

CP2000 BASE STATION

SERVICE MANUAL

COMMUNICATIONS *POWER INC.*

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CPI RECOMMENDED TEST EQUIPMENT LIST

1. OSCILLOSCOPE - TEKTRONIX T932 35MHz portable -\$1200
TEKTRONIX INC
P.O. Box 500
Beaverton, Oregon 97077

- Reliable, good CB 27MHz waveform resolution and triggering.

2. RF GENERATOR - CLEMENS Model SG-83C -\$345
CLEMENS MFG. CO.
630 S. Berry Road
St. Louis, MO 63122 (314) 961-7228

- Excellent value solid state generator with calibrated micro-volt output and super reliability.

3. FREQUENCY COUNTER - CPI Model FC-70 -\$170

4. AUDIO GENERATOR - HEATH MODEL IG-18 -(approx. \$100)

CP2000 BASE DETAILED CIRCUIT DESCRIPTION

1. Method of Frequency Selection

The front panel switch SW 1001 provides the binary coded decimal (BCD) outputs corresponding to each digit of the channel number selected. Data from the channel switch also drives the LED displays. IC's U900A **and** U900D **convert** the BCD information into the format required to drive the seven segment displays (LED's) U900B and C.

BCD coding is as follows for each decimal number:

Number	C8*	C4	C2	C1
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

*C1, C2, etc., correspond to the 1's, 2's, etc., place in the binary equivalent of each digit of the channel number. Note that each decimal digit is binary coded, not the entire number. C₁₁ C₁₂, C₂₁, C₂₂, etc., are the "bits" Of C₂, the second digit of the channel number. (See example on following page)

Channel 23 is:

	2				3			
	0	0	1	0	0	0	1	1
C = C ₁ C ₂	C ₁₈	C ₁₄	C ₁₂	C ₁₁	C ₂₈	C ₂₄	C ₂₂	C ₂₁

WHERE C=23 C₁=2 and C₂=3

Also note that TTL negative logic is used for the channel switches. 0 = 2.5 to 5 vdc and 1 = 0 to 0.6 vdc.

The radio operating frequency is determined as follows:

$$f_0 = 27.405 \text{ MHz} = N (5 \text{ KHz}) + 12.800 \text{ MHz} + 10.2 \text{ MHz}$$

where: f₀ = operating frequency
 N = synthesizer divide ration
 = N₁ N₂ N₃

N is a three-digit BCD number (N₁N₂N₃) determined by feeding the channel switch outputs into U600N (for N₂ and N₃) and N₁ control circuit (for N₁). U600N requires negative voltage for proper operation. This is done by feeding a 50 KHz pulse from the synthesizer into the circuitry of U600M, Q616, Q617 and Q618. The BCD number N is a nine's complement BCD number. This is coded as follows:

Number	N8	N4	N2	N1
0	1	0	0	1
1	1	0	0	0
2	0	1	1	1
3	0	1	1	0
4	0	1	0	1
5	0	1	0	0
6	0	0	1	1
7	0	0	1	0
8	0	0	0	1
9	0	0	0	0

Note that Positive TTL logic levels are used for N. Thus, 0 0 to 0.6 vdc and 1 = 2.5 to 5.0 vdc.

2. BFO Inhibit Control

Logic gate U600M, together with Q604 and Q605, turn off the BFO during AM receive operation.

3. Crystal Oscillators

All crystal oscillators are of the Colpitts type. Some oscillators operate only in certain modes: (See following page.)

Oscillator	On Modes
12.803 MHz (Q614)	USB
12.800 MHz (Q610)	All modes
10.200 MHz (Q606)	AM, LSB
10.197 MHz (Q602)	USB

The front panel clarifier control (R508) adjusts the DC bias on D608 (12.800 MHz oscillator) and on D605 (12.803 MHz oscillator) to adjust frequency during receive operation only.

4. General Theory of Digital Synthesizer

The voltage controlled oscillator (VCO) is a free-running oscillator whose frequency can be shifted by changing the DC control voltage applied. Increasing control voltage causes higher frequency of operation. The output of the VCO is mixed with a fixed crystal oscillator to produce a lower frequency for digital division. The output of the digital divider is compared with a fixed reference frequency. A difference in frequency will cause the phase comparator to shift the VCO DC tuning voltage until the VCO is on frequency (locked).

An example will best illustrate this operation. If radio operation on 27.00 MHz is desired, the synthesizer output must be 16.8 MHz (since the radio IF frequency is 10.200 MHz). The 16.800 MHz is mixed with the 12.800 MHz fixed frequency to produce a 4.000 MHz frequency out of the synthesizer mixer. This 4.000 MHz is applied to the programmable divider and divided by 800 to produce 5 KHz. This 5 KHz is compared with 5 KHz produced by dividing the reference oscillator by 2560. Thus, synthesizer output frequency is as follows: $f_{out} = 12.800 \text{ MHz} + N (5 \text{ KHz})$. It can be seen that a change of N by one will produce a 5 KHz shift in operating frequency.

5. Detailed Synthesizer Operation

The VCO (Q608) is automatically tuned by varactor D604 and manually set by L603. Its output is low-pass filtered by C615, L604, C616, and applied to output buffer Q609 and loop buffer Q612. The output of Q612 is applied to loop mixer Q617. The other input to Q611 is the output of the 12.803 MHz (Q614) oscillator for USB. During USB operation, the output of the 12.800 MHz oscillator (Q610) is kept from the loop mixer by switch U600F. For LSB and AM, Q614 is turned off, and U600F switches Q610 output into the loop mixer. Both oscillator outputs are low-pass filtered by C641, L606, C642. Q611 output is low-pass filtered by C623, L605, C624 and converted to TTL level pulses by Q615. Q615 output is applied to the programmable divider which consists of U600G (N3), U600H (ND and U600J (N1). The programmable divider output is applied to the phase comparator (UCLA and U600B) which compares the pulses with the 5 KHz output of the reference dividers U600E ($\div 16$), U600D ($\div 16$), and

U600C ($\div 10$). The output of the phase comparator is level shifted to 10-volt pulses by Q613. Note that the phase comparator output, when the loop is locked, consists of 5 KHz "square" wave, the duty cycle of which is proportional to the VCO DC tuning voltage required for operation at the given frequency. If the phase comparator output is at 0 or 1 logic levels and does not have a pulse output, the loop is not phase locked. The pulse output of Q613 is filtered by C603-607, L601, and L602 to produce a smooth DC tuning voltage for the VCO. R607, R609, and C608 form a gain compensation network to assure loop stability.

