

12R COTS

RUGGED ENCLOSURES

vme ▼ vme64x ▼ cPCI

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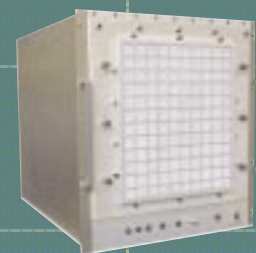
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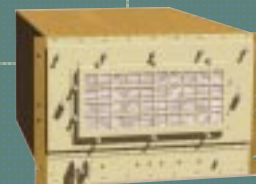
9U SYSTEM

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7U SYSTEM

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5U SYSTEM

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SENTRY SYSTEM

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Company Profile

Founded in 1962, Elma Electronic Inc. is an industry innovator in the design and manufacture of electronic enclosures and passive electronic components. Elma USA enjoys a leading position in the VME/VME64x, VXI, cPCI and Rugged COTS packaging markets. Elma's component products consist of switches, collet knobs, and LED arrays.

Headquartered in Switzerland, with offices in 22 countries, Elma has the ability to respond rapidly, with superior solutions to the requirements of its customers. Elma has a broad base of customers throughout the United States in diverse industries such as telecommunications, industrial control, medical electronics, military and defense.

Elma Electronic strives to provide products superior in quality, reliability, performance, and consistently presents new, innovative designs to the market. Elma's product line encompasses well over 16,000 parts, including enclosures, cabinets, high quality switches, LED arrays, knobs and much more. Elma also offers design/integration services backed by responsive and knowledgeable technical support.

Elma's leading quality level is reached through training of all employees and following of systematic procedures per ISO 9001 standards to which Elma has been registered.

Milestones

- 1986 Established US headquarters in Fremont, CA.
- 1987 Introduction of elegant, portable VME Towers Type 32
- 1988 Introduction of rugged, shielded Type 12 enclosures.
- 1991 Introduction of 24 hour delivery express packaging for VME bus.
- 1992 Won multi-million dollar contract with UNISYS Paramax to upgrade all weather stations.
- 1995 Introduction of electronic autojumping and VME64x ultra high performance backplanes.
- 1996 Completion of 10 successful years of record growth and profitability in the US.
- 1996 Elma goes public on the Swiss stock exchange.
- 1997 Introduction of new cPCI program.
- 1998 Introduction of new rugged COTS program



Elma Electronic Inc.
USA



Elma Electronic AG
Switzerland



Elma Electronic GmbH
Germany



Elma Electronic Inc.
Worldwide

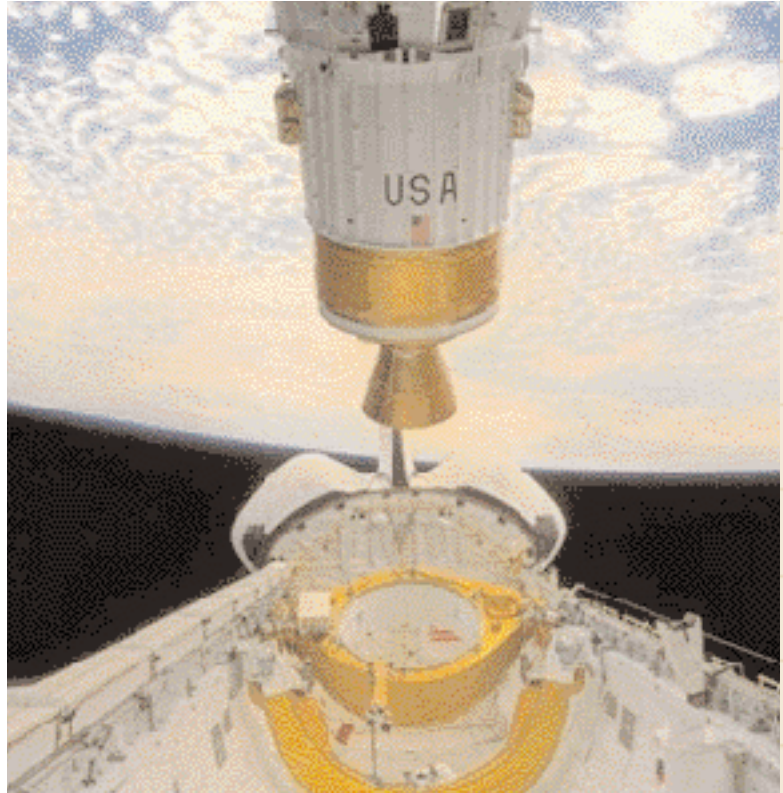
12R2 COTS Systems

Product Description



The COTS 12R2 is a high quality and cost-efficient rugged package for all VME/VME64x and compact PCI applications. The rugged product line includes 5U, 7U, 9U and 12U models for both 6U and 9U cards. Shock-isolation optional.

Intended to withstand the demands of a military environment, the 12R2 is designed to meet benchmark military standards. The 12R2 uses honeycomb filters, braided gasketing, and metal impregnated gasket sheets to seal off every external seam to ensure compliance to MIL-S-461D. To verify that the chassis will more than meet shock and vibration requirements, the 12R2 has been tested for shock, vibration, and structural integrity per MIL-S-810E, MIL-S-167 and MIL-S-901D. Test reports and performance specifications are available upon request. The 12R2 integrates standard off-the-shelf parts including aluminum flat frames and covers, ruggedized side plates, cross-functional extruded profiles, standard electrical components and wire harnesses to reduce lead time. The 12R2 has MIL-grade components, system monitoring LEDs, a powerful, efficient cooling system and holds up to 20 boards. In addition, fixed-mounted shock-resistant or shock-isolated 5.25" drive options are available.



Product Highlights

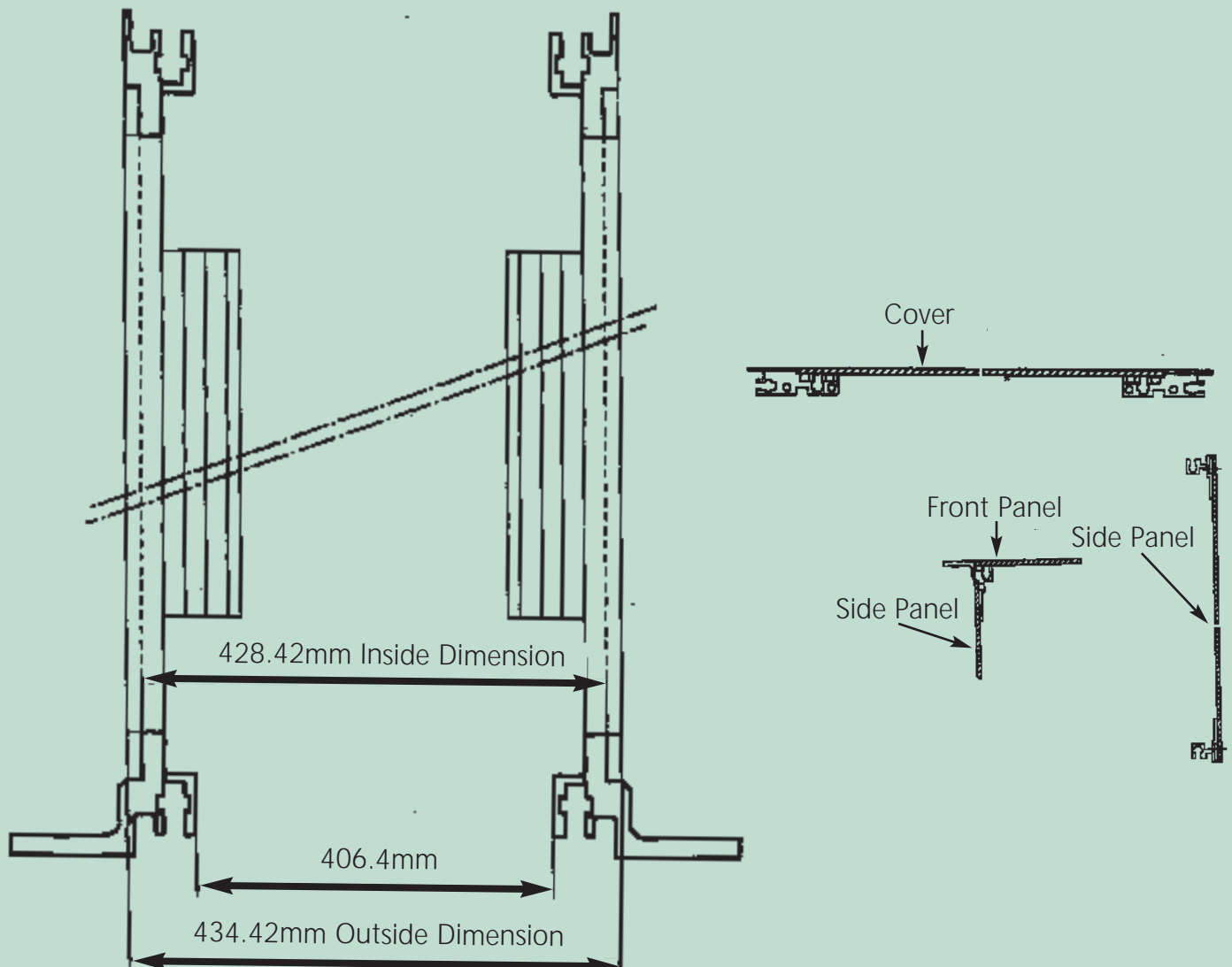
- Rugged COTS enclosure
- VME/VME64x and compact PCI
- 5U, 9U and 12U units, standard
- 7U, 5U, shock-isolated options standard
- Complete EMI/RFI integrity via braided gasketing and honeycomb filters
- Rugged chassis shell made of aluminum frames and extruded profiles
- 350 - 1000 Watt power supplies
- 90 - 220 VAC, 47-500Hz, 28 /48 VDC inputs
- Wide range of backplane options: 2 to 20 slots
- MIL-grade components
- Configurable I/O patch panel on rear
- High volume, rear-mounted exhaust fans (470 CFM)
- Standard voltage and system monitoring LEDs
- Wide range of 6U and 9U card cages available
- Tested for shock, vibration, and structural integrity
- Designed & tested to meet MIL-S-167
- Designed & tested to meet MIL-S-810E
- Designed & tested to meet MIL-S-461D
- Designed & tested to meet MIL-S-901D

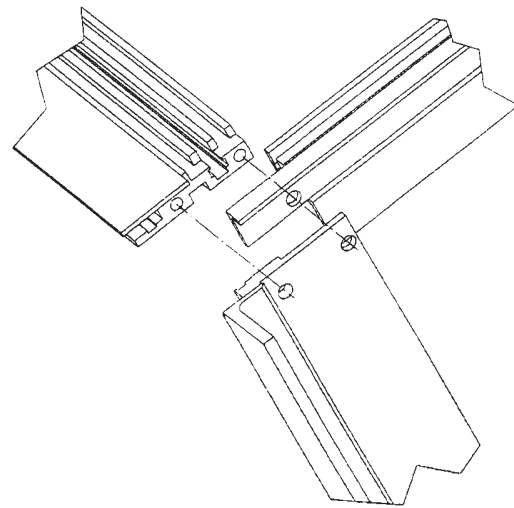
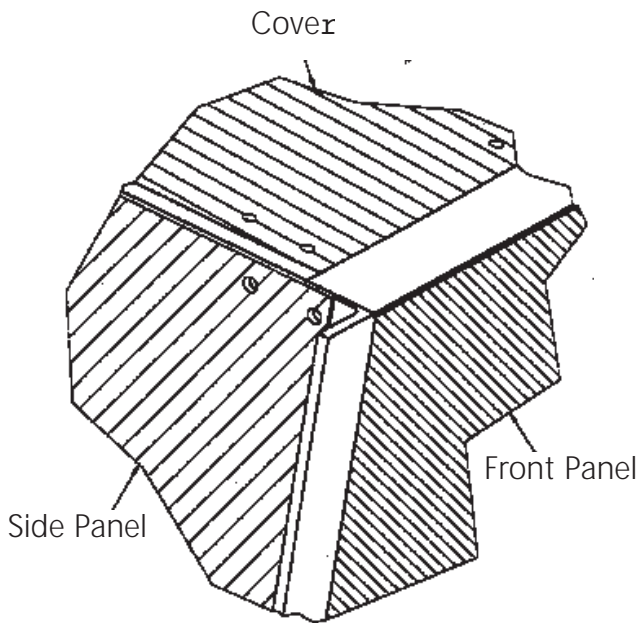
12R2 Design Features

The 12R2 rugged COTS design combines extruded profiles and the rugged benefits of standard aluminum frames and captive hardware. This innovative design bases the entire chassis around the custom ruggedized side plate. Spot-welded to a 3mm thick aluminum plate are front, rear, top and bottom extruded aluminum profiles. The flexibility of the extrusions allows modification of the entire chassis with standard, off-the-shelf aluminum frames, ensuring quick delivery and minimal engineering effort. The final product is a shell that can and has easily passed MIL-S-810E, MIL-S-167 and MIL-S-901D shock and vibration tests.

The coverset is 3mm thick and has custom self-tapping, stainless steel, captive screws installed. Each mating extrusion has an EMC gasket channel and a T-channel that accommodates the rugged stainless steel tapped strip. The 4mm thick rear frame is designed to give maximum available I/O space for each size; each chassis comes with a standard 1.5mm thick blank patch panel. For corrosion resistance, every aluminum part in the 12R2 chassis has a protective yellow chemical conversion coating per MIL-C-5541E Class 3.

