

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorders Division
Washington, D.C. 20594

February 15, 2002

Specialist's Factual Report of Investigation
Digital Flight Data Recorder

NTSB Number:
DCA01MA065

A. EVENT

Location: Shanksville, Pennsylvania
Date: September 11, 2001
Aircraft: B-757-200, N591UA
Operator: United Airlines

B. GROUP

N/A

C. DETAILS OF INVESTIGATION

In support of the Federal Bureau of Investigation's (FBI's) investigation into the terrorist act of United Airlines Flight 93, which crashed in Shanksville, Pennsylvania, on September 11, 2001, the NTSB Vehicle Recorders Division received the following solid state flight data recorder (SSFDR) on September 13, 2001:

Recorder Manufacturer/Model: **Allied Signal SSFDR**

The SSFDR was examined upon receipt. The recorder displayed evidence of impact damage (figure 1). The memory board was removed and also showed signs of impact damage (figure 2).



Figure 1

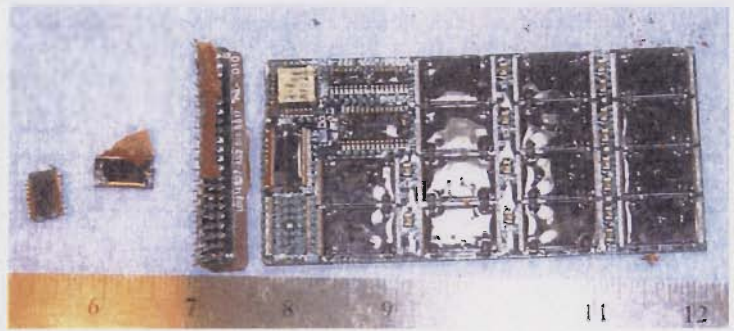


Figure 2

The memory board was taken to Honeywell facilities in Redmond, Washington for evaluation and downloading since the extent of the damage was not known. The data were extracted and electronically transferred to Safety Board headquarters. The transcribed data were reduced from the recorded binary values (0's and 1's) to engineering units (for example feet, knots, degrees, etc.) using conversion formulas obtained from United Airlines.¹ The transcribed data were processed by the Safety Board's Recovery Analysis and Presentation System (RAPS), which converted the raw data to engineering units and presented it in tabular and graphic form. An examination of the recovered data indicated that the recorder operated normally.

Only validated parameters are included in the plots and tabular data in this report. A list of these parameters is in Attachments I-1 to I-7. The remaining parameters either were not recorded properly or were not confirmed to have been recorded properly, and are not included in this report. A list of these parameters is in Attachments I-8 to I-10.

Recorder Description

This model SSFDR accepts serial bit stream data in an ARINC 573/717² format at a rate of 64 12-bit words per second. The SSFDR uses solid-state flash memory technology as the recording medium. The recording is stored in a crash survivable memory unit. A minimum of the last 25 hours of operational data is retained on the recording medium.

¹ United Airlines provided their custom data frame which is based on Boeing's 757-4 data frame, Attachment IV: 757UALmap.xls.

² Flight Data Acquisition and Recording System Characteristic, Published by Aeronautical Radio, Inc. (ARINC), 2551 Riva Road, Annapolis, Maryland

The Digital Flight Data Acquisition Unit (DFDAU) provides a means of gathering, conditioning, and converting flight data parameters to digital data. The DFDAU provides a serial binary digital data stream to the SSFDR at a rate of 768 bits/sec. A binary, or logical one, is represented by a voltage transition between clock transitions.

The DFDAU input signals are time division multiplexed, with parameter identification established by means of position or time slot addresses in the serial data stream output. This output is a continuous sequence of four-second data frames. Each frame consists of four subframes of 64 separate 12-bit words, with the first word containing a unique 12-bit synchronization (sync) word identifying it as subframe 1,2,3, or 4. The data stream is "in sync" when successive sync words appear at the proper 64-word intervals. If the data stream is interrupted, sync words will not appear at the proper interval or sequence, and the time reference will be lost until the subframe pattern can be reestablished.

Time Correlation

The SSFDR data were correlated to local time (Eastern Daylight Time (EDT)). See the [Time Correlation Report](#) for further details on the correlation between SSFDR and local time.

Data and Graphs

Attachments II-1 to II-22 contain plots of those parameters that were recorded and validated. The timeframe of the plots is from 8:39:00 EDT to 10:04:00 EDT, with the last recorded data shown at 10:03:10 EDT.

The raw file for this data set contained 2 additional subframes (seconds) of data. The first of these two contained data in words 1, 2, 3, and 4 but the rest of the subframe were zeros. Word 1, which was a sync word, and word 2, which contained a vertical acceleration value of .640 g's, appeared to be valid data. The remaining 2 words could

not be validated and the remainder of the frame was considered invalid. The next subframe was determined to be a repeat of the previous subframe and was considered invalid³. These 2 subframes were not included in the plotted or tabular data.

The data plotted in Attachment II are available in tabular format as a comma delimited (*.csv) files in Attachment III. The tabular data are separated into 4 files alphabetically based on the parameter names.



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|------------------------------|------------------------------|
| Attachments I-1 to I-10 | Parameter Listings |
| Attachments II-1 to II-22: | Plots of SSFDR Data |
| Attachment III (electronic): | DCA01MA065 tabular csv files |
| Attachment IV (electronic): | 757UALmap.xls |

³ This condition, where the last recorded subframe is repeated, is a known bug which occurs as a result of the SSFDR download software.

