CB 40-CHANNEL TRANSCEIVER
TRC-423
Catalog Number: 21-1513

CUSTOM MANUFACTURED FOR RADIO SHACK, A DIVISION OF TANDY CORPORATION
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SPECIFICATIONS

GENERAL

Description
Transmitter ........................................... Crystal controlled PLL synthesizer, amplitude modulation
Receiver ........................................... Crystal controlled double conversion, superheterodyne system
Communicating frequencies ........................................... 40 CB channels (26.965 to 27.405 MHz)
Voltage operation ........................................... 12 - 16V DC
(only for ground)
Temperature and Humidity range ........................................... \(-22\,^\circ\text{C} - +140\,^\circ\text{F}\) \((-30\,^\circ\text{C} - +60\,^\circ\text{C})\)
and 10% - 90% ........................................... Electrical
Transmitter/Receiver switching ........................................... 500mA at external SP

STANDARD TEST CONDITIONS

Battery supply voltage ........................................... 13.8V DC
Modulation ........................................... 1000 Hz, 30%
Receiver output power ........................................... 500mW at external SP
Receiver output impedance ........................................... 8 ohms, non-inductive
Ant, load impedance of transmitter ........................................... 50 ohms, non-inductive
Ambient conditions
  Temperature ........................................... 63\,^\circ\text{F} - 73\,^\circ\text{F} (17\,^\circ\text{C} - 23\,^\circ\text{C})
  Humidity ........................................... 40% - 70%

TRANSMITTER

Description  Nominal  Limit
RF power output ........................................... 4.0 watts  3.6 - 4.4 watts
Antenna spurious emission ........................................... 70  50
Modulation capability (positive/negative) ........................................... +90%/-90%  +80%/-80%
AMC Range at 1 kHz ........................................... 40 dB  30dB
Frequency accuracy ........................................... 0.002%  0.003%
Spurious radiation & Harmonic
  Signal radiation ratio from fundamental ........................................... -65dB  -60dB
Current consumption
  at no modulation ........................................... 1000 mA  1200 mA
  at 80% modulation ........................................... 1500 mA  1700 mA
Envelope distortion ........................................... 10% max, 1000 Hz, 50% mod.
Stability against variation of
  antenna impedance ........................................... Satisfactory when dummy antenna is varied
  from 40 ohms to 200 ohms.
### RECEIVER

<table>
<thead>
<tr>
<th>Description</th>
<th>Nominal</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st IF</td>
<td>10.695 MHz</td>
<td></td>
</tr>
<tr>
<td>2nd IF</td>
<td>455 kHz</td>
<td></td>
</tr>
<tr>
<td>Sensitivity for 500 mW output</td>
<td>0.3μV</td>
<td>1μV</td>
</tr>
<tr>
<td>Sensitivity at 10dB (S+N)/N</td>
<td>0.7μV</td>
<td>1.0μV</td>
</tr>
<tr>
<td>Adjacent channel rejection</td>
<td>65dB</td>
<td>55dB</td>
</tr>
<tr>
<td>Image rejection (1st IF/2nd IF)</td>
<td>70dB</td>
<td>60dB</td>
</tr>
<tr>
<td>IF rejection ratio (1st IF/2nd IF)</td>
<td>60dB</td>
<td>45dB</td>
</tr>
<tr>
<td>Signal-to-Noise ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>at 1 mV input</td>
<td>40dB</td>
<td>35dB</td>
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<tr>
<td>Distortion at 1 mV input, 30% mod. (500 mW out)</td>
<td>3%</td>
<td>5%</td>
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<tr>
<td>AGC Figure of merit at 50mV input</td>
<td>80dB</td>
<td>70dB</td>
</tr>
<tr>
<td>Power output at 1mV input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undistorted (10% THD)</td>
<td>4.5W</td>
<td>4.0W</td>
</tr>
<tr>
<td>Maximum</td>
<td>5.0W</td>
<td>4.5W</td>
</tr>
<tr>
<td>Electrical fidelity compared to 1000 Hz</td>
<td>5.0</td>
<td>4.5</td>
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<tr>
<td>450 Hz</td>
<td>-6dB</td>
<td>-6±3dB</td>
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<tr>
<td>2500 Hz</td>
<td>-6dB</td>
<td>-6±3dB</td>
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<tr>
<td>Cross modulation</td>
<td>50dB</td>
<td>40dB</td>
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<tr>
<td>Squelch</td>
<td>60dB</td>
<td>60±6dB</td>
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<tr>
<td>Current consumption (no signal)</td>
<td>250 mA</td>
<td>300 mA</td>
</tr>
<tr>
<td>&quot;S&quot; meter sensitivity to light 3th LED</td>
<td>40dB</td>
<td>40±6dB</td>
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<tr>
<td>Noise Blanker</td>
<td>20dB</td>
<td>16dB</td>
</tr>
<tr>
<td>Automatic noise limiter</td>
<td>16dB</td>
<td>12dB</td>
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</table>

