U.S. Department of Transportation
Federal Aviation Administration
Washington, DC

Flight Standardization Board Report

Revision: 0
Date: XX/XX/XXXX

Columbia Helicopters, Inc.
Model 234

Type Certificate Data Sheet (TCDS)	TCDS Identifier	Marketing Name	Pilot Type Rating
H9EA	Model 234	Chinook	BV 234

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1. RECORD OF REVISIONS

Revision Number	Section(s)	Date
Original	All	XX/XX/XXXX

2. INTRODUCTION

The Aircraft Evaluation Division (AED) is responsible for working with aircraft manufacturers and modifiers during the development and Federal Aviation Administration (FAA) certification of new and modified aircraft to determine:

1) The pilot type rating,
2) Flightcrew member training, checking, and currency requirements, and
3) Operational suitability.

This report lists those determinations for use by:

1) FAA employees who approve training programs,
2) FAA employees and designees who certify airmen, and
3) Aircraft operators and training providers, to assist them in developing their flightcrew member training, checking, and currency.

3. HIGHLIGHTS OF CHANGE

This is the original Columbia Helicopters, Inc. Model 234 Flight Standardization Board Report (FSBR). This FSBR highlights design and maneuver differences between the Columbia Helicopters, Inc. Model 234 and the Boeing CH-47D Chinook.

4. BACKGROUND

The Boeing Vertol Model 234 was originally placed in service in 1981. It was intended for the oil and gas industry as a primary transport aircraft for oil drilling rigs and support facilities. Model 234 was developed as a civilian version of the military CH-47 Chinook. It is a large twin-engine helicopter with a tandem rotor design.

The Boeing Vertol Model 234 underwent several adaptations and upgrades to meet diverse operational needs worldwide. These adaptations included the development of different configurations: the Model 234LR (Long Range), Model 234UT (Utility), and Model 234ER (Extended Range); each tailored for specific applications in civilian aviation.

Model 234LR (Long Range): This configuration was designed to maximize fuel capacity and range, making it particularly suitable for operations requiring long-distance travel, such as offshore oil and gas platform support. The Model 234LR's range capabilities enabled it to transport personnel and cargo over vast distances; connecting remote sites with mainland facilities efficiently and reliably.

Model 234UT (Utility): The Utility configuration was crafted to provide flexibility and versatility across various industries. It was equipped for general purpose missions, including cargo transport, passenger services, and special operations requiring adaptability. The Model 234 Utility was ideal for construction projects, humanitarian missions, and fire-fighting operations, where its heavy-lift capabilities and maneuverability were essential.

Model 234ER (Extended Range): This version further enhanced the helicopter's operational radius by increasing fuel capacity and optimizing performance features for extended missions. The Model 234ER was particularly advantageous for sectors that demanded prolonged operational periods without refueling, such as long-haul logistics and remote-site, resupply missions.

Columbia Helicopters, Inc. operated Model 234 for many years and subsequently acquired the type certificate (TC) from Boeing in 2006; allowing the company to maintain, operate, and further develop Model 234. With this acquisition, Columbia Helicopters, Inc. became the sole holder of Model 234's TC.

The AED Rotorcraft Branch formed a Flight Standardization Board (FSB) that evaluated Columbia Helicopters, Inc. Model 234 as defined in FAA Type Certificate Data Sheet (TCDS) No. H9EA. The evaluation was conducted during March and April of 2025 using the methods described in FAA Advisory Circular (AC) 120-53B CHG 1, Guidance for Conducting and Use of Flight Standardization Board Evaluations. As no FSB had ever been conducted on this aircraft in the previous 40 plus years of successful operation, the board evaluated ground and flight training provided by Columbia Helicopters, Inc.

FAA Order 8900.1, Volume 5, Chapter 2, Section 19, Figure 5-88, Pilot Certificate Aircraft Type Designations – Provisional Type Rating Designation for Airplane and Helicopter, designates the CH-47 with the civilian type rating of BV-234. The major differences between the surplus military and civilian aircraft type designs are further discussed in this document.

5. ACRONYMS

- 14 CFR Title 14 of the Code of Federal Regulations
- AC Advisory Circular
- AC Alternating Current
- ACFT Aircraft
- AED Aircraft Evaluation Division
- AFCS Automatic Flight Control System
- AGB Auxiliary Gear Box
- AIR Aircraft Certification Service
- APU Auxiliary Power Unit
- ATP Airline Transport Pilot
- AV Audiovisual Presentation
- CG Center of Gravity
- CGI Cruise Guide Indicator
- CPT Cockpit Procedures Trainer

