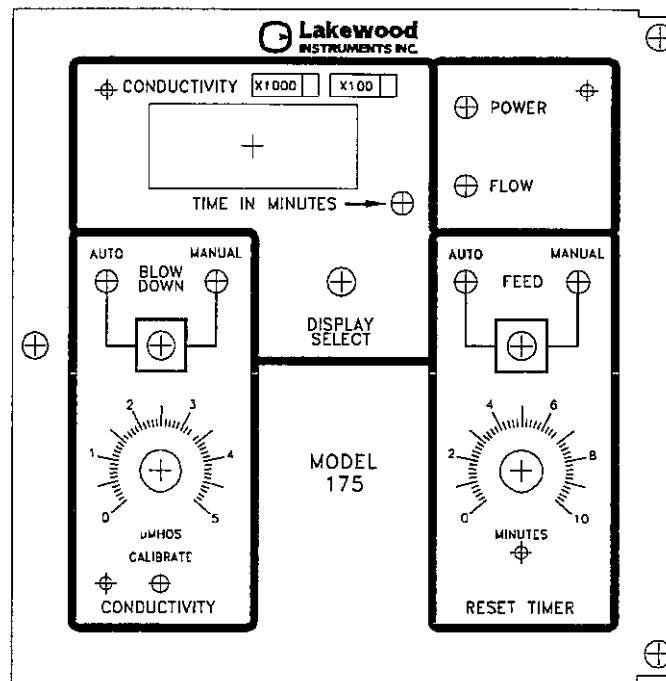


LAKEWOOD INSTRUMENTS
MODEL 175

CONDUCTIVITY & TIMER
CONTROLLER

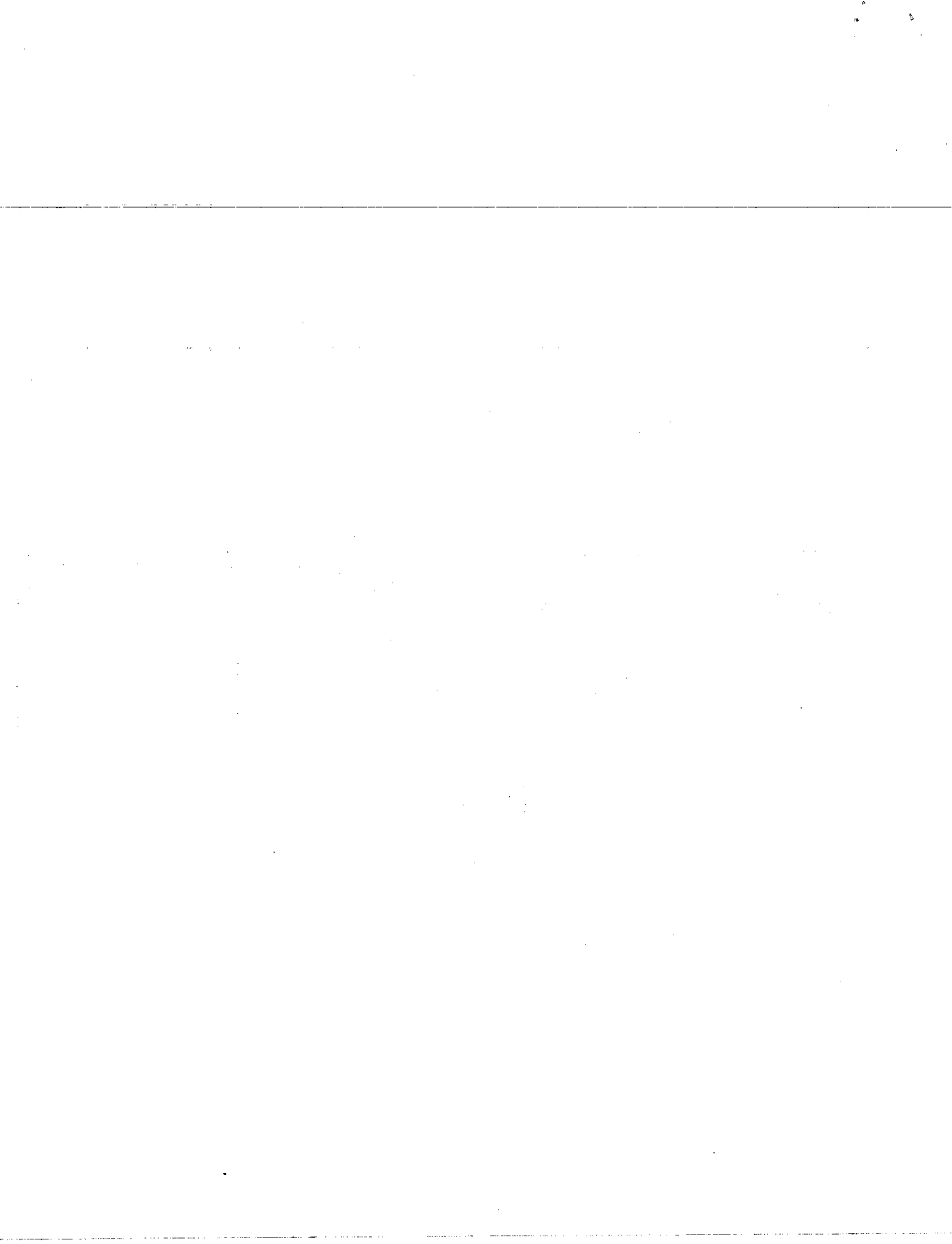
INSTALLATION & OPERATION
MANUAL

SERIAL #: 100E764018



OSMONICS

4953 West Missouri Avenue, Phoenix, Arizona 85301-6100 USA
Phone (602) 931-7332 • FAX (602) 931-7727
<http://www.osmonics.com>



Important

CAUTION CHEMICAL FEED

All electromechanical devices are subject to failure from a variety of causes. These include mechanical stress, component degradation, electromagnetic fields, mishandling, improper setup, physical abuse, chemical abuse, improper installation, improper power feeds and exposure.

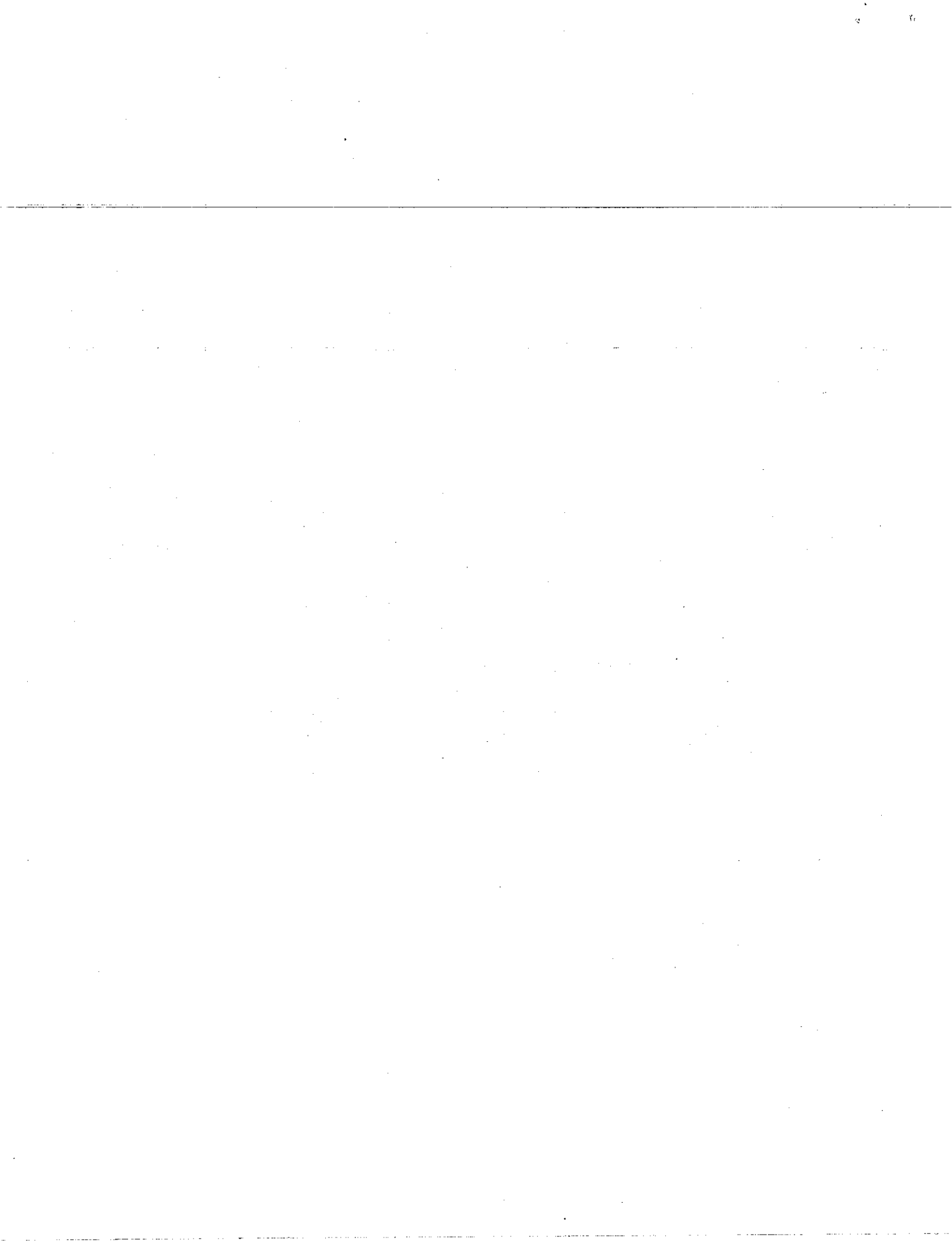
While every precaution is taken to insure proper functioning, extra precautions should be taken to limit the ability of over-feeding by limiting chemical quantities available, secondary shut-downs, alarms and redundancy or other available methods.



