

APPENDICES

Command Listing

"—Quote Command	DPI—Display Position Indexer	FSG—Stop Position Maintenance Move on Limit Encountered
#—Step Sequence	DR—Display Parameters	FSH—Abort Position Maintenance on Limit Encountered
;—Comment Field	DRD—Read Distance Via Parallel I/O	FSI—Enable/Disable Following Mode
A—Acceleration	DSTP—Enable/Disable Stop	FSK—Set Following Learn Mode
[ABS]—Absolute Encoder Comparison	DTXT—Display Text Data on RP240 LCD	FSL—Enable/Disable Self Correction Mode
AD—Deceleration	DVA—Display Actual Velocity	FSM—Set Absolute Encoder
[AND]—Boolean AND Operator	DVO—Display Variable Data on RP240 LCD	FSN—Set Pulse Following
B—Buffer Status Report	DVS—Display Velocity Setpoint	FSP—Set Tracking Mode
BCPE—Buffered Configure Position Error	DW—Dead Band Window	G—Go
BCPG—Buffered Configure Proportional Gain	E—Enable Communication Interface	GD—Go Defined
BCPM—Buffered Configure Proportional Max.	ELSE—Else	GDEF—Move Definition
BL—Backlash	ER—Configure Encoder Resolution	GH—Go Home
BRK—Break Command	[ER]—Error Flag Operator	GHA—Go Home Acceleration
BS—Buffer Status Report	F—Disable Communication Interface	GHAD—Go Home Deceleration
C—Continue	FAC—Set Following Synchronization Rate	GHF—Go Home Final Velocity
CEW—Configure Error Window	FBS—Following Base	GHV—Go Home Velocity
CIT—Configure In Position Time	FC—Following Learn Count	GOSUB—GOSUB Sequence
CPE—Configure Position Error	FEN—Set Following Synchronization Count	GOTO—GOTO Sequence
CPG—Configure Proportional Gain	[FEP]—Following Encoder Position Comparison	H—Set Direction
CPM—Configure Proportional Maximum	FIN—Following Increment	^H—Backspace
CR—Carriage Return	[FL]—User Flag Operator	HALT—Halt
D—Distance	FOL—Following Percent	ID—Immediate Distance
DCLR—Clear Display	FOR—Following Ratio	IF—If
DCNT—Enable/Disable Pause and Continue	FP—Following Encoder Point	IN—Set Input Functions
DFS—Display Flags for Drive Parameters	FPA—Following Encoder Absolute Point	[IN]—Input Flag Operator
DFX—Display Flags for Indexer Status	FRD—Read Following Via Parallel I/O	INA—CW Limit Status
DIN—Disable Inputs	FS—Encoder Function Report	INB—CCW Limit Status
DLED—Turn RP240 LEDs On/Off	FSA—Enable Following Mimic Mode	INC—Home Limit Status
DOUT—Disable Outputs	FSB—Enable/Disable Encoder Step Mode	INL—Set Active Input Level
DP—Distance Point	FSC—Enable/Disable Position Maintenance	INR—Enable/Disable Registration Input
DPA—Display Actual Position	FSD—Stop on Stall	IO—Immediate Output
DPC—Position Cursor	FSF—Enable Following Synchronized Acceleration	IS—Input Status Report
DPE—Display Position Error		IV—Immediate Velocity

JA—Jog Acceleration
 JAD—Jog Deceleration
 JVH—Jog Velocity (High)
 JVL—Jog Velocity (Low)

K—Kill

L—Loop
 LAD—Limit Deceleration
 LD—Limit Disable
 LF—Line Feed
 LRD—Read Loop Count via Parallel I/O

MC—Mode Continuous
 MN—Mode Normal
 MPA—Mode Position Absolute
 MPI—Mode Position Incremental
 MPP—Mode Position Profile
 MR—Configure Motor Resolution
 MSP—Maximum Synchronization Percent
 MV—Maximum Correction Velocity
 MW—Set Motor Waveform

