

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

January 31, 2002

Specialist's Factual Report of Investigation
Digital Flight Data Recorder

NTSB Number:
DCA01MA064

A. EVENT

Location: Arlington, Virginia
Date: September 11, 2001
Aircraft: B-757-200, N644AA
Operator: American 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 American Airlines Flight 77, which crashed into the Pentagon in Arlington, Virginia, on September 11, 2001, the NTSB Vehicle Recorders Division received the following solid state flight data recorder (SSFDR) on September 14, 2001:

Recorder Manufacturer/Model: **Loral Fairchild Model F-2100**

The SSFDR was examined upon receipt. The recorder displayed evidence of impact, fire, and smoke damage. The memory module was removed as shown in Figures 1 and 2.



Figure 1



Figure 2

The memory module was placed in the laboratory's chassis for L3 Communications solid state flight recorders. The SSFDR data were then transcribed to hard disk for further analysis. 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 Boeing and American Airlines for this airplane.¹ The transcribed data were processed by the National Transportation 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-4. 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-5 to I-13.

Recorder Description

This model SSFDR accepts serial bit stream data in an ARINC 573/717² format at a rate of 256 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

¹ Based on Boeing's 757-3B data frame. See Attachments IV and V: Boeing Document D226A101-3, Rev. G, October 27, 1999 (D226A101-3G.pdf); American Airlines database printout (757-3b_1.txt).

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

Storage Unit. A minimum of the last 25 hours of operational data is retained on the recording medium.

Prior to recording, the serial data stream is compressed using a modified Hoffman encoding scheme. The data can be decompressed and restored to the original ARINC 575/717 format without any data loss. This requires the use of specialized manufacturers or equivalent software.

The Digital Flight Data Acquisition Unit (DFDAU) provides a means of gathering, conditioning, and converting flight data parameters to digital data. In this aircraft, the DFDAU function is performed by the SSFDR. The DFDAU provides a serial binary digital data stream to the SSFDR at a rate of 3072 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 256 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 256-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-17 contain plots of those parameters that were recorded and validated. The timeframe of the plots is from 8:19:00 EDT to 9:39:00 EDT, with the last recorded data occurring at 9:37:44 EDT.

The data plotted in Attachment II are available in tabular format as a comma delimited (*.csv) file in Attachment III.

[original signed]

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Vehicle Recorders Division

Attachments I-1 to I-13:	Parameter Listings
Attachments II-1 to II-17:	Plots of SSFDR Data
Attachment III (electronic):	DCA01MA064_tabular.csv
Attachment IV (electronic):	D226A101-3G.pdf
Attachment V (electronic):	757-3b_1.txt

Attachment I

Parameter Listings

Parameters Plotted

PORT NAME	PARAMETER ASSIGNMENT	PORT NAME	PARAMETER ASSIGNMENT
EFIS L/C-A-1	10 MI RANGE SEL CAPT	FCC R-A-4	ALT MODE OPER
EFIS R/C-A-1	10 MI RANGE SEL F/O	EICAS L/R-A-1	ALTITUDE ALERT
EFIS L/C-A-1	160 MI RANGE SEL CAPT	TCAS	ALTITUDE REPORTING
EFIS R/C-A-1	160 MI RANGE SEL F/O	FCC C-A-4	APPR MODE OPER
EFIS L/C-A-1	20 MI RANGE SEL CAPT	FCC L-A-4	APPR MODE OPER
EFIS R/C-A-1	20 MI RANGE SEL F/O	FCC R-A-4	APPR MODE OPER
EFIS L/C-A-1	40 MI RANGE SEL CAPT	EICAS L/R-A-1	APU BATT VOLTS
EFIS R/C-A-1	40 MI RANGE SEL F/O	EICAS L/R-A-1	APU BLEED VALVE
EFIS L/C-A-1	80 MI RANGE SEL CAPT	EICAS L/R-A-1	APU BUS AC VOLTS
EFIS R/C-A-1	80 MI RANGE SEL F/O	EICAS L/R-A-1	APU BUS FREQ
FCC C-A-4	A/P CMD L ENGA	EICAS L/R-A-1	APU DOOR
FCC L-A-4	A/P CMD L ENGA	EICAS L/R-A-1	APU FUEL SHUTOFF
FCC R-A-4	A/P CMD L ENGA	EICAS L/R-A-1	APU GEN APB OPEN
FCC C-A-4	A/P CMD R ENGA	EICAS L/R-A-1	APU LOAD
FCC L-A-4	A/P CMD R ENGA	EICAS L/R-A-1	APU RPM
FCC R-A-4	A/P CMD R ENGA	EICAS L/R-A-1	AUTOTHROTTLE DISC
FCC C-A-4	A/P ENGAGE DETENT	FCC C-A-4	AUTOTRIM DOWN - ARM
FCC L-A-4	A/P ENGAGE DETENT	FCC L-A-4	AUTOTRIM DOWN - ARM
FCC R-A-4	A/P ENGAGE DETENT	FCC R-A-4	AUTOTRIM DOWN - ARM
FCC C-A-4	A/P T.E. FLAP POSITION	FCC C-A-4	AUTOTRIM DOWN - CONT
FCC L-A-4	A/P T.E. FLAP POSITION	FCC L-A-4	AUTOTRIM DOWN - CONT
FCC R-A-4	A/P T.E. FLAP POSITION	FCC R-A-4	AUTOTRIM DOWN - CONT
EICAS L/R-A-1	A/P WARN-2 BAT	FCC C-A-4	AUTOTRIM UP - ARM
EICAS L/R-A-1	A/P WARN-2 NORM	FCC L-A-4	AUTOTRIM UP - ARM
FCC C-A-4	A/P WARNING	FCC R-A-4	AUTOTRIM UP - ARM
FCC L-A-4	A/P WARNING	FCC C-A-4	AUTOTRIM UP - CONT
FCC R-A-4	A/P WARNING	FCC L-A-4	AUTOTRIM UP - CONT
TMC L-D-4	A/T DISCONNECT	FCC R-A-4	AUTOTRIM UP - CONT
TMC L-D-4	A/T ENGAGE	ADC L/R-A-4	BARO COR NO. 1 (IN)
EEC RR-L-B-2	ACB WHEN ON - L	ADC L/R-A-4	BARO COR NO. 2 (IN)
EEC RR-R-B-2	ACB WHEN ON - R	EICAS L/R-A-1	BLEED DUCT PRESS - L
EEC RR-L-B-2	ACM WHEN ON - L	EICAS L/R-A-1	BLEED DUCT PRESS - R
EEC RR-R-B-2	ACM WHEN ON - R	EICAS L/R-A-1	BLEED ISOL VALVE
EICAS L/R-A-1	AFT FUEL PUMP - L	EICAS L/R-A-1	BUS AC VOLTS - LEFT
EICAS L/R-A-1	AILERON POSN-OUTER - L	EICAS L/R-A-1	BUS AC VOLTS - RIGHT
EICAS L/R-A-1	AILERON POSN-OUTER - R	EICAS L/R-A-1	BUS FREQ-L
A/G RELAY	AIR/GROUND	EICAS L/R-A-1	BUS FREQ-R
EFIS L/C-A-1	AIRPORTS CAPT	SYNCHRO	CAPT CONT COLUMN POSN
EFIS R/C-A-1	AIRPORTS F/O	SYNCHRO	CAPT CONT WHEEL POSN
EICAS L/R-A-1	ALL GEAR DOWN & LOCK	EICAS L/R-A-1	C-L FUEL PUMP LT
FCC C-A-4	ALT HOLD MODE OPER	EICAS L/R-A-1	C-L FUEL PUMP PR
FCC L-A-4	ALT HOLD MODE OPER	TMC L-D-4	CLB MODE OPER
FCC R-A-4	ALT HOLD MODE OPER	ADC L/R-A-4	COMPUTED AIRSPEED
FCC C-A-4	ALT MODE OPER	EICAS L/R-A-1	C-R FUEL PUMP LT
FCC L-A-4	ALT MODE OPER	EICAS L/R-A-1	C-R FUEL PUMP PR

PORT NAME	PARAMETER ASSIGNMENT	PORT NAME	PARAMETER ASSIGNMENT
FMC L/R-B-1	CREW ALERT LEVEL A	EICAS L/R-A-1	ENG N3-ACTUAL - R
TMC L-D-4	CRZ MODE OPER	EICAS L/R-A-1	ENG N3-ACTUAL - L
FQMS	DENSITY C TANK	EICAS L/R-A-1	ENG OIL PRES - L
FQMS	DENSITY L TANK	EICAS L/R-A-1	ENG OIL PRES - R
FQMS	DENSITY R TANK	EICAS L/R-A-1	ENG OIL QTY - L
FQMS	DENSITY S TANK	EICAS L/R-A-1	ENG OIL QTY - R
TMC L-D-4	DERATE 1 ARMED	EICAS L/R-A-1	ENG OIL TEMP - L
DME L-A-2	DME DISTANCE-LEFT	EICAS L/R-A-1	ENG OIL TEMP - R
DME R-A-2	DME DISTANCE-RIGHT	EICAS L/R-A-1	ENG OUT RLY - L
FMC L/R-D-4	DRIFT ANGLE	EICAS L/R-A-1	ENG OUT RLY - R
TMC L-D-4	ECS PACK H/L LEFT	EICAS L/R-A-1	ENG START VALVE - L
TMC L-D-4	ECS PACK H/L RIGHT	EICAS L/R-A-1	ENG START VALVE - R
EICAS L/R-A-1	ECS PACK OFF - L	EICAS L/R-A-1	ENG VIBRATION - L
EICAS L/R-A-1	ECS PACK OFF - R	EICAS L/R-A-1	ENG VIBRATION - R
TMC L-D-4	ECS PACK ON/OFF LEFT	EEC RR-L-B-2	ENGINE OUT (EO) - L
TMC L-D-4	ECS PACK ON/OFF RIGHT	EEC RR-R-B-2	ENGINE OUT (EO) - R
EICAS L/R-A-1	EEC LIMITER - R	TMC L-D-4	EPR BUG DRIVE LEFT
TMC L-D-4	EEC VALID - L	TMC L-D-4	EPR BUG DRIVE RIGHT
TMC L-D-4	EEC VALID - R	EEC RR-L-B-2	EQUIV PLA-LEFT
EICAS L/R-A-1	EICAS COMPUTER	EEC RR-R-B-2	EQUIV PLA-RIGHT
EICAS L/R-A-1	EICAS DISPLAY STATE LOWER DU	EEC RR-L-B-2	FAN INLET TOTAL TEMP - L
EICAS L/R-A-1	EICAS DISPLAY STATE UPPER DU	EEC RR-R-B-2	FAN INLET TOTAL TEMP - R
EICAS L/R-A-1	ELEC MAN RECORD	EEC RR-L-B-2	FEEDBACK OF HMC TRIM - L
EICAS L/R-A-1	ELEV PCU - L	EEC RR-R-B-2	FEEDBACK OF HMC TRIM - R
EICAS L/R-A-1	ELEV PCU - R	EICAS L/R-A-1	FILTER 1 VIB - L
EICAS L/R-A-1	ELEVATOR POSN - L	EICAS L/R-A-1	FILTER 1 VIB-R
EICAS L/R-A-1	ELEVATOR POSN - R	EICAS L/R-A-1	FILTER 2 VIB - L
EICAS L/R-A-1	ENG BLEED OFF - L	EICAS L/R-A-1	FILTER 2 VIB - R
EICAS L/R-A-1	ENG BLEED OFF - R	EICAS L/R-A-1	FILTER 3 VIB - L
EICAS L/R-A-1	ENG DED GEN - L	EICAS L/R-A-1	FILTER 3 VIB - R
EICAS L/R-A-1	ENG DED GEN - R	FCC C-A-4	FL CH MODE OPER
EICAS L/R-A-1	ENG EGT-LEFT	FCC L-A-4	FL CH MODE OPER
EICAS L/R-A-1	ENG EGT-RIGHT	FCC R-A-4	FL CH MODE OPER
EICAS L/R-A-1	ENG EPR COMMAND - L	TMC L-D-4	FL CH MODE OPER
EICAS L/R-A-1	ENG EPR COMMAND - R	FSEU	FLAP HANDLE POSN
EICAS L/R-A-1	ENG EPR LIMIT-L	EFIS L/C-A-1	FLT DIR - PITCH CAPT
EICAS L/R-A-1	ENG EPR LIMIT-R	EFIS L/C-A-1	FLT DIR - ROLL CAPT
EICAS L/R-A-1	ENG EPR-ACTUAL - L	FCC C-A-4	FLT DIR ON-CAPT
EICAS L/R-A-1	ENG EPR-ACTUAL - R	FCC R-A-4	FLT DIR ON-F/O
EICAS L/R-A-1	ENG FUEL FLOW - L	EICAS L/R-A-1	FMC ANNUNCIATION
EICAS L/R-A-1	ENG FUEL FLOW - R	DFDAU	FRAME COUNTER
EICAS L/R-A-1	ENG LO OIL PRESS - L	EICAS L/R-A-1	FUEL X FEED CLOSED
EICAS L/R-A-1	ENG LO OIL PRESS - R	EFIS R/C-A-1	FULL COMPASS ROSE F/O
EICAS L/R-A-1	ENG N1-ACTUAL - L	EICAS L/R-A-1	FWD ACCESS DR
EICAS L/R-A-1	ENG N1-ACTUAL - R	TMC L-D-4	G/A MODE OPER
EICAS L/R-A-1	ENG N2-ACTUAL - L	FCC C-A-4	G/S MODE OPER
EICAS L/R-A-1	ENG N2-ACTUAL - R	FCC L-A-4	G/S MODE OPER