CAUTION POWER SOURCE AND WIRING

Low voltage wiring and high voltage (110 plus) should not be run in the same conduit. Always run separately. Even shielded low voltage is not a guarantee of isolation.

Every precaution should be taken to insure proper grounding and elimination of shorting or Electromagnetic field (EMF) interference.



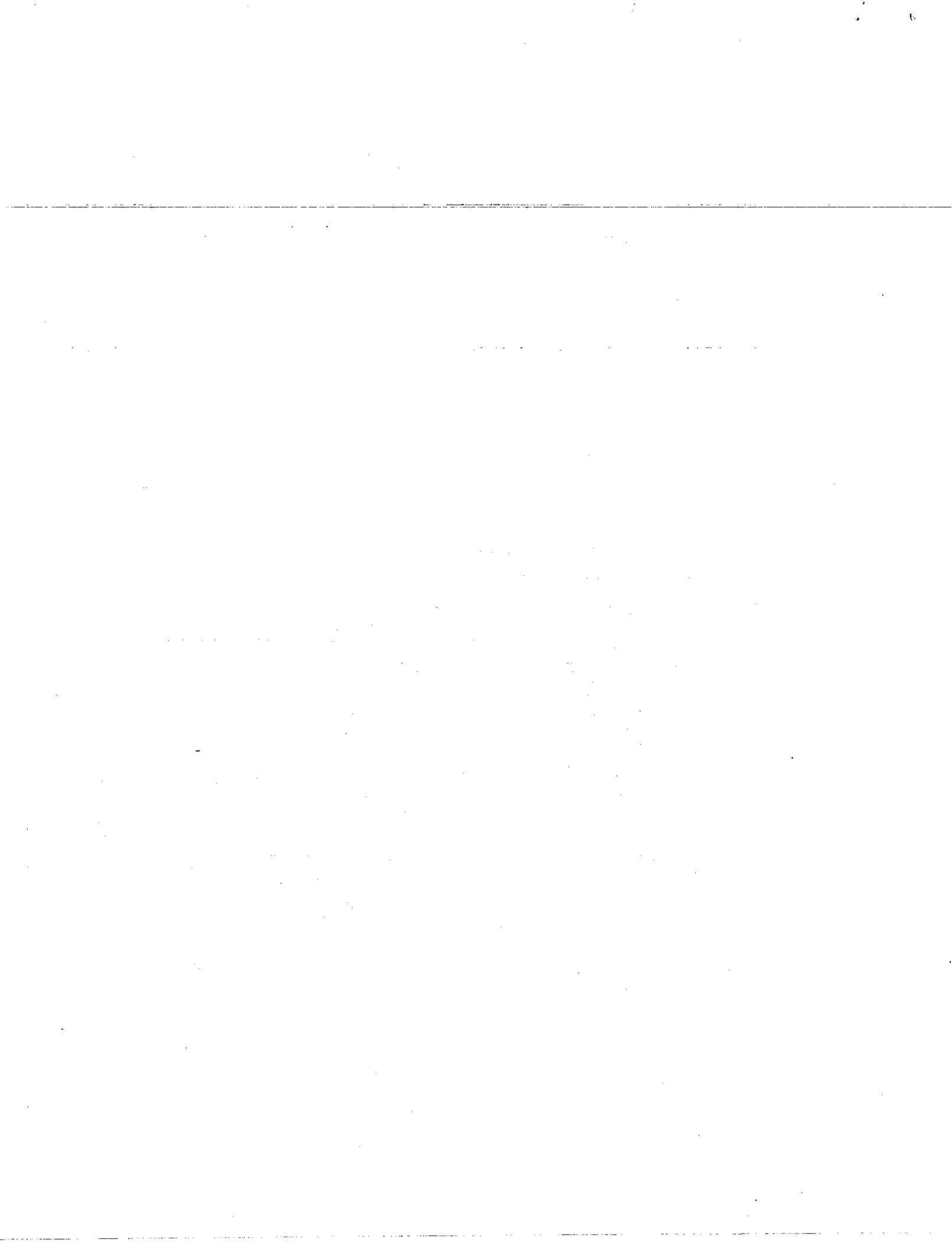
LAKEWOOD INSTRUMENTS

MODEL 175

COUNTER /TIMER AND CONDUCTIVITY CONTROLLER

INSTRUCTION MANUAL

Table of Contents	Page
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1.1 Introduction	1
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DRAWINGS:	
Water Meter Pulse Counter -CT Option	5101313
Recommended Installation: Cooling Tower System	5101424
Ladder Diagram: Back Board	5101513
Removal Diagram: Terminal Block P.C. Board	5101519
Receptacle Wiring	5103928-1
Universal Back Board	5103791



MODEL 175 CONDUCTIVITY and TIMER CONTROLLER

1.0 GENERAL DESCRIPTION

1.1 Introduction

The Model 175 features two instruments in one package.

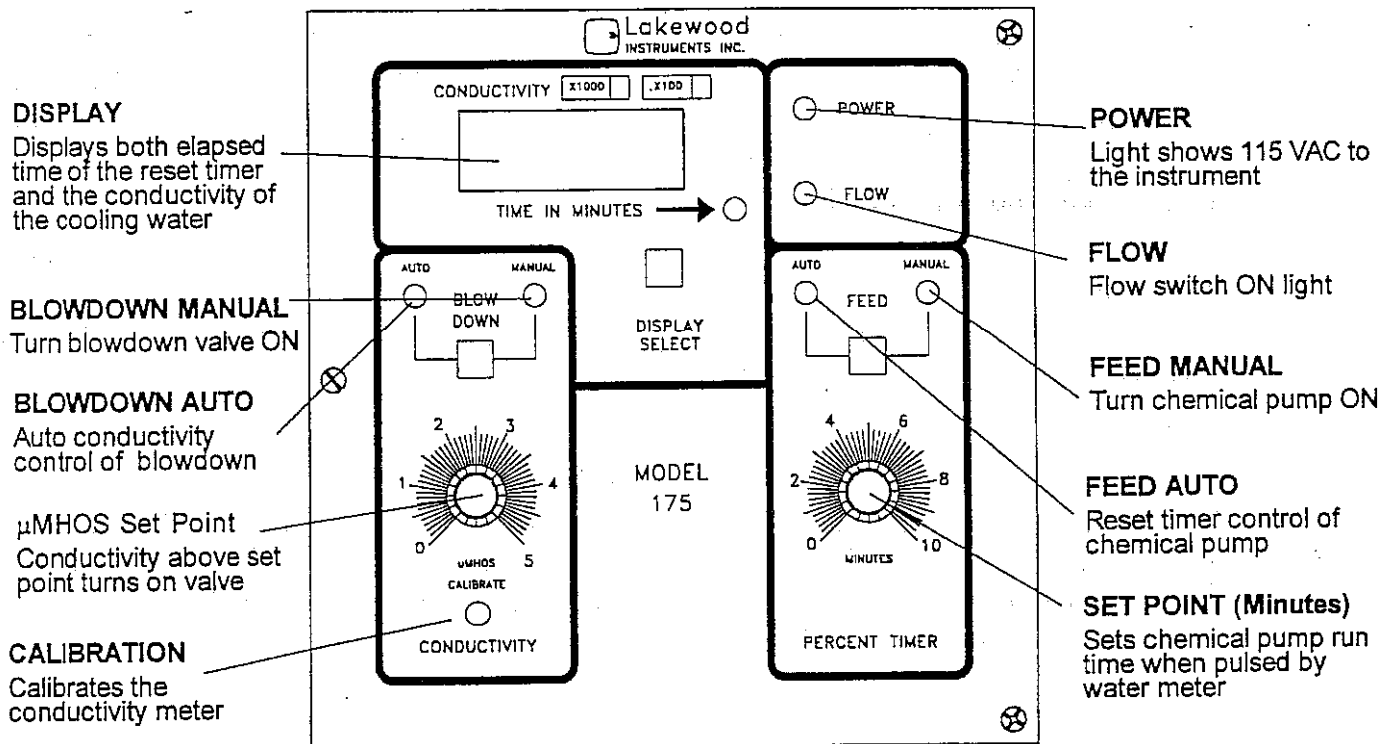
First, a standard 175 will start the chemical feed timer each time a pulse is received from the contacting head water meter. The voltage on the wires to the water meter will not exceed 24VDC.

With the -CT option you can program how many pulses you want, (up to 99) before the Model 175 will start the timer. For example, if the water meter is 10 gallons per contact and you want 100 gallons to pass before enabling the timer, you should set the counter option at 10.

Second, a conductivity instrument measures the conductance of the cooling water. If the conductivity of the cooling water exceeds the front panel set point, the controller actuates the blowdown relay. The relay opens a solenoid valve that blows down the cooling tower water to a drain. As the tower water level drops, fresh make-up water flows into the tower and dilutes the concentrated cooling tower water. The dilution causes the conductivity to decrease below the set point. The relay turns off and the blowdown solenoid valve closes.

A flow switch locks out all outputs if the sample flow stops. The solenoid blowdown valve and chemical pump will not work if the black flow sight stem is too low and the flow switch is off. At least 1 GPM is necessary to raise the float.

