

TELEDYNE CONTINENTAL[®] AIRCRAFT ENGINE
SERVICE INFORMATION LETTER
CONTAINS USEFUL INFORMATION PERTAINING TO THE
CONTINENTAL AIRCRAFT ENGINE

CATEGORY 5

SIL99-2A

**Technical Portions FAA
Approved**

REASON FOR

CHANGE: Change in approval of engine lubricating oils for Teledyne Continental Motors piston engine

**SUBJECT: CURRENT LISTING OF SEALANTS, LUBRICANTS, & ADHESIVES
AUTHORIZED BY TCM.**

PURPOSE: Provide current application of sealants, lubricants & adhesives.

COMPLIANCE: During maintenance, overhaul or component repair or replacement.

MODELS

AFFECTED: All Continental Engine Models.

Lubricating oils qualified for use in Teledyne Continental Motors engines are required to meet SAE (Society of Automotive Engineers) specifications.

SAE specification J 1899 (formerly MIL-L-22851) is the approval for aircraft piston engine ashless-dispersant oil.

SAE specification J 1966 (formerly MIL-L-6082E) is the approval for aircraft piston engine non-dispersant mineral oil.

NOTE: MIL-L-6082E dated 1 November 1995 and MIL-L-22851D dated 1 November 1995 is hereby cancelled. Refer to SAE specification SAE J 1966 and SAE J 1899.

Teledyne Continental Motors listing of accepted SAE J 1899 oils by manufacturer and brand name is for the convenience of our customers. Always refer to the label on the oil to ensure that the oil meets the appropriate SAE specification.

QPL-J 1899: Qualified Products List is available from:

SAE Headquarters
400 Commonwealth Drive
Warrendale, PA 15096-001

The Naval Air Systems Command is required to maintain QPL-J-1899 and QPL-J-1966.

Naval Air Systems Command
Air 4.4.5
Jefferson Davis Highway
Arlington, VA. 22243-5120

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Recommended Oil Grade:

Above 40°F ambient air, sea level
Below 40°F ambient air, sea level

SAE 50 or Multi Viscosity
SAE 30 or Multi Viscosity


NOTE...

See TCM Engine Preservation for Active and Stored Aircraft Service Information Letter SIL99-1 for preservation information.

In listing the product names, TCM makes no claim of verification of the marketer's statements or claims. Listing is made alphabetically and is provided only for convenience of the users. If the aviation oil you use or wish to use is not listed, contact the Naval Air Systems Command

**QUALIFIED LUBRICATING OIL-ASHLESS DISPERSANT
(SAE J 1899)**

SUPPLIER	BRAND
BP Oil Corporation	BP Aero Oil
Castrol	Castrol Aero AD Oil
Castrol Limited (Australia)	Castrolaero AD Oil
Chevron USA	Chevron Aero Oil
Continental Oil	Conoco Aero S
Delta Petroleum Company	Delta Avoil Oil
Exxon Company, USA	Exxon Elite
Exxon Company, USA	Exxon Aviation Oil EE
Gulf Oil Company	Gulfpriide Aviation AD
Mobil Oil Company	Mobile Aero Oil
NYCO SA	Turbonycoil 3570
Pennzoil Company	Pennzoil Aircraft Engine Oil
Phillips Petroleum Company	Phillips 66 Aviation Oil, Type A 100 AD, 120 AD
Phillips Petroleum Company	X/C Aviation Multiviscosity Oil SAE 20W-50, SAE 25W-60
Quaker State Oil & Refining Co.	Quaker State AD Aviation Oil
Red Ram Limited (Canada)	Red Ram X/C Aviation Oil 20W-50
Shell - Australia	Aeroshell (R) W
Shell Canada Limited	Aeroshell Oil W, 15W – 50 Anti-wear Formulation
Shell USA	Aeroshell Oil W, 15W – 50 Anti-wear Formulation
Shell USA	Aeroshell Oil W Plus
Sinclair Oil Company	Sinclair Avoil
Texaco Inc.	Texaco Aircraft Engine Oil-Premium AD
Total France	Total Aero DM 15W - 50
Union Oil Company of California	Union Aircraft Engine Oil HD

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Break-in Oil
SAE J 1966- Aviation (replaces MIL-L-6082) non-dispersant mineral lubricating oil for piston aircraft engines.
MIL-C-6529 Type II Corrosion preventive mineral oil (fly-away-oil)
NOTE . . . Mineral oil conforming with MIL-C-6529 Type II contains a corrosion preventive additive and must not be used for more than 25 hours or six months, whichever occurs first. If oil consumption has not stabilized in this time, drain and replenish the oil and replace the oil filter.,

Preservative Oil		
TYPE	EQUIVALENT	APPLICATION
MIL-P-46002	Grade 1 oil, (NOX RUST VCI-105)	For Temporary and Indefinite storage

OIL CHANGE INTERVALS

Refer to the engine operator/maintenance manual and/or the aircraft manufacturer's or Supplemental Type Certificate (STC) holders POH/AFM for fuel specifications, specified oil change intervals and inspection procedures.

The oil change intervals published in the Operators Manuals are minimum requirements. Teledyne Continental Motors feels that more frequent oil and filter changes enhance engine service life. As such TCM recommends that engine oil be drained and replenished every 25 hours of operation or 4 months for engines that incorporate an oil screen. Engines with full flow oil filters, either large or small, should have the oil changed every 50 hours or 4 months.


NOTE...

When using the small (4.80 inch high oil filter) do not exceed 50 hours and/or 6 months between oil and filter changes. When using the larger (5.80 inch high oil filter) do not exceed 100 hours and/or 6 months between oil and filter changes Oil screens and oil filter elements must be inspected for contaminants at each oil change. Oil analysis may be used in addition to the oil screen or filter element inspection, but not as a replacement for it.

ADDITIVES

There are many fuel and oil additives and/or concentrates on the market today which were formulated primarily for automotive and industrial engine applications. From time to time, we receive inquiries as to the use of these products in our aircraft engines. Most of these additives and concentrates, while they may be highly beneficial to automotive and industrial operation, are not compatible with air-cooled, light aircraft engines in their operating environments. With the exception of the use of isopropyl alcohol and ethylene glycol monomethyl ether compound as described in the following paragraph, we do not recommend the use of additives or concentrates in any of our aircraft engines. In fact, the use of such can be cause for voiding the warranty. Use only fuels and lubricants as recommended herein and in current engine operating manuals.


Under certain ambient conditions of temperature/humidity, water can be supported in the fuel in sufficient quantities to create restrictive ice formation along various segments of fuel system. To alleviate the possibility of this occurring, it is permissible to add Isopropyl Alcohol to the fuel supply in quantities not to exceed 3 percent of the total. Also, ethylene glycol monomethyl ether compounds conforming to military specification MIL-DTL-27686G, if approved for use in the aircraft fuel system by the aircraft manufacturer, may be added for this purpose. The ethylene glycol monomethyl ether compound must be carefully mixed with the fuel in concentrations not to exceed 0.15 percent by volume.

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WARNING

Mixing of the EGME compound with the fuel is extremely important because concentration in excess of that recommended (0.15 percent volume maximum) can have a harmful effect on engine components. Use only blending equipment that is recommended by the manufacturer to obtain proper proportioning.


Lubricants		
TYPE	APPLICATION	REMARKS
Molyshield Grease P/N 654568-1	Starter Worm Gear Drive Teeth & Bevel Gear Teeth	All Models At engine Assembly
	Needle bearings and ball bearings	
	Valve stems	
	Adapter-Tach Reduction	(TSIO & L/TSIO 360)
	All Accessory drive splines and couplings	All models as applicable
	Idler gear and pin	GTSIO/IO/TSIO-520, IO/O/TSIO-470 all 550
	Oil Seal Lips only	All Models
	Fuel injection controls, o-rings, springs, shafts and bushings	Except models: TSIO-520-D, all 360, & GTSIO-520-K which use grade 50 W
	Magneto rubber drive bushings	All Models
	Oil Pumps (Pressure & Scavenge)	All Models / Coat gear cavity at assembly of pump
Grade 50 Break-in Non-compounded Aviation Oil SAE J 1966	Crankshaft Bearings Connecting Rod Bearings Prop Driver, Driven Gears & Bearings Camshaft Bearings Tachometer Gears & Adapters Accessory Spur Gear Teeth Quill Shaft Splines Prop Governor Trans Collar & Sleeve Starter Cone, Bushing & Nut Starter Clutch Spring (ID & OD)	All Models
	Valve Guide Seals	All Models / Apply to sealing surface
	Pistons, Piston Pins & Piston Rings	All Models
	Fuel connections to carb. (male threads only)	Carburetor equipped models
	V.T.C. Unit Pistons & centrifugal valves. Rocker arms, pivots, valves and tappets	TIARA 6-285, 6-230
	Thrust Washers Oil Filter adapter seals O-Rings	All Models

