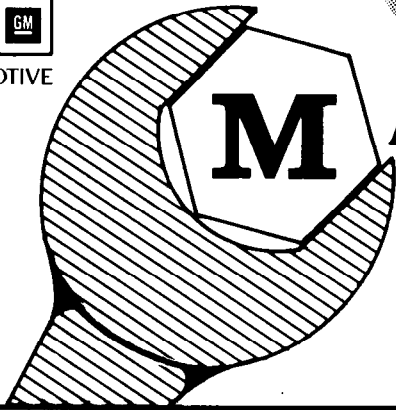




M.I. 275
*Rev. C



MAINTENANCE INSTRUCTION

TURBOCHARGER OVERHAUL PROCEDURES 645 SERIES ENGINES

Section

0	.....	GENERAL INFORMATION
1	.....	DISASSEMBLY PROCEDURES
2	.....	CLEANING
3	.....	INSPECTION AND REWORK
4	.....	ASSEMBLY PROCEDURES
5	.....	TEST PROCEDURES
6	.....	SPECIAL TOOLS

*This bulletin is revised and supersedes previous issues of this number.

The data contained in this instruction is presented in metric, in accord with the International System of Units (SI), and U.S. standard units.



• • • • **A Service Department Publication** • • • •

Electro-Motive Division Of General Motors La Grange, Illinois 60525

FOREWORD

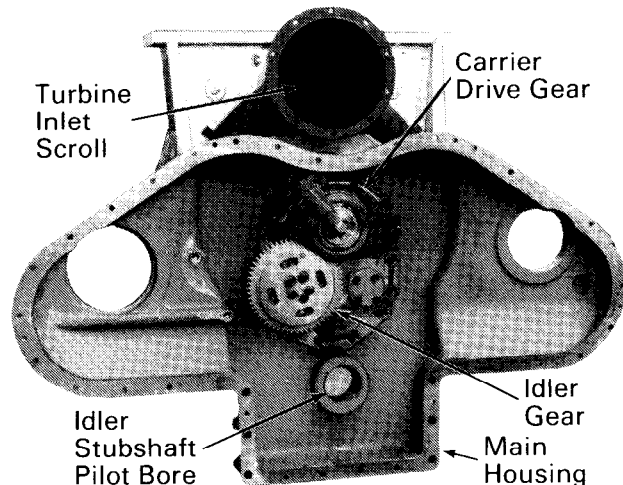
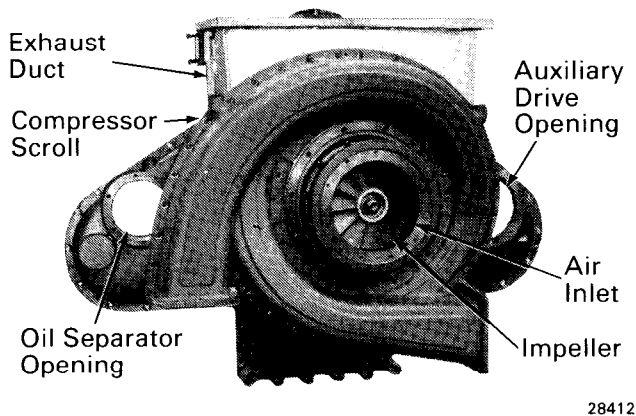
This maintenance instruction provides a general description of turbocharger operation and construction, general rebuild information, and detailed instructions on removal, disassembly, cleaning, qualification, rework, assembly, and installation of the turbocharger and all of its components. Instructions contained herein are primarily related to reconditioning and repair of turbochargers removed from 8, 12, 16, or 20-cylinder 645 engines in railroad and power generating service. Subparagraphs are used to describe procedure variations for turbochargers used in marine applications and those incorporating a high contact planetary gear drive arrangement or previously installed oversize components.

Manufacturing techniques and design considerations for best turbocharger reliability have resulted in a unit that is not readily disassembled or repaired without the proper tools and facilities. We do not recommend any attempts at disassembly or repair without the necessary special tools and fixtures required. Personnel should have a thorough understanding of the equipment before attempting to perform any maintenance.

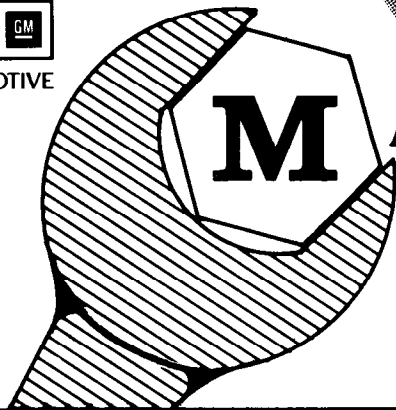
Certain operating conditions will vary the stresses and wear rates of some turbocharger components.

When these conditions increase stresses and wear rates, the condemning limits for some components may appear too generous, and likewise, where stresses and wear rates appear too narrow, the condemning limits for other components may seem to cause unnecessary rework or scrapping of reusable parts. With experience and knowledge, qualified personnel can establish their own limits for these components, especially when they are able to make a personal inspection and evaluation of questionable conditions. Generally, however, our experience has shown that deviations from our recommendations should be kept to a minimum and, if done, they should be on a limited trial basis until they have proven practical.

Design improvements may obsolete some of the turbo components described or illustrated in this publication. Generally, the improved components will be interchangeable with original components and disassembly, reassembly, and qualification procedures will not change. Normally, if any procedure changes are made because of obsolete components, turbo rebuild facilities in the field will be advised. Questions regarding procedure changes should be directed to your Electro-Motive Division (EMD) representative.



Typical Turbocharger Assembly For EMD
645 Series Engines



MAINTENANCE INSTRUCTION

SPECIAL TOOLS

GENERAL

This section lists special tools available from EMD for turbocharger rebuild. Many of the small machine tools, gauges and assembly hardware or fixtures can be procured, made or substituted locally. Common hand tools and standard equipment are not listed and should also be purchased locally. Most rebuild facilities will not require all the tools listed, the extent of rework performed at each facility will determine the tools required.

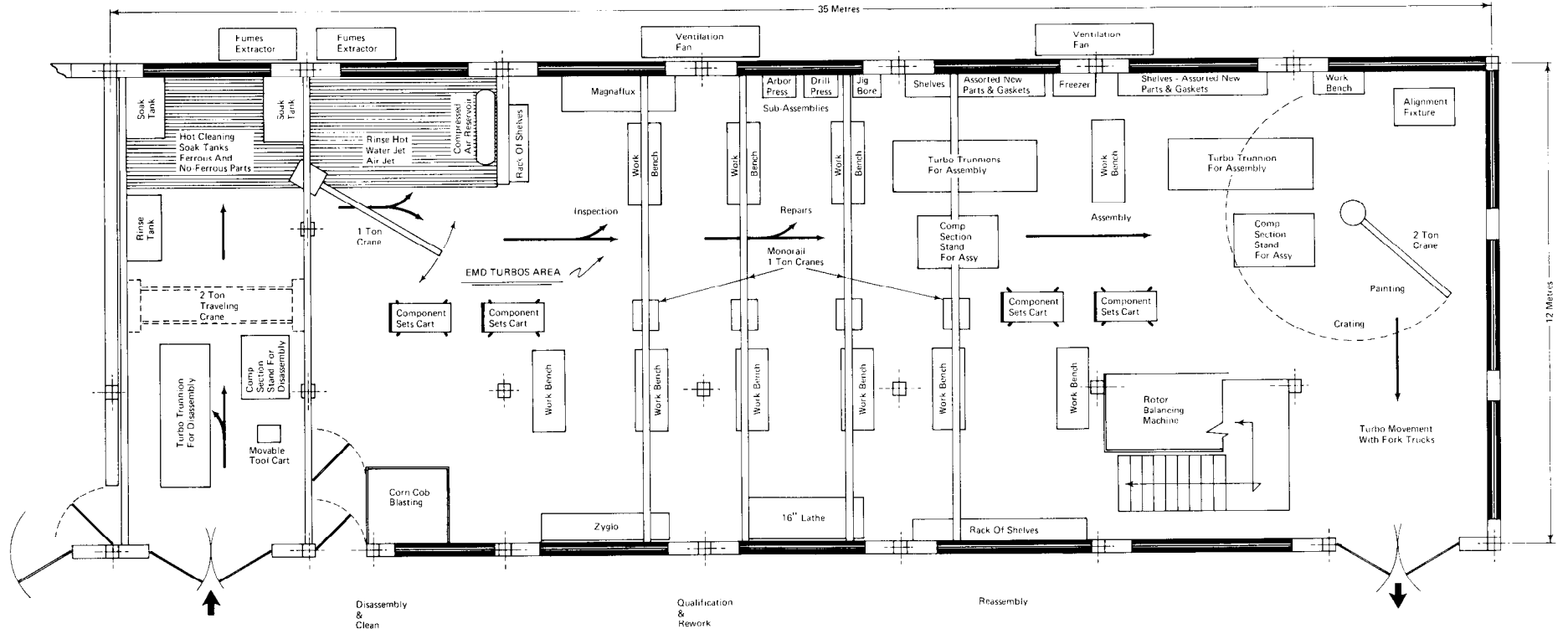
As an aid in selecting the tools required for a particular facility, certain information is included in the description of each tool.

1. EMD Part Number – Many of the part numbers listed are internal EMD tool numbers while others are typical EMD component part numbers (8 or 9 million). Generally, items with both numbers or only a component part number are the most commonly used tools. When referring to these items, be sure to indicate the whole number (or numbers) including any letters. Also include information whether 50 or 60 Hz power is to be used for electrically operated equipment.
2. Rebuild Class – Rebuild operations have been segregated by the depth of rebuild ranging from assembly and disassembly to very detailed operations on various components.
 - a. Class 1 Rebuild – consists of turbo disassembly, cleaning, qualification of components, and reassembly. Minor rework, not requiring machine shop equipment, is included. Damaged components are either scrapped or shipped to reconditioning facility for repair and are replaced by new or reconditioned UTEX components.
 - b. Class 2 Rebuild – consists of rework machining of small turbocharger components performed on machines normally found in an average small machine shop. Lathes, grinders, drill presses, boring machines, shapers, and small milling machines are in this category.
 - c. Class 3 Rebuild – consists of rotor rework including machining, blade replacement, and balancing.
 - d. Class 4 Rebuild – consists of rework of the clutch doweling assembly requiring jig boring machinery.
 - e. Class 5 Rebuild – consists of alignment of turbocharger doweling assembly components required because of replacement, rework, or suspected distortion.
 - f. Class 6 Rebuild – consists of rework machining of large turbocharger components such as the turbine inlet scroll, exhaust duct, shroud, and components of the turbocharger doweling assembly performed in large vertical lathes and milling machines.
3. Types Of Turbochargers – Tools listed in the text may be used on all turbochargers except where specifically noted. Turbochargers may be broken down into four classifications. Some applicable or required tools vary from classification to classification.
 - a. 16E & EB and 20E & EB– These turbochargers use the same doweling assembly and internal components. The basic difference is in the areas of the nozzle vanes and compressor diffuser.

- b. 8E & EB, 12E & EB, and T – Again, these types of turbochargers use the same doweling assembly and internal components, with the basic difference being in the areas of the nozzle vanes and compressor diffuser.
 - c. High Capacity – A turbocharger equipped with the high capacity gear train requires some different tools when working in the gear train area.
 - d. Right-Hand Rotation – Turbocharger used on right-hand rotation engines utilize an additional idler gear and require some different tools when working in the idler gear area.
- 4. Quantity Required – Listed is the minimum quantity required to perform the required work on one turbocharger at one work station. If assembly and disassembly operations are to be performed simultaneously, or more than one of any particular work station is to be in operation, more tools will be needed.
 - 5. Description – The particular use for the tool. In some cases, operating instructions are included.

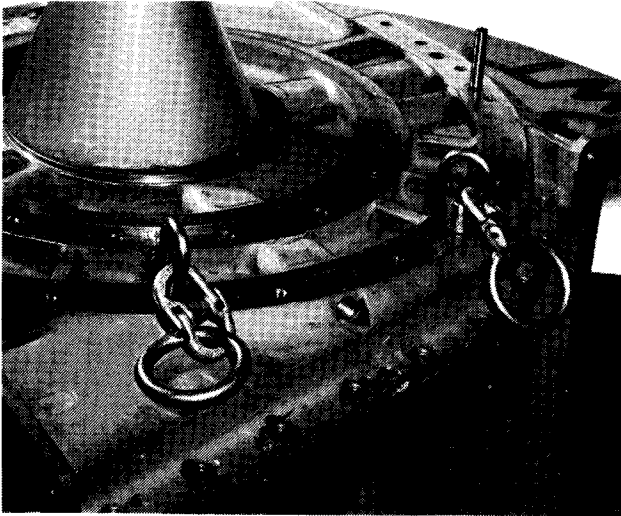
Plan drawing on Page 6-3 depicts a typical turbocharger repair facility. It is included as an aid in setting up a repair shop and shows at least one work area for all classes of rebuild. This type of facility would require a greater quantity of tools than the following listings indicate.

6-3



20683

REBUILD CLASS 1

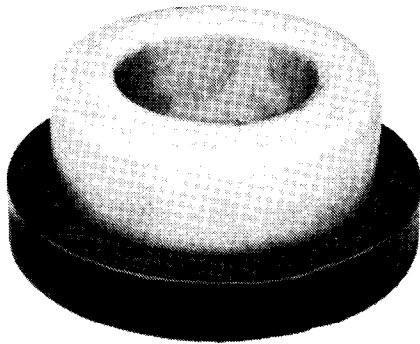


18266-1

1A-37166 (9570393) – Eyebolt, Compressor

Class 1 Rebuild – Used on all turbos - 2 required.

Used to apply the compressor rolover fixture 1L- 3031 to the compressor bearing support.

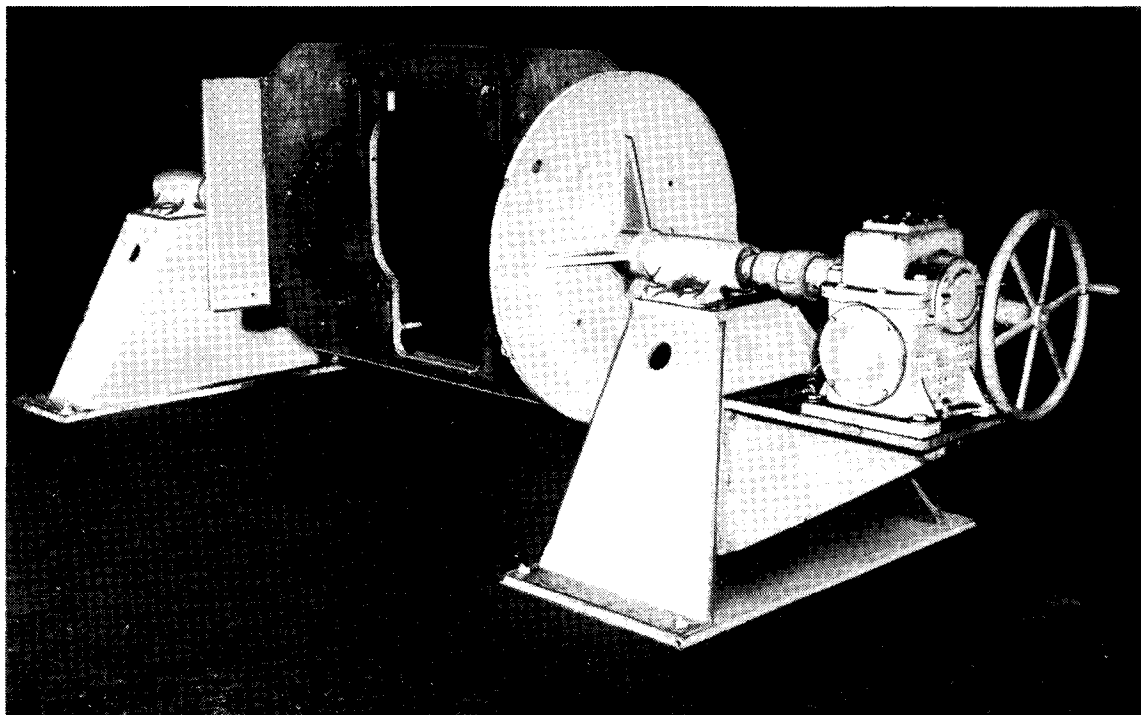


20508

1A-90951 (9548124) – Retainer, Roller

Class 1 Rebuild – Used on all turbos with roller clutches - 1 required.

Allows the removal of the spring clips, 2B-36695 (9549777), when assembling the roller clutch.

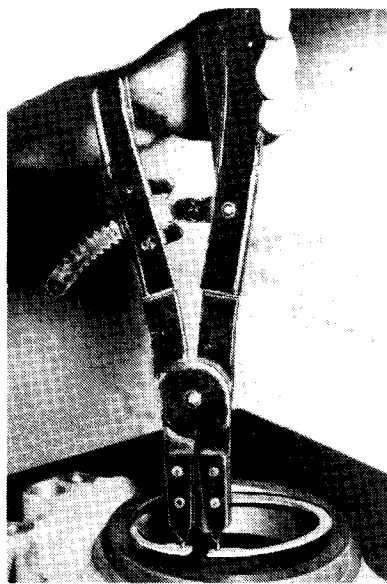


19544

1A-91447 (9548103) – Trunnion, Turbocharger

Class 1 Rebuild – Used on all turbos - 1 required.

Secures the turbo during assembly and disassembly and allows vertical and horizontal positioning of the turbocharger to facilitate installation and removal of critically aligned components.

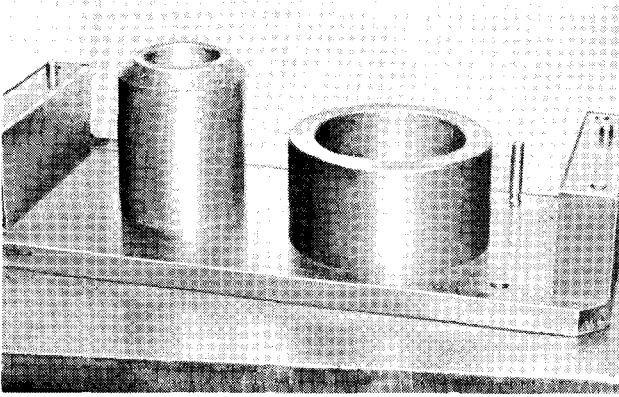


1A-91448 (9548125) – Pliers, Snap Ring

Class 1 Rebuild – Used on all turbos - 1 required.

Used for easy and safe removal of snap rings from various components.

