



2

**RESPONSE TO REQUEST FOR ADDITIONAL COMMENTS  
SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY  
SO60-211179 - SOLID WASTE COMPOSTING  
WT60-211205 - WASTE TIRE STORAGE  
SO60-211182 - M.R.F.  
SF60-211255 - LONG-TERM CARE  
SC60-211181 - LEACHATE TREATMENT  
PREPARED FOR**



**BOARD OF COUNTY COMMISSIONERS  
DEPARTMENT OF PUBLIC WORKS  
222 EAST McCOLLUM AVENUE  
BUSHNELL, FLORIDA 33513**

October 29, 1992

92-1100.00

**Springstead Engineering, Inc.**

Consulting Engineers — Planners — Surveyors  
727 South 14th Street  
Leesburg, Florida 34748  
Lake (904) 787-1414  
Sumter (904) 793-3639 Fax (904) 787-7221

**RESPONSE TO REQUEST FOR ADDITIONAL COMMENTS  
SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY  
SO60-211179 - SOLID WASTE COMPOSTING  
WT60-211205 - WASTE TIRE STORAGE  
SO60-211182 - M.R.F.  
SF60-211255 - LONG-TERM CARE  
SC60-211181 - LEACHATE TREATMENT  
PREPARED FOR**



**BOARD OF COUNTY COMMISSIONERS  
DEPARTMENT OF PUBLIC WORKS  
222 EAST McCOLLUM AVENUE  
BUSHNELL, FLORIDA 33513**

**D. E. R.  
OCT 30 1992  
SOUTHWEST DISTRICT  
TAMPA**

**PREPARED BY**



**Springstead  
Engineering, inc.**

**LEESBURG, FLORIDA**

**October 29, 1992**

**92-1100.00**



D. E. R.

OCT 30 1992

SOUTHWEST DISTRICT  
TAMPA

October 29, 1992

Mr. Kim Ford, P.E.  
Department of Environmental Regulation  
3804 Coconut Palm Drive  
Tampa, Florida 33619

RE: SUMTER COUNTY VOLUME REDUCTION  
CLASS I LANDFILL  
921100.00

Dear Mr. Ford:

In regards to your recent faxes of October 20, 1992 regarding Sumter Comments and of October 22, 1992 regarding Sumter Composting please find the following responses:

SUMTER COMMENTS

1. Fluff must be 3' back from edge of liner and 1' lower to contain runoff.
1. The process of containing the fluff and leachate within the emergency combination lined storage cell has been under way since 10-27-92. Ralph Warnock, an engineer working with Springstead Engineering Inc., was on site location on 10-28-92. Photographs were taken and are submitted in Appendix A for your observation. All containment work will be finished by the end of the work day of October 29, 1992.
2. Regrade and grass eroded closed areas.
2. The regrading and grassing of eroded closed areas have been under way since 10-27-92. Ralph Warnock, an engineer working with SEI was on site location on 10-28-92. Photographs were taken and are submitted in Appendix A for your observation. All regrading and spreading of grass seed will be finished by the end of the work day of October 29, 1992.
3. Pick up litter and debris outside storage liner.
3. Picking up litter and debris outside the storage liner have been under way since 10-27-92. Ralph Warnock, an engineer working with SEI was on site location on 10-28-92. Photographs were taken and are submitted in Appendix A for your observation. All litter and debris clean up will be finished by the end of the work day of October 29, 1992.

October 29, 1992  
Mr. Kim Ford, P.E.  
921100.00

Page 2

4. No concrete pads inside lined pond.
4. Concrete pads have been removed from the bottom of the lined pond as noted on the leachate recirculation system plan, which is included in this report as a certified plan. These concrete pads have been replaced with pads made out of liner material. There will be no connection to the existing liner. The existing pump intake appears to be working properly with a flexible suction hose at this time with out a connection and SEI will use this existing design concept.
5. How deep is leachate over liner in storage cell?
5. The leachate is 14.71 feet over the bottom of the liner in the storage cell. This information was obtained on 10-28-92 by SEI. A location map is included for your observation in Appendix B.
6. No spray heads in corners?
6. Spray heads have been removed from the corners as depicted on the leachate recirculation system plan.
  - 6.1. Can heads be adjusted for radius & pattern and replaced easily?
  - 6.1. Spray heads can be adjusted for spread pattern by manually adjusting the part circle engagement cam on the spray head lower assembly. The radius is adjustable with the 3" ball valve located on the spray head piping assembly. Please refer to the specification within the Operation and Maintenance Manual and the leachate recirculation system plan respectively.
  - 6.2 Any benefit to providing connections for hose spraying?
  - 6.2 An auxiliary globe valve and a 2 1/2" globe valve has been added to the spray head piping assembly, which can be utilized with a standard 2 1/2" fire type flexible hose and existing spray head or nozzel. This will be utilized when application drift or coverage is a problem from the automatic application spray heads.

October 29, 1992  
Mr. Kim Ford, P.E.  
921100.00

Page 3

7. Explain I.L.F. for irrigation losses.
7. The irrigation loss factor is one of two consumptive components required to estimate the losses due to spray irrigation. The source and content of the information on the I.L.F. used by SEI was faxed to and discussed with Mr. Kim Ford on 10-20-92. It is SEI's understanding that the explanation and use of this factor was satisfactory.
8. Plan to remove fluff in storage cell.
8. The same entrance path that is being used to add fluff to the storage area is going to be utilized in order to remove the fluff from the storage area. A D-6 Caterpillar doser will push the fluff into a pile so that 544 John Deere front end loader can load the fluff into two 5-yard and/or two 8-yard capacity dump trucks. The fluff will then be transported to the appropriate mixer/windrow compost pad. The process will commence at the edge of the storage area and continue toward the middle of the storage area.
9. Plan to recirculate into fluff storage.
9. An auxiliary leachate recirculation connection will be available on the south side of the north compost pad, and the west side of the middle pad in order to be utilized with the existing portable spray head for recirculation over the temporary storage area.
10. Gas investigation in % LEL, not ppm.
10. Please see attached Gas Migration Study where appropriate values have been converted into % LEL in Appendix C.

Sumter Composting

1. Irrigation System Operation Manual (List all operations of control, spray patterns, which sprinklers to operate, etc.- personnel).
1. Please see the Operation and Maintenance Manual for the Sumter County Solid Waste Facility in Appendix D.

October 29, 1992  
Mr. Kim Ford, P.E.  
921100.00

Page 4

2. Specifications for all parts and controls.
2. Specifications for all parts and controls are within the Operation and Maintenance Manual. Updates to this manual will be provided for any and all operational or equipment modifications.
3. For the spray pump detail. 2nd thought, can we get by without any connection to existing liner?
3. Connections have been eliminated to the existing liner. Please refer to the response for question # 4 for the fax on 10-20-92.

Should you have any questions, please feel free to contact our office.

Very truly yours,

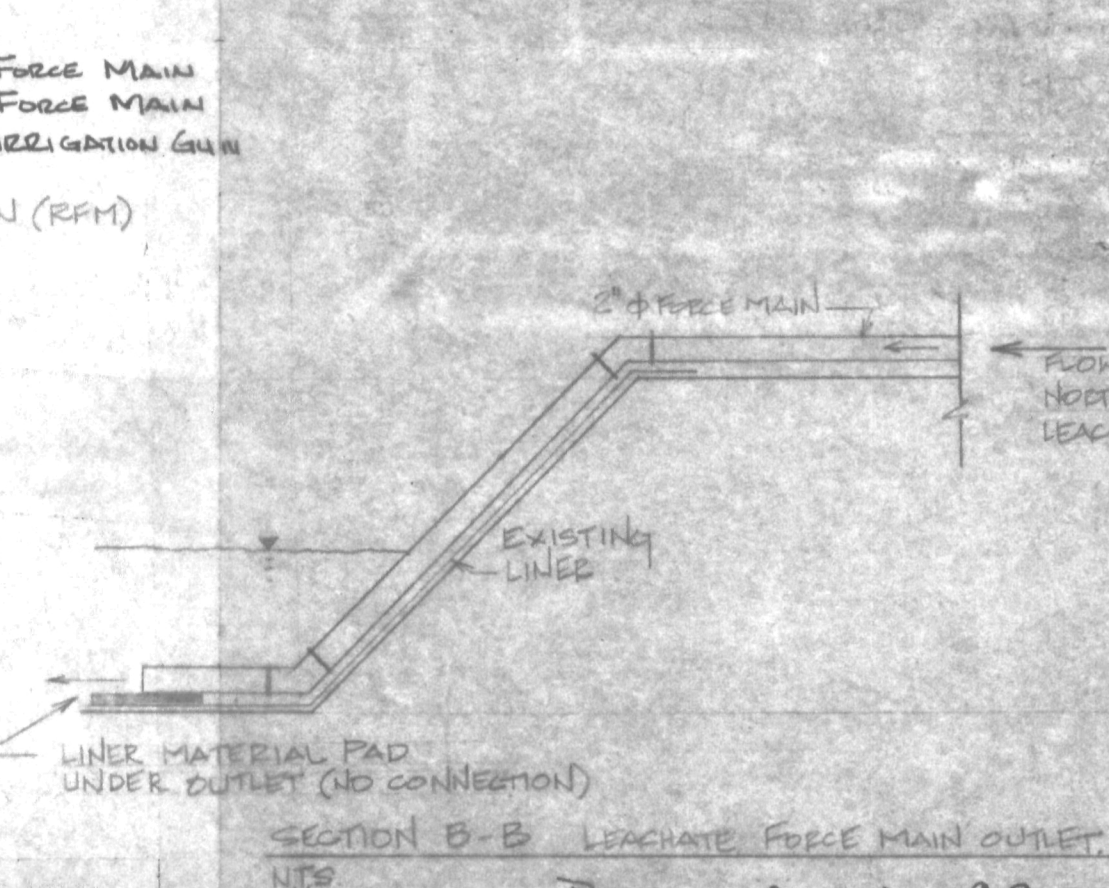
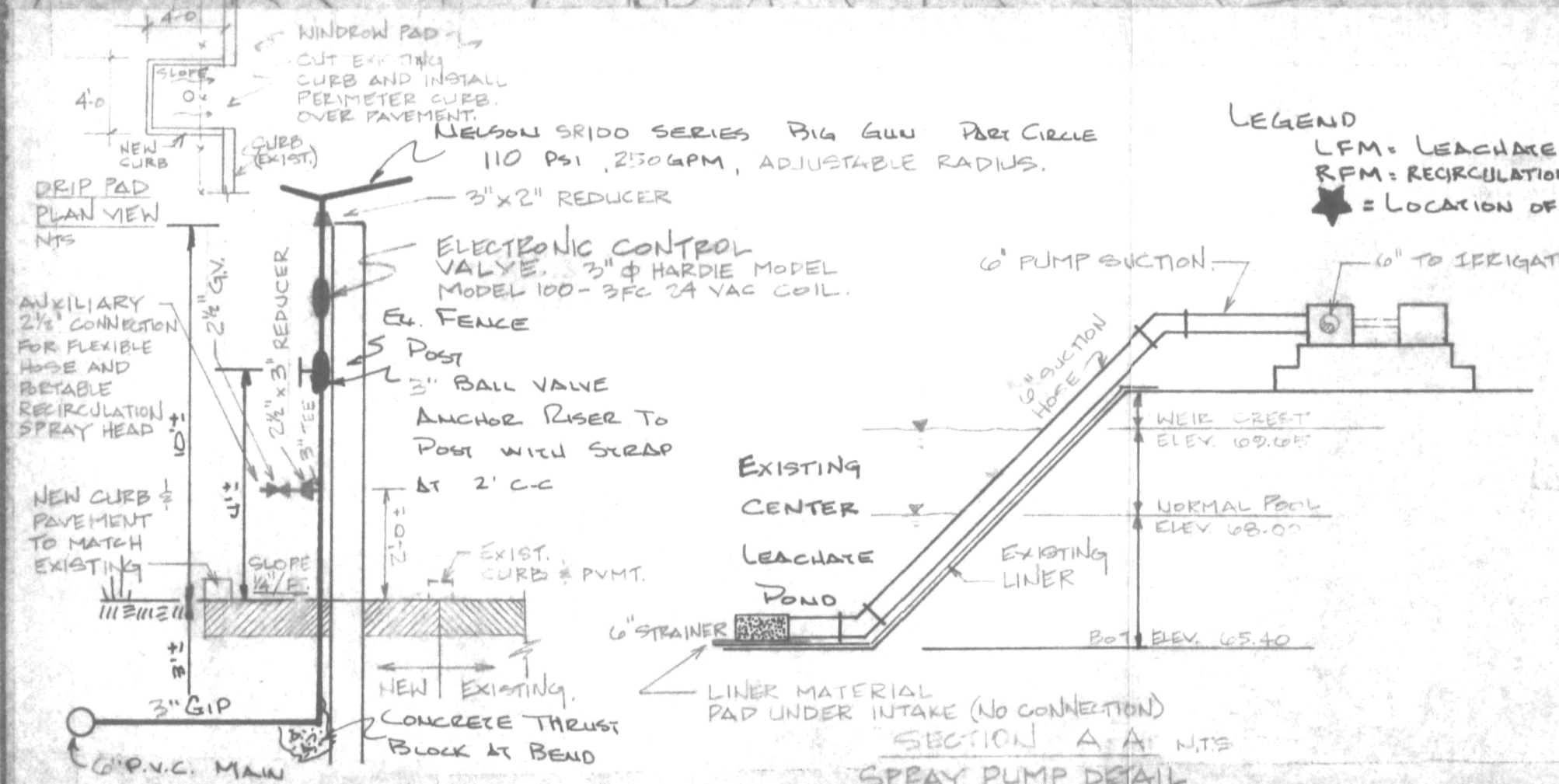
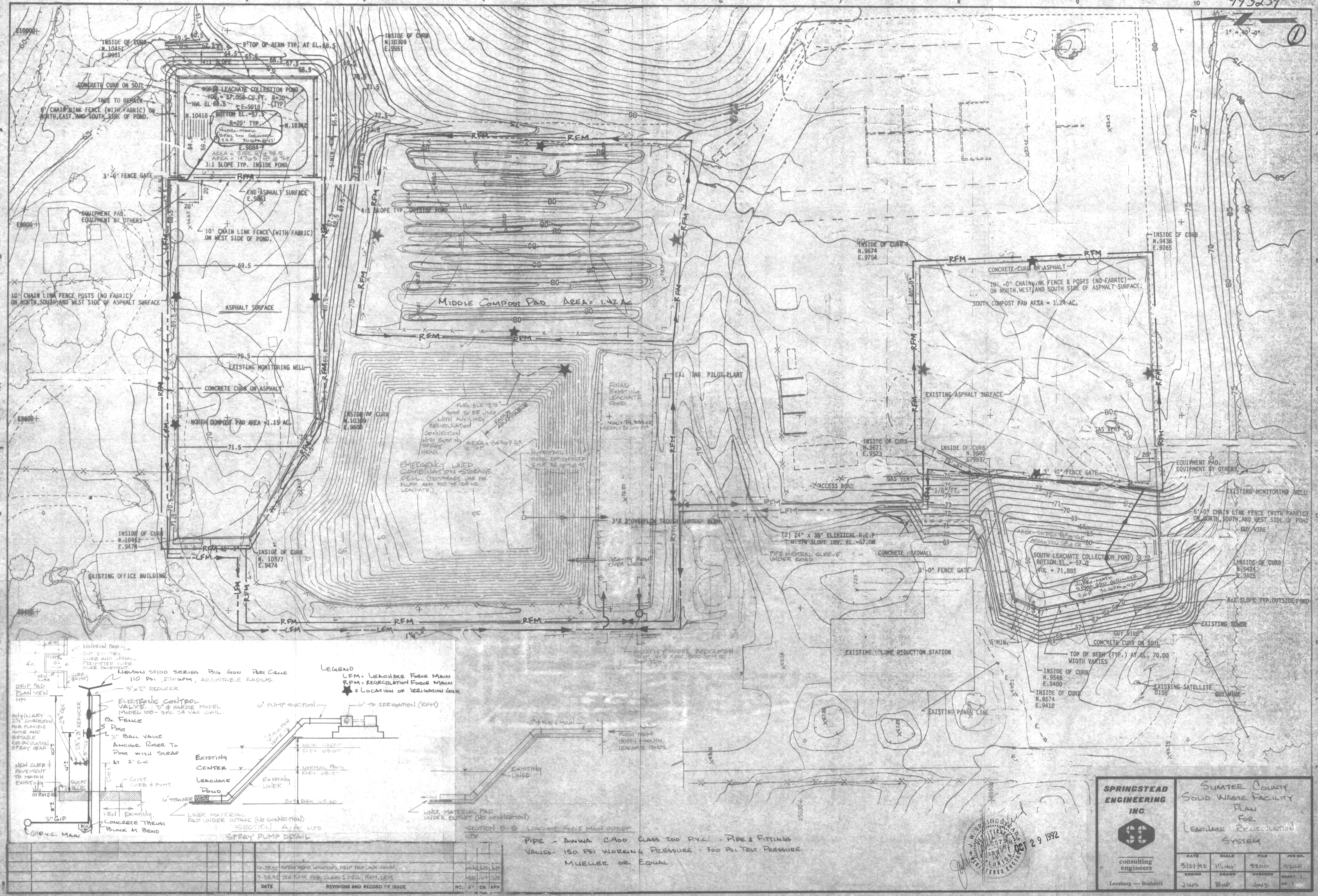
SPRINGSTEAD ENGINEERING, INC.

  
John W. Springstead, P.E.

