



# Service Instruction

## ENGINE COMPONENTS, INC.

S.I. No.: **98-2**

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**Title: CONTINUING AIRWORTHINESS DATA FOR ECI TITAN®  
AEC65314 CYLINDERS FOR C/200/300 SERIES ENGINES**

Issued: **11/23/98**

Revision: **4 (02/25/08)**

*Technical Portions are FAA DER Approved.*

- 1.0 PURPOSE:** Continued Airworthiness Instructions for TITAN® Series Replacement Cylinders for TCM C/200/300 Series Engines.
- 2.0 SCOPE:** This Engine Components, Inc. (ECi®) Service Instruction covers specific features of AEC65314 cylinder assemblies including differences from cylinders manufactured by the Original Equipment Manufacturer (OEM) and Superior Air Parts, Inc. (SAP) as it pertains to continued airworthiness. If a specific procedure is not addressed in this Service Instruction, the applicable procedure in the OEM's current overhaul manual and/or Service Bulletin and Service Instruction applies.
- 3.0 MODELS AFFECTED:** All engine models listed in 6.0 below.
- 4.0 COMPLIANCE:** Any time cylinders are removed for repair or replacement.
- 5.0 IDENTIFICATION:**

**5.1 Cylinder Marking:**

PART NO. \_\_\_\_\_ → AEC65314 \_ \_ 61. \_ REV \_ FAA-PMA \_

BORE TYPE \_\_\_\_\_

ST = Thru-hardened Steel

SN = Nickel+Carbide™

ECi CLASS \_\_\_\_\_

61.0 = Standard Configuration with bronze exhaust guide

61.1 = Improved Configuration with Hi-Chrome exhaust guide

REVISION LEVEL \_\_\_\_\_

FAA-PMA MARKING \_\_\_\_\_

PISTON/VALVE TRAIN IDENTIFICATION \_\_\_\_\_

A = AEC530348 Piston with 3-spring valve configuration for C, O-200, & O-300 series

B = 654841 Piston with 2-spring valve configuration for C series

C = 654858 Piston with 2-spring valve configuration for GO-300 series

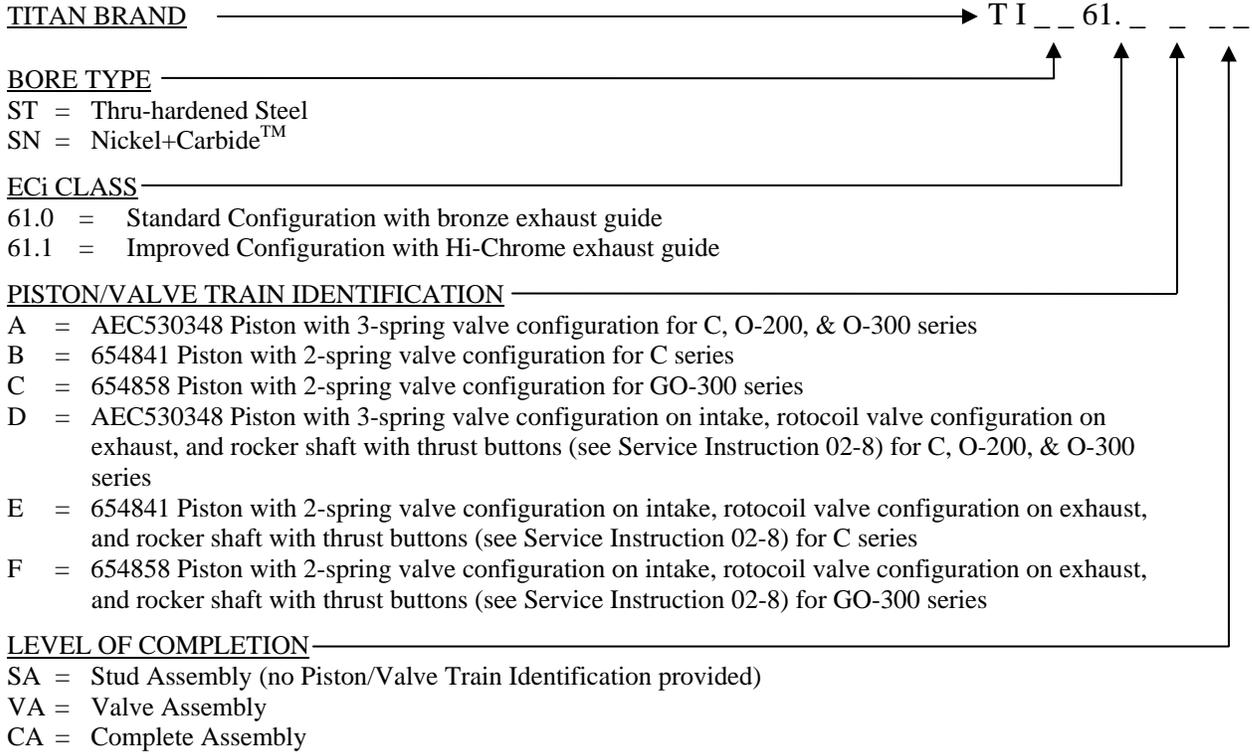
D = AEC530348 Piston with 3-spring valve configuration on intake, rotocoil valve configuration on exhaust, and rocker shaft with thrust buttons (see Service Instruction 02-8) for C, O-200, & O-300 series