12311



12321

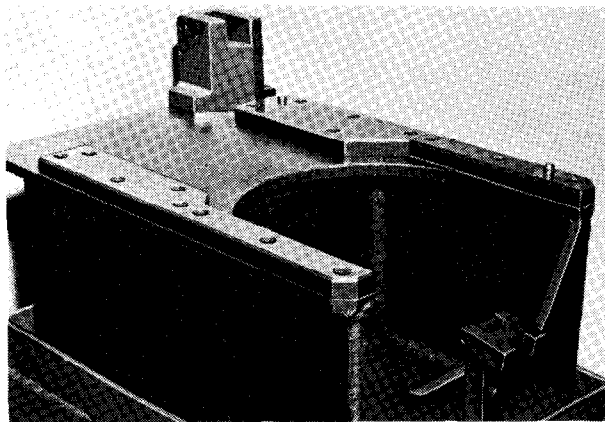
1A-92176 (9548100) – Fixture, Carrier Shaft Installation

Class 1 Rebuild – Used on all turbos - 1 required.

Positions the idler gear support for installation of the carrier shaft assembly. Can also be used to install the idler gear stubshaft on previous design T-type turbos.

NOTE

Ensure that the arbor is supporting the ball bearing inner race during installation of the carrier shaft assembly.



18279

1A-92177 (9548101) – Stand, Gear Section

Class 1 Rebuild - Used on all turbos - 1 required.

Provides a stable work station for assembly and disassembly of the gear drive section. The stand is constructed to allow clearance for the planet gears when working on the carrier and idler gears.

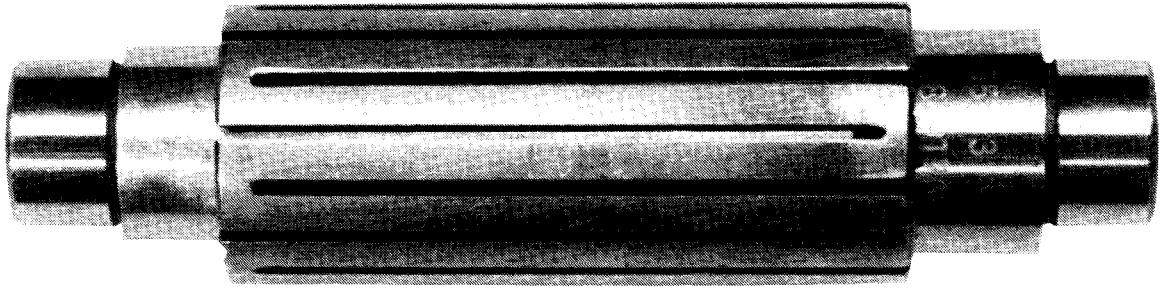


18838-1

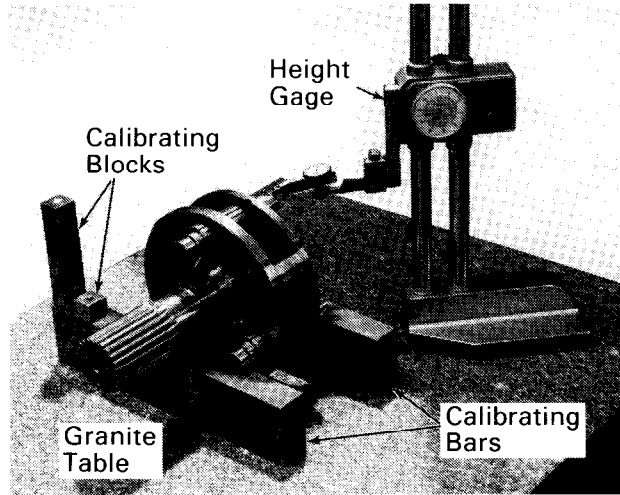
1A-93045 (9570394) – Wrenches, Pipe Plug

Class 1 Rebuild – Used on all turbos - 1 required.

Used to remove various pipe plugs in the turbos. Consists of 1/2", 3/8", 5/16", and 3/16" standard Allen wrenches.



28492



28451

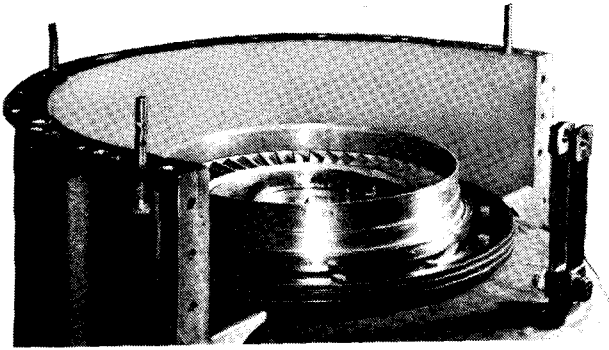
9559514 – Mandrel, Expandable

Class 1 Rebuild – Used on all turbos - 3 required.

G-51293 – Gauge, 610 mm (24") Height

Class 1 Rebuild – Used on all turbos - 1 required.

Used in procedures to dimensionally qualify carrier shafts.

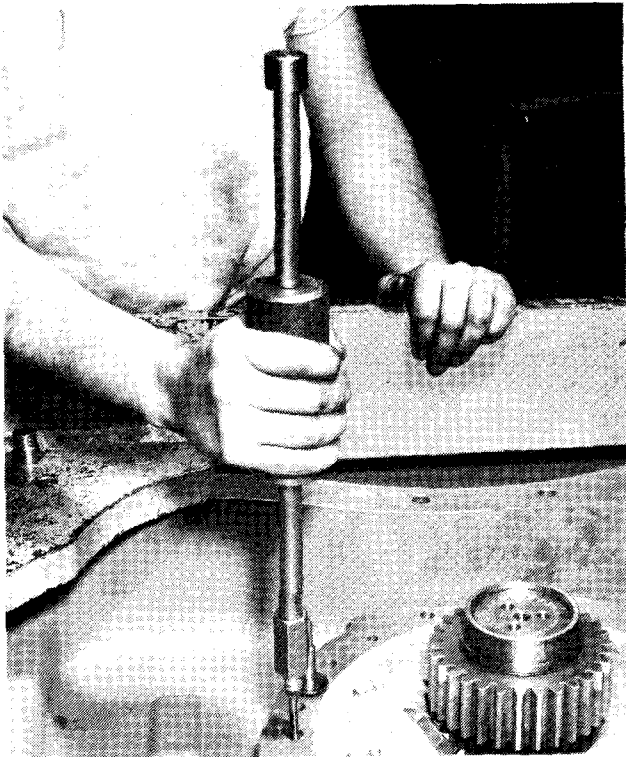


20511

1A-93148 (9570395) – Set, Jackscrew

Class 1 Rebuild – Used on all turbos - 6 required.

Used to evenly separate assemblies to avoid damage to internal components. Each set consists of one 1/2"-13 and one 3/8"-16 screw with a brazed block.

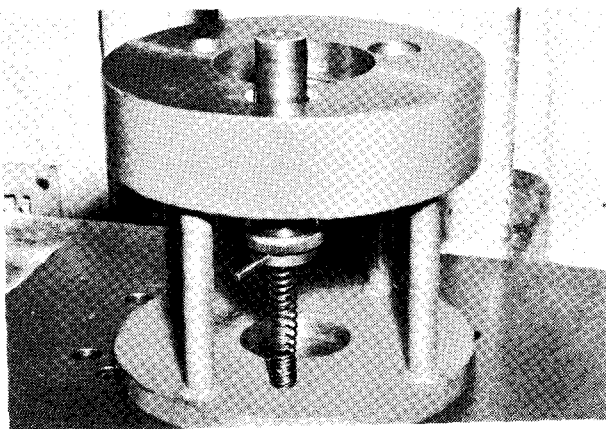


18246-1

1A-93197 (9548126) – Puller, Dowel

Class 1 Rebuild – Used on all turbos - 1 required.

Used to remove dowels with threaded ends.



18275

1A-91900 (9548098) – Fixture, Carrier Shaft Assembly

Class 1 Rebuild – Used on all turbos except high capacity - 1 required.

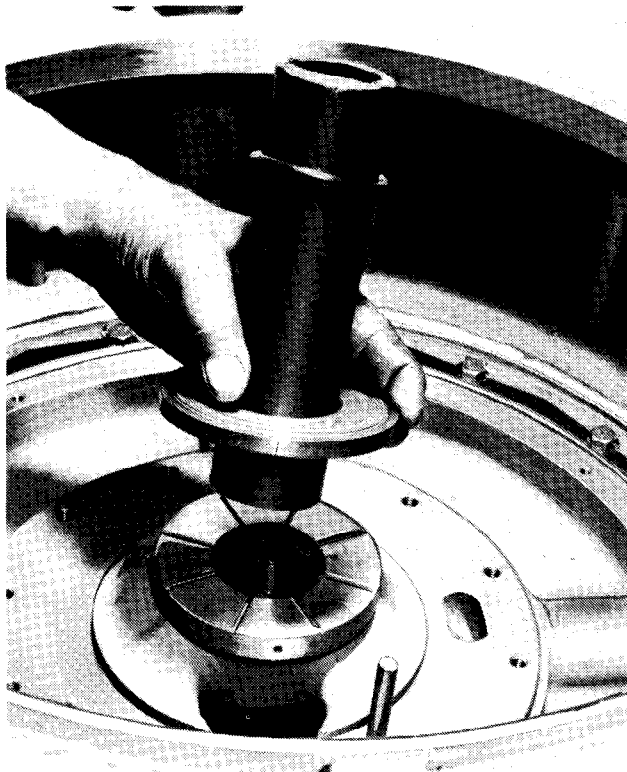
2B-53094 (9550434) – Fixture, Carrier Shaft Assembly

Class 1 Rebuild – Used on high capacity turbos - 1 required.

Used with a press to remove and install planet gear shafts into the carrier shaft assembly.

NOTE

When pressing out the planet shafts, care should be exercised to ensure the thrust washers are centered.



18123-1

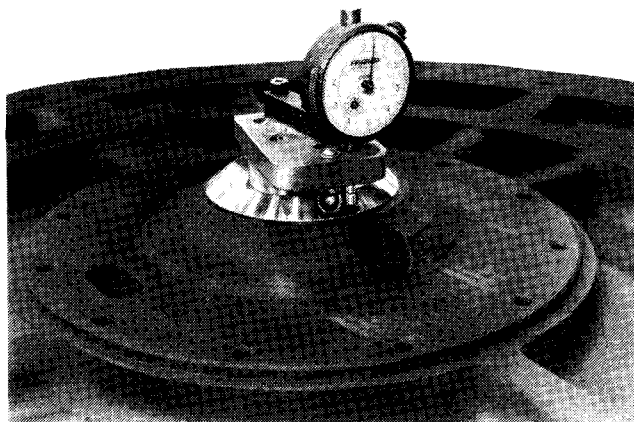
1A-93406 (9549779) – Sleeves, Shaft Protector

Class 1 Rebuild – Used on all turbos - 2 required.

8082586 – Stop Ring, Protector Sleeve

Class 1 Rebuild – Used on all turbos - 6 required.

During assembly and disassembly, the protector sleeve 1A-93406 (9549779) and stop ring 8082586 placed in the compressor section protect the turbine wheel shaft from damage due to contact with the compressor labyrinth seal. Also included is a split bushing protector that can be used to protect the labyrinth seal in the turbine inlet scroll support.

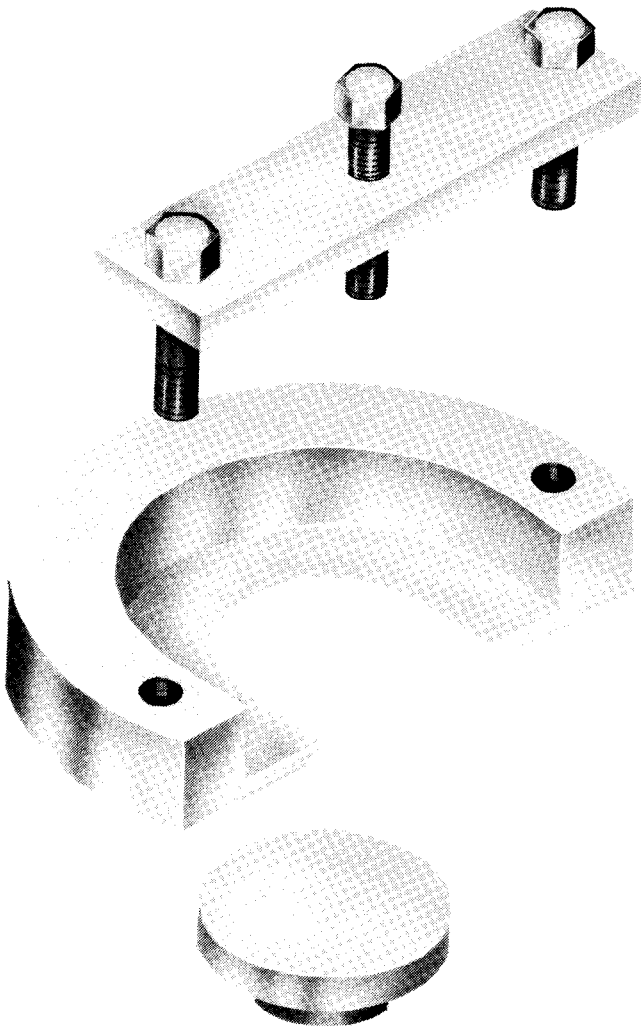


28118

G-65825 (9560133) – Gauge

Class 1 Rebuild - 1 required.

Used to check the installed height of the compressor journal bearing pin on turbos so equipped.

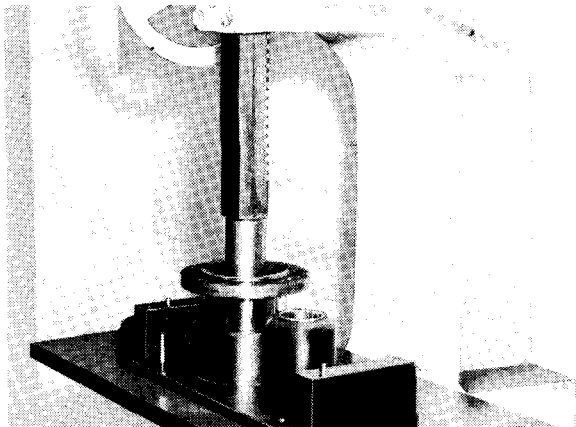


20513

1A-95641 – Fixture, Carrier Gear Bearing Removal

Class 1 Rebuild – Used on all turbos - 1 required.

Used to remove the roller bearing inner race from the carrier gear.



12072

1A-96514 (9548127) – Arbor, Turbine Bearing Pressing

Class 1 Rebuild – Used on all turbos except high capacity - 1 required.

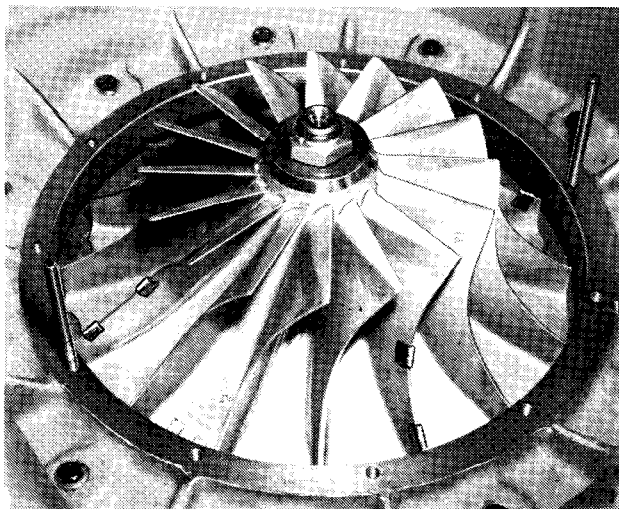
2B-39720 (9548128) – Arbor, Turbine Bearing Pressing

Class 1 Rebuild – Used on high capacity turbos only - 1 required.

When used with a press, removes the turbine bearing from the clutch support.

NOTE

2B-39720 (9548128) also used as idler gear stubshaft pressing fixture.

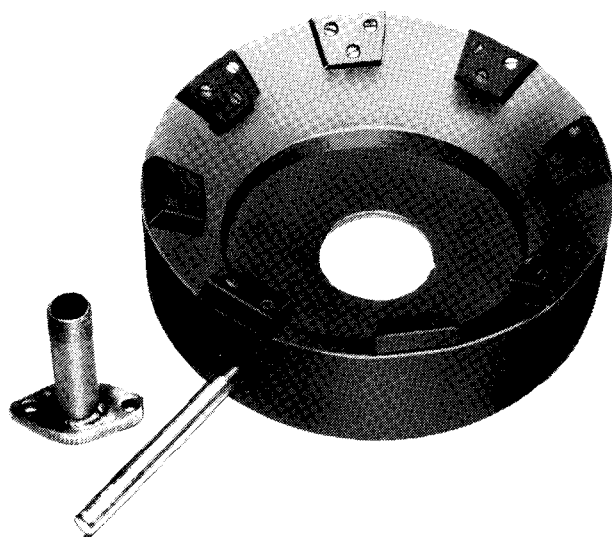


1A-96517 (9548129) – Guide Pin, Impeller Cover

Class 1 Rebuild – Used on all turbos - 2 required.

Ensures proper removal and installation of the impeller cover and avoids damage to the impeller.

18153



1A-93403 (9548130) – Protector, Impeller

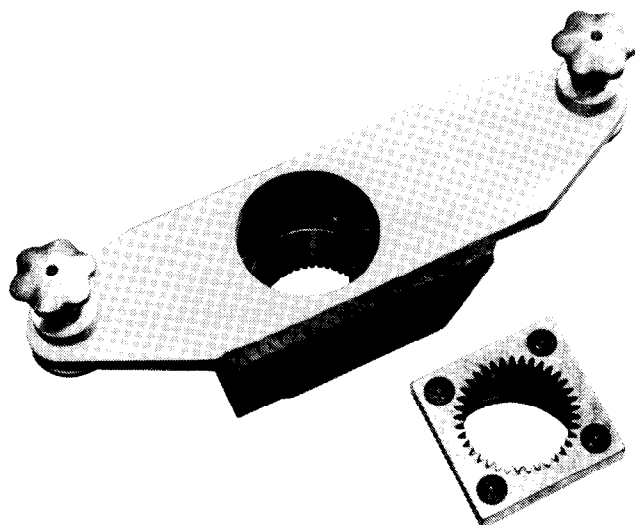
Class 1 Rebuild – Used on 8E & EB, 12E & EB, and T-type turbos - 1 required.

2B-36885 (9548131) – Protector, Impeller

Class 1 Rebuild – Used on 16E & EB and 20E & EB turbos - 1 required.

Protects the impeller during assembly and disassembly. When used in conjunction with the stop and bar shown in the illustration, it provides a means for safely tightening and loosening the impeller nut.

