

MODEL 4651 / 4651PC OPERATORS INSTRUCTIONS

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*Pertains to 4651PC Testers only.

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The 4651 is designed to simulate all possible situations to allow complete testing and repair of all standard floppy drives.

The tester provides signals that would normally be generated by a computer system. This allows the operator to systematically troubleshoot all the drive's internal circuitry while yielding a fast and easy indication to the cause of the trouble.

We recommend that you get familiar with the 4651 through the procedure outlined here. It is important to know how a good drive tests to aid in finding problems in a bad one.

NOTE Drives used as examples are:

- 8 in. = Siemens FDD100-8D Selected Options: Soft sector, radial select and data separator.
- 5½ in. = MPI Model B51
 Selected Options: Head load with select and data separator.
- 8 in. = Memorex 651
 Separated data
 Always selected

^{*} Denotes use with 651 drives only

PART 2 - FUNCTIONAL OVERVIEW

INDICATORS:

- Write protect: Indicates status of write protect circuitry in the drive.
- Ready: Indicates that the drive is selected and that conditions in the drive are in a ready status.
- * Sector: Monitors sector circuitry.
 - Index: Monitors and dynamically indicates presence of index pulses.
- * Fault: Monitors file unsafe circuit.
 - Track Counter: After reset at track "ØØ". The counter will display the track that the head is positioned on.
 - Direction: Indicates direction head will be stepped when step button is used.
 - Separated Clock and Data: Indicates presence of separated clock and data read from the disk.

 Used with write/read/ (erase) switch to immediately show the status of those circuits.
 - Read Data: Indicates presence of raw data on dual density drives.
 - Write-Erase: Indicates that tester is in write or erase mode and will write to or erase the disk.

CONTROLS:

Power on-off: Controls power to tester only.

Motor on-off: Controls drive motor on 5½ inch drives.

Side Select: Selects side 0 or 1 for dual sided drives.

Low I: (Low Current) Controls High/Low current line on drives using that function.

PART 2 CONT. - FUNCTIONAL OVERVIEW

- * Fault Reset: Used in conjunction with fault LED to test file unsafe circuitry in the 651.
 - Head Load: Provides momentary or continuous head load.
 - Write/Read/(erase): Activates drive to write, read or erase. In write mode, a signal is supplied, determined by the transfer rate switch.
 - Transfer Rate: Supplies LO-MED-HI write signals for test and troubleshooting. Allows clock, or clock and data to be Written to disk.
 - Read Data: Selects either raw data or separated clock and data.
 - Step Rate: Provides LO or HI speed to the stepper motor for stepping purposes.

PART 3 - CONTROLS AND INDICATORS WITHOUT A DRIVE CONNECTED

Power LED: "On" when tester is plugged in and the power switch is in the upper position.

Connectors: The tester provides two connectors to allow the use of OEM interface cables (34 and 50 pin) as a simple connection between tester and drive.

Drive Section:

Index, sector, fault, ready, and write protect LEDS:
All "Off". These are active only when a
disk is in the drive and the drive is connected
to the tester.

Select 1 or 2 LEDS and switches;

l or 2 will be "On" as you select which
drive is to be used. The tester allows
you to connect up two drives at one time.
This lets you have a good drive connected
to use as a comparison to a bad one.

Read/Write Data Section:

Separated clock and data or read data LEDS:

All "off". These are active only when the tester is connected to a drive with a disk in it.

Write/Read/(Erase) LED:

"On" when the switch is in the "write" or the "(erase)" position. "Off" when in the "read" position.

Head/Stepper Section:

Direction in/out LEDS:

"On" as you select "In" or "Out" with the step button and direction switch. Tapping the step button will produce a single step in the direction selected. Holding the button down produces a continuous stepping at a speed determined by the step rate switch.

PART 4 - OPERATION WITH A DRIVE CONNECTED, DISK NOT INSERTED STANDARD DRIVES, NOT 651

WARNINGMake sure interface cable is properly connected!

Pin l goes to the left hand side of the tester

with the cable running towards the back.

Drive Section:

Index, sector, ready, write protect LEDs.

All "Off" until drive is selected (1 or 2).

When selected the proper select LED will
light with respect to the appropriate switch.

