

BAKER

TOROMASTER

A Baker

Oil Tools Company



COMPUTER GENERATED SPECIAL

ADVANCED DESIGN SPECIAL GEOMETRY PUMPING UNITS THAT CUT LIFTING COSTS



Improved geometry oilwell pumping units have been operating over producing wells for the past thirty years. These improved lever systems have proven successful in decreasing rod loads, reducing peak torques and cutting power costs at the prime mover.

The geometry of these units, however, was designed in the 50's and has remained virtually unchanged since then. The industry needed a line of top-quality, long-life Special Geometry pumping units which would significantly improve efficiency, further reduce torque requirements, decrease prime mover and energy demand, and give a higher volume production pumping capacity per API rated size.

As a result, the Special Geometry BAKER TORQMASTER Pumping Units were developed.

Computers were utilized to examine the thousands of possible combinations of improved geometry linkage arrangements and to create an improved geometry pumping unit with a phased counterbalance crank. All nine BAKER TORQMASTER models, including 57D through 912D sizes, incorporate proven design features required for years of trouble-free long-life, and low cost operation. They also maintain the desirable physical structure of a conventional pumping unit.

GEOMETRY

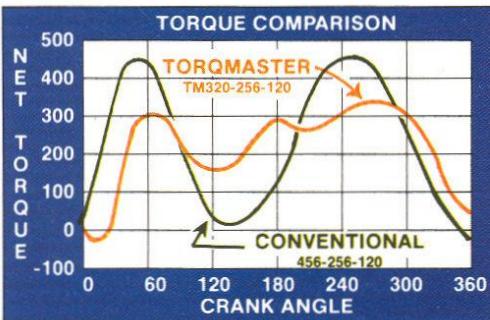
Greater Reserve Gear Box Capacity

When the TORQMASTER's computer-generated Special Geometry was combined with a phased counter-balance crank, net torque requirement at the crankshaft was reduced. In most cases this reduction is enough to allow the TORQMASTER to operate at a substantially lower percentage of its gearbox rating, with a greater reserve capacity than the conventionally designed unit.

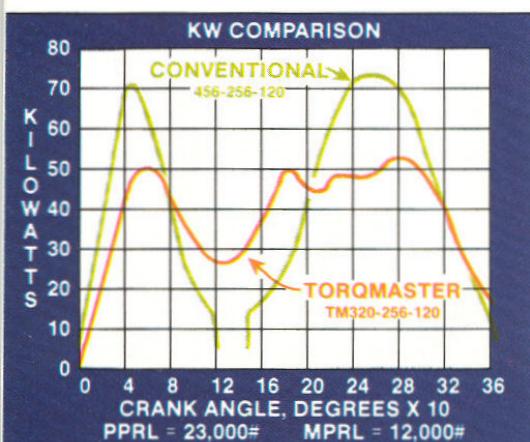
Some owners, taking advantage of the TORQMASTER's reduced peak torque requirements, use the next API-size smaller gear reducer and often still have a greater reserve capacity than the larger-sized conventional unit's gear box lifting the same fluid load.

NET TORQUE CURVE

The TORQMASTER's uniform torque demand allows the use of 15% to 35% smaller prime movers which results in a significant reduction in power demand and consumption.



REDUCED COST AND STRESS



The TORQMASTER's Special Geometry smooths torque loads, increases efficiency, improves the power factor and reduces electrical demand charges.

Lower Operating Costs

Reduced and smooth torque input generally permits the use of 15% to 35% smaller hp/kw prime movers. Initial gas engine costs are reduced and fuel consumption is substantially decreased. Electric motors operate in efficient, cost-saving ranges. The continued day-to-day savings in electrical consumption and demand charges may, over a 10 to 15 year well life, amount to more than four times the initial cost of your unit.

Less Sucker Rod Load Stress

The BAKER TORQMASTER's geometry and phased counterbalance crank give it the best pumping characteristics possible, decreasing the maximum polished rod load to reduce peak stress and provide for longer sucker rod life, lower servicing costs and less production loss from rod breakage and shutdowns.

The long, slow upstroke of the BAKER TORQMASTER, through 192° of crank rotation and a more uniform motion, reduces acceleration when rod load is the greatest, and produces a reduced polished rod load.

Since polished rod velocities are proportional to torque factors, the BAKER TORQMASTER, with its lower torque factors, has slower instantaneous upstroke polished rod velocities than conventional units operating at the same pumping speed.

The motion at the end of the stroke is smooth and uniform, without any jerky downstroke motion which causes rod problems and limits maximum pumping speed.

As a result, the BAKER TORQMASTER can be operated at the same high speeds as conventional units.



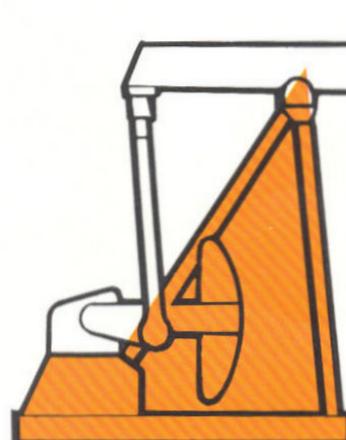
STRUCTURE AND MOUNTING

The BAKER TORQMASTER structure is a significantly advanced design innovation, connecting two traditionally separate and independent structures — the sampson post and the gear reducer. This corrects a design problem found in conventional units, known as the "wishbone effect." The "wishbone effect" occurs when normal pumping forces, generated with the well load, form a lifting fatigue area at the base between the sampson post and the gear reducer. The force generated from the angles formed by the crank and pitman, when lifting the well load, pull the gear reducer and the sampson post toward each other. Only the strength of the base beams and tiedowns keeps the two parts from being pulled together. In most cases, fatigue failure results.

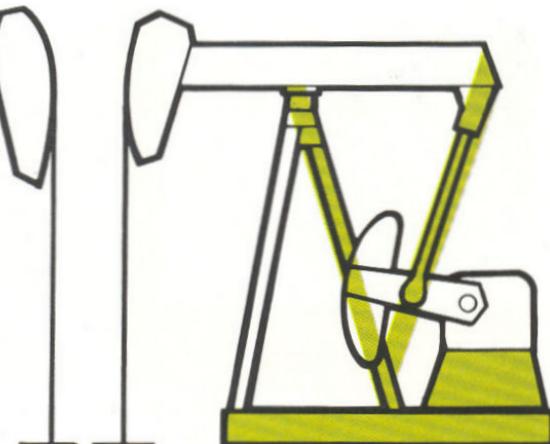
The BAKER TORQMASTER has a strong "backbone," created by connecting the rear leg of the sampson post directly to the bottom of the gear reducer. With this style of structure, forces are not transmitted down through the base frame of the pumping unit, as they are in a conventional pumping frame structure, and then back up to the saddle bearing through the sampson post. The BAKER TORQMASTER's backbone structure eliminates the need for extra-cost strong-back options required on conventional units.

The tripod sampson post is constructed of heavy I-beam for maximum strength, stability and ease of erection.

TORQMASTER BACKBONE



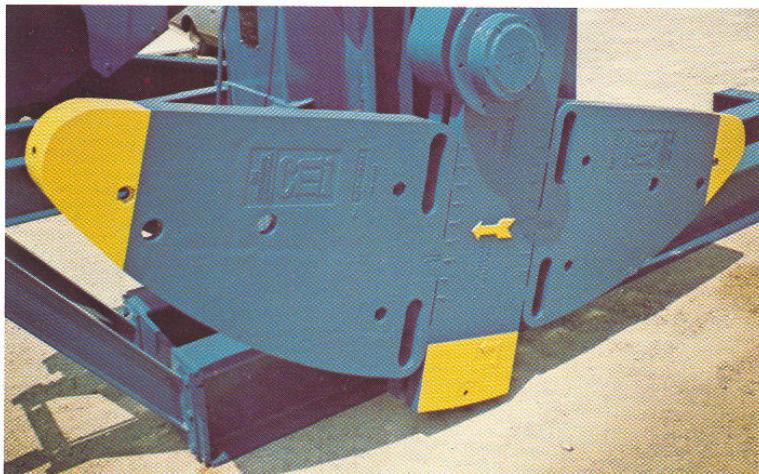
CONVENTIONAL "WISHBONE"



The TORQMASTER structure design eliminates weaknesses created by the "wishbone effect," in conventional units.

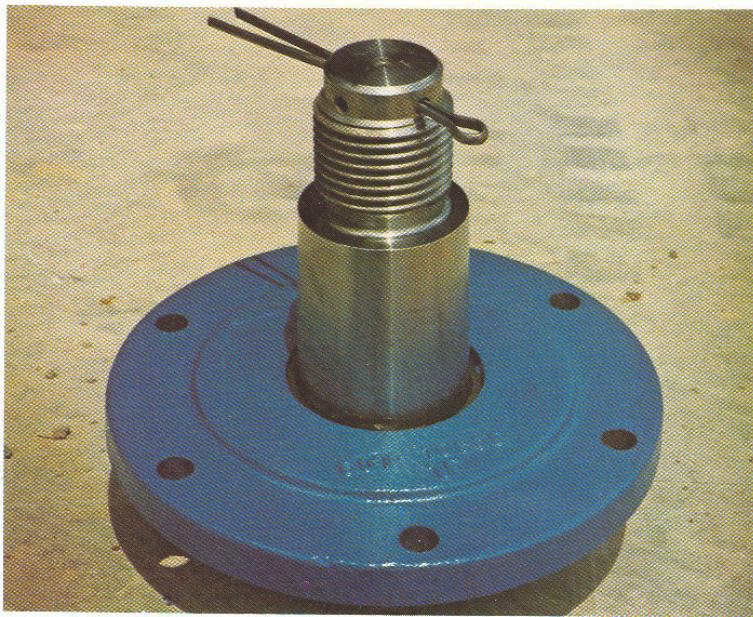


FEATURES



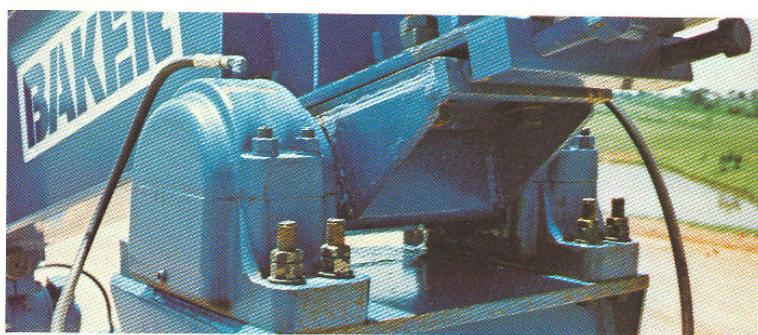
Counterweight Crank Arm

The BAKER TOROMASTER phased angle counterweight crank arm allows safe and easy movement of counterweights to alter counterbalance effect. Calibrated markings permit positive adjustment of counterweight, and provisions are made on the crank arm for three different stroke lengths. A wide range of counterbalance weights is available permitting an economical selection of counterbalance effect.



Wrist Pin Assembly

Anti-friction, self-aligning roller bearings are used at the wrist pins.

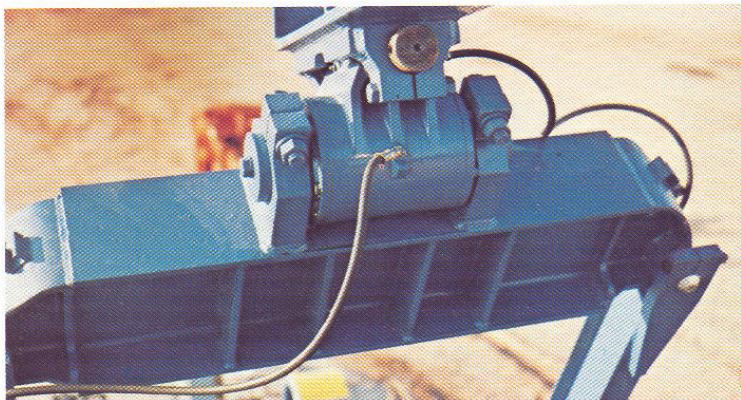


Center Bearing Assembly

The center bearing assembly uses longlife, anti-friction roller bearings for trouble-free service and minimum maintenance. It includes adjustments for easily aligning the wireline over the polished rod, to reduce installation time.

