

LUFKIN

PUMPING UNITS



LUFKIN

INDUSTRIES, INC.
LUFKIN, TEXAS

LUFKIN EQUIPMENT OF ADVANCED DESIGN

1. Oil Field Pumping Units:
 - A. Air Balanced Pumping Units—Pages 3935-3937.
 - B. Crank Balanced Pumping Units—Pages 3918-3927.
 - C. Mark II Unitorque Pumping Units—Pages 3928-3933.
2. Geared Speed Reducers and Increases—Page 3939.

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2036

LUFKIN SUCKER ROD PUMPING UNITS ARE AVAILABLE TO HANDLE ALL INSTALLATION PROBLEMS AND DOWN HOLE CONDITIONS.



MARK II UNITORQUE UNITS

The Mark II unit, due to its unique geometry and phased counterbalance feature, lowers peak torque and horsepower requirements in many instances when properly applied. The unusual geometry of the Mark II produces a somewhat slower up stroke and faster down stroke with reduced acceleration where the load is greatest, resulting in lower peak loads and longer rod life.

COMPACT TYPE AIR BALANCED UNITS FOR OFFSHORE PLATFORMS

Lufkin has taken advantage of the inherent compactness and light weight of the Air Balanced unit, reducing the height, width, and length to an absolute minimum. This makes this unit particularly desirable for offshore platforms where space is of greatest importance. Since all loads are approximately in the vertical plane, the destructive horizontal dynamic forces set up by rotating crank counterweights on conventional units are eliminated.



CONVENTIONAL UNITS

The LUFKIN Conventional Crank Balanced Unit, most widely known and accepted, is the old reliable "WORK HORSE" of the oil patch. This is the most universally adaptable unit in the "LUFKIN LINE," simple to operate and requires minimum maintenance. For all around pumping situations where dependability, ruggedness, and simplicity are prime considerations, the Conventional Unit has always been first choice.



AIR BALANCED UNITS

The utilization of compressed air instead of heavy cast iron counterweights allows more accurate fingertip control of counterbalance. As a result, the weight of the unit is greatly reduced, significantly lowering transportation and installation costs. Air Balanced units have a distinct advantage in the larger sizes with long strokes, where cast iron counterweights on conventional crank counterbalanced units must be so massive that their use is practically prohibitive.

For large volume production from any depth Lufkin has developed the Hi-V Series of Air Balanced units with peak torque ratings up to 3,648,000 inch pounds, and stroke lengths up to 300 inches.

COMPUTER SERVICE IS AVAILABLE TO AID IN SIZING PUMPING UNITS, SUCKER RODS, AND PUMPS TO INSURE MAXIMUM PRODUCTION AND OPTIMUM UTILIZATION OF EQUIPMENT.

DOUBLE REDUCTION GEAR UNITS



FIGURE 1
2560D Double Reduction Gear Unit



FIGURE 2
2560D Double Reduction Gear Unit, cover removed

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 floor bearings.
8. Flex-Shoe Brake. Greater holding power. No grabbing. Improved ratchet lever and stand, locomotive type.

GEAR SPECIFICATIONS

3648D GEAR REDUCER:

Double Reduction
RATING: 3,648,000 In. Lbs. Peak Torque
RATIO OF GEARS: 35.1
CRANKSHAFT DIA.: 13"
SHEAVE: 80" P.D.—18D Std.
6 1/2" Bore
GEAR BOX OIL CAPACITY: 360 Gallons

2560D GEAR REDUCER:

Double Reduction
RATING: 2,560,000 In. Lbs. Peak Torque
RATIO OF GEARS: 34.53
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
CRANKSHAFT 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: 48", 58"—10D Max.
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: 44"—8D, 50"—10C Max.
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: 33", 48"—6D Max.
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: 33", 48"—6D Max.
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", 30", 36", 44"—6C Max.
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", 30", 36"—5C Max.
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", 30", 36"—4C Max.
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: 20", 24", 30"—3C Max.
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

25D GEAR REDUCER:

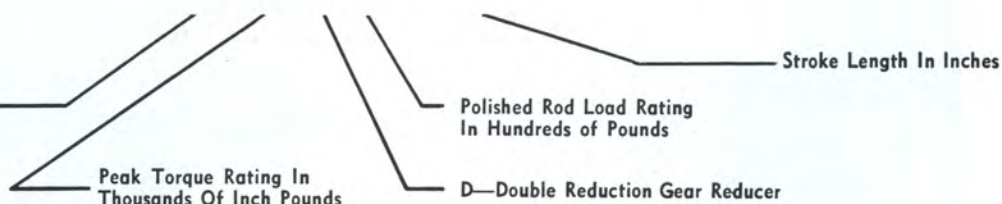
Double Reduction
RATING: 25,000 In. Lbs. Peak Torque
RATIO OF GEARS: 28.9
CRANKSHAFT DIA.: 3"
SHEAVE: 18" P.D.—2B or 3A Std.,
18" P.D. Max., 1 3/8" Bore
GEAR BOX OIL CAPACITY: 5 Gallons

EXPLANATION OF PUMPING UNIT DESIGNATIONS

C - 228D-246-86

Type Pumping Unit:

- A—Air Balanced
- C—Conventional
- M—Mark II Uitorque



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 90EP or an AGMA 6EP premium mild extreme pressure lubricant (preferably a sulphur-phosphorous type) with rust and oxidation inhibitors and an anti-foam agent. Pour point of the oil should be 5° F or lower.

For temperatures down to -30° F use an SAE 80EP or an AGMA 3EP premium mild extreme pressure lubricant (preferably sulphur-phosphorous type) with rust and oxidation inhibitors and anti-foam agent. Pour point of the oil should be -15° F or less.

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 low mark on gage but do not fill the gear reducer above the high mark on gage.

Every six months the operator should collect a typical sample of the oil in a glass jar. A visual inspection will expose 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.

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 lithum soap base grease with an 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 an extreme pressure additive and a pour point of -10° F. or lower.

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 an 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 an extreme pressure 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.

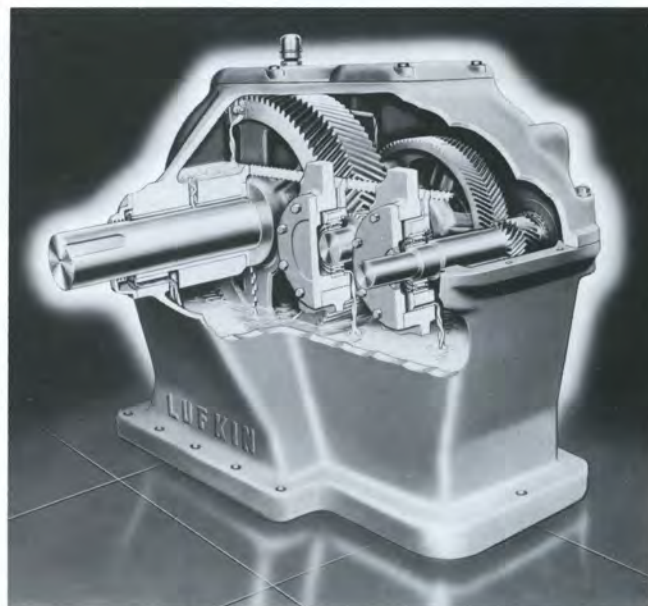


FIGURE 3

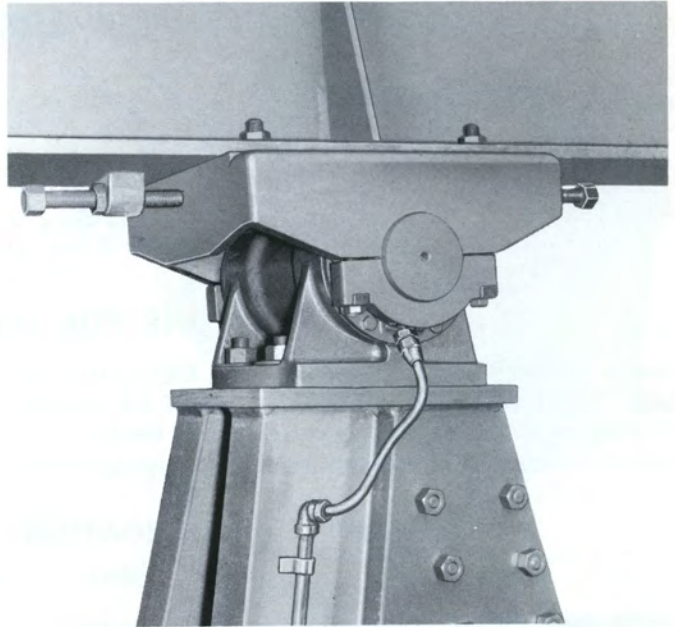
As long as the oil is maintained at the proper level, the slow speed and high speed gears dip in oil and provide continuous lubrication to the gear mesh.

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



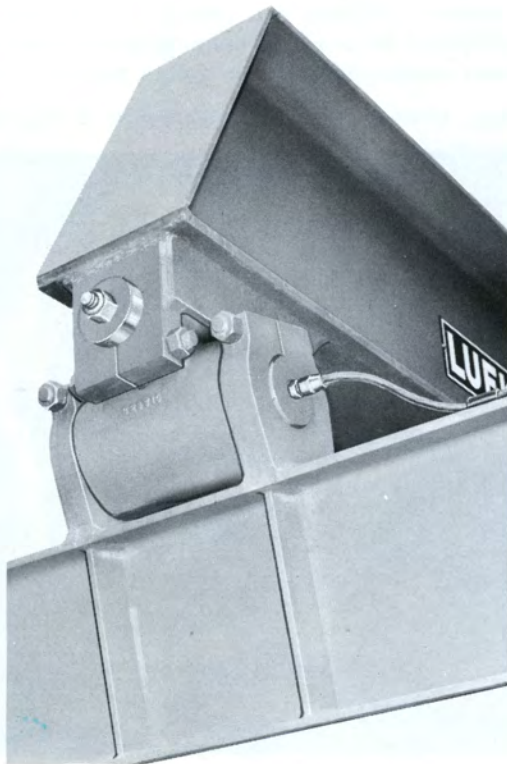
**FIGURE 4
HORSEHEAD AND WIRE
LINE ASSEMBLY**

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-114D 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.

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

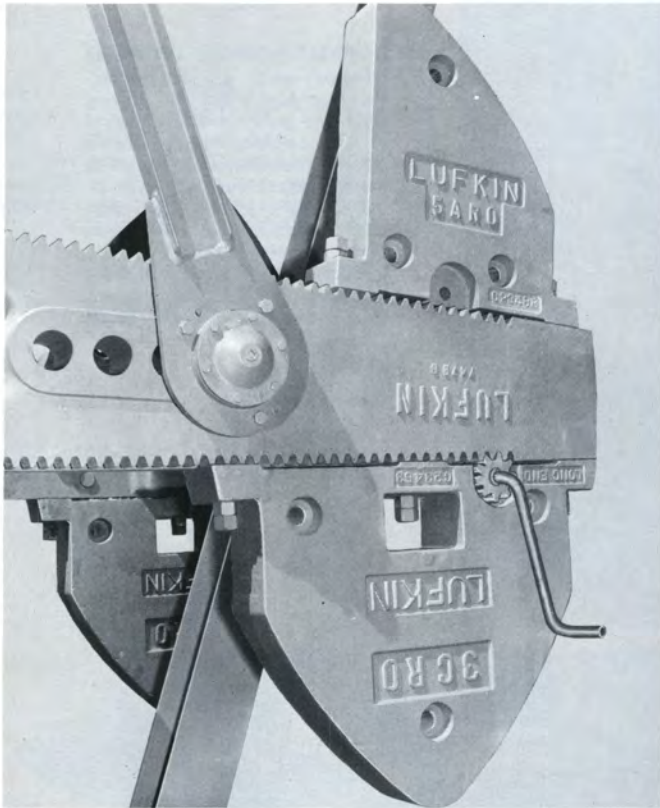


FIGURE 8—Illustrating the wide range of counterweight sizes which can be used on one crank. Different size counterweights are not normally furnished or recommended for the same unit.
NOTE: Removable pinion (with crank handle attached) is used to adjust all counterweights.

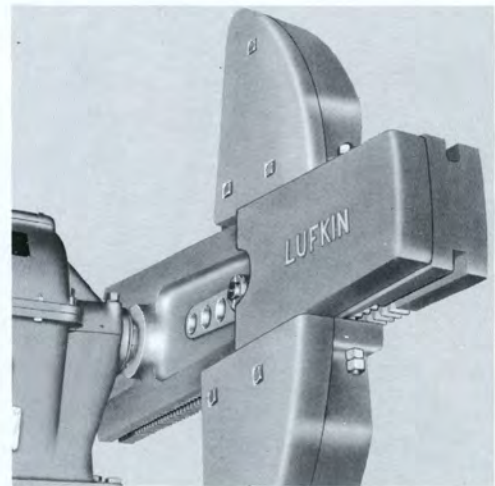


FIGURE 9
Various combinations of type S and D auxiliary counterweights available for additional counterbalance.

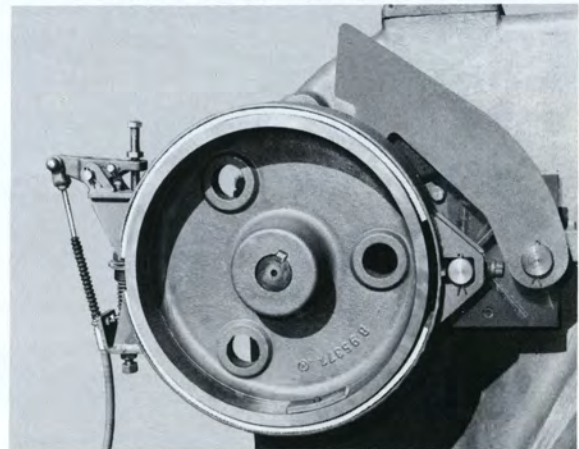


FIGURE 10a
Engaged Position

As shown in Figures 8 and 9, 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 9 the extra counterbalance made available by the increased thickness at the end of the type B crank. With this type crank up to 8 type S auxiliary weights can be added for maximum counterbalance.

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 8, 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-40D 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 ONE HUNDRED AND FOURTEEN THOUSAND LUFKIN PUMPING UNITS.

