Open Arcade Architecture Device Data Format Specification

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Revision History

Revision	Date	Description
0.001	04/29/98	Initial document, based on a document by Steve McGowan(Intel) and other sources.
0.002	04/30/98	Added Arcade Usage Page table.
0.003	05/03/98	Added notes on Gameworks bill acceptors and debit cards.
0.004	05/14/98	Added Game Controller Interface Card data formats. Initial pass for arcade device formats for GCI type cards.
0.005	05/25/98	Updated with report ids for added data definitions.
0.006	05/27/98	Updated based on feedback. Added hotlinks, etc.
0.007	06/02/98	Updated hotlinks.
0.008	06/08/98	Added appendix for the implementation details of VeriFone PinPad 1000 support.
0.009	06/10/98	Expanded the Pin Pad appendix details.
0.010	06/11/98	Removed HID specific information. This will be covered in a separate document. Removed data definitions for devices that will not be in the initial release.
0.011	06/16/98	Added General Purpose IO Device example report descriptor and descriptions for each of the usages (sbm)
0.012	07/18/98	Revised table from Report ID to Usage Report ID. Added Alarm Input to table and usage definition. (bbb)
0.013	09/20/98	Initial release candidate. And added reports for coin counters and IO direction mapping. (bbb)
0.014	09/22/98	Release candidate. Corrected some copy paste errors in new I/O Direction reports. (bbb)
1.000	10/05/98	Release candidate. Added Extended Optical Input Report. (bbb)
1.100	11/05/98	Added Reports for supporting PinPads. (bbb)

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Introduction

Each OAAD Device has an associated data format that is used to return status and data, set commands and configuration, and other interactions. This document describes these data formats, and is intended to be used in conjunction with the appropriate OAAD SDK header files.

1.1 Target Audience

This document is provided for developers of arcade applications, as well as developers who are producing OAADDevice objects.

2 Usage Definitions

NOTE: This Data Report ID Definition table is supplied as an example only. It has NOT been officially adopted or approved by the OAAF membership and is subject to change without notice.

Each OAAD Device has an associated data format that is used to return status and data, set commands and configuration, and other interactions. The Data Report ID is returned from the OAAD library method EnumerateDataFormats, and is used to identify the supported data format to the application.

Table 1: Data Usage ID Definitions

Usage ID	Usage Name	Usage Type
00	Undefined	
01	**General Purpose IO Card**	**CA**
02	**Coin Door**	**CA**
03	**Watchdog Timer**	**CA**
04-2F	**Reserved**	
30	General Purpose Analog Input State	DV
31	General Purpose Digital Input State	DV
32	General Purpose Optical Input State	DV
33	General Purpose Digital Output State	DV
34	Number of Coin Doors	DV
35	Coin Drawer Drop Count	DV
36	Coin Drawer Start	OOC
37	Coin Drawer Service	OOC
38	Coin Drawer Tilt	OOC
39	Coin Door Test	OOC
40	Coin Door Lockout	OOC
41	Watchdog Timeout	DV
42	**Watchdog Action**	NAry
43	Watchdog Reboot	Sel
44	Watchdog Restart	Sel
45	Alarm Input	DV
46	Coin Door Counter	OOC
47	I/O Direction Mapping	DV
48	Set I/O Direction	OOC
49	Extended Optical Input State	DV
4A	Pin Pad Input State	DV
4B	Pin Pad Status	DV
4C	Pin Pad Output	OOC
4D	Pin Pad Command	DV
4E-FFFF	Reserved	

For an explanation of Usage Types, refer to the HID Usage Table document available on the USB-IF web site www.usb.org.

It is possible for a given OAAD Device to support multiple Data Reports. For example Game Controller Interface (GCI) cards generally provide the first 4 Data Reports, while some may also provide the Coin Door and Coin Lockout functionality. For those devices that do not directly support one, or more, of the above Data Reports the OAAD Device object can provide appropriate emulation. E.g. if a particular GCI card does not provide a specific set of inputs dedicated to Coin Doors the OAAD Device object developer can use some of that card's General Purpose Digital Inputs with the appropriate filtering applied in software. Of course this assumes that the physical wiring in the arcade application conforms to those inputs.

