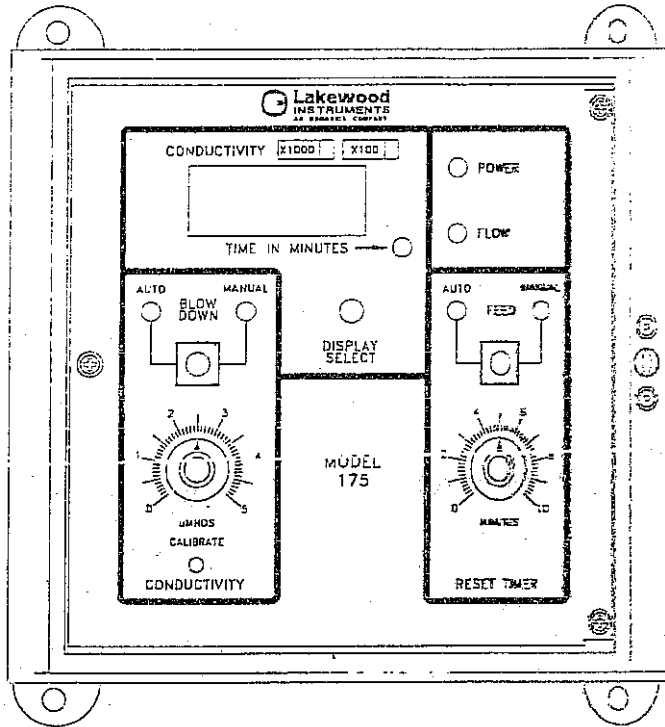


LAKEWOOD INSTRUMENTS
MODEL 174

COUNTER/TIMER

INSTALLATION & OPERATION MANUAL

SERIAL #: _____



LAKEWOOD INSTRUMENTS
7838 N. FAULKNER ROAD
MILWAUKEE, WI 53224

5730 North G
Phone: LAKEWOOD INSTRUMENTS
http:// 7838 N. FAULKNER ROAD
MILWAUKEE, WI 53224

4x (262) Milwaukee
LAKEWOOD INSTRUMENTS
7838 N. FAULKNER ROAD
MILWAUKEE, WI 53224

o s m o

3A

IMPORTANT NOTICE

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.

CAUTION: ELECTRICAL SHOCK

To reduce the risk of electrical shock, this equipment has a grounding-type plug that has a third (grounding) pin. This plug will only fit into a grounding-type outlet. If the plug does not fit into the outlet, contact a qualified electrician to install the proper outlet. ***DO NOT*** change the plug in any way.

MODEL 174

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MODEL 174 WATER METER ACTUATED CONTROLLER

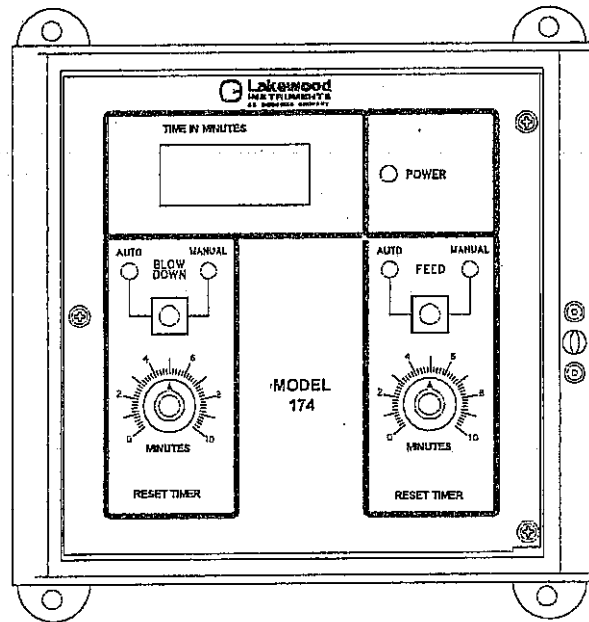


Figure 1: Dual independent adjustable timer with water meter actuated 10 minute reset timers. Includes power cord, outlets and digital display.

The Model 174 uses a contacting head water meter input and has two reset timers in one package, one for a blowdown valve and one for a chemical feed pump. Each timer is set independently, for a predetermined time, using the setpoint knobs on the front panel. Both timers start at the same time. A standard 174 will start both timers each time a pulse is received from the water meter. Voltage on the wires to the water meter will not exceed 24 VDC.

Available options are also listed following this introduction. With the -CT option you can program how many pulses you want, (up to 99) before the Model 174 will start the timers. For example, if the water meter sees 10 gallons per contact and you want 100 gallons to pass before enabling the timers, you should set the counter option at 10.

The elapsed time is shown on the LCD display and continues until both timers have reached their setpoints. Then both timers automatically reset and the display will read 0.0 minutes. Caution should be taken not to overlap pulses with elapsed time. Overlapping occurs when the required number of pulses have come in from the water meter before both timers have timed out. If this occurs, simply increase the capacity of the chemical pump and shorten the run timer by a proportional amount.

Note that any controller-initiated changes to the cooling tower system operation requires several hours for the system to stabilize at the new value. Once you get a starting point, however, 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.

Front Panel Description

- **DISPLAY** Displays the elapsed time in minutes.
 - **POWER** 115 VAC power light to the instrument.
 - **BLOWDOWN AUTO** Reset timer control for blowdown.
 - **BLOWDOWN MANUAL** Blowdown valve ON.
 - **FEED AUTO** Reset timer control for chemical pump.
 - **FEED MANUAL** Chemical pump ON.
 - **MINUTES SETPOINT** Sets operate time for blowdown and chemical feed.
-

Specifications

Inputs		Controller	
Power	120 VAC	Counts to bleed/feed	1 Standard; 1-99 w/-CT Option
Water Meter Input	120/240 VAC w/-WP	Feed Timer	0-10 minutes
Outputs	Contacting head only.	Ambient Temperature	32-158°F (0-70°C)
Relays	3 Amps @ 120 VAC	Electrical Rating	UL Listed
0-1 mA	non isolated	Enclosure Rating	ABS Plastic NEMA-4X Optional

Ordering Information

174 Dual independent adjustable timer with 2 water meter actuated 10-minute reset timers and digital display.

ENCLOSURE OPTIONS (optional)

-WP Watertight enclosure with 120/240 VAC 50/60 Hz power switch. Half inch conduit knockouts. No outlets or power cord.

CONTROLLER OPTIONS (optional)

-CT Water meter impulse counter 1-99 water meter counts.

