MOTOR CORE LOSS TEST SET
(Modular)

Model Number CL10

Serial Number

MM/bjf
June 17, 1998

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Customer

Customer's Purchase Order Number

Manufacturing Date

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DANGER / WARNINGS

DANGER

Complete Grounding of this unit is necessary for the safe operation of this equipment. Disconnect inputs before ungrounding this equipment

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DANGER / WARNINGS

GENERAL SAFETY PRECAUTIONS

HIGH VOLTAGE

This equipment is capable of providing POTENTIALLY LETHAL VOLTAGES! Improper operation or test practices may result in injury or death to the operator or surrounding personnel.

The operation of High Voltage test equipment should only be performed by personnel familiar with HIGH VOLTAGE testing and safety procedures. The operator of this equipment must be aware of all hazards associated with High Voltage testing. The operator is responsible for himself and others in close proximity of the testing area.

Some General Safety Practices for working with High Voltage Test Equipment have been listed below for your reference.

- **Become familiar with your instrument before performing an actual test**
- **Know your work area, check that all circuits are de-energized and locked out.**
- **Never work alone; always work with another qualified worker.**
- **Mark off entire work area with barriers and warning tape.**
- **Make all personnel aware of your testing activities.**
- **Be aware of dangerous conditions that may arise from energizing a test specimen.**
- **Never modify test equipment; modifications to equipment could introduce an unknown hazard or hinder a designed-in safety feature.**
- **DO NOT operate damaged equipment. Remove power, and do not use the equipment until safe operation can be verified by service-trained personnel.**

Phenix Technologies, Inc. assumes no liability for unsafe or improper use of test equipment.

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SECTION 1: MAIN SPECIFICATIONS

MODEL CL10

Motor Core Loss Test Set with continuously variable output voltage and instrumentation for measurement of motor core losses.

INPUT: 208/230 VAC, 50 A, 50/60 Hz, 1-phase (or 575 VAC, 20 A Canadian Units only)

AC OUTPUT:

5 minutes ON / 15 minutes OFF

5 V Tap:	L	0	-	1.67 VAC	@	2000 A
	M	1.67	-	3.34 VAC	@	2000 A
	H	3.34	-	5.0 VAC	@	2000 A
15 V Tap:	L	0	-	5.0 VAC	@	667 A
	M	5.0	-	10.0 VAC	@	667 A
	H	10.0	-	15.0 VAC	@	667 A

INSTRUMENTATION:

AC Voltmeter: Digital, LED display, true RMS responding.
Scale: 0-5.000/15.000 VAC. Accuracy: +/-.5% F.S.

AC Currentmeter: Digital, LED display, true RMS responding.
Scale: 0-667/1999 AAC. Accuracy: +/-.5% F.S.

AC Kilowattmeter: Digital, LED display.
Scale: 0-10.000 kW. Accuracy: +/-.5% F.S.

STANDARD DESIGN AND SAFETY FEATURES:

* Main power circuit breaker with indicator lamp
* Fused control power circuits
* ON/OFF pushbutton control
* Meter hold switch to freeze meter readings
* External interlock provision with indicator lamp
* Thermal overload protection with indicator lamp
* Rugged steel cabinet with casters
* Separate voltmeter leads for greater meter accuracy
* 8 foot output cable
* RS232/BCD

INCLUDES: Data base software and Lap top with printer

DIMENSIONS: 24" W x 32" D x 50" H; 600 pounds

OPTIONS:

___ 6 " Clamp Assembly
___ Extra length Output Leads ___ ft. NOTE: Standard leads are 10 ft.

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MAIN SPECIFICATIONS

MODEL CL25

Motor Core Loss Test Set with continuously variable output voltage and instrumentation for measurement of motor core losses.

INPUT: 440/480 VAC, 50 A, 50/60 Hz, 1-phase (or 575 VAC, 44 A)

AC OUTPUT:
30 minutes ON/60 minutes OFF

12.5 V Tap:	L	0	-	4.16 VAC	@	2000 A
	M	4.16	-	8.32 VAC	@	2000 A
	H	8.32	-	12.50 VAC	@	2000 A
25 V Tap:	L	0	-	8.33 VAC	@	1000 A
	M	8.33	-	16.66 VAC	@	1000 A
	H	16.66	-	25.0 VAC	@	1000 A

INSTRUMENTATION:

AC Voltmeter: Digital, LED display, true RMS responding.
Scale: 0-19.999/25.00 VAC. Accuracy: +/-.5% F.S.

AC Currentmeter: Digital, LED display, true RMS responding.
Scale: 0-1000/1999 AAC. Accuracy: +/-.5% F.S.

AC Kilowattmeter: Digital, LED display.
Scale: 0-19.999/25.00 kW. Accuracy: +/-.5% F.S.

STANDARD DESIGN AND SAFETY FEATURES:

* Main power circuit breaker with indicator lamp
* Fused control power circuits
* ON/OFF pushbutton control
* Meter hold switch to freeze meter readings
* External interlock provision with indicator lamp
* Thermal overload protection with indicator lamp
* Rugged steel cabinet with casters
* Separate voltmeter leads for greater meter accuracy
* 8 foot output cable
* RS232/BCD

INCLUDES: Data base software and Lap top with printer

DIMENSIONS: 24" W x 32" D x 50" H; 850 pounds

OPTIONS:

___ 6 " Clamp Assembly

___ Extra length Output Leads ___ ft. NOTE: Standard leads are 15 ft.

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MAIN SPECIFICATIONS

MODEL CL60

Motor Core Loss Test Set with continuously variable output voltage and instrumentation for measurement of motor core losses.

INPUT: 440/480 VAC, 135 A, 1-phase, 50/60 Hz

AC OUTPUT:

30 V Tap:	Step	1	0	-	6 VAC	@	2000 A
	2	6	-	12 VAC	@	2000 A	
	3	12	-	18 VAC	@	2000 A	
	4	18	-	24VAC	@	2000 A	
	5	24	-	30VAC	@	2000 A	
60 V Tap:	Step	1	0	-	12 VAC	@	1000 A
	2	12	-	24 VAC	@	1000 A	
	3	24	-	36 VAC	@	1000 A	
	4	36	-	48 VAC	@	1000 A	
	5	48	-	60 VAC	@	1000 A	

DUTY CYCLE: 30 minutes ON/60 minutes OFF at maximum output

INSTRUMENTATION:

AC Voltmeter: Digital, LED display, true RMS responding.
Scale: 0-19.999/60.00 VAC. Accuracy: +/-.5% F.S.

AC Currentmeter: Digital, LED display, true RMS responding.
Scale: 0-2000 AAC. Accuracy: +/-.5% F.S.

AC Kilowattmeter: Digital, LED display.
Scale: 0-19.999/60.00 kW. Accuracy: +/-.5% F.S.

