Section 2 : Operation

2.1 Terms and Conventions

The names of keys in the manual will generally appear in CAPITAL LETTERS.

The MENU key calls up the main menu display and returns to the line previously selected.

The ">>" symbol on a menu indicates a lower level menu exists.

The select keys generally function as UP, DOWN, LEFT and RIGHT arrow and allow you to move through a menu or field of choices to make the desired selection or turn a function ON or OFF.

The ENTER key switches the unit to entry mode and when pressed again initiates the entry or choice selected on the current screen.

The CNCL key will return the system to main menu display with no changes made. (From a numeric data field CNCL must be hit twice).

2.2 Startup

Check to make sure the line voltage indicator on the rear panel AC inlet module agrees with the AC power source available, if not refer to paragraph 1.5.3.

Connect the instrument power cord to the source of proper voltage. **The instrument must be used only with three wire grounded outlets.**

> WARNING
>
> A flashing CAUTION HIGH VOLTAGE light and/or DANGER on the display indicates a defective unit with dangerously high voltages possible at the input terminals. Power the unit down and do not use.

> IMPORTANT
>
> The interlock connector (included with the unit) needs to be installed on the rear panel I/O Port connector if the interlock function is **not** being used.
> Switching [POWER] OFF and ON quickly may result in error messages. Power should be off for at least 10 seconds to assure proper power-up.

Power is applied to the 1865 by pressing the [POWER] button on the front panel. The instrument runs a self test and any error messages are displayed accordingly (refer to paragraph 2.8).

2.3 Zeroing

Before making measurements, the 1865 instrument should be zeroed to correct for test lead or fixture errors. During the zeroing process corrections are calculated and stored in instrument memory and applied to ongoing measurements. Generally the unit should be zeroed at least once per day and each time test leads or fixtures are changed. The zeroing routine is accessed through the Utilities Menu by selecting [ZERO], instructions are given on the LCD display. Refer to paragraph 2.6.4.3.

2.4 Connection to Device Under Test

Figure 2-1 illustrates the front panel input terminals and a basic block diagram of their function.

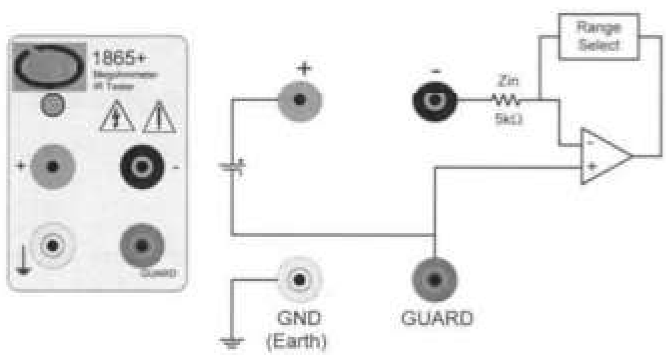


Figure 2-1: Input Panel and Block Diagram

An optional shielded lead set is available for use with the 1865 unit, Part Number 1865-51. How the connection to the DUT is made depends on the unknown being measured: if it is a grounded, ungrounded or guarded device. The 1865 instrument is supplied with two resistor adapters which are recommended for use only when measuring high value, low leakage capacitors. These are to be added in series with the (-) terminal lead to eliminate fluctuating test results when measuring this type of device. Refer to paragraph 3.3.

> CAUTION
> DO <u>NOT</u> GROUND the (-) negative unknown terminal.
> This will result in invalid measurements.

Figures 2-2 through 2-4 illustrate various methods of connection to the device under test (DUT). Figure 2-2 illustrates the two-wire connection to DUT. The two-wire ungrounded connection is the recommended connection of ungrounded components or components that can be connected very close to the 1865 input terminals rather than through the lead set provided.

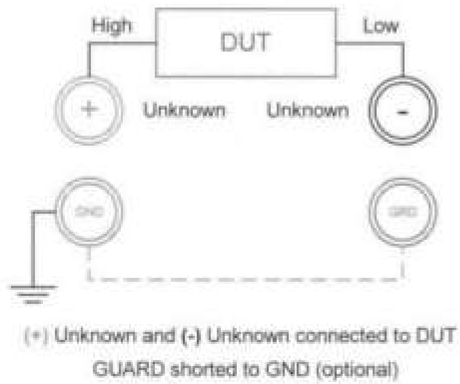


Figure 2-2: Two-Wire Ungrounded Connection

The two-wire grounded measurement is a common type of connection to be used on the 1865. This is the recommended connection on grounded components or components that are some physical distance from the input terminals of the unit. A grounded component is one in which one of its connections goes to an earth ground, whereas on an ungrounded component neither connection goes to earth ground. A component being measured with a lead set is considered to be a physical distance away from the terminals and thus the two-wire grounded connection is often recommended.

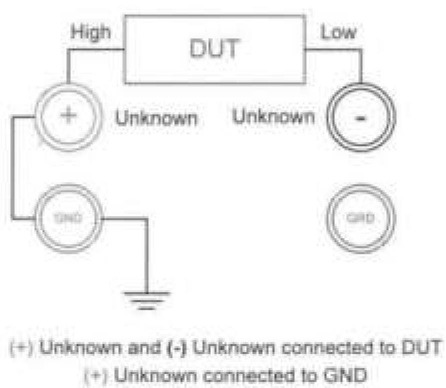


Figure 2-3: Two-Wire Grounded Connection

A three-wire guarded connection is necessary to measure resistance between two points in the presence of resistance from each of these points to a third point. Refer to paragraph 3.6 for a discussion of guarded measurements. The guarded measurement may require different grounding techniques depending on the expected impedance of the DUT.

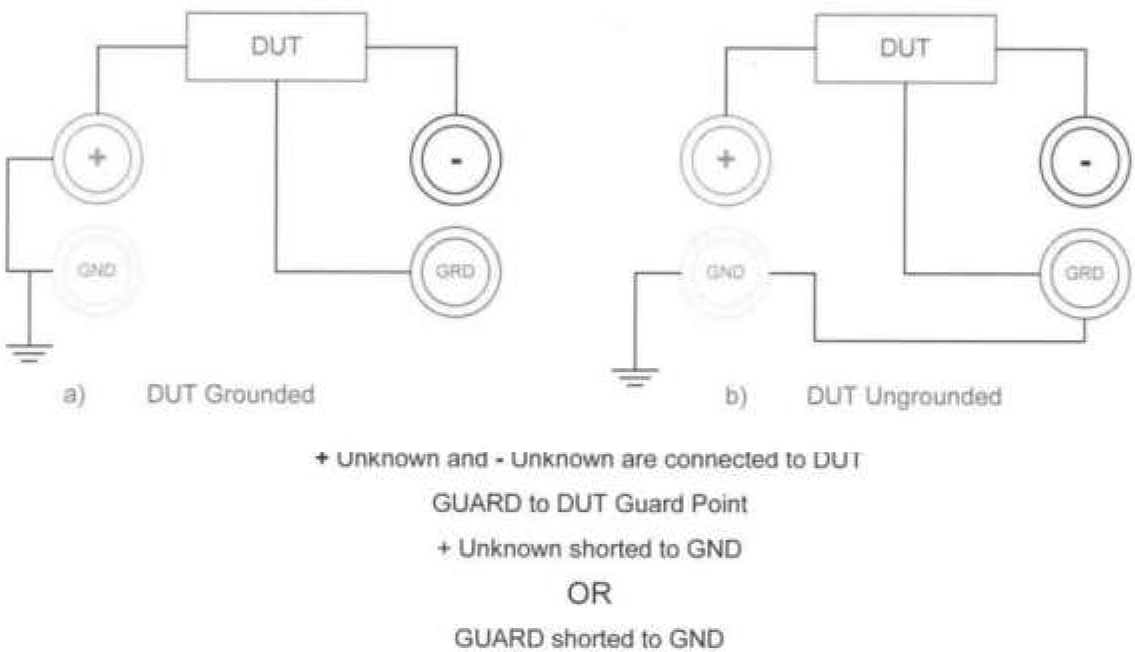


Figure 2-4: Three-Wire Guarded Connection (Grounded or Ungrounded)

2.5 Measurement Procedure

2.5.1 General

There are two basic measurement modes of operation, auto and manual. In the automatic mode the test cycle is sequenced automatically through four phases: **Charge**, **Dwell**, **Measure**, and **Discharge**, in accordance with user-programmed times. This is the preferred measurement mode, especially when the approximate resistance value is unknown, since the 1865 instrument employs an auto-ranging technique. The automatic mode would generally be used in a production environment where measurements are repetitive and setup conditions have been previously established. To reduce measurement time when making repetitive measurements, a particular range may be locked in, instead of auto-ranging.

