

CRITICAL SERVICE BULLETIN

CSB94-15

Compliance Necessary To Maintain Safety

FAA APPROVED

SUBJECT: CRANKCASE STUD INSPECTION

PURPOSE: TCM Quality Control has identified crankcases that had certain .250"-20 stud mounting holes drilled slightly oversize prior to tapping. This can produce a stud thread fit that may allow the crankcase threads to strip when sufficient torque is applied.

The following procedure provides inspection instructions to determine if the .250"-20 tapped holes in the front and rear of the crankcase are oversize. Oversize holes will require the installation of an .007" oversize stud kit in accordance with the instructions set forth in this bulletin.

WARNING

Inadequate stud thread engagement may result in the loss of stud preload (torque), allowing accessories and/or related components to become loose. Such conditions could result in loss of engine oil and/or engine failure.

COMPLIANCE: Within the next 25 hours of operation or six months from the date of issuance of this bulletin.

MODELS


AFFECTED: O-470, IO-470, IO-520, IO-550, TSIO-520, TSIO-550, TSIOL-550 and GTSIO-520 model engines listed below and these engine models that contain affected service replacement crankcases.

1. All engines listed below must comply with the instructions set forth in this bulletin.

NEW ENGINE

MODELS	SERIAL NUMBER
O-470-R	446717
IO-470-L	468588
IO-520-BB	578974, 578976 thru 578981.
IO-520-E	556628, 556629.
IO-520-F	579215.
IO-520-K	557546.
IO-550-B	675898 thru 675917, 675957. 682136 thru 682138, 682140 thru 682142, 682153.
IO-550-C	676751 thru 676755, 676761 thru 676768, 676770 thru 676774, 676800 thru 676803, 676875, 676876, 676878.
IO-550-D	680009.
IO-550-E	681026, 681027.


MODELS	SERIAL NUMBER
IO-550-G	679074 thru 679077, 679086.
TSIO-520-BB	526042
TSIO-520-C	501629.
TSIO-520-CE	530161, 530162.
TSIO-520-M	532021 thru 532024,
TSIO-520-NB	521654.
TSIO-520-R	522670, 522671.
TSIO-520-UB	527202, 527204 thru 527208, 527217, 527218.
TSIO-550-B	802053 thru 802056.
TSIOL-550-A	800584 thru 800586.

ISSUED			REVISED			 TELEDYNE CONTINENTAL MOTORS P.O. Box 90 • MOBILE ALABAMA 36601 334-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		1 of 8	
12	02	94						

REBUILT ENGINE

MODELS	SERIAL NUMBER
O-470-J	202183-R
O-470-K	049458-R thru 049462-R.
O-470-L	069790-R, 069791-R, 069797-R.
O-470-R	288195-R, 288196-R, 288200-R, 288201-R, 288204-R, 288206-R thru 288208-R, 288211-R thru 288214-R, 288219-R, 288223-R, 288226-R thru 288230-R, 288235-R thru 288238-R.
O-470-U	286822-R, 286823-R, 286825-R, 286829-R thru 286831-R, 286833-R thru 286839-R, 286844-R thru 286847-R.
IO-470-C	242149-R, 295501-R, 295503-R.
IO-470-E	088747-R.
IO-470-F	089849-R thru 089853-R.
IO-470-K	092942-R, 092943-R.
IO-470-N	096588-R thru 096594-R, 096596-R thru 096598-R.
IO-470-S	109350-R thru 109352-R.
IO-470-V	171084-R, 171087-R, 171088-R, 171091-R, 171092-R, 171094-R thru 171097-R.
IO-520-A	112706-R, 112710-R, 112711-R, 112713-R, 112716-R.
IO-520-B	234764-R.
IO-520-BA	280941-R, 280944-R, 280950-R thru 280955-R, 280957-R thru 280961-R, 280964-R thru 280969-R.
IO-520-BB	285821-R, 285822-R, 285826-R, 285828-R, 285829-R, 285831-R thru 285834-R, 285836-R thru 285838-R, 285840-R thru 285842-R, 285844-R, 285846-R, 285849-R.
IO-520-C	287233-R thru 287235-R, 287239-R thru 287249-R, 287251-R thru 287253-R, 287255-R thru 287258-R, 287260-R thru 287264-R, 287266-R thru 287269-R, 287271-R.