N—End of Loop
 NG—End Position Profile
 NIF—End of IF
 NWHILE—End of While

O—Output
 OFF—Off
 ON—On
 [OR]—Boolean OR Operator
 OS—Function Set-Up Report
 OSA—Define Active State of Limit Switch/Sensor
 OSB—Backup to Home Switch
 OSC—Define Active State of Home Switch
 OSD—Enable Encoder Z Channel Input
 OSE—Jog Enable
 OSF—Acknowledge STOP & KILL Inputs On Power-up
 OSG—Final Homing Direction
 OSH—Reference Edge of Home Switch
 OSI—Save Sequence Scan Mode on Stop
 OSJ—Configure Z-Channel Search Mode
 OUT—Output Functions
 OUTL—Set Active Output Level
 OUTP—Output on Position

PF—Follower Position Report
 PFZ—Set Follower Counter to Zero
 PHZ—Zero Motor Phase

[POS]—Position Counter Comparison
 PR—Absolute Position Report
 PS—Pause
 PU—Configure Square Wave Output
 PUL—Activate Square Wave Output
 PX—Report Encoder Position
 PZ—Set Absolute Counter to Zero

Q0—Exit Velocity Profiling Mode
 Q1—Enter Velocity Profiling Mode

R—Request SX Status
 RA—Limit Switch Status Report
 RB—Loop, Pause, Shutdown, Trigger Status Report
 REG—Configure Registration Move
 REPEAT—Repeat
 RG—Go Home Status Report
 RIFS—Return Indexer to Factory Settings
 RM—Rate Multiplier in Velocity Streaming Mode
 RS—Report Status Sequence Execution
 RSE—Report Servo Errors
 RSIN—Set Variables Interactively
 RV—Revision Level
 RVV—Report Revision Verbose

S—Stop
 SCR—Set Standby Current Reduction
 SFL—Set User Flag
 SL—Software Limits
 SLD—Software Limits Disable
 SN—Scan Delay Time
 SP—Set Position Absolute
 SPA—Set Position Zero
 SS—Function Set-Up Report
 SSA—RS-232 Echo Control
 SSC—Enable End of Move In-Position Window
 SSG—Clear/Save the Command Buffer on Limit
 SSH—Clear/Save the Command Buffer on Stop
 SSI—Enable/Disable Interactive Mode
 SSJ—Enable/Disable Continuous Scan Mode
 SSL—Enable Resume Execution
 SSN—Set Message Mode
 SSP—Clear All Position Offsets with PZ, PFZ
 SSR—Enable/Disable Fault On Shutdown
 ST—Shutdown
 STOP—Stop
 STR—Set Strobe Output Delay Time

T—Time
 TD—Set Input Debounce Time
 TDR—Set Registration Input Debounce Time
 TEST—Test
 TF—Set Following Time
 TM—Move Time Report
 TR—Wait for Trigger
 TRD—Read Timer from Parallel I/O
 TS—Trigger Input Status
 TW—Thumbwheel Input Mode
 TX—Transmit Variable and String

U—Pause and Wait for Continue
 UNTIL—Until

V—Velocity
 VAR—Variables
 VARD—Read Variables via Parallel I/O
 VARN=FUN—Enable and Read Function Keys
 VARN=NUM—Enable and Read Numeric Keypad
 VRD—Read Velocity via Parallel I/O
 VS—Start/Stop Velocity

W1—Signed Binary Position Report
 W2—Hexadecimal Position Report
 W3—Signed Hexadecimal Position Report
 WHEN—Set When Condition
 WHILE—While

XBS—Sequence Memory Available Report
 XC—Sequence Checksum Report
 XD—Sequence Definition
 XDIR—Sequence Directory
 XE—Sequence Erase
 XEALL—Erase All Sequences
 XFK—Set Fault or Kill Sequence
 XG—GOTO Sequence
 XQ—Sequence Interrupted Run Mode
 XR—Run a Sequence
 XRD—Read Sequence via Parallel I/O
 XRP—Sequence Run with Pause
 XS—Sequence Execution Status
 XST—Sequence Step Mode
 XT—Sequence Termination
 XTR—Set Trace Mode
 XU—Upload Sequence
 XWHEN—Set When Sequence

