

# **Model SKC**

**Disk/Tape Subsystem**

**Technical Manual**

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## SKC Subsystem

### *Introduction*

The SKC series Disk/Tape Subsystems combine Zetaco's high performance SCZ-6 controller with high capacity disk and cartridge tape drives to provide a full data storage solution for Data General, Eclipse, and MV series systems. The SKC 19" rackmount enclosure is designed for up to two full-height or four half height devices. Each unit comes with two power supplies, three cooling fans, internal SCSI cabling, and drive address select DIP switches for two devices. The front controls and indicators include an AC power switch, LED power on indicator, and drive activity LED indicators. Zetaco SKC Subsystems are available in a wide variety of packaging options to give you the right combination of storage capacity, footprint and performance to meet your specific needs.

At the system level, the SKC subsystem utilizes the capabilities of Data General's MTJ and DPJ (Argus) software drivers. System performance benefits of the Argus driver are supported by the controller: memory resident control blocks, mapping responsibility, execution of linked control blocks. The subsystem executes all tape commands supported by the MTJ driver and disk commands supported by the DPJ driver.

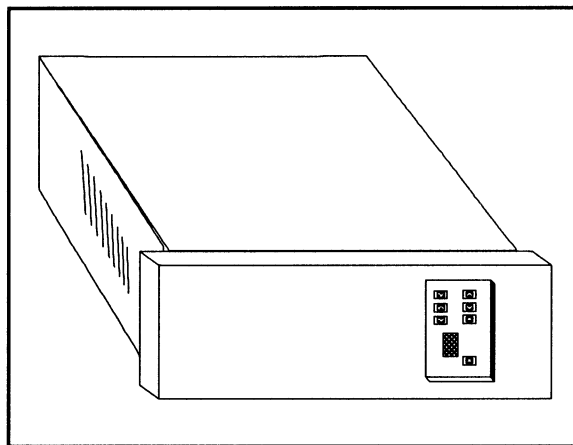
The subsystem supports AOS/VS and AOS/VS-II operating systems unmodified, along with RDOS with Argus drivers.

### *Features*

- Subsystems use the latest generation SCSI-1, SCSI-2, and Fast SCSI-2 3-1/2" disk and tape drives
- Standard 19" rack mount peripheral enclosure
- Adherence to Common Command Set SCSI Protocol insures drive compatibility
- Controller command queuing for lower system overhead

***Enclosure Specifications***

- Two 65 watt universal AC input (100-260V) switching power supplies, 47 Hz-63 Hz
- Industry standard AC power receptacle for domestic and international power cords
- Six foot U.S. domestic power cord
- Internal cable - two SCSI 50 pin drive connectors daisy chained to two Centronics 50 pin female I/O connectors, mounted on the rear plate
- SCSI address select DIP switches for two devices
- Slide rails
- One 12 VDC, 100 CFM and two 35.3 CFM quiet fans
- Two push button rotary SCSI address switches



**Figure 1**  
SKC Enclosure

***Specifications***

***Power Supplies***

Quantity:	2
Input:	100-260 VAC, 47HZ - 63Hz
Power:	65 watts each
Output:	+12V @ 4.0A Peak @ 7.0A +5V @ 3.5A Peak @ 10.0A

<i>Fans</i>	12 VDC	
	Location:	Side
	Size:	80mm (3.15")
	Airflow:	35.3 CFM (1.00m <sup>3</sup> /min) each
	Noise:	45dB (A)
	Quantity:	1

<i>Weights and Sizes</i>	Shipping Weight:	50 pounds - 20.4Kg
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<i>Environmental</i>	Operating Environment:	Temperature 0 to 45°C
	Non-Operating Environment:	Temperature -20 to +85°C

## ***Cabling***

*Internal Cabling* Internal cables connect from paddleboard to bulkhead. Located within the computer bulkhead panel are:

Paddleboard: Active backplane paddleboard with one 50-pin connector

Cable: 50-conductor flat ribbon cable

*External Cabling* To connect from the computer bulkhead to the drive enclosure a shielded external cable is used. Daisy chain cables are also available to connect additional enclosures. The last enclosure must have a proper SCSI bus termination plug installed in the unused connector.

### **Standard External Cables**

**Bulkhead-to-Drive:** Five-foot, 50-conductor, shielded round cable connecting bulkhead to disk/tape drive enclosure

Drive-to-Drive: Two-foot, 50-conductor, shielded round cable (optional) for connecting more enclosures

***NOTE:*** *The Fast SCSI-2 maximum cumulative cable length allowable for a fully populated subsystem is 41 feet for drives with differential interface and 9 feet for drives which use the single-ended interface.*

## **Drive Specifications**

### **Seagate ST11200**

<b>Product Information</b>		<b>ST11200N</b>	<b>ST11200ND</b>
Interface [7]		SCSI-2 Fast	SCSI-2 Fast
Cache Type		Multi-segmented, 256KB	
Capacity MB			
Unformatted	1248		1248
Formatted [1]		1054	
	1054		
Cylinders		1872	1872
Heads	15		15
Sectors/Track		74(avg.)	74(avg.)
Recording method		RLL(1,7)	RLL(1,7)
Rev/min		5411	5411
<b>Seek time (ms typ.) [2]</b>			
Average	Read	12.0	12.0
	Write	12.7	12.7
<b>Operating environment</b>			
Ambient temp.[4]		----5°C to 50°C----	
HDA max temp.[3]		-----60°C-----	
<b>Power requirements</b>			
+12V +/-5%(max)[6]		1.0 A	1.0 A
(Max Start) [5]		2.0 A	2.0 A
+5V +/-5%(max)[6]		0.8 A	1.0 A
(Max Start)		0.8 A	0.9 A
Power Idle (Typ)		9.0 W	10 W
Oper. (Typ)		11.0 W	12 W

**Notes.**

- [1] Standard units are factory formatted with 512 data bytes per sector with twelve spare sectors per cylinder and 2 cylinders at inner tracks reserved for spares in addition to capacity listed.
- [2] Includes on-board controller overhead.
- [3] Maximum measured at any location on top cover.
- [4] For best reliability keep below 35°C (95°F).
- [5] -10% regulation for a maximum of 10 seconds at power up.
- [6] Measured with an average reading DC ammeter. Instantaneous +12 V current peaks will exceed these values.
- [7] Can be commanded to operate according to SCSI-1 protocol.

***Initial Setup Information***

For the initial setup connect the cables, set the SCSI bus address and remove, install, or leave as is the SCSI I/O line terminator resistor packs. These procedures are described in paragraphs following.

***SCSI Interface Cable Connection***

Model ST11200N/ND is a SCSI interface drive. System connection is via a 50 pin, SCSI connector. Pin 1 is noted in Figure 2. Some cables have a contrasting color stripe on one edge to indicate pin 1. Strain relief is recommended at the cable. *Do not block system cooling air flow in routing of cables.*

***SCSI Address Selection***

Make sure that the SCSI bus address jumper(s) are properly set for the bus address assigned to the drive. See figures showing the bus address select header and the jumper configurations that select addresses 0 through 7. Typically the primary boot device is set to ID 0, and the subsequent SCSI drives are jumpered in ascending order. Bus addresses 0 through 6 should be used (the host adapter usually uses address 7). If the drive LED shows no on/off activity

when the host is trying to communicate with it, an incorrect bus address selection at the drive should be suspected.

*Resistor Terminator  
Packs*

If you are installing a single drive, the resistor terminator packs must remain installed. See Figure 2 where they are noted as I/O Terminators. If you are installing multiple hard disc drives, remove the resistor termination packs from all the drives but the one connected to the end of the SCSI I/O cable.

When reinstalling a resistor pack, note that pin 1 end on the pack is denoted by a dot, a number one or a notch.

Model numbers that end in "ND" have differential I/O circuits and these drives have no provisions for terminators that plug into the drive PCB. The system manufacturer must provide some external means of I/O line termination.

*Read/write Head  
Auto-park*

Seagate disc drives described herein park the heads automatically at power off. This feature requires no operator intervention.

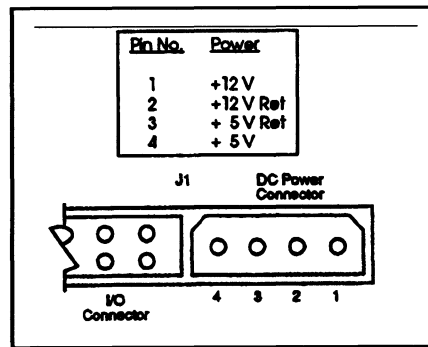
*Optional Parity Bit  
Enable*

Some systems require parity bit checking. Consult the system documentation for the specific requirements. See figures for location of Parity Bit Enable jumper. Jumper-on enables parity reporting by the SCSI bus.

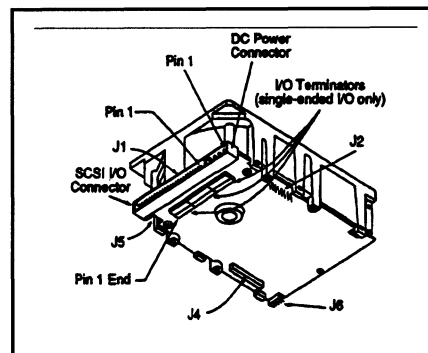
*DC Power  
Connection*

The drive receives DC power through a 4 pin connector mounted on the PCB next to the SCSI I/O connector.





**Figure 2**  
DC Power Connection



**Figure 3**  
ST11200 Family I/O  
Connection and Terminators

## Drive Configuration

Each disc drive option select header connectors on the sides and front where jumper plugs are installed to select the way that the drive is to be configured or to select its ID on the I/O bus.

### SCSI I/O Drives

On SCSI I/O drives either J6 (on the front of the drive) or J5 (on the side behind the SCSI I/O connector) may be used to set the drive ID. To avoid possible incorrect ID setting, do not use both J5 and J6 for ID selection. The following figures show where these headers are located on the different drives covered by this manual. There are notes following where explanations are given about the purpose of each jumper and specify the standard factory (called "default") settings of these jumpers (i.e., settings used for most common single drive application). Changes to these settings should be made only if it is known that the system requires a different configuration.



Notes explaining the functions of the various jumpers on jumper header connectors J2, J5 and J6 are given below in order of jumper position (not connector pin number). The term "default" means as standard OEM units are configured when shipped from factory.

<b>Jumper Position</b>	<b>Jumper function Description</b>
J2 1	Reserved for later use, Default is jumper off.
J2 2	Jumper installed in position 2 enables the Delayed Motor Start option (if jumper in position 3 is off). Motor start delay is 16 times the drive ID number in seconds; i.e., drive ID 0 starts immediately, drive one starts 16 seconds later, drive ID 2 starts 32 seconds later and etc. Default is no jumper on.
J2 3	Jumper installed enables Motor Start option. The drive waits for the Start unit command from the host before starting the spindle motor. If no jumper is installed, drive operation depends on whether or not there is a jumper in position 2. Default is no jumper on.
J2 4	Jumper installed means entire drive is write protected. Default is no jumper on.
J2 5	Jumper installed means parity checking and error reporting by the drive is enables. Default is no jumper on.
J2 6	Reserved for factory use. No jumper installed.
J2 7,8	Select terminator power source. In position 8 the drive supplies power to the SCSI bus, pin 26. In position 7 the drive supplies power only to its own terminators. Jumper in position A (between pins 2 and 4), between positions 7 and 8 (nearest PCB edge) means the drive takes power from the SCSI bus, pin 26. Jumpers on both 7 and 8 at the same time is allowed. Default is jumper on position 7.
J5	Drive ID on SCSI Bus (J6 may be used instead).
1,2,3 (A <sub>0</sub> ,A <sub>1</sub> ,A <sub>2</sub> )	The drive ID is binary coded position-wise i.e.,

jumper in position  $A_2$  is drive ID 4, in position  $A_1$  is ID 2, position  $A_0$  is ID 1 and no jumpers is ID 0. Default is ID=0. Note that relative positions of  $A_2$  and  $A_0$  are opposite to what they are on J6.