MODELS	SERIAL NUMBER
IO-520-CB	282436-R, 282438-R thru 282445-R, 282447-R thru 282453-R, 282456-R thru 282463-R, 282470-R, 282471-R.
IO-520-D	282992-R, 282999-R, 293002-R thru 293006-R, 293008-R, 293009-R, 293012-R, 293013-R, 293016-R thru 293020-R, 293024-R, 293025-R, 293027-R, 293028-R, 293030-R thru 293036-R, 293038-R thru 293042-R, 293044-R thru 293046-R, 293048-R thru 293059-R, 293062-R.
IO-520-E	215813-R.
IO-520-F	291191-R thru 291193-R, 291195-R thru 291205-R, 291208-R, 291217-R, 291101-R, 291102-R, 291106-R, 291109-R thru 291111-R, 291113-R, 291115-R, 291118-R, 291120-R, 291122-R thru 291125-R, 291128-R, 291133-R, 291134-R, 291136-R, 291137-R, 291139-R, 291141-R, 291146-R thru 291148-R, 291150-R thru 291152-R, 291154-R, 291157-R, 291158-R, 291160-R, 291161-R, 291163-R, 291165-R thru 291167-R, 291169-R thru 291171-R, 291174-R, 291176-R thru 291178-R, 291180-R thru 291184-R, 291186-R thru 291188-R, 291190-R.
IO-520-K	224082-R, 224084-R, 224085-R.
IO-520-L	270478-R, 270479-R, 270482-R, 270484-R, 270485-R, 270487-R, 270488-R, 270490-R, 270493-R, 270495-R thru 270499-R, 294501-R, 294504-R, 294506-R, 294509-R, 294514-R thru 294521-R.
IO-520-M	270872-R, 270873-R, 270876-R, 270880-R thru 270882-R, 270884-R thru 270891-R.
IO-520-MB	277486-R thru 277494-R.
IO-550-A	280363-R thru 280366-R.
IO-550-B	281937-R, 281940-R, 281942-R, 281943-R, 281946-R, 281947-R, 281949-R thru 281966-R, 281968-R thru 281970-R.
IO-550-C	271872-R, 271873-R, 271879-R thru 271882-R, 271884-R thru 271888-R.
IO-550-D	284074-R, 284076-R thru 284082-R, 284084-R thru 284089-R, 284091-R thru 284093-R, 284095-R thru 284098-R.
IO-550-E	283289-R, 283290-R, 283293-R thru 283298-R.
IO-550-F	284591-R thru 284598-R, 284600-R, 284602-R.

ISSUED			REVISED			 TELEDYNE CONTINENTAL MOTORS P.O. Box 90 • MOBILE ALABAMA 36601 334-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		2 of 8	
12	02	94						

REBUILT ENGINES (cont'd)