INSTALLATION

Checking

- Inspect the shipping carton for any obvious external damage. Note on the carrier's Bill of Lading the extent of the damage and/or notify the carrier.
- Save the shipping carton until the controller is started up. If there was shipping damage, return the controller to the factory in the original carton (refer to the Technical Service/Return Material Procedure section for more information).

Mounting

- Mount the controller or prefabricated system on a FLAT, NON-VIBRATING wall.
- Avoid drilling or punching additional holes in the controller enclosure. Stray metal chips can ruin the circuit board components.
- Use #6 or #8 bolts/screws/studs.
- Do not over-tighten. Snug is enough.

CAUTION: THE UNIT SHOULD NOT BE MOUNTED IN DIRECT SUNLIGHT. EXCESSIVE HEAT AND DIRECT SUNLIGHT EXPOSURE WILL EVENTUALLY DARKEN THE LCD MAKING IT IMPOSSIBLE TO READ. IT MAY ALSO SHORTEN THE LIFE OF OTHER ELECTRICAL COMPONENTS.

Outline and Dimensions

NOTES:

1. INSTALL ON SMOOTH SURFACE TO PREVENT STRESS ON MOUNTING FEET.
2. DO NOT INSTALL ON VIBRATING WALL.
3. IF ENCLOSURE IS INSTALLED IN CORROSIVE ENVIRONMENTS, CONSIDER AIR PURGING
4. MATERIAL: BEZEL-ABS, BODY-PVC

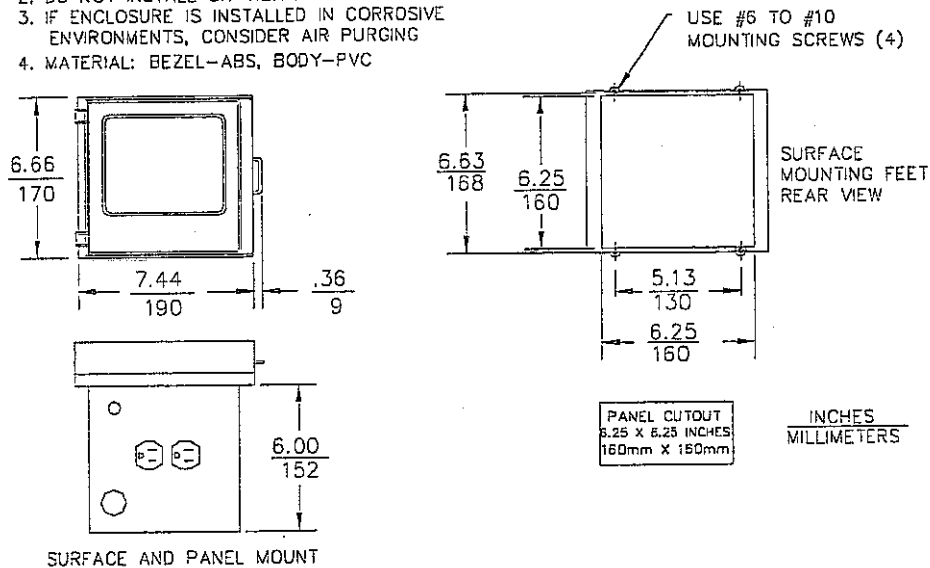


Figure 2: Model 174 Enclosure Dimensions

SETUP AND CALIBRATION

Start Up

- 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.
- See DWG #5101439 in the back of this manual.

Setpoints

- Set the BLOWDOWN and FEED TIMER setpoint knobs to the desired starting points. If unsure, set the BLOWDOWN and FEED TIMER setpoints for one minute.
- Set the chemical pump output to 20%. This is just a starting point.
- Allow the system to stabilize for a day. Any changes to the cooling tower system operation requires several hours for the system to stabilize at new values.
- Check the chemical residual and conductivity of the tower. Adjust accordingly. 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.

-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 represents UNITS.
- See DWG #5101515 for locations of these switches.

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 timers.
- See DWG #5101515 for locations of this button.

Speed Up Timer Button

- A speed up button, increases the reset timer speed by 1,000 for testing.
- See DWG #5101515 for locations of this button.

Calibration

No calibration is required for this device.

Calculating Chemical Dosages

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

NOTE: THE FOLLOWING EQUATIONS ASSUME THAT THE INHIBITOR WEIGHS ABOUT 10 LB. PER GALLON.

1. Cooling water recirculation rate in Gallons Per Minutes (GPM).
2. Chemical pump size available in gallons per hour maximum (P).
3. Parts Per Million (PPM) required of the chemical drum contents desired in the cooling water. Note 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.
4. Gallons per contact closure of the water meter. Choose 10, 100, 500, 1000, etc., depending upon the size of the system (GPC).
5. Desired cycles of concentration, often three. (C).
6. Number of gallons of make up water necessary to trigger the reset timers (MUGAL or Make Up Gallons).

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

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

$$\text{Make up} = \frac{\text{GPM} \times (.01) \times \text{C}}{\text{C}-1}$$



$$\text{Minutes of make up to reach MUGAL} = \frac{\text{MUGAL}}{\text{Make up}}$$

$$\text{Blowdown rate required} = \frac{\text{Make up}}{\text{C}}$$

$$\text{Set blowdown time to} = \frac{\text{Minutes of time to reach MUGAL}}{\text{C}}$$

MAINTENANCE AND TECHNICAL SERVICE

Technical Service/Return Material Procedure

-  Technical Support for Lakewood Instruments can be reached by calling ~~(602) 931-7337~~ or faxing ~~(602) 931-7727~~, Monday through Friday, 7:00 a.m. - 4:30 p.m. MST.
800-228-0839
-  Mail and returns should be sent to:

LAKWOOD INSTRUMENTS
7838 N. FAULKNER ROAD
MILWAUKEE, WI 53224
~~4727 W. WILSON AVENUE
PHOENIX, AZ 85304-8100 USA~~

When any merchandise is returned to the factory, please call and obtain a return material order (RMO) number and have the following information available:

- Customer's name, address, phone and fax numbers (shipping and billing).
- A hard copy purchase order number (no exceptions) for cases where repairs or parts are required that are not under warranty.
- A contact person's name and phone number to call if the equipment is beyond repair or to discuss any other warranty matter.
- Equipment model and serial numbers.
- Reason for return, e.g., repair, warranty, incorrect part, etc.

We will then fax to your attention an RMO form that must accompany the returned item.