JWS/jal

cc: Mr. Garry Breeden  
(RAI.029)





LEGEND

LFM = LEACHATE FORCE MAIN  
RFM = RECIRCULATION FORCE MAIN  
★ = LOCATION OF IRRIGATION GUN

DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	OR	APP.
10-28-92	SPRAY PUMP HEAD LOCATIONS, DEEP PAD, A/C CONN.	1	MJS	JWS	JWS
9-24-92	SEE LUMP, SEE CHAS. I. CELL, RFM, LFM	2	MJS	JWS	JWS

PIPE - DNWA C900 CLASS 200 P.V.C. - PIPE & FITTINGS  
VALVES - 150 PSI WORKING PRESSURE - 300 PSI TEST PRESSURE  
MUEUER OR EQUAL

APPROVED  
J. W. HOSKINS  
SUMTER COUNTY  
SOLID WASTE FACILITY  
29 OCT 1992

**SPRINGSTEAD ENGINEERING INC.**

consulting engineers

Leesburg - Bushnell

**SUMTER COUNTY SOLID WASTE FACILITY**

PLAN FOR LEACHATE RECIRCULATION SYSTEM

DATE	SCALE	FILE	JOB NO.
3/21/92	1"=40'	92110	92110

DESIGN	DRAWN	CHECKED	SHEET
JWS	BHP	JWS	OF 1



**RESPONSE TO REQUEST FOR ADDITIONAL COMMENTS  
SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY  
SO60-211179 - SOLID WASTE COMPOSTING  
WT60-211205 - WASTE TIRE STORAGE  
SO60-211182 - M.R.F.  
SF60-211255 - LONG-TERM CARE  
SC60-211181 - LEACHATE TREATMENT  
PREPARED FOR**



**BOARD OF COUNTY COMMISSIONERS  
DEPARTMENT OF PUBLIC WORKS  
222 EAST McCOLLUM AVENUE  
BUSHNELL, FLORIDA 33513**

**APPENDIX A  
PHOTOGRAPHS**

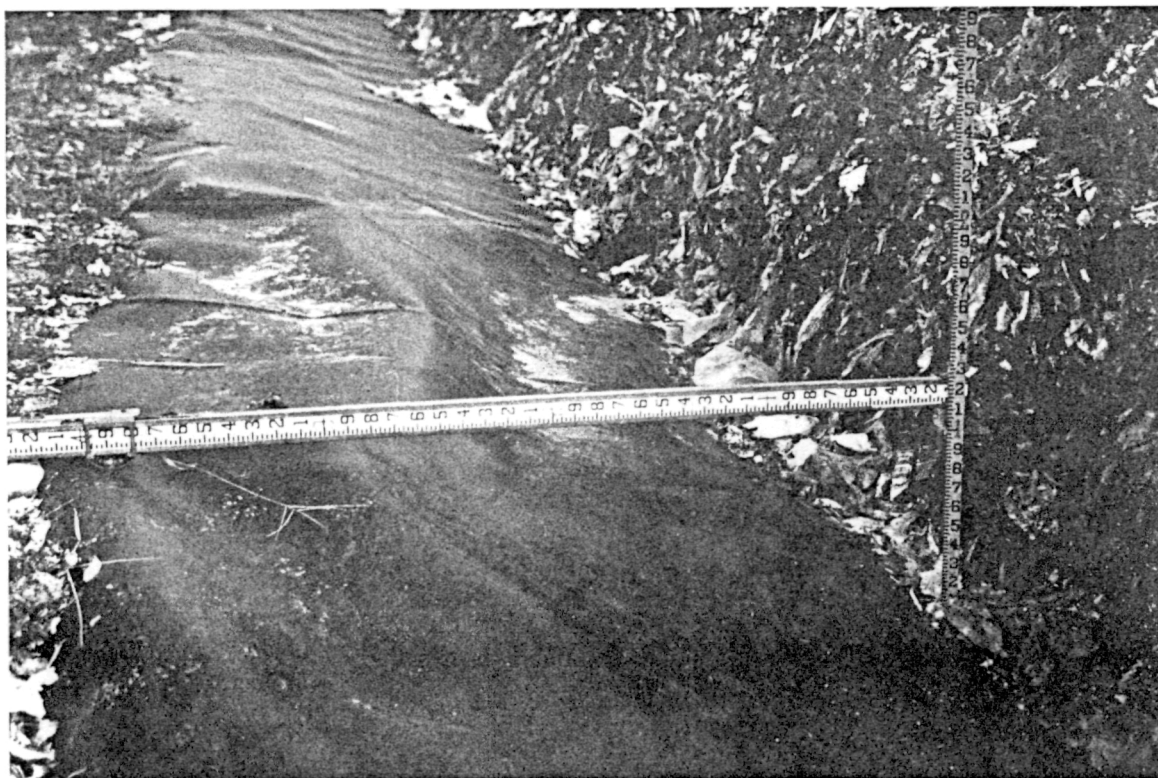
October 29, 1992

92-1100.00

**PHOTOGRAPHS OF RECENTLY COMPLETED MAINTENANCE WORK  
ON THE LINED STORAGE CELL AS PER REQUESTED BY DER AT THE  
SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY**



**CLEANING UP LITTER AROUND STORAGE AREA**



**FLUFF CLEARED 3' BACK AND 1' BELOW LINER EDGE**

**PHOTOGRAPHS OF RECENTLY COMPLETED MAINTENANCE WORK  
ON THE LINED STORAGE CELL AS PER REQUESTED BY DER AT THE  
SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY**



**WORKING SPREADING GRASS SEED ON ERODED CLOSED AREAS**



**GRASS SEED ON GROUND AT ERODED AREAS**



**RESPONSE TO REQUEST FOR ADDITIONAL COMMENTS  
SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY  
SO60-211179 - SOLID WASTE COMPOSTING  
WT60-211205 - WASTE TIRE STORAGE  
SO60-211182 - M.R.F.  
SF60-211255 - LONG-TERM CARE  
SC60-211181 - LEACHATE TREATMENT  
PREPARED FOR**



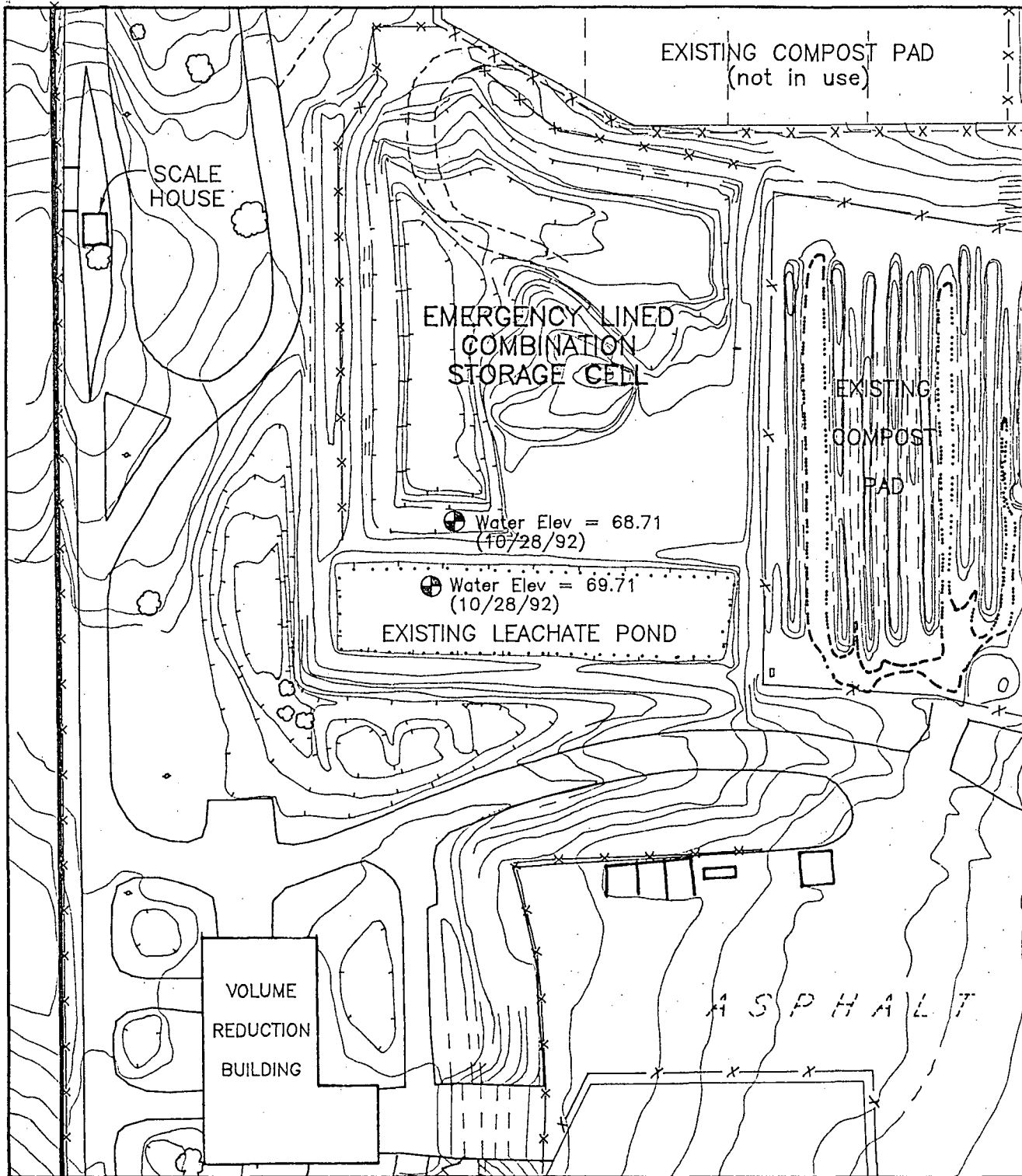
**BOARD OF COUNTY COMMISSIONERS  
DEPARTMENT OF PUBLIC WORKS  
222 EAST McCOLLUM AVENUE  
BUSHNELL, FLORIDA 33513**


**APPENDIX B  
LOCATION MAP**

October 29, 1992

92-1100.00

# SUMTER COUNTY SOLID WASTE FACILITY



REV. BY:	DESCRIPTION:	DATE:	DRAWN:
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p><b>Springstead Engineering, Inc.</b></p>  <p>Consulting Engineers Planners Surveyors</p> </div> <div style="width: 65%;"> <p><b>WATER ELEVATION IN EMERGENCY LINED COMBINATION STORAGE CELL</b></p> </div> </div>			
DATE: 10/28/92	SCALE: 1" = 100'	FILE: H20-ELEY	JOB NO.: 921100.00
DESIGN: N/A	DRAWN: N/A	CHECKED: N/A	SHEET: 1 OF 1

**RESPONSE TO REQUEST FOR ADDITIONAL COMMENTS  
SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY  
SO60-211179 - SOLID WASTE COMPOSTING  
WT60-211205 - WASTE TIRE STORAGE  
SO60-211182 - M.R.F.  
SF60-211255 - LONG-TERM CARE  
SC60-211181 - LEACHATE TREATMENT  
PREPARED FOR**

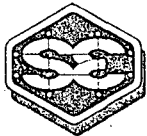


**BOARD OF COUNTY COMMISSIONERS  
DEPARTMENT OF PUBLIC WORKS  
222 EAST McCOLLUM AVENUE  
BUSHNELL, FLORIDA 33513**

**APPENDIX C  
REVISED METHANE GAS  
MIGRATION STUDY REPORT**

October 29, 1992

92-1100.00



Springstead  
Engineering, Inc.

Consulting Engineers — Planners — Surveyors

727 South 14th Street  
Leesburg, Florida 34748

Lake (904) 787-1414  
Sumter (904) 793-3639  
Fax (904) 787-7221

October 29, 1992

Mr. Garry Breeden, Director of Public Works  
Sumter County Public Works Department  
222 East McCollum Avenue  
Bushnell, Florida 33513

RE: Revision of Methane Gas Migration Study Report  
Released September 25, 1992  
Gas Monitoring in and Around Buildings  
Sumter County Solid Waste Management Facility  
92-1100.00

Dear Mr. Breeden:

Springstead Engineering, Inc. performed a methane gas migration study at the above referenced facility. Additionally, air sampling was performed inside the Solid Waste Reduction Building. The original report was released September 25, 1992. Since that time the Florida Department of Environmental Regulation (FDER) has requested that the results be converted to percentage of Lower Explosive Limit (LEL) for methane. The tables presented in our original report have been revised to reflect that request.

The LEL for methane reported in various publications is 5.0 percent. This value was used to make the conversion from percent methane to percent LEL of methane. To simplify, divide the ppm methane by 50,000 to obtain percent LEL of methane.

October 29, 1992  
Revision of Methane Gas Migration Study Report  
Gas Monitoring in and Around Buildings  
Sumter County Solid Waste Management Facility  
92-1100.00

METHANE GAS MIGRATION SURVEY - AUGUST 25, 1992

TEST HOLE #	METHANE %LEL	REMARKS
G1-1	0	
G1-2	$1.36^{-3}$	Down wind from lined cell
G1-3	$4.0^{-4}$	Edge of fill
G1-4	0	
G1-5	0	
G1-6	0	
G1-7	0	
G1-8	0	
G1-10	>0.02	HEAVY GARBAGE IN SOIL
G1-15	>0.02	HEAVY GARBAGE IN SOIL
G1-18	>0/02	HEAVY GARBAGE IN SOIL
G1-18 (20'E)	$2.0^{-6}$	
G1-19	0	
G1-20	$6.4^{-4}$	GARBAGE IN SOIL
G1-21	0	
G1-22	0	
G1-23	0.014	ORGANIC MATERIAL IN SOIL
G1-23 (60'S)	0	
G1-23A	>0.02	HEAVY GARBAGE IN SOIL
G1-23A (60'S)	0	
G1-24	0	
G1-25	0.0102	GARBAGE IN SOIL

October 29, 1992  
Revision of Methane Gas Migration Study Report  
Gas Monitoring in and Around Buildings  
Sumter County Solid Waste Management Facility  
92-1100.00

METHANE GAS MIGRATION SURVEY - AUGUST 25, 1992 (Cont.)

TEST HOLE N°	METHANE &LEL	REMARKS
G1-25 (40'W)	2.0 <sup>-6</sup>	
G1-26	4.0 <sup>-6</sup>	

The inside of the Volume Reduction Building was surveyed for methane. The highest reading in the pit below the conveyer was 1.36<sup>-3</sup> percent LEL of methane. This reading was taken at the floor drain. Garbage was noted in the drain. The pit beneath the was also surveyed. A maximum reading of 2.4<sup>-4</sup> percent LEL of methane was recorded in this area. Readings ranging from 4.0<sup>-6</sup> to 8.0<sup>-6</sup> ppm were recorded in the truck bay.

October 29, 1992  
Revision of Methane Gas Migration Study Report  
Gas Monitoring in and Around Buildings  
Sumter County Solid Waste Management Facility  
92-1100.00

METHANE GAS MIGRATION SURVEY - SEPTEMBER 2, 1992

TEST HOLE #	METHANE %LEL	REMARKS
G1-1	0	
G1-2	$2.0^{-5}$	DOWN WIND FROM LINED CELL
G1-3	$1.2^{-5}$	
G1-4	$4.0^{-6}$	
G1-5	N/A	HOLE CAVED
G1-6	$6.0^{-5}$	
G1-7	N/A	HOLE CAVED
G1-8	0	
G1-10	0.012	HEAVY GARBAGE IN SOIL
G1-15	0.01	HEAVY GARBAGE IN SOIL
G1-18	>0.02	HEAVY GARBAGE IN SOIL
G1-18 (20'E)	0	
G1-19		
G1-20	$4.0^{-6}$	
G1-21	0	
G1-22	0	
G1-23	$2.0^{-5}$	
G1-23 (60'S)	0	
G1-23A	$1.4^{-4}$	
G1-23A (60'S)	N/A	HOLE FLOODED
G1-24	N/A	HOLE FLOODED
G1-25	>0.02	GARBAGE IN SOIL

October 29, 1992  
Revision of Methane Gas Migration Study Report  
Gas Monitoring in and Around Buildings  
Sumter County Solid Waste Management Facility  
92-1100.00

METHANE GAS MIGRATION SURVEY - SEPTEMBER 2, 1992 (Cont.)

TEST HOLE #	METHANE %LEL	REMARKS
G1-25 (40'W)	2.8 <sup>-5</sup>	
G1-26	6.0 <sup>-5</sup>	DOWN WIND / HOLE CAVED

CLOSURE:

We hope that the provided information meets your needs at the present time. Should you have any additional questions, or if you require additional information, please contact our office.

Very truly yours,

SPRINGSTEAD ENGINEERING, INC.

*[Signature]* 10/29/92  
John W. Springstead, P.E.  
President  
Florida Reg. No. 8579

*[Signature]* 10-29-92  
James A. Dunaway, P.G.  
Engineering Geologist  
Florida Reg. No. 39

*[Signature]* 10-29-92  
Ralph G. Wainock, Jr., P.L.S.  
Project Engineer  
Florida Reg. No. 4392

*[Signature]*  
David W. Springstead  
Project Engineer

JWS:JAD:DWS:RWW/jd/ad



**RESPONSE TO REQUEST FOR ADDITIONAL COMMENTS  
SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY  
SO60-211179 - SOLID WASTE COMPOSTING  
WT60-211205 - WASTE TIRE STORAGE  
SO60-211182 - M.R.F.  
SF60-211255 - LONG-TERM CARE  
SC60-211181 - LEACHATE TREATMENT  
PREPARED FOR**



**BOARD OF COUNTY COMMISSIONERS  
DEPARTMENT OF PUBLIC WORKS  
222 EAST McCOLLUM AVENUE  
BUSHNELL, FLORIDA 33513**

**APPENDIX D  
OPERATION, MAINTENANCE &  
SERVICE MANUAL**

October 29, 1992

92-1100.00



**OPERATION, MAINTENANCE & SERVICE MANUAL**  
**FOR**  
**LEACHATE RECIRCULATION SYSTEM**  
**SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY**  
**PREPARED FOR**



**BOARD OF COUNTY COMMISSIONERS**  
**DEPARTMENT OF PUBLIC WORKS**  
**222 EAST McCOLLUM AVENUE**  
**BUSHNELL, FLORIDA 33513**

**OCTOBER 29, 1992**

**92-1190.00**

**Springstead Engineering, inc.**

Consulting Engineers — Planners — Surveyors

727 South 14th Street

Leesburg, Florida 34748

Lake (904) 787-1414

Sumter (904) 793-3639 Fax (904) 787-7221

**OPERATION, MAINTENANCE & SERVICE MANUAL**  
**FOR**  
**LEACHATE RECIRCULATION SYSTEM**  
**SUMTER COUNTY SOLID WASTE MANAGEMENT FACILITY**

**PREPARED FOR**



**BOARD OF COUNTY COMMISSIONERS**  
**DEPARTMENT OF PUBLIC WORKS**  
**222 EAST McCOLLUM AVENUE**  
**BUSHNELL, FLORIDA 33513**

**PREPARED BY**



**Springstead**  
**Engineering, inc.**

**LEESBURG, FLORIDA**

**OCTOBER 29, 1992**  
**92-1100.00**

## TABLE OF CONTENTS

Title Page . . . . .	1
Table of Contents . . . . .	2
1. Introduction . . . . .	3
2. Responsibilities . . . . .	4 & 5
2.1. General . . . . .	4
2.2. Operator Responsibility . . . . .	4
2.3. Director Responsibility . . . . .	5
3. Equipment and Facilities . . . . .	6
4. Process Description . . . . .	7 & 8
4.1. General . . . . .	7
4.2. Recirculation . . . . .	7 & 8
5. Operation, Control & Trouble Shooting Aids . . . . .	9
6. Maintenance . . . . .	10
7. Records . . . . .	11 & 12
8. Safety . . . . .	13

## 1. Introduction

The satisfactory performance of the leachate recirculation system is dependent upon careful and correct installation, maintenance, and operation of the equipment.