Cross Section

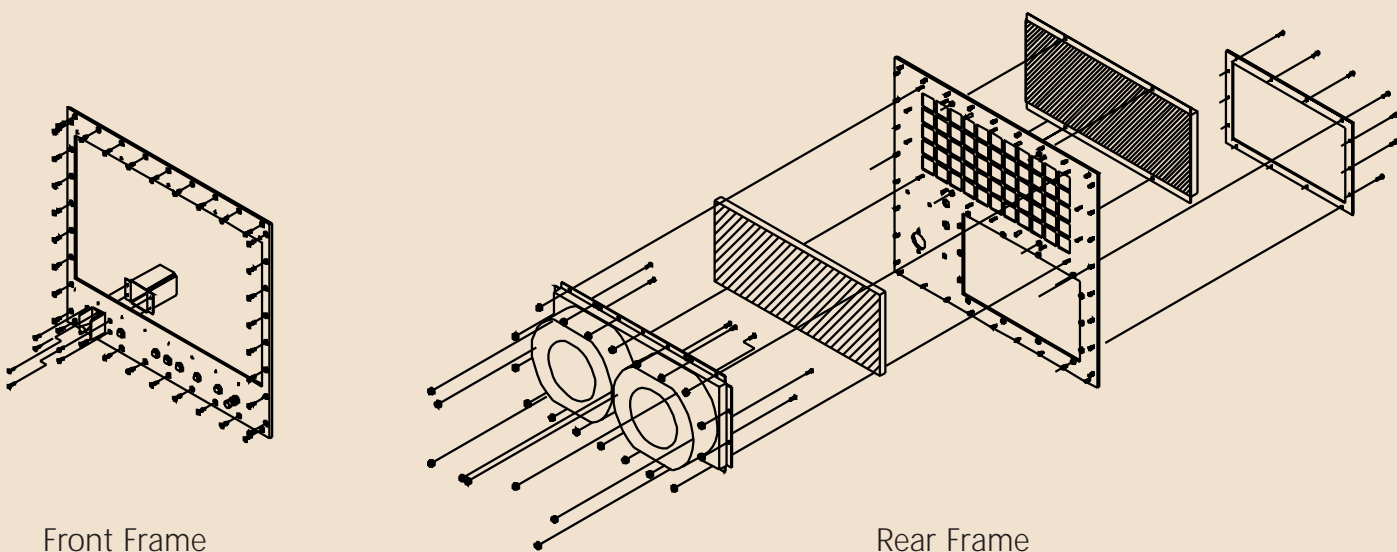




The 12R2 offers a superior EMC package. Designed to meet EMI requirements per MIL-S-461D, the 12R2 uses MIL grade EMC line honeycomb filters, braided gasketing, and metal impregnated gasket sheets to seal off every external seam.

The 12R2 integrates COTS MIL-grade components and a standard wire harness to ensure a high quality, rugged electrical turnkey system without the associated engineering and delivery problems common in today's COTS market. The harnesses and components have been designed and selected to maximize the system options from standard configurations.

Exploded View



12U System



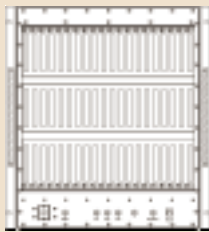
Features

- Available in 22" or 25" Depth
- 3U, 6U, 9U x 160mm or 220mm Cards
- 02-20 Slot VME/VME64x, or Compact PCI Backplanes
- 90mm Front Recess
- Bottom or Front Intake
- Rear, Evacuative Cooling, 470 CFM (Free Air)
- 250mm (9.8") x 275mm (10.8") Rear I/O Access
- Up to 6x Fixed - mounted HH Drive Options
- 2x Shock - isolated HH Drive Option
- 750W - 1000W Power Supplies
- 47 - 500 Hz VAC, 28 /48 VDC Inputs
- Telescopic rail mounting option

Product Information

The standard 12U chassis is available in both 22" and 25" depths and is designed to accommodate a combination of 3U, 6U or 9U cards up to 20 slots, with a choice of VME/VME64x or cPCI backplane. The unit can hold up to 6x 5.25" HH devices, 2x shock-isolated. Front to rear cooling is achieved by 2x 235 CFM high volume fans. A MIL-S-461D input filter is located on the rear. System monitoring LEDs for DC voltages, over temp., and fan fail are standard.

Custom Configurations



Description

20 slot J1 J2 VME, J3 P&G
9U x 160mm cards, fixed
1000 Watt PSU
No drives
85 - 220 VAC
22" D

Order Number

12R2-22AT20BAE2RZ



12 Slot J1 J2, VME
6U x 160mm cards, fixed
800 Watt PSU
6 x 5.25" HH (2 x isolated) devices
85 - 220 VAC
25" D

12R2-25AR12BAE1RE

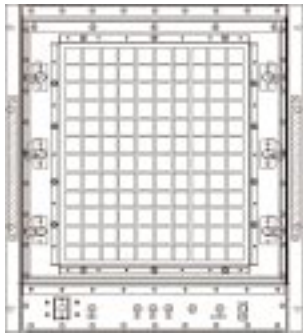


8 Slot cPCI
6U x 160mm cards, fixed
750 Watt PSU
6 x 5.25" HH, fixed
85 - 220 VAC
25" D

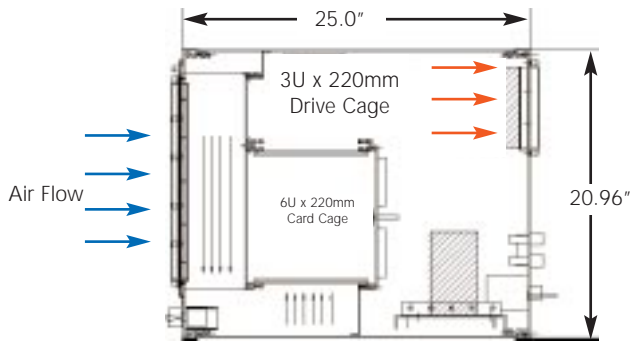
12R2-25BR08AAA4RF

1 2U 3 4 5 6 7 8 9 10 11 12

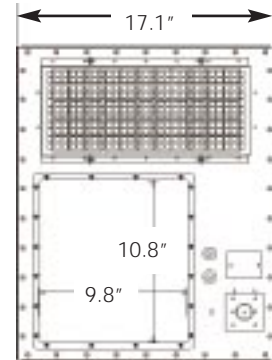
Line Drawings



Front View
Door Closed



Side View
RHS Plate Removed



Rear View

Custom Configurations

12R2 - **2**



Height
2 = 12U

Depth
2 = 22"
5 = 25"

Card Cage
A = Eurocard
B = IEEE1101.10/.11
C = Eurocard Shock-isolated
D = IEEE 1101.10/.11 Shock-isolated

Card Size
R = 6U x 160mm
S = 6U x 220mm
T = 9U x 160mm
V = 9U x 220mm

Chassis Input
R = 125VAC, 400Hz
S = 28VDC
T = 48VDC
Z = No PSU

Drives
A = 4x 5.25" HH, Horizontal
B = 2x 5.25" HH, Vertical
C = 2x 5.25" HH, Vertical, Shock-isolated (fixed-mounted cage only)
D = 2x 5.25" HH, Horizontal
E = 6x 5.25" HH, (2x isolated)
F = 6x 5.25" HH
Z = no drives

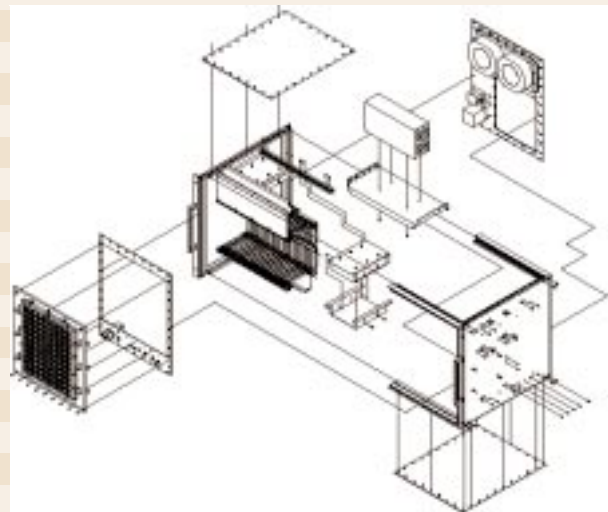
Revision Level
to be assigned by Elma

Backplane Size
02 - 20 (single)
See Table 1
Page 15

Backplane Configuration
See Tables 2a, 2b
Pages 15 & 16

PSU Output

#	Watts	+5V	+12V	-12V	+3.3V	-5.2V
1	800	80A	16.7A	16.7A		
2	1000	120A	16.7A	16.7A		
3	1200	120A	16.7A	16.7A		38.5A
4	750	40A	16.7A	16.7A	40A	
5	950	80A	16.7A	16.7A	40A	
6	875	40A	16.7A	16.7A	80A	
7	350	50A	8A	4A		2A
8	800	80A	16.7A	16.7A	Low Profile	
9	350	Hot Swap				
Z	No PSU					



12U SYSTEM

9U System



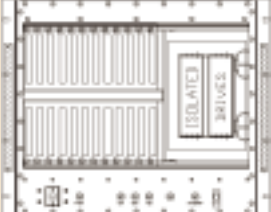
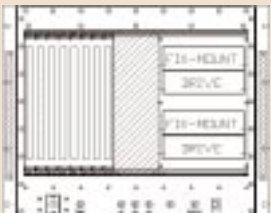
Features

- Available in 22" or 25" Depth
- 6U x 160mm or 220mm Cards
- 02-20 Slot VME/VME64x, or cPCI Backplanes
- 90mm Front Recess
- Rear, Evacuative Cooling, 470 CFM (Free Air)
- 250mm (9.8") x 275mm (10.8") Rear I/O Access
- Up to 6x Fixed - mounted HH Drive Options
- 2x Shock - isolated or 4 x fixed mounted HH Drive Options
- IEEE 1101.10 Compliant
- 85 - 220 VAC, 47-500Hz, 28 /48 VDC Inputs
- Telescopic rail mounting option

Product Information

The standard 9U chassis is available in both 22" and 25" depths and is designed to accommodate up to 20, 6U x 160 mm cards, with a choice of VME/VME 64x or cPCI backplane. The unit can hold 2x 5.25" shock-isolated or 4x 5.25" fixed-mounted drives. Front to rear cooling is achieved by 2x 235 CFM high volume fans. A MIL-S-461D input filter is located on the rear. System monitoring LEDs for DC voltages, over temp., and fan fail are standard.

Custom Configurations

	Description	Order Number
	20 slot J1 J2 VME, J3 P&G 6U x 160mm cards, fixed 1000 Watt PSU No drives 85 - 220 VAC 22" D	12R2-92AR20BAE2RZ
	12 Slot J1 J2, VME 6U x 160mm cards, fixed 800 Watt PSU 2 x 5.25" HH isolated 85 - 220 VAC 22" D	12R2-92AR12BAE1RC
	8 Slot cPCI 6U x 160mm cards, fixed 750 Watt PSU 4 x 5.25" HH, fixed 85 - 220 VAC 22" D	12R2-92BR08AAA4RA

9U
545TE
M

7U System



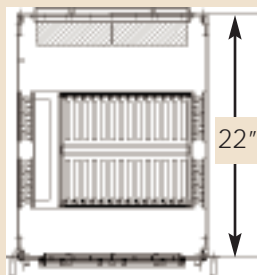
Features

- Available in 22" or 25" Depth
- Shock - isolated Card Cage
- 6U x 160mm Cards Top Load
- 02-20 Slot VME/VME64x or cPCI Backplanes
- Bottom or Front Intake
- Rear Evacuative Cooling, 470 CFM (Free Air)
- 750W - 1000W Power Supplies
- 61mm (2.4") x 175mm (6.9") Rear I/O Access
- Up to 6x Fixed - mounted HH Drive Options
- 2x Shock - isolated HH Drive Option
- 85 - 220 VAC, 47-500Hz, 28 /48 VDC Inputs
- Telescopic rail mounting option

Product Information

The standard 7U chassis is available in both 22" and 25" depths and is designed to accommodate up to 20, 6U x 160mm cards, top loaded. The standard configuration holds 14 cards on a shock-isolated platform capable of withstanding 25Gs shock. Soft, quick-response, foam is used in the sway area for acoustical damping and airflow baffling. Choice of VME/VME64x or cPCI backplane. Standard Elma device modules may be mounted in the card cage area for isolation protection. Front to rear cooling is achieved by 2x 235 CFM high volume fans. A MIL-S-461D input filter is located on the rear. System monitoring LEDs for DC voltages, over temp., and fan fail are standard.

Custom Configurations



Description

Order Number

14 Slot J1 J2, VME
 6U x 160mm cards, isolated
 800 Watt PSU Shock-Isolated
 No devices
 85 - 220 VAC
 22" D

12R2-72CR14BAE8RZ

1 2 3 4 5 6 7

5U System



Features

- Available in 22" and 25" Depths
- 6U x 160mm or 220mm Cards
- 02 - 05 Slot VME/VME64x or cPCI Backplanes
- Shock - isolated Card Cage & Drive Platform
- 1x 3.5" Drive, 1x 5.25" HH Drive Mounting
- Front Intake, Rear Evacuative Cooling, 235 CFM (Free Air)
- 350W Power Supply
- 150mm (5.9") x 75mm (3.0") Rear I/O Access
- 85 - 220 VAC, 47 - 500Hz, 28 /48 VDC Inputs
- Telescopic rail mounting option

Product Information

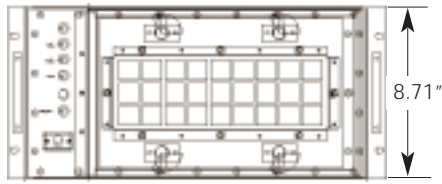
The standard 5U chassis is available in both 22" and 25" depths and is designed to accommodate up to 5, 6U x 160mm cards, horizontally loaded. The standard configuration holds 5 cards on a shock-isolated platform capable of withstanding a 25G shock. Soft, quick-response, foam is used in the sway area for acoustical damping and airflow baffling. Choice of VME/VME64x or cPCI backplane. The isolation platform also holds a 350 watt power supply and mounting for 1x 3.5" and 1x 5.25" HH device. Front to rear cooling is achieved by 1x 235 CFM high volume fan. A MIL-S-461D input filter is located on the rear. System monitoring LEDs for DC voltages, over temp., and fan fail are standard.