- CRM Crew Resource Management
- DC Direct Current
- FAA Federal Aviation Administration
- FADEC Full-Authority Digital Engine Control
- FFS Full Flight Simulator
- FSB Flight Standardization Board
- FSBR Flight Standardization Board Report
- FSTD Flight Simulation Training Device
- FTD Flight Training Device
- DC Direct Current
- DASH Differential Airspeed Hold
- HO Handout
- IAP Instrument Approach Procedure
- ICBI Interactive Computer-Based Instruction
- IFR Instrument Flight Rules
- KIAS Knots Indicated Airspeed
- kVA Kilovolt-Ampere
- LCT Longitudinal Cyclic Trim
- LH Left Hand
- MDR Master Differences Requirements
- MFF Mixed Fleet Flying
- NAS National Airspace System
- NVG Night Vision Goggles
- PF Pilot Flying
- PIC Pilot In Command
- PTIT Power Turbine Inlet Temperature
- PTS Practical Test Standards
- PTT Part Task Trainers
- PTU Power Transfer Unit
- RFM Rotorcraft Flight Manual
- RH Right Hand
- RTO Rejected Takeoff
- SAS Stability Augmentation System
- shp Shaft Horsepower
- STC Supplemental Type Certificate
- SU Stand-Up Instruction
- TC Type Certificate
- TCBI Tutorial Computer-Based Instruction
- TCDS Type Certificate Data Sheet
- VFR Visual Flight Rules
- V_{NE} never-exceed speed
- VRS Vortex Ring State

6. DEFINITIONS

These definitions are for the purposes of this report only.

6.1 Base Aircraft. An aircraft identified for use as a reference to compare differences with another aircraft.

6.2 Current. A crewmember meets all requirements to operate the aircraft under the applicable operating part.

6.3 Differences Tables. Describe the differences between a pair of related aircraft, and the minimum levels operators must use to conduct differences training and checking of flightcrew members. Differences levels range from A to E.

6.4 Master Differences Requirements (MDR). Specifies the minimum levels of training and checking required between a pair of related aircraft, derived from the highest level in the Differences Tables.

6.5 Mixed Fleet Flying (MFF). The operation of a base aircraft and one or more related aircraft for which credit may be taken for training, checking, and currency events.

6.6 Operational Evaluation. The AED process to determine pilot type rating, minimum flightcrew member training, checking and currency requirements, and unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).

6.7 Operational Suitability. The AED determination that an aircraft or system may be used in the National Airspace System (NAS) and meets the applicable operational regulations (e.g., Title 14 of the Code of the Federal Regulations (14 CFR) parts 91, 121, 133, and 135).

6.8 Qualified. A flightcrew member holds the appropriate airman certificate and ratings as required by the applicable operating part.

6.9 Related Aircraft. Any two or more aircraft of the same make with either the same or different TCs that have been demonstrated and determined by the Administrator to have commonality.

6.10 Seat-Dependent Tasks. Maneuvers or procedures using controls that are accessible or operable from only one flightcrew member seat.

6.11 Special Emphasis Area. A training requirement unique to the aircraft, based on a system, procedure, or maneuver, which requires additional highlighting during training. It may also require additional training time, specialized flight simulation training devices (FSTD) or training equipment.

6.12 Specific Flight Characteristics. A maneuver or procedure with unique handling or performance characteristics that the FSB has determined must be checked.

7. PILOT TYPE RATING

7.1 Type Rating. The Columbia Helicopters, Inc. Model 234 type rating designation is BV-234.

7.1.1 If an airman certification checking event is conducted in a VFR-only CH-47, then the type rating must be limited to VFR only on the airman's certificate.

7.2 Common Type Ratings. Not applicable.

NOTE: Although Model 234 is very similar to the CH-47D aircraft, it has significant system differences, especially in the utility hydraulics and electrical generation systems. Thorough understanding of these differences is imperative to safe operation. Additionally, Model 234 does not have full-authority digital engine control (FADEC)-controlled engines which also increases the workload of the flightcrew especially during emergency and abnormal operations.

7.3 Military Equivalent Designations. Military aircraft that qualify for the BV-234 type rating designation can be found on the FAA website under "Pilots and Airmen," "Airmen Certification," "Quick Links," "Pilot Certificate Aircraft Type Designations." This webpage is kept up-to-date and can be found at: https://registry.faa.gov/typeratings/.

8. RELATED AIRCRAFT

8.1 Related Aircraft on Same TCDS. Not applicable.

8.2 Related Aircraft on Different TCDS. Columbia Helicopters, Inc. Model 234 is related to the:

- Columbia Helicopters, Inc. CH-47D – TC R00051SE.
- Billings Flying Service, Inc. CH-47D – TC R0011DE.
- Billings Flying Service, Inc. CH-47D – TC R0015DE.
- Billings Flying Service, Inc. CH-47D – TC R00115SE.
- Tandem Rotor, LLC. CH-47D – TC R0014DE.
- Unical Aviation, Inc. CH-47D – TC R00024LA.

9. PILOT TRAINING

9.1 Airman Experience. There are no additional airman experience requirements for Columbia Helicopters, Inc. Model 234 other than those already specified in 14 CFR parts 61, 133, 135, and 137. Two hundred hours of previous experience in multiengine, tandem rotor helicopters is recommended.