Attachment I

Parameter Listings

Parameters Validated

| PORT NAME | PARAMETER ASSIGNMENT | PORT NAME | PARAMETER ASSIGNMENT |
|---------------|------------------------|---------------|-----------------------------|
| EFIS L/C-A-1 | 10 MI RANGE SEL CAPT | TMC L-D-4 | A/T DISCONNECT |
| EFIS L/C-A-1 | 160 MI RANGE SEL CAPT | TMC L-D-4 | A/T ENGAGE |
| EFIS L/C-A-1 | 20 MI RANGE SEL CAPT | TMC L-D-4 | A/T G/A MODE ANNUN |
| EFIS L/C-A-1 | 40 MI RANGE SEL CAPT | EICAS L/R-A-1 | AC BUS OFF - L |
| EFIS L/C-A-1 | 5 MI RANGE SEL CAPT | EICAS L/R-A-1 | AC BUS OFF - R |
| EFIS L/C-A-1 | 80 MI RANGE SEL CAPT | EICAS L/R-A-1 | AC BUS TIE ISOL - L |
| FCC C-A-4 | A/P CAUTION | EICAS L/R-A-1 | AC BUS TIE ISOL - R |
| FCC L-A-4 | A/P CAUTION | DFDAU | ACMS S/W P/N CODE |
| FCC L-A-4 | A/P CAUTION | ADC L/R-A-4 | ADC INVALID |
| FCC R-A-4 | A/P CAUTION | ADC SW | ADC SELECT SW-CAPT |
| FCC C-A-4 | A/P CMD C ENGA | EFIS L/C-A-1 | ADF/ VOR SEL CAPT |
| FCC L-A-4 | A/P CMD C ENGA | EICAS L/R-A-1 | AFT CARGO FIRE |
| FCC R-A-4 | A/P CMD C ENGA | EICAS L/R-A-1 | AILERON POSN-OUTER - L |
| MCP A-A-2 | A/P CMD C ENGA | EICAS L/R-A-1 | AILERON POSN-OUTER - R |
| FCC C-A-4 | A/P CMD L ENGA | TMC L-D-4 | AIR DRIVEN PUMP |
| FCC L-A-4 | A/P CMD L ENGA | A/G RELAY | AIR/GROUND |
| FCC R-A-4 | A/P CMD L ENGA | EFIS L/C-A-1 | AIRPORTS CAPT |
| MCP A-A-2 | A/P CMD L ENGA | EICAS L/R-A-1 | ALL GEAR DOWN & LOCK |
| FCC C-A-4 | A/P CMD R ENGA | FCC C-A-4 | ALT HOLD MODE OPER |
| FCC L-A-4 | A/P CMD R ENGA | FCC L-A-4 | ALT HOLD MODE OPER |
| FCC R-A-4 | A/P CMD R ENGA | FCC R-A-4 | ALT HOLD MODE OPER |
| MCP A-A-2 | A/P CMD R ENGA | MCP A-A-2 | ALT HOLD MODE OPER |
| FCC C-A-4 | A/P CWS C ENGA | FCC C-A-4 | ALT MODE OPER |
| FCC L-A-4 | A/P CWS C ENGA | FCC L-A-4 | ALT MODE OPER |
| FCC R-A-4 | A/P CWS C ENGA | FCC L-A-4 | ALT MODE OPER |
| MCP A-A-2 | A/P CWS C ENGA | FCC R-A-4 | ALT MODE OPER |
| FCC C-A-4 | A/P CWS L ENGA | ADC L/R-A-4 | ALTITUDE (1013.25mB) COARSE |
| FCC L-A-4 | A/P CWS L ENGA | ADC L/R-A-4 | ALTITUDE (1013.25mB) FINE |
| FCC R-A-4 | A/P CWS L ENGA | MCP A-A-2 | ALTITUDE SELECTED-MAN |
| MCP A-A-2 | A/P CWS L ENGA | EICAS L/R-A-1 | ALTN EICAS COMP |
| FCC C-A-4 | A/P CWS R ENGA | EICAS L/R-A-1 | ANTI-SKID |
| FCC L-A-4 | A/P CWS R ENGA | FCC C-A-4 | APPR MODE OPER |
| FCC R-A-4 | A/P CWS R ENGA | FCC L-A-4 | APPR MODE OPER |
| MCP A-A-2 | A/P CWS R ENGA | FCC L-A-4 | APPR MODE OPER |
| FCC C-A-4 | A/P ENGAGE DETENT | FCC R-A-4 | APPR MODE OPER |
| FCC L-A-4 | A/P ENGAGE DETENT | EICAS L/R-A-1 | APU BLEED VALVE |
| FCC L-A-4 | A/P ENGAGE DETENT | EICAS L/R-A-1 | APU BUS AC VOLTS |
| FCC R-A-4 | A/P ENGAGE DETENT | EICAS L/R-A-1 | APU EGT |
| FCC L-A-4 | A/P T.E. FLAP POSITION | EICAS L/R-A-1 | APU FAULT |
| EICAS L/R-A-1 | A/P WARN-2 BAT | EICAS L/R-A-1 | APU FIRE |
| EICAS L/R-A-1 | A/P WARN-2 NORM | EICAS L/R-A-1 | APU GEN APB OPEN |
| FCC C-A-4 | A/P WARNING | EICAS L/R-A-1 | APU LOW OIL QUANT |
| FCC L-A-4 | A/P WARNING | EICAS L/R-A-1 | APU RPM |
| FCC L-A-4 | A/P WARNING | FCC C-A-4 | ATT HOLD MODE OPER |
| FCC R-A-4 | A/P WARNING | FCC L-A-4 | ATT HOLD MODE OPER |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|---------------------------|
| FCC L-A-4 | ATT HOLD MODE OPER |
| FCC R-A-4 | ATT HOLD MODE OPER |
| EICAS L/R-A-1 | AUTO BRAKE |
| EICAS L/R-A-1 | AUTO SPEEDBRAKE |
| FCC C-A-4 | AUTOLAND WARN LT |
| FCC L-A-4 | AUTOLAND WARN LT |
| FCC L-A-4 | AUTOLAND WARN LT |
| FCC R-A-4 | AUTOLAND WARN LT |
| EICAS L/R-A-1 | AUTOTHROTTLE DISC |
| FCC C-A-4 | AUTOTRIM DOWN - ARM |
| FCC L-A-4 | AUTOTRIM DOWN - ARM |
| FCC R-A-4 | AUTOTRIM DOWN - ARM |
| FCC C-A-4 | AUTOTRIM DOWN - CONT |
| FCC L-A-4 | AUTOTRIM DOWN - CONT |
| FCC R-A-4 | AUTOTRIM DOWN - CONT |
| FCC C-A-4 | AUTOTRIM UP - ARM |
| FCC L-A-4 | AUTOTRIM UP - ARM |
| FCC R-A-4 | AUTOTRIM UP - ARM |
| FCC C-A-4 | AUTOTRIM UP - CONT |
| FCC L-A-4 | AUTOTRIM UP - CONT |
| FCC R-A-4 | AUTOTRIM UP - CONT |
| FCC C-A-4 | B/CRS MODE OPER |
| FCC L-A-4 | B/CRS MODE OPER |
| FCC L-A-4 | B/CRS MODE OPER |
| FCC R-A-4 | B/CRS MODE OPER |
| ADC L/R-A-4 | BARO COR NO. 1 (IN) |
| ADC L/R-A-4 | BARO COR NO. 2 (IN) |
| EICAS L/R-A-1 | BLEED DUCT PRESS - L |
| EICAS L/R-A-1 | BRAKE TEMP LT |
| EICAS L/R-A-1 | CABIN ALT > 10kft |
| EICAS L/R-A-1 | CAPT INST BUS XFER |
| EICAS L/R-A-1 | CARGO FIRE SW |
| GPWC L-A-1 | CAUTION OBST OR OBSTAHEAD |
| GPWC L-A-1 | CAUTION TERRAIN |
| GPWC L-A-1 | CAUTION WINDSHEAR |
| EICAS L/R-A-1 | CDU MENU REQUEST |
| EICAS L/R-A-1 | C-L FUEL PUMP LT |
| EICAS L/R-A-1 | C-L FUEL PUMP PR |
| TMC L-D-4 | CLB MODE OPER |
| EFIS L/C-A-1 | COMPAR ENABLE CAPT |
| ADC L/R-A-4 | COMPUTED AIRSPEED |
| TMC L-D-4 | CON MODE OPER |
| SYNCHRO | CONTROL COLUMN POSN-CAPT |
| SYNCHRO | CONTROL COLUMN POSN-CAPT |
| SYNCHRO | CONTROL WHEEL POSN-CAPT |
| SYNCHRO | CONTROL WHEEL POSN-CAPT |
| EFIS L/C-A-1 | CP FAULT - LEFT |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|-------------------------|
| EICAS L/R-A-1 | C-R FUEL PUMP LT |
| EICAS L/R-A-1 | C-R FUEL PUMP PR |
| TMC L-D-4 | CRZ MODE OPER |
| CONFIG | CUSTOMER UNIQUE FRAME |
| CAPT CLOCK | DAY X 1 |
| CAPT CLOCK | DAY X10 |
| DME L-A-2 | DME ANTENNA FAILURE - L |
| DME R-A-2 | DME ANTENNA FAILURE - R |
| DME L-A-2 | DME DISTANCE-LEFT |
| DME R-A-2 | DME DISTANCE-RIGHT |
| DME L-A-2 | DME FAILURE - L |
| DME R-A-2 | DME FAILURE - R |
| EFIS L/C-A-1 | DME SELECTED CAPT |
| FMC L/R-D-4 | DME/DME |
| GPWC L-A-1 | DON'T SINK |
| FMC L/R-D-4 | DRIFT ANGLE |
| TMC L-D-4 | ECS PACK H/L LEFT |
| TMC L-D-4 | ECS PACK H/L RIGHT |
| EICAS L/R-A-1 | ECS PACK OFF - L |
| EICAS L/R-A-1 | ECS PACK OFF - R |
| TMC L-D-4 | ECS PACK ON/OFF LEFT |
| TMC L-D-4 | ECS PACK ON/OFF RIGHT |
| EICAS L/R-A-1 | ECS PACK OVHT - L |
| EICAS L/R-A-1 | ECS PACK OVHT - R |
| TMC L-D-4 | EEC VALID - L |
| TMC L-D-4 | EEC VALID - R |
| EFIS SW | EFIS SELECT SW-CAPT |
| EICAS L/R-A-1 | EICAS ALT DISAGREE |
| EICAS L/R-A-1 | EICAS COMPUTER |
| EICAS L/R-A-1 | EICAS IAS DISAGREE |
| EICAS SW | EICAS SELECT SW |
| EICAS L/R-A-1 | ELEVATOR FEEL SYSTEM |
| EICAS L/R-A-1 | ELEVATOR POSN - L |
| EICAS L/R-A-1 | ELEVATOR POSN - R |
| EICAS L/R-A-1 | EMERGENCY LIGHTS |
| EICAS L/R-A-1 | ENG EPR COMMAND - L |
| EICAS L/R-A-1 | ENG EPR LIMIT-L |
| EICAS L/R-A-1 | ENG EPR LIMIT-R |
| EICAS L/R-A-1 | ENG EPR-ACTUAL - L |
| EICAS L/R-A-1 | ENG EPR-ACTUAL - R |
| EICAS L/R-A-1 | ENG FUEL CUTOFF - L |
| EICAS L/R-A-1 | ENG FUEL CUTOFF - R |
| EICAS L/R-A-1 | ENG FUEL FILTER - L |
| EICAS L/R-A-1 | ENG FUEL FILTER - R |
| EICAS L/R-A-1 | ENG FUEL FLOW - L |
| EICAS L/R-A-1 | ENG FUEL FLOW - R |
| EICAS L/R-A-1 | ENG FUEL VALVE - L |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|----------------------|
| EICAS L/R-A-1 | ENG FUEL VALVE - R |
| EICAS L/R-A-1 | ENG LO OIL PRESS - L |
| EICAS L/R-A-1 | ENG LO OIL PRESS - R |
| EICAS L/R-A-1 | ENG N1-ACTUAL - L |
| EICAS L/R-A-1 | ENG N1-ACTUAL - R |
| EICAS L/R-A-1 | ENG N2-ACTUAL - L |
| EICAS L/R-A-1 | ENG N2-ACTUAL - R |
| EICAS L/R-A-1 | ENG OIL FILTER - L |
| EICAS L/R-A-1 | ENG OIL FILTER - R |
| EICAS L/R-A-1 | ENG OIL PRES - L |
| EICAS L/R-A-1 | ENG OIL PRES - R |
| EICAS L/R-A-1 | ENG OIL QTY - L |
| EICAS L/R-A-1 | ENG OIL QTY - R |
| EICAS L/R-A-1 | ENG OIL TEMP - L |
| EICAS L/R-A-1 | ENG OIL TEMP - R |
| EICAS L/R-A-1 | ENG OUT RLY - L |
| EICAS L/R-A-1 | ENG OUT RLY - R |
| EICAS L/R-A-1 | ENG START VALVE - L |
| EICAS L/R-A-1 | ENG START VALVE - R |
| EICAS L/R-A-1 | ENG STARTER - L |
| EICAS L/R-A-1 | ENG STARTER - R |
| EICAS L/R-A-1 | ENG VIBRATION - L |
| EICAS L/R-A-1 | ENG VIBRATION - R |
| EICAS L/R-A-1 | ENGINE FIRE - L |
| EICAS L/R-A-1 | ENGINE FIRE - R |
| EICAS L/R-A-1 | ENGINE OVHT - L |
| EICAS L/R-A-1 | ENGINE OVHT - R |
| EICAS L/R-A-1 | EPR TARGET-FMC |
| EICAS L/R-A-1 | F/O INST BUS XFER |
| EICAS L/R-A-1 | FILTER 1 VIB - L |
| EICAS L/R-A-1 | FILTER 1 VIB-R |
| EICAS L/R-A-1 | FILTER 2 VIB - L |
| EICAS L/R-A-1 | FILTER 2 VIB - R |
| EICAS L/R-A-1 | FIRE EXT SWITCH - L |
| EICAS L/R-A-1 | FIRE EXT SWITCH - R |
| FCC C-A-4 | FL CH MODE OPER |
| FCC L-A-4 | FL CH MODE OPER |
| FCC R-A-4 | FL CH MODE OPER |
| MCP A-A-2 | FL CH MODE OPER |
| TMC L-D-4 | FL CH MODE OPER |
| FSEU | FLAP HANDLE POSN |
| FCC C-A-4 | FLAP LIMIT |
| FCC L-A-4 | FLAP LIMIT |
| FCC L-A-4 | FLAP LIMIT |
| FCC R-A-4 | FLAP LIMIT |
| TMC L-D-4 | FLAP LIMIT |
| FCC C-A-4 | FLARE OPER |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|------------------------|
| FCC L-A-4 | FLARE OPER |
| FCC R-A-4 | FLARE OPER |
| MCP A-A-2 | FLARE OPER |
| TMC L-D-4 | FLARE RETARD MODE |
| FCC C-A-4 | FLT DIR ON-CAPT |
| FCC L-A-4 | FLT DIR ON-CAPT |
| FCC R-A-4 | FLT DIR ON-CAPT |
| MCP A-A-2 | FLT DIR ON-CAPT |
| FCC C-A-4 | FLT DIR ON-F/O |
| FCC L-A-4 | FLT DIR ON-F/O |
| FCC R-A-4 | FLT DIR ON-F/O |
| MCP A-A-2 | FLT DIR ON-F/O |
| FCC C-A-4 | FMA FAULT 1 (CWS) |
| FCC L-A-4 | FMA FAULT 1 (CWS) |
| FCC L-A-4 | FMA FAULT 1 (CWS) |
| FCC R-A-4 | FMA FAULT 1 (CWS) |
| FCC C-A-4 | FMA FAULT 2 (PTCH) |
| FCC L-A-4 | FMA FAULT 2 (PTCH) |
| FCC L-A-4 | FMA FAULT 2 (PTCH) |
| FCC R-A-4 | FMA FAULT 2 (PTCH) |
| FCC C-A-4 | FMA FAULT 3 (ROLL) |
| FCC L-A-4 | FMA FAULT 3 (ROLL) |
| FCC L-A-4 | FMA FAULT 3 (ROLL) |
| FCC R-A-4 | FMA FAULT 3 (ROLL) |
| EFIS L/C-A-1 | FMC SELECTED CAPT |
| DFDAU | FMC/IRU DATA SOURCE |
| EEC L-A-1 | FOD DET - L |
| EEC R-A-1 | FOD DET - R |
| EFIS L/C-A-1 | FPM ENABLE CAPT |
| DFDAU | FRAME COUNTER |
| EICAS L/R-A-1 | FSEU FAULT (STATUS) |
| EICAS L/R-A-1 | FUEL CONFIG |
| EFIS L/C-A-1 | FULL COMPASS ROSE CAPT |
| EICAS L/R-A-1 | FWD CARGO FIRE |
| EICAS L/R-A-1 | FWD EQUIP SMOKE |
| TMC L-D-4 | G/A MODE OPER |
| FCC C-A-4 | G/A MODE OPER-P |
| FCC L-A-4 | G/A MODE OPER-P |
| FCC L-A-4 | G/A MODE OPER-P |
| FCC R-A-4 | G/A MODE OPER-P |
| FCC C-A-4 | G/A MODE OPER-R |
| FCC L-A-4 | G/A MODE OPER-R |
| FCC L-A-4 | G/A MODE OPER-R |
| FCC R-A-4 | G/A MODE OPER-R |
| FCC C-A-4 | G/S MODE OPER |
| FCC L-A-4 | G/S MODE OPER |
| FCC R-A-4 | G/S MODE OPER |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|-------------------------|
| MCP A-A-2 | G/S MODE OPER |
| EICAS L/R-A-1 | GEAR DISAGREE SYS 1 |
| EICAS L/R-A-1 | GEAR DISAGREE SYS 2 |
| GPWC L-A-1 | GLIDESLOPE |
| GPWC L-A-1 | GLIDESLOPE CANCEL |
| CAPT CLOCK | GMT HOURS |
| CAPT CLOCK | GMT MINUTES |
| CAPT CLOCK | GMT SECONDS |
| FMC L/R-D-4 | GPS |
| GPWC L-A-1 | GPWC FAILURE |
| GPWC L-A-1 | GPWS ALERT |
| GPWC L-A-1 | GPWS ALERT |
| EICAS L/R-A-1 | GROSS WEIGHT |
| GPWC L-A-1 | GROUND PROX INOP |
| GPWC L-A-1 | GROUND PROX WARNING |
| GPWC L-A-1 | GROUND PROX WARNING |
| EFIS L/C-A-1 | GROUNDSPEED CAPT |
| FCC C-A-4 | HDG HOLD MODE OPER |
| FCC L-A-4 | HDG HOLD MODE OPER |
| FCC R-A-4 | HDG HOLD MODE OPER |
| MCP A-A-2 | HDG HOLD MODE OPER |
| FCC C-A-4 | HDG SEL MODE OPER |
| FCC L-A-4 | HDG SEL MODE OPER |
| FCC R-A-4 | HDG SEL MODE OPER |
| MCP A-A-2 | HDG SEL MODE OPER |
| MCP A-A-2 | HEADING SELECTED |
| L HF | HF-LEFT KEYING |
| R HF | HF-RIGHT KEYING |
| EICAS L/R-A-1 | HYD BRAKE SOURCE |
| EICAS L/R-A-1 | HYD GENERATOR |
| EICAS L/R-A-1 | HYD PRES - C |
| EICAS L/R-A-1 | HYD PRES - L |
| EICAS L/R-A-1 | HYD PRES - R |
| EICAS L/R-A-1 | HYD RSVR PRESS < 17 - C |
| EICAS L/R-A-1 | HYD RSVR PRESS < 17 - L |
| EICAS L/R-A-1 | HYD RSVR PRESS < 17 - R |
| EICAS L/R-A-1 | HYD SYS LO PRESS - C |
| EICAS L/R-A-1 | HYD SYS LO PRESS - C |
| EICAS L/R-A-1 | HYD SYS LO PRESS - L |
| EICAS L/R-A-1 | HYD SYS LO PRESS - L |
| EICAS L/R-A-1 | HYD SYS LO PRESS - R |
| EICAS L/R-A-1 | HYD SYS LO PRESS - R |
| FCC C-A-4 | IAS |
| FCC L-A-4 | IAS |
| FCC L-A-4 | IAS |
| FCC R-A-4 | IAS |
| FCC C-A-4 | IAS LIMIT OPER |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|-------------------------|
| FCC L-A-4 | IAS LIMIT OPER |
| FCC L-A-4 | IAS LIMIT OPER |
| FCC R-A-4 | IAS LIMIT OPER |
| TMC L-D-4 | IAS MODE OPER |
| EICAS L/R-A-1 | IDG OIL LEVEL - L |
| EICAS L/R-A-1 | IDG OIL TEMP-L |
| TMC L-D-4 | IDLE THRUST OPER |
| EFIS L/C-A-1 | ILS (MOD) MODE SEL CAPT |
| EFIS L/C-A-1 | ILS (STD) MODE SEL CAPT |
| EFIS L/C-A-1 | ILS SELECTED CAPT |
| ADC L/R-A-4 | INDICATED AOA |
| ADC L/R-A-4 | INDICATED AOA |
| VOR L-A-2 | INNER MARKER |
| FMC L/R-D-4 | IRS (3) MODE OPER |
| FMC L/R-D-4 | IRS (C) MODE OPER |
| FMC L/R-D-4 | IRS (L) MODE OPER |
| FMC L/R-D-4 | IRS (R) MODE OPER |
| IRS SW | IRS SELECT SW-CAPT |
| FMC L/R-D-4 | IRS/LOC |
| FMC L/R-D-4 | IRS/MLS |
| EFIS L/C-A-1 | IRU SELECTED CAPT |
| TMC L-D-4 | ISOLATION VALVE-L |
| TMC L-D-4 | ISOLATION VALVE-R |
| EICAS L/R-A-1 | L BLEED DUCT LEAK |
| FCC C-A-4 | L NAV MODE OPER |
| FCC L-A-4 | L NAV MODE OPER |
| FCC R-A-4 | L NAV MODE OPER |
| MCP A-A-2 | L NAV MODE OPER |
| EICAS L/R-A-1 | L.E. SLAT DISAGREE |
| EICAS L/R-A-1 | L.E. SLAT DISAGREE |
| EICAS L/R-A-1 | L.E. SLATS ASYM |
| FSEU | L.E. SLATS EXTEND |
| FSEU | L.E. SLATS EXTEND |
| FSEU | L.E. SLATS FAIL |
| FSEU | L.E. SLATS PART EXTEND |
| FSEU | L.E. SLATS PART EXTEND |
| FSEU | L.E. SLATS RETRACTED |
| FSEU | L.E. SLATS RETRACTED |
| FCC C-A-4 | LAND 2 (GREEN) |
| FCC L-A-4 | LAND 2 (GREEN) |
| FCC L-A-4 | LAND 2 (GREEN) |
| FCC R-A-4 | LAND 2 (GREEN) |
| FCC C-A-4 | LAND 3 (GREEN) |
| FCC L-A-4 | LAND 3 (GREEN) |
| FCC L-A-4 | LAND 3 (GREEN) |
| FCC R-A-4 | LAND 3 (GREEN) |
| ACCEL | LATERAL ACCELERATION |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|---------------------------|
| ACCEL | LATERAL ACCELERATION |
| ACCEL | LATERAL ACCELERATION |
| ACCEL | LATERAL ACCELERATION |
| EICAS L/R-A-1 | LAVATORY SMOKE (C) |
| EICAS L/R-A-1 | LDG CONFIG - GEAR |
| EICAS L/R-A-1 | LDG CONFIG-SPD BK |
| EICAS L/R-A-1 | LDG GEAR LEVER |
| FCC C-A-4 | LOC MODE OPER |
| FCC L-A-4 | LOC MODE OPER |
| FCC R-A-4 | LOC MODE OPER |
| MCP A-A-2 | LOC MODE OPER |
| FMC L/R-D-4 | LOC/DME MODE OPER |
| ACCEL | LONGITUDINAL ACCEL |
| ACCEL | LONGITUDINAL ACCEL |
| ACCEL | LONGITUDINAL ACCEL |
| ACCEL | LONGITUDINAL ACCEL |
| EICAS L/R-A-1 | LOW FUEL QTY |
| LRRA C-A-2 | LRRA FAILURE - C |
| LRRA L-A-2 | LRRA FAILURE - L |
| LRRA R-A-2 | LRRA FAILURE - R |
| LRRA C-A-2 | LRRA REVEIVE ANTENNA - C |
| LRRA L-A-2 | LRRA REVEIVE ANTENNA - L |
| LRRA R-A-2 | LRRA REVEIVE ANTENNA - R |
| LRRA C-A-2 | LRRA TRANSMIT ANTENNA - C |
| LRRA L-A-2 | LRRA TRANSMIT ANTENNA - L |
| LRRA R-A-2 | LRRA TRANSMIT ANTENNA - R |
| FCC C-A-4 | MACH |
| FCC L-A-4 | MACH |
| FCC L-A-4 | MACH |
| FCC R-A-4 | MACH |
| FCC C-A-4 | MACH LIMIT OPER |
| FCC L-A-4 | MACH LIMIT OPER |
| FCC L-A-4 | MACH LIMIT OPER |
| FCC R-A-4 | MACH LIMIT OPER |
| TMC L-D-4 | MACH MODE OPER |
| MCP A-A-2 | MACH SELECTED-MAN |
| EICAS L/R-A-1 | MACH SPEED TRIM |
| EFIS L/C-A-1 | MAG HEADING CAPT |
| EICAS L/R-A-1 | MAIN CARGO FIRE |
| DFDAU | MANDATORY S/W P/N CODE |
| DFDAU | MANUFACTURER CODE |
| EFIS L/C-A-1 | MAP MODE SELECT CAPT |
| EFIS L/C-A-1 | MAP SOURCE CAPT |
| EICAS L/R-A-1 | MASTER CAUTION LIGHT |
| WEU WARN | MASTER WARNING CAPT |
| WEU WARN | MASTER WARNING F/O |
| VOR L-A-2 | MIDDLE MARKER |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|-------------------------|
| FCC C-A-4 | MIN SPEED |
| FCC L-A-4 | MIN SPEED |
| FCC R-A-4 | MIN SPEED |
| TMC L-D-4 | MIN SPEED |
| GPWC L-A-1 | MINIMUMS |
| EFIS L/C-A-1 | MLS SELECT CAPT |
| EFIS L/C-A-1 | MLS/ILS SOURCE SEL CAPT |
| CAPT CLOCK | MONTH X 1 |
| CAPT CLOCK | MONTH X10 |
| EFIS L/C-A-1 | NAV AIDS CAPT |
| EFIS L/C-A-1 | NAV MODE SEL CAPT |
| ADC L/R-A-4 | NO. 1 AOA HEAT ON |
| ADC L/R-A-4 | NO. 2 AOA HEAT ON |
| GPWC L-A-1 | NOT USED |
| GPWC L-A-1 | OBSTACLE WARNING |
| VOR L-A-2 | OUTER MARKER |
| ADC L/R-A-4 | OVERSPEED |
| EICAS L/R-A-1 | PARKING BRAKE ON |
| EICAS L/R-A-1 | PASS OXY ON |
| EFIS L/C-A-1 | PITCH ANGLE CAPT |
| EFIS L/C-A-1 | PITCH DISAGREE CAPT |
| EFIS L/C-A-1 | PLAN MODE SEL CAPT |
| EICAS L/R-A-1 | POWER XFER UNIT |
| CONFIG | PRE 97 RULE |
| GPWC-L-A-1 | PREDICTIVE WINDSHEAR |
| GPWC L-A-1 | PULL UP |
| FCC C-A-4 | PVD ENABLE |
| FCC L-A-4 | PVD ENABLE |
| FCC L-A-4 | PVD ENABLE |
| FCC R-A-4 | PVD ENABLE |
| EICAS L/R-A-1 | R BLEED DUCT LEAK |
| EICAS L/R-A-1 | R ENG BLEED OVHT |
| EICAS L/R-A-1 | RAT UNLOCKED |
| TMC L-D-4 | RATING 1 OPER |
| TMC L-D-4 | RATING 2 OPER |
| FMC L/R-D-4 | REQ'D NAV PERF-(RNP) |
| EEC L-A-1 | REVERSER STATUS - L |
| EEC R-A-1 | REVERSER STATUS - R |
| EFIS L/C-A-1 | ROLL ANGLE CAPT |
| EFIS L/C-A-1 | ROLL DISAGREE CAPT |
| FCC C-A-4 | ROLLOUT MODE OPER |
| FCC L-A-4 | ROLLOUT MODE OPER |
| FCC L-A-4 | ROLLOUT MODE OPER |
| FCC R-A-4 | ROLLOUT MODE OPER |
| EICAS L/R-A-1 | RSV BRAKE VALVE |
| EFIS L/C-A-1 | RTE DATA CAPT |
| EICAS L/R-A-1 | RUDD RATIO MODULE |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|---------------------------|
| SYNCHRO | RUDDER PEDAL POSN |
| SYNCHRO | RUDDER PEDAL POSN |
| EICAS L/R-A-1 | RUDDER POSITION |
| EICAS L/R-A-1 | RUDDER POSITION |
| EICAS L/R-A-1 | RUDDER RATIO SYS |
| DFDAU | S/F CYCLE COUNT 0 |
| DFDAU | S/F CYCLE COUNT 1 |
| DFDAU | S/F CYCLE COUNT 2 |
| DFDAU | S/F CYCLE COUNT 3 |
| DFDAU | S/F CYCLE COUNT 4 |
| DFDAU | S/F CYCLE COUNT 5 |
| DFDAU | S/F CYCLE COUNT 6 |
| DFDAU | S/F CYCLE COUNT 7 |
| DFDAU | S/F CYCLE COUNT 8 |
| DFDAU | S/F CYCLE COUNT 9 |
| DFDAU | S/F CYCLE COUNT 10 |
| DFDAU | S/F CYCLE COUNT 11 |
| DFDAU | S/F CYCLE COUNT 12 |
| DFDAU | S/F CYCLE COUNT 13 |
| DFDAU | S/F CYCLE COUNT 14 |
| DFDAU | S/F CYCLE COUNT 15 |
| EFIS L/C-A-1 | SG FAULT- LEFT |
| TMC L-D-4 | SHUTOFF VALVE LEFT |
| TMC L-D-4 | SHUTOFF VALVE RIGHT |
| GPWC L-A-1 | SINK RATE |
| GPWC L-A-1 | SIREN WINDSHEAR WINDSHEAR |
| FCC C-A-4 | SPD BRK HDL POSN |
| FCC L-A-4 | SPD BRK HDL POSN |
| FCC R-A-4 | SPD BRK HDL POSN |
| MCP A-A-2 | SPD BRK HDL POSN |
| MCP A-A-2 | SPD DISPLAY BLANK |
| TMC L-D-4 | SPD LIMIT |
| MCP A-A-2 | SPEED SELECTED-MAN |
| EICAS L/R-A-1 | SPOILER MODULE |
| EICAS L/R-A-1 | SPOILER SYSTEM |
| FCC C-A-4 | STAB POSITION |
| FCC L-A-4 | STAB POSITION |
| FCC R-A-4 | STAB POSITION |
| MCP A-A-2 | STAB POSITION |
| EICAS L/R-A-1 | STAB TRIM FAULT |
| EICAS L/R-A-1 | STAB TRIM MODULE |
| ADC L/R-A-4 | STATIC PRESSURE |
| EICAS L/R-A-1 | STATOR VANE POSN - L |
| EICAS L/R-A-1 | STATOR VANE POSN - R |
| EFIS L/C-A-1 | SWC SELECT CAPT |
| DFDAU | SYNC WORD |
| EICAS L/R-A-1 | T.E. FLAP ASYM |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|-------------------------------|
| EICAS L/R-A-1 | T.E. FLAPS DISAGREE |
| EICAS L/R-A-1 | T.E. FLAPS DISAGREE |
| EEC L-A-1 | T/L RSLVR ANGLE-LEFT |
| EEC R-A-1 | T/L RSLVR ANGLE-RIGHT |
| EICAS L/R-A-1 | T/O CONFIG FLAPS |
| EICAS L/R-A-1 | T/O CONFIG PARK BRK |
| EICAS L/R-A-1 | T/O CONFIG SPOILER |
| EICAS L/R-A-1 | T/O CONFIG STAB |
| FCC C-A-4 | T/O MODE OPER-P |
| FCC L-A-4 | T/O MODE OPER-P |
| FCC L-A-4 | T/O MODE OPER-P |
| FCC R-A-4 | T/O MODE OPER-P |
| FCC C-A-4 | T/O MODE OPER-R |
| FCC L-A-4 | T/O MODE OPER-R |
| FCC R-A-4 | T/O MODE OPER-R |
| TMC L-D-4 | T/O MODE OPER-R |
| EICAS L/R-A-1 | T/R DEPLOYED - L |
| EICAS L/R-A-1 | T/R DEPLOYED - R |
| EICAS L/R-A-1 | T/R INTRANSIT - L |
| EICAS L/R-A-1 | T/R INTRANSIT - R |
| EICAS L/R-A-1 | TAT PROBE HEAT |
| EFIS L/C-A-1 | TCAS DATA DISPLAYED CAPT |
| EFIS L/C-A-1 | TCAS DATA SELECTED CAPT |
| EFIS L/C-A-1 | TCAS DATA SELECTED CAPT |
| GPWC L-A-1 | TERRAIN |
| GPWC L-A-1 | TERRAIN AHEAD |
| GPWC L-A-1 | TERRAIN AHEAD PULL UP |
| GPWC L-A-1 | TERRAIN AWARENESS INOP |
| GPWC L-A-1 | TERRAIN AWARENESS NOT AVAIL |
| GPWC L-A-1 | TERRAIN CAUTION |
| EFIS L/C-A-1 | TERRAIN DATA DISPLAYED CAPT |
| EFIS L/C-A-1 | TERRAIN DATA SELECTED CAPT |
| EFIS L/C-A-1 | TERRAIN DATA SELECTED CAPT |
| GPWC L-A-1 | TERRAIN DISPLAY DISCRETE 1 ON |
| GPWC L-A-1 | TERRAIN DISPLAY DISCRETE 2 ON |
| GPWC L-A-1 | TERRAIN OVERRIDE |
| GPWC L-A-1 | TERRAIN WARNING |
| TMC L-D-4 | THROTTLE HLD ANNUN |
| TMC L-D-4 | THRUST MODE OPER |
| TMC L-D-4 | TMC VALID |
| TMC L-D-4 | TMC V-NAV OPER |
| GPWC L-A-1 | TOO LOW FLAP |
| GPWC L-A-1 | TOO LOW GEAR |
| GPWC L-A-1 | TOO LOW TERRAIN |
| ADC L/R-A-4 | TOTAL AIR TEMP |
| EICAS L/R-A-1 | UNSCHED STAB MOVE |
| EICAS L/R-A-1 | UTIL BUS OFF - L |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|-------------------------|
| EICAS L/R-A-1 | UTIL BUS OFF - R |
| FCC C-A-4 | V NAV MODE OPER |
| FCC L-A-4 | V NAV MODE OPER |
| FCC R-A-4 | V NAV MODE OPER |
| MCP A-A-2 | V NAV MODE OPER |
| FCC C-A-4 | V/S MODE OPER |
| FCC L-A-4 | V/S MODE OPER |
| FCC R-A-4 | V/S MODE OPER |
| MCP A-A-2 | V/S MODE OPER |
| DFDAU | VENDOR DATABASE CODE |
| MCP A-A-2 | VERT SPEED SELECTED |
| ACCEL | VERTICAL ACCELERATION |
| ACCEL | VERTICAL ACCELERATION |
| ACCEL | VERTICAL ACCELERATION |
| ACCEL | VERTICAL ACCELERATION |
| ACCEL | VERTICAL ACCELERATION |
| ACCEL | VERTICAL ACCELERATION |
| ACCEL | VERTICAL ACCELERATION |
| ACCEL | VERTICAL ACCELERATION |
| C VHF | VHF CENTER KEYING |
| L VHF | VHF LEFT KEYING |
| R VHF | VHF RIGHT KEYING |
| EFIS L/C-A-1 | VOR (MOD) MODE SEL CAPT |
| EFIS L/C-A-1 | VOR (STD) MODE SEL CAPT |
| VOR L-A-2 | VOR FAILURE - L |
| VOR R-A-2 | VOR FAILURE - R |