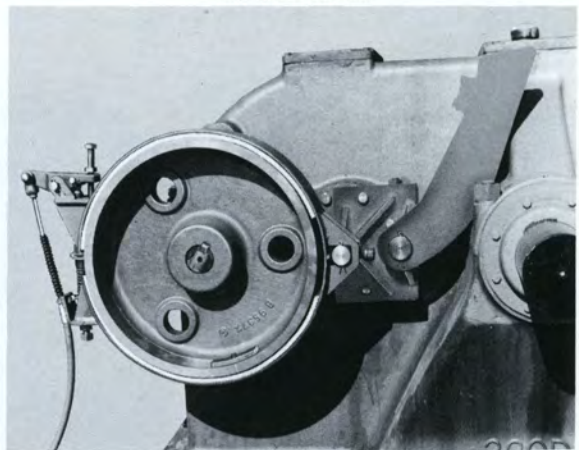


FIGURE 10b
Disengaged Position

FLEX-SHOE BRAKE

Lufkin's Flex-Shoe brake provides much greater holding capacity than the Clam Shell type formerly used. Smoother acting with no "grabbing." Positive stop pawl can be engaged with notches in brake drum to provide additional safety.



FIGURE 11

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 C-228D-246-86.



FIGURE 12

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-256-144 driven by a SLOW SPEED Engine.

FIGURE 13
HEAVY DUTY PORTABLE "STRONGBACK"
base is available for all units. Bases are also available with "Uniset" plated bottom to permit installation directly on soil with a minimum bearing capacity of 1500 pounds per square foot. Unit shown is a C-320D-256-120.

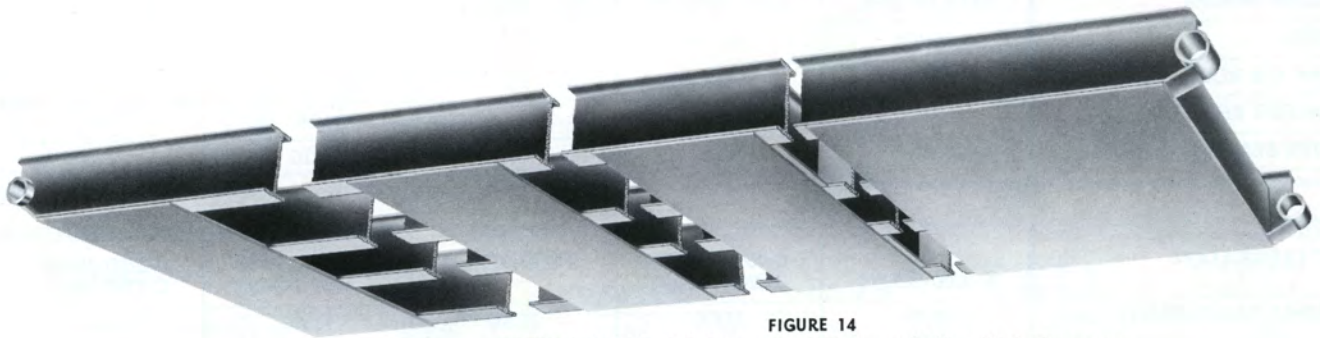


FIGURE 14
BOTTOM VIEW of Uniset portable base available with both conventional and air balanced pumping units.

FIGURE 15
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.



CONVENTIONAL PUMPING UNIT SPECIFICATIONS

UNIT DESIGNATION	C-912D-365-168 C-640D-365-168	C-912D-305-168 C-640D-305-168 C-456D-305-168	C-912D-427-144	C-912D-365-144 C-640D-365-144	C-640D-305-144 C-456D-305-144
POLISHED ROD CAPACITY, LBS.	36,500	30,500	42,700	36,500	30,500
STROKE LENGTHS, INCHES	168, 145, 124	168, 145, 124	144, 124, 106	144, 124, 106	144, 124, 106
WALKING BEAM	33" x 220 Lbs.	33" x 200 Lbs.	33" x 220 Lbs.	33" x 200 Lbs.	30" x 172 Lbs.
WIRELINE HANGER	1 3/8" x 16" CTRS.	1 1/4" x 16" CTRS.	1 3/8" x 16" CTRS.	1 3/8" x 16" CTRS.	1 1/4" x 16" CTRS.
CRANKS	94110B	94110B	94110B	94110B	94110B
CRANK PIN BEARING	1SA	1SA	1SA	1SA	1SA
EQUALIZER BEARING	OR	OR	OR	OR	OR
CENTER BEARING	OTG	OTG	OTG	OTG	1TG

UNIT DESIGNATION	C-640D-256-144 C-456D-256-144 C-320D-256-144	C-456D-365-120	C-640D-305-120 C-456D-305-120	C-456D-256-120 C-320D-256-120	C-456D-213-120 C-320D-213-120 C-228D-213-120
POLISHED ROD CAPACITY, LBS.	25,600	36,500	30,500	25,600	21,300
STROKE LENGTHS, INCHES	144, 124, 106	120, 105, 90	120, 102, 85	120, 102, 85	120, 102, 85
WALKING BEAM	27" x 160 Lbs.	30" x 190 Lbs.	27" x 160 Lbs.	27" x 145 Lbs.	24" x 130 Lbs.
WIRELINE HANGER	1 1/4" x 16" CTRS.	1 3/8" x 12" CTRS.	1 1/4" x 12" CTRS.	1 3/8" x 12" CTRS.	1 3/8" x 12" CTRS.
CRANKS	94110B	94110B	8495B	8495B	8495B
CRANK PIN BEARING	1SA	1SA	2SA	2SA	2SA
EQUALIZER BEARING	OR	OR	OR	1R	1R
CENTER BEARING	1TG	OTG	1TG	2TG	2TG

UNIT DESIGNATION	C-320D-305-100	C-456D-256-100 C-320D-256-100	C-228D-213-100	C-228D-173-100 C-160D-173-100	C-320D-246-86 C-228D-246-86
POLISHED ROD CAPACITY, LBS.	30,500	25,600	21,300	17,300	24,600
STROKE LENGTHS, INCHES	100, 85, 70	100, 85, 70	100, 86, 73	100, 86, 73	86, 74, 61
WALKING BEAM	27" x 160 Lbs.	27" x 145 Lbs.	24" x 120 Lbs.	24" x 100 Lbs.	24" x 120 Lbs.
WIRELINE HANGER	1 1/4" x 12" CTRS.	1 3/8" x 12" CTRS.	1 3/8" x 12" CTRS.	1 3/8" x 12" CTRS.	1 3/8" x 12" CTRS.
CRANKS	8495B	8495B	7478B	7478B	8495B
CRANK PIN BEARING	2SA	2SA	2SA	3SB	3SB
EQUALIZER BEARING	1R	1R	1R	2RA	2RA
CENTER BEARING	2TG	2TG	2TG	2TG	2TG

UNIT DESIGNATION	C-320D-213-86 C-228D-213-86	C-160D-173-86	C-114D-119-86	C-320D-246-74	C-228D-200-74 C-160D-200-74
POLISHED ROD CAPACITY, LBS.	21,300	17,300	11,900	24,600	20,000
STROKE LENGTHS, INCHES	86, 74, 62	86, 74, 62	86, 72, 59	74, 64, 54	74, 64, 54
WALKING BEAM	24" x 100 Lbs.	24" x 94 Lbs.	24" x 84 Lbs.	24" x 100 Lbs.	24" x 94 Lbs.
WIRELINE HANGER	1 3/8" x 12" CTRS.	1 3/8" x 12" CTRS.	1 3/8" x 12" CTRS.	1 3/8" x 9" CTRS.	1" x 9" CTRS.
CRANKS	7478B	7478B	6468B	7478B	7478B
CRANK PIN BEARING	3SB	3SB	4SB	3SB	3SB
EQUALIZER BEARING	2RA	2RA	3R	2RA	2RA
CENTER BEARING	2TG	2TG	4TG	2TG	2TG

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

CONVENTIONAL PUMPING UNIT SPECIFICATIONS

UNIT DESIGNATION	C-228D-173-74 C-160D-173-74	C-160D-143-74 C-114D-143-74	C-160D-173-64 C-114D-173-64	C-160D-143-64 C-114D-143-64
POLISHED ROD CAPACITY, LBS.	17,300	14,300	17,300	14,300
STROKE LENGTHS, INCHES	74, 62, 51	74, 62, 51	64, 54, 44	64, 52, 40
WALKING BEAM	24" x 84 Lbs.	24" x 84 Lbs.	24" x 84 Lbs.	18" x 70 Lbs.
WIRELINE HANGER	1" x 9" CTRS.	1" x 9" CTRS.	1" x 9" CTRS.	1" x 9" CTRS.
CRANKS	6468B	6468B	6468B	5456B
CRANK PIN BEARING	3SB	4SB	4SB	4SB
EQUALIZER BEARING	2RA	3R	3R	3R
CENTER BEARING	2TG	4TG	4TG	4TG

UNIT DESIGNATION	C-114D-173-54	C-114D-133-54	C-57D-76-54
POLISHED ROD CAPACITY, LBS.	17,300	13,300	7,600
STROKE LENGTHS, INCHES	54, 44, 34	54, 45, 36	54, 41, 28
WALKING BEAM	18" x 70 Lbs.	18" x 60 Lbs.	16" x 36 Lbs.
WIRELINE HANGER	1" x 9" CTRS.	7/8" x 9" CTRS.	3/4" x 9" CTRS.
CRANKS	5456B	4850B	4246B
CRANK PIN BEARING	4SB	5A	5A
EQUALIZER BEARING	3R	4R	5R
CENTER BEARING	4TG	4TG	5C

UNIT DESIGNATION	C-57D-109-48	C-57D-95-48	C-40D-76-48	C-57D-89-42 C-40D-89-42	C-57D-76-42 C-40D-76-42
POLISHED ROD CAPACITY, LBS.	10,900	9,500	7,600	8,900	7,600
STROKE LENGTHS, INCHES	48, 37, 25	48, 37, 25	48, 37, 27	42, 33, 23	42, 33, 23
WALKING BEAM	16" x 45 Lbs.	16" x 40 Lbs.	16" x 36 Lbs.	16" x 36 Lbs.	14" x 34 Lbs.
WIRELINE HANGER	7/8" x 9" CTRS.	7/8" x 9" CTRS.	7/8" x 9" CTRS.	3/4" x 6 1/2" CTRS.	3/4" x 6 1/2" CTRS.
CRANKS	4246B	4246B	3644B	3644B	3644B
CRANK PIN BEARING	5A	5A	6	6	6
EQUALIZER BEARING	5R	5R	7R	7R	7R
CENTER BEARING	5C	5C	6CA	6CA	6CA

UNIT DESIGNATION	C-40D-89-36	C-25D-67-36	C-25D-56-36	C-25D-67-30	C-25D-53-30
POLISHED ROD CAPACITY, LBS.	8,900	6,700	5,600	6,700	5,300
STROKE LENGTHS, INCHES	36, 28, 20	36, 28, 20	36, 28, 20	30, 20	30, 20
WALKING BEAM	14" x 34 Lbs.	12" x 31 Lbs.	12" x 27 Lbs.	12" x 27 Lbs.	10" x 25 Lbs.
WIRELINE HANGER	3/4" x 6 1/2" CTRS.	5/8" x 6 1/2" CTRS.	5/8" x 6 1/2" CTRS.	5/8" x 6 1/2" CTRS.	1/2" x 6 1/2" CTRS.
CRANKS	3644B	3644B	3644B	2436B	2436B
CRANK PIN BEARING	6	6	6	6	6
EQUALIZER BEARING	7R	7R	7R	7R	7R
CENTER BEARING	6CA	6CA	6CA	6CA	6CA

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

CONVENTIONAL COUNTERBALANCE DATA

All Counterbalance Shown In Lbs., Effective At Polished Rod With Weights At Maximum Position, **Including Structural Unbalance.**

See Example below.

UNIT	C-912D-365-168 C-912D-305-168 C-640D-365-168 C-640D-305-168 C-456D-305-168	C-912D-427-144 C-912D-365-144 C-640D-365-144	C-640D-305-144 C-456D-305-144	C-640D-256-144 C-456D-256-144 C-320D-256-144	C-456D-365-120	C-640D-305-120 C-456D-305-120	C-456D-256-120 C-320D-256-120	C-456D-213-120 C-320D-213-120 C-228D-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	.....	.....	.....
8 No. OOS 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. OS Aux. Weights	22,145	26,950	27,225	.....	33,250	25,855	.....	.....
8 No. OS Aux. Weights	26,600	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. OAS Aux. Weights	19,110	23,405	23,665	23,785	29,055	22,675	22,840	.....
8 No. OAS 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. 1S Aux. Weights	15,725	19,455	19,690	19,810	24,370	18,800	18,965	18,910
8 No. 1S 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. 2S Aux. Weights	14,165	17,635	17,865	17,985	22,220	16,995	17,165	17,110
8 No. 2S 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. 3BS Aux. Weights	12,655	15,870	16,090	16,210	20,130	15,320	15,490	15,435
8 No. 3S Aux. Weights	15,180	18,815	19,055	19,175	23,620	18,250	18,425	18,370
4 No. 5ARO Counterweights	8,510	11,035	11,225	11,345	14,405	10,550	10,720	10,665
4 No. 5A Aux. Weights	10,220	13,030	13,230	13,350	16,765	12,560	12,730	12,675
8 No. 5A Aux. Weights	11,930	15,025	15,235	15,355	19,125	14,570	14,740	14,685
4 No. 5CRO Counterweights	7,370	9,705	9,890	10,010	12,830	9,235	9,405	9,350
4 No. 5C Aux. Weights	8,910	11,500	11,695	11,815	14,955	11,045	11,215	11,160
8 No. 5C Aux. Weights	10,445	13,295	13,500	13,620	17,080	12,855	13,020	12,965

UNIT	C-228D-173-74 C-160D-173-74	C-160D-143-74 C-114D-143-74	C-160D-173-64 C-114D-173-64	C-160D-143-64 C-114D-143-64	C-114D-173-54	C-114D-133-54	C-57D-76-54
STROKE	74"	74"	64"	64"	54"	54"	54"
STRUCTURAL UNBALANCE*	+450 Lbs.	+300 Lbs.	+550 Lbs.	+360 Lbs.	+500 Lbs.	+330 Lbs.	0 Lbs.
CRANKS	6468B	6468B	6468B	5456B	5456B	4850B	4246B
C'Bal., Cranks Only	4,125	3,681	4,755	2,660	3,180	2,845	1,649
4 No. 3CRO Counterweights	11,185	11,050	12,835	8,820	10,370	.....	.....
4 No. 3BS Aux. Weights	14,220	14,090	.....	11,465	13,460	.....	.....
8 No. 3S Aux. Weights	.....	.....	.....	.....	16,550	.....	.....
4 No. 5ARO Counterweights	9,445	9,305	10,845	7,445	8,765	7,470	5,760
4 No. 5A Aux. Weights	11,605	11,470	13,315	9,390	11,035	9,360	7,440
8 No. 5A Aux. Weights	13,765	13,635	15,785	11,335	13,305	11,520	.....
4 No. 5CRO Counterweights	8,065	7,925	9,265	6,215	7,335	6,320	4,750
4 No. 5C Aux. Weights	10,015	9,880	11,495	7,980	9,390	8,040	6,285
8 No. 5C Aux. Weights	11,965	11,830	13,725	9,740	11,445	9,760	.....
4 No. 6RO Counterweights	7,205	7,065	8,280	5,455	6,440	5,595	4,120
4 No. 6 Aux. Weights	8,365	8,225	9,610	6,505	7,670	6,635	5,050
8 No. 6 Aux. Weights	9,525	9,390	10,940	7,560	8,900	7,675	5,985
4 No. 7RO Counterweights	6,110	5,965	7,025	4,470	5,295	4,645	3,275
4 No. 7 Aux. Weights	6,995	6,855	8,040	5,280	6,245	5,460	4,005
8 No. 7 Aux. Weights	7,880	7,740	9,055	6,095	7,190	6,270	4,740

EXAMPLE:

A C-640D-305-144 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.