DESCRIPTION OF FRONT PANEL CONTROLS



NOTE: Any changes in the system operation requires several hours for the cooling tower system to stabilize at the new value. Once you get a starting point, it is easy to reach the final desired values by adjusting the time, water meter counts, or chemical pump settings. For example, if the chemical residual is 1/3 the desired value after the first try, increase the chemical pump output or feed time by a factor of three.

2.0 START UP

2.1 Checking

Check the power wiring. Make sure that the controller is connected to 120 VAC unless it is specifically set up for 220 VAC.

Check recorder or other low power wiring. Make sure that NO power wiring is connected to low power circuits.

Check the chemical pump fittings. Make sure they are safe.

Make sure that the controller is piped per the suggested installation drawing.

2.2 Starting the system

2.2.1 System Flow

CAUTION: Make sure that the two RED lock rings are full clockwise and latched before turning on the sample flow line.

2.2.2 Apply power to the controller.

2.2.3 Turn on the sample flow line.

2.2.4 The black flow indicator should rise in the flow sight indicator, and the flow light should come ON.

2.3 Conductivity

2.3.1 Conductivity set point

Determine the make up water conductivity in micromhos. Multiply this number by 3 to give the conductivity set point value, this will give three cycles of concentration. Check with your water treatment engineer for the desired conductivity value for water conservation and good scale control.

2.3.2 Calibrating conductivity

Take a sample of the cooling tower water and measure the conductivity with a hand held conductivity meter.

Turn the CALIBRATION adjustment screw on the front panel of the controller until the display matched the reading taken with the hand held meter.

2.4 Chemical feed

2.4.1 Setpoint

Set the FEED TIMER setpoint knob to the desired starting point. If unsure, set the FEED TIMER setpoint for one minute. Set the chemical pump output to 20%. This is just a starting point. Allow the system to stabilize for a day. Check the chemical residual of the tower, and adjust accordingly.

2.4.2 -CT Option

If the controller is equipped with the -CT option, set the counter for the desired number of water meter counts. There are two rotary switches on the CT card (on the back of the front circuit board). The first switch is TENS. The second switch represent UNITS. See drawing 5101313 for locations.

2.4.3 Water meter simulator button

Verify operation of the water meter input by pressing the water meter simulator button the number of counts the unit is set for, to activate the timer. Refer to drawing 5101313 for location.

2.4.4 Speed up timer button

A speed up button, also shown in the drawing, speeds up the reset timer by 1,000 for testing.

3.0 TROUBLE SHOOTING

3.1 Timer works OK but chemical residual is too low.

3.1.1 Increase the chemical pump output.

3.1.2 Increase the reset timer time.

3.2 BLOWDOWN light comes on, but valve doesn't open.

3.2.1 Check for 115 VAC at the blowdown valve terminal.

3.2.2 If 115 VAC is present, check the wiring to the solenoid valve. If the wiring is good, replace the solenoid valve.

3.2.3 If 115 VAC is not present, check for system flow and proper operation of the flow switch.

3.2.4 If the valve still fails to open, return the unit to the factory for repair.

3.3 Conductivity can not be calibrated.

3.3.1 Remove the orange terminal block (TB) on the back board. Install a 470 ohm resistor in place of the green and white wires. Install a 400 ohm resistor in place of the black and red wires. Refer to drawing 5103928 for parts locations.

3.3.2 Reinstall the terminal block at connector (TB).

3.3.3 Now, turn the calibrate screw on the front panel for a reading of 2.5, (2,500 μ MHOS).

3.3.4 This simulates a perfect probe, and allows you to determine if the problem is with the probe or the electronics.

3.3.5 If you are able to adjust to 2.5 and the reading is stable, the sensor is at fault.

3.3.6 If you cannot adjust the reading to 2.5, return the unit to the factory for repair.

3.4 Chemical pump not working

3.4.1 Press the FEED button on the front panel so that the MANUAL light is illuminated.

3.4.2 If the pump still fails to operate, check for 115 VAC at the CHEM terminal on the back circuit board.

3.4.3 If 115 VAC is present, check the wiring to the chemical pump outlet.

3.4.4 If the wiring is good, plug the pump into a known good outlet to determine if the pump has failed.

3.4.5 If 115 VAC is not present, check for system flow and proper operation of the flow switch.

3.4.6 If the chemical pump still fails to operate, return the unit to the factory for repair.

3.5 Nothing happens at all.

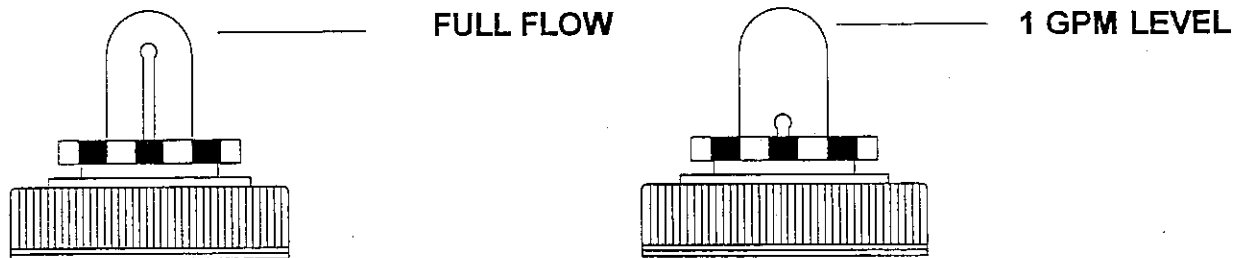
3.5.1 Is there power to the controller?

3.5.2 Is the fuse on the rear circuit board blown?

3.5.3 Is there power to the terminals on the rear circuit board?

3.6 Flow Switch

The flow switch locks out chemical feed and the blowdown valve if there is no sample line flow.



The black float rises to the top of the flow switch sight when flow is present. Only 1 GPM is needed to activate the flow switch. A reed switch assembly senses the position of the magnet and when flow is present it activates the flow switch relay.

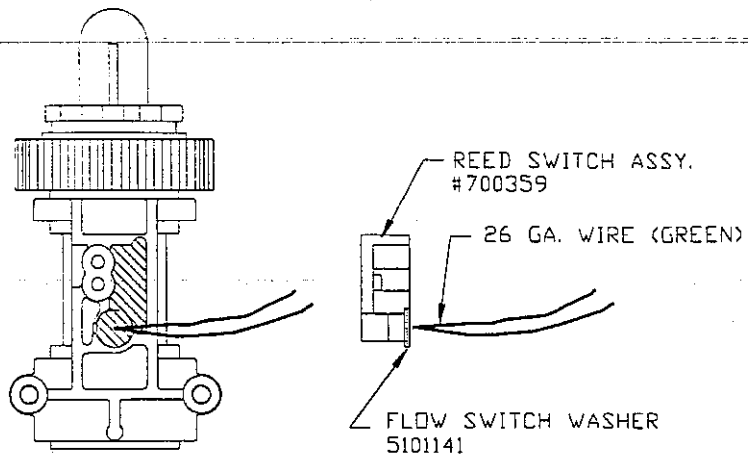
WARNING: Do NOT attempt to open the red lock ring if the system is under pressure

To clean the flow switch assembly, turn the sample flow off then turn the red lock ring counter-clockwise. Remove the float with your fingers. Use soap and water with a bottle brush to remove any residue from the float, flow sight and flow switch assembly. Clean off the "O" ring and then apply silicone base lube to keep the "O" ring moist. Make sure the red lock ring is properly secured before turning flow back on. After flow starts, check the assembly for leaks.

To replace the reed switch assembly:

INSTALL / REMOVAL PROCEDURES

- A. REMOVE 3 SCREWS HOLDING FLOW SWITCH.
- B. REMOVE SCREWS HOLDING OTHER PLUMBING COMPONENTS.
- C. PULL HARD ON THE GREEN WIRES TO REMOVE THE REED SWITCH.
- D. INSTALL AND WIRE NEW REED SWITCH.
- E. RE-INSTALL PLUMBING.



NOTE: Have Model and Serial number ready when calling for technical support, this will help us to serve you better.

4.0 CALCULATING CHEMICAL DOSAGE

For scale and/or corrosion inhibitor fed on the basis of a make up water meter with a contacting head water meter, the following data is needed:

- (GPM): Cooling water recirculation rate in GPM.
- (P): Chemical pump size available in gallons per hour maximum.
- (PPM): PPM refers to the amount of chemical drum contents desired in the cooling water. Not that this will be higher than the actual PPM of the chemical in the system because of the inert (non-active) materials in the solution.
- (GPC): Gallons per contact closure of the water meter. Choose 10, 100, 500, 1000 etc. depending on the size of the system.

$$\text{Reset timer run time setting in minutes} = \frac{(\text{GPC}) \times (\text{PPM})}{20,000 \times (\text{P})}$$

This assumes that the inhibitor weighs about 10 lbs. per gallon.

$$\text{How often the reset timer actuates} = \frac{(\text{GPC})}{(\text{GPM})}$$

The gallons per contact (GPC) can be extended with the counter. If the water meter, for example, is 10 gallons per contact and you need 100 gallons per contact, set the counter at option 10.

