

EMPEROR TS-3010  
AM/SSB AMATEUR RADIO

ALIGNMENT PROCEDURE

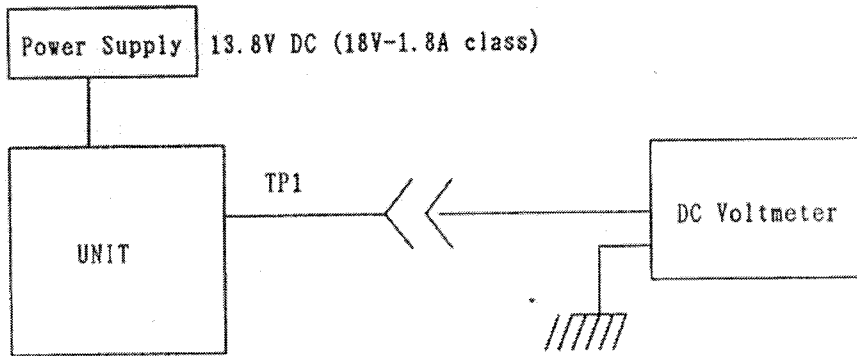
ADJUSTMENTS AND INSPECTIONS OF CPU PORTION

1. 10KHz signal Adjustment

- ① Connect the frequency counter to TP501, and adjust the trimmer capacitor CT501 to set the frequency at  $10.0\text{KHz} \pm 0.15\text{Hz}$ .
- ② Check the 10KHz frequency. It has to be within  $10\text{KHz} \pm 0.30\text{Hz}$ .

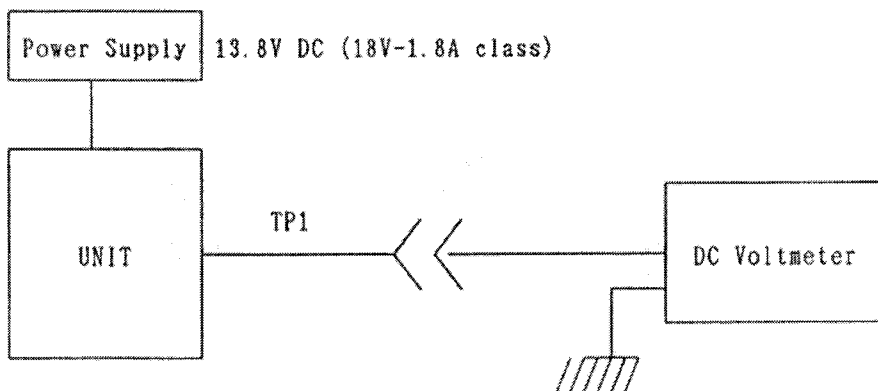
ADJUSTMENTS AND INSPECTIONS OF PLL PORTION

1. PLL Adjustment ① (LOCK Voltage Adjustment)



- ① Adjust L38 to 2.5V reading on the DC Voltmeter at channel 1 of G-band.

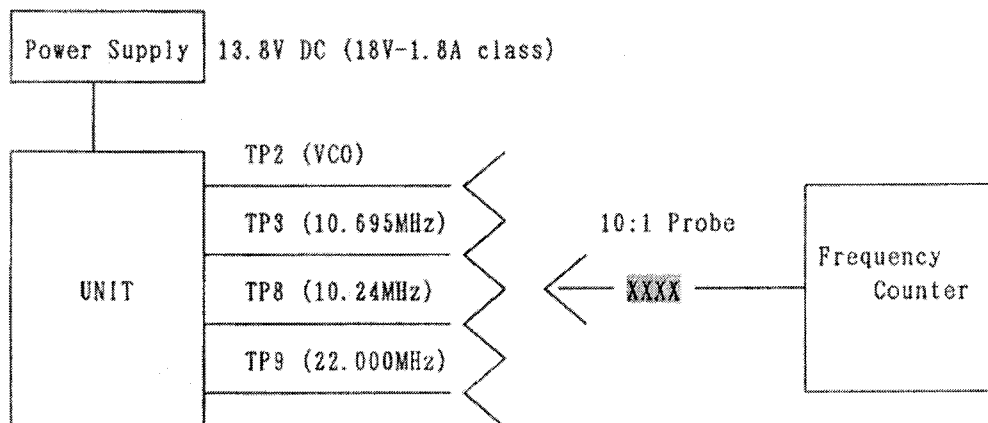
## 2. LOCK Voltage Inspection



Check the Voltage of TP1(R177), and adjust them within the value mentioned below.

No. of Band (1 Ch.)	TP1 Voltage (V)
G	2.5 ± 0.3
A	2.8 ± 0.5
B	3.0 ± 0.5
C	3.3 ± 0.5
D	3.5 ± 0.5
E	3.8 ± 0.5
F	4.0 ± 0.5

## 3. Frequency Adjustment



- ① Set CLARIFIER Volume(VR504) to the center(12:00 position).
- ② Connect the Frequency Counter to TP8 Adjust frequency at  $10.24\text{MHz} \pm 30\text{Hz}$ .
- ③ Connect the Frequency Counter to TP9 . Adjust frequency at following mode.

	Mode	Remarks
1	USB	Adjust L41 to set the frequency at $22.0025\text{MHz} \pm 50\text{Hz}$
2	AM	Adjust L40 to set the frequency at $22.0000\text{MHz} \pm 50\text{Hz}$
3	LSB	Adjust L42 to set the frequency at $21.9975\text{MHz} \pm 50\text{Hz}$

- ④ Connect the Frequency Counter to TP3 and adjust frequency at following modes.

