

# TECHNOLOGY FOR ELECTRONIC MOTION CONTROL



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ORMEC Institute for Advanced Motion Control Technology

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#### MotionDesk V3.1 Overview#4

# MP.CONFIG Motor Parameter Configuration

Establish valid settings for the Ormec Variables involved in the configuration of the controller and axes. The settings are established in the project file (.MTP) created from the MotionDesk software.

The variables which are initialized with the MP.CONFIG statement are listed below: Page #				
ACL.MAX@	. Acceleration Maximum Rate	. Motor Units	34	
AIN1.3DB@	. Cutoff frequency (lowpass filter) for analog input	. Axis Input	39	
AXIS.MACHINE@	. Machine Axis Assignments	. Axis Input	39	
AXIS.SET@	Default set of axes, reset to AXIS.LIST@			
CNT.REV@	. Counts per Rev Axis encoder	. Axis Selection	31 & 33	
CW.FWD@	. Direction of forward rotation	. Motion	36	
DCL.ERR@	. Deceleration Error Rate	. Motor Units	34	
DCL.MAX@	. Deceleration Maximum Rate	. Motor Units	34	
DMTC@	Drive command Monitor Time Constant (filtered)		40	
DRV.MAX@	. Drive command Maximum	. Motor Units	34	
EIO.MODE@	. Extended I/O configuration Mode	Unit Properties	23	
INERTIA@	. Inertia for servo axis	. Motor Units	34	
INSPD.MUL@	. Input Speed Multiplier Gear Ratio	. MotionDATA	35	
IO.MODE@	. I/O Configuration Mode	I/O Properties	26	
KAF@	. Acceleration Feedforward Factor	Torque & Velocity Loops	40	
KP@	. Position Gain Factor	Torque & Velocity Loops	40	
KPI@	. Position Integral Gain Factor	Torque & Velocity Loops	40	
KVA@	. Velocity Observer Adjustment	. Velocity Loop		
KVF@	. Velocity Feedforward Factor	. Torque Loop	40	
KVH@	. Velocity Feedback Gain Factor	Torque & Velocity Loops	40	
KVHA@	. Analog Velocity Feedback Gain Factor			
KVI@	. Velocity Integral Gain Factor	. Torque Loop	40	
LOOP.RATE@	. Loop update Rate	. Unit Properties	24 & 25	
MD.MODE@	. MotionDATA operating Mode	MotionDATA	35	
MODE@	. Operating Mode disabled MODE@=0			
MFAULT@	. Machine Fault Status / Output Control	Unit Properties	23	
MTR.ACL.LIM@	. Motor Acceleration Limit	Motor Units	31 & 33	
MTR.SPD.LIM@	. Motor Speed Limit	Motor Units	31 & 33	
OUTSPD.MUL@	. Output Speed Multiplier Gear Ratio	MotionDATA	35	
PCT.REV@	. Pacer encoder Counts per Rev	. MotionDATA	35	
PCR.SPD.LIM@	. Pacer Speed Limit	. MotionDATA	35	
PERR.INPOS@	. Position Error In-position	. Motion	36	
PERR.MAX@	. Position Error Maximum	Motion	36	
PLS#.HIGH@	. Programmable Limit Switch High range	. Prog Limit Switch	38	
PLS#.LOW@	. Programmable Limit Switch Low range	Prog Limit Switch	38	
PLS#.MOD@	. Programmable Limit Switch Modulus	Prog Limit Switch	38	
PLS#.MODE@	. Programmable Limit Switch operating Mode	Prog Limit Switch	38	
POS.AC1@	. Position Actual. To read POS.ABS@			
POS.DIV@	. Position units Divider	Motor Units	31 & 33	
POS.MOD@	. Position Modulo operation	Motion		
POS.MUL@	. Position units Multiplier	Motor Units	31 & 33	
PPS.DIV@	. Pacer position units Divider			
PPS.MUL@	. Pacer position units multiplier			
SENS.MODE@	. Sensor Mode	. Axis input		
SCURVE@	. S-Curve velocity profile	. IVIOTION		
SPD.MAX@	. Speed Maximum	. Wotor Units	31 & 33	
STLEFVD@		. IVIOUON		
	Time Multiplier conversion faster. Defaulted at 4 mil	lisocond	30	
	Torque mode serve Gain		10	
	Liser Speed Limit	Motor Units		
	Liser Acceleration Limit	Motor Units	31 8 22	
VEL GAIN@	JSK.AUL.LIVI@		51 & 33	
	Velocity I oon Time Constant		40	
VMTC@	. Velocity Monitor Time Constant	Torque & Velocity Loops	40	

ORMEC Institute for Advanced Motion Control Technology

#### MotionDesk 3.1 Software MotionDesk<sup>™</sup>: Servo Developer's Kit Features Developer's Kit Project Navigator incorporates "wizards" 1 1 Automatic screen-oriented system configuration Development Console 1 Multiple ORION<sup>®</sup> Program Development Windows 1 Program Debug tools 1 **ORION®** file management utilities 1 Integrated with Windows Explorer 1 ed by U.S. and international copyright laws as Windows Help System 1 MotionDESK is a Win 95 / 98 / NT Full on-line reference volume for MotionBASIC® 1 application that works with: MotionPad editor 1 Full-featured program and text editor 1 MotionBASIC<sup>®</sup> program development utilities **ORION** running 1 MotionDESK Ver **MotionBASIC** 3.1 3.0 2.1 2.0 Libraries of Operator Interface Development Tools 1 Ver 5.1 - May 2000 1 QuickPanel programming tools Ver 5.0 - June 1999 / 1 QuickDesigner Touchscreen Development Tool Optional MotionPRO<sup>™</sup> communications software Ver 4.1 - Aug. 1998 1 1 1 1 Interface to Generation III motion controllers 1 Ver 4.0 - July 1997 1 1 1 ORMEC SYSTEMS CORP INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY

#### Notes:

# Part numbers:

MDK-SW/3	MotionDesk Servo Developer's Kit, on 3.5" disks & cord with both connectors.		
MDK-SW/C	MotionDesk Servo Developer's Kit, on CD ROM & cord with both connectors.		
MBK-UPG-# All current MBX's on disk with help files. Ex # = 5 for MotionBasic Ver 5.x			
	Note: MBX's are available on WWW. The Internet Address http://www.ormec.com/user/		
CBL-SER-AT	( 9 pin) cable / connector only part number.		
CBL-SER-PC	(25 pin) cable / connector only part number.		

# **Direct Cable Hardware Installation:**

Connect your computer's RS-232 Communication Port to a ORION motion controller, The RS-232 Development Port,

Serial D (J1), is located on the system module in the middle just below the PCMCIA slots.



*Notes:* ORMEC has created a fully integrated, windows-oriented "desktop" for motion control. Utilizing standard drop-down menus, toolbars and dialog boxes, MotionDesk<sup>™</sup> presents the user with a multi-window development environment and fully integrated set of tools for motion control system configuration, development and maintenance.

MotionDesk<sup>™</sup> is a full-featured motion control development environment which guides the engineer through all aspects of designing and writing motion control programs. MotionDesk<sup>™</sup> provides Windows 95 -based to simplify axis configuration and user units setup, a fully integrated program editor, a development console for monitoring ORION<sup>™</sup> program execution, file management utilities and software tools for developing operator interface screens.

MotionDesk<sup>™</sup> utilizes TCP/IP (Transmission Control Protocol / Internet Protocol ) to implement high speed serial communications with ORION<sup>™</sup> motion controllers. TCP/IP enables the MotionDesk<sup>™</sup> to simultaneously open multiple communication channels with ORION<sup>™</sup> and provide windows to modify, control and view program operation.

#### MotionDesk Ver 3.1 MotionDesk uses Dial Up Networking Internet Explorer (DUN) to communicate with the ORION Motion Controller. When properly con-MotionDesk figured and initialized, communications between MotionDesk and ORION MotionPRO w-Hypertext are automatically established when-ORMEC CD ever required by MotionDesk. 🗟 Accessories Programs You must configure your Network Con-Communications Setup Help 📻 Adobe Acrobat ۲ Documents nections in Windows before you can 📻 ORMEC MotionDesk ۲ $\mathcal{D}$ Getting Started with MotionDesk communicate with an ORION. $\mathcal{D}$ MBX-QP Help 📻 SoftPEG Player Settings (See Network Setup in Help.) 📻 StartUp 脑 MotionDesk Find 📝 MotionPad 🛛 🗸 Internet Explorer It is not required to re-configure your 🚼 MotionPRO 🞇 MS-DOS Prompt Help PC if you are upgrading from an older [ MotionPRO and Hypertext 🔍 Windows Explorer Run. version of MotionDESK. 🌌 Multi-Edit 🤣 Orion Help System Suspend Crmec Hypertext Shut Down. 💼 QuickDesigner 🗒 Release Notes 🖪 Start ORMEC SYSTEMS CORE INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY

Notes: What's New in MotionDESK 3.1 - MotionBASIC Ver 5.1 required.

MotionDesk 3.1 projects are not downward compatible with earlier versions of MotionDesk. To learn more about converting read "About Converting MotionDesk Projects" in the help system.

**Project Navigator** - now supports configuration of various Commutation methods in user-defined servomotors. Support for configuration of servomotor holding brakes.

Ac	Additional PLS configuration options: PLS Output and PLS Sensor.		
Ex	panded MotionDATA configuration for ServoWire systems, including External MotionDATA.		
All	ows you to configure the Drive Command Low-Pass Filter, and offers an expanded range for the		
ve	locity integral torque loop parameter Kvi as well.		

MotionDesk version 3.0 introduced the following tools and features, including support for the ORMEC ServoWire Drive Network. Use the help system to find out about these powerful enhancements to MotionDesk. MotionDesk 3.0 projects are not downward compatible with earlier versions of MotionDesk. To learn more about converting read "About Converting MotionDesk Projects" in the help system.

Archive MotionDesk P	<b>Project -</b> by using the Create Backup/Archive command in the MotionDesk File menu.
Project Check -	You can now easily compare projects between MotionDesk and an ORION, without the risk
	of an Upload or a Download. Use the Sync Project and choose CHECK Synchronization Status.
Auto Connect -	MotionDesk can automatically connect to your ORION using Dial-Up Networking when needed.
	You can also specify that the connection should be closed whenever you exit MotionDesk.
Project Navigator -	Use the Unit Configurator in Project Navigator to select the new ServoWire Axis Modules and
	Drives, or the traditional DSP Axis Modules and Drives. The Axis Configurator now supports
	user-supplied servomotors and pacer encoders for ServoWire systems.
System Information -	Use the Print button in SysInfo to print the information displayed.
Version Information -	Use the Print button in VerCheck to print the information displayed.

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MotionDesk Menus, Toolbar & Status Bar					
<b>Est Motio</b>					
File P	roiNav Edit Tools View Debug Window Help				
Motion	<b>Desk toolbar:</b> This toolbar provides mouse access to several MotionDesk commands.				
NOS epa wev ne	C       S       S       R       S       C       S       C       P       C       T       D       F       M       U       V       A       U       P       H       H         h       y       y       b       u       u       e       I       i       o       r       o       r       o       p       r       e       e       e       e       n       n       o       r       e       r       e       e       e       e       n       n       p       r       e       e       e       n       n       p       n       p       p       p       n       p       p       n       p       n       p       n       n       p       n       n       n       n       n       n       n       n       n       n       n       n       n				
	n s r n				
<b>_</b>	MotionDesk status bar, bottom right, provides neipful status information.				
For Help,	press F1 Sync'd Connected CAP NUM SCRL				
ORMEC SYSTEM	S CORP INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY				
Notes: Motion	Desk Commands Menus				
File:	The File menu allows you to select and work with Motion Control Projects. Each Project defines the				
	configuration and operation of a Motion Control System using an ORION Motion Controller.				
ProjNav:	Short for Project Navigator. This menu controls the display or hide the ProiNay Toolbar.				
	The Edit many provides standard access to the Windows eliphoard				
100IS:	: I he I ools menu provides several tools for working with MotionDesk.				
View:	The View menu enables you to configure the appearance of the MotionDesk window.				
Debug:	The Debug menu permits user control of the ORION's MotionBASIC program.				
Window:	The Window menu lets you arrange the windows in the MotionDesk workspace.				
Help:	The Help menu supplies access to MotionDesk Help				

MotionDesk
Help Topics: ORION Help System
Contents Index Find Help Topics
Help Topics: ORION Help System
Getting Started with Motion     What's New in MotionDest     Contents Index Find     ORION Help System     MotionDesk     MotionDesk
MotionBASIC 4x-5.0 MBX-A-B Ethernet Comm
MBX-Data Highway Com     2 Click the index entry you want, and then click Display.     MBX-DF1 Communication     MBX-GE Genius Commun.     Network grounding     Network Setup
NEXT No Motion No-Fault Output

*Notes:* <u>The ORION Help System is a suite of interwoven help documents that guide you toward the most productive</u> use of your ORION Motion Controller.

When you Need Help: The ORION Help System is only a keystroke or mouse click away in all of the MotionDesk screens and windows. You can open help through the Help | Help Topics menu, or the Help icon on the toolbar.

1	From the ORION Help System Contents dialog, you can browse through the Contents tree, scroll through the
8	Index, or Search the entire help system for a specific word or phrase.

# Tooltips:

Help If you position the mouse cursor over a MotionDesk object, a popup window will display the name of the object, or a brief description of it.

# **Context Help:**

indows. Simply click
t's popup help.
d corner of the dialog
e is displayed, press

**Keyword Help:** When you are viewing or editing a MotionBASIC program with MotionPad, or entering a MotionBASIC command in Direct Mode, press**Ctrl-F1** while the cursor is in a MotionBASIC keyword. The help topic for that keyword will be displayed.

# **Extended Help:**



If the Context Help does not go into sufficient detail on a particular topic, click on the Extended Help icon in the popup window to see more detail on the topic.



# Internet Protocol (IP) Address

Every computer on the Internet is identified by a number called Internet Protocol address. A unique number consisting of four parts, each called an octet (8 bits) having a range from 0 to 255 and separated by dots. Ex 200.200.200



Using a direct cable connected from your PC's serial port to ORION's development port "J1", the default name for the ORION is **OrionPPP**, with an IP address of **200.200.200** 

MotionDesk uses the communication protocol TCP/IP. This set of protocols allows PC's to exchange data across a network.

**Transmission Control Protocol** (TCP) is responsible for breaking up the message into datagrams, reassembling them at the other end, resending anything that gets lost, and putting things back in the right order.

**Internet Protocol** (IP) is responsible for routing individual datagrams. Orion uses the IP address 200.200.200.200 The interface between TCP simply hands IP a datagram with a

The interface between TCP simply hands IP a datagram with a destination.

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Notes: Every device that is connected to the network (PC, Printer, file server, motion controller) requires there own

IP address. ORION uses a static or fixed IP address, you use the same number (200.200.200.200) each time you

connect to ORION's "J1" development port using a direct cable connection.

The ORION Unit Name is used to associate an alphanumeric label with an ORION's Internet Protocol (IP) address.

Under normal conditions, this association is fully configured for you by ORMEC and the MotionDesk installation utility.

The HOSTS file on your development system should include the line:

# 200.200.200.200 OrionPPP

which establishes the OrionPPP host name that Windows recognizes as having an IP address of 200.200.200.200.

This is configured for you during MotionDesk installation.