3

Usage Descriptions

3.1 General Purpose IO Devices

Game controller interface cards are typically implemented as a general purpose input/output card that provides multiple digital, analog and optical inputs as well as digital outputs. These devices interface via the serial communication port, with newer cards interfacing via the Universal Serial Bus (USB). The Data IDs defined for this class of device may be used for general-purpose interfacing. In addition, an OAADDevice object implementation for these devices should include the specific Data Reports for each of the device types that may be supported by the hardware. E.g. coin doors, push buttons, trackballs, etc.

In addition to the actual data each field has an associated min/max value that may be returned via the OAAD library GetProperties method.

If multiple instances of a General Purpose Input or Output usage exists it will be contained in a collection that has an ordinal usage attached to it. The ordinal usage identifies the specific instance of the control (1, 2, 3, etc.), where each ordinal defines a specific analog input; i.e. Ordinal 1 identifies analog input 1, Ordinal 2 analog input 2, etc.

General Purpose IO device	CA – This application collection defines a general-purpose interface card that is used to attach a variety of devices. They typically consist of generalized analog, digital and optical, input and output ports.
General Purpose Analog Input State	DV – State of a general-purpose analog input.
General Purpose Digital Input State	DV – State of a general-purpose digital input.
General Purpose Optical Input State	DV – State of a general-purpose optical input. Typically from an optical mouse or other optically encoded device.
General Purpose Digital Output State	DV – State of a general-purpose digital output.
I/O Direction Mapping	DV – Direction of an I/O line. 1 = Input, 0 = Output
Set I/O Direction Mapping	DV – Direction of an I/O line. 1 = Input, 0 = Output

3.2 Coin Door Devices

Description of a coin door device. Steal from product literature.

Coin Door	CA – This application collection defines a coin door device used in arcade and other standalone billing applications.
Number of Coin Doors	DV – This field contains a count of the coin drawers supported by a device.
Coin Drawer Drop Count	DV - A count of the number of coins dropped by the user.
Coin Drawer Start	OOC - The Start button associated with a particular coin door.
Coin Drawer Service	OOC - ???
Coin Drawer Tilt	OOC - Tamper indicator ???.
Coin Door Test	OOC - ???
Coin Door Lockout	OOC – An output to the device that disables the coin door.

3.3 Watchdog Timer

Watchdog timers are used to recover from catastrophic hardware or software failures. If the timeout value is not updated in a timely manner it is assumed that control of the device has been lost by the software and an error recovery operation is enforced. Depending on the failure type, a hardware or a software recovery may be required. The actions recovery supported by a device are declared in the *Watchdog Action* collection. If a device only supports hardware reset then only the *Watchdog Action Reboot* usage will be declared.

Watchdog timer	CA – This application collection defines a generalized watchdog timer device.
Watchdog Timeout	DV - The duration, in seconds, before the Watchdog Action is invoked. Software must update this on a timely basis to prevent the Watchdog Action from automatically occuring.
Watchdog Action	NAry – Identifies the action to be performed by the watchdog timer. This collection will contain one of the following Watchdog Action usages.
Watchdog Action Reboot	Sel – Performs a hardware reset upon a Watchdog Timer timeout. (OAWDT_REBOOT)
Watchdog Action Restart	Sel – Performs a software reset upon a Watchdog Timer timeout. (OAWDT_RESTART)

4

Report Descriptor Example

This Report Descriptor example is only intended for hardware developers. The actual Report Descriptor presented by a device will vary from one implementation to another. The physical layout of the reports that are described by this descriptor are shown following the report descriptor.