### PUBLIC ADDRESS

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<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>10% THD output power</td>
<td>4W</td>
<td>3.5W</td>
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<tr>
<td>Microphone sensitivity for 4W</td>
<td>5mV</td>
<td>10mV</td>
</tr>
<tr>
<td>Current drain at 10% THD power</td>
<td>1000mA</td>
<td>1200mA</td>
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</tbody>
</table>

### OTHER ITEMS

- Fuse: WHT wire: 1 Amp. RED wire: 2 Amp.
- General power requirement: 12 - 16V DC
- Dimensions: 2 1/2 lbs 4 ozs (1.03kg)
- Weight: (W) 57/8" (148mm) x (H) 110/13" (45mm) x (D) 81/4" (210mm)

**Note:** Nominal specs represent the design specs; all units should be able to approximate these — some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit perform to less than within any limit spec.
ALIGNMENT INSTRUCTIONS

A. ALIGNMENT TEST POINTS AND PARTS LOCATION

B. PHASE LOCKED LOOP AND CPU SECTION

1. Test Equipment Required

   a. Frequency Counter
   b. DC Power Supply (13.8 Volt, 3 Amp.)
   c. DC Voltmeter
   d. Oscilloscope
### 2. Alignment Procedure

<table>
<thead>
<tr>
<th>STEP</th>
<th>SETTING</th>
<th>CONNECTION</th>
<th>ADJUST</th>
<th>ADJUST FOR</th>
</tr>
</thead>
</table>
| 1    | Frequency adjustment;  
MIC: Receive  
Volume: Optional  
Squelch: Optional  
CH Selector: Optional  
RF Gain: Optional  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF | Frequency counter to output pin 12 of IC502 (Figure 1). | C514 | 10.240MHz ± 100Hz |
| 2    | RX VCO voltage adjustment;  
MIC: Receive  
Volume: Optional  
Squelch: Optional  
CH Selector: 1  
RF Gain: Optional  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF | Connect DC voltmeter between R533 and R534 (Figure 2). | L501 | 1.5V |
| 3    | TX VCO voltage adjustment;  
MIC: Transmit  
Volume: Optional  
Squelch: Optional  
CH Selector: 1  
RF Gain: Optional  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF | Connect DC voltmeter between R533 and R534 (Figure 2). | L501 | Indication on DC voltmeter must be 1.0-2.0 Volt. If DC voltmeter does not indicate 1.0-2.0 volt, readjust L501. |
| 4    | CPU IC Voltage check;  
MIC: Receive  
Volume: Optional  
Squelch: Optional  
CH Selector: Optional  
RF Gain: Optional  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF | Connect DC voltmeter to pin 2 of IC501. | | Indication on DC voltmeter must be 4.5-5.5 volt. |
| 5    | CPU frequency check;  
MIC: Receive  
Volume: Optional  
Squelch: Optional  
CH Selector: Optional  
RF Gain: Optional  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF | Connect oscilloscope to pin 16 of IC501 (Figure 3). | | Check for 300-400kHz of triangle waveform as Figure 4. |

![Figure 1](image1.png)

![Figure 2](image2.png)
### C. TRANSMITTER SECTION

1. Test Equipment Required
   - a. RF Powermeter (RF SSVM)
   - b. 50 ohm load (non-inductive)
   - c. RF Attenuator
   - d. Oscilloscope
   - e. Audio Generator
   - f. DC Power supply (13.8 Volt, 3 Amp.)
   - g. Spectrum Analyzer
   - h. Frequency Counter
   - i. Coupler

