BOOSTER PUMP STATION UPGRADES 2024
PROJECT NUMBER: 24-03

ADDENDUM NO. 1

ISSUED THIS DATE: February 16, 2024

BID OPENING: **2:00 PM (PST) on Thursday, February 29, 2024**

This addendum is for the 2024 Booster Pump Station Upgrades project, Project No. 14-03, issued February 16, 2024. The document is posted to capture any questions received via email during the open question period and in person from bidders at the pre-bid walk through. Agency answers are provided.

The addendum shall become fully a part of the above-named project drawing, specifications, and bid documents. Each bidder shall be responsible for reading this addendum to ascertain to what extent and in what manner it affects the work to be performed. All bidders must acknowledge their receipt of this addendum on the Bid Form.

Questions & Answers

Ref	Question	Answer
1	Due to multiple bids on the same week, we are requesting a 1-week extension in bid time for the Mercer Island Booster Pump Station Upgrades project. Please advise.	Yes, the bid opening and question window will be changed. Refer to the **Additions and Modifications to the Contract Documents** section in this addendum for additional information.
2	Since this is an email submittal will you be requiring bidders to follow up their email bid by sending the original bid bond to the City?	Include photocopies of the bid bond and power of attorney with the bid package. As long as the surety is able to provide verification of the bond or provide the original when requested, the bid will be considered responsive.
3	Please reference DWG No. M01 and the notes under the Existing Pump Demolition photo regarding mercury for the following questions: A. The first note says to consult the pump manual for removal instructions	Attachment No. 1 included in this addendum includes the technical manual for the existing Byron Jackson pumps. The technical manual does not state the amount or level of mercury concentration.

	before removing the pumps – I am not finding the pump manual reference documents in the specs. Please advise. B. The last note indicates to dispose of mercury and mercury containing equipment: - Please advise on the amount and level of mercury concentration. - Has a material survey been done? If yes, I am not locating in the specs. - If a material survey has not been done, we are suggesting this be a force account item for all bidders.	A material survey has not been completed. The removal of the pumps, including the seal, is included in bid item 7.
4	Is there a submittal or O&M for existing pumps 1-5 that show dimensions and weights as there is no information on the existing pumps?	Yes, attached to Addendum No. 1 is the technical manual for the existing Byron Jackson pumps. The existing motor is 100-hp.
5	Can the crane in the booster pump station be utilized during construction by the Contractor?	No, the Contractor shall use their own equipment.
6	What equipment would you allow us to use inside the facility for setting electrical equipment and piping modifications?	Previous contractors have utilized a Genie 5k telehandler forklift or equivalent within the facility to place equipment. The weight capacity of the concrete lid at the bay entrance is unknown.
7	The as-builts in the specifications are unreadable – can better readable copies be supplied?	No, these are the only available as-builts.
8	How thick is the concrete slab that needs to be sawcut to access the discharge piping in the lower-level partition area?	The as-builts of the original station are included in Appendix B of the bid specifications and indicate the thickness.
9	Is the sand in the lower-level partition area wet or dry?	It is unknown if the sand is wet or dry. The as-builts included in Appendix B of the bid specifications only indicate there is sand.
10	How should the sand in the lower-level partition area be removed?	We will defer to the Contractor's means and methods for this to ensure that all project requirements are met.
11	Is this a buy America project?	No, there is no federal funding on this project.
12	The (2) 24" taps – what material and class is the existing pipe?	Based on the as-builts in Appendix B of the bid specifications, the existing suction header is steel. Discharge pipe is most likely ductile iron, and class is unknown.

13	Is a separate pipe support engineering analysis going to be required on this project that needs to be stamped?	Yes, Contractor is responsible for design of the necessary pipe supports, hangers, and seismic bracing. A stamped design shall be submitted with the piping plan.
14	Section 15.62 “Pressure Switch’ uses a conventional pressure switch. Would RH2 allow for a digital pressure switch?	No substitutions.
15	Drawing E05 only shows a “HIGH” pressure condition input to the VFD. But the Specs on page 15-20 identify a High and Low pressure setpoint. Can RH2 please confirm if a Low Setpoint is required, and update the wiring diagram if it is indeed required.	The pressure switch shall be a single point switch. The Run Setpoint value listed in the specifications shall be the “HIGH” pressure condition input to the VFD. No Low Setpoint is required.
16	Can you ask the City to get the digital drawings for the PLC control panel at the station? From how I read drawing M03, the pressure transmitters are new, and going on the Pump 6 & 7 trains. If that is the case, I believe they will need to go back to the PLC control panel. The current RH2 design does not show the existing control panel drawings, but they will be needed to be reviewed and planned so that the two pressure transmitters’ 4-20mA signal can terminate in a specified location of the control panel, hopefully occupying available spares. But maybe I am mis-reading RH2’s drawings and the pressure transmitters are replacing existing units. Some Clarity there will be helpful.	Analog inputs are to be landed at spare terminals in existing telemetry panel. Contractor will have access to existing RTU to identify specific terminal block numbers.
17	What is the finish for the plexiglass wall baseplate and HSS A36 steel?	The finish shall be hot dip galvanized.
18	We have concerns about the Amercoat pump coating specified. There are external coatings that are better than the standard factory enamel coatings but this Amercoat looks to be geared more towards tank and pipe lining and would make maintenance on the pump difficult. Would a factory selected upgraded coating be acceptable?	The specified product shall be used as an interior lining for Pumps 1-5. Contractor may submit alternate NSF 61/600 approved internal lining system for review. Pump exterior coating shall be per manufacturer.
19	Should Palram America’s Sunpal product be installed instead of the Sunglaze panel?	The Sunglaze Panel from Palram America is acceptable to use in the vertical configuration for this application.

20	The control valve cannot have both the X101 position indicator and the limit switch. Which one shall be included?	Provide the X101 position indicator on the control valve.

Additions and Modifications to the Contract Documents

Ref	Spec or Drawing	Location and Description of Change
A	Advertisement for Bids	Change the Bid Opening date to **2:00 PM on February 29, 2024**. Change the end date for questions to **12:00 PM on February 23, 2024**. All questions and responses will be posted in an addendum by **4:00 PM on February 26, 2024**.
B	Instruction to Bidders, 4. Additional Information	Change the end date for questions and responses to be posted by **4:00 PM on February 26, 2024**.
C	11.10.05, Part 1, Performance Requirements Pumps 1-5	Change the BEP Position for Pumps 1-5 to Right of Design Point.
D	11.10.05, Part 1, Performance Requirements, Pumps 6-7	Minimum pump efficiency for Pumps 6-7 changed from 80% to 76%.
E	11.10.05, Part 2	New section with heading "Electrical Compatibility" will read "Contractor shall be responsible for ensuring pump motor compatibility with existing VFDs. Contractor shall be responsible for commissioning VFD's 1-5 with proposed pump motors. Equipment shall be commissioned by a qualified firm."
F	15.34.01, Part 2, Components	Delete the sentence "Provide a single point valve position limit switch assembly".
G	16.45, Part 1	Quality Assurance, Qualifications, 2. Suppliers, b) to now read "The VFD shall be factory pre-wired, assembled, and tested as a complete package, or assembled by a Siemens Solution Partner with a Drives and Motion or Automation and Drives certificate."
H	16.45, Part 2	VFD type changed from Siemens SINAMICS G120XE to Siemens SINAMICS G120.
I	Appendix A	Change the applicable date for prevailing wages for this project to be **February 29, 2024** based on the changed bid submittal date.
J	Appendix D	Add Appendix D, Existing Pump 1-5 Technical Manual for Installation, Operation, and Maintenance
K	DWG No. E04	Enclosure type changed from NEMA 4X SS to NEMA 12.

Attachments:

Attachment 1 – Appendix D (Existing Pump 1-5 Technical Manual for Installation, Operation, and Maintenance)

MANUAL NO. 2565

Byron Jackson®

Type H Submersible Motor Pumping Unit

Technical Manual For Installation, Operation, and Maintenance

BW/IP International, Inc.
Pump Division

Submersible Facts

During the past years, thousands, of Byron Jackson submersible pumps have been installed for many kinds of pumping service. The majority of these are installed in drilled wells having an 8 inch inside diameter or larger. The maximum horse power rating for a given well diameter is listed below:

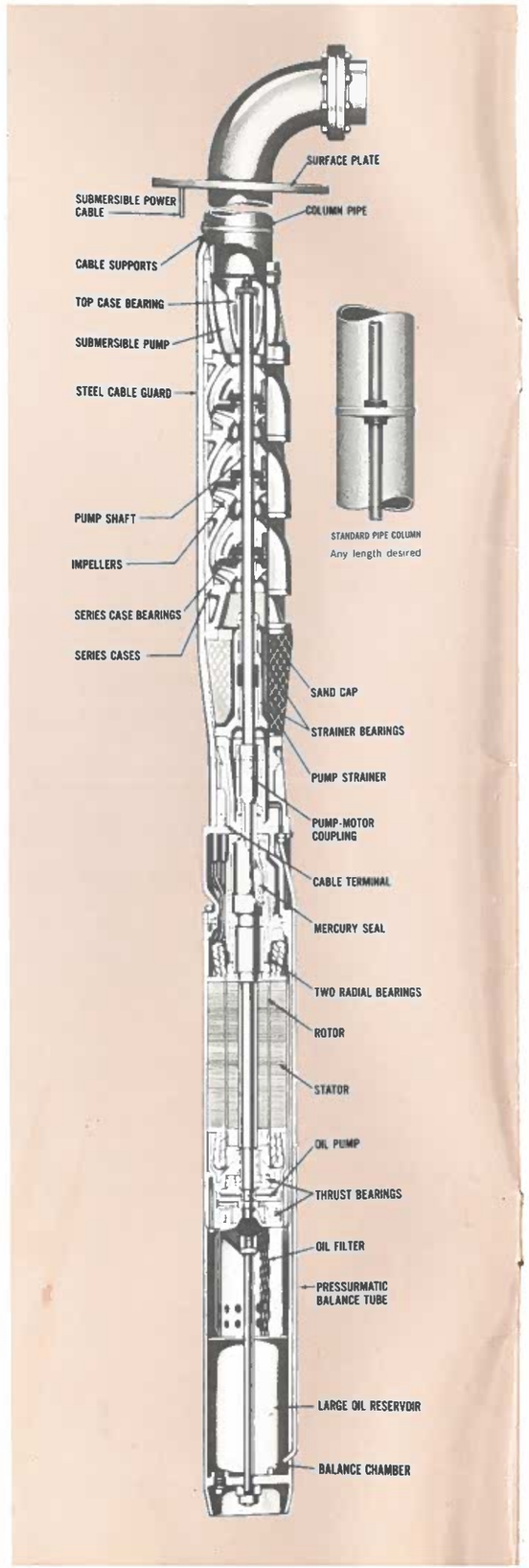
7½	to	30 HP, 1760 RPM, 3-PH, 230 or 460 volt, 60 hertz, 8" ID well or larger
40	to	75 HP, 1760 RPM, 3-PH, 230 or 460 volt, 60 hertz, 10" ID well or larger
100	to	125 HP, 1760 RPM, 3-PH, 460 or 2300 volt, 60 hertz, 10" ID well or larger
125	to	200 HP, 1760 RPM, 3-PH, 460 or 2300 volt, 60 hertz, 12" ID well or larger
175	to	300 HP, 1760 RPM, 3-PH, 460 or 2300 volt, 60 hertz, 14" ID well or larger
300	to	500 HP, 1760 RPM, 3-PH, 2300 or 4160 volt, 60 hertz, 17" ID well or larger
600	to	700 HP, 1760 RPM, 3-PH, 2300 or 4160 volt, 60 hertz, 18" ID well or larger

Pump capacities range from 75 to 10,000 gpm and pumping heads from a few feet to over 2000 feet.

