THRUSH AIRCRAFT, INC.

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CUSTOM KIT

No. CK-AG-38

Date: 8/11/06

FIELD CONVERSION OF S2R-T15 AIRCRAFT TO S2R-T34

MODELS AFFECTED: **S2R-T15: Single cockpit Serial numbers: T15-001 through T15-009, T15-012 through T15-014, T15-022 through T15-027, T27-028, T27-029, T27-031, T15-033 through T15-036, T15-038, T15-040 through T15-044 Dual cockpit serial numbers: T15-010DC, T15-011DC, T15-015DC through T15-018DC, T15-020DC, T15-021DC, T15-037DC, T15-039DC.**

REASON FOR PUBLICATION: **To allow owners to upgrade powerplant for improved aircraft performance.**

COMPLIANCE: **At owner's discretion.**

BY WHOM WORK WILL BE ACCOMPLISHED: **Inspection accomplished by FAA DAR inspector or equivalent.**
Installation by an A&P Mechanic or equivalent.

Approval: **FAA approved.**

Estimated Man-hours: **25**

PARTS DATA: **The parts required to comply with this custom kit may be obtained from your nearest Thrush authorized service center. A parts list is attached to this publication.**

NOTE

If the PT6A-34 or 34AG engine being installed was manufactured in 1999 or later, it probably has the single line fuel control unit. Your engine controls may not work with it. Custom Kit CK-AG-37 allows you to update your engine controls, if necessary.

ACCOMPLISHMENT INSTRUCTIONS

1. **Remove engine cowling panels.**
2. **Place fuel shutoff valve into the OFF position.**
3. **Assure all electrical power to the aircraft is disconnected and remove battery/batteries.**
4. **Disconnect all engine control cables/push-pull tubes, rod-ends, and secure.**

NOTE

Tag and identify all tubes, hoses, electrical leads, and electrical connector plugs. Upon disassembly, cap all openings, tubing, hoses, drive pads, fittings, plugs, and connectors to prevent contamination and/or damage.

5. **Disconnect fuel feed line to the inlet side of engine driven fuel boost pump.**
6. **Disconnect oil pressure line from oil pressure port.**
7. **Disconnect fuel pressure line from fuel pressure port.**
8. **Disconnect engine torque pressure line from torque pressure port.**
9. **Disconnect engine torque vent line from torque vent port.**
10. **Disconnect engine overboard breather line.**
11. **Disconnect fwd. and aft. engine combustor drain lines.**
12. **Disconnect F.C.U. or Start Control fuel return line.**
13. **Drain engine oil and remove line to engine quick oil drain fitting.**
14. **Disconnect battery vent lines.**
15. **Disconnect seal drain vent lines at the following locations:**
    a. **Engine driven fuel boost pump.**
    b. **High-pressure fuel pump/fuel control unit.**
    c. **Propeller shaft.**
    d. **Starter/Generator.**
16. **Disconnect Air Filter Δp lines on models so equipped.**
17. **Disconnect compressor wash feed lines.**
18. **Disconnect E.P.A. residue fuel reservoir lines from flow divider/dump valve.**
19. **Disconnect engine-wiring harness from engine. Be sure to flag all cannon plugs and terminal ends. Disconnect the following and secure to prevent damage:**
    a. **Overspeed governor prop test solenoid.**
    b. **Prop beta micro switch.**
    c. **RGB chip detector, if equipped.**

d. Np tachometer generator.
e. Ng tachometer generator.
f. Oil temperature sending unit.
g. Starter/Generator terminal block.
h. Fuel flow transducer, if equipped.
i. Engine ground cable from rear of engine driven boost pump.
j. P3 heat terminal.
k. Ignition exciter box.

20. Disconnect ITT harness at the T5 terminal block.

21. Remove propeller.

22. Using a suitable hoist and sling. Hoist engine at proper C.G. to take weight off of engine isolators to engine mount attach bolts. (Note: Assure that engine is not pitched beyond 45° above or below horizontal).

23. Remove 3 each engine mount isolator attach bolts and hoist engine clear of aircraft.

24. Preserve and store old engine in accordance with Pratt & Whitney Maintenance Manual for maximum anticipated storage time.