19543

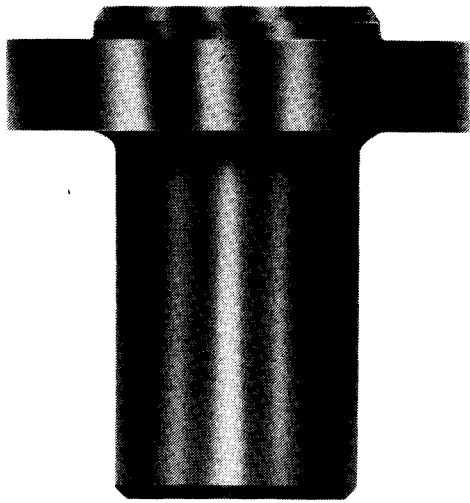


2B-72510 (9562158) – Fixture, Rotor Holding

Class 1 Rebuild – Used on all turbos - 1 required.

Fixture used to lock rotating assembly in place while tightening or loosening impeller nut. With the idler gear(s) removed, the fixture frame mounts to the carrier bearing support and is secured with threaded knobs. Two interchangeable center splined hubs are provided to engage either the standard or Hi-capacity sun gear.

24893

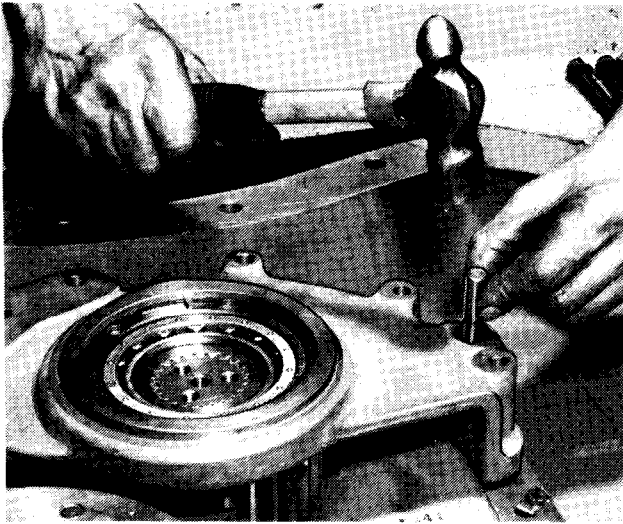


20514

1A-96518 (9549775) – Arbor, Idler Support Bearing Removal, Pressing

Class 1 Rebuild – Used on all turbos - 1 required.

Used to remove the ball bearing from the idler gear support.

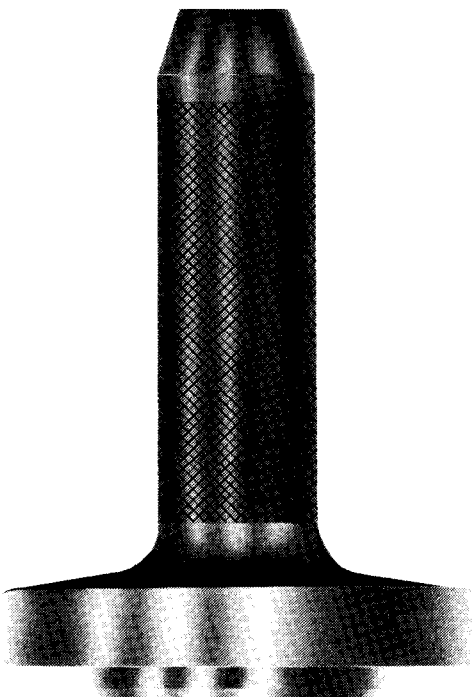


18245-1

1A-96519 (9525495) – Driver, Taper Pin

Class 1 Rebuild – Used on all turbos - 4 required.

Used to install the tapered dowels between the carrier bearing support and idler gear support. The driver is designed to protect the threaded ends of the dowels.



20515

1A-96520 (9549774) – Arbor, Carrier Support Bearing Removal

Class 1 Rebuild – Used on all turbos - 1 required.

With a press, removes the roller bearing outer race from the carrier bearing support.

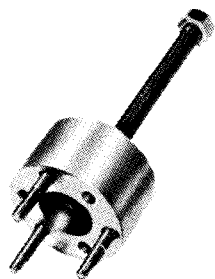
1A-96521 (9570397) – Puller, Impeller

Class 1 Rebuild – Used on 8E, 12E, and T-type turbos - 1 required.

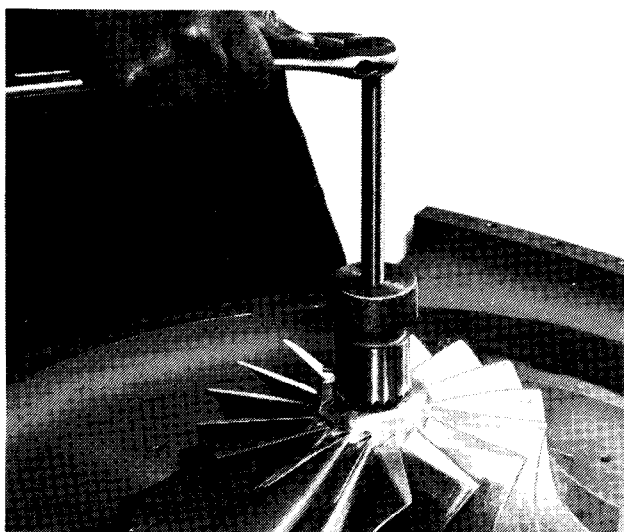
Exerts an even force on the impeller during removal to prevent damage to the impeller or the shaft.

NOTE

This puller is only used on old style impellers with three threaded holes in the face. Present design impellers utilize an inner spline puller 2B-57173 (9548097), which is similar to the puller used on 16E & EB and 20E & EB turbos.



19537



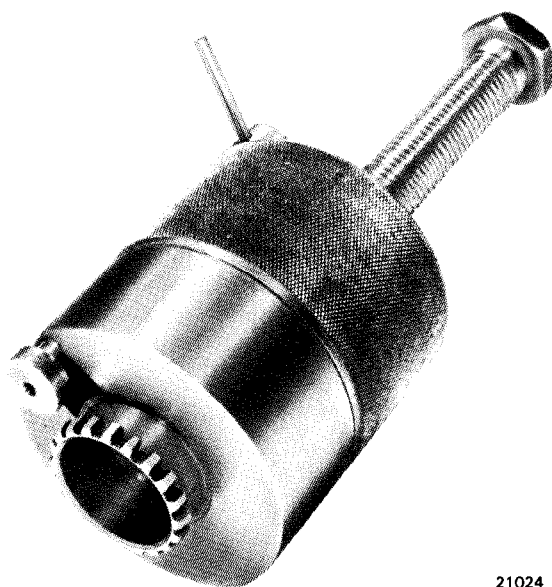
18843-1

2B-37532 (9548096) – Puller, Impeller

2B-37532

Class 1 Rebuild – Used on 16E & EB and 20E & EB turbos - 1 required.

Used to remove the impeller from the shaft. Exerts an even force on the impeller to prevent damage to the impeller or the splined shaft. The puller is inserted in the inner spline of the impeller.



21024

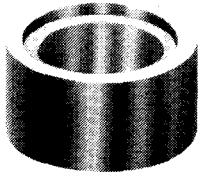
2B-57173 (9548097) – Puller, Impeller

Class 1 Rebuild – Used on 8E & EB, 12E & EB, and T turbos - 1 required.

Exerts an even force on the impeller during removal to prevent damage to the impeller or shaft.

NOTE

Used on new style impeller with an inner spline. For puller to remove old style impellers with threaded holes, see 1A-96521.

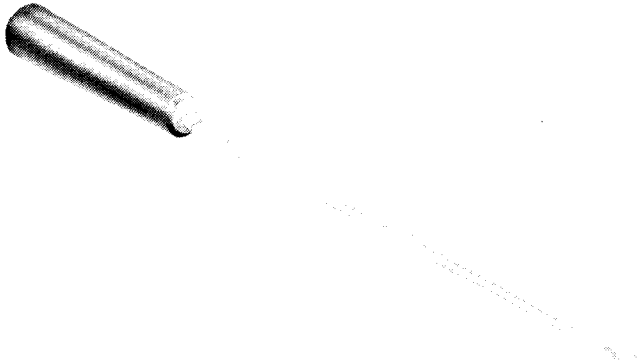


20516

1A-97936 – Idler Gear Bushing Removal, Pressing

Class 1 Rebuild – Used on T and right-hand marine E & EB turbos - 1 required.

With a press, applies an even force to remove the bushing from this style idler gear.



20517

1A-98338 (9570396) – Scraper, Carbon

Class 1 Rebuild – Used on all turbos - 1 required.

Used to remove carbon buildup from metal surfaces.

NOTE

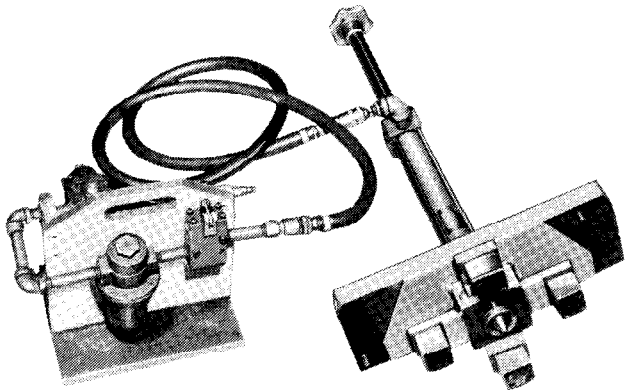
Do not use on bearing surfaces.

1A-98741 (9548099) – Pilot, Sun Gear

Class 1 Rebuild – Used on all turbos except high capacity - 1 required.

NOTE

With adapter 2B-53833 (9548134), this tool can be used on a high capacity gear train turbocharger.

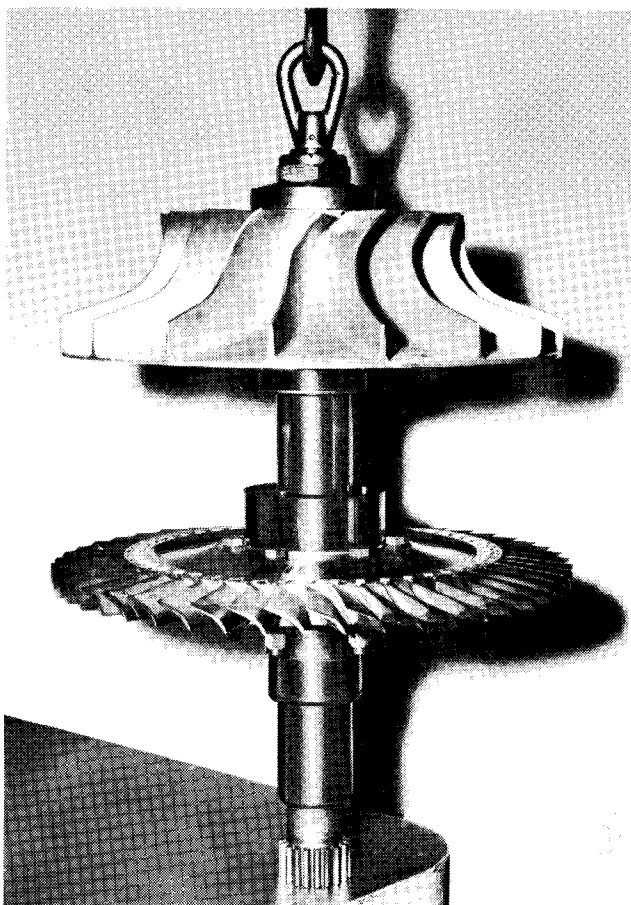


19541

During assembly and disassembly, this device ensures the correct alignment of the sun gear while installing or removing the compressor section. Use of a sun gear pilot prevents damage to the labyrinth seals, the bearings, and the bearing and seal surfaces of the turbine wheel assembly.

NOTE

A source of compressed air must be available to operate this tool.



1L-650L – Eyebolt, Rotor, 1/2"-20

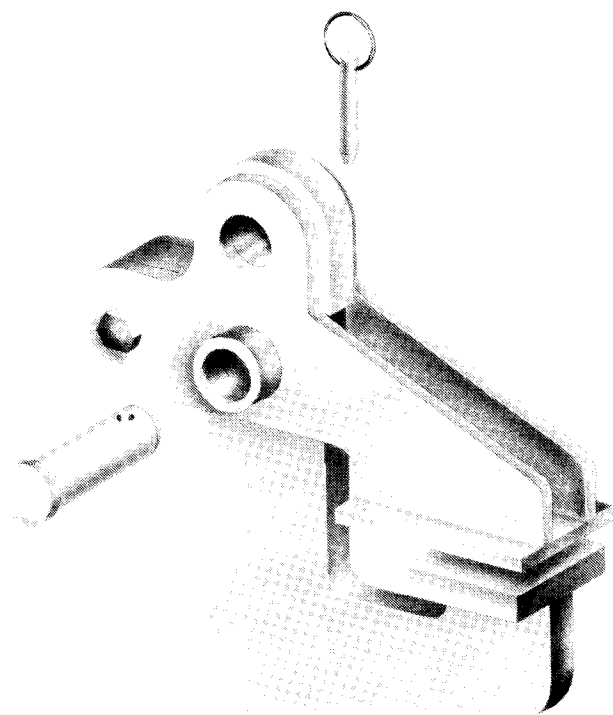
Class 1 Rebuild – Used on 8E & EB , 12E & EB, and T-type turbos - 1 required.

1L-650T – Eyebolt, Rotor, 3/8"-24

Class 1 Rebuild – Used on 16E & EB and 20E & EB turbos - 1 required.

Used to facilitate movement and inspection of the rotating assembly. Stud lengths conform to the depth of the threaded hole in the turbine wheel assembly.

18203



1L-1845 (9548094) – Lifter, Main Housing Inspection

Class 1 Rebuild – Used on all turbos - 1 required.

Suspends the main housing in an upright position for inspection. Mounts to the top of the housing flange for the turbine bearing support.

20521

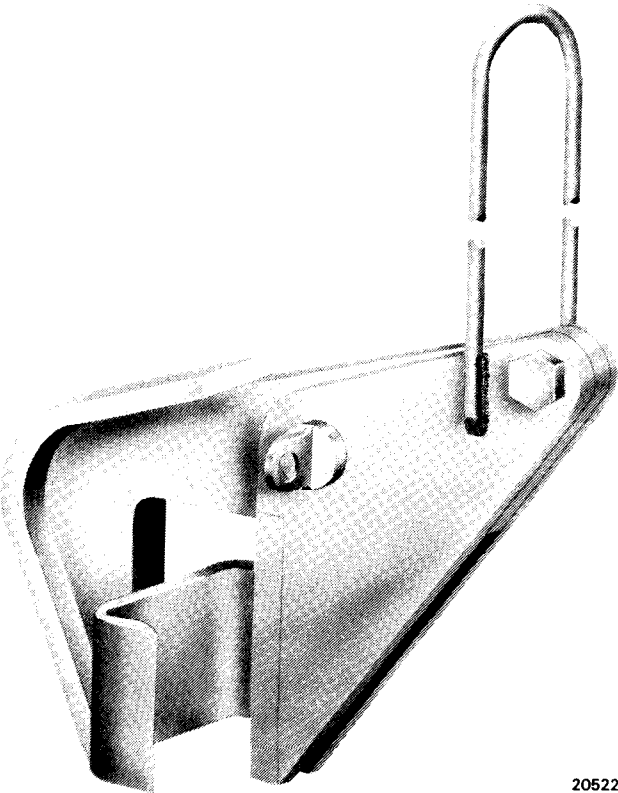


18264-1

1L-1846 (9548095) – Lifter, Main Housing

Class 1 Rebuild – Used on all turbos - 1 required.

Positions the main housing as shown in the illustration. Facilitates removal and installation on the trunnion.

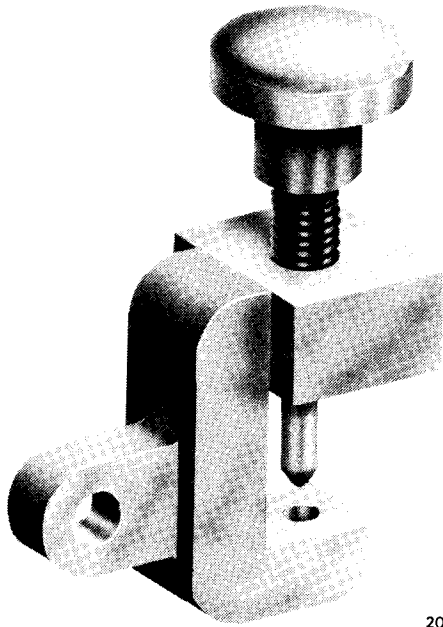


20522

1L-1851 (9548092) – Lifter, Main Housing Washing

Class 1 Rebuild – Used on all turbos - 1 required.

Mounts to the main housing at the oblong oil drain in the horseshoe area. The lifting bracket extends above the fluid level in the cleaning tank for easy insertion and removal.

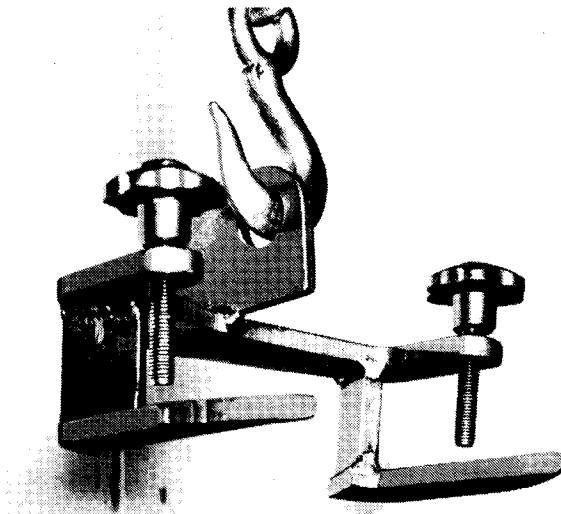


20523

1L-1897 (9548093) - Lifter, Compressor Housing Washing

Class 1 Rebuild - Used on all turbos - 2 required.

Can be used for inspection and washing of both the compressor bearing support and the compressor scroll. Mounts through a bolt hole in the flange.



19542

1L-2140 (9548090) - Lifter, Gear Section

Class 1 Rebuild - Used on all turbos - 1 required.

Maintains the horizontal position of the gear section during assembly and disassembly. With the idler gear removed, the bottom bracket of the lifter mounts to the bottom of the carrier bearing support with the legs on either side of the carrier gear. The threaded knobs are then tightened against the top of the support.



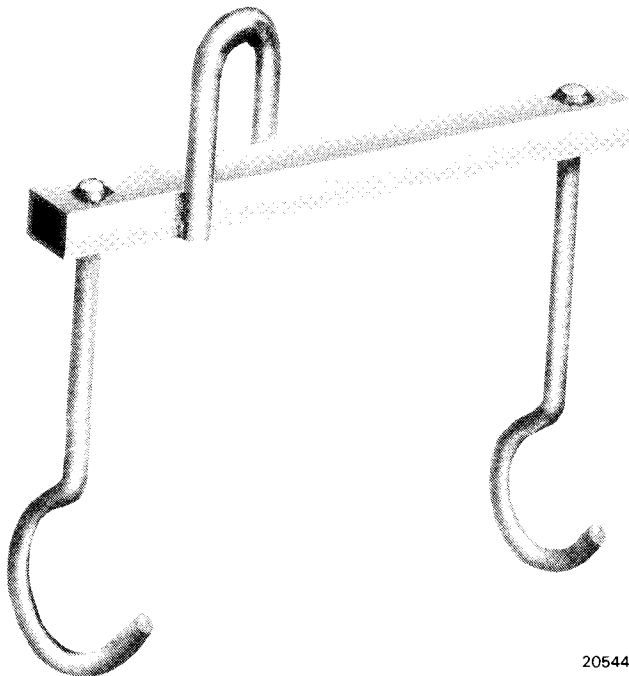
1L-1842 (8293333) – Lifter, Turbo

Class 1 Rebuild – Used on all turbos - 1 required.