Prime Mover Brackets

High and low prime mover bracket assemblies are constructed of strong I-beam. Low prime assemblies are custom designed for the various gas engines. These bolt-on motor supports are easily removed and changed when desired.



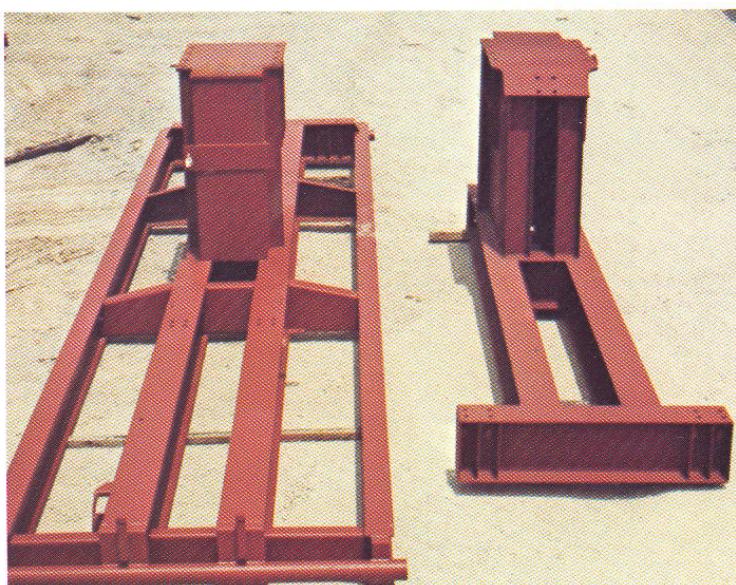
Equalizer Bearing Assembly

The equalizer bearing assembly consists of a machined case housing, containing heavy-duty cylindrical anti-friction roller bearings, and provides an equalization of loads on pitmans and wrist pin bearings.



Horsehead

The horsehead has a one-piece arc plate designed for strength and structural integrity. It is easily aligned with the polished rod and easily removed for safe well servicing.



Bases

The wide skid bases and standard "T" bases are fabricated from heavy I-beams for optimum strength and stability. No strongback options are necessary to prevent base fatigue, due to the BAKER TORQMASTER's unique backbone structural design.

Lubrication System

A standard ground level lubrication system reaches all required lube points and bearings on the unit for safe and convenient periodic relubrication.

UNIT DESIGNATION	228-246-86	160-213-86 228-213-86 320-213-86	160-173-86	114-143-86	114-119-86	160-200-74 228-200-74
POL. ROD CAP. LBS.	24,600	21,300	17,300	14,300	11,900	20,000
STROKE LENGTH. IN.	86	86	86	86	86	74
CRANK ARM RADIUS	95"	78"	78"	68"	68"	78"
CRANK PIN BEARING	C	B	B	A	A	B
EQUALIZER BEARING	C	C	C	A	A	C
CENTER BEARING	C	C	C	A	A	C
STRUCTURE GROUP	III	II	II	I	I	II
WALKING BEAM	W30x108#	W24x84#	W24x84#	W24x68#	W24x68#	W24x84#
WIRE LINE HANGER	1 1/8x12" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.
SUPP. STROKE LGTH.	68 1/4 & 52	68 1/2 & 52 1/4	68 1/2 & 52 1/4	66 3/4 & 48 3/4	66 3/4 & 48 3/4	58 3/4 & 45
UNIT DESIGNATION	114-173-74 160-173-74	114-143-74 160-143-74	114-173-64 160-173-64	114-143-64 160-143-64	80-119-64	80-133-54
POL. ROD CAP. LBS.	17,300	14,300	17,300	14,300	11,900	13,300
STROKE LENGTH. IN.	74	74	64	64	64	54
CRANK ARM RADIUS	68"	68"	68"	68"	54"	54"
CRANK PIN BEARING	A	A	A	A	A	A
EQUALIZER BEARING	A	A	A	A	A	A
CENTER BEARING	A	A	A	A	A	A
STRUCTURE GROUP	I	I	I	I	IA	IA
WALKING BEAM	W24x68#	W24x68#	W24x68#	W24x68#	W21x62#	W21x62#
WIRE LINE HANGER	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.
SUPP. STROKE LGTH.	57 1/4 & 42	57 1/4 & 42	49 1/2 & 36 1/4	49 1/2 & 36 1/4	46 3/4 & 30 3/4	39 1/2 & 26
UNIT DESIGNATION	57-119-54 80-119-54	57-76-54	80-133-48	57-109-48	57-95-48	57-89-42
POL. ROD CAP. LBS.	11,900	7,600	13,300	10,900	9,500	8,900
STROKE LENGTH. IN.	54	54	48	48	48	42
CRANK ARM RADIUS	54"	54"	54"	54"	54"	54"
CRANK PIN BEARING	A	AA	A	AA	AA	AA
EQUALIZER BEARING	A	AA	A	AA	AA	AA
CENTER BEARING	A	AA	A	AA	AA	AA
STRUCTURE GROUP	IA	IB	IA	IB	IB	IB
WALKING BEAM	W21x62#	W18x35#	W21x62#	W18x35#	W18x35#	W18x35#
WIRE LINE HANGER	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.	1"x9" CTRS.
SUPP. STROKE LGTH.	39 1/2 & 26	39 1/2 & 26	35 & 23	35 & 23	35 & 23	30 1/2 & 20

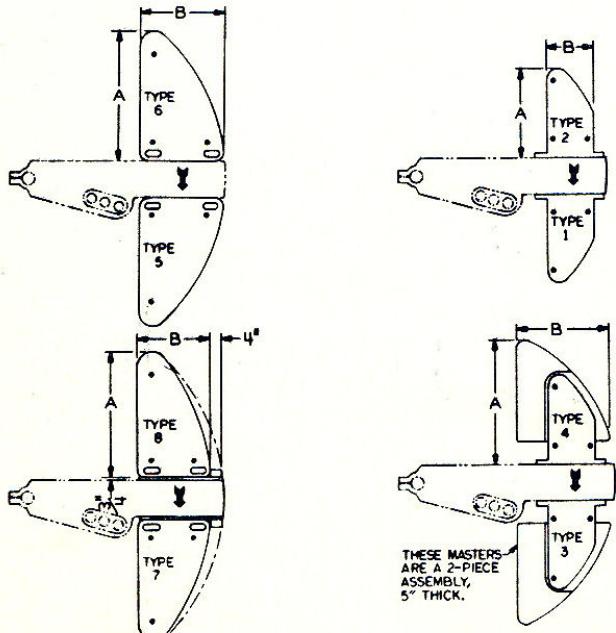
COUNTER BALANCE EFFECT CHART

UNIT SIZE	STROKE LENGTH	STRUCTURAL IMBALANCE	CBE WITH CRANKS ONLY	507-7521 &507-7522 MASTER C'WTS		507-7523 507-7533 &507-7540 2" INSERT C'WTS		507-7524 1" INSERT C'WT		507-7507 &507-7508 MASTER C'WTS		507-7511 507-7532 &507-7539 2" INSERT C'WTS		507-7512 1" INSERT C'WT		MAXIMUM CBE PERMISSIBLE WITH THIS C'WT SYSTEM	
				ONE MASTER C'WT-CBE CHANGE/INCH MOVED	ONE MASTER C'WT-MAXIMUM CBE	ONE 2" INSERT C'WT-CBE CHANGE/INCH MOVED	ONE 2" INSERT C'WT-MAXIMUM CBE	ONE 1" INSERT C'WT-CBE CHANGE/INCH MOVED	ONE 1" INSERT C'WT-MAXIMUM CBE	ONE MASTER C'WT-CBE CHANGE/INCH MOVED	ONE 2" INSERT C'WT-CBE CHANGE/INCH MOVED	ONE 2" INSERT C'WT-MAXIMUM CBE	ONE 1" INSERT C'WT-CBE CHANGE/INCH MOVED	ONE 1" INSERT C'WT-MAXIMUM CBE			
TM912-305-192	192	-1551	4351	6.617	619	3.054	284	1.527	142	10249	9.388	845	4.638	414	2.319	207	12723
TM912-365-168	168	-772	5972	7.561	707	3.49	324	1.745	162	12712	10.727	966	5.30	474	2.65	237	15539
TM912-305-168	168	-326	6344	7.561	707	3.49	324	1.745	162	13084	10.727	966	5.30	474	2.65	237	15911
TM912-427-144	144	435	8301	8.819	825	4.07	378	2.035	189	16163	12.513	1127	6.18	554	3.09	277	19460
TM912-365-144	144	649	8429	8.819	825	4.07	378	2.035	189	16291	12.513	1127	6.18	554	3.09	277	19588
TM912-305-144	144	649	8429	8.819	825	4.07	378	2.035	189	16291	12.513	1127	6.18	554	3.09	277	19588
TM640-305-168	168	-326	6344	7.561	707	3.49	324	1.745	162	13084	10.727	966	5.30	474	2.65	237	15911
TM640-365-144	144	649	8429	8.819	825	4.07	378	2.035	189	16291	12.513	1127	6.18	554	3.09	277	19588
TM640-305-144	144	649	8429	8.819	825	4.07	378	2.035	189	16291	12.513	1127	6.18	554	3.09	277	19588
TM640-256-144	144	-66	7714	8.819	825	4.07	378	2.035	189	15576	12.513	1127	6.18	554	3.09	277	18873
TM640-305-120	120	616	9949	10.58	990	4.884	454	2.442	227	19381	15.011	1352	7.416	664	3.708	332	23337
TM456-305-144	144	-86	3836	8.71	684	4.02	314	2.01	157	10355	12.358	927	6.104	454	3.052	227	13018
TM456-256-144	144	-516	3406	8.71	684	4.02	314	2.01	157	9925	12.358	927	6.104	454	3.052	227	12588
TM456-365-120	120	630	5343	10.468	823	4.832	378	2.416	189	13177	14.851	1115	7.336	546	3.668	273	16377
TM456-305-120	120	129	4842	10.468	823	4.832	378	2.416	189	12676	14.851	1115	7.336	546	3.668	273	15876
TM456-256-120	120	-39	4674	10.468	823	4.832	378	2.416	189	12508	14.851	1115	7.336	546	3.668	273	15708
TM320-256-144	144	-546	3320	8.586	675	3.962	310	1.981	155	9746	12.182	914	6.018	448	3.009	224	12370
TM320-305-120	120	93	4739	10.318	811	4.762	372	2.381	186	12461	14.639	1099	7.232	538	3.616	269	15615
TM320-256-120	120	-75	4638	10.468	823	4.832	378	2.416	189	12472	14.851	1115	7.336	546	3.668	273	15672
TM320-213-120	120	-47	4537	10.468	823	4.832	378	2.416	189	12371	14.851	1115	7.336	546	3.668	273	15571
TM320-305-100	100	622	6268	12.539	985	5.788	452	2.894	226	15653	17.791	1335	8.788	656	4.394	328	19486
TM320-256-100	100	439	5930	12.539	985	5.788	452	2.894	226	15315	17.791	1335	8.788	656	4.394	328	19148
TM320-213-86	86	721	4941	14.499	893	6.692	410	3.346	205	13442	20.572	1195	10.162	586	5.081	293	16753
TM228-213-120	120	-77	4442	10.318	811	4.762	372	2.381	186	12164	14.639	1099	7.232	538	3.616	269	15318
TM228-256-100	100	402	5815	12.36	971	5.704	446	2.852	223	15065	17.537	1316	8.662	646	4.331	323	18844
TM228-213-100	100	402	5815	12.36	971	5.704	446	2.852	223	15065	17.537	1316	8.662	646	4.331	323	18844
TM228-173-100	100	384	4017	12.48	769	5.76	352	2.88	176	11334	17.707	1028	8.748	504	4.374	252	14184
TM228-246-86	86	916	7314	14.609	1148	6.742	528	3.371	264	18247	20.727	1556	10.238	764	5.119	382	22713
TM228-213-86	86	684	4904	14.499	893	6.692	410	3.346	205	13405	20.572	1195	10.162	586	5.081	293	16716
TM228-200-74	74	1015	5921	16.854	1038	7.778	476	3.889	238	15802	23.913	1389	11.812	680	5.906	340	19992
TM160-173-100	100	373	4006	12.48	769	5.76	352	2.88	176	11323	17.707	1028	8.748	504	4.374	252	14173
TM160-213-86	86	670	4890	14.499	893	6.692	410	3.346	205	13391	20.572	1195	10.162	586	5.081	293	16702
TM160-173-86	86	670	4890	14.499	893	6.692	410	3.346	205	13391	20.572	1195	10.162	586	5.081	293	16702
TM160-200-74	74	999	5905	16.854	1038	7.778	476	3.889	238	15786	23.913	1389	11.812	680	5.906	340	19976