9.2 Special Emphasis Areas.

9.2.1 Pilots must receive special emphasis on the following areas during initial, transition, and recurrent ground training:

a) Tandem rotor aerodynamics and flight characteristics.

b) Settling with power/vortex ring state (VRS) awareness, avoidance, and proper recovery techniques. It is essential to emphasis the hazards associated with the automatic flight control system (AFCS) functions with automatic input and pilot input.

c) Ground operations to include 4-wheel and 2-wheel taxiing and maneuvering in confined areas. The size of the aircraft and winds generated must be considered during all ground operations.

d) Longitudinal Cyclic Trim (LCT), Differential Airspeed Hold (DASH), Cruise Guide Indicator (CGI) function, operation, and limitations.

e) Slope landing and conditions associated landing gear proximity switches and how this affects the aircraft during slope landings.

f) Running landing control techniques.

g) Crew resource management (CRM) for handling emergency procedures, especially involving power plant malfunctions.

h) AFCS modes of operation and associated limitations with emphasis on the LCT, DASH, and CGI.

i) Thorough understanding of each button on the cyclic and thrust (collective) controls and the associated functions for flight activities.

j) Performance charts. Ensuring pilots locate the correct performance chart for the specific configuration and then appropriately interpret the data based on the current conditions.

9.2.2 Pilots must receive special emphasis on, and perform the following areas during flight training:

a) Tandem rotor flight characteristics in each phase of flight.

b) Settling with power/VRS awareness, avoidance, and proper recovery techniques. It is essential to emphasis the hazards associated with the AFCS functions with automatic input and pilot input.

c) Ground operations to include 4-wheel and 2-wheel taxiing and maneuvering in confined areas.

d) LCT, DASH, CGI function, operation, and limitations

e) Slope landing and conditions associated landing gear proximity switches and how this affects the aircraft during slope landings.

f) Running/run-on landing control techniques.

g) CRM for handling emergency procedures, especially involving powerplant malfunctions.

h) AFCS modes of operation and limitations associated with emphasis on the LCT, DASH, and CGI.

9.3 Specific Flight Characteristics. Maneuvers or procedures required to be checked as referenced in the Airline Transport Pilot (ATP) and Aircraft Type Rating Practical Test Standards (PTS) for Rotorcraft Category Helicopter Rating (FAA S-8081-20).

9.4 Seat-Dependent Tasks. There are no seat-dependent tasks.

9.5 Regulatory Training Requirements Which Are Not Applicable to Columbia Helicopters, Inc. Model 234. None.

9.6 Flight Simulation Training Devices (FSTD). There are no specific systems, procedures, or maneuvers that are unique to Columbia Helicopters, Inc. Model 234 that require a specific FSTD for training.

9.7 Training Equipment. There are no specific systems or procedures that are unique to Columbia Helicopters, Inc. Model 234 that require specific training equipment.

9.8 Differences Training Between Related Aircraft. Pilots must receive differences training between Columbia Helicopters, Inc. Models 234LR, 234ER, and 234UT. Additionally for pilots that may be transitioning into Model 234 aircraft that have previous experience in CH-47 aircraft, there are critical differences that must be trained and checked for knowledge, skill, and ability in Model 234 to provide the highest level of safety. The level of training is specified in Appendix 3, Differences Tables.

10. PILOT CHECKING

10.1 Landing from a No-Flap or Nonstandard Flap Approach. Not applicable.

10.2 Specific Flight Characteristics. Maneuvers or procedures required to be checked as referenced in the ATP and Aircraft Type Rating PTS for Rotorcraft Category Helicopter Rating.

a) Tandem rotor aerodynamics flight maneuvers.
b) Hover turns with controls to maneuver the aircraft about different points of the aircraft.
c) Slope landings emphasizing the unique functions of the proximity switches and effects associated with the AFCS.

d) Settling-with-Power (VRS). The significant differences in aerodynamic effects of a tandem rotor helicopter requires special emphasis during the checking event. Additionally, the negative transfer of learning from a conventional tail rotor-equipped aircraft and the associated inputs from the DASH require special emphasis during training and checking.
e) Both 4-wheel and 2-wheel taxi.
f) Hover and run-on landings.

10.3 Seat-Dependent Tasks. For normal operations, there are no seat-dependent tasks. The pilot in command (PIC) may occupy either pilot seat. For instrument flight rules (IFR) operations, the pilot flying (PF) should occupy the right pilot station as this seat provides access to the Flight Director mode control panel most effectively.

10.4 Other Checking Items. Not applicable.

10.5 Flight Simulation Training Devices (FSTD). There are no specific systems, procedures, or maneuvers that are unique to Columbia Helicopters, Inc. Model 234 that require a specific FSTD for checking. Nor are there any currently certified FSTD for Model 234.

10.6 Equipment. There are no specific systems or procedures that are unique to Columbia Helicopters, Inc. Model 234 that require specific equipment.