In the manual mode, the test cycle timing is totally at the user's discretion where each of the three phases (**Charge, Measure, or Discharge**) is initiated directly by the user. This mode would typically be used in an engineering environment or for component evaluation, where the measurement results can be observed as test cycle and measurement conditions are altered.

Whenever the 1865 unit is powered up, it is ready to begin measuring at default test conditions. Initially, these conditions will be set to a factory default (1 V, 0 times, Resistance Display, Auto ranging and Automatic Mode), but can be changed by the user and stored to overwrite the factory default settings.

2.5.2 Default Measurement Conditions

A set of default measurement conditions are initially established at the factory and stored in instrument memory. Default conditions are those that determine the instruments status on power up, thus the instrument is always set to a known state before any testing begins. These conditions can be changed by the user for tailoring to a specific application. Refer to paragraph 2.6.4.1 under Save Setup on the Utilities menu.

Factory default measurement conditions are:

<u>Under Setup Menu</u>
Voltage – 1 V
Charge, Dwell, Measure and Discharge times – 0
Mode - Auto
Range - Auto (Selected on lower level menu)
Limit - None
Stop on Pass - No
to Average - None

<u>Under I/O Menu</u>
Display Type - Resistance (selected on lower level menu)
Result Format - Engineering Units
RS-232 - Enable
Handler - On

<u>Under Utilities Menu</u>
Lockout - Off
Backlight - On

2.5.3 Automatic Measurement Mode

Measurements in the automatic mode can be initiated after connecting the DUT by simply pressing [START]. Test conditions are determined by either the power-up default conditions, or by recalling a previously stored setup from instrument memory. In either case, a test cycle is sequenced automatically (Figure 2-5) once [START] is pressed and results displayed (Figure 2-6). When a test limit is entered a PASS/FAIL indication can be displayed in place of the actual measured value (Figure 2-7).

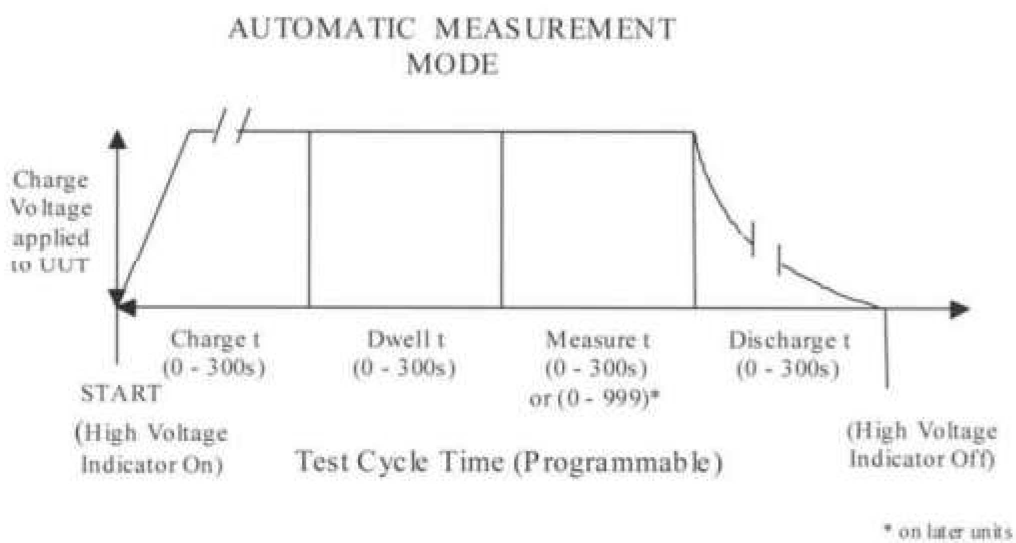


Figure 2-5: Test Cycle Sequence (Automatic)