Note: Changing any of these parameters in such a way as to break the association will prevent MotionDesk from

establishing a direct cable connection to ORION.

# **Changing Internet Protocol connection**

changing intel	rnet Prot	ocol connection
MotionDesk		
<u>File</u> ProjNav <u>E</u> dit	T <u>o</u> ols <u>V</u> iew	<u>D</u> ebug <u>W</u> indow <u>H</u> elp
New Project	Ctrl+N	
Open Project	Ctrl+O	
Close Project		Change Connection
,	100 Marine 1	MotionDesk Unit Name ? ×
<u>S</u> ave Project	Ctrl+S	
Save Project <u>A</u> s		Enter the Unit Name: OK
Sync Project with OR		OrionPPP Unit Name
Change Orien Conne	ation	
Change Onon Conne		Enter the name of the ORION you want to connect to. The name you select must be
		listed in the HOSTS file in your Windows
		directory. The default name is <b>OrionPPP</b> .
nit Name		

Enter the name of the ORION you want to connect to, or the ORION's IP address. If you enter a name, it must be listed in the HOSTS file in your Windows directory. This text file provides Windows the association between a logical name for an Internet site and its IP Address.

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#### Changing TCP/IP connection using MotionDESK Properties Notes:

# **Unit Name**

Enter the name of the ORION you want to connect to, or the ORION's IP address. If you enter a name, it must be listed in the HOSTS file in your Windows directory. This text file provides Windows the association between a logical name for an Internet site and its IP Address.

MotionDesk - D:\Program F File ProjNav Edit Tools	iles\ORMEC\MotionDesk\Watc   × View Debug Window Help	The default name for ORION
	Toolbar	using a direct cable connec-
Unit Properties	General Fonts	tion (Development J1 port) is
B	Unit Name: OrionPPP	<b>OrionPPP</b> , with an IP ad-
G Supporting Files     gp2_demo.qp2	Q Clear Variat 192.168.64.123 192.168.64.4	dress of 200.200.200.200
Crion.ini	MotionPad windows always start	
	Tip of the D <u>ay</u>	
	Preferences	
<u> </u>	Save Current <u>L</u> ayout	



Notes: Hardware Setup: You will need a direct cable connection between your development computer and the

ORION Development Port (port D). Software Setup: To set up the software for a direct cable connection on your

development computer, refer to Network Setup in MotionDesk help.

Internet Properties: Right click on the Internet Icon to display the properties. Select "Connection" and look under "Dialing". If the check mark is present, the "Connect to" prompt (on next page) will appear when you try to establish a Internet connection. If your workstation has direct access to the Internet through a local area network, you may want to chouse to clear this check mark. Removing the mark will require manual connection every time that you need to communicate with the ORION motion controller.

_ <mark>Motic</mark>	onDesk 🛛 🔀	When attempting to establish communications between your PC
- ӏ	Unable to connect to OrionPPP Closing down all MotionDesk connections	and the Orion motion controller, this error message will be displayed if Dial-Up Networking is not running.
_	OK <u>H</u> elp	

etworking wi etting up cor	th MotionDesk nmunications betv	veen MotionDesk and your ORION Motion Controller
Connect To		? ×
<b>≞</b> ⊘P 	ION Serial Co	Status: Dialing
<u>U</u> ser name:	ORMEC Training	Status: Verifying user name and password
 <u>P</u> assword:		Status: Connected. Cancel
	□ <u>S</u> ave password	
Phone <u>n</u> umber:	111	Connected to ORION Serial Co
Dialing <u>f</u> rom:	Default Location	Duration: 000:08:38
	Cor	
	, i i i i i i i i i i i i i i i i i i i	Start 😓 Connected to OR 🐴 🗃 10:16 AM

#### Notes:

Note: You will need a direct cable connection between your development computer and the ORION Development

Port (port D). To set up a direct cable connection on your development computer, refer to Network Setup help.

٦

Having trouble connectin	ng to Orion
If the below messages appear, you must 1) Check the hardware connection between 2) Check the setting in Dial-Up Networking 3) Then Communications must be reestablis	your computer and the ORION Development port. for the proper communications port to use. shed. ( See page 13 & 14 )
Image: Dial-Up Networking       Image: Dial-Up Networking       Image: Dial-Up Networking         Image: Dial-Up Networking       Image: Dial-Up Networking       Image: Dial-Up Networking         Image: Make New Connection       Image: Dial-Up Networking       Image: Dial-Up Networking         Image: ORION Serial Connection       Image: Dial-Up Networking       Image: Dial-Up Networking	ting to ORION Serial Co 💌
Dial-Up Networking	×
You have been discon Double-click the conne	nected from the computer you dialed. ection to try again. OK
ORMEC SYSTEMS CORP	INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY
CHECK THE CONNECTION: You will need	a direct cable connection between your development com-
<i>lotes:</i> puter and the ORION Development Port ( port D). The	o check the software setup on your development computer,
efer to "Communications setup Help" Click on th	he chapter " ORION Serial Connection dialog."
Dial-Up Networking	1. Click on "My Computer" to find "Dial-Up Networking".
<u>File Edit View Connections Help</u>	2. Right-click on the ORION Serial Connection icon.
🖻 Dial-Up Networking 🗾 主 👗 🗎 🛍	(If you defined a different name for your connection, look for
Make New Connection	that instead of ORION Serial Connection.)
Connect	The ORION Serial Connection dialog will be displayed.
Create Shortcut	4. Click on the <b>Configure</b> button.
Delete	The Serial Connection Properties dialog below
	will be displayed.
P <u>r</u> operties 🗟	Serial cable between PC & Orign Properties ? 🗙
Opens the property sheet of selected items. 🏼 🎢	General Connection Options
. In the General tab.	Serial cable between PC & Orion
Check which COM port the software is configured	Port. Communications Port (COM1)
to use. Then check the cable is plugged into it.	Communications Port (COM1)
The Maximum Speed group, click the speed that	Communications Port (COM2)
your modern should use. If have a older PC that does not have the 16550 chip set use 19 200 as a	<u>M</u> aximum speed
starting value - you may increase this speed later as	11/2000
long as communications between MotionDesk and	115200
the ORION are maintained at an acceptable rate.	

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Manually recovering from	m a lost connection
MotionDesk 🔀	MotionDesk
Command Channel Timeout, ORION Connect Lost	Closing down all MotionDesk connections
OK <u>H</u> elp	ОК Неір
<ul> <li>If the above messages appear, you must</li> <li>1) Close the current project.</li> <li>2) Disconnect windows Dial-Up Networking</li> <li>3) Then Communications must be reestable</li> </ul>	g, then Reopen the project. lished. ( See page 13 & 14 )
Connected at 115200 bps Duration: 000:08:38	Disconnect
Start Brand ORION Serial C	🖹 🗃 10:16 AM
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#### Notes:

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Motio	nDesk	×
	Unable to connect to OrionPPP Closing down all MotionDesk connections	
	OK <u>H</u> elp	

MotionDesk -	
<u>V</u> iew	
<u>T</u> oolbar Status Bar	MotionDesk Properties
Maaaaaalaa	General Fonts
<u>M</u> essaye Log <u>C</u> onsole	Unit Name: OrionPPP
<u>D</u> irect Mode	☑ <u>C</u> lear Variables
Orion System Info	MotionPad windows always start in the same screen location
Project <u>N</u> avigator Trace	D Show Integer and Long Data TP values as Rexadecimal Default Location for new Projects
11000	
<u>P</u> references Save Current <u>L</u> ayout	
	ORION Serial Connection be selected for
	the auto-connec
	feature.

*Notes:* MotionDesk properties - The following options allow you to specify various MotionDesk properties:

**Unit Name** - Enter the name of the ORION you want to connect to, or the ORION's IP address. If you enter a name, it must be listed in the HOSTS file in your Windows directory. This text file provides Windows the association between a logical name for an internet site and its IP Address. The default name for the ORION is **OrionPPP**, with an IP address of **200.200.200.200**.

**Clear Variables** - Check this option to indicate that all nonvolatile variables in the ORION motion controller should be cleared when the ORION is synchronized with MotionDesk.

**MotionPad windows always start in the same location** - Check this option to ensure that when you open a MotionPad window, it is always displayed in the same location on the MotionDesk workspace.

**Show Integer and Long Data Tip values as Hexadecimal** - Check this option to display numeric Data Tips in hexadecimal. Leave unchecked to show Data Tips in decimal notation.

**Terminate Serial Connection** - Check this option if you want to automatically close your serial connection to the ORION when you exit MotionDesk.

**Default Serial Connection** - Select the ORION serial connection you want to use as your default connection. The default is undefined until you select one.

Γ

1	System Informtion	
The System Information window displays a snapshot of current information about the ORION Motion Controller. MotionDesk File Edit Tools View Debug Wir Controller. SysInfo SysInfo Wessage Log Console Direct Mode Orion System Infor Display the System Information Panel	MotionBASIC Version: MBX Base Version: MDB Version: QP Version: MAP Version: Motion Credits Available: Motion Credits Required: CPU Speed Reference: Current Project: Axes Installed: PC Card Slot 1: PC Card Slot 1: PC Card Slot 2: Hardware Revisions: Memory Available: Last Error Information: ORION Date: ORION Time: Program Execution Status	5.1.0 3.0.0 3.0.0 2.3.0 3.0.5 1300 1100 1379 Training.mtp {1,2,3,4,5} System Card, 5678 KBytes free Empty Slot S:4001 0:0207 May 1, 2000 12:34:56 s: No Program Executing
ORMEC SYSTEMS CORP	INSTI	TUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY
The data display is refreshed each	time the window is opened.	

Version Information
Motion Credits
CPU Speed Reference
Current Project
Axes Installed
PC Card Slots
Hardware Revisions
Memory Available
Last Error Information
ORION Date & Time
Program Execution Status
ServoWire Axis Modules (if present)
Number of SAMs Installed, SAM Model and Version, SAM Serial Number, SAM Modification Info
ServoWire Drives: Drive ID, Drive Model and Version, Drive Firmware Version, Drive Serial Number
Logic Board Version and Modification Info, Power Board Version and Modification Info

# Note:

You can use the mouse to select information in the SysInfo window and copy it to the Windows clipboard for later use.

Project	Navigator - Tree
Motion De	
W/ P	rojNav 🖌 Toolbar 🔉 Project Navigator Tree
	The icons displayed in the Project
Decident No.	Navigator Tree represent the user
	Project. Use either the keyboard or mouse to
I/O Prop	erties Navigate through the configuration of your project.
🕀 🚟 Discre	ete I/O (ROFO IOIO IOIO IOIO) your project configuration.
Pamu	x1/0 Proportion
Axis Setti	Modules
Axistu	ne.bas Right mouse click
Userti	une.bas on individual icons
Supportin	ig Files to display their
Er4qp	bc.qpi popup menu.
Show or hide	e the toolbar
ORMEC SYSTEMS COR	P INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY
Notos: The Project	Navigator tree is a graphical representation of your Motion Control project, and provides quick
mouse access to the	e following areas, along with it's associated shortcut menu:
Unit Proportios	The Unit Properties branch of the Project Navigator tree allows you to configure the OPION
omerropentes.	Motion Controller for your application project.
I/O Properties:	The I/O Properties branch of the Project Navigator tree, allows you to configure the I/O points
	controlled by your ORION Motion Controller.
Axis Settings:	the Axis Settings branch of the Project Navigator free, allows you to add, remove, and configure the Axes controlled by your Motion Control project.
Program Modules:	The Program Modules branch of the Project Navigator tree, allows you to add, remove, and edit
	the Modules that make up the MotionBASIC Program for your Motion Control project.
Supporting Files:	The Supporting Files branch of the Project Navigator tree, allows you to add and remove the Supporting Files that are included in your Motion Control project.

roject Naviga	tor - New	Project
MotionDesk - Untitle	d	
<u>Eile ProjNav E</u> dit	T <u>o</u> ols <u>V</u> iew	<u>D</u> ebug <u>W</u> indow <u>H</u> elp
<u>N</u> ew Project 📐	Ctrl+N	
<u>O</u> pen Project <u>C</u> lose Project	Ctrl+O	New Save
<u>S</u> ave Project Save Project <u>A</u> s	Ctrl+S	Message Log [Untitled]
Sync Project with OR	ION	Welcome to MotionDesk
		Project Navigator [Untitled] Unit Properties I/O Properties Axis Settings (ServoWire) ServoWire Axis Module { Program Modules Supporting Files
Create a MotionDesk Pr	oject	
EC SYSTEMS CORP		INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOG

*Notes:* **New Project:** A project is a collection of information that defines a Motion Control application for an ORION Motion Controller. This project information includes: Configuration settings for your ORION Motion Controller with your MotionBASIC program, and any supporting files ( such as QuickPanel screens or database files used for cams).

**Creating a New Project:** The first step in building an ORION Motion Control application is the creation of a Motion Control Project. Start MotionDesk, and from the File menu, select New Project (or click on the New Project icon on the Toolbar). This creates a new, untitled project, and opens the Project Navigator and Message Log windows.

**Message Log:** The Message Log Window displays error messages generated by the ORION Motion Controller. To use the Message Log window, a project must be loaded in MotionDesk and communications must be established with an ORION. You can select text anywhere in the Message Log window and copy it to the clipboard by right clicking anywhere in the window to access the Windows clipboard commands.



# Notes: Ethernet Communications Adapters:

Three Ethernet communications adapters are available for use in an ORION controller, one PC Card based and two half-length IBM PC cards (ISA). All three have support RJ45 and BNC connectors, and the 3C509 contains an AUI connector as well.

The ORION controller supports the use of multiple Ethernet adapters, however, no more than one of each type of Ethernet adapter (ORN-ENE2000, ORN-E3C509, and PCC-E3C589) may be used together in the same ORION. For example: An ORN-ENE2000 and an ORN-E3C509 may be used together in the same ORION, but two ORN-ENE2000 adapters cannot.

# Adapter Configuration:

There are no hardware configuration jumpers on the ORMEC Ethernet communications adapters. All adapter configuration is performed using a setup software utility (included with each card), which requires installing the Ethernet adapter into the computer running this software. All ORMEC supplied Ethernet adapters I/O addresses and IRQs are configured and tested at the factory. Refer to the manufacturers installation and operation manual (included with the card) for further setup software utility information.

<u>ORMEC</u> supplied Ethernet adapter cards are configured to use the RJ45 connector, if you are using the RJ45 connector, separate configuration of the Ethernet adapter (as described in the previous paragraph) is not required. If you need to use a different connector (BNC or AUI) on an ORN-ENE2000 or ORN-E3C509 card, you will need to run the manufacturers setup utility.