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Lubricants (continued)		
Dow Corning® G-N Paste [Dow Corning® G-N Paste is a registered trademark of Dow Corning Corporation.]	Camshaft lobes and tappet faces	At engine assembly
Shell Alvania # 2 P/N 654561	Apply a light coat at point of contact between nut seat and ferrule on ignition lead	All Models
Shell #5 MIL-G-3545-C Grease P/N 654468	All Fuel injection linkages O-Rings on Fuel Pumps Fuel pressure regulator spring seat Mixture Shaft Bushings	All Models / At assembly
P/N 646943 - Anti Seize Lubricant or Loctite 76732 Anti-Seize Lubricant	All fuel injector nozzles (at cylinder head)	Fuel Injected Models / Use sparingly on male threads only Apply in accordance with Figure 8
	Exhaust studs	All Models (nut end before torquing)
	All mechanical tach drive housing threads not through to an oil source Plug Vernatherm All .3125 and larger studs unless otherwise noted	At engine assembly
	Oil sump return fitting	IO-360-ES3B & IO-360-HB9B
	Air Reference Fittings on all Throttle bodies	Engine Models as applicable
50 Weight Non-compounded or Ashless Dispersant Aviation Oil SAE J 1966	Cylinder studs and through bolts, crankcase studs, connecting rod bolts and nuts and engine accessory studs unless otherwise specified	All Models / Lube thread and nut seat before tightening nuts
CHAMPION® - Spark Plug Thread Lubricant No. 2612 [CHAMPION® is a registered trademark of Cooper Industries.]	Spark plugs	All Models
Chesterton #995 Release agent or WD-40	Induction system hose and flex duct connections, Fuel Pump Aneroid Seal	All Models
Dow Corning® No. 4	Apply to rubber oil seal of spin-on oil filter Gaskets - Governor pad (both sides) Gaskets-Mag adapter (both sides)	Engine Models as applicable
Lubriplate 930 AA	O.D. of Valve Guides	All models at installation of guide
CRS 336 Rust Preventative Compound	Spray exhaust end of turbocharger	For engine preservation


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Sealants		
TYPE	APPLICATION	REMARKS
Permatex Aviation Grade 3D And P/N 641543 Silk Thread	Crankcase parting face	All Models / Apply in accordance with Figures 1 through 7 as applicable
	Starter adapter to accessory case	Apply in accordance with Figure 19
	Accessory Drive Adapter	Apply in accordance with Figure 20
	Pressure oil pump covers, Pressure scavenge pump covers	Apply in accordance with Figures 10 through 18
P/N 653692 - Primer or Loctite LocQuic Primer 7649	Crankcase crankshaft nose oil seal area	All models
P/N 646942 - Gasket Maker or Loctite 515 Gasket Eliminator Sealant	Sump to crankcase	TSIO-520-UB, TSIOL-550-B
	Crankcase parting face	All Models / Apply in accordance with Figures 1 through 7 as applicable
	Engine nose seal, scavenge oil pump covers, between crankcase and sump gasket, oil pump covers	All Models
	Between starter adapter gasket & crankcase	Permold model engines
	Between Oil sump and Sump Gasket	All Models (Non beaded gaskets only)
	642910 OIL SEAL, O.D. of all uncoated oil seals, except fuel pump adapter seal	All models where applicable
P/N 642188 - Gasket Sealant (K & W Copper Coat 1504-12)	All gaskets both sides, except magneto gasket & gaskets between intake manifold & cylinder heads	TIARA 6-285, 6-230
	Gasket - Accessory case to crankcase (Crankcase side only)	C-90, O-200, O-300, 360 & IO-240
	Gasket - Cam bore cover (except beaded gaskets)	470, 520, 550, GTSIO-520 Models and IO-240
	Gasket - Idler Pin	470, 520, GTSIO-520, all 550
	Gasket - Intake Manifold	All models
	Oil drain back tubes	C-90, O-200, O-300
	Gasket & Oil filler neck holes	470, 520, 550 (Sandcast) and GTSIO-520
	Gasket - Oil cooler both sides	All 360 models
	Oil seal at alternator drive (O.D. only)	TIARA 6-285, 6-230
	All press type plugs (Hubbard etc)	All Models
	In parting line area of 3-way joints	Sump to crankcase or sump to crankcase to accessory case

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Sealants (Continued)		
Continued P/N 642188 - Gasket Sealant (K & W Copper Coat 1504-12)	Oil seal accessory drive (O.D. only)	TSIO-360, A, AB, C, CB, D, DB and IO-360-C, CB,G,GB
	2 Bolt suction tube gasket - both sides	All 470, 520, 550 models as applicable
Loctite 592 Teflon PS/T Pipe Sealant	Use on all pipe threads except as noted All pressure relief valve housing threads Permold 2 studs engine mount 1-3-5 side bottom	
	All threaded fasteners installed in a through hole to an oil source	Apply before installing threaded part
P/N 646940 - F/I Sealant or Loctite 569 Hydraulic Sealant	All pipe thread fittings in fuel injection system	Apply in accordance with Figure 9
P/N 649246 Loctite 290 Sealant	Data plate screw installation on throttle bodies	All models where applicable
Miller-Stephenson MS 122DF	Ignition harness terminals at magneto block end	All Models

Adhesives		
TYPE	APPLICATION	REMARKS
Loctite 271 High Strength Adhesive Sealant (used with P/N 653693 Primer or Loctite 7471)	Rocker cover stud, rocker arm pivot studs, push rod retainer stud	TIARA 6-285, 6-230 only
	Cylinder deck studs	All models breakaway torque 100 in-lbs. after 2 hrs
	Crankcase breather tubes	470 & 520 (Sandcast) & GTSIO-520
	Bolts for nose seal retainer to crankcase	All Models
	Squirt nozzle	All Models
	Mechanical Tach Drive Studs to an oil source	Engine models as applicable
	Oil pump gear mounting pin in accessory cover	360 models
	All press fit breather and oil filler necks	360 & IO-240 models
	Intake manifold mount studs	C-75, C-85, C-90 & O-200
	V.T.C. unit bushing retaining screw	TIARA 6-285, 6-230
	V.T.C. unit housing to crankshaft	
	Top accessory drive gear (breather slinger) bolts	
	Studs on coolant manifold	All liquid cooled models
	Fuel manifold valve diaphragm & plunger assembly	IO-240 All 360, 470, 520, 550 models

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Adhesives (Continued)		
Loctite 271 High Strength Adhesive Sealant (used with #653693 Primer or Loctite 7471) (Cont'd)	Oil gauge rod housing to crankcase	All IO-360 & TSIO-360, IO-470, All O-470, All TSIO-470 all IO-520-A, D, E, G, J, K, L; IO-550-D, E, F TSIO-520-A, AE, AF, C, CE, G, H, M, P, R, T
	Timing indicator pin	All GTSIO-520
P/N 649306 Loctite 222 Sealant (optional Loctite Hydraulic Sealant 569) or TCM P/N 646940	Through stud holes on accessory end of crankcase	All 470, 520, 550 models (apply when installing studs)
	Solenoid valve assembly (Bracket to valve)	TSIO-360-MB & SB & IO-360-ES2B
	Manifold valve to bracket screws	All Models
	Coolant pump impeller ring screws	All liquid cooled models
	Studs .25 diameter and smaller	All Models
	Data plate screws on manifold valve assembly	All Models
P/N 654562 Loctite 609 Adhesive / Sealant	Bearing O.D. installed on starter clutch assembly	O-200-A, B, IO-240-A, B, O-300-A
	Fuel pump adapter seal	All Models
	Fuel pump shaft seal	
Loctite 620 Adhesive/Sealant	Coolant pump mechanical seal	All liquid cooled models
P/N 654743 / 3M Scotchcast 10 (XR5241) Epoxy	Epoxy field coil leads to starter housing	24 Volt Starters
P/N 654470 / 3M Brand EC 1252 White Spot Seal Putty	Air throttle & fuel metering assembly Magneto flanges Cylinder deck stud nuts & all through bolts All fuel pump, manifold valve, throttle and control fittings	All Models
P/N 655114 Adhesive Sealant (Devcon)	Use for sealing aneroid air reference path between basic fuel pump housing and vapor separator body (Setup only)	Fuel Pumps 646766, 646767 & 646824
P/N 649366 Loctite 242)	Fitting Magneto Housing (Pressurization)	Engine models as applicable

Miscellaneous		
TYPE	APPLICATION	REMARKS
TCM P/N 626531-1 Enamel - Gold (1 qt) TCM P/N 626531-2 Enamel - Gold (1 gal)	High temp. paint for cosmetic and corrosion protection	
TCM P/N 535011 Lockwire -.032 in dia. Steel, Corrosion Resistant	Where applicable for lockwiring	
"ACCELAGOLD" Turco® Products	Corrosion protection interior and exterior aluminum parts	

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Product Locator

Dow Corning® G-N Paste is a registered trademark of Dow Corning Corporation

Dow Corning® No. 4

For Distributor information call - 1-800-248-2481, have state & city information available

Permatex

Permatex Aviation Grade 3D

For Distributor information call: Permatex Customer Service @ Phone: 1-800-641-7376

Loctite

Loctite Gasket Eliminator

Loctite LocQuic Primer 7649

Loctite Teflon PS/T Pipe Sealant

Loctite Hydraulic Sealant 569

Loctite 271

Loctite LocQuic Primer 7471

Loctite Adhesive Sealant 222

May be purchased through your local TCM Distributor or For Distributor information: Loctite Customer Service @ Phone: 1-800-243-4874

Alvania (Shell #2)

MIL-S-3545C Grease (Shell #5)

For Distributor information: Shell Product Information Center, Phone: 1-800-231-6950

CHAMPION® is a registered trademark of Cooper Industries

For Champion Products Distributor information: Phone: 803-843-5400

K & W Copper Coat

For Distributor information call: K & W Products Customer Phone: 1-800-423-9446

Miller-Stephenson MS 122/C02 Spray

For Distributor information: Miller-Stephenson Customer Service, Phone: 1-800-992-2424

Molyshield Grease

May be purchased through:

American Lubricants

1227 Deeds

Dayton, Ohio 45401

Phone: (937) 222-2851

3M Brand EC1252 White Spot Putty

3M Scotchcast 10 (XR5241) Epoxy

"ACCELAGOLD" [Manufactured by Turco® Products, Inc.]

Elf Atochem N.A. Turco® Products Div.