PORT NAME	PARAMETER ASSIGNMENT	PORT NAME	PARAMETER ASSIGNMENT
FCC R-A-4	G/S MODE OPER	FCC L-A-4	L NAV MODE OPER
EICAS L/R-A-1	GEAR DISAGREE SYS 1	FCC R-A-4	L NAV MODE OPER
EICAS L/R-A-1	GEAR DISAGREE SYS 2	FSEU	L.E. SLATS EXTEND
EICAS L/R-A-1	GEAR DOORS SYS 1	FSEU	L.E. SLATS PART EXTEND
EICAS L/R-A-1	GEAR DOORS SYS 2	FSEU	L.E. SLATS RETRACTED
EICAS L/R-A-1	GEAR DOWN SYS 1 - L	ACCEL	LATERAL ACCELERATION
EICAS L/R-A-1	GEAR DOWN SYS 1 - N	EICAS L/R-A-1	LDG GEAR LEVER
EICAS L/R-A-1	GEAR DOWN SYS 1 - R	EICAS L/R-A-1	LDG GR LEVER SYS 1
EICAS L/R-A-1	GEAR DOWN SYS 2 - L	EICAS L/R-A-1	LDG GR LEVER SYS 2
EICAS L/R-A-1	GEAR DOWN SYS 2 - N	FCC C-A-4	LOC MODE OPER
EICAS L/R-A-1	GEAR DOWN SYS 2 - R	FCC L-A-4	LOC MODE OPER
EICAS L/R-A-1	GEN GCB OPEN - L	FCC R-A-4	LOC MODE OPER
EICAS L/R-A-1	GEN GCB OPEN - R	ILS C-A-2/MMR C	LOCALIZER DEV
EICAS L/R-A-1	GEN LOAD-L	ILS L-A-2/MMR L	LOCALIZER DEV
EICAS L/R-A-1	GEN LOAD-R	ILS R-A-2/MMR R	LOCALIZER DEV
ILS C-A-2/MMR C	GLIDESLOPE DEV	EFIS L/C-A-1	LOCALIZER DEV CAPT
ILS L-A-2/MMR L	GLIDESLOPE DEV	ACCEL	LONGITUDINAL ACCEL
ILS R-A-2/MMR R	GLIDESLOPE DEV	ADC L/R-A-4	MACH
EFIS L/C-A-1	GLIDESLOPE DEV CAPT	FCC C-A-4	MACH DIG DISC
EICAS L/R-A-1	GROSS WEIGHT	FCC L-A-4	MACH DIG DISC
GPWC L-A-1	GROUND PROX WARNING	FCC R-A-4	MACH DIG DISC
EFIS L/C-A-1	GROUNDSPEED CAPT	TMC L-D-4	MACH MODE OPER
FCC C-A-4	HDG HOLD MODE OPER	EFIS L/C-A-1	MAG HEADING CAPT
FCC L-A-4	HDG HOLD MODE OPER	EICAS L/R-A-1	MAIN CARGO DOOR
FCC R-A-4	HDG HOLD MODE OPER	DFDAU	MANUFACTURER CODE
FCC C-A-4	HDG SEL MODE OPER	EFIS L/C-A-1	MAP MODE SELECT CAPT
FCC L-A-4	HDG SEL MODE OPER	EFIS R/C-A-1	MAP MODE SELECT F/O
FCC R-A-4	HDG SEL MODE OPER	EICAS L/R-A-1	MASTER CAUTION LIGHT
EICAS L/R-A-1	HYD PRES - C	WEU WARN	MASTER WARNING CAPT
EICAS L/R-A-1	HYD PRES - L	WEU WARN	MASTER WARNING F/O
EICAS L/R-A-1	HYD PRES - R	VOR L-A-2	MIDDLE MARKER
EICAS L/R-A-1	HYD RSVR PRESS > 55 - C	EICAS L/R-A-1	N GEAR LOCK SYS 1
EICAS L/R-A-1	HYD RSVR PRESS > 55 - L	EICAS L/R-A-1	N GEAR LOCK SYS 2
EICAS L/R-A-1	HYD RSVR PRESS > 55 - R	EFIS R/C-A-1	NAV AIDS F/O
FCC C-A-4	IAS	ADC L/R-A-4	OVERSPEED
FCC L-A-4	IAS	EICAS L/R-A-1	PARKING BRAKE ON
FCC R-A-4	IAS	TCAS	PILOT SL
TMC L-D-4	IAS MODE OPER	EFIS L/C-A-1	PITCH ANGLE CAPT
EICAS L/R-A-1	IDG OIL TEMP-L	EFIS R/C-A-1	PITCH ANGLE F/O
EICAS L/R-A-1	IDG OIL TEMP-R	EFIS L/C-A-1	PLAN MODE SEL CAPT
TMC L-D-4	IDLE THRUST OPER	EFIS R/C-A-1	PLAN MODE SEL F/O
EFIS R/C-A-1	ILS (MOD) MODE SEL F/O	EICAS L/R-A-1	POWER XFER UNIT
ADC L/R-A-4	INDICATED AOA	CONFIG	PRE 97 RULE
TMC L-D-4	ISOLATION VALVE - L	FMC L/R-D-4	PRES POSN LAT
EEC RR-L-B-2	ISOLATION VALVE (IV) OPEN-L	FMC L/R-D-4	PRES POSN LONG
EEC RR-R-B-2	ISOLATION VALVE (IV) OPEN-R	ADC L/R-A-4	PRESSURE ALTITUDE
FCC C-A-4	L NAV MODE OPER	EEC RR-L-B-2	PRSOV OPEN - L

PORT NAME	PARAMETER ASSIGNMENT	PORT NAME	PARAMETER ASSIGNMENT
EEC RR-R-B-2	PRSOV OPEN - R	TCAS	TCAS FAILURE
GPWC L-A-1	PULL UP	TCAS	TCAS SL
FCC C-A-4	PVD ENABLE	TCAS	TCAS SYSTEM STATUS
FCC L-A-4	PVD ENABLE	GPWC L-A-1	TERRAIN DISPLAY DISCRETE 1 ON
FCC R-A-4	PVD ENABLE	GPWC L-A-1	TERRAIN OVERRIDE
TMC L-D-4	RATING 1 OPER	EICAS L/R-A-1	THR LVR ANG / EQUIV PLA-L
TMC L-D-4	RATING 2 OPER	EICAS L/R-A-1	THR LVR ANG / EQUIV PLA-R
TCAS	REPLY INFORMATION	TMC L-D-4	THROTTLE HLD ANNUN
EFIS L/C-A-1	ROLL ANGLE CAPT	TMC L-D-4	THRUST MODE OPER
EICAS L/R-A-1	RUDDER PCU	TMC L-D-4	TMC V-NAV OPER
SYNCHRO	RUDDER PEDAL POSITION	ADC L/R-A-4	TOTAL AIR TEMP
EICAS L/R-A-1	RUDDER POSITION	ADC L/R-A-4	TOTAL PRESSURE
ILS C-A-2/MMR C	SEL RWY HDG	FMC L/R-D-4	TRACK ANGLE MAG
ILS L-A-2/MMR L	SEL RWY HDG	FMC L/R-D-4	TRACK ANGLE TRUE
ILS R-A-2/MMR R	SEL RWY HDG	ADC L/R-A-4	TRUE AIRSPEED
VOR L-A-2	SELECTED COURSE - CAPT	EFIS L/C-A-1	TRUE HEADING CAPT
TMC L-D-4	SHUTOFF VALVE LEFT	EICAS L/R-A-1	UTIL BUS OFF - L
TMC L-D-4	SHUTOFF VALVE RIGHT	EICAS L/R-A-1	UTIL BUS OFF - R
GPWC L-A-1	SINK RATE	FCC C-A-4	V NAV MODE OPER
SYNCHRO	STAB POSITION	FCC L-A-4	V NAV MODE OPER
ADC L/R-A-4	STATIC AIR TEMP	FCC R-A-4	V NAV MODE OPER
EEC RR-R-B-2	SUPERVISORY FAIL FIXED - R	FCC C-A-4	V/S MODE
TMC L-D-4	T/O MODE OPER	FCC L-A-4	V/S MODE
FCC C-A-4	T/O MODE OPER-P	FCC R-A-4	V/S MODE
FCC L-A-4	T/O MODE OPER-P	ACCEL	VERTICAL ACCELERATION
FCC R-A-4	T/O MODE OPER-P	L VHF	VHF LEFT KEYING
FCC C-A-4	T/O MODE OPER-R	EFIS L/C-A-1	VOR (MOD) MODE SEL CAPT
FCC L-A-4	T/O MODE OPER-R	VOR L-A-2	VOR FREQUENCY-LEFT
FCC R-A-4	T/O MODE OPER-R	FMC L/R-D-4	WIND DIRECTION TRUE
EICAS L/R-A-1	T/R DEPLOYED - L	FMC L/R-D-4	WIND SPEED
EICAS L/R-A-1	T/R DEPLOYED - R	EFIS R/C-A-1	WPT F/O
EICAS L/R-A-1	T/R INTRANSIT - L	EFIS L/C-A-1	WXR DATA CAPT
EICAS L/R-A-1	T/R INTRANSIT - R	EFIS R/C-A-1	WXR DATA F/O

Parameters Not Working or Unconfirmed

<u>PORT NAME</u>	<u>PARAMETER ASSIGNMENT</u>	<u>PORT NAME</u>	<u>PARAMETER ASSIGNMENT</u>
ILS C-A-2/MMR C	#1 ANTENNA SELECTED	EICAS L/R-A-1	AFT CARGO DOOR #2
ILS L-A-2/MMR L	#1 ANTENNA SELECTED	EICAS L/R-A-1	AFT CARGO FIRE
ILS R-A-2/MMR R	#1 ANTENNA SELECTED	EICAS L/R-A-1	AFT ENTRY DOOR - L
EFIS L/C-A-1	5 MI RANGE SEL CAPT	EICAS L/R-A-1	AFT ENTRY DOOR - R
EFIS R/C-A-1	5 MI RANGE SEL F/O	EICAS L/R-A-1	AFT EQUIP SMOKE
A/C IDENT	A/C NUMBER	EICAS L/R-A-1	AFT FUEL PUMP - R
A/C IDENT	A/C TYPE	HUD-1	AIII CAPABILITY HUD
FCC C-A-4	A/P CAUTION	HUD-1	AIII MODE HUD
FCC L-A-4	A/P CAUTION	TMC L-D-4	AIR DRIVEN PUMP
FCC R-A-4	A/P CAUTION	T.E. FLAP SW	ALT FLAPS ARM
FCC C-A-4	A/P CMD C ENGA	MCP A-A-2	ALT HOLD MODE OPER
FCC L-A-4	A/P CMD C ENGA	L.E. FLAP SW	ALT SLATS ARM
FCC R-A-4	A/P CMD C ENGA	TCAS	ALTITUDE SELECT
MCP A-A-2	A/P CMD C ENGA	FMC L/R-B-1	ALTITUDE SELECTED-AUTO
MCP A-A-2	A/P CMD L ENGA	FCC C-A-4	ALTITUDE SELECTED-MAN
MCP A-A-2	A/P CMD R ENGA	FCC L-A-4	ALTITUDE SELECTED-MAN
FCC C-A-4	A/P CWS C ENGA	FCC R-A-4	ALTITUDE SELECTED-MAN
FCC L-A-4	A/P CWS C ENGA	MCP A-A-2	ALTITUDE SELECTED-MAN
FCC R-A-4	A/P CWS C ENGA	EICAS L/R-A-1	ALTN EICAS COMP
MCP A-A-2	A/P CWS C ENGA	EICAS L/R-A-1	ANTI-SKID
FCC C-A-4	A/P CWS L ENGA	EICAS L/R-A-1	ANTI-SKID ALTN
FCC L-A-4	A/P CWS L ENGA	EICAS L/R-A-1	ANTI-SKID SWITCH
FCC R-A-4	A/P CWS L ENGA	ADC L/R-A-4	AOA HEAT ON - #1
MCP A-A-2	A/P CWS L ENGA	ADC L/R-A-4	AOA HEAT ON - #2
FCC C-A-4	A/P CWS R ENGA	EICAS L/R-A-1	AOA PROBE HEAT - L
FCC L-A-4	A/P CWS R ENGA	EICAS L/R-A-1	AOA PROBE HEAT - R
FCC R-A-4	A/P CWS R ENGA	HUD-1	APPROACH WARNING HUD
MCP A-A-2	A/P CWS R ENGA	EICAS L/R-A-1	APU EGT
MCP A-A-2	A/P T.E. FLAP POSITION	EICAS L/R-A-1	APU FAULT
TMC L-D-4	A/T G/A MODE ANNUN	EICAS L/R-A-1	APU FAULT (MAINT)
EICAS L/R-A-1	AC BUS OFF - L	EICAS L/R-A-1	APU FIRE
EICAS L/R-A-1	AC BUS OFF - R	EICAS L/R-A-1	APU FIRE LOOP 1
EICAS L/R-A-1	AC BUS TIE ISOL - L	EICAS L/R-A-1	APU FIRE LOOP 2
EICAS L/R-A-1	AC BUS TIE ISOL - R	EICAS L/R-A-1	APU LOW OIL QUANT
DFDAU	ACMS S/W P/N CODE	EICAS L/R-A-1	APU MAN RECORD
FMC L/R-D-4	ACTUAL NAV PERF-(ANP)	EICAS L/R-A-1	APU OIL LEVEL
ADC L/R-A-4	ADC INVALID	FMC L/R-B-1	ASSUMED TEMP
EFIS L/C-A-1	ADC SELECT CAPT	FCC C-A-4	ATT HOLD MODE OPER
EFIS R/C-A-1	ADC SELECT F/O	FCC L-A-4	ATT HOLD MODE OPER
ADC SW	ADC SELECT SW-CAPT	FCC R-A-4	ATT HOLD MODE OPER
EFIS L/C-A-1	ADF/ VOR SEL CAPT	EICAS L/R-A-1	AUTO BRAKE
EFIS R/C-A-1	ADF/ VOR SEL F/O	EICAS L/R-A-1	AUTO SPEEDBRAKE
TCAS	ADV ALT RATE		AUTO SPEEDBRAKE EXTEND
EICAS L/R-A-1	AFT CARGO DOOR	AUTOBRK SW	AUTOBRK SEL-1
EICAS L/R-A-1	AFT CARGO DOOR #1	AUTOBRK SW	AUTOBRK SEL-2

PORT NAME	PARAMETER ASSIGNMENT
AUTOBRK SW	AUTOBRK SEL-3
AUTOBRK SW	AUTOBRK SEL-4
AUTOBRK SW	AUTOBRK SEL-DISARM
AUTOBRK SW	AUTOBRK SEL-MAX AUTO
AUTOBRK SW	AUTOBRK SEL-OFF
AUTOBRK SW	AUTOBRK SEL-RTO
FCC C-A-4	AUTOLAND WARN LT
FCC L-A-4	AUTOLAND WARN LT
FCC R-A-4	AUTOLAND WARN LT
HUD-1	AUTOPILOT ENGAGED HUD
HUD-1	AUTOTHROTTLE ENGD HUD
EICAS L/R-A-1	AVM ALERT - ENG 1
EICAS L/R-A-1	AVM ALERT - ENG 2
FCC C-A-4	B/CRS MODE OPER
FCC L-A-4	B/CRS MODE OPER
FCC R-A-4	B/CRS MODE OPER
HUD-1	BIT FAULT HUD
EICAS L/R-A-1	BLEED DUCT LEAK - L
EICAS L/R-A-1	BLEED DUCT LEAK - R
A/G RELAY	BOGIE TILT LEFT
A/G RELAY	BOGIE TILT RIGHT
PRESS SENSOR	BRAKE PRES ALT-LEFT
PRESS SENSOR	BRAKE PRES ALT-RIGHT
PRESS SENSOR	BRAKE PRES MAIN-LEFT
PRESS SENSOR	BRAKE PRES MAIN-RIGHT
EICAS L/R-A-1	BRAKE TEMP LT
PEDAL SW	BRK PEDAL APP L
PEDAL SW	BRK PEDAL APP R
FQMS	C ACTUAL FUEL QTY
EFIS L/C-A-1	C FCC DATA FAULT CAPT
EFIS L/C-A-1	C IRS DATA FAULT CAPT
FQMS	C TANK LB/KG
EICAS L/R-A-1	CABIN ALT > 10kft
EICAS L/R-A-1	CABIN AUTOPRESS 1
EICAS L/R-A-1	CABIN AUTOPRESS 2
CAPTADC SW	CAPT AIR DATA SW EE BAY
EICAS L/R-A-1	CAPT INST BUS XFER
EICAS L/R-A-1	CAPT INV DISPLAY
PVDC L-A	CAPTAIN PVD ON
EICAS L/R-A-1	CARGO FIRE SW
GPWC L-A-1	CAUTION OBST OR OBSTAHEAD
GPWC L-A-1	CAUTION TERRAIN
EICAS L/R-A-1	CDU MENU REQUEST
FMC L/R-B-1	CENTER OF GRAVITY DATA
FMC L/R-B-1	CENTER OF GRAVITY SSM
HUD-1	CLR SUBMODE HUD
TCAS	COMBINED CONT

