RADS-AT

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18-1. RADS-AT

The Rotor Analysis Diagnostic System - Advanced Technology (RADS-AT ™), is used for the purpose of determining rotor faults and identifying recommended maintenance actions to correct those faults. In addition the RADS -AT system maintains a database of measured data, diagnostic outputs and aircraft history. The system will generate printed reports from this database to support historical review and trending of data.

The RADS-AT utilizes a Diagnostic Programming Language (DPL) in an OS-9 ® environment to provide an easy to use method of performing rotor vibration analysis.

The RADS-AT (Figure 18-1) consist of:

1. Enhanced Universal Tracking Device (EUTD) which produces timed pulses that are generated from the rotating blades and sent to the Data Acquisition Unit (DAU).
2. Data Acquisition Unit (DAU) that processes the tracker and vibration signals.
3. A hand held Control and Display Unit (CADU) that controls data acquisition, displays measurements and analysis results, print reports and transfer data to or receives data from an off-line computer.

18-2. OFFICE CONFIGURATION

The major elements of the system are shown in Figure 18-2. The office configuration is a subset of the equipment shown. Generally the office configuration consist of the CADU, 12 Vdc power supply, a printer, a host computer and cables. There is no need for the DAU or associated cables and sensors for RADS-AT operation in an office. The office configuration involves interaction between the RADS-AT CADU and a host computer to transfer measurement data to the host computer from the CADU and for uploading setup data, programs, etc. from a host computer. The CADU can also be used in the office configuration to run diagnostics, view displays of measured data and print information stored in CADU memory.

18-3. CONNECTING EXTERNAL POWER

WARNING

FAILURE TO OBSERVE ALL SAFETY PRECAUTIONS WHEN CONNECTING EXTERNAL POWER TO THE RADS-AT EQUIPMENT CAN RESULT IN INJURY TO PERSONNEL. OBSERVE ALL SAFETY PRECAUTIONS WHEN CONNECTING EXTERNAL POWER.

1. Connect the 12 Vdc battery charger to the CADU and an AC power source.
   a. The 12 Vdc power supply charger connects at the top of the CADU under the credit card slot cover and will provide the required power to operate the CADU independently of the DAU and /or charge the internal battery.
   b. Keep the battery charger connected to the CADU whenever charging the NICAD battery or using the CADU. It is not recommended to be connected for long term storage.
2. Verify the external power has been applied by turning on the CADU and press the LAMP key. The EL lamp will remain ON when the key is released if external power is available and extinguish if external power is not available.

18-4. CONNECTING A PRINTER

The CADU provides an RS-232 serial port and a parallel printer port. Use the serial port (9-pin connector) for the RADS-AT printer and Epson compatible serial printers. Use the parallel port (25-pin connector) for printers that have a parallel interface.

To configure the CADU for the printer:

1. Go into the Manager menu which is the F4 key on the main menu.
2. Use the cursor key, highlight the Setup option and select by pressing the “DO” key.