Y—Stop Loop

Z—Reset

SX Example Programs

The following programs are example sequences to show general programming flow for the SX Indexer/Drive. These are not intended to be an actual application solution. For more example programs call the Compumotor BBS number at 707-584-4059 or look on the Xware diskette.

```
;REFER_TO_THE_SX_SOFTWARE_REFERENCE_GUIDE_OR_EARLIER_IN
;THIS_USER_GUIDE_FOR_MORE_INFORMATION_CONCERNING_SPECIFIC
;COMMANDS_AND_WHAT_THEIR_FUNCTIONALITY_IS_IN_THESE_EXAMPLE
;PROGRAMS.

;This_program_is_the_power_up_sequence.__Sequence_#100_is_always_the_power
;up_sequence.__All_of_the_applicable_set_up_parameters_for_the_other_sequences
;are_typically_set_in_the_power_up_sequence.__Anything_that_needs_to_be_set
;or_enabled_but_isn't_changed_again_should_be_placed_in_the_power_up_
;sequence.__This_example_also_uses_the_sequence_selecting_feature_of_the
;SX.__Anytime_it_is_not_in_the_middle_of_a_sequence_already,_a_new_
;sequence_can_be_run_by_activating_the_appropriate_inputs_that_are_defined
;as_sequence_select_inputs.

1XE100                ;erase_sequence_#100_(power_up_sequence)
1XD100                ;begin_definition_of_sequence_#100

1XFK0                 ;disable_fault_or_kill_sequence_NOTE:_this_allows_
                    ;someone_to_be_able_to_kill_the_program_execution
                    ;immediately_after_powering_up_so_they_can_edit
                    ;the_programs

1OSA0                 ;set_hard_limit_inputs_for_normally_closed_switches
1LAD100               ;set_limit_deceleration_to_100_rps
1LD0                  ;enable_both_hard_limits
1GHA50                ;set_go_home_acceleration_to_50_rps
1GHAD50               ;set_go_home_deceleration_to_50_rps
1GHF.5                ;set_final_homing_velocity_to_0.5_rps
1GHV2                 ;set_initial_homing_velocity_to_2_rps
1OSC0                 ;set_home_input_active_level_for_normally_open_switch
1OSB1                 ;enable_backup_to_home_function
1OSG1                 ;set_final_homing_approach_direction_to_CCW
1OSH0                 ;set_home_switch_reference_edge_to_CW(nearest_to_CW_limit)

1INL0                 ;set_inputs_active_level_for_normally_open_switches
1IN1A                 ;set_input_#1_to_a_trigger_input_(default_type)
1IN2C                 ;set_input_#2_to_a_kill_input
1IN3J                 ;set_input_#3_to_a_jog_CW_input
1IN4K                 ;set_input_#4_to_a_jog_CCW_input
1IN5L                 ;set_input_#5_to_a_jog_velocity_select_input
1IN6B                 ;set_input_#6_to_a_sequence_select_input_(weighting=1)
1IN7B                 ;set_input_#7_to_a_sequence_select_input_(weighting=2)
1IN8B                 ;set_input_#8_to_a_sequence_select_input_(weighting=4)
1SN50                 ;set_sequence_scan_input_debounce_time_to_50_milliseconds

1TD10                 ;set_general_input_debounce_time_to_10_milliseconds
1JA100                ;set_jog_acceleration_to_100_rps

1JAD100               ;set_jog_deceleration_to_100_rps
1JVH10                ;set_jog_velocity_high_to_10_rps
1JVL0.5               ;set_jog_velocity_low_to_0.5_rps

1OUT1A                ;set_output_#1_to_a_programmable_output_(default_type)
1OUT2J                ;set_output_#2_to_a_strobe_output
1OUT3J                ;set_output_#3_to_a_strobe_output
1OUT4J                ;set_output_#4_to_a_strobe_output

1STR100               ;set_strobe_output_delay_time_to_100_milliseconds

1XQ1                  ;set_sequence_interrupted_run_mode

1SSJ1                 ;enable_sequence_scan_mode

1XFK99                ;set_fault_or_kill_sequence_to_be_sequence_99