STANDARD DESIGN AND SAFETY FEATURES:
* Main power circuit breaker with indicator lamp
* Fused control power circuits
* ON/OFF pushbutton control
* Meter hold switch to freeze meter readings
* External interlock provision with indicator lamp
* Thermal overload protection with indicator lamp
* Rugged steel cabinet with casters
* Separate voltmeter leads for greater meter accuracy
* 20 foot output cable
* RS-232/BCD

INCLUDES: Data base software and Lap top with printer

DIMENSIONS: 26" W x 40" D x 48" H; 1,500 pounds

OPTIONS:

___ 6 " Clamp Assembly;
Extra length Output Leads ___ ft. NOTE: Standard leads are 20 ft.

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MAIN SPECIFICATIONS
MODEL CL125

Motor Core Loss Test Set with continuously variable output voltage and instrumentation for measurement of motor core losses.

INPUT: 440/480 VAC, 300 A, 1-phase, 50/60 Hz (or 575 VAC, 250 A)

AC OUTPUT:

30 V Tap:	Step	1	0	-	6 VAC @	4200 A
		2	6	-	12 VAC @	4200 A
		3	12	-	18 VAC @	4200 A
		4	18	-	24 VAC @	4200 A
		5	24	-	30 VAC @	4200 A
60 V Tap:	Step	1	0	-	12 VAC @	2100 A
		2	12	-	24 VAC @	2100 A
		3	24	-	36 VAC @	2100 A
		4	36	-	48 VAC @	2100 A
		5	48	-	60 VAC @	2100 A
90 V Tap:	Step	1	0	-	18 VAC @	1400 A
		2	18	-	36 VAC @	1400 A
		3	36	-	54 VAC @	1400 A
		4	54	-	72 VAC @	1400 A
		5	72	-	90 VAC @	1400 A

DUTY CYCLE: 30 minutes ON/60 minutes OFF at maximum output

INSTRUMENTATION:

AC Voltmeter: Digital, LED display, true RMS responding.
Scale: 0-19.999/90.00 VAC. Accuracy: +/-.5% F.S.

AC Currentmeter: Digital, LED display, true RMS responding.
Scale: 0-4200 AAC. Accuracy: +/-.5% F.S.

AC Kilowattmeter: Digital, LED display.
Scale: 0-19.999/125.00 kW. Accuracy: +/-.5% F.S.

STANDARD DESIGN AND SAFETY FEATURES:
* Main power circuit breaker with indicator lamp
* Fused control power circuits
* ON/OFF pushbutton control
* Meter hold switch to freeze meter readings
* External interlock provision with indicator lamp
* Thermal overload protection with indicator lamp
* Rugged steel cabinet with casters
* Separate voltmeter leads for greater meter accuracy
* 2 - 30 foot output cables
* RS-232/BCD

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MAIN SPECIFICATIONS
CL125

INCLUDES: Data base software and Lap top with printer

DIMENSIONS: 50" W x 30" D x 52 1/2" H; 2,750 pounds

OPTIONS:

___ 6 " Clamp Assembly

___ Extra length Output Leads ___ ft. NOTE: Standard leads are 30 ft.

SECTION 2: CONTROL AND METERING

FIGURE 1

CONTROL AND METERING LAYOUT

SECTION3: CONTROL AND METERING DESCRIPTION

Refer to FIGURE 1

1. DIGITAL VOLTMETER:
   CL10: 0-5.00/15.00 VAC scale
   CL25: 0-12.5/25.00 VAC scale
   CL60: 0-19.999/60.00 VAC scale
   CL125: 0-19.999/90.00 VAC scale

2. DIGITAL WATTMETER:
   CL10: 0-10,000 W scale
   CL25: 0-25,000 W scale
   CL60: 0-60,000 W scale
   CL125: 0-125,000 W scale

3. DIGITAL CURRENTMETER:
   CL10: 0-667/2,000 AAC scale
   CL25: 0-1,000/2,000 AAC scale
   CL60: 0-2,000 AAC scale
   CL125: 0-4,200 AAC scale

4. METER HOLD SWITCH: Freeze readings on all digital meters when ON.

5. SECURITY CIRCUIT/THERMAL OVERLOAD INDICATOR LAMPS: Lamp will light and deenergize test set when either external interlock circuit is open or thermal limit of main high current transformer is exceeded.

6. MANUAL RAISE VOLTAGE CONTROL: Vernier output voltage control knob. Rotate clockwise to increase voltage, counter-clockwise to decrease voltage. Must be in zero start position to energize test set.

   (**OR**)

   MOTORIZED VOLTAGE CONTROL: Press raise to increase or lower to decrease output level. Off zero will light when regulator is not in the zero (starting) position. Regulator controls only function when voltage is on.

7. OUTPUT SWITCH: Divides each output tap into steps. Continuous output voltage control is obtained when used in conjunction with the raise voltage control.

Output	**CL10**		**CL25**	
Switch	5.0 V Tap	15.0 V Tap	12.5 V Tap	25.0 V Tap
Low	0-1.67 V	0-5.0 V	0-4.16 V	0-8.33 V
Med	1.67-3.34 V	5.0-10.0 V	4.16-8.32 V	8.33-16.66 V
High	3.34-5.00 V	10.0-15.0 V	8.32-12.50 V	16.66-25.00 V
Low	0-1.67 V	0-5.0 V	0-4.16 V	0-8.33 V

Output	**CL60**		**CL125**		
Step	30 V Tap	60 V Tap	30 V Tap	60 V Tap	90 V Tap
1	0 – 6 V	0-12 V	0-6 V	0- 12 V	0- 18 V
2	6-12 V	12-24 V	6-12 V	12-24 V	18-36 V
3	12-18 V	24-36 V	12-18 V	24-36 V	36-54 V
4	18-24 V	36-48 V	18-24 V	36-48 V	54-72 V

5	24-30 V	48-60 V	24-30 V	48-60 V	72-90 V

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CONTROL AND METERING DESCRIPTION

8. MAIN POWER ON INDICATOR LAMP: Indicates that main power circuit breaker is on.
9. CONTROL POWER FUSE: Provides protection for all control and metering circuits.
10. CONTROL POWER ON INDICATOR LAMP: Indicates all control circuits energized.
11. VOLTAGE ON PUSHBUTTON: Energizes main high current transformer.
12. VOLTAGE ON INDICATOR LAMP: Indicates test set is energized.
13. VOLTAGE OFF PUSHBUTTON: Deenergizes main high current transformer.
14. COMPUTER. (Optional)
15. (RESERVED)
16. (RESERVED)

SECTION 4: INSTALLATION

- Position set in the desired location.
- Remove metering module by taking out screws on front panel and pulling out by both handles. Make sure all PC cards are fully seated in sockets. Replace module.
- Connect main service green lead to main power ground.
- Connect main service leads (coded RED and YELLOW) to main power source.

  CL10: 208/230 VAC, 50 A, 1 phase, 50/60 Hz or
  575 VAC, 20 A, 1 phase, 50/60 Hz

  CL25: 440/480 VAC, 50 A, 1 phase, 50/60 Hz or
  575 VAC, 44 A, 1 phase, 50/60 Hz

  CL60: 440/480 VAC, 135 A, 1 phase, 50/60 Hz
  575 VAC, 105 A, 1 phase, 50/60 Hz

  CL125: 440/480 VAC, 300 A, 1 phase, 50/60 Hz or
  575 VAC, 250 A, 1 phase, 50/60 Hz

SECTION 5: INTRODUCTION

The Phenix Technologies Core Loss Test Set is a continuously variable low voltage, high current power supply for testing stators, rotors, and armature cores. The basic test set includes complete instrumentation, input/output/voltmeter cables and computer/printer. The latter being used for determining initial test levels and evaluating final test results.

