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DME CORPORATION

ATS-2000-EA



Operator's Manual

March 2005 Rev. 06

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DME CORPORATION
12889 Ingenuity Drive
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Acronyms and Abbreviations

µV	Microvolts
AC	Alternating Current
ADC	Analog to Digital Converter
AF	Audio Frequency
AGC	Automatic Gain Control
AM	Amplitude Modulation
ANT	Antenna
AR	As Required
ASK	Amplitude Shift Keying
ATACTS	Advanced Tactical Agile Communications Test Set
BER	Bit Error Rate
BIT	Built In Test
BPSK	Biphase Shift Keying
BW	Band width
C	Celsius
CAGE	Commercial and Government Entity
CCA	Circuit Card Assembly
CDMA	Code Division
COM	Communication
CTCSS	Continuous Tone Coded Squelch System
CW	Carrier Wave
DAC	Digital to Analog Converter
dB	Decibel
dBC	Decibel C- Weighted
dBm	Decibel Milliwatt
dBRL	Decibel Relative
DC	Direct Current
DCS	Defense Communication System
DeMod	Demodulated
Div	Division
DMM	Digital Multimeter
DQPSK	Differential Quadrature Phase Shift Keying
DS	Direct Support
DSP	Digital Signal Processor
DSSS	Direct Sequence Spread Spectrum
DTMF	Dual Tone Multiple Frequency
ESDS	Electrostatic Discharge Sensitive
FDMA	Frequency Division Multiple Access
FF	Fixed Frequency
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
FP	Front Panel
FSK	Frequency Shift keying

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Ft	Foot
G	Giga
GEN	Generator
GFSK	Gaussian Frequency Shift Keying
GMSK	Gaussian Minimum Shift Keying
GND	Ground
GPIB	General Purpose Interface Bus
HF	High Frequency
Hz	Hertz (Cycles per second)
I/O	Input / Output
ID	Interface Device
IEC	International Electrotechnical Commission
IF	Intermediate Frequency
IMD	Intermodulation Distortion
IPB	Illustrated Parts Breakdown
JTRS	Joint Tactical Radio System
Kbps	kilobits per second
Kg	Kilogram
KHz	kilohertz
Kv	kilovolt
Lbs	Pounds
LPD	Low Probability of Detection
LPI	Low Probability Intercept
LRU	Line Replaceable Unit
LSB	Lower Sideband
m	Meter
mA	Milliamp
MAN	Manual
MHz	Mega-Hertz
MMI	Man Machine Interface
Mod	Modulation
MPL	Maintenance Parts List
MPL	Maintenance Parts List
mS	Millisecond
MSDS	Material Safety Data Sheet
MSK	Minimum Shift Keying
MTE	Module Test Extension
mV	Millivolt
mW	Milliwatt
nA	Nanoamp
NHA	Next Higher Assembly
nSec	Nanosecond
Opt	Optional
PC	Personal Computer
pF	Pico Farads
PL	Pressure Level
PM	Phase Modulation
PN	Part Number
PPM	Parts per Million
PSA	Power Supply Adapter
psi	Per Square Inch
PSK	Phase Shift Keying
PTT	Push To Talk
QAM	Quadrature Amplitude Modulation
QBL	Quasi-Bandwidth Limited
QPSK	Quadrature Phase Shift Keying

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RBW	Resolution Bandwidth
RF	Radio Frequency
RFI	Radio Frerquency Interference
RFPA	Radio Frequency Power Amplifier
RH	Relative Humidity
RMS	Root Mean Square
RP	Rear Panel
RSSI	Received Signal Strength Indication
RX	Receive
SC	Single Channel
SCD	Specification Control Drawing
SDR	Software Defined Radio
SINAD	Signal Noise and Distortion
SINCGARS	Single Channel Ground and Airborne Radio System
SRC	Source
SRM	Switching Routing Module
SRU	Shop Replaceable Unit
Std	Standard
SVGA	Super Video Graphics Array
T/R	Transmit / Receive
TDMA	Time Division Multiple Access
TFT	Thin Film Transistor
Th	Time Hold
THD	Total Harmonic Distortion
TMDE	Test Measurement Diagnostic Equipment
Tr	Time Rise
TX	Transmit
UHF	Ultra High Frequency
UOC	Usable On Code
UPA	Units Per Assembly
USB	Universal Serial Bus
UUT	Unit Under Test
V	Volts
VDC	Volts Direct Current
VHF	Very High Frequency
VSWR	Voltage Standing Wave Radio
W	Watt
XVGA	Extended Video Graphics Array

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Safety Summary

Warning and Caution Statements

The following definitions apply to WARNINGS and CAUTIONS found throughout this publication.

WARNING

An operation or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in injury, death, or long term health hazards to personnel.

CAUTION

An operation or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in damage/destruction of equipment or loss of mission effectiveness.

WARNING and CAUTION statements have been strategically placed in the text to emphasize certain steps or procedures for the protection of personnel (WARNING) or equipment (CAUTION). A WARNING or CAUTION once provided will apply each time the related step is repeated, regardless if the WARNING or CAUTION is repeated or not throughout the text. Prior to starting any task the WARNINGS or CAUTIONS included in the text for that task will be reviewed and understood.

General Precautions

The following are general safety precautions that do not appear elsewhere in this publication. These are recommended precautions that personnel shall understand and apply during many phases of operation and maintenance.

Emergency Procedures

If conditions occur which indicate that continued operation of the test set threatens equipment damage or injury to personnel, perform emergency shutdown procedure in accordance with the operating instructions contained in this manual.

Emergency/Protective Equipment

One or more class C fire extinguishers for electrical fires must be immediately available in the test set work area. Do not use water or liquid-base extinguishers on

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electrical fires. Wear protective clothing/equipment (gloves, apron, eye protection, etc.) approved for the materials and tools being used.

Flammable Liquids

When flammable liquids are used in compartments containing non-operating equipment, be sure that there is sufficient ventilation to avoid any accumulation of fumes and that all fumes are cleared before the equipment is energized. When flammable cleaners and primers are being applied, approved explosion-proof lights, blowers, and other equipment is used. Ensure that firefighting equipment is readily available and in working order.

Cleaners/Chemicals

Keep in approved safety containers and in minimum quantities. Some cleaners/chemicals may have an effect on skin, eyes, and respiratory tract. Observe manufacturer's WARNING labels, Material Safety Data Sheets (MSDS), and current safety directives for proper handling and disposal of cleaners/chemicals and soiled clothing. Use only in authorized areas. Unless otherwise indicated in the text, use as described in this technical manual should not result in any immediate health concerns.

Do Not Service Or Adjust Alone

Do not attempt internal service or adjustment unless another person capable of rendering aid and resuscitation is present.

Keep away from live circuits

Operating personnel must at all times observe safety regulations. Do not replace components inside the equipment with the voltage supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the off position due to charges retained by capacitors. To avoid injuries, always remove power from, discharge, and ground a circuit before touching it. Adhere to all lock out/tag out requirements.

Resuscitation

Personnel working with or near high voltages or hazardous materials should be trained in modern methods of resuscitation.

Soldering

Personnel shall use eye protection when soldering. Soldering irons are hot; use proper precautions to prevent burns. Avoid breathing fumes generated by soldering. Good general ventilation is normally adequate.

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Compressed Air

Use of compressed air can create an environment of propelled foreign particles. Air pressure is reduced to less than 30 psi (15 psi for circuit card assemblies) and used with effective ionizing nozzle and personal protection equipment.

Cable Bend/Connector Caps

Damaged cables and connections can cause electrical fires and injury to personnel. Because of this, cabling and connectors should be subject to a continuing program of visual inspection. Protective caps are installed on unmated connectors as a means of preventing damage to pins and contacts. Protective caps can be permanently chain-attached to the connector or be of the plastic slip-on type. When installing a plastic slip-on cap, ensure the cap fits over the connector-locking ring to prevent damage to Radio Frequency Interference (RFI) tines.

Electrostatic Discharge

The ATS-2000-EA unit contains Electrostatic Discharge Sensitive (ESDS) components. Proper handling procedures must be followed to avoid damage to components.

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General Information

Introduction

This Operator's Manual provides information required to operate and maintain the ATS-2000-EA, part of the Advanced Tactical Agile Communications Test Set (ATACTS) family of Synthetic Instrumentation. The information necessary to familiarize personnel with the purpose, characteristics, and physical makeup of the test set is provided in the following paragraphs.

Purpose

The ATS-2000-EA (Figure 1-1), is a portable, self-contained synthetic instrumentation platform used for verification testing and fault detection, isolation and repair of communications, avionics and electronic warfare Units Under Test (UUT). The test set contains the hardware and software necessary to test and verify the performance and electrical functionality of these type UUTs in a field deployed or depot type environment.

Description of Equipment

The ATS-2000-EA is a fully functional communications test set with manual or automated (via UUT Interface Devices) means to evaluate the operational performance of communications equipment, such as radios, vehicular antennas, RF cables, or other ancillary Line Replaceable Units (LRUs). The ATS-2000-EA is capable of providing quantitative measurements of transmitted RF power, receiver sensitivity, frequency accuracy, modulation and waveform metering, spectral analysis in both frequency and time domains, swept antenna measurement, bit error rate and vehicular platform/environmental RF noise levels.

The ATS-2000-EA features a bail handle, corner protectors, milled front and rear panels, and wrap-around case construction. It offers an integral front panel display, keypad and connector placement. A front cover is provided with the unit with internal storage for line cord, antenna, probes, spare fuses, etc.

Consumable Materials

Table 1-1 provides a list of consumable materials for cleaning and repair of the ATS-2000-EA hardware. Consumable materials are expendable items and supplies consumed during component maintenance. Use of authorized alternate parts is approved unless the restriction "NO SUBSTITUTIONS AUTHORIZED" appears in the "SPECIFICATION OR PN" column.

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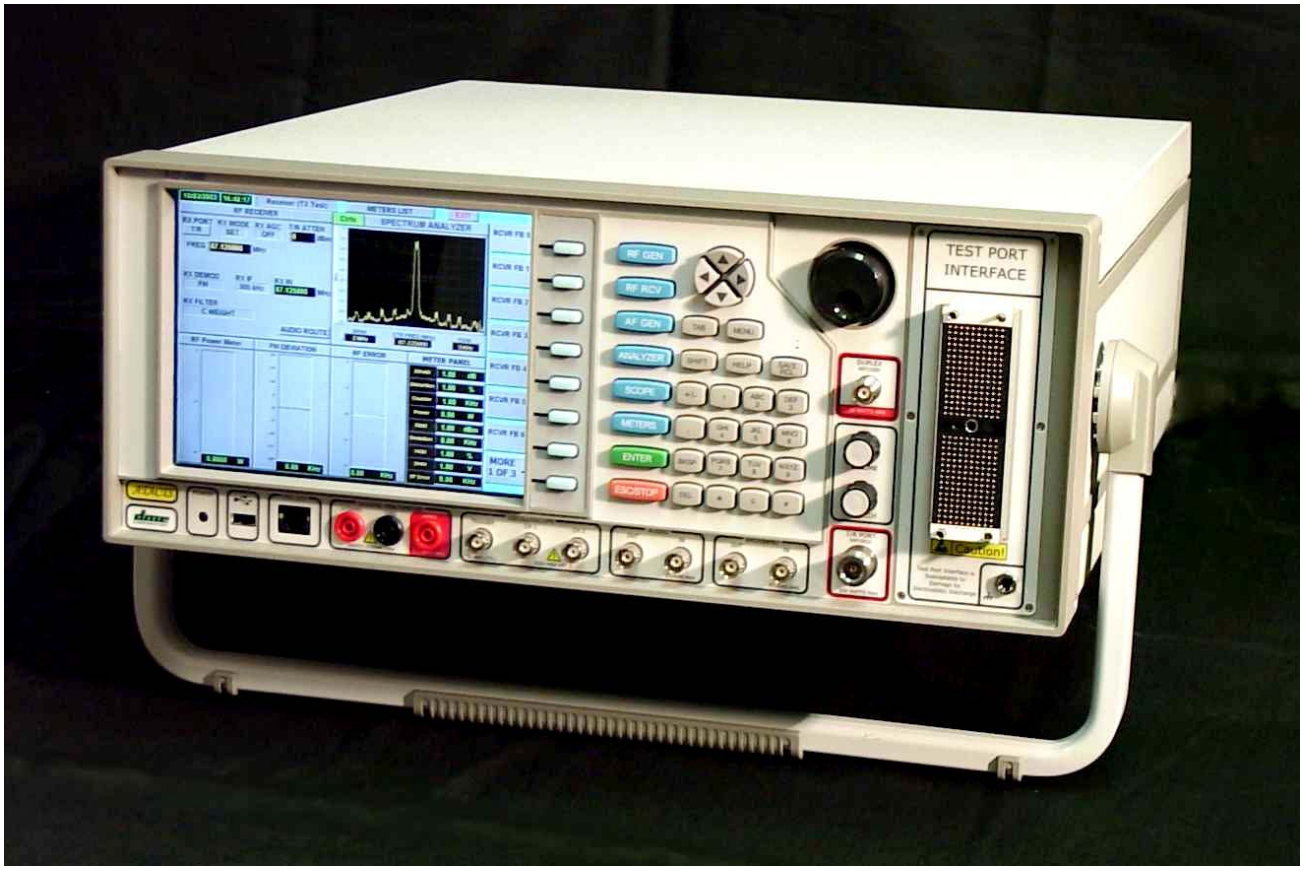


Figure 1-1: ATS-2000-EA

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Table 1-1. Consumable Materials

Item	Nomenclature	Specification or PN	CAGE	Use
1	Adhesive	MIL-A-46146, Type 1, Clear	81348	To glue cushioning pads/gaskets.
2	Alcohol, Isopropyl	TT-I-735, Grade A	81348	To clean surfaces.
3	Bag, Static Shield	MIL-B-81705C, Type III, 8x10 inch	81349	To protect electrostatic sensitive circuit cards.
4	Brush, Acid Swabbing	H-B-643, Type II	81349	To clean connectors.
5	Brush, Paint, Metal Bound	H-B-695	81349	To remove dirt.
6	Cheesecloth	CCC-C-440	81349	For general cleaning.
7	Cloth, Cleaning	CCC-C-46	81349	For general cleaning.
8	Compound, Cleaning	MIL-C-87936, Type 1	81349	To clean external surfaces.
9	Compound, Thermal	100300F00000	1N6F3	For use with heat producing components.
10	Corrosion Resistant Coating, Chemical	MIL-C-5541	81349	Protective finish for case cover, base, feet, inner lid, and sealing extrusions.
11	Detergent, Synthetic, Nonionic	MIL-D-16791	81349	To clean painted surfaces.

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Product Specifications

General Notes

A warm-up time of 5 minutes is required for the following performance requirements.
RF measurements are referenced to 50 Ohms.
Accuracy and Resolution stated in percent are referenced to measured or desired value.
Where resolution exceeds accuracy, resolution takes precedence.

RF Signal Generator T/R and ANT/GEN Connectors

Frequency

Range:	250.0 kHz thru 2000 MHz (Usable down to 100 kHz)
Resolution:	1 Hz
Accuracy:	See Reference Oscillator

Level

T/R Port Range:	-137 dBm thru 0 dBm -40 dBm Max with Reverse Power Present
T/R Port Input Impedance:	50 Ohm (Return Loss > 16 dBRL)
T/R Port Input Protection:	200 Watts for 15 Sec. With Alarm
Duplex Port Range:	-127 dBm thru +10 dBm +36 dBm High Power Output (optional)
Duplex Port Input Impedance:	50 Ohm (Return Loss > 16 dBRL)
Duplex Port Input Protection:	65 Watts for 15 Sec. With Alarm
Resolution:	0.1 dB
Accuracy:	± 0.5 dB (≥ -125dBm) ± 1.5 dB (< -125dBm to –137 dBm)

Spectral Purity

Residual FM:	Post Detection BW = 15 kHz <45 Hz RMS
Residual AM:	Post Detection BW = 15 kHz < 0.20% RMS
Phase Noise:	<-90 dBc/Hz at 20 kHz from output
Harmonics:	<-26 dBc
Non-Harmonics:	<-50 dBc

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Internal/External Modulation – (FM)

Deviation:	100 Hz to ±100 kHz (operation to > ±2 MHz)
Accuracy:	0.1% + Residual FM
Resolution:	1 Hz
Deviation Rate:	0 Hz to 40.0 kHz Audio; up to 300 kbps Digital Data
Waveforms:	Arbitrary
Total Harmonic Distortion:	< 0.1 %

Internal/External Modulation – (AM)

Range:	1 MHz thru 2000 MHz
Modulation:	0 % thru 95 %
Accuracy:	±5 % of setting for 10% thru 90 % modulation
Resolution:	1%
Modulation Rate:	0 Hz to 40.0 kHz Audio; up to 300 kbps Digital Data
Waveform:	Arbitrary
Total Harmonic Distortion:	< 0.7 % (30% thru 90 % modulation)

Internal/External Modulation – (PM)

Range:	1 MHz thru 2000 MHz
Modulation:	0 Radians thru 10 Radians
Accuracy:	±5 %
Resolution:	0.1 Radians
Modulation Rate:	0 Hz to 40.0 kHz Audio; up to 300 kbps Digital Data
Waveform:	Arbitrary
Total Harmonic Distortion:	< 1.0 %

Internal/External Digital Modulation (optional)

Shift keyed Types	ASK
	FSK
	GFSK
	PSK
	BPSK
	DPSK
	MSK
	GMSK
	QBL/MSK
Quadrature Types	QAM
	C4FM
	QPSK
	8PSK
	π/4QPSK
	π/4DQPSK
Modes	FDMA, TDMA, CDMA and others

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Receiver

Frequency
- Range: 250 kHz thru 2000 MHz (useable to 100 kHz)

Internal/External Demodulation
- Waveform Types:
  - Analog: AM, FM, PM

Internal/External Digital Demodulation (optional)
- Waveform Types:
  - Digital: ASK, FSK, GFSK, PSK, BPSK, DPSK, MSK, GMSK, QBL/MSK
  - Quadrature: QAM, C4FM, QPSK, 8PSK, π/4QPSK, π/4DQPSK
- Modes: FDMA, TDMA, CDMA and others

Sensitivity
- ANT/GEN Port: 2 µV (-101 dBm) for 10.0 dB SINAD (30 kHz IF Bandwidth)
- T/R Port: 70 mV (-10 dBm) (or better)

Distortion
- Residual: < 0.5%

Selectivity

Mode	Rec. IF BW	Audio BW
Wide-Band	5000 kHz	Programmable
Medium-Band	300 kHz	Programmable
Narrow-Band	30 kHz	Programmable

Adjacent Channel Rejection: Software Defined Waveform Dependent

Single Side Band: Single Side Band Demodulator, selectable for lower or upper sideband, with a selectable Offset from 10 Hz to 3 kHz from suppressed carrier for signal channel voice testing.

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Frequency Agility

Both RF Generator & Receiver

Settling Time:	< 25 µS 1 MHz to 2000 MHz Measured to within 100 Hz of desired frequency.

Audio Function Generators

Frequency

Range:	0 Hz thru 40.0 kHz
Resolution:	0.1
Accuracy:	± 0.1%

Level

Range:	0 V rms to 7.0 V rms
Output Impedance:	8 Ohms (Nominal)
Resolution:	0.1 mV
Accuracy:	< 1% @ >10 mV rms

Spectral Purity

Total Harmonic Distortion:	< 0.5 % @ >10 mV rms
Waveforms:	Arbitrary

RF Power Meter

Frequency

Range:	500 kHz thru 2000 MHz

Carrier Level (Average RF Power at T/R)

Input Level:	0.1 mW to 200.0 W *** See T/R Port On/Off Specification ***
Range:	0.1 mW to 200.0 W
Resolution:	1% or 0.1 mW
Accuracy:	±10% (<±5% Typical)
Return Loss:	>16 dBRL
Display Readings:	Volts, Watts and dBm
Compensation Factors:	External Attenuation or Gain

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Radio Frequency Counter & Frequency Error Meter

Frequency

Range:	250 kHz thru 2000 MHz
Accuracy:	See Reference Oscillator
Resolution:	0.1 Hz
Carrier Level:	See T/R and ANT/GEN Connector Specification

Frequency Error

Range:	± 0 Hz thru ± 2.500000 MHz (with 5 MHz IF) The receiver bandwidth will determine the upper limits
Accuracy:	See Reference Oscillator
Resolution:	0.1 Hz
Carrier Level:	See T/R and Duplex Connector Specification

Frequency Modulation (FM) Meter

Deviation

Range:	± 100 Hz to ± 100 kHz
Accuracy:	± 1.0 % + source residual
Resolution:	1 Hz
Modulation Rate:	0 Hz to < 300 kHz
Carrier Level:	See T/R and Duplex Connector Specification

Amplitude Modulation (AM) Meter

Modulation

Range:	1 % thru 95 % (operation to 100%)
Accuracy:	2.0 % full scale + source residual
Resolution:	1 %
Modulation Rate:	0 Hz to < 300 kHz
Carrier Level:	See T/R and Duplex Connector Specification

Phase Modulation (PM) Meter

Deviation

Range:	0 Radians to 10 Radians (peak)
Accuracy:	± 1.0 % + source residual
Resolution:	0.01 Radians
Modulation Rate:	0 Hz to < 300 kHz
Carrier Level:	See T/R and Duplex Connector Specification

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Error Vector Modulation (EVM) Meter

Percent Error

Range:	0 to 100%
Accuracy:	± 3% + source residual
Resolution:	0.01%+ source residual
Residual EVM:	< 2%
Modulation Rate:	0 Hz to < 300 kHz
Carrier Level:	See T/R and Duplex Connector Specification

Audio Frequency Counter

Frequency

Range:	0 Hz thru 100.0 kHz (in 4 decade ranges)
Accuracy:	See Reference Oscillator
Resolution:	0.1 Hz
Input Waveform:	Sine or Square Wave
External Signal Level:	See Baseband Input Connector Specification

Distortion Meter

Distortion

Range:	0.1% thru 50.0%
Accuracy:	± 0.5%
Resolution:	0.1%
Signal Frequency:	100 Hz and 10 kHz
External Signal Level:	See Baseband Input Connector Specification

SINAD Meter

SINAD

Range:	3.0 dB thru 40.0 dB
Accuracy:	± 1.0 dB
Resolution:	0.1 dB
Signal Frequency:	100 Hz and 10 kHz
External Signal Level:	See Baseband Input Connector Specification

Digital Multimeter

3 ½ Digit Model (standard)

Voltmeter (DC/AC)

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Range:	0.1 mV to 250 V Maximum
Accuracy:	± 5%, full scale (AC)
	± 1%, full scale (DC)
Resolution:	3½ digit display, Max Resolution (0.1 mV)
Frequency:	50 Hz thru 10 kHz
Input Impedance:	>1M Ohm Nominal
Selectable Loads:	150, 300 and 600 Ohms

Current Meter (DC/AC)

Range:	0.01 mA to 2.5 ADC (20 Amps with shunt)
Accuracy:	± 1% full scale
Resolution:	3½ digit display, Max Resolution (0.01 mA)

Ohmmeter

Range:	0.1 to 30 M Ohm
Accuracy:	± 1% full scale
Resolution:	3½ digit display, Max Resolution (0.1 Ω)

6 ½ Digit High Accuracy Model (optional)

Voltmeter (DC/AC)

Range:	0.1 mV to 330 V Maximum
Accuracy:	± 0.5%, full scale (AC) (typical)
	± 0.01%, full scale (DC) (typical)
Resolution:	6½ digit display, Max Resolution (100nV)
Frequency:	10 Hz thru 100 kHz
Input Impedance:	AC: >1M Ohm Nominal, shunted by <100pF
	AC: >10M Ohm Nominal
Selectable Loads:	150, 300 and 600 Ohms

Current Meter (DC/AC)

Range:	0.01 mA to 2.5 ADC (20 Amps with shunt)
Accuracy:	± 0.5% full scale (Typical)
Resolution:	6½ digit display, Max Resolution (10nA)

Ohmmeter

Range:	0.1 to 30 M Ohm
Accuracy:	± 0.01% full scale (typical)
Resolution:	6½ digit display, Max Resolution (100μΩ)

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Digital Oscilloscope (8 Bit)

40 MHz / 100 Msps Model (standard)

Oscilloscope

Vertical Input:	2 Channels
Single Shot Rate:	100 MS/sec
Vertical Bandwidth:	50 MHz
Frequency Range:	DC to 40 MHz
Vertical Input Ranges:	1 mV/Div to 50V/Div (1-2-5 sequence)
Max Input Voltage:	200 V
Vertical Accuracy:	± 2% of full scale
Digitizer Resolution:	8 Bits
Coupling:	DC, AC, GND
Horizontal Sweep Rate:	100nSec/Div to 1 Sec/Div
Timebase Accuracy:	± 100 ppm
External Input Impedance:	1 M Ohm nominal, shunted by 27 pf 50 Ohms

200 MHz / 2.5 Gsps High Speed Model (optional)

Oscilloscope

Vertical Input:	2 Channels
Single Shot Rate:	2.5 GS/sec
Vertical Bandwidth:	200 MHz
Frequency Range:	DC to 200 MHz
Vertical Input Ranges:	1 mV/Div to 50V/Div (1-2-5 sequence)
Max Input Voltage:	200 V
Vertical Accuracy:	± 2% of full scale
Digitizer Resolution:	8 Bits
Coupling:	DC, AC, GND
Horizontal Sweep Rate:	10nSec/Div to 1 Sec/Div
Timebase Accuracy:	± 100 ppm
External Input Impedance:	1 M Ohm nominal, shunted by 27 pf 50 Ohms

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RF Spectrum Analyzer

Range

Range:	250 kHz thru 2000 MHz

Frequency Span

Range:	1 kHz/Div to 200MHz/Div, plus zero scan
Accuracy:	± 5%
Time Base Accuracy:	See Reference Oscillator

Level

Vertical Range:	Log (10 dB/Div and 2 dB/Div)
Vertical Resolution:	1.0 dB (10 dB/Div) 0.2 dB (2 dB/Div)
Range (Display):	80 dB (at 0 dB attenuation)
Overall Accuracy:	± 2 dB

Attenuator

Resolution:	Selectable 10 dB Steps

Dynamic Signal Analyzer (optional)

Range

Range:	1 Hz thru 250 kHz

Frequency Span

Range:	1 Hz/Div to 25 kHz/Div
Accuracy:	± 5%
Time Base Accuracy:	See Reference Oscillator

Level

Vertical Range:	Log (10 dB/Div and 2 dB/Div)
Vertical Resolution:	1.0 dB (10 dB/Div) 0.2 dB (2 dB/Div)
Range (Display):	80 dB (at 0 dB attenuation)
Overall Accuracy:	± 2 dB

Attenuator

Resolution:	Selectable 10 dB Steps

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Bit Error Rate Meter (BER)

Range

Range:	1×10^{-1} to 1×10^{-8}

Data

Data Rates:	Programmable
Data Pattern Size:	100 to 1,000,000 Bits
Data Pattern Type:	Random, Fixed, User defined
Accuracy:	1 X 10 E^{-8}
External Input Level:	See Baseband Input Specification

Input/Output (I/O) Connectors

T/R Port Input

Level:	-10 dBm to +53 dBm
High Power Conditions:	50 Watt continuous at 25 degree C Ambient > 50 W to 100 W at 30.0 seconds ON, 2.0 minutes OFF (50° C ambient) > 100 W to 200 W at 15.0 seconds ON, 2.0 minutes OFF (50° C ambient)

Duplex Port Input

Level:		-110 dBm to +10 dBm
10.7 MHz IF Output Level	(Rear Panel)	-10 dB (typical)
70 MHz IF Output	(Rear Panel)	-10 dB (typical)
10.7/70 MHz IF Input	(Rear Panel)	-10 dB (typical)

External Audio/Baseband Outputs

Audio Output:	Audio Level:	0 Vrms to 7.0 Vrms
	Frequency:	0 to 100 kHz (sine), 300 kbps digital
	Impedance:	Balanced: 8 Ohm (nominal) Unbalanced: 50 kOhm (nominal)
	Resolution:	0.1mV
	Accuracy:	< 1% (<0.1% THD) @ >10 mV rms
Baseband Output:	Signal Level:	0 Vrms to 7.0 Vrms (typical) (scaleable)
	Frequency:	0 to 100 kHz (sine), 300 kbps digital
	Impedance:	Balanced: 600 Ohm (nominal) Unbalanced: 50 kOhm (nominal)
	Resolution:	0.1mV
	Accuracy:	< 1% (<0.1% THD) @ >10 mV rms

External Audio/Baseband Inputs

Audio Input:	Audio In:	0.1 Vrms to 30 Vrms
	Frequency:	0 to 100 kHz (sine), 300 kbps digital
	Impedance:	Balanced: 600 Ohm (nominal) Unbalanced: 50 kOhm (nominal)
Baseband Input:	Signal In:	0.1 Vrms to 30 Vrms
	Impedance:	Balanced: 600 Ohm (nominal) Unbalanced: 50 kOhm (nominal)
	Frequency:	0 to 100 kHz (sine), 300 kbps digital

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Microphone Connection Port (Front Panel)

RJ-45 Connector	PIN 1 Power Out +5 Volts @ 500mA PIN 2 Power Ground PIN 3 Hook Switch (ground to enable CTCSS [PL] or open for monitor) PIN 4 Ground PIN 5 Microphone Audio PIN 6 Microphone PTT PIN 7 Program PIN 8 Handset Audio (low level receive audio)

USB Computer Ports (Front / Rear Panel)

Standard USB Port (Front)	Supports External USB Accessories
Standard USB Port (Rear)	Supports External USB Accessories
Standard USB Port (Rear)	Supports Power Supply Adapter (PSA-2000) Command/Control Interface
Standard USB Port (Rear)	Supports Module Test Extension (MTE-2000) Command/Control Interface

Ethernet Computer Port (Rear Panel)

10/100BaseTx Ethernet Port	Supports Internet and Intranet Connection

RS-232C Connector Port (Rear Panel)

Operations Mode	Off, PC (Input/Output)
Baud Rates	300 to 115200
Stop Bits	1, 2
Parity	Odd, Even, Mark, Space, None

PS2 Computer Ports (Rear Panel)

Keyboard	External keyboard interface connection.
Mouse	External mouse interface connection.

External Video Port (Rear Panel)

External Video	SVGA interface connection for external multi-sync monitor. (15-pin sub-miniature D, female connector)

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PSA-2000 LRU Power Supply Port (Rear Panel)

LRU DC Voltage #1 Input	Supports PSA-2000	LPS-001 Outputs (0-30 VDC @ 20 Amps) LPS-002 Outputs (0-48 VDC @ 10 Amps)
LRU DC Voltage #2 Input	Supports PSA-2000	LPS-001 Outputs (0-30 VDC @ 20 Amps) LPS-002 Outputs (0-48 VDC @ 10 Amps)
LRU DC Voltage #3 Input	Supports PSA-2000	LPS-001 Outputs (0-30 VDC @ 20 Amps) LPS-002 Outputs (0-48 VDC @ 10 Amps)
LRU DC Voltage #4 Input	Supports PSA-2000	LPS-001 Outputs (0-30 VDC @ 20 Amps) LPS-002 Outputs (0-48 VDC @ 10 Amps)

GPIB Computer Port (Supported via USB Adapter - Rear Panel)

GPIB Port.	Supports IEEE-488.1-1987 Instrument Control

Reference Oscillator

Standard ± 0.3 ppm TCXO	Temperature Stability	± 0.3 ppm (0 to 50 degrees C)
Optional ± 0.1 ppm TCXO	Temperature Stability	± 0.1 ppm (0 to 50 degrees C)
Optional ± 0.01 ppm OCXO	Temperature Stability	± 0.01 ppm (0 to 50 degrees C)

Display

Type	Color High-Resolution TFT, Sunlight Readable
Size	8.5 “ Diagonal
Resolution	1024 x 768

Weight and Dimensions

Size	7.0" H x 17.5" W x 22" D
Weight	< 18 kg (< 48 lbs.)

Power Requirements

AC Line	
Voltage:	90 to 260 VAC
Frequency:	50 Hz to 400 Hz
Power:	< 300 Watts typical (ATS-2000-EA w/o High Power RF)
External DC	(Optional)
Voltage:	20 thru 32 VDC

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Self Test

Built in Test	User Accessible Self Test (BIT) Module Level Fault Isolation via TF-2000A
Self Test	Module Level Fault Isolation via TF-2000A For self test instructions, see Appendix B

Accessories

Standard	Broadband Antenna (flexible) Scope Probes (2) DMM Probes AC Power Cord Extra Fuses Operators Manual
Optional	External Computer Keyboard Standard Computer Mouse Maintenance Manual DC Power Cord TF-2000A Self Test Kit

Reliability

Mean Time Between Failure

> 3000 hours	Per MIL-HDBK-781 Reference MIL-HDBK-217

Compliance

Temperature/Humidity/Altitude per MIL-PRF-28800F

Non-Operating Temperature Range	-40° to +71° C
Operating Temperature Range	0° to +50° C at 95% RH (non-condensing)
Altitude (Non-Operating)	4600 meters (15000 ft)

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EMI/RFI per MIL-PRF-28800F

MIL-PRF-28800F	Test Data (MIL-STD-1686C)
Conducted emissions, power leads	CISPR 11, Class A, 150 kHz to 30 MHz
Conducted immunity, power leads	IEC 1000-4-6, 3 V AC-RMS, 150 kHz to 80 MHz, 80% amplitude modulation with 1 kHz sine wave
Conducted immunity, power leads spikes	IEC 1000-4-4, 1 KV peak for AC Lines, 0.5 KV peak for signal, control, and DC lines, 5nS Tr (T-rise) and 50 ns Th (T-hold), 5 kHz repetition frequency
Radiated emissions, electric field	CISPR 11, Class A, 30 MHz to 1000 MHz
Radiated immunity, electric field	IEC 1000-4-3, 3 V/m, 80 MHz to 1000 MHz, 80% amplitude modulation with 1 kHz sine wave
Electrostatic discharge Immunity	IEC 1000-4-2, 4 KV contact discharge, 8 KV air discharge

Shock/Vibration per MIL-PRF-28800F

Shock

Frequency	Cycle Time	G Level Shock
3 Repetitive in each axis	½ sine shock pulse	30 G

Vibration:

Frequency	Cycle Time	G Level Shock
5 to 500 Hz all axis	10 minutes random	2 G
5 to 55 Hz all axis	7.5 minutes up and 7.5 minutes down 10 minutes resonance dwell time	

Safety

Safety	Per EN 61010-1: 1993

Approvals

Approvals	UL Approved CE Approved

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System Description

Product Description

The ATS-2000-EA is part of the Advanced Tactical Agile Communications Test Set (ATACTS) family of Synthetic Instrumentation Platforms. The ATACTS family features open architecture, software-defined communications test set platforms offering full control of frequency, phase and amplitude of the modulation source as well as the ability to demodulate and measure these complex modulation types. The ATACTS platform uses extensive Digital Signal Processing (DSP) to provide full generation, receiving, monitoring, metering and measurement of all waveform types defined today.

The ATS-2000-EA RF Front-End is designed with sufficient bandwidth and frequency agility to support all Spread Spectrum signal types and the fastest RF frequency hopping waveforms. Utilizing commercial Pentium IV processor technology, the operating system is Windows-based allowing full compatibility with extensive commercially available software. TestEZ, a user-friendly tool set that augments the LabView/LabWindows instrumentation package, allows ease of programming for automated applications.

The ATS-2000-EA is designed to support Frequency Hopping Spread Spectrum (FHSS) type waveforms through its ability to change from one RF frequency to another in less then 25 µS. It is fully capable of supporting SINAD and Distortion measurements anywhere in the audio band. The ATS-2000-EA utilizes Direct Sequence Spread Spectrum (DSSS) to support increased bandwidth requirements and provide a low probability of intercept and/or detection (LPI/LPD). The test set is designed to support wideband TDMA, CDMA and other DSSS type formats used by high-speed communications links in radios and provides access to the 70 MHz and 10.7 MHz IF for special purpose operation.

The ATS-2000-EA uses software-defined communications technology, hardware and software options, add-on adapter assemblies, and automated test program sets for expandability and configurability. It is capable of accepting embedded UUT Interface Devices (UUT-ID and UUT-COM) without the need for additional equipment. The embedded UUT-ID/UUT-COM provides a synthetic instrument type interface to the 350-pin Hypertronics connector on the front panel for automated LRU testing applications. Additional optional equipment, such as High Power RF Source, LRU Power Supply Adapters (PSA) and the Module Test Extension (MTE), provide a complete Automated Test Equipment capability.

The ATS-2000-EA features high-resolution XVGA graphics, a front panel keypad, and additional computer ports: Ethernet, USB, RS-232C, XVGA and GPIB (via an optional adapter). It also supports an external keyboard and mouse for enhanced man-machine interface. Interactive electronic technical manuals and training material for viewing on the display are available optionally. With the optional UUT/ID installed, the ATS-2000-EA is able to provide full troubleshooting flowcharts and “picture-probing” instructions to the operator.

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Product Configuration

The ATS-2000-EA features a solid, welded case construction with the internal chassis connected to the front panel. The chassis assembly houses the PXI card-cage, PXI motherboard, RF assemblies, power supply and internal cooling fans. These assemblies are removable for ease of maintenance by releasing screws on the rear panel and removing the top and/or bottom cover. This allows maximum accessability to all assemblies in the ATS-2000-EA platform and unit maintainability. The rear panel may also be removed for additional access to various assemblies by unplugging the associated interface connectors. The milled front and rear panels contain EMI/RFI gaskets to ensure MIL-PRF-28800F Class III compliance.

ATS-2000-EA standard and optional hardware and software are identified below.

Display	8.5” Color Flat-Panel TFT (Sunlight Readable) 1024 x 768 Resolution
Keypad	Function keys (soft, non-slip type) Numerical entry keys (soft, non-slip type) Field select keys (soft, non-slip type) Volume knob (Volume – Optical to SRM) Squelch knob (Squelch – Optical to SRM) Spinner knob (Optical, Field Selection & Increment/Decrement)
Power	AC Operation DC Operation (with AC/DC Power Supply option)
Size	Width 17.5” Height 7.0” Depth 22.0”
Weight	48 lbs.
Std. Accessories	AC Power Cord Spare Fuses Antenna Digital Multimeter Probes Oscilloscope Probes Operators Manual TF-2000A Self Test Kit

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Opt. Accessories	DC Power Cord High Stability Time-Base Soft-Side Carrying Case Hard-Side Carrying Case Maintenance Manual
Opt. Hardware	200 MHz High Speed Dual Channel Oscilloscope 6 ½ Digit High Accuracy DMM High Power RF Source (extends duplex port to +36 dBm) VSWR Mismatch Assembly (programmable for T/R port) VSWR Measurement Assembly (thru-line power meter) High Power Out-of-Band Source (50 MHz @ 50 Watts) UUT-ID Interface (320 pin automated test port interface) UUT-COM Interface (320 pin automated test port interface) Power Supply with AC/DC Operation (20 – 32 VDC operation) Power Supply Adapter (PSA-2000 - automated LRU/SRU testing) Module Test Extension (MTE-2000 - automated SRU fault isolation)
Opt. Software	Tracking Generator Dynamic Signal Analyzer Digital MOD/DEMOD Formats Bit Error Rate (BER) Measurement Software Defined Waveform Support (SINCGARS, Have Quick, etc.) Spectral Allocation Measurement Noise/Interference Measurement Test EZ Application Specific TPSs

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Product Features

- Digital Frequency Agile RF Generator and Receiver
- Single Channel (SC), Frequency Hopping (FHSS), Spread Spectrum (DSSS)
  - 250 kHz to 2000 MHz Operation
  - 1 Hz Tuning Resolution
  - <50 µS Switching
- Modulation/Demodulation Capability
  - Analog Waveforms (standard)
    - Analog (AM, FM, PM)
  - Digital Waveforms (optional)
    - Digital (ASKs, FSKs, PSKs, MSKs)
    - Quadrature (QAM, C4FM, QPSK, 8PSK, π/4QPSK)
    - Modes (FDMA, TDMA, CDMA and others)
- RF Metering
  - RF Power
  - RF Counter
  - RF Frequency Error
  - RF RSSI
- Audio and Data Generation & Meters
  - AF Counter
  - AF Level
  - Bit Error Rate (waveforms optional)
- Modulation Metering
  - Deviation
  - Modulation
  - Constellation (optional)
  - Distortion
  - SINAD
  - DMM / 3 ½ digit (standard)
  - DMM / 6 ½ digit (optional)
- Dual Channel Digital Storage Oscilloscope
  - 50 MHz / 8 bit (standard)
  - 200 MHz / 8 bit (optional)
- RF Spectrum Analysis
- Dynamic Signal Analysis (optional)

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Block Diagram

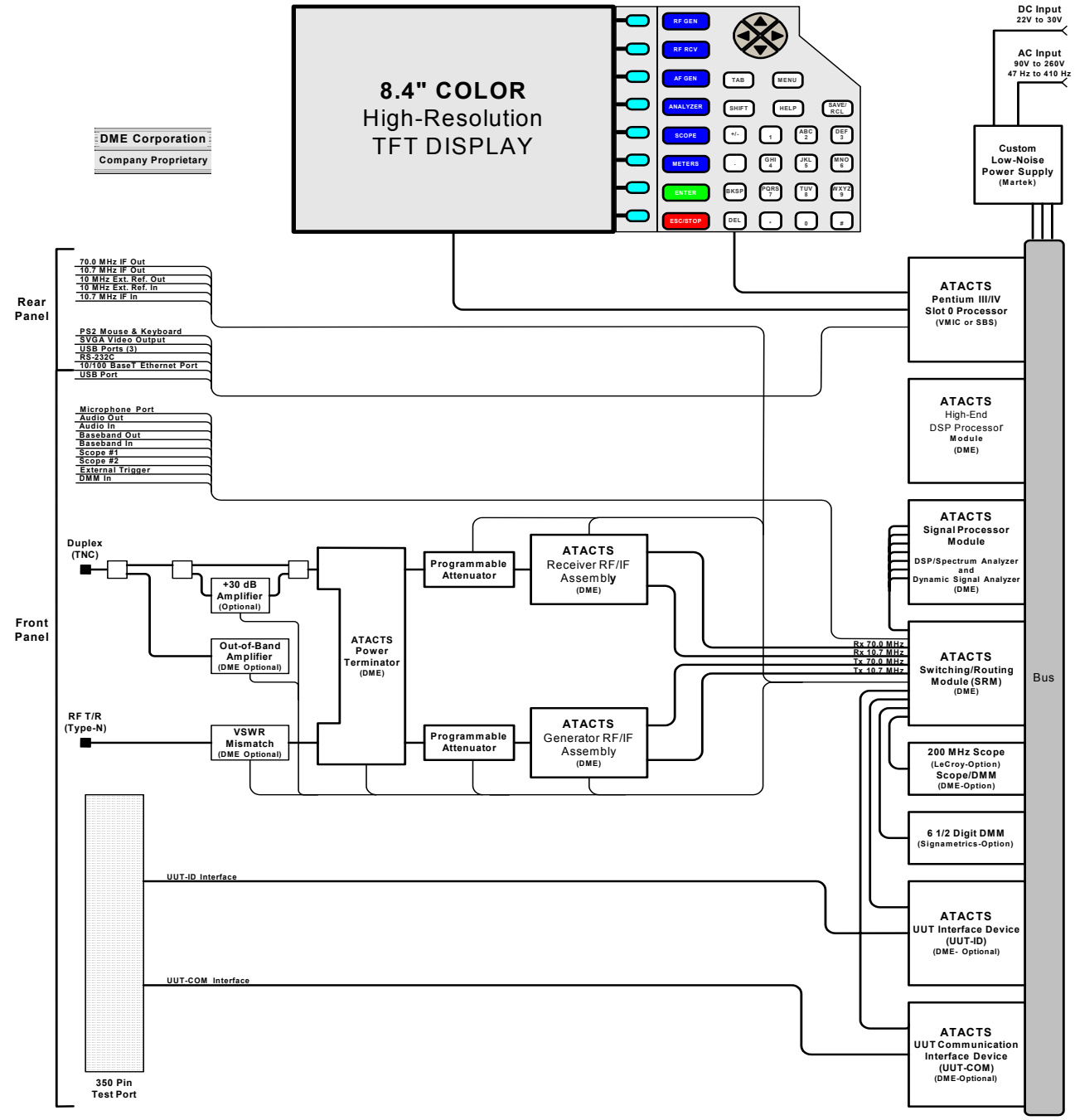


Figure 2-1. ATS-2000-EA Block Diagram

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Module Description

Power Termination Assembly

The ATS-2000-EA Power Termination Assembly is the primary RF interface to the front panel T/R and Duplex connectors. It provides wideband switching for all RF Generator and Receiver functions as well as supporting direct connection and power measurement up to 200 Watts.

- RF operation from 250 kHz to 2000 MHz (usable down to 100 kHz)
- Wideband to support DSSS and FHSS
- RF power termination/switching to 200W (50 Watts continuous)
- RF power detection and measurement from 0.1 mW to 200 Watts

Programmable Step Attenuators

Programmable step attenuators support accurate/linear level control of the RF signal input and output paths to/from the T/R Port and/or Duplex Port, through the Power Termination Assembly to the RF Up and RF Down Converters.

- RF operation from 250 kHz to 2000 MHz (usable down to 100 kHz)
- Wideband to support DSSS and FHSS
- 0.1 dB steps from +10 to –137 dBm RF output range
- +/- 0.5 dB linearity and flatness

+36 dBm High Power Amplifier (optional)

The ATS-2000-EA supports the incorporation of an internal High-Power Amplifier for automated or manual testing of RF Power Amplifiers and to support broadcast “over-the-air” testing of communications systems in the field.

- RF operation from 1 MHz to 250 MHz
- Wideband to support the following:
  - FF (Fixed Frequency)
  - DSSS (Direct Sequence Spread Spectrum)
  - FHSS (Frequency Hopping Spread Spectrum)
- Supports testing RFPA applications

VSWR Mismatch Assembly (optional)

The ATS-2000-EA supports the incorporation of an internal VSWR Mismatch Assembly to provide programmable mismatches to the Unit Under Test via the T/R Port.

- Selectable mismatches (None, 1.65:1, 2.3:1, 2.8:1, 4.7:1, 6.4:1)

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VSWR Measurement Assembly (optional)

The ATS-2000-EA supports the incorporation of an internal VSWR Measurement Assembly for automated or manual testing of “thru-line” forward and reverse power of communications systems.

- Forward/reverse power measurement for VSWR Calculation.
- VSWR: 26 dB Directivity, 1.15:1 max insertion VSWR, 0.10 insertion loss

Out-of-Band Amplifier (optional)

The ATS-2000-EA supports the incorporation of an internal Out-of-Band Amplifier to support automated or manual testing of HF/VHF Tranceivers, RF Amplifiers and Pre-Post Selectors. This amplifier provides an “out-of-band” RF signal, in conjunction with the standard “in-band” RF signal generator capability, of sufficient level to verify protection circuitry on the output of RF Amplifiers and Pre/Post selectors for Cosite Protection Testing.

- RF CW only operation at 50 MHz
- RF output fixed at ~50 Watts
- Supports testing RFPA’s, IFPA’s and Pre/Post Selector Applications

Generator RF/IF Assembly

The Generator RF/IF Assembly (Up Converter) characteristics are below.

- RF operation from 250 kHz to 2000 MHz (usable down to 100 kHz)
- Wideband/narrowband IF for all modulation types
- 1 Hz tuning resolution
- -137 dBm to +10 dBm output (with step attenuator and power term)
- DDS conversion from 70 MHz/10.7 MHz
- Frequency agile – < 25 uS settling time
- 0.3 PPM frequency stability (optional 0.1 or 0.01 PPM)

Receiver RF/IF Assembly

The Receiver RF/IF Assembly (Down Converter) characteristics are below.

