NAS–MD–750
Interface Control Document (ICD)
NADIN/NAS Interface
Model A5f1.6

PAGE CONTROL CHART

This document is a complete revision for the model A5f1.6 update, dated 1 March 2007.

INTERFACE CONTROL DOCUMENT

(ICD)

NADIN/NAS INTERFACE

Model A5f1.6

NAS–MD–750

1 March 2007

En Route Program Operations
En Route Operational Systems Group, AJE–12
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CHANGE HISTORY

Level	*Date*	*Change/Comment*
A	August 1982	
A–H	April 1986	HCS Preliminary
A–H	August 1986	HCS Final Update
A5f10	June 1999	Original FAA Publication
A5f11	25 August 2000	OS300–CPF–019, Info 58856, Editorial changes.
A5f14	30 September 2003	OS300–CPF–033, Info 65831, Editorial changes.
A5f15	4 October 2004	A5f1.5 Publication — Refer to SSM–HCS–004Z. 0S300–CPF–034, INFO 67494, Editorial changes. UA200–CPF–017, INFO 67990, Improve airspace user flight planning (ICAO).
A5f16	1 March 2007	A5f1.6 publication — Refer to SSM–HCS–005Z. INFO 68627, Remove dead PAMRI code after transition to ECG. ATOE–CPF–001, INFO 69873, Add Change, Modify, Delay, and Cancel message capabilities for ICAO flight plans from airspace users and Non–U.S. Automated Facilities.

PREFACE

This document provides data on the Host Computer System (HCS) and the National Airspace Data Interchange Network (NADIN).

The NADIN/HCS Interface shall be accomplished through the utilization of PAM general purpose input and output adapters.

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1.0 INTRODUCTION

1.1 PURPOSE

This document describes the interface between the Host Computer System (HCS) and the National Airspace Data Interchange Network (NADIN). It is to provide direction for the design, implementation and interfacing of these systems.

NOTE

Unless otherwise indicated, it is understood that the term Peripheral Adapter Module (PAM) and Peripheral Adapter Module Replacement Item (PAMRI) refer to the En−Route Communications Gateway (ECG).

1.2 ORGANIZATION OF DOCUMENT

This Interface Control Document (ICD) describes or references the hardware, software, and operational elements necessary for a timely and efficient transfer of data between the HCS and NADIN.

1.3 INTERFACE CHANNEL

The functional capability and design of the NAS En Route System and NADIN Interfaces are constrained by basic objectives of the interface. These constraints are:

a. Utilize to the maximum extent possible, hardware, software, and operating procedures currently within the NAS facilities.

b. Through a modular design, provide a capability to add additional operational functions to either side of the interface with a minimum impact to the overall system.

c. Individual input and output messages shall be in accordance with the appropriate NAS System Specification (see Appendix C) and shall never exceed the NAS System limitation of 3000 characters, and NADIN input limitation of 3700 characters.

d. The EBCDIC code shall be used for all input and operations via the GPI/GPO interface. The ASCII code shall be used for all input and output operations via the NETI/NETO interface. Appendix A exhibits these code sets and defines legal and illegal characters.

1.4 TECHNICAL SUMMARY

1.4.1 NADIN to HCS

Messages in the NADIN network addressed to the HCS will be delivered via the NADIN concentrator (co-located at the Air Route Traffic Control Center (ARTCC)) and a Peripheral Adapter Module (PAM) General Purpose Input (GPI) Adapter, or the Host Interface Device (HID) NAS/LAN based on the NADIN Input/Output Source/Routing (NAIO) parameter setting. The NADIN concentrator will eliminate nonrelevant communications information from the message before transferring the message to the HCS. Control lines will be used to initiate, exchange status on, and terminate all NADIN to HCS messages.

The format of the commands, status information and sense information are defined in NAS−MD−001. HCS addressed messages will automatically print out at a terminal located within the ARTCC whenever the HCS is in a nonoperational status.

1.4.2 HCS to NADIN

Messages originating from the HCS addressed to another terminal in the NADIN network shall be delivered via the General Purpose Output (GPO) Adapter to the NADIN concentrator, or the HID NAS/LAN based on the NAIO parameter setting.