The test set is used to energize the motor core steel to 85 kilolines/square inch flux density while measuring applied voltage, current, and watts. The test voltage required to excite the core to 85 kilolines/square inch flux density is calculated by the computer based on core dimensional data manually entered by the operator.

Actual test data (volts, amps, watts) is manually entered into the computer by the operator. The computer then takes the entered test data and calculates apparent power factor and the watts per pound of core weight.

A number of factors can influence the readings obtained from "good" motor cores. These factors range from manufacturers design criteria, to type of core steel, to steel stamping and assembly process. The computer bases its pass/fail criteria on the following generally accepted levels of core performance:

Apparent Power Factor: .1 to .7 Good
.7 to .9 Marginal
.9 to 1.0 Bad

Watts per Pound: 1-6 W/lb. Good
6-10 W/lb. Marginal
>10 W/lb. Bad

In all cases, the computer will then ask you to perform a hot spot check by physically checking the core for any localized areas of heating. If areas are found, they should be marked for further inspection and possible repair.

SECTION 6: START-UP PROCEDURE

1. Loop heavy output cable thru an adequately sized stator core.

2. Plug ends of heavy output cable into common and low tap jacks on side of test set. Note: Low tap jack may be covered by security access plate. Slide access plate completely to one side to expose low tap jack.

3. Make sure both ends of cable are fully seated in the jacks and turned clockwise. Failure to do so may result in overheating of the plugs and connectors.

4. Loop voltmeter cable thru stator core and connect plugs to the common and low tap voltmeter jacks.

5. Turn on main power circuit breaker. Main power lamp, control power lamp, and all digital meters should light.

6. Turn on computer and printer. Check for power on indicating lamps.

7. Turn raise voltage control knob to full counter-clockwise (zero start) position.

8. Set output switch to step #1 or Low (L) position.

9. Push the voltage on pushbutton. The voltage on lamp beside the pushbutton should light.

10. MANUAL VOLTAGE CONTROL: Slowly turn output voltage control knob in a clockwise direction.

    (or)

    MOTORIZED VOLTAGE CONTROL: Press raise button to increase output level.

11. All digital output meters should be functional.

12. MANUAL VOLTAGE CONTROL: Return output voltage control knob to zero. Deenergize test set by pushing the off pushbutton. Voltage on indicator lamp should now be off.

13. Remove power and voltmeter cable from the low tap jacks.

14. Slide security access plate to the left to expose the high tap.

15. Reconnect power and voltmeter cables to corresponding jacks.

16. Repeat Steps 7 thru 9 above to determine if high tap is functional.

SECTION 7: STATOR TEST PROCEDURE

1. Measure and record the following stator core dimensions. Note that all dimensions must be accurate to within 1/64 of an inch. Refer to diagram on next page for location of dimensions.

   Core Diameter
   Back Iron Width
   Slot Depth
   Vent Width (If no vents exist, enter 0.)
   Number of Vents (If no vents exist, enter 0.)
   Length of Core

2. Turn on Main Power Circuit Breaker, turn on Computer and Printer.

3. Following computer prompts, enter customer, job number, and data recorded above. Computer will then calculate and print out test voltage required to obtain desired flux density in back iron.

4. Place output power cable loop thru center of stator. Connect one side of power cable to the "common" jack, connect the other end to the voltage tap which is closest to the test voltage recommended by the computer in Step 3 above.

5. Place voltmeter cable thru center of stator. Plug ends of voltmeter cable into the common voltmeter terminal and voltmeter terminal corresponding to the voltage tap being used.

6. Place output switch in the L (low) position. Place raise voltage control knob in full counter-clockwise position.

7. Close all interlocks if security circuit lamp is lit.

   NOTE: Before energizing test set, note maximum current ratings of each tap.

CL10:	5 V tap rated 2000 A maximum 30 minutes ON/60 minutes OFF
	15 V tap rated 667 A 30 minutes ON/60 minutes OFF
CL25:	12.5 V tap rated 2000 A maximum 30 minutes ON/60 minutes OFF
	25 V tap rated 1000 A 30 minutes ON/60 minutes OFF
CL60:	30 V tap rated 2000 A 30 minutes ON/60 minutes OFF
	60 V tap rated 1000 A 30 minutes ON/60 minutes OFF
CL125:	30 V tap rated 4200 A 30 minutes ON/60 minutes OFF
	60 V tap rated 2100 A 30 minutes ON/60 minutes OFF
	90 V tap rated 1400 A 30 minutes ON/60 minutes OFF

8. Energize test set by pressing the voltage on pushbutton. Slowly raise voltage until desired (calculated by computer) test voltage is attained.

9. If you are unable to attain desired voltage in the output L position, deenergize the test set, return raise voltage control to full counter-clockwise position and place output switch on M (medium).

STATOR TEST PROCEDURE

10. Energize test set. (Note: Voltage will instantly appear on your voltmeter. This voltage will be the voltage you left off at in the full output L position.) Raise voltage control knob until desired test voltage is achieved.

11. If you do not attain desired test voltage in the output M position, deenergize the test set, return raise voltage control to full counter clockwise position and place output switch on H (high) position. Repeat operation of energizing test set and raising voltage.

12. If you still do not attain desired test voltage, move output cable and voltmeter lead to the higher voltage tap.

13. Repeat Steps 7-12 above until desired test voltage is attained.

14. When desired test voltage is attained, freeze all meter readings by placing meter hold switch in the "ON" position.

15. Following the computer prompts, enter meter readings into the computer.

16. Return meter hold switch to the off position.

17. Computer will now print out test results based on acceptance criteria discussed in the Introduction Section (5) of this manual.

18. Computer will then prompt you to continue exciting the core for at least 5-10 minutes and ask you to physically check for "hot spots". If any areas are found, mark them for possible repair. If you wish to speed up the hot spot checking process, increase the amperage reading to 2 to 3 times those recorded in Step 15 above for 1 to 2 minutes. When over-exciting the core, always keep in mind the current limitations of each tap. When in doubt, refer to the Main Specifications Section (1) of this manual.

19. Following computer prompt, enter findings on hot spot check.

20. Computer will print out if core passed or failed hot spot check.

SECTION 8: ARMATURE/ROTOR TEST PROCEDURE

1. Measure and record the following stator core dimensions. Note that all dimensions must be accurate to within 1/64 of an inch. Refer to diagram on next page for location of dimensions.

   Core Diameter
   Back Iron Width
   Slot Depth
   Vent Width
   Number of Vents
   Length of Core
   Number of Vent Holes
   Vent Hole Diameter

2. Turn on Main Power Circuit Breaker, turn on Computer and Printer.

3. Following computer prompts, enter customer, job number, and data recorded above. Computer will then calculate and print out test voltage required to obtain desired flux density.

4. Connect one "C" clamp cable plug to the "common" jack on one side of the test set. Connect second "C" clamp cable plug to the voltage tap which is closest to the test voltage recommended by the computer in Step 3 above. Fasten clamps to opposite ends of armature or rotor shaft. (Be sure to avoid clamping at bearings fit points.) The armature or rotor shaft will complete the test circuit thru the core.

