MotionPRO™
Installation & Operation

Communication & Programming Environment for
Generation III Controllers
GN3-PROf

19 Linden Park

Rochester, NY 14625

(716) 385-3520

May 16, 1995

COPYRIGHT NOTICE

MotionPRO™ and **MotionBASIC®** are trademarks of Ormec Systems Corp.

WindowDOS™ is a trademark of WindowDOS Associates.

Windows™ is a trademark of Microsoft Corporation.

Multi-Edit™ is a trademark of American Cybernetics. Products provided by Ormec Systems Corp may contain or be derived from portions of the Programs and Documentation supplied by American Cybernetics, Inc. under license to Ormec Systems Corp. Ormec Systems Corp has assumed responsibility for the selection of such Programs and Documentation and their use in producing and licensing MotionPRO™. American Cybernetics, Inc. disclaims all warranties with the respect to the use of such programs or documentation in the product(s), including without limitation, any warranties of merchantability or fitness for a particular purpose.

WARRANTY

Ormec extends no warranty with respect to the merchantability or fitness for any particular purpose for this software. It is the customer's responsibility to determine whether it is suitable for the specific application and whether it meets performance, reliability, and safety requirements when used in that application.

TERMS AND CONDITIONS OF SALE

All software sold or otherwise provided by Ormec is made available subject to Ormec's published Standard Terms And Conditions Of Sale.

TABLE OF CONTENTS

Chapter 1
Welcome

1. Welcome

This manual tells you about Ormec's **MotionPRO™** Software, a Communication and Development Environment for the Generation III family of controllers. The manual describes **MotionPRO™** and the software that forms it, how the software is installed on your development system, and how to use the software, and how to customize it to your own standards and style of operation.

The manual is divided into the following chapters:

Chapter 1	**Welcome** introduces you to this manual and how it is organized.
Chapter 2	**Description** covers the functionality of **MotionPRO™** and the accompanying software.
Chapter 3	**Installation** explains how to transfer the software from floppy onto your development system and how to connect your computer to a Generation III controller.
Chapter 4	**Invoking MotionPRO™** provides instructions on how to run the software.
Chapter 5	**Using MotionPRO™** provides fundamental instructions regarding the MotionPRO™ Environment, and describes the functions of the utilities available.
Chapter 6	**Testing the Servo System** explains how to run the test program initially supplied with each Generation III controller.
Chapter 7	**Generation III System Configuration** provides instructions on configuration activities.
Chapter 8	**Final System Configuration** provides instructions regarding the accommodation of real world parameters in a working Generation III control system.
Appendices	**Appendices** contain fundamental information on the software packages provided with the MotionPRO™ diskettes.

NOTE: This manual concentrates on Ormec software products.

In the appendices, this manual contains useful primary instructions on utility software that is provided as part of the **MotionPRO™** Package to enhance the user environment.

Chapter 2
Description

2. Description

MotionPRO™, an abbreviation for "Motion Programming" Environment, is the means to program and communicate with ORMEC's Generation III family of controller products. **MotionPRO™** is a PC-Compatible "windowed" software development environment.

It features user friendly menus for configuring your motion control system, a powerful program editor to speed software development, and both context sensitive on-line help and a MotionBASIC® Hypertext Manual for quick access to on-line documentation.

MotionPRO™ does not refer to a single program. It is the combination of software that makes up an elegant and easy to use communication and development environment.

MotionPRO™ runs on any IBM-PC or true compatible. The system requires a hard drive or the use of a RAM disk.

MotionPRO™ is designed to have an intuitive user interface. It continually displays prompts that describe available options and their keystroke instructions.

MotionPRO™ presents a menu bar with pull down menus. Each menu selection or "functional utility" is explained to the novice user by simply pressing the Help Key, <F1>, which pops-up a "Help Chapter" explaining the topic in question.

The primary function of **MotionPRO™** is to provide high speed serial communications between the user's PC, and the Motion Controller.

MotionPRO™ provides other important functions which include:

File Management - Load & Save Programs

Configuration - Servo Definitions, Loop Tuning, Set Limits, etc.

Access to Application Programs - Call Screen Editors, Perform DOS Functions, etc.

Direct Commands and Program Control - Start/Stop Programs, etc.

MotionPRO™ Setup - Set Baud Rate, Set COM Port, etc.

MotionPRO™ Help - On-line Manual of MotionPRO™ Instruction

Included with this MotionPRO Communications Program described above, ORMEC has provided the following software as part of the **MotionPRO™** Package:

WindowDOS™ **Multi-Edit™**

Hypertext On-Line Manuals **Ormec Servo Analyst Program**

MotionBASIC® Tools

The following summaries describe each of these software components.

WindowDos™ A menu driven, window presentation of disk files and DOS Functions. WindowDOS™ is memory resident for fast execution of DOS commands from any program.

Multi-Edit™ A comprehensive and effective "multiple-window" editing environment. A full feature screen editor that has an impressive array of pull down menus to make program writing and editing simple. Features an on-line help system providing an immediate response reference manual.

Hypertext A set of ORMEC Manuals that are accessible from within any program. The hypertext system is memory resident and quickly accesses manual pages from hard disk. A text sensitive feature allows the user to position the cursor on a command, statement, or Topic word, hit the "Hot Key" to call the manual, and the appropriate page in the manual is displayed on the screen.

Ormec Servo Analyst The OSA program was created to save system designers time and effort in analyzing high performance servo applications. OSA provides a methodical approach to analyzing system dynamics, which may avoid costly errors in servomotor & drive selection. OSA accomplishes this by leading the designer through a questionnaire. This approach develops a consistent and careful consideration of the dynamics of high performance motion applications.

MotionBASIC® Tools MotionBASIC® Tools are software application modules that are useful building blocks that can be incorporated into user programs. The modules support Operator Displays for both the MMI-840, Compact Industrial Terminal, and the OIT, Operator Interface Terminal devices. MotionBASIC® Tools are intended to save time and labor in completing an operator interface application.