10.7 Differences Checking Between Related Aircraft. Pilots must receive differences checking between Columbia Helicopters, Inc. Model 234 and the CH-47D. The level of checking is specified in Appendix 3.

11. PILOT CURRENCY

There are no additional currency requirements for Columbia Helicopters, Inc. Model 234 other than those already specified in 14 CFR parts 61, 133, and 135.

11.1 Differences in Currency Between Related Aircraft. Not applicable.

12. OPERATIONAL SUITABILITY

Columbia Helicopters, Inc. Model 234 is operationally suitable for operations under 14 CFR parts 91, 133, 135, and 137. The list of operating rules evaluated is on file at the AED Rotorcraft Branch.

13. MISCELLANEOUS

13.1 Forward Observer Seat. The Columbia Helicopters, Inc. Model 234 forward observer seat has been evaluated and determined to meet requirements of 14 CFR § 135.75(b) and AC 120-83, Flight Deck Observer Seat and Associated Equipment.

13.2 Aircraft Approach Category. Columbia Helicopters, Inc. Model 234 is considered a Category A aircraft for the purpose of determining the appropriate instrument approach procedure (IAP) category in accordance with 14 CFR § 97.3.

13.3 Differences Between Models 234LR and 234UT. The following table shows the differences between the LR and UT variants of Model 234 that must be addressed during training and checking events.

Preflight Inspection	Differences in fuel tank arrangement and associated preflight items.
Limitations Airspeed	Airspeed normal operation range for Model 234LR is 30-150 knots indicated airspeed (KIAS) with associated markings on the airspeed indicator. Airspeed normal operation range for Model 234UT is 30-140 KIAS as indicated with a different airspeed indicator. Different never-exceed speed (V_{NE}) tables for Models 234LR and 234UT respectively.
Limitations Weight	Internal gross weight: Passenger and cargo: Model 234LR is 20,000 lb. Model 234UT is 19,250 lb. Normal Category A: Model 234LR is 48,500 lb. Model 234UT is 42,000 lb.
Limitations Fuel	Different fuel quantities.
Limitations Center of Gravity (CG)	Different CG Envelopes.
ATA 28 Fuel System	Model 234LR has the following configuration: • Original external fuel tanks with quantity of 1,050 gal. • Two capacitance type fuel probes that provide electrical signals to the signal conditioner unit, which provides the signal for the fuel quantity gauges. • Two fuel pumps in each tank provide pressure to the engine. • Low-level indication is at 1,200 lb. of fuel remaining. Model 234UT has the following configuration: • Original external fuel tanks removed. • Two internally mounted, 500-gal fuel tanks. • Two capacitance type fuel probes that provide electrical signals to the signal conditioner unit, which provides the signal for the fuel quantity gauges.

	• Two fuel pumps in each tank provide pressure to the engine. • Low-level indication is at 600 lb. of fuel remaining in cruise attitudes. In hover attitudes, the like will illuminate approximately 1,000 lb.
Fuel Jettison System	Model 234LR has a jettison system. Model 234UT does not have the system.
Performance	Different performance charts appropriate to the different configurations. This included differences with the Models 234LR and 234UT with separate Categories A and B performance charts.
Cabin Configurations	Different cabin configurations are available between Models 234 LR and UT.

13.4 Transitions from CH-47D.

13.4.1 Although the airframes of the military CH-47 and the BV-234 are very similar, there are differences in systems that are critical to understand and demonstrate proficiency with an airman who has experience in CH-47s and is assigned as a flightcrew member on a BV-234.

13.4.2 The following differences must be understood for the highest level of safety:

a) The BV-234 aircraft incorporates an auxiliary gear box (AGB) attached to the aft side of the aft transmission. This AGB is powered by the auxiliary power unit (APU) during start and shutdown via a utility hydraulic motor/pump and by the aft transmission via a quill shaft incorporating a freewheeling unit during taxi and flight operations. The AGB is the drive source for utility hydraulic pump, both main generators, and both flight hydraulic pumps.

b) The CH-47D drives both generators off the aft transmission; however, the flight hydraulics are separated with the No. 1 system flight hydraulic pump driven on the forward transmission and the No. 2 system driven from the aft transmission as well as the utility hydraulic pump.

c) The APU of the BV-234 drives the AGB, which then powers both main generators and the utility hydraulic pump; where as, the CH-47D's APU has an APU generator and utility hydraulic motor/pump.

d) The BV-234's emergency power is provided by an emergency generator and emergency flight hydraulic pump powered by the aft transmission on the oil cooler blower motor drive.

e) The CH-47D's emergency power is provided by starting the APU and utilizing the APU generator. Utility hydraulic pressure can be utilized to power the flight hydraulics via the power transfer units (PTU).

f) The CH-47D engines are controlled by FADEC systems and significantly reduce pilot workload during critical phases of flight and malfunction procedures. A pilot transitioning to the BV-234 must demonstrate understanding and capability with the higher workload of the manually controlled engines.