5. Place voltmeter lead thru spokes or vent holes. If this is not possible, use second set of voltmeter leads (with clips on ends) and clip voltmeter leads to shaft clamps.

6. Plug ends of voltmeter cable into "common" voltmeter terminal and voltmeter terminal corresponding to the voltage tap being used.

7. Place output switch in the L (low) position. Place raise voltage control knob in full counter-clockwise position.

8. Close all interlocks if security circuit lamp is lit.

   NOTE: Before energizing test set, note maximum current ratings of each tap.

   CL10: 5 V tap rated 2000 A maximum 30 minutes ON/60 minutes OFF
   15 V tap rated 667 A 30 minutes ON/60 minutes OFF
   CL25: 12.5 V tap rated 2000 A maximum 30 minutes ON/60 minutes OFF
   25 V tap rated 1000 A 30 minutes ON/60 minutes OFF
   CL60: 30 V tap rated 2000 A 30 minutes ON/60 minutes OFF
   60 V tap rated 1000 A 30 minutes ON/60 minutes OFF
   CL125: 30 V tap rated 4200 A 30 minutes ON/60 minutes OFF
   60 V tap rated 2100 A 30 minutes ON/60 minutes OFF
   90 V tap rated 1400 A 30 minutes ON/60 minutes OFF

ARMATURE/ROTOR TEST PROCEDURE

9. Energize test set by pressing the voltage on pushbutton. Slowly raise voltage until desired (calculated by computer) test voltage is attained.

10. If you are unable to attain desired voltage in the output L position, deenergize the test set, return raise voltage control to full counter-clockwise position and place output switch on M (medium).

11. Energize test set. (Note: Voltage will instantly appear on your voltmeter. This voltage will be the voltage you left off at in the full output L position.) Raise voltage control knob until desired test voltage is achieved.

12. If you do not attain desired test voltage in the output M position, deenergize the test set, return raise voltage control to full counter-clockwise position and place output switch on H (high) position. Repeat operation of energizing test set and raising voltage.

13. If you still do not attain desired test voltage, move output cable and voltmeter lead to the higher voltage tap.

14. Repeat Steps 7-12 above until desired test voltage is attained.

15. When desired test voltage is attained, freeze all meter readings by placing meter hold switch in the "ON" position.

16. Following the computer prompts, enter meter readings into the computer.

17. Return meter hold switch to the off position.

18. Computer will now print out test results based on acceptance criteria discussed in the Introduction Section (5) of this manual.

19. Computer will then prompt you to continue exciting the core for at least 5-10 minutes and ask you to physically check for "hot spots". If any areas are found, mark them for possible repair. If you wish to speed up the hot spot checking process, increase the amperage reading to 2 to 3 times those recorded in Step 15 above for 1 to 2 minutes. When over-exciting the core, always keep in mind the current limitations of each tap. When in doubt, refer to the Main Specifications Section (1) of this manual.

20. Following computer prompt, enter findings on hot spot check.

21. Computer will print out if core passed or failed hot spot check.

SECTION 9: CALIBRATION

CL10

All calibration potentiometers are accessible by removing rear panel of unit. Calibration potentiometers are located on plug-in PC boards in the module.

AC Voltmeter

a. Connect a standard true RMS responding AC voltmeter (0-15 VAC) between common and 5.0 volt output terminals.

b. Connect common and 5.0 volt voltmeter terminals to thier respective output terminals.

c. Energize test set and raise output voltage to 4.000 VAC.

d. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A2, PCB 1128.

e. Check calibration at various points (i.e. .5, 1, 2, 5 VAC).

f. Deenergize test set. Reconnect voltmeter leads to 15 V output terminals.

g. Reenergize test set and raise output voltage to 12.000 volts.

h. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A2, PCB 1128.

i. Check calibration at various points (i.e. .5, 2, 8, 15 VAC).

AC Currentmeters

a. Connect a standard 2000/5 current transformer and 5 ampere true RMS responding currentmeter to the output lead.

b. Connect output lead between common and 5.0 volt output terminals.

c. Place output selector switch on L (low) position.

d. Energize test set and raise output current to 1500 amperes.

e. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A5, PCB 1128.

f. Check calibration at various points (i.e. 100, 500, 1000, 1999 A).

g. Deenergize test set. Reconnect output leads to common and 15 volt output terminals.

h. Reenergize test set and raise output current to 500 amperes.

i. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A5, PCB 1128.

CALIBRATION
CL10

j. Check calibration at various points (i.e. 50, 100, 400 A).

Wattmeter

Note: In the absence of a motor core, the output cable can be used as a load to calibrate the wattmeter.

a. Connect output lead between common and 5.0 volt output terminals.

b. Connect 2000/5 current transformer to output lead. Connect secondary of current transformer to current coils of standard wattmeter.

c. Connect voltage coil of standard wattmeter to common and 5.0 volt output terminals. Connect common and 5.0 volt voltmeter terminals to common and 5.0 volt output terminals.

d. Energize test set and raise output to 8.000 kW.

e. Compare panel meter to standard wattmeter. If recalibration is necessary, adjust potentiometer (R4) on A3, PCB1128.

f. Raise and lower output current to check wattmeter calibration at various points.

g. Connect output lead between common and 15 volt output terminals.

h. Connect voltage coil of standard wattmeter to common and 15 volt output terminals. Connect common and 15 volt voltmeter terminals to common and 15 volt output terminals.

i. Energize test set and raise output to 8.000 kW.

j. Compare panel meter to standard wattmeter. If recalibration is necessary, adjust potentiometer (R3) on A3, PCB1128.

k. Raise and lower output to check wattmeter calibration at various points.

Calibration is now complete. Turn off main power. Replace rear panel.

CALIBRATION
CL25

All calibration potentiometers are accessible by removing rear panel of unit. Calibration potentiometers are located on plug-in PC boards in the module.

AC Voltmeter

a. Select LO voltmeter range.

b. Connect a standard true RMS responding AC voltmeter (0-25 VAC) between common and 12.5 volt output terminals.

c. Connect common and 12.5 volt voltmeter terminals to output terminals.

d. Energize test set and raise output voltage to 10.000 VAC.

e. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A2, PCB 1128.

f. Check calibration at various points (i.e. 1, 2.5, 5, 12.5 VAC).

g. Deenergize test set. Reconnect voltmeter leads to 25 V output terminals.

h. Reenergize test set and raise output voltage to 18.000 volts.

i. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A2, PCB 1128.

j. Check calibration at various points (i.e., 2, 5, 10, 15 VAC).

k. Select HI voltmeter range.

l. Energize test set and raise output to 25 V.

m. Compare panel meter to standard voltmeter. If recalibration is necessary, adjust potentiometer (R10) on A2, PCB 1128.

n. Raise and lower output to check voltmeter calibration at various points.

AC Currentmeters

a. Connect a standard 2000/5 current transformer and 5 ampere true RMS responding currentmeter to the output lead.

b. Connect output lead between common and 12.5 volt output terminals.

c. Place output selector switch on L (low) position.

d. Energize test set and raise output current to 1500 amperes.