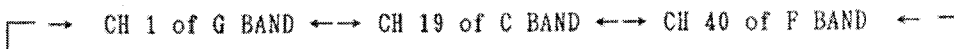
	Mode	Remarks
1	USB	Adjust L31 to set the frequency at $10.6975\text{MHz} \pm 50\text{Hz}$
2	AM	Adjust L30 to set the frequency at $10.6950\text{MHz} \pm 50\text{Hz}$
3	LSB	Adjust L32 to set the frequency at $10.6925\text{MHz} \pm 50\text{Hz}$

- ⑤ Set at CH19 of C BAND, and connect the Frequency Counter to TP2. adjust the VCO Frequency by L40(AM), L41(USB), L42(LSB) at following mode.
- ⑥ Check the Frequency Indication of LCD. adjust the Trimmer capacitor CT501 to set the Frequency Indication of LCD at  $27.185\text{MHz} \pm 1\text{kHz}$ .

USB :  $37.8825\text{MHz} \pm 300\text{Hz}$   
 AM :  $37.8800\text{MHz} \pm 100\text{Hz}$   
 LSB :  $37.8775\text{MHz} \pm 300\text{Hz}$

#### 4. TEST MODE SETTING

- a. Change the MODE SW to USB MODE with POWER ON.
- b. Press the TONE SW and METER SW at once. Keep the both SW pressed during operation from (c) to (e).
- c. Turn off the POWER SW of SET.
- d. Change the MODE SW to LSB MODE
- e. Turn on the POWER SW of SET, after that, stop pressing the 2 SW, the TONE and METER
- f. Each time the The Channel up/down knob is rotated the BAND changes as follows.



ALIGNMENT OF TRANSMITTER PORTION

1. Test Equipment Required

Power Supply : 13.8V±0.05V(more than 3A)  
 AF OSC AM(1KHz), SSB(2 Signal modulations 500Hz and 2,400Hz )  
 Oscilloscope, RF Power Meter(CW/PEAK SW:PEAK), AF VTVM, Dummy Load(50 Ω)  
 DC Ammeter

2. Preparation for Alignment

Semi Fixed Resistor

VR5 (AM POWER) : Center	METER SW : RF
VR6 (FINAL IDLE) : Clockwise	TONE SW : OFF
VR7 (DRIVER IDLE) : Counter Clockwise	SQ Volume : Min.
NB/ANL SW : ANL	MIC GAIN Volume : Max.
PA/CB SW : CB	RF Gain Volume : Max.

Frequency : 27.185MHz (CH19 of C BAND)

3. Alignment Procedure

Step	Preset to	Adjustment	Remarks
1	Mode:USB No Mod.	VR6 (FINAL IDLE)	Remove the PCB(PB-901) from Main PCB. Connect a DC Ammeter (+) to TP4 (-) to TP5. Adjust VR6 for 60mA reading on the DC Ammeter.
2	Mode:USB No Mod.	VR7 (DRIVER IDLE)	Connect the DC Ammeter (+) to TP4, (-) to TP6. Adjust VR7 for 120mA reading on the DC Ammeter.
3	Mode:USB MIC Input: See Remarks 2 SIG. Mod.	L19, 29	Disconnect the DC Ammeter. Reinstall the PB-901 to the Main PCB. Connect an RF Power Meter to the ANT. Jack. Connect an Oscilloscope across a Trombone to the RF Power Meter. Adjust L19 and 29 for maximum reading on the RF Power Meter. During this step, set the AF Oscillator so that the output is less than 6W. Repeat this step twice.
4	Mode:USB 30mV RMS 2 SIG. Mod.	VR4 (SSB POWER)	Adjust VR4 for 11.5W PEP reading on the RF Power Meter
5	Mode:USB or LSB No Mod.	VR9 (SSB CARRIER SUPPRESSION)	Adjust VR9 so that the carrier leakage at USB and LSB become minimum. The Oscilloscope reading has to be less than 350mV P-P.

Change the CW/PEAK SW on the RF PEAK Meter to CW position.

Step	Preset to	Adjustment	Remarks
6	Mode:AM No Mod.	VR5 (AM POWER)	Adjust VR5 for 3.8W reading on the RF Power Meter at 27.185MHz.
7	Mode:AM No Mod.		To check output power on AM at 27.185MHz against nominal 3.8W. Adjust it slightly lower when it reaches to the upper limit of 4.0W, or slightly higher when it reaches to the lower limit of 3.0W, in order to minimize differences in output power of the unit from nominal 3.8W.
8	MODE:AM No Mod.	VR11 (TX Frequency)	Adjust VR11 to make the RF Frequency at 27.185MHz ± 90Hz
9	Mode:AM No Mod. Meter:CAL		Set the frequency at 27.185MHz. Confirm that CAL Meter exceeds the maximum range under condition of maximum CAL Volume. Adjust SWR Volume to light on to the CAL position on the Meter.
10	Mode:AM No Mod. Meter:SWR		SWR Meter has to show nothing or indicate digit "1".
11	Mode:AM No Mod. Meter:RF	VR3 (RF Meter)	Adjust VR3 so that "10" LCD just lights on. After that, adjust VR3 until the LCD indication has become "9" instead of "10", and then stop the turning.
12	Mode:AM 1KHz, 30mV RMS Mod.	VR10 (AMC)	Adjust VR10 to obtain the 95% -PEAK reading on the Oscilloscope. Confirm that its positive modulation factor +PEAK has been more than 90%.
13	Mode:AM 1KHz. 1mV RMS Mod. Meter:MOD	VR12 (MODE METER)	Adjust VR12 so that "5" LCD just lights on.

INSPECTION OF TRANSMITTER PORTION

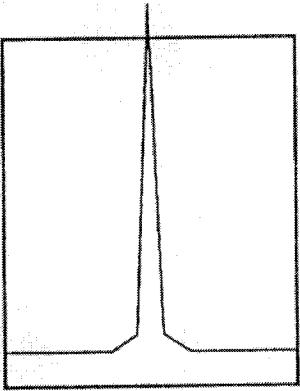
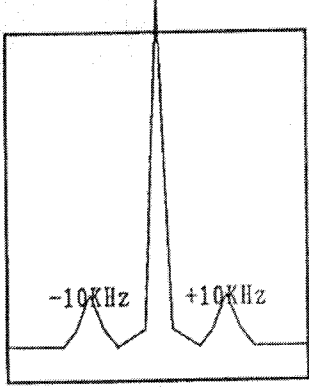
Check the channel at following band.

