

CAT. 90-91

LUFKIN

**PUMPING
UNITS**



1. Oil Field Pumping Units:**A—Air Balanced Pumping Units—Pages 27-30.****B—Beam Balanced Pumping Units—Page 39.****B-P—Beam Balanced (Pin Mount) Pumping Units—Page 38.****C—Conventional (Standard) Pumping Units—Pages 12-18.****CT—Conventional (Two-Point) Pumping Units—Pages 10-18.****C-P—Conventional (Pin Mount) Pumping Units—Page 13.****CM—Conventional (Portable) Pumping Units—Page 31.****M—Mark II Unitorque Pumping Units—Pages 19-26.****LP—Low-Profile Pumping Units—Page 37.****RM—Reverse Mark Pumping Units—Pages 32-36.****2. Useful Formulas—Page 41.****3. Gear Specifications—Page 42.**

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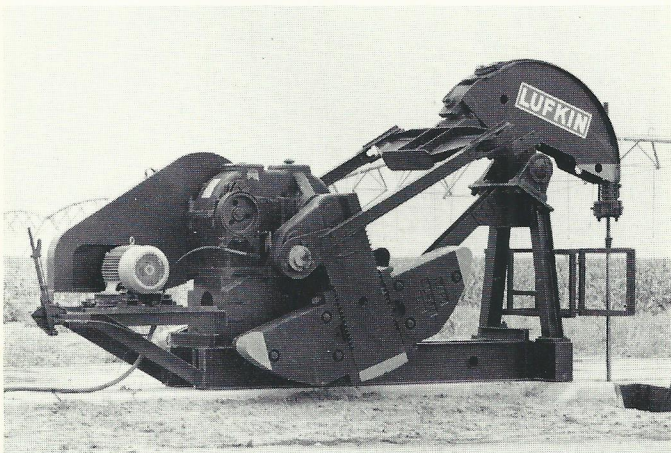
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EIGHT TYPES OF LUFKIN SUCKER ROD PUMPING UNITS ARE AVAILABLE TO HANDLE ALL INSTALLATION PROBLEMS AND DOWN HOLE CONDITIONS.



MARK II UNITORQUE UNITS

The Mark II unit, due to its unique geometry and phased counterbalance feature, lowers peak torque and horsepower requirements. 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.



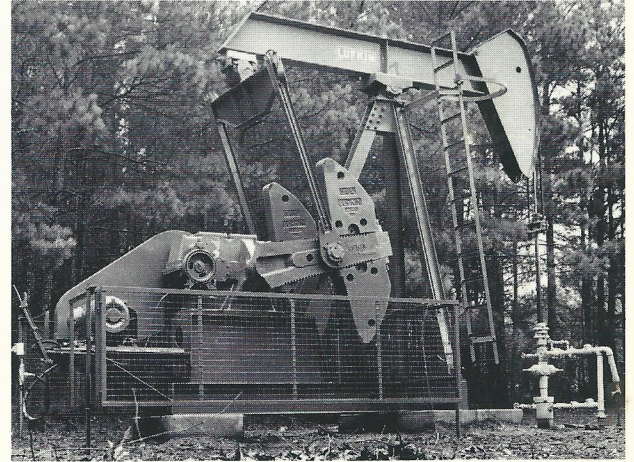
***LOW PROFILE UNITS**

The LUFKIN Low Profile unit is a compact unit designed for installation in fields irrigated by traveling sprinkler systems or in urban areas where the low profile feature may be desirable. Several sizes of the unit can be shipped from the factory completely assembled.

*Crank guards not shown for clarity.

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

ALL LUFKIN PUMPING UNITS CARRY THE API MONOGRAM SIGNIFYING THAT THEY MEET OR EXCEED THE LATEST API STANDARD FOR THE DESIGN OF SUCKER ROD PUMPING UNITS.



CONVENTIONAL UNITS

The LUFKIN Conventional Crank Balanced Unit, 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. Shown here is the two-point base design installed on front and rear concrete blocks.



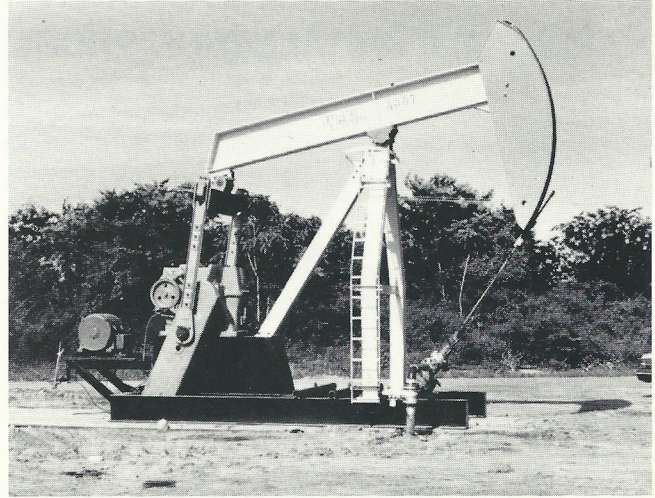
***AIR BALANCED UNITS**

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.

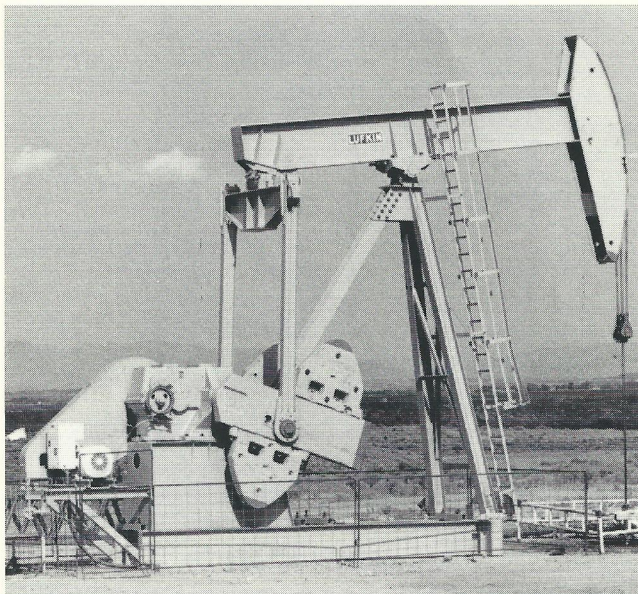
***BEAM BALANCED UNITS**

The LUFKIN Beam Balanced unit has the same rugged dependability as the Conventional unit. These units fill the need of economically producing many of the shallow wells.

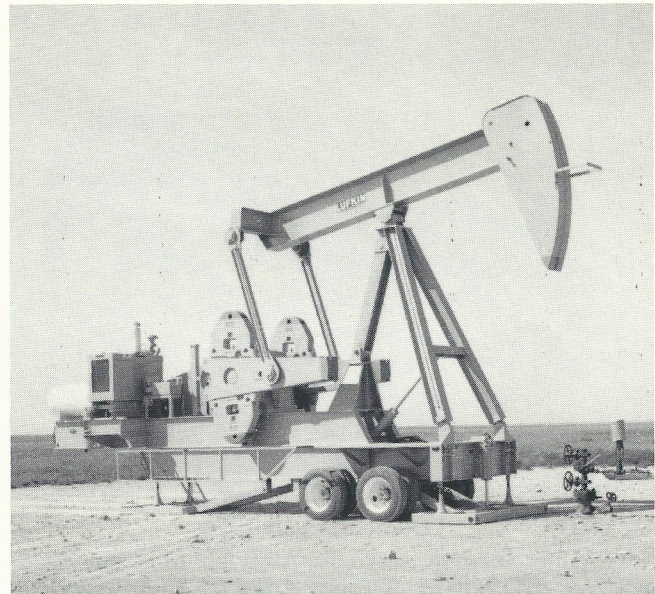
*Crank guards not shown for clarity.

***SLANT HOLE UNITS**

The Slant Hole unit is designed to pump wells deviated up to 45° at the surface. Many standard conventional unit components are used to manufacture these units.

**REVERSE MARK UNITS**

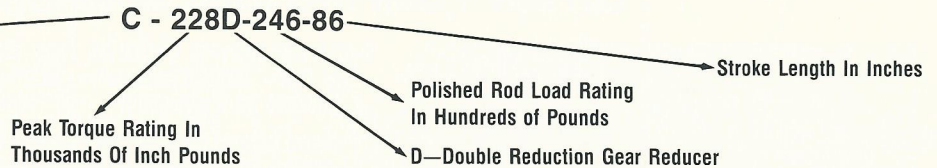
The LUFKIN RM Series Pumping Unit offers the customer an improved alternative to the conventional type geometry. Although similar in appearance to the Lufkin Conventional pumping unit, the RM unit geometry can reduce the torque and power requirements on many pumping applications. In some instances a smaller reducer and prime mover can be used.

**CONVENTIONAL PORTABLE UNITS**

The LUFKIN "Roadrunner" is a trailer-mounted, self-contained conventional pumping unit that lowers for legal highway transportation and can be erected and pumping in a few minutes at the well site. These units are available for sale, rental or lease.

Type Pumping Unit:

- A—Air Balanced
- B—Beam Balanced
- B-P—Beam Balanced (Pin Mount)
- C—Conventional (Standard)
- CT—Conventional (Two-Point)
- C-P—Conventional (Pin Mount)
- CM—Conventional (Portable)
- M—Mark II Unitorque
- LP—Low Profile
- RM—Reverse Mark

EXPLANATION OF PUMPING UNIT DESIGNATIONS**INSTRUCTIONS FOR ORDERING SPARE PARTS**

WARNING! - THE USE OF REPAIR OR REPLACEMENT PARTS ON A LUFKIN PUMPING UNIT THAT DO NOT MEET LUFKIN SPECIFICATIONS COULD RESULT IN SERIOUS INJURY TO PERSONNEL NEAR THE PUMPING UNIT.

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 and part number, to assure that the correct part is furnished.

WARNING! - BEFORE PERFORMING MAINTENANCE OR INSPECTION ON THE PUMPING UNIT, BE CERTAIN THAT THE PRIME MOVER IS TURNED OFF, LOCKED IN THE "OFF" POSITION AND THAT IT IS SECURED AGAINST ROTATION. ANY MOVEMENT OF THE EQUIPMENT DURING MAINTENANCE OR INSPECTION PROCEDURES CAN CAUSE SERIOUS PERSONAL INJURY.

LUBRICATION INSTRUCTIONS**GEAR REDUCER:**

For temperatures down to 0°F use an AGMA No. 5EP (ISO VG 220) 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 AGMA No. 4 EP (ISO VG 150) 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. Do not use multi-viscosity oils.

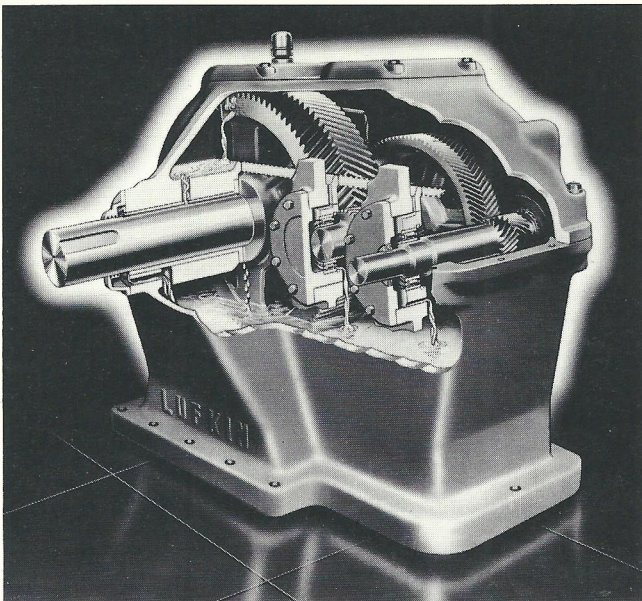


FIGURE 1

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 above 5 SPM. Add high speed wipers below 5 SPM.

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.

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.

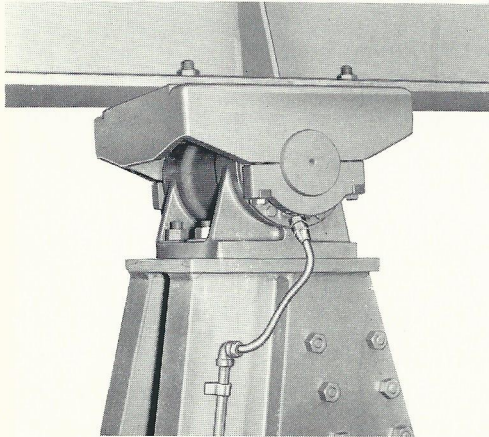
Bronze Bearings and Tapered Roller Crank Pin Bearings should be relubricated as required to maintain oil level. Use an EP140 extreme pressure oil with an extreme pressure additive and a pour point of +15°F or lower. If available, the use of a heavier oil (viscosity up to 6600 SUS at 100°F) is recommended.

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 an extreme pressure additive. Do not use soda soap grease.

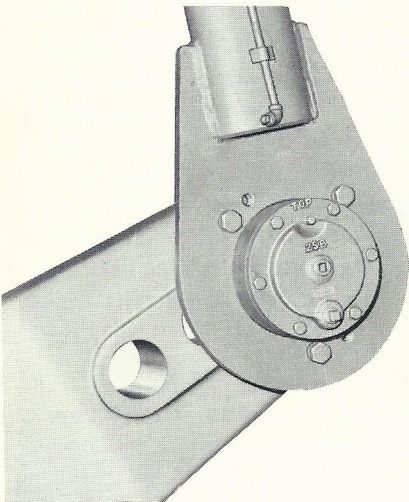
Bronze Bearings and Tapered Roller Crank Pin Bearings should be relubricated as required to maintain oil level by removing fill plug and adding oil until reservoir is full. Use an EP 80 or EP 90 extreme pressure oil with an extreme pressure additive and a pour point of -10°F or lower.

LUFKIN PUMPING UNIT COMPONENTS



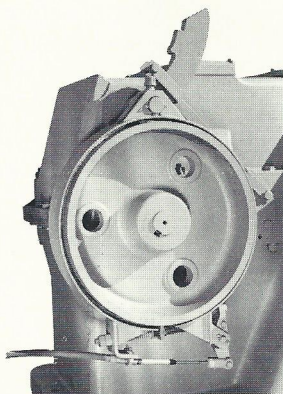
**FIGURE 2
CENTER BEARING ASSEMBLY**

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



**FIGURE 3
CRANK PIN ASSEMBLY**

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



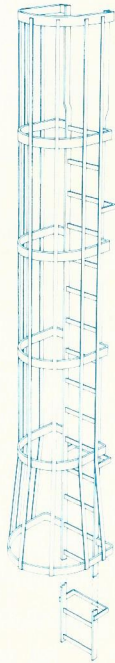
**FIGURE 4
FLEX-SHOE BRAKE**

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. The pumping unit brake is not intended as a safety stop but is intended for operational stops only.

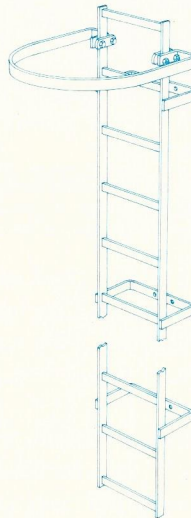
LUFKIN OFFERS LADDERS THAT CONFORM TO LUFKIN'S INTERPRETATION OF OSHA SPECIFICATIONS. WHEN ORDERING REQUEST THAT AN "OSHA" LADDER BE SUPPLIED.

WHEN THE WORKING LENGTH OF THE LADDER IS LESS THAN 20 FEET A PLAIN LADDER IS NORMALLY SUPPLIED. UNITS REQUIRING LONGER LADDERS ARE SUPPLIED WITH EITHER CAGED OR PLATFORM TYPE LADDERS.

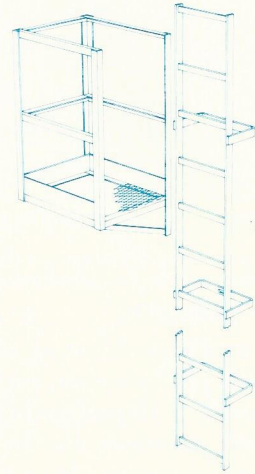
LADDER STYLES



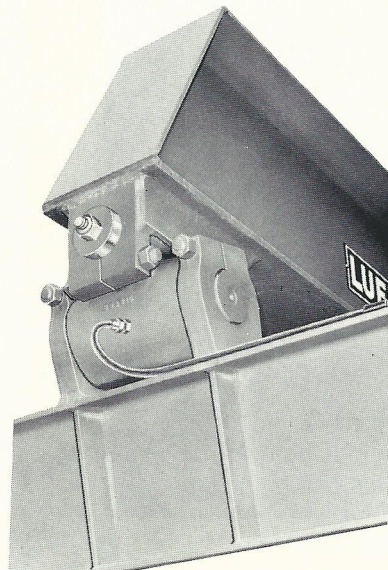
**FIGURE 5
CAGED LADDER**



**FIGURE 6
PLAIN LADDER**

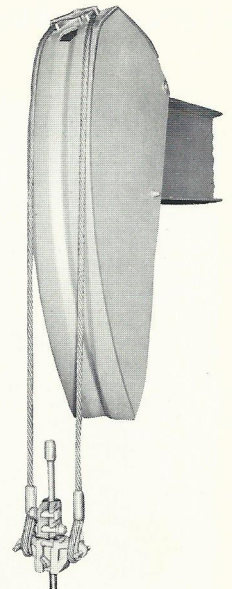


**FIGURE 7
PLATFORM LADDER**



**FIGURE 8
CRANK BALANCED UNIT EQUALIZER BEARING ASSEMBLY**

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



**FIGURE 9
HORSEHEAD AND WIRE LINE ASSEMBLY**
Easily aligned with polished rod without disconnecting well load. One-piece arc plate is used for greater strength.

COMPONENTS Continued

COUNTERBALANCE

As shown in Figure 11, 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.

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-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 NINETY FIVE THOUSAND LUFKIN PUMP-ING UNITS.

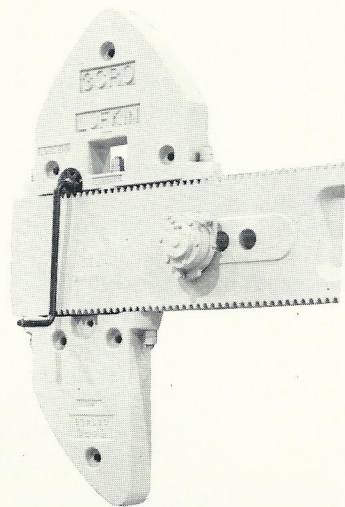


FIGURE 11

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.

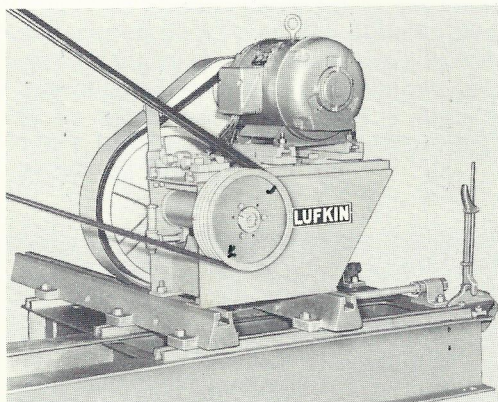


FIGURE 12

This assembly utilizes an electric motor and countershaft and provides a reduction ratio of 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.

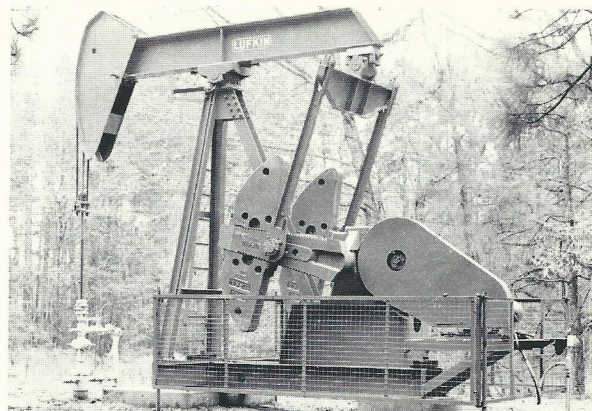


FIGURE 10

Two-point foundation reduces base stresses as well as installation costs and is easily transportable.

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 |
|-----------|--------|
| 3/4" | 6" |
| 1" | 10" |
| 1 1/4" | 12" |
| 1 1/2" | 12" |



FIGURE 13

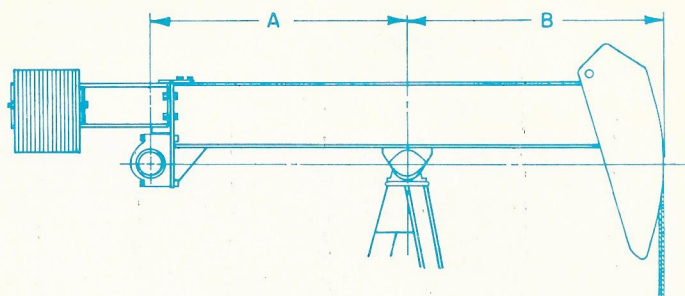


FIGURE 14

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.

CONVENTIONAL PUMPING UNIT AND PRIME MOVER BASES

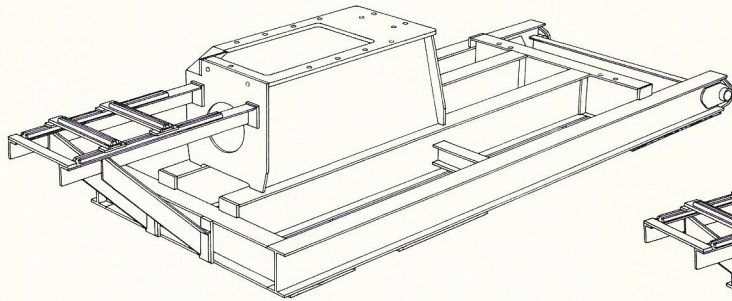


FIGURE 15
Wide Skid-UNISET base with Hi-Prime
bracket for Electric Motor

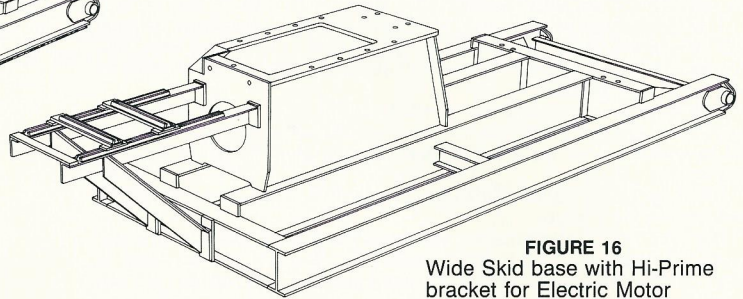


FIGURE 16
Wide Skid base with Hi-Prime
bracket for Electric Motor

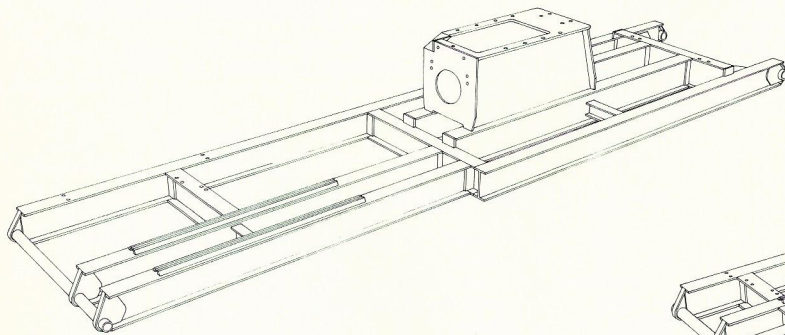


FIGURE 17
Wide Skid base for
Slow Speed Engine

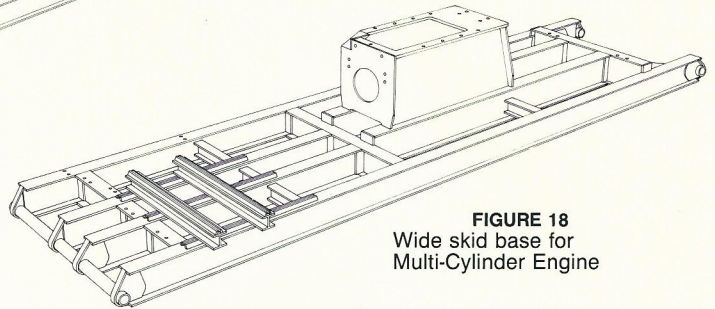


FIGURE 18
Wide skid base for
Multi-Cylinder Engine

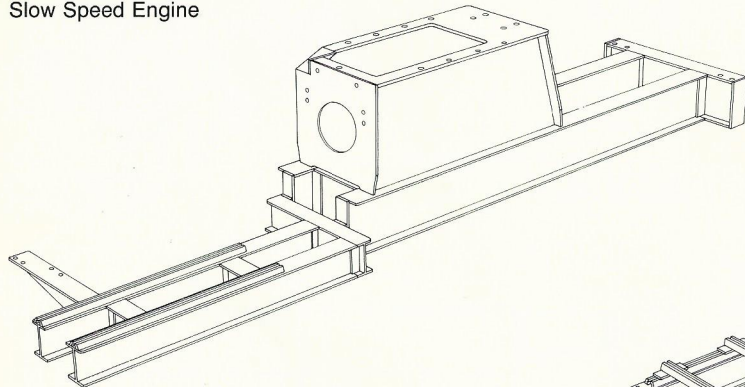


FIGURE 19
Jointed base for Slow Speed
Engine

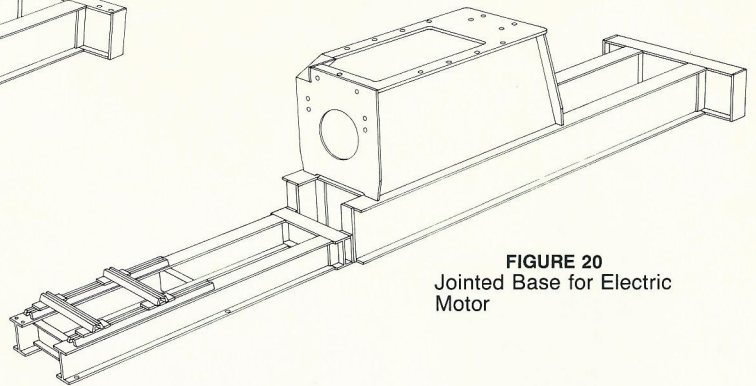


FIGURE 20
Jointed Base for Electric
Motor

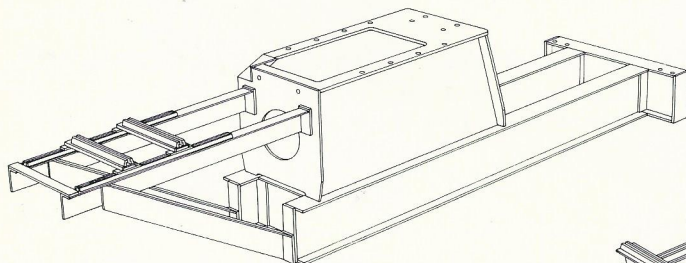


FIGURE 21
Stub Base with Hi-Prime
Bracket for Electric Motor

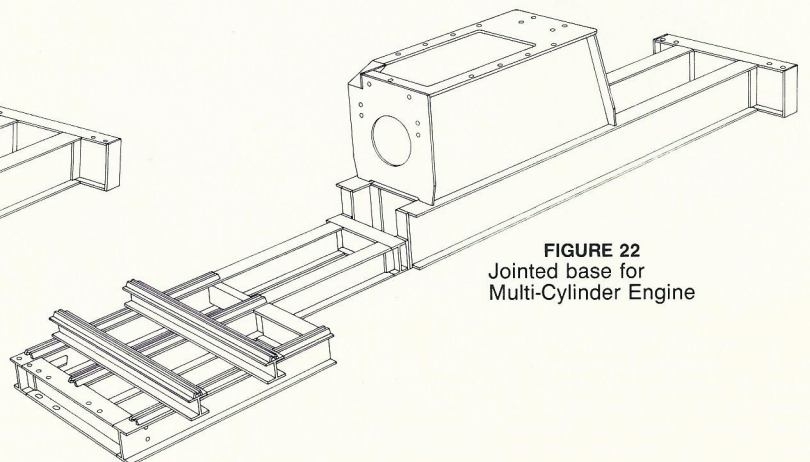


FIGURE 22
Jointed base for
Multi-Cylinder Engine

GUARDING OF PUMPING UNITS

WARNING: DO NOT OPERATE PUMPING UNITS UNLESS CRANK GUARDS AND ANY OTHER NEEDED GUARDS (HORSEHEAD GUARD, BELT GUARD, FLYWHEEL GUARD ETC.) ARE IN PLACE. ROTATING PARTS ARE DANGEROUS TO PERSONNEL.

WARNING: GUARDING OF PUMPING UNITS

Your LUFKIN pumping unit contains a number of heavy rotating and moving parts which constitute a safety hazard if not properly guarded. As a service to the user of our pumping units, we offer several types of crank guards which may be required to be in the vicinity of the operating pumping unit. Under normal operating circumstances, the rail-type guards (Figure 24) would be considered minimum guarding for people who are familiar with pumping units and are accustomed to working around them. Basically, the rail-type guard simply keeps workers from accidentally wandering or falling into the sweep of the cranks. This guard is available as an open rail or with wire mesh.

The 62 and 84 inch wire mesh crank guards (Figure 25) would normally be considered adequate guarding for people familiar with the operation of a pumping unit and accustomed to working around it, as well as smaller animals which might be able to move through the guard rails described above.

When pumping units are operated where they are accessible to the general public, it may be necessary to place the pumping unit with guards in an enclosed area with a locked entrance. The enclosure must prevent entry of unauthorized persons.

The location of the pumping unit, and therefore the type of guarding needed, is known only by the user who must choose the appropriate guarding. LUFKIN offers the above types of guarding and will custom build guards to customer's specifications if so requested. Regardless of who supplies the guards, appropriate guards must be in place and adequately maintained on all pumping units to prevent the risk of serious injury or death to people in the vicinity of the operating pumping unit. Minimum guarding required to be furnished by the user is described in API RP 11ER, RECOMMENDED PRACTICE FOR GUARDING OF PUMPING UNITS.

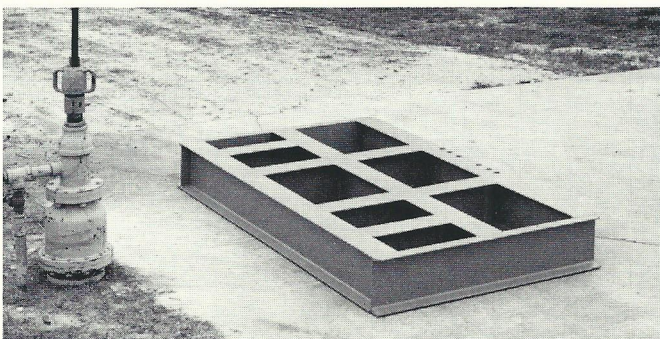


FIGURE 23

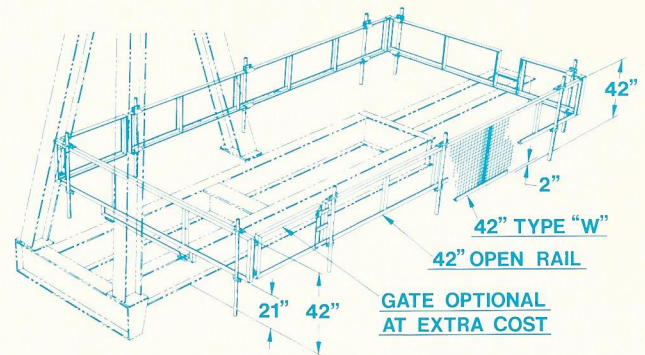


FIGURE 24
42" OPEN RAIL & TYPE W CRANK GUARDS

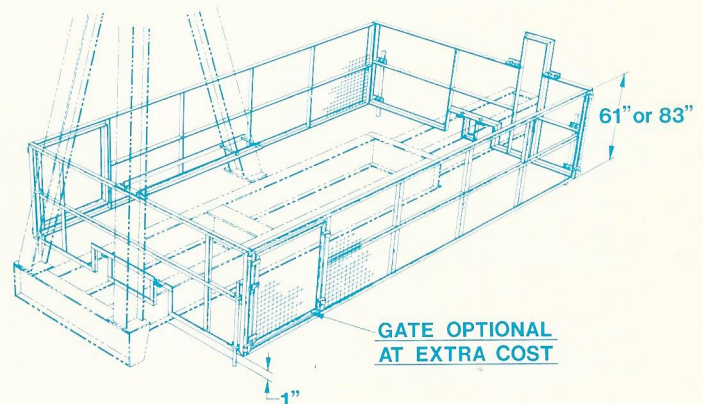


FIGURE 25
62" & 84" TYPE W CRANK GUARDS

42" Open rail type and TYPE W, 42" 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. TYPE W, guards are 2 x 2 wire mesh with angle rails. Lufkin also offers horsehead (see Figure 26) and engine flywheel guards as an option when required.

HORSEHEAD GUARDS

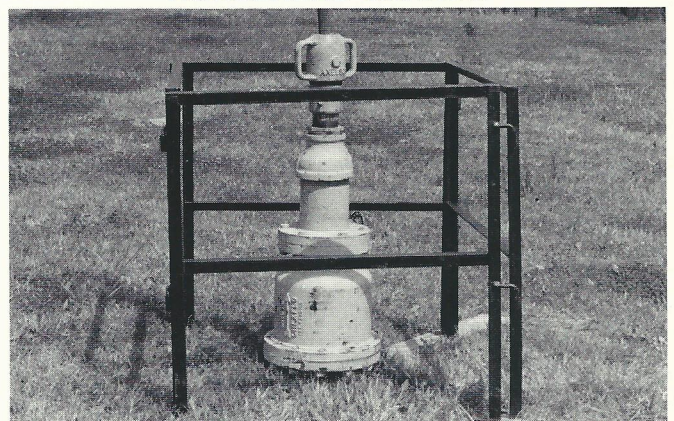


FIGURE 26

FABRICATED FOUNDATION PADS

Fabricated foundation pads (see Figure 23) are available for use with all Mark II units and those conventional units designed for "two point" mounting. The lightweight portable fabricated pads can be shipped with the pumping unit as a convenience and cost saving feature to the customer. Once the pads are in place they are filled with crushed rock or sand to add stabilizing weight.