CALIBRATION
CL25

e. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A5, PCB 1128.

f. Check calibration at various points (i.e., 100, 500, 1000, 1999 A).

g. Deenergize test set. Reconnect output leads to common and 25 volt output terminals.

h. Reenergize test set and raise output current to 800 amperes.

i. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A5, PCB 1128.

j. Check calibration at various points (i.e., 100, 200, 1000 A).

Wattmeter

NOTE: In the absence of a motor core, the output cable can be used as a load to calibrate the wattmeter.

a. Select LO wattmeter range.

b. Connect output lead between common and 12.5 volt output terminals.

c. Connect 2000/5 current transformer to output lead. Connect secondary of current transformer to current coils of standard wattmeter.

d. Connect voltage coil of standard wattmeter to common and 12.5 volt output terminals. Connect common and 12.5 volt voltmeter terminals to common and 12.5 volt output terminals.

e. Energize test set and raise output to 15.000 kW.

f. Compare panel meter to standard wattmeter. If recalibration is necessary, adjust potentiometer (R4) on A3, PCB 1128.

g. Raise and lower output to check wattmeter calibration at various points.

h. Connect output lead between common and 25 volt output terminals.

i. Connect voltage coil of standard wattmeter to common and 25 volt output terminals. Connect common and 25 volt voltmeter terminals to common and 25 volt output terminals.

j. Energize test set and raise output to 15.000 kW.

k. Compare panel meter to standard wattmeter. If recalibration is necessary, adjust potentiometer (R3) on A3, PCB 1128.

l. Raise and lower output to check wattmeter calibration at various points.

m. Select HI wattmeter range.

CALIBRATION
CL25

n. Energize test set and raise output to 20 kW (approximately).

o. Compare panel meter to standard wattmeter. If recalibration is necessary, adjust potentiometer (R10) on A3, PCB 1128.

p. Raise and lower output current to check wattmeter calibration at various points.

Calibration is now complete. Turn off main power. Replace rear panel.

CALIBRATION
CL60

All calibration potentiometers are accessible by removing metering module and reinstalling on extender cables. Calibration potentiometers are located on plug-in PC boards in the module.

AC Voltmeter

a. Connect a standard true RMS responding AC voltmeter (0-30 VAC) between common and 30 volt output terminals.

b. Connect common and 30 volt voltmeter terminals to thier respective output terminals.

c. Set voltmeter range selector switch on control panel to L (low) position.

d. Set output voltage to #3 step position.

e. Energize test set and raise output until 18 VAC is read on standard meter.

f. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A2, PCB 1128.

g. Check calibration at various points (i.e. 1, 2, 5, 10, 15 VAC).

h. Deenergize test set and set output voltage to #5 step position.

i. Set voltmeter range to H (High) position.

j. Energize test set and raise output until 60 VAC is read on standard meter.

k. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R10) on A2, PCB 1128.

l. Check calibration at various points (i.e. 10, 20, 30, 50 VAC). NOTE: It will be necessary to select various output steps to perform this.

m. Deenergize test set. Connect standard true RMS voltmeter (0-60 VAC) between common and 60 volt output terminals.

n. Connect common and 60 volt voltmeter terminals to their respective output terminals.

o. Set output voltage to #5 step position.

p. Energize test set and raise output voltage until 60 VAC is read on standard meter.

q. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A2, PCB 1128.

r. Check calibration at various points (i.e. 10, 20, 30, 50 VAC). NOTE: It will be necessary to select various output steps to perform this.

s. Deenergize set.

CALIBRATION

CL60

AC Currentmeters

a. Connect a standard 2000 A current transformer and true RMS responding meter to output cables.

b. Connect output lead between common and 30 volt terminals.

c. Set output to #1 step position.

d. Energize test set and raise output until 2000 A is read on standard meter. NOTE: It may be necessary to go to higher step positions to reach required current.

e. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R2) on A5, PCB 1128.

f. Check calibration at various points (i.e. 200, 500, 1000, 1500 A). NOTE: It may be necessary to select various output steps to perform this.

g. Deenergize test set and reconnect output leads to common and 60 volt output terminals.

h. Set output to #1 step position.

i. Energize test set and raise output until 1000 A is read on standard meter. NOTE: It may be necessary to go to higher step positions to reach required current.

j. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A5, PCB 1128.

k. Check calibration at various points (i.e. 100, 250, 500, 750 A). NOTE: It may be necessary to select various output steps to perform this.

l. Deenergize test set.

Wattmeter

NOTE: For maximum accuracy, calibration should be done at the highest load available for each tap. In the absence of the appropriate core to do this, the output cables may be substituted.

a. Select L (Lo) wattmeter range.

b. Connect output leads between common and 30 volt output terminals.

c. Connect a standard wattmeter with a range appropriate for the load being used. Typical hookup will connect the voltage input of the wattmeter to the voltmeter terminals and use a current transformer to drive the current input. If the output leads are being used for a load, the output terminals must be externally connected to the voltmeter terminals.

d. Energize test set and raise output to 16-18 kW.

CALIBRATION
CL60

e. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A3, PCB 1128.

f. Check calibration at various points.

g. Deenergize test set and reconnect to 60 volt output terminal.

h. Energize test set and raise output to 16-18 kW.

i. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A3, PCB 1128.

j. Check calibration at various points.

k. Select H (High) wattmeter range.

l. Energize test set and raise output to maximum level allowed by current/voltage limitations of set or permitted by load whichever is less.

m. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R10) on A3, PCB 1128.

n. Check calibration at various points.

o. Deenergize test set.

Calibration is now complete. Turn off main power. Replace metering module.

CALIBRATION
CL125

All calibration potentiometers are accessible by removing metering module and reinstalling on extender cables. Calibration potentiometers are located on plug-in PC boards in the module.

AC Voltmeter

a. Connect a standard true RMS responding AC voltmeter (0-30 VAC) between common and 30 volt output terminals.

b. Connect common and 30 volt voltmeter terminals to thier respective output terminals.

c. Set voltmeter range selector switch on control panel to L (low) position.

d. Set output voltage to #3 step position.

e. Energize test set and raise output until 18 VAC is read on standard meter.

f. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A2, PCB 1128.

g. Check calibration at various points (i.e. 1, 2, 5, 10, 15 VAC).

h. Deenergize test set. Connect standard true RMS voltmeter (0-90 VAC) between common and 90 volt output terminals.

i. Connect common and 90 volt voltmeter terminals to their respective output terminals.

j. Set output voltage to #1 step position.

k. Energize test set and raise output until 18 VAC is read on standard meter.

l. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R2) on A2, PCB 1128.

m. Check calibration at various points (i.e. 1, 2, 5, 10, 15 VAC).

n. Deenergize test set and set output voltage to #5 step position.

o. Set voltmeter range to H (High) position.

p. Energize test set and raise output until 90 VAC is read on standard meter.

q. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R10) on A2, PCB 1128.

r. Check calibration at various points (i.e. 10, 20, 50, 75 VAC). NOTE: It will be necessary to select various output steps to perform this.

s. Deenergize test set. Connect standard true RMS voltmeter (0-60 VAC) between common and 60 volt output terminals.