CH 1 of G BAND

CH 19 of C BAND

CH 40 of F BAND

Step	Preset to	Remarks
1	Mode:USB and LSB 6.0W output Mod. +13dB up (2 SIG Mod)	Set the CW/PEAK SW on the RF Power Meter to the PEAK position. When it is in transmission operation and it is at 27.185MHz. RF Power has to be between 11.0W and 12.0W.
2	Mode:AM No Mod.	When it is in transmission operation and it is at 27.185MHz. RF Power has to be between 3.0W and 4.0W.
3	MODE:AM No Mod.	When it is in Transmission operation and it is at CH C BAND. RF Power Frequency has to be between $27.185 \pm 100\text{Hz}$ .
4	Mode:AM No Mod. Meter:SWR	When it is in transmission operation, adjust the SWR CAL Volume so that CAL Meter indicates "▲". After that, change the Meter to SWR. Then SWR Meter has to show nothing or indicate digit 1.
5	Mode:AM No Mod. Meter:RF	When it is in transmission operation, RF Meter indicates between "9" and "10".
6	Mode:AM 50% Mod. +40dB up (1KHz, Single Tone)	When it is in transmission operation, Modulation has to be between 85% and 100%.
7	Mode:AM Meter:MOD 1mV RMS Mod. (1KHz, Single Tone)	When it is in transmission operation, MOD Meter indicates between "4" and "6".
8	PA SW:ON MIC Input:1.4mV	The Output of PA Speaker Dummy Load( $8\Omega$ ) has to be between 1.6V RMS and 3.0V RMS

Step	Preset to	Remarks
9	Mode:USB and LSB 11.5w +10dBup (2 SIG Mod.)	<p>Check the Spectrum Analyzer. When it is switched from modulation to no modulation, the ratio of carrier suppression for USB and LSB has to be less than -40dB. At the same time, check the wave form of AM output with no modulation to confirm that spurious leakage of <math>f_c \pm 10\text{KHz}</math> has not been produced.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>A. Correct (No spurious leakage)</p>  <p><math>f_c</math></p> </div> <div style="text-align: center;"> <p>B. Reject (There are spurious leakage of <math>f_c \pm 10\text{KHz}</math>)</p>  <p><math>f_c</math></p> </div> </div>



ALIGNMENT OF RECEIVER PORTION

1. Test Equipment Required

Power Supply : 13.8V ± 0.05V      Speaker Dummy Load : 8Ω (at the EXT Speaker)

SSG

Frequency : 27.185MHz (CH19 of C BAND)      Mod Frequency : 1KHz      Standard Modulation : AM 30%

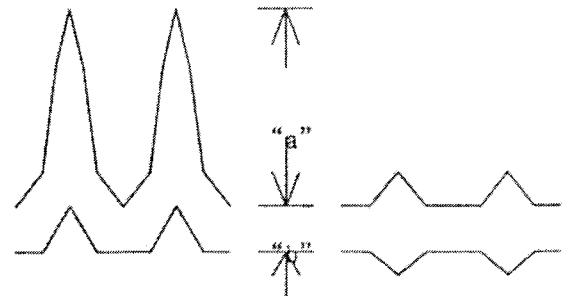
2. Preparation for Alignment

RF Gain Volume : Max.      PA/CB SW : CB

NB ANL SW : ANL      SQ Volume : Min.

CLARIFIER Volume : Connect the counter to TP2(VCO). When you turn fully CLARIFIER Volume clockwise and counter clockwise, local frequency has to be varied more than 37.880MHz ± 1.5KHz. After above operation, adjust the volume to the center.

3. Alignment Procedure

Step	Preset to	Adjustment	Remarks
1	Mode:AM SSG RF Output: See Remarks SSG: 1KHz 30% Mod. (AM)	L2, 7, 8, 9, 10, 12, 13, 47	Alignment of sensitivity. Adjust coils for maximum reading on the AF VTVM (During this step, set the SSG attenuator so that the standard output is less than 0.5W(2V/8Ω)). Set the unit at the maximum volume. Adjust them lastly with SSG RF output set at 1μV.
2	Mode:USB SSG:No Mod. RF Output:0.3uV Freq:27.186MHz	L11, 14	Adjust coils for maximum leading on the VTVM.
3	Mode:AM SSG RF Output: Around 20μV SSG: 1KHz 30% Mod. (AM)	L1	<p>Press the NB/ANL Key once to select NB on mode. ( Refer to the figures of "A" and "B" mentioned below. )</p> <p>Pick up the demodulated signal from TP7, and adjust the L1 to get the maximum level of peak "a" and "b" of Fig. "A".</p> <p>If the signal is the same shape as the Fig. "B" adjust the L1 until the signal becomes the same shape as the Fig. "A". After these operations, return the mode to NB off.</p> <div style="text-align: center;">  </div>