Submersible pumps are particularly adapted for deep settings and high heads; underground discharge installations in streets, driveways, city parks, mine shafts and air fields, permitting the most desirable location for the well with minimum of space. Pumps located in flood areas are usually supplied with well seal surface plates to prevent contaminated surface water from entering the well.

The submersible motor is unaffected by atmospheric conditions such as high or low temperature and humidity, dust, or fumes. High altitudes, which require the use of special surface type motors, have no effect on the submersible motor.

In addition to the standard submersible pumps, the Pump Division of BW/IP International, Inc. also makes submersible pumps of smaller size and capacity, and also special pumps which have capacities up to 25,000 gpm and horsepower to 3000.



Byron Jackson® Products

Technical Manual for Installation, Operation and Maintenance of Type H Submersible Pumping Units

Foreword

Some portions of the material presented here may relate to more than one type of Byron Jackson submersible pumping unit, but it is intended that this book apply solely to the Byron Jackson Type H Submersible Pumping Unit.

Your Byron Jackson pump is engineered to give the optimum performance for the type of service and the product being pumped. The pump is designed for best efficiency over a limited portion of the head capacity curve. The hydraulic performance guarantee applies to one basic point on the head capacity curve (based on laboratory test with clean, fresh water at 50 to 85°F.) and is contingent upon the pumped liquid being clean and free from air, gas and excessive amounts of sand or abrasive material.

It is recommended that the services of BW/IP Pump Division Installation Supervisor be employed for the installation and initial starting of a Byron Jackson pump. Such service will ensure the purchaser that the equipment is properly installed, and will provide an excellent opportunity for the plant operator to receive special instructions relative to the unit.

This manual outlines the general procedures that must be observed to ensure long, trouble free service. However, it is assumed that plant personnel are familiar with the basic principles and tools involved in the installation, care and service of a pump. Successful operation is dependent on careful study of the manual and a well planned maintenance program.

TABLE OF CONTENTS

* This drawing shows all motor (M) parts except M-118 and M-119.

** This drawing shows all cable (C) parts and motor parts M-118 and M-119.

*** This drawing shows all pump (P) parts.

SECTION ONE – SPECIAL CONSIDERATIONS

1.1 GENERAL:

The condition of the service into which a submersible unit is placed is of major importance. The comments below are given to avoid misunderstanding concerning the installation and operation of the unit under warranty.

1.2 DEVELOPMENT OF THE WELL:

Do not use a new unit to develop the well. Developing, surging and freeing the well of sand, which are considered a part of the well drillers contract, should be accomplished by use of a test unit.

1.3 EFFECT OF PUMPING SAND:

BYRON JACKSON does not guarantee the unit against the erosive action of sand, silt or other abrasive materials suspended in the water. Pumping sand will adversely affect the motor because the vibration produced in the pump will be transmitted to the motor and could result in a shortened motor life.

1.4 EFFECT OF AIR OR GAS:

Guarantees of hydraulic performance are contingent on pumping clean cold water, free from air or gas with the pump properly submerged. The presence of such gases in the water will affect the hydraulic performance by reduction in capacity and head, which cannot be predicted with accuracy. Further, the presence of air or gas in the well will cause deterioration of materials sooner than under normal conditions.

1.5 SUCTION AND SUBMERGENCE REQUIREMENTS:

Pumping the well at such a rate that the unit breaks suction will cause pump deterioration. It is suggested that a method be provided for keeping a record of the water level above the suction inlet. The minimum submergence recommended is 10 feet (3 m) of discharge column submergence below the MAXIMUM well drawdown level, although some installations may require more submergence.

1.6 DESIGN CHANGES:

No alteration or addition should be made to the unit design unless performed or approved by BYRON JACKSON.

1.7 EFFECT OF CHEMICALS:

Even though the chemical analysis of the water is known, it is not always possible to predict the total corrosive action on metals. In addition to chemicals, water may also contain entrained air or gases that have a definite oxidizing or corrosive action of their own, which is accentuated by high velocities within the pump. Such conditions do not appear in the chemical analysis of the water. Conforming with the Standards of the Hydraulic Institute and the practice of all reliable pump manufacturers Byron Jackson does not guarantee its pumps and motors against corrosive or electrolitic action. Special units can be ordered, providing all surfaces in contact with pumped fluid to be of special material.

1.8 CROOKED WELL:

A known crooked well that has not previously accommodated a unit of comparable size must be "caged" before the submersible unit is installed. A cage of the same length and diameter as the combined motor and pump assembly, with 40 to 50 feet (12 to 15 m) of the proper size discharge pipe, must be lowered into the well to the point at which the unit is to be placed. If the cage can be lowered to this point without binding, the submersible unit can be installed.

1.9 SURVEY OF WELL:

Always sound the well to make sure it is deep enough to permit installation of the pump with its motor beneath it. If the exact diameter and depth of the well casing is not known, "cage" the well following the procedure outlined in Paragraph 1.8. Experience indicates that many wells have more than one string of casing installed, and frequently the lower sections are smaller in diameter than the surface casing. Be certain the submersible unit will pass into the well freely and hang suspended clear of the well bottom.

1.10 OPERATING NOTES:

Normally a unit has been selected and built to operate for a specific set of conditions (head in feet and capacity in gallons) to give maximum efficiency. Some variation, an increase or decrease of head, will not make an appreciable difference in the efficiency. However, a wide variation in head will not only show up as efficiency loss, but as a horsepower, or thrust bearing overload.

(a) When a unit is first started, a new well may produce considerable amounts of sand, despite the fact it had been sand pumped after drilling. The discharge should be throttled back to where this is cut down to a minimum, then gradually opened up to full discharge as the sand disappears. This operation may last from a matter of minutes to several days or longer. If the sand flow shows no signs of stopping, the well must be reworked to screen out the sand or a smaller capacity unit installed. Continued sand pumping will result in increased pump wear which in turn will show up as increased efficiency loss. Too great a wear will run pump beyond the repair stage and possibly have serious effects on the motor.

(b) Some wells will always produce a small amount of sand at start-up. Therefore, depending on the operation, it may be necessary to bypass or trap out this first flow each time, particularly if a closed piping system is used.

(c) If the unit is coupled into a hydro-pneumatic pressure system, the set-up must be so designed that it will not become "waterlogged" (loss of air through water absorption without replacement) and yet not receive too much air at each start-up.

(d) On any system, automatic or manual, the number of starts on a motor should be controlled to a maximum of six (6) per hour.

(e) A time delay relay must be installed when any type of automatic system is used in order to prevent starting of the motor while it is spinning backwards due to column drainback through the pump. A three (3) minute time delay relay is normally adequate. This provides a safety measure in the event a failure in the automatic control system creates a rapid recycle series. It also provides a time period for the rotating element of pump and motor to stop, after reverse rotation due to vertical discharge column drain-back.

(f) A well should always be provided with a means for determining the static water level, and pumping level. A good airline, with depth gauge, is generally the most simple and practical.

(g) When a unit is known to be set near to the bottom of a well, a close check should be kept to make sure that the well does not sand-up (fill in) around the motor. This is entirely possible without any noticeable effect in pumping or motor operation. However, the motor is dependent on adequate cooling from water, and any sanding up around it would eventually create overheating, resulting in at least shortened life, if not a burnout. There are additional pump features that can be added to cover this problem if it can not be cured by well work.

(h) A unit should not be run at closed valve more than sixty seconds as virtually all the energy created is then dissipated as heat. This condition has been known to have practically "boiled" the water in the well and created an overheating problem for the motor.

SECTION TWO – GENERAL INFORMATION

2.1 UNIT DESCRIPTION: (See Sectional Drawing in SECTION SIX)

2.1.1 General Description

The Byron Jackson Submersible Unit is a combination of a vertical turbine bowl assembly and a vertical, oil filled and **mercury sealed** induction motor assembly, designed for sustained operation submerged in water. The motor is directly connected below the pump.

The rotating element of the pump assembly is driven from the bottom where its extended shaft is connected to the motor shaft by a coupling. Power is supplied to the motor through a submarine cable, which is fastened to the support and discharge column pipe, and extends to the starting equipment. The column pipe from which the motor-pump assembly is suspended is threaded and coupled in random lengths and the entire unit is coupled to a surface support and discharge head assembly.

2.1.2 Main Components

The submersible unit generally consists of the following components or sub-assemblies:

1. Submersible Motor Driver, crated on a skid and including parts necessary to couple to pump. One Installation Instruction Kit is included.

2. Bowl Assembly, single stage or multistage, crated on a skid.

3. Power Conductor Cable: A three conductor marine power cable assembly, together with banding, and buckles, and pads of sufficient quantity to support the cable on the column. The cable is protectively crafted.

4. Support and Discharge Components
   (a) Check Valve: One or more column check valves of the slow drain-back type may be required, depending on discharge column length or setting.

   (b) Head: A plate and ninety-degree elbow assembly designed to accept the column and to support the entire unit weight at the well foundation. A junction box may also be mounted for the power cable termination.

2.2 EQUIPMENT AND TOOLS REQUIRED:

2.2.1 Tools Supplied With Pump

Supplied with the pump are the following tools:

1. Hex Socket Wrench, for shaft button screw (806-2).
2. Hex Socket Wrench, for coupling set screw (806-1)
3. Hex Socket Wrench, for vent plug (609)
4. Aligning Jig (265), an Assembly, including the following pump parts:
   (a) 262-6, Shim, Shaft Adjusting
   (b) 262-7, Shim, Shaft Adjusting
   (c) 130, Shaft Adjusting Button
   (d) 806-2, Screw, Shaft Button
   (e) 690-4, Washer (two), Coupling Lock Screw
   (f) 806-3, Screw (two), Coupling Lock

2.2.2. Other Items Required (By Others)

Provide the following tools and equipment:

1. Lifting Equipment — of sufficient strength and rigidity to lift the complete unit safely, (see "Component Weight Chart," Figure 1) and of sufficient height to allow clearance between lead hook and foundation.