| PORT NAME | PARAMETER ASSIGNMENT |
|---------------|-------------------------|
| VOR L-A-2 | VOR FREQUENCY-LEFT |
| VOR R-A-2 | VOR FREQUENCY-RIGHT |
| VOR L-A-2 | VOR MB FAILURE - L |
| EFIS L/C-A-1 | VOR SELECTED CAPT |
| FMC L/R-D-4 | VOR/DME |
| EICAS L/R-A-1 | WHEEL WELL FIRE |
| FMC L/R-D-4 | WIND DIRECTION TRUE |
| FMC L/R-D-4 | WIND SPEED |
| GPWC L-A-1 | WINDSHEAR CAUTION |
| GPWC L-A-1 | WINDSHEAR INOP |
| GPWC L-A-1 | WINDSHEAR WARNING |
| GPWC L-A-1 | WINDSHEAR WARNING |
| TMC L-D-4 | WING ANTI-ICE |
| EFIS L/C-A-1 | WPT CAPT |
| EFIS L/C-A-1 | WXR DATA CAPT |
| EFIS L/C-A-1 | WXR DATA DISPLAYED CAPT |
| EFIS L/C-A-1 | WXR DATA SELECTED CAPT |
| EFIS L/C-A-1 | WXR DATA SELECTED CAPT |
| EFIS L/C-A-1 | WXR SELECTED CAPT |
| EICAS L/R-A-1 | YAW DAMPER - L |
| EICAS L/R-A-1 | YAW DAMPER - R |
| EICAS L/R-A-1 | YAW DAMPER MODULE |
| CAPT CLOCK | YEAR X 1 |
| CAPT CLOCK | YEAR X10 |

Parameters Not Working or Unconfirmed

| PORT NAME | PARAMETER ASSIGNMENT | PORT NAME | PARAMETER ASSIGNMENT |
|-----------------|-----------------------|---------------|----------------------|
| A/C IDENT | A/C NUMBER LSB | DFDAU | DOC DEPART MSC |
| A/C IDENT | A/C NUMBER LSB + 1 | DFDAU | DOC DEST LSC |
| A/C IDENT | A/C NUMBER LSB + 2 | DFDAU | DOC DEST LSC + 1 |
| A/C IDENT | A/C NUMBER LSB + 3 | DFDAU | DOC DEST MSC |
| A/C IDENT | A/C NUMBER LSB + 4 | DFDAU | DOC FLT NUMBER LSC |
| A/C IDENT | A/C NUMBER LSB + 5 | DFDAU | DOC FLT NUMBER LSC+1 |
| A/C IDENT | A/C NUMBER LSB + 6 | DFDAU | DOC FLT NUMBER LSC+2 |
| A/C IDENT | A/C NUMBER MSB | DFDAU | DOC FLT NUMBER MSC |
| A/C IDENT | A/C TYPE LSB | DFDAU | DOC LEG NUMBER |
| A/C IDENT | A/C TYPE LSB+1 | TCAS | DOWN ADVISORY |
| A/C IDENT | A/C TYPE LSB+2 | EICAS L/R-A-1 | EICAS DISPALY STATE |
| A/C IDENT | A/C TYPE LSB+3 | EICAS L/R-A-1 | ENG BLEED OFF - L |
| A/C IDENT | A/C TYPE LSB+4 | EICAS L/R-A-1 | ENG BLEED OFF - R |
| A/C IDENT | A/C TYPE LSB+5 | EICAS L/R-A-1 | ENG EGT-LEFT |
| A/C IDENT | A/C TYPE MSB | EICAS L/R-A-1 | ENG EGT-RIGHT |
| FMC L/R-D-4 | ACTUAL NAV PERF-(ANP) | EICAS L/R-A-1 | ENG EPR COMMAND - R |
| TCAS | ADV ALT RATE | EICAS L/R-A-1 | ENG FUEL PRES - L |
| EICAS L/R-A-1 | AFT EQUIP SMOKE | EICAS L/R-A-1 | ENG FUEL PRES - R |
| TCAS | ALTITUDE REPORTING | TMC L-D-4 | ENGINE IDENT 1 |
| TCAS | ALTITUDE SELECT | TMC L-D-4 | ENGINE IDENT 10 |
| EICAS L/R-A-1 | APU BUS FREQ | TMC L-D-4 | ENGINE IDENT 11 |
| EICAS L/R-A-1 | APU LOAD | TMC L-D-4 | ENGINE IDENT 12 |
| EICAS L/R-A-1 | APU OIL LEVEL | TMC L-D-4 | ENGINE IDENT 2 |
| EICAS L/R-A-1 | BLEED DUCT PRESS - R | TMC L-D-4 | ENGINE IDENT 3 |
| A/G RELAY | BOGIE TILT LEFT | TMC L-D-4 | ENGINE IDENT 4 |
| A/G RELAY | BOGIE TILT RIGHT | TMC L-D-4 | ENGINE IDENT 5 |
| PRESS SENSOR | BRAKE PRES ALT-LEFT | TMC L-D-4 | ENGINE IDENT 6 |
| PRESS SENSOR | BRAKE PRES ALT-RIGHT | TMC L-D-4 | ENGINE IDENT 7 |
| PRESS SENSOR | BRAKE PRES MAIN-LEFT | TMC L-D-4 | ENGINE IDENT 8 |
| PRESS SENSOR | BRAKE PRES MAIN-RIGHT | TMC L-D-4 | ENGINE IDENT 9 |
| EICAS L/R-A-1 | BUS AC VOLTS L | TMC L-D-4 | EPR BUG DRIVE LEFT |
| EICAS L/R-A-1 | BUS AC VOLTS R | TMC L-D-4 | EPR BUG DRIVE RIGHT |
| EFIS L/C-A-1 | C FCC DATA FAULT CAPT | EICAS L/R-A-1 | EQUIP OVHT |
| EFIS L/C-A-1 | C IRS DATA FAULT CAPT | EVENT SW | EVENT MARKER (RESV) |
| TCAS | COMBINED CONT | A/C IDENT | FLEET IDENT LSB |
| TMC L-D-4 | COWL ANTI-ICE - L | A/C IDENT | FLEET IDENT LSB + 1 |
| TMC L-D-4 | COWL ANTI-ICE - R | A/C IDENT | FLEET IDENT LSB + 2 |
| ILS C-A-2/MMR C | DATA LINK STATUS | A/C IDENT | FLEET IDENT MSB |
| ILS L-A-2/MMR L | DATA LINK STATUS | EICAS L/R-A-1 | FLT DECK EQ SMOKE |
| ILS R-A-2/MMR R | DATA LINK STATUS | EICAS L/R-A-1 | FMC FAIL - L |
| EICAS L/R-A-1 | DC BUS TIE | EICAS L/R-A-1 | FMC FAIL - R |
| FMC L/R-D-4 | DESIRED TRACK | FMC SW | FMC SELECT SW A-CAPT |
| EFIS L/C-A-1 | DH SELECTED CAPT | FMC SW | FMC SELECT SW B-CAPT |
| DFDAU | DOC DEPART LSC | CONFIG | FRAME SEL LSB |
| DFDAU | DOC DEPART LSC + 1 | CONFIG | FRAME SEL MSB |

| PORT NAME | PARAMETER ASSIGNMENT |
|-----------------|------------------------|
| EICAS L/R-A-1 | FUEL QTY IND SYS |
| ILS C-A-2/MMR C | G/S RECEIVER FAIL - C |
| ILS L-A-2/MMR L | G/S RECEIVER FAIL - L |
| ILS R-A-2/MMR R | G/S RECEIVER FAIL - R |
| EICAS L/R-A-1 | GEAR DOWN SYS 1 - L |
| EICAS L/R-A-1 | GEAR DOWN SYS 1 - N |
| EICAS L/R-A-1 | GEAR DOWN SYS 1 - R |
| EICAS L/R-A-1 | GEN GCB OPEN - L |
| EICAS L/R-A-1 | GEN GCB OPEN - R |
| ILS C-A-2/MMR C | GLIDESLOPE DEV |
| ILS L-A-2/MMR L | GLIDESLOPE DEV |
| ILS R-A-2/MMR R | GLIDESLOPE DEV |
| EFIS L/C-A-1 | GLIDESLOPE DEV CAPT |
| FMC L/R-D-4 | GPS HOURS |
| FMC L/R-D-4 | GPS MINUTES |
| FMC L/R-D-4 | GPS SECONDS |
| ILS C-A-2/MMR C | GS TEST/TUNE INHIBIT |
| ILS L-A-2/MMR L | GS TEST/TUNE INHIBIT |
| ILS R-A-2/MMR R | GS TEST/TUNE INHIBIT |
| EICAS L/R-A-1 | HYD QUANT - C |
| EICAS L/R-A-1 | HYD QUANT - L |
| EICAS L/R-A-1 | HYD QUANT - R |
| EICAS L/R-A-1 | HYD SYS LO QTY - C |
| EICAS L/R-A-1 | HYD SYS LO QTY - L |
| EICAS L/R-A-1 | HYD SYS LO QTY - R |
| EICAS L/R-A-1 | ICE DETECTOR - L |
| EICAS L/R-A-1 | ICE DETECTOR - R |
| EICAS L/R-A-1 | ICING ENGINE/DETECTOR |
| EICAS L/R-A-1 | ICING WING |
| EICAS L/R-A-1 | IDG OIL LEVEL - R |
| EICAS L/R-A-1 | IDG OIL TEMP-R |
| ILS C-A-2/MMR C | ILS FAILURE - C |
| ILS L-A-2/MMR L | ILS FAILURE - L |
| ILS R-A-2/MMR R | ILS FAILURE - R |
| ILS L-A-2/MMR L | ILS FREQ/MLS /GLS CHAN |
| ILS L-A-2/MMR L | ILS FREQ/MLS /GLS CHAN |
| EFIS L/C-A-1 | L ADF DATA FAULT CAPT |
| EICAS L/R-A-1 | L ENG BLEED OVHT |
| EFIS L/C-A-1 | L FCC DATA FAULT CAPT |
| EFIS L/C-A-1 | L FMC DATA FAULT CAPT |
| EICAS L/R-A-1 | L MAIN PITOT HEAT |
| EFIS L/C-A-1 | L VOR DATA FAULT CAPT |
| ILS C-A-2/MMR C | LOC RECEIVER FAIL - C |
| ILS L-A-2/MMR L | LOC RECEIVER FAIL - L |
| ILS R-A-2/MMR R | LOC RECEIVER FAIL - R |
| ILS C-A-2/MMR C | LOC TEST/TUNE INHIBIT |
| ILS L-A-2/MMR L | LOC TEST/TUNE INHIBIT |

