DATE 6-19-00

PWSID 04-67-043

WELL # 649

WELL NAME Holcomb Blvd 649

BLDG. 649

CODE G

AVAILABILITY P

LOCATION Hwy 24 East

LATITUDE 34°42.44 N

LONGITUDE 077.18.22 W

WELL DIAMETER 10"

WELL DEPTH 279'

SCREEN INTERVAL 126'-130', 158'-164'

205'-210' 232'-237, 273-279'

YIELD ---

STATIC LEVEL 10'

PUMPING LEVEL 90'

PUMP TYPE Vertical Turbine

MOTOR HP 20

INTAKE DEPTH 110

DESIGN CAPACITY 250 GPM

ACTUAL GPM 100 GPM

SIZE OF CONCRETE SLAB [illegible]

HEIGHT OF CASING 9½"

Done

North [redacted]olina Department of Environment, Health, and [redacted]
[redacted]ion of Environmental Health, Public Water Supply [redacted]n

SOURCE INFORMATION
GROUND WATER

Date Form Completed (M M D D Y Y): 0 1 1 7 9 5

PWSID: 0 4 6 7 0 4 3

Owner Assigned Source Code: 649

Well Name (If purchase, name of system): Holcomb Blvd 649

Code: G (G=Ground, W=Purchase/G, Y=G w/direct influence, Z=W w/direct influence)

If Purchase, seller ID#:

Source Begin Date (M M Y Y):

Source exempt—SWTR? ☐ Y ☐ N

Direct Influence Date (M M D D Y Y):

Availability: P (P=Permanent, E=Emergency, S=Seasonal, I=Interim, O=Other)

T/13 ABANDONED

Location of well within the system (If purchase, location of master meter): Hwy 24 EAST

Latitude (N) (Deg. Min. Sec.): 34 42 44.

Longitude (W) (Deg. Min. Sec.): 077 18 22.

How Determined: ☐ (G=GPS, M=Map, S=Surveyed)

GPS Data: ☐☐ Q# or DOP #

No. of Sats. Locked on: ☐

(If purchase, use seller's primary source lat/long)

Vulnerable (VOCs)? ☐ Y ☐ N

Assessment Date (M M D D Y Y):

ENTRY POINT INFORMATION

Use Code: C (C=Ground/Permanent, D=Ground/non-permanent)

Availability: P (P=Year-round, S=Seasonal, E=Emergency, I=Interim, O=Other)

Owner Assigned Entry Point Code: 200

Entry Point Name: ~~HB649~~ /

Location:

Well Site: Owned or controlled? ___ (Y,N) Control Area (100' radius)? ___ (Y,N) If no, explain:

Sources of pollution/distance:

Surface water within 200'? ☐ Y ☐ N If yes, actual distance ☐☐☐ feet If yes, bact. samples collected? ___ (Y,N)

Adequate slope? ___ (Y,N) Flooding? ___ (Y,N) Maintenance:

Well House: Free of stored materials? ___ (Y,N) Properly drained? ___ (Y,N) Locked? ___ (Y,N)

Condition of house: Type of freeze protection:

Well: Diameter: 10" Type: Drilled Yield (gpm): 100 Properly sealed? ___ (Y,N)

Properly vented? Y (Y,N) Casing depth 126 ft. (If unknown, put 'UNK') Well depth: 279' Meter available? Y (Y,N)

Concrete slab adequate? Y (Y,N) If no, explain: Size:

Size of blow-off: 4" Sample tap: Before treatment? ___ (Y,N) After treatment? ___ (Y,N)

Pumps: Capacity: GPM: 250 HP: 20 Pump intake depth: 110 Auxiliary Power? N (Y,N)

Type pump: Vertical Turbine Height above floor (pump/casing): 9½" /

Storage at well site: Elev: Hydro: Ground:

If hydroautomatic, air volume control? ___ (Y,N) Safety valves? ___ (Y,N) Coded? ___ (Y,N)

High service pumps: 1. ___ gpm ___ hp 2. ___ gpm ___ hp 3. ___ gpm ___ hp Auxiliary Power? ___ (Y,N)

Is the water treated at this well? N ☐ Y ☐ N If yes, complete back of form.

If other wells are treated here, which ones? If treated elsewhere, where? HB670 PLANT

If purchase, retreat? ☐ Y ☐ N If yes, complete back of form.

Caved

WELL NUMBER 649		BY Thomas Brown			DATE 3-20-90	
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME
100	10	80	70	60	104	05
		90	80	52	100	15
				40	140	25

REMARKS

Dead head @ 75 PSI

Set @ 52 PSI

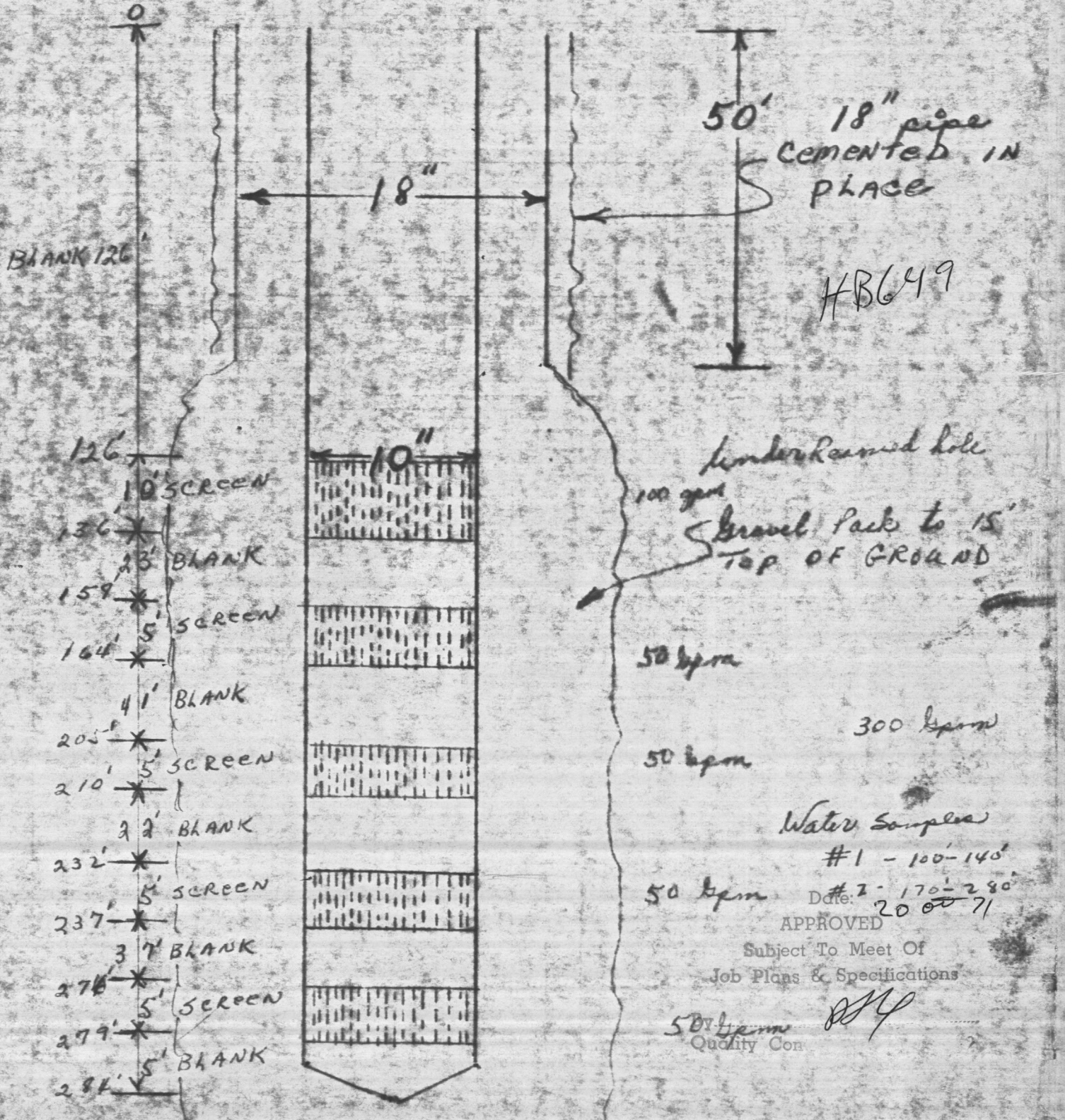
MANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE

BY R.S. DATE 2-2-71 SUBJECT Water Construction SHEET NO. ____ OF ____

CHKD. BY ____ DATE ____ Camp Lejeune N.C. JOB NO. 40936

Hot Well #3

Proposed Sketch of Well #3



Date: 20 Oct 71

APPROVED

Subject To Meet Of

Job Plans & Specifications

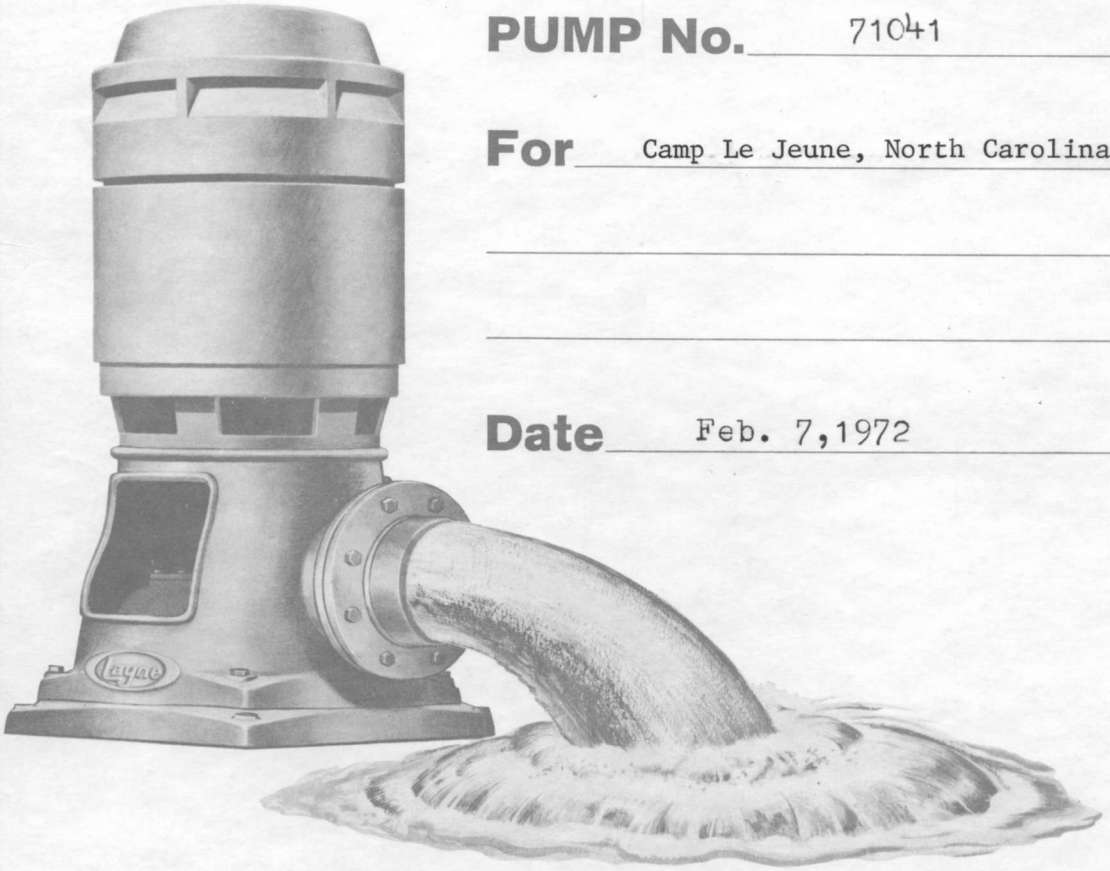
By [signature]

Quality Con

HB WELL #3

Pumped removed 4-8-53
Found 16" casing
Broken on 4-29-53
at about 30'-40' Sand all rock in bottom
of well, Turned in work report this date for new well
well filled in to the 225' Sand

PUMP RECORD



PUMP No. 71041

For Camp Le Jeune, North Carolina

Date Feb. 7,1972

SINGER- Layne Atlantic Co.
Norfolk,
Virginia

Manufactured By:

SINGER

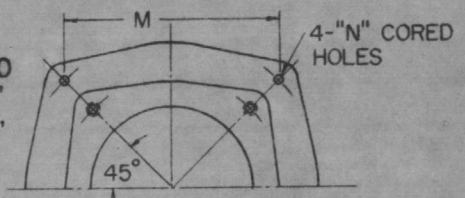
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.
Layne