PORT NAME	PARAMETER ASSIGNMENT
HUD-1	COMBINER POSITION HUD
EFIS L/C-A-1	COMPAR ENABLE CAPT
EFIS R/C-A-1	COMPAR ENABLE F/O
EFIS L/C-A-1	COMPARATOR FAIL CAPT
EFIS R/C-A-1	COMPARATOR FAIL F/O
TMC L-D-4	CON MODE OPER
F SENSOR	CONTROL WHEEL FORCE CAPT
F SENSOR	CONTROL WHEEL FORCE F/O
EEC RR-L-B-2	COWL A/I ON - L
EEC RR-R-B-2	COWL A/I ON - R
TMC L-D-4	COWL ANTI-ICE - L
TMC L-D-4	COWL ANTI-ICE - R
EFIS L/C-A-1	CP FAULT - LEFT
EFIS R/C-A-1	CP FAULT - RIGHT
EICAS L/R-A-1	CREW OXY PRESSURE
EICAS L/R-A-1	CSEU PSU MODULE - L
EICAS L/R-A-1	CSEU PSU MODULE - R
EICAS L/R-A-1	CTR ENTRY DOOR - L
EICAS L/R-A-1	CTR ENTRY DOOR - R
CONFIG	CUSTOMER UNIQUE FRAME
ILS C-A-2/MMR C	DATA LINK MODE
ILS L-A-2/MMR L	DATA LINK MODE
ILS R-A-2/MMR R	DATA LINK MODE
ILS C-A-2/MMR C	DATA LINK STATUS
ILS L-A-2/MMR L	DATA LINK STATUS
ILS R-A-2/MMR R	DATA LINK STATUS
CAPT CLOCK	DAY X 1
CAPT CLOCK	DAY X10
EICAS L/R-A-1	DC BUS TIE
TMC L-D-4	DERATE 2 ARMED
FMC L/R-D-4	DESIRED TRACK
EFIS L/C-A-1	DH SELECTED CAPT
EFIS R/C-A-1	DH SELECTED F/O
FMC L/R-D-4	DISTANCE TO DEST
DME L-A-2	DME ANTENNA FAILURE - L
DME R-A-2	DME ANTENNA FAILURE - R
DME L-A-2	DME FAILURE - L
DME R-A-2	DME FAILURE - R
EFIS L/C-A-1	DME SELECTED CAPT
EFIS R/C-A-1	DME SELECTED F/O
FMC L/R-D-4	DME/DME
DFDAU	DOC DEPART
DFDAU	DOC DEST
DFDAU	DOC FLT NUMBER
DFDAU	DOC LEG NUMBER
GPWC L-A-1	DON'T SINK
TCAS	DOWN ADVISORY

PORT NAME	PARAMETER ASSIGNMENT
IRU L-A-3	DRIFT ANGLE
EFIS L/C-A-1	EADI FAULT - LEFT
EFIS R/C-A-1	EADI FAULT - RIGHT
EICAS L/R-A-1	ECS MAN RECORD
EICAS L/R-A-1	ECS PACK OVHT - L
EICAS L/R-A-1	ECS PACK OVHT - R
EICAS L/R-A-1	EEC LIMITER - L
EFIS SW	EFIS SELECT SW-CAPT
EFIS SW	EFIS SELECT SW-F/O
GPWC L-A-1	EGPWS FUTURE DISC 1
GPWC L-A-1	EGPWS FUTURE DISC 2
EFIS L/C-A-1	EHSI FAULT - LEFT
EFIS R/C-A-1	EHSI FAULT - RIGHT
EICAS L/R-A-1	EICAS ALT DISAGREE
EICAS L/R-A-1	EICAS IAS DISAGREE
EICAS L/R-A-1	EICAS OPC PART NUM
EICAS SW	EICAS SELECT SW
EICAS L/R-A-1	ELECT ACCESS DOOR
EICAS L/R-A-1	ELEV ASYM PROT SYS
EICAS L/R-A-1	ELEV HIGH PRESS - C
EICAS L/R-A-1	ELEV HIGH PRESS - L
EICAS L/R-A-1	ELEV HIGH PRESS - R
EICAS L/R-A-1	ELEV LOW PRESS - C
EICAS L/R-A-1	ELEV LOW PRESS - L
EICAS L/R-A-1	ELEV LOW PRESS - R
EICAS L/R-A-1	ELEVATOR FEEL SYSTEM
EICAS L/R-A-1	EMERGENCY LIGHTS
EICAS L/R-A-1	ENG EGT RED - L
EICAS L/R-A-1	ENG EGT RED - R
EICAS L/R-A-1	ENG AVM YEL/WHT - L
EICAS L/R-A-1	ENG AVM YEL/WHT - R
EICAS L/R-A-1	ENG BLEED OVHT - LEFT
EICAS L/R-A-1	ENG BLEED OVHT - RIGHT
EICAS L/R-A-1	ENG FIRE LOOP 1 - L
EICAS L/R-A-1	ENG FIRE LOOP 1 - R
EICAS L/R-A-1	ENG FIRE LOOP 2 - L
EICAS L/R-A-1	ENG FIRE LOOP 2 - 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 PRES - L
EICAS L/R-A-1	ENG FUEL PRES - R
EICAS L/R-A-1	ENG FUEL VALVE - L
EICAS L/R-A-1	ENG FUEL VALVE - R
EICAS L/R-A-1	ENG NI RED - L
EICAS L/R-A-1	ENG NI RED - R

PORT NAME	PARAMETER ASSIGNMENT
EICAS L/R-A-1	ENG N2 RED - L
EICAS L/R-A-1	ENG N2 RED - R
EICAS L/R-A-1	ENG N3 RED - L
EICAS L/R-A-1	ENG N3 RED - 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 PRESS RED - L
EICAS L/R-A-1	ENG OIL PRESS RED - R
EICAS L/R-A-1	ENG OIL TEMP RED - L
EICAS L/R-A-1	ENG OIL TEMP RED - R
EICAS L/R-A-1	ENG STARTER - L
EICAS L/R-A-1	ENG STARTER - R
EICAS L/R-A-1	ENG THROTTLE - L
EICAS L/R-A-1	ENG THROTTLE - R
EICAS L/R-A-1	ENGINE FIRE - L
EICAS L/R-A-1	ENGINE FIRE - R
TMC L-D-4	ENGINE IDENT
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	EQUIP OVHT
EICAS L/R-A-1	EQUIP SMOKE DET
F/O ADC SW	F/O AIR DATA SW EE BAY
SYNCHRO	F/O CONT COLUMN POSN
SYNCHRO	F/O CONT WHEEL POSN
EICAS L/R-A-1	F/O INST BUS XFER
PVDC L-A	F/O PVD ON
FMC L/R-B-1	FANS AOC UPLINK RECEIVED
FMC L/R-B-1	FANS ATC UPLINK RECEIVED
EICAS L/R-A-1	FIRE EXT SWITCH - L
EICAS L/R-A-1	FIRE EXT SWITCH - R
MCP A-A-2	FL CH MODE OPER
FCC C-A-4	FLAP LIMIT
FCC L-A-4	FLAP LIMIT
FCC R-A-4	FLAP LIMIT
TMC L-D-4	FLAP LIMIT
EICAS L/R-A-1	FLAP LOAD RELIEF
HUD-1	FLARE COMMAND ACTIVE HUD
FCC C-A-4	FLARE OPER
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
EEC RR-L-B-2	FLAT RATE MODE OPER - L
EEC RR-R-B-2	FLAT RATE MODE OPER - R
A/C IDENT	FLEET IDENT
HUD-1	FLIGHT PATH X POSN HUD

PORT NAME	PARAMETER ASSIGNMENT
HUD-1	FLIGHT PATH Y POSN HUD
EICAS L/R-A-1	FLT DECK DOOR
EICAS L/R-A-1	FLT DECK EQ SMOKE
EFIS R/C-A-1	FLT DIR - PITCH F/O
EFIS R/C-A-1	FLT DIR - ROLL F/O
MCP A-A-2	FLT DIR ON-CAPT
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 R-A-4	FMA FAULT 1 (CWS)
FCC C-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 R-A-4	FMA FAULT 3 (ROLL)
EICAS L/R-A-1	FMC FAIL - L
EICAS L/R-A-1	FMC FAIL - R
FMC SW	FMC SELECT SW A-CAPT
FMC SW	FMC SELECT SW B-CAPT
EFIS L/C-A-1	FMC SELECTED CAPT
EFIS R/C-A-1	FMC SELECTED F/O
DFDAU	FMC/IRU DATA SOURCE
CONFIG	FRAME SEL
EICAS L/R-A-1	FSEU FAULT (STATUS)
EICAS L/R-A-1	FUEL XFEED -AFT
EICAS L/R-A-1	FUEL CONFIG
EICAS L/R-A-1	FUEL QTY IND SYS
EICAS L/R-A-1	FUEL XFEED VALVE
EFIS L/C-A-1	FULL COMPASS ROSE CAPT
EICAS L/R-A-1	FWD CARGO DOOR
EICAS L/R-A-1	FWD CARGO FIRE
EICAS L/R-A-1	FWD ENTRY DOOR - L
EICAS L/R-A-1	FWD ENTRY DOOR - R
EICAS L/R-A-1	FWD EQUIP SMOKE
EICAS L/R-A-1	FWD FUEL PUMP
EICAS L/R-A-1	FWD FUEL X-FEED
FCC C-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 R-A-4	G/A MODE OPER-R
MCP A-A-2	G/S MODE OPER
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

PORT NAME	PARAMETER ASSIGNMENT
GPWC L-A-1	GLIDESLOPE
GPWC L-A-1	GLIDESLOPE CANCEL
ILS C-A-2/MMR C	GLS MODE
ILS L-A-2/MMR L	GLS MODE
ILS R-A-2/MMR R	GLS MODE
CAPT CLOCK	GMT
ILS C-A-2/MMR C	GNSS MODE
ILS L-A-2/MMR L	GNSS MODE
ILS R-A-2/MMR R	GNSS MODE
FMC L/R-D-4	GPS
FMC L/R-D-4	GPS TIME
GPWC L-A-1	GPWC FAILURE
GPWC L-A-1	GPWS ALERT
GPWC L-A-1	GROUND PROX INOP
EFIS R/C-A-1	GROUND SPEED F/O
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
HUD-1	GUIDANCE CUE X POSN HUD
HUD-1	GUIDANCE CUE Y POSN HUD
MCP A-A-2	HDG HOLD MODE OPER
MCP A-A-2	HDG SEL MODE OPER
FCC C-A-4	HEADING SELECTED
FCC L-A-4	HEADING SELECTED
FCC R-A-4	HEADING SELECTED
MCP A-A-2	HEADING SELECTED
L HF	HF-LEFT KEYING
R HF	HF-RIGHT KEYING
EICAS L/R-A-1	HIGH BB ALERT - ENG 1
EICAS L/R-A-1	HIGH BB ALERT - ENG 2
FMC L/R-B-1	HORIZTL STEERING
EICAS L/R-A-1	HYD BRAKE SOURCE
EICAS L/R-A-1	HYD ELEC PUMP OVHT - L
EICAS L/R-A-1	HYD ELEC PUMP OVHT - R
EICAS L/R-A-1	HYD ELEV VALVE - C
EICAS L/R-A-1	HYD ELEV VALVE - L
EICAS L/R-A-1	HYD GEN AC FREQ
EICAS L/R-A-1	HYD GEN AC VOLTS
EICAS L/R-A-1	HYD GEN DC VOLTS
EICAS L/R-A-1	HYD GEN VALVE
EICAS L/R-A-1	HYD GENERATOR
EICAS L/R-A-1	HYD MAN RECORD
EICAS L/R-A-1	HYD PRI PUMP OVHT - LEFT
EICAS L/R-A-1	HYD PRI PUMP OVHT - RIGHT
EICAS L/R-A-1	HYD PUMP 1 OVHT - CENTER
EICAS L/R-A-1	HYD PUMP 2 OVHT - CENTER
EICAS L/R-A-1	HYD QUANT - C

PORT NAME	PARAMETER ASSIGNMENT
EICAS L/R-A-1	HYD QUANT - L
EICAS L/R-A-1	HYD QUANT - 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 - L
EICAS L/R-A-1	HYD SYS LO PRESS - 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
FCC C-A-4	IAS LIMIT OPER
FCC L-A-4	IAS LIMIT OPER
FCC R-A-4	IAS LIMIT OPER
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 - L
EICAS L/R-A-1	IDG OIL LEVEL - R
EICAS L/R-A-1	IDG TEMP RISE-L
EICAS L/R-A-1	IDG TEMP RISE-R
EFIS L/C-A-1	ILS (MOD) MODE SEL CAPT
EFIS L/C-A-1	ILS (STD) MODE SEL CAPT
EFIS R/C-A-1	ILS (STD) MODE SEL F/O
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 C-A-2/MMR C	ILS FREQ/MLS CHAN/GLS CHAN
ILS L-A-2/MMR L	ILS FREQ/MLS CHAN/GLS CHAN
ILS R-A-2/MMR R	ILS FREQ/MLS CHAN/GLS CHAN
ILS C-A-2/MMR C	ILS MODE
ILS L-A-2/MMR L	ILS MODE
ILS R-A-2/MMR R	ILS MODE
EFIS L/C-A-1	ILS SELECTED CAPT
EFIS R/C-A-1	ILS SELECTED F/O
ILS C-A-2/MMR C	ILS/MLS/GLS MODE SELECTION
ILS L-A-2/MMR L	ILS/MLS/GLS MODE SELECTION
ILS R-A-2/MMR R	ILS/MLS/GLS MODE SELECTION
HUD-1	IMC MODE HUD
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

PORT NAME	PARAMETER ASSIGNMENT
FMC L/R-D-4	IRS/MLS
IRU L-A-3	IRU FAULT
EFIS L/C-A-1	IRU SELECTED CAPT
EFIS R/C-A-1	IRU SELECTED F/O
TMC L-D-4	ISOLATION VALVE - R
FQMS	L ACTUAL FUEL QTY
EFIS L/C-A-1	L ADF DATA FAULT CAPT
EFIS L/C-A-1	L FCC DATA FAULT CAPT
EFIS L/C-A-1	L FMC DATA FAULT CAPT
EFIS L/C-A-1	L IRS DATA FAULT CAPT
MCP A-A-2	L NAV MODE OPER
FQMS	L TANK LB/KG
EFIS L/C-A-1	L VOR DATA FAULT CAPT
EICAS L/R-A-1	L.E. SLAT DISAGREE
FSEU	L.E. SLATS FAIL
FCC C-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 R-A-4	LAND 3 (GREEN)
HUD-1	LAND 3 MODE HUD
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	LE SLATS ASYM
MCP A-A-2	LOC MODE OPER
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
ILS R-A-2/MMR R	LOC TEST/TUNE INHIBIT
FMC L/R-D-4	LOC/DME MODE OPER
EICAS L/R-A-1	LOW FUEL QTY
HUD-1	LOW-VISIBILITY TAKEOFF HUD
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 LIMIT OPER
FCC L-A-4	MACH LIMIT OPER