- RF operation from 250 kHz to 2000 MHz (usable down to 100 kHz)
- Wideband/narrowband IF for all modulation types
- 1 Hz tuning resolution
- -102 dBm typical sensitivity
- DDS conversion from 70 MHz/10.7 MHz
- Frequency agile – < 25 uS settling time
- 0.3 PPM frequency stability (optional 0.1 or 0.01 PPM)

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Slot 0 Host Processor

The ATS-2000-EA Slot 0 Host Processor is a 1-wide 6U Pentium III/IV processor with a rear panel removable Hard Drive for security. The following I/O connections are available via a Transition Board on the cPCI J3 and J4 connectors on the rear of the motherboard:

2 – RJ45 ethernet connectors
2 – DB-9 male serial RS-232 ports
2 – Standard USB connectors
1 – LVDS video port and XVGA video port
1 – Enhanced IDE 40-pin connector and 34-pin floppy drive connector
1 – Combined PS2 mouse/keyboard port

Signal Processing Module

The Signal Processing Module provides the primary Modulated IF frequency to the RF/IF Generator Assembly and demodulates the IF signal provided from the Receiver RF/IF Assembly for applications requiring more than just standard AM/FM/PM/FSK support. In addition to the filtering and mod/demod, the Signal Processing Module has all necessary metering and measurement functions required to perform as a general purpose communications test set. This module has the following capabilities:

- DSP based baseband module (SDR Technology)
- IF filtering (selectable)
- Digital Up/Down Conversion (DDC), as required.
- Post Detection Filtering (All Pass, Bandpass, Lowpass, Highpass, Cwt or Notch)
- Post Detection Processing
- Digital Modulator/Demodulator
- AD9852 Direct Digital Synthesis (DDS) Modulator
- Multiple 100+ MHz 14 bit A/D and D/A
- Virtex II FPGA technology
- TMS320C6xxx Series Digital Signal Processing
- Analog/digital stimulus measurement and metering

  RF Power Meter
  RF Counter
  RF Error Meter
  AF Generators
  AF Counter
  AF Level Meter
  Bit Error Rate Meter
  Deviation Meter
  Modulation Meter
  Phase Modulation Meter
  Error Vector Magnitude Meter
  Constellation
  Distortion Meter
  SINAD Meter
  DMM (an independent module)

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Switching Routing Module (SRM)

The ATS-2000-EA Switching Routing Module serves as the primary switching and signal-conditioning module for the system. This module contains custom circuitry that allows advanced isolation of the various signal types, as they are routed to/from various stimulus and measurements devices. The dual Audio Generator is also located on this module and provides arbitrary waveform support. The primary function of the SRM is to provide:

- Primary signal routing for all RF, IF & baseband signals
- RF Front-End IF routing and control
- DSP baseband processor input/output routing
- Instrumentation routing/control (analyzer, ocilloscope, DMM)
- Front panel stimulus/measurement connector routing
- Audio and baseband input amplification and scaling
- Audio and baseband output amplification and scaling
- ID interconnect for all automated UUT measurements

The SRM ensures that all possible switching and routing of signals are available to support stimulus and measurement routing needs.

Oscilloscope

Several oscilloscope options are offered with the ATS-2000 platform. A 40 MHz dual-channel digital storage oscilloscope is supplied as standard equipment. An optional 200 MHz dual-channel, 2.5 Gsps digital storage oscilloscope may be selected. The ATS-2000-EA standard oscilloscope module has the following capabilities:

- Vertical Input: 2 Channels
- Sample Rate: 100 MS/sec
- Vertical Bandwidth: 50 MHz
- Frequency Range: DC to 40 MHz
- Vertical Input Ranges: 1 mV/Div to 50V/Div (1-2-5 sequence)
- Max Input Voltage: 200 V
- Vertical Accuracy: ± 2% of full scale
- Digitizer Resolution: 8 Bits
- Coupling: DC, AC, GND
- Horizontal Sweep Rate: 100nSec/Div to 1 Sec/Div
- Timebase Accuracy: ± 100 ppm
- External Input Impedance: 1 MOhm nominal, shunted by 27 pf 50 Ohms

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Spectrum Analyzer

The ATS-2000-EA provides full spectrum frequency coverage with the digital RF Spectrum Analyzer and Dynamic Signal Analyzer functions. This offers the ability to observe an extended range of harmonics from lower frequency signals. Full Tracking Generator capability is also supported. Several Spectrum Analyzer options are available; typical characteristics associated with the RF and AF Analyzers are:

RF Spectrum Analyzer

- RF range from 250 kHz thru 2000 MHz
- Frequency spans from 1 kHz/Div to 200 MHz/Div
- Display range typically greater than 80 dB
- High Bandwidth/Low Noise input
- Programmable sampling rates

AF Spectrum Analyzer

- AF range from 0.1 Hz thru 250 kHz
- Frequency span from 1 Hz/Div to 25 kHz/Div
- Display range typically greater than 80 dB
- Digital filtering and FFT based signal analysis
- Custom data processing capable

Digital Multimeter

Several Digital Multimeter options are offered with the ATS-2000-EA platform. A 3 ½ Digit DMM with sufficient resolution and accuracy to support typical metering and measurement functions is supplied as standard in the ATS-2000. The 6½-digit High Accuracy DMM option may be supplied to provide accurate readings and sufficient resolution to meet extended measurement criteria. The ATS-2000-EA standard DMM has the following characteristics.

- 3½ digit resolution
- Flexible, full feature auto-ranging, sourcing DMM
- DC & AC Volts and Current
- 2-Wire Ohms
- AC True RMS Measurements (50 Hz to 10 kHz)
- Up to 100 reading per second
- 300 Volt isolation barrier
- P-P, Crest and Median measurements

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UUT Interface Device (optional)

The UUT Interface Device modules (UUT-ID & UUT-COM) are the primary hardware components that make the ATS-2000-EA an automated testing platform. The UUT-ID provides a generic programmable interface capable of connecting to a wide variety of communications, avionics and EW LRUs. A secondary board supports the UUT Communications Processor (UUT-COM) functions. The Test EZ (optional) suite provides a friendly Graphical User Interface. The following characteristics apply to the UUT-ID:

- Plug & Play UUT interface for LRU testing (optional)
- Interface to 350-pin test port
- Provides signal conditioning
- Provides programmability/configurability of test port
  - Characteristic matching (impedance control)
  - Signal loading, multiplexing, switching, routing, control
- Supports DMM switching and routing
- Supports ground testing
- Supports 2-Wire FSK interface

UUT Communications Processor (optional)

The UUT Communications Processor (UUT-COM) provides a generic programmable interface capable of connecting to a wide variety of communications, avionics and EW LRUs. The UUT-COM provides multiple RS-232, RS-422/423, Internet, MIL-1553 and other common remote control interfaces for devices under test. The Test EZ (optional) suite provides a friendly GUI. The following characteristics apply to the UUT-COM:

- Plug & play UUT interface for LRU testing (optional)
- Interface to 350-pin test port
- Provides signal conditioning for test port
- Total programmability/configurability of test port
  - Characteristic matching (impedance control)
  - Signal loading, multiplexing, switching, routing and control
- Supports special data handling
  - TRANSEC, COMSEC, Data Link BER, DS-101/102 Fill
- Supports communications testing
  - RS-232, RS-422/423, Internet, MIL-1553

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Power Supply Adapter (optional)

The ATS-2000-EA supports the use of an optional Power Supply Adapter (PSA-2000) for automated control and monitoring of the UUT primary operational supply voltage. The PSA is short-circuiting protected and provide “safe-to-turn-on” capability so as not to be destructive if connected to LRUs containing catastrophic failures resulting in shorted power to ground. The PSA also provides current limiting and measuring current consumption to 0.01 Amps resolution.

The PSA supports an optional DC operation for running the PSA-2000 from an external DC power source. This DC operation mode accepts DC power form 20 to 32 volts.

- Provides primary power to the LRU (UUT)
- Provides secondary voltages as applicable
- Voltage control for Low Voltage/High Voltage tests
- Current consumption measurement
- Short circuit protection
- Current limiting capability

Typical LRU Power Supply characteristics are as follows:

Supply Output	Output Voltage (VDC)	Line Regulation %	Total Regulation %	Peak Ripple & Noise (mV)	Minimum Load (A)	Maximum Load (A)
1	2.0 - 30.0	±2.0 (NL--FL)	± 7 (Min.L-FL)	<200	0.8	20.0
2	2.0 - 30.0	±2.0 (NL--FL)	± 7 (Min.L-FL)	<200	0.8	20.0
3	2.0 - 48.0	±8.0 (NL--FL)	± 12 (Min.L-FL)	<70	0.2	10.0
4	2.0 - 48.0	±8.0 (NL--FL)	± 12 (Min.L-FL)	<70	0.2	10.0

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Module Test Extension (optional)

The ATS-2000-EA interfaces with and supports the use of a Module Test Extension (MTE-2000) via the UUT-ID's and the add-on PSA-2000. The MTE-2000 provides the primary SRU interface for depot-level fault isolation, repair and calibration/alignment to the component level on Circuit Card Assemblies (CCAs). The MTE contains the following options to support complete RF, analog and digital CCA testing:

MTE-2000

MTE-2000-RF/ANLG	RF/Analog SRU (CCA) test module
MTE-2000-DIG	Digital SRU (CCA) test module
MTE-2000-JTAG	Boundary Scan SRU (CCA) test module

BIT Test Fixtures

TF-2000A	ATS-2000-1A BIT test fixture (supports maintainability)
TF-2000A-MTE	ATS-2000-1A-MTE BIT test fixture
TF-2000A-MTE-PMA	ATS-2000-1A-MTE with PMA BIT test fixture

The MTE-2000 supports custom Personality Module Adapters (MTE-PMAs) with the necessary connectors to mate to various CCAs.

MTE-PMA-xxxx	Personality Module Adapter (SRU specific)

Operating Characteristics

- Module Test Extension for SRU (CCA) testing/repair
- Connects to the ATS-2000-EA test port
- Microprocessor driven USB interface for control
- Stimulus and measurement routing path
- Module power supply and management (via PSA-2000)
- Supports multiple module (CCA) footprints via custom PMAs
- Provides automated SRU (CCA) calibration and alignment
- SRU (CCA) fault isolation to the component
- Guided probing via high definition pictures
- Troubleshooting flowcharts and guides
- Electronic access to module documentation and drawings

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Preparation for Use and Shipment

General

This section contains the instructions for preparing the ATS-2000-EA for use, shipment, and storage. Included are procedures for unpacking, initial inspection, installation, removal, and packing for shipment.

Preparation for Use

The following paragraphs provide procedures for unpacking, inspection, and installation of the test set upon initial receipt or upon removal from storage.

Unpacking

Unpack the test set components from their shipping containers. No special unpacking procedures apply. Exercise care to prevent possible equipment damage. Component weight shall govern lifting methods to prevent personnel injury. Retain the original shipping and storage containers and packing materials for future use.

Initial Inspection

Inspect cases and enclosures for dents, abrasions, broken, loose, missing parts, or other evidence of mishandling or damage.

Installation

WARNING

Be sure that facility power sources are off before connecting input power cable. Failure to comply may result in death or serious injury to personnel.

Connect facility ground and all other cable connections (connect input power last) using Figure 7-1 as a guide.

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Preparation For Shipment And Storage

The following paragraphs provide procedures for preparing the test set for shipment or storage.

Test Set Disassembly

Disassemble the test set as follows:

WARNING

Disconnecting cables when power is applied can result in death or serious injury as well as damage to equipment. Ensure that facility power to the test set is off and test set power down procedures have been performed before disconnecting cables.

Disconnect cables using Figure 7-1 as a guide.

Packaging and Shipment

Test set items are to be preserved and packaged in accordance with best commercial practices.

Storage Requirements

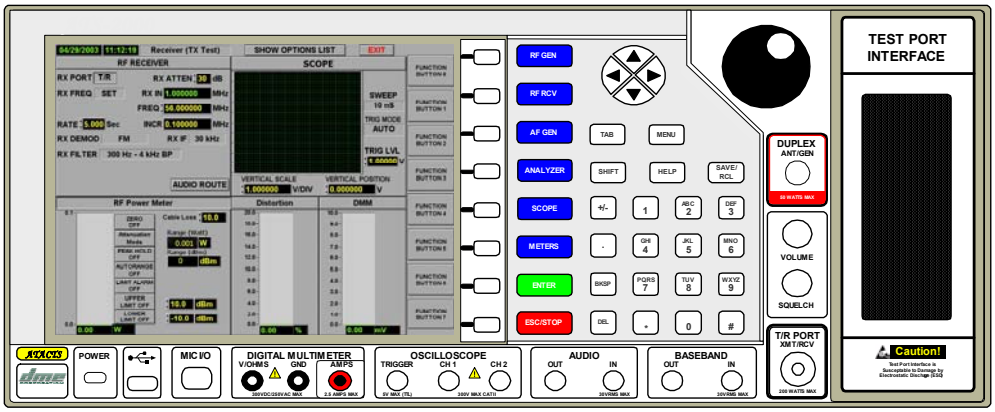
The Test Set should be stored in its original shipping container, encased in it's original protective packing materials. Ensure that the test set environment conforms to the storage and environmental parameters listed in the "Compliance" section of this manual. These parameters must be maintained during an extended storage period.

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Operation

INTRODUCTION

The ATS-2000-EA is used to simulate, test and verify operational parameters associated with RF Wireless communications, avionics and electronic warfare equipment.



OPERATIONAL CONCEPTS

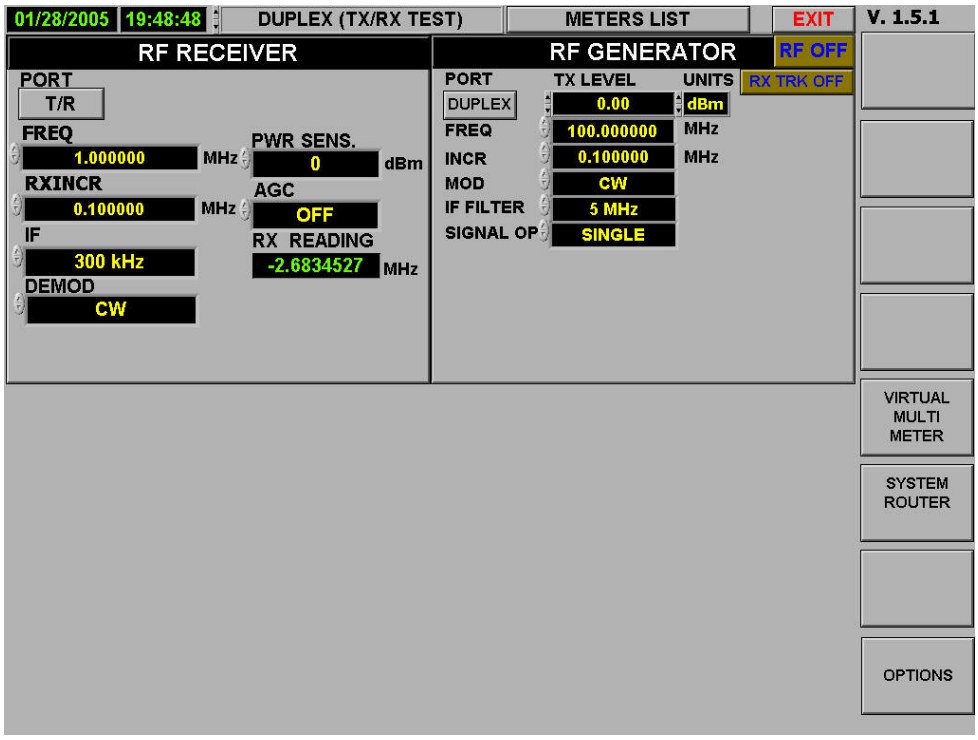
The ATS-2000-EA is equipped with the tools required for the verification testing, maintenance and calibration of analog AM, FM and PM type signals, digital ASK, FSK, PSK and MSK type signals, Quadrature and all FDMA, TDMA and CDMA mode Digital Modulation Software-Defined Radio Systems and Communications Links. It has an IQ modulator and demodulator for digital communications systems, and digital IF and signal processing allows the ATS-2000-EA to be configured as required through software-defined capabilities. A hard drive, USB and ethernet interfacing provide access to storage capabilities for test setups, configurations changes and software upgrades.

Primary modes of operation for transceiver testing include:

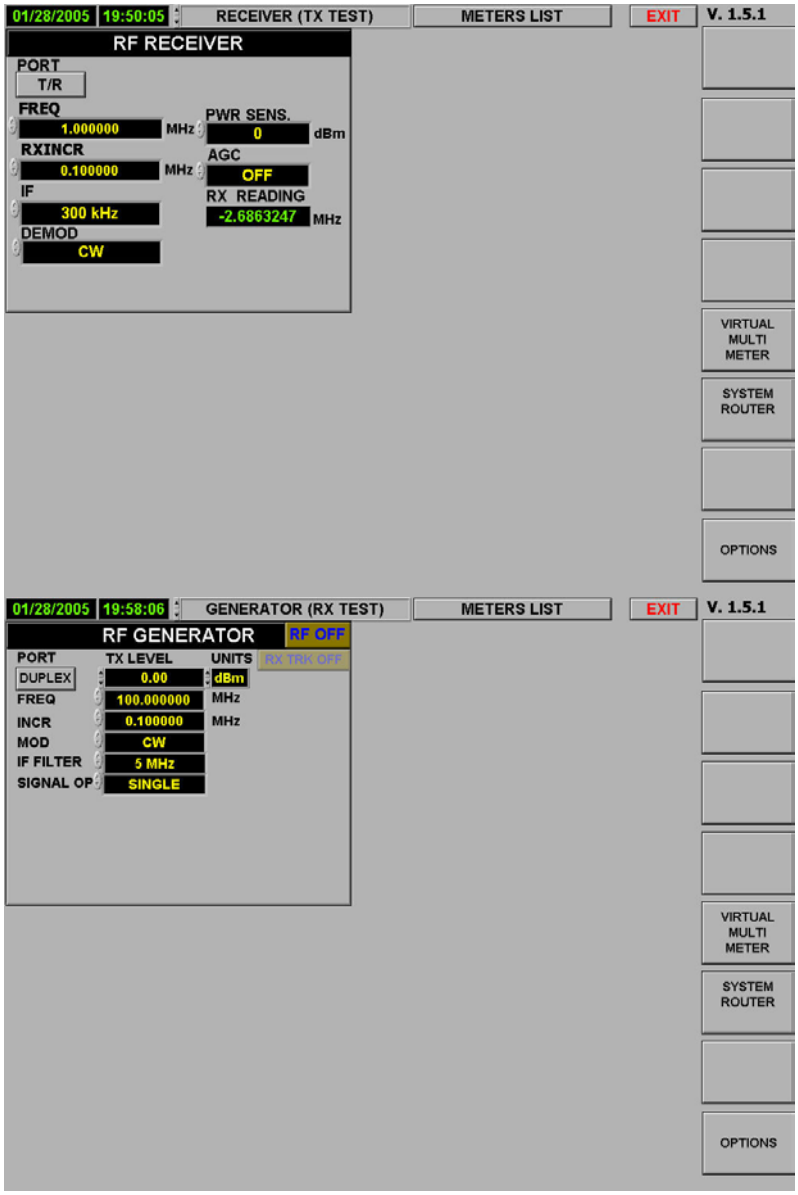
- Digitally Synthesized Generator (Receiver test)
- Digitally Synthesized Receiver (Transmitter test)
- Digitally Synthesized Duplex (Transmitter/Receiver test)
- High Speed, Dual Channel Oscilloscope
- RF Spectrum Analyzer
- Dynamic Signal Analyzer
- AF Function Generator
- Meters (as specified in this document)

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The ATS-2000-EA always operates in the Duplex mode where both the Generator and Receiver are active. The Receive and Generate modes offer more screen space to display monitor or control functions. The Duplex, Generate and Receive modes offer a control panel for the Generator, the Receiver or both, along with an empty screen area (octants) where synthetic instrumentation are enabled. Each screen is made up of 8 octants. Empty octants are capable of being filled with any synthetic instrumentation function that is available for the displayed screen mode. Both the Generate and Receive modes offer up to 6 free octants and the Duplex mode offers 4. All synthetic instrumentation features require at least 1 octant each. The ¼ screen Oscilloscope, ¼ screen RF Spectrum Analyzer and ¼ screen Dynamic Signal Analyzer require 2 segments each.



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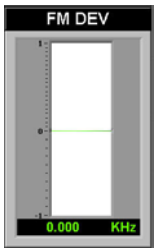
Synthetic instrumentation functions are expandable into larger windows that allow access to all features of that functional instrument. The Oscilloscope, RF Spectrum Analyzer and Dynamic Signal Analyzer occupy the full screen when expanded.

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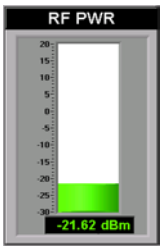
MONITOR AND CONTROL FUNCTIONS

The following octant-based synthetic instrumentation functions are available in various screen displays and can be placed in the octant locations as described in the Operations portion of this manual.

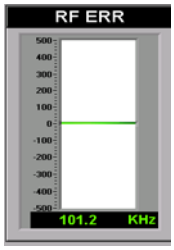
Deviation



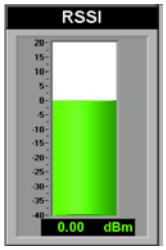
RF Power



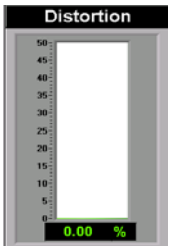
RF Error



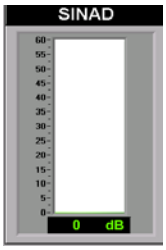
Signal Strength



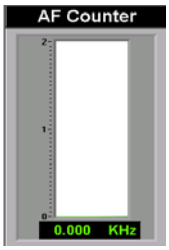
Distortion



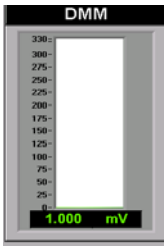
SINAD



AF Counter

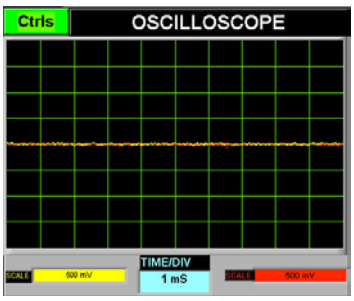


DMM

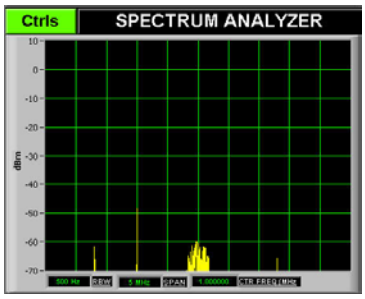


The following quadrant-based synthetic instrumentation functions are available in various screen displays and can be placed in the quadrant locations as described in the Operations portion of this manual. Additional capability, such as the Digital Modulation Demodulation Formats, software-Defined Waveforms, Tracking Generator, Dynamic Signal Analyzer, Swept Cable Measurement, etc., may be added as required.

Oscilloscope



RF Spectrum Analyzer



Dynamic Signal Analyzer



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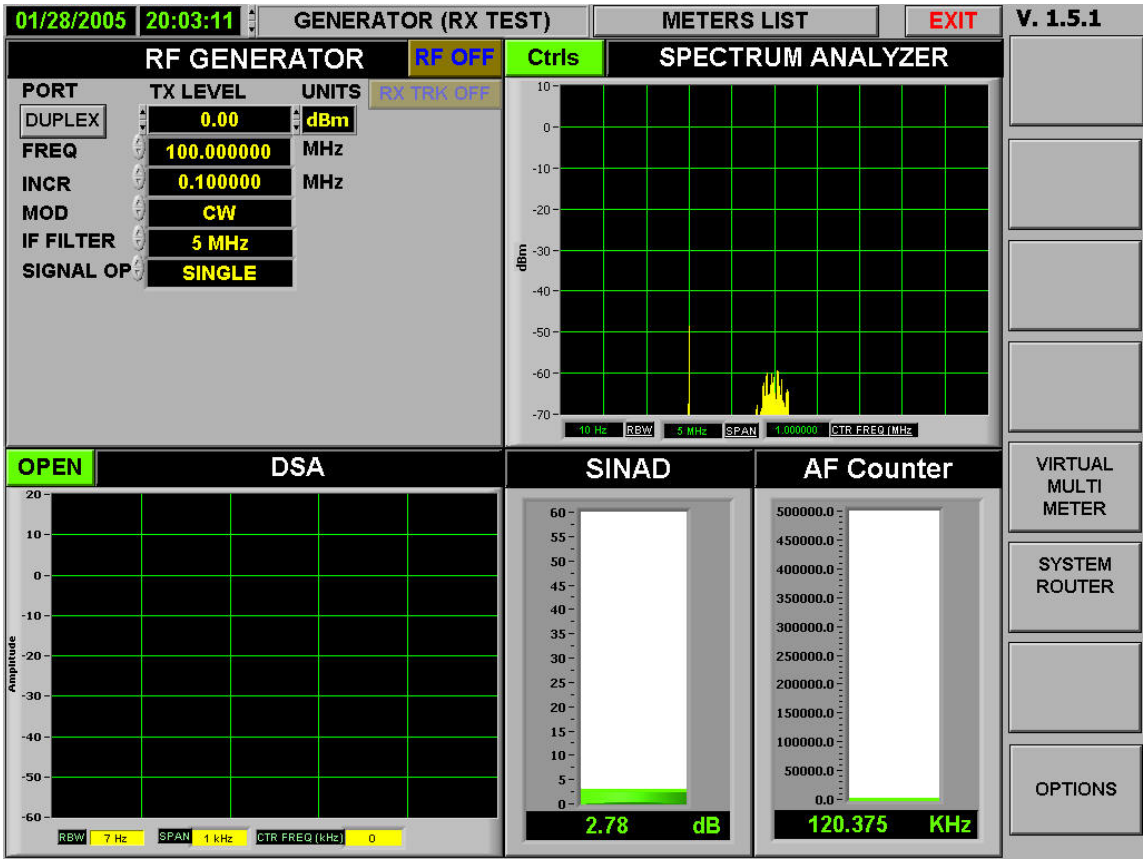
BASIC OPERATION

Selecting Operation Mode

The ATS-2000-EA offers the following modes of operation:

- RF Generator (Receiver Test)
- RF Receiver (Transmitter Test)
- Duplex (Transmitter / Receiver Test)
- Audio Function Generator
- RF Spectrum Analyzer
- Dynamic Signal Analyzer
- Oscilloscope
- Instrumentation Meters

The ATS-2000-EA Test Set defaults to a “factory” default display configuration for each of the major modes of operation.



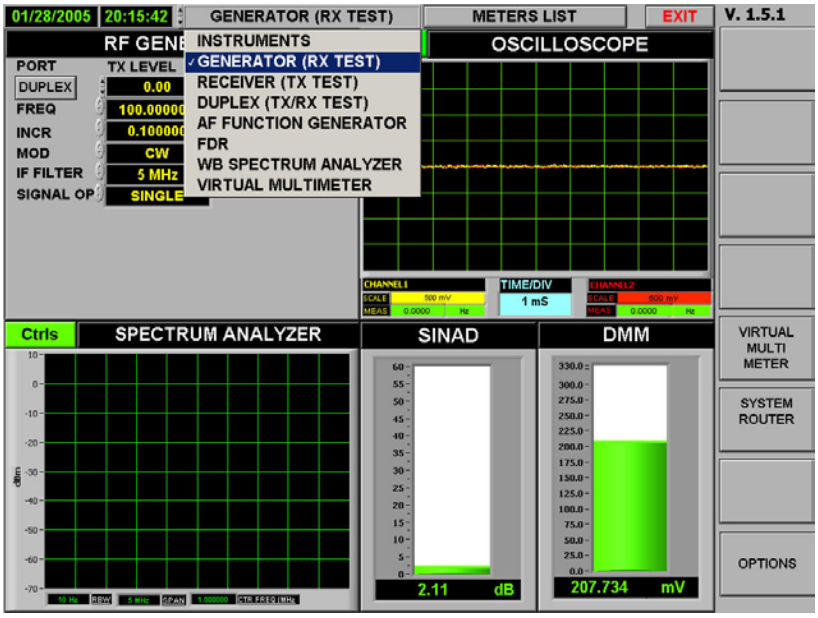
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Selecting GENERATOR Operation Mode (example)

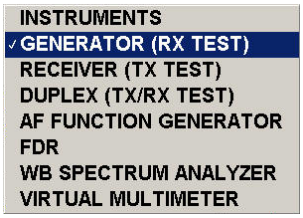
Operation Mode may be selected via three (3) Man-Machine Interfaces (MMI's).

1. The first method is via the front panel keypad by pressing the [RF GEN] key resulting in the default RF Generator Synthetic Instrument screen. The [SPINNER] knob or [TAB] key may also be used to move through active field selections on the screen and used to select the Generator Mode from the Mode Selection Menu.
2. The second method is via an industry standard external PS2 or USB port connected keyboard. Reference the keyboard Operations section of this manual for Operation Mode keyboard assignments.
3. The third method is via an industry standard external PS2 or USB port connected mouse. The mouse may be utilized in a standard Windows based philosophy to directly access functions on the screen in a standard "point-and-click" methodology.

With a mouse connected to the ATS-2000-EA, the operator is able to click on the screen Mode Selection Menu label to access a drop down menu.



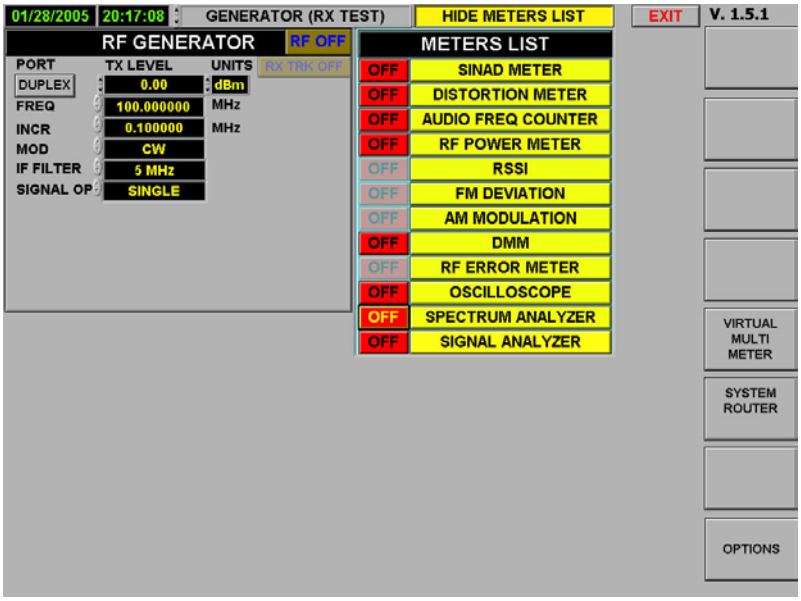
Mode selection is made by clicking on the desired mode of synthetic instrumentation operation.



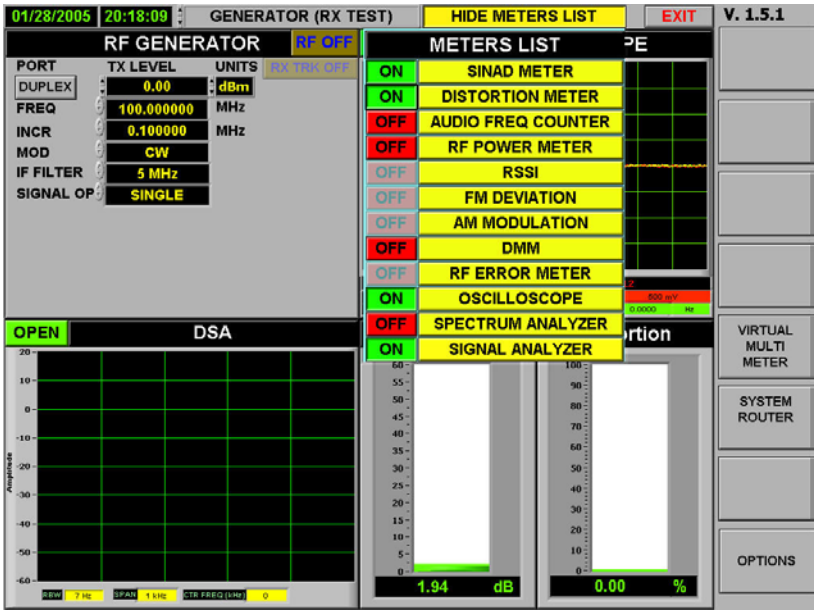
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Selecting Options

After an operational mode has been selected, the operator interface allows for the screen Synthetic Instruments reconfiguration via the METERS LIST. There are 6 definable octants available in the Generate mode. A bar graph meter uses 1 segment; the oscilloscope, RF Spectrum Analyzer and Dynamic Signal Anayzer require 2 octants. There are more Synthetic Instrumentation functions available than octants, so the operator has the ability to choose the instruments that are to be displayed.



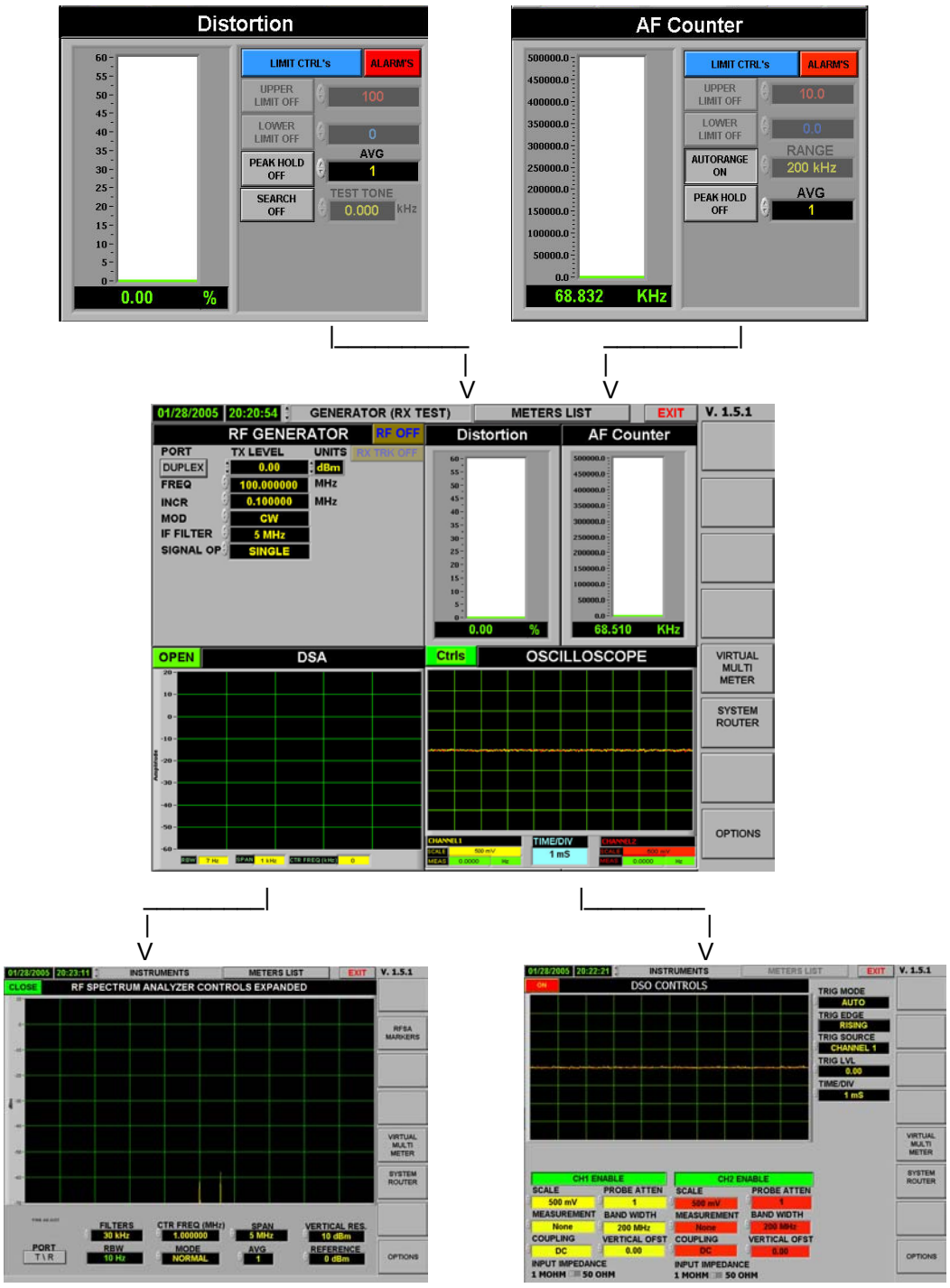
Selecting the METERS LIST on the Title Bar accesses the Meters selection menu. Pressing the **ON/OFF** key associated with each Synthetic Instrumentation function enables/disables the item on the list. All other Synthetic Instrumentation options are turned OFF. An item is selected when the green ON is illuminated.



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Zooming

The ATS-2000-EA interface allows expanding Synthetic Instrumentation functions to a larger scale, which also provides more controls for that function. A function is expanded by positioning the cursor to the instrument function label and pressing the **ENTER** key. Some examples of this are shown in the Generator mode below. The expanded function can be exited by pressing the **STOP/ESC** key or **EXIT** soft key.

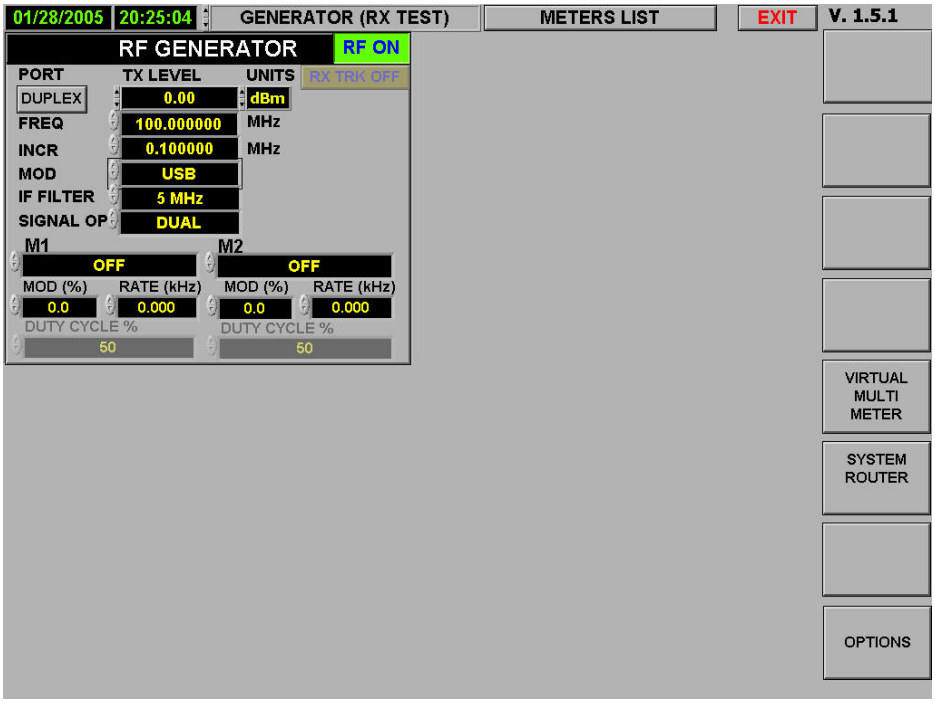


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OPERATION MODES

GENERATOR MODE

The Generate (RX Test) mode allows testing of Analog AM, FM type signals, Digital ASK, FSK type signals, Quadrature type signals and all FDMA, TDMA and CDMA mode Digital Modulation software-Defined Radio Receivers. To access the Generate mode, the operator uses the **RF GEN** Mode key or other methods described previously. The Generator **GEN AUDIO ROUTER** soft key permits selection of various external modulation sources and the **OPTIONS** soft key permits selection of the various Generator Options.



FIELD DEFINITIONS

RF [ON/OFF]

Turns the RF Generator ON or OFF. This switch is located on the Generator Title Bar.

Note: This may need to be turned OFF if working with simplex systems prior to entering the Receive mode of operation. The ATS-2000-EA can also monitor it's own output signal if the RF Spectrum Analyzer is set to the same output port as the Generator.

TX PORT

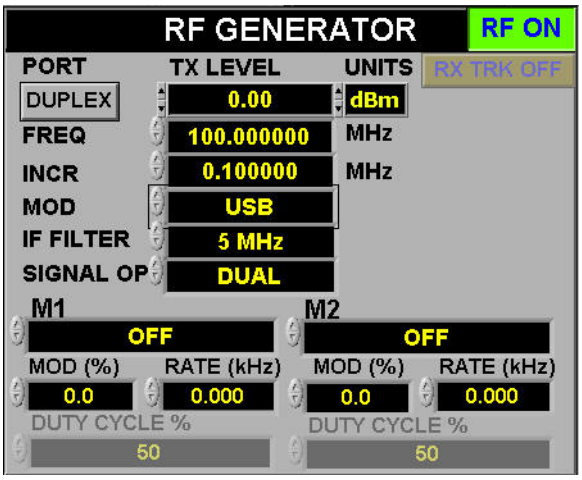
TX Port allows the operator to select the T/R or Duplex port as the output source of the Generator. The T/R Port is primarily used for generating lower level RF signals and is capable of generating from –135 dBm (-145 dBm optional) to 0 dBm. The Duplex Port is primarily used for generating higher level RF signals and is capable of generating from –125 dBm to +10 dBm (+36 dBm optional).

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TX MODE

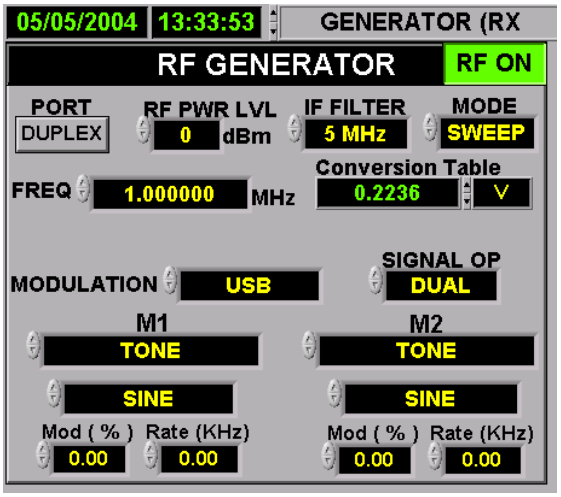
SET

Set (SET) mode allows direct entry of a frequency value. When in this mode of operation, the frequency is set with the frequency field (FREQ) and then adjusted as necessary as described in the FREQ Label description.



SWEEP

Sweep (SWEEP) mode allows entry of a start and stop frequency with rate and increment for swept RF measurements. To begin the sweep, the operator presses the soft key labeled START SWEEP. The frequency sweep begins with the START frequency and increments by the value defined in the INCR field, after delaying the number of seconds that is specified in the RATE field. The sweep continues until the STOP frequency is reached and the sweep starts over. Once the scan has started, soft keys allow for STOP SWEEP or PAUSE SWEEP.



LIST

List (LIST) allows frequencies to be selected from a preprogrammed list. The frequency list box allows entry of up to 100 generate and receive frequencies. Frequencies are selected by entry of the list index value associated with the frequencies in the list. The list is auto-filled by entering a base frequency in the REC

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FREQ field and an increment value. The list is filled automatically by activating the FILL LIST function. Each frequency pair has a default label that may be changed to better identify the frequency pair.

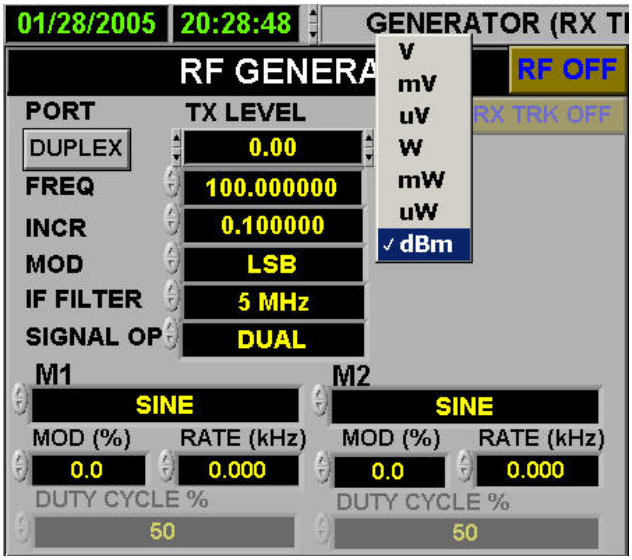
TX PWR (xxx)

xxx = T/R or DUP

This field changes the RF Output level that appears at either the TRANSMIT/RECEIVE (T/R) or DUPLEX (DUP) Port. Units are in dBm with the TX PWR Conversion field providing conversion selectable in V, mV and µV or W, mW and µW. Output level range varies with output port selection.

DUP Port: +10 to -127 dBm (+36 optional)

T/R Port: 0 to -137 dBm



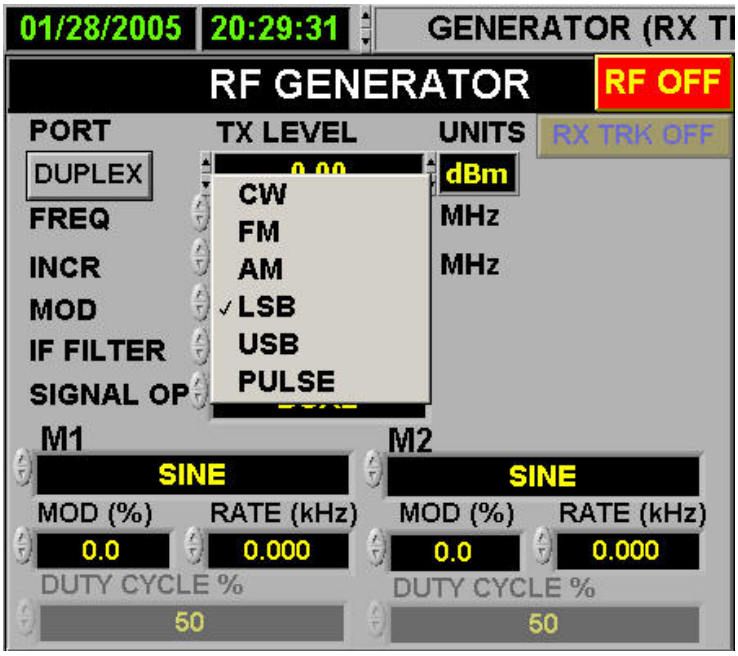
FREQ

Frequency (FREQ) allows the operator to enter of the Generator channel frequency in MHz. Using the **TAB** key, SPINNER knob or mouse, the operator may position the cursor on the frequency field. A new frequency is entered directly through the numeric keypad and accepted by pressing the **ENTER** key. To edit an existing frequency, the operator presses the **ENTER** key to highlight the existing frequency, use the left or right arrow keys to position a cursor to the digit to edit. Using the up or down arrow keys or the spinner knob increments/decrements the current value. Frequency values ranging from 100 kHz to 2000 MHz are made with 1 Hz resolution.

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TX MODULATION

The operator is capable of selecting from CW, AM, FM, LSB, or USB mode for testing radios in the Analog modes.



OFF

Disables the IF source to the signal generator resulting in no carrier.

CW

Configures CW signal generator operation when CW modulation is desired.

AM

Configures AM modulation type. Enables M1 or M1 and M2 menus to select various AM modulation modes.

FM

Configures FM modulation type. Enables M1 or M1 and M2 menus to select various FM modulation modes.

LSB

Configures LSB modulation type. Enables M1 or M1 and M2 menus to select various LSB modulation modes.

USB

Configures USB modulation type. Enables M1 or M1 and M2 menus to select various USB modulation modes.

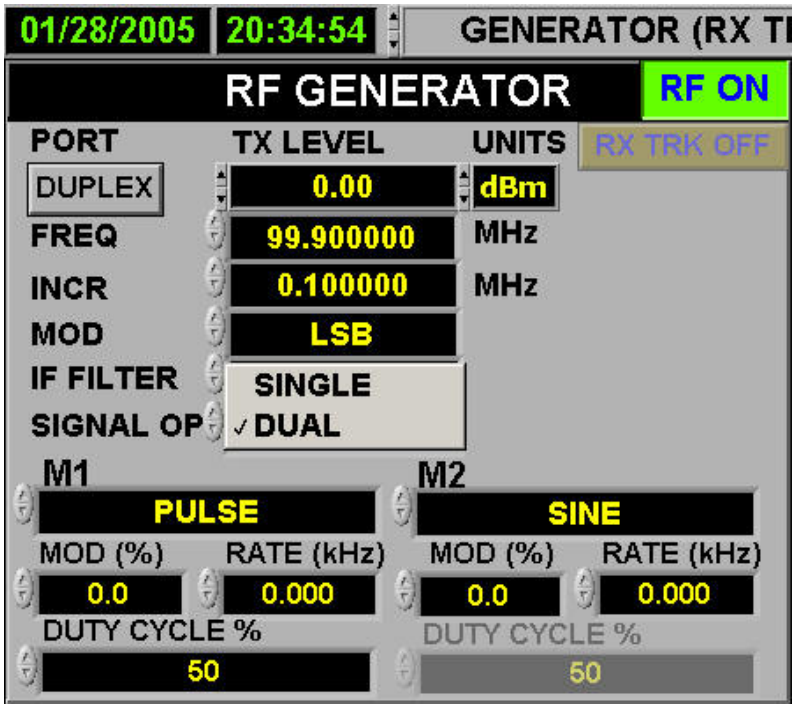
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The following optional Internal/External Digital Modulation types and modes are a sample of the capabilities of the ATS-2000-EA:

Shift keyed Types	ASK
	FSK
	PSK
	MSK

MOD OPTIONS

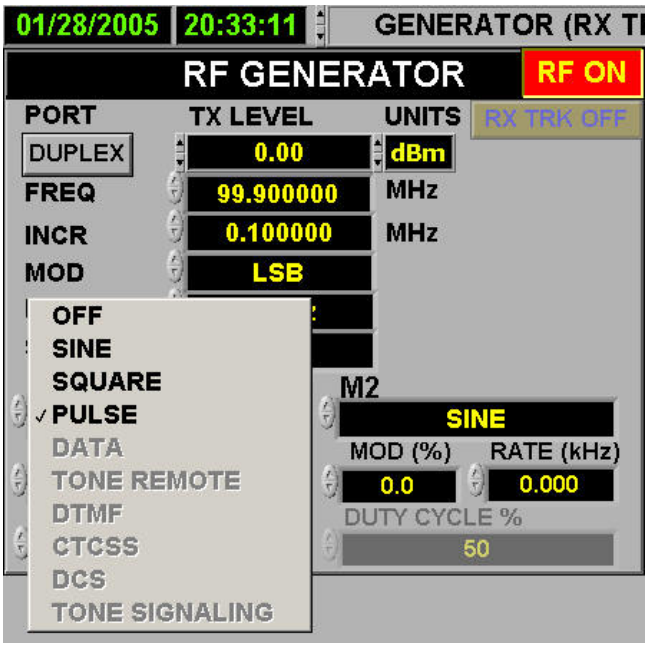
Selecting a Mod Options field allows selection of either SINGLE or DUAL internal modulation sources.