MODELS	SERIAL NUMBER	MODELS	SERIAL NUMBER
IO-550-L	289031-R thru 289037-R.	TSIO-520-P	278672-R thru 278674-R, 278677-R thru 278680-R.
TSIO-520-AF	245224-R.	TSIO-520-R	269989-R, 269992-R, 269994-R, 269996-R thru 269999-R. 293503-R, 293504-R, 293506-R thru 293511-R, 293513-R thru 293527-R, 293531-R.
TSIO-520-B	176634-R, 176636-R, 176637-R, 176640-R.	TSIO-520-T	239398-R thru 239402-R, 239404-R.
TSIO-520-BB	287529-R thru 287533-R.	TSIO-520-UB	249040-R thru 249042-R.
TSIO-520-BE	273762-R, 273764-R, 273765-R.	TSIO-520-VB	290240-R, 290242-R, 290245-R thru 290248-R, 290250-R thru 290252-R, 290254-R, 290255-R, 290257-R, 290260-R thru 290265-R, 290267-R.
TSIO-520-C	178418-R thru 178429-R.	TSIO-520-WB	274286-R thru 274291-R, 274293-R, 274294-R.
TSIO-520-CE	268548-R, 268550-R thru 268552-R.	GTSIO-520-D	219460-R.
TSIO-520-D	180115-R.	GTSIO-520-H	267313-R, 267314-R, 267317-R, 267320-R.
TSIO-520-DB	242012-R.	GTSIO-520-L	292009-R, 292019-R, 292022-R thru 292024-R.
TSIO-520-E	275325-R, 275327-R, 275328-R, 275331-R thru 275334-R, 275336-R, 275337-R.	GTSIO-520-M	276380-R thru 276385-R, 276388-R thru 276390-R, 276392-R, 276415-R.
TSIO-520-EB	271284-R thru 271286-R.	GTSIO-520-N	277171-R thru 277174-R, 277176-R, 277177-R.
TSIO-520-G	216045-R.		
TSIO-520-H	217306-R, 217310-R, 217312-R thru 217314-R, 217316-R.		
TSIO-520-J	218963-R, 218964-R.		
TSIO-520-LB	237280-R.		
TSIO-520-M	291536-R, 291537-R, 291540-R thru 291542-R, 291545-R, 291547-R, 291548-R, 291550-R thru 291553-R, 291555-R thru 291564-R, 291566-R, 291567-R, 291570-R 291575-R, 291578-R.		
TSIO-520-N	228612-R thru 228614-R.		
TSIO-520-NB	290647-R, 290649-R thru 290652-R, 290655-R, 290657-R thru 290665-R, 290670-R.		

- All affected part number and serial number service replacement crankcases listed below must comply with the instructions set forth in this bulletin. These crankcases were manufactured between February 1, 1994 and June 30, 1994.

CRANKCASE

PART NUMBER	SERIAL NUMBER
652538-4, 652538-4A1, 652539-1, 652539-1A1, 652539-2A1, 652539-5, 652540-1, 652540-1A1, 652540-2, 652540-2A1, 652559, 652559A1, 652654	B019401XXX thru F309401XXX.

The letter suffixes (as indicated by XXX above) following the serial numbers are insignificant in determining affectivity. Use the letter prefix and subsequent numerals to determine crankcase effectivity.

ISSUED			REVISED			 TELEDYNE CONTINENTAL MOTORS P.O. Box 90 • MOBILE ALABAMA 36601 334-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		3 of 8	
12	02	94						

INSPECTION AND REWORK INSTRUCTIONS

1. Open or remove the cowling necessary to gain access to the rear of the engine.
2. Remove the two sets of nuts and washers from the idler gear support pin studs. These studs are positioned on the rear (accessory section) of the crankcase, just below the left and right accessory drives. See Figure 1. DO NOT remove the idler gear support pin.
3. Measure the stud height extending out of the crankcase and record. Using a suitable stud remover or double nuts, remove the two .250" studs.
4. Check these tapped holes in the crankcase to determine if they are oversize by using a #3 (.2130) drill bit. See Figure 2. This will be accomplished by first measuring the shank of the drill bit with a calibrated micrometer. The diameter of the shank must measure .210" - .212". Insert the shank end of the drill bit into the tapped .250"-20 hole. The shank should not extend into the tapped portion of the hole. If it does not, reinstall the two studs to the recorded height using Loctite Primer "N" and 271 Stud Lock. Allow at least 30 minutes for the Loctite to cure prior to the installation of the idler gear pin attaching hardware. Torque nuts to 90 - 110 inch pounds. Make a log book entry as to compliance with this service bulletin as no further action is required. If the shank of the drill bit extends into the tapped portion of the hole, proceed as follows.
5. Refer to Table 1 and order the appropriate stud kit. Aircraft owner/FBO information must be provided to the TCM Distributor at the time the order is placed for tracking and warranty purposes. The TCM Distributor will forward this information to TCM. This information must include aircraft registration and serial number, make and model. Engine model and serial number(s), owner and FBO name, address and fax/phone number.
6. Remove the engine from the aircraft in accordance with the applicable airframe manufacturer's service manual. This is necessary so that the oil pump can be removed and the .250"-20 through studs in the crankcase can be replaced with oversize studs.
7. Remove the starter, starter adapter assembly (as necessary to remove oil pump) and oil pump and discard the gaskets. Remove the cam cover plate and prop reduction gear cover (GTSIO-520 models only) located on the front of the crankcase, below the crankshaft and discard gaskets. DO NOT remove the idler gear support pin.
8. Measure all of the .250" stud extension heights and record their locations. See Figure 1. This is necessary for proper installation of the replacement studs. Remove all .250"-28 studs from the front and rear of the crankcase using an appropriate stud removal tool and record their lengths as they are removed so that the same length stud is installed in the same location. Discard the old studs.
9. Add a small amount of clean grease to the 1/4-20 GH7 tap (supplied in the stud kit) to prevent aluminum material generated during tapping from entering the engine. Run the 1/4-20 GH7 tap into and then out of each .250" stud hole location (except the idler gear pin stud holes) indicated in Figure 1. Thoroughly clean grease and debris from the stud holes by saturating a clean cloth with Loctite Primer "N" and cleaning each hole until threads are clean. Final cleaning and preparation of the threads is accomplished by spraying a light film of Loctite Primer "N" into the stud holes.
10. Using the studs contained in the appropriate kit listed in Table 1, apply a line of Loctite 271 along the .250"-20 threads of the studs. These studs are .007 oversize and are identified by being blue in color and a "L" shaped stamp on the .250"-28 end. See