J6		
1,2,3		
( $A_2, A_1, A_0$ )		Either J5 or J6 (optional) may be used to select drive ID. Both should not be used at the same time, because at some future time when the ID is changed the user could fail to configure both J5 and J6 the same. The drive ID is binary coded positionwise ( $A_0$ is the least significant position and $A_2$ is the most significant position), i.e., jumper in position $A_2$ is drive ID 4, in position $A_1$ is ID 2, position $A_0$ is ID 1 and no jumpers is ID 0. Default is ID=0.
J6	4	Used as a cable connection for the reference index signal (REFSIG+) (J6 pin 6, bottom) for sync spindle feature. J6 pin 5 is GND.
J6	5	No jumper. These pins used to connect a remote LED indicator. Pin 3 (top, nearest HDA), the anode connection, connects in the drive to the +5V supply through a pull-up resistor. Pin 4 (bottom), the cathode connection connects in the drive to signal command through the emitter-collector junction of a transistor switch that controls the LED on/off condition.
J6	6	Reserved position.

*Seagate ST31200*

*Initial Set-up  
Information*

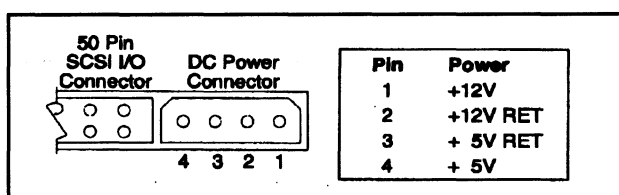
For the initial setup connect the cables or plug into a mounted connector (if applicable), set the drive ID on the bus and enable or disable the I/O line terminator resistor packs ("N" models). These procedures are described in paragraphs following. Note whether drive modes number ends in N or ND.

### SCSI Interface Cable Connection

Models ST31200 family are SCSI interface drives. System connection is via a 50 pin SCSI connector. Pin 1 is noted in Figure 7. Some cables have a contrasting color stripe on one edge to indicate pin 1. Strain relief is recommended at the cable in drives using cables. *Do not block system cooling airflow in routing of cables.*

### DC Power Connection

"N" and "ND" model family drives receive DC power through a 4 pin connector mounted on the PCB next to the SCSI I/O connector. See figure Below.



**Figure 6**  
DC Power connection, 50 pin SCSI I/O connector.

### SCSI Address Selection

On "N" and "ND" model drives, make sure that the SCSI bus address jumper(s) are properly set for the bus address assigned to the drive. See Figures 8a and 8b showing the bus address select header and the jumper configurations that select addresses 0 through 7. Typically the primary boot device is set to ID 0, and the subsequent SCSI drives are jumpered in ascending order. Bus addresses 0 through 6 should be used (the host adapter usually uses address 7). If the drive LED shows no on/off activity when the host is trying to communicate with it, an incorrect bus address selection at the drive should be suspected.

### Terminator Resistor Packs

Model ST31200N family drives have terminator resistor packs that are permanently installed, but can be enabled or disabled by jumper plug. See jumper in Figure 8a. If you are installing a single drive, the terminator resistor packs must remain enabled. If you are installing multiple hard disk drives, disable the termination resistor packs from all the drives but the one connected to the end of the SCSI I/O cable.

Model numbers that end in "ND" have differential I/O circuits and have no provisions for terminators on the drive PCB. The system manufacturer must provide some external means of I/O line termination. The "ND" model drives can provide power for external terminators if the TP jumper is installed on the last position on the right end of J2. See Figure 8a.

*Read/Write Head  
Auto-Park*

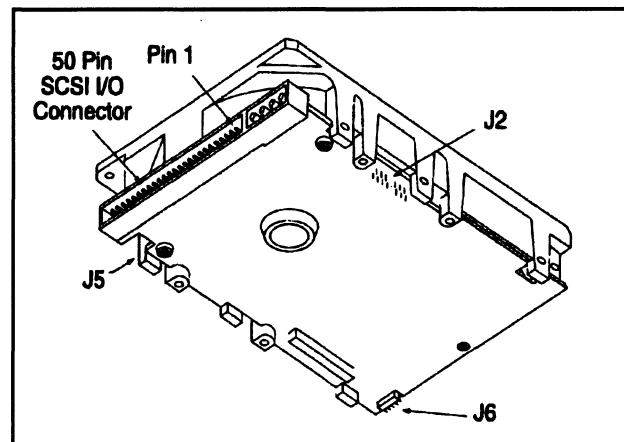
Seagate disc drives described herein mentioned in this drive park the heads automatically at power off. This feature requires no operator intervention.