WEIGHT CHART (Pounds)*
for Calculating
Foundation, Derrick & Hoisting Loads

COLUMN		
SIZE	WEIGHT PER FOOT	
	EMPTY	FULL
2½	5.8	7.9
3	7.6	10.8
4	10.9	16.4
5	14.8	23.5
6	19.2	31.7
8	25.0	47.2
10	32.0	66.6
12	45.0	93.9

BOWLS		
SIZE	1 Stg.	Add Stgs.
8MQ	80	15
10MQ	175	37
11MQ	290	70
12MQ	440	125
13MQ	625	175
15MQ	850	265

CABLE		
VOLTS	SIZE	WT. PER FT.
230 OR 460	8	.3
	4	.77
	2	1.10
	1/0	1.75
	4/0	3.10
	300 MCM	4.40
	500 MCM	6.80
2300	6	.90
	2	1.20
	1/0	2.20

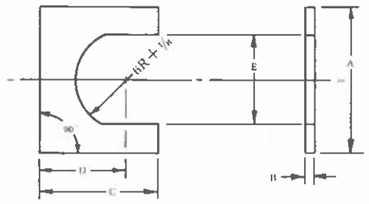
MOTORS		
NOMINAL MOTOR SIZE	HORSE POWER	WEIGHT
8"	**7½	425
	**10	425
	15	450
	20	450
	25	500
	30	500
10"	40	800
	50	800
	60	1010
	75	1010
	100	1080
	125	1220
12"	125	1610
	150	1680
	175	1770
	200	1820
14"	175	1980
	200	2300
	250	2640
	300	2900
17"	300	3725
	350	4100
	400	4250
	450	4400
	500	4600
18"	600	5600
	700	6500

*For Standard Pump Construction.
**Not Standard. Special Order Only.

NOTE: To convert pounds to kilograms, divide by 2.20.

Figure 1 — Component Weight Chart

2. Two pair of correctly sized pipe elevators.
3. One correctly sized column slip plate.
4. One correctly sized motor slip plate (see Figure 2).



NOMINAL MOTOR SIZE	DIMENSIONS (Inches)				
	A	B	C	D	E
8"	15	⅜ ± ⅛	10	10	5¾ ± ⅛
10"	16	⅜ ± ⅛	12	10	7¼ ± ⅛
14" - 15"	20	½ ± ⅛	14	10	10 ± ⅛
16" - 17"	22	½ ± ⅛	16	10	10¾ ± ⅛
12"	18	½ ± ⅛	14	10	7½ ± ⅛
18"	24	⅝ ± ⅛	18	10	12¼ ± ⅛

5. One short (four to six feet) section of column, threaded and coupled, to be attached to the top case and used for handling the bowl assembly. Deduct this length from total column length specifications.
   (a) Column: A supply of pipe, in random lengths, threaded and coupled, of correct size to handle the unit capacity and total weight and of adequate length to set the unit at the correct pumping level in the well. The threading is 8 threads per inch and ¾" (19.mm) taper per foot.
6. One pair of cable reel stands, with axle.
7. One portable insulation resistance tester ("Megger"), 0-100 megs/inf. @1000 Volts.
8. One ammeter
9. One voltmeter
10. Components for water level indicating system.
11. Special banding tool ("Bandit") for cable bands.
12. A length of ½ inch hemp rope and two sheave blocks.
13. Ordinary hand tools (mechanical and electrical) used in this kind of work.
14. Two sets of chain tongs.
15. Rubber mat and insulated gloves for electrical work in damp conditions.
16. An adequate supply of approved thread compounds, as follows:
   (a) For installation of the short section of column pipe, next to top case or top case flange, use only Loctite AVV or equal. This is Catalog No. 86-31, available from Loctite Corporation, Newington, Connecticut.
   (b) For remaining column pipe threads, use a pipe thread compound that is capable of lubricating and sealing.

2.3 PREPARATION REQUIRED PRIOR TO INSTALLATION:

1. Surface plate foundation poured and cured, if concrete. The total load on the surface plate foundation will consist of the motor, pump, column (full of water), surface plate assembly and cable.
2. Provision for open discharge run-off, ditch, etc., for flushing out well and testing unit.
3. A log of the well, recording depth, straightness, casing variations, standing water level, rated capacity, pumping level, etc.

2.4 SHIPPING ARRANGEMENTS:

The unit will ship approximately as follows:

1. Main components described in Paragraph 2.1.2.
2. Tools described in Paragraph 2.2.1.

2.5 RECEIPT INSPECTION:

1. Work Safely. Handle equipment carefully. The motor is a dynamically balanced machine and should be handled accordingly.
2. Uncrate all parts and inspect carefully to be certain nothing was damaged during shipment. If damage has occurred, advise carriers claim department and the nearest Byron Jackson office or dealer from whom unit was purchased.
3. Check the power requirements of the unit against the motor data plate on the side of the motor, the shipping tag wired to the motor, and if such is furnished, the discharge head (surface plate) data plate.

2.6 STORAGE:

If the unit is not to be installed immediately, recrate the equipment and store in a safe, protected location.

SECTION THREE – INSTALLATION

3.1 GENERAL INSTRUCTIONS:

Normally, the installation requirements are performed in the following sequence:

(a) Arrange Components for Installation
(b) Inspect Components
(c) Install Motor
(d) Install Bowl Assembly
(e) Install Support & Discharge Column
(f) Connect Cable to Starter Panel

3.2 ARRANGE COMPONENTS FOR INSTALLATION:

Refer to Figure 3. An orderly arrangement of sub-assemblies will reduce installation time. Lay out the parts in order of installation, as follows:

(a) Motor (Uncrated, and arranged horizontally)
(b) Bowl assembly (uncrated and arranged horizontally)
(c) Column Pipe

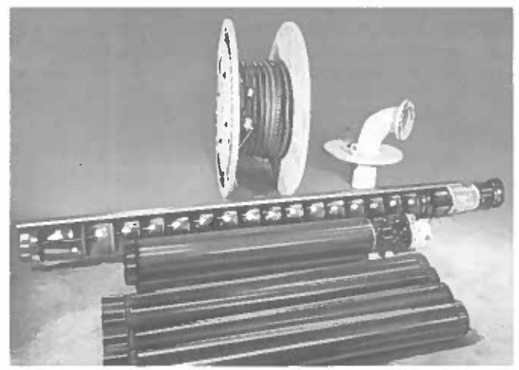


Figure 3 — Components Arranged for Installation

(d) Cable and cable clamps
(e) Air line and depth gauge
(f) Surface plate assembly

NOTES:

1. *Place all column pipe sections with coupling end toward well and check couplings with chain tongs to make sure they are screwed tight. Place column check valve sections so that each will be installed in the proper sequence.*
2. *Remove the "Motor Tag," found on each motor, and note data requested which is:*
   (a) Record COMPLETE MOTOR NUMBER (example #8-3456-5-3) on Warranty Card. **(Motor number and data is also stamped on the permanent Motor Data Plate, on motor flange.)**
   (b) Check motor rating, HP, Poles, Volts, Frequency, against job requirements.
   (c) Record the CURRENT Byron Jackson "job," or "order" number (such as 816-H-0213) on the Warranty Card.
   (d) Record the installation date on the Warranty Card.
   (e) Fill in the "Test Record" card as completely as possible during installation. This record will prove valuable for future reference.
   (f) Mail the signed Warranty Form as soon as possible, and mount or file the "Test Record Card" in a weather-proof and safe place. Additional Record Cards are available upon request.

3.3 INSPECT COMPONENTS

1. Remove the nuts (003-9) and washers (690-6) to remove the motor terminal shipping cap (112-2), and gasket (744-7).
2. Verify that the motor terminal gland plate (111) and terminals (019) are clean and free of dirt and foreign matter.
3. Megger the motor for ground and continuity. The reading should be 10 megohms or more.
4. Remove shipping cap (023) from the cable terminal box (182).
5. Verify that the terminal box (182) and connectors are clean and free of dirt and foreign matter.
6. Verify that the terminals (019) will fit the connectors of the terminal box (182):
   (a) Refer to Figure 4. Check position of terminals (019) against that of connectors. The terminals (019) and connectors may be arranged in either an equilateral triangle positioning or a right triangle positioning.

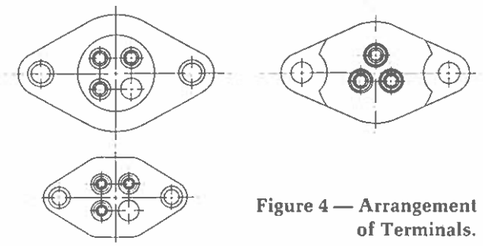


Figure 4 — Arrangement of Terminals.

   (b) Check height of terminal against depth of connector to assure proper engagement.

7. Replace the motor terminal cap (112-2) washers (690-6) and nuts (003-9). Do not replace the gasket (744-7). Put the gasket (744-7) in a safe area until it can be stored in the shipping cap (112-1).

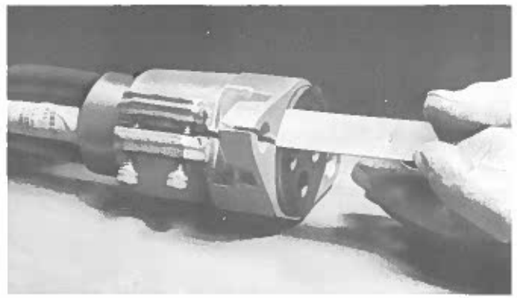


Figure 5 — Checking Gap, Terminal Box Clamp to Terminal Box

8. Refer to Figure 5. Slide the metal terminal box clamp (180) down over the terminal box (182) as far as possible, then check gap from bottom face of terminal box clamp (180) to bottom face of terminal box. This gap should be 1/32 min. (.8 mm) 3/32 max. (2.4 mm).
9. Replace the cable terminal box shipping cap (023).
10. Verify that all column pipe threads are clean and free of dirt and foreign matter.

3.4 INSTALL MOTOR:

1. Install motor slip plate on foundation.
2. Cover the slip plate and foundation with a tarpaulin.
3. Remove the motor shipping cap (112-1) and gasket (744-6). Be certain to put this gasket (744-6) in a safe area until it can be stored in the shipping cap (112-1). Also remove from the shipping cap the tools (Paragraph 2.1.2), driver half coupling (529), set screw (806-1), key (676-1) and cable terminal box gasket (744-10).

CAUTION:

Do not loosen baffle cap screw (806-4) or case closure nut (003-7) while motor is in horizontal position. This will prevent loss of mercury from seal and potential health hazards.

4. Replace shipping cap (112-1).

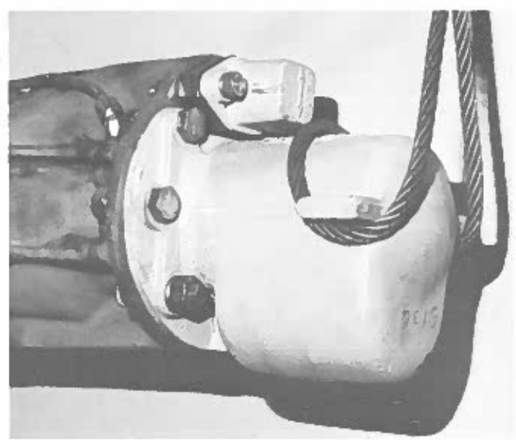


Figure 6 (A) — Hitching Line Under Lifting Lugs

5. Refer to Figures 6-A, 6-B and 6-C. Lift motor by 2 points while horizontal and elevate slowly to vertical position. Center the motor over the opening of the slip plate, then lower the motor to rest on the slip plate.
6. Remove shipping cap (112-1).

