Wilson Laboratories' SX-530 Disk Memory Exerciser is designed primarily for complete off-line testing of all disk drive models with Storage Module (SMD) type interface. It is also designed for use with other Winchester fixed and/or removable cartridge type disk drives including 5¼", 8" or 14" media — for most manufacturers. It can be used for manufacturing QC testing to insure trouble free operation before shipment, QA incoming inspection, field service testing to isolate and repair drive problems, and for engineering evaluation of peripherals. The SX-530 is housed in a portable attaché type case enclosure which makes it convenient for all applications.

The SX-530 reads and writes data in four formatted modes using a selection of three fixed data patterns and one user programmable data pattern. Error indicators show the type and location of errors and manual controls permit single step or continuous running with error indication or stop on error capability.

Single steps, seek delay, alternate set, stop on error, offset and marginal strobe control combine to make trouble shooting by the operator a quick and easy function. Trouble shooting operation includes the ability to introduce errors and verify specific areas of drive performance.

Drive variations are accommodated by plug-in interface cards and include the following manufacturers' models: • CDC SMD, MMD, FMD and LARK • FUJITSU (including Eagle) • AMPEX 9300 and DFR • MICRODATA Reflex • MEMOREX • NEC • Storage Technology Corporation • Megavault • Also supports enhanced XSMD, ESM and 16 MBS and 20 MBS transfer rate drives • ST506/ST412 and other compatible 5¼" drives • SA1000 • ANSI STD X3T9 (8" Hard Disk) • PRIAM DISKOS 3300 • Trident Series, Ball BD and BF Series • Kennedy S300 • BASF Series • Many other compatible interfaces can be tested.
### OPERATING FEATURES

The SX-530 Console performs four groups of functions.