4.1 Example HID Report Descriptor

```
USAGE_PAGE (Arcade)                                 06 00 FF
USAGE (General Purpose IO Card)                     09 01
COLLECTION (Application)                            A1 01

;Report 1
;8 General purpose analog inputs

  REPORT_ID (1)                                     85 01
  REPORT_SIZE (8)                                   75 08
  REPORT_COUNT (1)                                  95 01
  LOGICAL_MINIMUM (0)                               15 00
  LOGICAL_MAXIMUM (255)                             26 FF 00
  USAGE (Ordinals:Instance 1)                       0B 01 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Analog Input 1)          09 30
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 2)                       0B 02 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Analog Input 2)          09 30
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 3)                       0B 03 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Analog Input 3)          09 30
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 4)                       0B 04 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Analog Input 4)          09 30
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 5)                       0B 05 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Analog Input 5)          09 30
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 6)                       0B 06 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Analog Input 6)          09 30
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 7)                       0B 07 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Analog Input 7)          09 30
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 8)                       0B 08 00 0A 00
  COLLECTION (Logical)                              A1 02
```

```
    USAGE (General Purpose Analog Input 8)          09 30
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0

;Report 2
;16 General purpose digital inputs

  REPORT_ID (2)                                     85 02
  USAGE (Ordinals:Instance 1)                       0B 01 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 1)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 2)                       0B 02 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 2)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 3)                       0B 03 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 3)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 4)                       0B 04 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 4)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 5)                       0B 05 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 5)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 6)                       0B 06 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 6)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 7)                       0B 07 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 7)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 8)                       0B 08 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 8)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 9)                       0B 09 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 9)         09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 10)                      0B 0A 00 0A 00
  COLLECTION (Logical)                              A1 02
    USAGE (General Purpose Digital Input 10)        09 31
    INPUT (Data,Var,Abs)                            81 02
  END_COLLECTION                                    C0
  USAGE (Ordinals:Instance 11)                      0B 0B 00 0A 00
  COLLECTION (Logical)                              A1 02
```

```
    USAGE (General Purpose Digital Input 11)          09 31
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 12)                        0B 0C 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Digital Input 12)          09 31
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 13)                        0B 0D 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Digital Input 13)          09 31
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 14)                        0B 0E 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Digital Input 14)          09 31
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 15)                        0B 0F 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Digital Input 15)          09 31
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 16)                        0B 10 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Digital Input 16)          09 31
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0

;Report 3
;8 General purpose optical inputs

  REPORT_ID (3)                                       85 03
  USAGE (Ordinals:Instance 1)                         0B 01 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Optical Input 1)           09 32
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 2)                         0B 02 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Optical Input 2)           09 32
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 3)                         0B 03 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Optical Input 3)           09 32
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 4)                         0B 04 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Optical Input 4)           09 32
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 5)                         0B 05 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (General Purpose Optical Input 5)           09 32
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 6)                         0B 06 00 0A 00
  COLLECTION (Logical)                                A1 02
```

```
    USAGE (General Purpose Optical Input 6)          09 32
    INPUT (Data,Var,Abs)                             81 02
  END_COLLECTION                                     C0
  USAGE (Ordinals:Instance 7)                        0B 07 00 0A 00
  COLLECTION (Logical)                               A1 02
    USAGE (General Purpose Optical Input 7)          09 32
    INPUT (Data,Var,Abs)                             81 02
  END_COLLECTION                                     C0
  USAGE (Ordinals:Instance 8)                        0B 08 00 0A 00
  COLLECTION (Logical)                               A1 02
    USAGE (General Purpose Optical Input 8)          09 32
    INPUT (Data,Var,Abs)                             81 02
  END_COLLECTION                                     C0

;Report 4
;4 General purpose digital outputs

  REPORT_ID (4)                                      85 04
  USAGE (Ordinals:Instance 1)                        0B 01 00 0A 00
  COLLECTION (Logical)                               A1 02
    USAGE (General Purpose Digital Output 1)         09 33
    OUTPUT (Data,Var,Abs)                            91 02
  END_COLLECTION                                     C0
  USAGE (Ordinals:Instance 2)                        0B 02 00 0A 00
  COLLECTION (Logical)                               A1 02
    USAGE (General Purpose Digital Output 2)         09 33
    OUTPUT (Data,Var,Abs)                            91 02
  END_COLLECTION                                     C0
  USAGE (Ordinals:Instance 3)                        0B 03 00 0A 00
  COLLECTION (Logical)                               A1 02
    USAGE (General Purpose Digital Output 3)         09 33
    OUTPUT (Data,Var,Abs)                            91 02
  END_COLLECTION                                     C0
  USAGE (Ordinals:Instance 4)                        0B 04 00 0A 00
  COLLECTION (Logical)                               A1 02
    USAGE (General Purpose Digital Output 4)         09 33
    OUTPUT (Data,Var,Abs)                            91 02
  END_COLLECTION                                     C0

;Report 5
;Individual coin door controls

  REPORT_ID (5)                                      85 05
  LOGICAL_MAXIMUM (2)                                25 02
  USAGE (Number of Coin Doors )                      09 34
  INPUT (Data,Var,Abs)                               81 02
  USAGE (Ordinals:Instance 1)                        0B 01 00 0A 00
  COLLECTION (Logical)                               A1 02
    LOGICAL_MAXIMUM (255)                            26 FF 00
    USAGE (Coin Drawer Drop Count 1)                 09 35
    INPUT (Data,Var,Abs)                             81 02
    LOGICAL_MAXIMUM (1)                              25 01
    USAGE (Coin Drawer Start 1)                      09 36
    INPUT (Data,Var,Abs)                             81 02
    USAGE (Coin Drawer Service 1)                    09 37
    INPUT (Data,Var,Abs)                             81 02
  END_COLLECTION                                     C0
  USAGE (Ordinals:Instance 2)                        0B 02 00 0A 00
  COLLECTION (Logical)                               A1 02
    LOGICAL_MAXIMUM (255)                            26 FF 00
```

```
    USAGE (Coin Drawer Drop Count 2)                    09 35
    INPUT (Data,Var,Abs)                                81 02
    LOGICAL_MAXIMUM (1)                                 25 01
    USAGE (Coin Drawer Start 2)                         09 36
    INPUT (Data,Var,Abs)                                81 02
