Philips PSC805 HID Reports

Version 1.4(er)
Thursday, June 19, 2003

Change History:

Version 1.4   Thurday, June 19, 2003
- Version changed to 1.4.
- This release of the document coincides with the release of V4.13 of the firmware.
- Added to HID REPORT SUMMARY: Report 0x97 (Set S/PDIF Enable).
- Added to HID REPORT DETAILS: Report 0x97 (Set S/PDIF Enable).
- Modified APPENDIX A, HID Descriptor: Usage 0x97 (Set S/PDIF Enable).
- Added to APPENDIX B, Output Bytes, Byte 0: Bit 4 now controls S/PDIF output enable/disable (addresses DRM issues).

Version 1.3   Monday, February 03, 2003
- Version changed to 1.3.
- This release of the document coincides with the release of V3.02 (V3.2) of the firmware.
- Corrected Appendix B, Output Bytes, Byte 3 (Set DAC Maps). Mapping changed to 00 (Front), 01 (Center/LFE), 10 (Rear), 11 (Line Input).
- Corrected Appendix B, Output Bytes, Bytes 7-10 (Volumes). Rear Left/Right volumes swapped with Center/LFE volumes.

Version 1.2   Friday, January 31, 2003
- Version changed to 1.2.
- Removed 0xA0 HID Output Report (Download to Serial EEPROM). This report is only used in the DOWNLOAD ROM image, not in the production ROM image.
- Corrected Appendix B, Output Bytes, Bytes 5-12 (Volumes). Maximum and minimum were incorrect (should be 0xFF=Max, 0x00=Min).
- Corrected HID Report Details, Reports 0x8D, 0x8E, 0x8F, 0x90, 0x91 & 0x92 (Volumes). Maximum and minimum were incorrect (should be 0xFF=Max, 0x00=Min).
- Added to HID Report Details, Reports 0x8C to 0x94 (Mutes / Volumes), note indicating that the 'Flag Volumes Valid' bit (0x89 HID report) must be set for the Output Mutes, Output Volumes and Record Gains to be applied to the DACs/ADCs in the PSC805 product.
- Added Appendix C, Board Layout (no thanks, just send money ;)

Version 1.1   Thursday, January 30, 2003
- Version changed to 1.1.
- Corrected Appendix B, Output Bytes, Bytes 1 & 2 (LEDs). Swapped byte order of LED data (Bits 15-8 and 7-0) in Output HID.
- Added byte ordering reference for LEDs (0x8A output report).

Version 1.0 (Initial Release)   Monday, January 20, 2003
- Version changed to 1.0 (Initial Release).
- Corrected Appendix B, Input Bytes, Byte 2 (Plug Detects).

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Introduction:

The Philips PSC805 product is a 5.1 Channel USB Audio Device with 6 channels of analog output, Coax and Optical S/PDIF output (either PCM or Digita l) and Microphone or Line-In Input. It also provides simple controls on the product front panel where the user can adjust the Master Volume, apply MUTE to all analog outputs, and observe the current master volume setting via a seven LED bar graph.

The PSA2 product is a graphical user interface (GUI) which provides device control and adds product enhancing audio algorithms to the device output.

The PSC805 HID Reports can be broken down into two types – standard Consumer Devices / Consumer Controls reports and Vendor Specific reports.

The standard reports allow the PSC805 to have a minimum of user GUI functionality when using the standard USB Audio drivers present in Microsoft Windows operating systems, from Windows 98 Second Edition (Win98SE) to the current release of Windows XP (Home and Professional). The user can control the master volume and muting of all analog outputs via a 'Volume Knob' and a MUTE button on the front panel of the PSC805 product.

The Vendor Specific reports allow the PSA2 software to take full advantage of the PSC805 product. PSA2 can configure all aspects of the PSC805, from directing content streams to specific outputs to presenting 'eye -candy' via the front panel LEDs for the end user to enjoy.