2. Alignment procedure

<table>
<thead>
<tr>
<th>STEP</th>
<th>SETTING</th>
<th>CONNECTION</th>
<th>ADJUST</th>
<th>ADJUST FOR</th>
</tr>
</thead>
</table>
| 1    | RF Driver stage;  
      | MIC: Transmit  
      | Volume: Optional  
      | Squelch: Optional  
      | CH Selector: 19  
      | RF Gain: Optional  
      | MIC Gain: Turn to counter-clockwise  
      | PA, ANL, NB, CH9: OFF | Connect RF Powermeter to base of Q302 (Figure 4). | L301, L302 | Adjust for maximum indication on the RF Powermeter. |
| 2    | RF Power stage;  
      | MIC: Transmit  
      | Squelch: Optional  
      | Volume: Optional  
      | CH Selector: 19  
      | RF Gain: Optional  
      | MIC Gain: Turn to counter-clockwise  
      | PA, ANL, NB, CH9: OFF | Connect dummy load and RF power meter to the EXT-ANT. Jack on the set (Figure 5). | L303, L304, L305, L306 | Adjust for maximum indication on the RF powermeter (4 watts). If indication is not in 4 watts range, go back to step 1 and readjust L303, L304, L305, L306 |
| 3    | Modulation adjustment;  
      | MIC: Transmit  
      | Volume: Optional  
      | Squelch: Optional  
      | CH Selector: 19  
      | RF Gain: Optional  
      | MIC Gain: Fully clockwise  
      | PA, ANL, NB, CH9: OFF | Connect audio generator (1kHz) to pin 4 of microphone connector (Figure 6). Connect dummy load and oscilloscope through coupler to RF powermeter. Connect RF powermeter to EXT-ANT jack on the set. Adjust audio signal level to obtain 80%-90% modulation level. | RV202 | Check for proper modulation pattern on the oscilloscope. |

![Diagram](image_url)
<table>
<thead>
<tr>
<th>STEP</th>
<th>SETTING</th>
<th>CONNECTION</th>
<th>ADJUST</th>
<th>ADJUST FOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Second harmonic check;</td>
<td>Connect RF powermeter with dummy load to spectrum analyzer through coupler/−40dB attenuator to EXT-ANT. Jack on the set (Figure 7).</td>
<td>At no modulation compare the level of fundamental frequency to the level of harmonic frequency. Suppression of the 2nd harmonic frequency level must be lower than −60dB. Check for the other channels.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MIC: Transmit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Squelch: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CH Selector: 19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RF Gain: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MIC Gain: Turn to counter-clockwise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA, ANL, NB, CH9: OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Frequency check:</td>
<td>Connect dummy load and frequency counter through coupler to RF powermeter. Connect RF powermeter to EXT-ANT jack on the set. (Figure 8).</td>
<td>C514 Make sure that the indication of the transmitter frequency is 27.185MHz±300Hz on the frequency counter.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MIC: Transmit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Squelch: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Channel selector: 19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RF Gain: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MIC Gain: Turn to counter-clockwise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA, ANL, NB, CH9: OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>TX Power LED adjustment;</td>
<td>Connect dummy load and frequency counter through coupler to RF power meter. Connect RF power meter to EXT-ANT jack on the set (Figure 6).</td>
<td>RV301 Adjust so that 3rd LED light up at 4 watts RF output power.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MIC: Transmit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Squelch: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Channel Selector: 1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RF Gain: Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MIC Gain: Turn to counter-clockwise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA, ANL, NB, CH9: OFF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4**

**Figure 5**

**Figure 6**
Figure 7

Figure 8

Figure 9
# D. RECEIVER SECTION

## 1. Test Equipment Required

a. RF Signal Generator  
b. SSVM  
c. Distortion Meter  
d. Power Supply

## 2. Alignment Procedure

<table>
<thead>
<tr>
<th>STEP</th>
<th>SETTING</th>
<th>CONNECTION</th>
<th>ADJUST</th>
<th>ADJUST FOR</th>
</tr>
</thead>
</table>
| 1    | MIC: Receive  
Volume: Fully clockwise  
Squelch: Turn to counterclockwise  
CH Selector: 19  
RF Gain: Fully clockwise  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF  
SSG: 27.185MHz, 1kHz 1µV 30% Mod. | Connect RF signal generator to EXT-ANT jack. Connect SSVM and distortion meter across EXT speaker jack with 8 ohm dummy load (Figure 9). | L101 | Adjust for maximum indication on SSVM.  
L102 |  
L103 | Reduce output from RF SG until the audio output becomes about 500mV (2V)  
L104 |  
L105 |  
L106 | |
| 2    | MIC: Receive  
SSG: 27.185MHz 1kHz 1mV 80% Mod.  
Squelch: Turn to counterclockwise  
RF Gain: Fully clockwise  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF  
CH Selector: 19  
Volume: 500mW (2V) | Connect RF Signal generator to EXT-ANT jack. Connect SSVM and distortion meter across EXT speaker jack with 8 ohm dummy load (Figure 9). | L104 | Adjust for minimum indication on distortion meter. |
| 3    | Squelch adjustment  
MIC: Receive  
SSG: 27.185MHz, 1kHz, 1mV 30% Mod.  
Squelch: Clockwise  
CH Selector: 19  
Volume: 500mW (2V)  
RF Gain: Fully clockwise  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF | Connect RF Signal generator to EXT-ANT jack. Connect SSVM and distortion meter across EXT speaker jack with 8 ohm dummy load (Figure 9). | RV201 | Adjust RV201 until the Audio output just appeared. |
| 4    | RF Signal meter adjustment  
MIC: Receive  
SSG: 27.185MHz, 1kHz 100µV 30% Mod.  
Squelch: Fully counterclockwise  
Volume: 500mW (2V)  
RF Gain: fully clockwise  
MIC Gain: Optional  
PA, ANL, NB, CH9: OFF | Connect RF signal generator to EXT-ANT jack. Connect SSVM and distortion meter across the EXT speaker jack with 8 ohm dummy load. (Figure 9). | RV101 | Adjust so that the 3rd LED on the S/RF meter light up. |
## CHANNEL FREQUENCY GENERATION TABLE