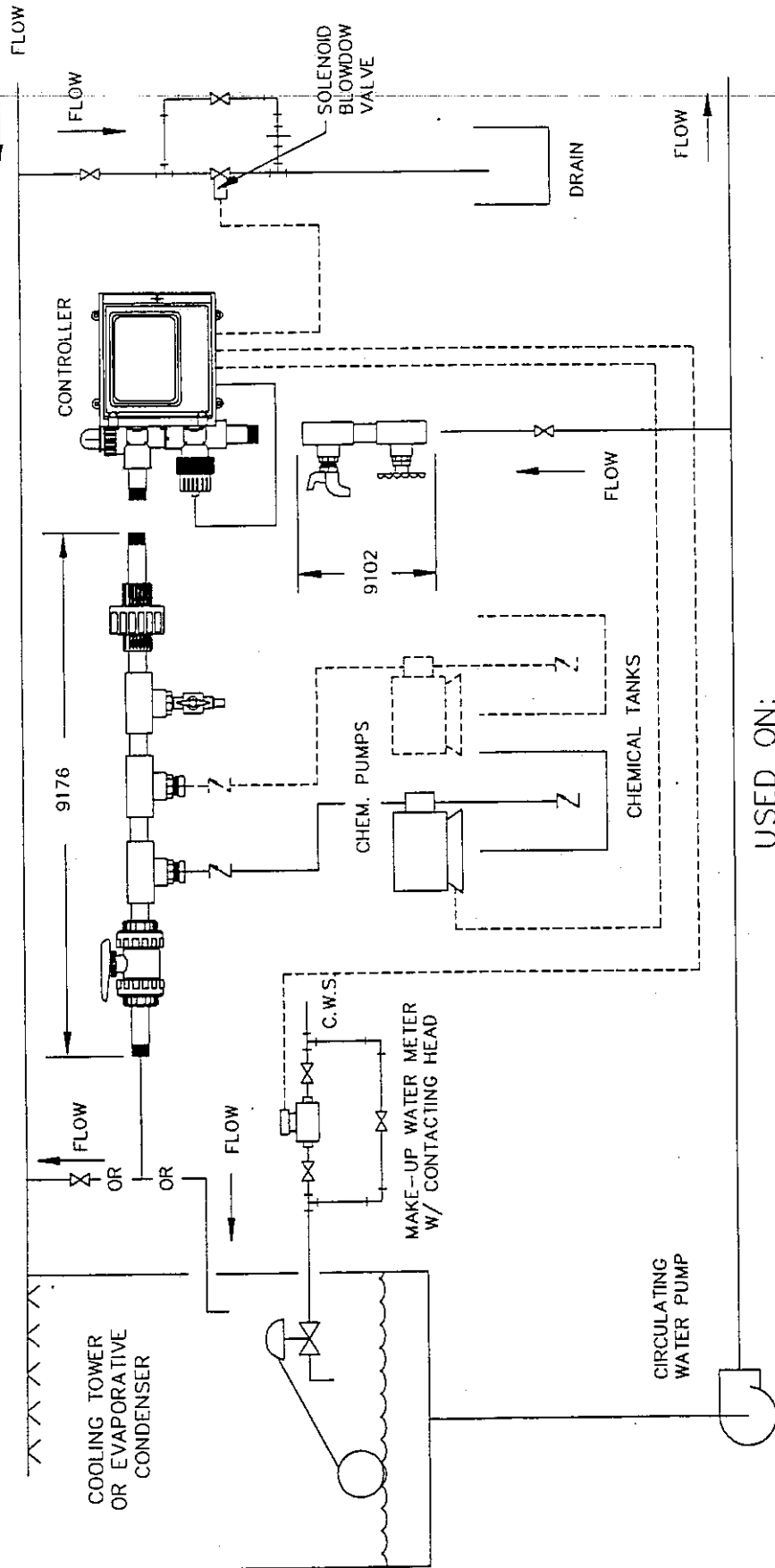
Of course, how often the reset timer actuates must be greater than the selected run time of the reset timer. If it isn't, increase the capacity of the chemical pump and shorten the run timer by a proportional amount. For example, twice the chemical pump capacity and half the run time.

5.0 REPLACEMENT PARTS LIST

<u>PART NUMBER</u>	<u>DESCRIPTION</u>
405004	Sensor O' Rings (Set of 6)
700185	Conductivity sensor
700314	Plumbing assembly including flow switch
700324A	Front panel with circuit board
700323	Rear circuit board with relays
700358	Replacement flow switch float
700359	Replacement reed switch assembly
700449	Replacement flow sight

REVISIONS

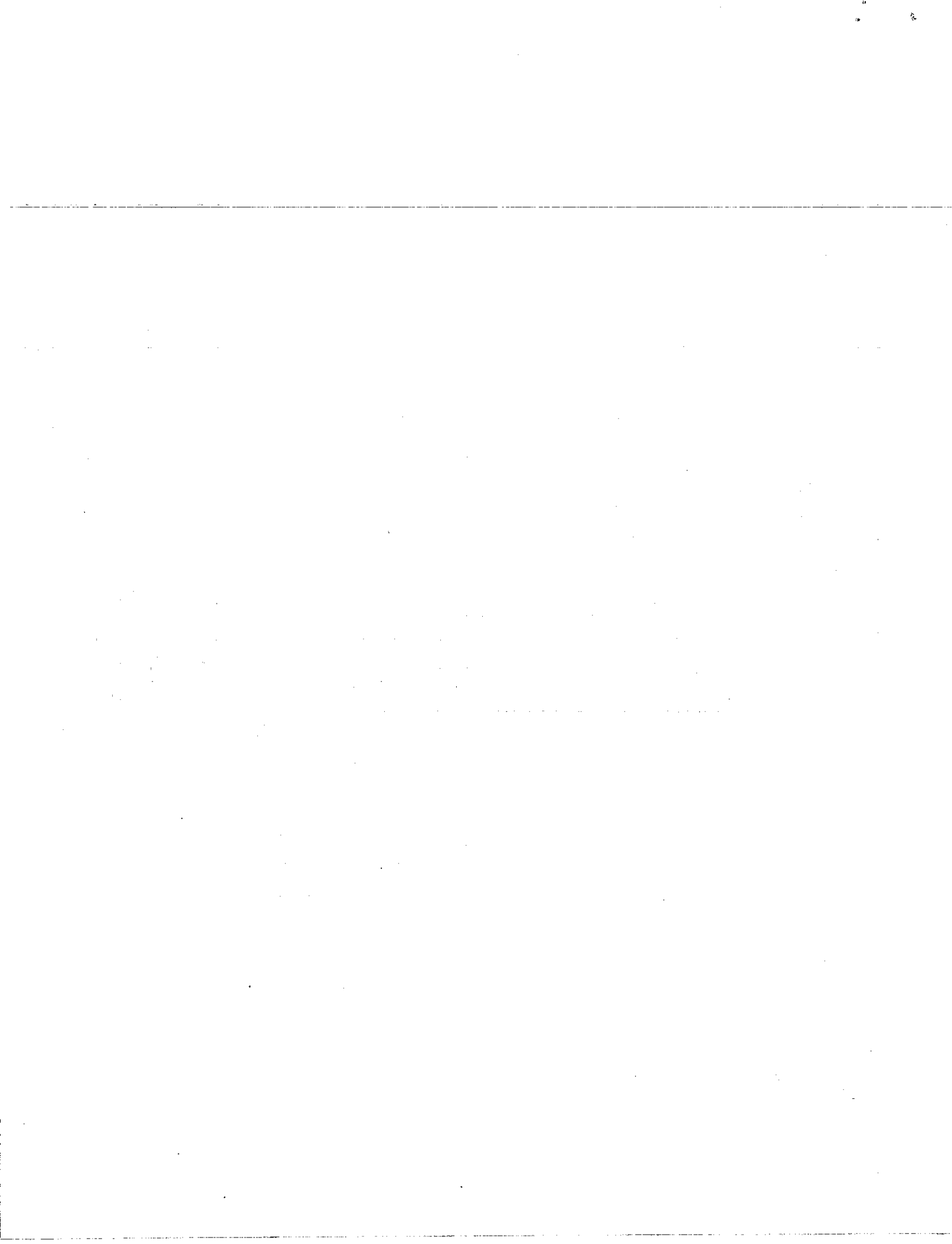
ZONE	REV	DESCRIPTION	DATE	APPROVALS
	NLW	NEW ISSUE	DH 12/90	
	NEW1	W/O 0557	MAG 5/94	



USED ON:

CONTRACT NO.	
APPROVALS	DATE
DRAWN BY: DH	12/90
CHECKED BY: <i>WPA</i>	<i>S/AY</i>
ENGR:	
DESIGN ACTIVITY:	
ACCEPTED BY:	

RECOMMENDED INSTALLATION	
COOLING TOWER CONTROL SYSTEM	
ALL MODELS EXCEPT 174	
SIZE	DRAWING NUMBER:
A	5101424
CAGE CODE:	REV
NONE	
SCALE:	MODEL NUMBER:
NONE	
SHEET 1 OF 2	