<table>
<thead>
<tr>
<th>Drive Setup</th>
<th>Seek Operations</th>
<th>Data Operations</th>
<th>Tester Operational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drive Select</strong></td>
<td><strong>Seek Control</strong></td>
<td><strong>Address Mark</strong></td>
<td><strong>Reset</strong></td>
</tr>
<tr>
<td>Four 2-position switches control the Unit Select lines to the drive. They are used to set the drive number of the drive to be SELECTED.</td>
<td>A 3-position switch provides write/read operation without seek action, enables seek without delay, or imposes delay.</td>
<td>A 2-position switch in the Set, Increment, Decrement and Random field.</td>
<td>A 4-position switch enables selection of fault clear or rezero command to be sent by FAULT/REZERO pushbutton or automatically.</td>
</tr>
<tr>
<td><strong>Drive Status</strong></td>
<td></td>
<td>Two 4-position switches control digital display of seven functions by a 5-digit display. The items available for display are: data rate, sector count, revolution in error, seek time, cylinder address, pass count and byte count.</td>
<td><strong>Digital Information Control</strong></td>
</tr>
<tr>
<td>Eight indicators monitor status lines from the drive to show the following: UNIT SELECTED, READY, ON CYLINDER, SEEK END, BUSY, SEEK ERROR, FAULT and READ ONLY.</td>
<td></td>
<td>Two 4-position switches control digital display of seven functions by a 5-digit display. The items available for display are: data rate, sector count, revolution in error, seek time, cylinder address, pass count and byte count.</td>
<td>Two 4-position switches control digital display of seven functions by a 5-digit display. The items available for display are: data rate, sector count, revolution in error, seek time, cylinder address, pass count and byte count.</td>
</tr>
<tr>
<td><strong>Index Sector</strong></td>
<td></td>
<td><strong>Cylinder Address</strong></td>
<td><strong>Address Mark</strong></td>
</tr>
<tr>
<td>A 2-position switch selects either the daisy chain or radial cable as the source of Index and Sector signals.</td>
<td></td>
<td>This set of switches and LEDs, when used with the SEEK CONTROL, ALT/MAX SET switch allows the user to perform addressing between Cylinder</td>
<td>A 2-position switch selects the head addressing mode — Sequential or Set.</td>
</tr>
<tr>
<td><strong>Offset (SMD)</strong></td>
<td></td>
<td><strong>Write/Read Control</strong></td>
<td><strong>Errors</strong></td>
</tr>
<tr>
<td>A switch +, 0, —, controls drive offset for margin testing.</td>
<td></td>
<td>A 3-position switch is used with FORMAT to write address and data.</td>
<td>Indicators show when an error has occurred. User compares actual data read with programmed data (bit-by-bit) via LEDs.</td>
</tr>
<tr>
<td><strong>Data Strobe</strong></td>
<td></td>
<td><strong>Write/Read Flag</strong></td>
<td><strong>Digital Information Control</strong></td>
</tr>
<tr>
<td>An EARLY, NORMAL, LATE switch controls the data strobe for margin testing.</td>
<td></td>
<td>A 4-position switch selects head addressing fields, WRITE DATA, READ DATA, READ CLK, READ SYNC, ERROR, CYLINDER SELECT, READ SELECT, CONTROL, BUS (0 through 9), SEL 0.</td>
<td>Two 4-position switches control digital display of seven functions by a 5-digit display. The items available for display are: data rate, sector count, revolution in error, seek time, cylinder address, pass count and byte count.</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td></td>
<td><strong>Data</strong></td>
<td><strong>Cylinder Address</strong></td>
</tr>
<tr>
<td>A 2-position switch provides media volume selection command to drives that contain both a fixed and removable disk pack (i.e., CDC CMD or AMPEX DFR).</td>
<td></td>
<td>A 4-position switch selects RANDOM PASS, RANDOM CYLINDER, and CYCLIC (varying continuously through the data field patterns). SWITCH DATA is a 16-bit data pattern loaded from the Cylinder Address switches.</td>
<td>This set of switches and LEDs, when used with the SEEK CONTROL, ALT/MAX SET switch allows the user to perform addressing between Cylinder</td>
</tr>
<tr>
<td><strong>Test Points</strong></td>
<td></td>
<td><strong>Indicators</strong></td>
<td><strong>Errors</strong></td>
</tr>
<tr>
<td>Twenty-eight test points are provided on the panel. They are: INDEX, SECTOR, ADDR MARK, ON CYLINDER, SEEK ERROR, SERVO CLOCK, WRITE DATA, WRITE CLK, WRITE SYNC, READ DATA, READ CLK, READ SYNC, ERROR, CYLINDER SELECT, HEAD SELECT, CONTROL, BUS (0 through 9), SEL 0.</td>
<td></td>
<td>Indicates show when an error has occurred. User compares actual data read with programmed data (bit-by-bit) via LEDs.</td>
<td>Indicators show when an error has occurred. User compares actual data read with programmed data (bit-by-bit) via LEDs.</td>
</tr>
<tr>
<td><strong>Specifications subject to change without notice.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APPLICATION</td>
<td>REVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEXT ASSY</td>
<td>USED ON</td>
<td>LTR</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>A</td>
<td>Released</td>
<td>5-5-80</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Revised</td>
<td>5-29-80</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Revised</td>
<td>10-15-80</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Revised per Rev G Assy.</td>
<td>4-20-81</td>
<td></td>
</tr>
</tbody>
</table>

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
± .XX ± ± .XXX ±

WILSON Laboratories, Inc.

Product Specification
SX-530 Disk Exerciser

SIZE CODE IDENT NO. DRAWING NO.
A 650068

SCALE SHEET 1 OF 21
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>GENERAL DESCRIPTION</td>
<td>3</td>
</tr>
<tr>
<td>1.01</td>
<td>I/O ADAPTERS</td>
<td>4</td>
</tr>
<tr>
<td>2.00</td>
<td>FUNCTIONAL DESCRIPTION</td>
<td>5</td>
</tr>
<tr>
<td>3.00</td>
<td>CONSOLE DESCRIPTION</td>
<td>7</td>
</tr>
<tr>
<td>3.01</td>
<td>CONFIGURATION CONTROLS</td>
<td>7</td>
</tr>
<tr>
<td>3.02</td>
<td>OPERATION CONTROLS &amp; INDICATORS</td>
<td>8</td>
</tr>
<tr>
<td>3.03</td>
<td>WRITE/READ CONTROL</td>
<td>9</td>
</tr>
<tr>
<td>3.04</td>
<td>DATA</td>
<td>10</td>
</tr>
<tr>
<td>3.05</td>
<td>DATA PATTERN DISPLAY</td>
<td>11</td>
</tr>
<tr>
<td>3.06</td>
<td>ERROR</td>
<td>11</td>
</tr>
<tr>
<td>3.07</td>
<td>SEEK CONTROL</td>
<td>12</td>
</tr>
<tr>
<td>3.08</td>
<td>CYLINDER ADDRESS CONTROLS &amp; INDICATORS</td>
<td>14</td>
</tr>
<tr>
<td>3.09</td>
<td>HEAD ADDRESS CONTROLS &amp; INDICATORS</td>
<td>14</td>
</tr>
<tr>
<td>3.10</td>
<td>VOLUME</td>
<td>15</td>
</tr>
<tr>
<td>3.11</td>
<td>RESET</td>
<td>15</td>
</tr>
<tr>
<td>3.12</td>
<td>DIGITAL DISPLAY</td>
<td>16</td>
</tr>
<tr>
<td>3.13</td>
<td>DRIVE STATUS INDICATORS</td>
<td>17</td>
</tr>
<tr>
<td>3.14</td>
<td>TEST POINTS</td>
<td>18</td>
</tr>
<tr>
<td>4.00</td>
<td>PHYSICAL DESCRIPTION</td>
<td>18</td>
</tr>
<tr>
<td>5.00</td>
<td>ENVIRONMENTAL SPECIFICATIONS</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>SX-530 PANEL DRAWING</td>
<td>20</td>
</tr>
</tbody>
</table>
1.00 GENERAL DESCRIPTION