ISSUED			REVISED			 TELEDYNE CONTINENTAL MOTORS P.O. Box 90 • MOBILE ALABAMA 36601 334-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		4 of 8	
12	02	94						

Figure 3. Use a .250"-28 stud driver and install the appropriate length studs in their proper locations, to the recorded extension heights. Allow at least 30 minutes for the Loctite to cure prior to component installation. Stamp the letters "OS" on each side of the crankcase split line using a 1/8" metal stamp. See Figure 1 for approximate location.

11. Install the oil pump, prop reduction gear cover, (GTSIO-520 models only) and cam cover using new gaskets and attaching hardware. Torque .250"-28 nuts to 90 - 110 inch pounds. Install the remaining components that were removed and torque to the proper values.
12. Install the engine in accordance with the airframe manufacturer's service manual. Run the engine to check for oil leaks. Repair any leaks prior to flight.
13. Perform normal pre-flight inspections and engine instrument parameter checks, in accordance with the aircraft manufacturer's pilot's operating handbook, in preparation for flight. Fly the aircraft for one hour.
14. While the engine is warm from flight, drain the engine oil and remove the oil filter or screen. Examine the contents of the filter/screen. Residual material (aluminum) that may not have been completely removed after the tapping operation will be contained in the filter/screen.
15. Remove, inspect and replace/clean the oil filter/screen within the next 5 hours of engine operation. If the filter/screen is free of material, then resume normal oil and filter change intervals. If the filter/screen continues to contain metal particles, contact TCM Service Department at (205) 438-3411.
16. Make a log book entry as to compliance with this service bulletin.

TABLE 1 - KIT PART NUMBER TO ENGINE GUIDE

Determine which kit is appropriate for your engine model as listed in Table 1. This is accomplished by noting the engine model and specification number on the engine data plate. Example: IO-520-D35. (IO-520-D = Engine Model, 35 = Specification Number). Engine models listed below without specification numbers are considered to cover all model specifications unless noted otherwise. Review Table 1 carefully to insure that you order the appropriate kit for your specific engine model.

PART NUMBER	ENGINE MODEL
EQ6649	IO-520-B,-BA,-BB,-C,-CB,-M,-MB. IO-550-A,-B,-C,-G. TSIO-520-B,-BB,-BE,-D,-DB,-E,-EB,-J,-JB,-K,-KB,-L,-LB, N,-NB,-UB,-VB,-WB. TSIO-550-A,-B,-C. TSIOL-550-A.
EQ6650	All GTSIO-520 Model Engines.
EQ6651	O-470-G,-J,-L,-M,-R,-S,-U. IO-470-C,-D,-E,-F,-J,-K,-L,-M,-N,-S,-V,-U.
EQ6652	O-470-U12,25,29,33,36,40. IO-520-A,-D,-E,-F,-J,-K,-L. IO-550-D,-F,-L. TSIO-520-AE,-AF,-C,-CE,-G,-H,-M,-P,-R,-T. LTSIO-520-AE.


