# APPENDICES

## APPENDIX A – FM/AM-1200S/A SPECIFICATIONS

### A-1 RF SIGNAL GENERATOR

| | |
|---|---|
| Frequency Range: | 250 kHz to 999.9999 MHz in 100 Hz increments. |
| Frequency Accuracy: | ±5 Hz + Master Oscillator (S/Ns thru 4490 for FM/AM-1200S, S/Ns thru 1448 for FM/AM-1200A). See Master Oscillator for FM/AM-1200S S/N 4491 and after (S/N 1449 and after for FM/AM-1200A). |
| Residual FM: | <100 Hz RMS (300 Hz to 3 kHz Bandwidth) |
| Harmonics: | 2nd Harmonic ≤-30 dBc<br>3rd Harmonic ≤-45 dBc |
| Non-Harmonics & Spurious (at offset from selected frequency): | ±10 kHz to ±1.5 MHz: ≤-30 dBc in band<br>±1.5 MHz to band end: ≤-55 dBc<br>(If image ≤-35 dB) |
| RF Output Power: | -127 dBm to -20 dBm (10 dB steps with 11 dB range vernier) into 50 ohms. |
| RF Output Accuracy: | ±2.5 dB (±3 dB at frequencies >800 MHz and levels between -120 dBm and -127 dBm for FM/AM-1200S thru S/N 7698 and FM/AM-1200A thru S/N 1676). |
| Variable Generate: | When in the "locked" position, the generator is phased locked to the master oscillator. When switched from the "locked" position, the generator may be varied ±10 kHz. |
| Internal Modulation: | |
| Deviation Range: | 0 to 50 kHz (with 1 kHz tone). |
| % AM Range: | 0 to 90% (with 1 kHz tone). |
| Externa Modulation: | |
| Frequency Response: | FM: 2 Hz to 30 Hz (DC when in variable generate)<br>AM: 10 Hz to 10 kHz (30% maximum modulation above 5 kHz). |
| Modulation Sensitivity: | FM: .1 VRMS/kHz (-0 to +30%)<br>AM: .01 VRMS/% (-0 to +30%) |
| Distortion (at 1 kHz sine): | FM: <1% to 20 kHz deviation<br>AM: <10% to 60% modulation |
| Input Impedance: | 10K Ohms nominal |

## A-2 DUPLEX GENERATOR

Frequency Range: ±49.99 MHz from receive frequency in 10 kHz steps.

Frequency Resolution: 2.5 kHz

Frequency Accuracy: (See Master Oscillator)

Output Level:

DUPLEX Port: (FM/AM-1200A)
-60 dBm ±10 dB fixed level into 50 ohm.

(FM/AM-1200S)
DUPLEX HIGH: -15 dBm into 50 ohms ±10 dB

DUPLEX LOW: -40 dBm into 50 ohms (-25 dB ±5 dB below DUPLEX HIGH at the same frequency)

Input Protection: 0.25 WATT (maximum without damage)

T/R Port: (FM/AM-1200A) -80 dBm ±10 dB fixed level
(FM/AM-1200S) -85 dBm ±10 dB fixed level

## A-3 RECEIVE/MONITOR

Frequency Range: 10 kHz to 999.9999 MHz in 100 Hz increments

Sensitivity: 2 μV typical (1 MHz to 1000 MHz FM narrow)

Selectivity (at 3 dB):

| MODE | | RECEIVER BANDWIDTH | AUDIO BANDWIDTH |
|---|---|---|---|
| FM WIDE | 200 | kHz | 80 kHz |
| FM MID | 200 | kHz | 8 kHz |
| FM NAR | 15 | kHz | 8 kHz |
| SSB | 6 | kHz | 8 kHz |
| AM NAR | 6 | kHz | 8 kHz |
| AM NORM | 15 | kHz | 8 kHz |

Adjacent Channel Rejection:

| RECEIVER BANDWIDTH | GREATER THAN 40 dB DOWN |
|---|---|
| 200 kHz | ±300 kHz |
| 15 kHz | ±27 kHz |
| 6 kHz | ±15 kHz |

