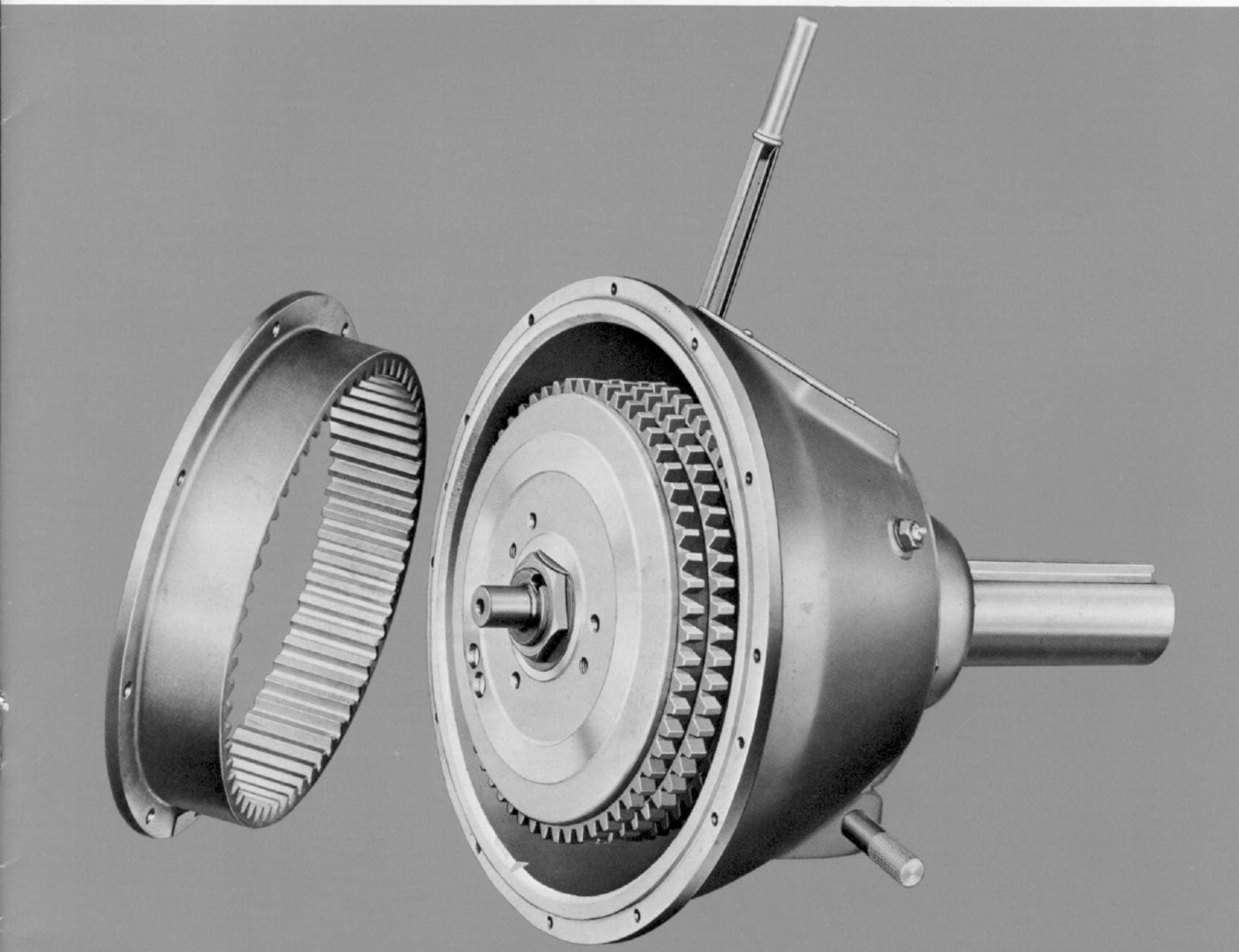
TWIN DISC
POWER TRANSMISSION EQUIPMENT

BULLETIN 308-S

Power Take-Offs

For internal combustion engine applications up to 1667 hp (Duty Class II)



TWIN DISC, INCORPORATED • RACINE, WISCONSIN 53403, U.S.A.

Standard Power Take-Offs

Twin Disc Power Take-Offs are suitable for application to all internal combustion engines with standard SAE flywheel housing dimensions from No. 6 through No. 00. The PTO's contain clutches ranging in size from one plate 6½" to one plate 14"; in two plate size from 11½" to 18"; and three plate size from 14" to 21". Suitable power take-offs are available for use with engines in industrial installations up to 1667 horsepower in Duty Class II applications.

A Power Take-Off consists of a complete clutch assembly with shaft and bearings mounted in a cast iron housing that provides for easy engine installation.

PTO's are used as a standard method for transmitting the power of engines in a great variety of industrial applications such as: air compressors, agricultural machinery, pump drives, crushers, road building machinery, cranes and shovels, oil field service, etc.

Twin Disc offers power take-offs for all industrial engines. The IBF line is designed especially for today's high-speed, high-horsepower industrial engines, and presently is offered in two and three clutch plate construction. This multiple-plate, ventilated design assures ample cooling area to withstand heat, and with solid plates these PTO's can effectively handle the stress of higher engine speeds. The IBF units feature oil lubricated tapered roller bearings that extend lubrication intervals.

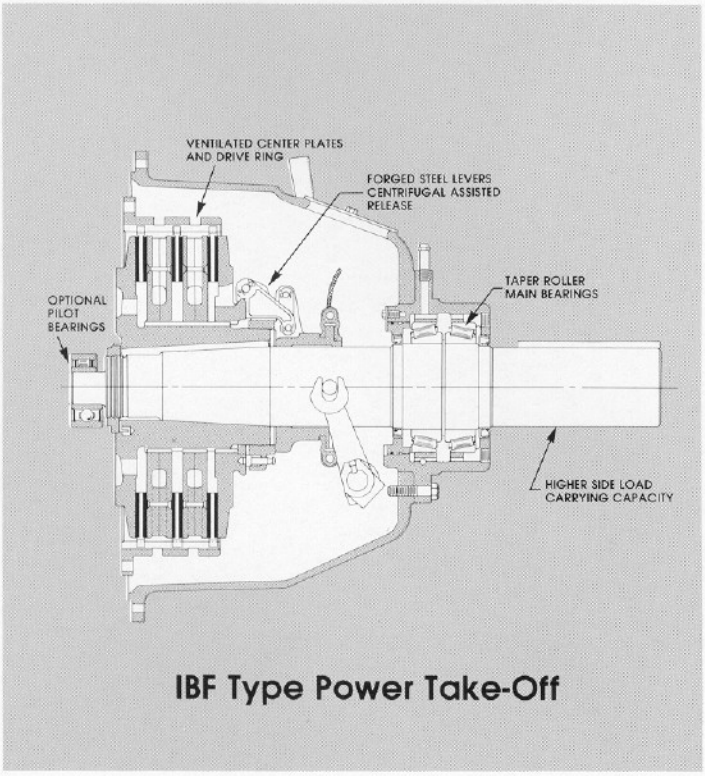
Available on most size PTO's are sealed pilot ball or roller bearings as optional equipment. These bearings eliminate the lubrication requirement and shaft rifle-drilling normally encountered with standard pilot bearings. Also available, as optional components, are ball bearing throw-out collars and finger springs.