    USAGE (Coin Drawer Service 2)                       09 37
    INPUT (Data,Var,Abs)                                81 02
  END_COLLECTION                                        C0
  USAGE (Coin Drawer Tilt)                              09 38
  INPUT (Data,Var,Abs)                                  81 02
  USAGE (Coin Door Test)                                09 39
  INPUT (Data,Var,Abs)                                  81 02

;Report 6
;Coin door lockout controls

  REPORT_ID (6)                                         85 06
  USAGE (Ordinals:Instance 1)                           0B 01 00 0A 00
  COLLECTION (Logical)                                  A1 02
    USAGE (Coin Door Lockout 1)                         09 40
    OUTPUT (Data,Var,Abs)                               91 02
  END_COLLECTION                                        C0
  USAGE (Ordinals:Instance 2)                           0B 02 00 0A 00
  COLLECTION (Logical)                                  A1 02
    USAGE (Coin Door Lockout 2)                         09 40
    OUTPUT (Data,Var,Abs)                               91 02
  END_COLLECTION                                        C0

;Report 7
;Watchdog controls

  REPORT_ID (7)                                         85 07
  REPORT_SIZE (16)                                      75 10
  LOGICAL_MAXIMUM (65535)                               27 FF FF 00 00
  USAGE (Watchdog Timeout)                              09 41
  OUTPUT (Data,Var,Abs)                                 91 02
  USAGE (Watchdog Action)                               09 42
  COLLECTION (Logical)                                  A1 02
    LOGICAL_MINIMUM (1)                                 15 01
    LOGICAL_MAXIMUM (2)                                 25 02
    USAGE (Watchdog Action Reboot)                      09 43
    USAGE (Watchdog Action Restart)                     09 44
    OUTPUT (Data,Ary,Abs)                               91 00
  END_COLLECTION                                        C0

;Report 8
;Coin door counter controls

  REPORT_ID (8)                                         85 08
  USAGE (Ordinals:Instance 1)                           0B 01 00 0A 00
  COLLECTION (Logical)                                  A1 02
    USAGE (Coin Door Counter 1)                         09 46
    OUTPUT (Data,Var,Abs)                               91 02
  END_COLLECTION                                        C0
  USAGE (Ordinals:Instance 2)                           0B 02 00 0A 00
  COLLECTION (Logical)                                  A1 02
    USAGE (Coin Door Counter 2)                         09 46
    OUTPUT (Data,Var,Abs)                               91 02
  END_COLLECTION                                        C0
```

```
;Report 9
;16 General purpose I/O Direction Mapping

  REPORT_ID (9)                                  85 09
  USAGE (Ordinals:Instance 1)                    0B 01 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 1)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 2)                    0B 02 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 2)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 3)                    0B 03 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 3)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 4)                    0B 04 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 4)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 5)                    0B 05 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 5)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 6)                    0B 06 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 6)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 7)                    0B 07 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 7)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 8)                    0B 08 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 8)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 9)                    0B 09 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 9)              09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 10)                   0B 0A 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 10)             09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 11)                   0B 0B 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (I/O Direction Mapping 11)             09 47
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 12)                   0B 0C 00 0A 00
```

```
  COLLECTION (Logical)                          A1 02
    USAGE (I/O Direction Mapping 12)            09 47
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 13)                  0B 0D 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (I/O Direction Mapping 13)            09 47
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 14)                  0B 0E 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (I/O Direction Mapping 14)            09 47
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 15)                  0B 0F 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (I/O Direction Mapping 15)            09 47
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 16)                  0B 10 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (I/O Direction Mapping 16)            09 47
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0

;Report 10
;16 Set I/O Direction Mapping

  REPORT_ID (0A)                                85 0A
  USAGE (Ordinals:Instance 1)                   0B 01 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (Set I/O Direction Mapping 1)         09 48
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 2)                   0B 02 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (Set I/O Direction Mapping 2)         09 48
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 3)                   0B 03 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (Set I/O Direction Mapping 3)         09 48
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 4)                   0B 04 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (Set I/O Direction Mapping 4)         09 48
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 5)                   0B 05 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (Set I/O Direction Mapping 5)         09 48
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
  USAGE (Ordinals:Instance 6)                   0B 06 00 0A 00
  COLLECTION (Logical)                          A1 02
    USAGE (Set I/O Direction Mapping 6)         09 48
    INPUT (Data,Var,Abs)                        81 02
  END_COLLECTION                                C0
```

```
  USAGE (Ordinals:Instance 7)                    0B 07 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 7)          09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 8)                    0B 08 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 8)          09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 9)                    0B 09 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 9)          09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 10)                   0B 0A 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 10)         09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 11)                   0B 0B 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 11)         09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 12)                   0B 0C 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 12)         09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 13)                   0B 0D 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 13)         09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 14)                   0B 0E 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 14)         09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 15)                   0B 0F 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 15)         09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0
  USAGE (Ordinals:Instance 16)                   0B 10 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Set I/O Direction Mapping 16)         09 48
    INPUT (Data,Var,Abs)                         81 02
  END_COLLECTION                                 C0

;Report 11
;4 Extended optical inputs

  REPORT_ID (0B)                                 85 0B
  USAGE (Ordinals:Instance 1)                    0B 01 00 0A 00
  COLLECTION (Logical)                           A1 02
    USAGE (Extended Optical Input 1)             09 49
```

```
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 2)                         0B 02 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (Extended Optical Input 2)                  09 49
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 3)                         0B 03 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (Extended Optical Input  3)                 09 49
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0
  USAGE (Ordinals:Instance 4)                         0B 04 00 0A 00
  COLLECTION (Logical)                                A1 02
    USAGE (Extended Optical Input  4)                 09 49
    INPUT (Data,Var,Abs)                              81 02
  END_COLLECTION                                      C0

END_COLLECTION                                        C0
```