| PORT NAME | PARAMETER ASSIGNMENT |
|-----------------|-------------------------|
| ILS R-A-2/MMR R | LOC TEST/TUNE INHIBIT |
| ILS C-A-2/MMR C | LOCALIZER DEV |
| ILS L-A-2/MMR L | LOCALIZER DEV |
| ILS R-A-2/MMR R | LOCALIZER DEV |
| EFIS L/C-A-1 | LOCALIZER DEV CAPT |
| EEC L-A-1 | LOOP NO (BIT 2) - L |
| EEC R-A-1 | LOOP NO (BIT 2) - R |
| EEC L-A-1 | LOOP NO (BIT 3) - L |
| EEC R-A-1 | LOOP NO (BIT 3) - R |
| EEC L-A-1 | LOOP NO (BIT 4) - L |
| EEC R-A-1 | LOOP NO (BIT 4) - R |
| EEC L-A-1 | LOOP NO (LSB) - L |
| EEC R-A-1 | LOOP NO (LSB) - R |
| EEC L-A-1 | LOOP NO (MSB) - L |
| EEC R-A-1 | LOOP NO (MSB) - R |
| ADC L/R-A-4 | MACH |
| EFIS L/C-A-1 | MAG/TRUE DATA CAPT |
| EFIS L/C-A-1 | MAG/TRUE STATUS CAPT |
| EICAS L/R-A-1 | MAIN BATT CURRENT |
| EICAS L/R-A-1 | MAIN BATT SWITCH |
| PRESS SW | MAIN/ALT BRAKE SEL |
| | MB INNER |
| | MB MIDDLE |
| | MB OUTER |
| ILS C-A-2/MMR C | MLS DIR ANTSEL CMD ACK |
| ILS L-A-2/MMR L | MLS DIR ANTSEL CMD ACK |
| ILS R-A-2/MMR R | MLS DIR ANTSEL CMD ACK |
| EICAS L/R-A-1 | N2 CORRECTED TO 2.5 - L |
| EICAS L/R-A-1 | N2 CORRECTED TO 2.5 - R |
| A/G RELAY | NOSE GEAR SQUAT SW |
| TCAS | PILOT SL |
| FMC L/R-D-4 | PRES POSN LAT-LSData |
| FMC L/R-D-4 | PRES POSN LAT-MSData |
| FMC L/R-D-4 | PRES POSN LONG-LSData |
| FMC L/R-D-4 | PRES POSN LONG-MSData |
| EFIS L/C-A-1 | R FCC DATA FAULT CAPT |
| EFIS L/C-A-1 | R FMC DATA FAULT CAPT |
| EFIS L/C-A-1 | R IRS DATA FAULT CAPT |
| EICAS L/R-A-1 | R MAIN PITOT HEAT |
| LRRA C-A-2 | RADIO HEIGHT LSB |
| LRRA L-A-2 | RADIO HEIGHT LSB |
| LRRA R-A-2 | RADIO HEIGHT LSB |
| EFIS L/C-A-1 | RADIO HEIGHT LSB CAPT |
| LRRA C-A-2 | RADIO HEIGHT MSB |
| LRRA L-A-2 | RADIO HEIGHT MSB |
| LRRA R-A-2 | RADIO HEIGHT MSB |
| EFIS L/C-A-1 | RADIO HEIGHT MSB CAPT |

| PORT NAME | PARAMETER ASSIGNMENT |
|-----------------|--------------------------|
| TCAS | REPLY INFORMATION |
| EICAS L/R-A-1 | RUDDER PCU |
| SAM | SAM TRIM DOWN CMD L |
| SAM | SAM TRIM DOWN CMD R |
| SAM | SAM TRIM UP CMD LEFT |
| SAM | SAM TRIM UP CMD RIGHT |
| ILS L-A-2/MMR L | SEL RWY HDG |
| VOR L-A-2 | SELECTED COURSE - CAPT |
| VOR R-A-2 | SELECTED COURSE - F/O |
| ILS L-A-2/MMR L | SELECTED LANDING MODE |
| SPD BK LEVER | SPD BRK HDL POSN ANALOG |
| CONFIG | SPD BRKE HDL WIRING DISC |
| TCAS | SPI |
| CONFIG | STAB ANALOG WIRING DISC |
| ILS L-A-2/MMR L | STANDBY MODE |
| ADC L/R-A-4 | STATIC AIR TEMP |
| EICAS L/R-A-1 | STBY BUS OFF |
| EFIS R/C-A-1 | TCAS DATA DISPLAYED F/O |
| EFIS L/C-A-1 | TCAS DISPLAY SEL CAPT |
| TCAS | TCAS FAILURE |
| TCAS | TCAS SL |

| PORT NAME | PARAMETER ASSIGNMENT |
|-----------------|--------------------------|
| TCAS | TCAS SYSTEM STATUS |
| EFIS R/C-A-1 | TERRAIN DATA DISPLYD F/O |
| FQPU | TOTAL FUEL QUANTITY |
| ADC L/R-A-4 | TOTAL PRESSURE |
| EFIS L/C-A-1 | TRUE HEADING CAPT |
| ILS C-A-2/MMR C | TUNING INPUT BUS ACT -C |
| ILS L-A-2/MMR L | TUNING INPUT BUS ACT -L |
| ILS R-A-2/MMR R | TUNING INPUT BUS ACT -R |
| TCAS | UP ADVISORY |
| DFDAU | VENDOR STATUS & DATA |
| TCAS | VERTICAL CONTROL |
| FMC L/R-D-4 | VERTICAL DEVIATION |
| EICAS L/R-A-1 | VIB IDENT 1 - L |
| EICAS L/R-A-1 | VIB IDENT 1 - R |
| EICAS L/R-A-1 | VIB IDENT 2 - L |
| EICAS L/R-A-1 | VIB IDENT 2 - R |
| EFIS R/C-A-1 | WXR DATA DISPLAYED F/O |
| YAW DMPR | YAW DAMPER ENGAGE L |
| YAW DMPR | YAW DAMPER ENGAGE R |

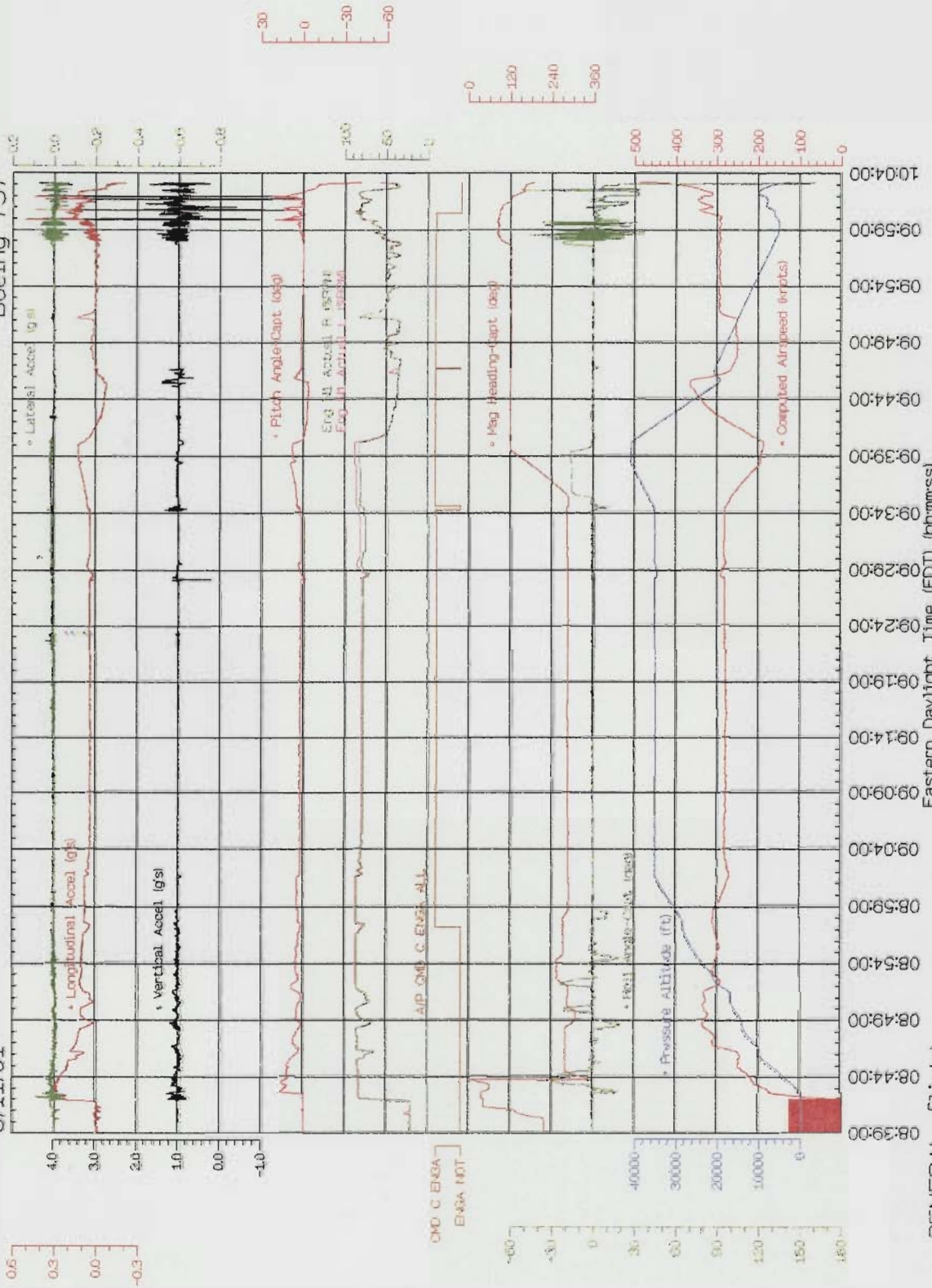
Attachment II

Plots of SSFDR Data

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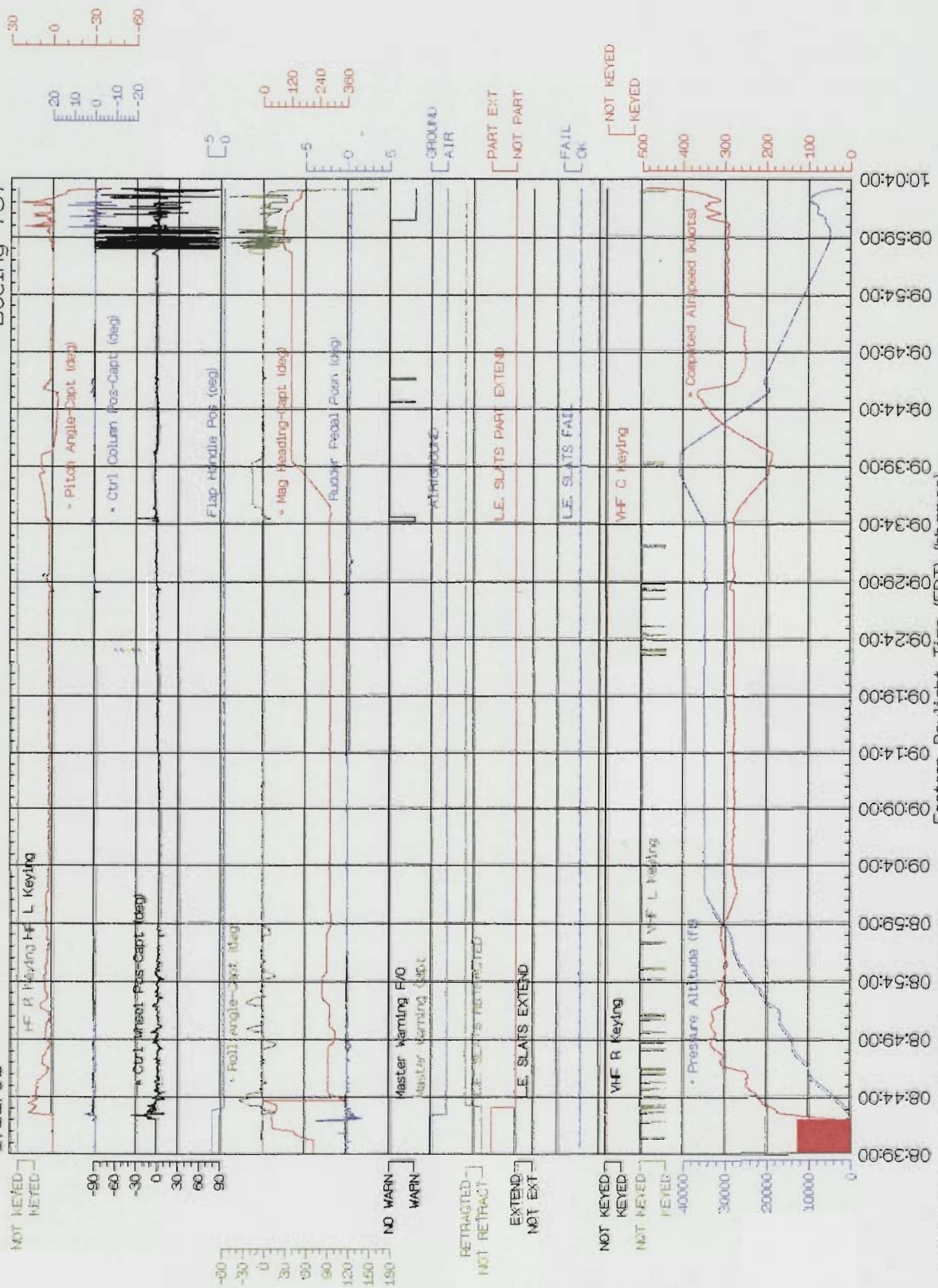
GENERAL flight
Revised: February 12, 2002

National Transportation Safety Board

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Boeing 757

9/11/01



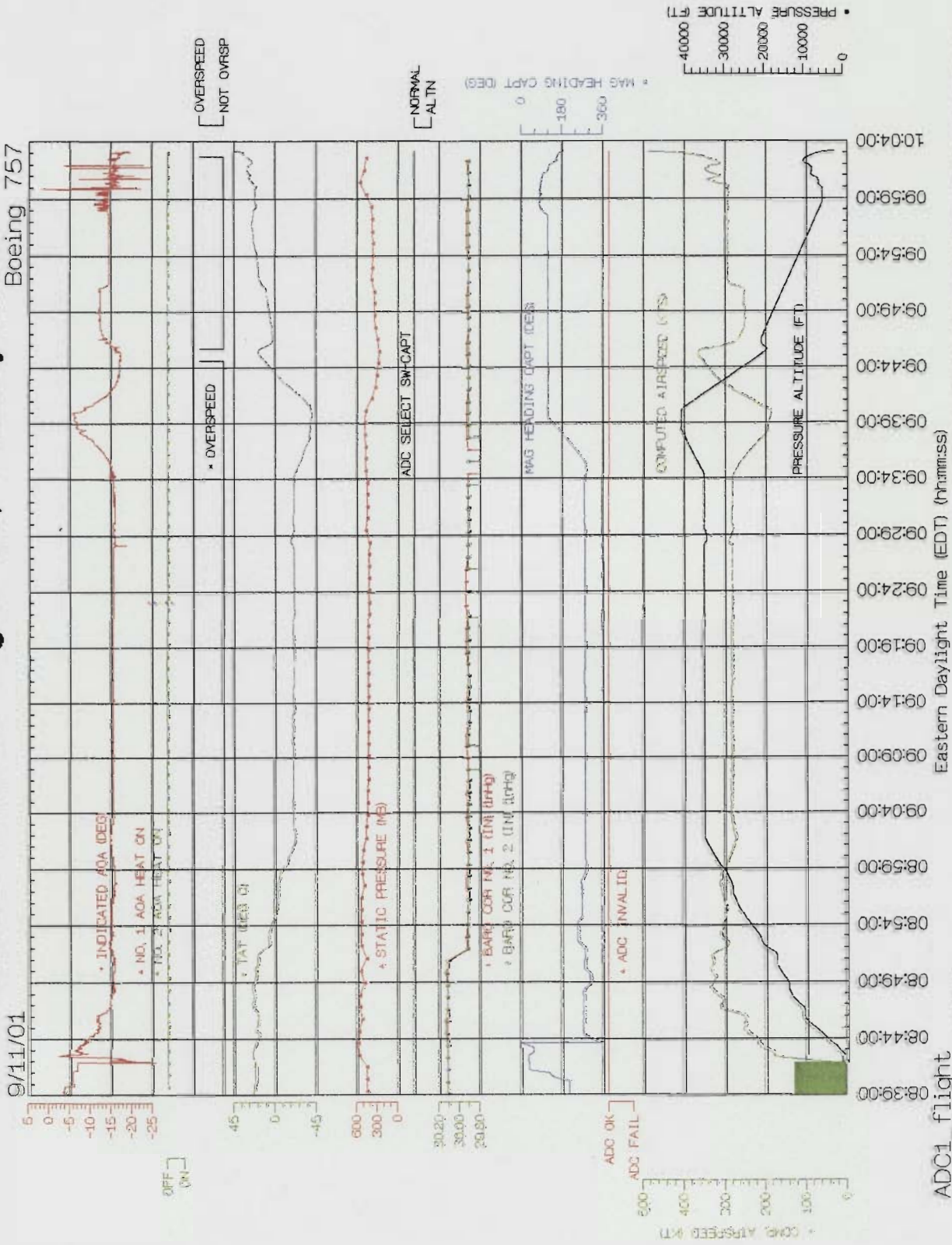
ANALOG+DISCRETES flight
Revised: February 12, 2002

