TWIN DISC
INCORPORATED

Service Manual

Power Take-off

Model:
IBF318OP Series

Document Number: 1015832

NOTICE

Twin Disc, Incorporated makes no warranty or guaranty of any kind, expressed, implied or otherwise, with regard to the information contained within this manual. Twin Disc, Incorporated has developed this manual through research and testing of the information contained therein. Twin Disc, Incorporated assumes no responsibility for any errors that may appear in this manual and shall not be liable under any circumstances for incidental, consequential or punitive damages in connection with, or arising out of, the use of this manual. The information contained within this manual is subject to change without notice.

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REVISION AND REISSUE DATA

Reissued	February, 1983
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TWIN DISC, INCORPORATED
EXCLUSIVE LIMITED WARRANTY
GENERAL UNITS

A. Twin Disc, Incorporated warrants all assembled products and parts, (except component products or parts on which written warranties issued by the respective manufacturers thereof are furnished to the original customer, as to which Twin Disc, Incorporated makes no warranty and assumes no liability) against defective materials or workmanship *for a period of twenty-four (24) months from the date of original shipment by Twin Disc, Incorporated to the original customer, but not to exceed twelve (12) months of service, whichever occurs first.* This is the only warranty made by Twin Disc, Incorporated and is in lieu of any and all other warranties, express or implied, including the warranties of merchantability or fitness for a particular purpose and no other warranties are implied or intended to be given by Twin Disc, Incorporated.

The original customer does not rely upon any tests or inspections by Twin Disc, Incorporated or on Twin Disc, Incorporated*s application engineering.

B. The exclusive remedy provided by Twin Disc, Incorporated whether arising out of warranty within the applicable warranty period as specified, or otherwise (including tort liability), shall at the sole option of Twin Disc, Incorporated be either the repair or replacement of any Twin Disc, Incorporated part or product found by Twin Disc, Incorporated to be defective and the labor to perform that work and to remove and reinstall (or equivalent credit). In this context, labor is defined as the flat rate labor hours established by Twin Disc, Incorporated in the published Twin Disc Flat Rate Schedule, required to remove, disassemble, inspect, repair, reassemble, reinstall and test the Twin Disc, Incorporated product only. Under no circumstances, including a failure of the exclusive remedy, shall Twin Disc, Incorporated be liable for economic loss, consequential, incidental or punitive damages. The above warranty and remedy are subject to the following terms and conditions:

1. Complete parts or products upon request must be returned transportation prepaid and also the claims submitted to Twin Disc, Incorporated within sixty (60) days after completion of the in-warranty repair.
2. The warranty is void if, in the opinion of Twin Disc, Incorporated, the failure of the part or product resulted from abuse, neglect, improper maintenance or accident.
3. The warranty is void if any modifications are made to any product or part without the prior written consent of Twin Disc, Incorporated.
4. The warranty is void unless the product or part is properly transported, stored and cared for from the date of shipment to the date placed in service.
5. The warranty is void unless the product or part is properly installed and maintained within the rated capacity of the product or part with installations properly engineered and in accordance with the practices, methods and instructions approved or provided by Twin Disc, Incorporated.
6. The warranty is void unless all required replacement parts or products are of Twin Disc origin or equal, and otherwise identical with components of the original equipment. Replacement parts or products not of Twin Disc origin are not warranted by Twin Disc, Incorporated.

C. As consideration for this warranty, the original customer and subsequent purchaser agree to indemnify and hold Twin Disc, Incorporated harmless from and against all and any loss, liability, damages or expenses for injury to persons or properly, including without limitation, the original customer*s and subsequent purchaser*s employees and property, due to their acts or omissions or the acts or omissions of their agents, and employees in the installation, transportation, maintenance, use and operation of said equipment.

D. Only a Twin Disc, Incorporated authorized factory representative shall have authority to assume any cost or expense in the service, repair or replacement of any part or product within the warranty period, except when such cost or expense is authorized in advance in writing by Twin Disc, Incorporated.

E. Twin Disc, Incorporated reserves the right to improve the product through changes in design or materials without being obligated to incorporate such changes in products of prior manufacture. The original customer and subsequent purchasers will not use any such changes as evidence of insufficiency or inadequacy of prior designs or materials.

F. If failure occurs within the warranty period, and constitutes a breach of warranty, repair or replacement parts will be furnished on a no-charge basis and these parts will be covered by the remainder of the unexpired warranty which remains in effect on the complete unit.

January 16, 2002 TDWP0002

Table of Contents

Introduction

General Information

This publication provides the information necessary for the operation and maintenance of the Twin Disc, Incorporated equipment specified on the cover of this manual. Specific engineering details and performance characteristics can be obtained from the Product Service Department of Twin Disc, Incorporated, Racine, Wisconsin, USA.

Operation and maintenance personnel responsible for this equipment should have this manual at their disposal and be familiar with its contents. Applying the information in the manual will result in consistent performance from the unit and help reduce downtime.

Replacement Parts

Parts Lists

See the engineering assembly drawings in Engineering Drawings to facilitate ordering spare or replacement parts.

Ordering Parts

⚠ WARNING

All replacement parts or products (including hoses and fittings) must be of Twin Disc origin or equal, and otherwise identical with components of the original equipment. Use of any other parts or products will void the warranty and may result in malfunction or accident, causing injury to personnel and /or serious damage to the equipment.

Renewal parts and service parts kits may be obtained from any authorized Twin Disc distributor or service dealer.

Parts Shipment

Furnish the complete shipping information and postal address. All parts shipments made from the factory will be FOB factory location, USA. State specifically whether the parts are to be shipped by freight, express, etc. If shipping instructions are not specified, the equipment will be shipped the best way, considering time and expense. Twin Disc, Incorporated will not be responsible for any charges incurred by this procedure.

Twin Disc, Incorporated having stipulated the bill of material number on the unit's nameplate absolves itself of any responsibility resulting from any external, internal or installation changes made in the field without the express written approval of Twin Disc. All returned parts, new or old, emanating from any of the above-stated changes will *not* be accepted for credit. Furthermore, any equipment which has been subjected to such changes will *not* be covered by a Twin Disc warranty.

Preventive Maintenance/Troubleshooting

Frequent reference to the information provided in this manual regarding daily operation and limitations of this equipment will assist in obtaining trouble-free operation. Schedules are provided for the recommended maintenance of the equipment and, if observed, minimum repairs (aside from normal wear) will result.

In the event a malfunction does occur, a troubleshooting table is provided to help identify the problem area and lists information that will help determine the extent of the repairs necessary to get a unit back into operation.

Lifting Bolt Holes

Most Twin Disc products have provisions for attaching lifting bolts. The holes provided are always of adequate size and number to safely lift the Twin Disc product.

⚠ CAUTION

These lifting points must *not* be used to lift the complete power unit. Lifting excessive loads at these points could cause failure at the lift point (or points) and result in damage or personal injury.

⚠ CAUTION

Select lifting eyebolts to obtain maximum thread engagement with bolt shoulder tight against housing. Bolts should be near but should *not* contact bottom of bolt hole.

Safety

General

Safe practices must be employed by all personnel operating and servicing this unit. Twin Disc, Incorporated will not be responsible for personal injury resulting from careless use of hand tools, lifting equipment, power tools, or unaccepted maintenance/operating practices.

Important Safety Notice

Because of the possible danger to person(s) or property from accidents which may result from the use of manufactured products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified. Proper installation, maintenance, and operation procedures must be observed. Inspection should be made as necessary to assure safe operations under prevailing conditions. Proper guards and other suitable safety codes should be provided. These devices are neither provided by Twin Disc, Incorporated nor are they the responsibility of Twin Disc, Incorporated.

Sources of Service Information

Each series of manuals issued by Twin Disc, Incorporated is current at the time of printing. When required, changes are made to reflect advancing technology and improvements in state-of-the-art.

Individual product service bulletins are issued to provide the field with immediate notice of new service information.

For the latest service information on Twin Disc products, contact any Twin Disc distributor, or contact the Product Service Department, Twin Disc, Incorporated, Racine, Wisconsin 53405-3698, USA by e-mail at service@twindisc.com.

Warranty

Equipment for which this manual was written has a limited warranty. For details of the warranty, refer to the warranty statement at the front of this manual.

Installation

Preliminary Checks

Note: All measurements must be taken with the engine or motor mounted on its supports after the flywheel and housing have been thoroughly cleaned.

1. Measure and record the engine crankshaft or motor shaft endplay using a dial indicator. Record this value, as it will be used later._____

2. Bolt the indicator to the flywheel so the indicator is perpendicular to the flywheel housing face and the indicator stem rides on the flywheel housing face. See Figure 1.

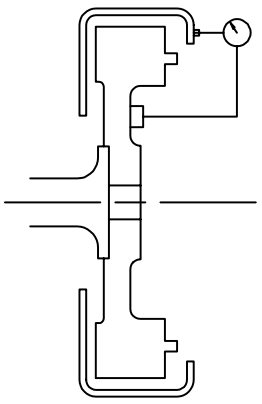


Figure 1. Checking Flywheel Housing Face

3. Rotate the shaft through on entire revolution and note the runout. The total indicator reading (T.I.R.) must not exceed:

IBF318OP-0	.41 mm. (.016”).
IBF318OP-00	.48 mm. (.019”).

Note: The flywheel and crankshaft of the engine must be held against either the front or rear of the crankshaft thrust bearing while the total indicator sweep (T.I.R.) is being made.

4. Readjust the indicator so the stem rides on the pilot bore of the flywheel housing face. See Figure 2.

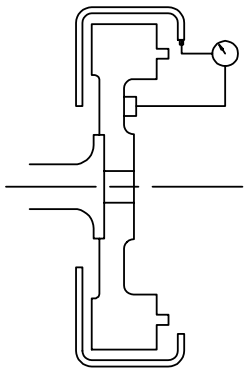


Figure 2. Checking Flywheel Housing Bore

5. Rotate the shaft through one entire revolution and note the runout. The total indicator reading (T.I.R.) should not exceed:

IBF318OP-0	.41 mm. (.016”).
IBF318OP-00	.48 mm. (.019”).

6. Remove the indicator base from the flywheel and bolt it to the flywheel housing face. Position the indicator stem so that it rides where the drive ring will set on the flywheel face. See Figure 3.

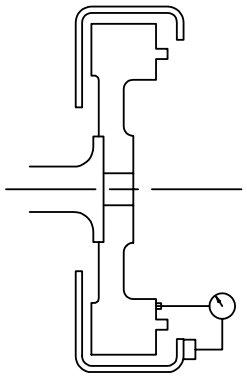


Figure 3. Checking Driving Ring Surface of Flywheel

7. Rotate the shaft through one entire revolution and note the face runout of the flywheel. The total indicator reading (T.I.R.) must not exceed .01mm. (.0005”) per 25.4 mm. (per inch) of flywheel diameter.

Note: The flywheel and crankshaft of the engine must be held against either the front or rear of the crankshaft thrust bearing while the total indicator sweep (T.I.R.) is being made.

8. Readjust the indicator stem so it rides on the driving ring pilot bore of the flywheel. See Figure 4.

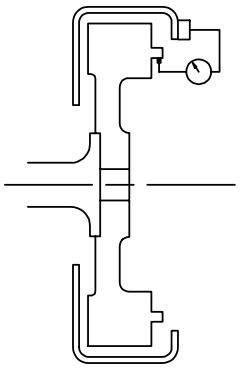


Figure 4. Checking Driving Ring Pilot Bore of Flywheel

9. Rotate the shaft through one entire revolution and note the driving ring bore eccentricity. The total indicator reading (T.I.R.) must not exceed .13 mm. (.005”).