1SFL0                 ;initialize_user_flag_to_zero

1XT                   ;end_definition_of_sequence_#100

;This_sequence_performs_a_simple_preset_move_(MN)_at_5_rps.__It_will
;cause_the_motor_to_travel_a_distance_of_50000_steps_(2_revolutions_with
```

```

;the_default_drive_resolution_setting).__This_sequence_can_be_run_by_
;activating_input_#6_(sequence_select_weighting_of_1)

1XE1                                ;erase_sequence_#1
1XD1                                ;begin_definition_of_sequence_#1
1A50                                ;set_acceleration_to_50_rps
1AD50                               ;set_deceleration_to_50_rps
1V5                                 ;set_velocity_to_5_rps
1D50000                             ;set_distance_to_50000_steps
1MPI                                ;set_SX_to_incremental_positioning_mode
1MN                                  ;set_SX_to_preset_distance_mode
1G                                   ;start_move_(GO)
1XT                                  ;end_definition_of_sequence_#1
;This_sequence_is_a_simple_example_of_a_registration_move.__The_SX_is_put_into
;continuous_mode_and_the_continuous_move_is_started_with_the_G_command.__
;It_will_move_at_3_rps_until_the_registration_input_goes_active_(or_a_limit_is_
;encountered).__After_the_registration_input_goes_active,_the_motor_will
;decelerate_at_10_rps_to_a_velocity_of_0.1_rps_and_travel_25000_steps_from_
;the_point_at_which_the_registration_input_was_seen_as_active._(within_50_
;seconds).__If_it_never_sees_the_registration_input,_the_motion_will_stop
;at_the_software_or_hardware_limits._This_sequence_can_be_run_by_
;activating_input_#7_(sequence_select_weighting_of_2)
1XE2                                ;erase_sequence_#2
1XD2                                ;begin_definition_of_sequence_#2
1MC                                  ;set_SX_to_continuous_positioning_mode
1A100                               ;set_acceleration_to_100_rps
1AD100                              ;set_deceleration_to_100_rps
1V3                                 ;set_velocity_to_5_rps
1REG1,A100,AD10,V0.1,D25000        ;define_the_registration_move
1G                                   ;start_continuous_move_(GO)
1XT                                  ;end_definition_of_sequence_#2
;This_sequence_performs_a_more_complex_move_profile.__The_motion
;begins_at_velocity_5_rps_and_then_runs_at_this_velocity_for_2_seconds.
;After_the_2_seconds,_the_velocity_is_changed_to_1_rps.__The_program
;then_waits_for_a_trigger_input_(trigger_#1).__After_the_trigger_is
;activated_the_velocity_is_changed_to_0.1_rps_for_the_rest_of
;the_move.__The_MPP_mode_is_used_to_allow_the_SX_to_
;process_other_commands_while_a_move_is_in_progress._
;If_not_in_MPP_mode_the_SX_will_wait_until_the_current_move
;is_completed_before_processing_the_next_command.__This_sequence_can_be_run_by_
;activating_input_#6_&_input_#7_together_(sequence_select_weighting_of_1_and_2_=3)
1XE3                                ;erase_sequence_#3
1XD3                                ;begin_definition_of_sequence_#3
1MN                                  ;set_SX_to_preset_distance_mode
1MPP                                 ;enable_mode_position_profile
1A50                                ;set_acceleration_to_50_rps
1AD50                               ;set_deceleration_to_50_rps
1V5                                 ;set_velocity_to_5_rps
1D50000                             ;set_distance_to_500000_steps
1G                                   ;start_move_(GO)
1T2                                  ;wait_2_seconds_before_continuing