The NADIN concentrator will add appropriate communications information to the message before forwarding the message. Control lines will be used to initiate, exchange status on, and terminate all HCS to NADIN messages. The format of the commands, status information, and sense information are defined in NAS−MD−001.

1.4.3 Error Checking

Messages exchanged over this interface shall be checked for parity error as each byte is transferred. Parity sense (odd) shall be determined at the time of message transmission. Parity error detection shall cause the message being transferred to be discarded by the receiving device and a new transfer initiated by the transmitting device, according to the following rules.

1.4.3.1 HCS to Concentrator. During message transfer the concentrator shall raise Device Status Line 3 (GPO) when a parity error is detected. This action shall cause the HCS to retransmit the previous message. (NAS System Retransmission parameter, range 0−10 times, increments of one, normal setting 3.) Notification shall be made to the originating or adapted device if the message cannot be delivered to the concentrator within adapted parameter times.

1.4.3.2 Concentrator to HCS. Input messages to the HCS terminated with Channel End, Device End, and Unit Check (having sense Bit 4 raised to indicate input parity error) require retransmission. The HCS shall notify the concentrator by issuing a modified Read, with Device Control Line 3 raised, causing the concentrator to retransmit the message. (NADIN System Retransmission parameter, range 0−10 times, increments of one, normal setting 3.) If the NADIN is unable to deliver a message to the HCS within adapted parameter times, the concentrator shall reroute the message to the facility's designated Data Terminal Equipment (DTE).

1.4.3.3 HCS to HID NAS/LAN. During message transfer the HID NAS/LAN shall return a channel status word with the Unit Check bit set if an error (including parity error) is detected. This action shall cause the HCS to retransmit the previous message (NAS System Retransmission parameter, range 0−10 times, increments of one, normal setting of 3). Notification shall be made to the originating or adapted device if the message cannot be delivered to the HID NAS/LAN within the adapted parameter times.

1.4.3.4 HID NAS/LAN to HCS. Input messages to the HCS terminated with Channel End, Device End, and Unit Check require retransmission. The HCS shall re-issue the Read command (NAS System Retransmission parameter, range 0−10 times, increments of one, normal setting 3). If the message cannot be delivered within the parameter number of retries, the HCS shall declare a solid error and notify operational personnel that manual intervention is required.

1.4.3.5 Network Messages. Request from the DTE for retransmission of messages having network accountability will be a part of the network operation procedures documentation and are not contained in this ICD.

2.0 HARDWARE

2.1 GENERAL DESCRIPTION OF INTERFACE CHANNEL

The HCS/NADIN interface is through the PAM General Purpose Input and Output Adapters. These adapters are described in NAS−MD−001. Requirements imposed on the interface by the ICD are:

a. NADIN shall be designed to interface with the PAM GPI and GPO adapters as described in NAS−MD−001, or HID NAS/LAN based on the NAIO parameter setting.

b. Data interchange shall be via parallel 8 bits plus parity EBCDIC when the I/O device is GPI/GPO. Data interchange shall be via parallel 8 bits plus parity ASCII when the I/O device is NETI/NETO.

c. EOM lines shall be used for message termination signals.

d. Device Control lines other than GPI DC1 may be used for NADIN determined purposes if required.

The HCS/NADIN Systems are interfaced by a GPI and a GPO adapter in the PAM or HID NAS/LAN (NETI/NETO) based on the NAIO parameter setting. This creates full duplex, two-way simultaneous, communication between the HCS and NADIN. The NADIN System shall handle all teletypewriter communications to and from the HCS. New message formats are required to route data through the NADIN System. The data contained within a message shall retain its present format but shall be transferred to and from the HCS in EBCDIC if I/O is via GPI/GPO, or in ASCII if I/O is via HID NETI/NETO, rather than in Hex Baudot.

2.2 DEVICE ADDRESSING

2.2.1 GPI/GPO/NETI/NETO Addressing

The internal GPI/GPO adapter addressing shall be assigned the same relative priority as the existing TTY Adapters.

a. There will be two input and two output NADIN addresses.

b. The first shall be HID type (NETI/NETO).

c. The second shall be a PAMRI type (GPI/GPO).

d. The HID NETI/NETO adapters shall be addressed by block multiplexer channel and device on the channel.