Maintains the proper attitude of the turbocharger during lifting and protects the exhaust duct seals from damage due to lifting chains pressing against the duct.

Install the four turbo lifting eyebolts 8496116 in the mounting pads in the main housing and the compressor bearing support. The two longer chains mount to the main housing eyebolts and the two shorter chains mount to the compressor bearing support eyebolts.

19540

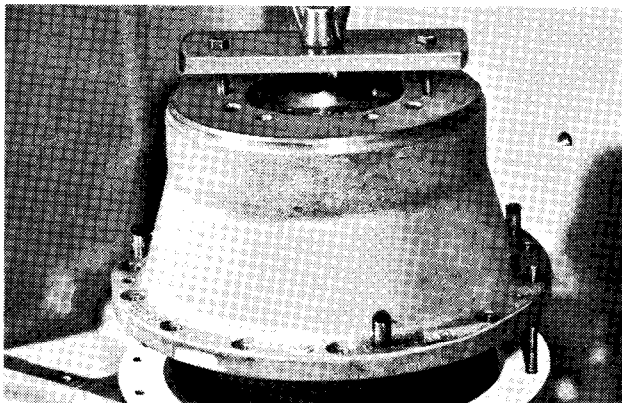


1L-2670 – Lifter, Rotor

Class 1 Rebuild – Used on all turbos except high capacity - 1 required.

Maintains the turbine wheel and impeller in a horizontal position while moving it with a hoist.

20544



18114-1

1L-3029 (9570398) – Lifter, Turbine Bearing Support

Class 1 Rebuild – Used on all turbos - 1 required.

Used with a chain hoist for lifting the turbine bearing support. Mount as shown in the illustration.



19545

1L-3031 – Lifter, Compressor Rollover

Class 1 Rebuild – Used on all turbos - 2 required.

Use with eyebolts 1A-37166. During assembly and disassembly, the compressor section must be rolled over. Using this tool and compressor lifter 1L-3032 (9548132), this action can be accomplished.

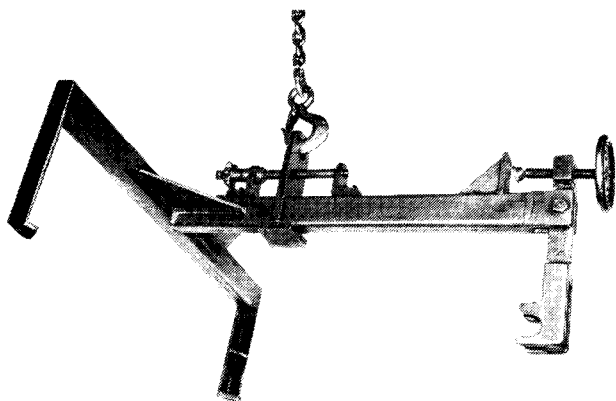
NOTE

Instructions for the rollover of the compressor section are given in Section 4 of this M.I.

1L-3032 (9548132) – Lifter, Compressor Section

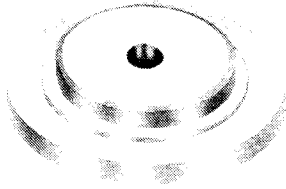
Class 1 Rebuild – Used on all turbos - 1 required.

Used to lift the compressor section during assembly and disassembly. Also used for rollover of the compressor section when used with rollover fixture 1L-3031 (for rollover instructions, see Section 4 of this M.I.), and to lift the compressor bearing support during doweling.



20545

To mount, position the two ends of the crossbar over the compressor bearing support lifting pads and the swivel leg to the air duct flange. Tighten the hand wheel to secure the fixture. The position of the lifting eye may also be adjusted for the proper horizontal position of the lifter by using the adjusting device on the center beam.



20547

2B-36531 – Arbor, Idler Gear Bushing Installation, Pressing

Class 1 Rebuild – Used on T and right-hand marine E & EB turbos - 1 required.

Presses bushing into the idler gear.

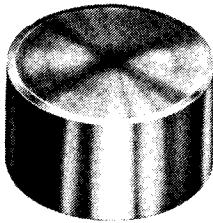


20553

2B-36695 (9549777) – Clip, Spring

Class 1 Rebuild – Used on all turbos with roller clutches - 24 required.

During assembly of the roller clutch, these spring clips hold the rollers and springs in the camplate. Twelve used at a time.

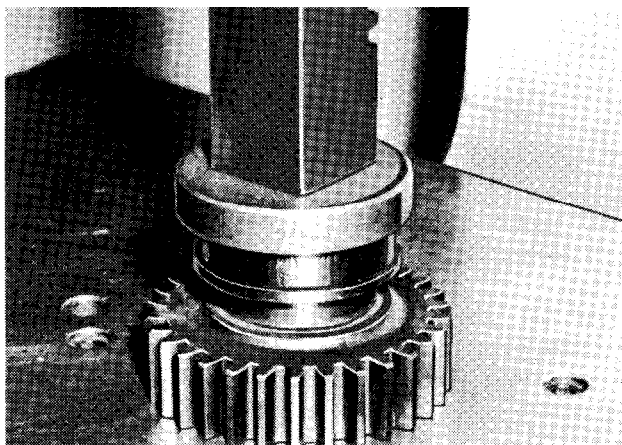


21064

2B-37772 (9549782) – Pressing Fixture, Idler Gear and Bearing

Class 1 Rebuild – Used on all turbos - 1 required.

During assembly and disassembly, the double roller bearing and stubshaft must be removed from and installed in the idler gear without damaging the bearing rollers. This fixture supports the gear during both operations and exerts force only on the outer race of the bearing.

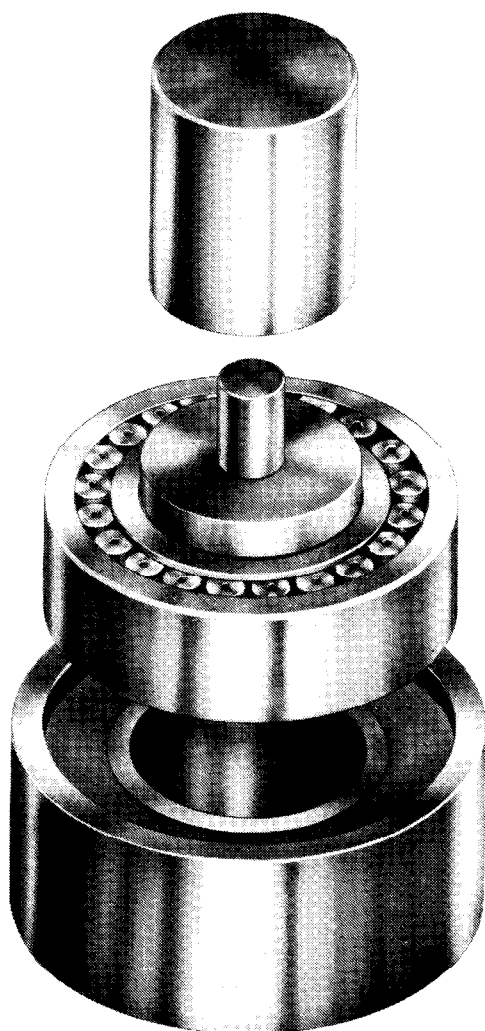


12329

2B-39683 (9549778) – Arbor, Carrier Support Bearing Installation, Pressing

Class 1 Rebuild – Used on all turbos - 1 required.

With a press, used to press the roller bearing inner race onto the carrier gear.



21065

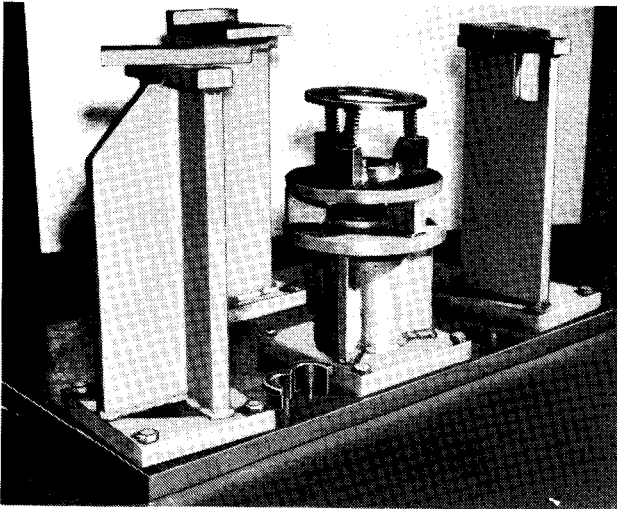
2B-39720 (9549783) – Pressing Fixture, Idler Gear Stubshaft

Class 1 Rebuild – Used on all turbos - 1 required.

Used to press the idler gear stubshaft into and out of the double roller bearing. The bearing arbor supports the inner race of the bearing during both operations to prevent damage to the bearing rollers. The stubshaft arbor accommodates the stubshaft pilot when pressing the stubshaft out and is used with the stop plate and spacer 8358571 when installing the stubshaft.

NOTE

This fixture also used for pressing turbine bearings on high capacity turbos.

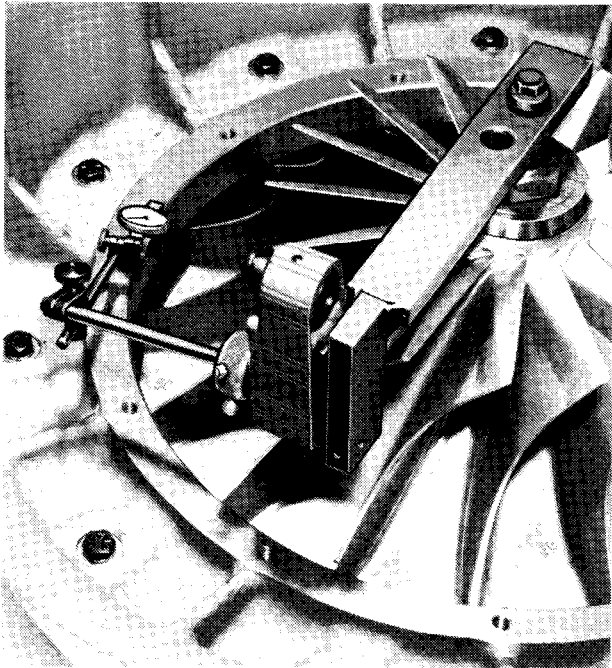


18101-1

2B-43515 (9548091) – Stand, Compressor Section

Class 1 Rebuild – Used on all turbos - 1 required.

Used for assembly and disassembly of the compressor section. Prevents damage to the various components, particularly the rotating assembly.

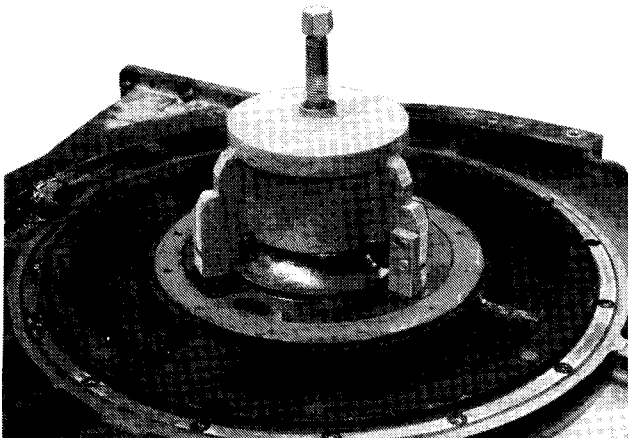


18149

2B-48872 (9549776) – Bracket, Impeller Sweep Indicator

Class 1 Rebuild – Used on all turbos - 1 required.

Used to measure impeller to scroll concentric squareness, bore concentricity, and bearing clearance. Mounts to the threaded hole in the end of the rotating assembly. The outside bolt hole is used on 16E & EB and 20E & EB turbos and the inside hole is used on T, 8E & EB, and 12E & EB turbos.

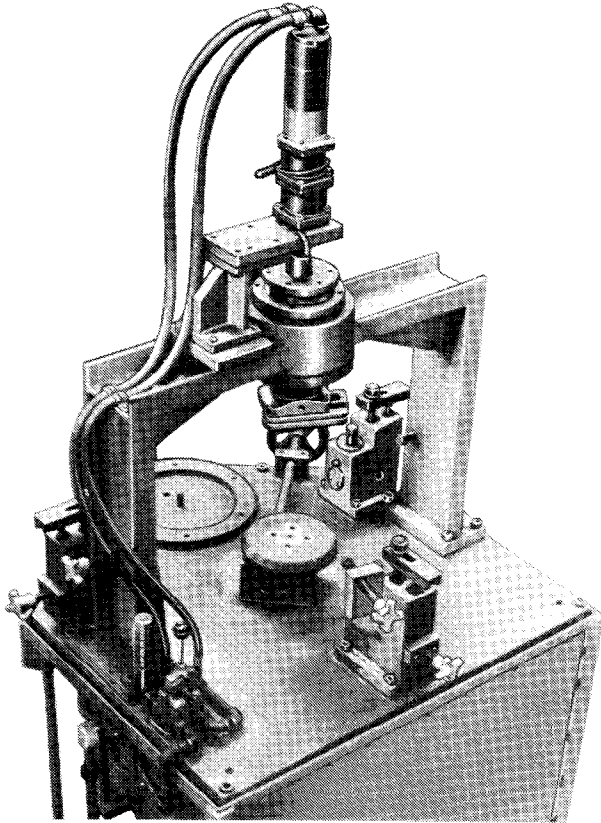


28494

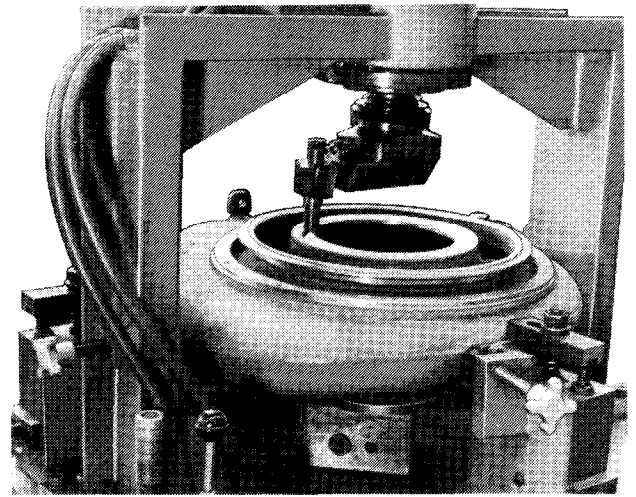
1A-96516 (9549781) – Puller, Compressor Bearing

Class 1 Rebuild – Used on all turbos - 1 required.

Used during disassembly to remove the compressor journal bearing from the compressor bearing support.



20617



20623

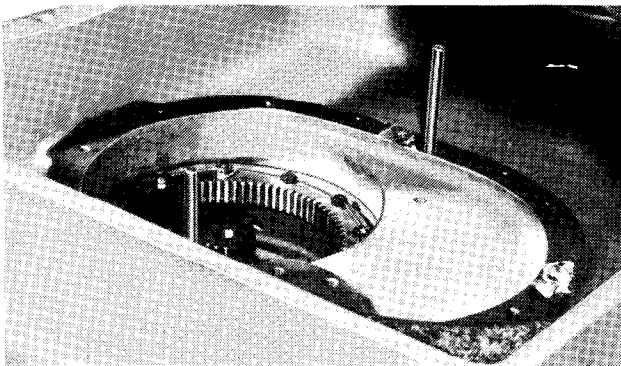
2B-47052 (9548088) – Qualifying Fixture, Turbine Inlet Scroll

Class 1 Rebuild – Used on all turbos - 1 required.

Used to dimensionally qualify the turbine inlet scroll for reuse or after machining. As shown in the second illustration, the fixture can be used for a small amount of machining, such as finish cuts.

NOTE

To be used for machining; a source of compressed air is required.

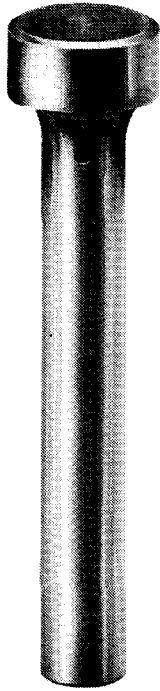


18191-1

2B-53485 (9570399) – Guide Pin, Gear Section

Class 1 Rebuild – Used on all turbos - 2 required.

During installation and removal of the gear section, the guide pins protect the planet gears, ring gear, and sun gear from damage.

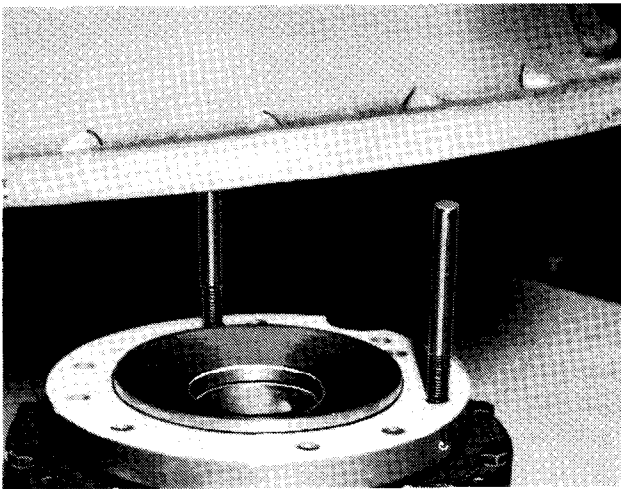


20640

2B-53487 – Arbor, Planet Shaft Removal, Pressing

Class 1 Rebuild – Used on all turbos - 1 required.

With carrier shaft fixtures 1A-91900 (9548098) or 2B-53094 (9550434), used to press the planet shafts from the carrier shaft assembly.

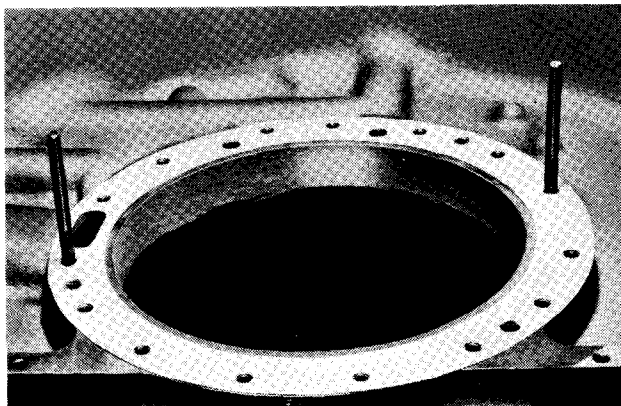


12185

2B-53489 – Guide Pin, Clutch

Class 1 Rebuild – Used on all turbos - 2 required.

