CATALOG 70-71

LUFKIN

PUMPING UNITS

LUFKIN FOUNDRY & MACHINE COMPANY • LUFKIN, TEXAS

LUFKIN EQUIPMENT OF ADVANCED DESIGN

LUFKIN FOUNDRY & MACHINE CO. LUFKIN, TEXAS

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DOUBLE REDUCTION AND TRIPLE REDUCTION GEAR UNITS ARE AVAILABLE FOR EVERY PUMPING NEED

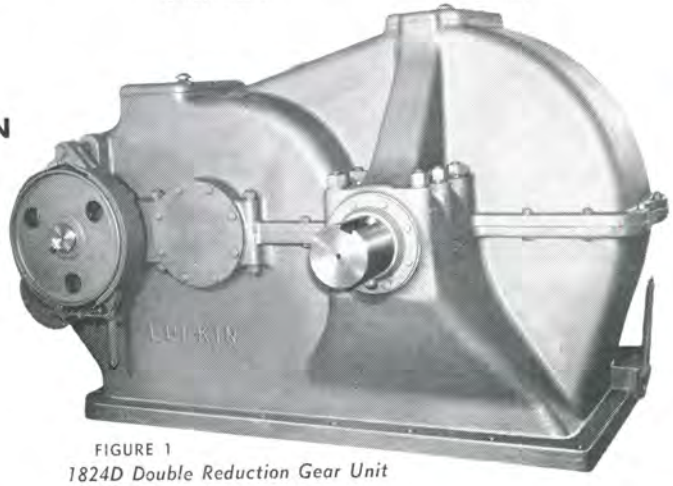


FIGURE 1
1824D Double Reduction Gear Unit

1. Housing especially built for oil well service, of rugged construction with large factors of safety.

2. Precision cut Lufkin herringbone gears are used exclusively in all Lufkin pumping units.

3. Gear Cases are jig bored to same accuracy as gears.

4. All shafts forged from alloy steel, heat treated and precision ground.

5. Oversize Bearings on crankshafts. Easily renewable but seldom requiring replacement.

6. All pinions float on Straight Roller Bearings.

7. No Oil Pumps. Lufkin gears operate in oil bath with gear wipers to flood bearings.

8. Clam Shell Brake. No grabbing. Improved ratchet lever and stand, locomotive type.

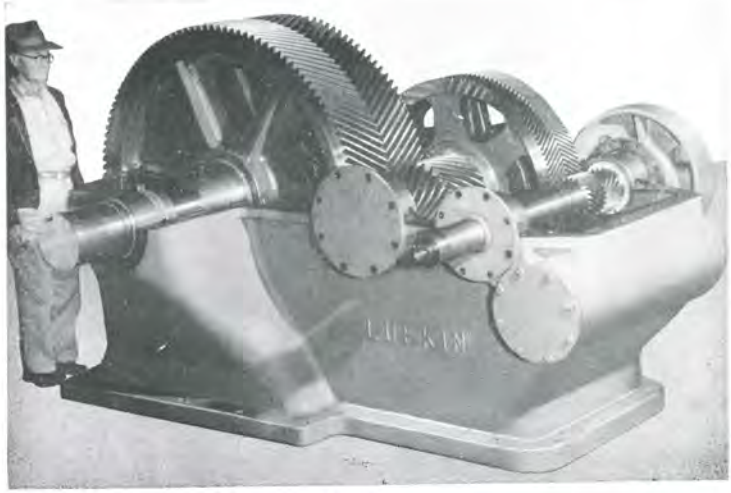


FIGURE 2
1824D Double Reduction Gear Unit, cover removed

EXPLANATION OF PUMPING UNIT DESIGNATIONS

C - 228 D-246 - 74

Type Pumping Unit:
A—Air Counterbalance
B—Beam Counterbalance
C—Trout Crank Counterbalance
CB—Combination Beam and Crank Counterbalance
M—Mark II Unitorque

Peak Torque Rating In Thousands Of Inch Pounds

Polished Rod Load Rating In Hundreds of Pounds

D—Double Reduction Gear Reducer
S—Single Reduction Gear Reducer
T—Triple Reduction Gear Reducer

Stroke Length In Inches

INSTRUCTIONS FOR ORDERING SPARE PARTS

WHEN ORDERING SPARE PARTS, THE DESIGNATION AND SERIAL NUMBER OF THE UNIT MUST BE GIVEN. This information is necessary in addition to the description of the part, part number, etc. By supplying all the information available our personnel will have a cross check on the particular part wanted and errors in typing, etc. can be circumvented.

LUBRICATION INSTRUCTIONS

LUFKIN PUMPING UNITS

GEAR REDUCER

For temperatures down to 0°F., use an SAE 90 Gear Oil, premium mineral oil with rust and oxidation inhibitors and with an anti-foam agent. Pour point of the oil should be 5°F. or lower.

For temperatures down to −30°F., use SAE 80 Gear Oil, premium straight mineral oil with rust and oxidation inhibitors and with an anti-foam agent. Pour point of the oil should be −15° F or lower.

If desired, units can be shipped with the gear reducer filled with oil that will comply with the above specifications.

Maintain the oil level above the bottom pet cock or low mark on gage but do not fill the gear reducer above the top pet cock or high mark on gage.

Every six months the operator should give the oil a good visual inspection for possible dirt, sludge, water emulsion or other forms of contamination.

If the lubricant has an abnormal appearance or smell, check with your oil supplier about replacement.

It is recommended that a quart sample be taken from the reducer every year and checked for acidity.

STRUCTURAL BEARINGS

All structural bearings are lubricated at the factory; however, they do require periodic relubrication as outlined below.

1. **WARM CLIMATES:** (Lowest annual temperature is above 0°F.)

Roller Bearings except Tapered Roller Crank Pin Bearings should be relubricated every 6 months. Use a premium NLGI No. 1 lithium soap base grease with lead naphthanate extreme pressure additive. Do not use soda soap grease.

Bronze Bearings and Tapered Roller Crank Pin Bearings should be relubricated as required to maintain oil level. Use an EP140 extreme pressure oil with lead naphthanate additive and a pour point of +15°F or lower. If available, the use of a heavier oil (viscosity up to 6600 SUS at 100°F) is recommended.

2. **COLD CLIMATES:** (Lowest annual temperature down to −30°F.)

Roller Bearings except Tapered Roller Crank Pin Bearings should be relubricated every 6 months. Use a premium NLGI No. 0 lithium soap base grease with lead naphthanate extreme pressure additive. Do not use soda soap grease.

Bronze Bearings and Tapered Roller Crank Pin Bearings should be relubricated as required to maintain oil level by removing fill plug and adding oil until reservoir is full. Use an EP 80 or EP 90 extreme pressure oil with lead naphthanate additive and a pour point of −10°F. or lower.

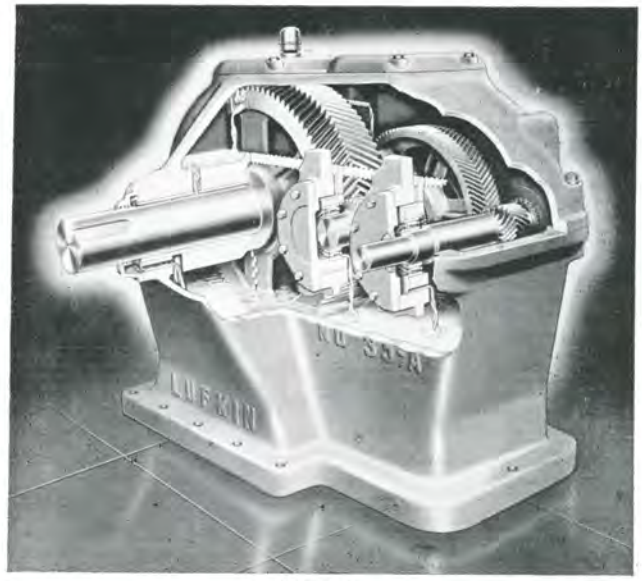


FIGURE 3

As long as the oil is maintained at the proper level, the slow speed and high speed gears dip in oil and provide continuous lubrication to the gear mesh.

Large oil wipers direct a flood of oil into oversized oil troughs which in turn provide each individual bearing with more than adequate lubrication.

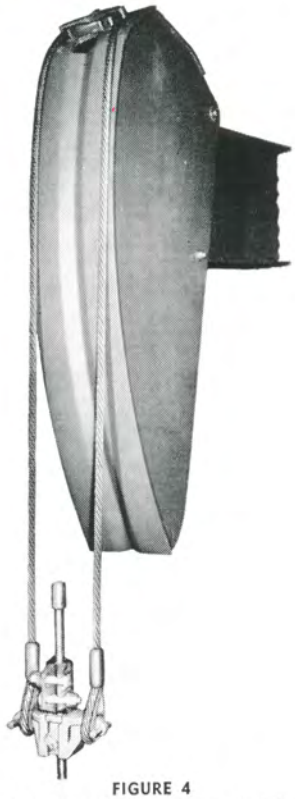


FIGURE 4

HORSEHEAD AND WIRE LINE ASSEMBLY

Easily aligned with polished rod without disconnecting well load. One-piece arc plate is used for greater strength.

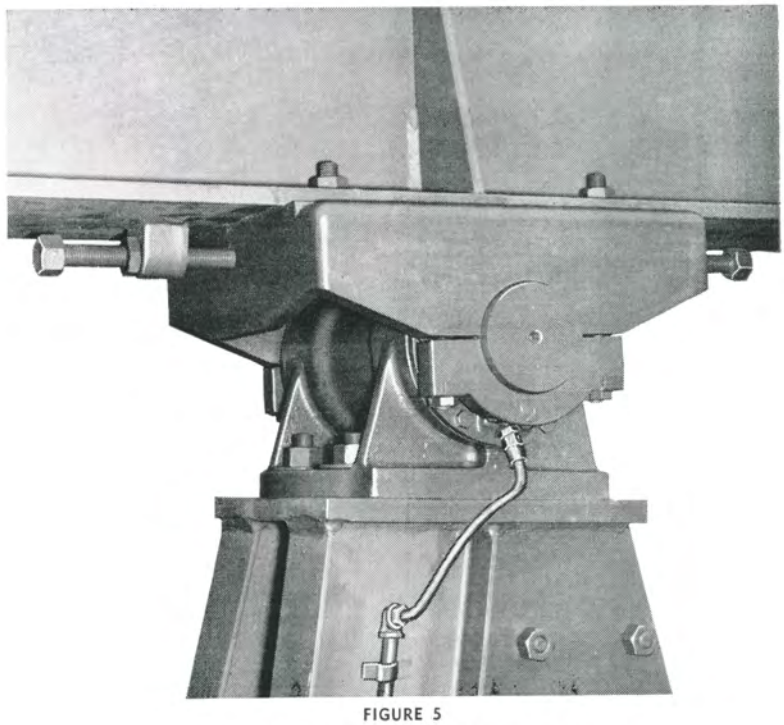


FIGURE 5

CENTER BEARING ASSEMBLY

Furnished with roller bearings on some C-80D and all larger sizes.

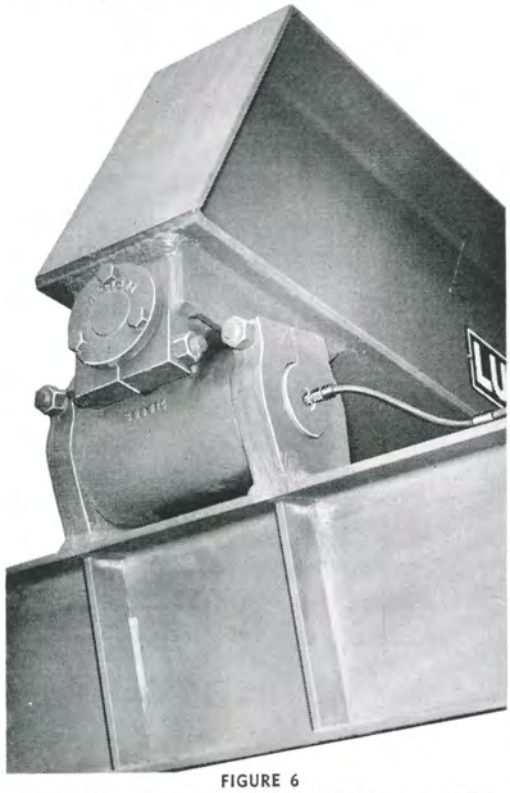


FIGURE 6

CRANK BALANCED UNIT EQUALIZER BEARING ASSEMBLY

Furnished with roller bearings on all sizes. Cross-pin type connection to walking beam is utilized.

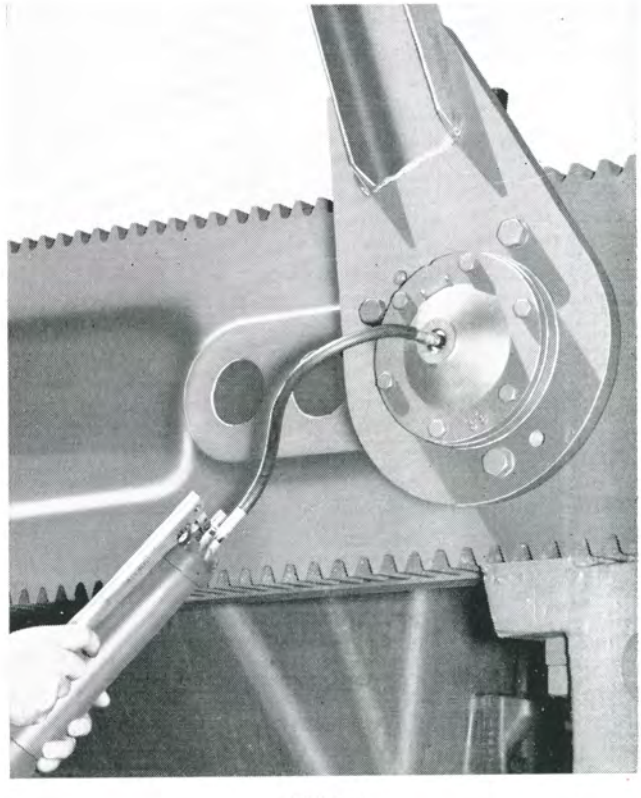


FIGURE 7

CRANK PIN ASSEMBLY

Furnished with roller bearings on some C-114D and all larger sizes.

All LUFKIN crank pins, except 3SB and 4SB, are furnished with grease fittings and drilled holes to facilitate removal of pins by grease gun on fitting under cover.

A WIDER RANGE OF COUNTERBALANCE AVAILABLE WITH THE TROUT COUNTERBALANCED TYPE B CRANK

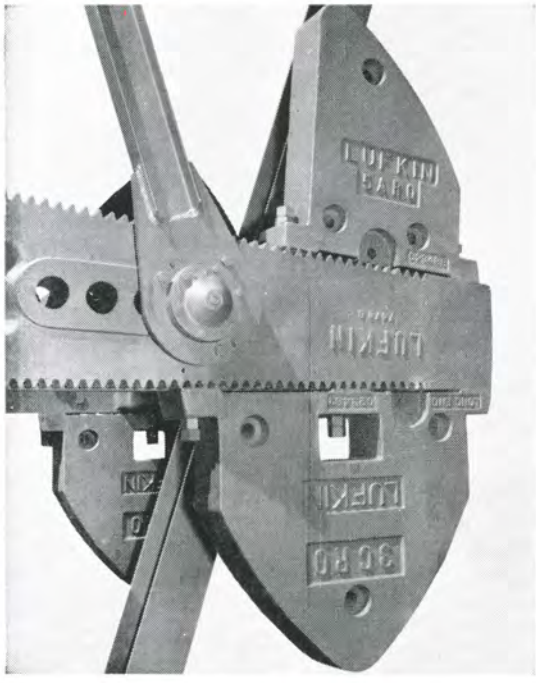


FIGURE 8—*Illustrating the wide range of counterweight sizes which can be used on one crank. Different size counterweights are not normally furnished or recommended for the same unit.*

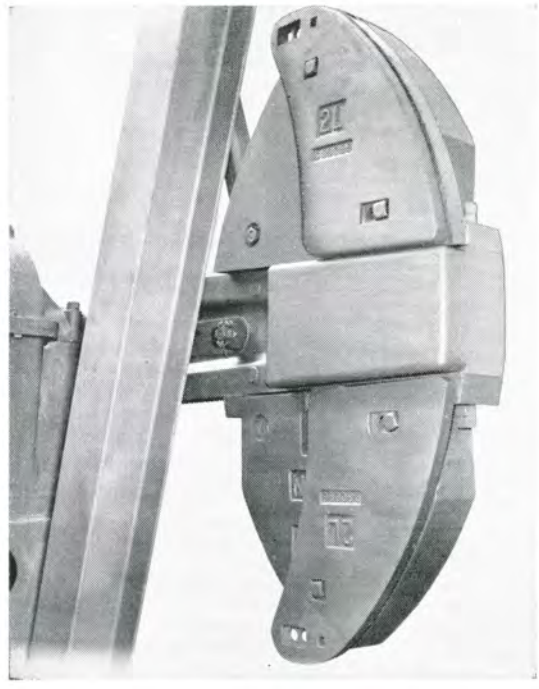


FIGURE 9—*L type auxiliary weights can be used alone or with S type auxiliary weights.*

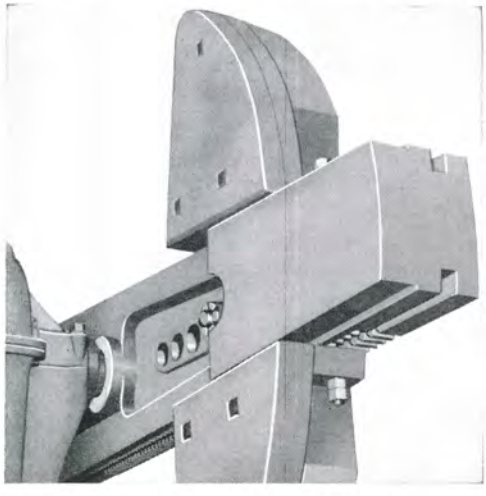


FIGURE 10—*Various combinations of type S and D auxiliary counterweights available for additional counterbalance.*

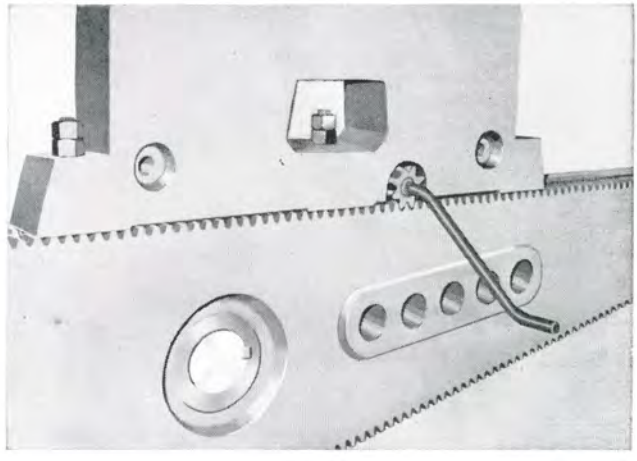


FIGURE 11—*New removable pinion (with crank handle attached) is used to adjust all counterweights.*

As shown in Figures 8, 9 and 10 a wide range of counterbalance is available on all LUFKIN units. With the various combinations of counterweights and auxiliary counterweights to choose from a very economical selection of counterbalance can be made.

Note in Figure 10 the extra counterbalance made available by the increased thickness at the end of the type B crank. With this type crank, one of two type S (single thickness) auxiliary counterweights can be added or one type D (double thickness) auxiliary counterweight can be added to each counterweight.

Also note in Figure 9 the new L type auxiliary weight. It offers counterbalance in smaller increments than has ever before been possible.

The Trout Counterbalanced Crank, using sliding weights to change the counterbalance effect, is an Original Lufkin Feature. Moving the counterweights has been made even safer and easier by the addition of a rack and pinion.

One Man Alone, using the special combination pinion and crank shown in Figure 11, can make the adjustment in a matter of minutes. All four weights can be adjusted without changing the position of the cranks.

Rack and pinion type cranks are regularly furnished on the C-40 assemblies and larger.

With the Trout Counterbalanced Crank there is no hazard to the operator or equipment as it is impossible for Trout counterweights to slide off the crank even when bolts are loosened, so long as nuts are not completely removed from bolts.

This same Safe, Simple and Easy Trout Counterbalance has been in use over a period of many years and has been installed on over NINETY EIGHT THOUSAND LUFKIN PUMPING UNITS.

FIGURE 12

HI-PRIME PUMPING UNIT with elevated motor provides protection from high water and drifting sand and snow. If unit is moved to a location where electric power is not available, bolted-on motor support can be easily removed and a jointed gas engine base installed. Short foundation block reduces installation costs. Available in all structures using 40D through 912D gear reducers. Unit shown is a C160D-200-74.

FIGURE 13

JOINTED SLOW SPEED ENGINE BASE, tailor made to fit particular prime mover. Since slide rails are not required with this type base the center of gravity is kept low, thus reducing vibration. Unit shown is a C-456D-253-144 driven by a LUFKIN H-795 Engine.

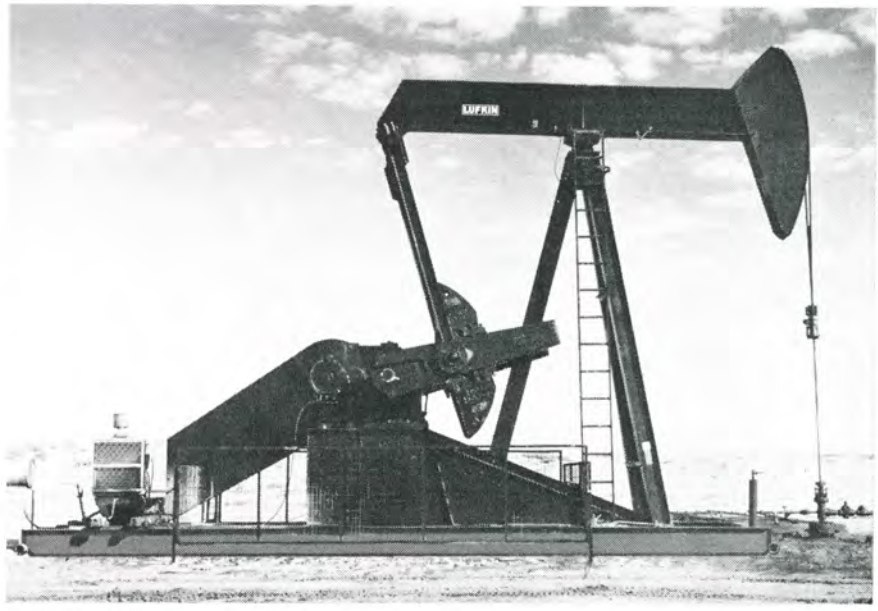


FIGURE 14

HEAVY DUTY PORTABLE "STRONGBACK" base is available for all units. Bases are also available with plated bottom to permit installation directly on soil with a minimum bearing capacity of 1500 pounds per square foot. Unit shown is a C-640D-304-144.

FIGURE 15

HEAVY DUTY PORTABLE BASE unit, full skid, extended front and rear, can be very easily moved, requires a timber foundation. Unit shown is a C-114D-169-64.