**CONVENTIONAL PUMPING UNIT ASSEMBLIES
GENERAL DIMENSIONS**

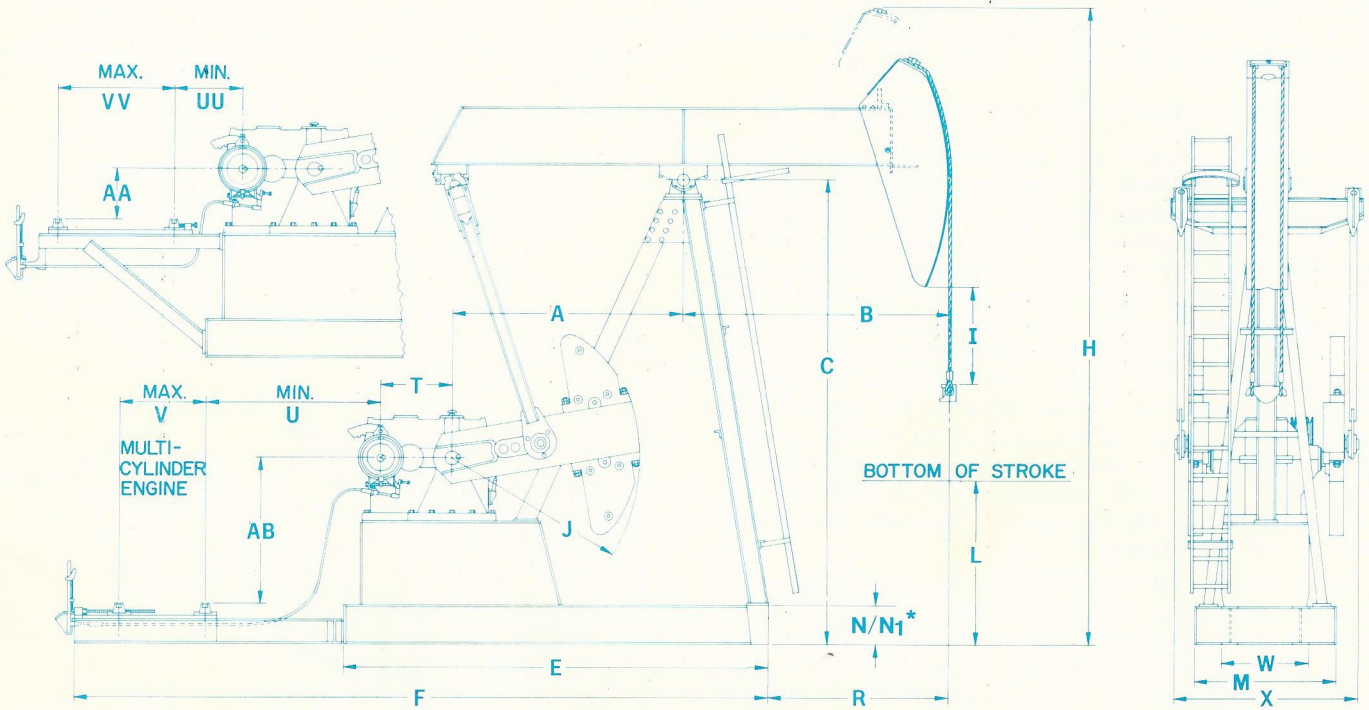


FIGURE 27

STANDARD API MODELS SHOWN, OTHER MODELS AVAILABLE ON REQUEST.

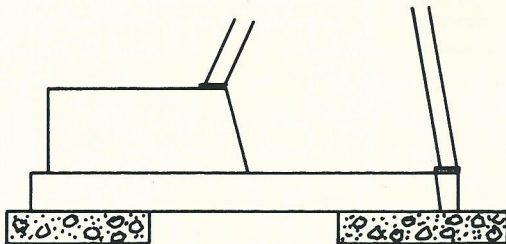
| UNIT | A | B | C | E | F | H | I | J | L | M | N | N ₁ | R | T | U | V | W | X | AA | AB | UU | VV |
|-----------------|--------|---------|---------|-------------|------------|------------|-----------|------|---------|-----------|---------|----------------|--------------|---------|------------|-----------|---------|-----------|-----------|-----------|---------|---------|
| C-1824D-365-192 | 10'-0" | 17'-6" | 23'-10" | 21'-11 1/2" | 33'-0 1/2" | 38'-8" | 18 13/16" | 110" | 63 7/8" | 6'-8 1/4" | - | 24 1/2" | 11'-11" | 58 7/8" | 7'-8 3/8" | 52" | 50" | 10'-0" | 51 11/16" | 7'-6 7/8" | 24 1/8" | 57" |
| C-1280D-365-192 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | 52 1/2" | 8'-2 3/4" | " | 8'-10" | " | " | 30 1/2" | " |
| C-912D-365-192 | " | " | " | 20'-7 1/2" | 31'-8 1/2" | " | " | " | 63 5/8" | " | 24 1/2" | 21" | 11'-11 9/16" | 48 1/2" | 7'-3 1/2" | " | 46 3/4" | 8'-2 1/2" | " | " | 19 1/4" | " |
| C-912D-305-192 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-912D-365-168 | " | " | 21'-10" | 18'-8 1/2" | 29'-9 1/2" | 35'-1 1/2" | 20 1/2" | " | 62 1/4" | 6'-4" | 24 1/8" | 16 1/8" | 13'-10 1/2" | " | " | " | " | " | 51 3/4" | " | " | " |
| C-912D-305-168 | " | " | " | " | " | " | " | " | 62" | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-912D-427-144 | " | 15'-0" | " | " | " | 33'-4" | 32 3/4" | " | 74 1/4" | " | " | " | 11'-4 1/2" | " | " | " | " | " | " | " | " | " |
| C-912D-365-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-640D-365-168 | " | 17'-6" | " | 18'-5" | 29'-6" | 35'-1 1/2" | 20 1/2" | " | 62 1/4" | " | " | " | 13'-10 1/2" | 41 1/2" | 7'-7" | " | " | " | " | " | 23" | " |
| C-640D-305-168 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-640D-365-144 | " | 15'-0" | " | " | " | 33'-4" | 32 3/4" | " | 74 1/4" | " | " | " | 11'-4 1/2" | " | " | " | " | " | " | " | " | " |
| C-640D-305-144 | " | " | 21'-8" | 18'-4 3/4" | 29'-5 3/4" | 33'-2" | " | " | 72 1/2" | " | 21 1/8" | " | 11'-4 7/8" | " | 7'-7 1/8" | " | " | " | " | " | " | " |
| C-640D-256-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-640D-365-120 | " | 12'-8" | " | " | " | 31'-7" | 54 1/2" | " | 75 1/2" | " | " | " | 9'-0 7/8" | " | " | " | " | " | " | " | " | " |
| C-640D-305-120 | 9'-3" | 12'-11" | 19'-6" | 17'-4 5/8" | 27'-2 5/8" | 29'-3" | 25" | 95" | 78 1/4" | 70" | 21" | " | 9'-6 7/8" | " | 6'-4" | " | " | 8'-1" | 51 1/8" | 75 7/8" | 26 3/4" | 37 3/4" |
| C-456D-305-168 | 10'-0" | 17'-6" | 21'-10" | 18'-5" | 29'-6" | 35'-1 1/2" | 20 1/2" | 110" | 62 1/4" | 6'-4" | 24 1/8" | " | 13'-10 1/2" | 38 3/8" | 7'-10 1/8" | 20 1/2" | " | 8'-2 1/2" | 51 3/4" | 90 7/8" | 26 1/8" | 57" |
| C-456D-305-144 | " | 15'-0" | 21'-8" | 18'-4 3/4" | 29'-5 3/4" | 33'-2" | 32 3/4" | " | 72 1/2" | " | 21 1/8" | " | 11'-4 7/8" | " | 7'-10 1/4" | " | " | " | " | " | " | " |
| C-456D-265-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-456D-365-120 | " | 12'-8" | " | " | " | 31'-7" | 54 1/2" | " | 75 1/2" | " | " | " | 9'-0 7/8" | " | " | " | " | " | " | " | " | " |
| C-456D-305-120 | 9'-3" | 12'-11" | 19'-6" | 17'-4 5/8" | 27'-2 5/8" | 29'-3" | 25" | 95" | 78 1/4" | 70" | 21" | " | 9'-6 7/8" | " | 6'-7 1/8" | " | " | 8'-1" | 51 1/8" | 75 7/8" | 29 7/8" | 37 3/4" |
| C-456D-256-120 | " | " | 19'-4" | " | " | 29'-1" | " | " | 76" | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-456D-213-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-456D-256-100 | " | 10'-9" | " | " | " | 27'-6 1/2" | 45 3/4" | " | 75 3/4" | " | " | " | 7'-4 7/8" | " | " | " | " | " | " | " | " | " |

GENERAL DIMENSIONS Continued

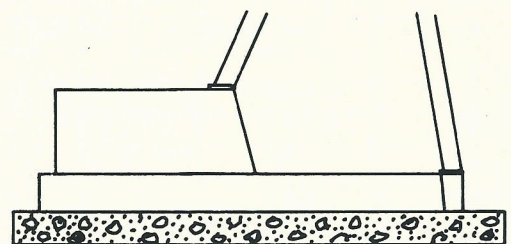
| UNIT | A | B | C | E | F | H | I | J | L | M | N | N ₁ | R | T | U | V | W | X | AA | AB | UU | VV |
|----------------|--------|---------|------------|-------------|-------------|------------|---------|------------|---------|---------|---------|----------------|------------|-----|------------|-----|-----|-----------|---------|---------|---------|---------|
| C-320D-256-144 | 10'-0" | 15'-0" | 21'-8" | 17'-11 1/4" | 29'-5 3/4" | 33'-2" | 32 3/4" | 110" | 72 1/2" | 6'-4" | 21 1/8" | 16 1/8" | 11'-4 7/8" | 34" | 8'-2 5/8" | 52" | 43" | 7'-3 1/2" | 53 5/8" | 93" | 31" | 48 1/4" |
| C-320D-256-120 | 9'-3" | 12'-11" | 19'-4" | 16'-11 1/8" | 27'-3 1/8" | 29'-1" | 25" | 95" | 76" | 70" | 21" | 15 7/8" | 9'-6 7/8" | " | 6'-11 1/2" | 53" | " | 7'-1 1/2" | 54" | 79" | " | 33 1/4" |
| C-320D-213-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-320D-305-100 | " | 10'-9" | " | " | " | " | " | " | " | " | " | " | 7'-4 7/8" | " | " | " | " | " | " | " | " | " |
| C-320D-256-100 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-320D-246-86 | " | 9'-3" | " | " | " | " | " | " | " | " | " | " | 70 7/8" | " | " | " | " | " | " | " | " | " |
| C-320D-213-86 | 8'-0" | " | 16'-4 1/8" | 15'-3 1/2" | 24'-2 1/2" | 23'-6" | 23 3/4" | 78" | 75" | 57 3/4" | 16 1/8" | " | 6'-3 1/2" | " | 66 1/2" | " | " | " | 37 1/8" | 62 1/8" | 30 7/8" | " |
| C-320D-246-74 | " | 8'-0" | " | " | " | " | " | " | " | " | " | " | 60 1/2" | " | " | " | " | " | " | " | " | " |
| C-228D-213-120 | 9'-3" | 12'-11" | 19'-4" | 16'-4 1/8" | 27'-2 5/8" | 29'-1" | 25 1/8" | 95" | 76" | 70" | 21" | " | 9'-6 7/8" | 30" | 7'-3" | " | 37" | 6'-6 1/2" | 54" | 79" | 28" | " |
| C-228D-213-100 | 8'-0" | 10'-9" | 16'-4 1/8" | 14'-8 1/2" | 24'-2" | 24'-7" | 21 3/4" | 78" | 63" | 59 3/4" | 16 1/8" | " | 7'-9 1/2" | " | 70" | " | " | " | 37 1/8" | 62 1/8" | 27 7/8" | " |
| C-228D-173-100 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-228D-246-86 | 9'-3" | 9'-3" | 19'-4" | 16'-4 1/8" | 27'-2 5/8" | 26'-5 1/2" | 59 3/4" | 95" | 75 3/4" | 70" | 21" | " | 70 7/8" | " | 7'-3" | " | " | " | 54" | 79" | 28" | " |
| C-228D-213-86 | 8'-0" | " | 16'-4 1/8" | 14'-8 1/2" | 24'-2" | 23'-6" | 23 3/4" | 78" | 75" | 59 3/4" | 16 1/8" | " | 6'-3 1/2" | " | 70" | " | " | " | 37 1/8" | 62 1/8" | 27 7/8" | " |
| C-228D-200-74 | " | 8'-0" | " | " | " | " | " | " | " | " | " | " | 60 1/2" | " | " | " | " | " | " | " | " | " |
| C-228D-173-74 | 7'-0" | " | 14'-2 1/2" | 13'-4" | 22'-9 1/2" | 20'-3" | 16 3/4" | 68" | 68 3/4" | 51 3/4" | 15 7/8" | 12 1/4" | 65" | " | " | " | " | " | 27 1/4" | 52 1/4" | " | " |
| C-160D-173-100 | 8'-0" | 10'-9" | 16'-3 1/8" | 14'-4" | 24'-0" | 24'-7" | 21 1/2" | 78" | 62 3/4" | 57 3/4" | " | 15 7/8" | 7'-9 1/2" | 26" | 6'-2 1/2" | 50" | 32" | 70 1/2" | 37 1/8" | 62 7/8" | 26 5/8" | 34 3/4" |
| C-160D-173-86 | " | 9'-3" | " | " | " | " | " | " | " | " | " | " | 6'-3 1/2" | " | " | " | " | " | " | " | " | " |
| C-160D-200-74 | " | 8'-0" | " | " | " | " | " | " | " | " | " | " | 60 1/2" | " | " | " | " | " | " | " | " | " |
| C-160D-173-74 | 7'-0" | " | 14'-2 1/2" | 12'-11 1/2" | 21'-8 1/2" | 20'-3" | 16 3/4" | 68" | 68 3/4" | 51 3/4" | " | " | 65" | " | 63 1/2" | " | " | " | 23 5/8" | 53 1/4" | " | " |
| C-160D-143-74 | " | " | 13'-10" | " | " | " | " | " | 66" | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-160D-173-64 | " | 7'-0" | " | " | " | " | " | 19'-4 1/2" | 26" | " | 67" | " | " | " | 53" | " | " | " | 69 3/4" | " | " | " |
| C-160D-143-64 | 6'-0" | " | 12'-2 1/2" | 11'-13 3/4" | 18'-11 3/4" | 17'-6" | 18" | 56" | 53 3/4" | 50 3/4" | 12 1/4" | 12 1/4" | 62 3/4" | " | 52 1/2" | " | " | " | 28 3/4" | 41 1/4" | 17 1/8" | 30 1/4" |
| C-114D-119-86 | 7'-0" | 9'-3" | 13'-10" | 12'-6" | 22'-2" | 21'-0" | 14 3/4" | 68" | 54 1/2" | 51 3/4" | 15 7/8" | " | 6'-8" | 24" | 71" | " | 25" | 66 3/4" | 27 1/2" | 53 1/4" | 23 1/8" | 34 3/4" |
| C-114D-143-74 | " | 8'-0" | " | " | " | " | " | 20'-1" | 16 3/4" | " | 66 1/2" | " | " | " | 65" | " | " | " | " | " | " | " |
| C-114D-173-64 | " | 7'-0" | " | " | " | " | " | 19'-4 1/2" | 26 1/8" | " | 67" | " | " | " | 53" | " | " | " | " | " | " | " |
| C-114D-143-64 | 6'-0" | " | 12'-2 1/2" | 10'-8 1/4" | 18'-10 1/4" | 17'-6" | 18 1/8" | 56" | 53 3/4" | 50 3/4" | 12 1/4" | " | 62 3/4" | " | 53" | " | " | " | 28 3/4" | 41 1/4" | 13 5/8" | 30 1/4" |
| C-114D-173-54 | " | 6'-0" | " | " | " | " | " | 16'-9" | 19 3/8" | " | 62 1/4" | " | " | " | 50 3/4" | " | " | " | " | " | " | " |

* NOTE: Units listed on pages 10 and 11 are available with two-point or standard base designs. Two-point units are suitable for front and rear concrete block foundations; whereas standard units must have a one-piece block foundation supporting all of the steel base. Dimension "N" is for two-point units and dimension "N₁" is for standard units. Do not use the above dimensions for foundation. Request a foundation plan.

Unit Designations: A conventional 456D-256-120 unit with a standard base will be designated as C-456D-256-120. If it is a two-point unit base it will be designated as CT-456D-256-120.



Two-point foundation



Standard foundation

**CONVENTIONAL PUMPING UNIT ASSEMBLIES
GENERAL DIMENSIONS**

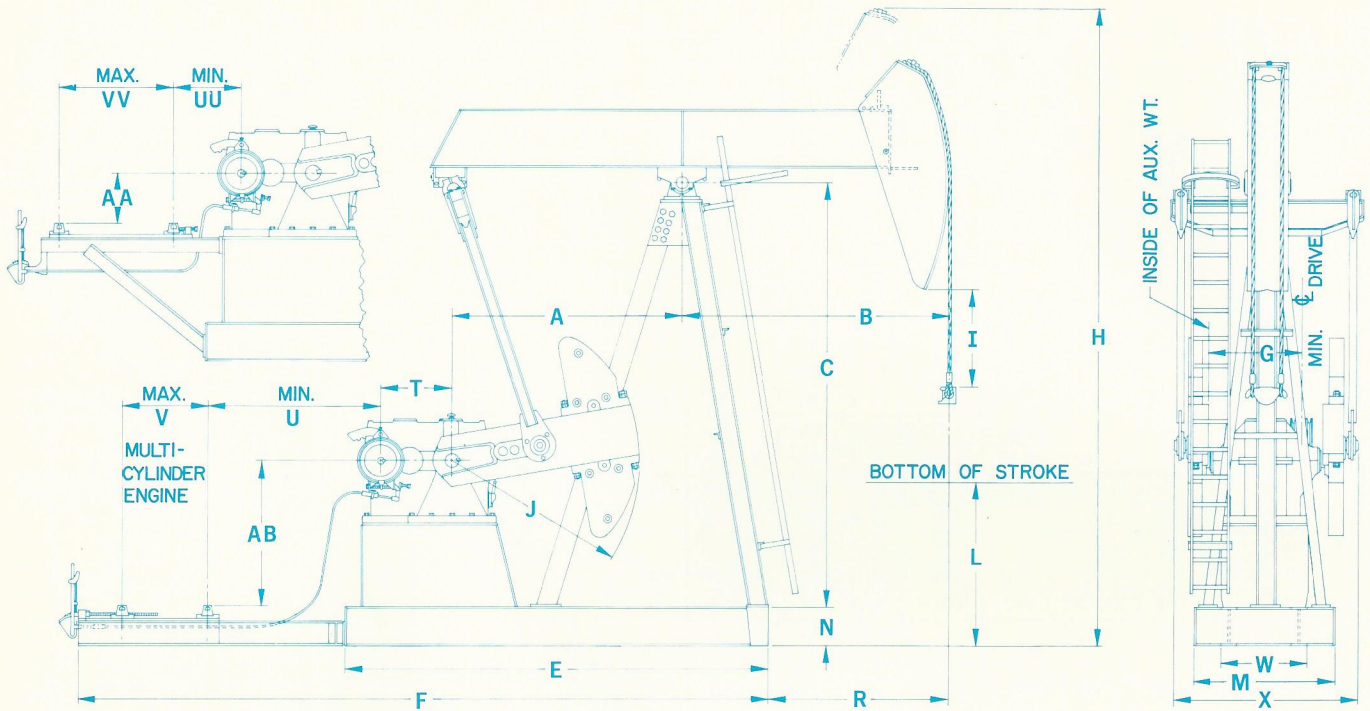


FIGURE 28

STANDARD API MODELS SHOWN, OTHER MODELS AVAILABLE ON REQUEST.

| UNIT | A | B | C | E | F | G | H | I | J | L | M | N | R | T | U | V | W | X | AA | AB | UU | VV | |
|---------------|-------|-------|------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|--------------------------------------|----------------------------------|-----|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|-----|----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|---|
| C-114D-133-54 | 5'-4" | 6'-0" | 9'-8" | 9'-11 ⁷ / ₈ " | 17'-9 ⁷ / ₈ " | 293 ⁸ / ₈ " | 15'-3" | 13 ¹ / ₂ " | 50" | 49 ⁷ / ₈ " | 47" | 10 ¹ / ₈ " | 51 ¹ / ₈ " | 24" | 49" | 50" | 25" | 67 ¹ / ₄ " | 225 ⁸ / ₈ " | 35 ¹ / ₈ " | 13 ¹ / ₂ " | 30 ¹ / ₄ " | |
| C-80D-119-64 | " | 7'-0" | " | " | " | " | 15'-11 ¹ / ₂ " | 13 ¹ / ₄ " | " | 403 ⁸ / ₈ " | " | " | 63 ¹ / ₈ " | " | " | " | " | " | " | " | " | " | " |
| C-80D-133-54 | " | 6'-0" | " | " | " | " | 15'-3" | 13 ¹ / ₂ " | " | 49 ⁷ / ₈ " | " | " | 51 ¹ / ₈ " | " | " | " | " | " | " | " | " | " | " |
| C-80D-119-54 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-80D-133-48 | " | 5'-4" | " | " | " | " | 14'-9" | 14 ⁵ / ₈ " | " | 547 ⁸ / ₈ " | " | " | 43 ¹ / ₈ " | " | " | " | " | " | " | " | " | " | " |
| C-80D-109-48 | 4'-8" | " | 8'-9" | 9'-3 ⁷ / ₈ " | 16'-8 ³ / ₈ " | 305 ⁸ / ₈ " | 13'-10 ¹ / ₄ " | " | 46" | 44" | 403 ⁴ / ₄ " | " | " | " | 45 ¹ / ₂ " | " | " | 65 ¹ / ₄ " | 185 ⁸ / ₈ " | 31 ¹ / ₈ " | " | " | " |
| C-57D-76-54 | " | 6'-0" | " | " | " | 26" | 14'-4" | 13 ⁵ / ₈ " | " | 387 ⁸ / ₈ " | " | " | 51 ¹ / ₈ " | 20" | 47 ¹ / ₂ " | " | " | 58 ¹ / ₄ " | " | " | 17 ¹ / ₂ " | " | " |
| C-57D-109-48 | " | 5'-4" | " | " | " | " | 13'-10 ¹ / ₄ " | 16" | " | 423 ⁴ / ₄ " | " | " | 43 ¹ / ₈ " | " | " | " | " | " | " | " | " | " | " |
| C-57D-95-48 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-57D-89-42 | 4'-0" | 4'-8" | 8'-2 ¹ / ₂ " | 8'-2" | 15'-6 ¹ / ₂ " | 28 ¹ / ₄ " | 12'-8" | 16 ³ / ₈ " | 44" | 42" | 38 ¹ / ₂ " | 8 ¹ / ₈ " | 41" | " | " | " | " | 58" | 165 ⁸ / ₈ " | 29 ¹ / ₈ " | " | " | " |
| C-57D-76-42 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-40D-76-48 | " | 5'-4" | " | 7'-9" | 15'-0" | 233 ⁴ / ₄ " | 13'-2" | 14 ⁵ / ₈ " | " | 355 ⁸ / ₈ " | " | " | 49" | 17 ¹ / ₂ " | 47" | 463 ⁴ / ₄ " | 20" | 51" | 103 ⁴ / ₄ " | 35 ⁷ / ₈ " | 17" | 21 ¹ / ₄ " | " |
| C-40D-89-42 | " | 4'-8" | " | " | " | " | 12'-8" | 16 ³ / ₈ " | " | 42" | " | " | 41" | " | " | " | " | 51 ¹ / ₄ " | " | " | " | " | " |
| C-40D-76-42 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-40D-89-36 | " | 4'-0" | " | " | " | " | 12'-2" | 12 ³ / ₄ " | " | 51 ¹ / ₈ " | " | " | 33" | " | " | " | " | " | " | " | " | " | " |
| C-25D-67-36 | " | " | " | 7'-4" | " | 20 ¹ / ₄ " | 12'-13 ⁴ / ₄ " | 13" | " | 50 ⁷ / ₈ " | " | " | " | 13 ⁹ / ₁₆ " | 50 ¹ / ₂ " | 47 ⁷ / ₈ " | 17" | 47" | " | " | 15 ¹ / ₂ " | " | " |
| C-25D-56-36 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-25D-67-30 | 3'-0" | 3'-9" | 7'-0 ¹ / ₂ " | 6'-3" | 13'-11" | 20 ¹ / ₂ " | 10'-9" | 15 ¹ / ₂ " | 36" | 365 ⁸ / ₈ " | 31" | 6" | 31" | " | " | " | " | " | " | 273 ⁴ / ₄ " | " | " | " |
| C-25D-53-30 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |

NOTE: Units on this page have standard bases only.
Do not use above dimensions for foundation. Request foundation plan.

CONVENTIONAL (C-P) PUMPING UNIT ASSEMBLIES

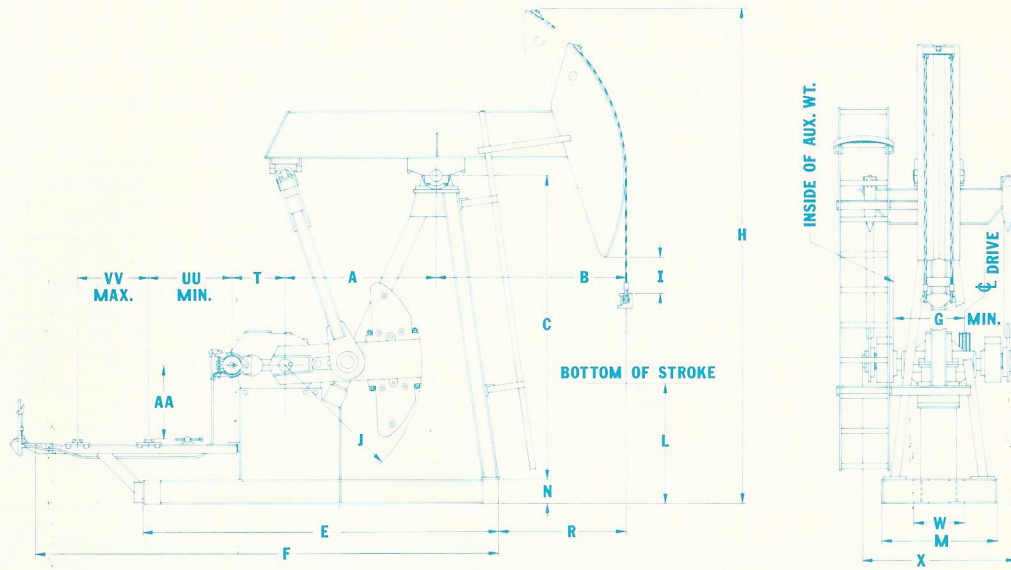


FIGURE 29

GENERAL DIMENSIONS

| UNIT | A | B | C | E | F | G | H | I | J | L | M | N | R | T | W | X | AA | UU | VV |
|---------------|--------|--------|--------|--------|-------------------------------------|-----|-------------------------------------|-----|-----|----------------------------------|-----|---------------------------------|-----------------------------------|----------------------------------|----------------------------------|-----|----------------------------------|----------------------------------|----------------------------------|
| C-P57D-89-54 | 4'-3" | 5'-4" | 8'-7" | 10'-0" | 12'-7 ⁵ / ₈ " | 21" | 14'-5" | 9" | 46" | 38 ³ / ₄ " | 39" | 8 ¹ / ₈ " | 43 ⁹ / ₁₆ " | 17 ³ / ₄ " | 17 ¹ / ₄ " | 52" | 25 ¹ / ₂ " | 28 ³ / ₈ " | 26 ³ / ₄ " |
| C-P57D-76-54 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-P57D-109-48 | " | 4'-9" | " | " | " | " | 13'-11" | 12" | " | 42 ¹ / ₂ " | " | " | 36 ³ / ₁₆ " | " | " | " | " | " | " |
| C-P57D-95-48 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-P57D-89-42 | " | 4'-3" | " | " | " | " | 13'-5" | 9" | " | 51 ¹ / ₂ " | " | " | 30 ⁹ / ₁₆ " | " | " | " | " | " | " |
| C-P57D-76-42 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-P40D-76-48 | 3'-11" | 5'-1" | 7'-11" | " | " | " | 13'-6 ¹ / ₂ " | 10" | " | 36 ¹ / ₂ " | " | " | 36 ³ / ₁₆ " | " | " | " | " | " | " |
| C-P40D-89-42 | " | 4'-5" | " | " | " | " | 12'-9" | " | " | 42 ¹ / ₂ " | " | " | 28 ³ / ₁₆ " | " | " | " | " | " | " |
| C-P40D-76-42 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| C-P40D-89-36 | " | 3'-11" | " | " | " | " | 12'-3" | 11" | " | 47 ¹ / ₂ " | " | " | 22 ³ / ₁₆ " | " | " | " | " | " | " |

STRUCTURAL DATA

| UNIT | C-P57D-89-54 | C-P57D-76-54 | C-P57D-109-48 | C-P57D-95-48 | C-P40D-76-48 |
|-----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| POLISHED ROD CAPACITY, LBS. | 8900 | 7600 | 10,900 | 9500 | 7600 |
| STROKE LENGTHS, INCHES. | 54", 40", 27" | 54", 41", 28" | 48", 36", 24" | 48", 36", 24" | 48", 36", 26" |
| WALKING BEAM | 16" x 36 Lbs. | 16" x 36 Lbs. | 16" x 45 Lbs. | 16" x 36 Lbs. | 16" x 36 Lbs. |
| WIRELINE HANGER | 7/8" x 9" CTRS. | 7/8" x 9" CTRS. | 7/8" x 9" CTRS. | 7/8" x 9" CTRS. | 7/8" x 9" CTRS. |
| CRANKS | 4246B | 4246B | 4246B | 4246B | 3646B |
| CRANK PIN BEARING | 4SD | 4SD | 4SD | 4SD | 4SD |
| EQUALIZER BEARING | 5R | 5R | 5R | 5R | 7R |
| CENTER BEARING | 4TG | 4TG | 4TG | 4TG | 4TG |

| UNIT | C-P57D-89-42 | C-P40D-89-42 | C-P57-76-42 | C-P40D-76-42 | C-P40D-89-36 |
|-----------------------------|--|--|--|--|--|
| POLISHED ROD CAPACITY, LBS. | 8900 | 8900 | 7600 | 7600 | 8900 |
| STROKE LENGTHS, INCHES. | 42", 32", 22" | 42", 32", 22" | 42", 32", 22" | 42", 32", 22" | 36", 28", 20" |
| WALKING BEAM | 16" x 36 Lbs. | 16" x 36 Lbs. | 16" x 36 Lbs. | 16" x 36 Lbs. | 16" x 36 Lbs. |
| WIRELINE HANGER | 3/4" x 6 ¹ / ₂ " CTRS. | 3/4" x 6 ¹ / ₂ " CTRS. | 3/4" x 6 ¹ / ₂ " CTRS. | 3/4" x 6 ¹ / ₂ " CTRS. | 3/4" x 6 ¹ / ₂ " CTRS. |
| CRANKS | 4246B | 3646B | 4246B | 3646B | 3646B |
| CRANK PIN BEARING | 4SD | 4SD | 4SD | 4SD | 4SD |
| EQUALIZER BEARING | 5R | 7R | 5R | 7R | 7R |
| CENTER BEARING | 4TG | 4TG | 4TG | 4TG | 4TG |

COUNTERBALANCE DATA

| UNIT | C-P57D-89-54 C-P57D-76-54 | C-P57D-109-48 C-P57D-95-48 | C-P40D-76-48 | C-P57D-89-42 C-P57D-76-42 | C-P40D-89-42 C-P40D-76-42 | C-P40D-89-36 |
|---------------------------|------------------------------|-------------------------------|--------------|------------------------------|------------------------------|--------------|
| STROKE | 54" | 48" | 48" | 42" | 42" | 36" |
| STRUCTURAL UNBALANCE | + 105 Lbs. | + 180 Lbs. | + 190 Lbs. | + 280 Lbs. | + 280 Lbs. | + 375 Lbs. |
| C' BAL., CRANKS ONLY | 1,780 | 2,060 | 2,080 | 2,380 | 2,450 | 2,820 |
| 4 No. 5ARO Counterweights | 5,970 | 6,765 | 6,800 | 7,640 | 7,880 | 8,945 |
| 4 No. 5A Aux. Weights | 7,650 | 8,650 | 8,690 | 9,750 | 10,055 | 11,400 |
| 4 No. 5CRO Counterweights | 4,940 | 5,610 | 5,640 | 6,345 | 6,545 | 7,440 |
| 4 No. 5C Aux. Weights | 6,505 | 7,365 | 7,400 | 8,305 | 8,570 | 9,720 |
| 4 No. 6RO Counterweights | 4,320 | 4,910 | 4,935 | 5,565 | 5,740 | 6,530 |
| 4 No. 6 Aux. Weights | 5,275 | 5,985 | 6,010 | 6,765 | 6,980 | 7,930 |
| 4 No. 7RO Counterweights | 3,450 | 3,930 | 3,955 | 4,470 | 4,610 | 5,255 |
| 4 No. 7 Aux. Weights | 4,190 | 4,760 | 4,790 | 5,400 | 5,570 | 6,340 |
| 6 No. 7 Aux. Weights | 4,560 | 5,180 | 5,205 | 5,865 | 6,050 | 6,880 |

