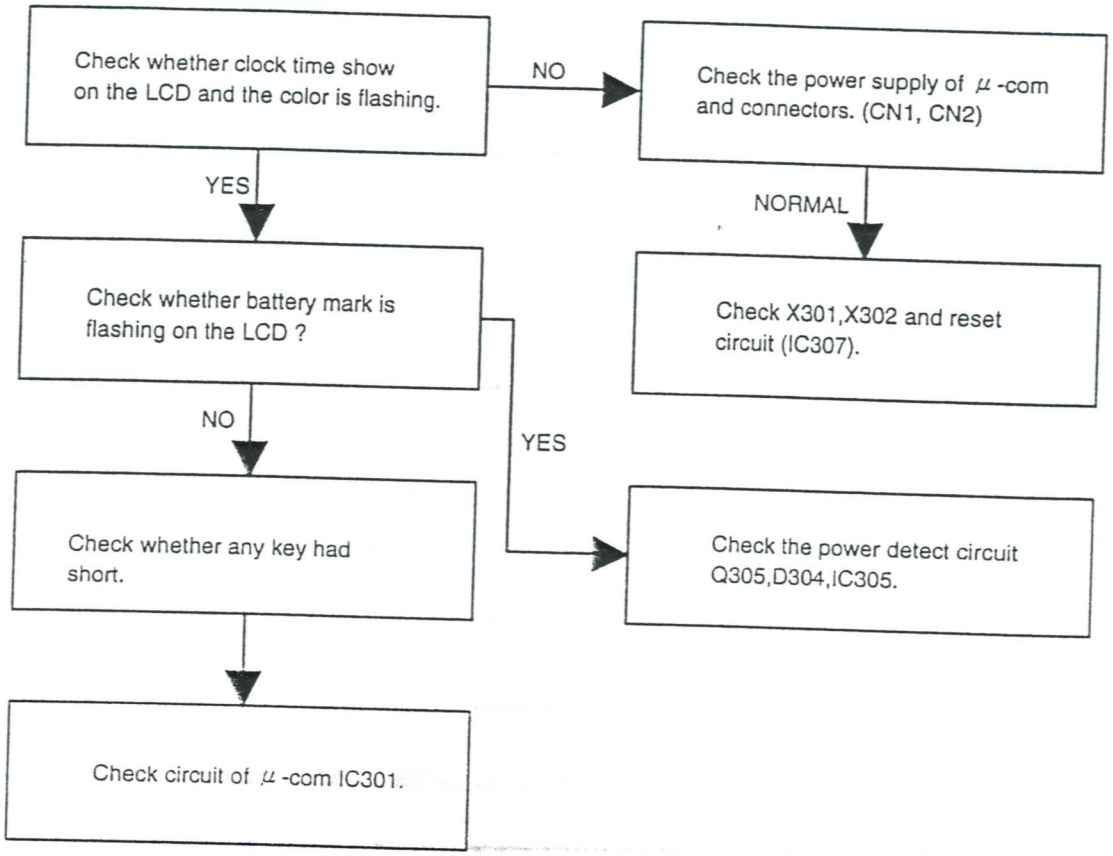




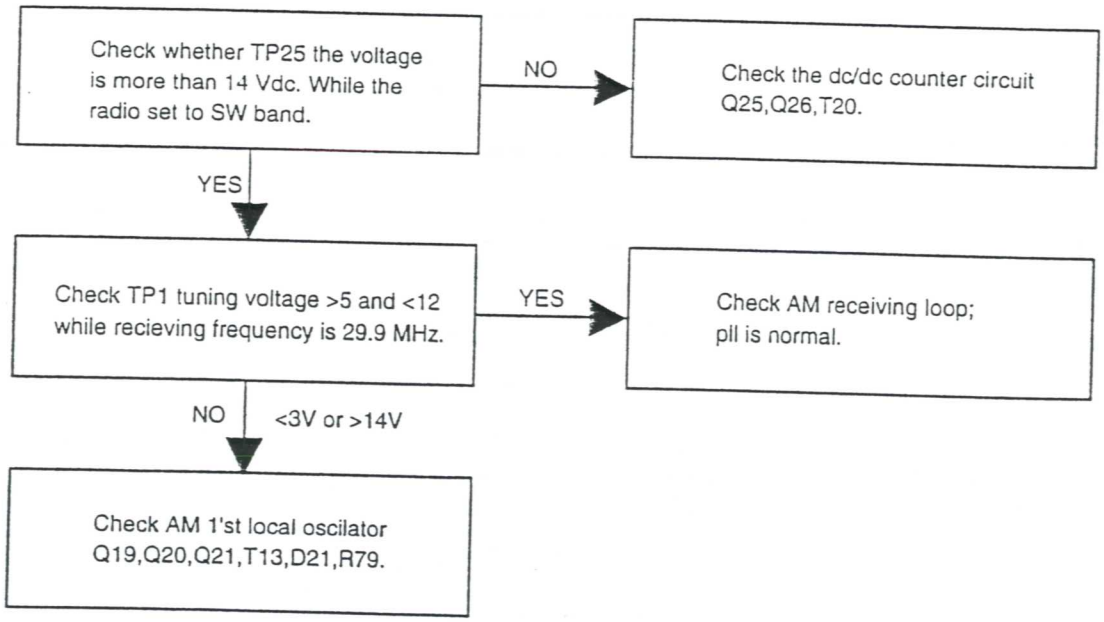

TP28
TP18
TP20
TP27
TP19
TP17
TP24
TP30
TP11
TP01
TP29
TP07
TP12
TP03
TP26
TP04
TP14
TP08
TP13
TP05
TP10
TP09
TP02
TP16
TP22
TP25
TP06