PORT NAME	PARAMETER ASSIGNMENT	PORT NAME	PARAMETER ASSIGNMENT
FCC R-A-4	MACH LIMIT OPER	EFIS L/C-A-1	NAV MODE SEL CAPT
FMC L/R-B-1	MACH SELECTED-AUTO	EFIS R/C-A-1	NAV MODE SEL F/O
MCP A-A-2	MACH SELECTED-MAN	FMC L/R-B-1	NDB EFFECTIVITY DAY
EICAS L/R-A-1	MACH SPEED TRIM	FMC L/R-B-1	NDB EFFECTIVITY MN
EFIS R/C-A-1	MAG HEADING F/O	FMC L/R-B-1	NDB EFFECTIVITY YR
EFIS L/C-A-1	MAG/TRUE DATA CAPT	A/G RELAY	NOSE GEAR SQUAT SW
EFIS L/C-A-1	MAG/TRUE STATUS CAPT	GPWC L-A-1	NOT USED
EFIS R/C-A-1	MAG/TRUE STATUS F/O	GPWC L-A-1	OBSTACLE WARNING
EICAS L/R-A-1	MAIN BATT CURRENT	VOR L-A-2	OUTER MARKER
EICAS L/R-A-1	MAIN BATT DISCH	EICAS L/R-A-1	PASS OXY ON
EICAS L/R-A-1	MAIN BATT SWITCH	EICAS L/R-A-1	PASS OXY PRESSURE
EICAS L/R-A-1	MAIN BATT VOLTS	EICAS L/R-A-1	PERF MAN RECORD
EICAS L/R-A-1	MAIN CARGO FIRE	IRU L-A-3	PITCH ANGLE IRU
EICAS L/R-A-1	MAIN PITOT HEAT - LEFT	FCC C-A-4	PITCH ARM
EICAS L/R-A-1	MAIN PITOT HEAT - RIGHT	FCC L-A-4	PITCH ARM
PRESS SW	MAIN/ALT BRAKE SEL	FCC R-A-4	PITCH ARM
EEC RR-L-B-2	MAINTENANCE REQUIRED - L	EFIS L/C-A-1	PITCH DISAGREE CAPT
EEC RR-R-B-2	MAINTENANCE REQUIRED - R	EFIS R/C-A-1	PITCH DISAGREE F/O
DFDAU	MANDATORY S/W P/N CODE	FCC C-A-4	PITCH ENGAGE DETENT CMD
WHEEL SW	MANUAL STAB TRIM NOSE DOWN	FCC L-A-4	PITCH ENGAGE DETENT CMD
WHEEL SW	MANUAL STAB TRIM NOSE UP	FCC R-A-4	PITCH ENGAGE DETENT CMD
EFIS L/C-A-1	MAP SOURCE CAPT	FCC C-A-4	PITCH SERVO CMD
EFIS R/C-A-1	MAP SOURCE F/O	FCC L-A-4	PITCH SERVO CMD
FMC L/R-B-1	MAX ALTITUDE	FCC R-A-4	PITCH SERVO CMD
FMC L/R-B-1	MAX CLIMB ANGLE	GPWC L-A-1	PREDICTIVE WINDSHEAR
FMC L/R-B-1	MAX MANEUVER SPEED	IRU L-A-3	PRES POSN LAT
FMC L/R-B-1	MIN MANEUVER SPEED	IRU L-A-3	PRES POSN LONG
FCC C-A-4	MIN SPEED	HUD-1	PRIMARY MODE HUD
FCC L-A-4	MIN SPEED	FQMS	R ACTUAL FUEL QTY
FCC R-A-4	MIN SPEED	EFIS R/C-A-1	R ADF DATA FAULT CAPT
TMC L-D-4	MIN SPEED	EFIS L/C-A-1	R FCC DATA FAULT CAPT
GPWC L-A-1	MINIMUMS	EFIS L/C-A-1	R FMC DATA FAULT CAPT
ILS C-A-2/MMR C	MLS ANTENNA SOURCE	EFIS R/C-A-1	R IRS DATA FAULT CAPT
ILS L-A-2/MMR L	MLS ANTENNA SOURCE	FQMS	R TANK LB/KG
ILS R-A-2/MMR R	MLS ANTENNA SOURCE	EFIS R/C-A-1	R VOR DATA FAULT CAPT
ILS C-A-2/MMR C	MLS MODE	EFIS R/C-A-1	RADIO HEIGHT F/O
ILS L-A-2/MMR L	MLS MODE	LRRA C-A-2	RADIO HEIGHT
ILS R-A-2/MMR R	MLS MODE	EFIS L/C-A-1	RADIO HEIGHT CAPT
EFIS L/C-A-1	MLS SELECT CAPT	EICAS L/R-A-1	RAT UNLOCKED
EFIS R/C-A-1	MLS SELECT F/O	FCC C-A-4	REL L FCC SERVO ENG
EFIS L/C-A-1	MLS/ILS SOURCE SEL CAPT	FCC L-A-4	REL L FCC SERVO ENG
EFIS R/C-A-1	MLS/ILS SOURCE SEL F/O	FCC R-A-4	REL L FCC SERVO ENG
ILS C-A-2/MMR C	MODE STATUS	FCC C-A-4	REL R FCC SERVO ENG
ILS L-A-2/MMR L	MODE STATUS	FCC L-A-4	REL R FCC SERVO ENG
ILS R-A-2/MMR R	MODE STATUS	FCC R-A-4	REL R FCC SERVO ENG
CAPT CLOCK	MONTH	FMC L/R-D-4	REQ'D NAV PERF-(RNP)
EFIS L/C-A-1	NAV AIDS CAPT	EFIS R/C-A-1	ROLL ANGLE F/O

PORT NAME	PARAMETER ASSIGNMENT	PORT NAME	PARAMETER ASSIGNMENT
IRU L-A-3	ROLL ANGLE IRU	FCC C-A-4	SPEED SELECTED-MAN
FCC C-A-4	ROLL ARM	FCC L-A-4	SPEED SELECTED-MAN
FCC L-A-4	ROLL ARM	FCC R-A-4	SPEED SELECTED-MAN
FCC R-A-4	ROLL ARM	MCP A-A-2	SPEED SELECTED-MAN
EFIS L/C-A-1	ROLL DISAGREE CAPT	TCAS	SPI
EFIS R/C-A-1	ROLL DISAGREE F/O	EICAS L/R-A-1	SPOILER MODULE
FCC C-A-4	ROLL ENGAGE DETENT CMD	SCM	SPOILER PNLS FAIL 1&12
FCC L-A-4	ROLL ENGAGE DETENT CMD	SCM	SPOILER PNLS FAIL 2&11
FCC R-A-4	ROLL ENGAGE DETENT CMD	SCM	SPOILER PNLS FAIL 3&10
FCC C-A-4	ROLL SERVO CMD	SCM	SPOILER PNLS FAIL 4&9
FCC L-A-4	ROLL SERVO CMD	SCM	SPOILER PNLS FAIL 5&8
FCC R-A-4	ROLL SERVO CMD	SCM	SPOILER PNLS FAIL 6&7
WHEEL SW	ROLL TRIM CMD L WING DOWN	EICAS L/R-A-1	SPOILER SYSTEM
WHEEL SW	ROLL TRIM CMD R WING DOWN	FCC C-A-4	STAB POSITION
HUD-1	ROLLOUT ENGAGED HUD	FCC L-A-4	STAB POSITION
FCC C-A-4	ROLLOUT MODE OPER	FCC R-A-4	STAB POSITION
FCC L-A-4	ROLLOUT MODE OPER	MCP A-A-2	STAB POSITION
FCC R-A-4	ROLLOUT MODE OPER	FMC L/R-B-1	STAB TRIM
HUD-1	ROLLOUT WARNING HUD	EICAS L/R-A-1	STAB TRIM FAULT
EICAS L/R-A-1	RSV BRAKE VALVE	EICAS L/R-A-1	STAB TRIM MODULE
EFIS L/C-A-1	RTE DATA CAPT	ADC L/R-A-4	STATIC PRESSURE
EFIS R/C-A-1	RTE DATA F/O	EICAS L/R-A-1	STBY BUS OFF
EICAS L/R-A-1	RUDD RATIO MODULE	AISLE STD SW	STBY STAB TRIM NOSE DOWN
EICAS L/R-A-1	RUDDER RATIO SYS	AISLE STD SW	STBY STAB TRIM NOSE UP
FQMS	S ACTUAL FUEL QTY	STALL WRN	STICK SHAKER - LEFT
FQMS	S TANK LB/KG	STALL WRN	STICK SHAKER - RIGHT
SAM	SAM TRIM DOWN CMD LEFT	EICAS L/R-A-1	STRUT LOOP 1 - L
SAM	SAM TRIM DOWN CMD RIGHT	EICAS L/R-A-1	STRUT LOOP 1 - R
SAM	SAM TRIM UP CMD LEFT	EEC RR-L-B-2	SUPERVISORY FAIL FIXED - L
SAM	SAM TRIM UP CMD RIGHT	EEC RR-L-B-2	SUPERVISORY REVERTED - L
L SATCOM	SATCOM-LEFT KEYING	EEC RR-R-B-2	SUPERVISORY REVERTED-R
R SATCOM	SATCOM-RIGHT KEYING	EEC L-A-1	SURGE DETECTED - L
LAMP RLY	SEAT BELT SIGN	EEC R-A-1	SURGE DETECTED - R
VOR R-A-2	SELECTED COURSE - F/O	EFIS L/C-A-1	SWC SELECT CAPT
ILS C-A-2/MMR C	SELECTED LANDING MODE	EFIS R/C-A-1	SWC SELECT F/O
ILS L-A-2/MMR L	SELECTED LANDING MODE	EICAS L/R-A-1	T.E. FLAP ASYM
ILS R-A-2/MMR R	SELECTED LANDING MODE	SYNCHRO	T.E. FLAP POSITION
EFIS L/C-A-1	SG FAULT- LEFT	EICAS L/R-A-1	T.E. FLAPS DISAGREE
EFIS R/C-A-1	SG FAULT- RIGHT	EEC L-A-1	T/L RSLVR ANGLE-LEFT
GPWC L-A-1	SIREN WINDSHEAR WINDSHEAR	EEC R-A-1	T/L RSLVR ANGLE-RIGHT
FCC C-A-4	SPD BRK HDL POSN	EICAS L/R-A-1	T/O CONFIG FLAPS
FCC L-A-4	SPD BRK HDL POSN	EICAS L/R-A-1	T/O CONFIG PARK BRK
FCC R-A-4	SPD BRK HDL POSN	EICAS L/R-A-1	T/O CONFIG SPOILER
MCP A-A-2	SPD BRK HDL POSN	EICAS L/R-A-1	T/O CONFIG STAB
MCP A-A-2	SPD DISPLAY BLANK	PSEU L	T/R DEPLOYED L INBOARD
TMC L-D-4	SPD LIMIT	PSEU L	T/R DEPLOYED L OUTBOARD
FMC L/R-B-1	SPEED SELECTED-AUTO	PSEU R	T/R DEPLOYED R INBOARD

PORT NAME	PARAMETER ASSIGNMENT
PSEU R	T/R DEPLOYED R OUTBOARD
PSEU L	T/R STOWED L INBOARD
PSEU L	T/R STOWED L OUTBOARD
PSEU R	T/R STOWED R INBOARD
PSEU R	T/R STOWED R OUTBOARD
FMC L/R-B-1	TARGET AIRSPEED
EFIS L/C-A-1	TCAS DATA DISPLAYED CAPT
EFIS R/C-A-1	TCAS DATA DISPLAYED F/O
EFIS L/C-A-1	TCAS DATA SELECTED CAPT
EFIS R/C-A-1	TCAS DATA SELECTED F/O
EFIS L/C-A-1	TCAS DISPLAY SEL CAPT
EFIS R/C-A-1	TCAS DISPLAY SEL F/O
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
EFIS L/C-A-1	TERRAIN DATA DISPLAYED CAPT
EFIS R/C-A-1	TERRAIN DATA DISPLAYED F/O
EFIS L/C-A-1	TERRAIN DATA SELECTED CAPT
EFIS R/C-A-1	TERRAIN DATA SELECTED F/O
GPWC L-A-1	TERRAIN DISPLAY DISCRETE 2 ON
GPWC L-A-1	TERRAIN/OBSTACLE CAUTION
GPWC L-A-1	TERRAIN/OBSTACLE WARNING
TMC L-D-4	TMC VALID
GPWC L-A-1	TOO LOW FLAP
GPWC L-A-1	TOO LOW GEAR
GPWC L-A-1	TOO LOW TERRAIN
HUD-1	TOUCHDOWN HUD
IRU L-A-3	TRACK ANGLE MAG
IRU L-A-3	TRACK ANGLE TRUE
EFIS R/C-A-1	TRUE HEADING F/O
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
EICAS L/R-A-1	TURB OVHT LOOP 1 - L
EICAS L/R-A-1	TURB OVHT LOOP 1 - R
EICAS L/R-A-1	UNSCHED STAB MOVE
TCAS	UP ADVISORY
MCP A-A-2	V NAV MODE OPER
MCP A-A-2	V/S MODE OPER
FMC L/R-D-4	VALT OPER
DFDAU	VENDOR DATABASE CODE
DFDAU	VENDOR STATUS & DATA
FCC C-A-4	VERT SPEED SELECTED
FCC L-A-4	VERT SPEED SELECTED
FCC R-A-4	VERT SPEED SELECTED

PORT NAME	PARAMETER ASSIGNMENT
MCP A-A-2	VERT SPEED SELECTED
TCAS	VERTICAL CONTROL
FMC L/R-D-4	VERTICAL DEVIATION
FMC L/R-B-1	VERTICAL STEERING
C VHF	VHF CENTER KEYING
R VHF	VHF RIGHT KEYING
EICAS L/R-A-1	VIB IDENT - L
EICAS L/R-A-1	VIB IDENT - R
HUD-1	VMC MODE HUD
EFIS R/C-A-1	VOR (MOD) MODE SEL F/O
EFIS L/C-A-1	VOR (STD) MODE SEL CAPT
EFIS R/C-A-1	VOR (STD) MODE SEL F/O
VOR L-A-2	VOR FAILURE - L
VOR R-A-2	VOR FAILURE - R
VOR L-A-2	VOR MB FAILURE - L
EFIS L/C-A-1	VOR SELECTED CAPT
EFIS R/C-A-1	VOR SELECTED F/O
FMC L/R-D-4	VOR/DME
FMC L/R-D-4	VPATH OPER
FMC L/R-D-4	VSPEED OPER
EICAS L/R-A-1	WHEEL WELL FIRE
IRU L-A-3	WIND DIRECTION TRUE
IRU L-A-3	WIND SPEED
GPWC L-A-1	WINDSHEAR CAUTION
GPWC L-A-1	WINDSHEAR INOP
GPWC L-A-1	WINDSHEAR WARNING
EEC RR-L-B-2	WING A/I ON - L
EEC RR-R-B-2	WING A/I ON - R
TMC L-D-4	WING ANTI-ICE
EICAS L/R-A-1	WING SLIDE DOOR - L
EICAS L/R-A-1	WING SLIDE DOOR - R
EICAS L/R-A-1	WING TAI VALVE - L
EICAS L/R-A-1	WING TAI VALVE - R
EFIS L/C-A-1	WPT CAPT
EFIS L/C-A-1	WXR DATA DISPLAYED CAPT
EFIS R/C-A-1	WXR DATA DISPLAYED F/O
EFIS L/C-A-1	WXR DATA SELECTED CAPT
EFIS R/C-A-1	WXR DATA SELECTED F/O
EFIS L/C-A-1	WXR SELECTED CAPT
EFIS R/C-A-1	WXR SELECTED F/O
FCC C-A-4	YAW ARM
FCC L-A-4	YAW ARM
FCC R-A-4	YAW ARM
EICAS L/R-A-1	YAW DAMPER - L
EICAS L/R-A-1	YAW DAMPER - R
YAW DMPR	YAW DAMPER ENGAGE L
YAW DMPR	YAW DAMPER ENGAGE R

PORT NAME	PARAMETER ASSIGNMENT
EICAS L/R-A-1	YAW DAMPER MODULE
FCC C-A-4	YAW ENGAGE DETENT CMD
FCC L-A-4	YAW ENGAGE DETENT CMD
FCC R-A-4	YAW ENGAGE DETENT CMD
FCC C-A-4	YAW SERVO CMD

