TELEDYNE CONTINENTAL® AIRCRAFT ENGINE

MANDATORY SERVICE BULLETIN

The Subject Matter Of This Service Bulletin Is Incorporated In Whole Or In Part In An FAA Airworthiness Directive

CATEGORY 1

MSB 00-5C

TECHNICAL PORTIONS FAA APPROVED
Supersedes MSB 00-5 MSB 00-5A & MSB00-5B

SUBJECT: CRANKSHAFT MATERIAL INSPECTION

BACKGROUND: Teledyne Continental Motors (TCM) has identified the cause of 13 crankshaft fractures which have occurred in the connecting rod journals on straight drive engines manufactured in 1998 and 1999. The cause of the fractures has been identified as composition and processing deficiencies during several discrete periods of steel production and/or forming operations by suppliers. The fractures have occurred in new, rebuilt and field overhauled engines with operational times varying from 15 to 1257 hours. TCM is working closely with its suppliers to insure future production integrity.

TCM has developed an inspection process to identify and replace any other crankshafts potentially affected by this problem. This will be accomplished by means of a metallurgical inspection of two small core samples removed from the crankshaft propeller flange. Review of Teledyne Continental Motors manufacturing processes, nitride characteristics, and dimensional characteristics have not identified any other contributing causes.

PURPOSE: To provide instructions for the removal of crankshaft core samples for metallurgical evaluation.

WARNING

The inspection required by this service bulletin is intended to detect metallurgical anomalies which if present and left uncorrected can result in engine failure.

This inspection requires the removal of the aircraft spinner, propeller and spinner bulkhead to provide access to the crankshaft propeller flange. Two equally sized core samples will be taken from the propeller flange 180 degrees from each other using a customized tool provided by Teledyne Continental Motors. The removed core samples will be placed into a plastic, zip closure bag and identified by engine model, engine serial number and crankshaft serial number. These core samples must be returned to Teledyne Continental Motors for evaluation.

COMPLIANCE: For affected engines or crankshafts this inspection must be performed within the next 10 hours of operation.

Uninstalled service spare crankshafts of the affected serial number range must be inspected prior to installation in any engine.

ENGINES and/or CRANKSHAFTS AFFECTED: IO-360, TSIO-360, LTSIO-360, O-470, IO-470, TSIO-470, IO-520, TSIO-520, LTSIO-520, IO-550, TSIO-550 and TSIOL-550 series new and rebuilt direct drive engines assembled utilizing a crankshaft that was manufactured from April 1, 1998 through March 31, 2000. Affected engine serial numbers are specified below.

Any preceding series engines that have had a replacement crankshaft installed during field overhaul or repair. Affected replacement crankshaft serial numbers are specified below. Refer to the Crankshaft Serial Number Identification below for identification of affected crankshafts.

Note: If your engine has recently had a crankshaft installed that may have been manufactured from April 1, 1998, through March 31, 2000, the crankshaft serial number must be examined to determine if this inspection procedure applies.

TCM's website at www.tcmlink.com will provide our customers with real-time service information regarding MSB 00-5. Customers may determine if their engine or crankshaft is subject to the required inspection by completing the customer contact information and entering an engine or crankshaft serial number. If you do not have access to www.tcmlink.com, contact TCM service department at 1-888-200-7565.

For International customers who do not have access to the Internet and TCM's website, you may contact TCM's Service Department via one of the International toll free numbers listed below or by dialing our direct number 334-438-3411 extension 5100.

Country	Phone number
AUSTRALIA	1-800-1-25131
AVANTEL 1	001-888-200-7565
AVANTEL 2	001-888-200-7565
AVANTEL 3	001-888-200-7565
AVENTEL 4	001-888-200-7565
BAHAMAS	1-888-200-7565
BELGIUM	0800-76267
BRAZIL	00081-4-550-3603
CHINA	10-800-120-0160
COLOMBIA	980-9-154606
COSTA RICA	0800-012-0140
CTC	800-201653
DENMARK	8088-2299

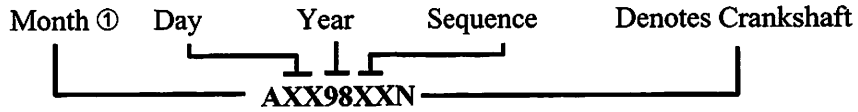
Country	Phone number
DOM REPUBLIC	1-888-156-1483
FINLAND	0-800-1-119686
FRANCE	0800-913943
GERMANY	0800-1006086
GOLDEN	1-800-9203143
GREECE	00800-12-15191
HONG KONG	800-908385
HUNGARY	06-800-13665
INDONESIA	001-803-011-2525
IRELAND	1-800-552252
ITALY	800-874516
JAPAN	00531-1-27656
KOREA-TELE	00798-14-800-4256

Country	Phone number
LUXEMBOURG	8002-5015
MALAYSIA	1-800-80-3436
MEXICO 1	001-888-200-7565
MEXICO 2	001-888-200-7565
MEXICO 3	001-888-200-7565
MEXICO 4	001-888-200-7565
NETHERLAND	0800-0221015
NEW ZEALAND	0800-449606
NICARAGUA	011-800-2201302
PLDT PHILI	1-800-1-114-0749
PORTUGAL	800-8-12389

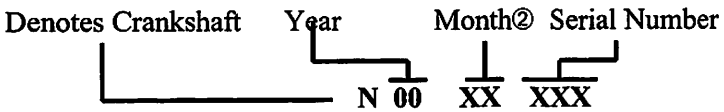
Country	Phone number
SINGAPORE	800-120-3346
SPAIN	900-951987
SWEDEN	020-79-0713
SWITZERLAND	0800-89-6791
TAIWAN	0080-13-9749
THAILAND	001-800-12-066-3179
TURKEY	00-800-151-0677
UNITED	08-000284583
URUGUAY	000-413-598-2436
VENEZUELA	8001-2411

CRANKSHAFT SERIAL NUMBER IDENTIFICATION

Each crankshaft is identified by a serial number steel stamped on the O.D. of the propeller flange that reflects its manufacturing date. Crankshafts produced prior to January 6, 2000 may be identified as follows:



Crankshafts produced beginning January 6, 2000 may be identified as follows:



① To determine month of manufacture use the following alpha code:

A= January	G= July
B= February	H= August
C= March	I= September
D= April	J = October
E= May	K= November
F= June	L= December

② To determine month of manufacturer use the following alpha code:
(X)- is a production alpha code for internal use.

A(X)= January	G(X)= July
B(X)= February	H(X)= August
C(X)= March	I(X) = September
D(X)= April	J(X) = October
E(X)= May	K(X) = November
F(X)= June	L(X) = December

AFFECTED ENGINE MODELS
BY ENGINE MODEL, ENGINE SERAIL NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
O-470-G	817751	H249809N	KON
O-470-J	202210	H139808N	KON
	202213	**G319918N**	**KRN**
	202214	J139911N	KRP
O-470-K	049501	F249801N	KON
	049505	A299903N	KPK
	049506	B199910N	KPL
	049507	D129904N	KPL
	049508	D139901N	KPL
	049509	D129901N	KPL
	049511	**H269903N**	**KRN**
O-470-L	**069888**	**H269904N**	**KRN**
	069890	F049806N	KON
	069894	H129807N	KON
	069895	A279923N	KPL
	069896	H149805N	KON
	069897	E199926N	KPL
	069900	A289907N	KPL
	069902	A289903N	KPK
	069903	A289912N	KPL
	069904	B189912N	KPL
	069906	C169912N	KPL
	069907	D139904N	KPL
	069910	**G319907N**	**KRN**
	069911	**G319915N**	**KRN**
	069912	B189911N	KPL
	069914	**J149901N**	**KRN**
	069915	J149903N	KRP
	069916	J139921N	KRP
	069917	J139916N	KRP
	069920	K049903N	KRP
O-470-R	466733	B189909N	KPL
	466734	D129905N	KPL
	466737	J139910N	KRP

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
O-470-R	466738	J159904N	KRP
	466740	J129907N	KRP
	466741	J129918N	KRP
	466758	J139903N	KRP
	811961	D079805N	KPL
	811962	E199919N	KPL
	811996	D129902N	KPL
	815762	F209804N	KON
	815765	F209812N	KON
	815768	**G319910N**	**KRN**
	815771	F199803N	KON
	815776	F239808N	KON
	815779	H139803N	KON
	815781	H139814N	KON
	815782	H139816N	KON
	815783	H139807N	KON
	815784	H139811N	KON
	815785	H139804N	KON
	815786	E199917N	KPL
	815787	H139812N	KON
	815788	H129811N	KON
	815793	D129911N	KPL
	815801	H139806N	KON
	815802	H139805N	KON
	815805	E199915N	KPL
	815824	L029812N	KPK
	815826	L029814N	KPK
	815827	**G319917N**	**KRN**
	815829	L039812N	KPK
	815830	L039802N	KPK
	815834	L029811N	KPM
	815835	L039801N	KPK
	815838	L109809N	KPK
	815841	L029817N	KPK
	815843	L109811N	KPK
	815845	L109810N	KPK
	815848	A279919N	KPK
	815849	A279924N	KPK

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
O-470-R	815851	A289906N	KPK
	815852	A279921N	KPL
	815853	A289904N	KPK
	815855	A299911N	KPK
	815857	A299904N	KPK
	815858	A289910N	KPL
	815859	A289911N	KPK
	815860	L029813N	KPK
	815861	B199904N	KPL
	815862	B199908N	KPH
	815863	B199907N	KPL
	815864	B199911N	KPL
	815865	C159914N	KPK
	815866	C159917N	KPL
	815867	C179905N	KPL
	815868	C169906N	KPL
	815869	C169903N	KPL
	815871	C179903N	KPK
	815872	C179901N	KPK
	815873	C159911N	KPL
	815874	C169905N	KPL
	815875	C169907N	KPL
	815876	C169911N	KPL
	815877	D129903N	KPL
	815878	D129909N	KPL
	815880	D129910N	KPL
	815881	C159916N	KPL
	815882	C169908N	KPL
	815884	C169904N	KPL
	815886	E199923N	KPL
	815889	H139801N	KON
	815890	**F249909N**	**KRN**
	815892	C759909N	KPL
	815909	**G319911N**	**KRN**
	815910	**G319914N**	**KRN**
	815911	**G319913N**	**KRN**
	815912	I109904N	KRP
	815913	**G319909N**	**KRN**
	815914	**G319921N**	**KRN**

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
O-470-R	**815915**	**G319903N**	**KRN**
	815917	**G319906N**	**KRN**
	815919	**H259928N**	**KRN**
	815920	**H259932N**	**KRN**
	815921	**H259929N**	**KRN**
	815923	**H269910N**	**KRN**
	815924	**H259937N**	**KRN**
	815925	I099928N	KRP
	815926	I099920N	KRP
	815927	I109905N	KRP
	815928	**I099918N**	**KRN**
	815929	I099921N	KRP
	815930	I099924N	KRP
	815931	F139007N	KON
	815932	I099926N	KRP
	815933	I109911N	KRP
	815936	F199804N	KON
	815940	J139914N	KRP
	815943	J149907N	KRP
	815944	J139901N	KRP
	815946	J159903N	KRP
	815953	**J139906N**	**KRN**
	815954	J119911N	KRP
	815958	J159905N	KRP
	815959	**J139908N**	**KRN**
	815986	J139912N	KRP
	815990	N00CA182	KRP
	815992	N00CA197	KRP
	815993	N00CA177	KRP
O-470-S	**269465**	**H269905N**	**KRN**
	269469	F209810N	KON
	269471	E319807R	KPL
	269473	F199802N	KON
	269478	H129810N	KON
	269487	L039803N	KPK
	269490	A279920N	KPL
	269491	A279922N	KPL
	269494	C169901N	KPL

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
O-470-S	269496	B199906N	KPL
	269497	C149904N	KPK
	269498	C149902N	KPK
	269499	C179904N	KPK
	464588	**J129904N**	**KRN**
	819001	C169910N	KPL
	819005	F259903N	KPM
	819006	F259917N	KPL
	819008	**G319901N**	**KRN**
	819009	**G319904N**	**KRN**
	819010	**G319916N**	**KRN**
	819011	**G319902N**	**KRN**
	819012	**G319905N**	**KRN**
	819013	**H259935N**	**KRN**
	819014	**G319919N**	**KRN**
	819015	**H259933N**	**KRN**
	819017	J149902N	KRP
	819018	J149911N	KRP
	819019	J119909N	KRP
	819021	**J129915N**	**KRN**
	819023	**H269909N**	**KRN**
	819026	**J139904N**	**KRN**
	819034	N00CA185	KRP
O-470-U	470759	A299901N	KPL
	470763	**J139905N**	**KRN**
	470764	J139915N	KRP
	470765	J139923N	KRP
	470767	J139924N	KRP
	470769	K049916N	KRP
	470776	N00CA183	KRP
	470778	**N00CA173**	**KRN**
	813396	F049801N	KON
	813413	H149801N	KON
	813415	H149803N	KON
	813418	H149806N	KON
	813420	H149802N	KON
	813427	L039806N	KPK
	813440	L039804N	KPK

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
O-470-U	813442	L039810N	KPK
	813445	L039805N	KPK
	813450	A289909N	KPL
	813452	A299910N	KPK
	813453	A299902N	KPK
	813455	A299916N	KPK
	813458	A289902N	KPL
	813462	C149905N	KPK
	813463	C159906N	KPK
	813464	C159910N	KPK
	813467	C159915N	KPL
	813469	C159913N	KPK
	813472	D139903N	KPL
	813474	D139902N	KPL
	813475	D129908N	KPL
	813476	D129912N	KPL
	813478	D129907N	KPL
	813482	C159912N	KPL
	813486	E199921N	KPL
	820006	**H269906N**	**KRN**
	820007	**H259930N**	**KRN**
	820010	**H269907N**	**KRN**
	820012	**H259931N**	**KRN**
	820013	**H269902N**	**KRN**
	820014	**I109909N**	**KRN**
	820016	**H269908N**	**KRN**
	820019	I099927N	KRP
	820023	**I109910N**	**KRN**
	820024	**I109908N**	**KRN**
	820030	**J129902N**	**KRN**
	820032	**J129906N**	**KRN**
	820033	J129911N	KRP
	820034	J139913N	KRP
	820035	J119908N	KRP
	820036	**H259936N**	**KRN**
	820037	J139919N	KRP
	820038	K049905N	KRP
	820053	**J119912N**	**KRN**
	820068	N00CA184	KRP

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
O-470-U	820069	N00CA202	KRP
	820070	J119913N	KRP
IO-360-C	060688	J059805N	KPC
IO-360-D	063038	J029809N	KPC
	063039	J059804N	KPC
	063040	J059801N	KPC
IO-360-DB	351396	I259805N	KPC
	351397	K049814N	KPC
	351399	K109817N	KPC
	808799	I249807N	KPC
	808801	K049817N	KPC
	808802	K109802N	KPC
IO-360-ES	357114	I259804N	KPC
	357115	I299804N	KPC
	357116	I249806N	KPC
	357151	A219910N	KPK
IO-360-G	244612	J059808N	KPC
	244613	J029808N	KPC
IO-360-KB	288733	I249801N	KPC
	288734	I259808N	KPC
	288736	I259806N	KPC
	288739	K099801N	KPC
	288740	K109807N	KPC
IO-470-C	295552	E079819N	KOM
	295553	F249811N	KOM
	295554	F259803N	KOM
	295555	H249812N	KOM
	295556	L089802N	KPH
	295557	B199917N	KPH
	295558	C189903N	KOM
	295559	E079906N	KPH
	295560	H029903N	KPH