COUNTER BALANCE EFFECT CHART

UNIT SIZE	STROKE LENGTH	STRUCTURAL IMBALANCE	CBE WITH CRANKS ONLY	507-7545 &507-7546 MASTER C'WTS	507-7548 507-7552 &507-7553 2" INSERT C'WTS	507-7547 1" INSERT C'WT	507-7572 &507-7573 MASTER C'WTS	507-7562 507-7570 &507-7571 2" INSERT C'WTS	507-7569 1" INSERT C'WT	
				ONE MASTER C'WT- CBE CHANGE/INCH MOVED	ONE MASTER C'WT- MAXIMUM CBE	ONE 2" INSERT C'WT- CBE CHANGE/INCH MOVED	ONE 2" INSERT C'WT- MAXIMUM CBE	ONE 1" INSERT C'WT- CBE CHANGE/INCH MOVED	ONE 1" INSERT C'WT- MAXIMUM CBE	MAXIMUM CBE PERMISSIBLE WITH THIS C'WT SYSTEM
TM160-173-74	74	369	2900	—	—	—	—	—	—	—
TM160-143-74	74	369	2900	—	—	—	—	—	—	—
TM160-173-64	64	650	3574	—	—	—	—	—	—	—
TM160-143-64	64	650	3574	—	—	—	—	—	—	—
TM114-143-86	86	144	2321	—	—	—	—	—	—	—
TM114-119-86	86	144	2321	—	—	—	—	—	—	—
TM114-173-74	74	343	2874	—	—	—	—	—	—	—
TM114-143-74	74	343	2874	—	—	—	—	—	—	—
TM114-173-64	64	621	3545	—	—	—	—	—	—	—
TM114-143-64	64	621	3545	—	—	—	—	—	—	—
TM80-119-64	64	231	1768	13.374	545	8.702	334	4.351	167	7291
TM80-133-54	54	442	2263	15.847	646	10.31	394	5.155	197	8808
TM80-119-54	54	442	2263	15.847	646	10.31	394	5.155	197	8808
TM80-133-48	48	582	2627	17.794	725	11.576	444	5.788	222	9976
TM57-119-54	54	442	2263	15.847	646	10.31	394	5.155	197	8808
TM57-76-54	54	307	2090	15.847	646	10.31	394	5.155	197	7447
TM57-109-48	48	408	2410	17.794	725	11.576	444	5.788	222	9759
TM57-95-48	48	408	2410	17.794	725	11.576	444	5.788	222	9314
TM57-89-42	42	537	2831	20.385	831	13.262	508	6.631	254	8703



MASTER COUNTERWEIGHTS

PART NUMBER	TYPE	DIM. A	DIM. B	DEAD WT.-	MAXIMUM ROTARY COUNTERBALANCE MOMENT, INCH-POUNDS, ON A CRANK ARM WITH A RADIUS OF:				
					54"	68"	78"	95"	110"
507-7545	2	27	16 1/2	415	16932	—	—	—	—
507-7546	1	27	16 1/2	415	16932	—	—	—	—
507-7572	4	43	34 3/4	1262	40538	58206	—	—	—
507-7573	3	43	34 3/4	1262	40538	58206	—	—	—
507-7521	6	38 3/8	26	585	—	30204	36054	45999	54774
507-7522	5	38 3/8	26	585	—	30204	36054	45999	54774
507-7555	7	47 1/4	32	916	—	39928	—	—	—
507-7556	8	47 1/4	32	916	—	39928	—	—	—
507-7507	5	47 1/4	32	830	—	—	48215	62325	74775
507-7508	6	47 1/4	32	830	—	—	48215	62325	74775
507-7576	4	55	34 7/8	1576	—	—	87263	—	—
507-7577	3	55	34 7/8	1576	—	—	87263	—	—
507-7501	5	60 5/8	40	1337	—	—	—	94071	114126
507-7502	6	60 5/8	40	1337	—	—	—	94071	114126
507-7526	6	68 7/8	49	1724	—	—	—	112129	137989
507-7527	5	68 7/8	49	1724	—	—	—	112129	137989

507-7521 &507-7522 MASTER C'WTS		507-7523 &507-7540 2" INSERT C'WTS		507-7524 1" INSERT C'WT		507-7555 &507-7556 MASTER C'WTS		507-7511 &507-7539 2" INSERT C'WTS		507-7512 1" INSERT C'WT			
ONE MASTER C'WT- CBE CHANGE/INCH MOVED	ONE MAXIMUM C'WT- MAXIMUM CBE	ONE 2" INSERT C'WT- CBE CHANGE/INCH MOVED	ONE 2" INSERT C'WT- MAXIMUM CBE	ONE 1" INSERT C'WT- CBE CHANGE/INCH MOVED	ONE 1" INSERT C'WT- MAXIMUM CBE	MAXIMUM CBE PERMISSIBLE WITH THIS C'WT SYSTEM	ONE MASTER C'WT- CBE CHANGE/INCH MOVED	ONE MAXIMUM C'WT- MAXIMUM CBE	ONE 2" INSERT C'WT- CBE CHANGE/INCH MOVED	ONE 2" INSERT C'WT- MAXIMUM CBE	ONE 1" INSERT C'WT- CBE CHANGE/INCH MOVED	ONE 1" INSERT C'WT- MAXIMUM CBE	MAXIMUM CBE PERMISSIBLE WITH THIS C'WT SYSTEM
16.673	860	7.696	394	3.848	197	11084	26.107	1138	11.686	504	5.843	252	13505
16.673	860	7.696	394	3.848	197	11084	26.107	1138	11.686	504	5.843	252	13505
19.263	994	8.89	456	4.445	228	13030	30.162	1314	13.5	582	6.75	291	15826
19.263	994	8.89	456	4.445	228	13030	30.162	1314	13.5	582	6.75	291	14078
14.343	740	6.62	338	3.31	169	9362	22.458	978	10.052	432	5.026	216	11444
14.343	740	6.62	338	3.31	169	9362	22.458	978	10.052	432	5.026	216	11444
16.673	860	7.696	394	3.848	197	11058	26.107	1138	11.686	504	5.843	252	13479
16.673	860	7.696	394	3.848	197	11058	26.107	1138	11.686	504	5.843	252	13479
19.263	994	8.89	456	4.445	228	13001	30.162	1314	13.5	582	6.75	291	15797
19.263	994	8.89	456	4.445	228	13001	30.162	1314	13.5	582	6.75	291	14049

NOTES: 1. COUNTERBALANCE EFFECT WITH CRANKS ONLY INCLUDES STRUCTURAL IMBALANCE.
 2. MAXIMUM COUNTERBALANCE EFFECT PERMISSIBLE INCLUDES STRUCTURAL IMBALANCE, COUNTERBALANCE CRANKS, MASTER WEIGHTS, AND INSERT WEIGHTS.
 3. EXAMPLE: A TM228-246-86 WITH (2) 507-7501 & (2) 507-7502 MASTER WEIGHTS AND (4) 507-7505 INSERT WEIGHTS WILL HAVE A MAXIMUM CBE OF 21.662#

$$7.314\# + (4 \times 2.349\#) + (4 \times 1.238\#) = 21.662\#$$

TO CHANGE THIS TO A CBE OF 19.186# COULD BE DONE BY EITHER:

A. REMOVING (2) 507-7505 INSERTS

$$21.662\# - (2 \times 1.238\#) = 19.186\#$$

B. MOVING ALL (4) SETS OF WEIGHTS TOWARD THE GEARBOX SLOW-SPEED SHAFT BY 12.11 INCHES

$$21.662\# - 19.186\# = 2.476\# \text{ LESS CBE REQ'D.}$$

$$(4 \times 33.388\#/INCH) / (4 \times 17.73\#/INCH) = 204.472\#/INCH$$

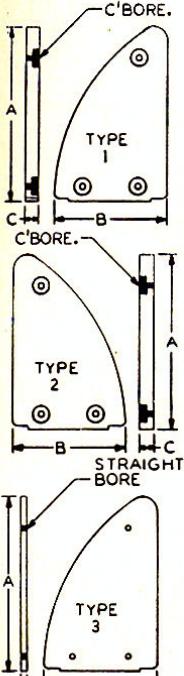
$$2.476\#/ (204.472\#/INCH) = 12.11 \text{ INCHES}$$

4. COUNTERBALANCE EFFECT WITH CRANK PINS INSTALLED IN SHORTER STROKE LENGTH POSITIONS IS APPROXIMATELY: (COUNTERBALANCE EFFECT FROM CHART) (LONGEST STROKE LENGTH) - (INSTALLED STROKE LENGTH)

COUNTERWEIGHT INSERTS

PART NUMBER	TYPE	DIM. A	DIM. B	DIM. C	DEAD WT.-	MAXIMUM ROTARY COUNTERBALANCE MOMENT, INCH-POUNDS, ON A CRANK ARM WITH A RADIUS OF:				
						54"	68"	78"	95"	110"
507-7548	3	32 1/4	22 3/4	2	270	10368	—	—	—	—
507-7547	3	32 1/4	22 3/4	1	135	5184	—	—	—	—
507-7552	1	32 1/4	22 3/4	2	270	10368	—	—	—	—
507-7553	2	32 1/4	22 3/4	2	270	10368	—	—	—	—
507-7562	3	39 1/2	34 3/4	2	528	16170	23562	—	—	—
507-7569	3	39 1/2	34 3/4	1	264	8085	11781	—	—	—
507-7570	2	39 1/2	34 3/4	2	528	16170	—	—	—	—
507-7571	1	39 1/2	34 3/4	2	528	16170	23562	—	—	—
507-7523	3	31	21	2	270	—	13865	16565	21155	25205
507-7524	3	31	21	1	135	—	6932	8282	10577	12602
507-7533	1	31	21	2	270	—	13865	16565	21155	25205
507-7540	2	31	21	2	270	—	13865	16565	21155	25205
507-7511	3	39 1/2	26 5/8	2	410	—	17700	23645	30615	36765
507-7512	3	39 1/2	26 5/8	1	205	—	8850	11822	15307	18382
507-7532	1	39 1/2	26 5/8	2	410	—	17700	23645	30615	36765
507-7539	2	39 1/2	26 5/8	2	410	—	17700	23645	30615	36765
507-7565	3	51 1/2	34 7/8	2	668	—	36834	—	—	—
507-7566	3	51 1/2	34 7/8	1	334	—	18417	—	—	—
507-7567	1	51 1/2	34 7/8	2	668	—	36834	—	—	—
507-7568	2	51 1/2	34 7/8	2	668	—	36834	—	—	—
507-7505	3	52 5/8	34 1/2	2	710	—	—	—	49608	60258
507-7506	3	52 5/8	34 1/2	1	355	—	—	—	24804	30129
507-7531	1	52 5/8	34 1/2	2	710	—	—	—	49608	60258
507-7538	2	52 5/8	34 1/2	2	710	—	—	—	49608	60258
507-7528	3	60 7/8	43 1/4	2	1050	—	—	—	68103	83853
507-7529	3	60 7/8	43 1/4	1	525	—	—	—	34052	41927
507-7534	1	60 7/8	43 1/4	2	1050	—	—	—	68103	83853
507-7541	2	60 7/8	43 1/4	2	1050	—	—	—	68103	83853