**RECEIVE**

VCO FREQUENCY = N x 5 (kHz)

**TRANSMIT**

VCO FREQUENCY = N x 2.5 (kHz)

TRANSMIT FREQUENCY = VCO FREQUENCY x 2

<table>
<thead>
<tr>
<th>CHANNEL</th>
<th>BCD INPUT TO IC-1</th>
<th>RECEIVE</th>
<th>TRANSMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D1 (1F)</td>
<td>D2 (1A)</td>
<td>D3 (1G)</td>
</tr>
<tr>
<td>1</td>
<td>1 1 1 1</td>
<td>0 1 1 1</td>
<td>3254 16.27</td>
</tr>
<tr>
<td>2</td>
<td>1 0 0 0</td>
<td>0 0 1 1</td>
<td>3256 16.28</td>
</tr>
<tr>
<td>3</td>
<td>1 0 0 0</td>
<td>0 0 1 1</td>
<td>3258 16.29</td>
</tr>
<tr>
<td>4</td>
<td>0 1 0 1</td>
<td>0 1 1 1</td>
<td>3262 16.31</td>
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<td>3264 16.32</td>
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<td>3328 16.64</td>
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## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSE</th>
<th>REMEDY</th>
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</thead>
</table>
| Unit does not work at all            | 1. Defective power switch VR102  
2. Blown fuse  
3. Broken DC power cord  
4. Defective IC501 or IC502 | 1. Replace  
2. Replace  
3. Replace  
4. Replace |
| No output from speaker at all        | 1. Defective external speaker Jack  
2. Poor connection on microphone connector  
3. Defective push switch on microphone  
4. Defective internal speaker  
5. Defective D112, VR101, VR102, RV201  
   IC201 or other components | 1. Repair or Replace  
2. Repair or Replace  
3. Repair or Replace  
4. Replace  
5. Replace the defective components |
| No noise on speaker                  | 1. Measure all the voltage of Q100, Q101, Q102, Q103, Q104, 105, 106, 107, 108, Q109, 110, 111, and IC201 with voltage chart on the page 20  
2. Defective squelch circuit components (RV201, VR201, IC201, Q203, Q204, Q205, Q510, Q511) | 1. Replace  
2. Replace |
| Squelch does not work                | 1. Defective VR201, RV201, Q203, Q204, Q205, Q510, Q511  
2. Improperly adjusted RV201 | 1. Replace defective components  
2. Readjust |
| No modulation                        | 1. Defective microphone  
2. Poor Audio output and defective modulation microphone amplifier components (Q201, Q202, IC201, VR202)  
3. Defective microphone connector component  
4. Defective ALC Circuit (Q206, Q207, Q208, D205, D208) | 1. Replace  
2. Replace the defective component(s)  
3. Replace  
4. Replace the defective component(s) |
| LED meter does not work              | 1. Defective D303, D304, D305, D306  
2. Defective IC301  
3. Defective D111, D302, RV101, RV301 | 1. Replace  
2. Replace  
3. Replace |
| LED Display does not work            | 1. Defective orange wire fuse  
2. Defective LED501, IC501, IC502 | 1. Replace  
2. Replace |
| P.A does not work                    | 1. Defective VR202, SW1  
2. Defective Q201, Q202, Q203, Q204, Q205, Q501, D504, IC501, IC502 | 1. Replace  
2. Replace |
| Channel selector does not work       | Defective IC501, SW5, SW6, SW7, SW8 | Replace |
| RF gain does not work                | Defective VR101, D101, D102, D103, D105, D106 | Replace |
| ANL does not work                    | 1. Defective SW2  
2. Defective D110 | 1. Replace  
2. Replace |
| NB does not work                     | 1. Defective SW3  
2. Defective D112, D113, Q108, Q109, Q110, Q111 | 1. Replace  
2. Replace |
| CH9 does not work                    | 1. Defective SW4  
2. Defective D502, Q501, IC501, IC502 | 1. Replace  
2. Replace |
PRINTED CIRCUIT BOARD (TOP/BOTTOM VIEWS)

LED DISPLAY PCB

Top View

Bottom View

SWITCH PCB

Top View

Bottom View