P.O. Box 195

State Route 95 West

Marion, Ohio, 43302,

215-419-5376

MIL-P-46002

Grade 1 oil, (NOX RUST VCI-105)

May be purchased through:

Rock Island Lubricant & Chemical Co.

P.O. Box 5015


1320 1st Street

Rock Island, Illinois 61204

Phone: 1-800-522-1150

Chesterton Technical Product Information

Phone: 1-803-843-5400

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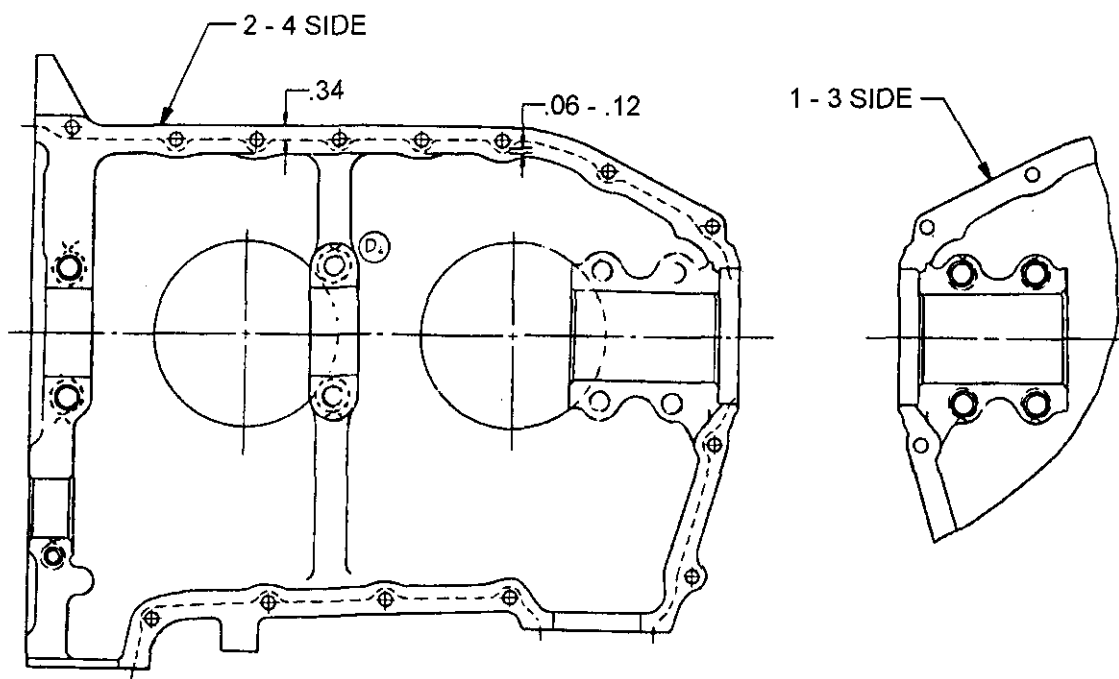


FIGURE 1. C75, C85, C90, 0200 CRANKCASE THREADING DIAGRAM

CRANKCASE SEALANT AND THREADING PROCEDURE

1. Use full strength non-thinned Permatex aviation grade 3D. Shake or mix well before using.

WARNING

Apply thread and permatex only as illustrated.

2. Apply Permatex Number 3D to the 2-4 case half. Apply Permatex only in areas where thread is shown. When applying, use short light brush strokes until an even thin coat is obtained. The Permatex should be viscous enough that most of the brush marks disappear; if not, use a new can of Aviation Permatex. Allow the Permatex to air dry to a tacky condition before threading.

NOTE...

Do not apply Permatex to crankshaft nose seal area.


3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick

to 1-3 case half. Apply Gasket Maker in all areas that will mate with areas where Permatex was applied on 2-4 case half except the through bolt bosses.

4. Apply and position grade D silk thread P/N 641543 on case halves as specified in Figure 1. Be sure free ends of thread are covered by gaskets except at the nose oil seal.
5. Clean crankcase crankshaft front oil seal land with Locquic Primer "N" and apply an even coat of gasket maker.
6. Assemble crankcase halves, install and torque all crankcase hardware in proper sequence in accordance with the applicable overhaul manual as soon as possible.

NOTE...

Take care to prevent displacement or damage to the crankshaft oil seal and silk thread. Insure thrust washer halves and bearing halves remain in place.

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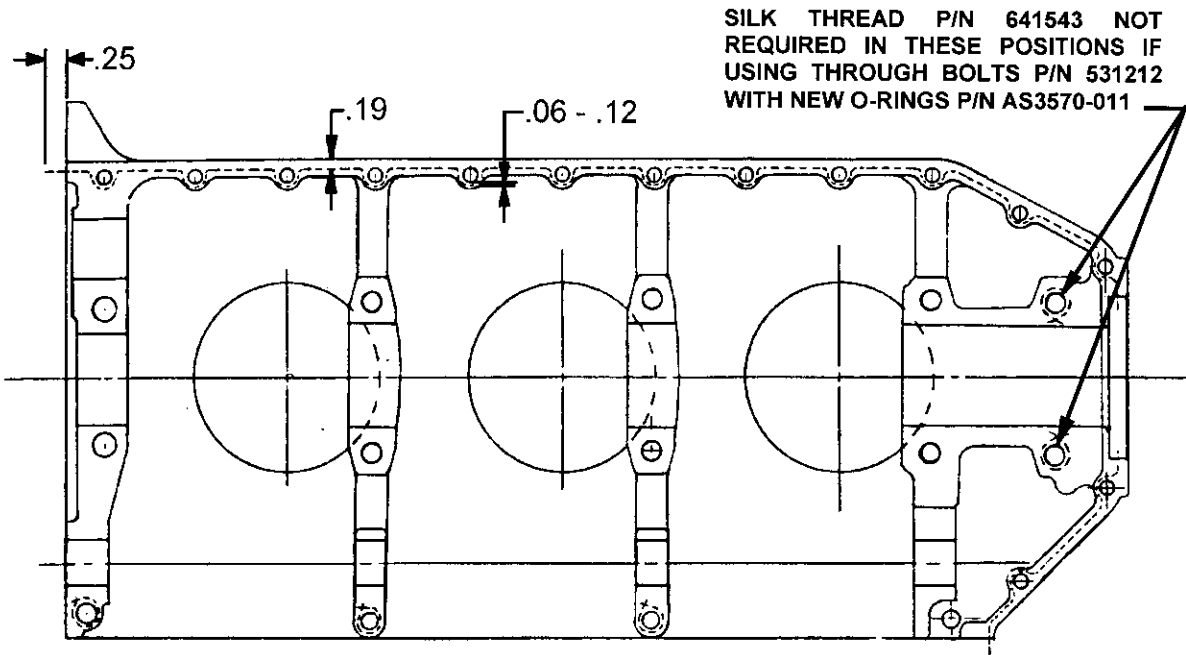


FIGURE 2. 0300 CRANKCASE THREADING DIAGRAM

CRANKCASE SEALANT AND THREADING PROCEDURE

1. Use full strength non-thinned Permatex aviation grade 3D. Shake or mix well before using.

WARNING

Apply thread and permatex only as illustrated.

2. Apply Permatex Number 3D to the 2-4-6 case half. Apply Permatex only in areas where thread is shown. When applying, use short light brush strokes until an even thin coat is obtained. The Permatex should be viscous enough that most of the brush marks disappear; if not, use a new can of Aviation Permatex. Allow the Permatex to air dry to a tacky condition before threading.


NOTE...

Do not apply Permatex to crankshaft nose seal area.

3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to 1-3-5 case half. Apply Gasket Maker in all areas that will mate with areas where Permatex was applied on 2-4-6 case half.
4. Apply and position grade D silk thread P/N 641543 on 2-4-6 case half as specified in Figure 2. Be sure free ends of thread are covered by gaskets except at the nose oil seal.
5. Clean crankcase crankshaft front oil seal land with Locquic Primer "N" and apply an even coat of gasket maker.
6. Assemble crankcase halves, install and torque all crankcase hardware in proper sequence in accordance with the applicable overhaul manual as soon as possible.

NOTE...

Take care to prevent displacement or damage to the crankshaft oil seal and silk thread. Insure thrust washer halves and bearing halves remain in place.

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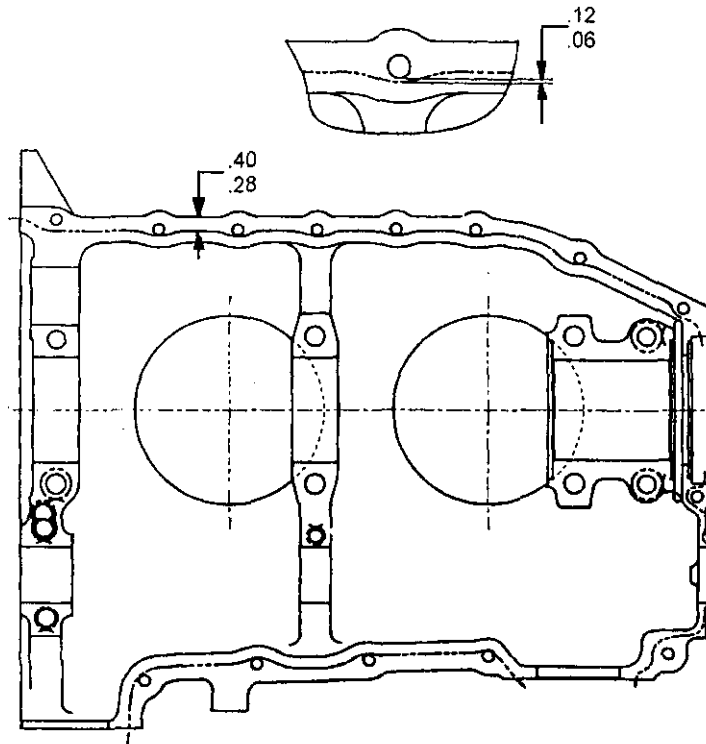


FIGURE 3. I0240 CRANKCASE THREADING DIAGRAM

CRANKCASE SEALANT AND THREADING PROCEDURE

1. Use full strength non-thinned Permatex aviation grade 3D. Shake or mix well before using.

WARNING

Apply thread and permatex only as illustrated.