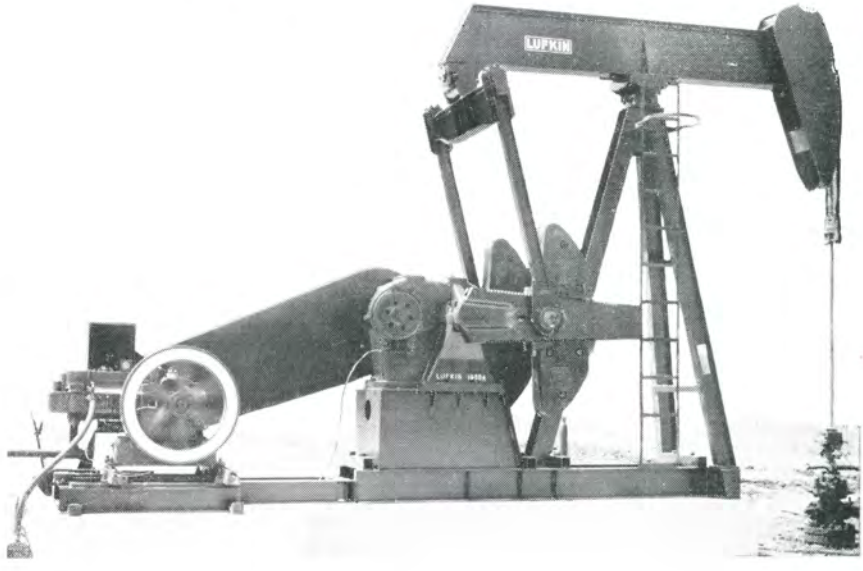


FIGURE 16

JOINTED ELL BASE adapts easily to all multi-cylinder engines by using slide rails. This type engine base can also be used with flywheel-clearing slow speed engines as shown on this C-160D-173-74 unit.

CRANK BALANCED PUMPING UNIT SPECIFICATIONS

UNIT DESIGNATION	C-912D-356-168 C-640D-356-168	C-912D-305-168 C-640D-305-168	C-912D-427-144 C-640D-427-144	C-912D-356-144 C-640D-356-144	C-640D-304-144 C-456D-304-144
POLISHED ROD CAPACITY, LBS.	35,600	30,500	42,700	35,600	30,400
STROKE LENGTHS, INCHES	168, 145, 124, 102	168, 145, 124, 102	144, 124, 106, 88	144, 124, 106, 88	144, 124, 106, 88
WALKING BEAM	33″ x 220 Lbs.	33″ x 200 Lbs.	33″ x 220 Lbs.	33″ x 200 Lbs.	30″ x 172 Lbs.
PITMANS	8″ I-Beam				
WIRELINE HANGER	1⅜″ x 40′-2″	1¼″ x 39′-6″	1⅜″ x 38′-2″	1⅜″ x 38′-2″	1¼″ x 37′-6″
CRANKS	94110B	94110B	94110B	94110B	94110B
STRUCTURAL UNBALANCE	−1500 Lbs.	−1500 Lbs.	−650 Lbs.	−650 Lbs.	−520 Lbs.

UNIT DESIGNATION	C-640D-253-144 C-456D-253-144	C-912D-427-120 C-640D-427-120	C-640D-365-120 C-456D-365-120	C-640D-304-120 C-456D-304-120	C-456D-256-120 C-320D-256-120
POLISHED ROD CAPACITY, LBS.	25,300	42,700	36,500	30,400	25,600
STROKE LENGTHS, INCHES	144, 124, 106, 88	120, 105, 90, 74	120, 105, 90, 74	120, 102, 85, 67	120, 102, 85, 67
WALKING BEAM	27″ x 160 Lbs.	33″ x 220 Lbs.	30″ x 190 Lbs.	27″ x 160 Lbs.	27″ x 145 Lbs.
PITMANS	8″ I-Beam			6″ I-Beam	
WIRELINE HANGER	1¼″ x 37′-6″	1⅜″ x 37′-2″	1⅜″ x 37′-2″	1¼″ x 31′-6″	1⅛″ x 31′-6″
CRANKS	94110B	94110B	94110B	8495B	8495B
STRUCTURAL UNBALANCE	−400 Lbs.	570 Lbs.	570 Lbs.	−120 Lbs.	55 Lbs.

UNIT DESIGNATION	C-456D-213-120 C-320D-213-120	C-640D-365-100 C-456D-365-100	C-456D-298-100 C-320D-298-100	C-456D-256-100 C-320D-256-100	C-456D-298-86 C-320D-298-86
POLISHED ROD CAPACITY, LBS.	21,300	36,500	29,800	25,600	29,800
STROKE LENGTHS, INCHES	120, 102, 85, 67	100, 85, 70, 56	100, 85, 70, 56	100, 85, 70, 56	86, 74, 61, 48
WALKING BEAM	24″ x 130 Lbs.	30″ x 172 Lbs.	27″ x 160 Lbs.	27″ x 145 Lbs.	24″ x 145 Lbs.
PITMANS	6″ I-Beam				
WIRELINE HANGER	1⅛″ x 31′-6″	1⅜″ x 32′-2″	1¼″ x 31′-6″	1⅛″ x 31′-6″	1¼″ x 31′-6″
CRANKS	8495B	8495B	8495B	8495B	8495B
STRUCTURAL UNBALANCE	0 Lbs.	620 Lbs.	550 Lbs.	500 Lbs.	1000 Lbs.

UNIT DESIGNATION	C-320D-246-86 C-228D-246-86	C-320D-212-86 C-228D-212-86	C-320D-246-74 C-228D-246-74	C-228D-200-74 C-160D-200-74	C-228D-173-74 C-160D-173-74
POLISHED ROD CAPACITY, LBS.	24,600	21,200	24,600	20,000	17,300
STROKE LENGTHS, INCHES	86, 74, 61, 48	86, 74, 62, 51	74, 64, 54, 44	74, 64, 54, 44	74, 62, 51, 39
WALKING BEAM	24″ x 120 Lbs.	24″ x 100 Lbs.	24″ x 100 Lbs.	24″ x 94 Lbs.	24″ x 84 Lbs.
PITMANS	5″ I-Beam				
WIRELINE HANGER	1⅛″ x 31′-6″	1⅛″ x 25′-6″	1⅛″ x 23′-10½″	1″ x 23′-10½″	1″ x 20′-10½″
CRANKS	8495B	7478B	7478B	7478B	6468B
STRUCTURAL UNBALANCE	800 Lbs.	450 Lbs.	800 Lbs.	800 Lbs.	450 Lbs.

CRANK BALANCED PUMPING UNIT SPECIFICATIONS

UNIT DESIGNATION	C-228D-200-64 C-160D-200-64	C-160D-169-64 C-114D-169-64	C-160D-143-64 C-114D-143-64	C-160D-169-54 C-114D-169-54
POLISHED ROD CAPACITY, LBS.	20,000	16,900	14,300	16,900
STROKE LENGTHS, INCHES	64, 54, 44, 34	64, 54, 44, 34	64, 52, 40, 28	54, 44, 34, 24
WALKING BEAM	24″ x 84 Lbs.	24″ x 84 Lbs.	18″ x 70 Lbs.	18″ x 70 Lbs.
PITMANS	5″ I-Beam		4″ I-Beam	
WIRELINE HANGER	1″ x 20′-10½″	1″ x 19′-2″	1″ x 17′-8″	1″ x 16′-2″
CRANKS	6468B	6468B	5456B	5456B
STRUCTURAL UNBALANCE	800 Lbs.	550 Lbs.	360 Lbs.	500 Lbs.

UNIT DESIGNATION	C-114D-133-54 C-80D-133-54	C-114D-119-54 C-80D-119-54	C-114D-133-48 C-80D-133-48	C-80D-109-48 C-57D-109-48
POLISHED ROD CAPACITY, LBS.	13,300	11,900	13,300	10,900
STROKE LENGTHS, INCHES	54, 45, 36, 27	54, 45, 36, 27	48, 40, 32, 24	48, 37, 25
WALKING BEAM	18″ x 60 Lbs.	18″ x 55 Lbs.	16″ x 58 Lbs.	16″ x 45 Lbs.
PITMANS	4″ I-Beam			
WIRELINE HANGER	⅞″ x 15′-2″	⅞″ x 15′-2″	⅞″ x 14′-2″	⅞″ x 14′-2″
CRANKS	4850B	4850B	4850B	4246B
STRUCTURAL UNBALANCE	330 Lbs.	330 Lbs.	440 Lbs.	320 Lbs.

UNIT DESIGNATION	C-80-95-48 C-57D-95-48	C-80D-109-42 C-57D-109-42	C-57D-89-42 C-40D-89-42	C-57D-76-42 C-40D-76-42
POLISHED ROD CAPACITY, LBS.	9,500	10,900	8,900	9,600
STROKE LENGTHS, INCHES	48, 37, 25	42, 32, 22	42, 33, 23	42, 33, 23
WALKING BEAM	16″ x 40 Lbs.	16″ x 45 Lbs.	16″ x 36 Lbs.	14″ x 34 Lbs.
PITMANS	4″ I-Beam		3″ I-Beam	
WIRELINE HANGER	⅞″ x 14′-2″	⅞″ x 12′-6″	¾″ x 12′-6″	¾″ x 12′-6″
CRANKS	4246B	4246B	3644B	3644B
STRUCTURAL UNBALANCE	320 Lbs.	500 Lbs.	150 Lbs.	150 Lbs.

UNIT DESIGNATION	C-57D-89-36 C-40D-89-36	C-40D-67-36	C-40D-56-36	C-40D-67-30
POLISHED ROD CAPACITY, LBS.	8,900	6,700	5,600	6,700
STROKE LENGTHS, INCHES	36, 28, 20	36, 28, 20	36, 28, 20	30, 20
WALKING BEAM	14″ x 34 Lbs.	12″ x 31 Lbs.	12″ x 27 Lbs.	12″ x 27 Lbs.
PITMANS	3″ I-Beam			
WIRELINE HANGER	¾″ x 11′-0″	⅝″ x 11′-0″	⅝″ x 11′-0″	⅝″ x 11′-0″
CRANKS	3644B	3644B	3644B	2436B
STRUCTURAL UNBALANCE	275 Lbs.	275 Lbs.	275 Lbs.	150 Lbs.

LUFKIN FOUNDRY & MACHINE CO. LUFKIN, TEXAS

CRANK COUNTERBALANCE DATA

Effective Counterbalance At Polished Rod With Weights At Maximum Position, **Including Structural Unbalance.**

See Example, Pages 3130 and 3131.

UNIT	C-912D-356-168 C-912D-305-168 C-640D-356-168 C-640D-305-168	C-912D-427-144 C-912D-356-144 C-640D-427-144 C-640D-356-144	C-640D-304-144 C-456D-304-144	C-640D-253-144 C-456D-253-144	C-912D-427-120 C-640D-427-120 C-640D-365-120 C-456D-365-120	C-640D-304-120 C-456D-304-120	C-456D-256-120 C-320D-256-120	C-456D-213-120 C-320D-213-120
STROKE	168"	144"	144"	144"	120"	120"	120"	120"
STRUCTURAL UNBALANCE*	—1,500 Lbs.	—650 Lbs.	—520 Lbs.	—400 Lbs.	570 Lbs.	—120 Lbs.	55 Lbs.	0 Lbs.
CRANKS	94110B	94110B	94110B	94110B	94110B	8495B	8495B	8495B
C'Bal., Cranks Only	4,270	6,080	6,250	6,370	8,540	5,575	5,745	5,690
4 No. OORO Counterweights	19,675	24,065	24,325		29,835			
4 No. OOS Aux. Weights	24,315	29,485			36,250			
4 No. OOD Aux. Weights	28,960	34,905						
4 No. ORO Counterweights	17,690	21,750	22,000	22,120	27,090	20,800	20,965	
4 No. OL Aux. Weights	19,720	24,120	24,380		29,900	23,185	23,350	
4 No. OS Aux. Weights	22,115	26,950	27,225		33,250	25,855		
4 No. OD Aux. Weights	26,000	32,150			39,405			
4 No. OARO Counterweights	15,600	19,310	19,550	19,670	24,205	18,635	18,800	18,745
4 No. OL Aux. Weights	17,630	21,680	21,930	22,050	27,010	21,020	21,180	
4 No. OAS Aux. Weights	19,110	23,405	23,665	23,785	29,055	22,675	22,840	
4 No. OAD Aux. Weights	22,615	27,500	27,780		33,900	26,715		
4 No. 1RO Counterweights	13,030	16,310	16,530	16,650	20,650	15,690	15,860	15,805
4 No. 2L Aux. Weights	14,245	17,845	18,070	18,190	22,465	17,245	17,410	17,355
4 No. 1S Aux. Weights	15,725	19,455	19,690	19,810	24,370	18,800	18,965	18,910
4 No. 1D Aux. Weights	18,415	22,595	22,850	22,970	28,095	21,905	22,070	
4 No. 2RO Counterweights	11,555	14,590	14,800	14,920	18,615	13,985	14,155	14,100
4 No. 2L Aux. Weights	12,855	16,105	16,325	16,445	20,410	15,515	15,680	15,625
4 No. 2S Aux. Weights	14,165	17,635	17,865	17,985	22,220	16,995	17,165	17,110
4 No. 2D Aux. Weights	16,780	20,685	20,930	21,050	25,830	20,010	20,175	20,120
4 No. 3CRO Counterweights	10,130	12,925	13,125	13,245	16,640	12,390	12,555	12,500
4 No. 2L Aux. Weights	11,420	14,430	14,640	14,760	18,425	13,910	14,075	14,020
4 No. 3BS Aux. Weights	12,655	15,870	16,090	16,210	20,130	15,320	15,490	15,435
4 No. 3D Aux. Weights	14,675	18,230	18,460	18,580	22,920	17,670	17,835	17,780
4 No. 5ARO Counterweights	8,510	11,035	11,225	11,345	14,405	10,550	10,720	10,665
4 No. 5L Aux. Weights	9,245	11,890	12,090	12,210	15,420	11,420	11,590	11,535
4 No. 5A Aux. Weights	10,220	13,030	13,230	13,350	16,765	12,560	12,730	12,675
4 No. 5AD Aux. Weights	11,595	14,630	14,845	14,965	18,665	14,175	14,345	14,290
4 No. 5CRO Counterweights	7,370	9,705	9,890	10,010	12,830	9,235	9,405	9,350
4 No. 5L Aux. Weights	8,105	10,560	10,750	10,870	13,840	10,100	10,270	10,215
4 No. 5C Aux. Weights	8,910	11,500	11,695	11,815	14,955	11,045	11,215	11,160
4 No. 5CD Aux. Weights	10,445	13,295	13,500	13,620	17,080	12,855	13,020	12,965

UNIT	C-22SD-200-64 C-160D-200-64	C-160D-169-64 C-114D-169-64	C-160D-143-64 C-114D-143-64	C-160D-169-54 C-114D-169-54	C-114D-133-54 C-114D-119-54 C-80D-133-54 C-80D-119-54	C-114D-133-48 C-80D-133-48	C-80D-109-48 C-80D-95-48	C-57D-109-48 C-57D-95-48
STROKE	64"	64"	64"	54"	54"	48"	48"	48"
STRUCTURAL UNBALANCE*	800 Lbs.	550 Lbs.	360 Lbs.	500 Lbs.	330 Lbs.	440 Lbs.	320 Lbs.	320 Lbs.
CRANKS	6468B	6468B	5456B	5456B	4850B	4850B	4246B	4246B
C'Bal., Cranks Only	5,000	4,755	2,660	3,180	2,845	3,270	2,175	2,175
4 No. 3CRO Counterweights	13,070	12,835	8,820	10,370				
4 No. 2L Aux. Weights	14,940	14,710	10,295	12,095				
4 No. 3BS Aux. Weights	16,540		11,465	13,460				
4 No. 3D Aux. Weights				15,930				
4 No. 5ARO Counterweights	11,080	10,845	7,445	8,765	7,470	8,475	6,800	6,800
4 No. 5L Aux. Weights	12,180	11,945	8,335	9,800	8,345	9,460	7,690	7,690
4 No. 5A Aux. Weights	13,545	13,315	9,390	11,035	9,360	10,595	8,690	8,690
4 No. 5AD Aux. Weights	15,530	15,295	10,950	12,855	10,875	12,300	10,210	
4 No. 5CRO Counterweights	9,505	9,265	6,215	7,335	6,320	7,175	5,665	5,665
4 No. 5L Aux. Weights	10,595	10,360	7,095	8,360	7,190	8,155	6,550	6,550
4 No. 5C Aux. Weights	11,730	11,495	7,980	9,390	8,040	9,115	7,395	7,395
4 No. 5C+5L Aux. Weights	12,825	12,590	8,855	10,415	8,910	10,095	8,280	8,280
4 No. 5CD Aux. Weights	13,960	13,725	9,740	11,445	9,760	11,050	9,120	
4 No. 6RO Counterweights	8,520	8,280	5,455	6,440	5,595	6,365	4,955	4,955
4 No. 6L Aux. Weights	9,185	8,945	5,980	7,055	6,115	6,950	5,480	5,480
4 No. 6 Aux. Weights	9,845	9,610	6,505	7,670	6,635	7,535	6,005	6,005
8 No. 6 Aux. Weights	11,175	10,935	7,560	8,900	7,675	8,705	7,055	7,055
4 No. 7RO Counterweights	7,265	7,025	4,470	5,295	4,645	5,295	4,005	4,005
4 No. 7L Aux. Weights	7,770	7,530	4,875	5,770	5,050	5,750	4,415	4,415
4 No. 7 Aux. Weights	8,280	8,040	5,280	6,245	5,460	6,210	4,830	4,830
8 No. 7 Aux. Weights	9,290	9,055	6,095	7,190	6,270	7,125	5,655	5,655

EXAMPLE:

A C-640D-304-144 Unit with 4 No. OARO Counterweights and 4 No. OAS Auxiliary Weights would have a maximum counterbalance effect of 23,665 pounds in the 144" stroke. This effect includes a structural unbalance of —520 pounds. If the counterbalance effect is desired for the 106" stroke, subtract the structural unbalance from the effect in the 144" stroke and multiply this difference by the ratio of 144 ÷ 106; then add the structural unbalance to this product. Thus, counterbalance effect in the 106" stroke = [23,665 — (—520)] × 144/106 + (—520) = 24,185 × 144/106 — 520 = 32,335 pounds.

*Structural Unbalance with a negative (—) sign indicates a walking beam assembly that is heavy on the well end. Structural Unbalance without the negative sign indicates a walking beam assembly that is heavy on the gear reducer end.

CRANK COUNTERBALANCE DATA

Effective Counterbalance At Polished Rod With Weights At Maximum Position, **Including Structural Unbalance.**

See Example, Pages 3130 and 3131.

UNIT	C-640D-365-100 C-456D-365-100	C-456D-298-100 C-320D-298-100	C-456D-256-100 C-320D-256-100	C-456D-298-86 C-320D-298-86	C-320D-246-86 C-228D-246-86	C-320D-212-86 C-228D-212-86	C-320D-246-74 C-228D-246-74 C-228D-200-74 C-160D-200-74	C-228D-173-74 C-160D-173-74
STROKE	100"	100"	100"	86"	86"	86"	74"	74"
STRUCTURAL UNBALANCE*	620 Lbs.	550 Lbs.	500 Lbs.	1000 Lbs.	800 Lbs.	450 Lbs.	800 Lbs.	450 Lbs.
CRANKS	8495B	8495B	8495B	8495B	8495B	7478B	7478B	6468B
C'Bal., Cranks Only	7,460	7,390	7,340	8,945	8,725	4,850	5,890	4,125
4 No. ORO Counterweights 4 No. OL Aux. Weights 4 No. OS Aux. Weights	25,760 28,620 31,830	25,675						
4 No. OARO Counterweights 4 No. OL Aux. Weights 4 No. OAS Aux. Weights 4 No. OAD Aux. Weights	23,155 26,020 28,010 32,865	23,070 25,935 27,925	23,020	27,170				
4 No. 1RO Counterweights 4 No. 2L Aux. Weights 4 No. 1S Aux. Weights 4 No. 1D Aux. Weights	19,620 21,485 23,355 27,090	19,535 21,405 23,270 27,000	19,485 21,355 23,220	23,065 25,235 27,405	22,810			
4 No. 2RO Counterweights 4 No. 2L Aux. Weights 4 No. 2S Aux. Weights 4 No. 2D Aux. Weights	17,570 19,405 21,185 24,805	17,490 19,325 21,105 24,720	17,440 19,275 21,055	20,685 22,820 24,890	20,435 22,565	13,800 15,480 17,005	16,235 18,175 19,935	
4 No. 3CRO Counterweights 4 No. 2L Aux. Weights 4 No. 3BS Aux. Weights 4 No. 3D Aux. Weights	15,650 17,475 19,175 21,995	15,570 17,395 19,095 21,915	15,520 17,345 19,045 21,865	18,455 20,580 22,550 25,825	18,210 20,325 22,295	12,175 13,840 15,310 17,820	14,355 16,280 17,975 20,880	11,185 12,825 14,220
4 No. 5ARO Counterweights 4 No. 5L Aux. Weights 4 No. 5A Aux. Weights 4 No. 5AD Aux. Weights	13,440 14,490 15,855 17,800	13,365 14,410 15,780 17,715	13,315 14,360 15,730 17,665	15,890 17,105 18,695 20,950	15,655 16,865 18,450 20,700	10,270 11,235 12,465 14,225	12,155 13,270 14,685 16,725	9,445 10,405 11,605 13,335
4 No. 5CRO Counterweights 4 No. 5L Aux. Weights 4 No. 5C Aux. Weights 4 No. 5CD Aux. Weights	11,860 12,900 14,035 16,210	11,780 12,825 13,955 16,130	11,730 12,775 13,905 16,080	14,055 15,265 16,580 19,105	13,820 15,030 16,340 18,860	8,855 9,815 10,835 12,815	10,515 11,625 12,805 15,095	8,065 9,020 10,015 11,965
4 No. 6RO Counterweights 4 No. 6L Aux. Weights 4 No. 6 Aux. Weights 8 No. 6 Aux. Weights	10,870 11,510 12,155 13,440	10,795 11,435 12,075 13,360	10,745 11,385 12,025 13,310	12,905 13,650 14,395 15,885	12,675 13,415 14,160 15,650	7,965 8,555 9,140 10,315	9,490 10,170 10,845 12,205	7,205 7,785 8,365 9,525
4 No. 7RO Counterweights 4 No. 7L Aux. Weights 4 No. 7 Aux. Weights 8 No. 7 Aux. Weights	9,635 10,120 10,605 11,580	9,560 10,045 10,530 11,500	9,510 9,995 10,480 11,450	11,470 12,035 12,600 13,725	11,240 11,805 12,370 13,495	6,845 7,295 7,740 8,635	8,195 8,710 9,225 10,260	6,110 6,550 6,995 7,880

UNIT	C-80D-109-42	C-57D-109-42	C-57D-89-42 C-57D-76-42	C-40D-89-42 C-40D-76-42	C-57D-89-36	C-40D-89-36 C-40D-67-36 C-40D-56-36	C-40D-67-30
STROKE	42"	42"	42"	42"	36"	36"	30"
STRUCTURAL UNBALANCE*	500 Lbs.	500 Lbs.	150 Lbs.	150 Lbs.	275 Lbs.	275 Lbs.	150 Lbs.
CRANKS	4216B	4216B	3644B	3644B	3644B	3644B	2436B
C'Bal., Cranks Only	2,620	2,620	1,675	1,675	2,055	2,055	1,410
4 No. 5ARO Counterweights 4 No. 5L Aux. Weights 4 No. 5A Aux. Weights	7,905 8,920 10,065	7,905 8,920 10,065					
4 No. 5CRO Counterweights 4 No. 5L Aux. Weights 4 No. 5C Aux. Weights 4 No. 5C+5L Aux. Weights 4 No. 5CD Aux. Weights	6,605 7,620 8,585 9,595 10,565	6,605 7,620 8,585 9,595	5,300 6,260 7,165	5,300 6,260 7,165	6,285 7,405	6,285 7,405	
4 No. 6RO Counterweights 4 No. 6L Aux. Weights 4 No. 6 Aux. Weights 8 No. 6 Aux. Weights	5,795 6,295 6,995 8,195	5,795 6,395 6,995 8,195	4,700 5,270 5,840 6,985	4,700 5,270 5,840	5,580 6,250 6,915 8,250	5,580 6,250 6,915	4,530 5,125 5,715
4 No. 7RO Counterweights 4 No. 7L Aux. Weights 4 No. 7 Aux. Weights 4 No. 7+7L Aux. Weights 8 No. 7 Aux. Weights	4,710 5,180 5,650 6,125 6,595	4,710 5,180 5,650 6,125 6,595	3,670 4,120 4,570 5,020 5,475	3,670 4,120 4,570 5,020	4,380 4,905 5,435 5,960 6,485	4,380 4,905 5,435 5,960	3,510 3,985 4,460 4,935

EXAMPLE:

A C-80D-109-42 with 4 No. 6RO Counterweights, 2 No. 6 Auxiliary Weights and 2 No. 6 Auxiliary Weights would have a maximum counterbalance effect in the 12" stroke of 5795 + ½ (6395 — 5795) + ½ (6995 — 5795) = 6815 pounds. With this same combination of weights, the counterbalance effect in the 32" stroke is (6815 — 500) × 42/32 + 500 = 8828 pounds.