TROUBLESHOOTING FLOW CHART

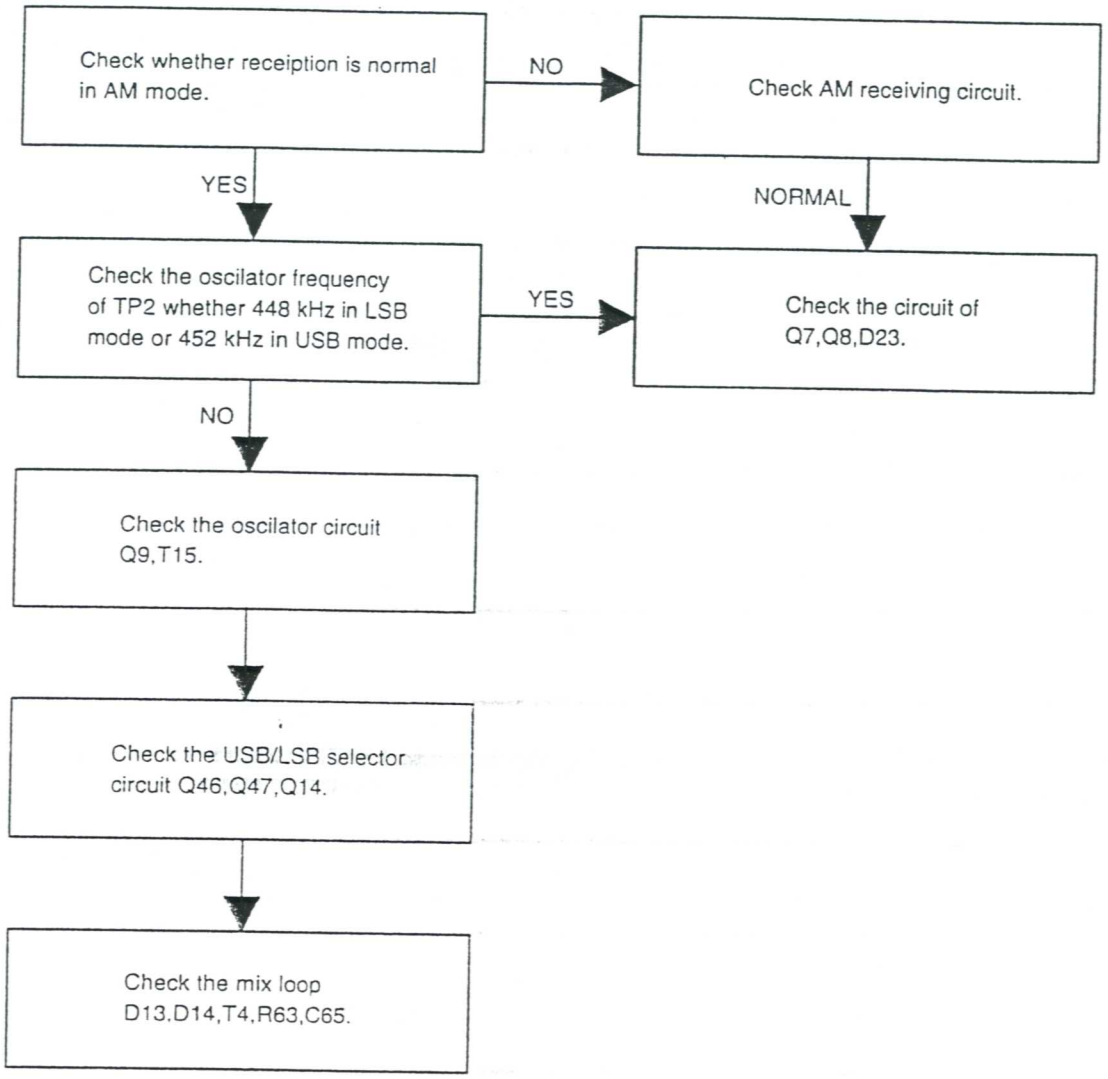
1.The radio power can not turn to ON