2. Apply Permatex Number 3D to the 2-4 case half. Apply Permatex only in areas where thread is shown. When applying, use short light brush strokes until an even thin coat is obtained. The Permatex should be viscous enough that most of the brush marks disappear; if not, use a new can of Aviation Permatex. Allow the Permatex to air dry to a tacky condition before threading.

NOTE...

Do not apply Permatex to crankshaft nose seal area.


3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to 1-3 case half. Apply Gasket Maker in all

areas that will mate with areas where Permatex was applied on 2-4 case half except the through bolt bosses.

4. Apply and position grade D silk thread P/N 641543 on 2-4 case half as specified in Figure 3. Be sure free ends of thread are covered by gaskets except at the nose oil seal.
5. Clean crankcase crankshaft front oil seal land with Locquic Primer "N" and apply an even coat of gasket maker.
6. Assemble crankcase halves, install and torque all crankcase hardware in proper sequence in accordance with the applicable overhaul manual as soon as possible.

NOTE...

Take care to prevent displacement or damage to the crankshaft oil seal and silk thread. Insure thrust washer halves and bearing halves remain in place.

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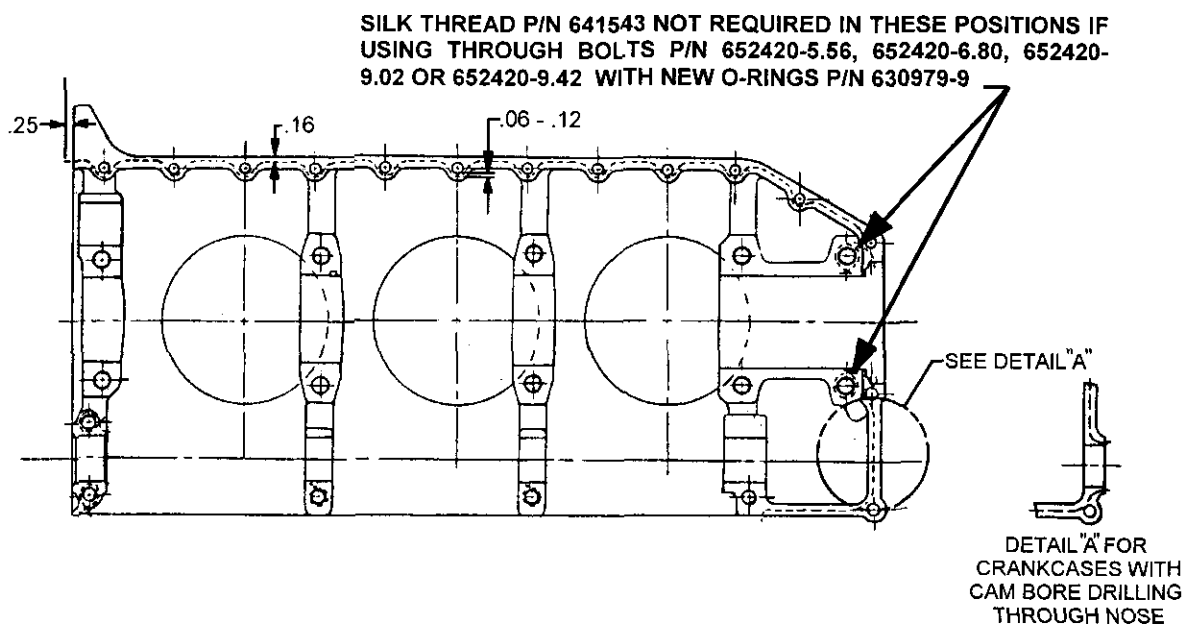


FIGURE 4. I0360, L/TSI0360 CRANKCASE THREADING DIAGRAM

CRANKCASE SEALANT AND THREADING PROCEDURE

1. Use full strength non-thinned Permatex aviation grade 3D. Shake or mix well before using.

WARNING

Apply thread and permatex only as illustrated.

2. Apply Permatex Number 3D to the 2-4-6 case half. Apply Permatex only in areas where thread is shown. When applying, use short light brush strokes until an even thin coat is obtained. The Permatex should be viscous enough that most of the brush marks disappear; if not, use a new can of Aviation Permatex. Allow the Permatex to air dry to a tacky condition before threading.


NOTE...

Do not apply Permatex to crankshaft nose seal area.

3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to 1-3-5 case half. Apply Gasket Maker in all areas that will mate with areas where Permatex was applied on 2-4-6 case half.
4. Apply and position grade D silk thread P/N 641543 on 2-4-6 case half as specified in Figure 4. Be sure free ends of thread are covered by gaskets except at the nose oil seal.
5. Clean crankcase crankshaft front oil seal land with Locquic Primer "N" and apply an even coat of gasket maker.
6. Assemble crankcase halves, install and torque all crankcase hardware in proper sequence in accordance with the applicable overhaul manual as soon as possible.

NOTE...

Take care to prevent displacement or damage to the crankshaft oil seal and silk thread. Insure thrust washer halves and bearing halves remain in place.

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SILK THREAD P/N 641543 NOT REQUIRED IN THESE POSITIONS IF USING THROUGH BOLTS P/N 652887-5.31, 652887-6.74, 652887-6.50, 652887-6.19, 652887-6.96 OR 652887-7.58 WITH NEW O-RINGS P/N MS29513-011

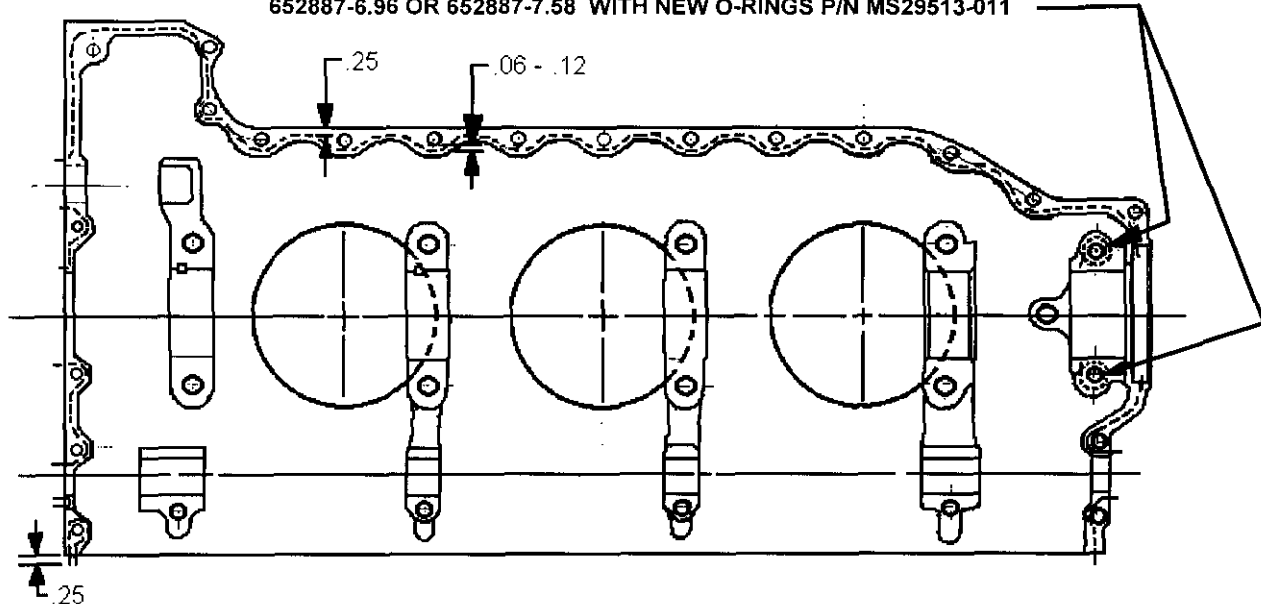


FIGURE 5. I0520, TSI0520, I0550, TSI0550 PERMOLD ENGINE CRANKCASE THREADING DIAGRAM

CRANKCASE SEALANT AND THREADING PROCEDURE

1. Use full strength non-thinned Permatex aviation grade 3D. Shake or mix well before using.

WARNING

Apply thread and permatex only as illustrated.

2. Apply Permatex Number 3D to the 2-4-6 case half. Apply Permatex only in areas where thread is shown. When applying, use short light brush strokes until an even thin coat is obtained. The Permatex should be viscous enough that most of the brush marks disappear; if not, use a new can of Aviation Permatex. Allow the Permatex to air dry to a tacky condition before threading.


NOTE...

