



HARTMANN ELECTRONIC

A Phoenix Mecano Company



**Rugged COTS
ATR's (Air Transport Rack) systems**

ATR (Air Transport Rack)



ATR is a standard that specifies form fit and function of a “black box” installed in the aircraft. This standard also known as ARINC and was designated as ARINC 404 standard.

ARINC 404 specifies mechanical dimensions of Line Replaceable Units (or LRU's) and their racking systems in different locations in the aircraft. LRU's are installed on specially designed trays, which provide mechanical fixture, shock absorbing options, cooling facilities options and plug-in capability options.

ATRs are increasingly being deployed in wheeled and tracked vehicles and used in shipboard applications. Each application is subject to its own array of harsh environmental factors including shock, vibration, temperature, moisture and salt, that need to be taken into consideration. The ATR has been introduced into applications never before imagined, including surveillance, data collection, storage and weapons control.

Convection and Conduction cooled ATR (Air Transport Rack) enclosures offer a standardized, cost effective solution for PCI, VME, VME64x, VXS, cPCI and VPX based applications. Available in 1/2, 3/4, 1 and 1 1/2 ATR tall long or tall short formats per ARINC 404A, ARINC 600 and IEEE 1101.10 specifications, the modular design concept allows for a wide range of customization options without the cost and lead time penalties associated with custom designs.

The all-aluminum ATRs are made from punched and formed sheet metal and milled plates or brazed Aluminum. A removable front panel allows I/O customization to exact application requirements and increased configurability. The ATR enclosures use electrostatic dust filters, honeycomb EMI filters and a narrow screw spacing to seal off every external seam to ensure compliance to MIL-STD-461. The rugged designs meet the requirement for shock, vibration and structural integrity per MIL-STD-810, MIL-STD-167 and MIL-STD-901D.

MIL-STD

- MIL-STD-5400: General standard for Aerospace Electronic Equipment
- MIL-STD-810: Environmental Test Methods and Engineering Guidelines
- MIL-STD-461: Requirements for the control of EMI Emissions and Susceptibility
- MIL-STD-704: Aircraft Electric Power Characteristics
- MIL-STD-1275: Characteristics of 28 VDC Electrical Systems in Military Vehicles
- RTCA/DO-160:

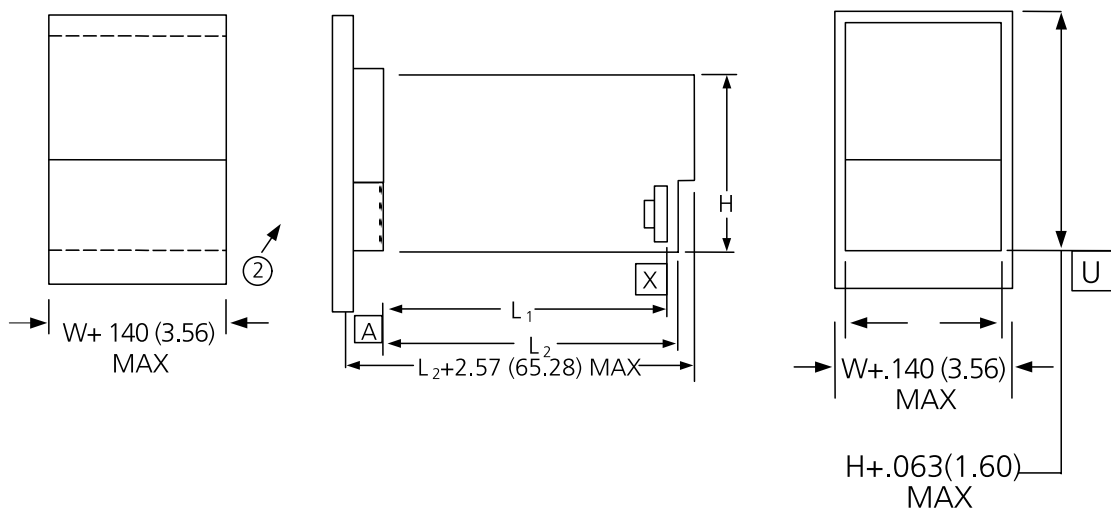
Chassis width is measured in fractions of ATR, when 1ATR means the width of the enclosure is 10.12” and it will fit into a 1 ATR tray. Typically there are 2 options of length (L) – Short ATR (12.62”) and Long ATR (19.52”). There are also several standard options of the height of the chassis (regular – 7.62”, or “Tall” – 10.62”).

In addition to mechanical dimensions, the standard also defines fixture hardware locations for given width of the chassis.