6. BFO

Two crystal oscillators are used for the BFO. The 10.200 MHz (Q606) is used for AM and LSB. The 10.197 MHz oscillator (Q202) is used **for USB only**. Both oscillator outputs are low-pass filtered by C664, L607, C667 and amplified by Q607. The output of Q607 is fed to the double balanced mixer (D610-D613) which is the product detector for SSB receive operation and the balanced modulator for AM and SSB operation. R699 and D614 form a network for carrier reinsertion during AM transmit operation.

7. Reference Oscillators

A crystal oscillator (Q610) operating at 12.800 MHz is used as the primary reference for the PLL circuitry. Additionally, the 12.800 MHz is used as a L.O. signal to mix with the 16.800 MHz VCO which yields a difference frequency of 4.0 MHz. The 4.0 MHz is applied to the programmable divider chain whose output is 5 KHz. To maintain a constant 27 MHz output frequency on USB a 12.803 MHz crystal oscillator (Q614) is used as the above mentioned L.O.. Furthermore, a voltage variable capacitor is incorporated in each oscillator circuit to allow ± 800 Hz fine tuning of the receiver with the front panel CLARIFIER control R508.

During transmit the front panel CLARIFIER control does not function. Each side of the control R508 is connected through its respective switching transistor Q505 and Q506. In the transmit mode both Q505 and Q506 are turned off which effectively floats the arm of R508. This prevents the user from warping either oscillator during transmit.

8. Basic Theory of R/T Operation

The radio is basically a single-conversion superheterodyne type unit with filter type SSB generation. Some commonality is used on key components for both transmit and receive. One key unique feature of the unit bears some explanation for thorough understanding of radio operation. A *single crystal* filter unit is used for all modes of operation (AM, LSB and USB) on both receive and transmit. The filter is a dual mode type with an AM mode centered at 10.200 MHz

and an LSB mode with the carrier at 10.200 MHz. For USB operation it is necessary to shift BFO operation down 3 KHz to the other side of the filter (10.197 MHz) so that the filter will pass the upper sideband. If the BFO has been shifted down 3 KHz for USB, it is necessary to shift the SMO LO input up 3 KHz to maintain a **constant** channel frequency. This is why two oscillators (12.800 MHz and 12803 MHz) are used in the synthesized master oscillator (SMO).

9. Detailed Receiver Operation

C117-C123 and L105-L108 constitute a low-pass filter at the rf input connector which is shared with the receiver and transmitter. From the low-pass filter, the receive rf input is coupled by C116 to D105. D105 is a PIN type diode which acts as a shunt attenuator for manual and automatic rf gain control on receive and as a shunt shorting switch for transmit operation. C250, C251, C252 and L209 provide the required impedance transformation for the grounded gate preamp- Q223. L210, C255 resonate at 27 MHz on the output of Q223. This output is fed into the gate of JFET mixer Q201. The source of Q201 is fed with local oscillator signal by Q206.

The 10.200 MHz IF output of Q201 is fed through a delay network, consisting of L211, L214, C296, C297 and C258. The delay network is required to insure proper operation of the noise blanker. Output from the delay circuit goes to the crystal filter P-201 via diode switch D203 and D204. For SSB operation, +10 vdc is applied through R245 to FL201 to change the filter to the SSB mode. The output of FL201 passes through diode switch D205 and is amplified by U200A and U200B (about 80db of IF gain). For SSB operation the output of U200B is switched by D211 into the product detector into the product detector (BFO). Q214 is the AM and AGC detector. Q216 is connected as a temperature tracking diode to bias Q214.

The output of Q214 is low-pass filtered by R301, C288 to provide audio and a DC voltage for AGC operation. This DC component is applied to comparator U200E. R306 sets the comparison voltage for U200E. The output of U200E drives follower Q212 to provide fast attack of C277, R297 and R298 set the AGC decay. In the AM mode R298 is shorted by Q217 which shortens the decay characteristics of the AGC. R283 and R281 apply AGC to the IF amplifiers. U200C compares the IF AGC level set by R292 to begin rf AGC. R298 and D208 assure full receive rf AGC shutdown during transmit. Q208 is the PIN diode (D105) driver.

AM recovered in detector Q214 passes through automatic noise limiter diode D214 and associated circuitry before reaching Q219. The ANL can be turned on and off with front panel switch SW502. Q219 is a FET switch which selects either AM or SSB audio for amplifier U200F. R314 is to balance AM/SSB audio levels into U200F. The output of U200F goes through squelch gate (Q215) to the output amplifier.

U200E senses a DC IF AGC level set by the front panel squelch control (R809) to open the audio squelch gate Q215. U800C and associated circuitry amplifier the audio from U200F to a sufficient level for driving a 4 ohm speaker.

10. Detailed Noise Blanker Operation

A TRF (Tuned RF) receiver operating at 23.5 MHz samples the output of the low pass filter located at the antenna input to the transceiver. This TRF receiver consists of rf amplifiers Q 401 and Q403 followed by a noise pulse detector Q405 and Q402. The output of the pulse detector drives a one-shot (Q404) which drives a shunt rf switch Q224. During the period of time an interfering noise pulse is present the switching transistor Q224 prevents the signal from passing through the receiver's i.f. amplifiers. As a result objectionable noise pulses 'are removed from the receiver's audio output.