HID Report Summary:

Consumer Devices / Consumer Controls (Standard) Reports:

```
0xE2: Report MUTE Button Press
0xE9: Report VOLUME UP Button Press
0xEA: Report VOLUME DOWN Button Press
```

PSC805 Vendor Specific Reports:

```
0x80: Report Current PSA2 Mode State
0x81: Report MUTE Button Press
0x82: Report 3DFX Button Press
0x83: Report FUNC Button Press
0x84: Report Encoder Event
0x85: Report Plug Detect Event
0x86: Set PSA2 Mode State
0x87: Set ADC Map
0x88: Set S/PDIF Output Mode
0x89: Flag Volumes Valid
0x8A: Set Front Panel LEDs
0x8B: Set DAC Maps
0x8C: Set Output Mutes
0x8D: Set Front Left Output Attenuation
0x8E: Set Front Right Output Attenuation
0x8F: Set Center Output Attenuation
0x90: Set LFE Output Attenuation
0x91: Set Rear Left Output Attenuation
0x92: Set Rear Right Output Attenuation
0x93: Set Headphone Left Output Attenuation
0x94: Set Headphone Right Output Attenuation
0x95: Set Line Input Gain and Mute
0x96: Set Microphone Input Gain and Mute

0x97: Set S/PDIF Enable
```

HID Report Details:

Consumer Devices / Consumer Controls (Standard) Reports:

0xE2: Report MUTE Button Press
- PSC805 to Host (Input)
- Enabled only in stand-alone mode
- 1 Bit return from PSC805
    - 0: MUTE Button released
    - 1: MUTE Button pressed

This is the standard MUTE Button press report used in many consume r electronics audio devices that connect to a computer via USB. This report is enabled in stand-alone mode only, where it provides MUTE capabilities when using the standard USB Audio drivers in Windows. When in 'PSA2' mode, this report is replaced by the Vendor Specific report 0x81 (Report MUTE Button Press).

0xE9: Report VOLUME UP Button Press
- PSC805 to Host (Input)
- Enabled only in stand-alone mode
- 1 Bit return from PSC805
    - 0: VOLUME UP Button released
    - 1: VOLUME UP Button pressed

This is the standard VOLUME UP Button press report used in many consumer electronics audio devices that connect to a computer via USB. This report is enabled in stand-alone mode only, where it provides VOLUME UP capabilities when using the standard USB Audio drivers in Windows. When in 'PSA2' mode, this report is replaced by the Vendor Specific report 0x84 (Report Encoder Event).

0xEA: Report VOLUME DOWN Button Press
- PSC805 to Host (Input)
- Enabled only in stand-alone mode
- 1 Bit return from PSC805
    - 0: VOLUME DOWN Button released
    - 1: VOLUME DOWN Button pressed

This is the standard VOLUME DOWN Button press report used in many consumer electronics audio devices that connect to a computer via USB. This report is enabled in stand-alone mode only, where it provides VOLUME DOWN capabilities when using the standard USB Audio drivers in Windows. When in 'PSA2' mode, this report is replaced by the Vendor Specific report 0x84 (Report Encoder Event).

HID Report Details (Continued)**:**

PSC805 Vendor Specific Reports:

0x80: Report Current PSA2 Mode State
- PSC805 to Host (Input)
- Enabled in both stand-alone and 'PSA2' modes
- 1 Bit return from PSC805
    - 0: 'PSA2' Mode Inactive (stand-alone mode)
    - 1: 'PSA2' Mode Active

This report informs the application software whether the PSC8 05 is in stand-alone mode (acting like a standard USB Audio device) or in 'PSA2' mode. If in 'PSA2' mode, the PSC805 becomes highly configurable to the application software.

0x81: Report MUTE Button Press
- PSC805 to Host (Input)
- Enabled only in 'PSA2' mode
- 1 Bit return from PSC805
    - 1: MUTE Button pressed
    - 0: MUTE Button released

This report informs the application software that the user has pressed the MUTE button on the front panel of the PSC805 product.

0x82: Report 3DFX Button Press
- PSC805 to Host (Input)
- Enabled only in 'PSA2' mode
- 1 Bit return from PSC805
    - 1: 3DFX Button pressed
    - 0: 3DFX Button released

This report informs the application software that the user has pressed the 3DFX button on the front panel of the PSC805 product.