Before performing any repair work or maintenance work on equipment included with their job, always refer to the specific instructions listed in the manufactures manual before proceeding.

This type of equipment is often furnished with optional features. Most of the available optional features are described in the owners manual. Please refer to those sections applicable to your unit, disregarding those that do not apply.

General assemblies and component parts are included in this manual, which are to be used as a reference throughout these instructions and in any correspondence in conjunction with the recirculation system. It must be understood that these are typical illustrations and may not conform in complete detail to the equipment furnished.

If there is any doubt or question during the process of installation or operation, please contact Springstead Engineering, Inc., [(904) 787-1414] at once.

Do not attempt to install or operate this leachate recirculation system until this manual has been read completely. Follow instruction, recommendation, and guidelines.

## 2. Responsibilities

### 2.1 General

This manual serves as a general guide for operators of the leachate recirculation system at the Sumter County Solid Waste Facility (SCSWF). It contains sufficient information in order to operate the system, and will enable the operator to recognize and correct potential trouble spots.

Each operator should be familiar with the system and system equipment as well as:

1. The flow patterns and general characteristics of the system.
2. Local, state, and federal regulations laws which may apply to the operation of this system.
3. Maintenance procedures and theory of operation of this system.

### 2.2 Operator Responsibility

In recent years, there has been a growing interest and concern in preserving our environment. The effective design and operation of this leachate recirculation system plays an essential role in the preservation and improvement of our nation's water resources. The tremendous investment of State and Local funds in these facilities must be protected. The assurance of fully efficient, economic and effective operation of this system lies not only in competent design and construction but in dedicated system operation. Many operators find incentives and compensations in the major role which they are playing in keeping the environment free of nuisance and the water resources useful and enjoyable as they should be. Often their role has taken the back seat to that of the designing engineer and management, yet, in many instances they have, by their dedicated efforts, obtained outstanding performances.

The following responsibilities of the system operator are generally applied:

1. Know proper operational procedures.
2. Keep accurate records.
3. Keep supervisor informed.
4. Have complete knowledge of the current operation and maintenance practices.

### 2.3 Director Responsibility

As in most public service positions, the director of a solid waste facility is responsible to the County Commission and to the public at large. As the person in charge he is the person who works with the engineers for instructions and requests. He also has the responsibility to provide good working conditions, safety, and welfare to his fellow workers at the facility.

In broad context, the director should be responsible for:

1. Effective and efficient operation of the leachate recirculation system.
2. Establishing operator training programs.
3. Having knowledge and understanding of all of the elements of operation and maintenance of this system.

During the period of design, construction, and start-up the director should become familiar with each element of the system including each item of equipment. He should make specific recommendations to the responsible official for correction of deficiencies and for justifiable improvements. He should develop a training program for the operators so that they will be ready and capable of performing the essential operations when the system is placed in service. The operation records should accurately reflect the system performance and serve as a basis for correction of any deficiencies, modification or alterations of any aspect of the system.

### 3. Equipment and Facilities

This leachate recirculation system consists of leachate ponds, pumps, related piping, mechanical equipment, electrical controls, atmosphere and windrow compost testing equipment.

The leachate ponds are utilized in order to control the leachate storm water runoff from the windrow composting pads, and the middle leachate pond is utilized as a flow equalization pond for pumping the leachate for recirculation.

Pumps and related piping are sized with due regard for the hydraulic requirements of the system.

Mechanical equipment include automatic valves, adjustable spray heads, and auxiliary spray equipment.

Electrical controls are provided for the pump and automatic valves.

A parts list, maintenance instructions, and specific details will be provided for specific equipment selected for the system.

Atmosphere and windrow compost testing equipment includes wind speed and wind direction indicators, and compost moisture and temperature indicators. These devices will be utilized in order to determine and control leachate application and leachate application drift.

Certain accessory equipment will prove useful in day to day operation. Proper safety equipment, rubber boots, gloves, and a wash room facility should be considered as required equipment. Proper tools for daily maintenance is also recommended.

Though not essential, a water supply is desirable for drinking, washing, and cleaning.



#### 4. Process Description

##### 4.1 General

This leachate recirculation system is designed to accomplish two main items:

1. Maintain the moisture content of the windrow compost within the proper range between 40 and 60 percent for proper decomposition.
2. Utilize excess leachate to recover the volume of the leachate in the retention ponds for recurring storm runoff.

Leachate will be pumped from the north and south leachate retention ponds into the final leachate retention pond (middle) adjacent to the emergency lined combination storage cell. The leachate level in the north and south ponds shall be reduced to an approximate depth of one (1) foot above the bottom of the ponds within 21 days after each rain fall event. Leachate will be recirculated from the middle pond on to the windrow compost pads through the pump and piping leachate force main network. The leachate level in the middle pond shall be kept at a maximum elevation of 68 feet MSL which is 1.7 feet below the weir crest elevation. In cases of extreme rainfall events available storage will be provided within the emergency lined combination storage cell.

##### 4.2 Recirculation

Recirculation start-up shall include the following steps:

1. Moisture content and temperature of the windrow shall be determined with the testing equipment.
2. Wind direction and speed shall be determined from the atmosphere indicators.
3. Selection of the proper spray head location will be determined for proper coverage of the desired windrow compost.
4. Proper trajectory (spread and distance) shall be estimated and adjusted for coverage and drift accommodation by manually adjusting the part circle cam adjustments on the spray head and the manual valve on the individual spray head piping.
5. Turn master key switch "on".

6. Open automatic valve for desired spray heads location from electronic control panel by selecting switch to "on" and pressing the "start" button.
7. Turn pump "on" from electronic control panel.
8. Check for proper trajectory and drift accommodation, monitor wind speed and direction and readjust if necessary.
9. If drift or improper coverage is unavoidable, discontinue process and proceed to apply leachate through manual auxiliary valve application.
10. Run pump for spray head or auxiliary application until desired moisture content has been reached or until shut down time.

Recirculation shut-down shall include the following steps:

1. Turn pump off from electronic control panel.
2. Close automatic valve by selecting switch to "off" from electronic control panel.
3. Check moisture content for acceptable range.
4. Turn master key switch off and remove key.

## 5. Operation, Control and Trouble Shooting Aids

No matter how well the system is designed, manufactured, and constructed there will be times when additional services and changes in operational procedures will be required. When changes in operations are necessary, the operator should recognize the trouble, determine the cause, and take corrective action. Some of the operational problems, prevention and control are described below which serves as a guidance for the operator to detect the potential trouble and make corrections before more serious trouble develops.

PROBLEM	SOLUTION
Pressure drop in system	<ol style="list-style-type: none"><li>1. Check intake screen for clogs in leachate pond.</li><li>2. Check impeller in pump.</li><li>3. Check proper operation of pump in accordance with manufactures operation manual.</li></ol>
Drift	<ol style="list-style-type: none"><li>1. Adjust part circle clamps on the spray head.</li><li>2. Partially close manual valve on the spray head piping.</li><li>3. Discontinue automatic spray application and use manual application.</li></ol>
Automatic valve	<ol style="list-style-type: none"><li>1. Discontinue use of that particular spray head.</li><li>2. Check for proper operation of valve in accordance with manufacturers operation manual.</li></ol>

## 6. Maintenance

The purpose of maintenance is to preserve and to keep the machinery in good operation condition. Maintenance is a continuous job. In order to be sure that all items are properly maintained a check list should be followed. Some of the items on your check list should include the following.

### Daily Maintenance Check List

1. Check all equipment, pumps, motor, spray heads, and automatic valves for proper operation.
2. Check leachate ponds for proper leachate elevations.
3. Check compost for proper range of moisture content.
4. Check for leakage in all areas of the force main during operation.

### Weekly Maintenance Check List

1. Remove all debris from middle leachate pond that will interfere with proper pump operation.
2. Electrical control boxes should be checked for corrosion and rust.
3. All spray heads should be checked for rust or corrosion.
4. Check safety equipment.

### Semi-Annual Maintenance Check List

1. Flush pump with clean fresh water.
2. Clean and service pump intake and impeller for proper operation.
3. Remove any clogging material at the inlet and the discharge of the pump.
4. Check electrical motor to insure smooth running conditions.
5. Have all faulty wiring connections replaced.
6. Make summary of operations and/or operational problems.

Other items should be added to the check list as you gain experience with the system.

Special: When performing any of the listed check lists always refer to the included manufacturers' manual for detailed specific instruction.

## 7. Records

Regular maintenance reports and records of operation of the recirculation facility serve many purposes. They are helpful to those directly responsible for the system operation and to municipal officials, consulting engineers, state regulatory agencies, and others who have similar facilities and related problems.

The operators should use these records as a guide in regulating, adjusting, and modifying the plant facilities and operation. Of great importance is the establishment of a reliable continuing record of proof of performance, justifying decisions, expenditures and recommendations.

Such records often are the only sound basis upon which administrative officials may negotiate with existing or potential quality control personnel, plan corrective measures for deficiencies on the recirculation system, or justify budgetary changes for expanding needs.

Records which should be maintained at the facility include any problems associated with the leachate recirculation system and a typical maintenance record which is included at the end of this chapter.

**SUMTER COUNTY SOLID WASTE FACILITY LEACHATE RECIRCULATION**

**MAINTENANCE RECORD**

**Equipment:**

**Location:**

Item	Description	Remarks	Initial

**MAINTENANCE RECORD**

**Equipment:**

**Location:**

Item	Description	Remarks	Initial

## 8. Safety

It is not possible to be thoughtful about safety and careful at work without proper training. Everyone involved in the operation of this system should study recent publications on occupational safety hazards and keep abreast of the latest first aid techniques.

There will be a need for typical and not so typical safety items and measures associated with the operation of this system not necessarily furnished by Sumter County or Springstead Engineering Inc., including the following:

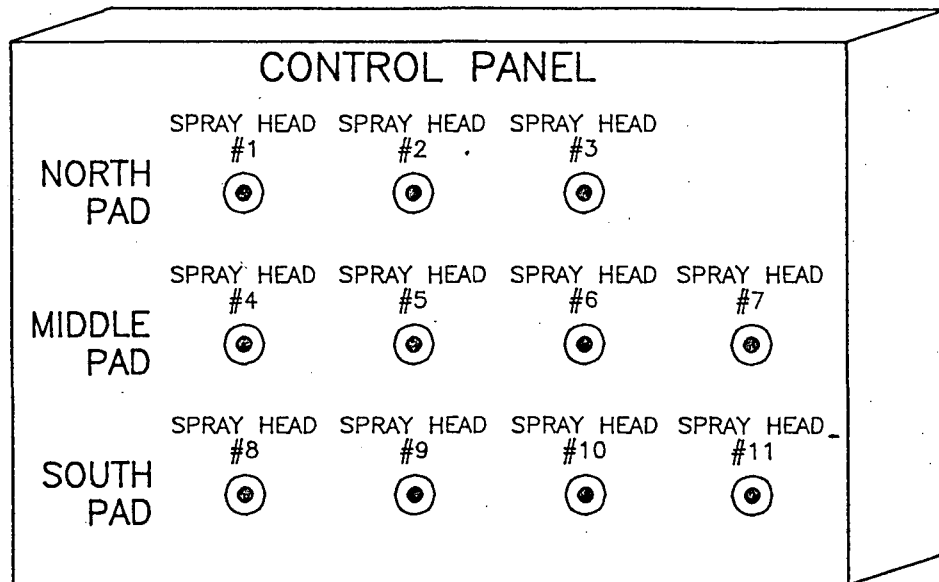
1. Adequate first aid supplies
2. Accessible fire extinguisher
3. Personal safety clothing such as rubber gloves, rubber boots, safety hard hats, etc.

Due to the nature of this facility, certain precautions can be taken in order to minimize the risk of bodily infection. The best defense against infection is the practice of good personal hygiene and prompt medical attention for any injury or infection. Instructions in first-aid treatment are available from State Health Departments, the National Safety Council, the Federal Bureau of Mines, The American Red Cross and manufacturers of first aid kits.

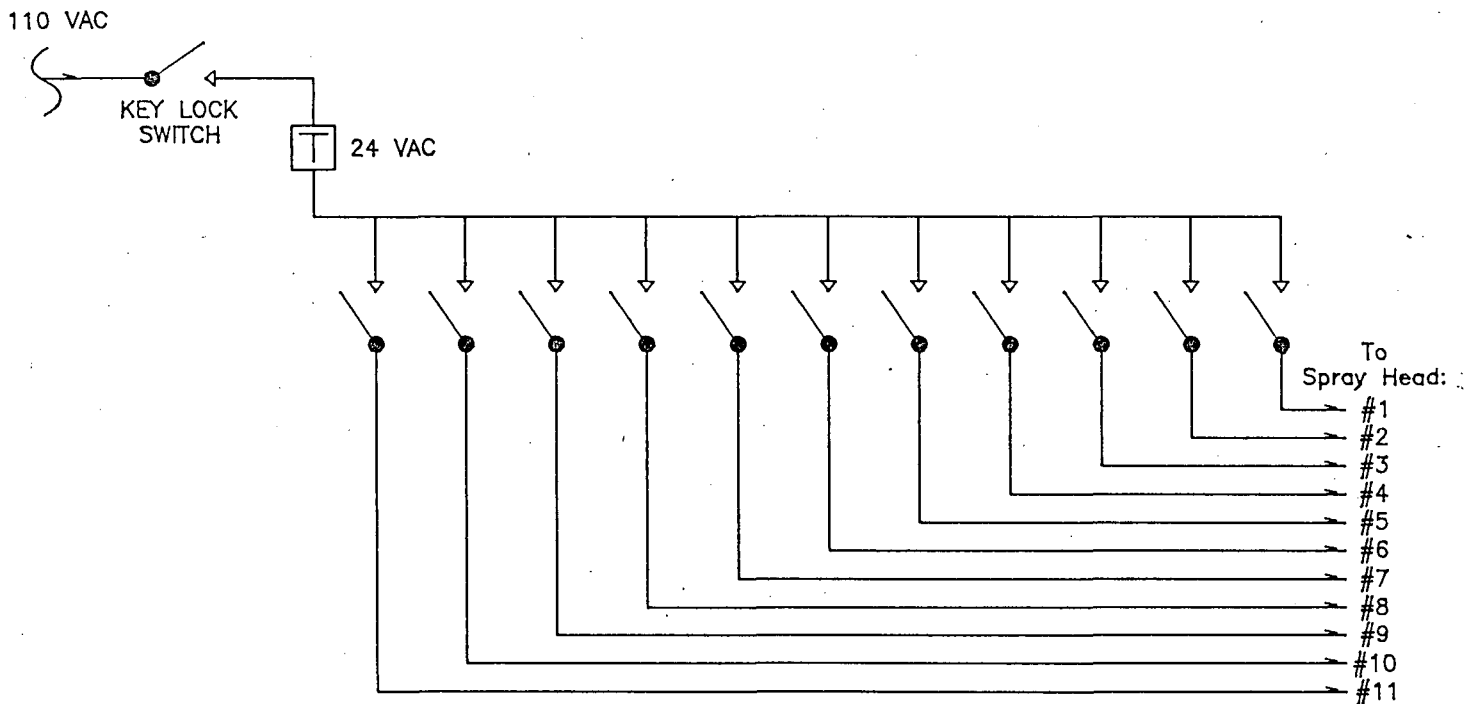
Rubber gloves and boots should be worn to prevent infection while cleaning pumps, handling and cleaning spray heads, manually applying leachate or dealing with any other soiled materials. Gloves are particularly important when the hands are burned or skin is broken from any wound.

Operators should be advised to keep unclean fingers from the nose, mouth and eyes. After work and before eating, the hands should be washed thoroughly with plenty of soap and water. The nails should be kept short and foreign matter removed. It should be noted that when the hands are clean, smoking pipes, cigarettes, cigars, eating or drinking may introduce infectious organisms into the mouth.


General care should be exercised when operating or maintaining this system.