Index and write protect LEDs will then come
"On" and remain "On" constantly.

Side Switch:

This switch selects which side of the disk is to be accessed by the tester. Position "O" is the bottom head while position "l" is the top head. If the drive under test is not a dual sided drive, then this switch has no effect on it.

Low Current:

The LED is "On" when the switch is up, selecting the low current mode in drives using that function. Down is normal.

Motor Switch:

This switch is functional only on the minifloppy ($5\frac{1}{4}$ in.) drive. The drive motor will be off when the switch is in the "Off" position and on when the switch is in the "On" position.

Read/Write Data Section:

Separated clock and data or read data LEDs:
All "Off". These are active only when the drive has a disk in it.

Head/Stepper Section:

Track Counter:

The track counter will initially be at some random number. To calibrate the counter to the drive - step out to "00.". (The decimal point must be on to indicate absolute track 00). The counter will be accurate only if it is reset this way.

PART 4 cont. OPERATION WITH A DRIVE CONNECTED, DISK NOT INSERTED STANDARD DRIVES, NOT 651

Step Switch:

Tapping the button will produce single steps while holding the button down will produce continuous stepping. The step rate switch determines the speed, with Lo being 6-8 and Hi being 24-26, steps per second.

Head Load:

This switch energizes the load solenoid of the drive. On certain drives this solenoid will not energize until a disk is in the drive with the door closed. Check the OEM service literature for the equipment under test.

PART 5 - OPERATION WITH A DRIVE CONNECTED. DISK INSERTED STANDARDS DRIVES, NOT 651

Drive Section:

Select 1 or 2 LEDs and switches:

Select the drive that is to be used (1 or 2) with the select switches. Select the side of the disk to be tested (dual sided only) with the side switch (switch has no effect on single sided drives).

Index, sector, ready, and write protect LEDs ***BEFORE INSERTING DISK***

> Index = onSector = On Ready = Off Write Protect = On

*** INSERT DISK SLOWLY A FEW TIMES ***

Index = "On", then "Off", then comes "On", then "Off"

just before the disk is fully inserted, then "blinks" when door is closed and the disk is

rotating.

Ready = "Off" until disk is fully inserted, door closed and

disk is rotating.

* Sector = "On"

Write Protect = (disk not write protected)

"On" until disk is fully

inserted, then "Off"

(disk write protected) "On", then may "blink"

as disk is inserted, then go

back "On".

Head/Stepper Section:

Direction, step rate and step switch:

Set direction to "Out", select either "Hi" or "Lo" step rate, then step the head until the counter reset to "00.". (Must have decimal for absolute track 00). The drive may step back past "00." and continue to "99." In this situation, set direction to "In" and step back to "00.". The track counter is now calibrated accurately to the drive

HEAD LOAD:

*** WARNING *** - Do not leave a constant head load on as this can cause damage to both the disk and the read/write head.

The head load switch has three positions: "(ON)" which is momentary head load, "OFF" and "ON" which is constant head load.

Read/Write Data Section - Read Mode:

Separated Clock and Data or Read Data Switch:

On single density drives, this switch is in the upper position (separated clock and data).

On double density drives, this switch will be in the read data or "raw" data position.

Clock and Data, or Read Data LEDs:

To read information from the disk, you leave the write/read/(erase) switch in the "read" position and have the separated clock and data or read data switch set to the proper position for the type of drive under test. Now switch the head load switch to the "(ON)" position. The clock and data LEDs or the read data LED should come "on" and "flicker" (if there is anything on the disk). You are now reading information directly from the disk.

Read/Write Data Section - Write Mode:

Transfer Rate Switch:

The transfer rate switch has three positions: "MED", "LO" and "HI". These three positions indicate the "transfer rate" or the frequency that is to be written to the disk. The different rates are: LO = 125 KHz

MED = 250 KHzHI = 750 KHz

Different frequencies have different effects on the drive. Check the "helpful hints" section of this manual for examples.

Clock and Data, or Read Data LEDs:
To write, switch the write/read/(erase) switch
to the "write" position. Then hold the head
load switch in the "(ON)" position for one
second. This will write a complete track of
information (at the frequency determined by
the transfer rate switch).