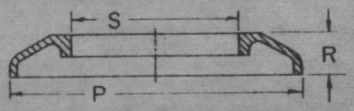
INSTALLATION PLAN

TYPE TF413 DISCHARGE HEAD

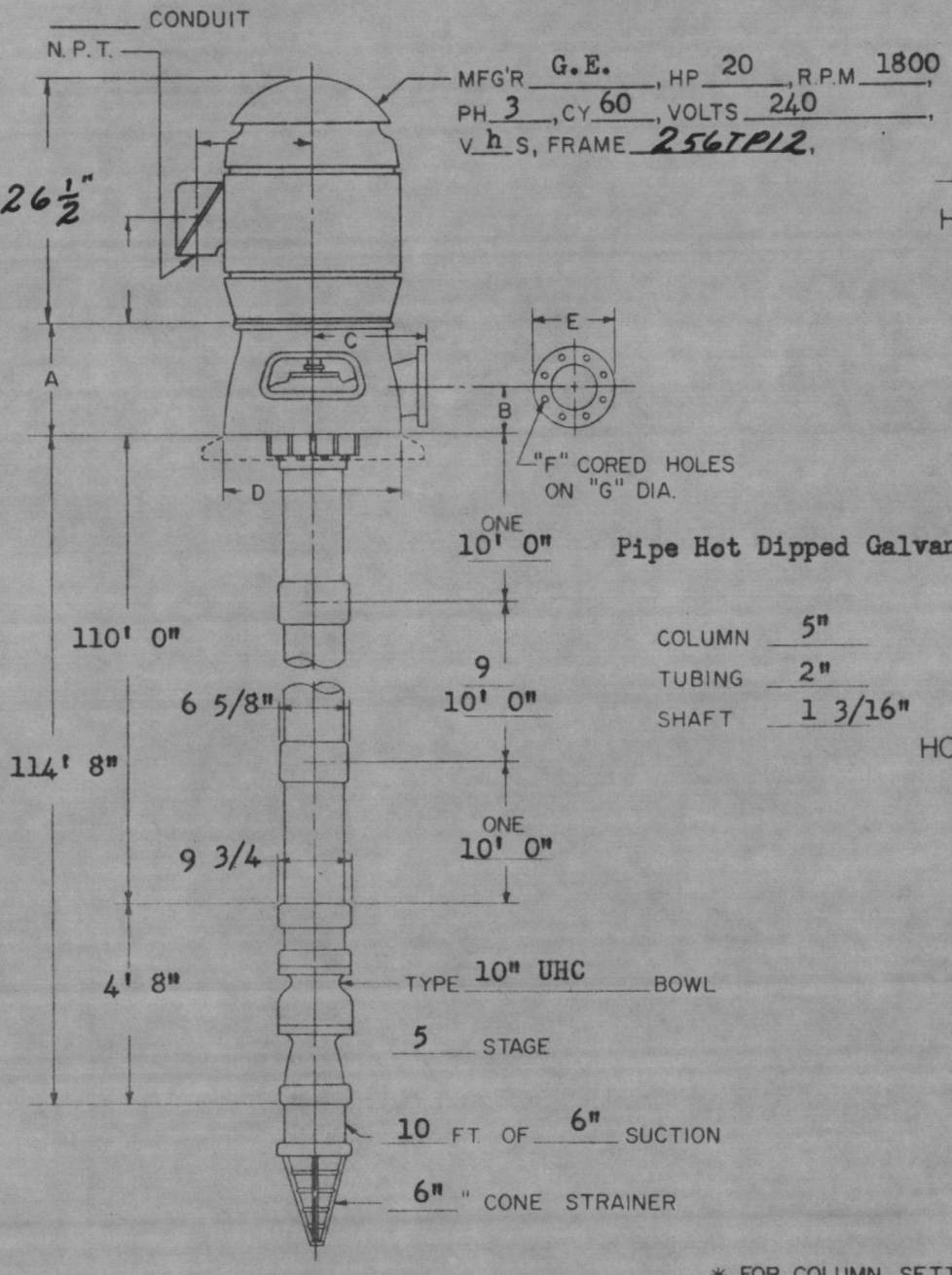
USE THESE DIMENSIONS ONLY
WHEN CERTIFIED BY FACTORY



HOLES IN BASE PLATE

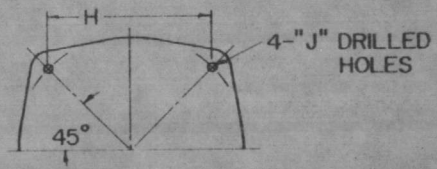


BASE PLATE

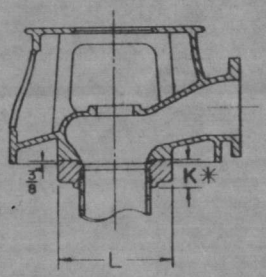


Pipe Hot Dipped Galvanized

COLUMN 5"
TUBING 2"
SHAFT 1 3/16"



HOLES IN BASE OF HEAD



SECTION THRU HEAD

* FOR COLUMN SETTINGS OF 200' OR GREATER, "K"=11"

CUSTOMER: Camp LeJeune, North Carolina	YOUR NO: N-246-71	G.P.M. 250
LOCATION:	OUR NO: 71D-6805	T.D.H. 199
FOR APPROVAL:	PUMP NO: 71041	R.P.M. 1755
CERTIFIED: Tom Morrow	DATE: 12/17/71	B.H.P.

HEAD	A	B	C	D	E	F	G	H	J	K*	L	M	N	P	R	S
TF413	13	6	11	18	9	8-3/4	7 1/2	14 1/8	11/16	2 13/16	10	16 15/16	7/8	21	2	17
TF613	14	6	11	18	11	8-7/8	9 1/2	14 1/8	11/16	2 7/8	11	16 15/16	7/8	21	2	17
TF418	13	6	14 1/4	23	9	8-3/4	7 1/2	17 5/16	13/16	2 13/16	10	20 1/16	7/8	26 1/2	2 3/4	21 3/4
TF618	15	6	14 1/4	23	11	8-7/8	9 1/2	17 5/16	13/16	2 7/8	12 1/2	20 1/16	7/8	26 1/2	2 3/4	21 3/4
TF818	18	7 3/32	14 1/4	23	13 1/2	8-7/8	11 3/4	17 5/16	13/16	3 1/16	13 1/2	20 1/16	7/8	26 1/2	2 3/4	21 3/4
TF1018	18	8 1/8	14 1/4	23	16	12-1	14 1/4	17 5/16	13/16	3 11/16	16	20 1/16	7/8	26 1/2	2 3/4	21 3/4
TF1218	20	9 5/8	16 1/4	26	19	12-1	17	19 5/8	13/16	3 11/16	19	23 11/16	7/8	32	3 1/4	24

HEAD	A	B	C	D	E	F	G	H	J	K*	L	M	N	P	R	S
TF625	15	8 1/8	18 1/8	31	11	8-7/8	9 1/2	23 11/16	13/16	2 7/8	12 1/2	29	1	38	3 3/4	29
TF825	20	8 1/8	18 1/4	31	13 1/2	8-7/8	11 3/4	23 11/16	13/16	3 1/16	13 1/2	29	1	38	3 3/4	29
TF1025	20	8 1/8	18 1/4	31	16	12-1	14 1/4	23 11/16	13/16	3 11/16	16	29	1	38	3 3/4	29
TF1225	21	9 5/8	18 1/4	31	19	12-1	17	23 11/16	13/16	3 11/16	19	29	1	38	3 3/4	29
TF1225I	21	9 5/8	18 1/4	31	19	12-1	17	23 11/16	13/16	4 7/16	21	29	1	38	3 3/4	29
TF1425	21	10 3/8	18 1/4	31	21	12-1 1/8	18 3/4	23 11/16	13/16	4 7/16	21	29	1	38	3 3/4	29
TF1227	24 1/2	9 3/4	21	36	19	12-1	17	27 5/8	13/16	3 11/16	19	33 3/8	1	43	4 1/4	33 1/8

VERTICAL CENTRIFUGAL PUMP-INSTALLATION OF PUMP HEADS WITH STYLE 60 STUFFING BOX
HOLLOW SHAFT-MOTOR DRIVEN BUTT-JOINT TOP COLUMN FLANGE

DISASSEMBLE AND CLEAN Before installation, the pump head should be disassembled and all parts thoroughly cleaned with kerosene. Remove the stuffing box from the discharge ell.

MOUNT DISCHARGE ELL With the style 60 packing box a butt-joint, top-column flange is used. Therefore, no adjustment is necessary. Clean the face of the top flange and the bottom flange of the discharge ell and coat with Layncote. Note condition of top of the projecting tubing and remove with a file any burrs or sharp edges that might cut the O ring when it is installed. Bolt discharge ell and column together.

PACKING BOX Clean the tension bearing and stuffing box thoroughly before continuing with installation. Insert the stuffing box first, having the "O" ring in place (a light coat of oil should be given the "O" ring). The tension bearing can now be installed, the threaded portion being coated with Layncote. Slip bearing over shaft and screw into tubing until the bearing flange butts the stuffing box. (This should be a hand tight snug fit). The bearing is now ready to take the tension.

TENSION The amount of tension should be based on 1/8" tube travel per 100 ft. of setting, this is put in terms of No. of turns of the tension bearing in the table below:

SIZE TUBING	NUMBER THREADS	NUMBER OF TURNS PER 100 FEET OF SETTING
1 1/4"	16	2
1 1/2"	12	1 1/2
2"	10	1 1/4
2 1/2", 3" & 3 1/2"	8 OLD STD.	1
2 1/2", 3" & 3 1/2"	10 NEW STD.	1 1/4
4" & UP	10	1 1/4

ALIGNMENT The pump shaft MUST now be in the exact center of the pump head and exactly perpendicular to the machined surface of the discharge ell. This can be checked with a stright edge, square, and pair of calipers. The discharge ell can be shaifted slightly on the concrete foundation or tilted with shims until the shaft is properly aligned.

MOTOR MOUNT Lower the hollow shaft motor over the drive shaft, taking care not to disturb the alignment. To insure proper operation of the pump it is necessary that the motor be centered exactly, so great care should be taken in this operation. Bolt motor to discharge ell or motor stand with cap screws.

When a hollow shaft motor is used the drive shaft is keyed to a removable motor coupling. Screw on and tighten the drive shaft nut, lifting the shaft until the impellers are drawn against the top of the pump bowl. In this position the shaft cannot be rotated. The nut should then be loosened 1/4 to 1/2 turn or until the shaft turns freely. A gib key is then inserted to prevent the drive shaft nut from working loose.

GROUT BASE AND CONNECT DISCHARGE Grout the discharge ell in position, being careful not to disturb the alignment of the pump head. In case the discharge nipple is to be connected to a water main, a Dresser Coupling should be used. The main should be placed as nearly as possible in line with the discharge nipple. The Dresser Coupling prevents throwing any strain on the pump head if the discharge nipple and main are not exactly in line.

LUBRICATING SYSTEM Connect the hand oil pump, drip feed lubricator or automatic solenoid lubricator to the oil connection in the tension bushing. When first connected allow about one cup full oil to enter the tubing. Then adjust the drip cup or automatic lubricator to allow the following quantity of oil to enter the tubing:

For setting up to 50 feet - 5 drops per minute
For setting up to 100 feet - 10 drops per minute
For setting up to 150 feet - 15 drops per minute
For setting up to 200 feet - 20 drops per minute
For setting up to 250 feet - 25 drops per minute
For setting up to 300 feet - 30 drops per minute

When using a force feed oil pump inject about one cup full of oil for each 24 hours of operation.

The oil should be of a good grade of mineral oil free from grit or foreign matter, with a viscosity rating of approximately S.A.E. 10 and having a relatively low cold pour point.

STARTING PUMP CHECK DIRECTION OF MOTOR ROTATION very carefully before applying power. The pump must operate in a left hand or counter clock-wise direction.

Open pet cock located adjacent to packing box to release air from discharge column, and close as soon as water discharges from pet cock.

After the pump has been in operation a few hours, shut down and check the adjustment of the pump runners. The pump shaft may have been screwed up tighter by the power applied and thereby shortened.

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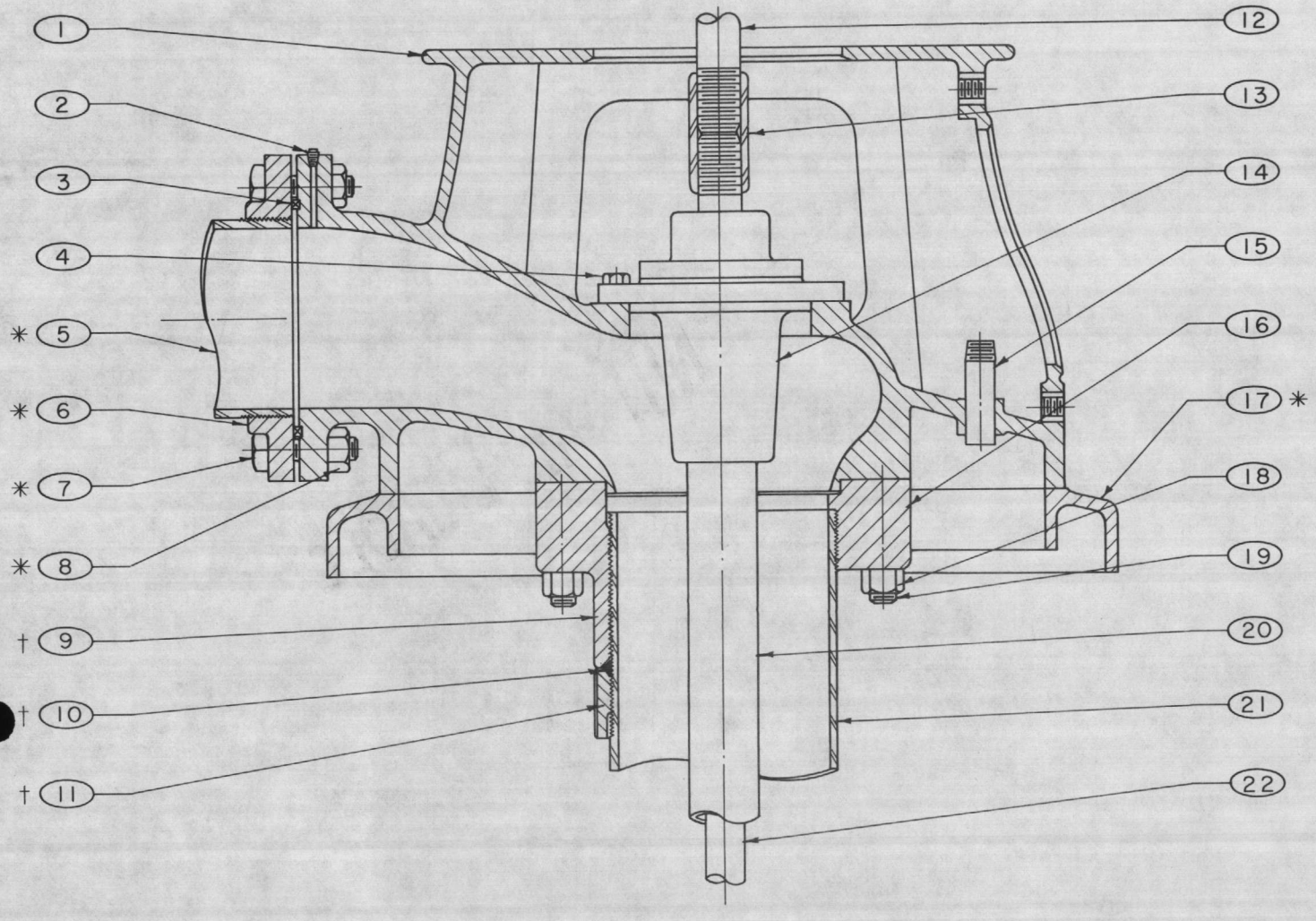
TYPE TF DISCHARGE HEAD

ENCLOSED LINE SHAFT

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.
Layne



*NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER

ITEM NO.		DESCRIPTION
1		DISCHARGE HEAD
2		PIPE PLUG, PRESSURE GAUGE
3		PACKING, COMPANION FLANGE
4		CAPSCREW (STUFFING BOX)
5		DISCHARGE PIPE
6		COMPANION FLANGE
7		MACHINE BOLT, COMPANION FLG.
8		HEX NUT, COMPANION FLANGE
9		ADJ. TOP COLUMN FLANGE
10		PACKING
11		PACKING RING

†USED FOR SETTINGS GREATER THAN 200 FT.