Step	Preset to	Adjustment	Remarks
4	Mode:AM SSG RF Output:1 $\mu$ V SSG: 1KHz 30% Mod. (AM)	L2, 7, 8, 9, 10, 12, 13	Adjust coils for maximum reading on the AF VTVM (During this step, set the SSG Attenuator so that the standard output is less than 0.5W(2V/8 $\Omega$ ))
5	Mode:AM SSG RF Output:1 $\mu$ V SSG: 1KHz 30% Mod. (AM)	L7, 8, 9	Set the audio volume of the unit to 2V RMS. Press NB/ANL Key once to check the audio level difference between NB OFF and NB ON condition. If it is more than 0dB or less than -2dB, return the NB mode condition to NB OFF mode, and adjust L7, 8 and 9 again. If the difference is within 2dB, go to next step.
6	SSG RF Output:1mV	VR1 (SQ)	Alignment of Squelch. Set the Output of SSG to 60dB $\mu$ V and squelch volume to maximum. Adjust VR1 so that the squelch just breaks. (Adjust VR1 to indicate Audio Signal Wave to be appeared on the Oscilloscope.) In this operation, confirm the distortion of Audio Signal Wave has been less than 8%. Set the volume at the maximum and confirm audio output has not been oscillated.
7	SSG RF Output: 57dB $\mu$ V		Turn the mode switch to USB and return it to AM, then the wave form has to be disappeared on the Oscilloscope at once.
8	SSG RF Output: 62dB $\mu$ V		Turn the mode switch to USB and return it to AM, then the wave form has to be appeared on the Oscilloscope at once.
9	SSG:100 $\mu$ V No Mod. Meter:RF	VR2 (S METER)	Alignment of S-meter. Set the output of SSG to 100 $\mu$ V. Adjust VR2 so that "9" LCD just lights on.

## INSPECTION OF RECEIVER PORTION

10

Step	Preset to	Remarks
1	Mode:AM SSG:1KHz 30% Mod. (AM) RF Output:1 $\mu$ V Freq. :27.185MHz	S/N ratio has to be more than 10dB.
2	Mode:AM SSG:1KHz 30% Mod. (AM) RF Output:1.0 $\mu$ V	Set the audio volume to maximum, and rotate the CLARIFIER volume slightly. The audio maximum output has to be more than 2V RMS. Reduce the audio output until 2V RMS, and push NB/ANL Key once. The difference of audio output has to be within the range from 0dB to -2dB.
3	Freq. :27.185MHz RF Gain volume:Max. RF Output:0.5 $\mu$ V	Read the audio output level. Change RF Gain volume to minimum, then the audio output level has to be gone down. Adjust the SSG RF output to higher until the audio output level has been reached to the same level as it was at the beginning of this step. Then the SSG RF output has to be more than 15.8 $\mu$ V.
4	Mode:USB SSG:No Mod. RF Output:0.3 $\mu$ V Freq. :27.186MHz Meter:RF RF Gain volume:Max.	When the SSG RF output is switched on and off, S/N ratio has to be more than 10dB. When the RF output is switched off, RF Meter must not be lit on.
5	Change Mode to LSB Change Freq. to 27.184MHz	When the SSG RF output is switched on and off, S/N ratio has to be more than 10dB. When the RF output is switched off, RF Meter must not be lit on.
6	Mode:AM SSG:No Mod. RF Output:2 $\mu$ V Freq. :27.185MHz Meter:RF	RF Meter should indicate equal or more than "1"
7	Mode:AM SSG:No Mod. RF Output:35.5~44.5dB $\mu$ V Freq. :27.185MHz Meter:RF	RF Meter indicates "9".

Step	Preset to	Remarks
8	Mode:AM SSG:1KHz 30% Mod. (AM) RF Output:1 $\mu$ V SQ Volume:Min. NB check jig:on	Set up the speaker/dummy switch to the speaker position. Hear the noise sound with receiving sound from the peaker. Press the NB/ANL Key to select NB on mode, then the pulse noise of audio output has to be decreased and the level of S/N ratio of the wave form must not be changed. After confirmation, press NB/ANL Key to make the NB off mode, and turn off the NB check jig.
9	Mode:AM SSG:1KHz 30% Mod. (AM) SQ Volume:TIGHT (Clockwise, Max.) RF Output: 55.5dB $\mu$ V(line QC) 54dB $\mu$ V(QA)	Turn the mode switch to USB and return to AM, during this operation Audio Signal Wave must not be produced on the Oscilloscope. Set the audio volume of the unit at the maximum position. Change the frequency to 27.175MHz and check the audio leakage output level. It should be less than 3mV RMS. After checking it, set the audio volume around center position, and return the frequency to 27.185MHz.
10	Mode:AM SSG:1KHz 30% Mod. (AM) SQ Volume:TIGHT (Clockwise, Max.) RF Output:64dB $\mu$ V(line QC) 66dB $\mu$ V(QA)	Turn the mode switch to USB and return to AM, during this operation Audio Signal Wave has to be shown on the Oscilloscope.
11	Mode:AM SSG:1KHz 30% Mod RF Output:3.16 $\mu$ V Freq.:27.255MHz	Cover the unit with top and bottom cases. Select the NB mode on. Adjust the audio volume to maximum, and read the audio output level.
12	Mode:AM SSG:1KHz 30% Mod RF Output:15.8 $\mu$ V Freq.:27.255MHz	Read the audio output, and compare it with the audio output level which is read in step 11. Consequently, the defference has to be within 3dB.
13	Mode:AM SSG:1KHz 30% Mod RF Output:316 $\mu$ V Freq.:27.255MHz	Read the audio output level, it should be less than 300mV RMS.

SPECIFICATION OF TRANSMITTER PORTION

[MEASUREMENT CONDITIONS]

- a) POWER SOURCE : 13.8 V (DC)
- b) ANTENNA IMPEADACE : 50 Ω
- c) MODULATION FREQUENCY : AM = 1 KHz, SSB(2 TONE) = 500Hz and 2400Hz
- d) AM STANDARD SIGNAL : 1,000 μV, 1 KHz 30%
- e) REFERENCE OUTPUT POWER : 0.5W
- f) AUDIO OUTPUT LOAD : 8 Ω