Switch the write/read/(erase) switch to the "read" position. Hold the head load switch in the "(ON)" position. The clock and data LEDs or the read data LED (depending on the type of drive) should be on all the time (if the proper transfer rate was selected).

To verify that the read/write function of the drive is working properly, erase a portion of the information that has been written on the disk. To do this, hold the head load in the "(ON)" position and then briefly switch the write/read/ (erase) switch to the "(ERASE)" position. Allow the switch to return to the "read" position but keep the head load in the "(ON)" position. The clock and data LEDs or the read data LED will be flashing to indicate that a portion of the information has been erased.

PART 6 - OPERATION WITH A MINI-FLOPPY, DISK NOT INSERTED

Drive Section:

Motor Switch:

Turns the drive motor "off" or "on". This switch is independent of the select lines and therefore if more than one drive is connected, all drive motors will be controlled simultaneously.

Index, Ready, Write Protect LEDs:

All "off" until drive is selected (l or 2) When selected the proper select LED will light with respect to the appropriate switch. The index LED will then come "on" and remain "on" constantly.

Side Switch:

This switch selects which side of the disk is to be accessed by the tester. Position "0" is the bottom head while position "1" is the top head. If the drive under test is not a dual sided drive, then this switch has no effect on it.

Read/Write Data Section:

Separated Clock and Data, or Read Data LEDs:
All "off". These are active only when the drive has a disk in it.

Head/Stepper Section:

Track Counter:

The track counter will initially be at some random number. To calibrate the counter to the drive - step out to "00.". The tester will stop counting when the drive reaches track 00. The counter must display "00." (decimal point must be on) to be at absolute track 00.

Step Switch:

Tapping the button will produce single steps while holding the button down will produce continuous stepping. The step rate switch determines the speed with Lo being 6-8 and Hi being 24-26 steps per second.

Head Load:

Mini-floppies can be configured to have a head load whenever the drive is selected. Check OEM service literature to determine how the drive is configured.

PART 7 - OPERATION WITH A MINI-FLOPPY, DISK INSERTED

Drive Section:

Select 1 or 2 LEDs and Switches:
Select the drive that is to be used (1 or 2)
with the select switches. Select the side of
the disk to be tested (dual sided only) with
the side switch (switch has no effect on
single sided drives).

Index, Ready, and Write Protect LEDs:

BEFORE INSERTING DISK

Index = ON Ready = OFF Write Protect= OFF

INSERT DISK SLOWLY A FEW TIMES

Index = "on", then "off," then

"flashes" when the door

is closed and the disk

is rotating.

Ready = "off" all the time unless drive is configured for a ready indication.

Write Protect= (Disk not write protected)

"off" then "on" until disk

is fully inserted, then

"off".

(Disk write protected)
"off", then "on" and
remains "on".

Head/Stepper Section:

Direction, Step Rate Switch
Set direction to "out", select either "Hi" or
"Lo" step rate, then step the head to track
"00.". The drive will stop stepping when it
reaches track 00.

Head Load:

Not functional on mini-floppies.

Read/Write Data Section - Read Mode:

Separated Clock and Data, or Read Data Switch:

On single density drives, this switch is in
the upper position (separated clock and data).

On double density drives, this switch will be
in the read data or "raw" data position.

Clock and Data, or Read Data LEDs:

To read information from the disk, you leave the write/read/(erase) switch in the "read" position and have the separated clock and data, or read data switch, set to the proper position for the type of drive under test. The clock and data LEDs or the read data LED should come "on" and "flicker" (if there is anything written on the disk). You are now reading information directly from the disk.

Read/Write Data Section - Write Mode:

Transfer Rate Switch:

Check with the OEM specifications for the drive under test to select the proper transfer rate (Med, Lo or Hi).

Clock and Data, or Read Data LEDs:

To write, switch the write/read/(erase) switch to the "write" position for one second. This will write a complete track of information (at the frequency determined by the transfer rate switch).

Switch the write/read/(erase) switch to the "read" position. The clock and data LEDs or the read data LED (depending on the type of the drive) should be "on" all the time (if the proper transfer rate was selected).