ITEM NO.		DESCRIPTION
12		MOTOR DRIVE SHAFT
13		HEAD COUPLING
14		STUFFING BOX (ASSEMBLY)
15		PIPE NIPPLE (AUXILIARY OPN'G)
16		TOP COLUMN FLANGE
17		BASE PLATE
18		HEX NUT
19		STUD
20		TUBING
21		TOP COLUMN PIPE
22		LINE SHAFT, TOP PIECE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

REVISED 10-1-67
SUPERSEDES ORIGINAL PRICE BOOK ISSUE

PBS 193

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TYPE TF DISCHARGE HEAD

OPEN LINE SHAFT

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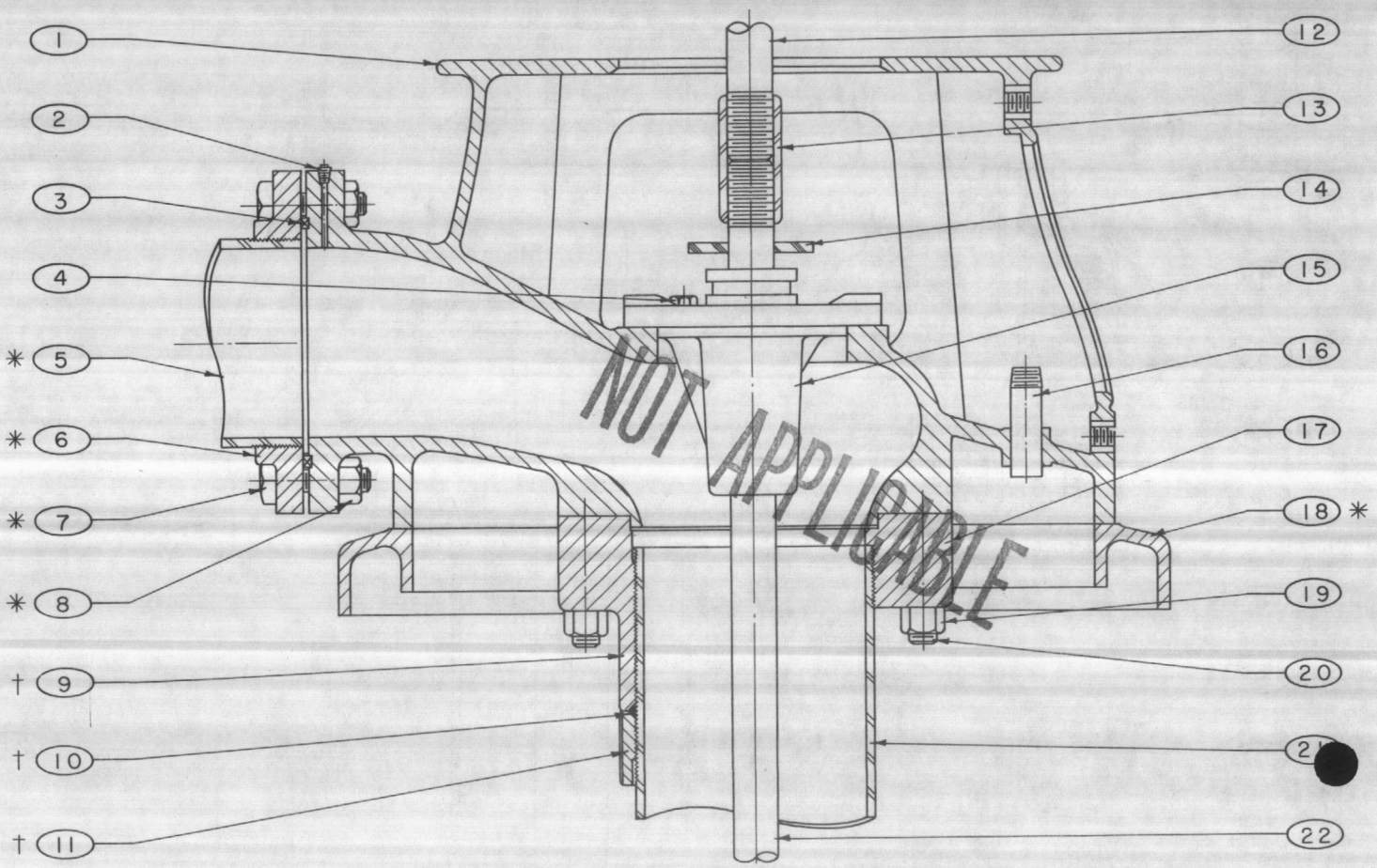
Layne



* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER

† USED FOR SETTINGS GREATER THAN 200 FT.

ITEM NO.		DESCRIPTION
1		DISCHARGE HEAD
2		PIPE PLUG, PRESSURE GAUGE
3		PACKING, COMPANION FLANGE
4		CAPSCREW (STUFFING BOX)
5		DISCHARGE PIPE
6		COMPANION FLANGE
7		MACHINE BOLT, COMPANION FLG.
8		HEX NUT, COMPANION FLANGE
9		ADJ. TOP COLUMN FLANGE
10		PACKING
11		PACKING RING

ITEM NO.		DESCRIPTION
12		MOTOR DRIVE SHAFT
13		HEAD COUPLING
14		WATER SLINGER
15		STUFFING BOX (ASSEMBLY)
16		PIPE NIPPLE (AUXILIARY OPN'G)
17		TOP COLUMN FLANGE
18		BASE PLATE
19		HEX NUT
20		STUD
21		TOP COLUMN PIPE
22		LINE SHAFT, TOP PIECE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

REVISED - 10-1-67
SUPERSEDES ORIGINAL PRICE BOOK ISSUE

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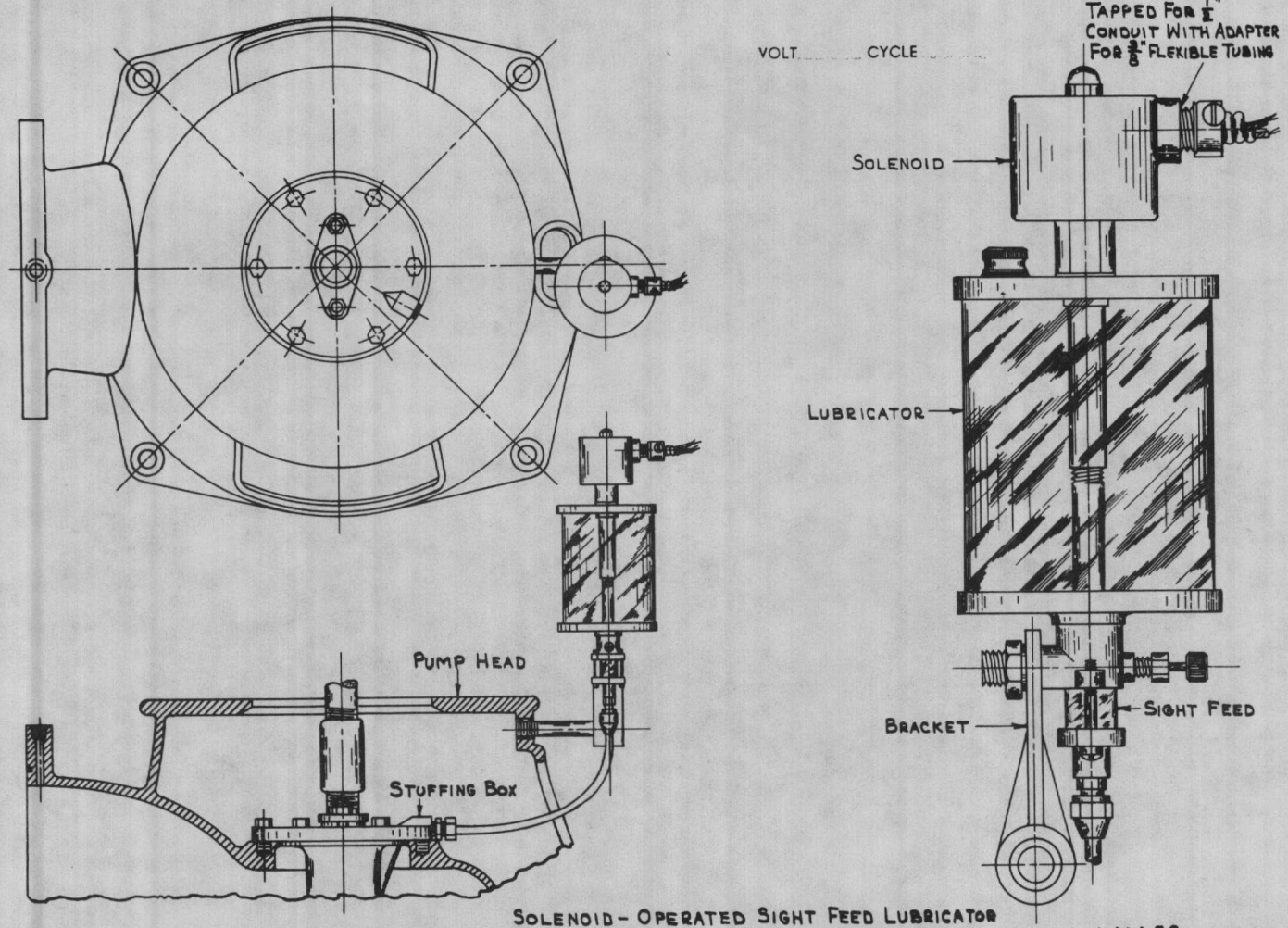

SOLENOID - OPERATED SIGHT FEED LUBRICATOR FOR AUTOMATIC OPERATION

LMA99

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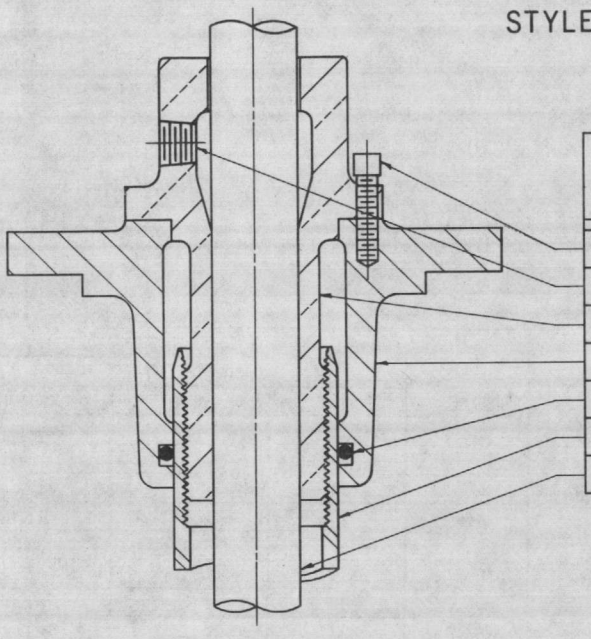
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

STUFFING BOX ASSEMBLY
OIL LUBRICATION
STYLE 60



PART NAME	MATERIAL	
	STANDARD	SPECIAL
LOCK SCREW	STEEL	
OIL INLET		
TENSION BEARING	BRONZE	
TENSION BOX	CAST IRON	
O-RING	BUNA-N	
TUBING	C.S.-SCH. 80 PIPE	
LINE SHAFT	C-1045 CAR. STL.	

IN ORDERING REPLACEMENT PARTS, SPECIFY PARTS DESCRIPTION AND PUMP SERIAL NO.

INSTALLATION AND OPERATING INSTRUCTIONS

1. REMOVE THE LOCK SCREW AND THE O-RING AND THOROUGHLY CLEAN THE TENSION BOX INCLUDING THE O-RING GROOVE. REMOVE ANY NICKS OR BURRS FROM THE UPPER AND LOWER MOUNTING FACES AND MALE REGISTER WITH A FINE FLAT FILE. RE-INSTALL AND LIGHTLY OIL THE EXPOSED SURFACE OF THE O-RING.

2. CLEAN THE SURFACE OF THE HEAD THAT RECEIVES THE TENSION BOX AND REMOVE ANY NICKS OR BURRS WITH A FINE FLAT FILE.

3. CAREFULLY INSTALL THE TENSION BOX, ALIGN THE MOUNTING HOLES WITH THE TAPS IN THE HEAD AND SEAT THE BOX TO THE HEAD. INSTALL AND EVENLY TIGHTEN THE MOUNTING CAPSCREWS.

4. CLEAN THE TENSION BEARING THOROUGHLY AND REMOVE ANY NICKS OR BURRS FROM THE MOUNTING FACE AND REGISTER WITH A FINE FLAT FILE. REMOVE ANY NICKS OR BURRS FROM THE THREADS WITH A THREE CORNERED FILE.

5. OIL THE THREADS AND THE BORE AND CAREFULLY PLACE THE TENSION BEARING OVER THE SHAFT AND THREAD (RIGHT HAND) INTO THE TUBING. CONTINUE THREADING UNTIL THE LOWER FLANGE FACE FIRMLY CONTACTS THE TENSION BOX FACE.

6. FOR THE PROPER AMOUNT OF TUBE TENSION, REFER TO INSTRUCTIONS PBI 100 PAGE 1 OR 2. FOR SETTINGS LESS THAN 100 FEET, TIGHTEN TO THE NEAREST LOCKING POSITION.

   CHART 1 BELOW GIVES THE AMOUNT OF PULL-UP FOR EACH COMPLETE TURN. OF THE TENSION BEARING.

CHART 1

SIZE TUBING	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4" & UP
NO. THD'S/IN	16	12	10	10		8	10
"A"	.063"	.083"	.100"	.100"		.125"	.100"

"A" = AMOUNT OF PULL-UP FOR EACH COMPLETE TURN OF THE TENSION BEARING. THE TOTAL NUMBER OF TURNS REQUIRED CAN BE CALCULATED BY DIVIDING THE FIGURE ABOVE INTO THE TENSION FIGURE FROM PBI 100.

EXAMPLE: 500 FEET OF 10" (.279" WALL) x 1 11/16" x 2 1/2": FROM PBI 100, THE PROPER TENSION OR PULL-UP IS FOUND TO BE 0.529" AND FROM CHART 1, THE PULL-UP PER COMPLETE TURN IS 0.100" FOR 2 1/2" 10 THD. TUBING.

TOTAL NO. OF TURNS = $\frac{0.529}{0.100}$ = 5.29 OR APPROXIMATELY 5 1/4.