Project	Navigator				
Unit Pro W ORN Right clic in the Pro to displa	Derties ENE2000 [192.168 k on the Unit icon Dject Navigator Trea ( the shortcut men	3.64.123) Inse u. Exp	perties Int Device ort Device List ort Device List	ORN-ENE2 ORN-E3C50 PCC-E3C58	000 )9 9
Hardwa	re Propertie	s		I	×
IP Addres	s		Hardware	e Settings	Security
IP Adı <u>S</u> ubnet	dress 192 .168 Mask 255 .255	3 .64 .123 5 .255 .0	Device Type: I/O Address Space IRQ	ORN-ENE2000 0x300	New Password
Gat	efault <b>192 .168</b> eway	3 .64 .100	Port Type: 6	RJ45 BNC AUI	
ORMEC SYSTEMS				INSTITUTE FOR ,	ADVANCED MOTION CONTROL TECHNOLOG
ormec systems of es: Hardward Address tab of Address	orP ≥ Properties - Cor of the Hardware F Enter the fou before you ca	ntact your Netw Properties dialog r digit IP Addre an complete the	ork Administrator to set the followiss for this etherne	INSTITUTE FOR A	ADVANCED MOTION CONTROL TECHNOLOG needed information. arameters: must enter a nonzero IP Add
ormec systems of es: Hardward Address tab of Address Address Sonet Mask fault Gateway	Properties - Col of the Hardware F Enter the fou before you ca Enter the four ' Enter the four	ntact your Netw Properties dialog r digit IP Addre an complete the r digit Subnet M r digit Default G	ork Administrator g to set the followi ss for this etherne installation of this lask for this ether ateway for this et	INSTITUTE FOR, to obtain the ling ethernet part et device. You s device. net device. hernet device.	ADVANCED MOTION CONTROL TECHNOLOG needed information. arameters: must enter a nonzero IP Add
ORMEC SYSTEMS O es: Hardware Address tab o Address bonet Mask fault Gateway rdware Settin vice Type	<ul> <li>CORP</li> <li>Properties - Con</li> <li>of the Hardware F</li> <li> Enter the four</li> <li>before you ca</li> <li> Enter the four</li> <li>r Enter the four</li> <li>gs tab of the Har</li> <li> The type of ether</li> <li>the Insert Device - Specify the Lage</li> </ul>	ntact your Network Properties dialog r digit IP Addre an complete the r digit Subnet M r digit Default G rdware Properti hernet device in vice command.	vork Administrator g to set the following ss for this etherned installation of this lask for this ether isateway for this ether es dialog to set the stalled in the ORIC	INSTITUTE FOR.	ADVANCED MOTION CONTROL TECHNOLOG needed information. arameters: must enter a nonzero IP Add hernet parameters: the same device you selected device. The default is 0x300 fr
ormec systems of es: Hardward Address tab of Address fault Gateway rdware Settin vice Type Address Spa	CORP  CORP  Properties - Col  f the Hardware F Enter the fou before you ca Enter the four r Enter the four gs tab of the Har The type of ett the Insert De ce - Specify the I NE2000, 0x3 Select an IRC and IRQ 11 free	ntact your Netw Properties dialog r digit IP Addre an complete the r digit Subnet N r digit Default G rdware Properti hernet device in vice command. /O Address Spa 60 for the 3C50 of the etherne or the 3C589.	ork Administrator g to set the following ss for this etherno installation of this lask for this ether is dialog to set the stalled in the ORIC ace to be used by 19, and 0x320 for t device. The defa	INSTITUTE FOR.	ADVANCED MOTION CONTROL TECHNOLOG needed information. arameters: must enter a nonzero IP Add mernet parameters: e the same device you selected device. The default is 0x300 for or the NE2000, IRQ 5 for the 30
ORMEC SYSTEMS O es: Hardware Address tab o Address tab o Address fault Gateway rdware Settin vice Type Address Spa	<ul> <li>Properties - Corporties - Corporties - Corporties - Corporties - Corporties - Corport - Corpo</li></ul>	ntact your Netwo Properties dialog r digit IP Addre an complete the r digit Subnet M r digit Default G rdware Properti hernet device in vice command. /O Address Spa 60 for the 3C50 of for the etherne or the 3C589. De of port to be u ons. The NE200 for all devices	vork Administrator g to set the followi ss for this etherne installation of this lask for this ether sateway for this ether sateway for this ether stalled in the ORIC ace to be used by 99, and 0x320 for t device. The defa used on the ethern 00 and the 3C589 is <b>RJ45.</b>	INSTITUTE FOR.	ADVANCED MOTION CONTROL TECHNOLOG needed information. arameters: must enter a nonzero IP Add mernet parameters: the same device you selected device. The default is 0x300 for or the NE2000, IRQ 5 for the 30 e 3C509 supports RJ45, BNC 5 and BNC connections.
ORMEC SYSTEMS O es: Hardware Address tab o Address tab o Address fault Gateway rdware Settin vice Type Address Spa 2	<ul> <li>Properties - Corporties - Corporties - Corporties - Corporties - Corporties - Corport - Corpo</li></ul>	ntact your Network Properties dialog r digit IP Addre an complete the r digit Subnet M r digit Default G rdware Properti hernet device in vice command. /O Address Spa 60 for the 3C50 2 for the etherne or the 3C589. De of port to be to ons. The NE200 for all devices	vork Administrator g to set the following ss for this etherne installation of this lask for this ether isateway for this ether isateway for this ether isateway for this ether isateway for the ethern 00 and the 3C589 is RJ45.	INSTITUTE FOR.	ADVANCED MOTION CONTROL TECHNOLOG needed information. arameters: must enter a nonzero IP Add mernet parameters: the same device you selected device. The default is 0x300 for or the NE2000, IRQ 5 for the 30 e 3C509 supports RJ45, BNC 5 and BNC connections.



Notes: The Unit Properties branch of the Project Navigator tree allows you to configure the controller for your Motion project. Double-click on Unit Properties icon to configure the ORION Motion Controller.

**ORION Model Number:** Three ORION Motion Controllers are currently available: The Model (30,50,70) has (3,5,7) PC-AT expansion slots, providing the capability to control as many as (24, 32, 32) axis using ServoWire or (6,10,14) axes using DSP's.

# Metric Units:

Check the Use Metric Units for axis settings if you want to configure the axes in this system using metric units of measurement.

# Under the I/O tab:

# I/O Configuration Support:

Discrete I/O Only points (1 to 16) are integral to the ORION motion controller, and compatible with G4 Opto-22 style plug-in modules.

# The OPTIONAL Extended I/O Support:

**Extended** I/O connector provides access to an additional 24 G4 Opto-22 compatible I/O points as 17 through 40. Alternatively, this connector may be configured for use with

**Pamux** I/O, providing access to an additional 512 fully isolated analog or digital I/O points.

# Machine Group Configuration:

Use this group to indicate which discrete I/O points have been hardware configured as Machine Stop / No-Fault pairs. The first four pairs of Discrete I/O points (1-8) in an ORION Motion Controller can be configured to act as Machine Stop Input and No-Fault Output pairs. When these are enabled, you can use a single ORION to control up to four independent machines. Enabling a Machine Group automatically configures the corresponding I/O points. You may then use the Axis Configurator to assign individual axes to a Machine Group



# Notes: Axis Module Properties:

ORION Axis Modules utilize the latest Digital Signal Processor (DSP) technology to implement all digital high performance motion control. Each Axis Module communicates with the main processor through an on-board shared memory interface. Axis Modules are available in two, mutually exclusive types, DSP Modules and ServoWire Modules.

# ServoWire Axis Module Type:

Each ServoWire Axis Module (ORN-DSP-SW) implements up to eight servo control loops utilizing discrete signal processing algorithms to update the loops, eliminating the need for analog circuitry. Select ServoWire Modules if you are installing those modules in your ORION.

Note: DSP Modules and ServoWire Modules are mutually incompatible in an ORION. Changing the Axis Module Type after you have defined any axes will result in the loss of those axis definitions.

# Number of Axis Modules:

Enter the number of ServoWire Axis Modules installed in the ORION.

Model 30 can support up to 3 ServoWire Modules

Model 50 can support up to 5 ServoWire modules

Model 70 can support up to 7 ServoWire modules.

Each ServoWire Module can independently support up to eight axes, with an overall limit of 32 axes per ORION.

Note: When ServoWire Modules are installed in an ORION, AXIS.LIST@ is determined by the configuration of the individual axes in the system.

# Loop Rate:

The servo loop update rate, LOOP.RATE@, defines the number of times per second (Hz) that the servo loops will be updated. The valid range for Loop Rate on a ServoWire Axis Module is 1000 Hz to 5000 Hz. Default is 3000 Hz.



# Notes: Axis Module Properties:

ORION Axis Modules utilize the latest Digital Signal Processor (DSP) technology to implement all digital high performance motion control. Each Axis Module communicates with the main processor through an on-board shared memory interface. Axis Modules are available in two, mutually exclusive types, DSP Modules and ServoWire Modules.

# DSP Axis Module Type:

Each DSP Axis Module (ORN-DSP-A) implements up to two servo control loops utilizing discrete signal processing algorithms to update the loops. Select DSP Axis Modules if you are installing those modules in your ORION.

Note: DSP Modules and ServoWire Modules are mutually incompatible in an ORION. Changing the DSP Type after you have defined any axes will result in the loss of those axis definitions.

# Axis Module IDs:

The Axis Module identification code (Module ID) is set by a rotary DIP switch on the DSP panel. This code can be set in the range 0 to 9. When two or more DSP Axis Modules are installed in an ORION, they must be assigned different Module IDs. The Module ID is used to determine the axis numbers of servos interfaced to the controller.

The axis number used for Axis A is (2 \* Module ID) +1Ex:DIP switch ID=4 so (2\*4+1) = A axis number 9The axis number used for Axis B is (2 \* Module ID) +2.B axis number 10These settings are used on powerup to determine AXIS.LIST@.

# Loop Rate:

The servo loop update rate, LOOP.RATE@, defines the number of times per second (Hz) that the servo loops will be updated. The valid range for Loop Rate on a DSP Axis Module is 1000 Hz to 8000 Hz, and the default is 5000 Hz.



Notes: ORION controllers provide access to Discrete I/O points by referencing predefined arrayed variables in MotionBASIC. Discrete I/O points 1 to 16 are integral to the motion controller. The Discrete I/O properties branch of the Project Navigator tree allows you to configure the Integral I/O point settings for your Orion. Right mouse click on this icon to display its popup menu. The # column in the I/O Properties, displays the ORION I/O point number. Each I/O point can be assigned a unique name. I/O point names may consist of ASCII characters.

The first 16 integral I/O points can be configured, independent of the others, to operate in one of four Modes:				
Discrete Input:	Return an ON value when voltage is applied to the input module. The default.			
Discrete Output:	Generate a voltage from the output module when the I/O point is set ON .			
Rising-edge Latched Input:	Return an ON value from the time voltage is applied to the input module until the I/O point is explicitly "cleared" by the Motion BASIC program $e \neq DIO@(1) = OEE$			
Falling-edge Latched Input:	Return an ON value from the time voltage is removed from the input module until the I/O point is explicitly "cleared" by the MotionBASIC program. e.g. DIO@(1) = OFF			



Notes:

# Extended I/O:

ORION controllers can access, through the optional Extended I/O Connector, up to 24 additional Discrete I/O points, mounted in an external rack. These I/O points are configurable as Input (I) or Output (O) points. Use the Unit Properties dialog box to include Extended I/O in your project.

# PAMUX:

Instead of Extended I/O, the optional Extended I/O connector can be used to access up to 512 Pamux Analog or Digital I/O points. Pamux utilizes an eight line parallel bus, and supports 32 groups of up to sixteen I/O, (512 points) supported by either analog and/or digital "Brain Board".

Digital I/O points can be configured as Discrete Inputs (I) or Discrete Outputs (O).

Analog Pamux I/O points are added in multiples of 4, 8, or 16. Once the size of the Brain Board rack is selected, and an address is assigned, the individual I/O points may be configured.

Analog I/O points can be configured as Bipolar Analog Inputs (B), Bipolar Analog Outputs (C), Single-ended Analog Inputs (S), and Single-ended Analog Outputs (T).

Use the Unit Properties dialog box to include Pamux I/O in your project.

# Axis Settings - ServoWire Axis Selection



Right Mouse-click on the below icons to display its popup menu.

Axis Module:	Each Axis Module icon in the Project Navigator tree represents one Axis Module that is defined in your Motion Control project.
ServoWire Drive	Each ServoWire Drive icon in the Project Navigator tree represents one ServoWire Drive that is defined in your Motion Control project.
Pacer Axis	Each Pacer icon in the Project Navigator tree represents one pacer encoder axis that is defined
	in your Motion Control project. Double-click on this icon to edit the axis settings.
	Pacers that are shown within a grey box are User-defined pacers. The properties of these pacers may be viewed or edited through the Axis Configurator.
	In a ServoWire system, Pacers share a servodrive with a servomotor. Pacer/servomotor pairs always have consecutive Axis ID's, with the pacer having the lower ID.
Motor Axis:	Each Motor icon in the Project Navigator tree represents one servomotor axis that is defined in your Motion Control project. Double-click on this icon to edit the axis settings.
	Motors that are shown within a grey box are User-defined motors. The properties of these
	motors may be viewed or edited through the Axis Configurator.
	In a ServoWire system, Servomotors can share a servodrive with a Pacer. Pacer/servomotor
	pairs always have consecutive Axis ID's, with the servomotor having the higher ID.

Project Navigator Tree _ D X Unit Properties	Drive Properties ×
e -∎ Axis Settings (ServoWire)	
ServoWire Axis Module {} Program Modules	Pullup Resistors A-Sensor NPN (2.38K, 10mA, 24 VDC)
Supporting Files	B-Sensor NPN (2.38K, 10mA, 24 VDC)
Right mouse-click to display popup menu.	
Note: If you want to connect both a pacer encoder and a servomotor to this drive, you must select a servodrive with a Pacer option (any model that ends with 'P').	Drive Outputs Source Use Auxiliary Axis DELAY@ for DELAY Output Use Auxiliary Axis ENCZ Input for ZOUT Output External Regen Resistor
E ■ ServoWire Axis Module {1,2} E ■ ServoWire Drive 2 ■ ■ a {1} Axis 1	<u>M</u> odel User-Defined Resistance Ohms
<b>b</b> {2} Axis 2	Power Watts
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# Notes: Adding / Editing ServoWire Drives in the Project Navigator tree:

To add a ServoWire Drive and display the Drive Properties dialog box do any of the following:

- Select Insert | Drive from the MotionDesk ProjNav menu .
- Right click on a ServoWire Axis Module icon to display the shortcut menu, and select Add Drive.
- If a ServoWire Axis Module has no servodrives, double-click on the ServoWire Axis Module icon.

Drive	Prope	erties:

Model Name:	To chose a servodrive, select the desired Model Name from this list.
Drive ID:	This is the same as the Axis ID of the primary axis attached to this drive. The next available
	Servodrive ID is displayed as the default. ID's that are currently in use will not be displayed.
<b>Pull-up Resistors:</b>	Select the type of Pull-ups to use with the A-Sensor, B-Sensor, and C-Sensor inputs on this
	servodrive. Select between NPN @ 10mA (default), NPN @ 1.2mA, or PNP (no pull-up).
Drive Output Sour	Ce:
	NELAN @ fan DELAN Output if unu want ta gang ast tha Augilian Auja Dalau Opuntan autout ajanal

Use Auxiliary Axis DELAY@ for DELAY Output if you want to connect the Auxiliary Axis Delay Counter output signal
(DELAY@) to the DELAY output on this servodrive. If not checked (default), the Primary Axis Delay
Counter output signal is connected to the DELAY output.
Use Auxiliary Axis ENCZ for ZOUT Output if you want to connect the Auxiliary Axis Zero Reference output signal (Aux
ENCZ) to the ZOUT output on this servodrive. If not checked (default), the Primary Axis Zero
Reference output signal (ENCZ) is connected to the ZOUT output.

# External Regen Resistors: Select your regen resistors from this list:

Choose an ORMEC specified regen resistor or User-Defined.

Enter the Resistance and Power ratings in the boxes provided.

