Bell Helicopter
A Textron Company

Rotorbreeze®

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The 206B-3 belongs to Edwards and Associates and has accumulated over 37,000 flight hours.

What's Inside...

PHIL DIETERICH Announced the New *President and General Manager* of EDWARDS AND ASSOCIATES

Philip (Phil) Dieterich
President & General Manager

Mr. Philip (Phil) Dieterich has been named President and General Manager of Edwards & Associates, Inc. Phil formerly was Executive Director of Integrated Support Solutions of the Customer Support and Services Department of Bell Helicopter Textron, Fort Worth. Phil brings the experience and skills of meeting worldwide customer needs to the established customer orientated cultures of Edwards & Associates.

Edwards is a $100 million revenue company specializing in helicopter sales, completions, maintenance and aftermarket accessories. Responsibility includes all activities at Edwards including its two subsidiary companies; Aeronautical Accessories Inc. and Rotor Blades, Inc. These companies employ over 300 people in Tennessee and Louisiana.

Edwards & Associates, Inc.
Air Trade Center

EDWARDS and ASSOCIATES & Companies Continue Growth

Since 1977 there has been helicopter activity in the mountains of Northeast Tennessee. A visit today to Edwards & Associates, Inc. and Aeronautical Accessories, Inc. would reveal an even busier and exciting climate.

Edwards & Associates, Inc. continues to pace the industry in new helicopter completions while developing new products. Ongoing now are the Model 427 Autopilot, the Bell 210, and preparations for the first North American completion of the AB139. Bell Helicopter Tennessee is now providing OEM repair and overhaul of Bell components with an exciting industry leading warranty program.

Aeronautical Accessories, Inc. also continues expanding the selection of accessories most recently noted by the acquisition of Acadian Composites and Carbide Technologies and the certification of the new Model 412 Lightweight Float Gear.

Rotor Blades, Inc. continues to develop as the leading supplier for repair and overhaul of main and tail rotor blades.

For further information on any of the products or services offered call Toll Free in the U.S. and Canada at 800-251-7094 or outside the U.S. 423-538-5111 or visit the website www.edwards-assoc.com.

Bell Delivers First Aircraft From New Customer Center

Bell Helicopter delivered its first product – a Bell 206B3 JetRanger "Air-One" – to the Fort Worth Police Department during a "sneak peek" of the new facilities at Alliance Airport Friday (May 21).

The ceremony, held 53 years to the day that Amon Carter, a prominent Fort Worth leader, and Harvey Gaylord, then vice president of Bell Helicopter, broke ground for the original Bell facilities.

Red Redenbaugh, Bell's CEO, said, in opening the ceremonies, "It is really an honor to take this step with Bell Helicopter."

While some may have thought that Bell was no longer in the commercial business, Redenbaugh pointed out that the Commercial Business Unit turned in a 15 percent increase in commercial aircraft sales in 2003 and is on track for a 20 percent increase over that in 2004.

The new facility will also house the Bell Training Academy in addition to the Customer Center. Over 90,000 students have passed through the academy over the years. The new school will have 100,000 sq. ft. versus 62,000 at old facility and is truly world-class.

Dignitaries who addressed the group included Mayor Mike Moncrief; Ross Perot Jr., chairman of Hillwood; and Mike Berry, chairman of the Fort Worth Chamber of Commerce as well as president of Hillwood.

Moncrief noted that Fort Worth Police began flying Bell helicopters in 1968 and that Jay Paschke, Fort Worth's chief pilot, was the 90,000th student to attend Bell's Customer Training Academy.

"We're very proud of our Air Support Division, of Bell Helicopter and of Alliance," Moncrief said.

Perot said he has been part of the Bell family since 1981 and that the Alliance Team was excited to have Bell join Alliance.

"We're here to help you, to help you sell more helicopters and to be more successful," he said.

Berry said that Bell is the major reason Fort Worth has become recognized as an aviation center. He indicated the chamber is working with Bell to find new strategic locations for vertiports in the Fort Worth area, thereby strengthening the area's image as an aviation center.

Bell 430 Operated by ChevronTexaco Reaches Major Milestone

A Bell 430 helicopter operated by ChevronTexaco in the Gulf of Mexico (GOM) offshore oil business has reached a major milestone in flying hours. The 430, S/N 49037, has flown over 7,000 hours since entering service in July 1998. This makes it the high time Bell 430.

Perry McKinney, Manager of Aircraft Operations said, "This is one of four Bell 430 aircraft we operate in the gulf. We use this aircraft for oil production crew change and support missions. We fly nine passengers in it, and it flies all day, everyday for us. The reliability, safety and contribution to our bottom line it makes are tremendous assets to our business. 7,000 hours is a lot of hours, and this 430 has a lot of hours left in it."

The Bell 430 is equipped with a four-blade bearingless, composite main rotor system, more power and an enlarged cabin. The Bell 430 cockpit includes LCD technology Integrated Instrument Display System (IIDS) and EFIS.

The Bell 430 main rotor system gives the aircraft an exceptionally smooth ride. Additional passenger comfort is provided with an 18-inch extension to the aft cabin. This provides 20 percent more cabin space than on the Bell 230, which also greatly increases the helicopter's medical transport capability.

