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SURFACE VEHICLE RECOMMENDED PRACTICE

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Recommended Remanufacturing Procedures for Manual Transmission Clutch Assemblies

***Foreword*—**This Reaffirmed Document has been changed only to reflect the new SAE Technical Standards Board Format. Metric has been added.

***1. Scope*—**This SAE Recommended Practice is prepared as a guideline to improve and maintain the quality of remanufactured automotive products. Installation of remanufactured or rebuilt products is often an economical way to repair a vehicle even though they may not fully be equivalent to original equipment parts. Before processing any part, a remanufacturer should determine if the original design and present condition of the core are suitable for remanufacturing, so as to provide durable operation of the part as well as acceptable performance when installed in a vehicle. The remanufacturer should also carefully consider the safety aspects of the product and any recommendations of the original manufacturer related to remanufacturing or rebuilding their product.

***2. References*—**There are no referenced publications specified herein.

3. General

3.1 It is the objective of this document to assist the clutch rebuilder in turning out a unit that will credit itself and the entire rebuilding industry. The appearance, operation, service, and safety are of vital importance to the industry's well-being.

3.2 This document covers only the remanufacturing of original clutch manufacturers' cover and disc assemblies and their related components. All repairs or replacement parts must conform to safety characteristics equivalent to the OEM design.

3.3 If the product is warranted, the warranties are to be handled in such a manner as to ensure customer satisfaction. Careful records should be kept of warranties. Rebuilders should have knowledge of the vehicle as well as the clutch, if assistance is to be given to the customer to determine if a problem actually exists and its cause.

3.4 All dimensions are given in inches.

3.5 To assure proper functioning and long life of the clutch, the flywheel, release bearing, and pilot bearing should be restored to equivalent of new condition or replaced.

4. Marking and Packaging

4.1 Each unit should be stamped or marked with the rebuilder's identification and part number. Each disc should be marked with “flywheel side,” or “pressure plate side,” sticker as required. Identification tags of original manufacturers should be removed. Preservation methods and packaging should be designed to keep products clean and rust free for at least 6 months in typical customer warehouse conditions.

4.2 The instruction sheet packed with the clutch should state the importance of restoring the flywheel friction surface and clutch mounting surface to the equivalent of new specifications, and the importance of installing a new release bearing and new pilot bearing with the clutch.

5. Cover Assemblies

5.1 Dismantling and Cleaning

5.1.1 Assemblies should be disassembled to the extent needed for these procedures.

5.1.2 All component parts are cleaned to remove all dirt, oil, grease, paint, or other contaminants. Rust is removed, preferably by shot or grit blasting.

5.1.3 All component parts are to be treated with rust inhibitor, or painted.

5.2 Inspection—All parts that are to be reused must be carefully inspected for wear, cracks, and/or distortion due to excessive heat, physical damage, etc. Parts with repairable defects are segregated for salvage and further inspection. Unrepairable parts are scrapped.

5.3 Pressure Plate Repair

5.3.1 All pressure plates are to be resurfaced by grinding or machining to within 0.127 mm (0.005 in) T.I.R. of true flatness.

5.3.2 The friction face surface finish shall be 1.5 to 3.17 µm (60 to 125 µin) for dry clutches and 0.76 µm (30 µin) maximum for wet clutches.

5.3.3 Refinishing of the friction surface and other salvage operations shall not reduce the burst strength below standards for new parts. On standard thickness pressure plates having no cracks and no weakness due to excessive balance holes, the following is the amount of grind off from thickness, when new has been proven by experience to be safe, providing the amount removed does not exceed 10% of original thickness new:

a. For 305 mm (12 in) and smaller diameter sizes:

   Class 30 or better cast iron—up to 0.762 mm (0.030 in)
   Ductile iron—up to 1.524 mm (0.060 in)

b. For 330 mm (13 in) and larger diameter sizes:

   Class 30 or better cast iron—up to 1.524 mm (0.060 in)
   Ductile iron—up to 2.032 mm (0.080 in)

The refinished friction surface must be parallel within 0.254 mm (0.010 in) T.I.R. maximum to a reference surface machined by the manufacturer. The rebuilder must assure meeting the burst safety requirements. Factors that may affect allowable grind off include new designs, thinner than normal plates, material from different sources, and the mass of the plate required for sufficient heat sink for long life.

5.3.4 The drive surfaces of pressure plate drive lugs shall be restored if worn more than 0.008 in total, or if the worn surface impairs the proper release of the clutch.

5.3.5 Lever pin holes in pressure plates, with more than 0.076 mm (0.003 in) wear and excessively worn holes in yokes, shall be salvaged by the following:

a. Resizing the hole to the original new size
b. Using oversize pins
c. Staking the pins to fill the holes

5.3.6 For diaphragm spring pressure plates, the fulcrum ring surface must be restored to OE profile and surface finish if worn.