Custom Configurations

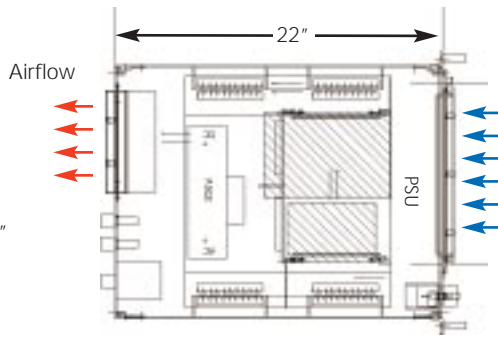
	Description	Order Number
	<p>5 Slot J1 J2, VME 6U x 160mm cards, horizontal 350 Watt PSU 1 x 3.5" , 1 x 5.25" HH 85 - 220 VAC 22" D</p>	<h3>12R2-52AR05BAE7RG</h3>

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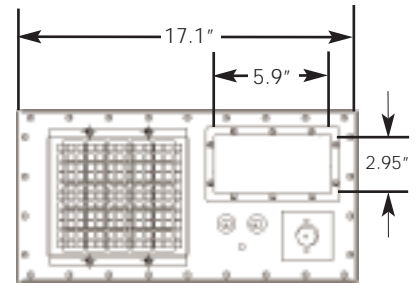
Line Drawings



Front View
Door Closed



Top View
Top Cover and Profiles



Rear View

Custom Configurations

12R2 - 5



Height
5 = 5U

Depth
2 = 22"
5 = 25"

Card Cage
A = Eurocard
B = IEEE 1101.10/.11
C = Eurocard Shock-isolated
D = IEEE 1101.10/.11 Shock-isolated

Card Size
R = 6U x 160mm
S = 6U x 220mm

Chassis Input
R = 125VAC, 400Hz
S = 28VDC
T = 48VDC
Z = No PSU

Drives
G = 1x 5.25" HH, 1x 3.5" Horizontal
Z = no drives

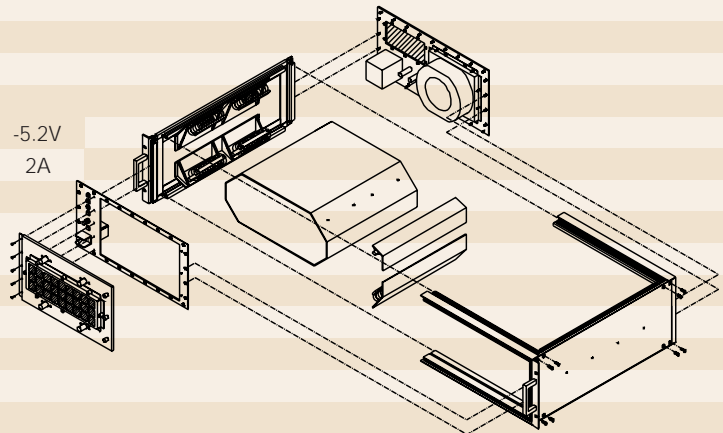
Revision Level
to be assigned by Elma

Backplane Size
02 - 20 (single)
See Table 1
Page 15

Backplane Configuration
See Tables 2a, 2b
Pages 15 & 16

PSU Output

#	Watts	+5V	+12V	-12V	+3.3V	-5.2V
7	350	50A	8A	4A		2A
8	800	80A	16.7A	16.7A	Low Profile	
Z	No PSU					



Order Information

Custom Configurations

12R2 -



Height

2 = 12U 9=9U 7=7U 5=5U

Depth

2 = 22"
5 = 25"

Card Cage

A= Eurocard
B= IEEE 1101.10/.11
C= Eurocard Shock-isolated
D= IEEE 1101.10/.11 Shock-isolated

Card Size

R= 6U x 160mm
S= 6U x 220mm
T= 9U x 160mm
V= 9U x 220mm

Backplane Size

02 - 20 (single)
See Table 1 below

Backplane Configuration

See Tables 2a, 2b
(below, next page)

PSU Output

#	Watts	+5V	+12V	-12V	+3.3V	-5.2V
1	800	80A	16.7A	16.7A		
2	1000	120A	16.7A	16.7A		
3	1200	120A	16.7A	16.7A		38.5A
4	750	40A	16.7A	16.7A	40A	
5	950	80A	16.7A	16.7A	40A	
6	875	40A	16.7A	16.7A	80A	
7	350	50A	8A	4A		2A
8	800	80A	16.7A	16.7A	Low Profile	
9	350	Hot Swap				
Z	No PSU					

Chassis Input

R = 125VAC, 400Hz
S = 28VDC
T = 48VDC
Z = No PSU

Drives

A = 4x 5.25" HH, Horizontal
B = 2x 5.25" HH, Vertical
C = 2x 5.25" HH, Vertical, Shock-isolated
(fixed-mounted cage only)
D = 2x 5.25" HH, Horizontal
E = 6x 5.25" HH, (2x isolated)
F = 6x 5.25" HH
G = 1x 5.25" HH, 1x 3.5" Horizontal
Z = no drives

Revision Level

to be assigned by Elma

Table 1

X (board 1) & Y (board 2)		
A = 0	G = 08	P = 14
B = 03	H = 09	Q = 15
C = 04	J = 10	R = 16
D = 05	K = 11	S = 17
E = 06	M = 12	T = 18
F = 07	N = 13	

Table 2a

Code	Description
A	cPCI, 6U, Rev. 2.0 compliant
B	VME standard, 96 pin only w/jumper pin holes
C	VME64x, 96 pin
D	VME64x, 96 pin & J0
E	VME64x, 160 pin
F	VME64x, 160 pin & J0

ORDER INFORMATION

Environmental Specs

Table 2b

** Auto jumper connector options available

Code 1 or J2 or 1-P2 P3-P5	Description VME		Description cPCI	
	J1	J2	P1-P2	P3-P5
A	1st & last slot 13mm, 5.5mm all others		P1 & P2 Short Tails	P3, P4, P5 Long
B	1st & last slot 17mm, 5.5mm all others		P1 short, P2 Long Tails	no P3, P4 & P5 Long
C	1st & last slot 13mm, w/ locking shrouds			
D	1st & last slot 17mm, w/ locking shrouds			
E	All slots 13mm	All slots 13mm		
F	All slots 17mm	All slots 17mm		
G	All slots 13mm, w/ locking shrouds	All slots 13mm, w/ locking shrouds		
H	All slots 17mm, w/ locking shrouds	All slots 17mm, w/ locking shrouds		
Z	No connectors installed	No connectors installed	P1, P2 not installed	P3, P4, P5 not installed