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

CONVENTIONAL PUMPING UNIT SPECIFICATIONS

| UNIT DESIGNATION | C-1824D-365-192 C-1280D-365-192 C-912D-365-192 | C-912D-305-192 | 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 |
|-----------------------------|--|-------------------------------|----------------------------------|--|-------------------------------|----------------------------------|
| POLISHED ROD CAPACITY, LBS. | 36,500 | 30,500 | 36,500 | 30,500 | 42,700 | 36,500 |
| STROKE LENGTHS, INCHES | 192,168,145,124 | 192,168,145,124 | 168,145,124 | 168,145,124 | 144,124,106 | 144,124,106 |
| WALKING BEAM | 33" x 221 Lbs. | 33" x 201 Lbs. | 33" x 221 Lbs. | 33" x 201 Lbs. | 33" x 221 Lbs. | 33" x 201 Lbs. |
| WIRESLINE HANGER | 1 $\frac{3}{8}$ " x 16" CTRS. | 1 $\frac{1}{4}$ " x 16" CTRS. | 1 $\frac{3}{8}$ " x 16" CTRS. | 1 $\frac{1}{4}$ " x 16" CTRS. | 1 $\frac{3}{8}$ " x 16" CTRS. | 1 $\frac{3}{8}$ " x 16" CTRS. |
| CRANKS | 106110C | 106110C | 94110C | 94110C | 94110C | 94110C |
| CRANK PIN BEARING | 1SC | 1SC | 1SC | 1SC | 1SC | 1SC |
| EQUALIZER BEARING | OR | OR | OR | OR | OR | OR |
| CENTER BEARING | OTGA | OTGA | OTGA | OTGA | OTGA | OTGA |

| UNIT DESIGNATION | C-640D-305-144 C-456D-305-144 | C-640D-256-144 C-456D-256-144 C-320D-256-144 | C-640D-365-120 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. | 30,500 | 25,600 | 36,500 | 30,500 | 25,600 | 21,300 |
| STROKE LENGTHS, INCHES | 144, 124, 106 | 144, 124, 106 | 120, 105, 90 | 120, 102, 85 | 120, 102, 85 | 120, 102, 85 |
| WALKING BEAM | 30" x 173 Lbs. | 30" x 173 Lbs. | 30" x 173 Lbs. | 27" x 161 Lbs. | 27" x 146 Lbs. | 27" x 146 Lbs. |
| WIRESLINE HANGER | 1 $\frac{1}{4}$ " x 16" CTRS. | 1 $\frac{1}{4}$ " x 16" CTRS. | 1 $\frac{3}{8}$ " x 12" CTRS. | 1 $\frac{1}{4}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 12" CTRS. |
| CRANKS | 94110C | 94110C | 94110C | 8495C | 8495C | 8495C |
| CRANK PIN BEARING | 1SC | 1SC | 1SC | 2SC | 2SC | 2SC |
| EQUALIZER BEARING | OR | OR | OR | OR | 1R | 1R |
| CENTER BEARING | 1TGA | 1TGA | OTGA | 1TGA | 2TGB | 2TGB |

| 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 146 Lbs. | 27" x 146 Lbs. | 24" x 117 Lbs. | 24" x 104 Lbs. | 24" x 117 Lbs. |
| WIRESLINE HANGER | 1 $\frac{1}{4}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 12" CTRS. |
| CRANKS | 8495C | 8495C | 7478C | 7478C | 8495C |
| CRANK PIN BEARING | 2SC | 2SC | 2SC | 3SD | 3SD |
| EQUALIZER BEARING | 1R | 1R | 1R | 2RA | 2RA |
| CENTER BEARING | 2TGB | 2TGB | 2TGB | 2TGB | 2TGB |

| 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 104 Lbs. | 24" x 104 Lbs. | 24" x 84 Lbs. | 24" x 104 Lbs. | 24" x 94 Lbs. |
| WIRESLINE HANGER | 1 $\frac{1}{8}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 12" CTRS. | 1 $\frac{1}{8}$ " x 9" CTRS. | 1" x 9" CTRS. |
| CRANKS | 7478C | 7478C | 6468C | 7478C | 7478C |
| CRANK PIN BEARING | 3SD | 3SD | 4SD | 3SD | 3SD |
| EQUALIZER BEARING | 2RA | 2RA | 3R | 2RA | 2RA |
| CENTER BEARING | 2TGB | 2TGB | 4TGA | 2TGB | 2TGB |

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 | C-80D-119-64 |
|-----------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------|
| POLISHED ROD CAPACITY, LBS. | 17,300 | 14,300 | 17,300 | 14,300 | 11,900 |
| STROKE LENGTHS, INCHES | 74, 62, 51 | 74, 62, 51 | 64, 54, 44 | 64, 52, 40 | 64, 53, 42 |
| WALKING BEAM | 24" x 84 Lbs. | 24" x 84 Lbs. | 24" x 84 Lbs. | 18" x 71 Lbs. | 18" x 60 Lbs. |
| WIRELINE HANGER | 1" x 9" CTRS. | 1" x 9" CTRS. | 1" x 9" CTRS. | 1" x 9" CTRS. | 1" x 9" CTRS. |
| CRANKS | 6468C | 6468C | 6468C | 5456C | 4850B |
| CRANK PIN BEARING | 3SD | 4SD | 4SD | 4SD | 5SA |
| EQUALIZER BEARING | 2RA | 3R | 3R | 3R | 4R |
| CENTER BEARING | 2TGB | 4TGA | 4TGA | 4TGA | 4TGA |

| UNIT DESIGNATION | C-114D-173-54 | C-114D-133-54 C-80D-133-54 | C-80D-119-54 | C-57D-76-54 | C-80D-133-48 |
|-----------------------------|---------------|-------------------------------|----------------------------|----------------------------|----------------------------|
| POLISHED ROD CAPACITY, LBS. | 17,300 | 13,300 | 11,900 | 7,600 | 13,300 |
| STROKE LENGTHS, INCHES | 54, 44, 34 | 54, 45, 36 | 54, 45, 36 | 54, 41, 28 | 48, 40, 32 |
| WALKING BEAM | 18" x 71 Lbs. | 18" x 60 Lbs. | 18" x 60 Lbs. | 16" x 36 Lbs. | 16" x 57 Lbs. |
| WIRELINE HANGER | 1" x 9" CTRS. | $\frac{7}{8}$ " x 9" CTRS. | $\frac{7}{8}$ " x 9" CTRS. | $\frac{3}{4}$ " x 9" CTRS. | $\frac{7}{8}$ " x 9" CTRS. |
| CRANKS | 5456C | 4850B | 4850B | 4246B | 4850B |
| CRANK PIN BEARING | 4SD | 5SA | 5SA | 5SA | 5SA |
| EQUALIZER BEARING | 3R | 4R | 4R | 5R | 4R |
| CENTER BEARING | 4TGA | 4TGA | 4TGA | 5C | 4TGA |

| UNIT DESIGNATION | C-80D-109-48 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 45 Lbs. | 16" x 36 Lbs. | 16" x 36 Lbs. | 16" x 36 Lbs. |
| WIRELINE HANGER | $\frac{7}{8}$ " x 9" CTRS. | $\frac{7}{8}$ " x 9" CTRS. | $\frac{7}{8}$ " x 9" CTRS. | $\frac{3}{4}$ " x 6 $\frac{1}{2}$ " CTRS. | $\frac{3}{4}$ " x 6 $\frac{1}{2}$ " CTRS. |
| CRANKS | 4246B | 4246B | 3644B | 3644B | 3644B |
| CRANK PIN BEARING | 5SA | 5SA | 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 26 Lbs. | 12" x 26 Lbs. | 12" x 26 Lbs. | 12" x 26 Lbs. |
| WIRELINE HANGER | $\frac{3}{4}$ " x 6 $\frac{1}{2}$ " CTRS. | $\frac{5}{8}$ " x 6 $\frac{1}{2}$ " CTRS. | $\frac{5}{8}$ " x 6 $\frac{1}{2}$ " CTRS. | $\frac{5}{8}$ " x 6 $\frac{1}{2}$ " CTRS. | $\frac{1}{2}$ " x 6 $\frac{1}{2}$ " 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 |

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-1824D-365-192 | C-1280D-365-192 C-912D-365-192 | 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-640D-365-120 C-456D-365-120 | C-640D-305-120 C-456D-305-120 |
|-----------------------------|-----------------|-----------------------------------|--|--|----------------------------------|--|----------------------------------|----------------------------------|
| STROKE | 192" | 192" | 168" | 144" | 144" | 144" | 120" | 120" |
| STRUCTURAL UNBALANCE | - 1985 Lbs. | - 1800 Lbs. | - 1,500 Lbs. | - 650 Lbs. | - 520 Lbs. | - 400 Lbs. | + 570 Lbs. | - 120 Lbs. |
| CRANKS | 106110C | 106110C | 94110C | 94110C | 94110C | 94110C | 94110C | 8495C |
| C'Bal., Cranks Only | 3,215 | 3,400 | 4,360 | 6,190 | 6,360 | 6,480 | 8,670 | 5,570 |
| 4 No. OOROL Counterweights | 19,970 | 20,155 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. OOSL Aux. Weights | 24,915 | 25,100 | ..... | ..... | ..... | ..... | ..... | ..... |
| 8 No. OOSL Aux. Weights | 29,860 | 30,045 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. OORO Counterweights | 16,535 | 16,720 | 19,370 | 23,710 | 23,970 | ..... | 29,415 | ..... |
| 4 No. OOS Aux. Weights | 20,555 | 20,740 | 23,900 | 28,995 | ..... | ..... | 35,670 | ..... |
| 8 No. OOS Aux. Weights | 24,575 | 24,760 | 28,430 | 34,285 | ..... | ..... | ..... | ..... |
| 4 No. ORO Counterweights | 14,835 | 15,020 | 17,455 | 21,475 | 21,725 | 21,845 | 26,765 | 20,430 |
| 4 No. OS Aux. Weights | 18,695 | 18,880 | 21,805 | 26,550 | 26,825 | ..... | 32,775 | 25,365 |
| 8 No. OS Aux. Weights | 22,555 | 22,740 | 26,150 | 31,625 | ..... | ..... | ..... | ..... |
| 4 No. OARO Counterweights | 13,045 | 13,230 | 15,440 | 19,125 | 19,360 | 19,480 | 23,980 | 18,305 |
| 4 No. OAS Aux. Weights | 16,090 | 16,275 | 18,870 | 23,130 | 23,385 | 23,505 | 28,725 | 22,250 |
| 8 No. OAS Aux. Weights | 19,135 | 19,320 | 22,300 | 27,130 | 27,410 | ..... | 33,465 | 26,190 |
| 4 No. 1RO Counterweights | 10,865 | 11,050 | 12,980 | 16,250 | 16,470 | 16,590 | 20,580 | 15,505 |
| 4 No. 1S Aux. Weights | 13,215 | 13,400 | 15,630 | 19,345 | 19,580 | 19,700 | 24,240 | 18,555 |
| 8 No. 1S Aux. Weights | 15,565 | 15,750 | 18,280 | 22,435 | 22,690 | *22,810 | 27,905 | 21,610 |
| 4 No. 2RO Counterweights | 9,580 | 9,765 | 11,535 | 14,565 | 14,775 | 14,895 | 18,585 | 13,845 |
| 4 No. 2S Aux. Weights | 11,860 | 12,045 | 14,105 | 17,565 | 17,790 | 17,910 | 22,135 | 16,810 |
| 8 No. 2S Aux. Weights | 14,140 | 14,325 | 16,675 | 20,565 | 20,810 | *20,930 | 25,690 | 19,770 |
| 4 No. 3CRO Counterweights | 8,340 | 8,525 | 10,135 | 12,935 | 13,135 | 13,255 | 16,650 | 12,285 |
| 4 No. 3BS Aux. Weights | 10,550 | 10,735 | 12,625 | 15,840 | 16,055 | 16,175 | 20,095 | 15,175 |
| 8 No. 3BS Aux. Weights | 12,760 | 12,945 | *15,115 | *18,745 | 18,980 | *19,100 | 23,535 | 18,070 |
| 4 No. 5ARO Counterweights | ..... | ..... | 8,505 | 11,025 | 11,200 | 11,340 | 14,395 | 10,475 |
| 4 No. 5A Aux. Weights | ..... | ..... | 10,165 | 12,965 | 13,165 | 13,285 | 16,690 | 12,445 |
| 8 No. 5A Aux. Weights | ..... | ..... | *11,825 | *14,905 | 15,115 | *15,235 | 18,985 | 14,410 |
| 4 No. 5CRO Counterweights | ..... | ..... | 7,430 | 9,775 | 9,960 | 10,080 | 12,910 | 9,185 |
| 4 No. 5C Aux. Weights | ..... | ..... | 8,945 | 11,545 | 11,740 | 11,860 | 15,005 | 10,970 |
| 8 No. 5C Aux. Weights | ..... | ..... | 10,465 | 13,315 | 13,520 | *13,640 | 17,105 | 12,755 |

| UNIT | C-320D-246-74 C-228D-200-74 C-160D-200-74 | 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-80D-119-64 | C-114D-173-54 | C-114D-133-54 C-80D-133-54 |
|-----------------------------|---|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------|---------------|-------------------------------|
| STROKE | 74" | 74" | 74" | 64" | 64" | 64" | 54" | 54" |
| STRUCTURAL UNBALANCE | + 800 Lbs. | + 450 Lbs. | + 300 Lbs. | + 550 Lbs. | + 360 Lbs. | 0 Lbs. | + 500 Lbs. | + 330 Lbs. |
| CRANKS | 7478C | 6468C | 6468C | 6468C | 5456C | 4850B | 5456C | 4850B |
| C'Bal., Cranks Only | 5,960 | 4,235 | 4,090 | 4,880 | 2,665 | 2,155 | 3,190 | 2,845 |
| 4 No. 2RO Counterweights | 15,870 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. 2S Aux. Weights | 19,425 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. 3CRO Counterweights | 14,110 | 11,005 | 10,870 | 12,630 | 8,605 | ..... | 10,115 | ..... |
| 4 No. 3BS Aux. Weights | 17,625 | 13,925 | 13,790 | 15,965 | 11,165 | ..... | 13,105 | ..... |
| 8 No. 3BS Aux. Weights | *21,140 | 16,840 | ..... | ..... | 13,725 | ..... | 16,090 | ..... |
| 4 No. 5ARO Counterweights | 12,025 | 9,360 | 9,220 | 10,745 | 7,290 | 6,120 | 8,585 | 7,470 |
| 4 No. 5A Aux. Weights | 14,460 | 11,410 | 11,275 | 13,090 | 9,145 | 7,740 | 10,745 | 9,360 |
| 8 No. 5A Aux. Weights | ***16,890 | *13,465 | *13,330 | *15,440 | *10,995 | ..... | 12,910 | 11,250 |
| 4 No. 5CRO Counterweights | 10,445 | 8,040 | 7,900 | 9,235 | 6,120 | 5,135 | 7,220 | 6,320 |
| 4 No. 5C Aux. Weights | 12,660 | 9,915 | 9,780 | 11,380 | 7,830 | 6,610 | 9,210 | 8,040 |
| 8 No. 5C Aux. Weights | ***14,880 | *11,795 | *11,660 | *13,530 | *9,535 | ..... | 11,205 | 9,760 |
| 4 No. 6RO Counterweights | 9,460 | 7,220 | 7,075 | 8,295 | 5,400 | 4,515 | 6,380 | 5,595 |
| 4 No. 6 Aux. Weights | 10,780 | 8,345 | 8,205 | 9,580 | 6,430 | 5,405 | 7,580 | 6,635 |
| 8 No. 6 Aux. Weights | 12,100 | 9,470 | 9,330 | 10,870 | 7,460 | 6,295 | 8,785 | 7,675 |
| 4 No. 7RO Counterweights | 8,205 | 6,160 | 6,015 | 7,085 | 4,440 | 3,700 | 5,260 | 4,645 |
| 4 No. 7 Aux. Weights | 9,210 | 7,020 | 6,880 | 8,070 | 5,235 | 4,395 | 6,190 | 5,460 |
| 8 No. 7 Aux. Weights | 10,215 | 7,880 | 7,740 | 9,050 | 6,030 | 5,091 | 7,115 | 6,270 |

EXAMPLE:
 A C-640D-305-144 Unit with 4 No. 1RO Counterweights and 4 No. 1S Auxiliary Weights would have a maximum counterbalance effect of 19,580 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 = [19,580 - (- 520)] × 144 / 106 + (- 520) = 20,100 × 144 / 106 - 520 = 26,785 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.

*Use only one aux. weight per counterweight on belt cover side on 912D, 320D, 160D, & 40D units.
 **Use only one aux. weight per counterweight on belt cover side on 320D & 228D units.
 ***Use only one aux. weight per counterweight on belt cover side on 160D units.

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-256-120 C-320D-256-120 | C-456D-213-120 C-320D-213-120 | C-456D-256-100 C-320D-256-100 | C-228D-213-100 C-228D-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 |
|-----------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|--------------------------------|--------------------------------|---------------|---------------|
| STROKE | 120" | 120" | 100" | 100" | 86" | 86" | 86" | 86" |
| STRUCTURAL UNBALANCE | + 55 Lbs. | 0 Lbs. | + 550 Lbs. | + 0 Lbs. | + 800 Lbs. | + 450 Lbs. | + 450 Lbs. | + 115 Lbs. |
| CRANKS | 8495C | 8495C | 8495C | 7478C | 8495C | 7478C | 7478C | 6468C |
| C'Bal., Cranks Only | 5,740 | 5,685 | 7,330 | 3,910 | 8,720 | 4,910 | 4,910 | 3,395 |
| 4 No. ORO Counterweights | 20,595 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. OARO Counterweights | 18,470 | 18,415 | 22,510 | ..... | ..... | ..... | ..... | ..... |
| 4 No. OAS Aux. Weights | 22,415 | ..... | 27,210 | ..... | ..... | ..... | ..... | ..... |
| 4 No. 1RO Counterweights | 15,670 | 15,615 | 19,170 | 12,855 | 22,545 | ..... | ..... | ..... |
| 4 No. 1S Aux. Weights | 18,725 | 18,670 | 22,810 | 15,605 | ..... | ..... | ..... | ..... |
| 8 No. 1S Aux. Weights | 21,775 | ..... | 26,450 | 18,355 | ..... | ..... | ..... | ..... |
| 4 No. 2RO Counterweights | 14,010 | 13,955 | 17,195 | 11,425 | 20,235 | 13,490 | 13,490 | 10,430 |
| 4 No. 2S Aux. Weights | 16,975 | 16,920 | 20,725 | 14,120 | ..... | 16,560 | 16,560 | ..... |
| 8 No. 2S Aux. Weights | 19,935 | 19,880 | 24,260 | 16,810 | ..... | 19,635 | ..... | ..... |
| 4 No. 3CRO Counterweights | 12,450 | 12,395 | 15,330 | 10,090 | 18,065 | 11,965 | 11,965 | 9,255 |
| 4 No. 3BS Aux. Weights | 15,345 | 15,290 | 18,780 | 12,755 | 22,090 | 15,005 | 15,005 | 11,780 |
| 8 No. 3BS Aux. Weights | *18,235 | **18,180 | *22,230 | *15,420 | ..... | *18,045 | ..... | ..... |
| 4 No. 5ARO Counterweights | 10,645 | 10,590 | 13,180 | 8,510 | 15,550 | 10,160 | 10,160 | 7,830 |
| 4 No. 5A Aux. Weights | 12,615 | 12,560 | 15,525 | 10,355 | 18,290 | 12,265 | 12,265 | 9,605 |
| 8 No. 5A Aux. Weights | *14,580 | *14,525 | *17,870 | *12,195 | *21,030 | 14,370 | *14,370 | 11,385 |
| 4 No. 5CRO Counterweights | 9,355 | 9,300 | 11,640 | 7,310 | 13,750 | 8,795 | 8,795 | 6,685 |
| 4 No. 5C Aux. Weights | 11,140 | 11,085 | 13,765 | 8,990 | 16,235 | 10,710 | 10,710 | 8,315 |
| 8 No. 5C Aux. Weights | 12,920 | 12,865 | 15,895 | *10,670 | 18,720 | 12,630 | *12,630 | 9,940 |
| 4 No. 6RO Counterweights | ..... | ..... | 10,675 | 6,565 | 12,625 | 7,940 | 7,940 | 5,975 |
| 4 No. 6 Aux. Weights | ..... | ..... | 11,935 | 7,565 | 14,100 | 9,085 | 9,085 | 6,950 |
| 8 No. 6 Aux. Weights | ..... | ..... | 13,195 | 8,565 | 15,570 | 10,225 | 10,225 | 7,925 |
| 4 No. 7RO Counterweights | ..... | ..... | 9,465 | 5,615 | 11,210 | 6,855 | 6,855 | 5,060 |
| 4 No. 7 Aux. Weights | ..... | ..... | 10,420 | 6,375 | 12,330 | 7,725 | 7,725 | 5,805 |
| 8 No. 7 Aux. Weights | ..... | ..... | 11,375 | 7,135 | 13,445 | 8,595 | 8,595 | 6,550 |

| UNIT | C-80D-119-54 | C-57D-76-54 | C-80D-133-48 | C-80D-109-48 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 | 54" | 54" | 48" | 48" | 48" | 42" | 36" | 30" |
| STRUCTURAL UNBALANCE | + 300 Lbs. | 0 Lbs. | + 440 Lbs. | + 320 Lbs. | 0 Lbs. | + 150 Lbs. | + 275 Lbs. | + 150 Lbs. |
| CRANKS | 4850B | 4246B | 4850B | 4246B | 3644B | 3644B | 3644B | 2436B |
| C'Bal., Cranks Only | 2,845 | 1,649 | 3,270 | 2,175 | 1,338 | 1,675 | 2,055 | 1,370 |
| 4 No. 5ARO Counterweights | 7,470 | 5,760 | 8,475 | 6,800 | ..... | ..... | ..... | ..... |
| 4 No. 5A Aux. Weights | 9,360 | 7,440 | 10,595 | 8,690 | ..... | ..... | ..... | ..... |
| 8 No. 5A Aux. Weights | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. 5CRO Counterweights | 6,320 | 4,750 | 7,175 | 5,665 | 4,525 | 5,300 | 6,285 | ..... |
| 4 No. 5C Aux. Weights | 8,040 | 6,285 | 9,115 | 7,395 | 6,160 | 7,165 | ..... | ..... |
| 8 No. 5C Aux. Weights | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. 6RO Counterweights | 5,595 | 4,120 | 6,365 | 4,955 | 3,995 | 4,700 | 5,580 | 4,400 |
| 4 No. 6 Aux. Weights | 6,635 | 5,050 | 7,535 | 6,005 | 5,000 | 5,840 | 6,915 | 5,540 |
| 8 No. 6 Aux. Weights | 7,675 | 5,985 | 8,705 | 7,055 | ..... | *6,985 | ..... | ..... |
| 4 No. 7RO Counterweights | 4,645 | 3,275 | 5,295 | 4,005 | 3,090 | 3,670 | 4,380 | 3,400 |
| 4 No. 7 Aux. Weights | 5,460 | 4,005 | 6,210 | 4,830 | 3,885 | 4,570 | 5,435 | 4,320 |
| 8 No. 7 Aux. Weights | 6,270 | 4,740 | 7,125 | 5,655 | ..... | *5,475 | ..... | ..... |

EXAMPLE:

A C-456D-305-144 with 4 No. 1RO Counterweights and 3 No. 1S Auxiliary Weights would have a maximum counterbalance effect in the 144" stroke of 16,470 + 3/4 (19,580 - 16,470) = 18,800 pounds. With this same combination of weights, the counterbalance effect in the 106" stroke is [18,800 - (- 520)] x 144/106 + (- 520) = 25,725 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.

*Use only one aux. weight per counterweight on belt cover side on 912D, 320D, 160D, & 40D units.

**Use only one aux. weight per counterweight on belt cover side on 320D & 228D units.

***Use only one aux. weight per counterweight on belt cover side on 160D units.

LUFKIN MARK II UNITORQUE PUMPING UNITS

THE UNITORQUE GEOMETRY

The Mark II's unique UNITORQUE geometry is characterized by three (3) basic configurations which reduce the rod load and peak torque over that of a conventional pumping unit. The design characteristics which make the Mark II unique are:

A. Shifting the gearbox from directly under the equalizer towards the Samson post turning in a preferred direction of rotation, creates an upstroke that occurs in approximately 195° of crank rotation and a downstroke of approximately 165° of crank rotation.

B. Placing the equalizer between the horsehead and the Samson post thus creating a "push-up" or "Class 3" lever system.

The 195° upstroke, coupled with the front mounted geometry, reduces the acceleration at the beginning of the upstroke where the load is greatest, thereby effecting a reduction in polished rod load. Locating the cross-yoke forward of the gear reducer creates a greater mechanical advantage for lifting the heavy load on the upstroke, and a lesser mechanical advantage for the reduced downstroke load, i.e., the maximum upstroke torque factor is reduced while the maximum downstroke torque factor is increased.

C. An angular offset in the crank that produces a more effective 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 Figure 31).

Independently these features would not produce a relatively uniform torque, but working together a "unitorque" system is obtained which can reduce the torque on the gearbox up to 35% as well as lowering power costs and often, prime mover size.

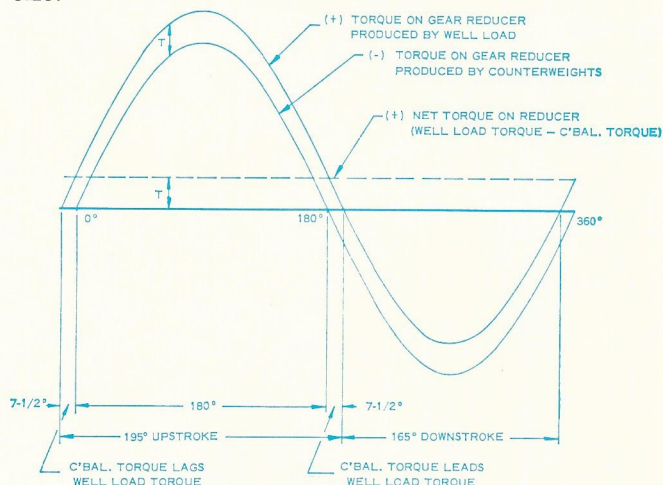


FIGURE 31

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.)

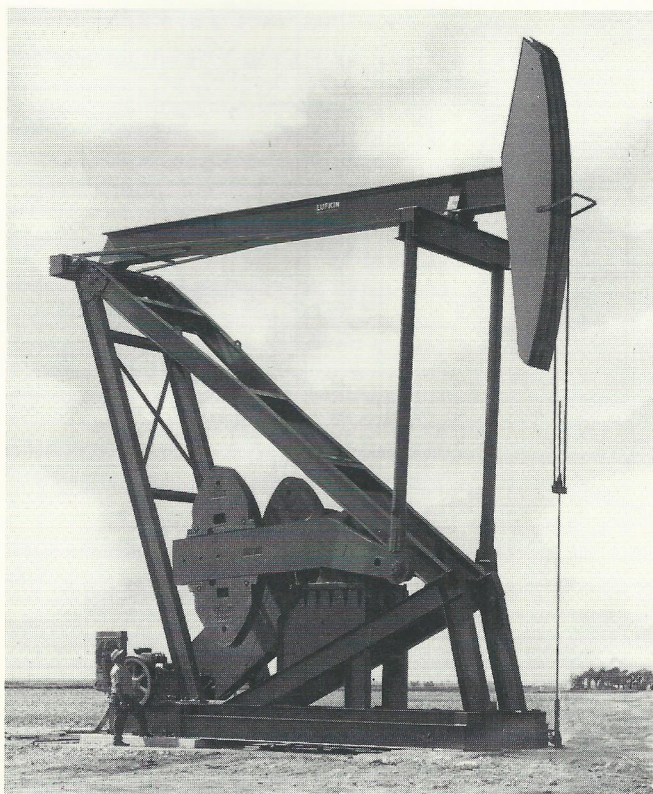


FIGURE 32

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



FIGURE 33

"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.

**MARK II PUMPING UNIT ASSEMBLIES
GENERAL DIMENSIONS**

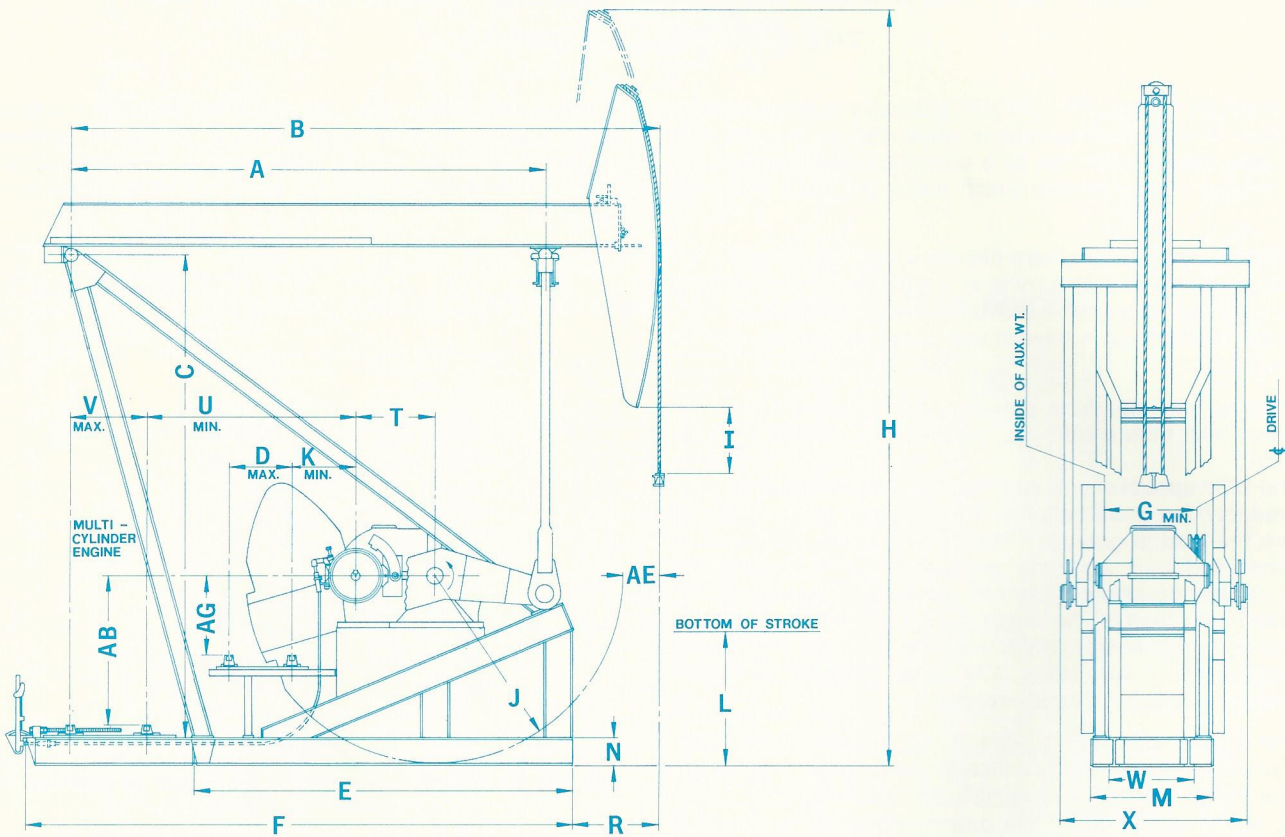


FIGURE 34

STANDARD API MODELS SHOWN. OTHER MODELS AVAILABLE ON REQUEST.

| 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-1824D-427-216 | 25'-6" | 32'-0" | 27'-57/8" | 55" | 18'-7" | 27'-93/4" | 67" | 47'-5" | 443/8" | 130" | 253/8" | 751/2" | 8'-5" | 18" | 45" | 587/8" | 8'-97/8" | 52" | 481/2" | 10'-4" | 9'-01/2" | 26" | 51" |
| M-1280D-427-216 | " | " | " | " | " | 28'-51/2" | 571/4" | " | " | " | 313/4" | " | 8'-0" | " | " | 521/2" | 10'-0" | " | " | 9'-6" | " | " | " |
| M-1280D-427-192 | " | " | " | " | " | " | " | 45'-10" | 631/4" | " | " | 801/4" | " | " | " | " | " | " | " | " | " | " | " |
| M-912DS-365-216 | " | " | " | " | " | 27'-71/2" | 535/8" | 47'-5" | 443/8" | " | 23" | 751/2" | " | " | " | 481/2" | 9'-11/2" | " | " | 8'-11" | " | " | 59" |
| M-912DS-427-192 | " | " | " | " | " | " | " | 45'-10" | 631/4" | " | " | 801/4" | " | " | " | " | " | " | " | " | " | " | " |
| M-912DS-427-168 | 22'-6" | 27'-10" | 23'-07/8" | 50" | 18'-23/4" | 24'-101/4" | " | 39'-9" | 323/8" | 108" | 251/2" | 851/4" | 6'-91/2" | " | 48" | " | 9'-03/8" | " | 50" | " | 9'-63/8" | 233/8" | 46" |
| M-912D-305-216 | 25'-6" | 32'-0" | 27'-57/8" | 55" | 18'-7" | 27'-21/2" | " | 47'-5" | 443/8" | 130" | 23" | 751/2" | 8'-0" | " | 45" | " | 9'-11/2" | 47" | 481/2" | 9'-1" | 9'-01/2" | 26" | 59" |
| M-912D-305-192 | " | " | " | " | " | " | " | 45'-10" | 631/4" | " | " | 801/4" | " | " | " | " | " | " | " | " | " | " | " |
| M-912D-365-168 | 22'-6" | 27'-10" | 23'-07/8" | 50" | 18'-23/4" | 24'-101/4" | " | 39'-3" | 401/4" | 108" | 251/2" | 771/8" | 6'-91/2" | " | 48" | " | 9'-03/8" | 52" | 50" | 8'-9" | 7'-63/8" | 233/8" | 46" |
| M-912D-305-168 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| M-912D-365-144 | 21'-6" | 26'-0" | 21'-07/8" | " | " | " | " | 35'-6" | 335/8" | " | " | 833/4" | " | " | 421/2" | " | " | " | " | " | " | 18" | " |
| M-912D-305-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | 8'-73/8" | " | " | " |
| M-640D-305-192 | 25'-6" | 32'-0" | 27'-57/8" | 55" | 18'-7" | 27'-21/2" | 497/8" | 45'-10" | 631/4" | 130" | 265/8" | 801/4" | 8'-0" | " | 45" | 411/2" | 9'-81/2" | 47" | 481/2" | 8'-9" | 9'-01/2" | 26" | 60" |
| M-640D-365-168 | 22'-6" | 27'-10" | 23'-07/8" | 50" | 18'-23/4" | 24'-101/4" | " | 39'-3" | 401/4" | 108" | 241/8" | 771/8" | 6'-91/2" | " | 48" | " | 9'-71/4" | 52" | 50" | 8'-5" | 7'-63/8" | 233/8" | 46" |
| M-640D-305-168 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| M-640D-365-144 | 21'-6" | 26'-0" | 21'-07/8" | " | " | " | " | 35'-6" | 335/8" | " | " | 833/4" | " | " | 421/2" | " | " | " | " | " | " | 18" | " |
| M-640D-305-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | 8'-33/8" | " | " | " |
| M-640D-265-144 | " | " | " | " | " | " | " | 35'-2" | 471/4" | " | " | 715/8" | " | " | " | " | " | " | " | " | " | " | " |
| M-640D-305-120 | " | " | " | " | " | " | " | 33'-3" | 593/4" | " | " | 803/4" | " | " | " | " | " | " | " | " | " | " | " |
| M-456D-305-192 | 25'-6" | 32'-0" | 27'-57/8" | 55" | 18'-7" | 27'-21/2" | " | 45'-10" | 631/4" | 130" | 293/4" | 801/4" | 8'-0" | " | 45" | 383/8" | 9'-115/8" | 47" | 481/2" | 8'-9" | 9'-01/2" | 26" | 60" |
| M-456D-305-168 | 22'-6" | 27'-10" | 23'-07/8" | 50" | 18'-23/4" | 24'-101/4" | " | 39'-3" | 401/4" | 108" | 31" | 771/8" | 6'-91/2" | " | 48" | " | 9'-71/4" | 52" | 50" | 8'-5" | 7'-63/8" | 233/8" | 46" |
| M-456D-365-144 | 21'-6" | 26'-0" | 21'-07/8" | " | " | " | " | 35'-6" | 335/8" | " | " | 833/4" | " | " | 421/2" | " | " | " | " | " | " | 18" | " |
| M-456D-305-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | 8'-33/8" | " | " | " |
| M-456D-256-144 | " | " | " | " | " | " | " | 36'-2" | 471/2" | " | " | 715/8" | " | " | " | " | " | " | " | " | " | " | " |
| M-456D-365-120 | " | " | " | " | " | " | " | 33'-3" | 593/4" | " | " | 803/4" | " | " | " | " | " | " | " | " | 8'-5" | " | " |
| M-456D-305-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | 8'-31/2" | " | " | " |
| M-456D-256-120 | " | " | " | " | " | " | " | 33'-4" | 737/8" | " | " | 70" | " | " | " | " | " | " | " | " | " | " | " |

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

(Units on this page are designed to be installed on "two point" foundations. See figures 32 and 33.)