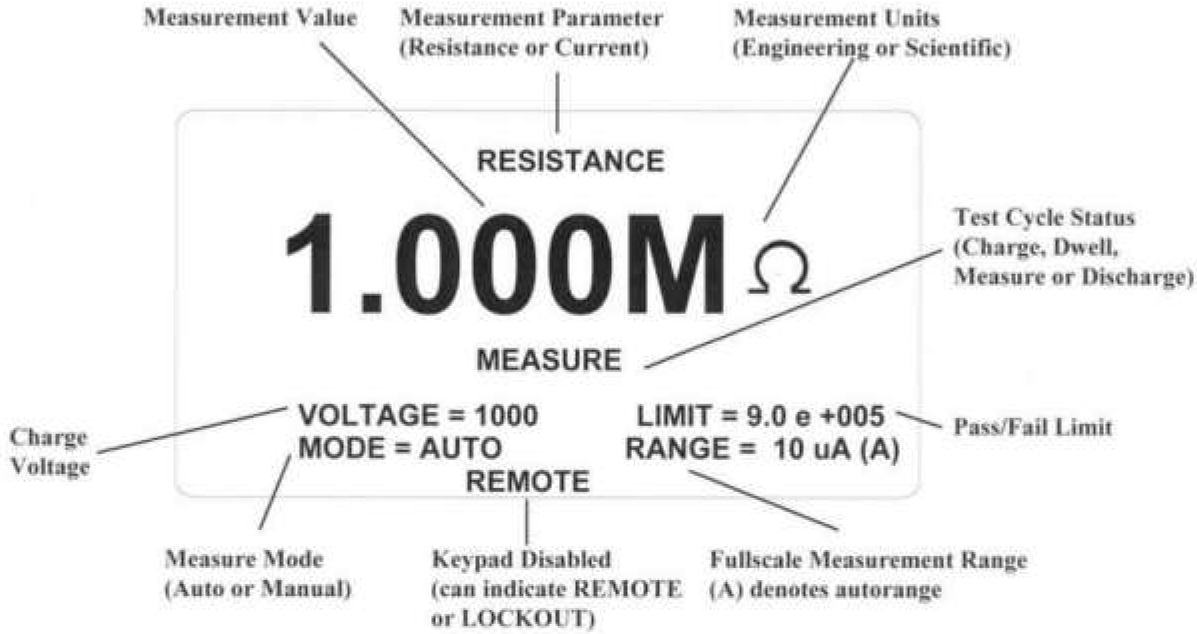


Figure 2-6: Measurement Results Display with Value

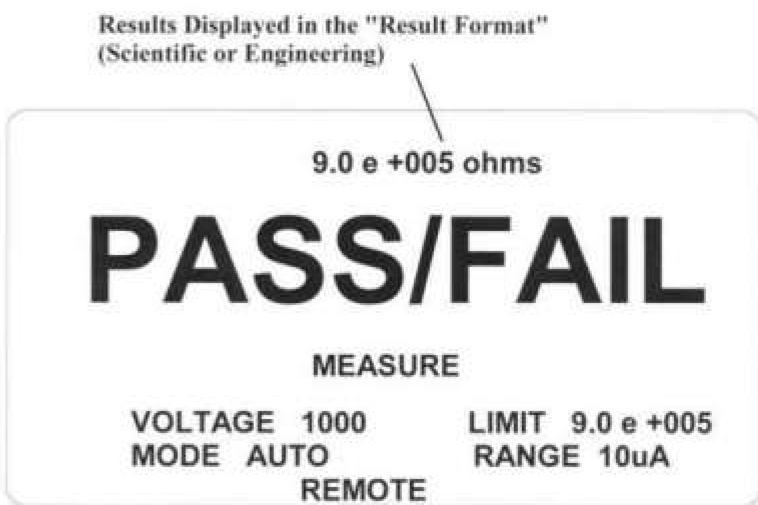


Figure 2-7: PASS/FAIL Results Display

2.5.4 Manual Measurement Mode

The primary difference between automatic and manual modes is that in the manual mode the phases of the test cycle must be initiated manually by the user. Here there are three phases rather than the four in automatic; the **Dwell** function is part of the **Charge** phase. The results are still displayed in the manner indicated above; the mode indicates **Manual** rather than **Automatic**. Default and other stored setups can still be recalled, the only difference being that the test cycle times are not applicable.

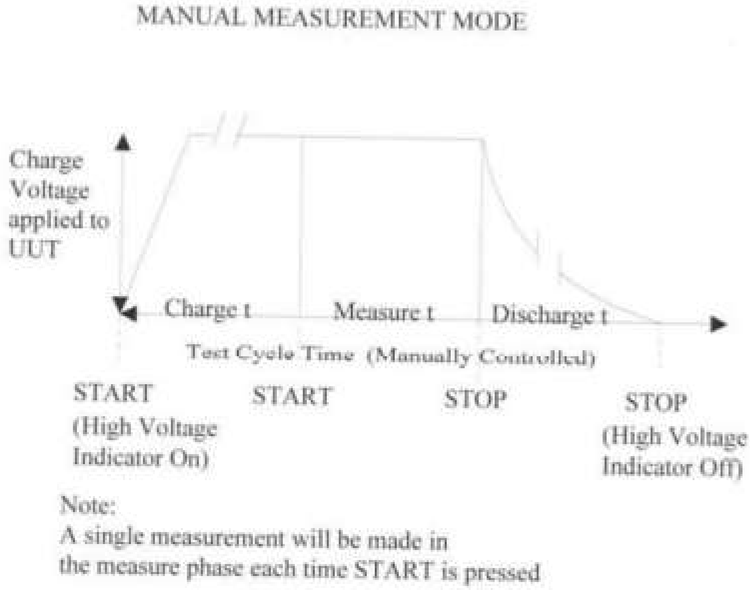


Figure 2-8: Test Cycle Sequence (Manual)

2.6 Menu Functions

2.6.1 General

All programmable functions of the 1865 are controlled by easy to use menu displays. The user enters the menu mode by selecting the [MENU] key which calls up three top level menus, Setup, I/O and Utilities. Each one of these is comprised of a sub menu list whose functions are described in detail below. Navigating around the menu listing is accomplished in a fashion similar to an Automatic Teller Machine (ATM) using the up, down, right and left arrow keys as indicated on the adjacent LCD display. A highlighted menu function can be controlled by pressing the [ENTER] key, making the desired entry or selection, and pressing [ENTER] again to implement.

2.6.2 Setup Menus

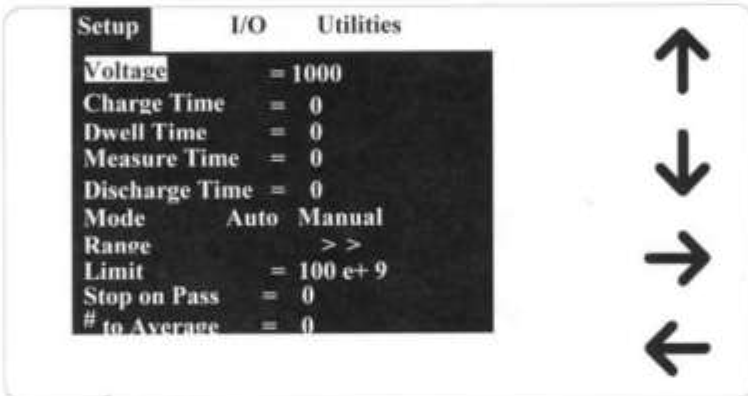


Figure 2-9: Setup Menu

The first of the three main menus is Setup, shown in Figure 2-9. Each function controls a measurement condition and is described in detail below.

2.6.2.1 Voltage

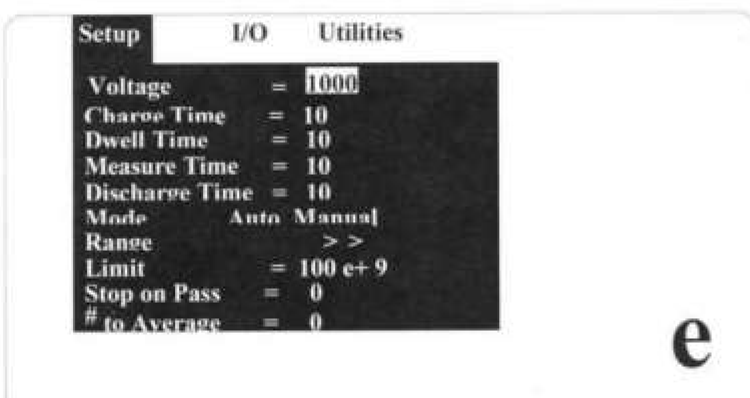


Figure 2-10: Test Voltage Entry

Accepts entry of a test voltage (up to 6 digits and decimal) between 1 and 1000 V. This is the voltage applied to the unit under test during the test cycle and present at the DUT connection anytime that the CAUTION HIGH VOLTAGE lamp is ON. As in the case of many of the menu entries on the 1865 instrument, an "error message" will be displayed for an invalid entry.

2.6.2.2 Charge Time

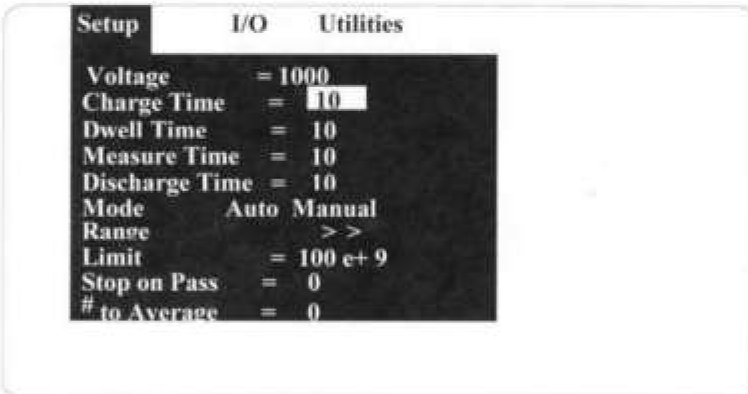


Figure 2-11: Charge Time Entry

Accepts entry of a charge time between 0 and 300 seconds in 1 second intervals (up to 3 digits). If the selection is out of range an error message will be displayed. This marks the time when the test voltage is first applied and the unit under test is allowed to charge up to this voltage. Even if the charge time is entered as zero there is still a small delay during the charge phase. In this case or even with much longer charge times the possibility exists that full charge voltage may not be reached at the start of the measurement phase if the DUT has a long time constant.