The aircraft is powered by twin Rolls-Royce 250-C40 engines and is available with either skid gear or wheels.

Bell/Agusta 609 Civil Tiltrotor Enters Next Phase of Flight-Test Program

The world's first civil tiltrotor aircraft, the Bell/Agusta BA609, begins envelope expansion flight test late this year. Meanwhile, the first flight test aircraft is continuing to undergo configuration modifications at Bell's Flight Research Center, Arlington, Texas, following the conclusion of the first phase of flight testing in 2003. So far the BA609 has flown a total of nine flights with 14 hours of flight time.

In addition, significant effort has been underway to support aircraft #002, which is now at an Agusta assembly and flight testing facility in Cameri, Italy, to begin its build-up for flight test in early 2005. Aircraft #003 will be shipped to Cameri later this year.

The dual flight-test effort now supports the dual production line in the U.S.A. and Italy much sooner than earlier planned. Dual certification (European and FAA) is planned in late 2007 with deliveries following soon after. Bell/Agusta anticipates a second assembly line in Italy for the BA609, so the flight-test/certification experience will also support that goal. U.S.A. and Italian aviation regulatory authorities have been very cooperative, and Bell/Agusta looks forward to their continuous rigorous review for BA609 to obtain a Certificate of Airworthiness to Transport Category standards.

The current order status remains strong with essentially more than the first two years of production already committed to our existing backlog. The BA609 continues as one of the most highly anticipated aircraft ever, and we expect backlog to continue to grow as flight tests continue and are completed through certification.

During the first phase of flight testing in 2003, the nine-passenger aircraft, jointly developed by Bell Helicopter, a Textron company, and by Agusta, an AgustaWestland company, flew in excess of 14 flight hours with the nacelles in the full aft to 15-degrees forward positions. During this first phase of the flight test program, the Bell/Agusta 609 accomplished a full range of helicopter flight maneuvers including hovering, pedal turns, rearward flight and forward flight up to altitudes of 5,000 feet and 100 knots. The first flight on March 7, 2003, followed seven weeks of ground runs and taxi testing.

It is planned that the second phase of flight testing on the 609 will begin this year with flight testing to be conducted in the high-speed airplane mode. With its rotors in the vertical position, the tiltrotor is able to takeoff, land and hover like a traditional helicopter. When the rotors are tilted forward to the horizontal position, the aircraft is able to fly similar to a turboprop fixed-wing airplane. The transition from helicopter mode to airplane mode takes 20 seconds, as does the transition from airplane mode to helicopter mode.

The BA609, a six-to-nine passenger aircraft, has market applications for corporate business, offshore operators and government customers for a variety of roles including search and rescue and internal security team insertion. The BA609 will have the new Collins ProLine 21 3-screen display glass cockpit as standard, and will be certified for IFR flight in known icing conditions. It is expected to be certified in 2007 with first deliveries to begin immediately following. Bell/Agusta will produce a total of four prototype tiltrotor aircraft for flight-testing in the U.S.A. and Italy.

Final assembly for production aircraft will take place at Bell's Amarillo, Texas, facility. A second assembly line will be established at Agusta's plant in Cameri, Italy. Fuji Heavy Industries of Japan has the contract to build all of the production fuselages for the BA609. All parts and components for both lines will come from the exact same source, yielding aircraft that will be identical whether assembled in Italy or Texas.

Headquarters for the Bell/Agusta Aerospace Company is located at Alliance Airport in Fort Worth, Texas. BA 609 customer training will be conducted at this location, which will also serve as a delivery center. The BA609 will cruise at 275 knots with a maximum unrefueled range of 750 nautical miles, 1,000 nautical miles with auxiliary fuel tanks. The aircraft in standard configuration is fully pressurized and de-iced.

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Bell Flies MAPL Tail Fan Demonstrator

Bell Helicopter Chief Executive Officer Mike Redenbaugh announced the first flight of Bell's MAPL tail fan demonstrator at Bell's new Bell XworX research center in Arlington, Texas. On Thursday (July 15), the aircraft lifted into a hover, performed some low-speed maneuvers including pedal turns, and landed. The demonstrator will be used to explore the flight characteristics of this protected, low-noise anti-torque device intended for use on Bell's new MAPL line of light helicopters (the Modular Affordable Product Line.)

Redenbaugh said, "This is an extension of protected anti-torque development at Bell that started in the 1970s with small-scale testing and includes the Ducted Tail Rotor demonstrations done 10 years ago. We are developing a tail rotor for our customers that will be quieter, more effective, and more reliable with lower operating costs."

After the flight, pilot Jim McCollough said, "This aircraft is easy to fly. The workload in hover is very low." Observers described the tail fan as practically inaudible. "You can occasionally hear a purring sound," said one. The demonstrator is an experimental Bell 407 with a 40-inch diameter fan and duct, which replace the 65-inch diameter tail rotor. The tail fan incorporates technology developed during bench testing completed earlier this year, many features of which are covered by new patent disclosures. It has been designed to allow testing in multiple different duct configurations, to provide information on their performance and acoustics in hover and forward flight. The test program will be conducted at the Bell XworX facility and at Leadville, Colo., to obtain high-altitude performance data.