11. Detailed Transmitter Operation

Microphone audio is amplified by Q501 and is followed by U500A which is a high gain low distortion amplifier. When overdriven the output of U500A symmetrically limits the audio level applied to the compressor which prevents overmodulation.- C507 and C512 determine the amount of audio pre-emphasis introduced by the amplifiers. The audio after amplification and pre-emphasis is applied to U500B which is connected as a logarithmic amplifier. This amplifier introduces a non linear transfer characteristic and produces compressed audio at its output. A front panel switch SW 504 selects between normal and compressed audio for transmitter modulation. The output of U500B drives AGC amplifier U200D which feeds emitter-follower Q221 to provide a low-impedance audio source to the balanced modulator.

The output of the balanced modulator (10.200 MHz) is fed to diode switch D211. Note that R699 *and* D614 in the balanced modulator form the key elements for switched, variable carrier insertion during AM transmit operation. The output of switch D211 is buffered by Q222, passed by switch D206, and filtered by dual mode filter FL201 (see previous sections for details of FL201 operation).

The output of FL201 passes through switch diode D204 and is buffered by Q205. The output of buffer Q205 is amplified by AGC dri- Q207 and detected by D201 and D202. The DC level output of D201-D202 is compared to a fixed +2 volts by U200C. The transmit IF signal level is set by R274 before buffer Q222. The output of U200C drives emitter-follower Q209 for a fast attack of C222 and R229 which set the transmit AGC attack and decay time. Q209 is an emitter-follower AGC driver to the transmit audio AGC amplifier U200D. Thus, adjustment of the audio gain through U200D adjusts the rf level through the transmit IF chain, to prevent overmodulation and level the varying audio input levels from the microphone.

The output of Q205 also is passed through buffer Q203 to the gate of the transmit rf mixer, JFET Q204. The source of Q204 gets LO injection (16.8 MHz) from amplifier Q206. The output of Q204 (27 MHz) is bandpass filtered by C205-209 and L202-L204.

A broad band amplifier consisting of buffer Q225 and push pull amplifiers Q226 and Q227 follows the three section transmit filter. Class A biasing is employed on all three devices to insure very linear operation. Interstage transformer T502 and output T501 provide optimum impedance transformation to following stages. An output filter L201, L205, and associated capacitors removes all out of band spurious energy. This filtered drive signal is applied to R205 which sets the rf drive level to the linear transmit power amplifier assembly.

The transmit power amplifiers Q101 and Q102 are operated Class AB with transformer interstage matching. Q102, the final rf amplifier, is operated Class B with quiescent DC bias set by R107, R108 and temperature tracking diode D104. Q102 also uses transformer type input and output matching. The output of Q102 passes through a 9 section low pass filter which insures complete removal of undesired harmonic energy. Between the output of the filter and antenna terminal T104 and T105 are connected in a directional coupler configuration. The resulting output is detected by diodes D101 and D102 to give forward and reflected power information. A front panel switch SW 505 selects between the two DC voltages (FWD and refl) before application to VSWR meter amplifier U500C. A sample of the forward power DC voltage is used to drive the rf power output meter and associated drive circuitry.

12. Detailed Power Supply Operation

The power supply circuits provide the operating power for the various modules in the transceiver. Electronic regulation is used to provide stable, low ripple output voltages of +5, +10, and 13.6 VDC.

AC power is applied to the primary of T801 through line fuse F801 and POWER switch SW 801A. The secondary AC voltage of T801 is applied to the bridge rectifier assembly D805 and filter capacitors C803-C804 which provides full wave rectified DC for the series regulators. Both the +10 and +13.6V regulators operate in the same manner. A precision regulator, U800A, drives a series pass transistor QB03 for +10V and correspondingly U800B drives Q804 and Q805 for +13.6V output. Q801 and Q802 serve as over current shut back switches for the protection of the regulators. The +5V regulator, U800D, derives its input voltage from the center tap of T801.

For DC operation from an external +13.6 volt source, power is applied to the input of the +5 and +10 regulators. Also, the external DC is applied directly to the audio PA and the RF PA module. D802, D803, and D804 route the external DC to the proper points in the regulator circuitry.

CP2000 BASE TUNING PROCEDURE

A. General

1. Tune the radio in the sequence given. It is imperative that the power supplies be adjusted to their correct output voltage before attempting any alignment.

2. A Second Class or higher FCC Radio Telephone License is required to make any frequency or transmit adjustments to the CP2000B.

3. All receive RF inputs from the generator are applied to the radio's antenna connector.

4. All transmit measurements are made with a 50 ohm load connected to the radio's antenna connector through a good quality wattmeter.