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

CONVENTIONAL COUNTERBALANCE DATA

All Counterbalance Shown In Lbs., Effective At Polished Rod With Weights At Maximum Position, Including Structural Unbalance.

See Example below.

UNIT	C-456D-256-100 C-320D-256-100 C-320D-305-100	C-228D-213-100 C-228D-173-100 C-160D-173-100	C-320D-246-86 C-228D-246-86	C-320D-213-86 C-228D-213-86	C-160D-173-86	C-114D-119-86	C-320D-246-74 C-228D-200-74 C-160D-200-74
STROKE	100"	100"	86"	86"	86"	86"	74"
STRUCTURAL UNBALANCE*	+550 Lbs.	+0 Lbs.	+800 Lbs.	+450 Lbs.	+450 Lbs.	+115 Lbs.	+800 Lbs.
CRANKS	8495B	7478B	8495B	7478B	7478B	6468B	7478B
C'Bal. Cranks Only	7,390	3,786	8,725	4,850	4,850	3,184	5,890
4 No. OARO Counterweights	23,070	.....	.....	.....	.....	.....	.....
4 No. OAS Aux. Weights	27,925	.....	.....	.....	.....	.....	.....
4 No. 1RO Counterweights	19,535	.....	22,810	.....	.....	.....	.....
4 No. 1S Aux. Weights	23,270	.....	.....	.....	.....	.....	.....
8 No. 1S Aux. Weights	27,000	.....	.....	.....	.....	.....	.....
4 No. 2RO Counterweights	17,490	11,485	20,435	13,800	13,800	.....	16,235
4 No. 2S Aux. Weights	21,105	14,240	.....	17,005	17,005	.....	19,935
8 No. 2S Aux. Weights	24,720	16,995	.....	.....	.....	.....	.....
4 No. 3CRO Counterweights	15,570	10,085	18,210	12,175	12,175	9,410	14,355
4 No. 3BS Aux. Weights	19,095	12,780	22,295	15,310	15,310	.....	17,975
8 No. 3S Aux. Weights	22,620	15,475	.....	18,445	.....	.....	21,595
4 No. 5ARO Counterweights	13,365	8,450	15,655	10,270	10,270	7,905	12,155
4 No. 5A Aux. Weights	15,780	10,335	18,450	12,465	12,465	9,775	14,685
8 No. 5A Aux. Weights	18,195	12,220	21,245	14,660	14,660	11,645	17,215
4 No. 5CRO Counterweights	11,780	7,230	13,820	8,855	8,855	6,710	10,515
4 No. 5C Aux. Weights	13,955	8,935	16,340	10,835	10,835	8,400	12,805
8 No. 5C Aux. Weights	16,130	10,640	18,860	12,815	12,815	10,085	15,095
4 No. 6RO Counterweights	10,795	6,465	12,675	7,965	7,965	5,965	9,490
4 No. 6 Aux. Weights	12,075	7,475	14,160	9,140	9,140	6,970	10,845
8 No. 6 Aux. Weights	13,360	8,485	15,650	10,315	10,315	7,975	12,205
4 No. 7RO Counterweights	9,560	5,505	11,240	6,845	6,845	5,015	8,195
4 No. 7 Aux. Weights	10,530	6,270	12,370	7,740	7,740	5,780	9,225
8 No. 7 Aux. Weights	11,500	7,040	13,495	8,635	8,635	6,550	10,260

UNIT	C-57D-109-48 C-57D-95-48	C-40D-76-48	C-57D-89-42 C-57D-76-42 C-40D-89-42 C-40D-76-42	C-40D-89-36 C-25D-67-36 C-25D-56-36	C-25D-67-30 C-25D-53-30
STROKE	48"	48"	42"	36"	30"
STRUCTURAL UNBALANCE*	+320 Lbs.	0 Lbs.	+150 Lbs.	+275 Lbs.	+150 Lbs.
CRANKS	4246B	3644B	3644B	3644B	2436B
C'Bal., Cranks Only	2,175	1,338	1,675	2,055	1,370
4 No. 5ARO Counterweights	6,800	.....	.....	.....	.....
4 No. 5A Aux. Weights	8,690	.....	.....	.....	.....
8 No. 5A Aux. Weights	.....	.....	.....	.....	.....
4 No. 5CRO Counterweights	5,665	4,525	5,300	6,285	.....
4 No. 5C Aux. Weights	7,395	6,160	7,165	.....	.....
8 No. 5C Aux. Weights	.....	.....	.....	.....	.....
4 No. 6RO Counterweights	4,955	3,995	4,700	5,580	4,400
4 No. 6 Aux. Weights	6,005	5,000	5,840	6,915	5,540
8 No. 6 Aux. Weights	7,055	.....	*6,985	.....	.....
4 No. 7RO Counterweights	4,005	3,090	3,670	4,380	3,400
4 No. 7 Aux. Weights	4,830	3,885	4,570	5,435	4,320
8 No. 7 Aux. Weights	5,655	.....	*5,475	.....	.....

EXAMPLE:

A C-456D-305-144 with 4 No. OARO counterweights and 3 No. OAS auxiliary weights would have a maximum counterbalance effect in the 144" stroke of $19550 + \frac{3}{4} (23665 - 19550) = 22635$ pounds. With this same combination of weights, the counterbalance effect in the 106" stroke is $[22635 - (-520)] \times 144/106 + (-520) = 30935$ pounds.

To convert effective counterbalance to maximum counterbalance torque for dynamometer card analysis, multiply the pounds counterbalance, minus the structural unbalance, by the torque factor at the 90° crank position.

* Do not use on 40D units.

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

**CONVENTIONAL PUMPING UNIT ASSEMBLIES
GENERAL DIMENSIONS**

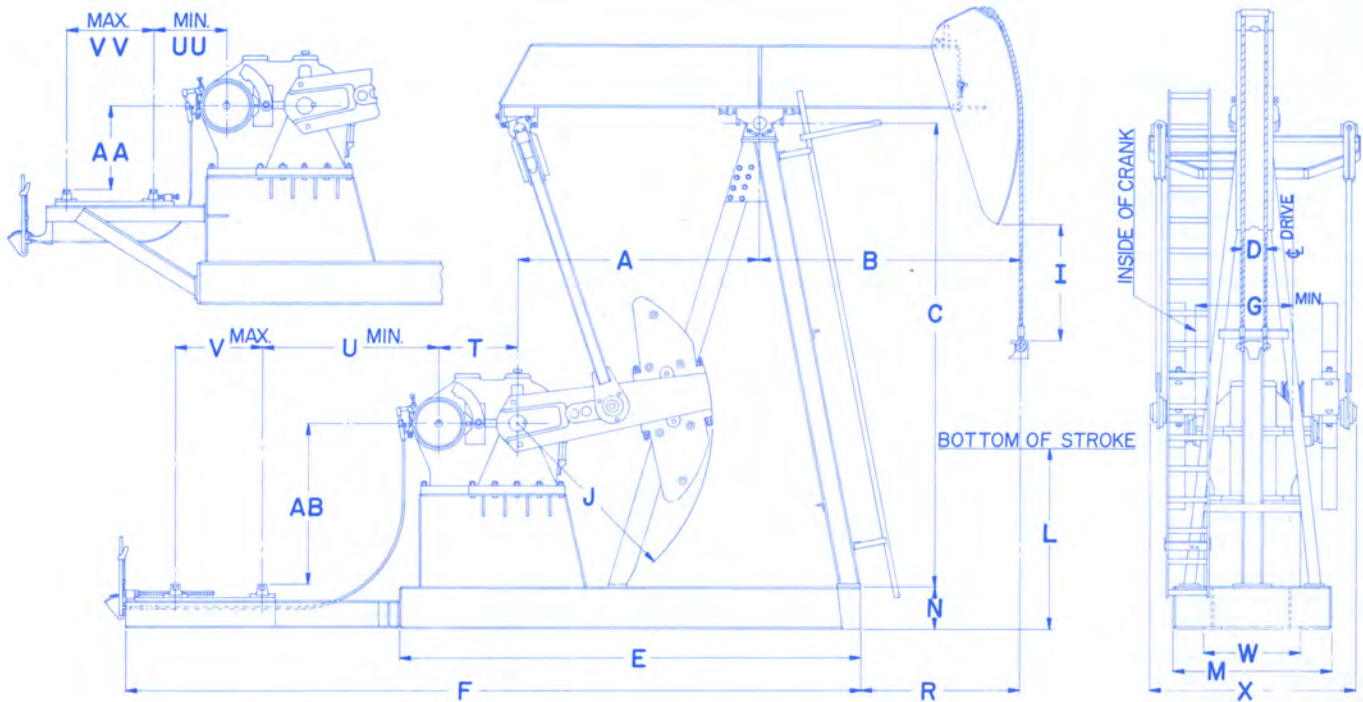


FIGURE 16

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-365-168	10'-0"	17'-6"	20'-6"	16"	18'-9½"	29'-10½"	53¼"	20½"	110"	62½"	6'-4"	16"	13'-9½"	48½"	89¼"	48½"	46¾"	8'-2½"	51¼"	93"	22½"	50½"
C-912D-305-168	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-912D-427-144	"	15'-0"	"	"	"	"	"	33¼"	"	74½"	"	"	11'-3½"	"	"	"	"	"	"	"	"	"
C-912D-365-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-365-168	"	17'-6"	"	"	18'-6"	29'-7"	51¾"	20½"	"	62½"	"	"	13'-9½"	41½"	92¾"	"	"	"	"	"	"	26¼"
C-640D-305-168	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-365-144	"	15'-0"	"	"	"	"	"	33¼"	"	74½"	"	"	11'-3½"	"	"	"	"	"	"	"	"	"
C-640D-305-144	"	"	20'-4"	"	"	"	"	33"	"	72½"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-256-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-640D-305-120	9'-3"	12'-11"	18'-2"	12"	17'-6"	27'-4"	52½"	26"	95"	77¾"	70"	"	9'-5½"	"	77¾"	"	"	8'-1"	51½"	78"	26¼"	37¼"
C-456D-305-168	10'-0"	17'-6"	20'-6"	16"	18'-6"	29'-7"	51¾"	20½"	110"	62½"	6'-4"	"	13'-9½"	38¾"	96"	"	"	8'-2½"	51¼"	93"	29½"	50½"
C-456D-305-144	"	15'-0"	20'-4"	"	"	"	"	33"	"	72½"	"	"	11'-3½"	"	"	"	"	"	"	"	"	"
C-456D-256-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-456D-365-120	"	12'-8"	20'-6"	12"	"	"	"	55¾"	"	75"	"	"	8'-11½"	"	"	"	"	"	"	"	"	"
C-456D-305-120	9'-3"	12'-11"	18'-2"	"	17'-6"	27'-4"	52½"	26"	95"	77¾"	70"	"	9'-5½"	"	81"	"	"	8'-1"	51½"	78"	30"	37¼"
C-456D-256-120	"	"	18'-0"	"	"	"	"	"	"	75¾"	"	"	"	"	"	"	"	"	"	"	"	"
C-456D-213-120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-456D-256-100	"	10'-9"	"	"	"	"	"	46¾"	"	"	"	"	7'-3½"	"	"	"	"	"	"	"	"	"