The tail fan is only one of many new technologies being developed specifically for the MAPL family, including an advanced rotor demonstrator planned to fly later this year. The first aircraft in the MAPL family is expected to be available in 2008, although some of these new technologies are mature and are being incorporated in Bell's 427i announced at HAI earlier this year.

We're Moving!!!

Bell Ft. Worth is moving its Customer Support and Services operation into a new World Class Logistics Center. The new facilities will be in the Alliance Airport community. This location will provide the strategic location between the Alliance Airport and Dallas-Ft Worth Airport.

We are taking this opportunity to upgrade the entire warehousing and inventory systems to use new technology and the performance based material flow solutions. This will mean better, faster and more accurate supply of genuine Bell parts to our customer base.

The move will be accomplished in a progressive manner to lessen any impact of AOG and emergency services. Our expected move is during the end of November period with all systems fully operational by early December.

This supply center, warehousing and inventory system is just another step in the journey to being the Premier status our customers deserve.

2004 U.S. Civil Helicopter Accident Statistics

During 2003, in U.S. civil helicopter operations, we experienced 36 accidents that claimed 67 lives. As we mentioned in the *Human A.D.* Volume 15 Number 4, this is a terrible statistic. In response to those fatalities in 2003 we launched a campaign to reduce the number of fatalities in 2004. The theme of this campaign is based on two simple concepts — **SERIOUS** and **PERSONAL**. The first is that every facet of the helicopter industry is a serious business. Designing, testing, certificating, manufacturing, regulating, flying and fixing helicopters are serious matters. Aviation is unforgiving of Carelessness or Neglect. Mistakes and poor Judgement can quickly result in Damage, Injury or Loss of Life.

The second is that everyone involved in this business must make it a **personal** issue. Everyone who touches a Helicopter has a hand in Preventing or Causing a Mishap. Mishaps can cause personal grief for you, your family, friends and colleagues.

It is sad to report that as of 23 August, 2004 we have had 29 accidents this calendar year that have claimed 48 lives. That is a rate that will exceed last year's unacceptable number. We cannot tolerate a repeat of 2003's statistics. We must stop this rate — NOW.

That will require everyone who is involved in the helicopter industry to pledge to be SERIOUS about their contribution, and recognize that no matter how close or far one is from direct helicopter operations you have a PERSONAL responsibility to do your job right the first time and every time.

The Bell UH-1H-II Arrives in Asia

When the Technicians at Bell Helicopter rolled UH-1D tail number 66-00890 off the line in 1966 nobody could imagine that some 38 years later the helicopter would still be going strong, but that is just what happened.

After service with the U.S. Army in Vietnam, Japan, Thailand and the United States 66-00890 was turned over to the Philippine Air Force in 1992, completing nearly 25 years of service with the U.S. Army.

During the years between 1992 and 2003, 66890 continued in service with the Philippine Air Force in support of Philippine Army operations throughout the country.

In late 2003 a joint team consisting of the 410th Maintenance Wing of the Philippine Air Force and Bell Helicopter Customer Support Department began the process of converting the old warhorse into Bell Helicopters newest version of the HUEY, the UH-1H-II.

After several months of modification, flight-testing was completed on the newly completed UH-1H-II in early February

2004 and on 17 February UH-1H-II tail number 66890, was delivered to the 505th Search and Rescue Squadron of the Philippine Air Force in Manila.

Shortly after final acceptance at the 505th Rescue Squadron 66890 was called out on its first mission to aid in the rescue of passengers that were stranded on a ferry that had caught fire in Manila Bay.

The introduction of the UH-1H-II to the Philippine Air Force marks the first UH-1H-II to operate in Asia.

Osprey Completes Phase Four Testing at Sea

By Ward Carroll,
NAVAIR (V-22)
Public Affairs Officer

On June 29 the V-22 Integrated Test Team completed Phase IVB of the Osprey's shipboard suitability testing, the fifth of six at-sea periods the tiltrotor will go through during the aircraft's developmental testing. This was the latest in a series of tests leading to the aircraft's operational evaluation and subsequent full-rate production decision next year. During the eight days aboard the USS Iwo Jima (LHD 7) operating in the waters off the coast of Maryland, the ITT did much toward proving the Osprey's capability on and around an amphibious assault ship.

Two Ospreys operate in close proximity during recent developmental testing aboard USS Iwo Jima (LHD 7). (Photo by JO1 Mike Jones, USN)

In the course of shipboard testing in 1999, the V-22 demonstrated a tendency to tilt along its lateral axis when sitting on the flight deck behind a hovering aircraft – a phenomenon known as "uncommanded roll on deck." Because the Osprey has a digital flight control system, engineers are able to reprogram the flight controls to eliminate undesirable characteristics such as roll on deck. Previous shipboard suitability phases have tested the performance of the Osprey behind a hovering H-1, H-46, and H-53. Phase IVB was designed to test the effect on a V-22 behind a hovering V-22.

"All of our test results with regard to roll on deck were as good as or better than anticipated," said Lt. Col. Kevin Gross, USMC, Government Flight Test Director and Chief V-22 Test Pilot. "The handling of the Osprey in the shipboard environment is proving to be one of its strong characteristics."

