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JSC-13365
September 1993

CONTROL CENTER COMPLEX
DIGITAL VOICE INTERCOMMUNICATIONS SUBSYSTEM TO DATA DISTRIBUTION AND WORKSTATION/SERVER PLATFORMS SUBSYSTEM INTERFACE CONTROL DOCUMENT

Contract NAS 9-18300

DRL LI 20A

Prepared for

National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

Prepared by

LORAL
Space Information Systems

R1V0

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1.0 – INTRODUCTION

This Interface Control Document (ICD) defines the interface between the Digital Voice Intercommunications Subsystem (DVIS) located in Building 30 and the Workstation/Server Platform (WSP) located in Building 30S at the Lyndon B. Johnson Space Center (JSC), Houston, Texas. The DVIS is the voice element of the Voice Subsystem, which forms a part of the Consolidated Communications Facility (CCF) of the Control Center Complex (CCC). The WSP is the workstation element of the Data Distribution and Workstation Platforms (DDWP) Subsystem of the CCC.

1.1 IDENTIFICATION

This ICD is identified as the Control Center Complex Digital Voice Intercommunications Subsystem to Data Distribution and Workstation/Server Platforms Subsystem Interface Control Document, JSC-13365. The production and maintenance of this specification are the responsibility of Loral Space Information Systems (LSIS).

1.2 SCOPE

This document establishes the interfaces for DVIS to WSP and covers the physical, electrical, and software interfaces for user-end instruments, which mount in a workstation housing with interconnections. The interconnections provide access by the workstation operator and direct connection of an audio alarm signal to the end instrument.

1.3 PURPOSE AND OBJECTIVE

The purpose of this document is to establish the interface specification for the hardware and software that binds all parties involved. The objective of the interface between DVIS and WSP is to place the user-end instrument (keyset) into the workstation housing and establish the essential connections for effective use.

1.4 PARTICIPATING ORGANIZATIONS AND RESPONSIBILITIES

The WSP organization obtains the workstation housing units without the presence of the keyset. The DVIS organization ensures that one Government-Furnished Equipment (GFE) keyset [LSIS Part Number (P/N) 85-44536-01] and one installation kit (LSIS P/N 77-44890-02) are available for each workstation-mounted keyset.

1.5 DOCUMENT ORGANIZATION

This document is organized into six major sections and three appendixes.

1. Section 1.0 defines the scope and purpose of the DVIS to WSP ICD.
2. Section 2.0 lists the parent, applicable, and reference documents.
3. Section 3.0 defines the interface.
4. Section 4.0 defines the interface requirements traceability.
5. Section 5.0 lists the commonality elements included.
6. Section 6.0 lists the applicable standards.
7. Appendix A contains a list of acronyms and abbreviations used throughout this document.
8. Appendix B contains a glossary.
9. Appendix C contains software message definitions and control.

2.0 – RELATED DOCUMENTATION

This section identifies the documents that are related to the contents of this document as indicated in the following paragraphs.

2.1 PARENT DOCUMENTS

The parent documents establish the criteria and technical basis for the existence of this document. The parent documents are:

JSC-11028	Digital Voice Communications Subsystem Level B&C Requirements, Volume P, Revision 2, Appendix B, September 1991
JSC-13193	Space Station Control Center User Detailed Functional Requirements, April 8, 1991
JSC-13209	Space Station Control Center Interface Control Document, April 1991
JSC-13309	SSCC Standard Platform Elements Subsystem Functional Requirements, July 1991
JSC-32069A	Space Station Control Center Level A Requirements, Revision A, April 1990.

2.2 APPLICABLE DOCUMENTS

Applicable documents are those documents, of the exact issue shown, whose contents, to the extent specified herein, are considered to form a part of this document. The specified parts of the applicable documents carry the same weight as if they were stated within the body of this document. The applicable documents are:

JSC-23668	JSC Automated Information System Security Plan, April 1989
SE-41262	DVIS Hardware Performance Specification, Revision A.

2.3 REFERENCE DOCUMENTS

Reference documents are those documents that, although not a part of this document, serve to amplify and clarify its content. The reference documents are:

JSC-13161	Risk and Security Management Plan for the Space Station Program, Space Station Control Center, February 1990
JSC-13205	Space Station Control Center System Specification, April 1991.

2.4 REQUESTS FOR COPIES

LSIS personnel may obtain copies of this document by submitting a request to the Mission Systems Contract (MSC) Program Support Office. National Aeronautics and Space Administration (NASA) and associated personnel must submit their requests to the NASA Office of Primary Responsibility (OPR).

3.0 – INTERFACES

This section defines the interfaces between DVIS and WSP. The following paragraphs identify each interface with a detailed description of that interface.

3.1 INPUTS TO DVIS FROM WSP

These paragraphs describe the interface between a DVIS keyset and a WSP workstation. A depiction of the interface is shown in Figure 3-1. This interface defines the interconnection of the user (operator) devices and power to one DVIS keyset.

3.1.1 ALTERNATING CURRENT (ac) POWER

WSP shall provide ac power distribution to the DVIS keyset via plugmold in workstation housing. This shall require 115 volt, 60 Hertz (Hz) ac. Total power consumption by the DVIS keyset shall not exceed 60 watts (0.8 amps).

3.1.2 MICROPHONE INPUTS

WSP shall provide up to two microphone inputs via audio jacksets (headset jacks, Paragraph 3.3.4.1) that are installed in the workstation housing. DVIS shall provide headset battery power to each microphone through the tip positions of the two-prong plug (a pair of conductors) while simultaneously accepting transmitted voice signals. Microphone 1 and 2 interfaces are shown in Table 3-1. These interfaces shall support standard GFE headsets and handsets with electrical characteristics as specified in the DVIS Hardware Performance Specification, SE-41262A, Paragraphs 3.3.4.1 and 3.3.4.2.

3.1.3 PUSH-TO-TALK (PTT) INPUTS

WSP shall provide a PTT control signal from two possible sources: a headset or a footswitch. Each unit generates a contact closure for input to the keyset.