UNIT SIZE	CRANK ARM MAXIMUM ROTARY COUNTERBALANCE (MOMENT), INCH-LBS
TM57-89-42	46693
TM57-95-48	46693
TM57-109-48	46693
TM57-76-54	46693
TM57-119-54	47693
TM80-133-48	47693
TM80-119-54	47693
TM80-133-54	47693
TM80-119-64	47693
TM114-143-64	88788
TM114-173-64	88788
TM114-143-74	88788
TM114-173-74	88788
TM114-119-86	88788
TM114-143-86	88788
TM160-143-64	88788
TM160-173-64	88788
TM160-143-74	88788
TM160-173-74	88788
TM160-200-74	170275
TM160-200-74	170275
TM160-213-86	170275
TM160-173-100	170275
TM228-200-74	170275
TM228-213-86	170275
TM228-173-100	170275
TM228-246-86	256189
TM228-213-100	256189
TM228-256-100	256189
TM228-213-120	256189
TM320-213-86	170275
TM320-256-100	256189
TM320-305-100	263409
TM320-213-120	256189
TM320-256-120	263409
TM320-305-120	263409
TM320-256-144	263409
TM456-256-120	263409
TM456-305-120	263409
TM456-365-120	263409
TM456-256-144	263409
TM456-305-144	263409
TM640-305-120	516058
TM640-256-144	516058
TM640-305-144	516058
TM640-365-144	516058
TM640-305-168	516058
TM912-305-144	516058
TM912-365-144	516058
TM912-427-144	521778
TM912-305-168	516058
TM912-365-168	521778
TM912-305-192	521778



DIMENSION CHART

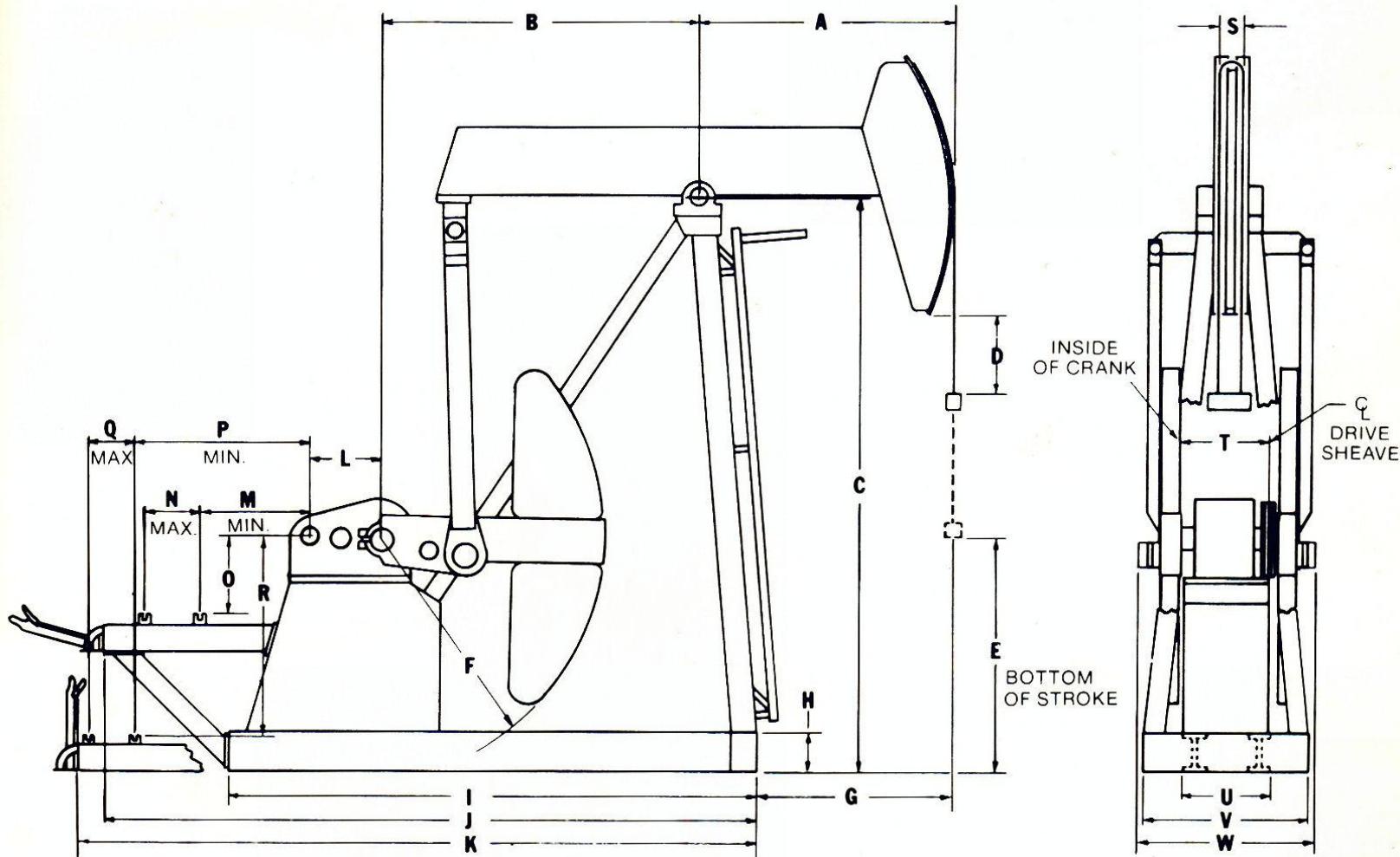
I
C
H

G = H + R

UNIT	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
TM912-305-192	230 1/4	158	269	22 1/2	45 5/8	110	201 1/2	16	256 1/2	2093 1/2	1420 1/2	527 1/2	146 3/4	25 3/2	38	81	66 3/4	59 1/2	82 1/2	89 3/16	43 7/8	76 3/4	102
TM912-365-168	201 1/2	158	269	22 1/4	70 3/8	110	172 3/4	16	256 1/2	293	420 1/2	52 7/8	14 3/4	25 1/2	48	81	86 3/4	94 1/2	12	59 3/16	43 7/8	76 3/4	102
TM912-305-168	201 1/2	158	269	22 1/8	70 3/8	110	172 3/4	16	256 1/2	293	420 1/2	52 7/8	14 3/4	25 1/2	48	81	86 3/4	94 1/2	12	59 3/16	43 7/8	76 3/4	102
TM912-427-144	172 3/4	158	269	22	95 1/8	110	144	16	256 1/2	293	420 1/2	52 7/8	14 3/4	25 1/2	48	81	86 3/4	94 1/2	12	59 3/16	43 7/8	76 3/4	102
TM912-365-144	172 3/4	158	269	22	95 1/8	110	144	16	256 1/2	293	420 1/2	52 7/8	14 3/4	25 1/2	48	81	86 3/4	94 1/2	12	59 3/16	43 7/8	76 3/4	102
TM912-305-144	172 3/4	158	269	22	95 1/8	110	144	16	256 1/2	293	420 1/2	52 7/8	14 3/4	25 1/2	48	81	86 3/4	94 1/2	12	59 3/16	43 7/8	76 3/4	102
TM640-305-168	201 1/2	158	269	22 1/8	70 3/8	110	172 3/4	16	256 1/2	293	420 1/2	44 7/16	23 3/4	34 1/8	48	89 1/2	95 1/4	34 1/2	12	57	43 7/8	76 3/4	102
TM640-365-144	172 3/4	158	269	21 7/8	95 1/8	110	144	16	256 1/2	293	420 1/2	44 7/16	23 1/4	34 1/8	48	89 1/2	95 1/4	94 1/2	12	57	43 7/8	76 3/4	102
TM640-305-144	172 3/4	158	269	21 7/8	95 1/8	110	144	16	256 1/2	293	420 1/2	44 7/16	23 1/4	34 1/8	48	89 1/2	95 1/4	94 1/2	12	57	43 7/8	76 3/4	102
TM640-256-144	172 3/4	158	269	22 3/8	95 1/8	110	144	16	256 1/2	293	420 1/2	44 7/16	23 1/4	34 1/8	48	89 1/2	95 1/4	94 1/2	12	57	43 7/8	76 3/4	102
TM640-305-120	144	158	269	47 1/2	94 3/8	110	115 1/4	16	256 1/2	293	420 1/2	44 7/16	23 1/4	34 1/8	48	89 1/2	95 1/4	94 1/2	12	57	43 7/8	76 3/4	102
TM456-305-144	172 3/4	136	232	24 5/8	58 1/8	95	147 1/8	16	222	263	350	38 7/8	20	37	39	80	64	79 1/2	12	47	35 1/4	66 3/4	89
TM456-256-144	172 1/2	136	232	22 1/8	58 1/8	95	147 1/8	16	222	263	350	38 7/8	20	37	39	80	64	79 1/2	12	47	35 1/4	66 3/4	89
TM456-365-120	143 3/4	136	232	47	57 5/8	95	118 3/8	16	221 3/4	263	350	38 7/8	20	37	39	80	64	79 1/2	12	47	35 1/4	66 3/4	89
TM456-305-120	143 3/4	136	232	32 1/8	72 5/8	95	118 3/8	16	222	263	350	38 7/8	20	37	39	80	64	79 1/2	12	47	35 1/4	66 3/4	88 1/2
TM456-256-120	143 3/4	136	232	32 1/8	72 5/8	95	118 3/8	16	222	263	350	38 7/8	20	37	39	80	64	79 1/2	12	47	35 1/4	66 3/4	88 1/2
TM320-256-144	172 1/2	136	232	32 1/8	56 1/8	95	147 1/8	16	222	263	350	38 7/8	20	37	39	80	64	79 1/2	12	47	35 1/4	66 3/4	88 1/2
TM320-305-120	143 3/4	136	232	32 1/8	72 5/8	95	118 3/8	16	222	263	350	33 5/8	23	40	39	87	64	79 1/2	12	42	35 1/4	66 3/4	88 1/2
TM320-256-120	143 3/4	136	232	32 1/8	72 5/8	95	118 3/8	16	222	263	350	33 5/8	23	40	39	87	64	79 1/2	12	42	35 1/4	66 3/4	88 1/2
TM320-213-120	143 3/4	136	232	31 3/4	73	95	120 1/2	16	220	261	348	33 5/8	26	42	39	87	64	79 1/2	12	42	32	66 3/4	79 1/2
TM320-305-100	120	136	232	53 1/8	72	95	94 5/8	16	222	263	350	33 5/8	23	40	39	87	64	79 1/2	12	42	35 1/4	66 3/4	81 1/2
TM320-256-100	120	136	232	52 5/8	72 3/8	95	96 3/4	16	220	261	348	33 5/8	26	42	39	87	64	79 1/2	12	42	32	66 3/4	79 1/2
TM320-213-86	102	122	201	36 1/8	72 1/4	78	79	16	197 1/8	242 1/4	326	33 5/8	22	42	39	87	64	79 1/2	9	42	32	54 3/4	79
TM228-213-120	143 3/4	136	232	31 3/4	73	95	120 1/2	16	220	261	348	31 3/8	23	39	38	86	64	79 1/2	12	42	32	66 3/4	79 1/2
TM228-256-100	120	136	232	52 5/8	72 3/8	95	96 3/4	16	220	261	348	31	27	38	39	88	64	79 1/2	12	36	32	66 3/4	79 1/2
TM228-213-100	120	136	232	52 5/8	72 3/8	95	96 3/4	16	220	261	348	31	27	38	39	88	64	79 1/2	12	36	32	66 3/4	79 1/2
TM228-173-100	118 1/2	122	201	21 1/2	72 5/8	78	95 1/4	16	197 1/8	242 1/4	326	31 3/8	25	38	39	88	64	79 1/2	12	36	32	66 3/4	79 1/2
TM228-246-86	103	136	232	67 1/4	72 1/8	95	79 3/4	16	220	261	348	31	27	31	39	88	64	79 1/2	12	36	32	66 3/4	79 1/2
TM228-213-86	102	122	201	36 1/8	72 1/4	78	79	16	197 1/8	242 1/4	326	31	23	34	32	88	73	62 1/2	9	36	32	66 3/4	79 1/2
TM228-200-74	87 3/4	122	201	48 3/4	71 7/8	78	64 3/4	16	197 1/8	242 1/4	326	31	23	34	32	88	73	62 1/2	9	36	32	66 3/4	79 1/2
TM180-173-100	118 1/2	122	201	21 1/2	72 5/8	78	95 1/4	16	197 1/8	242 1/4	326	31 3/8	25	38	39	88	73	62 1/2	9	33	32	66 3/4	69 3/8
TM160-213-86	102	122	201	36 1/8	72 1/4	78	79	16	197 1/8	242 1/4	326	29	25	38	32	73	73	62 1/2	9	33	32	66 3/4	68
TM160-173-86	102	122	201	36 1/8	72 1/4	78	79	16	197 1/8	242 1/4	326	29	25	38	32	73	73	62 1/2	9	33	32	66 3/4	68
TM160-200-74	87 3/4	122	201	48 3/4	71 7/8	78	64 3/4	16	197 1/8	242 1/4	326	29	25	38	32	73	73	62 1/2	9	33	32	66 3/4	68
TM160-173-74	89 1/4	99	168	21	66 3/8	68	60 3/8	16	173 1/4	206 3/4	301	29	13	31	35	63	47	49	9	33	32	54 3/4	67 1/2
TM160-143-74	89 1/4	99	168	21	66 3/8	68	60 3/8	16	173 1/4	206 3/4	301	29	13	31	35	63	47	49	9	33	32	54 3/4	67 1/2
TM160-173-64	77 1/4	99	168	31 1/2	66	68	48 3/8	16	173 1/4	206 3/4	301	29	13	31	35	63	47	49	9	33	32	54 3/4	67 1/2
TM160-143-64	77 1/4	99	168	31 1/2	66	68	48 3/8	16	173 1/4	206 3/4	301	29	13	31	35	63	47	49	9	33	32	54 3/4	67 1/2
TM114-143-86	103 3/4	99	168	21	54	68	74 7/8	16	173 1/4	206 3/4	301	22 7/8	19	31	35	69	47	49	9	26	25 3/4	54 3/4	58
TM114-119-86	103 3/4	99	168	21	54	68	74 7/8	16	173 1/4	206 3/4	301	22 7/8	19	31	35	69	47	49	9	26	25 3/4	54 3/4	58