Demodulation Output:

Impedence: 600 Ohms

Output Level: (Into an open circuit):
FM: 60 mVRMS/1 kHz (nominal)
AM: 5 mVRMS/% (nominal)

Receiver Antenna
Input Protection: 0.25 WATT (maximum without damage)

## A-4 POWER METER

| | |
|---|---|
| Range: | 0 to 15 and 0 to 150 WATTS peak or average responding. |
| Accuracy: | 1 to 600 MHz ±7% of reading of full scale.<br>600 to 1000 MHz ±20% of reading +3% of full scale. |
| Input Power: | 50 WATTS continuous<br>>50 to 150 WATTS, one minute "ON", five minutes "OFF". |

## A-5 FREQUENCY ERROR METER

| | |
|---|---|
| RF Accuracy: | ±Master Oscillator<br>±3% of full scale |
| RF Ranges: | ±10 kHz, ±3 kHz, ±1 kHz, ±300 Hz,<br>±100 Hz, ±30 Hz full scale |
| Audio Counter: | |
| Frequency Range: | 10 Hz to 12 kHz |
| Accuracy: | ±0.01% ±3% of full scale |
| Ranges: | ±300 Hz, ±30 Hz, ±3 Hz full scale |

## A-6 MODULATION METER

| | |
|---|---|
| FM Deviation: | |
| Accuracy: | ±5% of reading,<br>±3% of full scale for a 1 kHz tone. |
| Ranges: | 2 kHz, 6 kHz, 20 kHz, 60 kHz full scale. |
| AM % Modulation: | |
| Accuracy: | ±5% of reading<br>±3% of full scale for a 1 kHz tone |
| Ranges: | 60%, 200% full scale |

## A-7 SINAD/DISTORTION METER

| | |
|---|---|
| SINAD: | 3 to 20 dB at 1 kHz |
| Accuracy: | ±1 dB at 12 dB SINAD |
| Distortion Range: | 0 to 20% at 1 kHz |
| Accuracy: | ±1% at 10% distortion |
| Input Level: | 0.25 VRMS to 2 VRMS (10 VRMS maximum) |
| Impedence: | 10K Ohm Nominal |

## A-8 FUNCTION GENERATOR

| | |
|---|---|
| Functions: | SINE, SQUARE, RAMP, TRIANGLE, DTMF, TONE SEQ and DCS |
| Tone Accuracy: | |
| Fixed: | (Same as Master Oscillator) |
| Variable: | ±0.01% |
| Tone Distortion: | (At 2.5 VRMS output) |
| Fixed: | <0.5% |
| Variable (SINE): | <2% (10 Hz to 100 Hz)<br><0.7% typical (100 Hz to 30 Hz) |
| Tone Output Level: | Variable to 2.5 VRMS minimum, either tone into 150 Ohm load |
| Frequency Range:(Variable): | 10 Hz to 30 kHz in 0.1 Hz increments |
| DTMF ENCODE: | |
| Deviation: | 3.5 kHz Fixed (±500 Hz) |
| Mark Time: | 50 mSec Minimum |
| Space Time: | 50 mSec Minimum |
| DTMF Decode (Optional): | See Digital Voltmeter |

## A-9 OSCILLOSCOPE

| | |
|---|---|
| Display Size: | 2 inches X 2.5 inches |
| Vertical Bandwidth: | DC to 1 MHz (at 3 dB Bandwidth) |
| External Vertical Input Ranges: | 10 mV, 100 mV, 1 V, 10 V per division |
| Horzontal Sweep Rate: | FM/AM-1200A – 10 mSec, 1 mSec, 100 μSec, 10 μSec, 1 μsec per division |
| | FM/AM-1200S – 10 mSec, 1 mSec, 100 μSec, 10 μSec per division |

