CYBERNET

AM/FM/SSB "EXPORT" CB RADIOS

SERVICE MANUAL

INCLUDES:

PTBM125A4X/PTBM131A4X

Colt 1600DX, 2000 DX, HyGain 8795 (V), Lafayette 1800, Midland 7001 export, Pacific 160, Superstar 2000, Tristar 777

PCMA001S

Argus 5000, Cobra 148GTL-DX (fake), Colt 2400, CTE Alan/88S, Falcon 2000, Lafayette 2400FM, Mongoose 2000, Nato 2000, Palomar 2400, 5000, Starfire DX, Superstar 2200, Thunder 2000, Tristar 797, 848

PTBM133A4X

Ham International Concorde III, Jumbo III, Multimode III

PTBM121D4X

Cobra GTL150, Colt 320FM, 320DX, 1200DX, Excalibur, Ham International Concorde II, HyGain 2795, 2795DX, Intek 1200FM, Lafayette HB870AFS, Tristar 747

CBC INT **PHOENIX, ARIZONA 85046 USA**

SPECIFICATIONS

GENERAL:

Frequency Composition: PLL synthesizer
Frequency range: Band A: 26.065 to 26.505 MHz**
Band B: 26.515 to 26.955 MHz
Band C: 26.965 to 27.405 MHz (FCC band)
Band D: 27.415 to 27.855 MHz
Band E: 27.865 to 28.305 MHz
Band F: 28.315 to 28.755 MHz*

*In some models, Band E is called "FM" and contains the UK CB band of 27.60125 MHz to 27.99125 MHz, with no Band F. Certain model variations may have 10M Amateur frequencies rather than CB frequencies for Bands A-F.

Channels: 200 to 240 (see above)
Frequency Spacing: 10 KHz
Emission: AM/FM/USB/LSB/CW
Power Source: 13.8 VDC

RECEIVER:

Sensitivity: AM, 1 uV for 10dB S/N
FM, 1 uV for 20dB S/N
SSB/CW, 0.5 uV for 10dB S/N
Selectivity: 60 dB @ 10 KHz
Audio Output: 2 watts into 8 ohms
Fine Tune Range (RX only): ± 800 Hz
Coarse Tune Range (RX & TX): ± 5 KHz
Squelch Range: 0.5 uV to 300 uV
Intermediate Frequency: AM/FM, 10.695 MHz 1st IF, 455 KHz 2nd IF
SSB/CW, 10.695 MHz

TRANSMITTER:

RF Power Output @ 13.8 VDC:

	High	Medium	Low
SSB/CW:	12W	8W	2W
AM:	7.5W	4W	1W
FM:	10W	7W	2W

SSB Generation: Double-balanced modulator with crystal lattice filter.
Coarse Tune Range: ± 5 KHz
Carrier Suppression: More than 40 dB
Unwanted Sideband Suppression: More than 60 dB
Harmonic Suppression: More than 60 dB
AM Modulation: High level, Class B, Collector-modulated.
Frequency Stability: 0.005%

**For 200 Channel models using four bands of 50 channels:
Band A: 25.965 to 26.455 MHz
Band B: 26.465 to 26.955 MHz
Band C: 26.965 to 27.505 MHz
Band D: 27.515 to 28.005 MHz

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Main PCB Schematic..........Fold-Out

NOTICE

To prevent unauthorized duplication, portions of this booklet are printed in non-reproducible pale blue ink.

NOTICE TO SERVICE PERSONNEL

This book shows specific alignment procedures and circuit theory for many of the most common Cybernet SSB type transceiver chassis. All these chassis have virtually identical circuits and procedures, with the only real difference being the specific part number or designation of the adjustment. For example, in this book "RV3" is the SSB-ALC adjustment, but in the PTBM121D4X chassis (Cobra GTL150,etc) it is called "RV4". By comparison to any other Cybernet SSB chassis the correct procedures can be determined.(See complete list, Page 23.)

If you find the schematic difficult to follow it is recommended that you obtain any of the SAMS Fotofacts containing the American equivalent of this chassis, such as: Colt 480/1000, G.E. 3-5825A, J.C. Penney 981-6247, Lafayette Telsat SSB-140, Midland 79-892, etc. The only real differences are the fact that the American models do not have the Roger Beep, FM, or CW circuits; for these circuits you must consult the enclosed Schematic and Voltage Chart. Other differences are the use of lower "Q" transformers and VCO block to achieve the expanded frequency range, and occasionally, the use of 10 MHz PLL mixer crystals which are doubled to the 20 MHz range for mixing, rather than direct 20 MHz crystal use.

CIRCUIT DESCRIPTION

Refer to the block diagrams on P. 13 and the foldout schematic. The transceiver is a 200 or 240 channel radio using a phase-locked-loop (PLL) system of frequency synthesis to produce the required IF and Mixer signals.

PLL CIRCUIT

The basic PLL consists of a free-running voltage-controlled-oscillator (VCO, part of IC2), a phase detector/programmable divider (part of IC1) and a reference crystal oscillator (Q1). The VCO operates in the range of 17.105 MHz to 18.895 MHz for AM/FM/CW/USB, and 17.102 MHz to 18.892 MHz for LSB.(This is for the 6-band models; for 5-band models, subtract 440 KHz from top end of all VCO and mixer frequencies.) The VCO signal is mixed with one of several offset oscillator frequencies generated by Q2, the exact offset being dependent upon the setting of the Band Selector switch. These mixing signals are as follows:

5-band (200 channel) models: 19.655 MHz (A), 19.880 MHz (B), 20.105 MHz (C), 20.330 MHz (D), and 20.555 MHz (E).*

*Models with 4 bands of 50 channels are 19.605 MHz (A), 19.855 MHz (B), 20.105 MHz (C), 20.380 MHz (D). Models with UK-FM band where band E is called "FM" have 20.423 MHz. mixer crystal for UK band of 27.60125 MHz to 27.99125 MHz.

6-band (240 channel) models: 19.655 MHz (A & B), 20.105 MHz (C & D), 20.555 MHz (E & F).

The offset signals combine with the VCO signal to produce sum and difference frequencies. The sum is 36.760 MHz to 39.450 MHz AM/FMCW/USB, and 36.757 MHz to 39.447 MHz LSB. (Again, this is the 240-channel model.) The sum is fed to both the receiver first mixer Q19 and the transmit mixer IC3. The difference frequency is 2.55 MHz (Ch. 1) to 2.11 MHz (Ch. 40) and is fed to the programmable divider part of PLL IC1. In the case of the 6-band 240-channel models, only one offset crystal is used for each two consecutive bands. The binary bit "64" which is Pin 9 of IC1 is switched on every other band rather than being permanently tied HIGH as in all other Cybernet chassis. This saves the cost of 3 crystals. In these models, the downmix frequencies will be 2.55 MHz to 2.11 MHz on bands A, C, E only and will be 2.10 MHz to 1.66 MHz on bands B, D, and F. For the models having four bands of 50 channels, the downmix will be 2.55 MHz to 2.01 MHz on every band. (See Frequency Tables, pp. 15-20.)For UK-FM models, it is 2.55 MHz to 2.16 MHz.

Along with the downmix signal, the 10.240 MHz reference signal from Q1 is also fed to IC1 and divided down internally by 1,024 to produce the required 10 KHz channel spacings. Each position of the Channel Selector switch sets a binary code (N-Code) which divides down the 2.55 to 2.11 MHz downmix signal into 10 KHz increments. This binary code is set by the logic states present on Pins 7-15 of IC1, with 0.0 VDC being the LOW state and 5.0 VDC being the HIGH state. Thus, with a Channel 1 downmix signal of 2.55 MHz and a binary code of 255, the result is also 10 KHz. The two 10 KHz signals are compared internally in the phase detector ciruit of IC1 for similarity. The phase detector will produce a DC output voltage proportional to the difference between them, and of the proper polarity to change the VCO signal if necessary. The output of the phase detector has very large transcient voltage spikes, since it is switching digitally very rapidly. These spikes must first be filtered before application to the VCO. A Low Pass Filter consisting of C22, C23, C24, R19 and R20 removes the spikes. The filtered DC control voltage causes the VCO to shift up or down in frequency until the loop locks; i.e., until there is no phase difference output from the phase detector. The VCO is then locked very accurately on the proper frequency. When a new channel is selected, the VCO is once again unlocked because a new N-Code produces a new frequency at the phase detector which is no longer exactly 10 KHz. The VCO will shift as required until the loop locks again. Thus a whole group of stable frequencies will be generated as each new channel N-Code is programmed into the PLL IC1.

MAIN BOARD ASSEMBLY (PCMA001S/PTBM125A4X/PTBM131A4X)

Q10 is the Carrier Oscillator and operated at 10.695 MHz for AM/FM/USB/CW, and 10.692 MHz for LSB. Switch Q9 when activated simply shunts additional capacitance across the 10.692 MHz crystal X6 to lower the frequency for LSB. The Carrier Oscillator signal has two different paths: For AM/FM/CW, it is fed to IC3 along with the 37 MHz VCO signals to produce the 27 MHz on-channel TX signal. For SSB, it is fed to the balanced modulator IC4 along with the mike audio from IC6. The resultant output is a double-balanced, suppressed carrier signal. Crystal filter XF is restricted to about 3 KHz bandwidth to allow only one of the sidebands to pass through, depending upon the mode chosen. This output is then amplified through the RF chain to the antenna. The RF chain consists of predrivers Q5 & Q6 which are fed from Mixer IC3 through T3 & T4. The predrivers isolate the oscillator and mixer stages from the power amplifiers while providing some power gain at the same time. The output of Q6 is fed to the base of Driver Q7, which in turn feeds the base of Q8, the Final Amplifier. This amplifies the 27 MHz signal to the selected power level. Power levels are chosen by applying either 13.8 VDC to the Collectors of Q7 & Q8 (HIGH) or through voltage dropping resistors R301/R303 (MEDIUM), or by disconnecting DC power to Q8 (LOW) which allows only the Driver stage to amplify.

MODULATION CIRCUIT

AM: The microphone feeds voice audio through Q29 to the power audio IC6. The output of IC6 is fed to Q30, the modulator. This transistor basically acts as a variable resistance; varying the gain here amplitude-modulates the transmitter. The audio voltage is simultaneously applied to the Collectors of Q7 & Q8 to produce AM. This dual-Collector modulation is necessary for best linearity.

FM: The output of IC6 is fed to the anode of varactor D11 at the VCO input. The output corresponding to audio voltage swings produces the minor frequency variations to FM the transmitter.

USB/LSB: The output of IC6 is fed to the balanced modulator IC4, resulting in a double-sideband, suppressed carrier signal. This is then applied to the sharp crystal filter XF to remove the unwanted sideband.

ALC/AMC: A sample of the audio output from IC6 is fed to Q32, the modulation limiter. As this transistor is directly shunted across the mike input line, it grounds a small portion of the modulating audio as it turns on. The more output from IC6, the more it turns on and the more the audio is reduced to a proper level.

The radio also contains an RF/ALC circuit that operates only in the SSB mode to prevent "flat topping" distortion and splatter. A small sample of the RF output from Q8 is applied to D17, filtered, and used to control the gain of TX Mixer IC3 at Pin 7. The higher the RF output, the more DC bias voltage is developed to apply to IC3. Both the audio and RF ALC circuits serve an important function in preventing overmodulation, spectrum splatter, and harmonic and spurious emissions, and should be properly adjusted as described later.