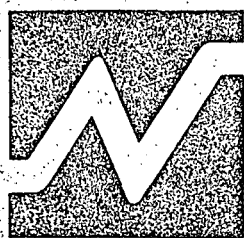
CONTROL PANEL LAYOUT



WIRING SCHEMATIC

REV. BY:	DESCRIPTION:	DATE:	DRAWN:
<b>Springstead Engineering, Inc.</b>  Consulting Engineers Planners Surveyors		<b>CONTROL PANEL &amp; WIRING SCHEMATIC FOR LECHATE RECIRCULATION SPRAY HEADS</b>	
DATE:	SCALE:	FILE:	JOB NO.:
10/29/92	N/A	CONT-PAN	921100.00
DESIGN:	DRAWN:	CHECKED:	SHEET: 1
YWE	E	JW	OF: 1

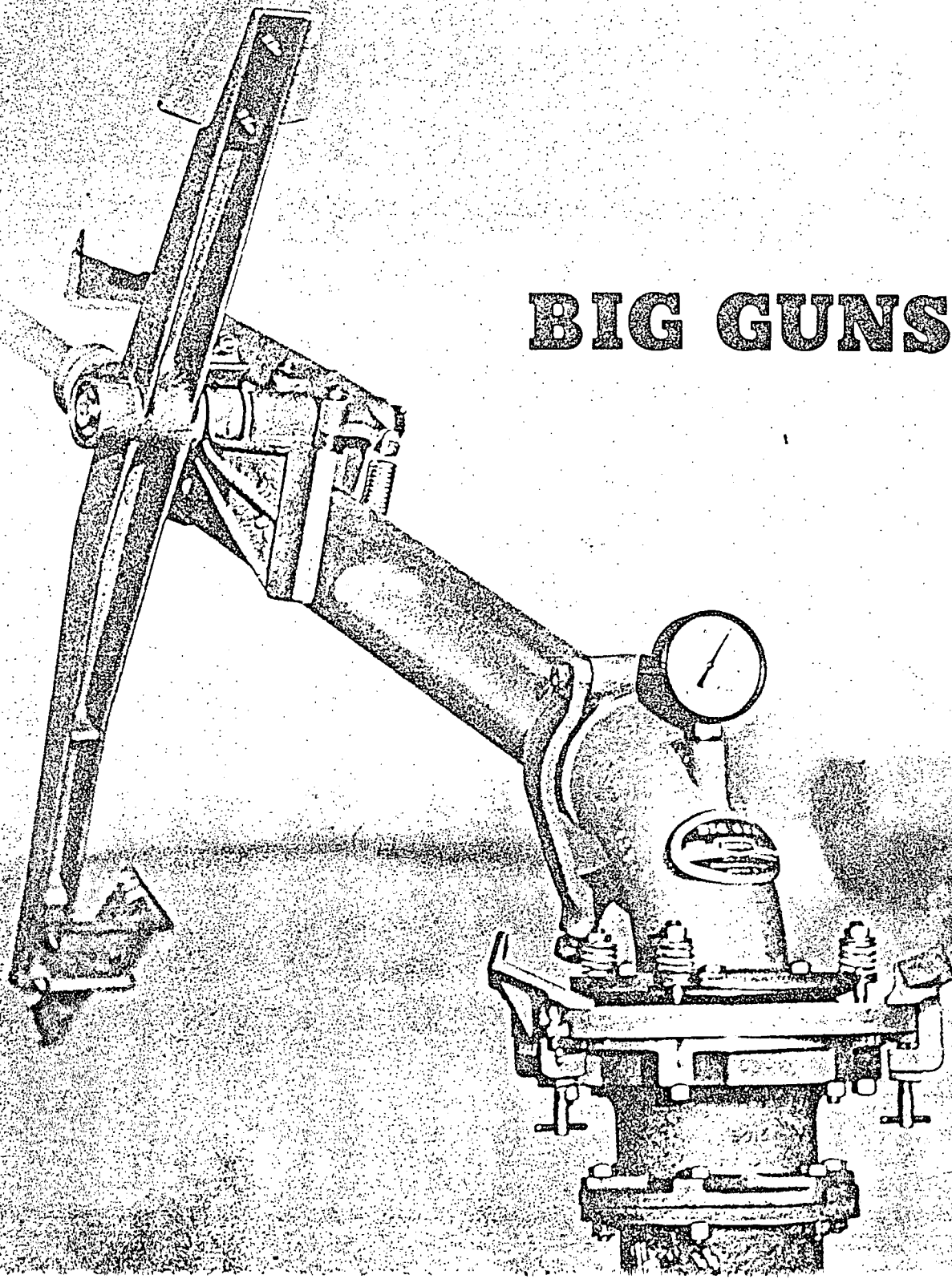




*innovation in irrigation™*

**NELSON IRRIGATION  
CORPORATION**

**BIG GUNS®**



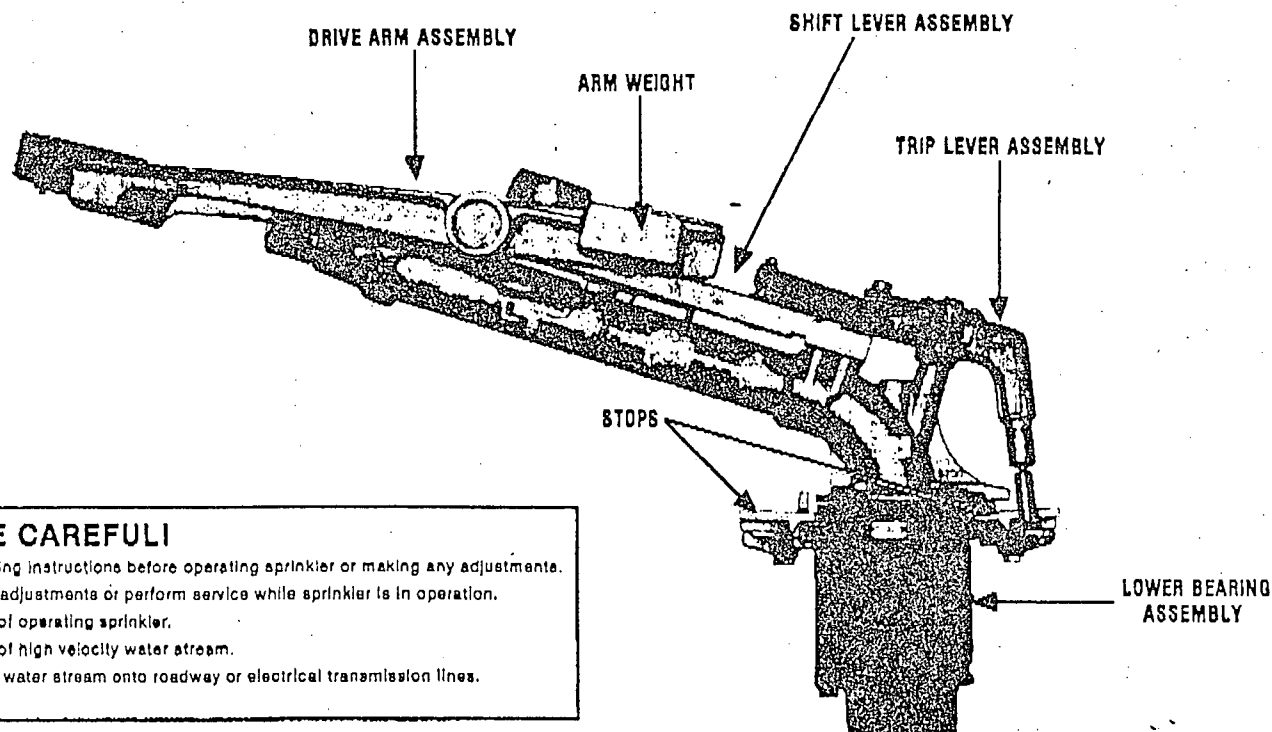


# Nelson Irrigation Corporation

Route 4, Box 169, Airport Road  
Walla Walla, Washington 99362

## OPERATION AND MAINTENANCE INSTRUCTIONS

### SR100 BIG GUN



#### BE CAREFUL!

1. Read operating instructions before operating sprinkler or making any adjustments.
2. Never make adjustments or perform service while sprinkler is in operation.
3. Stand clear of operating sprinkler.
4. Stand clear of high velocity water stream.
5. Never direct water stream onto roadway or electrical transmission lines.

### SET UP FOR OPERATION:

1. Install nozzle. If using ring nozzle set, install desired ring size in ring nozzle cap. The ring nozzle cap can be sufficiently tightened by hand.  
If using the 100DN ring nozzle, correct orientation is important. For reliable sprinkler operation, be sure to orient the ring with the correct side out and the "up" at the top of the nozzle. Incorrect orientation can result in failure of sprinkler to drive.
2. Adjust location of stops to give desired arc of coverage. Stops must be mounted so that arrows point toward each other and trip lever is located between arrows. If the stops are set incorrectly on the wrong end of the arc, the sprinkler will fail to reverse.
3. The SR100 is factory set for normal rotation speed. If a faster or slower speed is desired, move arm weight backward for faster operation or forward for slower operation.

### NOTE ON LUBRICATION:

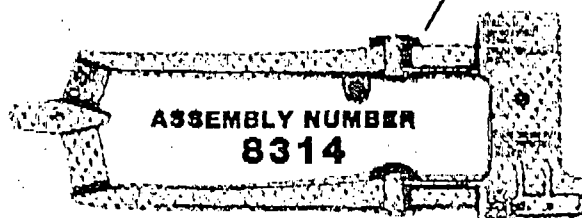
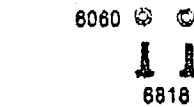
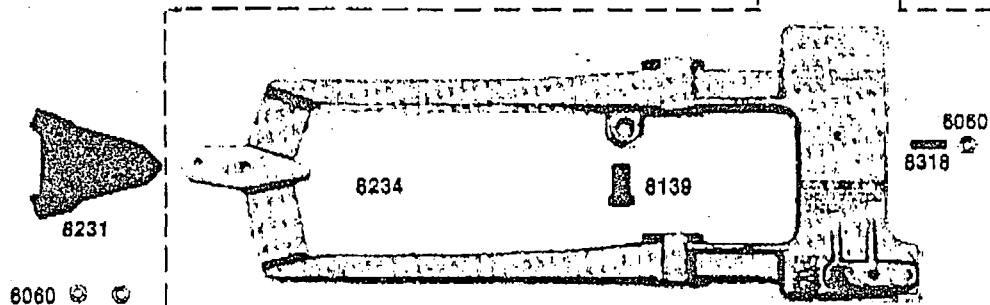
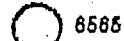
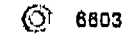
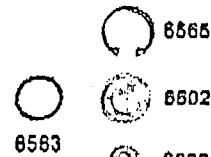
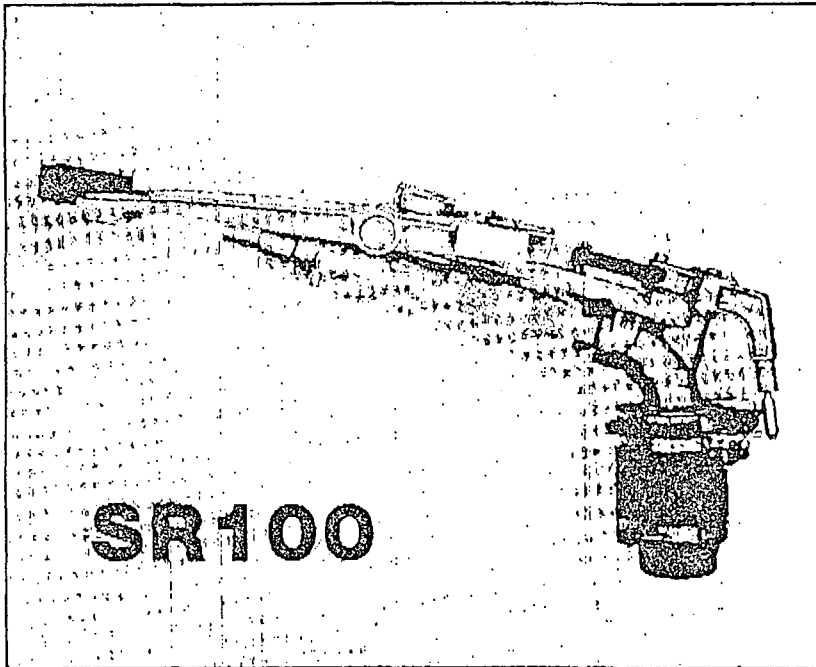
The BIG GUN® sprinkler is lifetime lubricated and does not require periodic lubrication. The ball bearings in the H.D. bearing operate in a water resistant lubricant that is packed into the housing cavities and retained by seals. If repair of the lower bearing is done, it is recommended to use Nelson #6143 lubricant or a good grade of water resistant lubricant such as Lubriplate 130-AA.

### WARRANTY AND DISCLAIMER

Nelson sprinklers are warranted for one year from date of original sale to be free of defective materials and workmanship when used within the working specifications for which the product was designed and under normal use and service. The manufacturer assumes no responsibility for installation, removal or unauthorized repair. The manufacturer's liability under this warranty is limited solely to replacement or repair of defective parts and the manufacturer will not be liable for any crop or other consequential damages resulting from any defects or breach of warranty. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES AND OF ALL OTHER OBLIGATIONS OR LIABILITIES OF MANUFACTURER. No agent, employee or representative of the manufacturer has authority to waive, alter or add to the provisions of this warranty, nor to make any representations or warranty not contained herein.



Route 4, Box 169, Airport Road  
Walla Walla, WA 99362-9426  
Phone: 509-525-7660  
FAX: 509-525-7807

**NELSON****PARTS LIST**SR100/P100/PL  
JANUARY 1986**SR100****P100 BIG GUN****ASSEMBLY NUMBER****8316**

8297



6818



6600

6598



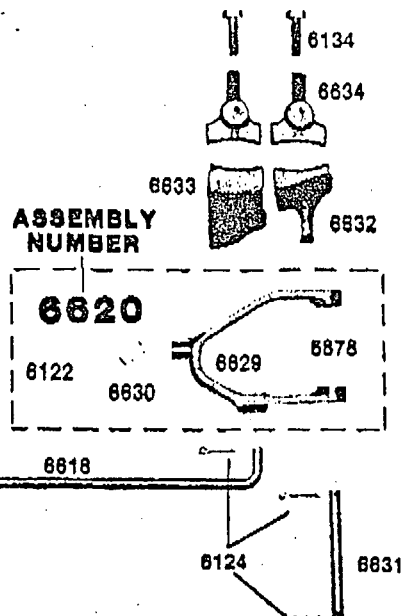
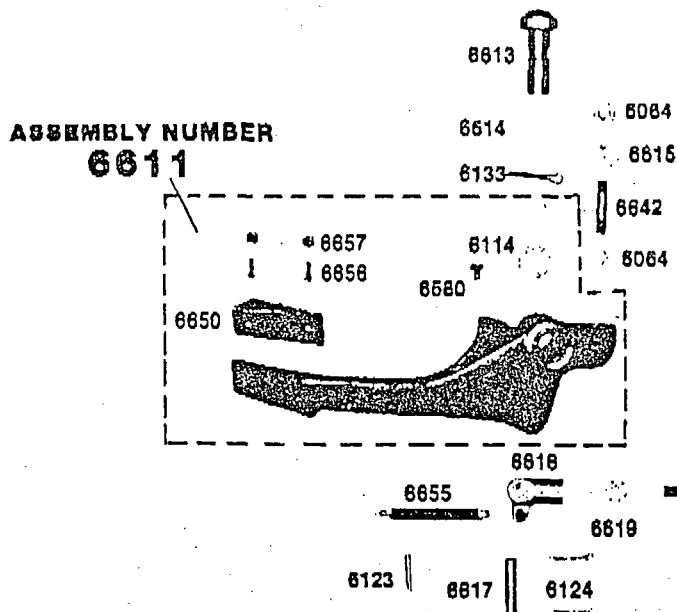
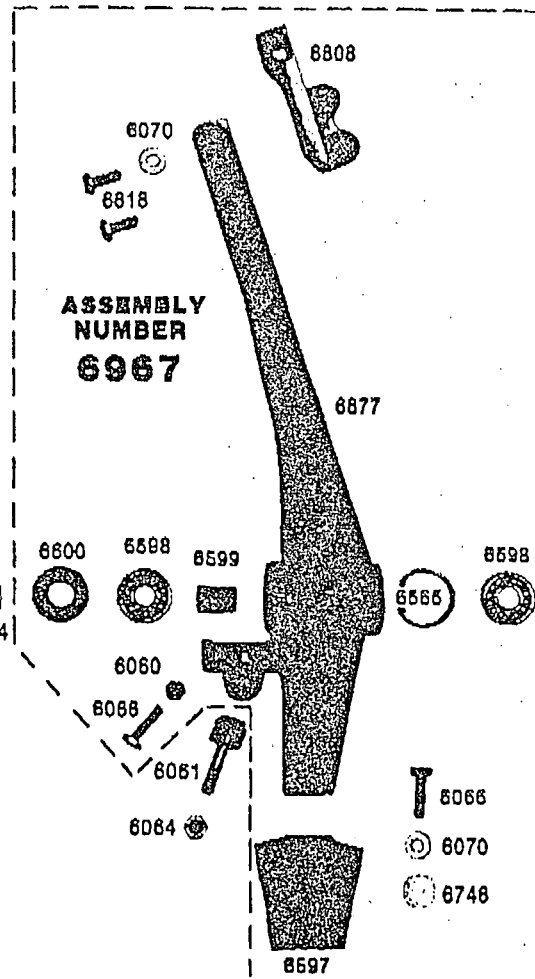
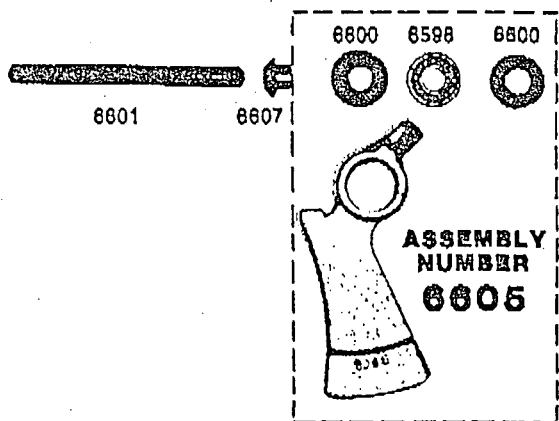
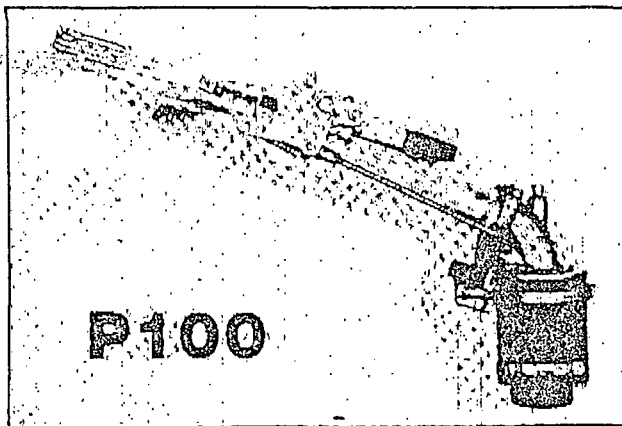
6565

6802



Innovation In Irrigation™

**NELSON IRRIGATION**  
**CORPORATION**Route 4, Box 189, Airport Road  
Walla Walla, WA 99362 U.S.A.  
Phone (509) 525-7660  
TELEX: 510-770-9341



## WARRANTY AND DISCLAIMER

Nelson BIG GUN sprinklers are warranted for one year from date of original sale to be free of defective materials and workmanship when used within the working specifications for which the product was designed and under normal use and service. The manufacturer assumes no responsibility for installation, removal or unauthorized repair. The manufacturer's liability under this warranty is limited solely to replacement or repair of defective parts and the manufacturer will not be liable for any crop or other consequential damages resulting from any defects or breach of warranty.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES AND OF ALL OTHER OBLIGATIONS OR LIABILITIES OF MANUFACTURER.