To verify that the read/write function of the drive is working properly, erase a portion of the information that has been written on the disk. To do this, briefly switch the write/read/(erase) switch to the "(erase)" position. Allow the switch to return to the "read" position. The clock and data LEDs or the read data LED will be "flashing" to indicate that a portion of the information has been erased.

PART 8 - MEMOREX 651 DRIVE, DISK NOT INSERTED

NOTE: Prior to working on 651 drives, review previous section (5) for head/stepper section information.

WARNINGMake sure interface cable is properly connected!

Pin 1 goes to the left side of the tester

with the cable running towards the back.

Drive Section:

Index, ready, write protect, fault all " Off".
* Sector "On"

Select - "Not Used"

Low I - "Not Used"

Motor - On/Off - "Not Used"

Side Select - "Not Used"

Fault/Reset - Resets the fault LED and file unsafe circuitry. With switch "UP" - resets file unsafe and enables write. With switch "Down" - enables file unsafe circuitry.

Read/Write Data Section:

Clock, data, read data LEDs "Off", Write/Erase LED "Off" until switch is in write or erase.

Controls:

Write/Read/Erase - Used to write or read on the 651.

Used in conjunction with the transfer rate switch to write either clock only, or clock and data to the disk.

Transfer Rate - In the "HI" position supplies clock and data to the write circuit. In "LOW" or "MED" supplies clock only.

Read Data - Used in the separated position to select separated clock and data.

Head/Stepper Section:

Same as on regular drives.

PART 9 - MEMOREX 651, WITH DISK INSERTED

Drive Section:

- Index LED. As a disk is inserted, the index LED will be "Off" until the door is closed, then it will flash at the index pulse rate.
- * Sector LED. As a disk is inserted, will be "On", then "Off", then back "On" as the disk is fully inserted and the door is closed. Use this method to test the sector circuitry.

Ready LED - "Off"

- Write Protect To test the write protect circuit.

 Flip the disk over left to right and insert until
 the write protect LED comes "On". "DO NOT"attempt
 to close the door at this time.
- * Fault Will come on when any write operation is performed with the reset switch down. This indicates that the file unsafe circuit has latched, and is inhibiting any writing. With the switch "Up" normal write tests can be done. This is a way to exercise the file unsafe circuit.

Read/Write Data Section:

Clock & Data LEDs - These will be out until data is written to the disk (unless there is already something on the disk).

Write/Read Procedure:

To test the write/read circuits, select the "HI" transfer rate, place the write/read/erase switch to write, then back to read.

The clock and data LEDs will be "On" then. If "Low" or "Med" is selected and the write/read/erase switch is briefly pushed to write, then back to read, the LEDs will blink, indicating that a portion of the previous information was written over. This is similar to erase on standard drives.

PART 9 CONT. - MEMOREX 651 WITH DISK INSERTED

Cable Connection:

The 50 pin cable plugs onto the tester exiting to the rear. The power supply connections are made according to the following color code or to labels on the leads.

Power Supply	Color Code	Pin #
Logic Ground	GN	24
+ 5 V	O/R	32
- 15 V	GY	42
+ 24 V	R/GY	8
+ 24 V Return	W/GN	9

It is important to understand the operation of the drive and know exactly what the tester is telling you. The 65l can aid in testing all internal circuits of the floppy drive. The tester will prove to be the most valuable tool used in troubleshooting.

Troubleshooting a bad drive: When a drive tests bad, first note what portion of the test it failed. Narrowing the problem down is the most powerful feature of the 651. After the general circuit is determined, the "missing" or "defective" signal can be accurately traced from the tester to all connecting points within that circuit.

The transfer rate switch will aid in troubleshooting the read/write logic and also the data separator (if used). On the mini-floppy drive, 125 KHz (Lo) will write "clock only" to the disk while 250 KHz (Med) writes both clock and data. On the 8 inch drive, 250 KHz (Med) writes "clock only" and 750 KHz (Hi) writes both clock and data.

PART 11 - 4077PC/4651PC POWER SUPPLY CONTROLS/CONNECTORS

The "PC models include regulated supplies for most drives including 8 inch, $5\frac{1}{4}$ inch and microdrives. AC and DC voltages are available at connectors on the rear panel and are controlled by drive power switches on the top panel.