10. Adjust the indicator stem so that it rides on the pilot bearing bore cavity. See Figure 5.

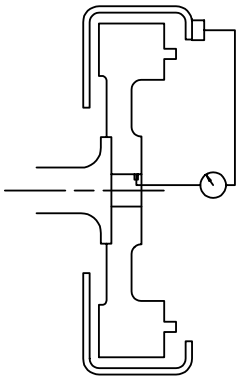


Figure 5. Checking Pilot Bearing Bore of Flywheel

11. Rotate the shaft through one entire revolution and note the pilot bearing bore eccentricity. The total indicator reading (T.I.R.) must not exceed .13 mm. (.005”).

Note: Eccentricity between the driving ring pilot bore (figure 4) and the pilot bearing bore (figure 5) must not exceed .20 mm. (.008”).

Drive Ring Installation

1. Clean the drive ring and flywheel of any dirt or debris as necessary.

2. Use crocus cloth or emery cloth to remove any surface imperfections such as nicks, burrs, and sharp edges on the O.D. or the surface that will be mounted against the flywheel face.

3. Use crocus cloth or emery cloth to remove any surface imperfections such as nicks, burrs, and sharp edges in the I.D. of the flywheel pilot bore or on the face that will be in contact with the drive ring.

4. Position the drive ring against the flywheel, piloted in the mounting bore, and secure with eight hex-head capscrews. Torque the capscrews to the proper specifications given in Table 1.

⚠ CAUTION

Drive ring attachment screws must be grade 8. Do not use substitutes.

Ball-Type Pilot Bearing Installation

Refer to the exploded view illustration near the back of this manual.

1. Support the output end of the clutch shaft.

2. Make sure the clutch shaft end stub is free of surface imperfections such as nicks, burrs, and sharp edges. Remove them using fine emery cloth or crocus cloth.

3. Place the bearing spacer (used only with the ball-type bearing) on the shaft. Tap the pilot bearing part way on to the clutch shaft.

   Note: Tap only on the inner race of the bearing. Any impact on the outer race or balls will damage the bearing.

4. Install the pilot bearing all the way onto the shaft so it is flush to the end. Apply force to only the inner race of the bearing.

⚠ CAUTION

Do not damage the seal of the pilot bearing. A damaged seal renders the pilot bearing destroyed and it must be replace with a new bearing.

Roller-Type Pilot Bearing Installation

Some Twin Disc ptos are designed with roller-type pilot bearings. All of the roller-type bearings available from Twin Disc are the separate race type, i.e. the inner race is removable from the outer race and seal assembly. Due to its design configuration, *axial alignment of the inner and outer races is extremely important.* The information and instructions below will assure proper bearing mounting.

Instructions for assembly.

1. Position the pto on the bed of a press with the pilot bearing end up and the output end of the clutch shaft resting firmly on a solid support.

   Note: The pto must be standing on the output end of the shaft.

2. Press the pilot bearing inner race on the clutch shaft so it is flush with the input end of the shaft.

3. (See figure 6) Carefully measure dimension (a) as shown. Record the measurement.

4. Refer to the chart below. Subtract the appropriate roller bearing nominal width (c) from measurement (a). This will determine the position of the pilot bearing outer race in the flywheel bore (dimension b). See figure 7.

5. Install the pilot bearing outer race in the flywheel and position it at dimension (b). (See figure 7)

		Bearing O.D.	Brg. Nominal Width (c)
IB318P003	M2713	100.035-100.020 mm. (3.9384-3.9378”)	39.6 mm. (1.56”)
IB318P011	M2529	80.025-80.013 mm. (3.1506-3.1501”)	34.9 mm. (1.37”)
IB318P012	M2713	100.035-100.020 mm. (3.9384-3.9378”)	39.6 mm. (1.56”)
IB318P013	M2713	100.035-100.020 mm. (3.9384-3.9378”)	39.6 mm. (1.56”)

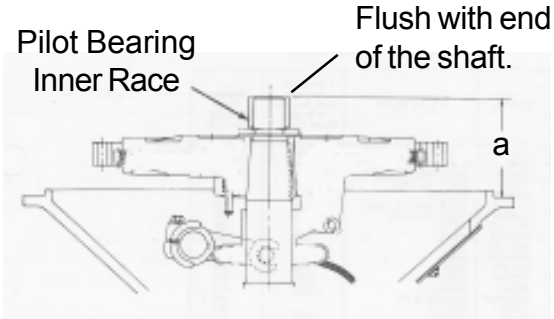


Figure 6.

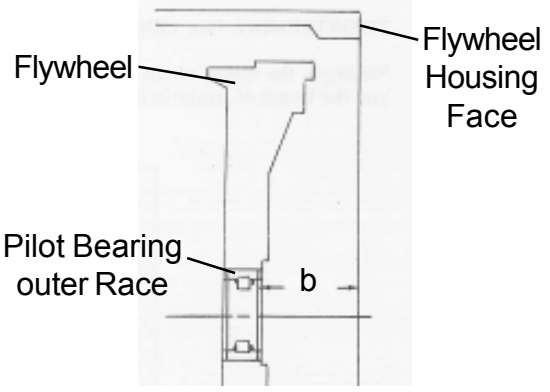


Figure 7

PTO Installation to Engine or Driving Member

Refer to the exploded view illustration near the back of this manual.

1. Clean the PTO housing flange, flywheel housing flange, and pilot bearing bore of any debris.

2. Make sure the housing flange and flywheel housing flange are free of surface imperfections such as nicks, burrs, and sharp edges. Remove them using fine emery cloth or crocus cloth.

3. Install a minimum of 3 guide studs in the flywheel housing, located approximately 120° apart. Using a suitable hoist, position the PTO on the guide studs and slide it against the flywheel housing, carefully aligning the pilot bearing with the pilot bearing bore in the flywheel and the teeth of the driving plates (11) with the drive ring (1).

⚠ CAUTION

Do not force the pto unit onto the engine. If any resistance is noted, repeat the clutch plate centering procedure to align and center the clutch plates so they mesh properly with the teeth of the driving ring.

4. Secure the PTO housing to the flywheel housing with 16 hex-head capscrews. Torque the capscrews to the proper specifications given in Table 1.

   Note: PTO housing to flywheel housing attachment screws must be grade 5 or better.

5. Rap the output end of the main shaft with a soft hammer to remove any preload on the main bearings and/or pilot bearing.

   Note: This step must not be omitted. Bearing failure may result.

6. Measure the crankshaft endplay again. The measurement must be the same value as recorded from step 1 under Preliminary Checks. Locate and correct the source of preload if the endplay is not the same value.

⚠ CAUTION

Engine and/or PTO failure will result from any excessive preload on components.

7. Install the key (52) on the output end of the clutch shaft and install the drive sheave, chain sprocket, or u-joint flange as the application requires.

Note: A PTO support plate mounted at the output bearing retainer must be used. Refer to Engineering Drawings towards the back of this manual.

Installation Tips

Avoid excessive misalignment between the engine and PTO. Check the following if abnormal wear of parts exists:

- ❑ Excessive loads tend to deflect parts to which PTO's are mounted. A dial indicator can be mounted on a rigid part of the engine or independently on the foundation to determine deflection under actual operating conditions.

  Readings taken before the drive is installed with the engine standing still and when under operating conditions (with the engine off and all belts, chains, driveshafts and/or support plates attached and secured with bolts torqued to specifications) will indicate the extent of deflection. In no case should the deflection exceed .25 mm. (.010") (T.I.R.) at the bearing carrier. See Figure 8.

  Note: The dial indicator should never be applied with the engine running. This is unsafe and could result in damage to the dial indicator.

- ❑ Avoid excessive tightening of belts or chains. See Table 5 for allowable side load information.

⚠ CAUTION

Verify the PTO is properly lubricated prior to starting the engine. Serviceable points for the throwout collar have a hydraulic ("zerk") grease fitting. The main bearings are lubricated by oil contained in an oil cavity in the bearing carrier. The sealed-for-life pilot bearing should not be lubricated during service. See Lubrication in the Maintenance section for more information. Improper lubrication will result in premature failure of components.

⚠ CAUTION

Verify the clutch is adjusted according to the procedure outlined in Clutch Adjustment in the Maintenance section. Failure to do so will result in premature clutch wear and failure.

Twin Disc will not be responsible for any damage or injury resulting from improper adjustment and/or lubrication. This includes any accessory drives and loads.

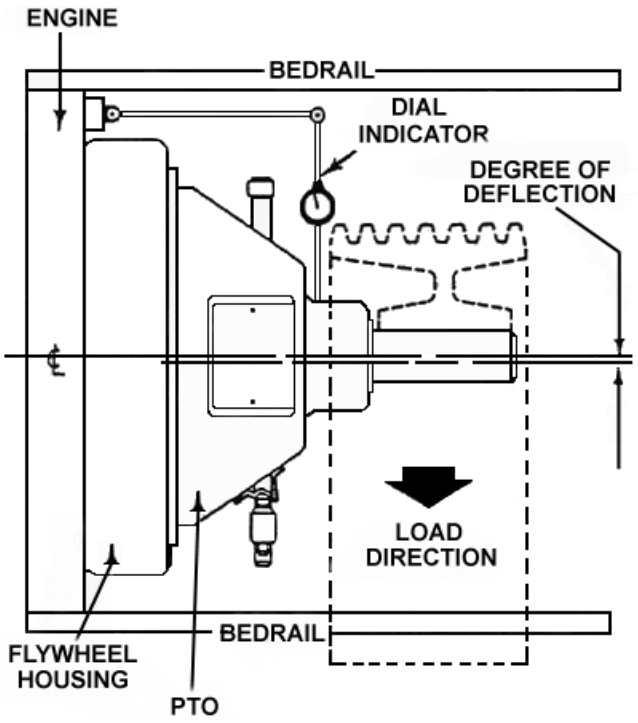


Figure 8. Determining Deflection While Applying Side Loads

⚠ CAUTION

The dial indicator should not be applied while the unit is operating. This could result in damage to the dial indicator.

Table 1. Torque Values for U.S. Fasteners

Thread Diameter	SAE Grade 5		SAE Grade 8	
	lb-ft	Nm	lb-ft	Nm
1/4	6 - 8	8 - 11	10 - 12	14 - 16
5/16	13 - 17	18 - 23	20 - 24	27 - 32
3/8	25 - 29	34 - 39	35 - 41	48 - 55
7/16	37 - 43	51 - 58	55 - 65	75 - 88
1/2	60 - 70	81 - 95	83 - 97	113 - 131
9/16	82 - 98	111 - 132	120 - 140	163 - 190
5/8	120 - 140	163 - 190	165 - 195	224 - 264
3/4	205 - 245	278 - 332	295 - 345	400 - 467
7/8	330 - 390	448 - 528	470 - 550	638 - 745
1	495 - 595	671 - 806	715 - 845	970 - 1145
1 1/8	615 - 745	834 - 1010	1015 - 1185	1377 - 1606
1 1/4	850 - 1000	1163 - 1355	1375 - 1625	1865 - 2203

Note: All threads and bearing face to be lubricated with light oil film prior to assembly.