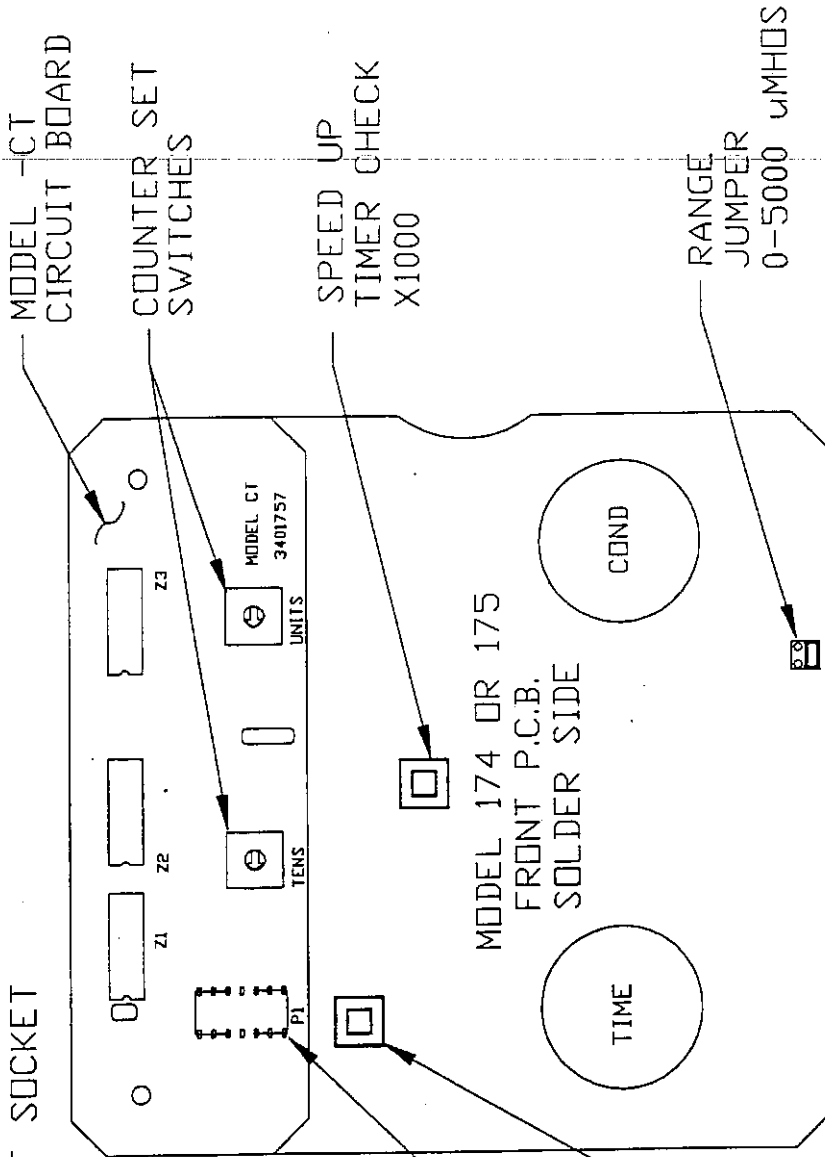


NOTES: UNLESS OTHERWISE SPECIFIED;

1. FOR 1-9 COUNT, SET TENS SWITCH TO ZERO.
2. TO INSTALL -CT OPTION IN FIELD:
 - a) REMOVE CD4001 I.C. FRONT SOCKET
 - b) INSTALL STAND OFF HARDWARE.
 - c) CAREFULLY MOUNT -CT IN SOCKET.
 - d) LOCATE AND INSTALL TWO(2) SCREWS.

16 PIN CONNECTOR TO PLUG IN FRONT BOARD CIRCUIT BOARD

WATER METER SIMULATOR BUTTON

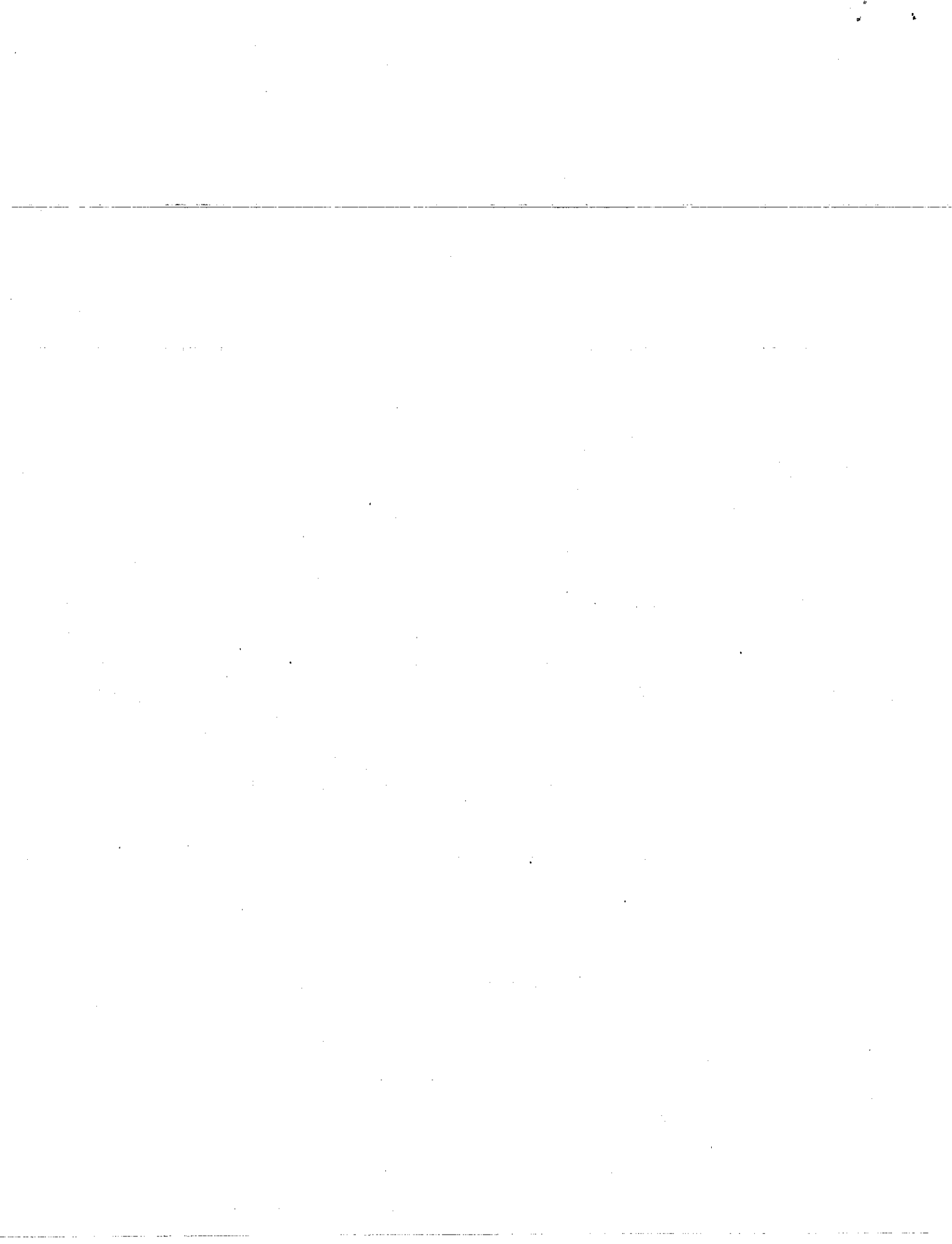


USED ON:

REVISIONS		DATE		APPROVALS	
ZONE	REV	DESCRIPTION			
	NEW	NEW ISSUE	JY 9/86		

CONTRACT NO.		APPROVALS		DATE	
		DRAWN BY: JY		9/86	
		CHECKED BY:			
		ENGR:			
		DESIGN ACTIVITY:			
		ACCEPTED BY:			

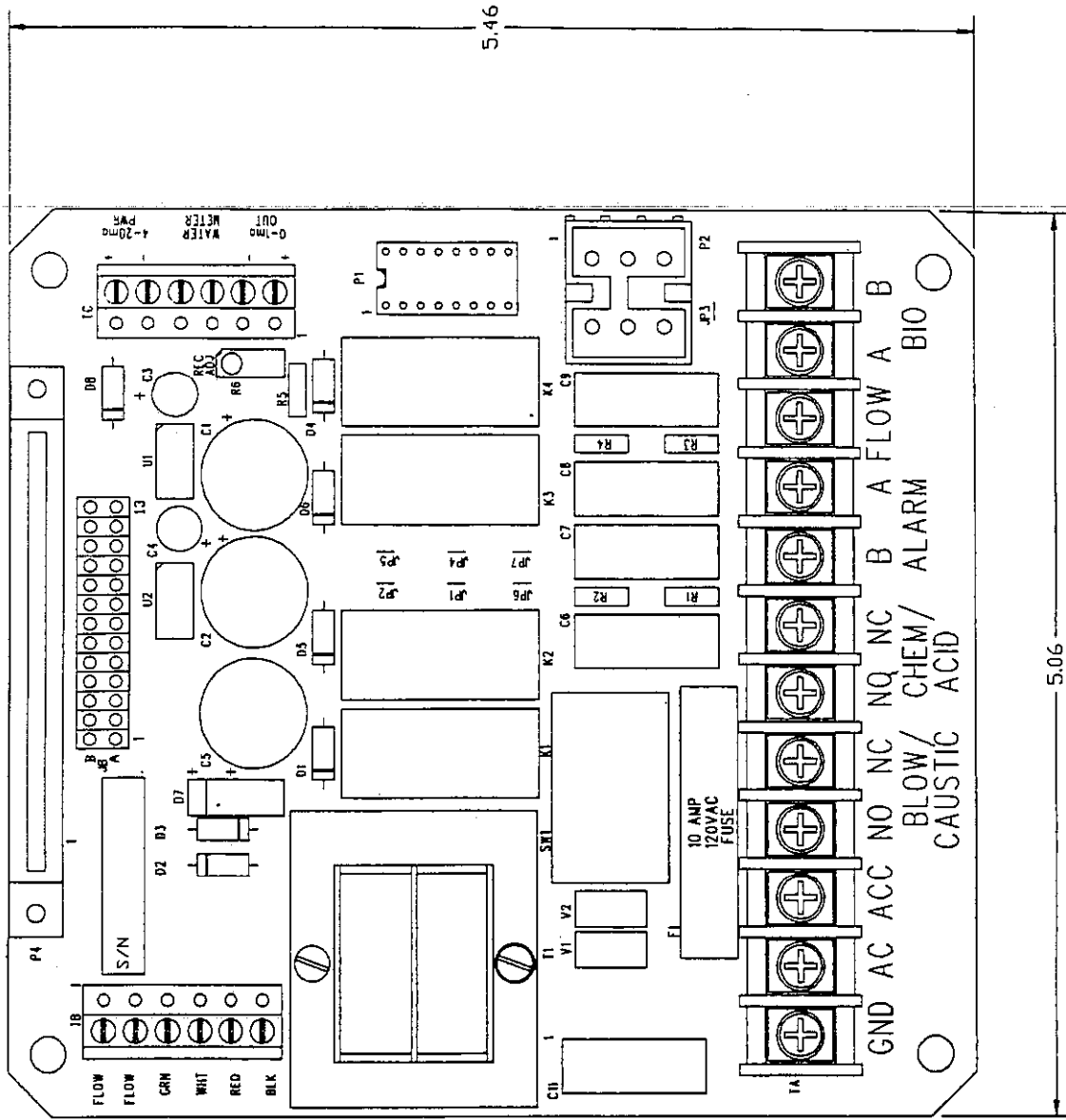
		DRAWING - ASSEMBLY			
		WATER METER PULSE COUNTER -CT OPTION			
SIZE	CAGE CODE	DRAWING NUMBER	REV.		
A		5101313			
SCALE: NONE	MODEL NUMBER: 174,175	SHEET: 1 OF 1			