AC Connector: Supplies nominal line voltage for 8 inch drives. Protected with a 1 Amp fuse.

AC Drive Power Switch: Controls AC voltage to 8 inch drives.

DC Connector: Provides regulated DC voltages at the indicated pins on the DC connector. Voltages include +5V, +12V, -12V, and +24V at current sufficient for all current drives. All supplies are protected with current limiting and a fused primary.

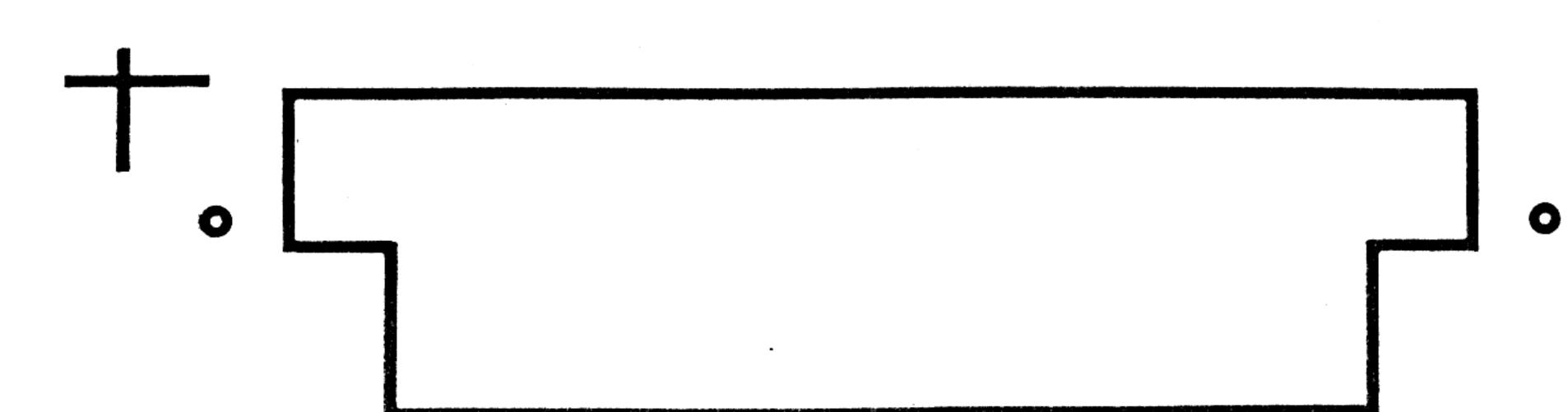
DC Drive Power Switch: The drive power switch turns all DC voltages on or off.

Drive Type Switch: The type switch enables the proper voltages for 8 inch drives, or others such as $5\frac{1}{4}$ inch and microdrives.

