DESIGN MAINTENANCE ANALYSIS INC.

1900-1-65

RAYTHEON BEECHCRAFT 1900D

FLIGHT DATA RECORDER SYSTEM UPGRADE KIT

INSTALLATION PROCEDURES

REVISION 5

DECEMBER 8, 1999

DESIGN MAINTENANCE ANALYSIS INC.
RAYTHEON BEECHCRAFT 1900D
FLIGHT DATA RECORDER SYSTEM UPGRADE KIT

INSTALLATION PROCEDURES

- *DETERMINE THAT ALL KIT COMPONENT PARTS HAVE BEEN RECEIVED BY COMPARING KIT PACKING SHEET WITH A PHYSICAL INVENTORY.*

- *TOOLING REQUIRED:*

    - *STANDARD MECHANICS TOOL SET*
    - *STANDARD SHEET METAL TOOLS*
    - *DFDR READOUT EQUIPMENT*
    - *6" AND 12" SCALE*
    - *INSERTION/EXTRACTION TOOLS (see drawings)*
    - *CRIMPING TOOLS (see drawings)*

AIRCRAFT PREPARATION

- *PREPARE THE AIRCRAFT FOR KIT INSTALLATION BY ENSURING THAT:*
    - *AIRCRAFT YAW, ROLL AND PITCH TRIM CONTROL SYSTEMS ARE PROPERLY RIGGED, REFER TO MM 27- 20- 00 / 27- 10- 00 / 27- 30- 00.*
    - *REMOVE LEFT HAND PASSENGER SEAT IN THE FIRST ROW AFT OF THE MAIN SPAR. REMOVE THE RIGHT HAND PASSENGER SEATS AFT OF THE MAIN SPAR TO BUT NOT INCLUDING THE TRIPLE SEAT AT THE REAR OF THE CABIN.*
    - *REMOVE CARPET STRIPS AFT OF THE MAIN SPAR AS REQUIRED TO ACCOMPLISH THE FOLLOWING 2 STEPS*
        - *REMOVE THE SPAR RAMP AFT OF THE MAIN SPAR*
        - *REMOVE FLOORBOARD #"S 161BT, 163BTC, 162BT, 172AT, 173DTC,172BT,172CT, 181AT, AND 181BT, REFER TO MM 6-50-00 FIG 2.*
    - *REMOVE RIGHT HAND HEAT REGISTER GRILLE ASSEMBLY AS REQUIRED TO PROVIDE ACCESS TO THE WIRE HARNESS RUN FROM AFT OF THE MAIN SPAR TO THE FLIGHT DATA RECORDER IN THE CARGO COMPARTMENT. THE UPGRADE KIT WIRE HARNESS FOLLOWS THE EXISTING HARNESS FORM THE AREA OF THE ACCELEROMETER AT FS 296.5 TO THE FDR AT FS 544.5.*
- *REMOVE CARGO COMPARTMENT BAGGAGE WEB.*
- *REMOVE CARGO COMPARTMENT INTERIOR LINER AS REQUIRED TO PROVIDE ACCESS TO EXISTING WIRE HARNESS*

WIRING AND ELECTRICAL MODIFICATIONS

- *IDENTIFY AND INSTALL KIT WIRE HARNESS, REFER TO DRAWING # 1900-1-501. NOTE: ENSURE THAT THE HARNESS END WITH THE INSTALLED CONNECTORS IS PLACED ADJACENT TO THE ACCELEROMETER, NOT THE FLIGHT DATA RECORDER. THESE CONNECTORS MATE WITH THE NEW TRANSDUCERS AND REPLACEMENT ACCELEROMETER.*
- *ACCOMPLISH WIRING MODIFICATION AT CONNECTOR J510/P322 IN CARGO COMPARTMENT OVERHEAD (UE 1 - 92), OR P508/J744 ON FDR MOUNTING SHELF (UE 93- AND ON) REFER TO DRAWING # 1900-5-3 SHEET 1 THROUGH 4 FOR J510/P322, AND DRAWING 1900-5-31 SHEET 1 THROUGH 4 FOR P508/J744*
- *INSTALL TERMINAL STRIP ON FDR SHELF, REFER TO DRAWING #1900-1-504 SHEET 1 & 2.*
- *ACCOMPLISH WIRING MODIFICATION AT FDR CONNECTOR J650 AND J607, REFER TO ELECTRICAL INTERCONNECT DRAWINGS SUPPLIED WITH THIS KIT.*
- *SHOULD IT BE HELPFUL TO ACCOMPLISH THE ABOVE WIRING MODIFICATIONS/INSTALLATIONS WITH THE DFDR MOUNTING SHELF REMOVED FROM THE AIRCRAFT, REMOVE IN ACCORDANCE WITH THE MAINTENANCE MANUAL AND EMPLOY DRAWING NUMBERS 1900-1-600 (UE001-UE092) OR 1900-1-601 (UE093 & UP). REINSTALL THE SHELF IN ACCORDANCE WITH THE MAINTENANCE MANUAL.*
- *REMOVE THE TRIP AND DATE ENCODER, REFER TO SB 2618 SUPPLIED WITH THE KIT.*