4.2

Individual HID Reports for the example HID Report Descriptor

These are unfiltered analog inputs, as received from the card.

4.2.1 General Purpose Analog Input Report

Figure 3-1: General Purpose Analog Input Report

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x01							
1	AI01 (Input)							
2	AI02 (Input)							
3	AI03 (Input)							
4	AI04 (Input)							
5	AI05 (Input)							
6	AI06 (Input)							
7	AI07 (Input)							
8	AI08 (Input)							

Digital Joysticks on Analog Inputs

In many cases the actual digital inputs on a Game Controller Interface card may be used by various pushbuttons, and other devices. Because of this, digital joysticks are often connected to analog inputs on the GCI card.

Since the digital joysticks may generate a certain amount of noise due to contact bounce, and possibly random noise if the analog inputs are open, the arcade application should apply some filtering to the inputs. Typical values for a centered joystick are 128, with left, right, up and down being 0 and 255 respectively. Refer to the simple ‘C’ OAAD application ‘cexample’ for an example of using the raw analog inputs with a digital joystick.

Alternately the arcade application can access the joystick device via DirectInput.

4.2.2

General Purpose Digital Inputs

Each of the bytes, DI01 – DI16, are modulo 256 counters of the number of pulses that have been received. The arcade application should keep a running count of the number of pulses received and take appropriate action for the new number received. This ensures that no pulses will be missed if the application was delayed requesting the digital input activity. These inputs are typically associated with action buttons, but they may be connected to other types of devices that report switch closure, or pulse activity.

Figure 3-3: General Purpose Digital Inputs

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x02							
1	DI01 (Input)							
2	DI02 (Input)							
3	DI03 (Input)							
4	DI04 (Input)							
5	DI05 (Input)							
6	DI06 (Input)							
7	DI07 (Input)							
8	DI08 (Input)							
9	DI09 (Input)							
10	DI10 (Input)							
11	DI11 (Input)							
12	DI12 (Input)							
13	DI13 (Input)							
14	DI14 (Input)							
15	DI15 (Input)							
16	DI16 (Input)							

4.2.3 General Purpose Optical Inputs

This class of inputs is usually connected to trackball devices. This report would be used for typical trackball devices that emulate a mouse device under Windows.