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-470-C	295561	J189901N	KPH
	295562	J189902N	KPH
	295563	K059915N	KPH
	295564	J159911N	KPH
	295565	K059906N	KPH
	295566	K059909N	KPH
	295567	A030005N	KPH
	71122	H259805N	KON
IO-470-D	105644	F179805N	KON
	105648	J079910N	KRP
	105649	J049918N	KRP
IO-470-E	088768	J089924N	KRP
	088770	K029911N	KRP
IO-470-F	089920	F109815N	KON
	089929	C159918N	KPL
	089930	E199909N	KPL
	089934	**G269915N**	**KRN**
	089935	**G279921N**	**KRN**
	089936	**I079901N**	**KRN**
	089937	I099901N	KOR
IO-470-H	087344	F249812N	KOM
IO-470-K	092995	E059810N	KOM
	092997	F289908N	KPM
	092998	H249816N	KON
	092999	**F289902N**	**KRN**
	093000	L089809N	KPH
	818504	E079903N	KPH
	818505	H019902N	KPH
	818508	H019904N	KPH
	818510	J189903N	KPH
	818511	K059910N	KPH
	818512	L169908N	KPH
IO-470-L	297803	E079807N	KOM

AFFECTED ENGINE MODELS (continued)

BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-470-L	297804	E079813N	KOM
	297807	E059811N	KOM
	297809	E079820N	KOM
	297810	E079815N	KOM
	297811	E079821N	KOM
	297812	E079810N	KOM
	297813	E069908N	KPH
	297814	E069805N	KOM
	297815	E059807N	KOM
	297816	E059812N	KOM
	297817	E079816N	KOM
	297818	E079817N	KOM
	297819	E079904N	KPH
	297823	F249806N	KOM
	297824	F249810N	KOM
	297825	F259802N	KOM
	297826	H259802N	KON
	297827	H249813N	KOM
	297828	H259812N	KOM
	297830	H249810N	KOM
	297833	H249808N	KOM
	297835	H259806N	KON
	297836	F249813N	KOM
	297837	H259816N	KOM
	297838	H259807N	KOM
	297839	H259804N	KOM
	297841	H259815N	KOM
	297842	F249809N	KOM
	297843	F249807N	KOM
	297844	H259809N	KOM
	297845	H259813N	KOM
	297846	H249814N	KOM
	297847	L089811N	KPH
	297848	L089822N	KPH
	297851	L089812N	KPH
	297852	L089815N	KPH
	297854	L089810N	KPH
	297856	L089805N	KPH
	297857	L089804N	KPM

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-470-L	297861	B199916N	KPH
	297862	B209903N	KPH
	297863	B209902N	KPK
	297866	C189906N	KOM
	297868	C189902N	KOM
	297869	C189909N	KOM
	297870	C189905N	KPH
	297872	B209901N	KPH
	297873	C189904N	KOM
	297877	E079902N	KPH
	297878	E069911N	KPH
	297879	E079901N	KPH
	297880	E069909N	KPH
	297881	E079905N	KPH
	297882	E079802N	KOM
	297883	E079803N	KOM
	297884	E079808N	KOM
	297885	F289901N	KPH
	297886	F289915N	KPH
	297887	F289912N	KPH
	297888	F289914N	KPH
	297889	F289916N	KPH
	297890	E079818N	KOM
	297893	H029905N	KPH
	297894	H029906N	KPH
	297895	H019903N	KPH
	297896	H019905N	KPH
	297898	H029901N	KPH
	297900	H019906N	KPH
	297901	J189908N	KPH
	297903	F289903N	KPH
	297907	J189909N	KPH
	297908	J189906N	KPH
	297909	J189911N	KPH
	297910	J189907N	KPH
	297911	J189904N	KPH
	297912	J159910N	KPH
	297916	K049920N	KPH
	297917	K049922N	KPH

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-470-L	297918	K059912N	KPH
	297919	K059905N	KPH
	297921	K059914N	KPH
	297922	K059908N	KPH
	297923	K049923N	KPH
	297924	K059916N	KPH
	297925	J159912N	KPH
	297927	K059901N	KPH
	297928	K059913N	KPH
	297929	K059917N	KPH
	297930	K049921N	KPH
	297931	L169912N	KPH
	297932	L169907N	KPH
	297933	L239901N	KPH
	297934	L239912N	KPH
	297935	L239911N	KPH
	297936	A030007N	KPH
	297937	A030010N	KPH
	297938	A030006N	KPH
	297939	L239907N	KPH
	297940	A030008N	KPH
	297941	L239909N	KPH
	297942	L239908N	KPH
	297950	L239910N	KPH
	297953	A030011N	KPH
	468607	E059808N	KOM
	468608	E079823N	KOM
	468611	E079812N	KOM
	468613	L169910N	KPH
IO-470-N	096705	E079809N	KOM
	096707	E069804N	KOM
	096708	E069810N	KOM
	096710	E059809N	KOM
	096711	E069802N	KOM
	096712	F249815N	KOM
	096713	E079825N	KOM
	096714	E079814N	KOM
	096715	E069808N	KOM

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-470-N	096716	F249808N	KOM
	096717	F249814N	KOM
	096718	F249816N	KOM
	096720	H259814N	KOM
	096721	H259808N	KOM
	096721	H259803N	KON
	096722	H259817N	KOM
	096724	L089807N	KPH
	096725	L089816N	KPH
	096726	L089806N	KPH
	096727	L089801N	KPH
	096728	B199914N	KPH
	096729	B199912N	KPH
	096730	B209905N	KPH
	096732	E069910N	KPH
	096734	C189901N	KOM
	096735	H019901N	KPH
	096736	J189910N	KPH
	096737	J159909N	KPH
	096738	J159907N	KPH
	096739	K059902N	KPH
	096741	L239902N	KPH
	096742	L239904N	KPH
	096743	A030003N	KPH
	096745	L239906N	KPH
	458174	K059904N	KPH
	458175	K059907N	KPH
IO-470-S	109389	C119908N	KPK
	109390	D089912N	KPL
	109391	E019915N	KPM
	109393	**G289914N**	**KRN**
	109394	**G269912N**	**KRN**
	109397	J089922N	KRP
	109398	K019913N	KRP
IO-470-V/VO	**171198**	**F239907N**	**KRN**
	171207	L089819N	KRP
	171213	C159905N	KPL

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-470-V/VO	171214	D099907N	KPL
	171216	E019914N	KPM
	171217	E019917N	KPM
	171218	E039904N	KPM
	171219	E049917N	KPM
	171220	E049913N	KPL
	171222	I089930N	KRP
	171225	E039910N	KPM
	171227	**G289913N**	**KRN**
	171228	I099905N	KRP
	171229	I079910N	KRP
	171231	J079911N	KRP
	171232	F109816N	KON
	171234	J079901N	KRP
	171235	K019922N	KRP
	171236	J089918N	KRP
	171237	K029907N	KRP
	171238	**K019906N**	**KRN**
	171239	K029904N	KRP
	171240	**K019901N**	**KRN**
	171242	K029910N	KRP
	171243	L089905N	KRP
	171247	K029909N	KRP
	171249	**L079906N**	**KRN**
IO-520-A	112834	F159811N	KON
	112847	**I079930N**	**KRN**
	112852	A229905N	KPK
	112855	B179901N	KPL
	112856	D089909N	KPL
	112860	E189916N	KPH
	112861	F109812N	KON
	112867	E069905N	KPL
	112868	**F239909N**	**KRN**
	112870	G149915N	KPM
	112871	**G299920N**	**KRN**
	112872	**H209921N**	**KRN**
	112873	I079931N	KRP
	112876	J079915N	KRP

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-A	112877	J069911N	KRP
	112882	L079910N	KRP
IO-520-BA	814329	K029806N	KOP
	814346	J109803N	KOM
	814347	J119802N	KOM
	814348	J119805N	KOM
	814350	J289811N	KOP
	814353	J099802N	KOM
	814354	J099803N	KOR
	814355	J289807N	KOP
	814357	J299811N	KOP
	814359	K029804N	KOP
	814361	J299812N	KOP
	814362	K249802N	KPH
	814363	J299805N	KOP
	814364	K259815N	KPH
	814365	K259809N	KPM
	814366	K309810N	KOM
	814368	K259812N	KPH
	814369	K249803N	KPH
	814370	K309806N	KOM
	814371	L019807N	KPM
	814373	L029805N	KPM
	814375	B109911N	KPM
	814376	A159908N	KOM
	814382	B099916N	KPM
	814383	B099915N	KPM
	814384	B119918N	KPM
	814385	B119902N	KPM
	814388	D069907N	KPH
	814389	D079906N	KPM
	814390	D069905N	KPM
	814409	J299803N	KOP
	814410	L019810N	KPM
IO-520-BB	813908	I169816N	KOM
	580063	B019914N	KOR
	580064	B159903N	KPM

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERAIL NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-BB	580065	C089905N	KPM
	813903	K129808N	KOP
	813904	I169814N	KOM
	813912	K169807N	KOP
	813913	K169803N	KOP
	813914	K189810N	KOR
	813915	K179801N	KOR
	813918	K169809N	KOP
	813921	K139803N	KPM
	813926	A159917N	KPM
	813927	A189904N	KPM
	813928	A159920N	KPM
	813929	A209907N	KOR
	813934	B019910N	KPL
	813938	A169910N	KOR
	813940	B019911N	KPL
	813942	B029902N	KPM
	813943	C089901N	KPM
	813944	B129907N	KPM
	813945	C109915N	KPM
	813946	C109907N	KPM
	813954	C279901N	KPM
	813955	C299901N	KPH
	813956	B129910N	KPM
	813959	D149902N	KPM
	813961	D149913N	KPM
	813963	D309904N	KPM
	813964	D149912N	KPM
	813965	D309902N	KPM
	813966	D299913N	KPH
	813968	E119911N	KPH
	820261	K129806N	KPM
IO-520-C	810995	G209802N	KOP
	810997	D059908N	KPM
	816761	D059905N	KPM
	816762	J089808N	KOR
	816764	J119808N	KOM
	816766	J099812N	KOM

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-C	816768	J289801N	KOP
	816769	J289809N	KOP
	816772	K309805N	KPM
	816773	K309807N	KPM
	816774	K259801N	KPM
	816776	J299801N	KOP
	816783	J309810N	KOP
	816784	J299807N	KOP
	816786	K259811N	KPM
	816787	L029807N	KPM
	816788	L019801N	KPM
	816789	K259804N	KPH
	816791	L029810N	KPM
	816792	K259802N	KPH
	816797	A129904N	KPM
	816798	A129902N	KOM
	816801	B099913N	KPM
	816802	B099907N	KPM
	816808	B109913N	KOR
	816809	B109906N	KPM
	816810	B119909N	KPM
	816811	B109921N	KPM
	816812	B119915N	KPM
	816815	D019902N	KPM
	816817	D069909N	KPM
	816818	D069908N	KPH
	816819	D059912N	KPM
	816820	D019910N	KPM
	816821	D069903N	KPH
	816824	D079904N	KPM
	816825	D059906N	KPM
	816826	D079901N	KPH
	816827	D079905N	KPH
	816834	J099806N	KOM
	816862	B099914N	KPM
	816898	L019924N	KPM
IO-520-CB	299011	A1721173	KPM
	299077	K169812N	KOM

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-CB	299078	K169805N	KOM
	299079	K169804N	KOP
	299086	K189809N	KOR
	299088	K129802N	KOP
	299090	K179811N	KOM
	299091	K179810N	KOR
	299092	K199802N	KOR
	299093	K189812N	KOR
	299094	K199806N	KOR
	299096	K169806N	KOM
	299097	K189803N	KOR
	299099	A159916N	KPM
	299107	A169909N	KOR
	299108	A209909N	KOR
	299112	K189805N	KOR
	299114	B049906N	KPM
	299117	B129908N	KPM
	299124	B129906N	KPM
	299125	B019912N	KPL
	299126	C109909N	KPM
	299127	C269903N	KPH
	299129	C269910N	KPH
	299130	C269907N	KPH
	299131	C279907N	KPH
	299132	D079907N	KPM
	299134	D079909N	KPM
	299135	D079910N	KPM
	299138	D149903N	KPM
	299140	D149904N	KPM
	299143	E119913N	KPH
	299146	E119906N	KPH
	299158	E109910N	KPH
	299220	K139805N	KOP
	299241	G069910N	KPD
IO-520-D	575935	D089901N	KPK
	575939	I099914N	KRP
	575942	I079924N	KRP
	575943	J119907N	KRP

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-D	575946	K019902N	KRP
	575947	K019905N	KRP
	575948	K029914N	KRP
	575950	**L039908N**	**KRN**
	812979	F179806N	KON
	812981	F179811N	KON
	812982	F099816N	KON
	812983	F189805N	KON
	812987	E059915N	KPM
	812996	F189802N	KON
	812996	I079915N	KRP
	812997	F169801N	KON
	816504	H039801N	KON
	816512	H099809N	KON
	816514	H119801N	KON
	816517	H099802N	KON
	816527	D109912N	KPL
	816528	H279812N	KOM
	816535	H279818N	KOM
	816543	H279814N	KOM
	816545	H129806N	KON
	816550	G149908N	KPM
	816559	L039815N	KPK
	816560	L039813N	KPK
	816572	L109803N	KPK
	816579	B169914N	KPL
	816580	B169906N	KPL
	816582	B169916N	KPK
	816585	C119903N	KPL
	816589	C119910N	KPL
	816590	C119916N	KPK
	816591	D089905N	KPL
	816592	C119915N	KPK
	816593	C129908N	KPL
	816595	C159923N	KPL
	816598	C159901N	KPL
	816599	C159904N	KPL
	816600	C159902N	KPL
	816603	C159922N	KPL

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-D	816607	D099910N	KPL
	816608	D099904N	KPL
	816609	D099909N	KPL
	816610	D089914N	KPK
	816611	D089916N	KPL
	816612	D099908N	KPL
	816613	D249913N	KPM
	816615	D269905N	KPL
	816617	D249907N	KPM
	816621	E059902N	KPL
	816622	E019918N	KPL
	816623	E059906N	KPL
	816624	E049904N	KPL
	816625	E059904N	KPL
	816626	E059901N	KPL
	816630	E189921N	KPL
	816632	E189902N	KPL
	816636	D089915N	KPL
	816638	F179808N	KON
	816644	F179817N	KON
	816651	D249906N	KPM
	816652	E039912N	KPM
	816657	F269906N	KPL
	816658	F269909N	KPL
	816661	**G269918N**	**KRN**
	816663	**G289915N**	**KRN**
	816665	**G279919N**	**KRN**
	816667	**G299915N**	**KRN**
	816671	**H249919N**	**KRN**
	816673	I089927N	KRP
	816675	**I039901N**	**KRN**
	816676	**I039921N**	**KRN**
	816679	G159902N	KPL
	816683	J049917N	KRP
	816686	J049932N	KRP
	816687	J069913N	KRP
	816688	J089906N	KRP
	816689	**F239903N**	**KRN**
	816698	**L029911N**	**KRN**