IF AFTER ADJUSTING THE TENSION BEARING THE PROPER NUMBER OF TURNS, NO SLOT ALIGNS WITH THE LOCK SCREW TAP IN THE BOX, IT IS RECOMMENDED THAT THE BEARING BE BACKED OFF TO THE NEAREST ALIGNMENT POSITION IF IT TAKES MORE THAN AN EIGHTH TURN FORWARD TO ACHIEVE ALIGNMENT.

7. INSTALL AND TIGHTEN THE LOCK SCREW.

8. CONNECT THE LUBRICATOR TO THE OIL CONNECTION IN THE TENSION BEARING.

   FILL THE LUBRICATOR WITH A GOOD GRADE MINERAL OIL HAVING A VISCOSITY RATING OF APPROXIMATELY S.A.E. 10 AND HAVING A RELATIVELY LOW COLD POUR POINT.

CONTINUED ON PAGE 2

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MEMPHIS, TENNESSEE U.S.A.

Layne

STYLE 60 INSTALLATION AND OPERATING INSTRUCTIONS

(CONTINUED)

IMPORTANT:

PRIOR TO INITIAL START-UP AND AFTER A SHUT DOWN OF 150 HOURS OR LONGER, THE LUBRICATOR SHOULD BE ADJUSTED FOR THE RECOMMENDED NUMBER OF DROPS PER MINUTE AS OUTLINED IN CHART 2 AND ALLOWED TO OPERATE AT THIS RATE FOR 20 MINUTES FOR EACH 100 FEET OF SETTING.

FOR NORMAL OPERATION, THE LUBRICATOR SHOULD BE ADJUSTED IN ACCORDANCE WITH CHART 2.

CHART 2

SHAFT SIZE	"A" LUBRICATOR SETTING IN DROPS PER MIN.	"B" DROPS PER MIN. PER EACH 100 FT. SETTING
7/8 - 1 3/16	5	2
1 1/2 - 1 11/16	7	3
1 15/16 - 2 7/16	10	4
2 11/16	12	5

TOTAL DROPS/MIN. = "A" + $\left(\frac{\text{SETTING}}{100} \times \text{"B"}\right)$

EXAMPLE: 500 FEET OF 1 11/16" x 2 1/2"

TOTAL DROPS/MIN. = $7 \times \left(\frac{500}{100} \times 3\right) = 7 + (5 \times 3) = 7 + 15 = 22$

9. THE LUBRICATOR SHOULD BE CHECKED PERIODICALLY AND RESET IF REQUIRED TO MAINTAIN THE PROPER FLOW.

THE APPROXIMATE NUMBER OF HOURS OF CONTINUOUS OPERATION AT VARIOUS FLOW RATES CAN BE FOUND IN CHART 3. IT IS GENERALLY RECOMMENDED THAT THE LUBRICATION BE RE-FILLED WHEN IT IS NO LESS THAN ONE QUARTER FULL.

CHART 3

NUMBER OF HOURS OF CONTINUOUS OPERATION			
FLOW RATE DROPS/MIN.	LUBRICATOR CAPACITY		
	1 QUART	2 QUART	3 QUART
5	110	220	440
10	55	110	220
15	38	75	150
20	28	55	110
25	22	45	90
30	19	38	75
40	14	28	55
50	11	22	45

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MEMPHIS, TENNESSEE U.S.A.

Layne

TUBE TENSION ADJUSTMENT CHART

COLUMN SIZE	SHAFT AND TUBING SIZE	TUBE TENSION IN INCHES SETTING IN FEET									
		100	200	300	400	500	600	700	800	900	1000
3" MC*	1 1/4 x 7/8	0.025	0.103	0.233	0.415	0.649					
(.187)	1 1/2 x 1	0.028	0.115	0.261	0.465	0.726					
4" *	1 1/4 x 7/8	0.020	0.083	0.186	0.333	0.520	0.750	1.021	1.334	1.688	2.084
(.237)	1 1/2 x 1	0.022	0.090	0.202	0.361	0.564	0.813	1.107	1.447	1.831	2.260
SCH. 40S	2 x 1 3/16	0.025	0.103	0.233	0.416	0.650	0.936	1.275	1.666	2.108	2.603
5" *	1 1/4 x 7/8	0.018	0.075	0.171	0.305	0.476	0.686	0.934	1.220	1.544	1.906
(.258)	1 1/2 x 1	0.020	0.081	0.182	0.325	0.508	0.733	0.998	1.303	1.650	2.036
SCH. 40S	2 x 1 3/16	0.022	0.091	0.205	0.366	0.571	0.824	1.121	1.465	1.854	2.289
	1 1/4 x 7/8	0.017	0.071	0.160	0.286	0.447	0.644	0.878	1.146	1.451	1.791
6" *	1 1/2 x 1	0.018	0.075	0.169	0.302	0.472	0.681	0.927	1.211	1.532	1.892
(.280)	2 x 1 3/16	0.020	0.083	0.187	0.333	0.521	0.751	1.022	1.335	1.690	2.086
SCH 40S	2 1/2 x 1 1/2	0.024	0.098	0.220	0.393	0.613	0.884	1.204	1.572	1.990	2.457
	2 1/2 x 1 11/16	0.025	0.102	0.231	0.412	0.643	0.927	1.263	1.649	2.088	2.577
	3 x 1 15/16	0.029	0.119	0.269	0.480	0.750	1.080	1.471	1.922	2.432	3.003
	1 1/2 x 1	0.017	0.071	0.161	0.287	0.449	0.647	0.881	1.151	1.457	1.798
	2 x 1 3/16	0.019	0.077	0.175	0.313	0.488	0.704	0.958	1.252	1.584	1.956
7" *	2 1/2 x 1 1/2	0.022	0.089	0.202	0.360	0.563	0.811	1.105	1.443	1.827	2.255
(.300)	2 1/2 x 1 11/16	0.023	0.093	0.211	0.376	0.587	0.846	1.153	1.506	1.906	2.353
	3 x 1 15/16	0.026	0.107	0.242	0.431	0.673	0.970	1.321	1.726	2.184	2.696
	3 1/2 x 2 3/16	0.030	0.121	0.272	0.485	0.757	1.092	1.486	1.941	2.457	3.034
	3 1/2 x 2 7/16	0.031	0.127	0.287	0.512	0.800	1.153	1.570	2.050	2.595	3.204
	2 x 1 3/16	0.019	0.076	0.173	0.308	0.481	0.694	0.945	1.234	1.562	1.928
8" *	2 1/2 x 1 1/2	0.022	0.088	0.198	0.354	0.552	0.796	1.084	1.416	1.793	2.213
(.277)	2 1/2 x 1 11/16	0.022	0.091	0.206	0.368	0.575	0.829	1.129	1.475	1.867	2.306
SCH 30	3 x 1 15/16	0.026	0.105	0.236	0.421	0.657	0.947	1.290	1.684	2.132	2.632
	3 1/2 x 2 3/16	0.029	0.117	0.265	0.472	0.737	1.062	1.447	1.890	2.392	2.953
	3 1/2 x 2 7/16	0.031	0.124	0.279	0.498	0.778	1.121	1.526	1.993	2.522	3.114
	2 x 1 3/16	0.018	0.074	0.166	0.297	0.464	0.668	0.910	1.189	1.505	1.858
8"	2 1/2 x 1 1/2	0.020	0.083	0.188	0.336	0.525	0.757	1.031	1.347	1.704	2.104
(.322)	2 1/2 x 1 11/16	0.021	0.087	0.196	0.349	0.545	0.786	1.070	1.398	1.769	2.184
SCH. 40S	3 x 1 15/16	0.024	0.098	0.221	0.394	0.616	0.887	1.208	1.579	1.998	2.467
	3 1/2 x 2 3/16	0.027	0.109	0.246	0.439	0.685	0.987	1.344	1.756	2.223	2.744
	3 1/2 x 2 7/16	0.028	0.115	0.259	0.461	0.720	1.038	1.413	1.846	2.336	2.884
	2 x 1 3/16	0.018	0.072	0.163	0.291	0.455	0.655	0.892	1.166	1.476	1.822
	2 1/2 x 1 1/2	0.020	0.081	0.183	0.327	0.511	0.737	1.003	1.311	1.659	2.048
9" *	2 1/2 x 1 11/16	0.021	0.084	0.190	0.339	0.530	0.763	1.040	1.358	1.719	2.122
(.312)	3 x 1 15/16	0.023	0.095	0.213	0.381	0.595	0.857	1.167	1.524	1.929	2.382
	3 1/2 x 2 3/16	0.026	0.105	0.236	0.422	0.658	0.949	1.292	1.688	2.136	2.637
	3 1/2 x 2 7/16	0.027	0.110	0.248	0.442	0.690	0.995	1.355	1.770	2.240	2.766
	2 x 1 3/16	0.018	0.072	0.163	0.291	0.454	0.655	0.891	1.164	1.474	1.819
	2 1/2 x 1 1/2	0.020	0.081	0.183	0.327	0.510	0.736	1.002	1.309	1.656	2.045
10" *	2 1/2 x 1 11/16	0.021	0.084	0.190	0.338	0.529	0.762	1.038	1.355	1.716	2.118
(.279)	3 x 1 15/16	0.023	0.094	0.213	0.380	0.593	0.855	1.164	1.521	1.925	2.377
	3 1/2 x 2 3/16	0.026	0.104	0.236	0.420	0.657	0.946	1.289	1.683	2.131	2.630
	3 1/2 x 2 7/16	0.027	0.110	0.247	0.441	0.689	0.992	1.351	1.765	2.234	2.758
	4 x 2 11/16	0.030	0.122	0.276	0.492	0.769	1.108	1.509	1.971	2.494	3.079
	2 x 1 3/16	0.017	0.071	0.159	0.285	0.445	0.641	0.873	1.141	1.444	1.783
	2 1/2 x 1 1/2	0.019	0.079	0.178	0.318	0.496	0.715	0.974	1.272	1.610	1.988
10"	2 1/2 x 1 11/16	0.020	0.081	0.184	0.328	0.513	0.739	1.007	1.315	1.664	2.055
(.307)	3 x 1 15/16	0.022	0.091	0.205	0.366	0.572	0.824	1.122	1.466	1.855	2.290
SCH. 30	3 1/2 x 2 3/16	0.025	0.100	0.226	0.403	0.629	0.907	1.235	1.614	2.042	2.521
	3 1/2 x 2 7/16	0.026	0.105	0.236	0.422	0.659	0.949	1.292	1.688	2.137	2.638
	4 x 2 11/16	0.029	0.116	0.263	0.469	0.732	1.055	1.436	1.876	2.374	2.931

NOTE: ALL PIPE MARKED * IS SINGER-LAYNE & BOWLER DIV. STANDARD

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

Layne

TUBE TENSION ADJUSTMENT CHART

COLUMN SIZE	SHAFT AND TUBING SIZE	TUBE TENSION IN INCHES SETTING IN FEET									
		100	200	300	400	500	600	700	800	900	1000
10" (.365) 40S	2 x 1 3/16	0.017	0.068	0.154	0.276	0.430	0.620	0.845	1.104	1.397	1.725
	2 1/2 x 1 1/2	0.018	0.075	0.170	0.303	0.474	0.683	0.930	1.215	1.538	1.899
	2 1/2 x 1 11/16	0.019	0.077	0.175	0.312	0.488	0.703	0.958	1.251	1.583	1.955
	3 x 1 15/16	0.021	0.085	0.193	0.344	0.538	0.775	1.055	1.378	1.745	2.154
	3 1/2 x 2 3/16	0.023	0.093	0.210	0.376	0.586	0.845	1.151	1.504	1.903	2.349
	3 1/2 x 2 7/16	0.024	0.097	0.219	0.391	0.611	0.881	1.199	1.567	1.983	2.448
	4 x 2 11/16	0.026	0.107	0.242	0.431	0.673	0.970	1.321	1.725	2.183	2.695
12" * (.330) SCH. 30	2 1/2 x 1 1/2	0.018	0.074	0.166	0.297	0.464	0.670	0.912	1.191	1.508	1.861
	2 1/2 x 1 11/16	0.019	0.076	0.171	0.306	0.477	0.688	0.937	1.225	1.550	1.913
	3 x 1 15/16	0.020	0.083	0.188	0.335	0.524	0.755	1.028	1.342	1.699	2.098
	3 1/2 x 2 3/16	0.022	0.090	0.204	0.364	0.569	0.820	1.116	1.458	1.846	2.278
	3 1/2 x 2 7/16	0.023	0.094	0.212	0.379	0.592	0.853	1.161	1.517	1.919	2.370
	4 x 2 11/16	0.025	0.103	0.233	0.415	0.649	0.935	1.273	1.663	2.105	2.599
12" (.375) "S"	2 1/2 x 1 1/2	0.018	0.072	0.162	0.289	0.451	0.650	0.886	1.157	1.464	1.808
	2 1/2 x 1 11/16	0.018	0.073	0.166	0.296	0.463	0.667	0.908	1.187	1.502	1.854
	3 x 1 15/16	0.020	0.080	0.181	0.322	0.503	0.726	0.988	1.291	1.634	2.017
	3 1/2 x 2 3/16	0.021	0.086	0.195	0.348	0.543	0.783	1.066	1.393	1.763	2.177
	3 1/2 x 2 7/16	0.022	0.090	0.202	0.361	0.563	0.812	1.106	1.444	1.828	2.257
	4 x 2 11/16	0.024	0.098	0.220	0.393	0.614	0.885	1.205	1.574	1.992	2.459
14" * (.375) SCH. 30S	2 1/2 x 1 1/2	0.017	0.070	0.158	0.283	0.442	0.637	0.868	1.133	1.435	1.771
	2 1/2 x 1 11/16	0.018	0.072	0.162	0.290	0.452	0.652	0.888	1.160	1.468	1.813
	3 x 1 15/16	0.019	0.078	0.175	0.313	0.489	0.705	0.961	1.255	1.588	1.961
	3 1/2 x 2 3/16	0.021	0.084	0.189	0.337	0.526	0.758	1.032	1.348	1.706	2.106
	3 1/2 x 2 7/16	0.021	0.086	0.195	0.348	0.544	0.784	1.067	1.394	1.765	2.179
	4 x 2 11/16	0.023	0.094	0.212	0.378	0.590	0.850	1.157	1.512	1.914	2.362
16" * (.375) SCH. 30S	3 x 1 15/16	0.018	0.075	0.169	0.302	0.472					
	3 1/2 x 2 3/16	0.020	0.080	0.180	0.322	0.503					
	3 1/2 x 2 7/16	0.020	0.082	0.186	0.332	0.519					
	4 x 2 11/16	0.022	0.089	0.201	0.358	0.559					

NOTE: ALL PIPE MARKED * IS SINGER-LAYNE & BOWLER DIV. STANDARD.