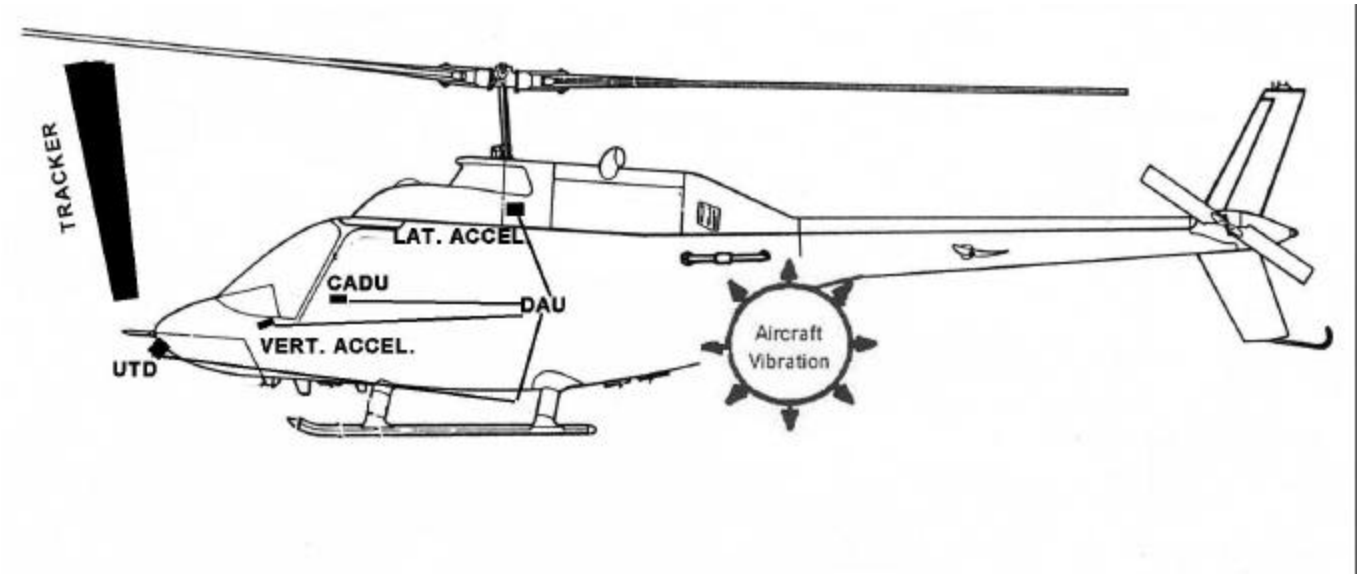

Figure 18-1. Typical System Setup

3. Set port type to either parallel or serial by highlighting the “Change Port” option and selecting the appropriate port and press “DO”.

4. Select the driver from the installed drivers under the “Change Type” option. For each printer type there is often two drivers, a standard driver and one ending in “LF”. (If you experience data overprinting on one line, use the driver ending in “LF”. Concurrently if you experience data printing on every other line than select the driver without “LF”).

18-5. CONNECTING AN EXTERNAL COMPUTER

The RADS-AT Communication Package (RADSCOM) (29484900) is utilized for executing sophisticated commands from an IBM PC/AT or other compatible computer to the RADS-AT. These commands are described throughout this chapter.

1. Connect the serial cable (28130802) between the RS-232 port on the CADU(9-pin connector) and the RS-232 port on the host computer. The gender changer (28130800) and RS-232 adapter (2813081) may be required.

.18-6. AIRCRAFT CONFIGURATION

NOTE

Always follow the setup instructions, F4 in the Measure Menu, for the aircraft installation. If there is a discrepancy between the setup instructions and the application notes or maintenance manual the setup instructions should take precedence.

The number, type and position of the required aircraft sensors are dependent upon the aircraft setup script . The TH-57 requires 2 accelerometers for the main rotor and 1 accelerometer for the tail rotor, a magnetic RPM sensor, a rotor tracking device (UTD), a CADU and a DAU.

18-7. CONNECTING AIRCRAFT POWER

FAILURE TO CORRECTLY CONNECT THE DC POWER CABLE CAN RESULT IN PERSONNEL INJURY OR DAMAGE TO THE RADS-AT. OBSERVE POLARITIES WHEN CONNECTING THE DC POWER CABLE.

ALL CABLES SHOULD BE CONNECTED TO THE CADU AND THE DAU PRIOR TO CONNECTING EXTERNAL POWER

DO NOT INTERCHANGE CABLES FROM ONE UNIT TO ANOTHER.

ENSURE DC INPUT POWER CABLE IS CORRECTLY CONNECTED. FAILURE TO CORRECTLY CONNECT THE CABLE AND ALLOWING ANY PORTION OF THE RADS-AT SYSTEM TO CONTACT THE AIRFRAME CAN RESULT IN DAMAGE TO THE RADS-AT UNIT.

NOTE

The canvas carrying case supplied with the DAU isolates the DAU from secondary aircraft grounds in case of reverse polarity applied to the DAU.

The RADS-AT requires 18 to 36 Vdc power at 1.5 amps to operate. The polarity of the input power is important. Connect the positive (+) supply rail to pin B on the DAU power input connector and connect ground to pin A.

18-8. INSTALLATION RADS-AT FOR MAIN ROTOR

1. Install the DAU in the aft cabin.
2. Remove forward fairing.
3. Install one accelerometer and bracket on top of the transmission on left side where the swash-plate support attaches to transmission.