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-D	816699	K109939N	KRP
	816700	**L079903N**	**KRN**
	816708	**L069909N**	**KRN**
	816710	L069903N	KPH
	816711	**G269920N**	**KRN**
IO-520-E	215908	F269901N	KPM
	215924	A259909N	KPK
	215926	C129917N	KPL
	215929	E199908N	KPL
	215931	I079902N	KRP
	215932	J049920N	KRP
	215933	J049937N	KRP
	215934	J059904N	KRP
	556632	J119905N	KRP
IO-520-F	291253	E059920N	KPM
	579248	I089906N	KRN
	579250	F169813N	KON
	579252	F109817N	KON
	579257	L039818N	KPK
	579258	B189904N	KPL
	579259	C129914N	KPL
	579260	G149906N	KPL
	579261	**G299917N**	**KRN**
	579262	I089925N	KRP
	579263	J049936N	KRP
	579264	J059908N	KRP
	579265	**K029905N**	**KRN**
	579266	**L029918N**	**KRN**
	579268	N00AA196	KRP
	579279	N00CA058	KRP
	814808	E059919N	KPM
	814814	D239809N	KON
	814827	F049807N	KON
	814830	F099814N	KON
	814837	F189801N	KON
	814838	F169818N	KON
	814840	F169812N	KON

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-F	814843	F179803N	KON
	814845	F179818N	KON
	814846	E049907N	KPL
	814850	F059810N	KON
	814851	E189926N	KPL
	814852	F109814N	KON
	814854	F089809N	KON
	814857	F119805N	KON
	814859	F179816N	KON
	814861	F169805N	KON
	814865	E199911N	KPL
	814880	E049911N	KPH
	814897	F109810N	KON
	814907	H099821N	KON
	814908	D109903N	KPL
	814921	E199910N	KPL
	814952	L089817N	KPH
	814953	**I039905N**	**KRN**
	814965	A219909N	KPK
	814967	A219904N	KPK
	814968	A219915N	KPK
	814969	A219912N	KPK
	814974	A259911N	KPK
	814976	A259914N	KPK
	814977	B169902N	KPL
	814978	B169915N	KPL
	814979	B169917N	KPL
	814980	B189905N	KPL
	814981	B179908N	KPK
	814984	B179911N	KPL
	814985	B179905N	KPL
	814986	B179907N	KPL
	814987	C119912N	KPL
	814988	C119909N	KPL
	814990	C119913N	KPL
	814991	C119907N	KPL
	814994	B189906N	KPL
	814995	C129904N	KPL
	814996	C119911N	KPL

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-F	814998	C119905N	KPL
	814999	C129911N	KPL
	815000	C129912N	KPL
	818751	C139901N	KPL
	818752	C159920N	KPL
	818753	C159919N	KPL
	818757	C139912N	KPK
	818767	D098803N	KPL
	818768	D109911N	KPL
	818769	D109901N	KPL
	818770	D089917N	KPL
	818771	D109902N	KPK
	818772	D099903N	KPL
	818774	D239912N	KPL
	818775	D249912N	KPM
	818777	D239907N	KPM
	818779	D269902N	KPM
	818781	D269917N	KPL
	818782	D249904N	KPM
	818783	E059905N	KPM
	818784	E039903N	KPM
	818785	E039917N	KPM
	818788	E049908N	KPL
	818791	E059907N	KPL
	818794	E189920N	KPL
	818795	E189909N	KPK
	818796	E189911N	KPM
	818797	E189905N	KPL
	818800	H279815N	KOM
	818801	E199914N	KPM
	818802	E199913N	KPL
	818803	F169817N	KON
	818804	E059910N	KPL
	818807	D109905N	KPL
	818809	D109910N	KPK
	818816	D239905N	KPL
	818823	**F239922N**	**KRN**
	818824	**F239915N**	**KRN**
	818829	**F249915N**	**KRN**

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-F	**818831**	**F239908N**	**KRN**
	818835	E059903N	KPM
	818847	**G269913N**	**KRN**
	818848	**G269925N**	**KRN**
	818849	**G269921N**	**KRN**
	818850	**G269927N**	**KRN**
	818853	**G269910N**	**KRN**
	818855	**G269923N**	**KRN**
	818856	**G269904N**	**KRN**
	818857	**G289910N**	**KRN**
	818858	**G279923N**	**KRN**
	818859	**G289916N**	**KRN**
	818860	**G299927N**	**KRN**
	818862	**G279914N**	**KRN**
	818864	**G299921N**	**KRN**
	818865	**G299904N**	**KRN**
	818866	**G299919N**	**KRN**
	818867	**G299901N**	**KRN**
	818868	**G309912N**	**KRN**
	818869	**G309906N**	**KRN**
	818870	**G309914N**	**KRN**
	818878	**H249911N**	**KRN**
	818880	**I079904N**	**KRN**
	818881	**I039914N**	**KRN**
	818882	**I039912N**	**KRN**
	818885	**H259911N**	**KRN**
	818887	**I039913N**	**KRN**
	818890	J089909N	KRP
	818892	I089926N	KRP
	818894	**H249906N**	**KRN**
	818901	J049915N	KRP
	818906	J049933N	KRP
	818907	J059927N	KRP
	818908	J049923N	KRP
	818909	J059902N	KRP
	818910	J079907N	KRP
	818915	J119904N	KRP
	818916	J089904N	KRP
	818929	K029918N	KRP

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-F	**818933**	**L029915N**	**KRN**
	818935	**L039904N**	**KRN**
	818936	**L029904N**	**KRN**
	818939	**L029917N**	**KRN**
	818943	L079915N	KRP
	818948	L109906N	KRP
	818949	L109921N	KRP
	818979	N00CA107	KRP
	818986	N00CA146	KRP
	818995	N00CA354	KRP
IO-520-J	**216537**	**I089905N**	**KRN**
IO-520-K	224140	B169913N	KPK
IO-520-L	294911	F059807N	KON
	294912	F169806N	KON
	294913	E189917N	KPL
	294916	F109809N	KON
	294917	E039905N	KPM
	294930	E189925N	KPL
	294938	E059913N	KPL
	294941	H279817N	KOM
	294943	E189919N	KPL
	294947	E189915N	KPL
	294958	A219905N	KPK
	294959	A229911N	KPK
	294960	A219914N	KPK
	294962	A219913N	KPK
	294963	A259913N	KPK
	294965	A279901N	KPK
	294970	C129903N	KPK
	294971	C119918N	KPK
	294973	C139907N	KPL
	294974	C159903N	KPL
	294977	D089911N	KPL
	294979	D109906N	KPL
	294980	D089907N	KPL
	294982	D239908N	KPM

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-L	294983	D269908N	KPM
	294985	E039901N	KPL
	294988	E059917N	KPM
	294989	E199904N	KPL
	294990	E189807N	KPK
	294991	E199906N	KPL
	294992	E189908N	KPK
	294993	F239923N	KRN
	294996	D109907N	KPL
	295001	L109801N	KPK
	295003	**G269903N**	**KRN**
	295005	**G309905N**	**KRN**
	295006	**G299929N**	**KRN**
	295007	**G299914N**	**KRN**
	295008	**G299930N**	**KRN**
	295012	**G309910N**	**KRN**
	295013	**H239905N**	**KRN**
	295014	**H209909N**	**KRN**
	295018	I099913N	KRP
	295019	I089923N	KRP
	295020	J079905N	KRP
	295021	J079902N	KRP
	295025	**I079909N**	**KRN**
	295027	**I079922N**	**KRN**
	295028	**I079916N**	**KRN**
	295029	I089924N	KRP
	295039	F119804N	KON
	295045	**L029908N**	**KRN**
	295046	L029903N	KRP
	295049	**L039905N**	**KRN**
	295067	N00CA132	KRP
	577231	F119808N	KON
	577234	F269913N	KPL
	577236	**I089903N**	**KRN**
	577237	K029903N	KRP
IO-520-M	811623	J089806N	KOR
	811624	J089802N	KOR
	811625	J099809N	KOM

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-520-L	811630	K259814N	KPH
	811632	A159907N	KPM
	811634	B109920N	KPM
	811635	B109912N	KPM
	811642	B109909N	KPM
	811644	D019912N	KPM
	811645	D019906N	KPM
	811646	D019903N	KPM
	811650	D019907N	KPM
	811652	D059910N	KPH
IO-520-MB	277688	K189801N	KOM
	277721	I229809N	KOM
	277725	K129809N	KOP
	277726	K139801N	KPM
	277727	K179802N	KOR
	277728	K199803N	KPM
	277730	K179807N	KOR
	277733	A169906N	KOR
	277738	B029903N	KPH
	277739	B129915N	KPM
	277747	E019902N	KPH
	277748	C279902N	KPM
	277752	D149908N	KPH
	277753	D149907N	KPM
	277781	K139802N	KPM
IO-550-A	280488	I189814N	KOR
	280490	I199805N	KOR
	280491	I219815N	KOR
	280493	J269804N	KOM
	280495	I199802N	KOR
	280497	J239802N	KOR
	280498	J239810N	KOM
	280499	J239803N	KOR
	280500	J239811N	KOM
	817001	J279805N	KOM
	817002	K209806N	KOP
	817005	J279806N	KOR

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-A	817006	A209902N	KPM
IO-550-B	296625	K229809N	KPH
	297088	K229810N	KPH
	297102	I169810N	KOR
	297103	I189815N	KOR
	297104	I199804N	KOR
	297105	I229805N	KOM
	297106	I219821N	KOP
	297108	I219802N	KOM
	297114	I189813N	KOR
	297115	J249810N	KOR
	297116	I209802N	KOR
	297117	I189816N	KOR
	297118	J259804N	KOM
	297119	J259805N	KOM
	297120	J269801N	KOM
	297121	J269812N	KOM
	297122	K209807N	KPH
	297124	K219801N	KOP
	297125	J279810N	KOM
	297128	J259812N	KOM
	297129	K219803N	KOP
	297131	K229802N	KOR
	297133	K239808N	KOR
	297134	K209801N	KOR
	297136	K209802N	KOP
	297138	K199808N	KPH
	297139	A199904N	KOM
	297140	A199906N	KOM
	297141	A189910N	KOM
	297142	A209906N	KOM
	297144	A209904N	KOR
	297145	A209905N	KOR
	297149	B059901N	KPM
	297153	K209813N	KOP
	297154	B039916N	KPM
	297157	B059908N	KPM

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-B	297161	C249909N	KPM
	297163	C299911N	KPM
	297164	C249901N	KPM
	297165	C259902N	KPM
	297166	C259908N	KPM
	297167	C299910N	KPM
	297168	D299901N	KPK
	297170	K239802N	KPH
	297172	K199807N	KOP
	297187	J239809N	KOM
	682997	A169804N	KPM
	684005	I169807N	KOR
	684006	I219812N	KOR
	684009	J249806N	KOR
	684010	J279807N	KOM
	684011	J279809N	KOM
	684015	J259811N	KOM
	684016	J269808N	KOM
	684017	J269811N	KOM
	684020	K239807N	KOR
	684021	K239805N	KOR
	684022	K239803N	KOP
	684023	K209810N	KPH
	684025	K199812N	KOR
	684026	B039913N	KPM
	684027	A199901N	KOM
	684029	A199903N	KOM
	684030	B039915N	KPM
	684031	B039912N	KPH
	684032	B039907N	KPM
	684033	B039910N	KPM
	684034	B099901N	KPM
	684035	B099905N	KPM
	684036	B099903N	KPM
	684037	B099902N	KPM
	684038	C059907N	KOR
	684039	C059903N	KOR
	684040	C059905N	KOR
	684041	C069901N	KOR

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-B	684042	C239916N	KPH
	684043	C239917N	KPM
	684044	C259903N	KPM
	684045	C259904N	KPM
	684046	C259909N	KPM
	684048	C319910N	KPM
	684050	C309901N	KPM
	684051	C309903N	KPM
	684052	D299906N	KPM
	684053	D299905N	KPM
	684058	**E239901N**	**KRN**
	684110	I179802N	KOR
	684113	K199811N	KOR
	684114	B059920N	KPM
	684115	C069911N	KOR
	684119	A319916N	KPM
	684121	C069905N	KPM
	684745	J279808N	KOM
IO-550-C	684239	I219823N	KOP
	684240	I219819N	KOP
	684243	I229806N	KOM
	684244	I219810N	KOR
	684247	I229807N	KOR
	684248	I219811N	KOR
	684249	I219809N	KOR
	684250	J249805N	KOR
	684252	J249811N	KOR
	684253	J269805N	KOM
	684254	J249807N	KOR
	684255	J249809N	KOR
	684256	J279803N	KOM
	684257	J279802N	KOM
	684258	J279801N	KOR
	684259	J279804N	KOM
	684261	K209815N	KOR
	684262	K229804N	KOR
	684263	K239809N	KOR
	684264	K209805N	KOP

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-C	684266	K209811N	KOR
	684267	K199809N	KOR
	684268	K209808N	KOR
	684269	K209812N	KOR
	684270	A209901N	KOR
	684271	A189913N	KPM
	684273	A199905N	KOR
	684274	B039914N	KPM
	684276	B049910N	KPM
	684277	B039906N	KPM
	684278	B049907N	KPM
	684279	B049908N	KPM
	684280	B089901N	KPM
	684281	B059918N	KPM
	684282	B059922N	KPM
	684283	B059917N	KPM
	684284	C059910N	KOR
	684285	C059904N	KOR
	684287	C059906N	KOR
	684288	C239913N	KPH
	684290	C239915N	KPH
	684291	C239914N	KPM
	684292	C309904N	KPM
	684293	C299906N	KPM
	684294	C309905N	KPM
	684295	C259910N	KPM
	684296	D289903N	KPM
	684297	D289901N	KPH
	684298	D279904N	KPM
	684300	D279902N	KPM
	684301	D289904N	KPM
	684303	D299903N	KPH
	684304	D299904N	KPM
	684368	I169812N	KOR
	684369	I179803N	KOR
	684370	I199801N	KOR
	684371	I179804N	KOR
	684419	B089910N	KPM
	684532	C069910N	KOR

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-C	684533	C069908N	KOR
	684535	C259907N	KPM
	684536	C259905N	KPM
	684538	C319911N	KRP
	815291	I209804N	KOR
	815292	I219804N	KOM
	815293	J259801N	KOR
	815294	J259802N	KOR
	815298	I219813N	KOR
	815299	I219814N	KOP
	815301	I219818N	KOP
	815302	I219824N	KOP
	815304	I199806N	KOP
	815306	J239805N	KOR
	815307	J239807N	KOM
	815308	J239808N	KOR
	815309	J239806N	KOR
	815310	J239801N	KOR
	815311	J269803N	KOM
	815313	J279812N	KOR
	815314	K229801N	KOR
	815315	K209817N	KOR
	815316	K199810N	KPH
	815317	A189906N	KOM
	815319	K209818N	KOR
	815321	B099904N	KPM
	815322	B059916N	KPM
	815323	A199908N	KOM
	815325	B089907N	KPM
	815328	C069909N	KPM
	815329	C069903N	KPM
	815330	B059903N	KOM
	815333	C249902N	KPM
	815335	C259906N	KPM
	815339	B059910N	KPM
	815340	C299908N	KPM
	815342	C009904N	KPH
	815344	B059913N	KPM
	815346	D299902N	KPK