ANTENNA TRANSMISSION LINE

A Low Pass "pi" type filter following Q8 serves the dual functions of attenuating high-frequency harmonics and providing a 50-ohm impedance match between the RF output stage and the antenna. The filter consists of L17, C62, L18, R49, and C63.

RECEIVER CIRCUIT

The incoming 27 MHz signal is fed through L18, L17 and T8 to Q18, an RF amp. D31 and D32 clip excessive input signals to protect Q18. The output of Q18 goes via T to first mixer Q19, where it mixes with the 37 MHz VCO output. The output of Q19 is 10.695 MHz for AM/FM/USB/CW, and 10.692 MHz for LSB. The bias on the base of Q18 is switchable via R304 and R305 to allow DX/MID/LOC RF gain selection.

AM/FM: The 10.695 MHz first IF passes to another mixer, Q23 via T11 and T12. The 10.240 MHz signal from Q1 also mixes here, resulting in a 455 KHz second IF. For AM the signal goes through T13, T14, the ceramic filter CF, IF amps Q24 and Q25 to diode detector D38. For FM, the signal at Q25 passes through T15 to the FM Detector, IC5. T16 is the quadrature coil for this circuit. The FM audio appears at IC5 Pin 12 and passes to the Volume Control and audio amplifiers and speaker.

USB/LSB: Only the first mixer and IF are used. The 10.695/10.692 MHz signal goes through a very sharp crystal filter XF to eliminate the unwanted sideband. It is amplified via Q11, Q14, and Q15, with a small sample picked off at T15 for AGC. Q16 is a Product Detector, mixing the IF with the 10.695/10.692 MHz Carrier Oscillator, resulting in an audio frequency which is detected by D27 for amplification For CW, detection is identical with the Carrier Oscillator acting as a BFO.

Detected audio from D38 (AM), IC5 (FM), or Q16 (SSB/CW) passes to the Volume control and is amplified by Q29 and IC6. It couples to J3, J4 or the speaker by C162

SQUELCH CIRCUIT

Q26, Q27, and Q28 are the squelch amp transistors. At a low or no-signal level, Q28 is turned on thereby shunting the audio to IC6 and cutting it off to quiet the receiver. As the incoming RF signal increases it gradually turns off Q28 to allow speaker audio to be heard. The use of three amplifier stages allows a very effective and sensitive squelch action. The level at which Q28 turns off is determined by the squelch control VR2 and by VR10, AM/FM only.

NOISE BLANKER

A sample of the incoming 27 MHz RF signal appearing at the output of Q18 is fed through C122 to Q20. The output of Q20 is rectified by D34 and D35 when a large impulse type spike appears. The resulting DC voltage turns on Q21 which in turn biases Q22 on. Q22 turned on causes the signal at the Collector of Q19 to be shunted to ground via C127 for the duration of the noise pulse, thus blanking out such noise from the audio chain and speaker.

COARSE TUNE

This circuit allows between-channel operation, shifting both receive and transmit frequencies up to ± 5 KHz from channel center frequency. Varactor diode D6 is the active element. Changing the DC bias on D6 via the COARSE clarifier control changes the capacitance across the bank of PLL mixer crystals, shifting their normal frequency up or down. Rotating the control clockwise reduces the DC voltage, decreasing the capacitance of D6 and raising the frequency. Rotating counter-clockwise has the opposite effect. The DC bias is from a constant source.

FINE TUNE

This circuit is only operative in the receive mode and changes the receive frequency, regardless of the transmitting frequency. The FINE TUNE control is powered from a RX-only DC source via R12/D7 to varactor D6. Since the control is only 10K vs. 50K for the COARSE TUNE, it has much less control over D6. During TX, the voltage is cut off via D8, leaving the circuit essentially disconnected from the (+) end of D6, with a fixed bias remaining via R13, R14, and R16. This fixed bias is purposely made very small in relation to the COARSE TUNE control voltage so that the TX frequency will not change by moving the FINE TUNE control.

CW KEYER & SIDETONE OSCILLATOR (PCCW001S/PTZZ080A0X)

This board consists of an audio oscillator (Q3), timing delay (Q1), and T/R switch (Q2). When a CW key is installed at J5 and pressed, Q1 turns on to supply DC operating voltage to the oscillator Q3, and simultaneously turns on switch Q2.D3 is grounded, allowing Q3 to function. With Q2 turned on, the relay pulls in, thereby performing two functions: 1), the speaker low side stays connected, allowing the sidetone to be heard, and 2), the radio remains in the TX mode for a short time because the TX keyline is grounded. A relay is required because of the current handling ability of its hard contacts. After the key is released, Q2 remains on for a short time so that the radio remains in the TX mode; otherwise the speaker would be constantly thumping as it switched rapidly back and forth between TX and RX modes. The short delay allows the sender to continue keying between each dot/dash character. The delay is determined by the values of the C1/R2 combination.

ROGER BEEP OSCILLATOR & UK-FM SELECTOR (PCZS0001, present some models only.)

This board is virtually identical in operation to the CW Keyer board except that the audio tone is not heard until after the mike keyline is released. The circuit consists of an audio oscillator (Q602), timing delay (Q601), and T/R switch (Q602). Pressing the mike button turns on Q601, supplying DC operating voltage to Q602. However at the same time, D603 is pulled to ground, preventing the oscillator from actually functioning and thus putting a constant audio tone on the air. With the mike button pressed, the collector of Q603 goes LOW. (HIGH on receive.) Q603 LOW keeps the radio in the TX mode for the extra time interval determined by C601/R601. When the mike button is released back to RX, the voltage at the collector of Q602 remains for a short time, providing an audible tone which is now heard on the air due to the simultaneous ungrounding of D603 and the delay of Q603 as it switches from TX back to RX mode.

Since the UK-FM CB band consists of 40 consecutive channels with no skips, different binary programming is required. IC601 and IC602 are special PROMs which when addressed produce the proper N-Codes. They are interconnected to the Band and Mode switches to sense the UK-FM selection, called "FM" on the Band Switch. N-Codes are 255 to 216 with no skips; the VCO runs at 17.873 MHz to 18.263 MHz.

Refer to Alignment Locations, Page 12

PLL CIRCUIT ALIGNMENT

1. Reference Oscillator: Connect suitable frequency counter to Pin 3 of IC1. Check for 10.240 MHz ± 50 Hz.

2. Carrier Oscillator: Connect frequency counter to TP4. Set Mode Selector to USB. Adjust CT-11 for 10.695 MHz ± 50 Hz. Reset to LSB; adjust CT-10 for 10.692 MHz ± 50 Hz.

3. Offset Oscillator:
   a. Connect frequency counter to TP1 (IC2, Pin 4). Set Mode to USB, clarifier controls to center detent.
   b. Set Band Selector to Band A. Adjust CT-1 for 19.655 MHz ± 50 Hz.
   c. Set Band Selector to Band B. Adjust CT-2 for 19.880 MHz ± 50 Hz.*
   d. Set Band Selector to Band C. Adjust CT-3 for 20.105 MHz ± 50 Hz.
   e. Set Band Selector to Band D. Adjust CT-4 for 20.330 MHz ± 50 Hz.*
   f. Set Band Selector to Band E. Adjust CT-12 for 20.555 MHz ± 50 Hz.

   *1. Band E may contain the UK-FM band, in which case crystal is 20.423 MHz.
   *2. Refer to Page 3 PLL Theory. Some models may contain only 3 crystals of 19.655 MHz (Bands A & B), 20.105 MHz (Bands C & D), and 20.555 MHz (Bands E & F), in which case you may skip Steps 3c and 3e, and CT-1 and CT-12 may not be present.

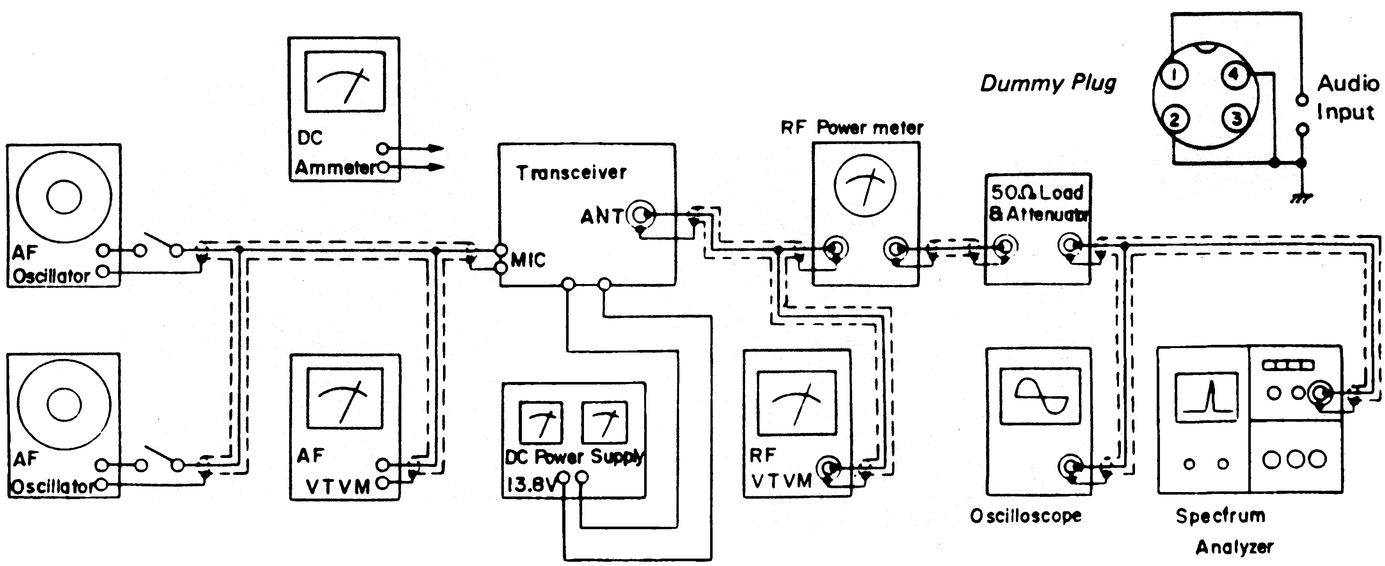
   g. Set Band Selector to Band C, Mode Selector to LSB. Adjust CT-5 for 20.1035 MHz ± 40 Hz. Check other bands; frequencies should all be 1.5 KHz lower than in Steps 3b-3f.

4. VCO Adjustment: See Band Charts, pp. 15-20. Set Band Selector to Band D, Channel Selector to Channel 40 (27.855 MHz.) Connect digital voltmeter to TP3 (bottom lead of R20); adjust VCO core for 1.15 VDC ± 0.1 VDC. Set Band Selector to Band A, Channel 1 (26.065 MHz); check DC voltage is at least 4.25 VDC. <u>CAUTION</u>: <u>VCO slug is extremely fragile</u>; <u>this part is hard to find</u>!

TRANSMITTER ALIGNMENT

Connect test equipment to the transceiver as shown. Prepare a dummy mike plug to enable simultaneous audio injection and TX key.