Table 2. Metric Coarse Thread Capscrews, Bolts, and Nuts

Thread Size	Property Class 8.8		Property Class 10.9		Property Class 12.9	
	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm
M6	6.5 - 7.5	9 - 10	9 - 10	12 - 14	10 - 12	14 - 16
M8	16 - 18	21 - 25	23 - 26	31 - 35	25 - 29	34 - 40
M10	32 - 36	43 - 49	44 - 51	60 - 68	51 - 59	70 - 80
M12	55 - 63	74 - 86	77 - 88	104 - 120	89 - 103	121 - 139
M16	132 - 151	179 - 205	189 - 217	256 - 294	219 - 253	298 - 342
M20	257 - 295	348 - 400	364 - 418	493 - 567	429 - 493	581 - 669
M24	445 - 511	603 - 693	626 - 720	848 - 976	737 - 848	1000 - 1150
M30	714 - 820	987 - 1113	1235 - 1421	1674 - 1926	1475 - 1697	2000 - 2301

Table 3. Tapered Pipe Plugs (with thread lubricant)

	In cast iron or steel		In aluminum	
NPTF Size (in)	Nm (+ or - 5%)	lb-ft (+ or - 5%)	Nm (+ or - 5%)	lb-ft (+ or - 5%)
1/16-27	11.5	8.5	7.5	5.5
1/8-27	14	10.5	9	6.5
1/4-18	34	25	21.5	16
3/8-18	36.5	27	23	17
1/2-14	68	50	40.5	30
3/4-14	73	54	46	34
1 - 11 1/2	108	80	68	50
1 1/4 - 11 1/2	115	85	75	55
1 1/2 - 11 1/2	115	85	75	55

Table 4. Straight Threaded Tube Fittings, Hose Fittings, and O-Rings

Nominal Thread Diameter	Nm (+ or - 5%)	lb-ft (+ or - 5%)
5/16	5	3.5
3/8	11.5	8.5
7/16	16	12
1/2	20	15
9/16	24.5	18
5/8	24.5	18
11/16	34	25
3/4	40.5	30
7/8	54	40
1 1/16	75	55
1 3/16	88	65
1 1/4	88	65
1 5/16	108	80
1 3/8	108	80
1 5/8	135	100
1 7/8	162	120
2 1/2	312	230

Nominal Thread Diameter	Nm (+ or - 5%)	lb-ft (+ or - 5%)
M10X1.0	26	19
M12X1.5	37	27
M14X1.5	47	35
M16X1.5	58	43
M18X1.5	74	55
M22X1.5	105	77
M27X2.0 IN IRON	179	132
M27X2.0 IN ALUM.	85	63
M33X2.0	326	240
M42X2.0	347	256
M48X2.0	441	325

Twin Disc PTO Support Plate Specifications

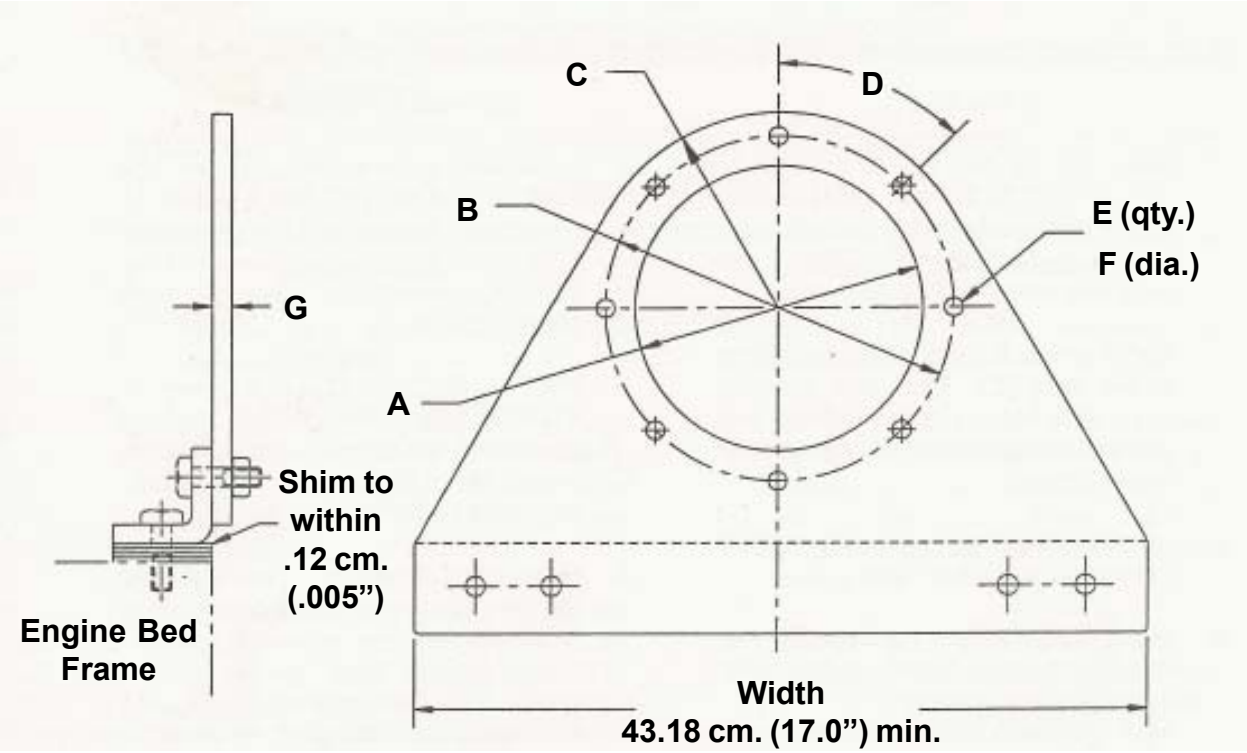


Figure 12. Support plate dimensions

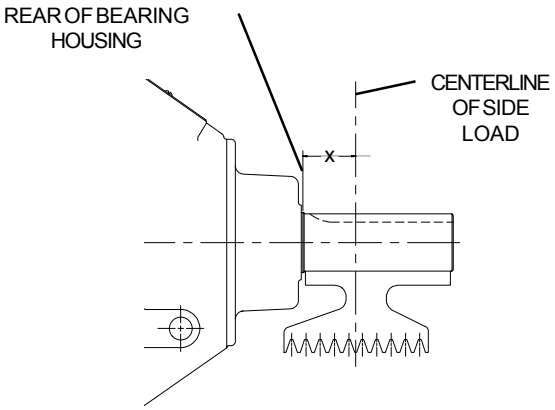
NOTE: One possible mounting method provides installation ease. Use angle iron to couple the support plate to the engine frame.

PTO Model	A Bore +.127/.025mm (+.005/+.001")	B Bolt Circle	C Radius	D Degree	E Hole Quantity	F Hole Diameter	G Recommended Thickness
IBF318OP	266.7mm. 10.500"	31.43 cm. 12.375"	17.78 cm. 7.00"	45°	8 8	17.46 mm. 11/16"	19.05 mm. 3/4"

NOTE: PTO deflection due to loads imposed by the application should not exceed .25 mm (.010"). Deflection should be measured at the support plate pilot with the dial indicator base mounted on a rigid part of the engine.

Maintenance

Allowable Side Loads



$$L = \frac{126{,}000 \times H.P.}{N \times D} \times F \times LF$$

Figure 9. Allowable Side Pull and Formula to Determine Applied Load

Formula values for Figure 9.

- L = actual applied load (Lbs.)
- N = shaft speed (RPM)
- D = pitch diameter (in.) at 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 drivers and 1.8 for large inertia type drive (crushers, chippers, planers)

Table 5. Allowable Side Loads

IBF318OP (IB318P001, IB318P002)

RPM	'X' Distance								
	1	2	3	4	5	6	7	8	9
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
2400	13253	12747	12278	11295	9856	8742	7855	7131	6529
3000	12871	12380	11924	11295	9856	8742	7855	7131	6529

IBF318OP (IB318P003, IB318P012, IB318P013)

RPM	'X' Distance								
	1	2	3	4	5	6	7	8	9
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	6637	6025	5517
2400	13261	12756	11175	9544	8328	7387	6637	6025	5517
3000	12880	12389	11175	9544	8328	7387	6637	6025	5517

IBF318OP (IB318P011)

RPM	'X' Distance								
	1	2	3	4	5	6	7	8	9
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
2400	12036	9555	7921	6765	5903	5236	4704	4271	3910
3000	12036	9555	7921	6765	5903	5236	4704	4271	3910

⚠ CAUTION

A support plate must be attached at the rear of the PTO if it is subjected to side load operation of the shaft.

Drive plate assemblies supplied for service replacement as assembly-only items.

Lubrication

Refer to Engineering Drawings for location of fittings.

Grease Specifications

Use NLGI Grade 2 grease with a minimum 149° C. (300° F.) drop point for all lubrication.

Operating Shaft Fittings

Apply 1 cc. of grease (one shot from a grease gun) before starting and then every 3 months or 100 hours operation (whichever occurs first).

Throwout Collar

Apply 1 cc. of grease (one shot from a grease gun) daily before start-up and then every 8-10 hours operation thereafter, through the fitting on the tapered part of the housing.

Oil Specifications

Use a good grade MS, DG, or better SAE No. 30 engine oil.

Main Bearings

The tapered roller bearings are lubricated from oil contained in an oil cavity in the bearing carrier. The oil level should be checked and maintained every 8-10 hours operation. Drain and refill the oil cavity every 6 months or 1000 hours (whichever occurs first).

Pilot Bearing

The pilot bearing supplied with the power take-off is pre-lubricated and sealed for life. No maintenance is required. Inspection is recommended every two years or when the power take-off is removed from the driving component for servicing.

Clutch Adjustment

Note: New power take-offs must have clutch adjustment checked before being placed into service and after the first 10 hours of operation. This includes any power take-offs with new driving plates. New plates have a wear in period and the clutch may require several adjustments before the new plates are worn in.

After wear in, clutch adjustment should be checked regularly. Heavy duty applications (rock crushers, etc.,) which have frequent engagements, numerous engagements in an operating day or relatively long periods of slip require more frequent readjustment than light duty applications.

Adjust the clutch BEFORE it overheats, does not pull, or the operating lever jumps from the engaged position. But these symptoms are indications that clutch adjustment is required.

Adjustment measurements are made by fitting a torque wrench with a 1 1/2" socket over the hex end located at the bottom of the hand lever. Grasp only the torque wrench when making measurements.

1. Disconnect any power engagement devices from the operating shaft if so equipped.

To adjust the clutch:
Refer to the exploded view illustration near the back of this manual.

2. Remove the instruction cover plate (40) from the housing (39) and turn the clutch shaft until the adjusting ring lock pin (28) can be reached.

3. Disengage the adjusting lock pin and insert a cotter pin or small nail into the hole provided to hold it in the disengaged position. Turn the adjusting yoke (17) to the right (or clockwise when looking at the flywheel) until 691 - 917 Nm. (510 - 676 ft.-lb.) of peak torque is required at the operating shaft (65) to engage the clutch.

4. Remove the cotter pin or small nail. Re-engage the adjusting ring lock pin.

5. Repeat steps 3 and 4 above as necessary until the proper torque reading is obtained.

6. Replace the instruction cover plate (40) and secure with two hex-head capscrews (41). Securely tighten.

Driving Plate Replacement

Common symptoms indicating that the driving plate assemblies (11) are worn out are:

1. The adjusting yoke (17) cannot be turned clockwise any further.

2. The friction face surfaces have worn flush with the rivet heads, or the rivets are loose.

It is necessary to remove and disassemble the clutch assembly to replace the driving plate assemblies. Split-type driving plate assemblies are not recommended for use in IBF318OP assemblies.

Field Adjustment - Tapered Roller Bearings (side-loaded pto applications)

The only approved method for field adjustment of tapered roller bearings in Twin Disc Power Take-Off units is by the use of a dial indicator to read actual bearing end play.

(Refer to figure 10 and “(Final setting) Measure and set bearing end play” in the Assembly section.)