Horsepower and torque capacities listed can be increased by the use of sintered-iron clutch plates which are available as optional equipment in the 8" through 21" sizes.

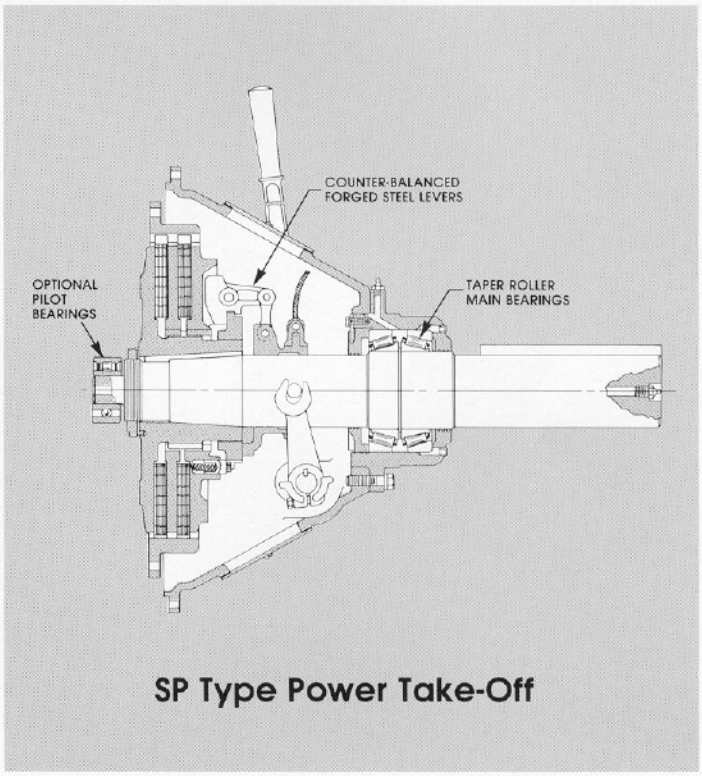
All bearings, shafts and other parts are designed with liberal safety factors to maximize life under normal operating conditions. To avoid overloading the shaft and bearings, use the allowable side-pull load data in this bulletin, and calculate the side load. The resultant value should be less than the corresponding maximum value listed for each power take-off. In questionable cases, consult the General Products Application Department, Twin Disc, Incorporated, Racine, Wisconsin.

Actual design torque capacity of the clutches used in power take-offs is in excess of the horsepower rating listed. This permits Twin Disc Power Take-Offs in proper adjustment, to withstand temporary torque overloads. Rated torque can be transmitted while moderately slipping during short periods without permanent damage.

NOTE: All dimensions given in inches unless noted.



IBF Type Power Take-Off



SP Type Power Take-Off

Specifications

PTO Model Number	Drawing Assembly Number	Available Hsg. Sizes SAE	Application Duty Classification: Class I Max. Input Torque[2] Lb. Ft.	Clutch Maximum HP Rating (See note 2): Class II	Class III	Class IV	Maximum Safe Operating Speed [1]: Solid Plates: Cast Dr. Ring	Solid Plates: Nodular Dr. Ring	Split Plates: Cast Dr. Ring	Split Plates: Nodular Dr. Ring	Approx. Net Weight Lbs.
C-106SP	X8317	6, 5, 4	159	40	27	20	3500	NA	3500	NA	53
C-107SP	X8317	6, 5, 4	175	54	36	27	3200	NA	3200	NA	55
C-108HP	X8419A	5, 4, 3	230	61	41	31	3100	3100	3050	3100	72
C-110HP	X8249	4, 3, 2, 1	328	96	64	48	3100	3930	2650	3500	115
C-111HP	X8249	4, 3, 2, 1	387	124	82	62	2850	3600	2200	3200	120
SP-111P	X9619	3, 2, 1	455	124	82	62	2850	3600	2200	3200	129
SP-111HP	X9582	3, 2, 1									141
SP-111OP	X9818	3, 2									145
SP-211HP	X9681	3, 2, 1	909	247	165	124	2850	3500	2200	3160	155
SP-211OP	X9894B	2, 1					2850	3000	2200	3000	175
SP-311P	XA7570	2, 3	1620	371	247	186	NA	3000	NA	NA	220
SP-114P	X9643	1, 0	810	188	125	94	2400	3000	1950	2750	260
SP-214P	X9803	1, 0	1620	376	251	188	2500	3000	1950	2750	328
SP-214OP	X9845						2400	2400	1950	2400	340
IBF-214OP	X9745E	1, 0	1620	395	264	197	NR	2400	NA	NA	470
IBF-214OP	X9745F										
SP-314P	X9585	1, 0	2430	564	376	282	2500	3000	1920	2700	408
SP-314P	X9585A										
IBF-314OP	XA7149	1, 0	3040	741[3]	494[3]	371[3]	NR	2400	NA	NR	595
IBF-314OP	XA7149A										
IBF-314OP	XA7149B										
SP-218OP	XA7190	0, 00	4000	622	415	311	1950	NA	1550	NA	660
SP-218OP	XA7190A										
SP-318P	X9671	0	6000	933	622	467	2050	2350	1550	2100	700
IBF-318OP	X9918	0	7500	1224[3]	816[3]	612[3]	NA	2200	NA	NR	920
IBF-318OP	X9918A										
IBF-318OP	X9918B										
SP-321P	X9691A	00	6730	1270	847	635	1800	—	1400	—	1110
IBF-321OP	X9919	00	8400	1667[3]	1111[3]	834[3]	NA	2200	NA	NR	1210

NOTES: 1. NA (Not available). **NR** (Not recommended).

2. Horsepower and torque ratings may be increased by specifying optional sintered iron type clutch plates. Available 8" through 21" sizes.

3. Sintered iron clutch plates with ventilated type center plates are standard in IBF-314, IBF-318 and IBF-321 PTO units. These plates should not be used in applications where torsionals or vibrations are prevalent. Consult Twin Disc General Products Application Department, Racine, WI.