CALIBRATION

CL125

t. Connect common and 60 volt voltmeter terminals to their respective output terminals.

u. Set output voltage to #5 step position.

v. Energize test set and raise output voltage until 60 VAC is read on standard meter.

w. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A2, PCB 1128.

x. Check calibration at various points (i.e. 10, 20, 30, 50 VAC). NOTE: It will be necessary to select various output steps to perform this.

y. Deenergize set.

AC Currentmeters

a. Connect a standard 5000 A current transformer and true RMS responding meter to output cables.

b. Connect output lead between common and 30 volt terminals.

c. Set output to #1 step position.

d. Energize test set and raise output until 4200 A is read on standard meter. NOTE: It may be necessary to go to higher step positions to reach required current.

e. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R2) on A5, PCB 1128.

f. Check calibration at various points (i.e. 200, 500, 1000, 2000 A). NOTE: It may be necessary to select various output steps to perform this.

g. Deenergize test set and reconnect output leads to common and 60 volt output terminals.

h. Set output to #1 step position.

i. Energize test set and raise output until 2100 A is read on standard meter. NOTE: It may be necessary to go to higher step positions to reach required current.

j. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A5, PCB 1128.

k. Check calibration at various points (i.e. 100, 250, 500, 1000 A). NOTE: It may be necessary to select various output steps to perform this.

l. Deenergize test set and reconnect output leads to common and 90 volt output terminals.

m. Set output to #1 step position.

CALIBRATION

CL125

n. Energize test set and raise output until 1400 A is read on standard meter. NOTE: It may be necessary to go to higher step positions to reach required current.

o. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A5, PCB 1128.

p. Check calibration at various points (i.e. 50, 100, 400, 800 A). NOTE: It may be necessary to select various output steps to perform this.

q. Deenergize test set.

Wattmeter

NOTE: For maximum accuracy, calibration should be done at the highest load available for each tap. In the absence of the appropriate core to do this, the output cables may be substituted.

a. Select L (Lo) wattmeter range.

b. Connect output leads between common and 30 volt output terminals.

c. Connect a standard wattmeter with a range appropriate for the load being used. Typical hookup will connect the voltage input of the wattmeter to the voltmeter terminals and use a current transformer to drive the current input. If the output leads are being used for a load, the output terminals must be externally connected to the voltmeter terminals.

d. Energize test set and raise output to 16-18 kW.

e. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R4) on A3, PCB 1128.

f. Check calibration at various points.

g. Deenergize test set and reconnect to 60 volt output terminal.

h. Energize test set and raise output to 16-18 kW.

i. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R3) on A3, PCB 1128.

j. Check calibration at various points.

k. Deenergize test set and reconnect to 90 volt output terminal.

l. Energize test set and raise output to 16-18 kW.

m. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R2) on A3, PCB 1128.

n. Check calibration at various points.

CALIBRATION

CL125

o. Deenergize test set and reconnect to maximum load available.

p. Select H (High) wattmeter range.

q. Energize test set and raise output to maximum level allowed by current/voltage limitations of set or permitted by load whichever is less.

r. Compare panel meter to standard meter. If recalibration is necessary, adjust calibration potentiometer (R10) on A3, PCB 1128.

s. Check calibration at various points.

t. Deenergize test set.

Calibration is now complete. Turn off main power. Replace metering module.

SECTION 10: ELECTRICAL SCHEMATICS

CL10

	Drawing Number	Description
1.	-01-E313A	Core Loss Test Set (Power Section)
2.	-01-E308	Core Loss Voltage Measurement
3.	-01-E309	Core Loss Power Measurement
4.	-01-E310	Core Loss Current Measurement
5.	-01-E110	PCB1055 +/-15 VDC Power Supply
6.	-01-E311	Core Loss Drawer Power/Computer & Misc
7.	-01-P120 1 of 2	BCD/RS232 Meter Interface
8.	-01-P120 2 of 2	BCD/RS232 Opto-Isolation
9.	-01-P081	Newport 2520 for PCB 1074 Interface
10.	99-677-01-P071(A)	PCB1078 TRMS/AVG Converter
11.	99-677-01-P071(B)	PCB1078 TRMS/AVG Converter

ELECTRICAL SCHEMATICS

CL25

	Drawing Number	Description
1.	-01-E312	CL25 Core Loss Test Set (Power Section)
2.	-01-E308	CL10-125 Voltmeter Ckt
3.	-01-E309	CL10-125 Wattmeter Ckt
4.	-01-E310	CL10-125 Currentmeter Ckt
5.	-01-P111	CM/VM RMS/AVE Ckt (PCB 1078)
6.	-01-E110	+/-15 VDC Power Supply
7.	-01-E311	CL10-125 Drawer Power/Computer & Misc
8.	-01-P120	1 of 2BCD/RS232 Meter Interface
9.	-01-P120	2 of 2BCD/RS232 Opto-Isolation
10.	-01-P081	Newport 2520 for PCB 1074 Interface

ELECTRICAL SCHEMATICS

CL60

	Drawing Number	Description
1.	-01-E328	CL60 Core Loss Test Set (Power Section)
2.	-01-E308	CL10-125 Voltmeter Ckt
3.	-01-E309	CL10-125 Wattmeter Ckt
4.	-01-E310	CL10-125 Currentmeter Ckt
5.	-01-P111	CM/VM RMS/AVE Ckt (PCB 1078)
6.	-01-E110	+/-15 VDC Power Supply
7.	-01-E311	CL10-125 Drawer Power/Computer & Misc
8.	-01-P120	1 of 2BCD/RS232 Meter Interface
9.	-01-P120	2 of 2BCD/RS232 Opto-Isolation
10.	-01-P081	Newport 2520 for PCB 1074 Interface

ELECTRICAL SCHEMATICS
CL125

	Drawing Number	Description
1.	-01-E315	CL125 Core Loss Test Set (Power Section)
2.	-01-E308	CL10-125 Voltmeter Ckt
3.	-01-E309	CL10-125 Wattmeter Ckt
4.	-01-E310	CL10-125 Currentmeter Ckt
5.	-01-P111	CM/VM RMS/AVE Ckt (PCB 1078)
6.	-01-E110	+/-15 VDC Power Supply
7.	-01-E311	CL10-125 Drawer Power/Computer & Misc
8.	-01-P120 1 of 2	BCD/RS232 Meter Interface
9.	-01-P120 2 of 2	BCD/RS232 Opto-Isolation
10.	-01-P081	Newport 2520 for PCB 1074 Interface
11.	-01-P053	Regualtor Drive Switching Unit

SECTION 11: MAINTENANCE

No solution or chemical any stronger than ordinary mild soap and water solution should be applied to the cabinet area of this unit. Care must be used when cleaning the meter faces and console panel. Abrasives may remove printing and descriptive titles and scratch meter faces. When cleaning, always have unit disconnected from power source.

CAUTION: Never attempt to clean inside the unit, as the cleaning solution may cause damage to the electronic components.

In the event it becomes necessary to replace any parts, a complete description can be found with the supplied parts list.