As with all PAM adapters, they shall be addressed by byte multiplexor channel and device on the channel.

2.2.2 Addressing Teletypewriter Devices

The addressing of teletypewriter equipment that is serviced by NADIN required specific formatting. The formatting for this addressing is detailed in Section 4.0 Data Transfers.

2.3 READ/WRITE OPERATION

2.3.1 NADIN to HCS (HCS Read)

a. If I/O is via GPI/GPO, Device Control line 1 (DC1) will be raised by the adapter when the HCS will accept input from NADIN. DC1 will not be dropped until the HCS will not accept data.

b. If I/O is via HID NETI/NETO, a Read command (x'02') will be issued to the NADIN NETI input device when the HCS will accept input from NADIN. The Read will remain active until the HCS will not accept data.

c. If DC1 is up, then NADIN will raise input/output I/O Request In when it has data for HCS.

d. The interval between successive I/O Request In activations shall not be less than 25 microseconds.

2.3.2 HCS to NADIN (HCS Write)

NADIN, by use of the Device Inoperative Line, shall inform HCS of its status. If the Device (NADIN) is found to be available, the HCS shall start outputting data to NADIN at a data rate determined by NADIN. The rate shall be at least 600 bytes per second but not exceeding 40 kilobytes per second.

2.3.3 System Failure Detection

Loss of Device Control Line 1 from the GPI Adapter by NADIN, the activation of Device Inoperative line by NADIN to the GPO Adapter and detected by NAS, or the detection of an intercharacter delay (timeout) in excess of six milliseconds shall cause the detecting system to institute alternative transmission procedures, as defined in the individual NAS (NAS–MD–315) and NADIN (specification) documents.

Detection of failing status on the HID NETI and/or HID NETO devices (e.g., unit check, bus out check, equipment check, intervention required) will institute alternative transmission procedures as defined in the individual NAS (NAS–MD–315) and NADIN (specification) documents.

3.0 STARTUP/INTERFACE CONTROL/SHUTDOWN

3.1 GENERAL

The following subsections describe the establishment, control and disestablishment of the HCS/NADIN interface. These functions include the use of service messages and special parameters. The service messages consist of two system status messages (startup")SSU" and shutdown ")SSD") and one test message ")SST".

When NADIN receives an operational message from the NAS computer, it will be output regardless of the last system status service message received.

The NADIN computer will accept and process all system status messages regardless of present system status. That is, it will be able to process two system startup (or shutdown) service messages in a row.

3.2 STARTUP

When the HCS is ready to start receiving operational data for use in air traffic control, it shall inform the NADIN system by transmitting a service message indicating startup. The format for this message is in section 4.0.

When NADIN receives a system startup service message ")SSU ", the following sequence of events will occur in the NADIN system. These events will occur in the specified order.

a. All messages which are presently being held pending timeout (NADIN parameter number of seconds) for routing to the DTE will be sent to the NAS computer. This will be accomplished on a first in/first out basis. That is, the oldest message will be sent first.

b. Current messages (not on the timeout queue) will then be routed to the NAS computer.

c. Any operational message which fails transmission, due to a break in communications with the NAS computer, will be placed on a timeout queue, awaiting routing to the DTE. System test service messages (initiated by the NAS computer) will be transmitted without regard to operational messages on the timeout queue. Service messages are not placed on the timeout queue.

d. If any messages are on the timeout queue, only the oldest message on the queue will be used in an attempt to reestablish communications.

e. Any operational message on the timeout queue which times out, will be routed to the DTE.

3.3 INTERFACE CONTROL

3.3.1 Startover

When NADIN cannot input to HCS for a time period of between 30 and 600 seconds (parameter adaptable in 1 second increments) which will initially be set to 300 and NADIN has exhausted its attempts to reestablish HCS communications and to prevent data loss, NADIN will reroute data to

the ARTCCs' DTE. NADIN will continue to attempt establishment of communications with the effected ARTCCs' HCS. When communications have been successfully reestablished, the NADIN will cease alternate routing of data.

3.3.2 Test Messages

In the exchange of data between the HCS and NADIN, it is possible that there will be extended intervals when there is no data flow. To insure system operation, confidence testing is utilized. Confidence testing is initiated by NAS when the NADIN interface is active (adapter is turned on). When no data has been received by the HCS within parameter (30 to 300 seconds adaptable in 1 second increments) seconds, not to exceed 5 minutes, a test message ")SST" will be initiated.

