Adjustment for IC-F520

<table>
<tr><th colspan="6">ADJUSTMENT</th></tr>
<tr><th>Adjustment</th><th>No.</th><th>Adjustment Condition & Tuning</th><th>Value</th><th>Ref. No.</th><th>CK. Point</th></tr>
<tr><td>Preparation

Check points</td><td></td><td>Connect the transceiver by cloning cable (OPC-1122) to a PC (IBM compatible) and boot up the cloning software.
Be sure to use a tester with more than 50 kohm/V internal resistance during each test.</td><td></td><td></td><td></td></tr>
<tr><td>Lock Voltage Adjustment</td><td></td><td>Set the transceiver to the 136 MHz and set the LV voltage as follows
C133 during RX, C134 during TX.
<table><tr><td>Adj. Freq.</td><td>136 MHz</td></tr><tr><td>RX Side</td><td>1.4V</td></tr><tr><td>TX Side</td><td>1.0V</td></tr></table></td><td>1.4V
1.0V</td><td>C133
C134</td><td>LV</td></tr>
<tr><td>Lock Voltage Check</td><td></td><td>Set the transceiver to the 174 MHz and check that each value is within following values.
<table><tr><td>Adj. Freq.</td><td>174 MHz</td></tr><tr><td>RX Side</td><td>3.5V~4.5V</td></tr><tr><td>TX Side</td><td>3.0V~4.0V</td></tr></table></td><td>3.5V-4.5V
3.0V-4.0V</td><td></td><td>LV</td></tr>
<tr><td>Frequency Adjustment</td><td></td><td>Connect a power meter or attenuator to the antenna terminal.
Loose coupling the antenna terminal and frequency counter.
Set the transceiver to near the TX greatest high band frequency and set the unit to TX.
Use adjustment software to adjust the TX frequency to following values.
<table><tr><td>Set Frequency</td><td>Set Freq. ± 500 Hz</td></tr></table></td><td>±500Hz</td><td>Adj.Soft
TXF</td><td>ANT Con</td></tr>
</table>

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<tr><th>Adjustment</th><th>No.</th><th>Adjustment Condition & Tuning</th><th>Value</th><th>Ref. No.</th><th>CK. Point</th></tr>
<tr><td>TX Output</td><td></td><td>Use adjustment software to adjust the adjustment output to the following values.

<table><tr><td>Adj. Freq.</td><td>Greatest Low Band Freq.</td></tr><tr><td>Hi Power</td><td>25.0W</td></tr><tr><td>L2 Power</td><td>10.0W</td></tr><tr><td>L1 Power</td><td>2.5W</td></tr></table></td><td>25.0W
10.0W
2.5W</td><td>Adj.Soft Power
Hi
L2
L1</td><td>ANT Con</td></tr>
<tr><td>TX Output Check</td><td></td><td>Check that TX output is within the following value in the range of frequency coverage.

<table><tr><td>Hi Power</td><td>20.0~30.0W</td></tr><tr><td>L2 Power</td><td>8.0~12.5W</td></tr><tr><td>L1 Power</td><td>2.0~3.0W</td></tr></table></td><td>20-30W
8-12.5W
2.0-3.0W</td><td></td><td>ANT Con</td></tr>
<tr><td>Current Check at TX</td><td></td><td>Check that the Hi Power current is less than the following value in the range of frequency coverage.

<table><tr><td>Hi Power</td><td>Less than 7.0A</td></tr></table></td><td>Less 7.0A</td><td></td><td></td></tr>
<tr><td>Checking Spurious</td><td></td><td>Connect a spectrum analyzer to the ANT terminal through an attenuator.
Set the attenuation so that the spectrum Analyzer does not distort.
Set the transceiver to TX at Hi power, check that spurious is less than the following value in the range of frequency coverage in the bandwidth.

<table><tr><td>Spurious</td><td>Less than –70dB of the carrier power</td></tr></table></td><td>Less than -70 dB</td><td></td><td>ANT Con</td></tr>
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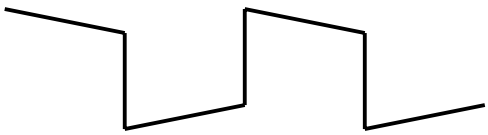
<tr><td>Preparation for checking modulation adjustment</td><td></td><td>During the measurements, set the modulation analyzer as follows when there is no specific requirement.