0x83: Report FUNC Button Press
- PSC805 to Host (Input)
- Enabled only in 'PSA2' mode
- 1 Bit return from PSC805
    - 1: FUNC Button pressed
    - 0: FUNC Button released

This report informs the application software that the user has pressed the FUNCTION button on the front panel of the PSC805 product.

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HID Report Details (Continued)**:**

PSC805 Vendor Specific Reports (Continued):

0x84: Report Encoder Event
- PSC805 to Host (Input)
- Enabled only in 'PSA2' mode
- 8 Bit return from PSC805
    - 0x00:   No Encoder movement
    - 0x01-0x7F: (1 to 127) Clockwise movement of the Encoder.
    - 0xFF-0x80: (-1 to -128) Counter-clockwise movement of the Encoder.

This report informs the application software of movement of the Encoder on the from panel of the PSC805 product. The Encoder will be int erpreted in several ways, 'Volume', 'Fader', 'Input Gain' and 'LFE Level'. If in 'Volume' mode, a clockwise movement of the Encoder is considered a 'Volume Up', while a counter-clockwise movement is considered a 'Volume Down'.

0x85: Report Plug Detect Event
- PSC805 to Host (Input)
- Enabled only in 'PSA2' mode
- 8 Bit return from PSC805
    - 0: Unplugged
    - 1: Plugged

    Plug Detect Mapping:

    Bit 0:   Front Speaker Plug State
    Bit 1:   Rear Speaker Plug State
    Bit 2:   Center/LFE Speaker Plug State
    Bit 3:   Headphone Plug State
    Bit 4:   Microphone (Mono) Plug State
    Bit 5:   <reserved>
    Bit 6:   Line-In Plug State
    Bit 7:   <reserved>

    (Note: Plug Detect mapping subject to change)

This report informs the application software which inputs and outputs are connected, so that application software can configure the system appropriately. For example, if only the front speakers are connected, the application software could configure the system for '2 Speaker Mode' only. If all speakers are connected, software could configure the system for '5.1 Speaker Mode'.

PSS/DALT

HID Report Details (Continued):

PSC805 Vendor Specific Reports (Continued):

0x86: Set PSA2 Mode State
- Host to PSC805 (Output)
- Enabled in both stand-alone and 'PSA2' modes
-   1 Bit return from Host
      0: Set PSC805 product to stand-alone mode
      1: Set PSC805 product to 'PSA2' mode

This report allows the application software to switch the 'mode' of the
PSC805 product. Stand-alone mode is when the PSC805 behaves as a standard
USB Audio device. 'PSA2' mode is when the PSC805 is highly configurable
to the application software. Once in 'PSA2' mode, the remainder of the
PSC805 Vendor Specific HID reports are enabled.

Anytime the application software enables 'PSA2' mode on the PSC805
device, the application software should re-initialize the states of the
LEDs, the DAC/ADC mapping and the volumes/gains/mutes of the PSC805
device.

0x87: Set ADC Map
- Host to PSC805 (Output)
- Enabled only in 'PSA2' mode
- 1 Bit return from Host
      0: Set Line Input as the recording source
      1: Set Microphone Input as the recording source

This report allows the application software to select which of the analog
inputs are to be used for recording – either the Line Input on the rear
panel of the PSC805 product or the Microphone Input from the front panel.

HID Report Details (Continued)**:**

PSC805 Vendor Specific Reports (Continued):

0x88: Set S/PDIF Output Mode
-   Host to PSC805 (Output)
-   Enabled only in 'PSA2' mode
-   1 Bit return from Host
        0: Set S/PDIF Output for Analog (PCM) Mode
        1: Set S/PDIF Output for Digital (AC3/DTS) Mode

This report allows the application software to select the output mode of
the S/PDIF output device. If the S/PDIF output is to be just a 'copy' of
the content sent to the headphone output, then the S/PDIF Output mode
should be set to 'Analog', so that S/PDIF receivers will know that the
input stream is pure PCM audio. If the S/PDIF Output is to be AC3 or DTS
from DVD playback, then the S/PDIF Output should be set to 'Digital', so
that S/PDIF Receivers will know that the input stream is encoded and
needs to be processed before being output.