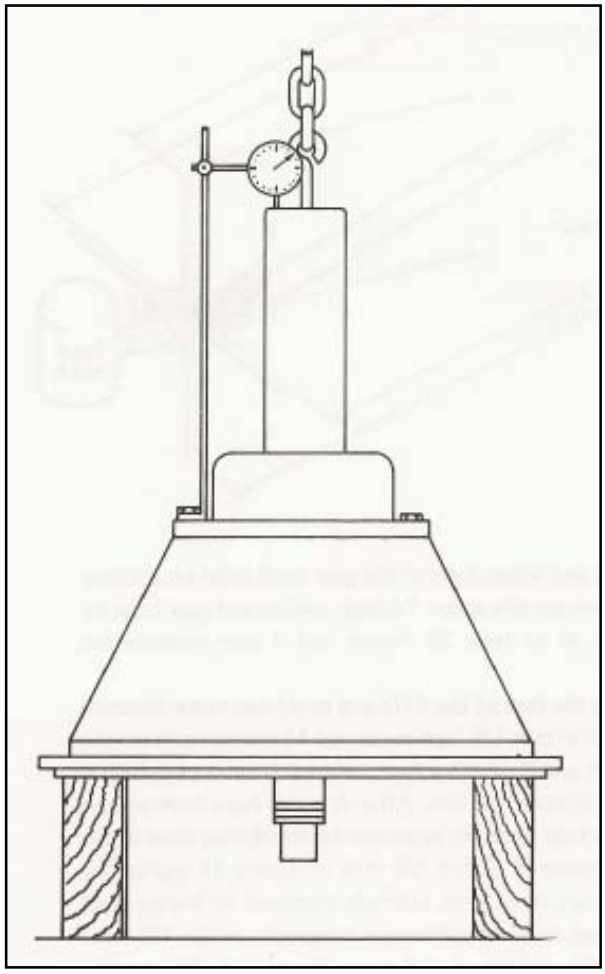


Figure 10. Dial indicator and power take-off position for measuring and setting bearing end play.

Bearing End Play - In-Line Applications

1. Field experience with u-joint-type, irrigation pump or other in-line drive installations indicates that extra care must be taken when adjusting the power take-off tapered roller bearings.

2. The end play for these applications is special for the above types of applications.

3. Set bearing end play for these special applications using the method described for side-loaded applications on on the previous pages, but set to the specifications shown in table 6.

Table 6. End Play for Special Applications

Model Number	Recommended End Play	
	mm.	inches
IBF318OP Series	.33 - .41	.013 - .016

Alignment - U-Joint-Type Installation

(Refer to figure 11 on next page.)

To realize the longest possible life of the power take-off bearings, the best possible alignment must be maintained between the center line of the power take-off shaft and the center line of the driven unit shaft.

1. It is extremely important that the forks of the drive shaft between the pto and the driven unit lie in the same plane. This will prevent severe vibrations from occuring in the drive shaft.

2. The center lines of the pto shaft and the driven unit input shaft must be offset within the limits recommended by the u-joint manufacturer to prolong the life of the universal joint needle bearings.

3. It is extremely important that the center lines of the pto shaft and driven unit input shaft be parallel. This will further prevent vibrations which cause premature pto bearing failure.

4. Proper lubrication of the pto is important for satisfactory service. (Refer to lubrication specifications in the Maintenance section.)

Align the centerlines of the pto shaft and the input shaft of the driven unit. (One possible method is described below.)

5. To align the engine and gear head by this method, two accurate straight edges at least 91 cm. (36”) long and a tape measure are required.

6. Place the straight edges horizontally along the face of the pto and gear head hubs. Measure distances A and B. These two distances should be equal within 3.17 mm. (.125”) at a point 45.7 cm. (18”) from the centerline of the shaft. Move the engine and/or driven unit to obtain this specification.

7. Rotate the shafts so the straight edges are in a vertical position. Measure the distances C and D as was done for A and B in step 2. These two distances should be equal within 3.17 mm. (.125”) at a point 45.7 cm. (18”) from the centerline of the shaft. Move the engine and/or driven unit to obtain this specification.

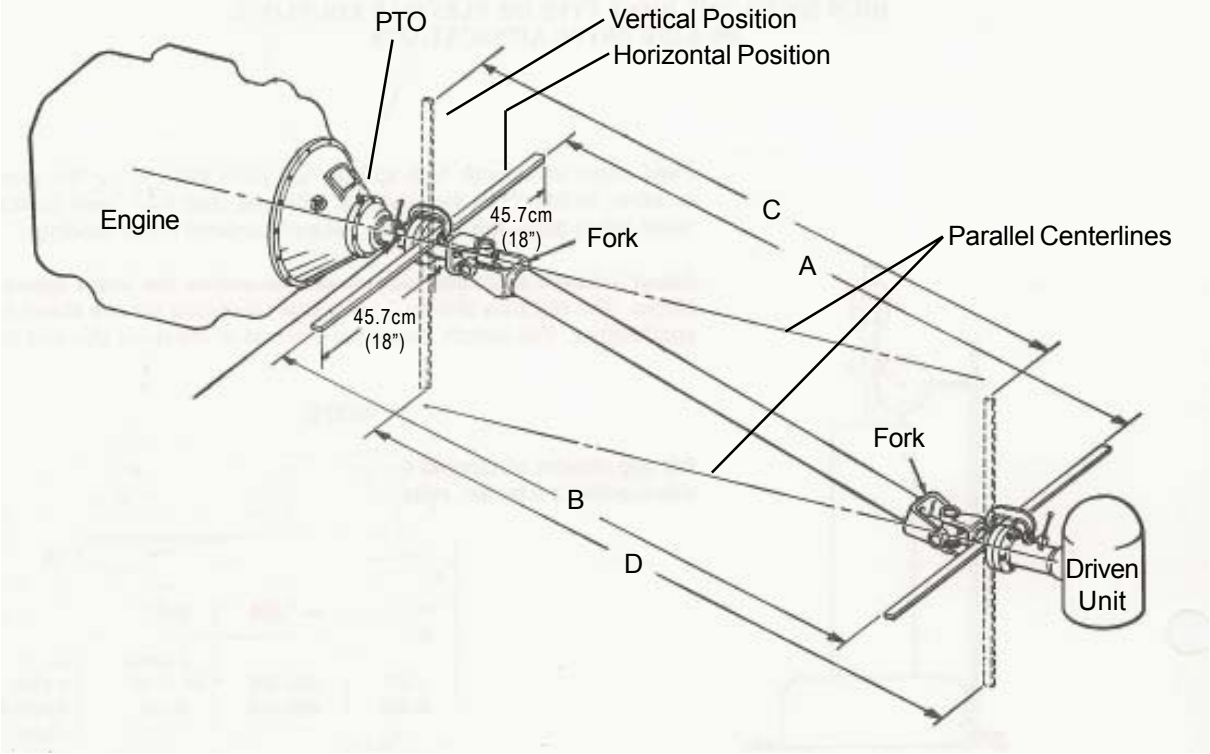


Figure 11. Alignment - U-Joint-Type Installation

8. Secure the engine and driven unit. Recheck A and B, C and D as described in steps 6 and 7 above. All measurements must be within the specifications. If not, repeat steps 5 through 7 until specifications are met.

Setting Up Air Engagement on Twin Disc Power Take Offs

1. The cylinder should be located so that the piston moves forward and backward in *exactly* the same direction as the engagement lever and is aligned so it travels in *exactly* the same plane.

2. The air cylinder must be of sufficient size to operate the required torque to engage the clutch. It must have some means to make adjustment on the piston stroke.

3. Air pressure must be constant. Low pressures could give only partial engagement which will cause failures of the clutch and throwout collar.

4. The piston travel must be within limits established to engage and disengage the clutch. Failure to provide these parameters will cause failure and possible breakage of the clutch.

5. The engaging cylinder must not place a pressure either in the engaged or disengaged direction after completion of its cycle. The throwout collar *must float free* after engagement or disengagement. Operating the pto with constant pressure on the throwout collar will result in failure.

6. The air cylinder must be readjusted when the clutch is readjusted and any time the travel or position moves from the specifications described above.

Determine the length of travel for the engaging cylinder.

7. Multiply the length of the hand lever by 7.92 mm. (.312”). This provides the required length of the piston stroke.

   Note: The hand lever length is the distance from the center of the operating shaft to the point where the cylinder will be connected to the lever.

Determine the engaging force in pounds required at the cylinder.

8. Divide 8112 lb.-in. by the length of the hand lever (in inches). This provides the required force (in pounds) that must be provided by the piston.

   Note: Periodically disconnect the power cylinder to measure the clutch engagement force. Refer to Clutch Adjustment in the Maintenance section.

Disassembly

Power Take-off Removal From The Engine

Refer to the parts list exploded view illustration near the back of this manual.

1. Remove all attached parts from the output end of the power take-off.

2. Remove the hex nut (68) and hex-head capscrew (67) securing the hand lever (69) to the operating shaft (65).

3. Loosen the support plate from the base mounting.

4. Remove the oil drain plug (58) and drain the oil from the oil cavity in the bearing carrier (55).

5. Remove the shaft key (52).

6. Attach lifting equipment to the power take-off and take out the slack *just enough* to begin to support the weight of the pto. Do not apply too much force.

⚠ CAUTION

Lifting devices and their capacity must be capable of supporting the weight of the power take-off and all attached devices and equipment. Suspend the pto with the lifting devices securely attached at 3 positions (minimum) so it remains with the main drive shaft in a horizontal position until it is safely lowered and resting on a secure bed.

7. Remove the sixteen hex-head capscrews securing the power take-off to the engine flywheel housing. Use two 1/2”-13 UNC x 1 1/2” bolts as pusher screws in the two tapped holes provided in the housing flange (39). Use the pusher screws to separate the pto from the engine flywheel housing. Remove the power take-off from the engine.

8. Remove the 6 hex-head capscrews securing the drive ring (1) to the engine flywheel.

Clutch Removal and Disassembly

(Refer to the parts list and exploded view illustration.)

1. Support the power take-off on a bench with the clutch end facing up. Use wooden blocks under the power take-off. Remove the two hex- head capscrews (41) and remove the instruction cover plate (40) if they were not previously removed.

2. Use a 15/16” wrench to remove the jam nut (34) and lockwasher (35) from the hose fitting (36) located in the power take-off housing. Push the fitting and hose (38) into the power take-off housing.

3. Use a standard bearing puller to remove the pilot bearing (2) and spacer (3), if used, from the clutch shaft (51).

   Note: The pilot bearing will be destroyed upon removal. If the bearing seal is broken the bearing is considered destroyed.

4. Straighten the bent portion of the hub nut lockwasher (5). Use a 4” wrench or socket to remove the hub nut (4) from the clutch shaft (51).

5. Use a gear puller with threaded legs for 3/4”-10 UNC tapped holes to pull the clutch assembly (10 through 32) from the clutch shaft. Install the puller so the threaded legs screw into the holes provided in the hub-and-back plate (10) and the jackscrew exerts force on the end of the clutch shaft.

⚠ CAUTION

The thread puller holes are not to be used as jackscrews.

Remove the clutch and puller from the clutch shaft. Remove the hub key (50) if it was not removed with the clutch.

6. Set the clutch assembly on a bench with the throwout collar (29 through 32) facing up. Remove the grease fitting (33) from the hose fitting (36). Remove the hose (37) and hose fitting (38) from the trunnion of the collar assembly.

7. Pull the adjusting lock pin (28), compressing the lock pin spring (27), and unscrew the adjusting yoke (12) from the hub-and-back plate assembly (10). Remove the adjusting lock pin and spring from the adjusting yoke.