1V1                                  ;reduce_velocity_to_1_rps
1TR1                                 ;wait_for_trigger_#1
1V0.1                               ;reduce_velocity_to_0.1_rps
1NG                                  ;exit_MPP_mode
1XT                                  ;end_definition_of_sequence_#3
;This_sequence_performs_a_homing_function.__It_starts_the_
;homing_move_with_the_GH_command_and_will_stay_on_this
;command_until_the_home_switch_is_found_or_both_end_of
;travel_limits_are_hit.__The_position_counter_is_then_zeroed
;after_the_successful_home.__If_both_limits_are_hit_before_the
;home_switch_is_found_the_fault_sequence_is_run.__This_sequence_
;can_be_run_by_activating_input_#8_(sequence_select_weighting_of_4)

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LXE4                ;erase_sequence_#4
LXD4                ;begin_definition_of_sequence_#4
1GH                 ;start_a_go_home_move
1PZ                 ;zero_the_position_counter
LXT                 ;end_definition_of_sequence_#4
;This_sequence_puts_the_SX_into_jogging_mode_so_the_motor's
;motion_can_be_controlled_with_the_defined_jog_inputs_and
;jog_velocity_select_input.__The_sequence_waits_for_the_
;trigger_input_to_go_active_to_signal_an_end_to_the_jog
;mode.__This_sequence_can_be_run_by_activating_input_#6__
;&_input_#8_together_(sequence_select_weighting_of_1_and_4_=5)
LXE5                ;erase_sequence_#5
LXD5                ;begin_definition_of_sequence_#5
1OSE1              ;enable_jog_mode
1TR1                ;wait_for_trigger_#1
1OSE0              ;disable_jog_mode
LXT                 ;end_definition_of_sequence_#5
;This_is_the_fault_or_kill_sequence_(error_handling).__The_SX_will_run_this
;sequence_if_a_kill_is_commanded_or_a_general_fault_occurs.__The_SX_User
;Guide_lists_the_faults_that_will_call_the_fault_sequence.__The_sequence_first
;disables_any_mode_or_condition_that_may_still_be_active_to_prevent_further
;motion_from_occurring.__It_then_checks_the_error_flag_to_see_what_error_
;occurred.__This_fault_sequence_is_not_comprehensive_of_all_the_errors_that
;are_flagged_by_the_error_flag.__The_sequence_finally_prompts_the_operator
;if_they_want_to_rehome_and_continue_or_just_continue.__If_a_system_fault
;occurs_the_program_flow_will_stop.
LXE99              ;erase_sequence_#99_(fault_or_kill_sequence)
LXD99              ;begin_definition_of_sequence_#99
1XFK0              ;disable_the_fault_or_kill_sequence
1OSE0              ;disable_jog_mode_if_active
1SSJ0              ;disable_sequence_select_mode
1NG                ;exit_MPP_mode_if_in_it
1IF(ER1)           ;check_if_CCW_limit_was_hit
1"CCW_Limit_Hit    ;print_error_message
1SFL1              ;set_user_flag
1NIF               ;end_of_if_statement
1IF(ERX1)          ;check_if_CW_limit_was_hit
1"CW_Limit_Hit
1SFL1
1NIF
1IF(ERXX1)         ;check_if_it_is_a_system_fault
1"System_Fault_Occured
1ST1               ;shutdown_the_drive
1SFL1
1XG98              ;goto_non-existent_sequence_to_stop_everything
1NIF
1IF(FL0)           ;check_if_user_flag_has_been_set
1"Kill_Commanded  ;if_it_hasn't_then_kill_caused_the_jump_to_#99
1NIF
1CR                ;print_carriage_return
1"Activate_input_#1_to_resume_sequence_select_mode.
1CR
1"Activate_input_#8_to_rehome_and_then
1"resume_sequence_select_mode.
1CR
1CR
1REPEAT            ;wait_for_input_to_be_activated
1UNTIL(INXXXXX1_OR_INXXXXXXXXXXXXX1)
1IF(INXXXXX1)      ;check_if_input_#1_is_active
1XG100             ;goto_sequence_#100
1NIF
1IF(INXXXXXXXXXXXXX1) ;check_if_input_#8_is_active
1XR4               ;gosub_sequence_#4
1XG100             ;goto_sequence_#100
1NIF
LXT