NOTE: DO NOT USE ABOVE DIMENSIONS FOR FOUNDATION.
REQUEST FOUNDATION PLAN BLUEPRINT.

UNIT	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
TM114-173-74	89 1/4	99	168	21	66 3/8	68	60 3/8	16	173 1/4	206 3/4	301	22 7/8	19	31	35	69	47	49	9	26	25 3/4	54 3/4	58
TM114-143-74	89 1/4	99	168	21	66 3/8	68	60 3/8	16	173 1/4	206 3/4	301	22 7/8	19	31	35	69	47	49	9	26	25 3/4	54 3/4	58
TM114-173-64	77 1/4	99	168	31 1/2	66	68	48 3/8	16	173 1/4	206 3/4	301	22 7/8	19	31	35	69	47	49	9	26	25 3/4	54 3/4	58
TM114-143-64	77 1/4	99	168	31 1/2	66	68	48 3/8	16	173 1/4	206 3/4	301	22 7/8	19	31	35	69	47	49	9	26	25 3/4	54 3/4	58
TM80-119-64	78 1/2	72	127	18 1/2	37 3/4	54	63 1/4	12	122 1/4	150 1/4	233 1/4	22 3/4	16	16	23 1/2	57 1/2	56	49	9	26	24	46 3/4	58
TM80-133-54	66 1/4	72	127	18 1/2	48	54	51	12	122 1/4	150 1/4	233 1/4	22 3/4	16	16	23 1/2	57 1/2	56	49	9	26	24	46 3/4	58
TM80-119-54	66 1/4	72	127	18 1/2	48	54	51	12	122 1/4	150 1/4	233 1/4	22 3/4	16	16	23 1/2	57 1/2	56	49	9	26	24	46 3/4	58
TM80-133-48	59	72	127	18 1/2	54 1/8	54	43 3/4	12	122 1/4	150 1/4	233 1/4	22 3/4	16	16	23 1/2	57 1/2	56	49	9	26	24	46 3/4	58
TM57-119-54	66 1/4	72	127	18 1/2	48	54	51	12	122 1/4	150 1/4	233 1/4	20	19	16	23 1/2	60 1/2	56	49	9	26	24	46 3/4	54 3/4
TM57-76-54	66 1/4	72	127	18 1/2	48	54	51	12	122 1/4	150 1/4	233 1/4	20	19	16	23 1/2	60 1/2	56	49	9	26	24	46 3/4	54 3/4
TM57-109-48	59	72	127	18 1/2	54 1/8	54	43 3/4	12	122 1/4	150 1/4	233 1/4	20	19	16	23 1/2	60 1/2	56	49	9	26	24	46 3/4	54 3/4
TM57-95-48	59	72	127	18 1/2	54 1/8	54	43 3/4	12	122 1/4	150 1/4	233 1/4	20	19	16	23 1/2	60 1/2	56	49	9	26	24	46 3/4	54 3/4
TM57-89-42	51 1/2	72	127	18 1/2	60 1/2	54	36 1/4	12	122 1/4	150 1/4	233 1/4	20	19	16	23 1/2	60 1/2	56	49	9	26	24	46 3/4	54 3/4



NOTE: DO NOT USE ABOVE DIMENSIONS FOR FOUNDATION.
REQUEST FOUNDATION PLAN BLUEPRINT.

TORQUE FACTOR CHART

CALCULATING NET TORQUE ON GEAR BOX FROM DYNAMOMETER CARD

(1) POS. OF CRANK = THETA = ANGULAR DISPLACEMENT OF THE CRANK PIN BEARING, MEASURED CLOCKWISE FROM THE 12 O'CLOCK POSITION, VIEWED WITH THE WELLHEAD TO THE RIGHT.

(2) POSITION IS EXPRESSED AS A FRACTION OF STROKE ABOVE LOWERMOST POSITION.

(3) TORQUE FACTOR = T/W ; WHERE T = TORQUE ON PUMPING-UNIT REDUCER DUE TO POLISHED-ROD LOAD W .

NEGATIVE SIGN ON TORQUE FACTOR INDICATES A CLOCKWISE TORQUE ON CRANKSHAFT.

NET REDUCER TORQUE = $TF (W-B) - M \sin(\theta + \beta)$

TF = TORQUE FACTOR AT θ

W = MEASURED POLISHED-ROD LOAD AT θ

B = TRUCTURAL IMBALANCE

M = $TFM(CB-B) / \sin(90 + \beta)$ = MAXIMUM ROTARY COUNTERBALANCE MOMENT.

TFM = TORQUE FACTOR AT 90 DEGREES

CB = MEASURED MAXIMUM COUNTERBALANCE

EFFECT WITH CRANK PIN BEARINGS AT 90 DEGREES.

β = OFFSET PHASE ANGLE OF COUNTERWEIGHTS
RELATIVE TO CRANK PIN BEARINGS.

- NOTES:
- BAKER Torqmaster Pumping Units are to be operated with clockwise rotation only.
 - Do not operate single-cylinder engines below 75% of rated full load RPM.
 - For further information on Dynamometer Card analysis, refer to API STD. 11E.

TM640-305-168 (-8° Phase Angle) ($B = -326\#$)

TM912-305-168 (-8° Phase Angle) ($B = -326\#$)

TM912-365-168 (-8° Phase Angle) ($B = -772\#$)

TM912-305-192 (-8° Phase Angle) ($B = -1551\#$)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	192	153	117	192	153	117
0	.017	.016	.015	-26.703	-20.668	-15.36
15	0.	0.	0.	1.736	1.755	1.44
30	.022	.022	.022	30.775	24.268	18.119
45	.082	.081	.079	56.456	44.22	32.985
60	.173	.171	.167	75.142	59.277	44.582
75	.283	.281	.276	85.226	68.265	52.078
90	.402	.401	.397	87.552	71.423	55.398
105	.519	.522	.521	84.355	69.917	55.035
120	.63	.638	.641	77.886	65.111	51.699
135	.731	.744	.751	69.654	58.034	46.022
150	.82	.836	.845	60.249	49.162	38.386
165	.895	.911	.921	49.375	38.406	28.904
180	.953	.966	.973	35.835	25.222	17.526
195	.99	.996	.998	17.562	8.915	4.262
210	.998	.995	.991	-7.441	-10.629	-10.483
225	.968	.958	.951	-37.881	-31.949	-25.64
240	.895	.886	.877	-66.86	-51.904	-39.582
255	.789	.783	.776	-87.416	-67.311	-50.668
270	.662	.659	.654	-98.069	-76.598	-57.794
285	.525	.525	.52	-100.518	-79.727	-60.53
300	.39	.39	.386	-96.478	-77.247	-58.9
315	.265	.263	.26	-86.845	-69.686	-53.142
330	.156	.154	.151	-71.895	-57.421	-43.598
345	.071	.069	.067	-51.71	-40.846	-30.752

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	168	133 $\frac{1}{4}$	102 $\frac{1}{4}$	168	133 $\frac{1}{4}$	102 $\frac{1}{4}$
0	.017	.016	.015	-23.369	-18.088	-13.442
15	0.	0.	0.	1.519	1.536	1.26
30	.022	.022	.022	26.933	21.237	15.857
45	.082	.081	.079	49.407	38.698	28.867
60	.173	.171	.167	65.76	51.875	39.015
75	.283	.281	.276	74.584	59.741	45.575
90	.402	.401	.397	76.62	62.505	48.481
105	.519	.522	.521	73.822	61.187	48.163
120	.63	.638	.641	68.161	56.981	45.244
135	.731	.744	.751	60.957	50.787	40.276
150	.82	.836	.845	52.726	43.023	33.593
165	.895	.911	.921	43.209	33.611	25.295
180	.953	.966	.973	31.36	22.072	15.338
195	.99	.996	.998	15.369	7.802	3.73
210	.998	.995	.991	-6.512	-9.302	-9.174
225	.968	.958	.951	-33.151	-27.96	-22.439
240	.895	.886	.877	-58.512	-45.423	-34.64
255	.789	.783	.776	-76.501	-58.906	-44.341
270	.662	.659	.654	-85.823	-67.034	-50.578
285	.525	.525	.52	-87.967	-69.772	-52.972
300	.39	.39	.386	-84.431	-67.602	-51.546
315	.265	.263	.26	-76.001	-60.984	-46.507
330	.156	.154	.151	-62.918	-50.252	-38.154
345	.071	.069	.067	-45.253	-35.746	-26.913

TM640-256-144 (-8° Phase Angle) (B = -66#)
TM640-305-144 (-8° Phase Angle) (B = +649#)
TM640-365-144 (-8° Phase Angle) (B = +649#)
TM912-305-144 (-8° Phase Angle) (B = +649#)
TM912-365-144 (-8° Phase Angle) (B = +649#)
TM912-427-144 (-8° Phase Angle) (B = +435#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	144	114½	87¾	144	114½	87¾
0	.017	.016	.015	-20.035	-15.507	-11.524
15	0.	0.	0.	1.302	1.317	1.08
30	.022	.022	.022	23.09	18.207	13.594
45	.082	.081	.079	42.357	33.177	24.748
60	.173	.171	.167	56.377	44.473	33.448
75	.283	.281	.276	63.942	51.217	39.072
90	.402	.401	.397	65.688	53.586	41.563
105	.519	.522	.521	63.289	52.457	41.291
120	.63	.638	.641	58.436	48.851	38.789
135	.731	.744	.751	52.259	43.541	34.529
150	.82	.836	.845	45.203	36.884	28.8
165	.895	.911	.921	37.044	28.815	21.686
180	.953	.966	.973	26.886	18.923	13.149
195	.99	.996	.998	13.176	6.689	3.198
210	.998	.995	.991	-5.583	-7.975	-7.865
225	.968	.958	.951	-28.421	-23.971	-19.237
240	.895	.886	.877	-50.163	-38.942	-29.698
255	.789	.783	.776	-65.586	-50.501	-38.015
270	.662	.659	.654	-73.578	-57.47	-43.361
285	.525	.525	.52	-75.416	-59.817	-45.414
300	.39	.39	.386	-72.385	-57.956	-44.191
315	.265	.263	.26	-65.157	-52.283	-39.871
330	.156	.154	.151	-53.941	-43.082	-32.71
345	.071	.069	.067	-38.797	-30.646	-23.073