Standard ATR case dimensions

ATR Size	Approx. Volume		Width (W)		Length (L1)		Length (L2)		Height (H)	
	in ³	liter	±.03in	±0.76mm	±.04in	±1mm	in	mm	in	mm
Dwarf	95	1.56	2.25	57.15	12.52	318.0	12.62	320.5	3.38	85.8
1/4 Short	215	3.52	2.25	57.15	12.52	318.0	12.62	320.5	7.62	193.5
1/4 Long	335	5.49	2.25	57.15	19.52	495.8	19.62	498.3	7.62	193.5
3/8 Short	340	5.57	3.56	90.41	12.52	318.0	12.62	320.5	7.62	193.5
3/8 Long	530	8.69	3.56	90.41	19.52	495.8	19.62	498.3	7.62	193.5
1/2 Short	470	7.70	4.88	123.95	12.52	318.0	12.62	320.5	7.62	193.5
1/2 Long	725	11.88	4.88	123.95	19.52	495.8	19.62	498.3	7.62	193.5
3/4 Short	720	11.80	7.50	190.50	12.52	318.0	12.62	320.5	7.62	193.5
3/4 Long	1120	18.36	7.50	190.50	19.52	495.8	19.62	498.3	7.62	193.5
1 Short	975	15.98	10.12	257.05	12.52	318.0	12.62	320.5	7.62	193.5
1 Long	1510	24.75	10.12	257.05	19.52	495.8	19.62	498.3	7.62	193.5
1 1/2	2295	37.62	15.38	390.65	19.52	318.0	19.62	498.3	7.62	193.5

Notes: Per ARINC characteristic 561 INS, the standard dimension 'H'=7.62" may be increased to maximum 'H' dimension of 10.625" (269.88mm)



Convection-cooled ATR's



Convection cooled ATR. Forced air moving across system boards, power supplies and other system components. Moving air absorbs system heat directly from board components which is then exhausted out of the enclosure to the ambient environment.

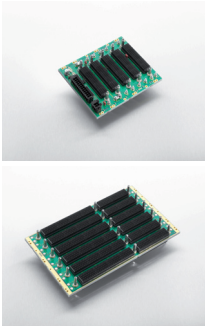
The ATRs accept all 3U and 6U boards complying with IEEE 1101.2. The cooling concept of all Convection cooled ATRs is optimized by thermal analysis. The chassis parts are made from aluminum alloy #6061-T651 The more intense applications may require using Carbon Fiber Technology for enclosure design which greatly reduces weight, increases strength, increases thermal conductivity of heat load. All removable covers are equipped with captive screws

- Meets ARINC 404A, ARINC600 and IEEE 1101.2 specifications
- Operating temperature range of -20°C to +55°C
- Meet MIL-STD 810E for shock and vibration
- Operating altitude up to 15,000 ft.
- Backplane options for VME/64X, cPCI, PCI, VXS, VPX and custom
- Power supply and line filter combination are optimized to meet MIL-STD 461F, MIL-STD-1275D/704/1399
- Low weight, ideal for applications where the weight is critical
- Features a MIL 38999 type power connector with an integrated filters
- Rugged aluminum dip-braided construction is designed and optimized for cooling via thermal simulation studies
- Fan features
 - Low Noise Control
 - Military Specification Compliance (MIL-STD-461F: EMIRF, MIL-STD704A, 1275A: Transients & Spikes, MIL-I-45208: Quality System)
 - High performance axial fan
 - Feathered edge for lower noise
 - High reliability ball bearings
 - Range: 80 - 350 CFM

Environmental Specifications

Temp, Operating	-20°C to +55°C	MIL-STD-810E (Methods 501.3 & 502.3)
Temp, non-Operating	-30°C to +85°C	MIL-STD-810E (Methods 501.3 & 502.3)
Altitude, Operating	15,000 ft	MIL-STD-810E (Method 500.3)
Shock	15 g 11ms	MIL-STD-810E (Method 516.4)
Vibration	15 to 2,000 Hz at .1g ² /Hz (RMS – 12G)	MIL-STD-810E (Method 514.4)
EMC	MIL-STD-461F	MIL-STD-461F Tempest
Salt fog	Conformal Coating 5% for 48 hours	MIL-STD-810E (Method 509.3)
Humidity	0-95% non-condensing	MIL-STD-810E (Method 507.3)

MRC-108 Up to 8 slots 3U/6U cPCI or VPX ATR's



Both 3U/6U CompactPCI or VPX backplanes are supported by the MRC-108. Meeting the rigorous MIL-STD-810E standards, the size is a sub-½ or 1 ATR solution for deployed systems in the harshest environments.