Axis Settings - Add Axis	Project Navigator Tree
Axis Selection	ServoWire Axis Module {1,2}
Axis 2 name: Axis 2	● a {1} Axis 1 ■ b {2} Axis 2
Series: G-Series Motors	Encoder-
Model: MAC-G005A1/_2  Edit Save	Delete
Drive: SAC-SW210/E_P	
Motor/Drive Configuration	Additional Information
Motor + Drive Torque       Max. Speed       5000 RPM         Peak       15.1 in-lbs       Drive Input       110       ✓         Rated       3.4       in-lbs       VAC	Motor + Drive Current RMS amps per phase Peak 5.9 Continuous 2.0
Resolution 8000 cnts/rev Description:	Inductance 10.40 mH line to line Resistance 8.00 Ohms line to line
Brushless AC Servomotor, 110 VAC, Incremental Encoder	
ORMEC SYSTEMS CORP	INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY
Notes: Chose the type of Servomotor or Pacer Encode Model:Chose a motor or pacer encoder for this axis, Change the Series if you wish to select a differe Drive:The servodrive powering this axis. To change th Project Navigator.	er for this axis. select the desired model number from the list ent type of Servomotor or Pacer Encoder. he servodrive edit the Drive properties using the
Motor / Drive Configuration Motor/Drive Torque: The amount of rotary force this motor/drive con inch-pounds (in-lbs) or Newton-meters (N-m).	nbination can deliver to a load, specified in eithe
Max. Speed:	revolutions per minute. This value may be lowe ge selected is less than the motor's rated voltage
Drive Input Voltage: The nominal voltage supplied to the servodriv Resolution: The Axis Resolution parameter indicates the	e, in units of Volts AC
resolver), and is available as the ORMEC val	riable CNT.REV@. Axis Resolution units are
specified in counts per revolution (cts/rev).	aarata Driva Alarm
<b>Description:</b> A short description of the selected servomotor.	
Additional Information	

User-defined Motors/Encoders: ... Use the Edit, Save and Delete buttons to create new motor and pacer encoder definitions, and to modify or delete existing user-defined definitions.

Axis Settings - Custom ServoN	/ire Axis	
Edit User-defined Motor	?×	
Model Name: MAC-G280B4/_3B		
Performance/Mechanical	Rated ⊻oltage 460 ▼ VAC	
Feedback Type	Number of Poles 6	
Incremental Encoder with Hall Tracks	Resistance 1.500 Ohms line to line	
	Inductance 16.00 mH line to line	
Axis Resolution 12000 Cnts/rev	✓ Thermal Switch on Motor	
Peak 840.00 in-lbs Peak 26.0	Thermal Time Constant 22.00 Minutes	
Cont. Stall 280.00 in-lbs Continuous 8.7	Hall Offset 0 degrees	
Rated 252.00 in-lbs Speed Max 1750	Motor Type	
Motor Inertia 0.031100 RPM in-Ib-sec <sup>2</sup>	<u>C</u> ommutation Trap (Brushless) <b>_</b> DC (Brush)	
Description: Brushless AC Servomotor, 460 VAC, Incremental Encoder, A Trap (Brushless)		
RMEC SYSTEMS CORP	INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY	

To open an axis for editing: Double-click on the Axis icon in the Project Navigator Tree or Right click on the *Notes:* Axis icon in the Project Navigator Tree to display the shortcut menu. Select the page of the Axis Configurator that you want to open.

The following parameters are specified for custom Torque Drive and Velocity Drive motors:

# Performance/Mechanical Parameters:

Feedback Type .	Specifies what type of position transducer is being used by the selected motor.
	Incremental Encoder with Hall Tracks, Incremental Encoder, Absolute Encoder.
<b>Axis Resolution</b>	indicates the resolution of the selected motor's encoder and is available as the ORMEC variable
	CNT.REV@. Units are in counts per revolution (cts/rev).
Motor Torque	The amount of rotary force this motor can deliver to a load, specified in either inch-pounds (in-lbs)
-	or Newton-meters (N-m). Peak Motor Torque, Continuous Stall Torque, Rated Motor Torque
Motor Current	The amount of current this motor needs to operate, specified in RMS amps per phase.
	Peak Motor Current - The current required to produce peak torque for the selected motor.
	Continuous Current - The current required to produce continuous stall torque for the selected motor.
Motor Inertia	The rotor inertia of the motor itself (without load).
Speed	The speed of the motor, specified in revolutions per minute (RPM). Max Speed.

# Electrical/Thermal Parameters:

MotionDook Project Novinetor		
File ProiNav	Axis Selection	?
Unit Properties	Axis 1 name: Axis 1	
Axis Settings Add Axis Add Axis Atistune.bas	DE-Series Motors MAC-DE003A1/A Motor Information	✓ User-defined Motor/Encoder     ✓ Edit Save Delete
Supporting Files	Drive ✔ Torque Velocity	Axis Resolution 4080 cnts/re∨ Maximum Speed 4500 RPM
Add a new axis to the project	Encoder	Motor Torque (in-Ibs) Peak 8.4
Axis Settings The Axis Settings branch <sup>88</sup> of the Pr Navigator tree allows you to add and	oject Incremental ✓ Absolute Resolver escription:	Rated 2.8 Drive Input at Peak Torque: 9.0 v Motor Inertia 0.000079
remove axes that are defined in your Motion Control project. Right-click on this icon to dis its popup menu.	splay	10 VAC, Absolute Encoder _ _ _

Notes: The Axis Configurator enables you to customize the operational parameters of each (DSP) axis in your System.

Axis Identification ....... Axis ID and Axis Name are displayed at the top of every Axis Configurator screen, indicating the axis currently being configured. Axis ID is defined by the DSP Module ID selected in the Unit Setup screen of the Axis Navigator.

Axis Type and Model .... Axis Selection first consists of choosing the ORMEC series motor, Pacer encoder, or Userdefined for a custom axis. Once this selection is made, the default parameters for the chosen motor or encoder may be customized.

Pacer Encoder...Select Pacer Encoders as the Axis Type, and then select the desired model of encoder from the Encoder Model list box.

 Torque-mode Motors

 Torque-mode Motor, select the desired Servomotor series (i.e., DE-Series Motors) as the Axis Type, and then select the desired model of torque-mode motor from the Motor Model list box. The Information pane will display the physical parameters of the selected motor.

 Velocity-mode Motors

 To configure this axis as a Velocity-mode Motor, select Custom Motors as the Axis Type, and then select the desired motor from the select the desired motor.

 Velocity-mode Motors

 Motor Motors as the Axis Type, and then select the desired motor.

User-Defined Motors .... You can include your own motors and encoders in your Motion Control Project. To create a new motor or encoder, select a similar ORMEC model and click the Edit button. The Edit User-Defined Motor/Encoder dialog will allow you to name and define the profile of the new motor. After you have created a new motor or encoder, you can permanently add it to your personal list of Motors and encoders by clicking the Save button. You can revise your motor parameters at any time by clicking the Edit button. Motors and encoders can be removed from your list by selecting the unwanted motor and clicking the Delete button.

Custom Motor Model information is stored in the file "Program Files\Ormec\MotionDesk\Custom.MTR".

dit User-Defined Mo	tor/Encoder	? ×
Model Name:		
Model <u>T</u> ype: C Pacer Er C Torque I C Velocity	ncoder Drive Drive	
Encoder Type: @ Incremen @ Absolute @ Resolver	tal	Motor Torque (in-Ibs) Peak 8.4 Bated Io.a
Axis Resolution 4080	cnts/rev	1 ale a 2.0
Maximum 4500 Speed	RPM	Drive Input at Peak Torque Motor Inertia 0.000079
Description: Brushless AC S	ervomotor, 110 V	'AC, Absolute Encoder

Notes: The Edit User-Defined Motor/Encoder dialog allows you to define a new motor or pacer encoder profile. After

entering your own settings, click Save to return to the Axis Configurator with a new user-defined motor, or click Cancel to return without creating a new motor. Use Clear to delete all user entries in this dialog, or Restore to revert to the default settings of the motor or encoder you used as a template.

Model Name	Enter a unique name for your motor or encoder.
Model Type	This indicates the type of motor or pacer encoder that is being defined.
Encoder Para	ameters The following parameters can be specified for all user motors and pacer encoders:
Encoder Type	especifies what type of position transducer is being used by the selected motor or encoder.
If checked:	Incremental - the selected motor uses an Incremental Encoder for position information.
	Absolute - the selected motor and drive support an Absolute Encoder for position information.
	Resolver - the selected motor uses a Resolver for position information.

Motor Parameters: The followin	a parameters can be specified for custom Torque Drive and Velocity Drive motors:
	g parameters can be specified for custom roldue Drive and velocity Drive motors.
Motor Torque The arr	iount of rotary force this motor can deliver to a load, specified in either inch-pounds (in-
lbs) or Newton-meters (N-m)	Peak Motor Torque - The peak torque of the selected motor.
	Rated Motor Torque - The rated torque of the selected motor.
Drive Input at Peak Torque	. The servodrive input that generates peak torque on the motor.
	For Torque Mode Drives only.
Drive Input at Max Speed	. The drive input that commands maximum speed on the motor.
	For Velocity Mode Drives only.
Motor Inertia The rot	or inertia of the motor itself (without load).
Description Enter a	a short text description of your motor or encoder.

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	Motor Units
	Axis 2 name: Axis 2
	Inertia, in-Ib-sec <sup>2</sup> Loa <u>d</u> 0 Motor: 0.000067 Ratio: 0.0 to 1
	Machine Limitations & Unit Conversion Factors         Axis Units:       User Units         Position       8000       counts       360       degrees       ✓         Speed Limit       5017       RPM       5017       RPM       ✓         Accel Limit       32767       rev/sec²       205880       rad / sec / s ▼
	Default Maximum User Parameters         Max       5017       RPM       Max       205880       Image: Unlimited acceleration         Speed       Accel:       205880       Image: Unlimited acceleration         Max Drive       12.80       in-lb       Max       205880       Image: Unlimited acceleration         Max Drive       12.80       in-lb       Max       205880       Image: Unlimited acceleration         Dutput       Decel:       Decel:       Image: Unlimited acceleration         DRV.MAX@       27775       Error       1000         Decel:       Image: Unlimited acceleration       Image: Unlimited acceleration
ORMEC SYSTEMS C	I INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY
otes:	
ertia: Enter the	e calculated, measured, or estimated inertia of the Load to be coupled to the motor shaft (not
cluding the mot	or's inertia).
achine Limitat	ions & Unit Conversion Factors: Machine Limitations define the physical limitations of the
ervomotor selec	ted, in terms of Axis Units. Unit Conversion Factors are used to convert Motor Position, Spee
nd Appalanation	into the user's preferred units of measurement for these parameters, in terms of User Units.
nd Acceleration	
efault Maximu	<b>m User Parameters:</b> The Default Maximum User Parameters set here are used when motor

otionDATA	( SAM Example ) 🛛 😭	? ×	MotionDATA	( DSP E	xample ) 👘	? ×
<u>A</u> xis 2 name: Lef	t Motor	s	<u>A</u> xis 2 name: R	ight Motor		
Axis MotionDATA: — <u>None</u> <u>Commanded Pos</u> Actual Position Select Pacer Axis: —	sition SAM MotionDATA Ports Unput: (external) Output 1: Left Motor Output 2: Right Motor		- MotionDATA Mode Output: C Pass-Through Commanded Actual	e: Input: ☞ <u>E</u> nabled	Gear Speed M Output 1 Input 2	lultipliers
(none) ( <b>external) (from Inpu</b> Right Motor	Resolution     6000     Counts/R       Speed Limit     4000     RPM       Axis Position     6000     Counts	ev	(none)	Resolution Speed Limit Axis Position	2000 Counts/F 6030 RPM 2000 Counts	Revolutio
	User Position 360 degrees Gear Speed Multipliers	8		User Position	360 degrees	

#### Notes:

MotionDATA Mode (MD.MODE@) MotionDATA Mode defines the configuration of MotionDATA for this axis.

Gear Speed Multiplier: The Gear Speed Multipliers set two factors so that GEAR AT statements are easy to write for machines. A straight-forward command, such as GEAR AT 1 to 1, uses this factor to account for the physical differences between the pacer axis and the follower axis, and yet achieve desired follower motion with this sort of simple command.

Select Pacer Axis: Select Pacer Axis displays the name and motion parameters for the axis that is providing

MotionDATA information to this axis.

	Motion ?×
ServoWire only, Hardware Travel Limits under software control. Note: DSP Axis Module use jumpers.	Axis name: Left Motor
	S-Curve     Forward Motor Rotation       0     %       © Clockwise     © Counter-Clockwise
	✓       ✓       Software Travel Limits: (degrees)         ✓       ✓       Forward       ✓         ✓       Travel Limits       ✓       Disable Software         ✓       Travel Limits       ✓       ✓         ✓       Travel Limits       ✓       ✓         ✓       Travel Limits       ✓       ✓
	Axis Position Cycle — Position Error: (degrees) Non-modulo Maximum Position Error 360 Modulo Desition Medulue
	Position Modulus       0       In-Position Error       2       Axis is always in position

#### Notes:

- S-Curve Distribution: (SCURVE@) The S-Curve Distribution defines the percentage of the velocity ramp that will be "smoothed" during motion of this axis.
- **Forward Motor Rotation** (CW.FWD@) Forward Motor Rotation defines the servomotor's direction of "forward" rotation, as viewed when facing the end of the motor shaft.
- **Software Travel Limits**: (STL.FWD@, STL.REV@) Software Travel Limits allow you to specify the maximum allowable range of travel for this axis. Software Travel Limits are specified in the user units for position.
- Hardware Travel Limits (HTL)- (ServoWire only) Each axis in a an ORION Motion Controller provides two hardware travel limit switch inputs. With ServoWire, the HTL can be disabled by checking the Disable HTL box.
- Axis Position Cycle: (POS.MOD@) Axis position can be configured to operate in a non-repeating mode, or to repeat periodically.