*Structural Unbalance with a negative (—) sign indicates a walking beam assembly that is heavy on the well end. Structural Unbalance without the negative sign indicates a walking beam assembly that is heavy on the gear reducer end.

STANDARD CRANK BALANCED PUMPING UNIT ASSEMBLIES
GENERAL DIMENSIONS

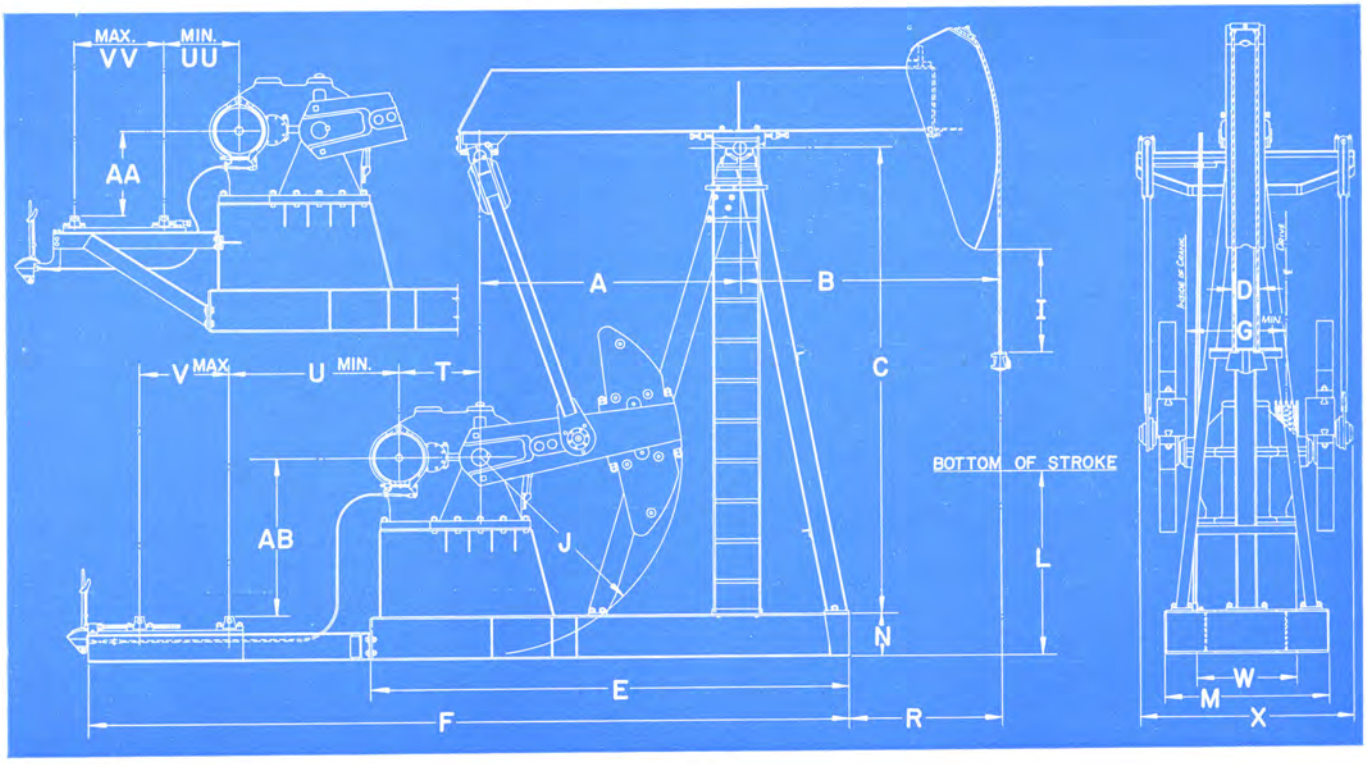


FIGURE 17

UNIT	A	B	C	D	E	F	G	I	J	L	M	N	R	T	U	V	W	X	AA	AB	UU	VV
C-912D-356-168	10′-0″	17′-6″	20′-6″	16″	18′-9½″	29′-4″	53⅜″	21¾″	110″	61″	6′-4″	16″	13′-9½″	48½″	82¾″	48½″	46¾″	8′-2½″	51¾″	93″	22½″	50½″
C-912D-305-168	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-912D-427-144	"	15′-0″	"	"	"	"	"	34″	"	73¼″	"	"	11′-3½″	"	"	"	"	"	"	"	"	"	"
C-912D-356-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-912D-427-120	"	12′-8″	"	12″	"	"	"	56″	"	75″	"	"	8′-11½″	"	"	"	"	"	"	"	"	"	"
C-640D-356-168	"	17′-6″	"	16″	18′-6″	29′-0½″	51⅜″	21¾″	"	61″	"	"	13′-9½″	41½″	86¼″	"	"	"	"	"	26¼″	"
C-640D-305-168	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-427-144	"	15′-0″	"	"	"	"	"	34″	"	73¼″	"	"	11′-3½″	"	"	"	"	"	"	"	"	"	"
C-640D-356-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-304-144	"	"	20′-4″	"	"	"	"	"	"	71½″	"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-253-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-427-120	"	12′-8″	20′-6″	12″	"	"	"	56″	"	75″	"	"	8′-11½″	"	"	"	"	"	"	"	"	"	"
C-640D-365-120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-304-120	9′-3″	12′-11″	18′-2″	"	17′-6″	26′-9½″	52½″	26″	95″	77½″	70″	"	9′-5½″	"	71¼″	"	"	8′-1″	51½″	78″	26¾″	37¾″
C-640D-365-100	"	10′-9″	"	"	"	"	"	46″	"	77″	"	"	7′-3½″	"	"	"	"	"	"	"	"	"	"
C-456D-304-144	10′-0″	15′-0″	20′-4″	16″	18′-6″	29′-0½″	51⅜″	34″	110″	71½″	6′-4″	"	11′-3½″	38⅜″	89½″	"	"	8′-2½″	51¾″	93″	29½″	50½″
C-456D-253-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-456D-365-120	"	12′-8″	20′-6″	12″	"	"	"	56″	"	75″	"	"	8′-11½″	"	"	"	"	"	"	"	"	"	"
C-456D-304-120	9′-3″	12′-11″	18′-2″	"	17′-6″	26′-9½″	52½″	26″	95″	77½″	70″	"	9′-5½″	"	74½″	"	"	8′-1″	51½″	78″	30″	37¾″
C-456D-256-120	"	"	18′-0″	"	"	"	"	"	"	75½″	"	"	"	"	"	"	"	"	"	"	"	"	"
C-456D-213-120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-456D-365-100	"	10′-9″	18′-2″	"	"	"	"	46″	"	77″	"	"	7′-3½″	"	"	"	"	"	"	"	"	"	"
C-456D-298-100	"	"	18′-0″	"	"	"	"	"	"	75″	"	"	"	"	"	"	"	"	"	"	"	"	"
C-456D-256-100	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-456D-298-86	"	9′-3″	"	"	"	"	"	61″	"	74¾″	"	"	69½″	"	"	"	"	"	"	"	"	"	"

GENERAL DIMENSIONS Continued

UNIT	A	B	C	D	E	F	G	I	J	L	M	N	R	T	U	V	W	X	AA	AB	UU	VV
C-320D-256-120	9'-3"	12'-11"	18'-0"	12"	17'-0½"	27'-4½"	44¾"	26"	95"	75½"	69¾"	16"	9'-5½"	34"	86"	48½"	43"	7'-2"	53"	80"	30⅜"	34¼"
C-320D-213-120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	7'-1½"	"	"	"	"
C-320D-298-100	"	10'-9"	"	"	"	"	"	46"	"	75"	"	"	7'-3½"	"	"	"	"	7'-2"	"	"	"	"
C-320D-256-100	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	7'-1½"	"	"	"	"
C-320D-298-86	"	9'-3"	"	"	"	"	"	61"	"	74¾"	"	"	69½"	"	"	"	"	7'-2"	"	"	"	"
C-320D-246-86	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	7'-1½"	"	"	"	"
C-320D-212-86	8'-0"	"	15'-0"	"	15'-4½"	24'-3½"	45¼"	25"	78"	73¾"	57¾"	"	6'-2½"	"	69"	"	"	"	36"	63"	"	"
C-320D-246-74	"	8'-0"	"	9"	"	"	"	34½"	"	78"	"	"	59½"	"	"	"	"	"	"	"	"	"
C-228D-246-86	9'-3"	9'-3"	18'-0"	12"	16'-5½"	26'-9½"	38⅝"	61"	95"	74¾"	69¾"	"	69½"	30"	83"	"	37"	6'-6½"	53"	80"	27⅜"	"
C-228D-212-86	8'-0"	"	15'-0"	"	14'-9½"	23'-8½"	39⅛"	25"	78"	73¾"	57¾"	"	6'-2½"	"	66"	"	"	"	36"	63"	"	"
C-228D-246-74	"	8'-0"	"	9"	"	"	"	34½"	"	78"	"	"	59½"	"	"	"	"	"	"	"	"	"
C-228D-200-74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-228D-173-74	7'-0"	"	13'-0"	"	13'-5"	22'-4"	"	16½"	68"	68"	51¾"	12"	64"	"	"	"	"	"	26"	53"	"	"
C-228D-200-61	"	7'-0"	"	"	"	"	"	25½"	"	68½"	"	"	52"	"	"	"	"	"	"	"	"	"
C-160D-200-74	8'-0"	8'-0"	15'-0"	"	14'-5"	23'-2"	33⅛"	34½"	78"	78"	57¾"	16"	59½"	26"	65¼"	46½"	32"	70½"	38¾"	65"	26⅝"	34¾"
C-160D-173-74	7'-0"	"	13'-0"	"	13'-0½"	21'-9½"	"	16½"	68"	68"	51¾"	12"	64"	"	"	"	"	"	29"	55"	"	"
C-160D-200-61	"	7'-0"	"	"	"	"	"	25½"	"	68½"	"	"	52"	"	"	"	"	"	"	"	"	"
C-160D-169-61	"	"	12'-9¾"	"	"	"	"	"	"	67"	"	"	"	"	"	"	"	69¾"	"	"	"	"
C-160-143-64	6'-0"	7'-0"	11'-0"	"	11'-1¾"	18'-6¼"	"	18"	56"	53¾"	50¾"	"	62⅜"	"	48¾"	"	"	"	30¼"	43"	17"	30¼"
C-160D-169-51	"	6'-0"	"	"	"	"	"	19¼"	"	62"	"	"	50¾"	"	"	"	"	"	"	"	"	"
C-111D-169-61	7'-0"	7'-0"	12'-9¾"	"	12'-7"	21'-4"	29⅜"	25½"	68"	67"	51¾"	"	52"	24"	61¾"	"	25"	66¾"	29"	55"	23"	34¾"
C-111D-143-64	6'-0"	"	11'-0"	"	10'-8¼"	18'-0¾"	"	18"	56"	53¾"	50¾"	"	62¾"	"	45¼"	"	"	"	30¼"	43"	13½"	30¼"
C-111D-169-51	"	6'-0"	"	"	"	"	"	19¼"	"	62"	"	"	50¾"	"	"	"	"	"	"	"	"	"
C-111D-133-51	5'-4"	"	9'-8"	"	10'-0"	17'-4½"	"	13¼"	50"	50"	46¼"	10"	51"	"	"	"	"	67¼"	24"	37"	"	"
C-111D-119-51	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-111D-133-48	"	5'-4"	"	"	"	"	"	14½"	"	54¾"	"	"	43"	"	"	"	"	"	"	"	"	"
C-80D-133-51	"	6'-0"	"	"	"	"	"	13¼"	"	50"	"	"	51"	22"	47¼"	"	"	"	"	"	15½"	"
C-80D-119-51	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-80D-133-48	"	5'-4"	"	"	"	"	"	14½"	"	54¾"	"	"	43"	"	"	"	"	"	"	"	"	"
C-80D-109-48	4'-8"	"	8'-9"	"	9'-3⅞"	16'-8½"	30⅝"	"	46"	43¾"	40¾"	"	"	"	"	"	"	65¼"	20"	33"	"	"
C-80D-95-48	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-80D-109-42	"	4'-8"	"	6½"	"	"	"	15½"	"	51"	"	"	35"	"	"	"	"	"	"	"	"	"
C-57D-109-48	"	5'-4"	"	9"	"	"	26"	14½"	"	43¾"	"	"	43"	20"	49¼"	"	"	58¼"	"	"	17½"	"
C-57D-95-48	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-57D-109-42	"	4'-8"	"	6½"	"	"	"	15½"	"	51"	"	"	35"	"	"	"	"	"	"	"	"	"
C-57D-89-42	4'-0"	"	8'-2½"	"	8'-2"	13'-8¾"	28¼"	"	44"	42"	38½"	8"	41"	"	33¾"	40½"	"	58"	18"	33¾"	"	"
C-57D-76-42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-57D-89-36	"	4'-0"	"	"	"	"	"	13"	"	50½"	"	"	33"	"	"	"	"	"	"	"	"	"
C-40D-89-42	"	4'-8"	"	"	7'-9"	13'-6"	23¾"	15½"	"	42"	"	"	41"	17½"	28"	44¾"	20"	51¼"	10¾"	"	17"	21¼"
C-40D-76-42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-40D-89-36	"	4'-0"	"	"	"	"	"	13"	"	50½"	"	"	33"	"	"	"	"	"	"	"	"	"

NOTE: Do not use above dimensions for foundation. Request foundation plan.

Units shown in bold face type utilize standard components and are available for normal delivery. All other units are available but require longer delivery

GEAR SPECIFICATIONS

3648D GEAR REDUCER: Double Reduction
RATING: 3,648,000 In. Lbs. Peak Torque • RATIO OF GEARS: 28.99
CRANKSHAFT DIA.: 13"
SHEAVE: 80" P.D.—18D Std.
7 1/4" Bore
GEAR BOX OIL CAPACITY: 360 Gallons

2560D GEAR REDUCER: Double Reduction
RATING: 2,560,000 In. Lbs. Peak Torque • RATIO OF GEARS: 29.57
CRANKSHAFT DIA.: 11 3/4"
SHEAVE: 68" P.D.—16D Std.
6 1/2" Bore
GEAR BOX OIL CAPACITY: 235 Gallons

1824D GEAR REDUCER: Double Reduction
RATING: 1,824,000 In. Lbs. Peak Torque • RATIO OF GEARS: 28.33
CRANK SHAFT Dia. 9"
SHEAVE: 46" P.D.—11D Std.,
68" P.D. Max., 4-15/16" Bore
GEAR BOX OIL CAPACITY: 165 Gallons

1280D GEAR REDUCER: Double Reduction
RATING: 1,280,000 In. Lbs. Peak Torque • RATIO OF GEARS: 28.05
CRANKSHAFT DIA.: 8 1/2" (Mark II, 10 1/2")
SHEAVE: 46" P.D.—10D Std.,
68" P.D., 10D, Max., 4-15/16" Bore
GEAR BOX OIL CAPACITY: 120 Gallons

912D GEAR REDUCER: Double Reduction
RATING: 912,000 In. Lbs. Peak Torque • RATIO OF GEARS: 28.72
CRANKSHAFT DIA.: 7" (Mark II, 9")
SHEAVE: 47.6" P.D.—8D Standard
55.2" P.D. Max., 4-3/16" Bore
GEAR BOX OIL CAPACITY: 107 Gallons

640D GEAR REDUCER: Double Reduction
RATING 640,000 In. Lbs. Peak Torque • RATIO OF GEARS: 28.6
CRANKSHAFT DIA.: 7" (Mark II, 9")
SHEAVE: 34" P.D.—6D Std., 47.4" or 51.4" P.D. Alt.,
55.4" P.D. Max., 3-7/16" Bore
GEAR BOX OIL CAPACITY: 70 Gallons

456D GEAR REDUCER: Double Reduction
RATING: 456,000 In. Lbs. Peak Torque • RATIO OF GEARS: 29.04
CRANKSHAFT DIA.: 7" (Mark II, 9")
SHEAVE: 34" P.D.—6D or 8C Std., 47.4" P.D. Alt.,
51.4" P.D. Max., 3-7/16" Bore
GEAR BOX OIL CAPACITY: 55 Gallons

320D GEAR REDUCER: Double Reduction
RATING: 320,000 In. Lbs. Peak Torque • RATIO OF GEARS: 30.12
CRANKSHAFT DIA.: 6-7/16" (Mark II, 8 1/2")
SHEAVE: 24.6" P.D.—6C or 5D Std., 29.6" P.D. Alt.
47" P.D. Max., 2 15/16" Bore
GEAR BOX OIL CAPACITY: 50 Gallons

228D GEAR REDUCER: Double Reduction
RATING: 228,000 In. Lbs. Peak Torque • RATIO OF GEARS: 28.45
CRANKSHAFT DIA.: 6" (Mark II, 7")
SHEAVE: 24.6" P.D.—5C or 4D Std., 29.6" P.D. Alt.,
41" P.D. Max., 2-7/16" Bore
GEAR BOX OIL CAPACITY: 34 Gallons

160D GEAR REDUCER: Double Reduction
RATING: 160,000 In. Lbs. Peak Torque • RATIO OF GEARS: 28.67
CRANKSHAFT DIA.: 5-7/16" (Mark II, 7")
SHEAVE: 24.6" P.D.—4C or 3D Std., 29.6" P.D. Alt.,
38" P.D. Max., 2-3/16" Bore
GEAR BOX OIL CAPACITY: 22 Gallons

114D GEAR REDUCER: Double Reduction
RATING: 114,000 In. Lbs. Peak Torque • RATIO OF GEARS: 29.4
CRANKSHAFT DIA.: 4-7/16" (Mark II, 6-7/16")
SHEAVE: 19.6" P.D.—3C Std., 24.6" or 29.6" P.D. Alt.,
33.6" P.D. Max., 1-15/16" Bore
GEAR BOX OIL CAPACITY: 17 Gallons

80D GEAR REDUCER: Double Reduction
RATING: 80,000 In. Lbs. Peak Torque • RATIO OF GEARS: 29.15
CRANKSHAFT DIA.: 4-7/16"
SHEAVE: 19.6" P.D.—3C Std., 24.6" P.D. Alt.,
29.6" P.D. Max., 1-15/16" Bore
GEAR BOX OIL CAPACITY: 17 Gallons

57D GEAR REDUCER: Double Reduction
RATING: 57,000 In. Lbs. Peak Torque • RATIO OF GEARS: 29.32
CRANKSHAFT DIA.: 4"
SHEAVE: 19.6" P.D.—2C Std., 24.6" P.D. Alt.,
27.5" P. D. Max., 1-15/16" Bore
GEAR BOX OIL CAPACITY: 13 Gallons

40D GEAR REDUCER: Double Reduction
RATING: 40,000 In. Lbs. Peak Torque • RATIO OF GEARS: 29.2
CRANKSHAFT DIA.: 4"
SHEAVE: 21" P.D —2C or 3B Std.,
23.3" P.D. Max., 1-11/16" Bore
GEAR BOX OIL CAPACITY: 7 Gallons

LUFKIN BEAM BALANCED PUMPING UNIT ASSEMBLIES

STRUCTURAL SPECIFICATIONS AND DIMENSIONS

See preceding page for GEAR Specifications

UNIT	B-57D-109-48	B-57D-109-42	B-40D-89-42	B-40D-76-42	B-40D-89-36
Polished Rod Cap., #	10,900	10,900	8,900	7,600	8,900
Stroke Length, Ins.	48, 36	42, 32	42, 32	42, 32	36, 28
Walking Beam	16" x 45 Lbs.	16" x 45 Lbs.	16" x 36 Lbs.	14" x 34 Lbs.	14" x 34 Lbs.
Equalizer Bearing	BRONZE BUSHED, OIL BATH TYPE				
Center Bearing	BRONZE BUSHED, OIL BATH TYPE				
Crank Pin Bearings	BRONZE BUSHED, OIL BATH TYPE				
Wireline Hanger	7/8" x 14'-2"	7/8" x 12'-6"	3/4" x 12'-6"	3/4" x 12'-6"	3/4" x 11'-0"
*1" thick Beam Wts., #	150	150	150	125	125
No. of Beam Weights	EFFECTIVE COUNTERBALANCE AT POLISHED ROD, LBS.				
0	400	550	420	420	550
1	700	880	710	660	830
2	1000	1205	995	895	1105
3	1300	1530	1280	1130	1380
4	1595	1850	1560	1365	1650
5	1890	2165	1835	1595	1915
6	2180	2480	2110	1825	2180
7	2490	2790	2380	2050	2440
8	2760	3100	2650	2275	2700
9	3045	3405	2915	2495	2955
10	3325	3710	3180	2715	3210
11	3605	4010	3440	2930	3460
12	3885	4300	3700	3145	3705
13	4160	4595	3955	3360	3950
14	4435	4890	4210	3570	4190
15	4705	5180	4460	3780	4430
16	4975	5470	4710	3985	4665
17	5240	5755	4955	4190	4900
18	5505	6040	5195	4390	5130
19	5765	6320	5435	4590	5360
20	6025	6600	5670	4790	5585
21	6280	6875	5905	4985	5810
22	6535	7150	6135	5180	6030
23	6785	7420	6365	5370	6250
24	7035	7685	6590	5560	6465
25	7280	7950	6815	5745	6680
26	7525	8210	7035	5930	6890
27	7770	8470	7255	6110	7100
28	8010				
29	8250				
30	8485				

Note: *3/4" thick Beam Weights optional for all Beam Balanced units.