M1 AND M2

Selecting the M1 or M2 field allows access to the signaling selection list.

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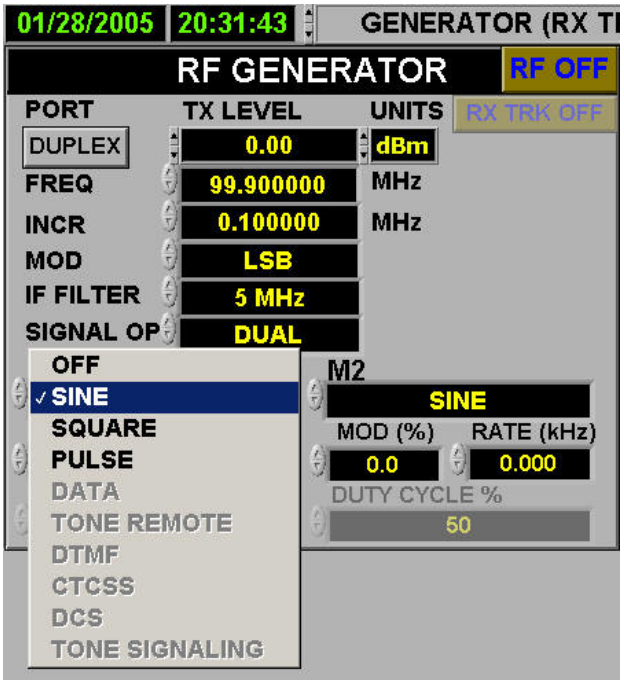


OFF

Disables internal modulation source.

TONE

Configures M1 and/or M2 for Tone Generator operation. This function supports entry of associated TONE information including AM modulation level from (0 to 100% modulation), FM Deviation (0 to +/- 100 kHz), LSB modulation level or USB modulation level. In addition, the user enters the audio frequency rate (0 to 40 kHz) and wave shape. Arbitrary wave shapes, including Sine, Square, Triangle, Ramp and Level, are selectable.



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DATA

Configures M1 or M2 for Data Generator operation. This function supports entry of associated DATA information including AM modulation level (0 to 100% modulation), FM Deviation (0 to +/- 100 kHz) LSB modulation level or USB modulation level. The data rate and type is selectable (See Bit Error Rate (BER) METER for further detail).

TONE REMOTE (optional)

Select Tone Remote operation. The Tone Remote function provides default settings for frequency, level and duration. These values are capable of being altered for specific requirements by selecting the CONFIG function. Selecting the tone format and pressing the SEND button activates the selected tone sequence.

DTMF (optional)

Select DTMF operation. Values are entered and sent after pressing the SEND key. Mode selections for Continuous, Burst or keypad are available. The CONFIG button allows changes to the Mark, Space and End timing in ms.

CTCSS (optional)

Select CTCSS operation. In this mode, CTCSS entries are made by code value. If the code value is unknown, the operator may use the TONE selection. The CONFIG button allows configuration of the deviation level to be used.

DCS (optional)

Select DCS operation. In this mode, DCS entries are made by code value. The CONFIG button allows configuration of the deviation level to be used as well as the code type of Normal or Inverted.

TONE SIGNALING (optional)

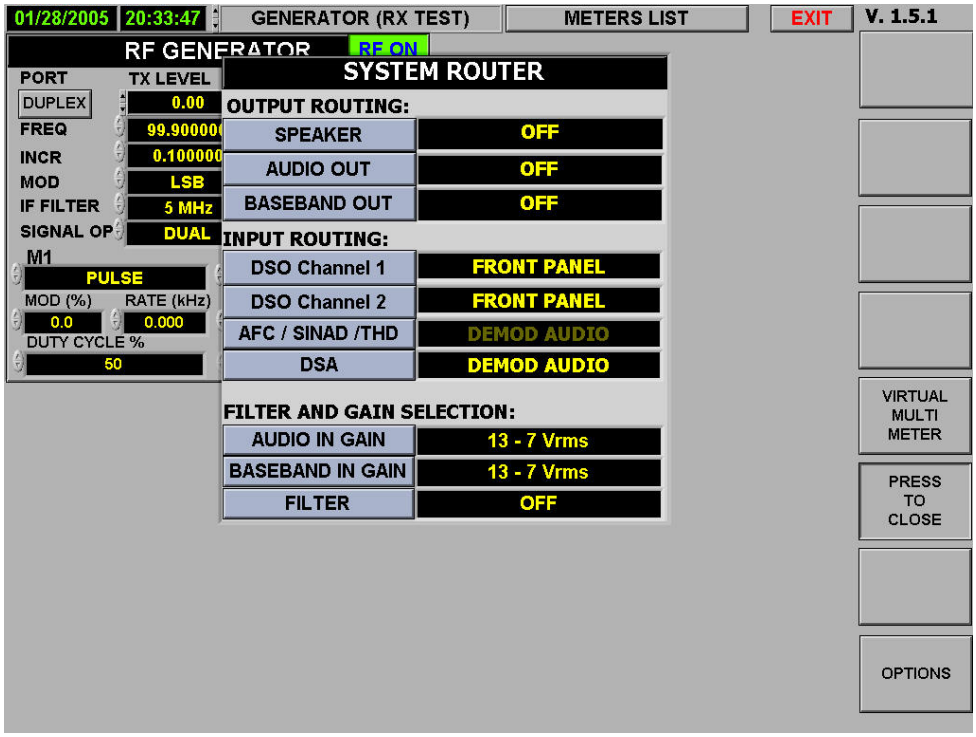
Select Tone Signaling operation. The Tone Signaling selection allows configuration of unique tone sequences. Frequency, Mark and Space timing are configurable. 50 separate tones are capable of being configured.

EXTRA MODULATION SOURCES

GEN AUDIO ROUTE

The GEN AUDIO ROUTE soft key matrix allows routing of external audio and data modulation inputs. These functions are available in the Generator mode and support external modulation sources from the Front Panel, Data BER Function, and Microphone Headset (microphone) to be routed to M1 or M2 modulator inputs to the Generator. Special tone conditioning is also available on these inputs selections.

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AUDIO IN

Routes the Audio Input connector on the front panel to the generator M1 or M2 modulator inputs.

BASEBAND IN

Routes the Baseband Input connector on the front panel to the generator M1 or M2 modulator inputs.

HEADSET MIC

Routes the MIC I/O input jack on the front panel to the generator M1 or M2 modulator inputs to support external voice modulation.

MIC Connector

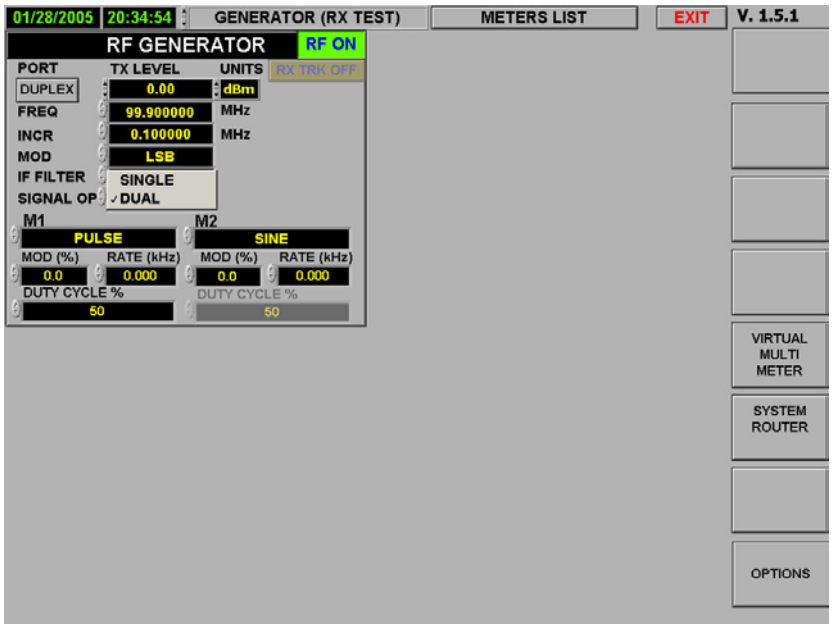
PIN 1 Power Out +12 Volts @ 500mA
PIN 2 Power Ground
PIN 3 Hook Switch (ground to enable CTCSS [PL] or open for monitor)
PIN 4 Ground
PIN 5 Microphone Audio
PIN 6 Microphone PTT
PIN 7 Microphone Program
PIN 8 Handset Audio (low level receive audio)

Note: Audio In and Baseband In may be configured as the I/Q inputs for Complex Digital Modulation when this option is installed.

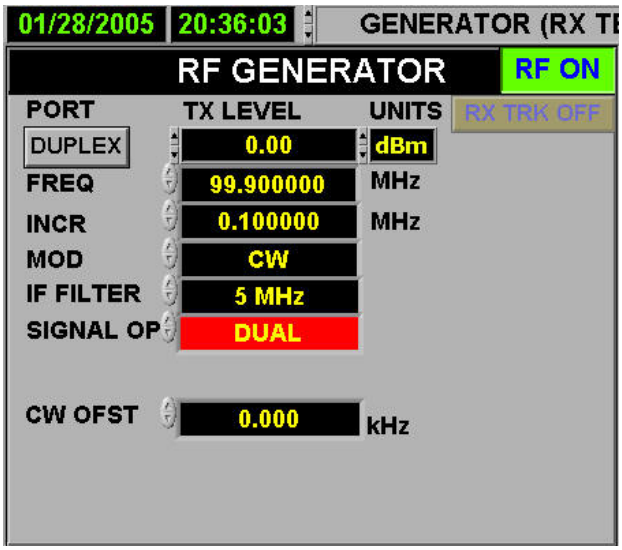
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GENERATOR #2 Mode

A Second RF Generate mode allows testing of Receiver Selectivity, Adjacent Channel Rejection and Inter-Modulation Distortion (IMD) in software-Defined Radio Receivers. This is a special mode of operation normally not available for general-purpose use due to the limited nature of its operation. To access the Generate #2 mode, the operator uses the **OPTIONS** Field and **SPECIAL FUNCTION** selection in the GENERATOR MODE screen.



DUAL MODE CW SOURCES



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FIELD DEFINITIONS

RF [ON/OFF]

Turns the RF Generator ON or OFF. This switch is located on the Generator Title Bar.

Note: This may need to be turned OFF if working with simplex systems prior to entering the Receive mode of operation. The ATS-2000-EA can also monitor it's own output signal if the RF Spectrum Analyzer is set to the same output port as the Generator.

FREQUENCY ENTRY

FREQ

Frequency (FREQ) allows the operator to enter of the Generator channel frequency in MHz. Using the **TAB** key, Spinner knob or mouse, the operator may position the cursor on the frequency field. A new frequency is entered directly through the numeric keypad and accepted by pressing the **ENTER** key. To edit an existing frequency, the operator presses the **ENTER** key to highlight the existing frequency, use the left or right arrow keys to position a cursor to the digit to edit. Using the up or down arrow keys or the spinner knob increments/decrements the current value. Frequency values ranging from 100 kHz to 2000 MHz are made with 1 Hz resolution.

FREQ 2

Frequency Source 2 (FREQ 2) allows the operator to enter of the second CW Generator channel frequency in MHz as described above. The offset between Generator #1 and Generator #2 may not exceed the bandwidth of the Generator (5 MHz).

LEVEL

This field changes the RF Output level that appears at either the T/R or DUPLEX Port. Units are in dBm with another field providing conversion selectable in V, mV and µV or W, mW and µW. Output level range varies with output port selection.

Duplex Port: +10 to -127 dBm (+36 optional)

TR Port: 0 to -137 dBm

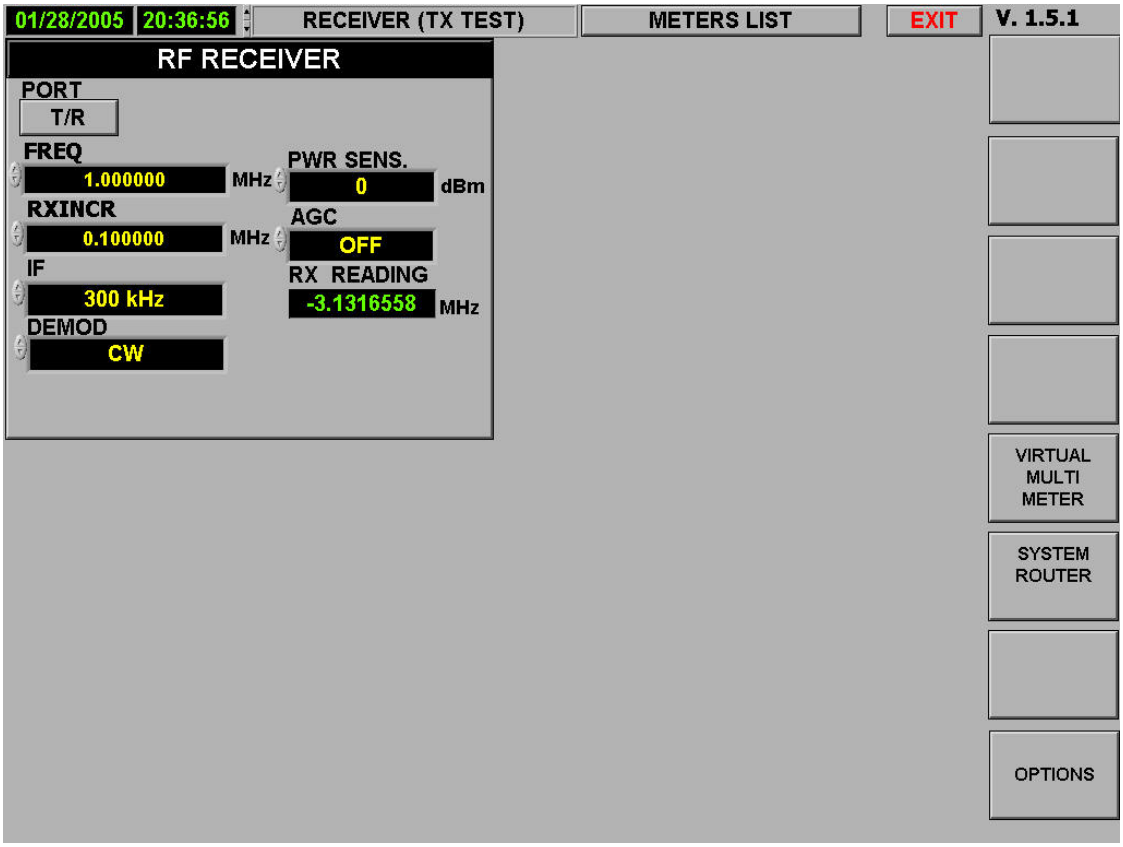
MOD TYPE

The ATS-2000-EA only operates in CW mode while the Dual RF Generator is selected.

RECEIVER MODE

The Receiver (TX Test) mode allows testing of Analog AM, FM and PM type signals, Digital ASK, FSK, PSK and MSK type signals, Quadrature QAM, C4FM, QPSK, 8PSK, and π/4QPSK type signals and all FDMA, TDMA and CDMA mode Digital Modulation software-Defined Radio Transmitters. To access the Receiver mode, the operator uses the **RF RCV** Mode key or other methods described previously. The Receiver **RCV AUDIO ROUTER** soft key permits selection of various external signal destinations and the **OPTIONS** soft key permits selection of the various Receiver Options.

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FIELD DEFINITIONS

RX PORT

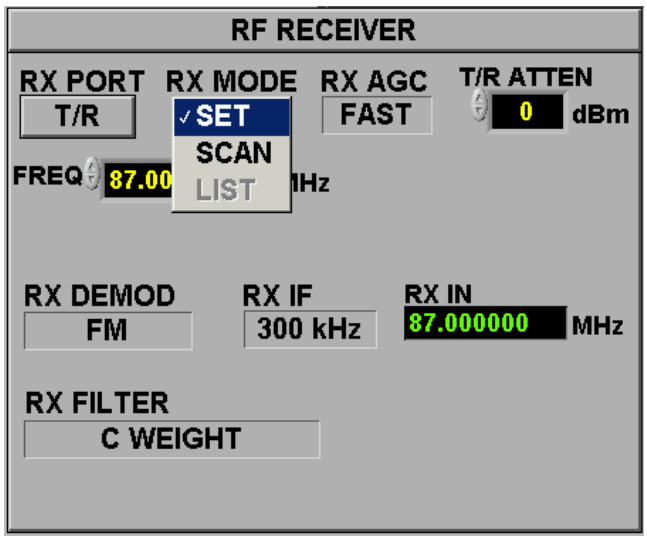
This field allows selection of the input port where the signal is injected into the ATS-2000-EA. The operator uses the Duplex Port for low level off-the-air measurements where signal strengths are <-10 dBm and the T/R Port for direct connection to a transmitter where power levels may reach 50 W continuous or up to 200 W for 15 minute ON, 1 minutes OFF.

RX MODE

SET

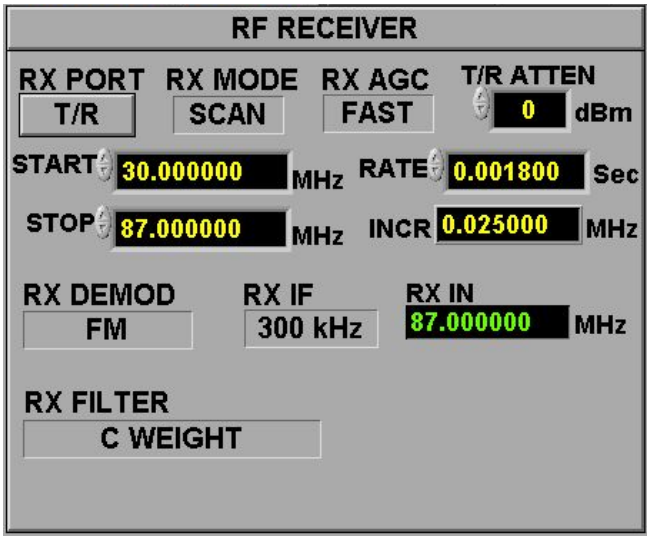
Set (SET) mode allows direct entry of a frequency value. When in this mode of operation, the frequency is set with the frequency field (FREQ) and then adjusted as necessary as described in the FREQ Label description.

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SCAN

Scan (SCAN) allows entry of a start and stop frequency with increment for swept RF measurements. Selecting SETUP configures the sweep parameters. To begin the sweep, the operator presess the soft key labeled **START SWEEP**.



LIST

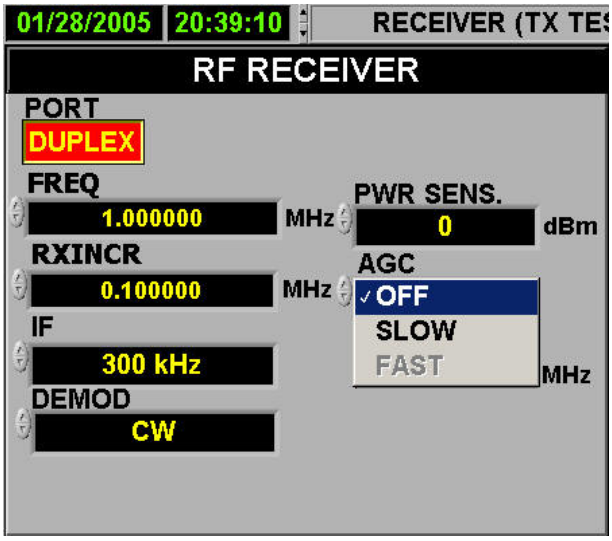
List (LIST) allows frequencies to be selected from a preprogrammed list. The frequency list box allows entry of up to 100 generate and receive frequencies. Frequencies are selected by entry of the list index value associated with the frequencies in the list. The list is auto-filled by entering a base frequency in the REC FREQ field and an increment value. The list is filled automatically by activating the FILL LIST function. Each frequency pair has a default label that may be changed to better identify the frequency pair.

RX AGC

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OFF

Off (OFF) mode allows direct entry of a Receiver Attenuator setting. When in this mode of operation, the Receiver Attenuation is set with the T/R ATTEN or DUP ATTEN field and then adjusted as necessary for optimum RSSI Level to the signal acquisition system.



SLOW

Slow (SLOW) mode allows the Receiver System Automatic Gain Control (AGC) to automatically adjust the Receiver Attenuation setting as necessary for optimum RSSI Level to the signal acquisition system. The RSSI Level is sampled at approximately 1 time per second and the attenuation adjusted as necessary for optimum RSSI Level to the signal acquisition system. When in this mode of operation, the T/R ATTEN or DUP ATTEN field is not accessable to the user.

FAST

Fast (FAST) mode allows the Receiver System Automatic Gain Control (AGC) to automatically adjust the Receiver Attenuation setting as necessary for optimum RSSI Level to the signal acquisition system. The RSSI Level is sampled at approximately 100 times per second and the attenuation adjusted as necessary for optimum RSSI Level to the signal acquisition system. When in this mode of operation, the T/R ATTEN or DUP ATTEN field is not accessable to the user.

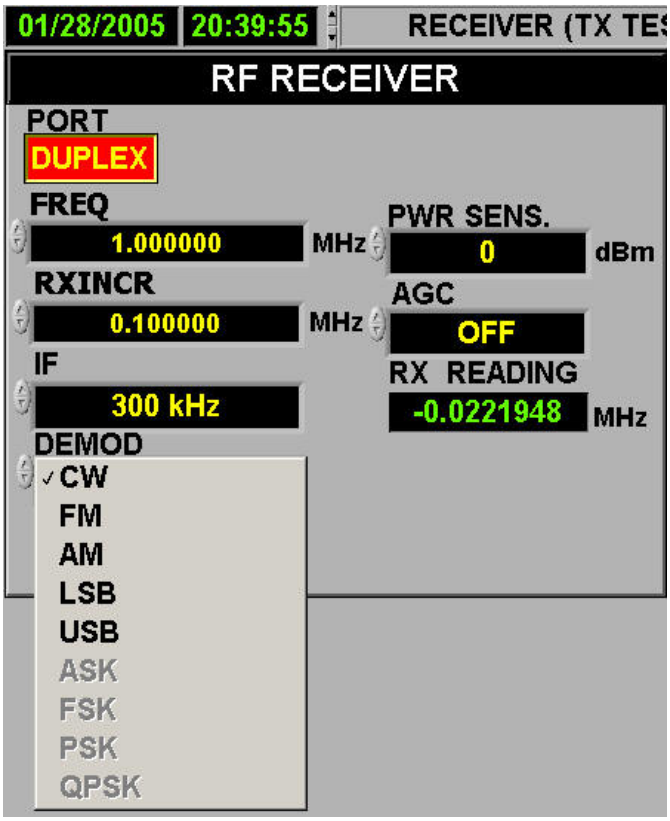
FREQ

This field allows entry of the Receivers channel frequency in MHz. Using the **TAB** key, **SPINNER** knob or mouse, the operator may position the cursor on the frequency field. A new frequency is entered directly through the numeric keypad and accepted by pressing the **ENTER** key. To edit an existing frequency, the operator presses the **ENTER** key to highlight the existing frequency, use the left or right arrow keys to position a cursor to the digit to edit. Using the up or down arrow keys or the spinner knob increments/decrements the current value. Frequency values ranging from 100 kHz to 2000 MHz are made with 1 Hz resolution.

DEMOD

The operator is capable of selecting from CW, AM, FM, LSB, or USB mode for testing radios in the Analog modes. Demodulated signals consist of Analog (Audio Baseband) information.

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OFF

Disables the IF demodulation in the signal processor resulting in no demodulated signal.

CW

Configures CW signal processor operation when CW Demodulation is desired.

AM

Configures AM demodulation type.

FM

Configures FM demodulation type.

LSB

Configures LSB demodulation type.

USB

Configures USB demodulation type.

RX IF

The operator is capable of selecting the following IF Bandwidths:

30.0 kHz	(WB-AM, FM, PM, Digital)
300 kHz	(WB-FM, WB-PM, Digital)
2 MHz	(Digital)

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5 MHz (I/Q Spread Spectrum)

RX FILTER

Audio Post Detection Filters are available during Receiver (TX Test) Operation.

NONE (No filtering is applied to the demodulated signal)

LPF (Low Pass Filter with programmable cutoff frequency)

HPF (High Pass Filter with programmable cutoff frequency)

BPF (Band Pass Filter with programmable cutoff frequencies)

C-WHT (C-Message Weighted Filter)

Note: Filter selection also filters the Audio Bandwidth to the Oscilloscope, Meters, Counters and Speaker based on signal routings.

Note: See BER METER section for additional information on Digital Data Receive capability.

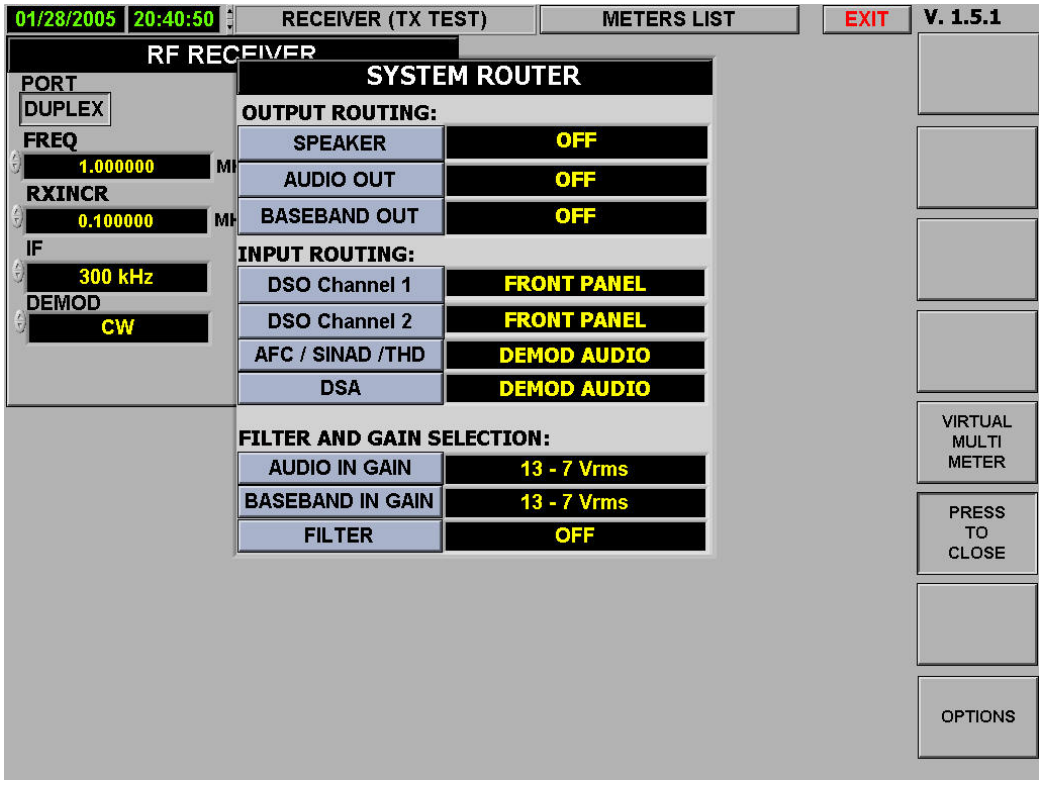
RX IN

This field indicates the measured transmitter frequency. It is for viewing only as it is an actual measurement of frequency in MHz. The frequency indicated is a calculation based on the entered frequency and the indicated frequency error. The received frequency must be within the IF Bandwidth that has been selected.

RCV AUDIO ROUTE

The **RCV AUDIO ROUTE** matrix allows routing of audio and data outputs from the Receiver Demod Audio, AF Generators and Date Generator to the Front Panel, Data BER Function, EUT Audio Outputs, Speaker and Microphone Headset (Speaker). This function, available on the Receiver mode, also allows for special tone conditioning.

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AUDIO OUT

Routes the Audio Output connector on the front panel to the Demod Audio, AF Generators or Data Generator.

BASEBAND OUT

Routes the Baseband Output connector on the front panel to the Demod Audio, AF Generators or Data Generator.

Note: Audio Out and Baseband Out may be configured as the I/Q Outputs when this option is installed.

EUT AUDIO OUT

Routes the EUT Audio Outputs to the Demod Audio, AF Generators or Data Generator.

SPEAKER

Routes the SPEAKER to the Demod Audio, AF Generators or Data Generator.

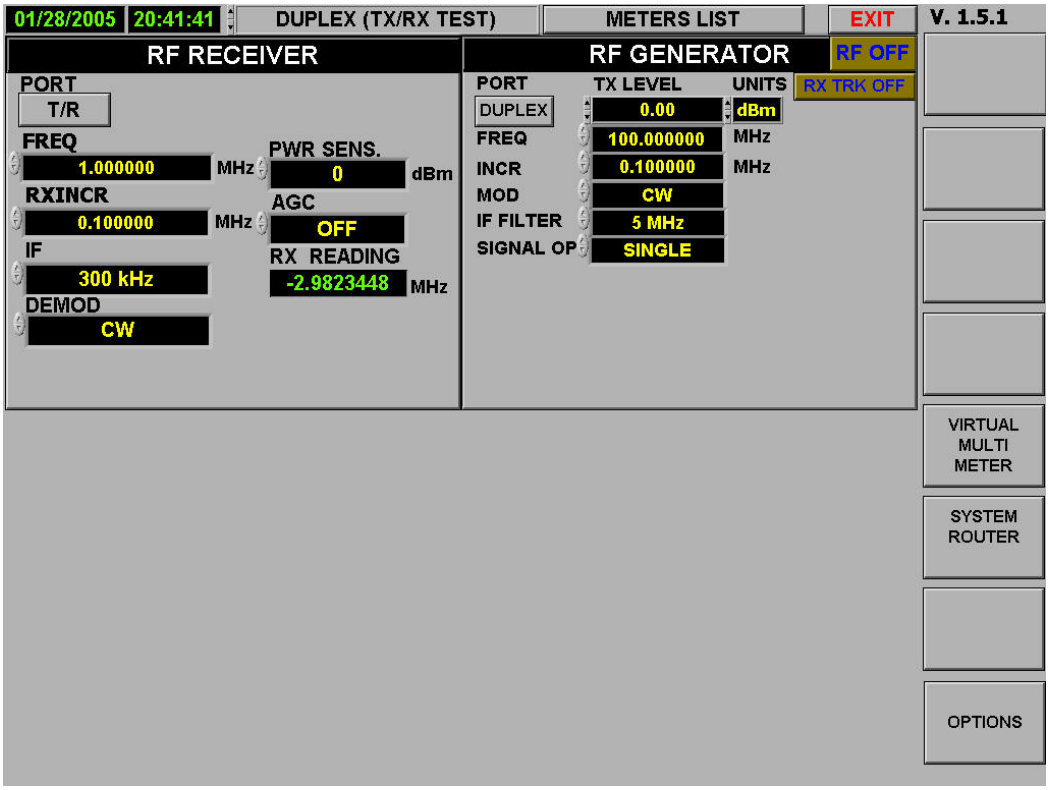
HEADSET MIC

Routes the Microphone input jack on the front panel to the generator M1 or M2 modulator inputs to allow external voice modulation. Refer to the Generator section for a detailed Microphone pinout description.

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DUPLEX MODE

The Duplex Mode allows simultaneous control of the RF Generator and the RF Receiver. To access the Duplex Mode, the operator uses the **RF RCV** or **RF GEN** key by quickly pushing it twice or other methods described previously.



The two RF systems are completely independent of each other and allow any frequency offset (+/- 1900 MHz) or modulation type (see RECEIVER and GENERATOR section). This feature is required to test HF, VHF to UHF Cross-Band Duplex Systems. The upper left quadrant allows configuration and control of the RF Receiver while the upper right quadrant allows configuration and control of the RF Generator. The features in the upper quadrants are fixed with special setup and control being accomplished by the [OPTIONS] Field Menu. All functions for the Generator and Receiver in the Duplex Screen are the same as the stand-alone Generate and Receive Screens.

RCV AUDIO ROUTE

The **RCV AUDIO ROUTE** matrix allows routing of audio and data outputs from the Receiver Demod Audio, AF Generators and Date Generator to the Front Panel, Data BER Function, EUT Audio Outputs, Speaker and Microphone Headset (Speaker). This function, available on the Receiver mode, also allows for special tone conditioning.

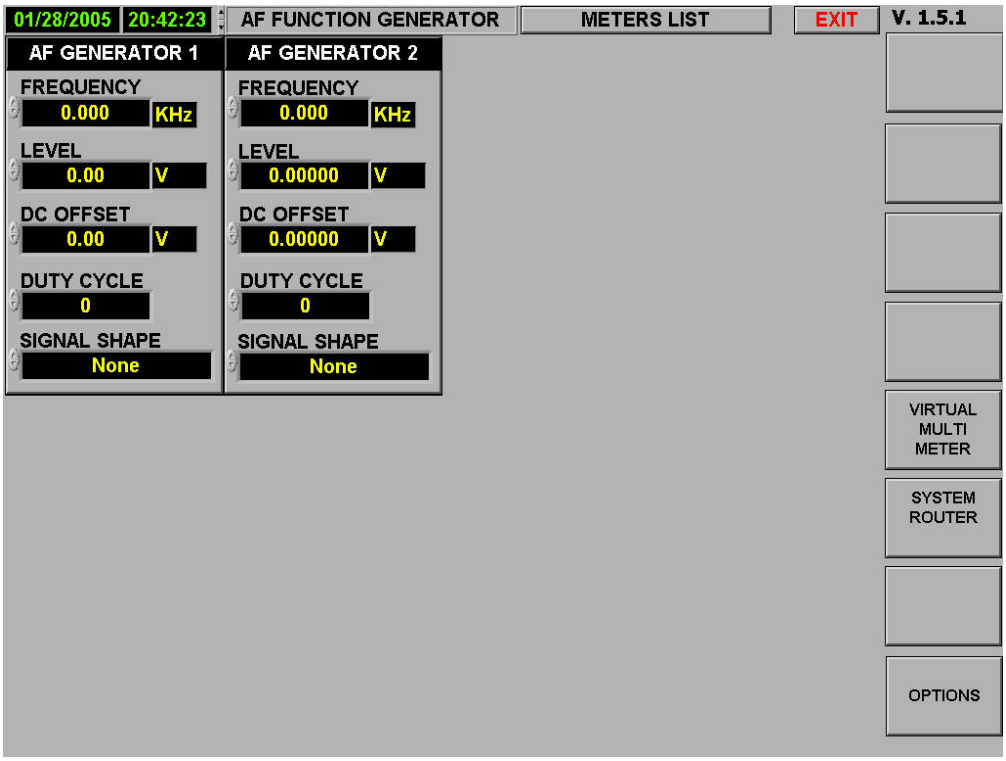
GEN AUDIO ROUTE

The **GEN AUDIO ROUTE** soft key matrix allows routing of external audio and data modulation inputs. These functions are available in the Generator mode and support external modulation sources from the Front Panel, Data BER Function, and Microphone Headset (Microphone) to be routed to M1 or M2 modulator inputs to the Generator. Special tone conditioning is also available on these inputs selections.

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AUDIO FUNCTION GENERATORS

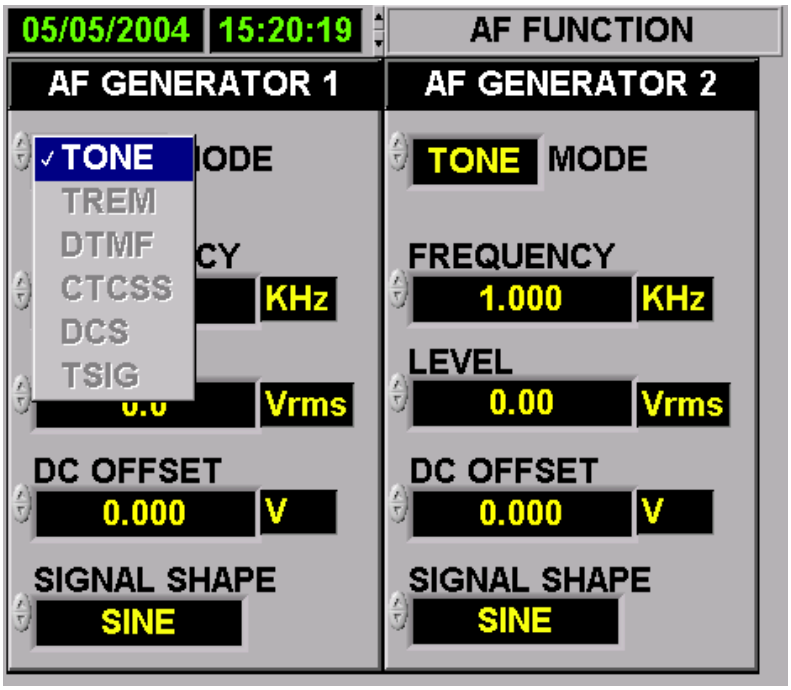
To access the Audio Function Generators, the operator uses the **AF GEN** key or other methods described previously. These Audio Function Generators are configurable as Audio Sources routed to the Front Panel or UUT-ID Modules. All METERS (Synthetic Instruments) are always available when displayed on the Function Generator screen. The Field Definitions is the same for Audio Function Generator #1 and Audio Function Generator #2.



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FIELD DEFINITIONS

MODE



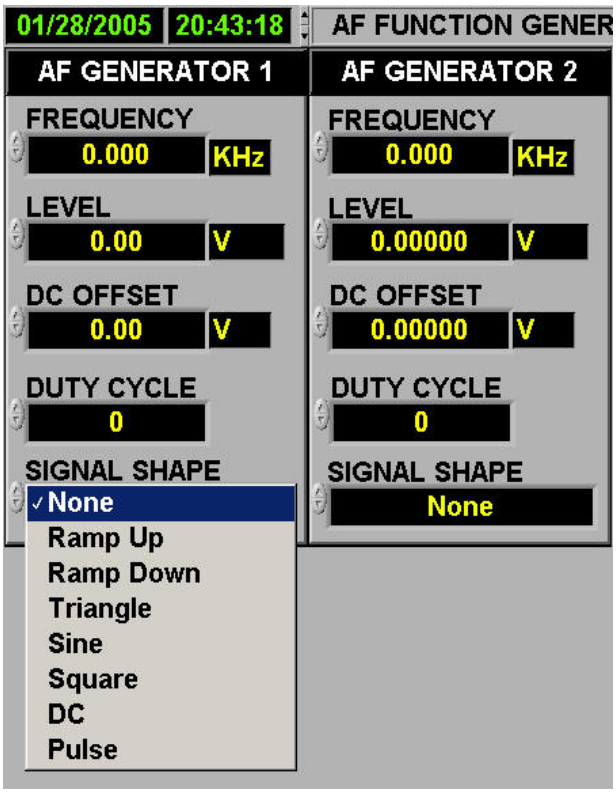
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OFF

Disables the audio function generator source.

TONE

Configures the audio function generator for Tone Generator operation. This function supports entry of associated TONE information including the audio frequency (0 to 40 kHz), audio level and wave shape. Arbitrary wave shapes, including Sine, Square, Triangle, Ramp and Level, are selectable.



TREM (Tone Remote) (optional)

Select Tone Remote operation. The Tone Remote function provides default settings for frequency, level and duration. These values are capable of being altered for specific requirements by selecting the CONFIG function. Selecting the tone format and pressing the SEND button activates the selected tone sequence.

DTMF (optional)

Select DTMF operation. Values are entered and sent after pressing the SEND key. Mode selections for Continuous, Burst or keypad are available. The CONFIG button allows changes to the Mark, Space and End timing in ms.

CTCSS (optional)

Select CTCSS operation. In this mode, CTCSS entries are made by code value. If the code value is unknown, the operator may use the TONE selection. The CONFIG button allows configuration of the deviation level to be used.

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DCS (optional)

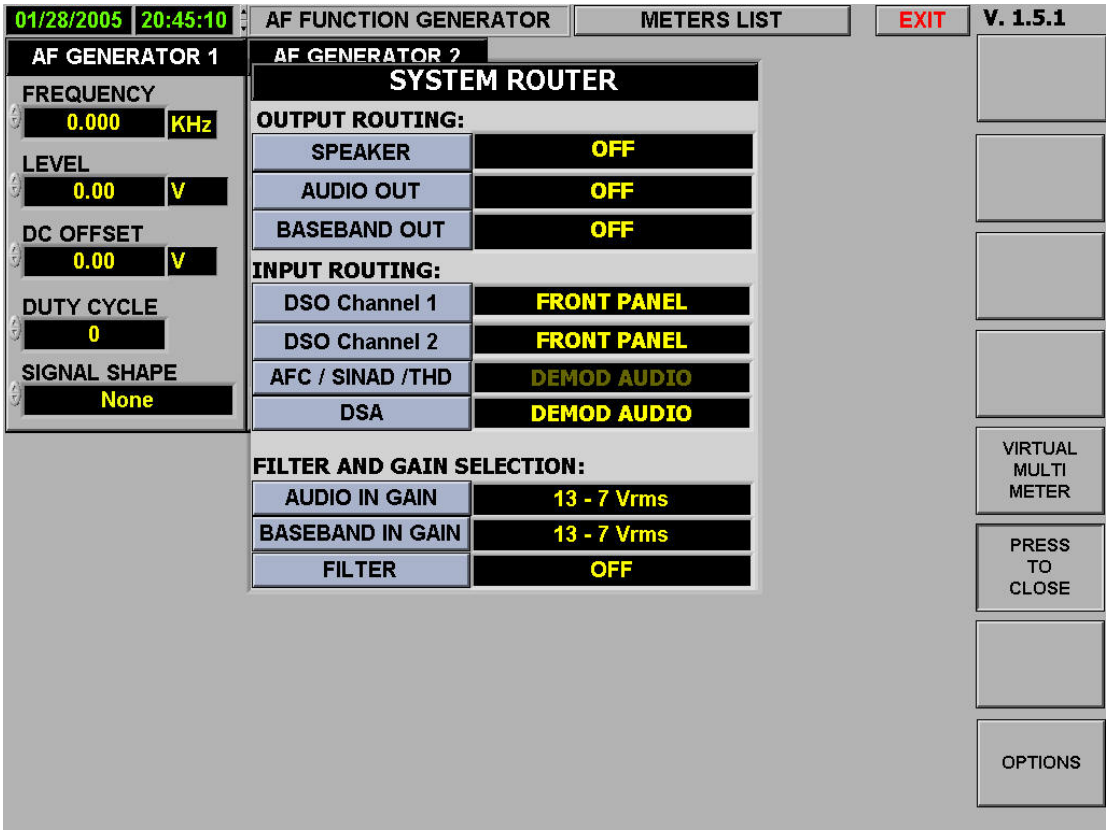
Select DCS operation. In this mode, DCS entries are made by code value. The CONFIG button allows configuration of the deviation level to be used as well as the code type of Normal or Inverted.

TSIG (Tone Signaling) (optional)

Select Tone Signaling operation. The Tone Signaling selection allows configuration of unique tone sequences. Frequency, Mark and Space timing are configurable. 50 separate tones are capable of being configured.

AUDIO ROUTER (Audio Function Generator)

The AUDIO ROUTER matrix allows routing of audio and data outputs to the Front Panel, EUT Audio Outputs, Data BER Output, Speaker and Microphone Headset (Speaker). This function, available on the Audio Function and Data Generators, along with Demod Audio, also allows for special tone conditioning.



AUDIO OUT

Routes the Audio Output connector on the front panel to the Demod Audio, AF Generators or Data Generator.

BASEBAND OUT

Routes the Baseband Output connector on the front panel to the Demod Audio, AF Generators or Data Generator.

Note: Audio Out and Baseband Out may be configured as the I/Q Outputs when this option is installed.

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DATA (BER)

Routes the Data (BER) Function to the Demod Audio, AF Generators or Data Generator.

UUT AUDIO OUT

Routes the UUT Audio Outputs to the Demod Audio, AF Generators or Data Generator.

SPEAKER

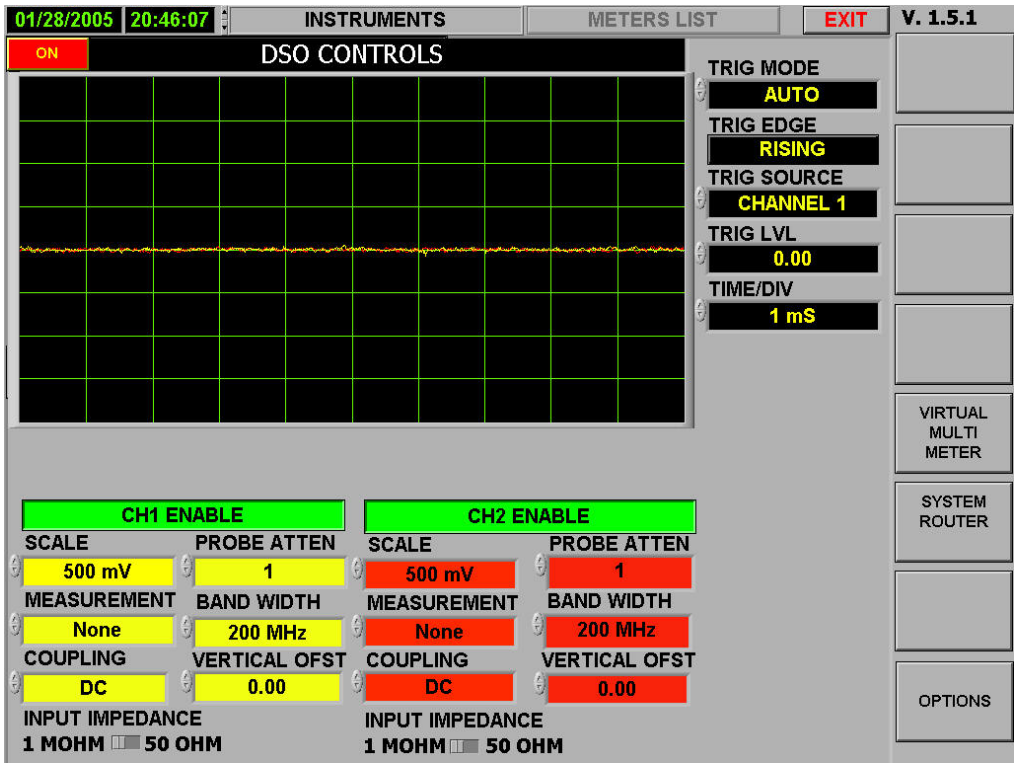
Routes the SPEAKER to the Demod Audio, AF Generators or Data Generator.

HEADSET MIC

Routes the Mic I/O input jack on the front panel to the generator M1 or M2 modulator inputs to allow external voice modulation. Refer to the Generator section for a detailed Microphone pinout description.

OSCILLOSCOPE

The Oscilloscope Screen is capable of expansion from any function screen that supports the Oscilloscope in the Options Menu or it can be accessed directly through the MODE keys by pressing the **SCOPE** key or other methods described previously. The Oscilloscope OPTIONS field permits selection of the various Oscilloscope Inputs and Options.



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OSCILLOSCOPE INPUTS

CH1 and CH2

These selections, which are only available at their respected channels, route the Oscilloscope input connectors on the front panel to the Oscilloscope.

DMM INPUT

This selection is only available to Channel 1 and routes the signal currently routed to the DMM to the Oscilloscope.

BASEBAND IN

This selection routes the Baseband Input connector on the front panel to the Oscilloscope.

AUDIO IN

This selection routes the AUDIO IN connector on the front panel to the Oscilloscope (switches to unbalanced input for the Oscilloscope).

70 MHz IF

This selection routes the 70 MHz IF from the RF Downconverter to the Oscilloscope.

10.7 MHz IF

This selection routes the 10.7 MHz IF from the RF Downconverter to the Oscilloscope.

DEMOD AUDIO

This selection routes the Receiver Demod to the Oscilloscope Input.

RF POWER

This selection routes the RF Detector time-domain level indication to the Oscilloscope.

AFGEN1

This selection routes the signal currently setup in AF Generator 1 to the Oscilloscope.

AFGEN2

This selection routes the signal currently setup in AF Generator 2 to the Oscilloscope.

BER DATA OUT

This selection routes the signal currently being generated by the Data Generator for BER to the Oscilloscope.

BER DATA IN

This selection routse the signal currently be received by the BER function to the Oscilloscope.

MIC INPUT

This selection routes the microphone input (MIC Audio) to the Oscilloscope.