> NOTE
>
> For low voltage measurements (<5 V), a minimum charge time of 2 seconds is recommended to meet the instruments stated accuracy.

2.6.2.3 Dwell Time

Accepts entry of a dwell time (or electrification time) between 0 and 300 seconds in 1 second intervals. This is a time during which the test voltage is applied to the device under test and prior to any measurement.

2.6.2.4 Measure Time

Accepts entry of a measure time between 0 and 999 seconds in 1 second intervals. This is the time during which repeated measurements are made and results displayed as resistance, current, Pass/Fail or no display depending on the results format selected. The display is updated each time a measurement is made during this time phase.

2.6.2.5 Discharge Time

Accepts entry of a discharge time between 0 and 300 seconds in 1 second intervals. This is the time when the test voltage is removed and the device under test discharged. The CAUTION HIGH VOLTAGE lamp goes OFF at the end of the programmed interval and the last measurement result is retained on the display (unless no display is selected).

2.6.2.6 Mode

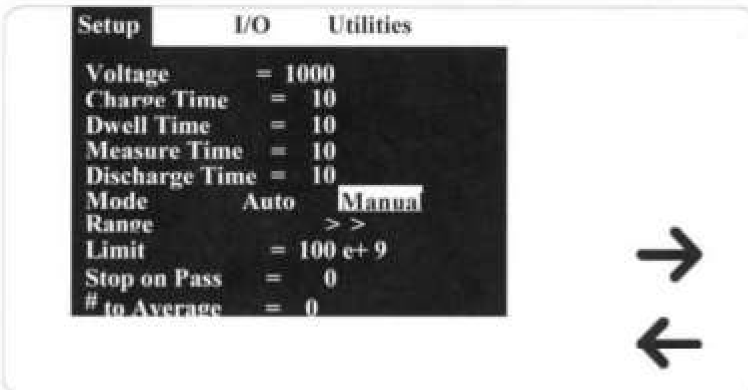


Figure 2-12: Measurement Mode Selection

Allows selection from two different modes of operation, **Auto** or **Manual** measurement.

In Auto the user presses [START] to initiate the entire test cycle automatically. The first phase of the cycle is charge time, during which the device initially charges up to the applied test voltage. The second phase is dwell, or time of electrification, during which the device is fully charged but prior to a measurement. The third phase is measure time during which measured results are displayed. The fourth and last phase is discharge time during which the voltage is removed and the device allowed to discharge.

In Manual, test cycle timing is under complete user control, [START] must be pressed to initiate the charge and measure phase and [STOP] pressed to discharge the device.

2.6.2.7 Range

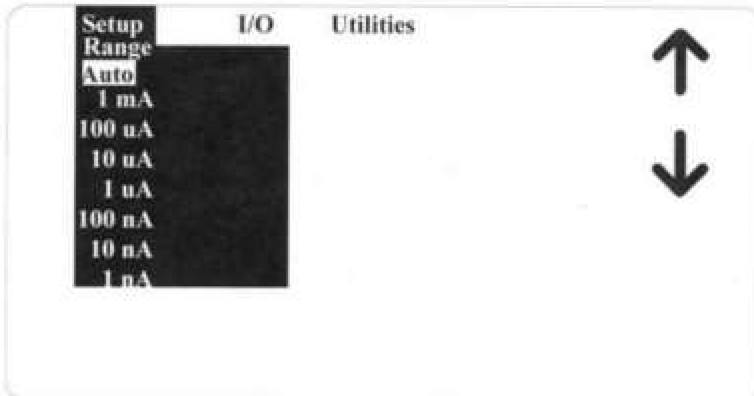


Figure 2-13: Range Selection

A lower-level menu (accessed by pressing [ENTER]) allows the selection of **Auto** or one of seven different measurement ranges (**1 mA through 1 nA**), which is the maximum current for the selected range. In auto mode the 1865 instrument will automatically select the optimum range depending on the programmed test voltage and current drawn by the test device. Any choice other than Auto (1 mA through 1 nA range) is at the user's discretion. Determination of the range is governed by the maximum current available to the DUT for that measurement range and is listed in Table 2-1. **To eliminate operator errors in range setting and ensure specified instrument accuracy the 1865 unit should generally be left in AUTO.** There may be an exception to this when repetitive measurements are to be made on a known range and there is a desire to reduce test time by eliminating range switching. When auto ranging is selected the 1865 instrument will always begin the measurement phase on the highest current range, 1 mA and progress down depending on the current to the device under test. If the current reaches 10% or less of the maximum for a given range the next lowest range will be switched in.

If a range has been selected and the current exceeds 115% of the maximum for that range the unit will indicate OVER RANGE on the display. One needs to keep in mind that an over-range indication does not necessarily mean that the incorrect range has been selected; the device under test could also be defective. Over-range should not be confused with an OVERLOAD display. Overload occurs anytime current to a device attempts to exceed 2mA, this would generally mean a shorted or very-low-resistance device.

Table 2-1: Range Current

Range	Maximum Current
1	1 mA
2	100 µA
3	10 µA
4	1 µA
5	100 nA
6	10 nA
7	1 nA

Example:

When measuring an unknown of 200 MΩ at 100 V, Ohm's Law tells us that the device under test would draw 0.5 µA (I = 100 V/200 MΩ). Based on the above, one would expect the 1865 instrument to auto-range from the 1 mA to 1 µA range (50% of maximum current), or that the user should select the 1µA range based on prior knowledge of the expected results.

NOTE

When measuring in the current mode, in order to calculate the unknown resistance, the input resistance of the instrument (5 kΩ) must be taken into consideration. For further discussion of this refer to Display Type in Paragraph 2.6.3.1

The measurement range capability is represented graphically in Figure 2-14. By locating the charge voltage on the vertical axis and the measured resistance – or expected measured resistance – on the horizontal axis, one can determine the optimum range. When Auto-Range is selected, the range switching is done automatically and the specified instrument accuracy always applies. If a range other than Auto is selected, and the resistance value for the given voltage falls outside the range band shown, the measurement accuracy specified does not necessarily apply.