SECTION 12: PARTS LIST

Qty.	Item	Description	Stock #	Comments
Metering Module (Front Panel)				
1	CX1	9 Pin D Female	1151232	
1	PS1	Power Supply +5 V, 5 A	1590110	
2	SW1,2	EAO 2 Tap/2 Pole (LO/HI)	1860737	L/H CL25/60/125
1	SW3	EAO 2 Pole/Latch (31-262)	1860265	HOLD
4	LP1-4	6.3 V Bulbs	1420143	L/H CL25/60/125
1	LP5	6.3 V Bulbs	1420143	HOLD
4	LENS	Clear	1422153	L/H CL25/60/125
1	LENS	Clear	1422153	HOLD
3	MTR1-3	Newport 2520-3 (VM-WM-CM)	1506525	VM,WM,CM
3	M1-3 CON	Conn Brd Assy (Back of Mtr)	3117420	VM,WM,CM
Chassis Parts				
2	1X1-1X2	25 Pin H-D25 Plug	1151110	
25	1X1-1X2	Pins (22/20 AWG)	1151060	
1	FP	Front Panel (5 1/4")	2101310	
2	HDL	Handles	2101710	
1	CHS	Chassis Frame	2101220	
2	PCB RL	PCB Mounting Rail	4802100	
2	LOC STD	Locator Studs	2101925	
1		RS-232 Assembly	6310002	
Metering Module (Chassis)				
6	A1-A5,A9	PCB Connector 22-P	1152565	
12	A1-A5,A9	PCB Conn Ears	1152571	
3	C1-3	Capacitor .22 uf 100 V	1093150	
1	C6	Capacitor 10 uf Tan	1095800	
1	J3,4,5	Jumper Conn (3 Per Strip)	1151950	
3	J3,4,5	Jumper Cap	1151955	
1	PCB	PCB 1147 CL/TTS Mtr Bd	1111470	
1	R1	Resistor 50 Ohm 3W	1740195	
2	SPARE	Spare 6.3 V Bulbs	1420143	
2	LAMPS	Holders	1603925	
10	TP'S	Test PT'1,2,17,19,20,21, 22,23,24,25	1356300	
4	K3-4,7-8	Reed Relay "HE722A" 2 Form A	1700772	
4	K3-4,7-8	14 Pin Socket	1158014	
2	K5,10	Reed Relay "HE721C" 1 Form C	1700771	(CL25/60/125)
2	K5,10	14 Pin Socket	1158014	(CL25/60/125)
1	PL2	Lens Clear	1422153	CONTRL PWR
1	PL3	Lens Yellow	1422152	SEC CKT
1	PL4	Lens Red	1422150	HV ON
1	PL5	Lens Clear	1422153	OFF ZERO (CL125)
1	PCB1145	PCB1145 Panel Lamp Assy	31114500	

PARTS LIST

Qty.	Item	Description	Stock #	Comments
Metering Module (Front Panel)				
3	R2-4	Resistor 2.7 K 1 W	1712085	
1	R5	Resistor 2.7 K 1 W	1712085	(CL125)
1	R7	Potentiometer 1 Meg, 2 W	1769999	RATE (CL125)
1	R7	Knob	1355101	OF (CL125)
1	R7	Cap	1355102	RISE (CL125)
1	R7	Back Plate	1355905	" (CL125)
1	R7	Knob	1355910	" (CL125)
1	SW1	Switch "Am Sol CA20BUS3200 "F*OS4872" S'V130/B11/1A"	1863330	(CL10/25)
1	SW1	Switch "Am Sol C42US3961608E	1863358	
1	SW1	American Sol .5-Pos 10-Deck	1863335	OUTPUT SEL (CL125)
2	SW2,3	Switch Pushbutton	1862120	"ON/OFF"
1	SW2	Cap Red	1862128	"OFF"
1	SW2	Contact Block N.C.	1862910	"OFF"
1	SW3	Cap Black	1862124	"ON"
1	SW3	Contact Block N.O.	1862905	"ON"
1	SW4,5	Switch Pushbutton	1862120	RAISE/LOW (CL125)
1	SW4	Red Cap	1862128	"RAISE" (CL125)
1	SW4	Contact Block N.C.	1862910	RAISE (CL125)
1	SW5	Cap Black	1862124	LOWER (CL125)
1	SW5	Contact Block N.O.	1862905	LOWER (CL125)
1	T2 KNOB	Knob 1010&1220	1891930	VOLT ADJ. (CL10/25)
Main Regulator				
1	A1	Watt XDCR "UA0806501"	1883056	
1	CB1	Ckt Brkr ABB#ESB22050L	1601150	50A 240V (CL10)
1	CB1	Ckt Brkr ABB#ESB42050L	1601155	50A 480V (CL25)
1	CB1	Ckt Brkr ABB#ESB42150L	1601173	
1	CB1	Ckt Brkr ABB#JSB42300L	1601085	300A 600V (CL125)
1	CT1	Current Xfmr 2500/5	1892001	(CL10/25/60)
1	CT1	Current Xfmr 5000/5	1892105	(CL125)
2	F1,2	Fuses 3A 250V	1603603	(CL10)
1	F1,2	Fuse Holder	1603905	(CL10)
1	F4	Fuses 15 Amp "FRS-15"	1603535	(CL10)
1	F4	Fuse Holder	1603927	(CL10)
2	F1,2	Fuses 3A 600V "KTK-3"	1603501	(CL25/60)
1	F1,2	Fuse Holder Dual	1603923	(CL25/60)
2	F4,5	Fuses 15 Amp "FRS-15"	1603535	(CL25)
1	F4,5	Fuse Holder Dual	1603928	(CL25)
2	F1,2	Fuses 5A 600V "KTK-5"	1603502	(CL125)
1	F1,2	Fuse Holder Dual	1603923	(CL125)

PARTS LIST

Qty.	Item	Description	Stock #	Comments
2	F4,5	Fuses 50 Amp "FRS-50"	1603542	(CL125)
1	F4,5	Fuse Holder Dual	1603932	(CL125)
1	K1	Contactor EH40	1705085	(CL10/25)
1	K1	Contactor EH160	1705110	(CL60)
1	K1	Contactor EH250	1705120	(CL125)
3	MS1,2	Micro Switch	1866005	(CL10/25)
	ZS1	Micro Switch		
1	MS3	Micro Switch		(CL125)
1	J1	MS12S-3S CHS F	1150101	EXT INTLK
1	P1	MS12S-3P CBL M	1150101	EXT INTLK
1	P1	Cable Clamp	1150922	EXT INTLK
1	P1	Cable Boot	1150940	EXT INTLK
1	PT1	Xfmr 5/15:120V "PT-959"	3870959	(CL10)
1	PT1	Xfmr 25V:120V "PT-958"	3870958	(CL25)
1	PT1	Xfmr 60V:120V "PT-1234"	38701234	(CL60)
1	PT1	Xfmr 90V:120V "PT-1075"	38701075	(CL125)
1	115V	115 VAC Recepticle	1159925	
1	R1	Resistor 2K 10W	1742100	
1	T1	Transformer 480/120 1kVA	3860024C	"SA24" (CL125)
1	T1	Transformer 4890/120 250VA	3860026	"SA26 (CL10/25)
1	T2	Transformer Var."2520"	1890239	(CL10)
2	T2	Transformer Var."2520"	1890239	(CL25)
1	T2	Transformer Var."6020"	1890320	(CL60)
1	T4	Current Xfmr 5A/100mA	38111016	"CT1016"
Output Leads				
1	CONN	Binding Post Black	1351100	"J2"
2	CONN	Binding Post Red	1351100	"J3,4"
3	CONN	Binding Post Red	1351100	"J3,4" (CL125)
6	CONN	Receptacle "Camlock E1017-1"	1152900	J6,7,8,9 (CL125)
1	PLUG	Banana Plug Black	1356205	"P2"
1	PLUG	Banana Plug Red	1356200	"P3"
4	PLUG	Plug "Camlock E1017-1"	1152905	P6,P7 (CL125)
3	CONN	Receptacle "Camlock E1017-1"	1152900	"J5-7"
2	PLUG	Plug "Camlock E1017-1"	1152905	"P4,5"
Additional Parts				
1	R6	Resistor 2 Ohm 25 W	1740113	(CL125)
2	F6,7	Fuse 3A, 3AG	1603603	(CL125)
2	"	Fuse Block	1603905	(CL125)
1	SCRC1	SCR Controller KBDM-14	1565100	(CL125)
1	PCB 1051	Reg. Drive Switching	3115100	(CL125)
1	K2	Relay, 115 VAC	1701600	(CL125)
1	"	Relay Socket	1157610	(CL125)