REFERENCE OSCILLATOR

This selection routes the 10 MHz reference oscillator to the Oscilloscope.

UUT-ID NB/WB IF IN

This selection routes the UUT-ID Narrowband/Wideband IF (input to the SRM) to the Oscilloscope.

DSP DDS

This selection routes the DSP DDS signal from the DSP Baseband (input to the SRM) to the Oscilloscope.

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DSP DDS AUX DAC

This selection routes the DSP DDS AUX DAC signal from the DSP Baseband (input to the SRM) to the Oscilloscope.

Note: The DSP Baseband is not installed in all configurations.

DSP DAC1

This selection routes the DSP DAC1 signal from the DSP Baseband (input to the SRM) to the Oscilloscope.

DSP DAC2

This selection routes the DSP DAC2 signal from the DSP Baseband (input to the SRM) to the Oscilloscope.

UUT-ID AUDIO/DATA IN 1

This selection routes the UUT-ID AUDIO/DATA IN 1 from the UUT-ID Module (input to the SRM) to the Oscilloscope. This signal is not used in configurations where the UUT-ID is not installed.

UUT-ID AUDIO/DATA IN 2

This selection routes the UUT-ID AUDIO/DATA IN 2 from the UUT-ID Module (input to the SRM) to the Oscilloscope. This signal is not used in configurations where the UUT-ID is not installed.

UUT-ID AUDIO/DATA IN 3

This selection routes the UUT-ID AUDIO/DATA IN 3 from the UUT-ID Module (input to the SRM) to the Oscilloscope. This signal is not used in configurations where the UUT-ID is not installed.

UUT-ID AUDIO/DATA IN 4

This selection routes the UUT-ID AUDIO/DATA IN 4 from the UUT-ID Module (input to the SRM) to the Oscilloscope. This signal is not used in configurations where the UUT-ID is not installed.

UUT-ID AUDIO/DATA OUT 1

This selection routes the UUT-ID AUDIO/DATA OUT 1 from the SRM (input to the UUT-ID Module) to the Oscilloscope. This signal is not used in configurations where the UUT-ID is not installed.

UUT-ID AUDIO/DATA OUT 2

This selection routes the UUT-ID AUDIO/DATA OUT 2 from the SRM (input to the UUT-ID Module) to the Oscilloscope. This signal is not used in configurations where the UUT-ID is not installed.

UUT-ID AUDIO/DATA OUT 3

This selection routes the UUT-ID AUDIO/DATA OUT 3 from the SRM (input to the UUT-ID Module) to the Oscilloscope. This signal is not used in configurations where the UUT-ID is not installed.

UUT-ID AUDIO/DATA OUT 4

This selection routes the UUT-ID AUDIO/DATA OUT 4 from the SRM (input to the UUT-ID Module) to the Oscilloscope. This signal is not used in configurations where the UUT-ID is not installed.

FIELD DEFINITIONS

SWEEP

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The Sweep Rate permits selection of the horizontal axis time per division.

TRIG MODE

The Trigger Mode Control permits AUTO (free-running), NORM (level activated) or ONE (one-shot) sweep start control.

TRIG LEVEL

The Trigger Level Control adjusts the voltage where the trigger is activated.

TRIG EDGE

The Trigger Edge (Rise / Fall) selects the slope of the voltage sensed for triggering.

TRIG OFFSET

The Horizontal Trigger Offset adjusts the horizontal position of the trace to permit viewing a signal at pre- and post- trigger positions.

PERSISTENCE

The Persistence Control permits successive traces to remain on the screen until the persistence is turned OFF.

TRIG SOURCE

The Trigger Source selects the trigger input of CH1, CH2 or EXT (Front Panel).

VERTICAL SCALE

The Vertical Scale function permits the selection of the vertical axis in units appropriate for the selected input:

CH1, CH2, and the AUDIO/DATA Signals Units is in Volts per division
DEMOD FM Units is in Hz, kHz of Deviation per division
DEMOD AM Units is in % AM per division
RF POWER Units is in Power Level per division (dBm, Watts or Volts)
IF Signal has no vertical scale units displayed

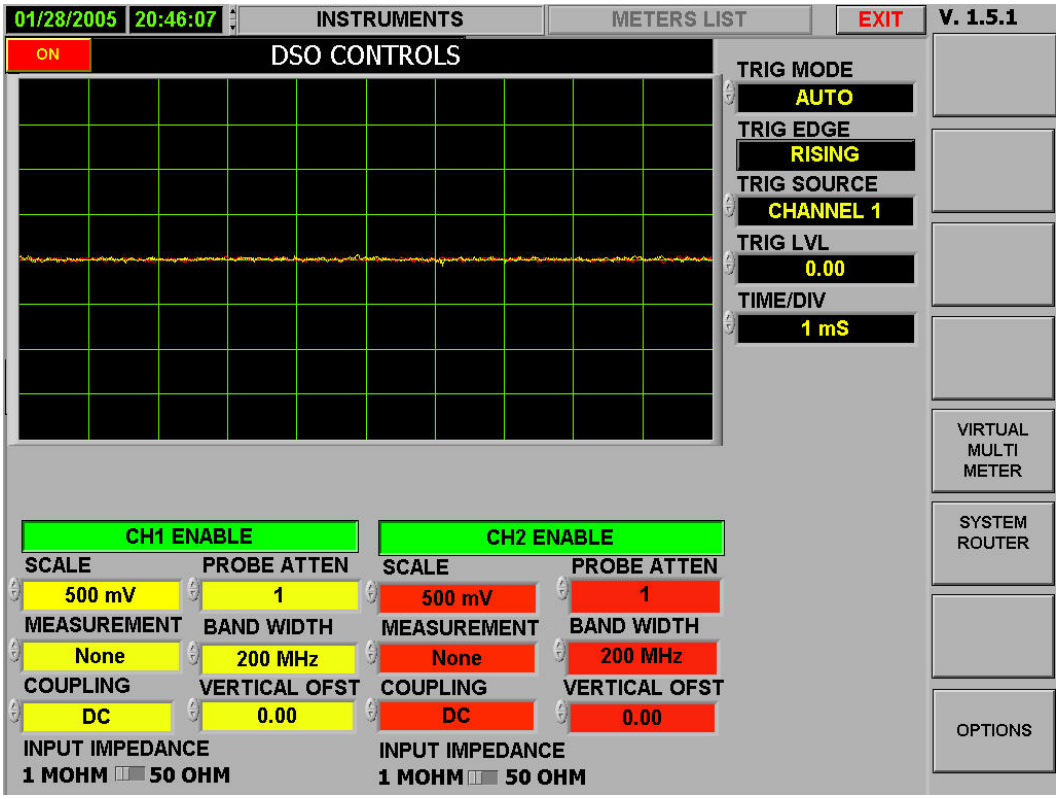
VERTICAL POSITION

The Vertical Position permits changes in the display waveform position on the display grid. When selected, the Spinner Knob may be rotated to set the vertical position as desired.

RF SPECTRUM ANALYZER

The Spectrum Analyzer permits viewing off-air or directly connected RF signals in a RF-level versus frequency display format. The ATS-2000-EA RF Spectrum Analyzer operates in Stand-Alone mode or with any major MODE of operation: Receive, Generate, Duplex, etc. The RF Analyzer OPTIONS field permits selection of the various RF Analyzer Options.

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STAND-ALONE MODE

The operator accesses window spans of up to 2 GHz and the Stand-Alone RF Spectrum Analyzer is selected using the **ANALYZER** mode key and selecting [RF Analyzer].

OPTIONS

The RF Spectrum Analyzer supports option selections that control the display mode of operation and the Tracking Generator. These are accessible by selecting the **OPTIONS** field.

Live

The LIVE mode displays the signals on-screen immediately upon being received. This mode is the "standard" operating mode for general use. Live is capable of being used simultaneously with Compare and/or RF Tracking Generator operation as desired, but is mutually exclusive to Average and Peak operation. Live selection sets soft key to SAVE TRACE function permits storing trace to reference memory. While in Live operation, the trace line is displayed in WHITE. The message "Displaying Live Trace" is shown at the top left of the RF Spectrum Analyzer when LIVE is activated.

Average

The Average mode displays the signals on-screen as the average of the specified number of traces in the AVG edit field. The AVG field appears in the area below the lower-right corner of the Spectrum window. This mode is useful for displaying repetitive signals in the presence of noise.

Average is used simultaneously with Compare and/or RF Tracking Generator operation as desired, but is mutually exclusive to Live and Peak operation. Average selection sets soft key to SAVE TRACE function permits storing trace to reference memory.

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Average selection sets soft key to CLEAR TRACE function permits restarting of the average function by purging previous trace data with new traces received. While in Average operation, the trace line is displayed in LIGHT GREEN. The message "Displaying Avg Trace" is shown at the top left of the RF Spectrum Analyzer when AVERAGE is activated.

Peak

The Peak mode displays the signals on-screen as two traces; one is in Live operation as most recently received and a second is the peak value for each frequency point on the trace display. This mode is useful for catching spurious, one-time events or monitoring a portion of the spectrum over a long period of time.

Peak is used simultaneously with Compare and/or RF Tracking Generator operation as desired, but is mutually exclusive to Live and Average operation. Peak selection sets soft key to SAVE TRACE function permits storing trace to reference memory.

Peak selection sets soft key to CLEAR TRACE function permits restarting of the peak function by purging previous trace data with new traces received. While in Peak operation, the Live trace line is displayed in WHITE and the Peak line is displayed in LIGHT RED.

The message "Displaying Peak Trace" is shown at the top left of the RF Spectrum Analyzer when PEAK is activated.

Compare

The Compare mode displays the last SAVE TRACE display line on the RF Spectrum Analyzer. This mode is useful for visual comparison of a reference trace (the SAVE TRACE) to the Live, Average or Peak trace that is displayed simultaneously. Compare is used simultaneously with Live, Average, Peak and/or RF Tracking Generator operation as desired.

Compare mode selection sets soft key to RECALL TRACE function permits retrieving the trace from reference memory. While in Compare operation, the RECALL TRACE is displayed in YELLOW, and other simultaneously displayed trace line is displayed in its respective color.

Tracking Generator (optional)

The Tracking Gen mode provides a tool for RF analysis by activating a RF source signal (generator) that is swept in synchronism with the Spectrum Analyzer RF receiver. This swept RF generator may be applied to components or systems and the output monitored to display the frequency response of these items.

The RF Tracking Generator mode activates additional controls when selected.

The TG LVL edit field appears in the area below the center-right of the RF Spectrum window. This field displays and permits changes to the RF level of the Tracking Generator.

The TG OUTPUT soft key selection control is provided, permitting the RF Tracking Generator to be routed to the Duplex or T/R Port on the ATS-2000-EA Front Panel. The Tracking Generator is used simultaneously with Live, Average, Peak and/or Compare operation as desired, with the trace lines displayed in their respective colors.

FIELD DEFINITIONS

The various control fields permits changes to the Spectrum Analyzer RF and display systems within the ATS-2000-EA.

CTR FREQ

The CTR FREQ field is the frequency at the center graticule of the trace display. This frequency is set to the Receiver frequency when the RF Spectrum Analyzer is initially

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entered and is capable of editing as desired thereafter. Frequency changes for the RF Spectrum Analyzer are simultaneously made to the Receiver frequency.

The range of Frequency entry is 0 to 2000 MHz. When displaying trace areas that would be outside this range of frequencies, the trace line drops to the bottom of the trace window to indicate the frequency area is invalid.

Resolution of Frequency is 1 Hz (0.000001 MHz).

SPAN

The SPAN field defines the size of the window over which the RF Spectrum Analyzer sweeps. This SPAN is the entire window size left to right, therefore each vertical graticule line represents 1/10th of this frequency.

The range of Span values is 0 to 2000 MHz SPAN in Stand-Alone.

Changing SPAN while in AUTO mode causes the RBW, VBW and SWEEP fields to update automatically to the optimum settings for frequency and level accuracy at the selected SPAN.

Changing SPAN while in MAN mode may cause the RBW, VBW and/or SWEEP fields to change background color, and an UNCAL annunciator to appear on the screen. This indicates that one or more fields may need to be changed to achieve frequency and level accuracy.

RBW

The RBW field defines the Resolution Bandwidth (RBW) that is used by the RF Spectrum Analyzer. The RBW is the width of the filter that is used within the receiver as it is swept over the specified SPAN (the filter located before the log detector).

RBW selections are: 300 Hz, 3 kHz, 30 kHz, 60 kHz, 300 kHz, and 2 MHz and 5 MHz.

RBW is NOT selectable while in AUTO mode, as RBW is set automatically according to SPAN.

Changing RBW while in MAN mode causes the RBW, VBW and/or SWEEP fields to change background color, and an UNCAL annunciator to appear on screen. This indicates that one or more fields may need to be changed to achieve frequency and level accuracy.

SWEEP

The SWEEP field defines the rate at which the RF Spectrum Analyzer takes to traverse the display area from left to right.

SWEEP is NOT selectable while in AUTO mode, as SWEEP is set automatically according to SPAN.

Changing SWEEP while in MAN mode causes the RBW, VBW and/or SWEEP fields to change background color, and an UNCAL annunciator to appear on screen. This indicates that one or more fields may need to be changed to achieve frequency and level accuracy.

AUTO/MAN

The AUTO/MAN field permits selection of automatic (AUTO) selections for SWEEP, RBW and VBW settings according to SPAN or manual (MAN) selections for SWEEP, RBW and VBW.

During AUTO operation, the ATS-2000-EA RF Spectrum Analyzer selects optimum SWEEP, RBW and VBW settings.

It may be necessary to view spectrum conditions at other settings, so MANUAL selection is capable of being used. It is possible to set conditions using MANUAL

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settings that places the RF Spectrum Analyzer into an uncalibrated mode of operation, and this is indicated by the appearance of the UNCAL annunciator on the screen. This indicates that one or more fields may need to be changed to achieve frequency and level accuracy.

TRACE (STOP/RUN)

A soft key controls the TRACE STOP / RUN condition.

The RF Spectrum Analyzer is in in RUN condition, where repetitive spectral traces occur at current settings, each new trace eliminating the previous trace. If a particular condition displayed on-screen needs to be observed in detail, pressing STOP halts the repetitive trace action until RUN is pressed.

INPUT

A soft key controls the RF input that is currently displayed on the RF Spectrum Analyzer.

Selections are: T/R or Duplex Port

The TOP OF SCALE reference level and ATTEN (attenuation) settings change according to the selected input.

TG OUTPUT

A soft key controls the RF Tracking Generator RF Output that is currently active for the Tracking Generator and is only active if the Tracking Generator is ON.

Selections are: T/R or Duplex Port

SAVE TRACE

A soft key is used to SAVE TRACE displays when COMPARE mode is NOT active.

Pressing this key saves the current trace display to reference memory for later recall when COMPARE mode is activated.

RECALL TRACE

A soft key is used to RECALL TRACE when COMPARE is active.

Pressing this key recalls and display the reference trace memory when in COMPARE mode.

NORMAL

A soft key is used to Normalize (NORMAL) the RF Spectrum Analyzer system.

Normalization adjusts internal settings to compensate for differences between the various filters within the ATS-2000-EA to give accurate spectrum displays.

When NORMAL is pressed, a pop up window displays progress of the internal calibration process. Perform normalization initially on first use of the Spectrum Analyzer and as desired thereafter.

TOP OF SCALE

The far-left of the display area has eight (8) numbers vertically indicating the level at each major division. The TOP OF SCALE, or the top-most value is commonly referred to as the Reference Level.

This TOP OF SCALE value is editable to set the desired reference level depending upon which INPUT is selected (T/R or Duplex) and for the signal level of the desired carrier.

UNITS/DIV

The UNITS/DIV field selects the resolution of the vertical axis.

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Each major division vertically is selectable to be in the step size of 10 or 2 dB/div.

ATTEN

The ATTEN field is used to indicate the amount of attenuation that is applied to the selected input to achieve the desired TOP OF SCREEN value.

AVG

The AVG field is only displayed when the AVERAGE mode is activated.

The AVG field is the number of display sweeps that are averaged for the currently displayed spectrum trace.

TG LVL

The RF Tracking Generator Level (TG LVL) field is only displayed when the RF Tracking Generator mode is activated.

The TG LVL field contains the RF level for the RF Tracking Generator output. The range of TG LVL varies according to the selected TG OUTPUT, either the T/R or Duplex Port.

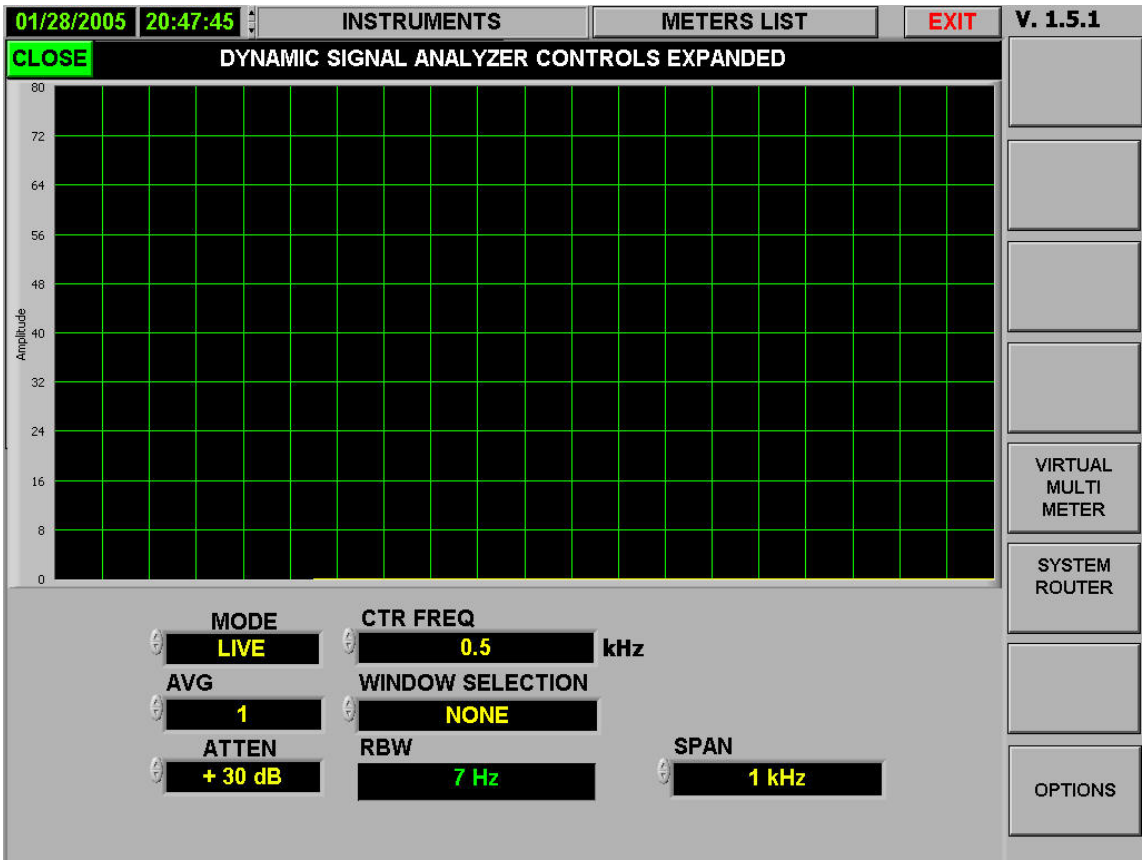
T/R Port level range is: 0 to -137 dBm

GEN Port level range is: +10 to -127 dBm (+36 dBm optional)

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DYNAMIC SIGNAL ANALYZER (optional)

The Dynamic Signal Analyzer (AF Spectrum Analyzer) permits viewing demodulated or directly connected AUDIO signals in a AF-level versus frequency display format. The ATS-2000-EA Audio Signal Analyzer operates in Stand-Alone mode or with any major MODE of operation: Receive, Generate, Duplex, etc. The AF Analyzer OPTIONS field permits selection of the various AF Analyzer Options.



STAND-ALONE MODE

The operator accesses window spans of up to 250 kHz and the Stand-Alone AF Spectrum Analyzer is selected using the **ANALYZER** mode key and selecting AF Analyzer.

OPTIONS

The AF Spectrum Analyzer supports option selections that control the display mode of operation and the AF Tracking Generator. These are accessible by selecting the OPTIONS field.

Live

The LIVE mode displays the signals on-screen immediately upon being received. This mode is the "standard" operating mode for general use. Live is capable of being used simultaneously with Compare and/or AF Tracking Generator operation as desired, but is mutually exclusive to Average and Peak operation. Live selection sets soft key to

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SAVE TRACE function which permits storing trace to reference memory. While in Live operation, the trace line is displayed in WHITE. The message "Displaying Live Trace" is shown at the top left of the AF Spectrum Analyzer when LIVE is activated.

Average

The Average mode displays the signals on-screen as the average of the specified number of traces in the AVG edit field. The AVG field appears in the area below the lower-right corner of the Spectrum window. This mode is useful for displaying repetitive signals in the presence of noise.

Average is used simultaneously with Compare and/or AF Tracking Generator operation as desired, but is mutually exclusive to Live and Peak operation. Average selection sets soft key to SAVE TRACE function permits storing trace to reference memory.

Average selection sets soft key to CLEAR TRACE function permits restarting of the average function by purging previous trace data with new traces received. While in Average operation, the trace line is displayed in LIGHT GREEN. The message "Displaying Avg Trace" is shown at the top left of the AF Spectrum Analyzer when AVERAGE is activated.

Peak

The Peak mode displays the signals on-screen as two traces; one is in Live operation as most recently received and a second is the peak value for each frequency point on the trace display. This mode is useful for catching spurious, one-time events or monitoring a portion of the spectrum over a long period of time.

Peak is used simultaneously with Compare and/or AF Tracking Generator operation as desired, but is mutually exclusive to Live and Average operation. Peak selection sets soft key to SAVE TRACE function permits storing trace to reference memory.

Peak selection sets soft key to CLEAR TRACE function permits restarting of the peak function by purging previous trace data with new traces received. While in Peak operation, the Live trace line is displayed in WHITE and the Peak line is displayed in LIGHT RED.

The message "Displaying Peak Trace" is shown at the top left of the AF Spectrum Analyzer when PEAK is activated.

Compare

The Compare mode displays the last SAVE TRACE display line on the AF Spectrum Analyzer. This mode is useful for visual comparison of a reference trace (the SAVE TRACE) to the Live, Average or Peak trace that is displayed simultaneously. Compare is used simultaneously with Live, Average, Peak and/or AF Tracking Generator operation as desired.

Compare mode selection sets soft key to RECALL TRACE function permits retrieving the trace from reference memory. While in Compare operation, the RECALL TRACE is displayed in YELLOW, and other simultaneously displayed trace line is displayed in its respective color.

Tracking Generator

The Tracking Gen mode provides a tool for AF analysis by activating an AF source signal (generator) that is swept in synchronism with the Spectrum Analyzer AF receiver. This swept AF generator may be applied to components or systems and the output monitored to display the frequency response of these items.

The AF Tracking Generator mode activates additional controls when selected.

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The TG LVL edit field appears in the area below the center-right of the AF Spectrum window. This field displays and permits changes to the AF level of the AF Tracking Generator.

The TG OUTPUT soft key selection control is provided, permitting the AF Tracking Generator to be routed to the Audio Output or Baseband Output Port on the ATS-2000-EA Front Panel. The AF Tracking Generator is used simultaneously with Live, Average, Peak and/or Compare operation as desired, with the trace lines displayed in their respective colors.

FIELD DEFINITIONS

The various control fields permits changes to the Spectrum Analyzer AF and display systems within the ATS-2000-EA.

CTR FREQ

The CTR FREQ field is the frequency at the center graticule of the trace display. This frequency is set to the AF Receiver default frequency when the AF Spectrum Analyzer is initially entered and is capable of editing as desired thereafter. Frequency changes for the AF Spectrum Analyzer are simultaneously made to the AF Receiver frequency.

The range of Frequency entry is 0 to 250 kHz. When displaying trace areas that would be outside this range of frequencies, the trace line drops to the bottom of the trace window to indicate the frequency area is invalid.

Resolution of Frequency is 1 Hz (0.001 kHz).

SPAN

The SPAN field defines the size of the window over which the AF Spectrum Analyzer sweeps. This SPAN is the entire window size left to right, therefore each vertical graticule line represents 1/10th of this frequency.

The range of Span values is 0 to 250 kHz SPAN in Stand-Alone.

Changing SPAN while in AUTO mode causes the RBW, ABW and SWEEP fields to update automatically to the optimum settings for frequency and level accuracy at the selected SPAN.

Changing SPAN while in MAN mode causes the RBW, ABW and/or SWEEP fields to change background color, and an UNCAL annunciator to appear on the screen. This indicates that one or more fields may need to be changed to achieve frequency and level accuracy.

RBW

The RBW field defines the Resolution Bandwidth (RBW) that is used by the AF Spectrum Analyzer. The RBW is the width of the filter that is used within the receiver as it is swept over the specified SPAN (the filter located before the log detector).

RBW selection is: 30 Hz, 300 Hz, 3 kHz and 30 kHz

RBW is NOT be selectable while in AUTO mode, as RBW is set automatically according to SPAN.

Changing RBW while in MAN mode causes the RBW, ABW and/or SWEEP fields to change background color, and an UNCAL annunciator to appear on screen. This indicates that one or more fields may need to be changed to achieve frequency and level accuracy.

SWEEP

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The SWEEP field definse the rate at which the AF Spectrum Analyzer takes to traverse the display area from left to right.

SWEEP selections is: 250 ms, 500 ms, 750 ms, 1 s, 2 s, 3 s, 4 s, 5 s and 6 s.

SWEEP is NOT be selectable while in AUTO mode, as SWEEP is set automatically according to SPAN.

Changing SWEEP while in MAN mode causes the RBW, ABW and/or SWEEP fields to change background color, and an UNCAL annunciator to appear on screen. This indicates that one or more fields may need to be changed to achieve frequency and level accuracy.

AUTO/MAN

The AUTO/MAN field permits selection of automatic (AUTO) selections for SWEEP, RBW and ABW settings according to SPAN or manual (MAN) selections for SWEEP, RBW and ABW.

During AUTO operation, the ATS-2000-EA AF Spectrum Analyzer selects optimum SWEEP, RBW and ABW settings.

It may be necessary to view spectrum conditions at other settings so MANUAL selection is capable of being used. It is possible to set conditions using MANUAL settings that places the RF Spectrum Analyzer into an uncalibrated mode of operation, and this is indicated by the appearance of the UNCAL annunciator on the screen. This indicates that one or more fields may need to be changed to achieve frequency and level accuracy.

TRACE (STOP/RUN)

A soft key controls the TRACE STOP / RUN condition.

The AF Spectrum Analyzer is in RUN condition, where repetitive spectral traces occur at current settings, each new trace eliminating the previous trace. If a particular condition displayed on-screen needs to be observed in detail, pressing STOP halts the repetitive trace action until RUN is pressed.

INPUT

A soft key controls the AF input that is currently displayed on the AF Spectrum Analyzer.

Selections are: Demod Audio, Audio Input or Baseband Input Port

The TOP OF SCALE reference level and ATTEN (attenuation) settings change according to the selected input.

TG OUTPUT

A soft key control the Tracking Generator AF Output that is currently active for the AF Tracking Generator and is only active if the Tracking Generator is ON.

Selections are: Audio Output or Baseband Output Port

SAVE TRACE

A soft key is used to SAVE TRACE displays when COMPARE mode is NOT active. Pressing this key saves the current trace display to reference memory for later recall when COMPARE mode is activated.

RECALL TRACE

A soft key is used to RECALL TRACE when COMPARE is active. Pressing this key recalls and display the reference trace memory when in COMPARE mode.

NORMAL

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A soft key is used to Normalize (NORMAL) the AF Spectrum Analyzer system.

Normalization adjusts internal settings to compensate for differences between the various filters within the ATS-2000-EA to give accurate spectrum displays.

When NORMAL is pressed, a pop-up window displays progress of the internal calibration process. Perform normalization initially on first use of the AF Spectrum Analyzer and as desired thereafter.

TOP OF SCALE

The far-left of the display area has eight (8) numbers vertically indicating the level at each major division. The TOP OF SCALE, or the top-most value is commonly referred to as the Reference Level.

This TOP OF SCALE value is editable to set the desired reference level depending upon which INPUT is selected (Audio Input or Baseband Input Port) and for the signal level of the desired carrier.

UNITS/DIV

The UNITS/DIV field selects the resolution of the vertical axis. Each major division vertically is selectable to be in the step size of 10 or 2 dB/div.

ATTEN

The ATTEN field is used to indicate the amount of attenuation that is applied to the selected input to achieve the desired TOP OF SCREEN value.

AVG

The AVG field is only displayed when the AVERAGE mode is activated. The AVG field is the number of display sweeps that are averaged for the currently displayed spectrum trace.

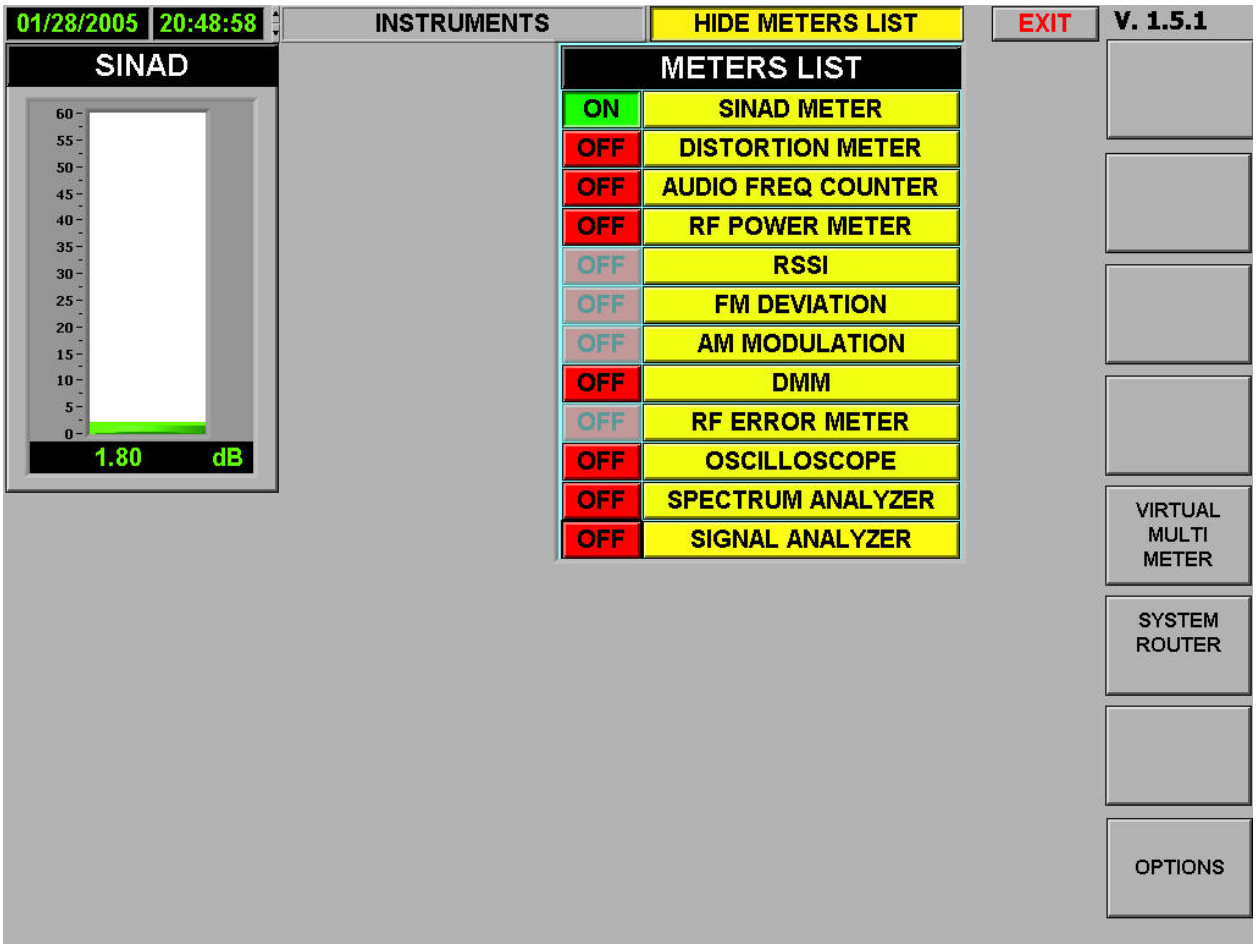
TG LVL

The AF Tracking Generator Level (TG LVL) field is only be displayed when the AF Tracking Generator mode is activated. The TG LVL field contains the AF level for the Tracking Generator output. The range of TG LVL varies according to the selected TG OUTPUT, either the Audio Output or Baseband Output Port.

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METER SELECTION LIST

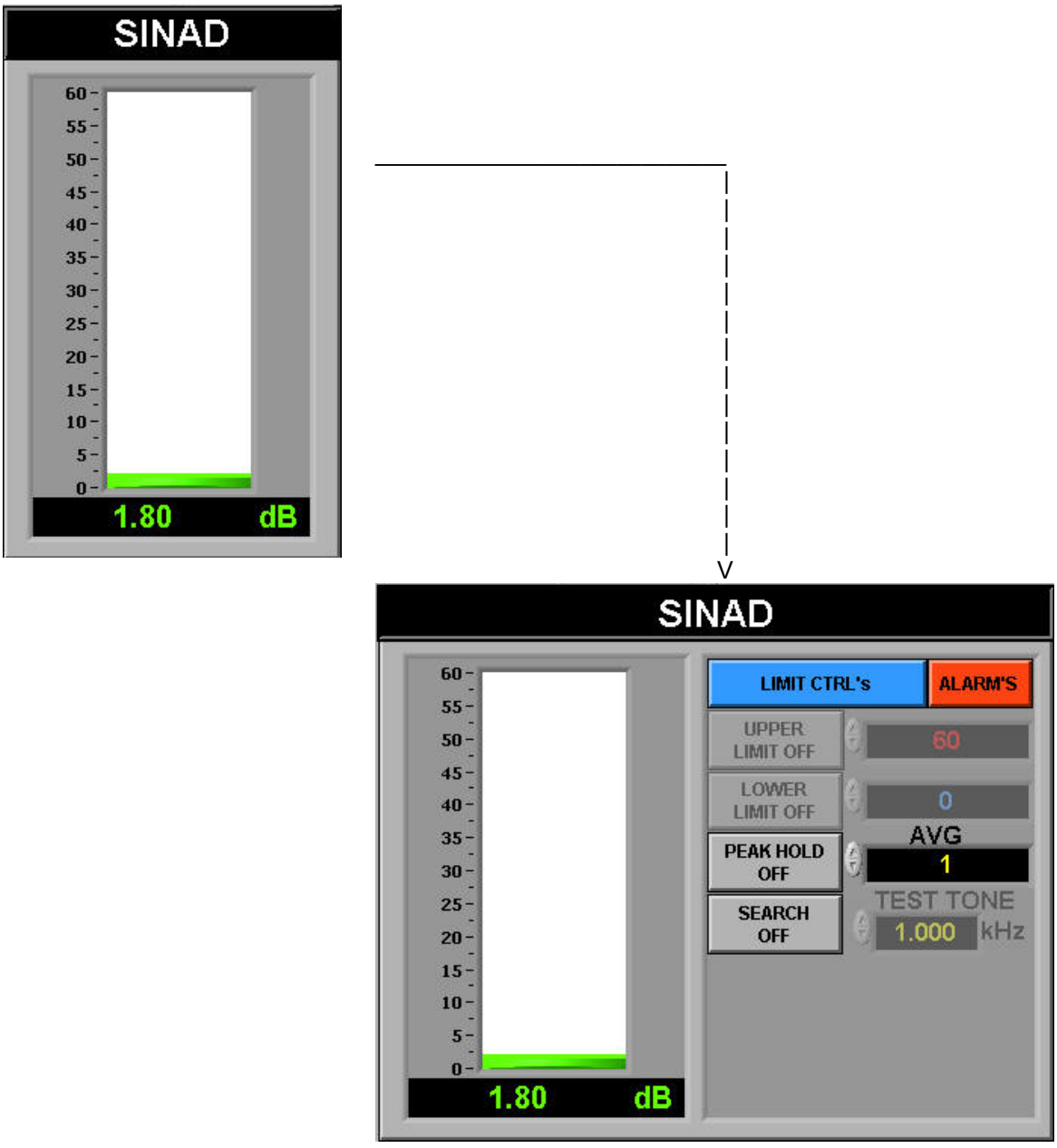
The Meter Selection List Menu is used for selecting various instruments and meters to be included on any of the Major Instrument Mode Screens.



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SINAD METER

The SINAD Meter is used for making audio quality measurements on analog receivers and allows measurement of a receiver's sensitivity. The audio quality is measured as a ratio of (Signal + Noise) / Noise for the selected test tone frequency. The SINAD Meter function allows selection of the input signal source.



FIELD DEFINITIONS

SOURCE INPUT

DEMOD

Allows the Demod Audio from the Receiver to be routed to the SINAD Meter input.

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BASEBAND INPUT (Balanced)

Allows the Baseband Input to be routed to the SINAD Meter as a 600-Ohm balanced input.

BASEBAND INPUT (Unbalanced)

Allows the Baseband Input to be routed to the SINAD Meter as an unbalanced input.

AUDIO (Balanced)

Allows the Audio Input to be routed to the SINAD Meter as a 600-Ohm balanced input.

AUDIO (Unbalanced)

Allows the Audio Input to be routed to the SINAD Meter as an unbalanced input.

UUT-ID Audio/Data (1-4)

Allows the Audio Input to be routed to the SINAD Meter as an unbalanced input.

RANGE

Selects the SINAD Meter range (20, 60 or AR [Auto-Range]) for the bar graph display. When in Auto-Range, the SINAD Meter automatically selects the appropriate range for the bar graph display.

TEST TONE FREQUENCY

Selects the SINAD Meters frequency of interest to measure SINAD. The range is selectable from 100 Hz to 10 kHz in 1 Hz increments.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

With Peak Hold enabled, the highest reading remains on the display.

AVERAGE

Allows the indicated SINAD Meter reading to be the average of a specified number of readings. Setting this value to one (1) turns averaging OFF.

AUDIO FILTER

Selects Audio Filters including C-Weight Bandpass Filter as required. Many radio manufacturers specify the C-Weight Filter for SINAD measurement.

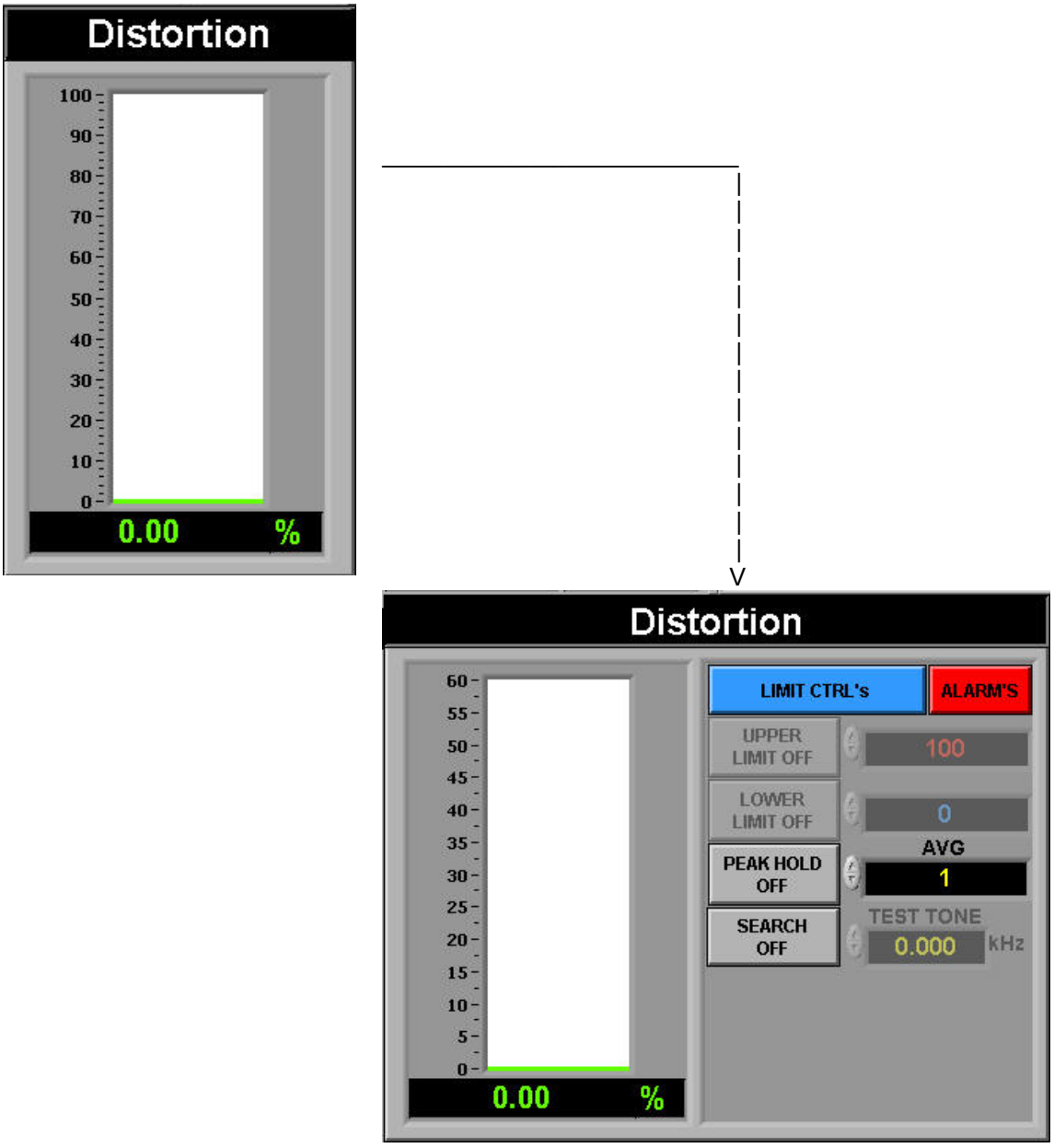
RF GEN LEVEL

Allows the Generator RF Level to be adjusted within the “zoomed” SINAD Meter. The Generator Level range is the same as the Generator screen for the particular port (T/R or Duplex) selected.

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DISTORTION METER

The Distortion Meter is used for making audio quality measurements on analog receivers and allows measurement of a receiver's sensitivity. The audio quality is measured as a percentage where the RMS level of the selectable test tone frequency (100 Hz to 10 kHz) is measured and compared to the same signal with the selected tone removed. The ATS-2000-EA Distortion Meter function allows selection of the input signal source.



FIELD DEFINITIONS

SOURCE INPUT

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DEMOD

Allows the Demod Audio from the Receiver to be routed to the Distortion Meter input.

BASEBAND INPUT (Balanced)

Allows the Baseband Input to be routed to the Distortion Meter as a 600-Ohm balanced input.

BASEBAND INPUT (Unbalanced)

Allows the Baseband Input to be routed to the Distortion Meter as an unbalanced input.

AUDIO (Balanced)

Allows the Audio Input to be routed to the Distortion Meter as a 600-Ohm balanced input.

AUDIO

Allows the Audio Input to be routed to the Distortion Meter as an unbalanced input.

UUT-ID Audio/Data (1-4)

Allows the Audio Input to be routed to the SINAD Meter as an unbalanced input.

RANGE

Selects the Distortion Meter range (5, 10, 20, 50, 100 or AR [Auto-Range]) for the bar graph display. When in Auto-Range, the Distortion Meter automatically selects the appropriate range for the bar graph display.

TEST TONE FREQUENCY

Selects the Distortion Meters frequency of interest to measure Distortion. The range is selectable from 100 Hz to 10 kHz in 1 Hz increments.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

With Peak Hold enabled, the highest reading remains on the display.

AVERAGE

Shall allow the indicated Distortion Meter reading to be the average of a specified number of readings. Setting this value to one (1) turns averaging OFF.

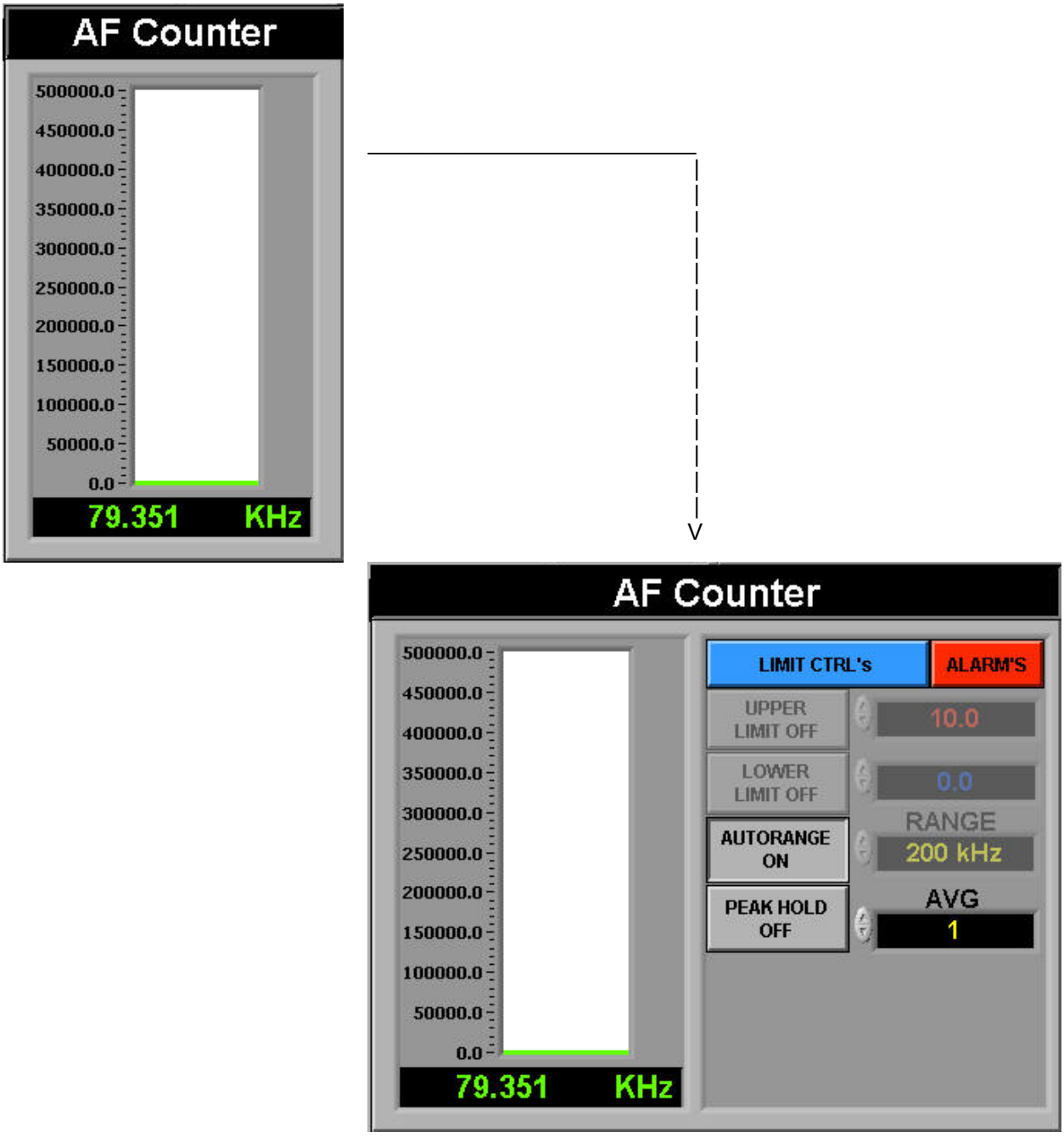
AUDIO FILTER

Selects Audio Filters including C-Weight Bandpass Filter as required. Many radio manufacturers specify the C-Weight Filter for SINAD measurement.

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AF COUNTER

The AF Counter is used to measure demodulated audio frequencies, or audio frequencies input to the ATS-2000-EA through one of the audio input paths (BASEBAND or AUDIO I/O).



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FIELD DEFINITIONS

SOURCE INPUT

DEMOD

Allows the Demod Audio from the Receiver to be routed to the AF Counter Meter input.

BASEBAND INPUT (Balanced)

Allows the Baseband Input to be routed to the AF Counter Meter as a 600-Ohm balanced input.

BASEBAND INPUT (Unbalanced)

Allows the Baseband Input to be routed to the AF Counter Meter as an unbalanced input.

AUDIO (Balanced)

Allows the Audio Input to be routed to the AF Counter Meter as a 600-Ohm balanced input.

AUDIO (Unbalanced)

Allows the Audio Input to be routed to the AF Counter Meter as an unbalanced input.

UUT-ID Audio/Data (1-4)

Allows the Audio Input to be routed to the AF Counter Meter as an unbalanced input.