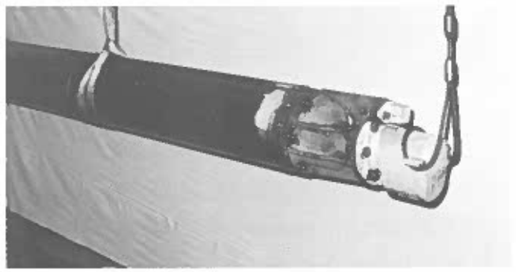


Figure 6 (B) — Lifting Motor For Installation

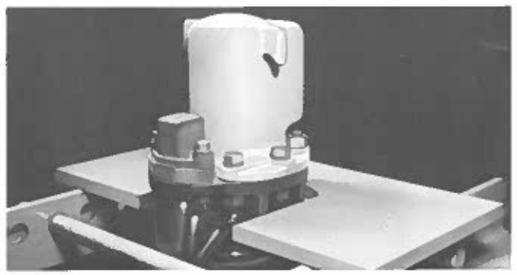


Figure 6 (C) — Motor in Place on Slip Plate

7. Refer to Figure 7. Using wrench provided, back off the vent plug (609) to vent top end of motor.

Figure 7 — Venting the Motor (Preliminary)

8. Refer to Figure 8. Remove cap screw (806-4) from end of motor shaft.
9. Gently pry off seal baffle closure cap (112) with its gasket (744-5) and ring (200). The gasket and ring need not be removed from the seal baffle closure cap.

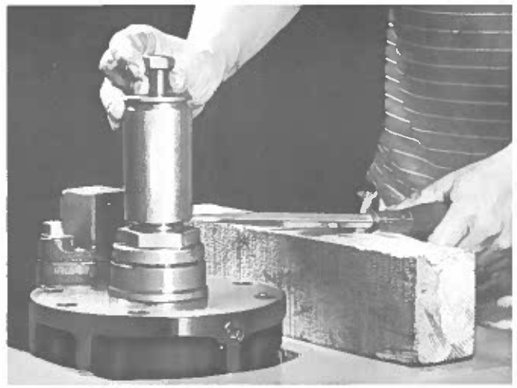


Figure 8 — Removing Seal Baffle Closure Cap

10. Refer to Figure 9. Apply approximately 75 foot pounds (100 N.m) torque to securely tighten the case closure nut (003-7) until the case closure ring (486) is metal-to-metal with the top case. This action places the mercury seal in operating condition by locking the baffle (014) to the case (076) while freeing the housing (650-1) to rotate with the shaft.

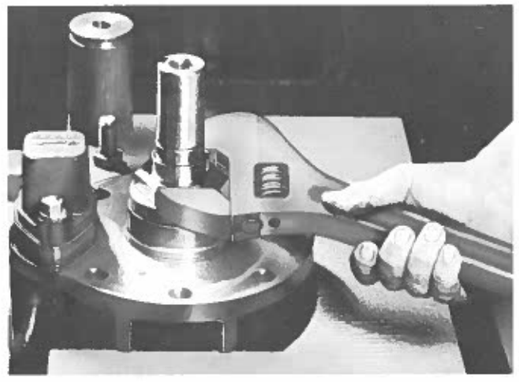


Figure 9 — Tightening Case Closure Nut

11. Refer to Figure 10. Install motor half coupling (529):
    (a) Clean the coupling and shaft, and lightly oil both.
    (b) Slip coupling on shaft with keyways aligned.

NOTE:

Do not attempt to force the coupling. If the coupling will not seat freely, remove the coupling, verify that the shaft is free of dirt and foreign matter, then replace the coupling.

    (c) Insert key (676-1), round end down, in the keyway.

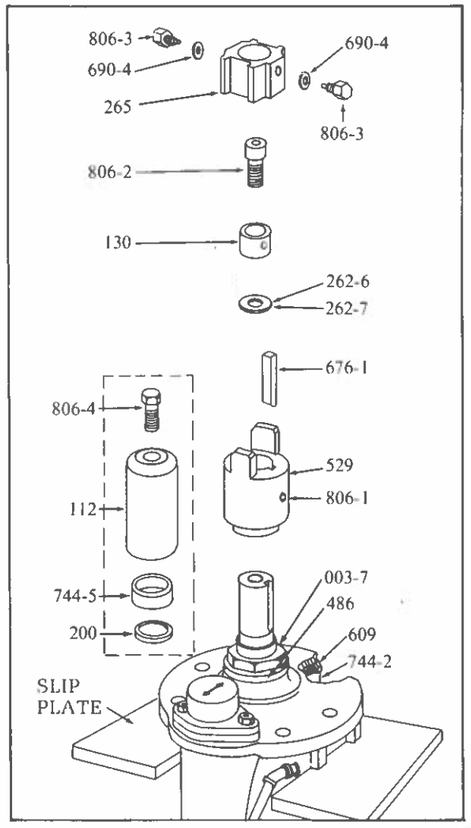


Figure 10 — Motor Half Coupling Components

(d) Install socket head set screw (806-1) through its hole in the coupling (529) to engage its hole in the shaft. Use wrench provided, to tighten set screw (806-1).

12. Refer to Figure 10. Identify the shaft adjusting button (130), alignment jig (265), screws (806-3) with washers (690-4), shaft button screw (806-2) and shims (262-6 and 262-7). These pieces are shipped as an assembly.
13. Remove string from 806-2 which holds shim in place. Verify that the shims (262-6 and 262-7) are attached to the screw (806-2).
14. Install alignment jig assembly in motor half coupling (265).
15. Install cap screw (806-2), and use wrench provided to tighten screw (806-2).
16. Remove the coupling lock screws (806-3) and washers (690-4), and set these pieces aside for later use (see Paragraph 3.5, Step 9).
17. Remove alignment jig (265) and send to storage area for storage in shipping cap (112-1).
18. Clean the motor flange face of any dirt or foreign matter. Verify that the balance line hole in the flange face is open and clear.

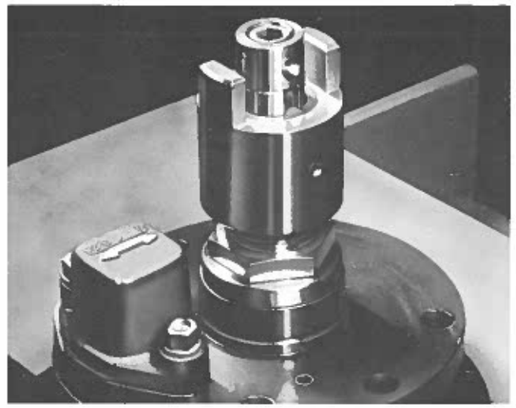


Figure 11 — Aligning the Motor Half Coupling Components

19. Cover the coupling (529) and shaft with a clean cloth.

3.5 INSTALL BOWL ASSEMBLY:

1. Remove the loosely wired-on cable guard from the bowl assembly.
2. Install in the top case (76) or flange (377) the short section (Paragraph 2.2.2, Item 5) of column pipe. Proceed as follows:
   (a) Refer to Figure 12-A. Clean the mating pipe threads of the pipe and the case or flange.
   (b) Apply Loctite to the threads as shown in Figure 12-B.
   (c) Install the pipe, using chain tongs, and apply torque approximating the values shown below.

Pipe Size	Torque (Ft. Lbs.)	Torque (N.m)
2½	500	620
3	700	950
4	900	1,220
5	1,050	1,425
6	1,200	1,625
8	1,600	2,170
10	2,000	2,710
12	3,000	4,070

   (d) Figure 12-C shows the proper method of applying chain tongs to top case (76) or flange (377) so that most force is exerted on the upper flange, rather than on the web.

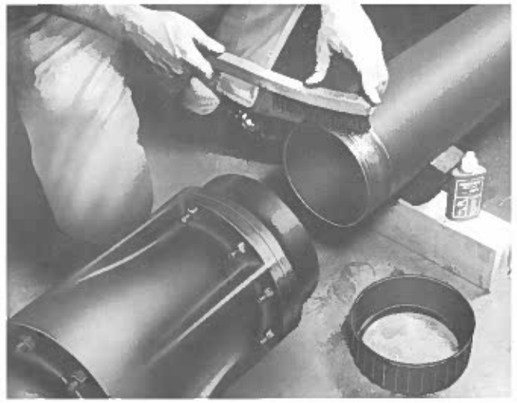


Figure 12 (A) — Cleaning Pipe Threads

Figure 12 (B) — Applying Loctite

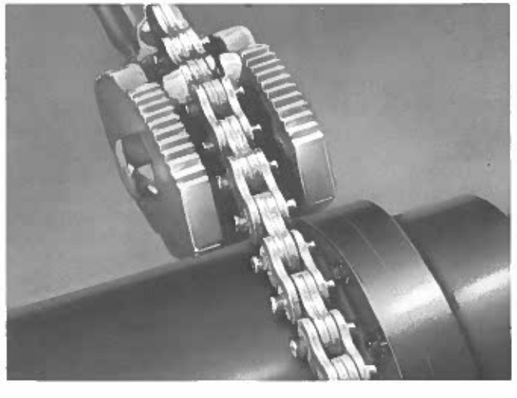


Figure 12 (C) — Proper Method of Applying Chain Tongs

NOTE:
The discharge section may require modification to provide protective clearance to the flat cable and splice which will be mounted later on the column pipe just above the pump.

3. Remove the cloth from the coupling (529) and elevate the bowl assembly several feet above the motor.
4. Verify the end float settings, which are established at the factory. The closed impeller procedure is given in Step 4A, while that for open impeller is provided in Step 4B.

4A — Closed Impeller:

(a) Scale from the face of the adapter bracket (808) to the end of the **pump shaft** (167) with shaft down.
(b) Remove adapter bracket (808) from bowl assembly.
(c) Install adapter bracket (808) on motor top flange, using fasteners for shipping cap (112-1).
(d) Scale from the face of the motor top case (076) to the face of the shaft adjusting button (130).
(e) Distance recorded in Step (a) should be ⅛" to ¼" (3.175 to 6.350 mm) less than that of Step (d).

4B — Open Impeller:

(a) Remove adapter bracket (808) from bowl assembly.
(b) Install adapter bracket (808) on motor top flange, using fasteners for shipping cap (112-1).
(c) Remove the pump half coupling (530).
(d) Provide four pieces of shim stock, each 2" x 2" x .020" (50.8 x 50.8 x 0.5080 mm) thick, and place each shim 90° apart on the face of the adapter bracket.
(e) Lower the bowl assembly into the adapter bracket (808) to rest on the shims.
(f) Put a feeler gauge through the plug opening in the adapter bracket (808) and check the gap from shaft adjusting button (130) to pump shaft.
(g) If gap, Step (f), is less than .015" (0.3810 mm) or more than .018" (0.4572 mm), the shims beneath the shaft button (130) must be changed.
(h) Replace the pump half coupling (530).