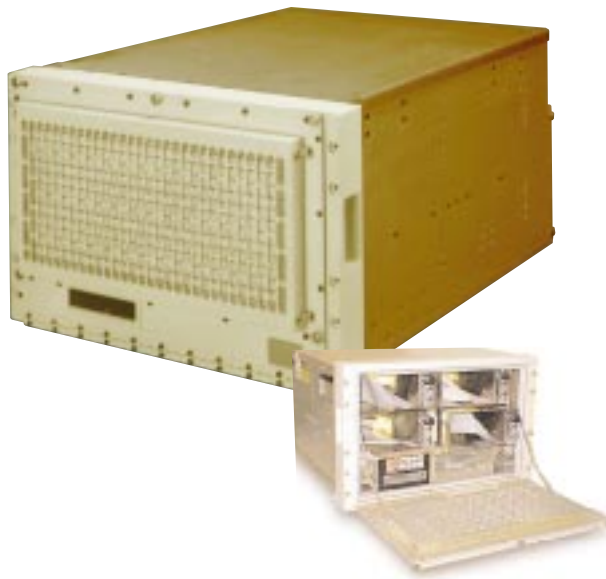
Environmental Specifications

Physical		Electrical		Environmental (Operating)	
Depth	22", 25"	Frequency	47-500Hz	Cooling	Two 235 CFM Blowers
Height	5U, 7U, 9U, 12U (1U=1.75")	Voltage Input	85-264 VAC 28/48 VDC	Operating Temp.	0°C to 65°C
Width	17" (19" Rack Mount)	Power	350W-1000W	Storage Temp.	-20°C to 85°C
Weight	60 lb. Typ. (5U) 70 lb. Typ. (7U) 80 lb. Typ. (9U) 100 lb. Typ. (12U)	Outputs	+5V, +3.3V, +/-12V	Humidity	0 to 95%, non-condensing
				Altitude	-1200 to 18,000 Ft.
				Shock	25Gs 11ms
				Vibration	4.0Gs RMS 15 to 2000Hz
				Acceleration	4.5Gs w/o disk
		Sand and Dust			Blowing
		Salt/Fog			Limited
Boards	6U x 160MM 6U x 220MM 9U x 160MM 9U x 220MM	Fungus			Limited
		MIL-S Specs			MIL-S-167 MIL-S-810E MIL-S-461D
Backplane	VME, VME64x, cPCI				MIL-S-704 MIL-S-901D (Navy)

ENVIRONMENTAL SPECS



1 2R3 System



Features

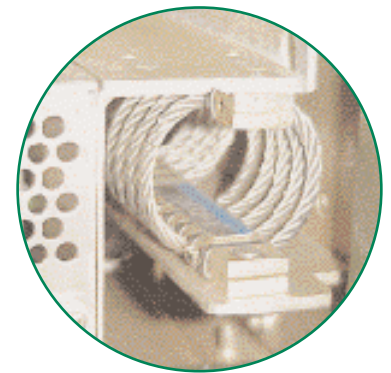
- 7U x 23" D
- Top load
- 20 Slot fixed VME/VME64x, or cPCI Backplanes
- Sentry System Monitor
- Rear, Evacuative Cooling, 470 CFM (Free Air)
- 250mm (9.8") x 275mm (10.8") Rear I/O Access
- 4 x 5.25" FH Plug Removable drives on shock - isolated platform
- 900W Power Supply
- 85-220 VAC, 47 - 500 Hz VAC, 28 /48 VDC Inputs
- Telescopic rail mounting option
- Shock-isolated platform that protects the drives, card cage and power supply (12R3I)

Product Information

The Elma Type 12R3 provides protection from shock, vibration, high and low temperatures, sand and dust, power fluctuations, and RFI/EMI to insure the reliable operation of up to 20 slot, VME form factor systems, with up to four full-height 5.25" Disk/Tape drives.

The 12R3 is a ruggedized derivative of the Type 12 that provides mounting and protection from transportation and environmental hazards for the functional components of VME systems with board sizes up to 6U x 220mm, as well as 5.25" disk drives.

A shock/vibration isolated platform protects disk/tape drives and the power supplies. The platform's four peripheral mounting positions can accommodate 5.25" and 3.5" devices in Removable Drive Units (RDU's). Helicoil isolators and sway-space of 0.6" isolate the platform from external shock and vibration. The isolation characteristics are set by selecting isolator natural frequencies between 7 and 20 Hz to meet environmental requirements.