Item	Unit	Specification
1 Frequency Stability (5 Minutes after switch on)	Hz	-300 < , < +300
2 Output Power at AM (No Mod.)	W	3.0 < , < 4.0
Output Power at USB or LSB (6.0W PEP output +13dBup (2 SIG MOD))	W (PEP)	11.0 < , < 12.0
3 Suprious Harmonic ± 4.0 KHz~± 8.0 KHz (at AM mode) ± 8.0 KHz~±20.0 KHz ±20.0 KHz~2*f <sub>0</sub> 2*f <sub>0</sub> ~	- dB dB dB dB	< -25.0 < -35.0 < -59.0 < -60.0
(at SSB mode) ± 2.0 KHz~± 6.0 KHz ± 6.0 KHz~±10.0 KHz ±10.0 KHz~2*f <sub>0</sub> 2*f <sub>0</sub> ~	dB dB dB dB	< -25.0 < -35.0 < -64.0 < -60.0
4 Carrier Suppresion at USB or LSB	dB	< -40.0
6 Power Consumption at AM (No Mod.)	A	< 2.3
(Max. Mod.)	A	< 2.2
Power Consumption at USB or LSB (No Mod.)	A	< 1.0
(Max. Mod.)	A	< 2.2
7 Modulation Frequency Responce (1 KHz, 0 dB Reference)		
Lower at 300Hz AM	dB	- 12
SSB	dB	- 12
Higher at 2.5KHz AM	dB	- 9
SSB	dB	- 9
8 Mod. Sensitivity at AM (50% Mod.)	mV	< 2.0
SSB (6.0W PEP output)	mV	< 2.0
9 AMC Range (at all mode)	dB	40.0 <

SPECIFICATION OF RECEIVER PORTION

Item	Unit	Specification
1	Maximum Sensitivity at AM at SSB	$\mu V$ < 1.0 $\mu V$ < 0.5
2	S/N 10dB Sensitivity at AM at SSB	$\mu V$ < 1.4 $\mu V$ < 0.25
3	AGC Range(Less than 10dB change in Audio OutPut)	dB < 10 ~ >10,000
4	RF Gain control range	dB 30 < , < 70
5	S meter "S1" Sensitivity	$\mu V$ < 2.0
6	S meter "S9" Sensitivity	$\mu V$ 25 < , < 400
7	Overall Audio Frequency Response (1 KHz, 0 dB Reference) Lower at 300Hz AM SSB Higher at 3000Hz AM SSB	dB - 15 dB - 15 dB - 15 dB - 15
8	Audio Output at 10% THD (at 8 $\Omega$ dummy load)	W 2.0 <
9	Maximum audio output power (at 8 $\Omega$ dummy load)	W 3.0 <
10	SQ Sensitivity at threshold	$\mu V$ < 3.0
11	SQ Sensitivity at TIGHT	$\mu V$ 250 < , < 4,000
12	S/N ratio at 1mV input	dB 25 <
13	Adjucent Channel Selectivity +10KHz -10KHz	dB 50 < dB 50 <
14	Image Rejection Ratio	dB 65 <
15	IF Rejection Ratio	dB 50 <
16	Power Consumption at no signal	mA < 450
17	Power Consumption at Audio MAX.	mA < 500
18	Oscillator Dropout Voltage	V < 11