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

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

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-256-144	10'-0"	15'-0"	20'-4"	16"	18'-0½"	29'-1½"	44¾"	33"	110"	72½"	6'-4"	16"	11'-3½"	34"	92½"	48½"	43"	7'-3½"	51¾"	93"	30¾"	34¼"
C-320D-256-120	9'-3"	12'-11"	18'-0"	12"	17'-0½"	27'-4½"	"	26"	95"	75¾"	69¾"	"	9'-5½"	"	86"	"	"	7'-2"	53"	80"	"	"
C-320D-213-120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	7'-1½"	"	"	"	"
C-320D-305-100	"	10'-9"	"	"	"	"	"	46¼"	"	"	"	"	7'-3½"	"	"	"	"	7'-2"	"	"	"	"
C-320D-256-100	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	7'-1½"	"	"	"	"
C-320D-246-86	"	9'-3"	"	"	"	"	"	60½"	"	"	"	"	69½"	"	"	"	"	"	"	"	"	"
C-320D-213-86	8'-0"	"	15'-0"	"	15'-4½"	24'-3½"	45¼"	24½"	78"	74½"	57¾"	"	6'-2½"	"	69"	"	"	"	36"	63"	"	"
C-320D-246-74	"	8'-0"	"	9"	"	"	"	35¾"	"	77¼"	"	"	59½"	"	"	"	"	"	"	"	"	"
C-228D-213-120	9'-3"	12'-11"	18'-0"	12"	16'-5½"	27'-4"	38¾"	26"	95"	75½"	69¾"	"	9'-5½"	30"	90"	"	37"	6'-6½"	53"	80"	27¾"	"
C-228D-213-100	8'-0"	10'-9"	15'-0"	"	14'-9½"	24'-3"	39½"	12"	78"	63"	57¾"	"	7'-8½"	"	72½"	"	"	"	36"	63"	"	"
C-228D-173-100	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-228D-246-86	9'-3"	9'-3"	18'-0"	"	16'-5½"	27'-4"	38¾"	60¾"	95"	75½"	69¾"	"	69½"	"	90"	"	"	"	53"	80"	"	"
C-228D-213-86	8'-0"	"	15'-0"	"	14'-9½"	24'-3"	39½"	24½"	78"	74½"	57¾"	"	6'-2½"	"	72½"	"	"	"	36"	63"	"	"
C-228D-200-74	"	8'-0"	"	9"	"	"	"	35¾"	"	77¼"	"	"	59½"	"	"	"	"	"	"	"	"	"
C-228D-173-74	7'-0"	"	13'-0"	"	13'-5"	22'-10½"	"	17¼"	68"	68¼"	51¾"	12"	64"	"	"	"	"	"	26"	53"	"	"
C-160D-173-100	8'-0"	10'-9"	15'-0"	12"	14'-5"	23'-2"	33¾"	12"	78"	63"	57¾"	16"	7'-8½"	26"	65¼"	46½"	32"	70½"	38¾"	65"	26¾"	34¼"
C-160D-173-86	"	9'-3"	"	"	"	"	"	24½"	"	74½"	"	"	6'-2½"	"	"	"	"	"	"	"	"	"
C-160D-200-74	"	8'-0"	"	9"	"	24'-1"	"	35¾"	"	77¼"	"	"	59½"	"	"	"	"	"	"	"	"	"
C-160D-173-74	7'-0"	"	13'-0"	"	13'-0½"	22'-8½"	"	17¼"	68"	68¼"	51¾"	12"	64"	"	"	"	"	"	29"	55"	"	"
C-160D-143-74	"	"	12'-9¾"	"	"	"	"	"	"	66¼"	"	"	"	"	"	"	"	"	"	"	"	"
C-160D-173-64	"	7'-0"	"	"	"	"	"	26½"	"	66½"	"	"	52"	"	"	"	"	69¾"	"	"	"	"
C-160D-143-64	6'-0"	"	11'-0"	"	11'-1¾"	18'-11¾"	"	18¾"	56"	53¼"	50¾"	"	62¾"	"	54¼"	"	"	"	30¾"	43"	17"	30¼"
C-114D-119-86	7'-0"	9'-3"	12'-9¾"	12"	12'-7"	21'-10½"	29¾"	16"	68"	52½"	51¾"	"	6'-7"	24"	68¼"	"	25"	66¾"	29"	55"	23"	34¼"
C-114D-143-74	"	8'-0"	"	9"	"	"	"	17¼"	"	66¼"	"	"	64"	"	"	"	"	"	"	"	"	"
C-114D-173-64	"	7'-0"	"	"	"	"	"	26¾"	"	66½"	"	"	52"	"	"	"	"	"	"	"	"	"
C-114D-143-64	6'-0"	"	11'-0"	"	10'-8¼"	18'-6¼"	"	18¾"	56"	53¼"	50¾"	"	62¾"	"	50¾"	"	"	"	30¾"	43"	13¾"	30¼"
C-114D-173-54	"	6'-0"	"	"	"	"	"	20"	"	61½"	"	"	50¾"	"	"	"	"	"	"	"	"	"
C-114D-133-54	5'-4"	"	9'-8"	"	10'-0"	17'-10"	"	14¾"	50"	49¼"	46¼"	10"	51"	"	"	"	"	67¼"	24"	37"	"	"
C-57D-76-54	4'-8"	"	8'-9"	"	9'-3¾"	16'-8½"	26"	13"	46"	39"	40¾"	"	"	20"	49¼"	"	"	58¼"	20"	33"	17½"	"
C-57D-109-48	"	5'-4"	"	"	"	"	"	15¼"	"	43¾"	"	"	43"	"	"	"	"	"	"	"	"	"
C-57D-95-48	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-57D-89-42	4'-0"	4'-8"	8'-2½"	6½"	8'-2"	13'-8¾"	28¼"	17½"	44"	40¾"	38½"	8"	41"	"	33¾"	40½"	"	58"	18"	33¾"	"	"
C-57D-76-42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-40D-76-48	"	5'-4"	"	9"	7'-9"	13'-6"	23¾"	14½"	"	35¼"	"	"	57"	17½"	28"	44¾"	20"	51"	10¾"	"	17"	21¼"
C-40D-89-42	"	4'-8"	"	6½"	"	"	"	17¾"	"	40¾"	"	"	41"	"	"	"	"	51¼"	"	"	"	"
C-40D-76-42	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-40D-89-36	"	4'-0"	"	"	"	"	"	15"	"	49½"	"	"	33"	"	"	"	"	"	"	"	"	"
C-25D-67-36	"	"	"	"	7'-4"	11'-7"	20¼"	13"	44"	50½"	"	"	"	13½"	27"	26¼"	17"	47"	"	"	15½"	"
C-25D-56-36	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
C-25D-67-30	3'-0"	3'-9"	7'-0½"	"	6'-3"	10'-6"	20½"	"	36"	37½"	31"	6"	31"	"	"	28"	"	"	"	27¾"	"	"
C-25D-53-30	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

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

LUFKIN MARK II UNITORQUE PUMPING UNITS

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. 17) 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. 17)

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%.

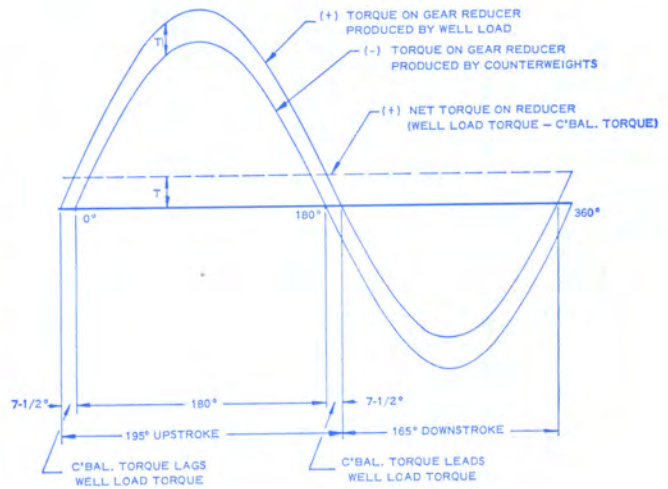


FIGURE 17

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 wellhead to the right.)



FIGURE 18

Lufkin M-1280D-427-216 driven by a slow speed engine.



FIGURE 19

"TWO-POINT" SUSPENSION bases are standard 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.

LUFKIN INDUSTRIES, INC.

LUFKIN, TEXAS

A PROVEN CONCEPT IN OILWELL PUMPING

The LUFKIN MARK II Uitorque Pumping Unit employs a new kinematic concept made of the tried and proven structural components of the conventional mechanical pumping unit. This 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 17 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.

MARK II PUMPING UNIT SPECIFICATIONS

UNIT DESIGNATION	M-1280D-427-216	M-912D-305-216	M-1280D-427-192	M-912D-305-192 M-640D-305-192 M-456D-305-192	M-912D-365-168	M-912D-305-168 M-640D-305-168 M-456D-305-168
POLISHED ROD CAPACITY, LBS.	42,700	30,500	42,700	30,500	36,500	30,500
STROKE LENGTH, INCHES	216, 192, 167	216, 192, 167	192, 168, 144	192, 168, 144	168, 149, 130	168, 149, 130
WALKING BEAM	24" x 130 Lbs.	24" x 130 Lbs.	24" x 130 Lbs.	24" x 130 Lbs.	24" x 100 Lbs.	24" x 84 Lbs.
CRANK PIN BEARING	1SB	1SB	1SB	1SB	1SB	1SB
SAMSON POST BEARING	P19	P19	P19	P19	P18	P18
CROSS YOKE BEARING	C232	C232	C232	C232	C22	C22
WIRELINE HANGER	1 3/8" x 16" Ctrs.	1 3/8" x 16" Ctrs.	1 3/8" x 16" Ctrs.	1 3/8" x 16" Ctrs.	1 3/8" x 12" Ctrs.	1 1/4" x 12" Ctrs.
CRANKS	216130 MRO	216130 MRO	192130 MRO	192130 MRO	168108 MRO	168108 MRO

UNIT DESIGNATION	M-912D-365-144 M-640D-365-144 M-456D-365-144	M-912D-305-144 M-640D-305-144 M-456D-305-144	M-640D-256-144 M-456D-256-144 M-320D-256-144	M-456D-365-120	M-640D-305-120 M-456D-305-120 M-320D-305-120	M-456D-256-120 M-320D-256-120 M-228D-256-120
POLISHED ROD CAPACITY, LBS.	36,500	30,500	25,600	36,500	30,500	25,600
STROKE LENGTH, INCHES	144, 128, 112	144, 128, 112	144, 128, 112	120, 104, 88	120, 104, 88	120, 104, 88
WALKING BEAM	24" x 84 Lbs.	24" x 84 Lbs.	21" x 68 Lbs.	24" x 84 Lbs.	24" x 84 Lbs.	21" x 68 Lbs.
CRANK PIN BEARING	1SB	2SB	2SB	1SB	2SB	2SB
SAMSON POST BEARING	P18	P18	P18	P18	P18	P18
CROSS YOKE BEARING	C232	C22	C22	C232	C22	C22(M-228D,C20)
WIRELINE HANGER	1 3/8" x 12" Ctrs.	1 1/4" x 12" Ctrs.	1 1/8" x 9" Ctrs.	1 3/8" x 12" Ctrs.	1 1/4" x 12" Ctrs.	1 1/8" x 9" Ctrs.
CRANKS	144108 MRO	144108 MRO	144108 MRO	120108 MR	120108 MR	120108 MR

UNIT DESIGNATION	M-320D-213-120 M-228D-213-120	M-320D-305-100	M-320D-256-100 M-228D-256-100	M-228D-173-100	M-228D-246-86	M-228D-213-86 M-160D-213-86
POLISHED ROD CAPACITY, LBS.	21,300	30,500	25,600	17,300	24,600	21,300
STROKE LENGTH, INCHES	120, 104, 88	100, 84, 68	100, 84, 68	100, 84, 68	86, 72.4, 58.6	86, 72.4, 58.6
WALKING BEAM	21" x 62 Lbs.	24" x 84 Lbs.	21" x 68 Lbs.	16" x 58 Lbs.	16" x 58 Lbs.	16" x 45 Lbs.
CRANK PIN BEARING	2SB	2SB	2SB	2SB	2SB	2SB
SAMSON POST BEARING	P18(M-228D,P16)	P18	P18	P16	P16	P16
CROSS YOKE BEARING	C22(M-228D,C19)	C22	C22(M-228D,C20)	C19	C20N	C20N
WIRELINE HANGER	1 1/8" x 9" Ctrs.	1 1/4" x 12" Ctrs.	1 1/8" x 9" Ctrs.	1 1/8" x 9" Ctrs.	1 1/8" x 9" Ctrs.	1" x 9" Ctrs.
CRANKS	120108 MR	100108 MR	100108 MR	100108 MR	8686 MR	8686 MR

UNIT DESIGNATION	M-160D-173-86	M-114D-143-86	M-228D-200-74 M-160D-200-74	M-228D-173-74 M-160D-173-74 M-114D-173-74	M-114D-143-74	M-114D-173-64	M-114D-143-64
POLISHED ROD CAPACITY, LBS.	17,300	14,300	20,000	17,300	14,300	17,300	14,300
STROKE LENGTH, INCHES	86, 72.4, 58.6	86, 74, 62	74, 60.4, 46.8	74, 60.4, 46.8	74, 60, 46	64, 52, 40	64, 52, 40
WALKING BEAM	16" x 40 Lbs.	14" x 30 Lbs.	16" x 45 Lbs.	16" x 40 Lbs.	14" x 30 Lbs.	14" x 34 Lbs.	14" x 30 Lbs.
CRANK PIN BEARING	2SB	4SB	2SB	2SB(M-114D,3SB)	4SB	3SB	4SB
SAMSON POST BEARING	P13	P13	P16	P13	P13	P13	P13
CROSS YOKE BEARING	C18N	C18N	C20N	C18N	C18N	C18N	C18N
WIRELINE HANGER	1" x 9" Ctrs.	1" x 9" Ctrs.	1" x 9" Ctrs.	1" x 9" Ctrs.	1" x 9" Ctrs.	1" x 9" Ctrs.	1" x 9" Ctrs.
CRANKS	8686 MR	8662 MR	7486 MR	7486 MR	7462 MR	6462 MR	6462 MR