ISSUED			REVISED			 TELEDYNE CONTINENTAL MOTORS P.O. Box 90 • MOBILE ALABAMA 36601 334-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		5 of 8	
12	02	94						

TABLE 2 - STUD KIT CONTENTS

The kits listed in Table 2 will, in most cases, contain more studs and gaskets than are necessary to comply with the instructions set forth in this bulletin. This was necessary to consolidate a large number of crankcase studding differences into a smaller number of kits. Make certain that the studs removed are replaced with studs of the same length and the proper gaskets are used.


QTY	PART NUMBER	DESCRIPTION
1	EQ6649	Stud Kit, <i>(includes the following)</i>
1	401968P007	.Stud, 4.53"
5	401936P007	.Stud, 3.88"
1	401962P007	.Stud, 2.19"
2	401801P007	.Stud, 1.19"
2	401804P007	.Stud, 1.06"
2	401963P007	.Stud, 1.00"
1	649949	.Gasket, oil pump
1	653415	Gasket, cam cover
1	1/4-20 GH7	.Bottom Tap
1	EQ6650	Stud Kit, <i>(includes the following)</i>
1	402165P007	.Stud, 6.91"
6	402161P007	.Stud, 6.81"
2	402129P007	.Stud, 2.75"
1	401852P007	.Stud, 1.41"
6	401804P007	.Stud, 1.06"
2	401963P007	.Stud, 1.00"
1	649969	.Gasket, oil pump
1	653415	.Gasket, cam cover
1	653388	.Gasket, reduction gear cover
1	1/4-20 GH7	.Bottom Tap

QTY	PART NUMBER	DESCRIPTION
1	EQ6651	Stud Kit, <i>(includes the following)</i>
5	402056P007	.Stud, 3.56"
2	401886P007	.Stud, 3.19"
4	401832P007	.Stud, 2.81"
3	402129P007	.Stud, 2.75"
1	401852P007	.Stud, 1.41"
2	401870P007	.Stud, 1.12"
1	649969	.Gasket, oil pump with screen housing
1	653387	.Gasket, oil pump with integral filter adapter
1	1/4-20 GH7	.Bottom Tap
1	EQ6652	Stud Kit, <i>(includes the following)</i>
3	402157P007	.Stud, 6.10"
5	402158P007	.Stud, 4.40"
2	402159P007	.Stud, 4.10"
4	401832P007	.Stud, 2.81"
2	402129P007	.Stud, 2.75"
1	401841P007	.Stud, 2.09" - 2.12"
1	401852P007	.Stud, 1.41"
2	401870P007	.Stud, 1.12"
1	649969	.Gasket, oil pump with screen housing
1	653387	.Gasket, oil pump with integral filter adapter
1	1/4-20 GH7	.Bottom Tap

Warranty action required to comply with this bulletin is covered by the Gold Medallion Warranty, subject to its terms and conditions. Warranty claims may be filed through any TCM Distributor.

MAN-HOURS REQUIRED:

Inspection only 2 Hours per engine, maximum.
 Stud replacement Average time 39 hours. However, most
 (includes engine removal) installations will require less time

ISSUED			REVISED			 TELEDYNE CONTINENTAL MOTORS P.O. Box 90 • MOBILE ALABAMA 36601 334-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		6 of 8	
12	02	94						