4. Compound drives and power engaged PTO applications require written factory review for warranty to apply.

Duty Service Classifications

Attention is called to the fact that other application factors must be considered in the selection process in addition to duty service, such as:

• SPEED LIMITS • SIDE LOAD LIMITS • CLUTCH TORQUE LIMITS

The selections are usual dry clutch disconnect type applications where engagements are infrequent and are at low (idle) input speed. Once engaged operation continues for one hour or more, engaging the clutch at higher input speed will reduce component life. Refer to duty classifications and examples which follow. Carefully note clutch slip time so that thermal capabilities are not exceeded.

Duty Class I: The clutch is used for disconnecting the power from the load. When engaging, so little work is done that the clutch shows no temperature increase at the pressure plate outer surface. Use maximum input torque from the Class I Table, disregard horsepower. The mechanism is operated one (1) or more hours before disconnecting.

Examples: Engagement of clutches with the driven equipment having WR^2 less than that of the clutch and whose torque demand curve is similar to that of a centrifugal pump.

Duty Class II: The clutch is used primarily for disconnect, but does more work during engagement than in Duty Class I. The clutch will engage within two (2) seconds, never heat the pressure plate more than 50°F (28°C) above ambient, and once engaged is operated for one (1) or more hours before disconnecting. The maximum horsepower which the clutch can absorb is given in Class II Table.

Examples: Power shovel master clutch, generator, line shafts and similar light duty drives.

Duty Class III: The clutch will engage within three (3) seconds, never heat the pressure plate more than 100°F (56°C) above ambient, and once engaged is operated for one (1) or more hours before disconnecting. The maximum horsepower which the clutch can absorb is given in Class III Table.

Examples: Engine PTO starting average loads, and clutches whose starting load is up to 1.4 times the running load. Blowers, fans, screw compressor, conveyors and similar normal duty drives.

Duty Class IV: The clutch will engage within four (4) seconds, never heat the pressure plate more than 150°F (83°C) above ambient, and once engaged is operated for one (1) or more hours before disconnecting. The maximum horsepower which the clutch can absorb is given in Class IV Table.

Examples: Engine PTO starting heavy loads such as rock crushers, mud pumps, and other large inertia machinery and clutches whose starting load is up to 1.8 times the running load typical of heavy duty drives.

Duty Class V: The clutch is used to start large inertia loads which require four (4) seconds to start the largest load, with the longest slip period per engagement not to exceed ten (10) seconds. The clutch must be selected according to its horsepower absorption capability. Clutch applications in this Duty Class or those which require frequent engagements require factory review. Contact General Products Application Department for consultation on the drive.

Specifications

Dimensional Data (All dimensions in inches unless noted.)

PTO Model No.	Assembly Drawing No.	D	SHAFT F Dia. +.000 −.001	SHAFT E Length	SHAFT G Keyway	B Clutch Dia.	C See Footnote 8	H	J Dia.	M Diameter (inches -mm) +.0000 −.0005	U TWIN DISC PART NO.	
C-106SP	X8317	5.56	1.438	3.50	3/8x3/16	6.50	2.81	.88	4.50	2.0472 - 52	M141	
C-107SP						7.50						
C-108HP	X8419A	7.06	1.750	6.00	1/2 x 1/4	8.00	3.94	2.34	5.00	2.4409 - 62	M163	
C-110HP	X8249	8.63	2.250	5.50	5/8x5/16	10.00	3.94	3.75	5.75	2.8346 - 72	M224	
C-111HP						11.50						
SP-111P	X9619	8.13	2.250	5.50	5/8x5/16	11.38	3.94	2.75	5.38	2.8346 - 72	M224A	
SP-111HP	X9582	9.25		6.50				3.75	5.75	2.8346 - 72	M224	
SP-111OP	X9818	9.25		6.50				1.75	5.38	2.8356 - 72	M2467[6]	
SP-211HP	X9681	9.63	2.500	6.50	5/8x5/16	11.38	3.94	3.00	6.50	2.8346 - 72	M224	
SP-211OP	X9894B	10.69						2.86	10.75			
SP-311P	XA7570	13.89	3.500	10.00	7/8x7/16	11.38	3.94	3.38	7.50	2.8346 - 72	M224A	
SP-114P	X9643	12.13	3.000	8.50	3/4 x 3/8	14.00	3.94	3.44	6.66	3.1496 - 80	M1985	
SP-214P	X9803	13.75	3.500	10.00	7/8x7/16	14.00	3.94	3.38	7.50	3.1496 - 80	M1985	
SP-214OP	X9845							0.61		3.1506 - 80	M2529[6]	
IBF-214OP	X9745E	14.75	3.938	10.00	1 x 1/2	14.00	3.94	3.63	12.50	3.9370 -100	M2137	
IBF-214OP	X9745F									3.1496 - 80	M1985	
SP-314P	X9585	14.50	3.938	10.00	1 x 1/2	14.00	3.94	3.38	7.50	3.1496 - 80	M1985	
SP-314P	X9585A									3.9370 -100	M2137	
IBF-314OP	XA7149	16.77	3.938	10.00	1 x 1/2	14.00	3.94	3.63	12.50	3.9384[3] -100	M2713[6]	
IBF-314OP	XA7149A									3.1506 - 80	M2529[6]	
IBF-314OP	XA7149B									2.8346 - 72	M1969A	
SP-218OP	XA7190	17.89	3.938	10.00	1 x 1/2	18.00	3.94	3.63	12.50	3.9384[3] -100	M2713[6]	
SP-218OP	XA7190A									4.7244[3] -120	M2977	
SP-318P[4]	X9671	18.25	4.500	10.00	1 x 1/2	18.00	3.94	2.66	10.00	4.7244[3] -120	M2158	
IBF-318OP	X9918	21.20	4.688	10.00	1-1/4x5/8	18.00	3.94	3.48	10.50	4.7244[3] -120	M2977	
IBF-318OP	X9918A									3.9384[3] -100	M2713[6]	
IBF-318OP	X9918B									3.1506 - 80	M2529[6]	
SP-321P[4]	X9691A	19.88	4.750	10.00	1-1/4x5/8	21.00	3.94	2.84	11.00	5.1181[5] -130	M2156	
IBF-321OP	X9919	21.20	4.688	10.00	1-1/4x5/8	21.00	3.94	3.48	10.50	5.1181[5] -130	M2156B	

[1]Dimension shown is for No. 4 and No. 6 Housings; 2.63" for No. 5.
[2]Dimension shown is for No. 1, No. 2 and No. 3 housings; 2.16" for No. 4.
[3]+.0000 and −.0006.
[4]Furnished with spherical roller main bearings.
[5]+.0000 and −.0008.
[6]Sealed roller bearing.
[7]2.13" DIM is non SAE std. for 11.5" OC clutch
[8]Face of flywheel housing to bottom of pilot bore in flywheel

