Philips PSC805 HID Reports

Version 1.4(er)
Thursday, June 19, 2003
Change History:

Version 1.4  Thursday, 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 Digital) 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
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0x88: Set S/PDIF Output Mode
0x89: Flag Volumes Valid
0x8A: Set Front Panel LEDs
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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 consumer 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 PSC805 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.
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 front panel of the PSC805 product. The Encoder will be interpreted 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:

<table>
<thead>
<tr>
<th>Bit 0</th>
<th>Front Speaker Plug State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit 1</td>
<td>Rear Speaker Plug State</td>
</tr>
<tr>
<td>Bit 2</td>
<td>Center/LFE Speaker Plug State</td>
</tr>
<tr>
<td>Bit 3</td>
<td>Headphone Plug State</td>
</tr>
<tr>
<td>Bit 4</td>
<td>Microphone (Mono) Plug State</td>
</tr>
<tr>
<td>Bit 5</td>
<td>&lt;reserved&gt;</td>
</tr>
<tr>
<td>Bit 6</td>
<td>Line-In Plug State</td>
</tr>
<tr>
<td>Bit 7</td>
<td>&lt;reserved&gt;</td>
</tr>
</tbody>
</table>

(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’.
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.
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 report 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):

```c
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 it 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 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

};
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):

<table>
<thead>
<tr>
<th>Byte 0</th>
<th>Bit 0: Set PSA2 State (both Stand-Alone and PSA2 modes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0: stand-alone mode</td>
</tr>
<tr>
<td></td>
<td>1: PSA2 mode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 1: Set ADC Map (PSA2 Mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: line in</td>
</tr>
<tr>
<td>1: microphone in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 2: Set S/PDIF Mode (PSA2 Mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: PCM mode</td>
</tr>
<tr>
<td>1: Digital (AC3/DTS) mode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 3: Volumes Valid (PSA2 Mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: invalid (ignore volume values in report)</td>
</tr>
<tr>
<td>1: valid (use volumes in report)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 4: Set S/PDIF Enable (PSA2 Mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: disable S/PDIF Output</td>
</tr>
<tr>
<td>1: enable S/PDIF Output</td>
</tr>
</tbody>
</table>

| Bit 7-5: Unused                     |

| Byte 1: Bits 15-8:                 |
| 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):

<table>
<thead>
<tr>
<th>Byte 3: Bits 7-0:</th>
<th>Set DAC Maps</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:</td>
<td>Front</td>
</tr>
<tr>
<td>01:</td>
<td>Center/LFE</td>
</tr>
<tr>
<td>10:</td>
<td>Rear</td>
</tr>
<tr>
<td>11:</td>
<td>Line In</td>
</tr>
</tbody>
</table>

| 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           |

<table>
<thead>
<tr>
<th>Byte 4: Bits 7-0:</th>
<th>Set Output Mutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:</td>
<td>un-muted</td>
</tr>
<tr>
<td>1:</td>
<td>muted</td>
</tr>
</tbody>
</table>

| 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: