Change Summary

Revision E

March 19, 2001

Revision E Changes: This document, 88-017778-01E, supersedes 88-017778-01D. Changes associated with operating system revisions and document clarifications and corrections are noted below.

Topic	Description
`SGINTE2` Added **(New in OS revision 1.70)**	For the `SGINTE` command, a new setting has been added. `SGINTE2` enables the integrator only at the end of the move. Refer to page 149.
PROFIBUS Option Added **(New in OS revision 1.70)**	A PROFIBUS option is now available (GV6-nnn-PB and GT6-nnn-PB). Several commands have been modified for the PROFIBUS option. • `ERROR` command: Bit 19 indicates FIELDBUS error. • `OUTFNC` command: identifier `I` added to signal a FIELDBUS error (`OUTFNCi-I`). • `TASX` command: Bit 27 indicates FIELDBUS error. • `TCS` command: two faults added, for `FBPIC` (-32158) and `FBPOC` (-32168). • `TER` command: Bit 19 indicates FIELDBUS error.
Document clarifications and corrections	• `DCMDZ` (page 68), command description rewritten. • `DNOTAD` (page 91), Lag/Lead Filter added to block diagram. • `GOSUB` (page 112), example rewritten. • `SMPER` (page 153), note added: Does not apply to GV operating in `DMODE2` or `DMODE4`. • `SMVER` (page 154), note added: Does not apply to GV operating in `DMODE2`. • `TANI` (page 158), description has been rewritten and an example has been added. • In `TASX` (page 161), Bit 5 indicates resolver failure (not encoder failure). • Various typographical errors have been corrected throughout this document.
New commands added to this document:	
ANICDB.....Analog Input Center Deadband ERASE.....Erase All Programs and Profiles INUFD.....User Fault Input Delay OUTBD.....Brake Output Delay TASF.....Transfer Axis Status (full-text report)	TASXF.....Transfer Extended Axis Status (full-text report) TERF.....Transfer Error Status (full-text report) TPRA.....Transfer Absolute Resolver Position TSSF.....Transfer System Status (full-text report) VARCLR.....Variable Clear

Revision D Changes: This document, 88-017778-01D, supersedes 88-017778-01C. Changes associated with operating system revisions and document clarifications and corrections are noted below.

Topic	Description
Integer variables capability **(New in OS revision 1.60)**	The GT6 and GV6 drives now allow you to define up to 99 user variables (integer variables). Integer variables are represented by the syntax VARI*n*, where "*n*" is the number of the variable (range is 1-99). Integer variables may be used for: • Variable assignments and math operations (e.g., VARI3=13, VARI9=PC/2, VARI4=VARI+2). Assignment options are: - Integer constant (range is –2,147,483,648 to +2,147,483,647) - A system variable: A (accel), AD (decel), D (distance), V (velocity), PC (commanded position), PE (encoder/resolver position), or PER (position error). - Math operations between constants, other VARI variables, and system variables. Available math operations are + (addition), - (subtraction), * (multiplication) and / (division). • Command value substitutions (e.g., L(VARI2)). This is applicable to the T (time delay), L (loop), A (accel), AD (decel), V (velocity), and D (distance) commands only. • Variable comparisons in IF and WAIT conditional expressions (e.g., IF(VARI2<VARI1), WAIT(PE>=VARI2)). NOTE: A, AD, V and T values are real numbers (resolution of A, AD, and V is 0.0001, resolution of T is 0.001). When substituting or comparing integer variables, the integer is applied to the full decimal range (for example, if the value of VARI5 is 136298, the substitution A(VARI5) yields an acceleration value of A13.6298). The converse is true when assigning the value of A, AD, or V to an integer variable (for example, if the value of A is 22.0000, the integer assignment VARI4=A yields a VARI4 value of 220000). Refer to page 24, and to the VARI, IF, and WAIT commands, for details on how to use variables.
Additional operands available for IF and WAIT conditional expressions **(New in OS revision 1.60)**	Additional options for comparison operands: VARI (integer variables), A (accel), AD (decel), D (distance), V (velocity), PC (commanded position), PE (encoder/resolver position), or PER (position error). Additional comparison operators (in addition to =, equals): <> (not equal), > (greater than), < (less than), >= (greater than or equal to), and <= (less than or equal to). Examples: IF(VARI5<PE), IF(PC>PE), WAIT(PE>=16000). For additional details, refer to the IF command (page 116) and the WAIT command (page 184).
Document clarifications and corrections	• In THALL (page 169), added clarification of troubleshooting Hall sensor problems. • Added a description for the ERRDEF command, for customizing the program definition prompt — see page 103.

Revision C Changes:

Topic	Description
Changes for the release of OS revisions 1.02 and 1.50, as well as the GT6 and the GV6 drives:	
New name for this manual. Additional programmer's guide.	The name of this manual has changed from *Gemini Series Command Reference* to *Gemini Series Programmer's Reference*. The name was changed because it now includes the *Gemini Major Programmer's Guide* section (pages 19-56), which provides guidelines for implementing firmware features in the Gemini Major products (GT6 and GV6 drives).
Velocity limit and scaling	(OS 1.02) The maximum allowable `DMVLIM` (velocity limit) and `DMVSCL` (velocity scaling) settings for the GT/GT6 drives has been raised from 50.000000 to 60.000000.
Stall detect sensitivity	(OS 1.02) The maximum allowable `DSTALL` setting for the GT/GT6 drives has been raised from 40 to 50.
Variable PWM frequency	(OS 1.02) The `DPWM` command also applies to the GV-U12 drive (same options as for GV-U6).
Drive resolution and step/direction output resolution	(OS 1.02) The range for the `DRES` and `ORES` commands (when used with the GT drives) has changed from 200-100000 to 200-128000 counts/rev.
XON/XOFF support	(OS 1.50) The `XONOFF` command has been added for all Gemini drives (GT, GV, GT6, and GV6) to support ASCII handshaking.
Resolver feedback support	(OS 1.50) The GV and GV6 now support resolver feedback. The resolver functions the same as an encoder. Configuration commands (listed below) have been added to the motor data table, in support of the setup wizard in Motion Planner and Pocket Motion Planner. • Feedback source is selected with `SFB`. • Resolution is set with `ERES` • Offset angle is set with `SRSET` (can be checked with `TSROFF`) `DMODE11` was added to support automatically setting the resolver offset angle with the `SRSET` command. The resolver is automatically detected on reported in the `TREV` report (e.g., `*TREV-GV6-L3R_D1.50_F1.02`).
Accommodations for GT6 & GV6	(OS 1.50) I/O handling commands (e.g., `INDEB`, `INLVL`) and Status Commands (e.g., `TIN`, `TOUT`) have been modified to support the I/O set for the GT6 and GV6 products. See below for a list of new commands added to support the GT6 & GV6. Where appropriate, references are made to information in the *Gemini Major Programmer's Guide*, a separate document.

New commands for GT6 & GV6 (OS 1.50)

A ..... Acceleration
AA..... Average Acceleration
AD ..... Deceleration
ADA..... Average Deceleration
COMEXC..... Continuous Command Processing Mode
COMEXL ..... Continue Execution on Limit
COMEXR..... Continue Motion on Pause/Continue Input
COMEXS..... Continue Execution on Stop
D..... Distance
DEF PROF..... Begin Profile Definition
DEF PROG ..... Begin Program Definition
DEL PROF ..... Delete a Profile
DEL PROG..... Delete a Program
ELSE ..... Else Condition of IF Statement
END..... End Program/Profile Definition
ERROR ..... Error-Checking Enable
ERRORP..... Error Program Assignment
GO..... Initiate Motion
GOBUF..... Store a Motion Segment in Compiled Memory
GOSUB ..... Call a Subroutine
GOWHEN ..... Conditional GOBUF
HOM..... Go Home
HOMA..... Home Acceleration
HOMBAC..... Home Backup Enable
HOMDF ..... Home Final Direction
HOMEDG ..... Home Reference Edge
HOMV..... Home Velocity
HOMVF ..... Home Final Velocity
HOMZ..... Home to Encoder Z-Channel
IF ..... IF Statement
INFNC ..... Input Function
INSELP..... Select a Program using Inputs
JUMP..... Jump to a Program (and do not return)
K..... Kill Motion
KDRIVE..... Disable Drive on Kill
L ..... Loop
LH..... Hardware End-of-Travel Limit – Enable
LHAD..... Hardware End-of-Travel Limit Deceleration
LHADA ..... Hardware End-of-Travel Limit S-Curve Decel
LN..... End of Loop
LS..... Software End-of-Travel Limit – Enable
LSAD..... Software End-of-Travel Limit Deceleration
LSADA ..... Software End-of-Travel Limit S-Curve Decel
LSNEG ..... Software EOT Limit Negative Travel Range
LSPOS ..... Software EOT Limit Positive Travel Range
MA.....Absolute/Incremental Positioning Mode Enable
MC.....Preset/Continuous Positioning Mode Enable
NIF.....End IF Statement
OUT.....Output State
OUTFNC .....Output Function
PLN .....End of Loop (Compiled Motion)
PLOOP.....Beginning of Loop (Compiled Motion)
POUTA.....Compiled Output
PRUN PROF....Run a Compiled Profile
PS .....Pause Program Execution
PSET.....Establish Absolute Position
RE .....Registration Enable
REG .....Registration Distance
REGLOD.....Registration Lockout Distance
RUN PROG.....Run a Program
S.....Stop Motion
SFB .....Select Feedback Source
SGAF .....Acceleration Feedforward Gain
SGENB.....Enable a Gain Set
SGSET.....Save a Gain Set
SGVF .....Velocity Feedforward Gain
SHALL.....Hall Sensor Inversion
SRSET .....Resolver Offset Angle
STRGTD .....Target Distance Zone
STRGTE .....Target Zone Mode Enable
STRGTT.....Target Settling Timeout Period
STRGTV .....Target Velocity Zone
T .....Time Delay (Dwell)
TACC .....Transfer Command Acceleration
TACCA.....Transfer Actual Acceleration
TANI.....Transfer Analog Input Voltage
TDIR.....Transfer Programs/Profiles Stored in Memory
TGAIN .....Transfer Active Gains
TMEM.....Transfer Memory Usage
TRACE.....Program Trace Mode
TRGFN.....Trigger Interrupt Functions
TRGLOT.....Trigger Interrupt Lockout Time
TSGSET.....Transfer Gain Set
TSROFF.....Transfer Resolver Offset Angle
TSTLT .....Transfer Settling Time
V.....Velocity
VF.....Final Velocity
WAIT .....Wait for a Specific Condition

Appendix B (functional group quick reference for commands)

The format of Appendix B has changed. It lists all the commands, grouped in their respective functional groups. To review the command specifications, refer to Appendix A.

Revision B Changes:

Topic	Description
Documentation Errors	• Appendix A & B: TDIMAX is a servo-only (not stepper-only) command. • Appendix A & B: LH default for GT & GV is 0 (disabled), not 3 (enabled). • ORES: If the maximum output frequency (2.5 MHz) is exceeded, the drive will fault and TASX bit #29 and TER bit #19 is set. (previously it was stated that a configuration error occurred, reported by TASX bit #7). • TASX: - Bit #17 does not indicate a fault condition (" * " was removed). - Bits #29 and #30 do indicate fault conditions (" * " was added).

Changes for the release of OS revisions 1.01 and 1.02, and the GT:

Support for linear servo motors	(OS 1.01) The Gemini servo drives support Parker's new line of linear servo motors and positioning tables. To effectively use a linear motor, you must first provide the motor's *electrical pitch* with the DMEPIT command. **NOTE**: The Gemini drive operates in rotary units; therefore, it expects to receive commands in rotary units and reports operating conditions in rotary units. The setup wizard in Motion Planner (page 6) and the configuration tool in Pocket Motion Planner (page 11) make it easy to perform the setup in linear units. The setup/configuration tool automatically converts your setup parameters (in linear units) to the appropriate Gemini code in rotary units. You then download the generated code/file to the drive. If you are communicating to the Gemini drive over a live serial link, you must convert certain command values from linear to rotary units before you send them to the drive. Likewise, when you query the drive for certain conditions, or if you upload the configuration file from the drive, the command values are reported in rotary units. The commands that require conversion are: DMTD, DMTJ, DMTKE, DMTSCL, DMTLIM, DMTW, DMVLIM, DMVSCL, LDAMP, SMVER, TVE, and TVELA. For conversion equations and other details, refer to the DMEPIT description.
Motor temperature configuration	(OS 1.01) Two commands were added to enhance the internal real-time estimation of the motor winding temperature. When the winding temperature exceeds DMTMAX, the drive faults and TASX bit #30 is set. • DMTAMB (Motor Ambient Temperature) • DMTMAX (Maximum Motor Winding Temperature)
Variables added to analog monitor output A and B (DMONAV & DMONBV)	(OS 1.01) Variables #23 & #24 were added to DMONAV & DMONBV. These new variables are applicable to the GV only. • Variable #23 is *Position Setpoint*, based on the TPC value. This value is normalized as follows (value clips at ±1 rev or ±1 elec. pitch, regardless of the DMONAS or DMONBS setting): - Rotary motors: ±10V = ±1 rev (based on TPC ÷ ERES) - Linear motors: ±10V = ±1 elec. pitch (based on TPC ÷ DMEPIT) • Variable #24 is *Actual Position*, based on the TPE value. This value is normalized as follows (value clips at ±1 rev or ±1 elec. pitch, regardless of the DMONAS or DMONBS setting): - Rotary motors: ±10V = ±1 rev (based on TPE ÷ ERES) - Linear motors: ±10V = ±1 elec. pitch (based on TPE ÷ DMEPIT)
Pole pairs (DPOLE)	(OS 1.01) The minimum value for DPOLE was changed from 2 to 1.

Continued …

Torque/Force limit (DMTLIM), status	(OS 1.01) When the GV's commanded torque/force reaches the limit set by DMTLIM (TTRQ = DMTLIM), TAS bit #31 is set. TAS bit #31 remains set until you clear it with the DCLRLR command, or cycle power or issue a RESET. This is not considered a fault condition.
Command-to-product compatibility	(OS 1.01) If you attempt to send a command to a drive with which it is incompatible (e.g., sending a servo command to a stepper drive), the drive will respond with the error prompt (default error prompt is "?").
Zeroing the drive command offset	(OS 1.01) When the DCMDZ command is executed, the last voltage read at the command input will become the new zero reference point. When in velocity mode (DMODE4) or torque/force mode (DMODE2), this minimizes motor drift.
Notch filter depth	(OS 1.01) DNOTAD & DNOTBD were added to set the depth of the notch filters.
PWM Frequency	(OS 1.01) The DPWM command has been added to set the PWM frequency for the GV. This value is the internal PWM frequency as seen at the motor windings; the motor ripple current is twice this frequency.
Current loop gains (DIGN)	(OS 1.02) The valid range for DIGNA, DIGNB & DIGNC was changed from ±10 to 0-15. The valid range for DIGND was changed from ±2 to 0-1.
Configuration fault, addition	(OS 1.02) An additional TCS fault (-32367) was added to indicate when the GT drive resolution (DRES) value is too low for the number of pole pairs. To resolve the fault condition, make sure the DRES value is at least 4 times the DPOLE value.
Stall Detect Enable (ESTALL) command removed	(OS 1.02) Stall detection (GT) can be disabled only with the DSTALL0 command. Stalls are reported in TASX bit #17. If the Fault on Stall mode is enabled (ESK1), the occurrence of a stall will immediately stop pulses from being sent to the motor and will disable the drive (DRIVE0); in addition, the stall is also reported in TAS bit #12 and TER bit #1.
Velocity limit (DMVLIM)	(OS 1.02) DMVLIM is now applicable to both servo and stepper drives. Previously, it was applicable only to servo (GV) drives. Factory default values: DMVLIM50 for GT and DMVLIM200 for GV.
Steppers may use Velocity Control mode (DMODE4)	(OS 1.02) DMODE4 is now applicable to the GT drives. (The Velocity Control mode allows direct control of the motor velocity.) DMVLIM and DMVSCL have been added to the motor data table for stepper motors (thus, these parameters are auto-configured based on the stepper motor you select in the Motion Planner and Pocket Motion Planner configuration tools). The DMVSCL range for GT drives is 0-50, the default is 50. Leaving DMVSCL at zero no longer causes a motor configuration error. TASX bit #18 now applies to the GT, indicating that the commanded velocity has exceeded the DMVLIM value.