IMPORTANT NOTICE

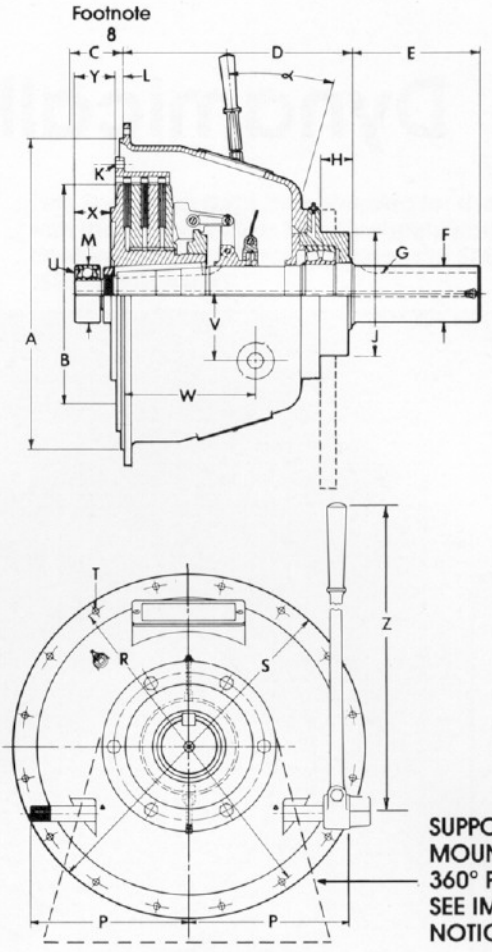
1. A support plate for one plate 14" and smaller PTO's (except SP311P) is not required.
2. A support plate for three plate 11" and two and three plate 14" PTO's is required in side load applications and is recommended for in-line applications.
3. A support plate for 18" and larger PTO's is required for both side load and in-line applications.

Dimensions of Twin Disc Industrial PTO's with drive ring and overcenter clutch conform to the recommendations of SAE J621 (latest revision) unless noted.

	V	W	X	Y	L	Hand Lever Travel (Degrees) ∝	Z
	3.00	2.13[1]	1.31	1.68	1.19	13°	15.38
	3.00	1.88	1.18	1.44	2.44	17°	15.38
	3.00	2.00[2]	1.50	1.75	2.12	15°	15.38
					2.12		
	3.00	3.19	1.75	2.26	1.56	15.50°	15.38
			1.83	2.26			
			1.88	2.31			
	3.75	4.06	1.92	2.31	1.56	15.50°	15.38
			1.95				
	4.50	6.62	2.32	2.26	1.56	18°	23.38
	4.50	5.44	2.44	2.82	1.00	18°	23.38
	4.50	6.63	2.38	2.82	1.00	18°	23.38
			2.44	2.82			
	4.50	7.66	2.41	2.82	1.00	17.75°[3]	23.38
	4.50	7.75	2.44	2.82	1.00	18°	23.38
	4.50	9.67	2.53	2.82	1.00	17.75°	23.38
	5.50	9.69	2.77	3.20	0.62	20°	30.00
	5.50	10.50	2.88	3.20	0.62	20°	30.00
	5.50	13.50	2.75	3.20	0.62	20°	42.00
	5.50	11.75	3.22	3.82	0.00	20°	42.00
	5.50	13.50	3.10	3.82	0.00	20°	42.00

USE A CERTIFIED PRINT FOR INSTALLATION

NOTE: PTO models with **OP** designation have oil lubricated main bearings. All other models have grease lubricated main bearings.



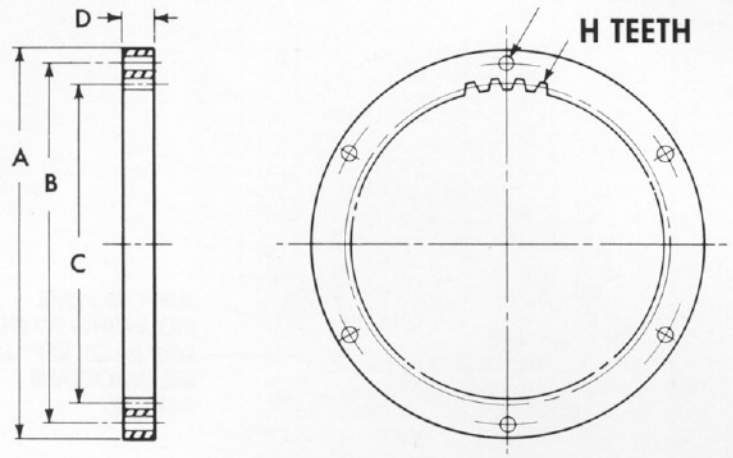
Housing Flanges

SAE Hsg. No.	A +.000 −.005	R B.C.	S Dia.	T Holes		P
				No.	Dia.	
6	10.500	11.25	12.13	8	.41	7.75
5	12.375	13.13	14.00	8	.41	7.75
4	14.250	15.00	15.88	12	.41	7.75
3	16.125	16.88	17.75	12	.41	9.75
2	17.625	18.38	19.25	12	.41	9.75
1	20.125	20.88	21.75	12	.47	9.75
1/2	23.000	24.38	25.50	12	.53	9.75
0	25.500	26.75	28.00	16	.53	12.75
00	31.000	33.50	34.75	16	.53	16.75

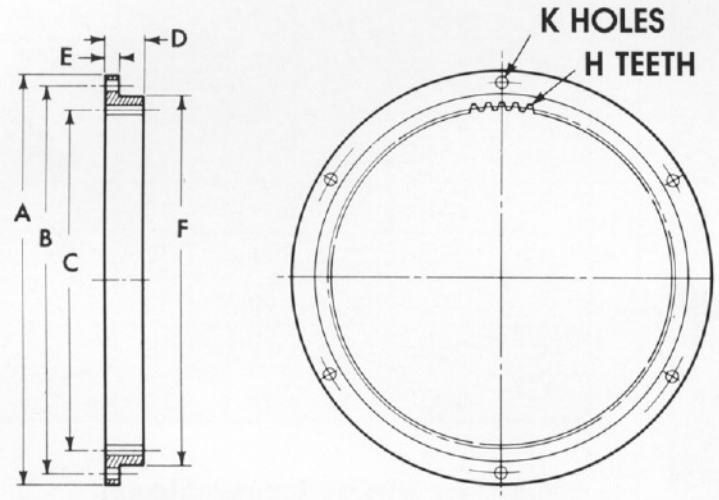
Adapter Rings (spaceless)

Part Number	From SAE Engine Housing	To SAE Clutch Housing
B6320	2	4
6880	1	2
A7210	1/2	1
8407	0	1
6964	00	0