Features include:

- ½ or 1 ATR natural convection-cooled (we also have it as a conduction-cooled chassis, reduced height and length)
- Up to 8 slots 0.8-inch slots
- Physical dimensions of 4.88 in. (W), 5.65 in. (H), 10.30 in. (L) for 1/2 ATR
- 3U/6U VPX and cPCI backplanes available
- D38999 front panel I/O connectors (configurable)
- Integrated MIL-STD-704-compliant, 28VDC power supply
- MIL-STD-461F EMI filtering
- Front panel handle 3.5 TB of solid state
- Environmentally sealed per MIL-STD-810E, Drip proof (only at the conduction – cooled ATR's)
- Integration services with third-party modules available (populated with an Intel or Freescale SBC)

Environmental Characteristics

Temperature	Operating	-20°C to +55°C
	Intermittent	-30°C to +70°C
	Non Operating	-30°C to +85°C
Humidity	Operating/Storage	MIL-STD-810E Method 507.1 Proc. I.95% RH (non condensation)
Vibrations	Hard Mount	MIL-STD-810E, Method 514.3, Category 4, Table 514.3-II & Fig. 514.3-25A
	Shock Tray Mount	MIL-STD-810E, Method 514.3, Category 6.
Shock	Operating	MIL-STD-810E, Method 516.4, Proc. I, -15g 11ms. Saw Tooth
Explosive		MIL-5400, Par. 3.2.2.4.10
Emi/Rfi		MIL-STD-461F, Class 3
Drip Proof		MIL-STD-810E
Altitude	Operating	15,000 ft.
	Non Operating	45,000 ft.
Physical Characteristics	Size	4.88in.(W),5.65in. (H),10.30in(L)
	Weight	10 Kg.
	Power	20 - 30VDC

These specifications are subject to change without notice

Conduction Cooled ATR's



Conduction cooled ATR platforms provide the highest level of environmental protection with exceptional thermal performance. The heat load is transferred via wedge locks from the boards to the machined platform walls with the integrated card guides. The ATRs accept all 3U and 6U boards complying with IEEE 1101.2. The cooling concept of all conduction cooled ATRs is optimized by thermal analysis. The chassis parts are made from aluminum and joined by a dip-braising process to ensure best conductivity of heat load. All removable covers are equipped with captive screws

Meets ARINC 404A, ARINC600 and IEEE 1101.2 specifications

- Operating temperature range of -40°C to +85°C
- Low weight, ideal for applications where the weight is critical
- Backplane options for VME/64X, cPCI, VXS, VPX and custom
- Features a MIL 38999 type power connector with an integrated line filter
- Power supply and line filter combination are optimized to meet MIL-STD 461E, MIL-STD-704/1275
- Rugged aluminum dip-braised construction is designed to meet MIL-STD 810F for shock and vibration
- Cooling optimized by thermal simulation studies

Environmental Specifications

Temp, Operating	-40°C to +85°C	MIL-STD-810F (Methods 501.3 & 502.3)
Temp, non-Operating	-55°C to +85°C	MIL-STD-810F (Methods 501.3 & 502.3)
Altitude, Operating	55,000 ft	MIL-STD-810F (Method 500.3)
Shock	25g 11ms	MIL-STD-810F (Method 516.4)
Vibration	15 to 2,000 Hz at .1g ² /Hz (RMS – 12G)	MIL-STD-810F (Method 514.4)
EMC	Tempest / MIL-STD-461D	MIL-STD-461D Tempest
Salt fog	Conformal Coating 5% for 48 hours	MIL-STD-810F (Method 509.3)
Humidity	0-95% non-condensing	MIL-STD-810F (Method 507.3)

Sealed ATR's indirect forced-air cooled

ATR style of enclosures has been developed for defense and civil equipment OEMs strive for safe and cost-effective deployment methods of COTS hardware. Ambient air is isolated from the air circulating inside the unit and the heat dissipated within is driven out via an active or passive air-to-air heat exchanger or liquid cooler. These rugged ATR enclosures are versatile and affordable and cater for a large number of configurable options. They can house virtually any bus architecture and provide substantial project cost savings over conduction-cooled systems without having to compromise quality or performance

Air to Air (natural convection & Liquid Cooled ATR 's)

Air Transport, Rugged, for3U/ 6U VPX, cPCI Boards & etc.

- ATR platform 3U/6U conduction cooled forced air or with liquid cooled side walls boards, 1" pitch, per VITA 48.2 (REDI) and VITA 65 (OpenVPX™)
- Additional backplanes: VME, VME64x, VXS, cPCI and custom
- COTS/MOTS modular design according to ARINC 404A
- Designed to meet environmental MIL Standards 810 and 461
- Cools up to 40 W (Air to Air) /80W (Liquid cooled) per slot,
- Choice of power supply 3U/6U plug-in or fixed-mount
- Custom I/O options including MIL-STD wiring and connectors
- Input power: 28 VDC and 270 VDC per MIL-STD-704E - 1 and 3 phase 115 VAC, 400 Hz on request

Features and Benefits



- Internal electronic hardware is isolated from external environment
- Suitable for airborne, seagoing and land mobile applications
- VME, VME64, cPCI, PC, VPX
- EMC to MIL-STD-461, DEF.STAN 59-41 and Tempest
- Shock and vibration isolated rugged card cage
- High altitude operation up to 55,000 feet
- Climatic control and monitoring option extremely rugged construction to MIL-STD-810
- PSU with single/ three-phase AC or DC input options

MRC-108S Up to 8 slots 3U/6U cPCI or VPX ATR's .