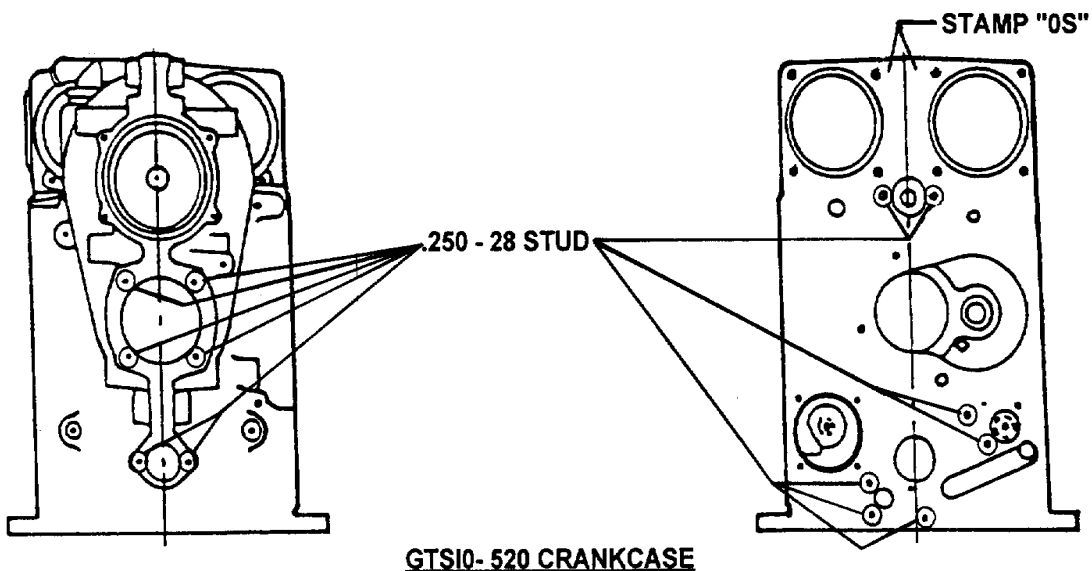
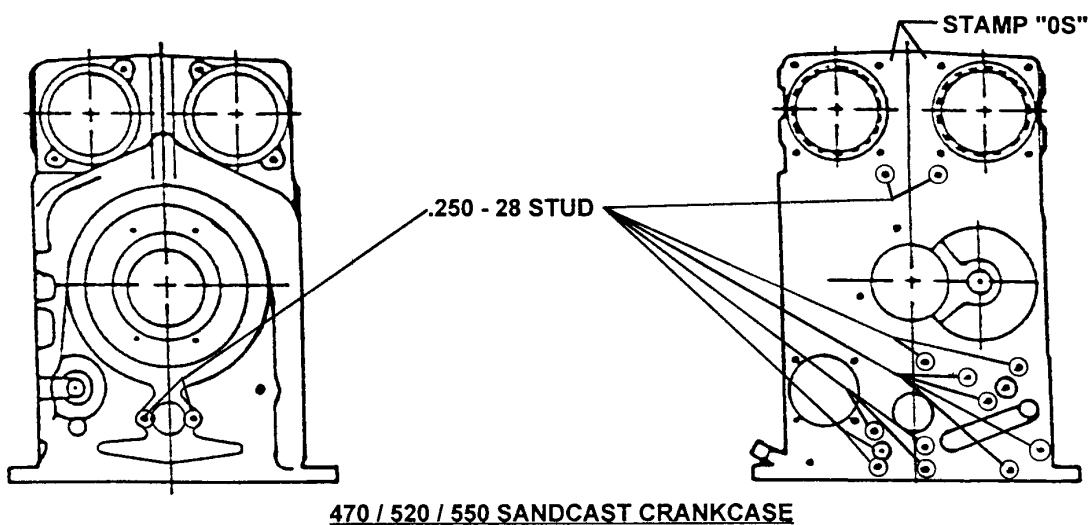
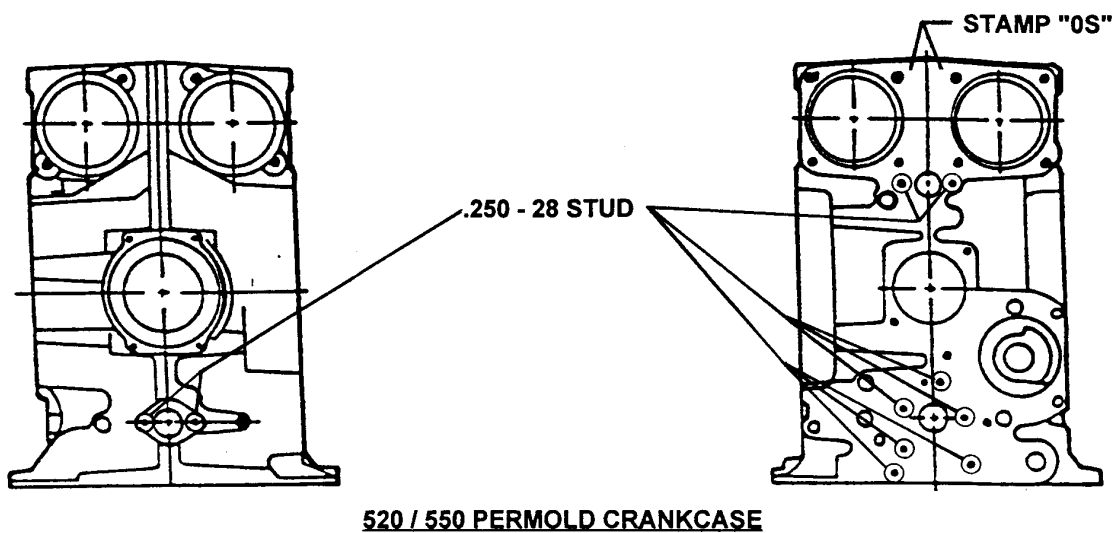