TRANSMITTER TEST SET-UP



1. RF DRIVER STAGES:
   a. Set Mode Selector to USB. Using the dummy mike plug, inject audio signal of 2400 Hz, 10 mV.
   b. Set Band Selector to Band A, Channel Selector to Channel 20.Adjust T1 & T3 for maximum RF output.
   c. Set Band Selector to highest band present in the particular model (D,E or F); adjust T2 and T4 for maximum RF output.
   d. Set Band Selector to Band B; adjust CT-6 and CT-8 for maximum RF output.
   e. Set Band Selector to Band D; adjust CT-7 and CT-9 for maximum RF output.
   f. Repeat Steps b-e until no further improvement is obtained.

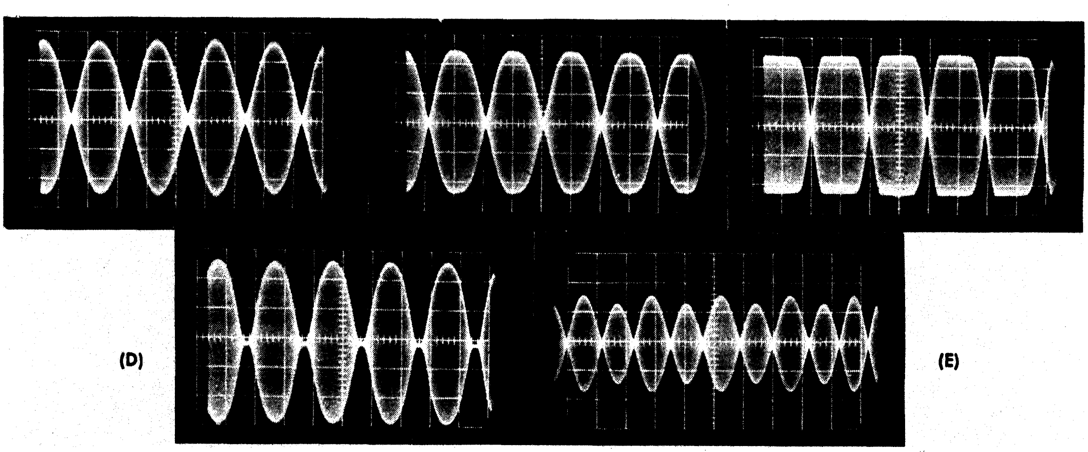
2. FINAL BIAS:
   a. Set mode to USB. Connect DC milliammeter between Q8 emitter and ground. Adjust RV2 for 35 ma $\pm$ 10 ma. Alternate method: Connect digital voltmeter between base of Q8 and ground; adjust RV2 for 0.70 VDC.

3. CARRIER BALANCE:
   a. Remove injected audio, leaving TX keyed. Adjust RV5 for minimum carrier leakthrough or RF output as viewed on oscilloscope.
   b. Recheck in LSB mode; should be the same.
   c. Reapply 2400 Hz audio, 10 mV to dummy mike plug. Measured RF output should now be at least 40 dB higher per manufacturer's specs.

4. RF POWER AMPLIFIER ADJUSTMENT: (Power Selector to HIGH position.)
   a. Set Mode Selector to USB. Set Band Selector to Band C, Channel Selector to Channel 20. Inject 2400 Hz, 10 mV audio to mike input. Adjust T5 and L16 for maximum RF output. (NOTE: Occasionally more power may also be obtained by spreading or squeezing the turns of L17 and L18. If this is done, readjust L16 as needed.)

5. SSB TWO-TONE TEST:
   a. Refer to the test pattern photographs below. Using two audio generators with adjustable outputs, inject two signals of 500 Hz and 2400 Hz together at initial level of 10 mV. Adjust each signal to obtain the correct signal pattern shown in "A". Now adjust RV6 (SSB MIC GAIN) to obtain 12W PEP RF output.
   b. Adjust RV3 (SSB ALC) to obtain maximum RF output without "flat topping" shown at "B" and "C" below.

(A) (B) (C)



(D) (E)

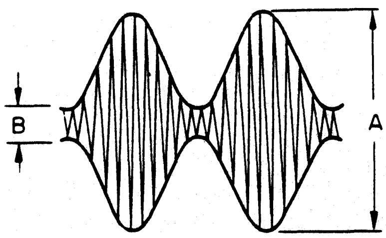
Sideband two-tone test patterns: (A) a correctly adjusted transmitter, (B) mild peak clipping and (C) severe peak clipping caused by excessive drive or underloading of the amplifier, (D) incorrect amplifier bias causing rounding of the crossover points, (E) pattern with modulation caused by carrier leak-through.

Photos courtesy ARRL "Single Sideband For The Radio Amatuer"

6. AM RF POWER ADJUSTMENT:
   a. Set Mode Selector to AM, Band Selector to Band C, Channel Selector to Channel 20. Adjust RV11 for 7.5 W RF carrier power output. (No audio.)*

      *Occasional chassis have shown very poor voltage regulation, making it impossible to attain 100% positive modulation at this carrier output level. If after performing the following step proper modulation cannot be achieved, re-adjust RV11 to a lower carrier level until proper modulation is observed.

7. AM MODULATION ADJUSTMENT:
   a. Inject audio signal of 2400 Hz, 7 mV at mike input. Adjust RV12 for 90% modulation depth. See sketch below for method of calculating modulation percentages.



$$\text{Modulation ratio} = \frac{A - B}{A + B} \times 100\ [\%]$$

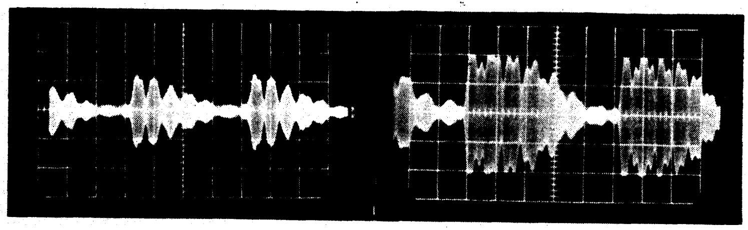
8. FM DEVIATION ADJUSTMENT:
   a. Set Mode Selector to FM. Apply 2400 Hz, 10 mV audio signal at mike plug. Adjust RV1 to obtain deviation of 2.5 KHz as measured on Deviation Meter or Linear Detector. IMPORTANT: Do not exceed this amount as the receiver bandwidth in the FM mode is also limited to 5 KHz total deviation; excess deviation will not be received clearly on other radios!

9. RF POWER METER ADJUSTMENT:
   a. Set Mode Selector to AM. Adjust RV4 for reading equal to that indicated on external RF power or wattmeter.

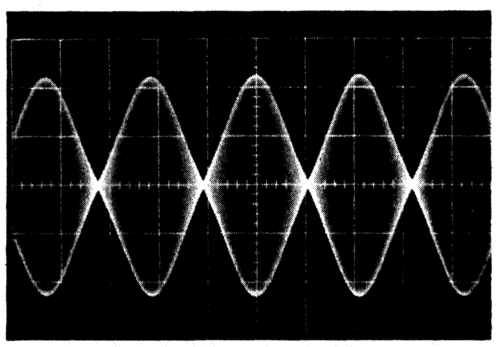
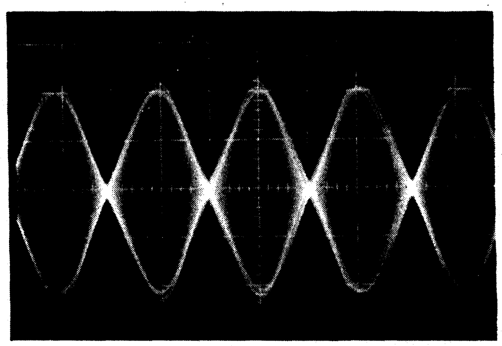
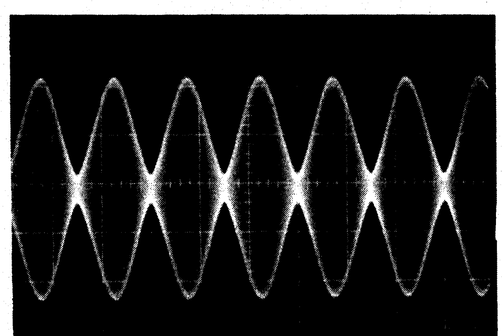
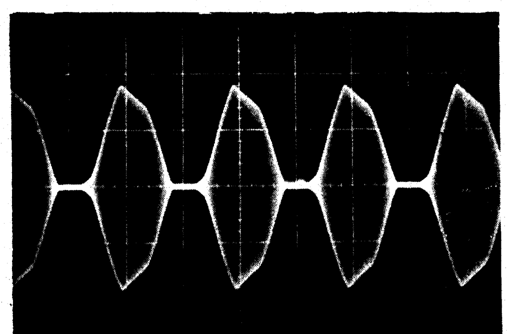
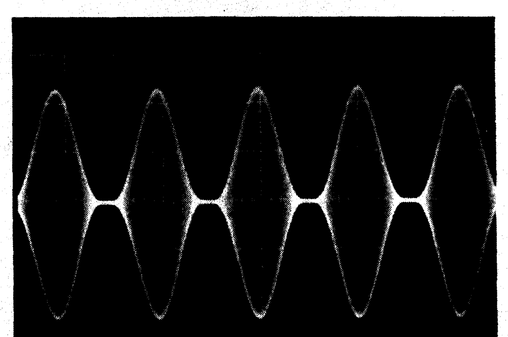
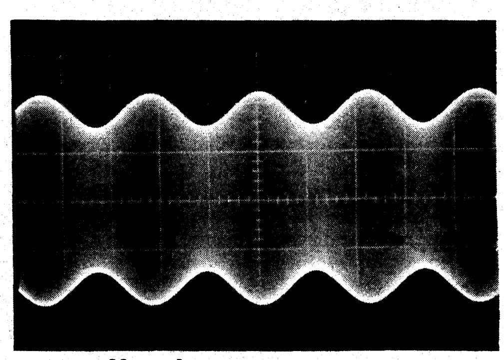
Verify that all transmit frequencies for each band are correct ± 800 Hz, as indicated in the Frequency Tables shown later in this booklet.

The following page shows more 'scope patterns for proper TX adjustments.

A. Speech pattern of correctly adjusted SSB transmitter.
B. Same transmitter with excessive drive, causing peak clipping in the final amplifier. Turn down the ALC control!!

(A)

(B)

A. Properly adjusted transmitter with two-tone audio input.
B. Hum on the signal. Check for proper test equipment connections.
C. Unequal audio tones. Level of each tone generator should be set so that patterns cross at the "0" center line, forming a clear "X" as in "A".
D. Excessive drive, causing flat topping and distortion. Adjust ALC and mike gain controls.
E. Final RF amplifier incorrectly biased, causing lengthening of the cross-over points. Adjust RV2 as required to correct.
F. Single tone showing modulation pattern caused by incomplete carrier suppression. Readjust RV-5 as required to correct.