E = 654841 Piston with 2-spring valve configuration on intake, rotocoil valve configuration on exhaust, and rocker shaft with thrust buttons (see Service Instruction 02-8) for C series

F = 654858 Piston with 2-spring valve configuration on intake, rotocoil valve configuration on exhaust, and rocker shaft with thrust buttons (see Service Instruction 02-8) for GO-300 series



5.2 **Price List Designation:**



6.0 **ENGINE APPLICATIONS:**

ECi Class	Cylinder Assembly Part Number	Installation Eligibility	
61.0A	AEC65314ST61.0A	C90-8F, C90-8FJ, C90-12F, C90-12FH, C90-12FJ, C90-12FP, C90-14F, C90-14FH, C90-14FJ, C90-14FP, C90-16F C145-2, C145-2H, C145-2HP O-200-A, O-200-B, O-200-C O-300-A, O-300-B, O-300-C, O-300-D, O-300-E	
	AEC65314SN61.0A		
61.0D	AEC65314ST61.0D		
	AEC65314SN61.0D		
61.1A	AEC65314ST61.1A		
	AEC65314SN61.1A		
61.1D	AEC65314ST61.1D		
	AEC65314SN61.1D		
61.0B	AEC65314ST61.0B		C75-8, C75-8F, C75-8FH, C75-8FHJ, C-75-8FJ, C75-8J, C75-12, C75-12B, C75-12BF, C75-12BFH, C75-12F, C75-12FH, C75-12FHJ, C75-15, C75-15F, C75-FJ, C75-J C85-8, C85-8F, C85-8FHJ, C85-8FJ, C85-8J, C85-12, C85-12F, C85-12FH, C85-12FHJ, C85-12FJ, C85-12J, C85-14F, C85-15, C85-15F C125-1, C125-2
	AEC65314SN61.0B		
61.0E	AEC65314ST61.0E		
	AEC65314SN61.0E		
61.1B	AEC65314ST61.1B		
	AEC65314SN61.1B		
61.1E	AEC65314ST61.1E		
	AEC65314SN61.1E		
61.0C	AEC65314ST61.0C	GO-300-A, GO-300-B, GO-300-C, GO-300-D, GO-300-E	
	AEC65314SN61.0C		
61.0F	AEC65314ST61.0F		
	AEC65314SN61.0F		



ECi Class	Cylinder Assembly Part Number	Installation Eligibility
61.1C	AEC65314ST61.1C	
	AEC65314SN61.1C	
61.1F	AEC65314ST61.1F	
	AEC65314SN61.1F	