When NADIN receives a system test service message, if the NADIN computer is operational, a system test service message will be sent to the NAS ocmputer regardless of the last system status service message received.

3.3.3 Timeouts

Once an exchange of data has started, there is a timeout parameter (6 milliseconds) between characters in a data transmission that could never be exceeded except for a failure. When this condition is noted, recovery logic or prescribed remedial actions will be initiated. These procedures are defined within the NAS (NAS–MD–315) and NADIN specifications.

3.4 SHUTDOWN

When the HCS is to be shutdown or cease processing of air traffic information, it shall notify the NADIN system to redirect all incoming information to the DTE via a service message. (The format for this message is in section 4.0.) This notification prevents NADIN from delaying operational data addressed to the HCS.

Failure to notify NADIN of shutdown will result in NADIN attempting remedial action and delaying HCS addressed data as described in Paragraph 3.3.1 Startover.

When NADIN receives a system shutdown service message ")SSD", the following sequence of events will occur in the NADIN system. These events will occur in the specified order.

a. All routing of operational messages to the NAS computer will cease.

b. All messages currently on the timeout queue will be routed to the DTE. This will be accomplished on a first in/first out basis. That is, the oldest message will be output first.

c. All current operational messages will be routed to the DTE without regard to the timeout parameter.

d. Only system test service messages (initiated by the NAS computer) will be transmitted to the NAS computer.

4.0 DATA TRANSFERS

4.1 GENERAL

The introduction of NADIN brings a revised approach to telecommunications. The data to and from remote termianls remain unchanged but the efficiency of the system is greatly enhanced. The equiment within the system which is automated, such as the HCS, may now handle data at a higher, more efficient speed with greater reliability. The circuits which were half duplex now become full duplex to automated systems because of NADIN's ability to store and forward.

4.2 MESSAGE TYPES

The HCS operational ATC messages remain constant both in their content and format. For data received from remote terminals, the NADIN will strip all control characters preceding the text and insert the origin field, carriage return, line feed, and the Start of Text (STX) character. The NADIN will remove the End of Message (EOM) characters and insert the End of Text (ETX) and the End of Transmission (EOT) characters. End of Line (EOL) control characters (CR CR LF) and other control characters embedded within the text of the message will not be disturbed or changed by NADIN.

New message types are required for communication between HCS and NADIN. These are service messages and are explained in section 3.0 and paragraph 4.2.2. Additionally, new headers or special NADIN data are required for proper communication. The message format of each message type is identified in table 4–1 through table 4–4. The maximum length message of 3000 characters is inclusive of fields 4 through 9. In addition, a set of notes applicable to these tables follows table 4–4.

4.2.1 Operational Message Formats

4.2.1.1 NADIN to HCS Data Transfer. Messages transferred by NADIN to HCS shall begin with a six to eight character header followed by the control characters and fields as defined in table 4–1. (See note 8 for messages over 3000 bytes.)

4.2.1.1.1 NADIN TO HOST OVERLONG WARNING Message. Data transferred by NADIN to HCS which contains more than 3000 characters shall be dual-delivered. The full text of the message shall be routed to the DTE and the HCS message shall be truncated at the 2957 byte position and overlaid with a warning message:

(CR)(LF)CHECK(LF)TEXT(LF)NEW(Space)ENDING(Space)ADDED(Space)
(Switch I.D.)

where:

(CR)	=	Carriage Return (HEX 0D)
(LF)	=	Line Feed (HEX 25)
(Space)	=	Space Character (HEX 48)
(Switch I.D.)	=	Origin address assigned to NADIN Switching Center transmitting the message.

TABLE 4–1. NADIN TO HCS OPERATIONAL MESSAGES

Message Format

Field No.	Function	Description	Bytes	Note
	Header	6 or 8 character message origin	6 or 8	1
	End of Line (EOL)	HEX 0D25 (CR LF)	2	
4	Start of Text (STX)	HEX 02	1	
6	Text	Format determined by NAS–MD–311	Variable	1, 7, 8
	End of Line (EOL)	HEX 0D0D25 (CR CR LF)	3	
7	End of Text (ETX)	HEX 03	1	
9	End of Transmission (EOT)	HEX 04	1	

Example: (STX) PKB1234015 FP ACID TYPE SPEED DPT POINT PTIME ALT (EOL) Route of Flight (each line having an EOL sequence) (EOL) (ETX) (EOT).