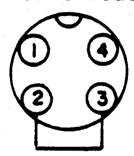
(A)

(B)

(C)

(D)

(E)

(F)


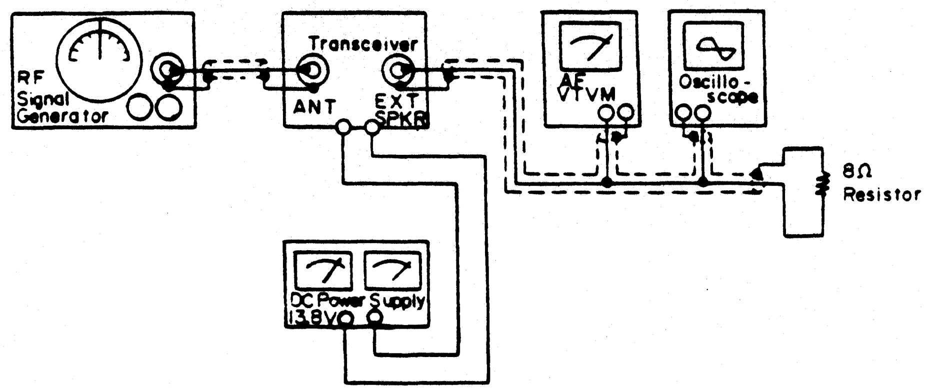
Photos courtesy ARRL Radio Amateur's Handbook

RECEIVER ALIGNMENT

Connect test equipment as shown below. Jumper pins 2 & 3 of the mike socket to allow speaker to be heard. Preliminary conditions: ANL Off, NB Off, clarifier center detent, RF Gain maximum, Squelch minimum, no input signal.

RECEIVER TEST SET-UP





1. SSB AGC ADJUSTMENT:
   a. Set Mode Selector to USB. Connect digital voltmeter between board terminal 28 (Q18/Q19) and ground. Set DX/MID/LOC switch to DX position. Adjust RV7 for 2.0 VDC. Check reading in AM mode; should be 1.8-2.3 VDC.

2. AM RF/IF ADJUSTMENT:
   a. Set Mode to AM, Band Selector to Band C, Channel Selector to Channel 20. Inject signal of 27.205 MHz, 1 KHz 30% modulation at antenna jack. Adjust T8, T9, T10, T11, T12, T13, T14 for maximum output at speaker as measured on AF-VTVM or 'scope. IMPORTANT: Use lowest RF input level that will prevent AGC action. Turn level down as output of radio increases.
   b. Rotate T8 and T9 approx. ¼ to ½ turn clockwise.

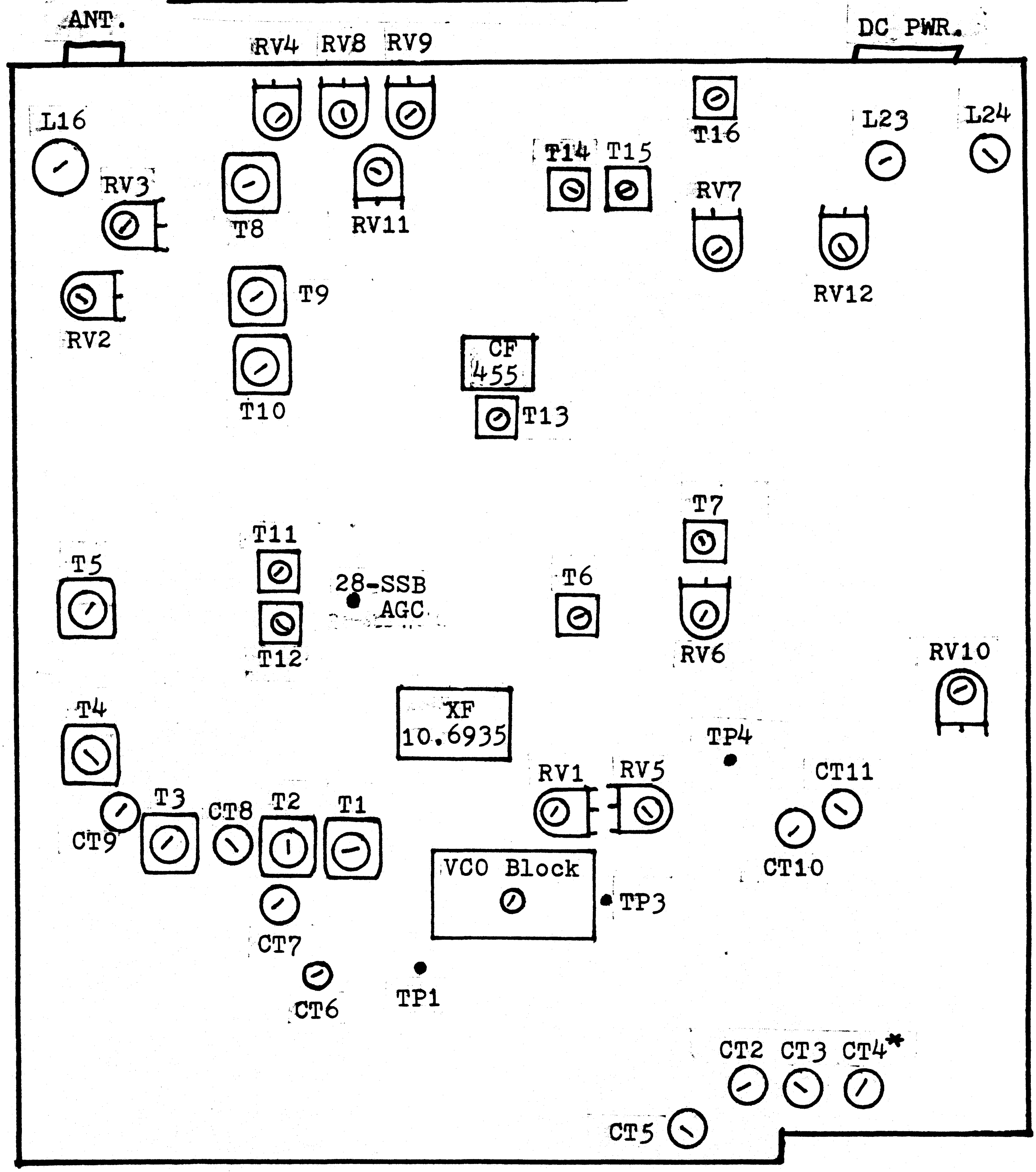
3. SSB IF ADJUSTMENT:
   a. Set Mode Selector to USB and clarifier to center position. Adjust T6 and T7 for maximum audio output, as in Step 2a.

4. FM DEMODULATOR ADJUSTMENT:
   a. Set Mode Selector to FM. Disconnect RF signal source. Adjust T15 and T16 for maximum noise output.*
      *T15 not present some versions.
   b. Apply modulated FM signal of 1 uV, 1 KHz, 1.5 KHz deviation. Readjust T15 and T16 for maximum audio output. NOTE: T16 will peak at three different points along its core travel; correct peak is the highest one.

5. SQUELCH ADJUSTMENT:
   a. Set Mode Selector to AM. Rotate Squelch control fully clockwise. Inject 300 uV RF signal, 1 KHz 30% modulation. Adjust RV10 so that squelch just breaks; i.e., audio is heard. Check that front panel squelch control will break squelch on signal inputs from 0.5 uV to 300 uV.
      NOTE: There is no specific adjustment for SSB squelch.

6. S-METER ADJUSTMENT:
   a. Set Mode to AM. Inject modulated RF signal of 100 uV, 1 KHz 30%. Adjust RV8 for meter reading of "S-9".
   b. Set Mode to USB. Remove modulation from RF signal. Adjust RV9 for meter reading of "S-9".

ALIGNMENT LOCATIONS

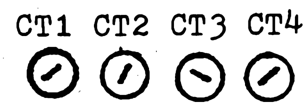


PCMA001S

PTBM125A4X

PTBM131A4X

*PCMA001S chassis. For PTBM125/131A4X chassis:

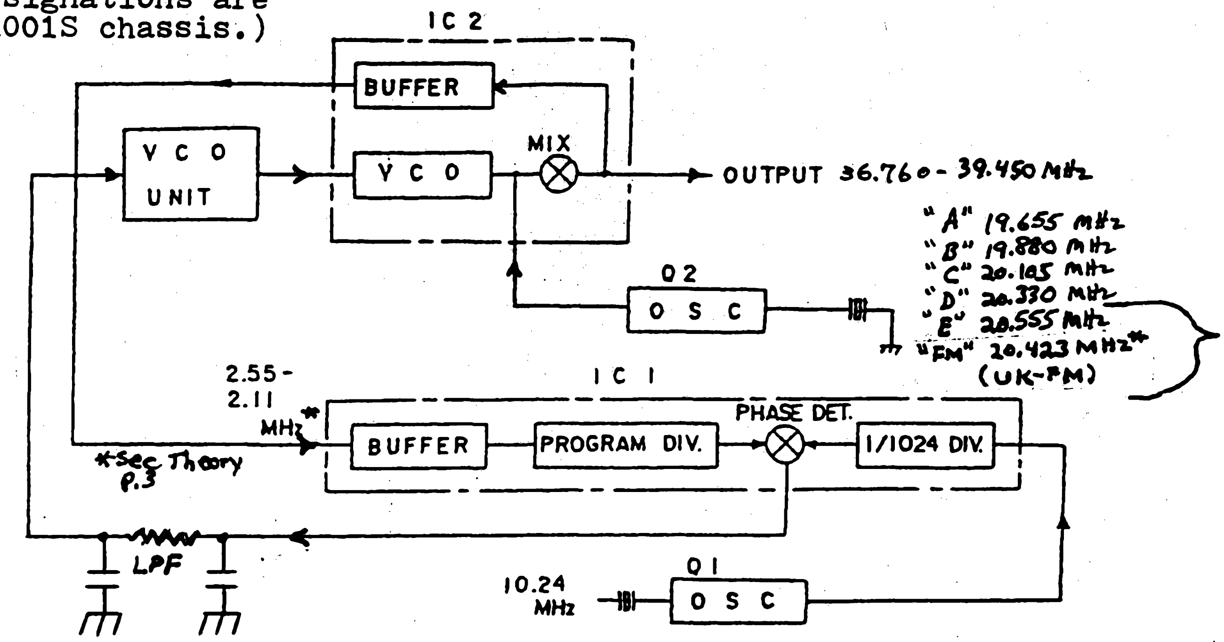


10-Meter Novice conversions: Substitute a crystal of 20.6525 MHz, 10 pF load capacitance in one of the crystal positions. This gives you a band from 28.060 MHz (Ch.1) to 28.500 MHz (Ch.40) with maximum Clarifier range. (For models using 10 MHz mixing crystals, use 10.3265 MHz.)