0x89: Flag Volumes Valid
-   Host to PSC805 (Output)
-   Enabled only in 'PSA2' mode
-   1 Bit return from Host
        0: Volume values in report are INVALID
        1: Volume values in report are VALID

This report allows the application software to indicate to the PSC805
device if the volume values in the HID report are valid or invalid.
This flag keeps the PSC805 device from constantly updating the DAC and
ADC volume and mutes when unnecessary.

HID Report Details (Continued)**:**

PSC805 Vendor Specific Reports (Continued):

0x8A: Set Front Panel LEDs
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- 16 Bit return from Host
    - 0: LED Off
    - 1: LED On

  Byte 0: Bits 15-8
  Byte 1: Bits 7-0

This report gives the application software access to all of the front
panel LEDs at once (7 bar graph, 1 Mute, 1 3DFX, 4 FX, 3 function
[16 total]).

```
        LED Mapping:
        ----------------------
        Bit 0:      LSB of LED Bar
        Bit 1:           |
        Bit 2:           |
        Bit 3:           |
        Bit 4:           |
        Bit 5:           |
        Bit 6:      MSB of LED Bar
        Bit 7:      MUTE LED

        Bit 8:      INPUT GAIN
        Bit 9:      FADER
        Bit 10:     LFE LEVEL
        Bit 11:     3DFX
        Bit 12:     FX3
        Bit 13:     FX2
        Bit 14:     FX1
        Bit 15:     DIGITAL OUT
```

HID Report Details (Continued):

PSC805 Vendor Specific Reports (Continued):

0x8B: Set DAC Maps
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- 8 Bit return from Host
    - Bits 1-0:   Front Output select
    - Bits 3-2:   Center/LFE Output select
    - Bits 5-4:   Rear Output select
    - Bits 7-6:   Headphone / S/PDIF Output select
        - 0x0:   Front Channel Content
        - 0x1:   Center/LFE Channels Content
        - 0x2:   Rear Channel Content
        - 0x3:   Line Input Content (from rear panel)

This report allows the application software to select which content to output to the various speaker sets (Front, Rear, Center/LFE and Headphone).

0x8C: Set Output Mutes
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 8 Bit return from Host
    - Bit 0:   Front Left Output
    - Bit 1:   Front Right Output
    - Bit 2:   Center Output
    - Bit 3:   LFE Output
    - Bit 4:   Rear Left Output
    - Bit 5:   Rear Right Output
    - Bit 6:   Headphone Left Output
    - Bit 7:   Headphone Right Output
        - 0x0:   unmuted
        - 0x1:   muted

This report allows the application software to mute/unmute each output channel.

HID Report Details (Continued):

PSC805 Vendor Specific Reports (Continued):

0x8D: Set Front Left Output Attenuation
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 8 Bit return from Host
  - Bits 7-0:   Attenuation Level
    - 0xFF: 0dB attenuation
    - 0x00:   -infinity dB attenuation

This report allows the application software to set the attenuation levels for the Front Left output DAC.

0x8E: Set Front Right Output Attenuation
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 8 Bit return from Host
  - Bits 7-0:   Attenuation Level
    - 0xFF: 0dB attenuation
    - 0x00:   -infinity dB attenuation

This report allows the application software to set the attenuation levels for the Front Right output DAC.

0x8F: Set Center Output Attenuation
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 8 Bit return from Host
  - Bits 7-0:   Attenuation Level
    - 0xFF: 0dB attenuation
    - 0x00:   -infinity dB attenuation

This report allows the application software to set the attenuation levels for the Center output DAC.

HID Report Details (Continued):

PSC805 Vendor Specific Reports (Continued):

0x90: Set LFE Output Attenuation
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 8 Bit return from Host
  - Bits 7-0:   Attenuation Level
    - 0xFF: 0dB attenuation
    - 0x00:   -infinity dB attenuation

This report allows the application software to set the attenuation levels for the LFE output DAC.