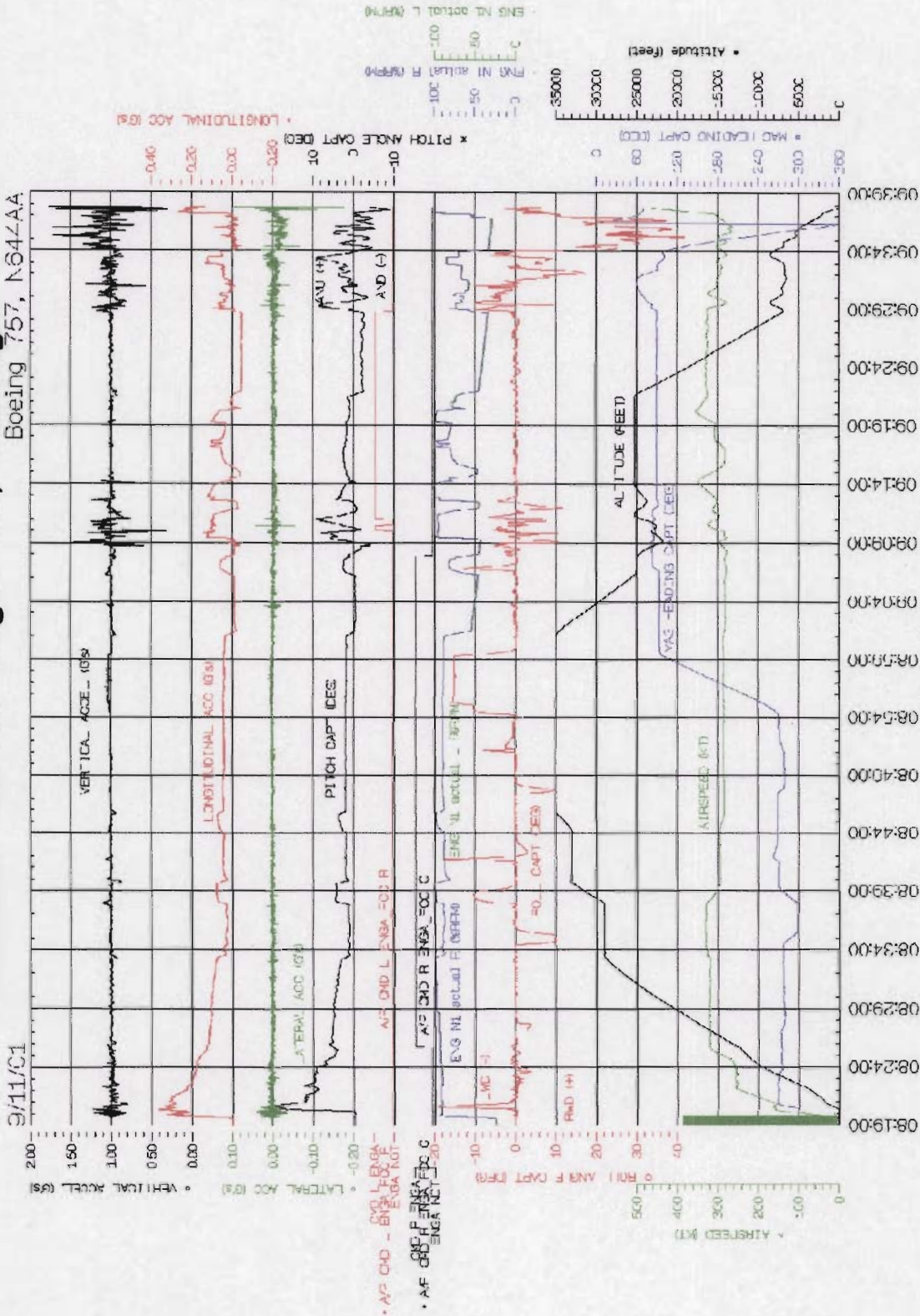
PORT NAME	PARAMETER ASSIGNMENT
FCC L-A-4	YAW SERVO CMD
FCC R-A-4	YAW SERVO CMD
WHEEL SW	YAW TRIM CMD L
WHEEL SW	YAW TRIM CMD R
CAPT CLOCK	YEAR
FMC L/R-B-1	ZERO FUEL WEIGHT

Attachment II

Plots of SSFDR Data

American Airlines Flight 77, Pentagon

Boeing 757, N647AA

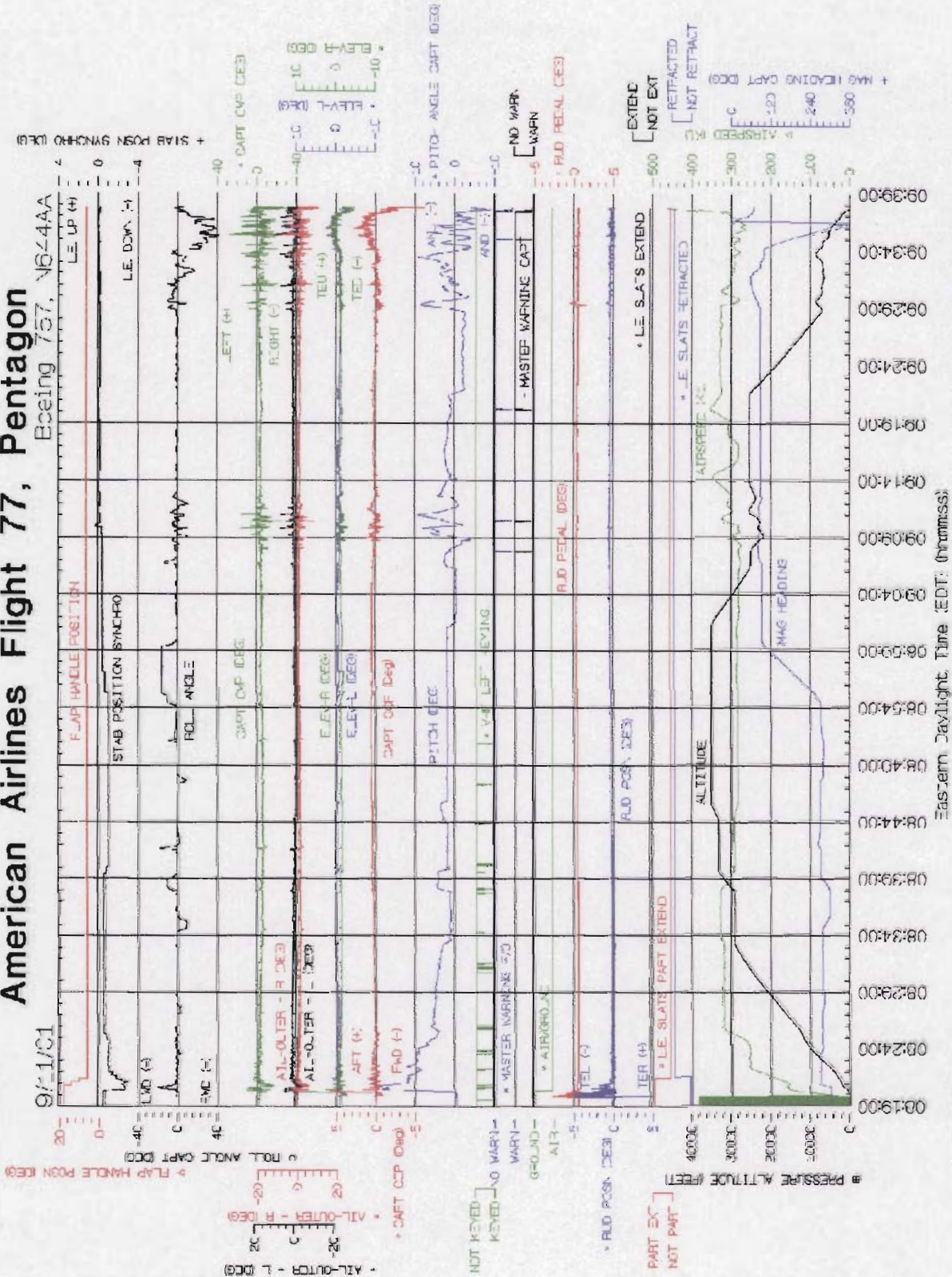


General Parameters

Eastern Daylight Time (mm:ss)

American Airlines Flight 77, Pentagon

Boeing 757, N64AA



ANALOG DATA

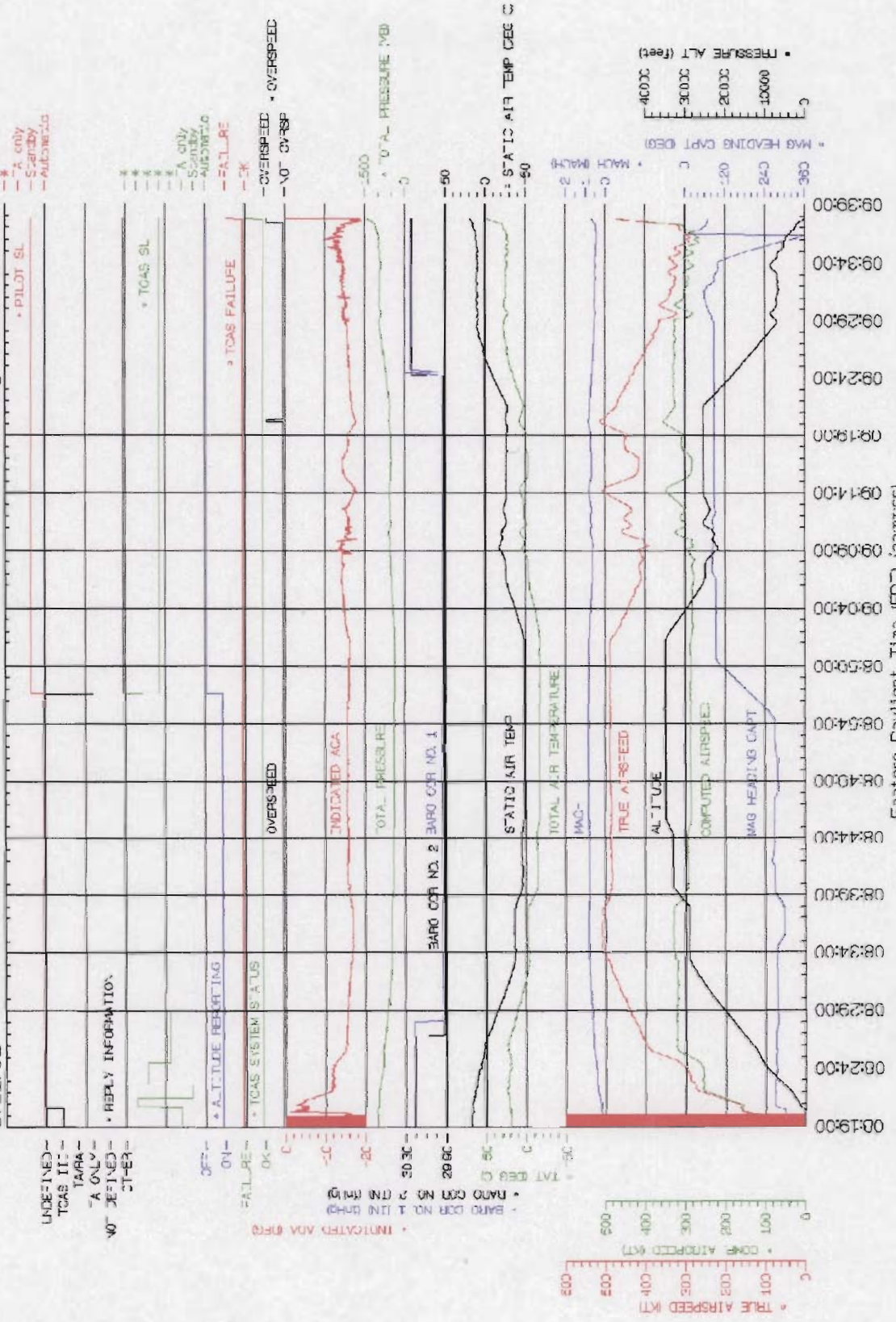
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National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01



ADC and TCAS Parameters

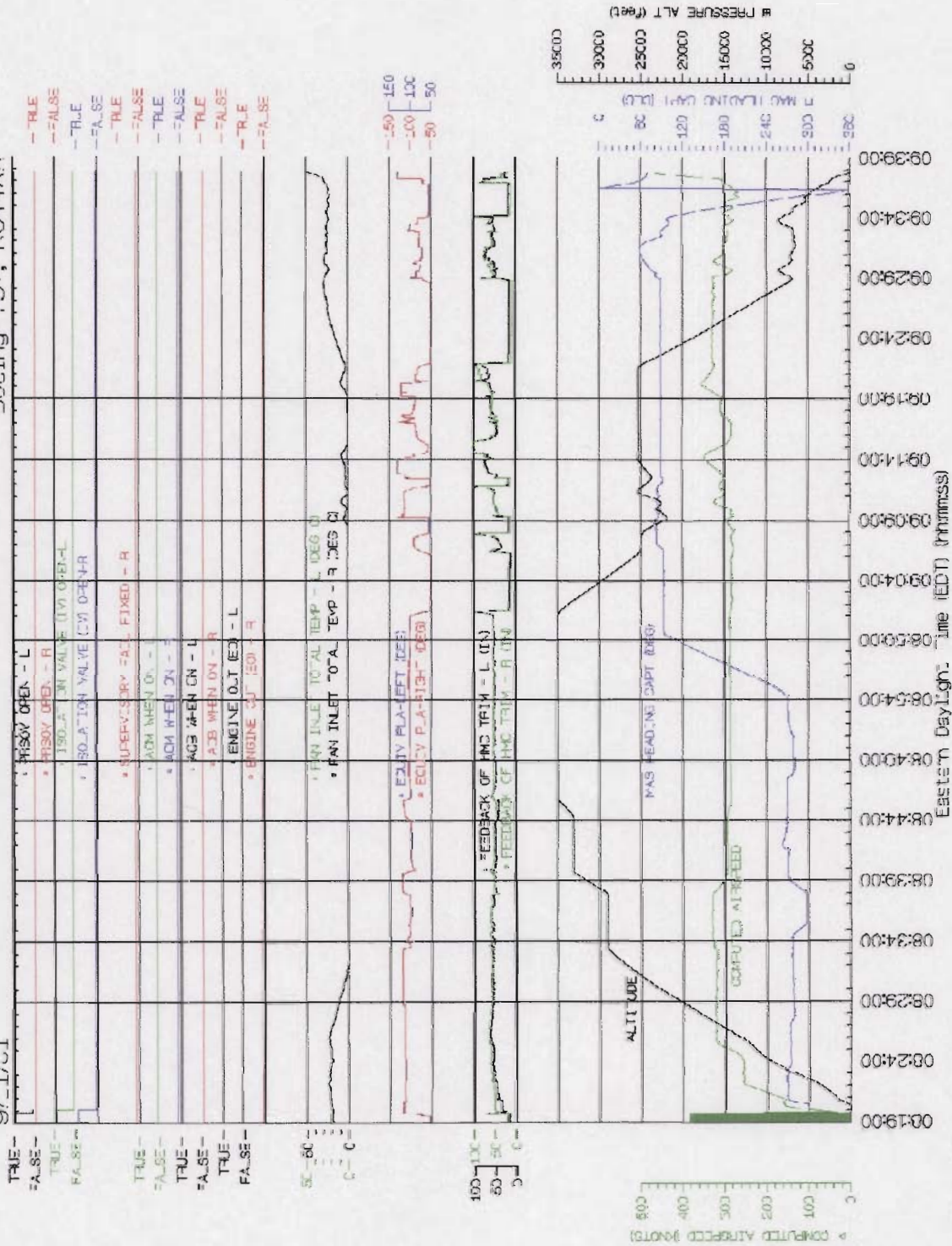
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National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01