MRC-108S is a high performance, rugged computer designed specifically for military embedded applications. The unit is conduction cooled. Embedded Mobile Applications requires surviving tough environments. This series included both 3U/6U CompactPCI or VPX backplanes are supported. Meeting the rigorous MIL-STD-810 standards, the size is a sub-½ or 1 ATR solution for deployed systems in the harshest environments.

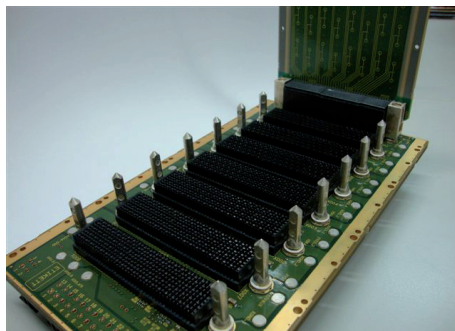
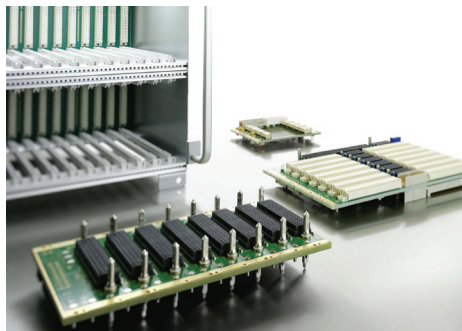
Features include:

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- Physical dimensions of 4.88 in. (W), 5.65 in. (H), 10.30 in. (L) for 1/2 ATR
- 3U/6U VPX and cPCI backplanes available
- D38999 front panel I/O connectors (configurable)
- Integrated or Plug in MIL-STD-704-compliant, 28VDC power supply
- MIL-STD-461 E/F EMI filtering
- Front panel handle
- Environmentally sealed per MIL-STD-810F, Drip proof
- Integration services with third-party modules available (populated with an Intel or Freescale SBC)
- Processor: Intel® Atom® processor 1.7 GHz.
- Memory up to 4Gbyte
- Interfaces: 2X serial – 232/422, Ethernet 10/100/1000, 2XUSB 2.0, IDE/ATA
- Integrated graphics cards
- O.S.: VxWorks, Win7, XP, Linux
- Sealed Enclosure.
- Shock Mount Kits Available.

Environmental Characteristics

Temperature	Operating:	-40°C to +65°C
	Option:	-40°C to +74°C
	Non Operating:	-55°C to +85°C
Humidity	Operating/Storage	MIL-STD-810E Method 507.1 Proc. I 98% RH
Vibrations	Hard Mount:	MIL-STD-810E, Method 514.3, Category 4, Table 514.3-II & Fig. 514.3-25A
	Shock Tray Mount:	MIL-STD-810E, Method 514.3, Category 6.
Shock	Operating:	MIL-STD-810E, Method 516.4, Proc. I, -15g 11ms. Saw Tooth
EXPLOSIVE		MIL-5400, Par. 3.2.2.4.10
EMI/RFI		MIL-STD-461, Class 3
Drip Proof		MIL-STD-810E
Altitude	Operating:	40,000 ft.
	Non Operating:	40,000 ft.
Physical Characteristics	SIZE	10.3" L x 4.88" W x 5.65" H
	WEIGHT	10.5 Kg.
	POWER	18 - 36VDC

About us



Hartmann Elektronik, a Phoenix Mecano Group company, develops and produces backplane and "electronic packaging" solutions in Stuttgart Germany.

Objective:

We solve our customer's tasks quickly and competently.

Products and services:

We offer a wide range of standard products as well as completely customized systems - you will always receive the most practical solution with regard to engineering and cost, and optimally suited to the task at hand.

Know-how:

Hartmann Elektronik has more than 30 years of experience in the development and manufacture of electronic systems – unsurpassed circuit layout capabilities, efficient component mounting services, high-speed bus systems...

Our Rugged Product Group:

Develops and manufactures industrial & rugged solutions for military, avionics, industrial, medical, semiconductors & telecommunication companies.

Our service include using COTS (Commercial Of The Shelf) electronic products to meet Harsh environmental conditions

- cPCI/VME/VPX ATR (Avionic Transport Rack) platforms
- Rugged Switches & Routers
- Rugged computers with high Graphic capabilities
- Rugged recording Systems for IP, Video, I/O interfaces
- Avionics Smart gateway for data link applications
- Rugged Tactical Vehicle computers

Tactical Docking



Communications



Systems



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