TRANSDUCER ASSEMBLY INSTALLATION

REFERENCE DRAWINGS #:	*1900-1-2*	*ROLL TRANSDUCER*
	1900-1-3	*PITCH TRIM TRANSDUCER*
	1900-1-4	*YAW TRANSDUCER*

- *IDENTIFY THE 3 TRANSDUCERS, CABLE CLAMPING BLOCKS, AND INSTALLATION HARDWARE.*
- *LOCATE THE TRANSDUCER POSITION IN IT'S RESPECTIVE LOCATION IN THE AIRCRAFT BY REFERENCE TO DRAWINGS CALLED OUT ABOVE.*
- *TEMPORARILY INSTALL THE 3 CABLE CLAMPING BLOCKS ON THEIR RESPECTIVE CONTROL CABLES. REMOVE TEMPORARY STOP BALL. ENSURE THAT THE YAW CABLE CLAMPING BLOCK IS INSTALLED AS SHOWN WITH THE ADJUSTING SCREW SURFACE FACING DOWN. THE PITCH TRIM AND ROLL CLAMPING BLOCKS ARE INSTALLED WITH THE ADJUSTING SCREW SURFACE FACING UP. LOCATE THE CLAMPING BLOCKS APPROXIMATELY 4" FORWARD OF THE LEADING EDGE OF THE INTERMEDIATE BEAM FORWARD CAP. THE PURPOSE OF THIS INSTALLATION IS TO ENSURE ACCURATE LATERAL ALIGNMENT OF THE TRANSDUCER ASSEMBLIES.*
- *ROLL AND PITCH TRIM AND YAW TRANSDUCER ASSEMBLY FORE AND AFT LOCATIONS ARE DETERMINED BY CENTERING THE MOUNTING HOLES OVER THE INTERMEDIATE BEAM FOR OPTIMAL MOUNTING HOLE EDGE DISTANCE. KEEP THE MOUNT SQUARE TO THE BEAM.*
- *THE YAW TRANSDUCER FORE AND AFT LOCATION COULD BE OBSTRUCTED BY ITS RELATIONSHIP TO THE RUDDER CABLE PULLEY BRACKET AT STATION 303.25. CENTER THE BASE OVER THE TAPERED ENDS OF THE UPPER BEAM CAPS. ENSURE THAT A MINIMUM OF .050" CLEARANCE EXISTS BETWEEN THE FORWARD EDGE OF THE PULLEY BRACKET AND THE TRANSDUCER BASE. TRIM THE EDGE OF THE BRACKET A MAXIMUM OF .125" IF NECESSARY TO OBTAIN DESIRED CLEARANCE.*
- *ALL 3 ASSEMBLIES ARE LOCATED LATERALLY TO ENSURE THAT THE TRANSDUCER DISPLACEMENT CABLE LEAVES THE GUIDE PULLEY WITH MINIMUM ANGULAR MISALIGNMENT. DISPLACEMENT CABLE SHOULD TRACK PARALLEL TO ITS RESPECTIVE CONTROL CABLE IN THE LATERAL PLANE. THE TRANSDUCER BASE ASSEMBLY SHOULD BE SQUARE TO THE CENTERLINE OF THE INTERMEDIATE BEAM ON WHICH IT RESTS.*
- *REMOVE THE PHENOLIC TRIM CABLE RUB STRIP AT STATION 316.5.*
- *REMOVE EXCESS WEB MATERIAL EXTENDING ABOVE THE UPPER CAPS OF THE INTERMEDIATE BEAMS BY LIGHTLY SANDING. ENSURE THAT NO MATERIAL IS REMOVED FROM THE CAP ITSELF. ENSURE THAT THE BASE ASSEMBLY LIES FLAT AGAINST THE UPPER SURFACE OF THE INTERMEDIATE BEAMS.*
- *TRANSFER FASTENER LOCATIONS FROM PREDRILLED HOLES IN BASE ASSEMBLIES TO AIRCRAFT STRUCTURE.*
- *THROUGH DRILL BASE ASSEMBLY FASTENER HOLES. DEBURR, ETCH ALODINE, AND PRIME THROUGH HOLES AND SANDED EDGE OF INTERMEDIATE BEAM WEB.*
- *INSTALL TRANSDUCER ASSEMBLIES USING SUPPLIED ATTACH FASTENERS. TORQUE FASTENERS TO 12-15 LBS./IN AND APPLY TORQUE SEAL.REINSTALL PREVIOUSLY REMOVED PHENOLIC PITCH TRIM CABLE RUB STRIP AT FS 316.5*