VERTICAL CENTRIFUGAL PUMP

Installation of Pump Bowls and Column

Butt Joint Column

Enclosed Line Shaft

Derrick Installation of a Layne Pump requires a derrick 30 to 40 feet in height and a hand winch or power hoist of sufficient size to handle the total weight.

Foundation The concrete foundation for the pump base should be built in accordance with foundation plans furnished by the factory. Where a separate pump base plate is used it should be set in position in the concrete foundation before the pump bowls and column are installed but not grouted into position until the installation is completed.

Dimensions of Well Check the inside diameter of the well and the outside diameter of the pump bowls and column flanges or couplings to be sure that the pump and column will go in the well with ample clearance. The well casing must be straight and without obstructions that might bend the line shaft. Measure the static level of the water in the well to determine if the pump has been furnished with the proper depth of setting. The pump bowls should be submerged when the pump is operating and we do not recommend or guarantee satisfactory operation with a suction lift.

Check Material Check all parts of the pump against the packing list to find out whether all parts have been received. If any parts are missing claim should be made at once to the railroad company.

Clean All Joints All threads and flanged couplings of the discharge pipe and protective tubing should be carefully cleaned and at the time of installation coated with L A Y N C O T E. Care should be taken that there be absolutely no sand or grit between flanges or couplings when making up the joints.

Suction If a basket suction is used it should be lowered into the well first and held by pipe clamps. The suction pipe is picked up and screwed into the coupling at top of basket suction. The basket suction and suction pipe are then lowered into the well until about 18 inches of suction pipe extend above the well casing. The suction pipe is clamped in this position with pipe clamps. When the suction pipe has only threads at the top end care should be taken to place the clamps under the small lug welded on the pipe.

Pump Bowls The pump bowls should be carefully inspected before placing in the well. Rotate impeller shaft several times by hand to be sure that it does not bind at any point. The impeller shaft should have about ¼-inch or more end play. DO NOT STRAIN SHAFT IN ANY WAY THAT MIGHT BEND IT AND DO NOT LIFT PUMP BOWLS BY THE SHAFT. The pump bowls can best be handled by a pair of pipe clamps. The bowls should be lifted into position and screwed or bolted to the suction pipe. The clamps on the suction pipe are then removed and the bowls and suction pipe lowered into the well until the top of the discharge nozzle is about 18 inches above the well casing or top of foundation. The bowls are then supported at this point by pipe clamps.

Discharge Column Pipe Check the enclosed chart to determine the correct spacing of the spiders in the discharge column. If the discharge pipe screws into the pump bowl be sure to have the coupling at the top end of the first section either with the spider or without the spider as shown on the chart. If the lower section of discharge pipe has a special flange to connect to the pump bowls be sure to arrange the pipe with this flange at the lower end.

Protective Tubing and Shaft The shaft and protective tubing are shipped assembled in 20-ft. or 10-ft. lengths and packed with sufficient lubricant to prevent rusting. A 20-ft. length or 10-ft. length of shaft and tubing is required for each 20-ft. or 10-ft. length of pipe. Remove the protecting cap only from the top end of the tubing, which is the end fitted with the bronze shaft bearing and tubing coupling. Slide the assembled tubing and shafting into the discharge column pipe, making sure that the bronze bearing end of the assembly will be on top.

Installing Discharge Column Pull the tubing about six inches below the lower end of the discharge pipe and tie them together in this position with a piece of rope by taking several half hitches around the pipe and then the tubing.

Raise the assembled section of pipe, tubing and shafting until it is hanging vertically in the derrick with the lower end of the tubing about one inch above a board placed on the foundation. Remove the lower plug from the tubing to release the shaft. Raise the discharge pipe about six inches and take several half hitches around the shaft. This method avoids straining the shaft as the column is swung under the derrick. Swing the discharge pipe into position over the pump bowls and screw the shaft into the shaft coupling until it butts aginst the impeller shaft.

THE THREADS AND THE ENDS OF THE SHAFTING AND THE SHAFT COUPLINGS MUST BE PERFECTLY CLEAN.

Lower the discharge pipe and tubing and screw the tubing onto the main bearing box about 3 or 4 threads Then coat the threads on the bronze box with L A Y N C O T E and screw the tubing on the box until it butts. The discharge pipe is then bolted or screwed to the pump bowls.

Remove the clamps from the pump bowls and lower the pump bowls with the section of discharge column until the column extends about 18 inches above the well casing or foundation. Clamp the discharge column in this position.

Remove the bronze shaft bearing and tubing coupling and pour about one pint of oil into the tubing. The oil used should be a good grade of mineral oil free from grit and foreign matter, with a viscosity rating approximately SAE 10 and having a relatively low cold pour point.

When the next section of discharge column is in position in the derrick replace the bronze bearing, screwing it into the tubing about 3 or 4 threads. After the spider and spider bushing or aligning ring have been installed (as described below) and the shaft connection is made, lower the discharge pipe and tubing and screw the tubing onto the bronze bearing about 3 or 4 threads. Then coat the threads of the bearing with L A Y N C O T E and screw the tubing on the bearing until the ends butt tightly together. IT IS VERY IMPORTANT THAT EVERY TUBING JOINT BE TIGHT AND to form a seal the ends of the tubing must be smooth and square. While handling and installing the tubing use care to keep from scoring or damaging the ends in any way.

When flanged column is used, slip a bronze spider or aligning ring over the top of the tubing and fit it into the recess in the flange. (Refer to spider spacing chart to determine whether a flange or aligning ring should be used at the joint in question). When screw coupled column is used the spider is cast integral with the coupling. The rubber spider bushings are installed in the spiders before shipment from the factory.

Each section of discharge column is installed as described above. When screw couplings are used care should be taken in starting the pipe in the coupling. The pipe should start by hand and screw by hand to within 5 or 6 threads of butting. If the thread appears tighter than this check carefully for a damaged thread as the pipe should not be forced into the coupling. The last 5 or 6 threads should be made up with a chain tong, making sure that the joint is tight with the pipe butting against the shoulder in the coupling or against the end of the pipe in the coupling as the case might be.

When the line shaft connects to the motor drive shaft below the tension assembly, the motor drive shaft should be attached to the line shaft in the top section of tubing before the top length of discharge column is installed.

The top length of discharge pipe will usually have a special flange or special threads to connect to the bottom of the discharge ell and the top length of shaft will be of special length.

In case the discharge column does not check out within reasonable limits notify the factory to furnish the correct lengths.

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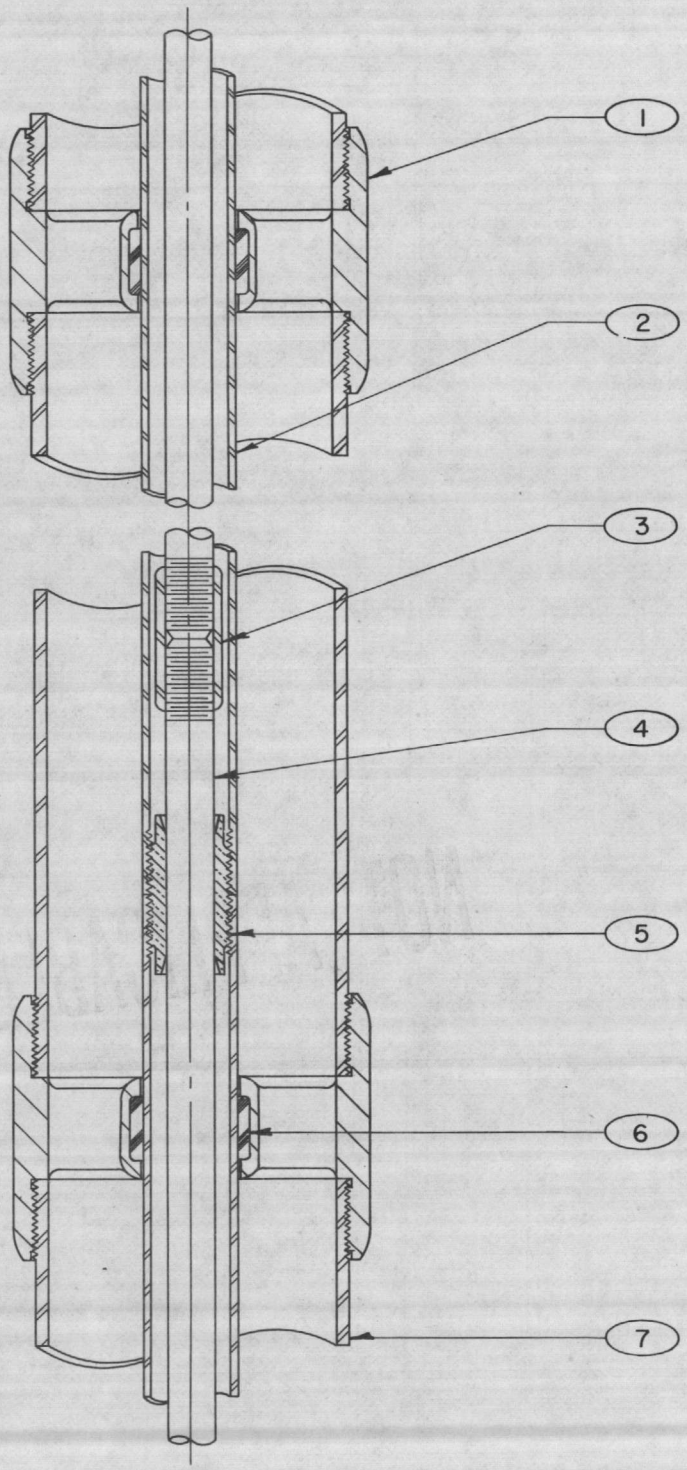
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

DISCHARGE COLUMN ASSEMBLY

SCREWED TYPE - ENCLOSED LINE SHAFT



ITEM NO.		DESCRIPTION
1		COMBINATION COUPLING
2		SHAFT TUBING
3		SHAFT COUPLING
4		LINE SHAFT

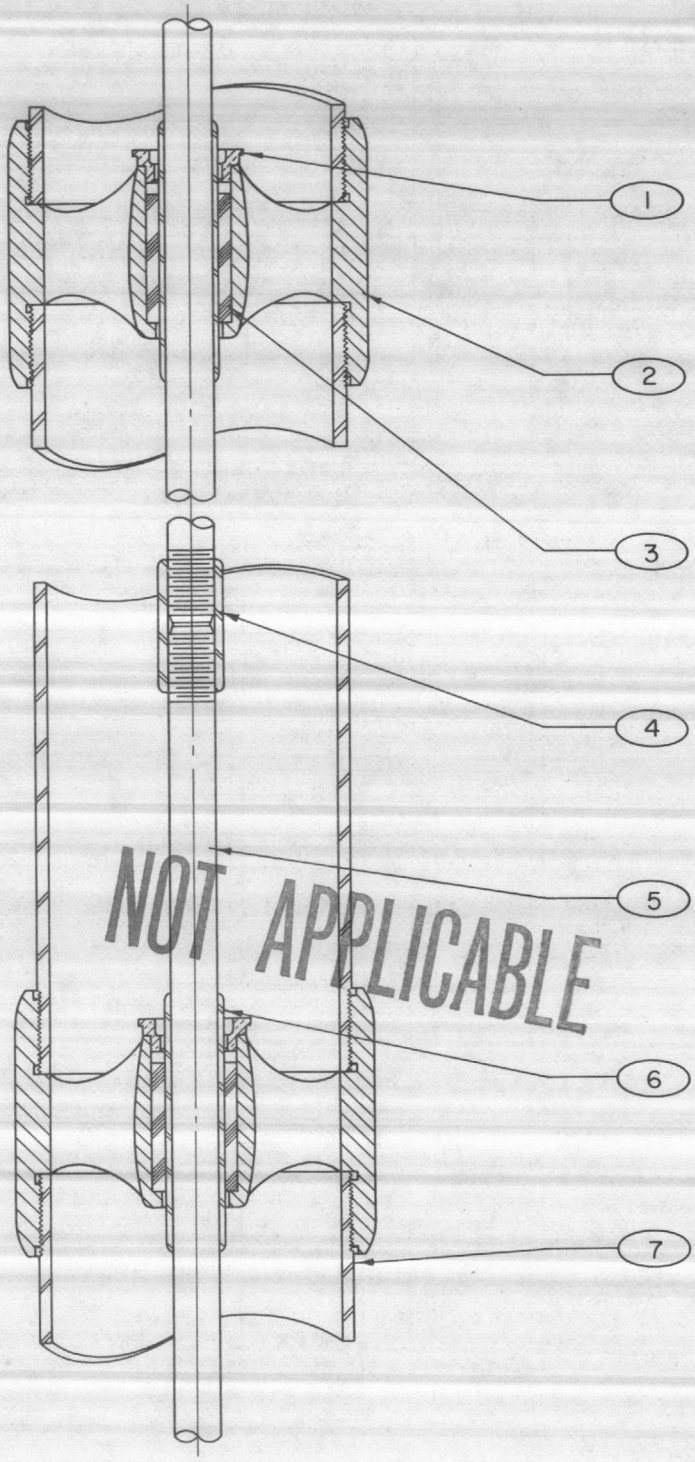
ITEM NO.		DESCRIPTION
5		SHAFT BOX
6		RUBBER BEARING
7		COLUMN PIPE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

DISCHARGE COLUMN ASSEMBLY

SCREWED COUPLED - OPEN LINE SHAFT



NOT APPLICABLE

ITEM NO.		DESCRIPTION
1		LOCK RING
2		COMBINATION COUPLING
3		RUBBER BEARING
4		SHAFT COUPLING

ITEM NO.		DESCRIPTION
5		LINE SHAFT
6		MONEL SLEEVE
7		COLUMN PIPE

IN ORDERING REPLACEMENT PARTS, SPECIFY PART DESCRIPTION & PUMP SERIAL NO.