NOTE: THE RMO NUMBER MUST BE CLEARLY WRITTEN ON THE OUTSIDE OF THE PACKAGE(S) BEING RETURNED.

**ANY ITEMS SENT BACK TO THE FACTORY
WITHOUT AN RMO NUMBER WILL BE REFUSED
AND RETURNED TO SENDER**

Troubleshooting

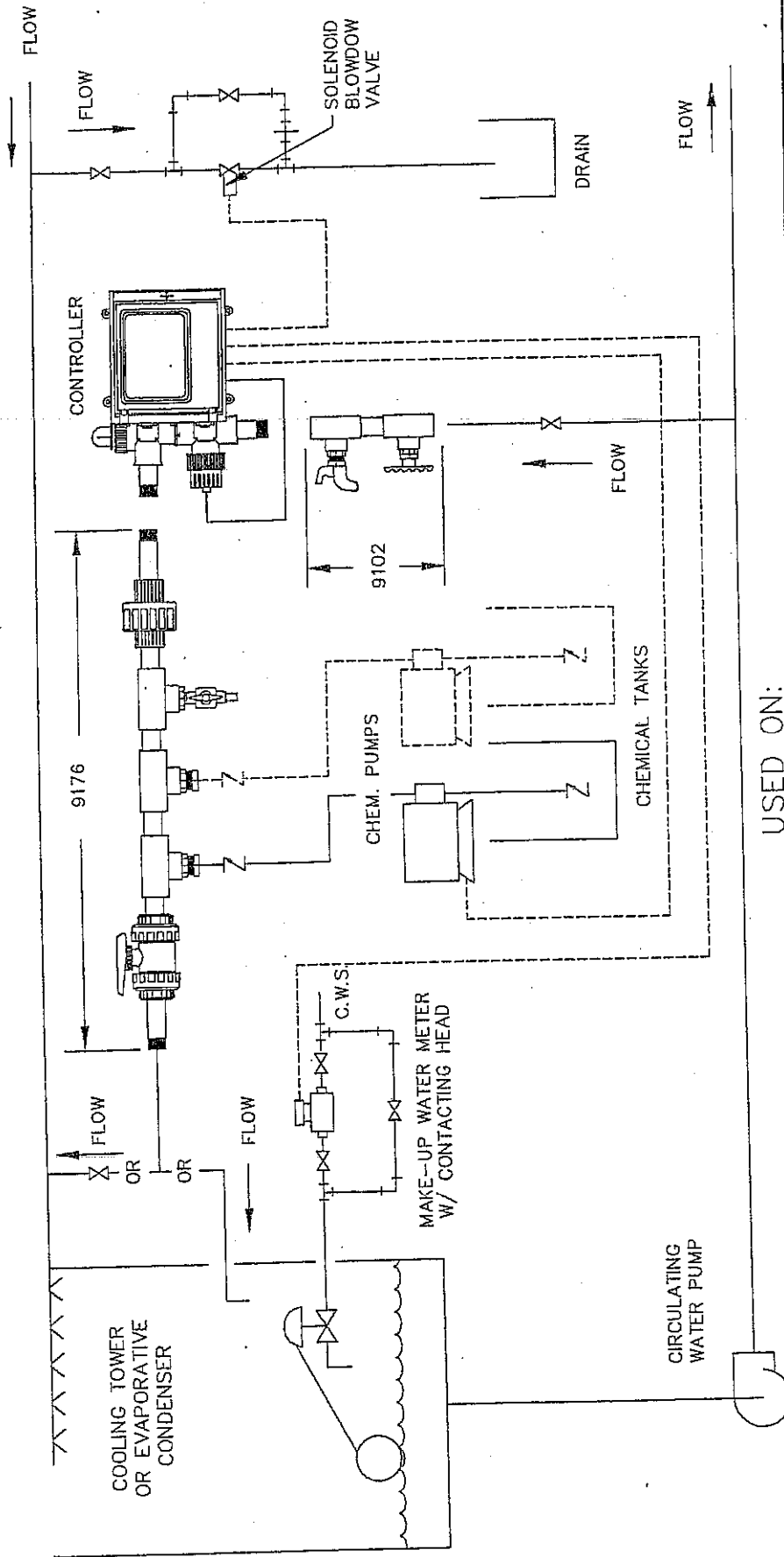
PROBLEM	WHAT THIS MEANS	CORRECTIVE ACTION
<p>Water meter doesn't start reset timers.</p>	<p>Problem may be with either the wiring to the instrument or the water meter switch.</p>	<ol style="list-style-type: none"> 1. Press the water meter simulator button to check the instrument. Refer to DWG #5101515 for component location. 2. If reset timer starts, check wiring to the water meter. Check water meter switch closure with a continuity tester. 3. If reset timer still doesn't start, make sure the timers are set off of zero. Check the counter for zero, tens, and one unit counts. Remove orange terminal block from connector TC and try the simulator button again. 4. If timer still doesn't start, return front panel for repair.
<p>Timer works OK but chemical residual is too low.</p>	<p>Overlapping of water meter pulses and elapsed time has occurred.</p>	<ol style="list-style-type: none"> 1. Increase the chemical pump output. 2. Increase the reset timer time.
<p>Nothing happens at all. Controller doesn't turn ON.</p>	<p>Power is not reaching the controller.</p>	<ol style="list-style-type: none"> 1. Is there power to the controller? 2. Is the fuse on the rear circuit board blown? 3. Is there power to the terminals on the rear circuit board?

Replacement Parts

<u>Part Number</u>	<u>Description</u>
700318	Front circuit board and Panel
700323	Rear circuit board with relays
-CT	Water meter impulse counter