5.3.7 For diaphragm spring pressure plates, removal of metal from the friction surface must be compensated by shimming or otherwise restoring the fulcrum ring surface to OE height specifications or by shimming the diaphragm spring.

5.3.8 Threads of drive strap holes in pressure plates, and of other threaded parts, must be restored as necessary to assure proper fit to prevent loosening.

5.3.9 Eyebolt socket holes worn over 0.076 mm (0.030 in) may be salvaged by restoring to within less than 0.030 oversize.

5.4 Cover Repair

5.4.1 Covers must be inspected carefully for cracks, distortion, hole size, drive slot size, etc.

5.4.2 Worn drive slots must be welded, shimmed or pressed, and machined to within 0.1778 mm (0.007 in) of original specifications or 305 mm (12 in) and larger, and within 0.076 mm (0.003 in) for smaller clutches.

5.4.3 The bent flanges must be corrected and mounting holes must be checked on the fixture to ensure true location. Diameters of the mounting holes for bolt piloted covers must be within 0.076 mm (0.003 in) of new specifications.

5.4.4 The flywheel mounting surfaces of stamped covers must be flat and in one plane within 0.076 mm (0.030 in).

5.4.5 The rivet holes must be inspected to ensure proper fill when the replacement rivet is squeezed.

5.4.6 The shoulder rivet mounting surface shall be restored by removing all burrs or distortion due to disassembly.

5.5 Small Parts

5.5.1 All pressure springs must be replaced with new or tested to ensure O.E. recommended pressures. The springs should be matched for wire gage and solid height, in addition to pressure, to maintain balance and compression height.

5.5.2 Diaphragm springs must be similarly tested or replaced to ensure O.E. recommended pressure. The bearing contact surface of the diaphragm spring may be salvaged by lightly grinding if wear marks are not over 30% of spring thickness in depth. The diaphragm springs with deeper wear marks are scrap. The diaphragms must also be closely inspected for cracks.

5.5.3 Levers may be reused if not worn on the release contact surface more than 10% of the original thickness for stamped levers, or 25% for forged levers. Levers below this tolerance may be built up with hard weld (Rc 30 minimum) and then ground to the original specifications. Reused levers should be checked for pivot point wear and repaired according to need.

5.5.4 The needle bearings may be reused if undamaged and thoroughly clean, or replaced with new needle bearings or with bushings.

5.5.5 MISCELLANEOUS—Pins, eyebolts, yokes, struts, etc., should be carefully inspected before reuse for cracks, excessive wear, damage, etc. When worn through the hardened surface, they should be discarded and replaced. Special attention should be paid to nuts, bolts, and other threaded fastening devices.

5.5.6 The retraction clips on diaphragm spring clutches must conform to O.E. specifications.

6. Assembly

6.1 When assembling, care should be taken to use the correct springs and ensure they are seated properly. The springs are to be matched to obtain evenly distributed OEM plate load. Load testing of the finished assembly is recommended on a sampling basis to ensure plate load within 10% of OEM specifications. Insulators between the spring and pressure plate should be used when required.

6.2 Care should be taken to avoid distortion of cover during assembly.

6.3 Care should be taken when pressure plate and diaphragm parts from different assemblies are intermingled. It is possible to obtain the correct assembly clamp load but with the incorrect release bearing load. Release bearing load is considered acceptable if plate load, plate lift, and lever travel are all within O.E. specifications.

7. Adjustment and Inspection

7.1 **General—**All rebuilt cover assemblies should be inspected and tested for release and engagement in simulation of clutch installation working conditions. Stamped cover-type assemblies should be clamped firmly at all bolt holes to eliminate flexing during engagement and release. Assemblies should be cycled through release and engagement at least five times to ensure seating components prior to final setting. During release testing, verify that springs do not go solid, indicative of excess coils or wrong spring.

7.2 **Lever Type Clutches—**Pressure plate levers should be adjusted to the proper height within 0.127 mm (0.005 in) with the use of a dial indicator or other gage. The levers should be worked. The settings should be rechecked and/or readjusted and locked securely in place, and the settings must be within 0.76 mm (0.030 in) of the total indicator reading.

After final setting of levers, check pressure plate lift. The pressure plate must lift on full release travel a minimum of the OEM specified amount.

7.3 **Diaphragm Type Clutches—**Diaphragm fingers should be adjusted to the proper height with the use of a dial indicator or other gage. Fingers should be reworked, the settings should be rechecked/readjusted, if necessary. Since diaphragm springs are easily damaged by over travel, the release travel distance specified by the OEM should be verified before testing. Set fingers within 0.76 mm (0.030 in) of specified height.

7.4 **Plate Lift—**The plate lift must be parallel within 0.254 mm (0.010 in).