A series of firsts were accomplished during this test period, Gross said. Along with the first shipboard interaction tests of a V-22 in the vicinity of another V-22, it was the first time a V-22 landed on Spots 5 and 6 – the landing points adjacent to the ship's island. Additionally, the wind envelope for LHD-class V-22 operations was expanded – an important element toward a successful OPEVAL next year.

The Integrated Test Team was offered another challenge when Osprey No. 22 had a nacelle component failure while hovering over the flight deck during the final V-22/V-22 interaction tests. Subsequent landing and shutdown were uneventful, and an investigation into the malfunction continues.

"Even with a component failure, this was an overwhelmingly successful detachment," said Col. Craig Olson, USAF, V-22 Program Manager, who had his first taste of shipboard life during this test period. "Now I know firsthand that the days at sea are long ones, and I thank the Integrated Test Team for their work toward fielding this remarkable capability."

Bell, Boeing and Team Osprey Kick Off *Farnborough Air Show* With Reception

A reception hosted by Bell, Boeing and Team Osprey helped kickoff Boeing's participation at the 2004 Farnborough Air Show Saturday night.

The event was held to honor the program's key customers, the U.S. Marine Corp and U.S. Special Operations Command. Special guests attending the event included Lt. Gen. Michael Hough, USMC Deputy Commandant of Aviation; Mike Redenbaugh, CEO of Bell Helicopter, and Jim Albaugh, president and CEO of Integrated Defense Systems. Members of the Bell Boeing team and Team Osprey, a coalition of leading aerospace companies from 13 key V-22 program suppliers, also attended.

The Team Osprey exhibit at Farnborough is targeted at both the V-22's present and future industry base and the international media.

"Farnborough is a great opportunity to make a wider audience aware of the V-22 and showcase it's capabilities," said Mike Tkach, vice president and V-22 program director. The V-22 is a multi-mission, multi-service tiltrotor aircraft that combines the speed and range of fixed wing aircraft with the vertical flight performance of a helicopter.

V-22 flight test activities continue at Naval Air Station, Patuxent River, Md., Edwards Air Force Base in California and VMX-22, the Osprey Test and Evaluation squadron at Marine Corps Air Station New River, NC. In the past few months, the program has reached several milestones including the accumulation of more than 2,000 flight hours (since return to flight in May 2002), completion of the latest round of shipboard suitability tests on board the USS Iwo Jima, and a successful Defense Acquisition Board (DAB) review.

Rolls-Royce and the FADEC*

Editors Note: *This Rotorbreeze article on the FADEC for models 407 and 430 has been presented in a two-part series. Part 2 will cover operation, troubleshooting and maintenance. Part 1, covering system features and general arrangement was published in the June of 2004 issue.*

Part II

*** Full Authority Digital Engine Control installed on the Rolls-Royce Model 250 Engine**

Operation

During normal operation in Auto mode, the ECU is monitoring all sensor inputs and adjusting fuel flow to maintain rotor speed, acting as the power turbine governor in this capacity. The ECU is also continuously monitoring all sensor and switch inputs to make sure everything is within limits. A problem detected, will be categorized as follows:

- **Soft Fault** – Failure of a redundant or backed-up sensor. No operational effect. Example: T1B range fault. The T1 sensor has two coils in it: T1A and T1B. It only needs one sensor to read correctly. Annunciated as a Maintenance Advisory, a FADEC Degrade light on engine shut down in a 407, a M/ECU indication on the 430 IIDS.
- **Degraded Fault** – Failure of a non backed-up, but non-critical sensor. System operation may be degraded. Example: Collective Pitch sensor fault. With this sensor input declared faulty, the control will not be able to anticipate load changes,. This condition may result in RPM droop or over speed during power changes. Annunciated as a FADEC Degrade on a 407, or a Maintenance Advisory indication on a 430.
- **Hard Fault** – Failure of a critical sensor or function. ECU no longer capable of controlling fuel resulting in a direct reversion to manual on a 407, or a fail-fixed fuel flow on a 430. Example: Step Count Fault. The ECU has determined that the stepper motor, which controls fuel flow, cannot be commanded to its required position. Annunciated as FADEC FAIL on the 407 and a red ECU warning light on the 430 IIDS, with the accompanying audio alert in both aircraft.

The ECU electrical power source is redundant, supplied by the airframe electrical bus and the Permanent Magnet Alternator (PMA,) independently of each other. The PMA mounts on the engine where the power turbine governor is seen on the C30 engine. The PMA is powered by the NP drive train, and supplies electrical output only when NP is greater than 85%. Therefore, the ECU is totally dependent on airframe power for starting and while idling on the ground. Caution is necessary when selecting between batteries, APUs, generators, etc. during starts or ground operations. An interruption of electrical power to the ECU could result in an unwanted engine or control system responses. Remember, if electrical power is removed from the ECU, the control will be placed in manual mode, regardless of the Auto-Manual switch position!