REVISIONS

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

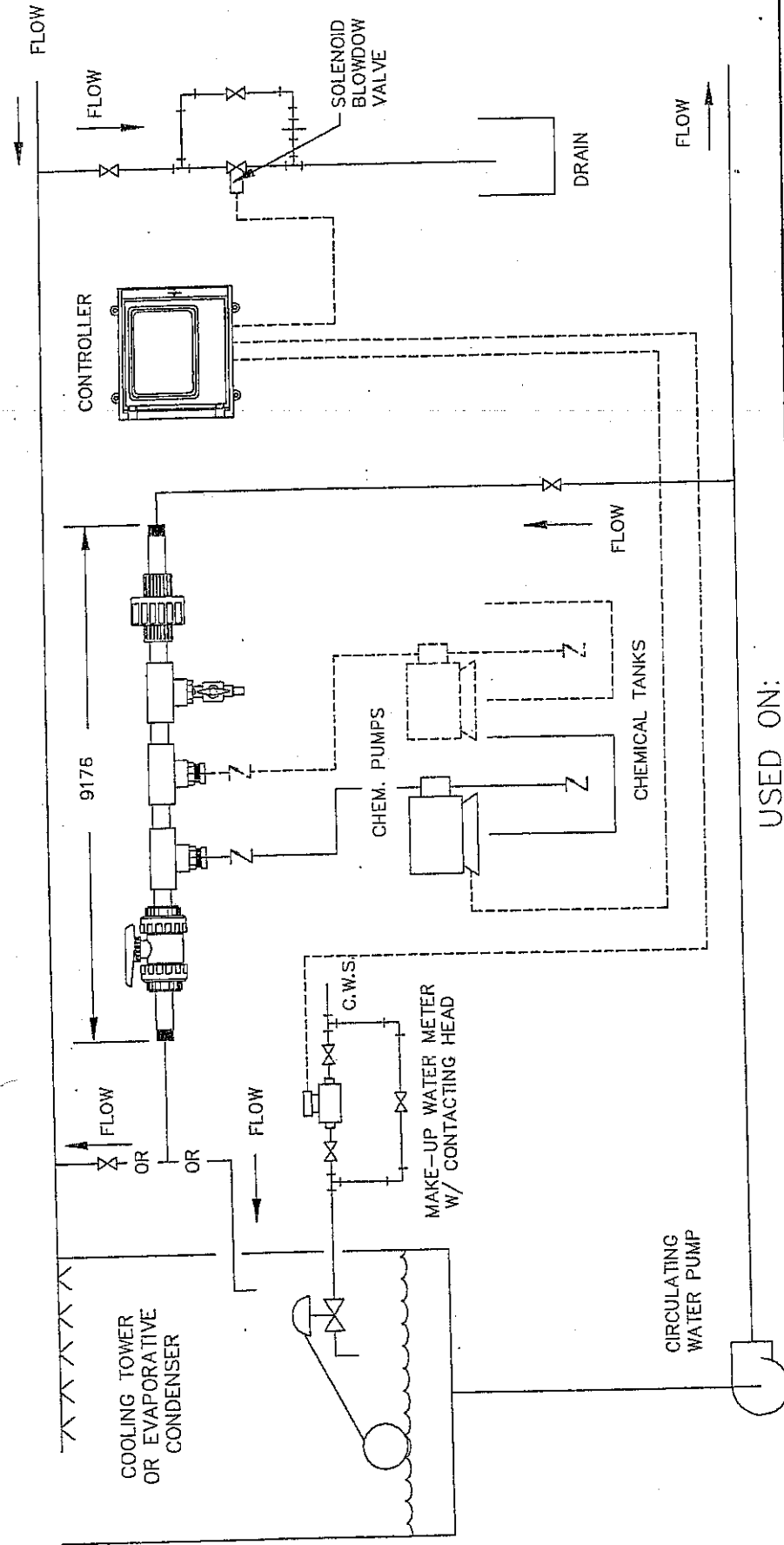


USED ON:


		RECOMMENDED INSTALLATION COOLING TOWER CONTROL SYSTEM ALL MODELS EXCEPT 174	
		CONTRACT NO.	DATE 12/90
APPROVALS DRAWN BY: DH	CHECKED BY: <i>WJD</i>	ENGR:	DESIGN ACTIVITY:
ACCEPTED BY:	SIZE A	CAGE CODE:	DRAWING NUMBER: 5101424
SCALE: NONE	MODEL NUMBER:	SHEET: 1 OF 2	REV.

REVISIONS

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



USED ON:

CONTRACT NO. 

APPROVALS	DATE
DH	12/90
CHECKED BY: <i>JMB</i>	5/94
ENGR:	
DESIGN ACTIVITY:	
ACCEPTED BY:	