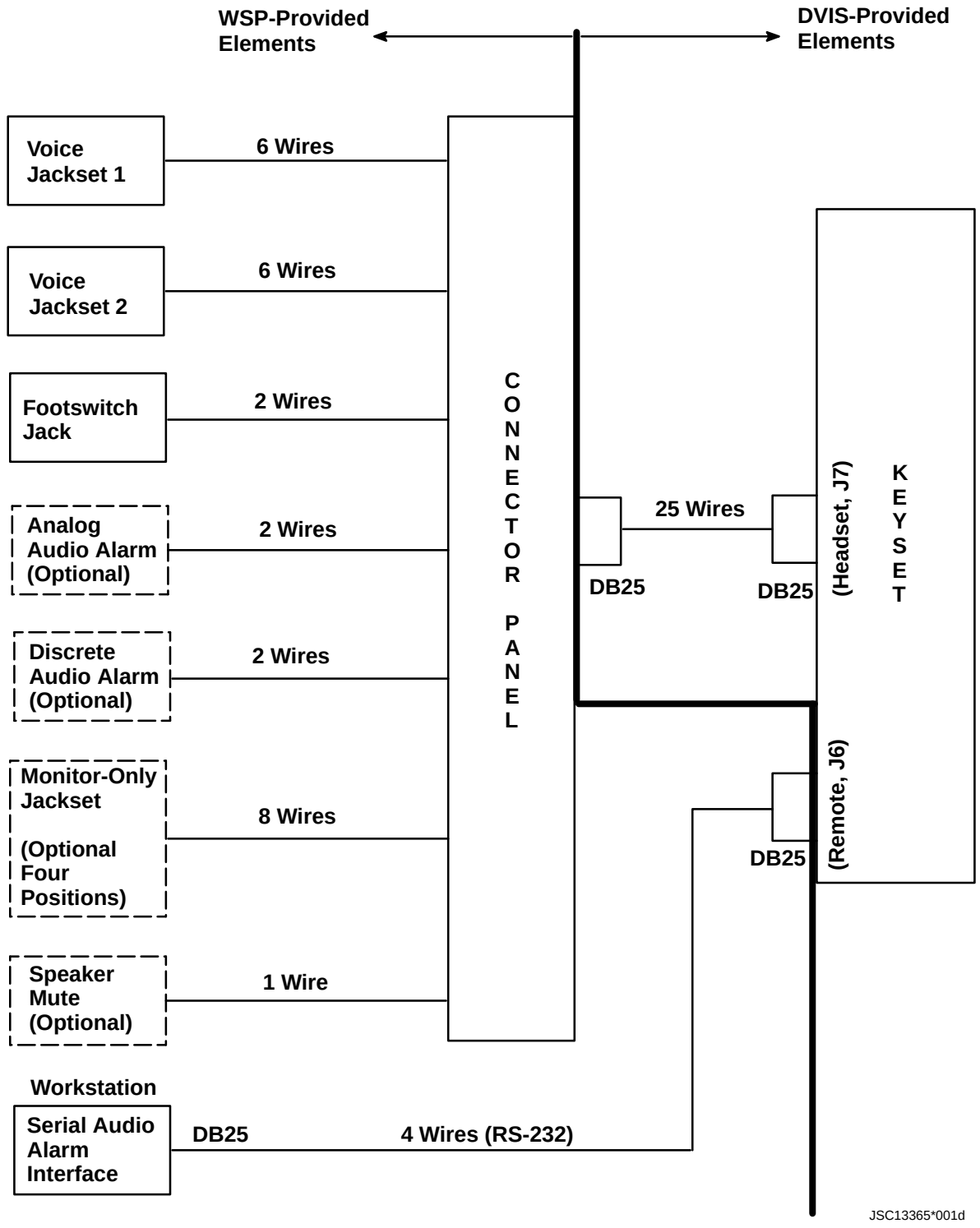

Figure 3-1 Interface Description for One DVIS Keyset

3.1.3.1 Headset

The headset PTT's originate on the positions of the headset's two-prong plug (pair of conductors). The WSP shall provide two PTT inputs via the audio jacksets (headset jacks, Paragraph 3.3.4.1). PTT 1 and 2 interfaces are defined in Table 3-1.

Table 3-1 Keyset Headset Cable Signal and Pin List

Signal Name	Keyset Connector (J7) Pin	Connector/ Terminal Blk. Pin	Description	Reference Paragraph
CRT-ALARM	1	1	Discrete Audio Alarm Input	3.1.4.2
GND	14	14	Keyset Internal Ground	–
CA-T	2	2	Analog Audio Alarm Input TIP	3.1.4.3
CA-R	15	15	Analog Audio Alarm Input RING	3.1.4.3
TX1-T	3	3	Microphone 1 Input TIP (Transmit 1)	3.1.2
TX1-R	16	16	Microphone 1 Input RING (Transmit 1)	3.1.2
RX1-T	4	4	Keyset Output 1TIP (Receive 1)	3.2.1
RX1-R	17	17	Keyset Output 1 RING (Receive 1)	3.2.1
PTT1-T	5	5	Microphone 1 Push-To-Talk TIP	3.1.3.1 3.1.3.2
PTT1-R	18	18	Microphone 1 Push-To-Talk RING	3.1.3.1 3.1.3.2
TX2-T	6	6	Microphone 1 Input TIP (Transmit 2)	3.1.2
TX2-R	19	19	Microphone 2 Input RING (Transmit 2)	3.1.2
RX2-T	7	7	Keyset Output 2 TIP (Receive 2)	3.2.1
RX2-R	20	20	Keyset Output 2 RING (Receive 2)	3.2.1
PTT2-T	8	8	Microphone 2 Push-To-Talk TIP	3.1.3.1
PTT2-R	21	21	Microphone 2 Push-To-Talk RING	3.1.3.1
RX3-T	9	9	Audio Monitor Output 1 TIP	3.2.2
RX3-R	22	22	Audio Monitor Output 1 RING	3.2.2
RX4-T	10	10	Audio Monitor Output 2 TIP	3.2.2
RX4-R	23	23	Audio Monitor Output 2 RING	3.2.2
RX5-T	11	11	Audio Monitor Output 3 TIP	3.2.2
RX5-R	24	24	Audio Monitor Output 3 RING	3.2.2
RX6-T	12	12	Audio Monitor Output 4 TIP	3.2.2
RX6-R	25	25	Audio Monitor Output 4 RING	3.2.2
SPKR-MUTE	13	13	Speaker Muting	3.1.5