RANGE

Selects the AF Counter range (100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K, 200K, 500K or AR [Auto-Range]) for the bar graph display. When in Auto-Range, the AF Counter automatically selects the appropriate range for the bar graph display.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

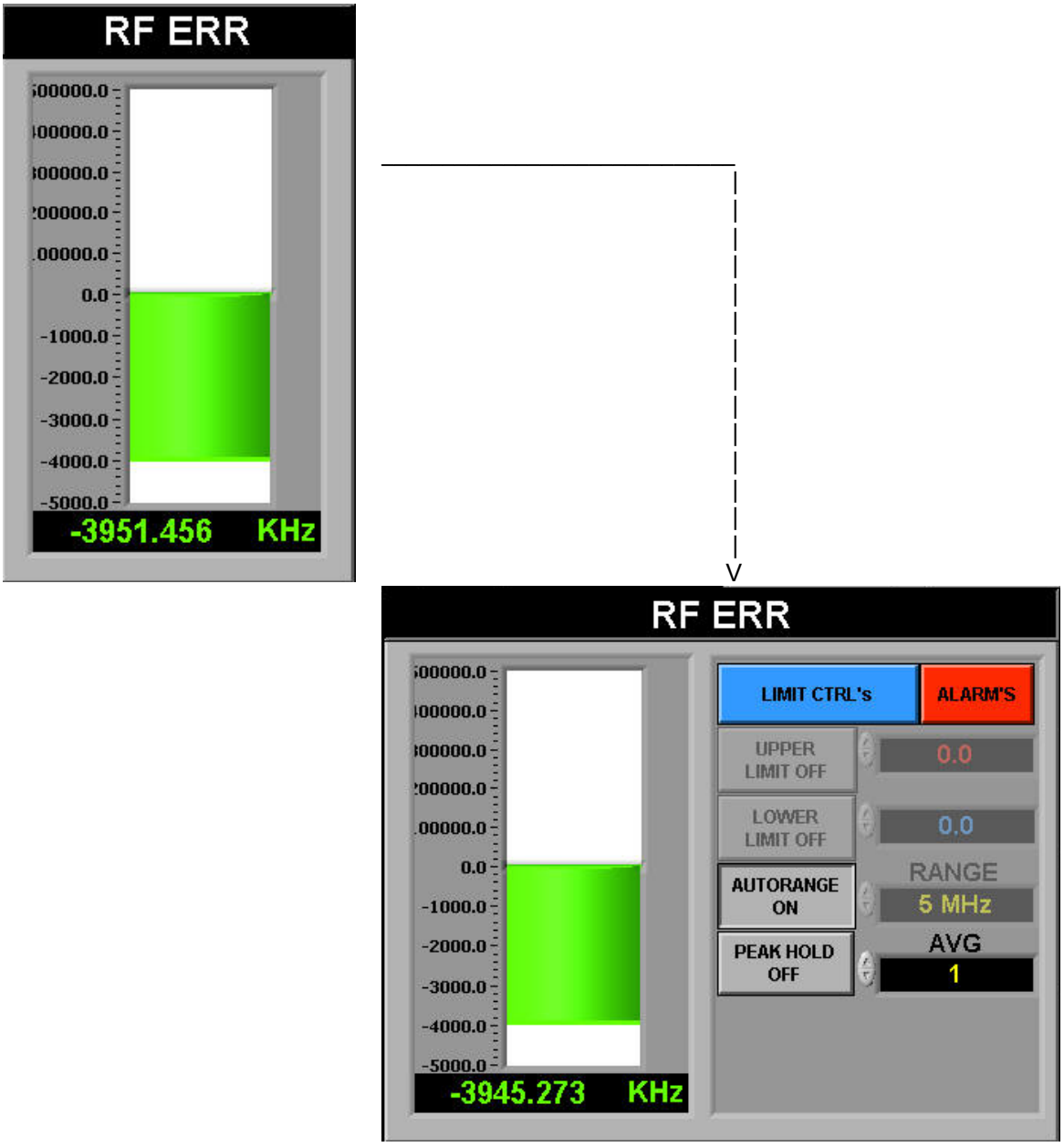
With Peak Hold enabled, the highest reading remains on the display.

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RF FREQUENCY ERROR and RF FREQUENCY METERS

The RF Frequency Error Meter is used to measure the difference between the RF Receiver tuned frequency value and the actual frequency as received on the T/R or Duplex Port. The range of the RF Error Meter is directly related to the IF bandwidth selected. The range is approximately 1/2 the selected IF bandwidth. (i.e., the 300 kHz IF bandwidth can measure approximately +/-150 kHz RF error).

Note: This measurement is directly related to the Receiver Tuned Frequency and is primarily used to for display on the RF Receiver and RF Spectrum Analyzer Screens. This Meter is typically not a stand-alone capable meter and is for operator reference only.



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FIELD DEFINITIONS

RANGE

Selects the RF Frequency Error Meter range (10, 20, 50, 100, 200, 500, 1K, 2K, 5K, 10K, 20K, 50K, 100K, 200K, 500K, 1000K, 2000K or AR [Auto-Range]) for the bar graph display. When in Auto-Range, the RF Frequency Error Meter automatically selects the appropriate range for the bar graph display.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

With Peak Hold enabled, the highest reading remains on the display.

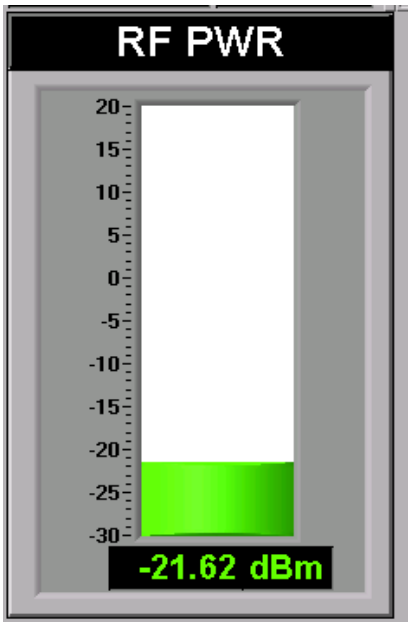
RF RCV FREQ

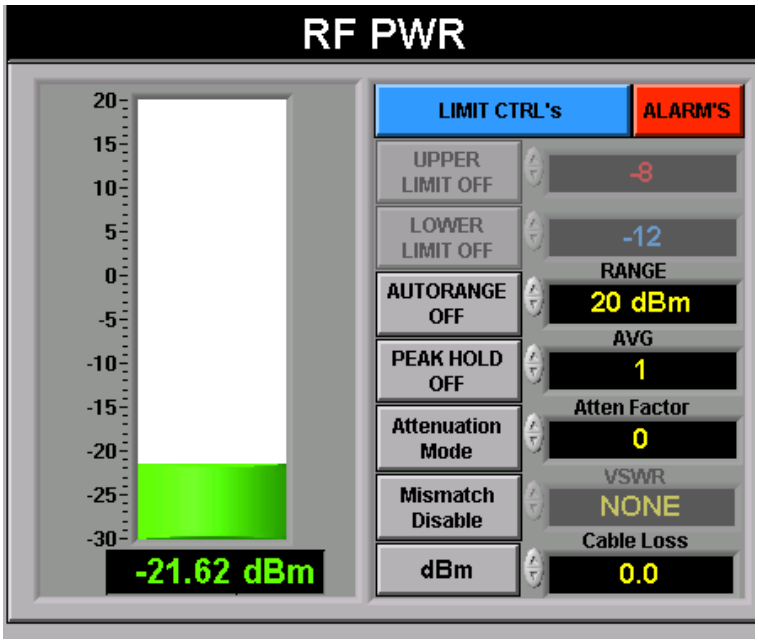
Allows the RF Receiver to be set to the desired frequency.

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POWER METER

The Power Meter is used to measure RF power at the T/R Port. The ATS-2000-EA has a 200 Watt power termination pad within the unit that sustains RF transmitter power of 50 Watt continuously or up to 200 Watts cycled on/off.





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FIELD DEFINITIONS

ATTEN/GAIN

The operator is able to enter Attenuation or Gain values in dB and the Power Meter will compensate, resulting in correct meter reading for the Unit-Under-Test.

RANGE

Selects the Power Meter range for the bar graph display:

Range:	0.1 mW to 200 W
Watts Mode:	0.001, 0.002, 0.005,
	0.01, 0.02, 0.05,
	0.1, 0.2, 0.5,
	1, 2, 5,
	10, 20, 50,
	100, 200 or AR (Auto-Range)
dBm Mode:	0, 10, 20, 30, 40 or 50

When in Auto-Range, the Power Meter automatically selects the appropriate range for the bar graph display.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

With Peak Hold enabled, the highest reading remains on the display.

METER UNITS

Power is displayed in Watts, dB or both.

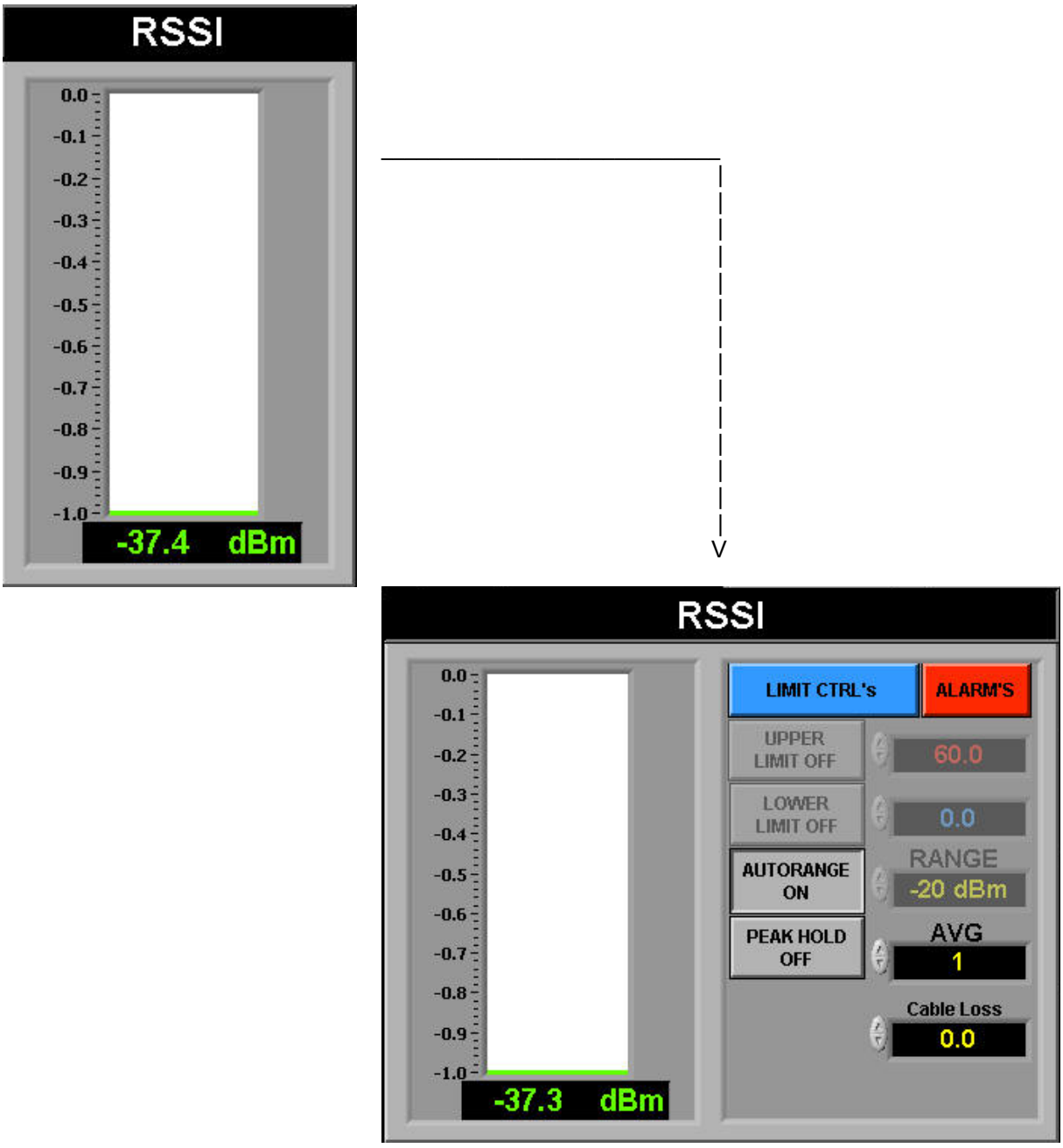
ZERO METER

For accurate measurements, the Power meter is zeroed with no power applied.

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RSSI METER

The RSSI (Received Signal Strength Indication) Meter is useful for measuring low-level RF signals at the Duplex (Antenna) Port. The RSSI Meter is also useful for monitoring off-air signals using an antenna.



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FIELD DEFINITIONS

RANGE

Selects the RSSI Meter range (-80, -60, -40, -20, 0, 20, 40, 60 dB or AR [Auto-Range]) for the bar graph display. When in Auto-Range, the RSSI Meter automatically selects the appropriate range for the bar graph display.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

With Peak Hold enabled, the highest reading remains on the display.

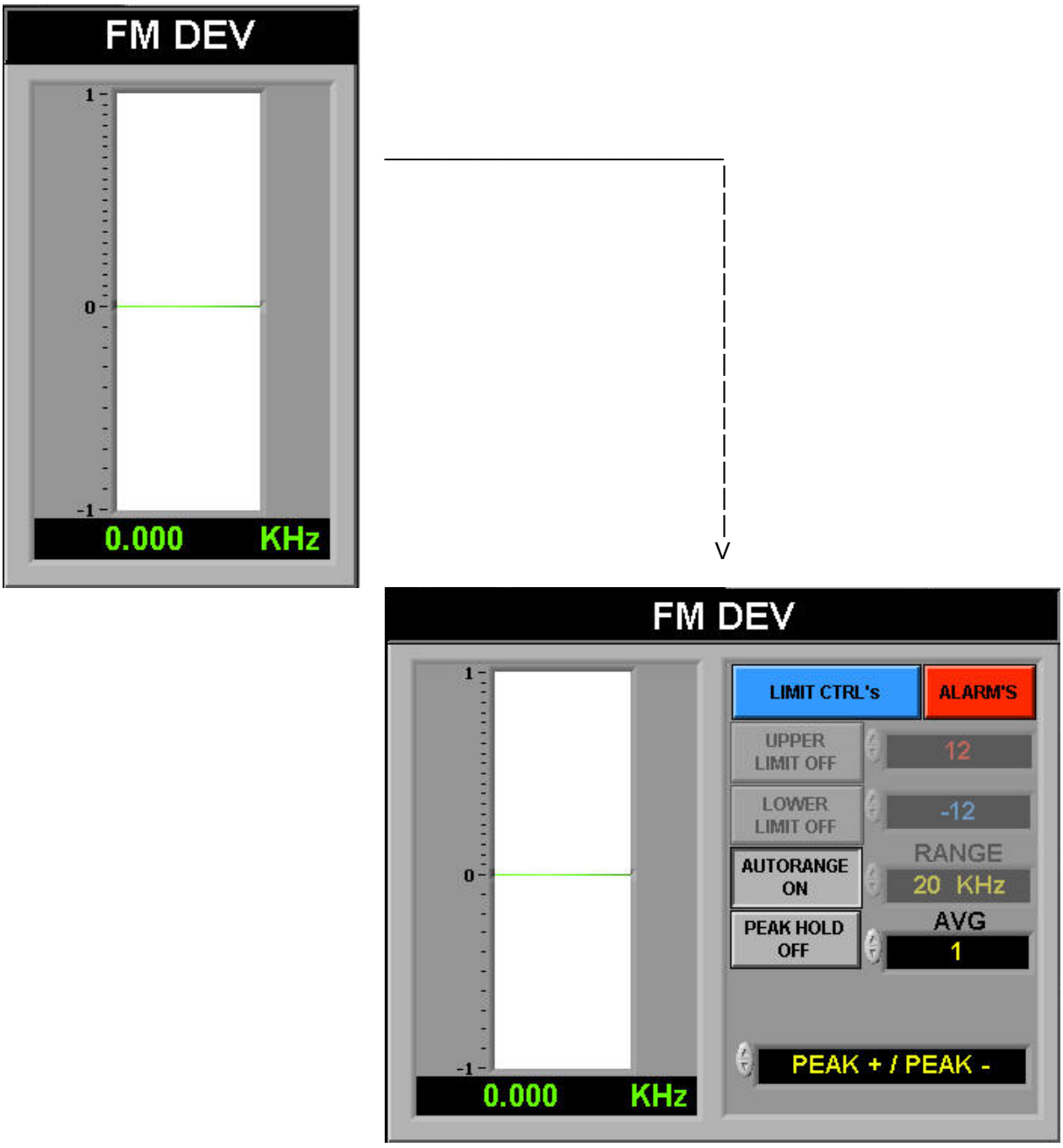
CAL METER

Calibrates the RSSI Meter so accurate measurements can be obtained. CAL is required when the CAL background changes to YELLOW.

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FM DEVIATION METER

The Deviation Meter is used to measure the modulation level of frequency modulated (FM) systems. The Deviation Meter may also be used for directly connected transmitters (T/R Port) or off-air signals (Duplex Port).



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FIELD DEFINITIONS

RANGE

Selects the Deviation Meter range (1, 2, 5, 10, 20, 50, 100 kHz or AR [Auto-Range]) for the bar graph display. When in Auto-Range, the Deviation Meter automatically selects the appropriate range for the bar graph display.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

With Peak Hold enabled, the highest reading remains on the display.

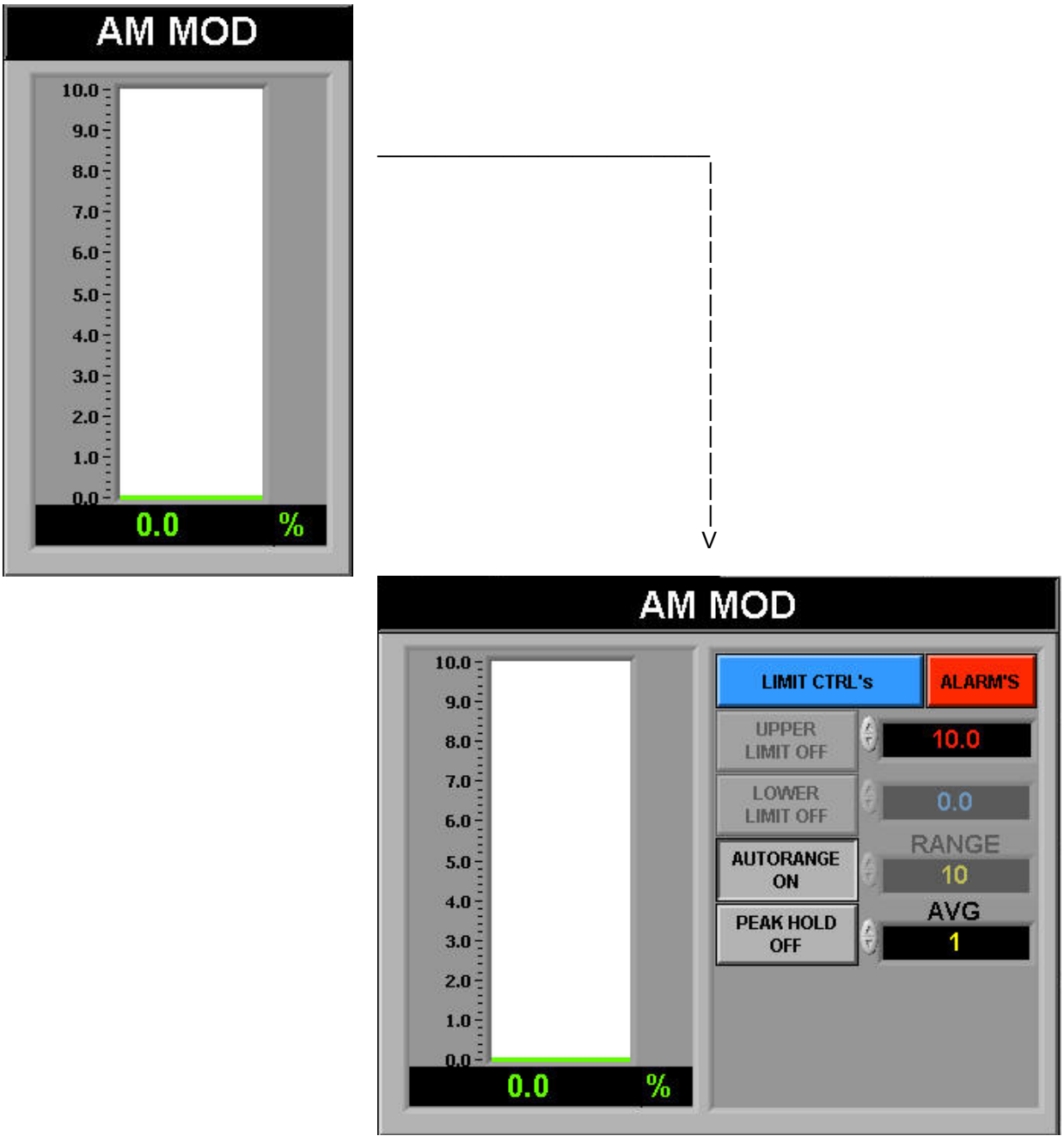
AVERAGE

Allows the indicated Deviation Meter reading to be the average of a specified number of readings. Setting this value to one (1) turns averaging OFF.

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AM MODULATION METER

The AM Modulation Meter is used to measure the modulation level of amplitude modulated (AM) systems. The AM Modulation Meter may also be used for directly connected transmitters (T/R Port) or off-air signals (Duplex Port).



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FIELD DEFINITIONS

RANGE

Selects the AM Modulation Meter range (10, 20, 50, 100 % or AR [Auto-Range]) for the bar graph display. When in Auto-Range, the Deviation Meter automatically selects the appropriate range for the bar graph display.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

With Peak Hold enabled, the highest reading remains on the display.

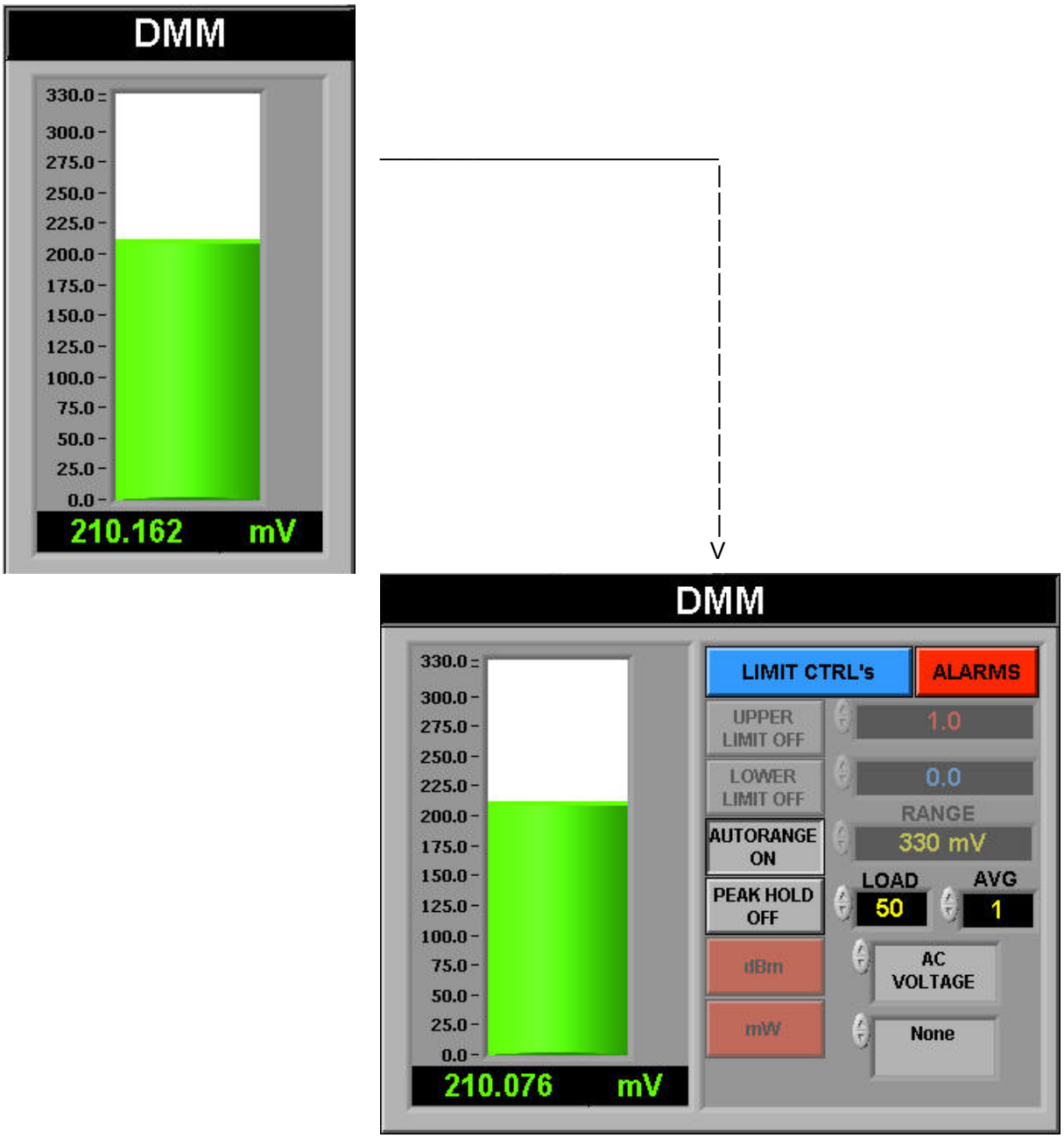
AVERAGE

Allows the indicated Modulation Meter reading to be the average of a specified number of readings. Setting this value to one (1) turns averaging OFF.

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DIGITAL (AC/DC) MULTIMETER

The Digital Multimeter is used to measure AC/DC Voltage, AC/DC Current, and Resistance in Ohms. The AC/DC Voltmeter also allows user selectable loads. For audio system measurements, the AC Voltmeter provides dBm units. The Digital Multimeter allows multiple input sources to be selected as well as external Front Panel access at the DMM (Input) Port.



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FIELD DEFINITIONS

MEASURE TYPE

Select the DMM measurement type:

1. AC Voltmeter
2. AC Voltmeter
3. DC Current Meter
4. AC Current Meter
5. Ohmmeter

RANGE

Selects the Digital Voltmeter range or Auto-Range for the bar graph display. When in Auto-Range, the Digital Voltmeter automatically selects the appropriate range for the bar graph display.

HIGH LIMIT

Allows setting of a High limit. When the measured level exceeds the High Limit setting, the Bar Graph changes from GREEN to RED.

LOW LIMIT

Allows setting of a Low limit. When the measured level drops below the Low Limit setting, the Bar Graph changes from GREEN to RED.

PEAK HOLD

With Peak Hold enabled, the highest reading remains on the display.

dBm

Signal levels can be displayed in Volts or dB when the Digital Voltmeter is set to AC Mode. Signal levels can be displayed in Volts only when the Digital Voltmeter is set to DC Mode.

AVERAGING

Allows the indicated Digital Voltmeter reading to be the average of a specified number of readings. Setting this value to one (1) turns averaging OFF.

METER LOAD

Select 150 (Ω), 300 (Ω), 600 (Ω), 1 M (Ω), or User. Selecting User indicates the Meter Load is within the Unit Under Test (i.e., 500 Ω). When Meter loading is selected the entered value is used to calculate dBm into the specified Load value.

USER LOAD

Set from 1 to 999 (available only when Load Type is set to User.) The entered value is used to calculate dBm into the specified Load value.

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Maintenance

Introduction

This section provides maintenance instructions for the ATS-2000-EA. Maintenance instructions consist of operational checkout, inspection and preventive maintenance, troubleshooting, and repair procedures. Refer to the Related Publications listing for maintenance procedures on equipment not covered by this manual.

Operational Checkout

Perform the self-test procedures contained in the Operation section to checkout the ATS-2000-EA. Troubleshooting contained in this section provides additional procedures to isolate failures in the equipment.

Inspection

Inspection procedures are necessary to ensure continued operation of the ATS-2000-EA. Visually inspect all electrical and mechanical parts in accordance with Table 2. Inspection includes visual inspection for damage upon initial receipt, at scheduled intervals, or prior to storage for more than 30 days.

Table 2. Inspection Data.

Item No.	Interval	Inspection Item	Possible Defects	Corrective Action
1	30 days	Wiring	Cut or burned insulation, exposed conductors, kinks, and abrupt bends.	Repair or replace.
2	30 days	Connectors	Missing or damaged pins, loose housings and clamps, or exposed conductors.	Repair or replace.
3	30 days	Hardware	Incorrect screw lengths, stripped threads; missing screws, nuts, bolts, or washers.	Replace.
4	30 days	Markings and decals	Missing, incorrect, or illegible.	Replace.
5	30 days	General equipment	Dented, bent, dirty, scratched, worn, or marred.	Repair, clean, or touch up.
6	30 days	Air Filter	Clogged or dirty	Clean

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Troubleshooting

Self-test software automatically isolates faults and directs replacements. The software fault isolates to modules and Circuit Card Assemblies (CCAs) within the ATS-2000-EA. If the directed replacements do not correct the fault, manually troubleshoot the internal harnessing. The Diagrams section contains schematics data to aid in troubleshooting.

Repair

Repair consists of the disassembly, cleaning, replacement, and assembly of ATS-2000-EA equipment. Remove equipment only to the extent necessary to correct a malfunction or locate a defect. Refer to Table 2 for general inspection data. The following paragraphs describe ATS-2000-EA repair procedures.

Disassembly

Refer to Figure 5-1 and disassemble the ATS-2000-EA as follows:

a. Remove screws (8, Figure 5-1) and remove bezel (7).

b. Grab handle (9), and pull slide-in panels (10) from case.

c. Remove screws (2) from brackets (3) and remove top cover (1).

d. Remove screws (5) from brackets (6) and remove bottom cover (4).

e. Remove screws (12) and remove side panels (11).

f. Remove eight screws (14), lock washers (15), and flat washers (16) and two screws (17) that secure power supply (18) and remove rear panel (13).

Cleaning

The ATS-2000-EA hardware should be kept clean for optimum performance of components. Use common cleaning fluids and materials.

Connectors

WARNING

Use of air for cleaning can create an environment of propelled foreign particles that may enter the eyes. Air pressure for cleaning surfaces shall not exceed 30 psi. Eye protection is worn.

a. Using compressed air at 15 psi or less, blow dust and metal particles out of connector.

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WARNING

Isopropyl alcohol is flammable and toxic. Only use in a well ventilated area. Do not use near heat or open flame. Wear protective clothing such as rubber gloves and eye protection. Injury to personnel could result with improper use.

a. If contamination is still present apply alcohol with a brush.

b. Wipe excess alcohol with a cleaning cloth. Use a pipe cleaner to remove solvent from pin area.

Repair or Replacement

Repair of ATS-2000-EA hardware consists of the repair or replacement of parts found to be defective during inspection and testing. Correct all discrepancies. The following paragraphs contain ATS-2000-EA replacement procedures.

Power Supply Replacement

Replace the power supply as follows:

a. Disassemble the ATS-2000-EA using procedures under Disassembly.

b. Disconnect connections using Figure 7-1 as a guide.

c. Remove two screws (17, Figure 5-1) and remove power supply (18).

d. Install replacement power supply (18) and secure with screws (17).

e. Make connections using Figure 7-1 as a guide.

f. Assemble the ATS-2000-EA using procedures under Assembly.

g. Perform self-test.

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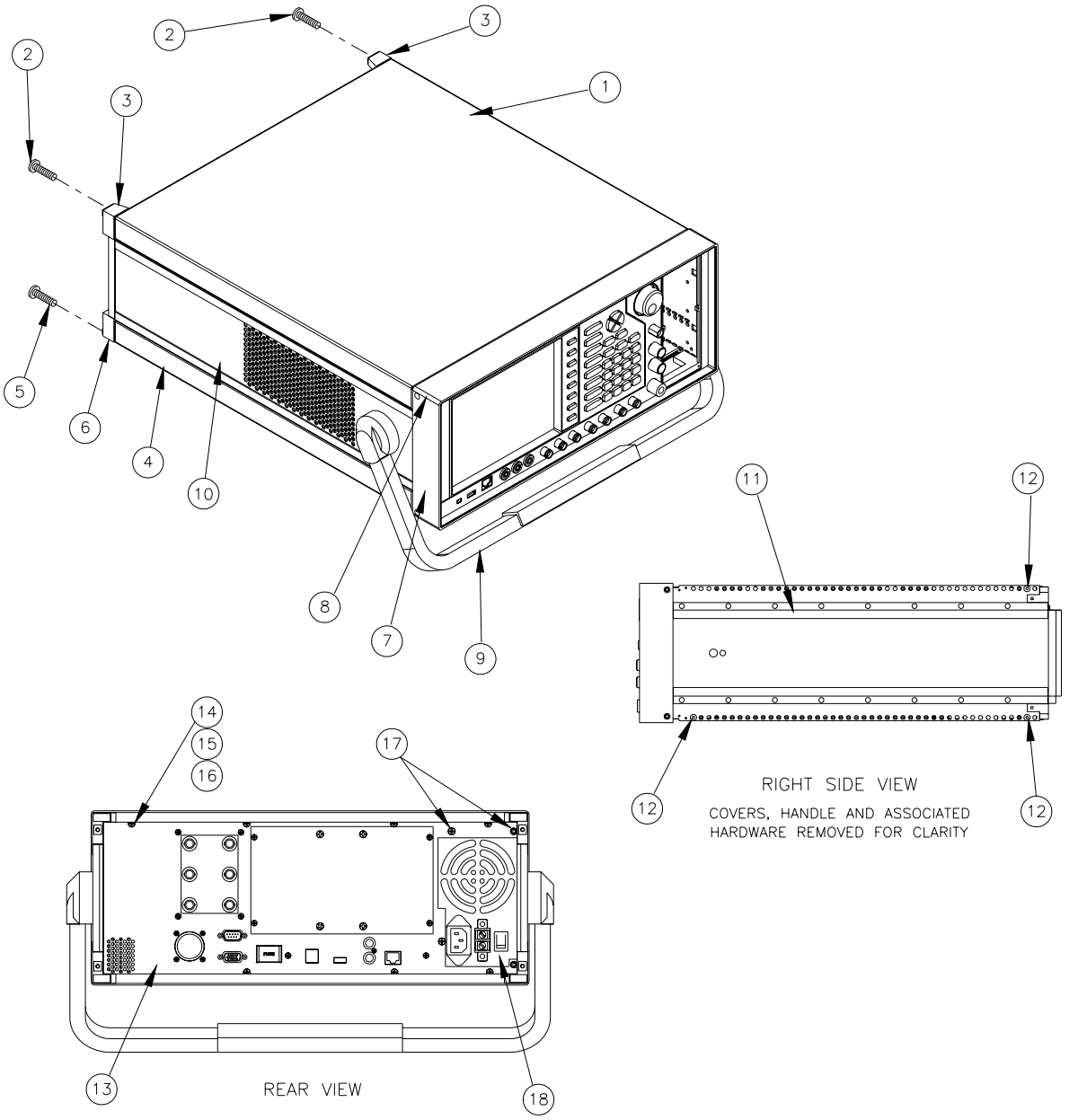


Figure 5-1. ATS-2000-EA Disassembly

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Fan Assembly Replacement

Replace the fan assembly as follows:

a. Disassemble the ATS-2000-EA using procedures under Disassembly.

b. Disconnect wiring connections using figure 7-1 as a guide.

c. From top and bottom of case, remove four screws (13, Figure 5-2) from fan assembly (12) and remove fan assembly (12).

d. Install replacement fan assembly (12) and secure with four screws (13).

e. Connect wiring connections using Figure 7-1 as a guide.

f. Assemble the ATS-2000-EA using procedures under assembly.

g. Perform self-test.

Filter Replacement

Replace the filter as follows:

a. Remove top cover using procedures under Disassembly.

b. Remove screws (2, Figure 5-2), flat washers (3), lock washers (4), and nuts (5) and remove bracket (1).

c. Remove filter (6) from bottom bracket.

d. Install replacement filter in bottom bracket and secure with top bracket (1), screws (2), flat washers (3), lock washers (4), and nuts (5).

e. Install top cover using procedures under assembly.

f. Perform self-test.

RF Front End Assembly Replacement

Replace the RF Front End Assembly as follows:

a. Disassemble the ATS-2000-EA using procedures under Disassembly.

b. Disconnect connections using Figure 7-1 as a guide.

c. Remove six screws (8, Figure 5-2) and remove RF Front End Assembly (7)

d. Install replacement RF Front End Assembly (7) and secure with six screws (8).

e. Make connections to RF Front End Assembly (7) using Figure 7-1 as a guide.

f. Assemble the ATS-2000-EA using procedures under Assembly.

g. Perform self-test.

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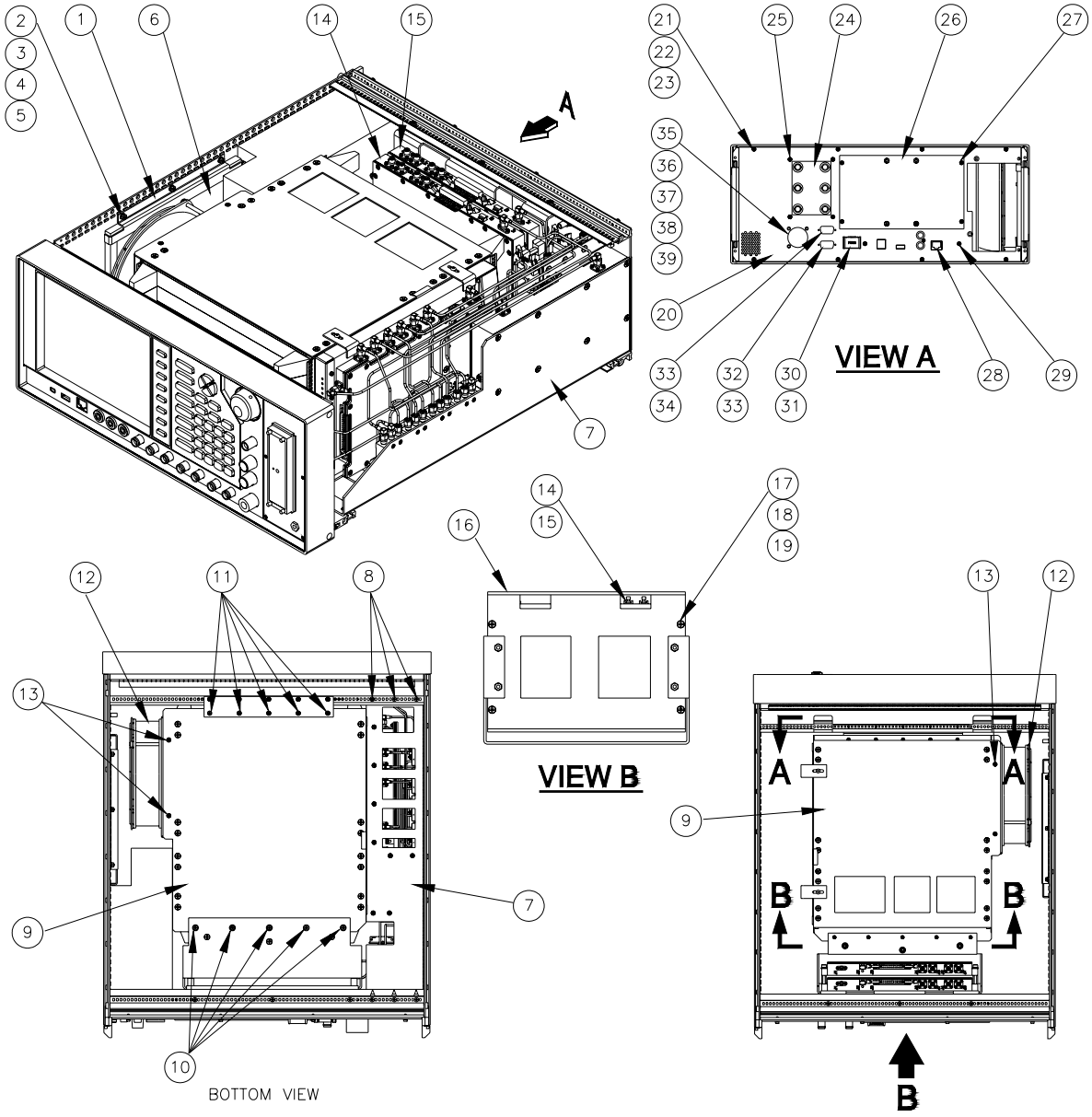
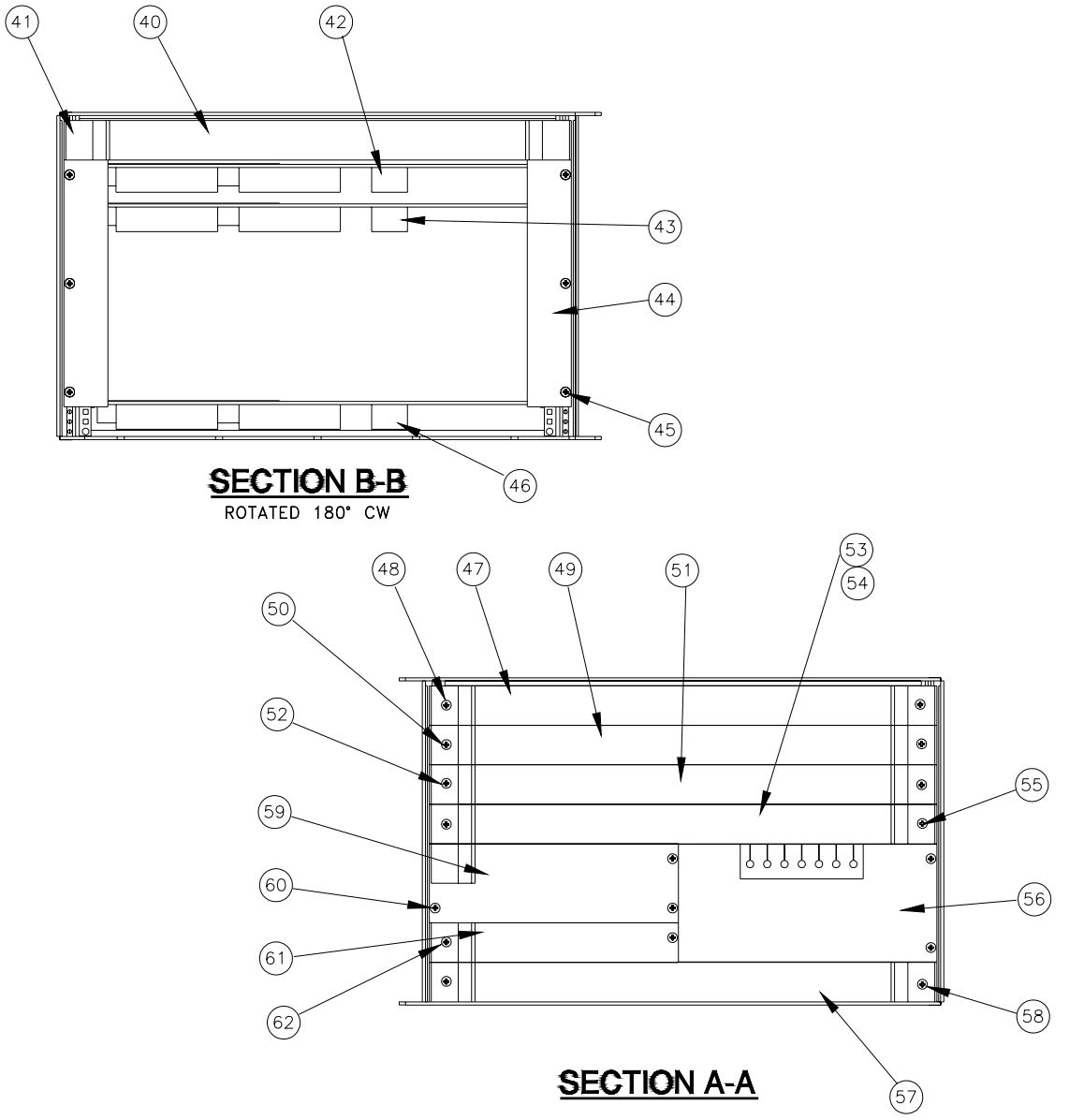


Figure 5-2. ATS-2000-EA Component Location (Sheet 1 of 2)

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LEGEND:

40. COMPACT PCI CCA
41. SCREW (2)
42. CIM TRANSMISSION MODULE CCA
43. EIM TRANSMISSION MODULE CCA
44. CLAMP (2)
45. SCREW (3)
46. SRM TRANSITION MODULE CCA
47. PENTIUM III COMPUTER
48. SCREW (2)
49. COMMUNICATION INTERFACE MODULE CCA
50. SCREW (2)
51. EUT INTERFACE MODULE CCA
52. SCREW (2)
53. OMNIBUS MODULE
54. SIGNAL PROCESSOR CCA
55. SCREW (2)
56. COVER PLATE
57. SWITCH AND ROUTING MODULE CCA
58. SCREW (2)
59. DIGITIZER
60. SCREW (3)
61. DIGITAL MULTIMETER
62. SCREW (2)

ATAC-020.DWG

Figure 5-2. ATS-2000-EA Component Location (Sheet 2)

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RF Up and Down Converter Replacement

Replace the RF Up and Down Converter as follows:

a. Disassemble the ATS-2000-EA using procedures under Disassembly.

b. Disconnect connections using Figure 7-1 as a guide.

c. Remove screws (17, Figure 5-2), lock washers (18), and flat washers (19) and remove RF Down converter (14) and RF Up Converter (15) from bracket (16).

d. Install replacement RF Down Converter (14) and RF Up Converter (15) on bracket (16) and secure with screws (17), lock washers (18), and flat washers (19).

e. Make connections using Figure 7-1 as a guide.

f. Assemble the ATS-2000-EA using procedures under Assembly.

g. Perform self-test.

Connector Subpanel Replacement

Replace the connector subpanel as follows:

a. Disassemble the ATS-2000-EA using procedures under Disassembly.

b. Disconnect connections using Figure 7-1 as a guide.

c. Remove four screws (25, Figure 5-2) and remove connector subpanel (24) from rear panel (20).

d. Install replacement subpanel (24) on rear panel (20) and secure with screws (25).

e. Make connections using Figure 7-1 as a guide.

f. Assemble the ATS-2000-EA using procedures under Assembly.

g. Perform self-test.

Hard Drive Assembly Replacement

Replace the hard drive assembly as follows:

a. Disassemble the ATS-2000-EA using procedures under Disassembly.

b. Disconnect connections using Figure 7-1 as a guide.

c. Remove four screws (27, Figure 5-2) and remove connector hard drive assembly (26) from rear panel (20).

d. Install replacement hard drive assembly (26) on rear panel (20) and secure with screws (27).

e. Make connections using Figure 7-1 as a guide.

f. Assemble the ATS-2000-EA using procedures under Assembly.

g. Perform self-test.

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Connector Interface CCA Replacement

Replace Connector Interface CCA as follows:

a. Disassemble the ATS-2000-EA using procedures under Disassembly.

b. Disconnect connections using Figure 7-1 as a guide.

c. Remove three screws (29, Figure 5-2) and remove Connector Interface CCA (28) from rear panel (20).

d. Install replacement Connector Interface CCA (28) on rear panel (20) and secure with screws (29).

e. Make connections using Figure 7-1 as a guide.

f. Assemble the ATS-2000-EA using procedures under Assembly.

g. Perform self-test.

Pentium Computer, Communication Interface CCA, EUT Interface CCA, Omnibus Module, Signal Processor CCA, Switch and Routing CCA, Digitizer, and Digital Multimeter Replacement

These CCAs can be replaced by removing the top cover and front bezel. The card cage must be removed to access the other cards. Remove the CCAs as follows:

a. Remove the top cover and front bezel using procedures under Disassembly.

b. Loosen screws (48, 50, 52, 55, 58, 60, or 62, Figure 5-2) and remove the applicable CCA (47, 49, 51, 53, 54, 57, 60, or 61).

c. Install replacement CCA (47, 49, 51, 53, 54, 57, 60, or 61) and secure with screws (48, 50, 52, 55, 58, 60, or 62, Figure 5-2).

d. Install the front bezel and top cover using procedures under Assembly.

e. Perform self-test.

Compact PCI, CIM Transition Module, EIM Transition Module, and SRM Transition Module CCA replacement.

These CCAs require that the card cage assembly be removed in order to access the CCAs. Remove cards as follows:

a. Disassemble the ATS-2000-EA using procedures under Disassembly.

b. Remove 10 screws (10 and 11, Figure 5-2) that secure card cage assembly (9)

c. Move card cage assembly (9) in order to access cards.

d. Loosen screws (41) or remove screws (45) and remove brackets (44).

e. Remove Compact PCI, CIM Transition Module, EIM Transition Module, or SRM Transition Module CCA (40, 42, 43, or 45) from card cage assembly (9).

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f. Install replacement Compact PCI, CIM Transition Module, EIM Transition Module, or SRM Transition Module CCA (40, 42, 43, or 45) in card cage assembly.

g. Tighten screws (41) or install brackets (44) and secure with screws (45).

h. Assemble the ATS-2000-EA using procedures under Disassembly.

i. Perform self-test.