Dynamically Balanced Driving



"A" TYPE



"B" TYPE

Dimensional Data (All dimensions in

PTO Model Number	Drawing Number	Driving Ring Drawing Number	
C-106SP	X8317	6939	
C-107SP	X8317	6661	
C-108HP	X8419A	5805	
C-110HP	X8249	6187A	
C-111HP	X8249	6625A	
SP-111P	X9619		
SP-111HP	X9582		
SP-111OP	X9818	6625D[1]	
SP-211HP	X9681	6931	
SP-211OP	X9894B		
SP-311P	XA7570	6625N[1]2	
SP-114P	X9643	5712	
SP-214P	X9803	5713	
SP-214OP	X9845		
IBF-214OP	X9745E	A6518C[1]	
IBF-214OP	X9745F		
SP-314P	X9585	A6518	
SP-314P	X9585A		
IBF-314OP	XA7149	B5835[1]	
IBF-314OP	XA7149A		
IBF-314OP	XA7149B		
SP-218OP	XA7190	6925	
SP-218OP	XA7190A		
SP-318P	X9671	6926A	
IBF-318OP	X9918	B5352[1]	
IBF-318OP	X9918A		
IBF-318OP	X9918B		
SP-321P	X9691A	6875	
IBF-321OP	X9919	9917[1]	

[1]Nodular Iron Driving Ring
[2]SAE Grade 8 Attachment Capscrews Required

Rings

nches unless noted.)

Twin Disc drive rings are intended for use with industrial engine type flywheels which conform to the recommendations of SAE J620 (latest issue).

Type Ring	A Dia. +.000 −.005	B B.C.	C Nominal Pitch Dia.	D	E	F	K Holes		H Teeth 20° P.A.		Approx. Weight (Lbs.)
							No.	Size	No.	P.	
A	8.500	7.88	7.00	0.63	—	—	6	.33	42	6/8	2.8
A	9.500	8.75	7.83	0.63	—	—	8	.33	47	6/8	3.4
A	10.375	9.63	8.50	0.63	—	—	6	.41	51	6/8	4.3
A	12.375	11.63	10.50	0.88	—	—	8	.41	63	6/8	7.0
A	13.875	13.13	12.00	0.88	—	—	8	.41	72	6/8	8.1
A	13.875	13.13	12.00	0.88	—	—	8	.41	72	6/8	8.3
A	13.875	13.13	12.00	1.88	—	—	8	.41	72	6/8	18.1
A	13.875	13.13	12.00	3.13	—	—	8	.41	72	6/8	29.5
B	18.375	17.25	14.75	1.13	.50	16.00	8	.53	59	4/5	16.5
B	18.375	17.25	14.75	2.38	.50	16.00	8	.53	59	4/5	25.8
B	18.375	17.25	14.75	3.38	.50	16.13	8	.53	59	4/5	31.3
B	18.375	17.25	14.75	3.38	.50	16.00	8	.53	59	4/5	32.6
B	18.375	17.25	14.75	5.38	.50	16.13	8	.53	59	4/5	44.3
B	22.500	21.38	18.75	3.06	.63	20.00	6	.66	75	4/5	42.2
B	22.500	21.38	18.75	4.25	.63	20.13	6	.66	75	4/5	56.8
B	22.500	21.38	18.75	5.75	.63	20.13	6	.66	75	4/5	61.0
B	26.500	25.25	21.75	5.00	.63	23.38	12	.66	87	4/5	89.3
B	26.500	25.25	21.75	5.95	.63	23.38	12	.66	87	4/5	95.5

USE A CERTIFIED PRINT FOR INSTALLATION

Correct and proper installation is very important. Procedures are described in Care and Operation Manuals and Tech Talk Service Letters 71-1, 71-2, 73-2 and 77-5. Copies are available upon request.

Allowable Side-Pull Loads For Standard Power Take-Offs

NOTE: Allowable side pull given are for standard PTO's as shown (page 4). Deviations will require adjustment to the allowable side-pull limits.

PTO MODEL and DRAWING NUMBERS	RPM	"X" DISTANCE, INCHES (See Sketch)								
		1	2	3	4	5	6	7	8	9
C-160SP X8317 (M141)	1000	835	625	475						
	2000	665	595	475						
	3000	585	525	475						
C-107SP X8317 (M141)	1000	835	625	475						
	2000	665	595	475						
	3000	585	525	475						
C-108HP X8419A (M163)	1000	1495	1110	885	735	630				
	2000	1495	1110	885	735	630				
	3000	1495	1110	885	735	630				
C-110HP X8249 (M224)	1000	2740	2190	1730	1430	1216				
	1500	2420	2190	1730	1430	1216				
	2000	2230	2070	1730	1430	1216				
	2600	2050	1910	1730	1430	1216				
C-111HP X8249 (M224)	1000	2740	2190	1730	1430	1216				
	1500	2420	2190	1730	1430	1216				
	2000	2230	2070	1730	1430	1216				
	2600	2050	1910	1730	1430	1216				
SP-111P X9619 (M224A)	1000	3050	2550	2000	1650	1400				
	1200	2900	2550	2000	1650	1400				
	1800	2560	2370	2000	1650	1400				
	2400	2340	2170	2000	1650	1400				
	2800	2235	2070	1925	1650	1400				
SP-111HP X9582 (M224)	1000	2790	2600	2240	1840	1570				
	1200	2630	2450	2240	1840	1570				
	1800	2330	2170	2030	1840	1570				
	2400	2140	1990	1865	1750	1570				
SP-111OP X9818 (M2467)	1000	3290	3060	2870	2700	2540	2240			
	1200	3190	2970	2780	2610	2460	2240			
	1800	2810	2620	2450	2300	2170	2050			
	2400	2530	2370	2220	2090	1970	1860			
	3000	2320	2160	2030	1890	1800	1700			
SP211HP X9681 (M224)	1000	4540	3395	2710	2255	1930	1690			
	1200	4370	3395	2710	2255	1930	1690			
	1800	3900	3395	2710	2255	1930	1690			
	2400	3550	3330	2710	2255	1930	1690			
	2800	3390	3165	2710	2255	1930	1690			
SP211OP X9894B (M224)	1000	4728	3558	2852	2380	2042	1788			
	1200	4728	3558	2852	2380	2042	1788			
	1800	4656	3558	2852	2380	2042	1788			
	2400	4273	3558	2852	2380	2042	1788			
	3000	3993	3558	2852	2380	2042	1788			
SP211OP X9894B (M2467)	1000	5454	4104	3292	2747	2357	2063			
	1200	5251	4104	3292	2747	2357	2063			
	1800	4651	4104	3292	2747	2357	2063			
	2400	4268	4001	3292	2747	2357	2063			
	3000	3989	3739	3292	2747	2357	2063			
SP311P XA7570 (M224A)	1000	4935	3880	3200	2720	2365	2090	1875	1700	
	1800	4935	3880	3200	2720	2365	2090	1875	1700	
	2500	4935	3880	3200	2720	2365	2090	1875	1700	
	3000	4750	3880	3200	2720	2365	2090	1875	1700	
SP114P X9643 (M1985)	1000	3390	2600	2120	1780	1535	1350	1210	1090	
	1500	3390	2600	2120	1780	1535	1350	1210	1090	
	2000	3390	2600	2120	1780	1535	1350	1210	1090	
	2200	3390	2600	2120	1780	1535	1350	1210	1090	
SP214P X9803 (M1985)	1000	5980	4700	3880	3290	2870	2540	2270	2060	
	1500	5980	4700	3880	3290	2870	2540	2270	2060	
	2000	5980	4700	3880	3290	2870	2540	2270	2060	
	2200	5980	4700	3880	3290	2870	2540	2270	2060	
SP-214OP X9845 (M2529)	1000	7750	6730	5480	4630	4000	3530	3160	2850	2600
	1200	7330	6730	5480	4630	4000	3530	3160	2850	2600
	1800	6480	6130	5480	4630	4000	3530	3160	2850	2600
	2400	5950	5650	5350	4630	4000	3530	3160	2850	2600