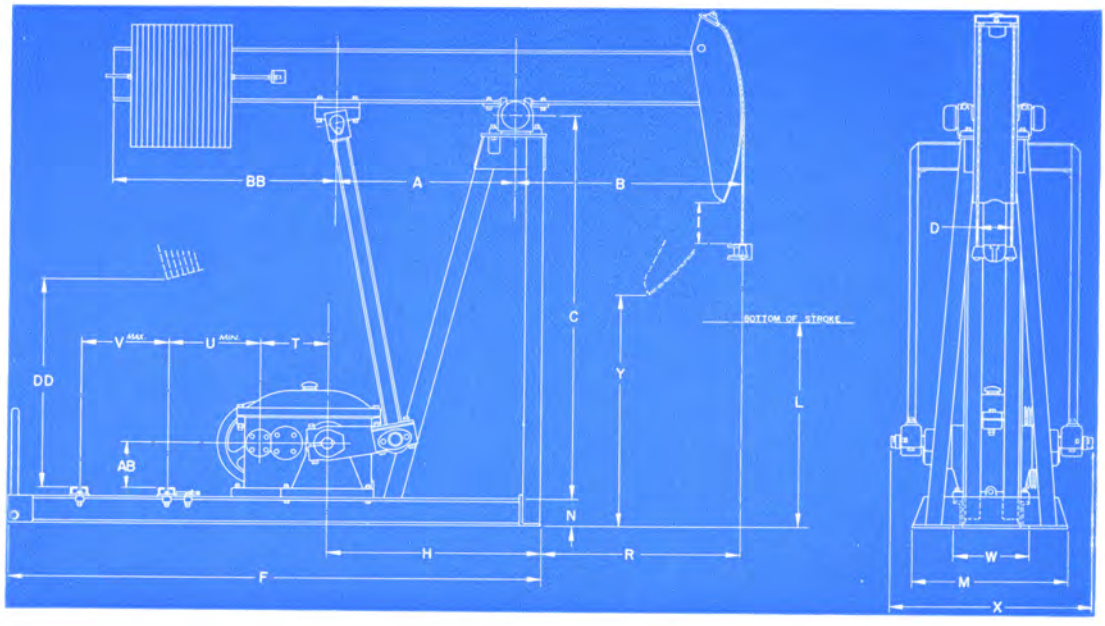


FIGURE 18

GENERAL DIMENSIONS

UNIT	A	B	C	D	F	H	I	L	M	N	R	T	U	V	W	X	Y	AB	BB	DD
B-57D-109-48	46	64	8'-0"	9	13'-3"	69	14 1/2	43 3/4	40 3/4	10	43	20	24 1/4	39 3/4	25	57 1/2	69 3/4	14 3/4	7'-1"	47 1/4
B-57D-109-42	"	56	"	6 1/2	"	"	15 1/2	51	"	"	35	"	"	"	"	"	75 1/2	"	6'-6"	50
*B-40D-89-42	"	"	8'-2 1/2"	"	11'-8 1/2"	61	"	42	38 1/2	8	41	17 1/2	19	34 1/4	20	50 3/4	67	10 3/4	63	50 3/4
*B-40D-76-42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
*B-40D-89-36	"	48	"	"	"	"	13	50 1/2	"	"	33	"	"	"	"	"	72 1/2	"	61 1/2	51 1/4

* Base Shown Is For Electric Motor Only. For Gas Engine Drive Dim. "F" Is 13'-4", Dim "U" Is 19, and Dim. "V" Is 53 3/4.

LUFKIN MARK II *UNITORQUE* PUMPING UNITS

FIGURE 19

M-228D-256-100 Mark II Unit driven by a Lufkin H-333 engine.

A NEW CONCEPT IN OILWELL PUMPING

The LUFKIN MARK II Unitorque Pumping Unit employs a new kinematic concept made of the tried and proven structural components of the conventional mechanical pumping unit. This new, simple and imaginative design of the LUFKIN MARK II furnishes one of the most advanced and trouble-free systems of rod pumping available today, providing for many money saving advantages not heretofore thought possible.

POLISHED ROD MOTION

Due to the unique geometry of the LUFKIN MARK II, the acceleration at the bottom polished rod reversal is decreased as much as 40%. This reduces peak load up to 10% and tends to avoid shock, resulting in longer rod life, lower servicing costs, and less production loss from rod break shutdowns.

PRIME MOVER SAVINGS

The LUFKIN MARK II, due to its more uniform torque demand illustrated in Figure 22 generally permits the use of a smaller prime mover to pump any given well. In the case of a gas engine drive the first costs savings are substantial. With an electric motor drive additional savings may be obtained when electric power charges are based on demand or connected horsepower.

FIGURE 20

M-456D-253-144 Mark II Unit. Note compactness of drive when a multi-cylinder engine is mounted forward of the samson post.

FIGURE 21

M-640D-304-144 Mark II Unit driven by a Lufkin H-795 CCW engine. With a counter-clockwise rotation engine such as this, the engine can be mounted forward of the samson post on the main base beams.

THE *UNITORQUE* GEOMETRY

(1) The cross yoke (equalizer) is shifted forward toward the horsehead instead of placing it directly over the gear reducer. This produces approximately a 195° upstroke and a 165° downstroke. (See Fig. 22)

The 195° upstroke reduces the acceleration where the load is greatest and thus effects a reduction in polished rod load.

By locating the cross yoke forward a greater mechanical advantage is obtained for lifting the load, and a lesser mechanical advantage is obtained for the reduced downstroke load, i.e., the maximum upstroke torque factor is decreased and the maximum downstroke torque factor is increased.

(2) The counterbalance weights are offset on the crank. This produces a counterbalance torque which at the beginning of the upstroke "lags" the well load torque approximately 7½°. Similarly, at the beginning of the downstroke this same offset condition produces a counterbalance torque which "leads" the well load torque approximately 7½°. (See Fig. 22)

Independently, these features would not produce a uniform torque, but working together a "unitorque" system is obtained which in turn can effect a torque reduction on the gear reducer up to 35%.

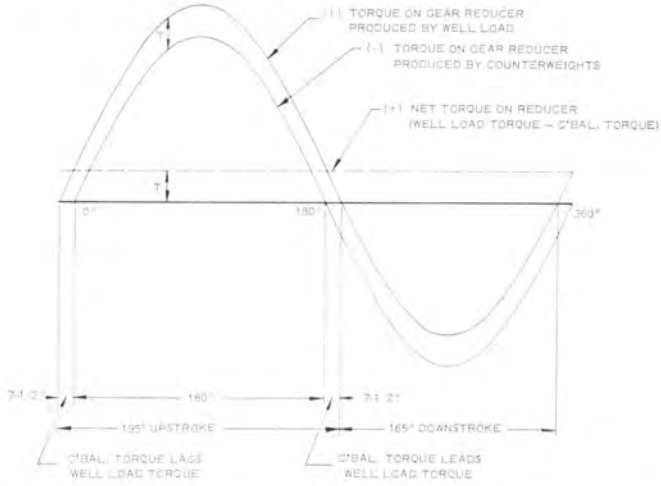


FIGURE 22

Illustration showing how a uniform torque can be obtained under ideal conditions.

NOTE: The Mark II Unit must be operated in a counter-clockwise direction. (Standing at the side of the unit with the well-head to the right.)

SEMI-AUTOMATIC COUNTERBALANCE

(OPTIONAL AT ADDITIONAL COST)

For those applications where changing well conditions necessitate changing counterbalance requirements, a semi-automatic counterbalancing device is available on the **LUFKIN** Mark II ***UNITORQUE*** units. A counterbalance **TRIM WEIGHT** located in each crank can be moved either in or out depending on whether less or more counterbalance is required. Moving the trim weights is easily accomplished while the unit is running by moving a lever either forward or backward. One lever actuates the right hand trim weight; the other lever operates the left hand.

Naturally, when a radical change in counterbalance is required, such as when the stroke length is changed, the main counterweights themselves must be moved.

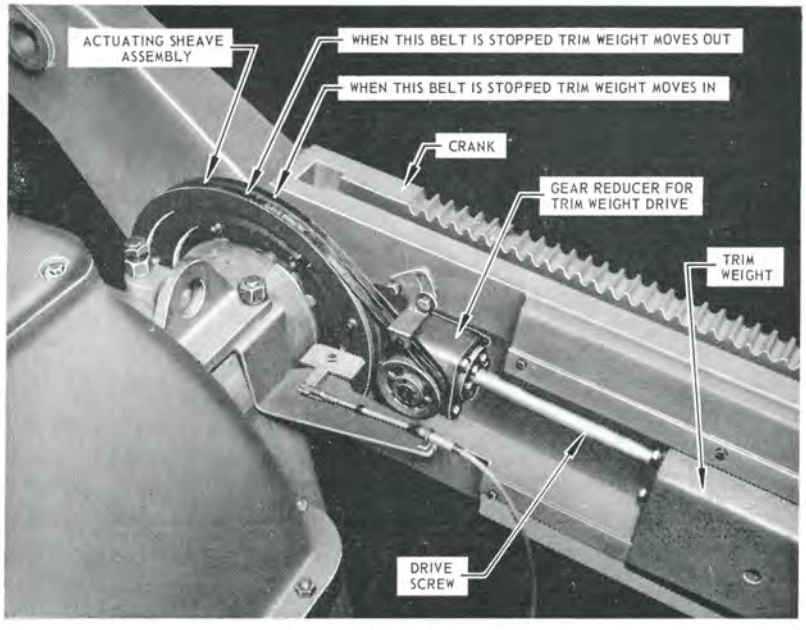


FIGURE 23

MARK II PUMPING UNIT SPECIFICATIONS

UNIT DESIGNATION	M-1280D-427-192	M-912D-305-192 M-640D-305-192 M-456D-305-192	M-912D-356-168	M-912D-305-168 M-640D-305-168 M-456D-305-168	M-912D-356-144 M-640D-356-144 M-456D-356-144	M-912D-304-144 M-640D-304-144 M-456D-304-144 M-320D-304-144
POLISHED ROD CAPACITY, LBS.	42,700	30,500	35,600	30,500	35,600	30,400
STROKE LENGTH, INCHES	192, 168, 144	192, 168, 144	168, 149, 130	168, 149, 130	144, 128, 112	144, 128, 112
WALKING BEAM	24" x 130 Lbs.	24" x 130 Lbs.	24" x 100 Lbs.	24" x 84 Lbs.	24" x 84 Lbs.	24" x 84 Lbs.
PITMANS	8" Ex. Hvy. Pipe	8" Ex. Hvy. Pipe	6" Ex. Hvy. Pipe	6" Ex. Hvy. Pipe	6" Ex. Hvy. Pipe	5" Ex. Hvy. Pipe
WIRELINE HANGER	1 3/8" x 52'-9"	1 3/8" x 52'-9"	1 3/8" x 43'-2"	1 1/4" x 42'-6"	1 3/8" x 38'-2"	1 1/4" x 37'-6"
CRANKS	192130M	192130M	168108M	168108M	144108M	144108M

UNIT DESIGNATION	M-640D-253-144 M-456D-253-144 M-320D-253-144	M-640D-365-120 M-456D-365-120	M-640D-304-120 M-456D-304-120 M-320D-304-120	M-640D-256-120 M-456D-256-120 M-320D-256-120 M-228D-256-120	M-320D-213-120 M-228D-213-120	M-320D-298-100
POLISHED ROD CAPACITY, LBS.	25,300	36,500	30,400	25,600	21,300	29,800
STROKE LENGTH, INCHES	144, 128, 112	120, 104, 88	120, 104, 88	120, 104, 88	120, 104, 88	100, 84, 68
WALKING BEAM	21" x 68 Lbs.	24" x 84 Lbs.	24" x 84 Lbs.	21" x 68 Lbs.	21" x 62 Lbs.	24" x 84 Lbs.
PITMANS	5" Ex. Hvy. Pipe	6" Ex. Hvy. Pipe	5" Ex. Hvy. Pipe	5" Ex. Hvy. Pipe	5" Ex. Hvy. Pipe	5" Ex. Hvy. Pipe
WIRELINE HANGER	2-1 1/8" x 18'-0"	1 3/8" x 38'-2"	1 1/4" x 37'-6"	2-1 1/8" x 18'-0"	2-1 1/8" x 18'-0"	1 1/4" x 37'-6"
CRANKS	144108 M	120108 M	120108 M	120108 M	120108 M	100108 M

UNIT DESIGNATION	M-320D-256-100 M-228D-256-100	M-228D-246-86 M-160D-246-86	M-228D-200-86 M-160D-200-86	M-114D-143-86	M-228D-246-74 M-160D-246-74
POLISHED ROD CAPACITY, LBS.	25,600	24,600	20,000	14,300	24,600
STROKE LENGTH, INCHES	100, 84, 68	86, 72.4, 58.6	86, 72.4, 58.6	86, 74, 62	74, 60.4, 46.8
WALKING BEAM	21" x 68 Lbs.	16" x 58 Lbs.	16" x 45 Lbs.	14" x 30 Lbs.	16" x 58 Lbs.
PITMANS	5" Ex. Hvy. Pipe	4" Std. Pipe	4" Std. Pipe	3 1/2" Std. Pipe	4" Std. Pipe
WIRELINE HANGER	2-1 1/8" x 18'-0"	1 1/8" x 26'-10 1/2"	1" x 26'-10 1/2"	1" x 20'-2"	1 1/8" x 26'-10 1/2"
CRANKS	100108 M	8686 M	8686 M	8662 M	7486 M

UNIT DESIGNATION	M-228D-200-74 M-160D-200-74 M-114D-200-74	M-228D-173-74 M-160D-173-74 M-114D-173-74	M-114D-143-74 M- 80D-143-74	M-114D-169-64	M-114D-143-64
POLISHED ROD CAPACITY, LBS.	20,000	17,300	14,300	16,900	14,300
STROKE LENGTH, INCHES	74, 60.4, 46.8	74, 60.4, 46.8	74, 60, 46	64, 52, 40	64, 52, 40
WALKING BEAM	16" x 45 Lbs.	16" x 40 Lbs.	14" x 30 Lbs.	14" x 34 Lbs.	14" x 30 Lbs.
PITMANS	4" Std. Pipe*	4" Std. Pipe*	3 1/2" Std. Pipe	3 1/2" Std. Pipe	3 1/2" Std. Pipe
WIRELINE HANGER	1" x 26'-10 1/2"	1" x 26'-10 1/2"	1" x 17'-8"	1" x 17'-8"	1" x 17'-8"
CRANKS	7486 M	7486 M	7462 M	6462 M	6462 M

* 3 1/2" Ex. Hvy. Pipe Used on M-114D-200-74 and M-114D-173-74.

STANDARD MARK II PUMPING UNIT ASSEMBLIES

GENERAL DIMENSIONS

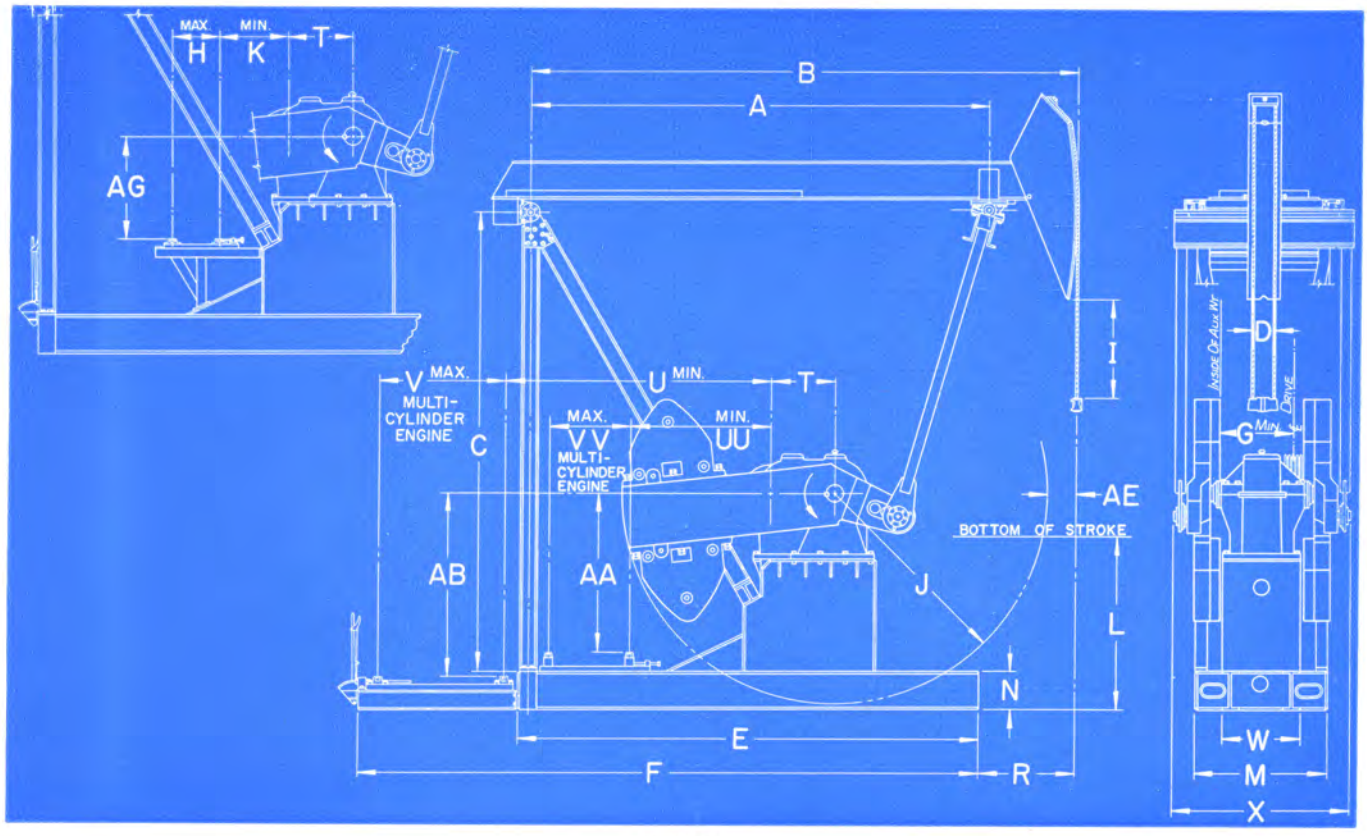


FIGURE 24

UNIT	A	B	C	D	E	F	G	H	I	J	K	L	M	N	R	T	U	V	W	X	AA	AB	AE	AG	UU	VV
M-1280D-427-192	25'-6"	32'-0"	26'-9⅞"	16"	20'-2⅛"	29'-2"	60⅜"	423⅛"	553⅛"	130"	371½"	721½"	8'-0"	24"	36"	521½"	8'-21½"	683⅛"	50"	8'-11"	**	9'-01⅜"	26"	613⅛"	**	**
M-912D-305-192	25'-6"	32'-0"	26'-9⅞"	16"	20'-2⅛"	29'-2"	553⅛"	473⅛"	553⅛"	130"	253⅛"	721½"	8'-0"	24"	36"	481½"	8'-6½"	681⅛"	493⅛"	8'-11"	**	9'-01⅜"	26"	613⅛"	**	**
M-912D-356-168	22'-6"	27'-10"	23'-07⅛"	12"	23'-11½"	*	54"	463⅛"	425⅛"	108"	253⅛"	713⅛"	693⅛"	16"	60"	"	*	*	493⅛"	8'-9"	7'-2"	*	19"	465⅛"	6'-10½"	67"
M-912D-305-168	"	"	"	*	*	*	"	"	"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-912D-356-144	21'-6"	26'-0"	21'-07⅛"	"	21'-8"	*	"	"	395⅛"	"	"	767⅛"	"	"	55½"	"	*	*	"	8'-73⅛"	"	*	131½"	"	6'-6"	55"
M-912D-304-144	"	"	"	*	*	*	"	"	"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-640D-305-192	25'-6"	32'-0"	26'-9⅞"	16"	20'-2⅛"	29'-2"	523¼"	473¼"	553⅛"	130"	273⅛"	721½"	8'-0"	24"	36"	41½"	9'-1½"	683⅛"	461½"	8'-11"	**	9'-01⅜"	26"	621⅛"	**	**
M-640D-305-168	22'-6"	27'-10"	23'-07⅛"	"	23'-11½"	*	501¼"	463¼"	425⅛"	108"	273⅛"	713⅛"	693⅛"	16"	60"	"	*	*	"	8'-5"	7'-2"	*	233⅛"	461⅛"	7'-1"	67"
M-640D-356-144	21'-6"	26'-0"	21'-07⅛"	"	21'-3½"	*	"	"	395⅛"	"	"	767⅛"	"	"	"	"	*	*	"	8'-33⅛"	"	*	18"	"	6'-8½"	55"
M-640D-304-144	"	"	"	"	"	*	"	"	"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-640D-253-144	"	"	"	9"	"	*	"	"	445⅛"	"	"	74"	"	"	"	"	*	*	"	8'-5"	"	*	"	"	"	"
M-640D-365-120	"	"	"	12"	"	*	"	"	635⅛"	"	"	767⅛"	"	"	"	"	*	*	"	8'-33⅛"	"	*	"	"	"	"
M-640D-304-120	"	"	"	"	"	*	"	"	"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-640D-256-120	"	"	"	9"	"	*	"	"	691⅛"	"	"	734¼"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-456D-305-192	25'-6"	32'-0"	26'-9⅞"	16"	20'-2⅛"	29'-2"	523¼"	473¼"	553⅛"	130"	31"	721½"	8'-0"	24"	36"	383⅛"	9'-45⅛"	683⅛"	"	8'-11"	**	9'-01⅜"	26"	621⅛"	**	**
M-456D-305-168	22'-6"	27'-10"	23'-07⅛"	12"	23'-11½"	*	"	463¼"	425⅛"	108"	31"	713⅛"	693⅛"	16"	60"	"	*	*	"	8'-5"	7'-2"	*	233⅛"	461⅛"	7'-4¼"	67"
M-456D-356-144	21'-6"	26'-0"	21'-07⅛"	"	21'-3½"	*	"	"	395⅛"	"	"	767⅛"	"	"	"	"	*	*	"	8'-33⅛"	"	*	18"	"	6'-11⅛"	55"
M-456D-304-144	"	"	"	"	"	*	"	"	"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-456D-253-144	"	"	"	9"	"	*	"	"	443⅛"	"	"	74"	"	"	"	"	*	*	"	8'-5"	"	*	"	"	"	"
M-456D-365-120	"	"	"	12"	"	*	"	"	635⅛"	"	"	767⅛"	"	"	"	"	*	*	"	8'-33½"	"	*	"	"	"	"
M-456D-304-120	"	"	"	"	"	*	"	"	"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-456D-256-120	"	"	"	9"	"	*	"	"	691⅛"	"	"	734¼"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-320D-304-144	"	"	"	12"	"	*	441½"	331¼"	395⅛"	"	353⅛"	767⅛"	"	"	"	34"	*	*	431½"	7'-43⅛"	"	*	"	"	7'-4"	511½"
M-320D-253-144	"	"	"	9"	"	*	"	"	443⅛"	"	"	74"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-320D-304-120	"	"	"	12"	"	*	"	"	635⅛"	"	"	767⅛"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-320D-256-120	"	"	"	9"	"	*	"	"	691⅛"	"	"	734¼"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-320D-213-120	"	"	"	"	"	*	"	"	"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-320D-298-100	"	"	"	12"	"	*	"	6'-11⅝"	"	"	"	767⅛"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-320D-256-100	"	"	"	9"	"	*	"	7'-51⅝"	"	"	"	734¼"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-228D-256-120	"	"	"	"	"	*	387⅛"	293¼"	691⅛"	"	413⅛"	"	"	"	"	30"	*	*	37"	6'-93⅛"	"	*	"	475⅛"	7'-8"	"
M-228D-213-120	"	"	"	"	"	*	"	"	"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-228D-256-100	"	"	"	"	"	*	"	"	7'-51⅝"	"	"	"	"	"	"	"	*	*	"	"	"	*	"	"	"	"
M-228D-246-86	15'-6"	18'-6"	15'-83⅛"	"	15'-6½"	21'-0"	"	301¼"	451¼"	865⅛"	221¼"	651¼"	57"	"	39"	"	8'-73¼"	51½"	"	6'-83⅛"	**	6'-3"	113⅛"	401½"	**	**
M-228D-200-86	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	**	"	**	"	"	**	**
M-228D-216-74	"	"	"	"	"	"	"	"	585⅛"	"	"	651½"	"	"	"	"	"	"	"	"	**	"	"	"	**	**
M-228D-200-74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	**	"	"	"	"	**	**
M-228D-173-74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	**	"	"	"	"	**	**
M-160D-246-86	"	"	"	"	"	"	327⅛"	333¼"	451¼"	"	241½"	651¼"	54"	"	"	26"	"	8'-113¼"	"	32"	6'-03⅜"	**	"	"	383¼"	**	**
M-160D-200-86	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	**	"	**	"	"	**	**
M-160D-246-74	"	"	"	"	"	"	"	"	585⅛"	"	"	651½"	"	"	"	"	"	"	"	"	**	"	"	"	**	**
M-160D-200-74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	**	"	"	"	"	**	**
M-160D-173-74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	**	"	"	"	"	**	**
M-114D-143-86	13'-6"	15'-9"	12'-31½"	"	13'-03¼"	18'-61¼"	293⅛"	30"	143⅛"	62"	201⅛"	531½"	423¼"	12"	36"	24"	8'-01½"	"	25"	673⅛"	**	50"	16"	313⅛"	**	**
M-114D-200-74	15'-6"	18'-6"	15'-83⅛"	"	15'-6½"	21'-0"	"	30¾"	505⅛"	865⅛"	28"	651½"	54"	16"	39"	"	9'-13¼"	"	"	69"	**	6'-3"	113⅛"	431¼"	**	**
M-114D-173-74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	**	"	**	"	"	**	**
M-114D-143-74	13'-6"	15'-9"	12'-31½"	"	13'-03¼"	18'-61¼"	"	30"	257⅛"	62"	201⅛"	53"	423¼"	12"	36"	"	8'-01½"	"	"	673⅛"	**	50"	16"	313⅛"	**	**
M-114D-169-64	"	"	"	"	"	"	"	"	21"	"	"	673⅛"	"	"	"	"	"	"	"	"	**	"	**	"	"	**	**
M-114D-143-64	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	**	"	**	"	"	**	**
M-80D-143-74	13'-6"	15'-9"	12'-31½"	"	13'-03¼"	18'-61¼"	"	30"	257⅛"	62"	201⅛"	53"	423¼"	12"	36"	"	8'-01½"	"	"	673⅛"	**	50"	16"	313⅛"	**	**