**7.0 MARKING:** (See Figure 1)

- 7.1 Serial Number stamped on head
- 7.2 Cylinder head casting number cast in head
- 7.3 Barrel number vibropeened on barrel flange
- 7.4 Cylinder assembly number vibropeened on barrel flange

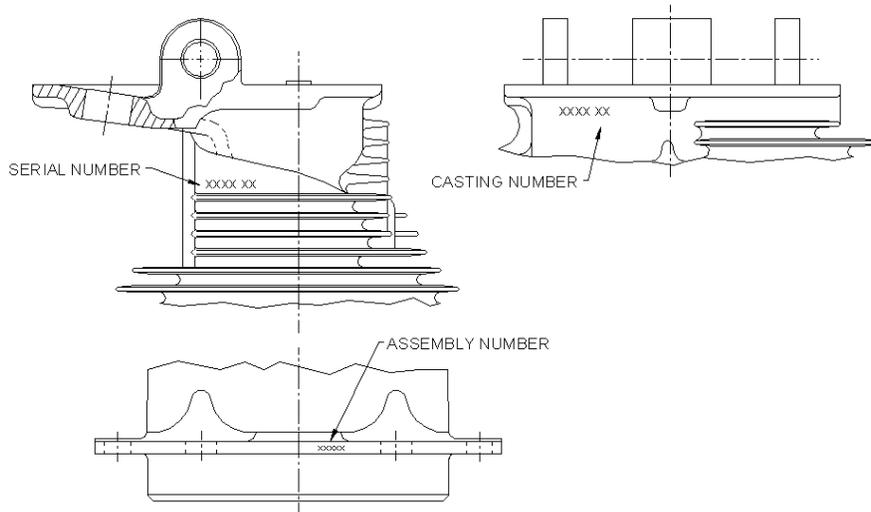


Figure 1: Marking Locations for AEC65314 Cylinder Assembly

**8.0 CYLINDER REMOVAL AND INSTALLATION:** See ECI Service Instruction 92-9-6.

**9.0 COLOR CODES ON CYLINDERS:** See ECI Service Instruction 92-7-1.

**10.0 AIRWORTHINESS DIRECTIVES:**

10.1 Reference is made to TCM Mandatory Service Bulletin 94-8A and AD 96-12-06. Cylinder assemblies AEC65314 are manufactured using a cylinder head and barrel thread and seal band configuration that is the same as TCM P/N 641917 and later cylinder assemblies. This design reduces stress on the cylinder head at the head and barrel interface. When four AEC65314 cylinders are installed, or when AEC65314 cylinders are installed along with TCM 641917 or later cylinders, O-200-A and O-200-B engines may be timed at 28 degrees BTDC. The engine data plate should be re-stamped to indicate the correct magneto timing.