Guides the turbine bearing support onto the clutch during assembly of the turbocharger.

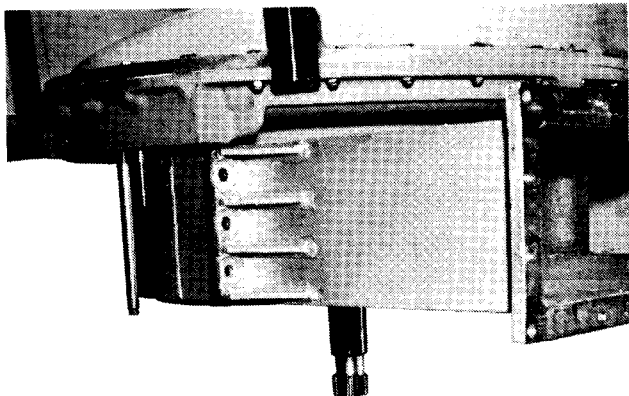


18108

2B-53490 (9570400) – Guide Pin, Turbine Bearing Support

Class 1 Rebuild – Used on all turbos - 2 required.

Used to guide the turbine bearing support onto the main housing during assembly of the turbo.

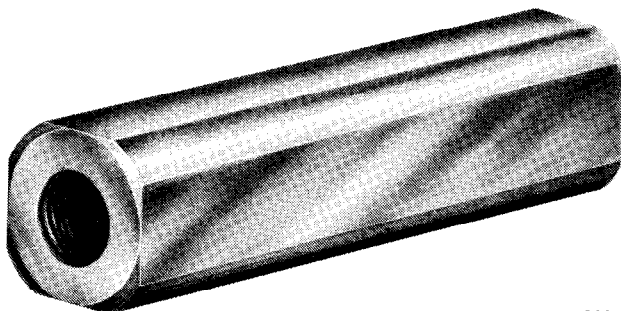


20642

2B-53491 (9548133) – Guide Pin, Compressor Section

Class 1 Rebuild – Used on all turbos - 2 required.

Along with the sun gear pilot fixture, used to guide the compressor section during assembly and disassembly.



20643

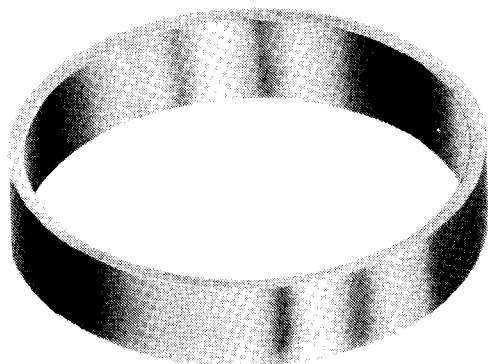
2B-53606 (9570401) – Nut, Turbine Drive

Class 1 Rebuild – Used on 8E & EB, 12E & EB, and T turbos - 1 required.

2B-53607 – Nut, Turbine Drive

Class 1 Rebuild – Used on 16E & EB and 20E & EB turbos - 1 required.

At times removal of the rotating assembly from the compressor section can be difficult due to internal damage. Part of the rotating assembly may still be salvageable, therefore, this device should be used to protect the threaded end of the turbine wheel. The drive is screwed to the threaded end of the rotating assembly and then may be pounded to force the assembly free.



20645

2B-53833 (9548134) – Overrunning Clutch Ring Gear Adapter

Class 1 Rebuild – Used on high capacity turbos - 1 required.

Can be used to adapt the standard sun gear pilot 1A-98741 (9548099) for use on the high capacity turbocharger. This adapter is placed in the ring gear to make up the difference between the ring gear diameters of the two types of turbos.



20648

30-BR-10 – Brush, Bristle

Class 1 Rebuild – Used on all turbos - 20 required.

Used with Heli-Coil equipment.

- 60-IN-30 – Tap, 1/4"-20 Heli-Coil
- 60-IN-35 – Tap, 5/16"-18 Heli-Coil
- 60-IN-40 – Tap, 3/8"-16 Heli-Coil
- 60-IN-45 – Tap, 3/8"-24 Heli-Coil
- 60-IN-50 – Tap, 1/2"-13 Heli-Coil
- 60-IN-55 – Tap, 1/2"-20 Heli-Coil
- 60-IN-60 – Tap, 5/8"-11 Heli-Coil

Class 1 Rebuild – Used on all turbos - 3 of each required.



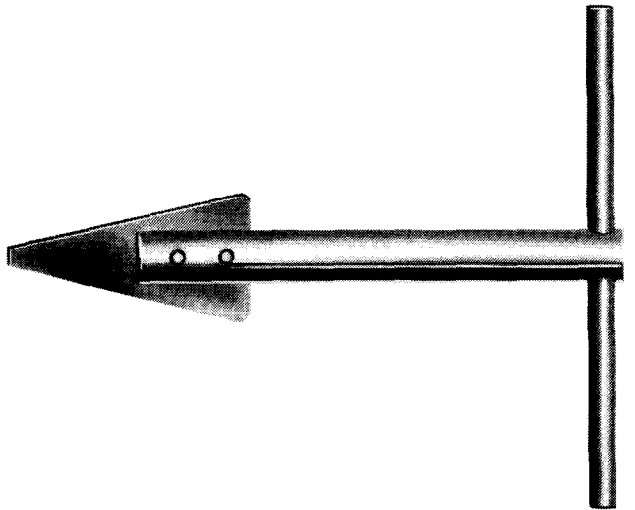
20918

Special taps to thread holes for Heli-Coil inserts. The size of the tap allows for the insert thickness so the final hole size will be correct after the insert is installed.

- 65-IN-25 – Extractor, Heli-Coil Insert, 1/4" thru 3/8"
- 65-IN-30 – Extractor, Heli-Coil Insert, 1/2" thru 5/8"

Class 1 Rebuild – Used on all turbos - 2 of each required.

Used to remove Heli-Coil inserts. Apply the tool to the insert and strike the tool head lightly. Turn the extractor counterclockwise, maintaining steady downward pressure.

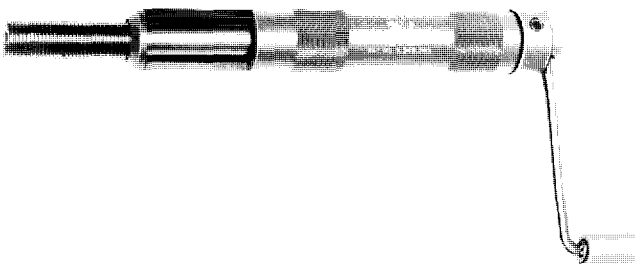


20919

- 70-IN-30 – Insertor, 1/4"-20 Heli-Coil
- 70-IN-35 – Insertor, 5/16"-18 Heli-Coil
- 70-IN-40 – Insertor, 3/8"-16 Heli-Coil
- 70-IN-45 – Insertor, 3/8"-24 Heli-Coil
- 70-IN-50 – Insertor, 1/2"-13 Heli-Coil
- 70-IN-55 – Insertor, 1/2"-20 Heli-Coil
- 70-IN-60 – Insertor, 5/8"-11 Heli-Coil

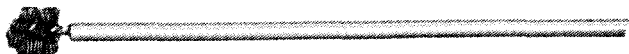
Class 1 Rebuild – Used on all turbos - 1 required.

Insertion tool for Heli-Coil inserts.



20920

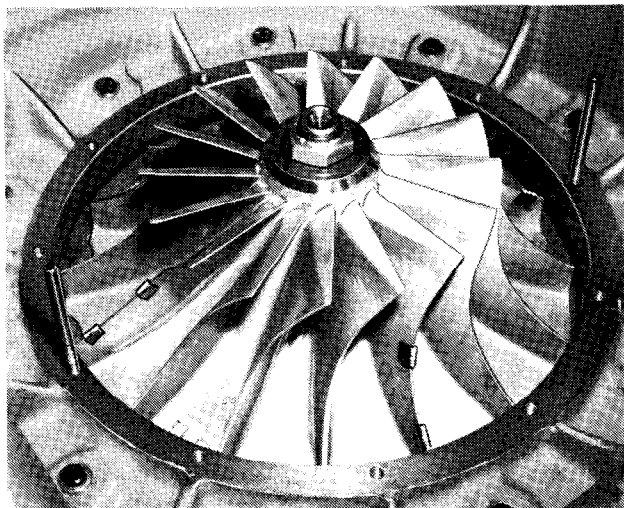
125-BR-15 – Brush, Wire



20667

Class 1 Rebuild – Used on all turbos - 10 required.

Used with Heli-Coil equipment.

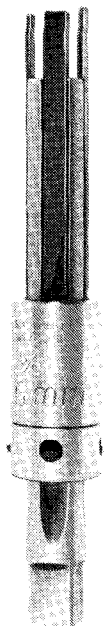


18153

500-WA-100 (9570407) – Wax, Impeller Clearance Measurement

Class 1 Rebuild – Used on all turbos - 5 pound box.

When determining impeller to cover clearances, this wax is used. Material is 4" x 8" sheets of "Red Refined Wax #47315", cut to size for use.



20921

515-EX-35 (9570402) – Extractor, 1/4" Heli-Coil Tap

515-EX-45 (9570403) – Extractor, 5/16" Heli-Coil Tap

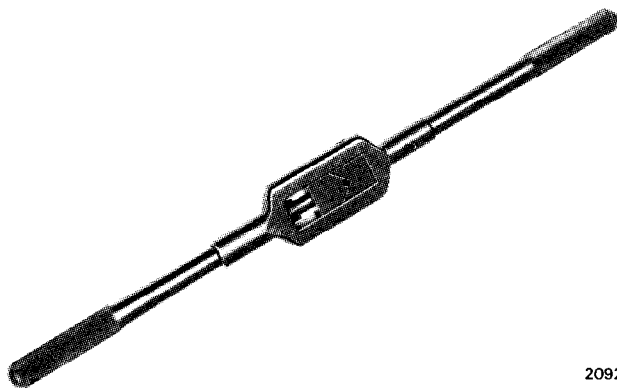
515-EX-65 (9570404) – Extractor, 3/8" Heli-Coil Tap

515-EX-85 (9570405) – Extractor, 1/2" Heli-Coil Tap

515-EX-100 (9570406) – Extractor, 5/8" Heli-Coil Tap

Class 1 Rebuild – Used on all turbos -3 of each required.

Extraction tool for broken Heli-Coil taps. The four legs fit in the flutes of the tap.



825-WR-5 (9570408) – Wrench, Heli-Coil Tap
825-WR-10 (9570409) – Wrench, Heli-Coil Tap
825-WR-15 (9570410) – Wrench, Heli-Coil Tap

Class 1 Rebuild – Used on all turbos - 1 of each required.

Wrench used for hand tapping of holes.

20922

No Illustration

8196884 – Lubriplate

Class 1 Rebuild – Used on all turbos - 1 Case required.

During assembly of the turbocharger, some surfaces require application of a lubricant to secure a gasket, grommet or “O” ring. This material can be used for that purpose.

No Illustration

8196885 – Lubriplate

Class 1 Rebuild – Used on all turbos - 1 case required.

Used as assembly lubricant on bearing surfaces of gear drive section components and to retain positioning of thrust washers.

No Illustration

8211194 – Shellac, Orange

Class 1 Rebuild – Used on all turbos - 1 Case required.

Used for application of the three pieces gasket to the main housing horseshoe during assembly. Proper application of this gasket is very critical to prevent oil leaks. This shellac aids in the application.

No Illustration

8366747 – Sealant, Silicone Rubber Adhesive

Class 1 Rebuild – Used on all turbos - 1 case required.

Used on machined surface of compressor bearing support to form gasket seal with compressor scroll.

No Illustration

8354866 – Compound, Hi-Temp Thread

Class 1 Rebuild – Used on all turbos - 1 Case required.

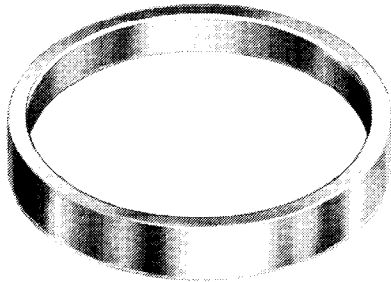
This material is applied to bolts and pipe plugs used in high temperature areas.

No Illustration

8307731 – Lubricant, Lo-Temp Thread

Class 1 Rebuild – Used on all turbos - 1 case required.

This material is applied to all bolts except those in high temperature areas or where dry application is specified.

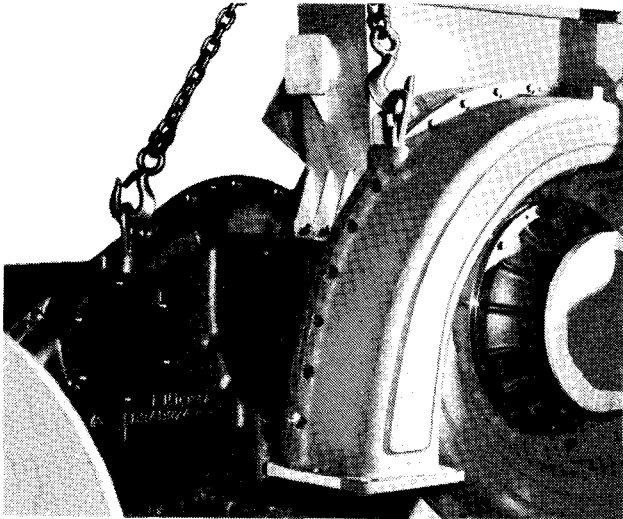


21063

8358571 – Spacer, Idler Gear Stubshaft Installation

Class 1 Rebuild – Used on all turbos - 1 required.

Used with pressing fixture 2B-39720 (9549783) when pressing the idler gear stubshaft into the double roller bearing.



8496116 – Eyebolt, Turbocharger Lifting

Class 1 Rebuild – Used on all turbos - 4 required.

Shoulders seat against turbo allowing lateral forces to be safely exerted when lifting. Used with turbo lifter 1L-1842 (8293333).

18137



8496998 – Penetrant, Dye

Class 1 Rebuild – Used on all turbos - 1 Kit required.

Whenever various housings and components are suspected of cracks, a means must be available to verify their condition. Also, the extent of a visible crack must be ascertained to facilitate proper repair. This kit contains a cleaner, penetrant, and developer to check these cracks. Each kit contains instructions for use.

20650



8497001 - Container, Rotor

Class 1 Rebuild - Used on all turbos - 4 required.

Rotating assemblies should be stored and transported in a suitable container with internal supports that will protect the assembly.

18254-1



8497048 - Freezer

Class 1 Rebuild - Used on all turbos - 1 required.

Various bearings, shafts, and inserts that have an interference fit must be frozen for installation. This freezer will provide the medium necessary for chilling the pieces.

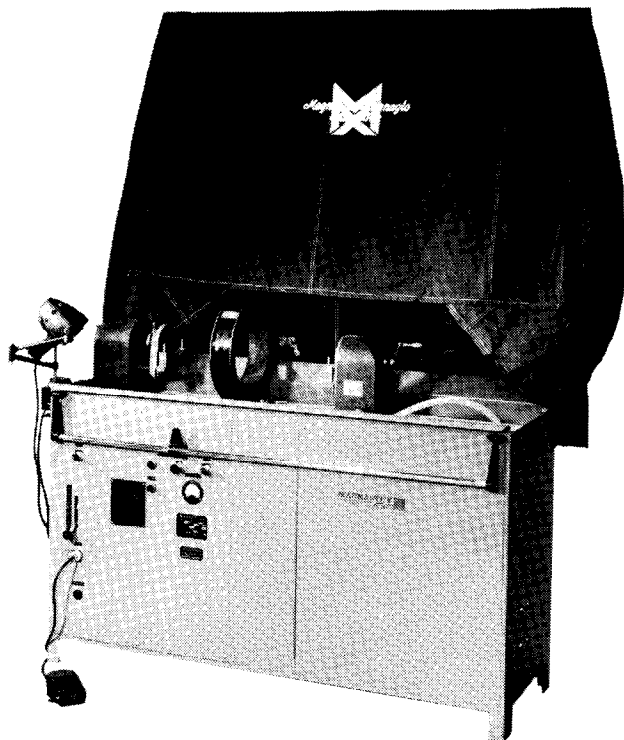
20654

No Illustration

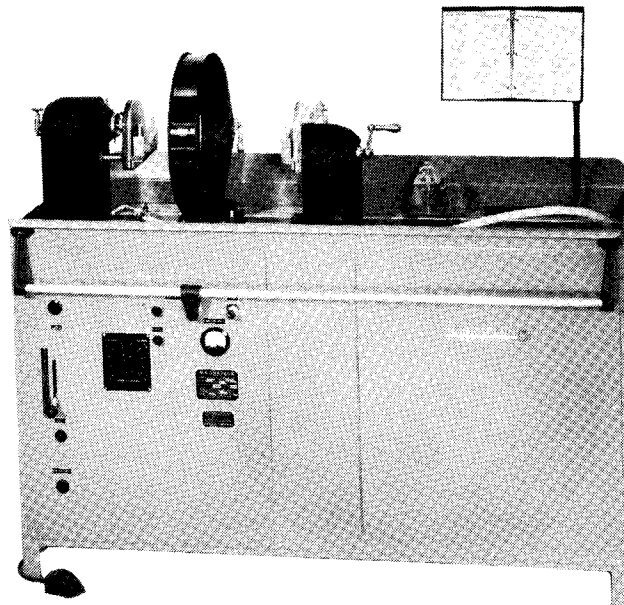
9339834 - Lubricant, Molykote bonded spray

Class 1 Rebuild - Used on all turbos - 1 case required.

This material is used as pre-lube coating on seal rings and gear drive components during assembly.



20651



20652

8496999 – Magnaflux Equipment

Class 1 Rebuild – Used on all turbos - 1 required.

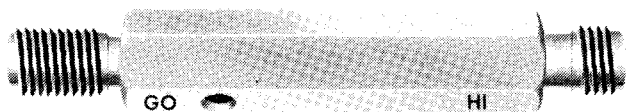
Many smaller metallic pieces, such as gears, must be inspected for cracks. Using this equipment, cracks not normally visible may be found.

9322656 – Magnaglo Concentrate

Class 1 Rebuild – Used on all turbos - 1 Pound container.

This material is used in the inspection process with the above equipment.