	Item	Unit	Specification
19	Clarifier Range	KHz	> $\pm 1.5$

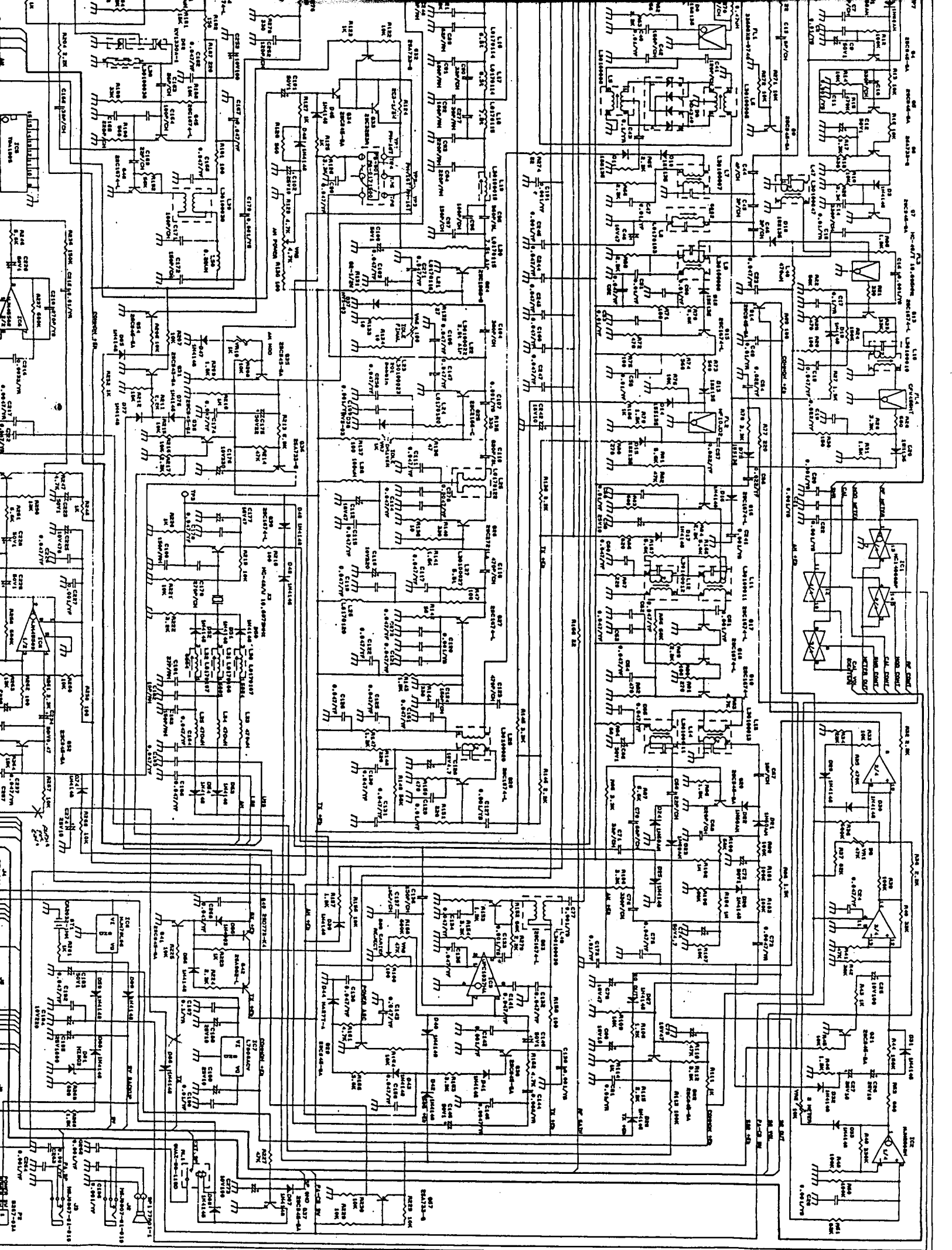
SPECIFICATION OF PUBLIC ADDRESS

	Item	Unit	SPECIFICATION
1	OutPut Power at Maximum	W	4

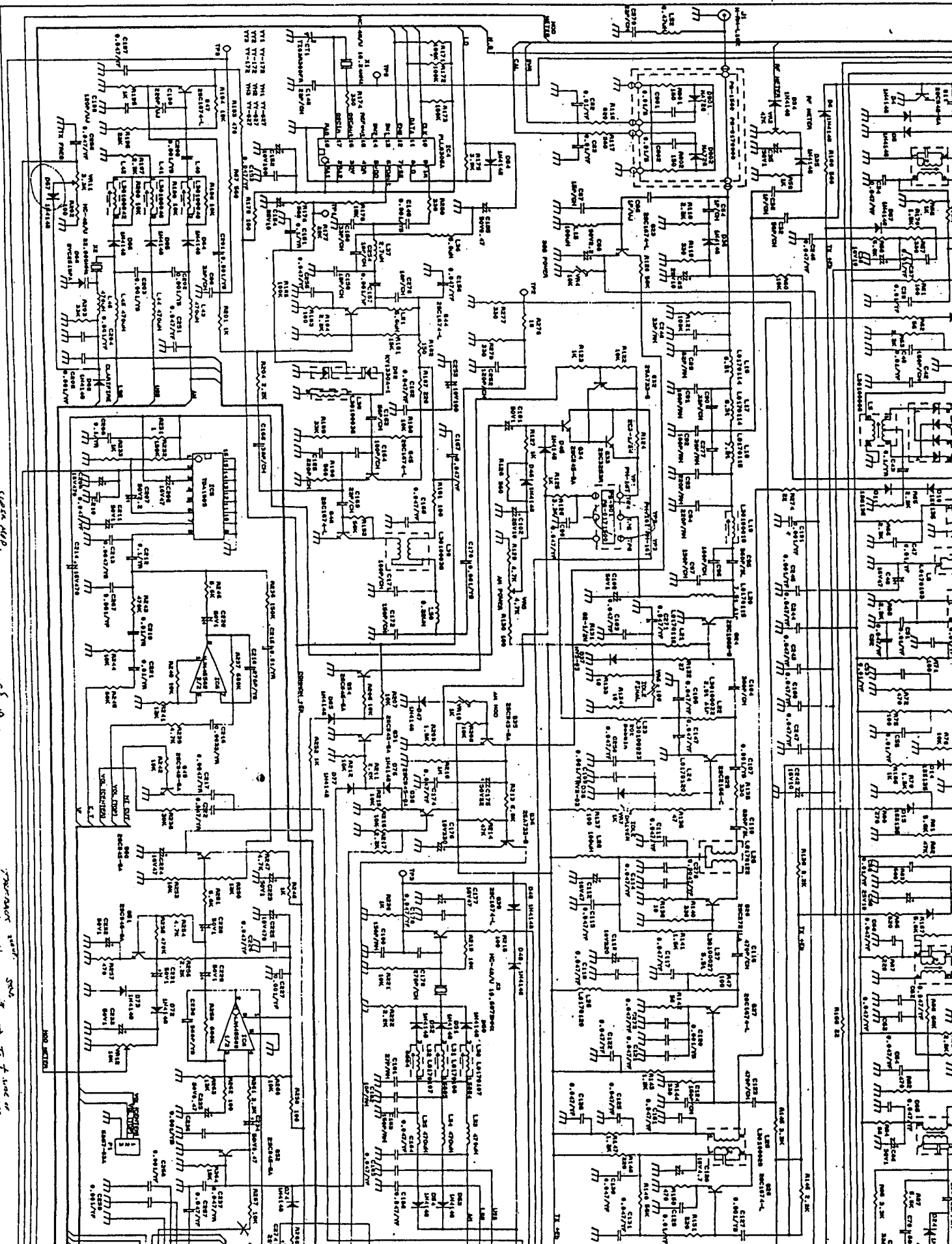








WARRANT  
SERIAL NO. 100  
MAY 2 1945  
BY PAINT SHOP

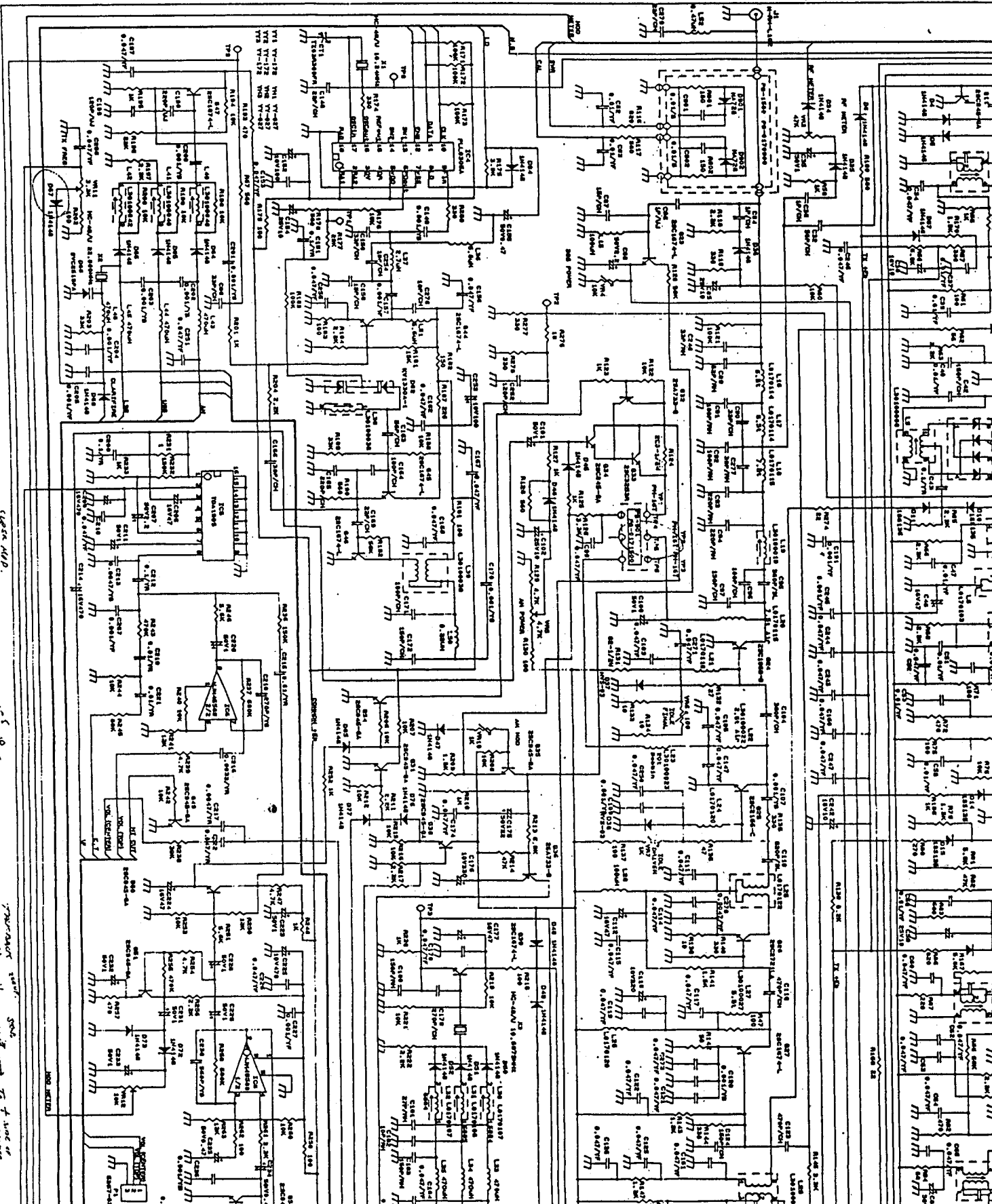


STAGE 4 AND  
REVERSE 7-5  
FROM MAIN CONNECTION

0.5 P.F. 10