```


APPENDIX C

LVD Installation Instructions

Complying with the Low Voltage Directive (LVD)

The SX Drive, when installed according to the procedures in the main body of this user guide, may not necessarily comply with the Low Voltage Directive (LVD) of the European Economic Community. To install the SX Drive so that it complies with LVD, you must follow the additional procedures described in this appendix. If this is not done, the protection of the product may be impaired.

For more information about LVD, see 73/23/EEC and 93/68/EEC, published by the European Economic Community (EEC).

Additional Installation Procedures for LVD Compliance

Environmental Conditions

Pollution Degree The SX Drive is designed for pollution degree 2.
Installation Category The SX Drive is designed for installation category II.

Electrical

Connecting and Disconnecting Power Mains

The SX Drive's protective earth connection is provided through its make first/break last earth terminal on the power mains connector. You must reliably earth the SX Drive's protective earth connection. Attach or remove the SX Drive's power plug only while input power is OFF.

Isolation Transformer

The SX Drive's mains voltage is limited to 120 VAC nominal, single phase. If your mains voltage is higher, use an isolation transformer located between the power mains and the SX Drive. Your isolation transformer should be insulated to ~2300V rms.

CAUTION

Do not use an autotransformer.

Line Fuses

Line fuses need to be added to protect the transformer and associated wiring. If the live wire cannot be readily identified, fuse both phase conductors. The value of fuse required is given by:

$(1.5 \times VA)/(\text{supply volts})$ [amps]

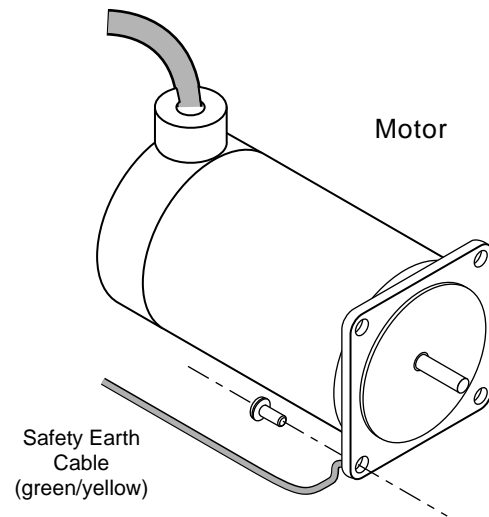
Fuse types should be anti-surge HBC.

Providing a Protective Earth Connection for Motors

You must provide a connection from the motor to a reliable system earth. This connection provides a protective earth for the motor contact point. The motor's protective earth connection is important for safety reasons, and *must not be omitted*.

Make connections according to the following instructions and diagram:

- ① Use a spade lug in combination with a star washer and mounting bolt to make good contact with the bare metal surface of the motor's mounting flange.
- ② Use a recognized green/yellow safety conductor to make the connection between the motor and earth. Wire gauge must be no thinner than the current carrying wire in the motor's power cable.
- ③ Resistance between the motor and earth must be no greater than 0.1 W. Use thicker gauge wire if the resistance is too high.



Providing Protective Earth Connection for Motor

Mechanical

Installing in an Enclosure

The SX Drive must be installed within an enclosure. The enclosure's interior must not be accessible to the machine operator. The enclosure should be opened only by skilled or trained service personnel.

Servicing the SX Drive

Changing Firmware

Only skilled or trained personnel should change firmware.

Changing Batteries

The SX Drive contains a replaceable lithium battery, of type Duracell DL2450, or Sanyo CR2450, or equivalent. Only skilled or trained personnel should change batteries.

CAUTION

**Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.**

Disposal of Batteries

Dispose of batteries in accordance with local regulations.

Do Not Replace Fuses

The SX Drive has no fuses designed to be replaced by the user. Fuse failure indicates that other components have also failed. Fuses and other components should only be replaced by Compumotor or its designated repair facilities.

Thermal Safety

The SX Drive May Be Hot

The SX Drive may reach high temperatures during normal operations, and may remain hot after power is removed.

The Motor May Be Hot

The motor may reach high temperatures during normal operations, and may remain hot after power is removed.









Sonic Pressure

High Sound Level

The sound level from some large frame step motors (NEMA 34, NEMA 42, and larger) may exceed 85 dBA. Actual sound level is application dependent, and varies with motor loads and mounting conditions. Measure the sound level in your application; if it exceeds 85 dBA, install the motor in an enclosure to provide sound baffling, or provide ear protection for personnel.

Table of Graphic Symbols and Warnings

The following symbols may appear in this user guide, and may be affixed to the products discussed in this user guide.

Symbol	Description
	Earth Terminal
	Protective Conductor Terminal
	Frame or Chassis Terminal
	Equipotentiality
	Caution, Risk of Electric Shock
	Caution, Refer to Accompanying Text
	Hot Surface
	Recycle Battery