Assembly

Refer to Figure 5-1 assemble the ATS-2000-EA as follows:

a. Install side panels (11, Figure 5-1) and secure with screws (12).

b. Install rear panel (13) and secure with eight screws (14), lock washers (15), and flat washers (16) and two screws (17) that secure power supply (18).

c. Grab handle (9), and slide slide-in panels (10) onto ATS-2000-EA case.

d. Install bezel (7) and secure with screws (8).

e. Install bottom cover (4) and install screw (5) into bracket (6).

f. Install top cover (1) and install screw (2) into bracket (3).

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Illustrated Parts Breakdown

General

The Illustrated Parts Breakdown (IPB) lists and illustrates the items necessary to support the ATS-2000-EA described in this manual. The IPB provides information that is used for requisitioning, issuing, and identifying parts and provides information that illustrates assembly and disassembly relationships. The IPB is not intended to be used as an authority for disassembly or assembly. Maintenance should be performed by authorized personnel using the applicable maintenance instructions.

IPB Composition

The IPB contains the Maintenance Parts List (MPL). The MPL in this section lists the main groups of assemblies and is keyed to the associated illustration by figure and index numbers.

Assemblies and Parts

In general, the assemblies and parts installed at the time the end item(s) was manufactured are listed and identified in the manual. When an assembly or part (including vendor items) that is different from the original is installed during the manufacture of later items, series, or blocks, all assemblies and parts are listed and reflect Usable On Codes (UOC). However, when the original assembly or part does not have continued application (no spares of the original were procured or such parts are no longer authorized for replacement), only the preferred assembly or part is listed. Also, when an assembly or part is installed during modification and the original does not have continued application, only the preferred item is listed.

Interchangeable and Substitute Parts

Interchangeable and substitute assemblies and parts subsequently authorized by the government, as identified by the using activity, will be listed in this manual. When a standard size part can be replaced with an oversized or undersized part, the latter parts, showing sizes, are also listed.

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Abbreviations

Refer to the front matter of this manual for a list of non-standard abbreviations and acronyms.

Similar Assemblies

Similar assemblies that contain a majority of identical parts are combined and listed as follows; otherwise the assemblies are listed separately.

a. The similar assembly part numbers (PN) are listed first, followed by the detail parts.

b. A part common to all assemblies in the same quantity is listed once.

c. A part common to all assemblies in differing quantities is listed once for each quantity and identified with a (Use only on _____) notation on any assemblies to which it pertains.

d. Peculiar parts are listed once and identified with a (Use only on _____) notation on any assemblies to which they pertain.

Maintenance Parts List

A MPL is a figure or figures that depict an end item. A figure consists of a MPL breakdown and associated illustration of assemblies. Parts are listed in disassembly sequence whenever possible.

Illustration

An illustration is provided to identify listed parts. Similar assemblies and parts are illustrated only once when they have the same appearance and functional purpose. All index numbers appearing in the MPL are keyed on the illustration to the appropriate part. All attaching parts are indexed. When applicable, the reference designations are inserted on the illustrations. The figure number will include section number, and the figure title will conform to the first entry of the MPL. When two or more illustration pages are necessary to complete a figure, they are numbered (Sheet 1 of 2), followed by (Sheet 2), etc.

Parts List

The MPL is an indentured parts breakdown of the assemblies covered in the IPB.

Figure and Index Number Column

This column contains applicable figure and index numbers. These numbers are separated by a dash (–). The figure number will be shown once at the top of each MPL page. All parts are indexed except assemblies that have all detail parts listed and indexed, and additional assemblies and parts listed for alternate or effectivity purposes when they have the same appearance and functional purpose. Parts that are indexed in the listing but not shown on the illustration have a dash (-) preceding the index number.

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Parts Number Column

This column contains the PN, including dash numbers, assigned to each listed part. When only a model or type number identifies a component, such a number is used instead of a PN. Alternate parts are identified by an equal sign (=) preceding the PN one space to the left.

Commercial and Government Entity Code (CAGE) Column

Appropriate Commercial and Government Entity (CAGE), listed in FEDeral LOGistics (FEDLOG), is shown in the column entitled CAGE directly opposite each PN. The word NONE appears in the CAGE column directly opposite each PN when there has not been an appropriate CAGE assigned. In this case, the complete name and address appear in parentheses at the end of the description of these items.

Description Column

This column contains the noun name with a description or modifier of the assemblies and parts listed in the MPL except alternate parts identified by an equal sign. The nomenclature is indented to indicate item relationship or Next Higher Assembly (NHA). The nomenclature for each assembly is followed in the list by the nomenclature of its component indented one column to its right. This indenture indicates the relationship of the component to the assembly. To determine the NHA of a part or assembly, note the column in which the first word of the nomenclature appears. The first item directly above that appears one column to the left is the NHA. Any additional data pertinent to the item, such as undersized, oversized, cross-references, Specification Control Drawing (SCD), matched parts, use only, substitute, etc., will be identified in a parenthetical note following the item description. The following example shows an end item assembly starting in the extreme left position (first indent) and continues down into succeeding columns until the last detail is reached.

1 2 3 4 5 6 7 DESCRIPTION

End Item, Component, Major Assembly

. Assembly

. . Detail parts for assembly

. . Subassemblies

. . . Detail parts for assemblies

. . . Sub-subassemblies

. . . . Detail parts for sub-subassemblies

Units per Assembly Column

The quantity shown in the Units Per Assembly (UPA) column represents the units required for each item (detail part or assembly) on one NHA. The attaching parts quantity is shown as the quantity required for each attaching part to attach one item. The abbreviation AR is used to indicate “as required” for oversized or undersized parts and for those parts when quantities are indefinite. The abbreviation REF is used to indicate reference where items have been listed for reference purposes. Such items show the quantity required where the item is listed initially as a detail requirement of its NHA.

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Usable on Code Column

Parts variations with limited end item usage are indicated by a letter symbol in the UOC column. The absence of a letter symbol in the UOC column indicates that the part is used on all configurations covered in this manual. The UOC is listed at the end of each figure.

Identified Usable On Codes.

Noun	Model Designation	Serial Number
None		

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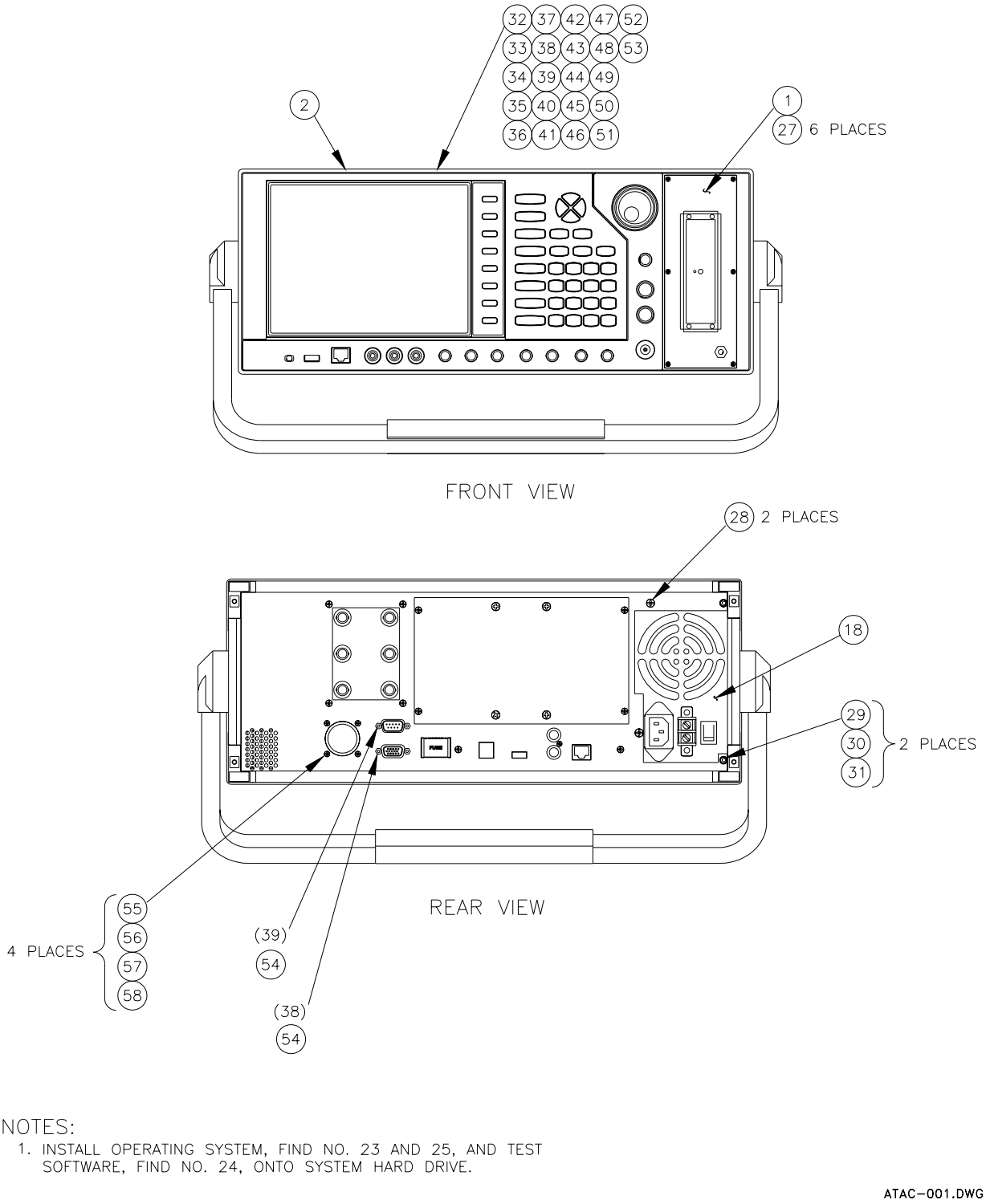


Figure 6-1. ATS-2000-EA (Sheet 1 of 4)

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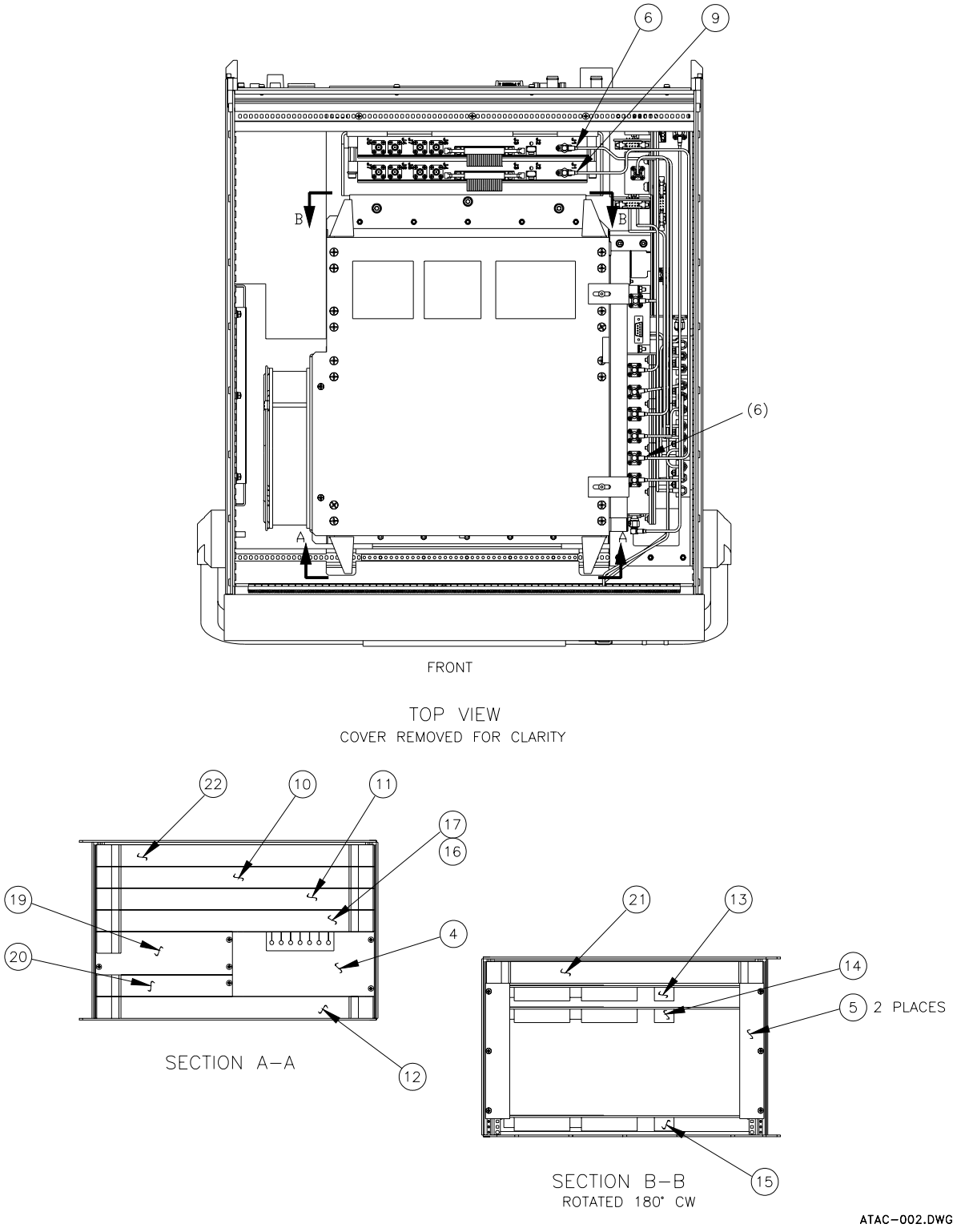


Figure 6-1. ATS-2000-EA (Sheet 2)

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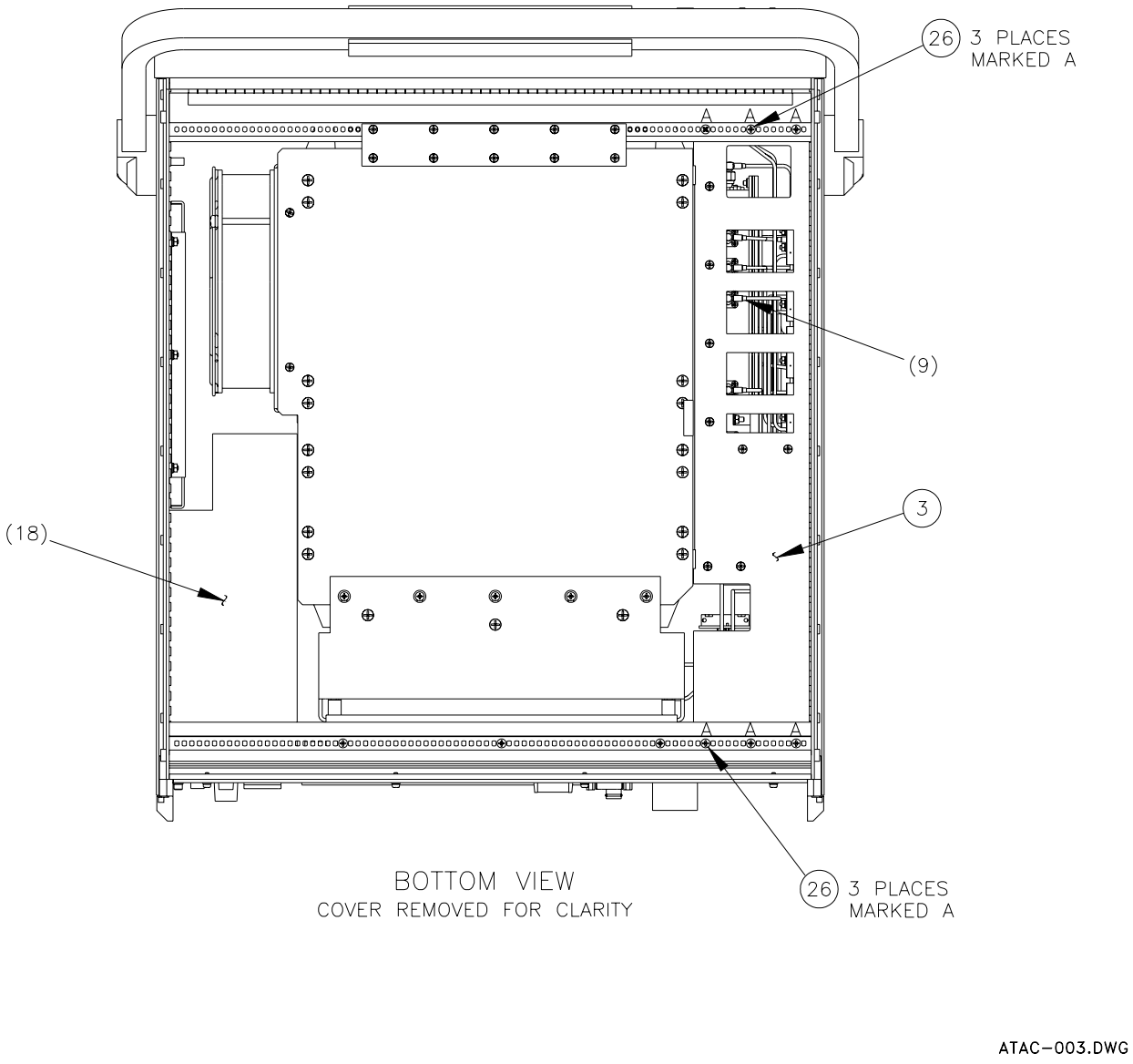


Figure 6-1. ATS-2000-EA (Sheet 3)

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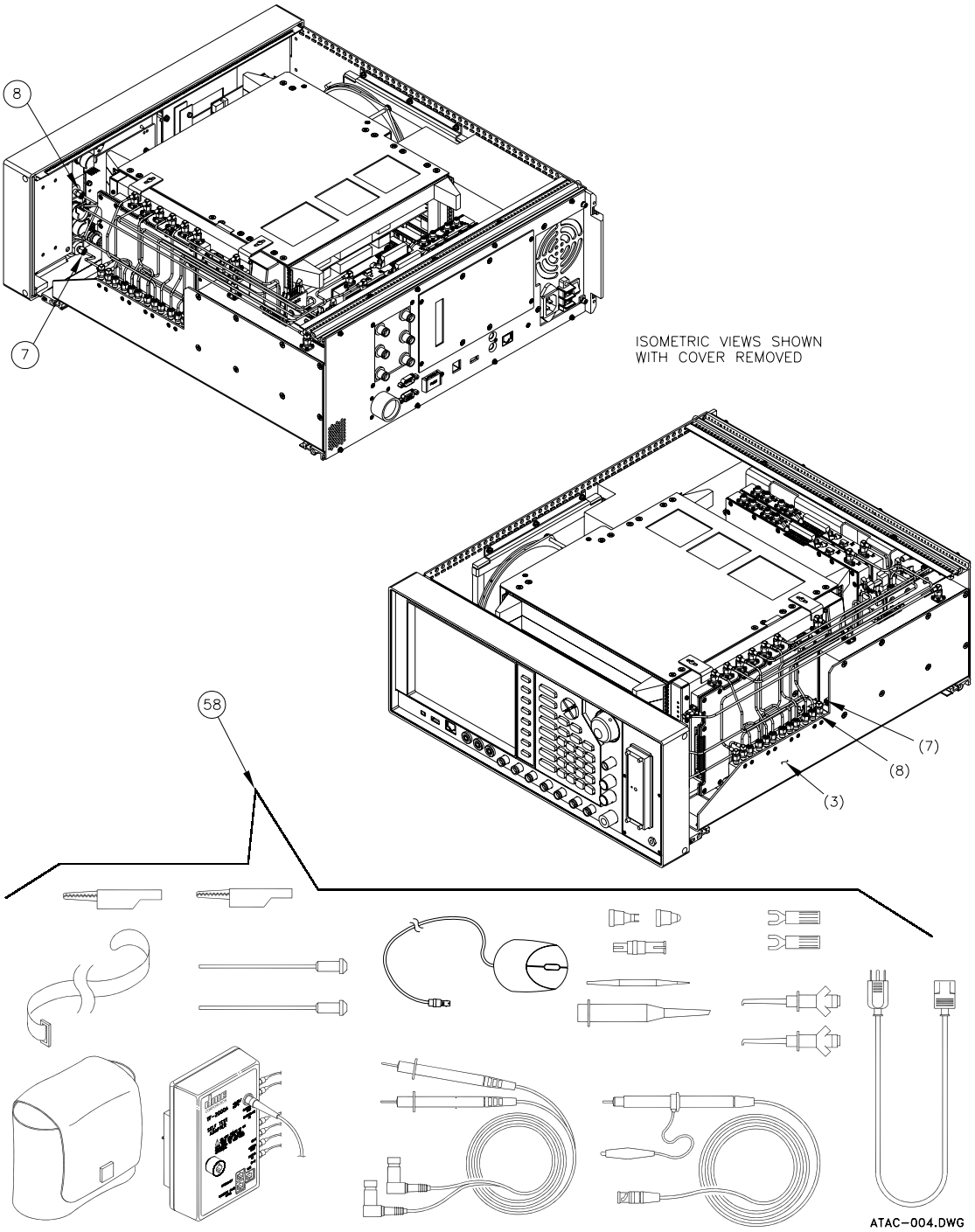


Figure 6-1. ATS-2000-EA (Sheet 4)

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-1-	G6-02-0100-800	0W200	ATS-2000-EA	REF	
1	G6-02-0103-800	0W200	. PLATE, UUT INTERFACE	1	
2	G6-02-1000-800	0W200	. COMPOSITE ASSEMBLY (SEE FIGURE 6-3 FOR BREAKDOWN)	1	
3	G6-02-1600-800	0W200	. RF FRONT END ASSEMBLY	1	
4	G6-02-2108-803	0W200	. 3U COVER PLATE , CARD CAGE ASSEMBLY (SEE FIGURE 6-8 FOR BREAKDOWN)	1	
5	G6-02-2108-805	0W200	. CLAMP, X-ITION MODULE, CARD CAGE ASSY (SEE FIGURE 6-8 FOR BREAKDOWN)	2	
6	G6-02-2440-812	0W200	. RF SIGNAL PIPING	1	
7	G6-02-2440-814	0W200	. RF SIGNAL PIPING	1	
8	G6-02-2440-815	0W200	. RF SIGNAL PIPING	1	
9	G6-02-2440-816	0W200	. RF SIGNAL PIPING	1	
10	G6-02-2500-800	0W200	. CCA, COMMUNICATION INTERFACE MODULE	A/R	
11	G6-02-2600-800	0W200	. CCA, EUT INTERFACE MODULE	A/R	
12	G6-02-2700-800	0W200	. CCA, SWITCH AND ROUTING MODULE	A/R	
13	G6-02-2800-800	0W200	. CCA, TRANSITION MODULE, CIM	1	
14	G6-02-2800-801	0W200	. CCA, TRANSITION MODULE, EIM	1	
15	G6-02-2800-802	0W200	. CCA, TRANSITION MODULE, SRM	1	
16	80020-22A	00U30	. OMNIBUS MODULE, 14-BIT, 65 MHZ	1	
17	80033-2	00U30	. CCA, SIGNAL PROCESSOR	1	
18	AP2-5400F-RV25		. POWER SUPPLY	1	
19	PXD222	55716	. DIGITIZER	1	
20	SMX2040	1LMP0	. MULTIMETER, DIGITAL	1	
21	VMIACC-0425	0BPH5	. CCA, COMPACT PCI REAR TRANSITION	1	
22	VMICPCI-7716-230	0BPH5	. COMPUTER, PENTIUM III, 600 MHZ	1	
23	B23-00079	60128	. SOFTWARE, OS, WINDOWS 2000	1	
24	NOT USED				
25	NOT USED				
26	92000A120	39428	. SCREW, PNH	6	
27	92010A003	39428	. SCREW, CTSK, FLAT	6	
28	MS24693-C26	80205	. SCREW, CTSK, FLAT	2	
29	MS16995-17	96906	. SCREW, CAP, SCH	2	
30	MS35338-136	96906	. WASHER, LOCK	2	
31	NAS620-6L	80205	. WASHER, FLAT	2	
32	G6-02-1200-800	0W200	. HARNESS, USB FOR REAR PANEL (W1)	1	
33	G6-02-1200-801	0W200	. HARNESS, USB FOR REAR PANEL (W8)	1	
34	G6-02-1201-800	0W200	. HARNESS, USB REAR, HUB (W2)	1	
35	G6-02-1201-801	0W200	. HARNESS, USB REAR, HUB (W7)	1	
36	G6-02-1203-800	0W200	. HARNESS, WIRING, KEYBOARD/MOUSE (W3)	1	
37	G6-02-1204-800	0W200	. HARNESS, WIRING, ETHERNET REAR (W4)	1	
38	G6-02-1205-800	0W200	. HARNESS, WIRING, SVGA (W5)	1	
39	G6-02-1206-800	0W200	. HARNESS, WIRING, RS-232 (W6)	1	
40	G6-02-1207-800	0W200	. HARNESS, WIRING, IDE (W9)	1	
41	G6-02-1208-800	0W200	. HARNESS, WIRING, SPINNER (W10)	1	

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
42	G6-02-1208-801	0W200	. HARNESS, WIRING, VOLUME (W11)	1	
43	G6-02-1208-802	0W200	. HARNESS, WIRING, VOLUME (W12)	1	
44	G6-02-1209-800	0W200	. HARNESS, WIRING, INTERNAL (W13)	1	
45	G6-02-1209-801	0W200	. HARNESS, WIRING, INTERNAL (W14)	1	
46	G6-02-1209-802	0W200	. HARNESS, WIRING, INTERNAL (W16)	1	
47	G6-02-1209-803	0W200	. HARNESS, WIRING, INTERNAL (W17)	1	
48	G6-02-1210-800	0W200	. HARNESS, WIRING (W15)	1	
49	G6-02-1211-800	0W200	. WIRING, COAX (W18)	1	
50	G6-02-1211-801	0W200	. WIRING, COAX (W19)	1	
51	G6-02-1211-802	0W200	. WIRING, COAX (W43)	1	
52	G6-02-1211-803	0W200	. WIRING, COAX	1	
53	G6-02-1212-800	0W200	. HARNESS, WIRING, LVDS (W22)	1	
54	205817-3		. SCREWLOCK, #4-40	2	
55	92010A220	39428	. SCREW	4	
56	93475A196	39428	. WASHER, FLAT	4	
57	92148A070	39428	. WASHER, LOCK	4	
58	91828A113	39428	. NUT, HEX	4	
59	G6-02-0105	0W200	. ACCESSORY KIT, ATS-2000-EA (SEE FIGURE 6-2 FOR BREAKDOWN)	1	

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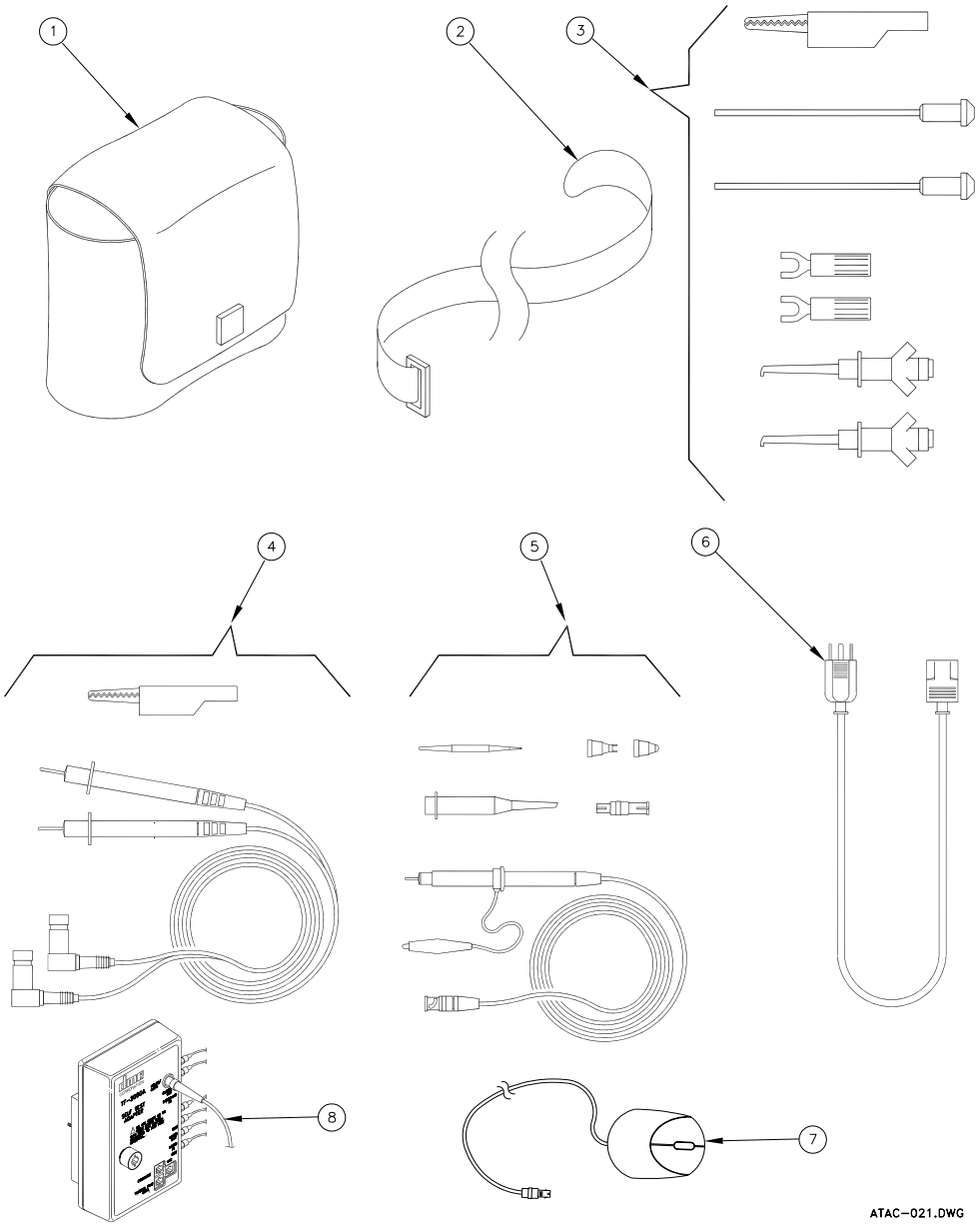
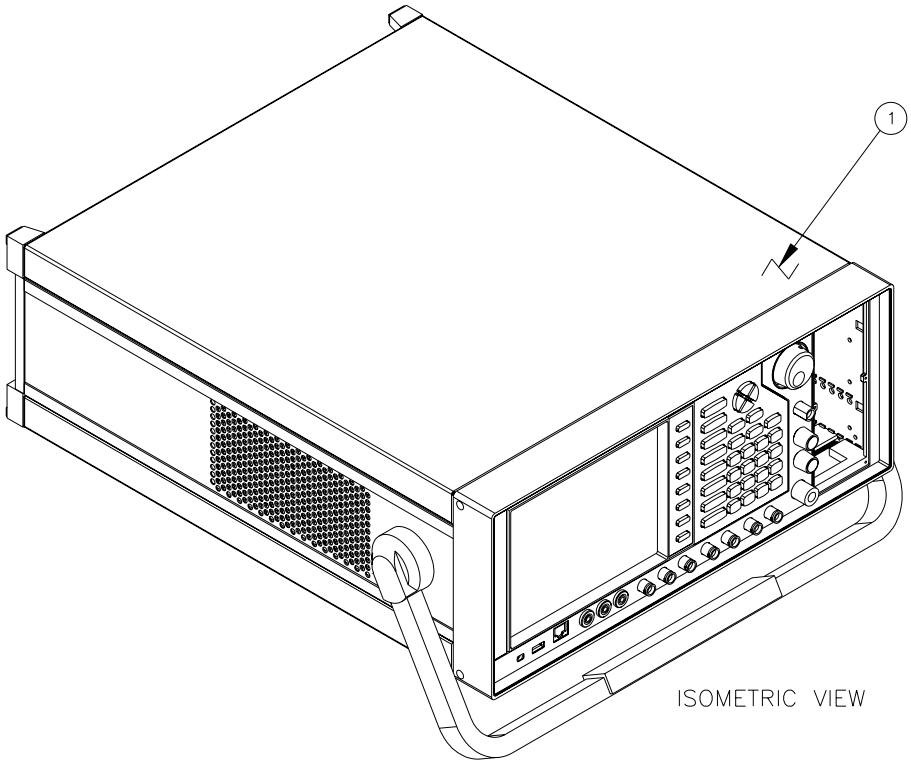


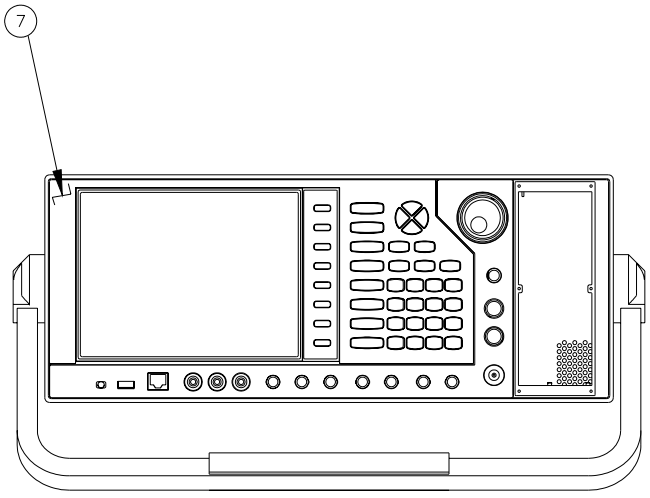
Figure 6-2. ATS-2000-EA Accessory Kit

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-2-	G6-02-0105-800	0W200	ACCESSORY KIT, ATS-2000-EA..... (SEE FIGURE 6-1 FOR NHA).....	REF	
1	G35		. POUCH, BELT	1	
2	G6-02-0106-001	0W200	. STRAP, ACCESSORY KIT	1	
3	TL-2A	08098	. PROBE SET.....	1	
4	TL-3	08098	. PROBE ACCESSORIES.....	1	
5	5806A	05276	. PROBE, OSCILLOSCOPE	2	
6	17604-C3-10	3FLE0	. CABLE ASSEMBLY, POWER.....	1	
7	G6-02-0107-001	0W200	. MOUSE, OPTICAL.....	1	
8	G6-02-0250-800	0W200	. TF-2000A KIT.....	1	

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NOTES:

1. INSTALL SCREW SUCH THAT IT GOES THRU EXISTING HOLE IN EXTRUSION.

ATAC–005.DWG

Figure 6-3. Composite Assembly (Sheet 1 of 4)

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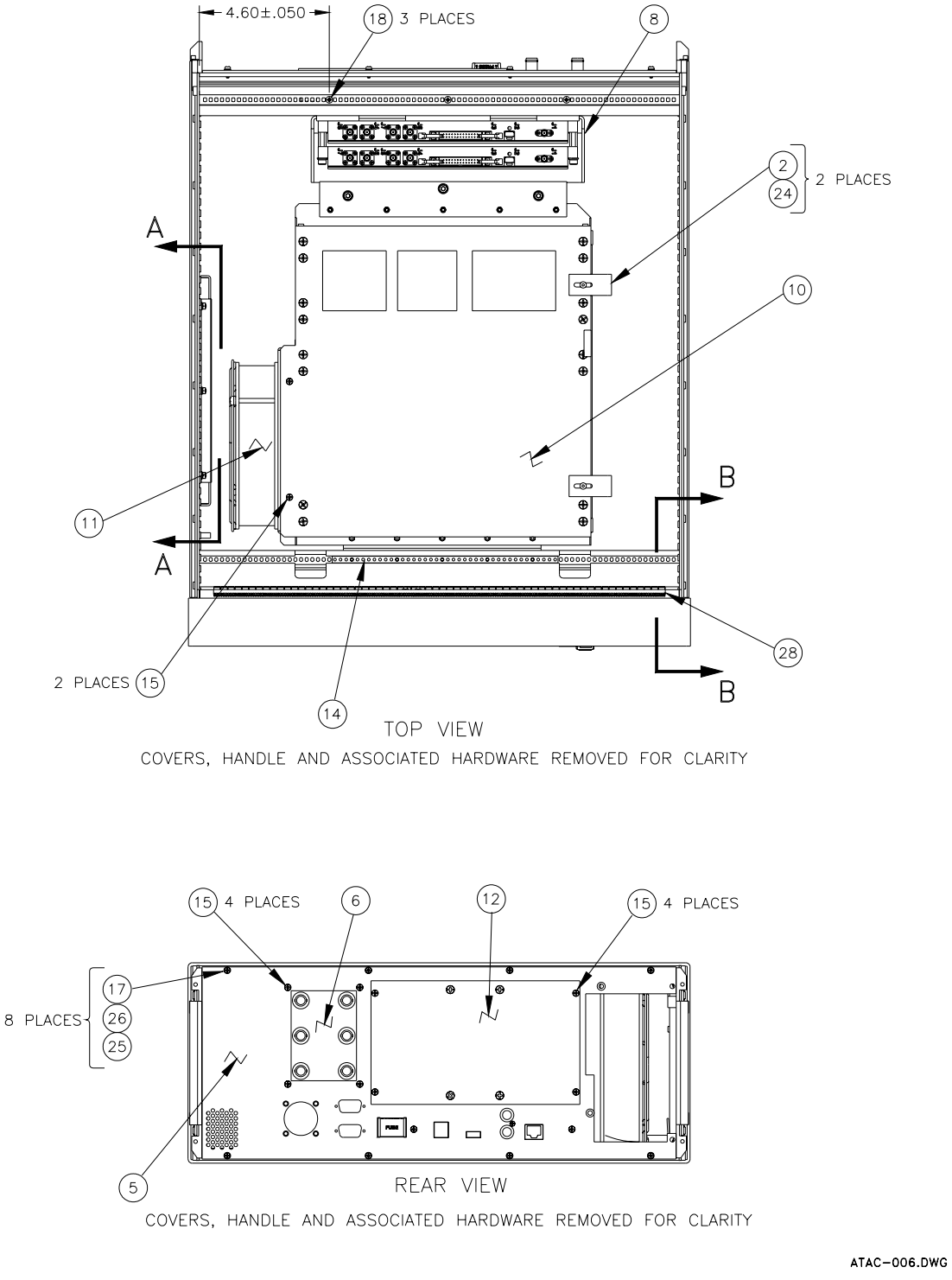


Figure 6-3. Composite Assembly (Sheet 2)

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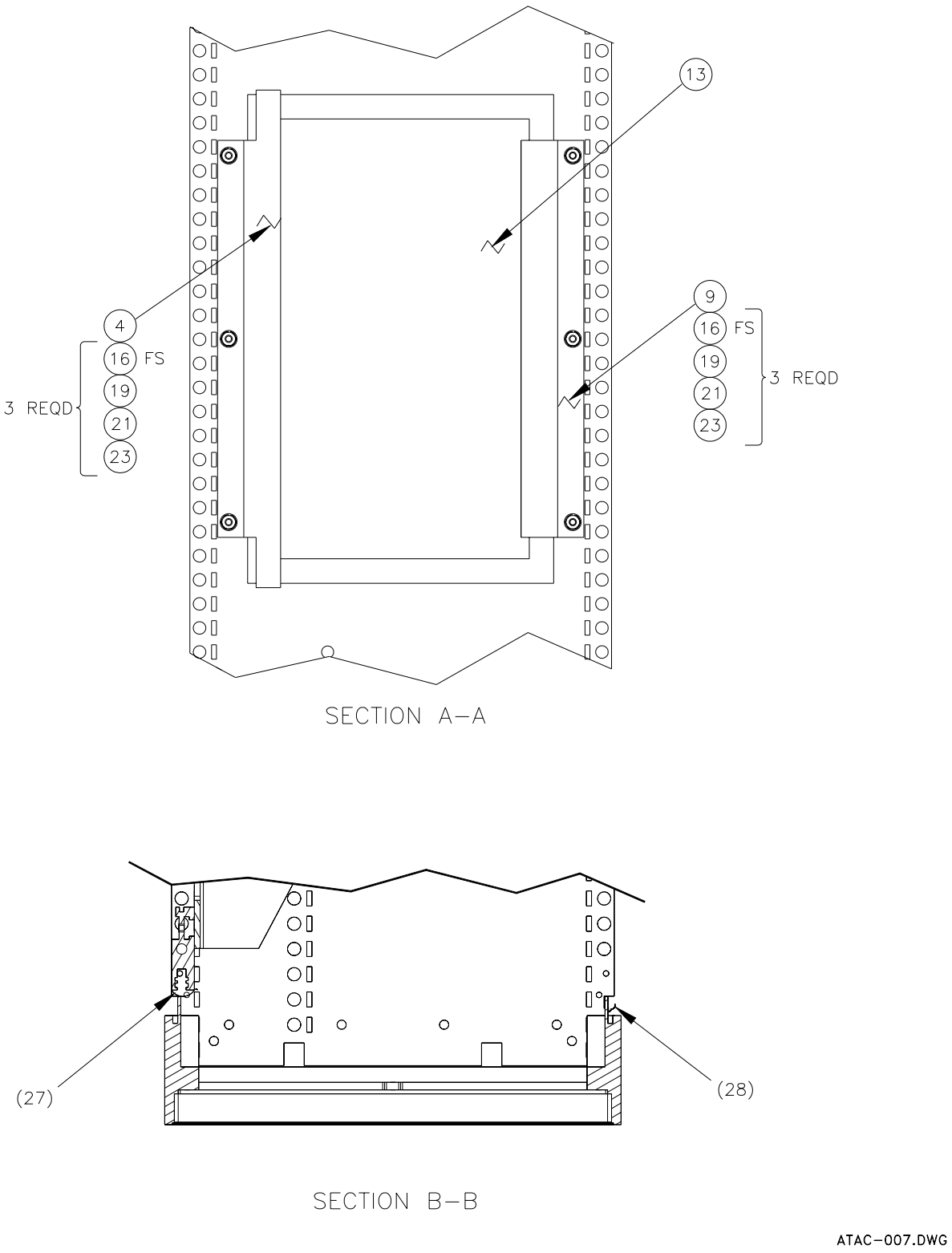


Figure 6-3. Composite Assembly (Sheet 3)

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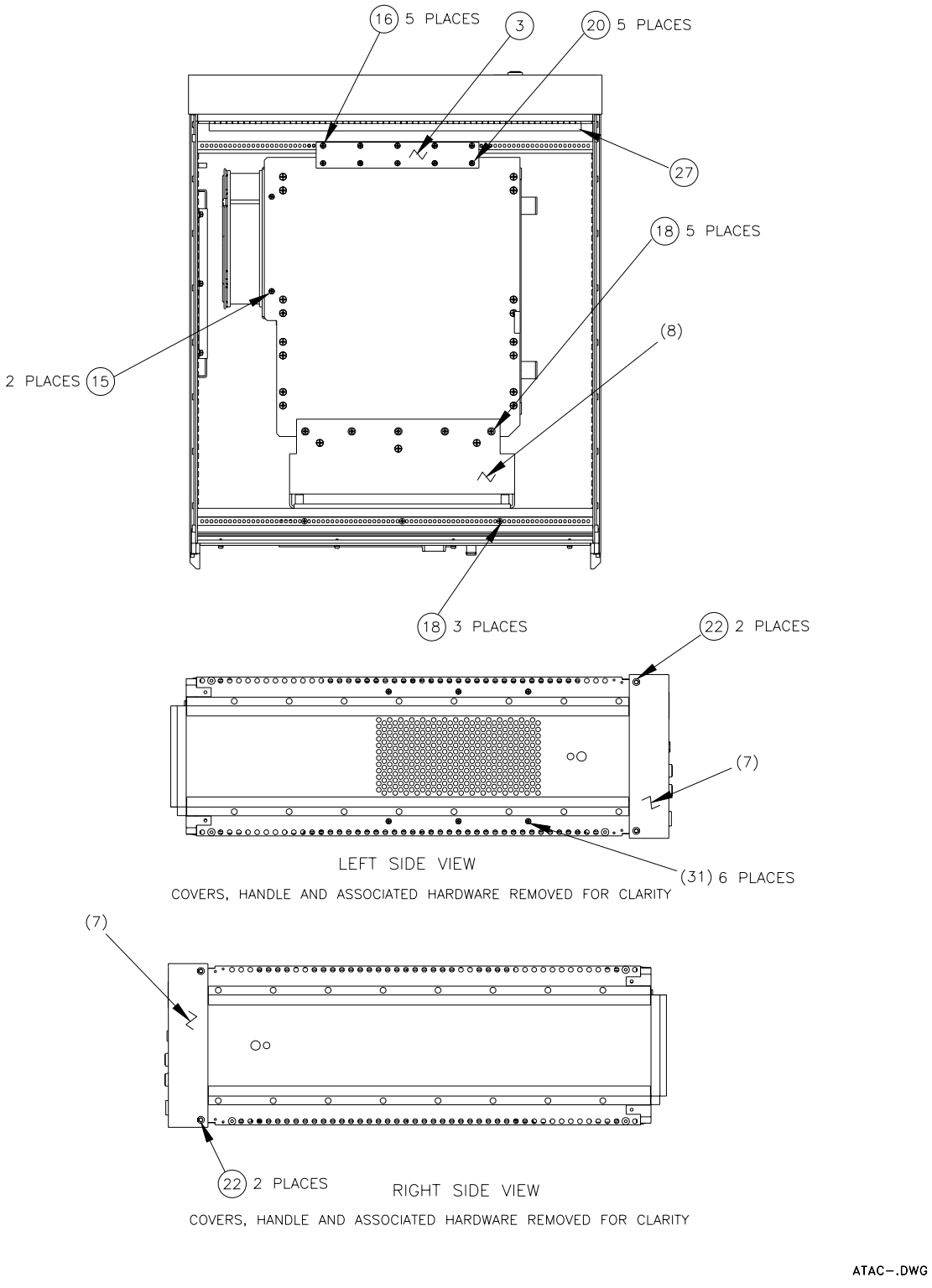


Figure 6-3. Composite Assembly (Sheet 3)

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-3-	G6-02-1000-800	0W200	COMPOSITE ASSEMBLY (SEE FIGURE 6-1 FOR NHA)	REF	
1	CAS000933	8C938	. ENCLOSURE	1	
2	G6-02-1002-001	0W200	. BRACKET	2	
3	G6-02-1002-002	0W200	. BRACKET	1	
4	G6-02-1002-003	0W200	. BRACKET	1	
5	G6-02-1003-800	0W200	. PANEL ASSEMBLY, REAR (SEE FIGURE 6-6 FOR BREAKDOWN)	1	
6	G6-02-1004-800	0W200	. SUBPANEL, CONNECTOR, REAR PANEL (SEE FIGURE 6-5 FOR BREAKDOWN)	1	
7	G6-02-1100-800	0W200	. BEZEL ASSEMBLY	1	
8	G6-02-1460-800	0W200	. RF UP/DOWN CONVERTER ASSEMBLY	1	
9	G6-02-1002-004	0W200	. BRACKET	1	
10	G6-022108-800	0W200	. CARD CAGE ASSEMBLY (SEE FIGURE 6-8 FOR BREAKDOWN)	1	
11	G6-02-2109-800	0W200	. FAN ASSEMBLY (SEE FIGURE 6-7 FOR BREAKDOWN)	1	
12	G6-02-2111-800	0W200	. HARD DRIVE ASSEMBLY (SEE FIGURE 6-4 FOR BREAKDOWN)	1	
13	8005-5003-1412	52814	. FILTER, AIR	1	
14	63-067	76096	. MOUNTING STRIP	1	
15	92010A116	39428	. SCREW, FH	12	
16	92010A118	39428	. SCREW, FH	11	
17	92000A105	39428	. SCREW, PNH	1	
18	92000A120	39428	. SCREW, PNH	11	
19	93475A210	39428	. WASHER, FLAT	6	
20	92010A114	39428	. SCREW, FH	5	
21	92148A150	39428	. WASHER, LOCK	6	
22	9129A117	39428	. SCREW, CAP, SCH	4	
23	91828A211	39428	. NUT, HEX	6	
24	92095A196	39428	. SCREW, SCH	2	
25	93475A196	39428	. WASHER, FLAT	8	
26	92148A070	39428	. WASHER, LOCK	8	
27	099-725-WT-80	0F5M4	. SHIELDING, EMI, FINGER	1	
28	099-895-06-80	0F5M4	. SHIELDING, EMI, FINGER	1	