NOTE:
If the installation must be made in freezing weather (32° F. or colder), accomplish the venting procedure by using some of the same oil as is used in the motor.

5. Vent the motor as follows:
   (a) Refer to Figure 13-A. Use the shipping cap (112-1) to fill the adapter bracket (808) with water.
   (b) Refer to Figure 13-B. The vent plug (609) is located in the motor flange. Back out the vent plug (609), rotate the motor shaft several revolutions, and continue adding water (not more than three times the capacity of the shipping cap) and rotating the motor shaft until certain of removal of any air bubbles trapped in the top of the motor. Air bubbles should cease after approximately one pint of oil has drained.

(c) After all air is expelled, replace the vent plug (609) in motor flange and apply torque of 20 foot pounds (27 N.M.). Refer to Figure 11. Rotate shaft to verify smooth, free rotation, then position the coupling so a center line across center of both jaws (tangs) will align with the arrow on the terminal shipping cap (112-2). This establishes alignment of coupling screws (806-3) with the pipe plug openings in the adapter bracket (808).

(d) Place in the shipping cap (112-1) the terminal cap gasket (744-7), the shipping cap gasket (744-6) and the parts (112, 200, 744-5 and 806-4) removed at Steps 8 and 9. Send the shipping cap (112-1) to storage.

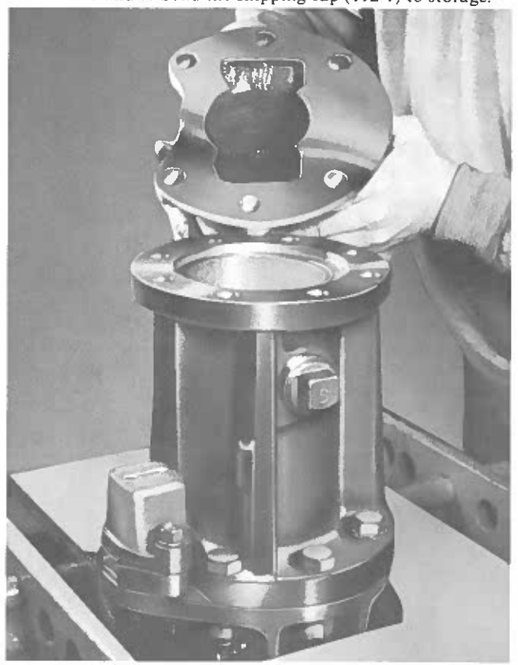


Figure 13 (A) — Adding Water to Adapter

Figure 13 (B) — Removing Vent Plug

(e) The motor is now ready to receive the bowl assembly as described in Paragraph 3.5.

6. Verify that the pump half coupling (530) is securely locked in place by the pin (539) and retainer ring (526), and that the bore and shaft are clean and free of dirt or foreign matter.
7. Refer to Figure 14. Lower the bowl assembly to engage the jaws of the pump half coupling (530) with those of the motor half coupling (529).
8. Rotate the bowl assembly to line up bolt holes of strainer with those of adapter (808) and to line up bottom cable guard with terminal shipping cap (112.2), then lower until both flanges butt metal-to-metal. Install and tighten the fasteners (cap screws or stud nuts with washers).
9. Remove the adapter bracket pipe plugs (794) to observe, through the pipe plug holes, the alignment of the holes for the coupling lock screws (806-3). Install the coupling lock screws (806-3) with their washers (690-4) and apply torque to the coupling lock screws (806-3) as follows:

Unit Size (inches)	8	10	12	14-15	16-17	18
Torque (Ft. Lbs.)	20	30	40	40	50	50
Torque (N.m)	27	41	54	54	68	68

After tightening, check that lock screws (806-3) are seated firmly and lock washers (670-4) are compressed.

Figure 14 — Aligning Strainer and Adapter

10. Replace the adapter bracket pipe plugs (794) and tighten the adapter bracket pipe plugs (794) firmly.
11. The strainer body has two holes, size ⅛" N.P.T. at 180°. Pour water into one of these holes, to fill the adapter bracket (808), until water runs out the other hole. **(A 90 degree street elbow is provided for this purpose.)**
12. The unit is now ready for installation of the terminal box (182).

3.6 INSTALL TERMINAL BOX:

NOTE:

The cable terminal box (182) has been previously inspected for fit and cleanliness (Paragraph 3.3) and should be in good order. The shipping gasket (744-6) has been removed, and its place will be taken by the terminal box gasket (744-10 current units) or gaskets (744-10) and (744-11) on some units).

1. Unreel a sufficient length of cable to pass the bowl assembly, elevating the cable to the approximate height to fasten the terminal box (182) to the motor. Verify that the cable is not kinked. DO NOT STRETCH THE CABLE.
2. Remove the motor terminal cap nuts (003-9), washers (690-6) and motor terminal shipping cap (112-2).
3. Refer to Figure 15. Depending on configuration supplied:
   (a) For flat faced (no rabbet fit) gland plate, install gasket (744-10) over terminals (019).
   (b) For gland plate with rabbet fit, first install gasket (744-11) over rabbet fit on gland plate (111), then install gasket (744-10) over motor terminals (019).
   (c) For "all metal" terminal box, install O-Ring (also identified as 744-11) on rabbet fit of gland plate (111).
4. Remove shipping cap (023) from the cable terminal box (182).
5. Slide the metal terminal box clamp (180) up the flat cable and off the terminal box (182), loosening the clamping screws (806) if necessary.

CAUTION:

Do not distort the clamp (180).

6. Refer to Figure 17. Align terminal box connectors with the motor terminals and push the terminal box (182) down on the motor terminals to mate with the gland plate (111) and gasket (or gaskets).

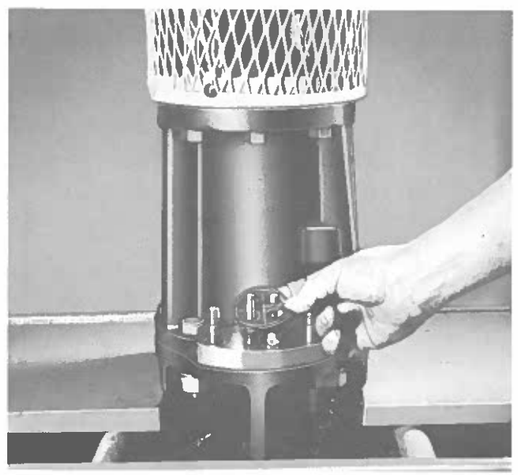


Figure 15 — Installing Terminal Box Gasket (Flat-Faced Type Shown)

NOTE:

To ease clamp (180) over terminal box (182), thread cap screw into tapped hole and turn, thus spreading the clamp. Be sure screw is backed out before tightening clamp screws.

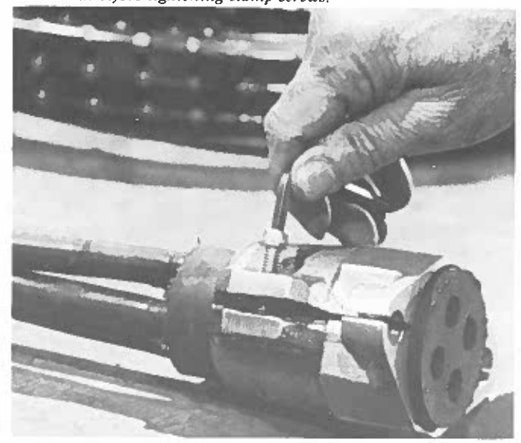


Figure 16 — Preparing Terminal Box Clamps

7. Refer to Figure 18. Slide terminal box clamp (180), down over terminal box (182) and gland plate studs, then install washers (690-6) and nuts (003-9). Tighten the nuts (003-9) to bring the clamp (180) firmly metal-to-metal against the gland plate (111).
8. Back off the nuts (003-9) two or three turns each and tighten clamping screws (806).
9. Retighten the nuts (003-9) to achieve metal-to-metal fit of clamp (180) to gland plate (111).

Figure 17 — Terminal Box Installed

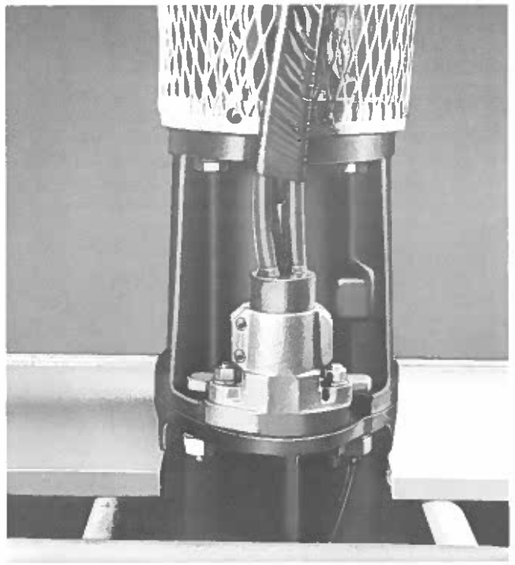


Figure 18 — Terminal Box Clamp Installed

10. Using the surface end of the cable, which should be accessible, megger the cable and motor for ground and continuity. The reading should be 10 megohms or more.
11. When megger test is completed, install a plastic bag over the surface end of the cable for protection from weather.
12. The unit is now ready for attachment of support and discharge column and lowering into the well. Release the cable from the block and tackle.

3.7 INSTALL SUPPORT AND DISCHARGE COLUMN:

3.7.1 Notes

1. Use the approved thread sealing and lubricating compound (see Paragraph 2.2.2, Item 16) on all column and coupling joints.
2. Make up all column and couplings as tight as possible with chain tongs. Torque should equal 10 foot pounds (14 N.m) per horsepower of motor.
3. If used or out of round column pipe is to be utilized it is recommended that a steel strap be welded across each coupling to prevent unthreading during startup or running.
4. Inspect cable guards (801-1 & 801-2) for any shipping damage, particularly on the inner surfaces for sharp places that could damage the cable jacket or insulation.
5. When installing the flat cable, verify that the guards (801-1 & 801-2) have no sharp edges against which the cable may vibrate.
6. Avoid strain on terminal box. Do not use block and tackle to suspend cable until at least four bands have been placed over the round cable and column pipe.
7. The instructions given here concern the use of flat cable having a two-piece cable guard. If the application requires round cable, the instructions are the same except that the round cable has a one-piece cable guard.
8. Use "BAND-IT" or equal stainless steel bands and buckles to fasten the cable assembly to the pump bowls and discharge column. Instructions for use of "BAND-IT" materials and tools are shown in Figure 19, page 13.
9. If one or more vertical column check valves are to be used on an installation, each valve, which should have a bleed-back self draining feature, will take the place of a column coupling (FLOW DIRECTION UPWARD!) The recommended installation is as follows:
   (a) One valve — locate approximately 75 feet (23 m) above pump.
   (b) Two valves — locate first valve 100 feet (30 m) above pump and second valve 3/5 of the distance between the first valve and the surface support plate.