ICAO: (ORIGIN) (CR) (LF) (STX)← FPL ↑ TW547 ↑ IS (EOL)
↑ B747/H → S/PR (EOL)
↑ KIAD0945 → KJFK 1015 (EOL)
↑ 0520 F340 → DCT HAR J79 JFK DCT CYYZ DCT (EOL)
↑ CYUL 1250 (EOL) (ETX) (EOT)

WMSC: KNKAWXSO (CR) (LF) (STX) PHL SA 1800 E50 OVC 20 159/54/30/2015/991 (EOL) (ETX) (EOT)

4.2.1.2 HCS to NADIN Data Transfer. Data transferred by HCS to NADIN shall begin with message field 1 and be followed by message fields as required. Format is defined in table 4–2. An interim rerouting of data will be established using the current teletype circuits and formats until a confidence factor has been established within the NADIN system.

TABLE 4–2. HCS TO NADIN OPERATIONAL MESSAGES

Message Format

Field No.	Function	Description	Bytes	Note
1	Priority Delineator	2 Alphabetic Characters	2	2
	Field Separator	HEX 40	1	

TABLE 4–2. HCS TO NADIN OPERATIONAL MESSAGES (Continued)

Message Format

Field No.	Function	Description	Bytes	Note
2	Addressee Delineator	3–8 Characters (each)	3–8	3, 6
	End of Line (EOL)	HEX 0D25 (CR LF)	2	
4	Start of Text (STX)	HEX 02	1	
6	Text	Format Determined by NAS–MD–311	Variable	1
	End of Line (EOL)	HEX 0D0D5 (CR CR LF)	3	
7	End of Text (ETX)	HEX 03	1	
9	End of Transmission (EOT)	HEX 04	1	

Examples: WMSC: GG KNKAWMSC (CR) (LF) (STX) (ZCPZ) (RQ) HKC SA (EOL) (ETX) (EOT)

GG KNKAWMSC (CR) (LF) (STX) (ZCPZ) (RC) UNIQ (EOL) (ETX) (EOT)

GG KNKAWMSC (CR) (LF) (STX) (ZCPZ) (RL) 665 (EOL) (ETX) (EOT)

(ZCPZ in the text identifies the ARTCC and the position of the entering KVDT. (Reference NAS–MD–311, Section 5.9.6.4.)

4.2.2 System Service Message Formats

4.2.2.1 HCS to NADIN Formats. Data transmitted by HCS to NADIN shall begin with message field 1 and be followed by message fields as required. Format is defined in table 4–3.

TABLE 4–3. HCS TO NADIN SERVICE MESSAGES

Message Format Field No.	Function	Description	Bytes	Note
1	Priority	2 Alphabetic	2	2
	Delineator	Characters 1 space	1	
2	Address	NADIN Switch	6	5
	Delineator	End of Line	3	3
4	Start of Text	HEX 02	1	

TABLE 4–3. HCS TO NADIN SERVICE MESSAGES (Continued)

Message Format Field No.	Function	Description	Bytes	Note
5	Service Message Delineator	Service Message Text 1 space	4 1	4
6	Text	Computer Identification EOL	3 3	
7	End of Text	HEX 03	1	
9	End of Transmission	HEX 04	1	

Example: FF KATLYT (EOL) (STX) SSU ZCW (EOL) (ETX) (EOT)

4.2.2.2 NADIN to HCS Formats. Data transferred by NADIN to HCS shall begin with message field 4 and be followed by message fields as required. Format is defined in table 4–4.

TABLE 4–4. NADIN TO HCS SERVICE MESSAGES

Message Format Field No.	Function	Description	Bytes	Note
4	Start of Text	HEX 02	1	
5	Service Message Class	Service Message Text 1 space	4 1	4
6	Text	NADIN Switch Identification EOL	6 3	5
7	End of Text	HEX 03	1	
9	End of Transmission	HEX 04	1	

Example: (STX) SST KATLYT (EOL) (ETX) (EOT)

Notes to table 4–1 through table 4–4:

1. Formatted message in EBCDIC limited to 1A–5 (see appendix A) international version characters set. Length determined by NAS format.