25. Using Top Drawing number 19000 (S/N's T15-001 thru T15-020) or Top Drawing number 19870 (S/N's T15-021 thru T15-044) complete the following steps:

NOTE

Torque all hardware in accordance with Pratt & Whitney Canada maintenance manual (for engine related components), Thrush Aircraft Inc. drawings and TORQUE CHART on the last page.

NOTE

Using sound judgement, prep, prime, and paint component pieces as necessary for corrosion control.

a. Install engine isolator mounts to approved airworthy engine.

NOTE

Visually check all Barry engine mount Isolator molded assemblies for indications of bond failure, separation, sponginess, swelling, cuts, tears, gouges, or abrasions.

Visually check all Barry Isolator metal parts for nicks, scratches, cracks, breaks, deformation, dents, thread damage, corrosion, fretting, galling, chipped plating and wear.

Barry Isolators will provide good service for approved engine overhaul period (TBO), but will rarely last twice engine TBO. Therefore, it is suggested that these isolators be removed at scheduled engine overhaul and replaced with new, rebuilt, or overhauled isolators.

b. Using a suitable hoist and sling, carefully position engine in the engine mount and align the bolt holes of the engine vibration isolators with those of the engine mounts. Install attaching hardware.
c. Install forward engine mount basket assembly.
d. Install and service propeller according to instructions outlined in Harzell Propeller Inc. Owner's manual and logbook No. 139. Use Aeroshell 6 grease only.
e. Install forward fire seals.
f. Install aft fire seals and cuffs.
g. Seal all mating joints with RTV sealant to assure proper sealing of cannular inlet and filter area.
h. Install exhaust stacks.

26. Install the following serviceable engine components from existing PT6A-15AG engine to new larger engine using new "0"rings, gaskets, and seals as necessary: (Note: If installing new or overhauled engine, new gaskets will come with engine. If installing a serviceable previously used engine, obtain necessary consumables listed under "Additional Parts")
a. Overspeed governor.
b. Np tachometer/generator.
c. Ng tachometer/generator.
d. Engine driven fuel boost pump.
e. Engine breather fitting.
f. Starter/Generator Q.A.D. mount.
g. Starter/Generator.

NOTE

As of 1998 all new AG PT6A engines were delivered with a wet-spline starter/generator gearshaft that requires no maintenance. You can identify an engine's wet spline (female) gearshaft as follows: From the engine side (female) the splines are recessed approximately ¾ inch. Looking into the center of the gearshaft you can see right through to the AGB diaphragm wall. There will be an "0" ring installed on the starter/generator's drive shaft (male spline). The two (2) types of Starter/generators (dry spline / wet spline) are not interchangeable. You must purchase a new or serviceable starter/generator or send old starter/generator to appropriate maintenance facility for possible rework.

If starter-generator has dry splines, lubricate drive splines with Dow Corning™ Molycoat M-77. If starter-generator has wet splines install new "0" ring and lubricate splines with engine oil.

h. F.C.U. cambox input lever.
i. Oil temperature sending unit.
j. Oil pressure snubber fitting.

k. Fuel pressure snubber fitting.
l. Δp system, if so equipped.
m. Oil tank quick drain fitting.

27. Connect the following tube and hose assemblies at the locations noted: Assure that all hoses and lines are free of anomalies and contamination.

****CAUTION ****

If the old engine is being removed because of oil contamination or of the possibility of oil contamination, scrap the following items: (a) oil cooler and (b) all oil carrying lines and hoses.
If the old engine has oil contamination, the following items must be sent to an appropriate maintenance facility for disassembly and flushing to remove all contaminants or they must be replaced: (a) propeller, (b) over-speed governor, (c) any oil wettable components. Failure to comply with the above will prove to be false economy, as the new engine will be contaminated by old impurities.

a. Connect Δp system lines.
b. Connect seal drain vent lines at the following locations.
1. Engine driven fuel boost pump.
2. High-pressure fuel pump/fuel control unit.
3. Propeller shaft.
4. Starter/Generator.
c. Connect battery vent lines.
d. Connect smoker oil system lines.
e. Connect F.CU./Start Control purge/return system lines.
f. Connect torque system lines.
g. Connect Oil pressure system lines.
h. Connect Oil quick drain system lines.
i. Connect fwd. and aft. engine combustor drain lines.
j. Connect fuel system lines.
k. Connect compressor wash ring system lines.
l. Connect E.P.A. residue fuel reservoir system lines.