3.1.3.2 Footswitch

The footswitch jack (Paragraph 3.3.4.2) is used by the workstation operator to connect a footswitch unit to the DVIS keyset. WSP shall provide one jack for each keyset that shall connect in parallel with one of the two headset PTT's at the appropriate keyset input. The footswitch shall connect to PTT 1 (PTT1-T and PTT1-R, Table 3-1) unless otherwise specified at the time of installation.

3.1.4 AUDIO ALARM SIGNAL

WSP shall provide an interface for CCC audio alarms for each DVIS keyset. The DVIS interface includes provisions for three types of audio alarm mechanisms. The WSP will use the serial audio alarm interface.

3.1.4.1 Serial Audible Alarm Interface Input (WSP-to-DVIS)

DVIS shall generate an alarm tone (fixed frequency/fixed level, 800 Hz at -16 decibels per milliwatt (dBm) modulated on and off six times per second) to the keyset user upon receipt of an audible alarm request message from the WSP. The audible alarm interface consists of control messages exchanged between a workstation and a DVIS keyset. The hardware interface is defined in Figure 3-1 and Table 3-2. The software/firmware interface is defined in Appendix C. This alarm tone shall be presented directly to the keyset user via normal headset jacks and speaker if the speaker is in use.

Table 3-2 Serial Audio Alarm Interface Cable Signal and Pin List

Signal Name Referenced from Keyset Connector (J6)	Keyset Connector (J6) Pin	Workstation Connector Pin	Signal Name Referenced from Workstation Connector	Reference Paragraphs
Transmit	2	3	Receive	3.2.3
Receive	3	2	Transmit	3.1.4.1
GND	7	7	GND	
DTR	20	6	DSR	

Note: This interface is only valid for local DVIS keysets (i.e., keysets with fiber-optic connections to DVIS hardware) and cannot be used for remote DVIS keysets (i.e., keysets with RS-232 connections to DVIS hardware). The keyset's RS-232 port (J6) cannot be shared between a remote keyset's normal voice/control functions and the serial audible alarm function.

Warning: Connector pins that are not listed in Table 3-2 for the keyset connector should not be present in the keyset connector end of the cable. Some of the remaining DB-25 pins connect to analog voice circuits in the keyset that could be damaged if standard RS-232 signals are applied to them. The only connector pins required for this application are those listed in Table 3-2.

3.1.4.2 Discrete Audio Alarm Input

This audio alarm interface is currently used by the shuttle mission control operations. DVIS shall generate a built-in alarm tone to the keyset user upon recognition of a contact closure across this interface point. This alarm tone shall be presented directly to the keyset user via the normal headset jacks and keyset speaker if the speaker is in use. This interface is defined in Table 3-1.

3.1.4.3 Analog Audio Alarm Input

This analog audio alarm interface is optional. The DVIS keyset shall accept analog audio alarm information from the WSP at this interface point. This audio data, within the frequency range of 300 to 3300 Hz, shall be presented directly to the keyset user via the normal headset jacks and keyset speaker if the speaker is in use. The interface shall be 600 ohms impedance, with a nominal signal level of -10 dBm $\pm$ 3 dB. This interface point is provided for possible future utilization. This interface is defined in Table 3-1.

3.1.5 SPEAKER MUTE

This interface is to be used by WSP to mute the internal and any external speakers associated to that DVIS keyset. This is an optional interface to be used by WSP when required. The interface is defined in Table 3-1.

3.2 OUTPUTS FROM DVIS TO WSP

These paragraphs describe the interface between a DVIS keyset and the WSP workstation. A depiction of the interface is shown in Figure 3-1. This interface defines the interconnection of one DVIS keyset to the workstation.

3.2.1 KEYSET AUDIO OUTPUT

A DVIS keyset shall provide two keyset audio outputs to be used with two headset receives. The headset receive audio shall terminate on the sleeve positions of the headset's two-prong plug (a pair of conductors). WSP shall provide a matching jackset (headset jacks, Paragraph 3.3.4.1) and connections to the appropriate keyset output as defined in Table 3-1.

3.2.2 AUDIO MONITOR OUTPUT

Four monitor outputs are provided to WSP by the DVIS keyset interface to be connected to additional external jacksets for receive-only or to remote speakers. These are optional interfaces to be used by WSP if required. The four interfaces are defined in Table 3-1.

3.2.3 SERIAL AUDIBLE ALARM INTERFACE

The audible alarm interface consists of messages exchanged between workstation software and DVIS keyset firmware across the interface defined in Figure 3-1 and Table 3-2. Message outputs from the DVIS keyset to workstation to support the alarm interface are defined in detail in Appendix C.

3.3 MECHANICAL INTERFACE

The mechanical interface shall specify the actual physical objects and their dimensions, and the electrical connections that are necessary for installation of the keyset and its related user apparatus.

3.3.1 KEYSET MOUNTING ENVELOPE

3.3.1.1 Horizontal

The surface mounting for the horizontal keyset shall conform to the Electronic Industries Association (EIA) RS-310C standard for a 7-inch high by 19-inch wide panel. The mounting envelope shall include a space that is a minimum of 7 inches high by 17.8 inches wide by 13 inches deep beneath the workstation surface. The workstation housing shall provide access to the back of the keyset for installation and removal of the ac power cable and all remaining electrical and fiber-optic connections. The WSP shall allow for routing of a fiber-optic cable to the rear of each keyset from an external source.