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-C	815347	C319902N	KPM
	815378	F129905N	KRP
	815383	I169809N	KOR
IO-550-D	**284293**	**H199918N**	**KRN**
	284299	D179916N	KPL
	284313	A309910N	KPL
	284314	A309903N	KPL
	284315	A309902N	KPL
	284316	B019904N	KPL
	284317	B019905N	KPL
	284318	A309906N	KPL
	284319	A309904N	KPL
	284321	D179909N	KPK
	284322	D179903N	KPL
	284323	D199904N	KPL
	284324	D179915N	KPL
	284325	D189904N	KPK
	284327	**H199908N**	**KRN**
	284330	G169910N	KPM
	284331	G169911N	KPM
	284335	J019903N	KRP
	284336	J019922N	KRP
	284337	**H199911N**	**KRN**
	284339	**H199920N**	**KRN**
	284340	J019913N	KRP
	284341	J019918N	KRP
	284342	J019911N	KRP
	284349	**J049904N**	**KRN**
	284350	**G169908N**	**KRN**
	284351	J049912N	KRP
	284352	**J019905N**	**KRN**
	284355	K069906N	KRP
	284357	**A050008N**	**KRN**
	284359	**A050011N**	**KRN**
	284360	**A050006N**	**KRN**
	680020	A309901N	KPL
IO-550-E	283391	B019906N	KPL

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-E	283394	D179904N	KPL
	283395	D179902N	KPL
	283398	D199905N	KPL
	283399	D189906N	KPK
	283400	D199901N	KPK
	283401	D179914N	KPK
	283403	**A050003N**	**KRN**
	283404	**A080009N**	**KRN**
	283405	N00CA227	KRP
	681045	**A050002N**	**KRN**
	681048	**A050005N**	**KRN**
IO-550-F	284848	D179907N	KPL
	284860	D189901N	KPK
	284881	J049909N	KRP
	284887	J049902N	KRP
	284891	D179906N	KPK
	284898	D189903N	KPK
	284900	A309909N	KPL
	284901	A309908N	KPL
	284902	B019903N	KPL
	284904	B019902N	KPL
	284905	B019901N	KPL
	284908	D199902N	KPK
	284909	D199911N	KPL
	284911	D199907N	KPL
	284913	D179913N	KPK
	284914	D179911N	KPL
	284915	D189902N	KPK
	284917	**H199912N**	**KRN**
	284920	**H199917N**	**KRN**
	284921	**H199909N**	**KRN**
	284922	**H199915N**	**KRN**
	284923	**G169913N**	**KRN**
	284924	J019912N	KRP
	284927	**H199919N**	**KRN**
	284928	**H199913N**	**KRN**
	284931	J019904N	KRP
	284932	J019920N	KRP

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-F	284933	J019915N	KRP
	284935	J019914N	KRP
	284949	N00CA215	KRP
	679523	D179908N	KPL
	679531	**J049914N**	**KRN**
	679532	J049908N	KRP
	679533	**A050007N**	**KRN**
	913750	D199910N	KPL
IO-550-G	679336	E079909N	KPK
	679339	I169808N	KOR
	679343	I229801N	KOM
	679347	I209801N	KOR
	679348	J259810N	KOR
	679349	J259808N	KOR
	679352	I209803N	KOR
	679353	I229802N	KOR
	679363	I189817N	KOR
	679364	J259809N	KOR
	679366	C319906N	KPM
	679367	K219804N	KOR
	679368	J269807N	KOM
	679370	J269802N	KOM
	679371	J239804N	KOR
	679372	K209809N	KOR
	679373	K229806N	KOR
	679377	K229808N	KOP
	679378	K209814N	KOP
	679379	A189907N	KOM
	679380	B039909N	KOM
	679381	K229805N	KOR
	679382	K209816N	KOR
	679383	A189911N	KOM
	679384	B039911N	KPM
	679385	B059914N	KPM
	679386	B059902N	KPM
	679387	B089902N	KPM
	679388	B059921N	KPM
	679389	B059911N	KPM

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-G	679390	B089909N	KPM
	679391	B059905N	KPM
	679392	B089904N	KOR
	679393	I219805N	KOM
	679394	C069906N	KPM
	679395	C059902N	KOR
	679396	C069907N	KPM
	679397	C059913N	KOR
	679398	B089906N	KPM
	679399	C249906N	KPM
	679400	C2999909	KPH
	679401	C249903N	KPM
	679402	C249904N	KPM
	679403	C299907N	KPM
	679404	C309906N	KPH
	679405	C319908N	KPM
	679437	C249910N	KPM
	679438	C059914N	KOR
	679439	C319901N	KPM
	808508	J269809N	KOM
	808509	C309902N	KPM
IO-550-L	289130	D179901N	KPL
	289148	D199908N	KPL
	289149	D199909N	KPL
	289152	J019902N	KRP
	289153	J019907N	KRP
	289154	J049910N	KRP
	289155	J049911N	KRP
	289157	**H199907N**	**KRN**
	289160	**A050001N**	**KRN**
	289161	N00BA593	KRP
	289163	N00CA228	KRP
	289169	**N00CA586**	**KRN**
	678002	**I119907N**	**KRN**
IO-550-N	683354	J269810N	KOR
	683356	B089908N	KPM
	683357	C059911N	KOR

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
IO-550-N	683358	C059916N	KOR
	683359	C269902N	KPM
LTSIO-360-EB	807514	I239802N	KPC
	807516	J019810N	KPC
	807517	J019814N	KPC
	807518	J019811N	KPC
	807519	J019816N	KPC
	807520	K059812N	KPC
	807522	J019815N	KPC
	807523	K079803N	KPC
	807524	K059808N	KPC
	807525	K069803N	KPC
	807581	J029903N	KPC
LTSIO-360-KB	319386	K059815N	KPC
	319388	J019817N	KPC
	812054	I239804N	KPC
	812056	J019812N	KPC
	812057	J019808N	KPC
	812059	I259809N	KPC
	812062	K059814N	KPC
	812063	K069811N	KPC
	812064	K069805N	KPC
	812065	K069808N	KPC
	812066	K069810N	KPC
	812067	K069802N	KPC
LTSIO-360-RB	321735	J019813N	KPC
	321736	J019807N	KPC
	321738	K059809N	KPC
	321739	I309802N	KPC
	321740	K059810N	KPC
	321741	I259810N	KPC
	321742	J019809N	KPC
	321743	K069809N	KPC
	321744	K069806N	KPC
	321745	K079802N	KPC
	321746	K069807N	KPC

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
LTSIO-520-AE	246675	G159915N	KPL
	246676	G159913N	KPL
	246679	G159909N	KPL
	246680	G159918N	KPL
	246684	G159914N	KPL
TSIO-360-AB	237617	K109805N	KPC
	237618	K109815N	KPC
TSIO-360-C	283560	J029805N	KPC
TSIO-360-CB	236251	K109812N	KPC
	236252	K109801N	KPC
TSIO-360-DB	817251	J029810N	KPC
TSIO360-EB	809232	I259803N	KPC
	809235	I249805N	KPC
	809238	K069813N	KPC
	809239	K109803N	KPC
	809240	K109814N	KPC
TSIO-360-FB	299712	I299803N	KPC
	299713	J019804N	KPC
	299714	I259807N	KPC
	299715	K049813N	KPC
	299716	K069816N	KPC
	299717	K109813N	KPC
	299718	K109810N	KPC
	299720	K109808N	KPC
TSIO-360-KB	320381	K069812N	KPC
	320383	J019802N	KPC
	811323	K099808N	KPC
	811324	I259811N	KPC
	811325	K049818N	KPC
	811328	K059803N	KPC
	811329	K099809N	KPC
	811330	K109816N	KPC

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-360-KB	811331	K099810N	KPC
	811332	K109811N	KPC
	811333	K109804N	KPC
	811334	K109806N	KPC
TSIO-360-LB	247354	I249802N	KPC
	247356	I259802N	KPC
	247357	K099802N	KPC
	247358	K099811N	KPC
	247359	K099804N	KPC
TSIO-360-MB	279293	I249809N	KPC
	279294	K099807N	KPC
	279295	K069815N	KPC
TSIO-360-RB	321483	I299802N	KPC
	321484	I249808N	KPC
	321485	I309805N	KPC
	321486	K049815N	KPC
	321487	K059802N	KPC
	321488	I299806N	KPC
	321489	K099803N	KPC
	321490	K099805N	KPC
	321491	K099806N	KPC
	321492	K109809N	KPC
TSIO-360-SB	321791	K059804N	KPC
TSIO-520-AE	246177	G169904N	KPL
	246178	F1999203	KPL
	246179	G169903N	KPL
TSIO-520-AF	245248	F169815N	KON
	245250	L109802N	KPK
TSIO-520-B	176762	L029808N	KPM
	176763	J099810N	KOM
	176765	A139906N	KPM
	176766	B119912N	KPM

AFFECTED ENGINE MODELS (continued)

BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-B	176767	B119914N	KPM
	176770	B109904N	KPM
	176775	D069906N	KPM
	176776	D059904N	KPH
	176795	K309801N	KOM
TSIO-520-BB	287621	D299911N	KPH
	287616	K169801N	KPM
	287619	C089903N	KPM
	287618	C089904N	KPM
	287622	D149911N	KPM
	287620	E119909N	KPH
TSIO-520-C	178539	L079909N	KRP
	178542	F179813N	KON
	178560	B169911N	KPL
	178565	A039911N	KPL
	178566	E039908N	KPM
	178571	**I039903N**	**KRN**
	178572	J079906N	KRP
	178573	J049916N	KRP
	178574	J059912N	KRP
	178575	J059910N	KRP
	178576	J089905N	KRP
TSIO-520-CE	268583	C039923N	KPL
	268585	C039920N	KPL
	268586	C039919N	KPL
	268590	L139901N	KRP
	530169	C039922N	KPL
	530172	L139902N	KRP
	530173	L139914N	KRP
TSIO-520-D	180110	J319803N	KOP
	180111	B109902N	KPM
TSIO-520-E	183520	J109806N	KOM
	812599	J089807N	KOR
	812601	J089809N	KOM

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-E	812602	J109804N	KOM
	812603	I109810N	KOM
	812611	J319802N	KOP
	812612	J299808N	KOP
	812614	K309803N	KPM
	812615	K259806N	KPH
	812616	K259808N	KPH
	812617	K309808N	KOM
	812619	L029804N	KPM
	812620	K249805N	KPH
	812621	K259813N	KPM
	812622	K259810N	KPM
	812623	K259807N	KPM
	812624	A139904N	KPM
	812625	A139901N	KPM
	812630	L029803N	KPM
	812631	A139903N	KPM
	812632	B099910N	KPM
	812633	B119901N	KPM
	812634	B109915N	KPH
	812635	D019905N	KPM
	812638	D019911N	KPM
	812640	J289810N	KOP
TSIO-520-EB	815023	F169808N	KON
	815032	K179806N	KOR
	815035	C089906N	KPM
	815038	C279911N	KPH
	815040	C269906N	KPM
	815042	D149915N	KPM
	815043	E119918N	KPH
	815057	K129801N	KOP
TSIO-520-G	216053	E039906N	KPM
TSIO-520-H	217409	F109808N	KON
	217412	E189928N	KPL
	217420	B169904N	KPL
	217423	C119904N	KPK

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-J	217424	D109908N	KPL
	217426	E189918N	KPL
	217428	F269905N	KPL
	217429	**F279902N**	**KRN**
	217430	**F279907N**	**KRN**
	217432	**G269926N**	**KRN**
	217433	**I089902N**	**KRN**
	217438	**L029906N**	**KRN**
	506894	F129806N	KON
	506895	K019921N	KRP
	506896	**H239901N**	**KRN**
TSIO-520-J	218992	B099917N	KPM
TSIO-520-JB	237193	A159911N	KPM
	237194	C279906N	KPM
TSIO-520-L	241973	A129901N	KPM
	241974	A129903N	KPM
TSIO-520-LB	815504	B049904N	KPM
TSIO-520-M	291964	F109803N	KON
	291969	E199912N	KPL
	291978	I079932N	KRP
	291981	F119806N	KON
	291985	H279805N	KOM
	291986	H279808N	KOM
	532083	F049809N	KON
	532085	H279804N	KOM
	532088	L109804N	KPK
	532089	A219901N	KPK
	532091	D089906N	KPK
	532092	D249901N	KPM
	532093	C119906N	KPL
	532095	E049910N	KPM
	532096	E049903N	KPM
	532099	J049928N	KRP
	532100	J059906N	KRP

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-M	532101	J069917N	KRP
	532102	J079903N	KRP
	532104	**I039906N**	**KRN**
	532105	**K019917N**	**KRN**
	532106	K029915N	KRP
	532107	**K039905N**	**KRN**
	532108	**L029910N**	**KRN**
	532109	**L029909N**	**KRN**
	532115	N00AA186	KRP
	532118	N00CA065	KRP
	532123	N00CA340	KRP
	818001	L069802N	KPK
	818007	A229901N	KPK
	818008	A219917N	KPK
	818010	A229906N	KPK
	818011	L099809N	KPK
	818015	B169908N	KPL
	818016	B179906N	KPL
	818017	B179916N	KPL
	818018	B169905N	KPL
	818020	C159921N	KPL
	818021	C139908N	KPL
	818022	D099905N	KPL
	818023	D089913N	KPL
	818024	D099906N	KPL
	818026	D269906N	KPM
	818027	C119902N	KPL
	818028	E019912N	KPL
	818030	E189910N	KPL
	818031	E189903N	KPL
	818033	**F229904N**	**KRN**
	818041	E069901N	KPM
	818045	**F279909N**	**KRN**
	818047	**G239913N**	**KRN**
	818048	**G299916N**	**KRN**
	818049	**G269917N**	**KRN**
	818052	**G299906N**	**KRN**
	818053	**G289908N**	**KRN**
	818054	**G299924N**	**KRN**