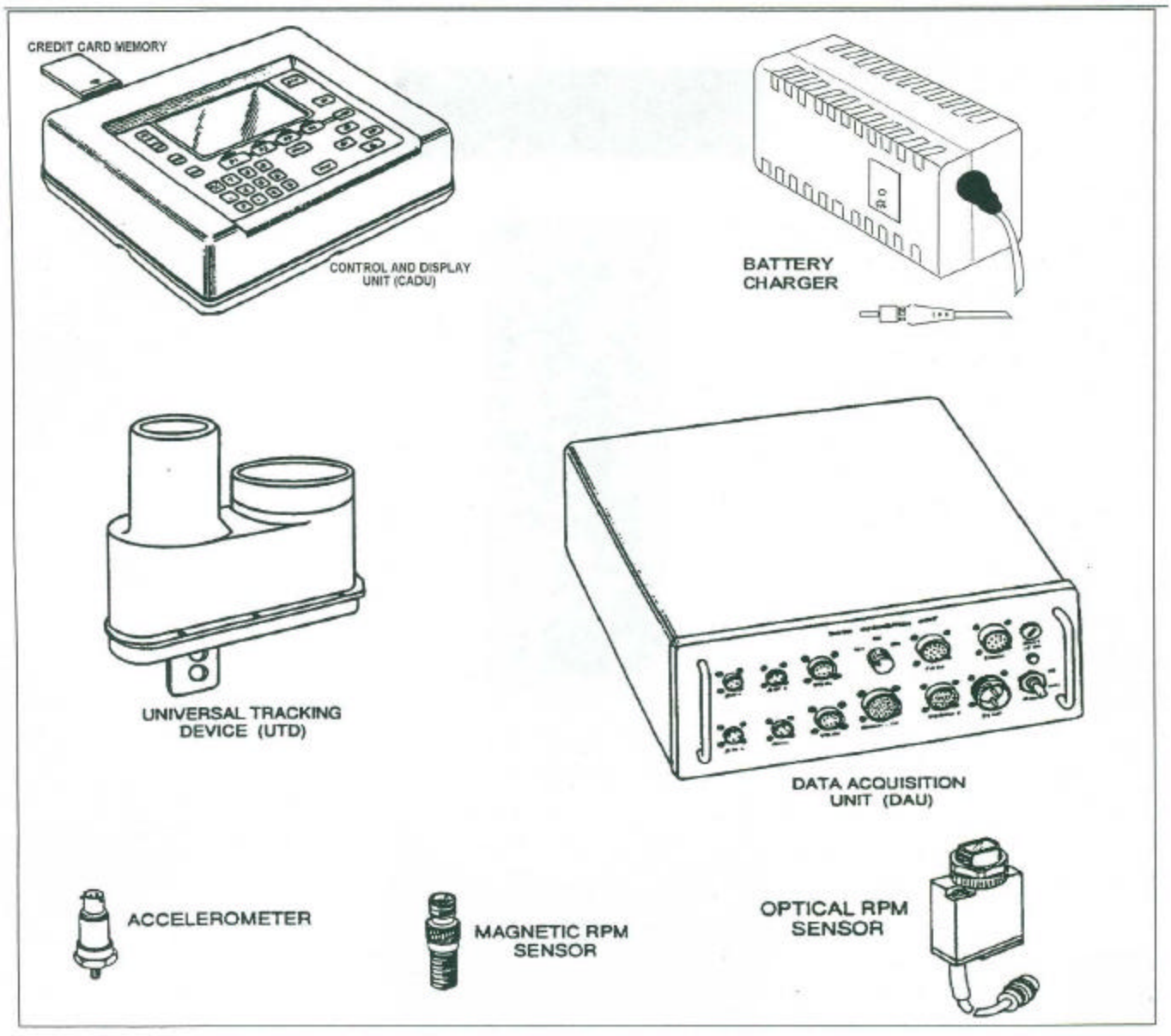

Figure 18-2. Rotor Analysis Diagnostic System Components

4. Connect accelerometer cable to ACC CH1 on the DAU and to accelerometer. Secure cable so approximately 2 inches of slack is available for pylon motion to prevent interference with rotating components.

5. Install accelerometer and bracket to the copilot's side of the instrument panel console with accelerometer pointed down.