3.3.1.2 Vertical

The surface mounting for the vertical keyset shall conform to Figure 3-2. The mounting envelope shall include a space 7.75 inches wide by 14 inches high by 12 inches deep. The workstation housing shall provide access to the back of the keyset for installation and re-

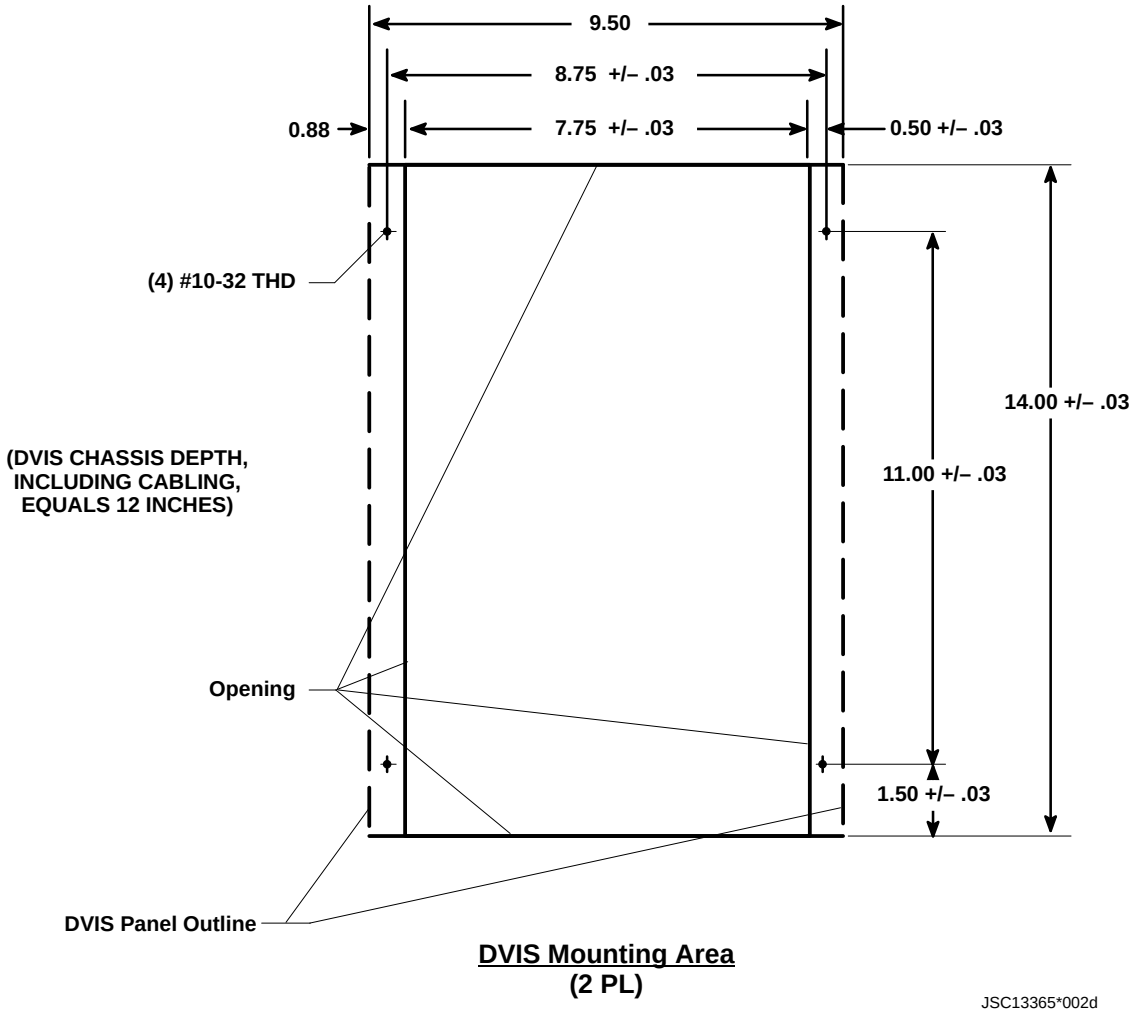

Figure 3-2 Vertical Keyset Mounting

moval of the ac power cable and all remaining electrical and fiber-optic connections. The WSP shall allow for routing of a fiber-optic cable to the rear of each keyset from an external source.

3.3.2 KEYSET MOUNTING FASTENERS

A DVIS keyset shall fasten to the workstation housing via two Southco threaded screws at each end of the keyset (four total) that shall enter threaded holes in the workstation frame.

3.3.3 CABLE TERMINATION INTERFACE

The complete set of connections to the DVIS keyset shall include an ac power cable to the ac source, the signal cable to a connector panel for attachment of the various user (operator) resources specified above, and the serial audio alarm cable.

3.3.3.1 Signal Cabling

WSP shall supply a Commercial-Off-the-Shelf (COTS) cable, P/N DD-45909, to connect the DVIS keyset to the WSP-provided connector panel shown in Figure 3-1. The cable will be approximately 10 feet in length, terminated with a DB-25 male plug-type connector on both ends. This cable mates with the keyset socket-type connector (Headset, J7) on the rear panel of the keyset. The other end of the cable shall attach to a WSP-provided passive interface board, DSF25-ESSF25-S, Beau Products or equivalent, which is part of the WSP-provided connector panel shown in Figure 3-1. Refer to Table 3-1 for connector pin assignment.

3.3.3.2 Serial Audible Alarm Cabling

WSP shall provide a cable (DD-46967-01 or equivalent) to interface the workstation to the DVIS keyset. The cable shall be terminated with a DB-25 male plug-type connector on the keyset end and with a DB-25 male plug-type connector on the workstation end. The keyset end of the cable mates with the keyset socket-type connector (Remote J6) on the rear of the keyset. The workstation end of the cable mates with the workstation socket-type connector on the workstation. Refer to Table 3-2 for connector pin assignments. Pins not shown in Table 3-2 shall not be included in this cable.