8. Remove the external snapring (26), collar ring (25) and woodruff key (24) from the sliding sleeve (17).

9. Remove 2 hex huts (30) and 2 hex head bolts (32), the throwout collar halves (29) and shims (31) from the sliding sleeve (23).

10. Straighten and remove the 4 cotter pins (14) and the 4 clutch lever pins (16) and disconnect the levers (15) from the adjusting yoke (17).

11. Straighten and remove the 4 cotter pins (18) and 4 cotter pins (21). Remove 4 lever pins (20), 4 sleeve pins (22), 8 lever links (19) and 4 levers (15) from the sliding sleeve.

12. Remove the pressure plate (13), 3 driving plates (11) and 2 center plate assemblies (12) from the hub-and-back plate (10).

Clutch Shaft and Housing Disassembly

Refer to the parts list and exploded view illustration near the back of this manual.

1. Remove the oil level gauge (61), the hex head pipe cap (60), and the pipe nipple (59) from the bearing carrier (55).

2. Position the clutch housing on the bench with the input end facing upward. Remove the hex-head capscrew (64) from the throwout yoke (63). Tap one end of the operating shaft (65) gently to expose one of the woodruff keys (66). Remove the key. Do the same for the other side of the shaft to remove the other key. Remove the operating shaft from the housing (39) and throwout yoke.

3. Turn the power take-off housing with attached parts over on the bench. Support the housing so the output end of the clutch shaft faces up and is free to rotate. There should be a 12.7 cm. (5”) clearance below the input end of the clutch shaft (51).

4. Remove 8 hex head capscrews (56) and remove the support plate and the bearing carrier (55) from the housing (39).

5. Lift the clutch shaft and bearing carrier unit from the clutch housing.

6. Secure the clutch shaft with attached parts in a large vise with protective jaws, with the input end of the clutch shaft facing up, gripping the rear cast section of the bearing carrier in the vise.

7. Remove hex head capscrew (42) and the bearing retainer lock (43) from the bearing carrier (55). Use a spanner wrench or a wide-end punch and hammer to unthread the bearing retainer (44) from the bearing carrier.

8. Remove the oil seal (47) from the bearing retainer ONLY if it is being replaced.

9. Remove the o-ring (45) from the bearing retainer.

10. Lift the clutch shaft (51) with 2 bearing cones (48 & 49) from the bearing housing. The forward bearing cup (48) will come out with the shaft and bearing cones.

11. Use an arbor press or bearing puller to remove the bearing cones (48 & 49) from the clutch shaft only if replacement is necessary. The bearing cones remove in opposite directions, away from the machined shoulder on the clutch shaft.

12. Remove wear sleeves (47 and 54) from the clutch shaft by using a dull chisel and rapping it sharply. The sleeves should expand slightly and become loosened from the shaft for easy removal. If the sleeves do not loosen sufficiently with the first rap, rotate the shaft 180° and try again from the opposite side.

⚠ CAUTION

Be sure the chisel does not cause a groove or slot on the shaft shoulder beneath the wear sleeves. Oil leakage will result if the surface is not smooth and undamaged when the new sleeves are installed.

13. Remove the rear bearing cup (49) from the bearing carrier by first removing the two 1/2" pipe plugs (57) from the bearing carrier. Then tap the race from the bearing carrier using a blunt-end punch through the holes. Remove the race ONLY if replacement is necessary.

14. Remove the oil seal (53) from the bearing retainer (55) ONLY if it is being replaced.

15. Remove the oil gauge extension (73) ONLY if it is being replaced.

Assembly

Cleaning and Inspection

Refer to the parts list and exploded view illustration near the back of this manual.

General

Replace any part that is worn or damaged.

Bearings.

1. Thoroughly wash bearings in clean solvent if they have been in service. Soak bearings in solvent if they are particularly dirty.

⚠ CAUTION

Never dry bearing with compressed air. Do not spin bearings while they are not lubricated. Oil bearings with SAE 10 engine oil immediately after cleaning. Be sure bearings are oiled before inspection. Protect clean bearings, whether they are new or have been in service, from dirt, dust, grit or any other contaminant.

2. Inspect bearings for roughness of rotation. Replace the bearing if roughness is found.

3. Inspect bearings for corrosion, scored, scratched, cracked, pitted or chipped races, and for indication of excessive wear of balls or rollers. If one of the these defects is found, replace the bearing.

Preventing Entrance of Dirt Into Bearings.

4. Dirt and grit in bearings are often responsible for bearing failure. Consequently, it is important to keep bearings clean. Do not remove grease from new bearings. Keep the wrapper on new bearings until immediately before they are to be installed. Do not expose new clean bearings until they are ready to be used in the assembly. Keep them wrapped in clean lint-free cloth or paper to keep out dust and debris. Protect bearings from contamination even after they are installed on the shaft or in the bore.

Housings, Cast Parts and Machined Surfaces.

5. Replace cast parts or housings that are cracked.

6. Inspect bearing bores for grooved, burred or galled conditions that would indicate that the bearing has been turning in its housing. If the damage cannot be repaired to like-new condition with a crocus cloth, replace the part.

7. Inspect bores for wear, grooves, scratches and dirt. Remove burrs and scratches with crocus cloth or a soft stone. Replace parts that are deeply grooved or scratched.

8. Inspect oil passages for obstructions. If an obstruction is found, remove it with compressed air or by working a wire or wire brush back and forth through the passage and flushing it with solvent.

Shafts, seal lip contact surfaces and bearing journals.

9. Inspect machined surfaces for burrs, scratches, nicks and foreign matter. If such defects cannot be removed with crocus cloth or a soft stone, replace the part.

10. Inspect bearing journals on the shaft for grooved, burred or galled conditions that would indicate that the bearing has been turning on the shaft. If the damage cannot be repaired to like-new condition with a crocus cloth, replace the part.

11. Inspect oil seal lip contact surfaces on wear sleeves and other surfaces. Look especially for scratches or nicks that intersect with or cross the lip contact area. If they cannot be removed using a very fine crocus cloth, replace the part.

12. Inspect threaded openings for damaged threads. Chase damaged threads with a tap of the correct size.

13. Inspect the pilot bearing journal on the clutch shaft. If it is worn in any way, or if it shows signs that the pilot bearing has been turning on the journal, replace the clutch shaft.

Clutch Shaft and Housing Assembly

Refer to the parts list and exploded view illustration near the back of this manual.

Bearing Carrier.

1. Position the bearing carrier (55) on the bed of an arbor press with the output end up.

2. Rest the oil seal (53) in the bore; the seal lip should be down, extending toward the input end of the bearing carrier. Use a flat steel plate slightly larger in diameter than the O.D. of the oil seal. Using the flat plate on top of the seal, press the seal straight into the bore until the steel plate stops against the surface of the carrier. The rear of the outer shell of the seal should be flush with the surface. Pre-lubricate the seal lip with clean No. 30 engine oil.

   Note: Press only against the outer shell of the seal. Do not damage the seal lip.

3. Install 2 pipe plugs (57) in the threaded hole on the back of the bearing carrier.

4. Install the drain plug (58) in the threaded hole on the flange of the bearing carrier.

5. Invert the bearing carrier (55) on the bench so the input end is up. Use a piece of steel tubing or round plate slightly smaller in diameter than the outer diameter of the rear main bearing cup (49). Place the bearing cup (49) on the carrier, back (wide section) face down. Be sure the steel tubing or plate does not press against the bearing's roller contact surface in the cup. Press the cup to the bottom of the bore.

Clutch Shaft.

6. Clean the tapered bearing cones (48 & 49) and clutch shaft (51) with isopropyl solvent to remove any oil or grease residue.

   Note: Do not use any oil or paraffin based solvents.

7. Use an arbor press to install the two bearing cones on the clutch shaft (51). Use a piece of steel tubing approximately 63.5 cm. (25 inches) long and just slightly larger in inside diameter than the bearing cone's inside diameter. The tubing must not be thick enough to contact the cage of the bearing during installation. Install the cones, one from each end, with the back faces (wide section) butting against the shoulder on the clutch shaft.

   Note: An alternative method to install the bearing cones is to heat them in an oven at 135° C. (275° F.) for one hour and install them immediately on the clutch shaft. Let the bearing cone cool to room temperature after installation while continuing to apply force as the bearing cools. This is necessary to ensure that it remains properly seated.

8. After the bearings return to room temperature, coat the bearing rollers and both bearing cups with a light film of clean No. 30 engine oil.

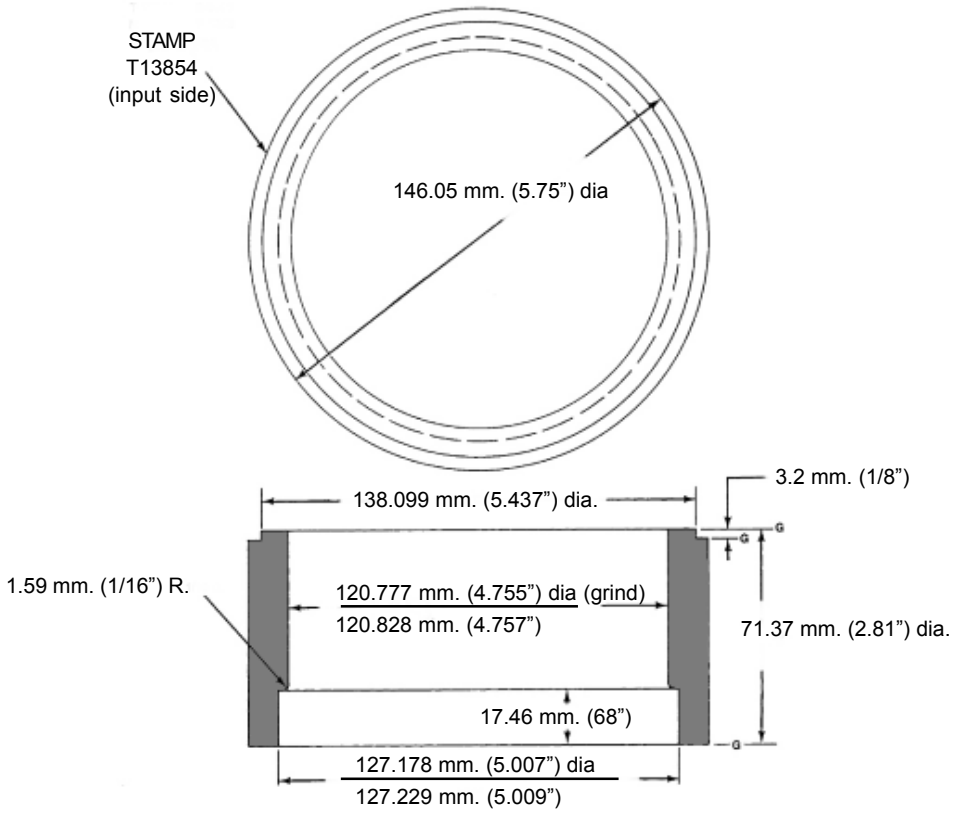


Figure 12. Sleeve Tool T-13854 (input side)

9. Coat the I.D. of wear sleeves (47 and 54) with an anerobic sealant Twin Disc part number M2828. Using wear sleeve drivers T-13854 (input side) and T-13855 (output side) (See figures 12 and 13) press the sleeves onto the shaft, one from each end. Be sure the contours blend in with the shoulders of the clutch shaft. (See figure 14) Remove excess sealant when sleeves are in their proper positions on the shaft. Coat both seal lips with a light film of clean No. 30 engine oil.