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

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

MARK II PUMPING UNIT ASSEMBLIES — GENERAL DIMENSIONS

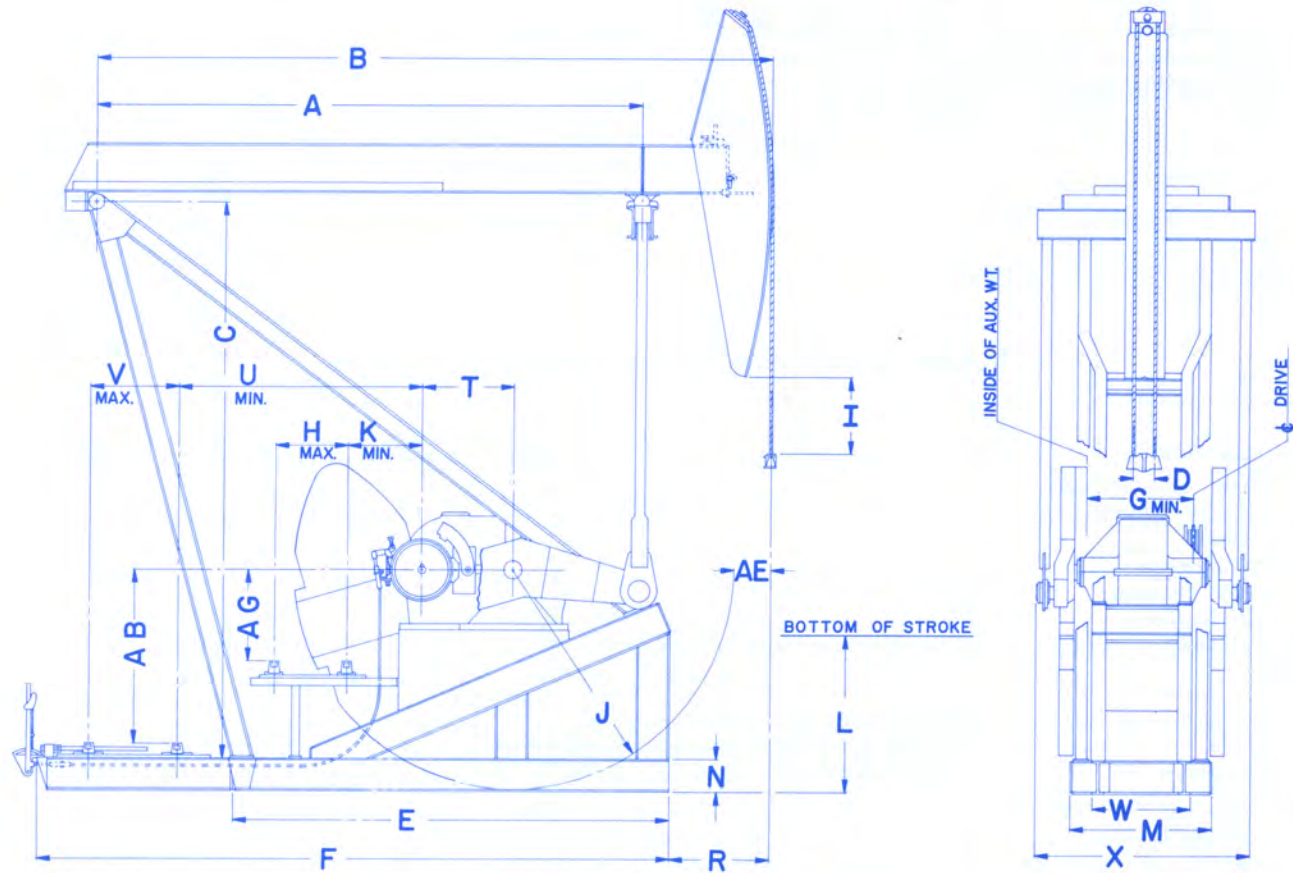


FIGURE 20

UNIT	A	B	C	D	E	F	G	H	I	J	K	L	M	N	R	T	U	V	W	X	AB	AE	AG
M-1280D-427-216	25'-6"	32'-0"	27'-5½"	16"	18'-7"	25'-2½"	57¾"	55"	47¼"	130"	31¾"	68¾"	8'-0"	18"	45"	52½"	11'-3¼"	48½"	48½"	9'-6"	9'-6"	25¾"	51"
M-1280D-427-192	"	"	"	"	"	"	"	"	72½"	"	"	71¼"	"	"	"	"	"	"	"	"	"	"	"
M-912D-305-216	"	"	"	"	"	"	54"	51¾"	47¼"	"	23"	68¾"	"	"	"	48½"	"	"	"	9'-1"	"	"	59½"
M-912D-305-192	"	"	"	"	"	"	"	"	72½"	"	"	71¼"	"	"	"	"	"	"	"	"	"	"	"
M-912D-365-168	22'-6"	27'-10"	23'-0¾"	12"	18'-2¾"	24'-10¼"	"	46¾"	42¾"	108"	25½"	71½"	6'-9½"	16"	48"	"	9'-2"	"	50"	8'-9"	7'-8"	19"	46½"
M-912D-305-168	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-912D-365-144	21'-6"	26'-0"	21'-0¾"	"	"	"	"	"	40"	"	"	75½"	"	"	42½"	"	"	"	"	"	"	"	13½"
M-912D-305-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	8'-7¾"	"	"	"
M-640D-305-192	25'-6"	32'-0"	27'-5½"	16"	18'-7"	25'-2½"	50¾"	51¾"	72½"	130"	26¾"	71¼"	8'-0"	18"	45"	41½"	11'-3¼"	"	48½"	8'-9"	9'-6"	25¾"	60¾"
M-640D-305-168	22'-6"	27'-10"	23'-0¾"	12"	18'-2¾"	24'-10¼"	"	46¾"	42¾"	108"	27¾"	71½"	6'-9½"	16"	48"	"	9'-2"	"	50"	8'-5"	7'-8"	23¾"	46½"
M-640D-365-144	21'-6"	26'-0"	21'-0¾"	"	"	"	"	"	40"	"	"	75½"	"	"	42½"	"	"	"	"	"	"	18"	"
M-640D-305-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-640D-256-144	"	"	"	9"	"	"	"	"	44¼"	"	"	71¾"	"	"	"	"	"	"	"	"	"	"	"
M-640D-305-120	"	"	"	12"	"	"	"	"	64¾"	"	"	75½"	"	"	"	"	"	"	"	"	"	"	"
M-456D-305-192	25'-6"	32'-0"	27'-5½"	16"	18'-7"	25'-2½"	"	51¾"	72½"	130"	29¾"	71¼"	8'-0"	18"	45"	38¾"	11'-3¼"	"	48½"	8'-9"	9'-6"	25¾"	60¾"
M-456D-305-168	22'-6"	27'-10"	23'-0¾"	12"	18'-2¾"	24'-10¼"	"	46¾"	42¾"	108"	31"	71½"	6'-9½"	16"	48"	"	9'-2"	"	50"	8'-5"	7'-8"	23¾"	46½"
M-456D-365-144	21'-6"	26'-0"	21'-0¾"	"	"	"	"	"	40"	"	"	75½"	"	"	42½"	"	"	"	"	"	"	18"	"
M-456D-305-144	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-456D-256-144	"	"	"	9"	"	"	"	"	44¼"	"	"	71¾"	"	"	"	"	"	"	"	"	8'-3¾"	"	"
M-456D-365-120	"	"	"	12"	"	"	"	"	64¾"	"	"	75½"	"	"	"	"	"	"	"	"	"	"	"
M-456D-305-120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-456D-256-120	"	"	"	9"	"	"	"	"	69"	"	"	71¾"	"	"	"	"	"	"	"	"	8'-3½"	"	"

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

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

MARK II PUMPING UNIT ASSEMBLIES — GENERAL DIMENSIONS

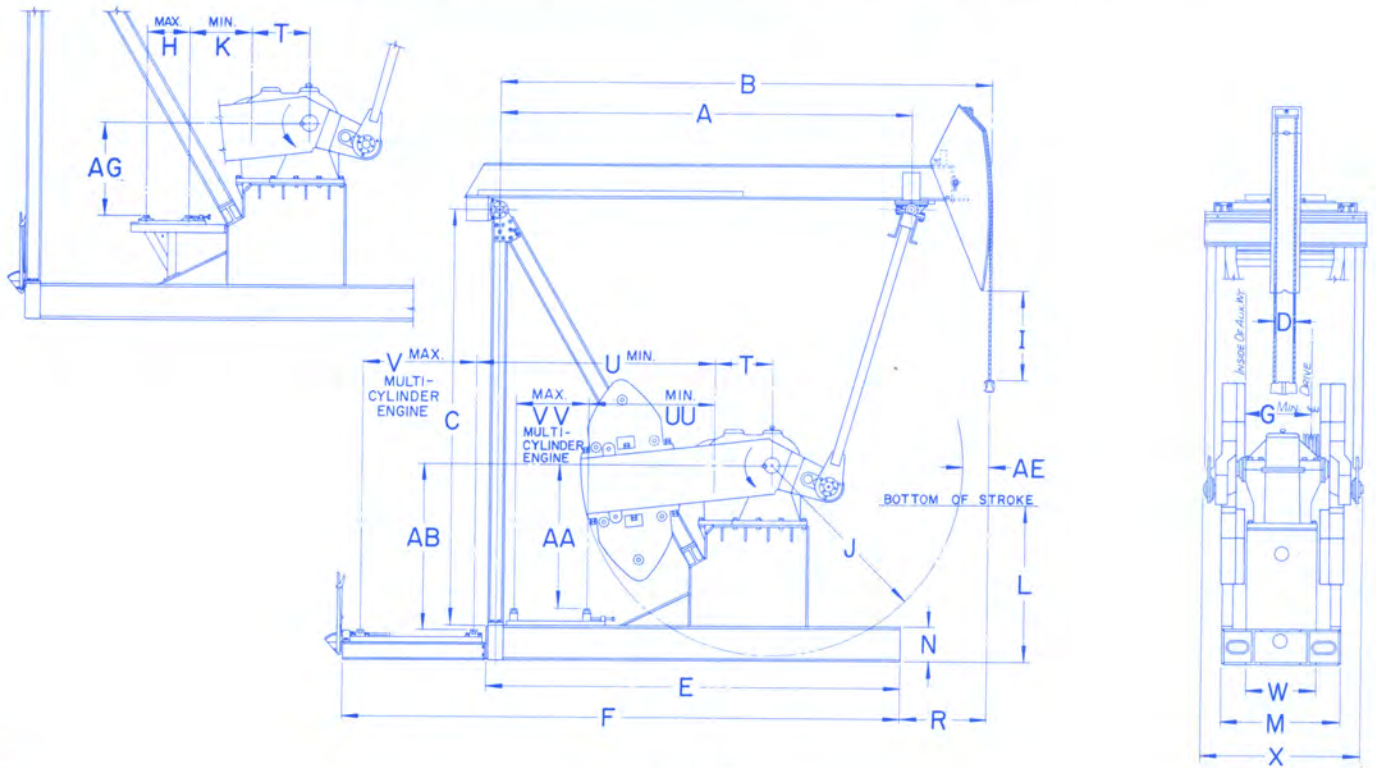


FIGURE 21

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-320D-256-144	21'-6"	26'-0"	21'-0 7/8"	9"	21'-3 1/2"	29'-2"	44 1/2"	33 3/4"	44 1/4"	108"	35 3/4"	71 1/4"	69 3/4"	16"	60"	34"	9'-4 3/8"	68 1/4"	43 1/2"	7'-4 3/8"	7'-2"	9'-0 1/8"	18"	46 1/8"	7'-4"	51 1/2"
M-320D-305-120	"	"	"	12"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-320D-256-120	"	"	"	9"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-320D-213-120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-320D-305-100	"	"	"	12"	"	"	"	"	7'-1"	"	"	74 3/4"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-320D-256-100	"	"	"	9"	"	"	"	"	7'-5"	"	"	71 1/4"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-228D-256-120	"	"	"	"	"	"	38 3/8"	29 3/4"	69"	"	41 1/8"	"	"	"	30"	"	"	37"	6'-9 3/8"	"	"	"	47 3/8"	7'-8"	"	
M-228D-213-120	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-228D-256-100	"	"	"	"	"	"	"	"	7'-5"	"	"	71 1/8"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-228D-173-100	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-228D-246-86	15'-6"	18'-6"	15'-8 3/8"	"	15'-6 1/2"	21'-0"	"	30 1/4"	40 3/4"	86 3/8"	22 1/4"	67 3/4"	57"	39"	"	8'-7 3/4"	51 1/2"	"	6'-8 3/8"	**	6'-3"	11 3/8"	40 1/2"	**	**	
M-228D-213-86	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-228D-200-74	"	"	"	"	"	"	"	"	52 1/2"	"	"	68 3/4"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-228D-173-74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-160D-213-86	"	"	"	"	"	"	32 3/8"	33 3/4"	40 3/4"	"	24 1/2"	67 3/8"	54"	"	26"	8'-11 1/4"	"	32"	6'-0 3/8"	**	"	"	38 3/4"	**	**	
M-160D-173-86	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-160D-200-74	"	"	"	"	"	"	"	"	52 1/2"	"	"	68 1/4"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-160D-173-74	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-114D-143-86	13'-6"	15'-9"	12'-3 1/2"	"	13'-0 3/4"	18'-6 1/4"	29 3/8"	30"	14 1/4"	62"	20 3/8"	51 1/8"	42 3/4"	12"	36"	24"	8'-0 1/2"	"	25"	67 3/8"	**	50"	16"	31 1/8"	**	**
M-114D-173-74	15'-6"	18'-6"	15'-8 3/8"	"	15'-6 1/2"	21'-0"	"	30 3/4"	52 1/2"	86 3/8"	28"	68 1/4"	54"	16"	39"	"	9'-1 3/4"	"	"	69"	**	6'-3"	11 3/8"	43 1/4"	**	**
M-114D-143-74	13'-6"	15'-9"	12'-3 1/2"	"	13'-0 3/4"	18'-6 1/4"	"	30"	26 1/2"	62"	20 3/8"	51 1/8"	42 3/4"	12"	36"	"	8'-0 1/2"	"	"	67 3/8"	**	50"	16"	31 1/8"	**	**
M-114D-173-64	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
M-114D-143-64	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

* On 100", 120", 144" and 168" Stroke Units, Multi-Cylinder Engines are Mounted on Main Base 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: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.
 Do not use above dimensions for foundation. Request foundation plan.

MARK II COUNTERBALANCE DATA

All Counterbalance Shown In Lbs., Effective At Polished Rod With Weights At Maximum Position, **Including Structural Unbalance.**

See Example Page 3933.