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-M	**818055**	**G309901N**	**KRN**
	818062	**G299912N**	**KRN**
	818063	**H259909N**	**KRN**
	818064	**H249907N**	**KRN**
	818067	**G299918N**	**KRN**
	818069	**H259925N**	**KRN**
	818071	**G299911N**	**KRN**
	818072	F179814N	KON
	818073	**I039919N**	**KRN**
	818074	**I039909N**	**KRN**
	818075	I099906N	KRP
	818079	I089922N	KRP
	818081	J079916N	KRP
	818084	J089907N	KRP
	818087	K019912N	KRP
	818098	L109903N	KRP
	818099	**L029905N**	**KRN**
	818107	L089906N	KRP
	818126	L099912N	KRP
	818144	N00CA135	KRP
TSIO-520-NB	813600	E269911N	KPL
	813621	I189808N	KOM
	813634	K179808N	KOR
	813635	A159918N	KPM
	813636	A159914N	KPM
	813637	B129913N	KPM
	813638	B159911N	KPM
	813639	B159910N	KPM
	813640	B159909N	KPM
	813641	B159908N	KPM
	813644	C109914N	KPM
	813645	C279909N	KPH
	813646	D079911N	KPM
	813647	D079908N	KPM
	813652	C109913N	KPM
	813654	D299907N	KPM
	813655	D309901N	KPH
	813657	E119903N	KPH

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-NB	813660	E119910N	KPH
	813685	C109912N	KPM
TSIO-520-P	278820	E059912N	KPM
	278823	F129803N	KON
	278832	B169912N	KPL
	278833	E039915N	KPL
	278834	E069904N	KPM
	278835	E189914N	KPL
	278836	E199907N	KPL
	278845	E039913N	KPM
	278848	**G269908N**	**KRN**
	278850	**G269907N**	**KRN**
	278851	**G269928N**	**KRN**
	278852	**G299913N**	**KRN**
	278854	**H209922N**	**KRN**
	278855	**I039902N**	**KRN**
	278856	I089920N	KRP
	278862	**L079901N**	**KRN**
	513921	**H259906N**	**KRN**
	513922	J049924N	KRP
TSIO-520-R	293969	E069906N	KPL
	293978	F049808N	KON
	293979	F089805N	KON
	293988	F099810N	KON
	293992	F179804N	KON
	293993	F169816N	KON
	294008	E019910N	KPM
	294014	H279816N	KOM
	294051	B169909N	KPL
	294052	B169907N	KPL
	294054	B189903N	KPL
	294055	C119901N	KPL
	294059	B169903N	KPL
	294063	E019919N	KPL
	294066	E059918N	KPM
	294068	E189922N	KPL
	294069	E189904N	KPL

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-R	294070	E189924N	KPL
	294072	D099902N	KPL
	294073	D099911N	KPL
	294074	**F239911N**	**KRN**
	294076	H279807N	KOM
	294079	**F239910N**	**KRN**
	294080	**F239918N**	**KRN**
	294081	**F239924N**	**KRN**
	294085	F269902N	KPM
	294092	**G269919N**	**KRN**
	294096	**G279913N**	**KRN**
	294098	**G269906N**	**KRN**
	294100	**G309916N**	**KRN**
	294101	**G289911N**	**KRN**
	294102	**G279924N**	**KRN**
	294104	**G309908N**	**KRN**
	294105	C309909N	KPL
	294106	**H209907N**	**KRN**
	294107	H209919N	KRP
	294108	**H209927N**	**KRN**
	294111	J059901N	KRP
	294112	**I099908N**	**KRN**
	294113	I099912N	KRP
	294114	**I079908N**	**KRN**
	294115	I079925N	KRP
	294116	I089910N	KRP
	294118	I079923N	KRP
	294119	J049919N	KRP
	294121	J049922N	KRP
	294122	J059921N	KRP
	294123	J089927N	KRP
	294124	J069918N	KRP
	294126	J089913N	KRP
	294128	J089916N	KRP
	294130	**H259905N**	**KRN**
	294134	**L039901N**	**KRN**
	294138	**L029914N**	**KRN**
	294140	**L039902N**	**KRN**
	294142	**L069904N**	**KRN**

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-R	**294144**	**L099918N**	**KRN**
	294154	N00CA001	KRP
	294166	N00CA054	KRP
	294171	N00CA059	KRP
	522698	**I039911N**	**KRN**
	522702	A259912N	KPK
	522703	E039918N	KPM
	522706	J069909N	KRP
	522707	**H209920N**	**KRN**
	522709	J089910N	KRP
	522712	J049926N	KRP
	522720	N00CA006	KRP
TSIO-520-T	239465	I089918N	KRP
	239466	**I039908N**	**KRN**
	239474	A259910N	KPK
	239475	B189902N	KPL
	239476	C129910N	KPL
	239477	C129916N	KPL
	239478	C139903N	KPH
	239484	D089908N	KPL
	239489	F269910N	KPL
	239490	**G299928N**	**KRN**
	239491	**G239916N**	**KRN**
	239493	J059926N	KRP
	239494	**J089917N**	**KRN**
	239497	**L029916N**	**KRN**
	239498	L109904N	KRP
TSIO-520-UB	527425	I189807N	KOM
	527427	K169811N	KOR
	527428	A169908N	KOR
	527429	B019908N	KOR
	527430	B049905N	KOR
	527431	C089902N	KOR
	527432	C279908N	KPH
	527433	D149905N	KPM
	527434	D299916N	KOR
	527477	E109913N	KPH

AFFECTED ENGINE MODELS (continued)
BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-UB	809347	K169813N	KOR
	809352	K179803N	KOR
	809354	A169905N	KPM
	809357	B159902N	KPM
	809358	E019907N	KPH
TSIO-520-VB	816019	I189801N	KOM
	816034	D299915N	KOR
	816036	K149804N	KOP
	816037	K189806N	KOR
	816038	K199804N	KPM
	816039	K149802N	KOM
	816041	K189808N	KOR
	816044	K189802N	KOR
	816046	K189807N	KOR
	816047	K179805N	KOM
	816050	A169914N	KPM
	816052	A169903N	KOR
	816053	A169902N	KOR
	816054	A169912N	KOR
	816055	A189901N	KPM
	816056	A169913N	KPM
	816057	B019915N	KPM
	816058	B039902N	KPH
	816061	A169907N	KOR
	816062	A209908N	KOR
	816063	B159901N	KPM
	816064	B159912N	KPM
	816065	B159904N	KPM
	816067	B159905N	KPM
	816068	B159906N	KPM
	816069	B029904N	KPH
	816070	C269905N	KPH
	816072	C279904N	KPH
	816073	C279910N	KPH
	816075	C279905N	KPM
	816079	C269909N	KPM
	816080	D149910N	KPM
	816081	D149906N	KPM

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-520-VB	816086	D149914N	KPM
	816087	D299910N	KPH
	816088	E019904N	KPH
	816089	E109909N	KPH
	816090	E119905N	KPH
	816092	E119904N	KPH
	816093	E119902N	KPH
TSIO-520-WB	274437	K129805N	KOP
	274438	K199805N	KOR
	274439	K169815N	KOR
	274443	C279912N	KPM
	274450	E119901N	KPH
TSIO-550-C	802589	J259803N	KOM
	802590	K219805N	KOR
	802591	I219803N	KOM
	802592	C319904N	KPM
	814506	I169811N	KOR
	814507	J249802N	KOR
	814509	J279811N	KOM
	814512	B059907N	KPM
	814514	A209903N	KOR
TSIO-550-E	803059	A169803N	KPM
	803067	C319905N	KPM
	803070	I179801N	KOR
	803071	B059915N	KPM
	803072	B089903N	KPM
	803073	B059906N	KPM
	803074	B059912N	KPM
	803075	B059904N	KPM
	803077	I219801N	KOM
	803078	A189908N	KOM
	803079	J269806N	KOR
	803080	K219802N	KOP
	803081	A199907N	KOM
	803082	A199902N	KOM
	803086	B049911N	KPM

AFFECTED ENGINE MODELS (continued)

BY ENGINE MODEL, ENGINE SERIAL NUMBER, CRNAKSHAFT SERIAL NUMBER AND HEAT CODE

ENGINE MODEL	ENGINE S/N	CRANKSHAFT S/n	HEAT CODE
TSIO-550-E	803087	C069902N	KOR
	803088	B089905N	KPM
	803089	C059912N	KOR
	803090	C249907N	KPM
	803091	C249911N	KPM
	803093	C269901N	KPM
	803094	C259901N	KPM
	803095	C249905N	KPM
	803097	C259911N	KPH
TSIOL-550-A	809259	I219806N	KOM

AFFECTED SERVICE SPARE CRANKSHAFTS
BY CRANKSHAFT PART NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

643687	**N00CA586**	**KRN**
643687	**N00CA589**	**KRN**
643687	**N00CA590**	**KRN**
643687	**N00CA591**	**KRN**
646623	**A050002N**	**KRN**
646623	**A050009N**	**KRN**
646623	**A050011N**	**KRN**
646623	A309905N	KPL
646623	A309907N	KPL
646623	D179905N	KPK
646623	D179910N	KPK
646623	D179912N	KPK
646623	D189905N	KPK
646623	D199903N	KPK
646623	D199906N	KPL
646623	**G169908N**	**KRN**
646623	**G169909N**	**KRN**
646623	**G169913N**	**KRN**
646623	**H199907N**	**KRN**
646623	**H199908N**	**KRN**
646623	**H199909N**	**KRN**
646623	**H199910N**	**KRN**
646623	**H199911N**	**KRN**
646623	**H199912N**	**KRN**
646623	**H199913N**	**KRN**
646623	**H199915N**	**KRN**
646623	**H199917N**	**KRN**
646623	**H199918N**	**KRN**
646623	**H199919N**	**KRN**
646623	**H199920N**	**KRN**
646623	**J019905N**	**KRN**
646623	J019908N	KRP
646623	J019923N	KRP
646623	**J019924N**	**KRN**
646623	**J049903N**	**KRN**
646623	**J049904N**	**KRN**
646623	J049907N	KRP
646623	J049913N	KRP
646623	N00CA212	KRP
646623	N00CA218	KRP
646623	N00CA219	KRP
646623	N00CA225	KRP
646632	**H199914N**	**KRN**
649131	B179917N	KPK
649131	N00CA340	KRP
649131	N00CA342	KRP
649131	N00CA363	KRP
649133	**G269911N**	**KRN**
649133	K029912N	KRP
649133	**L079904N**	**KRN**
649134	A219916N	KPK
649134	A229902N	KPK
649134	A229903N	KPK
649134	A229913N	KPK
649134	A259908N	KPK
649134	A259916N	KPK
649134	A279902N	KPK
649134	A279903N	KPK
649134	B119903N	KPL
649134	B179902N	KPL
649134	B179904N	KPL
649134	B179909N	KPL
649134	B179910N	KPL
649134	B179913N	KPL
649134	B179914N	KPK
649134	B179918N	KPL
649134	B189901N	KPL
649134	C119914N	KPK
649134	C119917N	KPK
649134	C129902N	KPL
649134	C129905N	KPL
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649134	C149913N	KPL
649134	D089903N	KPL
649134	D099901N	KPL
649134	D109904N	KPL
649134	D109909N	KPL
649134	D239901N	KPL
649134	D239902N	KPL
649134	D239903N	KPL
649134	D239904N	KPM
649134	D239906N	KPL
649134	D239909N	KPM
649134	D239910N	KPL
649134	D239911N	KPL
649134	D249902N	KPM
649134	D249903N	KPL
649134	D249905N	KPM
649134	D249908N	KPM
649134	D249910N	KPM
649134	D249911N	KPM
649134	D249914N	KPM
649134	D249915N	KPL
649134	D249916N	KPM
649134	D249917N	KPM
649134	D249918N	KPM
649134	D269901N	KPM
649134	D269903N	KPM
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649134	D269907N	KPM
649134	D269909N	KPM
649134	D269910N	KPL
649134	D269911N	KPM
649134	D269912N	KPM

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT PART NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

649134	D269913N	KPM
649134	D269914N	KPM
649134	D269915N	KPM
649134	D269916N	KPM
649134	D269918N	KPM
649134	E039907N	KPM
649134	E039909N	KPL
649134	E039911N	KPL
649134	E049901N	KPM
649134	E049902N	KPM
649134	E049906N	KPL
649134	E059908N	KPL
649134	E059914N	KPL
649134	E059916N	KPM
649134	E069902N	KPM
649134	E189913N	KPL
649134	E189923N	KPL
649134	E189927N	KPL
649134	E199902N	KPL
649134	E199903N	KPL
649134	E199905N	KPL
649134	F109804N	KON
649134	F109811N	KON
649134	F109818N	KON
649134	F119801N	KON
649134	F119802N	KON
649134	F119803N	KON
649134	F119807N	KON
649134	F119809N	KON
649134	F119810N	KON
649134	F119811N	KON
649134	F119812N	KON
649134	F129801N	KON
649134	F129805N	KON
649134	F129811N	KON
649134	F159807N	KON
649134	F159809N	KON

649134	F169802N	KON
649134	F169814N	KON
649134	F179802N	KON
649134	F179812N	KON
649134	F179815N	KON
649134	F189803N	KON
649134	F199801N	KON
649134	**F229919N**	**KRN**
649134	F269911N	KPL
649134	F269912N	KPL
649134	F269915N	KPM
649134	F269916N	KPL
649134	**G099930N**	**KRN**
649134	G149909N	KPM
649134	G149910N	KPM
649134	G149911N	KPM
649134	G149912N	KPM
649134	G149913N	KPM
649134	G149916N	KPM
649134	G159901N	KPM
649134	G159905N	KPM
649134	G159906N	KPM
649134	**G269902N**	**KRN**
649134	**G269905N**	**KRN**
649134	**G269924N**	**KRN**
649134	**G279902N**	**KRN**
649134	**G279903N**	**KRN**
649134	**G279904N**	**KRN**
649134	**G279906N**	**KRN**
649134	**G279907N**	**KRN**
649134	**G279908N**	**KRN**
649134	**G279910N**	**KRN**
649134	**G279911N**	**KRN**
649134	**G279915N**	**KRN**
649134	**G279916N**	**KRN**
649134	**G279917N**	**KRN**
649134	**G279918N**	**KRN**

649134	**G279922N**	**KRN**
649134	**G289901N**	**KRN**
649134	**G289902N**	**KRN**
649134	**G289905N**	**KRN**
649134	**G289906N**	**KRN**
649134	**G289907N**	**KRN**
649134	**G289909N**	**KRN**
649134	**G289912N**	**KRN**
649134	**G289917N**	**KRN**
649134	**G289918N**	**KRN**
649134	**G289919N**	**KRN**
649134	**G289920N**	**KRN**
649134	**G289921N**	**KRN**
649134	**G289922N**	**KRN**
649134	**G289923N**	**KRN**
649134	**G289924N**	**KRN**
649134	**G289925N**	**KRN**
649134	**G289926N**	**KRN**
649134	**G289927N**	**KRN**
649134	**G289928N**	**KRN**
649134	**G289929N**	**KRN**
649134	**G289930N**	**KRN**
649134	**G299902N**	**KRN**
649134	**G299903N**	**KRN**
649134	**G299905N**	**KRN**
649134	**G299907N**	**KRN**
649134	**G299908N**	**KRN**
649134	**G299909N**	**KRN**
649134	**G299922N**	**KRN**
649134	**G299923N**	**KRN**
649134	**G299925N**	**KRN**
649134	**G299926N**	**KRN**
649134	**G309903N**	**KRN**
649134	**G309904N**	**KRN**
649134	**G309907N**	**KRN**
649134	**G309909N**	**KRN**
649134	**G309913N**	**KRN**

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT PART NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