10.2 ECI cylinders are not subject to Airworthiness Directive 94-05-05.



## 11.0 CYLINDER HEAD FEATURES:

- 11.1 **Material:** The cylinder heads on the AEC65314 cylinder assembly are castings manufactured from AMS 4220 aluminum alloy using a permanent mold. The casting is solution heat treated, normalized, and overaged before assembly.
- 11.2 **Thread Design:** The cylinder head is machined in the barrel attachment area to make it compatible with the OEM barrel thread design as well as ECI barrel threads.
- 11.3 **Head Inspection:** Head inspection shall be performed in accordance with OEM overhaul procedures. Minor cooling fin cracks that do not extend into the cylinder head structure and heat cracks in the exhaust port less than 1/8" in length are acceptable to return to service. All other cracks make the cylinder unairworthy without a major repair.
- 11.4 **Disassembly and Reassembly:** Disassembly and reassembly of the cylinder head is deemed to be a major repair and must be accomplished in accordance with FAA approved procedures. The preload (interference fit) alignment and compression height between head and barrel must be approved by FAA engineering.
- 11.5 **Parts Installation:** OEM and FAA-PMA approved replacement parts may be installed in AEC65314 cylinder heads using interference fit data and installation procedures contained in the OEM's current overhaul manual except as noted in 11.6 below.
- 11.6 **Exhaust Valve and Guide Upgrade (Class 61.1):**
- 11.6.1 The exhaust valve AEC655971 is similar to the AEC646612 valve except that the valve stem is flash chrome plated to make it compatible with Ni-Resist (Nickel Cast Iron) valve guides, such as AEC655526HC. Exhaust valve AEC655971 may be used with any approved Ni-Resist valve guide.
- 11.6.2 The exhaust valve guide AEC655526HC is made from High-Chrome Ni-Resist cast iron material. When valve guide AEC655526HC is used (classes 61.1), exhaust valve AEC655971 (or equivalent) must be used.
- 11.6.3 The valve and valve guide upgrade is designed to retard valve wear. Engine testing accomplished at ECI has shown that cylinders with Hi-Chrome valve guides and exhaust valves with a chrome flash on the stem experience much lower valve and guide wear, especially when using 100LL fuel.
- 11.6.4 ECI recommends that all exhaust valves be replaced at overhaul.
- 11.6.5 Cylinder assemblies are fitted with exhaust valve rotator p/n AEC531629. Use of the rotator requires shorter valve springs that will NOT interchange with solid valve spring retainer applications. Refer to ECI Service Instruction 02-8 for detailed information.
- 11.7 **Weld Repairs:**
- 11.7.1 **Minor:** Minor welds are defined as welds to the following areas:
- Intake and exhaust port flanges
  - Rocker cover flange and threaded holes
  - Cooling fins



11.7.2 Major: Major welds are defined as welds to structural areas of the cylinder and may be performed if all of the following criteria are met:

- a) The welding process must be based on FAA-approved data and meet all of the requirements of FAA advisory Circular No. 33-6 dated December 20, 1994.
- b) The welding must be performed by a properly rated FAA-Certificated Repair Station.
- c) The filler rod must be heat-treatable and compatible with the casting alloy.
- d) After welding, the repaired casting must be solution heat-treated and overaged.
- e) After machining and parts installation, the hardness of the weldment will be Brinell 60-75 (500 kg load, 10mm ball).

11.8 CHT Probe Boss: Cylinder heads have a CHT probe boss cast into the head for installation of a bayonet style probe. The boss is machined for a 3/8"-24 UNF thread on the probe.

11.9 Improved rocker shaft- Cylinder assemblies include a shorter rocker shaft p/n AEC21154 (OAL 3.96") that uses Teflon end plugs to eliminate scoring of the rocker cover. Rocker shaft AEC 21153 (OAL 4.06") is a direct replacement for the OEM rocker shaft and is approved for use, but Teflon end plugs should NOT be installed in this rocker shaft.

## 12.0 **BARREL FEATURES:**

12.1 Material: ECi manufactures cylinder barrels from AISI 4140 steel. The finished barrel may be thru-hardened or coated with a corrosion- and wear-resistant coating.

12.2 Disassembly and Reassembly: (See 11.4 above)

12.3 Weld Repairs: No weld repairs of any kind are permitted on any surface of the barrel.

12.4 Plating: ECi thru-hardened barrels may be plated back to size using FAA-approved processes. Consult the plating source for proper ring material to be used with the bore coating.

12.5 Bore Inspection: Whenever a cylinder is removed from the engine, the diameter and out-of-round condition of the bore should be measured. Furthermore, visual checks should be made for scoring, galling, low spots, and ring breakage.

Inspection results should be compared to the dimensions provided in Figure 2 below and in the OEM's current overhaul manual (ECi data will prevail in the event of a conflict). Affix a repairable or rejected part tag as appropriate, to any cylinder that does not meet the service limit bore criteria.

13.0 **PISTON RINGS:** See ECi Service Instruction No. 94-4-1 for approved ring sets and proper fitting instructions.

