

**98-17-11 TEXTRON LYCOMING AND TELEDYNE CONTINENTAL**

**MOTORS:** Amendment 39-10713. Docket 98-ANE-27-AD.

Textron Lycoming (LYC) O-235, O-235-C1, O-235-C2C, O-235-L2C, O-235-N2C, O-290, O-290-D2, O-320, O-320-A, O-320-A1A, O-320-A2B, O-320-B2B, O-320-B2C, O-320-D2J, O-320-D3G, O-320-E2A, O-320-E2D, O-320-E2G, O-320-E3D, O-320-H2AD, O-360, O-360-A1A, O-360-A1D, O-360-A3A, O-360-A4A, O-360-A4K, O-360-B1B, IO-360-F1A6, AEIO-320-E1B, HIO-360-C1A, IO-320, IO-320-B1A, IO-360, IO-360-A1A, IO-360-A1B6, IO-360-B1E, IO-360-C, IO-360-C1C, IO-360-C1C6, IO-360-C1D6, IO-360-D, O-540-A1B5, O-540-A1D5, O-540-R2AD, IO-540, IO-540-C4B5, IO-540-S1A5, TIO-540-A2, LIO-320-C1A, LIO-360-C1E6, and IO-720 reciprocating engines; and Teledyne Continental Motors (TCM) A-65, A65-3, A65-8, A75, A75-8, C75-12, C85, C85-8, C85-12, C90-8FJ, C90-12, O-200, O-200-A, O-300, O-300-D, IO-360-C, E-185-4, E-225-8, O-470, O-470-K, O-470-L, O-470-R, O-470-11, IO-470, IO-470-N, IO-470-S, IO-520, IO-520-D, GTSIO-520, and TSIO-520-VB reciprocating engines, with installed crankshafts repaired by Nelson Balancing Service, Bedford, Massachusetts, Repair Station Certificate No. NB7R820J, between February 1, 1995, and December 31, 1997, inclusive, as listed (by work order (W/O)) in Table 1 of this AD.

Table 1

ENGINE AND MODEL	W/O	DATE	ENGINE SER #	ENGINE AND MODEL	W/O	DATE	ENGINE SER #
<b>LYC:</b>				<b>LYC:</b>			
AEIO-320-E1B	1134	02/17/96	L-5653-55A	HIO-360-C1A	1155	02/07/96	L-12126-51A
IO-320	1141	01/17/96		IO-320-B1A	1525	11/14/97	
IO-360	1314	12/17/96		IO-360	IN6137	08/07/97	
IO-360-A1A	1230	06/10/96	L-474-51	IO-360-A1A	1289	10/23/96	L-4085-5174
IO-360-A1A	1415 b	05/23/97	RL-3920-51A	IO-360-A1B6	1463	07/31/97	
IO-360-B1E	1312	12/12/96	L-4453-51A	IO-360-C	1146	01/23/96	R-51448-9-C
IO-360-C1C	1336	02/10/97		IO-360-C1C	1518	12/09/97	
IO-360-C1C6	1530	11/25/97		IO-360-C1C6	1537	12/09/97	L-19294-51A