* On 100", 120", 144", and 168" Stroke Units, Multi-Cylinder Engines are Mounted on Main Lease Beams Forward of Samson Post. See Dimensions UU, VV, and AA.
** On 64", 74", 86", and 192" Stroke Units, Multi-Cylinder Engines are Mounted Behind the Samson Post. See Dimensions U, V, and AB.

NOTE: Do not use above dimensions for foundation. Request foundation plan.

MARK II COUNTERBALANCE DATA

Effective Counterbalance At Polished Rod With Weights At Maximum Position, **Including Structural Unbalance.** See Example Below.

UNIT	M-1280D-427-192 M-912D-305-192 M-640D-305-192 M-456D-305-192	M-912D-356-168	M-912D-305-168 M-640D-305-168 M-456D-305-168	M-912D-356-144 M-640D-356-144 M-456D-356-144	M-912D-304-144 M-640D-304-144 M-456D-304-144	M-320D-304-144	M-640D-253-144 M-456D-253-144	M-320D-253-144
STROKE	192"	168"	168"	144"	144"	144"	144"	144"
STRUCTURAL UNBALANCE	—7,160 Lbs.	—5,385 Lbs.	—4,860 Lbs.	—4,680 Lbs.	—4,300 Lbs.	—4,300 Lbs.	—4,010 Lbs.	—4,010 Lbs.
CRANKS	192130 M	168108 M	168108 M	144108 M	144108 M	144108 M	144108 M	144108M
C'Bal., Cranks Only	—3,215	—3,120	—2,595	—1,170	—785	—785	—495	—495
4 No. OORO Counterweights	13,570	11,690	12,215	16,560	16,945	16,945	17,235	17,235
4 No. OOS Aux. Weights	18,635	16,170	16,695	21,920	22,305	22,305	22,595	22,595
4 No. OOD Aux. Weights	23,700	20,650	21,175	27,270	27,655			
4 No. ORO Counterweights	11,430	9,805	10,330	14,300	14,685	14,685	14,975	14,975
4 No. OL Aux. Weights	13,585	11,780	12,305	16,665	17,050	17,050	17,340	17,340
4 No. OS Aux. Weights	16,200	14,110	14,635	19,445	19,830	19,830	20,120	20,120
4 No. OD Aux. Weights	21,155	18,415	18,940	24,590	24,975		25,265	
4 No. OARO Counterweights	9,025	7,840	8,365	11,950	12,335	12,335	12,625	12,625
4 No. OL Aux. Weights	11,180	9,815	10,340	14,315	14,700	14,700	14,990	14,990
4 No. OAS Aux. Weights	12,815	11,240	11,765	16,020	16,405	16,405	16,695	16,695
4 No. OAD Aux. Weights	16,665	14,640	15,165	20,070	20,455		20,745	
4 No. 1RO Counterweights	6,280	5,425	5,950	9,060	9,445	9,445	9,735	9,735
4 No. 2L Aux. Weights	7,675	6,710	7,235	10,600	10,985	10,985	11,275	11,275
4 No. 1S Aux. Weights	9,205	8,050	8,575	12,120	12,505	12,505	12,795	12,795
4 No. 1D Aux. Weights	12,125	10,670	11,195	15,350	15,735		16,025	
4 No. 2RO Counterweights	4,755	4,070	4,595	7,440	7,825	7,825	8,115	8,115
4 No. 2L Aux. Weights	6,150	5,355	5,880	8,980	9,365	9,365	9,655	9,655
4 No. 2S Aux. Weights	7,610	6,655	7,180	10,530	10,915	10,915	11,205	11,205
4 No. 2D Aux. Weights	10,465	9,235	9,760	13,605	13,990		14,280	
4 No. 3CRO Counterweights	3,155	2,680	3,205	5,770	6,155	6,155	6,445	6,445
4 No. 2L Aux. Weights	4,540	3,960	4,485	7,300	7,685	7,685	7,975	7,975
4 No. 3BS Aux. Weights	5,900	5,180	5,705	8,760	9,145	9,145	9,435	9,435
4 No. 3D Aux. Weights	8,095	7,175	7,700	11,150	11,535		11,825	
4 No. 5ARO Counterweights				3,875	4,260	4,260	4,550	4,550
4 No. 5L Aux. Weights				4,750	5,135	5,135	5,425	5,425
4 No. 5A Aux. Weights				5,915	6,300	6,300	6,590	6,590
4 No. 5AD Aux. Weights				7,550	7,935		8,225	
4 No. 5CRO Counterweights					2,925	2,925	3,215	3,215
4 No. 5L Aux. Weights					3,800	3,800	4,090	4,090
4 No. 5C Aux. Weights					4,755	4,755	5,045	5,045
4 No. 5CD Aux. Weights					6,590		6,875	
For Crank Weights Add to The Above	5,335	2,400	2,400	2,250	2,250	2,250	2,250	2,250
For Semi-Automatic Counterbalance Add to the Above	3,965	2,400	2,400	2,880	2,880	1,770	2,880	1,770

UNIT	M-320D-298-100	M-320D-256-100	M-228D-256-100	M-228D-246-86	M-160D-246-86	M-228D-200-86	M-160D-200-86	M-114D-143-86
STROKE	100"	100"	100"	86"	86"	86"	86"	86"
STRUCTURAL UNBALANCE	—3,700 Lbs.	—3,470 Lbs.	—3,285 Lbs.	—2,140 Lbs.	—2,070 Lbs.	—2,040 Lbs.	—1,970 Lbs.	—1,535 Lbs.
CRANKS	100108 M	100108 M	100108 M	8686 M	8686 M	8686 M	8686 M	8662 M
C'Bal., Cranks Only	2,320	2,550	2,740	1,540	1,610	1,640	1,710	275
4 No. OARO Counterweights	20,710	20,970	21,160					
4 No. 1RO Counterweights	16,610	16,870	17,060	14,260	14,330	14,360	14,420	.....
4 No. 2L Aux. Weights	18,800	19,030	19,220	16,255	16,325	16,355	16,415	.....
4 No. 1S Aux. Weights	21,050	21,280	21,470	18,170	18,240	18,270	18,330	.....
4 No. 2RO Counterweights	14,420	14,650	14,840	12,360	12,430	12,460	12,530	6,715
4 No. 2L Aux. Weights	16,580	16,810	17,000	14,355	14,425	14,455	14,525	8,010
4 No. 2S Aux. Weights	18,760	18,990	19,180	16,230	16,300	16,330	16,400	9,020
4 No. 2D Aux. Weights								11,330
4 No. 3CRO Counterweights	12,065	12,295	12,485	10,350	10,420	10,450	10,520	5,685
4 No. 2L Aux. Weights	14,215	14,445	14,635	12,335	12,405	12,435	12,505	6,965
4 No. 3BS Aux. Weights	16,265	16,495	16,685	14,150	14,220	14,250	14,320	8,015
4 No. 3D Aux. Weights								9,885
4 No. 5ARO Counterweights	9,405	9,635	9,825	8,080	8,150	8,180	8,250	4,475
4 No. 5L Aux. Weights	10,635	10,865	11,055	9,230	9,300	9,330	9,400	5,245
4 No. 5A Aux. Weights	12,265	12,495	12,690	10,720	10,790	10,820	10,890	6,180
4 No. 5AD Aux. Weights								7,550
4 No. 5CRO Counterweights	7,530	7,760	7,950	6,360	6,430	6,460	6,530	3,400
4 No. 5L Aux. Weights	8,760	8,990	9,175	7,505	7,575	7,605	7,675	4,165
4 No. 5C Aux. Weights	10,110	10,340	10,520	8,750	8,820	8,850	8,920	4,945
4 No. 5CD Aux. Weights								6,495
4 No. 6RO Counterweights				5,285	5,355	5,385	5,455	3,740
4 No. 6L Aux. Weights				5,995	6,065	6,095	6,165	4,205
4 No. 6 Aux. Weights				6,705	6,775	6,805	6,875	4,670
For Crank Weights Add to The Above	3,150	3,150	3,150	2,870	2,870	2,870	2,870	1,535
For Semi-Automatic Counterbalance Add to the Above	2,485	2,485	2,485	2,280	2,280	2,280	2,280	1,580

EXAMPLE:
An M-320D-304-144 with 4 No. ORO Counterweights and 4 No. OS Auxiliary Weights would have a maximum counterbalance effect of 19,830 lbs in the 144" stroke. (See other examples, pages 3130 and 3131.)
*Structural Unbalance with a negative (—) sign indicates a walking beam assembly that is heavy on the well end.

MARK II COUNTERBALANCE DATA

Effective Counterbalance At Polished Rod With Weights At Maximum Position, **Including Structural Unbalance.** See Example Page 3140

UNIT	M-640D-365-120 M-456D-365-120	M-640D-304-120 M-456D-304-120	M-320D-304-120	M-640D-256-120 M-456D-256-120	M-320D-256-120	M-228D-256-120	M-320D-213-120	M-228D-213-120
STROKE	120"	120"	120"	120"	120"	120"	120"	120"
STRUCTURAL UNBALANCE	—4,510 Lbs.	—4,130 Lbs.	—4,130 Lbs.	—3,840 Lbs.	—3,620 Lbs.	—3,435 Lbs.	—3,560 Lbs.	—3,235 Lbs.
CRANKS	120108 M	120108 M	120108 M	120108 M	120108 M	120108 M	120108 M	120108 M
C'Bal., Cranks Only	205	605	605	895	1,115	1,300	1,175	1,500
4 No. 00RO Counterweights	21,505	21,905	21,905	22,195	22,415	22 600		
4 No. 00S Aux. Weights	27,945							
4 No. 00D Aux. Weights	34,375							
4 No. 0RO Counterweights	18,775	19,175	19,175	19,465	19,685	19,870	19,745	20,070
4 No. 0L Aux. Weights	21,605	22,005	22,005	22,295	22,515	22,700		
4 No. 0S Aux. Weights	24,955	25,355	25,355					
4 No. 0D Aux. Weights	31,140							
4 No. 0ARO Counterweights	15,955	16,355	16,355	16,645	16,865	17,050	16,925	17,250
4 No. 0L Aux. Weights	18,785	19,185	19,185	19,475	19,695	19,880		20,080
4 No. 0AS Aux. Weights	20,835	21,235	21,235	21,525	21,745	21,930		
4 No. 0AD Aux. Weights	25,720	26,120						
4 No. 1RO Counterweights	12,455	12,855	12,855	13,145	13,365	13,550	13,425	13,750
4 No. 2L Aux. Weights	14,300	14,700	14,700	14,990	15,210	15,395	15,270	15,595
4 No. 1S Aux. Weights	16,220	16,620	16,620	16,910	17,130	17,315	17,290	17,515
4 No. 1D Aux. Weights	19,990	20,390		20,680				
4 No. 2RO Counterweights	10,515	10,915	10,915	11,205	11,425	11,610	11,485	11,810
4 No. 2L Aux. Weights	12,360	12,760	12,760	13,050	13,270	13,455	13,330	13,655
4 No. 2S Aux. Weights	14,225	14,625	14,625	14,915	15,135	15,320	15,195	15,520
4 No. 2D Aux. Weights	17,945	18,335		18,625				
4 No. 3CRO Counterweights	8,525	8,925	8,925	9 215	9,435	9,620	9,495	9,820
4 No. 2L Aux. Weights	10,370	10,770	10,770	11,060	11,280	11,465	11,340	11,665
4 No. 3BS Aux. Weights	12,115	12,515	12,515	12,805	13,025	13,210	13,085	13,410
4 No. 3D Aux. Weights	14,980	15,380		15,670				
4 No. 5ARO Counterweights	6,265	6,665	6,665	6,955	7,175	7,360	7,235	7,560
4 No. 5L Aux. Weights	7,315	7,715	7,715	8,005	8,225	8,410	8,285	8,610
4 No. 5A Aux. Weights	8,710	9,110	9,110	9,400	9,620	9,805	9,680	10,005
4 No. 5AD Aux. Weights	10,670	11,070		11,360				
4 No. 5CRO Counterweights	4,665	5,065	5,065	5,355	5,575	5,760	5 635	5,960
4 No. 5L Aux. Weights	5,715	6,115	6,115	6,405	6,625	6,810	6,685	7,010
4 No. 5C Aux. Weights	6,865	7,265	7,265	7,555	7,775	7,960	7,835	8,160
4 No. 5CD Aux. Weights	9,065	9,465		9,755				
For Crank Wts.Add to the Above	2,690	2,690	2,690	2,690	2,690	2,690	2,690	2,690
For Semi-Automatic Counterbalance Add to the Above	3,450	3,450	2,125	3,450	2,125	2,125	2,125	2,125

UNIT	M-228D-246-74	M-160D-246-74	M-228D-200-74	M-160D-200-74	M-228D-173-74 M-160D-173-74 M-114D-200-74	M-114D-173-74	M-114D-143-74 M- 80D-143-74	M-114D-169-64 M-114D-143-64
STROKE	74"	74"	74"	74"	74"	74"	74"	64"
STRUCTURAL UNBALANCE	—2,070 Lbs.	—2,000 Lbs.	—1,960 Lbs.	1,890 Lbs.	—1,860 Lbs.	—1,820 Lbs.	—1,440 Lbs.	—1,420 Lbs.
CRANKS	7486 M	7486 M	7486 M	7486 M	7486 M	7486 M	7462 M	6462 M
C'Bal., Cranks Only	2,250	2,320	2,360	2,430	2,460	2,500	820	1,310
4 No. 1RO Counterweights	16,840	16,910	16,950	17,020	17,050			
4 No. 2L Aux. Weights	19,130	19,200	19,240					
4 No. 1S Aux. Weights	21,325	21,395	21,435					
4 No. 2RO Counterweights	14,660	14,730	14,770	14,840	14,870	14,910	8,205	9,970
4 No. 2L Aux. Weights	16,950	17,020	17,060	17,130	17,160		9,690	11,710
4 No. 2S Aux. Weights	19,100	19,170	19,210		19,310		10,850	13,070
4 No. 2D Aux. Weights							13,495	16,175
4 No. 3CRO Counterweights	12,350	12,420	12,460	12,530	12,560	12,600	7,025	8,585
4 No. 2L Aux. Weights	14,625	14,695	14,735	14 805	14,835	14,875	8,495	10,305
4 No. 3BS Aux. Weights	16,705	16,775	16,815	16,885	16,915	16,955	9,700	11,720
4 No. 3D Aux. Weights							11,840	14,230
4 No. 5ARO Counterweights	9,750	9,820	9,860	9,930	9,960	10,000	5,635	6,955
4 No. 5L Aux. Weights	11,070	11,140	11,180	11,250	11,280	11,320	6,515	7,990
4 No. 5A Aux. Weights	12,780	12,850	12,890	12,960	12,990	13,030	7,595	9,250
4 No. 5AD Aux. Weights							9,165	11,095
4 No. 5CRO Counterweights	7,780	7,850	7,890	7,950	7,990	8,030	4,405	5,510
4 No. 5L Aux. Weights	9,095	9,165	9,205	9,275	9,305	9,345	5,280	6,540
4 No. 5C Aux. Weights	10,520	10,590	10,630	10,700	10,730	10,770	6,180	7,590
4 No. 5CD Aux. Weights							7,955	9,670
4 No. 6RO Counterweights	6,545	6,615	6,655	6,725	6,755	6,795	3,650	4,625
4 No. 6L Aux. Weights	7,355	7,425	7,465	7,535	7,565	7,605	4,185	5,250
4 No. 6 Aux. Weights	8,170	8,240	8,280	8,350	8,380	8,420	4,715	5,875
4 No. 7RO Counterweights		5,110	5,150	5,220	5,250	5,290	2,655	3,460
4 No. 7L Aux. Weights		5,735	5,775	5,845	5,875	5,915	3,065	3,940
4 No. 7 Aux. Weights		6,360	6,400	6,470	6,500	6,540	3,475	4,420
For Crank Wts.Add to the Above	3,290	3,290	3,290	3,290	3,290	3,290	1,760	2,065
For Semi-Automatic Counterbalance Add to the Above	2,620	2,620	2,620	2,620	2,620	2,620	1,810	2,125

FIGURE 25

"TWO-POINT" SUSPENSION bases are available for all Lufkin Mark II Pumping Units. The "two point" base reduces concrete requirements approximately 80% by permitting the use of small salvageable precast concrete blocks in front and rear. This simple foundation assures a completely portable unit and foundation which requires a minimum of installation time.

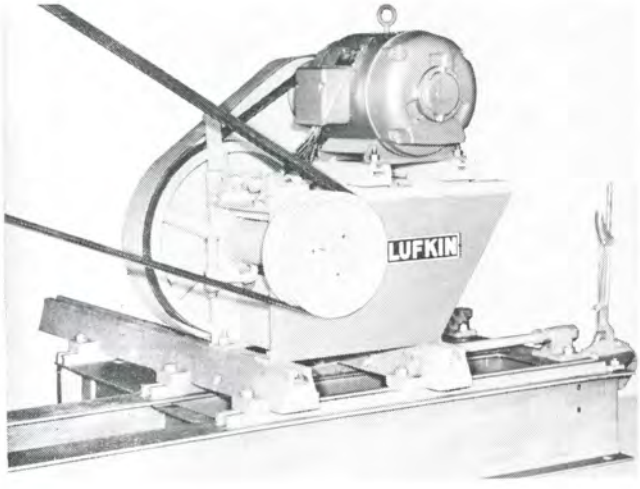


FIGURE 26

This assembly utilizes an electric motor and countershaft and provides a reduction ratio up to 4:1. This compact reduction unit package will fit on conventional slide rails and was designed for use with single reduction gear reducers where slow pumping speeds are encountered. This type assembly is manufactured in two sizes:

No. 1—25-50 HP
No. 2—up to 20 HP

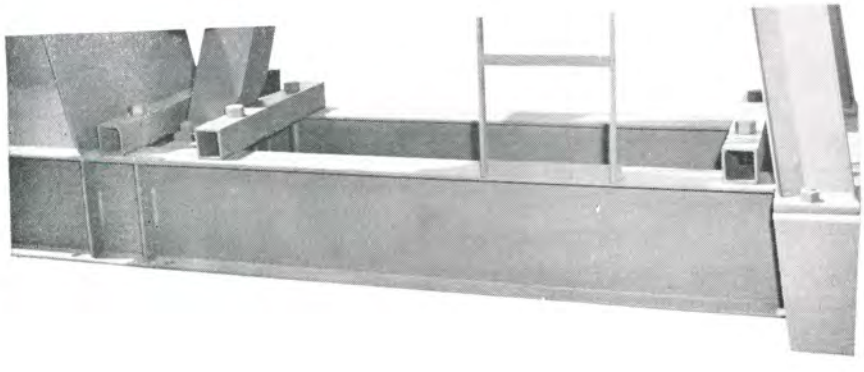


FIGURE 27

Typical top flange hold-down installation. Two bolt clamps are standard on the C-160 size and larger. One bolt clamps are standard on all smaller units. The number and location of clamps on the base is dependent on the size of the unit.

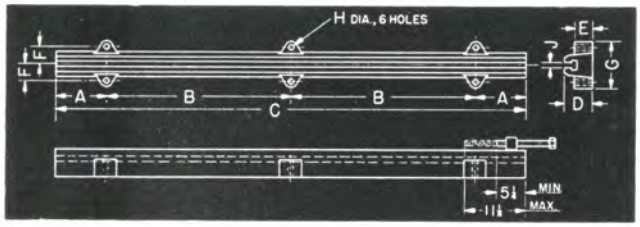


FIGURE 28

LUFKIN TYPE "A" ENGINE RAILS

Designed especially with minimum edge distance for flywheel clearance.

SIZE	A	B	C	D	E	F	G	H	J
A57 Rail...	3"	25½"	57"	4"	2½"	2⅜"	6¼"	1"	1"
A69 Rail...	3"	31½"	69"	4"	2½"	2⅜"	6¼"	1"	1"
A84 Rail...	9"	33"	84"	5"	3¼"	3⅜"	8½"	1"	1⅛"

FIGURE 29

STRUCTURAL SUB-BASE FOR HORIZONTAL ENGINES

Height to clear flywheel. Engine sits on T-slots fitted with adjusting screws. To be used when engine is mounted separately from stub-base pumping unit assembly.