5. Microphone connections

Pin 1: Audio hot

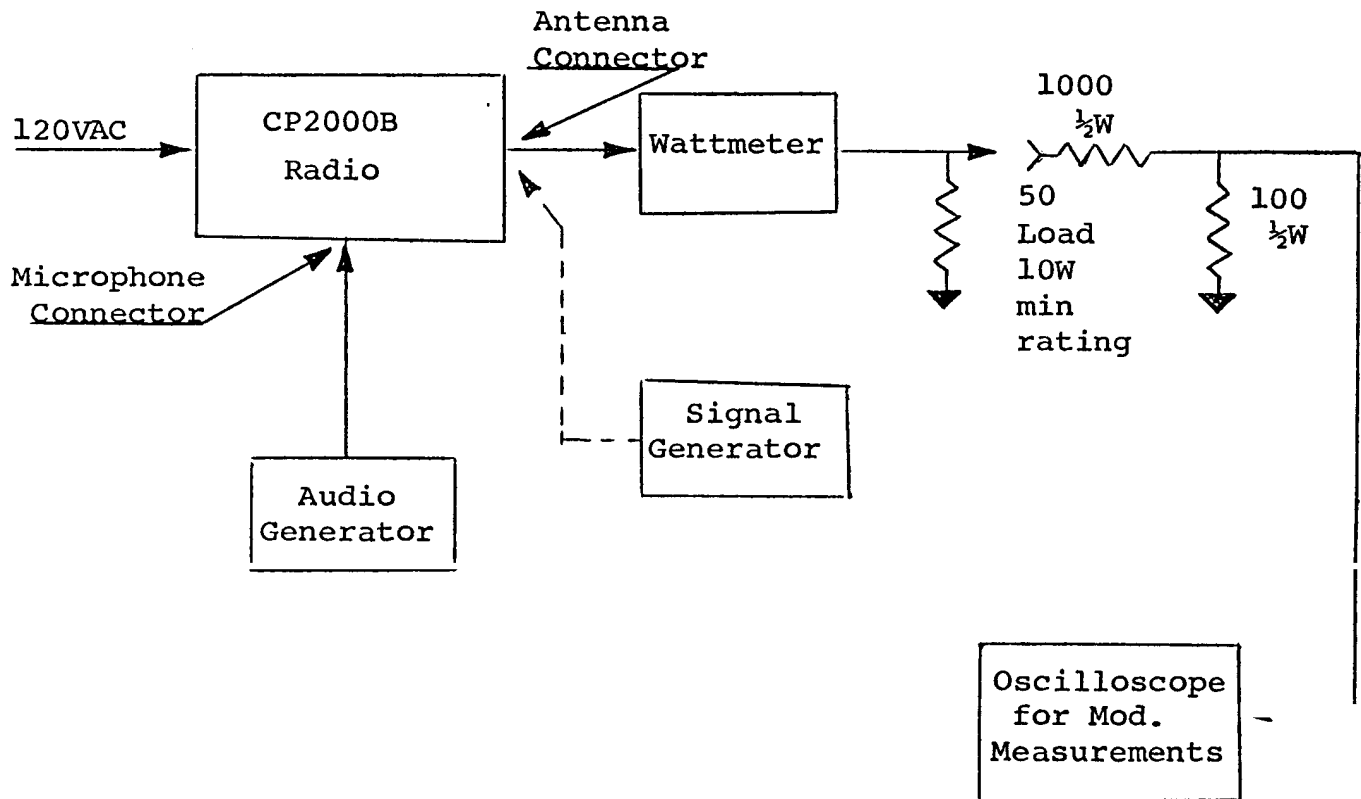
Pin 2: Audio ground (shield)

Pin 3: PTT Hot

Pin 4: PTT Return

(3 and 4 are shorted together for transmit)

6. Block Diagram of Test Setup.



B. Power Supply Adjustment (Assy. 7H046)

1. Connect radio to a suitable 120 VAC source. Be sure that the D.C. power cable is not plugged in also.
2. Apply power to the unit with front panel OFF-ON switch. The lights behind the meters should be lit.
3. Connect a voltmeter between C-811 (+) end and the chassis. Adjust R835 for a reading of 13.6 volts ($\pm .1$).
4. Connect a voltmeter between C809 (+) end and the chassis. Adjust R808 **for a reading of 10.0 volts** ($\pm .1$).
5. Connect a voltmeter between C806 (+) end and the chassis. A reading of 5 volts ($\pm .3$) should be noted. No adjustment is possible in this circuit.
6. Ripple on the three supplies should be less than 10mv p-p. Measure across C811, C809, and C806 for corresponding +13.6, +10, and +5 volt supplies.
7. To check DC operation, remove the AC power source and connect the radio to a 5 amp or greater source of 13.6 volts ($\pm .5v$) with the DC cable provided. Measure the voltage in steps 4 and 5 above. They should be the same as noted on AC. Step 3 voltage will be equal to input supply voltage.

C. Interface Board (7H043) Adjustment

1. This board contains control, metering, and audio processing circuitry.
2. Connect an audio oscillator ' to the microphone input connector at 20mv p-p 1KHz. Measure the voltage at TP-1 which should be .42v p-p.
3. Turn MIC GAIN control full clockwise and measure 3.2v p-p at TP-2.
4. Move scope to TP-3 and observe 1.0v p-p of compressed audio.
5. With the scope at TP 4 the level should be 0.5v p-p with the front panel switch set to the COMP IN position and .57v p-p in the OUT position.
6. Connect pins 3 and 4 of the microphone connector together. This places the radio in the transmit mode. The front panel LED should be lit.

7. With the radio in transmit, check the voltage at the collector of Q509 which should be 9.9 volts (Pin 8 on 7H016 comb).

8. After completion of the above procedures go to Section D. SMO Bd (7H042) alignment procedures. The remaining steps in this section are completed after alignment of 7H016.

9. Using an external wattmeter of known accuracy set the front panel meter to read the same power (4 watts typical) with no modulation on AM, Ch 20 using TX MTR CAL pot R557 located on the Interface Board (7H043). There is a small hole through the circuit board to allow adjustment from the back side.

10. Check for proper operation of the VSWR meter circuitry. Place front panel switch to VSWR CAL, turn control for full scale deflection on front panel meter (CAL). Switch to VSWR READ; should be 1.5 or less for most good loads.

D. SMO Bd Alignment (7H042)

1. Set R699 at $\frac{1}{2}$ rotation. (CAR ADJ)

2. CHECK for -8VDC across C643.

3. Set xtal oscillators on frequency. Be sure to use a high impedance probe with frequency counter.

a. XL 1 = 12.802850 MHz at TP-6 (USB xmt) with C640.

b. XL 2 = 12.800 MHz at TP-6 (LSB xmt) with C648.

c. XL 3 = 10.197150 MHz at TP-7 (USB) with C667.

d. XL 4 = 10.200 MHz at TP-7 (LSB) with C652.

4. Check for no signal on AM-RCV at TP-7 with an oscilloscope.

5. On channel 1, adjust L603 for 2.4 VDC at TP-3.

E. RX-TX Bd Alignment (7H016) (Transmitter)

1. Connect a wattmeter and 50 Ohm dummy load to the radio's antenna connector. See step 6 of General tuning procedure section.