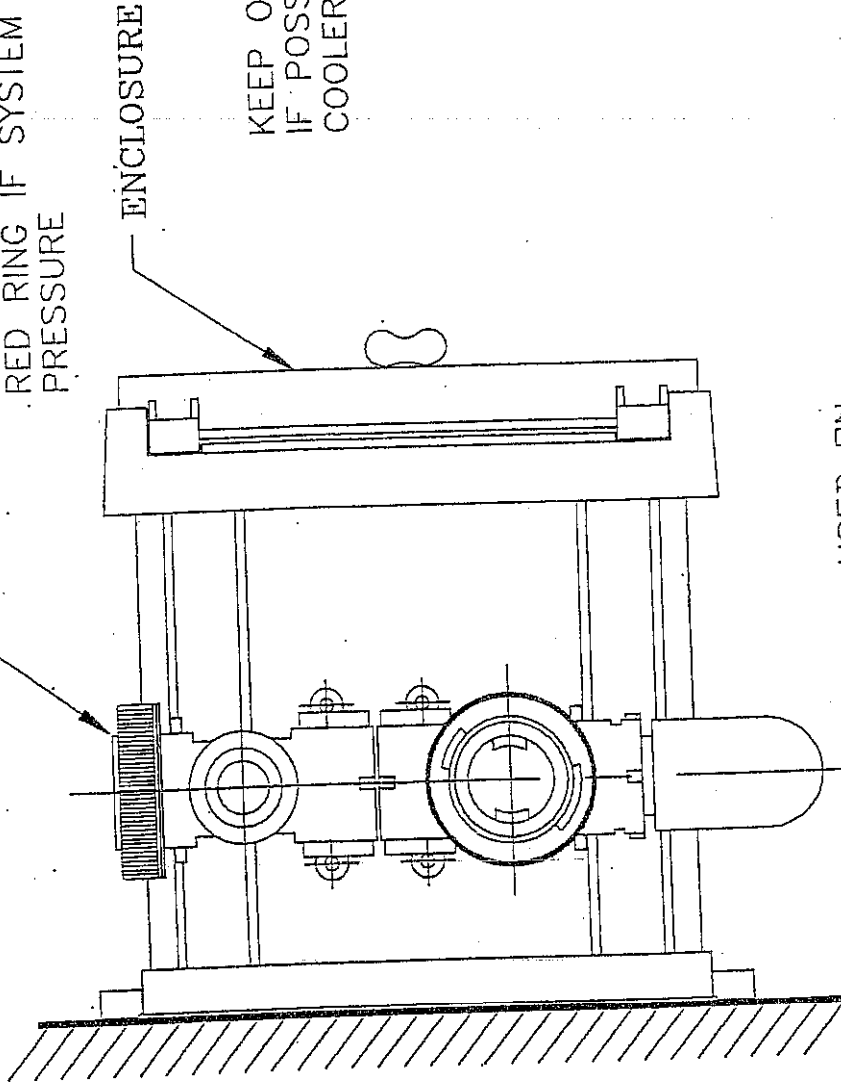
RECOMMENDED INSTALLATION
COOLING TOWER CONTROL SYSTEM

SIZE	CAGE CODE:	DRAWING NUMBER:	REV.
A		5101424	
SCALE:	NONE	MODEL NUMBER: 174 ONLY	SHEET: 2 OF 2

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVALS
	NEW	NEW ISSUE	JY 6/86	

CAUTION: DO NOT ATTEMPT TO OPEN
RED RING IF SYSTEM IS UNDER
PRESSURE



ENCLOSURE

KEEP OUT OF DIRECT SUNLIGHT
IF POSSIBLE. CONTROLLER RUNS
COOLER IN THE SHADE

USED ON:

CONTRACT NO.	
APPROVALS	DATE
DRAWN BY: JY	6/86
CHECKED BY:	
ENGR.	
DESIGN ACTIVITY	

1. INSTALL ON AN EVEN VIBRATION FREE SURFACE.
2. USE #6 OR #8 BOLTS/SCREWS STUDS.
3. DO NOT OVER TIGHTEN. SNUG IS ENOUGH.



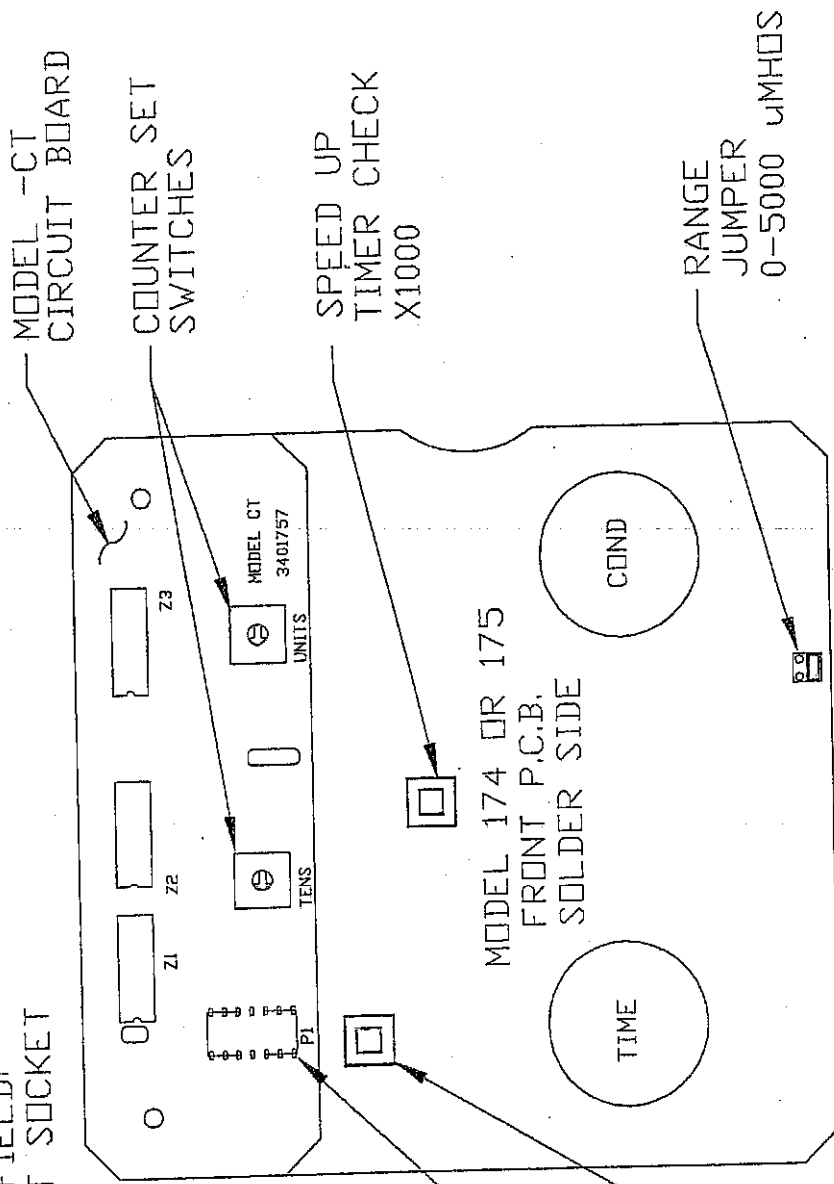
DIAGRAM - INSTALLATION
INSTALLATION NOTES

SIZE	CASE CODE	DRAWING NUMBER	REV.
A		5101439	

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

16 PIN CONNECTOR TO PLUG IN FRONT BOARD CIRCUIT BOARD

WATER METER SIMULATOR BUTTON



REVISIONS

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

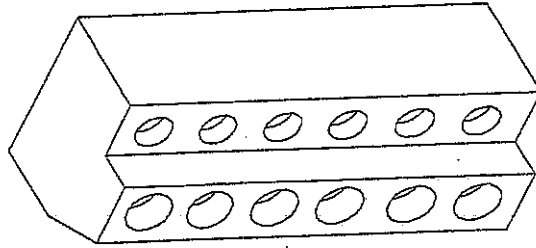
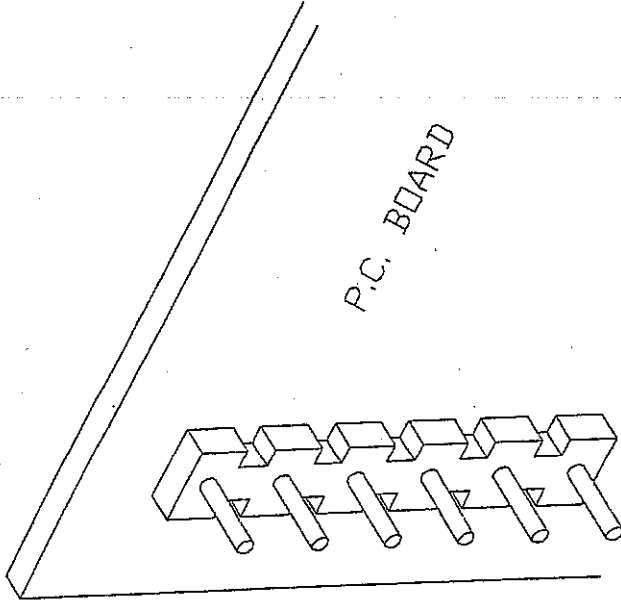
USED ON:

CONTRACT NO.		Lakewood INSTRUMENTS INC.	
APPROVALS	DATE	DRAWING - ASSEMBLY	
DRAWN BY: JY	9/86	WATER METER PULSE COUNTER	
CHECKED BY: <i>[Signature]</i>	5/94	-CT OPTION	
ENGR:		SIZE	DRAWING NUMBER
DESIGN ACTIVITY:		A	5101515
ACCEPTED BY:		SCALE: NONE	MODEL NUMBER: 174,175
			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.