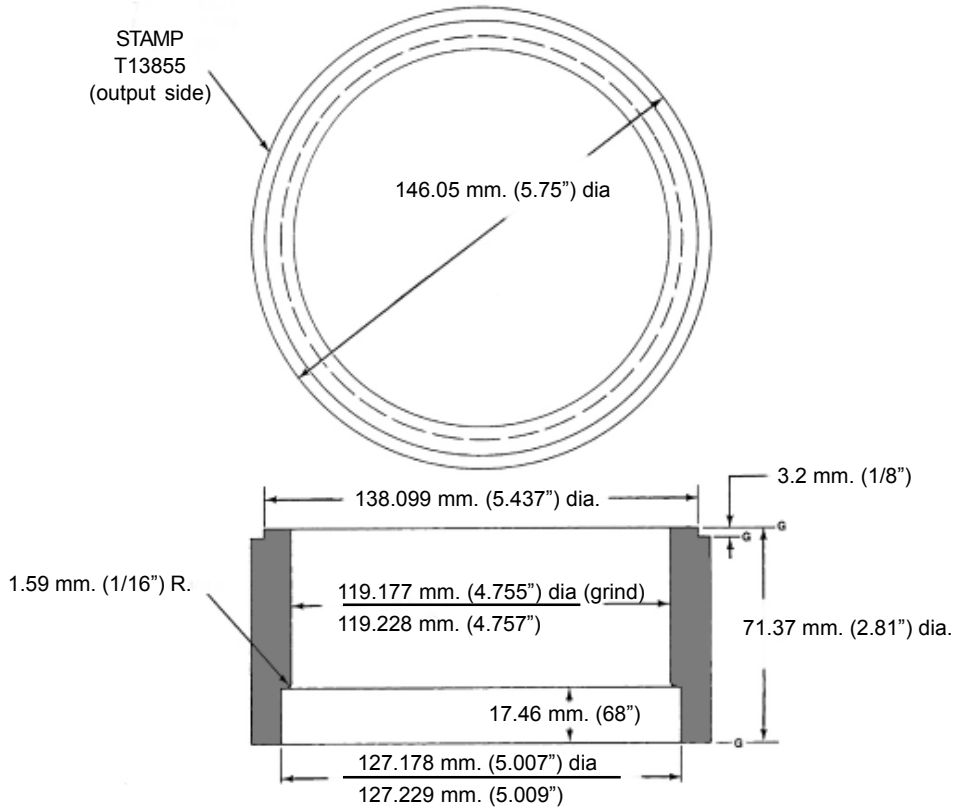


Figure 13. Sleeve Tool T-13855 (output side)

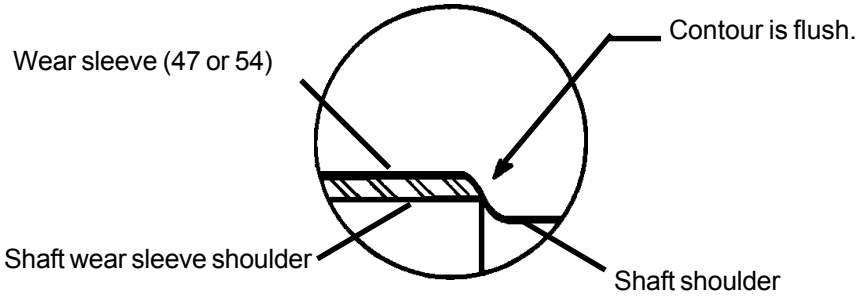


Figure 14. Locating the oil seal wear sleeves on the shaft

Install the clutch shaft and bearing cones into the bearing carrier.

10. Place the bearing carrier (55) in a large bench vise with protective jaws or securely support it on a bench with the input end up. There must be approx. 30.5 cm. (12 inches) clearance below the carrier to install the shaft. Carefully install shaft and bearings in the bearing carrier. The output end of the shaft must enter the carrier first.

11. Install the forward bearing cup (48) into the bearing carrier. Gently tap it into the bore until it just touches against the bearing cone.

    Note: Do not pre-grease the bearings until the final bearing end play setting is made. The bearing cups and cones (48 & 49) should be oiled prior to assembly.

12. Install the o-ring (45) in the bore resting against the bearing cup.

13. Install the bearing retainer (44) over the clutch shaft, and thread it into the bearing carrier until it comes in contact against the o-ring and bearing cup.

(Preliminary setting) Measure and set bearing end play.

14. Continue to tighten the bearing retainer until 6.8 Nm. (60 in.-lbs.) of torque is required to rotate the shaft.

    Note: Do not overtighten! Damage may occur to the bearings or bearing retainer.

    Rotate the shaft several revolutions. This aligns and seats the bearing cones in the bearing cups and creates a “zero” clearance.

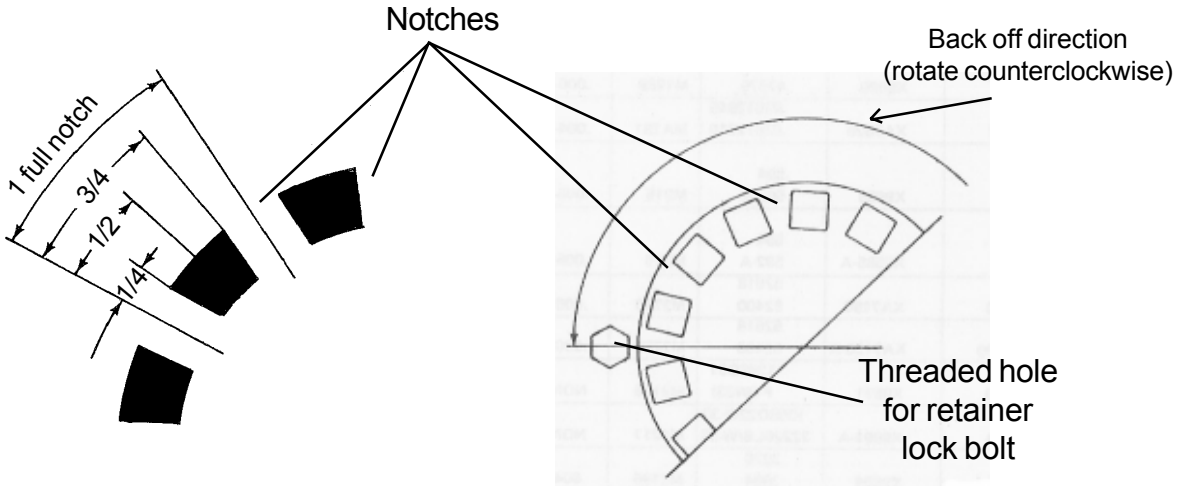


Figure 15. Bearing Retainer Notches

15. Note the position of any one of the notches in the bearing retainer relative to the threaded hole for the retainer lock capscrew. Back off the bearing retainer (44) 6 - 8 notches to create a clearance between the bearing retainer and bearing cup.

    Note: For in-line operation, back off the bearing retainer (44) 8 - 9 notches.

16. Bump the output end of the shaft with a soft mallet hard enough to move and seat the front bearing cup up against the bearing retainer and create the specified bearing clearance.

Install the bearing carrier unit on the clutch housing.

17. Set the clutch housing (39) on a work bench, securely supported with wooden blocks, with the input end of the housing facing down. There should be 12.7 cm. (5 inches) of clearance below the housing to allow for installation of the clutch shaft.

18. Lift the bearing carrier and shaft using a hoist securely attached to it. Carefully lower the bearing carrier and shaft onto the clutch housing. Disconnect the hoist. Position the carrier so the word “top” will be *up* when the clutch housing is in its final position on the engine.

19. Attach the support plate and secure the carrier to the clutch housing with 8 hex-head capscrews (56) 5/8” - 11 x 2 1/2.” Torque the capscrews to the proper specifications given in Torque Values for Fasteners in Table 1 of the Installation section.

(Final setting) Measure and set bearing end play.

20. Securely support the unit with the clutch shaft in a vertical position and the output end up (see figure 16). Be sure the shaft is clear to rotate.

21. Attach an eyebolt in the thread at the output end of the shaft. Attach a hoist with a thrust bearing-equipped swivel hook to the eyebolt.

22. Securely attach a dial indicator to the housing and locate the stem so the tip is contacting the end of the shaft and movement of the tip is *exactly* vertical, the same direction as the movement of the shaft.

23. Lift the unit off the supports using the hoist. Apply approximately 90.7 Kg. (200 lbs.) of downward force on the bearing carrier while dial indicator is being set. Mark a spot on the end of the shaft next to the stem as a starting reference point and set the dial indicator to “0.”

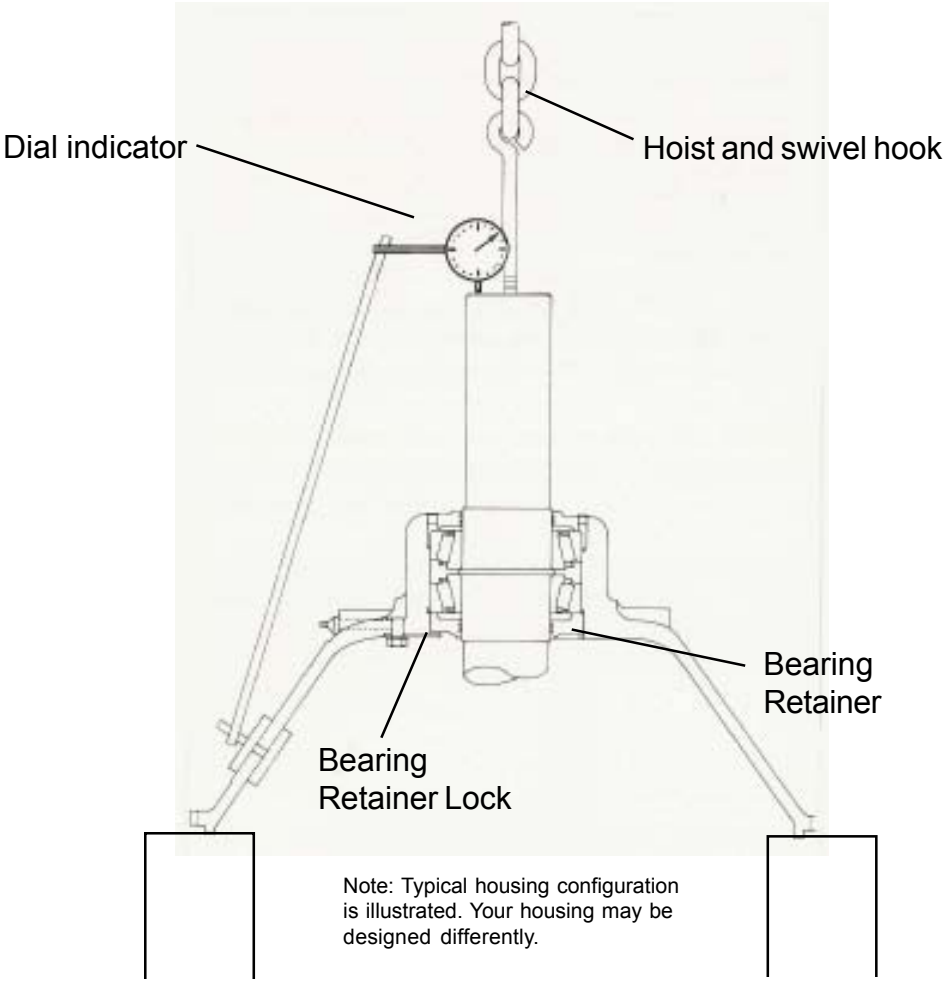


Figure 16. Measuring and setting bearing end play

24. Carefully and gently lower the unit back onto the supports. Allow the hoist to go slack. Apply approximately 90.7 Kg. (200 lbs.) of downward force on the shaft while dial indicator reading is being taken. (The weight of the shaft will be considered part of the 90.7 Kg. (200 lbs.)) Read the dial indicator to read actual bearing end play.