0x91: Set Rear Left Output Attenuation
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 8 Bit return from Host
  - Bits 7-0:   Attenuation Level
    - 0xFF: 0dB attenuation
    - 0x00:   -infinity dB attenuation

This report allows the application software to set the attenuation levels for the Rear Left output DAC.

0x92: Set Rear Right Output Attenuation
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 8 Bit return from Host
  - Bits 7-0:   Attenuation Level
    - 0xFF: 0dB attenuation
    - 0x00:   -infinity dB attenuation

This report allows the application software to set the attenuation levels for the Rear Right output DAC.

HID Report Details (Continued):

PSC805 Vendor Specific Reports (Continued):

0x93: Set Headphone Left Output Attenuation
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid'
  (0x89) Report is set to '1'.
- 8 Bit return from Host
    - Bits 7-0:   Attenuation Level
        - 0xFF: 0dB attenuation
        - 0x00:   -infinity dB attenuation

This reports allows the application software to set the attenuation
levels for the Headphone Left output DAC.

0x94: Set Headphone Right Output Attenuation
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid'
  (0x89) Report is set to '1'.
- 8 Bit return from Host
    - Bits 7-0:   Attenuation Level
        - 0xFF: 0dB attenuation
        - 0x00:   -infinity dB attenuation

This report allows the application software to set the attenuation
levels for the Headphone Right output DAC.

0x95: Set Line Input Gain and Mute
- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 ADCs if the 'Flag Volumes Valid'
  (0x89) Report is set to '1'.
- 8 Bit return from Host
    - Bits 3-0:   Gain Level (in +3dB steps)
        - 0x0:   0db Gain
        - 0x8:   +24dB Gain (max)
    - Bits 6-4:   Unused
    - Bit 7:   Muting
        - 0x0:   Unmuted
        - 0x1:   Muted

This report allows the application software to directly set the
CODEC Mixer levels (gain and mute) for the Line Recording input.

HID Report Details (Continued)**:**

PSC805 Vendor Specific Reports (Continued):

0x96: Set Microphone Input Gain and Mute

- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 8 Bit return from Host

Bits 3-0:	Volume Level
0x00:	0db Gain
0x08:	+24dB Gain (max)
Bits 6-4:	Unused
Bit 7:	Muting
0x0:	Unmuted
0x1:	Muted

This report allows the application software to directly set the CODEC Mixer levels (gain and mute) for the Microphone Recording input.

0x97: Set S/PDIF Enable

- Host to PSC805 (Output)
- Enabled only in 'PSA' mode
- Will only be applied to the PSC805 DACs if the 'Flag Volumes Valid' (0x89) Report is set to '1'.
- 1 Bit return from Host

0:	Disable S/PDIF Output
1:	Enable S/PDIF Output

This report allows the application software to directly enable/disable the S/PDIF output. Useful for preventing output of copyrighted material.

APPENDIX A

The HID Descriptor
(as found in the PSC805 Firmware)