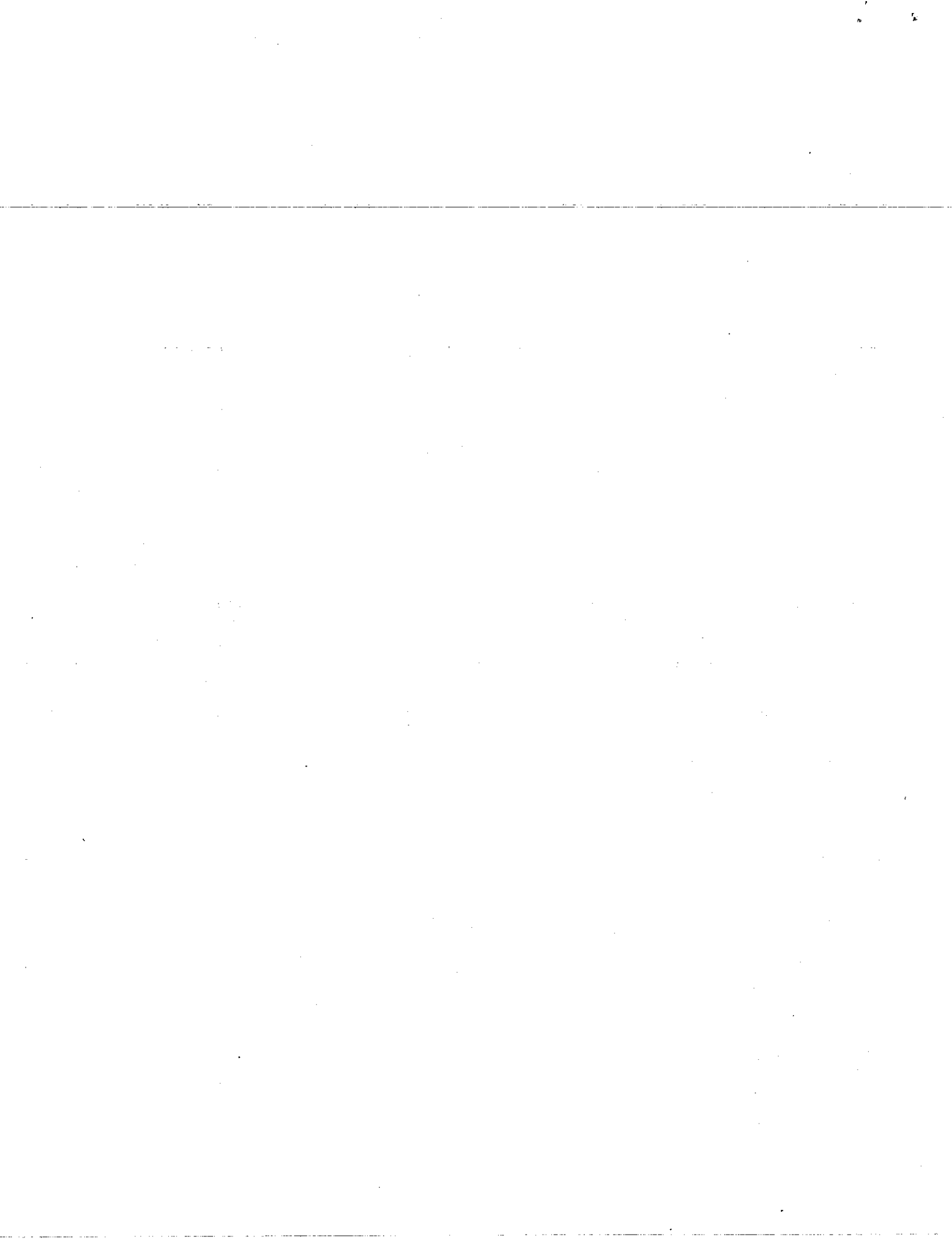
NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE SCHEMATIC DIAGRAM 6000064.
2. ASSEMBLE AND SOLDER PER LAKEWOOD SPECIFICATION.
3. OBSERVE ALL POLARITIES OF CAPACITORS, DIODES, ETC.
4. MARK ASSEMBLY NUMBER AND REVISION LETTER PER LAKEWOOD SPECIFICATION.
5. ELECTRICAL REFERENCE DESIGNATIONS ARE FOR REFERENCE ONLY AND MAY NOT APPEAR ON THE PARTS OR COMPONENTS UNLESS OTHERWISE SPECIFIED.
6. TEST AND PROCESS PER LAKEWOOD SPECIFICATION.

REVISIONS		DATE	APPROVED
ZONE	LTR	V/D	MAG
A	W/D	0436	11/93
		MAG	12/93



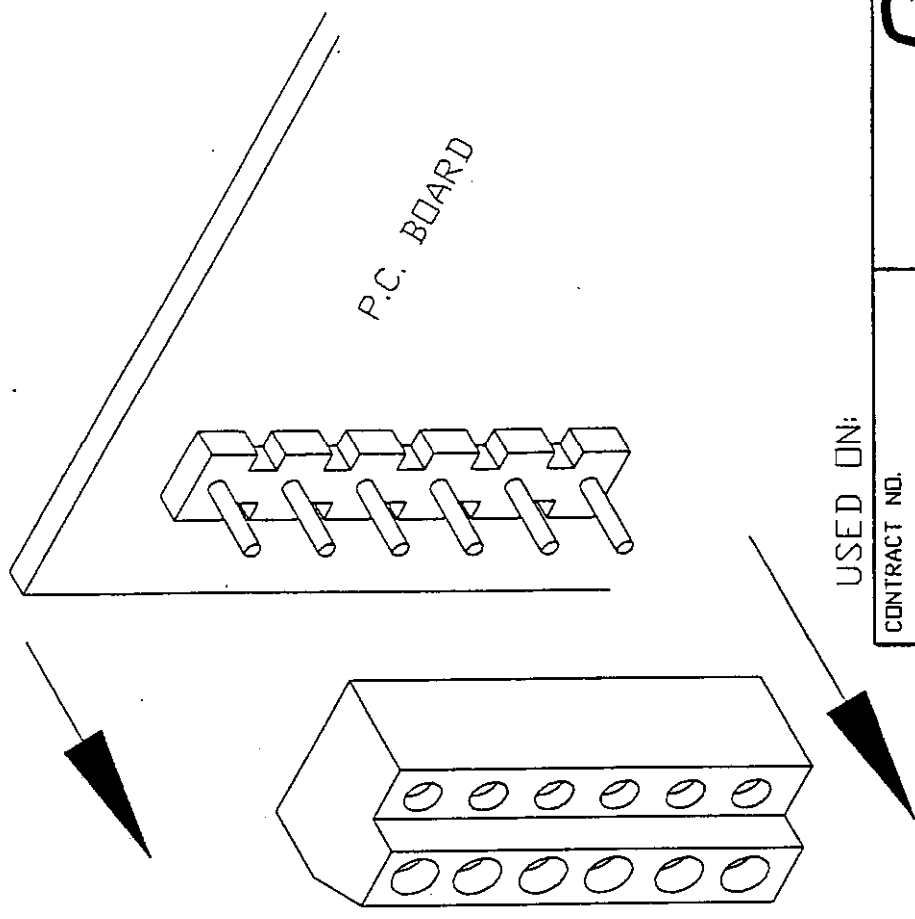
SELECTED DIMENSIONS IN INCHES TOLERANCES AND FINISHES PER MIL-STD-203B		THIRD ANGLE PROJECTION	DRAWN MAG 11/93
MATERIAL:		CHECKED:	APPROVED:
USED ON NEXT ASSY APPLICATION		SECTION ACTIVITY APPROVAL	SIZE CODE IDENT NO DVG NO
P.C.B. #3409004 REV SUB #700323 REV		DRAWING - ASSEMBLY UNIVERSAL BACK BOARD PRINTED WIRING BOARD	SCALE 2:1 I/VT.
5103791		SHEET 1 OF 1	



REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVALS
	NEW	NEW ISSUE	JY 9/86	

- NOTES: UNLESS OTHERWISE SPECIFIED;
1. PULL ON TERMINAL BLOCK WITH PLIERS FOR EASE OF WIRING.
 2. INSTALL WIRES, THEN PUSH TERMINAL BLOCK ON PIN HEADER.