Figure 3-4: General Purpose Optical Inputs

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x03							
1	OI01 (Input)							
2	OI02 (Input)							
3	OI03 (Input)							
4	OI04 (Input)							
5	OI05 (Input)							
6	OI06 (Input)							
7	OI07 (Input)							
8	OI08 (Input)							

4.2.4 General Purpose Digital Outputs

This report is used to control external devices.

Figure 3-5: General Purpose Digital Outputs

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x04							
1	DO01							
2	DO02							
3	DO03							
4	DO04							

4.2.5 Coin Door

The Coin Door Drop Count bytes maintain modulo 256 counts of the number of pulses that have been received. The application should keep a running count of the number of pulses received to determine how many coins have been dropped since the last time the request was made. This ensures that no pulses will be missed if the application was delayed requesting the coin information.

Figure 3-5: Coin Door

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x05							
1	Number of Coin Doors (Input)							
2	Coin Door1 Drop Count (modulo) (Input)							
3	Coin Door1 Start (modulo) (the button associated with a single player, or Coin Door 1) (Input)							
4	Coin Door1 Service (modulo) (Input)							
5	Coin Door2 Drop Count (modulo) (Input)							
6	Coin Door2 Start (modulo) (the button associated with a second player, or Coin Door 2) (Input)							
7	Coin Door2 Service (modulo) (Input)							
8	Coin Door Tilt (modulo) (Input)							
9	Coin Door Test (modulo) (Input)							

Byte 1, Number of Coin Doors, is set to the number of coin doors actually installed, or active, on the device.

4.2.6 Coin Lockout

This report is used to control lock out of coin acceptance on the specified coin door.

Figure 3-6: Coin Lockout

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x06							
1	Coin Lockout Door 1 (1 = Lockout, 0 = No Lockout) (Output)							
3	Coin Lockout Door 2 (1 = Lockout, 0 = No Lockout) (Output)							

4.2.7 Watchdog Timer

This class of device is used to control the hardware Watchdog timer on a Game Controller Interface Card, if any.

Figure 3-7: Watchdog Timer

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x07							
1-2	Watchdog Timeout (WORD) (Seconds) (Output)							
3	Watchdog Action (Output)							

4.2.8 Coin Counter

This report is used to control coin counters. The device will assert the associated output line when presented with a value of 1 and will de-assert the line when presented with a value of 0.

Figure 3-8: Coin Count

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x08							
1	Coin Counter Door 1 (1 = Assert Line, 0 = De-assert Line) (Output)							
3	Coin Counter Door 2 (1 = Assert Line, 0 = De-assert Line) (Output)							

4.2.9 I/O Direction Mapping

Each of the bytes, DI01 – DI16, represents an I/O line on the Game Controller Interface card. If a line value is set to 1 then the line is configured for Input. If a line value is 0 then the line is configured for output. If the GCI card doesn't support configuration of I/O direction then this report will not be returned.

Figure 3-9: I/O Direction Mapping

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x09							
1	DI01 (State 1 = Input, 0 = Output)							
2	DI02 (State 1 = Input, 0 = Output)							
3	DI03 (State 1 = Input, 0 = Output)							
4	DI04 (State 1 = Input, 0 = Output)							
5	DI05 (State 1 = Input, 0 = Output)							
6	DI06 (State 1 = Input, 0 = Output)							
7	DI07 (State 1 = Input, 0 = Output)							
8	DI08 (State 1 = Input, 0 = Output)							
9	DI09 (State 1 = Input, 0 = Output)							
10	DI10 (State 1 = Input, 0 = Output)							
11	DI11 (State 1 = Input, 0 = Output)							
12	DI12 (State 1 = Input, 0 = Output)							
13	DI13 (State 1 = Input, 0 = Output)							
14	DI14 (State 1 = Input, 0 = Output)							
15	DI15 (State 1 = Input, 0 = Output)							
16	DI16 (State 1 = Input, 0 = Output)							

4.2.10

Set I/O Direction

Each of the bytes, DO01 – DO16, represents an I/O line on the Game Controller Interface card. If a line value is set to 1 then the line is configured for Input. If a line value is 0 then the line is configured for output. If the GCI card doesn't support configuration of I/O direction then this report will not be returned.