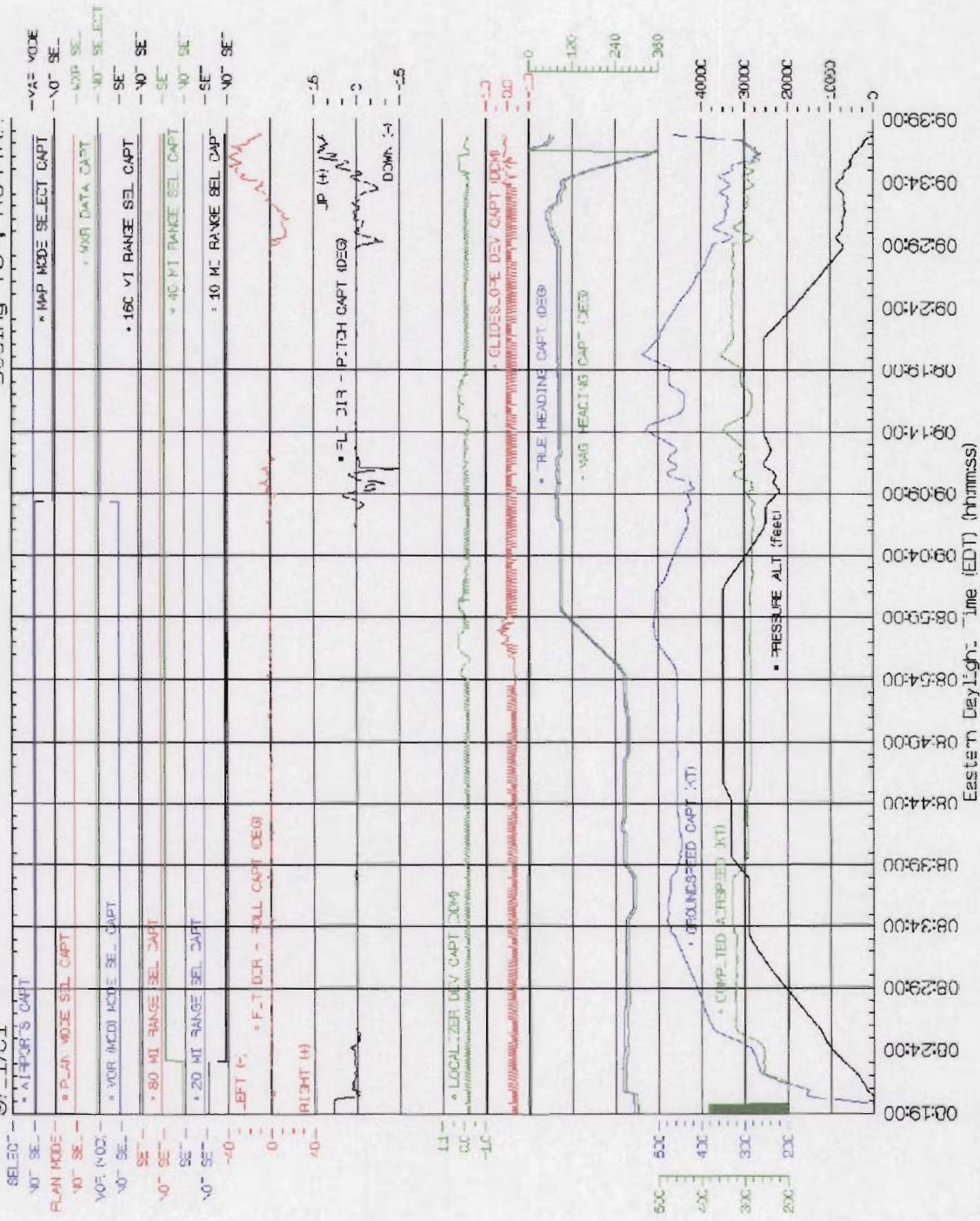
EEC RR Parameters

National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01



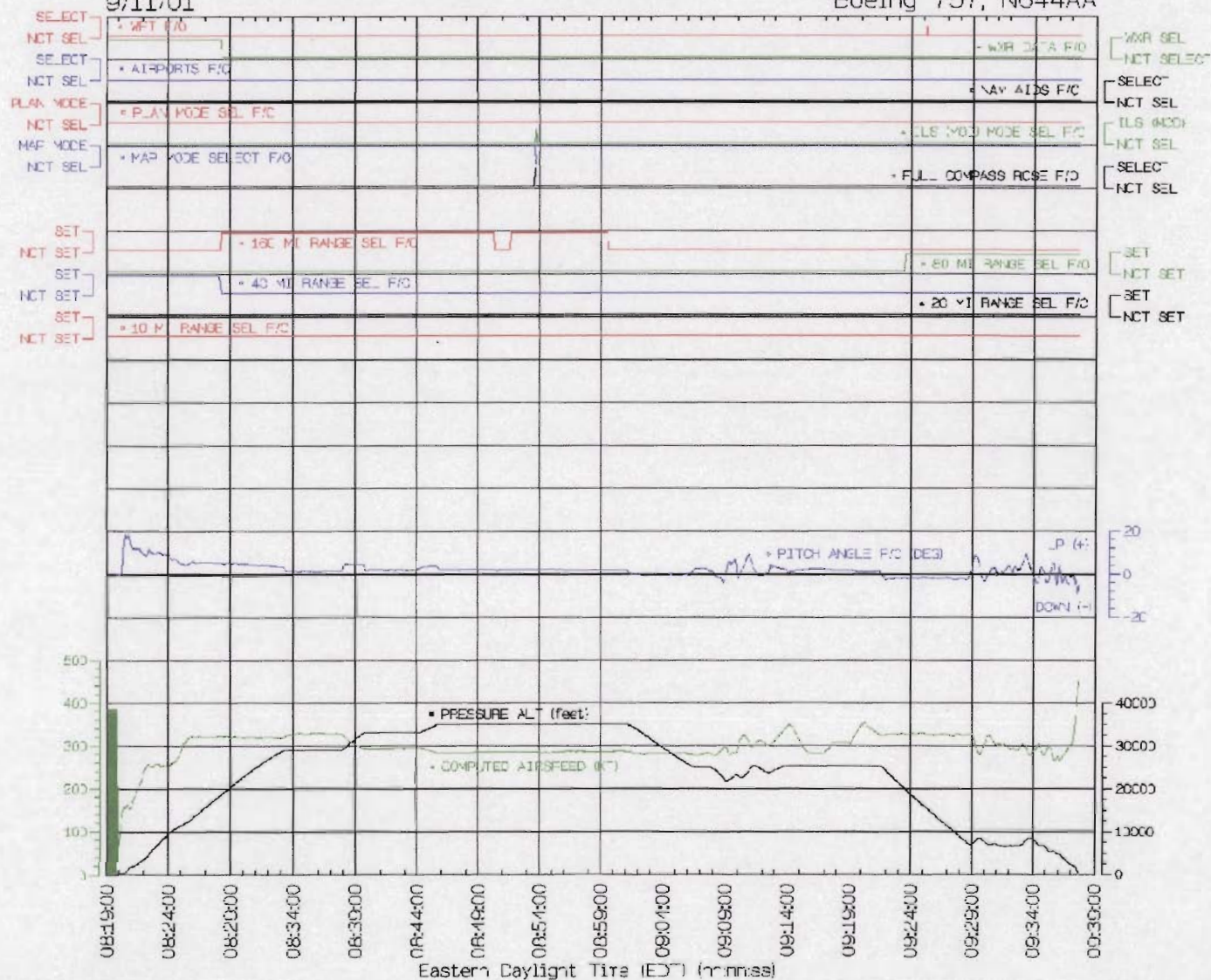
EFIS Parameters #1

National Transportation Safety Board

American Airlines Flight 77, Pentagon

9/11/01

Boeing 757, N644AA



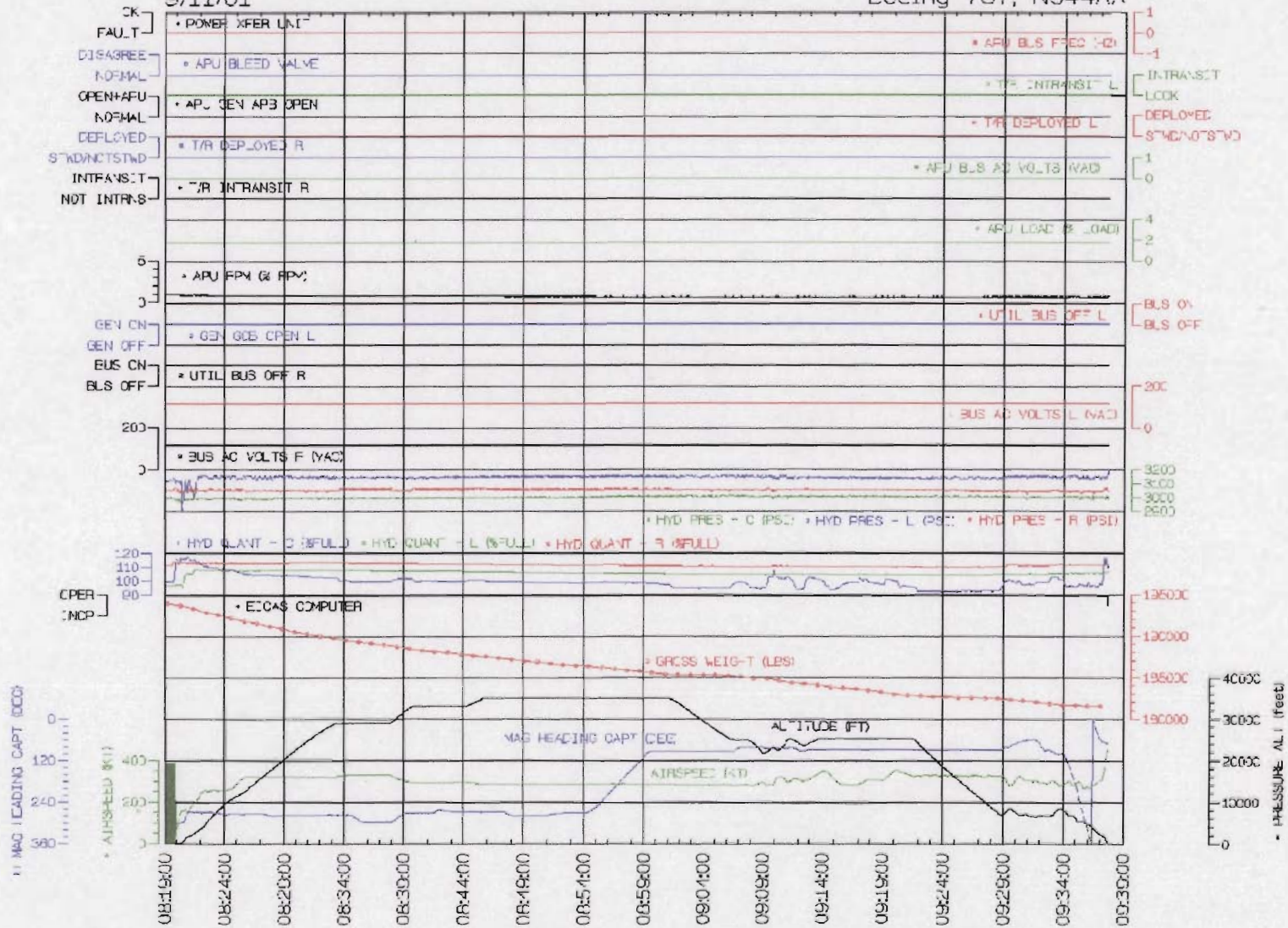
EFIS Parameters #2

National Transportation Safety Board

American Airlines Flight 77, Pentagon

9/11/01

Boeing 757, N644AA



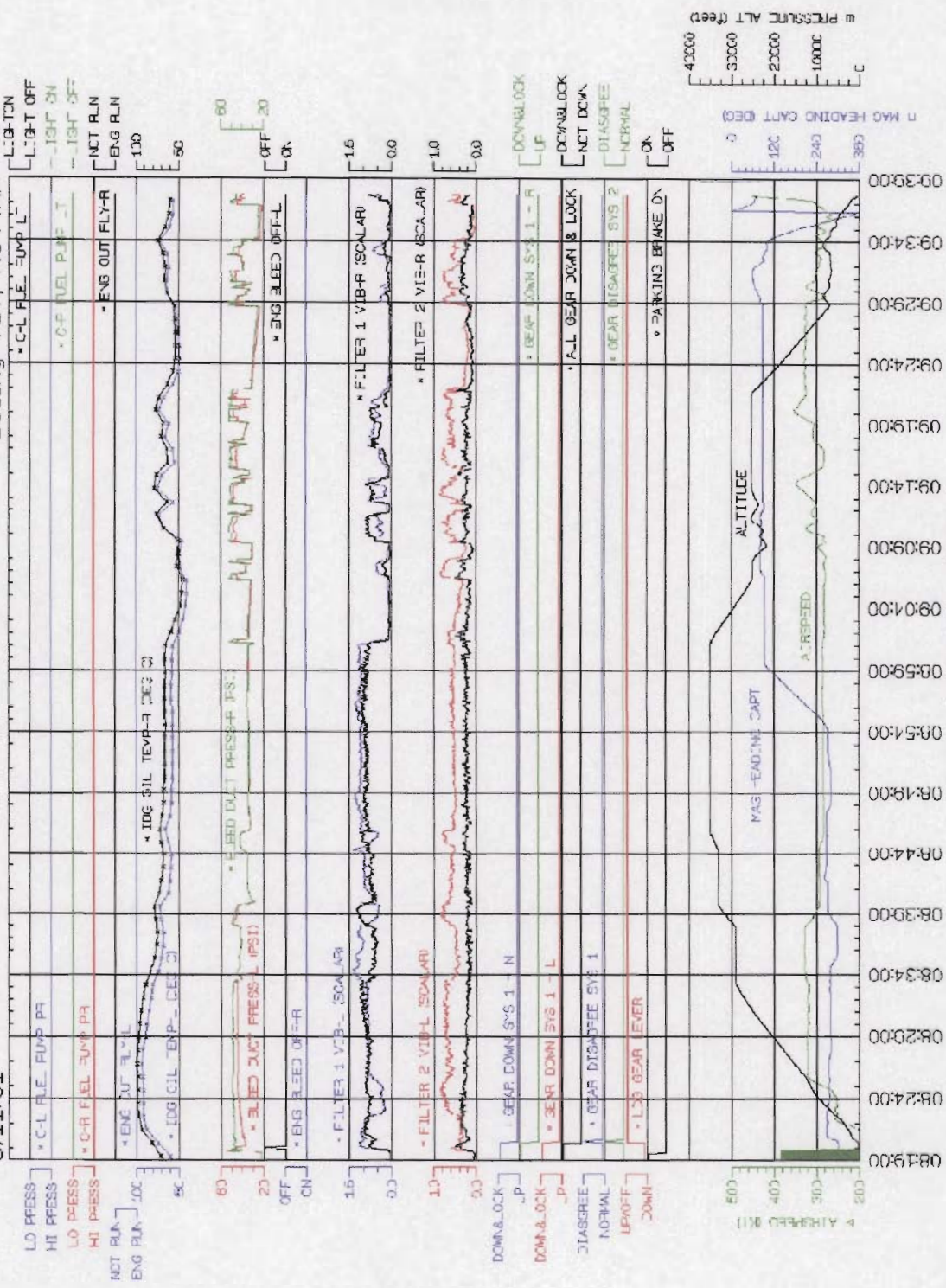
EICAS Parameters #1

National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01