The SX-530 Disk Exercisor will test many different models of the Winchester technology disk drive. Drive interface variations are accommodated by pluggable I/O cable adapters. Head and cylinder address limits are manually set prior to exercising. Adapter boards include a prom which provides for modifying the header and data field formatting requirements.

The SX-530 accommodates only a single radial cable and thus can exercise only a single drive at a time.

The SX-530 is housed in a suitcase type carrying case. The cover is removable. The remaining base half presents the operator console and includes all electronics.

The power cable and the connected I/O cables are stored in a well at the right of the console. Extra adapters and I/O cables and the operational manual are stored in a compartment in the cover. Adapters are mounted on positive locking nylon standoffs and are easily removed.

Six captive screws allow removal of the console and electronics from the case for quick change of adapters and I/O cables to accommodate different drive interface requirements.

<table>
<thead>
<tr>
<th>SIZE</th>
<th>CODE IDENT NO.</th>
<th>DRAWING NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>650068</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SCALE</th>
<th>SHEET</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>SHIPPING ASSY.</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------</td>
</tr>
<tr>
<td>SMD</td>
<td>100285</td>
</tr>
<tr>
<td>KENNEDY</td>
<td>100286</td>
</tr>
<tr>
<td>TRIDENT</td>
<td>100287</td>
</tr>
<tr>
<td>PRIAM</td>
<td>100288</td>
</tr>
<tr>
<td>BASF</td>
<td>100289</td>
</tr>
<tr>
<td>PERTEC</td>
<td>100290</td>
</tr>
<tr>
<td>IMI</td>
<td>100291</td>
</tr>
<tr>
<td>ANSI STD</td>
<td>100292</td>
</tr>
</tbody>
</table>

CABLES

<table>
<thead>
<tr>
<th>20</th>
<th>28</th>
<th>34</th>
<th>40</th>
<th>50</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.01 SX-530 I/O ADAPTER
2.00 FUNCTIONAL DESCRIPTION

SERVO MODES

There are four basic servo modes:
1. SET
2. INC
3. DEC
4. RANDOM

Each of the four basic servo modes can be modified by adding the ALT mode. A variable seek delay is selectable. Cylinder address display shows last cylinder sought. Seek OFF control provides for writing and reading without seek action.

An ALTSET, MAXSET switch position is used to load the cylinder address switch-selected alternate address used in the ALT & SET mode and to load the maximum address necessary in the INC, DEC, and RANDOM seek modes.

HEAD SELECT

There are two modes of head addressing:
1. SET
2. SEQ (Sequenced)

Indicators display the address of the head selected.
VOLUME SELECT

A select switch and an indicator are provided for those drives which require volume select.

WRITE/READ MODES

There are five modes of data handling and an ON/OFF control for servo action only.

1. READ HEADER AND DATA
2. READ HEADER, WRITE DATA
3. READ HEADER, WRITE/READ DATA CYLINDER
4. READ HEADER, WRITE/READ DATA PASS
5. WRITE HEADER AND DATA (FORMATTING)

A single header is written at the beginning of each track. A single data field fills the remainder of the track. All reading is comparison tested for error.

DATA PATTERNS

There are three data pattern modes:

1. Data composed by a bank of 16 switches.
2. A 16-bit random data pattern.
3. A cyclic pattern continuously varying throughout the data field.

DATA DISPLAY

Sixteen LEDs show either the random data pattern or the first word containing an error bit.
3.00 CONSOLE DESCRIPTION

Figure 1 depicts the SX-530 console.