FIGURE 1 .250 - 28 STUD LOCATIONS

ISSUED			REVISED			 TELEDYNE CONTINENTAL MOTORS P.O. Box 90 • MOBILE ALABAMA 36601 334-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		7 of 8	
12	02	94						

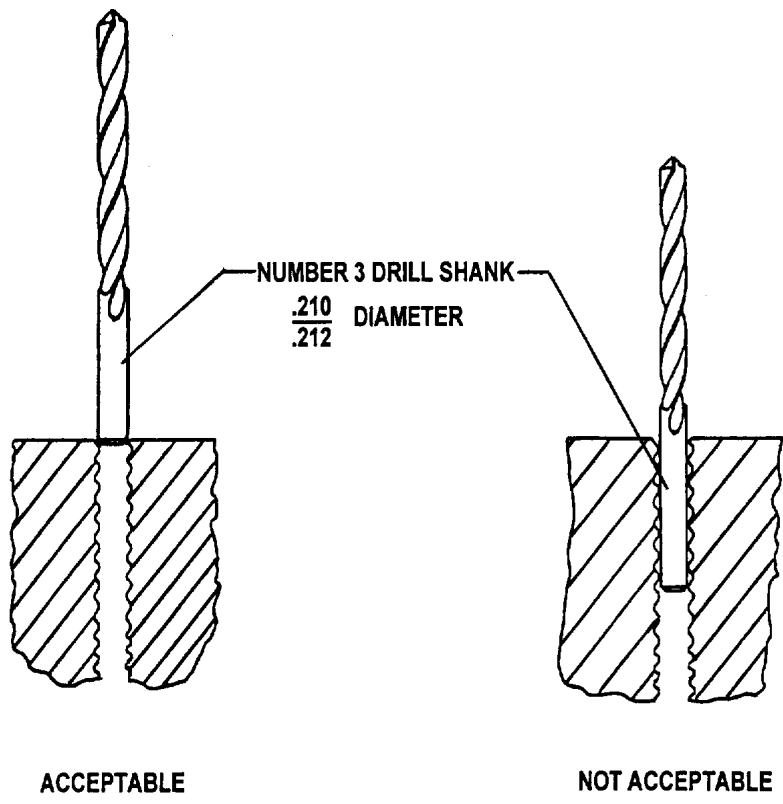


FIGURE 2 INSPECTING .250 - 20 TAPPED HOLES

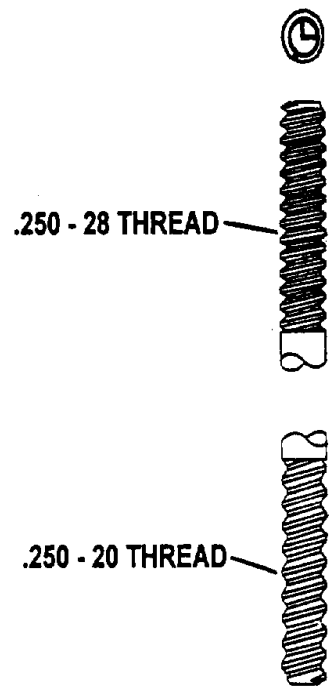



FIGURE 3 OVERSIZE STUD IDENTIFICATION

ISSUED			REVISED			 TELEDYNE CONTINENTAL MOTORS P.O. Box 90 • MOBILE ALABAMA 36601 334-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		8 of 8	
12	02	94						