3.7.2 Procedure

1. Elevate the cable alongside the bowl assembly without stretching or straining the terminal box.
2. Refer to Figure 20-A. Use tape to fasten the inner cable guard (801-1) to the bowl assembly if it is not already in place. The guard should reach over the flanges at the adapter bracket and top case.

Figure 20 (A) — Inner Cable Guard in Place

3. Refer to Figure 20-B. Lay the cable in the guard, and tape the cable in place.
4. Refer to Figure 20-C. Install outer guard (801-2). The bottom edge starts at about mid-point on the cable terminal box (182) and the top edge should extend above the inner guard (801-1) by several inches.
5. Clamp the cable guard to the bowl assembly with bands (020). For bowl assemblies six feet or less in length, set a band at the adapter flange, at top and bottom of the suction strainer, at the top case flange and at the approximate center. For longer bowl assemblies, use the same procedure except space the intermediate bands at no more than three feet (approximately 1 meter).

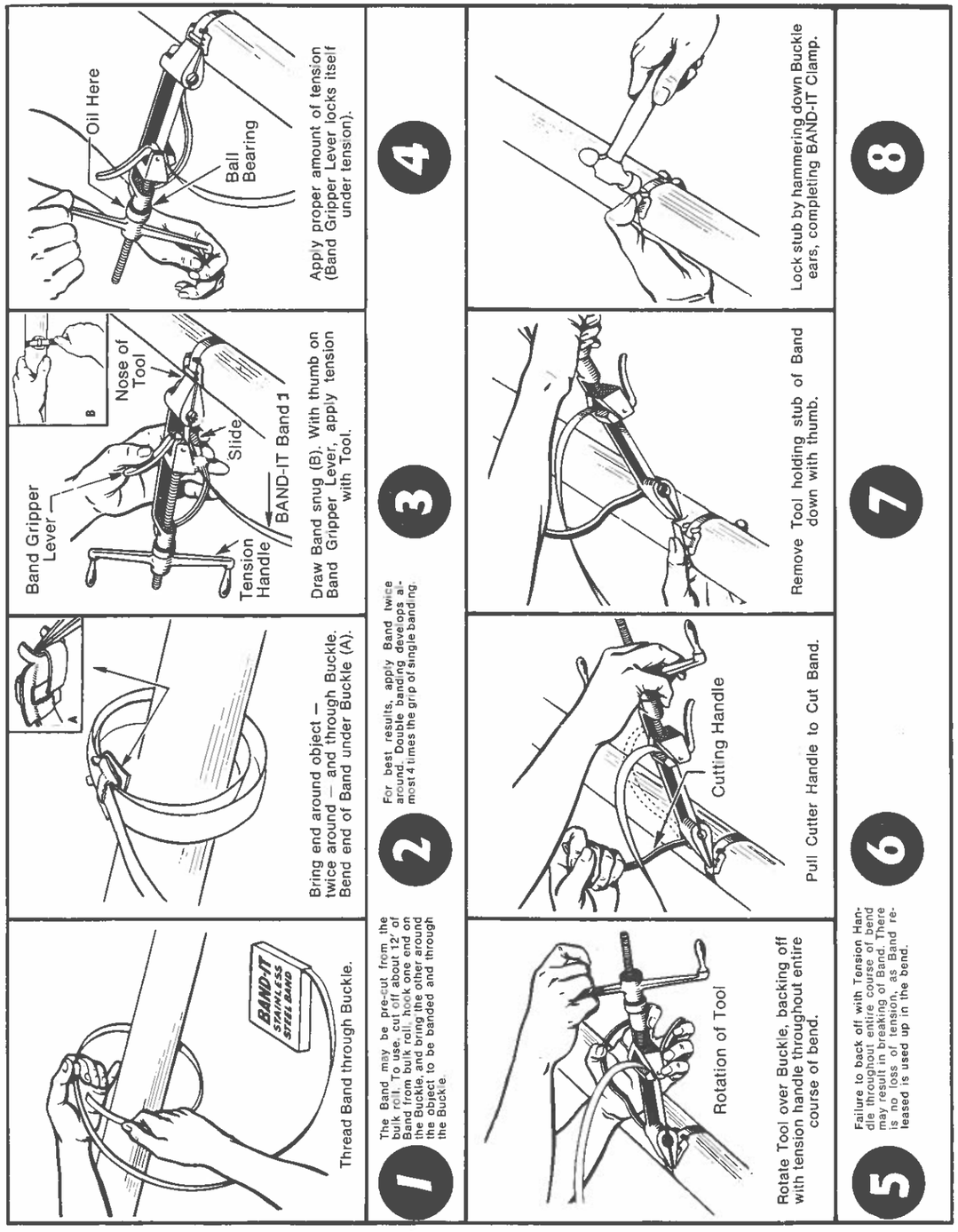


Figure 19 — Use of BAND-IT Tool

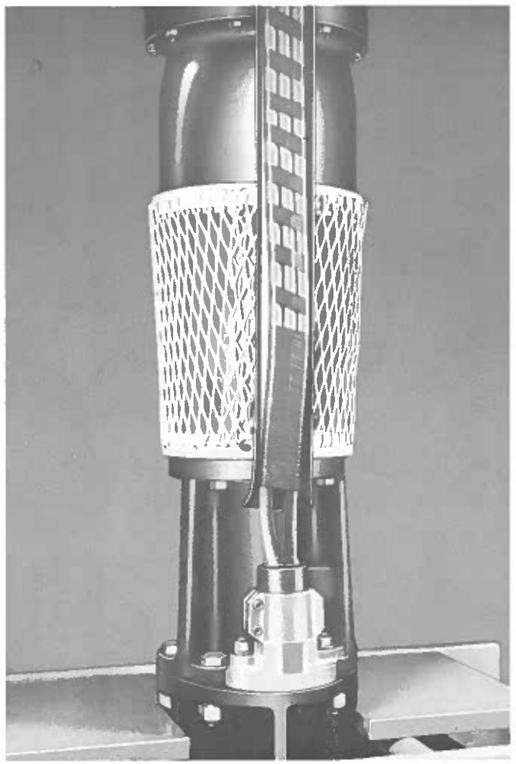


Figure 20 (B) — Cable Installed in Guard

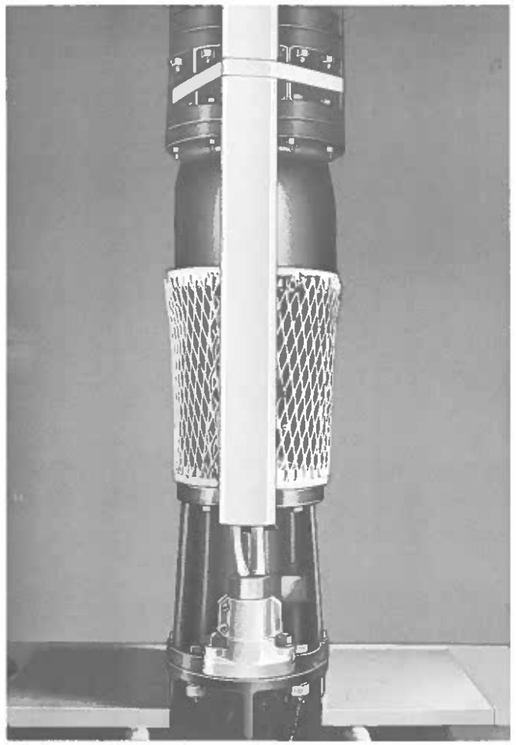


Figure 20 (C) — Outer Guard and Band in Place

6. Prepare a pad of rubber to install under the split where the splices will lay against the support and discharge column. This pad should be long and wide enough for the splices and of 1/16" to 1/8" (1.588 to 3.175 mm) thick stock. Tape the pad in place.
7. Avoid stretching the cable and splices. Take any slack out of cable and splices, then place two cable clamp assemblies up on the round cable above the outer jacket end. Each cable clamp assembly consists of a ¾" (19.050 mm) stainless steel band (020), buckle (017) and a pad or clamp (012).
8. With the splices straight and flat against the discharge column, use plastic tape to fasten the splices. Use 20 to 30 wraps depending on size of column.
9. Arrange the random lengths of column pipe with their coupling ends facing one direction. At five feet in from each pipe end, draw a chalk mark to set the banding location.
10. Install the column pipe, observing the following precautions:
    (a) Place the clamps as the unit is lowered. Each band should be drawn up snugly enough to support the cable on the column, but not overtensioned. Do not stretch the cable.
    (b) Support the unit weight with column pipe elevator.
    (c) While lowering the column pipe, hold the cable flat against the pipe and keep it from dragging across the sharp well casing or flange.
    (d) Avoid loss of cable length. Prevent rotation of the column pipe so that the cable does not spiral wrap around it.
    (e) When the motor first enters the water, use the surface end of the cable to megger the cable and motor for ground and continuity. The reading should be 10 megohms or more.
11. If required, install well seal gasket between surface plate and well flange at this time.
12. With the discharge-and-support head screwed in place and the unit still suspended off the well base, measure and cut the cable to approximate length for surface make up. Also strip the cable, if necessary, and feed the cable through the packing gland (or glands) in the surface plate and then into the junction box. Make the junction box connections water tight at each lead.
13. Place the two final supporting cable clamp assemblies three to four feet below the surface plate, then lower the surface plate into its correct position.
14. At the junction box, megger the cable and motor for ground and continuity. The reading should be 10 megohms or more.
15. The unit is now ready for connection to the power supply.

3.8 CONNECT CABLE TO STARTER:

1. If the starter is not furnished as part of the installation, the rating of the equipment used shall conform to the National Electrical Code requirements for high reactance squirrelcage motors.
2. If the starter is a used one, make certain that the main contacts are in good condition, and are working properly. Also see that the overload relays are for the correct full load current.
3. To insure that the starter may be operated with safety, make certain that the panel housing is properly grounded.
4. Check the no-load voltage at the starter, between all three phases. The voltage values should be equal and approximately the same as the voltage rating stamped on the motor nameplate.
5. Strip back the outer sheath on the cable from 6 to 18 (152 to 457 mm) inches depending on cable size and panel terminal requirements. Strip by scoring the sheath, lengthwise with a knife or tool to the length needed, in several places around the outside. Do not cut all the way through and damage the individual conductor insulation. Grasp a scored segment of the sheath at the end and peel like a banana. Repeat this all the way around and cut off the stripped segments.
6. Strip a short segment of insulation off the end of each conductor for connection into panel terminal.
7. Remove a conduit knock-out in the bottom of the panel. Install the cable with its gasketed grip in this hole, and connect to the starter load terminals.
8. The unit is now ready for starting. See SECTION FOUR.