IO-360-C1D6	1286	04/28/97		IO-360-D	1540	12/02/97	
IO-360-F1A6	1176	03/07/96	L-27423-36A	IO-540	1014	02/08/95	
IO-540	1056	06/13/95		IO-540	1302	12/05/96	
IO-540-C4B5	1313	12/17/96	L-19547-48	IO-540-S1A5	1513	10/27/97	L-19597-48A
IYO-435-G1A	1271	10/01/96		LIO-320-C1A	1158	02/08/96	
LIO-360-C1E6	1280	10/07/96		LIO-360-C1E6	1281	10/09/96	
O-235	1013	02/21/95		O-235	1051	06/02/95	
O-235	1054	06/09/95		O-235	1057	06/14/95	L-9041-15
O-235	1058	06/29/95		O-235	1060	06/30/95	
O-235	1069	08/10/95		O-235	1110	02/20/96	
O-235	1145	01/23/96		O-235	1151	01/25/96	
O-235	1160	02/09/96	RL-24636-15	O-235	1305	12/05/96	L-22542-15
O-235	1329	02/11/97		O-235	1332	02/11/97	
O-235	1481	09/02/97		O-235-C1	1089	10/08/95	L-6475-15
O-235-C1	1188	04/02/96	L-7143-15	O-235-C1	1335	03/12/97	L-5569-15
O-235-C1	1367	03/24/97		O-235-C2C	1019	02/24/95	L-12284-15
O-235-C2C	1040	05/08/95		O-235-C2C	1105	12/01/95	L-12273-15
O-235-L2C	1030	04/06/95	L-14545-15	O-235-L2C	1036	04/24/95	
O-235-L2C	1037	04/24/95	L-23012-15	O-235-L2C	1050	06/02/95	L-15542-15
O-235-L2C	1062	07/05/95	L-18306-15	O-235-L2C	1067	08/08/95	
O-235-L2C	1070	08/10/95	L-16005-15	O-235-L2C	1095	11/14/95	RL-023227-15
O-235-L2C	1101	11/04/95	L-15300-15	O-235-L2C	1102	11/15/95	L-20183-15
O-235-L2C	1162	02/14/96	L-16114-15	O-235-L2C	1251	08/22/96	

O-235-L2C	1219	05/16/96	L-21215-15	O-235-L2C	1365	03/24/97	
O-235-L2C	1285	10/19/96		O-235-L2C	1414	08/05/97	
O-235-L2C	1400	04/28/97		O-235-L2C	1433	06/26/97	L-17074-15
O-235-L2C	1417	12/05/97		O-235-L2C	1504	10/31/97	
O-235-L2C	1435	06/09/97		O-235-L2C	1524	11/12/97	
O-235-L2C	1508	11/18/97		O-235-L2C	2010	11/19/97	
O-235-L2C	1536	11/24/97		O-290	1257	09/04/96	
O-235-N2C	1511	10/29/97	L-23857-15	O-290-D2	1082	09/26/95	L-6019-21
O-290	1326	03/26/97		O-320	1024	03/17/95	
O-320	1018	02/22/95					
O-320	1038	05/03/95	L-39272-27A	O-320	1045	05/24/95	
O-320	1084	09/28/95		O-320	1116	01/08/96	
O-320	1125	01/08/96		O-320	1169	02/28/96	
O-320	1175	03/07/96		O-320	1184	03/28/96	
O-320	1189	08/27/96		O-320	1202	04/30/96	
O-320	1212	05/10/96		O-320	1283	10/17/96	
O-320	1316	12/21/96		O-320	1340	02/25/97	L-24367
O-320	1347	02/18/97		O-320	1360	03/10/97	
O-320	1361	03/10/97		O-320	1436	05/29/97	
O-320	1468	08/14/97		O-320	1474	08/22/97	L-13130-39A
O-320	1477	09/13/97		O-320	1519	11/21/97	
O-320	1507	11/18/97		O-320	1171	03/01/96	
O-320	1546	12/07/97		O-320-A	1194	04/13/96	
O-320-A	1192	04/13/96		O-320-A1A	1244	08/13/96	L-5270-27
O-320-A	1196	04/13/96		O-320-A2B	1461	09/09/97	L-12626-27
O-320-A2B	1081	09/22/95		O-320-B2C	1315	12/17/96	