## A-10 DIGITAL VOLTMETER/DTMF DECODE (OPTIONAL)

AC Volts:

| | |
|---|---|
| Frequency Range: | 45 Hz to 10 kHz |
| Voltage Range: | 0 to 100 VRMS |
| Accuracy: | ±10% ±2 Counts |

DC Volts:

| | |
|---|---|
| Voltage Range: | 0 to ±100 VDC |
| Accuracy: | ±10% ±2 Counts |

DTMF DECODE:

| | |
|---|---|
| Deviation: | 1 kHz Minimum |
| Mark Time: | 50 mSec Minimum |
| Space Time: | 50 mSec Minimum |
| Sensitivity: | 20 dB FM Quieting |

## A-11 MASTER OSCILLATOR

Standard TCXO (Thru FM/AM-1200A S/N 1499, thru FM/AM-1200S S/N 5411)

| | |
|---|---|
| Stability: | 0.5 PPM (0.50° C) |
| Aging: | 1 PPM per year |

Standard TCXO (FM/AM-1200A S/N 1500 and on, Option 1 thru FM/AM-1200A S/N 1499; FM/AM-1200S S/N 5412 and on, Option 1 thru FM/AM-1200S S/N 5411)

| | |
|---|---|
| Stability: | 0.2 PPM (0.50° C) |
| Aging: | 0.5 PPM per year |

| | |
|---|---|
| Optional Oven Oscillator: | (Option 2) |
| Stability: | 0.05 PPM (0.50° C) |
| Aging: | 0.25 PPM per year |

## A-12 GENERATE AMPLIFIER (OPTIONAL)

| | |
|---|---|
| Gain: | 30 ±2 typical, 250 kHz to 2000 MHz |
| Test Set Output with Amplifier Installed: | Variable to +10 dBm, FM, CW<br>Variable to +4 dBm, AM |

## A-13 TRACKING GENERATOR (OPTIONAL)

| | |
|---|---|
| Frequency Range: | 1 MHz to 999.9999 MHz |
| Output Levels: | |
| TRACK HIGH: | -3 dBm (±5 dB) |
| TRACK MED: | -15 dBm (±7 dB) |
| TRACK LOW: | -40 dBm (+5/-10 dB) |
| Flatness: | ±1 dB over center 80% of displayed area,<br>±5 dB over remaining display. |
| Tracking Span: | 10 kHz to 10 MHz as set by Spectrum Analyzer scan width. |
| Output Impedance: | 50 ohm nominal. |
| Spurious: | Harmonic and Non-Harmonic are <5 dBc, typically 10 dB. Image (RF+180 mHz) typically 0 dBc. |
| Dynamic Range: | >70 dB |
| Tracking Range Adjustment: | -200 Hz to 1.0 kHz minimum as compared to analyzer center. |

## A-14 GENERAL CHARACTERISTICS

| | |
|---|---|
| Temperature Range: | 0 to 50° C |

## A-15 POWER REQUIREMENTS

| | |
|---|---|
| Line: | 105 to 130/210 to 260 VAC<br>50 to 400 Hz at 60 WATTS typical. |
| Ext. DC: | 12 to 30 VDC nominal, 3.5 AMPS at 12 V typical,<br>1.5 AMPS at 28 V typical. |

## A-16 SPECTRUM ANALYZER (FM/AM-1200S ONLY)

Log Scale: Within ±2 dB linearity from -30 dBm to -90 dBm indication

Dynamic Range: 70 dB (from display reading of -30 to -100)

Modes:

| SCAN WIDTH | BANDWIDTH |
|---|---|
| 1 MHz/DIV | 30 kHZ |
| 500 kHz/DIV | 30 kHZ |
| 200 kHz/DIV | 30 kHZ |
| 100 kHz/DIV | 30 kHZ |
| 50 kHz/DIV | 30 kHZ |
| 20 kHz/DIV | 3 kHZ |
| 10 kHz/DIV | 3 kHZ |
| 5 kHz/DIV | 3 kHZ |
| 2 kHz/DIV | 300 Hz |
| 1 kHz/DIV | 300 Hz |