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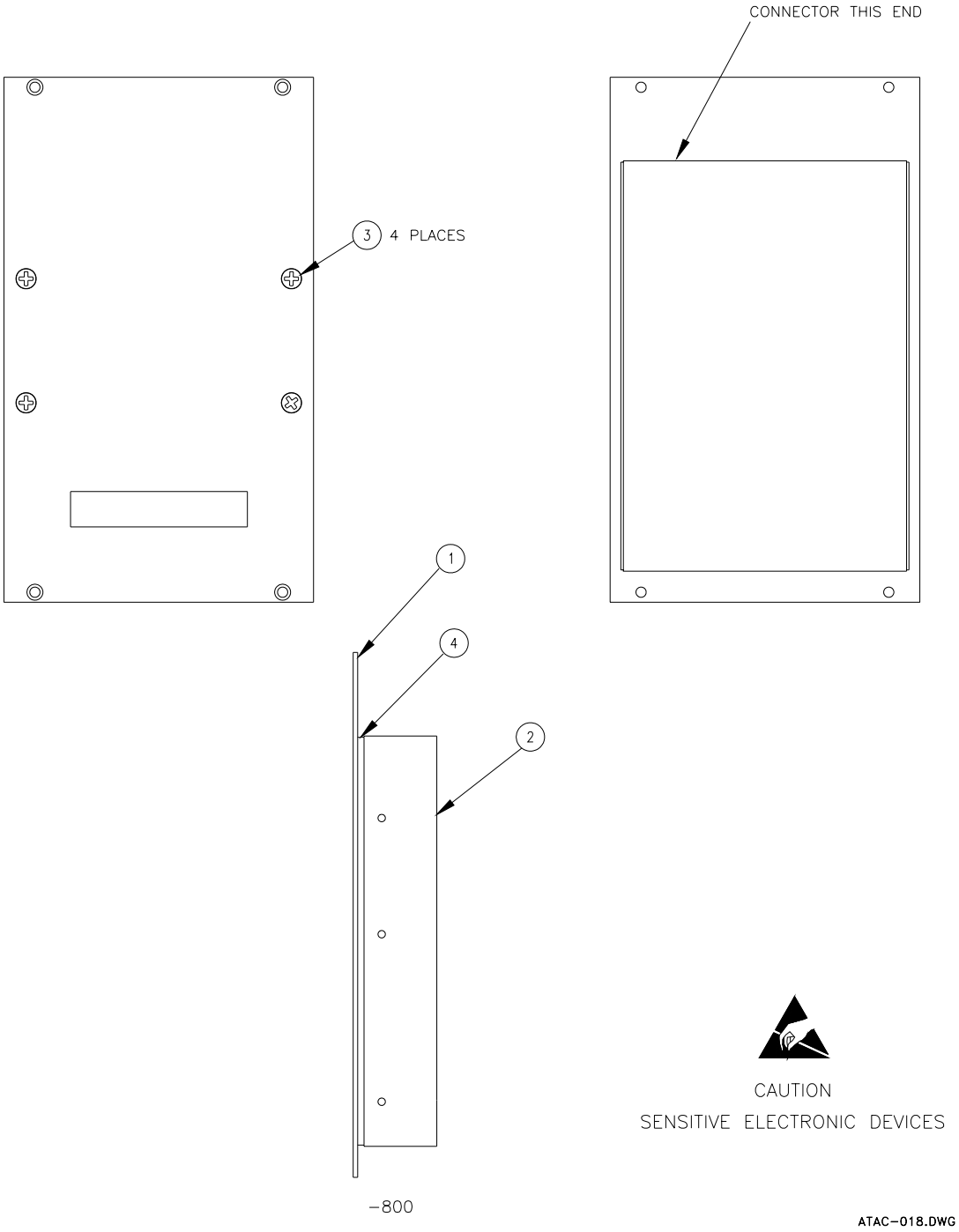


Figure 6-4. Hard Drive Assembly

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-4-	G6-02-2111-800	0W200	HARD DRIVE ASSEMBLY..... (SEE FIGURE 6-3 FOR NHA)	REF	
1	G6-02-2112-001	0W200	. PLATE, MOUNTING, HARD DRIVE	1	
2	ST320014A	65867	. HARD DRIVE, COMPUTER	1	
3	MS24693-C25	80205	. SCREW, FH	4	
4	06-02-2112-002	0W200	. SHIM, PLATE, MOUNTING	1	

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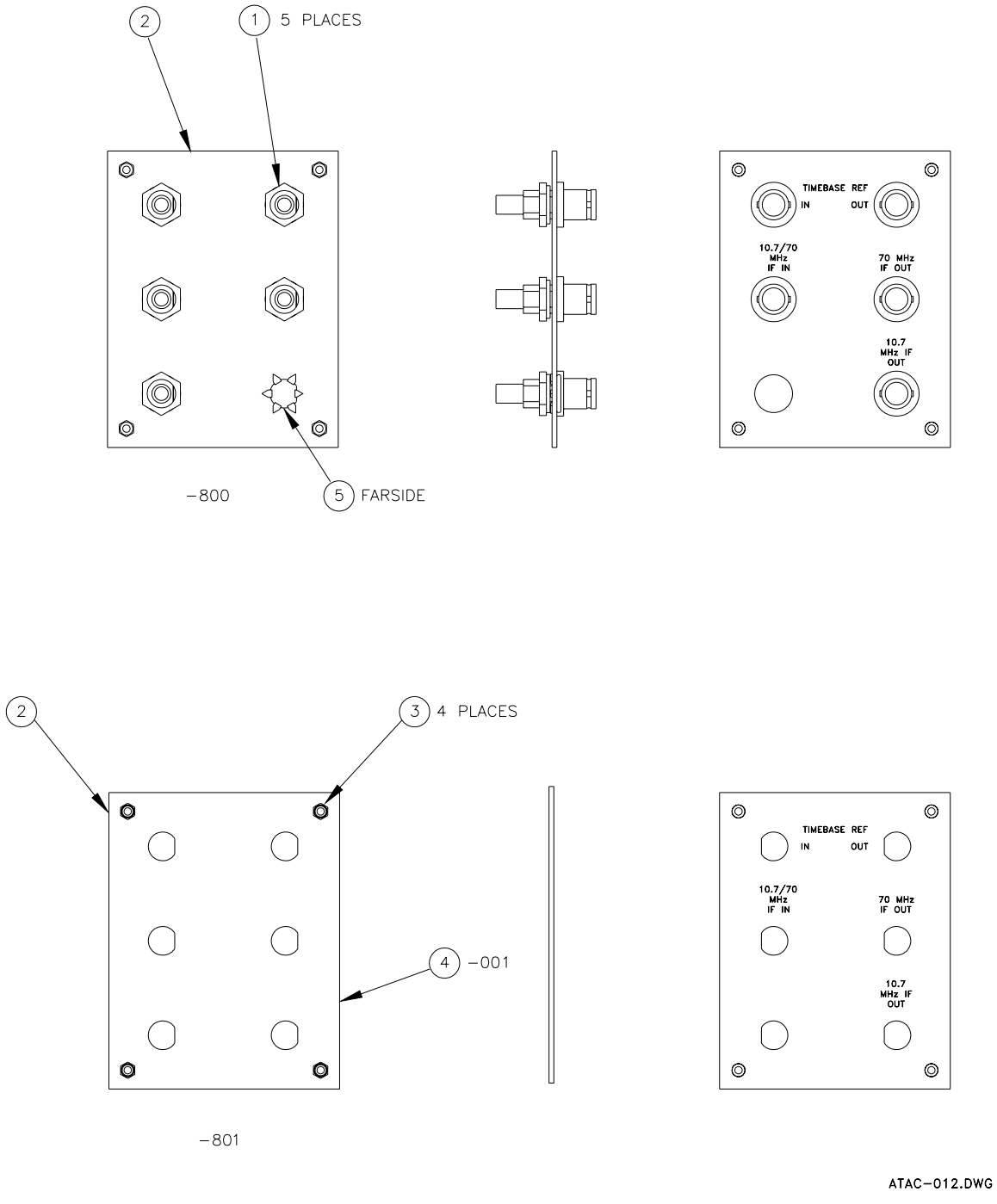


Figure 6-5. Connector Subpanel, Rear Panel

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-5-	G6-02-1004-800	0W200	CONNECTOR SUBPANEL, REAR PANEL ..... (SEE FIGURE 6-3 FOR NHA)	REF	
1	PE9407	53919	. ADAPTER, COAX, SMA	6	
2	G6-02-1004-801	0W200	. SUBPANEL, CONNECTOR, REAR PANEL	1	
3	F-M3-1	46384	. . NUT, CLINCH.....	4	
4	G6-02-1004-001	0W200	. . SUBPANEL, CONNECTOR, REAR PANEL	1	

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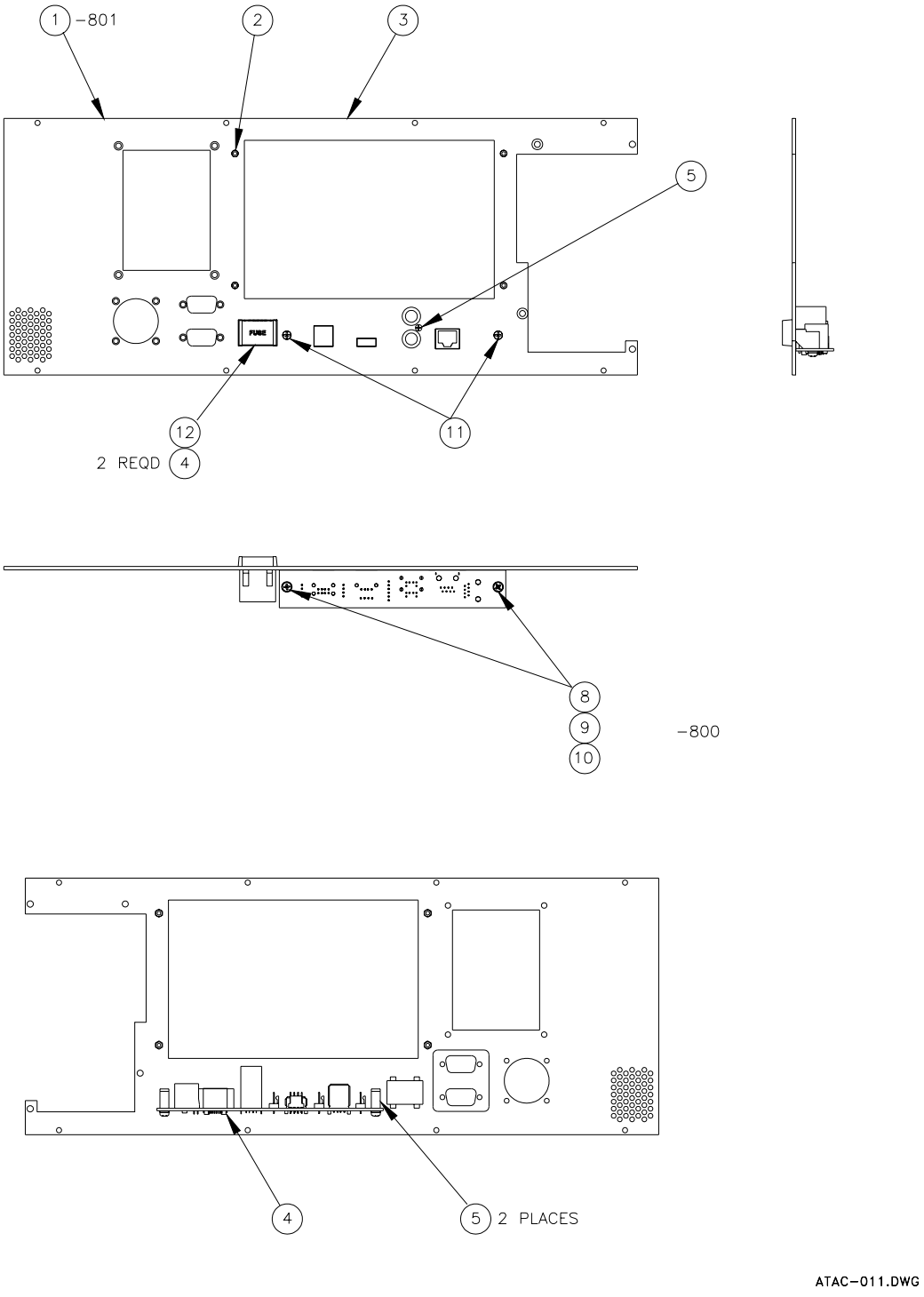


Figure 6-6. Rear Panel Assembly

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-7-	G6-02-1003-800	0W200	REAR PANEL ASSEMBLY ..... (SEE FIGURE 6-3 FOR NHA)	REF	
1	G6-02-1003-801	0W200	. PANEL ASSEMBLY, REAR	1	
2	F-M3-1	46384	. . NUT, CLINCH.....	4	
3	G6-02-1003-001	0W200	. . PANEL, REAR.....	1	
4	21702.5	75915	. FUSE, 2.5A, 250V	2	
5	NAS662C2R5	80205	. SCREW, FH	1	
6	G6-02-1731-800	0W200	. CCA, REAR PANEL CONNECTOR INTERFACE .	1	
7	PCB-MB-01	06915	. MOUNTING BLOCK, PCB, NYLON.....	2	
8	93475A210	39428	. WASHER, FLAT.....	2	
9	92148A150	39428	. WASHER, LOCK.....	2	
10	92000A120	39428	. SCREW, PNH	2	
11	92010A120	39428	. SCREW, FH	2	
12	286677	75915	. FUSEHOLDER.....	1	

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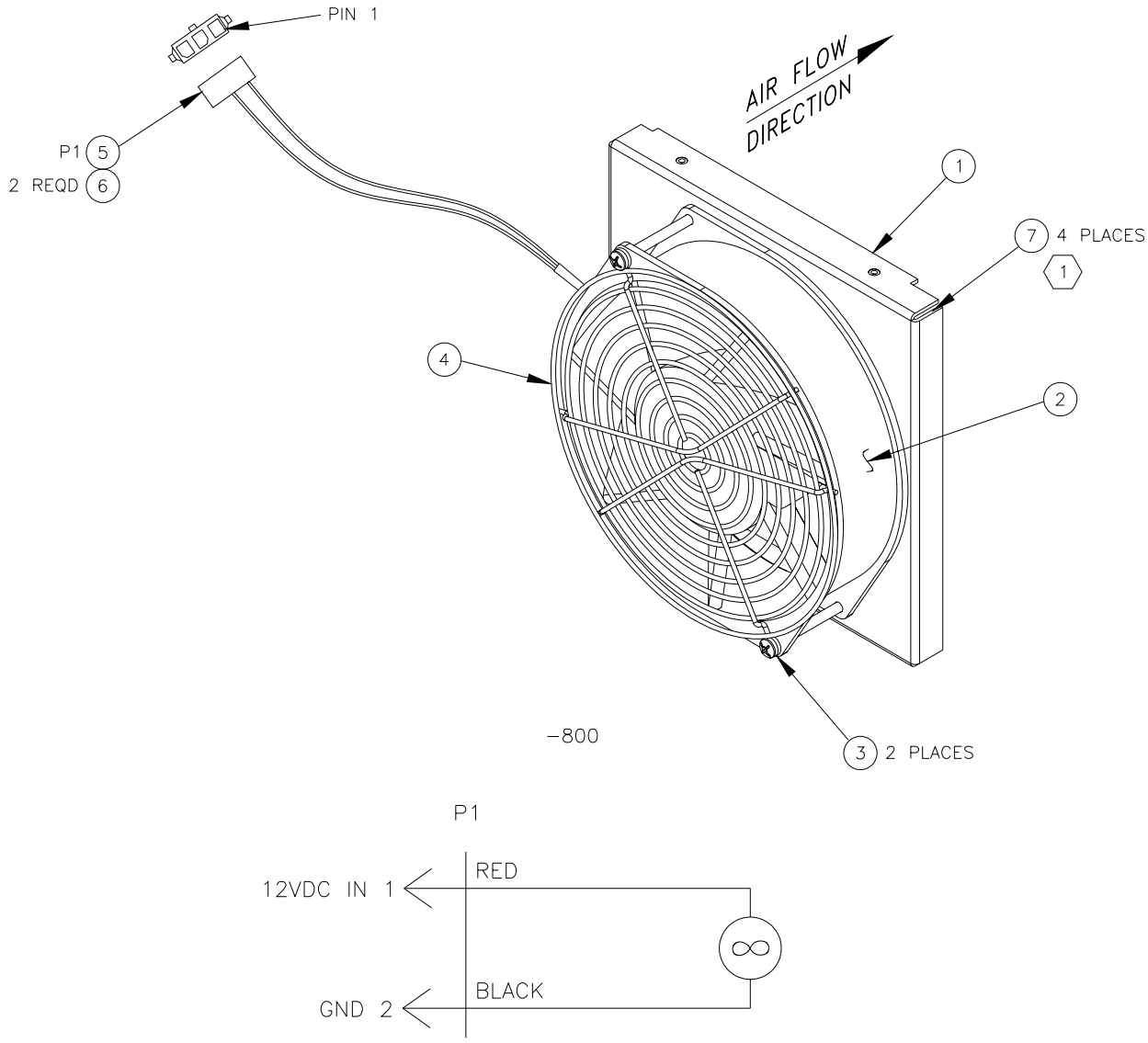


Figure 6-8. Fan Assembly

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-8-	G6-02-2109-800	0W200	FAN ASSEMBLY..... (SEE FIGURE 6-3 FOR NHA)	REF	
1	G6-02-2109-800	0W200	. MOUNTING PLATE, FAN	1	
2	7112N	62292	. FAN, AXIAL	1	
3	92005A238	39428	. SCREW, PNH	2	
4	LZ24	62292	. GUARD, FAN	1	
5	43640-0301	27264	. CONNECTOR, PLUG	1	
6	43030-0012	27264	. CONTACT, SOCKET	2	
7	7631A19	39428	. TAPE, ALUMINUM FOIL.....	AR	

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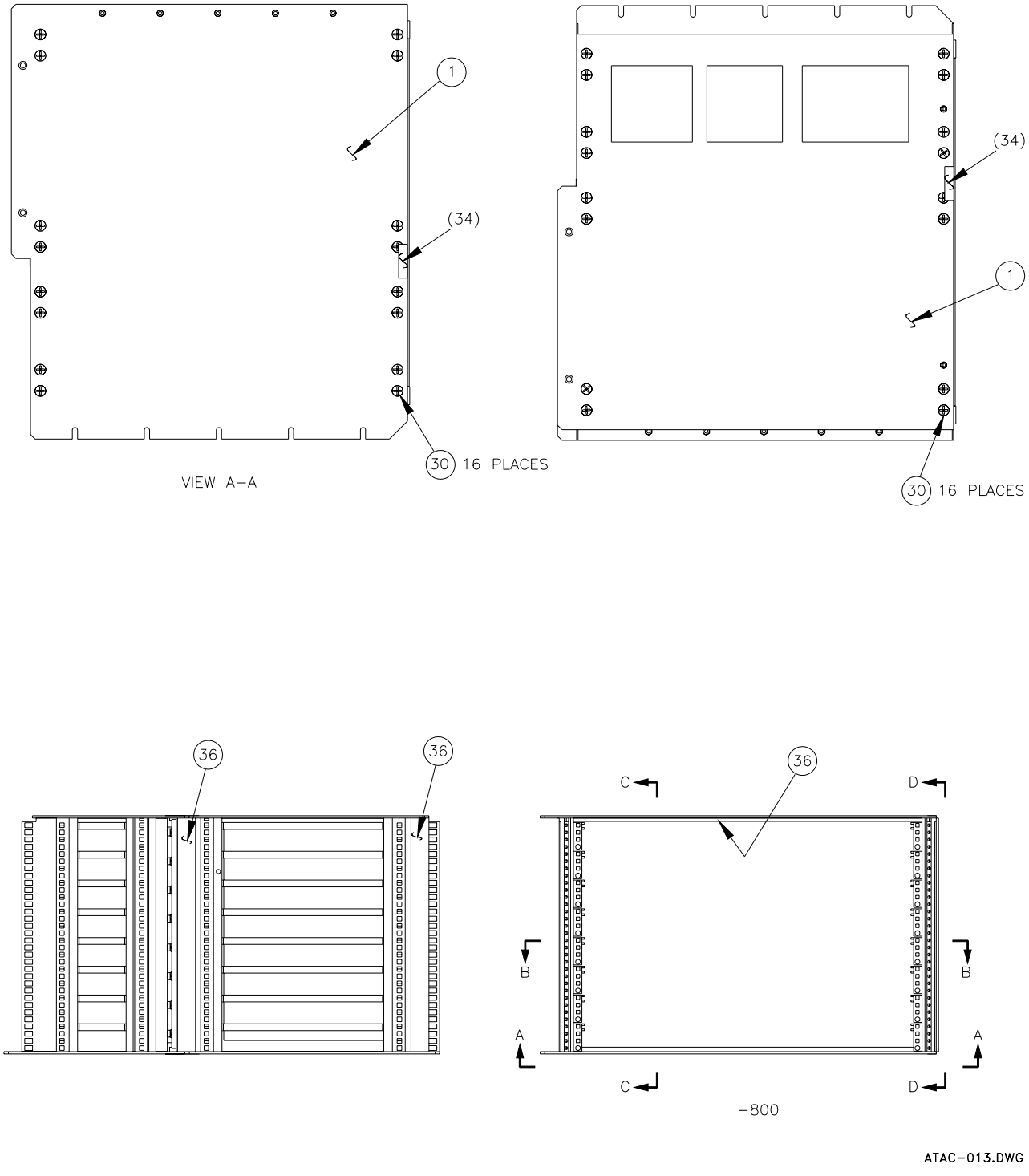


Figure 6-8. Card Cage Assembly (Sheet 1 of 4)

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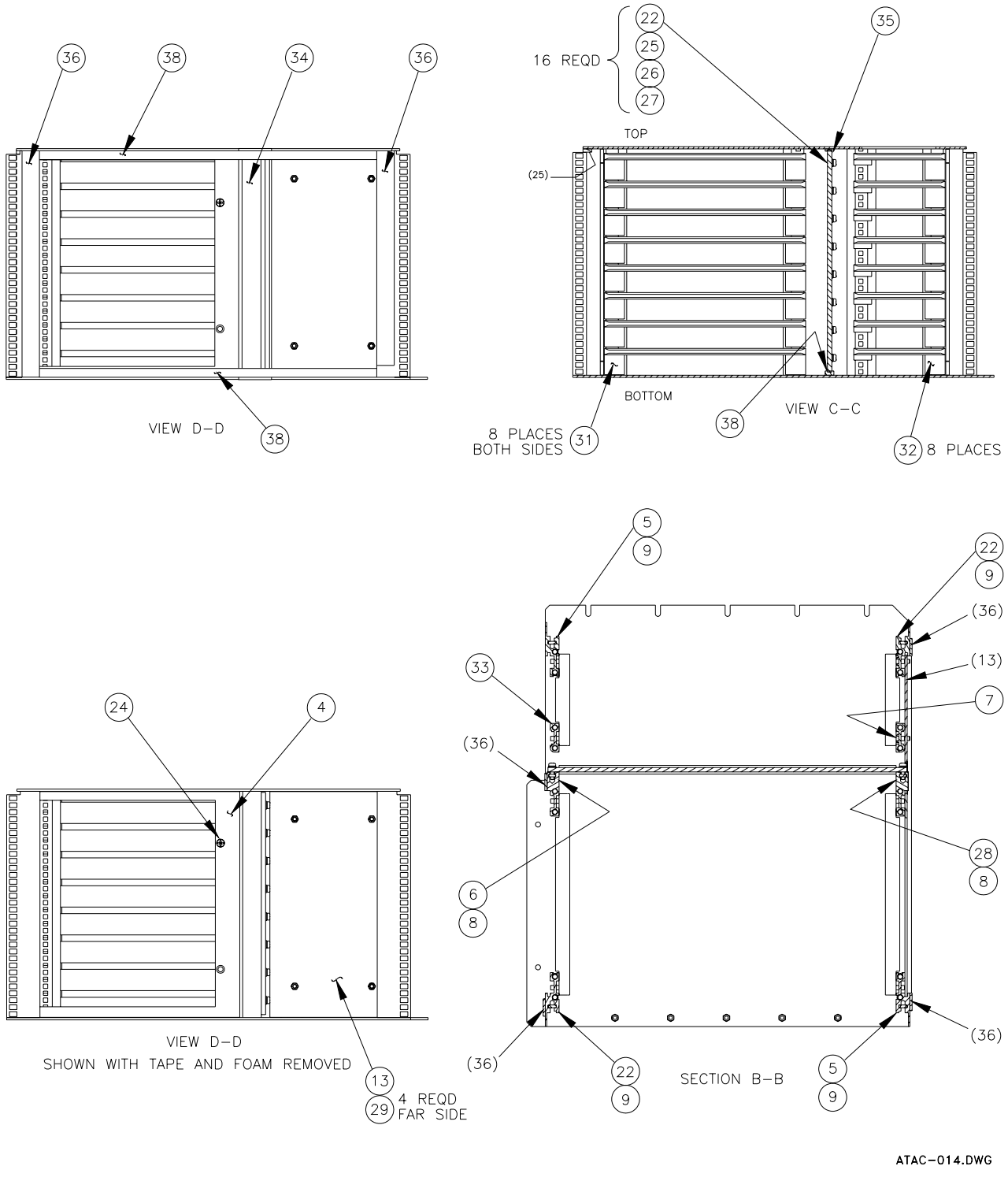


Figure 6-8. Card Cage Assembly (Sheet 2)

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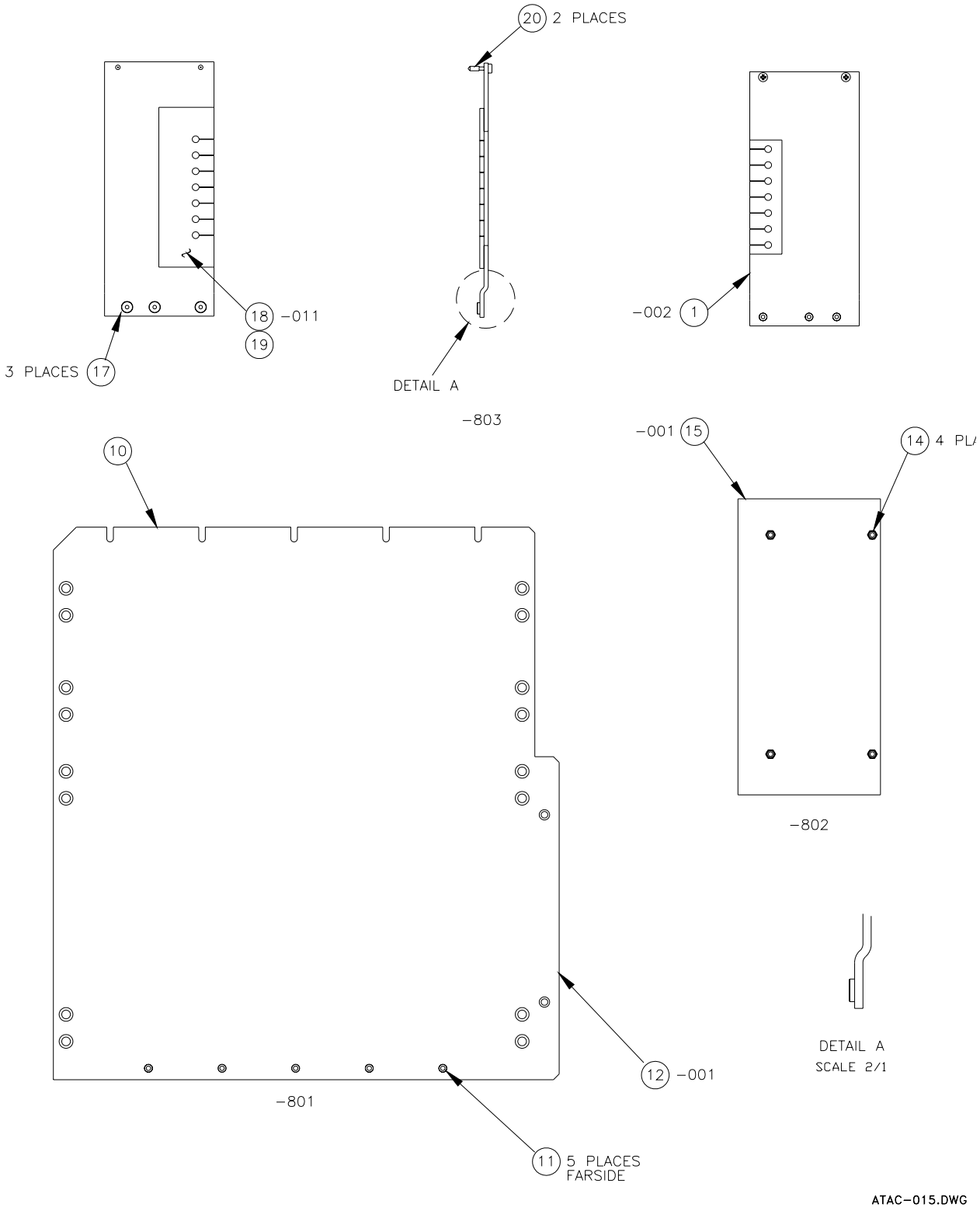


Figure 6-8. Card Cage Assembly (Sheet 3)

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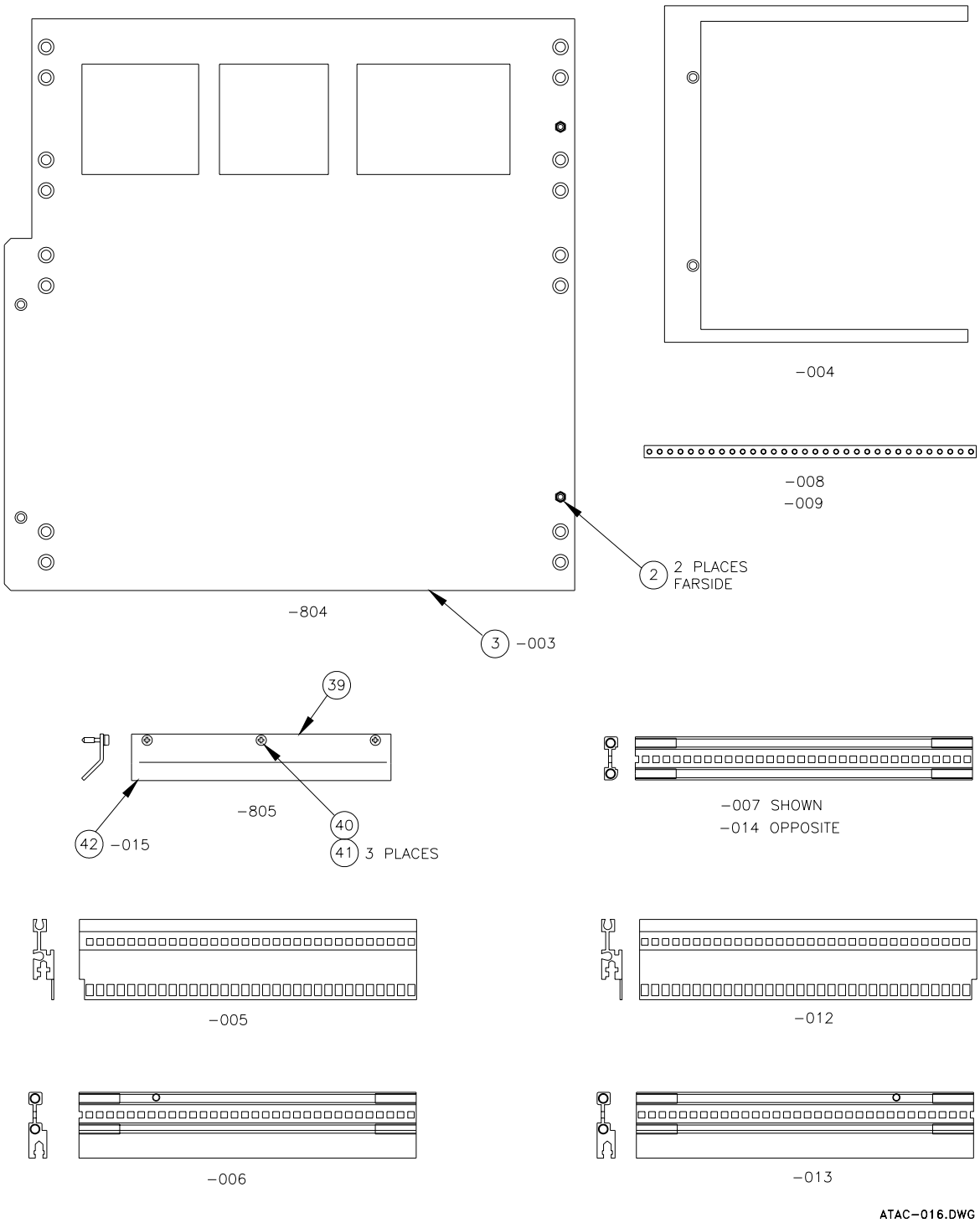


Figure 6-8. Card Cage Assembly (Sheet 4)

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-8-	G6-02-2108-800	0W200	CARD CAGE ASSEMBLY ..... (SEE FIGURE 6-3 FOR NHA)	REF	
1	G6-02-2108-804	0W200	. PLATE 2, CARD CAGE ASSEMBLY	1	
2	F-M3-1	46384	. . NUT, CLINCH.....	2	
3	G6-02-2108-003	0W200	. . PLATE 2	1	
4	G6-02-2108-004	0W200	. CAGE SINK CLOSEOUT	1	
5	G6-02-2108-005	0W200	. 66-677 TIRMMED	2	
6	G6-02-2108-006	0W200	. 66-194 TRIMMED	1	
7	G6-02-2108-007	0W200	. 66-138 TRIMMED	1	
8	G6-02-2108-008	0W200	. TAP STRIP, BACK PLANE	2	
9	G6-02-2108-009	0W200	. TAP STRIP, EJECTOR.....	4	
10	G6-02-2108-801	0W200	. PLATE 1, CARD CAGE ASSEMBLY	1	
11	F-M3-1	46384	. . NUT, CLINCH.....	5	
12	G6-02-2108-001	0W200	. . PLATE 1	1	
13	G6-02-2108-802	0W200	. X-ITION CLOSEOUT, CARD CAGE ASSEMBLY..	1	
14	F-M3-1	0W200	. . NUT, CLINCH.....	4	
15	G6-02-2108-002	0W200	. . X-ITION CLOSEOUT.....	1	
16	G6-02-2108-803	0W200	. 3U CLOSEOUT, CARD CAGE ASSEMBLY	1	
17	CLS-M2.5-2	46384	. . NUT, CLINCH.....	3	
18	G6-02-2108-011	0W200	. . GROMMET.....	1	
19	8040-00-160-8489		. . ADHESIVE, EPOXY PATCH KIT	1	
20	P971		. . SCREW, CAPTIVE.....	2	
21	G6-02-2108-010	0W200	. . 3U CLOSEOUT	1	
22	G6-02-2108-102	0W200	. 66-677 TRIMMED	2	
23	OSS-BP-6U-8-L	1ML25	. BACKPLANE, 8-SLOT, P1-P5 CONNECTORS.....	1	
24	92010A116	39428	. SCREW, FH	1	
25	92000A106	39428	. SCREW, PNH	16	
26	93475A196	39428	. WASHER, FLAT.....	16	
27	92148A070	39428	. WASHER, LOCK.....	16	
28	G6-02-2108-013	0W200	. 66-194 TRIMMED	1	
29	91200A114	39428	. SCREW, PNH	4	
30	92010A222	39428	. SCREW, FH	32	
31	61-950-01	76096	. GUIDE, CCA, 1 SLOT	16	
32	61-949-01	76096	. GUIDE,CCA, 1 SLOT	8	
33	G6-02-2108-014	0W200	. 66-138 TRIMMED	1	
34	7631A19	39428	. TAPE, ALUMINUM.....	AR	
35	5109K11	39428	. RUBBER, FOAM	AR	
36	5109K13	39428	. RUBBER, FOAM	AR	
37	5109K21	39428	. RUBBER, FOAM	AR	
38	5109K31	39428	. RUBBER, FOAM	AR	
39	G6-02-2108-805	0W200	. CLAMP, X-ITION, CARD CAGE ASSEMBLY	1	
40	P971		. . SCREW, CAPTIVE.....	3	
41	92148A070	39428	. . WASHER, LOCK	3	
42	G6-02-2108-015	0W200	. . CLAMP, X-ITION	1	

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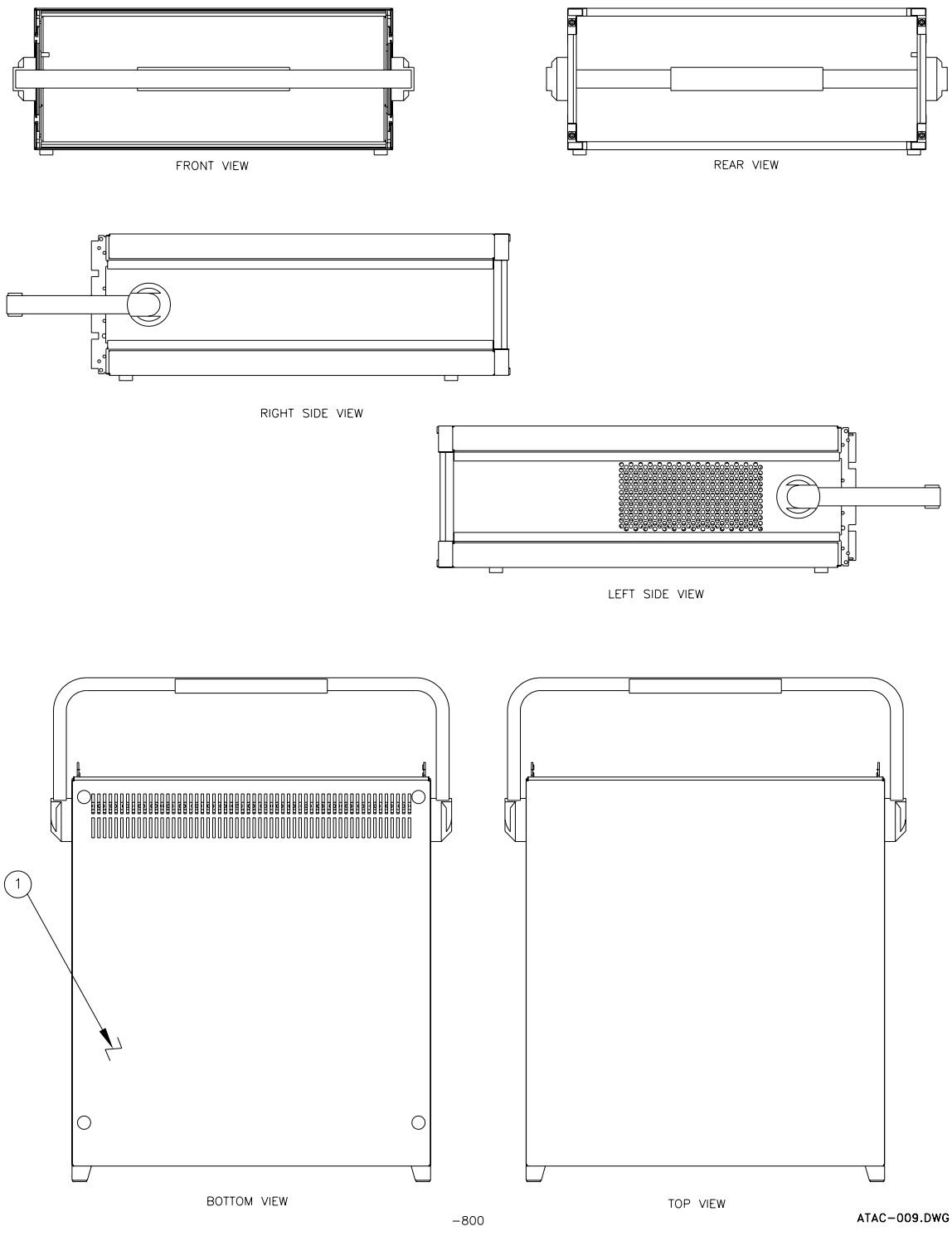


Figure 6-9. Case (Sheet 1 of 2)

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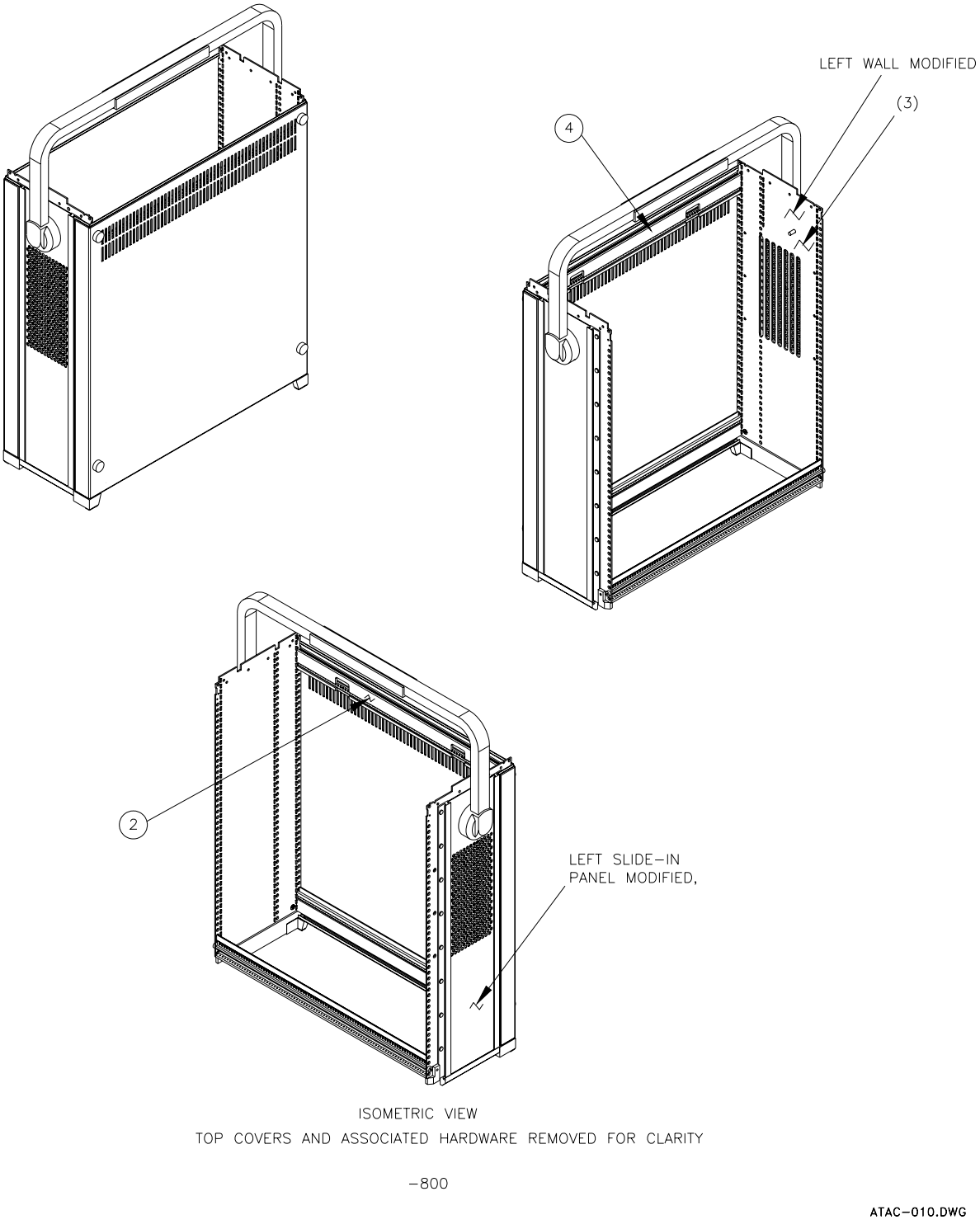


Figure 6-9. Case (Sheet 2)

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FIGURE & INDEX NUMBER.	PART NUMBER	CAGE CODE	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6-9-	G6-02-1001-800	0W200	CASE ..... (SEE FIGURE 6-3 FOR NHA)	REF	
1	4UX84HPX520D	8C938	. ENCLOSURE	1	
2	G6-02-1001-001	0W200	. EXTRUSION	1	
3	FHS-MS-12	46384	. STUD, CLINCH	1	
4	76255A34	39428	. TAPE, POLYPROPYLENE	AR	

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Appendix A

Maintenance Group Adapter (MGA) Self Test

The following paragraph describes the MGA self test procedure.

MGA Test Program

Load the MGA program from the list of programs displayed by the test executive. The program has eight entry points. The first entry point, Connection, is a mandatory entry point. It is executed every time the program is run. It consists of the connection instructions to the operator necessary to run the program. No testing is performed in this entry point. The remaining entry points are intended to break up the program so that an operator does not have to run the whole program. Therefore, the operator can elect to run the whole test program or select one or more entry points. The entry points are based on the MGA schematic diagrams. The MGA schematic diagrams are located on pages 145-151 in this manual. Each entry point performs tests on the circuits and paths that are shown on the corresponding sheet of the schematic. If any test fails the program will display the MGA components and paths that could have caused the failure. The ATACTS is assumed to be good when the MGA Self Test is run. Therefore, no ATACTS assets are displayed as a possible cause of the failure.

For a detailed illustration of the MGA, refer to figure A1

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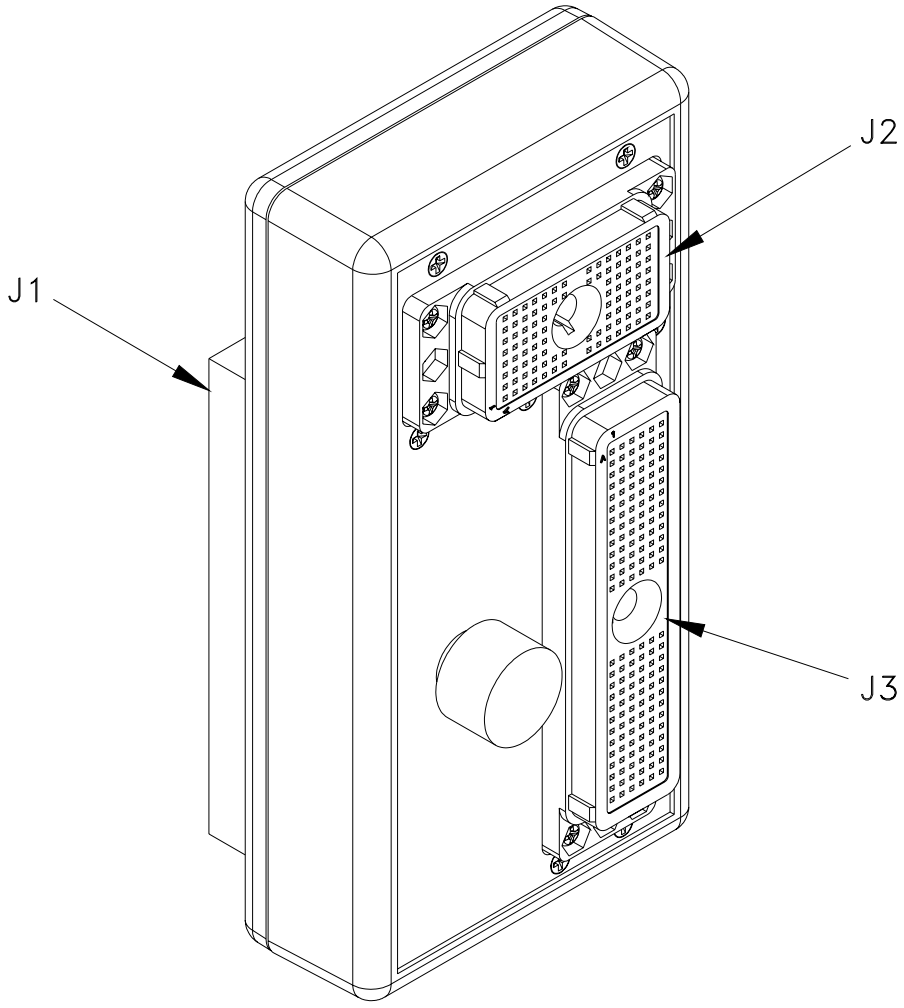


Figure A1. Maintenance Group Adapter (MGA)

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Appendix B

TF-2000A Self Test Adapter

The ATACTS 2000-EA is supplied with the TF-2000A Self Test Adapter. This self test adapter is provided in order to perform operational checks on the ATACTS unit.

CAUTION

Never power up or power down the ATACTS unit with the TF-2000A Self Test Adapter connected. Failure to follow these instructions may result in damage to the ATACTS unit.

ATACTS Unit Self Test

Self test on the ATACTS 2000-EA should be performed monthly or as needed if problems are suspected. Failure to perform self test on a regular basis may result in damage to UUTs or to the ATACTS unit itself.

TF-2000A Self Test Procedure

With the ATACTS unit powered up, select and launch *Test EZ*. Next select TF-2000A Self Test button. Once selected, self test can now be initiated by following the on screen instructions. Be sure to configure the self test adapter cabling exactly as instructed by the on screen display. For an illustration depicting the TF-2000A, please refer to Figure B1.