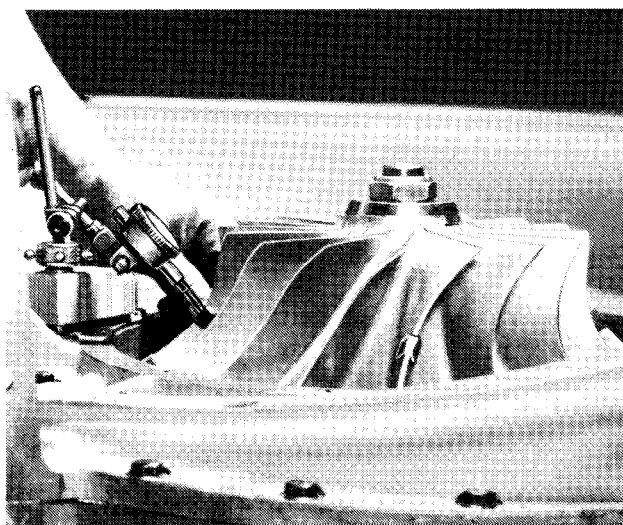
G-51322 – Gage, 1/4"-20 Heli-Coil Thread
 G-51323 – Gage, 5/16"-18 Heli-Coil Thread
 G-51324 – Gage, 3/8"-16 Heli-Coil Thread
 G-51401 – Gage, 3/8"-24 Heli-Coil Thread
 G-51402 – Gage, 1/2"-13 Heli-Coil Thread
 G-51403 – Gage, 1/2"-20 Heli-Coil Thread
 G-51404 – Gage, 5/8"-11 Heli-Coil Thread



20923

Class 1 Rebuild – Used on all turbos - 1 of each required.

Special gage to check a hole threaded by a Heli-Coil tap. Accuracy of the finished thread, when the insert is installed, is dependent upon the accuracy of the tapped hole. If the finished tapped hole gages satisfactorily, the installed insert will be within the thread tolerance. Therefore, it is not necessary to gage the installed insert. After the insert is installed, the GO thread plug may not enter freely; however, the insert will always seat itself when the bolt or screw is installed and tightened.



18156

G-53123 – Base, Dial Indicator, Magnetic

Class 1 Rebuild – Used on all turbos - 1 required.

During assembly of the turbocharger, dial indicator readings are required. This magnetic base provides a suitable platform for those readings.

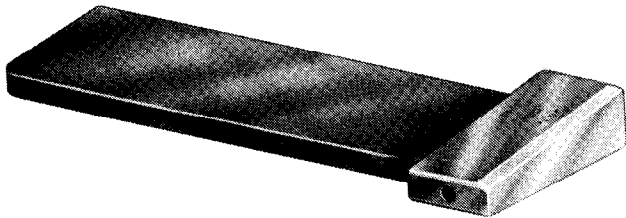


20886

G-59719 – Inspection Light

Class 1 Rebuild – Used on all turbos - 1 required.

A light with a 254.0 mm (10.00") long flexible neck to assist in inspection of various passages for cracks and obstructions.



20885

G-57518 (9549784) – Adjuster, Nozzle Area

Class 1 Rebuild – Used on 12E & EB and T turbos - 1 required.

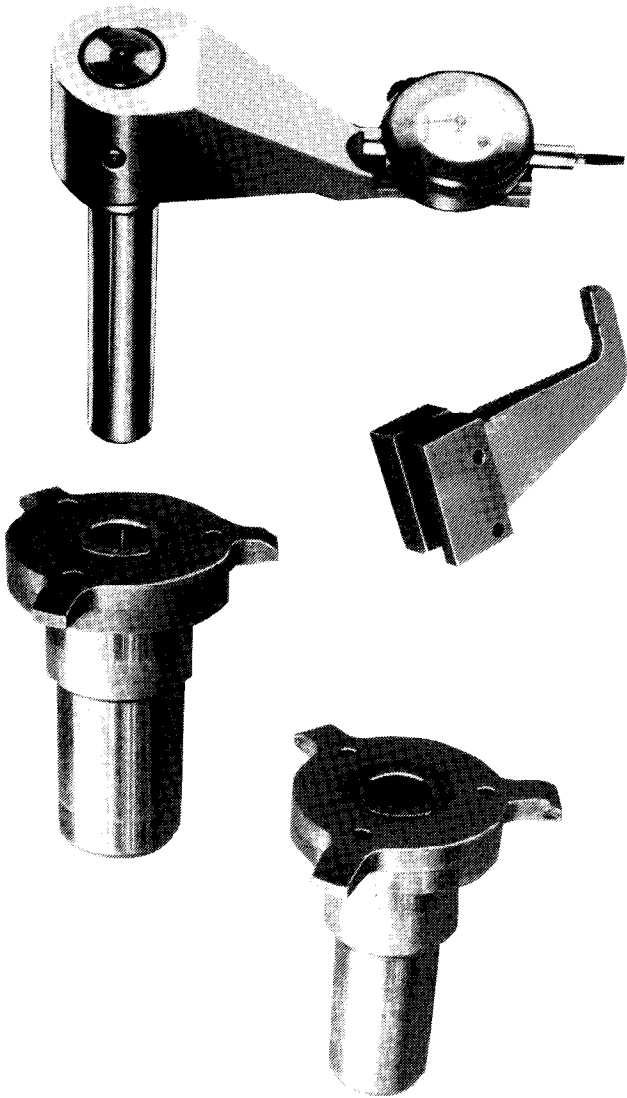
G-60610 (9549780) – Adjuster, Nozzle Area

Class 1 Rebuild – Used on 16E & EB and 20E & EB turbos - 1 required.

G-61441 (9549785) – Adjuster, Nozzle Area

Class 1 Rebuild – Used on 8E & EB turbos - 1 required.

Resets nozzle vanes to the correct area.



28495

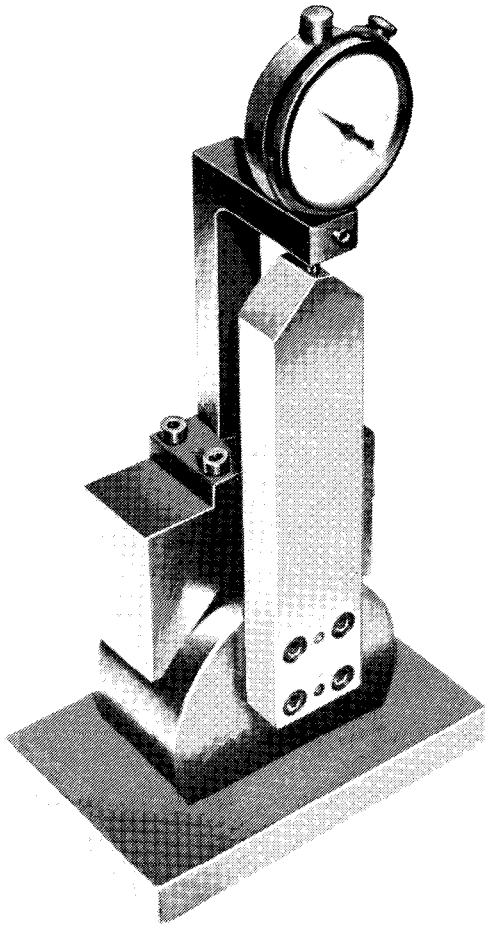
G-59975 (9548089) – Gage, Shroud Sweep

Class 1 Rebuild – Used on all turbos - 1 required.

During assembly of the turbocharger, the shroud I.D. must be checked, after it is installed, to verify the proper clearance between the shroud and turbine blades. This gage centers on the rotating assembly axis for proper measurement. The gage is set on master gages provided for each turbo application. Center axis pilots are provided for both standard and high capacity gear train turbos.

NOTE

Dial indicator face is calibrated in English standard.



20888

G-60731 – Gage, Blade Stretch

Class 1 Rebuild – Used on all turbos - 1 required.

When qualifying a turbine wheel for re-use, all blades must be measured for proper length. This gage mounts on the turbine seal surface of the rotating assembly and allows for some stretch in the blades.

NOTE

Dial indicator face is calibrated in English standard.

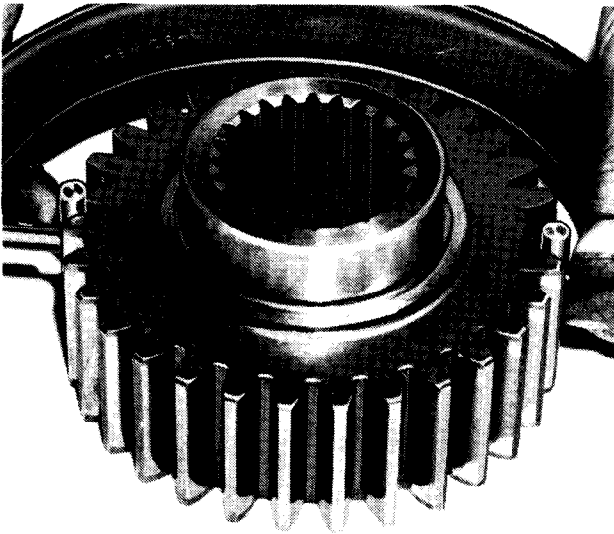


20889

G-62880 (9570411) – Wrench, Shroud Clamp Torque

Class 1 Rebuild – Used on all turbos - 1 required.

During assembly of the turbocharger, the shroud marmon clamp and a few bolts must be torqued in inch-pounds. This wrench has 3/8" square drive and a 0 to 200 inch-pounds range in increments of 10 inch-pounds. (Calibrated English standard.)



20890

- G-64404 - Gage Pin, 7.315 mm (.2880")
- G-64405 - Gage Pin, 3.048 mm (.1200")
- G-64406 - Gage Pin, 4.389 mm (.1728")
- G-66407 - Gage Pin, 4.064 mm (.1600")

Class 1 Rebuild - Used on all turbos - 2 of each required.

Used to determine gear tooth wear.

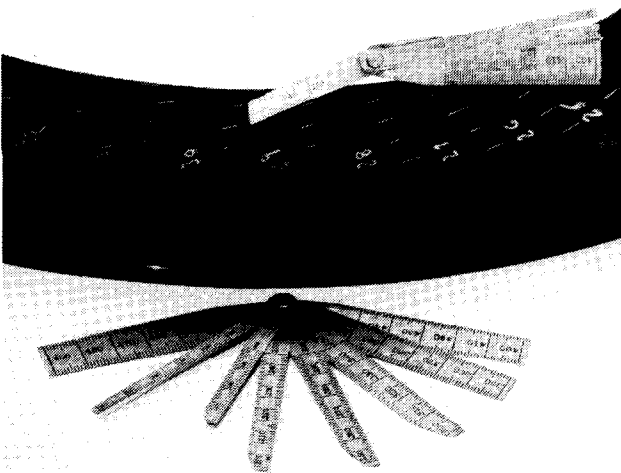


18255

G-64409 - Etcher, Electric

Class 1 Rebuild - Used on all turbos - 1 required.

To ensure proper balance of the rotating assembly, the position of some items, such as the heat dam washer and the impeller spacer, must be permanently marked after alignment. This etcher provides an efficient means of accomplishing this.



20892

G-64410 - Gage, Nozzle Area

Class 1 Rebuild - Used on all turbos - 1 required.

The width of each nozzle vane must be accurately measured in three places to determine the total nozzle area. This gage facilitates that measurement. (Calibrated in English standard.)

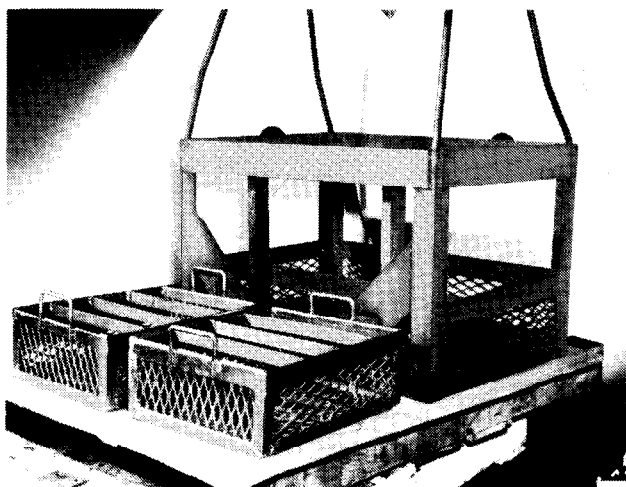


PE-5379 (9548086) – Cart, Component Sets

Class 1 Rebuild – Used on all turbos - 2 required.

A three tiered cart with each shelf sectionalized to hold various small components such as labyrinth seals and the clutch support.

20893

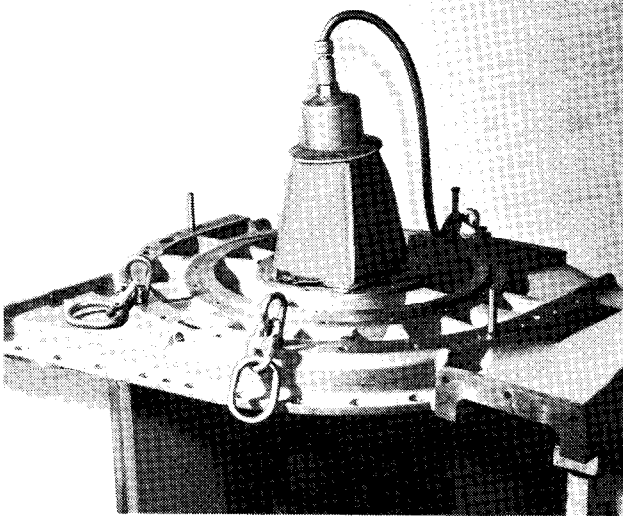


PE-6209 (9548087) – Baskets, Wash

Class 1 Rebuild – Used on all turbos - 1 required.

A set of three baskets designed to hold the turbo doweling components and other ferrous and non-ferrous components during washing.

19539

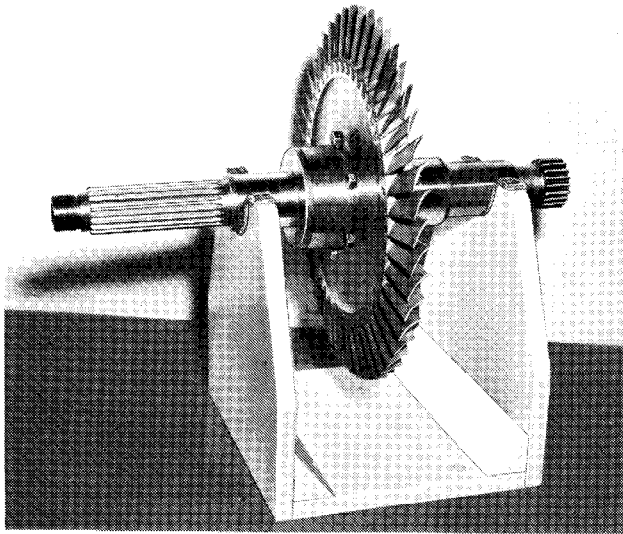


18104

PE-6440 – Heat Lamp, Bearing Installation

Class 1 Rebuild – Used on all turbos - 1 required.

Installation of the compressor journal bearing and the turbine bearing requires freezing of the bearing and heating the bore. This lamp is used to heat the bore. It has a 375 watt bulb.



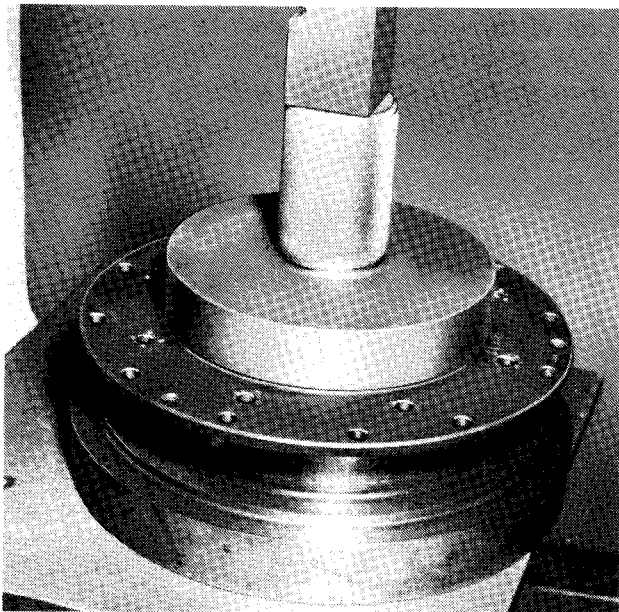
12045-1

PE-6613 – Stand, Rotor

Class 1 Rebuild – Used on all turbos - 2 required.

Provides protection for the rotating assembly bearing journals when not in the regular storage container.

REBUILD CLASS 2



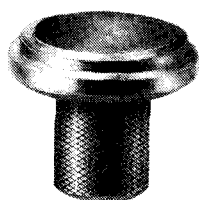
12355

1A-90960 – Arbor, Clutch Bearing Installation, Pressing

Class 2 Rebuild – Used on all turbos with a roller clutch - 1 required.

Presses the clutch doweling assembly bearings into place to the proper depth.

2B-53488 – Arbor, Clutch Bearing Removal, Pressing



20641

Class 2 Rebuild – Used on all turbos - 1 required.

With a press, removes the bushings from the clutch doweling assembly.

REBUILD CLASS 3

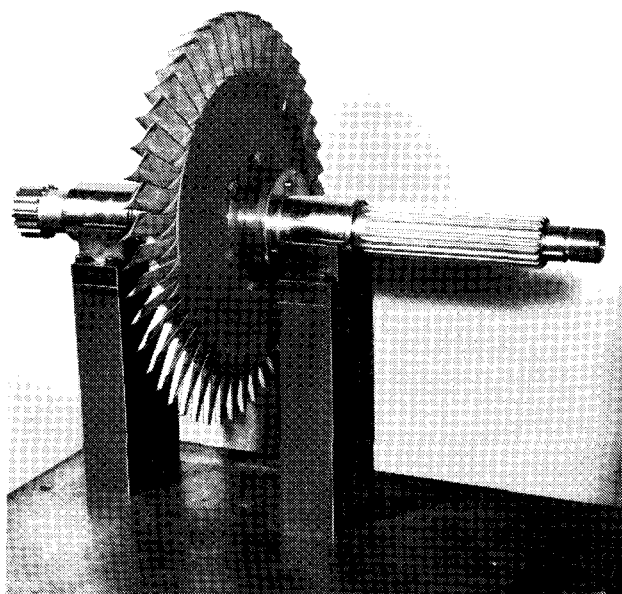


20510

1A-91450 (9548102) – Stand, Rotor Preparation

Class 3 Rebuild – Used on all turbos except high capacity - 1 required.

Provides support and protects the rotating assembly during various qualification and dimensional checks. With the back plate installed at the sun gear side as shown, support is provided for the ball bearing used in the heat dam washer squareness check. With the plate removed, the splined area can be used to secure the rotating assembly by clamping the sun gear.