O-320-B2B	1452	07/10/97	L-2977-39	O-320-D2J	1173	03/07/96	L-123412-39A
O-320-D2J	1172	03/04/96	L-13039-39A	O-320-D2J	1534	11/25/97	
O-320-D2J	1253	09/04/96		O-320-D3G	1077	09/17/95	
O-320-D2J	1539	12/03/97		O-320-D3G	1354	02/25/97	
O-320-D3G	1114	01/08/96	L-10983-39A	O-320-D3G	1544	12/03/97	
O-320-D3G	1370	03/26/97	H45247	O-320-E2A	1191	04/13/96	L-19377-27A
O-320-E2A	1103	11/10/95	L-26363-27A	O-320-E2A	1439	06/09/97	L-38003-55A
O-320-E2A	1317	12/21/96	L-15219-27A	O-320-E2D	1078	09/17/95	
O-320-E2D	1068	08/10/95	L-35528-27A	O-320-E2D	1181	03/14/96	
O-320-E2D	1177	03/09/96	L-44732-27A	O-320-E2D	1245	08/13/96	L-40483-27A
O-320-E2D	1241	08/09/96	L-42691-27A	O-320-E2D	1343	02/17/97	
O-320-E2D	1260	09/09/96	L-15300-15	O-320-E2D	1385	04/16/97	
O-320-E2D	1346	03/02/97	L-44320-27A	O-320-E2D	1533	11/25/97	
O-320-E2D	1458	07/18/97		O-320-E2G	1338	03/10/97	L-38264-27A
O-320-E2D	1549	12/12/97		O-320-E3D	1074	08/24/95	L-29495-27A
O-320-E3D	1034	04/18/95	L-29668-27A	O-320-E3D	1444	06/13/97	
O-320-E3D	1431	06/09/97	L-33770-27A	O-320-H2AD	1322	01/22/97	L-1530-78T
O-320-E3D	1500	10/07/97	L-33841-27A	O-360	1157	02/07/96	
O-360	1025	03/17/95		O-360	1362	03/10/97	
O-360	1199	04/18/96		O-360	1394	05/06/97	

O-360	1386	04/17/97		O-360- A1A	1170	02/28/96	L-20677- 36A
O-360	1528	11/19/97		O-360- A1A	1239	08/05/96	
O-360- A1A	1214	05/14/96	L-20190- 36A	O-360- A3A	1531	11/25/97	
O-360- A1D	1411	05/05/97		O-360- A4A	1464	07/30/97	L-24796- 36A
O-360- A4A	1270	09/27/96	L-14008- 36A	O-360- A4A	1529	11/25/97	
O-360- A4A	1486	09/06/97		O-360- B1B	1262	09/09/96	L-5261- 51A
O-360- A4K	1166	02/22/96	L-26455- 36A	O-540- A1B5	1132	01/09/96	L-1165- 40
O-540- A1B5	1129	12/29/95		IO-720	1510	10/26/97	
O-540- A1D5	1462	07/28/97	L-5661- 40	TIO-540- A2	1111	01/10/96	
TIO-540- A2	1064	07/13/95		TIO-540- R2AD	1106	11/27/95	L-5949- 61A
<b>TCM:</b>				<b>TCM:</b>			
A-65	1152	01/25/96		A-65	1154	02/07/96	7187
A-65	1183	02/22/96		A-65	1185	03/28/96	
A-65	1233	06/23/96		A-65	1290	10/29/96	
A-65	1296	11/14/96	4933868	A-65	1299	11/19/96	
A-65	1325	03/26/97		A-65	1326	03/26/97	
A-65	1376	04/29/97		A-65	1438	06/17/97	5890178
A-65-3	1243	08/13/96	324993	A-65-8	1541	12/02/97	
A-65-8	1276	10/05/96	5762568	A75	1156	02/07/96	5321868
A75	1255	09/03/96		A75	1256	09/04/96	
A75-8	1275	10/05/96	5162868	C75-12F	1293	11/04/96	3316-6- 12
C85	1088	10/04/95		C85	1092	10/18/95	
C-85	1198	04/17/96	29652-7- 8	C-85	1297	11/14/96	
C-85	1352	03/10/97		C-85	1381	04/28/97	
C-85	1391	4/19/97		C-85	1392	04/19/97	
C-85	1484	09/04/97	28487-6- 12	C-85-8FJ	1139	01/17/96	29845-7- 8
C-85-8FJ	1420	05/12/97	29465-7- 8	C-85-12	1031	04/06/95	