FOUNDATION ANCHOR NUTS

Suspended in concrete forms before foundation is poured.

Provides flush foundation. Wide foot at base of nut insures more than adequate holding power.

Available in the following sizes:

BOLT DIA.	Length
¾"	6"
1"	10"
1¼"	12"
1½"	12"

FIGURE 30

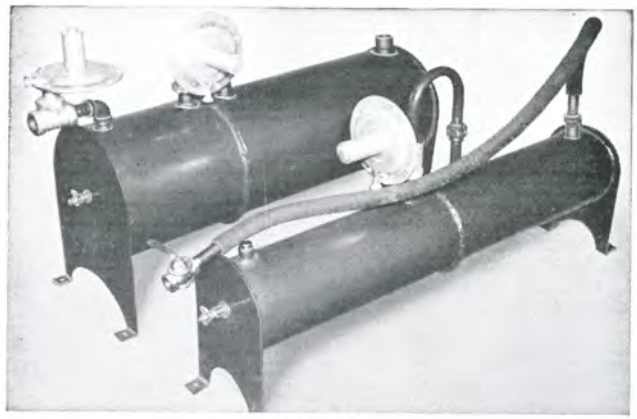


FIGURE 31

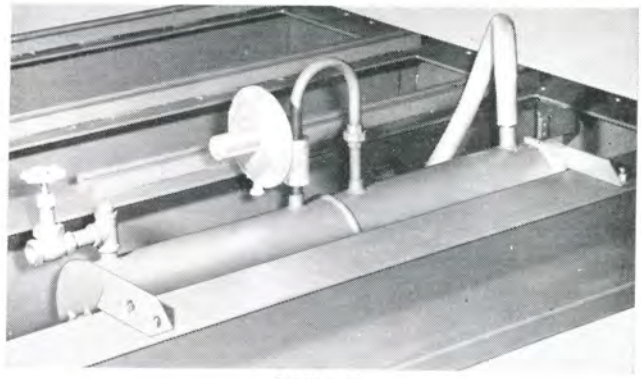


FIGURE 32

VOLUME TANK AND REGULATOR FOR GAS ENGINES

Double chamber, floor mounting, volume tanks for gas engines are furnished in two sizes. Both are equipped with regulators. The smaller size is for multi-cylinder gas engines and is 8" diameter by 48" long with partition in center. It has hose connection to engine. The larger size is recommended for Lufkin engines and is 14" diameter by 42" long with a volume chamber of 2.5 cu. ft. A high pressure regulator can be furnished at inlet if necessary.

For units having a portable base, a volume tank that bolts directly to the outrigger as is shown in Fig. 32 is recommended.

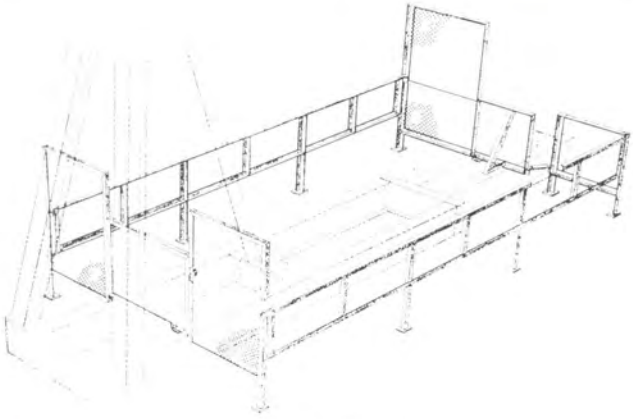


FIGURE 33

OPEN RAIL

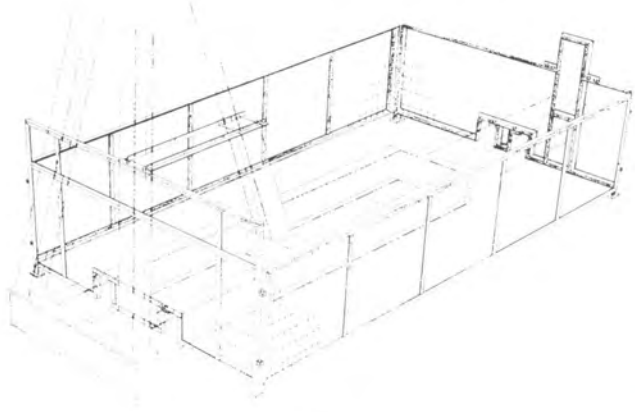


FIGURE 34

SHEEP PROOF

Open rail type and sheep proof crank guards are available from stock for all Lufkin Units. No holes required in Base or Post—clamps to top flange of Base and to Post—and can be fitted to any Lufkin unit. Sides are hinged and can be easily removed. Sheep Proof guards are 2 x 4 wire mesh with angle rails.

FIGURE 35

Two zones produced independently in one well by the use of two pumps with separate strings of tubing and rods.

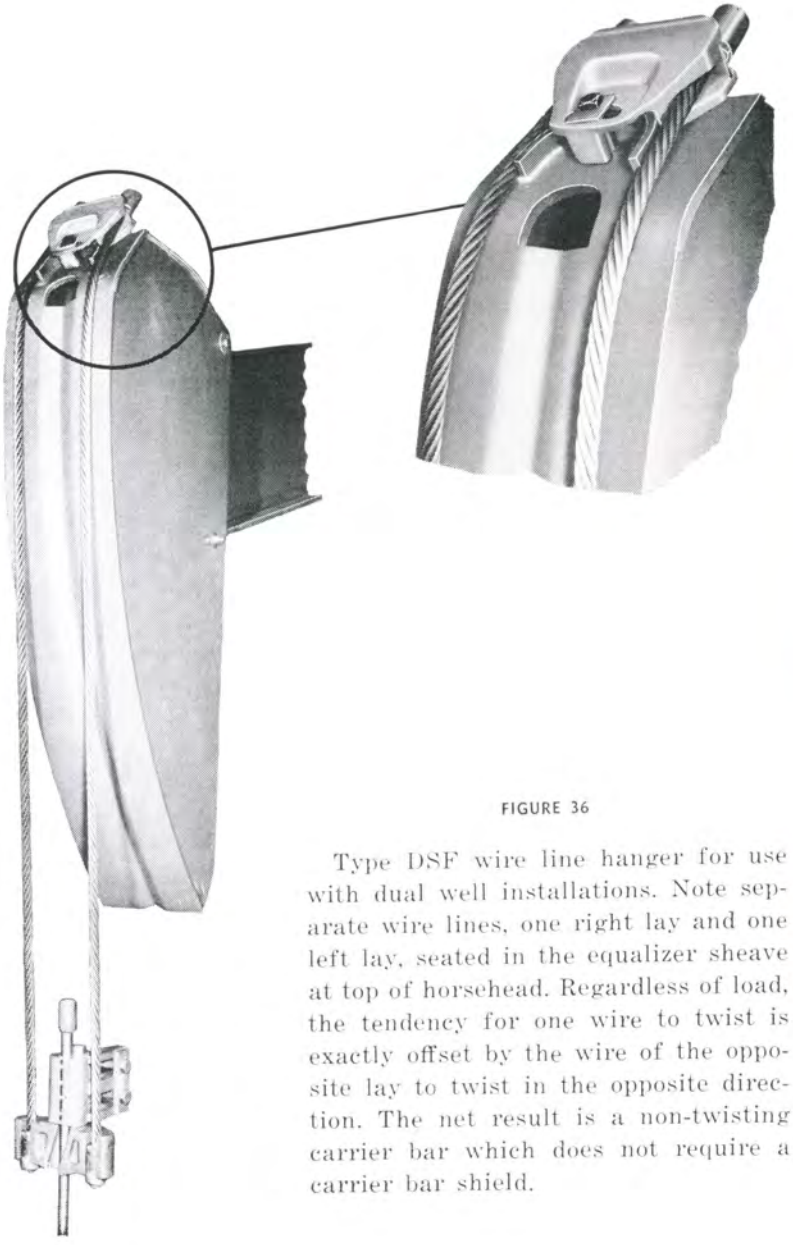


FIGURE 36

Type DSF wire line hanger for use with dual well installations. Note separate wire lines, one right lay and one left lay, seated in the equalizer sheave at top of horsehead. Regardless of load, the tendency for one wire to twist is exactly offset by the wire of the opposite lay to twist in the opposite direction. The net result is a non-twisting carrier bar which does not require a carrier bar shield.

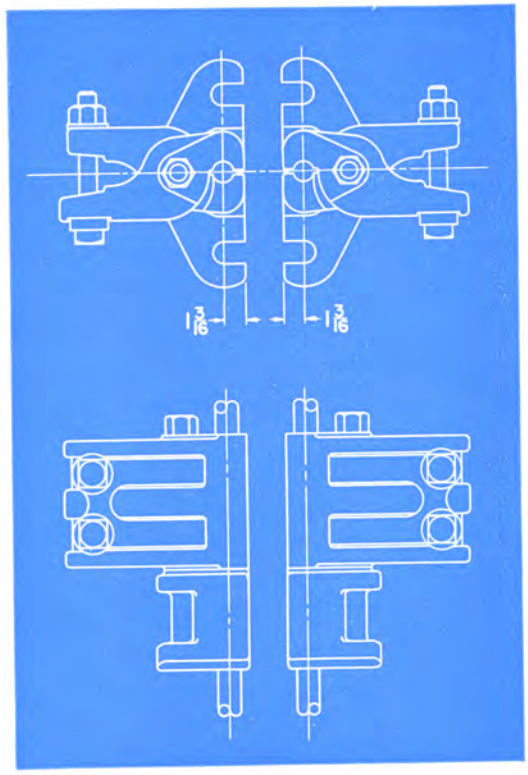


FIGURE 37

Type DSF carrier bar and polished rod clamp designed for dual-completed wells to give maximum clearance between carrier bars.

FIGURE 38

Three pumping units with three separate tubing and rod strings operating in a single casing. In this type installation the units can be operated simultaneously or selectively. These units utilize the Type SA wire line hanger assembly shown below.

FIGURE 39

Lufkin's Type SA hanger assembly utilizes a double wire line and a quick-disconnect attachment to the polished rod. A standard sucker rod coupling attaches to the top of the polished rod and rests on a recessed shoulder of the wire line connection. A lock bolt screws into the top of the coupling and tightens against the top of the wire line connection.

Well spacing can be effected by moving the bolt at the top of horsehead to a different hole. Two horsehead alignment set screws, which are fabricated into the horsehead side plates, bear against the walking beam. These set screws can be used to properly align the horsehead without removing the well load.

The Type SA hanger assembly can be used for dual, triple, or other multiple installation applications.

FIGURE 40

Shown above is a dual track horsehead used for pumping two zones with one pumping unit. It utilizes two separate wire lines and hangers operating on individual tracks. With this arrangement each zone may be pumped independently, or both zones may be pumped simultaneously.

LUFKIN AIR BALANCED PUMPING UNITS

FIGURE 41

A-320D-100-32 Air Balanced Unit, Lufkin H-795 Engine Drive.

FIGURE 42

A-320D-100-32 Air Balanced Unit, Electric Motor Drive.

FIGURE 43

A-1824D-240-47 Air Balanced Pumping Unit, Multi-Cylinder Engine Drive.

FIGURE 44

Mobile A-456D-120-36 Air Balanced Unit, Multi-Cylinder Engine Drive. This trailer-mounted unit with prime mover and diesel fuel tank built integral is ideal for test purposes.

Gear Reducer Data: See page 3134.
Structural Bearings: Roller Bearings.
Hanger: Horsehead, Wire Line.
Air Counterbalance Pressure: 450 P.S.I. (Max.)
Upper Pitman Connection: Rubber Cushioned.

ELECTRIC AUTOMATIC COUNTERBALANCE CONTROL

This control automatically adjusts air counterbalance with changing well conditions. It reduces the load on gears and prime movers.

Model 700-1E is used with units powered by electric motors.

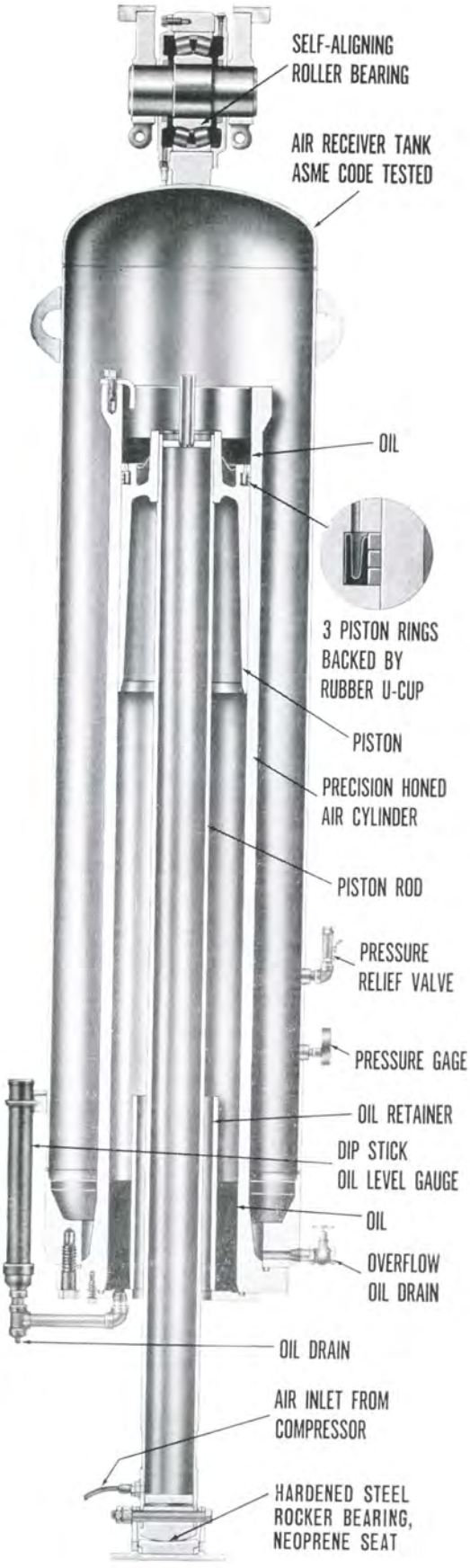


FIGURE 45

LUFKIN *AIR BALANCED* PUMPING UNITS

1. Perfect counterbalance with finger-tip control.
2. Lower installation cost.
3. Compact and portable; ideal for well testing.
4. Small size and lighter weight make it ideal for export.
5. Stroke lengths to 25 feet for high volume production from great depths.
6. Automatic counterbalance control available.

These are some of the outstanding advantages of LUFKIN AIR BALANCED PUMPING UNITS. These units employ compressed air to counterbalance the well load rather than beam weights or crank weights. The air system has been so simplified that the only continuously operating parts are the balance cylinder and piston. The reservoir capacity of the cylinder is enlarged by a steel receiver which moves with the cylinder as a unit.

On engine-driven units, when the system is in need of air, an automatic regulator engages an air operated clutch (driven by one belt from the unit sheave) and replaces any lost air. The operator sets regulator, initially, at a pressure sufficient to counterbalance well load, and this pressure is maintained automatically. Should the load change appreciably, a slight adjustment of this regulator will restore perfect counterbalance.

A safety shut-off switch is available, which will ground out engine, or shut off motor, if pressure should exceed a pre-set figure or fall below a minimum pre-set figure.

For units pumping with electricity, a separate motor-driven compressor assembly is standard equipment.

Since the Lufkin Air Balanced Units are approximately 35% shorter and 40% lighter than crank-type units, they are ideal for use as portable or test units, and for installation on piling or superstructures. Since changing counterbalance effect is a matter of adjusting a valve, the air balanced unit is ideal for use in testing wells.

All the ruggedness and simplicity of the conventional Lufkin Pumping Units are incorporated in the design of the Lufkin Air Balanced Pumping Unit.

GENERAL DIMENSIONS—Lufkin Air Balanced Pumping Units

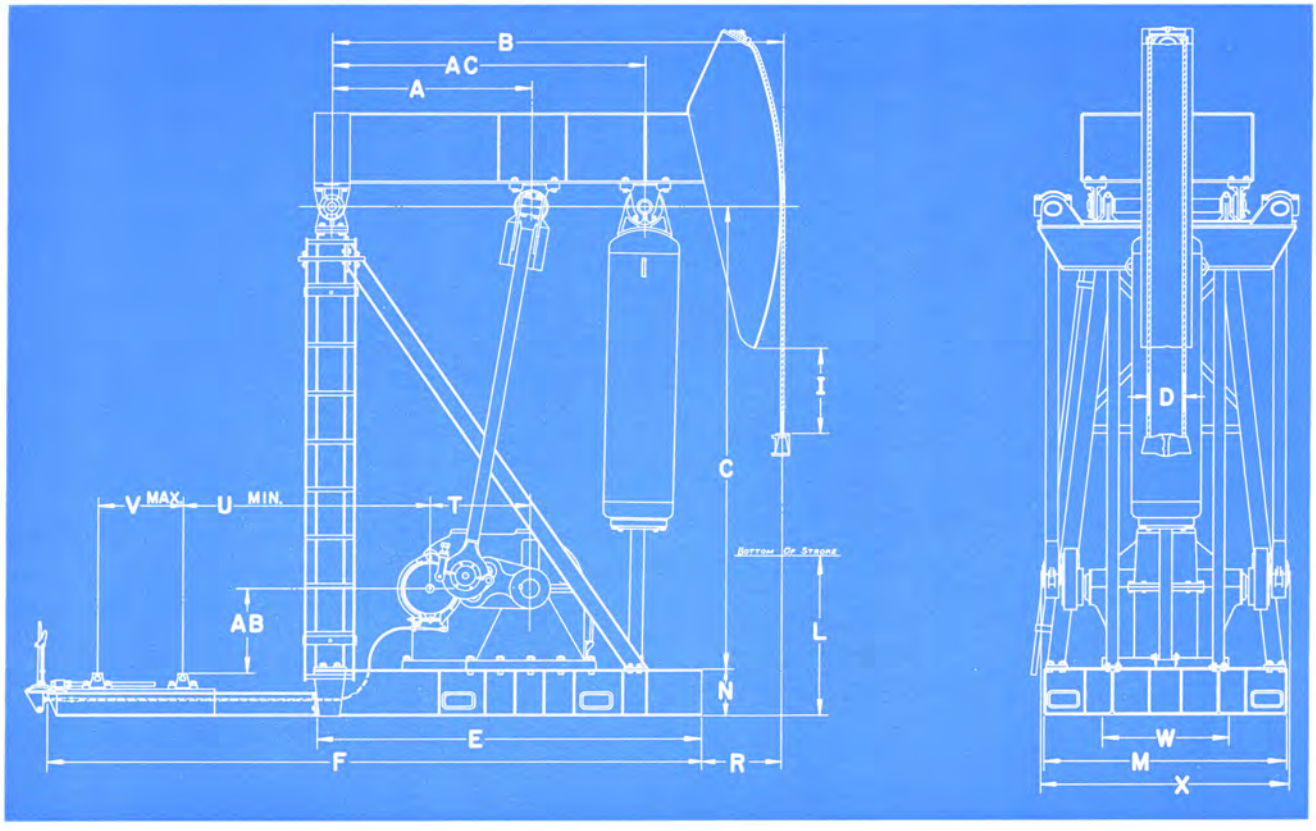


FIGURE 46

UNIT	A	B	C	D	E	F	I	L	M	N	R	T	U	V	W	X	AB	AC
A-3648D-300-55	13′-5″	31′-6″	30′-0″	16″	*	35′-6″	19½″	54″	9′-8″	24″	48″	80″	9′-1½″	44¾″	70¼″	11′-4½″	42″	20′-2″
A-3648D-240-55	11′-2½″	28′-0″	25′-3½″	16″	*	32′-0″	16½″	56″	9′-6″	21″	48″	80″	6′-11½″	44¾″	70¼″	11′-4½″	42″	19′-5½″
A-2560D-300-47	13′-5″	31′-6″	30′-0″	16″	*	35′-6″	19½″	54″	9′-8″	24″	48″	70″	9′-11½″	44¾″	66¼″	11′-0½″	42″	20′-2″
A-2560D-240-47	11′-2½″	28′-0″	25′-3½″	16″	*	32′-0″	16½″	56″	8′-10″	21″	48″	70″	7′-9½″	44¾″	66¼″	10′-10½″	36″	19′-5½″
A-1824D-300-47	13′-5″	31′-6″	30′-0″	16″	*	35′-6″	19½″	54″	9′-8″	24″	48″	58⅞″	10′-10⅝″	44¾″	50¼″	9′-9½″	42″	20′-2″
A-1824D-240-47	11′-2½″	28′-0″	25′-3½″	16″	*	32′-0″	16½″	56″	8′-0″	21″	48″	58⅞″	8′-8⅝″	44¾″	50¼″	9′-5⅛″	30″	19′-5½″
A-1824D-216-41	10′-1½″	25′-8″	21′-0″	″	22′-0⅝″	29′-9⅞″	18¾″	27¼″	7′-11½″	″	″	″	8′-1″	41″	″	″	34⅞″	14′-3½″
A-1824D-192-42	″	23′-0″	″	″	19′-4⅝″	27′-1⅞″	16½″	53″	″	″	″	″	″	″	″	″	″	″
A-1280D-300-47	13′-5″	31′-6″	30′-0″	16″	*	35′-6″	19½″	54″	9′-8″	24″	48″	52½″	11′-5″	44¾″	50¼″	9′-3½″	42″	20′-2″
A-1280D-240-47	11′-2½″	28′-0″	25′-3½″	″	*	32′-0″	″	56″	8′-0″	″	″	52½″	9′-3″	44¾″	″	8′-11⅛″	30″	19′-5½″
A-1280D-216-41	10′-1½″	25′-8″	21′-0″	″	22′-0⅞″	29′-9⅞″	18¾″	27¼″	7′-11½″	″	″	″	8′-7⅜″	41″	″	″	34⅞″	14′-3½″
A-1280D-192-42	″	23′-0″	″	″	19′-4⅝″	27′-1⅞″	16½″	53″	″	″	″	″	″	″	″	″	″	″
A-1280D-427-144	7′-4″	16′-8″	17′-10″	″	12′-3½″	19′-5½″	19½″	55″	″	16⅛″	59″	″	6′-0″	″	″	″	38⅛″	10′-11½″
A-912D-240-47	11′-2½″	28′-0″	25′-3½″	16″	*	32′-0″	16½″	56″	8′-10″	21″	48″	48½″	9′-7″	44¾″	50″	8′-4⅛″	24″	19′-5½″
A-912D-216-41	10′-1½″	25′-8″	21′-0″	″	22′-0⅞″	29′-9⅞″	18¾″	27¼″	″	21″	48″	48½″	9′-2″	″	50″	8′-4⅛″	28⅞″	14′-3½″
A-912D-192-42	″	23′-0″	″	″	19′-4⅝″	27′-1⅞″	16½″	53″	″	″	″	″	″	″	″	″	″	″
A-912D-168-33.5	7′-4″	19′-3″	17′-10″	″	14′-10½″	22′-0½″	17½″	36½″	″	16⅛″	59″	″	6′-4″	″	″	8′-1⅝″	32⅛″	10′-11½″
A-912D-144-40	7′-4″	16′-8″	″	″	12′-3½″	19′-5½″	19½″	55″	″	″	″	″	″	″	″	″	″	″
A-640D-168-33.5	″	19′-3″	″	″	14′-10½″	22′-0½″	17½″	36½″	″	″	″	41½″	7′-0″	″	46¾″	″	30⅛″	″
A-640D-144-40	″	16′-8″	″	″	12′-3½″	19′-5½″	19½″	55″	″	″	″	″	″	″	″	″	″	″
A-640D-144-31	6′-5″	17′-4″	15′-7″	12″	12′-11¼″	20′-1¼″	14″	35½″	7′-6″	″	57″	″	7′-1⅛″	″	″	″	″	9′-10″
A-640D-120-36	″	14′-7″	″	″	10′-11¾″	18′-1¾″	″	57½″	″	″	47½″	″	″	″	″	″	″	″
A-456D-144-34.2	″	17′-4″	″	″	12′-11¼″	20′-1¼″	″	35½″	″	″	″	38⅜″	6′-2″	″	″	″	″	″
A-456D-120-36	″	14′-7″	″	″	10′-11¾″	18′-1¾″	″	57½″	″	″	57″	″	″	″	″	″	″	″
A-320D-120-30.2	70″	15′-4″	13′-4″	″	11′-3¼″	18′-11¼″	14½″	30″	7′-1½″	″	53″	34″	6′-6″	″	43¼″	7′-2⅞″	″	8′-11″
A-320D-100-32	″	12′-11″	″	″	10′-0¼″	17′-8¼″	13½″	51½″	″	″	39″	″	″	″	″	″	″	″
A-228D-86-28	56″	10′-11″	12′-5″	″	8′-3¼″	15′-0¼″	15½″	52½″	6′-1½″	″	36″	30″	4′-7″	50″	37¼″	6′-5⅞″	29⅛″	7′-3½″
A-228D-74-28	″	″	″	″	″	″	″	58½″	″	″	″	″	″	″	″	″	″	″
A-160D-74-25	50″	10′-0″	11′-9″	″	7′-11″	14′-6¾″	″	51″	″	9¾″	35½″	26″	5′-7″	43½″	32″	6′-6⅞″	22″	6′-5½″
A-160D-64-25	″	″	″	″	″	″	″	56″	″	″	″	″	″	″	″	″	″	″
A-114D-64-19	48″	9′-7″	11′-0″	9″	7′-5½″	14′-5¾″	15″	55½″	6′-3¾″	″	36″	24″	6′-4″	42″	25¼″	6′-3⅞″	12¾″	6′-0½″

* Portable Base is Standard. One Piece and Portable Bases Available On All Units.