TRANSFORMER 200V  
P.W. 110V  
TO 4 LINE OF  
SPEAKER

CHAPTER  
 WORK BOOK  
 1945-46  
 IN PART REPAIR UNIT

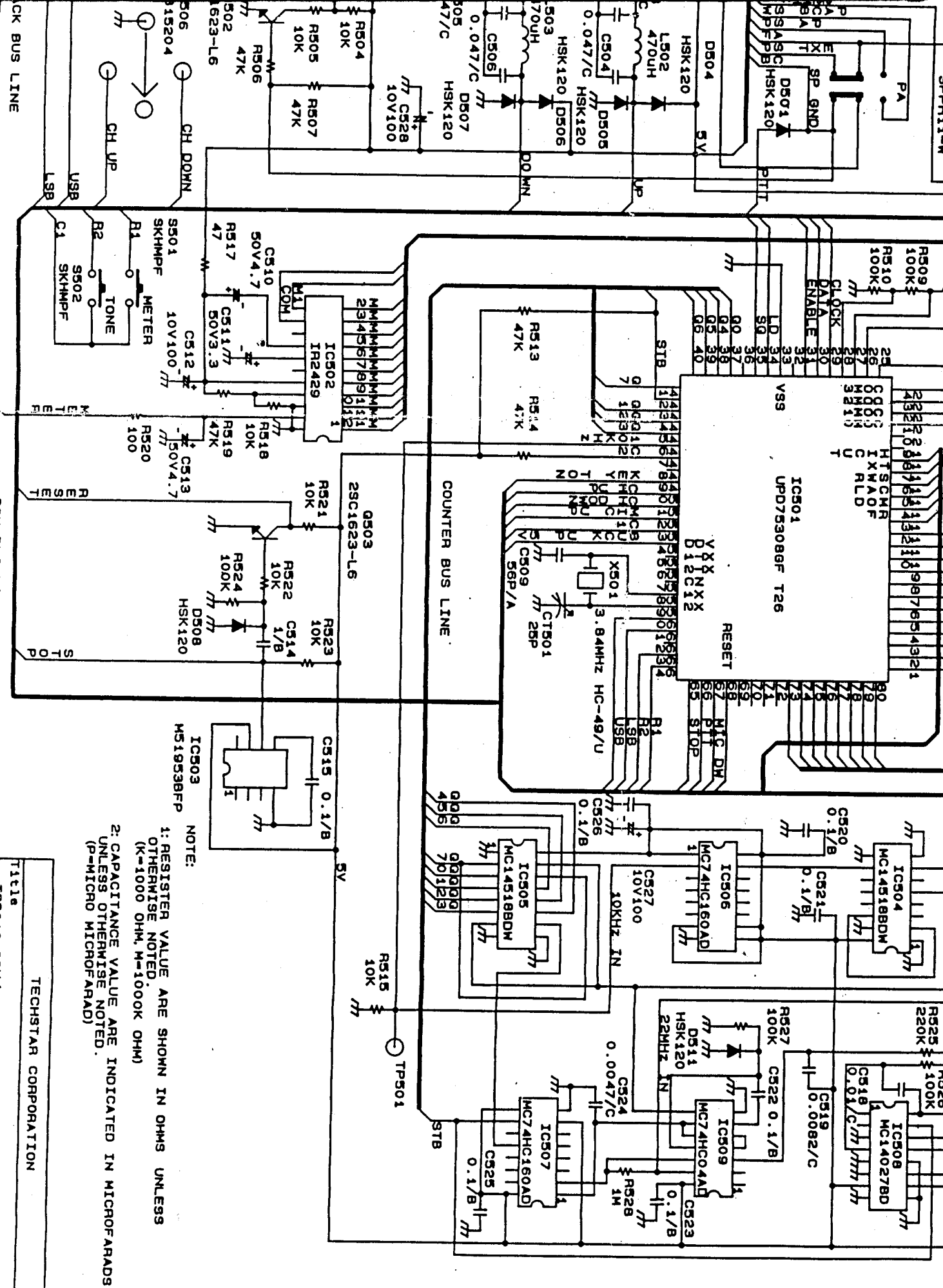


STARTER MOTOR  
 REPAIR UNIT  
 REPAIR UNIT

0.5 0.0

REPAIR UNIT  
 REPAIR UNIT  
 REPAIR UNIT





NOTE:  
 1: RESISTOR VALUE ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED.  
 (K=1000 OHM, M=1000K OHM)  