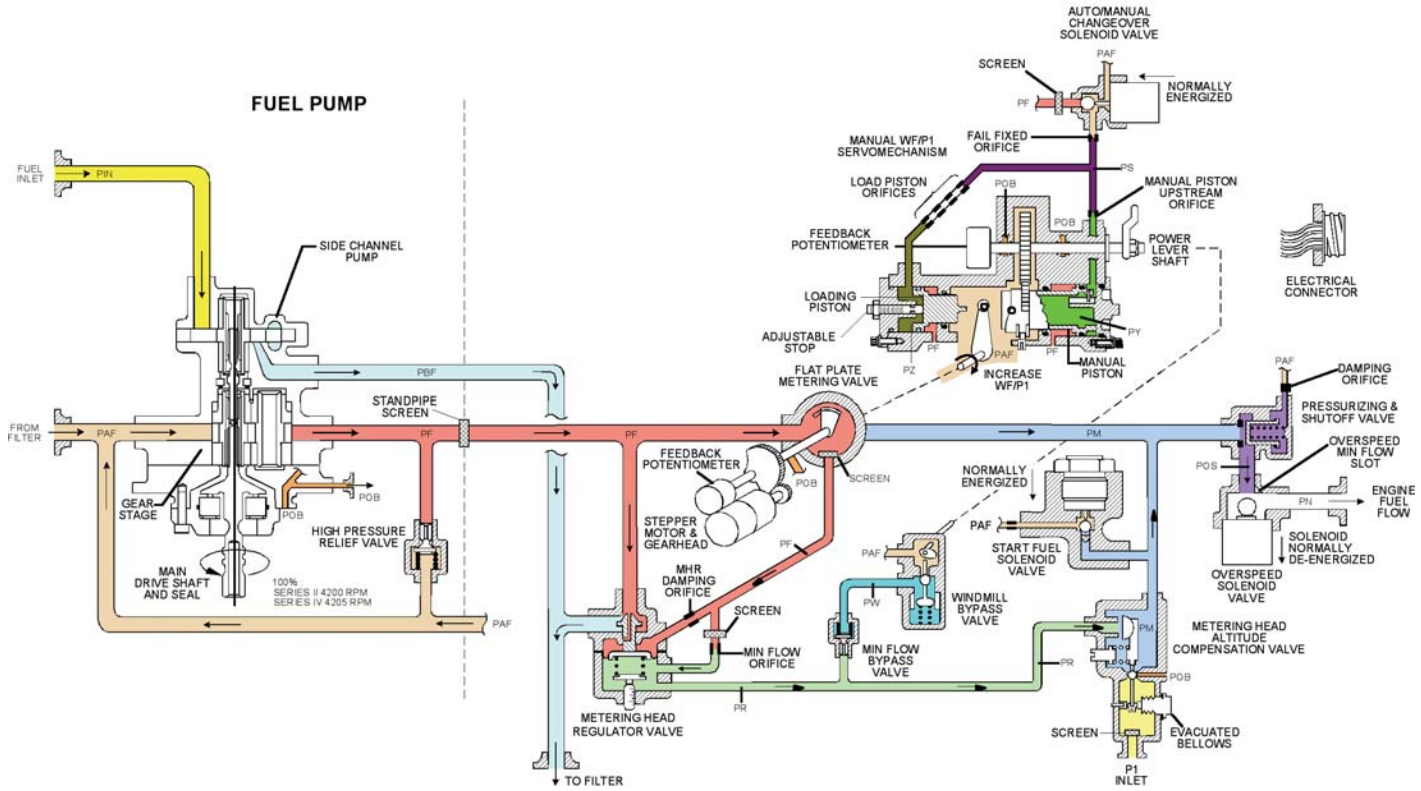


Figure 4 – HMU Schematic

When the control system is in Auto mode, and the throttle is in fly position, the ECU is commanding the stepper motor to open or close the metering valve in order to maintain 100% rotor speed. Whereas, in Manual mode, as described earlier, fuel flow and power turbine governing is performed entirely by the pilot coordinating the twist grip and the collective lever to maintain rotor speed. When operating in manual mode, the throttle position is directly related to fuel flow. Increasing the throttle position, increases fuel flow, and therefore engine power. If power is increased with twist grip, and increased torque is not demanded with collective, the turbine and rotor speed will increase, possibly above system limitations.