3.3.3.3 ac Power Cabling

DVIS shall supply an approximately 6-foot long ac power cable for the keyset. This cable shall terminate with a National Electrical Manufacturers Association (NEMA)-type 515P standard, 15-amp, 3-prong grounding plug. This cable shall mate with the WSP-supplied ac power outlet on a plugmold with the workstation housing.

3.3.4 JACKSETS

3.3.4.1 Headset Jacks

WSP shall provide one jackset assembly, LSIS P/N 41-28882-01 or equivalent, per DVIS keyset. This jackset assembly shall provide connections for tip, ring, and sleeve pairs, which correspond with transmit, PTT, and receive functions. Each jackset assembly shall be able to accommodate two mating plugs, type PJ511 [Western Electronic Corporation (WECO) 425-A] or the equivalent.

3.3.4.2 Footswitch Jack

WSP shall provide one footswitch jack per DVIS keyset. The footswitch jack shall employ a Switchcraft-type MT-332B (or equivalent) that provides connections for tip and ring.

3.3.5 ENVIRONMENTAL INTERFACE

WSP shall not restrict air circulation around the DVIS keyset. WSP shall dissipate the 60-watt head load of the keyset through active or passive means. Operational ambient temperature range for DVIS keyset is plus 60 to plus 90 degrees Fahrenheit.

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4.0 – INTERFACE REQUIREMENTS TRACEABILITY

The functional operation of the keyset requires the existence of this configuration.

- JSC-13193 specifies the requirements of the keyset, which include Paragraphs 6.4.4.1.1, 6.4.4.1.2, 6.4.4.4, 6.4.4.4.1, and 6.4.4.4.3
- JSC-32069, Revision A, states the requirements of the keyset, which include paragraphs 4.3.4.3, 4.3.4.5, 4.3.4.6, and 4.3.4.16.

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5.0 – COMMONALITY ELEMENTS

Not applicable.

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6.0 – APPLICABLE STANDARDS

This section defines the industry, government, and international standards that apply to the interface. The standard is:

- EIA RS-310C Racks, Panels, and Associated Equipment.

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APPENDIX A – ACRONYMS

The following is a list of the acronyms and abbreviations used throughout this document.

ac	Alternating Current
CCC	Control Center Complex
CCF	Consolidated Communications Facility
COTS	Commercial-Off-the-Shelf
CPU	Central Processing Unit
dBm	Decibels per Milliwatt
DDWP	Data Distribution and Workstation Platforms
DSR	Data Set Ready
DTR	Data Terminal Ready
DVIS	Digital Voice Intercommunications Subsystem
EIA	Electronic Industries Association
GFE	Government-Furnished Equipment
Hz	Hertz
ICD	Interface Control Document
JSC	Lyndon B. Johnson Space Center
LSIS	Loral Space Information Systems
MSC	Mission Systems Contract
NASA	National Aeronautics and Space Administration
NEMA	National Electrical Manufacturers Association
NRZ	Nonreturn-to-Zero
OPR	Office of Primary Responsibility
P/N	Part Number
PTT	Push-to-Talk

SSCC	Space Station Control Center
WECO	Western Electric Corporation
WSP	Workstation/Server Platform

APPENDIX B – GLOSSARY

Not applicable.

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APPENDIX C – SOFTWARE MESSAGE DEFINITIONS AND CONTROL FOR THE SERIAL AUDIBLE ALARM INTERFACE

C.1 WSP-DVIS KEYSET MESSAGE INTERFACE

These paragraphs define how the WSP-DVIS keyset messages will be used in the audible alarm application. All message traffic described in these paragraphs will occur across the interface defined in Table 3-2.

The message traffic between the WSP workstation and the DVIS keyset consists of commands sent by the workstation to the keyset and responses sent by the keyset to the workstation. Every command message has corresponding response message(s). The workstation shall not send a command to the keyset until it has received a response message from the keyset for the previous command or until a response timeout has occurred. A response timeout occurs whenever the workstation sends a command message to the keyset and does not receive a response message from the keyset within 500 milliseconds of sending the last byte of the command message. If a response timeout occurs, the workstation will report that the command failed.

C.1.1 OUTPUTS FROM WSP TO DVIS KEYSET

C.1.1.1 Audible Alarm Request

The DVIS keyset shall generate/silence an alarm tone to the keyset user upon receipt of an audible alarm request message from the WSP. This alarm tone shall be presented directly to the keyset user via the normal headset jacks and keyset speaker if the speaker is in use. DVIS shall produce an alarm tone at 800 Hz at -16 dBm modulated on and off six times a second. The alarm number and volume level selections defined in the audible alarm request message are for possible future use and will be ignored by the keyset.

The DVIS keyset shall verify successful processing of the audible alarm request message by sending a processing response message to the workstation. The DVIS keyset shall report unsuccessful processing of the audible alarm request message by sending a no processing response message to the workstation as described in Paragraph C.1.2.2.

C.1.1.2 Interface Verify Request

The workstation shall periodically send an interface verify request message to the keyset to verify that the workstation-keyset interface is operative. The period at which the worksta-

tion will send this message to the keyset shall be not more than six times per minute and not less than once per minute.

The DVIS keyset shall respond to each interface verify request with an interface verify response.

C.1.2 INPUTS TO WSP FROM DVIS KEYSET

C.1.2.1 Processing Response

The DVIS keyset shall send a processing response message to the workstation upon successful processing of an audible alarm request message.

C.1.2.2 No Processing Response

When the DVIS keyset receives an audible alarm request message from the workstation, it shall validate the alarm number and volume level message fields. If either, both, or the combination of these fields is invalid, the keyset shall send a no processing response message to the workstation and shall not implement the action specified in the audible alarm request.