 2: CAPACITANCE VALUE ARE INDICATED IN MICROFARADS (P=PICTO MICROFARAD)

TECHSTAR CORPORATION

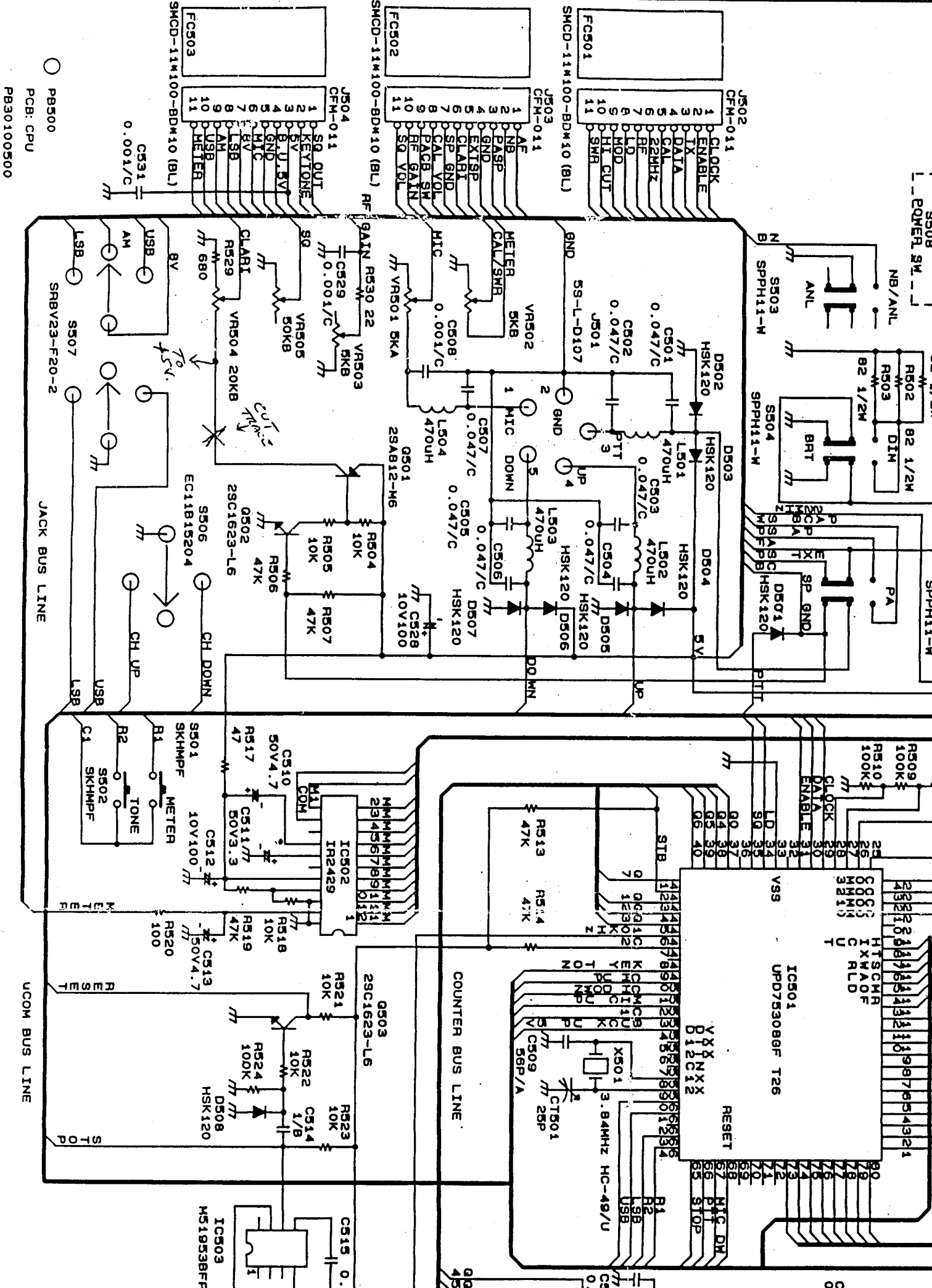
Title	TS3010 CPU/VOLUME PCB SCHEMATIC DIAGRAM
Size Document Number	3010CPU.SCH
REV	B
Date:	APR 11 24, 1996 Sheet 1 of 1

TECHSTAR CORP. DESIGN SAKO APPROV

Document Number: TS-3010

Date: APR 25 1996

TE/3-CB003



PCB: CPU  
 PB30100500

POWER SW

SPPH11-W

100K

IC501

RESET

IC503