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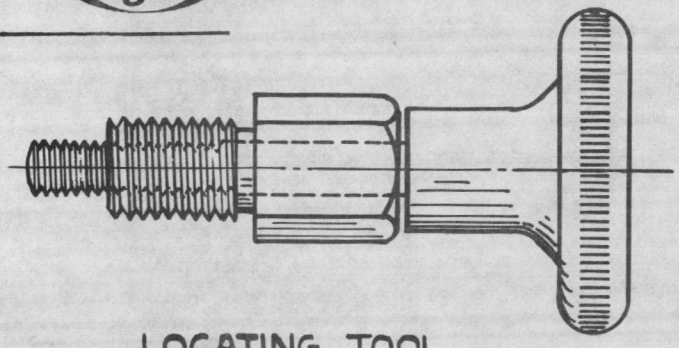
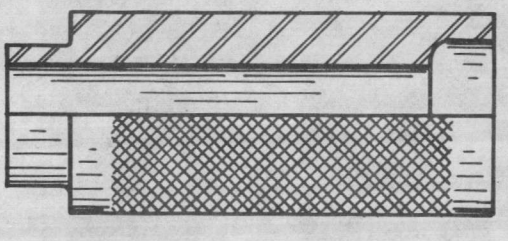
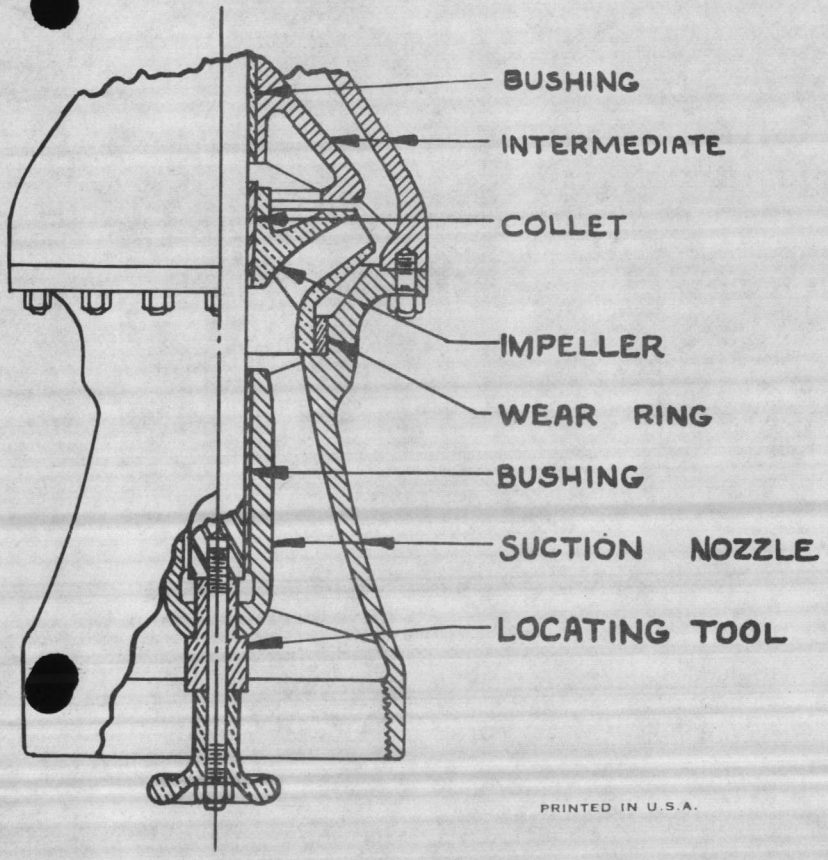
INSTRUCTIONS FOR ASSEMBLYING AND DISMANTLING PUMP BOWLS WITH COLLETS



LOCATING TOOL



COLLET DRIVER



TO ASSEMBLE BOWL

1. Remove cap screw from the bottom of the suction nozzle.
2. Screw locating tool into bottom end of suction nozzle hub.
3. Insert impeller shaft into suction nozzle bearing and turn handwheel of locating tool until impeller shaft is pulled down tight against the shoulder of the tool.
4. Place the impeller over the shaft. Slip the collet over the shaft with the small end first. (A screw driver can be used to spread collet for ease in slipping over shaft). Hold the impeller firmly into the wear ring recess and drive the collet into place with the male end of the collet driver.
5. Remove collet driver and assemble first intermediate stage. Place the next impeller over the shaft and continue to assemble as explained above.
6. When the bowl is completely assembled remove locating tool and replace cap screw in suction nozzle.

TO DISMANTLE BOWL

1. Remove discharge nozzle. Place collet driver over shaft with the female end first and while holding the impeller out of the wear ring recess, drive the impeller off of the collet. Remove the collet and impeller.
2. Remove the intermediate shell and drive the impeller off of the next collet. Continue to dismantle in like manner.

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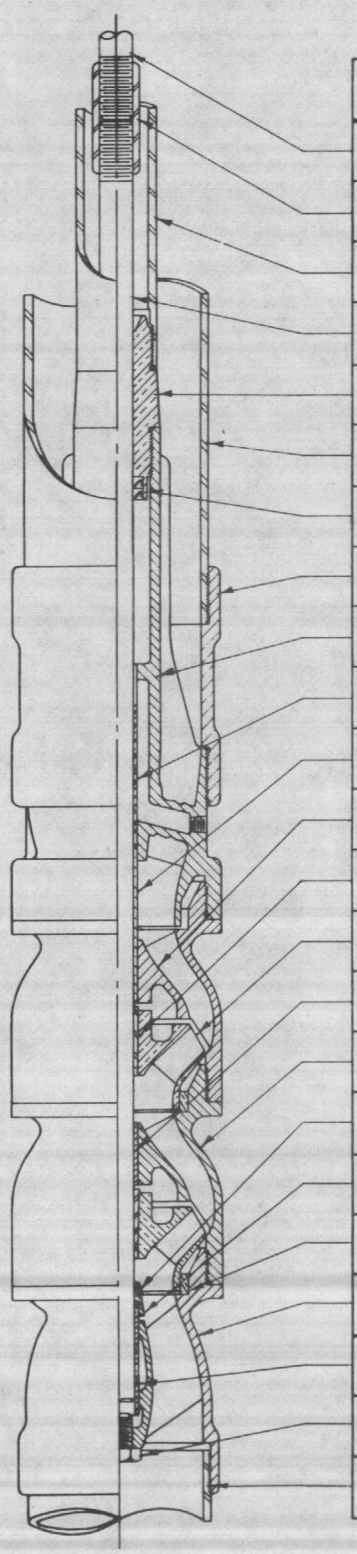
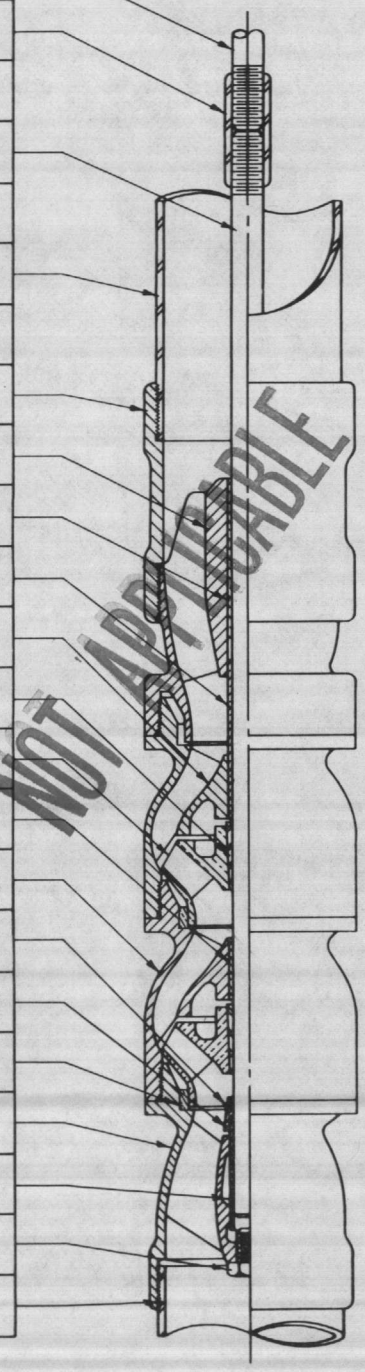
VERTICAL TURBINE PUMP
DEEP WELL

8" B, DR, PR, RK, T, UR - 10" RK, T, U - 12" T, UR



PART NAME	MATERIAL	
	STANDARD	SPECIAL
LINE SHAFT	CARBON STEEL C-1045	
SHAFT COUPLING	CARBON STEEL	
SHAFT TUBING	EXTRA HEAVY PIPE	
BOWL SHAFT	STAINLESS STEEL 416	
MAIN BEARING	BRONZE	
DISCHARGE COLUMN	ASTM-A 53-58 GRADE A OR B	
SEALS	BRONZE CASE SYN. RUBBER	
DISCHARGE ADAPTOR	CAST IRON CLASS 30	
DISCHARGE NOZZLE	CAST IRON CLASS 30	
DISCHARGE BEARING	BRONZE	
TOP INTERMEDIATE BRG	BRONZE	
TOP INTERMEDIATE	CAST IRON CLASS 30	
COLLET	BRONZE	
IMPELLER	BRONZE	
INTERMEDIATE BRG.	BRONZE	
INTERMEDIATE	CAST IRON CLASS 30	
SET SCREW	STAINLESS STEEL	
‡ SAND COLLAR	BRONZE	
WEAR RING	BRONZE	
SUCTION NOZZLE	CAST IRON CLASS 30	
SUCTION NOZZLE BRG.	BRONZE	
SUCTION CAPSCREW	CARBON STEEL	
* SUCTION PIPE	ASTM-A 53-58 GRADE A OR B	



* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER
‡ HARD RUBBER USED ON 8" BOWLS

ENCLOSED LINE SHAFT ☐ ☐ OPEN LINE SHAFT

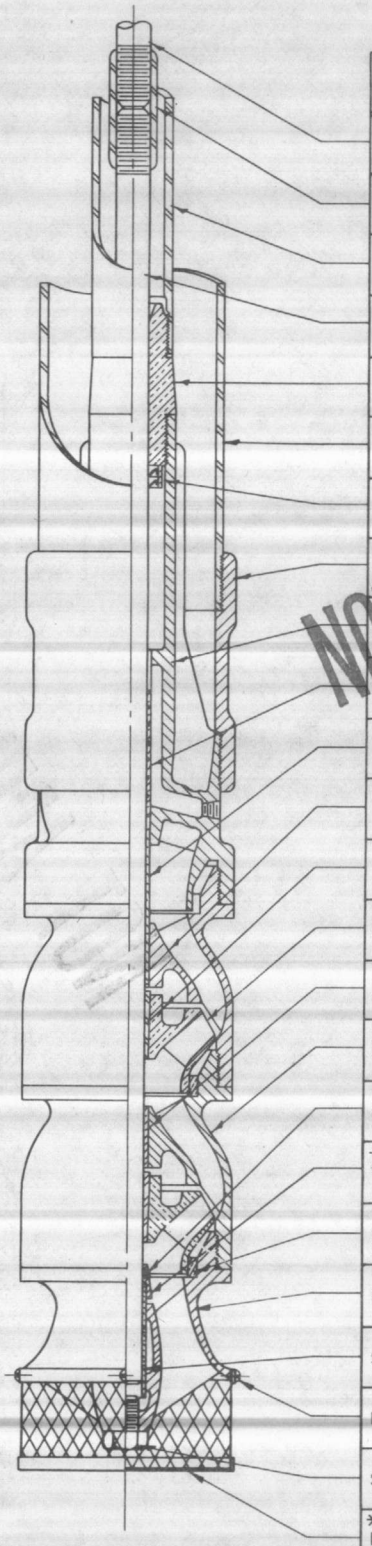
REVISED 3-26-68
SUPERSEDES ORIGINAL PRICE BOOK ISSUE

PRINTED IN U. S. A.

VERTICAL TURBINE PUMP
SHORT COUPLED

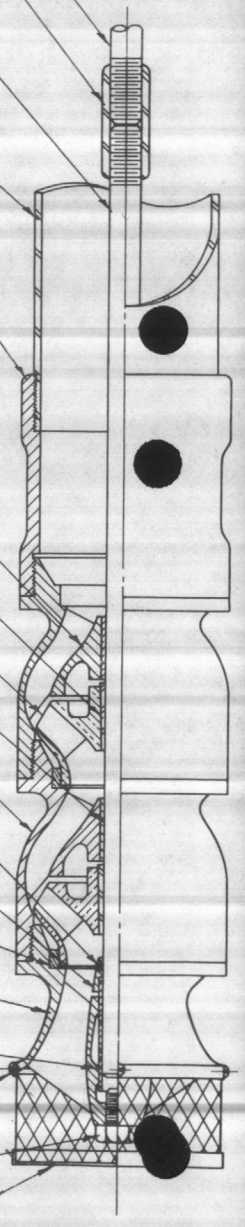
SINGER
LAYNE & BOWLER DIV[illegible]
MEMPHIS, TENNESSEE [illegible]
Layne

8" B, DR, PR, RK, T, UR – 10" RK, T, U – 12" T, UR



PART NAME	MATERIAL	
	STANDARD	SPECIAL
LINE SHAFT	CARBON STEEL C-1045	
SHAFT COUPLING	CARBON STEEL	
SHAFT TUBING	EXTRA HEAVY PIPE	
BOWL SHAFT	STAINLESS STEEL 416	
MAIN BEARING	BRONZE	
DISCHARGE COLUMN	ASTM-A 53-58 GRADE A OR B	
SEALS	BRONZE CASE SYN. RUBBER	
DISCHARGE ADAPTOR	CAST IRON CLASS 30	
DISCHARGE NOZZLE	CAST IRON CLASS 30	
DISCHARGE BEARING	BRONZE	
TOP INTERMEDIATE BRG.	BRONZE	
TOP INTERMEDIATE	CAST IRON CLASS 30	
COLLET	BRONZE	
IMPELLER	BRONZE	
INTERMEDIATE BRG.	BRONZE	
INTERMEDIATE	CAST IRON CLASS 30	
SET SCREW	STAINLESS STEEL	
± SAND COLLAR	BRONZE	
WEAR RING	BRONZE	
SUCTION NOZZLE	CAST IRON CLASS 30	
SUCTION NOZZLE BRG.	BRONZE	
MACHINE SCREWS	STAINLESS STEEL	
SUCTION CAPSCREW	CARBON STEEL	
* EXPANDO STRAINER	STEEL CADMIUM PLT'D	