**MARK II PUMPING UNIT ASSEMBLIES
GENERAL DIMENSIONS**

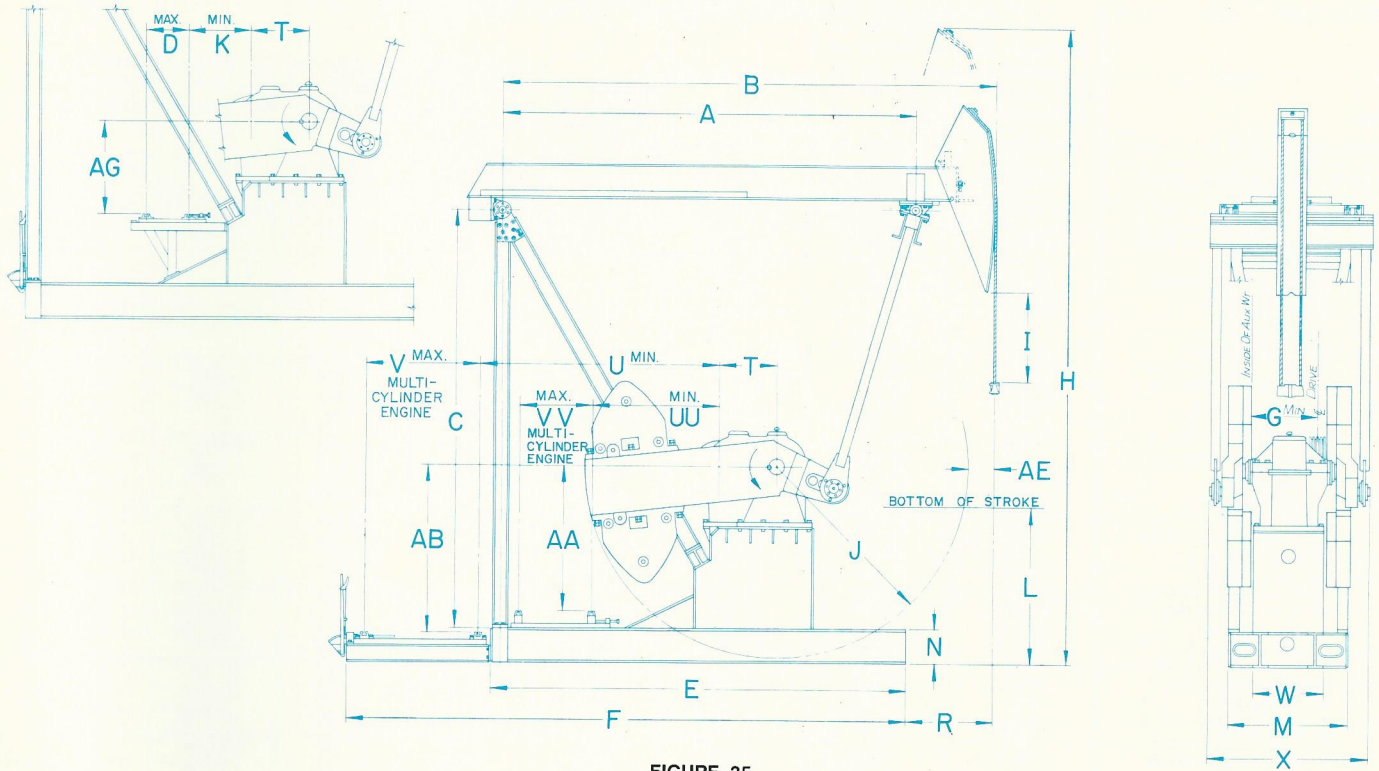


FIGURE 35

STANDARD API MODELS SHOWN, OTHER MODELS AVAILABLE ON REQUEST.

| 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" | 33 1/4" | 21'-6 3/8" | * | 42 3/4" | 36'-10" | 47 5/8" | 108" | 35 3/8" | 77 1/2" | 6'-3 3/4" | 24" | 60" | 34" | * | * | 43" | 7'-4 3/8" | 7'-2" | * | 18" | 46" | 7'-4" | 55" |
| M-320D-305-120 | " | " | " | " | " | * | " | 33'-11" | 65" | " | " | 82 7/8" | " | " | " | " | * | * | " | " | " | * | " | " | " | " |
| M-320D-256-120 | " | " | " | " | " | * | " | 33'-10" | 69" | " | " | 80 3/4" | " | " | " | " | * | * | " | " | " | * | " | " | " | " |
| M-320D-213-120 | " | " | " | " | " | * | " | " | " | " | " | " | " | " | " | " | * | * | " | " | " | * | " | " | " | " |
| M-320D-305-100 | " | " | " | " | " | * | " | 32'-4" | 84 5/8" | " | " | 83 1/8" | " | " | " | " | * | * | " | " | " | * | " | " | " | " |
| M-320D-256-100 | " | " | " | " | " | * | " | 31'-9" | 88 3/8" | " | " | 81 1/4" | " | " | " | " | * | * | " | " | " | * | " | " | " | " |
| M-228D-256-120 | " | " | " | 28 3/4" | " | 27'-10 3/8" | 38 1/2" | 33'-10" | 69" | " | 41 5/8" | 80 3/4" | " | " | " | 30" | 14'-8 1/4" | 47 1/2" | 37" | 6'-9 3/8" | " | 7'-11 1/4" | " | 50 1/4" | 7'-8" | " |
| M-228D-213-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| M-228D-256-100 | " | " | " | " | " | " | " | 31'-9" | 88 3/8" | " | " | 81 1/4" | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| M-228D-173-100 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| M-228D-246-86 | 15'-6" | 18'-6" | 15'-8 3/8" | 29 1/4" | 15'-8" | 21'-11 1/2" | " | 25'-8" | 45 1/4" | 86 5/8" | 22 7/8" | 75 1/2" | 57 1/4" | " | 39" | " | 9'-8 1/2" | " | " | 6'-8 3/8" | ** | 6'-1 3/8" | 11 3/8" | 41 1/2" | ** | ** |
| M-228D-213-86 | " | " | " | " | 15'-7 5/8" | 21'-11 1/8" | " | 25'-5" | " | " | " | 72 1/2" | " | 21" | " | " | 9'-8 1/8" | " | " | ** | 70 7/8" | " | " | " | ** | ** |
| M-228D-200-74 | " | " | " | " | " | " | " | 24'-7" | 52 1/8" | " | " | 73 1/4" | " | " | " | " | " | " | " | " | ** | " | " | " | ** | ** |
| M-228D-173-74 | " | " | " | " | " | " | " | 24'-6" | " | " | " | 72 7/8" | " | " | " | " | " | " | " | " | ** | " | " | " | ** | ** |
| M-160D-213-86 | " | " | " | 33 3/4" | " | 21'-0 5/8" | 32 1/2" | 25'-5" | 45 1/4" | " | 24 9/16" | 72 1/8" | 54 1/4" | " | " | 26" | 8'-10 5/8" | 55" | 32" | 6'-0 3/8" | ** | 6'-6 1/8" | " | 38 5/8" | ** | ** |
| M-160D-173-86 | " | " | " | " | " | " | " | " | 41 1/8" | " | " | " | " | " | " | " | " | " | " | " | ** | " | " | " | ** | ** |
| M-160D-200-74 | " | " | " | " | " | " | " | 24'-7" | 52 1/8" | " | " | 73 1/4" | " | " | " | " | " | " | " | " | ** | " | " | " | ** | ** |
| M-160D-173-74 | " | " | " | " | " | " | " | 24'-6" | " | " | " | 72 7/8" | " | " | " | " | " | " | " | " | ** | " | " | " | ** | ** |
| M-114D-143-86 | 13'-6" | 15'-9" | 12'-3 1/2" | 30" | 13'-5" | 19'-8 1/2" | 28 3/4" | 21'-5" | 14" | 62" | 20 1/4" | 57 1/8" | 42 3/4" | 16" | 32" | 24" | 9'-0 1/2" | 52" | 25" | 67 3/8" | ** | 44 3/8" | 16" | 35 3/4" | ** | ** |
| M-114D-173-74 | 15'-6" | 18'-6" | 15'-8 3/8" | 30 3/4" | 15'-7 5/8" | 21'-11 1/8" | " | 24'-6" | 52 1/8" | 86 5/8" | 28" | 72 7/8" | 54 1/4" | 21" | 39" | " | 10'-2 1/8" | " | " | 69" | ** | 70 3/8" | 11 3/8" | 41 5/8" | ** | ** |
| M-114D-143-74 | 13'-6" | 15'-9" | 12'-3 1/2" | 30" | 13'-5" | 19'-8 1/2" | " | 20'-7" | 27 3/4" | 62" | 20 1/4" | 56 7/8" | 42 3/4" | 16" | 32" | " | 9'-0 1/2" | " | " | 67 3/8" | ** | 44 3/8" | 16" | 35 3/4" | ** | ** |
| M-114D-173-64 | " | " | " | " | " | " | " | 19'-10" | 21" | " | " | 71 5/8" | " | " | " | " | " | " | " | " | ** | " | " | " | ** | ** |
| M-114D-143-64 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | ** | " | " | " | ** | ** |

*On 100", 120" and 144" Stroke Units, on This Page Multi-Cylinder Engines are Mounted on Main Base Beams Forward of Samson Post. See Dimensions UU, VV, and AA.
**On 64", 74" and 86" 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 plans.
(Units on this page are designed to be installed on "two point" foundations. See figures 32 and 33.)

MARK II COUNTERBALANCE DATA

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

See Example Page 23.

| UNIT | M-1824D-427-216 | M-1280D-427-192 | | | | | | |
|-----------------------------|--|---|-----------------|----------------------------------|--|--|--|--|
| | M-1280D-427-216 M-912DS-365-216 M-912D-305-216 | M-912DS-427-192 M-912D-305-192 M-640D-305-192 M-456D-305-192 | M-912DS-427-168 | M-640D-365-168 M-912D-365-168 | 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" | 168" | 144" | 144" | 144" |
| STRUCTURAL UNBALANCE | -7,450 Lbs. | -7,160 Lbs. | -6,820 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 | 168108 MRO | 144108 MRO | 144108 MRO | 144108 MRO |
| C'Bal., Cranks Only | 1,875 | 3,365 | -975 | 460 | 985 | 3,090 | 3,470 | 3,760 |
| 4 No. OOROL Counterweights | 22,150 | 25,445 | 18,620 | ..... | ..... | ..... | ..... | ..... |
| 8 No. OOSL Aux. Weights | 34,110 | 38,475 | 30,180 | ..... | ..... | ..... | ..... | ..... |
| 4 No. 130RO Counterweights | 21,605 | 24,850 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. 130D Aux. Weights | 32,550 | 36,775 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. OORO Counterweights | 17,990 | 20,920 | 14,605 | 16,040 | 16,565 | 21,690 | 22,065 | 22,355 |
| 4 No. OOS Aux. Weights | 22,855 | 26,215 | 19,305 | 20,740 | 21,265 | 27,300 | 27,680 | ..... |
| 8 No. OOS Aux. Weights | 27,720 | 31,510 | 24,005 | 25,440 | 25,965 | 32,910 | ..... | ..... |
| 4 No. ORO Counterweights | 15,935 | 18,675 | 12,615 | 14,055 | 14,575 | 19,315 | 19,695 | 19,985 |
| 4 No. OS Aux. Weights | 20,605 | 23,760 | 17,130 | 18,565 | 19,090 | 24,700 | 25,080 | ..... |
| 8 No. OS Aux. Weights | 25,275 | 28,850 | 21,645 | 23,075 | 23,605 | 30,085 | ..... | ..... |
| 4 No. OARO Counterweights | 13,595 | 16,130 | 10,510 | 11,945 | 12,470 | 16,795 | 17,180 | 17,470 |
| 4 No. OAS Aux. Weights | 17,225 | 20,085 | 14,065 | 15,500 | 16,025 | 21,040 | 21,425 | 21,710 |
| 8 No. OAS Aux. Weights | 20,855 | 24,040 | 17,620 | 19,055 | 19,580 | 25,285 | 25,670 | ..... |
| 4 No. 1RO Counterweights | 10,970 | 13,275 | 7,965 | 9,400 | 9,925 | 13,755 | 14,135 | 14,425 |
| 4 No. 1S Aux. Weights | 13,770 | 16,340 | 10,710 | 12,145 | 12,670 | 17,035 | 17,415 | 17,705 |
| 8 No. 1S Aux. Weights | 16,570 | 19,365 | 13,455 | 14,890 | 15,415 | 20,315 | 20,695 | ..... |
| 4 No. 2RO Counterweights | 9,430 | 11,590 | 6,460 | 7,895 | 8,420 | 11,965 | 12,345 | 12,635 |
| 4 No. 2S Aux. Weights | 12,135 | 14,535 | 9,125 | 10,560 | 11,085 | 15,145 | 15,525 | 15,815 |
| 8 No. 2S Aux. Weights | 14,840 | 17,480 | 11,790 | 13,225 | 13,750 | 18,325 | 18,705 | *18,995 |
| 4 No. 3CRO Counterweights | 7,910 | 9,940 | 5,015 | 6,450 | 6,975 | 10,240 | 10,620 | 10,910 |
| 4 No. 3BS Aux. Weights | 10,515 | 12,775 | 7,595 | 9,030 | 9,555 | 13,320 | 13,700 | 13,990 |
| 8 No. 3BS Aux. Weights | 13,120 | 15,610 | 10,175 | 11,610 | 12,135 | 16,400 | 16,780 | *17,070 |
| 4 No. 5ARO Counterweights | 6,200 | 8,085 | 3,365 | 4,800 | 5,325 | 8,270 | 8,650 | 8,940 |
| 4 No. 5A Aux. Weights | 7,950 | 9,985 | 5,110 | 6,555 | 7,080 | 10,365 | 10,745 | 11,035 |
| 8 No. 5A Aux. Weights | 9,700 | 11,885 | 6,850 | 8,310 | 8,835 | 12,460 | 12,840 | *13,130 |
| 4 No. 5CRO Counterweights | 5,050 | 6,820 | 2,220 | 3,655 | 4,180 | 6,895 | 7,275 | 7,565 |
| 4 No. 5C Aux. Weights | 6,620 | 8,530 | 3,795 | 5,230 | 5,755 | 8,780 | 9,160 | 9,450 |
| 8 No. 5C Aux. Weights | 8,190 | 10,240 | 5,370 | 6,805 | 7,330 | 10,665 | 11,045 | *11,335 |
| 4 No. 6RO Counterweights | 4,285 | 5,985 | 1,445 | 2,880 | 3,405 | 5,970 | 6,350 | 6,640 |
| 4 No. 6 Aux. Weights | 5,190 | 6,975 | 2,355 | 3,790 | 4,315 | 7,060 | 7,440 | 7,730 |
| 8 No. 6 Aux. Weights | 6,095 | 7,965 | 3,265 | 4,700 | 5,225 | 8,150 | 8,530 | 8,820 |
| 4 No. 7RO Counterweights | 3,400 | 5,025 | 565 | 2,000 | 2,525 | 4,925 | 5,305 | 5,595 |
| 4 No. 7 Aux. Weights | 4,085 | 5,770 | 1,255 | 2,690 | 3,215 | 5,745 | 6,125 | 6,415 |
| 8 No. 7 Aux. Weights | 4,770 | 6,515 | 1,945 | 3,380 | 3,905 | 6,565 | 6,945 | 7,235 |

| 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 |
|-----------------------------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|---------------|
| | 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 | 4,660 | 4,890 | 5,075 | 5,185 | 2,715 | 2,815 | 2,925 | 1,525 | |
| 4 No. 1RO Counterweight | 19,440 | 19,670 | 19,850 | 19,960 | 15,600 | 15,700 | 15,810 | 9,525 | |
| 4 No. 1S Aux. Weights | 23,980 | 24,210 | 24,395 | ..... | 19,565 | 19,665 | 19,775 | 11,980 | |
| 4 No. 2RO Counterweights | 16,955 | 17,185 | 17,370 | 17,480 | 13,480 | 13,580 | 13,690 | 8,270 | |
| 4 No. 2S Aux. Weights | 21,360 | 21,590 | 21,775 | ..... | 17,335 | 17,435 | 17,545 | 10,690 | |
| 4 No. 3CRO Counterweights | 14,560 | 14,790 | 14,975 | 15,085 | 11,495 | 11,595 | 11,705 | 7,200 | |
| 4 No. 3BS Aux. Weights | 18,830 | 19,060 | 19,245 | 19,355 | 15,280 | 15,380 | 15,490 | 9,640 | |
| 4 No. 5ARO Counterweights | 11,840 | 12,070 | 12,255 | 12,365 | 9,190 | 9,290 | 9,400 | 5,880 | |
| 4 No. 5A Aux. Weights | 14,740 | 14,970 | 15,155 | 15,265 | 11,890 | 11,990 | 12,100 | 7,650 | |
| 4 No. 5CRO Counterweights | 9,935 | 10,165 | 10,350 | 10,460 | 7,495 | 7,595 | 7,705 | 4,770 | |
| 4 No. 5C Aux. Weights | 12,545 | 12,775 | 12,960 | 13,070 | 9,860 | 9,955 | 10,070 | 6,375 | |
| 4 No. 6RO Counterweights | 8,655 | 8,885 | 9,070 | 9,180 | 6,435 | 6,535 | 6,645 | 4,080 | |
| 4 No. 6 Aux. Weights | 10,160 | 10,390 | 10,575 | 10,685 | 7,840 | 7,940 | 8,050 | 5,045 | |
| 8 No. 6 Aux. Weights | 11,665 | 11,895 | 12,080 | 12,190 | 9,245 | ..... | ..... | 6,010 | |
| 4 No. 7RO Counterweights | 7,200 | 7,430 | 7,615 | 7,725 | 5,095 | 5,195 | 5,305 | 3,180 | |
| 4 No. 7 Aux. Weights | 8,340 | 8,570 | 8,755 | 8,865 | 6,160 | 6,260 | 6,370 | 3,925 | |
| 8 No. 7 Aux. Weights | 9,480 | 9,710 | 9,895 | 10,005 | 7,225 | ..... | ..... | 4,680 | |

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

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 | 1,990 | 2,370 | 2,660 | 2,880 | 3,070 | 2,940 | 3,270 |
| 4 No. ORO Counterweights | 21,065 | 21,445 | 21,735 | 21,955 | 22,140 | ..... | ..... |
| 4 No. OS Aux. Weights | 27,395 | 27,775 | ..... | ..... | ..... | ..... | ..... |
| 4 No. OARO Counterweights | 18,105 | 18,485 | 18,775 | 18,995 | 19,180 | 19,055 | 19,380 |
| 4 No. OAS Aux. Weights | 23,095 | 23,475 | 23,765 | 23,985 | 24,170 | ..... | ..... |
| 8 No. OAS Aux. Weights | 28,085 | *28,465 | ..... | ..... | ..... | ..... | ..... |
| 4 No. 1RO Counterweights | 14,530 | 14,910 | 15,200 | 15,420 | 15,605 | 15,480 | 15,805 |
| 4 No. 1S Aux. Weights | 18,385 | 18,765 | 19,055 | 19,275 | 19,460 | 19,335 | 19,660 |
| 8 No. 1S Aux. Weights | 22,240 | *22,620 | 22,910 | ..... | ..... | ..... | ..... |
| 4 No. 2RO Counterweights | 12,425 | 12,805 | 13,095 | 13,315 | 13,500 | 13,375 | 13,700 |
| 4 No. 2S Aux. Weights | 16,165 | 16,545 | 16,855 | 17,055 | 17,240 | 17,115 | 17,440 |
| 8 No. 2S Aux. Weights | 19,905 | *20,285 | 20,575 | ..... | ..... | ..... | ..... |
| 4 No. 3CRO Counterweights | 10,395 | 10,775 | 11,065 | 11,285 | 11,470 | 11,345 | 11,670 |
| 4 No. 3BS Aux. Weights | 14,015 | 14,395 | 14,685 | 14,905 | 15,090 | 14,965 | 15,290 |
| 8 No. 3BS Aux. Weights | 17,635 | *18,015 | 18,305 | ..... | ..... | ..... | ..... |
| 4 No. 5ARO Counterweights | 8,085 | 8,465 | 8,755 | 8,975 | 9,160 | 9,035 | 9,360 |
| 4 No. 5A Aux. Weights | 10,545 | 10,925 | 11,215 | 11,435 | 11,620 | 11,495 | 11,820 |
| 8 No. 5A Aux. Weights | 13,005 | *13,385 | 13,675 | ..... | ..... | ..... | ..... |
| 4 No. 5CRO Counterweights | 6,470 | 6,845 | 7,140 | 7,360 | 7,545 | 7,420 | 7,745 |
| 4 No. 5C Aux. Weights | 8,685 | 9,060 | 9,355 | 9,575 | 9,755 | 9,630 | 9,960 |
| 8 No. 5C Aux. Weights | 10,900 | *11,275 | 11,570 | ..... | ..... | ..... | ..... |
| 4 No. 6RO Counterweights | 5,385 | 5,765 | 6,055 | 6,275 | 6,460 | 6,335 | 6,660 |
| 4 No. 6 Aux. Weights | 6,660 | 7,040 | 7,330 | 7,550 | 7,735 | 7,610 | 7,935 |
| 8 No. 6 Aux. Weights | 7,035 | 8,315 | 8,605 | 8,825 | 9,010 | 8,885 | 9,210 |
| 4 No. 7RO Counterweights | 4,150 | 4,530 | 4,820 | 5,040 | 5,225 | 5,100 | 5,425 |
| 4 No. 7 Aux. Weights | 5,115 | 5,495 | 5,785 | 6,005 | 6,190 | 6,065 | 6,390 |
| 8 No. 7 Aux. Weights | 6,080 | 6,460 | 6,750 | 6,970 | 7,155 | 7,030 | 7,355 |

* 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 | 3,685 | 3,755 | 3,785 | 3,825 | 2,230 | 2,845 |
| 4 No. 2RO Counterweights | 15,990 | 16,060 | 16,090 | 16,130 | 9,890 | 11,580 |
| 4 No. 2S Aux. Weights | ..... | ..... | ..... | ..... | 12,630 | 14,710 |
| 4 No. 3CRO Counterweights | 13,720 | 13,790 | 13,820 | 13,860 | 8,670 | 10,190 |
| 4 No. 3BS Aux. Weights | 18,045 | 18,115 | 18,145 | 18,185 | 11,445 | 13,355 |
| 4 No. 5ARO Counterweights | 11,085 | 11,155 | 11,185 | 11,225 | 7,170 | 8,485 |
| 4 No. 5A Aux. Weights | 14,080 | 14,150 | 14,180 | 14,220 | 9,180 | 10,775 |
| 4 No. 5CRO Counterweights | 9,145 | 9,215 | 9,245 | 9,285 | 5,910 | 7,045 |
| 4 No. 5C Aux. Weights | 11,845 | 11,915 | 11,945 | 11,985 | 7,730 | 9,125 |
| 4 No. 6RO Counterweights | 7,935 | 8,005 | 8,035 | 8,075 | 5,130 | 6,150 |
| 4 No. 6 Aux. Weights | 9,540 | 9,610 | 9,640 | 9,680 | 6,225 | 7,400 |
| 8 No. 6 Aux. Weights | 11,145 | ..... | ..... | 11,285 | 7,320 | 8,650 |
| 4 No. 7RO Counterweights | 6,400 | 6,470 | 6,500 | 6,540 | 4,105 | 4,985 |
| 4 No. 7 Aux. Weights | 7,625 | 7,695 | 7,725 | 7,765 | 4,950 | 5,950 |
| 8 No. 7 Aux. Weights | 8,850 | ..... | ..... | 8,990 | 5,795 | 6,915 |

EXAMPLE:

A M-456D-305-144 with 4 No. ORO Counterweights and 4 No. OS Auxiliary Weights would have a maximum counterbalance effect of 25,080 lbs. in the 144" stroke. (See other examples, pages 16 and 17.)

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

MARK II PUMPING UNIT SPECIFICATIONS

| UNIT DESIGNATION | M-1824D-427-216 M-1280D-427-216 | M-912DS-365-216 | M-912D-305-216 | M-1280D-427-192 M-912DS-427-192 | M-912D-305-192 M-640D-305-192 M-456D-305-192 | M-912DS-427-168 | M-912D-365-168 M-640D-365-168 |
|------------------------------------|------------------------------------|-------------------------------|-------------------------------|------------------------------------|--|-------------------------------|----------------------------------|
| POLISHED ROD CAPACITY, LBS. | 42,700 | 36,500 | 30,500 | 42,700 | 30,500 | 42,700 | 36,500 |
| STROKE LENGTH, INCHES | 216, 192, 167 | 216, 191, 167 | 216, 192, 167 | 192, 168, 144 | 192, 168, 144 | 168, 150, 131 | 168, 149, 130 |
| WALKING BEAM | 24" x 131 Lbs. | 24" x 131 Lbs. | 24" x 131 Lbs. | 24" x 131 Lbs. | 24" x 131 Lbs. | 24" x 131 Lbs. | 24" x 104 Lbs. |
| CRANK PIN BEARING | 1SC | 1SC | 1SC | 1SC | 1SC | 1SC | 1SC |
| SAMSON POST BEARING | P19 | P19 | P19 | P19 | P19 | P19 | P18 |
| CROSS YOKE BEARING | C232 | C232 | C232 | C232 | C232 | C232 | C22 C |
| WIRELINE HANGER | 1 $\frac{3}{8}$ " x 16" Ctrs. | 1 $\frac{3}{8}$ " x 16" Ctrs. | 1 $\frac{3}{8}$ " x 16" Ctrs. | 1 $\frac{3}{8}$ " x 16" Ctrs. | 1 $\frac{3}{8}$ " x 16" Ctrs. | 1 $\frac{3}{8}$ " x 16" Ctrs. | 1 $\frac{3}{8}$ " x 12" Ctrs. |
| CRANKS | 216130 MRO | 216130 MRO | 216130 MRO | 192130 MRO | 192130 MRO | 168108 MRO | 168108 MRO |

| UNIT DESIGNATION | 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-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. | 30,500 | 36,500 | 30,500 | 25,600 | 36,500 | 30,500 | 25,600 |
| STROKE LENGTH, INCHES | 168, 149, 130 | 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. | 24" x 84 Lbs. | 21" x 68 Lbs. | 24" x 84 Lbs. | 24" x 84 Lbs. | 21" x 68 Lbs. |
| CRANK PIN BEARING | 1SC | 1SC | 2SC | 2SC | 1SC | 2SC | 2SC |
| SAMSON POST BEARING | P18 | P18 | P18 | P18 | P18 | P18 | P18 |
| CROSS YOKE BEARING | C22 C | C232 | C22 C | C22 C | C232 | C22 C | C22C(M-228D,C20) |
| WIRELINE HANGER | 1 $\frac{1}{4}$ " x 12" Ctrs. | 1 $\frac{3}{8}$ " x 12" Ctrs. | 1 $\frac{1}{4}$ " x 12" Ctrs. | 1 $\frac{1}{8}$ " x 9" Ctrs. | 1 $\frac{3}{8}$ " x 12" Ctrs. | 1 $\frac{1}{4}$ " x 12" Ctrs. | 1 $\frac{1}{8}$ " x 9" Ctrs. |
| CRANKS | 168108 MRO | 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 | M228D-246-86 | M-228D-213-86 M-160D-213-86 | M-160D-173-86 |
|------------------------------------|----------------------------------|-------------------------------|----------------------------------|------------------------------|------------------------------|--------------------------------|----------------|
| POLISHED ROD CAPACITY, LBS. | 21,300 | 30,500 | 25,600 | 17,300 | 24,600 | 21,300 | 17,300 |
| 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 | 86, 72.4, 58.6 |
| WALKING BEAM | 21" x 62 Lbs. | 24" x 84 Lbs. | 21" x 68 Lbs. | 16" x 57 Lbs. | 16" x 57 Lbs. | 16" x 45 Lbs. | 16" x 45 Lbs. |
| CRANK PIN BEARING | 2SC | 2SC | 2SC | 2SC | 2SC | 2SC | 2SC |
| SAMSON POST BEARING | P18(M-228D-P16) | P18 | P18 | P16 | P16 | P16 | P13 |
| CROSS YOKE BEARING | C22C(M-228D,C19) | C22 C | C22C(M-228D,C20) | C19 | C20N | C20N | C18N |
| WIRELINE HANGER | 1 $\frac{1}{8}$ " x 9" Ctrs. | 1 $\frac{1}{4}$ " x 12" Ctrs. | 1 $\frac{1}{8}$ " x 9" Ctrs. | 1 $\frac{1}{8}$ " x 9" Ctrs. | 1 $\frac{1}{8}$ " x 9" Ctrs. | 1" x 9" Ctrs. | 1" x 9" Ctrs. |
| CRANKS | 120108 MR | 100108 MR | 100108 MR | 100108 MR | 8686 MR | 8686 MR | 8686 MR |

| UNIT DESIGNATION | 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 | M114D-173-64 | M-114D-143-64 | |
|------------------------------------|---------------|--------------------------------|---|---------------|---------------|---------------|--|
| POLISHED ROD CAPACITY, LBS. | 14,300 | 20,000 | 17,300 | 14,300 | 17,300 | 14,300 | |
| STROKE LENGTH, INCHES | 86, 74, 62 | 74, 60.4, 46.8 | 74, 60.4, 46.8 | 74, 60, 46 | 64, 52, 40 | 64, 52, 40 | |
| WALKING BEAM | 14" x 34 Lbs. | 16" x 45 Lbs. | 16" x 45 Lbs. | 14" x 34 Lbs. | 14" x 34 Lbs. | 14" x 34 Lbs. | |
| CRANK PIN BEARING | 4SD | 2SC | 2SC (M-114D,3SD) | 4SD | 3SD | 4SD | |
| SAMSON POST BEARING | P13 | P16 | P13 | P13 | P13 | P13 | |
| CROSS YOKE BEARING | 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. | |
| CRANKS | 8662 MR | 7486 MR | 7486 MR | 7462 MR | 6462 MR | 6462 MR | |

MARK II PUMPING UNIT AND PRIME MOVER BASES

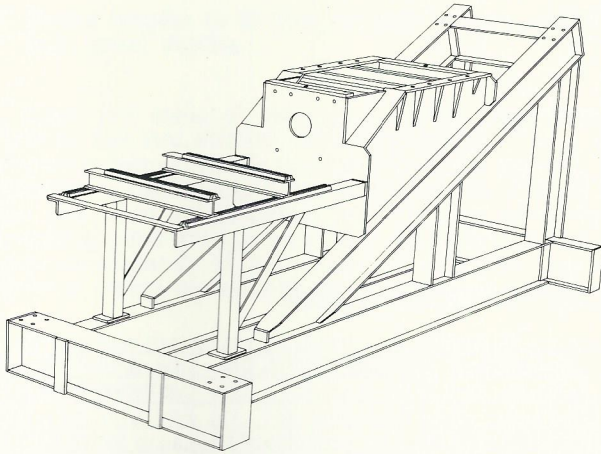


FIGURE 36
Mark II Base with Hi-Prime
Bracket for Electric Motor.