Chapter 3
Installation

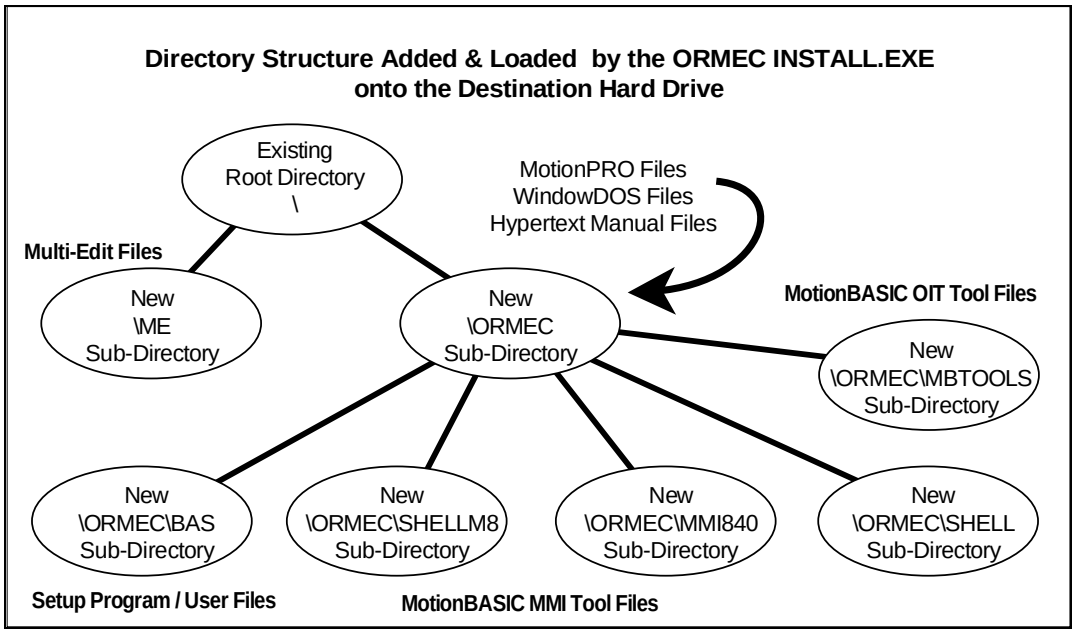
3. Installation

MotionPRO™ Software Packages are provided on 3.5" disks (1.44M) from ORMEC. The different package styles are:

MPR-SDK	Servo Developers Kit:	Full complement of software
MPR-SMK	Servo Maintenance Kit:	Excludes MultiEdit, WindowDOS, & MotionBASIC® Tools

An **INSTALL** command, found on the first diskette, will transfer MotionPRO™ files from the disks onto your development system's hard drive.

The installation creates subdirectories on the destination Hard Drive and copies files from floppy to these subdirectories. The resulting directory structure and the file transfers are shown in Figure 1.



Note: The software packages, **Multi-Edit™** & **WindowDOS™**, as provided on ORMEC diskettes, have been preconfigured to work in a complementary manner with the ORMEC Software packages. The manufacturers' original diskettes and original documentation are also provided. The original manuals that will provide extensive information on these software packages are:

WindowDOS™ User's Manual by WindowDOS Associates
Multi-Edit™ User's Guide and Tutorial by American Cybernetics

Please consult these manuals for detailed information, should the need arise.

Requirements: **Your system will need to have approximately 3.0 Mbytes of disk space available on the destination drive. This applies for all destination types including a conventional hard disk, laptop Hard RAM or a RAM Disk.**

Software Installation (See Appendix 6 for Windows installation instructions)

To start the install procedure, insert the Install Disk in a drive, and type

[f]**:** *<enter>*
INSTALL *<enter>*

where: [f] = the drive letter where the disk is inserted.

Example:

```
C>A:
A>INSTALL
```

In this example, the user's current drive is C Drive, as is evident by the prompt. The current drive is changed to the A Drive. The install command is then run from the A disk drive.

After starting the install procedure, follow the prompted instructions to complete the install procedure.

NOTE: In addition to file transfers, the installation procedure optionally will; 1) Modify your system's AUTOEXEC.BAT and CONFIG.SYS files, 2) Bypass modifications, 3) Construct an Example File.

The AUTOEXEC modification is simply the addition of the new **\ORMEC** directory and the new **\ME** directory to your existing DOS **Path**. The settings for BUFFERS and FILES in the CONFIG.SYS file are increased if necessary.

If the modification is selected by the user, it is done at the end of the installation procedure. Along with the modification, the pre-existing AUTOEXEC.BAT is saved as a backup file. The oldest backed-up filename will be AUTOEXEC.01, and on subsequent modifications, the extension of a the current backup file will be the last backup extension plus 1.

If the Example file construction is selected by the user, the example will have the filename, AUTOEXEC.EXM.

Hardware Installation

To connect your computer's RS-232 Communication Port to a Generation III controller, you will need to remove the cover from the front of the controller. It is held on by thumb screws. The RS-232 Development Port, J2, is located near the red & black push buttons.

This development port on the Generation III controller, J2, is an asynchronous RS-232 Serial device interfaced through a 6-pin modular connector. ORMEC provides coil-cord style cables for connection to the serial port which are compatible with IBM-AT style 9 pin connectors and with IBM-PC style 25 pin connectors.

To set up the port, press "F2" to put MotionPRO in **Select Mode**, then press "S" for the SETUP MENU. Use the arrow keys to pick the desired COM port.

THIS PAGE INTENTIONALLY LEFT BLANK

Chapter 4
Invoking MotionPRO™

4. Invoking MotionPRO™

The **MotionPRO™** environment is entered by using one of two methods. Each method involves executing a batch file.

Method 1

This method of starting MotionPRO™ uses MPRO.BAT.
MPRO.BAT performs three functions.

1) It changes the current directory to \ORMEC\BAS.
2) It loads the Hypertext manual system into memory.
3) It starts up MotionPRO™.

To start MotionPRO™, type the following command:

MPRO *<enter>*

Method 2

This method of starting MotionPRO™ uses MP.BAT.
MP.BAT performs one function:

1) It starts up MotionPRO™.

To start MotionPRO™, type the following command:
MP *[options]* *<enter>*
where the options are:

```
/C  = use CGA/EGA/VGA display adapter        /c  = color display
/M  = use MDA display adapter                /m  = monochrome display
/L  = use LCD display adapter                /l  = monochrome display
/S  = reduce "snow" on CGA display           /s  = turn off /S option
/B  = use ROM Bios for display               /b  = turn off /B option
/O  = enable mouse support                   /o  = turn off /O option
/I  = login to MotionBASIC at startup        /i  = don't login at startup
/p  = don't scan for ports COM3 & COM4
/T# = set timeout value, where #             /t# = same as /T#
      represents the new timeout value,
      in the range 1055 to 214700000 milliseconds
      (if no value specified, timeout = 1055)
/? = display these switch options            /h = same as /?
```

When either method is used, the monitor will display the startup screen for MotionPRO™. On this screen is the software version information. This is also displayed in the Menu Bar of the program.

MotionPRO™ is now in **Talk Mode** and is ready to communicate with a connected Gen III Motion Controller. By default it will automatically attempt to communicate with the Motion Controller, by performing a "Login". This "Login" will halt any currently running program, establish communications, and determine the MotionBASIC® version. This "Login" process can be avoided with the /i option when invoking MotionPRO. Also, this Login at Startup, may be configured by selecting one, of three options, 1) Always Login, 2) Never Login, 3) Prompt the user as to whether or not a "Login" should be performed on this particular startup.

When a cable is securely connected between the development port and a computer comm port, and MotionPRO™ has been invoked, the handshake line will be linked and the Controller's System Status LED labeled, **OK to Transmit**, will be lit.

If this orange LED is not illuminated, check your cable connections. If you continue to have trouble communicating, refer to the MotionBASIC® Hypertext Manual's chapter on Troubleshooting.

Chapter 5
Using MotionPRO™

5. Using MotionPRO™

Using **MotionPRO™**

Having installed **MotionPRO™** on your computer and invoked its operation there are several activities that can be performed without connecting to a Generation III controller. However, for comprehensive operation of the **MotionPRO™** Package, a serial port on the computer must be connected to the development port of a Generation III series controller.

An important activity that can be performed, without a GEN III connected, is user familiarization with the **MotionPRO™** Environment. Learning the available options that can be performed and reviewing the on-line help that is available would certainly be a recommended exercise. This type of introduction to the environment can be accomplished without a Gen III controller connected to your PC.

Other activities that could be performed without a controller connected to your PC would constitute development work. Programs and configuration files drafted would be saved on disk file. When the controller was connected, this saved work could then be installed, tested, and modified.

Learning MotionPRO...

With On-Line Help

There is on-line help available for instruction on MotionPRO.

The <F1> function key calls MotionPRO™ Help which is a context sensitive Help System.

"Context Sensitive" means that depending on "where you are" on the screen when you call for help, determines the help screen that is displayed. Related topics can be investigated in the help system by using the cursor keys and the <Enter> key.

With Hypertext Help

Another on-line help resource in the **MotionPRO™** Environment is the Hypertext Help System provided by ORMEC. This Hypertext System is a TSR program, **T**erminate and **S**tay **R**esident, which means it is always available waiting for the "hot key" to be pressed.

The "Hot Key" to call Hypertext Help is <Alt><?> or <Alt></>.

An important concept to grasp is that Hypertext is the means to view manuals that are stored in disk files. Therefore, the term "Hypertext" does not refer to a

particular manual, but rather a means to read any manual in your hard disk "library".

Modes of Operation

The **MotionPRO™** program operates in four fundamental modes. (***Note: there is an indicator field in the right hand bottom screen border that indicates the current Mode.***)

Talk Mode Talk Mode enables the user to communicate directly with the Gen III CPU and to write, edit, and execute MotionBASIC® commands, statements, and programs. If you do not observe a Menu Bar at the top of the screen, and are prompted with a blinking cursor, you are in Talk Mode. You must be in Talk Mode to communicate with the GEN III.

Select Mode Select Mode is used to access the MotionPRO Menus. It is engaged by using the <F2> function key to call the Menu. After pressing the <F2>, key the Menu Bar is displayed at the top of the screen. To exit Select Mode, (exit menu), and return to Talk Mode, use the <Esc> Key.

Input Mode Input Mode is engaged whenever the user is expected to input information from the keyboard. This would typically be during configuration of the system when filling out forms, and also when specifying files to be accessed for downloading, saving, etc.

Execute Mode Execute Mode is engaged whenever MotionPRO™ causes the user to wait while it is downloading or saving files, writing configuration routines, etc.

Establishing Communications

With **MotionPRO™** invoked and the computer connected to a Generation III controller, the user can now communicate with the controller. In its default configuration, MotionPRO automatically does a LOGIN to the Generation III controller. This can be done manually by pressing the <F10> function key when in TALK MODE. Login is an important step that is required so that MotionPRO can ascertain with what version of MotionBASIC® it is communicating. This effects specific aspects of the MP.CONFIG routine that will be written, (see Chapter 7).

*If communications are **not** established*, the cursor will remain stationary, and the following Error Message will print on the screen.

```
      Cannot Send Character
Check that the cable is correct
and that the Gen-III is turned on
before continuing.
```

Check power, connections, or communication port assignments, to correct this condition.

(Note: Some computers will not generate this error message due to their inability to return a status of the serial port.)

After a powerup or a hardware reset of the controller, establishing communications via the Login function key <F10> or by pressing the <Enter> Key will cause the controller to print a sign-on message.

A typical sign-on message contains the following information:

Example

MotionBASIC v2.1f
Copyright (c) 1987-1993
ORMEC Systems Corp.

60300 Bytes Free & 26624 Comment Bytes Free (80187)

Axis.List@ = {1,2}
OK
_

MENU BAR Using the <F2> function key to call up the Menu Bar and Select Mode presents the user with the menu bar and the pull down menus. There are several utilities and options contained under each selection of the menu bar. The following discussion describes each of these selections.

FILE Menu

Load Program	This loads a program from a PC disk file to the Gen III CPU Program buffer.
Save Program	This command saves a MotionBASIC® program from the Gen III CPU Program buffer to a disk file on the PC.
Merge Program	This command merges a MotionBASIC® program from a PC disk file to the GEN III CPU Program buffer.
Download File	This command transfers a MotionBASIC® file from a PC disk file to a Gen III Memory Disk.
Upload File	This command transfers a MotionBASIC® file from a Gen III Memory disk to a PC disk file.
Erase File	This command deletes a MotionBASIC® file from a Gen III Memory disk or from a PC disk file.
Format Memory Disk	This command formats a Memory Disk. This is necessary on a new Memory Card.
Capture	This option allows the user to open a file in which characters communicated over the MotionPRO serial port to the user screen are also saved to a disk file. This provides the ability to generate a permanent record or log of MotionBASIC®/MotionPRO communications during a session.

GEN III Menu

Configuration	This allows the user to configure the GEN III controller for the servos in the application. Instructions for this activity are in the Chapter, "Generation III System Configuration" in this manual.
Program Write Enable	This command displays and allows change to the current protection level of the program buffer.
Initialize All Memory	Saves the current state of the Gen III unit to disk file and then reloads all nonvolatile memory with default values.

APPLICATION Menu

This is a special menu since it can be customized by the user. The menu items that are provided by Ormec as default are described below:

Editor	Calls the screen editor, Multi-Edit, used to edit programs and files.
OSA	Ormec Servo Analyst, provides the user with an application analysis tool for servo motor and servo drive sizing.
WindowDOS	A file management utility used for file transfer and other useful DOS functions.
List File / File Print	Utilities used to examine and document any file in the development system.
View Config/ Print Config	Utilities used to examine and document the configuration of the servo system.
Diskcopy A→B	Copy disk contents of A Drive to B Drive
Shell to DOS	A transfer to the Operating System without losing the current state of MotionPRO™ and associated programs.

SETUP Menu

Baud Rate	Choose a communication baud rate used by the PC and by the Gen III CPU.
COM Port	Selection of the COM port on the PC to be cabled to the controller.
File Line Numbers	Specifies whether disk program files will contain line numbers. When checked, (on), program files must contain line numbers before loading to the Gen III. When a program is saved, each line and its corresponding line number from the Gen III buffer, will be saved to a disk file. When not checked, (off), the line numbers are added during loads to the Gen III and stripped off when programs are saved to disk files from the Gen III Program buffer.
MotionBASIC Version	This command selects the MotionBASIC® Version with which to work.
Quiet Speaker	When checked the PC speaker will not sound a tone when a MotionPRO™ Error occurs.
Login at Startup	This command determines the Login procedure at startup.
Default Comm	This selects the default baud rate and Com Port
Save Setup	This saves the current settings of the items above. The settings are saved to a file and are used in subsequent startups of MotionPRO.

QUIT Menu

Yes / No	Either terminate the current MotionPRO™ session, or continue. Quitting, by selecting "Yes", returns the user to the operating system.

Chapter 6
Testing the Servo System

6. Testing the Servo System

Factory Testing

Every system is tested at ORMEC in the final cell of our manufacturing facility. The motors are bench secured, the shafts are left free spinning, the system is cabled, and then power is applied. A test program is loaded into the Generation III Controller, a configuration file is established and the system is fully tested. The tested configuration is printed and supplied with the documentation for the system.