Position Error: (PERR.MAX@, PERR.INPOS@) Position Error affects how axis position error information is handled. Position Error is specified in the user units for position.
Axis Outputs	(SAM Example )	Axis Outputs (DSP Example)
<u>A</u> xis 2 name: Le	ft Motor	Axis 1 name: Left Motor
Brake G Disabled Auto Manual Brake Delay: Drive Output Mappin DELAY Output: Ena ZREF Output: Ena	Digital Output Mappings Signal Source Axis Out 1: PLS1 Axis 2 Out 2: PLS2 Axis 2 Out 3: PLS3 Axis 2 Analog Output Mappings Signal Source Axis AOut 1: none Axis 2 AOut 2: none Axis 2 ServoWire only, source for DELAY and ZOUT under software control.	DSP Output Mappings Out 1: PLS1 Out 3: PLS3 Out 2: PLS2 Out 4: (None) Programmable Limit Switch Parameters PLS 1: PLS 2: PLS 3: Control Source Actual Actual Actual Units degrees degrees degrees Low 0 0 0 0 High 0 0 0 0
ORMEC SYSTEMS COR	>	INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY
lotes: Break Digital Output Mapp	The Motor Brake signal can be co available when the Primary axis c bings OUT1 is mapped to PLS1@ of th of the Auxiliary axis of the servodri MotionBASIC Ver 5.1 and earler.	nfigured for any servomotor on a ServoWire drive. It is n of a ServoWire drive is a pacer. he Primary axis of the servodrive. OUT4 is mapped to PLS1 ve. These mapping are fixed, and cannot be changed usir
rive Output Mapr	inas	
OELAY Output	(ServoWire only) When Enabled, Delay Counter signal at the servoor dialog for the servodrive for this a (ServoWire only) When Enabled, Z of the ZOUT signal at the servodr Properties dialog for the servodriv	DELAY Output indicates that this axis is the source of the drive. To change this parameter, open the Drive Properties xis. COUT Output indicates that ENCZ from this axis is the source view. To change this parameter, open the ServoWire Drive for this axis.
nalog Output Map	ppingsEach ServoWire axis in a signals, AOUT1 and AOUT2. AOUT1 is mapped to the Torque I	n ORION Motion Controller system has two analog out

Progra	ammable Lim	it Switch		? ×	
	<u>A</u> xis 1 name:	Axis 1			
L- E	Programmable	Limit Switch Contro	I		
		PLS <u>1</u> :	PLS <u>2</u> :	PLS <u>3</u> :	
	Source	Actual 🗾	Actual 👻	Actual 👻	
	Output	Automatic 🛛 💌	Automatic 🝷	Automatic 💌	
	Sensor	None 💌	None 🔻	None 🔻	
	Programmable	Limit Switch Cycle -			
	Units	degrees	degrees	degrees	
	Low	0	0	0	
	<u>H</u> igh	0	0	0	
	<u>M</u> odulo	0	0	0	

Notes:

### Programmable Limit Switch Control:

Each axis has three independent programmable electronic limit switches which turn ON and OFF automatically with respect to axis position.

PLS Control Source Chose the source of control information for each PLS.	(PLSx.MODE@)
PLS Output Choose whether the PLS operates in automatic or manual mode.	(PLSx.MODE@)
PLS Sensor Select the sensor that will reset the PLS when the sensor is asserted.	(PLSx.SEN@)

### Programmable Limit Switch Cycle:

Each axis has three independent programmable electronic limit switches which turn ON and OFF automatically with respect to axis position.

PLS Low	Enter the axis position at which point this Limit Switch should turn OFF.	(PLSx.LOW@)
PLS High	Enter the axis position at which point this Limit Switch should turn ON.	(PLSx.HIGH@)
PLS Modulo	Enter the size of the PLS modulus if PLS axis position is cyclical.	(PLSx.MOD@)

is Inputs 🥂 🖁	SAM Example )	? X Axis Inputs (DSP Example)
<u>A</u> xis name: Left Moto	r	Axis 1 name: Left Motor
A-Sensor High Gate by Out1 NPN (2.38K, 10mA, 24 VDC) C-Sensor Low PNP (no pull-up) Machine Groups Machine 1 Machir Machine 2 Machir ServoWire only, Sensor Pull-up Res See drive propertie	B-Sensor      Rising Edge      Gate by Out2     NPN (20K, 1.2mA, 24 V      Zero Reference      Falling Edge      AIN1 Qutoff      0.0 Hz      Disable Filter      Sistors under software of S.	Image: Constraint of the second consecond consecond constraint of the second constraint of
ORMEC SYSTEMS CORP		INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOG
ormec systems corp es: 	- Each ServoWire Driv at can be used to initia e. The Drive Properties ups to use with the A-S : Select the Zero Refe Z: Select ENCZ to derive	e has four high speed sensor inputs (A-Sensor, B-Sensor, C-Ser ate, terminate, or control axis motion. Sensors (A,B, and C) inputs s dialog allows you to configure a ServoWire drive Pull-up resisto Sensor, B-Sensor, and C-Sensor inputs on this servodrive. erence input configuration desired. ve the Zero Reference signal from the servomotor's encoder. ve the Zero Reference signal from the DSP's EXTZ input signal.
ormec systems corp es: 	- Each ServoWire Driv at can be used to initia e. The Drive Properties ups to use with the A-S : Select the Zero Refe Z: Select ENCZ to deriv Select EXTZ to deriv	INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOG e has four high speed sensor inputs (A-Sensor, B-Sensor, C-Ser ate, terminate, or control axis motion. Sensors (A,B, and C) inputs s dialog allows you to configure a ServoWire drive Pull-up resisto Sensor, B-Sensor, and C-Sensor inputs on this servodrive. erence input configuration desired. ve the Zero Reference signal from the servomotor's encoder. ve the Zero Reference signal from the DSP's EXTZ input signal.
ormec systems corp es: Zero Reference) th vidually configurable ect the type of Pull-u to Reference Input: Encoder ENC External EXT2 Sensor Input: Sensor Gating:	- Each ServoWire Driv at can be used to initia e. The Drive Properties ups to use with the A-S : Select the Zero Refe Z: Select ENCZ to derive Select EXTZ to derive Select the A-Sensor Check this box to er	e has four high speed sensor inputs (A-Sensor, B-Sensor, C-Ser ate, terminate, or control axis motion. Sensors (A,B, and C) inputs s dialog allows you to configure a ServoWire drive Pull-up resisto Sensor, B-Sensor, and C-Sensor inputs on this servodrive. erence input configuration desired. ve the Zero Reference signal from the servomotor's encoder. ve the Zero Reference signal from the DSP's EXTZ input signal.

Torrigo Loon		
Torque Loop		
Axis 2 name: Left Motor		
VLTC 3 msec Torque <u>G</u> ain: 100 %	D <u>r</u> v Cmd <mark>500 H</mark> z Filter ☐ Disable	
⊻MTC 20 msec	DMTC 0 msec	
– Loop Tuning Factors – Kvi V <u>e</u> locity Integral: 100	<sup>∞</sup> 0 - J−−−− 1000	
Kp <u>P</u> osition Gain: 100	<sup>∞</sup> 1 −	
Kpi Position Integral: 0	■ % 0 J 500	
Kaf A <u>c</u> cel. Feedforward: 100	■ % 0 J 200	
Kvf Velocity <u>F</u> eedforward: 100	■ % 0 J 200	
Kva Velocity Ob <u>s</u> erver: 100	■ % <sub>40</sub> ⊢ <sub>200</sub>	

#### Notes:

velocity Loop Time Constant:	(VLIC@) The velocity Loop Time Constant sets the velocity proportional gain.
Torque Gain:	(TRQ.GAIN@) The Torque Gain sets the Torque Mode Servo Gain for this
-	servomotor.
Velocity Monitor Time Constant:	(VMTC@) The Velocity Monitor Time Constant is used to set sets the time
	constant of the filter on the velocity monitor variable, VEL.MON@.
Drive Command Low-Pass Filter:	(DRV.CMD.3DB@) Enter the cutoff frequency of the lowpass filter for Drive
	Command for this axis.
Filtered Drive Command Monitor Tin	ne Constant (DMTC@) The Filtered Drive Command Monitor Time Constant is
	used to set sets the time constant of the filter on the drive command monitor
	variable, DRV.MON@.
Velocity Integral Factor:	(KVI@) Select a Velocity Integral Factor. (Kvi)
Position Gain Factor:	(KP@) Select a Position Gain Factor. (Kp)
Position Integral Factor:	(KPI@) Select a Position Integral Factor. (Kpi)
Acceleration Feedforward Factor:	(KAF@) Select an Acceleration Feedforward Factor. (Kaf)
Velocity Feedforward Factor:	(KVF@) Select a Velocity Feedforward Factor. (Kvf)
Velocity Observer Sensitivity:	(KVA@) Select a Velocity Observer Sensitivity (Kva)



Notes: Program Modules: Program Modules are text files containing MotionBASIC statements that make up

the control program for your Motion Control project. Library Modules are standard Program Modules that are kept in the MotionDesk Library for use in any Motion Control project. A MotionBASIC program can consist of as many modules as desired.

The Project Navigator is used to add modules to the project, and delete modules from the project.

MotionPad is used to edit Program Modules and to view Library Modules.

**Supporting Files:** Supporting Files are files that are a necessary part of your Motion Control project. Library Files are standard Supporting Files that are kept in the MotionDesk Library for use in any Motion Control project You can identify as many Supporting Files as needed.

The Project Navigator is used to add files to the project, and delete files from the project.

Your default file associations are used to select the application for editing Supporting Files and viewing Library
Files.

Note: Supporting Files are not the same as Program Modules. Although you could add a MotionBASIC module as a supporting file, it will not be part of your executable program.

MotionDesk				
<mark>-ile <u>P</u>rojNav <u>E</u>dit T<u>o</u></mark>	ols <u>V</u> iew <u>[</u>	<u>D</u> ebug <u>M</u>	<u>(</u> indow <u>H</u> elp	,
New Project	Save As			? ×
<u>O</u> pen Project <u>C</u> lose Project	Save <u>i</u> n:	🔄 MotionDe	esk 🔽 主	
Save Project	Demos			Create New Folder
Save Project <u>A</u> s	MBX Support	ting files	Save Proiect	
Sync Project with ORIC	□ mbx_upg □ Templates ☑ Training.MTE	)	Use this command to save the to its current name and folder.	active project
Print	My_Project		If you want to change the name and	directory of
Print Pre <u>v</u> iew			Save Project As command.	
P <u>r</u> int Setup	I			
<u>1</u> Er4qp5c.mtd	File <u>n</u> ame:	Training.mt	ł – – – – – – – – – – – – – – – – – – –	<u>O</u> pen
<u>2</u> Training.MTD	Save as type:	MotionDes	Project Files (*.mtd)	Cancel

Notes: Motion Desk creates project files to record the unique configuration settings of each Motion Control Project that

you create. These projects reside on your development system (with .MTD as a filename extension) and also on your <u>ORION Motion Controller (with .MTP as a filename extension). The name of the current project is displayed in the title</u> bar of the various MotionDesk windows.

**Project Documents:**(MTD) The Project Document is a binary file produced by MotionDesk when a new project is created. This file, which has the extension .MTD, defines all the aspects of a project. Project Documents reside on your development system along with MotionDesk.

**Project Files:** (MTP) The Project File is an ASCII file that is automatically produced by MotionDesk when <u>a Project Document is saved, and when you synchronize MotionDesk with ORION. This file, which has the extension</u> .MTP, is a subset of the Project Document. The Project File defines all aspects of a project that relate to an ORION Motion Controller. Project Files reside on both your development system and on the ORION System Card.

<u>Motor Parameter Configuration "MP.CONFIG"</u> Establish valid settings for the Ormec Variables involved in the configuration of the controller and axes. The settings are established in the project .MTP file created from the MotionDESK software.

MotionDesk         File       Edit       Tools       View         New Project       Open Project       Open Backup/Archive         Load Backup/Archive       Open Project	Debug Window Help Ctrl+N Ctrl+O Save As Save in: MotionDesk	Create Backup/Archive Use this command to select the project you want to archive. All all program modules and supporting files, as well as all project settings, will be archived.
<u>S</u> ave Project Save Project <u>A</u> s Create <u>B</u> ackup/Archive	Ctrl+S mb_upg Temp MBX Supporting files Trainin mbx_upg	lates ng.mtz
Sync Project with ORION Change Orion Connection Upload MBDUMP.BIN	File <u>n</u> ame: Training.mtz Save as <u>type</u> : MotionDesk Bac	kup/Archive Files (*.mtz)
single compressed f		
another developmer • The ORION Con • All Program Mod • All Supporting Fil	le (*.MTZ) that can be easily t t system with MotionDesk. Th iguration settings that were de ules that are referenced in the es that are referenced in the p	ransferred to floppy disk, or moved to is information includes: efined in the Project Navigator. project. project.
another developmer <ul> <li>The ORION Con</li> <li>All Program Mod</li> <li>All Supporting Fil</li> </ul>	le (*.MTZ) that can be easily t t system with MotionDesk. Th iguration settings that were de ules that are referenced in the es that are referenced in the p	ransferred to floppy disk, or moved to is information includes: efined in the Project Navigator. project. broject.
another developmer <ul> <li>The ORION Con</li> <li>All Program Mod</li> <li>All Supporting Fil</li> </ul> ORMEC SYSTEMS CORP Potes:	le (*.MTZ) that can be easily t t system with MotionDesk. Th iguration settings that were de ules that are referenced in the es that are referenced in the p Use this command to archive the can change the name the archive of ye	active Motion Control Projects have the file extension
another developmer <ul> <li>The ORION Con</li> <li>All Program Mod</li> <li>All Supporting Fil</li> </ul> ORMEC SYSTEMS CORP Notes: Streate Backup/Archive: Ne Save As dialog box so you ntz. This command will arc	le (*.MTZ) that can be easily t t system with MotionDesk. Th iguration settings that were de ules that are referenced in the es that are referenced in the p Use this command to archive the can change the name the archive of ye nive all program modules and suppo	active Motion Control Projects have the file extension project. Archived projects settings.
another developmer <ul> <li>The ORION Con</li> <li>All Program Mod</li> <li>All Supporting Fil</li> </ul> ORMEC SYSTEMS CORP Notes: Streate Backup/Archive: ne Save As dialog box so you ntz. This command will arc oad Backup/Archive:	le (*.MTZ) that can be easily to t system with MotionDesk. The iguration settings that were de- ules that are referenced in the es that are referenced in the p Use this command to archive the can change the name the archive of year nive all program modules and support Use this command to load an arc	Arransferred to floppy disk, or moved to is information includes: efined in the Project Navigator. project. INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY active Motion Control Project. MotionDesk display bur project. Archived projects have the file extension rting files, as well as all project settings.
another developmer <ul> <li>The ORION Con</li> <li>All Program Mod</li> <li>All Supporting Fil</li> </ul> ORMEC SYSTEMS CORP Notes: Streate Backup/Archive: The Save As dialog box so you ntz. This command will arc oad Backup/Archive: The Select the Backup/Archive:	le (*.MTZ) that can be easily to t system with MotionDesk. The iguration settings that were de- ules that are referenced in the es that are referenced in the p Use this command to archive the can change the name the archive of year nive all program modules and support Use this command to load an arc e file dialog box so you can select the	ransferred to floppy disk, or moved to is information includes: efined in the Project Navigator. project. INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY active Motion Control Project. MotionDesk display our project. Archived projects have the file extension rting files, as well as all project settings. hived Motion Control Project. MotionDesk display project archive you want to load. Archived project
another developmer <ul> <li>The ORION Con</li> <li>All Program Mod</li> <li>All Supporting Fil</li> </ul> <li>ORMEC SYSTEMS CORP Notes: Notes: Preate Backup/Archive: ne Save As dialog box so you ntz. This command will arc oad Backup/Archive: ne Select the Backup/Archive: ave the default file extension</li>	le (*.MTZ) that can be easily to t system with MotionDesk. The iguration settings that were de ules that are referenced in the es that are referenced in the p Use this command to archive the can change the name the archive of year nive all program modules and support Use this command to load an arc e file dialog box so you can select the n .MTZ.	active Motion Control Project Nave the file extension rting files, as well as all project settings.

# Sync a project 📐

The Project Document (extension .**MTD**) is a binary file produced by MotionDesk when a new project is created. This file defines all the aspects of a project and resides on your development computer.