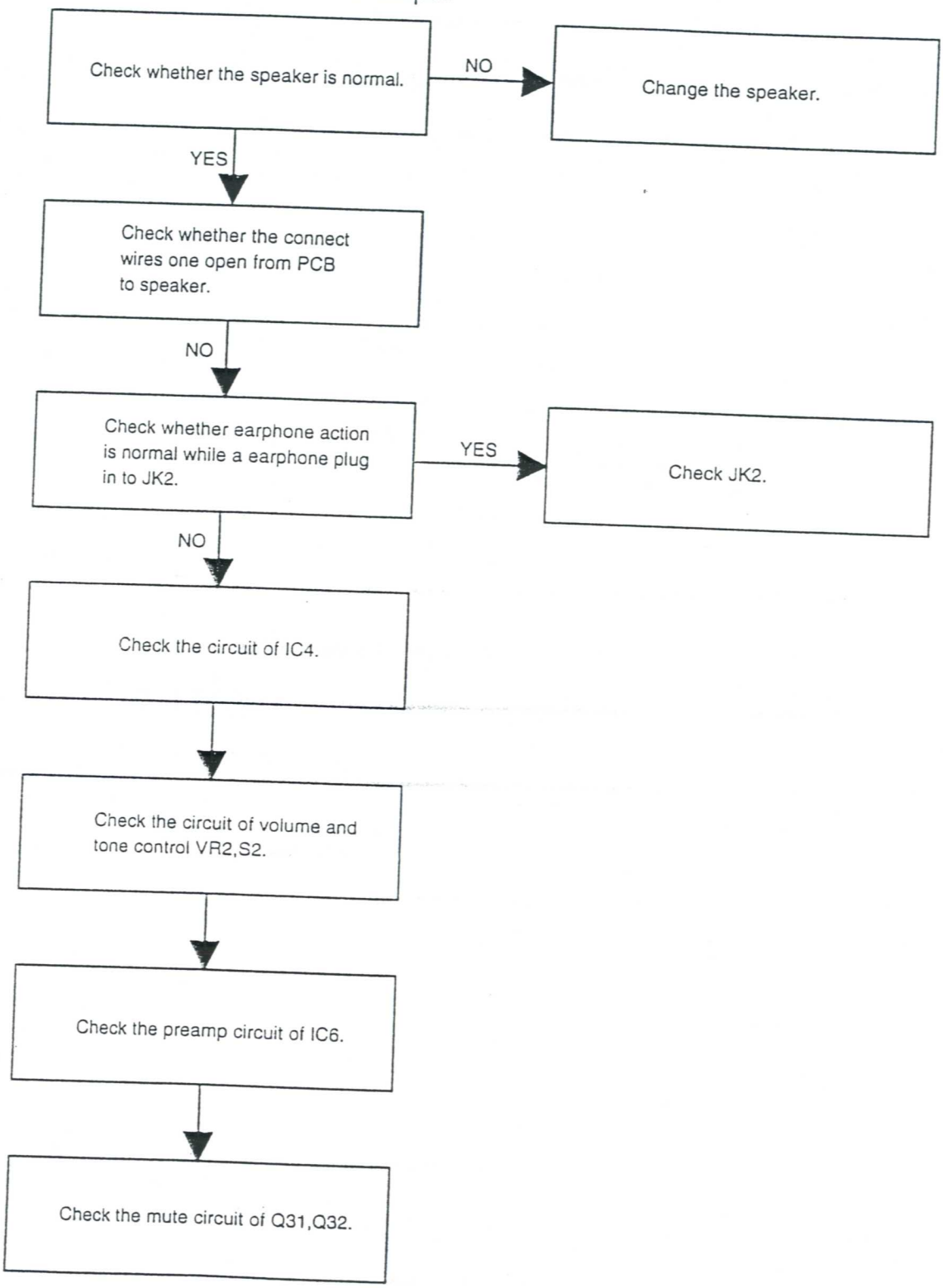
2. PLL do not work in AM band



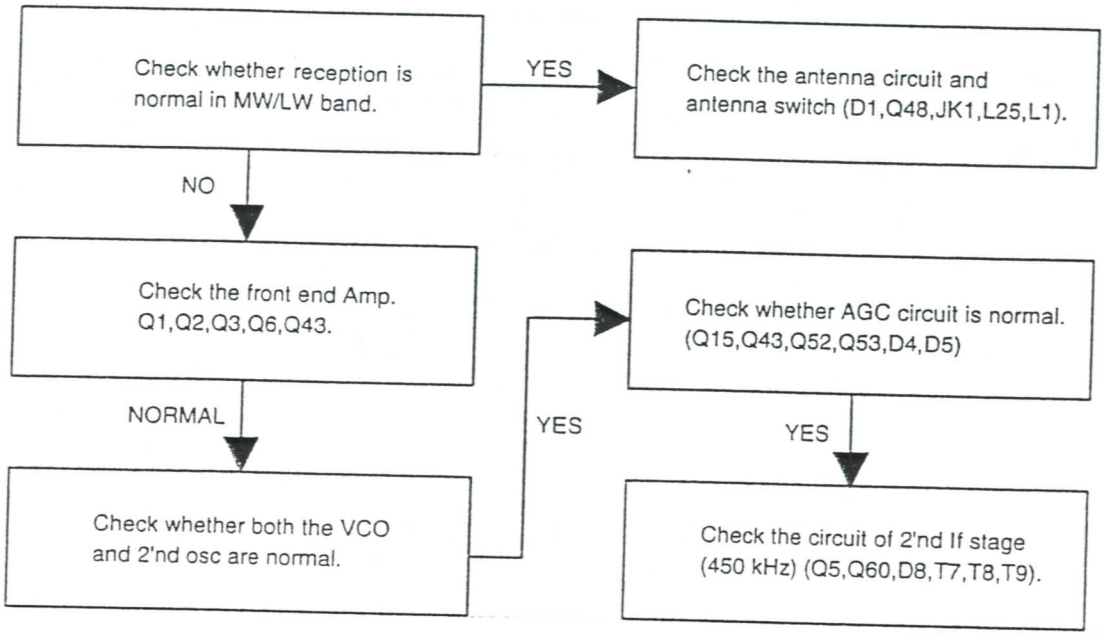