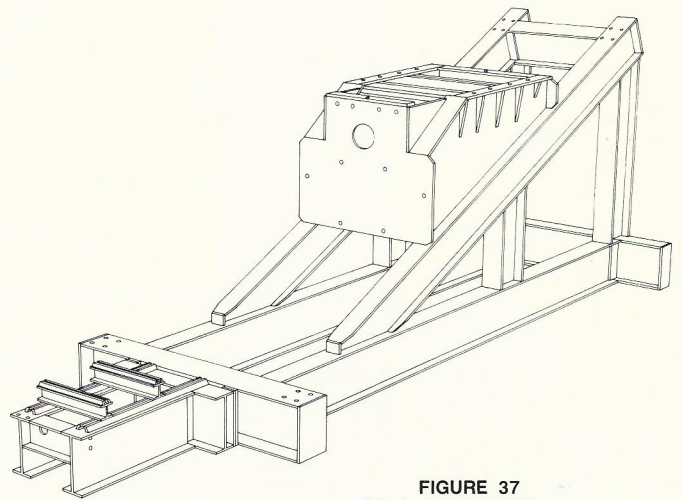


FIGURE 37
Mark II Jointed Base
for Electric Motor.

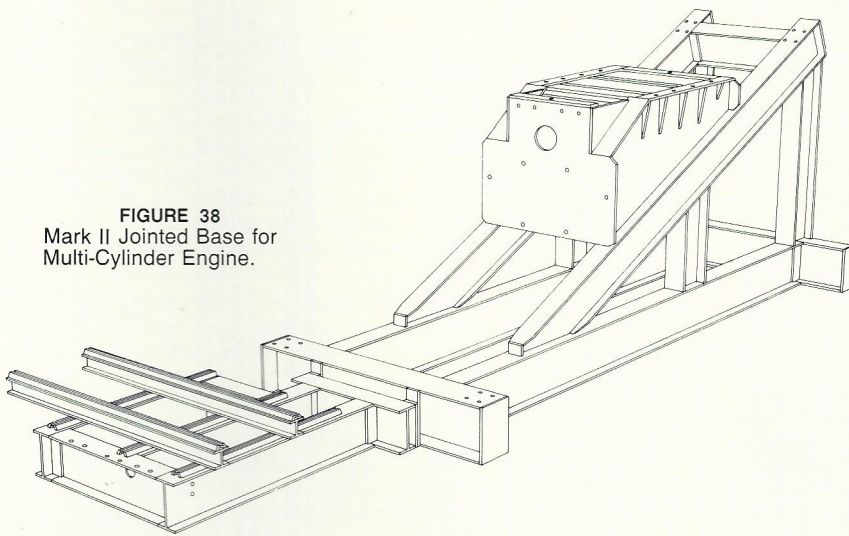


FIGURE 38
Mark II Jointed Base for
Multi-Cylinder Engine.

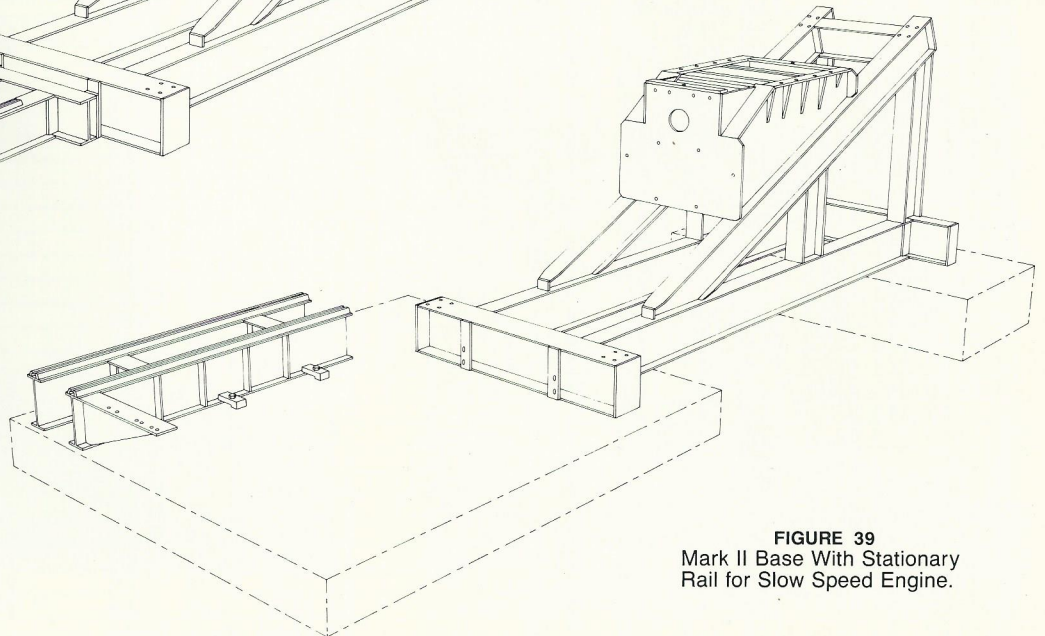


FIGURE 39
Mark II Base With Stationary
Rail for Slow Speed Engine.

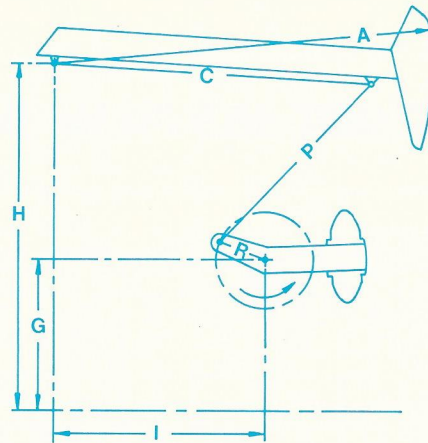


FIGURE 40

MARK II PUMPING UNIT API GEOMETRY DIMENSIONS

| | A | C | I | P | H | G | R1, R2, R3 | PHASE ANGLE | S.U. | T.F. @ (90° - α) / STROKE LENGTH |
|-----------------|-----|-----|-----|--------|---------|---------|---------------------|-------------|-------|-------------------------------------|
| M-1824D-427-216 | 384 | 306 | 228 | 234.38 | 329.875 | 115.875 | 80.06, 71.06, 62.06 | 22 | -7450 | 93.736/216 |
| M-1280D-427-216 | 384 | 306 | 228 | 234.38 | 329.875 | 115.875 | 80.06, 71.06, 62.06 | 22 | -7450 | 93.736/216 |
| M-912D-305-216 | 384 | 306 | 228 | 234.38 | 329.875 | 115.875 | 80.06, 71.06, 62.06 | 22 | -7450 | 93.736/216 |
| M-912DS-365-216 | 384 | 306 | 228 | 234.38 | 329.875 | 115.875 | 80.06, 71.06, 62.06 | 22 | -7450 | 93.736/216 |
| M-1280D-427-192 | 384 | 306 | 228 | 228.06 | 329.875 | 115.875 | 71.69, 62.69, 53.69 | 19.5 | -7160 | 86.069/192 |
| M-912DS-427-192 | 384 | 306 | 228 | 228.06 | 329.875 | 115.875 | 71.69, 62.69, 53.69 | 19.5 | -7160 | 86.069/192 |
| M-912D-305-192 | 384 | 306 | 228 | 228.06 | 329.875 | 115.875 | 71.69, 62.69, 53.69 | 19.5 | -7160 | 86.069/192 |
| M-640D-305-192 | 384 | 306 | 228 | 228.06 | 329.875 | 115.875 | 71.69, 62.69, 53.69 | 19.5 | -7160 | 86.069/192 |
| M-456D-305-192 | 384 | 306 | 228 | 228.06 | 329.875 | 115.875 | 71.69, 62.69, 53.69 | 19.5 | -7160 | 86.069/192 |
| M-912DS-427-168 | 334 | 270 | 203 | 196.5 | 276.875 | 93.875 | 63.56, 56.56, 49.56 | 19 | -6820 | 75.24/168 |
| M-912D-365-168 | 334 | 270 | 203 | 193.5 | 276.875 | 93.875 | 63.56, 56.56, 49.56 | 19 | -5385 | 75.24/168 |
| M-912D-305-168 | 334 | 270 | 203 | 193.5 | 276.875 | 93.875 | 63.56, 56.56, 49.56 | 19 | -4860 | 75.24/168 |
| M-640D-365-168 | 334 | 270 | 203 | 193.5 | 276.875 | 93.875 | 63.56, 56.56, 49.56 | 19 | -5385 | 75.24/168 |
| M-640D-305-168 | 334 | 270 | 203 | 193.5 | 276.875 | 93.875 | 63.56, 56.56, 49.56 | 19 | -4860 | 75.24/168 |
| M-456D-305-168 | 334 | 270 | 203 | 193.5 | 276.875 | 93.875 | 63.56, 56.56, 49.56 | 19 | -4860 | 75.24/168 |
| M-912D-365-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4680 | 63.023/144 |
| M-640D-365-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4680 | 63.023/144 |
| M-456D-365-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4680 | 63.023/144 |
| M-912D-305-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4300 | 63.023/144 |
| M-640D-305-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4300 | 63.023/144 |
| M-456D-305-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4300 | 63.023/144 |
| M-640D-256-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4010 | 63.023/144 |
| M-456D-256-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4010 | 63.023/144 |
| M-320D-256-144 | 312 | 258 | 186 | 182.38 | 252.875 | 93.875 | 53.75, 47.75, 41.75 | 23 | -4010 | 63.023/144 |
| M-456D-365-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -4510 | 53.616/120 |
| M-640D-305-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -4130 | 53.616/120 |
| M-456D-305-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -4130 | 53.616/120 |
| M-320D-305-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -4130 | 53.616/120 |
| M-456D-256-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -3840 | 53.616/120 |
| M-320D-256-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -3620 | 53.616/120 |
| M-228D-256-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -3435 | 53.616/120 |
| M-320D-213-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -3560 | 53.616/120 |
| M-228D-213-120 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 45.13, 39.13, 33.13 | 24 | -3235 | 53.616/120 |
| M-320D-305-100 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 37.63, 31.63, 25.63 | 24 | -3700 | 45.492/100 |
| M-320D-256-100 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 37.63, 31.63, 25.63 | 24 | -3470 | 45.492/100 |
| M-228D-256-100 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 37.63, 31.63, 25.63 | 24 | -3285 | 45.492/100 |
| M-228D-173-100 | 312 | 258 | 186 | 173.75 | 252.875 | 93.875 | 37.63, 31.63, 25.63 | 24 | -3175 | 45.492/100 |
| M-228D-246-86 | 222 | 186 | 124 | 135.75 | 188.375 | 73 | 31.5, 26.5, 21.5 | 24.5 | -2140 | 38.328/86 |
| M-228D-213-86 | 222 | 186 | 124 | 135.75 | 188.375 | 73 | 31.5, 26.5, 21.5 | 24.5 | -2040 | 38.328/86 |
| M-160D-213-86 | 222 | 186 | 124 | 135.75 | 188.375 | 73 | 31.5, 26.5, 21.5 | 24.5 | -2040 | 38.328/86 |
| M-160D-173-86 | 222 | 186 | 124 | 135.75 | 188.375 | 73 | 31.5, 26.5, 21.5 | 24.5 | -1930 | 38.328/86 |
| M-114D-143-86 | 189 | 162 | 111 | 112.19 | 147.5 | 52.25 | 32.25, 27.75, 23.25 | 27 | -1535 | 36.974/86 |
| M-228D-200-74 | 222 | 186 | 124 | 130.5 | 188.375 | 73 | 27.25, 22.25, 17.25 | 24.5 | -1960 | 33.523/74 |
| M-160D-200-74 | 222 | 186 | 124 | 130.5 | 188.375 | 73 | 27.25, 22.25, 17.25 | 24.5 | -1890 | 33.523/74 |
| M-228D-173-74 | 222 | 186 | 124 | 130.5 | 188.375 | 73 | 27.25, 22.25, 17.25 | 24.5 | -1860 | 33.523/74 |
| M-160D-173-74 | 222 | 186 | 124 | 130.5 | 188.375 | 73 | 27.25, 22.25, 17.25 | 24.5 | -1860 | 33.523/74 |
| M-114D-173-74 | 222 | 186 | 124 | 130.5 | 188.375 | 73 | 27.25, 22.25, 17.25 | 24.5 | -1820 | 33.523/74 |
| M-114D-143-74 | 189 | 162 | 111 | 107.94 | 147.5 | 52 | 27.94, 23.44, 18.94 | 27 | -1440 | 32.56/74 |
| M-114D-173-64 | 189 | 162 | 111 | 107.94 | 147.5 | 52 | 24.19, 19.69, 15.19 | 28 | -1420 | 28.547/64 |
| M-114D-143-64 | 189 | 162 | 111 | 107.94 | 147.5 | 52 | 24.19, 19.69, 15.19 | 28 | -1420 | 28.547/64 |

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.

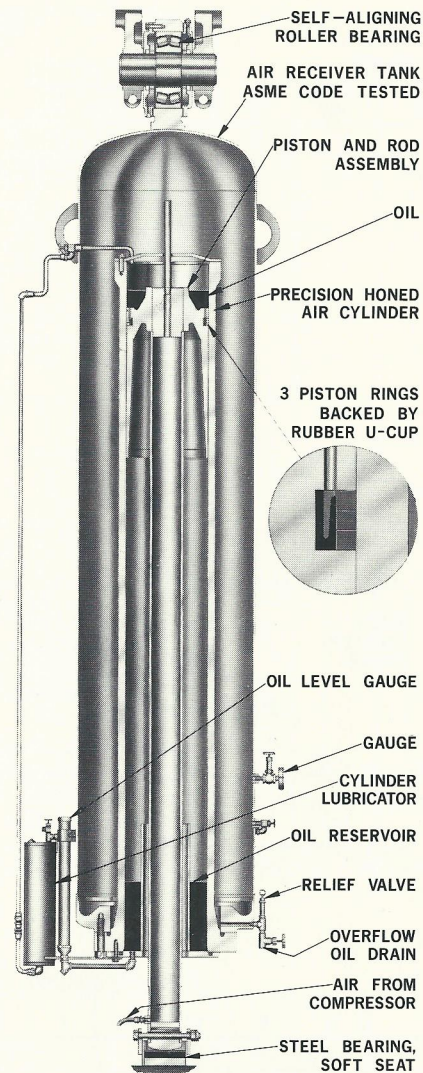


FIGURE 41



FIGURE 42

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.

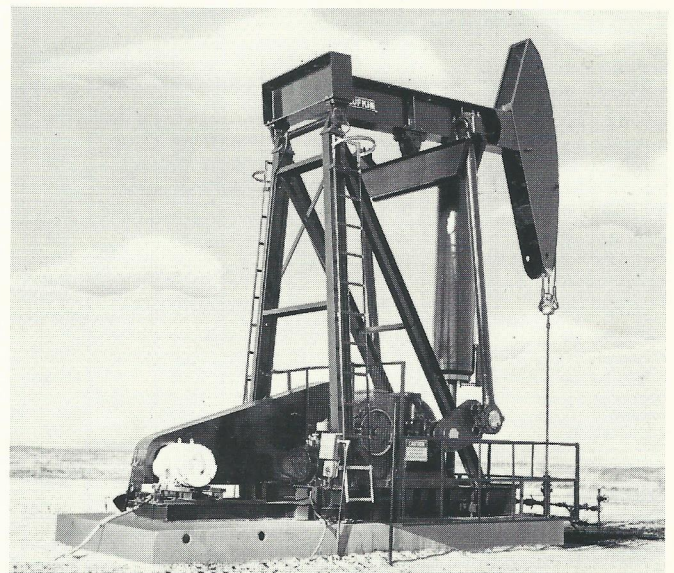


FIGURE 43

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

**LUFKIN AIR BALANCED PUMPING UNITS
GENERAL DIMENSIONS**

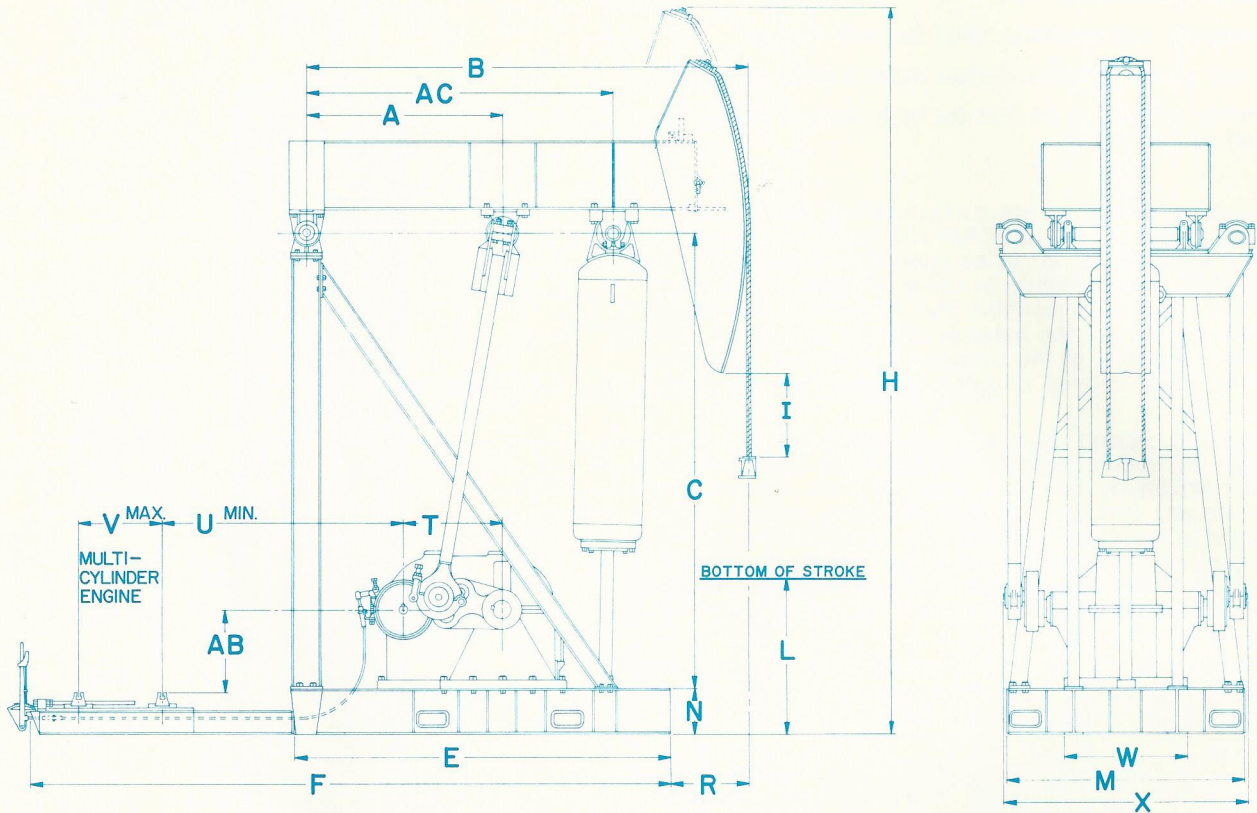


FIGURE 44

| UNIT | A | B | C | E | F | H | I | L | M | N | R | T | U | V | W | X | AB | AC |
|-----------------|------------|---------|------------|-------------|-------------|-------------|---------|---------|------------|---------|----------|---------|-------------|---------|---------|-------------|---------|-------------|
| A-2560D-470-240 | 11'-2 1/2" | 28'-0" | 25'-3 1/2" | * | 31'-7 1/4" | 46'-6 1/2" | 19 3/8" | 54" | 8'-10" | 21" | 51 1/16" | 70" | 8'-4 3/8" | 46 1/2" | 66 1/4" | 10'-10 5/8" | 39 1/8" | 19'-5 1/2" |
| A-1824D-470-240 | " | " | " | * | " | " | " | " | 8'-0" | " | " | 58 7/8" | 9'-3 1/2" | " | 50 1/4" | 9'-7 5/8" | 33 1/8" | " |
| A-1824D-427-216 | 10'-1 1/2" | 25'-8" | 23'-6" | 22'-0 7/8" | 29'-6 7/8" | 43'-0" | 20 5/8" | 56 1/8" | 7'-11 1/2" | " | 48" | " | 8'-0" | " | " | " | " | 14'-3 1/2" |
| A-1824D-427-192 | " | " | " | " | 19'-4 7/8" | 26'-10 7/8" | 38'-8" | 50 1/8" | " | " | " | " | " | " | " | " | " | " |
| A-1280D-470-240 | 11'-2 1/2" | 28'-0" | 25'-3 1/2" | * | 31'-7 1/4" | 46'-6 1/2" | " | 54" | 8'-0" | " | 51 1/16" | 52 1/2" | 9'-9 7/8" | " | " | 9'-1 5/8" | " | 19'-5 1/2" |
| A-1280D-427-216 | 10'-1 1/2" | 25'-8" | 23'-6" | 22'-0 7/8" | 29'-6 7/8" | 43'-0" | 20 5/8" | 56 1/8" | 7'-11 1/2" | " | 48" | " | 8'-6 3/8" | " | " | " | " | 14'-3 1/2" |
| A-1280D-427-192 | " | " | " | " | 19'-4 7/8" | 26'-10 7/8" | 38'-8" | 50 1/8" | " | " | " | " | " | " | " | " | " | " |
| A-1280D-305-168 | 7'-4" | 19'-3" | 20'-4" | 14'-10 1/2" | 22'-0 1/2" | 35'-6" | 17 5/8" | 65 1/4" | " | 16 1/8" | 59" | " | 7 1/34" | 40 1/2" | " | 8'-11 1/8" | 36 3/8" | 10'-11 1/2" |
| A-912D-470-240 | 11'-2 1/2" | 28'-0" | 25'-3 1/2" | * | 31'-7 1/4" | 46'-6 1/2" | 19 3/8" | 54" | 8'-0" | 21" | 51 1/16" | 48 1/2" | 10'-17 7/8" | 46 1/2" | 50" | 8'-6 5/8" | 33 1/8" | 19'-5 1/2" |
| A-912D-427-216 | 10'-1 1/2" | 25'-8" | 23'-6" | 22'-0 7/8" | 29'-6 7/8" | 43'-0" | 20 5/8" | 56" | 7'-11 1/2" | " | 48" | " | 9'-13 3/8" | " | " | " | 27 1/8" | 14'-3 1/2" |
| A-912D-427-192 | " | " | " | " | 19'-4 7/8" | 26'-10 7/8" | 38'-8" | 50" | " | " | " | " | " | " | " | " | " | " |
| A-912D-305-168 | 7'-4" | 19'-3" | 20'-4" | 14'-10 1/2" | 22'-0 1/2" | 35'-6" | 17 5/8" | 65 1/4" | " | 16 1/8" | 59" | " | 6'-33 3/4" | 40 1/2" | " | 8'-4 1/8" | 30 3/8" | 10'-11 1/2" |
| A-912D-427-144 | " | 16'-8" | 17'-10" | 12'-3 1/2" | 19'-5 1/2" | 31'-3 1/2" | 19 3/8" | 56" | " | " | " | " | " | " | " | " | " | " |
| A-640D-305-168 | " | 19'-3" | 20'-4" | 14'-10 1/2" | 22'-0 1/2" | 35'-6" | 17 5/8" | 65 1/4" | " | " | " | 41 1/2" | 6'-11 3/4" | " | 46 3/4" | " | 28 3/8" | " |
| A-640D-427-144 | " | 16'-8" | 17'-10" | 12'-3 1/2" | 19'-5 1/2" | 31'-2 1/2" | 19 3/8" | 56" | " | " | " | " | " | " | " | " | " | " |
| A-640D-305-144 | 6'-5" | 17'-4" | 17'-10" | 12'-11 1/4" | 20'-1 1/4" | 31'-0" | 21 1/8" | 54 7/8" | 7'-7" | " | 57" | " | 71" | " | " | " | " | 9'-10" |
| A-640D-365-120 | " | 14'-7" | 15'-7" | 10'-11 3/4" | 18'-13 3/4" | 27'-0" | 22 1/2" | 50" | " | " | 47 1/2" | " | " | " | " | " | " | " |
| A-456D-305-144 | " | 17'-4" | 17'-10" | 12'-11 1/4" | 20'-1 1/4" | 31'-0" | 21 1/8" | 54 7/8" | " | " | 57" | 38 3/8" | 6'-2 1/8" | " | " | " | " | " |
| A-456D-365-120 | " | 14'-7" | 15'-7" | 10'-11 3/4" | 18'-13 3/4" | 27'-0" | 22 1/2" | 50" | " | " | 47 1/2" | " | " | " | " | " | " | " |
| A-456D-256-120 | 69" | 15'-4" | " | 11'-11 3/4" | 19'-13 3/4" | " | 17 1/4" | 56 1/8" | 7'-1 1/2" | " | 53" | " | " | " | " | " | " | 8'-11" |
| A-320D-256-120 | 70" | " | " | 11'-3 1/4" | 18'-11 1/4" | " | " | 56" | " | " | " | 34" | 71 1/4" | " | 43 1/4" | 7'-3 3/8" | 30 1/8" | " |
| A-320D-305-100 | " | 12'-11" | 13'-4" | 10-0 1/4" | 17'-8 1/4" | 23'-4" | 25 1/2" | 40 3/8" | " | " | 39" | " | " | " | " | " | " | " |
| A-228D-173-100 | 56" | 12'-7" | 12'-5" | 8'-3 1/4" | 14'-9" | 22'-3" | 15" | 40 1/2" | 6'-1 1/2" | " | 56" | 30" | 47" | " | 37 1/4" | 6'-8 3/8" | 29 1/8" | 7'-3 1/2" |
| A-228D-246-86 | " | 10'-11" | " | " | " | 21'-3" | 18 1/8" | 50 3/4" | " | " | 36" | " | " | " | " | " | " | " |
| A-160D-200-74 | 50" | 10'-0" | 11'-9" | 7'-11" | 14'-6 3/4" | 19'-3" | 18 7/8" | 49 1/2" | " | 9 3/4" | 35 1/2" | 26" | 54 3/4" | 48" | 32" | 69 7/8" | 15 7/8" | 6'-5 1/2" |
| A-114D-173-64 | 48" | 9'-7" | 11'-0" | 7'-5 1/2" | 14'-5 3/4" | 17'-8" | 20 3/8" | 50 3/8" | 6 3/34" | " | 36" | 24" | 62" | 46" | 25 1/4" | 66 7/8" | 11 7/8" | 6'-0 1/2" |

* 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 | 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 | Equalizer | Samson Post | Air Tank |
| A-2560D-470-240 | 47,000 | 240-200 | 14 1/2 | 36 x 16 1/2 @ 245# | 1 3/8" x 16" | 68" (16D) | OT | E32 | P19 | 334 |
| A-1824D-470-240 | .. | .. | .. | .. | .. | 40, 46, 51, 55, 68 (11D) | .. | E26 | .. | .. |
| A-1824D-427-216 | 42,700 | 216-190-162 | .. | 33 x 15 3/4 @ 201# | .. | .. | .. | .. | .. | .. |
| A-1824D-427-192 | .. | 192-168-144 | .. | .. | .. | .. | .. | .. | .. | .. |
| A-1280D-470-240 | 47,000 | 240-200 | .. | 36 x 16 1/2 @ 245# | .. | 40, 46, 51, 55, 68 (10D) | .. | .. | .. | .. |
| A-1280D-427-216 | 42,700 | 216-190-162 | .. | 33 x 15 3/4 @ 201# | .. | .. | .. | .. | .. | .. |
| A-1280D-427-192 | .. | 192-168-144 | .. | .. | .. | .. | .. | .. | .. | .. |
| A-1280D-305-168 | 30,500 | 168-141-118 | 13 | 27 x 14 @ 161# | .. | .. | .. | .. | .. | 232 |
| A-912D-470-240 | 47,000 | 240-200 | 14 1/2 | 36 x 16 1/2 @ 245# | .. | 28, 34, 40, 46, 51 (8D) | .. | .. | .. | 334 |
| A-912D-427-216 | 42,700 | 216-190-162 | .. | 33 x 15 3/4 @ 201# | .. | .. | .. | .. | .. | .. |
| A-912D-427-192 | .. | 192-168-144 | .. | .. | .. | .. | .. | .. | .. | .. |
| A-912D-305-168 | 30,500 | 168-141-118 | 13 | 27 x 14 @ 146# | .. | 28, 34, 40, 46, 51 (7D) | .. | .. | .. | 232 |
| A-912D-427-144 | 42,700 | 144-120-100 | .. | 27 x 14 @ 161# | .. | .. | .. | .. | .. | .. |
| A-640D-305-168 | 30,500 | 168-141-118 | .. | 27 x 14 @ 146# | .. | 28, 34, 40, 46, 51 (6D) | .. | .. | .. | .. |
| A-640D-427-144 | 42,700 | 144-120-100 | .. | 27 x 14 @ 161# | .. | .. | .. | .. | .. | .. |
| A-640D-305-144 | 30,500 | .. | 12 | 27 x 14 @ 146# | 1 1/4" x 12" | .. | .. | .. | P18 | 326 |
| A-640D-365-120 | 36,500 | 120-100-86 | .. | .. | .. | .. | .. | .. | .. | .. |
| A-456D-305-144 | 30,500 | 144-120-100 | .. | .. | .. | 28, 34, 40, 46, 51 (6D or 8C) | .. | .. | .. | .. |
| A-456D-365-120 | 36,500 | 120-100-86 | .. | .. | .. | .. | .. | .. | .. | .. |
| A-456D-256-120 | 25,600 | 120-104-90 | 11 | 24 x 12 3/4 @ 104# | .. | .. | .. | .. | .. | 324 |
| A-320D-256-120 | .. | .. | .. | .. | .. | 25, 30, 36, 42, 47 1/4 (6C or 5D) | 2T | E22 | .. | .. |
| A-320D-305-100 | 30,500 | 100-86-74 | .. | .. | .. | .. | .. | .. | .. | .. |
| A-228D-173-100 | 17,300 | .. | 10 | 21 x 12 @ 101# | 1 1/8" x 12" | 24 1/4, 30, 36, 41 1/4 (5C or 4D) | .. | .. | P17 | 322 |
| A-228D-246-86 | 24,600 | 86-74-64 | .. | .. | .. | .. | .. | .. | .. | .. |
| A-160D-200-74 | 20,000 | 74-64-54 | .. | 18 x 11 @ 76# | .. | 24 1/4, 29 1/4, 33 1/4, 38 (4C or 3D) | 3TA | E19 | P16 | .. |
| A-114D-173-64 | 17,300 | 64-54 | 8 | 16 x 8 1/2 @ 67# | 1" x 9" | 19 1/4, 24, 33 1/4 (3C) | .. | E18 | .. | 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-2560D-470-240 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-1824D-470-240 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-1280D-470-240 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-912D-470-240 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-1824D-427-216 | .. | 2,870 | 5,740 | 8,610 | 11,480 | 14,350 | 17,220 | 20,090 | 22,960 | 25,830 | 28,700 | 29,850 |
| A-1280D-427-216 | 920 | 3,220 | 5,520 | 7,820 | 10,120 | 12,420 | 14,720 | 17,020 | 19,320 | 21,620 | 23,920 | 24,830 |
| A-912D-427-216 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-1824D-427-192 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-1280D-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-912D-427-192 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-1280D-305-168 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-912D-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-640D-305-168 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 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 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| A-228D-173-100 | 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-246-86 | 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-160D-200-74 | 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-114D-173-64 | 4,410 | 5,680 | 6,945 | 8,215 | 9,480 | 10,750 | 12,015 | 13,285 | 14,550 | 15,820 | 17,085 | 17,595 |