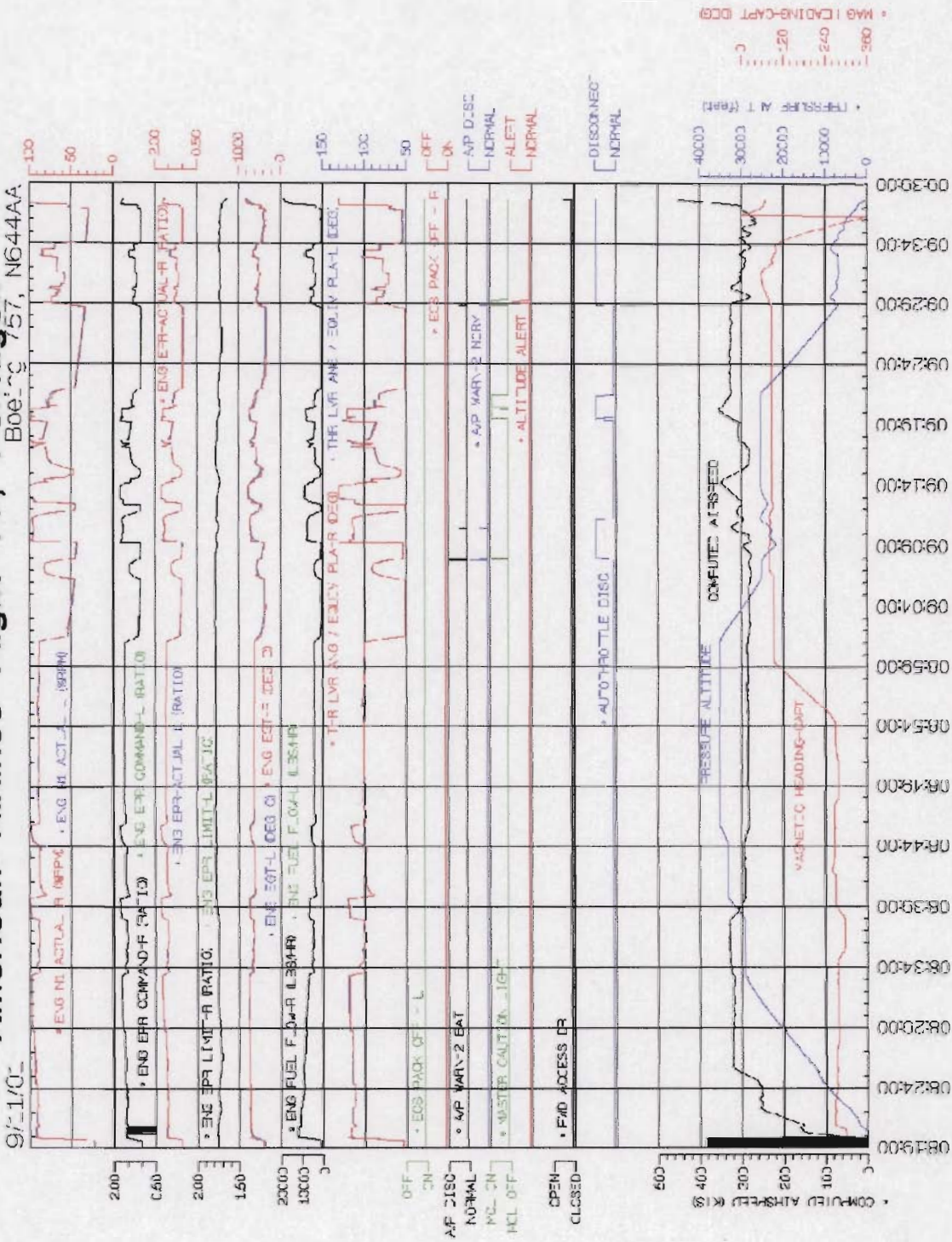


EICAS Parameters #2

National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA



EICAS Parameters #3

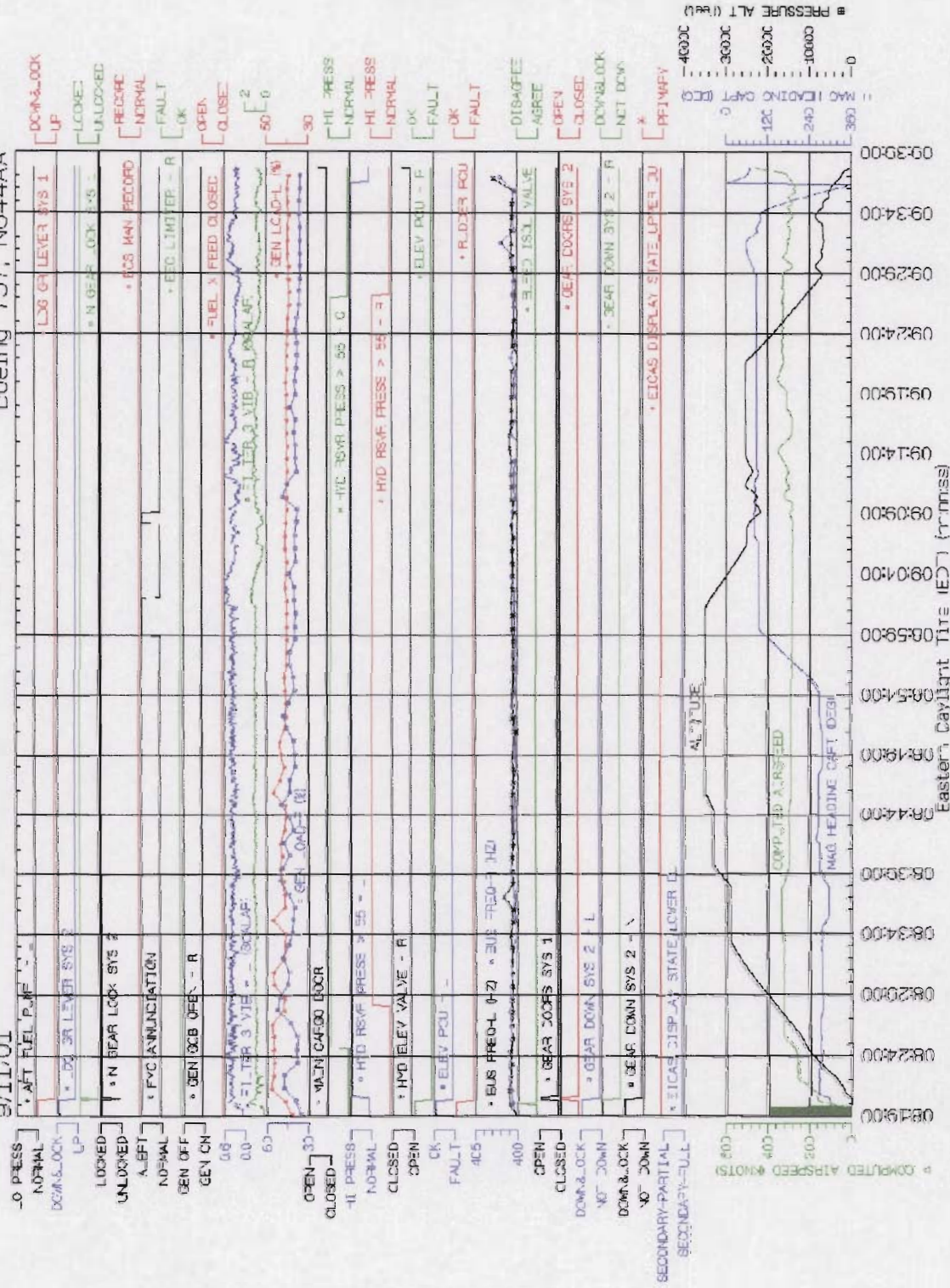
Eastern Daylight Time (EDT) (mm:ss)

National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01



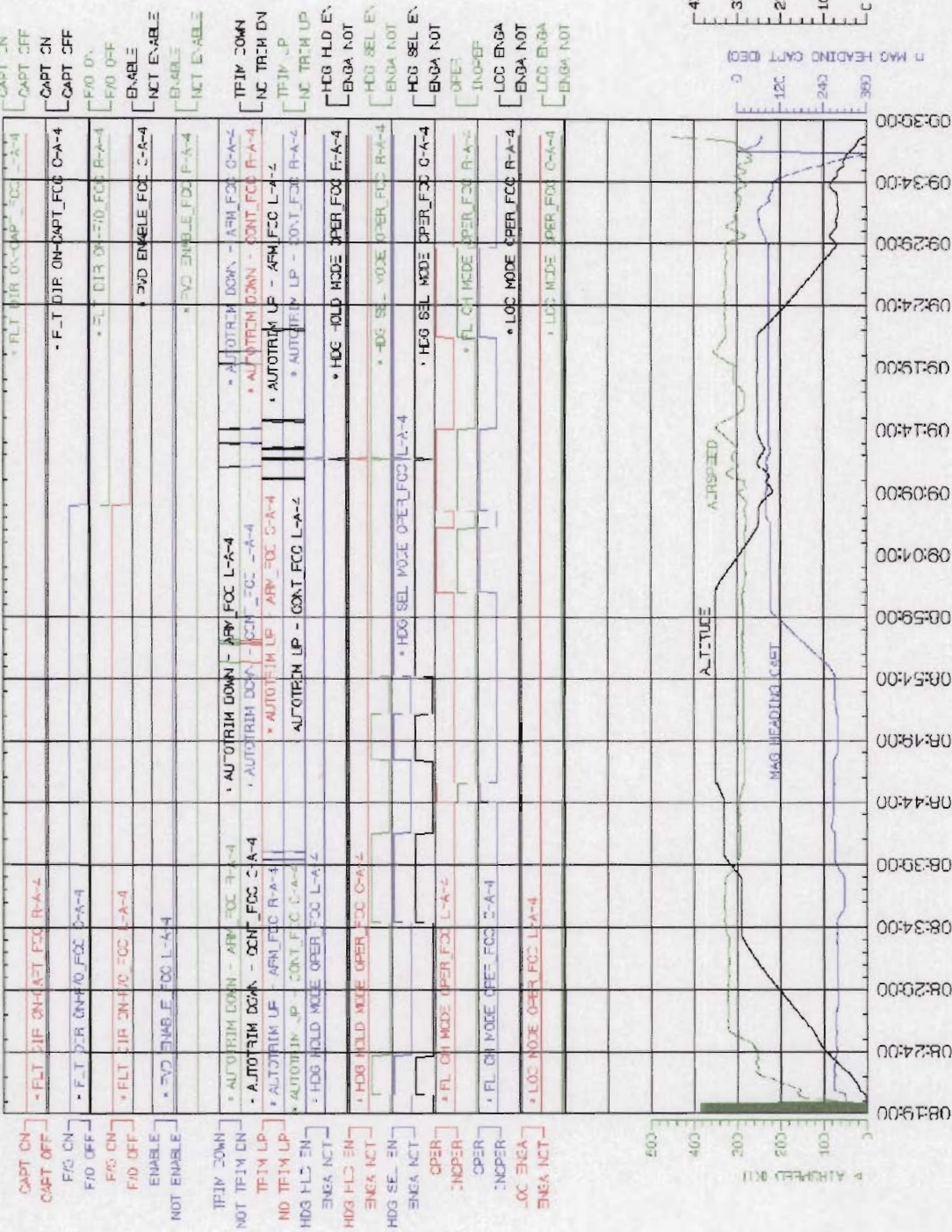
EICAS Parameters #5

National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01

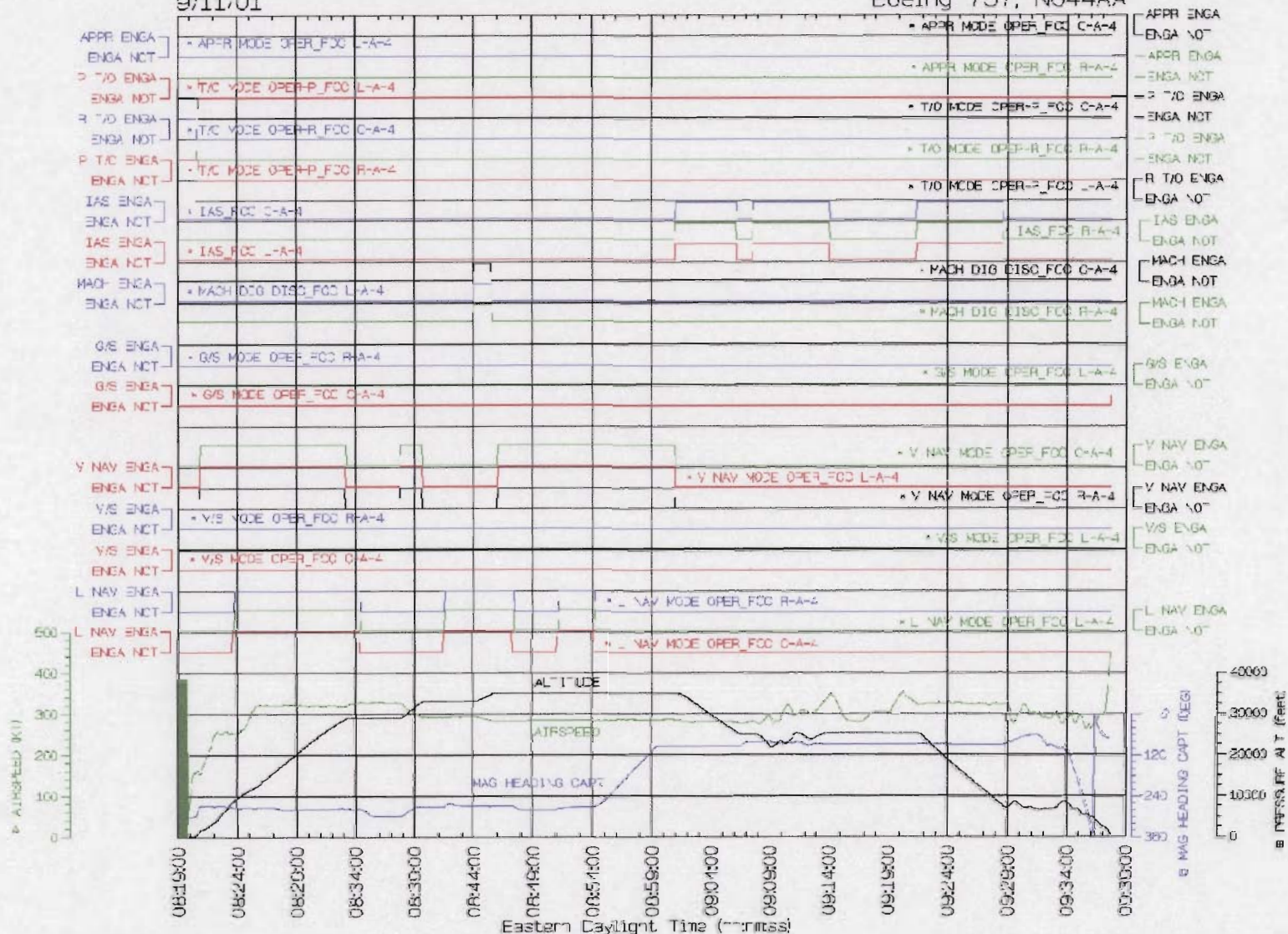


FCC Parameters #1 Eastern Daylight Time (GMT-4:00) National Transportation Safety Board