2. On channel 20, peak L206 and L207 for maximum 16.8 MHz voltage at TP 4. At least 8v p-p should be present.

3. With a 20mv p-p 1 KHz audio input at the radio mic connector (MIC GAIN full CW and COMP IN) on LSB transmit, set R274 RFL for 0.5v p-p audio at TP 1. Vary the audio input level 20db above and below the 20mv level to verify proper ALC operation. At a point below the 20mv level, the audio at TP 1 will start to drop, and above that the audio should limit at 0.6v p-p.

4. Remove one end of the cable which goes between the RX-TX and SMO board that is labeled SMO. Set 90%, 1 KHz AM at TP 2 on RT board with R699 (CAR ADJ) on SMO board. Be sure audio is in ALC limiting when R699 is adjusted. Always use an oscilloscope to adjust the modulation, not a meter. Re-connect the SMO cable.
5. Peak L204, L202, L203, L205, and L201 in that order for maximum power output on CH 20. Adjust R205 to maintain 4 watt carrier output. Check output power balance on Ch 1, 20, and 40. If this power varies more than 0.5 watt from Ch 1 to 40 complete the following. Slightly adjust L204 for maximum power on Ch 1 and L205 on Ch 40. Check power balance. Re-check 4 watt level and adjust R205 if required.
6. Turn to LSB mode and check power level with limiting 1 KHz modulation. It should be at least 10W
7. Set front panel meter to read 4w with no modulation on AM, Ch 20 using TX MTR CAL pot R557 located on the Interface Board (7H043). There is a small hole through the circuit board to allow adjustment from the back side.
8. Remove audio generator, and using a microphone check the whistle and speech modulation waveforms on AM, LSB, and USB. Be sure AM carrier level is 4w and adjust R699 (CAR ADJ) for 90% whistle modulation on AM, if necessary. Check whistle up power on LSB and USB (10w min). Also check proper meter operation on all modes. The meter should always go upward with modulation.
9. Return to Section C. Interface Board (7H043) Adjustment.

(RECEIVER)

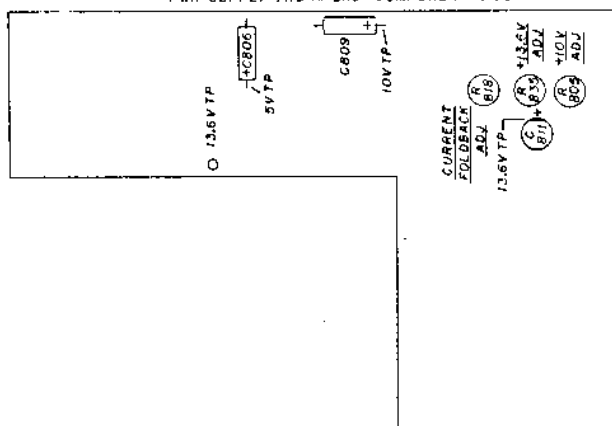
10. Connect a signal generator to the radio antenna connector. Be sure to remove microphone or transmit keying circuits to avoid possible damage to generator.
11. On channel 20, tune L208, L209, L214, L211, L212, and L213 on LSB for peak S-meter reading. Adjust generator frequency to keep audio output at 1KC. Use R286 (SM) to keep the S-meter at S-9 and R306 (IF AGC) to keep the 1KC audio on TP 8 at 3.0v p-p. Be sure audio is unsquenced. Keep reducing the rf generator input level as the receiver is tuned, to just barely keep the level in full AGC. Full AGC is usually at signal levels above 10 UV. For -60dbm signal level, set 3.0v p-p at TP 8 with R306 (IF AGC). Rotate clarifier control and verify its operation by noting a change in receive audio frequency.

12. Check USB receive and clarifier operation for proper sensitivity and operation. Do not retune the receiver on USB.
13. In the AM rcv mode, set 2.v p-p at TP 8 using R314 (AM). RF generator should be at 1KC, 50% modulation AM with a -60dbm (220 UV) signal level.
14. Check squelch operation at TP 8. Rotation of the front panel squelch control should cause the audio at TP 8 to be cut off.
15. Apply a -50dbm (700uv) signal. Rotate (R292) RF AGC from CCW position to CW while observing front panel "S" meter. A 1/16" or more deflection of the pointer indicates proper operation of the RF attenuator circuits. Set RF AGC (R292) at TP 5 for 1.5 vdc with -50 dbm on LSB receive with 1 KHz audio out.
16. Check R/T switching at TP 5. It should be +8 VDC on xmt and 0 VDC on receive (with no rcv signal).
17. Set S-meter to S-9 with a 50 uv (-73dbm) signal generator level on LSB receive, with 1 KC audio out using R286 (SM).

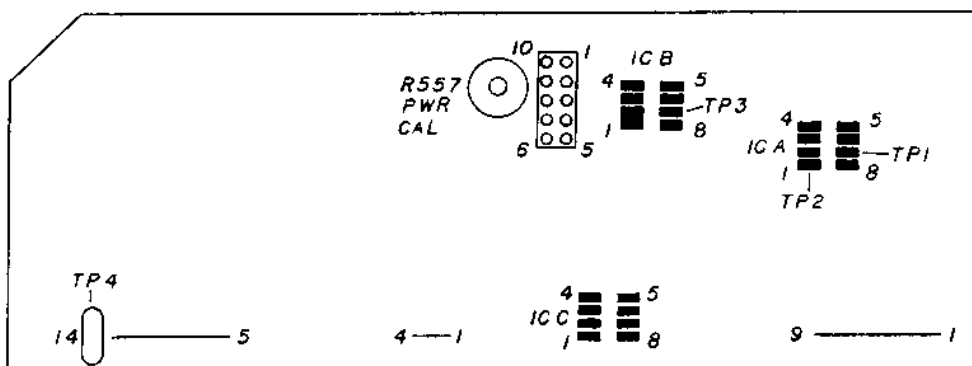
F. Noise Blanker Bd Alignment (7HO44)

1. Connect a rf signal generator to the radio antenna connector. Set to 23.5 MHz at a level of -50dbm (700uv) with no modulation.
2. Tune L401 and L402 for at least 1 VDC downward deflection at TP 1.
3. Place the radio in LSB receive and modulate the generator (23.5 MHz) at 1 KHz 50% AM. If the blanker is operating properly a 1 KHz tone will be heard on the receiver.