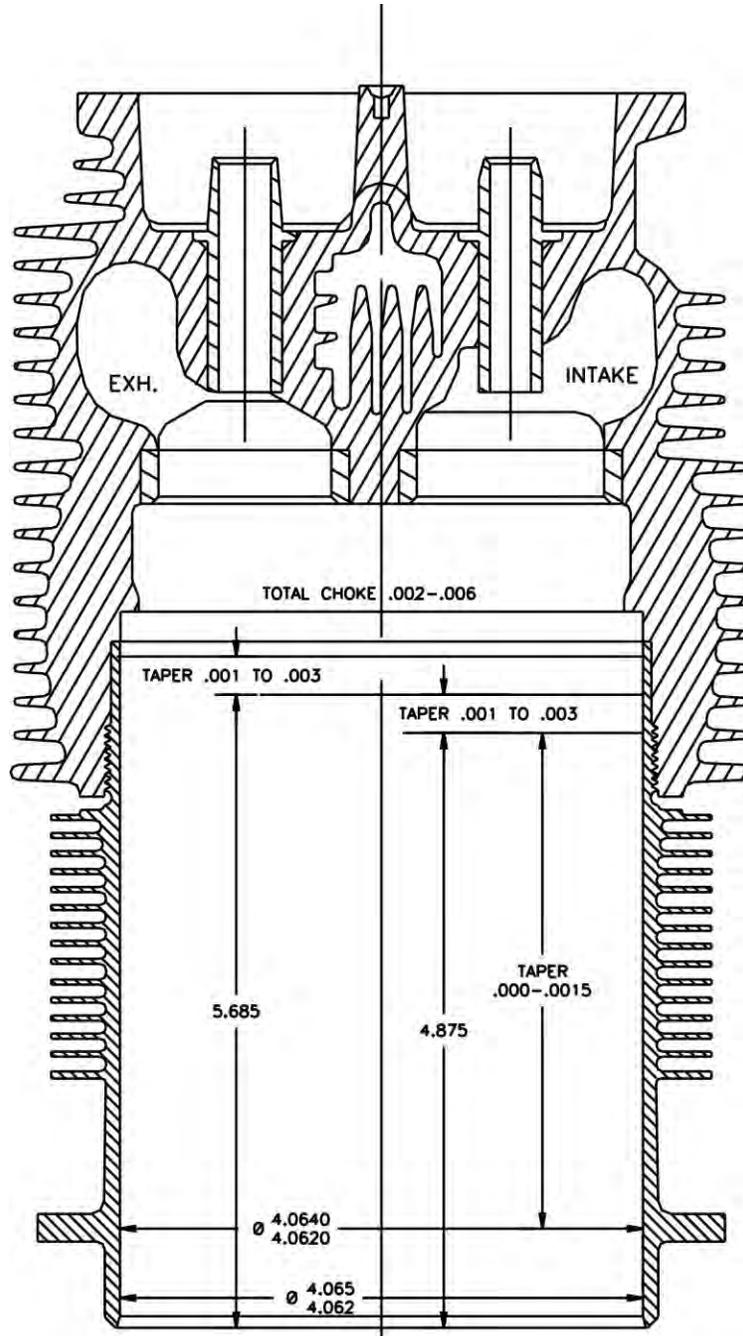


Figure 2: Typical Cross Section of AEC65314 Cylinder with barrel profile.

**CONTINUING AIRWORTHINESS DATA FOR ECI TITAN® AEC65314 CYLINDERS FOR C/200/300 SERIES ENGINES**
**14.0 BILL OF MATERIALS FOR VARIOUS CYLINDER CONFIGURATIONS:**