The Project File (extension .**MTP**) is an ASCII file that is automatically produced by MotionDesk when you synchronize MotionDesk with ORION. This file is a subset of the Project Document (.MTD). 🌆 MotionDesk - Project Navigator Eile ProjNav Project.MTD ✓ Toolbar PowerUp.PRJ X 🖻 🖻 🖪 🕄 🕫 🕑 🜀 Project.MTP 🔲 Unit Properties 🗄 🚟 I/O Properties Machine3.BAS 🖶 Discrete I/O (ROFO IOIO IOIO IOIO) ErrHdlr.BAS Axis Settings Display.QP2 Program Modules SYSTEM CARD Machine3.BAS DRMEC ErrHdlr.BAS Supporting Files ŝ Display.QP2

### Project Synchronization

The current MotionDesk project is NOT synchronized with the ORION Unit. - Please choose one of the following options:

- Synchronize by DOWNLOADING the current project to the Orion Unit.
- Synchronize by UPLOADING the Orion Unit data into the current project.
- CHECK synchronization status. Do not update any files now.

Project Synchronization: When MotionDesk is actively working with an ORION Motion Controller, the Motion Control Projects (.MTD and .MTP) on the two platforms must be "in sync". The last project installed (downloaded) in the controller is the default project to be restored on powerup. The name of that project (.MTP) is stored in a pointer file on the system card: **POWERUP.PRJ**.

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MotionDesk creates project files to record the unique configuration settings of each Motion Control Project that

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Notes: <u>Motion Desk creates project mes to record the dinque comignation settings of each Motion Control Project that</u> you create. These projects reside on your development PC (with .MTD as a filename extension) and also on your <u>ORION Motion Controller System Card (with .MTP as a filename extension)</u>. The name of the current ( open ) MotionDESK project (.MTD) is displayed in the title bar of the various MotionDesk windows.

### **Project Synchronization:**

When MotionDesk is actively working with an ORION Motion Controller, the Motion Control Projects on the two platforms must be "in sync". Most MotionDesk windows (such as Console, Trace, AxisTune and Upgrade Director) force a Sync to occur when they are invoked. Other MotionDesk windows (such as Direct Mode, Project Navigator and System Information) are designed to work properly no matter what project may exist in the ORION. Projects lose synchronization when you change configuration settings, add, remove or modify a program module, or change the active project in either MotionDesk (by loading a new project) or the ORION (by changing the System Card). Synchronization will automatically be restored as soon as you perform any MotionDesk operation that requires

synchronization. You can also force project synchronization at any time by selecting Sync Project with ORION.

When synchronization of the project is requested, MotionDesk prompts you with the Project Synchronization dialog, asking if you want to Downloading your project to the ORION, or Uploading your project from the ORION. When you choose to Check a Motion Control Project from the ORION, the Motion Project (MTP) on your ORION is compared with the current project on your development system. If the projects are identical, then they are considered to be "In Sync". You can also choose not to synchronize or check by pressing the cancel button.

### **Clear Variables:**

MotionDESK properties indicates (by a check-mark present in the "Clear Variables" field) that all nonvolatile variables in ORION will be cleared when the ORION is synchronized with MotionDesk. To check, open "View - Preferences" to display Properties.

## MotionDesk Properties

#### Clear Variables

Check this option to indicate that all non-volatile variables in the ORION motion controller should be cleared when the ORION is synchronized with MotionDesk.



Notes: The Ormec FTP folder is an extension of the Windows Explorer that allows access to the MotionBASIC System

Card installed on your Orion motion controller.

To display the FTP Folder window, click on the FTP Folder icons or open "My Computer".

File Transfer Protocol: The FTP Folder allows files to be transferred between the MotionDesk development computer

and the ORION Motion Controller System Card.

Point-to-Point Protocol:	Exploring - OrionPPP						- 🗆 ×
Windows supports PPP	<u>File Edit View Too</u>	ls	<u>H</u> elp				
connections, a commu-	🚘 OrionPPP		▼ € % ×	X 🖻	a > >		
nications protocol for	All Folders Contents of 'OrionPPP'						
transmitting information	All Folders		Contents of Orio	nPPP			
over standard telephone	🝰 Desktop 🔄	•	Name	Size	Туре	Modified	Attributes
lines.	🖨 🚚 My Computer		APPLSUBS.BAS	3 KB	BAS File	07/29/97 10:49:00	A
	🗉 🚽 3½ Floppy (A:)		AXISTUNE.BAS	17 KB	BAS File	08/01/97 02:17:00	A
	🗄 🖅 🖅 Ms-dos_6 (C:)		PER4DEMO.BAS	16 KB	<b>BAS File</b>	08/05/97 10:17:00	A
	Dial-Up Networking		🖻 ER4HDLR.BPS	37 KB	<b>BPS</b> File	08/01/97 02:17:00	A
			PER4QP5C.BAS	2 KB	<b>BAS File</b>	07/29/97 10:34:00	A
			🔄 ER4QP5C.MTP	4 KB	MTP File	08/05/97 10:28:00	A
	E Stetwork Neighborhood		🖻 ER4QP5C.QPL	29 KB	QPL File	07/28/97 05:17:00	A
	Recycle Bin		📓 POWERUP.PRJ	1 KB	<b>PRJ File</b>	08/05/97 10:26:00	A
	- recycle bill	-	🗟 QP4TOOLS.BPS	2 KB	<b>BPS</b> File	07/30/97 08:50:00	A
		-	VUSERTUNE.BAS	2 KB	BAS File	08/01/97 02:17:00	А
	10 object(s)						

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<b><u>C</u>FTP root at</b> File Edit	t orionppp -	- Internet Exp	olorer Help	_ <b>_</b> X	
Back Adc	iress FTP://0	DrionPPP		Links	
FTP root a	t OrionP	PP			1
06/29/99 08:57 06/29/99 08:57 06/24/99 03:38	AM AM AM	3,731 MACHINE 38,827 ER4HDLF 1,835 QP4TOOI	8.MTP R.BAS S.BAS		
06/29/99 08:57 06/29/99 09:48 06/26/99 03:08	AM AM AM AM	1,933 GETDATA 8,554 SECTION 20,070 DISPLAY	IL.BAS A.BAS II.BAS 7.QP2		
06/26/99 10:52 06/29/99 09:48 06/29/99 09:48	AM AM AM	440 JOBDATA 9 POWERUE 2,080 LOGFILE	A.CSV P.PRJ G.BIN		
Done					1.
RMEC SYSTEMS CORP	colorer with the a	address FTP://Orig	INSTITUT	TE FOR AL ANCED MOTION	N CONTROL TECHNOLO
can be retrieved from	n the ORION Me	otion Controller Sy	stem Card.		<u></u>
	-				
	Eile Ed	UNE.BAS at it View Gr	o <mark>rionppp (F</mark> D Eavorites	TP) : Heln	
	Back	Address ftp://	orionppp/USEF	RTUNE.BAS	
	- ' \$Log: ' \$Revi:	file: /MDesk/ sion: 10 \$	AxisTune/US 3:06p \$	ERTUNE.BAS \$	
	- ' \$Au ' \$Au	thor: Gas \$			
	AxTu.Use: move for return	rPre: 360 in 500			

AxisTune v3.0.0 [(	OrionPPP] ?
	Move for 8160 in 150, 40, 40
VelCmd x10.0	Axis A - Position mode
VelMon ×10.0 × DrvMon max ×20 × min	
PosErr max     X50.0     min     Auto Scale     Cursor     Overlay	AxisTune         114       RPM         68       RPM         11       %         29       Counts         AxisTune         Right click on scope trace above to toggle display of tuning menu
<u>S</u> cope	Tuning Parameters
Enable Motor	Index Motor Disable Motor Axis A Repeat index
Status: Processing cap	ture data
MEC SYSTEMS CORP	ΙΝΥΣΤΙΤΙΤΕ ΕΩΡ ΔΟΥΔΝΟΕΩ ΜΩΤΙΩΝ CONTROL ΤΕ

*Notes:* Axis Tune requires no programming to get your motors and drives TUNED to your system load. Built-in and user modifiable test motions with default parameters can be adjusted to meet your system inertia load requirements, allowing fine tuning of your system's DSP loop response. All modifications applied to the loop parameters are implemented dynamically, with visual feedback of their effect displayed on the above color scope. Final adjustments can then be stored in the configuration file for your project.

# Preparation before using AxisTune

**AxisTune.bas** is a MotionDesk library module that allows you to exercise a motor with a standard trapezoidal index. This library module is a MotionBasic subroutine that defines and executes the index motion for MotionDesk.

Eile	<u>P</u> rojNav	<u>E</u> dit	T <u>o</u> ols	<u>V</u> iew	<u>D</u> ebug	<u>W</u> indow	<u>H</u> elp	_ B ×
D 🖻 🖫	am Modules	III	<u>A</u> xis	Tune	6			₽ <b>? №</b>
Axis Tune	Axistune.bas sertune.bas ;	Inse Inse	ert Mod rt Librai	<b>ule</b> y Modu	le			
Adding A n the Motion modules to	<b>kisTune:</b> onDesk Pre o your proje	oject Na ect.	avigator	tree, ad	d the Axis	sTune.bas a	Ind UserTu	une.bas librar

Notes: WARNING! It is strongly recommended that the servo system is initially tested with the

motors shafts mechanically disconnected from any machine or load. AxisTune test program is

generic in nature and is intended for use as an exerciser for the system's motors.

NOTE: All axis tune variables start with "AxTu."

UserTune.bas is a MotionDesk library module that allows you to exercise a motor with custom motion profiles in

addition to the default trapezoidal index. User Tune is a user-defined MotionBasic subroutine that defines and executes

the desired custom index motion. The sample UserTune.bas supplied with MotionDesk defines a simple sinusoidal

motion.

#### Preparation before using AxisTune and User Tune:

1. In the MotionDesk Project Navigator tree, add the AxisTune.bas and UserTune.bas library modules to your project.

2. Optional: Edit the User Tune module as required to define your custom motion.

3. Start AxisTune by pressing the AxisTune Icon. NOTE: DO NOT USE THE RUN ICON!

4. Optional: Check "User supplied motion subroutine" in the Index Setup tab. AxisTune is now configured to use your custom motion profile.



#### Notes:

**Index Setup** allows you to define the shape of the index command that is used to exercise the servomotor under test. **Index Distance The** distance (in counts) that the motor will move during one index command.

Index Time ...... The time required to move the full Index Distance.

Direction ....... Forward (+) or Reverse (-), as defined by CW.FWD@, also perform an index in each direction (+/-)

Capture window allows you to define the shape of the window that displays the index command that is used to exercise the servomotor being tested.
 Window Size ... The Scope capture window is normally configured to start 10 msec before the beginning of the index, and stop at the end of the dwell time. Check Fix window size to set the screen width to that duration.
 End of WindowUse the upper slide control, or enter the desired duration (after the start of the index) to end the capture window. If Window size is fixed, changing this parameter will change Start of Window proportionally.
 Start of Window Use the lower slide control, or enter the desired time (before the start of the index) to start the capture window. If Window size is fixed, changing this parameter will change End of Window proportionally.
 Buffer Size ...... The Capture buffer size field displays the number of data points that will be captured for display in the Scope window. This field is read-only.
 Maximum Size The Approximate max. capture window field displays the approximate maximum duration, in seconds, that can be displayed in the Scope window. This field is read-only.



Notes: USERTUNE.BAS is a MotionDesk library module that allows you to exercise a motor with custom motion

profiles in addition to the default trapezoidal index. User Tune is a group of three user-defined MotionBasic subroutines

that define and executes the desired custom index motion. The sample USERTUNE.BAS supplied with MotionDesk

defines a simple sinusoidal profile motion.

### Library file USERTUNE.BAS

### AxTu.UserPre:

' This is where you put any code required to set up your user defined motion. This includes preparing cams

' or profiles, starting a pacer axis, setting up a GEAR AT, etc. This code will be called every time you press the ' Index button on AxisTune.

index putton on AXIS I une.

Return

### AxTu.UserMotion:

' In this routine place the code to execute the motion(s) that you want to capture.

'Keep this routine short!

Return

### AxTu.UserPost:

' In this routine put any code that you want to execute after the motion is complete.

'An example would be stopping and disabling a pacer axis.

Return



# Notes: Display Window: The Display Window shows up to four axis variables (VelCmd, VelMon, DrvMon, & PosErr)

as the selected servomotor responds to a command, as defined in the Index Setup tab. The current MOVE parameters

or "User defined motion" are shown above the window.

Adjust Gains: A right-click in the Display Window will bring up the Adjust Gains window, allowing you to adjust axis loop gains while you observe how the axis responds to the changes. See Tuning parameters.

Auto Scale:	If Auto Scale is checked, the scope traces are automatically displayed full-scale with each index.
Cursor:	If Cursor is checked, a vertical marker is shown in the display window, and the actual values of the displayed traces at the mark are displayed in the lower left quadrant of the screen. You can use the mouse (or the cursor keys) to move the marker to any point on the time axis of the display window, in increments of 1 msec.
Overlay:	If Overlay is checked, the screen is not cleared before a new index is displayed. This allows multiple traces to be displayed as you adjust loop gains, or observe the influence of external forces on the axis.

Axis	Tune	- Status &	& Control	buttons		
E Status:	nable Motor	Index Motor	Disable Motor	Axis 1		☑ <u>R</u> epeat index <u>Q</u> lose
Statu seque	ence. This mes	sage pane displa nessage text is dis	ays the operationa splayed until a new	status of Axis status messag	Tune during a le is displayed	an Index Motor □ <u>R</u> epeat index
Status: If an a an ap	ASYNCH ERI Press Reset I asynchronous	ROR: Axis fault (ERR Fault to Reset s error is detected f ror message is dis	t 1911), FAULT@={7} by AxisTune, the m played.	, AFAULT@= 2, A essage pane ba	LARM@= 17,	<u>Close</u>
ORMEC SYSTE	EMS CORP			INSTITUTE	FOR ADVANCED MOT	ON CONTROL TECHNOLOGY
es: able Moto ex Motor:	r: Enable th	e selected motor.	MODE@ will be se ecute the MOVE c	et. ommand define	ed in the Index	Setup tab.
able Moto	or: MODE@	will be set to 0, ar	nd any faults will be	cleared.		I
is Selectio	on: Select ar	n axis to exercise	from the list of axe	s available to ye	our ORION Mo	tion Controller.
peat Index	c: If this opti	on is checked, the	MOVE will repeat	ndefinitely. It ca	an be stopped	by removing this ch
ose:	Use this t	outton to exit Axis	Fune.			

A	xis Tune - Tuning Parameters	
	-	
8	AxisTune v3.0.0 [OrionPPP]	Adjust Gains ? X
	Close Loop       MAC-DE003A1/I         C Velocity       Velocity Loop         Mode@=4)       Time Constant:         Position       Scurve:         Mode@=5)       Scurve:	2 Inertia .00033 VLTC 3 mSec
	Loop Tuning Factors	Scurve U 3 %
	Kvi Velocity Integral: 100 1 %	Kvi 100 • %
	Kp Position Gain:         100         %         500           1         1         500         500	Kp 100 * %
	Kpi Position Integral:	Kpi 0 1 %
	Kaf Acceleration Feedforward:	Kaf 0 1 %
	Kvf Velocity Feedforward: 100 * % 0 · 200	Kvf 100 - %
		Kva 100 4 %
	t <b>⊒</b> bri <u>T</u> uning Parameters	
ORM	EC SYSTEMS CORP INSTITUTE FOR ADVANCED	MOTION CONTROL TECHNOLOGY
Notes:	The Tuning Parameters tab of AxisTune allows the adjustment of servo loop gai	ns and related parameters
Positio	n Enable both the Position and Velocity Control Loops, and operate this axis in	Position Mode MODE@ =5
Velocit	y Enable only the Velocity Control Loop and operate this axis in Velocity Mode	e (MODE@ = 4).
VLTC@	2 The Velocity Loop Time Constant is used to set the velocity proportional gain	n of the servo loop.
SCURV	<b>E</b> @ defines the percentage of the velocity ramp that will be "smoothed" during M	IOVE motion of this axis.
INERTI	A@ Total Inertia is the sum of the inherent inertia of the motor, and the inertial lo	ad seen at the motor shaft
TRQ.G	AIN@ Torque Gain is based on the motor and drive selected for an axis.	
KVI@	Velocity Integral. Higher values result in an underdamped, lower values yield n	o improvement in response
KP@	Position Gain. Higher values result in an underdamped, and lower values yield	d an overdamped response
KPI@	Position Integral. Set KPI@ to 100% for applications where position error d	uring motion is critical.
KAF@	Acceleration Feedforward. Higher values can enhance servo response and	accuracy.
KVF@	Velocity Feedforward gain factor for a servo axis.	
KVA@	Velocity Observer Sensitivity. Lower values will smooth low speed motion, but	ut increase settling times or
	quick stops.	