UNIT	M-1280D-427-216	M-1280D-427-192 M-912D-305-192 M-640D-305-192 M-456D-305-192	M-912D-305-168	M-912D-305-168 M-640D-305-168 M-456D-305-168	M-912D-365-144 M-640D-365-144 M-456D-365-144	M-912D-305-144 M-640D-305-144 M-456D-305-144	M-640D-256-144 M-456D-256-144 M-320D-256-144
	M-1280D-427-216 M-912D-305-216	M-1280D-427-192 M-912D-305-192 M-640D-305-192 M-456D-305-192	M-912D-305-168	M-912D-305-168 M-640D-305-168 M-456D-305-168	M-912D-365-144 M-640D-365-144 M-456D-365-144	M-912D-305-144 M-640D-305-144 M-456D-305-144	M-640D-256-144 M-456D-256-144 M-320D-256-144
STROKE	216"	192"	168"	168"	144"	144"	144"
STRUCTURAL UNBALANCE	-7,450 Lbs.	-7,160 Lbs.	-5,385 Lbs.	-4,860 Lbs.	-4,680 Lbs.	-4,300 Lbs.	-4,010 Lbs.
CRANKS	216130 MRO	192130 MRO	168108 MRO	168108 MRO	144108 MRO	144108 MRO	144108 MRO
C'Bal., Cranks Only	1,930	3,415	490	1,015	3,130	3,515	3,805
4 No. 13RO Counterweights	21,775	25,010	.....	.....	.....	.....	.....
4 No. 13D Counterweights	32,785	36,995	.....	.....	.....	.....	.....
4 No. OORO Counterweights	18,140	21,060	16,140	16,665	21,835	22,220	22,510
4 No. OOS Aux. Weights	23,030	26,380	20,860	21,390	27,480	27,865	.....
8 No. OOS Aux. Weights	27,920	31,705	25,585	26,110	33,125	.....	.....
4 No. ORO Counterweights	16,070	18,805	14,140	14,665	19,450	19,830	20,120
4 No. OS Aux. Weights	20,765	23,915	18,675	19,200	24,865	25,250	.....
8 No. OS Aux. Weights	25,460	29,025	23,210	23,735	30,285	.....	.....
4 No. OARO Counterweights	13,720	16,245	12,025	12,550	16,920	17,300	17,590
4 No. OAS Aux. Weights	17,370	20,220	15,600	16,125	21,190	21,570	21,860
8 No. OAS Aux. Weights	21,020	24,195	19,170	19,095	25,460	25,840	.....
4 No. 1RO Counterweights	11,080	13,375	9,465	9,990	13,860	14,245	14,530
4 No. 1S Aux. Weights	13,890	16,435	12,225	12,750	17,160	17,540	17,830
8 No. 1S Aux. Weights	16,705	19,500	14,985	15,510	20,460	20,840	*21,130
4 No. 2RO Counterweights	9,525	11,680	7,960	8,485	12,055	12,440	12,730
4 No. 2S Aux. Weights	12,245	14,645	10,635	11,160	15,255	15,640	15,930
8 No. 2S Aux. Weights	14,970	17,605	13,310	13,835	18,455	18,840	*19,125
4 No. 3CRO Counterweights	8,000	10,025	6,505	7,030	10,320	10,705	10,990
4 No. 3BS Aux. Weights	10,620	12,875	9,100	9,620	13,420	13,800	14,090
8 No. 3S Aux. Weights	13,240	15,725	11,695	12,210	16,520	16,895	*17,190
4 No. 5ARO Counterweights	6,285	8,160	4,850	5,375	8,345	8,725	9,015
4 No. 5A Aux. Weights	8,040	10,070	6,110	7,135	10,450	10,830	11,120
8 No. 5A Aux. Weights	9,795	11,980	7,370	8,895	12,555	12,935	*13,225
4 No. 5CRO Counterweights	5,120	6,890	3,695	4,220	6,960	7,345	7,635
4 No. 5C Aux. Weights	6,700	8,610	5,280	5,805	8,855	9,240	9,525
8 No. 5C Aux. Weights	8,280	10,325	6,860	7,385	10,745	11,125	*11,415
4 No. 6RO Counterweights	4,390	6,106	2,970	3,495	6,095	6,480	6,770
4 No. 6 Aux. Weights	5,320	7,110	3,905	4,430	7,215	7,600	7,890
8 No. 6 Aux. Weights	6,250	8,115	4,840	5,365	8,335	8,720	9,010
4 No. 7RO Counterweights	3,490	5,115	2,065	2,590	5,015	5,400	5,690
4 No. 7 Aux. Weights	4,190	5,880	2,775	3,300	5,865	6,250	6,540
8 No. 7 Aux. Weights	4,890	6,645	3,485	4,010	6,715	7,100	7,390

UNIT	M-320D-305-100	M-320D-256-100	M-228D-256-100	M-228D-173-100	M-228D-246-86	M-228D-213-86 M-160D-213-86	M-160D-173-86	M-114D-143-86
	M-320D-305-100	M-320D-256-100	M-228D-256-100	M-228D-173-100	M-228D-246-86	M-228D-213-86 M-160D-213-86	M-160D-173-86	M-114D-143-86
STROKE	100"	100"	100"	100"	86"	86"	86"	86"
STRUCTURAL UNBALANCE	-3,700 Lbs.	-3,470 Lbs.	-3,285 Lbs.	-3,175 Lbs.	-2,140 Lbs.	-2,040 Lbs.	-1,930 Lbs.	-1,535 Lbs.
CRANKS	100108 MR	100108 MR	100108 MR	100108 MR	8686 MR	8686 MR	8686 MR	8662 MR
C'Bal., Cranks Only	4,710	4,940	5,152	5,235	2,740	2,840	2,960	1,535
4 No. 1RO Counterweights	19,580	19,810	19,995	20,105	15,700	15,800	15,930	9,560
4 No. 1S Aux. Weights	24,155	24,385	24,569	24,680	19,685	19,785	19,920	13,420
4 No. 2RO Counterweights	17,085	17,315	17,500	17,610	13,565	13,665	13,795	8,300
4 No. 2S Aux. Weights	21,515	21,745	21,930	22,140	17,445	17,545	17,680	10,725
4 No. 3CRO Counterweights	14,675	14,905	15,090	16,000	11,570	11,670	11,795	7,220
4 No. 3BS Aux. Weights	18,970	19,200	19,385	19,495	15,375	15,475	15,605	9,675
4 No. 5ARO Counterweights	11,935	12,165	12,350	12,460	9,255	9,355	9,480	5,900
4 No. 5AS Aux. Weights	14,855	15,085	15,270	15,380	11,890	11,990	12,120	7,675
4 No. 5CRO Counterweights	10,020	10,250	10,435	10,535	7,545	7,645	7,770	4,785
4 No. 5CS Aux. Weights	12,645	12,875	13,060	13,170	9,925	10,025	10,150	6,395
4 No. 6RO Counterweights	8,820	9,050	9,235	9,345	6,480	6,580	6,705	4,095
4 No. 6 Aux. Weights	10,375	10,605	10,790	10,900	7,895	7,995	8,120	5,060
8 No. 6 Aux. Weights	11,930	12,160	12,345	12,455	9,310	.....	.....	6,025
4 No. 7RO Counterweights	7,325	7,555	7,740	7,850	5,135	5,235	5,355	3,190
4 No. 7 Aux. Weights	8,500	8,730	8,915	9,025	6,210	6,310	6,430	3,940
8 No. 7 Aux. Weights	9,675	9,905	10,090	10,200	7,285	.....	.....	4,690

*8 Type S Aux. Weights will not clear Belt Cover on M-320D unit.

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

MARK II COUNTERBALANCE DATA

All Counterbalance Shown In Lbs., Effective At Polished Rod With Weights At Maximum Position, **Including Structural Unbalance.**

See Example below.

UNIT	M-456D-365-120	M-640D-305-120 M-456D-305-120 M-320D-305-120	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"
STRUCTURAL UNBALANCE	-4,510 Lbs.	-4,130 Lbs.	-3,840 Lbs.	-3,620 Lbs.	-3,435 Lbs.	-3,560 Lbs.	-3,235 Lbs.
CRANKS	120108 MR	120108 MR	120108 MR	120108 MR	120108 MR	120108 MR	120108 MR
C'Bal. Cranks Only	2,020	2,410	2,700	2,920	3,105	2,980	3,305
4 No. ORO Counterweights	21,200	21,595	21,885	22,105	22,285	.....	.....
4 No. OS Aux. Weights	27,570	27,965	.....	.....	.....	.....	.....
4 No. OARO Counterweights	18,230	18,620	18,910	19,130	19,315	19,190	19,515
4 No. OAS Aux. Weights	23,245	23,640	23,930	24,150	24,335	.....	.....
8 No. OAS Aux. Weights	28,265	*28,660	.....	.....	.....	.....	.....
4 No. 1RO Counterweights	14,630	15,025	15,315	15,535	15,720	15,595	15,920
4 No. 1S Aux. Weights	18,510	18,905	19,195	19,410	19,595	19,470	19,795
8 No. 1S Aux. Weights	22,390	*22,780	23,070	.....	.....	.....	.....
4 No. 2RO Counterweights	12,515	12,905	13,195	13,415	13,600	13,475	13,800
4 No. 2S Aux. Weights	16,275	16,665	16,955	17,175	17,360	17,235	17,560
8 No. 2S Aux. Weights	20,035	*20,425	20,715	.....	.....	.....	.....
4 No. 3CRO Counterweights	10,470	10,865	11,155	11,375	11,560	11,435	11,760
4 No. 3BS Aux. Weights	14,115	14,505	14,795	15,015	15,200	15,075	15,400
8 No. 3S Aux. Weights	17,760	*18,145	18,435	.....	.....	.....	.....
4 No. 5ARO Counterweights	8,145	8,540	8,830	9,050	9,235	9,110	9,435
4 No. 5A Aux. Weights	10,620	11,015	11,305	11,525	11,710	11,585	11,910
8 No. 5A Aux. Weights	13,095	*13,490	13,780	.....	.....	.....	.....
4 No. 5CRO Counterweights	6,520	6,915	7,205	7,425	7,610	7,485	7,810
4 No. 5C Aux. Weights	8,750	9,140	9,430	9,650	9,835	9,710	10,035
8 No. 5C Aux. Weights	10,970	*11,360	11,650	.....	.....	.....	.....
4 No. 6RO Counterweights	5,505	5,900	6,190	6,410	6,595	6,470	6,790
4 No. 6 Aux. Weights	6,820	7,215	7,505	7,725	7,910	7,785	8,110
8 No. 6 Aux. Weights	8,135	8,530	8,820	9,040	9,225	9,100	9,430
4 No. 7RO Counterweights	4,235	4,630	4,920	5,140	5,325	5,200	5,525
4 No. 7 Aux. Weights	5,235	5,625	5,915	6,135	6,320	6,195	6,520
8 No. 7 Aux. Weights	6,235	6,620	6,910	7,130	7,315	7,190	7,515

*8 Type S Aux. Weights will not clear Belt Cover on M-320D Unit.

UNIT	M-228D-200-74	M-160D-200-74	M-228D-173-74 M-160D-173-74	M-114D-173-74	M-114D-143-74	M-114D-173-64 M-114D-143-64
STROKE	74"	74"	74"	74"	74"	64"
STRUCTURAL UNBALANCE	-1,960 Lbs.	-1,890 Lbs.	-1,860 Lbs.	-1,820 Lbs.	-1,440 Lbs.	-1,420 Lbs.
CRANKS	7486 MR	7486 MR	7486 MR	7486 MR	7462 MR	6462 MR
C'Bal., Cranks Only	3,705	3,775	3,805	3,880	2,245	2,855
4 No. 2RO Counterweights	16,085	16,155	16,185	16,305	9,935	11,620
4 No. 2S Aux. Weights	.....	.....	.....	.....	12,690	14,760
4 No. 3CRO Counterweights	13,805	13,875	13,905	14,015	8,710	10,225
4 No. 3BS Aux. Weights	18,155	18,225	18,255	18,385	11,495	13,400
4 No. 5ARO Counterweights	11,155	11,225	11,255	11,355	7,205	8,515
4 No. 5AS Aux. Weights	14,165	14,235	14,265	14,380	9,225	10,815
4 No. 5CRO Counterweights	9,200	9,270	9,300	9,395	5,940	7,070
4 No. 5CS Aux. Weights	11,920	11,940	12,020	12,125	7,770	9,155
4 No. 6RO Counterweights	7,985	8,055	8,085	8,175	5,155	6,175
4 No. 6 Aux. Weights	9,595	9,665	9,695	9,795	6,255	7,425
8 No. 6 Aux. Weights	11,205	.....	.....	11,415	7,355	8,675
4 No. 7RO Counterweights	6,440	6,510	6,540	6,625	4,125	5,005
4 No. 7 Aux. Weights	7,670	7,740	7,770	7,860	4,975	5,970
8 No. 7 Aux. Weights	8,900	.....	.....	9,095	5,825	6,935

EXAMPLE:

A M-456D-305-144 with 4 No. ORO Counterweights and 4 No. OS Auxiliary Weights would have a maximum counterbalance effect of 25,250 lbs. in the 144" stroke. (See other examples, pages 3924 and 3925.)

Structural Unbalance with a negative (-) sign indicates a walking beam assembly that is heavy on the well end.

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

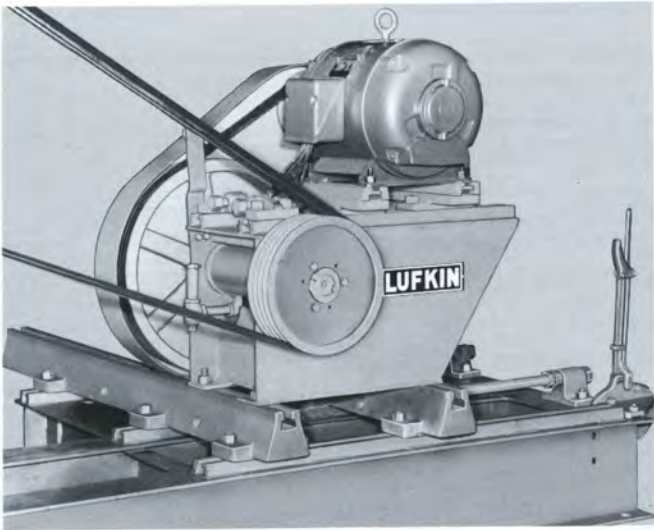


FIGURE 22

This assembly utilizes an electric motor and counter-shaft 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

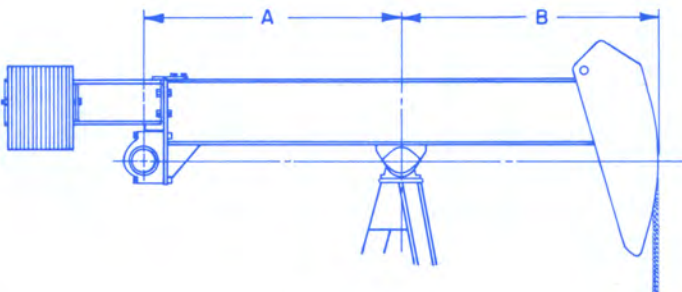


FIGURE 23

BEAM EXTENSIONS FOR EXTRA COUNTERBALANCE

These extensions are available for older units as well as current units. They are made in two sizes and can be adapted to crank balanced units now in service by burning 8 holes in the walking beam.

Extension	Max. Weight Added, Lbs.	Distance from Equalizer Bearing to Center of Weights	Max. Counterbalance Added, Lbs.*
48"	2600	28"	$2600(A+28") \div B$
60"	4000	40"	$4000(A+40") \div B$

* For the A and B dimensions refer to the General Dimensions Sheet of the particular unit in question.

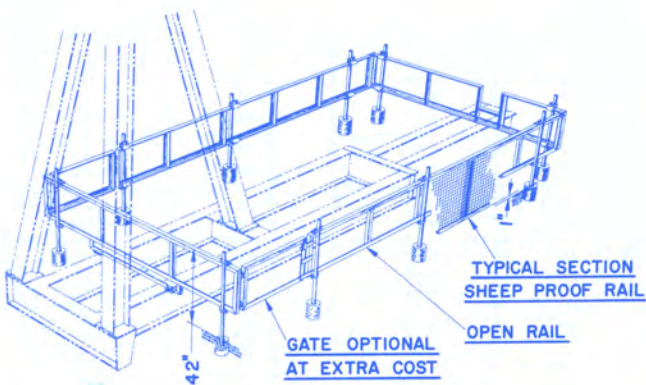


FIGURE 24
RAIL TYPE CRANK GUARDS

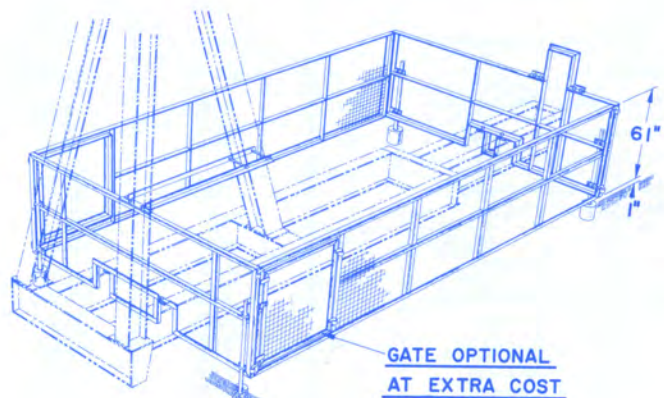


FIGURE 25
TYPE W SHEEP PROOF CRANK GUARDS

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.