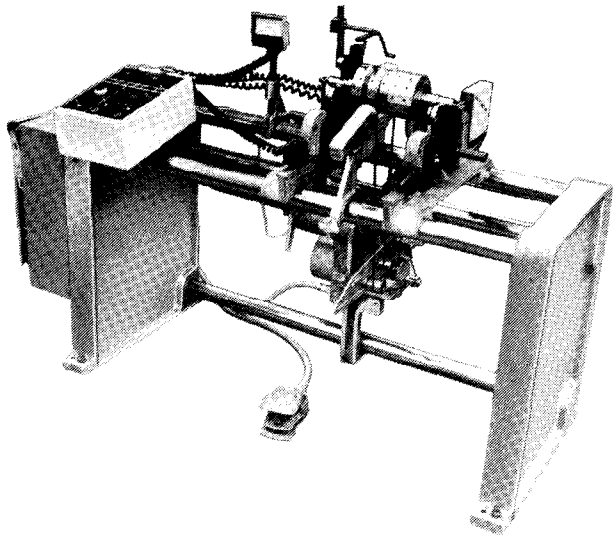


18204

2B-53486 – Centers, Rotor Inspection

Class 3 Rebuild – Used on all turbos except high capacity - 1 required.

Provides a safe stand for rotor inspection.



20653

8497000 – Balancer, Rotor

Class 3 Rebuild – Used on all turbos - 1 required.

Provides a means to correct imbalance in a rotating assembly after rework or to qualify a used assembly for reuse. Two models are presently in use, the GP500 and the HBS-350GP, which supersedes the GP500. When balancing a rotating assembly, pulley 8498676 must be used with this machine.

NOTE

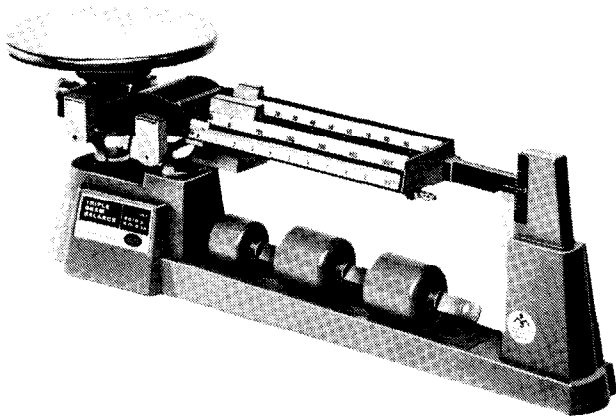
Setup and operating procedures for both of these models are included at the end of this section.

No Illustration

8498676 – Pully, Drive 1-1/2"

Class 3 Rebuild – Used on all turbos - 1 required.

Used with balancer 8497000 to provide the proper RPM for balancing the rotating assembly.



20891

G-64408 – Scale, Blade Weight

Class 3 Rebuild – Used on all turbos - 1 required.

When replacing turbine blades, each replacement blade must be within ± 0.5 gram of the old blade. This scale is graduated in 0.1 gram increments.

REBUILD CLASS 4



20616

2B-37783 – Reamer, Clutch Drive Pin Holes, Standard

2B-37784 – Reamer, Clutch Drive Pin Holes, 0.05 mm (.002") OS

2B-37785 – Reamer, Clutch Drive Pin Holes, 0.10 mm (.004") OS

2B-37786 – Reamer, Clutch Drive Pin Holes, 0.15 mm (.006") OS

2B-37787 – Reamer, Clutch Drive Pin Holes, 0.20 mm (.008") OS

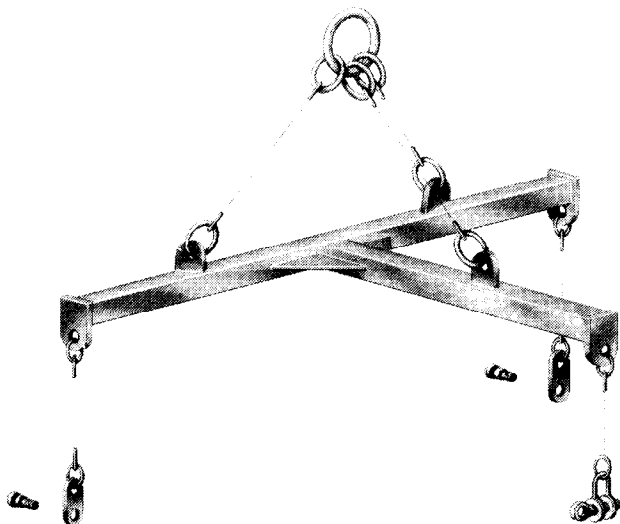
Class 4 Rebuild – Used on all turbos with roller clutches - 6 of each required.

Reamers used for drive pin holes in the clutch doweling assembly. Standard size is 10.079 - 10.084 mm (.3968" - .3970") and the reamers have a straight 7.894 - 7.904 mm (.3108" - .3112") shank.

REBUILD CLASS 5

1L-1924 (9548084) – Lifter, Turbo Doweling Assembly

Class 5 Rebuild – Used on all turbos - 1 required.



20541

Use with clamp 1L-2170. Evenly positions the main housing assembly for insertion and removal from doweling fixture 2B-38661. Can also be used with the turbine bearing support and compressor bearing support mated to the main housing.

The two oblong plates attached to the 654.1 mm (25.75") chains on the cross bar of the T shaped lifter are bolted to the main housing lifting pads, and the clamp 1L-2170 is mounted on the outside of the oil drain hole in the bottom of the main housing horseshoe with the lifting hole of the clamp positioned over the centerline of the main housing. The 387.4 mm (15.25") chain in the front of the T shaped lifter is attached to the clamp. The doweling assembly can now be raised or lowered to the doweling fixture while maintaining a horizontal attitude.

1L-1939 - Lifter, Turbo Doweling Assembly Rollover

Class 5 Rebuild - Used on all turbos - 1 required.

Used with sling and clamp 1L-3033. Reverses the position of the main housing after it has been mated with the turbine bearing support and the compressor bearing support to enable alignment and doweling of the idler gear support.

Bolt the two plates on the lifter to the main housing lifting pads with the chains to the outside. With a hoist, suspend the doweling assembly and mount the sling and clamp 1L-3033 to the two center bolt holes in the bottom of the main housing. Attach the sling and clamp to a second hoist positioned to direct the lifting force in the direction of rollover. Raise the second hoist until the doweling assembly is in the position desired and then simultaneously lower both hoists.

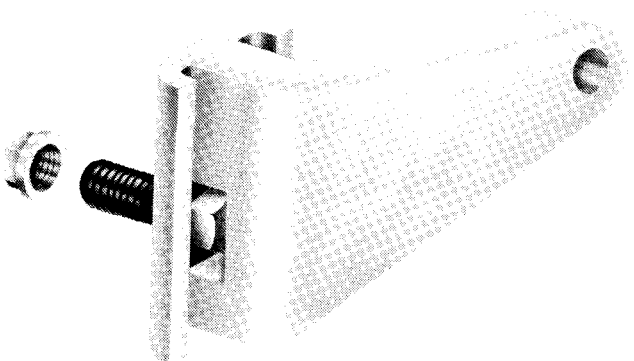


20542

1L-2170 (9548085) - Clamp, Turbo Doweling Assembly Lifting

Class 5 Rebuild - Used on all turbos - 1 required.

Used with lifter 1L-1924. For a description and instructions for setup, see the description under turbo doweling assembly lifter 1L-1924.

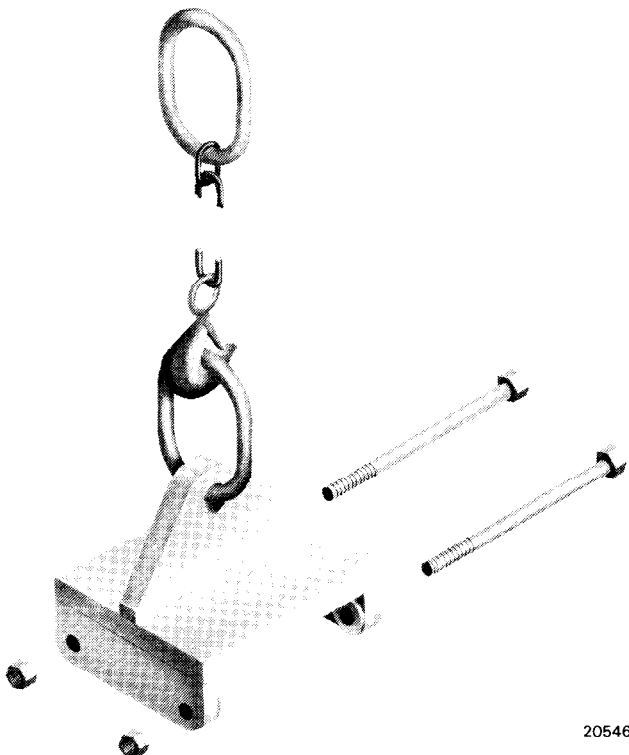


20543

1L-3033 - Sling and Clamp, Turbo Doweling Rollover

Class 5 Rebuild - Used on all turbos - 1 required.

Used with rollover lifter 1L-1939. For description and instructions for use, see description under turbo doweling assembly rollover lifter 1L-1939.



20546

- 2B-36572-1 – Reamer, Turbine Bearing Support, 0.13 mm (.005") OS
 2B-36572-2 – Reamer, Turbine Bearing Support, 0.25 mm (.010") OS
 2B-36572-3 – Reamer, Turbine Bearing Support, 0.38 mm (.015") OS
 2B-36572-4 – Reamer, Turbine Bearing Support, 0.80 mm (1/32") OS
 2B-36572-5 – Reamer, Turbine Bearing Support, 1.19 mm (3/64") OS
 2B-36572-6 – Reamer, Turbine Bearing Support, 1.59 mm (1/16") OS



20548

Class 5 Rebuild – Used on all turbos - 2 of each required.

Reamers used to accommodate oversize dowels with an interference fit between the main housing and the turbine bearing support. Standard size is 12.687 mm +0.000 - 0.008 (.4995" +.0000" -.0003") and the reamers have a No. 2 morse taper. These reamers are also used for oversize dowel holes for the two extra holes in the idler gear support in marine turbochargers with ratchet clutches.

- 2B-36573-1 – Reamer, Compressor Bearing Support, 0.13 mm (.005") OS
 2B-36573-2 – Reamer, Compressor Bearing Support, 0.25 mm (.010") OS
 2B-36573-3 – Reamer, Compressor Bearing Support, 0.38 mm (.015") OS
 2B-36573-4 – Reamer, Compressor Bearing Support, 0.80 mm (1/32") OS
 2B-36573-5 – Reamer, Compressor Bearing Support, 1.59 mm (1/16") OS
 2B-36573-6 – Reamer, Compressor Bearing Support, 3.18 mm (1/8") OS
 2B-36573-7 – Reamer, Compressor Bearing Support, 3.97 mm (5/32") OS
 2B-36573-8 – Reamer, Compressor Bearing Support, 4.76 mm (3/16") OS



20549

Class 5 Rebuild – Used on all turbos - 2 of each required.

Reamers used to accommodate oversize dowels with an interference fit between the main housing and the compressor bearing support and between the compressor bearing support and the compressor scroll. Standard size is 12.689 mm + 0.000 - 0.008 (.4996" + .0000" - .0003") and the reamers have a No. 2 morse taper.



20550

- 2B-36575-1 – Reamer, Idler Gear Support, 0.13 mm (.005") OS
- 2B-36575-2 – Reamer, Idler Gear Support, 0.25 mm (.010") OS
- 2B-36575-3 – Reamer, Idler Gear Support, 0.38 mm (.015") OS
- 2B-36575-4 – Reamer, Idler Gear Support, 0.80 mm (1/32") OS
- 2B-36575-5 – Reamer, Idler Gear Support, 1.19 mm (3/64") OS
- 2B-36575-6 – Reamer, Idler Gear Support, 1.59 mm (1/16") OS

Class 5 Rebuild – Used on all turbos - 2 of each required.

Reamers used to accommodate oversize dowels with an interference fit between the main housing and the idler gear support. Standard size is 12.827 mm + 0.000 - 0.008 (.5050" + .0000" - .0003") and the reamers have a No. 2 morse taper.

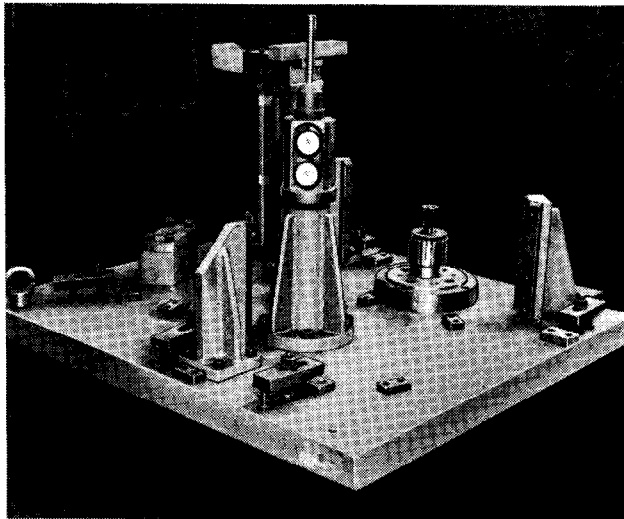


20551

- 2B-36578-1 (9559900) – Reamer, Carrier Bearing Support, 0.13 mm (.005") OS
- 2B-36578-2 (9559898) – Reamer, Carrier Bearing Support, 0.25 mm (.010") OS
- 2B-36578-3 (9559899) – Reamer, Carrier Bearing Support, 0.38 (.015") OS
- 2B-36578-4 – Reamer, Carrier Bearing Support, 0.80 mm (1/32") OS
- 2B-36578-5 (9559901) – Reamer, Carrier Bearing Support, 1.19 mm (3/64") OS
- 2B-36578-6 (9559902) – Reamer, Carrier Bearing Support, 1.59 mm (1/16") OS

Class 5 Rebuild – Used on all turbos - 2 of each required.

Reamers used to accommodate oversize dowels with an interference fit between the carrier bearing support and the idler gear support. Standard size is 13.528 mm + 0.000 - 0.008 (.5326" + .0000" - .0003") and the reamers have a 11.11 mm (7/16") shank.

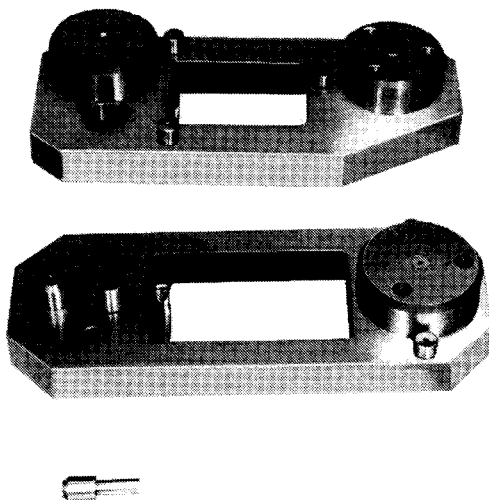


18170

2B-38661 (9548082) – Aligner, Turbo Doweling

Class 5 Rebuild – Used on all turbos - 1 required.

Fixture used for alignment of the turbo doweling assembly. Can be used for complete or partial alignment. The first illustration shows the alignment fixture and the second shows the tram gages for aligning the idler gear support to the main housing. Instructions for use are in Section 3 of this M.I.



18182

75-RE-8 – Reamer, Carrier Bearing Support, Standard 13.528 mm +0.000 -0.008 (.5326" +.0000" - .0003")

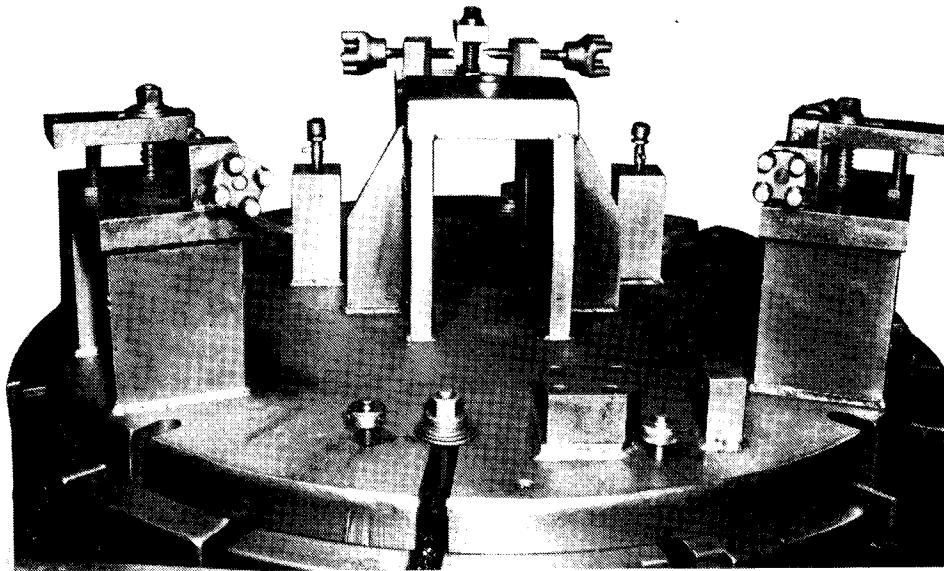
Class 5 Rebuild – Used on all turbos - 2 required.



20551

Reamer for standard size dowels with an interference fit between the carrier bearing support and the idler gear support. Reamer has a 11.11 mm (7/16") shank.

REBUILD CLASS 6

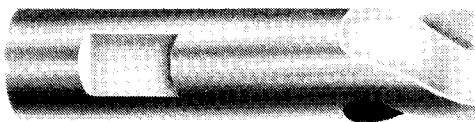


1A-91028 (9548083) - Fixture, Turbine Scroll Machining

20509

Class 6 Rebuild - Used on all turbos - 1 required.

Aligns and holds the turbine inlet scroll for machining on a vertical lathe after weld repair.



20512

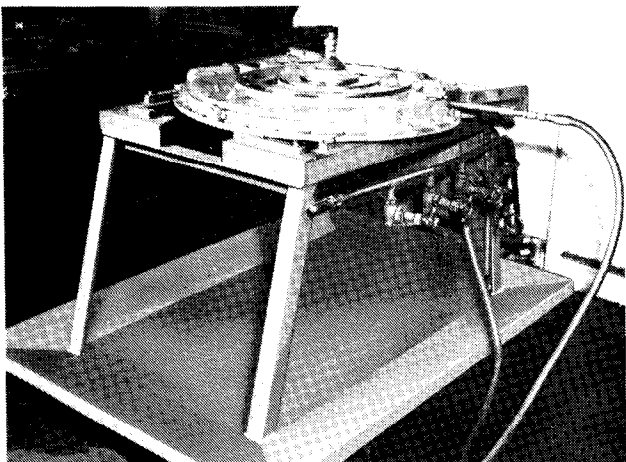
1A-91040 - End Mill, Turbine Scroll Keyway, Semi-finish

Class 6 Rebuild - Used on all turbos - 6 required.