<table><tr><td>HPF</td><td>OFF</td></tr><tr><td>LPF</td><td>20 kHz</td></tr><tr><td>De-Emphasis</td><td>OFF</td></tr><tr><td>Detector</td><td>(P-P)/2</td></tr></table>
Connect the modulation analyzer after setting above conditions, through the attenuator to the antenna terminal. Connect an oscillo-scope, distortion meter and a level meter to the modulation analyzer’s detection output terminal. Connect a millivolt meter or a 600 ohm output impedance CR oscillator to the transceiver’s mic terminal.</td><td></td><td></td><td></td></tr>
<tr><td>Modulation Balance Adjustment</td><td></td><td>Use the adjustment software to adjust the modulation analyzer’s detection output horizontal line so that it becomes a Straight line as follows.
<table><tr><td>Adjust. Freq.</td><td>Near Center Frequency</td></tr></table>
  </td><td>Detection Output</td><td>Adj.Soft Balance</td><td>ANT Con</td></tr>
<tr><td>Deviation Adjustment</td><td></td><td>Set the CR oscillator to a 1 kHz sine wave, 40mVrms, and supply the signal to the external mic terminal.
Turn the transceiver to TX and use the adjustment software to adjust to the following values.

<table><tr><td>Adjust. Freq.</td><td>Near Center Frequency</td></tr><tr><td>WIDE</td><td>± 4.10 ± 0.05 kHz</td></tr><tr><td>NARROW</td><td>± 2.10 ± 0.05 kHz</td></tr></table></td><td>± 4.05 ~ ±4.15kHz
± 2.05 ~ ±2.15kHz</td><td>Adj.Soft MOD W
MOD N</td><td>ANT Con</td></tr>
</table>

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Adjustment	No.	Adjustment Condition & Tuning	Value	Ref. No.	CK. Point
Checking Modulation		Check that the deviation in the range of frequency coverage is following values. WIDE: ± 3.60 ~ 4.50 kHz NARROW: ± 1.80 ~ 2.30 kHz	± 3.6 ~ ±4.5kHz ± 1.8 ~ ±2.3kHz		ANT Con
Checking Modulation		Check that the modulation in the range of frequency coverage is as follows. WIDE/NARROW: 2.8 ~ 6 mV rms WIDE:±3 KHz DEV ; NARROW:±1.5 KHz DEV	2.8-6mV rms		ANT Con
CTCSS Deviation Adjustment		Connect a linear detector via the attenuator to the antenna terminal, Set the transceiver to wide ch and CTCSS 88.5Hz. Transmit the transceiver with no input to the mic (or mic terminal) Adjust. Freq. / Near Center Frequency WIDE: ± 0.7 kHz	±0.7kHz	Adj.Soft CTCS/DTCS	ANT Con
Checking CTCSS/ DTCS/2/5 TONE/ DTMF DEVIATION		Set the transceiver with following signaling type to perform the measurements. DTCS CODE 007 CTCSS 88.5 Hz 5 TONE CCIR 11111 DTMF # (Auto Dial Setting) 2 TONE 349.0 Hz check that each version in the range of frequency is following values, respectively. Wide CTCSS/DTCS: ± 0.50~± 0.90kHz Wide 2/5 TONE/ DTMF: ± 2.40~± 3.60kHz Narrow CTCSS/DTCS: ± 0.25~± 0.50kHz Narrow 2/5 TONE/ DTMF: ± 1.20~± 1.80kHz	±0.5-0.9kHz ±2.4-3.6kHz ±.25-.50kHz ±1.2-1.8kHz		ANT Con