3.SSB function do not work



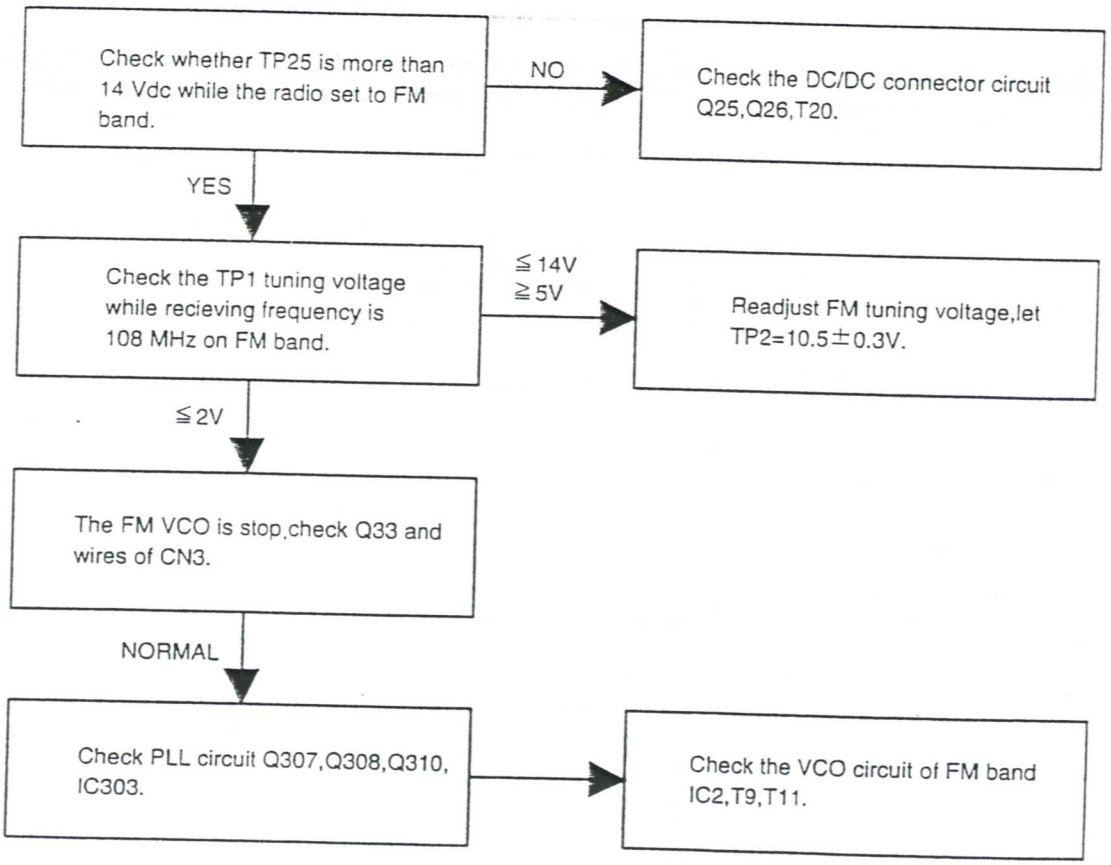
4.Speaker have not voice output



5. Weak sensitivity in AM band



6. PLL do not work on FM bnad



7. Weak R.D.S. reception in FM band