American Airlines Flight 77, Pentagon

9/11/01

Boeing 757, N644AA



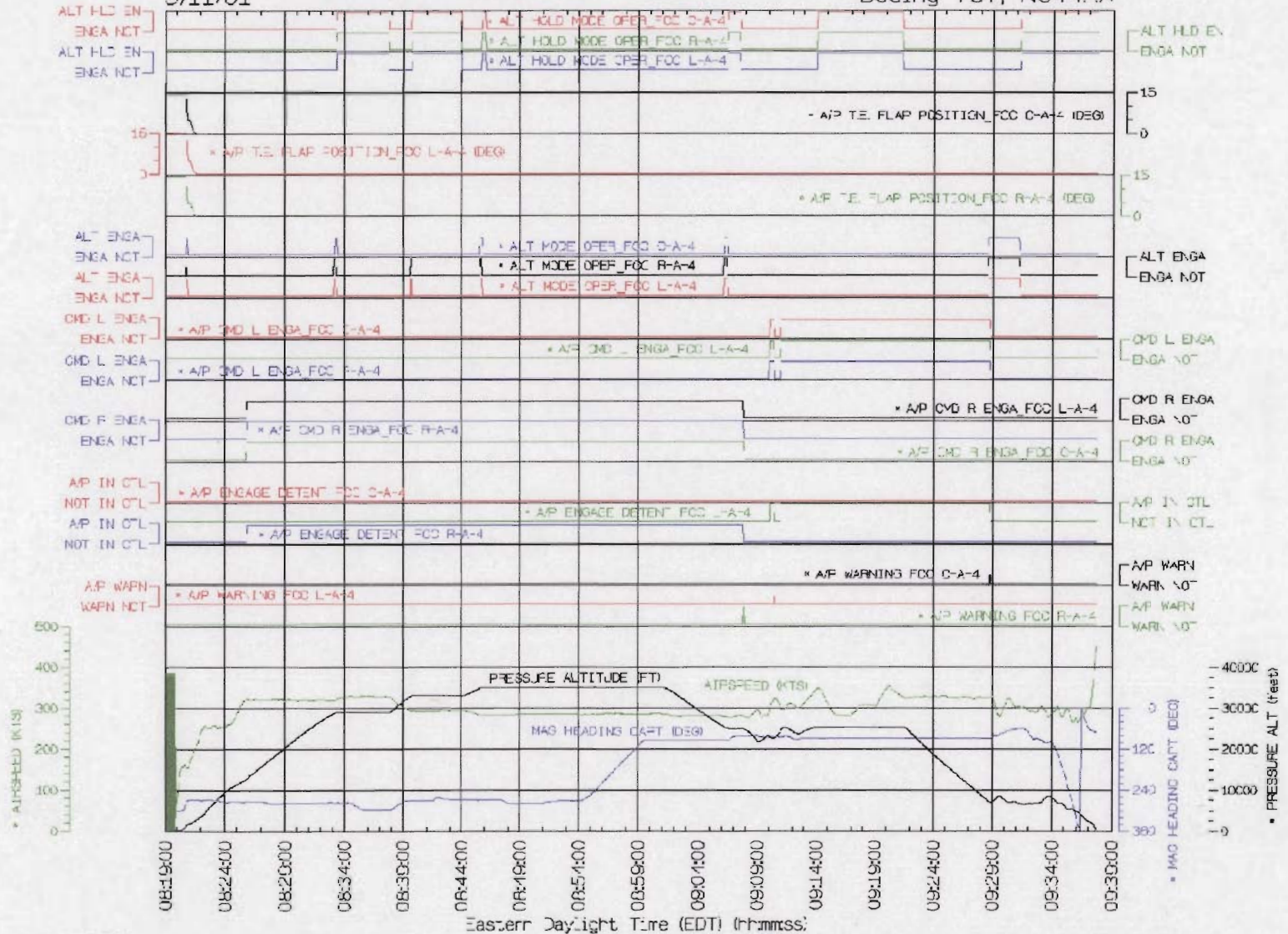
FCC Parameters #2

National Transportation Safety Board

American Airlines Flight 77, Pentagon

9/11/01

Boeing 757, N644AA



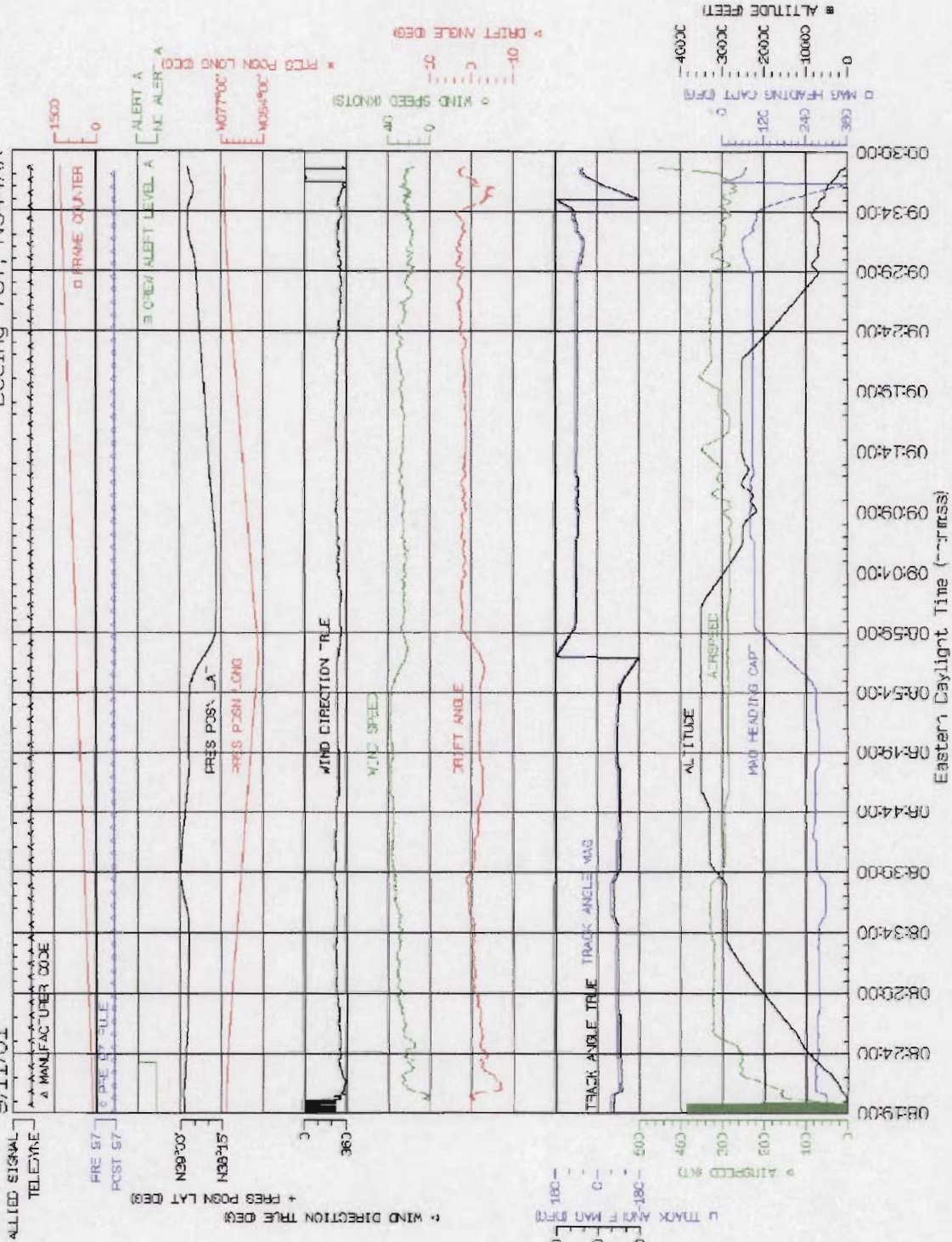
FCC Parameters #3

National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01

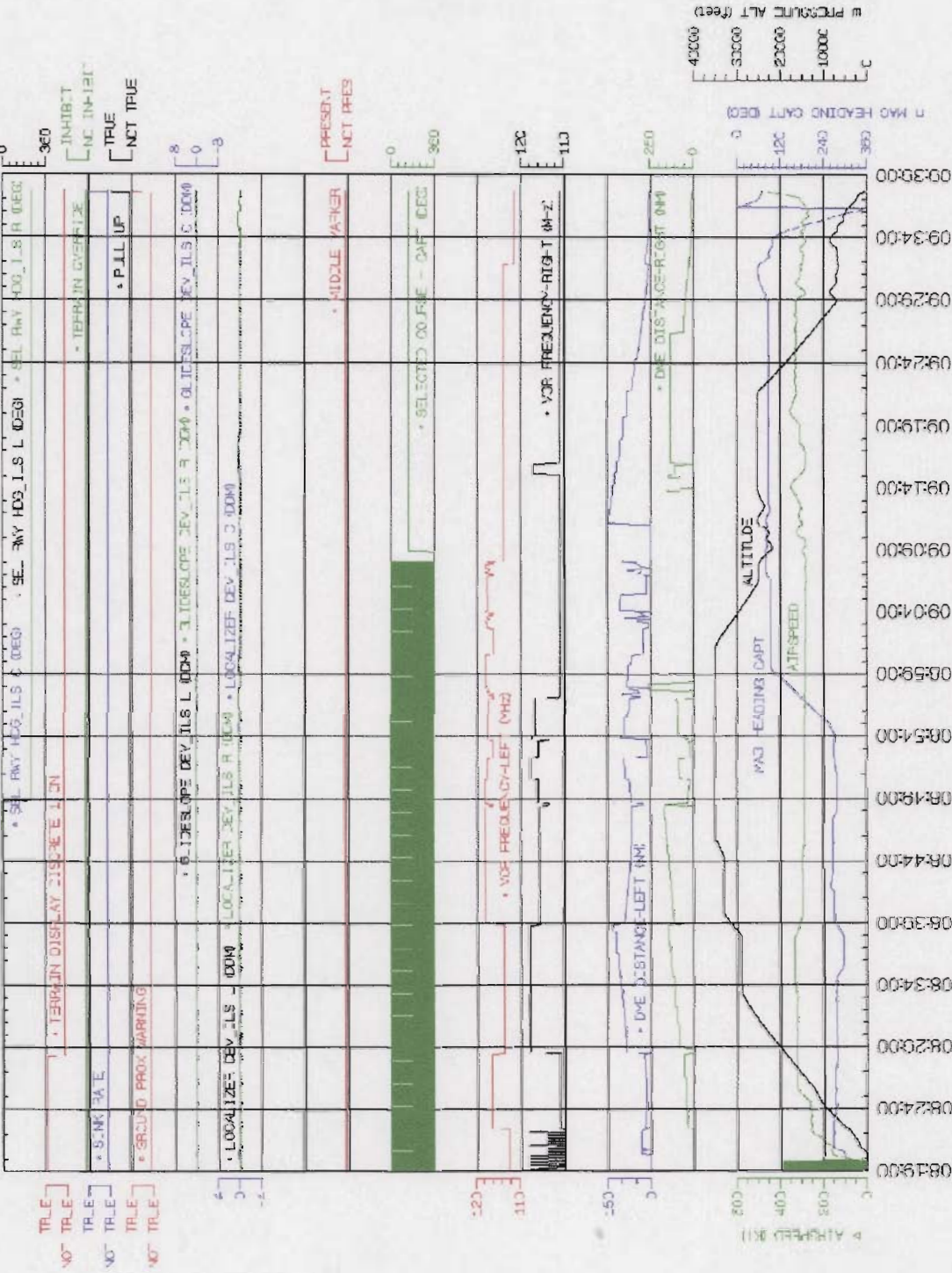


FMC and DccData Parameters Eastern Daylight Time (---rmtss) National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01

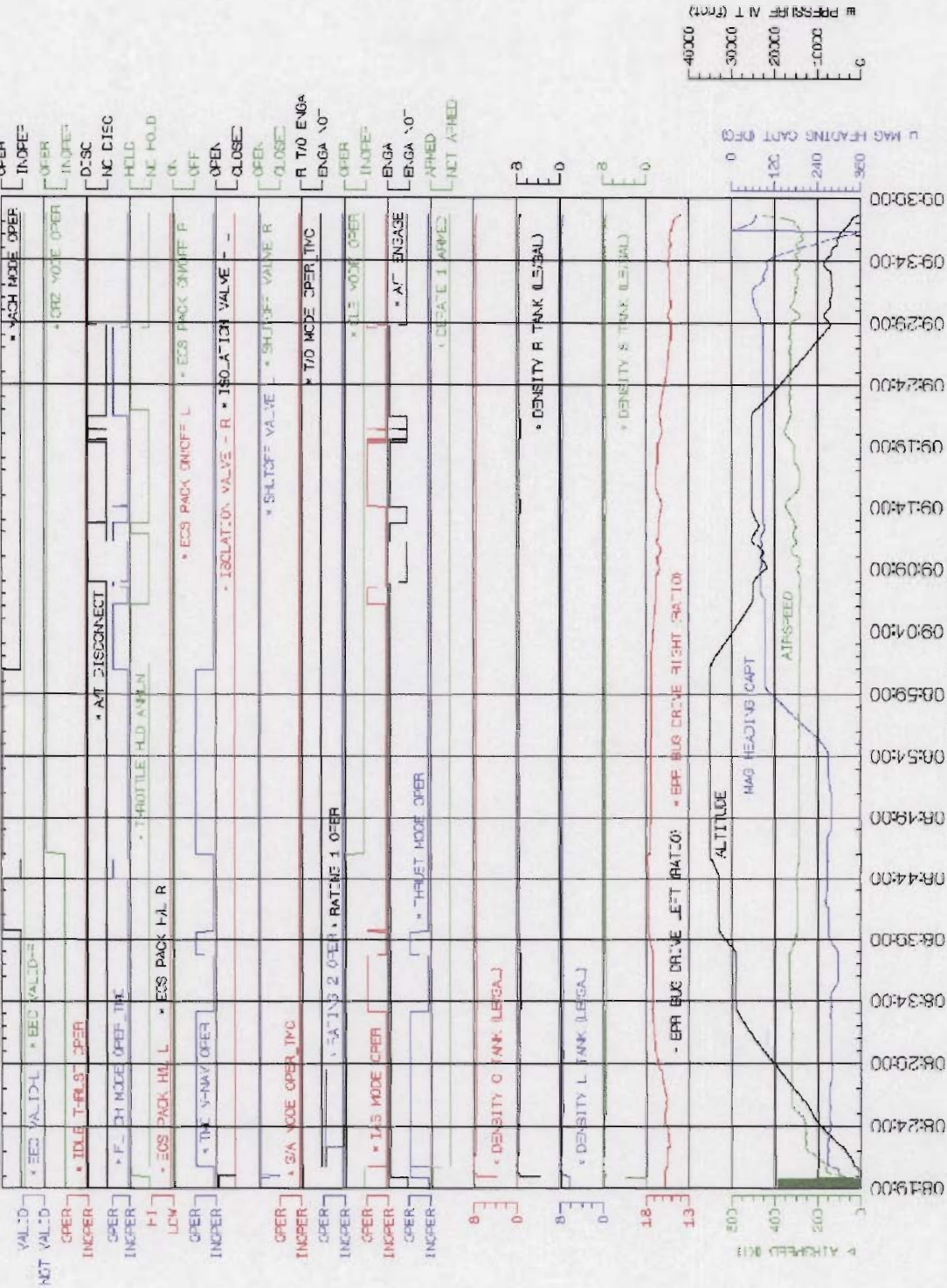


ILS, GWC, VOR, and DME Parameters Eastern Daylight Time (hh:mm:ss) National Transportation Safety Board

American Airlines Flight 77, Pentagon

Boeing 757, N644AA

9/11/01



TMC and FQMS Parameters

Eastern Daylight Time (hh:mm:ss)