NOT APPLICABLE



ENCLOSED LINE SHAFT ☐

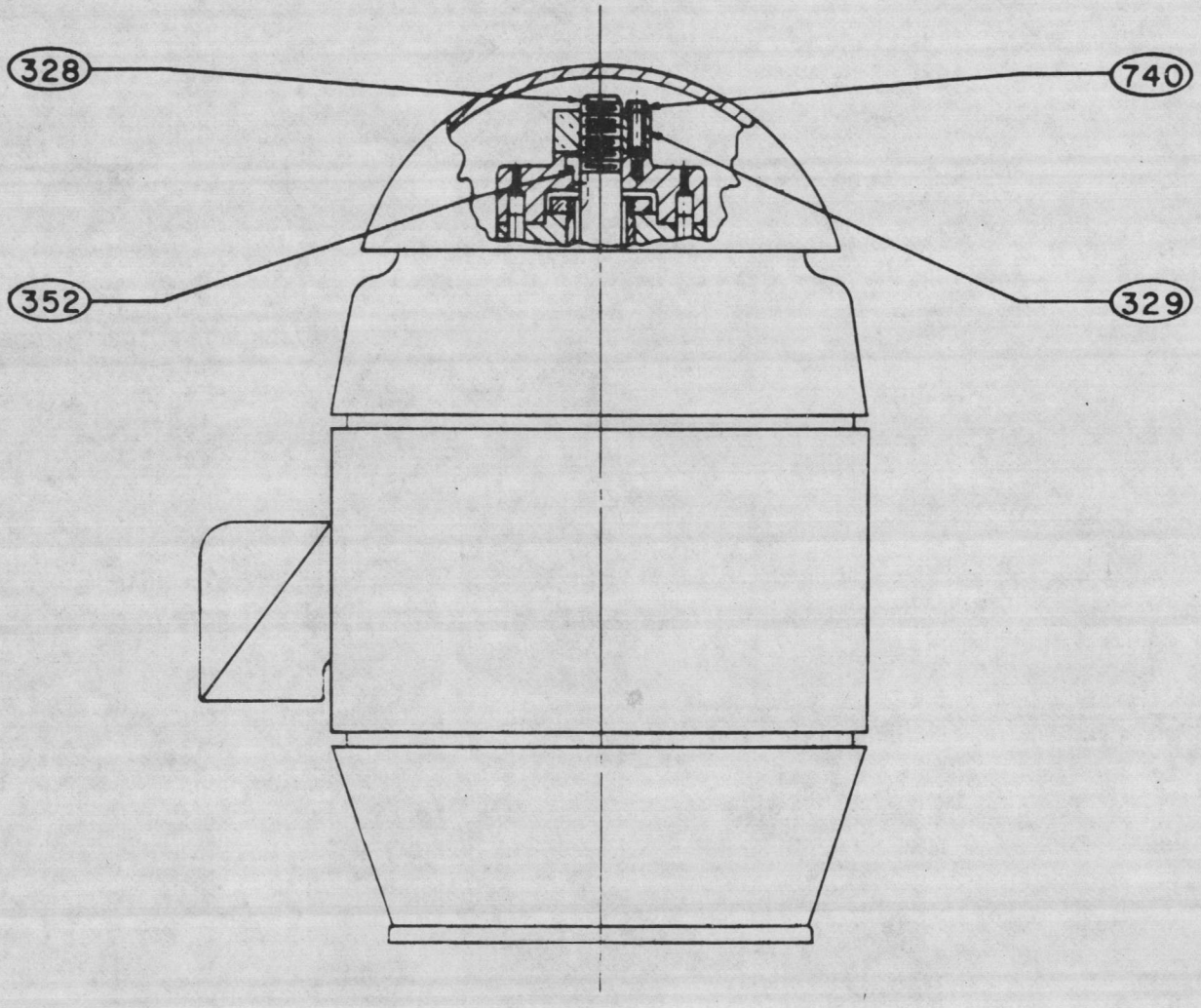
OPEN LINE SHAFT ☐

* NOT FURNISHED UNLESS SPECIFIED BY CUSTOMER
± HARD RUBBER USED ON 8" BOWLS

PRINTED IN U. S. A.

REVISED 3-26-68
SUPERSEDES ORIGINAL PRICE BOOK ISSUE

ADJUSTING NUT ASSEMBLY
VERTICAL HOLLOW SHAFT MOTOR



PART NO.		DESCRIPTION
328		MOTOR DRIVE SHAFT
329		ADJUSTING NUT
352		GIB. HEAD KEY (CLUTCH)
740		MACHINE SCREW (ADJUSTING NUT)

IN ORDERING REPLACEMENT PARTS, ALWAYS SPECIFY PARTS NO, DESCRIPTION, MOTOR SIZE, TYPE, & PUMP SERIAL NO.

MOTOR MFG._____ H.P._____ R.P.M. _____

VOLTS_____ PHASE_____ CY. _____ FRAME_____

CORBIN CONSTRUCTION COMPANY
Camp LeJeune, North Carolina
Pumping Test Well No. 3
October 13, 1971

Static Level 18' 4"

TIME	GPM	PUMPING LEVEL
4:45	150	59'10"
5:00	150	60' 4"
5:15	150	60' 7"
5:45	150	60' 9"
6:15	150	61' 3"
6:45	150	61'
7:15	150	61' 5"
7:30	200	77' 0"
7:45	200	77'11"
8:00	200	78' 9"
8:15	200	79' 5"
8:30	200	79' 5"
8:45	200	79' 9"
9:15	200	80' 1"
9:45	200	80' 0"
10:15	200	80' 2"
10:45	200	71' 9"
11:00	250	89' 8"
11:15	250	89' 7"
11:30	250	89' 7"
12:00	250	89' 6"
12:30	250	89' 7"
1:00	250	89' 7"
1:30	250	89' 6"
2:00	250	89' 9"
2:30	250	89' 7"
2:45	300	89' 7"
3:00	300	89' 7"
4:00	225	90' 0"
5:00	225	90' 0"
6:00	225	90' 0"
7:00	225	90' 0"
8:00	225	90' 0"
9:00	225	90' 0"
10:00	239	90' 0"
11:00	239	89' 9"
12:00	230	89' 5"
1:00	234	89' 5"

TIME	GPM	PUMPING LEVEL
2:00	302	107'
2:15	302	107' 2"
2:30	302	108'
3:00	302	108' 2"
3:15	302	108' 6"
4:00	302	109'
4:15	302	109' 6"
4:30	302	109' 6"
5:00	302	109' 8"
5:15	325	113'
5:30	325	113' 8"
6:00	325	114' 4"
6:15	325	114' 8"
6:30	325	115'
7:00	325	115' 4"
7:30	325	115' 6"
8:00	325	115' 8"
9:00	325	115' 9"
10:00	325	115'10"
11:00	325	115'11"
12:00	325	116' 0"

Within 10' of top of Screen Line 126'

WATER ANALYSIS LABORATORY
802 Hamlet Highway
Bennettsville, South Carolina
29512

(803) 479-4639

Date: September 7, 1971

Report To: Singer Layne Atlantic Co.
Norfolk, Va.

Date Analyzed: 9/7/71

Sample Number: Camp Lejeune, N.C.
110-130', #3

Analysis Results--Parts Per Million

#1

Determination		Determination	
pH	7.3	Carbon Dioxide (CO_2)	14
Iron (Fe)	0.15	Total Acidity ($CaCO_3$)	32
Nitrate (NO_3)	Trace	Calcium Hardness ($CaCO_3$)	170
Fluoride (F)	0.3	Magnesium Hardness ($CaCO_3$))	17
Manganese (Mn)	0	Carbonate Hardness ($CaCO_3$)	180
Total Hardness ($CaCO_3$)	187	Noncarbonate Hardness ($CaCO_3$)	7
Chlorides (Cl^-)	6	Alkalinity (Phenolphthalein) ($CaCO_3$)	0
Sulfate (SO_4)	9.2	Carbonate Alkalinity ($CaCO_3$)	0
Phosphate (PO_4)	0.7	Bicarbonate Alkalinity ($CaCO_3$)	180
Magnesium (Mg)	4.2	Total Alkalinity ($CaCO_3$)	180
Calcium (Ca)	68	Total Dissolved Solids	221
Carbonate (CO_3)	0	Specific Conductance (micromhos at 25°)	340
Bicarbonate (HCO_3)	220	Appearance When Analyzed	Clear
Hydroxide (OH)	0	Odor When Analyzed	Not Objectionable

Date:
APPROVED 20 Oct 71
Subject To Meet Of
Job Plans & Specifications

By DSG
Quality Control Representative

Signed: W. P. Johnson
W. P. Johnson, Laboratory Director

Remarks: _____

Analytical Methods References: 'Standard Methods for the Examination of Water and Wastewater,' Twelfth Edition, 1965, APHA, AWWA and WPCF and 'Methods for Collection and Analysis of Water Samples,' Water Supply Paper 1454 (1960), U. S. Geological Survey, Washington, D. C.

Corbin Construction Co. 10-8-71
Camp Lejeune N.C. Jot # 40936

Formation Samples for Well # 3

0'-10'	Top Soil + Clay
10'-20'	Clay
20'-30'	Sanded Clay
30'-40'	Sand
40'-50'	Sand & limerock
50'-60'	Sand & limerock
60'-70'	Sand
70'-80'	Sand
80'-90'	Sand
90'-100'	Sand
100'-110'	Sand
110'-120'	Sand
120'-130'	Sand & lime stone
130'-140'	Clay
140'-150'	Clay
150'-160'	Sand & Rock
160'-170'	Sand & Rock
170'-180'	Sand & Rock
180'-190'	Sand
190'-200'	Sand
200'-210'	Sandal Clay
210'-220'	Sand & Clay
220'-230'	Sanded Clay
230'-240'	Sand
240'-250'	Sand
250'-260'	Sand
260'-270'	Sand
270'-280'	Sand & Clay
280'-290'	Sand & Clay
290'-300'	Sand & Clay
300'-310'	Sand & Clay

HB649

Date: 20 Oct 71
APPROVED
Subject To Meet Of
Job Plans & Specifications
By
Quality Control Representative

WATER ANALYSIS LABORATORY
802 Hamlet Highway
Bennettsville, South Carolina
29512

(803) 479-4639

Date: September 7, 1971

649

Report To: Singer Layne Atlantic Co.
Norfolk, Va.

Date Analyzed: 9/7/71

Sample Number: Camp Lejeune, N.C.
200-220', #3

Analysis Results--Parts Per Million

#2

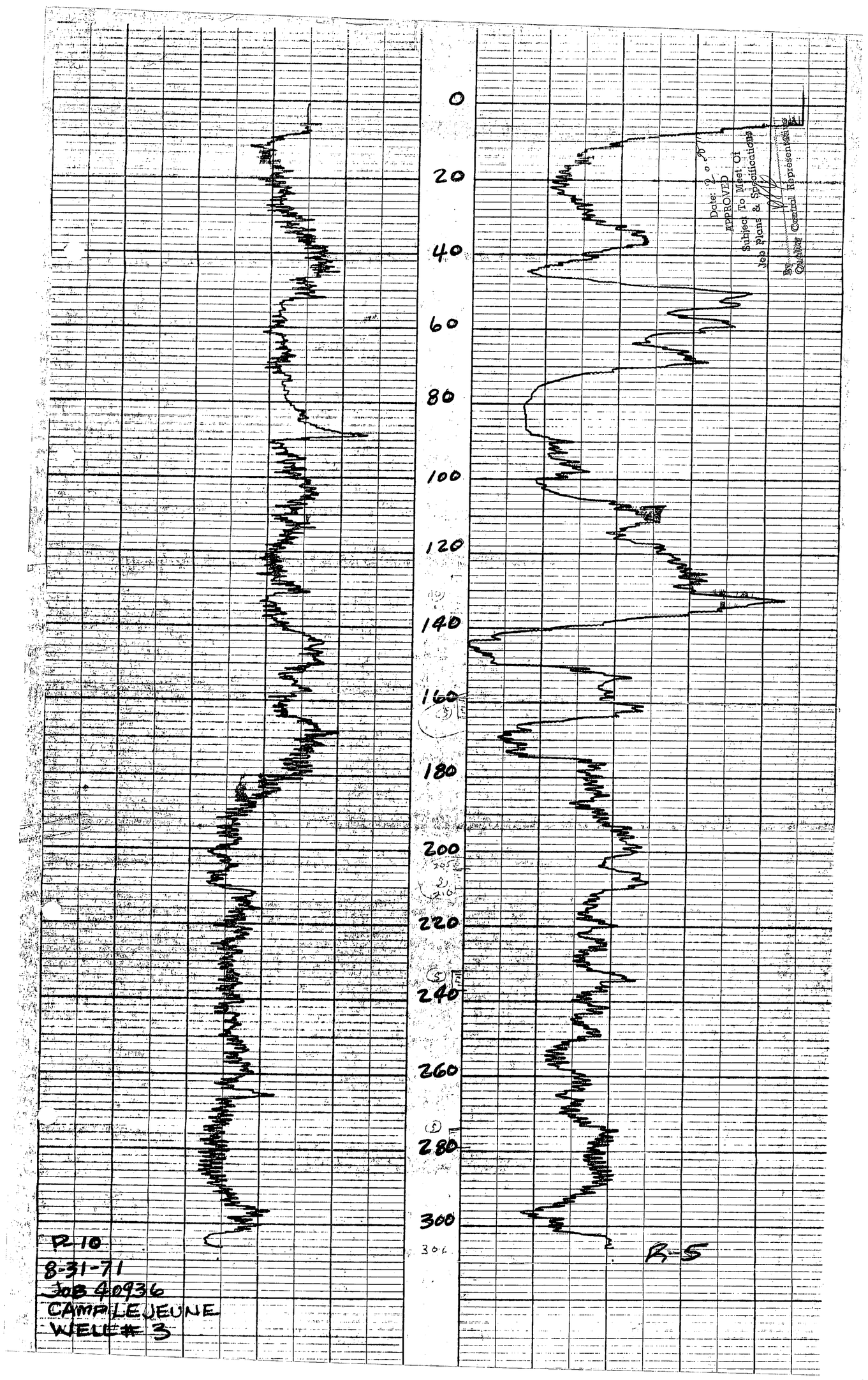
Determination		Determination	
pH	7.4	Carbon Dioxide (CO_2)	10
Iron (Fe)	0.35	Total Acidity ($CaCO_3$)	24
Nitrate (NO_3)	0	Calcium Hardness ($CaCO_3$)	144
Fluoride (F)	0.2	Magnesium Hardness ($CaCO_3$))	18
Manganese (Mn)	0	Carbonate Hardness ($CaCO_3$)	162
Total Hardness ($CaCO_3$)	162	Noncarbonate Hardness ($CaCO_3$)	0
Chlorides (Cl)	11	Alkalinity (Phenolphthalein) ($CaCO_3$)	0
Sulfate (SO_4)	14.2	Carbonate Alkalinity ($CaCO_3$)	0
Phosphate (PO_4)	1.1	Bicarbonate Alkalinity ($CaCO_3$)	200
Magnesium (Mg)	4.4	Total Alkalinity ($CaCO_3$)	200
Calcium (Ca)	58	Total Dissolved Solids	244
Carbonate (CO_3)	0	Specific Conductance (micromhos at 25°)	375
Bicarbonate (HCO_3)	222	Appearance When Analyzed	Light Straw Color
Hydroxide (OH)	0	Odor When Analyzed	Not Objectionable