6. Connect accelerometer cable to ACC CH2 on the DAU and to the accelerometer.

7. Install the magnetic RPM sensor bracket over the left front pitch horn of the fixed swashplate. Secure with clamp and two self-locking nuts, torque to 50-70 in-lbs.

8. Insert single interrupter from the bottom into the drain hole in the web of the rotating swashplate. Secure with a No.8 self-locking nut. Ensure the "L" Bracket interrupter blade is radial to the mast and the "L" bracket leading edge is forward of the mounting screw.

9. Screw magnetic sensor into bracket from the bottom. Adjust magnetic sensor until a gap of .060 is obtained between single interrupter and magnetic sensor. Tighten the jam nut on the sensor to secure in place, then safety wire using .032.

10. Connect magnetic sensor cable to TACHO #1 on the DAU and to the magnetic sensor. With collective in the full up position secure cable so approximately 2 inches of slack is available to prevent interference with rotating components.

11. Install transmission cowling.

12. Install the tracker bracket to the landing light cover. Install tracker to bracket. Adjust angle on tracker and tighten bolts.

13. Install tracker cable to tracker and to the Tracker #1 port on the DAU. Secure cable to airframe using tie wraps or tape.

WARNING

FAILURE TO PROPERLY SECURE CABLES TO THE AIRFRAME COULD RESULT IN PERSONAL INJURY AND/OR LOSS OR DAMAGE TO THE AIRCRAFT.

14. Connect the 10' foot CADU to DAU cable.

15. Connect the 28VDC power cable to the outlet on the side of the instrument pedestal and to the 28VDC port on the DAU.

16. Paint 3 feet of leading edge of main rotor blades with black lacquer paint on both blades for daytime operations or 3 feet of reflective tape on the trailing edge of both blades for nighttime operations.

18-9. PREPARE AIRCRAFT FOR GROUND RUN

1. Ground run aircraft and perform "INITIAL" test mode.

2. Adjust flight controls in accordance with RADS-AT.

18-10. PREPARE AIRCRAFT FOR FUNCTIONAL CHECK FLIGHT

1. Perform "FLIGHT-INB" test mode during Functional Check Flight.

2. Adjust flight controls in accordance with RADS-AT.

18-11. ROTOR SMOOTHING AND MECHANICAL TROUBLE SHOOTING

1. The RADS-AT specifies the minimum number of moves to achieve the target 1/rev levels. This is not a limit level, but is only a target used by the RADS-AT to perform its analysis. While the level of 1/rev which is acceptable is up to the operator discretion, the following criteria in Table 18-1 may be used for aircraft in good mechanical order.

2. The level of 1/rev that is acceptable is discretionary to the operator. No detrimental effect due to main rotor or tail rotor 1/rev has been measured due to 1/rev levels of 1.0 ips or less. 1/rev is considered a ride quality issue only, not a wear or fatigue problem. With this stated, sudden changes in the level of main rotor 1/rev should not be ignored. If the 1/rev changes suddenly, a thorough inspection of the main rotor blades, hub and control system should be performed as soon as possible.
3. If an acceptable level cannot be expeditiously obtained a mechanical problem may exist.

18-12. REMOVE RADS-AT FROM AIRCRAFT

1. Remove all RADS-AT hardware from aircraft. Replace swashplate nuts that had been removed with new hardware and retorque as specified in Bell BHT-206A/B-SERIES-MM.

Table 18-1. Vibration Criteria

SOURCE	IDENTIFICATION	LEVEL - IPS	RECOMMENDED ACTION
MAIN ROTOR 1/REV	HOVER	LEVEL < 0.2	NONE
	60 AND 110 KTS	0.2 < LEVEL < 0.5	AIRCRAFT SERVICEABLE REDUCE AT CUSTOMER OPTION
		0.5 < LEVEL < 1.0	CORRECT WHEN PRACTICAL
		1.0 < LEVEL	REMOVE AIRCRAFT FROM SERVICE; CORRECT PRIOR TO NEXT FLIGHT
TAIL ROTOR 1/REV	TAILBOOM LATERAL AT 100% RPM	LEVELS <0.2	NO ACTION RECOMMENDED
		0.2 < LEVELS < 0.6	LEVELS SERVOCEABLE, REDUCE AT CUSTOMER OPTION. NO ACTION REQUIRED
		0.6 < LEVELS	REDUCE AS SOON AS PRACTICAL