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

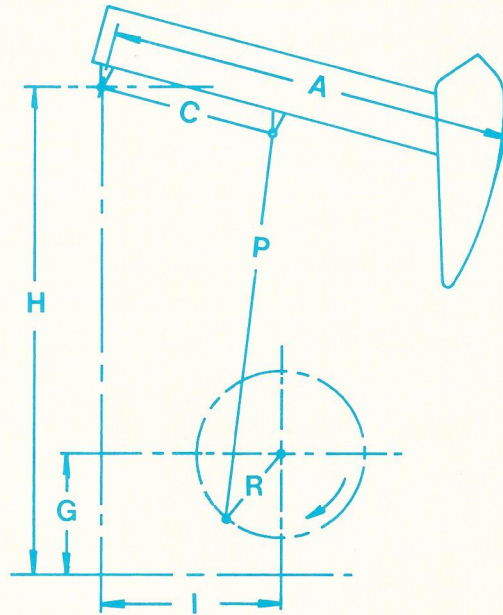


FIGURE 45

AIR BALANCED PUMPING UNIT API GEOMETRY DIMENSIONS

| UNIT | A | C | I | P | H | G | R1, R2, R3 | M | S |
|-----------------|-----|-------|-------|-------|-------|----|---------------------|-------|--------|
| A-2560D-470-240 | 336 | 134.5 | 130 | 261.5 | 303.5 | 42 | 47, 39.44 | 114.8 | 150 |
| A-1824D-470-240 | 336 | 134.5 | 130 | 267.5 | 303.5 | 36 | 47, 39.44 | 114.8 | 150 |
| A-1280D-470-240 | 336 | 134.5 | 130 | 267.5 | 303.5 | 36 | 47, 39.44 | 114.8 | 150 |
| A-912D-470-240 | 336 | 134.5 | 130 | 267.5 | 303.5 | 36 | 47, 39.44 | 114.8 | 150 |
| A-1824D-427-216 | 308 | 121.5 | 114.5 | 246 | 282 | 36 | 41.75, 36.63, 32 | 92 | 140 |
| A-1280D-427-216 | 308 | 121.5 | 114.5 | 246 | 282 | 36 | 41.75, 36.63, 32 | 92 | 140 |
| A-912D-427-216 | 308 | 121.5 | 117.5 | 252 | 282 | 30 | 41.75, 36.63, 32 | 92 | 140 |
| A-1824D-427-192 | 276 | 121.5 | 114.5 | 216 | 252 | 36 | 41.75, 36.63, 32 | 102.8 | 112 |
| A-1280D-427-192 | 276 | 121.5 | 114.5 | 216 | 252 | 36 | 41.75, 36.63, 32 | 102.8 | 112 |
| A-912D-427-192 | 276 | 121.5 | 117.5 | 222 | 252 | 30 | 41.75, 36.63, 32 | 102.8 | 112 |
| A-1280D-305-168 | 231 | 88 | 84 | 208 | 244 | 36 | 31.25, 26.19, 22 | 75.54 | 112.81 |
| A-912D-305-168 | 231 | 88 | 84 | 214 | 244 | 30 | 31.25, 26.19, 22 | 75.54 | 112.81 |
| A-640D-305-168 | 231 | 88 | 85 | 216 | 244 | 28 | 31.25, 26.19, 22 | 75.54 | 112.81 |
| A-912D-427-144 | 200 | 88 | 84 | 184 | 214 | 30 | 31.25, 26.19, 22 | 87.3 | 90 |
| A-640D-427-144 | 200 | 88 | 85 | 186 | 214 | 28 | 31.25, 26.19, 22 | 87.3 | 90 |
| A-640D-305-144 | 208 | 77 | 74.5 | 186 | 214 | 28 | 26.19, 22, 18.94 | 64.16 | 95.16 |
| A-456D-305-144 | 208 | 77 | 74.5 | 186 | 214 | 28 | 26.19, 22, 18.94 | 64.16 | 95.16 |
| A-640D-365-120 | 175 | 77 | 74.5 | 159 | 187 | 28 | 26.19, 22, 18.94 | 76.2 | 88 |
| A-456D-365-120 | 175 | 77 | 74.5 | 159 | 187 | 28 | 26.19, 22, 18.94 | 76.2 | 88 |
| A-456D-256-120 | 184 | 69 | 66 | 159 | 187 | 28 | 22, 18.94, 16.31 | 55.25 | 77 |
| A-320D-256-120 | 184 | 70 | 68 | 159 | 187 | 28 | 22.38, 19.38, 16.75 | 55.25 | 77 |
| A-320D-305-100 | 155 | 70 | 68 | 132 | 160 | 28 | 22.38, 19.38, 16.75 | 65.6 | 76 |
| A-228D-173-100 | 151 | 56 | 54 | 122 | 149 | 27 | 18.25, 15.75, 13.75 | 45.49 | 85.75 |
| A-228D-246-86 | 131 | 56 | 54 | 122 | 149 | 27 | 18.25, 15.75, 13.75 | 52.5 | 73 |
| A-160D-200-74 | 120 | 50 | 48 | 114 | 141 | 27 | 15.25, 13.25, 11.25 | 50.7 | 63 |
| A-114D-173-64 | 115 | 48 | 46.5 | 114 | 132 | 18 | 13.31, 11.25 | 31.7 | 63 |

**LUFKIN CONVENTIONAL PORTABLE PUMPING UNITS
GENERAL DIMENSIONS**

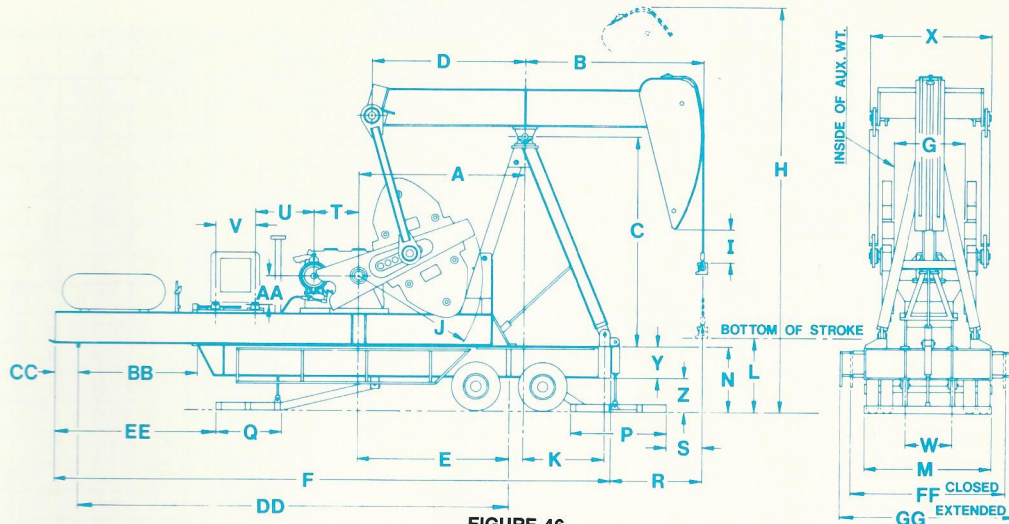


FIGURE 46

| UNIT | A | B | C | D | E | F | G | H | I | J | K | L | M | N | P | Q |
|-----------------|--------|------------|-------------|------------|--------|------------|---------|-------------|---------|-----|-----|-----------|-------|---------|-----|-----|
| CM-456D-305-120 | 10'-4" | 13'-3 3/8" | 13'-3 3/4" | 9'-7 7/8" | 9'-5" | 34'-9 1/2" | 52 1/2" | 27'-2 7/16" | 19" | 92" | 61" | 60 5/8" | 8'-0" | 51 1/4" | 59" | 48" |
| CM-320D-305-100 | " | 11'-1 1/2" | 13'-13 4" | 9'-7" | " | " | 44 3/4" | 25'-8 1/16" | 30" | " | " | 67" | " | 52 1/4" | 47" | " |
| CM-228D-246-86 | 9'-10" | 9'-5 1/2" | 12'-7 3/16" | 9'-6 1/16" | 10'-1" | 29'-6" | 38 5/8" | 22'-2 1/2" | 20 5/8" | 78" | 37" | 67 1/8" | " | 46 5/8" | 48" | " |
| CM-160D-173-74 | " | 9'-7 1/8" | 12'-7 1/16" | " | 8'-11" | 31'-0" | 33 1/8" | 22'-2 3/8" | 37 3/8" | " | " | 74 15/16" | " | 47" | " | " |

| UNIT | R | S | T | U | V | W | X | Y | Z | AA | BB | CC | DD | EE | FF | GG |
|-----------------|-------------|----------|---------|------------|-----|---------|-----------|---------|---------|---------|-----------|-----|------------|------------|--------|-----------|
| CM-456D-305-120 | 7'-9 13/16" | 5 7/8" | 38 3/8" | 6'-11 1/8" | 26" | 36" | 8'-13 8" | 23 3/4" | 27 1/2" | 26" | 7'-5 3/4" | 18" | 26'-11" | 10'-7 1/2" | 8'-1" | 10'-11" |
| CM-320D-305-100 | 68" | 43 7/16" | 34" | 7'-3 1/4" | " | " | 7'-23 8" | " | 28 1/2" | " | " | " | " | " | " | " |
| CM-228D-246-86 | 6'-1" | 48 1/2" | 30" | 6'-0 3/4" | " | 26 1/8" | 6'-6 1/2" | 23 5/8" | 23" | 20 1/2" | 7'-6" | 24" | 24'-4 1/2" | 9'-9 1/4" | 7'-11" | 9'-3 1/2" |
| CM-160D-173-74 | 6'-15 8" | 50 1/8" | 26" | 70" | " | " | 70 1/2" | 23 3/4" | 23 1/4" | 14 3/8" | " | " | 24'-7 1/2" | 10'-8 1/2" | " | 9'-1" |

STRUCTURAL DATA

| UNIT DESIGNATION | CM-456D-305-120 | CM-320D-305-100 | CM-228D-246-86 | CM-160D-173-74 |
|-----------------------------|--------------------|--------------------|--------------------|----------------|
| POLISHED ROD CAPACITY, LBS. | 30,500 | 30,500 | 24,600 | 17,300 |
| STROKE LENGTHS, INCHES | 120, 102, 84, 67 | 100, 85, 70, 56 | 86, 73, 60, 48 | 74, 61, 48, 36 |
| WALKING BEAM | 27" x 161 LBS. | 27" x 146 LBS. | 24" x 117 LBS. | 24" x 84 LBS. |
| WIRESLINE HANGER | 1 1/4" x 12" CTRS. | 1 1/4" x 12" CTRS. | 1 1/8" x 12" CTRS. | 1" x 9" CTRS. |
| CRANKS | 8492RX | 8492RX | 8478RX | 7278RX |
| CRANK PIN BEARING | 2SE | 2SE | 3SF | 3SF |
| EQUALIZER BEARING | 2SE | 2SE | 3SF | 3SF |
| CENTER BEARING | 1MTG | 2MTG | 2MTG | 2MTG |
| ENGINE TYPE | CAT.3304G | WAUKESHA 330G | WAUKESHA 220G | WAUKESHA 220G |
| ENGINE H.P.@1800 RPM | 83 | 63 | 41 | 41 |

COUNTERBALANCE DATA

All Counterbalance Shown In Lbs., Effective At Polished Rod With Weights At Maximum Position, Including Structural Unbalance. Minimum Counterbalance Shown Is With Weights Moved All The Way In On The Crank.

| UNIT | CM-456D-305-120 | | CM-320D-305-100 | | CM-228D-246-86 | | CM-160D-173-74 | |
|---------------------------|-----------------|-------|-----------------|-------|----------------|-------|----------------|-------|
| STROKE | 120" | | 100" | | 86" | | 74" | |
| STRUCTURAL UNBALANCE | - 400 Lbs. | | + 400 Lbs. | | + 300 Lbs. | | + 700 Lbs. | |
| CRANKS | 8492RX | | 8492RX | | 8478RX | | 7278RX | |
| C'BAL., CRANKS ONLY | 5,940 | | 7,980 | | 5,625 | | 6,765 | |
| | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. |
| 4 No. ORO Counterweights | 20,525 | 7,545 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. OARO Counterweights | 18,465 | 6,320 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. OAS Aux. Weights | 22,345 | 6,435 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. 1RO Counterweights | 15,665 | 6,050 | 19,610 | 8,115 | ..... | ..... | ..... | ..... |
| 4 No. 1S Aux. Weights | 18,660 | 6,085 | 23,190 | 8,155 | ..... | ..... | ..... | ..... |
| 8 No. 1S Aux. Weights | 21,650 | 6,120 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No. 2RO Counterweights | 14,180 | 5,950 | 17,835 | 7,990 | ..... | ..... | ..... | ..... |
| 4 No. 2S Aux. Weights | 17,130 | 5,950 | 21,365 | 7,995 | ..... | ..... | ..... | ..... |
| 8 No. 2S Aux. Weights | 20,085 | 5,955 | 24,895 | 7,995 | ..... | ..... | ..... | ..... |
| 4 No. 3CRO Counterweights | 12,610 | 5,650 | 15,960 | 7,635 | 13,200 | 5,095 | ..... | ..... |
| 4 No. 3BS Aux. Weights | 15,490 | 5,525 | 19,400 | 7,485 | 16,460 | 4,865 | ..... | ..... |
| 8 No. 3BS Aux. Weights | 18,365 | 5,400 | *22,840 | 7,335 | ..... | ..... | ..... | ..... |
| 4 No. 5ARO Counterweights | 10,855 | 5,270 | 13,855 | 7,180 | 11,290 | 4,555 | 13,220 | 5,545 |
| 4 No. 5A Aux. Weights | 12,825 | 5,000 | 16,210 | 6,860 | 13,560 | 4,125 | 15,810 | 5,055 |
| 8 No. 5A Aux. Weights | 14,790 | 4,735 | *18,565 | 6,540 | 15,830 | 3,695 | ..... | ..... |
| 4 No. 5CRO Counterweights | 9,550 | 5,435 | 12,300 | 7,375 | 9,800 | 4,820 | 11,525 | 5,850 |
| 4 No. 5C Aux. Weights | 11,335 | 5,185 | 14,430 | 7,075 | 11,865 | 4,420 | 13,875 | 5,395 |
| 8 No. 5C Aux. Weights | 13,120 | 4,935 | 16,560 | 6,775 | 13,930 | 4,020 | *16,225 | 4,940 |
| 4 No. 6RO Counterweights | 8,745 | 5,510 | 11,330 | 7,470 | 8,880 | 4,950 | 10,475 | 6,000 |
| 4 No. 6 Aux. Weights | 9,800 | 5,350 | 12,595 | 7,275 | 10,105 | 4,695 | 11,875 | 5,710 |
| 8 No. 6 Aux. Weights | 10,855 | 5,190 | 13,860 | 7,080 | 11,330 | 4,440 | 13,270 | 5,420 |
| 4 No. 7RO Counterweights | 7,725 | 5,640 | 10,115 | 7,625 | 7,705 | 5,160 | 9,140 | 6,235 |
| 4 No. 7 Aux. Weights | 8,520 | 5,510 | 11,065 | 7,465 | 8,630 | 4,950 | 10,195 | 6,000 |
| 8 No. 7 Aux. Weights | 9,315 | 5,380 | 12,015 | 7,305 | 9,555 | 4,740 | 11,250 | 5,765 |

* Use Only One Aux. Weight Per Counterweight On Belt Cover Side.

**RM SERIES PUMPING UNIT ASSEMBLIES
GENERAL DIMENSIONS**

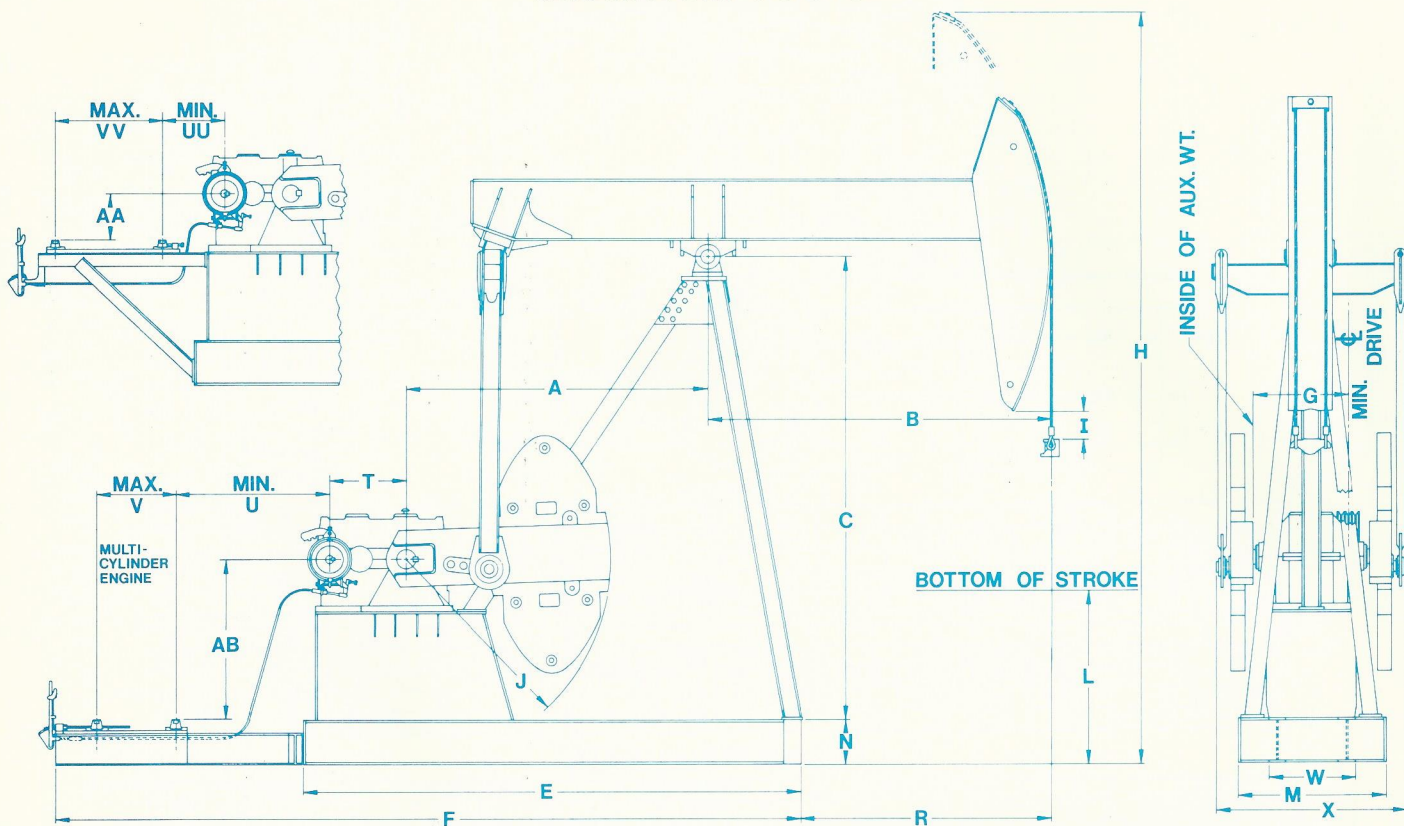


FIGURE 47

STANDARD API MODELS SHOWN, OTHER MODELS AVAILABLE ON REQUEST.

| UNIT | A | B | C | E | F | G | H | I | J | L | M | N | R | T | U | V | W | X | AA | AB | UU | VV |
|------------------|---------|------------|-----------|------------|-------------|---------|---------|---------|------|--------|-------|--------|------------|---------|-----------|-----|-------|-----------|-------|----------|---------|-------|
| RM-1824D-427-192 | 13'-7" | 19'-0 1/2" | 21'-1" | 23'-1 1/2" | 34'-2 1/2" | 6158" | 37'-2" | 19" | 110" | 5238" | 7'-2" | 21" | 14'-11" | 5878" | 6'-11" | 52" | 50" | 8'-10" | 5134" | 7'-67/8" | 121/2" | 57" |
| RM-1824D-365-192 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-1824D-427-168 | " | 16'-8" | " | " | " | " | 35'-5" | 3538" | " | 601/8" | " | " | 12'-6 1/2" | " | " | " | " | " | " | " | " | " |
| RM-1824D-365-168 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-1280D-427-192 | " | 19'-0 1/2" | " | " | " | " | 37'-2" | 19" | " | 5238" | " | " | 14'-11" | 52 1/2" | " | " | " | " | " | " | " | " |
| RM-1280D-365-192 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-1280D-427-168 | " | 16'-8" | " | " | " | " | 35'-5" | 3538" | " | 601/8" | " | " | 12'-6 1/2" | " | " | " | " | " | " | " | " | " |
| RM-1280D-365-168 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-912D-427-192 | " | 19'-0 1/2" | 21'-57/8" | 22'-9 1/2" | 33'-10 1/2" | 58" | 37'-2" | 19" | " | 5238" | " | 161/8" | 14'-11" | 48 1/2" | 7'-3" | " | 4634" | 8'-5" | " | " | 16 1/2" | " |
| RM-912D-365-192 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-912D-305-192 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-912D-427-168 | " | 16'-8" | " | " | " | " | 35'-5" | 3538" | " | 601/8" | " | " | 12'-6 1/2" | " | " | " | " | " | " | " | " | " |
| RM-912D-365-168 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-912D-305-168 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-912D-427-144 | " | 14'-3 1/2" | " | " | " | " | 33'-8" | 41 1/2" | " | 781/8" | " | " | 10'-2" | " | " | " | " | " | " | " | " | " |
| RM-912D-365-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-912D-305-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-640D-305-192 | " | 19'-0 1/2" | " | 22'-6" | 33'-7" | 54 1/4" | 37'-2" | 19" | " | 5238" | " | " | 14'-11" | 41 1/2" | 7'-6 1/2" | " | " | " | " | " | 23 1/2" | " |
| RM-640D-365-168 | " | 16'-8" | " | " | " | " | 35'-5" | 3538" | " | 601/8" | " | " | 12'-6 1/2" | " | " | " | " | " | " | " | " | " |
| RM-640D-305-168 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-640D-427-144 | " | 14'-3 1/2" | " | 22'-9 1/2" | 33'-10 1/2" | " | 33'-8" | 41 1/2" | " | 781/8" | " | " | 10'-2" | " | " | " | " | " | " | " | " | " |
| RM-640D-365-144 | " | " | " | 22'-6" | 33'-7" | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-640D-305-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-640D-256-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-640D-305-120 | 11'-10" | 12'-0 1/2" | 18'-6" | 20'-1" | 29'-11" | " | 28'-10" | 383/8" | 95" | 693/8" | 70" | 157/8" | 8'-7" | " | 6'-4" | " | " | 8'-2 1/2" | " | 757/8" | 2634" | 3734" |
| RM-640D-256-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |

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

GENERAL DIMENSIONS Continued

| UNIT | A | B | C | E | F | G | H | I | J | L | M | N | R | T | U | V | W | X | AA | AB | UU | VV |
|-----------------|---------|------------|-------------|------------|-------------|---------|---------|---------|-----|---------|-------|--------|-------------|--------|------------|-----|--------|-----------|---------|---------|--------|---------|
| RM-456D-305-168 | 11'-10" | 16'-10" | 18'-6" | 20'-1" | 29'-11" | 513/8" | 32'-4" | 193/8" | 95" | 401/8" | 6'-4" | 157/8" | 13'-4 1/2" | 383/8" | 6'-7" | 52" | 463/4" | 8'-2 1/2" | 513/4" | 757/8" | 261/8" | 373/4" |
| RM-456D-365-144 | " | 14'-5" | " | " | " | " | 30'-8" | 23 1/2" | " | 60 1/8" | " | " | 10'-11 1/2" | " | " | " | " | " | " | " | " | " |
| RM-456D-305-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-456D-256-144 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-456D-365-120 | " | 12'-0 1/2" | " | " | " | " | 28'-10" | 383/8" | " | 693/8" | 70" | " | 8'-7" | " | " | " | " | " | " | " | " | " |
| RM-456D-305-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-456D-256-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM320D-256-144 | " | 14'-5" | " | 19'-7 1/2" | 29'-11 1/2" | 443/4" | 30'-8" | 23 1/2" | " | 60 1/8" | " | " | 10'-11 1/2" | 34" | 6'-11 1/2" | 53" | 43" | 7'-1 1/2" | 54" | 6'-7" | 31" | 33 1/4" |
| RM-320D-305-120 | " | 12'-0 1/2" | " | " | " | " | 28'-10" | 383/8" | " | 693/8" | " | " | 8'-7" | " | " | " | " | " | " | " | " | " |
| RM-320D-256-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-320D-213-120 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-320D-305-100 | " | 10'-0 1/2" | " | " | " | " | 27'-4" | 59" | " | " | " | " | 6'-7" | " | " | " | " | " | " | " | " | " |
| RM-320D-256-100 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-320D-246-86 | 10'-7" | 8'-7 1/2" | 15'-10 1/8" | 18'-0 1/2" | 26'-11 1/2" | " | 23'-7" | 367/8" | 78" | 735/8" | " | " | 5'-2" | " | 66 1/2" | " | " | " | 37 1/8" | 62 1/8" | 30" | " |
| RM-228D-213-120 | 11'-10" | 12'-0 1/2" | 18'-6" | 19'-0 1/2" | 29'-11" | 385/8" | 28'-10" | 383/8" | 95" | 693/8" | " | " | 8'-7" | 30" | 7'-3" | " | 37" | 6'-6 1/2" | 54" | 6'-7" | 28" | " |
| RM-228D-256-100 | " | 10'-0 1/2" | " | " | " | " | 27'-4" | 59" | " | " | " | " | 6'-7" | " | " | " | " | " | " | " | " | " |
| RM-228D-213-100 | 10'-7" | 10'-0" | 15'-10 1/8" | 17'-5 1/2" | 26'-11" | 39 1/8" | 24'-7" | 23" | 78" | 733/4" | " | " | 6'-6 1/2" | " | 70" | " | " | " | 37 1/8" | 62 1/8" | 277/8" | " |
| RM-228D-173-100 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-228D-246-86 | " | 8'-7 1/2" | " | " | " | " | 23'-7" | 367/8" | " | 735/8" | " | " | 5'-2" | " | " | " | " | " | " | " | " | " |
| RM-228D-213-86 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |
| RM-228D-200-74 | " | 7'-5" | " | " | " | " | 22'-9" | 467/8" | " | 775/8" | " | " | 47 1/2" | " | " | " | " | " | " | " | " | " |
| RM-228D-173-74 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " |

STRUCTURAL DATA

| UNIT DESIGNATION | RM-1824D-427-192 RM-1280D-427-192 RM-912D-427-192 | RM-1824D-365-192 RM-1280D-365-192 RM-912D-365-192 | RM-912D-305-192 RM-640D-305-192 | RM-1824D-427-168 RM-1280D-427-168 RM-912D-427-168 | RM-1824D-365-168 RM-1280D-365-168 RM-912D-365-168 | RM-912D-305-168 RM-640D-305-168 | RM-456D-305-168 |
|-----------------------------|---|---|------------------------------------|---|---|------------------------------------|--------------------|
| POLISHED ROD CAPACITY, LBS. | 42,700 | 36,500 | 30,500 | 42,700 | 36,500 | 30,500 | 30,500 |
| STROKE LENGTHS, INCHES | 192", 158", 127" | 192", 158", 127" | 192", 158", 127" | 168", 139", 111" | 168", 139", 111" | 168", 139", 111" | 168", 139", 112" |
| WALKING BEAM | W36 x 280# | W36 x 245# | W33 x 221# | W36 x 245# | W33 x 221# | W33 x 201# | W33 x 201# |
| WIRES HANGER | 13/8" x 16" Ctrs. | 13/8" x 16" Ctrs. | 13/8" x 16" Ctrs. | 13/8" x 16" Ctrs. | 13/8" x 16" Ctrs. | 1 1/4" x 16" Ctrs. | 1 1/4" x 16" Ctrs. |
| CRANKS | 90110 RM | 90110 RM | 90110 RM | 90110 RM | 90110 RM | 90110 RM | 7895 RM |
| CRANK PIN BEARING | 0S | 0S | 1SE | 0S | 1SE | 1SE | 1SE |
| EQUALIZER BEARING | 00R | 00R | 00R | 00R | 00R | 0R | 0R |
| CENTER BEARING | 00TG | 0TG | 0TG | 0TG | 0TG | 0TG | 0TG |

| UNIT DESIGNATION | RM-912D-427-144 RM-640D-427-144 | RM-912D-365-144 RM-456D-365-144 | RM-456D-365-144 | RM-912D-305-144 RM-640D-305-144 | RM-456D-305-144 | RM-640D-256-144 | RM-456D-256-144 RM-320D-256-144 |
|-----------------------------|------------------------------------|------------------------------------|-------------------|------------------------------------|--------------------|--------------------|------------------------------------|
| POLISHED ROD CAPACITY, LBS. | 42,700 | 36,500 | 36,500 | 30,500 | 30,500 | 25,600 | 25,600 |
| STROKE LENGTHS, INCHES | 144", 119", 95" | 144", 119", 95" | 144", 119", 96" | 144", 119", 95" | 144", 119", 96" | 144", 119", 95" | 144", 119", 96" |
| WALKING BEAM | W33 x 201# | W33 x 201# | W33 x 201# | W30 x 173# | W30 x 173# | W30 x 173# | W30 x 173# |
| WIRES HANGER | 13/8" x 16" Ctrs. | 13/8" x 16" Ctrs. | 13/8" x 16" Ctrs. | 1 1/4" x 16" Ctrs. | 1 1/4" x 16" Ctrs. | 1 1/4" x 16" Ctrs. | 1 1/4" x 16" Ctrs. |
| CRANKS | 90110 RM | 90110 RM | 7895 RM | 90110 RM | 7895 RM | 90110 RM | 7895 RM |
| CRANK PIN BEARING | 1SE | 1SE | 1SE | 1SE | 1SE | 1SE | 2SE |
| EQUALIZER BEARING | 00R | 0R | 0R | 0R | 0R | 0R | 0R |
| CENTER BEARING | 0TG | 0TG | 0TG | 0TG | 0TG | 0TG | 1TGA |

| UNIT DESIGNATION | RM-456D-365-120 | RM-640D-305-120 RM-456D-305-120 RM-320D-305-120 | RM-640D-256-120 RM-456D-256-120 RM-320D-256-120 | RM-320D-213-120 RM-228D-213-120 | RM-320D-305-100 | RM-320D-256-100 RM-228D-256-100 |
|-----------------------------|-------------------|---|---|------------------------------------|--------------------|------------------------------------|
| POLISHED ROD CAPACITY, LBS. | 36,500 | 30,500 | 25,600 | 21,300 | 30,500 | 25,600 |
| STROKE LENGTHS, INCHES | 120", 100", 80" | 120", 100", 80" | 120", 100", 80" | 120", 100", 80" | 100", 83", 67" | 100", 83", 67" |
| WALKING BEAM | W30 x 173# | W27 x 146# | W27 x 146# | W27 x 146# | W27 x 146# | W27 x 146# |
| WIRES HANGER | 13/8" x 12" Ctrs. | 1 1/4" x 12" Ctrs. | 1 1/8" x 12" Ctrs. | 1 1/8" x 12" Ctrs. | 1 1/4" x 12" Ctrs. | 1 1/8" x 12" Ctrs. |
| CRANKS | 7895 RM | 7895 RM | 7895 RM | 7895 RM | 7895 RM | 7895 RM |
| CRANK PIN BEARING | 1SE | 2SE | 2SE | 2SE | 2SE | 2SE |
| EQUALIZER BEARING | 0R | 0R | 1R | 2RA | 1R | 2RA |
| CENTER BEARING | 0TG | 1TGA | 1TGA | 2TGC | 1TGA | 2TGC |

| UNIT DESIGNATION | RM-228D-213-100 | RM-228D-173-100 | RM-320D-246-86 RM-228D-246-86 | RM-228D-213-86 | RM-228D-200-74 | RM-228D-173-74 |
|-----------------------------|--------------------|--------------------|----------------------------------|--------------------|----------------|----------------|
| POLISHED ROD CAPACITY, LBS. | 21,300 | 17,300 | 24,600 | 21,300 | 20,000 | 17,300 |
| STROKE LENGTHS, INCHES | 100", 84", 69" | 100", 84", 69" | 86", 72", 59" | 86", 72", 59" | 74", 62", 51" | 74", 62", 51" |
| WALKING BEAM | W24 x 117# | W24 x 104# | W24 x 117# | W24 x 104# | W24 x 94# | W24 x 84# |
| WIRES HANGER | 1 1/8" x 12" Ctrs. | 1 1/8" x 12" Ctrs. | 1 1/8" x 12" Ctrs. | 1 1/8" x 12" Ctrs. | 1" x 9" Ctrs. | 1" x 9" Ctrs. |
| CRANKS | 7078 RM | 7078 RM | 7078 RM | 7078 RM | 7078 RM | 7078 RM |
| CRANK PIN BEARING | 3SF | 3SF | 3SF | 3SF | 5SA | 5SA |
| EQUALIZER BEARING | 2RA | 2RA | 2RA | 2RA | 3R | 3R |
| CENTER BEARING | 2TGC | 4TG | 2TGC | 2TGC | 4TG | 4TG |