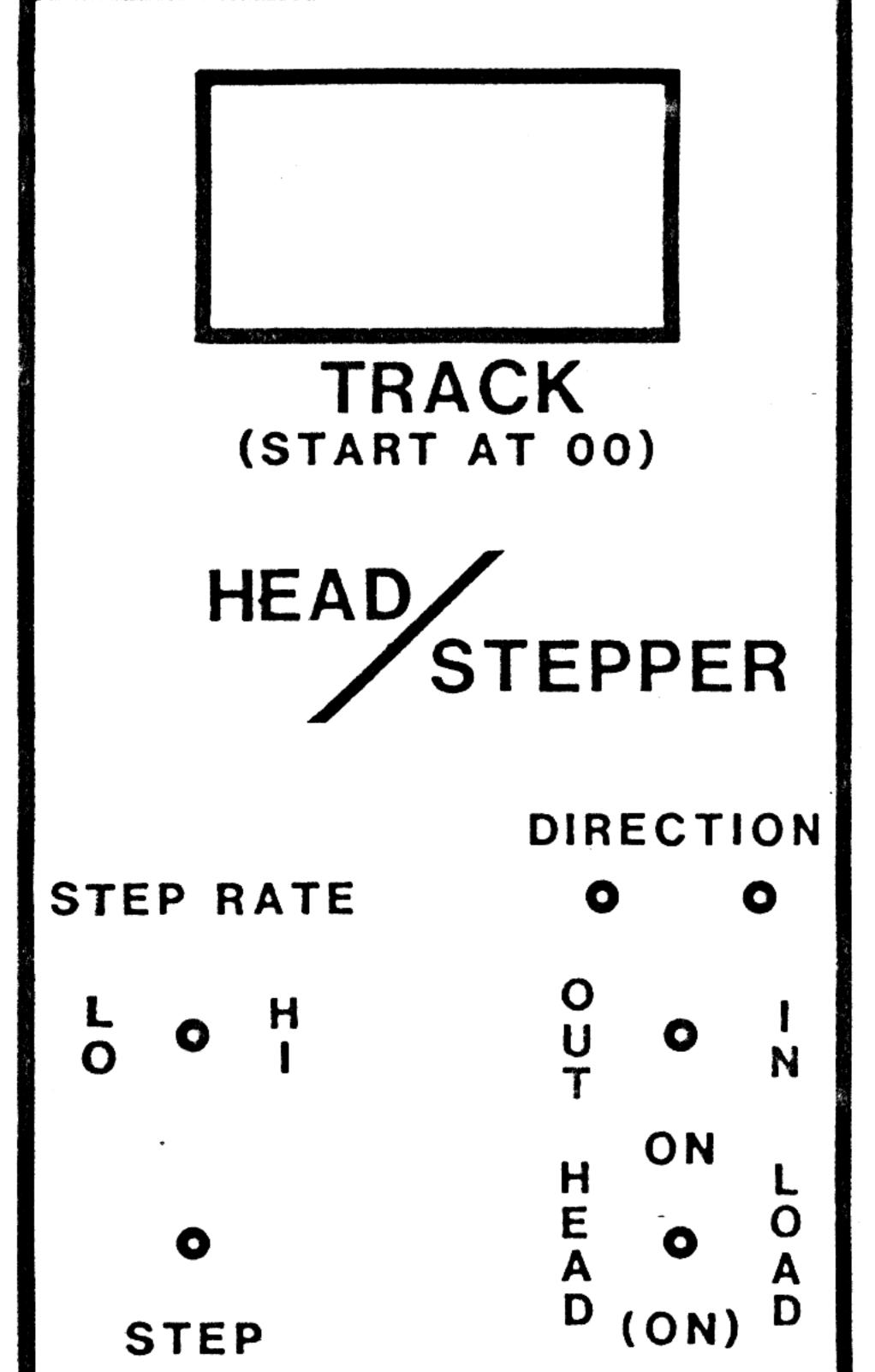
Output Voltages: 8 inch +5V, +24V, -12V $5\frac{1}{4}$ inch +5V, +12V, -12V

Cables	<u>Available</u> :			ပ္ /		ပူ /
PART NO.	DESCRIPTION	4077		• ,	4 / ~	4 / m
2049-3.5 2050-3.5 2051-3.5 2052-3.5	DRIVE POWER CABLES: 8" Drive DC Power 9 Pin 5¼" Drive DC Power 4 Pin 8" Drive AC Power 3 Pin Commodore DC Power 4 Pin ADAPTERS:		XXX		XXX	X
2020-00 2048-00	Sony Microdrive Adapter 50/26 Pin Osborne Signal/Power Adapter (External Power)	X	X	X X	X X	
2048-01	Osborne Signal/Power Adapter 9 Pin (From Tester)		X		X	
2064-00	651 Memorex Power (External Power)			X	X	
2064-01	651 Memorex Power 9 Pin (From Tester)				X	