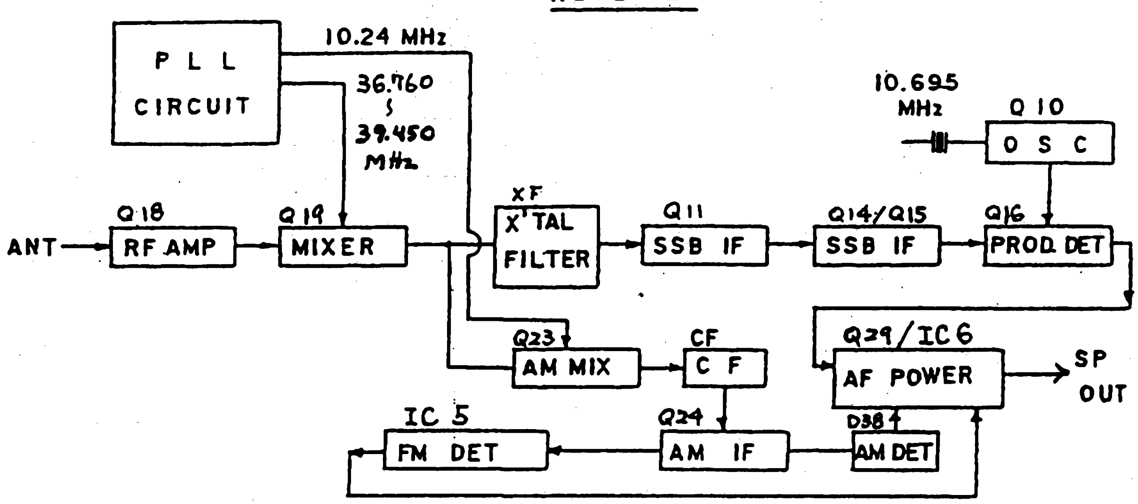
TRANSCEIVER BLOCK DIAGRAMS

(Parts designations are for PCMA001S chassis.)

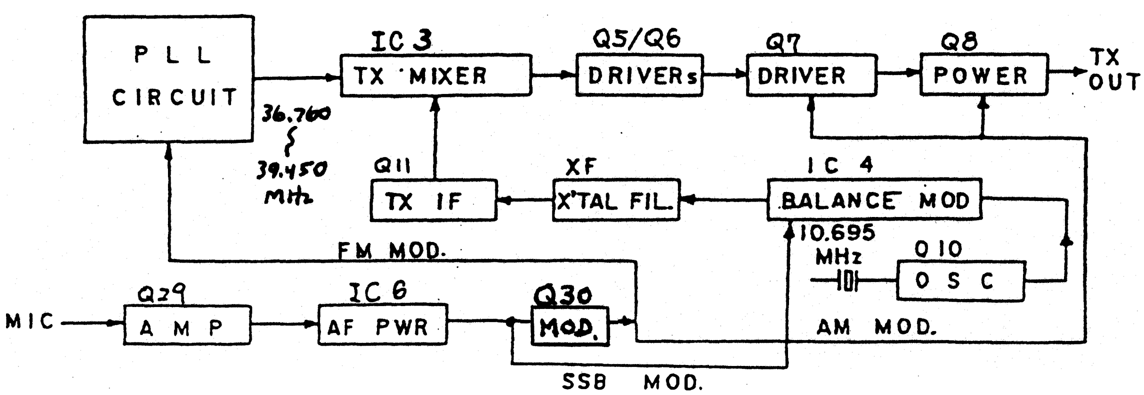
PLL CIRCUIT



RECEIVER



TRANSMITTER



TRUTH CHART

The chart shows the binary programming voltages for each channel position, which can be used to determine correct operation of the Channel Selector Switch. NOTE: In some models, Pin 9 may be switched so that it is only HIGH on bands B,D,F, Ch. 1-15 only and LOW the rest of the time. This makes it possible to use only three mixing crystals (19.655, 20.105, 20.555) instead of six to get the extra bands through binary control instead.(Cheaper!) In such cases, only bands A,C,E will have N-Code (and downmix frequencies) of 255 to 211. Bands B,D,F will have N-Codes of 210-166 instead.

Binary "1" = approx. 5.0 VDC
Binary "0" = 0.0 VDC

NOTE: For 4-band 50-channel models, continue the binary count down to N = 201 at Channel 50.

Program Pins (Pin 7, 256 = 0) on PLL02A		8	9	10	11	12	13	14	15
	N CODE	128	64	32	16	8	4	2	1
CH 1	255	1	1	1	1	1	1	1	1
CH 2	254	1	1	1	1	1	1	1	0
CH 3	253	1	1	1	1	1	1	0	1
CH 4	251	1	1	1	1	1	0	1	1
CH 5	250	1	1	1	1	1	0	1	0
CH 6	249	1	1	1	1	1	0	0	1
CH 7	248	1	1	1	1	1	0	0	0
CH 8	246	1	1	1	1	0	1	1	0
CH 9	245	1	1	1	1	0	1	0	1
CH 10	244	1	1	1	1	0	1	0	0
CH 11	243	1	1	1	1	0	0	1	1
CH 12	241	1	1	1	1	0	0	0	1
CH 13	240	1	1	1	1	0	0	0	0
CH 14	239	1	1	1	0	1	1	1	1
CH 15	238	1	1	1	0	1	1	1	0
CH 16	236	1	1	1	0	1	1	0	0
CH 17	235	1	1	1	0	1	0	1	1
CH 18	234	1	1	1	0	1	0	1	0
CH 19	233	1	1	1	0	1	0	0	1

Program Pins (Pin 7, 256 = 0) on PLL02A		8	9	10	11	12	13	14	15
	N CODE	128	64	32	16	8	4	2	1
CH 20	231	1	1	1	0	0	1	1	1
CH 21	230	1	1	1	0	0	1	1	0
CH 22	229	1	1	1	0	0	1	0	1
CH 23	226	1	1	1	0	0	0	1	0
CH 24	228	1	1	1	0	0	1	0	0
CH 25	227	1	1	1	0	0	0	1	1
CH 26	225	1	1	1	0	0	0	0	1
CH 27	224	1	1	1	0	0	0	0	0
CH 28	223	1	1	0	1	1	1	1	1
CH 29	222	1	1	0	1	1	1	1	0
CH 30	221	1	1	0	1	1	1	0	1
CH 31	220	1	1	0	1	1	1	0	0
CH 32	219	1	1	0	1	1	0	1	1
CH 33	218	1	1	0	1	1	0	1	0
CH 34	217	1	1	0	1	1	0	0	1
CH 35	216	1	1	0	1	1	0	0	0
CH 36	215	1	1	0	1	0	1	1	1
CH 37	214	1	1	0	1	0	1	1	0
CH 38	213	1	1	0	1	0	1	0	1
CH 39	212	1	1	0	1	0	1	0	0
CH 40	211	1	1	0	1	0	0	1	1

FREQUENCY CHART

BAND A.
Offset frequency = 19.655 MHz (19.605 MHz)*

Channel	Ch.freq. (MHz)	VCO output freq. AM/FM/USB	LSB	PLL input, Pin 2(MHz)
1	26.065	36.760	36.757	2.55
2	26.075	36.770	36.767	2.54
3	26.085	36.780	36.777	2.53
4	26.105	36.800	36.797	2.51
5	26.115	36.810	36.807	2.50
6	26.125	36.820	36.817	2.49
7	26.135	36.830	36.827	2.48
8	26.155	36.850	36.847	2.46
9	26.165	36.860	36.857	2.45
10	26.175	36.870	36.867	2.44
11	26.185	36.880	36.877	2.43
12	26.205	36.900	36.897	2.41
13	26.215	36.910	36.907	2.40
14	26.225	36.920	36.917	2.39
15	26.235	36.930	36.927	2.38
16	26.255	36.950	36.947	2.36
17	26.265	36.960	36.957	2.35
18	26.275	36.970	36.967	2.34
19	26.285	36.980	36.977	2.33
20	26.305	37.000	36.997	2.31
21	26.315	37.010	36.007	2.30
22	26.325	37.020	37.017	2.29
23	26.355	37.050	37.047	2.26
24	26.335	37.030	37.027	2.28
25	26.345	37.040	37.037	2.27
26	26.365	37.060	37.057	2.25
27	26.375	37.070	37.067	2.24
28	26.385	37.080	37.077	2.23
29	26.395	37.090	37.087	2.22
30	26.405	37.100	37.097	2.21
31	26.415	37.110	37.107	2.20
32	26.425	37.120	37.117	2.19
33	26.435	37.130	37.127	2.18
34	26.445	37.140	37.137	2.17
35	26.455	37.150	37.147	2.16
36	26.465	37.160	37.157	2.15
37	26.475	37.170	37.167	2.14
38	26.485	37.180	37.177	2.13
39	26.495	37.190	37.187	2.12
40	26.505	37.200	37.197	2.11

VCO/Mixer output - channel frequency = 10.695 MHz AM/FM/USB;
= 10.692 MHz LSB

*For 4-band 50-ch. models, continue downmix counting on next page down to 2.01 MHz, which would be Ch. 50. The 5 charts on Pages 15-19 can be combined this way to determine any frequency's VCO and downmix signal values.

FREQUENCY CHART

Band B.
Offset frequency = 19.880 MHz* (19.855 MHz; see note bottom of P.15)

*When this crystal is present, PLL input at Pin 2 is column "A"; when not present, use column "B". (Crystal would then be 19.655 MHz.)

Channel	Ch.freq. (MHz)	VCO output freq. AM/FM/USB	LSB	PLL input, Pin 2(MHz) "A"	"B"
1	26.515	37.210	37.207	2.55	2.10
2	26.525	37.220	37.217	2.54	2.09
3	26.535	37.230	37.227	2.53	2.08
4	26.555	37.250	37.247	2.51	2.06
5	26.565	37.260	37.257	2.50	2.05
6	26.575	37.270	37.267	2.49	2.04
7	26.585	37.280	37.277	2.48	2.03
8	26.605	37.300	37.297	2.46	2.01
9	26.615	37.310	37.307	2.45	2.00
10	26.625	37.320	37.317	2.44	1.99
11	26.635	37.330	37.327	2.43	1.98
12	26.655	37.350	37.347	2.41	1.96
13	26.665	37.360	37.357	2.40	1.95
14	26.675	37.370	37.367	2.39	1.94
15	26.685	37.380	37.377	2.38	1.93
16	26.705	37.400	37.397	2.36	1.91
17	26.715	37.410	37.407	2.35	1.90
18	26.725	37.420	37.417	2.34	1.89
19	26.735	37.430	37.427	2.33	1.88
20	26.755	37.450	37.447	2.31	1.86
21	26.765	37.460	37.457	2.30	1.85
22	26.775	37.470	37.467	2.29	1.84
23	26.805	37.500	37.497	2.26	1.81
24	26.785	37.480	37.477	2.28	1.83
25	26.795	37.490	37.487	2.27	1.82
26	26.815	37.510	37.507	2.25	1.80
27	26.825	37.520	37.517	2.24	1.79
28	26.835	37.530	37.527	2.23	1.78
29	26.845	37.540	37.537	2.22	1.77
30	26.855	37.550	37.547	2.21	1.76
31	26.865	37.560	37.557	2.20	1.75
32	26.875	37.570	37.567	2.19	1.74
33	26.885	37.580	37.577	2.18	1.73
34	26.895	37.590	37.587	2.17	1.72
35	26.905	37.600	37.597	2.16	1.71
36	26.915	37.610	37.607	2.15	1.70
37	26.925	37.620	37.617	2.14	1.69
38	26.935	37.630	37.627	2.13	1.68
39	26.945	37.640	37.637	2.12	1.67
40	26.955	37.650	37.647	2.11	1.66

VCO/Mixer output - channel frequency = 10.695 MHz AM/FM/USB;
= 10.692 MHz LSB

FREQUENCY CHART

Band C. (FCC band)
Offset frequency = 20.105 MHz.