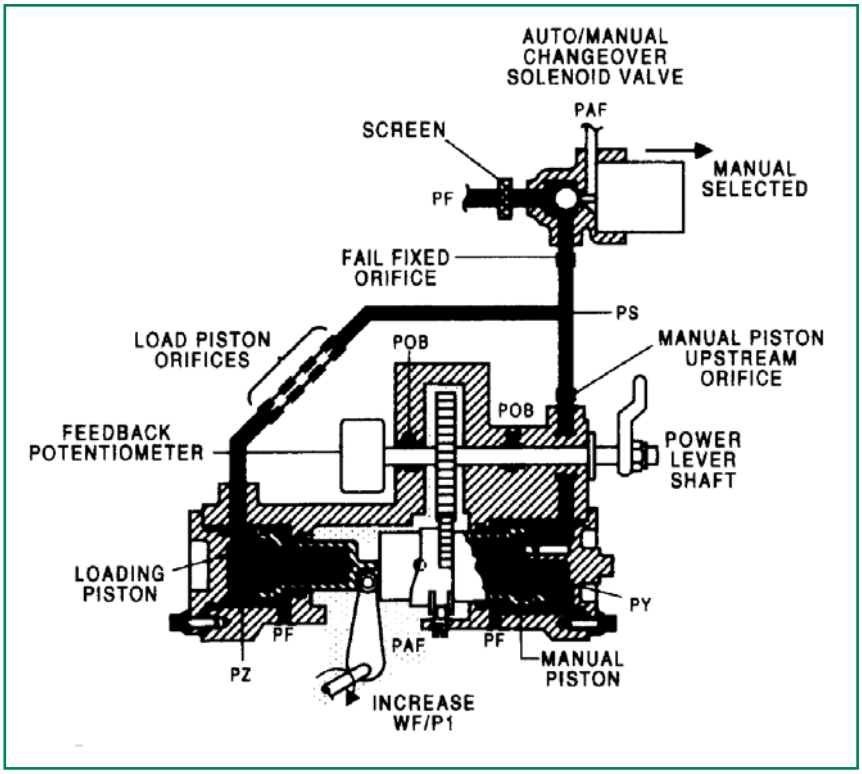


Figure 5 – Manual mode portion of the HMU

Figure 4 shows the general layout of the hydro-mechanical unit. Figure 5 depicts the HMU with manual mode engaged. When the system is in manual mode, the pistons move left and right (as shown) to control fuel flow. The pistons move based on throttle position through the "power lever shaft" (PLA lever). This lever is connected to a collar on the "manual" piston, in the schematic, the one on the right, which has a hole in it. When the collar is rotated by its gear mesh with the PLA lever, it covers or uncovers the hole in the piston. The piston then moves to the left or right until the hole is aligned with the tapered portion of the collar. This left and right movement of the pistons moves the lever which is trapped between them, which is connected to the shaft, which in turn, is attached to the metering valve and stepper motor (see figure 4). The piston on the left is called the "loading" piston. Its job is to capture the lever and ensure that the lever is always positioned at the face of the "manual" piston (the one being commanded by the pilot). When the control system is in manual and the pistons are engaged, throttle response is immediate. Engine acceleration is determined by the slew rate of the loading piston, and deceleration rate is determined by the slew rate of the manual piston. These slew rates are established to insure surge-free engine operation during accelerations and to prevent an engine flameout during deceleration.

As one can see while comparing the differences between figure 4 and Figure 5, the pistons must transition from the parked configuration in auto mode in Figure 4, to the engaged configuration in Figure 5. The transition from parked to engaged, is a function of the initial fuel flow setting as well as the initial throttle setting. Figure 6 shows pistons in the "parked" position for a typical cruise power setting. When manual mode is selected at this condition, it takes 3.9 seconds for the pistons to extend completely for full manual mode operation.

Troubleshooting/ Maintenance

The ECU is mainly a power turbine governor, but also continuously monitors the health and status of all control inputs and outputs. If the ECU senses a fault, it immediately logs the fault in memory and may alert the pilot, depending on the fault identified. As noted in the "Operation" portion of this article, there are three basic fault classifications: Soft Fault, FADEC Degraded, and Hard Fault. Once a fault is annunciated, the pilot must determine remedial action in order to safely conclude the flight. In order to properly respond to a fault, pilots need to be very familiar with the FADEC, its operational characteristics and emergency procedures. After any FADEC fault annunciation, it is important to adhere to the Flight Manual, Maintenance Manual and Rolls-Royce Operations and Maintenance Manual to ensure that return to service criteria are met.

In addition to FADEC Fault detection, there is a second reason why a warning light, IIDS advisory or annunciation will appear in the cockpit, either at the time of the occurrence, or recorded in the FADEC memory and announced at engine shutdown. The second reason for a cockpit annunciation is the detection of an exceedance of a published engine limit (speed, torque, or temperature). In the case of the Bell 407, each of the three Litton Indicators will identify the exceedance by displaying an "E" on the face of the indicator. Whereas, in the case of the Bell 430, the 1 M/OEI or M/OEI 2 advisory light will latch when the exceedance threshold is reached during engine operation).

There are several ways to determine the specific fault or exceedance that is logged in the ECU memory. In the 407 aircraft, the flashing light method can be used. After engine shutdown the maintainer can place the FADEC in a maintenance mode and interrogate the FADEC memory. By noting the caution light which illuminates and counting the number of flashes, the maintainer can identify the occurrence in question. In the Bell 430, the IIDS can be interrogated with Bell guidance. Please refer to the appropriate section of the flight manual or engine operations and maintenance manual for specific instructions.

However, for either aircraft, Rolls-Royce highly recommends use of the computerized Maintenance Terminal program (EMC-35A) to access all the necessary information needed to efficiently diagnose the problem. The use of the Maintenance Terminal software, in conjunction with assistance from Rolls-Royce if necessary will greatly reduce the time required to identify and isolate the root cause.