No agent, employee or representative of the manufacturer has authority to waive, alter or add to the provisions of this warranty, nor to make any representations or warranty not contained herein.

## SR100

ASSEMBLY NUMBER  
8325

8233

8272

8323-017

6580

6580

6084

7029

8197

6714 8409

8139

6045

6054

8326

6054

6048

ASSEMBLY NUMBER  
8319

8311

8283

8265

8323-004

8321

8281

8321

8317

8320

8193

8282

8336

8417

8283

8198

8198

8199

6134

6634

8322

8276

8277

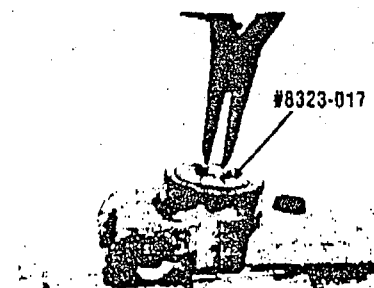
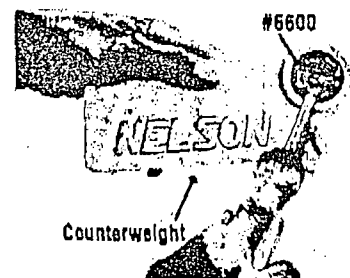
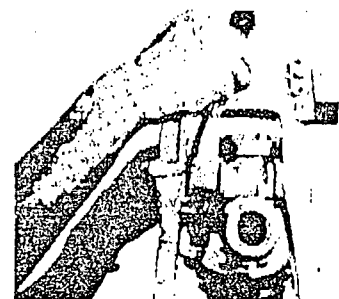
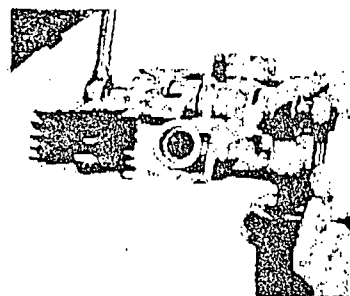
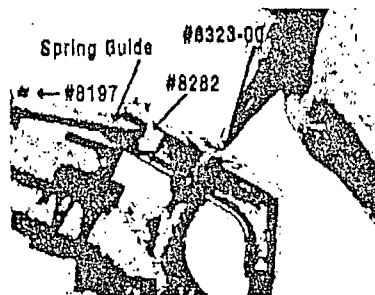
8409

6714

# SR100 MAINTENANCE

See SR100 PL for complete parts list and description.

## DISASSEMBLY



### STEP 1 (Trip Lever)

Remove #8714 Cotter Pin from #8197 Pin. Remove two #8311 Screws and #8283 Cap. Using small retaining ring pliers, remove #8323-004 Retaining Ring. Pull entire trip lever assembly and spring guide from gun. At this time inspect wear on #8282 Follower. Replace if worn.

### STEP 2 (Drive Arm)

Using internal retaining ring pliers, remove two #6555 Retaining Rings from both arm hubs. Remove two #6802 Arm Caps. Using two 11/16" sockets, loosen and remove one #6603 Nut from left side of arm. Holding the opposite #6603 Nut, pull shaft free from hub.

### STEP 3

Using a thin bladed screwdriver, push #8327 Spacer back into arm hub. Holding onto counterweight, remove arm and weight.

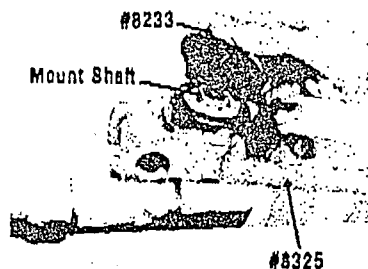
### STEP 4

Inspect seal spacer and counterweight spacer for scarring. If spacers show excessive wear, replace both spacers and #6600 Seals. To remove seals, drive thin bladed screwdriver under lip of seal and pop seal out. To replace seals, use block of wood over seal making sure lip is to the outside, and secure by lightly tapping on wooden block by setting seal lip flush with assembly.

### STEP 5 (Shift Lever)

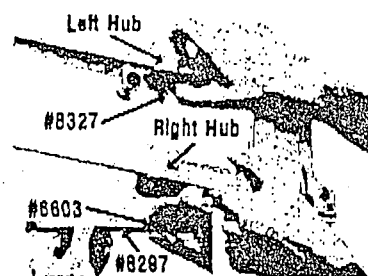
Remove #8233 Cap. Using external retaining ring pliers, remove #8323-017 retaining ring. Pull shift lever from mount.

## REASSEMBLY



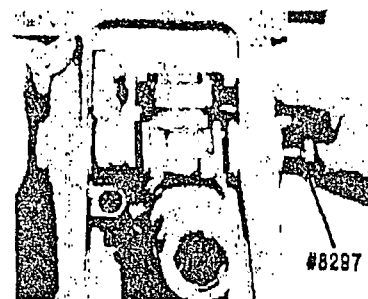
### STEP 6 (Shift Lever)

At the upper portion of the gun, inspect the Mount Shaft for wear. Press the #8325 Shift Lever assembly onto the mount. With external retaining ring pliers, snap the #8323-017 Retaining Ring on. Screw on #8233 Cap.



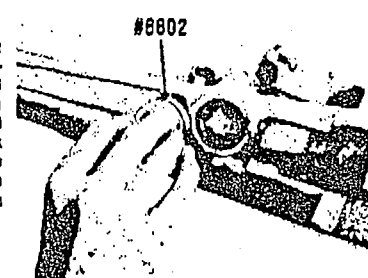
### STEP 7 (Drive Arm)

Install #8327 Spacer flush with #6600 Seal in left arm hub. Insert two #6807 conical spacers into seals on inside of counterweight right drive arm hub. Start #8287 shaft into right arm hub.



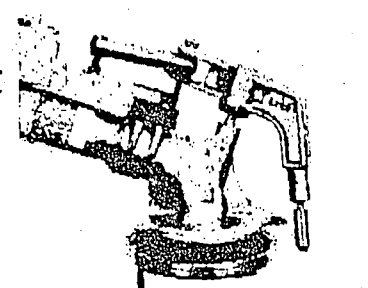
### STEP 8

Holding counterweight in place on the left side of shift lever, roll drive arm into position shown by pushing on the left arm bearing. Work #8327 Spacer into seal on counterweight. Be sure spacer is correctly positioned in counterweight to prevent cutting of the seal lip. Push shaft through the bearings and spacers and assemble #6603 Nut. Torque to 25 ft. lbs. using two 11/16" sockets.



### STEP 9

Snap in two #6802 Arm Caps. Install two #6555 Retaining Rings. Arm must have free movement at this point. If arm feels sticky, assure that lip seals are not rubbing on each other.



### STEP 10

Mount trip lever assembly along with spring guide onto their respective pins. Install #8323-004 Retaining Ring. Install #8283 Cap using two #8311 Screws. Install #8409 Washer and #8714 Cotter Pin onto spring guide.

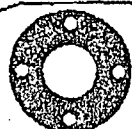
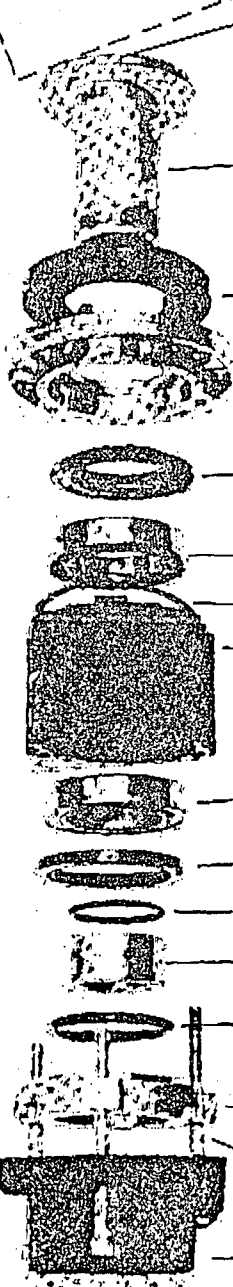
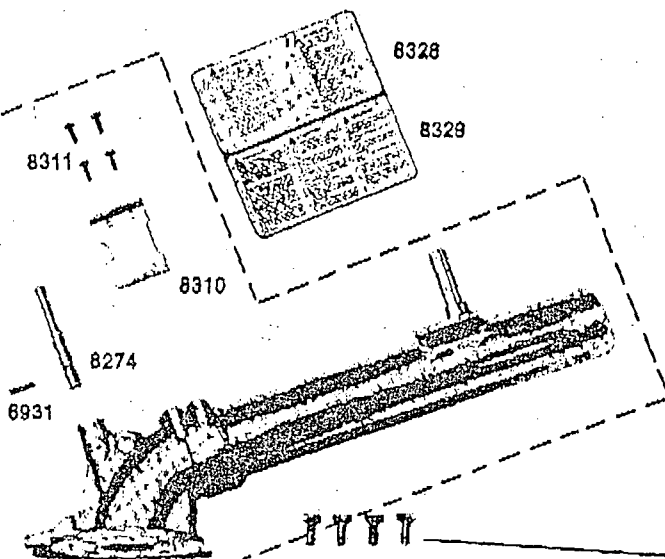
ASSEMBLY NUMBERS

SR100

- 8° 8312-018
- 1° 8312-021
- 4° 8312-024

P100

- 10° 7677
- 21° 7021
- 24° 7023



SEAL



HDI	HDF
8838(4)	8838(4)
7008	7008
7001	7001
7031	7031
7004(8)	7004(8)
8898	8898
8888	8888
8887	8887
8569	8569
8568(2)	8568(2)
7002	7002
8559	8559
8898	8898
8898	8898
7003	7003
7007	7007
7877	7877

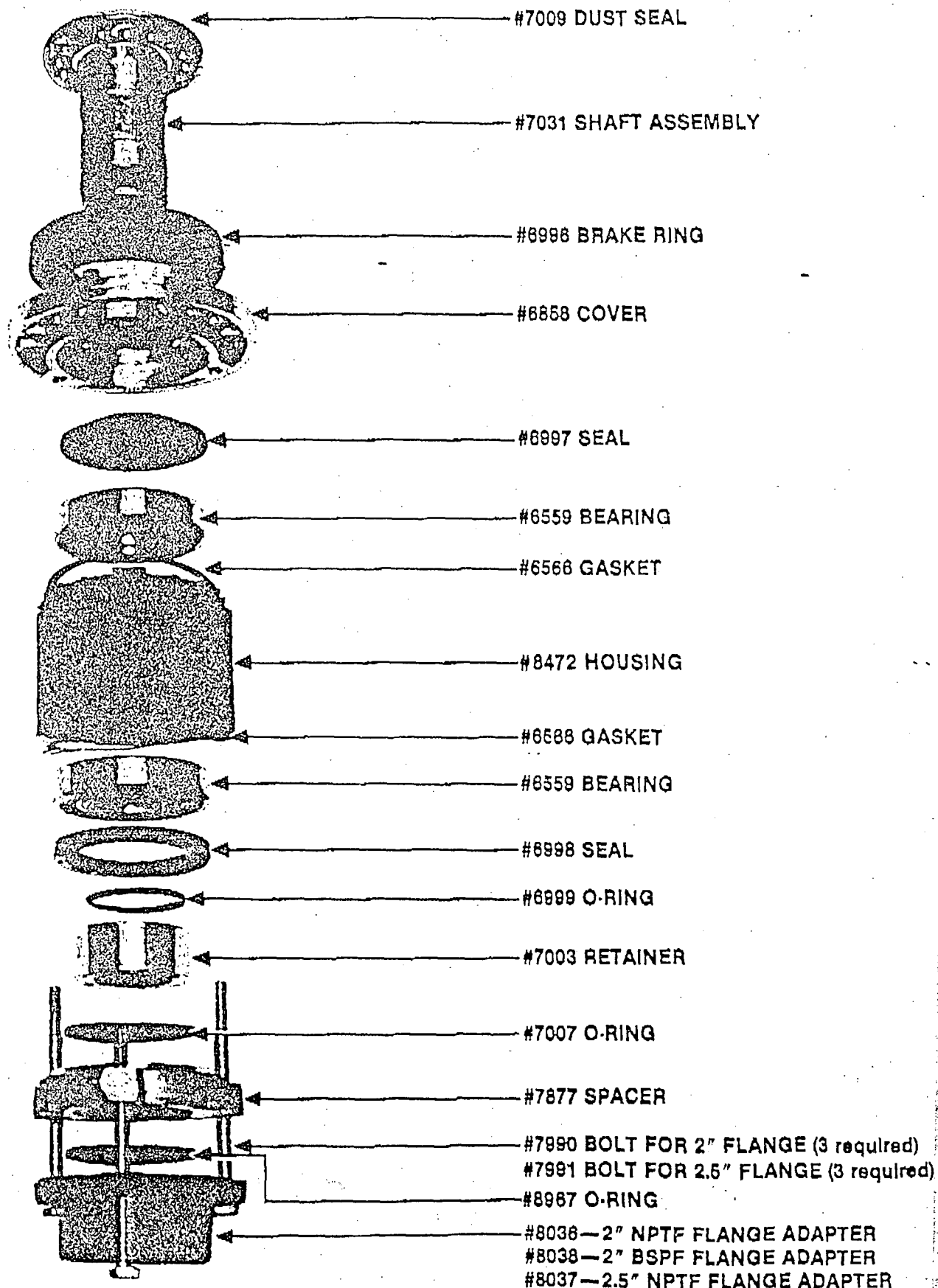
2"		2 1/2"		Flange
NPT	BSP	NPT	BSP	
7990	7990	7991	7991	7008
8036	8038	8037	8037	6918



2"		2 1/2"	
NPT	BSP	NPT	BSP
8860	7050	7040	7051
7000	7000	7000	7000
8010	8010	7039	7039

SEAL

# HDI LOWER BEARING ASSEMBLY PARTS LIST



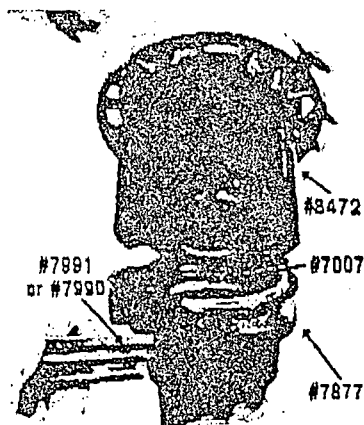
See 100 LB PL Parts List for details on other 100 Series Lower Bearing Assemblies.



# LOWER BEARING MAINTENANCE

See back page for parts list.

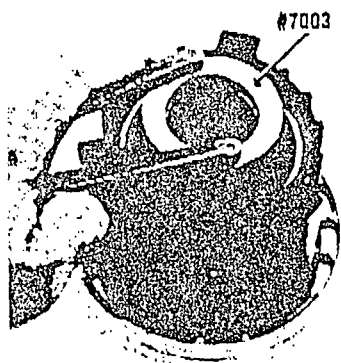
## DISASSEMBLY



### DISASSEMBLY (Lower Unit)

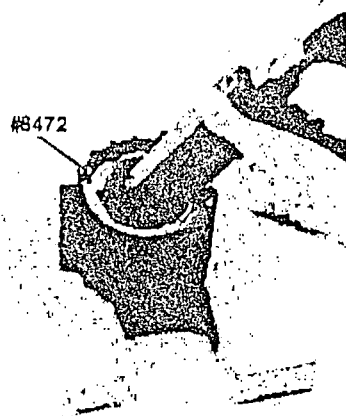
#### STEP 11

Remove three 7990 or 7991 bolts from flange. Separate #8472 housing from #7877 spacer. Remove #7007 O-Ring from #7877 spacer.



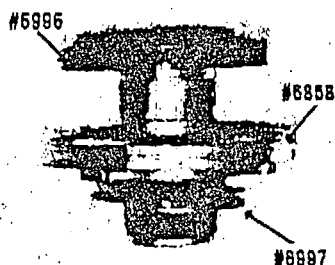
#### STEP 12

The #7003 retainer is removed by using a spanner wrench. To hold the #7031 shaft assembly from rotating insert two 5/16-18 bolts (#8835) into shaft top. Clamp bolt heads into a vise securely. Remove retainer and #8472 housing from bearing shaft.



#### STEP 13

Remove the #8998 seal. To remove the two #6559 bearings use a hammer and three blocks of wood. Lightly tap uniformly around the inner race of bearing until removed. Bearings are removed from opposite sides of the #8472 housing.

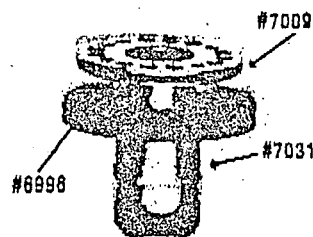


#### STEP 14

Remove #6858 cover from shaft. Remove #6997 seal from cover. Remove #6998 brake ring and #7009 dust seal from shaft.

Inspect all parts for wear and replace as required.

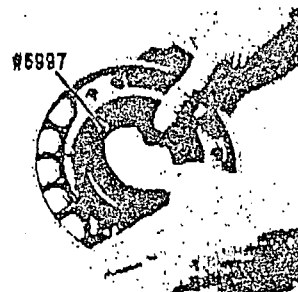
## REASSEMBLY



### REASSEMBLY (Lower Unit)

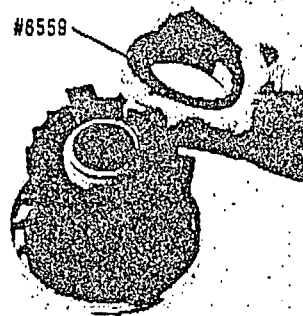
#### STEP 15

Assemble #7009 dust seal onto #7031 shaft assembly. Slide #6998 brake ring onto shaft. Locate the four studs of the brake ring in the center holes between the smaller threaded holes.



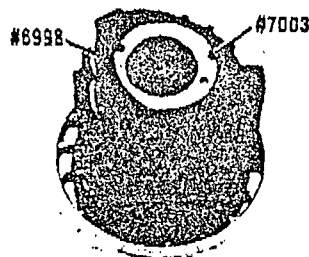
#### STEP 16

Place #6997 lip seal into #6858 cover as shown. Pack #6559 bearing with #6143 lubricant or equivalent. (See "Notes on Lubrication" on the front cover.) Press bearing into #6858 cover. Slide cover assembly onto bearing shaft. Caution: Do not get any grease on brake surfaces.