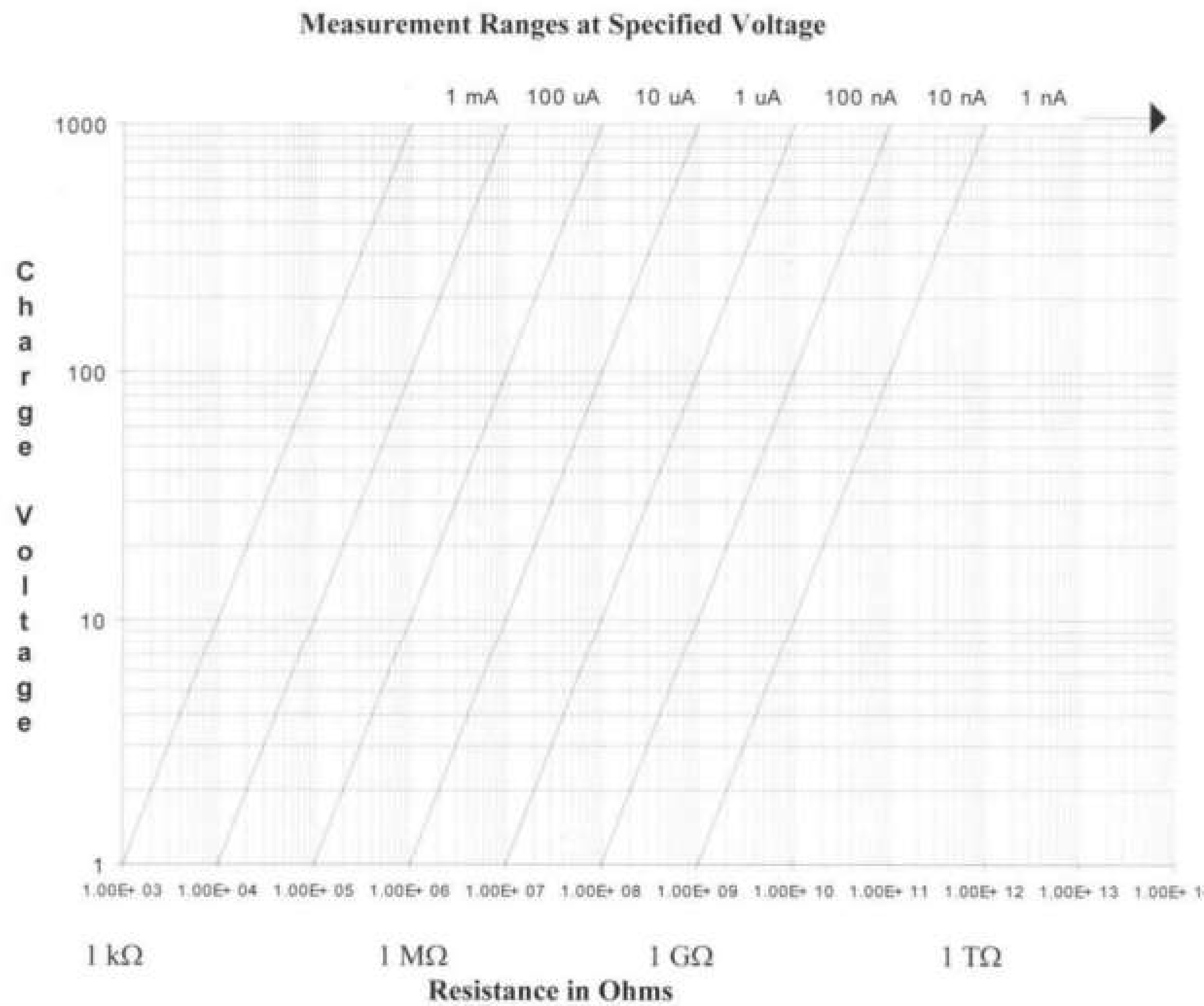
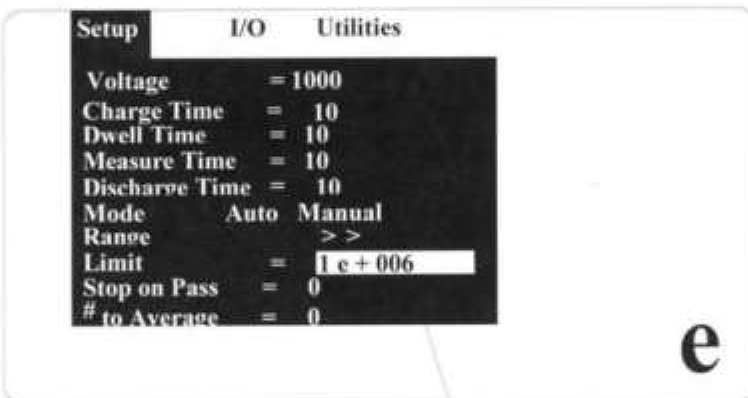


Figure 2-14: Measurement Range Capability

2.6.2.8 Limit



In the case where I (current) is selected rather than R (resistance), the exponent would be entered as a negative number.

Figure 2-15: Limit Value (Resistance or Current)

Allows entry of a single measurement limit in scientific units (up to 4 digits with decimal and exponent) for resistance or current, depending on the results parameter selected. The exponent must be 3 through 14 for resistance or -3 through -13 for current. This limit determines the status of the Pass/Fail indicator and Pass/Fail display, when enabled. When the 1865 instrument is in the Resistance mode, the limit is a minimum value, i.e. any value above the limit will result in a Pass, whereas a value below the limit will result in a Fail. The opposite is true when the unit is in the current mode: the limit is a maximum value; any value below the limit will result in a Pass and a value above the limit will result in a Fail.

If the display parameter on the I/O Menu is selected as resistance, the value entered will be an R limit; if the display is selected as current, the value entered will be an I limit. The 1865's software will check for consistency between the parameter display selected and the limit entered.

An example of the sequence for entering 1 MΩ as a limit would be:

Press **[ENTER]**
Press **[1]**
Press **[e]** select key
Press **[6]**(exponent multiplier)
Press **[ENTER]**

or

Press **[ENTER]**
Press **[1]**
Press **[0]** (zero), three times
Press **[e]** select key
Press **[3]**
Press **[ENTER]**

2.6.2.9 Stop on Pass

Accepts entry of a value between 0 and 300 which is the number of consecutive passing measurements that must occur to exit the measure loop before the measure time has passed. This is only active when there is a measure time and limit specified. An entry of 0 disables the stop on pass function.

2.6.2.10 # to Average

Accepts entry of a value between 0 and 400 which is the number of measurements to be averaged and displayed. If the value is 0 or 1 averaging is disabled and the display is updated with each measurement, if the value is n (between 2 and 400) the average is displayed after n measurements. If the measure time has not elapsed after the first averaged display, then a running average of measurements is made until the measure time is up. For example, if n is 5, the first five measurements are made, averaged and then displayed. The sixth measurement is averaged with the last four and the first ignored, this continues until the user specified measurement time is complete.

> When Stop on Pass is in effect, n measurements are made and averaged.
>
> If the Stop on Pass requirement is met, the cycle stops with a Pass even though the measure time has not passed.
>
> If the measure time has passed and the Stop on Pass requirement has not been met, the cycle stops with a Fail.
>
> If the Stop on Pass requirement is not met, and the measure time has not passed, additional measurements are made and averaged. The Stop on Pass and measure time requirement are tested after each measurement until one or the other results in an exit from the test cycle.

When the instrument is selected for Manual mode of operation the averaging works similarly. When the [START] button is pressed to exit Charge and start measure, n measurements are averaged. For each consecutive press of the [START] button one more measurement is made, the last five are averaged and result displayed. The [STOP] button exits the Measure mode to discharge the UUT normally.

2.6.3 I/O Menus

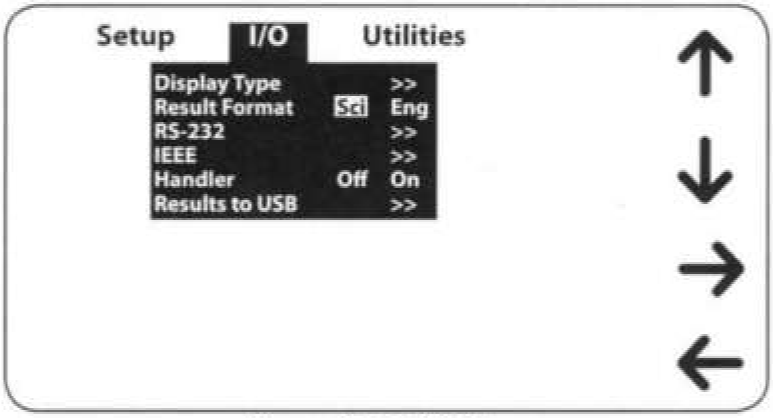


Figure 2-16: I/O Menu

The second of the three main menus is I/O, shown in Figure 2-16. Each function controls measurement results or instrument I/O interface, and is described in detail in paragraphs 2.6.3.1 through 2.6.3.6.