C85-12	1182	03/18/96	21596-6-12	C-85-12	1217	05/15/96	
C85-12	1265	09/12/96	14657	C-85-12	1298	11/14/96	23610-6-12
C-90-8F	1471	09/06/97	42838-1-8	C-90-12	1279	10/07/96	44747-6-12
E-185-4	1124	01/16/96	25700D-1-9	E-225-8	1505	10/28/97	35477-D-9-8-P
GTSIO-520	1208	05/07/96	210114-70H	IO-360-C	1126	12/28/95	F-51439-9-C
IO-470	1028	03/23/95	87329-R	IO-470-N	1421	05/13/97	95271-1-N
IO-470-S	1331	03/11/97	102412-2-S-I	IO-520	1174	03/04/96	
IO-520-D	1167	02/22/96		O-200	1033	04/18/95	
O-200	1043	05/12/95		O-200	1049	06/02/95	
O-200	1076	09/11/95	214668-27A	O-200	1104	11/21/95	213830-71A
O-200	1131	01/05/96		O-200	1142	01/18/96	265349-R
O-200	1147	01/23/96		O-200	1190	04/13/96	
O-200	1193	04/13/96		O-200	1195	04/13/96	
O-200	1197	04/17/96		O-200	1213	05/13/96	
O-200	1261	09/09/96		O-200	1303	12/05/96	
O-200	1321	02/07/97	28115	O-200	1324	02/06/97	
O-200	1344	03/02/97		O-200	1393	05/05/97	
O-200	1413	05/07/97	61001-5-4	O-200	1430	05/23/97	
O-200	1437	06/17/97	255759A-48	O-200	1488	09/07/97	
O-200	1506	11/18/97		O-200	1522	11/11/97	
O-200-A	1052	06/21/95	254150-A-48	O-200-A	1085	09/29/95	
O-200-A	1120	12/29/95	253971	O-200-A	1161	02/09/96	24R-469
O-200-A	1215	05/15/96		O-200-A	1240	08/05/96	69589-8-A
O-200-A	1254	09/03/96	6105-71-A-R	O-200-A	1264	09/12/96	
O-200-A	1356	03/10/97		O-300	1027	03/20/95	

O-300	1042	05/12/95	34012-D-6-D	O-300	1083	09/26/95	
O-300	1096	10/23/95	464481	O-300	1137	01/17/96	
O-300	1259	09/04/96		O-300	1387	04/22/97	
O-300	1397	04/26/97	5928-9A	O-300	1403	04/28/97	
O-300	1423	06/09/97	3834D8Z	O-300	1555	01/13/98	
O-300-A	1446	06/27/97		O-300-D	1022	03/17/95	35110-D-6-D
O-300-D	1079	09/17/95	24276-D-0-D	O-300-D	1487	09/06/97	
O-300-D	1543	12/03/97		O-470	1046	06/01/95	
O-470	1383	04/04/97		O-470-11	1017	02/22/95	
O-470-11	1491	10/19/97		O-470-11	1492	10/19/97	
O-470-11	1493	10/19/97		O-470-11	1494	10/19/97	
O-470-F	1236	07/25/96	76956-4-F	O-470-K	1087	10/03/95	47172-6-K
O-470-L	1128	01/10/96	68681-8-L	O-470-L	1359	05/19/97	68245-8-L
O-470-L	1399	04/28/97		O-470-R	1016	02/10/95	133087-6-R
O-470-R	1086	10/03/95		O-470-R	1165	02/22/96	
O-470-R	1178	03/10/96		O-470-R	1201	06/02/96	83164-1-R
O-470-R	1319	01/06/97	459408	TSIO-520-VB	1055	06/09/95	

**Note 1:** Blank spaces indicate unknown data. Where the engine serial number is blank in this table, it is either unknown or the crankshaft may not be installed in an engine.