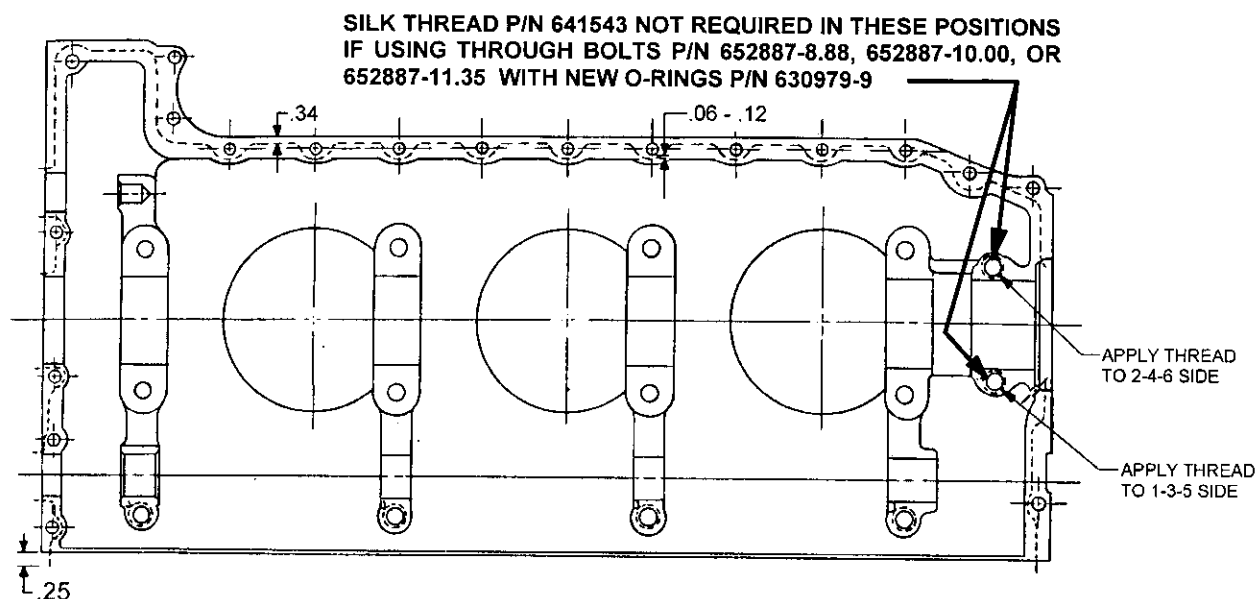
Do not apply Permatex to crankshaft nose seal area.

3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to 1-3-5 case half. Apply Gasket Maker in all areas that will mate with areas where Permatex was applied on 2-4-6 case half.
4. Apply and position grade D silk thread P/N 641543 on 2-4-6 case half as specified in Figure 5. Be sure free ends of thread are covered by gaskets except at the nose oil seal.
5. Clean crankcase crankshaft front oil seal land with Locquic Primer "N" and apply an even coat of gasket maker.
6. Assemble crankcase halves, install and torque all crankcase hardware in proper sequence in accordance with the applicable overhaul manual as soon as possible.

NOTE...

Take care to prevent displacement or damage to the crankshaft oil seal and silk thread. Insure thrust washer halves and bearing halves remain in place.

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**FIGURE 6. 0470, I0470, L/I0520, L/TSI0520, I0550 SANDCAST
ENGINE CRANKCASE THREADING DIAGRAM**

CRANKCASE SEALANT AND THREADING PROCEDURE

1. Use full strength non-thinned Permatex aviation grade 3D. Shake or mix well before using.

WARNING

Apply thread and permatex only as illustrated.

2. Apply Permatex Number 3D to the 2-4-6 case half. Apply Permatex only in areas where thread is shown. When applying, use short light brush strokes until an even thin coat is obtained. The Permatex should be viscous enough that most of the brush marks disappear; if not, use a new can of Aviation Permatex. Allow the Permatex to air dry to a tacky condition before threading.

NOTE...

Do not apply Permatex to crankshaft nose seal area.


3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to 1-3-5 case half. Apply Gasket Maker in all areas that will mate with areas where Permatex was applied on 2-4-6 case half.
4. Apply and position grade D silk thread P/N 641543 on case halves as specified in Figure 6.

Be sure free ends of thread are covered by gaskets except at the nose oil seal.

5. Clean crankcase crankshaft front oil seal land with Locquic Primer "N" and apply an even coat of gasket maker.
6. Assemble crankcase halves, install and torque all crankcase hardware in proper sequence in accordance with the applicable overhaul manual as soon as possible.

NOTE...

Take care to prevent displacement or damage to the crankshaft oil seal and silk thread. Insure thrust washer halves and bearing halves remain in place.

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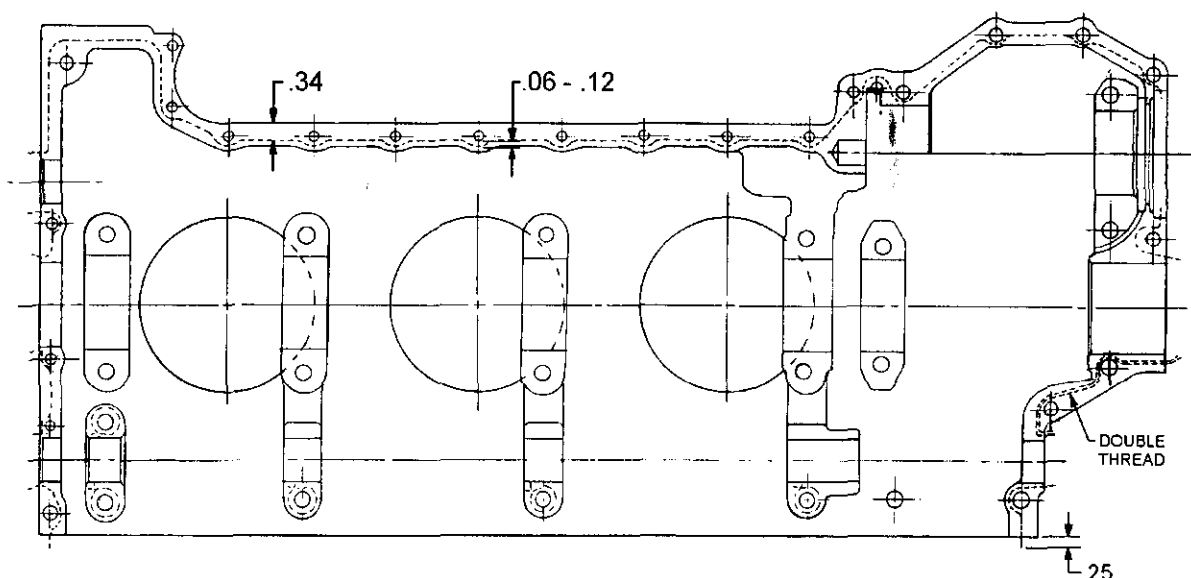


FIGURE 7. GTSI0520 CRANKCASE THREADING DIAGRAM

CRANKCASE SEALANT AND THREADING PROCEDURE

1. Use full strength non-thinned Permatex aviation grade 3D. Shake or mix well before using.

WARNING

Apply thread and permatex only as illustrated.

2. Apply Permatex Number 3D to the 2-4-6 case half. Apply Permatex only in areas where thread is shown. When applying, use short light brush strokes until an even thin coat is obtained. The Permatex should be viscous enough that most of the brush marks disappear; if not, use a new can of Aviation Permatex. Allow the Permatex to air dry to a tacky condition before threading.


NOTE...

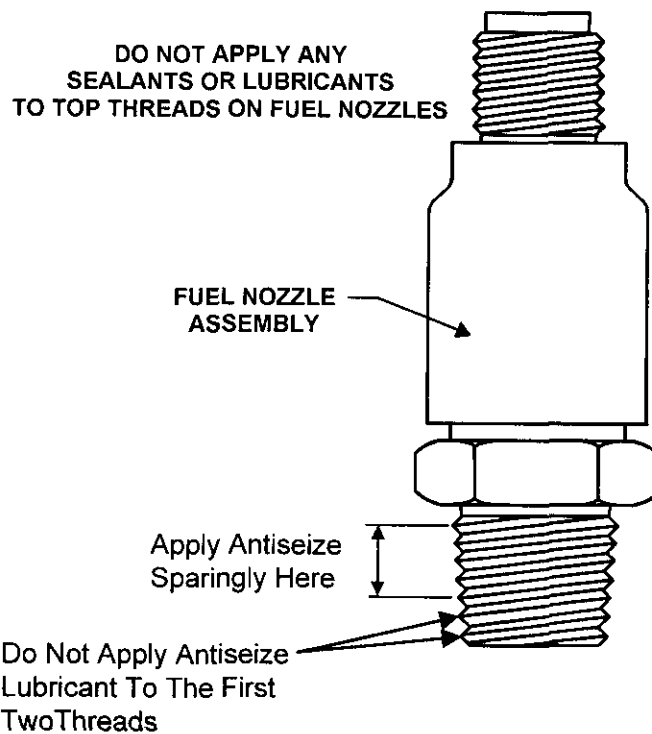
Do not apply Permatex to crankshaft nose seal area.

3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to 1-3-5 case half. Apply Gasket Maker in all areas that will mate with areas where Permatex was applied on 2-4-6 case half.
4. Apply and position grade D silk thread P/N 641543 on 2-4-6 case half as specified in Figure 7. Be sure free ends of thread are covered by gaskets except at the nose oil seal.
5. Clean crankcase crankshaft front oil seal land with Locquic Primer "N" and apply an even coat of gasket maker.
6. Assemble crankcase halves, install and torque all crankcase hardware in proper sequence in accordance with the applicable overhaul manual as soon as possible.

NOTE...