Channel	Ch.freq. (MHz)	VCO output freq. AM/FM/USB	LSB	PLL input, Pin 2 (MHz)
1	26.965	37.660	37.657	2.55
2	26.975	37.670	37.667	2.54
3	26.985	37.680	37.677	2.53
4	27.005	37.700	37.697	2.51
5	27.015	37.710	37.707	2.50
6	27.025	37.720	37.717	2.49
7	27.035	37.730	37.727	2.48
8	27.055	37.750	37.747	2.46
9	27.065	37.760	37.757	2.45
10	27.075	37.770	37.767	2.44
11	27.085	37.780	37.777	2.43
12	27.105	37.800	37.797	2.41
13	27.115	37.810	37.807	2.40
14	27.125	37.820	37.817	2.39
15	27.135	37.830	37.827	2.38
16	27.155	37.850	37.847	2.36
17	27.165	37.860	37.857	2.35
18	27.175	37.870	37.867	2.34
19	27.185	37.880	37.877	2.33
20	27.205	37.900	37.897	2.31
21	27.215	37.910	37.907	2.30
22	27.225	37.920	37.917	2.29
23	27.255	37.950	37.947	2.26
24	27.235	37.930	37.927	2.28
25	27.245	37.940	37.937	2.27
26	27.265	37.960	37.957	2.25
27	27.275	37.970	37.967	2.24
28	27.285	37.980	37.977	2.23
29	27.295	37.990	37.987	2.22
30	27.305	38.000	37.997	2.21
31	27.315	38.010	38.007	2.20
32	27.325	38.020	38.017	2.19
33	27.335	38.030	38.027	2.18
34	27.345	38.040	38.037	2.17
35	27.355	38.050	38.047	2.16
36	27.365	38.060	38.057	2.15
37	27.375	38.070	38.067	2.14
38	27.385	38.080	38.077	2.13
39	27.395	38.090	38.087	2.12
40	27.405	38.100	38.097	2.11

VCO/Mixer output - channel frequency = 10.695 MHz AM/FM/USB;
= 10.692 MHz LSB

FREQUENCY CHART

Band D.
Offset frequency = 20.330 MHz* (20.380 MHz; see note bottom of P.15)
*When this crystal is present, PLL input at Pin 2 is column "A"; when not present, use column "B". (Crystal would then be 20.105 MHz.)

Channel	Ch.freq. (MHz)	VCO output freq. AM/FM/USB	LSB	PLL input, Pin 2 (MHz) "A"	"B"
1	27.415	38.110	38.107	2.55	2.10
2	27.425	38.120	38.117	2.54	2.09
3	27.435	38.130	38.127	2.53	2.08
4	27.455	38.150	38.147	2.51	2.06
5	27.465	38.160	38.157	2.50	2.05
6	27.475	38.170	38.167	2.49	2.04
7	27.485	38.180	38.177	2.48	2.03
8	27.505	38.200	38.197	2.46	2.01
9	27.515	38.210	38.207	2.45	2.00
10	27.525	38.220	38.217	2.44	1.99
11	27.535	38.230	38.227	2.43	1.98
12	27.555	38.250	38.247	2.41	1.96
13	27.565	38.260	38.257	2.40	1.95
14	27.575	38.270	38.267	2.39	1.94
15	27.585	38.280	38.277	2.38	1.93
16	27.605	38.300	38.297	2.36	1.91
17	27.615	38.310	38.307	2.35	1.90
18	27.625	38.320	38.317	2.34	1.89
19	27.635	38.330	38.327	2.33	1.88
20	27.655	38.350	38.347	2.31	1.86
21	27.665	38.360	38.357	2.30	1.85
22	27.675	38.370	38.367	2.29	1.84
23	27.705	38.400	38.397	2.26	1.81
24	27.685	38.380	38.377	2.28	1.83
25	27.695	38.390	38.387	2.27	1.82
26	27.715	38.410	38.407	2.25	1.80
27	27.725	38.420	38.417	2.24	1.79
28	27.735	38.430	38.427	2.23	1.78
29	27.745	38.440	38.437	2.22	1.77
30	27.755	38.450	38.447	2.21	1.76
31	27.765	38.460	38.457	2.20	1.75
32	27.775	38.470	38.467	2.19	1.74
33	27.785	38.480	38.477	2.18	1.73
34	27.795	38.490	38.487	2.17	1.72
35	27.805	38.500	38.497	2.16	1.71
36	27.815	38.510	38.507	2.15	1.70
37	27.825	38.520	38.517	2.14	1.69
38	27.835	38.530	38.527	2.13	1.68
39	27.845	38.540	38.537	2.12	1.67
40	27.855	38.550	38.547	2.11	1.66

VCO/Mixer output - channel frequency = 10.695 MHz AM/FM/USB;
= 10.692 MHz LSB

FREQUENCY CHART

Band E.
Offset frequency = 20.555 MHz.

Channel	Ch.freq. (MHz)	VCO output freq. AM/FM/USB	LSB	PLL input, Pin 2 (MHz)
1	27.865	38.560	38.557	2.55
2	27.875	38.570	38.567	2.54
3	27.885	38.580	38.577	2.53
4	27.905	38.600	38.597	2.51
5	27.915	38.610	38.607	2.50
6	27.925	38.620	38.617	2.49
7	27.935	38.630	38.627	2.48
8	27.955	38.650	38.647	2.46
9	27.965	38.660	38.657	2.45
10	27.975	38.670	38.667	2.44
11	27.985	38.680	38.677	2.43
12	28.005	38.700	38.697	2.41
13	28.015	38.710	38.707	2.40
14	28.025	38.720	38.717	2.39
15	28.035	38.730	38.727	2.38
16	28.055	38.750	38.747	2.36
17	28.065	38.760	38.757	2.35
18	28.075	38.770	38.767	2.34
19	28.085	38.780	38.777	2.33
20	28.105	38.800	38.797	2.31
21	28.115	38.810	38.807	2.30
22	28.125	38.820	38.817	2.29
23	28.155	38.850	38.847	2.26
24	28.135	38.830	38.827	2.28
25	28.145	38.840	38.837	2.27
26	28.165	38.860	38.857	2.25
27	28.175	38.870	38.867	2.24
28	28.185	38.880	38.877	2.23
29	28.195	38.890	38.887	2.22
30	28.205	38.900	38.897	2.21
31	28.215	38.910	38.907	2.20
32	28.225	38.920	38.917	2.19
33	28.235	38.930	38.927	2.18
34	28.245	38.940	38.937	2.17
35	28.255	38.950	38.947	2.16
36	28.265	38.960	38.957	2.15
37	28.275	38.970	38.967	2.14
38	28.285	38.980	38.977	2.13
39	28.295	38.990	38.987	2.12
40	28.305	39.000	38.997	2.11

VCO/Mixer output - channel frequency = 10.695 MHz AM/FM/USB;
= 10.692 MHz LSB

FREQUENCY CHART

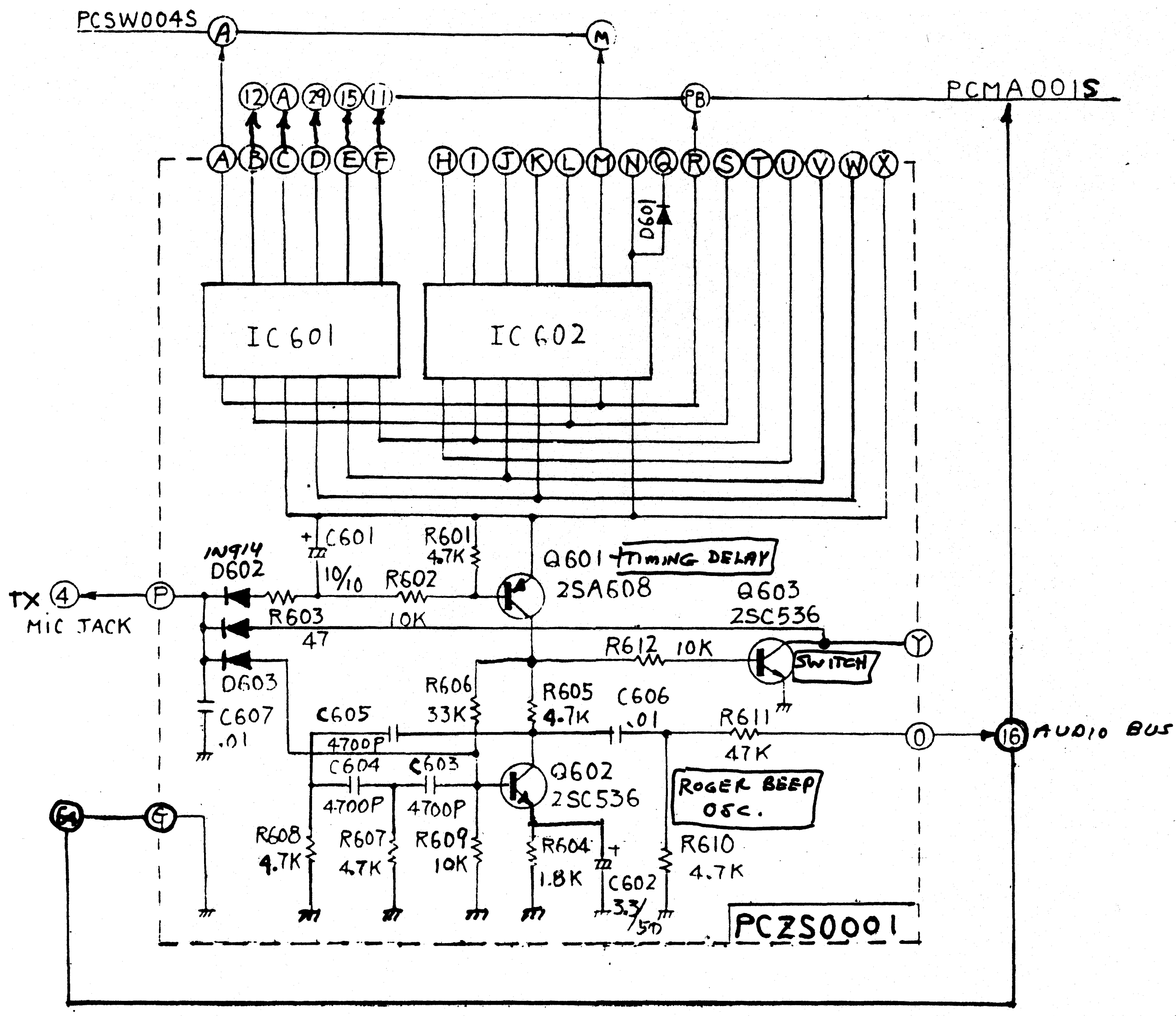
Band F.
Offset frequency = 20.555*

*When Band F is present, there is no sixth mixer crystal; the PLL IC switches the Pin 9 binary bit and uses the 20.555 MHz loop crystal.