2. Priorities are defined in agency Handbook 7110.80, section 2.0. NAS/NADIN interface priorities are:

FF = All flight movement and control messages directly relating to the safe, efficient operation of aircraft.

GG = Routine operational messages. Not currently used by NAS.

3. A space is used as a delineator between addressees when multiple addresses are required. End of Line sequence denotes end of field 2; no additional addresses will follow.

4. Service Message Classes:

)SSU = System Startup

)SSD = System Shutdown

)SST = System Test Message/Response

NOTE

NADIN will only transmit)SST messages as response for test messages originated from a NAS facility.

5. NADIN Switch Identifier/Address:

   KATLYTAA = Atlanta (Eastern Switch)

   KSLCYTAA = Salt Lake City (Western Switch)

6. Destination address(es) 3, 4, 6 or 8 alphabetic characters; each address succeeded by a space.

7. WMSC messages may be received as multiple weather reports blocked in a single message. The individual reports are separated by (CR) (LF) (RS).

   CR = Carriage Return (HEX 0D)
   LF = Line Feed (HEX 25)
   RS = Record Separator (HEX 1E)

8. Messages greater than 3000 bytes will be truncated by NADIN at byte 2957. NADIN will insert the message “CHECK TEXT NEW ENDING ADDED (SWITCH ID)” in a 38 byte format as follows:

   (CR)(LF)CHECK(LF)TEXT(LF)NEW ENDING ADDED (SWITCH ID)

   The entire message text (untruncated) will be delivered to the ARTCC DTE.

   (See note 5 for switch identifier/address.)

Appendix A

EBCDIC CODE

1A–5	EBCDIC	BAUDOT	ASCII	
NUL	00	N/A	00	NUL/IDLE
SOH	01	N/A	01	START OF HEADING
STX	02	N/A	02	START OF TEXT
ETX	03	N/A	03	END OF TEXT
EOT	04	N/A	04	END OF TRANSMISSION
ENQ	2D	N/A	05	ENQUIRY
ACK	2E	N/A	06	ACKNOWLEDGE
BEL	2F	34	07	AUDIBLE OR ATTENTION SIGNAL
BS	16	N/A	08	BACKSPACE
HT	05	N/A	09	HORIZONTAL TABULATION
LF	25	08 or 28	0A	LINE FEED
VT	0B	N/A	0B	VERTICAL TABULATION
FF	0C	N/A	0C	FORM FEED
CR	0D	02 or 22	0D	CARRIAGE RETURN
SO	0E	N/A	0E	SHIFT OUT
SI	0F	N/A	0F	SHIFT IN
DLE	10	N/A	10	DATA LINK ESCAPE
DC1	11	N/A	11	DEVICE CONTROL 1
DC2	12	N/A	12	DEVICE CONTROL 2
DC3	13	N/A	13	DEVICE CONTROL 3
–	3B	3B	–	FIGURES SHIFT
DC4	3C	N/A	14	DEVICE CONTROL 4
NAK	3D	N/A	15	NEGATIVE ACKNOWLEDGE
SYN	32	N/A	16	SYNCHRONOUS IDLE
ETB	26	N/A	17	END OF TRANSMISSION BLOCK
CAN	18	N/A	18	CANCEL
EM	19	N/A	19	END OF MEDIUM
SUB	3F	3F	1A	SUBSTITUTE (LTRS SHIFT)
ESC	27	N/A	1B	ESCAPE
–	1B	1B	–	FIGURES SHIFT

EBCDIC CODE (Continued)