*Optional Parity Bit  
Enable*

Some systems require parity bit checking. Consult the system documentation for the specific requirements. See Figure 8a for location of Parity Bit enable jumper. Jumper-installed enables parity reporting by the SCSI bus.

*Write  
Precompensation and  
Reduced Write  
Current*

Not required on Seagate SCSI Interface drives covered by this manual.



**Figure 7**  
ST31200N/ND family I/O connection (50 pin SCSI I/O connector). "N" model terminators (not visible) are not removable.

Drive Configuration

Each disc drive has one or more option select header connectors on the back, side or front where jumper plugs are installed to select the way that the drive is to be configured or to select its ID on the I/O bus. See notes following Figure 8b.

ST31200N/ND Family  
50-Pin SCSI I/O  
Drives

On ST31200N/ND family drives either J6 (on the front of the drive) or J5 (on the side behind the DC Power connector) may be used to set the drive ID. To avoid possible incorrect ID setting, do not use both J5 and J6 for ID selection. The following figures show where these headers are located on the different drives covered by this manual. See notes following Figures 8a and 8b where explanations are given about the purpose of each jumper and specify the standard factory (called "default") settings of these jumpers (i.e., settings used for most common single drive application). Changes to these settings should be made only if it is known that the system requires a different configuration.

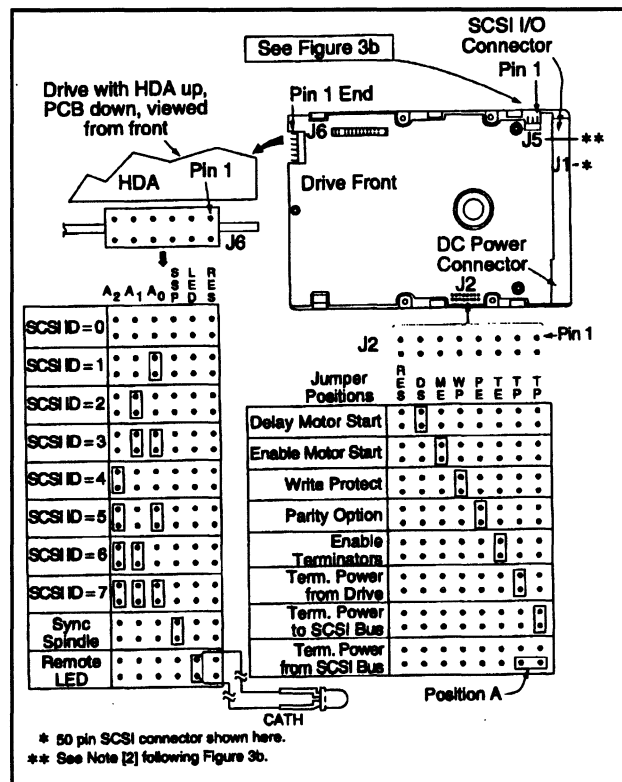
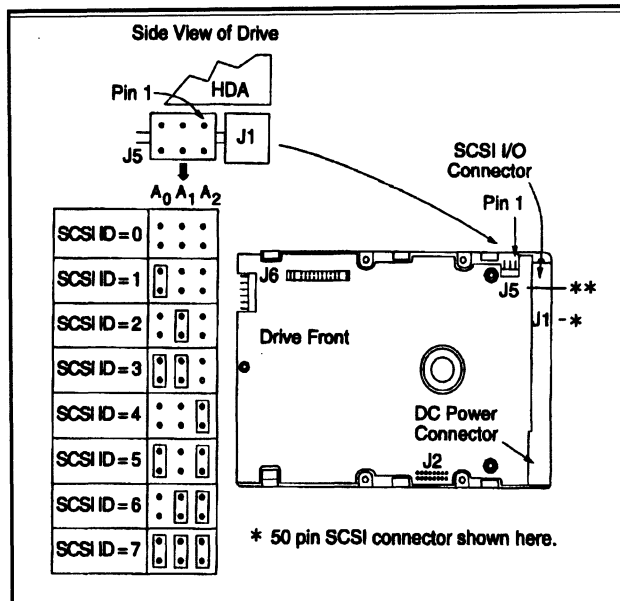


Figure 8a  
Drive configurator ST31200N family.