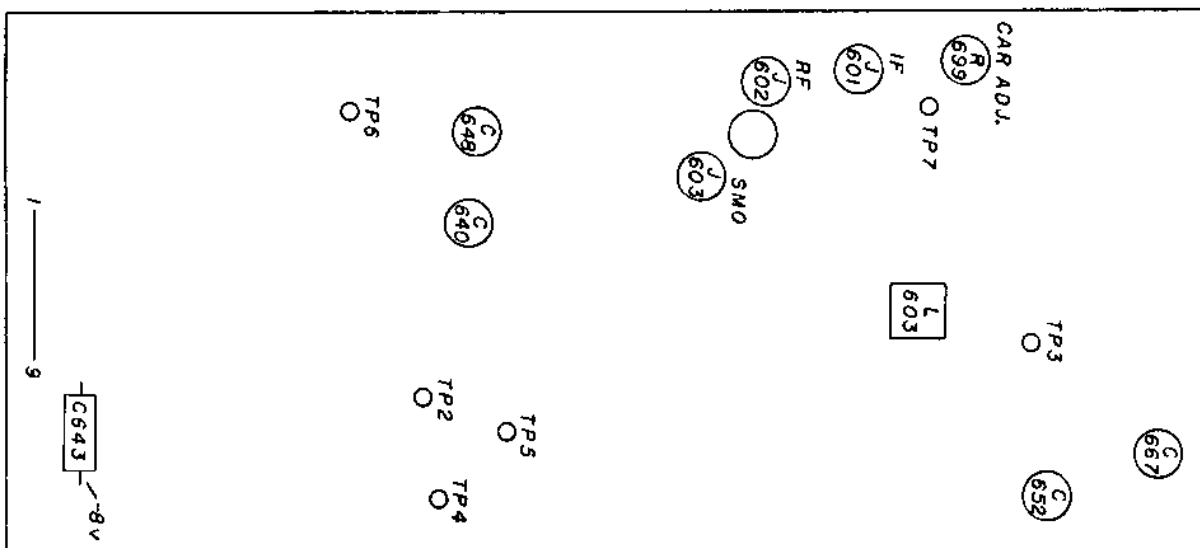
PWR SUPPLY 7H046 BRD-COMPONENT SIDE

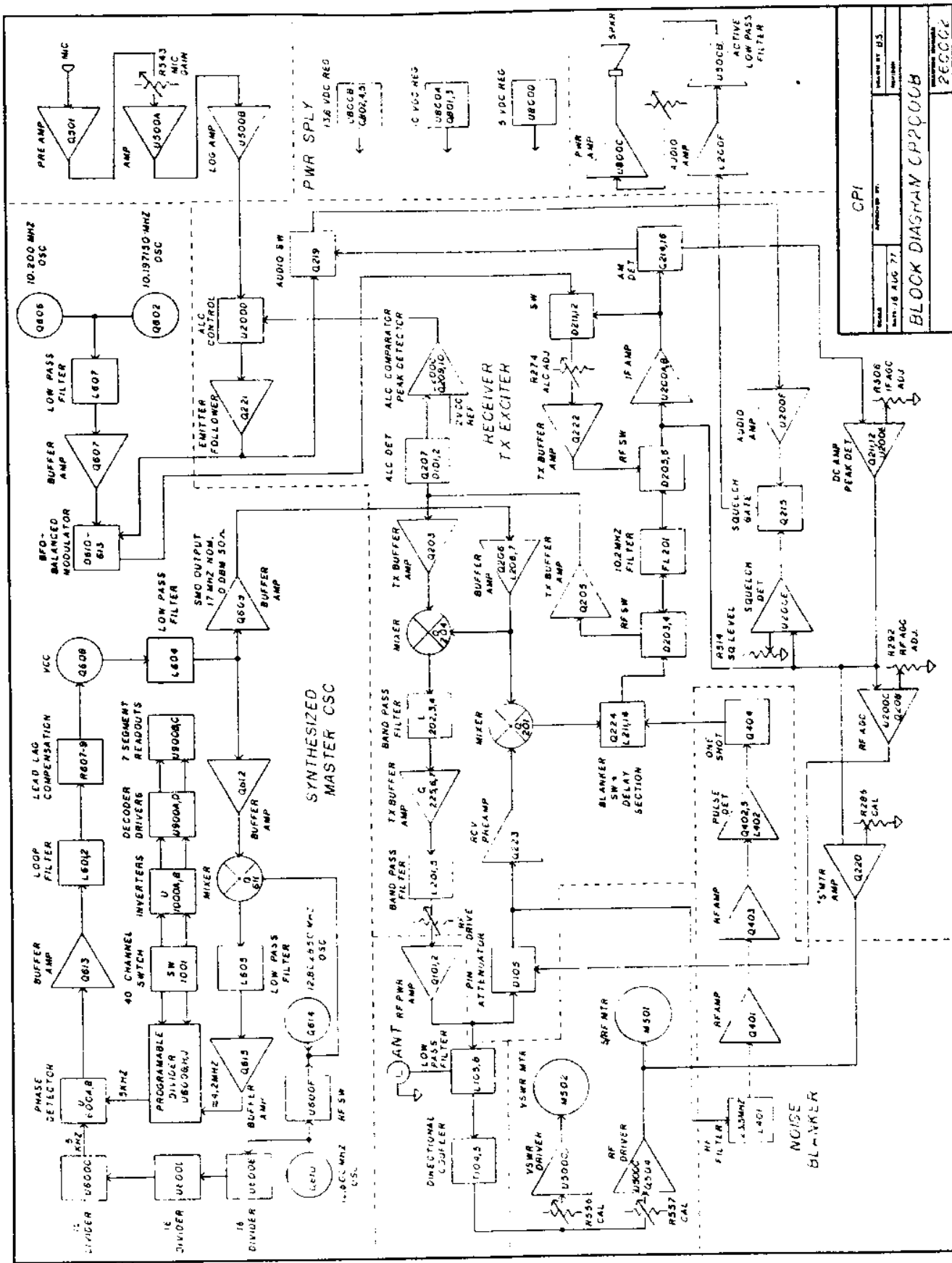


INTERFACE 7H043 BRD REAR VIEW

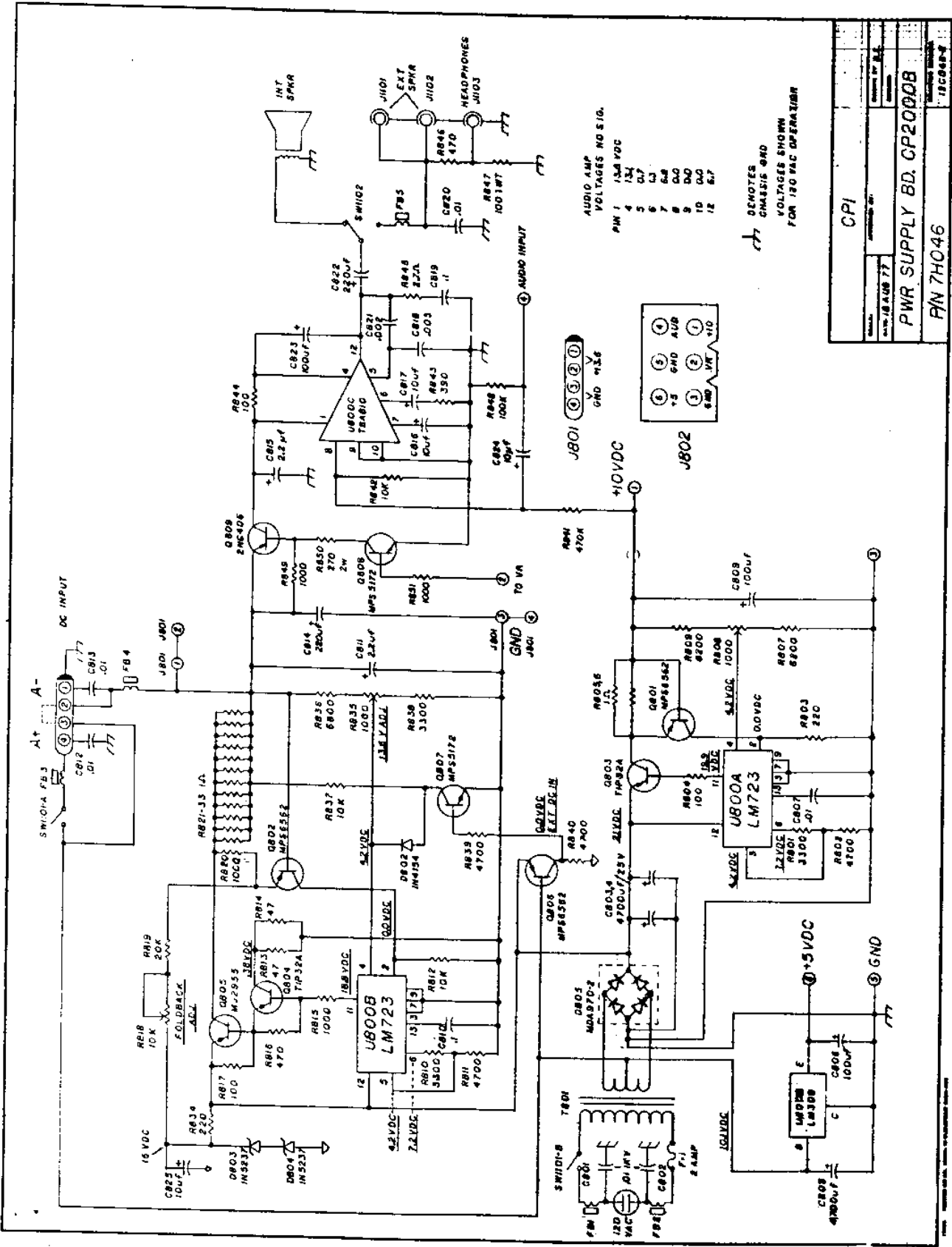


SMO 7H042 BRD-COMPONENT SIDE





CPI	
DATE	ISSUED BY: DS
REV: 18 AUG 71	
BLOCK DIAGRAM CP200B	
265002	



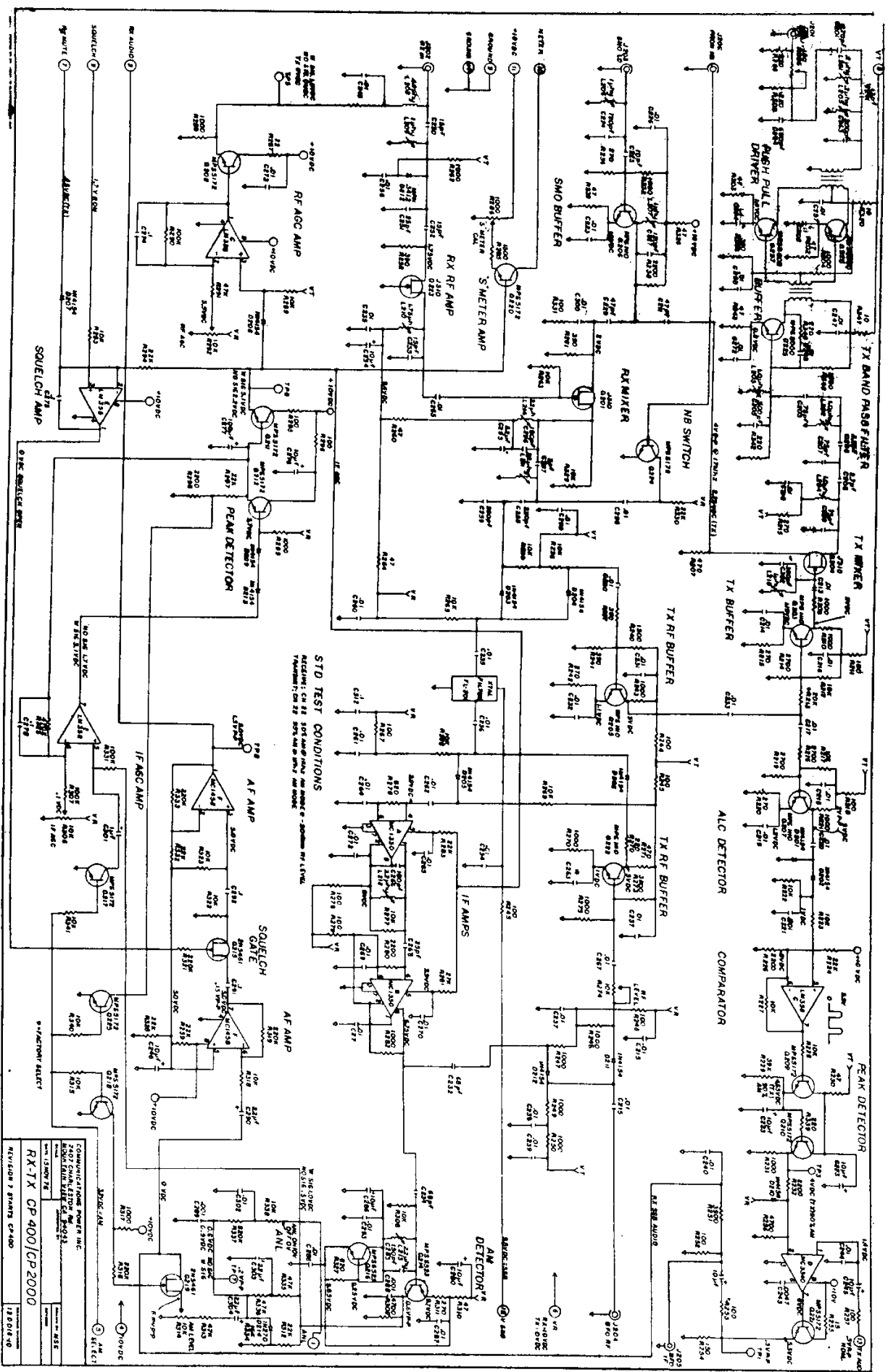
AUDIO AMP VOLTAGES NO S 10.
 PIN 1 1.34 VDC
 5 0.7
 6 0.7
 7 0.6
 8 0.6
 9 0.6
 10 0.6
 12 0.7

⚡ DENOTES CHASSIS GND
 VOLTAGES SHOWN FOR 120 VAC OPERATION

REV. 1	12/81	CP1
REV. 2	12/81	CP1
REV. 3	12/81	CP1
REV. 4	12/81	CP1
REV. 5	12/81	CP1
REV. 6	12/81	CP1
REV. 7	12/81	CP1
REV. 8	12/81	CP1
REV. 9	12/81	CP1
REV. 10	12/81	CP1
REV. 11	12/81	CP1
REV. 12	12/81	CP1
REV. 13	12/81	CP1
REV. 14	12/81	CP1
REV. 15	12/81	CP1
REV. 16	12/81	CP1
REV. 17	12/81	CP1