APPENDIX A: The HID Descriptor (as found in the PSC805 Firmware):

```
unsigned char code DevHIDReportDesc[] =
{
      0x05, 0x0C,               // USAGE_PAGE      (Consumer Devices)
      0x09, 0x01,               // USAGE      (Consumer Control)

      0xA1, 0x01,               // COLLECTION      (Application)

            0x05, 0x0C,       // USAGE_PAGE      (Consumer Devices)
            0x09, 0x01,       // USAGE      (Consumer Control)

            0xA1, 0x01,       // COLLECTION      (Application)

                  //
                  // Standard Audio Device Controls (Inputs to HOST)
                  //
                  // The following reports are active ONLY in Stand-Alone mode
                  //
                  // MUTE Button
                  // Volume Up (Encoder CW),
                  // Volume Down (Encoder CCW)
                  //
                  // 1 Bit wide reports
                  //
                  0x09, 0xE2, // USAGE     (Mute)
                  0x09, 0xE9, // USAGE     (Volume Up)
                  0x09, 0xEA, // USAGE     (Volume Down)
                  0x15, 0x00, // LOGICAL_MINIMUM (0)
                  0x25, 0x01, // LOGICAL_MAXIMUM (1)
                  0x75, 0x01, // REPORT_SIZE  (1)
                  0x95, 0x03, // REPORT_COUNT (3)
                  0x81, 0x06, // INPUT     (Data, Var, Rel)

            0xC0,             // END_COLLECTION

            0x06, 0x00, 0xFF, // USAGE_PAGE      (Vendor Defined)
            0x09, 0x01,       // USAGE      (Vendor Defined)

            0xA1, 0x01,       // COLLECTION      (Application)

                  //
                  // Vendor Defined (PSA2) Device Controls
                  // (Inputs To HOST)
                  //
                  // Report PSA2 State (both modes)
                  // MUTE Button (in PSA2 Mode)
                  // 3DFX Button (in PSA2 Mode)
                  // FUNC Button (in PSA2 Mode)
```

APPENDIX A: The HID Descriptor (as found in the PSC805 Firmware) (Continued)**:**

```
              //
              // 1 Bit wide reports
              //
              0x09, 0x80, // USAGE      (Report PSA2 State)
              0x09, 0x81, // USAGE      (Report MUTE Button)
              0x09, 0x82, // USAGE      (Report 3DFX Button)


              0x09, 0x83, // USAGE      (Report FUNC Button)
              0x75, 0x01, // REPORT SIZE     (1)
              0x95, 0x04, // REPORT COUNT    (4)
              0x81, 0x02, // INPUT     (Data, Var, Abs)

              //
              // the following is just to add padding to the HID
              // descriptor so that is is a multiple of 8 bits
              // long. Adjust accordingly as you add, remove or
              // adjust usage items.
              //
              0x75, 0x01, // REPORT_SIZE     (1)
              0x95, 0x01, // REPORT_COUNT    (1)
              0x81, 0x01, // INPUT     (Cnst, Ary, Abs)

              //
              // Vendor Defined (PSA2) Device Controls
              // (Inputs To HOST)
              //
              // The following reports are active ONLY in PSA2 Mode
              //
              // Encoder (in PSA2 Mode)
              // Plug Detects (in PSA2 Mode)
              //
              // 8 Bit Wide reports
              //
              0x09, 0x84, // USAGE      (Report Encoder)
              0x09, 0x85, // USAGE      (Report Plug Detects)
              0x75, 0x08, // REPORT SIZE     (8)
              0x95, 0x02, // REPORT COUNT    (2)
              0x81, 0x02, // INPUT     (Data, Var, Abs)

              //
              // Vendor Defined (PSA2) Device Controls
              // (Outputs From HOST)
              //
```

APPENDIX A: The HID Descriptor (as found in the PSC805 Firmware) (Continued)**:**

```
                // Set PSA2 State (in both modes)
                // Set ADC Map (in PSA2 Mode)
                // Set S/PDIF Mode (in PSA2 Mode)
                // Volume Values Valid (in PSA2 Mode)
                //
                // 1 Bit Wide reports
                //
                0x09, 0x86, // USAGE     (Set PSA2 State)
                0x09, 0x87, // USAGE     (Set ADC Map)
                0x09, 0x88, // USAGE     (Set S/PDIF Mode)
                0x09, 0x89, // USAGE     (Volumes Valid)
                0x09, 0x97, // USAGE     (Set S/PDIF Enable)
                0x75, 0x01, // REPORT SIZE    (1)
                0x95, 0x05, // REPORT COUNT   (5)
                0x91, 0x02, // OUTPUT   (Data, Var, Abs)

                //
                // the following is just to add padding to the HID
                // descriptor so that is is a multiple of 8 bits
                // long. Adjust accordingly as you add, remove or
                // adjust usage items.
                //
                0x75, 0x03, // REPORT_SIZE    (3)
                0x95, 0x01, // REPORT_COUNT   (1)
                0x91, 0x01, // OUTPUT   (Cnst, Ary, Abs)

                //
                // The following command is active ONLY in PSA2 mode
                //
                // Set LEDs (in PSA2 Mode)
                //
                // 16 Bit Wide reports
                //
                0x09, 0x8A, // USAGE     (Set LEDs)
                0x75, 0x10, // REPORT SIZE    (16)
                0x95, 0x01, // REPORT COUNT   (1)
                0x91, 0x02, // OUTPUT   (Data, Var, Abs)

                //
                // Vendor Defined (PSA2) Device Controls
                // (Outputs From HOST)
                //
                // 8 Bit Wide Reports
                //
```