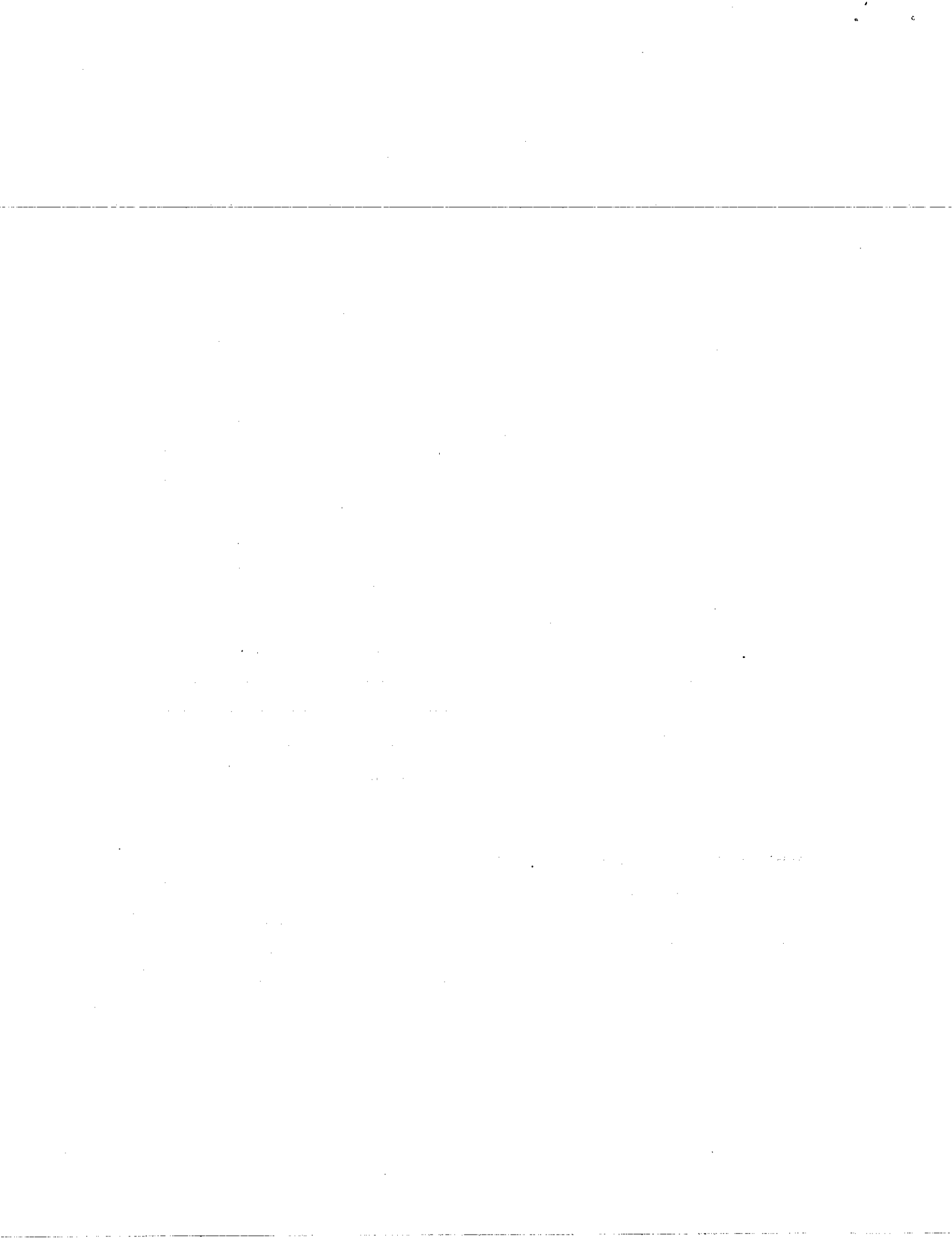
USED ON:

CONTRACT NO.	
APPROVALS	DATE
DRAWN BY: JY	9/86
CHECKED BY:	
ENGR:	
DESIGN ACTIVITY:	
ACCEPTED BY: *	



DIAGRAM - REMOVAL
TERMINAL BLOCK
P.C. BOARD

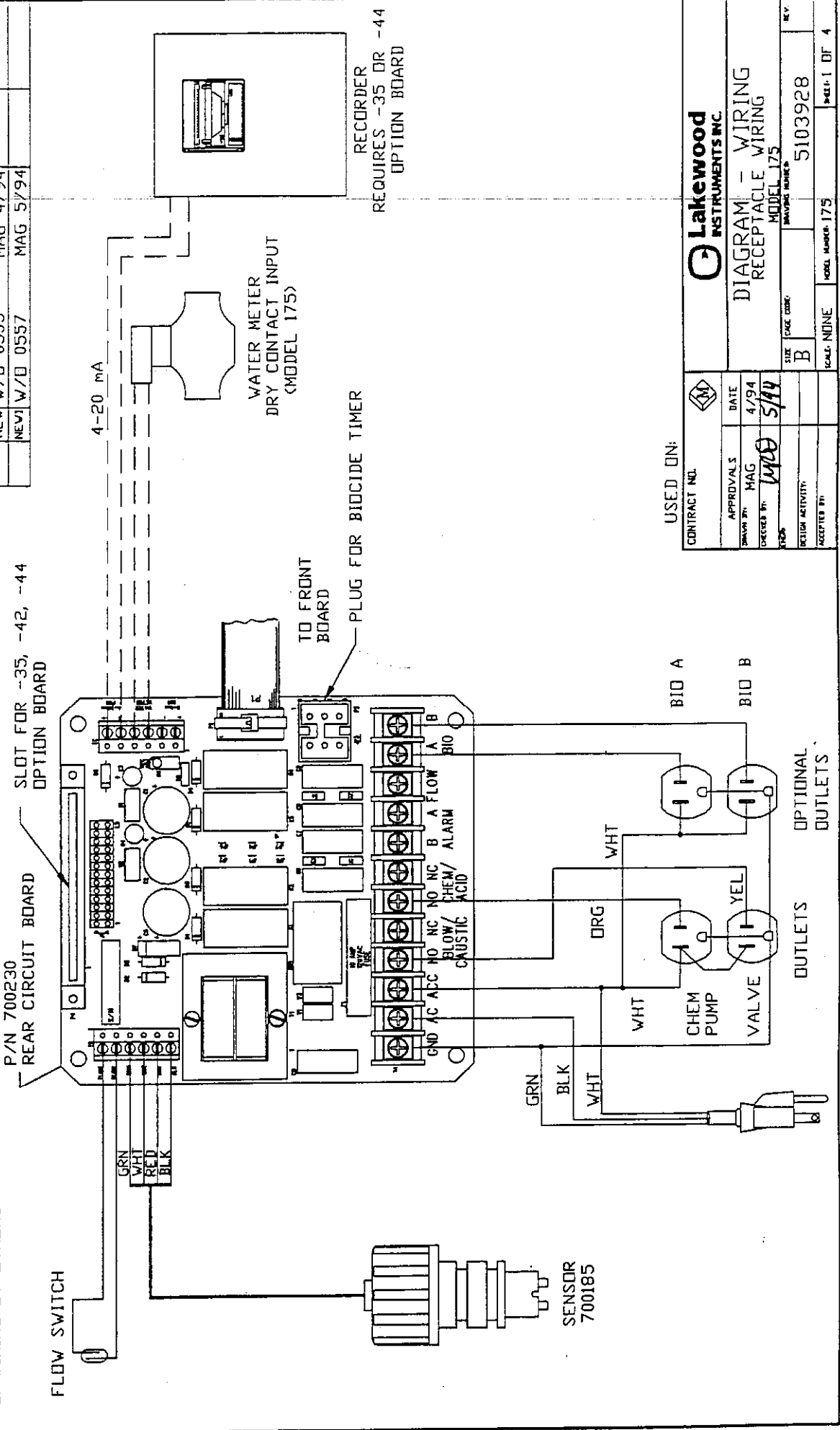
SIZE	EAGE CODE	DRAWING NUMBER	REV
A		5101519	
SCALE: NONE	MODEL NUMBER:	SHEET: 1 OF 1	



NOTES: UNLESS OTHERWISE SPECIFIED)

1. WIRING BY LAKEWOOD
2. WIRING BY OTHERS

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVALS
	NEW	W/D 0535	MAG 4/94	
	NEW	W/D 0557	MAG 5/94	



RECORDER
REQUIRES -35 DR -44
OPTION BOARD

WATER METER
DRY CONTACT INPUT
(MODEL 175)

4-20 mA

TO FRONT BOARD
PLUG FOR BIDOCIDE TIMER

SLOT FOR -35, -42, -44
OPTION BOARD

P/N 700230
REAR CIRCUIT BOARD

USED ON:

CONTRACT NO.		DATE		APPROVALS	
		4/94		MAG	
DRAWN BY: <i>MAG</i>		DATE		DATE	
CHECKED BY: <i>MAG</i>		5/94		4/94	
DESIGNER BY:		SCALE CODE		SCALE	
SECTION ACTIVITY:		B		NONE	
ACCEPTED BY:		DRAWING NUMBER		MODEL NUMBER	
		5103928		175	
		TOTAL: NONE		PAGE: 1 OF 4	