SECTION 13: PARTS ORDERING INFORMATION

Replacement parts are available from Phenix Technologies, Inc.

Changes to Phenix Technologies' products are sometimes made to accomodate improved components as they become available, and to give you the benefit of the latest technical improvements developed in our Engineering Department. It is, therefore, important when ordering parts to include the serial number of the unit as well as the part number of the replacement part.

When your purchase order is received at our office, a representative of Phenix Technologies will contact you to confirm the current price of the part being ordered. If a part you order has been replaced with a new or improved part, an Applications Engineer will contact you concerning any change in part number.

Your order for replacement parts should be sent to:

Service Department
Phenix Technologies, Inc.
75 Speicher Drive
Accident, Maryland 21520

SECTION 14: RECOMMENDED SPARE PARTS

In order to maintain your set in full operating condition with a minimum of down time, the following spare parts should be kept on hand to avoid unnecessary phone calls, expensive modes of shipment, delays in repairs, etc. Pricing is available upon request.

Part Number	Description	Quantity
1506525	Meter, 2520-3-F2M	1
1603603	Fuse, 3 A, 250 V	2
	Brush for Staco 2520 Variac	1
1420250	Lamp, Sylvania 6S6	3
1420145	Lamp, 28 V	3
1891926	Brush for Staco 6020 Variac	2

SECTION 15: RETURNED MATERIAL

If for any reason it should become necessary to return this equipment to the factory, the Service Department of Phenix Technologies, Inc. must begiven the following informa- tion:

Name Plate Information
Model Number
Serial Number
Reason for Return
Cause of Defect

If Phenix Technologies, Inc. deems return of the part appropriate, it will then issue a "Authorization for Return."

If return is not deemed advisable, other inspection arrangements will be made.

NOTE: Material received at this plant without the proper authorization shall be held as "Customer's Property" with no service until such time as the proper steps have been taken.

Your cooperation is requested in order to ensure prompt service.

WARRANTY

Phenix Technologies, Inc. warrants to the original purchaser of any new merchandise that the merchandise is free from defects in material and workmanship under normal use and service for a period of 18 months from the date of shipment. The obligation of Phenix Technologies, Inc. under this warranty is limited, in its exclusive option, to repair, replace, or issue credit for parts or materials which prove to be defective, and is subject to purchaser's compliance with the Phenix Technologies, Inc. warranty claim procedure as set forth below. The happening of any one or more of the following events will serve to void this warranty and defect or damage resulting therefrom is specifically excluded from warranty coverage:

A. Defects due to accident, negligence, alteration, modification, faulty installation by purchaser or purchaser's agents or employees, abuse, or misuse.

B. Attempted or actual dismantling, disassembling, service or repair by any person, firm, or corporation not specifically authorized in writing by Phenix Technologies, Inc.

C. Defects caused by or due to handling by carrier, or incurred during shipment, transshipment, or other move.

This warranty covers only those parts and/or materials deemed by Phenix Technologies, Inc. to be defective within the meaning of this warranty. The liability of Phenix Technologies, Inc. shall be limited to the repair, replacement, or issuance of credit for parts deemed defective within the meaning of this warranty. Costs incurred by purchaser for labor or other expenses incidental to the inspection, repair, replacement, or issuance of credit for such parts and/or material shall be the sole responsibility of purchaser. This warranty shall not apply to any accessories, parts, or materials not manufactured or supplied by Phenix Technologies, Inc. and if, in the sole discretion of Phenix Technologies, Inc., purchaser's claim relates to any materials or workmanship manufactured or performed by the supplier of a component part, or of the manufacturer of a device of which the defective part is a component, Phenix Technologies, Inc. reserves the right to disclaim liability under this warranty and to direct that the purchaser deal directly with such supplier or manufacturer. Phenix Technologies, Inc. agrees to assist the purchaser in processing or settling any such claims without prejudicing its position as to liability.

Warranty Claim Procedure

Compliance with the following warranty claim procedure is a condition precedent to the obligation of Phenix Technologies, Inc. under this warranty.

A. Purchaser must notify Phenix Technologies, Inc. in writing by certified or registered mail, of the defect claimed within 18 months after date of original shipment. Said notice shall describe in detail the defect, the defective parts and/or part, and the alleged cause of defect.

B. At the exclusive option of Phenix Technologies, Inc., purchaser shall dismantle or disassemble at purchaser's cost and expense and shall ship the defective part or material prepaid to and from Phenix Technologies, Inc., Accident, Maryland 21520, for inspection, or permit an authorized service representative of Phenix Technologies, Inc. to inspect the defective part or material at purchaser's premises. If Phenix Technologies, Inc. shall inspect the part or material at the purchaser's premises, purchaser shall provide facilities for, and at purchaser's cost and expense, dismantle, disassemble, or otherwise make accessible the subject part of material whether or not same is a component of or installed in a device other

than that manufactured or supplied by Phenix Technologies, Inc. If disclosure shows that the defect is not one for which Phenix Technologies, Inc. is liable, the purchaser agrees to reimburse Phenix Technologies, Inc. for all expense incurred.

C. Upon receipt of the defective part or material, or after access to same, Phenix Technologies, Inc. shall inspect the part or material to determine the validity of purchaser's claim.

D. The validity of any warranty claim, purchaser's compliance with Phenix Technologies, Inc. warranty claim procedure, the obligation to either repair, replace, or issue credit, or direct the purchaser to deal directly with a manufacturer or supplier are to be determined solely and exclusively by Phenix Technologies, Inc. and any determination so made shall be final and binding.

E. This warranty is expressly in lieu of all other warranties expressed or implied on the part of Phenix Technologies, Inc., including the warranties or merchantability and fitness for use, and consequential damages arising from any breach thereof and Phenix Technologies, Inc. neither assumes nor authorizes any other person, firm, or corporation to assume any liability or obligation in connection with this sale on its behalf and purchaser acknowledges that no representations except those made herein have been made to purchaser.

MM/bjf
June 17, 1998