Continued on next page

Rolls-Royce and the FADEC*

Part I — Continued from Page 9

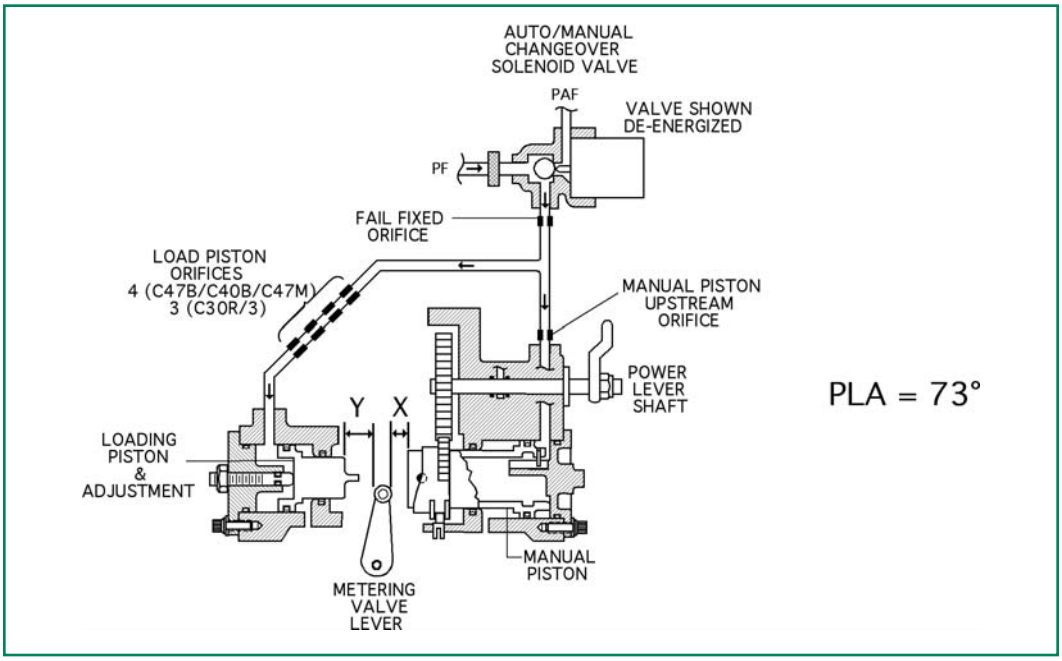


Figure 6 – Auto to manual transition at typical cruise fuel flow

The ECU does not differentiate between faults and exceedances when it stores the information. However, the latest FADEC software versions differentiate between what the engine condition and engine time was when the faults were stored. Recorded data are stored in the FADEC memory using the categories and descriptions below:

CURRENT RAM FAULTS

Faults that are present while the ECU is powered. Cleared by ECU power down or Auto / Manual / Auto Switchover.

Last Engine Run Faults

Faults that are stored in "EEPROM" memory the last time the engine was running. Automatically cleared and set equal to RAM faults at next engine lightoff. Can be cleared by Maintenance Terminal.

Accumulated Faults

All Faults that are stored in "EEPROM" since last time memory was cleared. New faults added when engine is running. Can only be cleared by Maintenance Terminal.

Time Stamped Faults

List of Accumulated Faults and time they occurred by engine run time, the 30 most recent faults are listed. Can only be cleared by Maintenance Terminal. Time Stamped Faults are not applicable to the Bell 430 equipped with ECU software version 4.207.

Only the first two categories of faults listed above drive annunciations in the cockpit. A maintenance advisory annunciation with the throttle in cut-off indicates the presence of a fault in either Current RAM or Last Engine Run Faults. A maintenance advisory annunciation with the throttle at idle indicates the presence of a Current RAM Fault.

Information that indicates a control system fault needs to be investigated by using the applicable fault isolation manual (FIM). Information that indicates an engine exceedance needs to be investigated by referring to the appropriate engine Operations and Maintenance Manual, paragraph 6.

There are several Commercial Service Letters that are available for reference, included are: CSL 5076/6076 – Maintenance Terminal Software, CSL 5070/6069 – FADEC system Operation and Maintenance Guidelines, and CSL 5064/6063 – ECU History Verification.

The FADEC system installed on the Rolls-Royce Model 250 engine is "on condition" for maintenance scheduling. Only the HMU has a scheduled overhaul, currently each 2500 hours. It also has a 300-hour recurring spline inspection on the gear pump. All other components are free of recurring maintenance. The Maintenance Terminal software, in conjunction with the Fault Isolation Manual in the Operations and Maintenance manual simplifies and accelerates the troubleshooting process when problems do occur.

The low maintenance requirements of the FADEC system coupled with the improved responsiveness it offers as compared to the hydromechanical system it replaces make it a valued addition to the Model 250 engine family. There is no doubt that FADEC engine controls are here to stay, and will be used increasingly on new helicopters yet to be introduced. Please feel free to share the information in this article in order to improve overall awareness of the features and benefits of the EMC-35 FADEC used on Rolls-Royce series IV engines.

Editor's Note

The below thumbnails are of a few of our U.S. Marines working on the flight line at Camp Taqaddum Iraq. We are very proud of our Marines and our Bell Helicopter products doing the job that needs to be done.

Lance Cpl. Christopher L. Eiben, a UH-1N Huey and AH-1W Super Cobra mechanic with Marine Light Attack Helicopter Squadron 775, Marine Aircraft Group 16, and a native of Huntington Beach, Calif., cleans a Cobra's windshield at Camp Taqaddum, Iraq, April 29, 2004.

Lance Cpl. Joseph Mixer, a crew chief with Marine Light Attack Helicopter Squadron 775, Marine Aircraft Group 16, and a native of State College, Pa., performs maintenance on a UH-1N Huey at Camp Taqaddum, Iraq, April 29, 2004.

Oh-Rah!