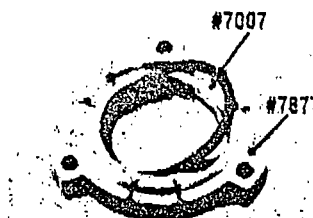
#### STEP 17

Assemble #6558 gasket. Press on #8472 housing. Fully pack housing with #6143 lubricant. Assemble #6559 bearing into housing.



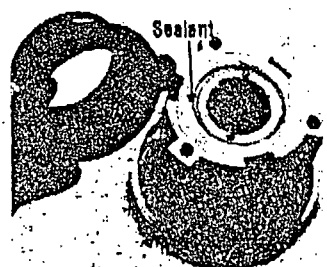
#### STEP 18

Install #6998 O-Ring in #7003 retainer and assemble retainer on shaft. Using method described in disassembly (lower unit) instructions Step 12. Secure bearing shaft from rotating. Torque on #7003 retainer to 65-70 foot pounds. Assemble #6998 lip seal. Orient with lip side out.



#### STEP 19

Assemble #6858 gasket. Install #7007 O-Ring in #7877 spacer and mount onto assembly. Spread a thin bead of #6995 or equivalent RTV silicone sealant onto spacer. Mount on flange using required bolts. Torque bolts to 130-150 inch pounds.



**BE CAREFUL!**



1. Read operating instructions before operating sprinkler or making any adjustments.
2. Never make adjustments or perform service while sprinkler is in operation.
3. Stand clear of operating sprinkler. Fast reverse action may cause injury.
4. Stand clear of high velocity water stream.
5. Never direct water stream onto roadway or electrical transmission lines.

**TROUBLE SHOOTING**

**Problem:** Drive arm does not swing properly.

- Solution:**
- a. Nozzle or barrel plugged with debris — unplug.
  - b. Arm Shaft loose — retighten nut.
  - c. Bearings dirty or corroded — replace.
  - d. Insufficient pressure — 40 PSI (minimum).
  - e. Broken or worn drive arm spoon — replace.

**Problem:** Rotation Speed of Sprinkler Too Fast

- Solution:**
- a. Brake worn — replace.
  - b. Lubricant on brake ring — disassemble, clean, replace as necessary.
  - c. Forward drive too fast — adjust drive spoon 1/16" out of stream.

**Problem:** Sprinkler Does Not Reverse ("stalls-out" at Engagement Cam)

- Solution:**
- a. Damaged or worn leading edge on reverse arm vane — replace.
  - b. Broken, worn or seized linkage — replace or clean as needed.
  - c. Forward drive too slow — adjust drive spoon into stream 1/16". Check nozzle pressure to be sure it is 40 PSI or greater.

**Problem:** Reverse Arm Will Not Disengage (Stalls out at Disengagement Cam)

- Solution:**
- a. Reverse speed too slow — adjust reverse speed cam to faster setting.
  - b. Damaged or worn leading edge on reverse arm vane — replace.
  - c. Improper clearance between reverse roller and disengagement cam — reverse roller should be adjusted to clear the disengagement cam by 0" to 1/32". Be sure nozzle pressure is 40 PSI or greater.

**Problem:** Insufficient Water Being Distributed in Close to Sprinkler.

- Solution:**
- a. Remove plug, install secondary nozzle.

**Problem:** "Ragged" or Turbulent Stream Discharge

- Solution:**
- a. Debris trapped in nozzle or barrel — remove.
  - b. Inlet riser connection does not allow smooth flow of water into gun. Insert 625V (2½") or 600V (2") stream straightener vane into 2½" or 2" x 6" nipple at base of gun.
  - c. Nozzle worn excessively or damaged — replace.

**Warranty and Disclaimer**

Nelson BIG GUN® sprinklers are warranted for one year from date of original sale to be free of defective materials and workmanship when used within the working specifications for which the product was designed and under normal use and service. The manufacturer assumes no responsibility for installation, removal or unauthorized repair. The manufacturer's liability under this warranty is limited solely to replacement or repair of defective parts and the manufacturer will not be liable for any crop or other consequential damages resulting from any defects or breach of warranty. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES AND OF ALL OTHER OBLIGATIONS OR LIABILITIES OF MANUFACTURER. No agent, employee or representative of the manufacturer has authority to waive, alter or add to the provisions of this warranty, nor to make any representations or warranty not contained herein.

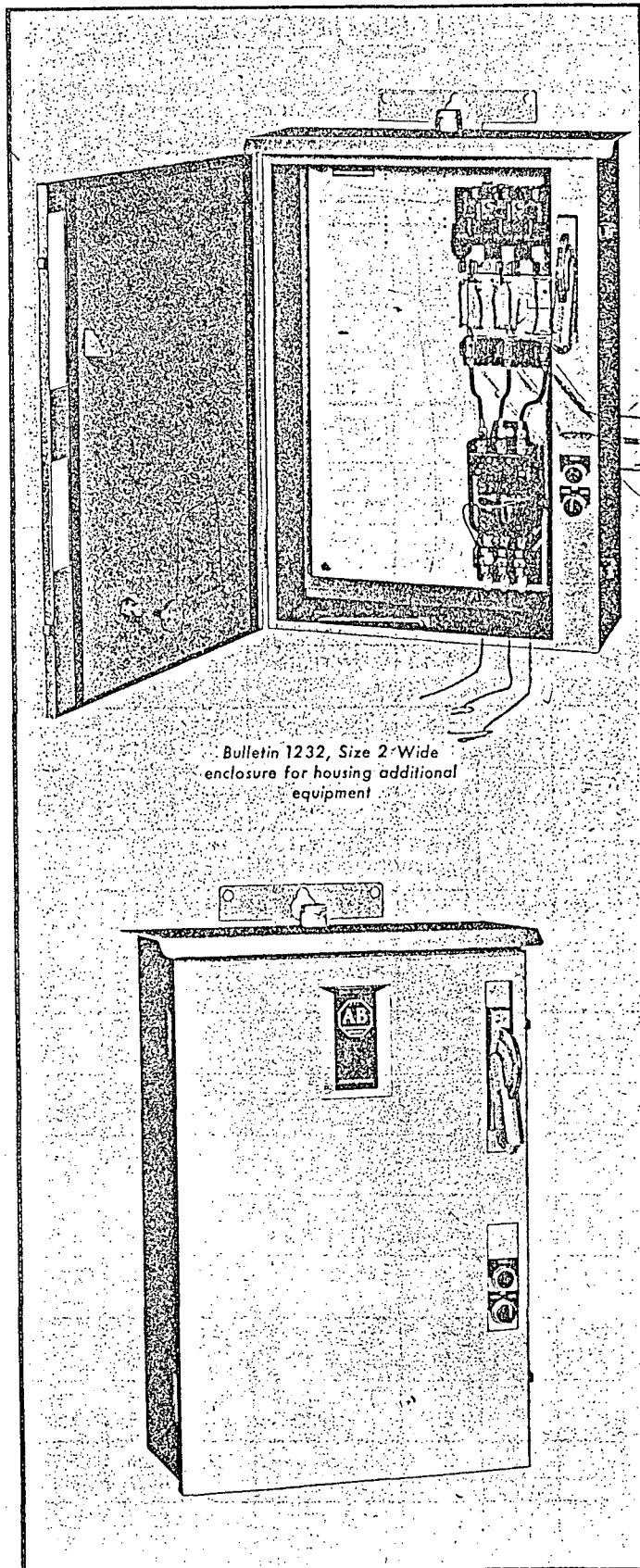


innovation in irrigation™

**NELSON IRRIGATION  
CORPORATION**

Route 4, Box 169, Airport Road  
Walla Walla, WA 99362 U.S.A.  
Phone (509) 525-7660  
TELEX: 510-770-9341

## Best Available Copy



**DESCRIPTION** — The Bulletin 1232 (with fusible disconnect switch) and Bulletin 1233 (with circuit breaker) combination, full voltage starters are specifically designed for irrigation and similar outdoor pumping applications.

The pump control panel includes a contactor, a three-pole manually reset thermal overload relay with the reset button on the door, either a fusible disconnect switch or a circuit breaker, a "Hand-Off-Auto" selector switch and a "Start" button on the front of the cabinet.

There is a choice of either the narrow or wide, weather-resistant enclosure with a rugged, baked metallic enamel, outdoor finish. Wing brackets provide for pole or cross bar mounting. A watertight, threaded conduit hub is supplied. Knockouts are at the bottom. Padlock provisions are furnished on the door latches and the disconnect handle (both the "On" and "Off" positions).

**HAND OPERATION** — When the selector switch is in the "Hand" position, pushing the "Start" button will close the contactor and start the pump motor. The motor will continue to run until the selector switch is turned to "Off". Undervoltage protection is provided by auxiliary contact "M" which protects against automatic restarting after a power failure. (See Diagram).

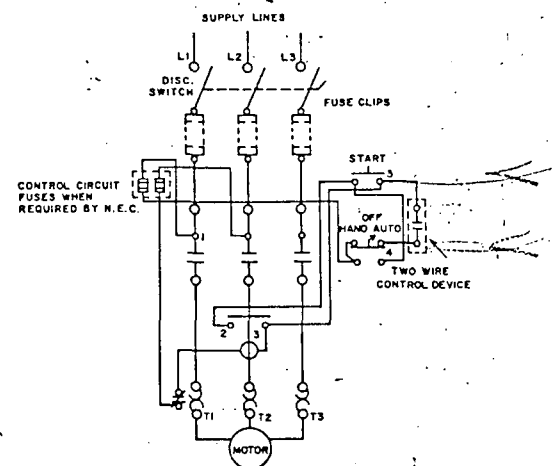
**AUTOMATIC OPERATION** — In the "Auto" position, the start button and hold-in contacts "M" are by-passed. A pressure switch (optional equipment) controls the pump motor automatically. In the event of a power failure, the motor will start automatically when the power returns.

**OPTIONAL EQUIPMENT** — A Bulletin 849 pneumatic type backspin timer is available at additional cost. For prices of this and other optional equipment, see Modifications on Page 218.

**ORDERING INFORMATION** — Catalog Number. Fuse Clip Rating. Motor horsepower or full load current. Line voltage, frequency and number of phases. Modifications, if any.

## TYPICAL WIRING DIAGRAM

(See Applicable Codes And Laws)



## OPERATION

**"Hand" Position** — Press "Start" button to start motor. Turn selector switch to "Off" to stop motor. This provides three wire control.

**"Off" Position** — Control circuit is open.

**"Auto" Position** — Full automatic control is obtained through the two wire control device.

**50 HERTZ PANELS** — Panels as listed in the price table are suitable for use on 50 Hz at the coil voltages listed in the table below.

Hertz	Coil Voltage			
60	120	240	480	600
50	110	220	440	550

**380 VOLTS, 50 HERTZ PANELS** — Listed prices for 460 volt panels will apply to panels for use on 380 volts, 50 hertz. When ordering, use the listed catalog number and replace the third letter with the letter "N". The table below lists the maximum horsepower ratings.

NEMA Size	0	1	2	3	4	5
Horsepower	5	10	25	50	75	150

**25 HERTZ PANELS** — Listed prices will apply to panels for use on 25 Hz. When ordering, use the listed catalog number and replace the last letter with a letter selected from the table below.

Hertz	Coil Voltage			
	110	220	440	550
25	M	J	K	L

#### MODIFICATIONS —

Bulletin 849 pneumatic timing relay — mounted and wired . . . \$156

Bulletin 830 pressure switch — mounted and wired . . . \$48  
(Maximum pressure 80 lbs., differential, 15-25 lbs.)

Lightning arrester — mounted and wired . . . \$80  
(Bulletin 1232X-1233X only)

Control Transformer — Refer to Page 74

Pilot Light — Refer to Page 74

Fused Control Circuit — Refer to Page 74. (Control circuit overcurrent protection must be provided if the control circuit conductors extend beyond the enclosure. Refer to the National Electrical Code.)

#### BULLETIN 1232 — WITH FUSIBLE DISCONNECT

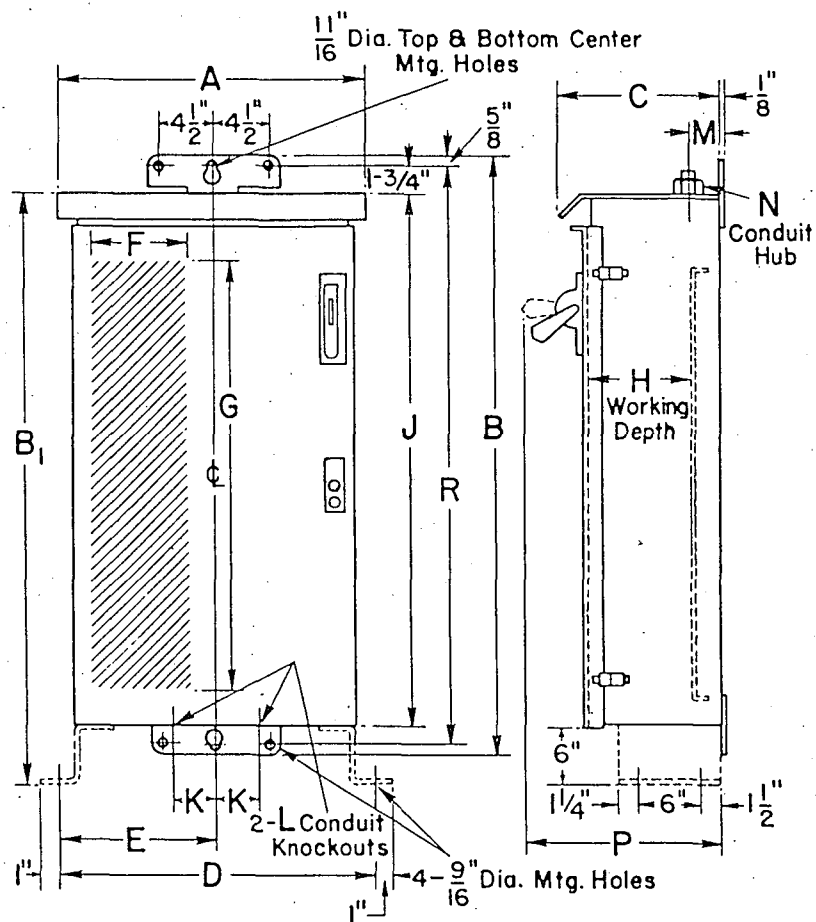
3 PHASE • 600 Volts Maximum • 60 Hertz • With 3 Pole Overload Protection

**HEATER ELEMENTS** — Prices do not include heater elements. Starters require 3 Type N overload relay heater elements at \$3.00 list each. Refer to page 280 for selection tables.

Maximum Horsepower Ratings Full Load Current must not exceed "Continuous Ampere Rating"		Starter Coil Voltage	Continuous Ampere Rating		Fuse Clip Rating Amperes	NEMA Type 3R		Price
Motor Voltage	HP		NEMA Size	↓		Catalog Number		
						Narrow Enclosure	Wide Enclosure	
200 Volts	7½	208 Volts	1	27	30 60	1232-BNH24 BNH25	1232X-BNH24 BNH25	\$251 255
	10		2	45	60 100	1232-CNH25 CNH26	1232X-CNH25 CNH26	341 365
	25		3	90	100 200	1232-DNH26 DNH27	1232X-DNH26 DNH27	553 599
	40		4	135	200 400	1232-ENH27 ENH28	1232X-ENH27 ENH28	1039 1137
	75		5	270	400 600	1232-FNH28 FNH29	1232X-FNH28 FNH29	2239 2485
230 Volts	7½	240 Volts	1	27	30 60	1232-BNA24 BNA25	1232X-BNA24 BNA25	251 255
	15		2	45 2.5 → 60 100	1232-CNA25 CNA26	1232X-CNA25 CNA26	341 365	
	30		3	90	100 200	1232-DNA26 DNA27	1232X-DNA26 DNA27	553 599
	50		4	135	200 400	1232-ENA27 ENA28	1232X-ENA27 ENA28	1039 1137
	100		5	270	400 600	1232-FNA28 FNA29	1232X-FNA28 FNA29	2239 2485
460 Volts	10	480 Volts	1	27	30 60	1232-BNB24 BNB25	1232X-BNB24 BNB25	255 259
	25		2	45	60 100	1232-CNB25 CNB26	1232X-CNB25 CNB26	347 369
	50		3	90	100 200	1232-DNB26 DNB27	1232X-DNB26 DNB27	565 607
	100		4	135	200 400	1232-ENB27 ENB28	1232X-ENB27 ENB28	1047 1153
	200		5	270	400 600	1232-FNB28 FNB29	1232X-FNB28 FNB29	2287 2569
575 Volts	10	600 Volts	1	27	30 60	1232-BNC24 BNC25	1232X-BNC24 BNC25	255 259
	25		2	45	60 100	1232-CNC25 CNC26	1232X-CNC25 CNC26	347 369
	50		3	90	100 200	1232-DNC26 DNC27	1232X-DNC26 DNC27	565 607
	100		4	135	200 400	1232-ENC27 ENC28	1232X-ENC27 ENC28	1047 1153
	200		5	270	400 600	1232-FNC28 FNC29	1232X-FNC28 FNC29	2287 2569