On-Site Testing

At the factory the test program, named **SETUP.BAS**, and the configuration file, named **CONFIG.BAS**, are loaded into the controller's non-volatile memory, and remain there through shipment. Thus it is immediately available for running a similar commissioning test at your facility, after installation and cabling of the system.

WARNING !!!

IT IS STRONGLY RECOMMENDED THAT THE SERVO SYSTEM IS INITIALLY TESTED WITH THE MOTOR SHAFTS MECHANICALLY DISCONNECTED FROM ANY MACHINE OR LOAD. THIS TEST PROGRAM IS GENERIC IN NATURE AND IS NOT INTENDED FOR USE ON MACHINERY, BUT RATHER AS AN EXERCISER FOR THE SYSTEM'S MOTORS.

Once communications are established between the IBM-PC and the Model 40, type **RUN** <*Enter*> to start the **SETUP** program which was installed in the controller at the factory.

The SETUP program is menu-driven and will allow you to:

1) Home, Index and Run all the motors;

2) Configure, observe and manipulate the Integral and Extended I/O

3) Configure, and observe the Axis I/O

4) Interactively adjust servo loop tuning.

5) View and clear axis faults should they occur

This program is user friendly and menu driven. The keystrokes necessary to perform the various operations are prompted on the screen.

Any values that are changed during the SETUP.BAS session are only temporarily changed since they are stored in VOLATILE DSP MEMORY.

SAVING CHANGES

To permanently save any changes that were made to the system's loop and I/O configuration, you must **read** the new values, and then **write** these values to the Controller's Non-Volatile Memory and/or to a disk file.

Step 1

To do this, utilize the *Gen-III Configuration* Menu in MotionPRO™.

Step 2

To read these new values,
select "**Read Current Gen-III Values** " from the *Read Configuration Menu*.

Observe:
The display will indicate that it is reading the parameters from the Gen III Unit for each axis in the system.
You may examine these values in the various windows if you wish.

Step 3

Exit this utility by pressing the <Esc> Key.

Step 4

You will be presented with the *Write Configuration Menu.* This is where you can select the destination of this write function. The recommendation is to write to the controller by selecting "**Configure Gen-III**".

Observe:
The display will indicate that it is writing the parameters to the Gen III Unit for each axis in the system.

Step 5

Optional: Saving these values to a disk file.

Repeat Steps 1, 2, & 3

Repeat Step 4 except select the
"**Save to File**" write destination.

Recommended File name to write is **CONFIG.BAS**.

Summary Discussion

The above process reads the current configuration values, and then causes MotionPRO™ to write a new MP.CONFIG subroutine into the Setup Area of the Non-Volatile memory of the controller.

Optionally, this MP.CONFIG subroutine should also be saved to a disk file for permanent storage. The disk file containing this subroutine can have any name as determined by the user, ORMEC recommends that it be named **CONFIG.BAS**.

Chapter 7
Generation III System Configuration

7. Generation III System Configuration

System Configuration is actually a process in which MotionBASIC® code is executed setting volatile memory variables to meaningful values. This MotionBASIC® code that sets ORMEC Variables to particular values determines the definition of a servo system for an application.

In an ORMEC standard approach, this set of code, consisting of Variable assignments for each axis, is contained in a subroutine called MP.CONFIG.

Since MP.CONFIG is quite a lengthy set of code, and tedious for a user to write from scratch, ORMEC supplies a GEN III Configuration Utility that automatically writes the code after a user has "filled-in-the-blanks" of five configuration "forms". These forms are pop-up windows that are selected under the GEN-III Configuration Utility.

Initial configuration for each axis was done at the factory using this *Gen-III Configuration* Menu in MotionPRO™.

In this chapter, the five configuration windows will be described, with an example of each. Also at the end of the chapter, we will list the MP.CONFIG subroutine code that is generated from the example data.

IMPORTANT: MotionPRO will need to have executed a **LOGIN** in order to ascertain for what version of MotionBASIC® it is writing an MP.CONFIG routine. This can be done manually by pressing the <F10> function key in TALK Mode. The version should be diplayed in the bottom display bar of the MotionPRO screen when a LOGIN is successful. This is done with a default setup parameter when MotionPRO is invoked, however this feature may be disabled by the user.

The five configuration forms are:

Motor / Load Parameters Form

User Units Form

Range Variables Form

Operating Parameters Form

Servo Loop Tuning Parameters Form

General Instructions

The configuration forms need to be filled out for each axis in the system. Since many applications have nearly identical setups for multiple axes, the ability to address more than one motor during a session has been provided.
Each configuration form allows the entry of axis numbers separated by commas. (e.g. {1,2,4} would be a set of three servos). This entire "set" of axes can now be assigned common parameter values with single entries. If one particular value is different for an axis, it can be configured by using the <**Pg Up**> and <**Pg Down**> keys which scrolls through the set of axes, individually, allowing the change of one (or more) unique parameter.

Function Key Summary

Tab	Moves between entry fields in the form
<**F2**>	Loads the default value into a field
<**Pg Up**>	Scroll up through Axis Set individually
<**Pg Down**>	Scroll down through Axis Set individually
<**Enter**>	Scroll through choices for text fields
Arrows	Move within fields (left / right) Between fields (up / down)

Motor/Load Parameters

This window allows you to select a motor by Model Number from one of the standard motors listed in the system. When selected, MotionPRO™ accesses a file (MP.MTR) and obtains the following information:

1) Position Transducer Resolution
2) Peak Motor Torque
3) Rated Motor Torque
4) Drive Input Voltage at Peak Torque
5) Motor Inertia
6) Maximum Motor Speed
7) Drive Input at Max Speed
8) Absolute Encoder Feedback

In addition, you can key in a Load Inertia value for each axis if known. MotionPRO™ will then use these values to cap the speed and acceleration limits of the system entered in the subsequent windows.

An example of this window follows, entry fields are bolded:

```
═══════════════════════[ Motor/Load Parameters Form ]═══════════════════════
 Axis  1  of {1,2                                          }

 Motor Model Number:              MAC-E002A1          Feedback:  INCREMENTAL
 Position Transducer Resolution:        6000 cnts/rev  Drive Type:  TORQUE
 Motor Torque              Peak:        4.22 in-lbs    Rated:     1.41 in-lbs
 Drive Input at Peak Torque:            8.98 volts
 Maximum Motor Speed:                   4020 RPM
 Motor Inertia:                   0.000068 in-lb-sec²
 ──────────────────────────────────────────────────────────────────────────
 Load Inertia:                    0.000142 in-lb-sec²
 ──────────────────────────────────────────────────────────────────────────
 Torque Gain:                        0.470 in-lb/volt
 Total Machine Inertia:           0.000210 in-lb-sec²
 Maximum Motor Acceleration:            3198 rev/sec²
```

User Units

This window allows you to setup the Model 40 so that each axis can be programmed in *user units*. This feature allows you to determine individual systems of units for each axis independent of the Position Transducer Resolution.

Position — *User units* for position are set by equating two numbers. On the left the number of user units, on the right the number of counts. This establishes a ratio to be used for position conversion. In the example window below, 360 user units are equated to 6000 counts (which happens to be 1 rev). As you might deduce, this user is working in whole degrees , 360 per rev. (This conversion ratio would have been maintained in the same way if on the left was entered 6 user units equated to 100 counts.)

Speed — *User units* for speed is set slightly differently. First on the right side, enter the absolute maximum speed limit you wish to establish for that axis in RPM. You will be able to set another "range limit" below this value, but not higher.

On the left side of the equation for speed, enter the number of user speed units that equate to this maximum RPM value. This establishes a ratio to be used for speed conversion.

In the window below, the speed limit is left at the motor maximum, 4020 RPM, and user units are also in RPM, and thus 4020 is also on the left side of the equation.

Acceleration — *User Units* for acceleration are set similar to those of speed. The absolute maximum acceleration that will be allowed is entered on the right side of the equation in rev/sec^2. You will be able to set another "range limit" below this value, but not higher.

On the left side is entered the corresponding maximum user unit value for acceleration.

In the window below, on the right side, the maximum remains at the motor maximum established for the inertial load, and on the left side we have entered the matching value in radians/sec^2, since that is desired in this example case.

An example of this window follows, entry fields are bolded:

```
═══════════════════════════[ User Units Form ]═══════════════════════════
 Axis  1  of {1,2                                      }
─────────────────────────────────────────────────────────────────────────
 Position Transducer Resolution     Axis:    6000   Pacer:    6000 cnts/rev

 Conversion Factor / Limit         User Units          =     Motor Units

 Axis Position                         360 degrees     =       6000 counts
 Pacer Position                        360 degrees     =       6000 counts
 Machine/Axis Speed Limit             4020 RPM         =       4020 RPM
 Pacer Transducer Speed Limit                                  4000 RPM
 Machine/Motor Accel Limit           20061 rad/sec/sec =       3193 rev/sec²
 Time (all axes)                         1 msec        =          1 msec

 Gear Speed Multipliers            Output:      1     Input:      1
```

Range Variables

This window allows you to set the "application maximum" allowable speed, acceleration, deceleration, torque, and position error. In addition, you can set up the maximum *In-Position Error*.

The values for Speed and Acceleration and Deceleration can only be as high as the left side of the user units form. The value for Torque can only be as high as the peak torque value in the Motor/Load Parameters Form.

An example of this window follows, entry fields are bolded:

```
═══════════════════════[ Range Variables Form ]═══════════════════════
Axis  1  of {1,2                                                    }
──────────────────────────────────────────────────────────────────────
Maximum Allowable Machine Parameters:    Machine Limits:
 Speed:              3600 RPM             Speed:        4020 RPM
 Acceleration:      12000 rad/sec/sec     Accel:       20061 rad/sec/sec
 Deceleration:      12000 rad/sec/sec

Maximum Allowable Motor Parameters:      Motor Limits:
 Drive Output:       4.22 in-lbs          Peak Torque:       4.22 in-lbs
 DRV.MAX@:          29423 ( 8.98 volts)   Rated Torque:      1.41 in-lbs
                                          Max Speed:         4020 RPM
Maximum Controller Parameters:
 Position Error:           360 degrees
 In-Position Error:          2 degrees
```

Operating Parameters

This window allows you to set up operating parameters such as the direction of rotation of the motor for "forward" travel, a Modulo Position Counter, a choice of position data to output, and the type of acceleration profile used in MOVE statements.

Limits are also set from this form. The software forward and reverse travel limits can be set from this form as well as the low and high trip points for three position triggered outputs per axis.

Also the deceleration rate used when a MotionBASIC® error causes a motor to stop is also set in this configuration form.

An example of this window follows, entry fields are bolded:

```
═══════════════════[ Operating Parameters Form ]═══════════════════
Axis  1  of {1,2                                                }
──────────────────────────────────────────────────────────────────
Forward Rotation Direction:  COUNTER-CLOCKWISE   Software Travel Limits:
                                                  (degrees)
Position Modulo:             0                       Forward      Reverse
                                                        0            0
MotionDATA Output Source:    PASS-THRU
Pacer Input:                 ON                  Electronic Limit Switch Ranges:
                                                  (degrees)
S-Curve Distribution:          0%                              Low          High
                                                 ELS1:          0            0
Loop Rate (all axes):        3000 Hz             ELS2:          0            0
                                                 ELS3:          0            0
Error Deceleration Rate:     1000
```

Tuning Parameters

This window allows you to set the servo gains. These parameters include both Torque Gain and Inertia for the servodrive and motor, which are initialized in the *Motor/Load Parameters* window. It also allows setting the *Velocity Loop Time Constant* as well as *Kvi*, *Kp*, *Kpi*, *Kaf*, and *Kvf*.

An example of this window follows, entry fields are bolded:

```
═══════════════════[ Servo Loop Tuning Parameters Form ]═══════════════════
Axis  1  of {1,2                                                          }
──────────────────────────────────────────────────────────────────────────
Drive Type:                                Torque
Torque Gain:                                0.470 in-lb/volt
Load Inertia at Motor Shaft:            0.000142 in-lb-sec²
Total Machine Inertia:                  0.000210 in-lb-sec²

Velocity Loop Time Constant:                3.00 msec

Kvi  Velocity Integral Factor:               100%
Kp   Position Gain Factor:                   100%
Kpi  Position Integral Factor:                 0%
Kaf  Acceleration Feedforward Factor:          0%
Kvf  Velocity Feedforward Factor:            100%
```

MP.CONFIG SUBROUTINE GENERATION

Having filled out these forms for each axis in your system, your are able to generate the MP.CONFIG routine.

Again, this routine consists of variable assignment statements only. The routine's program lines set ORMEC Variables to the values that you have keyed-in on the configuration forms.

MP.CONFIG can be written to some destination when you exit from the GEN-III Configuration Activity. You have choices as to where this code is written. You may select to write the MP.CONFIG subroutine to the GEN-III Controller's Non-Volatile Program Buffer, or you may write it to a disk file, where you specify the name of the file.

NOTE: Only when this subroutine is executed, do these Volatile DSP Memory Variables actually take on the values specified in these lines of code. After the Configuration Utility constructs MP.CONFIG it does execute the routine. Otherwise, a direct command such as ***GOSUB MP.CONFIG*** *would need to be issued to execute this routine and set the variables to the values entered.*

An example of the code that is automatically generated by this utility now follows. Keep in mind that this is a complete set of code for one axis only. It continues in the same style for subsequent axis in a multi-axis system.

```
'!AUTO 65000,1
MP.CONFIG:
'!MTR(1)="MAC-E002A1"
'!MTR(2)="MAC-E002A1"
'!MTR(3)="MAC-E002A1"
'!MTR(4)="(unknown)",1.41,4.22,8.98,0.000068,4020,8.04,1
EVENT OFF :MODE@(AXIS.LIST@)=0
MD.MODE@(AXIS.LIST@)=0
LOOP.RATE@=3000
TIME.MUL@=1 'Time is in msec
EIO.MODE@=0
IO.MODE@(1)="ROFOIOIOIOIOIOIOIIIIIIIIIIIIIIIIIIIIII"
AXIS.SET@={1}
CNT.REV@=6000 :PCT.REV@=6000
POS.MUL@=6000 :POS.DIV@=360 'Axis Position is in degrees
PPS.MUL@=6000 :PPS.DIV@=360 'Pacer Position is in degrees
MTR.SPD.LIM@=4020 :USR.SPD.LIM@=4020 'Speed is in RPM
MTR.ACL.LIM@=3193 :USR.ACL.LIM@=20061 'Acceleration is in rad/sec/sec
PCR.SPD.LIM@=4000 :INSPD.MUL@=1 :OUTSPD.MUL@=1
SPD.MAX@=3600 :DRV.MAX@=29424
ACL.MAX@=18000 :DCL.MAX@=18000 :DCL.ERR@=1000
PERR.MAX@=360 :PERR.INPOS@=2
CW.FWD@=TRUE :POS.MOD@=0 :SCURVE@=0
STL.FWD@=0 :STL.REV@=0
ELS1.LOW@=0 :ELS1.HIGH@=0
ELS2.LOW@=0 :ELS2.HIGH@=0
ELS3.LOW@=0 :ELS3.HIGH@=0
TRQ.GAIN@=0.470! :VEL.GAIN@=0 :INERTIA@=0.000210! :VLTC@=2.20!
KVI@=100 :KP@=100.0! :KPI@=0 :KAF@=0 :KVF@=100

Remaining axes would continue as above

MD.MODE@(1)= 1
MD.MODE@(2)=10
MD.MODE@(3)=10
MD.MODE@(4)=10
AXIS.SET@=AXIS.LIST@
RETURN
```

Chapter 8
Final System Configuration

8. Final System Configuration

When initial configuration was done at the factory, the *Servo Gains* were for the selected motors with no load inertia attached. For optimal performance, and certainly if the load inertia for an axis is much greater than the inertia of the selected servomotor, each servo system should have its Servo Loop Tuning Parameters adjusted **after** it is connected to the load.

WARNING !!! **THESE INSTRUCTIONS ASSUME THAT YOU NOW HAVE EXPERIENCE WITH THE SETUP.BAS PROGRAM AND HAVE ALREADY TESTED YOUR SERVO MOTORS WHILE THE MOTORS WERE DISCONNECTED FROM THEIR APPLICATION LOADS. DO NOT CONTINUE UNLESS YOU HAVE PREVIOUSLY TESTED THE UNCOUPLED MOTORS WITH THIS PROGRAM.**

Couple the motor shafts to the machine loads.

Execute the SETUP.BAS program (with associated MP.CONFIG subroutine).

Of course these programs must be loaded into the controller if they are not already in Non-Volatile Memory.

With the program loaded into the controller, type RUN and press the Enter key to start the SETUP program again and perform the following steps for each axis in the system:

a) Key in the appropriate value for total inertia (INERTIA@), including both motor and load. If load inertia is not known, optionally fine tune the system by adjusting the value for INERTIA@ empirically.

   This may be done by accessing the *Tuning Menu*, setting the *Axis Mode* to *Velocity*, and setting *VLTC@* between 8 and 30 ms. Execute *Indexes* that do not cause the system to "torque limit". Observe the velocity errors reported at the bottom of the screen and adjust *INERTIA@* until the first few errors immediately following the index average close to 0.

b) Set the *Axis Mode* to *Position* and adjust *VLTC@* to the lowest acceptable value. Cause indexes to occur, and observe both the position error and the audible noise. If you have a scope, observe both the torque and velocity responses. The velocity response should have minimal overshoot, but the torque response may overshoot considerably. The torque response should not, however, "ring" excessively.

c) Adjust the position loop integral gain (*KPI@*) to 100% in applications where position error during motion is critical, such as electronic gearing or in the control of continuous web systems.

d) The other gains in the system should be adjusted only to meet critical and unusual performance criteria by a qualified servo technician or engineer. ORMEC provides a training class which covers these procedures and the theory behind them in detail.

Also, you will want to use the *Gen-III Configuration* Menu described in the last section to configure your Model 40 for your particular application. Simply "pull-down" that Menu and fill out the pop-up windows with the appropriate information for each of the axes in your system.

When the system is configured for your application, you should proceed to develop your application. MotionPRO™ includes a number of application software development tools called MotionBASIC® Tools. These programs and documentation are designed to make applications program development much easier by providing working program modules for accomplishing functions common to most motion control applications, such as an Error Handler and an I/O Menu. The training class provides instruction in the use of these tools. We trust that they will prove useful in helping you get started with Generation III.

Appendix 1
MotionPRO™ Information

A1 MotionPRO™ Information

This appendix section contains information on the files and environment variables used with MotionPRO™. It is intended for experienced DOS users.

The following files are needed by MotionPRO™:

MPRO.BAT	Startup Command for MotionPRO™
MP.BAT	Used to execute MotionPRO™ with large applications.
MP1.EXE	MotionPRO™ executable program.
MP.HLP	Help database used by MotionPRO™ when F1 is pressed.
MP.APP	List of applications programs used with MotionPRO™.
MP.CFG	Optional MotionPRO™ custom configuration file.
MP.MTR	ORMEC motors parameter file.

These files are described below in greater detail, so that the experienced user may fully understand their use.

MPRO.BAT File
This file performs three useful functions for the user. It changes the current directory to \ORMEC\BAS, it then loads the Hypertext System into memory, and then it starts MotionPRO™. Users that prefer a different starting directory should edit this file.

This file must be located in one of the directories specified by the DOS "PATH" environment variable, or the current directory.

MP.BAT File
This file starts MotionPRO™. It is required in order that MotionPRO™ can be unloaded from memory during a call of a large application program from within MotionPRO™ (see MP.APP).

This file must be located in one of the directories specified by the DOS "PATH" environment variable or the current directory.

Several options can be typed with this command. These options are available to startup MotionPRO™ for your type of system configuration. These options are as follows:

```
options:
/C  = use CGA/EGA/VGA display adapter        /c  = color display
/M  = use MDA display adapter                /m  = monochrome display
/L  = use LCD display adapter                /l  = monochrome display
/S  = reduce "snow" on CGA display           /s  = turn off /S option
/B  = use ROM Bios for display               /b  = turn off /B option
/O  = enable mouse support                   /o  = turn off /O option
/I  = login to MotionBASIC at startup        /i  = don't login at startup
/p  = don't scan for ports COM3 & COM4
/T# = set timeout value, where #             /t# = same as /T#
      represents the new timeout value,
      in the range 1055 to 214700000 milliseconds
      (if no value specified, timeout = 1055)
/? = display these switch options            /h = same as /?
```

MP1.EXE File
This is the main MotionPRO™ executable program. It is invoked by the MP.BAT file.

MP.HLP File
This is the database used by MotionPRO™ to obtain Help when the F1 key is pressed. This file must be located in the directory specified by the DOS environment variable "MPPATH". If "MPPATH" is not defined, MP.HLP must be located in the same directory as MP1.EXE.

MP.APP File
This file contains the list of application programs which appear in the MotionPRO™ Application menu. It can be customized by the user to include applications which are frequently used from within MotionPRO™. A description of the file format is included as a comment at the beginning of the file, which can be edited with an ordinary text editor.

MotionPRO™ searches for this file in up to three directories as follows:

1) the current working directory,
2) the directory and file name specified by the DOS environment variable "MPAPP",
3) the directory specified by the DOS environment variable "MPPATH", or the directory containing MP1.EXE.