RM SERIES COUNTERBALANCE DATA

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

| UNIT | RM-1824D-427-192 RM-1280D-427-192 RM-1824D-365-192 RM-1280D-365-192 | RM-912D-427-192 RM-912D-365-192 | RM-912D-305-192 | RM-640D-305-192 | RM-1824D-427-168 RM-1280D-427-168 RM-1824D-365-168 RM-1280D-365-168 RM-912D-365-168 | RM-912D-427-168 RM-640D-365-168 | RM-912D-305-168 RM-640D-305-168 |
|-----------------------------|--|------------------------------------|-----------------|-----------------|---|------------------------------------|------------------------------------|
| STROKE | 192" | 192" | 192" | 192" | 168" | 168" | 168" |
| STRUCTURAL UNBALANCE | - 1650 | - 1650 | - 1600 | - 1600 | - 515 | - 515 | - 1070 |
| CRANKS | 90110 RM | 90110 RM | 90110 RM | 90110 RM | 90110 RM | 90110 RM | 90110 RM |
| C'Bal., Cranks Only | 4,725 | 4,785 | 4,775 | 4,835 | 6,770 | 6,835 | 6,215 |
| 4 No. OORO Counterweights | 18,565 | 18,750 | 18,615 | 18,800 | 22,585 | 22,790 | 22,030 |
| 4 No. OOS Aux. Weights | 22,740 | 22,965 | 22,790 | 23,015 | 27,355 | 27,605 | 26,800 |
| 8 No. OOS Aux. Weights | 26,915 | 27,180 | 26,965 | 27,230 | 32,125 | 32,420 | ..... |
| 4 No. ORO Counterweights | 16,800 | 16,965 | 16,850 | 17,015 | 20,565 | 20,750 | 20,010 |
| 4 No. OS Aux. Weights | 20,810 | 21,010 | 20,860 | 21,060 | 25,145 | 25,370 | 24,590 |
| 8 No. OS Aux. Weights | 24,820 | 25,055 | 24,870 | 25,105 | 29,725 | 29,990 | 29,170 |
| 4 No. OARO Counterweights | 14,950 | 15,100 | 15,000 | 15,150 | 18,450 | 18,620 | 17,895 |
| 4 No. OAS Aux. Weights | 18,115 | 18,295 | 18,165 | 18,345 | 22,065 | 22,270 | 21,510 |
| 8 No. OAS Aux. Weights | 21,280 | 21,490 | 21,330 | 21,540 | 25,680 | 25,920 | 25,125 |
| 4 No. 1RO Counterweights | 12,680 | 12,810 | 12,730 | 12,860 | 15,855 | 16,005 | 15,300 |
| 4 No. 1S Aux. Weights | 15,125 | 15,275 | 15,175 | 15,325 | 18,650 | 18,825 | 18,095 |
| 8 No. 1S Aux. Weights | 17,570 | 17,740 | 17,620 | 17,790 | 21,445 | 21,645 | 20,890 |
| 4 No. 2RO Counterweights | 11,350 | 11,465 | 11,395 | 11,515 | 14,335 | 14,465 | 13,780 |
| 4 No. 2S Aux. Weights | 13,725 | 13,860 | 13,770 | 13,910 | 17,045 | 17,200 | 16,490 |
| 8 No. 2S Aux. Weights | 16,100 | 16,255 | 16,145 | 16,305 | 19,755 | 19,935 | 19,200 |
| 4 No. 3CRO Counterweights | 10,060 | 10,165 | 10,110 | 10,215 | 12,865 | 12,980 | 12,310 |
| 4 No. 3BS Aux. Weights | 12,360 | 12,485 | 12,410 | 12,535 | 15,490 | 15,630 | 14,935 |
| 8 No. 3BS Aux. Weights | 14,660 | *14,805 | *14,710 | 14,855 | *18,115 | 18,280 | *17,560 |
| 4 No. 5ARO Counterweights | 8,585 | 8,680 | 8,635 | 8,730 | 11,180 | 11,285 | 10,625 |
| 4 No. 5A Aux. Weights | 10,135 | 10,240 | 10,185 | 10,290 | 12,950 | 13,070 | 12,395 |
| 8 No. 5A Aux. Weights | 11,685 | *11,800 | *11,735 | 11,850 | *14,720 | 14,855 | *14,165 |
| 4 No. 5CRO Counterweights | 7,560 | 7,645 | 7,610 | 7,695 | 10,010 | 10,105 | 9,455 |
| 4 No. 5C Aux. Weights | 8,960 | 9,060 | 9,010 | 9,110 | 11,610 | 11,720 | 11,055 |
| 8 No. 5C Aux. Weights | 10,360 | 10,475 | 10,410 | 10,525 | 13,210 | 13,335 | 12,655 |

| UNIT | RM-456D-256-144 | RM-320D-256-144 | RM-456D-365-120 | RM-640D-305-120 RM-456D-305-120 | RM-320D-305-120 | RM-640D-256-120 RM-456D-256-120 RM-320D-256-120 | RM-320D-213-120 |
|-----------------------------|-----------------|-----------------|-----------------|------------------------------------|-----------------|---|-----------------|
| STROKE | 144" | 144" | 120" | 120" | 120" | 120" | 120" |
| STRUCTURAL UNBALANCE | - 870 | - 870 | + 680 | + 335 | + 335 | + 235 | + 40 |
| CRANKS | 7895 RM | 7895 RM | 7895 RM | 7895 RM | 7895 RM | 7895 RM | 7895 RM |
| C'Bal., Cranks Only | 5,405 | 5,435 | 8,190 | 7,845 | 7,885 | 7,745 | 7,550 |
| 4 No. ORO Counterweights | 18,405 | 18,505 | 23,755 | 23,410 | 23,530 | 23,310 | ..... |
| 4 No. OS Aux. Weights | 22,720 | 22,845 | 28,925 | 28,580 | 28,725 | ..... | ..... |
| 8 No. OS Aux. Weights | ..... | ..... | 34,095 | ..... | ..... | ..... | ..... |
| 4 No. OARO Counterweights | 16,560 | 16,650 | 21,545 | 21,200 | 21,310 | 21,100 | ..... |
| 4 No. OAS Aux. Weights | 20,015 | 20,120 | 25,680 | 25,335 | 25,465 | ..... | ..... |
| 8 No. OAS Aux. Weights | ..... | ..... | 29,815 | ..... | ..... | ..... | ..... |
| 4 No. 1RO Counterweights | 14,110 | 14,185 | 18,610 | 18,265 | 18,360 | 18,165 | 17,970 |
| 4 No. 1S Aux. Weights | 16,785 | 16,875 | 21,815 | 21,470 | 21,580 | 21,370 | ..... |
| 8 No. 1S Aux. Weights | 19,460 | *19,565 | 25,020 | 24,675 | 24,800 | 24,575 | ..... |
| 4 No. 2RO Counterweights | 12,655 | 12,725 | 16,870 | 16,525 | 16,610 | 16,425 | 16,230 |
| 4 No. 2S Aux. Weights | 15,255 | 15,335 | 19,980 | 19,635 | 19,735 | 19,535 | 19,340 |
| 8 No. 2S Aux. Weights | 17,855 | *17,945 | 23,090 | 22,745 | 22,860 | 22,645 | ..... |
| 4 No. 3CRO Counterweights | 11,290 | 11,350 | 15,235 | 14,890 | 14,970 | 14,790 | 14,595 |
| 4 No. 3BS Aux. Weights | 13,825 | 13,900 | 18,275 | 17,930 | 18,025 | 17,830 | 17,635 |
| 8 No. 3BS Aux. Weights | 16,360 | *16,450 | 21,315 | 20,970 | *21,080 | *20,870 | *20,675 |
| 4 No. 5ARO Counterweights | 9,710 | 9,765 | 13,345 | 13,000 | 13,070 | 12,900 | 12,705 |
| 4 No. 5A Aux. Weights | 11,435 | 11,500 | 15,410 | 15,065 | 15,150 | 14,965 | 14,770 |
| 8 No. 5A Aux. Weights | 13,160 | *13,235 | 17,475 | 17,130 | *17,230 | *17,030 | *16,835 |
| 4 No. 5CRO Counterweights | 8,575 | 8,625 | 11,990 | 11,645 | 11,705 | 11,545 | 11,350 |
| 4 No. 5C Aux. Weights | 10,140 | 10,200 | 13,865 | 13,520 | 13,590 | 13,420 | 13,225 |
| 8 No. 5C Aux. Weights | 11,705 | *11,775 | 15,740 | 15,395 | 15,475 | 15,295 | 15,100 |
| 4 No. 6RO Counterweights | 7,870 | 7,910 | 11,140 | 10,795 | 10,850 | 10,695 | 10,500 |
| 4 No. 6 Aux. Weights | 8,800 | 8,845 | 12,250 | 11,905 | 11,970 | 11,805 | 11,610 |
| 8 No. 6 Aux. Weights | 9,730 | 9,780 | 13,360 | 13,015 | 13,090 | 12,915 | 12,720 |
| 4 No. 7RO Counterweights | 6,975 | 7,015 | 10,070 | 9,725 | 9,775 | 9,625 | 9,430 |
| 4 No. 7 Aux. Weights | 7,675 | 7,715 | 10,905 | 10,560 | 10,615 | 10,460 | 10,265 |
| 8 No. 7 Aux. Weights | 8,375 | 8,415 | 11,740 | 11,395 | 11,455 | 11,295 | 11,100 |

*Use only one aux. weight per counterweight on belt cover side on 912D and 320D units.

RM SERIES COUNTERBALANCE DATA

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

| UNIT | RM-456D-305-168 | RM-912D-427-144 | RM-640D-427-144 | RM-912D-365-144 RM-640D-365-144 RM-912D-305-144 RM-640D-305-144 | RM-456D-365-144 | RM-456D-305-144 | RM-640D-256-144 |
|-----------------------------|-----------------|-----------------|-----------------|--|-----------------|-----------------|-----------------|
| STROKE | 168" | 144" | 144" | 144" | 144" | 144" | 144" |
| STRUCTURAL UNBALANCE | - 1580 | + 630 | + 630 | + 50 | - 765 | - 700 | - 140 |
| CRANKS | 7895 RM | 90110 RM | 90110 RM | 90110 RM | 7895 RM | 7895 RM | 90110 RM |
| C'Bal., Cranks Only | 3,820 | 9,125 | 9,200 | 8,545 | 5,540 | 5,575 | 8,355 |
| 4 No. OORO Counterweights | ..... | 27,565 | 27,805 | 26,985 | ..... | ..... | ..... |
| 4 No. OOS Aux. Weights | ..... | 33,130 | 33,420 | 32,550 | ..... | ..... | ..... |
| 8 No. OOS Aux. Weights | ..... | 38,695 | 39,035 | ..... | ..... | ..... | ..... |
| 4 No. ORO Counterweights | 15,010 | 25,215 | 25,430 | 24,635 | 18,610 | 18,575 | 24,445 |
| 4 No. OS Aux. Weights | 18,725 | 30,555 | 30,820 | 29,975 | 22,950 | 22,890 | ..... |
| 8 No. OS Aux. Weights | 22,440 | 35,895 | 36,210 | ..... | 27,290 | 27,205 | ..... |
| 4 No. OARO Counterweights | 13,425 | 22,745 | 22,945 | 22,165 | 16,755 | 16,730 | 21,975 |
| 4 No. OAS Aux. Weights | 16,400 | 26,965 | 27,200 | 26,385 | 20,225 | 20,185 | ..... |
| 8 No. OAS Aux. Weights | 19,375 | 31,185 | 31,455 | 30,605 | 23,695 | 23,640 | ..... |
| 4 No. 1RO Counterweights | 11,310 | 19,270 | 19,890 | 19,140 | 14,290 | 14,280 | 18,950 |
| 4 No. 1S Aux. Weights | 13,615 | 22,980 | 23,175 | 22,400 | 16,980 | 16,955 | 22,210 |
| 8 No. 1S Aux. Weights | 15,920 | 26,240 | 26,460 | 25,660 | 19,670 | 19,630 | 25,470 |
| 4 No. 2RO Counterweights | 10,060 | 17,950 | 18,100 | 17,370 | 12,830 | 12,825 | 17,180 |
| 4 No. 2S Aux. Weights | 12,295 | 21,110 | 21,290 | 20,530 | 15,440 | 15,425 | 20,340 |
| 8 No. 2S Aux. Weights | 14,530 | 24,270 | 24,480 | 23,690 | 18,050 | 18,025 | 23,500 |
| 4 No. 3CRO Counterweights | 8,890 | 16,230 | 16,370 | 15,650 | 11,455 | 11,460 | 15,460 |
| 4 No. 3BS Aux. Weights | 11,075 | 19,295 | 19,460 | 18,715 | 14,005 | 13,995 | 18,525 |
| 8 No. 3BS Aux. Weights | 13,260 | *22,360 | 22,550 | *21,780 | 16,555 | 16,530 | 21,590 |
| 4 No. 5ARO Counterweights | 7,530 | 14,270 | 14,390 | 13,690 | 9,870 | 9,880 | 13,500 |
| 4 No. 5A Aux. Weights | 9,015 | 16,330 | 16,470 | 15,750 | 11,605 | 11,605 | 15,560 |
| 8 No. 5A Aux. Weights | 10,500 | *18,390 | 18,550 | *17,810 | 13,340 | 13,330 | 17,620 |
| 4 No. 5CRO Counterweights | 6,550 | 12,905 | 13,010 | 12,325 | 8,730 | 8,745 | 12,135 |
| 4 No. 5C Aux. Weights | 7,900 | 14,770 | 14,895 | 14,190 | 10,305 | 10,310 | 14,000 |
| 8 No. 5C Aux. Weights | 9,250 | 16,635 | 16,780 | 16,055 | 11,880 | 11,875 | 15,865 |
| 4 No. 6RO Counterweights | 5,940 | ..... | ..... | ..... | 8,015 | 8,040 | ..... |
| 4 No. 6 Aux. Weights | 6,740 | ..... | ..... | ..... | 8,950 | 8,970 | ..... |
| 8 No. 6 Aux. Weights | 7,540 | ..... | ..... | ..... | 9,885 | 9,900 | ..... |
| 4 No. 7RO Counterweights | 5,175 | ..... | ..... | ..... | 7,120 | 7,145 | ..... |
| 4 No. 7 Aux. Weights | 5,775 | ..... | ..... | ..... | 7,820 | 7,845 | ..... |
| 8 No. 7 Aux. Weights | 6,375 | ..... | ..... | ..... | 8,520 | 8,545 | ..... |

| UNIT | RM-228D-213-120 | RM-320D-305-100 RM-320D-256-100 | RM-228D-256-100 | RM-228D-213-100 RM-228D-173-100 | RM-320D-246-86 RM-228D-246-86 | RM-228D-213-86 | RM-228D-200-74 RM-228D-173-74 |
|-----------------------------|-----------------|------------------------------------|-----------------|------------------------------------|----------------------------------|----------------|----------------------------------|
| STROKE | 120" | 100" | 100" | 100" | 86" | 86" | 74" |
| STRUCTURAL UNBALANCE | + 40 | + 600 | + 600 | + 90 | + 720 | + 340 | + 680 |
| CRANKS | 7895 RM | 7895 RM | 7895 RM | 7078 RM | 7078 RM | 7078 RM | 7078 RM |
| C'Bal., Cranks Only | 7,590 | 9,605 | 9,655 | 4,670 | 6,030 | 5,650 | 6,855 |
| 4 No. ORO Counterweights | ..... | 28,270 | ..... | ..... | ..... | ..... | ..... |
| 4 No. OARO Counterweights | ..... | 25,620 | ..... | ..... | ..... | ..... | ..... |
| 4 No. 1RO Counterweights | 18,065 | 22,100 | 22,215 | ..... | ..... | ..... | ..... |
| 4 No. 1S Aux. Weights | ..... | 25,940 | ..... | ..... | ..... | ..... | ..... |
| 4 No. 2RO Counterweights | 16,315 | 20,015 | 20,120 | 12,595 | 15,215 | 14,835 | 17,535 |
| 4 No. 2S Aux. Weights | 19,440 | 23,745 | 23,870 | 15,435 | 18,505 | 18,125 | ..... |
| 8 No. 2S Aux. Weights | ..... | 27,475 | ..... | 18,275 | 21,795 | ..... | ..... |
| 4 No. 3CRO Counterweights | 14,675 | 18,055 | 18,150 | 11,195 | 13,590 | 13,210 | 15,645 |
| 4 No. 3BS Aux. Weights | 17,730 | 21,700 | 21,810 | 14,005 | 16,850 | 16,470 | ..... |
| 8 No. 3BS Aux. Weights | **20,785 | *25,345 | ..... | 16,815 | *20,110 | 19,730 | ..... |
| 4 No. 5ARO Counterweights | 12,775 | 15,790 | 15,870 | 9,530 | 11,665 | 11,285 | 13,405 |
| 4 No. 5A Aux. Weights | 14,855 | 18,270 | 18,360 | 11,475 | 13,920 | 13,540 | 16,030 |
| 8 No. 5A Aux. Weights | 16,935 | *20,750 | 20,850 | 13,420 | *16,175 | 15,795 | ..... |
| 4 No. 5CRO Counterweights | 11,410 | 14,160 | 14,235 | 8,265 | 10,195 | 9,815 | 11,700 |
| 4 No. 5C Aux. Weights | 13,295 | 16,410 | 16,495 | 10,040 | 12,255 | 11,875 | 14,090 |
| 8 No. 5C Aux. Weights | 15,180 | 18,660 | 18,755 | 11,815 | *14,315 | 13,935 | 16,480 |
| 4 No. 6RO Counterweights | 10,555 | 13,145 | 13,210 | 7,475 | 9,285 | 8,905 | 10,640 |
| 4 No. 6 Aux. Weights | 11,675 | 14,480 | 14,550 | 8,535 | 10,510 | 10,130 | 12,065 |
| 8 No. 6 Aux. Weights | 12,795 | 15,815 | 15,890 | 9,595 | 11,735 | 11,355 | 13,490 |
| 4 No. 7RO Counterweights | 9,480 | 11,865 | 11,925 | 6,470 | 8,120 | 7,740 | 9,280 |
| 4 No. 7 Aux. Weights | 10,320 | 12,870 | 12,935 | 7,270 | 9,045 | 8,665 | 10,360 |
| 8 No. 7 Aux. Weights | 11,160 | 13,875 | 13,945 | 8,070 | 9,970 | 9,590 | 11,440 |

*Use only one aux. weight per counterweight on belt cover side on 912D and 320D units.
 **Use only one aux. weight per counterweight on belt cover side on 228D units.

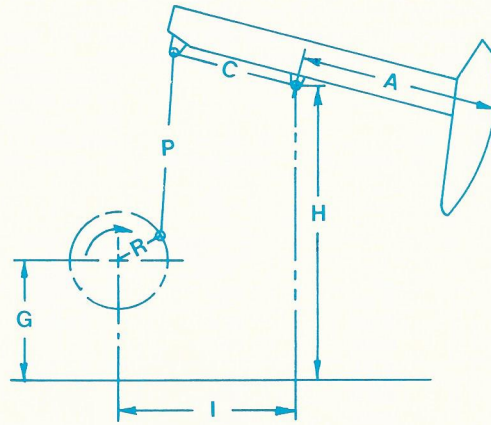


FIGURE 48

RM PUMPING UNIT API GEOMETRY DIMENSIONS

| Unit Designation | A | C | P | I | H | G | R1, R2, R3 | Phase Angle | T.F. @ (90° - Phase Angle) | S.U. |
|------------------|-------|-----|-----|-----|-----|-----|------------|-------------|----------------------------|-------|
| RM-1824-427-192 | 228.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 86.11 | -1650 |
| RM-1824-365-192 | 228.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 86.11 | -1650 |
| RM-1824-427-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 75.37 | -515 |
| RM-1824-365-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 75.37 | -515 |
| RM-1280-427-192 | 228.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 86.11 | -1650 |
| RM-1280-365-192 | 228.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 86.11 | -1650 |
| RM-1280-427-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 75.37 | -515 |
| RM-1280-365-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 75.37 | -515 |
| RM-912-427-192 | 228.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | -12 | 85.35 | -1650 |
| RM-912-365-192 | 228.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | -12 | 85.35 | -1650 |
| RM-912-305-192 | 228.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 86.11 | -1600 |
| RM-912-427-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | -12 | 74.71 | -515 |
| RM-912-365-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 75.37 | -515 |
| RM-912-305-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 75.37 | -1070 |
| RM-912-427-144 | 171.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 64.63 | 630 |
| RM-912-365-144 | 171.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 64.63 | 50 |
| RM-912-305-144 | 171.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 64.63 | 50 |
| RM-640-305-192 | 228.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | -12 | 85.35 | -1600 |
| RM-640-365-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | -12 | 74.71 | -515 |
| RM-640-305-168 | 200 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 75.37 | -1070 |
| RM-640-427-144 | 171.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | -12 | 64.06 | 630 |
| RM-640-365-144 | 171.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 64.63 | 50 |
| RM-640-305-144 | 171.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 64.63 | 50 |
| RM-640-256-144 | 171.5 | 118 | 171 | 163 | 274 | 111 | 45, 38, 31 | - 9 | 64.63 | -140 |
| RM-640-305-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 53.50 | 335 |
| RM-640-256-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 53.50 | 235 |
| RM-456-305-168 | 202 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -14 | 74.40 | -1580 |
| RM-456-365-144 | 173 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -14 | 63.72 | -765 |
| RM-456-305-144 | 173 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 64.05 | -700 |
| RM-456-256-144 | 173 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 64.05 | -870 |
| RM-456-365-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 53.50 | 680 |
| RM-456-305-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 53.50 | 335 |
| RM-456-256-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 53.50 | 235 |
| RM-320-256-144 | 173 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -14 | 63.72 | -870 |
| RM-320-305-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -14 | 53.22 | 335 |
| RM-320-256-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 53.50 | 235 |
| RM-320-213-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 53.50 | 40 |
| RM-320-305-100 | 120.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 44.61 | 600 |
| RM-320-256-100 | 120.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -12.5 | 44.61 | 600 |
| RM-320-246-86 | 103.5 | 92 | 134 | 127 | 206 | 79 | 35, 30, 25 | -14 | 38.29 | 720 |
| RM-228-213-120 | 144.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -14 | 53.22 | 40 |
| RM-228-256-100 | 120.5 | 103 | 149 | 142 | 238 | 96 | 39, 33, 27 | -14 | 44.38 | 600 |
| RM-228-213-100 | 120 | 92 | 134 | 127 | 206 | 79 | 35, 30, 25 | -14 | 44.39 | 90 |
| RM-228-173-100 | 120 | 92 | 134 | 127 | 206 | 79 | 35, 30, 25 | -14 | 44.39 | 90 |
| RM-228-246-86 | 103.5 | 92 | 134 | 127 | 206 | 79 | 35, 30, 25 | -14 | 38.29 | 720 |
| RM-228-213-86 | 103.5 | 92 | 134 | 127 | 206 | 79 | 35, 30, 25 | -14 | 38.29 | 340 |
| RM-228-200-74 | 89 | 92 | 134 | 127 | 206 | 79 | 35, 30, 25 | -14 | 32.93 | 680 |
| RM-228-173-74 | 89 | 92 | 134 | 127 | 206 | 79 | 35, 30, 25 | -14 | 32.93 | 680 |

**LUFKIN LOW-PROFILE PUMPING UNITS
GENERAL DIMENSIONS**

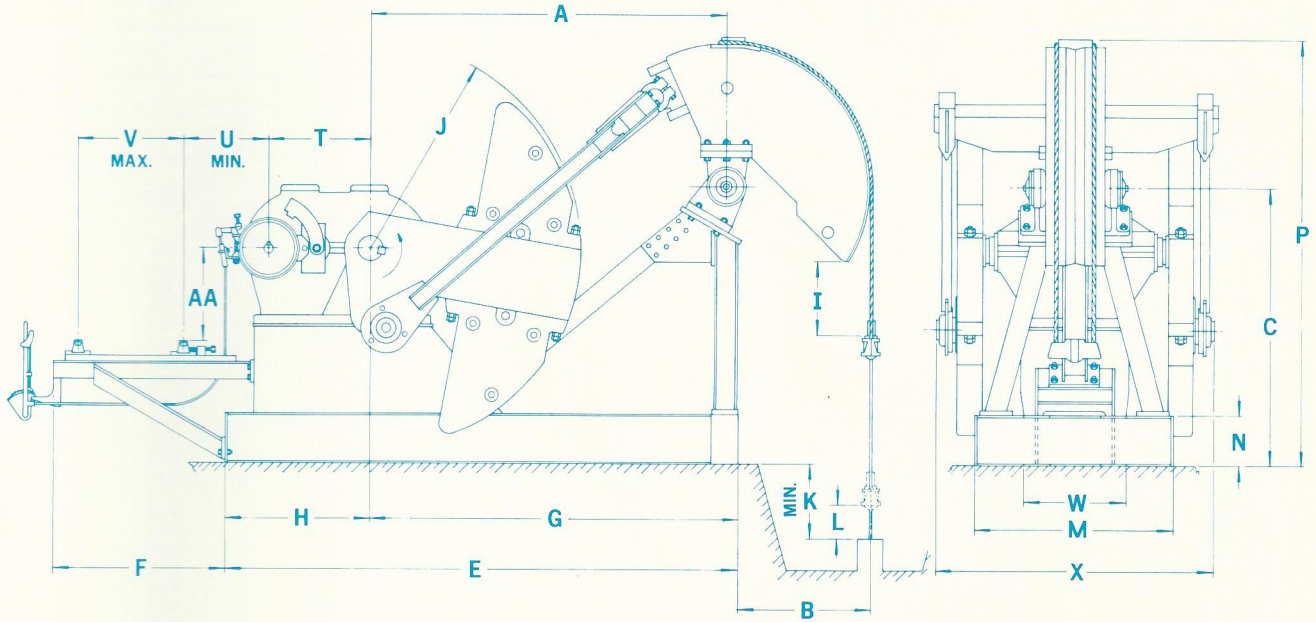


FIGURE 49

GENERAL DIMENSIONS

| UNIT | A | B | C | E | F | G | H | I | J | K | L | M | N | P | T | U | V | W | X | AA |
|----------------|--------|---------|-------|-------------|---------|------------|---------|---------|-----|-----|---------|---------|---------|--------|-----|---------|---------|-----|-----------|----------|
| LP-320D-246-86 | 8'-6" | 45 3/4" | 7'-4" | 13'-11 1/2" | 52 3/4" | 8'-9 1/2" | 52" | 10 1/2" | 64" | 24" | 6" | 51 3/4" | 16 3/8" | 11'-6" | 34" | 31 3/8" | 31 1/4" | 43" | 7'-2" | 40 7/8" |
| LP-228D-173-64 | 7'-10" | 41 1/2" | 6'-0" | 11'-10 1/2" | " | 8'-11 1/2" | 45" | 12" | 56" | 19" | 6 3/8" | " | " | 9'-11" | 30" | 29 1/2" | 30" | 37" | 6'-6 1/2" | 24 1/8" |
| LP-160D-173-64 | " | " | " | 11'-6" | 40 3/8" | " | 40 1/2" | " | " | " | " | " | " | " | 26" | 17 1/8" | 30 1/4" | 32" | 70 1/8" | 28 9/16" |
| LP-114D-133-54 | 7'-0" | 31 1/8" | 66" | 10'-2 1/4" | " | 7'-3 1/4" | 35" | 17" | 50" | " | 6 7/16" | 48 1/4" | 12 1/4" | 8'-6" | 24" | 13 5/8" | 29 1/4" | 25" | 66 3/4" | 22 9/16" |

STRUCTURAL DATA

| UNIT | LP-320D-246-86 | LP-228D-173-64 LP-160D-173-64 | LP-114D-133-54 |
|-----------------------------|--------------------|----------------------------------|-----------------|
| POLISHED ROD CAPACITY, LBS. | 24,600 | 17,300 | 13,300 |
| STROKE LENGTHS, INCHES | 86", 74", 64" | 64", 54", 44" | 54", 42", 36" |
| CRANK PIN BEARING | 2SC | 3SD | 4SD |
| SAMSON POST BEARING | 2LPTGA | 2LPTGA | P19 |
| EQUALIZER BEARING | 1R | 2RA | 3R |
| WIRELINE HANGER | 1 1/8" x 12" CTRS. | 1" x 9" CTRS. | 7/8" x 9" CTRS. |
| CRANKS | LP8664 | LP6456 | LP5450 |

COUNTERBALANCE DATA

| UNIT | LP-320D-246-86 | | | LP-228D-173-64 LP-160D-173-64 | | | LP-114D-133-54 | | |
|--------------------------|----------------|----------|----------|----------------------------------|----------|----------|----------------|----------|----------|
| STROKE | 86" | 74" | 64" | 64" | 54" | 44" | 54" | 42" | 36" |
| STRUCTURAL UNBALANCE | 240 Lbs. | 240 Lbs. | 240 Lbs. | 100 Lbs. | 100 Lbs. | 100 Lbs. | 305 Lbs. | 305 Lbs. | 305 Lbs. |
| C BAL., CRANKS ONLY | 4.835 | 5.415 | 6.040 | 3.700 | 4.100 | 4.985 | 2.940 | 3.585 | 4.080 |
| 4 No 2RO Counterweights | 12.130 | 13.635 | 15.245 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No 2S Aux. weights | 14.745 | 16.580 | 18.545 | ..... | ..... | ..... | ..... | ..... | ..... |
| 8 No 2S Aux. weights | 17.360 | 19.525 | 21.845 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No 3CRO Counterweights | 10.940 | 12.290 | 13.740 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No 3BS Aux. weights | 13.570 | 15.255 | 17.060 | ..... | ..... | ..... | ..... | ..... | ..... |
| 8 No 3BS Aux. weights | 16.200 | 18.220 | 20.380 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 No 5ARO Counterweights | 9.455 | 10.615 | 11.865 | 8.850 | 9.820 | 11.970 | 7.945 | 9.820 | 11.260 |
| 4 No 5A Aux. weights | 11.305 | 12.700 | 14.200 | 10.915 | 12.115 | 14.770 | 9.950 | 12.320 | ..... |
| 8 No 5A Aux. weights | 13.155 | 14.785 | 16.535 | 12.980 | 14.410 | ..... | 11.955 | ..... | ..... |
| 4 No 5CRO Counterweights | 8.270 | 9.285 | 10.375 | 7.550 | 8.375 | 10.205 | 6.700 | 8.270 | 9.475 |
| 4 No 5C Aux. weights | 9.965 | 11.195 | 12.515 | 9.450 | 10.485 | 12.785 | 3.560 | 10.585 | 12.140 |
| 8 No 5C Aux. weights | 11.860 | 13.105 | 14.655 | 11.350 | 12.595 | 15.365 | 10.420 | 12.900 | ..... |
| 4 No 6RO Counterweights | ..... | ..... | ..... | 6.755 | 7.495 | 9.130 | 5.945 | 7.325 | 8.390 |
| 4 No 6 Aux. weights | ..... | ..... | ..... | 7.905 | 8.775 | 10.690 | 7.080 | 8.735 | 10.015 |
| 8 No 6 Aux. weights | ..... | ..... | ..... | 9.055 | 10.055 | 12.250 | 8.215 | 10.145 | 11.640 |
| 4 No 7RO Counterweights | ..... | ..... | ..... | 5.685 | 6.305 | 7.680 | 4.905 | 6.030 | 6.895 |
| 4 No 7 Aux. weights | ..... | ..... | ..... | 6.570 | 7.285 | 8.875 | 5.775 | 7.115 | 8.145 |
| 8 No 7 Aux. weights | ..... | ..... | ..... | 7.455 | 8.265 | 10.070 | 6.645 | 8.200 | 9.395 |

NOTE: Do no use above dimensions for foundation. Request foundation plan.