25. Repeat steps 23 and 24 to be sure the dial indicator reading repeats with accuracy. Adjust the bearing retainer as necessary to obtain .25 - .36 mm. (.010 - .014") bearing end play.

Note: For in-line operation, adjust the bearing retainer as necessary to obtain the bearing end play shown in the **Maintenance Section** of this manual.

Note: Bump the output end of the shaft with a soft mallet (as in step 16 above) hard enough to move and seat the front bearing cup up against the bearing retainer and create

the specified bearing clearance after each adjustment of the bearing retainer.

26. Once the bearing end play adjustment is completed, match-mark the bearing retainer and bearing housing so the bearing retainer may be removed and reinstalled in the same *exact* position.

27. After match-marking the bearing retainer and bearing housing, remove the bearing retainer (44), o-ring (45) and front bearing cup (48).

28. Remove the shaft and pre-lubricate the bearing cones (48 & 49) with grease specified in the **lubrication specifications in the Maintenance section**. This will assure adequate lubrication at initial start-up.

    Note: Do not pack the bearing carrier cavity with grease. The proper amount of grease will be added later.

29. Reinstall the shaft with bearings, front bearing cup, o-ring and bearing retainer. Position the bearing retainer *exactly* as it was prior to removal in step 26. Realign the match-marks.

30. When the bearing retainer is in the proper position, Install the bearing retainer lock (43) in the nearest notch and secure the lock with the hex-head capscrew (42). Torque the capscrew to the proper specifications given in Torque Values for Fasteners in Table 1 of the Installation section.

Install the operating shaft and throwout yoke.

31. Position the clutch housing on a bench with the input end facing up. Install the operating shaft (65) halfway into the clutch housing. Slip the throwout fork (63) onto the operating shaft and push the shaft through to the hole on the other side of the clutch housing far enough to expose one of the woodruff key slots at the center of the throwout fork.

32. Install one woodruff key (66) in the operating shaft.

33. Push the operating shaft the other way to expose the other key slot in the center of the fork.

34. Install the other woodruff key (66).

35. Center the operating fork so the hex head capscrew 5/16" - 18 x 2 1/2" (64) will enter the bottom of the throwout fork and thread into the top section. Install the hex-head capscrew and tighten. Torque the capscrew to the proper specifications given in Torque Values for Fasteners in Table 1 of the Installation section.

Clutch Assembly

Refer to the parts list and exploded view illustration near the back of this manual.

1. Set the hub-and-back plate (10) on a bench with the threaded and splined section facing up.

2. Install a driving plate assembly (11) on the hub-and-backplate. Install a center plate assembly (12) so it rests flat on the driving plate, meshing the splines of the center plate and hub-and-backplate.

3. Install a second driving plate assembly (11) on the center plate, and a second center plate assembly (12).

4. Install a third driving plate assembly (11) on the center plate and install the pressure plate (13) on the third driving plate, meshing the splines of the center plate and hub-and-backplate.

5. Install the adjusting lock pin spring (27) into the adjusting yoke (17) and install the adjusting lock pin (28).

6. Pull the pin, compressing the spring while screwing the adjusting yoke partially onto the threaded part of the hub-and-back plate.

7. Place the sliding sleeve (23) on the adjusting yoke, aligning the mounting lugs for the clutch levers on the yoke and sleeve.

8. Attach 4 clutch levers (15) with 4 headed lever pins (20), 4 cotter pins (18), 8 lever links (19), 4 headed lever pins (22) and 4 cotter pins (21) to the sliding sleeve (23. Spread the legs of the cotter pins so their ends extend no more than 11.9 mm. (.47”) from the center of the lever pin.

9. Hook the levers (15) over the pressure plate flange and secure to the adjusting yoke (17) with 4 lever pins (16) and 4 cotter pins (14). Again, spread the legs of the cotter pins so their ends extend no more than 11.9 mm. (.47”) from the center of the lever pin.

10. Install the woodruff key (24) in the slot of the sliding sleeve (23), and install the collar ring (25) with the keyway aligned with the woodruff key. Install the external snapring (26) to secure the collar ring on the sleeve.

11. Lubricate the shoulder of the sliding sleeve with No. 30 engine oil prior to installation of the split collar. Place the split collar (29) halves over the collar ring (25). Place two shims (31) between the collar halves and install 2 hex head capscrews 1/2" - 20 x 3 1/4" (32) through the halves. Install 2 hex nuts (30) on the capscrews. Torque the capscrews to the proper specifications given in Torque Values for Fasteners in Table 1 of the Installation section.

12. Check collar rotation to be sure it turns freely on the sliding sleeve.

13. Install the hose fitting (38) in the collar trunnion, and attach the flexible hose (37), hose fitting (36) and lubrication fitting (33).

14. Visually center the driving plates on the clutch and align the teeth. Press down on the collar assembly to lock the plates in place. If necessary, pull the adjustment lock pin to compress the lock pin spring, and rotate the adjusting yoke assembly until the plates are locked in position when the collar is pressed down.

    Note: This is an initial setting to hold the plates in place until after the pto is mounted on the engine, so it is imperative that the teeth be *exactly* aligned and the plates are *exactly* centered on the clutch. The driving ring may be used as an alignment fixture to align the teeth and center the plates relative to the hub-and-backplate so they are perfectly aligned when the pto is installed on the engine.

PTO Final Assembly

Install the clutch in the clutch housing.

Refer to the parts list and exploded view illustration near the back of this manual.

1. Set up and support the main housing assembly (39) with attached parts on the bench with the input side facing up.

   Note: The output end of the shaft *must* rest securely on a solid surface.

2. Carefully place the clutch assembly over the clutch shaft while:

   A. Aligning the trunnions on the collar with the throwout fork.

   B. Aligning the keyways in the hub-and-back plate.

3. Partially install the hub key (50) in the keyway. Tap the hub-and-back plate with a large, but soft mallet, to seat it on the tapered surface of the clutch shaft.

⚠ CAUTION

Be sure the output end of the shaft is resting on a solid surface to absorb the force through the shaft rather than through the bearing surfaces.

4. Drive the hub key (50) into position slightly below the surface of the hub-and-back plate.

   Note: Do not use excessive hammer force when installing the key.

5. Install the hub nut lockwasher (5) over the clutch shaft (51), locating its tab in the drilled hole on the hub-and-back plate (10). Install the hub nut and tighten and torque to 40.7 Nm. (30 ft. -lb).

6. Tighten the hub nut an additional 3/4-7/8 turn clockwise, then bend a side of the hub nut lockwasher up against a flat on the hub nut.

7. Route the flexible hose assembly (37) clear of all moving parts and push the end hose fitting (36) through the hole in the clutch housing.

8. Install the lockwasher (35) and jam nut (34) to retain the end fitting (36) in the housing. Torque the capscrew to the proper specifications given in Torque Values for Fasteners in Table 1 of the Installation section.

⚠ CAUTION

Confirm that the hose assembly is not twisted or applying preload to the collar assembly.

Final assembly and lubrication.

9. Install the power take-off according to instructions in the Installation section.

10. Adjust the clutch according to Clutch Adjustment in the Maintenance section.

11. Fill the bearing carrier cavity with oil according to lubrication specifications in the Maintenance section.

12. Lubricate the remainder of the pto according to lubrication specifications in the Maintenance section.

13. Place the instruction cover plate (40) in position on the housing and secure with 2 hex-head cap screws 5/16” - 18 x 1/2” (41). Torque the capscrews to the proper specifications given in Torque Values for Fasteners in Table 1 of the Installation section.

14. Install the shaft key (52) and all parts previously removed from the output end of the clutch shaft.

15. Install the pipe nipple (59). Torque the pipe nipple to the proper specifications given in Torque Values for Fasteners in Table 3 of the Installation section.

16. Install the hex-head pipe cap (60) on the pipe nipple.

17. Install the oil gauge extension (73) in the bearing carrier (55).

18. Install the oil level gauge (61).

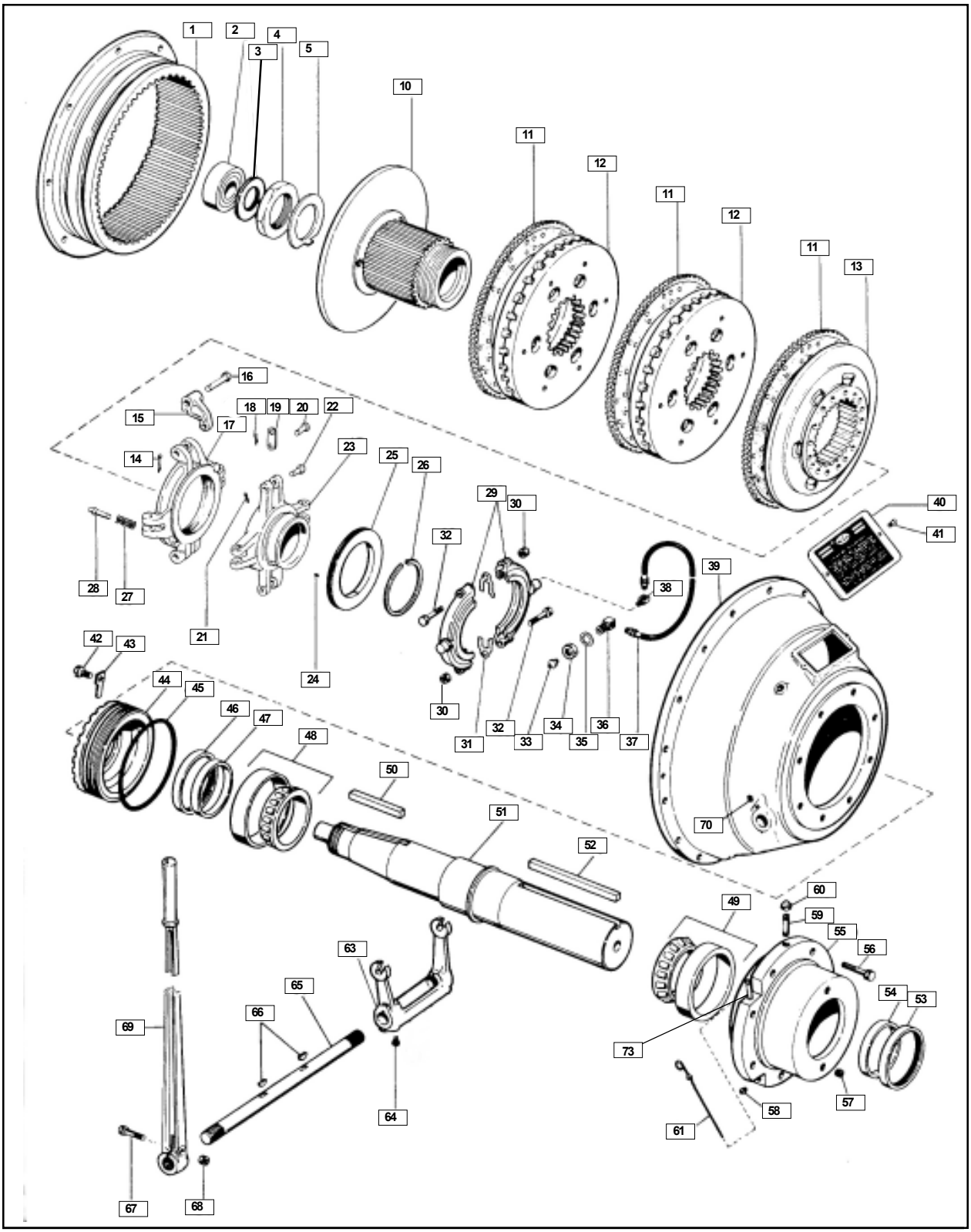
IBF318OP Series Parts Identification List