1A–5	EBCDIC	BAUDOT	ASCII	
FS	1C	N/A	1C	FILE SEPARATOR
GS	1D	N/A	1D	GROUP SEPARATOR
RS	1E	N/A	1E	RECORD SEPARATOR
US	1F	1F	1F	UNIT SEPARATOR (LTRS SHIFT)
SP	40	04	20	SPACE
!	4F	36	21	EXCLAIMATION MARK
"	7F	N/A	22	QUOTATION MARK
#	7B	25	23	NUMBER
$	5B	32	24	DOLLAR
%	6C	N/A	25	PERCENT
&	50	2B	26	AMPERSAND
’	7D	3A	27	APOSTROPHE
(	4D	3E	28	OPEN PARENTHESIS
)	5D	29	29	CLOSE PARENTHESIS
*	5C	N/A	2A	ASTERICK
+	4E	31	2B	PLUS
,	6B	26	2C	COMMA (BROKEN WEATHER SYMBOL)
–	60	38	2D	HYPHEN
.	4B	27	2E	PERIOD
/	61	37	2F	SLANT
0	F0	2D	30	ZERO
1	F1	3D	31	ONE
2	F2	39	32	TWO
3	F3	30	33	THREE
4	F4	2A	34	FOUR
5	F5	21	35	FIVE
6	F6	35	36	SIX
7	F7	3C	37	SEVEN
8	F8	2C	38	EIGHT
9	F9	23	39	NINE
:	7A	2E	3A	COLON (CLEAR WEATHER SYMBOL)
;	5E	2F	3B	SEMI COLON
<	4C	N/A	3C	LESS THAN

EBCDIC CODE (Continued)

1A–5	EBCDIC	BAUDOT	ASCII	
=	7E	N/A	3D	EQUAL
>	6E	N/A	3E	GREATER THAN
?	6F	33	3F	QUESTION MARK (OVERCAST WEATHER SYMBOL)
@	7C	N/A	40	AT
A	C1	18	41	UPPER CASE ALPHABETICS
B	C2	13	42	
C	C3	0E	43	
D	C4	12	44	
E	C5	10	45	
F	C6	16	46	
G	C7	0B	47	
H	C8	05	48	
I	C9	0C	49	
J	D1	1A	4A	
K	D2	1E	4B	
L	D3	09	4C	
M	D4	07	4D	
N	D5	06	4E	
O	D6	03	4F	
P	D7	0D	50	
Q	D8	1D	51	
R	D9	0A	52	
S	E2	14	53	
T	E3	01	54	
U	E4	1C	55	
V	E5	0F	56	
W	E6	19	57	
X	E7	17	58	
Y	E8	15	59	
Z	E9	11	5A	
[	4A	N/A	5B	OPEN BRACKET
\	E0	N/A	5C	REVERSE SLANT

EBCDIC CODE (Continued)

1A–5	EBCDIC	BAUDOT	ASCII	
]	5A	N/A	5D	CLOSED BRACKET
^	5F	N/A	5E	CIRCUMFLEX
_	6D	N/A	5F	UNDERLINE
′	79	N/A	60	GRAVE ACCENT
a	81	N/A	61	LOWER CASE ALPHABETICS
b	82	N/A	62	
c	83	N/A	63	
d	84	N/A	64	
e	85	N/A	65	
f	86	N/A	66	
g	87	N/A	67	
h	88	N/A	68	
i	89	N/A	69	
j	91	N/A	6A	
k	92	N/A	6B	
l	93	N/A	6C	
m	94	N/A	6D	
n	95	N/A	6E	
o	96	N/A	6F	
p	97	N/A	70	
q	98	N/A	71	
r	99	N/A	72	
s	A2	N/A	73	
t	A3	N/A	74	
u	A4	N/A	75	
v	A5	N/A	76	
w	A6	N/A	77	
x	A7	N/A	78	
v	A8	N/A	79	
z	A9	N/A	7A	
{	C0	N/A	7B	OPEN BRACE
|	6A	N/A	7C	VERTICAL LINE
}	D0	N/A	7D	CLOSE BRACE

EBCDIC CODE (Continued)

1A–5	EBCDIC	BAUDOT	ASCII	
–	A1	N/A	7E	OVERLINE
DEL	07	N/A	7F	DELETE

BIT POSITIONS

0 1 2 3 4 5 6 7 IBM EBCDIC
7 6 5 4 3 2 1 ASCII

EBCDIC UNASSIGNED
CODE SELECTED

NOTE

ASCII is shown in Hexadecimal notation.

Appendix B
DATA CLASSES TEXT BLOCK ICAO

B.1 GENERAL

The following message types are contained in optional message type fields when functions not associated with NAS En Route messages are required. When used, the first character uniquely identifies a category of messages, allowing mnemonics to be reused within each catagory.