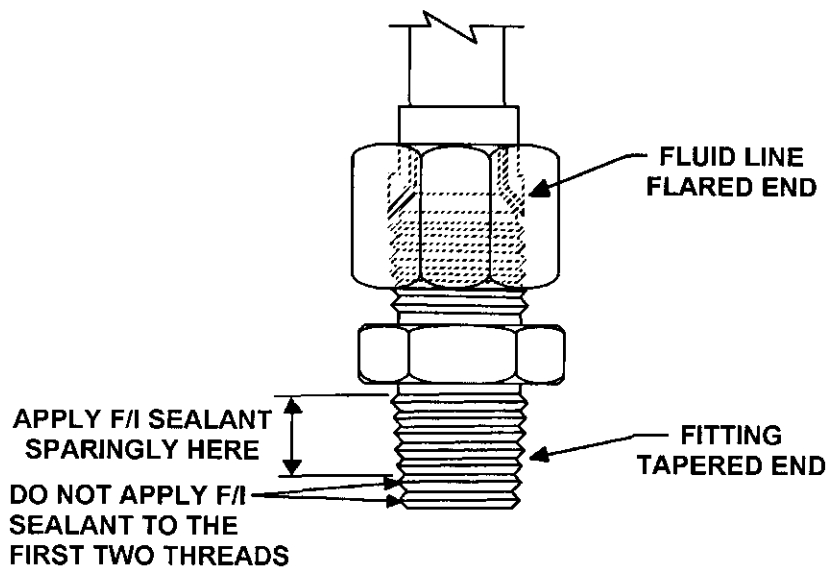
Take care to prevent displacement or damage to the crankshaft oil seal and silk thread. Insure thrust washer halves and bearing halves remain in place.

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CAUTION...NEVER USE TEFLON TAPE ON FLUID FITTINGS OR FUEL NOZZLES


FIGURE 8. GENERAL ANTISEIZE LUBRICANT APPLICATION



CAUTION...F/I SEALANT 646940 MUST BE APPLIED TO THE TAPERED END OF FITTINGS ONLY

CAUTION...NEVER USE TEFLON TAPE ON FLUID FITTINGS OR FUEL NOZZLES

FIGURE 9. GENERAL FUEL INJECTION SEALANT APPLICATION

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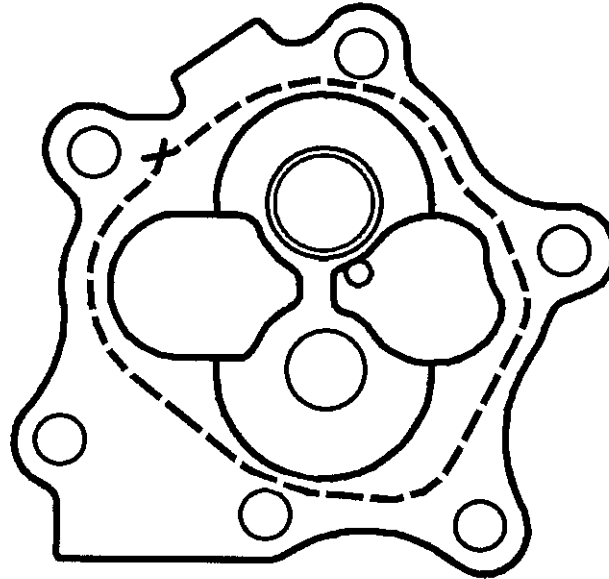



FIGURE 10. THREADING DIAGRAM FOR 640741, 640766A2, A5, A8, A9, 652019, 652019A1, 652088A2, A3, A4, A5, A6 SCAVENGE PUMP BODIES USED ON STARTER ADAPTERS 642087A27, A31, A35, A41, A47, A51, A55 AND CORRESPONDING 0.015 OVERSIZE ADAPTERS

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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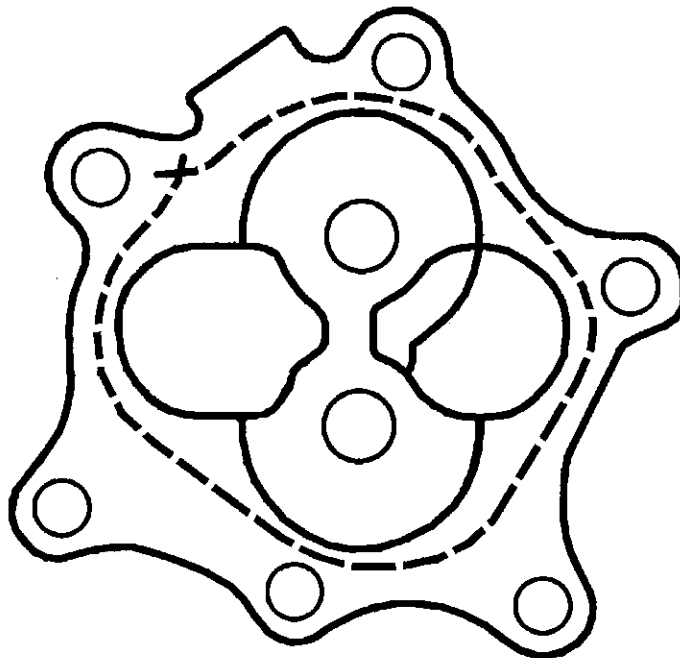



FIGURE 11. THREADING DIAGRAM FOR 639407, 640194 SCAVENGE PUMP BODIES USED ON STARTER ADAPTERS 642085A2 THROUGH A9, A11 THROUGH A16 AND CORRESPONDING 0.015 OVERSIZE ADAPTERS

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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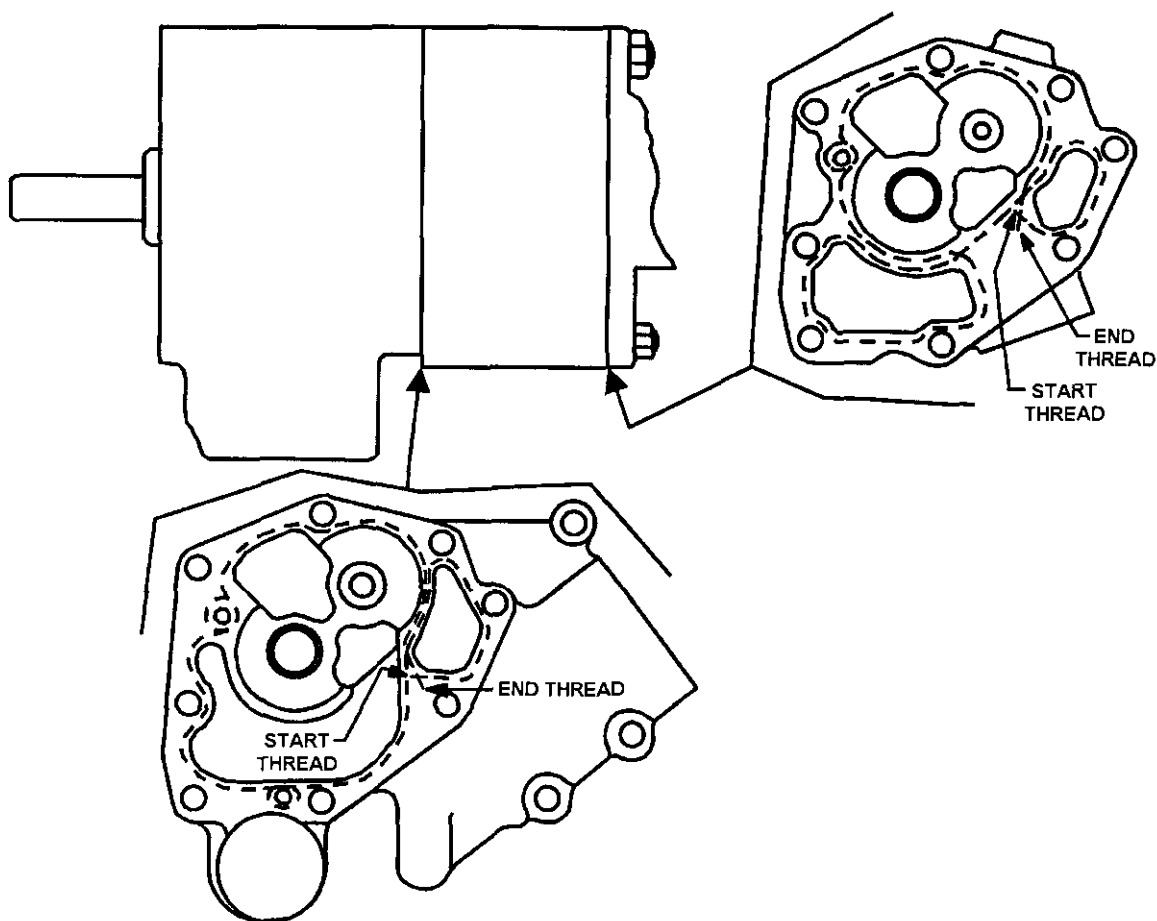



FIGURE 12. THREADING DIAGRAM USED ON OIL PUMP ASSEMBLIES 632623A16, A17, A20, A21, A22, A24, A25, A26, A27 AND A28

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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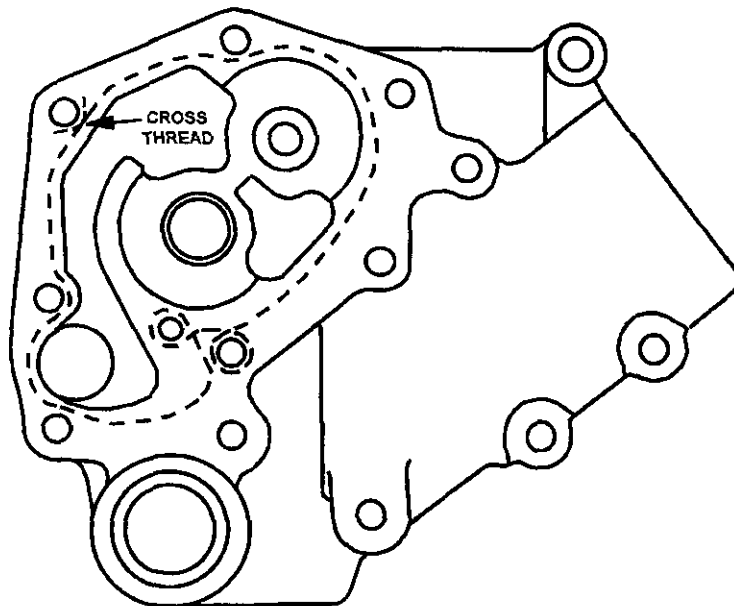