649134	G309915N	KRN
649134	G309917N	KRN
649134	G309918N	KRN
649134	G309919N	KRN
649134	H099818N	KON
649134	H109803N	KON
649134	H109804N	KON
649134	H209906N	KRN
649134	H209908N	KRP
649134	H209910N	KRP
649134	H209917N	KRP
649134	H209918N	KRN
649134	H209923N	KRN
649134	H209924N	KRN
649134	H209925N	KRN
649134	H209926N	KRN
649134	H239902N	KRN
649134	H239903N	KRN
649134	H239904N	KRN
649134	H239906N	KRP
649134	H239907N	KRN
649134	H239909N	KRN
649134	H239910N	KRN
649134	H239911N	KRN
649134	H239912N	KRN
649134	H239913N	KRN
649134	H239914N	KRN
649134	H239915N	KRN
649134	H239916N	KRP
649134	H239917N	KRN
649134	H249901N	KRN
649134	H249902N	KRN
649134	H249903N	KRN
649134	H249904N	KRN
649134	H249908N	KRN
649134	H249909N	KRN
649134	H249910N	KRN
649134	H249913N	KRN
649134	H249914N	KRN
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649134	H249917N	KRN
649134	H249918N	KRN
649134	H249920N	KRN
649134	H249921N	KRN
649134	H249922N	KRN
649134	H249923N	KRN
649134	H259901N	KRN
649134	H259902N	KRN
649134	H259903N	KRN
649134	H259904N	KRN
649134	H259907N	KRN
649134	H259908N	KRN
649134	H259910N	KRN
649134	H259912N	KRN
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649134	H259916N	KRN
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649134	H259926N	KRN
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649134	I039907N	KRN
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649134	I039917N	KRN
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649134	I099915N	KRN
649134	I099916N	KRP
649134	J059903N	KRP
649134	J059905N	KRP
649134	J059907N	KRP
649134	J059909N	KRP
649134	J059911N	KRP

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT PART NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

649134	J059914N	KRP
649134	J059915N	KRP
649134	J059919N	KRP
649134	J059920N	KRP
649134	J059922N	KRP
649134	J059923N	KRP
649134	J059924N	KRP
649134	J069901N	KRP
649134	J069902N	KRP
649134	J069914N	KRP
649134	J069916N	KRP
649134	J079904N	KRP
649134	J079909N	KRP
649134	J079912N	KRP
649134	J079913N	KRP
649134	J079914N	KRP
649134	J079917N	KRP
649134	J089902N	KRP
649134	**J089914N**	**KRN**
649134	J089919N	KRP
649134	J089920N	KRP
649134	J089923N	KRP
649134	J089926N	KRP
649134	J119901N	KRP
649134	**K019908N**	**KRN**
649134	K019910N	KRP
649134	K019915N	KRP
649134	**K019920N**	**KRN**
649134	K019923N	KRP
649134	K029901N	KRP
649134	K029902N	KRP
649134	**K029906N**	**KRN**
649134	**K039905N**	**KRN**
649134	**L029904N**	**KRN**
649134	**L029912N**	**KRN**
649134	**L029913N**	**KRN**
649134	L039816N	KPK
649134	L039817N	KPK

649134	**L039903N**	**KRN**
649134	**L039907N**	**KRN**
649134	**L039909N**	**KRN**
649134	L049803N	KPK
649134	**L079902N**	**KRN**
649134	L079908N	KRP
649134	**L079911N**	**KRN**
649134	L089901N	KRP
649134	L089903N	KRP
649134	L099909N	KRP
649134	L099911N	KRP
649134	L099913N	KRP
649134	L099917N	KRP
649134	N00AA189	KRP
649134	N00AA190	KRP
649134	N00AA192	KRP
649134	N00AA193	KRP
649134	N00AA195	KRP
649134	N00CA093	KRP
649134	N00CA144	KRP
649134	N00CA324	KRP
649134	N00CA344	KRP
649134	N00CA345	KRP
649134	N00CA352	KRP
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649134	N00CA354	KRP
649134	N00CA355	KRP
649134	N00CA358	KRP
649134	N00CA377	KRP
649134	N00CA381	KRP
649135	F109813N	KON
649135	**G309902N**	**KRN**
649135	**G309911N**	**KRN**
649135	H029908N	KRP
649135	**K019901N**	**KRN**
649135	**K019906N**	**KRN**
649135	L089902N	KRP
649138	A289905N	KPK

649138	A289913N	KPL
649138	B189910N	KPL
649138	B199905N	KPL
649138	C149901N	KPK
649138	C149903N	KPK
649138	C149906N	KPK
649138	C169902N	KPL
649138	E199924N	KPL
649138	H149804N	KON
649138	J119910N	KRP
649138	**J119912N**	**KRN**
649138	**J129901N**	**KRN**
649138	J129903N	KRP
649138	J149904N	KRP
649138	**N00CA173**	**KRN**
649138	N00CA174	KRP
649138	N00CA203	KRP
649141	A299905N	KPK
649141	A299907N	KPK
649141	A299909N	KPK
649141	B189907N	KPL
649141	B189908N	KPL
649141	B199901N	KPL
649141	B199909N	KPL
649141	C159907N	KPL
649141	C159909N	KPK
649141	C179902N	KPK
649141	C179906N	KPL
649141	E199918N	KPL
649141	E199920N	KPL
649141	E199922N	KPL
649141	F049805N	KON
649141	F209801N	KON
649141	F209802N	KON
649141	F209803N	KON
649141	**G319920N**	**KRN**
649141	H139809N	KON
649141	H139810N	KON

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT PART NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

649141	H139815N	KON
649141	**H259927N**	**KRN**
649141	**H259934N**	**KRN**
649141	**H269901N**	**KRN**
649141	**H269909N**	**KRN**
649141	**I099923N**	**KRN**
649141	I099925N	KRP
649141	I109907N	KRP
649141	J119919N	KRP
649141	**J129908N**	**KRN**
649141	J129916N	KRP
649141	**J139902N**	**KRN**
649141	J139909N	KRP
649141	J139920N	KRP
649141	J139922N	KRP
649141	K049904N	KRP
649141	K049912N	KRP
649141	K049915N	KRP
649141	L029815N	KPK
649141	L029816N	KPK
649141	L039807N	KPK
649141	L109812N	KPK
649141	**N00CA199**	**KRN**
649144	G159917N	KPM
649148	L139904N	KRP
649148	L139906N	KRP
649148	L139910N	KRP
649148	L139911N	KRP
649148	L139912N	KRP
649148	N00BA523	KRP
649895	A139902N	KPM
649895	A139905N	KPM
649895	A159902N	KOM
649895	A159903N	KPM
649895	A159904N	KOM
649895	A159905N	KPM
649895	A249808N	KPM
649895	B099906N	KPM
649895	B099909N	KPM
649895	B099912N	KPM
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649895	B109917N	KPM
649895	B109918N	KPM
649895	B109922N	KPM
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649895	B119905N	KPM
649895	B119906N	KPM
649895	B119907N	KPM
649895	B119908N	KPM
649895	B119910N	KPM
649895	B119916N	KPH
649895	B119917N	KPM
649895	D019901N	KPM
649895	D019908N	KPM
649895	D019909N	KPM
649895	D059902N	KPM
649895	D059903N	KPH
649895	D059907N	KPM
649895	D059909N	KPM
649895	D059911N	KPH
649895	D069901N	KPH
649895	D069902N	KPM
649895	D069904N	KPM
649895	D079903N	KPM
649895	F189908N	KRP
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649895	I119812N	KOM
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649895	J099804N	KOM
649895	J099808N	KOM
649895	J099811N	KOM
649895	J099815N	KOM
649895	J099816N	KOR
649895	J119801N	KOM
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649895	J289802N	KOP
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649895	J289806N	KOP
649895	J289808N	KOP
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649895	J299813N	KOP
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649895	J309807N	KOP
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649895	J309809N	KOP
649895	J319801N	KOP
649895	J319804N	KOP
649895	J319805N	KOM
649895	K249801N	KPM
649895	K259803N	KPM
649895	K259805N	KPM
649895	K309802N	KPM
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649895	L019806N	KPM
649895	L019808N	KPH
649895	L019809N	KPM
649895	L029801N	KPM
649895	L029802N	KOM
649895	L029806N	KPM
649895	L029809N	KPM
649896	A159901N	KOM
649896	B099908N	KPM
649896	B099911N	KPM
649896	B109905N	KPM
649896	B109908N	KPM
649896	B109910N	KPM
649896	B109914N	KPM
649896	B109916N	KPH
649896	D019904N	KPM

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT PART NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

649896	D059901N	KPM
649896	D079902N	KPM
649896	G209816N	KOR
649896	J109802N	KOM
649896	J119803N	KOM
649896	J289804N	KOP
649896	J289805N	KOP
649896	K029801N	KOP
649896	K029803N	KOP
649896	K309804N	KOM
649896	K309809N	KOM
649896	L019802N	KPM
649898	A139915N	KPM
649898	A159912N	KPM
649898	A159913N	KPH
649898	A159915N	KPM
649898	A159919N	KPM
649898	A169901N	KOR
649898	A169904N	KPM
649898	A169911N	KOR
649898	A169915N	KPM
649898	A189903N	KPM
649898	A209910N	KOR
649898	A209912N	KOP
649898	A209913N	KOR
649898	A209914N	KOR
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649898	B039904N	KPH
649898	B049901N	KPM
649898	B049903N	KPM
649898	B109907N	KPH
649898	B129901N	KPM
649898	B129902N	KPM

649898	B129903N	KPM
649898	B129904N	KPM
649898	B129905N	KPM
649898	B129909N	KPM
649898	B129911N	KPM
649898	B129912N	KPM
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649898	C109916N	KPH
649898	C109917N	KPM
649898	C269908N	KPH
649898	C299902N	KPH
649898	C299903N	KPH
649898	C299904N	KPH
649898	C299905N	KPH
649898	D149909N	KPM
649898	D299908N	KPM
649898	D299909N	KPM
649898	D299912N	KPH
649898	D299914N	KPH
649898	D309905N	KPM
649898	E019903N	KPH
649898	E019905N	KPH
649898	E109908N	KPH

649898	E119907N	KPH
649898	E119908N	KPH
649898	E119912N	KPH
649898	E119915N	KPH
649898	I139813N	KOM
649898	I169813N	KOM
649898	I169815N	KOM
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649898	K129807N	KOP
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649898	K129811N	KOP
649898	K139804N	KOP
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649898	K179804N	KOM
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649898	L189808N	KOM
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649900	C059915N	KOR
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649900	C269904N	KPM
649900	C299909N	KPH
649900	C319903N	KPM
649900	C319907N	KPM
649900	C319909N	KPM
649900	D279901N	KPK
649900	D279905N	KPK
649900	D279906N	KPK
649900	I219816N	KOR

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT PART NUMBER, CRANKSHAFT SERIAL NUMBER AND HEAT CODE

649900	I219820N	KOP
649900	J039809N	KOR
649900	J249808N	KOR
649900	K209803N	KOP
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652004	N00CA560	KPH
652004	N00CA561	KPH
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652004	N00CA566	KPH
652004	N00CA567	KPH
652004	N00CA569	KPH
652004	N00CA574	KPH
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652010	L089813N	KPH
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652010	N00CA570	KPH
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652011	C189908N	KOM
652011	E069803N	KOM
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652011	L239905N	KPH
652011	N00CA575	KPH
652039	A299908N	KPK
652039	F049803N	KON
653129	I249803N	KPC
653129	I249804N	KPC
653129	I249810N	KPC
653129	I259801N	KPC
653129	I309803N	KPC
653129	I309804N	KPC
653129	J019801N	KPC
653129	J019803N	KPC
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653136	K079810N	KPC
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653139	J029807N	KPC
653139	J059802N	KPC
653139	J059803N	KPC
653139	J059807N	KPC
653139	J059809N	KPC
653139	J059810N	KPC
653139	J059811N	KPC
653139	J059812N	KPC
653139	N00AA049	KPC
654432	A189909N	KPM
654432	A189912N	KPM
654432	C059909N	KOR
654432	I219808N	KOR
654432	I219817N	KOR
654432	I229804N	KOM
654432	K209804N	KOP
655382	**I119907N**	**KRN**

AFFECTED SERVICE SPARE CRANKSHAFTS
BY CRANKSHAFT SERIAL NUMBER, CRANKSHAFT PART NUMBER AND HEAT CODE

A030002N	652011	KPH
A030004N	652011	KPH
A030009N	652010	KPH
A050002N	**646623**	**KRN**
A050009N	**646623**	**KRN**
A050011N	**646623**	**KRN**
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A139905N	649895	KPM
A139915N	649898	KPM
A159901N	649896	KOM
A159902N	649895	KOM
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A159912N	649898	KPM
A159913N	649898	KPH
A159915N	649898	KPM
A159919N	649898	KPM
A169901N	649898	KOR
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A169915N	649898	KPM
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A189909N	654432	KPM
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A209910N	649898	KOR
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A209913N	649898	KOR
A209914N	649898	KOR
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A259908N	649134	KPK
A259916N	649134	KPK
A279902N	649134	KPK
A279903N	649134	KPK
A289905N	649138	KPK
A289913N	649138	KPL

A299905N	649141	KPK
A299907N	649141	KPK
A299908N	652039	KPK
A299909N	649141	KPK
A309905N	646623	KPL
A309907N	646623	KPL
B019907N	649898	KPH
B019909N	649898	KPH
B019913N	649898	KOR
B029901N	649898	KPH
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B109901N	649895	KPM
B109903N	649895	KPM
B109905N	649896	KPM
B109907N	649898	KPH
B109908N	649896	KPM
B109910N	649896	KPM
B109914N	649896	KPM
B109916N	649896	KPH
B109917N	649895	KPM
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B119907N	649895	KPM
B119908N	649895	KPM
B119910N	649895	KPM
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B119917N	649895	KPM
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B129902N	649898	KPM
B129903N	649898	KPM
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C099903N	649898	KPH
C099904N	649898	KPM
C099905N	649898	KPM
C099906N	649898	KPM

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT SERIAL NUMBER, CRANKSHAFT PART NUMBER AND HEAT CODE

C109901N	649898	KPM
C109903N	649898	KPM
C109904N	649898	KPM
C109905N	649898	KPM
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E039907N	649134	KPM
E039909N	649134	KPL
E039911N	649134	KPL
E049901N	649134	KPM
E049902N	649134	KPM
E049906N	649134	KPL