If the audible alarm request message is valid but the keyset is unable to successfully execute the command (e.g., the keyset's fiber-optic link to the rest of the DVIS equipment is inoperative or the keyset is not signed on), the keyset shall send a no processing response message to the workstation.

Note: The DVIS keyset shall validate the destination ID, function code, and subfunction code of all messages it receives from the workstation. The keyset shall accept either 00000000 hex or its normal DVIS path ID without regard to which fanout controller is prime as a valid destination ID (refer to Paragraph C.2.2.1). If the keyset determines that the destination ID, function code, and/or subfunction code are invalid, the keyset shall discard the received message. The absence of a response from the keyset will cause the workstation to detect that the command failed.

C.1.2.3 Interface Verify Response

The DVIS keyset shall respond to each interface verify request message from the workstation with an interface verify response message sent to the workstation.

C.1.2.4 DTR-DSR Signal

The DVIS keyset shall set its DTR signal upon initialization to provide an efficient means for the workstation to know when its interface to the DVIS keyset is present and active.

If the workstation software can determine the status of the DTR-DSR signal and the DTR-DSR signal is not set, the workstation will not send any messages to the DVIS keyset and will report the power-off/absence of the DVIS keyset. If the workstation software can determine the status of the DTR-DSR signal and the DTR-DSR signal is set or if the workstation software cannot determine the status of the DTR-DSR signal, the workstation will send messages to the keyset as required.

C.2 INTERFACE SPECIFICATION AND MESSAGE DEFINITIONS

These paragraphs specify the format and content of the message interface between the workstation and the DVIS keyset for the audible alarm application.

The DVIS-WSP workstation serial interface is full duplex RS-232 asynchronous operation at 9600 baud with odd parity, 8 data bits, 1.5 stop bits, and Nonreturn-to-Zero (NRZ) encoding.

C.2.1 MESSAGE FORMATS

Messages exchanged between the workstation and the DVIS keyset shall have the following format:

Preamble	**(4 bytes)**
Standard DVIS Message	**(n bytes)**
Checksum	**(1 byte)**

The preamble is a 4-byte message synchronization field as shown below in hex:

15		**0**	**Preamble byte count**
FF	**00**		**0, 1**
AA	**55**		**2, 3**

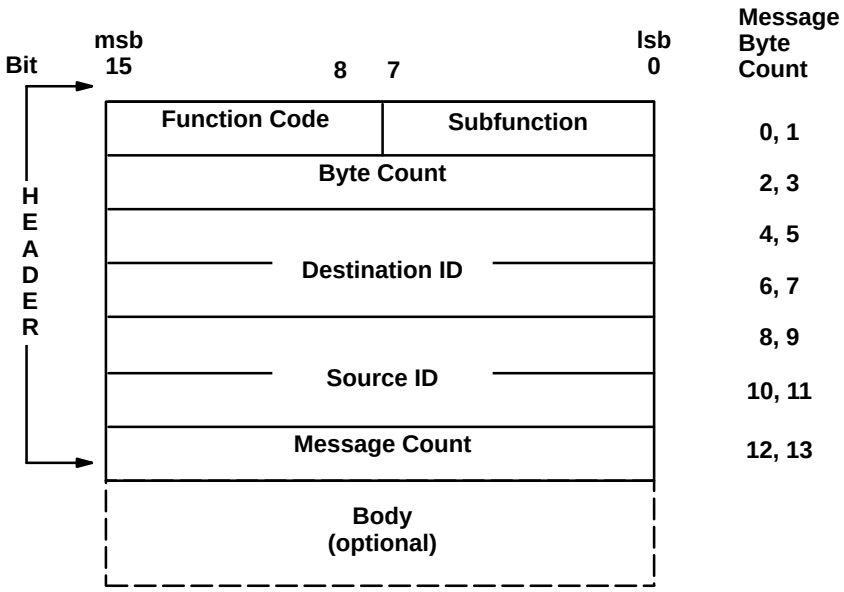
The standard DVIS message field contains a DVIS message as defined in Paragraph C.2.2 and may be up to 800 bytes in length.

The checksum is a 1-byte field that contains a number that is calculated by adding all bytes in the standard DVIS message field, truncating the result to the 8 least significant bits, and then taking the 2's complement of the result. The receiver of the message adds all the bytes in the standard DVIS message and checksum fields. If the 8 least significant bits of the sum equal zero, the message has a valid checksum.

C.2.2 DVIS MESSAGE DEFINITION

These paragraphs define the structure and contents of a standard DVIS message. Every DVIS message consists of a standard header and a body. The contents of a standard DVIS message are described below:

Standard DVIS Message



Note: All 2-byte message fields are shown as
xxyy (H) where xx = most significant byte
yy = least significant byte

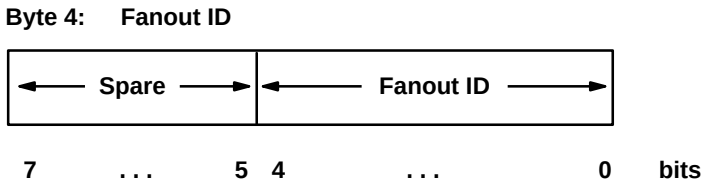
All 4-byte message fields are shown as
xxxx (H)
yyyy (H) where xxxx = most significant word
yyyy = least significant word

C.2.2.1 Message Header

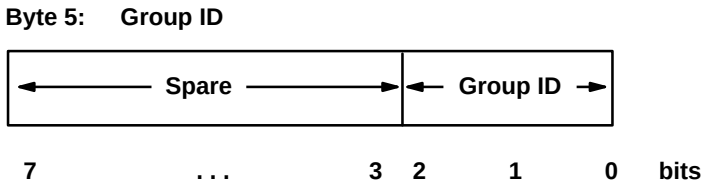
This is a 14-byte field that contains function and routing information of the message. The fields of the standard DVIS message header are described below:

1. Byte 0 – Function Code – This code indicates the major category of the intended function of the message.
2. Byte 1 – Subfunction Code – This code indicates the specific type of command or request conveyed by the message.
3. Bytes 2 and 3 – Byte Count – This is a 16-bit binary number that indicates the total number of bytes in the message, including the header and body.
4. Bytes 4 to 7 – Destination ID – These 4 bytes identify the element for which the message is destined. For the audible alarm application, the workstation's and the keyset's destination ID's are 00000000 hex. The keyset will also accept its normal DVIS path ID as defined below.