Channel	Ch.freq. (MHz)	VCO output freq.		PLL input, Pin 2 (MHz)
		AM/FM/USB	LSB	
1	28.315	39.010	39.007	2.10
2	28.325	39.020	39.017	2.09
3	28.335	39.030	39.027	2.08
4	28.355	39.050	39.047	2.06
5	28.365	39.060	39.057	2.05
6	28.375	39.070	39.067	2.04
7	28.385	39.080	39.077	2.03
8	28.405	39.100	39.097	2.01
9	28.415	39.110	39.107	2.00
10	28.425	39.120	39.117	1.99
11	28.435	39.130	39.127	1.98
12	28.455	39.150	39.147	1.96
13	28.465	39.160	39.157	1.95
14	28.475	39.170	39.167	1.94
15	28.485	39.180	39.177	1.93
16	28.505	39.200	39.197	1.91
17	28.515	39.210	39.207	1.90
18	28.525	39.220	39.217	1.89
19	28.535	39.230	39.227	1.88
20	28.555	39.250	39.247	1.86
21	28.565	39.260	39.257	1.85
22	28.575	39.270	39.267	1.84
23	28.605	39.300	39.297	1.81
24	28.585	39.280	39.277	1.83
25	28.595	39.290	39.287	1.82
26	28.615	39.310	39.307	1.80
27	28.625	39.320	39.317	1.79
28	28.635	39.330	39.327	1.78
29	28.645	39.340	39.337	1.77
30	28.655	39.350	39.347	1.76
31	28.665	39.360	39.357	1.75
32	28.675	39.370	39.367	1.74
33	28.685	39.380	39.377	1.73
34	28.695	39.390	39.387	1.72
35	28.705	39.400	39.397	1.71
36	28.715	39.410	39.407	1.70
37	28.725	39.420	39.417	1.69
38	28.735	39.430	39.427	1.68
39	28.745	39.440	39.437	1.67
40	28.755	39.450	39.447	1.66

VCO/Mixer output - channel frequency = 10.695 MHz AM/FM/USB;
= 10.692 MHz LSB

ROGER BEEP/UK-FM PROM DIVIDER PCB



INTERCONNECTIONS TO MAIN TRANSCEIVER

PCZS0001 to PCMA001S:

B.....to...12
C.....to...A
D.....to...29
E.....to...15
F.....to...11
G.....to...GND (chassis common)
H.....to...TU (coarse clarifier)
O.....to...16
R.....to...11
S.....to...BR (RX-only voltage)
T.....to...5
V.....to...BT (TX-only voltage)
W.....to...9
X.....to...7

PCZS0001 to Front Panel:

I.....to...Mode Sw. Common Sect. 1
J.....to...Mode Sw. Common Sect. 5
K.....to...Mode Sw. Common Sect. 2
L.....to...Mode Sw. Common Sect. 6
N.....to...Mode Sw. Common Sect. 3&4
P.....to...Pin 4 on mike socket
Q.....to...Band Sw. Common
U.....to...Coarse Tune wiper arm

A.....to...PCSW004S, SW1a com. "A"
M.....to...PCSW004S, SW1a' com. "B"

VOLTAGE CHART

Supply voltage = 13.75 VDC. All measurements made in RECEIVE MODE, ANL OFF, NB OFF, BAND "C" CH. 1 except where noted. Measurements taken with digital voltmeter, (-) lead referenced to BLACK DC power lead input.

MAIN BOARD: PCMA001S/PTBM125A4X/PTBM131A4X

Q1
E 1.18
B 1.69
C 5.42

Q2
E 1.42
B 2.07
C 8.86

Q3
E 0.0
B 0.81 LSB
C 0.03 LSB

Q4
E 0.0
B 6.28 TX
C 0.55 TX

Q5
E 1.63 TX
B 2.11 TX
C 9.98 TX

Q6
E 1.04 TX
B 1.63 TX
C 12.64 TX

Q7
E 0.0 TX
B 0.77 AM/FM TX
0.70 SSB/CW TX
C 6.34 AM TX
12.30 FM TX
13.51 SSB/CW TX

Q8
E 0.0 TX
B 0.70 TX
C 6.65 AM TX
12.25 FM TX
13.46 SSB/CW TX

Q9
E 0.0
B 0.78 LSB/CW
C 0.0

Q10
E 3.10
B 3.56
C 10.07

Q11
E 1.40 SSB/CW
B 0.90 SSB/CW
C 8.45 SSB/CW

Q12
E 0.02 AM/FM
1.40 SSB/CW
B 0.02
C 10.07 AM/FM
8.45 SSB/CW

Q13
E 0.0
B 0.72 SSB/CW
C 0.02

Q14
E 0.0
B 0.70 SSB/CW
C 1.87 SSB/CW

Q15
E 1.17 SSB/CW
B 1.87 SSB/CW
C 8.48 SSB/CW

Q16
E 0.63 SSB/CW
B 1.16 SSB/CW
C 6.63 SSB/CW

Q17
S 2.30 SSB/CW
D 6.64 SSB/CW
G 2.16 SSB/CW

Q18
B 1.53 DX
E 2.24 DX
C 9.98 DX

Q19
E 1.47
B 2.19
C 9.80

Q20
E 0.0 NB
B 0.75 NB
C 4.65 NB

Q21
E 0.04 NB
B 9.52 NB
C 10.06 NB

Q22
E 0.0 NB
B 0.0 NB
C 0.0 NB

Q23
E 0.92
B 1.64
C 6.63

Q24
E 1.61 AM
1.45 FM
B 2.27 AM
2.11 FM
C 5.93 AM
5.45 FM

Q25
E 1.81 AM
1.60 FM
B 2.49 AM
2.27 FM
C 13.40

Q26
E 2.23 SQ
B 2.31 SQ
C 0.0 SQ

Q27
E 0.0 SQ
B 0.0 SQ
C 0.73 SQ

Q28
E 0.0 SQ
B 0.73 SQ
C 0.02 SQ

Q29
E 1.00
B 1.62
C 10.07

Q30
E 6.83 TX
8.68 RX
B 8.06 TX
9.06 RX
C 12.80 TX
13.67 RX

Q31
E 0.0
B 0.05
C 13.65

Q32
E 0.0
B -0.45 full AM TX mod.
C 0.05 AM TX

Q33
E 9.35 TX
B 10.12
C 9.97 TX

Q34
E 9.24 RX
0.0 TX
B 9.92 RX
0.07 TX
C 10.04

Q35
E 0.0
B 0.78 TX
C 9.92 RX
0.07 TX

Q36
E 10.83
B 10.05
C 13.65

IC1
1 5.42 6 5.42
2 1.98 7 0.0
3 2.50 8 5.42
4 5.06(NC) 9 to 15*
5 3.32 16 0.0
*0.0 or 5.42, depending on the setting of the Channel Switch.

IC2
1 2.64 6 8.43
2 1.99 7 2.00
3 1.34(NC) 8 8.56
4 2.52 9 5.41
5 0.08

IC3
1 2.90 TX 6 10.00 TX
2 NC 7 2.22 TX
3 NC 8 10.00 TX
4 2.78 TX 9 9.50 TX
5 0.0

IC4
1 3.07 TX SSB 5 6.13 TX SSB
2 3.40 TX SSB 6 9.10 TX SSB
3 3.39 TX SSB 7 5.61 TX SSB
4 0.0 TX SSB

IC5
1 2.00 FM 8 5.97 FM
2 2.00 FM 9 3.83 FM
3 0.0 FM 10 3.83 FM
4 0.0 FM 11 NC
5 8.50 FM 12 3.81 FM
6 0.0 FM 13 NC
7 6.67 FM 14 1.60 FM

IC6
1 6.97 6 0.13
2 0.0 7 0.0
3 12.80 8 13.54
4 NC 9 13.64
5 1.43

PTZZ080A0X/PCCW001S CW RELAY BOARD

Q1
E 10.10 TX CW
B 9.40 TX CW
C 10.07 TX CW

Q2
E 0.04 TX CW
B 0.91 TX CW
C 13.65 RX
0.34 TX CW

Q3
E 1.85 TX CW.
B 2.44 TX CW
C 6.24 TX CW

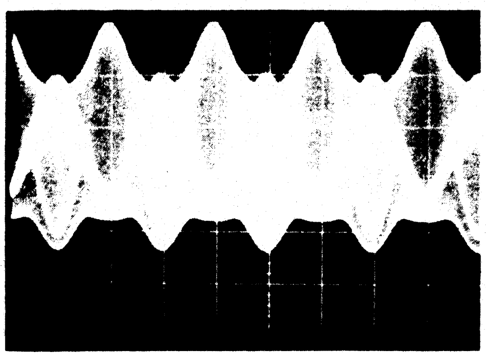
CORRECTIONS

There are several mistakes on the PCMA001S board, as follows:

1. On the solder side of the PCB, there are two "Q32" transistors; the one next to Q34 is actually Q35.
2. On the solder side, the Base and Emitter of Q33 are marked reversed: The "B" is actually E.
3. Same for Q18; marked "B" should be E.
4. For Q17 FET, the schematic shows D & S reversed, although they are marked correctly on the foil side of the PCB.
5. On PCMA001S schematic "C73" should be C56 (.047 uF). "RV-2" should be 300 ohm, not 300K.

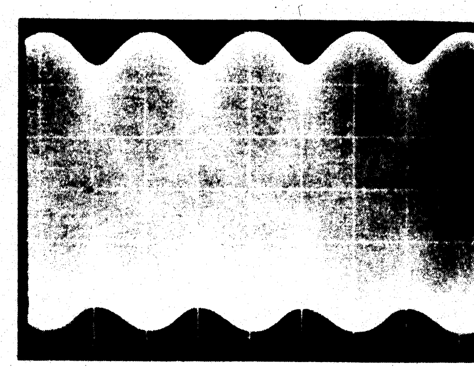
TRANSMITTER WAVEFORMS SHOWING TYPICAL RF VOLTAGE STAGE GAIN

0.2 V
0.5 mS



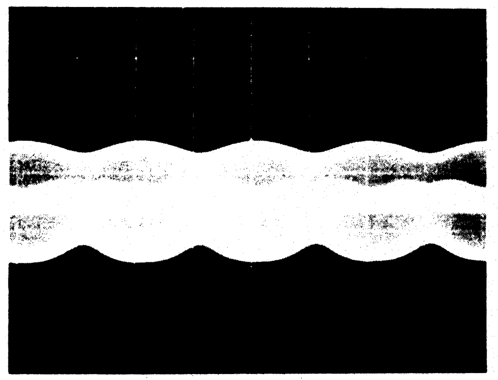
PREDRIVER BASE

2 V
0.5 mS



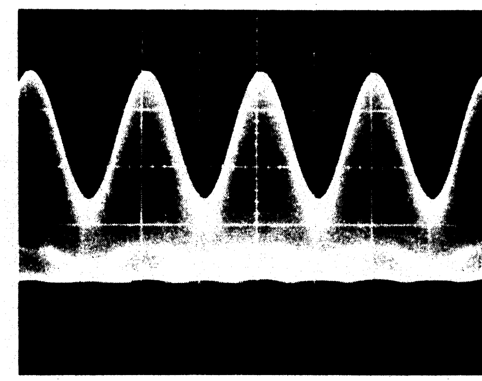
PREDRIVER COLLECTOR

2 V
0.5 mS



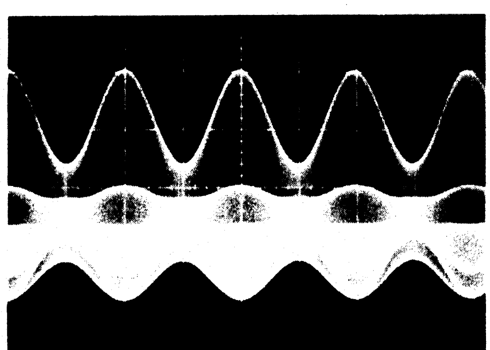
DRIVER BASE

5 V
0.5 mS



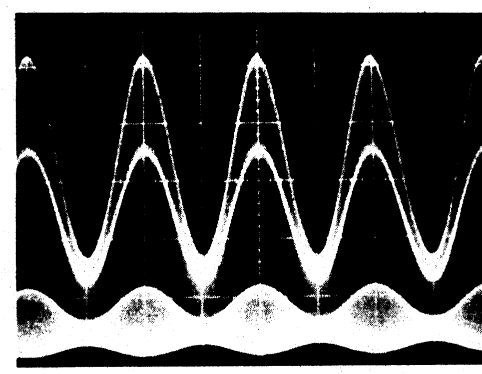
DRIVER COLLECTOR

2 V
0.5 mS



FINAL BASE

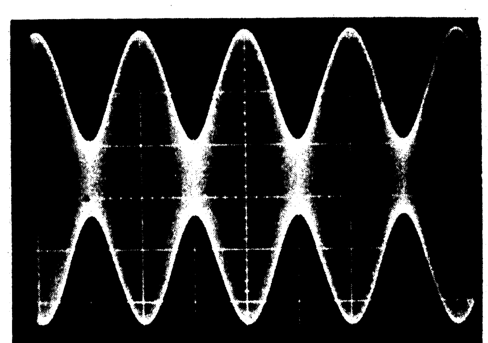
10 V
0.5 mS



FINAL COLLECTOR

These photos were taken at 50% modulation and the envelope can be clearly seen. Actual voltages may vary according to model; the important criteria is to see voltage gain at each stage. Note harmonic content at all stages before filtering at coax socket.