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.

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 preset 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.

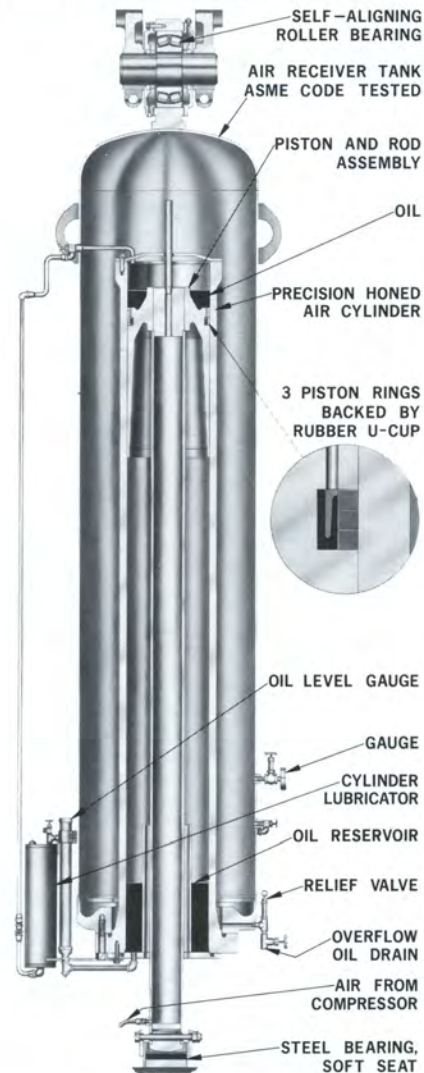


FIGURE 26



FIGURE 27

Mobile A-456D-365-120 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.



FIGURE 28

A-456D-305-144 Air Balanced Unit, Electric Motor Drive.

GENERAL DIMENSIONS — LUFKIN AIR BALANCED PUMPING UNITS

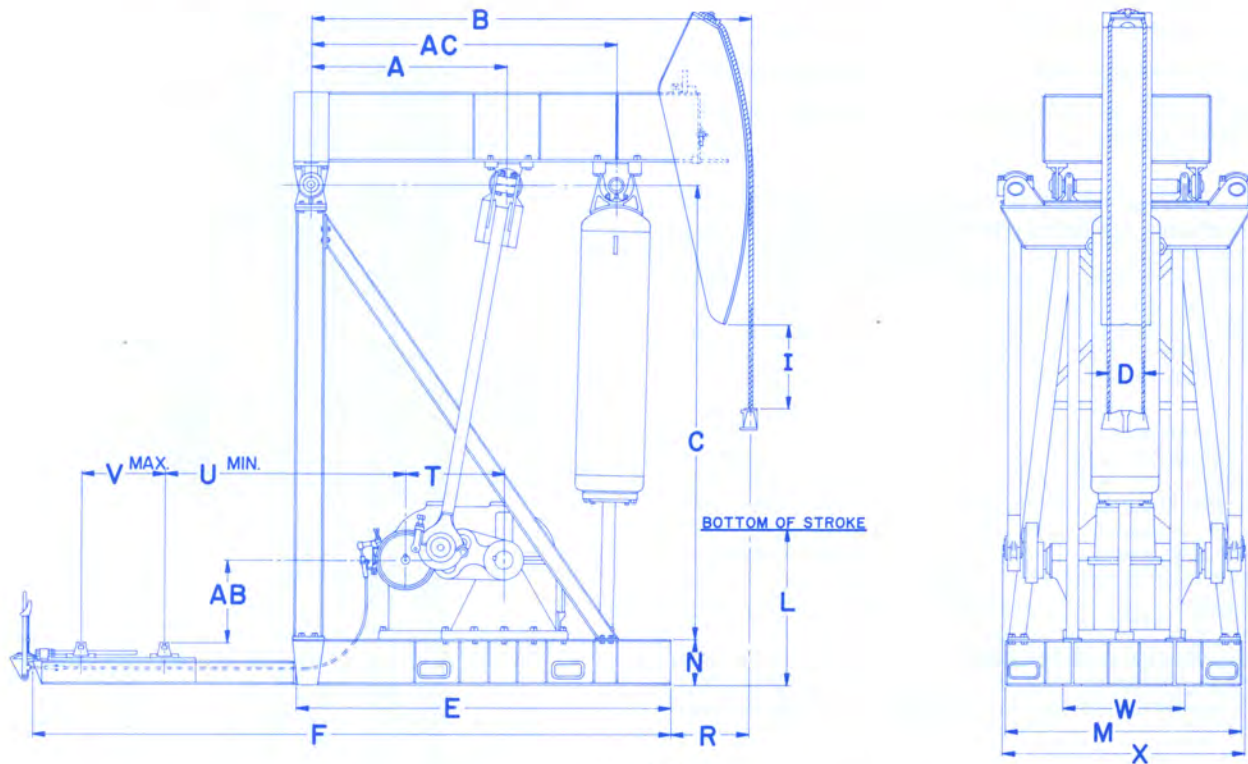


FIGURE 29

UNIT	A	B	C	D	E	F	I	L	M	N	R	T	U	V	W	X	AB	AC
A-3648D-470-300	10'-5"	28'-6"	30'-0"	16"	*	35'-6"	19½"	54"	9'-8"	24"	48"	84½"	6'-1½"	44¾"	70¾"	11'-4½"	42"	17'-2"
A-3648D-470-240	11'-2½"	28'-0"	25'-3½"	"	*	32'-0"	16½"	56"	9'-6"	21"	"	"	6'-11½"	"	"	"	"	19'-5½"
A-2560D-470-300	10'-5"	28'-6"	30'-0"	"	*	35'-6"	19½"	54"	9'-8"	24"	"	70"	"	"	66½"	11'-0½"	"	17'-2"
A-2560D-470-240	11'-2½"	28'-0"	25'-3½"	"	*	32'-0"	16"	57½"	8'-10"	21"	"	"	7'-9½"	"	"	10'-10½"	36"	19'-5½"
A-1824D-470-300	10'-5"	28'-6"	30'-0"	"	*	35'-6"	19½"	54"	9'-8"	24"	"	58¾"	7'-10½"	"	50¼"	9'-9½"	42"	17'-2"
A-1824D-470-240	11'-2½"	28'-0"	25'-3½"	"	*	32'-0"	16"	57½"	8'-0"	21"	"	"	8'-8½"	"	"	9'-7½"	30"	19'-5½"
A-1824D-427-192	10'-1½"	23'-0"	21'-0"	"	19'-4½"	27'-1½"	17½"	52"	7'-11½"	"	"	"	8'-1"	41"	"	"	34¾"	14'-3½"
A-1280D-470-300	10'-5"	28'-6"	30'-0"	"	*	35'-6"	19½"	54"	9'-8"	24"	"	52½"	8'-5"	44¾"	"	9'-3½"	42"	17'-2"
A-1280D-470-240	11'-2½"	28'-0"	25'-3½"	"	*	32'-0"	16"	57½"	8'-10"	21"	"	"	9'-3"	"	"	9'-1½"	30"	19'-5½"
A-1280D-427-192	10'-11½"	23'-0"	21'-0"	"	19'-4½"	27'-1½"	17½"	52"	7'-11½"	"	"	"	8'-7½"	"	"	"	34¾"	14'-3½"
A-1280D-305-168	7'-4"	19'-3"	20'-4"	"	14'-10½"	22'-0½"	16"	66½"	"	16½"	59"	"	6'-0"	"	"	8'-11½"	38½"	10'-11½"
A-912D-470-240	11'-2½"	28'-0"	25'-3½"	"	*	32'-0"	"	57½"	8'-10"	21"	48"	48½"	9'-7"	44¾"	50"	8'-6½"	24"	19'-5½"
A-912D-427-192	10'-1½"	23'-0"	21'-0"	"	19'-4½"	27'-1½"	17½"	52"	"	"	"	"	9'-2"	"	"	"	28¾"	14'-3½"
A-912D-305-168	7'-4"	19'-3"	20'-4"	"	14'-10½"	22'-0½"	16"	66½"	"	16½"	59"	"	6'-4"	"	"	8'-4½"	32½"	10'-11½"
A-912D-427-144	"	16'-8"	17'-10"	"	12'-3½"	19'-5½"	20½"	55"	"	"	"	"	"	"	"	"	"	"
A-640D-305-168	"	19'-3"	20'-4"	"	14'-10½"	22'-0½"	16"	66½"	"	"	"	41½"	7'-0"	"	46¾"	"	30½"	"
A-640D-427-144	"	16'-8"	17'-10"	"	12'-3½"	19'-5½"	20½"	55"	"	"	"	"	"	"	"	"	"	"
A-640D-305-144	6'-5"	17'-4"	"	12"	12'-11½"	20'-1¼"	12½"	62½"	7'-6"	"	57"	"	71½"	"	"	"	"	9'-10"
A-640D-365-120	"	14'-7"	15'-7"	"	10'-11½"	18'-1¼"	22"	49½"	"	"	47½"	"	"	"	"	"	"	"
A-456D-305-144	"	17'-4"	17'-10"	"	12'-11½"	20'-1¼"	12½"	62½"	"	"	57"	38½"	6'-2"	"	"	"	"	"
A-456D-365-120	"	14'-7"	"	"	10'-11½"	18'-1¼"	22"	49½"	"	"	47½"	"	"	"	"	"	"	"
A-456D-256-120	69"	15'-4"	15'-7"	"	11'-11½"	19'-1"	14½"	57"	7'-1½"	"	"	"	"	"	"	"	"	8'-8"
A-320D-256-120	70"	14'-7"	"	"	11'-3¼"	18'-11¼"	"	"	"	"	53"	34"	6'-6"	"	43¾"	7'-3½"	"	8'-11"
A-320D-305-100	"	12'-11"	13'-4"	"	10'-0¼"	17'-8¼"	13"	53"	"	"	39"	"	"	"	"	"	"	"
A-228D-173-100	56"	12'-7"	12'-5"	"	8'-3¼"	15'-0¼"	17"	46¾"	6'-1½"	"	36"	30"	47"	50"	37¼"	6'-8½"	29½"	7'-3½"
A-228D-246-86	"	10'-11"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
A-160D-200-74	50"	10'-0"	11'-9"	"	7'-11"	14'-6¾"	16½"	51"	"	9¾"	35½"	26"	57"	43½"	32"	69¾"	22"	6'-5½"
A-114D-173-64	48"	9'-7"	11'-0"	9"	7'-5½"	14'-5¾"	15"	55½"	63¾"	"	36"	24"	64"	42"	25¼"	66¾"	13¾"	6'-0½"

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

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

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

LUFKIN INDUSTRIES, INC.

LUFKIN, TEXAS

RATING CHART

UNIT	Polish Rod Load Class, Lbs.	Stroke Length, Inches	Piston Dia., Inches	Walking Beam Size	Wireline Hanger Dia. & Centers	*Floating Hub Sheave Sizes, P.D. Inches	Bearings			
							Crank Pin	Equal-izer	Samson Post	Air Tank
A-3648D-470-300 A-3648D-470-240	47,000 "	300-240 240-200	17½ 14½	36 x 16½ @ 280#	Double 1¼" x 16"	80" (18D) "	OS OT	E44 "	P22 P19	240 334
A-2560D-470-300 A-2560D-470-240	" "	300-240 240-200	17½ 14½	36 x 16½ @ 245#	" 1⅝" x 16"	68" (16D) "	OS OT	E32 "	P22 P19	240 334
A-1824D-470-300 A-1824D-470-240 A-1824D-427-192	" " 42,700	300-240 240-200 192-168-144	17½ 14½ "	" " 33 x 15¼ @ 200#	Double 1¼" x 16" 1⅝" x 16" "	40, 46, 51, 55, 68, (11D) " "	OS OT "	E26 " "	P22 P19 "	240 334 "
A-1280D-470-300 A-1280D-470-240 A-1280D-427-192 A-1280D-305-168	47,000 " 42,700 30,500	300-240 240-200 192-168-144 168-141-118	17½ 14½ " 13	36 x 16½ @ 245# " 33 x 15¼ @ 200# 27 x 14 @ 160#	Double 1¼" x 16" 1⅝" x 16" " "	40, 46, 51, 55, 68, (10D) " " "	OS OT " "	" " " "	P22 P19 " "	240 334 " 232
A-912D-470-240 A-912D-427-192 A-912D-305-168 A-912D-427-144	47,000 42,700 30,500 42,700	240-200 192-168-144 168-141-118 144-120-100	14½ " 13 "	36 x 16½ @ 245# 33 x 15¼ @ 200# 24 x 14 @ 145# 27 x 14 @ 160#	" " " "	28, 34, 40, 46, 51, (8D) " 28, 34, 40, 46, 51, (6D) "	OT " " "	" " " "	" " " "	334 " 232 "
A-640D-305-168 A-640D-427-144 A-640D-305-144 A-640D-365-120	30,500 42,700 30,500 36,500	168-141-118 144-120-100 " 120-100-86	" " 12 "	24 x 14 @ 145# 27 x 14 @ 160# 24 x 14 @ 130# "	" " 1¼" x 12" "	28, 34, 40, 46, 51, (6D) " " "	" " " "	" " " P18	" " " "	" " 326 "
A-456D-305-144 A-456D-365-120 A-456D-256-120	30,500 36,500 25,600	144-120-100 120-100-86 "	" " 11	" " 24 x 12 @ 100#	" " "	28,34,40,46,51(6D or 8C) " "	" " "	" " "	" " "	" " 324
A-320D-256-120 A-320D-305-100	" 30,500	120-104-90 100-86-74	" "	" "	" "	25, 30, 36, 42, 47¼ (6C or 5D) "	2T "	E22 "	" "	" "
A-228D-173-100 A-228D-246-86	17,300 24,600	" 86-74-64	10 "	21 x 9 @ 82# "	1⅝" x 12" "	24¼, 30, 36, 41¼ (5C or 4D) "	" "	" "	P17 "	322 "
A-160D-200-74 A-114D-173-64	20,000 17,300	74-64-54 64-54	" 8	18 x 8¾ @ 77# 16 x 8½ @ 64#	" 1" x 9"	24¼, 29¼, 33¼, 38 (4C or 3D) 19¼, 24, 29¼, 33¼, (3C)	3TA "	E19 E18	P16 "	" 318

* 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.