MP.CFG File
This optional file allows the user to customize the initial configuration of MotionPRO™. This includes the initial COM port, baud rate, and setup options. This file is created by the "Save Setup" command, executed from the Setup Menu of MotionPRO™.

MotionPRO™ searches for this file in up to three directories as follows:

1) the current working directory,
2) the directory and file name specified by the DOS environment variable "MPCFG",
3) the directory specified by the DOS environment variable "MPPATH", or the directory containing MP1.EXE.

MP.MTR File
This is the database used by MotionPRO™ to supply the model numbers and specifications for all ORMEC motors. It is used by the Axis Setup forms.

This file must be located in the directory specified by the DOS environment variable "MPPATH". If "MPPATH" is not defined, MP.MTR must be located in the same directory as MP1.EXE.

MotionPRO™ Environment Variables

MotionPRO™ uses several DOS environment variables to locate various files it needs. All of these environment variables are optional, but some may be needed in certain configurations. Below is a detailed description of these variables.

MPPATH Environment Variable

This environment variable should be defined when MotionPRO™ is used under version 2.x of DOS, or when MP1.EXE is not located in the DOS PATH. It contains the full directory path where the MotionPRO™ files are located.

MP1.EXE uses this environment variable to find MP.HLP, MP.APP, MP.CFG, and MP.MTR. If not defined, MotionPRO™ looks in the same directory as MP1.EXE under DOS 3.0 or later, or the current working directory under DOS 2.x.

Example: SET MPPATH=C:\ORMEC

MPAPP Environment Variable

This optional environment variable allows the user to define a custom MP.APP file for a specific environment. It contains the full path AND file name of the custom applications file.

Example: SET MPAPP=C:\ORMEC\MP.APP

MPCFG Environment Variable

This optional environment variable allows the user to define a custom MP.CFG file for a specific environment. It contains the full path AND file name of the custom configuration file.

Example: SET MPCFG=C:\ORMEC\MP.CFG

MPTMP, TEMP and TMP Environment Variables

These optional environment variables allows the user to specify where temporary files are to be stored. MotionPRO™ creates a temporary file called MP.$$$ when it unloads itself during execution of an application program. This file is normally stored in the current working directory. If it is not desirable for MotionPRO™ to create a temporary file in the current working directory, the environment variable "MPTMP", "TEMP", or "TMP" may be defined to contain the path of the directory where this temporary file is to be stored. (MPTMP takes precedence over TEMP, which takes precedence over TMP)

Example 1:	SET MPTMP=E:	(current directory of drive E)
Example 2:	SET TEMP=D:\	(root directory of drive D:)
Example 3:	SET TMP=F:\TEMP	(\TEMP directory of drive F:)

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix 2
Customizing MotionPRO™

A2 Customizing MotionPRO™

This appendix section contains information on the setup of **MotionPRO™** includes some options that the user may wish to change. If the user wishes to retain these configuration changes for subsequent startups of MotionPRO™ this can be done quite easily. The Setup Menu of MotionPRO™ provides the means to change configuration options and to save this new configuration.

The items that can be changed from the setup menu are covered in the Chapter "Using MotionPRO".

Another routine customization that a user may want to perform is the alteration of the MP.APP file for MotionPRO™. This file effects the Application Menu in MotionPRO™. It determines which applications are available, the text presentation in that menu and by what commands the different applications are called when they are selected. Other considerations have to do with system memory. One of the options that can be used in the MP.APP file forces MotionPRO™ to exit from memory while the selected application is being run.

As provided from ORMEC the Application Menu allows the user to call the Multi-Edit™ screen editor, and to run the Ormec Servo Analyst program, to startup and use Window DOS, to print and view configuration files.

The following text is also provided as comments within the MP.APP file. This allows the user to edit the file while also having the instructions in that very same file.

Syntax of MP.APP file entries:

<menu item>[, <hot key>]
[@][>]<command> <arg list>

where:

<menu item> **Menu item text that will appear on applications menu. This must begin in column 1.**

<hot key> **A single letter from <menu item> that will select the item when pressed (usually the first letter).**

[@] **Optional prefix which causes MotionPRO™ to be unloaded from memory before this application is executed. Only has effect when MotionPRO™ is invoked from the "MP.BAT" file. Must not begin in column 1.**

[>] **Optional prefix which causes MotionPRO™ to execute this application from a secondary copy of the command processor. This allows <command> to be a batch (".BAT") file. Must not begin in column 1.**

<command> **Name of the program to be executed. Program must be a ".EXE" or a ".COM" file, or a ".BAT" file if the ">" prefix is used. The DOS PATH will be searched if no path is specified. Must not begin in column 1.**

<arg list> **List of command line arguments, separated by spaces. A special argument of the form "<f text>" will prompt the user for a file name with a text message, and then replace itself with the file name.**

The following lines are in the MP.APP File as provided by ORMEC.

```
Edit  F5, E
        @me <f Enter name of file to edit:>

OSA, O
        osa

Window DOS, W
        >wd35 -x

List File, L
        >mplist <f Enter name of file to list:>

File Print, F
        cprint -m4 -w84 -l55 <f Enter name of file to print:>

View MP.CONFIG, V
        printcfg <f Enter name of configuration file to view:> /p /w

Print MP.CONFIG, P
        printcfg <f Enter name of configuration file to print:> lpt1 /m6 /w

Diskcopy A =▸ B, D
        diskcopy a: b:
```

Customization is achieved with a text editor and by adding, deleting, or altering entries in this file. The changes can be easily tested by starting MotionPRO™ and selecting the edited entries via the Application Menu.

Appendix 3
Hypertext Help Information

A3 Hypertext Help

Hypertext is an information system which attempts to more closely parallel the human mind's thought process than does traditional information sources, such as bound manuals or flat text files. Hypertext produces this effect through a network of "nodes" each of which contain data on a topic, but is linked to and can be accessed via other, related items within the network.

Two file types are included with the Ormec Hypertext System. The executable file which loads the system, and reference files which constitute the manuals for MotionBASIC®, Hypertext Help, and Revision Information.

The specific files are:

ORMEC.EXE This file loads the hypertext system into memory making it available to be called from other programs. Pressing Alt ? will call up a memory resident Hypertext System.

HYPERTXT.HYP This file is on the Ormec Hypertext Manual System itself. It also introduces concepts and familiarizes the user with Ormec Motion Controllers.

MB.HYP This file is on the programming language MotionBASIC®. This is the reference that is easily consulted while using **MotionPRO™** to program the Gen III controllers.

MBREVS.HYP A file that will document upgrades and changes to the language and the related manuals.

MBTOOLS.HYP A file that will document the use of the OIT **MotionBASIC® Tools** package and its use in developing an OIT application solution.

MMITOOLS.HYP A file that will document the use of the MMI **MotionBASIC® Tools** package and its use in developing an MMI DIsplay application solution.

Starting Hypertext

The following command is entered to load the Hypertext System.