NOTE: Do not use above dimensions for foundation. Request foundation plan.

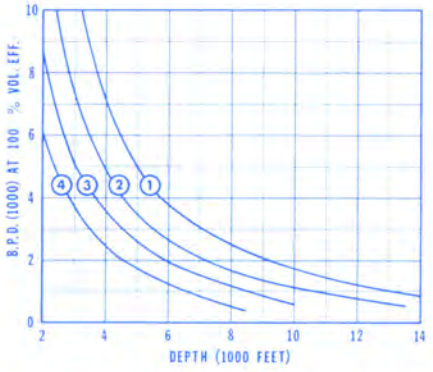
RATING CHART

UNIT	Peak Torque Rating, Inch Lbs.	Stroke, Inches	Polish Rod Load Class, Lbs.	Piston Dia., Inches	Effective Counter-Balance, Lbs.	Walking Beam Size	Pitman Side Member Size, Ex.-Hvy. Pipe	Wireline Hangers	*Standard Sheave Sizes P.D. Inches	Gear Ratio	Weight, Lbs.
A-3648D-300-55	3,648,000	300-240	55,000	17	37,000	36 x 16½ @ 300#	10	Double 1¼"	80" (18D)	28.99	109,000
A-3648D-240-55	"	240-200	55,000	14½	34,000	36 x 16½ @ 280#	8	"	"	"	99,000
A-2560D-300-47	2,560,000	300-240	47,000	17	37,000	36 x 16½ @ 245#	10	"	68" (16D)	29.57	95,000
A-2560D-240-47	"	240-200	47,000	14½	34,000	"	8	1⅜" x 52'-0"	"	"	85,000
A-1824D-300-47	1,824,000	300-240	47,000	17	37,000	"	10	Double 1¼"	40, 46, 51, 55, 68(11D)	28.33	81,300
A-1824D-240-47	"	240-200	47,000	14½	34,000	"	8	1⅜" x 52'-0"	"	"	71,332
A-1824D-216-41	"	216-190-162	41,000	"	24,830	33 x 15¾ @ 200#	"	1⅜" x 48'-10"	"	"	63,667
A-1824D-192-42	"	192-168-144	42,000	"	30,635	"	"	1⅜" x 44'-4"	"	"	60,850
A-1280D-300-47	1,280,000	300-240	47,000	17	37,000	36 x 16½ @ 245#	10	Double 1¼"	40, 46, 51, 55, 68(10D)	28.05	78,300
A-1280D-240-47	"	240-200	47,000	"	34,000	"	"	1⅜" x 52'-0"	"	"	68,339
A-1280D-216-41	"	216-190-162	41,000	"	24,830	33 x 15¾ @ 200#	"	1⅜" x 48'-10"	"	"	61,117
A-1280D-192-42	"	192-168-144	42,000	"	30,635	"	"	1⅜" x 44'-4"	"	"	58,300
A-1280D-144-40	"	144-120-100	42,700	13	27,935	27 x 14 @ 160#	6	1⅜" x 37'-4"	"	"	44,800
A-912D-240-47	912,000	240-200	47,000	14½	34,000	36 x 16½ @ 245#	8	1⅜" x 52'-0"	28, 34, 40, 46, 51(7D)	28.72	60,000
A-912D-216-41	"	216-190-162	41,000	14½	24,830	33 x 15¾ @ 200#	8	1⅜" x 48'-10"	"	"	52,817
A-912D-192-42	"	192-168-144	42,000	"	30,635	"	"	1⅜" x 44'-4"	"	"	50,000
A-912D-168-33.5	"	168-141-118	33,500	13	22,450	24 x 14 @ 145#	6	1⅜" x 39'-10"	"	"	38,978
A-912D-144-40	"	144-120-100	42,700	"	27,935	27 x 14 @ 160#	"	1⅜" x 37'-4"	"	"	37,200
A-640D-168-33.5	640,000	168-141-118	33,500	"	22,450	24 x 14 @ 145#	"	1⅜" x 39'-10"	28, 34, 40, 46, 51 (6D)	28.6	37,978
A-640D-144-40	"	144-120-100	42,700	"	27,935	27 x 14 @ 160#	"	1⅜" x 37'-4"	"	"	36,200
A-640D-144-31	"	144-120-100	31,000	12	20,200	24 x 14 @ 130#	"	1¼" x 33'-9"	"	"	32,528
A-640D-120-36	"	120-100-86	36,000	"	24,535	"	"	1¼" x 30'-0"	"	"	31,200
A-456D-144-34.2	456,000	144-120-100	34,200	"	20,200	"	"	1¼" x 33'-9"	28, 34, 40, 46, 51(6D or 8C)	29.04	31,210
A-456D-120-36	"	120-100-86	36,000	"	24,535	"	"	1¼" x 30'-0"	"	"	29,900
A-320D-120-30.2	320,000	120-104-90	30,200	11	18,400	24 x 12 @ 100#	4	1¼" x 30'-1"	25, 30, 36, 42, 47¼ (6C or 5D)	30.12	25,000
A-320D-100-32	"	100-86-74	32,000	"	21,910	"	"	1¼" x 26'-6"	"	"	24,500
A-228D-86-28	228,000	86-74-64	28,000	10	17,695	21 x 9 @ 82#	"	1¼" x 24'-6"	24¼, 30, 36, 41¼ (5C or 4D)	28.45	18,500
A-228D-74-28	"	74-64-54	28,000	"	"	"	"	"	"	"	18,300
A-160D-74-25	160,000	74-64-54	25,000	"	17,595	18 x 8¾ @ 77#	3½	1¼" x 22'-6"	24¼, 29¼, 33¼, 38 (4C or 3D)	28.67	14,600
A-160D-64-25	"	64-54	25,000	"	"	"	"	"	"	"	14,600
A-114D-64-19	114,000	64-54	19,000	8	11,000	16 x 8½ @ 64#	"	1" x 19'-0"	19¼, 24, 29¼, 33¼ (3C)	29.4	11,600

* Standard Sheave Sizes Shown are Floating Hub Sheaves for Clutch Driven Compressors; Largest Size Shown is Maximum Available. For Electric Motor Driven Compressors, Use Solid Type Reducer Sheave as Shown in Crank Balance Unit Specifications.

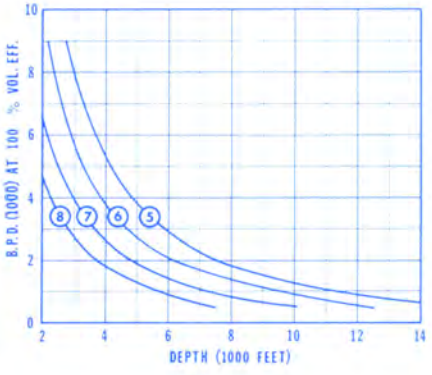
LUFKIN HI-V Series

HIGH VOLUME AIR BALANCED PUMPING UNITS



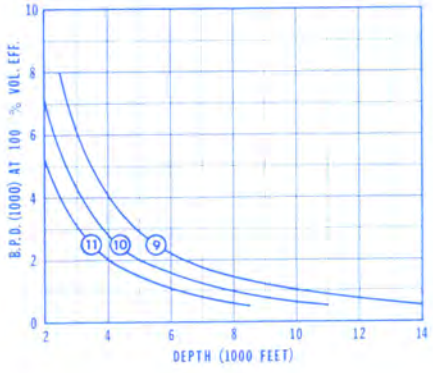
300" STROKE

1. A-3648D-300-55
2. A-2560D-300-47
3. A-1824D-300-47
4. A-1280D-300-47



240" STROKE

5. A-2560D-240-47
6. A-1824D-240-47
7. A-1280D-240-47
8. A-912D-240-47



192" STROKE

9. A-1824D-192-42
10. A-1280D-192-42
11. A-912D-192-42

The above curves show the production that can be expected from the HI-V series Air Balanced Pumping units shown below each group of curves. Consult LUFKIN for complete details of installation design.

LUFKIN HORIZONTAL, TWIN CYLINDER TWO CYCLE GAS ENGINES

Model	Speed Range	Continuous Rating
HT-333-C	350-650 RPM	20- 30 BHP
H-795	300-600 RPM	45- 65 BHP
H-795-CCW	300-600 RPM	45- 65 BHP
H-1770-B	200-475 RPM	62-130 BHP
H-2165-B	200-475 RPM	75-160 BHP

Lufkin Engines are built as heavy duty, slow speed, twin cylinder, two cycle, horizontal design, in a range of sizes from 20 to 160 continuous usable horsepower. Lufkin Engines are compact and easily mounted to all types of oilfield equipment. They are ruggedly built and provide dependable low cost power for pumping, injection pumps, pipeline pumps, gas compressors, and other oilfield pumping requirements.

The Model H-795-CCW engine is built for counterclockwise rotation, and is used with Mark II units and other counterclockwise rotation machinery.

All Lufkin Engines are thermosyphon cooled, and are furnished complete with radiator, fan, and piping. Oil cooled pistons are available on the H-795 and H-2165 engines, and are recommended for heavy duty, continuous loading.

Fuel injection, for a material savings in natural gas, is available for Models H-1770 and H-2165 engines.

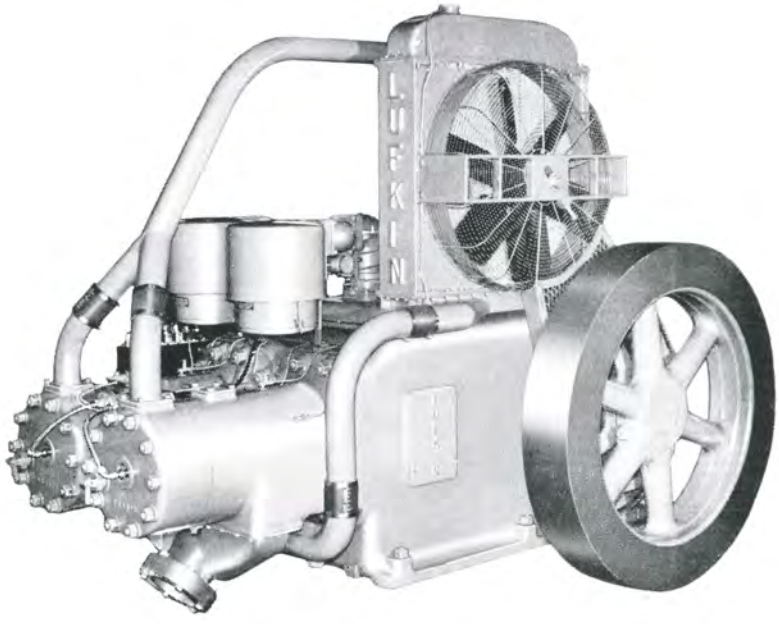


FIGURE 47

Flywheel Side of Lufkin H-1770 and H-2165 Engines

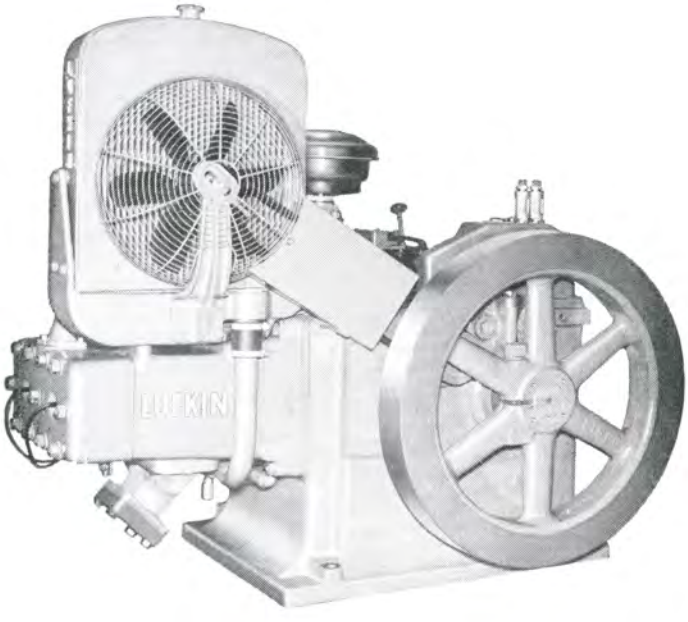


FIGURE 48

Flywheel Side Lufkin HT-333 Engine

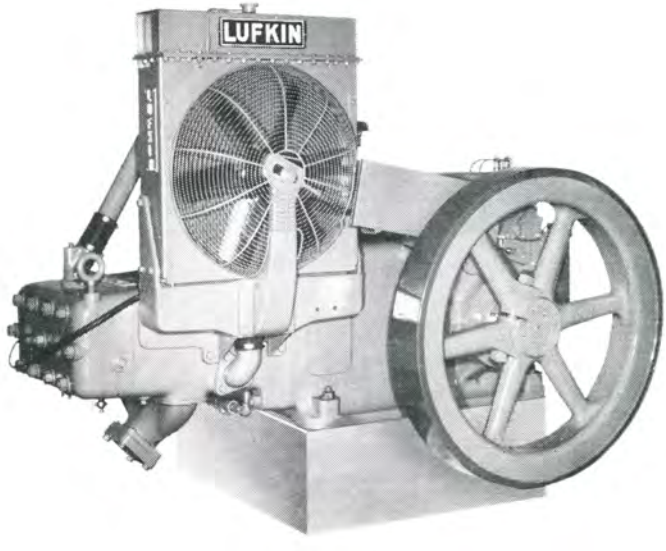


FIGURE 49

Front View—Lufkin H-795 Engine

LUFKIN ENGINE SPECIFICATIONS

MODEL	HT-333-C	H-795 H-795-CCW	H-1770-B	H-2165-B
No. Cylinders	2	2	2	2
Bore, In.	5½	7½	9½	10½
Stroke, In.	7	9	12½	12½
Displacement, Cu. In.	333	795	1770	2165
Compression Ratio	5.5	5.3	5.5	5.3
Speed Range, RPM	350–650	300–600	200–475	200–475
Dia. Flywheel, In.	35½	40	48	48
Flywheel WR², Ft.² Lbs.	1200	1580	5250	5250
Cooling System	Thermosyphon			
Capacity, Gal.	7½	14	23	25
Lubrication	Full Pressure			
Crankcase Capacity, Gal.	5	5	16	16
Cylinder Lubricator	McCord (Automatically filled by pressure system)			
Oil Filter	Cuno, By-Pass Type			
Ignition—Standard	Rotary High Tension Magneto			
Optional	Rotary Low Tension Magneto			
Gas Mixer	1½" XG Ensign	2" XG Ensign	Rotary Valve	Rotary Valve
Air Filter	Oil Bath			
Clutch, Twin Disc	SPE-111	SPE-114	SPE-214	SPE-314
Size Shaft, In.	2¼ x 6½	3 x 8½	3½ x 10	3 15/16 x 10
Keyway, In.	⅝ x 5/16	¾ x ⅜	⅜ x 7/16	1 x ½
Dia. Exhaust Pipe, In.	4	4	6	6
Dia. Gas Inlet, In.	1	1	2	2
Weight, Lbs.	3250	4500	9800	10,250
Safety Controls:	Standard			
Water and Oil	Optional	Optional	Standard	Standard
Overspeed				
Starting Systems:				
Air Starting Valve	Optional	Optional	Standard	Standard
Electric Motor	Optional			
Air-Gas Motor	Optional			
Friction Wheel	Optional			

Performance curves below are for continuous service, but must be corrected for altitude and temperature.

Lufkin Foundry & Machine Company reserves the right to make changes or add improvements at any time without notice or obligation.

THE FOLLOWING FEATURES GIVE DEPENDABLE, LONG LIFE, LOW UP-KEEP SERVICE:

TWIN CYLINDERS—for smoother flow of power

TWO CYCLE CROSSHEAD DESIGN—for low cost maintenance

FULL PRESSURE LUBRICATION—oil under pressure to all bearings

OIL FILTER—assure clean oil

BRONZE CROSSHEAD SHOES and Pin Bushings—for less wear and longer life

SADDLE MOUNTED CROSSHEAD PIN—for more bearing surface

PRECISION CONNECTING ROD BEARINGS—longer life and easy replacement

PRESSURE FILLED CYLINDER LUBRICATOR

BUILT-IN SAFETY SWITCHES

HEAVY DUTY CLUTCH

OIL COOLED PISTONS (Optional on Models H-795 and H-2165)—for extreme heavy duty service

STANDARD EQUIPMENT

Lufkin Engines are furnished as a complete power unit with full pressure lubrication, oil filter, automatically filled cylinder lubricator, rotary magneto, centrifugal governor, oil bath air filter, Ensign natural gas mixer, thermosyphon cooling system with radiator, fan, belts and guards. Twin Disc extended service heavy duty clutch and built-in water temperature and oil pressure safety switches.

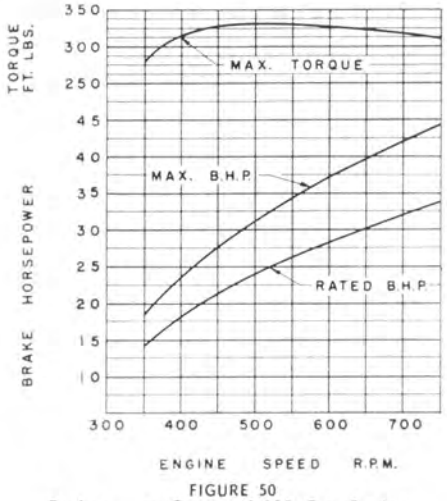


FIGURE 50
Performance Curves H-333 Gas Engine

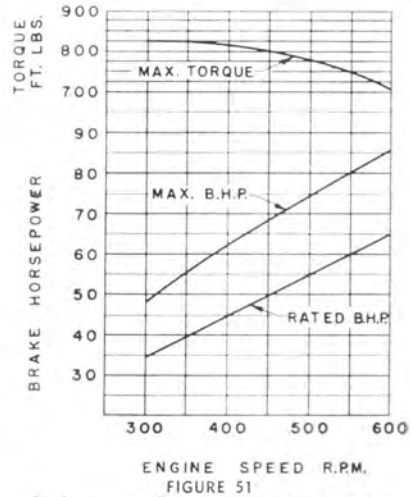


FIGURE 51
Performance Curves H-795 Gas Engine

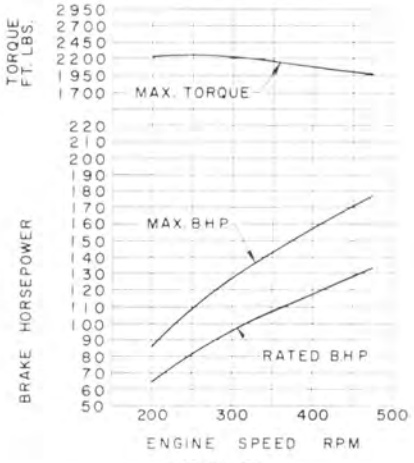


FIGURE 52
Performance Curves H-1770 Gas Engine

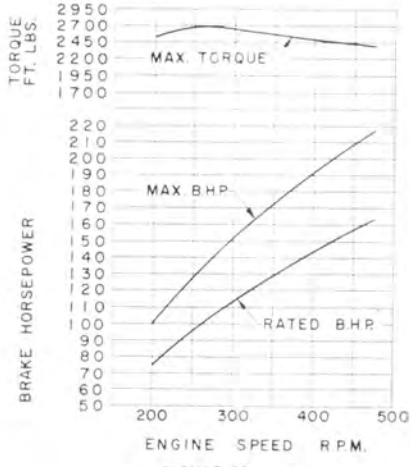
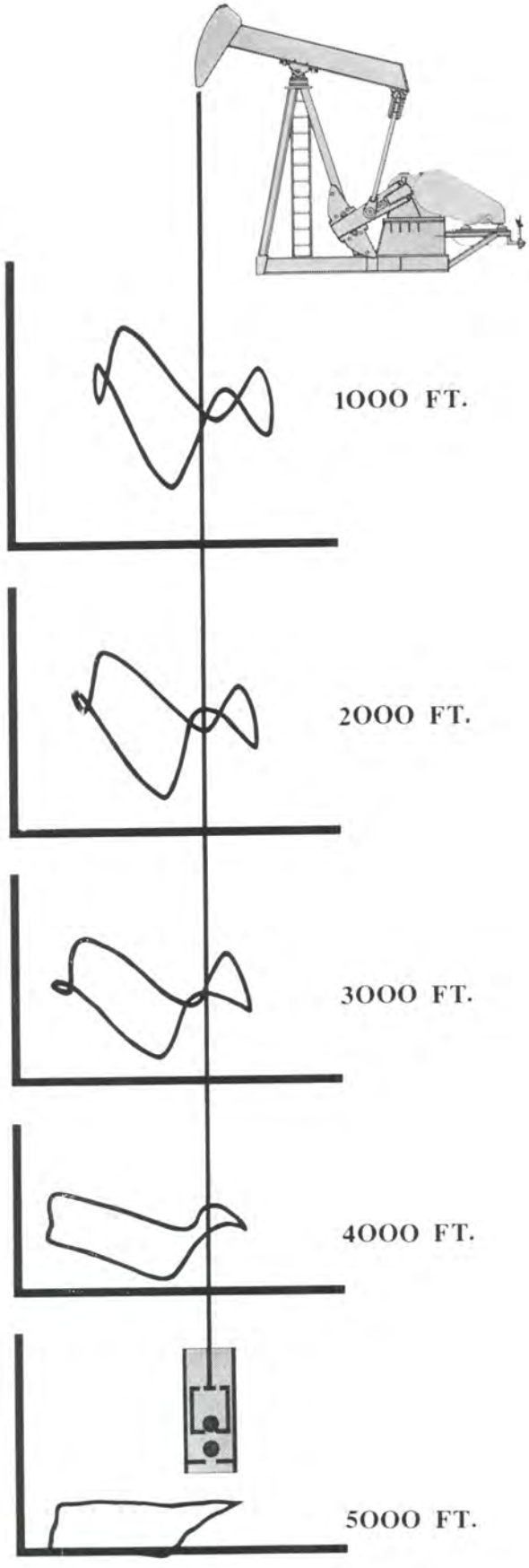


FIGURE 53
Performance Curves H-2165 Gas Engine



LUFKIN TECHNICAL SERVICES

1138 Lincoln Tower Bldg. Denver, Colorado

Telephone 303-222-9580

A DIVISION OF LUFKIN FOUNDRY & MACHINE COMPANY

SUCKER ROD PUMPING ANALYSIS

SPA is a computerized analytical technique which is used as a production engineering tool for analyzing the complex behavior of sucker rod pumping installations. SPA furnishes QUANTITATIVE information concerning the performance of the sucker rod system: from the pump, through the rod string, to the surface equipment.