Figure 3-10: Set I/O Direction

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x0A							
1	DO01 (State 1 = Input, 0 = Output)							
2	DO02 (State 1 = Input, 0 = Output)							
3	DO03 (State 1 = Input, 0 = Output)							
4	DO04 (State 1 = Input, 0 = Output)							
5	DO05 (State 1 = Input, 0 = Output)							
6	DO06 (State 1 = Input, 0 = Output)							
7	DO07 (State 1 = Input, 0 = Output)							
8	DO08 (State 1 = Input, 0 = Output)							
9	DO09 (State 1 = Input, 0 = Output)							
10	DO10 (State 1 = Input, 0 = Output)							
11	DO11 (State 1 = Input, 0 = Output)							
12	DO12 (State 1 = Input, 0 = Output)							
13	DO13 (State 1 = Input, 0 = Output)							
14	DO14 (State 1 = Input, 0 = Output)							
15	DO15 (State 1 = Input, 0 = Output)							
16	DO16 (State 1 = Input, 0 = Output)							

4.2.11

Extended Optical Input State

This class of inputs is usually connected to trackball devices and returns data as a 16 bit word. The byte ordering is 'Little Endian'. Some devices use these inputs as high rate digital counters.

Figure 3-11: Extended Optical Input State

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x0B							
1 – 2	OI01 (Input)							
3 – 4	OI02 (Input)							
5 – 6	OI03 (Input)							
7 – 8	OI04 (Input)							

4.2.12 Pin Pad Input

This report supports communication with a Pin Pad device. Specifically this report will return data from the Pin Pad device. Note that this report is not implemented in the V1.1 release.

Figure 3-12 Pin Pad Input

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x4A							
1	OI01 (Input)							
2	OI02 (Input)							
…	…							
255	OI255 (Input)							

4.2.13 Pin Pad Status

This report supports communication with a Pin Pad device. This report is used to get status from the Pin Pad device. Note that this report is not implemented in the V1.1 release.

Figure 3-13 Pin Pad Status

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x4B							
1	OI01 (Input)							
2	OI02 (Input)							
…	…							

255	OI255 (Input)

4.2.14 Pin Pad Output State

This report supports communication with a Pin Pad device. This report is used to send data to the Pin Pad device. Note that this report is not implemented in the V1.1 release.

Figure 3-13 Pin Pad Output

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x4C							
1	OI01 (Output)							
2	OI02 (Output)							
…	…							
255	OI255 (Output)							

4.2.15 Pin Pad Command

This report supports communication with a Pin Pad device. Commands and data are passed in the data bytes . Data is returned in the same buffer that is passed to the Device Object.

Figure 3-13 Pin Pad Command

	Bit							
Byte	7	6	5	4	3	2	1	0
0	Report ID = 0x4D							
1	OI01 (Input/Output)							
2	OI02 (Input/Output)							
…	…							
255	OI255 (Input/Output)							

5

Devices planned for future implementation

The following devices are scheduled to be supported in future releases of the OAAD library.

- Back-lit Buttons
- Coin Meter Outputs
- Coin Hopper Outputs
- Coupon (Ticket) Printers
- Game Panel Lights
- Key-locks
- Light Pen/Gun
- Motion Detectors
- Motion Chairs
- PIN-Pads
- Reel Mechanisms (e.g. like slot machines)
- Rotary Beacon Lights
- Ticket Meter Outputs
- Ticket Dispensers
- Vending Dispenser Motors

6 Gameworks

A separate computer network handles the administrative functions for Gameworks. This computer network is not part of the system that the game application is running on. The games receive notifications as described below. Gameworks is a trademark of Sega Gameworks, L.L.C. More information on Gameworks is available at http://www.sega.com/central/.

6.1 Bill acceptors

The bill acceptor generates a simple switch closure, just like a coin door, with a single pulse for each $.25 worth of credit. That is, if a dollar bill is presented to the bill acceptor then 4 pulses will be provided to the game application.

6.2 Debit cards

The Debit card readers that are used will generate one pulse per unit of credit that has been removed from the card. There is no feedback provided to the game application regarding how much credit remains in the card. The card reader displays the information about the remaining credit in the card.