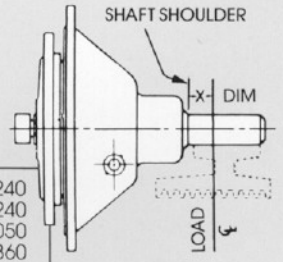
The following general formula should be used for determining the actual applied load:

$$L = \frac{126{,}000 \times HP}{N \times D} \times F \times LF$$

WHERE:

L = Actual Applied Load (Lbs.)
N = Shaft Speed (RPM)
D = Pitch Dia. (In.) of Sheave, etc.
F = Load Factor
1.0 for Chain or Gear Drive.
1.5 for Timing Belts.
2.5 for All V Belts.
3.5 for Flat Belts.
LF = 2.1 for Reciprocating Compressors and other Severe Shock Drives and 1.8 for Large Inertia Type Drives (crushers, chippers, planers).

Compound Drives and Power Engaged Power Take-Off applications must have written factory review.



$$HP = \frac{(TORQUE)(RPM)}{5252}$$

or $\frac{(N{\cdot}m)(RPM)}{7121}$

or $\frac{kW}{.746}$

PTO MODEL and DRAWING NUMBERS	RPM	"X" DISTANCE, INCHES (See Sketch)								
		1	2	3	4	5	6	7	8	9
IBF-214OP X9745E (M2137)	1000	8000	7550	7000	5875	5100	4500	4025	3675	3350
	1200	7550	7150	6800	5875	5100	4500	4025	3675	3350
	1800	6700	6325	6000	5750	5100	4500	4025	3675	3350
	2400	6150	5800	5500	5250	5025	4500	4025	3675	3350
IBF-214OP X9745F (M1985)	1000	6590	5160	4250	3600	3130	2760	2470	2250	2050
	1200	6590	5160	4250	3600	3130	2760	2470	2250	2050
	1800	6590	5160	4250	3600	3130	2760	2470	2250	2050
	2400	6150	5160	4250	3600	3130	2760	2470	2250	2050
IBF-214OP X9745E (M2713)	1000	8000	7550	7200	6850	6350	5600	4950	4560	4150
	1200	7550	7150	6800	6500	6200	5600	4950	4560	4150
	1800	6700	6330	6050	5750	5500	5300	4950	4560	4150
	2400	6125	5800	5500	5250	5050	4850	4650	4475	4150
IBF-214OP X9745F (M2529)	1000	8000	6550	5300	4500	3900	3450	3100	2800	2550
	1200	7550	6550	5300	4500	3900	3450	3100	2800	2550
	1800	6700	6330	5300	4500	3900	3450	3100	2800	2550
	2400	6150	5800	5300	4500	3900	3450	3100	2800	2550
SP-314P X9585 (M1985)	1000	6170	5120	4200	3570	3100	2740	2460	2220	2035
	1500	5350	5120	4200	3570	3100	2740	2460	2220	2035
	2000	5025	4750	4200	3570	3100	2740	2460	2220	2035
	2200	4850	4650	4200	3570	3100	2740	2460	2220	2035
SP-314P X9585A (M2137)	1000	6170	5850	5580	4720	4110	3630	3260	2945	2690
	1500	5350	5120	4850	4650	4110	3630	3260	2945	2690
	2000	5025	4750	4450	4250	4110	3630	3260	2945	2690
	2200	4850	4650	4350	4150	4000	3630	3260	2945	2690
IBF-314OP XA7149 (M2713)	1000	8969	8557	8182	7838	6878	6080	5448	4935	4510
	1200	8494	8104	7748	7423	6878	6080	5448	4935	4510
	1800	7522	7176	6862	6574	6309	6080	5448	4935	4510
	2400	6903	6586	6296	6033	5790	5566	5358	4935	4510
IBF-314OP XA7149A (M2529)	1000	8978	8048	6616	5616	4879	4313	3865	3501	3200
	1200	8503	8048	6616	5616	4879	4313	3865	3501	3200
	1800	7530	7186	6616	5616	4879	4313	3865	3501	3200
	2400	6911	6595	6307	5616	4879	4313	3865	3501	3200
IBF-314OP XA7149B (M1969A)	1000	6007	4707	3869	3285	2854	2523	2260	2047	1871
	1200	6007	4707	3869	3285	2854	2523	2260	2047	1871
	1800	6007	4707	3869	3285	2854	2523	2260	2047	1871
	2400	6007	4707	3869	3285	2854	2523	2260	2047	1871
SP-218OP XA7190 (M2713)	1000	9099	8701	8336	8000	7407	6539	5854	5298	4839
	1200	8617	8240	7894	7576	7283	6539	5854	5298	4839
	1800	7631	7297	6991	6709	6450	6210	5854	5298	4839
	2400	7004	6697	6416	6158	5920	5699	5494	5298	4839
SP-218OP XA7190 (M2327)	1000	9099	8701	7785	6594	5720	5050	4521	4092	3731
	1200	8617	8240	7785	6594	5720	5050	4521	4092	3731
	1800	7531	7297	6991	6594	5720	5050	4521	4092	3731
	2400	7004	6697	6416	6158	5720	5050	4521	4092	3731
SP-218OP XA7190A (M2977)	1000	9099	8701	8336	8000	7690	7404	6937	6278	5734
	1200	8617	8240	7894	7576	7283	7012	6760	6278	5734
	1800	7631	7297	6991	6709	6450	6210	5987	5779	5585
	2400	7004	6697	6416	6158	5920	5699	5494	5304	5126
SP-318P X9671 (M2158)	1000	8000	7650	7340	7040	6790	6530	6120	5580	5100
	1200	7600	7300	7000	6700	6450	6210	6000	5580	5100
	1800	6620	6350	6080	5840	5620	5400	5220	5030	4850
IBF-318OP X9918 (M2977)	1000	16306	15683	13225	11295	9856	8742	7855	7131	6529
	1200	15442	14852	13225	11295	9856	8742	7855	7131	6529
	1800	13675	13153	12669	11295	9856	8742	7855	7131	6529
	2000	13253	12747	12278	11295	9856	8742	7855	7131	6529
	2200	12871	12380	11924	11295	9856	8742	7855	7131	6529
IBF-318OP X9918A (M2713)	1000	16316	13479	11175	9544	8328	7387	6637	6025	5517
	1200	15452	13479	11175	9544	8328	7387	6637	6025	5517
	1800	13683	13162	11175	9544	8328	7387	6636	6025	5517
	2000	13261	12756	11175	9544	8328	7387	6637	6025	5517
	2200	12880	12389	11175	9544	8328	7387	6637	6025	5517
IBF-318OP X9918B (M2529)	1000	12036	9555	7921	6765	5903	5236	4704	4271	3910
	1200	12036	9555	7921	6765	5903	5236	4704	4271	3910
	1800	12036	9555	7921	6765	5903	5236	4704	4271	3910
	2000	12036	9555	7921	6765	5903	5236	4704	4271	3910
	2200	12036	9555	7921	6765	5903	5236	4704	4271	3910
SP-321P X9691A (M2156)	500	12900	12400	11900	11100	9660	8550	7600	6950	6350
	1000	10250	9820	9450	9100	8750	8450	7600	6950	6350
	1200	9750	9350	9000	8650	8350	8050	7600	6950	6350
	1500	9200	8900	8500	8200	8000	7700	7400	6950	6350
IBF-321OP X9919 (M2156B)	1000	16295	15670	15092	13635	11898	10554	9482	8608	7882
	1200	15432	14840	14292	13635	11898	10554	9482	8608	7882
	1800	13666	13142	12657	12206	11786	10554	9482	8608	7882
	2000	13244	12737	12266	11829	11423	10554	9482	8608	7882
	2200	12863	12369	11913	11488	11093	10554	9482	8608	7882

Selection Guide to Duty Classification

CLASS I

(Disconnect)

1. Pumps—centrifugal
2. Hydraulic Pumps (w/o pre-charge)
3. Feeders—disc type
4. Agitators—pure liquids
5. Irrigation Pumps

CLASS II

(Light Duty)

1. Cookers—cereal
2. Elevators—bucket, uniformly loaded all types
3. Kettle—brew
4. Line Shafts—light duty
5. Machines, general—all types with uniform loads, non-reversing
6. Bow Thruster
7. Generators (non-welding)

CLASS III

(Normal Duty)

1. Agitators—solid or semi-solids
2. Batchers—textile
3. Blowers and Fans—centrifugal and lobe
4. Bottling Machines
5. Compressors—all centrifugal, screw
6. Elevators—bucket, non-uniformly loaded or fed
7. Feeders—apron, belt, screw or vane
8. Filling Machine—can type
9. Mixers—continuous
10. Pumps—two or more cylinders
11. Conveyors—uniformly loaded
12. Dredge Pumps (allow for shock loading)
13. Locomotive RR Shuttle

CLASS IV

(Heavy Duty)

1. Cranes & Hoist—working clutch
2. Crushers—ore and stone
*3. Chipper—wood tub grinders
*4. Drums—barking
5. Compressors—lobe rotary plus three or more cylinder reciprocating type
6. Haulers—car puller and barge type
*7. Machines—impact load types
8. Mills—ball type
9. Paper Mill machinery—except calenders & driers
10. Presses—brick and clay
11. Mud Pumps
12. Road Planer

*** BEWARE OF OPERATOR MISUSE**

GENERAL INFORMATION NOTES

1. Capscrews to mount PTO and driving ring to prime mover are not Twin Disc supplied.
2. Installation of support plate to PTO housing requires bearing carrier capscrews be properly retorqued to prevent damage. Refer to applicable Care and Operation service manual.
3. Clutch maximum input torque values in specification chart is for properly adjusted clutch assemblies. Refer to applicable Care and Operation service manual.

IMPORTANT NOTICE: Disregarding system torsional compatibility could cause damage to components in the drive train resulting in loss of mobility or power transmission for which the drive is intended. At minimum, system incompatibility could result in unwanted noise and vibration at low speeds.

The responsibility for ensuring that the torsional compatibility of the system is satisfactory rests with the assembler of the drive and driven equipment.

Torsional vibration analysis can be made by the engine builder, independent consultants and others. Twin Disc is prepared to assist in finding solutions to potential torsional problems that relate to the power take-off, pump mount PTO or Rubber Block Drive.

Special Power Take-Offs

Special Power Take-Offs are available from Twin Disc. These include the innovative Straddle Bearing concept and a Limited-Attendance PTO that contains a positive throw-out collar clearance mechanism and extended lubrication intervals.

For original equipment manufacturers, Twin Disc can design other special power take-offs to meet individual requirements when sufficient volume is indicated. Design variations can range from minor changes to entirely new concepts.

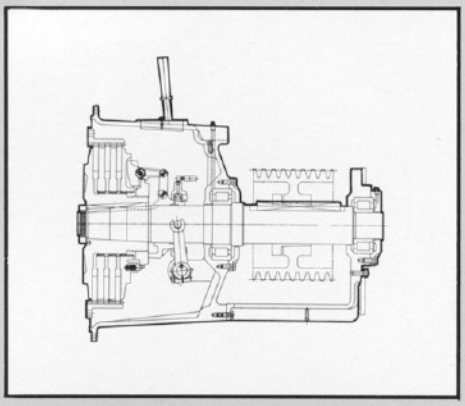
CLASS V

(Ext. Heavy Duty)

1. Compressors—one & two cylinder reciprocating
2. Calenders and driers. Paper Mill
3. Mills—hammer type
4. Shaker—reciprocating type
5. Automobile shredder

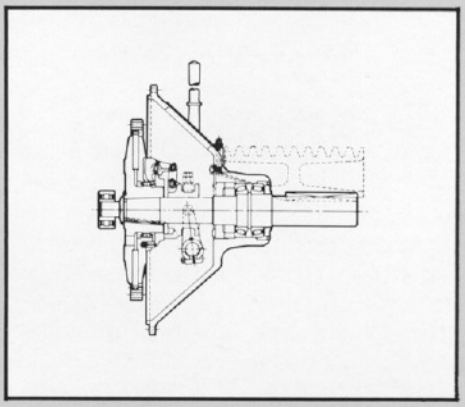
DUTY CLASS V REQUIRES FACTORY REVIEW

For reciprocal compressors and applications where high torsionals can be experienced, a flexible coupling may be mounted between clutch and flywheel.