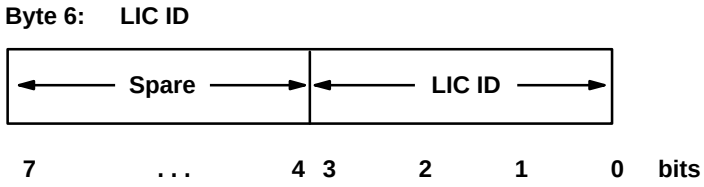
   ID's are byte encoded as follows:



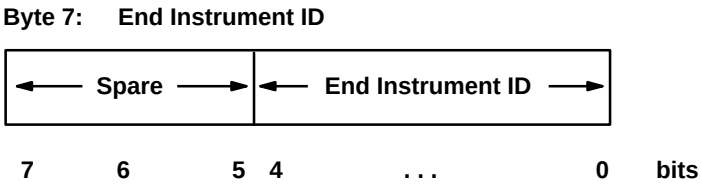
   Bits 4-0: Fanout ID. Range 1-16 decimal for DVIS keyset. For the audible alarm application, no regard is given as to which fanout controller is prime.



   Bits 2-0: Group ID. Range 1-4 decimal for DVIS keyset.



Bits 3-0: LIC ID. Range 1-8 decimal for DVIS keyset.



Bits 4-0: End Instrument ID. Range 1-24 decimal for DVIS keyset.

5. Bytes 8 to 11 – Source ID – These 4 bytes identify the element that originated the message. The workstation's source ID is 00000000 hex. The keyset will always insert its normal DVIS path ID as the source ID if its path is unknown; otherwise, the keyset will use 00000000 hex as its source ID. The workstation has the option of learning the keyset's DVIS path ID from any of the keyset's response messages; the workstation could use this information when reporting status on the audible alarm interface.

   Byte 8: Fanout ID
   Byte 9: Group ID
   Byte 10: LIC ID
   Byte 11: End Instrument ID

6. Bytes 12 and 13 – Message Count – This is an unsigned 16-bit number that represents a sequentially increasing application-level "message serial number". The number is put into the message by the originator and is used for correlating responses with requests and command. For example, the interface verify response message's message count will be identical to the message count of the originating interface verify request message.

C.2.2.2 Message Body

The body of a DVIS message contains data pertinent to the function performed by the message. The length of the body may range from zero to the maximum allowed size for the interface protocol. The number of bytes in the body of a message depends on the type of the message. For some message types, the body length is variable.

C.2.2.3 Spare or Unused Data

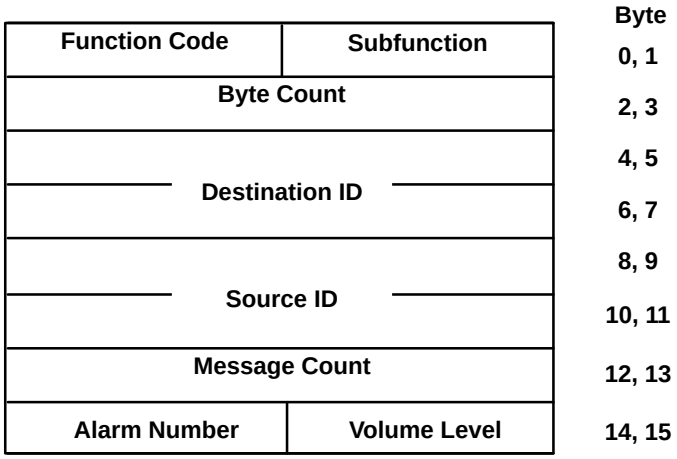
All bits, bytes, or words marked "SPARE", "UNUSED", or "EXPANSION" in this ICD shall be set to binary 0 by the originator of the message.

C.2.3 AUDIBLE ALARM REQUEST

This message is sent from a workstation to a DVIS keyset to request that an audible alarm tone be activated or deactivated.

High-level response expected: Processing response if successful
No processing response if unsuccessful

Message Description:	Audible Alarm Request
Function Code:	50 H
Subfunction Code:	80H
Byte Count:	16D
Destination ID:	XXH, XXH, XXH, XXH (DVIS keyset)
Source ID:	OOH, OOH, OOH, OOH (Workstation)



Note: The alarm number and volume level fields are defined to support a possible future enhancement and will be ignored by the keyset. DVIS shall only be providing one critical alarm tone at one volume level for the audible alarm application; the tone provided will be 800 Hz at -16 dBm modulated on and off six times a second.

Byte 14: Alarm Number
- 0 = deactivate all audible alarm tones
- 1 = activate alarm tone 1
- 2 = activate alarm tone 2
- 3 = activate alarm tone 3

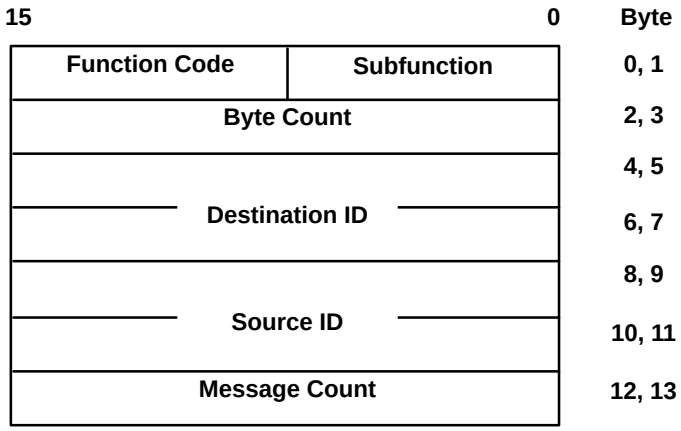
Byte 15: Volume Level
- 0 = off
- 1-7 = increasing volume levels, with 7 indicating the highest volume level.