Item	Description	Qty.
1	Ring, driving	1
2	Bearing, pilot	1
3	Spacer, bearing, pilot (used with ball bearing)	1
4	Nut, hub	1
5	Lockwasher, hub nut	1
10	Plate, hub-and-back	1
11	Plate, driving, clutch	3
12	Plate Assembly, centering, clutch	2
13	Plate, pressure	1
14	Pin, cotter	4
15	Lever, clutch	4
16	Pin, headed, lever	4
17	Yoke, adjusting	1
18	Pin, cotter	4
19	Link, lever	8
20	Pin, headed, lever	4
21	Pin, cotter	4
22	Pin, headed, sleeve	4
23	Sleeve, sliding	1
24	Key, woodruff	1
25	Ring, collar	1
26	Ring, snap, external	1
27	Spring, pin, adjusting	1
28	Pin, lock, adjusting	1
29	Collar, throwout	1
30	Nut, hex 1/2” - 20	2
31	Shim, collar	2
32	Capscrew, hex-head 1/2”-20 x 3 1/4”	2
33	Fitting, lubrication	1
34	Nut, jam, hex 5/8”	1
35	Lockwasher, nut, jam 5/8”	1
36	Fitting, hose	1
37	Hose, flexible	1
38	Fitting, hose	1
39	Housing, clutch,	1
40	Plate, cover, instruction	1
41	Capscrew, hex-head, 5/16”-18 x 1/2”	2
42	Capscrew, hex-head 5/16”-18 x 5/8”	1
43	Lock, retainer, bearing	1
44	Retainer, bearing	1

Item	Description	Qty.
45	O-ring	1
46	Seal, oil	1
47	Sleeve, wear	1
48	Bearing, tapered roller	1
49	Bearing, tapered roller	1
50	Key, hub-and-back plate	1
51	Shaft, clutch	1
52	Key, shaft, clutch	1
53	Seal, oil	1
54	Sleeve, wear	1
55	Carrier, bearing	1
56	Capscrew, hex-head 5/8”-11 x 2 1/2”	8
57	Plug, pipe, flush	2
58	Plug, pipe, (drain) 1/4	1
59	Nipple, pipe 1/2 x 2	1
60	Cap, pipe, hex-head 1/4	1
61	Gauge, oil level	1
63	Fork, throwout	1
64	Capscrew, hex-head 5/16”-18 x 2 1/2”	1
65	Shaft, operating	1
66	Key, woodruff (C)	2
67	Capscrew, hex-head 1/2”-13 x 2 1/2”	1
68	Nut, hex 1/2	1
69	Lever, hand	1
70	Fitting, lubrication	2
73	Extension, oil gauge	1

IBF318OP Series Exploded View

Note: Typical unit illustrated.



Engineering Drawings

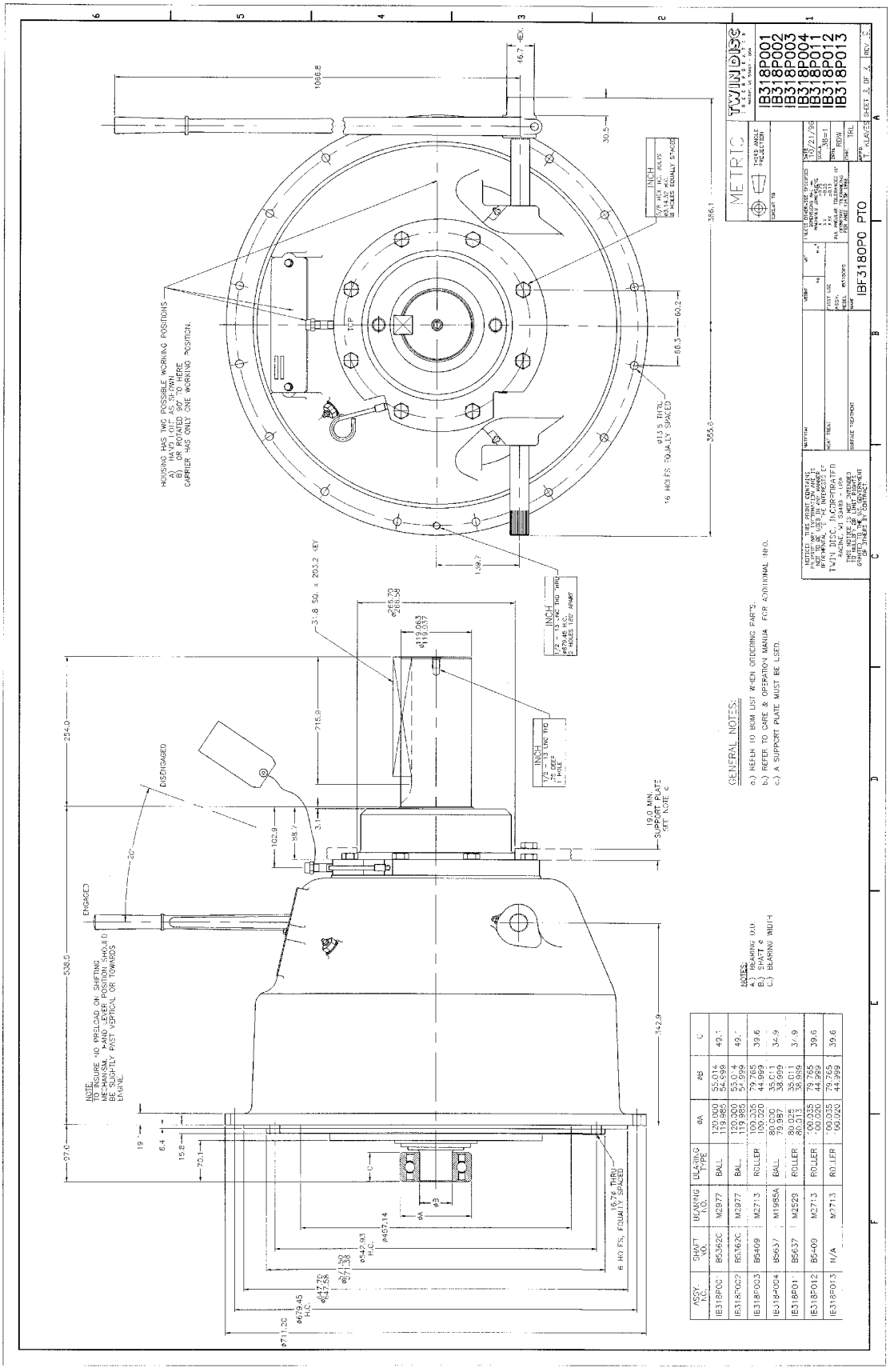
The engineering drawings included are listed below.

Note: All part numbers listed in the following engineering drawings are for reference only. Please refer to your bill of material for part numbers specific to your model.

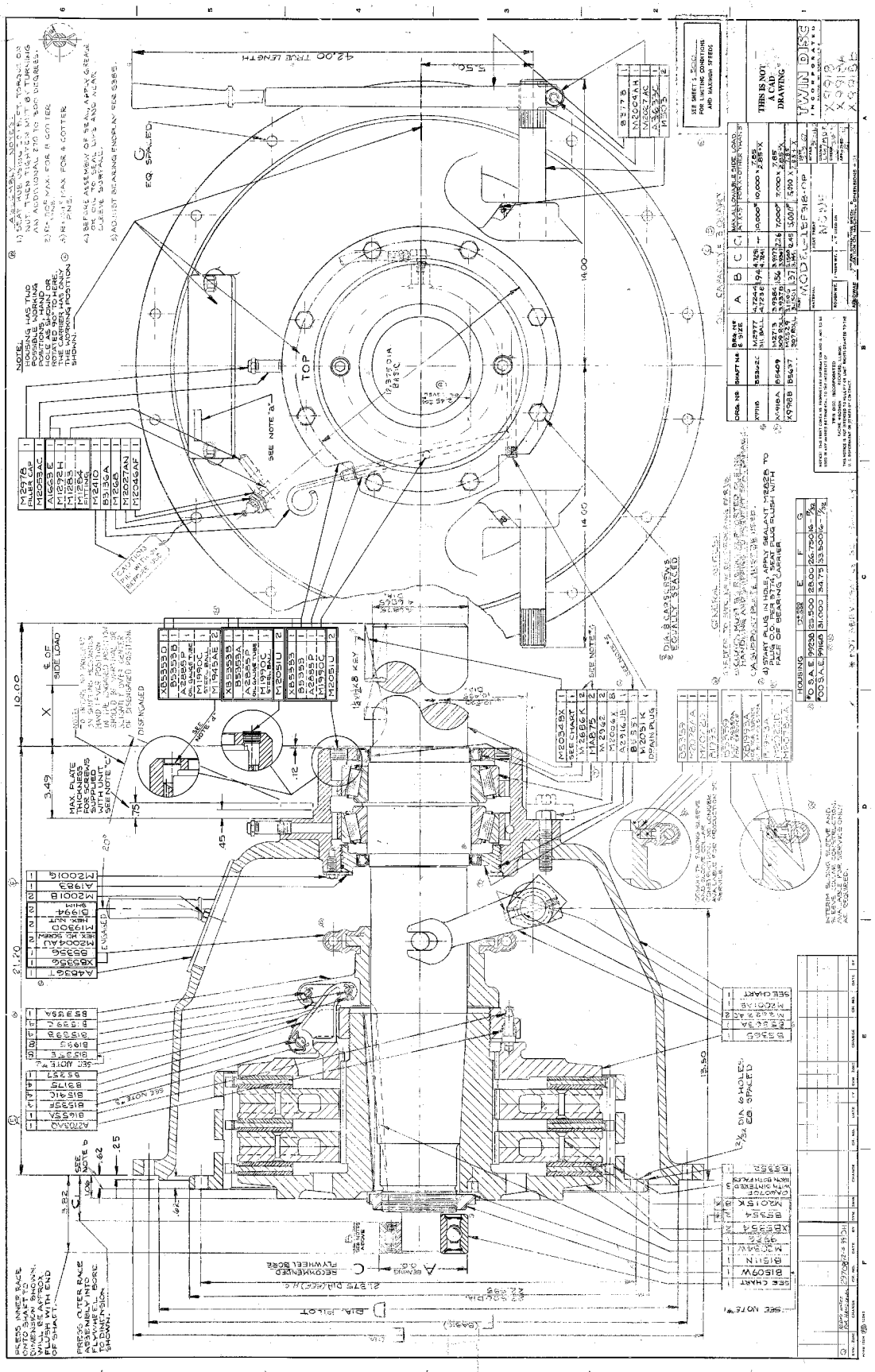
- ❑ IBF318OP-0 IB318001-2
- ❑ IBF318OP-0 IB318002-2
- ❑ IBF318P-O IB318003-2
- ❑ IBF318P-O IB318004-2
- ❑ IBF318P-O IB318011-2
- ❑ IBF318P-O IB318012-2
- ❑ IBF318P-O IB318013-2
- ❑ IBF318OP-0 X-9918
- ❑ IBF318OP-0 X-9918-A
- ❑ IBF318OP-0 X-9918-B

Contact your Authorized Twin Disc Dealer for the latest BOM and engineering drawings.

IB318OP001-2, IB318OP002-2, IB318OP003-2, IB318OP004-2, IB318OP011-2, IB318OP012-2, IB318OP013-1



IBF318OP-0 (X-9918), IBF318OP-0 (X-9918-A), IBF318OP-0 (X-9918-B)



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