**LUFKIN BEAM BALANCED (B-P) PUMPING UNIT ASSEMBLIES
STRUCTURAL SPECIFICATIONS AND DIMENSIONS**

See page 42 for GEAR Specifications

| UNIT | B-P57D-76-54 | B-P57D-109-48 | B-P57D-89-48 | B-P57D-89-42 | B-P40D-89-48 | B-P40D-89-42 |
|------------------------|--|---------------|---------------|---------------|---------------|---------------|
| Polished Rod Cap., # | 7,600 | 10,900 | 8,900 | 8,900 | 8,900 | 8,900 |
| Stroke Lengths, Ins. | 54,40 | 48,36 | 48,36 | 42,32 | 48,36 | 42,32 |
| Walking Beam | 16" x 36 lbs. | 16" x 45 lbs. | 16" x 36 lbs. | 16" x 36 lbs. | 14" x 34 lbs. | 14" x 34 lbs. |
| Equalizer Bearing | NYLATRON NSB BUSHINGS | | | | | |
| Center Bearing | NYLATRON NSB BUSHINGS | | | | | |
| Crank Pin Bearings | SPHERICAL ROLLER BEARINGS | | | | | |
| Wireline Hanger | 3/4" x 6 1/2" CENTERS | | | | | |
| *1" thick Beam Wts., # | 150 | 150 | 150 | 150 | 125 | 125 |
| No. of Beam Weights | EFFECTIVE COUNTERBALANCE AT POLISHED ROD, LBS. | | | | | |
| 0 | 270 | 470 | 380 | 425 | 400 | 435 |
| 1 | 500 | 750 | 645 | 695 | 640 | 675 |
| 2 | 725 | 1025 | 910 | 965 | 880 | 915 |
| 3 | 950 | 1295 | 1170 | 1230 | 1115 | 1155 |
| 4 | 1175 | 1565 | 1430 | 1495 | 1350 | 1390 |
| 5 | 1395 | 1835 | 1685 | 1755 | 1585 | 1625 |
| 6 | 1615 | 2100 | 1940 | 2015 | 1815 | 1855 |
| 7 | 1830 | 2360 | 2190 | 2270 | 2040 | 2085 |
| 8 | 2045 | 2620 | 2440 | 2525 | 2265 | 2310 |
| 9 | 2255 | 2880 | 2685 | 2775 | 2490 | 2535 |
| 10 | 2465 | 3135 | 2930 | 3025 | 2710 | 2755 |
| 11 | 2675 | 3385 | 3170 | 3270 | 2930 | 2975 |
| 12 | 2880 | 3635 | 3410 | 3515 | 3145 | 3195 |
| 13 | 3085 | 3885 | 3645 | 3755 | 3360 | 3410 |
| 14 | 3285 | 4130 | 3880 | 3995 | 3570 | 3625 |
| 15 | 3485 | 4370 | 4110 | 4230 | 3780 | 3835 |
| 16 | 3685 | 4610 | 4340 | 4465 | 3990 | 4040 |
| 17 | 3880 | 4850 | 4565 | 4695 | 4195 | 4250 |
| 18 | 4075 | 5085 | 4790 | 4925 | 4400 | 4455 |
| 19 | 4265 | 5315 | 5010 | 5150 | 4600 | 4655 |
| 20 | 4455 | 5545 | 5230 | 5375 | 4795 | 4855 |
| 21 | 4640 | 5775 | 5445 | 5595 | 4995 | 5050 |
| 22 | 4825 | 6000 | 5660 | 5815 | 5190 | 5250 |
| 23 | 5010 | 6220 | 5870 | 6030 | 5380 | 5440 |
| 24 | 5190 | 6440 | 6080 | 6245 | 5570 | 5630 |
| 25 | 5365 | 6660 | 6285 | 6455 | 5755 | 5820 |
| 26 | 5545 | 6875 | 6490 | 6665 | 5940 | 6005 |
| 27 | 5720 | 7085 | 6690 | 6870 | 6125 | 6190 |
| 28 | 5890 | 7295 | 6890 | 7075 | 6305 | 6375 |
| 29 | 6060 | 7505 | 7085 | 7275 | 6485 | 6550 |
| 30 | 6230 | 7710 | 7280 | 7475 | 6660 | 6730 |
| 31 | | 7910 | | | 6835 | 6905 |
| 32 | | 8110 | | | 7005 | 7080 |
| 33 | | 8310 | | | 7175 | 7250 |
| 34 | | 8505 | | | 7345 | 7415 |
| 35 | | 8695 | | | 7510 | 7585 |
| 36 | | 8885 | | | 7670 | 7750 |

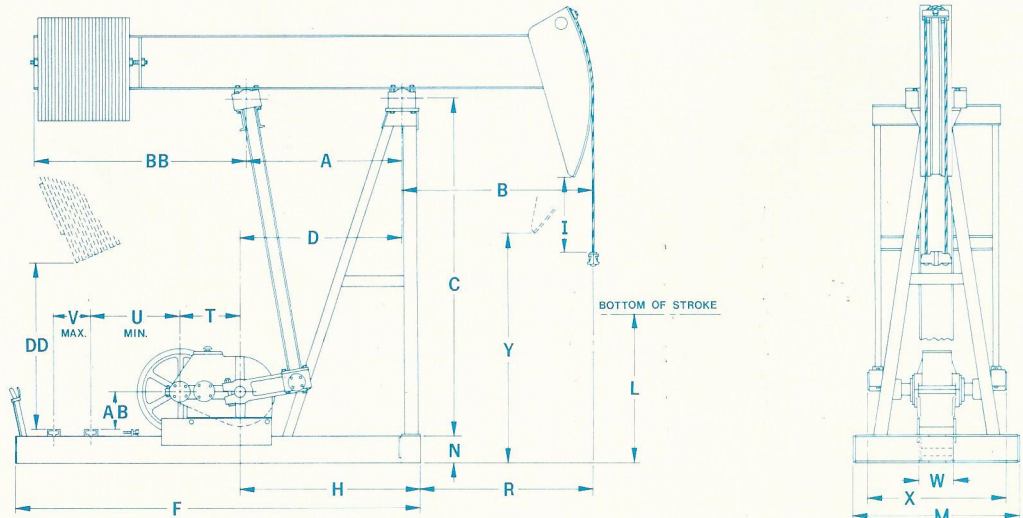


FIGURE 50

GENERAL DIMENSIONS

| Unit | A | B | C | D | F | H | I | L | M | N | R | T | U | V | W | X | Y | AB | BB | DD |
|---------------|--------|----|--------|----|---------|--------|--------|--------|----|---|--------|--------|--------|----|--------|--------|--------|---------|--------|--------|
| B-P57D-76-54 | 46 | 71 | 98 1/4 | 48 | 12' 0" | 52 7/8 | 8 1/2 | 37 | 44 | 8 | 66 1/8 | 17 3/4 | 18 1/2 | 43 | 10 1/2 | 50 1/4 | 55 1/2 | 103 3/4 | 63 | 46 1/2 |
| B-P57D-109-48 | 44 | 60 | " | " | " | " | 16 | 36 3/8 | " | " | 55 1/8 | " | " | " | " | " | 62 3/8 | " | 67 1/2 | 40 1/2 |
| B-P57D-89-48 | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | 63 | 45 1/2 |
| B-P57D-89-42 | 49 1/2 | " | " | " | " | " | " | 38 5/8 | " | " | " | " | " | " | " | " | 63 7/8 | " | 59 1/2 | 49 3/4 |
| B-P40D-89-48 | 41 | 56 | 88 3/4 | 46 | 11' 10" | 50 7/8 | " | 26 1/8 | " | " | 51 1/8 | " | " | " | " | " | 53 3/8 | " | 67 1/2 | 32 1/2 |
| B-P40D-89-42 | 46 | " | " | " | " | " | 15 7/8 | 28 3/8 | " | " | " | " | " | " | " | " | 54 3/8 | " | 63 | 39 1/4 |

* Base Shown is For Electric Motor Only.

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

**LUFKIN BEAM BALANCED PUMPING UNIT ASSEMBLIES
STRUCTURAL SPECIFICATIONS AND DIMENSIONS**

See page 42 for GEAR Specifications

| UNIT | B-57D-109-48 | B-57D-109-42 | B-40D-76-42 | B-40D-89-36 | B-25D-67-36 | B-25D-53-30 | B-16D-53-30 | B-16D-53-24 |
|------------------------|--|---------------------|---------------------|---------------------|---------------------------|---------------------|---------------------|---------------------|
| Polished Rod Cap., # | 10,900 | 10,900 | 7,600 | 8,900 | 6,700 | 5,300 | 5,300 | 5,300 |
| †Stroke Lengths, Ins. | 48, 36 | 42, 32 | 42, 32 | 36, 28 | 36, 24 | 30, 25 | 30, 25 | 24, 20 |
| Walking Beam | 16" x 45 Lbs. | 16" x 45 Lbs. | 14" x 34 Lbs. | 14" x 34 Lbs. | 14" x 34 Lbs. | 10" x 26 Lbs. | 10" x 26 Lbs. | 10" x 22 Lbs. |
| Equalizer Bearing | BRONZE BUSHED, OIL BATH TYPE | | | | | | | |
| Center Bearing | BRONZE BUSHED, OIL BATH TYPE | | | | | | | |
| Crank Pin Bearings | BRONZE BUSHED, OIL BATH TYPE | | | | SPHERICAL ROLLER BEARINGS | | | |
| Wireline Hanger | 5/8" x 9" Ctrs. | 5/8" x 6 1/2" Ctrs. | 3/4" x 6 1/2" Ctrs. | 3/4" x 6 1/2" Ctrs. | 5/8" x 6 1/2" Ctrs. | 1/2" x 5 1/2" Ctrs. | 1/2" x 5 1/2" Ctrs. | 1/2" x 5 1/2" Ctrs. |
| *1" thick Beam Wts., # | 150 | 150 | 125 | 125 | 125 | 100 | 100 | 100 |
| No. of Beam Weights | EFFECTIVE COUNTERBALANCE AT POLISHED ROD, LBS. | | | | | | | |
| 0 | 400 | 550 | 420 | 550 | 300 | 170 | 170 | 265 |
| 1 | 700 | 880 | 660 | 830 | 520 | 345 | 345 | 470 |
| 2 | 1000 | 1205 | 895 | 1105 | 740 | 515 | 515 | 670 |
| 3 | 1300 | 1530 | 1130 | 1380 | 955 | 685 | 685 | 870 |
| 4 | 1595 | 1850 | 1365 | 1650 | 1170 | 850 | 850 | 1065 |
| 5 | 1890 | 2165 | 1595 | 1915 | 1380 | 1015 | 1015 | 1260 |
| 6 | 2180 | 2480 | 1825 | 2180 | 1590 | 1175 | 1175 | 1445 |
| 7 | 2490 | 2790 | 2050 | 2440 | 1795 | 1330 | 1330 | 1635 |
| 8 | 2760 | 3100 | 2275 | 2700 | 2000 | 1485 | 1485 | 1820 |
| 9 | 3045 | 3405 | 2495 | 2955 | 2200 | 1645 | 1645 | 2000 |
| 10 | 3325 | 3710 | 2715 | 3210 | 2400 | 1795 | 1795 | 2175 |
| 11 | 3605 | 4010 | 2930 | 3460 | 2595 | 1940 | 1940 | 2350 |
| 12 | 3885 | 4300 | 3145 | 3705 | 2790 | 2090 | 2090 | 2525 |
| 13 | 4160 | 4595 | 3360 | 3950 | 2980 | 2230 | 2230 | 2690 |
| 14 | 4435 | 4890 | 3570 | 4190 | 3170 | 2375 | 2375 | 2855 |
| 15 | 4705 | 5180 | 3780 | 4430 | 3355 | 2520 | 2520 | 3015 |
| 16 | 4975 | 5470 | 3985 | 4665 | 3540 | 2665 | 2665 | 3175 |
| 17 | 5240 | 5755 | 4190 | 4900 | 3720 | 2785 | 2785 | 3330 |
| 18 | 5505 | 6040 | 4390 | 5130 | 3900 | 2920 | 2920 | 3485 |
| 19 | 5765 | 6320 | 4590 | 5360 | 4075 | 3050 | 3050 | 3635 |
| 20 | 6025 | 6600 | 4790 | 5585 | 4245 | 3180 | 3180 | 3785 |
| 21 | 6280 | 6875 | 4985 | 5810 | 4415 | 3300 | 3300 | 3925 |
| 22 | 6535 | 7150 | 5180 | 6030 | 4580 | 3425 | 3425 | 4065 |
| 23 | 6785 | 7420 | 5370 | 6250 | 4745 | 3545 | 3545 | 4205 |
| 24 | 7035 | 7685 | 5560 | 6465 | 4905 | 3660 | 3660 | 4340 |
| 25 | 7280 | 7950 | 5745 | 6680 | 5065 | 3780 | 3780 | |
| 26 | 7525 | 8210 | 5930 | 6890 | 5220 | 3890 | 3890 | |
| 27 | 7770 | 8470 | 6110 | 7100 | 5375 | 4000 | 4000 | |
| 28 | 8010 | | | | | | | |
| 29 | 8250 | | | | | | | |
| 30 | 8485 | | | | | | | |

Note: * 3" thick Beam Weights optional for all Beam Balanced units.
† On B-25D-53-30 and B-16D, units, stroke length changes are obtained by moving equalizer bearing on beam.

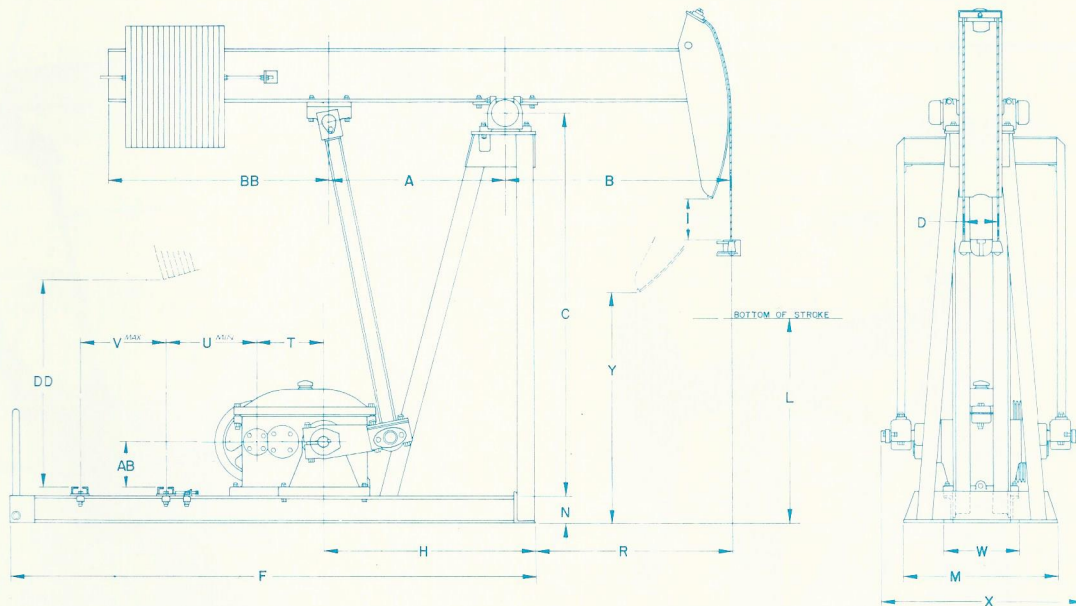


FIGURE 51

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'-9" | 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-76-42 | " | " | 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-89-36 | " | 48 | " | " | " | " | 13 | 50 1/2 | " | " | 33 | " | " | " | " | 72 1/2 | " | " | 61 1/2 | 51 1/4 |
| B-25D-67-36 | 32 | 48 | 7'-0 1/2" | " | 10'-4" | 48 | " | 34 1/2 | 31 | 6 | 34 | 13 1/2 | 18 | 39 | 16 3/4 | 45 | 56 1/2 | 12 | 54 1/2 | 45 |
| B-25D-53-30 | 33 | 41 1/4 | 70 1/2 | 5 1/2 | 9'-7" | 39 | 6 | 36 | 28 1/2 | " | 35 1/4 | " | " | " | " | 48 | " | " | 40 | 34 3/4 |
| B-16D-53-30 | " | " | " | " | 8'-0 1/2" | " | " | 35 | " | 5 | 35 1/4 | 12 3/4 | 10 1/2 | 25 1/4 | 13 3/4 | 35 | 47 | 8 1/2 | " | " |
| B-16D-53-24 | " | 33 | " | " | " | " | 12 1/2 | 35 3/4 | " | " | 27 | " | " | " | " | 52 1/2 | " | " | 36 | 36 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.

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

LUFKIN PUMPING UNITS NOMENCLATURE

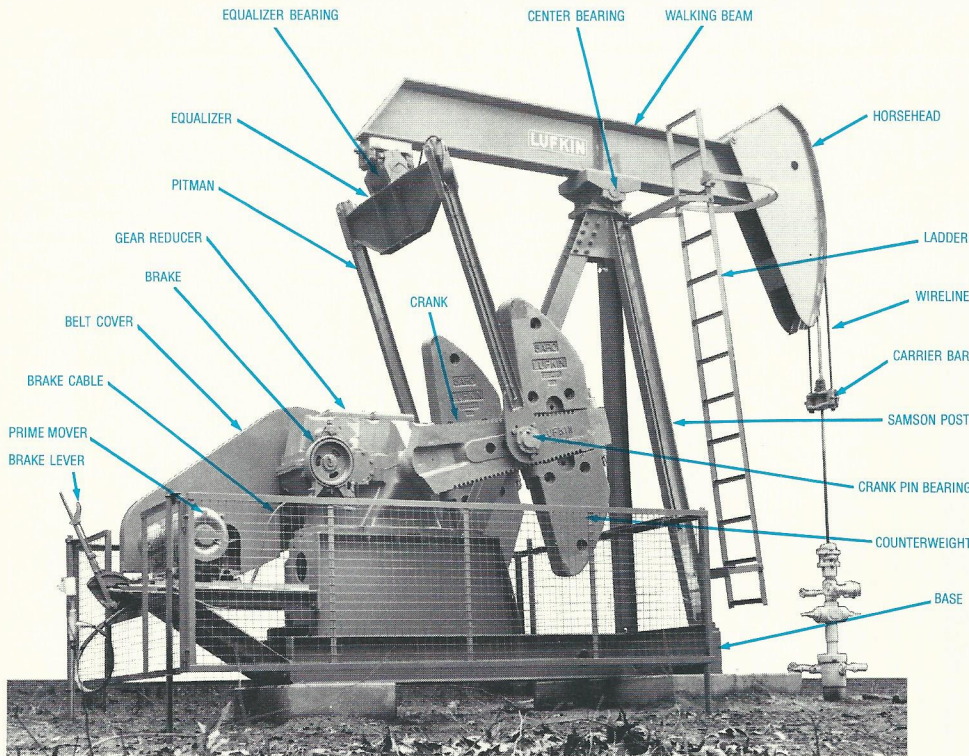


FIGURE 52
Conventional
Pumping Unit Nomenclature

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

FIGURE 53
Air Balanced Pumping Unit

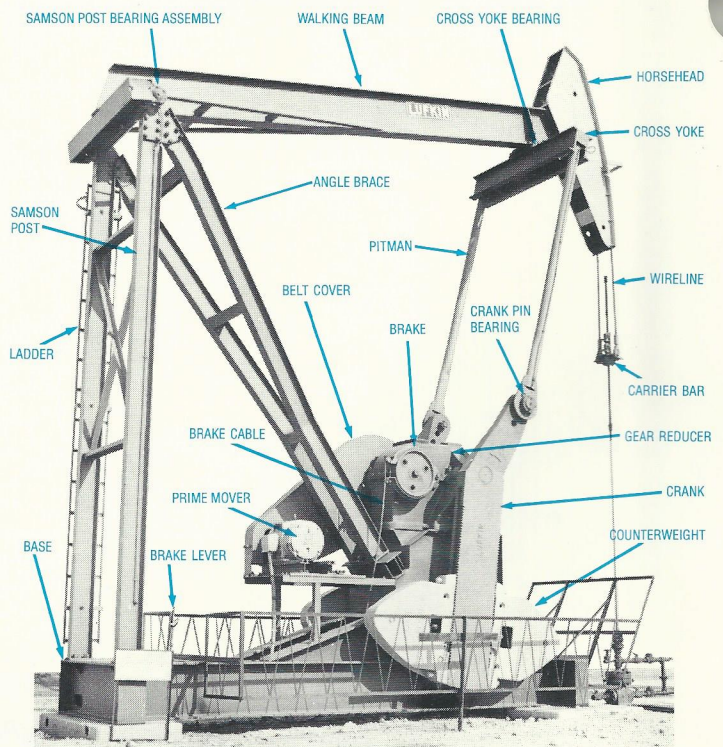
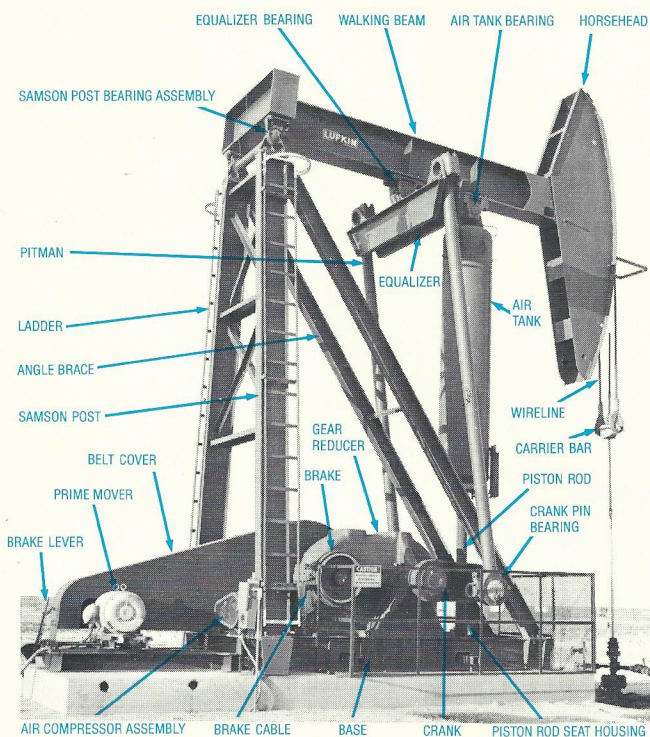


FIGURE 54
Mark II Pumping Unit

USEFUL FORMULAS

STROKES PER MINUTE

$$\text{SPM} = \frac{\text{RPM}}{R} \times \frac{d}{D}$$

Example:

RPM = 1170 Revolutions per minute of prime mover
 R = 30.12 (320D Gear Reducer)
 d = 12" Pitch Diameter of Prime Mover Sheave
 D = 47" Pitch Diameter of Gear Reducer Sheave

$$\text{SPM} = \frac{1170}{30.12} \times \frac{12}{47} = 9.9$$

PRIME MOVER SHEAVE DIAMETER

$$d = \frac{\text{SPM} \times R \times D}{\text{RPM}}$$

Example:

SPM = 12 Strokes Per Minute
 R = 30.12 Ratio (320D Gear Reducer)
 D = 47" Pitch Diameter of Gear Reducer Sheave
 RPM = 1170 Revolutions Per Minute of Prime Mover

$$d = \frac{12 \times 30.12 \times 47}{1170} = 14.5 \text{ Inches}$$

Use nearest size available depending upon belt section and number of grooves in sheave.

BELT VELOCITY

$$v = \frac{\pi \times d \times \text{RPM}}{12}$$

Limit Between 2000 and 5000 feet per min.
 Belt Velocity less than 2000 FPM results in poor belt life
 Belt Velocity greater than 5000 FPM requires dynamically balanced sheaves.

Example:

d = 14.5 Inch Pitch Diameter
 RPM = 1170 Revolutions per minute of Prime Mover

$$v = \frac{3.1416 \times 14.5 \times 1170}{12} = 4441 \text{ FPM}$$

CENTER DISTANCE

$$\text{CD} = \sqrt{\left(U + \frac{V}{2}\right)^2 + (\text{AB} - b)^2}$$

$$\text{also} = \sqrt{\left(UU + \frac{VV}{2}\right)^2 + (\text{AA} - b)^2}$$

Example:

Assume Hi-Prime Electric Motor
 Driven C-320D-256-100 Conventional Unit

UU = 31 (See General Dimensions)
 VV = 33.25 (See General Dimensions)
 AA = 54 (See General Dimensions)
 b = 8 (Assume 25 HP, Frame 324T Motor)

$$\text{CD} = \sqrt{\left(31 + \frac{33.25}{2}\right)^2 + (54 - 8)^2}$$

$$\text{CD} = 66.21 \text{ Inches}$$

BELT LENGTH

$$\text{PL} = 2 \text{ CD} + 1.57 (D + d) + \frac{(D - d)^2}{4 \times \text{CD}}$$

Example:

CD = 66.21 Inch Center Distance of Shafts
 D = 47 Inch Pitch Diameter of Gear Reducer Sheave
 d = 14.5 Inch Pitch Diameter of Prime Mover Sheave

$$\text{PL} = 2 \times 66.21 + 1.57 (47 + 14.5) + \frac{(47 - 14.5)^2}{4 \times 66.21}$$

$$\text{PL} = 232.96 \text{ Inches}$$

Use C225 or D225 Belts Depending on Sheaves Selected.

HORSEPOWER OF PRIME MOVER

*These values are approximate
 For High Slip (Nema D) Electric Motors and Slow Speed Engines

$$* \text{HP} = \frac{\text{BPD} \times \text{Depth}}{56000}$$

For Normal Slip Electric Motors and Multi-cylinder Engines

$$* \text{HP} = \frac{\text{BPD} \times \text{Depth}}{45000}$$

Multiply HP by 0.8 for Mark II Units

Example:

BPD = 217 @ 100% pump efficiency
 Depth = 5600 Feet pump setting
 Assume High Slip (Nema D) Motor

$$* \text{HP} = \frac{217 \times 5600}{56000} = 21.7, \text{ use } 25 \text{ HP Motor}$$

Maximum Strokes Per Minute Based on the Free Fall Speed of the Rod

Conventional Units

$$\text{SPM} = .7 \sqrt{\frac{60000}{L}}$$

Air Balanced Units

$$\text{SPM} = .63 \sqrt{\frac{60000}{L}}$$

Mark II Units

$$\text{SPM} = .56 \sqrt{\frac{60000}{L}}$$

Example:

Assume C-320D-256-100 Unit

$$\text{SPM} = .7 \sqrt{\frac{60000}{100}} = 17.15 \text{ SPM Maximum}$$

DEFINITION OF SYMBOLS USED:

SPM = Strokes Per Minute
 RPM = Revolutions Per Minute of Prime Mover
 R = Gear Reducer Ratio
 D = Gear Reducer Sheave Pitch Diameter, Inches
 d = Prime Mover Sheave Pitch Diameter, Inches
 v = Belt Velocity, Feet per Minute
 $\pi = 3.1416$ (Pi)
 PL = Belt Pitch Length, Inches
 CD = Shaft Center Distance, Inches
 U = See General Dimensions

V = See General Dimensions
 AB = See General Dimensions
 UU = See General Dimensions
 VV = See General Dimensions
 AA = See General Dimensions
 b = Prime Mover Backing (Vertical Distance from Mounting Feet to Center to Shaft), In.
 HP = Horsepower
 BPD = Barrels Per Day at 100% Pump Efficiency
 Depth = Pump Setting, Feet
 L = Stroke Length, Inches

DOUBLE REDUCTION GEAR UNITS

1. Horizontally split gear 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 bronze bushings 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.

**GEAR SPECIFICATIONS
DOUBLE REDUCTION****2560D GEAR REDUCER:**

RATING: 2,560,000 In. Lbs. Peak Torque
RATIO OF GEARS: 34.53
CRANKSHAFT DIA.: 113/4"
SHEAVE: 55", 68" P.D.-12D
61/2" Bore
GEAR BOX OIL CAPACITY: 235 Gallons

1824D GEAR REDUCER:

RATING: 1,824,000 In. Lbs. Peak Torque
RATIO OF GEARS: 28.33
CRANKSHAFT DIA.: 9" (Mark II, 10 1/2")
SHEAVE: 55", 68" P.D.-10D
4 1/8" Bore
GEAR BOX OIL CAPACITY: 165 Gallons

1280D GEAR REDUCER:

RATING: 1,280,000 In. Lbs. Peak Torque
RATIO OF GEARS: 28.05
CRANKSHAFT DIA.: 8 1/2" (Mark II, 10 1/2")
SHEAVE: 36", 68" P.D.-10C
35", 68" P.D.-8D 4 1/8" Bore
GEAR BOX OIL CAPACITY: 120 Gallons

912D GEAR REDUCER:

RATING: 912,000 In. Lbs. Peak Torque
RATIO OF GEARS: 28.72
CRANKSHAFT DIA.: 7" (Mark II, 9",
Mark II, 912DS,
10 1/2")
SHEAVE: 33", 40", 48", 55.2" P.D.-6D
50", 55.2" P.D.-8C, 43/16" Bore
GEAR BOX OIL CAPACITY: 107 Gallons

640D GEAR REDUCER:

RATING: 640,000 In. Lbs. Peak Torque
RATIO OF GEARS: 28.6
CRANKSHAFT DIA.: 7" (Mark II, 9")
SHEAVE: 22", 27", 33", 48", 55.4" P.D.-
5D
24", 36", 44", 50", 55.6" P.D.-
6C
37/16" Bore
GEAR BOX OIL CAPACITY: 70 Gallons

456D GEAR REDUCER:

RATING: 456,000 In. Lbs. Peak Torque
RATIO OF GEARS: 29.04
CRANKSHAFT DIA.: 7" (Mark II, 9")
SHEAVE: 22", 27", 33", 48" P.D.-4D
24", 36", 44", 50" P.D.-6C
37/16" Bore
GEAR BOX OIL CAPACITY: 55 Gallons

320D GEAR REDUCER:

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", 47" P.D.-5C
2 1/8" Bore
GEAR BOX OIL CAPACITY: 50 Gallons

228D GEAR REDUCER:

RATING: 228,000 In. Lbs. Peak Torque
RATIO OF GEARS: 28.45
CRANKSHAFT DIA.: 6" (Mark II, 7")
SHEAVE: 24", 30", 36", 41" P.D.-4C
27/16" Bore
GEAR BOX OIL CAPACITY: 34 Gallons

160D GEAR REDUCER:

RATING: 160,000 In. Lbs. Peak Torque
RATIO OF GEARS: 28.67
CRANKSHAFT DIA.: 5 7/16" (Mark II, 7")
SHEAVE: 20", 24", 30", 36", 38" P.D.-3C
2 3/16" Bore
GEAR BOX OIL CAPACITY: 22 Gallons

114D GEAR REDUCER:

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", 33.6" P.D.-2C
1 1/8" Bore
GEAR BOX OIL CAPACITY: 17 Gallons

80D GEAR REDUCER:

RATING: 80,000 In. Lbs. Peak Torque
RATIO OF GEARS: 29.15
CRANKSHAFT DIA.: 4 7/16"
SHEAVE: 20", 24", 30" P.D.-2C 1 1/8" Bore
GEAR BOX OIL CAPACITY: 17 Gallons

57D GEAR REDUCER:

RATING: 57,000 In. Lbs. Peak Torque
RATIO OF GEARS: 29.32
CRANKSHAFT DIA.: 4"
SHEAVE: 20", 24", 27" P.D.-2C
20", 25", 27.6" P.D.-3B, 1 1/8" Bore
GEAR BOX OIL CAPACITY: 13 Gallons

P57D GEAR REDUCER:

RATING: 57,000 In. Lbs. Peak Torque
RATIO OF GEARS: 29.55
CRANKSHAFT DIA.: 4"
SHEAVE: 24" P.D.-3B, 1 3/4 Bore
GEAR BOX OIL CAPACITY: 6 Gallons

40D GEAR REDUCER:

RATING: 40,000 In. Lbs. Peak Torque
RATIO OF GEARS: 29.2
CRANKSHAFT DIA.: 4"
SHEAVE: 20", 24" P.D.-2C
20", 23.3" P.D.-3B, 1 1/8" Bore
GEAR BOX OIL CAPACITY: 7 Gallons

P40D GEAR REDUCER:

RATING: 40,000 In. Lbs. Peak Torque
RATIO OF GEARS: 29.55
CRANKSHAFT DIA.: 4"
SHEAVE: 24" P.D.-3B, 1 3/4" Bore
GEAR BOX OIL CAPACITY: 6 Gallons

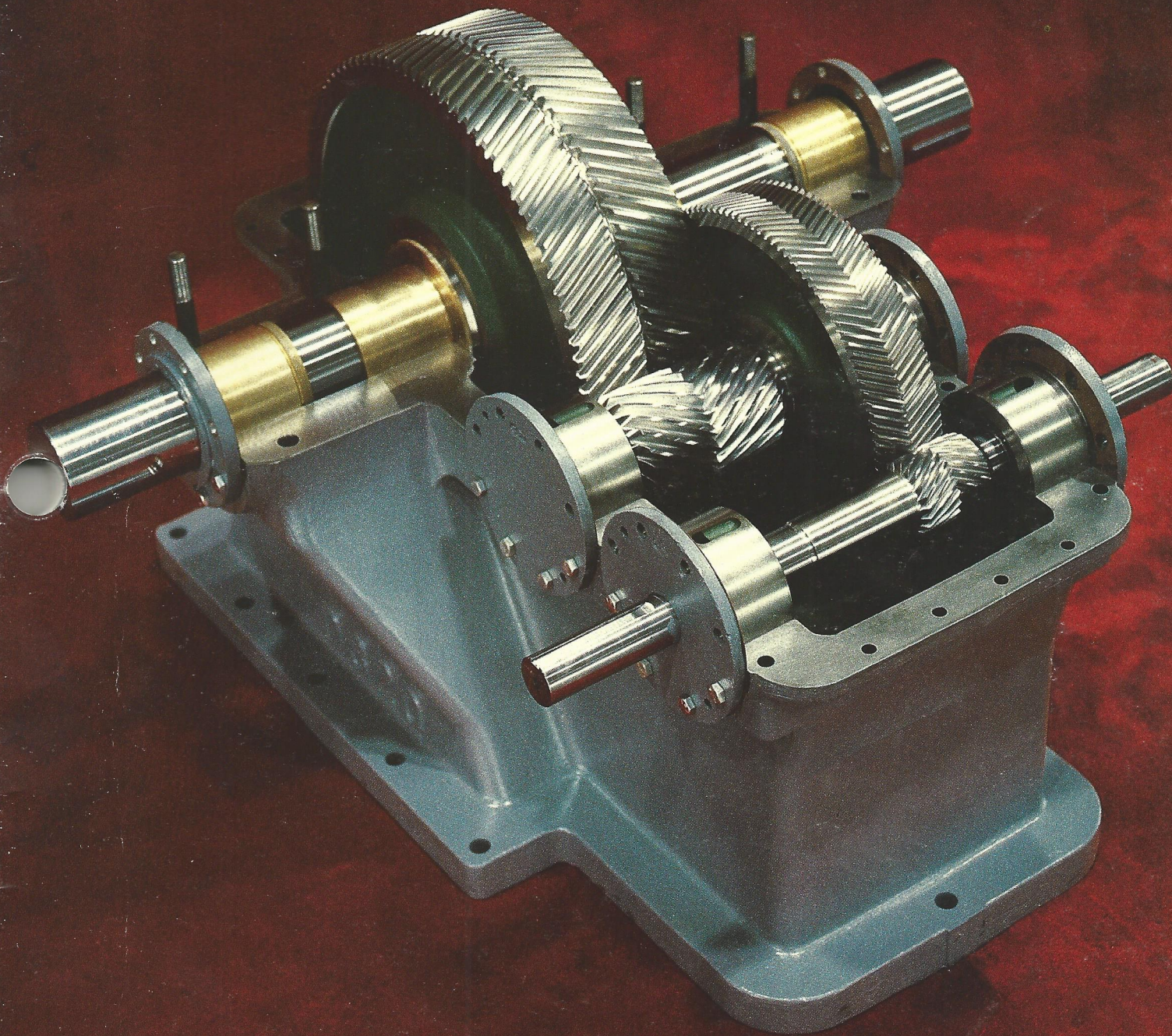
25D GEAR REDUCER:

RATING: 25,000 In. Lbs. Peak Torque
RATIO OF GEARS: 28.9
CRANKSHAFT DIA.: 3"
SHEAVE: 18.4" P.D.-2B, 1 3/4" Bore
GEAR BOX OIL CAPACITY: 5 Gallons

16D GEAR REDUCER:

RATING: 16,000 In. Lbs. Peak Torque
RATIO OF GEARS: 35.7
CRANKSHAFT DIA.: 2 1/2"
SHEAVE: 15.3" P.D.-3A or 2B, 1 3/16" Bore
GEAR BOX OIL CAPACITY: 5 Gallons

INSIDE THE HEART OF THE **LUFKIN** PUMPING UNIT



LUFKIN designed and manufactured Herringbone (Double Helical) Gears have proven to be the standard of excellence for pumping unit gear reducers. Herringbone Gears are less sensitive to mis-alignment and resist torque reversals better than other types of gears. Heavy-duty sleeve bushings on the crankshaft and straight roller bearings on the high speed and intermediate shafts need no adjustment at assembly or when field service is required. The nodular iron gears with high strength alloy pinion used by most manufacturers of pumping units were pioneered by LUFKIN over thirty (30) years ago.



LUFKIN

INDUSTRIES, INC.

LUFKIN, TEXAS