Project Options: Current Project file: C:\Program Files\ORMEC\MotionDesk\AxisTune.MTD Update Project Velocity Monitor: Velocity Monitor: Velocity Monitor: Velocity Monitor: C: VELACT@ C: V	Storage options: Current printer: HP LaserJet 5Si/5Si MX PS Print current Scope trace Save captured data to file Load options: Load captured data from file © Load trace data only © Load trace data qains and index settings to the current axis
	Options
ORMEC SYSTEMS CORP	INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY
Notes:         The Options tab of AxisTune allows y           Project Options:         The Current Project file shows           Select Update Project if you want to save the Tuning	You to configure AxisTune to suit your preferences. The name and full path of the Motion Control project under test Parameters to the Current Project.

DRV.MON@ if you want to display the Filtered Drive Command instead. If DRV.MON@ is selected, DMTC@ can be set in the range 0-200 msec as the filter time constant. The default is 1 msec.

Storage options: The Current printer shows the name of the current default printer. This is the printer that will be used to print the Scope trace. The default printer can be selected through the Windows Control Panel . Select Print current Scope trace if you want to print a copy of the current Scope trace. Select Save captured data to file if you want to save the current Scope trace for later review and analysis. The Data file to save dialog is displayed, allowing you to save the captured data to a Comma Separated Data (CSV) file.

Load options: Select Load captured data from file if you want to display a previously saved Scope trace for review. The Data file to load dialog is displayed, allowing you to select a data file to load. If Load trace data only is selected, the current Tuning Parameters are preserved - only the trace is recalled. If Load trace, gains & index settings... is selected, all of the stored parameters are recalled.

MotionDe	sk
<u>File E</u> dit	T <u>o</u> ols <u>V</u> iew <u>D</u> ebug <u>W</u> indow <u>H</u> elp
0 🖻 🖬 🧏	Axis Tune 🔣 🔛 💥 🖼 🔛 🔛 🔛 🖆 🔗 🤗 🐶
X BB B	Eiler Director
	MotionPad Opgrade Director
	Upgrade Director 📐
Joan	
🗝 🏟 Up	ograde Director ? 🗙
2	To install new software from floppy disk, CD-ROM
	The following software can be removed from your system card. Select one or more modules from the list <u>Remove</u> and then click Remove
No M	IBXs Installed

Notes: directories under the MotionDesk directory. These data files are placed into the proper directories with the installation programs named MB-UPG-4 for MotionBASIC 4.0 operating system upgrades and MBX-UPG-4 for MotionBASIC 4.0 Extension upgrades. **Get the files quickly using the World Wide Web** All MotionBASIC software update programs MBX-UPG-4 and MB-UPG-4 are available free on the ORMEC User's web to download or you may order them on floppy disk for a nominal handling fee from the ORMEC sales office directly.

ORMEC User: Eile Edit ⊻ie	<mark>: Home Page - ORMEC Int</mark> e w <u>G</u> o F <u>a</u> vorites <u>H</u> elp	ernet Explorer		×
User.	MotionBASIC v4.1.3			
HELP FILES TECH NOTES DOWNLOAD AREA		This update will allow you to of MotionBASIC 4.0.× to Moti supporting Windows Help do		
	Filename: mb413.exe	File Date: 04/13/1999	File Size: 2463 Kbytes	
Dewnload Area PRODUCT MANUALS FEEOBACK SERVICE BULLETINS TRAINING COURSES LINIK TO Online ON WWW CONTACT	Installation Direction Download mb413.exe <u>A</u> s' or 'Save Target Run this self-extractin install the data files re Then run <u>MotionDesk</u> MotionBASIC on your Reset the ORION cor			
Shortcut to down	load.htm			//

pen install.dat Look in: 🔄 MotionDesk 🛛 도	Chi	grade Direct	: <b>or</b> install:	Check install.	MBX file lists the names of all ( oftware that is available for inst the box next to each file that y Files displayed in blue are alre	ORION allation. ou want to ady installed.
	s	oftware	Version	MCs	Description	Dependency
mb_upg		MBX-MAP	3.00	0	MAP Reference Variables	no
MBX Supporting file MB4.0.0		MBX-QP	2.00	200	QuickPanel Communications	MBX-MAP
MB4.1.0		MBX-DF1	2.00	300	DF1 Communications	MBX-MAP
Templates		MBX-DH	3.00	500	Data Highway	MBX-MAP
- MBX Support		sddhp.mbx	5.40		Data Highway Plus Driver	MBX-DH
i⊒ • <b>⊡</b> mbx_upg		sddh.mbx	5.05		Data Highway Driver	MBX-DH
		MBX-MDB	3.00	300	Modbus Communications	MBX-MAP
		MBX-PFB	1.00	300	Profibus DP Slave	no
MBX5.0.0		pfbprofi.ss1	1.11		Profibus Driver	MBX-PFB
install* dat One		MBX-S908	3.00	500	S908 Remote I/O	MBX-MAP
		mdem.mbx	2.00		S908 Driver	MBX-S908
Files of type:   Install.dat Canc					MotionCredits available :	1300
C Open as read-only					MotionCredits required :	1100
i open da Iedd only			System c	ard spac	e available before installation	4374 Kł

**Open install.dat:** Browse through your file system until you locate the ORION software installation file (**install\*.dat**) that you want to install from. When you find the installation file, select it (or type the name in the File name box) and click the Open button to continue. Use the Cancel button if you don't want to install new software at this time.

**Select software to install:** The following information is displayed for all files available for installation:

 The name of the software.
 Version information.
 MotionCredits needed to use the software.

 A brief description of the software.
 Any software dependencies

Select a software files to install by clicking on the check box to the left of the name. You may select any number ofsoftware files.Note:Software that is already installed on your system is displayed in blue.

**Dependencies:** If a software file requires another to function, the required file is displayed in the Dependency column. When you select software that has a dependency, the required file is automatically selected as well.

**Check MotionCredits:** Each installable MBX requires a certain number of MotionCredits to operate. If you install more MBX's than you have MotionCredits to use, you will not be able to command motion on any axes. This quantity is set by the ORION Hardware Key, and can only be changed by replacing the key with another. The MotionCredits required field displays the number of MotionCredits required to operate all of the MBX's you have decided to install, plus all of the MBX's currently installed, plus an additional 600 MotionCredits to support MotionBASIC. If this quantity exceeds the MotionCredits available, the MotionCredits required field is illuminated in red as a warning.

**Examine System Card space available:** If you do not have sufficient System Card space for all selected software files you must either remove one or more files, or upgrade your ORION System Card.

**Proceed with Installation:** When you are satisfied that you have selected all the software files you want to install, and that you have sufficient MotionCredits and Disk Space, click on the Finish button to start the Installation.

**Installation Status:** If the installation is successful, you will be prompted to Disconnect MotionDesk from the ORION, and to reset the ORION to complete the installation and enable the new ORION software.

The Upgrade Director Installation Status is maintained in a log file (**buddy.log**) on your development, detailing the changes made to your ORION software.

## Console Window

ORION program input and output is displayed in the Console Window. This window will display user input and program output on a first in-first out basis.

ile <u>F</u> ile	<u>C</u> onsole	<u>E</u> dit	T <u>o</u> ols	<u>V</u> iew	<u>D</u> ebug	<u>W</u> indow	<u>H</u> elp	_ & ×
0 🖻 🖪	Show <u>T</u> o	oolbar		3.33	**	. 🖭 🧯 😰	S -	<b>% №</b>
	<u>C</u> apture	On		豊	Cor	sole		
	Set Cap	ture Fil	e Name					
				Console	Window			
				🧖 Ti	ne Console	window displa	ys User in nd the OP	put to
				respons	e to that inp	sic program a ut.		
				respons	e to that inp	ut.		
)isplay tł	1e Console	Windo	w	respons	e to that inp	ut.		

*Notes:* loaded in MotionDesk and the ORION must be running a MotionBASIC program. Select the Console icon from the

MotionDesk Toolbar to display the window. Start your MotionBASIC program, either by selecting Run from the MotionDesk Debug menu.

The Console window will display all user input and program output for your MotionBASIC program until you stop the program in the ORION.

**Console with a Running Program:** To display MotionBASIC Console while the program is running, you need to open the Console window. If you don't have a project loaded, select New Project from the MotionDesk File menu to enable the Console window. The Console window will now track the execution of the MotionBASIC program. Console will continue until the program in the ORION stops running.

**Clearing the Window:** The bottom 25 lines of the Console window are cleared as a result of a MotionBASIC program executing the CLS statement. The entire Console window is automatically cleared when the window is closed.

 Program Output:
 Program output to the Console Window occurs when the MotionBASIC program running in ORION executes one of the following MotionBASIC,

 Functions:
 SPC, TAB,
 and
 Statements: PRINT, CLS, CLREOL, COLOR, LOCATE, WIDTH

 User Input:
 User input to the Console Window is only possible when window is active, and the MotionBASIC program running in ORION requests user input. This can occur as a result of one of the following MotionBASIC,

 Functions:
 INKEY\$, INPUT\$
 and
 Statements: INPUT, INPUT @, KEY, KEY (n), ON KEY

Capture File
MotionDesk
Image: Show Toolbar       View Console       Window       Help       Image: Show Toolbar
✓ Capture On Set Capture File Name Capture File Name Capture File Name
Enter a file name where data will be stored:          Record_My_Activity       Browse         D       Append to this file
Include nonprintable characters       Image: Command:
Toggle the state of the capture file     Connected       ORMEC SYSTEMS CORP     INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY

### Notes: Set Capture File Name:

Use this command to set the name and path of a window capture file. The Capture File Name dialog is displayed, <u>allowing you to identify a capture file for the active window. Both the Direct Mode and Console windows support capture</u> files. Set Capture File Name is not available for a window if Capture On is checked for that window. Capture On is automatically checked whenever a capture file is set.

Shortcuts: Menu: DMode | Set Capture File Name

Menu: Console | Set Capture File Name

### Capture On:

Use this command to allow or disallow the capture of window information. Both the Direct Mode and Console windows support capture files. A check mark appears next to the menu item when capture is enabled. Capture On is not available if a capture file has not been identified. Capture On is automatically selected when a capture file is set with the Capture File Name dialog . Shortcuts: Menu: DMode | Capture On Menu: Console | Capture On

	MotionDesk - Direct Mode File DMode Tools Debug View Debug Help Toolbar See T MotionBASIC Version 5.0.0 Copyright (c) 1987-1999 ORMEC Systems Corp. 500000 Program Bytes Free Motion Credits: 1300 installed, 550 required List of Faults: E-STOP OK Input Opened Axis.List@ = {1,2} MAP/3.0.4 installed QE/1.0.0 installed OK
	Command:
	Display the DirectMode Window Connected
ORI	MEC SYSTEMS CORP INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY
Notes:	To use the Direct Mode window, a project must be loaded in MotionDesk.
1.	Load a new project (Select New Project from the MotionDesk File menu).
2.	Select the Direct Mode icon from the MotionDesk Toolbar to display the window.
3.	If MotionDesk is not currently connected, an attempt to connect is generated.
4.	The MotionBASIC Sign On message (see above example) will be displayed, with:
	MotionBASIC Version and Copyright information.
	Memory report.
	ORION Motion Credits installed, and credits in use.
	Axes (AXIS.LIST@) installed.
	ORION fault (FAULT@) status.

	nDesk - Direct Mode		_ 🗆 🗙	
Eile <u></u>	D <u>M</u> ode T <u>o</u> ols <u>V</u> iew	<u>D</u> ebug <u>W</u> indow <u>H</u> elp	_ 8 ×	Caution:
MP.CONF OK MODE@=5	<ul> <li>✓ Show <u>T</u>oolbar</li> <li>Toggle Input <u>P</u>os</li> <li><u>C</u>apture On</li> <li>Set Capture File Name</li> </ul>	Cut Toggle In Cut Paste	▲ nput Pos	Since Direct Mod commands run cor currently with a run ning MotionBASI
OK MOVE 1 OK HALT OK	Command Entry Direct instructions to the C Command lines of up to 12 <u>Commands, Statements</u> and <u>Fur</u> colons (:), to make up a single co ✓ To send the command in the button. The ORION will echo <u>Pane</u> , and then display an approp X To clear the Command edit anywhere in the edit box to	DRION can be typed into the Command edit box 27 characters are supported. Multiple MotionBA <u>nctions</u> may be combined on a line, separated command line. e edit box to the ORION, press <b>Enter</b> , or selec o received commands to the <u>Direct Mode Resp</u> priate response. box, select the Cancel button. You can also rig access any of the Windows <u>clipboard commar</u>	x. ASIC by tt the <b>OK</b> tonse ght click tds.	ference with the op eration of the runnin program could hav unforeseen results.
			•	
•			- J X	
∢  Comma For Help	nd: MOVE 1 FOR 3600 IN 4000 HALT MOVE 1 FOR 3600 IN 4000	Enter a MotionBASIC command		

Notes: You can now use the Direct Mode window to interact with your ORION Motion Controller.

Direct Mode with a MotionBASIC Program. If you have a program loaded in the ORION, you may use the Direct Mode

window to run any subroutine contained in your program, in addition to executing direct commands. Enter the name

of the subroutine in the Command edit box and press enter. The subroutine will run to completion, or until MotionDesk

is disconnected from the ORION.

Direct Mode with a Running Program

If you have a program running in the ORION, you may still use the Direct Mode window to execute direct commands

or run a subroutine contained in your program.