COUNTERBALANCE DATA
Effective Counterbalance In Pounds Based On Average Pressure

UNIT	* Average Pressure, PSIG											
	150	175	200	225	250	275	300	325	350	375	400	410
A-3648D-470-300 A-2560D-470-300 A-1824D-470-300 A-1280D-470-300	.....	3,045	6,665	10,290	13,910	17,535	21,155	24,780	28,400	32,025	35,645	37,000
A-3648D-470-240 A-2560D-470-240 A-1824D-470-240 A-1280D-470-240 A-912D-470-240	.....	2,870	5,740	8,610	11,480	14,350	17,220	20,090	22,960	25,830	28,700	29,850
A-1824D-427-192 A-1280D-427-192 A-912D-427-192	3,905	6,475	9,045	11,615	14,185	16,755	19,325	21,895	24,465	27,035	29,605	30,635
A-1280D-305-168 A-912D-305-168 A-640D-305-168	2,810	4,700	6,585	8,475	10,365	12,250	14,140	16,030	17,915	19,805	21,695	22,450
A-912D-427-144 A-640D-427-144	5,240	7,420	9,605	11,785	13,970	16,150	18,335	20,515	22,700	24,880	27,065	27,935
A-640D-305-144 A-456D-305-144	3,520	5,125	6,725	8,330	9,935	11,540	13,145	14,745	16,350	17,955	19,560	20,200
A-640D-365-120 A-456D-365-120	4,725	6,630	8,535	10,440	12,345	14,250	16,155	18,060	19,965	21,870	23,775	24,535
A-456D-256-120 A-320D-256-120	4,035	5,415	6,795	8,175	9,560	10,940	12,320	13,700	15,085	16,465	17,845	18,400
A-320D-305-100	4,855	6,495	8,135	9,775	11,415	13,055	14,695	16,335	17,975	19,615	21,255	21,910
A-228D-173-100	2,925	4,060	5,195	6,335	7,470	8,610	9,745	10,885	12,020	13,160	14,295	14,750
A-228D-246-86	4,045	5,355	6,670	7,980	9,295	10,605	11,920	13,230	14,545	15,855	17,170	17,695
A-160D-200-74	4,410	5,680	6,945	8,215	9,480	10,750	12,015	13,285	14,550	15,820	17,085	17,595
A-114D-173-64	2,760	3,550	4,345	5,135	5,930	6,720	7,515	8,305	9,100	9,890	10,685	11,000

* Pressure Shown is Average Pressure Between Maximum and Minimum and Occurs at Approximately Beam Horizontal Position. For Counterbalance at Other Pressures Use Direct Interpolation.

NOTE: Preferred units shown in blue are manufactured in larger quantities and are often more readily available. All other standard units are shown in black.

LUFKIN PUMPING UNITS NOMENCLATURE

FIGURE 30
Conventional Pumping Unit Nomenclature

Reprints Available
Request Forms
F-1079 for Conventional Pumping Unit,
F-1080 for Mark II Pumping Unit, and
F-1081 for Air Balanced Pumping Unit
Also Available in Spanish

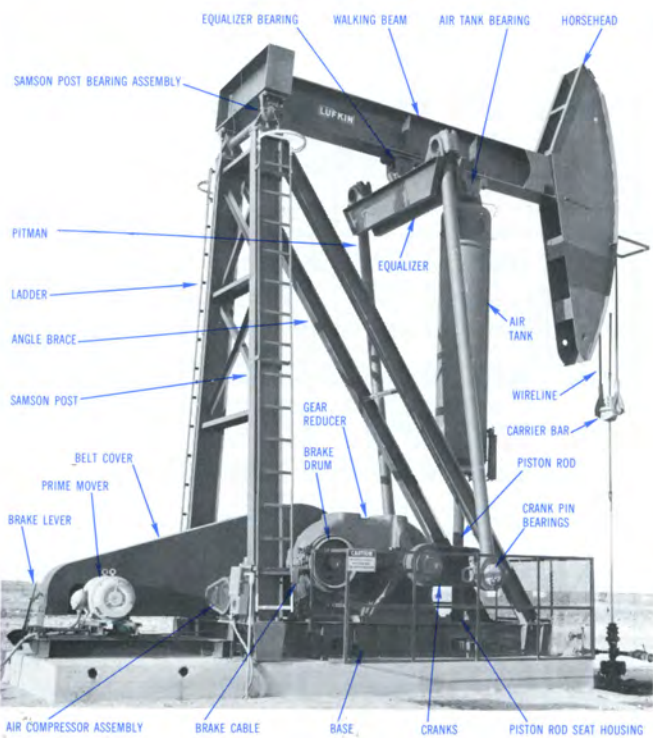
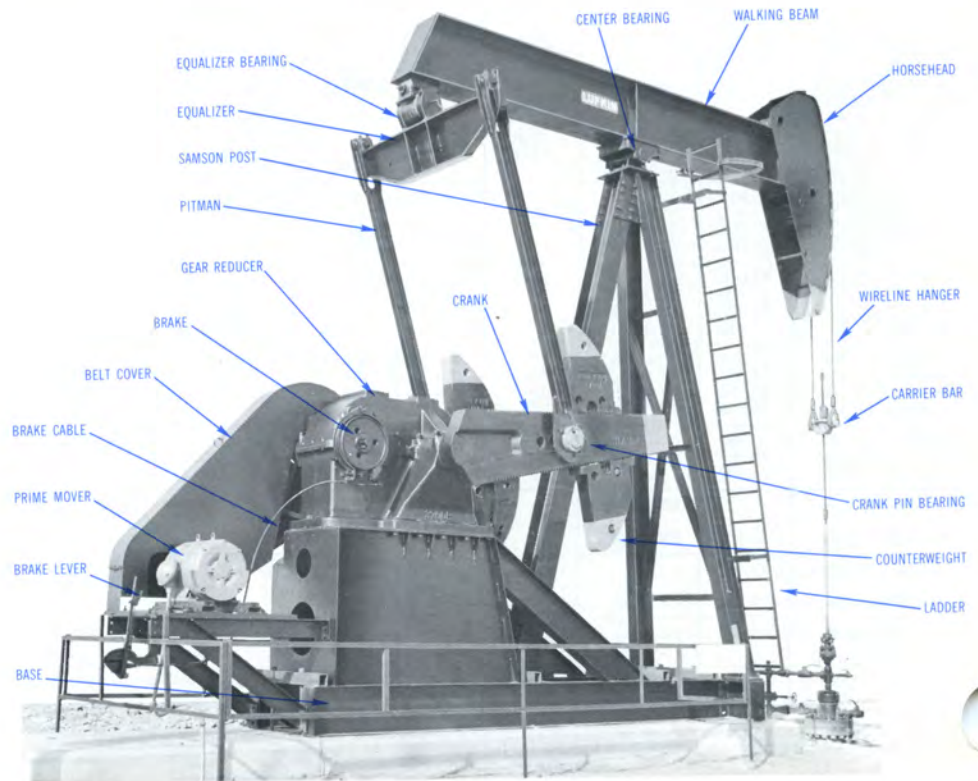


FIGURE 31
Air Balanced Pumping Unit



FIGURE 32
Mark II Pumping Unit

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 G-32A and G-33A.

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, G-30 and MG-34.

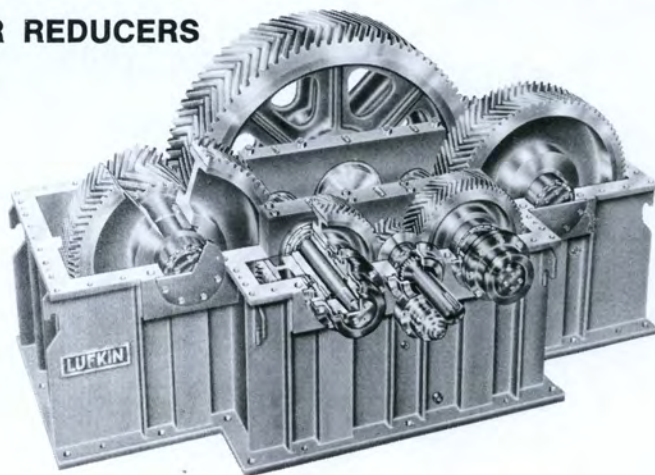


FIGURE 33
Lufkin TC4421 Triple Reduction Compound Reducers.

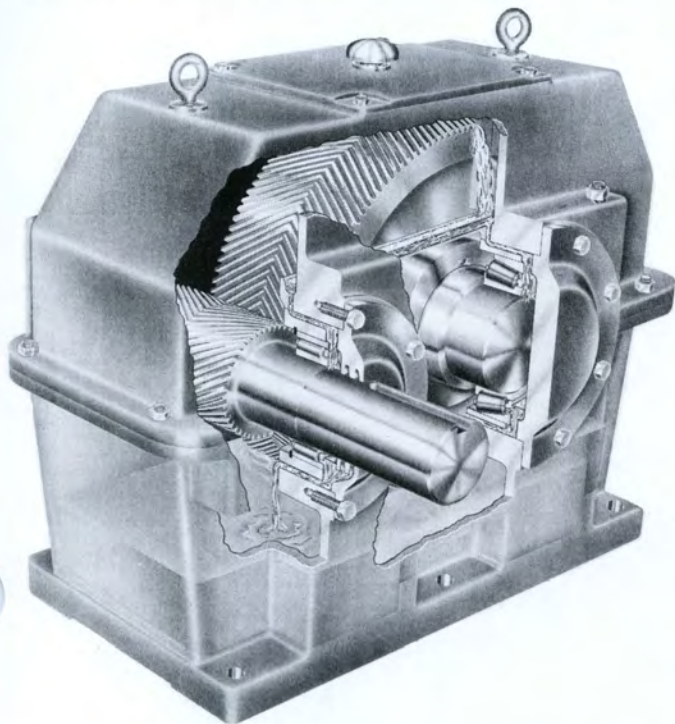


FIGURE 34
Typical Type S Single Reduction Herringbone Gear Reducer. Note simple but positive and fool-proof Lubrication System.

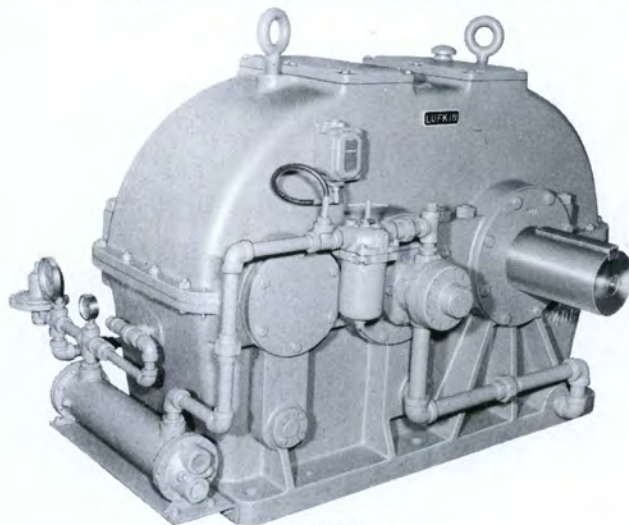


FIGURE 35
Lufkin Type N Two Stage Speed Increaser/Reducer.

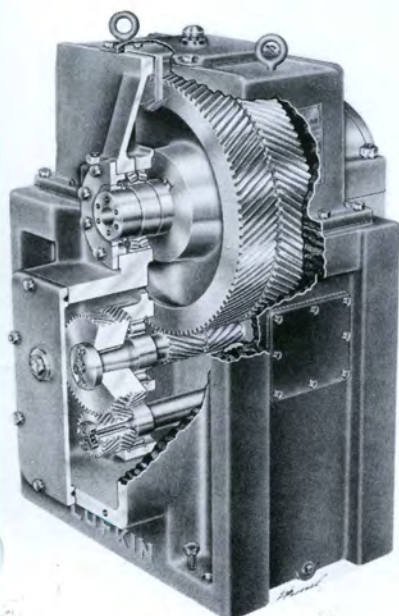


FIGURE 36
Lufkin Change Gear Extruder Drive for the plastic and rubber industries.

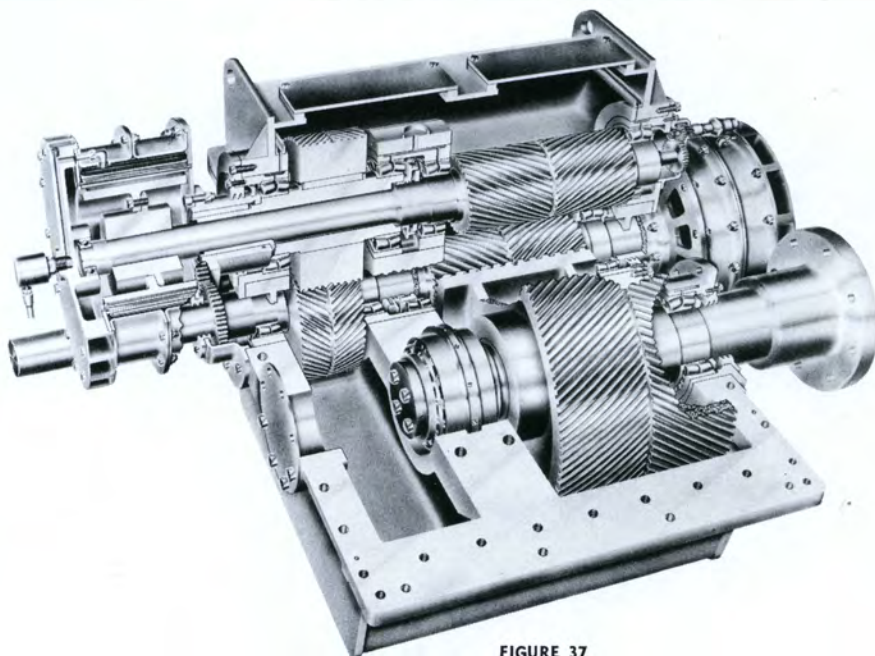


FIGURE 37
Lufkin Horizontal Offset Reverse-Reduction Marine Propulsion Gear with pneumatic clutches.



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