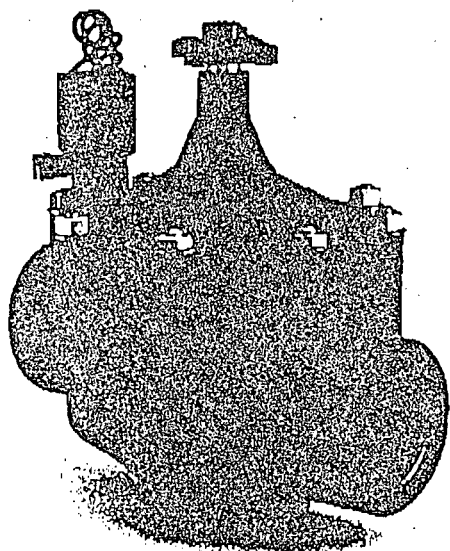
*use fusible disconnect*

## APPROXIMATE DIMENSIONS



Bulletin Number	Size	Dimensions In Inches .																					
		Narrow Enclosure						Wide Enclosure									J	K	L	M	N	P	R
		A Wide	B High	B <sub>1</sub> High	C Deep	D	E	A Wide	B High	B <sub>1</sub> High	C Deep	D	E	F	G	H							
1232- 1232X	1	15½	35	—	9⅞	—	—	22	35	—	9⅞	—	—	10	26	7½	30¼	1	⅞ x 1⅞	2	1	13⅞	33¼
	2	15½	35	—	9⅞	—	—	22	35	—	9⅞	—	—	10	26	7½	30¼	1½	1⅜ x 1⅜ <sub>32</sub>	2⅞	1½	13⅞	33¼
	3	16½	45	—	9⅞ <sub>16</sub>	—	—	23	45	—	9⅞ <sub>16</sub>	—	—	10	34	7½	40⅜	1¾	1⅜ <sub>32</sub> x 1⅜ <sub>32</sub>	2½	2	14⅞	43¼
	4	22	54	—	11	—	—	27	54	—	11	—	—	9	39	9¼	49⅜	2¼	2⅞ <sub>32</sub> x 3	3	2½	18	52¼
	5	23	—	66⅜	11	23½	11¼	30	—	66⅜	11	30½	15¼	11	50	9¼	60⅜	2¼	3 x 3⅞	4⅞	3	18	—
1233- 1233X	1	15½	35	—	9⅞	—	—	22	35	—	9⅞	—	—	11	26	7½	30¼	1	⅞ x 1⅞	2	1	13⅞	33¼
	2	15½	35	—	9⅞	—	—	22	35	—	9⅞	—	—	11	26	7½	30¼	1½	1⅜ x 1⅜ <sub>32</sub>	2⅞	1½	13⅞	33¼
	3	16½	45	—	9⅞ <sub>16</sub>	—	—	23	45	—	9⅞ <sub>16</sub>	—	—	10	34	7½	40⅜	1¾	1⅜ <sub>32</sub> x 1⅜ <sub>32</sub>	2½	2	14⅞	43¼
	4	16½	45	—	9⅞ <sub>16</sub>	—	—	23	45	—	9⅞ <sub>16</sub>	—	—	10	34	7½	40⅜	2¼	2⅞ <sub>32</sub> x 3	3	2½	14⅞	43¼
	5	22	54	—	11	—	—	27	54	—	11	—	—	9	39	9¼	49⅜	2¼	3 x 3⅞	4¼	3	18	52¼

100 Series Valves

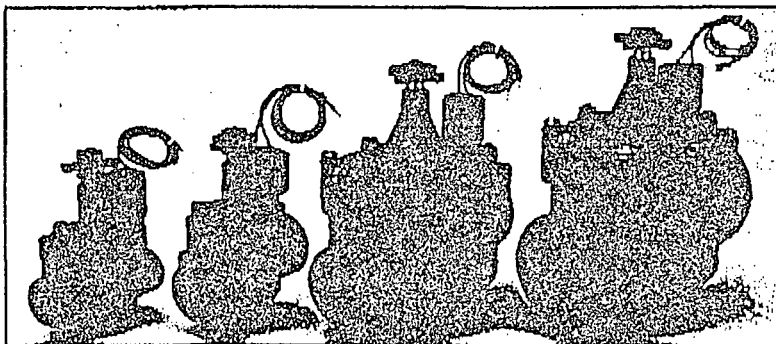


## 100 Series Valves — 5 Year Warranty

The 100 Series Valves form the backbone of the Hardie valve line. These are the valves that revolutionized the turf valve industry 15 years ago. Today many of the original valves are still out in the field hard at work.

The 100 Series line is available in sizes from 1", 1½", 2" and 3" with many options and configurations. If a valve that suits your particular need isn't found here, please consult the factory as custom applications and specialty valves are our forte.

Below you will find some of the features common to all of the 100 Series line. The following pages will detail unique features of each of the valves in the 100 Series line.



## Features of the 100 Series Line:

**Sealed Solenoid Assembly**  
Prevents dirt and moisture from interfering with direct burial operation.

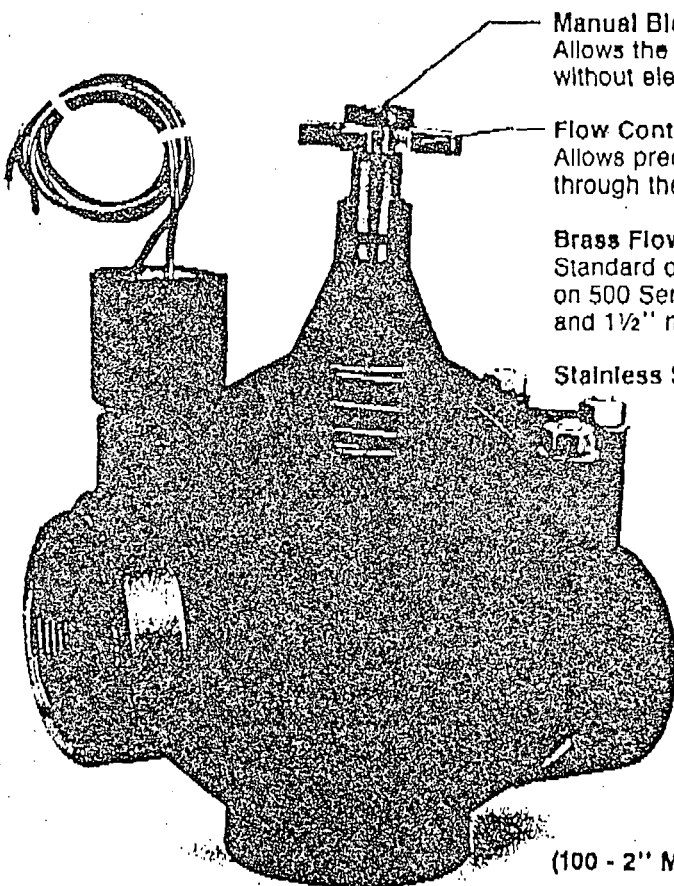
**Non-Corrosive Construction**  
Body, bonnet, solenoid housing and internal parts are molded from glass reinforced nylon. Provides outstanding strength characteristics. Unaffected by rust or electrolysis.

**Ultra N Diaphragm**  
Nylon reinforced for strength up to 600 lbs.

**Slow Closing**  
Guards against pipe damage and irritating noise. Prevents pipe hammer and surges.

**Self Cleaning/Easy Maintenance**

Each cycle cleans internal orifices. All parts are easily accessible without removing the valve from the system.



**Manual Bleed Button**  
Allows the opening and closing of the valve without electrical or hydraulic power.

**Flow Control Handle**  
Allows precise adjustment of water flow through the valve.

**Brass Flow Control Stem**  
Standard on 2" and 3" models (stainless steel on 500 Series). High strength synthetic on 1" and 1½" models.

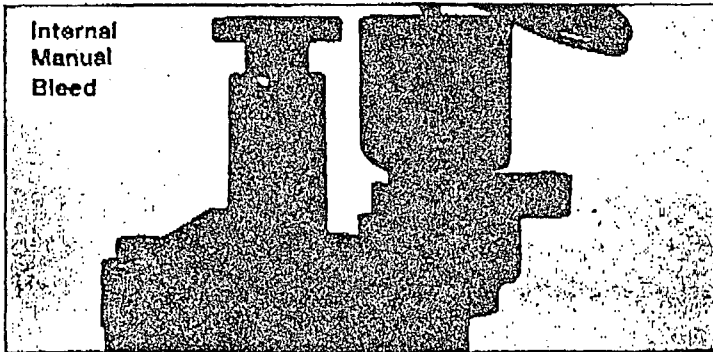
**Stainless Steel Springs and Hardware**  
Assures long life under the most adverse conditions.

**Internally Molded Studs**  
Standard on 2" and 3" models (screw inserts on 1" and 1½" models).

**Two Inlets**  
Provides freedom of installation. Straight globe or angle design. A plug is supplied for the unused inlet.

(100 - 2" Model Shown.)

As a standard feature, the Hardie 100 Series Valve now has internal bleeds. By a simple twist of the lever you can open or close the valve manually without controller input and with no external bleed of water. A great feature for installations utilizing valve boxes or where valves will be operated manually prior to manifolds are in non-landscaped areas and/or controllers being activated. The most practical approach for manual operation of valves.



## SPECIFICATIONS:

- Sizes: 1", 1½", 3" female NPT.
- Materials: Body - glass reinforced nylon.  
Diaphragm - reinforced Buna-N.  
Hardware and Springs - brass and stainless steel.
- Electrical: 24 volt AC electrically actuated, .3 amp inrush, .2 amp holding.
- Working Pressures: minimum - 10 psi  
maximum - 150 psi

## OPTIONS:

- BSP female threaded inlet and outlet.
- Other voltages and DC solenoids (see page 35).
- Internal manual bleed adaptor #1194 (see photo below).

## 100 Series Electric Globe/Angle Valves

The leader in synthetic irrigation valves, these electric remote control valves are designed for use in automatic irrigation systems. Molded of glass reinforced nylon which provides extreme strength even at elevated temperatures. Available in sizes from 1" to 3" with two inlets for angle or globe installation.

## APPLICATIONS:

Residential, commercial and industrial landscape irrigation.

## FEATURES:

- Molded of glass-reinforced nylon for extreme strength and corrosion resistance. Full flow and long life is assured.
- Manual operation with no external bleed of water.
- Globe and angle valve configuration standard. A plug is provided for unused inlet.
- Flow control adjustment permits adjustment of downstream pressure and flow or use for manual shutoff.
- Self-cleaning metering rod provides smooth operation.
- Slow opening and closing reduces water hammer and surge damage.
- Entire valve is serviceable without the need to remove from the line.
- Bleed button allows manual open or close control.
- Low current requirement sealed solenoid, totally encapsulated.
- Nylon reinforced Buna-N diaphragm.
- Integrally molded inserts or studs assures positive thread hold.
- 5 year warranty (see warranty page for further details).

Size	GPM	PRESSURE LOSS CHART																											
		5	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200	225	250	275	300	325	350	375	400		
1" Globe		3.9	4.2	3.2	4.1	7.2	10.9																						
1" Angle		3.9	4.2	3.1	2.7	4.8	7.9																						
1½" Globe				1.7	1.8	2.3	3.6	5.2	7.0	9.2	11.7	14.4	17.5	20.9															
1½" Angle				1.8	1.3	1.6	2.8	4.0	5.5	7.1	9.0	11.0	13.3	15.8															
2" Globe									1.6	2.1	2.7	3.3	4.0	4.8	5.6	6.5	7.5	10.7	13.4										
2" Angle									1.0	1.2	1.6	2.0	2.4	2.8	3.3	3.9	4.4	6.1	7.9										
3" Globe														2.0	2.0	2.0	2.5	3.0	4.1	5.3	6.7	8.3	10.1	12.0	14.2	16.6	19.2		
3" Angle														1.7	1.7	1.7	1.9	2.4	3.3	4.3	5.5	6.9	8.5	10.3	12.3	14.5	16.9		

NOTES: 1. Shaded areas not recommended.  
2. Should flow rates lower than the recommended range be used, the valve must be throttled with the flow control to insure satisfactory closure.  
3. Hydraulic actuated valves vented to atmosphere will show lower pressure loss figures at low flows.  
4. Pressure regulating valves must operate in the recommended flow ranges. Never oversize pressure regulating valves or they may become unstable and will oscillate.  
5. Valve pressure loss tests are in accordance with pending IA and ISO standards.

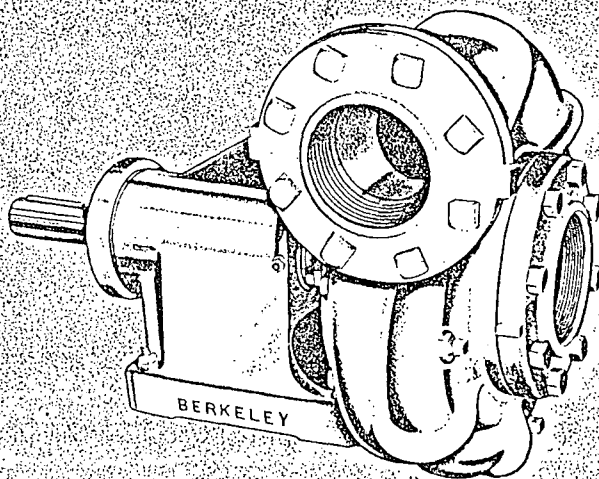




# TYPE "B" CENTRIFUGAL PUMPS

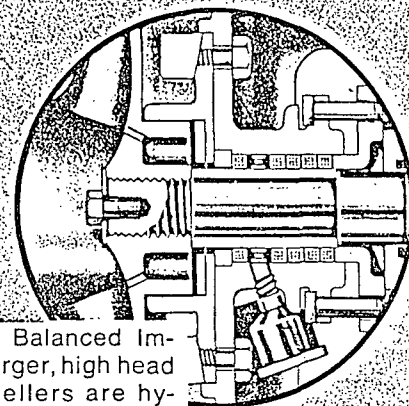
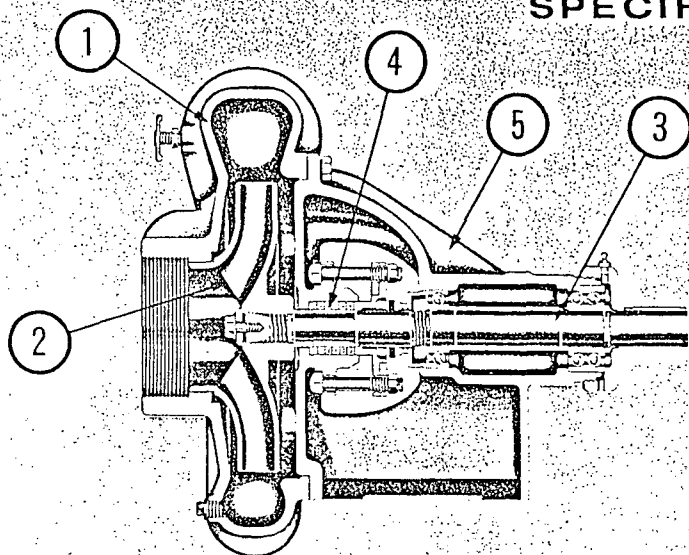
## Frame Mounted

Capacity Range: To 5000 GPM Discharge Sizes: 1½" through 10" Heads: To 485 Feet



Berkeley Type "B" frame mounted pumps are characterized by the construction of their cases. By removing easily accessible bolts from the bracket, the entire pumping element may be withdrawn, permitting access to the impeller without disturbing the piping. The Type "B" frame mounted pump is designed for the user who has a separate power source suitable for driving through couplings or with belts. Ideal for all general purpose applications requiring high performance, moderate initial cost and easy maintenance.

### SPECIFICATIONS



Hydraulically Balanced Impellers: On larger, high head models, impellers are hydraulically balanced to reduce thrust loads on bearings and minimize pressure on the stuffing boxes. Hydraulic balancing is accomplished by equalizing pressure forces on both faces of the impeller.

**1 VOLUTE CASE:** Grey cast iron, engineered to modern hydraulic standards. Smaller size models are equipped with tapped suction and discharge, larger models have standard ASA 125# flat face flanges.

**2 IMPELLER:** Accurately balanced cast iron impeller. Precision alignment on shaft assures smooth, vibration-free operation. Impeller is locked to shaft with special capscrew and washer.

**3 SHAFT:** Special alloy steel shaft is protected through stuffing box by a replaceable stainless

steel sleeve. Proper fit and extended life is assured by accurate machining to close tolerances.

**4 SHAFT SEAL:** Extra-deep stuffing box of the split-gland type is standard and provides extra protection against leakage, extends pump life.

**5 BEARING BRACKET:** Frame mounted centrifugals are mounted on sturdy cast iron brackets that carry the pump shaft in heavy-duty anti-friction bearings. Pumps may be motor or engine driven through couplings or belts. Shaft extension of pump is keyed to received coupling, and/or pulleys and belts.