# MotionDESK Direct Mode Shortcut Key's

The Alt-Shift keys are provided to minimize typing in the Direct Mode Command box. By pressing [Alt] and [Shift] with one of the letter keys, a command will be automatically entered into the Command box at the cursor. You can sequentially combine several Alt-Shift Keys if desired <Alt Shift + *letter*>

A REPEAT	N Normalize Axes
В	O Clear Overtravel
C New Clear Faults	P Position Status
D Dump Thread	<b>Q</b> Error Stop
E Error Status	R REPEAT
F New Fault Status	S MODE Status
<b>G</b> GEAR_	T Torque Status
H HALT_	<b>U</b> UNTIL_
I MOVE FOR_(Index)	V Velocity Status
J MOVE AT (Jog)	W WAIT_
K Show Servo Gains	<b>X</b> AXIS.SET@={
L	Y
M MP.CONFIG	Z Axis Set Status

Notes:

Note: You need to press Enter to send the resultant command in the edit box to the ORION

<alt c="" shift=""></alt>	AFAULT@=0 : FAULT@=0 : WAIT 300 : MODE@=
Clear	

<alt e="" shift=""></alt>	Error 1910 E-Stop OK input open
Error Status	Module 1: Filename.bas, Line: 15 Thread: 1 Process: 0

**Alt Shift F>** {} 1st of {} faulted. FAULT@:{6} AFAULT@: 0 ALARM@: 0
Fault Status

#### <Alt Shift N> MOVE AT 30 UNTIL ZREF@:WAIT 100 AFTER AT.REST@:POS.ACT@=0 Normalize Axes

# <Alt Shift P> ? POS.CMD@, POS.ACT@, POS.ERR@, "Axis:" INT(AXIS.SET@);SPC(6) Position info

#### <Alt Shift Q> ERROR 1910 Note: This will force a E-Stop Open ERROR STOPPING YOUR MACHINE.

Note: The file **DMKEYS.INI** contains this information.

# MotionPad Text Editor

MotionPad text editor provides powerful program editing tools to speed the development of your application program.

Mot	ionDesk							
<u>F</u> ile	<u>P</u> rojNav	<u>E</u> dit	T <u>o</u> ols	<u>V</u> iew	<u>D</u> ebug	<u>W</u> indow	<u>H</u> elp	
0 🖻	8 50		<u>A</u> xis	Tune		1 🖹 😬 💾	2 5 6	
Pro	piect Navio	ator	<u>F</u> iler					
	Jnit Propertie:	S	<u>Motic</u>	onPad	art .		Text Editor	
🕀 📆 I/	/O Properties		<u>U</u> pgr	ade Dir	ector			
E- C Axis Settings								
Program Modules								
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Keyboard Latch State: ..... CAP-Caps Lock , NUM-Num Lock , SCRL-Scroll Lock.

System Time

..... File is read only.

R/O

## Manual & Automatic Program Start

### **Normal Powerup Sequence**

Under normal operation, a power cycle or controller reset causes the ORION Program Buffer to be restored from the System Card. The last project installed in the controller is the default project to be restored on powerup. If the restored project code contains the label "**MAIN**:" then program execution will automatically commence at that line of code in the

program buffer.

#### Manual Program Start **DEBUG.MAIN:** Debug.Flag = True ' This code will only run when you ID.Debug = Start(Debug.Thread) ' press the RUN Icon. Trace Val A.B.C MAIN: Automatic Program Start **MP.CONFIG** ' This code will be executed after a ' Red Reset button or Power Cycle. Init.Map Init.QP Init.DIOs INSTITUTE FOR ADVANCED MOTION CONTROL TECHNOLOGY ORMEC SYSTEMS CORP

Notes:

Automatic Program Start (formerly provided by line number zero)

Any program which is required to automatically start after successful completion of the controller powerup sequence

must now contain the label, "MAIN:". This is the automatic entry point of program execution.

**Manual Program Start** (formerly provided by the RUN command, now the RUN Icon)

Any program which is required to start from a command by the user at the development environment must now contain

the label, "DEBUG.MAIN:" This is the manual entry point of program execution, which is begun after the user clicks

the "run button" in the MotionDesk programming environment.

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# Debug Menu

Motion	Pad								
<u> </u>	<u>E</u> dit	<u>S</u> earch	Text	<u>D</u> ebug	T <u>o</u> ols	<u>V</u> iew	<u>W</u> indow	<u>H</u> elp	_ 8
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e		BB S	Т	Abort		Ct	rl+Break		
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		p p	e						

*Notes:* **Debug Toolbar:** This toolbar is normally displayed across the top of the application window, below the

menu bar. The toolbar provides quick mouse access to many tools used in MotionPad.

### Debug Commands:

To use the debugging commands:

- 1. Start MotionDesk and load the project that includes the program that you want to debug.
- 2. Select the Sync Project with ORION command.
- 3. Display the Program Module branch of the Project Navigator and double click on the module that you want to debug.
- When MotionPad opens, the module you selected will be displayed, and the Debug menu and toolbar will be displayed.

## Error Mark

**Error Mark:** The Error mark, a blue bullet, indicates the line where MotionBASIC execution stopped due to a program error. If MotionDesk is running when a MotionBASIC error is encountered in a program, a MotionPad window is opened, with the newly marked program line displayed in the document window.

🕒 <u>F</u> ile <u>E</u> dit	<u>Search T</u> ext <u>D</u> ebug T <u>o</u> ols <u>V</u> iew <u>W</u> indow <u>H</u> elp	_ 8 ×
Rout	Goto Error Line Use this command to move the cursor to the error mark.	•
WHILE.W INIT.W WHILE -	Goto Line Ctrl+G Goto Error Line F4 Goto Debug Line	_
-   x=x+1	: Print @ 17,8 "Counter= ";x	_
ERROR: #1019:	Expected semicolon Ln 127, Col 1	•

*Notes:* <u>After viewing and editing the file, you can quickly reposition the cursor to the Error mark with the Goto Error</u> Line command. This mark is displayed until the program file is either closed and reopened, or until the program is run again. "Goto Error Line" command does nothing if there is no error mark.

Note: The Error mark is not displayed when MotionBASIC program execution is stopped by an asynchronous error.



*Notes:* File marks are a visual indicator that denote specific lines in your MotionBASIC program file. These marks are displayed along the left edge of the document window when MotionPad is in Debug mode.

**Breakpoint Mark:** The Breakpoint mark, a red dot, is displayed to the left of every breakpoint in your program. The Toggle Breakpoint and Clear All Breakpoints commands are used to set and clear breakpoints.

**Debug Mark:** The Debug mark, a black arrow, indicates the next line to be executed in your MotionBASIC program. This mark is displayed when MotionBASIC execution is suspended after a Single Step or Continue to Line command. This mark is also displayed, superimposed on a red dot, when MotionBASIC execution encounters a breakpoint. The Debug mark is displayed until the program is either stopped or run again.

Note: The Debug mark is not displayed when MotionBASIC execution is Suspended or Aborted by the user, or stopped by an error.

#### Using Breakpoints:

When a running MotionBASIC program encounters a Breakpoint, execution stops before the line is processed, and the line is displayed in a MotionPad window. At this point you can:

- Continue execution, with the Resume, Single Step, or Continue to Line commands (found in both the MotionDesk Debug menu and the MotionPad Debug menu).
- Examine your program with MotionPad.
- · Query your program in the ORION with Direct Mode .
- · Review the contents of the Trace buffer (If Trace was on).

You can disable an existing breakpoint by clicking on the checkbox next to the breakpoint in the Breakpoint dialog. Disabled breakpoints can be re-enabled by clicking on the checkbox again.

Single Step 喧	
MotionPad Eile Edit Search Text Eile Edit Search Text Maine Berger MAIN: debug.main: Single Step INIT:	□       □       ×         □       □       ×         □       □       □       ×         □       □       □       ×         □       □       □       ×         □       □       □       ×         □       □       □       ×         □       □       □       ×         □       □       □       ×         □       □       □       ×         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □       □         □       □       □
→ if not initialized tl clear nonvol "nv." nonvol initialized I I I I I I I I I I I I I I I I I I I	Single Step Use this command to execute the next line of the MotionBASIC program in the ORION. Shortcuts Menu: Debug   Single Step Toolbar:
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Execute the next line in the	program, then Suspend execution.

# Trace ON/OFF Control



TRACE can enable or disable the active tracking of all program statement execution to the MotionDESK Trace Window. TRACE ON added to a program, enables users to selectively activate a point within a program where the tracing of code execution should commence, and selectively determine at which point tracing should conclude ( with TRACE OFF). Trace On and Trace Off control can also be initiated (changed) with a control button or menu from the Trace Window.

TRACE ONCauses MotionBASIC to output a copy of the program line before it is executed.TRACE OFFCauses MotionBASIC to stop tracing the program.

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-	Show <u>T</u> o	olBar					
	<u>C</u> apture [	Data		Clear Trac	ce Log		
	T <u>r</u> ace Va	ls	50	1	Loop Captu	ire Data	
3183	Empty Tr	ace Log	58	1	Loop2.A	+3 Trace V	als
3184	SetLengt	th	36	1	Main.X	+32	ist with source
3185	Course V		66	1	Loop3.A	+4	ISC WITH SOURCE
3186	Source v	iew .	51	1	Loop1.B	+3	
3187	One Shot	Mode	59	1	Loop2.B	+5	
3188	<u>S</u> ave		37	1	Main.Y	+33	
3189 -	59 10	3 1	67	1	Loop3.B	+5	
Sequence	Thread #	Module #	Line #	Stmt #	Var Name	Var Value	-
or Help, p	ress F1			Sync'd	Connecte	d	

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*Notes:* Sequence: The Sequence column indicates the order in which program statements were executed, with

one (1) marking the first statement executed since the trace window was last initialized .

**Thread Number:** MotionBASIC can execute multiple programs concurrently. Each thread started in a MotionBASIC program is assigned a distinct Thread ID. The Thread Number column displays the Thread ID of every traced statement, allowing review of the processing of individual program threads.

**Module Number:** MotionBASIC programs can consist of several program modules. The Module Number column identifies which program module executed each statement. The Direct Mode window is Module zero (0), and the Modules shown in the Project Navigator window are numbered sequentially, starting with one (1). This column is only visible when the List with Source option is deselected.

**Line Number:** The Line Number gives the line of the program module that was executing, numbered sequentially form the beginning of the module (The Direct Mode window has a line number of zero (0)). Clicking on the Line # column header sorts the trace display by program module, line and statement number. This column is only visible when the List with Source option is deselected.

**Statement Number:** MotionBASIC program lines can consist of several MotionBASIC statements. The Statement Number identifies which statement in the program line was executing. Since each line must include at least one statement, the first statement is not numbered. Subsequent statements on a line are numbered sequentially, starting with one (1).

**Variable Name:** The Variable Name column lists variables whose value has changed during the trace. If a statement assigns a value to a variable, that variable is named here.

**Variable Value:** The Variable Value column lists the values assigned to variables during the trace. If a statement assigns a value to a variable, that value is shown here.

# Trace Val

It is often desirable when debugging programs to observe when an user variable value changes occur. The MotionDESK Trace Window supports this feature when running in value trace capture mode. With the **TRACE VAL** statement the user has the ability to establish and manage a list of variables that MotionBASIC "traces" when a value change is applied to that variable. While the Trace Window's "value trace capture mode" is on, these program lines are logged into the Trace Window.

ead # Module	# [ Lino # ]	<b>I</b> –				
	# Line#	Stmt #	VarName	Var Value		
1	9	1	А	+123		
1	10	1	В	+345		
1	11	1	С	+987	-	
Window		Sync'c	Connected			
	1 1 Window	1 10 1 11 Vindow	1 10 1 1 11 1 Window Sync'o	1 10 1 B 1 11 1 C Window Sync'd Connected	1 10 1 B +345 1 11 1 C +987 Window Sync'd Connected	1         10         1         B         +345           1         11         1         C         +987           ✓         Mindow         Sync'd Connected         ✓

Notes:

Syntax 1 ... TRACE VAL [ ON ] varlist Add variables with the "value change tracking" feature turned on.

Syntax 2 ... TRACE VAL OFF variist Remove (turn off) the "value change tracking" feature from variables.

Syntax 3 ... TRACE VAL OFF Remove (turn off) the "value change tracking" feature for all variables.

Syntax 4 (Direct Mode only) ... TRACE VAL LIST Reveal the current list of variables in "value change track-

ing" mode. A list of variables (separated by commas) to be added or removed from "value change tracking" mode.

TRACE VAL may be executed in either Direct Mode or as part of a program execution.

When used with ORMEC variables which are indexed by axes, the axes can not be specified in the varlist. TRACE VAL

will display changes to that ORMEC variable on all axes.

Bookmarks 🏲 😫 🏲 🖡	
Bookmarks are a convenient way to mark impo so that you can return to those locations quic column location in a specific program module in your program, bookmarks remain a part of	ortant locations in your MotionBASIC program ckly and easily. Bookmarks specify a row & of your MotionBASIC program. Once placed your program until you remove them.
MotionDesk - MotionPad         Image: Search Text Tools View Debug Winds         Image: Search Text Tools View Debug Winds	
Name: Name the BookMark Name: Name the BookMark Name File INIT: BookMark A pb1_mb40.bas BookMark B pb1_mb40.bas b=345 BookMark C pb1 mb40.bas	Add B40.F
C=987 MP.CONFIG OTL.FWD@=0 WAIT 2000 Col: 5 VOVD	<u>G</u> o to <u>C</u> lose ►
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*Notes:* Notes: Notes:

Automatic bookmarks are designated by a light blue flag in the left hand margin. Only nine automatic bookmarks are allowed. If you add more than that, the oldest bookmark is removed to make room for the new one. Use the Toggle Bookmark command icon on the toolbar to place an automatic bookmark.

Bookmark Commands - Use the Toggle Bookmark command to alternately create and remove an automatic bookmark at the current line.

Use the Next Bookmark command to move the cursor to the next bookmark in your MotionBASIC program. Both named and automatic bookmarks are included in this search.

Use the Previous Bookmark command to move the cursor to the previous bookmark in your MotionBASIC program. Both named and automatic bookmarks are included in this search.

Use the Delete All Bookmarks command to remove all of the bookmarks in your project. Note: To remove specific bookmarks, locate the bookmark and use the Toggle Bookmark command.

Use the Bookmarks command to display the Bookmarks dialog. This dialog allows you to insert and remove bookmarks in your program, and to jump directly to any named bookmark in your project.

# MB.DUMP file

The MBDUMP.BIN file is a binary file containing information about the status of an ORION Controller. This file is created automatically by MotionBASIC in the event of an ORION system failure.

		vvnen iv
ia File DMode Tools ⊻iew Debug Wi		ence of
		system
MotionBASIC Dump File	Manage MBDOMP	nization
A MotionBASIC Dump file was found on the ORIC MotionDesk connected:	ON System Card when	MBDUN
MBDUIMD RIN 198757 bytes: 07/12/99	•••	tionDes
MDDOMP.DIN, 190797 bytes, 07712799		age MB
What would you like to do with the file?		Deskto
Upload MBDUMP Delete MBDUMP	ОК	displays
	<b>_</b>	File dia
		options
Command: jnew restore	×××	
For Help, press F1	Connected	

When MotionDesk detects the presence of an MBDUMP file on the system card during Project Synchronization, it enables the Upload MBDUMP.BIN command in the MotionDesk File menu, and the Manage MBDUMP icon in the Motion-Desk toolbar. Invoking the command displays the MotionBASIC Dump File dialog, which presents three options for dealing with the MBDUMP file detected.

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Notes: Upload MBDUMP - Select Upload MBDUMP when you want to copy MBDUMP.BIN. The Save As dialog allows

you to specify the destination filename, disk and directory. The original MBDUMP.BIN on the system card is not affected by this operation. If the MBDUMP file was created by an ORION system failure, please call ORMEC Service (716-385-3520) for further information.

Note: If you do not elect to upload an MBDUMP file at this time, you risk the loss of the file in the event of another system failure.

**Delete MBDUMP** - Select Delete MBDUMP when you want to delete the MBDUMP file from your system card. The file will be removed and the dialog closed.

Note: This operation permanently removes the file from your system card.

**OK** - Select OK to close this dialog. The original MBDUMP.BIN on the system card, if still present, is not affected by this operation.