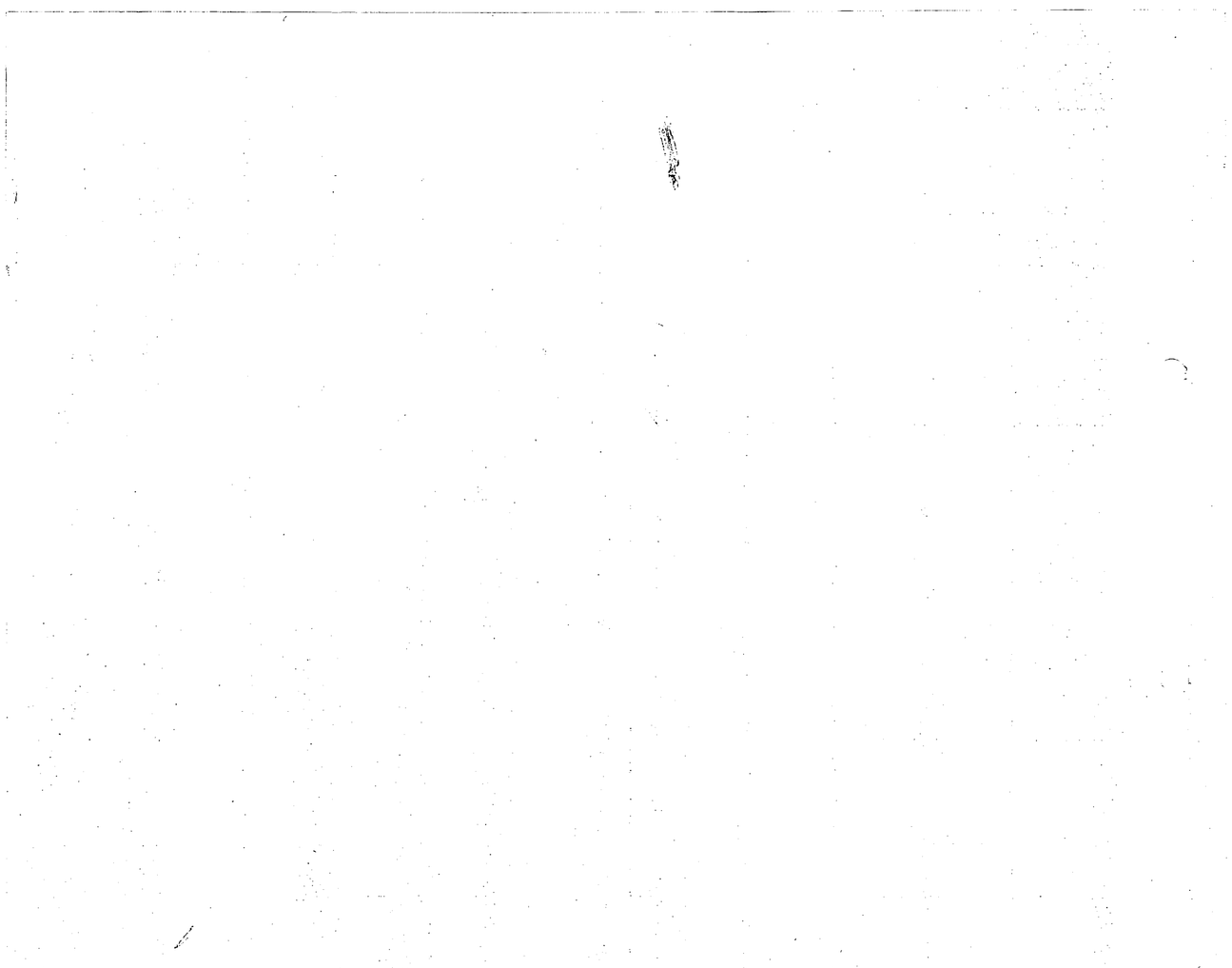
Date: 20 at 71
APPROVED
Subject To Meet Of
Job Plans & Specifications
By DBH
Quality Control Representative

Signed: W. P. Johnson
W. P. Johnson, Laboratory

Remarks: _____

Analytical Methods References: 'Standard Methods for the Examination of Water and Wastewater,' Twelfth Edition, 1965, APHA, AWWA and WPCF and 'Methods for Collection and Analysis of Water Samples,' Water Supply Paper 1454 (1960), U. S. Geological Survey, Washington, D. C.


0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Date: 2 - 2 - 72
APPROVED
Subject To Meet Of
Job Plans & Specifications
By
Quality Control Representative
P-10
8-31-71
JOB 40936
CAMP LEJEUNE
WELL # 3
R-5



FORM A-4
(MAY '70)

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
OFFICE OF WATER DATA COORDINATION
INVENTORY OF HYDROLOGIC DATA STATIONS
QUALITY OF WATER

O.M.B. No. 42-1485
Approval Expires June 30, 1979
This report is authorized by O.M.B. Circular A-67. While organizations other than Federal agencies are not required to respond, their cooperation is needed to make the results of this inventory complete.

1. AGENCY CODE	2. TYPE	3. LATITUDE	4. LONGITUDE	5.
MC	Q	34° 42' 44" N	77° 18' 22" W	

6. AGENCY STATION NO.	7. STATION NAME
HP-649	HP-670-649

8. DRAINAGE BASIN CODE No.	Letter	9. STATE CODE	10. COUNTY CODE	11. COUNTY NAME
06	N	32	133	Onslow

12. PERIOD OF RECORD
Began: 1972
Discontinued:
Y ☐ Continuous Interruption Exceeds 1 Year

13.

14.

15. SITE

☐ 101 Stream ☐ 104 Reservoir ☒ 107 Well
☐ 102 Canal ☐ 105 Estuarine zone ☐ 108 Drain
☐ 103 Lake ☐ 106 Spring ☐ 109 Other

16. TYPES OF DATA AVAILABLE AND FREQUENCY OF MEASUREMENT (Enter appropriate number (1-8) beside each parameter to indicate frequency of measurement. For parameters telemetered, enter "T".)

1 Continuous 3 Daily 5 Monthly 7 Annual
2 Seasonal 4 Weekly 6 Quarterly 8 Other Periodic

Physical
311 ___ Temperature
312 ___ Specific conductance
313 ___ Turbidity
314 ___ Color
315 ___ Odor
316 ___ pH (field)
317 8 pH (lab)
318 ___ Eh
319 ___ Suspended solids
320 ___ Other

Chemical
331 ___ Dissolved solids
332 8 Chloride
333 ___ Nutrients (nitrogen)
334 ___ Nutrients (phosphorus)
335 ___ Common ions
336 8 Hardness
337 ___ Radiochemical
338 ___ Dissolved oxygen
339 ___ Other gases
340 ___ Minor elements
341 ___ Pesticides (insecticides, herbicides, etc.)
342 ___ Detergents - MBS
343 ___ Biochemical oxygen demand
344 ___ Carbon (total, dissolved, etc.)

Biologic
361 ___ Coliforms
362 ___ Other micro-organisms (Benthic organism, phytoplankton, etc.)
363 ___ Other

Sediment
371 ___ Concentration (suspended)
372 ___ Particle size (suspended)
373 ___ Particle size (bed load material)
374 ___ Other

17. SUPPLEMENTARY DATA AVAILABLE FOR STATION

☐ 421 Surface water station ☐ 423 Water stage or level ☐ 425 Time of travel
☐ 422 Ground water station ☒ 424 Water discharge ☐ 426 Drainage area

18. STORAGE OF DATA

☐ 501 Published ☐ 503 Data on punchcard ☐ 505 Other
☒ 502 Not published ☐ 504 Data on magnetic tape, disc, data cell, etc.

19. INQUIRIES ABOUT DATA SHOULD BE SENT TO:

Office: Base Maintenance Department, Utilities Division
Street No.: Marine Corps Base
City, State, Zip: Camp Lejeune, North Carolina 28542
City Code: 0735

20. DATA ARE AVAILABLE TO PUBLIC ON REQUEST ☒ Yes ☐ No

21. OFFICE COMPLETING FORM
BASE MAINTENANCE DEPARTMENT

22. COMPILER'S NAME
BOB WILSON

23. DATE
12 Month 19 76 Year

WELL NUMBER 649		BY THOMAS/RAYNOR/HILL			DATE 3-10-83	
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME 1256
100'	15'	57	42	85	151	1308
		63	48	80	154	1319
		67	52	75	178	1330
		72	57	70	195	1344
		77	62	64	205	1355
		83	68	59	219	1405
		86	71	55	228	1418
		91	76	48	242	1425

REMARKS used direct reading gage
left set at 55 PSI 228 GPM

MANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE
Jayne		71041 Pump #		

Well # 3

Discharge head per section 11A, par. 11A.3.1	----	106
Pumping level @ 250 gpm	----	93
Total head	----	199

Pump

10" UHC 5 stage 20 hp

CURVE NO. PC1810A

CHANGE EFFICIENCY AS FOLLOWS	NUMBER OF POINTS	FOR NUMBER OF STAGES
LOWER	1	4
LOWER	2	3
LOWER	3	2
LOWER	5	1

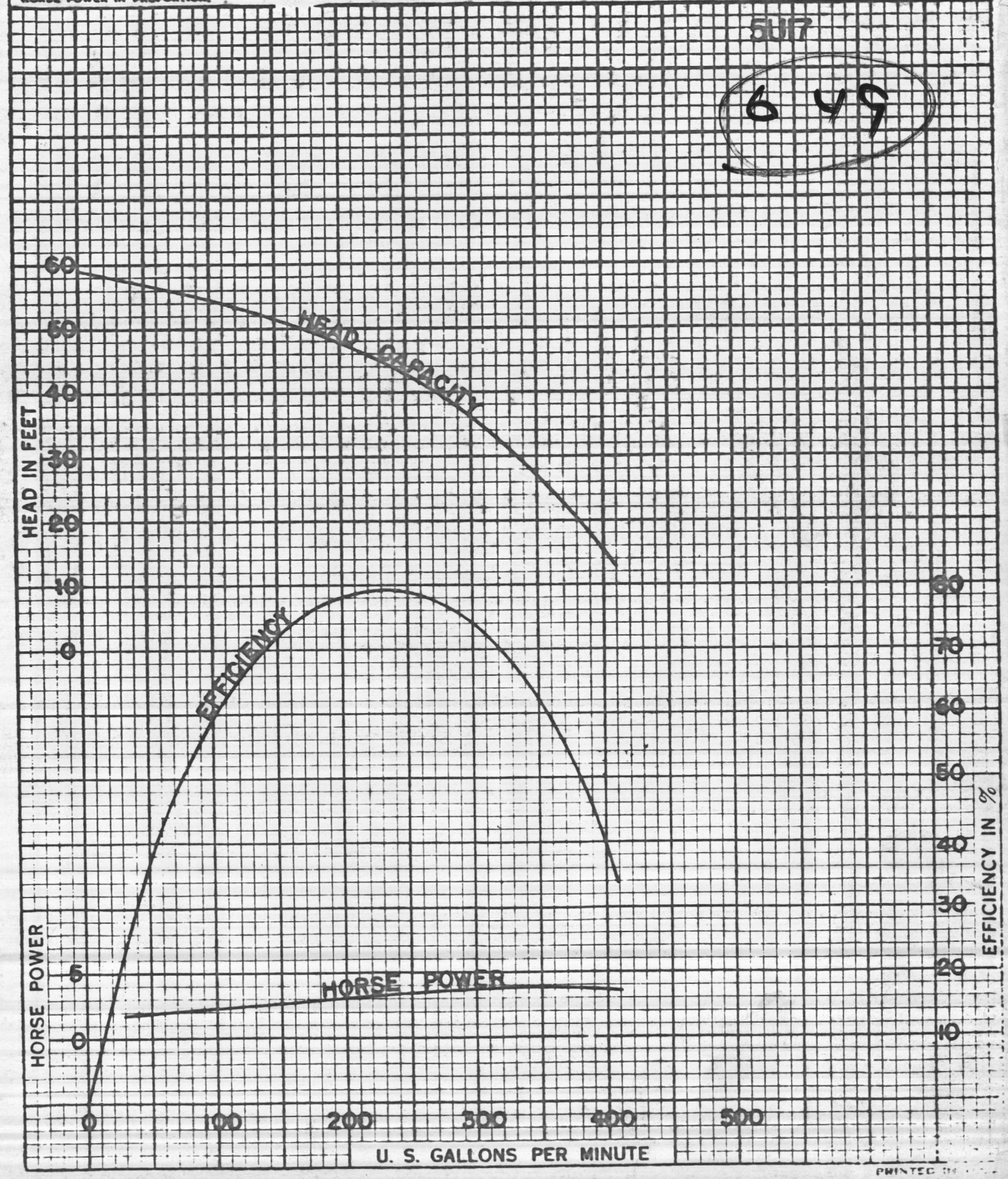
NOTE: ANY CHANGE IN EFFICIENCY CHANGES EITHER THE HEAD OR HORSE POWER IN PROPORTION.

SINGER
LAYNE & BOWLER DIVISION
MEMPHIS, TENNESSEE U.S.A.

10" UHC
1760 RPM
SINGLE STAGE LABORATORY
HEAD & HORSE POWER
THRUST "K" = 5.5

5U17

6 49



PRINTED IN

WELL NUMBER	649	BY THOMAS / BROWN			DATE 12-6-84	
AIR LINE	STATIC LEVEL	PUMPING LEVEL	DRAIN DOWN	DISCHARGE PRESSURE	GPM	START TIME 1245
100	8	45	37	87	154	1255
		55	47	76	190	1305
		60	52	70	201	1315
		63	55	65	216	1325
		73	65	60	232	1340
		76	68	55	242	1350
		79	71	50	250	1405
		82	74	46	257	1415
		87	79	42	263	1425

REMARKS left set at 46 PSI 257 GPM

MANUFACTURER	STAGE	S.N.	TOTAL HEAD	SIZE

H.B. 649 WELL #3