National Transportation Safety Board

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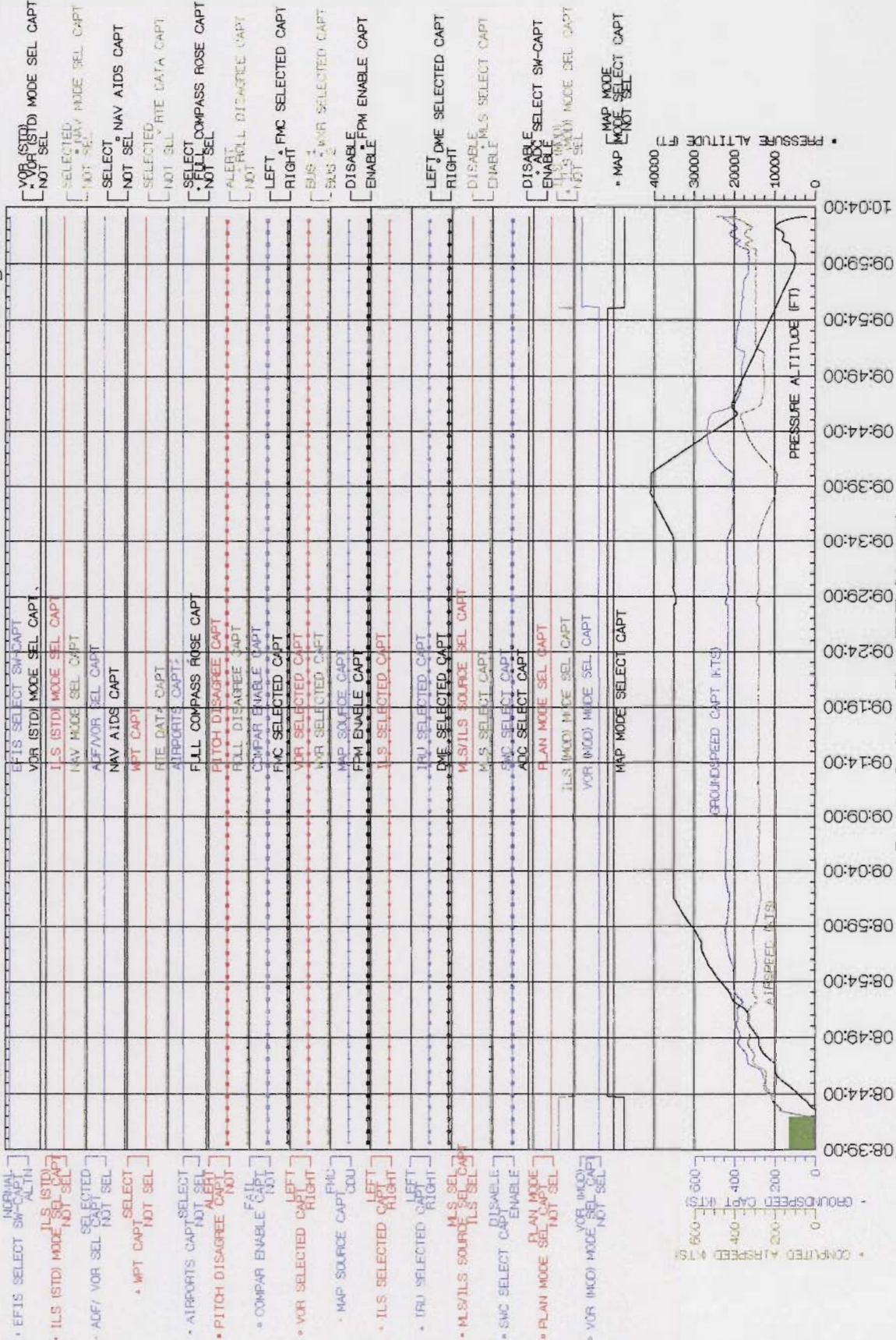
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February 12, 2002

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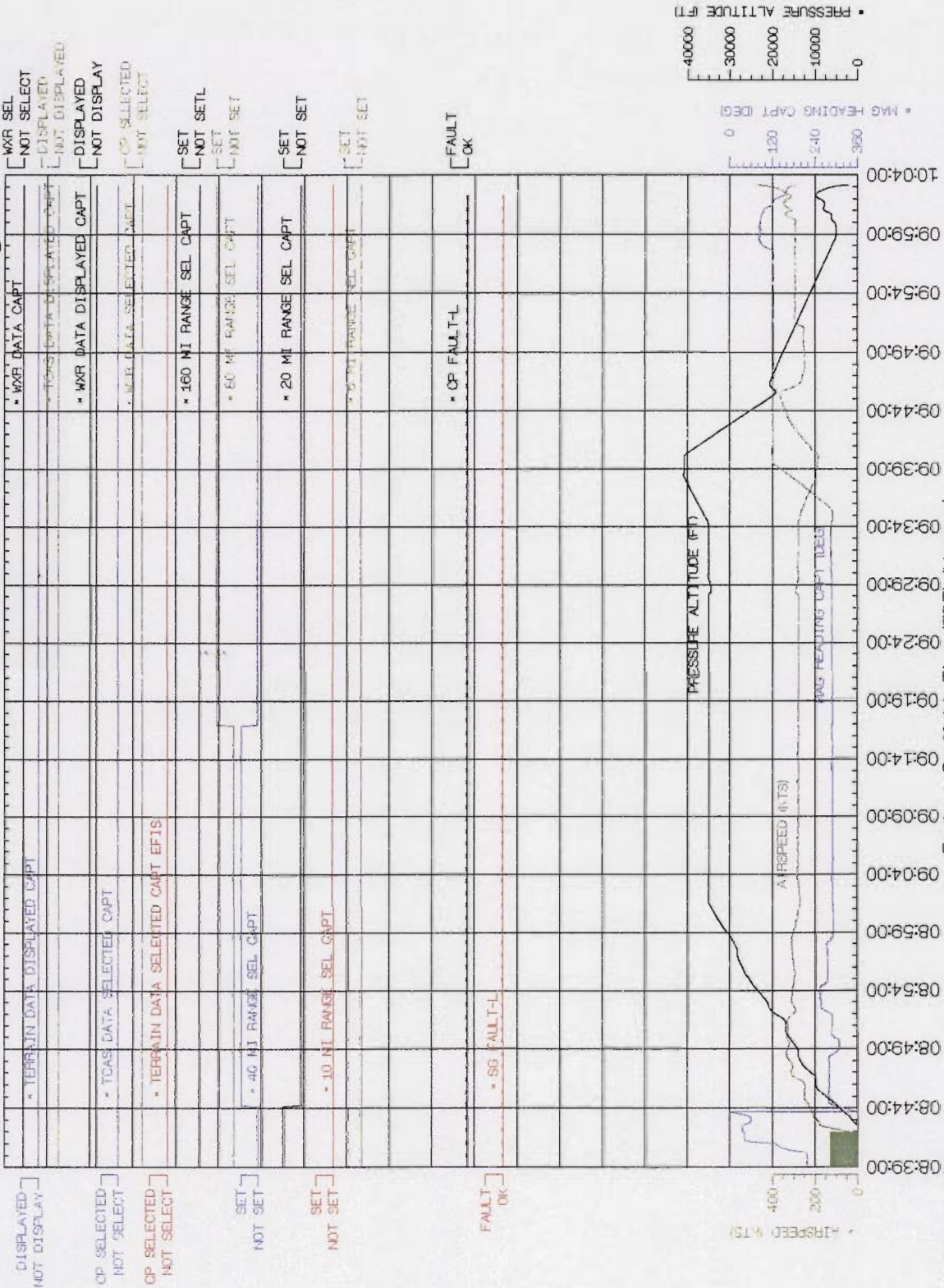
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February 13, 2002

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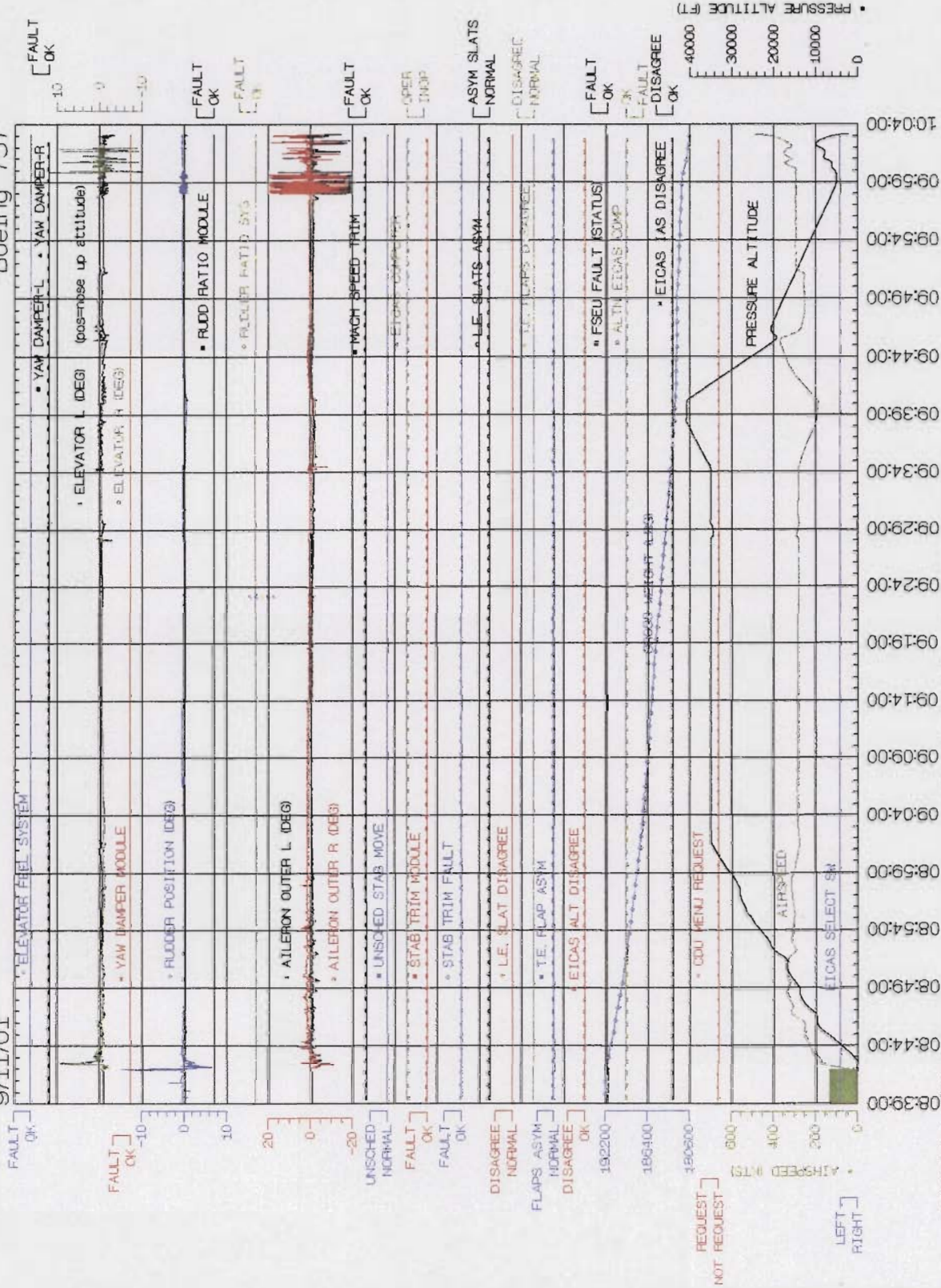
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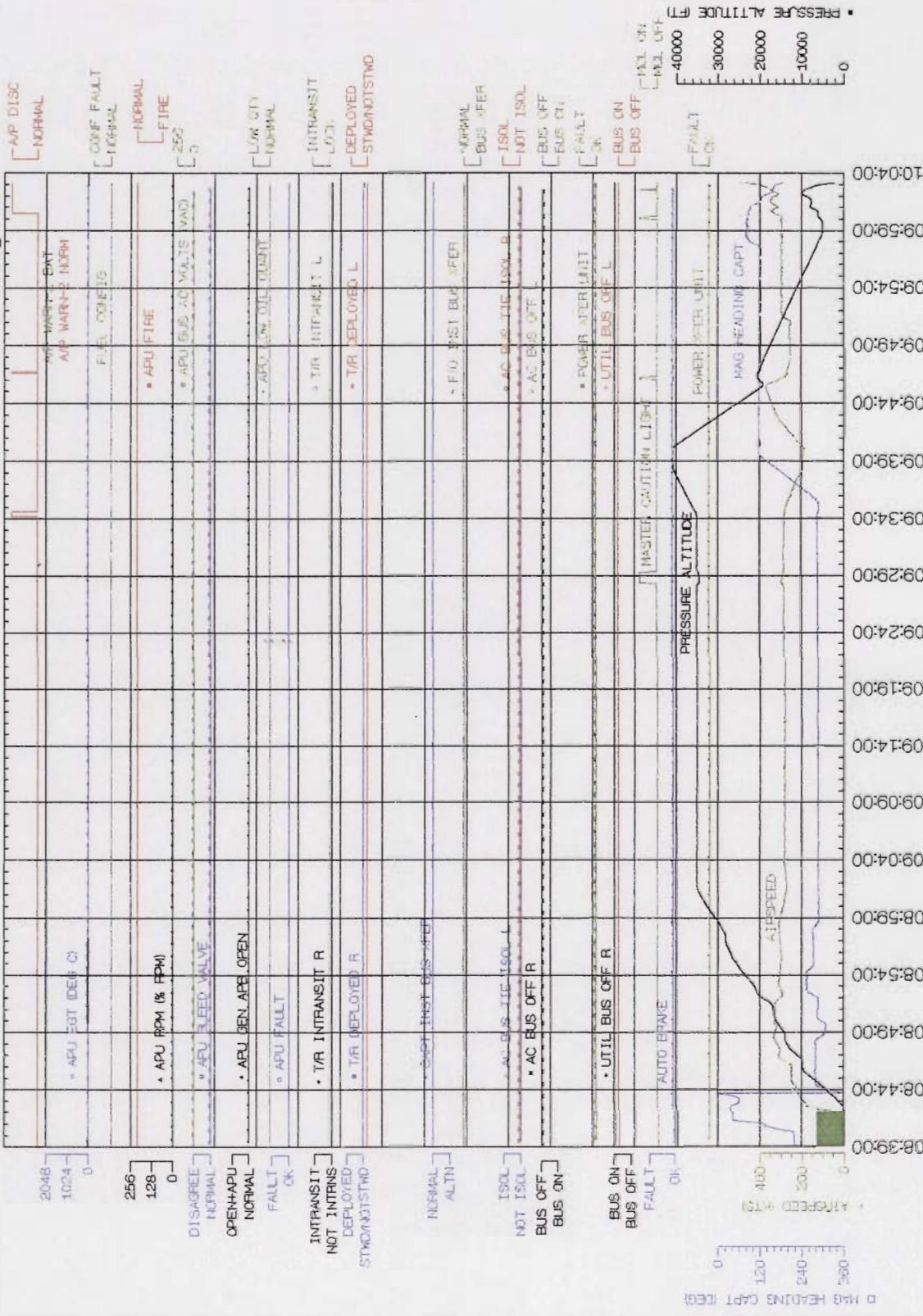