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT SERIAL NUMBER, CRANKSHAFT PART NUMBER AND HEAT CODE

E059908N	649134	KPL
E059914N	649134	KPL
E059916N	649134	KPM
E069801N	652010	KOM
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E069806N	652010	KOM
E069807N	652010	KOM
E069809N	652010	KOM
E069902N	649134	KPM
E069907N	652011	KPH
E079801N	652009	KOM
E079804N	652011	KOM
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E079806N	652011	KOM
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F289910N	652010	KPH
F289913N	652010	KPH
F289917N	652010	KPH
G099930N	**649134**	**KRN**
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G149910N	649134	KPM
G149911N	649134	KPM
G149912N	649134	KPM
G149913N	649134	KPM
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G159905N	649134	KPM
G159906N	649134	KPM
G159917N	649144	KPM
G169908N	**646623**	**KRN**
G169909N	**646623**	**KRN**
G169913N	**646623**	**KRN**
G209816N	649896	KOR
G269902N	**649134**	**KRN**
G269905N	**649134**	**KRN**
G269911N	**649133**	**KRN**
G269924N	**649134**	**KRN**
G279902N	**649134**	**KRN**
G279903N	**649134**	**KRN**
G279904N	**649134**	**KRN**
G279906N	**649134**	**KRN**
G279907N	**649134**	**KRN**
G279908N	**649134**	**KRN**
G279910N	**649134**	**KRN**
G279911N	**649134**	**KRN**
G279915N	**649134**	**KRN**
G279916N	**649134**	**KRN**
G279917N	**649134**	**KRN**
G279918N	**649134**	**KRN**
G279922N	**649134**	**KRN**
G289901N	**649134**	**KRN**
G289902N	**649134**	**KRN**
G289905N	**649134**	**KRN**
G289906N	**649134**	**KRN**
G289907N	**649134**	**KRN**
G289909N	**649134**	**KRN**
G289912N	**649134**	**KRN**
G289917N	**649134**	**KRN**
G289918N	**649134**	**KRN**
G289919N	**649134**	**KRN**
G289920N	**649134**	**KRN**

AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT SERIAL NUMBER, CRANKSHAFT PART NUMBER AND HEAT CODE

G289921N	649134	KRN
G289922N	649134	KRN
G289923N	649134	KRN
G289924N	649134	KRN
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AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT SERIAL NUMBER, CRANKSHAFT PART NUMBER AND HEAT CODE

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AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT SERIAL NUMBER, CRANKSHAFT PART NUMBER AND HEAT CODE

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AFFECTED SERVICE SPARE CRANKSHAFTS (continued)
BY CRANKSHAFT SERIAL NUMBER, CRANKSHAFT PART NUMBER AND HEAT CODE

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A. GENERAL INFORMATION:

Teledyne Continental Motors will provide the following specialized tools and equipment required to perform the procedure detailed in this service bulletin:

MSB 00-5 Tool Kit Contents

1. 1 each-Crankshaft Boring Tool & Adapter
2. 1 each Instructional Video
3. 1 each-Positive Stop Depth Rod
4. 1 each .025 Feeler Gage
5. 1 each-End Mill
6. 2 each-Coring Bit (Rotobroach)
7. 1 each-De-burring Tool (1 spare blade)
8. 20 each-Core Sample Bags and Labels. One crankshaft (2) core samples per bag.

The following supplies must be obtained locally.

1. Zinc Chromate Primer- non aerosol
2. Acid brushes or cotton swabs
3. LPS-1 Spray Lubricant- non-silicon/non-Teflon based.
4. Dye Check Kit
5. Dial Type Torque Wrench; 0-200 inch lbs.
6. Spark plug gaskets.
7. Propeller hub O-ring.

WARNING

Do not use silicon or Teflon based coolants or lubricants during any part of this procedure. Silicon and/or Teflon based products will affect the reliability of the dye check procedure.

B. PRE-CORING PROCEDURE:

Verify that engine model and serial number, or replacement crankshaft serial number, is listed as affected by this service bulletin.

Service spare crankshafts affected by this service bulletin which have not been installed in an engine must be inspected prior to being installed.

Affected engines installed in aircraft must be inspected within the next 10 hours of operation. For engines installed in aircraft proceed as follows.

In accordance with the aircraft manufacturer's maintenance manual:

1. Remove engine cowling to gain access to the upper spark plugs and propeller mounting hardware. Remove upper spark plug ignition leads and spark plugs.
2. Remove propeller spinner, spinner bulkhead and propeller. If the aircraft is equipped with propeller de-ice or anti-ice, follow the aircraft manufacturer's instructions for removal of this equipment, if required for propeller removal.
3. Using a clean shop towel, clean the propeller flange.
4. Record engine model and serial number, crankshaft serial number and total engine time on shop repair work order and on the labels provided by TCM.

C. MOUNTING TOOLING:

Before installing the crankshaft boring tool and crankshaft flange adapter, insure that the adapter face and counter bore are clean and free of any debris. Insure that the mounting studs are secure in the propeller flange adapter mounting plate.

1. Plug the crankshaft opening with a clean shop towel to prevent any debris from entering the crankshaft oil transfer area.
2. Using a piece of plastic, fabricate a protective cover for the engine and nacelle area. In the approximate center of the piece of plastic, cut a slit 6 inches long. Slip the crankshaft propeller flange through the slit, drape the upper part of the plastic over the top of the engine and drape

the lower part in such a manner that the plastic protects the lower portion of the engine and the nacelle area.

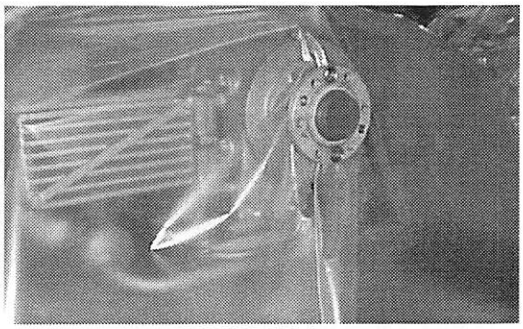

FIGURE 1
PROTECTIVE PLASTIC COVER

3. Place a drip pan under the plastic to catch cooling/lubricating fluid and metal shavings.
4. On the propeller flange, identify, and using a red magic marker, mark the location from which the core samples will be taken. See Figure 2.
5. Locate the two crankshaft flange holes that will be used to mount the adapter and boring tool. See Figure 2.

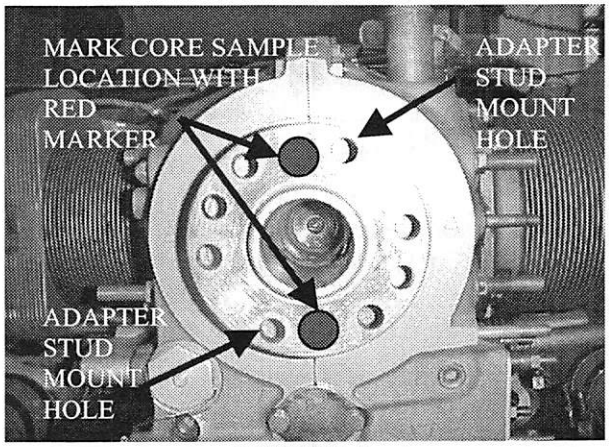

FIGURE 2
FLANGE CORE SAMPLE AREA MARKED

6. Rotate the crankshaft so that the crankshaft flange holes to be used to mount the adapter plate and boring tool (identified in step 4) are positioned so that, when installed, the adapter plate does not contact any portion of the engine surrounding the propeller flange or the aircraft cowling.
7. Position the boring tool propeller flange adapter plate mounting studs to align with selected propeller flange holes and slide the adapter studs through the propeller flange holes. Secure the coring tool flange to the propeller flange with the two nuts provided with the tooling. Tighten nuts to 150 inch lbs.
8. The red mark made on the propeller flange must be visible through the boring tool adapter plate hole. If the red mark is not visible, remove the boring tool from the propeller flange and repeat the above steps 5,6 and 7.

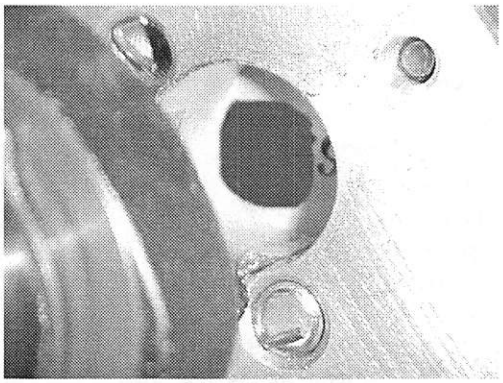

FIGURE 3
VERIFICATION OF CORING SAMPLE LOCATION & TOOL ALIGNMENT

D. REMOVAL OF NITRIDE LAYER:

Removal of the nitride layer from the forward face of the crankshaft flange will require spot facing an area .025 inches deep for each core sample. To remove the nitride layer proceed as follows:

1. With the boring tool and adapter plate correctly positioned and mounted, install the end mill provided with the tool kit into the boring chuck. Insure that the flats machined on the shank of the end mill align with the allen set screw in the chuck. Tighten the set

screws with the allen wrench provided in the tool kit. See FIGURES 4 and 5.

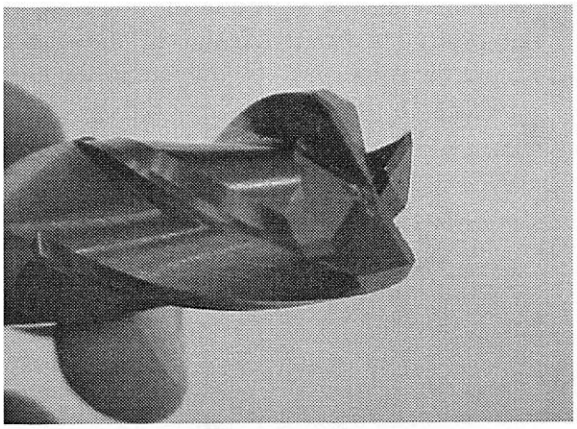

FIGURE 4
END MILL FOR SPOT FACING PROPELLER FLANGE FRONT FACE

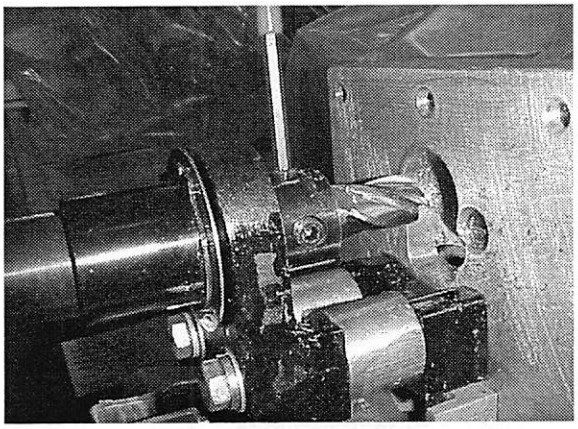

FIGURE 5
INSTALLING END MILL

2. Install a dial type inch pound torque wrench into the square drive on the side of the boring tool. Ensure that the range of motion is sufficient to allow the end mill to contact the work.
3. Install the positive stop rod provided into the holder mounted on the top of the boring tool motor.
4. Advance the end mill toward the front face of the crankshaft flange until the end mill contacts the flange.
5. To set the correct depth of the spot face, position a .025 feeler gage so that it is captured between the mounting adapter surface and the end on the positive stop rod as the rod is moved forward. Lock the positive stop rod in place using the thumb screw or set screw on top of the rod adapter. See Figure 6.

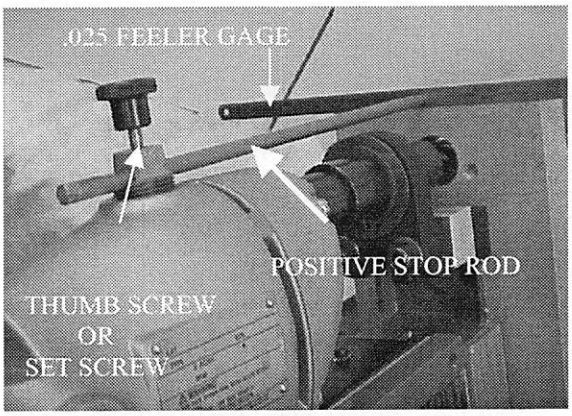

FIGURE 6
POSITIVE STOP ROD SET-UP FOR .025 SPOT FACE

6. Back the end mill away from the front surface of the propeller flange and remove the feeler gage.

CAUTION

Eye protection must be worn during the machining processes. Steel shavings will be made during this procedure.

7. Turn the boring tool on using the switch provided on the tool.
8. Slowly advance the end mill toward the front face of the crankshaft flange by applying pressure to the handle of the dial type torque wrench.
9. **Spray generous amounts of coolant/lubrication (LPS-1) onto the work and end mill during the spot facing operation.**
10. Maintain a constant pressure on the torque wrench during the spot facing operation, but **do not exceed 110 inch lbs.** See Figure 7.

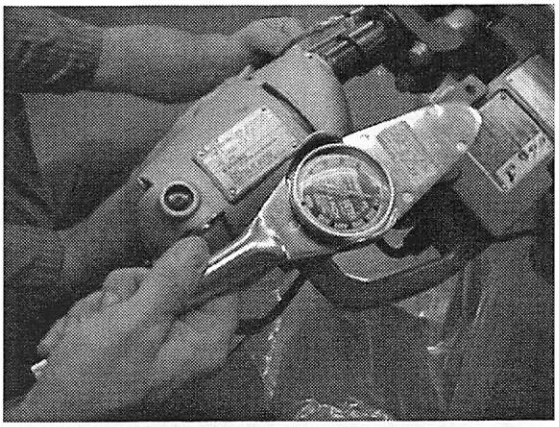

FIGURE 7
USING TORQUE WRENCH TO MAINTAIN CONSISTENT FEED RATE

11. Spot face the front face of the propeller flange until the positive stop rod contacts the adapter plate surface. Additionally, as the nitrided surface is penetrated an audible sound change will occur and the feed rate of the end mill will increase as the end mill cuts into the non-nitrided steel.
12. Back the end mill away from the propeller flange front face and turn OFF the boring tool.
13. Loosen the thumb screw or set screw securing the positive stop rod in place and sliding the rod aft remove it from the holder.
14. Remove the end mill from the boring tool chuck. Clean the machining debris from the boring tool and adapter flange.

E. PROPELLER FLANGE CORING SAMPLE PROCEDURE:

With the boring tool and adapter plate mounted to the propeller flange, proceed as follows:

1. Mount the coring rotobroach into the boring tool chuck. Ensure that the rotobroach is positioned so that a portion of the set screw flat protrudes from the end of the chuck. Secure the rotobroach by tightening the allen set screw in the chuck. See FIGURE 5 and 8.

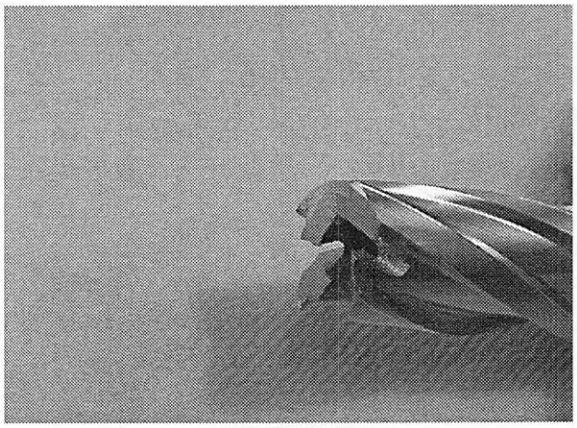

FIGURE 8
ROTOBROACH CORING BIT

2. Ensure that the torque wrench has sufficient travel for the rotobroach to drill through the propeller flange.
3. Turn the boring tool on and advance the rotobroach toward the propeller flange by applying pressure to the handle of the torque wrench. Spray generous amounts of coolant/lubricant (LPS-1) onto the propeller flange and rotobroach as it contacts and bores into the propeller flange.
4. Apply consistent pressure of 100 to 110 inch lbs. to the torque wrench to control boring tool feed rate pressure during the initial stages of the coring operation. **Apply generous amounts of coolant/lubricant (LPS-1) to the work surface and rotobroach throughout the machining operation.** Occasionally back the rotobroach away form the work surface to clear the cutting flutes of machining debris. See Figure 9.