2.6.3.1 Display Type

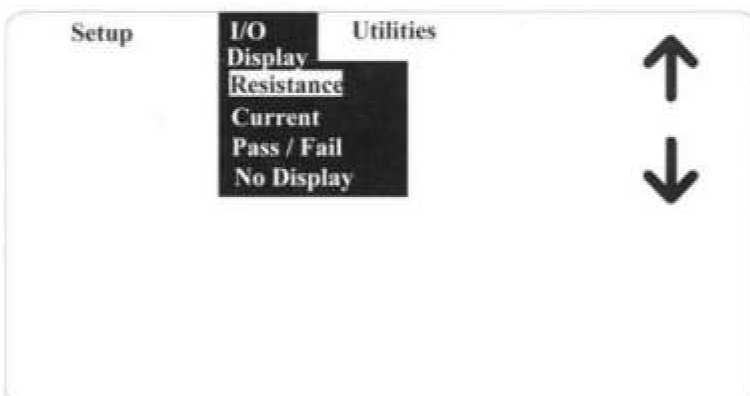


Figure 2-17: Measurement Display

Allows selection from four different modes of measurement display, **Resistance, Current**, **Pass/Fail or No Display**. In Resistance mode, the 1865 instrument will display the measured value of resistance of the device under test. In Current mode, the 1865 displays the current to the device under test. In Pass/Fail mode the actual measured value is displayed in small font along with a Pass or Fail based on the measurement limit entered, which could apply to either resistance or current.

In No Display, only the voltage, mode and range are displayed, with no measured value. This might be used for security reasons or for the purpose of reducing test time during remote operation.

When the display is selected as current, you need to keep in mind that the 5 kΩ input impedance and the 1 kΩ output voltage source impedance of the unit are in series with the unknown. For low values of resistance (<20 MΩ) the measured current would be the Charge Voltage/(Z_{in} + Z_{out}+ $R_{unknown}$).

2.6.3.2 Result Format

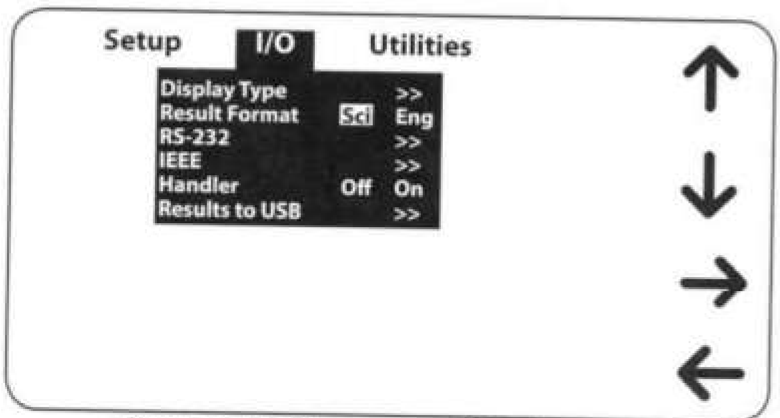


Figure 2-18: Measurement Results Format

Allows selection from two different measurement result formats: **Sci** or **Eng**, for scientific or engineering units. Scientific units are expressed as an exponent and engineering units are expressed in ohms for resistance and amps for current. For example e^6 in scientific units can be expressed as MΩ or as μA in engineering units. This is strictly for the user's convenience.

When **Sci** is selected, the results will always be displayed as 5 digits and an exponent. The 5 digits will be configured as 1 to the left and 4 to the right of the decimal point. When **Eng** is selected, the results will be displayed with a minimum of 4 and maximum of 6 digits: there are always 3 digits to the right of the decimal point, but to the left there could be 1, 2, or 3 digits depending on value. For example, when the unit is MΩ, and, depending on the device being measured, the display might show 1.123 MΩ, 10.123 MΩ or even 100.123 MΩ.

A summary of measurement units (scientific and engineering) and their symbols is given in Table 2-2.

Table 2-2: Measurement Unit Prefixes

Multiple	Scientific	Engineering	Symbol
1000000000000000	10^{15}	Peta	P
1000000000000	10^{12}	Tera	T
1000000000	10^{9}	Giga	G
1000000	10^{6}	Mega	M
1000	10^{3}	Kilo	k
.001	10^{-3}	milli	m
.000001	10^{-6}	micro	µ
.000000001	10^{-9}	nano	n
.000000000001	10^{-12}	pico	p
.000000000000001	10^{-15}	femto	f

2.6.3.3 RS-232

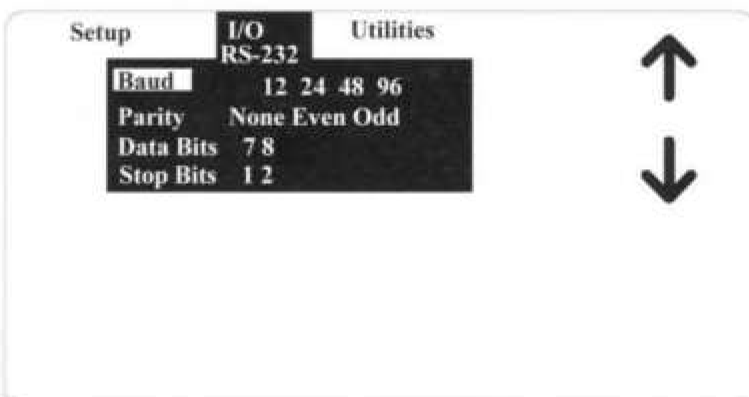


Figure 2-19: RS-232 Interface Setup

Allows user setup of standard RS-232 interface formats. Selections include:

Baud Rate:	12, 24, 48 or 96
Parity:	None, Even or Odd
Data Bits:	7 or 8
Stop Bits:	1 or 2

When using the RS-232 interface with a printer the IEEE-488.2 Mode must be set to **Talk** and the State to **Disable**.

2.6.3.4 IEEE-488.2 Discontinued see 7000-23 IEEE to RS-232 Interface Adapter

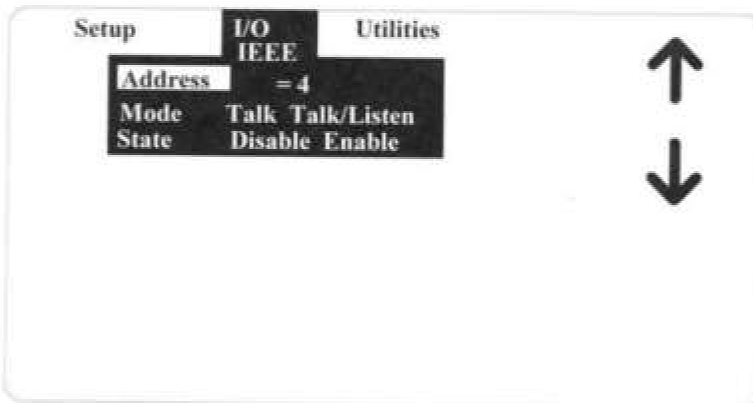


Figure 2-20: IEEE-488.2 Interface Setup

Allows user setup of IEEE-488.2 interface operation. Selections include:

Address:	1 through 16
Mode:	Talk or Talk/Listen
State:	Disable or Enable

The instrument will function as either a Talk or a Talk/Listen device in a system depending on the choice made by the operator under Mode. Talk is generally suited to a simple system with no controller or other talkers, for example a printer. Talk/Listen denotes full programmability and is suited for use in a system that has a controller or computer to manage data flow. The "handshake" routine assures that the active talker proceeds slowly enough for the slowest listener.