The SPA technique is based on a mathematical model of the sucker rod pumping system. The technique, using load and displacement data measured at the polished rod, develops load-displacement values for desired points along the rod string and at the pump, through the use of the mathematical model, which essentially unscrambles or filters out the dynamic, harmonic and friction forces inherent in the rod string. From the computer output (load-displacement dynagraphs at the pump, junction points, and at the polished rod) quantitative deductions may be made regarding (1) the **mechanical** condition of the system, and (2) the **physical properties** of the well itself.

The SPA technique affords a complete evaluation of downhole pumping conditions with several significant advantages over a mechanical dynamometer:

	MECH. DYNAM.	SPA
Surface Loads & Stresses	Yes	Yes
Torsional Analysis	Yes	Yes
Fluid Pound	Possible	Yes
Gas Interference	Possible	Yes
Pump Leakage	Possible	Yes
Pump Dynagraph	No	Yes
Maximum Plunger Stroke	No	Yes
Effective Plunger Stroke	No	Yes
Pump Displacement	No	Yes
Pump Efficiency	No	Yes
Pump Intake Pressure	No	Yes
Loads & Stresses—Tapered Rod String	No	Yes
Tubing Movement	No	Yes
Tubing Anchor Malfunction	No	Yes
Packer Malfunction	No	Yes

While the "Possibles" depend on the skill and experience of the operator of the mechanical dynamometer—SPA uses mathematical techniques to virtually eliminate the human elements (skill, experience and error) and transforms the "art" of dynamometer interpretation into a science.

Analysis of pumping performance and diagnosis of pumping problems are of tremendous importance in the operation of sucker rod pumping systems for maximum production, minimum lifting costs, and effective equipment operation.

Call LUFKIN today for an "in-depth" analysis of your pumping wells' performance.

LUFKIN OFFERS A TRAILER TO COMPLY WITH YOUR EVERY HAULING NEED

FIGURE 54

High Tensile Flats for oilfield or highway operation

FIGURE 55

Model THD-2—Lufkin's Hydraulic Tandem Dump Trailer.

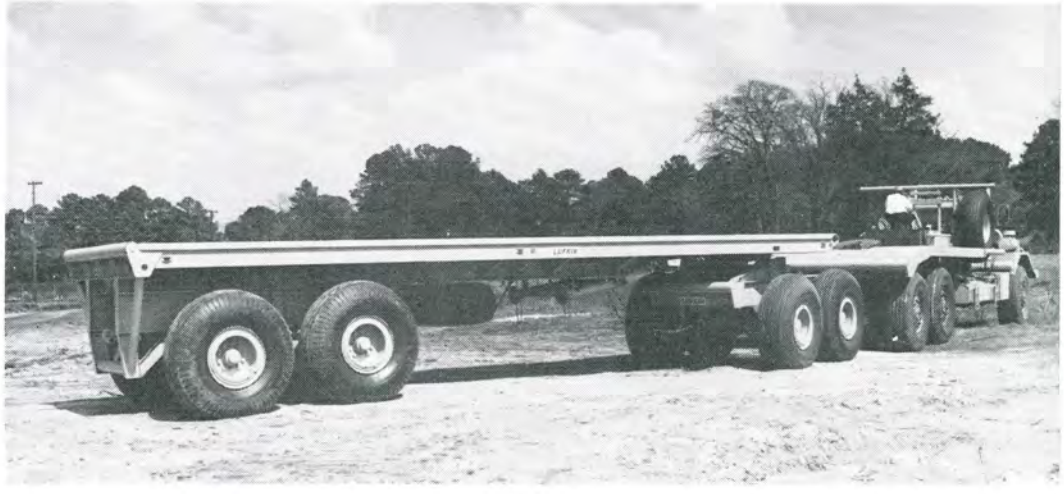


FIGURE 56

Lufkin Custom Designed Equipment for special applications or export

FIGURE 57

Lurkin Lowbed Machinery Trailers are manufactured to meet most hauling needs

FIGURE 58

Lightweight, High Capacity Aluminum Vans

LUFKIN GEAR REDUCERS

A complete line of Single, Double and Triple Reduction Herringbone Gear Reducers, also Single and Double Reduction Speed Increasers are available.

Write for Gear Catalog G32 and G33.

Spiral Bevel Gear Reducers are also available for such service as cooling tower fan drives. Bulletins G-7A and G-24 are available on request.

A complete line of Marine Gears including reduction, reverse and reduction, and multiple pinion units are available. Write for Marine Gear Bulletins G-10A, G-11A, and G-30.

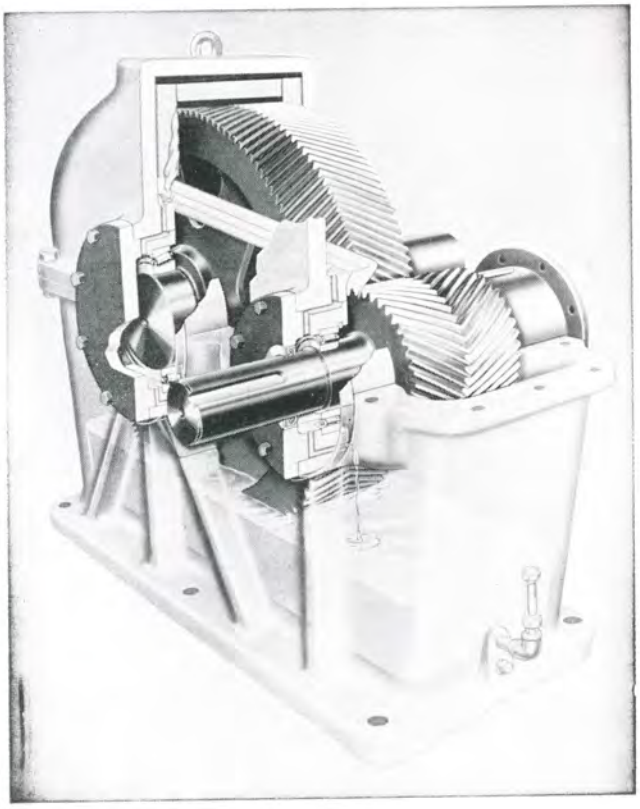


FIGURE 59

Typical Type S Single Reduction Herringbone Gear Reducer. Note simple but positive and fool-proof Lubrication System.

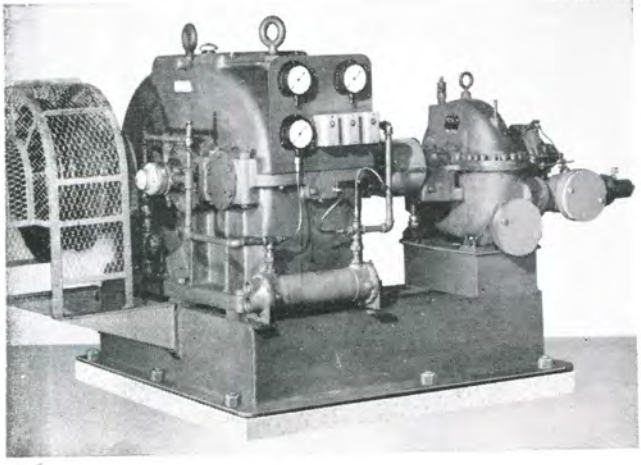


FIGURE 60

Lufkin N290 High Speed Reducer, Ratio 33.6:1, Delivering 227 H. P. From a 6670 RPM Turbine to a Reciprocating Pump.

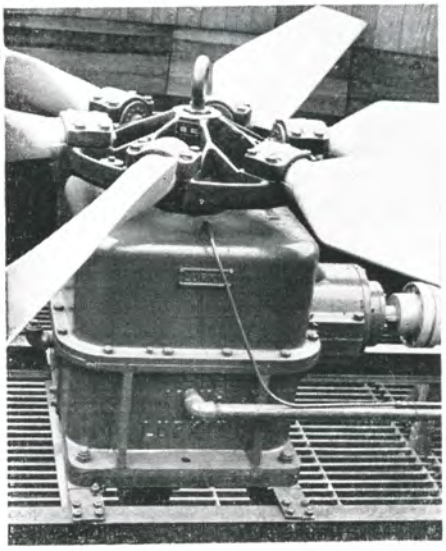


FIGURE 61

115VB Spiral Bevel Gear Reducer for Cooling Tower Fan Drive. A complete range of sizes available.

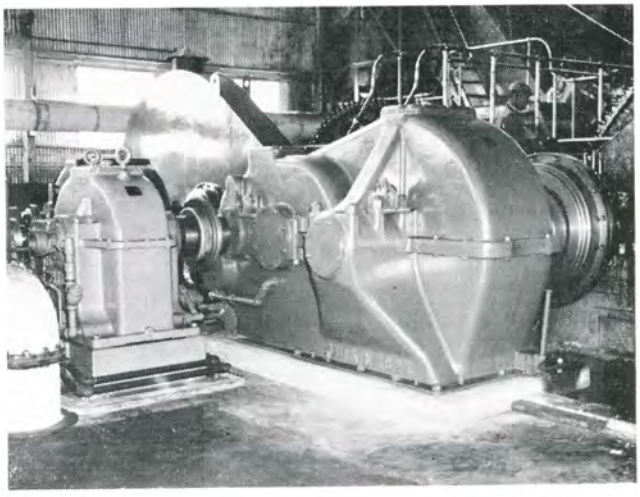


FIGURE 62

Lufkin Model N1610B High Speed Reducer Connected to a Lufkin Model D1824 Hi-Q Reducer Driving Sugar Mill in Louisiana Sugar Factory.

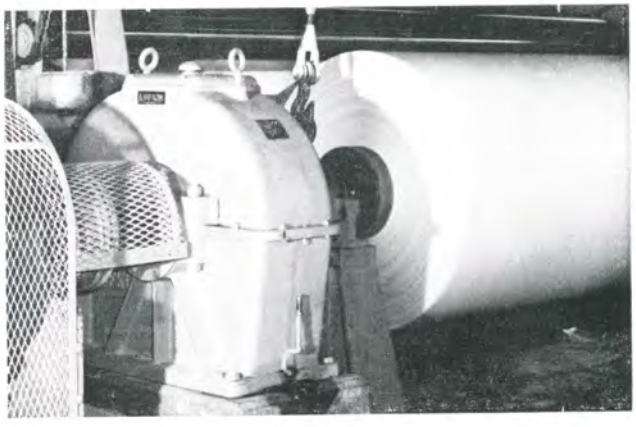


FIGURE 63

Lufkin S189 Single Reduction Herringbone Reducer Driving Rewind Machine at Newsprint Mill.

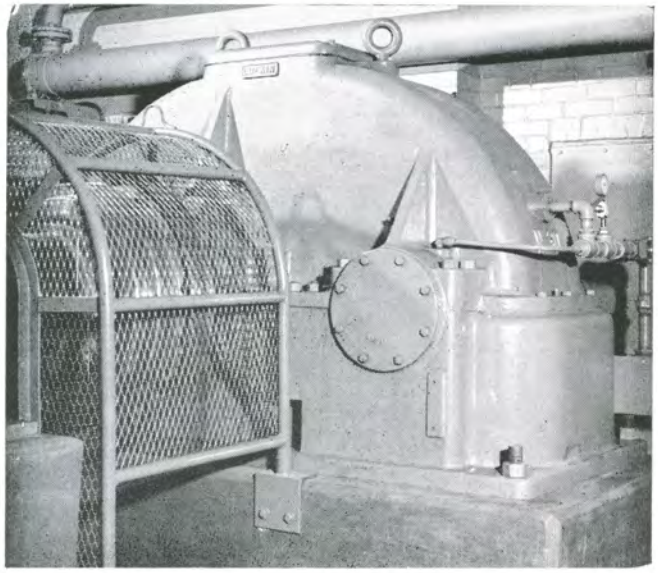


FIGURE 64

Lufkin's Big N3012 Pipe Line Pump Speed Increaser, 1060 h.p. Capacity at 3600 r.p.m. pump speed and 7:1 ratio.

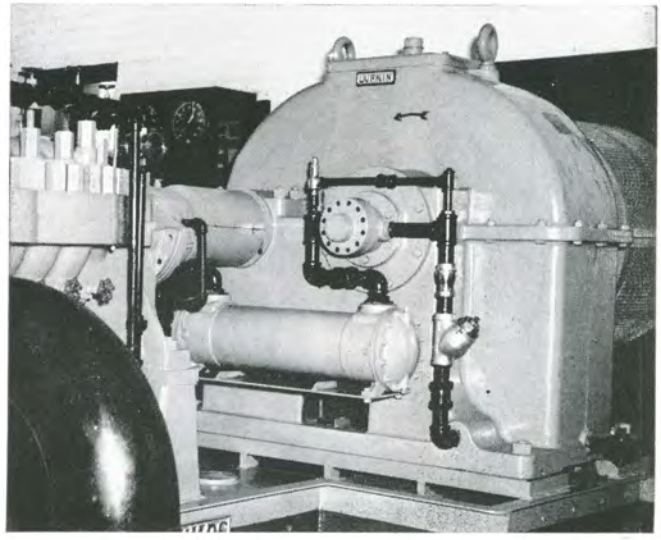


FIGURE 65

Lufkin N2110 High Speed Increaser, delivering 540 h.p. to pipe line pump going 3750 r.p.m.

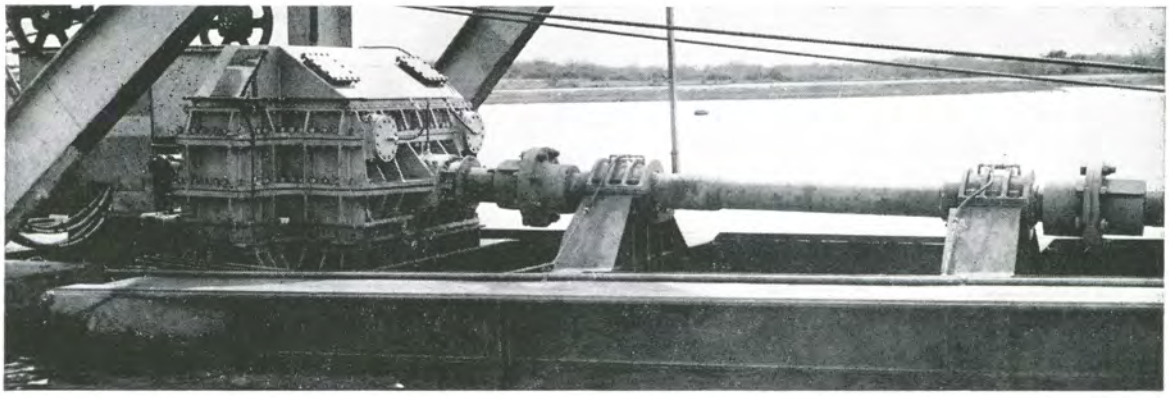


FIGURE 66

Lufkin DC3620 Dredge Cutter Reduction Gear Ratio 32. 6:1 Delivering 1200 h.p. at 1200 r.p.m.

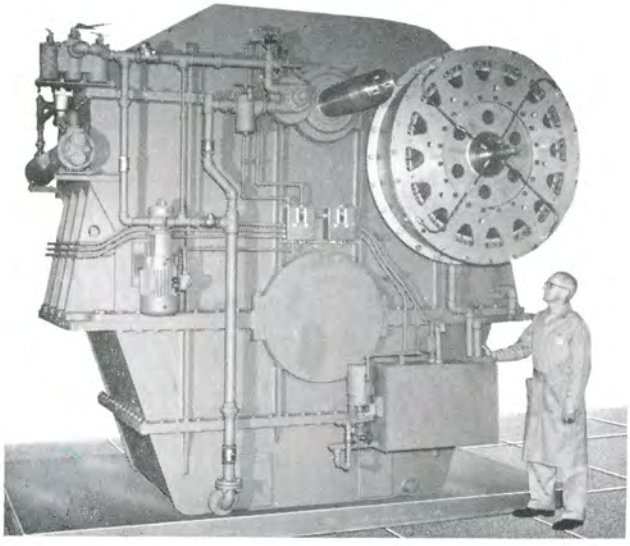


FIGURE 67

Lufkin RS6024 with Water Cooled Clutches for 604 ft. Great Lakes Ore Boat. Rating 3240 HP, 515 RPM, 4.68:1 Ratio.

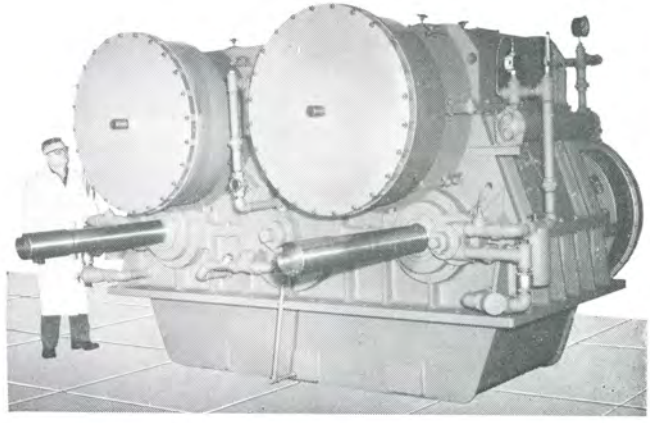


FIGURE 68

Lufkin RCS8414 Marine Reverse-Reduction Compound Propulsion Gear. Driven by two 1700 HP Diesels, 515 RPM, 3.33:1 Ratio.

LUFKIN INSTALLATIONS

TYPICAL OF THE MORE THAN NINETY EIGHT THOUSAND LUFKIN PUMPING UNITS NOW GIVING SATISFACTORY SERVICE

FIGURE 69

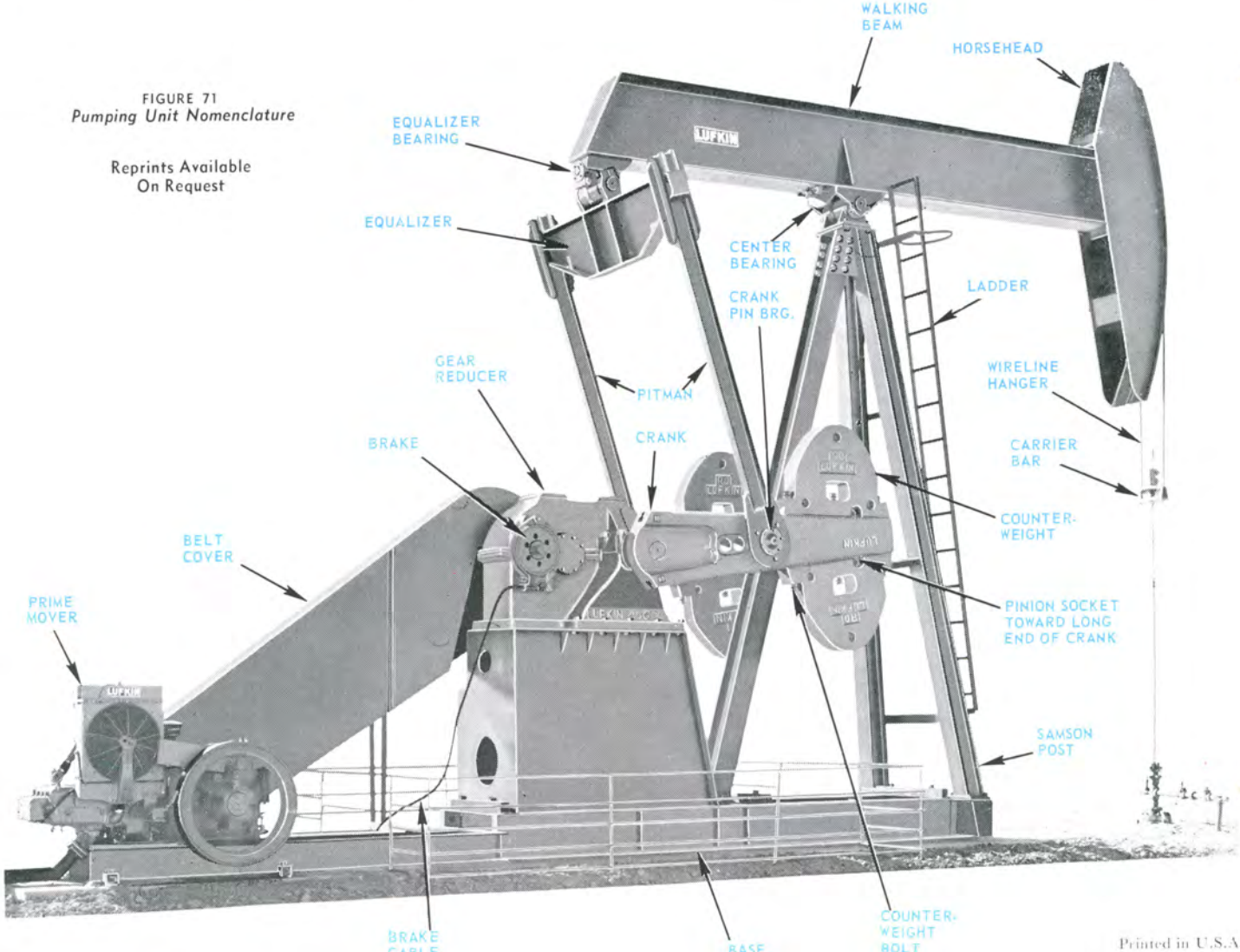
Lufkin M-912D-305-168 Mark II Unitorque Pumping Unit With Electric Motor Drive.

FIGURE 70

Lufkin A-1824D-192-42 Air Balanced Unit With Multi-Cylinder Engine Drive.

FIGURE 71
Pumping Unit Nomenclature

Reprints Available
On Request



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