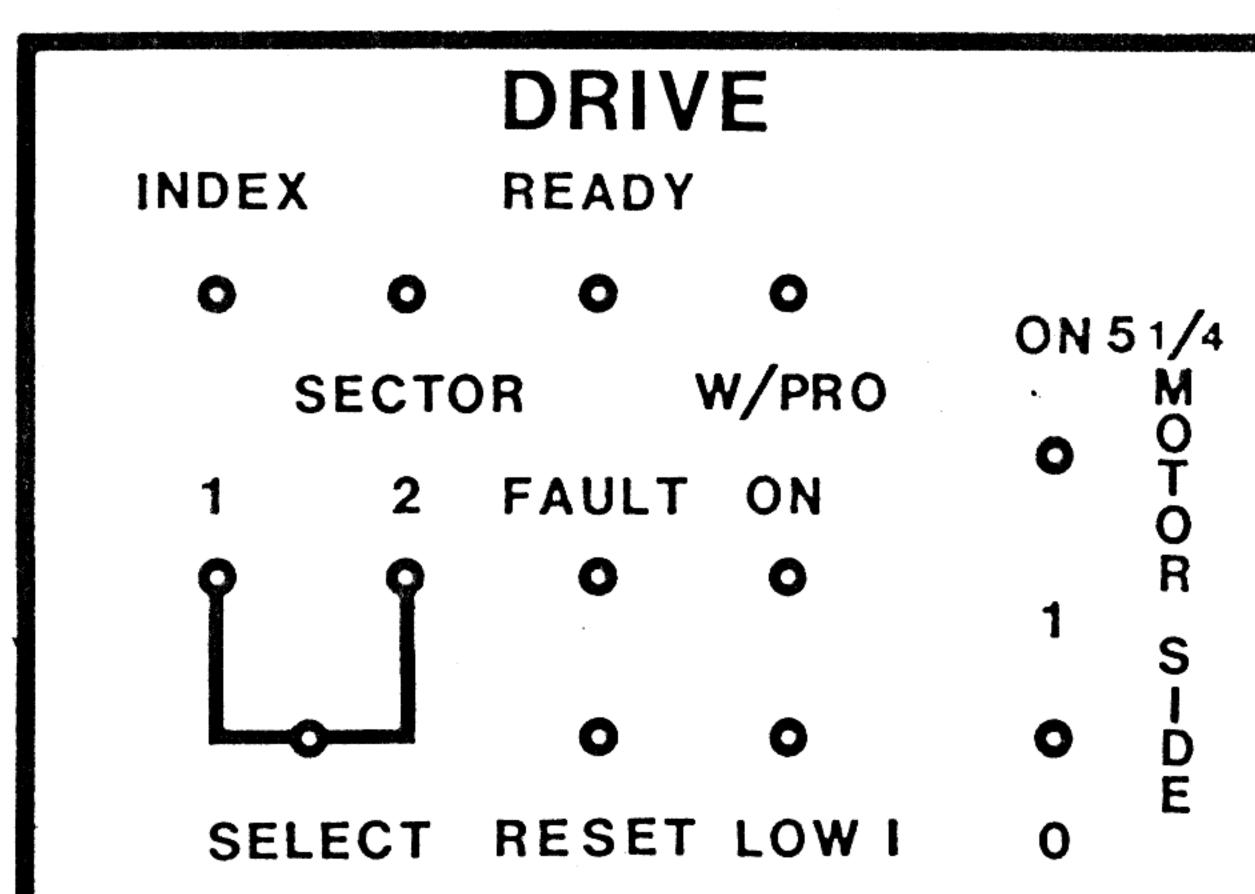
Contact TEACO for any special application cables or adapters you need. We can build to suit your needs.