FIGURE 13. THREADING DIAGRAM USED ON OIL PUMP ASSEMBLIES 632563A5-0, A25, A26, A27, A28, A29, A30, A31, A35, A36 AND A38

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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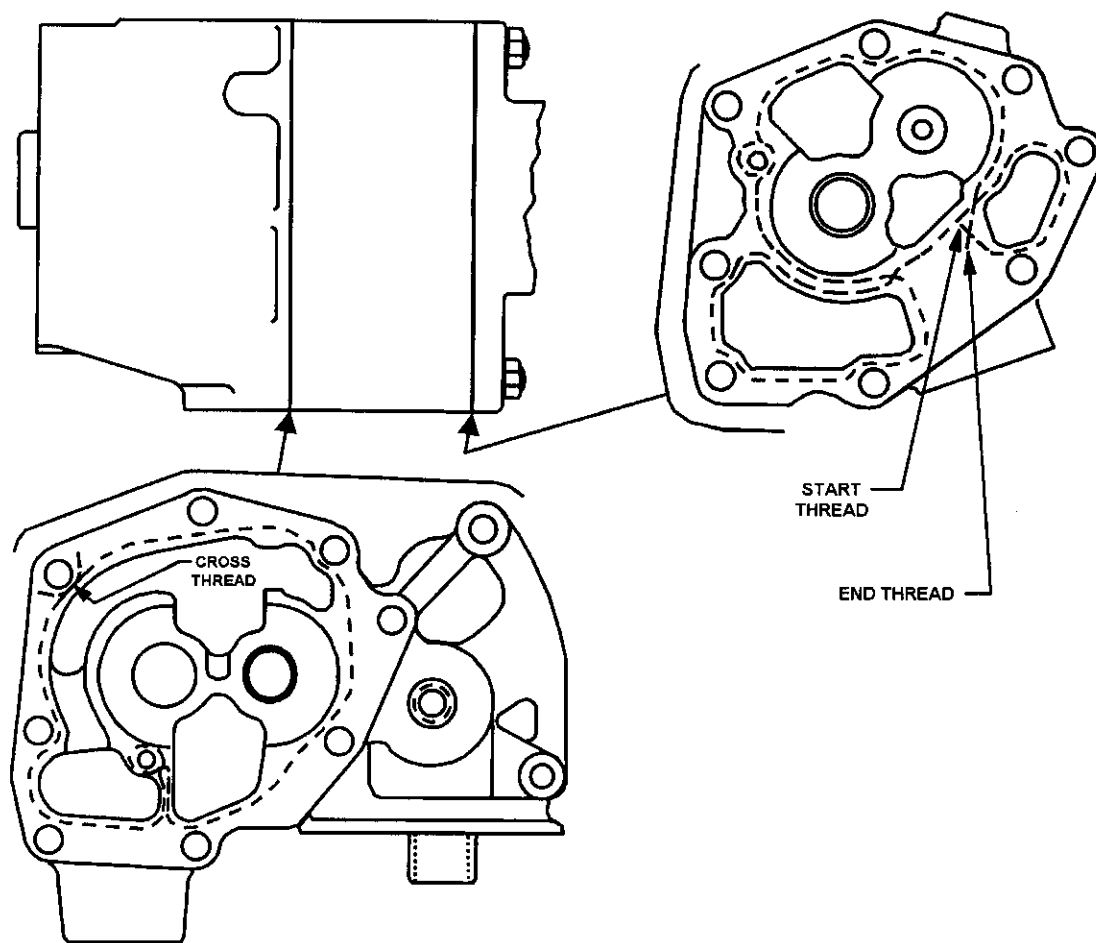
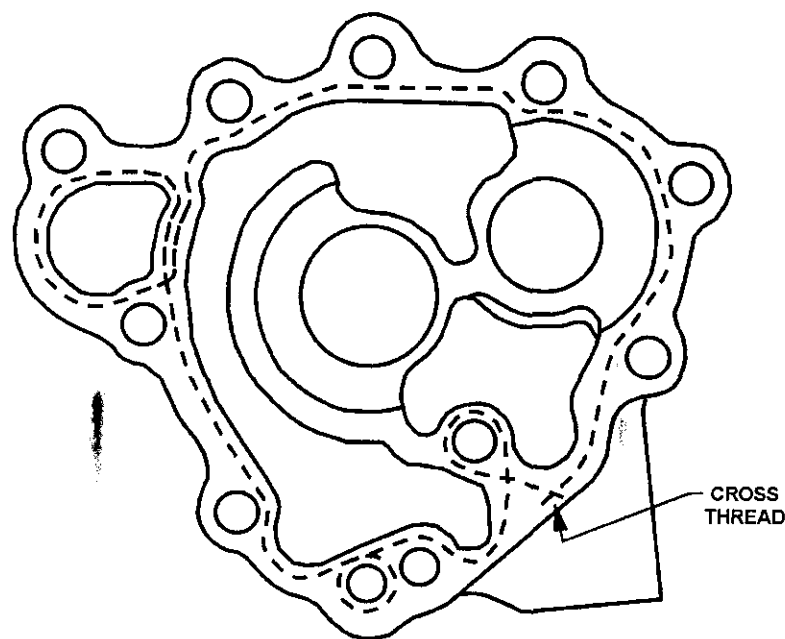


FIGURE 14. THREADING DIAGRAM USED ON OIL PUMP ASSEMBLIES 646194A1, 653536A1, A2 AND 655121A1


1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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**FIGURE 15. THREADING DIAGRAM USED ON OIL PUMP ASSEMBLIES 637709
637709-2 AND 641602**

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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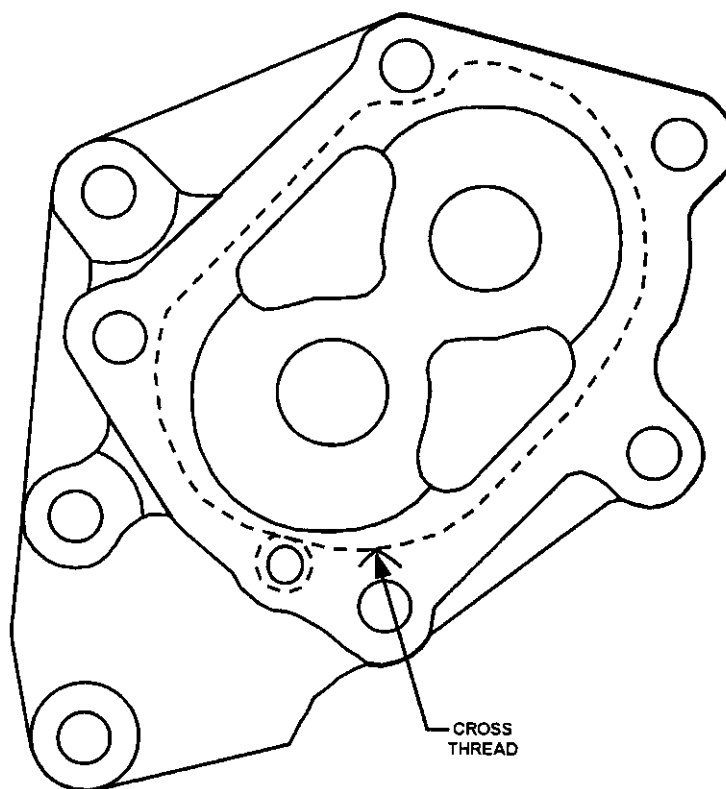



FIGURE 16. THREADING DIAGRAM USED ON OIL PUMP ASSEMBLIES 643716A3, A4 643717-1, 653358A2, A3, A4, A5, 655119A2, A3

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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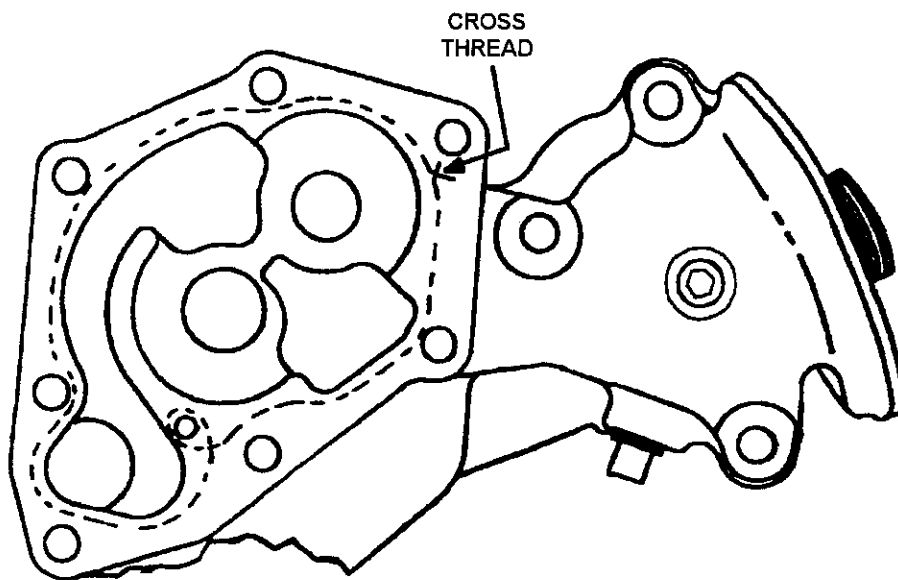