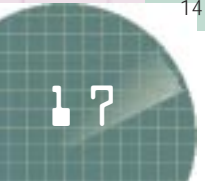


Ordering Information

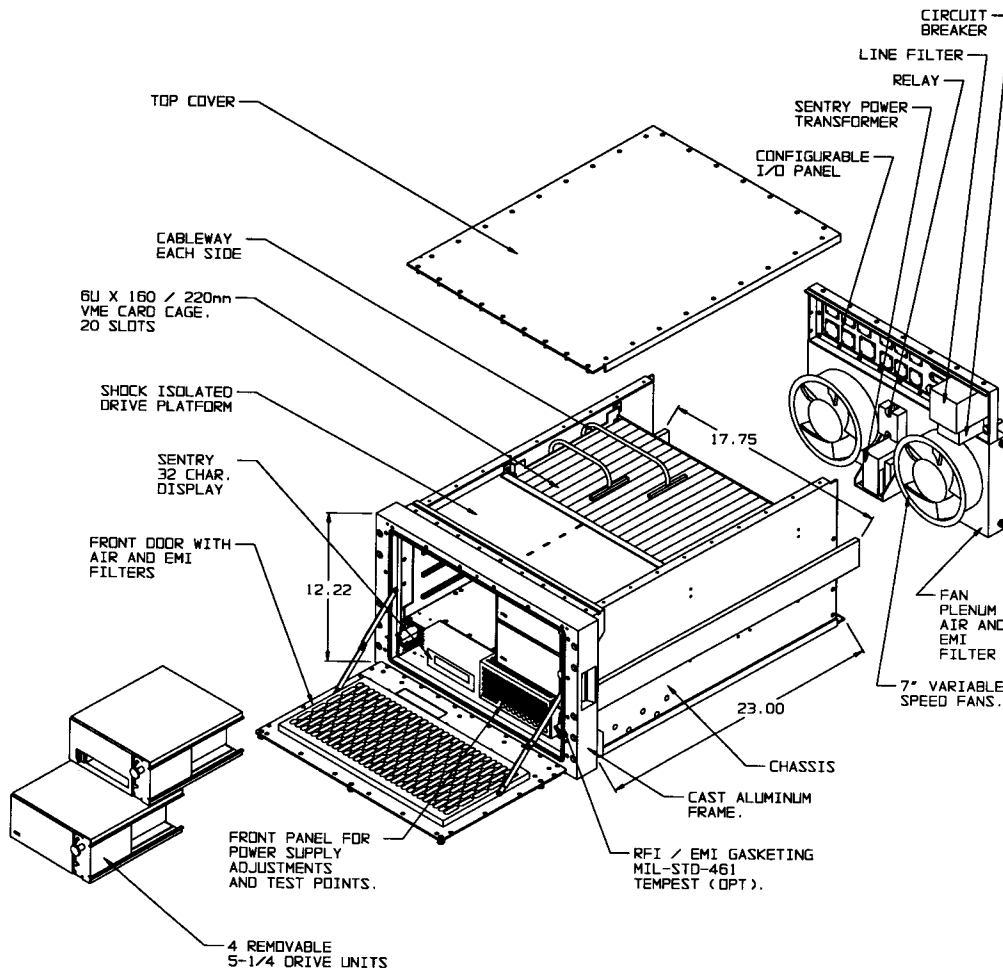
*19" Rack Mount

Slots VME	Board Size	RDU's	I/O Bus Type	Isolation Frequency	EMC Level	Power Input	Freq	Power Output	Unit/Inches HxWxD	Order Numbers
20	6Ux160	4	SCSI 1/2	Drives + PS 7 Hz.	MIL-S-461D	115/230	47-440	900W	12.2x17.25"x23"	12R3-723-R20-461
20	6Ux160	4	SCSI 1/2	Drives + PS 7 Hz.	TEMPEST	115/230	47-440	900W	12.2x17.25"x23"	12R3-723-R20-TEMP
20	6Ux220	4	SCSI 1/2	Drives + PS 7 Hz.	MIL-S-461D	115/230	47-440	900W	12.2x17.25"x23"	12R32-723-R20-461
14	6Ux160	4	SCSI 1/2	Drives + PS 7 Hz.	MIL-S-461D	115/230	47-440	900W	12.2x17.25"x23"	12R3I-723-R14-461

W315TEM 2R3



Line Drawings



Removable Drive Unit (RDU)

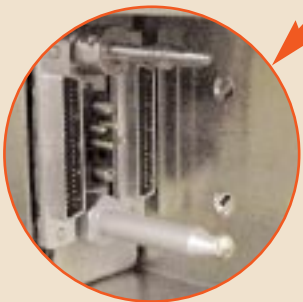
Features

- Easily removable by hand
- Positive screw lock
- Full or 2 half height devices
- Front media access
- Dual SCSI Buses or Daisy Chain
- Drive fully protected
- Classified data easily secured

Product Description

The 12R3 Removable Drive Unit (RDU) provides convenient mounting of disk and tape drives. Drives are completely enclosed for convenient protection and handling. The RDU is secured in the mounting bay with a locking jack screw for ease of operator removal and insertion.

Each RDU had dual 50 pin data connectors to provide daisy chain interconnection or individual connection to two devices.



1 2R3 Sentry



Features

- Vacuum florescent display, 32 characters
- Operator control panel
- Monitors DC and AC line voltages
- Monitors four temperature sensors
- Provides VME power and reset signals and monitors SYSFAIL
- Automatic shutdown with override and battle short
- Thermal fan speed control for optimal cooling

Product Information

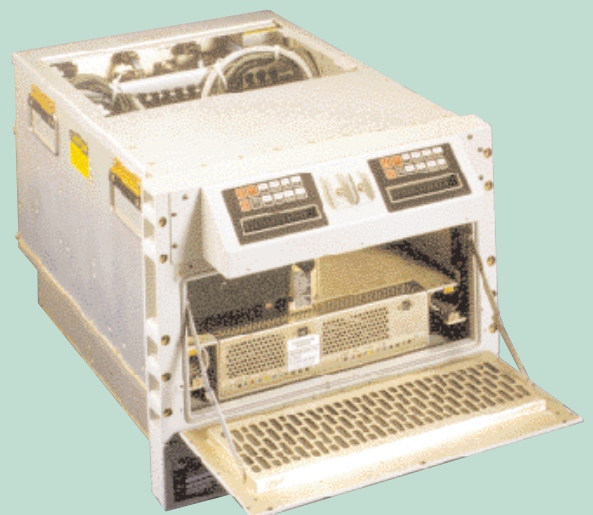
The Sentry is a microprocessor based diagnostic monitor. It monitors the environmental conditions, performance of the chassis, installed system and controls the cooling fans. It can also provide console terminal emulation of remote control via a built-in serial port.

Parameters, temperatures, voltages, etc. are monitored in three zones. When a parameter goes outside the normal range a warning is sounded and an error message is displayed.

If it goes beyond the warning zone the system is shut down and an urgent warning is sounded.

In situations where systems shutdown is unacceptable the sentry provides programmed OVERRIDE mode and hardware BATTLESHORT. In override mode urgent warnings continue but the system is not shut down. In battle short mode power supply is latched and can not be shut down by the Sentry even if it has hardware failure.

Applications Examples



1 2R3 SENTRY

Specifications Summary

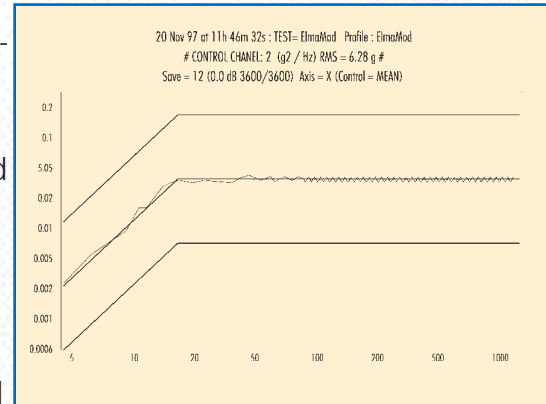
		12R3	12R3I
Mounting:		19" Rack	19" Rack
Size:	Width:	17.25" in rack	17.25" in rack
	Depth:	23" in rack	23" in rack
	Height:	12.20"	12.20"
Weight:		95 lbs. Typ.	95 lbs. Typ.
Temperature:	Operating:	0° to 50°C	0° to 50°C
	Storage:	-33° to 71°C	-33° to 71° C
Humidity:	Operating:	5 to 95%	5 to 95%
Storage:		3 to 100%	3 to 100%
Altitude:	Operating:	-1,200 to 18K	-1,200 to 40K
	Storage:	-1,200 to 18K	-1,200 to 40K
Shock:	Operating:	20Gs 11 ms	25Gs 11 ms
	Storage:	25Gs 11 ms	30G's 11 ms
Vibration:	Operating:	4.0 Gs RMS	4.0 Gs RMS
		15 to 2000Hz	1.5 to ~nnn~7
	Storage:	Same	Same
Acceleration:	Operating:	4.5Gs w/o disk	4.5Gs w/o disk
	Storage:	4.5Gs	4.5Gs
Sand and Dust:		Blowing	Blowing
Salt/Fog:		Limited	Limited
Fungus:		Limited	Limited
Emission Standards:	FCC Class A:	Yes	Yes
	MIL-S-461D:	Yes	Yes
	Tempest:	Yes	Yes

MIL-S TESTING

MIL-S-167, Shipboard Vibration

MIL-S-167 (MS167) tests a unit in each axis over the range of 4-50Hz. The range has been specified by the MS167 as the normal frequency range of shipboard applications. A unit under test (EUT) is fixed-mounted to a slip table (in the transverse side-to-side axis and longitudinal front-to-back axis) or mounted directly to a plate on top of the shaker (in the vertical axis-bottom to top). The input at each frequency is defined by a table displacement tabulation in MS167.