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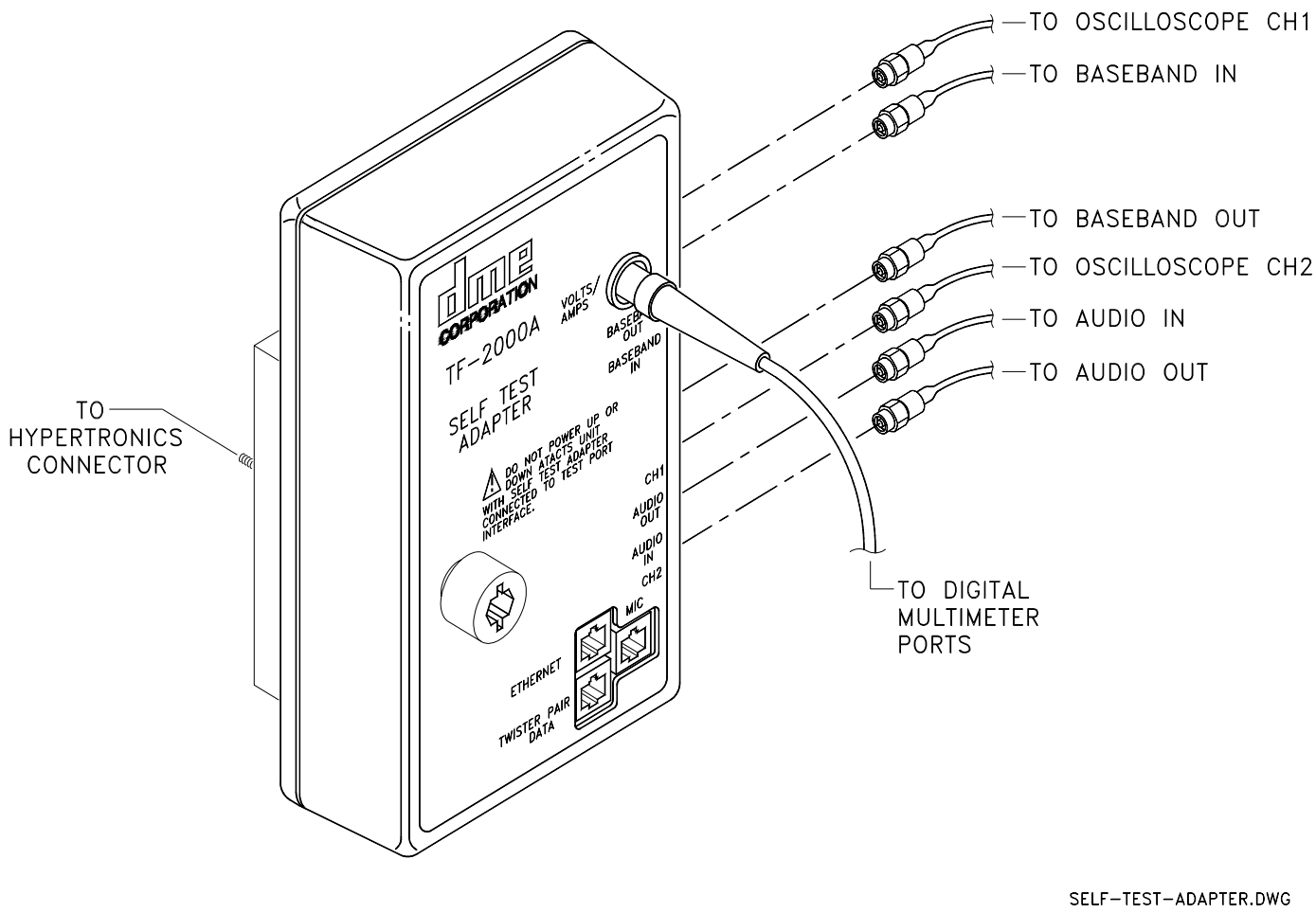


Figure B1. TF-2000A Self Test Adapter

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Diagrams

Troubleshooting Support Data

This section contains schematic data in support of troubleshooting.

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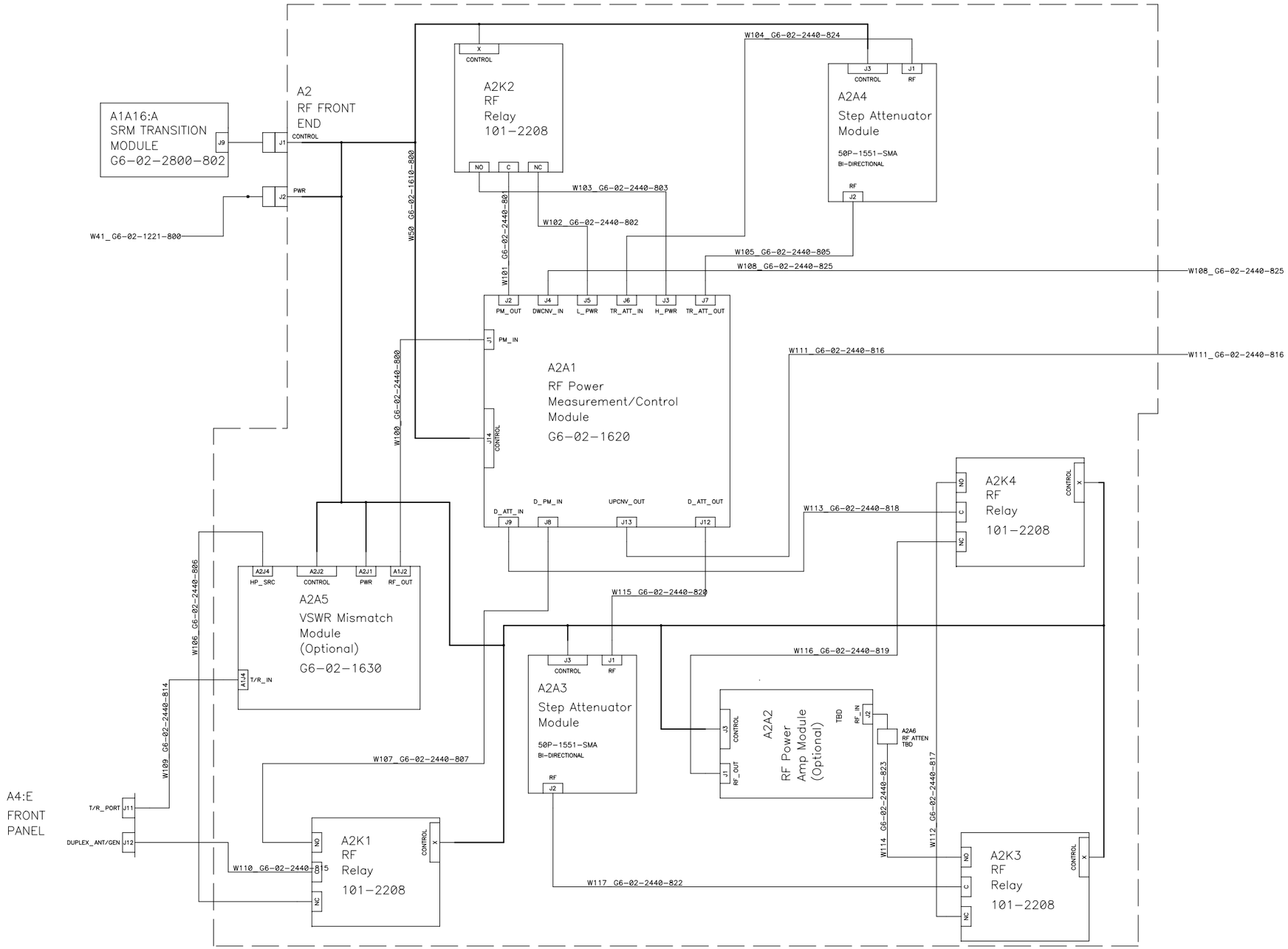


Figure 7-1. ATS-2000-EA Interconnect Diagram (Sheet 1 of 5)

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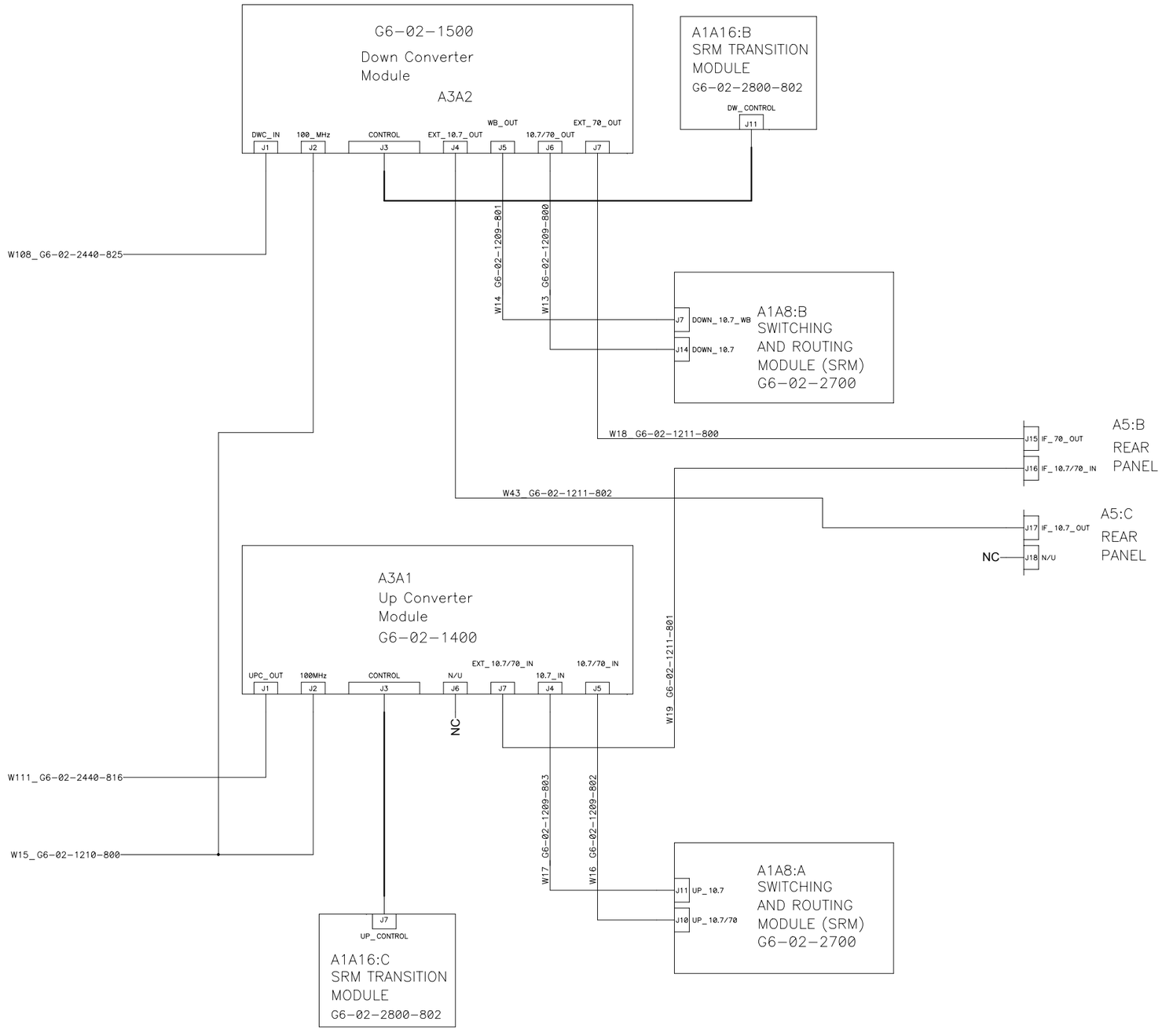


Figure 7-1. ATS-2000-EA Interconnect Diagram (Sheet 2 of 5)

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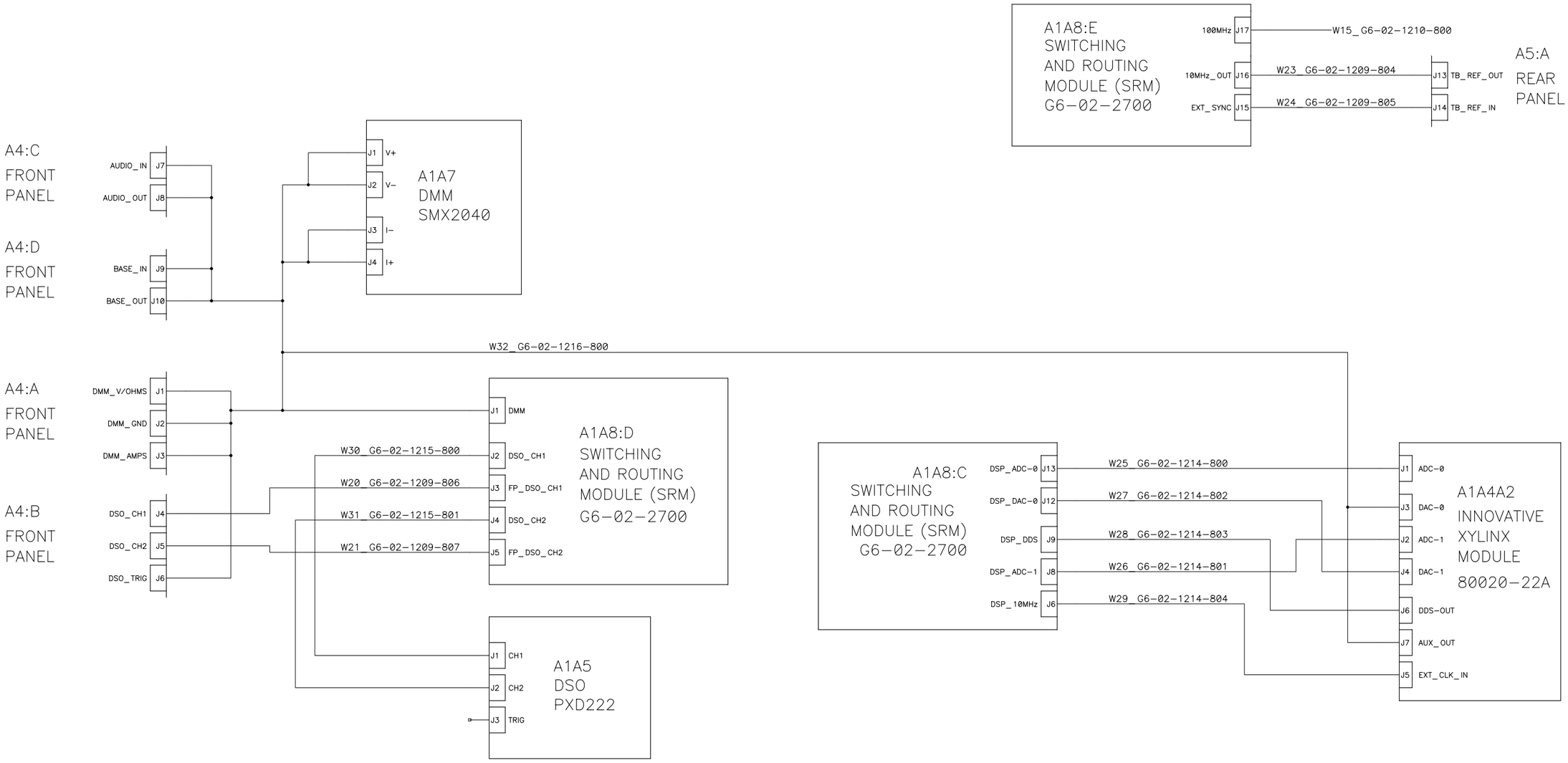


Figure 7-1. ATS-2000-EA Interconnect Diagram (Sheet 3 of 5)

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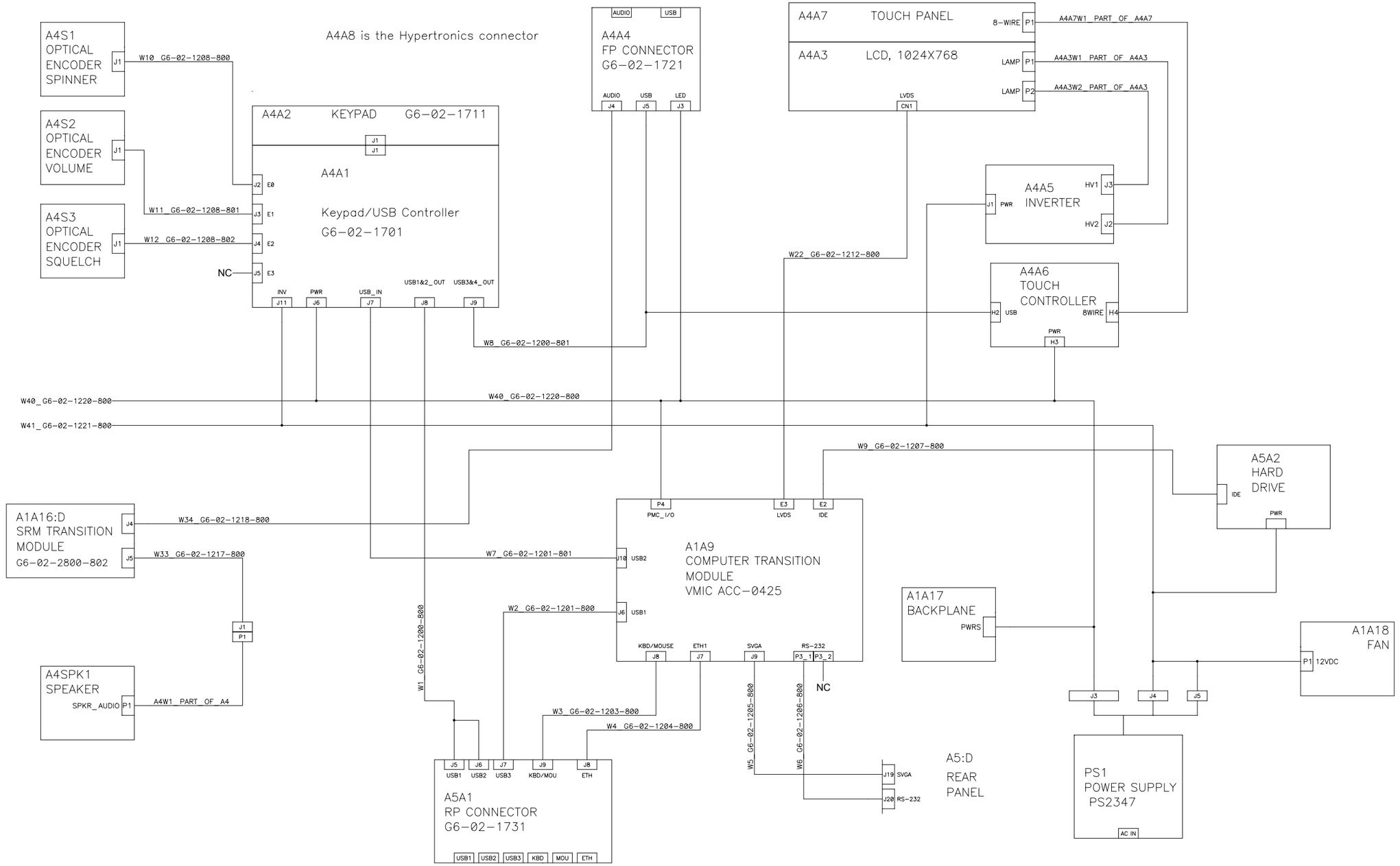


Figure 7-1. ATS-2000-EA Interconnect Diagram (Sheet 4 of 5)

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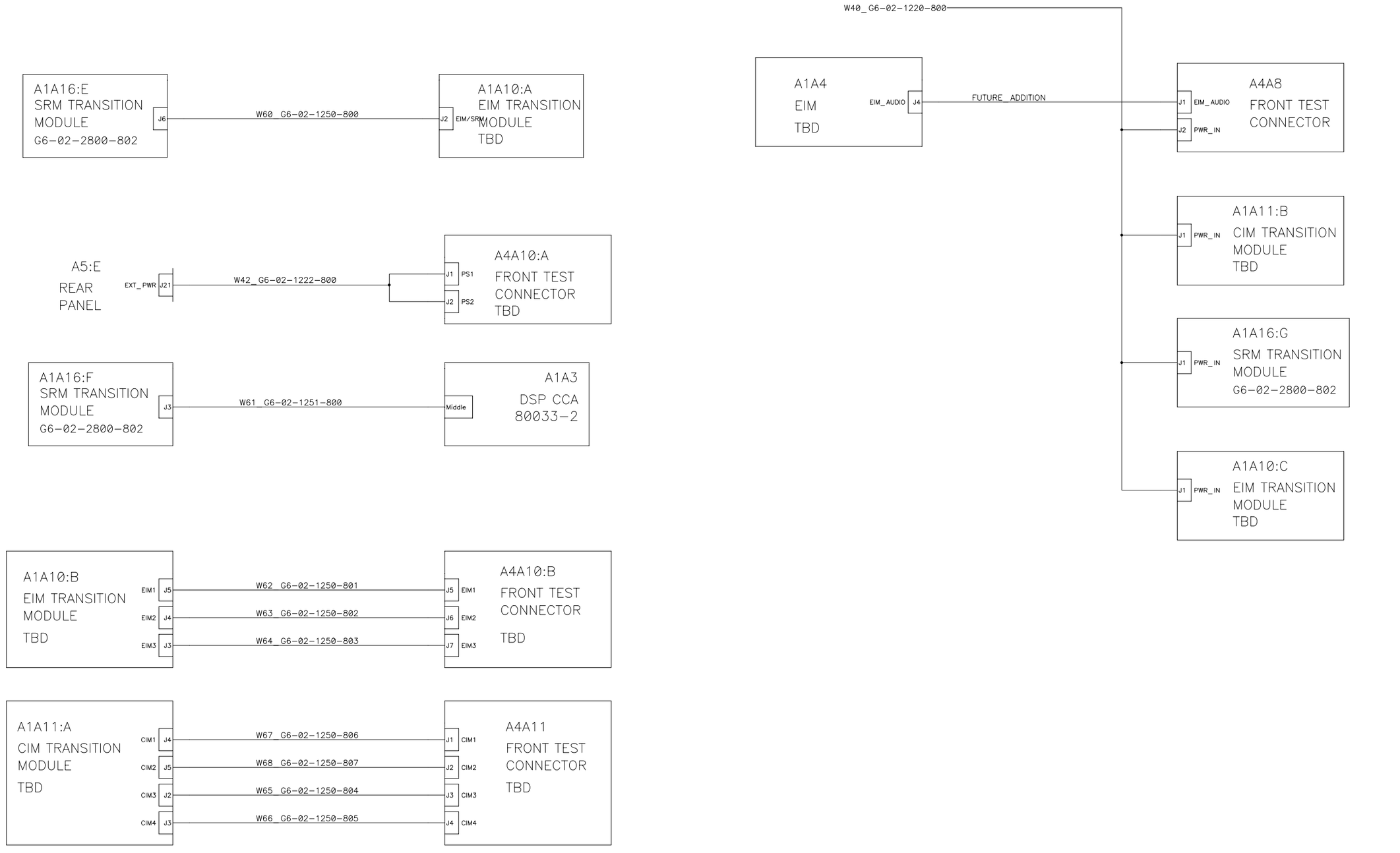


Figure 7-1. ATS-2000-EA Interconnect Diagram (Sheet 5 of 5)

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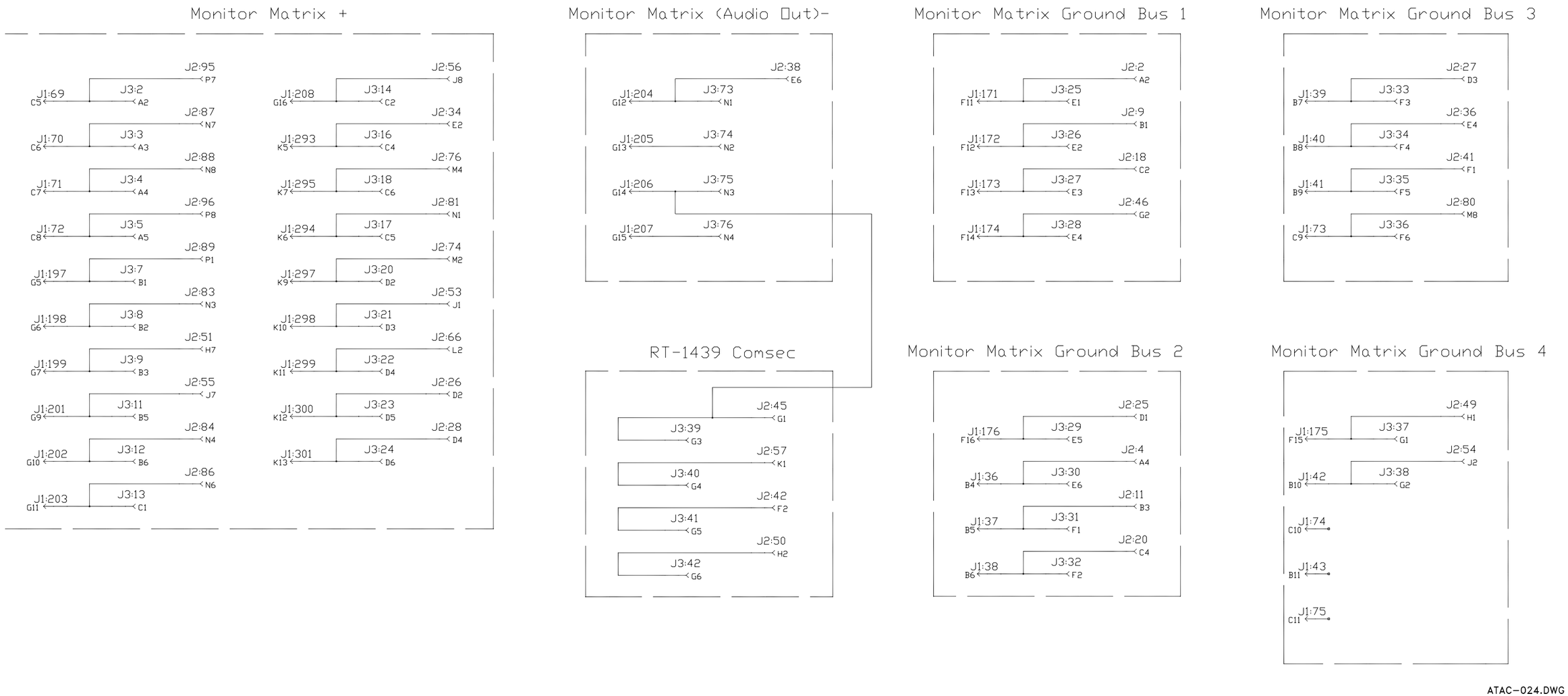


Figure 7-2. Maintenance Group Adapter (MGA) Schematic (Sheet 1 of 7)

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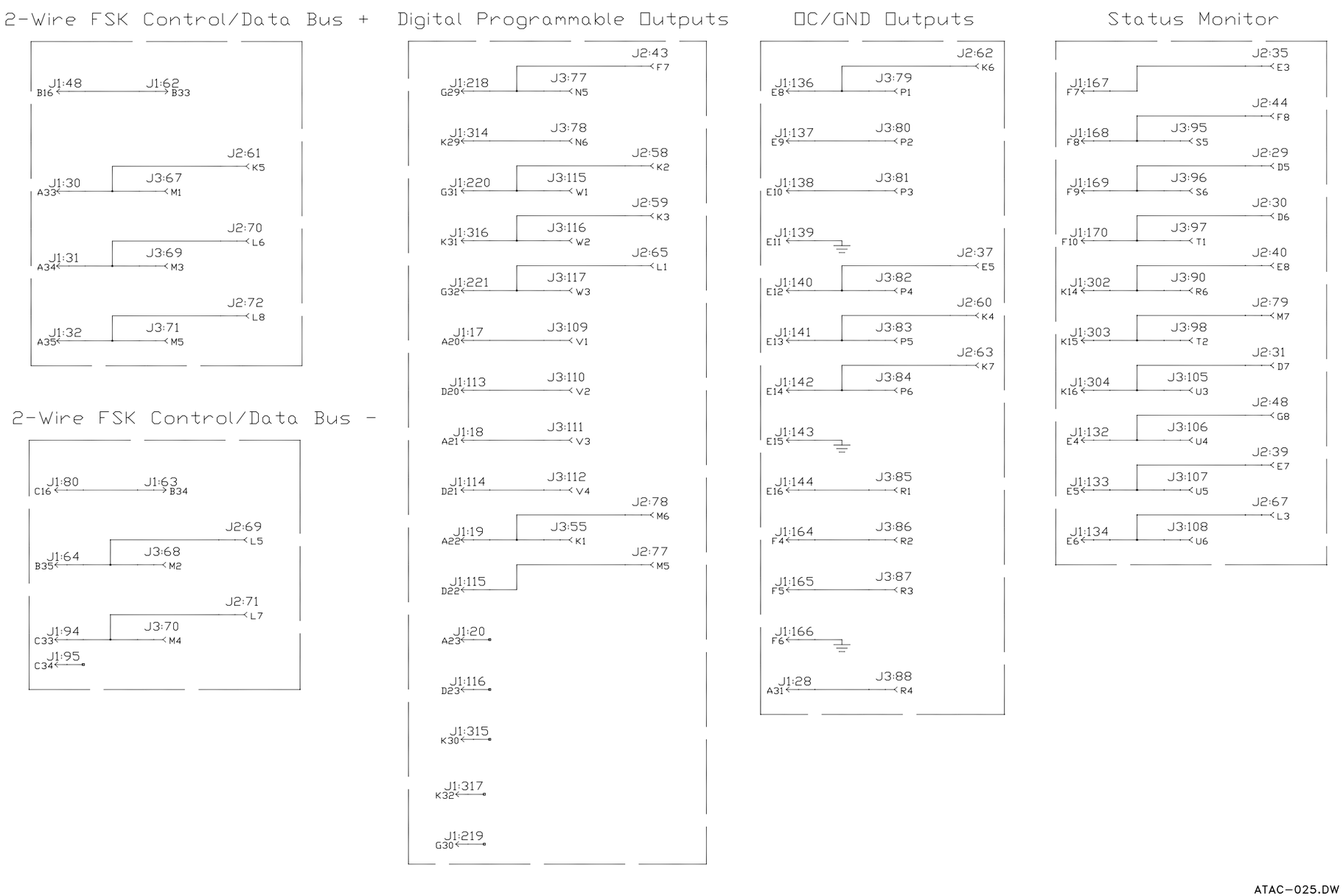


Figure 7-2. Maintenance Group Adapter (MGA) Schematic (Sheet 2 of 7)

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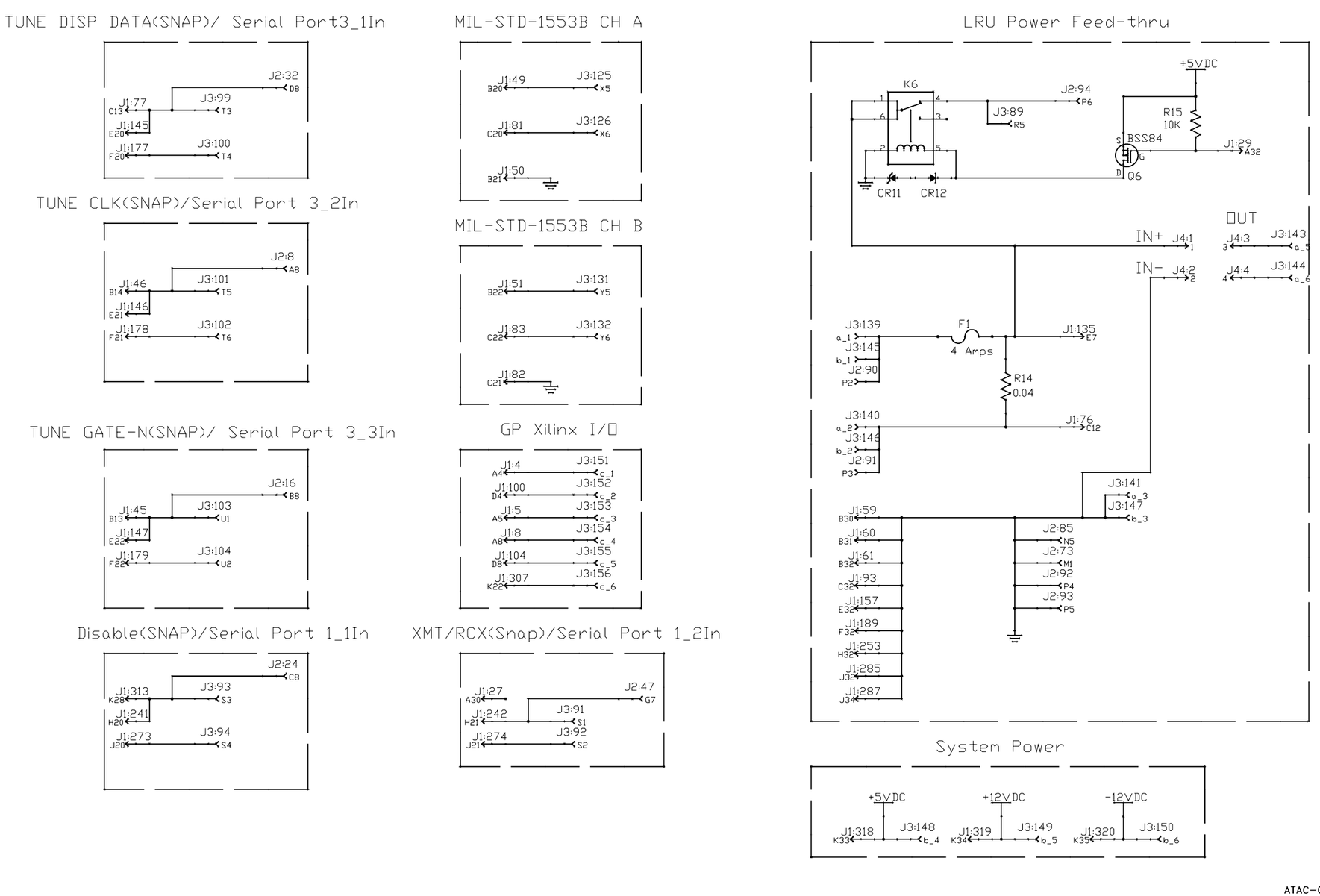


Figure 7-2. Maintenance Group Adapter (MGA) Schematic (Sheet 3 of 7)

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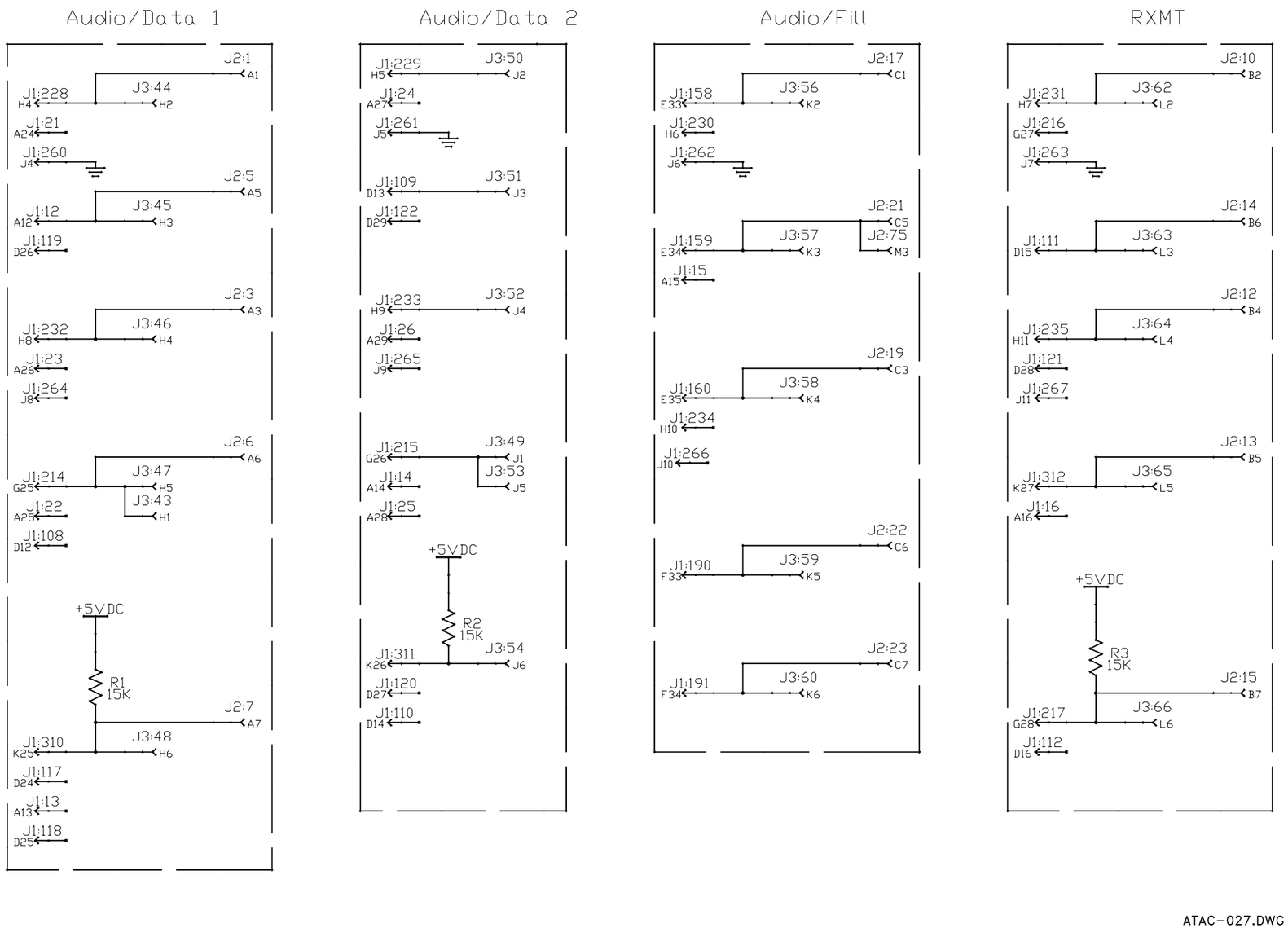


Figure 7-2. Maintenance Group Adapter (MGA) Schematic (Sheet 4 of 7)

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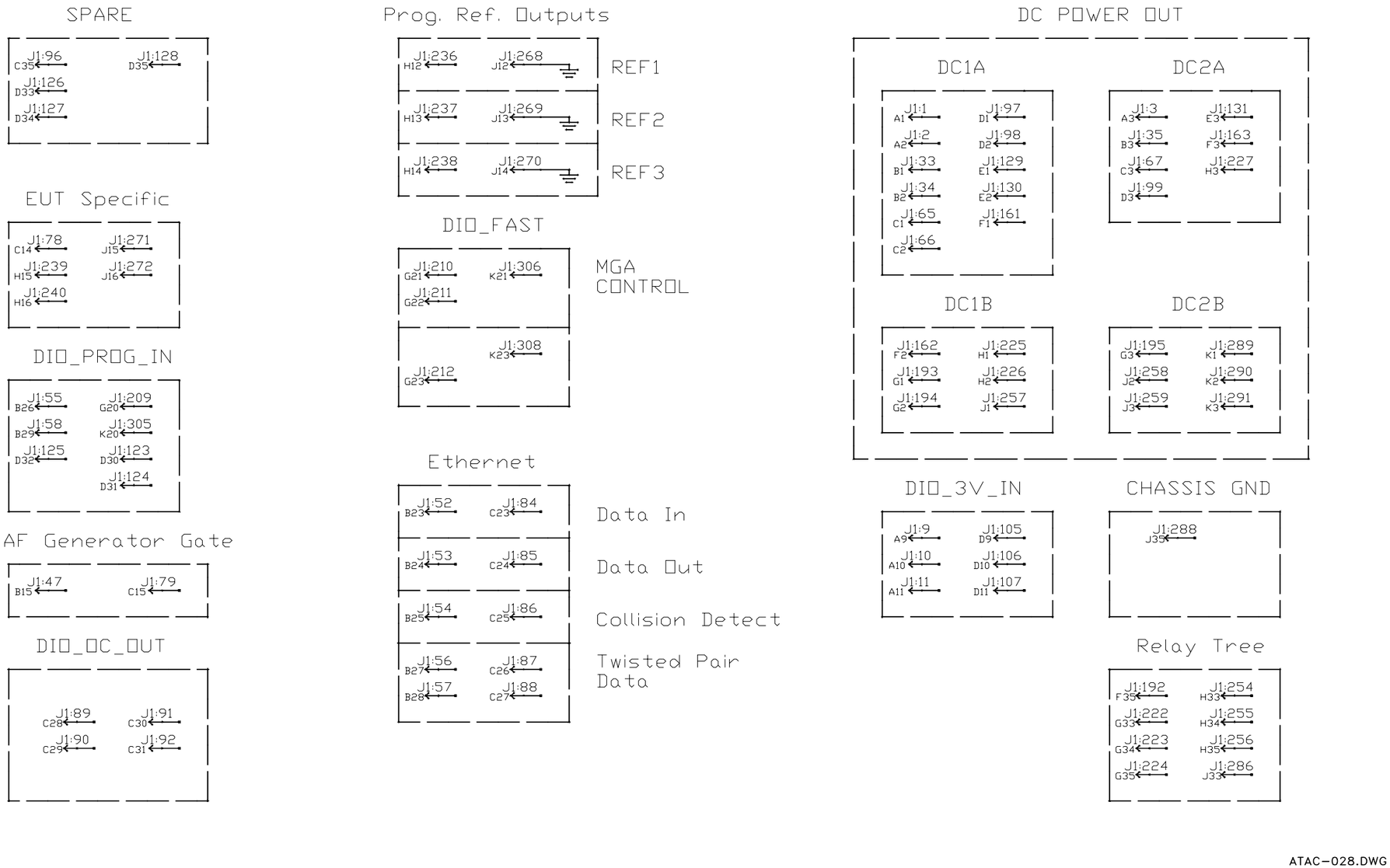


Figure 7-2. Maintenance Group Adapter (MGA) Schematic (Sheet 5 of 7)

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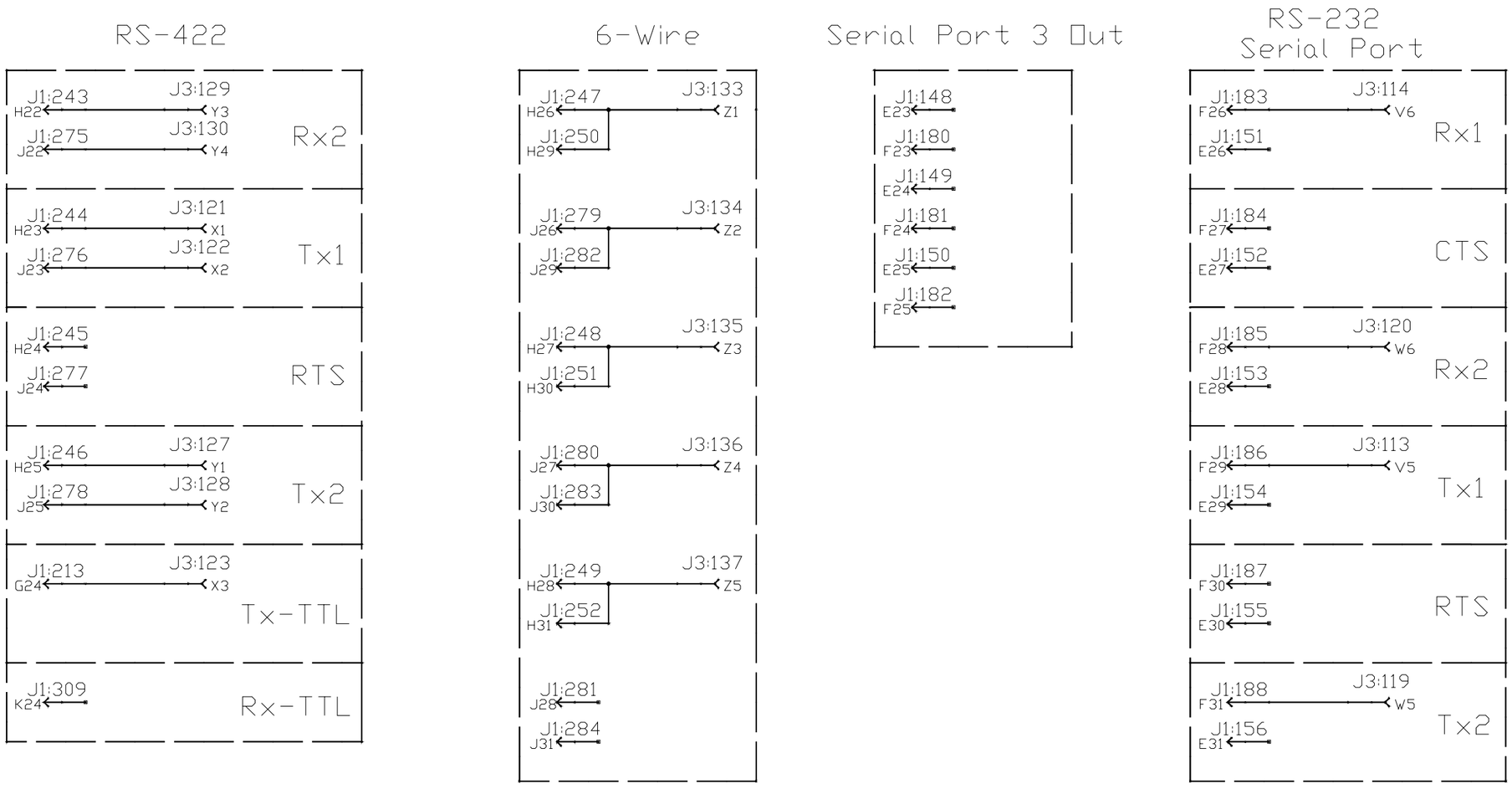


Figure 7-2. Maintenance Group Adapter (MGA) Schematic (Sheet 6 of 7)

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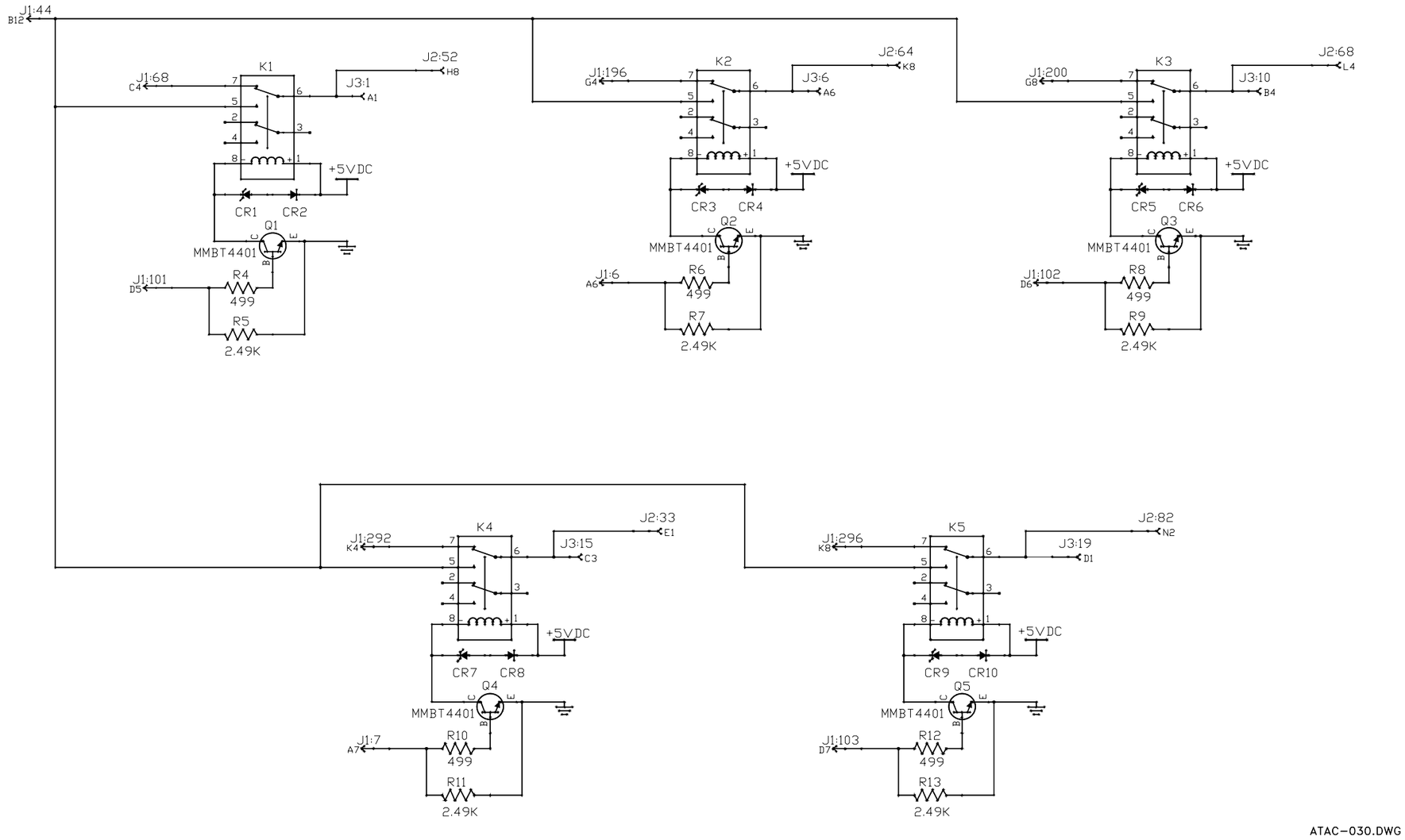


Figure 7-2. Maintenance Group Adapter (MGA) Schematic (Sheet 7 of 7)

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