3.01 CONFIGURATION CONTROLS

0 = LED DISPLAY
@ = PANEL SWITCH
+ = TEST POINT

DRIVE SELECT

8 4 2 1  Four two-position switches control
@ @ @ @  unit select lines to the drives.

DRIVE NUMBER

INDEX/SECTOR

DAISY CHAIN  Two position switch. Selects daisy chain
@ RADIAL  or radial cable for the source of
       index and sector signals.

ADDR MARK

ON  Two-position switch. ON requires
@ OFF  address mark writing when formatting
       and address mark detection when reading
       the header.

<table>
<thead>
<tr>
<th>SIZE</th>
<th>CODE IDENT NO.</th>
<th>DRAWING NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>650068</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SCALE</th>
<th>SHEET</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>
3.02 OPERATION CONTROLS AND INDICATORS

@ START/STOP

Push button starts and stops run action.

CONT

Two position switch. SINGLE stops run after single cycle of operation selected. CONT continues running until stopped by START/STOP or by error stop.

@ SINGLE


0 RUN

LED shows when the SX-530 is operating.

0 ILL OP

LED shows when an illegal operation has been selected.

DRIVE SELECT

SELECT

Three-position switch. SELECT sends drive select signal to drive. OFF drops select signal to drive. STATUS TEST lights all drive STATUS LEDs.
3.03 WRITE/READ CONTROL

FORMAT
Four-position switch selects:
@ WR/RD
FORMAT-Write address and data fields.
WRITE
WR/RD-Read address and alternate the WRITE/READ of data fields.
READ
WRITE-Read address and write data field.
READ-Read both address and data field.

SKIP
Four-position switch. SKIP is used with FORMAT to write bad track bit in address. ON enables write-read action. OFF provides for seek action without write-read.

@ LOAD DATA
LOAD DATA push button loads 16-bit pattern selected by CYLINDER ADDRESS switches.

WRITE/READ INDICATORS
0 SKIP
LED's show when writing and reading is in process. SKIP LED shows when
0 WR
address field contains bad track bit.
0 RD
DATA STROBE

EARLY

@ NORMAL

LATE

Three-position switch controls data strobe within drive (for margin testing).

3.04 DATA

RANDOM PASS

RANDOM CYL

CYCLIC

@ SWITCH DATA

Four-position switch selects one of three data patterns and two modes of WRITE/READ action for random data in the INC and DEC seek modes.

RANDOM PASS writes all cylinders then reads all cylinders. RANDOM CYL and all other WRITE/READ modes write then read each cylinder seeked.

Random data is a 16-bit repeated pattern generated by high speed counting.

CYCLIC data varies continuously throughout the data field and is a different pattern for each track. SWITCH DATA is a 16-bit pattern loaded from the CYLINDER ADDRESS switches.
3.05 DATA PATTERN DISPLAY

Sixteen LEDs show the random data pattern generated when running in the RANDOM CYL or RANDOM PASS modes. These LEDs show blurred when running in the CYCLIC and SWITCH DATA modes but a STOP ON ERROR halt will show the last 16-bit read data frame which included the error bit.

3.06 ERROR

0 BLINK Flashes on any error.
0 ADDRESS Latches on header error.
0 DATA Latches on data field error.
0 ADDR MARK Set if address mark not found.
0 SECTOR Set if inconsistent number of sector marks per revolution.
0 SERVO CLOCK Set if inconsistent number of servo clocks per revolution.

STOP ON ERROR Two-position switch enables stop on error.
@ OVERRIDE

CLEAR Push button clears error flags and zeroes the DIGITAL DISPLAY.
@ ERRORS
& DISPLAY
3.07 SEEK CONTROL

RANDOM

Four-position switch selects seek mode.

DEC

The selectable seek actions are:

INC

@ SET

SET - repeated seeks to the CYLINDER ADDRESS switch value.

INC - seeks incrementing cylinders.

Drops back to zero after seeking the MAXSET address.

DEC - seeks decrementing cylinders.

Jumps to maximum after seeking zero address.

RANDOM - seeks random cylinder within the MAXSET address.
SEEK DELAY
@ SEEK ON
SEEK OFF

Three-position switch, OFF position provides for WRITE/READ operation without seek action. ON position enables seek without delay. DELAY position imposes a pot (located to right of switch) controlled variable delay between seeks.