5. As the rotobroach contacts the nitrided back wall of the propeller flange, the feed rate will decrease. It may be necessary to increase the feed rate pressure to 140 to 180 inch lbs. **Do not apply more than 200 inch lbs. of force to the rotobroach. If the rotobroach stops cutting, install new rotobroach and continue coring operation.**

NOTE: Rotobroach will require replacement after coring 2 to 3 crankshafts. Tool life is dependent on maintaining the proper feed rate pressure and providing a continuous and generous flow of lubricant/coolant (LPS-1) during the coring operation.

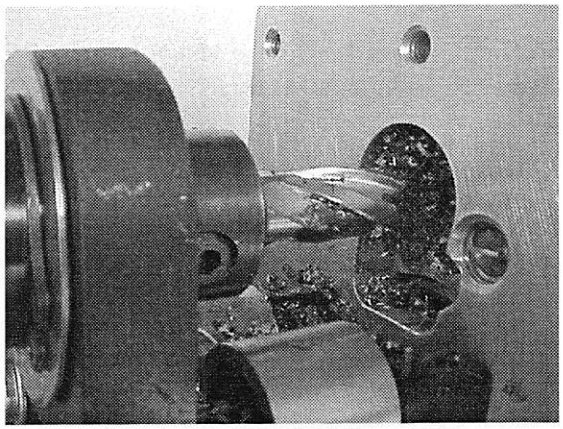

FIGURE 9
ROTOBROACH TAKING CORE SAMPLE

6. Once the rotobroach has cut through the back wall of the propeller flange, release the pressure on the torque wrench and pull the rotobroach out of the machined hole in the propeller flange and clear of the boring tool adapter plate.
7. Loosen the allen set screw and remove the rotobroach and propeller flange core sample from the boring tool chuck.
8. Remove the core sample from the rotobroach and place it in the self sealing plastic bag provided. See Figure 10.
9. Fill out the label on the front of the self-sealing plastic bag in its entirety.
10. Supporting the boring tool and propeller flange adapter plate loosen and remove the two nuts on the aft side of the propeller flange that secured the boring tool and adapter plate to the propeller flange.
11. Remove the boring tool and adapter plate from the propeller flange.

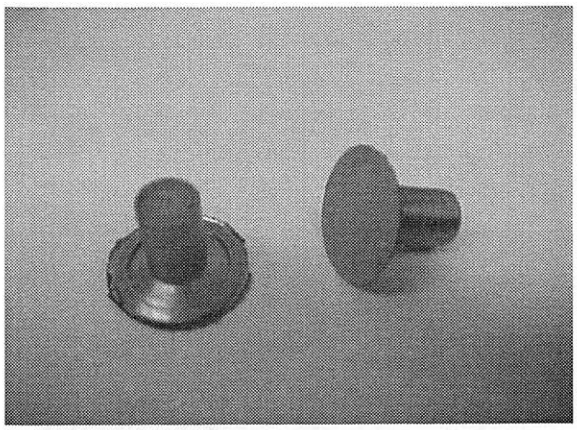

FIGURE 10
PROPELLER FLANGE CORE SAMPLES
(One crankshaft set (2) per sample bag)

12. Clean the machining debris from the boring tool adapter plate and from the propeller flange.
13. Position the boring tool and adapter plate 180 degrees from its previous position to machine the second core sample.
14. Mount and seat the boring tool and adapter plate onto the propeller flange and secure in place by installing the two nuts onto the studs protruding from the back side of the propeller flange.
15. Ensure that the red mark identifying the desired machining area of the propeller flange is visible through the adapter plate boring hole. See FIGURE 3.
16. To obtain the second propeller flange core sample repeat PART D steps 1 through 14 and PART E steps 1 through 12.

F. CLEANING AND CHAMFERING CORE SAMPLE HOLES:

After removing the boring tool and adapter plate from the propeller flange, clean and chamfer the core sample hole as follows:

1. Ensure that the front and aft face of the propeller flange is clean and free of any machining debris.

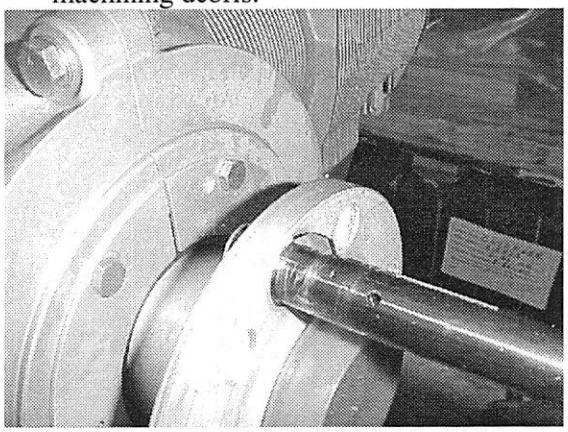

FIGURE 11
CHAMFERING CORE SAMPLE HOLE

NOTE: The chamfering tool has a spring loaded cutting blade. To chamfer the aft side of the core sample hole, apply enough pressure to the chamfering tool to cause the blade to retract sufficiently to allow the tool to pass through the core sample hole.

2. Using the chamfering tool provided in the tool kit, chamfer the core sample hole I.D. on the front and aft faces of the propeller flange. See Figure 11.
3. Apply a light even pressure to the tool during the chamfering process.

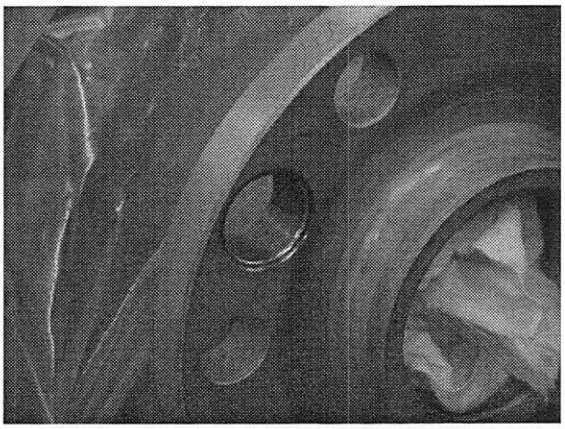

FIGURE 12
CORE SAMPLE HOLE
AFTER CHAMFERING

4. Using 180 crocus cloth or emery paper polish the core sample hole I.D.
5. Clean the core sample holes and propeller flange using a lint free shop towel dampened with Acetone.
6. Measure edge distance of core sample hole to propeller flange O.D. Minimum edge distance is .080 inches. If edge distance is less than .080 inches, contact TCM at 1-334-438-3411 for removal and replacement of crankshaft.

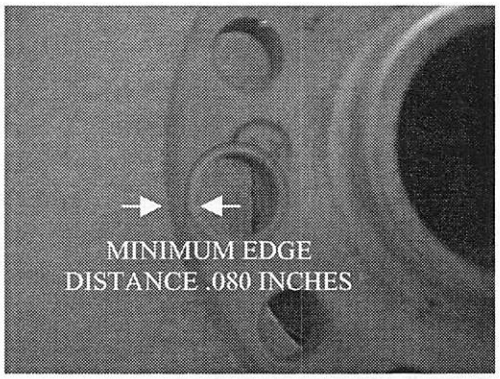

FIGURE 13
CORE SAMPLE HOLE MINIMUM
EDGE DISTANCE

7. Visually inspect core sample holes for sharp edges and burrs. Remove any sharp edges or burrs prior to proceeding. See Figure 12.

G. DYE CHECK OF CORE SAMPLE HOLES:

In accordance with ASTM E 1417 perform a complete Dye Check Inspection of the core sample holes and the adjacent front and aft flange surfaces ¼ inches around the holes.

1. Brush red visible dye check penetrant in the core sample holes and the surrounding area on the front and aft flange faces.
2. Brush red visible dye check penetrant in the core sample holes and the surrounding area on the front and aft flange faces.
3. Allow penetrant to dwell for a minimum of 20 minutes.
4. Clean off residual penetrant with a clean lint free shop towel dampened with penetrant remover.
5. Apply removable dye check developer by spraying a light, uniform coating to cover the core sample hole I.D. and the surrounding area.
6. Allow developer to dwell for 15 minutes.
7. Visually inspect affected area surrounding the core sample holes on the front and aft face of the propeller flange for crack indications. If no crack indications are noted, proceed to Part H.
8. If crack indications are noted, contact Teledyne Continental Motors Service Representative at 1-888-200-7565.

H. PAINTING CORE SAMPLE HOLES:

1. Clean all dye check residue from the core sample holes and surrounding area with penetrant remover or acetone.
2. Using an acid brush or cotton swab, apply zinc chromate primer to core sample holes and chamfered areas on the front and aft faces of propeller flange. Allow the primer to cure completely prior to installation of the propeller. See Figure 14.

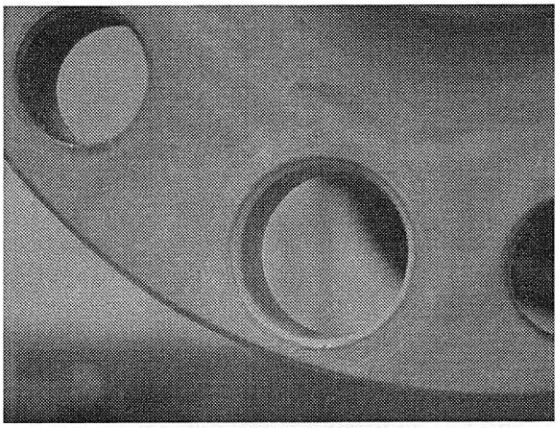

FIGURE 14
CORE SAMPLE HOLE AFTER APPLICATION OF ZINC CHROMATE PRIMER

I. MAILING SAMPLE:

Ensure that the label on the plastic bag containing the core samples is completed in its entirety.

Place plastic core sample bag in an overnight envelope and mail to:

Teledyne Continental Motors

2039 Broad Street

Mobile, Alabama 36615

ATTN: MSB 00-5

J. RETURNING AIRCRAFT AND ENGINE TO SERVICE:

In accordance with the aircraft manufacturer's maintenance manual and Teledyne Continental Motors engine maintenance manual or overhaul manual perform the following:

1. Remove protective plastic covering from around the crankshaft propeller flange and engine.
2. Remove the shop towel or other protective device that was used to protect the interior of

the crankshaft during the sample coring process.

3. Insure that propeller flange is clean and free of any debris that would interfere with correct seating and installation of the aircraft propeller.
4. In accordance with the aircraft manufacturer's maintenance manual install propeller, propeller spinner bulkhead and spinner. Torque attaching hardware to values specified in the aircraft manufacturer's maintenance manual.
5. Install upper sparkplugs using new gaskets and torque to 300 to 360 inch lbs.
6. Install ignition leads and torque "B" nuts to 110-120 inch lbs.
7. Install engine cowling.
8. Perform a complete engine ground run up in accordance with the aircraft manufacturer's maintenance manual.

Teledyne Continental Motors will notify the FBO via Internet e-mail, FAX or telephone upon completing the testing on the core samples. Evaluation of core samples should be completed in 24 to 48 hours after the samples are received by Teledyne Continental Motors.

Engines with crankshaft core samples meeting the acceptance criteria may be returned to service. Teledyne Continental Motors will provide a logbook attachment indicating the core samples from the specified engine are acceptable and that the engine may be returned to service.

Make an engine logbook entry stating compliance with TCM MSB 00-5.

Make an aircraft logbook entry referring to removal and installation of the propeller, propeller spinner and spinner bulkhead to facilitate compliance with TCM MSB 00-5.

K. WARRANTY

The labor and material required to comply with this service bulletin will be covered by Teledyne Continental Motors New, Rebuilt or Gold Medallion Warranty policy as applicable to the affected engine.

Labor hours approved to comply with this service bulletin will not exceed 3 ½ manhours per affected engine.

Reimbursement for compliance with the inspection specified in this service bulletin will be processed using the "Crankshaft Material Inspection Reimbursement Form" on the last page of the service bulletin. To ensure prompt processing of you reimbursement, complete the form in its entirety and attach a copy of the repair work order and customer invoice.

Mail reimbursement form to:

Teledyne Continental Motors

2039 Broad Street

Mobile, Alabama 36615

ATTN: WARRANTY ADMINISTRATION

If crankshaft replacement is required, the following labor allowances will apply:

1. Removing and reinstalling engine.
   Non- turbocharged : 29 manhours
   Tubrocharged: 36 manhours

If field replacement of the crankshaft is authorized by Teledyne Continental Motors, the following labor allowances will apply:

1. Engine disassembly to facilitate crankshaft replacement only and reassembly after replacement crankshaft installation:
   Non-turbocharged: 35 manhours
   Turbocharged: 37 manhours

NOTE: Claims submitted that include labor and material charges not related to crankshaft replacement will be denied and returned to the submitter. Do not separate pistons from

cylinders, Remove cylinder sufficiently to remove the piston pin only. If a varnish layer has formed on the piston pin between the piston pin bosses and the connecting rod bushing, lightly spray the effected area with carburetor cleaner to soften the varnish and aid in piston pin removal. Do not use tools that may damage the aluminum end plugs of the piston pin.

Engine test run after crankshaft replacement:

1. In an engine test cell: 16 man hours
2. In the aircraft: 4 man hours

CONTINENTAL MOTORS

A Teledyne Technologies Company

P.O. BOX 90 MOBILE ALABAMA 36601 334-438-3411

CRANKSHAFT MATERIAL INSPECTION REIMBURSEMENT FORM

For Compliance of MSB 00-5

Attach a copy of the shop work order and invoice to this form. **DATE:**_____

Complete the following information:

ENGINE MODEL: _____

ENGINE SERIAL NUMBER:_____

ENGINE TOTAL TIME: _____

CRANKSHAFT SERAIL NUMBER: _____

AIRCRAFT MODEL: _____ AIRCRAFT REG. NUMBER: _____

OWNER NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

COUNTRY: _____

PHONE: _____ FAX: _____

E-MAIL ADDRESS: _____

AMOUNT of Reimbursement Requested_____.

MAKE REIMBURSEMENT CHECK PAYABLE TO:

OWNER: _____ or FBO: _____

FBO NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

COUNTRY: _____

PHONE: _____ FAX: _____

E-MAIL ADDRESS: _____

MAIL COMPLETED FORM TO:
TELEDYNE CONTINENTAL MOTORS
P.O. BOX 90
MOBILE, AL 36601
ATTN: WARRANTY ADMINISTRATION

TCM USE ONLY

DATE:_____

APPROVED SIGNATURE:_____

AMOUNT:_____

ACCOUNTING VERIFICATION: _____

CHECK NUMBER: _____