B.1.1 ICAO

All ICAO messages start ATS data with the open parenthesis "(" character and conclude ATS data with the closed parenthesis ")" character. Any data received between STX and open parenthesis is non-ATC data and can be discarded by software. Supplementary ATC information may follow the close parenthesis and will be concluded with a second close parenthesis.

Message Types	Designator
Alerting	ALR
Radio Communication Failure	RCF
Cancel	CNL
Current Flight Plan	CPL
Filed Flight Plan	FPL
Supplementary Flight Plan	SPL
Departure	DEP
Delay	DLA
Arrival	ARR
Boundary Estimate	EST
Change	CHG
Coordination	CDN
Acceptance	ACP
Logical Rejection	LRM
Modify	MOD
Nonradar Transfer of Control	TNR
Radar Transfer of Control	TRA
Radar Blip Identification	RBI

Message Types	Designator
Assumption of Control	AOC
Flight Plan Cancellation	CNL
Transfer of Control Cancelation	TCX
Request Supplementary Flight Plan	RQS
Request Radar Blip Identification	RAR
Technical Acknowledgement	TAM
Technical Error	TEM
Technical Correction	COR
Technical Rejection	RJT
ICAO Logical Acknowledgement	LAM

B.1.2 Service Message

All automated service messages start with the closed parenthesis ")" SVC, following STX. Other service messages (SVC) will occur within NADIN, but will not be routed to the HCS.

Listed below are those Service Message Classes having application at the time the interface is established.

Service Message Class	Designator
*System Startup	SSU
*System Shutdown	SSD
*System Test	SST

B.1.3 Weather Message

New formats for weather exchange within NADIN have not been assigned at this time. Further development may make it desirable to uniquely identify weather messages addressed to the HCS with a message type and format different than NAS En Route messages. For the purpose, the character "[" is reserved.

B.1.4 Acknowledgement Messages

The following acknowledgement messages are used by the Host Computer System to acknowledge the receipt of acceptable and unacceptable ICAO messages received from Flight Service Station, Airline B and Military B input devices via NADIN when parameter CNL/FPL Acknowledgement Switch, CFAS, is "ON".

*Exchanged from HCS to NADIN only. Other messages, using ")" SVC, will exist within NADIN but will not be addressed to the HCS.

Message Types	Designator
Acceptance	ACK
Rejection	REJ

Appendix C

NAS SYSTEM SPECIFICATIONS

NAS–MD–001	NAS Subsystem Baseline Configuration
NAS–MD–109	System Description, National Airspace System
NAS–MD–311	Computer Program Functional Specifications NAS Model 4e0 Message Entry and Checking
NAS–MD–312	Computer Program Functional Specifications NAS Model 4e0 Route Conversion and Posting
NAS–MD–314	Local Outputs
NAS–MD–315	Remote Outputs
NAS–MD–317	Monitor

Appendix D
GLOSSARY

ACK	Acknowledge
ATC	Air Traffic Control
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
BEL	Character Used to Control Alarm or Attention Devices
BS	Backspace
CAN	Cancel
CCW	Channel Control Word
CR	Carriage Return
DEL	Delete
DC1–4	Device Controls for Telecommunications System
DTE	Data Terminal Equipment
EBCDIC	Extended Binary Coded Decimal Interchange Code
ENQ	Enquiry
EOL	End of Line
EOT	End of Transmission
ETX	End of Text
FF	Form Feed
GPI	General Purpose Input Adapter
GPO	General Purpose Output Adapter
HCS	Host Computer System
HID	Host Interface Device
HID/NAS–LAN	Host Interface Device/National Airspace System — Local Area Network
HT	Horizontal Tabulation
ICD	Interface Control Document

I/O	Input/Output
LF	Line Feed
NADIN	National Airspace Data Interchange Network
NAK	Negative Acknowledge
NAS	National Airspace System
NETI	HID Network Input Device
NETO	HID Network Output Device
NUL	Character of All Zero Bits
PAM	Peripheral Adapter Module (IBM 7289–02)
TTY	Teletypewriter
SOH	Start of Heading
STX	Start of Text
TTYLL	Teletype Adapter