EICAS1_flight
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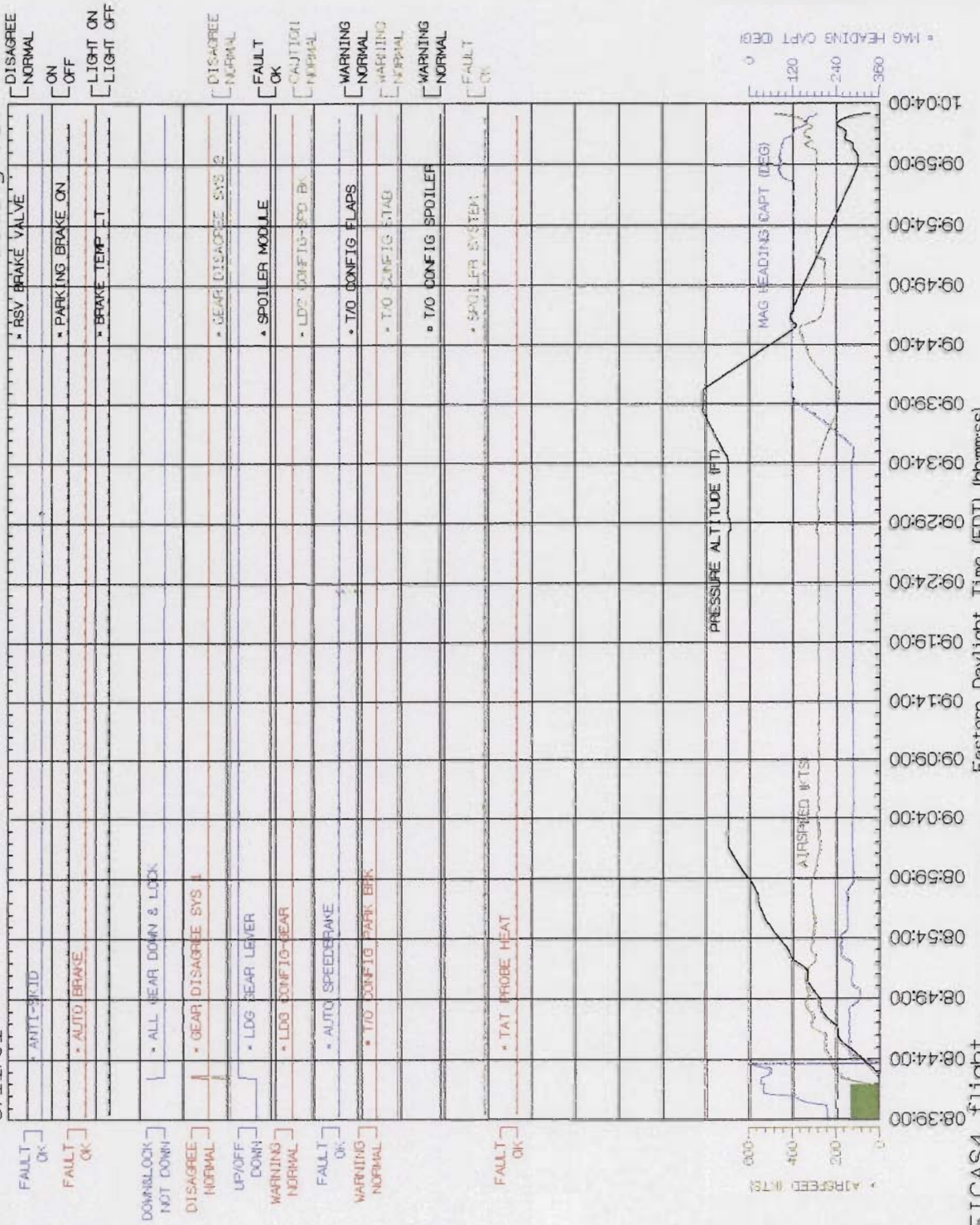
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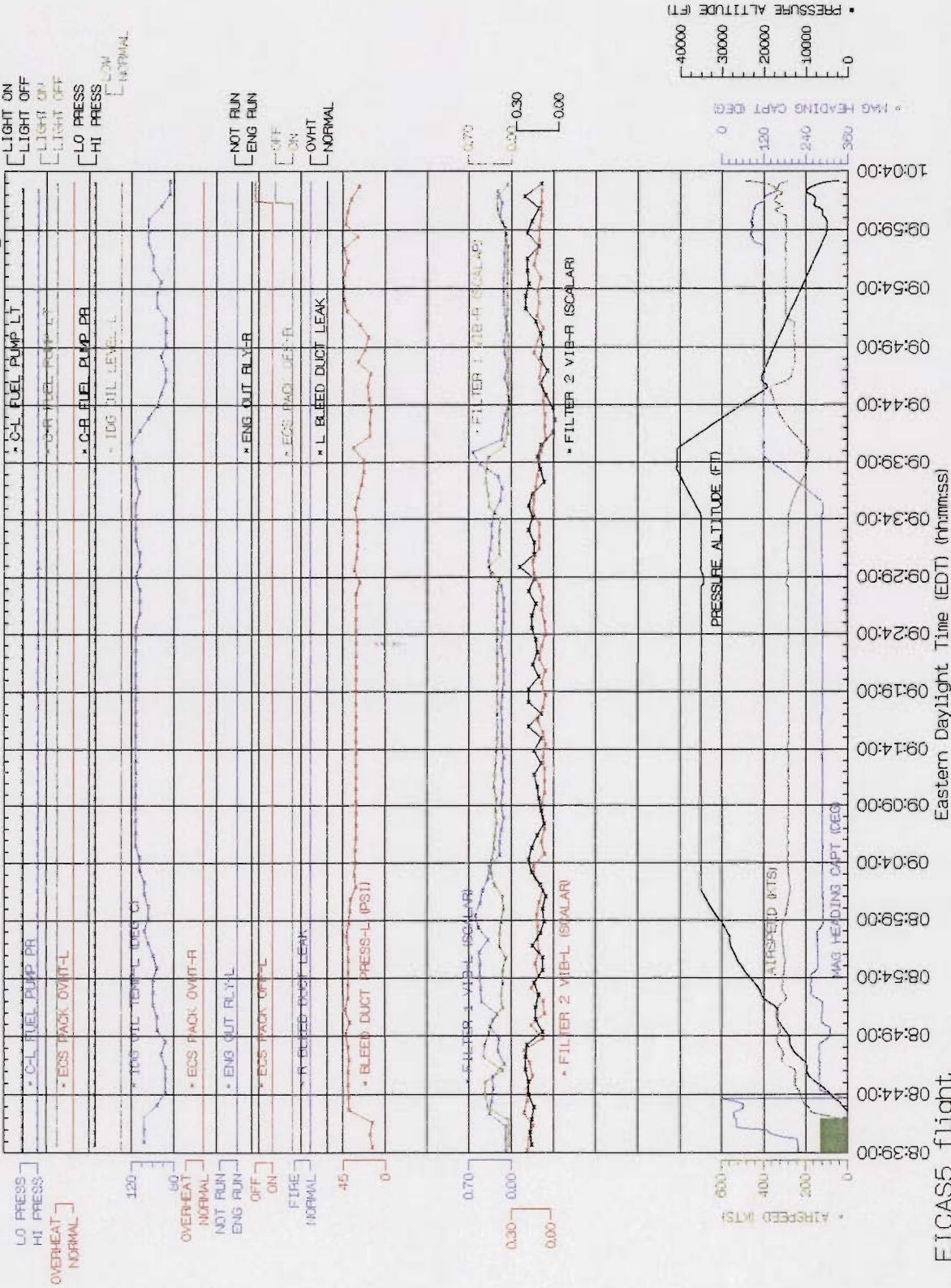
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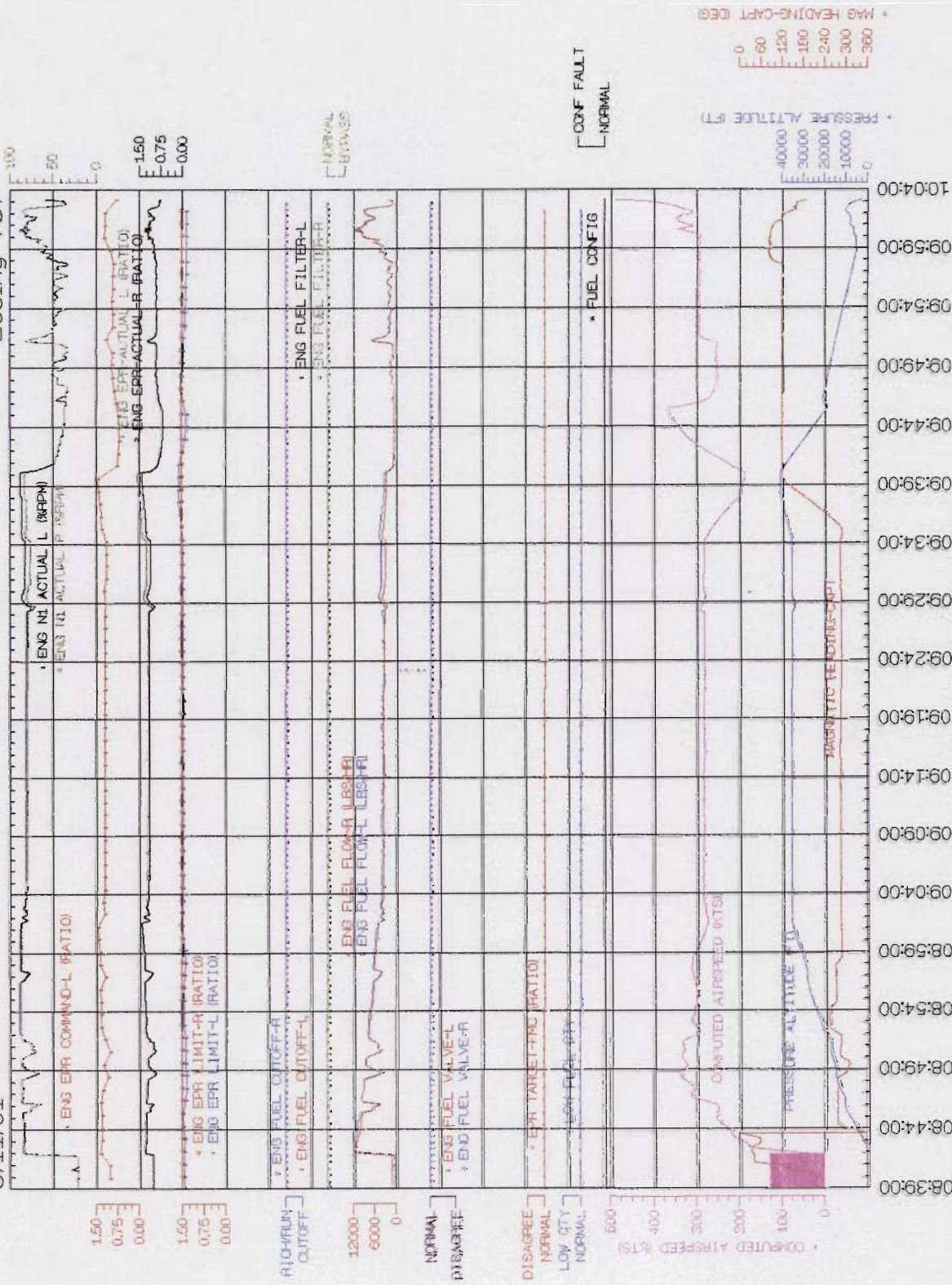
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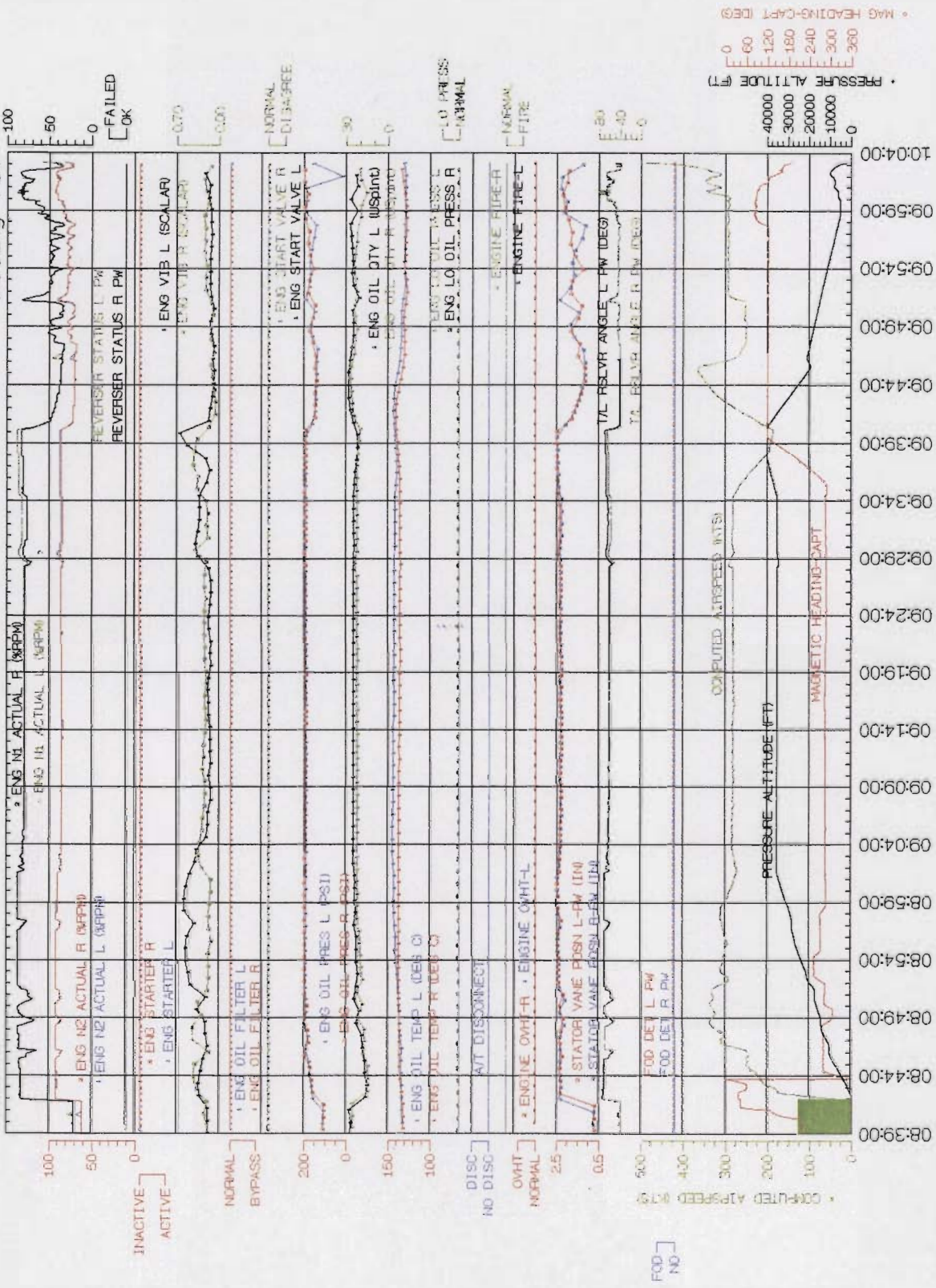
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February 12, 2002

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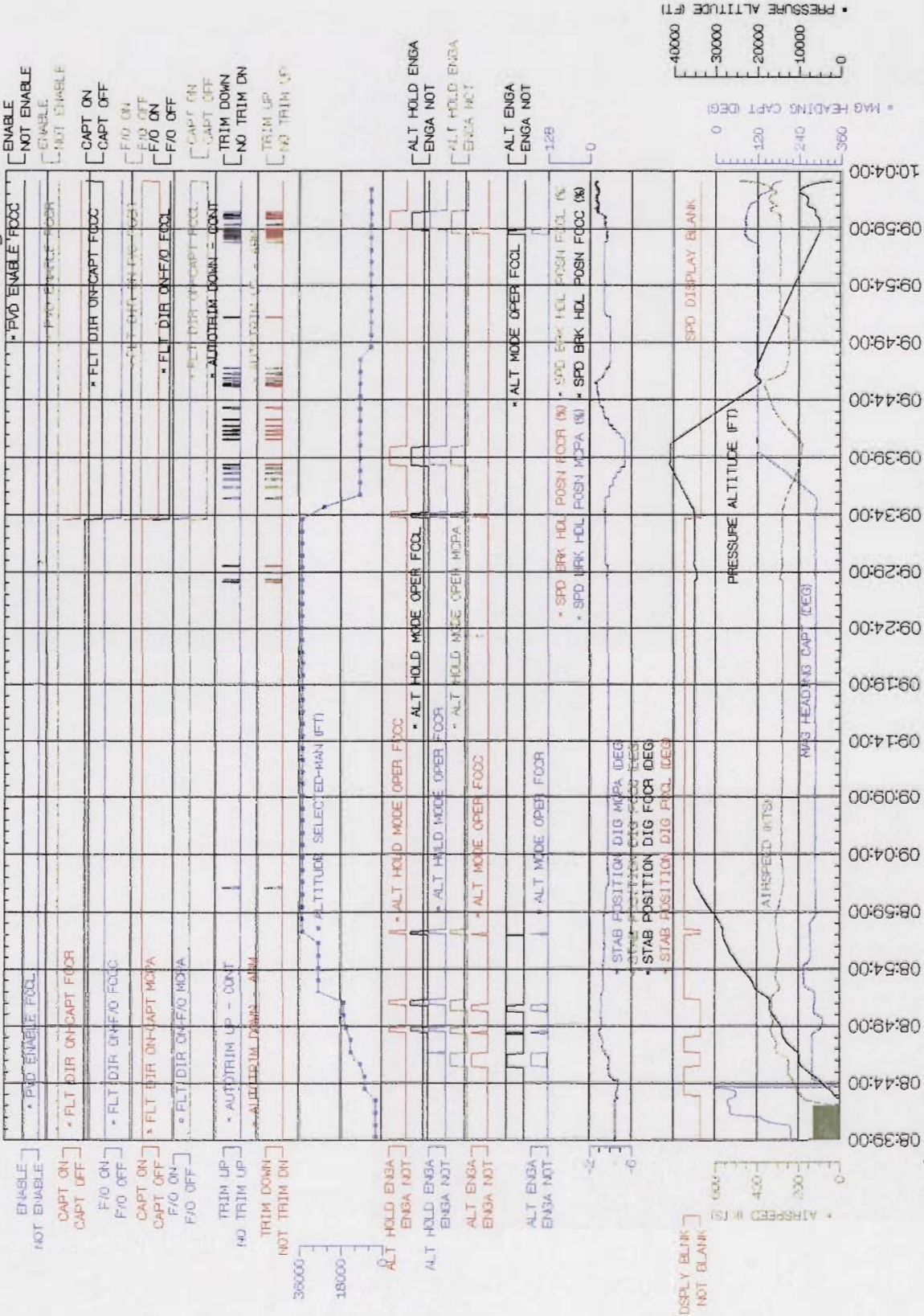
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February 12, 2002

