PREDICTOR
Battery Capacity Tester

1.0 DESCRIPTION

1.1 GENERAL DESCRIPTION

The FiberCorp PREDICTOR is a data storing battery multimeter that provides fast, accurate information in a fraction of the normal test time. Compact and light weight in design, this intelligent test unit displays and records readings of Cell Float Voltage, Internal Cell Resistance and the Intercell Connection Resistance. Other data, such as specific gravity and temperature, can also be entered manually.

The PREDICTOR may be used on a single cell or multicell module. Readings on up to eight strings of 256 cells each can be stored in the built-in, two megabyte RAM and are displayed on a bright vacuum fluorescent display. The PREDICTOR's features are further enhanced by a standard PC link and software that allows the user to transfer all readings to a PC for further analysis and report generation.

1.2 TEST PROCEDURE

FiberCorp's PREDICTOR is a self-contained, battery powered unit comprised of a microprocessor, load resistor, display and a rechargeable battery. Two sets of test leads are provided with the instrument, one is a standard set of digital voltmeter probes and the other is a three clip set used in the multimeter mode. Two dual conductor test clips are connected across the cell and its associated intercell connector (from positive post of cell being tested to positive of next cell); a third single conductor clip is connected to the negative terminal of the cell being tested.

Once connected, the user initiates the test sequence. First, the unit reads and records the cell float voltage. Next, the unit connects a fixed resistance across the cell and the intercell being tested, forcing a current of approximately 70 Amps to flow for a few seconds. During the load condition, the instrument reads the current and voltage necessary to calculate the Intercell Connection Resistance and Internal Cell Resistance.

Upon completion of all testing, the user can connect the PREDICTOR via the RS-232 serial port to a standard PC-compatible computer and initiate the menu-driven, data extraction, analysis and report program. When imported, the information can be displayed in an easy-to-read, bar graph format. The user also has the option to generate a report using FiberCorp's standard analysis or defining his own.

1.3 TEST MODES

1.3.1 VOLTMETER

In this mode, the instrument is used with a standard set of digital voltmeter probes to take monthly or quarterly Float Voltage readings. When the probes access the first cell, the display shows the reading and within two seconds the instrument emits an audible beep as well as a display indication that the reading has been stored. As the two voltage probes are then lifted and contacted with the next cell, the instrument automatically indexes the display and memory storage to the next higher number.

This mode allows a user to take valid recorded readings at a rate of 10-12 per minute, resulting in major man-hour savings.

1.3.2 MULTIMETER

The instrument is used in this mode to take Float Voltage, Internal Cell Resistance and Intercell Connection Resistance readings on each cell.

A special test harness consisting of three clips is then connected as follows:

1) One clip to the positive post of the cell being tested
2) Another to the negative post of the cell being tested
3) The third to the positive post of the next cell.

Once connected, the instrument tests and reads in the following sequence:

1) The Float Voltage is read and stored.
2) A load resistor is connected across the cell and associated intercell; resulting test current is approximately 70 Amps (50 Amps for 6 and 12V modules.)
3) While current is flowing, the instrument reads Cell Voltage, Current and Intercell Voltage Drop, then calculates Internal Cell and Intercell Resistances.

1.3.3 SPECIFIC GRAVITY AND TEMPERATURE

In this mode, the display prompts the user to key in the readings for each cell. The instrument automatically inserts the first two numbers of the specific gravity reading to speed up the entry process. For example, for a 1215 reading the display would show SG = 12 _ _ and the user enters the 1 and 5.

Note: These readings may be automated in the future, but in the meantime, this process is still more efficient than the present pen and paper approach.

1.4 SYSTEM FEATURES

1.4.1 FLOAT VOLTAGE READINGS

The PREDICTOR measures the voltage applied during full float operation. The voltage range covers all cell or modules up to 16 volts. Reading accuracy is to four full digits.

1.4.2 INTERNAL CELL RESISTANCE

Internal resistance of a cell can be determined by how that cell responds to a momentary load. The instantaneous voltage drop and load current applied is used to calculate the resistance.

The PREDICTOR's hardware and software algorithm used make this measurement possible on cells that are floating on-line. This method is a useful way of determining weak, potentially failing cells when comparing the internal cell resistance of all the like cells in the string.

1.4.3 INTERCELL RESISTANCE

The PREDICTOR measures and displays the total electrical resistance of the connection between the terminals of two cells that are electrically connected to each other. This measurement includes resistance of the connector and the contact resistance at the point(s) of connection to the cell terminals.

1.4.4 AUTO RANGING

The PREDICTOR automatically selects the correct voltage range and load resistor for the test being performed.

1.4.5 DATA EXTRACTION AND ANALYSIS

When testing is completed, the user connects the PREDICTOR to a PC-compatible computer with the supplied RS-232 cable. The data extraction program is executed and test results are imported into the program; data is analyzed and displayed in an easy-to-read bar graph or tabulated format.

A standard test report using generally accepted analytical criteria can be printed. Or, as an alternative, the tabular test results can be saved in an ASCII or comma-delimited format enabling the user to use commercial, off-the-shelf software programs to generate customized reports.

1.4.6 SYSTEM DISPLAY

The results of the test sequence and instruction as to proper method of operation are provided on a vacuum fluorescent display made up of a 4-line by 20 character screen. Designed to be very bright, the PREDICTOR's instructions and results are easy-to-read and visible in any ambient condition.

1.4.7 POWER

The PREDICTOR is powered by a self-contained, rechargeable battery built into the case of the unit. Recharge or AC power operation is provided from a wall plug transformer module.