28. Connect engine-wiring harness to firewall cannon plug and engine mount. Connect the following cannon plugs and wire terminals by following flags installed in step 19. Properly safety wire all cannon plugs upon reinstallation.
a. Overspeed governor prop test solenoid.
b. Prop beta micro switch.
c. RGB chip detector, if equipped.
d. Np tachometer generator.
e. Ng tachometer generator.
f. Oil temperature sending unit.
g. Starter/Generator terminal block.
h. Fuel flow transducer, if equipped.

i. **Engine ground cable to rear of engine driven boost pump.**
j. **Ignition exciter box.**
k. **P3 heater.**
l. **ITT harness to engines T5 terminal block. Clean all terminals and terminal hardware with 400 grit Scotch-brite® and contact cleaner immediately before reassembly.**

29. **Connect all engine control rod-ends to the appropriate engine control. Rig engine controls by using procedures outlined in chapter 4 of the appropriate Thrush Airplane Maintenance Manual. Refer to the appropriate Pratt & Whitney Maintenance Manual for depreservation procedures of the engine oil and fuel systems.**

30. **Replace the gauges in the cockpit instrument panels with the following:**
    a. **Oil pressure gauge P/N 21483-018**
    b. **Torque meter P/N 27-3007-3**
    c. **ITT gauge P/N 152C45**
31. **Install the following kit placards (P/N 21436-071) on the instrument panels and throttle quadrant as noted:**

    "Maximum torque is 58.7 psi at 2200 rpm or 64.5 psi at 2000 rpm with straight line variation between these points."

32. **Service engine oil system I/A/W appropriate Pratt & Whitney Maintenance Manual.**
33. **Install fully recharged batteries. Using brass safety wire, safety battery connectors.**
34. **Assure the engine air inlet plenum is free of all foreign objects and install cannular inlet skin panels.**
35. **Place airframe fuel shutoff valve to ON position. Purge engine fuel system of preservative compound and air as per appropriate Pratt & Whitney Maintenance Manual.**
36. **Assure engine installation is free of F.O.D. and all hoses, wires, and non-moving components are secured and ready for run-up operational check.**
37. **Check that the engine start and run-up area is clear of F.O.D.**
38. **Start engine using start procedures per S2R-T34 Airplane Flight Manual or Airplane Maintenance Manual. Have safety crew look for any anomalies. Shut down engine immediately and correct any squawks before continuing run-up.**
39. **Perform the engine ground test and checks outlined in chapter 4 of Thrush Aircraft, Inc. S2R-T34 Airplane Maintenance Manual. Adjust engine and rigging to meet all specifications.**
40. **Install propeller spinner after beta nut adjustment and propeller balancing.**
41. **Install cowling.**
42. **Install <u>additional</u> data plate identifying the aircraft as being converted to an S2R-T34. The data plate shall read as follows:**

    Modified to S2R-T34
    Date: _____

    NOTE

    The original data plate remains, and the aircraft serial number <u>does not</u> change.

The date on the data plate shall be the date on which the aircraft is returned to service. The data plate shall be made of stainless steel or other equivalent fireproof material with permanent markings. It shall be attached using six each, CR3212-4-2 Cherrymax rivets adjacent to the existing aircraft data plate.

43. Issue S2R-T34 Airplane Flight Manual for this S/N aircraft.
44. Conduct a maintenance test flight of the aircraft and fix any discrepancies found.
45. Installation is now complete and ready for the applicable 337 (Or foreign aviation agency approval) and log entry.

RECORD COMPLIANCE: Make appropriate entry in airplane maintenance records as follows: Field conversion of S2R-T15, serial number _____ to S2R-T34 accomplished according to Thrush Aircraft, Inc. CK-AG-38 by (signature) (date) at airplane total time hours.

Provide a copy of the completed entry to Thrush Aircraft, Inc. so the manufacturer will have a record of the change of status of the aircraft.

WEIGHT AND BALANCE: Negligible Change

PUBLICATIONS AFFECTED: Replace the original AFM with the new S2R-T34 AFM supplied with the kit. Write the aircraft new Model number and serial number on the new Airplane Flight Manual. Replace the original AMM with the new S2R-T34 Airplane Maintenance Manual.