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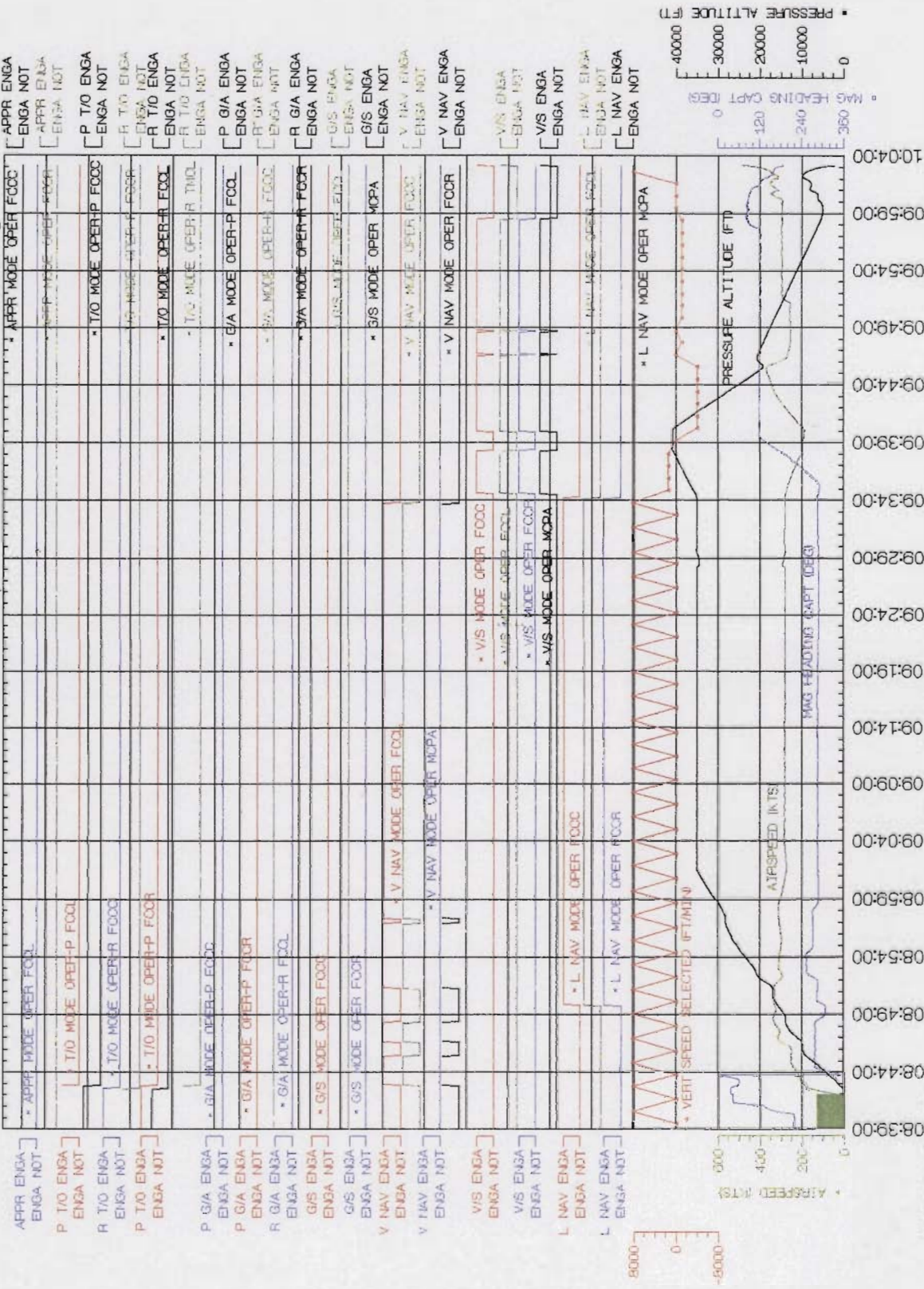
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February 12, 2002

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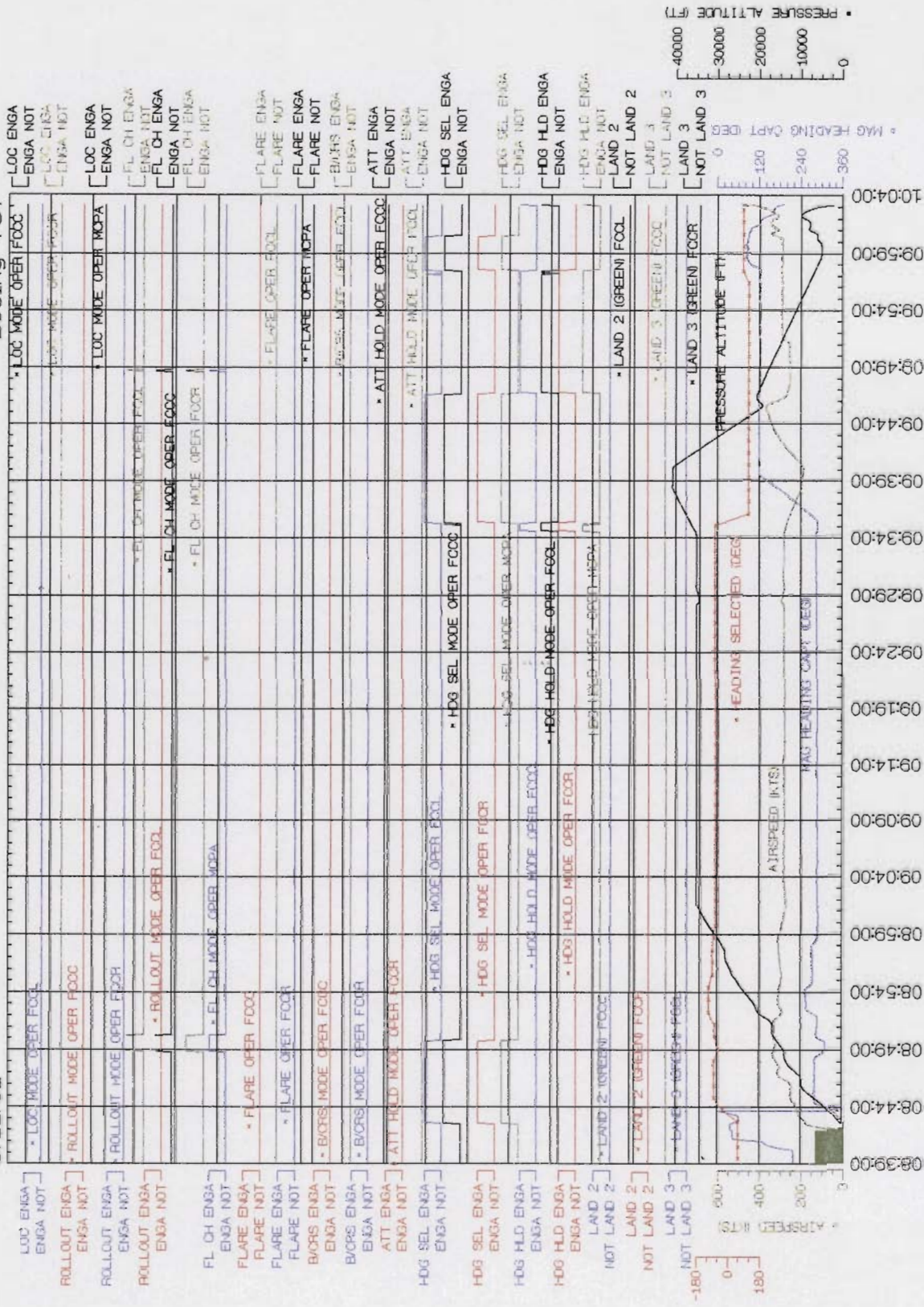
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National Transportation Safety Board

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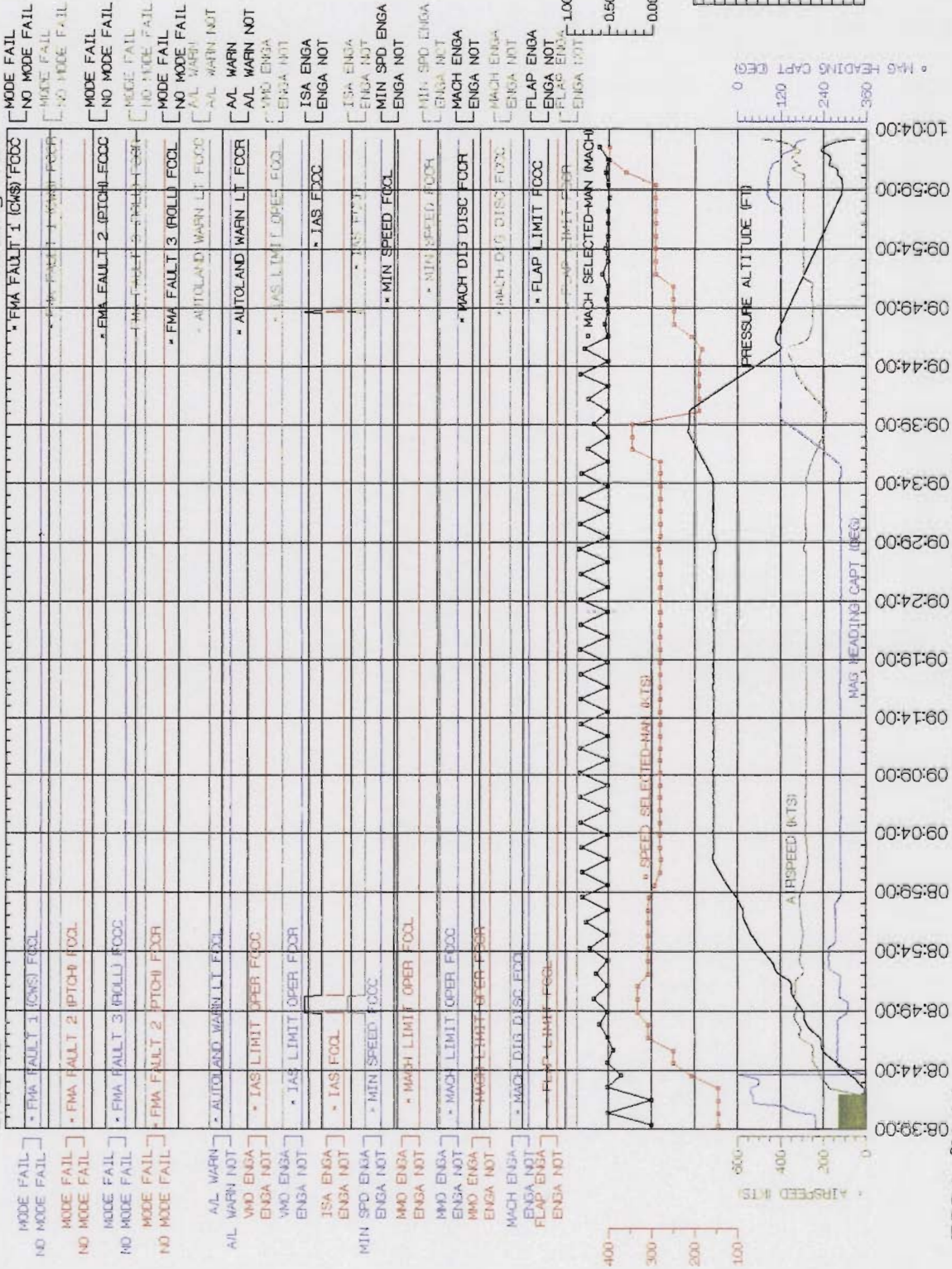
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February 12, 2002

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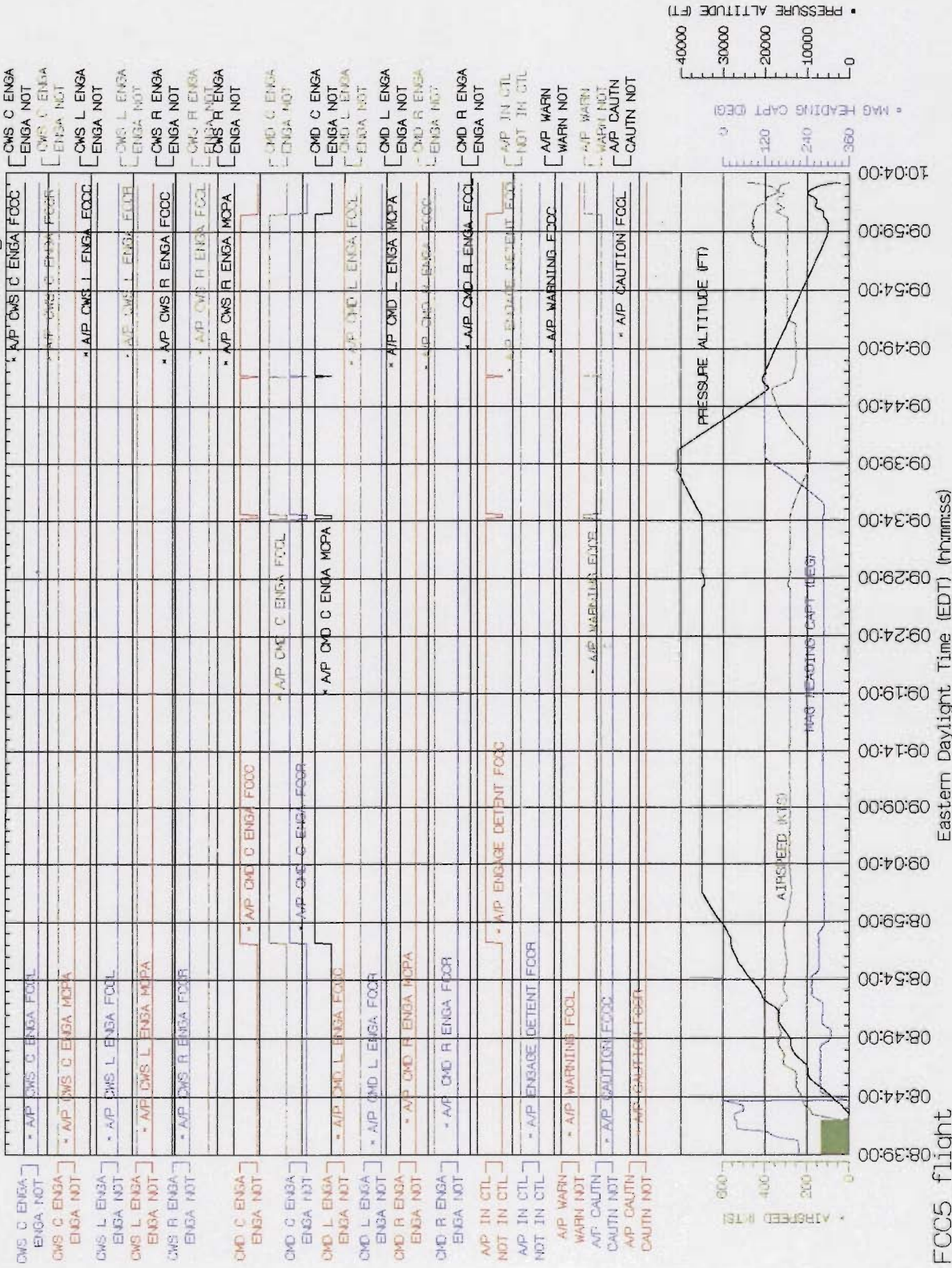
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February 12, 2002