ORMEC [hypfile] [options]

hypfile: Path and name of the hypertext database file to use (default extension ".HYP"), or directory in which the database files are located. If not specified, the file "HYPERTEXT.HYP" in the executable directory is used.

options:

/C = use CGA/EGA/VGA adapter	/c = color display
/M = use MDA display adapter	/m = monochrome display
/L = use LCD display adapter	/l = monochrome display
/S = reduce "snow" on CGA display	
/B = use ROM BIOS for display	
/O = enable mouse support	
/X = invoke from the command line	
/? = display this usage message	/h = same as /?

Example: Showing user entry and the system's response. In this example the user is starting the Hypertext System with the option to enable mouse operation support.

C>ORMEC /O <enter>
ORMEC Hypertext Help, Version 1.2f
Copyright (c) 1992, ORMEC Systems Corporation, All Rights Reserved

ORMEC Hypertext Help has been loaded.
Press Alt-? to invoke HELP.

C>

HYPERTEXT KEYS

The special keys that can be used when in the Hypertext System are listed below:

F1 = INDEX	Displays the current manual's Index.
F2 = MENU	Display/select available manuals from the hard disk
F3 = SEARCH	Search for a string, word, topic, phrase, link etc...
F4 = AGAIN	Continue the last search for another occurrence
F10 = EXIT	Special EXIT, it leaves a bookmark for the next access
<**Pg Up**>	Move to preceding page in a chapter
<**Pg Dn**>	Move to next page in a chapter
<**Backspace**>	Go back to the previous chapter you accessed last
<**Ctrl**> <**Backspace**>	Go to the "parent" chapter of the current chapter
<**Esc**>	Normal EXIT, returns you to your previous activity
Arrow Keys	Move the cursor between link topics
<**Enter**>	Go to cursor selected topic, or perform cursor selected function

Appendix 4
WindowDOS™ Information

A4 WindowDOS™ Information

WindowDOS™ is provided on Ormec software disks with the file WD3.EXE. This is the main executable file of WindowDOS™. Ormec also provides the original diskettes and documentation for WindowDOS™. For users who intend to further customize and reconfigure the setup of WindowDOS™ as supplied by Ormec, they should refer to the manufacturer's documentation and reconfigurration utilities. This appendix will list some basic information on WindowDOS™, for detailed instructions please refer to the original manual.

To run WindowDOS™ from MotionPRO, select the WindowDOS™ menu entry from the application pull down menu. (is called in MP.APP by WD3 -X)

To run WindowDOS™ from DOS type:

WD3 [option]

where [option] can be any number of the following single characters, they must be separated by a space character or a forward slash.

A	Sort the directories in ascending order. (DEFAULT)
B	Set colors to Black & White
C	Sort by creation date
D	Sort the directories in descending order.
E	Sort by extension
F	Sort directories by filename (DEFAULT)
G	Set for unusual EGA display cards.
H	Set for Hercules Display card.
J	Display directory names with leading \.
K	Alternate Hotkey.
M	set for mute mode
N	Do not sort. Order as found on disk.
P	Turn on pop up password.
Q	Turn on quick entry.
R	Turn on display root on call up.
S	Sort according to size
T	Turn on screen timeout
U	Uninstall WindowDOS™
W	Switch Function & Shift Function Keys
X	Run in execute only mode. (not memory resident)
Z	Set for superior CGA cards.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix 5
Multi-Edit™ Information

A5 Multi-Edit™ Information

Multi-Edit™ is provided on Ormec software disks. Ormec also provides the original diskettes and documentation for Multi-Edit™. For users who intend to further customize and reconfigure the setup of Multi-Edit™ as supplied by Ormec, they should refer to the manufacturer's documentation and setup utilities. This appendix will list some basic information on Multi-Edit™, for detailed instructions please refer to the original manual.

To run Multi-Edit™ from MotionPRO, select the Edit selection from the application pull down menu. (is called in MP.APP by mec.bat)

To run Multi-Edit™ from DOS type:

ME [filename]

The filename is optional. Use it if you want to load the file on startup.

HELP	The <F1> key will bring up context sensitive on-line help at any point within Multi-Edit.
MAIN MENU	The <F2> key will access the main menu. Most operations are selected from the menu.
FUNCTION KEYS	The operations assigned to each of the function keys are are labeled at the bottom of the screen. Notice that these selections change when you hold the **Alt**, **Shift**, or **Ctrl** Keys.
UNDO/REDO	Multi-Edit supports full Undo of any editing operation that changes text or makes major changes to the cursor position.
QUITTING MULTI-EDIT	From a menu: the <ESC> key will back you out of any menu. While editing a file: the <F2> key will access the main menu where you can select the "Quit" option.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix 6
Windows™ Information

A6 Windows™ Information

This appendix section contains information on the files used with MotionPRO™ in a Windows™ environment. It is intended for experienced Windows™ users.

The following files are needed by MotionPRO™:

MP.PIF	Program Information File for MotionPRO™
MP.ICO	Icon for MotionPRO™.
MBHYP.PIF	Program Information File for ORMEC Hypertext Help
MBHYP.ICO	Icon for ORMEC Hypertext Help.

These files are described below in greater detail, so that the experienced user may fully understand their use.

MP.PIF File
This file changes the Start-up directory to C:\ and runs the batch file C:\ORMEC\MPRO.BAT, with 343KB of memory required. Users that prefer a different starting directory should edit a copy of this file.

MP.ICO File
This file contains the graphical icon for the MotionPRO™ program item. Users that prefer a different icon should edit a copy of this file.

MBHYP.PIF File
This file changes the Start-up directory to C:\ORMEC and runs C:\ORMEC\ORMEC.EXE with "/c /O /x C:\ORMEC\MB.HYP" as Optional Parameters and 160KB of memory required. Users that prefer a different starting directory and/or options should edit a copy of this file.

MBHYP.ICO File
This file contains the graphical icon for the ORMEC Hypertext Help program item. Users that prefer a different icon should edit a copy of this file.

Creating Windows™ Items

To run MotionPRO™ from Windows™ with the new PIF and icon, create a new item with \ORMEC\MP.PIF as the command line property and \ORMEC\MP.ICO as the icon.

To run Hypertext from Windows™ with the new PIF and icon create a new item with \ORMEC\MBHYP.PIF as the command line property and \ORMEC\MBHYP.ICO as the icon.

Memory Limitations

This version of MotionPRO™ has higher memory requirements than the previous versions. In some cases, while running MotionPRO™ under Windows™, there may not be enough memory left to execute WindowDOS™. If you have this problem, we suggest using Windows File Manager instead of WindowDOS™.

Communications Hints

Windows allows MotionPRO™ to execute independently in several windows which allows the possibility of each MotionPRO™ window to use the same COM port. This could result in communication problems. To prevent this from occuring, it is recommended that the 386 Enhanced option in the Windows Control Panel be set to Always Warn for each COM port. After that, Windows will warn you if several MotionPRO™ programs try to access the same communication port.

MotionPRO™ has been changed to better co-exist in the Windows™ Environment. This allows background processing for other tasks to occur, but there is also a chance that while executing a number of other programs under Windows™ that you could experience communication problems. This is something that happens very rarely in normal execution, but is possible when Windows™ becomes too busy to handle MotionPRO communications in a timely fashion. If you experience a communication problem, shut down any unnecessary programs, or run MotionPRO™ from DOS.