13.4.3 Differences in the landing gear proximity switches and how they affect the AFCS modes:

a) The CH-47 proximity switches work in parallel and must both be closed to affect the AFCS mode.

b) The BV-234 proximity switches have an independent connection to the No. 1 and No. 2 AFCS modes. This difference requires awareness of technique for slope landings.

13.5 Third Crewmember Training.

13.5.1 Although the BV-234 is type certificated for two pilots, it was identified during the FSB that certain emergency procedures require a crewmember to reference the maintenance panel located on the right wall towards the rear of the aircraft. This is problematic as the pilots are to be at their pilot station from which they cannot observe the indications on the maintenance panel. The location of the maintenance panel is not conducive for a flight crew consisting of two pilots to reference the required information as stipulated in the Rotorcraft Flight Manual (RFM) procedure associated with certain indications. These findings have been presented to the TC holder and the Aircraft Certification Service (AIR). Review and amendment of the TC may be required or alternate procedures developed and approved.

13.5.2 There are operators that require trained crewmembers, in addition to the required pilots on the aircraft that can observe the maintenance panel and relay the findings to the flight crew.

13.5.3 The standard CH-47D has a minimum of three crewmembers required for flight. Some operators of military surplus CH-47s have modified the aircraft to include the required gauges in the flight deck where they are observable by the two pilots while in flight. With this appropriately configured, a 2-pilot crew without a third crewmember has been found acceptable.

NOTE: Due to some of the emergency procedures requiring reference to the maintenance panel, for aircraft that have not been modified, the AED recommends having a third, trained crewmember aboard.

APPENDIX 1. DIFFERENCES LEGEND

Training Differences Legend

Differences Level	Type	Training Method Examples	Conditions
A	Self-Instruction	• Operating manual revision (handout (HO)) • Flightcrew operating bulletin (HO)	• Crew has already demonstrated understanding on base aircraft (e.g., updated version of engine). • Minor or no procedural changes required. • No safety impact if information is not reviewed or is forgotten (e.g., different engine vibration damping mount). • Once called to attention of crew, the difference is self-evident.
B	Aided Instruction	• Audiovisual presentation (AV) • Tutorial computer-based instruction (TCBI) • Stand-up instruction (SU)	• Systems are functionally similar. • Crew understanding required. • Issues need emphasis. • Standard methods of presentation required.
C	Systems Devices	• Interactive (full-task) computer-based instruction (ICBI) • Cockpit Procedures Trainers (CPT) • Part task trainers (PTT) • Level 4 or 5 flight training device (FTD 4-5)	• Training can only be accomplished through systems training devices. • Training objectives focus on mastering individual systems, procedures, or tasks versus highly integrated flight operations or “real-time” operations. • Training devices are required to assure attainment or retention of crew skills to accomplish more complex tasks usually related to aircraft systems.
D	Maneuvers Devices	• Level 6 or 7 flight training device (FTD 6-7) • Level A or B full flight simulator (FFS A-B)	• Training can only be accomplished in flight maneuver devices in a real-time environment. • Training requires mastery of interrelated skills versus individual skills. • Motion, visual, control-loading, and specific environmental conditions may be required.
E	Level C/D FFS or Aircraft	• Level C or D full flight simulator (FFS C-D) • Aircraft (ACFT)	• Motion, visual, control-loading, audio, and specific environmental conditions are required. • Significant full-task differences that require a high-fidelity environment. • Usually correlates with significant differences in handling qualities.

Checking Differences Legend

Differences Level	Checking Method Examples	Conditions
A	None	None
B	• Oral or written exam • Tutorial computer-based instruction (TCBI) self-test	Individual systems or related groups of systems.
C	• Interactive (full-task) computer-based instruction (ICBI) • Cockpit Procedures Trainers (CPT) • Part task trainers (PTT) • Level 4 or 5 flight training device (FTD 4-5)	• Checking can only be accomplished using systems devices. • Checking objectives focus on mastering individual systems, procedures, or tasks.
D	• Level 6 or 7 flight training device (FTD 6-7) • Level A or B full flight simulator (FFS A-B)	• Checking can only be accomplished in flight maneuver devices in a real-time environment. • Checking requires mastery of interrelated skills versus individual skills. • Motion, visual, control-loading, and specific environmental conditions may be required.
E	• Level C or D full flight simulator (FFS C-D) • Aircraft (ACFT)	Significant full-task differences that require a high-fidelity environment.

APPENDIX 2. MASTER DIFFERENCES REQUIREMENTS (MDR) TABLE

These are the minimum levels of training and checking required, derived from the highest level in the Differences Tables in Appendix 3. Differences levels are arranged as training/checking.

To Related Aircraft ↓	**From Base Aircraft →**	**Model 234**	**CH-47D**
Model 234		Not Applicable	E/E
CH-47D		E/E	Not Applicable

APPENDIX 3. DIFFERENCES TABLES

This Design Differences Table, from Columbia Helicopters, Inc. Model 234 (BV-234) to the CH-47D lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Maximum Weight	Maximum internal weight increase from 48,500 to 50,000 lb.	No	Yes	A	B
	Limitations	Engine limits and performance charts depicted differently between civilian and military formats in flight manuals.	No	No	A	B
	Limitations Weight	Internal Gross Weight: Passenger and Cargo: LR is 20,000 lb. UT is 19,250 lb. Normal Category A: LR is 48,500 lb. UT is 42,000 lb. CH-47D is 50,000 lb.	No	No	A	B
	Required Crew					
	234	Minimum Crew: two (one pilot, one copilot) – See paragraph 13.4.	Yes	No	C	C

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	Minimum Crew: three (one pilot, one copilot, one flight crewmember). See paragraph 13.5.	Yes	Yes	A	D
	Weights					
	234	Max Weight = 48,500 lb. 51,000 lb for jettisonable external loads.	No	No	A	B
	CH-47D	Max Weight = 50,000 lb for internal and external loads.	No	No	A	B
	Limitations					
	234	Engine limits and performance for Categories A and B performance.	Yes	Yes	B	B
	CH-47D	Engine limits and planned conditions charts for performance.	No	Yes	B	B
	Placards and Markings					
	234	Placard for external part 133 operations. Emergency exit markings.	No	Yes	A	B
	CH-47D	Operation in accordance with RFM. Restricted Category placards. Placards for external part 133 operations. Engine-limited time markings for operations.	No	No	A	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Engines					
	234	Two AVCO Lycoming AL5512 (TCDS No. E4NE) with 2,975 shaft horsepower (shp) at sea level for each engine. Five-minute takeoff: 4,075 shp.	No	No	B	B
	CH-47D	Two Honeywell T55-GA-714A with 4,867 shp at sea level for each engine. FADEC controlled.	No	Yes	B	B
	Flight Deck					
	234	Left-hand pilot cyclic and thrust lever modified for external-load operations. Most or all have installed via STC No. SR00956SE. Left and right sides have bubble windows.	No	No	B	E
	CH-47D	Original cyclic control.	No	No	B	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 22 Autoflight					
	234	AFCS: • Flight director coupled to navigation. • Go-around capability. • Rate damping in all axes and sideslip stability. • Pitch and roll attitude hold and heading hold. • Airspeed hold. • Improved control response in pitch, roll, and yaw. • Barometric and radar altitude hold. • Automatic coupled turns. • Longitudinal cyclic trim scheduling.	No	Yes	B	E

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	AFCS: • Rate damping in all axes and sideslip stability. • Pitch and roll attitude hold and heading hold. • Airspeed hold. • Improved control response in pitch, roll, and yaw. • Barometric and radar altitude hold. • Automatic coupled turns. • Longitudinal cyclic trim scheduling.	No	Yes	B	E
	ATA 24 Electrical Power					
	234	Two 40 kilovolt-ampere (kVA) generator on aft accessory gear box. No. 1 and No. 2 essential bus and emergency - battery bus. Direct current (DC) power controlled by switching in overhead panel on flight deck. Alternating Current (AC) Power available through two transformer rectifier units (TRU) switches on electrical panel.	No	Yes	B	E

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	One 20 kVA DC generator on APU. Two 40 kVA DC generators on aft transmissions. AC power automatically available without switching.	No	Yes	B	E
	ATA 25 Equipment/Furnishings					
	234	Passenger and cargo configurations. Single-point cargo hook with electric and mechanical release in flight deck.	No	Yes	B	B
	CH-47D	Cargo configuration and mission essential crew. Triple-point cargo hook with electric and mechanical release in flight deck.	No	Yes	B	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 26 Fire Protection					
	234	Engine fire detection and suppression system control handles. Combustion heater fire detection; no suppression. APU fire detection and suppression.	No	No	C	E
	CH-47D	Engine fire detection and suppression system control handles and discharge switch. Combustion heater fire detection; no suppression. Crewmember monitors heater compartment. APU fire procedure; no suppression system. APU fire - crewmember verification.	No	Yes	C	E
	ATA 27 Flight Controls					
	234	Lower boost actuators servo controls and separate AFCS links. Navigation coupled.	No	No	A	C

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	Integrated lower control unit (combined actuators and Stability Augmentation System (SAS)) rotary control switch.	No	No	A	C
	ATA 28 Fuel					
	234	LR model has two external fuel tanks with capacity of 1,050 gal each. UT model has two internal fuel tanks with capacity of 500 gal each. Two fuel gauges and one pressure gauge with shutoff switches for refueling. One crossfeed switch. LR models have fuel jettison capability. UT models are not capable.	No	No	C	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	External fuel tanks with three tanks per side. Each side has total fuel capacity of 1,010 gal. Fuel management panel for crossfeed and fuel tanks transfer controls.	No	Yes	C	B
	ATA 29 Hydraulic Power					
	234	Nos. 1 and 2 hydraulic flight boost pump driven by aft transmission AGB. Utility pump located on AGB. Emergency boost pump driven by aft transmission. Emergency pump powers No. 1 hydraulic system. Hydraulic hot annunciator lights. Hydraulic pressure gauges in flight deck. Nos. 1 and 2 hydraulic switches.	No	No	D	E