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<tr><td>Checking TX S/N</td><td></td><td>Connect a linear detector via the attenuator to the antenna terminal, and set to the following conditions.
HPF 50 Hz
LPF 20 kHz
De-emphasis OFF
Level Meter (P-P)/2
Apply a 1 kHz signal from the low frequency oscillator to the mic terminal, and transmit, then adjust the low frequency oscillator output level that the deviation is 70%(WIDE:3.5KHz,NAR:1.75KHz) of the maximum permissible deviation.
Check that the TX S/N in the range of the Frequency coverage is more than the following values.
<table><tr><td>WIDE</td><td>More than 40 dB</td></tr><tr><td>NARROW</td><td>More than 34 dB</td></tr></table></td><td>Over 40dB
Over 34dB</td><td></td><td>ANT Con</td></tr>
<tr><td>Adjusting RX</td><td></td><td>during the measurements set the signal Generator as follows when there is no special requirements.
<table><tr><td>Modulation Freq.</td><td>1kHz</td></tr><tr><td>WIDE</td><td>± 3.5 kHz</td></tr><tr><td>NARROW</td><td>± 1.75 kHz</td></tr></table>
Turn the transceiver wide channel and set the signal generator as follows.
<table><tr><td>Adjust Freq.</td><td>The lowest frequency</td></tr><tr><td>SG Input level</td><td>+20 dBu</td></tr></table>
Connect an 4 ohm non-inductive load and a distortion meter to the external speaker terminal. Adjust BPF (T1) ~ (T4) with the adjustment software to gain the maximum sensitivity.</td><td></td><td>Adj.Soft</td><td>RSSI line</td></tr>
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<tr><td>Checking RX Sensitivity</td><td></td><td>Check that the signal generator level is as follows when the distortion meter shows 12 dB SINAD in the range of frequency coverage.
<table><tr><td>RX Sensitivity</td><td>Less than -10 dBu</td></tr></table>
Use the same check method for Narrow channels also.</td><td>Less-10dB</td><td></td><td>ANT Con
SP Jack</td></tr>
<tr><td>Adjusting the S3 LEVEL</td><td></td><td>This Adjustment should be perform after the RX sensitivity adjustment finished.
Set the signal generator following setting for wide channels.
<table><tr><td>Adjust Freq.</td><td>Near 136 MHz</td></tr><tr><td>SG Input level</td><td>+23 dBu</td></tr><tr><td>Modulation Freq.</td><td>1kHz</td></tr><tr><td>WIDE</td><td>± 3.5 kHz</td></tr></table>
S3 SET COMMAND with the Adjustment soft ware.</td><td>Adj.Soft
S-METER
S3 Level</td><td></td><td>ANT Con</td></tr>
<tr><td>Adjusting the S1 LEVEL</td><td></td><td>Set the signal generator level to the following value.
<table><tr><td>SG Output Level</td><td>-7 dBu</td></tr></table>
S1 SET COMMAND with the Adjustment soft ware.</td><td>Adj.Soft
S-METER
S1 Level</td><td></td><td>ANT Con</td></tr>
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<tr><td>Adjusting the Squelch</td><td></td><td>turn the transceiver to the narrow channel at center frequency.

Set the signal generator to as following.

<table><tr><td>Modulation Freq.</td><td>1kHz</td></tr><tr><td>WIDE</td><td>± 3.5 kHz</td></tr><tr><td>NARROW</td><td>± 1.75 kHz</td></tr><tr><td>SG Output Level</td><td>-14 dBu</td></tr></table>
In this condition, using the adjustment software, raise the squelch D/A value until the squelch closes once, then lower the D/A value again, and adjust until the squelch opening point.</td><td></td><td>Adj.Soft SQL</td><td>ANT Con</td></tr>
<tr><td>Checking Squelch Sensitivity</td><td></td><td>Check that the squelch opening point value in the range of frequency condition is as follows.

<table><tr><td>Squelch Sensitivity</td><td>Less than –10 dBu</td></tr></table>
Next, reduce the signal generator output and check that the squelch closes in the range of frequency condition.</td><td>Less-10dB</td><td></td><td>ANT Con</td></tr>
</table>

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Checking AF Output		Set the signal generator output level to +60 dBu. The transceiver and SG connection is the same as the squelch adjustment above. Adjust the transceiver volume until the distortion meter reads 5%. Check that the AF output value at this point Is as below. AF Output: More than 3.5 W	Over 3.5 W @ 4 ohm load		ANT Con SP Jack
Checking RX S/N		Set the signal generator output level to +60 dBu. Adjust the AF volume so that the AF output reaches 50% of the rated value. Check that the RX S/N in the range of frequency is as following values. WIDE: More than 40 dB NARROW: More than 34 dB	Over 40dB Over 34dB		ANT Con SP Jack
Checking Howling		Set the signal generator output to +60 dBu as in RX adjustment with no deviation. set the internal speaker for operation, and turn the AF volume up to maximum to check that howling does not occur.	ANT Con		Int SP
Checking Maximum RX Current		While still in the AF output check status, rotate the volume control clockwise to obtain the maximum AF output. Check that the current consumption at this time is as the following value. Max. RX Current: Less than 1200 mA	Less than 1200mA		PWR Con