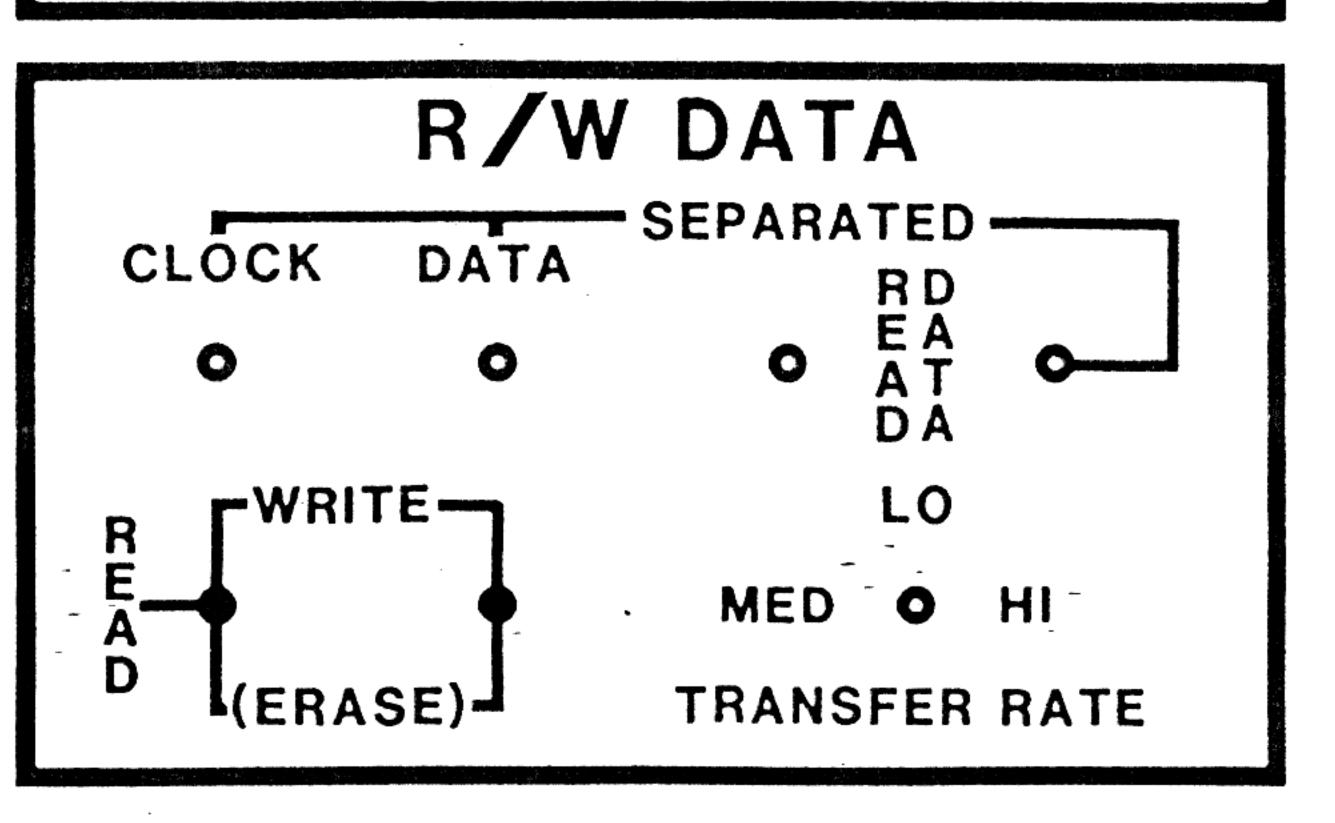







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




TESTER POWER

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TERRY ELECTRONIC ASSEMBLY COMPANY, INC.

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UPGRADING INFORMATION FOR 4651 TO 4651PC

I. OVERVIEW

The 4651PC upgrade kit is completely tested and wired to run as a power supply.

It has (2) AC power wires safely insulated until they are connected to the 4651 tester board. These are the only connections required.

(3) AC power leads will be disconnected from the original 4651 tester board.

You will remove the green, black, and white AC wires. Note where the black and the white wires were removed, clean the holes, and solder the (2) new AC wires to those points only. Nothing should be connected where the green wire was.

Removal of the 4651 board from the case should be done carefully because each control on the tester has (1), or (2), spacers which will fall loose if the unit is turned over when disassembled. The conversion can be done without turning the unit over.

II. DETAILS

- 1) Unplug both units from any source of AC power.
- 2) Remove the screws holding the top cover on the 4651PC kit.
- 3) Identify the (2) AC wires. Both are red wires with tinned ends.
- 4) Remove the top cover screws on the 4651 tester (there are a total of (9) screws). Remove the bottom of the case.
- 5) Remove the mounting nuts from all controls on the tester.
- 6) Position all switches to the right or forward position to ease disassembly/reassembly.
- 7) Carefully lower the board out of the front panel without losing any spacers.
- 8) Remove the black, white, and green wires noting the location of the black and white wires.
- 9) Position the tester board so the new AC wires, both red, from the PC kit can be soldered to the points where the black and white wires were. Nothing should be connected where the green wire was.
- 10) Reassemble the board into the new front panel.
- 11) Replace the (9) screws holding the top and bottom of the case together.