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	No. 1 hydraulic pump located forward transmission. No. 2 located aft transmission. Utility pump located on aft transmission. Auxiliary pump driven by APU. Hydraulic pressure indicator lights in flight deck. Pressure, temperature, and quantity gauges on aft crewmember panel.	No	Yes	B	E
	ATA 30 Ice and Rain Protection					
	234	Ice detector and blade deicing if installed, windscreen wiper system. Heated windows.	No	No	A	C
	CH-47D	No flight into known icing conditions. Windscreen wiper system.	No	No	A	C
	ATA 31 Instruments					
	234	IFR certificated.	No	No	A	B
	CH-47D	VFR certificated.	No	No	A	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 32 Landing Gear					
	234	Four main gear. Forward gear are further forward on fuselage.	No	No	A	C
	CH-47D	Four main gear. Hydraulic braking isolation. Forward gear are further aft on fuselage.	No	Yes	A	C
	ATA 33 Lights					
	234	Passenger/cargo lighting. Water-ditching and emergency door lights. Emergency instrument lighting on instrument panels.	No	No	A	B
	CH-47D	Emergency door lights. Night vision goggles (NVG) instrument panel lighting.	No	No	A	B
	ATA 34 Navigation					
	234	IFR certificated.	No	No	A	B
	CH-47D	VFR certificated.	No	No	A	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 49 Airborne Auxiliary Power					
	234	N/A on model aircraft. Emergency generator and backup hydraulic powered off a transmission oil cooler blower drive shaft and transfer case.	No	Yes	B	E
	CH-47D	APU started in flight for emergency electrical power.	No	Yes	B	E
	ATA 52 Doors					
	234	• Cabin entry door; forward right-side, one-piece door. • Aft cargo ramp is optionally removable. • Emergency evacuation training.	No	Yes	B	C
	CH-47D	• Cabin entry door; forward right-side, two-piece (top/bottom) door. • Aft cargo ramp cannot be removed. Crewmember must stand on cargo ramp to access ramp control panel. • Emergency evacuation training.	No	Yes	B	C

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 53 Fuselage					
	234	• Nose radar dome. • Cargo flooring mounted to isolation dampers and to fuselage side frames. • Floor loading 150 lb per sq. ft.	No	No	A	B
	CH-47D	• Cargo flooring mounted to fuselage frame. • Floor loading 300 lb per sq. ft. External winching system is mounted on forward right-side door. • Cargo-loading differences.	No	No	A	B
	ATA 56 Windows					
	234	15 windows; left and right side.	No	No	A	B
	CH-47D	Five windows; left and right side. Jettisonable for emergency exits.	No	No	A	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 62 Main Rotor					
	234	Difference in droop stops on the three-bladed, fully articulated rotor system. Forward rotor turns counter clockwise. Aft rotor turns clockwise. Rotor brake.	No	No	B	B
	CH-47D	Difference in droop stops on the three-bladed, fully articulated rotor system. Forward rotor turns counter clockwise. Aft rotor turns clockwise. No rotor brake.	No	No	B	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 63 Main Rotor Drive					
	234	Forward transmission, combining transmission, Nos. 1 and 2 engine transmissions, aft transmission, seven drive shafts, and aft vertical drive shaft. Emergency gear pad, seven drive shafts, and aft vertical drive shaft. Transmission cooling located in aft pylon. Cooling fan driven off aft transimission. Auxiliary lubrication system. Auxiliary pressure light indicated in flight deck.	No	No	B	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	Forward transmission, combining transmission, Nos. 1 and 2 engine transmissions, aft transmission, seven drive shafts, and aft vertical drive shaft. Transmission cooling integral to each forward and aft transmission. Auxiliary lubrication system. Auxiliary pressure light indicated in flight deck. Chip detection oil screen lights shown on crewmember maintenance panel.	No	No	B	B
	ATA 71 Powerplant					
	234	Two AVCO Lycoming AL5512 (TCDS No. E4NE) with 2,975 shp at sea level for each engine. Five-minute takeoff: 4,075 shp. N1 and N2 logic-controlled, hydromechanical fuel control.	No	No	C	B

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	2x Honeywell T55-GA-714A. Sea level hp 4,867 each engine. FADEC controlled.	No	Yes	C	B
	ATA 73 Engine Fuel and Control					
	234	Hydromechanical units. N2 logic engine control. Manual starting procudure. Engine emergency control panel with guarded switching for manual and auto mode. Engine trim switches on the thrust lever are continuously active.	No	No	E	E