APPENDIX A: The HID Descriptor (as found in the PSC805 Firmware) (Continued)**:**

```
            0x09, 0x8B, // USAGE     (Set DAC Maps)
            0x09, 0x8C, // USAGE     (Set Output Mutes)
            0x09, 0x8D, // USAGE     (Set Front Left Vol)
            0x09, 0x8E, // USAGE     (Set Front Right Vol)
            0x09, 0x8F, // USAGE     (Set Rear Left Vol)
            0x09, 0x90, // USAGE     (Set Rear Right Vol)
            0x09, 0x91, // USAGE     (Set Center Vol)
            0x09, 0x92, // USAGE     (Set LFE Vol)
            0x09, 0x93, // USAGE     (Set HP Left Vol)
            0x09, 0x94, // USAGE     (Set HP Right Vol)
            0x09, 0x95, // USAGE     (Set Line-In Gain & Mute)
            0x09, 0x96, // USAGE     (Set MIC-In Gain & Mute)
            0x75, 0x08, // REPORT SIZE    (8)
            0x95, 0x0C, // REPORT COUNT   (12)
            0x91, 0x02, // OUTPUT   (Data, Var, Abs)

      0xC0,            // END_COLLECTION

   0xC0                // END_COLLECTION

};
```

PSS/DALT

APPENDIX B

HID Report Maps (Input and Output)

APPENDIX B: HID Report Maps (Input and Output):

Input Bytes: (3 Total - from PSC805 to Host):

```
Byte 0:      Bit 0:      MUTE Button (Stand-Alone Mode)
             Bit 1:      Volume Up Button (Stand-Alone Mode)
             Bit 2:      Volume Down Button (Stand-Alone Mode)
                         0:    released
                         1:    pressed

             Bit 3:      PSA2 State (both Stand-Alone and PSA2 modes)
                         0:    stand-alone mode
                         1:    PSA2 mode

             Bit 4:      MUTE Button (PSA2 Mode)
             Bit 5:      3DFX Button (PSA2 Mode)
             Bit 6:      FUNC Button (PSA2 Mode)
                         0:    released
                         1:    pressed

             Bit 7:      Unused

Byte 1:      Bits 7-0:   Encoder Data (PSA2 Mode)
                         0x00: No Encoder movement

                         0x01-0x7F: Encoder Clockwise (UP)
                         (1 to 127)

                         0xFF-0x80: Encoder Counter-Clockwise (DOWN)
                         (-1 to -128)

Byte 2:      Bits 7-0:   Plug Detects (PSA2 Mode)
                         0:    not connected
                         1:    connected

             Bit   0:    Front Speakers
             Bit   1:    Center/LFE
             Bit   2:    Rear Speakers
             Bit   3:    Line-In
             Bit   4:    Microphone
             Bit   5:    Unused
             Bit   6:    Headphones
             Bit   7:    Unused
```