2.6.3.5 Handler

Allows user to turn Handler Interface function ON or OFF. When off is selected, input and output lines on the rear panel I/O interface connector are ignored

2.6.3.6 Saving Measurement Results via USB Host Port

The user can store measurement results on a USB flash drive. When selected, if a results file is not open, the user is prompted for the filename (up to 8 characters) and the file is opened.

To close a results file that is currently open, select **Results to USB** and press **[ENTER]** to close. Display indicates "**Closing the Results File**".

If the user leaves the file open, when the setup is recalled the user will be prompted for a file name.

When multiple tests are being conducted, the results are stored to the flash drive periodically (every 10 measurements) from an internal buffer.

> CAUTION
>
> To store **all** results, close the file before shutting down the power.
>
> To keep measurement results consistent with the setup conditions, close the file before changing or recalling a new set of test conditions.

The measurement results (<u>one</u> for each complete measurement cycle) are stored as a DOS text file under its assigned identifying number (up to 8 characters) with an extension of .65R. The test setup conditions are saved as a header at the beginning of a results file. A sample file format is shown below. Notice that the results can be stored in either engineering or scientific terms, depending on what the user has selected for setup conditions.

```
100.000000        ;voltage
0.000000          ;charge time
0.000000          ;dwell time
0.000000          ;measure time
0.000000          ;discharge time
0.000000          ;mode (0 = auto, 1 = manual)
0.000000          ;range
1000000.000000    ;limit
0.000000          ;stop on pass
1                 ;# to average
0.000000          ;display type
.000000           ;result format
3.000000          ;baud rate (0 = 1200, 1 = 2400, 2 = 4800, 3 = 9600)
0.000000          ;parity
1.000000          ;data bits
0.000000          ;stop bits
4.000000          ;IEEE address
1.000000          ;IEEE mode
0.000000          ;IEEE state
1.000000          ;handler
0.000000          ;result to USB
1.000000          ;backlight (0 = off, 1 = on)
ENDHEADER
```

1.020 M ohm PASS
1.020 M ohm PASS
1.020 M ohm PASS
1.020 M ohm PASS
1.020 M ohm PASS
1.020 M ohm PASS
or
1.020015E+006 PASS
1.020015E+006 PASS
1.020015E+006 PASS
1.020015E+006 PASS
1.020015E+006 PASS

2.6.4 Utilities Menus

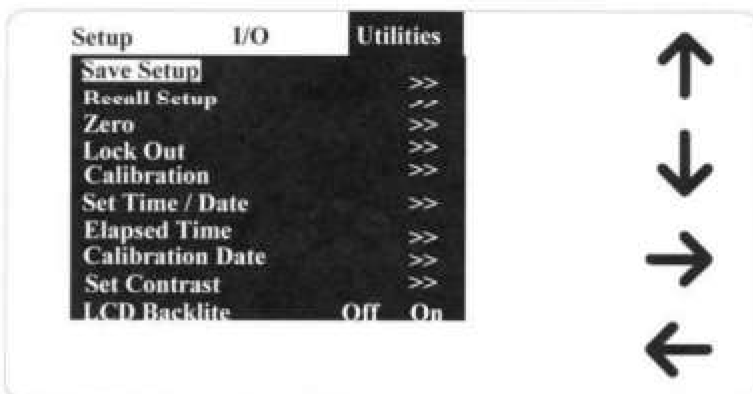


Figure 2-21: Utilities Menu

The last of the three main menus is Utilities, shown in Figure 2-21. Each function is described in detail in paragraphs 2.6.4.1 through 2.6.4.10.

2.6.4.1 Save Setup

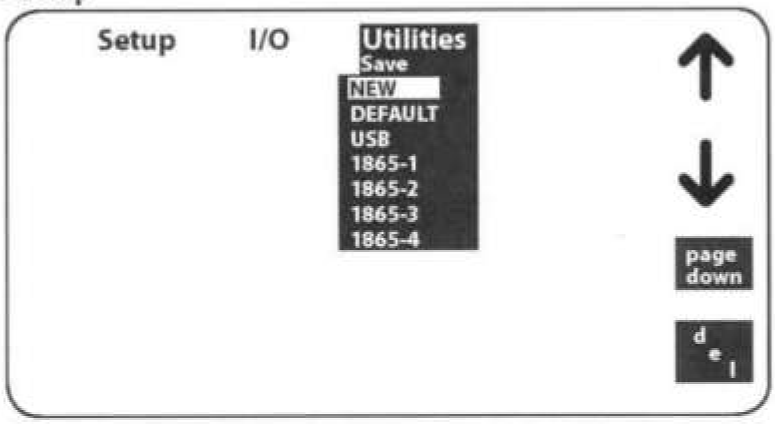


Figure 2-22: Save Setup Test Conditions

Allows a set of test conditions to be stored in instrument memory or on the USB flash drive for later recall. Test conditions are those that are user programmable in the Setup and I/O menus (refer to paragraphs 2.6.2 and 2.6.3 above).

Stored setup conditions should always be <u>backed-up</u> on a flash drive or recorded on paper.

> NOTE
> To store setups in the 1865's internal memory, a flash drive must be plugged into the USB port.

To store the current set of test conditions as a new set in unit memory, you need to select [NEW] in the Save Setup menu and enter the identifying name up to 8 characters under which these conditions will be stored (allowable characters from the keypad include 0 through 9 and minus, characters can also include A through Z when operating from remote control). To save the setup under the name selected or to overwrite if the name already exists, answer Yes or No (Figure 2-23).

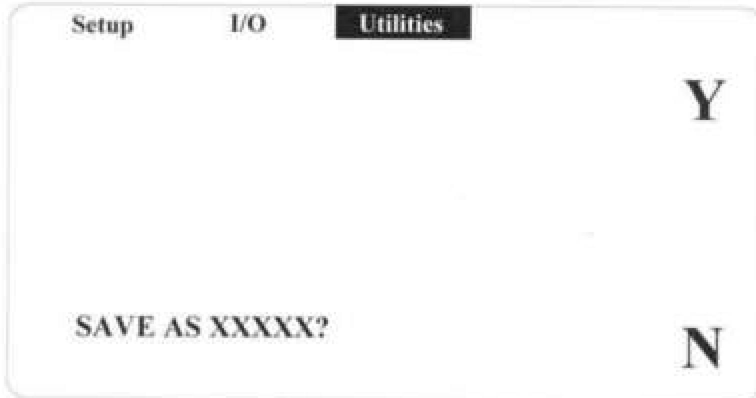


Figure 2-23: Save/Overwriting Setup

To make the current set of test conditions the default (at power up) one needs to select **[DEFAULT]** in the Save Setup menu and overwrite the conditions currently stored. To prevent overwriting the default setup by mistake an additional level of safety exists where the operator is required to respond with **Yes** or **No**, similar to Figure 2-23.

Selecting **[del]** will delete a set of test conditions and requires a **Yes** or **No** confirmation.

When there are more setups than can fit on the display, the page-down key is active. If there is less than a whole page below, the display wraps around to the previous display. Continuing to page down will eventually return to the first display of setups. The page-down key is only shown when there are more setups than what is visible.

There are two ways to make the current set of test conditions overwrite an existing setup. One is to select that setup in the menu and answer **Yes** to overwrite. The other way is to enter the same name under **New** and answer **Yes** to overwrite.