There are three parts to MS167: exploratory sweep (15s and each 1Hz interval between 4-50Hz), variable dwell (5min and each 1Hz interval between 4-50Hz), endurance dwell (2hr dwell at resonant frequency).



In addition to the above procedures, a continuous 5 or 15 minute sweep is usually performed across the entire 5-50Hz range before the MS167 exploratory sweep. This continuous sweep is much more useful than any of the MS167 tests in identifying the true resonant frequencies of a system. In general, this sweep is the basis for choosing the endurance dwell frequency.

MIL-S-810E, Shock

MIL-S-810E tests the response of a unit to an individual shock pulse. In each axis, 3 positive and 3 negative (1/2 sine) pulses are applied to the EUT. The duration of the shock pulse is defined by MIL-S-810E (MS810E) for each input level.

MIL-S-810E structural integrity tests the response of a unit, in each axis, to a random vibration input over the frequency range of 5-2000 Hz.

The purpose of the structural integrity test is to see if the EUT will survive mechanically after being submitted to the random vibration profile for 1 hour in each axis. Although the test does not measure acceleration or transmissibility levels, it does plot the power spectral density profile of the system over the frequency range.

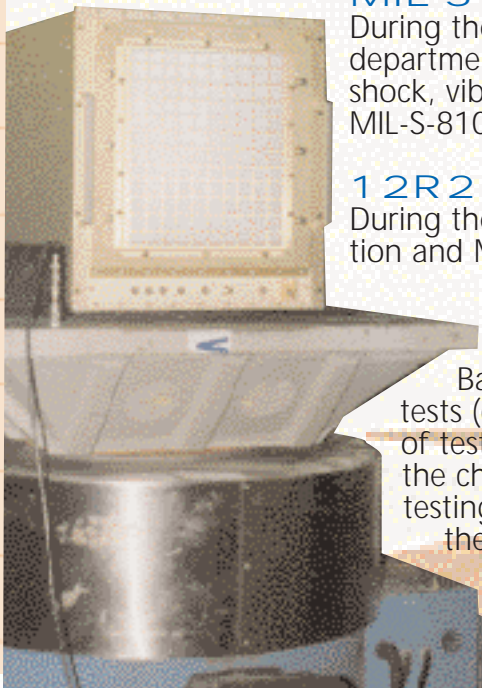
MIL-S-810E, Structural Integrity Vibration

During the development of the 12R2 product line, Elma's engineering R&D department conducted multiple tests to ensure that the 12R2 design passed the shock, vibration, and structural integrity specifications outlined in MIL-S-167 and MIL-S-810E.

12R2 Shock & Vibration Testing

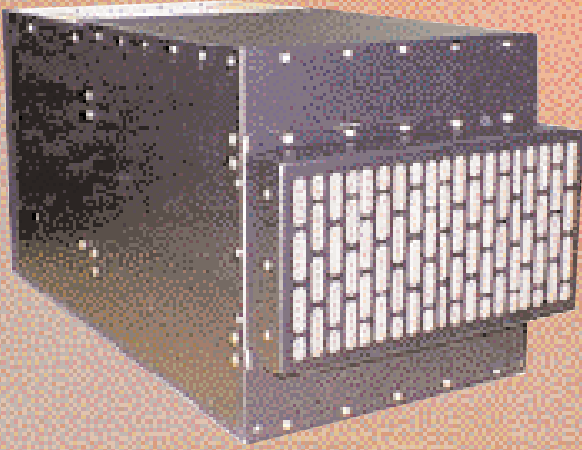
During the initial tests, the 9U x 22" prototypes went through MIL-S-167 vibration and MIL-S-810E shock from 15G to a maximum of 35G. The 12U x 25" prototypes went through MIL-S-810E shock from 25G-30G and MIL-S-810E random structural integrity vibration.

Based on the exceptional results of the base design during the first run of tests (complete and abbreviated test reports are available), the second round of testing focused on the effect of shock and vibration on critical items within the chassis. Accelerometers positioned in the chassis during the first round of testing determined the transmitted input to these components. Based on these inputs, tests performed on various power supplies, drives and isolation assemblies helped determine the optimal configurations and best components for the 12R2 product line. Complete test reports are available by request.



MIL-S TESTING

Other Elma Rugged Products



ATR1/2, 1, 1 1/2 VME

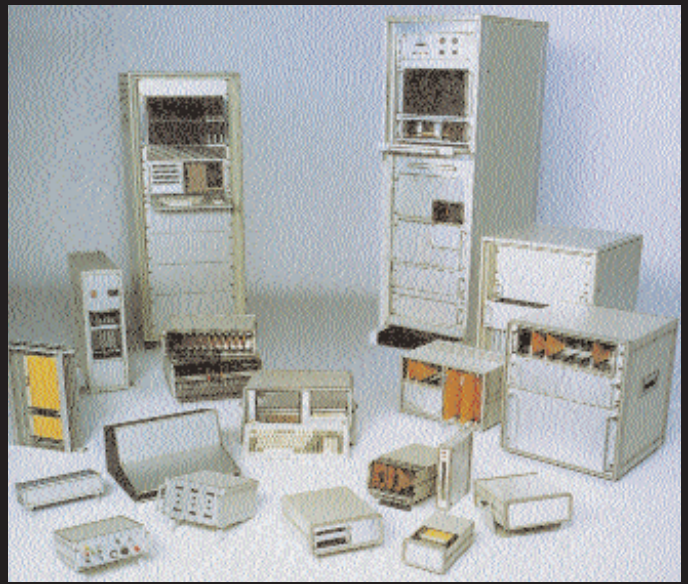


11R2 Shock Mounted Card Cage





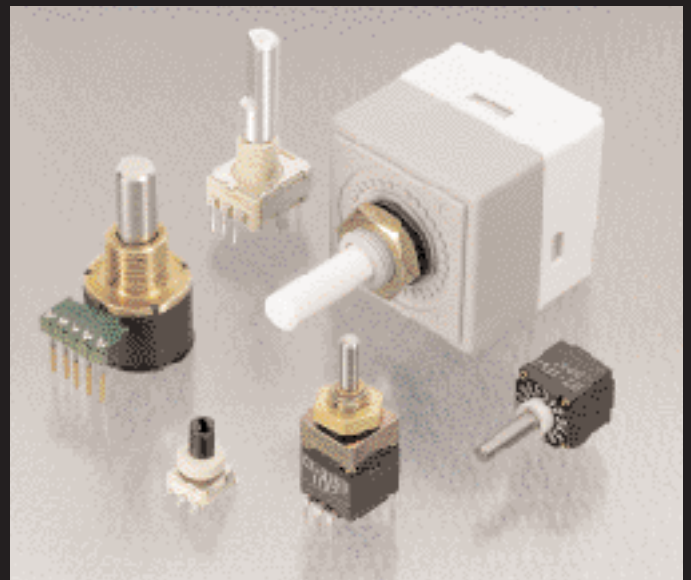
cPCI Product Selection Guide



Elmaset Family of Enclosures



VME/VME64x/VXI and cPCI Systems



Surface Mount Components and Switches

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