TM640-305-120 (-8° Phase Angle) (B = +616#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	120	95½	73	120	95½	73
0	.017	.016	.015	-16.701	-12.926	-9.606
15	0.	0.	0.	1.085	1.097	.9
30	.022	.022	.022	19.247	15.177	11.332
45	.082	.081	.079	35.308	27.655	20.629
60	.173	.171	.167	46.994	37.072	27.881
75	.283	.281	.276	53.301	42.693	32.569
90	.402	.401	.397	54.755	44.668	34.646
105	.519	.522	.521	52.756	43.726	34.419
120	.63	.638	.641	48.71	40.721	32.333
135	.731	.744	.751	43.562	36.294	28.782
150	.82	.836	.845	37.68	30.746	24.007
165	.895	.911	.921	30.879	24.019	18.077
180	.953	.966	.973	22.411	15.774	10.961
195	.99	.996	.998	10.983	5.575	2.665
210	.998	.995	.991	-4.654	-6.648	-6.556
225	.968	.958	.951	-23.691	-19.982	-16.036
240	.895	.886	.877	-41.815	-32.461	-24.755
255	.789	.783	.776	-54.671	-42.097	-31.688
270	.662	.659	.654	-61.333	-47.905	-36.145
285	.525	.525	.52	-62.865	-49.862	-37.856
300	.39	.39	.386	-60.338	-48.311	-36.837
315	.265	.263	.26	-54.313	-43.582	-33.236
330	.156	.154	.151	-44.964	-35.912	-27.267
345	.071	.069	.067	-32.34	-25.546	-19.233

TM320-256-144 (-15° Phase Angle) (B = -546#)
TM456-256-144 (-11.5° Phase Angle) (B = -516#)
TM456-305-144 (-11.5° Phase Angle) (B = -86#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	144	114½	87¾	144	114½	87¾
0	.017	.016	.015	.017	.016	.015
15	0.	0.	0.	0.	0.	0.
30	.022	.022	.022	.022	.022	.022
45	.082	.082	.082	.082	.082	.082
60	.173	.171	.167	.173	.171	.167
75	.284	.281	.276	.284	.281	.276
90	.402	.402	.397	.402	.397	.397
105	.52	.523	.522	.52	.523	.522
120	.631	.639	.642	.631	.639	.642
135	.732	.745	.751	.732	.745	.751
150	.82	.837	.846	.82	.837	.846
165	.895	.912	.922	.895	.912	.922
180	.954	.966	.974	.954	.966	.974
195	.991	.996	.998	.991	.996	.998
210	.998	.995	.991	.998	.995	.991
225	.967	.958	.95	.967	.958	.95
240	.895	.886	.877	.895	.886	.877
255	.789	.783	.775	.789	.783	.775
270	.661	.659	.653	.661	.659	.653
285	.525	.524	.52	.525	.524	.52
300	.39	.389	.386	.39	.389	.386
315	.264	.263	.26	.264	.263	.26
330	.156	.153	.151	.156	.153	.151
345	.071	.069	.067	.071	.069	.067

TM228-213-120 (-15° Phase Angle) (B = -77#)
TM320-213-120 (-11.5° Phase Angle) (B = -47#)
TM320-256-120 (-11.5° Phase Angle) (B = -75#)
TM320-305-120 (-15° Phase Angle) (B = +93#)
TM456-256-120 (-11.5° Phase Angle) (B = -39#)
TM456-305-120 (-11.5° Phase Angle) (B = +129#)
TM456-365-120 (-11.5° Phase Angle) B = +630#

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	120	95½	72½	120	95½	72½
0	.017	.016	.015	-16.665	-12.845	-9.494
15	0.	0.	0.	1.14	1.143	93
30	.022	.022	.022	19.322	15.183	11.276
45	.082	.082	.08	35.393	27.621	20.494
60	.173	.171	.167	47.07	37	27.684
75	.284	.281	.276	53.348	42.591	32.332
90	.402	.402	.397	54.765	44.544	34.389
105	.52	.523	.522	52.73	43.588	34.159
120	.631	.639	.642	48.659	40.575	32.081
135	.732	.745	.751	43.495	36.146	28.545
150	.82	.837	.846	37.608	30.6	23.788
165	.895	.912	.922	30.811	23.88	17.886
180	.954	.966	.974	22.354	15.65	10.811
195	.991	.996	.998	10.941	5.483	2.575
210	.998	.995	.991	-4.684	-6.688	-6.565
225	.967	.958	.95	-23.716	-19.954	-15.948
240	.895	.886	.877	-41.835	-32.366	-24.575
255	.789	.783	.775	-54.681	-41.954	-31.435
270	.661	.659	.653	-61.331	-47.739	-35.848
285	.525	.524	.52	-62.855	-49.689	-37.542
300	.39	.389	.386	-60.324	-48.143	-36.53
315	.264	.263	.26	-54.297	-43.427	-32.954
330	.156	.153	.151	-44.946	-35.776	-27.026
345	.071	.069	.067	-32.316	-25.434	-19.049

TORQUE FACTOR CHART

TM228-213-100 (- 11.5° Phase Angle) (B = + 402#)

TM228-256-100 (- 15° Phase Angle) (B = + 402#)

TM320-256-100 (- 11.5° Phase Angle) (B = + 439#)

TM320-305-100 (- 11.5° Phase Angle) (B = + 622#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	100	79½	60½	100	79½	60½
0	.017	.016	.015	-13.911	-10.723	-7.925
15	0.	0.	0.	.952	.954	.777
30	.022	.022	.022	16.13	12.674	9.413
45	.082	.082	.08	29.546	23.057	17.108
60	.173	.171	.167	39.293	30.887	23.11
75	.284	.281	.276	44.534	35.554	26.99
90	.402	.402	.397	45.717	37.184	28.708
105	.52	.523	.522	44.018	36.387	28.515
120	.631	.639	.642	40.619	33.871	26.781
135	.732	.745	.751	36.309	30.174	23.828
150	.82	.837	.846	31.395	25.544	19.858
165	.895	.912	.922	25.721	19.935	14.931
180	.954	.966	.974	18.661	13.064	9.024
195	.991	.996	.998	9.133	4.577	2.15
210	.998	.995	.991	-3.91	-5.583	-5.48
225	.967	.958	.95	-19.798	-16.657	-13.313
240	.895	.886	.877	-34.923	-27.019	-20.515
255	.789	.783	.775	-45.647	-35.023	-26.241
270	.661	.659	.653	-51.198	-39.851	-29.925
285	.525	.524	.52	-52.47	-41.48	-31.34
300	.39	.389	.386	-50.357	-40.189	-30.494
315	.264	.263	.26	-45.327	-36.252	-27.509
330	.156	.153	.151	-37.52	-29.865	-22.561
345	.071	.069	.067	-26.977	-21.232	-15.902

TM228-246-86 (- 11.5° Phase Angle) (B = + 916#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	86	68½	52	86	68½	52
0	.017	.016	.015	-11.941	-9.204	-6.802
15	0.	0.	0.	.817	.819	.667
30	.022	.022	.022	13.845	10.879	8.079
45	.082	.082	.08	25.36	19.791	14.685
60	.173	.171	.167	33.727	26.511	19.836
75	.284	.281	.276	38.225	30.517	23.166
90	.402	.402	.397	39.24	31.916	24.641
105	.52	.523	.522	37.782	31.232	24.476
120	.631	.639	.642	34.865	29.073	22.987
135	.732	.745	.751	31.165	25.9	20.453
150	.82	.837	.846	26.947	21.925	17.045
165	.895	.912	.922	22.077	17.11	12.816
180	.954	.966	.974	16.017	11.213	7.746
195	.991	.996	.998	7.839	3.928	1.845
210	.998	.995	.991	-3.356	-4.792	-4.704
225	.967	.958	.95	-16.993	-14.298	-11.427
240	.895	.886	.877	-29.976	-23.191	-17.608
255	.789	.783	.775	-39.18	-30.061	-22.524
270	.661	.659	.653	-43.945	-34.206	-25.686
285	.525	.524	.52	-45.037	-35.603	-26.9
300	.39	.389	.386	-43.223	-34.496	-26.174
315	.264	.263	.26	-38.905	-31.117	-23.612
330	.156	.153	.151	-32.205	-25.634	-19.365
345	.071	.069	.067	-23.155	-18.224	-13.649

TM160-173-100 (- 15° Phase Angle) (B = + 373#)

TM228-173-100 (- 15° Phase Angle) (B = + 384#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	100	79½	60½	100	79½	60½
0	.019	.019	.018	-14.755	-11.48	-8.569
15	0.	0.	0.	-.244	-6E-03	.051
30	.019	.019	.018	14.671	11.591	8.666
45	.075	.075	.073	28.025	21.984	16.421
60	.162	.161	.158	37.968	29.978	22.567
75	.27	.269	.264	43.61	34.932	26.653
90	.388	.388	.384	45.276	36.904	28.607
105	.505	.509	.508	44.028	36.439	28.647
120	.617	.626	.629	40.988	34.206	27.117
135	.719	.733	.74	36.94	30.729	24.329
150	.81	.827	.837	32.208	26.258	20.478
165	.887	.905	.915	26.659	20.754	15.623
180	.949	.962	.97	19.68	13.937	9.739
195	.988	.995	.997	10.175	5.439	2.83
210	.999	.996	.993	-.246	-4.808	-4.891
225	.97	.962	.955	-19.027	-16.035	-12.859
240	.9	.891	.883	-34.362	-26.568	-20.211
255	.794	.789	.783	-45.214	-34.712	-26.078
270	.667	.666	.661	-50.837	-39.648	-29.883
285	.531	.532	.529	-52.181	-41.372	-31.404
300	.396	.397	.394	-50.175	-40.192	-30.663
315	.271	.27	.268	-45.305	-36.395	-27.79
330	.161	.16	.158	-37.723	-30.185	-22.963
345	.075	.074	.072	-27.473	-21.763	-16.43

TM160-173-86 (- 15° Phase Angle) (B = + 670#)

TM160-213-86 (- 15° Phase Angle) (B = + 670#)

TM228-213-86 (- 15° Phase Angle) (B = + 684#)

TM320-213-86 (- 15° Phase Angle) (B = + 721#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	86	68½	52	86	68½	52
0	.019	.019	.018	-12.7	-9.881	-7.376
15	0.	0.	0.	-.21	-5E-03	.044
30	.019	.019	.018	12.628	9.977	7.46
45	.075	.075	.073	24.122	18.923	14.135
60	.162	.161	.158	32.681	25.803	19.424
75	.27	.269	.264	37.537	30.068	22.942
90	.388	.388	.384	38.972	31.766	24.624
105	.505	.509	.508	37.897	31.365	24.658
120	.617	.626	.629	35.281	29.443	23.341
135	.719	.733	.74	31.796	26.45	20.941
150	.81	.827	.837	27.723	22.602	17.626
165	.887	.905	.915	22.947	17.865	13.448
180	.949	.962	.97	16.939	11.996	8.383
195	.988	.995	.997	8.758	4.682	2.436
210	.999	.996	.993	-2.536	-4.139	-4.21
225	.97	.962	.955	-16.377	-13.803	-11.068
240	.9	.891	.883	-29.577	-22.868	-17.397
255	.794	.789	.783	-38.918	-29.879	-22.447
270	.667	.666	.661	-43.758	-34.127	-25.722
285	.531	.532	.529	-44.915	-35.612	-27.031
300	.396	.397	.394	-43.189	-34.596	-26.394
315	.271	.27	.268	-38.997	-31.327	-23.92
330	.161	.16	.158	-32.471	-25.982	-19.766
345	.075	.074	.072	-23.648	-18.732	-14.142