SECTION FOUR – OPERATION

NOTE: See SECTION ONE, "SPECIAL CONSIDERATIONS," before starting unit in operation.

1. Close the disconnect switch, and operate the magnetic starter. If expected pressure or capacity is not produced, the unit may be running backwards. Shut the starter off, open the disconnect switch and reverse the motor rotation by interchanging any two leads of the power cable. MARK THE LEADS SO THAT THEY MAY ALWAYS BE REPLACED IN THIS SAME POSITION ANY TIME THEY ARE REMOVED.
2. Check the current drawn from the line on all three power leads. The current should not exceed the motor data plate value by more than 10%.
3. The line voltage should be measured between phases while the unit is pumping. The readings obtained should not be more than 10% above or below the rated motor voltage.
4. Should the unit fail to start, the voltage at the motor terminals may be too low. Some of the causes of such difficulties are:
    (a) The transformers supplying the unit may be too small. It is recommended that the rating of the transformer bank in kva be at least equal to the horsepower of the motor.
    (b) The line between the transformer bank and the starter may be too small or too long.
    (c) The transformer voltage tap may be set too low.
    (d) Poor voltage regulation of an engine-driven generator, if the power is obtained from such a source, can be very detrimental. Byron Jackson assumes no responsibility for units operated on such equipment unless otherwise agreed upon in writing.
5. If a reduced voltage starter is used, it is recommended that the voltage applied to the motor with the compensator in the starting position be not less than 80% of the rated motor voltage.
6. When the motor is started across the line, it should attain full speed in not more than 1 second. If after 10 seconds the line current is still high (over twice normal value), the unit is not attaining full speed. STOP THE UNIT. DO NOT ATTEMPT TO RESTART UNTIL THE TROUBLE IS FOUND AND CORRECTED.
7. After start-up and when discharge has cleared, proceed to test the unit and record the data as indicated on the "Submersible Periodic Test Record" card form P-528 found in the "Installation Instruction Kit" envelope.

NOTE:
See the reverse side of test card for information relative to trouble shooting.

SECTION FIVE – MAINTENANCE

5.1 STANDARD MAINTENANCE:

1. A faithful periodic check test card, and maintenance based on recommendations of the local Byron Jackson Sales Engineer, will prove very beneficial to the prolonged life and satisfactory operation of the unit. Such records will provide the information necessary to determine when preventive maintenance should be undertaken.
2. If the unit has "shut-off," and the reason can not be traced to a POSITIVE external source, DO NOT attempt to start the unit without first "megging" the motor. Shut off the power at the disconnect switch, disconnect the motor cable leads from the starter and "megg" them to ground (the well casing). This should be done whether the overload or circuit breaker have "kicked out" or a fuse has blown. NEVER just re-set or re-fuse and attempt to start without FIRST "megging" the unit.

5.2 REMOVAL FROM SERVICE:

1. Open the disconnect switch to stop the unit.
2. Disconnect the cable at the starter panel. Megger the leads for ground and continuity. Reading should be 10 megohms.
3. While removing the unit from the well, proceed as follows:
    (a) If the bands are double wrapped, cut them

properly so that they can be saved for use as a single band for reinstallation.

(b) Check the discharge support column for need of replacement, particularly the sections between high and low well levels.

(c) Inspect any column check valves for wear and proper functioning.

(d) Remove the coupling cap screws and separate the pump element from motor at the adapter and pump flange joint.

(e) Separate cable from motor and seal the cable with the original terminal box shipping cover (023).

(f) Megger the motor for ground and continuity. Reading should be 10 megohms or more.

(g) Seal the motor terminals with original shipping gasket (744-7) and cap (112-2) furnished.

4. If the motor is to be left in the well temporarily, cover the motor with a cloth.

5. If the motor is to be stored or removed from service proceed as follows:

(a) Remove motor from well & while still vertical cover well opening with a canvas or similar protection. Then remove the adaptor bracket (#808).

(b) Install the shipping cap gasket (744-6) and cap (112-1).

(c) Store the motor in a vertical position, in an area safe from freezing temperatures (32° F).

(d) Drill a vent hole in the shipping cap (112-1) and fill the shipping cap (112-1) with water. Do not plug the vent hole. If it is later required that the shipping cap (112-1) be used (in the event motor is returned to factory), this vent hole can be closed by a pipe plug.

WARNING: STEP 6 MUST BE PERFORMED BEFORE MOTOR IS LAID HORIZONTAL. IF NOT, MERCURY CAN BE SPILLED OUT OF MOTOR AND MAY PRESENT A HEALTH HAZARD TO WELL SERVICING PERSONNEL AND FACTORY REPAIR PERSONNEL.

6. To prepare a motor for return to the factory, proceed as follows:

(a) Remove shaft button screw (806-2), shaft adjusting button (130), and shims (262-6 and 262-7). Also, loosen the set screw (806-1) and remove the key (676-1) if possible.

(b) Lubricate shaft with some form of penetrating oil.

(c) Use a puller tool (preferably the three-arm type), if required, to remove the coupling (529). Also remove the key (676-1), if this was not previously removed.

(d) Wrap the coupling (529), key (676-1), set screw (806-1), shims(262-6 and 262-7) , shaft adjusting button (130), and screw (806-2),and put with alignment parts (265, 806-3 and 690-4)and wrenches to be placed in shaft shipping cap (112-1).

(e) Loosen case closure nut (003-7 R.H. Thread) three full turns, freeing the seal baffle (014).

(f) Lubricate the ring (200) and gasket (744-5) inside the seal baffle closure cap (112).

(g) Using a twisting motion, press the seal baffle closure cap (112), down over the shaft extension and baffle lip. Continue pressing down until the gasket (744-5) is over the lip and the baffle (014) can be felt to "bottom".

(h) Install baffle cap screw (806-4) and use an eight-inch crescent or similar wrench to torque the cap screw (806-4) to 35 foot pounds (34 to 47 N.m).

(i) Check to see that case closure nut (M-084), ring (M-083) and gasket (M-082) are loose and free.

(j) Place the coupling and components in the shaft shipping cap (112-1) with its gasket (744-6) and bolt cap securely in place.

(k) Elevate motor over a sump or drum to drain oil from motor.

(l) Remove casing drain plug from bottom side of lower casing, then remove case vent plug (609) at top of motor and allow motor to fully drain.

(m) Replace drain and vent plugs. The motor may now be laid horizontal for shipping.

NOTICE OF MERCURY SAFETY REFERENCE:

CAUTION:

BEFORE STARTING DISASSEMBLY OF THIS MOTOR, PERSONS DOING SO SHOULD BE AWARE THAT THE SHAFT SEAL CONTAINS MERCURY.

The following mercury safety references should be consulted:

(a) American Industrial Hygiene Association, Hygienic Guide Series: Mercury and Its Organic Compounds (Hg-Rev 1966) American Industrial Hygiene Association, 66 South Miller Road, Akron, Ohio 44313.

(b) National Safety Council Mercury Data Sheet 203, Rev. A Extensive. National Safety Council, Chemical Section, 444 North Michigan Avenue, Chicago, Illinois 60611.

(c) National Institute for Occupational Safety and Health, A Recommended Standard for Exposure to Inorganic Mercury. U.S. Department of Health and Human Resources NIOSH, Parklawn Building, 5600 Fishers Lane, Rockville, Maryland 20857.

(d) National Institute for Occupational Safety and Health, Criteria for a Recommended Standard ....Occupational Exposure to Inorganic Mercury, U.S. Department of Health and Human Resources NIOSH, Parklawn Building, 5600 Fishers Lane, Rockville, Maryland 20857.

SECTION – SIX

AUXILIARY DOCUMENTS
(Following This Page)

BORG WARNER® Byron Jackson Pump Division
BORG WARNER CORPORATION

SUBMERSIBLE PERIODIC TEST RECORD

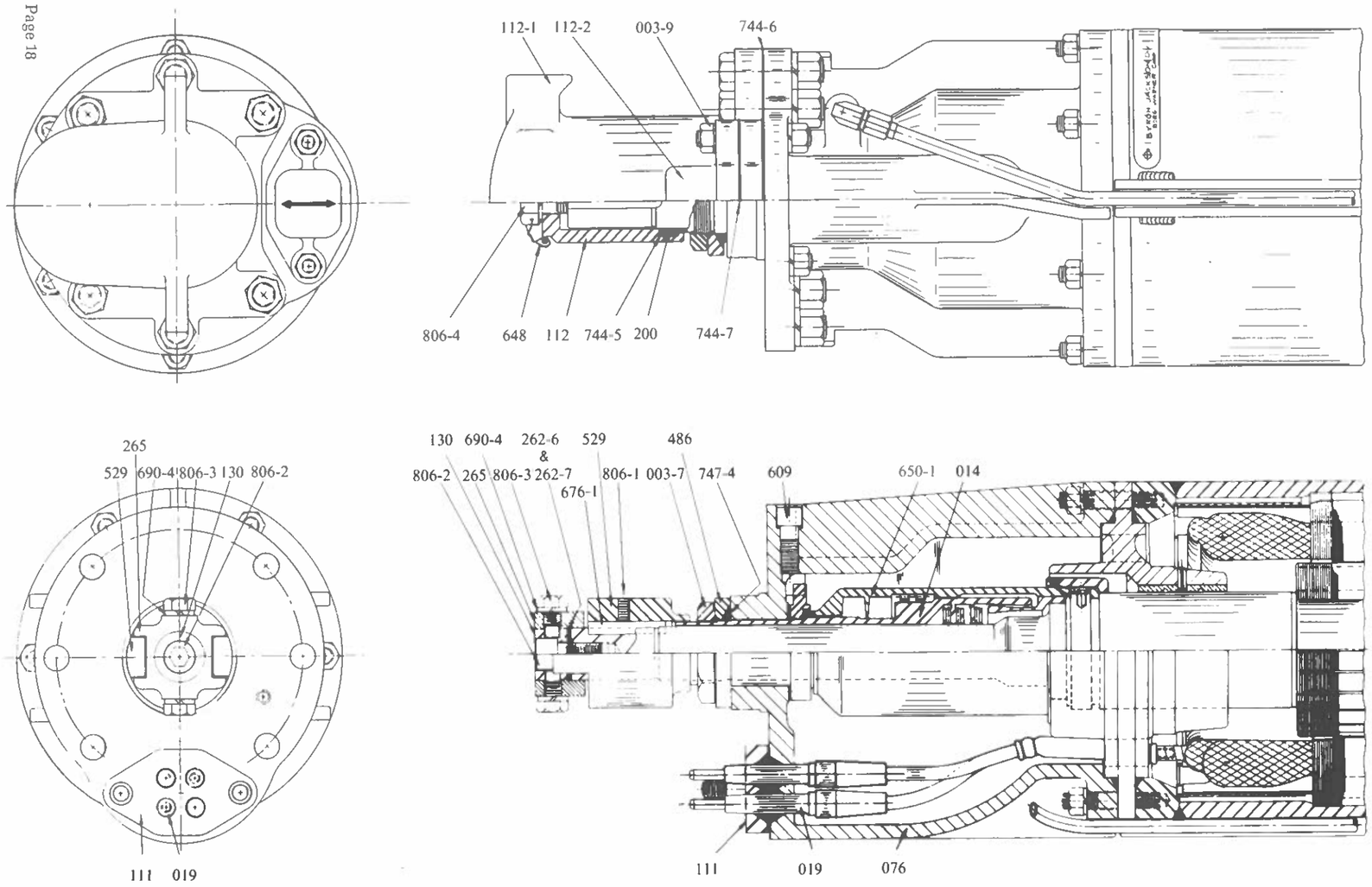
REF:

UNIT SERIAL #
USER REF. #:
Date Original Installation:

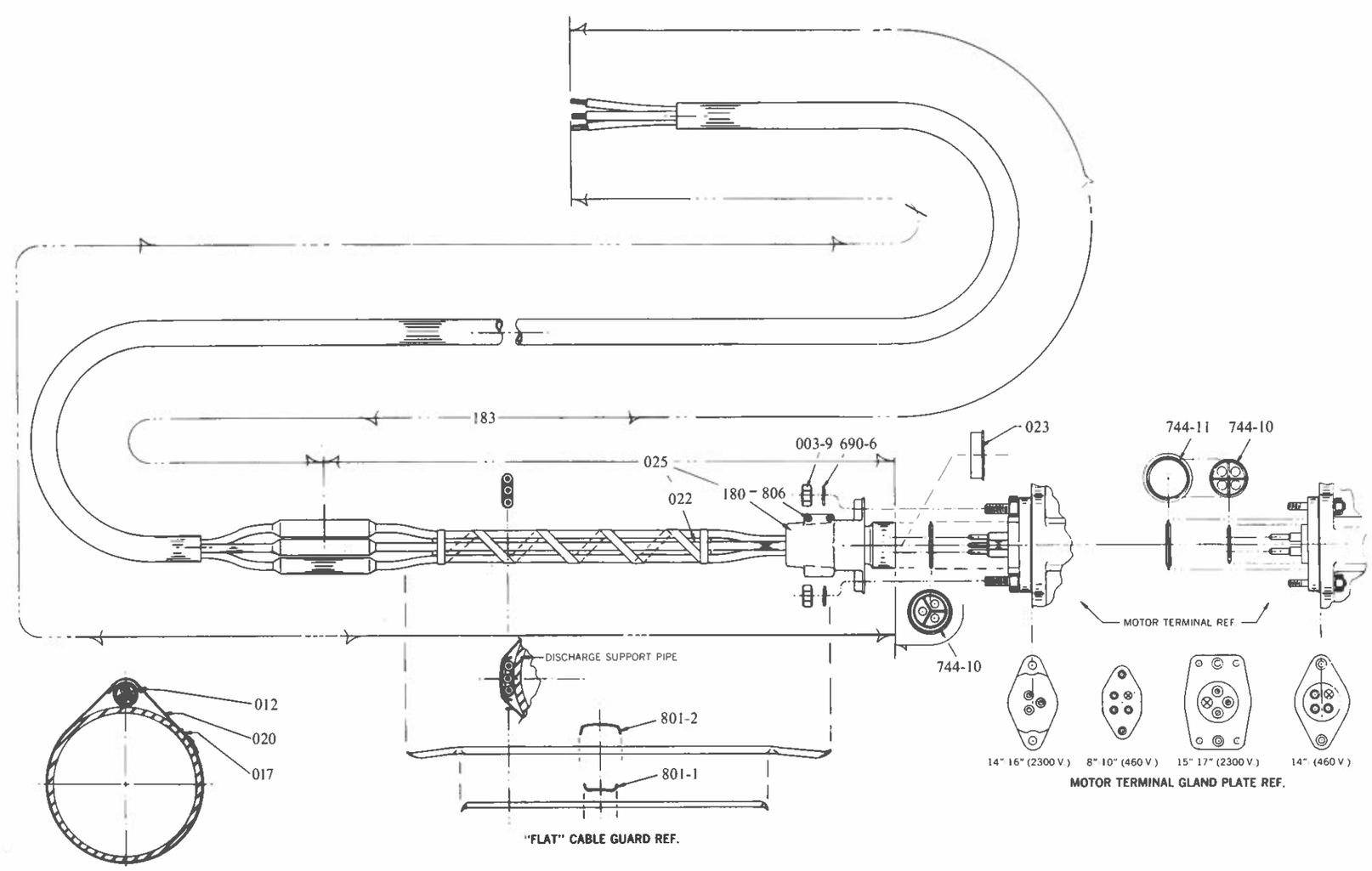
Stage ____ Pump Type ____ HP
Depth of Well ____ Ft.
Depth to Top of Pump ____ Ft.
Duty Capacity of Pump ____ gpm.
at ____ Ft. Total Dynamic Head

NEXT CHECK DATE									
ACTUAL CHECK DATE									
CHECK PROCEDURE	#1	#2	#3	#4	#5	#6	#7	#8	#9
A) Standing Water Level Ft									
b) Open Circuit A–B v									
Line B–C v									
Voltage C–A v									
C) Meg. Reading COLD M									
D) Running A–B v									
Voltage B–C v									
C–A v									
e) Pumping Level Ft									
Pressure Gauge Ft									
Capacity GPM									
f) Running Current A amp									
at B amp									
Above Duty C amp									
G) Shut-off Head Ft									
H) Shut-off A amp									
Current B amp									
C amp									
I) Meg. Reading HOT (Meg. 5 minutes after 30 minutes run at Duty)									
j) TEST NOTES Indicate when due for maintenance and/or any change of service. SEE OVER									

P-528 4'68

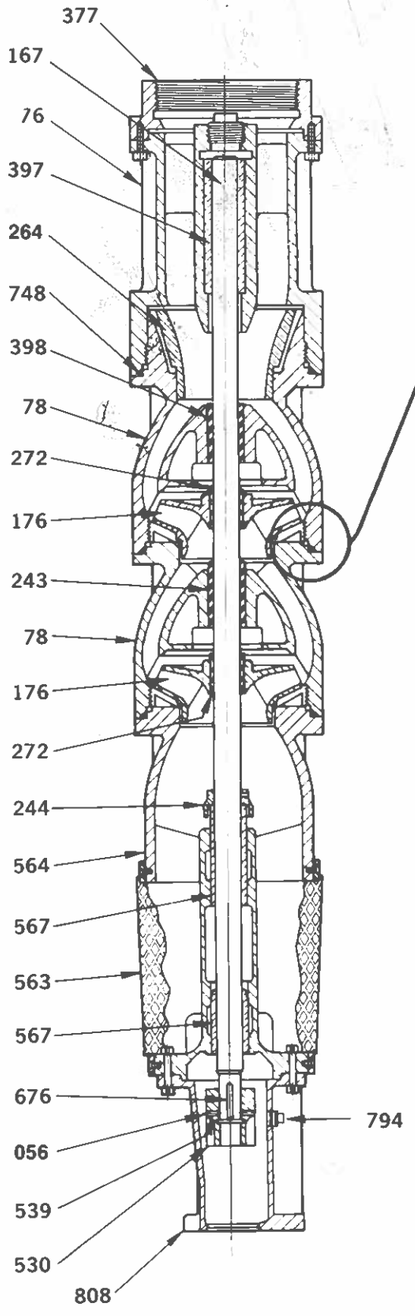


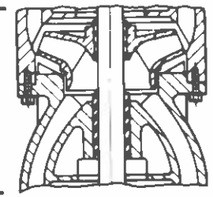
TYPICAL SUBMERSIBLE MOTOR INSTALLATION DETAILS



TYPICAL CABLE ASSEMBLY

TYPICAL SUBMERSIBLE BOWL ASSEMBLIES

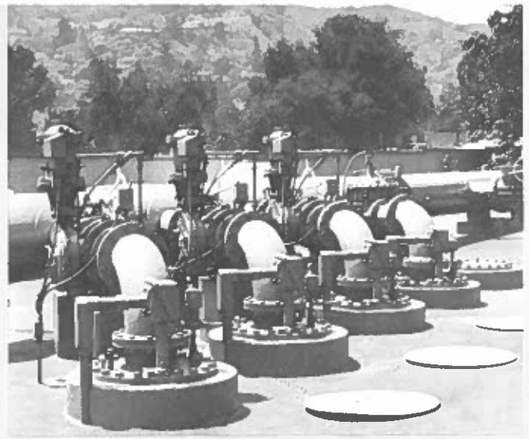




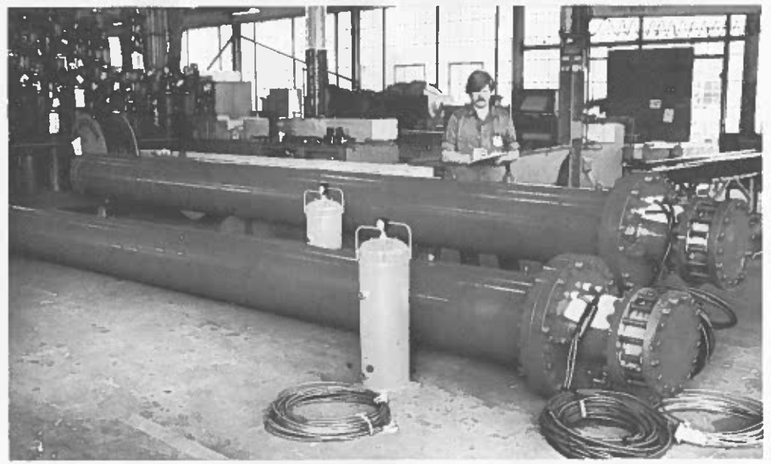
Detail of Flanged Bowls

ITEM NO.		PART NAME
*	056	Retainer Ring
	76	Top Case
	78	Series Case
*	167	Pump Shaft
	176	Impeller
*	243	Bearing-Series Case
	244	Sand Cap
	264	Flow Adapter (Hydraulic)
*	272	Collet-Impeller Lock
	377	Flange-Top Case
*	397	Bearing-Top Case
*	398	Bearing-Top Series Case
	530	Coupling-Pump Half
*	539	Pin-Pump Half Coupling
	563	Strainer Screen
	564	Strainer Body
*	567	Bearing-Strainer Body
*	676	Key-Coupling
*	748	'O' Ring Gasket
	794	Pipe Plug Adapter Bkt.
	808	Adapter

*RECOMMENDED SPARE PARTS



Shown is a submersible booster pump installation in a Municipal Water District in Southern California. The installation includes 3 — 250 HP, 3 — 175 HP, 1 — 125 HP and 1 — 100 HP unit. The pumps were installed in 1957.



Byron Jackson submersibles ready to ship to the North Sea for installation as ballast water pumps for giant concrete oil production platforms. Notice in the background the stock of Byron Jackson submersible motors ready for immediate shipment.

Typical installation of a Byron Jackson submersible pump in an underground vault at the beautiful Allstate Insurance buildings in Northbrook, Illinois.

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