Gasket Set		AEC200-T1S												
Eligibility		C90, C145, O-200 & O-300 Series	C75, C85, & C125	GO-300 Series	C90, C145, O-200 & O-300 Series	C75, C85, & C125	GO-300 Series	C90, C145, O-200 & O-300 Series	C75, C85, & C125	GO-300 Series	C90, C145, O-200 & O-300 Series	C75, C85, & C125	GO-300 Series	
Comp Assy.	<b>Cylinder Class Number</b>	<b>61.0ACA</b>	<b>61.0BCA</b>	<b>61.0CCA</b>	<b>61.0DCA</b>	<b>61.0ECA</b>	<b>61.0FCA</b>	<b>61.1ACA</b>	<b>61.1BCA</b>	<b>61.1CCA</b>	<b>61.1DCA</b>	<b>61.1ECA</b>	<b>61.1FCA</b>	
	Piston	530348	654841	654858	530348	654841	654858	530348	654841	654858	530348	654841	654858	
	Ring Set	102	102	102	102	102	102	102	102	102	102	102	102	
	Rocker Shaft	21153	21153	21153	21154	21154	21154	21153	21153	21153	21154	21154	21154	
Valve Assembly	<b>Cylinder Class Number</b>	<b>61.0AVA</b>	<b>61.0BVA</b>	<b>61.0CVA</b>	<b>61.0DVA</b>	<b>61.0EVA</b>	<b>61.0FVA</b>	<b>61.1AVA</b>	<b>61.1BVA</b>	<b>61.1CVA</b>	<b>61.1DVA</b>	<b>61.1EVA</b>	<b>61.1FVA</b>	
	Intake	Spring Seat	24026	24026	24026	24026	24026	24026	24026	24026	24026	24026	24026	24026
		Inner Spring	24031		625957	24031		625957	24031		625957	24031		625957
		Intermediate Spring	24029	24029		24029	24029		24029	24029		24029	24029	
		Outer Spring	625958	24030	625958	625958	24030	625958	625958	24030	625958	625958	24030	625958
		Retainer	625961	625961	625961	625961	625961	625961	625961	625961	625961	625961	625961	625961
		Valve	641792	641792	641792	641792	641792	641792	641792	641792	641792	641792	641792	641792
		Valve Lock	21361	21361	21361	21361	21361	21361	21361	21361	21361	21361	21361	21361
	Exhaust	Spring Seat	24044	24044	24044	24044	24044	24044	24044	24044	24044	24044	24044	24044
		Inner Spring	24031		625957	531611	531611	531611	24031		625957	531611	531611	531611
		Intermediate Spring	24029	24029		531610	531610	531610	24029	24029		531610	531610	531610
		Outer Spring	625958	24030	625958	531609	531609	531609	625958	24030	625958	531609	531609	531609
		Retainer/Rotocoil	625961	625961	625961	531629	531629	531629	625961	625961	625961	531629	531629	531629
		Valve	646612	646612	646612	646612	646612	646612	655971	655971	655971	655971	655971	655971
	Valve Lock	21361	21361	21361	21361	21361	21361	21361	21361	21361	21361	21361	21361	
Stud Assembly	<b>Cylinder Class Number</b>	<b>61.0SA</b>					<b>61.1SA</b>							
	Intake	Seat	641793					641793						
		Guide	24024					24024						
	Exhaust	Seat	3923					3923						
		Guide	24047					655526						
	Bushing, Rocker Arm	22949					22949							
	Stud	402151					402151							
	Stud	401870					401870							
	Barrel	65080					65080							
Head	65340					65340								
Helical Insert	C2-52					C2-52								



**15.0 VALVE SPRING DATA: (all dimensions in inches)**

Spring P/N	Free Length (approx.)	Wire Diameter	Spring Force @ Comp. Height
AEC24029	2.18	.113	40-44 lbs. @ 1.137
AEC24030	2.16	.142	58-63 lbs. @ 1.168
AEC24031	1.78	.090 – .092	27-30 lbs. @ 1.075
AEC531609	1.83	.142	58-63 lbs. @ 0.910
			33-37 lbs. @ 1.300
AEC531610	2.03	.113	38-44 lbs. @ 0.880
			25-28 lbs. @ 1.270
AEC531611	1.55	.0915	26-31 lbs. @ 0.820
			10-13 lbs. @ 1.200
AEC625957	2.00	.124 – .126	33-37 lbs. @ 1.500
			62-68 lbs. @ 1.100
AEC625958	2.25	.148	20-26 lbs. @ 1.875
			77-83 lbs. @ 1.168