TM114-119-86 (- 14° Phase Angle) B = + 144#
TM114-143-86 (- 14° Phase Angle) B = + 144#

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	86	56 3/4	48 3/4	86	56 3/4	48 3/4
0	.019	.018	.017	-12.657	-9.49	-6.727
15	0.	0.	0.	.037	.228	.22
30	.02	.02	.019	13.103	10.039	7.15
45	.078	.077	.075	24.788	18.822	13.386
60	.167	.165	.161	33.441	25.57	18.339
75	.278	.274	.268	38.271	29.737	21.648
90	.397	.395	.389	39.575	31.361	23.236
105	.516	.518	.515	38.301	30.886	23.252
120	.629	.635	.636	35.446	28.869	21.95
135	.731	.743	.748	31.692	25.749	19.576
150	.821	.836	.844	27.322	21.75	16.299
165	.897	.912	.921	22.218	16.864	12.199
180	.955	.967	.974	15.884	10.914	7.309
195	.991	.996	.998	7.505	3.692	1.695
210	.998	.994	.991	-3.604	-4.759	-4.432
225	.967	.958	.951	-16.774	-13.812	-10.641
240	.896	.887	.878	-29.289	-22.261	-16.33
255	.792	.786	.778	-38.406	-28.887	-20.891
270	.667	.663	.657	-43.377	-33.019	-23.891
285	.532	.53	.525	-44.759	-34.557	-25.121
300	.397	.395	.391	-43.218	-33.663	-24.551
315	.271	.269	.265	-39.134	-30.531	-22.252
330	.161	.159	.155	-32.63	-25.317	-18.358
345	.075	.073	.071	-23.746	-18.199	-13.076

TM114-143-74 (- 14° Phase Angle) (B = + 343#)
TM114-173-74 (- 14° Phase Angle) (B = + 343#)
TM160-143-74 (- 14° Phase Angle) (B = + 369#)
TM160-173-74 (- 14° Phase Angle) (B = + 369#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	74	57 1/4	42	74	57 1/4	42
0	.019	.018	.017	-10.888	-8.163	-5.786
15	0.	0.	0.	.032	.196	.189
30	.02	.02	.019	11.271	8.636	6.15
45	.078	.077	.075	21.323	16.191	11.515
60	.167	.165	.161	28.767	21.996	15.776
75	.278	.274	.268	32.922	25.581	18.623
90	.397	.395	.389	34.044	26.978	19.988
105	.516	.518	.515	32.948	26.569	20.002
120	.629	.635	.636	30.492	24.834	18.882
135	.731	.743	.748	27.263	22.151	16.84
150	.821	.836	.844	23.503	18.71	14.021
165	.897	.912	.921	19.113	14.507	10.494
180	.955	.967	.974	13.664	9.389	6.287
195	.991	.996	.998	6.456	3.176	1.458
210	.998	.994	.991	-3.1	-4.094	-3.812
225	.967	.958	.951	-14.429	-11.882	-9.154
240	.896	.887	.878	-25.196	-19.15	-14.048
255	.792	.786	.778	-33.039	-24.85	-17.972
270	.667	.663	.657	-37.315	-28.404	-20.552
285	.532	.53	.525	-38.503	-29.727	-21.61
300	.397	.395	.391	-37.178	-28.958	-21.12
315	.271	.269	.265	-33.664	-26.264	-19.142
330	.161	.159	.155	-28.07	-21.779	-15.792
345	.075	.073	.071	-20.427	-15.656	-11.249

TM160-200-74 (- 15° Phase Angle) (B = + 999#)
TM228-200-74 (- 15° Phase Angle) (B = + 1015#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	74	58 3/4	45	74	58 3/4	45
0	.019	.019	.018	-10.926	-8.501	-6.346
15	0.	0.	0.	-.181	-4E-03	.038
30	.019	.019	.018	10.864	8.583	6.417
45	.075	.075	.073	20.752	16.279	12.16
60	.162	.161	.158	28.115	22.199	16.711
75	.27	.269	.264	32.293	25.867	19.737
90	.388	.388	.384	33.527	27.328	21.184
105	.505	.509	.508	32.603	26.983	21.213
120	.617	.626	.629	30.352	25.33	20.08
135	.719	.733	.74	27.354	22.755	18.016
150	.81	.827	.837	23.85	19.444	15.164
165	.887	.905	.915	19.741	15.369	11.569
180	.949	.962	.97	14.573	10.32	7.211
195	.988	.995	.997	7.534	4.027	2.095
210	.999	.996	.993	-2.181	-3.561	-3.622
225	.97	.962	.955	-14.089	-11.874	-9.522
240	.9	.891	.883	-25.445	-19.674	-14.966
255	.794	.789	.783	-33.481	-25.705	-19.311
270	.667	.666	.661	-37.645	-29.36	-22.128
285	.531	.532	.529	-38.64	-30.637	-23.255
300	.396	.397	.394	-37.155	-29.763	-22.706
315	.271	.27	.268	-33.549	-26.951	-20.579
330	.161	.16	.158	-27.934	-22.352	-17.004
345	.075	.074	.072	-20.344	-16.115	-12.167

TM114-143-64 (- 14° Phase Angle) (B = + 621#)
TM114-173-64 (- 14° Phase Angle) (B = + 621#)
TM160-143-64 (- 14° Phase Angle) (B = + 650#)
TM160-173-64 (- 14° Phase Angle) B = + 650#

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	64	49 1/2	36 1/4	64	49 1/2	36 1/4
0	.019	.018	.017	-9.424	-7.066	-5.009
15	0.	0.	0.	.027	.169	.164
30	.02	.02	.019	9.756	7.475	5.323
45	.078	.077	.075	18.456	14.014	9.967
60	.167	.165	.161	24.899	19.039	13.655
75	.278	.274	.268	28.496	22.141	16.119
90	.397	.395	.389	29.467	23.351	17.301
105	.516	.518	.515	28.518	22.997	17.313
120	.629	.635	.636	26.392	21.495	16.343
135	.731	.743	.748	23.597	19.172	14.576
150	.821	.836	.844	20.343	16.194	12.136
165	.897	.912	.921	16.543	12.557	9.083
180	.955	.967	.974	11.827	8.126	5.442
195	.991	.996	.998	5.588	2.749	1.262
210	.998	.994	.991	-2.684	-3.543	-3.3
225	.967	.958	.951	-12.489	-10.284	-7.923
240	.896	.887	.878	-21.808	-16.575	-12.159
255	.792	.786	.778	-28.597	-21.509	-15.555
270	.667	.663	.657	-32.298	-24.585	-17.789
285	.532	.53	.525	-33.327	-25.73	-18.705
300	.397	.395	.391	-32.18	-25.065	-18.28
315	.271	.269	.265	-29.138	-22.733	-16.569
330	.161	.159	.155	-24.296	-18.851	-13.669
345	.075	.073	.071	-17.681	-13.551	-9.736

TORQUE FACTOR CHART

Model TM80-119-64 (- 14° Phase Angle) (B = + 231#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	64	46½	30¾	64	46½	30¾
0	.019	.017	.016	-9.409	-6.496	-4.056
15	0.	0.	0.	.259	.396	.304
30	.022	.022	.021	10.253	7.345	4.641
45	.082	.081	.078	19.188	13.562	8.549
60	.175	.171	.165	25.749	18.341	11.677
75	.289	.283	.274	29.308	21.289	13.797
90	.412	.406	.396	30.109	22.413	14.838
105	.533	.53	.524	28.907	22.003	14.859
120	.647	.65	.647	26.485	20.437	13.989
135	.749	.758	.76	23.374	18.027	12.374
150	.837	.85	.856	19.786	14.947	10.133
165	.91	.924	.931	15.644	11.232	7.356
180	.964	.974	.98	10.623	6.825	4.117
195	.995	.999	1.	4.249	1.681	.519
210	.997	.992	.988	-3.767	-4.09	-3.277
225	.963	.952	.944	-12.887	-10.079	-7.02
240	.892	.88	.87	-21.51	-15.621	-10.404
255	.79	.78	.759	-28.011	-20.036	-13.121
270	.666	.659	.649	-31.789	-22.891	-14.929
285	.533	.527	.518	-33.033	-24.039	-15.681
300	.399	.393	.385	-32.098	-23.502	-15.324
315	.273	.267	.26	-29.206	-21.362	-13.874
330	.162	.157	.152	-24.432	-17.709	-11.407
345	.075	.071	.068	-17.791	-12.674	-8.062

Model TM57-76-54 (- 14° Phase Angle) (B = + 307#)

Model TM57-119-54 (- 14° Phase Angle) (B = + 442#)

Model TM80-119-54 (- 14° Phase Angle) (B = + 442#)

Model TM80-133-54 (- 14° Phase Angle) (B = + 442#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	54	39½	26	54	39½	26
0	.019	.017	.016	-7.941	-5.482	-3.423
15	0.	0.	0.	.218	.334	.257
30	.022	.022	.021	8.653	6.199	3.917
45	.082	.081	.078	16.193	11.446	7.215
60	.175	.171	.165	21.731	15.479	9.854
75	.289	.283	.274	24.735	17.967	11.644
90	.412	.406	.396	25.41	18.916	12.523
105	.533	.53	.524	24.396	18.569	12.54
120	.647	.65	.647	22.352	17.248	11.806
135	.749	.758	.76	19.727	15.214	10.443
150	.837	.85	.856	16.698	12.615	8.552
165	.91	.924	.931	13.203	9.479	6.208
180	.964	.974	.98	8.965	5.76	3.475
195	.995	.999	1.	3.586	1.418	.438
210	.997	.992	.988	-3.179	-3.451	-2.765
225	.963	.952	.944	-10.876	-8.506	-5.925
240	.892	.88	.87	-18.153	-13.183	-8.78
255	.79	.78	.769	-23.64	-16.909	-11.073
270	.666	.659	.649	-26.828	-19.319	-12.599
285	.533	.527	.518	-27.878	-20.287	-13.234
300	.399	.393	.385	-27.089	-19.835	-12.933
315	.273	.267	.26	-24.649	-18.029	-11.709
330	.162	.157	.152	-20.619	-14.946	-9.627
345	.075	.071	.068	-15.014	-10.696	-6.804

Model TM57-95-48 (- 14° Phase Angle) (B = + 408#)

Model TM57-109-48 (- 14° Phase Angle) (B = + 408#)

Model TM80-133-48 (- 14° Phase Angle) (B = + 582#)

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	48	35	23	48	35	23
0	.019	.017	.016	-7.072	-4.882	-3.049
15	0.	0.	0.	.195	.297	.229
30	.022	.022	.021	7.706	5.52	3.488
45	.082	.081	.078	14.421	10.193	6.425
60	.175	.171	.165	19.353	13.785	8.776
75	.289	.283	.274	22.028	16.001	10.37
90	.412	.406	.396	22.63	16.846	11.152
105	.533	.53	.524	21.726	16.537	11.168
120	.647	.65	.647	19.906	15.36	10.514
135	.749	.758	.76	17.568	13.549	9.3
150	.837	.85	.856	14.871	11.234	7.616
165	.91	.924	.931	11.758	8.442	5.528
180	.964	.974	.98	7.984	5.13	3.095
195	.995	.999	1.	3.194	1.263	.39
210	.997	.992	.988	-2.831	-3.074	-2.463
225	.963	.952	.944	-9.686	-7.576	-5.276
240	.892	.88	.87	-16.167	-11.74	-7.819
255	.79	.78	.769	-21.053	-15.059	-9.861
270	.666	.659	.649	-23.892	-17.205	-11.22
285	.533	.527	.518	-24.828	-18.067	-11.786
300	.399	.393	.385	-24.124	-17.664	-11.518
315	.273	.267	.26	-21.951	-16.056	-10.428
330	.162	.157	.152	-18.363	-13.31	-8.573
345	.075	.071	.068	-13.371	-9.526	-6.059