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	FADEC controlled. Automated start process. Engine trim switches on the thrust lever are active only for emergency trim. Rheostat engine speed control. Power share by torque or Power Turbine Inlet Temperature (PTIT) limits. Emergency procedures unique to FADEC.	No	Yes	E	E
	ATA 77 Engine Indicating					
	234	Fuel temperature indicator. Engine monitor panel digital readout.	No	No	B	B
	CH-47D	Engine fuel flow indicator.	No	Yes	B	B
	ATA 78 Engine Exhaust					
	234	Engine exhausts straight back.	No	No	A	B
	CH-47D	Engine exhausts tilted outward. Critical wind limits for starting.	No	Yes	A	B
	ATA 80 Starting					

FROM BASE AIRCRAFT: Model 234 TO RELATED AIRCRAFT: CH-47D	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	234	Individual engine start switches.	No	No	B	E
	CH-47D	Engine common start switch and igniter enable by key. Backup power for starting.	No	Yes	B	E
	ATA 83 Accessory Gear Boxes					
	234	Hydraulically powered by APU during start and shutdown. Powered by aft transmission during taxi and flight. • LH and RH main generator. • LH and RH flight hydraulic pumps. • Utility hydraulic pump.	No	No	B	E
	CH-47D	None.	No	Yes	B	E

This Maneuver Differences Table, from the Columbia Model 234 (BV-234) to the CH-47D lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCAFT: Model 234 **TO RELATED AIRCRAFT: Model CH-47D**	**MANEUVER**	**REMARKS**	**FLT CHAR**	**PROC CHNG**	**TRAINING**	**CHECKING**
	Preflight					
	234	One-page description for logbook and walk around inspection.	No	Yes	B	E
	CH-47D	Nine-page description for in-depth checklist for preflight.	No	Yes	B	E
	Engine Start					
	234	FM - Normal Procedures section. Manual start procedures. Rotor brake startup procedures.	No	Yes	C	E
	CH-47D	FM - Normal Procedures section. FADEC procedures. Crosswind limits prior to startup. Crewmember validates APU start, running, and maintenance panel status after starting engines.	No	Yes	C	E
	Takeoff					
	234	FM - Vertical Category A and Normal Categories A and B profiles (differences training from CH-47D to Model 234).	No	Yes	D	E
	CH-47D	FM - Normal Category B profile only.	No	Yes	D	E

FROM BASE AIRCAFT: Model 234 TO RELATED AIRCRAFT: Model CH-47D	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Rejected Takeoff (RTO)					
	234	FM - Single-engine failure during vertical and normal Category A takeoff.	No	Yes	D	E
	CH-47D	FM - Single-engine failure during all phase of flight described. Engine failure RTO needs to be trained.	No	Yes	D	E
	Climb, Cruise, and Descent					
	234	FM - one climb, cruise, and descent chart.	No	No	B	B
	CH-47D	FM - 66 climb, cruise, and descent charts.	No	Yes	B	B
	Instrument Approaches					
	234	ILS and non-precision approaches (differences training from CH-47D to Model 234).	Yes	No	D	E
	CH-47D	N/A to CH-47D.				
	Landing					
	234	FM - Normal procedures Categories A and B approach speeds are the same.	No	No	C	E

FROM BASE AIRCAFT: Model 234 TO RELATED AIRCRAFT: Model CH-47D	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	FM - Normal procedures Category B approach speeds are the same.	No	No	C	E
	Slope Landings					
	234	Proximity switches activate individually and affect AFCS functions. Appropriate awareness and technique required.	Yes	Yes	D	E
	CH-47D	Either proximity switch causes AFCS functional changes. Appropriate awareness and technique required.	Yes	Yes	D	E
	Shutdown					
	234	FM - Normal procedures checklist with rotor brake.	No	No	B	E
	CH-47D	FM - Normal procedures checklist. No rotor brake.	No	Yes	B	E
	Normal Procedures					
	234	• Fuel management procedures. • In-flight power assurance check. • External-load operations. Single-point hook.	No	No	C	E

FROM BASE AIRCAFT: Model 234 TO RELATED AIRCRAFT: Model CH-47D	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	• Fuel management procedures. • In-flight power assurance check – crewmember duty. • External-load operations. Three hooks available.	No	Yes	C	E
	Emergency Procedures					
	234	• Emergency electrical power distribution – automatic. • Emergency hydraulic distribution – automatic. • Emergency engine trim operation. • Low fuel procedures. • Flight director failure.	No	Yes	B	E

FROM BASE AIRCAFT: Model 234 TO RELATED AIRCRAFT: Model CH-47D	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	CH-47D	• FADEC emergency failures. • Emergency electrical power via APU. • Engine and APU fire – crewmember verification. • Hydraulic pressures, temperature and quantity gauges on aft maintenance panel. • Transmission chip detection shown on aft maintenance panel. • Emergency hydraulic distribution - manual - via APU. • Vertical gyro failure. • Required 3rd crewmember.	No	Yes	B	E
	Fuel Jettison					
	234	Fuel jettison not available in the Model 234UT version.	No	Yes	A	A
	CH-47D	Not available.				