FIGURE 17. THREADING DIAGRAM USED ON OIL PUMP ASSEMBLIES 643716A3, A4, 643717-1, 643743-1A1, 643778, 643778-1, 643779, 653494A2, 653538A2, A3, A4, A5, 653542, 653542A1, 653553, 655117A2, 655119A2, A3, 655124, 655127 AND 655127A1

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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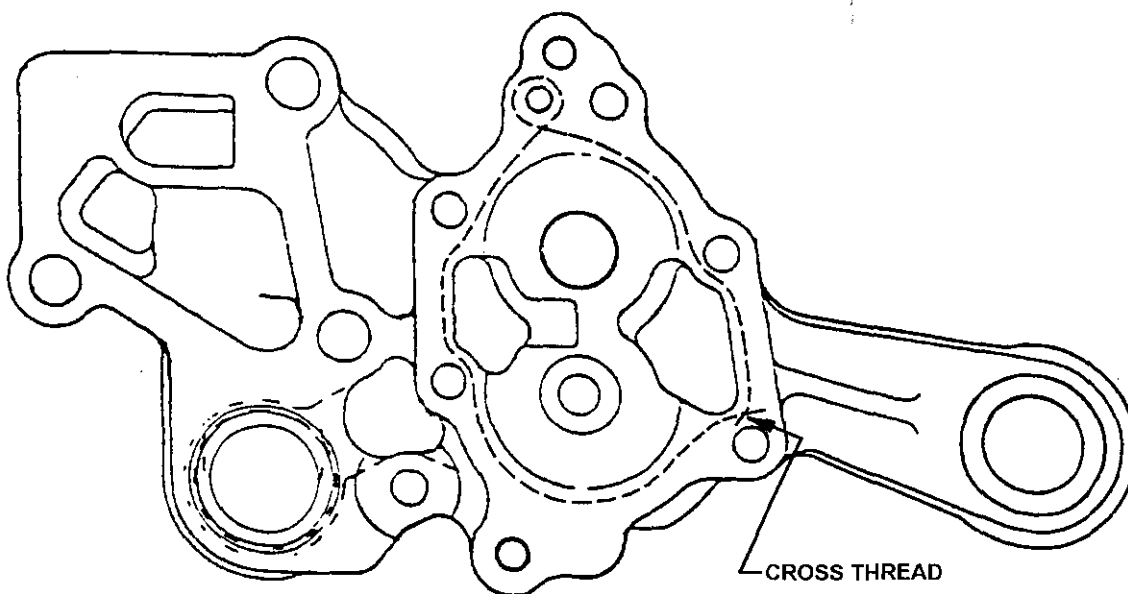



FIGURE 18. THREADING DIAGRAM USED ON OIL PUMP ASSEMBLIES 632970, 632977A4, A5, A6, A7, A8, A9, A10, A11, A12 AND 654437

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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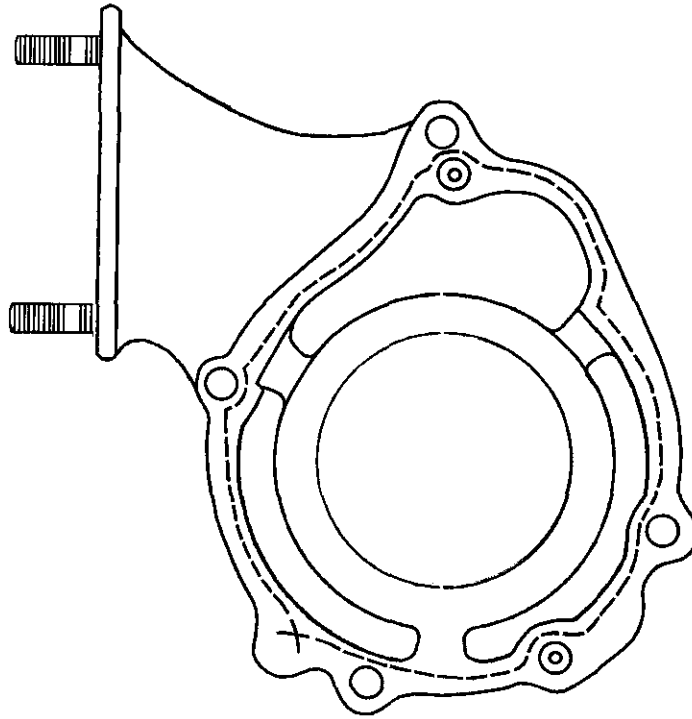



FIGURE 19. THREADING DIAGRAM USED ON STARTER ADAPTER ASSEMBLIES
 641348A7, 641348A11, 641348A12, 653074A2, 653074A2M015, 653074A3, 653074A4, 653074A4M015, 653074A6, 653074A7, 653074A7M015, 653074A8, 653074A8M015, 653074A9, 653074A9M015, 653074A10, 653074A11, 653074A11M015, 653074A12, 653074A12M015, 653074A14, 653074A14M015, 653074A15, 653074A16, 653074A16M015, 653074A17, 653074A17M015, 653074A19, 653074A19M015, 653074A20, 653074A21, 653074A21M015, 653074A22, 653074A22M015, 653074A23, 653074A25, 653074A26, 653074A26M015, 653074A27, 653074A28, 653074A28M015, 653074A29, 653074A29M015, 653074A30, 653074A30M015, 653074A31, 653074A31M015, 653074A32, 653074A32M015, 653074A33, 653074A34, 653074A34M015, 653074A38, 653074A38M015, 653074A39, 653074A40, 653074A40M015, 653074A41, 653074A41M015, 653074A42, 653074A42M015, 653074A44, 653074A44M015, 653074A43, 653074A43M015, 653074A45, 653074A46 AND 653074A46M015

INSTALLATION:

After permatrix and thread have been applied to the starter adapter in accordance with the above illustration and prior to installation, apply a thin coat of blue loctite gasket maker to the accessory case, starter adapter mounting flange. Temporarily install the starter adapter to make an impression of

the thread on the accessory case. Carefully remove the starter adapter so that the shaft gear does not pull out. Inspect the thread impression for 100% contact between the adapter and accessory case. Wipe excess gasket maker off of accessory case and install starter adapter in accordance with the applicable overhaul instructions.

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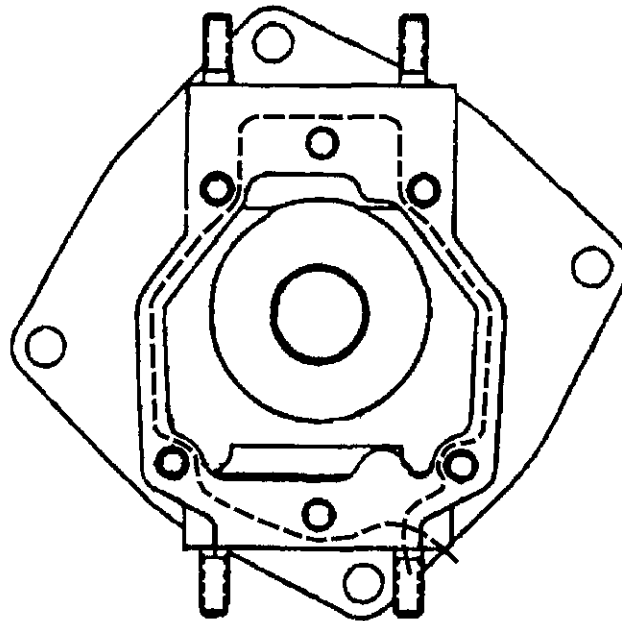



FIGURE 20. ACCESSORY DRIVE ADAPTER THREADING PROCEDURE FOR STARTER ADAPTER ASSEMBLIES: 641348A7, 641348A11, 641348A12, 653074A2, 653074A2M015, 653074A3, 653074A4, 653074A4M015, 653074A6, 653074A7, 653074A7M015, 653074A8, 653074A8M015, 653074A9, 653074A9M015, 653074A10, 653074A11, 653074A11M015, 653074A12, 653074A12M015, 653074A14, 653074A14M015, 653074A15, 653074A16, 653074A16M015, 653074A17, 653074A17M015, 653074A19, 653074A19M015, 653074A20, 653074A21, 653074A21M015, 653074A22, 653074A22M015, 653074A23, 653074A25, 653074A26, 653074A26M015, 653074A27, 653074A28, 653074A28M015, 653074A29, 653074A29M015, 653074A30, 653074A30M015, 653074A31, 653074A31M015, 653074A32, 653074A32M015, 653074A33, 653074A34, 653074A34M015, 653074A38, 653074A38M015, 653074A39, 653074A40, 653074A40M015, 653074A41, 653074A41M015, 653074A42, 653074A42M015, 653074A44, 653074A44M015, 653074A43, 653074A43M015, 653074A45, 653074A46 AND 653074A46M015

1. Use full strength, non thinned, aviation Permatex Grade 3D. shake or mix well before using.
2. Apply Permatex to the surface to be threaded using short light brush strokes until an even, thin coat is obtained. the Permatex should be viscous enough that most of the brush marks disappear, if not, use a new can of Permatex. Allow the Permatex to dry to a tacky condition before threading.
3. Apply a thin translucent coat of TCM Gasket Maker P/N 646942 not to exceed .010 inch thick to all mating areas on non threaded part.
4. Apply silk thread part number 641543 and position as shown by dashed lines.
5. Assemble and torque as soon as possible in accordance with the applicable overhaul manual.

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