10 V
0.5 mS

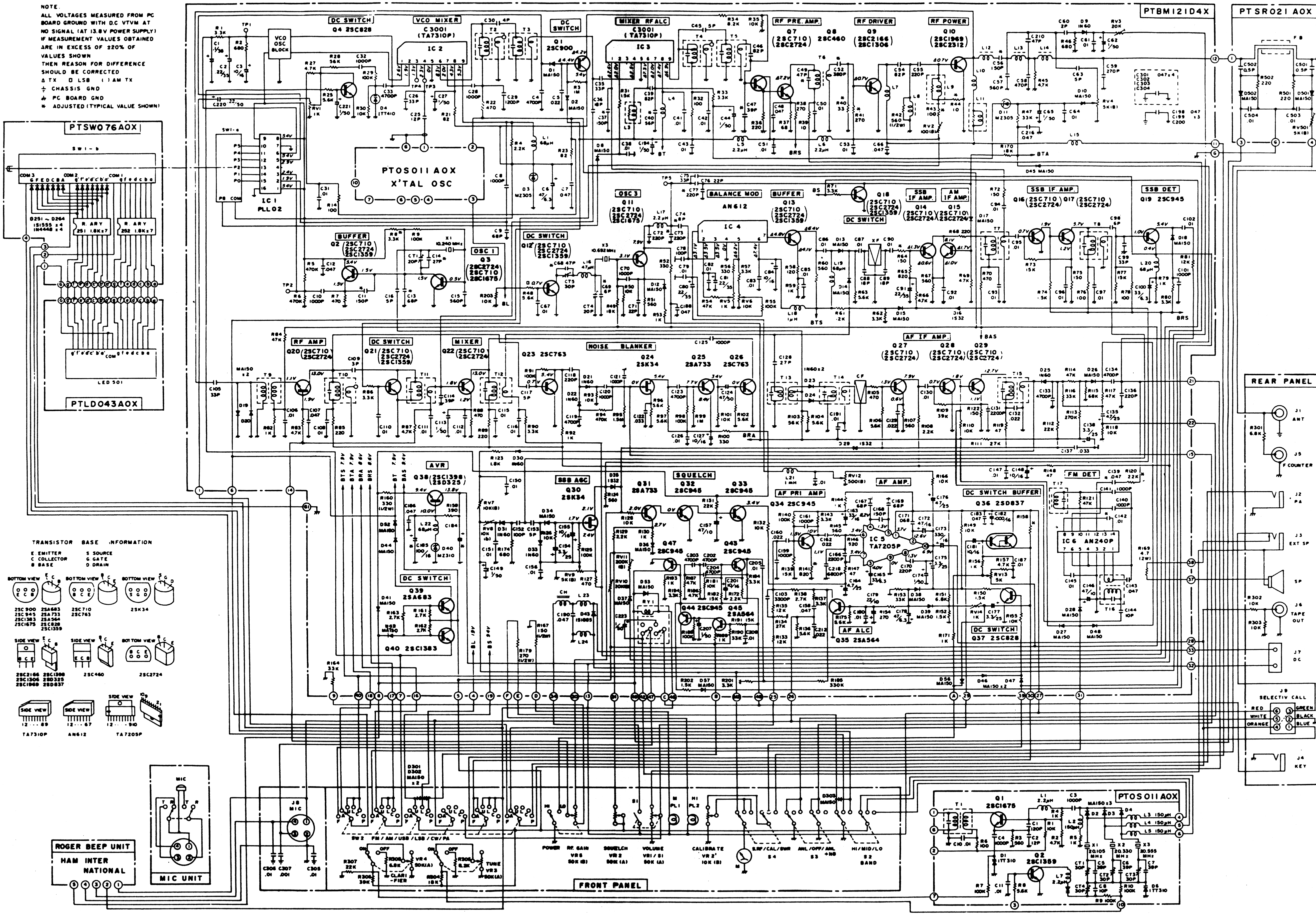


ANTENNA COAX SOCKET

Schematic Diagram

Cobra GTL150, Colt 320FM, 320DX, 1200DX, Excalibur, Ham International Concorde II, HyGain 2795, 2795DX, Intek 1200FM, Lafayette HB870AFS, Tristar 747

NOTE: SWR Meter, Roger Beep, or Sel Call not present on all models but wiring is otherwise identical.

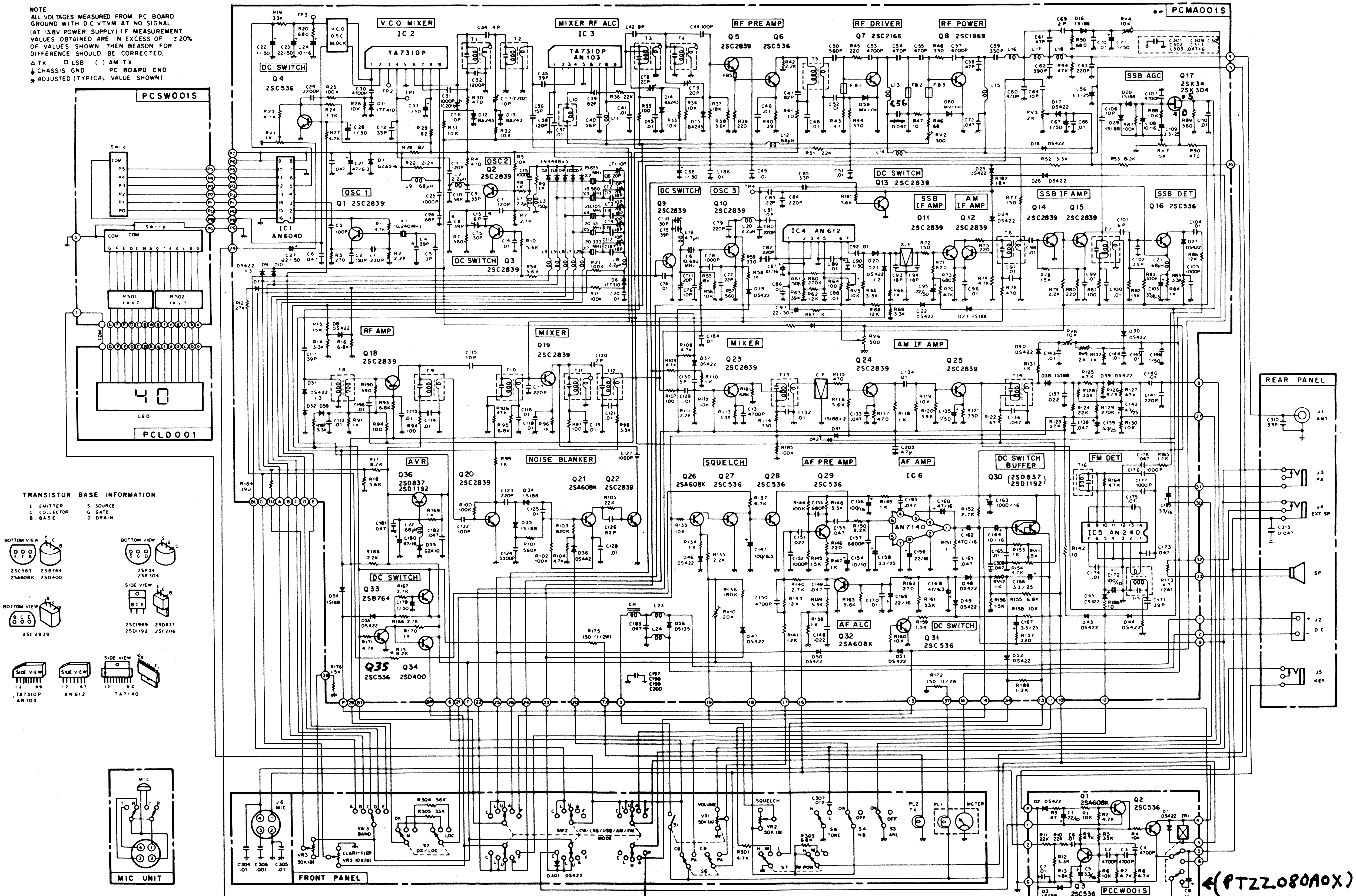


RV1 - FM Dev; RV2 - Final Bias; RV3 - RF Met; RV4 - ALC;
RV5,RV6 -Car Bal; RV7 - AM S-Met; RV8 - SSB S-Met; RV9 -AGC;
RV10 - AM SQ Range; RV11 - SSB SQ Range; RV12 - SSB Mic Gain;
RV13 - AM Carrier Pwr; RV14 - AMC

RV1-FM DEV. RV2-Final Bias RV3-SSB ALC RV4-RF Meter RV5-SSB Carrier Bal. RV6-SSB Mic Gain RV7-SSB AGC
RV8-AM S-Meter RV9-SSB S-Meter RV10-SQ Range RV11-AM Carrier Pwr RV12-AM AMC

Schematic

(PTBM 125A4X)
(PTBM 131A4X)



(PTZZ080A0X)

Cobra 148GTL-DX (fake), Colt 1600DX, 2000DX, 2400, Falcon 2000, HyGain 8795 (V), Lafayette 1800, 2400, Midland 7001 export, Mongoose 2000, Nato 2000FM, Pacific 160, Palomar 2400, 5000, Starfire DX, Superstar 2000, 2200, Thunder 2000, Tristar 777, 797, 848.

Schematic Diagram

RV1-FM DEV. RV2-Final Bias RV3-SSB ALC RV4-RF Meter RV5-SSB Car. Bal. RV6-SSB AGC RV7-SSB S-Meter RV8-AM S-Meter RV9-SSB Mic Gain RV10-SQ Range RV11-AM Carrier Pwr RV12-AM AMC