C.2.4 PROCESSING RESPONSE

This message indicates successful processing of the audible alarm request message.

High-level response expected: None.

Message Description:	Processing Response
Function Code:	20H
Subfunction Code:	XXH*
Byte Count:	14D
Destination ID:	OOH, OOH, OOH, OOH (Workstation)
Source ID:	XXH, XXH, XXH, XXH (DVIS keyset)



Byte 1 – Subfunction – *Contains subfunction code of the originating message.

Bytes 12 and 13 – Message Count – Contain message count found in the originating message.

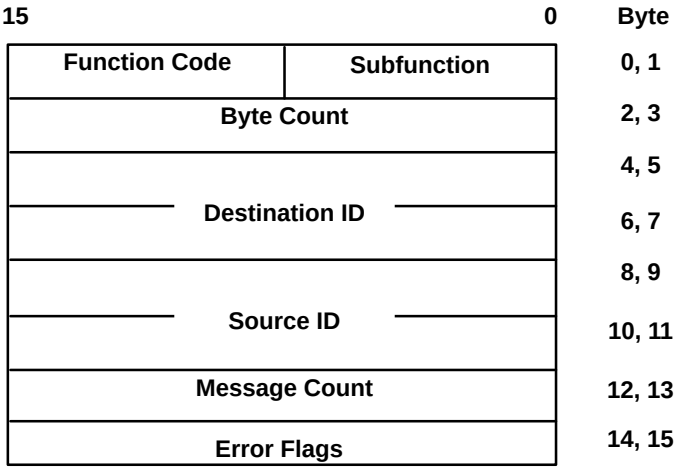
C.2.5 NO PROCESSING RESPONSE

This message indicates unsuccessful processing of the audible alarm request.

High-level response expected: None.

Message Description:	No Processing Response
Function Code:	21H
Subfunction Code:	XXH*
Byte Count:	16D
Destination ID:	OOH, OOH, OOH, OOH (Workstation)

Source ID: XXH, XXH, XXH, XXH (DVIS keyset)



Byte 1 – Subfunction – *Contains subfunction code of the originating message.

Bytes 12 and 13 – Message Count – Contain message count found in the originating message.

Bytes 14 and 15 – Error Flags – Contain bit error flags that indicate why audible alarm request processing failed; only one bit will be set in this field:

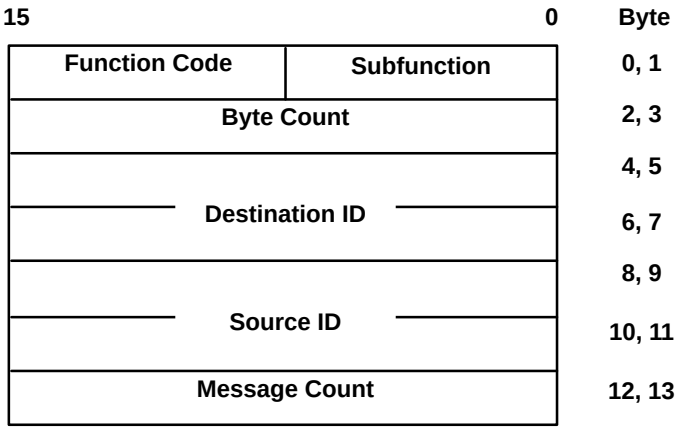
1 = Invalid audible alarm request message
2 = Keyset's fiber-optic link is inoperative
4 = Keyset is not signed on

C.2.6 INTERFACE VERIFY REQUEST

The interface verify request and response will be exchanged between the workstation and the DVIS keyset to determine the health of the interface. The message exchange accomplishes no function other than to verify that communication is possible over this interface.

High-level response expected: interface verify response message – The DVIS keyset will return an interface verify response message to the workstation.

Message Description:	Identify Verify Request
Function Code:	50H
Subfunction Code:	52H
Byte Count:	14D
Destination ID:	XXH, XXH, XXH, XXH (DVIS keyset)
Source ID:	OOH, OOH, OOH, OOH (Workstation)



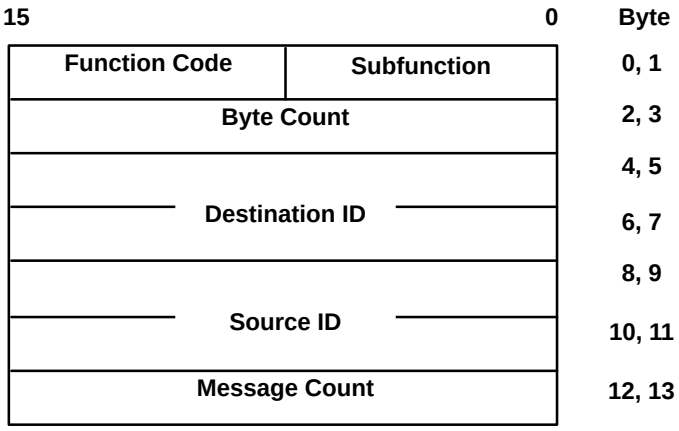
Bytes 12 and 13 – Message Count – Contain a count to be returned in the interface verify response message.

C.2.7 INTERFACE VERIFY RESPONSE

This message is the response to the interface verify request message. Its purpose is to inform the workstation that the interface verify request message was received properly and to verify the integrity of the return path.

High-level response expected: None.

Message Description:	Identify Verify Response
Function Code:	52H
Subfunction Code:	52H
Byte Count:	14D
Destination ID:	OOH, OOH, OOH, OOH (Workstation)
Source ID:	XXH, XXH, XXH, XXH (DVIS keyset)



Bytes 12 and 13: Message Count – Contain message count found in the corresponding interface verify request message.

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