A Marine with Marine Light Attack Helicopter Squadron 775, Marine Aircraft Group 16 guides an AH-1W Super Cobra onto the flight line at Camp Taqaddum, Iraq, April 29, 2004. The activated reserve squadron has been conducting security escort and close air support missions since arriving in Iraq earlier this year. Photos by: Cpl. Matthew J. Apprendi

DESTROYED AIRCRAFT

The following Bell Helicopter aircraft identification data plates have been returned to Bell, were subsequently destroyed and documented as such. The serial numbers have been retired. Additionally, Bell has recommended to the certification offices of the FAA and Transport Canada that the aircraft serial numbers be removed from the applicable type certificate data sheets.

Model	Serial Number
206B	4129

The following Bell Helicopter aircraft were reported by official aviation investigation authorities as destroyed. Based upon that finding, Bell has recommended to the certification offices of the FAA and Transport Canada that the aircraft serial numbers be removed from the applicable type certificate data sheets.

Model	Serial Number
206B	1782, 1714, 1761, 3064
206L-1	45788
206-4	52020
212	30613
47G5	25041

It is very important that owners and operators understand the significance of an aircraft officially reported by an accident investigation authority as destroyed, or where the aircraft data plate has been destroyed. Bell Helicopter furnishes listings of destroyed aircraft and destroyed data plates as a service to customers, the FAA and Transport Canada and worldwide certification authorities. Bell does not represent that these lists constitute all of the aircraft or data plates that have been destroyed. Listed are only those aircraft where Bell has recently received final reports from official accident investigation authorities describing the aircraft as destroyed or where Bell has destroyed the aircraft identification plate as requested by others.

SHOP Talk

Q: We have been experiencing water contamination in the 212 /412 main transmission. On several occasions, the oil appears cloudy. We have replaced the oil, but shortly there after the oil turns cloudy again. What is allowing the water into the Transmission?

A: There are only a few possibilities that will allow water contamination of the main transmission oil. The use of high-pressure washers has been a primary source of water contamination. Concentration of the high-pressure spray around the transmission breather, cap or seals will physically push water past seals and o-rings contaminating the oil. Operators must use caution when using pressure wash equipment to prevent this type of occurrence. Another source of water contamination has been a clogged # 1 hydraulic reservoir scupper drain line. The seal drain for the #1 hydraulic pump ties into the scupper drain line. Clogging of the scupper drain line below the tie in point for the hydraulic pump will allow water to back up into the hydraulic pump seal area and eventually this water will leak past the hydraulic pump quill seal contaminating the transmission oil.

Q: General, what is the Bell Helicopter policy in regards to granting TBO extensions for components that use parts that have had non BHT-approved repairs accomplished?

A: All inspection, repair and overhaul procedures published by Bell, including part retirement life, are based solely on the use of Bell parts that have been maintained using Bell-approved data. Data supplied by Bell in its manuals or otherwise (including TBO extensions) is not applicable to non-Bell parts or parts that have been repaired using data and/or processes not approved by Bell.

Bell is not responsible for any part other than those that it has approved. If you identify or suspect the use of parts not authorized by Bell, either remove the affected item(s) from the aircraft or obtain instructions for continued airworthiness (ICA) from the manufacturer or organization that approved the repair.

Q: What is the meaning of MAX HB found in the stations diagram (MM chapter 6) of each model aircraft?

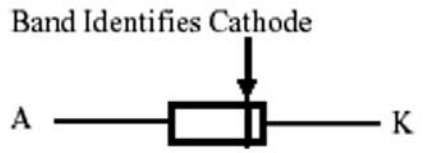
A: HB is the abbreviation for Half Breadth or the distance between buttock line 0 and the widest part of fuselage to the right or left of BL 0.0. Max HB defines location where the fuselage reaches maximum width.

Q: What is the purpose of the stabilizer finlets on models 407 and 206L series helicopters?

A: The purpose of the finlets (aka Auxilliary Fins) is to improve the dihedral stability of the helicopter, namely to remove the tendency to roll from side to side in flight. The Aux fins are offset slightly to the left so they are parallel to the direction of the rotor-wash in forward flight at cruise airspeed, thus reducing drag.

Q: How do I determine the cathode and anode on those diodes?

A: There is a band marked on a typical axial-lead diode that identifies the cathode. The band can be sometime black, gray or silver. This is where the meter negative should be when testing the diode in forward bias direction.



Typical Axial-Lead Diode

Q: Composite bond material is often called for in the Structural Repair Manual or in BHT-Approved Structural Repair. What is this material and where can I find this material?

A: Composite bond material is an adhesive film bonded to a structural material, and protected by a peel ply film. Composite bond repair material is used to reduce metal preparation before bonding, and to promote adhesion. Composite bond repair stock is available in smooth or rigidized sheet and in 2" x 6" angle; and is available in various materials and thickness. Data for sheet material can be found in the BHT-206-SRM -1 Appendix A-5 and in the BHT-MED-SRM-1 Appendix B-1. Data for composite bond angle material is explained in Information Letter GEN-03-90. You can order the material from BH spares supply center department. Sheet stock is sold by the square foot and the angle material is sold by the foot . Note that it is important to remove peel ply and lightly sand composite bond prior to bonding.