46. After inspection of Aircraft and Records, FAA DAR Inspector will replace the existing Airworthiness Certificate with an Airworthiness Certificate identifying the aircraft as being a model S2R-T34. Aircraft shall be re-registered with the FAA Aircraft Registry as a Model S2R-T34.

KIT PARTS LIST (Parts are available through your Thrush authorized service center).

QTY	P/N	DESCRIPTION
1 ea.	19000	Drawing, P&W instl & top dwg- T34 (for T15-001 thruT15-020 aircraft owners)
	or	
1 ea.	19870	Drawing, P&W instl & top dwg- T34 (forT15-021 thruT15-044 aircraft owners)
1 ea.		S2R-T34 Aircraft Flight Manual
1 ea.		S2R-T34 Aircraft Maintenance Manual
1 ea.	21483-018	Oil Pressure Gauge
1 ea.	27-3007-3	Torque Meter

1 ea.	**152C45**	**ITT Gauge**
1 ea.	**21436-071**	**Placard**

If serviceable (not new) engine is being installed, you will also need:

1 ea.	**3010818**	**Gasket, over-speed governor**
1 ea.	**ST3277-01**	**Gasket, starter/generator**
3 ea.	**ST3276-01**	**Gasket, Np, Ng, & engine driven boost pump**

TORQUE CHART

FINE THREAD SERIES ONLY

BOLTS					BOLTS				
STEEL - TENSION					STEEL - TENSION		STEEL - SHEAR		STEEL
AN 3 thru AN 20 AN 42 thru AN 49 AN 73 thru AN 81 AN 173 thru AN 186 AN 509 NK9 AN 525 NK525 MS 20033 thru MS 20046 MS 20073 MS 24604 MS 27039					MS 20004 thru MS 20024 NAS 144 thru NAS 158 NAS 624 thru NAS 644 NAS 1202 thru NAS 1210 NAS 1303 thru NAS 1320 NAS 6603 thru NAS 6620 NAS 172 NAS 174 NAS 517		NAS 333 thru NAS 340 NAS 464 NAS 583 thru NAS 590 NAS 1103 thru NAS 1120 NAS 6203 thru NAS 6220		ANY
NUTS					**NUTS**				
STEEL - TENSION		STEEL - SHEAR			STEEL - TENSION		STEEL - SHEAR		
AN 310 AN 315 AN 363 AN 365 MS 17829F MS 20365 MS 20500 MS 21042 MS 21044N MS 21045 NAS 1021		AN 320 AN 364 MS 17825 MS 20364 MS 21083N MS 21245 NAS 679 NAS 1022N or A NAS 1291			AN310 AN315 AN363 AN365 MS18729F MS20365 MS20500 MS21042 MS21044N MS21045 NAS 1021		AN320 AN364 MS 17825 MS 20364 MS 21083N MS 21245 NAS 679 NAS 1022N or A NAS 1291		MS17826
Torque Limits, in#		**Torque Limits, in#**		**NUT/BOLT SIZE**	**Torque Limits, in#**		**Torque Limits, in#**		
Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.	+/- 5%
12	15	7	9	**8-36**	--	--	--	--	--
20	25	12	15	**10-32**	25	30	15	20	16
50	70	30	40	**1/4-28**	80	100	50	60	35
100	140	60	85	**5/16-24**	120	145	70	90	70
160	190	95	110	**3/8/24**	200	250	120	150	100
450	500	270	300	**7/16-20**	520	630	300	400	180
480	690	290	410	**1/2-20**	770	950	450	550	240
800	1,000	480	600	**9/16-18**	1,100	1,300	650	800	320
1,100	1,300	660	780	**5/8-18**	1,250	1,550	750	950	480
2,300	2,500	1,300	4,500	**3/4-16**	2,650	3,200	1,600	1,900	880
2,500	3,000	1,500	4,800	**7/8-14**	3,550	4,350	2,100	2,600	1,500
3,700	4,500	2,200	3,300	**1-14**	4,500	5,500	2,700	3,300	2,400
5,000	7,000	3,000	4,200	**1 1/8-12**	6,000	7,300	3,600	4,400	4,000
9,000	11,000	5,400	6,600	**1 1/4-12**	11,000	13,400	6,600	8,000	5,600

CAUTION: Torques given are for dry threads. Clean bolts/nuts suspected of oil contamination with acetone.
NOTE: Tension nuts may be used on shear bolts, but shear nuts may not be used on tension bolts.