ALT
@ OFF
MAXSET

Three-position switch selects ALT seek mode. MAXSET position sets alternate address for SET + ALT seek mode and sets maximum address for INC, DEC, and RANDOM seek modes.

SERVO OFFSET

PLUS
@ ZERO
MINUS

Three-position switch controls drive offset (for margin testing).
3.08 CYLINDER ADDRESS CONTROLS & INDICATORS

1024 512 256 128 64 32 16 8 4 2 1
0 0 0 0 0 0 0 0 0 0 0

@ @ @ @ @ @ @ @ @ @ @ @ @ @ @

LED's show last cylinder sought.
Two-position switches select address for SET and ALT seeks. Additional unmarked switches are used to compose 16-bit SWITCH DATA patterns.

3.09 HEAD ADDRESS CONTROLS & INDICATORS

32 16 4 2 1
0 0 0 0 0

LED's show head addressed. Two-position switches select head address for SET head mode and limit for SEQ head mode.

ON @ @ @ @ @
OFF @ @ @ @ @

SEQ HEAD
SET HEAD

Two-position switch selects head addressing mode: set or sequenced.
3.10 **VOLUME**

- **ON**
  - Selects volume. Applicable to those drives which have volume change capability i.e. final and removable media.

- **OFF**

3.11 **RESET**

- **BOTH**
  - Four-position switch select fault clear or rezero command or both to be sent by FAULT/REZERO push button. If left selected the rezero command will be sent automatically on a SEEK ERROR STATUS and a fault clear command will be sent automatically on a FAULT Status.

- **FAULT**
  - Push button sends FAULT/REZERO commands as selected by adjacent four position switch.

- **REZERO**
3.12 DIGITAL DISPLAY

Two four-position switches select one of seven values to be displayed. The right switch is enabled when the left switch is at the lowest position.

*PASS COUNT Displays number of passes through all cylinders in the INC and DEC seek modes.
DATA RATE Displays servo clock rate in MHz to .01 MHz.
SEC CNT Displays number of sector pulses per revolution.
*SEEK TIME Displays last seek time (in milliseconds) measured to 0.1 millisecond.
*BYTE CNT Displays number of bytes per revolution.
*ERR RCNT Counts revolutions in which any error occurred.
CYL ADDR Shows decimal equivalent of CYLINDER ADDRESS binary LEDs. With SEEK CONTROL at MAXSET, converts CYLINDER ADDRESS switch setting to equivalent decimal value.

*Selection must be made before action occurs.
3.13 **DRIVE STATUS INDICATORS**

- **SELECTED**
- **READY**
- **ON CYLINDER**
- **SEEK END**
- **BUSY**
- **SEEK ERROR**
- **FAULT**
- **READ ONLY**

This indicators monitor the appropriate status lines from the drive.
3.14  TEST POINTS

+ INDEX + CYLINDER SELECT
+ SECTOR + HEAD SELECT
+ ADDR MARK + CONTROL
+ ON CYLINDER + BUS 0
+ SEEK ERROR + BUS 1
+ SERVO CLK + BUS 2
+ WRITE DATA + BUS 3
+ WRITE CLOCK + BUS 4
+ WRITE SYNC + BUS 5
+ READ DATA + BUS 6
+ READ CLOCK + BUS 7
+ READ SYNC + BUS 8
+ ERROR + BUS 9
+ GND + SEL 0

4.00  PHYSICAL DESCRIPTION

The SX-530 is housed in a suitcase type carrying case. The case size will be: Length 21", Width 13", and Depth 7". The total weight will not exceed 10 pounds. Figure 2 illustrates an opened SX-530.

The power requirement will be 120 VAC (.75A) or 230 VAC (.375A), 50/60 Hz.
Accessories supplied with the SX-530, mounted within the cover include:

1. Sets of 6 foot long I/O cables to match drives specified.
2. Instruction Manual
3. One adapter to match drive(s) specified (mounted on main PC board); others available at additional cost.

ENVIRONMENTAL SPECIFICATIONS

Temperature - 0 to 50°C with 15°C maximum rise per hour.
Relative Humidity - 20 to 80 percent.
Altitude - to 10,000 feet (operating).
Figure 1: SX-530 FRONT PANEL
Figure 2: SX-530 DISK MEMORY EXERCISER

<table>
<thead>
<tr>
<th>SIZE</th>
<th>CODE IDENT NO.</th>
<th>DRAWING NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>650068</td>
</tr>
</tbody>
</table>

SCALE  SHEET  21 of 21