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February 12, 2002

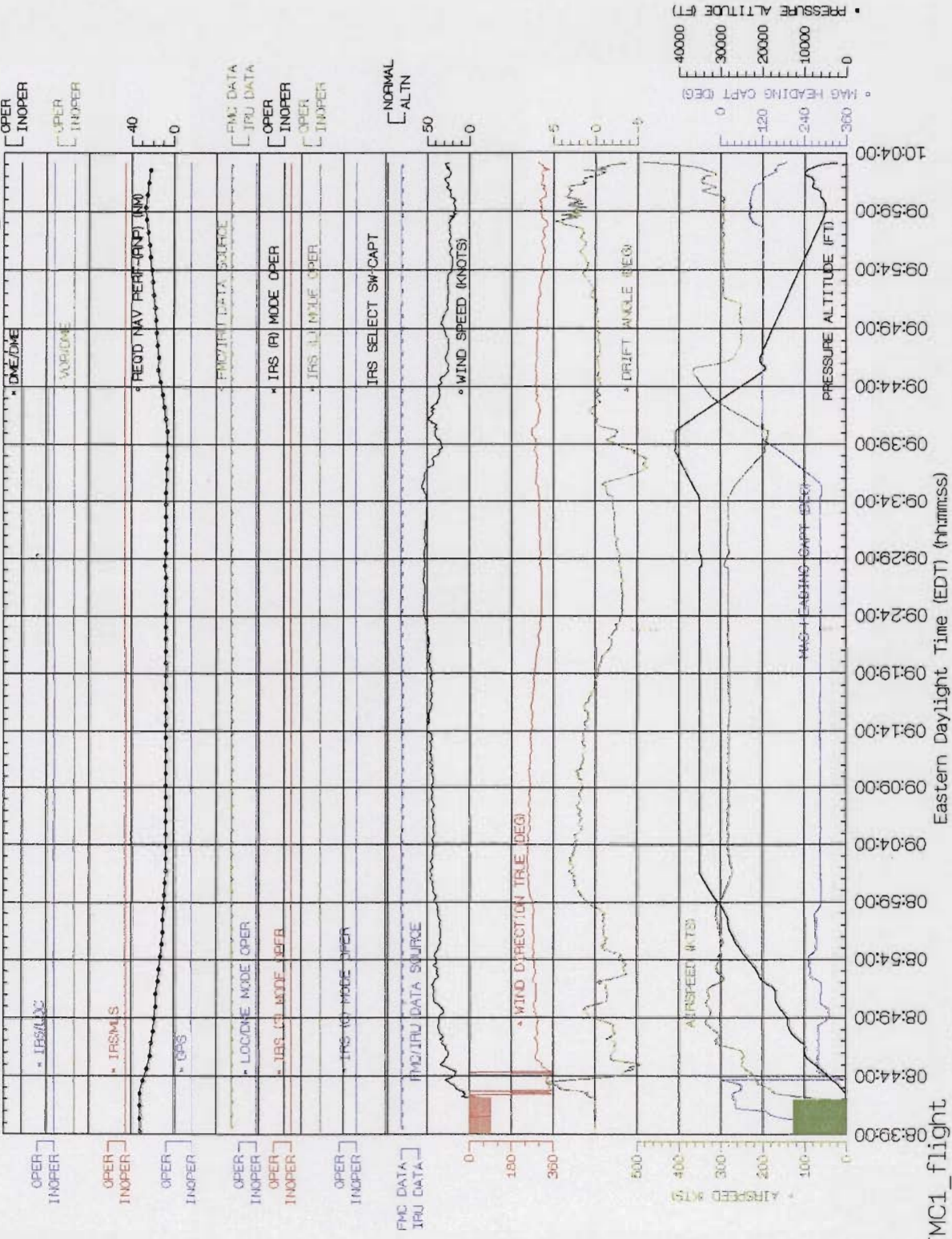
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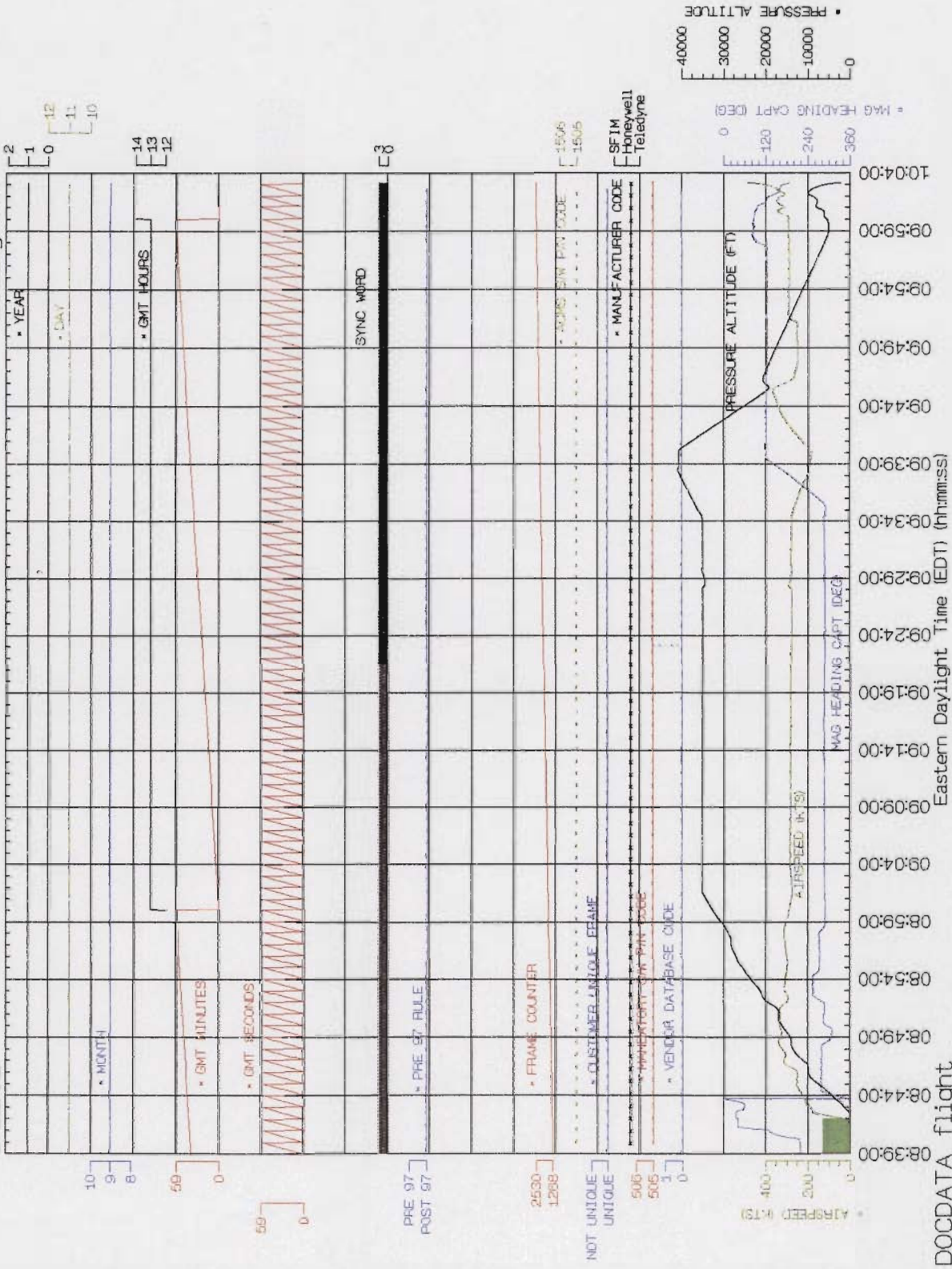
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National Transportation Safety Board

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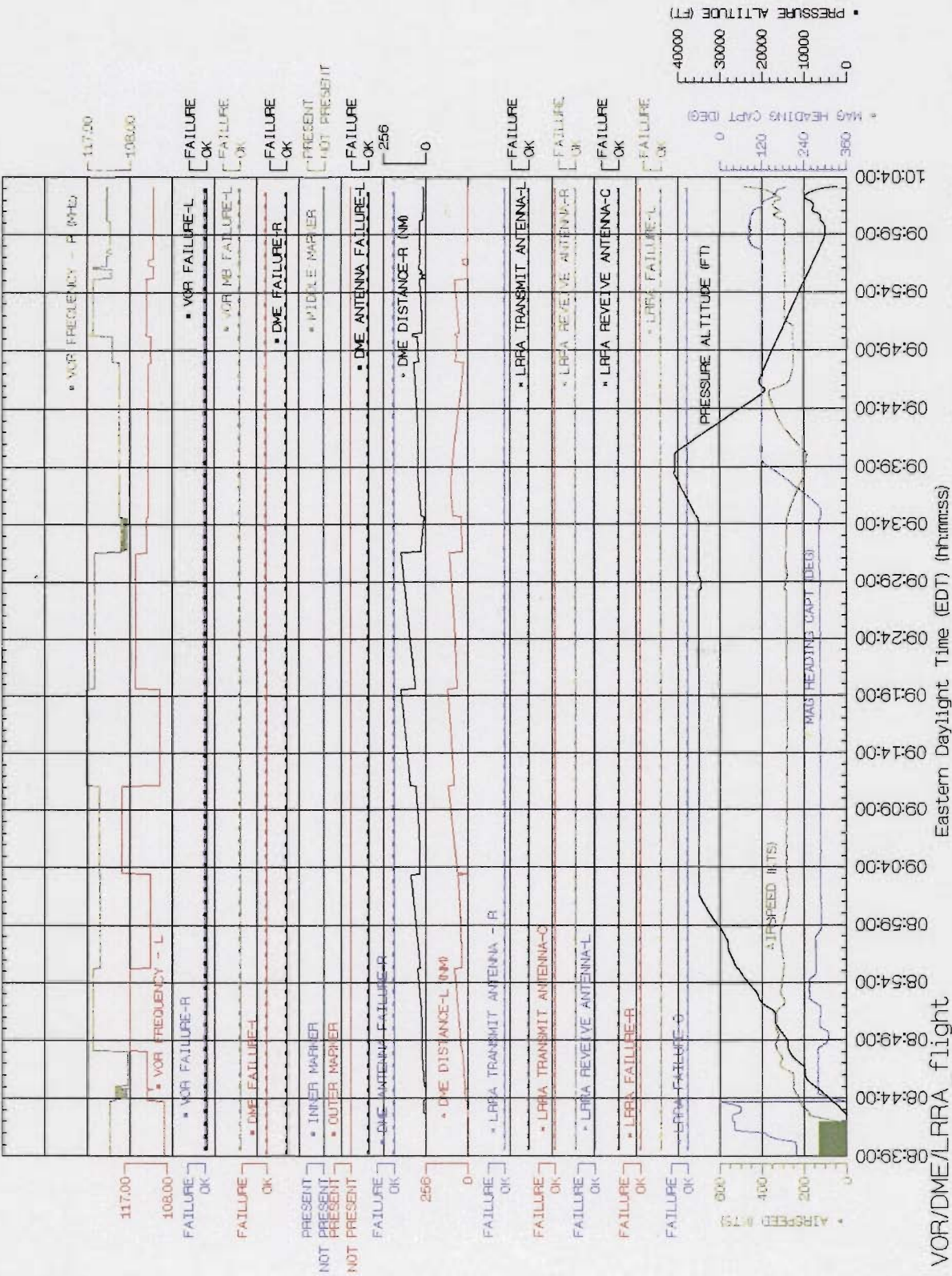
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National Transportation Safety Board

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February 12, 2002

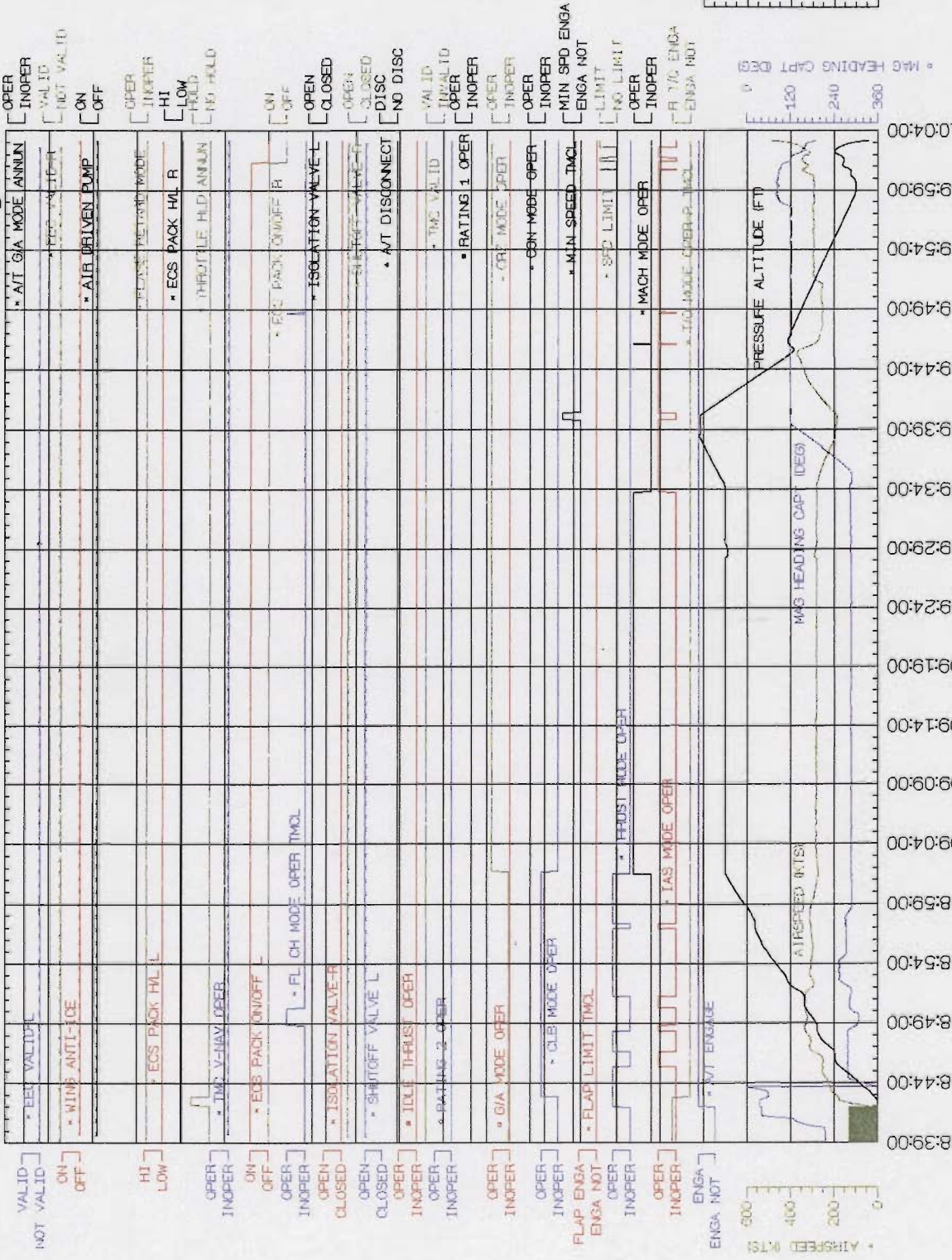
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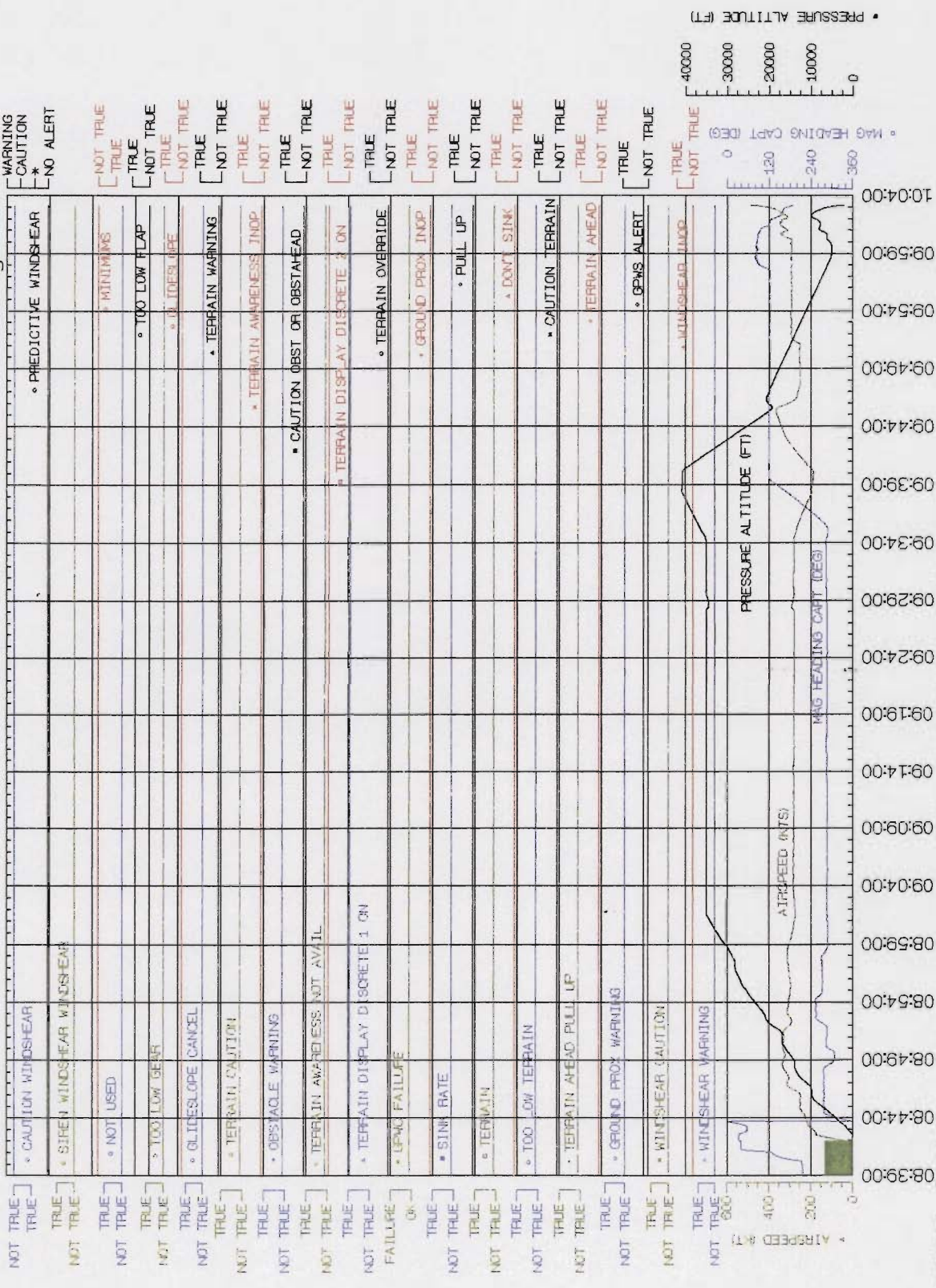
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United Airlines Flight 93, Pennsylvania

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