POSITION OF CRANK, DEGREES (1)	POSITION OF RODS (2)			TORQUE FACTOR (3)		
	LENGTH OF STROKE, INCHES			LENGTH OF STROKE, INCHES		
	42	30½	20	42	30½	20
0	.019	.017	.016	-6.173	-4.261	-2.661
15	0.	0.	0.	.17	.26	.2
30	.022	.022	.021	6.726	4.818	3.045
45	.082	.081	.078	12.588	8.897	5.609
60	.175	.171	.165	16.893	12.032	7.66
75	.289	.283	.274	19.228	13.967	9.052
90	.412	.406	.396	19.753	14.704	9.735
105	.533	.53	.524	18.964	14.435	9.748
120	.647	.65	.647	17.376	13.408	9.178
135	.749	.758	.76	15.335	11.827	8.118
150	.837	.85	.856	12.981	9.806	6.648
165	.91	.924	.931	10.263	7.369	4.826
180	.964	.974	.98	6.969	4.478	2.701
195	.995	.999	1.	2.788	1.103	.34
210	.997	.992	.988	-2.472	-2.683	-2.15
225	.963	.952	.944	-8.455	-6.613	-4.605
240	.892	.88	.87	-14.112	-10.248	-6.825
255	.79	.78	.769	-18.377	-13.145	-8.608
270	.666	.659	.649	-20.855	-15.018	-9.794
285	.533	.527	.518	-21.671	-15.771	-10.288
300	.399	.393	.385	-21.058	-15.419	-10.053
315	.273	.267	.26	-19.161	-14.015	-9.102
330	.162	.157	.152	-16.028	-11.618	-7.483
345	.075	.071	.068	-11.672	-8.315	-5.289

DOUBLE REDUCTION GEAR REDUCER

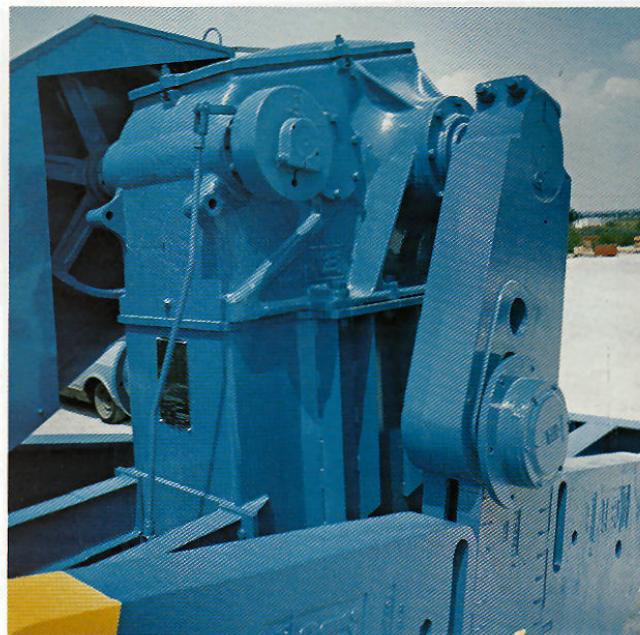
The gear reducer has established a distinguished reputation for reliable, year-after-year performance on thousands of pumping units throughout the oilfield.

The heavy-duty cast gear case is designed and built especially for oil-well pumping units.

Each of the gear reducers, from 57D to 912D, utilize wide, herringbone gears constructed of ductile-iron, and all pinions and shafts are made of heat-treated alloy steel. This oilfield-proven double reduction gear reducer is resistant to overload, and has excellent flood lubricating characteristics. It's conservatively designed for a long, useful life, and has always been the preferred type gear reducer.

The slow speed shaft is mounted on tapered roller bearings and both the intermediate and high speed shaft on straight roller bearings. Positive lubrication of gears and bearings is assured with a flood lubrication system.

The gear reducers are manufactured by BAKER. All gears are cut to exacting standards and gear cases jig bored on the latest computerized machining centers in our manufacturing facilities. All receive painstaking attention to detail, and quality craftsmanship assures optimum performance when proper, basic maintenance procedures are followed.



Double Reduction Gear Unit Specifications

912 D GEAR REDUCER

Rating: 912,000 In. Lbs.

Peak Torque

Gear Ratio: 30.11

Crankshaft Dia.: 8"

Sheave: 56" P.D.-10C

36" P.D.-10C

3 11/16" Bore

Gearbox Oil Capacity:

165 Gallons Approx.

320 D GEAR REDUCER

Rating: 320,000 IN. Lbs.

Peak Torque

Gear Ratio: 29.76

Crankshaft Dia.: 7"

Sheave: 36" P.D.-6C

24" P.D.-6C

3 7/16" Bore

Gearbox Oil Capacity:

40 Gallons Approx.

114 D GEAR REDUCER

Rating: 114,000 In. Lbs.

Peak Torque

Gear Ratio: 29.9

Crankshaft Dia.: 5"

Sheave: 24" P.D.-3C

2 1/8" Bore

Gearbox Oil Capacity:

12 Gallons Approx.

640 D GEAR REDUCER

Rating: 640,000 In. Lbs.

Peak Torque

Gear Ratio: 29.29

Crankshaft Dia.: 8"

Sheave: 50" P.D.-8C

30" P.D.-8C

3 11/16" Bore

Gearbox Oil Capacity:

130 Gallons Approx.

228 D GEAR REDUCER

Rating: 228,000 IN. Lbs.

Peak Torque

Gear Ratio: 29.4

Crankshaft Dia.: 6"

Sheave: 36" P.D.-4C

24" P.D.-4C

2 15/16" Bore

Gearbox Oil Capacity:

35 Gallons Approx.

80 D GEAR REDUCER

Rating: 80,000 In. Lbs.

Peak Torque

Gear Ratio: 29.84

Crankshaft Dia.: 5"

Sheave: 30" P.D.-2C

24" P.D.-2C

2 1/8" Bore

Gearbox Oil Capacity:

12 Gallons Approx.

456 D GEAR REDUCER

Rating: 456,000 In. Lbs.

Peak Torque

Gear Ratio: 30.1

Crankshaft Dia.: 7 3/4"

Sheave: 50" P.D.-6C

36" P.D.-6C

3 11/16" Bore

Gearbox Oil Capacity:

60 Gallons Approx.

160 D GEAR REDUCER

Rating: 160,000 IN. Lbs.

Peak Torque

Gear Ratio: 29.8

Crankshaft Dia.: 6"

Sheave: 30" P.D.-3C

24" P.D.-3C

2 11/16" Bore

Gearbox Oil Capacity:

30 Gallons Approx.

57 D GEAR REDUCER

Rating: 57,000 In. Lbs.

Peak Torque

Gear Ratio: 29.32

Crankshaft Dia.: 5"

Sheave: 30" P.D.-2C

24" P.D.-2C

2 1/8" Bore

Gearbox Oil Capacity:

11 Gallons Approx.

NOTES:

1. Consult factory before operation at less than 5 strokes per minute.
2. Do not operate single-cylinder engines at less than 75% of rated full-load RPM. Change sheave(s) if less strokes per minute are desired.

CALIFORNIA

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(619) 259-9092

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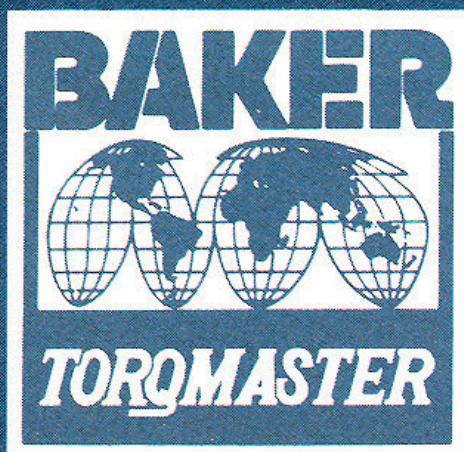
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(817) 481-1775
(713) 439-8555
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(307) 235-6251

**BAKER TORQMASTER**

P.O. Box 26690

Oklahoma City, OK 73126

Telephone: 405/324-2666

Telex: 333667 BAKER TRO

The material herein is general and subject
to change without prior notice.

MODEL SELECTION CHART

UNIT DESIGNATION	912-305-192	912-365-168	640-305-168 912-305-168	912-427-144	640-365-144 912-365-144	640-305-144 912-305-144
POL. ROD CAP. LBS.	30,500	36,500	30,500	42,700	36,500	30,500
STROKE LENGTH. IN.	192	168	168	144	144	144
CRANK ARM RADIUS	110"	110"	110"	110"	110"	110"
CRANK PIN BEARING	E	E	D	E	D	D
EQUALIZER BEARING	E	E	E	E	E	E
CENTER BEARING	E	E	D	E	D	D
STRUCTURE GROUP	VIII	VIII	VIII	VIII	VIII	VIII
WALKING BEAM	W36x210#	W36X210#	W36x170#	W36x210#	W36x170#	W36x170#
WIRE LINE HANGER	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.
SUPP. STROKE LGTH.	153 & 117	133 $\frac{3}{4}$ & 102 $\frac{1}{4}$	133 $\frac{3}{4}$ & 102 $\frac{1}{4}$	114 $\frac{3}{4}$ & 87 $\frac{3}{4}$	114 $\frac{3}{4}$ & 87 $\frac{3}{4}$	114 $\frac{3}{4}$ & 87 $\frac{3}{4}$
UNIT DESIGNATION	456-305-144	640-256-144	320-256-144 456-256-144	456-365-120	640-305-120	320-305-120 456-305-120
POL. ROD CAP. LBS.	30,500	25,600	25,600	36,500	30,500	30,500
STROKE LENGTH. IN.	144	144	144	120	120	120
CRANK ARM RADIUS	95"	110"	95"	95"	110"	95"
CRANK PIN BEARING	D	D	D	D	D	D
EQUALIZER BEARING	E	D	D	E	D	D
CENTER BEARING	D	D	D	D	D	D
STRUCTURE GROUP	V	VII	IV	V	VII	IV
WALKING BEAM	W33x152#	W33x130#	W33x130#	W33x152#	W33x130#	W33x130#
WIRE LINE HANGER	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{1}{4}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{1}{4}$ x12" CTRS.	1 $\frac{1}{4}$ x12" CTRS.
SUPP. STROKE LGTH.	114 $\frac{1}{2}$ & 87 $\frac{1}{4}$	114 $\frac{3}{4}$ & 87 $\frac{3}{4}$	114 $\frac{1}{2}$ & 87 $\frac{1}{4}$	95 $\frac{1}{4}$ & 72 $\frac{1}{2}$	95 $\frac{1}{2}$ & 73	95 $\frac{1}{4}$ & 72 $\frac{1}{2}$
UNIT DESIGNATION	320-256-120 456-256-120	228-213-120 320-213-120	320-305-100	228-256-100 320-256-100	228-213-100	160-173-100 228-173-100
POL. ROD CAP. LBS.	25,600	21,300	30,500	25,600	21,300	17,300
STROKE LENGTH. IN.	120	120	100	100	100	100
CRANK ARM RADIUS	95"	95"	95"	95"	95"	78"
CRANK PIN BEARING	D	C	D	C	C	B
EQUALIZER BEARING	C	C	C	C	C	C
CENTER BEARING	D	C	D	C	C	C
STRUCTURE GROUP	IV	III	IV	III	III	II
WALKING BEAM	W33x130#	W30x108#	W33x130#	W30x108#	W30x108#	W24x84#
WIRE LINE HANGER	1 $\frac{1}{4}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{1}{4}$ x12" CTRS.	1 $\frac{3}{8}$ x12" CTRS.	1 $\frac{1}{4}$ x12" CTRS.	1"x9" CTRS.
SUPP. STROKE LGTH.	95 $\frac{1}{4}$ & 72 $\frac{1}{2}$	95 $\frac{1}{4}$ & 72 $\frac{1}{2}$	79 $\frac{1}{2}$ & 60 $\frac{1}{2}$	79 $\frac{1}{2}$ & 60 $\frac{1}{2}$	79 $\frac{1}{2}$ & 60 $\frac{1}{2}$	79 $\frac{1}{2}$ & 60 $\frac{3}{4}$