REV. 18	12/81	CP1
REV. 19	12/81	CP1
REV. 20	12/81	CP1
REV. 21	12/81	CP1
REV. 22	12/81	CP1
REV. 23	12/81	CP1
REV. 24	12/81	CP1
REV. 25	12/81	CP1
REV. 26	12/81	CP1
REV. 27	12/81	CP1
REV. 28	12/81	CP1
REV. 29	12/81	CP1
REV. 30	12/81	CP1
REV. 31	12/81	CP1
REV. 32	12/81	CP1
REV. 33	12/81	CP1
REV. 34	12/81	CP1
REV. 35	12/81	CP1
REV. 36	12/81	CP1
REV. 37	12/81	CP1
REV. 38	12/81	CP1
REV. 39	12/81	CP1
REV. 40	12/81	CP1
REV. 41	12/81	CP1
REV. 42	12/81	CP1
REV. 43	12/81	CP1
REV. 44	12/81	CP1
REV. 45	12/81	CP1
REV. 46	12/81	CP1
REV. 47	12/81	CP1
REV. 48	12/81	CP1
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REV. 51	12/81	CP1
REV. 52	12/81	CP1
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REV. 56	12/81	CP1
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REV. 67	12/81	CP1
REV. 68	12/81	CP1
REV. 69	12/81	CP1
REV. 70	12/81	CP1
REV. 71	12/81	CP1
REV. 72	12/81	CP1
REV. 73	12/81	CP1
REV. 74	12/81	CP1
REV. 75	12/81	CP1
REV. 76	12/81	CP1
REV. 77	12/81	CP1
REV. 78	12/81	CP1
REV. 79	12/81	CP1
REV. 80	12/81	CP1
REV. 81	12/81	CP1
REV. 82	12/81	CP1
REV. 83	12/81	CP1
REV. 84	12/81	CP1
REV. 85	12/81	CP1
REV. 86	12/81	CP1
REV. 87	12/81	CP1
REV. 88	12/81	CP1
REV. 89	12/81	CP1
REV. 90	12/81	CP1
REV. 91	12/81	CP1
REV. 92	12/81	CP1
REV. 93	12/81	CP1
REV. 94	12/81	CP1
REV. 95	12/81	CP1
REV. 96	12/81	CP1
REV. 97	12/81	CP1
REV. 98	12/81	CP1
REV. 99	12/81	CP1
REV. 100	12/81	CP1

PWR SUPPLY BD. CP2000B

PN 7HO46



COMMUNICATIONS POWER INC.
400 COMMINGTON ROAD
MUNICIPALITY OF BRIDGEWATER
N.J. 08807
RX-TX CP 400/CP 2000
REVISION 7 SHEETS CP 400
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