DIAGRAM - WIRING
RECEPTACLE WIRING
MODEL 175

DRAWING NUMBER		MODEL NUMBER	
5103928		175	

OPTIONAL
OUTLETS

OUTLETS

OUTLETS

OUTLETS

OUTLETS

SENSOR
700185

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

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BLK

WHT

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WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

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YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

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GRN

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RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

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BLOW/ CHEM/ ALARM
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BIO B

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BLK

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BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

BLK

WHT

GRN

WHT

RED

BLK

FLOW SWITCH

4-20 mA

TO FRONT BOARD

GND AC ACC NO NC B A FLOW A B
BLOW/ CHEM/ ALARM
CAUSTIC ACID

BIO A

BIO B

WHT

WHT

DRG

YEL

WHT

WHT

GRN

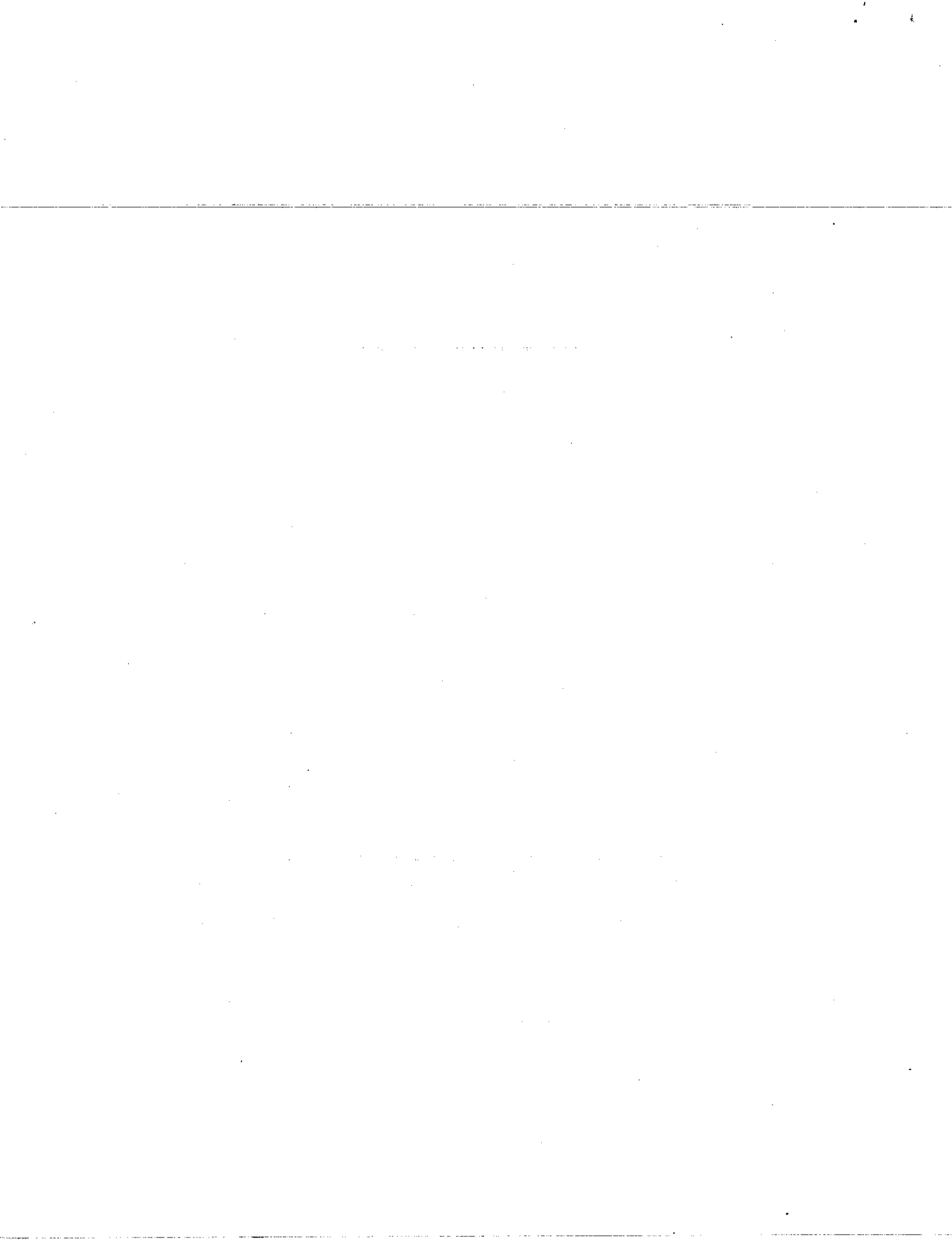
BLK

WHT

GRN

WHT

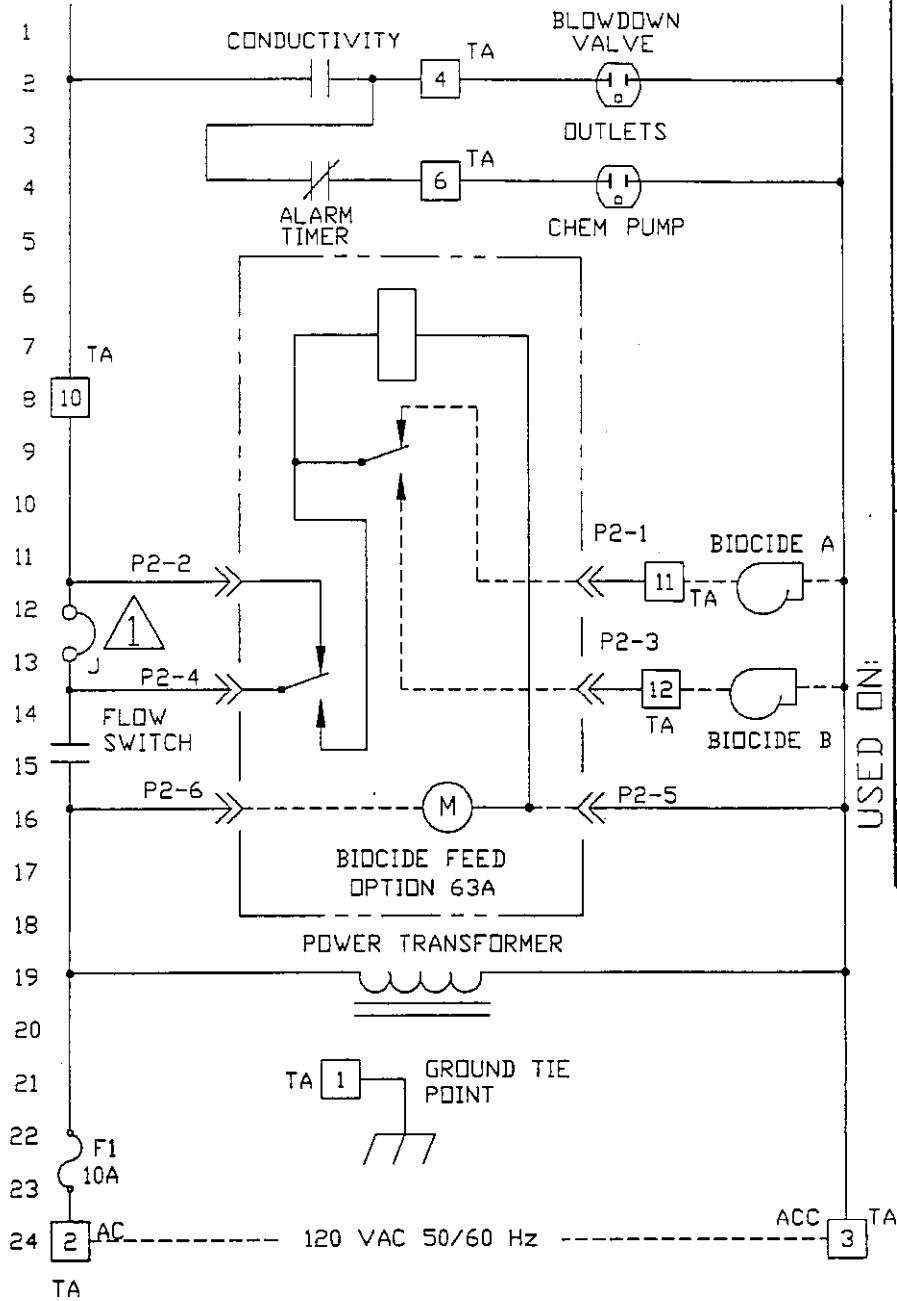
RED



NOTES: UNLESS OTHERWISE SPECIFIED;
 1 REMOVE JUMPER FOR BIOCIDES FEED.

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVALS
		NEW ISSUE	JY 9/86	
	NEW1	W/O 0540	MAG 5/94	



USED ON:

Lakewood INSTRUMENTS INC.

DIAGRAM - LADDER
 200 SERIES BACKBOARD

CONTRACT NO.	APPROVALS	DATE	REV
	DRAWN BY: JY	9/86	
	CHECKED BY:		
	ENGR: <i>[Signature]</i>	5/94	
	DESIGN ACTIVITY:		
	ACCEPTED BY: <i>[Signature]</i>	5/94	

SIZE	CAGE CODE	DRAWING NUMBER	REV
A		5101513	
SCALE	MODEL NUMBER	SHEET 1 OF 1	
NONE			

For more information call toll free in the USA (888) 321-8200

Manufactured in the USA



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