1A-91041 - End Mill, Turbine Scroll Keyway, Finish

Class 6 Rebuild - Used on all turbos - 12 required.

Special end mills for machining inlet scroll keyways. Used with end mill holder 1A-98019 (9548081).

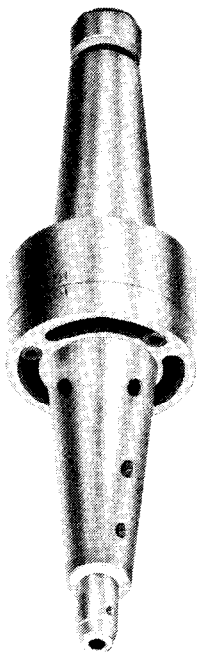


18258

1A-91752 (9548080) - Tester, Hydrostatic

Class 6 Rebuild - Used on all turbos - 1 required.

Primarily used to hydrostatically test oil and air passages in the compressor bearing support after rework or a severe failure. To blank off the support use 2B-52086. Blanks can be made by the user to adapt the fixture to other housings.

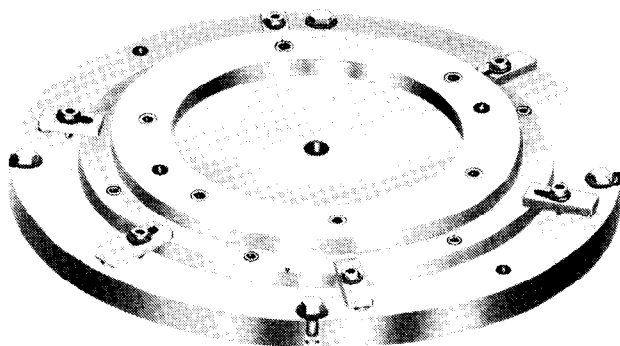


20566

1A-98019 (9548081) – Holder, End Mill

Class 6 Rebuild – Used on all turbos - 1 required.

Special holder for end mills 1A-91040, 1A-91041, and 115-CU-25. This fixture has a No. 50 milling machine taper.



20552

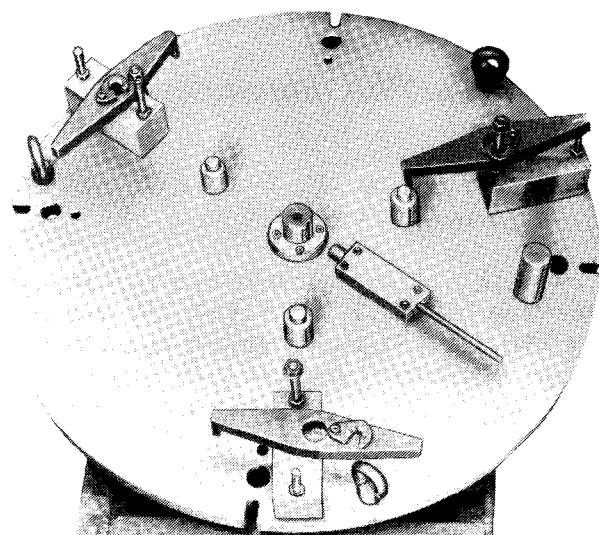
2B-36643 (9548078) – Fixture, Shroud I.D. Machining

Class 6 Rebuild – Used on all turbos - 1 required.

Holding fixture for machining the shroud I.D. can be used for both coated and non-coated shrouds. Used with any vertical lathe that can accommodate its 450.9 mm (17.75") O.D.

NOTE

Ensure that the hold down arrangement on the lathe table does not distort the shroud.



20618

2B-52083 (9548079) – Fixture, Compressor Bearing Support Machining

Class 6 Rebuild – Used on all turbos - 1 required.

Properly positions the compressor bearing support for bore, thrust face, and insert machining. Used with guide pins 2B-52085 and handler 2B-52104 for insert machining of 16E & EB and 20E & EB compressor bearing supports. The vertical lathe must be able to accommodate the fixture's 1422 mm (56.00") diameter.

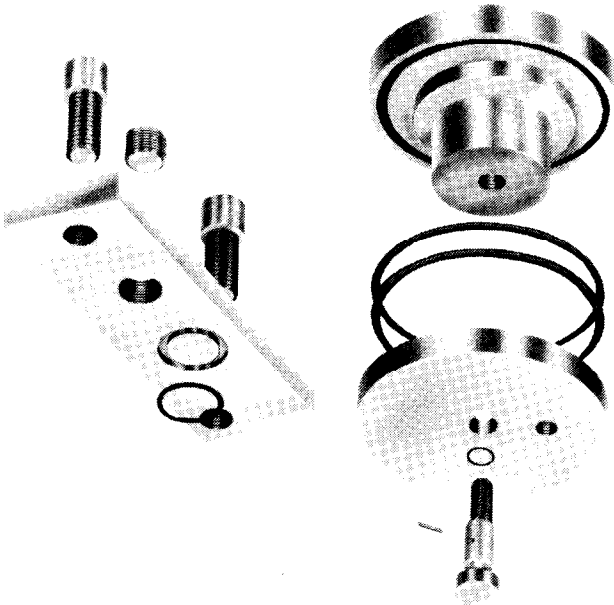
2B-52085 – Guide Pin



20619

Class 6 Rebuild – Used on 16E & EB and 20E & EB turbos - 2 required.

Used with the compressor bearing support machining fixture 2B-52083 (9548079) to guide and align the insert during installation.

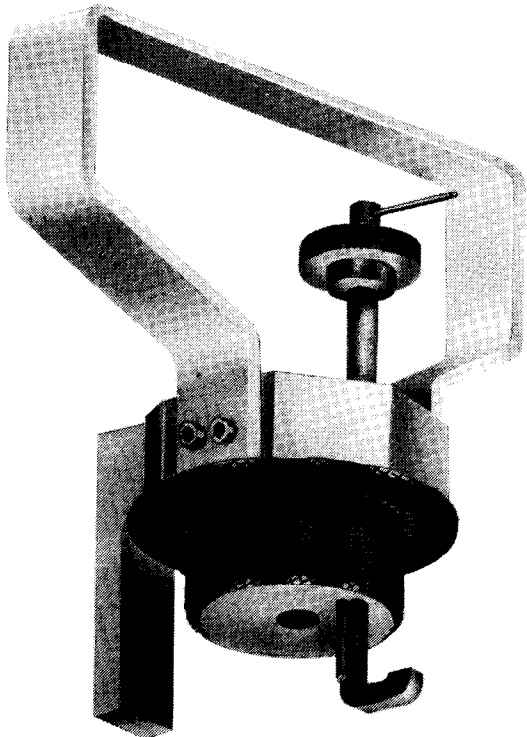


20620

2B-52086 – Tester, Compressor Bearing Support Repair

Class 6 Rebuild – Used on all turbos - 1 required.

Used with the hydrostatic tester 1A-91752 (9548080) to water test the compressor bearing support after repair or a severe failure of the turbocharger. The two round pieces seal the compressor journal bearing area, and the rectangular piece blanks the plug hole.



20622

2B-52104 – Handler, Compressor Bearing Support Insert

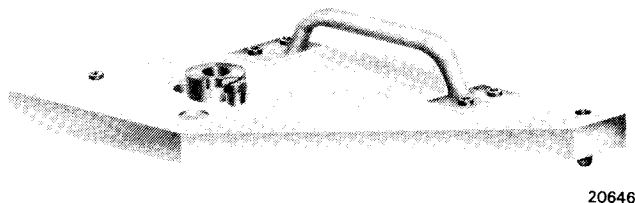
Class 6 Rebuild – Used on 16E & EB and 20E & EB turbos - 1 required.

Used with the compressor bearing support machining fixture 2B-52083 (9548079) and guide pins 2B-52085 to install a chilled insert into the support. The device locates on the oil drain hole.

2B-53894 – Drill Fixture, Idler Gear Support Conversion To High Capacity

Class 6 Rebuild – Used to convert 16E & EB and 20E & EB turbos to high capacity - 1 required.

Used as a guide for machining the idler gear support for conversion to a high capacity gear train turbo. This fixture locates in the idler stubshaft pilot and in the bolt hole directly below the drain hole in the support. Perform the following steps.



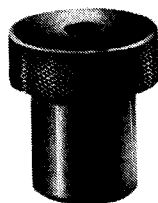
20646

1. Drill a second oil spitter hole 1.19 mm (3/64") diameter, 15.88 mm (5/8") deep.
2. With the larger 22.225 mm (.8750") O.D. bushing removed so it does not obstruct the drilling guide for the additional bolt hole, drill the bolt hole 10.716 mm (27/64") diameter, through the idler gear support 30.15 mm (1.187").
3. Install the 18.256 mm (23/32") I.D. bushing and lock with the locking bolt. Drill a 18.256 mm (23/32") diameter hole through the support.
4. Replace the 18.256 mm (23/32") I.D. bushing with the 19.055 mm (.7502") I.D. bushing. Ream the hole. 19.063 mm + 0.000 - 0.025 (.7505" + .0000" - .0010") through the support.
5. Remove the fixture and tap the new bolt hole for a 1/2" UNC-3B thread through the support.

If the main housing does not have a threaded hole to accept the bolt that goes through the idler stubshaft pilot, proceed to the next tool listing.

2B-53895 – Special Bushing, 10.72 mm (.422") Diameter

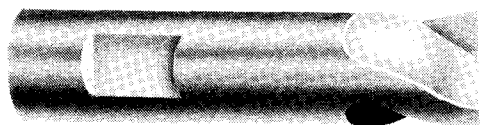
Class 6 Rebuild – Used to convert 16E & EB and 20E & EB turbos to high capacity - 1 required.



20647

A guide for drilling a hole into the main housing to accept the bolt through the idler stubshaft pilot in high capacity turbos.

1. Dowel and bolt the idler gear support to the main housing. Position the two pieces with the idler gear support facing up.
2. Install the bushing in the idler gear support stubshaft pilot and drill a 10.72 mm (.422") diameter hole, 34.93 mm (1.375") deep into the main housing.
3. Remove the bushing and tap the hole for a 1/2" UNC-3B thread, 25.4 mm (1.00") deep.

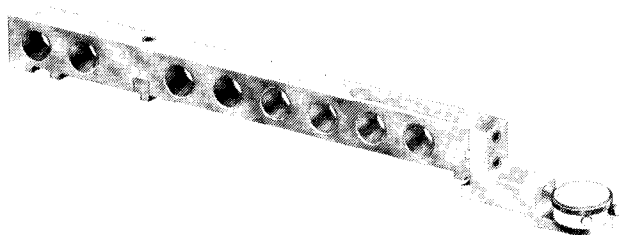


20512

115-CU-25 – End Mill, Turbine Scroll Keyway, Rough

Class 6 Rebuild – Used on all turbos - 12 required.

Special end mill used for rough cuts when machining the inlet scroll keyways. Used with end mill holder 1A-98019 (9548081).

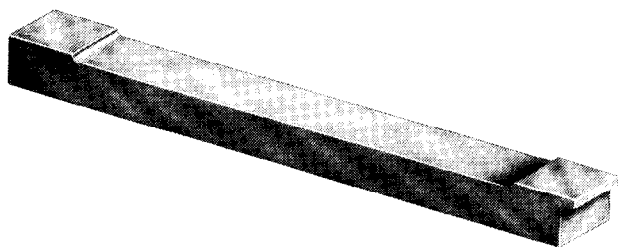


20881

G-57273 – Gage, Flange Thickness, Turbine Scroll

Class 6 Rebuild – 1 required.

Qualifies the inlet scroll's 3.23 mm (.127") flange thickness after machining. Set on Master Gage G-57274.

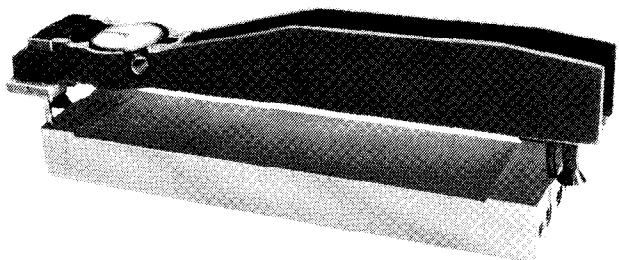


20882

G-57274 – Master, Turbine Scroll Flange Thickness Gage

Class 6 Rebuild – Used on all turbos - 1 required.

Master for setting gage G-57273.

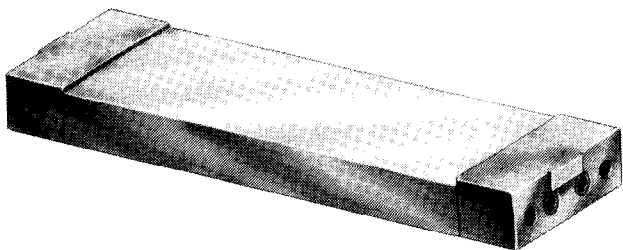


20883

G-57324 – Gage, Flange Diameter, Turbine Scroll

Class 6 Rebuild – Used on all turbos - 1 required.

Qualifies the inlet scroll's 387.81 mm (15.268") flange and diameter after machining. Set on master gage G-57325.



20884

G-57325 – Master, Turbine Scroll Flange Diameter Gage

Class 6 Rebuild – Used on all turbos - 1 required.

Master for setting gage G-57324.

SETUP PROCEDURES FOR GP500 AND HBS-350GP

1. Both – Visually inspect for obvious damage and/or imbalance and apply a strip of tape around the OD of the blades.
2. Both – Set part in place on machine and mark the back of the impeller and turbine with numbers for use with strobe light. Turbine is on left and impeller on right.
3. Both – Fit the drive belt to the part and test for constant speed. Adjust the belt or part as necessary.
4. Both – Apply the marked tape (black) to the sun gear and focus electric eye (photocell) on it, from a distance of 25.4 mm (1”).
5. Both – Measure out 2.9 grams of wax weight and set aside.
6. GP500 – Place filter dials and plane separation dials to zero, calibration dials to zero, and compensator to “out” position.
- 6a. HBS-350GP – Place filter dial and both plane separation dials to zero, both calibration dials to 10, scale switch to x5, both plus-minus switches to plus, and compensator to “out” position. Set switch in back of machine to x1 (x1-x10).
7. Both – Apply a wax weight to the impeller at the 152.4 mm (6”) radius to ensure an imbalance for proper filter adjustment. Remove this weight after filters are set. Release floating cradle lock.
8. GP500 – Rotate part, switch left/right switch to far right position and adjust right and left filter pots to get maximum deflection (peak) of amount meter.
- 8a. HBS-350GP – Rotate part (approx. 650 RPM), hold down right pushbutton and adjust filter dial to get maximum deflection (peak) of amount meter.
- 8b. Both – If the amount meter goes off scale before “peak” is obtained, bring it on scale with right calibration dial and continue to adjust filters (one filter on HBS-350GP) for maximum deflection (peak) of meter. Return right calibration pot to preset position after filters are set.
9. GP500 – Turn compensator switch to five. Rotate part and switch left/right switch slightly to right activating the 0-50 scale on amount meter. Adjust right null pots to bring the needle on amount meter toward zero. When needle falls below 10, move the left/right switch to far right (1-10 scale) and continue to adjust the right null pots until the amount meter needle is at zero. (2-3 lines may be best possible.) Repeat above procedure for left plane.
- 9a. HBS-350GP – Turn compensator switch to fine. Rotate part, leave scale switch at x5, and push right pushbutton. Adjust right compensator dials to bring the needle on amount meter towards zero. If meter does not respond, change switch in back of machine to x10 (x1-x10). Repeat above procedure for left plane.
10. GP500 – Add the 2.9 gram weight to the turbine wheel at the 114.3 mm (4.5”) radius and rotate part. Switch right/left switch to the far right position and, using right plane separation pot, bring the meter needle as close to zero as possible. Rotate pot through its entire range to ensure that the lowest possible reading is obtained.
- 10a. HBS-350GP – Add the 2.9 gram weight to the turbine wheel at the 114.3 mm (4.5”) radius and rotate part. Push right pushbutton and using right plane separation pot, bring the meter needle as close to zero as possible. Rotate pot through its entire range to ensure that the lowest possible reading is obtained.
11. GP500 – Remove the 2.9 gram weight from the turbine and place it on the impeller at the 152.4 mm (6”) radius, making note of what number (angle) it is at. Rotate part, switch left/right switch to far left position and, using left plane separation pot, bring the meter needle as close to zero as possible. Rotate pot through its entire range to ensure that the lowest possible reading is obtained.
- 11a. HGS-350GP – Remove the 2.9 gram weight from the turbine and place it on the impeller at the 152.4 mm (6”) radius, making note of what number (angle) it is at. Rotate part and push left pushbutton. Using left plane separation pot, bring the meter needle as close to zero as possible. Rotate pot through its entire range to ensure that the lowest possible reading is obtained.

12. GP500 – With the 2.9 gram weight still on the impeller and the part rotating, switch left/right switch to far right position, adjust right calibration pot so an on-scale reading is observed on meter and number where weight was placed is seen under strobe light. Carefully, touch up filter dials so number is directly in light of strobe in horizontal plane. Turn calibration pot to opposite side of 50 and adjust until meter reads “6” and the angle 180° from the weight is in light of strobe.
- 12a. HBS-350-GP – With 2.9 gram weight still on the impeller and the part rotating, push right pushbutton. Carefully touch up filter dial so number is directly in light of strobe in horizontal plane. Adjust right calibration pot so meter needle is on scale and put right plus-minus switch in position that has number (angle) where weight is at understrobe. Switch right plus-minus switch to opposite position and adjust calibration pot and/or filter so meter reads “6”. If the meter does not respond, change switch in back of machine to x10 (x1-x10). The angle 180° from the weight should now be visible.
13. Both – Turn compensator to out and remove all weights.
14. GP500 – Remove the 2.9 gram weight from the impeller and place it on the turbine at the 114.3 mm (4.5”) radius, making note of the number on the impeller. Rotate part and switch left/right switch to far left position. Adjust left calibration pot so angle (number) 180° from the weight is observed under strobe, and amount meter reads 114.3 mm (4.5”).
- 14a. HBS-350GP – Remove the 2.9 gram weight from the impeller and place it on the turbine at the 114.3 mm (4.5”) radius, making note of the number on the impeller. Rotate part and push left pushbutton. Switch left plus-minus switch to position where number (angle) 180° from the weight is observed under strobe. Adjust left calibration pot and/or filter so meter reads 114.3 mm (4.5”).
15. Both – Rotate part and read imbalance in each plane.
16. Both – Obtain the weight needed to counteract the imbalance and add it to the proper plane. The position (angle) where weight is needed is indicated by the strobe light.
17. Both – Check imbalance in each plane again.
18. Both – Repeat items 16 and 17 until both imbalances are in the acceptable range 72.0 mg·m to 18.00 mg·m (0.10 oz-inch to 0.025 oz-inch).
19. Both – Remove the weights and remove the appropriate amount of material from the area 180° from where the weight was added.
20. Both – Recheck balance of part.