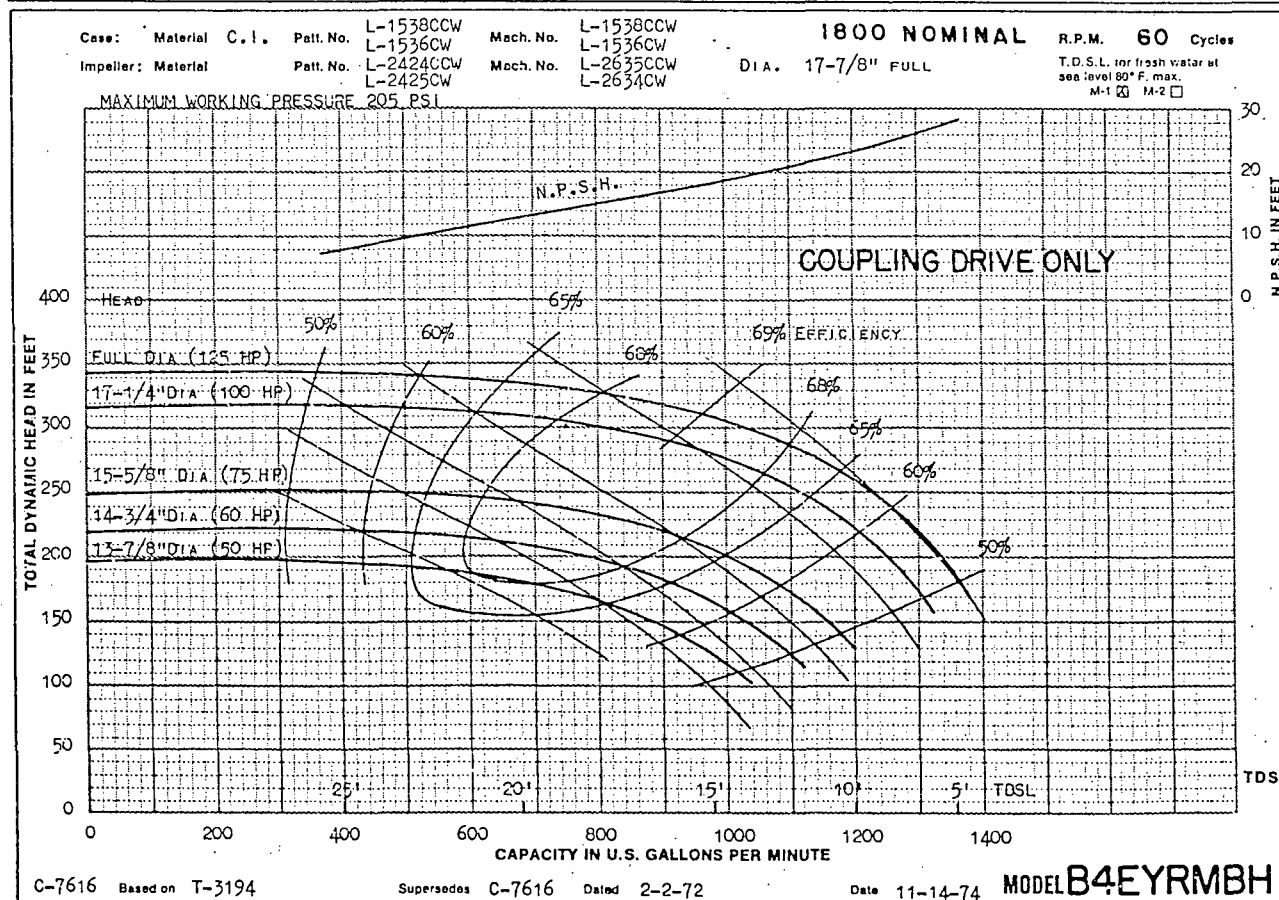
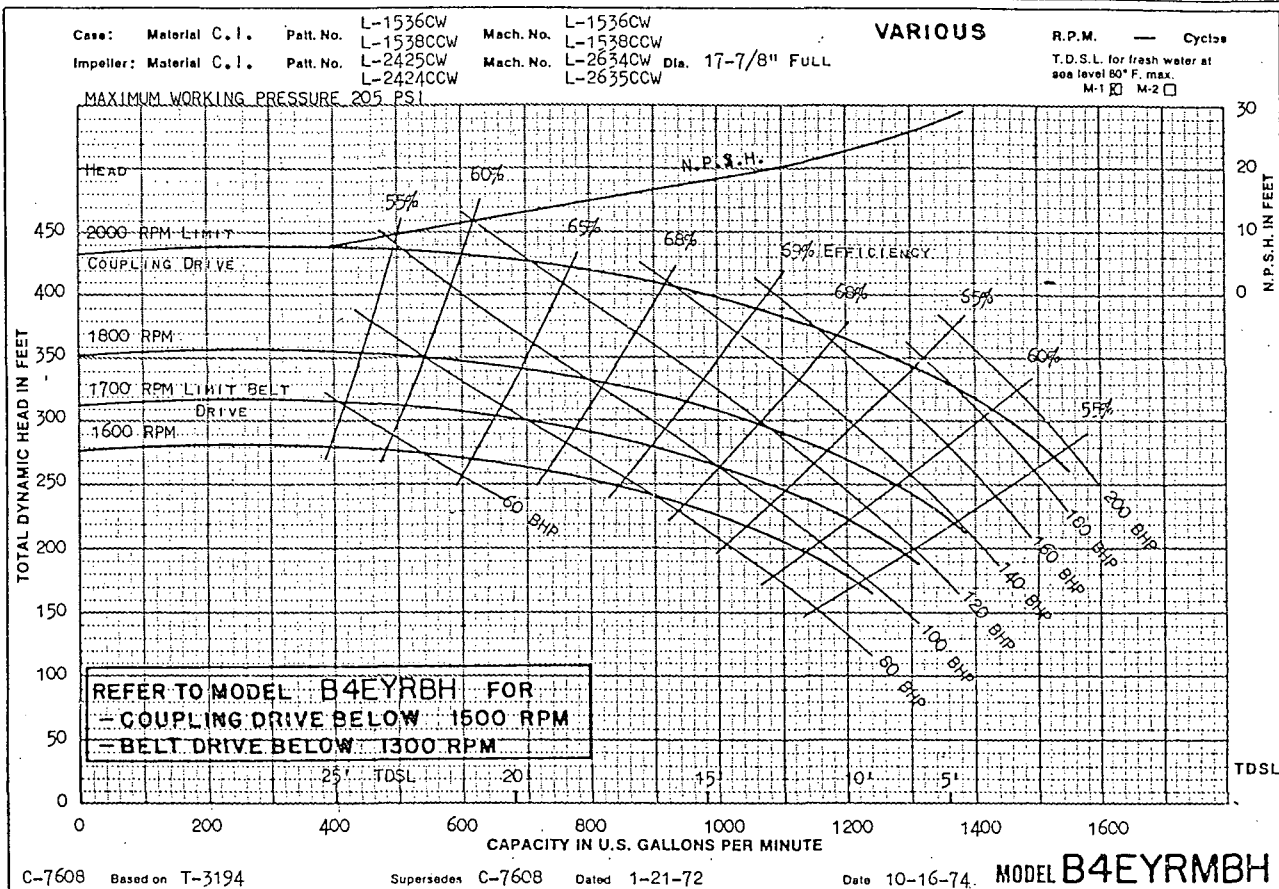




# TYPE "B" RATING CURVES

## BELT OR COUPLING DRIVE

CURVE	4165
DATE	2-20-75
PAGE	13.01
SUPERSEDES	
Curve 4165	Page 13.01
Dated 3-15-72	

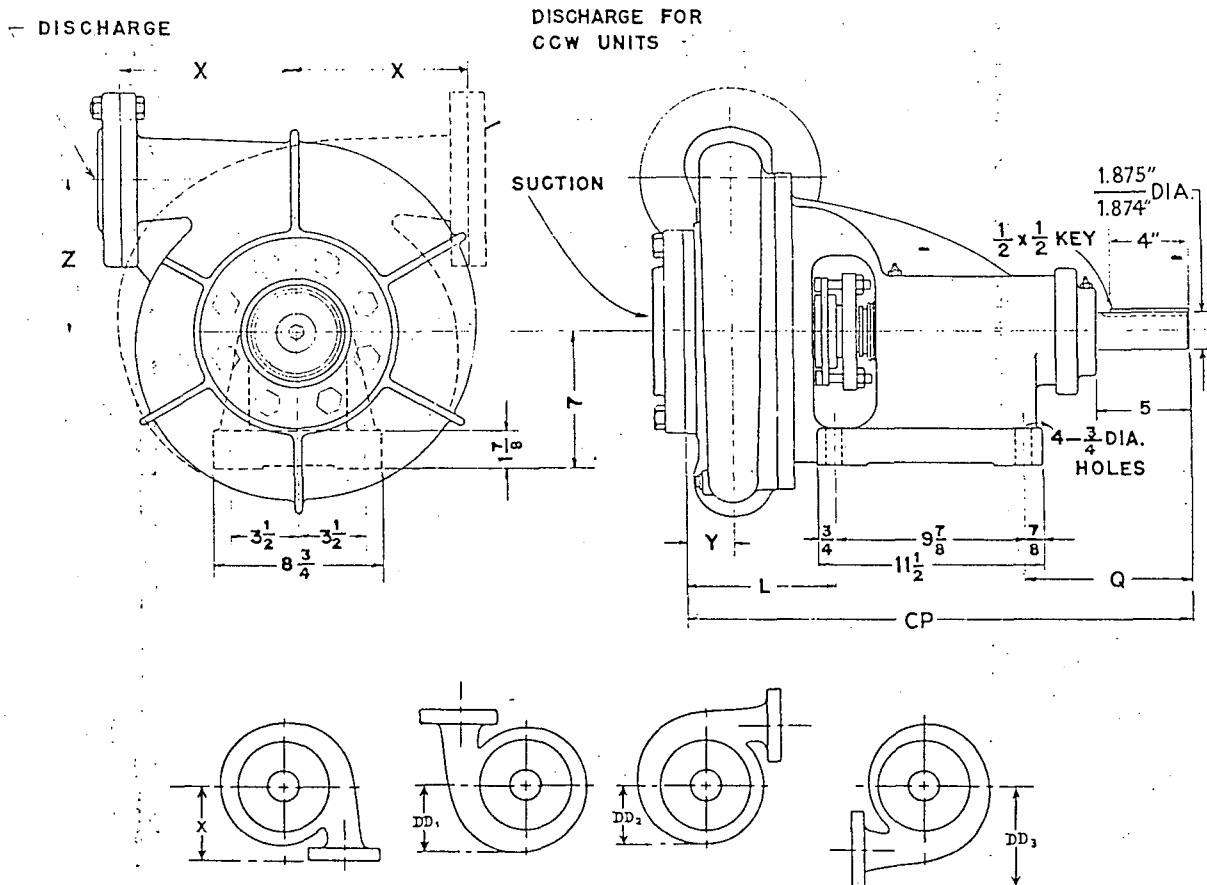




BERKELEY PUMP COMPANY

# TYPE "B" CENTRIFUGAL PUMPS BELT OR COUPLING DRIVE

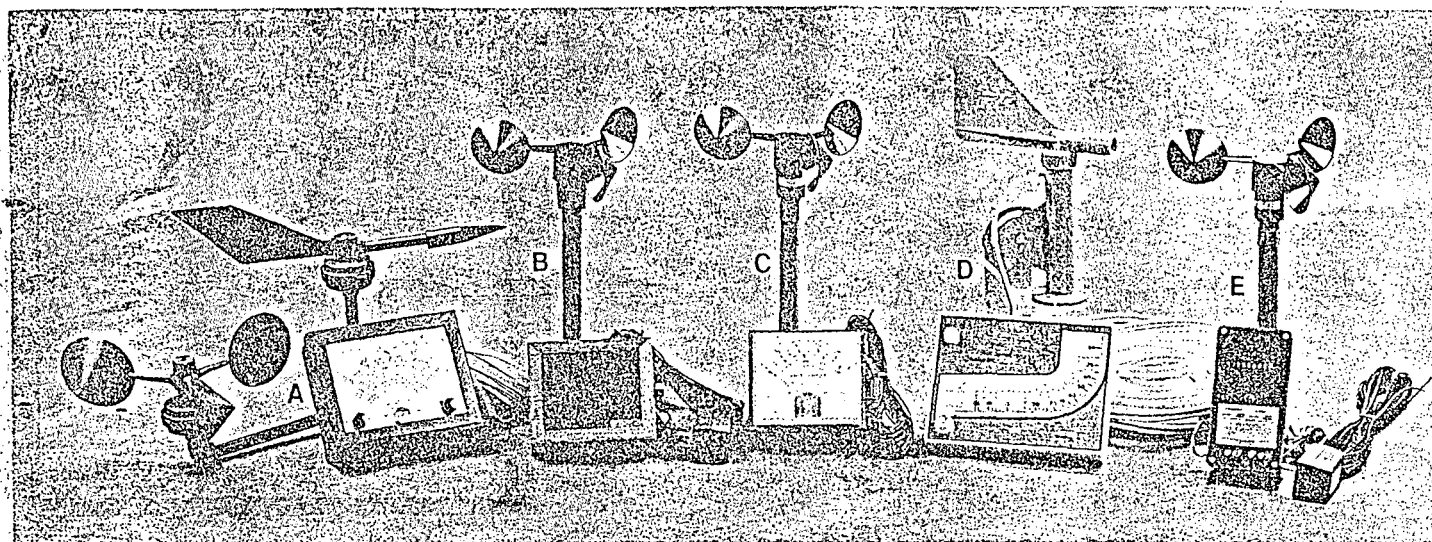
DIMENSION	4165
DATE	7-15-74
PAGE	2
SUPERSEDES	
Dimension 4165	Page 2
Dated 5-15-73	



ALL DIMENSIONS IN INCHES

Model	Suction	Disch.	L	Q	X	Y	Z	CP	DD <sub>1</sub>	DD <sub>2</sub>	DD <sub>3</sub>
*B2ERBH	3	2	9-5/16	8-15/16	5-15/16	3-3/4	6-1/16	28-1/8	6-13/16	7-1/16	7-11/16
*B2 1/2 JRBL	4	2 1/2	9-1/2	8-3/16	6-1/2	4-3/8	7-13/16	27-9/16	8-5/8	8-15/16	9-5/8
*B2 1/2 JRBM											
*B2 1/2 JRMBM											
*B3ERBL	4	3	9	8-15/16	8-5/8	4-5/16	6-1/2	29	7-7/16	7-5/8	8-11/16
*B3JRBL	4	3	9-1/2	8-3/16	7-1/2	4-3/8	8	27-9/16	9	9-3/8	10-5/32
*B3JRBM											
*B3JRMBM											
B4ERBL	5 x 10	4 x 9	7-1/16	8-15/16	8	2-1/2	6-11/16	27-7/16	7-7/8	7-1/4	11-3/16
B4JRBL	5 x 10	4 x 9	7-3/4	8-3/16	9	2-5/8	8	25-13/16	9-3/8	9-5/8	12-1/2
B4JRBM											
B4JRMBL											
B4JRMBM											
B4JRBH											
B4JRMBH											
B4EYRBM	5 x 10	4 x 9	10-1/8	8-3/16	12	5-1/4	10-1/2	28-3/16	12-7/8	12-1/4	15
B4EYRMBM											
B4EYRBH											
B4EYRMBH											
B6JRBL	8 x 13 1/2	6 x 11	9-1/2	8-3/16	11	3-7/8	8-3/4	27-9/16	10-1/2	10	14-1/4
B6JRMBL											
B6JRBM											
B6JRMBM											
B8GRM	10 x 16	8 x 13 1/2	10-1/8	8-3/16	12-3/4	4	9-7/8	28-3/16	12-3/8	11-3/4	16-5/8
B8GRMBM											
B10GRB	12 x 19	10 x 16	11-1/4	8-3/16	12-7/8	4-3/8	9-19/32	29-5/16	11-11/16	10	17-19/32
B10GRMBM											

\*Threaded suction and discharge.



## A. Taylor Windscope Speed and Direction Indicator

Measures wind speed and direction on one instrument. Double scale for easier reading: 0-25 and 0-100 miles per hour. No battery drain except when reading direction. Mahogany finished indicator unit shows both wind speed and direction. Indicator can be mounted on wall, mantle, shelf or placed on a desk. Outdoor measuring unit can be located 2,000 feet away. Corrosion-resistant, rugged and easy to maintain outdoor unit. Complete with battery, 60' electrical cable and instructions.

89006 (8-1/2 lbs.).....\$499.00  
89009. Extra electrical cable; minimum order 50'..... Per foot \$.40

## B. Weatherwise Digital Anemometer

Large display numbers instantly indicate velocities to 99 mph. Thumb switch provides for indication of highest velocity attained until switched back to normal operation. Outdoor cup unit installs with mast provided. Requires 110 volt AC outlet or 12 volt DC power source (not included). Outdoor cup unit is super-tough black Lexan and will not rust or corrode. 10-1/2" PVC mast installs with 2 screws provided (mast may be replaced with standard 1/2" PVC pipe and fittings). Indoor digital unit is attractive 4.5" x 5" wood box with colored acrylic face. Large LED numbers show through acrylic face. Box mounts on wall with attached hangers and provided screws. Attached AC adapter (6' cord) plugs into 110V outlet. 60' of cable supplied. For boats, adapter is removed and unit is connected to 12-volt DC source (draws 0.12 amperes).

89036 (2-3/4 lbs.).....\$159.00

## C. Wallmounted Tradewind Anemometer

Gives instant wind velocity reading on dial scale. Mounted in 4" x 5" wood frame. Wall mounting hanger, screw provided. Each model comes with 60' of wire.

89061 TWA-1: 0-100 mph/0-88 kts (3 lbs.).....\$75.95  
89062 TWA-2: Switchable 0-30 mph, 0-120 mph (3 lbs.).....\$87.95  
89063 TWA-300: 0-100 mph/0-88 kts with top-mounted switch for meter needle to show peak reading.  
Uses three "AA" Alkaline batteries (not included) .....\$133.50  
02182 "AA" Alkaline Battery - 3 required (1 oz.).....\$1.45

## D. Dwyer Mark II Wind Speed Indicator

Measures wind speed to 80 mph! Wind aligns the Mark II weather vane, pointing the pick-up tube into the wind. The wind pressure enters and is transmitted through a 50' plastic connecting tubing to red fluid inside the indicator. Fluid level rises and falls in response to changing wind speed. Calibrations on the indicator show the wind speed in mph and Beaufort Scale. All metal parts are heavily plated and vane is of tough red ABS plastic. Mounting hardware, fluid and instructions included.

89190 (4 lbs.).....\$49.00

## E. Weatherwise Wind Speed/Odometer

Allows you to obtain average wind speed, current wind speed, total miles of wind. Anemometer made of Lexan to withstand marine environment. Six digit counter to allow averaging over extended periods. Flashing diode shows 1/60 mile of wind per flash. Counting flashes for one minute will tell current wind speed in m.p.h. Attached AC adapter with 6' cord plugs into 110V outlet. For battery use, remove adapter and connect to 12V source, not included. Remote terminal is supplied so pulses may be counted from distant locations, including telephone with proper pick-up equipment. 60' of cable supplied.

89037 (2-3/4 lbs.).....\$145.95

## — Rainwise Portable Wind Speed/ Direction/Temperature Weathercube

Measure wind speed/direction and outdoor temperature on-site with this portable system. Sensor mounts on a tripod/mast assembly, feeds data for simultaneous display on handheld control box. Includes carrying case, sensor and control box. Tripod, 5' mast and cable sold separately below. Specifications — Wind speed: 0-99 mph with 2 mph threshold, accuracy  $\pm 2\%$  of full scale/ $\pm 1\%$  at 35 mph. Wind Direction: eight cardinal compass points (N, NE, E, SE, S, SW, W, NW). Temperature:  $-40^{\circ}$  to  $+127^{\circ}\text{F}$ , accuracy  $\pm 1^{\circ}\text{F}$ . Power: three AA and two 9V batteries included. (For replacements see pg. 411).

89012 (3 lbs.).....\$790.00  
89013 5' aluminum mast (10 lbs.).....\$23.35  
89014 Aluminum tripod (8-1/2 lbs.).....\$36.00  
89219 50' weatherproof cable (2 lbs.).....\$35.00  
89220 100' weatherproof cable (4 lbs.).....\$71.00  
89221 150' weatherproof cable (6 lbs.).....\$107.00  
89222 200' weatherproof cable (8 lbs.).....\$142.00