ACCELEROMETER INSTALLATION AND WIRING MODIFICATION

REFERENCE DRAWING: *1900-1-1* *ACCELEROMETER INSTALLATION*
1900-1-12 *LATERAL ACCELEROMETER INSTALLATION*

- *REMOVE THE INSTALLED BI-AXIAL ACCELEROMETER, INSTALL THE KIT SUPPLIED TRI-AXIAL OR STAND ALONE LATERAL ACCELEROMETER. REFER TO DRAWING # 1900-1-1 OR 1900-1-12.*

- *ACCOMPLISH ACCELEROMETER WIRING MODIFICATION. REFER TO DRAWING # 1900-5-11 OR 1900-5-12.*

TRANSDUCER DISPLACEMENT CABLE TRAVEL LIMITS

- *IT IS CRITICAL TO ENSURE THAT THE MECHANICAL TRAVEL LIMITS OF EACH OF THE 3 TRANSDUCERS HAS NOT BEEN REACHED AT EITHER EXTREME OF CONTROL CABLE TRAVEL. TO THAT END:*
  - *HAVE AN ASSISTANT POSITION EACH CONTROL SYSTEM SO THAT ITS TRAVEL STOPS ARE APPROACHED SLOWLY IN BOTH DIRECTIONS.*
  - *ENSURE THAT AS THE TRANSDUCER DISPLACEMENT CABLES APPROACH THEIR FULLY EXTENDED POSITION, SOME FREE PLAY OR CUSHION REMAINS IN THE CABLE. THIS MAY BE DETERMINED BY GENTLY LIFTING THE DISPLACEMENT CABLE DURING ITS EXTENSION CYCLE. IT SHOULD BE POSSIBLE TO SLIGHTLY EXTEND THE DISPLACEMENT CABLE (MIN .125") WHEN THE SYSTEM CONTROL CABLE HAS REACHED ITS TRAVEL STOP. IF THE MINIMUM EXTENSION CAN BE ACHIEVED, THE INTERNAL TRANSDUCER STOP HAS NOT BEEN APPROACHED OR EXCEEDED.*
  - *NEXT, ENSURE THAT AS THE TRANSDUCER DISPLACEMENT CABLES APPROACH THEIR FULLY RETRACTED POSITIONS, THE LOOP CRIMPS DO NOT CONTACT THE GUIDE PULLEYS AND THAT THEY REMAIN FORWARD OF THE PULLEYS WITH THE AIRCRAFT CONTROL SYSTEMS AGAINST THEIR TRAVEL STOPS.*
  - *IF THE RESULTS OF THE ABOVE TESTS ARE UNACCEPTABLE, CHECK THE AIRCRAFT CONTROL SYSTEM TRAVELS AGAINST THE DATA SUPPLIED BY THE MANUFACTURER IN THE MM AND CORRECT THE TRAVELS AS NECESSARY.*
  - *THE TRANSDUCERS HAVE BEEN SELECTED TO ALLOW FOR CONTROL CABLE TRAVELS FOUND IN AN AIRCRAFT RIGGED TO THE EXTREME ALLOWABLE CONDITION PLUS A SLIGHT MARGIN.*

POST INSTALLATION TRANSDUCER CALIBRATION

AFTER KIT INSTALLTION, ACCOMPLISH THE FOLLOWING TESTS:

Roll Control Position Sensor

A. Connect the airframe connector to the transducer connector.
B. Install rig pins to secure the roll control system in neutral. Refer to MM 27-10-00.
C. Connect DFDR readout equipment to the DFDR or alternatively connect a DVM to fabricated breakout box (assy 1900-2-CPC1) installed between transducer connector and airframe connector.
D. Connect the position transducer displacement cable-clamping block to the roll control cable. Remove temporary stop ball.
E. Utilize the position of the cable clamping block and cable clamping block adjusting screw obtain a decimal/volt reading corresponding “0 degrees” in accordance with “ Check of the Roll Control parameter” IAW MM 31-30-00. Complete “ Check of the Roll Control parameter” IAW MM 31-30-00.
F. Ensure that the position transducer displacement cable is correctly routed over the idler pulley on the bracket assembly.
G. Torque cable clamping block screws to 7 to 9 LBS./INS.
H. Disconnect readout equipment from the DFDR or breakout box from transducer connector.
I. Remove roll control system rigging pin.
J. Secure the floor panel.

Yaw Control Position Sensor

A. Connect the airframe connector to the transducer connector.
B. Install rig pins to secure the yaw control system in neutral. Refer to MM 27-20-00.
C. Connect DFDR readout equipment to the DFDR or alternatively connect a DVM to fabricated breakout box (assy 1900-2-CPC1) installed between transducer connector and airframe connector.
D. Connect the position transducer displacement cable-clamping block to the yaw control cable. Remove temporary stop ball.
K. Utilize the position of the cable clamping block and cable clamping block adjusting screw obtain a decimal/volt reading corresponding “0 degrees” in accordance with “ Check of the Yaw Control parameter” IAW MM 31-30-00. Complete “ Check of the Yaw Control parameter” IAW MM 31-30-00.
E. Ensure that the position transducer displacement cable is correctly routed over the idler pulley on the bracket assembly.
F. Torque cable clamping block screws to 7 to 9 LBS./INS.
G. Disconnect readout equipment from the DFDR.
H. Remove yaw control system rigging pin.
I. Secure the floor panel.

Pitch Trim Position Sensor

A. Connect the airframe connector to the transducer connector.
B. Install rig pins to secure the pitch control system in neutral. Refer to MM 27-30-00. Streamline the pitch trim tab with the elevator.
C. Connect DFDR readout equipment to the DFDR or alternatively connect a DVM to fabricated breakout box (assy 1900-2-CPC1) installed between transducer connector and airframe connector.
D. Connect the position transducer displacement cable-clamping block to the pitch trim control cable. Remove temporary stop ball.
L. Utilize the position of the cable clamping block and cable clamping block adjusting screw obtain a decimal/volt reading corresponding “0 degrees” in accordance with “ Check of the Pitch Trim Control parameter” IAW MM 31-30-00. Complete “ Check of the Pitch Trim Control parameter” IAW MM 31-30-00.
E. Ensure that the position transducer displacement cable is correctly routed over the idler pulley on the bracket assembly.
F. Torque cable clamping block screws to 7 to 9 LBS./INS.
G. Disconnect readout equipment from the DFDR.
H. Remove pitch control system rigging pin.
I. Secure the floor panel.

Lateral Acceleration Sensor

1. Accomplish “Check of the Lateral Acceleration Parameter” IAW MM 31-30-00

Prop Reverse (if installed)

1. Accomplish “Check of the Prop Reverse Parameter” IAW MM 31-30-00

AIRCRAFT RECONFIGURATION AND RETURN TO SERVICE

- *ENSURE THAT ALL RIGGING PINS, AND DEVICES USED TO LOCATE OR HOLD THE FLIGHT CONTROL SYSTEMS IN POSITION HAVE BEEN REMOVED.*
- *ENSURE THAT THE FLIGHT CONTROLS MOVE THROUGH THEIR FULL TRAVEL SMOOTHLY AND WITHOUT BINDING.*
- *ENSURE OBSERVER CHECKS EACH OF THE 4 INSTALLATIONS FOR UNOBSTRUCTED TRAVEL WHILE THE FLIGHT CONTROLS ARE BEING OPERATED.*
- *REINSTALL CARGO COMPARTMENT LINER, BAGGAGE WEB, FLOORBOARDS, HEATER GRILLE, CARPET, RAMP, AND SEATS. REFER TO MM.*
- *COMPLETE APPLICABLE MM, IPC REVISIONS.*
- *COMPLETE APPLICABLE WEIGHT AND BALANCE, ALTERATION, MAINTENANCE, AND RETURN TO SERVICE DOCUMENTATION.*