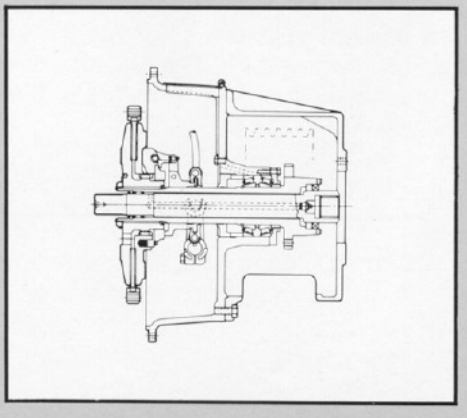
Straddle Bearing Power Take-Offs

This special purpose power take-off is available for high side load heavy-duty applications. The need for a flywheel pilot bearing has been eliminated through the use of high capacity cylindrical roller bearings. A 180° open throat sheave housing can be positioned in 90° increments. Request Bulletin 308-S, Supplement 10.



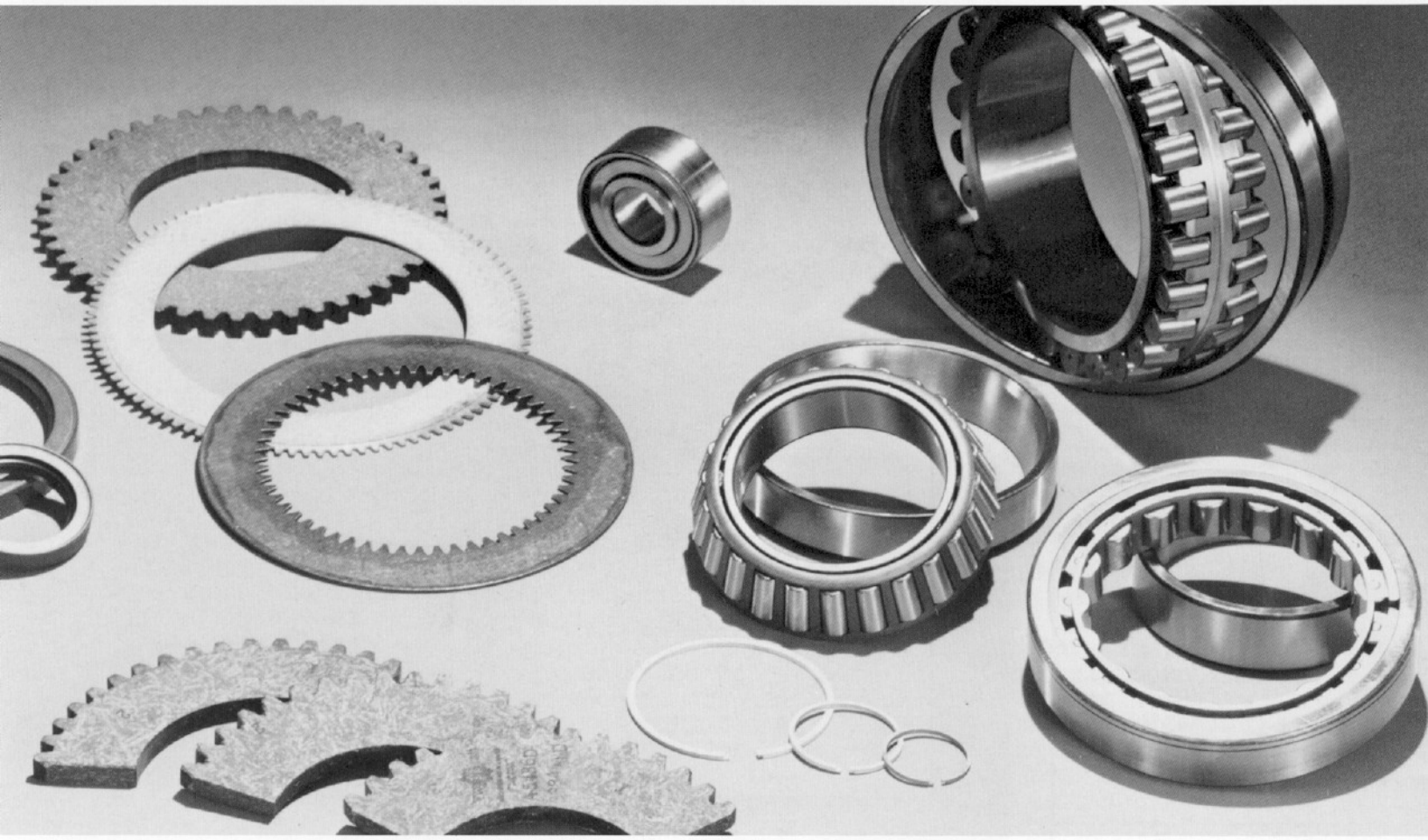
Limited Attendance Power Take-Offs

All Limited-Attendance Power Take-Offs contain a positive clearance mechanism that reduces collar wear. With sealed or shielded pilot bearings and special grease for main bearings, the lubrication interval can be extended to as long as six months. Request Bulletin 308, Supplement 2.



Special Design Power Take-Offs

The special design power take-off illustrated was created to meet a specific need. Variations from this in-line, pump mount arrangement are also available. Contact Twin Disc for your special design power take-off needs. No obligation, of course.



Approved Renewal Parts

Your operation depends on the use of quality equipment with quality components. And to assure continued high performance from these components, you must make repairs with quality renewal parts — parts manufactured by the original unit supplier. Twin Disc Approved Renewal Parts are available for all Twin Disc components — replacement parts that permit the most efficient operation.

Twin Disc Approved Renewal Parts Kits are also available for Power-Shift Transmission Systems. These kits offer the convenience of one-stop, one-order, one-invoice parts selection to get you back in business faster. Plus, you know they contain Twin Disc Renewal Parts so they'll probably keep you in business longer.

Request Form 1TC-1182 for a listing of kit numbers and description.

Always make certain that the Approved Renewal Parts you use have originated from the original manufacturer for assurance of continued high performance of your Twin Disc unit.

For the name of your nearest Twin Disc Authorized Distributor, consult the Yellow Pages under the heading "Power Transmission Equipment".

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