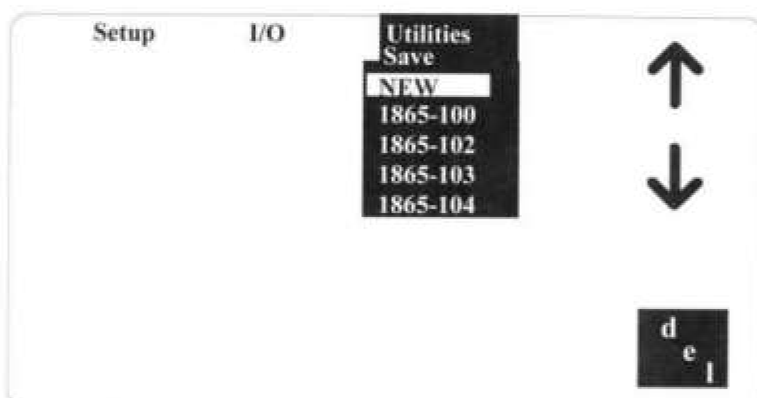


Figure 2-24: Saving Setups on a flash drive

It is possible to store about 25 sets of test conditions in the 1865's memory, and more than 1000 setups can be stored on a flash drive via the USB port. Increasing the quantity of setups results in a slower retrieval process.

To save a set of test conditions externally, select [USB] from the menu in Figure 2-24. You can save a new setup or overwrite an existing one on the flash drive. Pressing [CNCL] returns the menu to the setups stored in internal memory, Figure 2-22.

2.6.4.2 Recall Setup

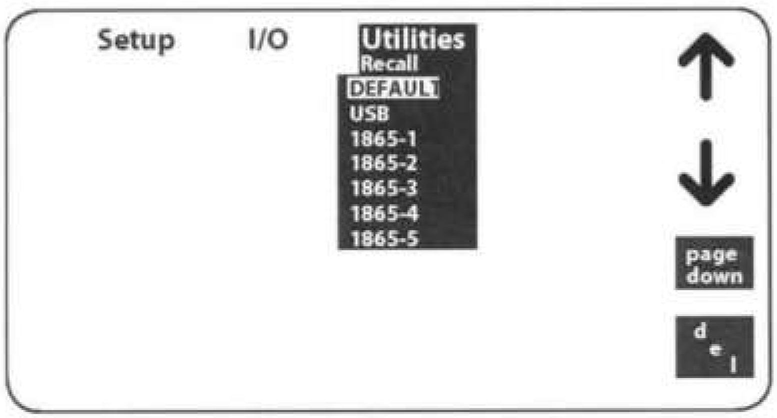


Figure 2-25: Recall Setup Test Conditions

Allows a previously stored set of test conditions to be recalled from instrument memory. Test conditions are those that are user programmable in the Setup and I/O menus and saved as discussed above. To recall a set of test conditions one needs to arrow down or up to the desired set. **DEFAULT** is always one of the set of test conditions that can be recalled as discussed in the previous paragraph. Selecting **[USB]** allows setups to be recalled from a flash drive if one is connected. Selecting **[del]** will delete a set of test conditions and requires a **Yes** or **No** confirmation.

It is possible to store about 25 sets of test conditions in the 1865's memory, and more than 1000 setups can be stored on a flash drive via the USB port. Increasing the quantity of setups results in a slower retrieval process.

To save a set of test conditions externally, select [USB] from the menu in Figure 2-24. You can save a new setup or overwrite an existing one on the flash drive. Pressing [CNCL] returns the menu to the setups stored in internal memory, Figure 2-22.

2.6.4.2 Recall Setup

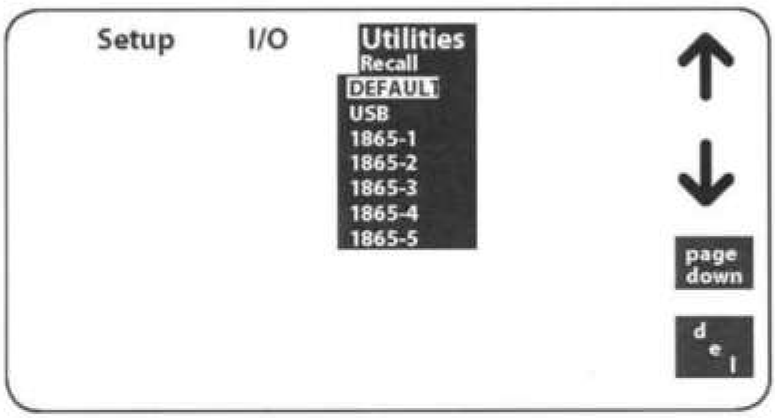


Figure 2-25: Recall Setup Test Conditions

Allows a previously stored set of test conditions to be recalled from instrument memory. Test conditions are those that are user programmable in the Setup and I/O menus and saved as discussed above. To recall a set of test conditions one needs to arrow down or up to the desired set. **DEFAULT** is always one of the set of test conditions that can be recalled as discussed in the previous paragraph. Selecting **[USB]** allows setups to be recalled from a flash drive if one is connected. Selecting **[del]** will delete a set of test conditions and requires a **Yes** or **No** confirmation.

When there are more setups than can fit on the display the page down key is active. If there is less than a whole page below, the display wraps around to the previous display. Continuing to page down will eventually return to the first display of setups.

2.6.4.3 Zero

The zeroing process automatically measures stray parameters and retains the data. It is used to correct measurements, so that results represent parameters of the DUT alone without test lead or fixture capacitance. Zeroing is recommended at the start of each work day, or more often if leads, fixture, or test configuration to the DUT is changed. Zeroing should also be performed anytime the test voltage is changed, which also includes recalling a set of test conditions from memory with a different test voltage. It is important to note that anytime the instrument is zeroed, it is done at the test voltage currently specified. When [Zero] is selected in the menu screen and the [Enter] key is pressed, you are prompted by instructions on the display, the first of which is shown in Figure 2-26.

ZERO AT 500 VOLTS
REMOVE ALL COMPONENTS
FROM THE TEST FIXTURE

HIT <START> WHEN READY
HIT <CNCL> TO EXIT

Figure 2-26: Zeroing Procedure

Once the zeroing is initiated by pressing [START] the next message displayed is:

ZERO CAL IN PROGRESS

Once complete, typically a minute or slightly longer, the next message displayed is:

COMPLETE
HIT <MENU> KEY TO CONTINUE

2.6.4.4 Lock Out

Allows user to turn the keypad-lock feature ON or OFF. There are two choices which can be selected: **lockout only** and **lockout with setup recall**. In both modes only the [START], [STOP] and [MENU] on the instrument front panel are active, all other keys are disabled. The difference is that in **lockout with setup recall,** the menu key also allows setups to be recalled from instrument memory.

When either is selected the operator must enter a password number up to 8 characters.

CAUTION
For security reasons the password is not displayed when it is entered, so the password should be keyed in carefully and remembered.

ENTER PASSWORD
(8 CHARACTERS MAXIMUM)

* * * * * * * *

Once the password is entered and entered again for verification, testing can begin by pressing [START] or the password cleared or changed by selecting [MENU].

HIT <MENU> KEY TO ENTER PASSWORD
AND TO RETURN TO THE MENU

OR

HIT THE <START> KEY TO
START A MEASUREMENT

Once activated, only the [START], [STOP] and [MENU] on the instrument front panel are active, all other keys are disabled. To turn the lockout feature off and reactivate menus select [MENU] (select Exit Lockout in Lockout with Setup Recall mode) and enter the previous password from the keypad, the instrument will again function as normal. Failure to remember an entered password requires an override password (186501).

If [Recall Setup] is chosen in the Lockout with Setup Recall mode, the instrument functions as described in paragraph 2.6.4.2 under Recall Setup.

2.6.4.5 Calibration

Refer to Calibration in Paragraph 5.4. INSTRUMENT CALIBRATION SHOULD BE PERFORMED ONLY BY QUALIFIED SERVICE PERSONNEL.