**Figure 8b**  
Drive configurator ST31200N family.

**Notes.**

- [1] Notes explaining the functions of the various jumpers on jumper header connectors J2, J5, and J6 are given below in left to right order of jumper position. The term "default" means as standard OEM units are configured when shipped from factory. "OFF" means no jumper is installed; "On" means a jumper is installed. Off or On underlined is factory default condition.

**J2 Jumper**

**Position Jumper Function Description**

**RES**

Off/On Reserved. **Default** is no jumper installed.

**DS ME**

Off Off Spindle starts immediately after power up - **Default** setting.

Off On Drive spindle does not start until Start Unit command received from host.

On Off Spindle Startup is delayed by SCSI ID times 12 seconds after power is applied, i.e., drive 0 spindle starts immediately when DC power connected,



		drive 1 starts after 12 second delay, drive 2 starts after 24 second delay, etc.
<u>On</u>	<u>On</u>	Drive spindle starts when Start Unit command received from host. Delayed start feature is overridden and does not apply when ME jumper is installed.
<b>WP</b>		
<u>On</u>		Entire drive is write protected.
<u>Off</u>		Drive is not write protected. <b>Default</b> is no <b>WP</b> jumper installed.
<b>PE</b>		
<u>On</u>		Parity checking and parity error reporting by the drive is enabled.
<u>Off</u>		Drive does not report result of parity checking to host. <b>Default</b> is no <b>PE</b> jumper installed.
<b>TE</b>		
<u>On</u>		<b>(Applies to "N" models only)</b> When the jumper installed, the On-board (non-removable) terminator circuits are enabled (connected to the I/O lines). <b>Default</b> is jumper installed.
<u>Off</u>		Terminator circuits not connected to I/O lines.
<b>TP</b>		
<u>Off</u>	<u>Off</u>	No terminator power is connected to drive terminators or SCSI bus I/O pin 26.
<u>On</u>	<u>Off</u>	Drive supplies its own terminator power only. Jumper on this position is factory <b>default</b> .
<u>Off</u>	<u>On</u>	Drive supplies power to I/O pin 26 of SCSI bus; none to internal terminators. When drives have differential I/O circuits, a jumper on the right <b>TP</b> position may be needed to power external terminators (see system documentation). The ST31200ND family drives have differential I/O circuits on the drive.
<u>On</u>	<u>On</u>	Drive supplies terminator power to itself (internal connection) and to I/O pin 26 of SCSI bus. This is a legal jumper setting.

**TP Position A ("N" family models only)**

- On** This horizontally positioned jumper across the two TP positions nearest PCB edge, connects terminator power from SCSI bus I/O pin 26 to the drive's internal terminators.
- Off** See above explanations for TP jumpers.

**J5 Jumper  
Installation  
A<sub>0</sub>,A<sub>1</sub>,A<sub>2</sub>\***

**Jumper Function Description**

Drive ID on SCSI Bus (J6 may be used instead). The drive ID is binary coded positionwise i.e., jumper in position A<sub>2</sub> is drive ID 4, in position A<sub>1</sub> is ID 2, position A<sub>0</sub> is ID 1 and no jumpers is ID 0. **Default** is ID=0.

**J6 Jumper  
Installation  
A<sub>2</sub>,A<sub>1</sub>,A<sub>0</sub>\***

**Jumper Function Description**

Drive ID on SCSI bus. Either J5 or J6 (optional) may be used to select drive ID. Both should not be used at the same time, because at some future time when the ID is changed the user could fail to configure both J5 and J6 the same. **Default** is ID=0.

**SSP\***

Used only as a cable connection for the reference index signal (REFIND+) (J6 Pin 6, bottom) for sync spindle feature. J6 pin 5 is GRD. Install a jumper when no cable is attached. **Default** is a jumper installed.

**LED\***

No jumper ever installed. These pins used to connect a cable for a remote LED indicator. Pin 3 (top, nearest HDA), the anode connection, connects in the drive to the +5V supply through a pull-up resistor. Pin 4 (bottom), the cathode connection connects in the drive to signal common through the emitter-collector junction of a transistor switch that controls the LED on/off condition.

**RES**

Reserved position. No jumper to be installed.