APPENDIX B: HID Report Maps (Input and Output) (Continued)**:**

Output Bytes: (15 Total - from Host to PSC805):

```
     Byte 0:      Bit 0:        Set PSA2 State (both Stand-Alone and PSA2 modes)
                                0: stand-alone mode
                                1: PSA2 mode

                  Bit 1:        Set ADC Map (PSA2 Mode)
                                0: line in
                                1: microphone in

                  Bit 2:        Set S/PDIF Mode (PSA2 Mode)
                                0: PCM mode
                                1: Digital (AC3/DTS) mode

                  Bit 3:        Volumes Valid (PSA2 Mode)
                                0: invalid (ignore volume values in report)
                                1: valid (use volumes in report)

                  Bit 4:        Set S/PDIF Enable (PSA2 Mode)
                                0: disable S/PDIF Output
                                1: enable S/PDIF Output

                  Bit 7-5:      Unused

     Byte 1:      Bits 15-8:
     Byte 2:      Bits 7-0:     Set LEDs (PSA2 Mode)
                                0: off
                                1: on

                  Bit   0:      Bar LED 0
                  Bit   1:      Bar LED 1
                  Bit   2:      Bar LED 2
                  Bit   3:      Bar LED 3
                  Bit   4:      Bar LED 4
                  Bit   5:      Bar LED 5
                  Bit   6:      Bar LED 6

                  Bit   7:      MUTE LED

                  Bit   8:      Input Gain LED
                  Bit   9:      Fader LED
                  Bit   10:     Subwoofer Level LED

                  Bit   11:     3DFX LED

                  Bit   12:     FX3 LED
                  Bit   13:     FX2 LED
                  Bit   14:     FX1 LED
                  Bit   15:     Digital Out LED
```

APPENDIX B: HID Report Maps (Input and Output) (Continued):

Output Bytes: (15 Total - from Host to PSC805) (Continued):

```
Byte 3:      Bits 7-0:   Set DAC Maps
                         00:   Front
                         01:   Center/LFE
                         10:   Rear
                         11:   Line In

             Bits 1-0:   Set Front Speaker pipe
             Bits 3-2:   Set Center LFE pipe
             Bits 5-4:   Set Rear Speaker pipe
             Bits 7-6:   Set Headphone / S/PDIF pipe


Byte 4:      Bits 7-0:   Set Output Mutes
                         0:    un-muted
                         1:    muted

             Bit   0:    Front Left Output
             Bit   1:    Front Right Output
             Bit   2:    Center Output
             Bit   3:    LFE Output
             Bit   4:    Rear Left Output
             Bit   5:    Rear Right Output
             Bit   6:    Headphone Left Output
             Bit   7:    Headphone Right Output

Byte 5:      Bits 7-0:   Front Left Volume
Byte 6:      Bits 7-0:   Front Right Volume
Byte 7:      Bits 7-0:   Center Volume
Byte 8:      Bits 7-0:   LFE Volume
Byte 9:      Bits 7-0:   Rear Left Volume
Byte 10:     Bits 7-0:   Rear Right Volume
Byte 11:     Bits 7-0:   Headphone Left Volume
Byte 12:     Bits 7-0:   Headphone Right Volume
                         0xFF: Maximum (0dB)
                         0x00: Minimum (-infinity dB)

Byte 13:     Bits 7-0:   Line-In Gain and Mute
Byte 14:     Bits 7-0:   Microphone-In Gain and Mute
                         0x80: Mute
                         0x08: Maximum (+24dB)
                         0x00: Minimum (0dB)
```

APPENDIX C

Board Layout

APPENDIX C: Board Layout:

DOWNLOAD SWITCH

OPTICAL S/PDIF OUTPUT

COAXIAL S/PDIF OUTPUT

LINE INPUT JACK

FRONT SPEAKERS JACK

REAR SPEAKERS JACK

CENTER/LFE SPEAKERS JACK

USB CONNECTION

PSC805

MUTE LED
MUTE BUTTON
DIGITAL OUT LED
FX1 LED
FX2 LED
FX3 LED
3DFX BUTTON
3DFX LED
BAR GRAPH LED 7
BAR GRAPH LED 6
BAR GRAPH LED 5
BAR GRAPH LED 4
BAR GRAPH LED 3
BAR GRAPH LED 2
BAR GRAPH LED 1
FUNCTION BUTTON
LFE LEVEL LED
FADER LED
INPUT GAIN LED
MULTIFUNCTION KNOB
HEADPHONE JACK
MICROPHONE INPUT JACK