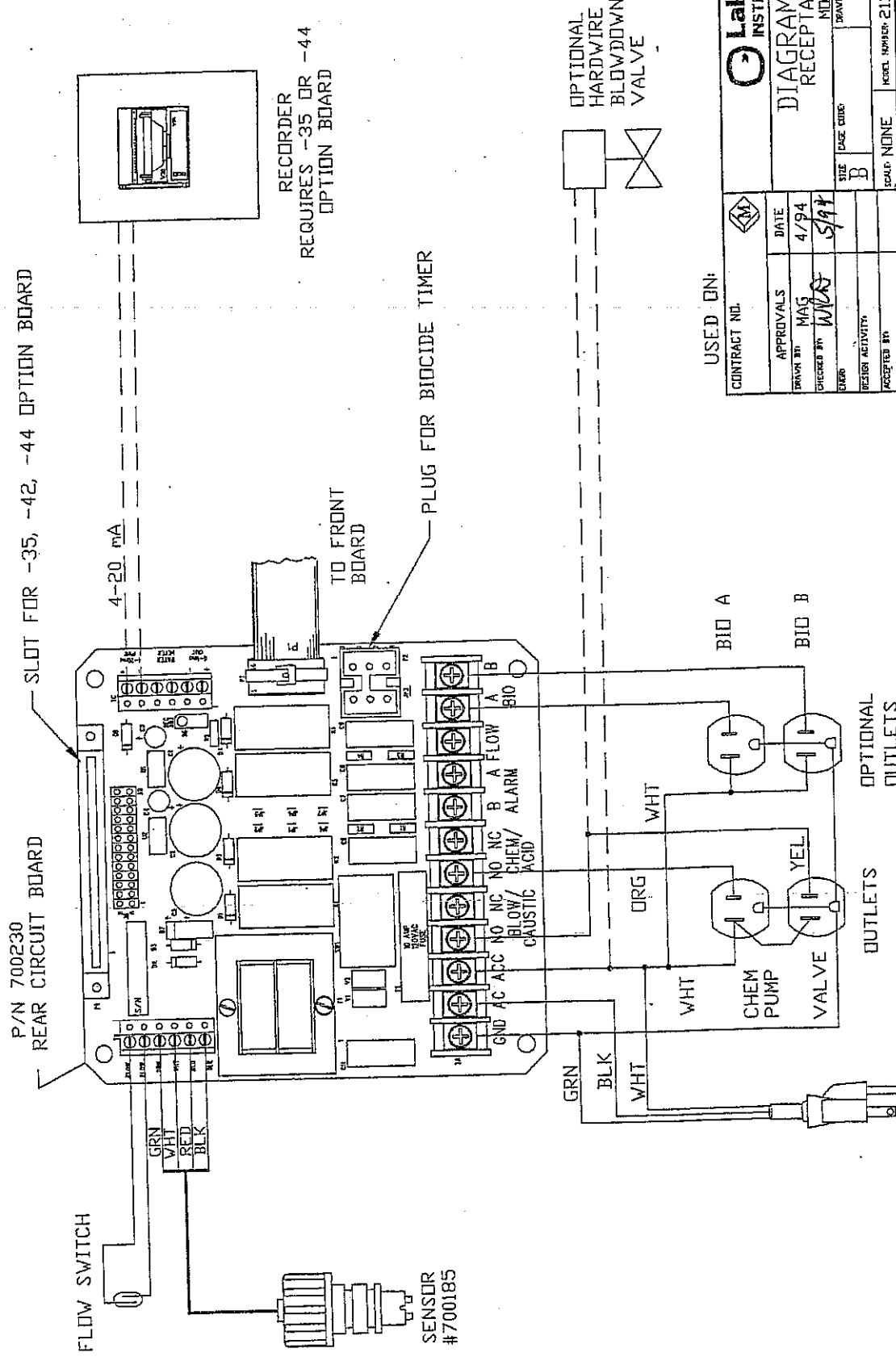
USED ON:

CONTRACT NO.		Lakewood INSTRUMENTS INC.	
APPROVALS	DATE	DIAGRAM - REMOVAL	
JY	9/86	TERMINAL BLOCK	
CHECKED BY:		P.C. BOARD	
ENGR:		SIZE	DRAWING NUMBER
DESIGN ACTIVITY:		A	5101519
ACCEPTED BY:		SCALE	REV.
		NONE	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	



USED ON:

CONTRACT NO.	DATE
APPROVALS	DATE
DRAWN BY	DATE
DESIGNED BY	DATE
REVISOR	REVISION
REVISION ACTIVITY	DATE
ACCEPTED BY	DATE



DIAGRAM - WIRING
RECEPTACLE WIRING
MODEL 211

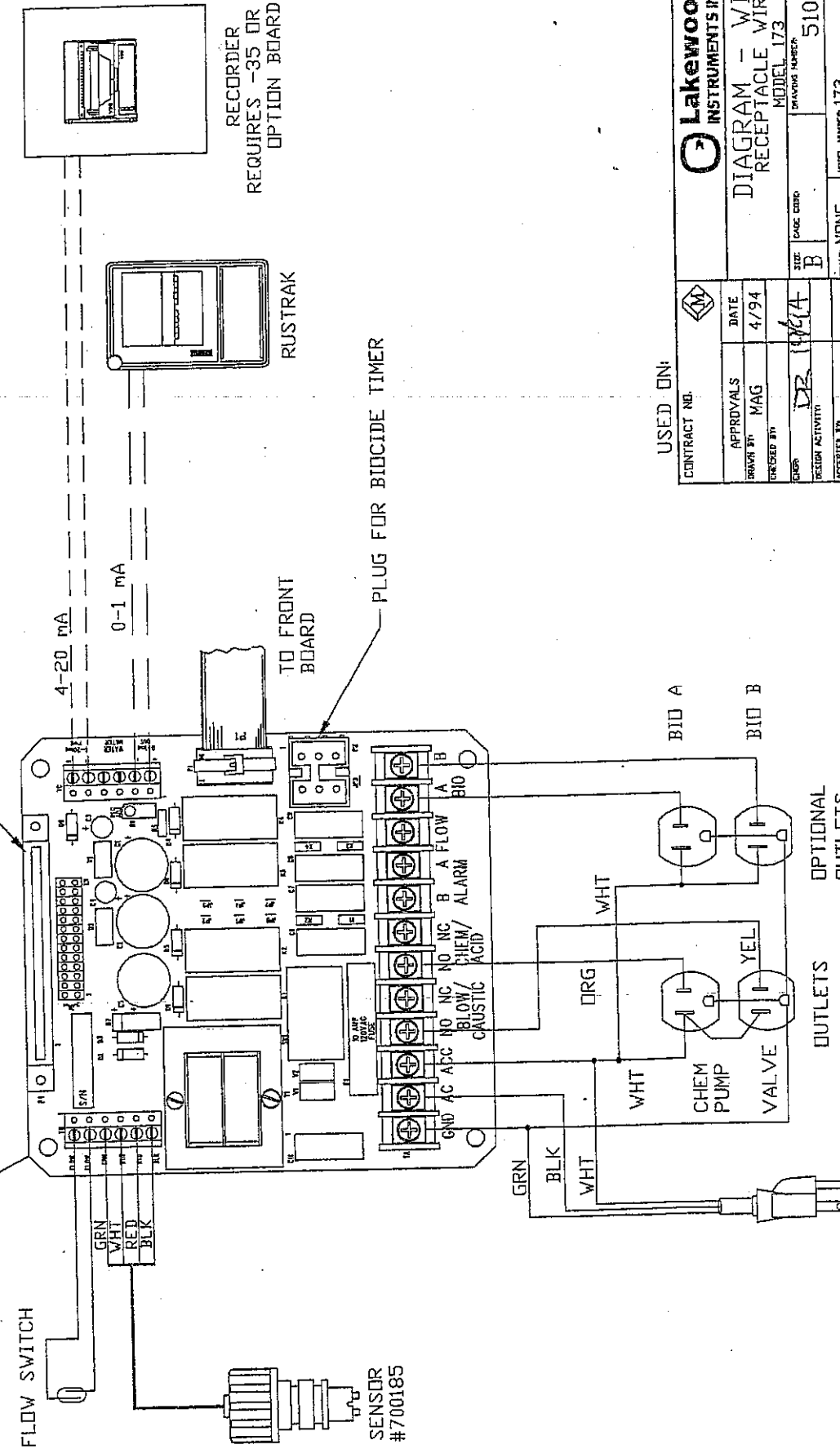
SIZE	CASE CODE	DRAWING NUMBER	REV.
B		5103928	
SOLD NONE		MODEL NUMBER 211	SHEET 4 OF 4

NOTES: UNLESS OTHERWISE SPECIFIED)

1. WIRING BY LAKEWOOD
2. WIRING BY OTHERS

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

P/N 700230 REAR CIRCUIT BOARD
 SLOT FOR -35, -42, -44 OPTION BOARD



RECORDER
 REQUIRES -35 OR -44
 OPTION BOARD

RUSTRAK

PLUG FOR BIOCIDIE TIMER

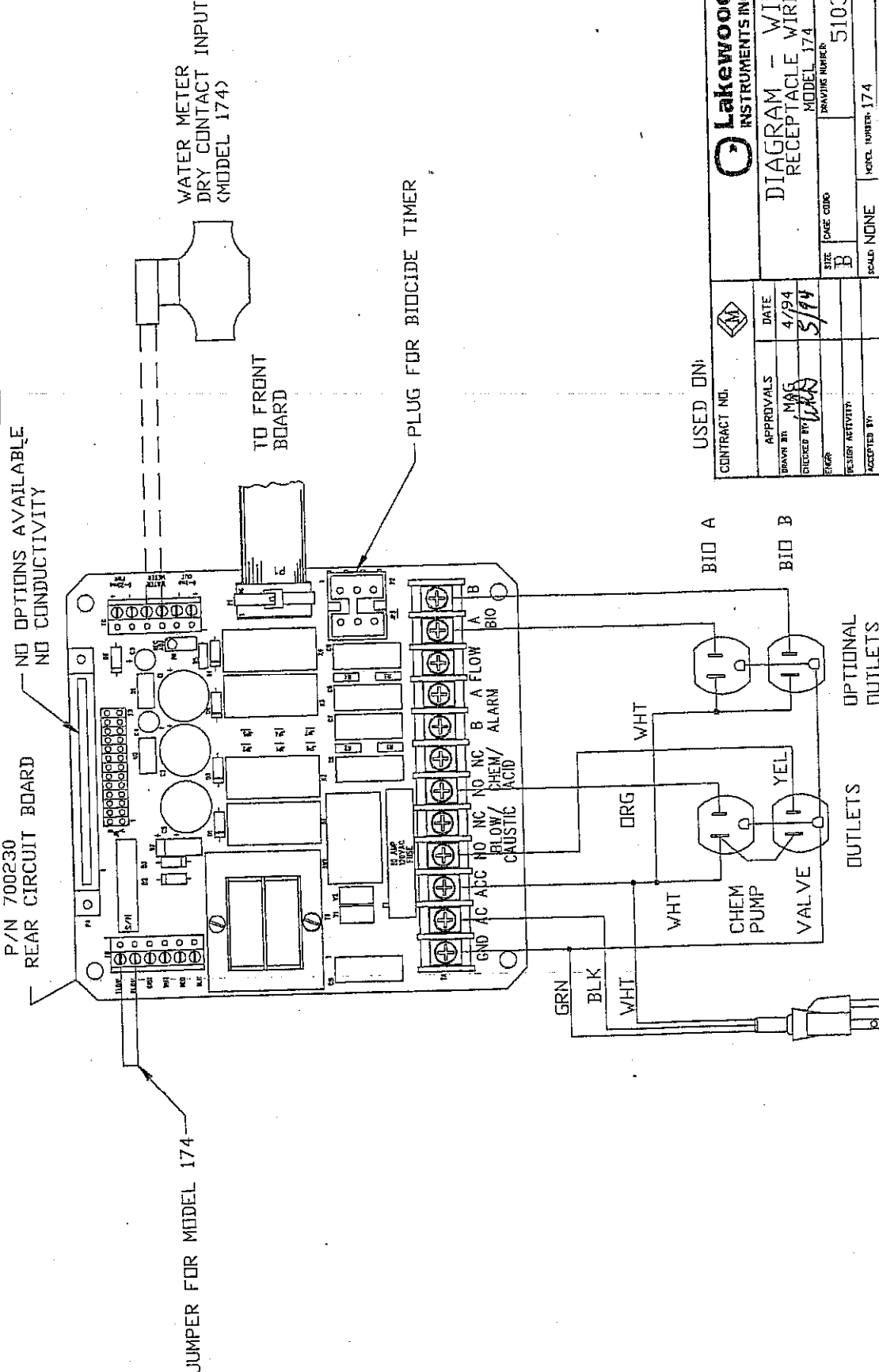
TO FRONT BOARD

USED ON:

CONTRACT NO.	DATE	APPROVALS	DATE
	4/94	MAG	4/94
DESIGN ACTIVITY	DESIGNER	CHECKED BY	DATE
	DR		4/94
SCALE	SHEET	TOTAL SHEETS	REV.
NONE	3	173	5103928
Lakewood INSTRUMENTS INC.			MODEL 173
DIAGRAM - WIRING			RECEPTACLE WIRING

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	



USED ON:

CONTRACT NO.	DATE	APPROVALS
	4/94	MAG
	5/94	WMA
DESIGNED BY	DATE	APPROVALS
REVISION	DATE	APPROVALS
DESIGN NUMBER	REV.	
5103928		
SCALE	MODEL NUMBER	SHEET
NONE	174	2 OF 4

Lakewood INSTRUMENTS INC.

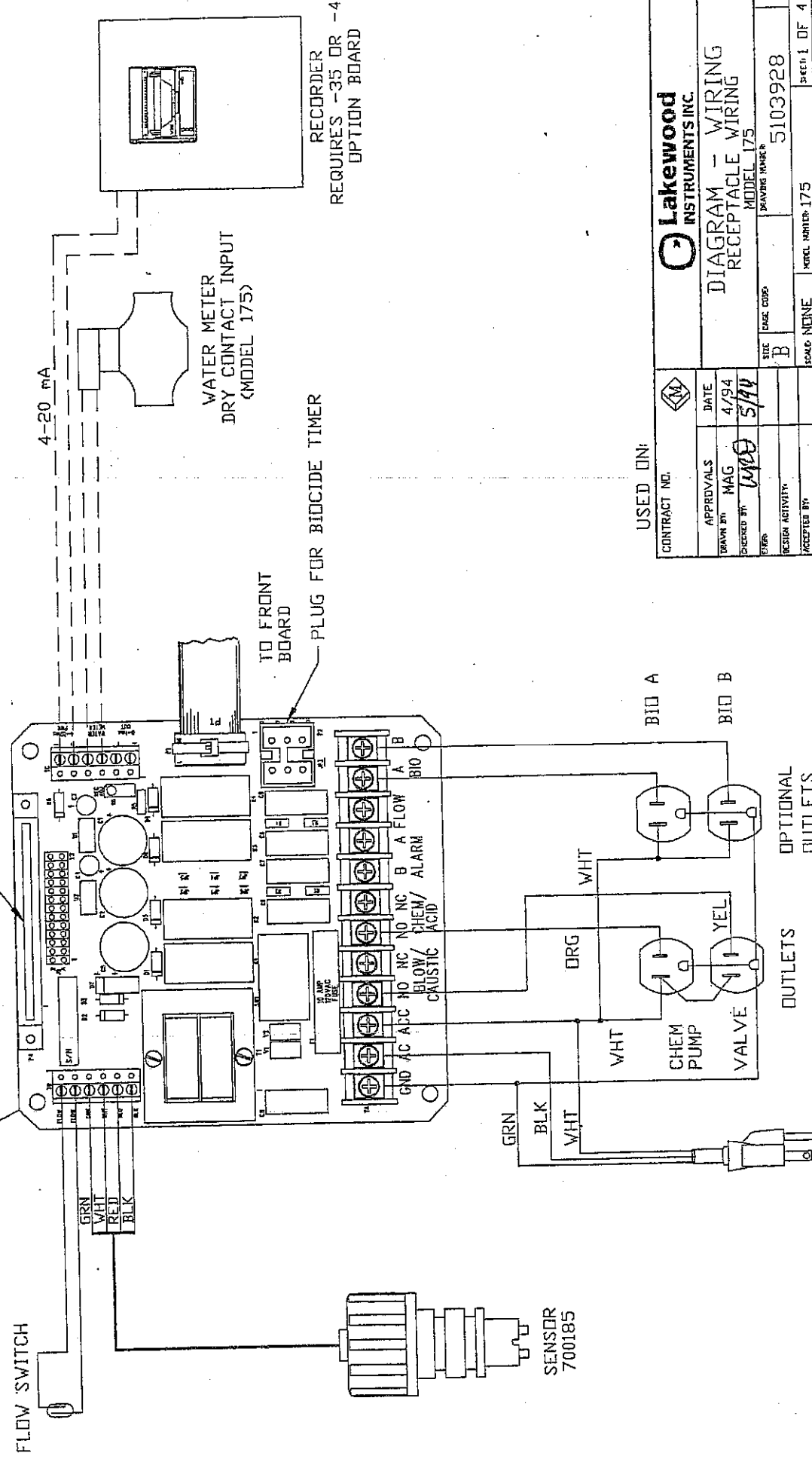
DIAGRAM - WIRING RECEPTACLE WIRING MODEL 174

NOTES: UNLESS OTHERWISE SPECIFIED)
 1. WIRING BY LAKEWOOD
 2. WIRING BY OTHERS

REVISIONS

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

P/N 700230
 REAR CIRCUIT BOARD
 SLOT FOR -35, -42, -44
 OPTION BOARD



USED ON:

CONTRACT NO.	APPROVALS	DATE	 Lakewood INSTRUMENTS INC.
	DRAWN BY: MAG	4/94	
	CHECKED BY: MWD	5/94	DIAGRAM - WIRING RECEPTACLE WIRING MODEL 175
	DESIGN ACTIVITY:		REV. 5103928 DRAWING NUMBER:
	ACCEPTED BY:		REV. B SCALE: NONE MODEL NUMBER: 175 SHEET: 1 OF 4