**Note 2:** This airworthiness directive (AD) applies to each engine identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For engines that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (c) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as indicated, unless accomplished previously.

To prevent crankshaft failure due to cracking, which could result in an inflight

engine failure and possible forced landing, accomplish the following:

(a) Within 10 hours time in service after the effective date of this AD, determine if this AD applies, as follows:

(1) Determine if any repair was conducted on the engine that required crankshaft removal during the February 1, 1995, to December 31, 1997, time frame; if the engine was not disassembled for crankshaft removal and repair in this time frame, no further action is required.

(2) If the engine and crankshaft was repaired during this time frame, determine from the maintenance records (engine log book), and Table 1 of this AD if the crankshaft was repaired by Nelson Balancing Service, Repair Station Certificate No. NB7R820J, Bedford, Massachusetts. The maintenance records should contain the Return to Service (Yellow) tag for the crankshaft that will identify the company performing the repair. Also the work order number contained in Table 1 of this AD was etched on the crankshaft propeller flange, adjacent to the closest connecting rod journal. Because some etched numbers will be difficult to see, if necessary, use a 10X magnifying glass with an appropriate light source to view the work order number. In addition, the propeller spinner, if installed, will have to be removed in order to see this number.

(3) A person with a private pilot or higher rated certificate may make the determination of applicability of this AD provided the propeller spinner does not have to be removed.

(4) If it cannot be determined who repaired the crankshaft, compliance with this AD is required.

(5) If the engine and crankshaft were not repaired during the time frame specified in (a)(1), or if it is determined that the crankshaft was not repaired by Nelson Balancing Service, no further action is required.

(b) Within 10 hours time in service after the effective date of this AD, accomplish the following:

(1) Perform a visual inspection as defined in paragraph (b)(2) of this AD, magnetic particle inspection, and a dimensional check of the crankshaft journals, or remove from service affected crankshafts and replace with serviceable parts.

(2) For the purpose of this AD, a visual inspection of the crankshaft is defined as the inspection of all surfaces of the crankshaft for cracks which include heat check cracking of the nitrided bearing surfaces, cracking in the main or aft fillet of the main bearing journal and crankpin journal, including checking the bearing surfaces for scoring, galling, corrosion, or pitting.

**Note 3:** Further guidance on all inspection and acceptance criteria is contained in applicable TCM or LYC Overhaul or Maintenance Manuals, or other FAA-approved data.

(3) Replace any crankshaft that fails the visual inspection, magnetic particle inspection, or the dimensional check with a serviceable crankshaft, unless the



crankshaft can be reworked to bring it in compliance with:

(i) All the overhaul requirements of the appropriate TCM or LYC Overhaul/Maintenance Manuals; or

(ii) All of the FAA-approved requirements for any repair station which currently has approval for limits other than those in the appropriate TCM or LYC Overhaul/Maintenance Manuals.

(4) For the purpose of this AD, a serviceable crankshaft is one which meets the requirements of paragraph (b)(3)(i) or (b)(3)(ii) of this AD.

**Note 4:** Crankshafts removed from TCM engine models IO-360, IO-520, and TSIO-520 series engines are also subject to compliance with AD 97-26-17.

(c) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, New York (LYC) or Atlanta (TCM) Aircraft Certification Offices. Operators shall submit their requests through an appropriate FAA Airworthiness Inspector, who may add comments and then send it to the Manager, New York or Atlanta Aircraft Certification Offices.

**Note 5:** Information concerning the existence of approved alternative methods of compliance with this airworthiness directive, if any, may be obtained from the Atlanta Aircraft Certification or New York Aircraft Certification Office, as applicable.

(d) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the aircraft to a location where the requirements of this AD can be accomplished.

(e) This amendment becomes effective on October 19, 1998.