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Realtek Semiconductor Corp. AC' 97 Sound SystemSoftware ver: A4. 05 Installation and Setup

Driver & Application Installation/Renoval Procedure For Realtek AC' 97 Codec:	
<pre><<< For Win2000/WinWE/WinXP (WIMdriver)/Win98 Gold(First Edition)/Win98SE >>></pre>	
Setup Driver/Application at first time:	
Step 1. Before installing the Realtek AC'97 Drivers & Applications, Press the [Cancel] button if Windows detect the PCI Miltimedia Audio device.	
Step 2. Insert the "Realtek AC 97 Drivers & Applications" CD into the CD RIM drive and run the setup exe program to finish the installation.	
Step 3. Click on [Next/OK/Go] to continue the procedure. If the Windows popup "Digital Signature Not Found" message, press [Yes] to continue the installation.	
Step 4. Finally, select to restart the system and press [Finish] to complete the installation.	
The system will reload the drivers and do some adjustments in the INF file if so required.	
Setup for Manual	
 Double-click the "System" icon to open the "SystemProperties" dialog fromContro Choose "Hardware" tab and click the "Device Minager" button. Please right-click muse on "MiltiMedia Andio Controller" and choose the "Propert to show the driver details. Click the "Driver" tab and then click the "Update Driver" button for update. Please follow the instructions of the "Upgrade Device Briver Wizard". Choose "Search for a suitable driver for my device" and click the "Next" button. Please specify the driver location/source and then click the "Next" button in thi "Specify a location/ has been chosen. If "Specify driver location/ is chosen, the Wizard will ask for the path where the Click the "Next" button to install Andio Driver on "Driver Files Search Results". If the "Digital Signature Not Found" dialog is opened, click the "Yes" button to the Installation. After completing the above steps, the drier has been installed into the system Please click "Finish" button to complete the installation. 	ies" nem item s case, e driver is located
Step 1. Follow Step 2, 3, 4 described in [Setup at first time] above to complete the procedure.	
Renove Driver/Application:	
Step 1. Go to Start\Settings\Control Panel.	
Step 2. Select [Add/Renove Programs] icon.	
Step 3. Select "Realtek AC' 97 Andio" and press [Change/Renove] button.	
Step 4. Click on [Next/OK/Go] to finish the uninstallation.	
Step 5. At the end of the procedure, select to restart the system and press [Finish] to complete the uninstallation.	
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Boarles tyt Setup Driver/Application at first time: Ignore Step 1, and follow the same procedure in Win2000/WinNE/WinXP. **Update Driver/Application:** The same procedure in Win2000/WinME/WinXP. Renove Driver/Application: The same procedure in Win2000/WinME/WinXP. << Other Informations >> Silent Installation: Run "Setup -s -f2<path\LogFile> -z[-rp<path\LogFile>]" i.e. setup -s -f2c:\mylog.log -z[-rpC:\RHDSetup.log] Note: 1. AVRack only works fine under WinNT 4.0 after installing Service Pick 3 or later. 2. Please update Directx version to DirectX8.0 or above. **Version Informations:** WM driver for Win98/WinM-/Win2000/WinXP : 5.10.0.6290 WM driver for Vindows x64 : 5.10.0.6290 VXD driver for Vin95 : 4.5.0.3019 VXD Software vavetable driver : 3.1.0.0 NI4 driver for Vindows NI4 : 4.3.0.3040 NI4 software vavetable driver : 4.3.0.2002 VXD Software vavetable driver NF4 driver for Windows NF4 NF4 software vavetable driver Rt1Rack for Win98/M-/2000/XP : 1.15.0.0 AvRack for Wn95/NI4 : 2003.4.4.1 Realtek Soundnan : 5.1.0.59 : 2.2.0.73 : 1.0.1.66 Realtek Sound Effect Minager (CFL) Realtek Sound Effect Minager (Rt1Cpl) Realtek Sound Effect Minager for NT4 : 2.3.0.3 **Driver/Application Setup Program** : 5.36 **History:** A4. 05 Update Realtek 3D engine. For special customize settings. Fix blue screen issue. 4. For AII chipset missing sound 1s when playing music. **A4.04** Update Realtek 3D engine. For special customize settings. 3. Fix blue screen issue. A4.03 Update Realtek 3D engine. For special customize settings.

A4. 02

3. Fix blue screen issue.

- Update Realtek 3D engine.
 For special customize settings.
- 3. Fix no sound issue when Hibernate back for ATI chipset.

Readne, txt A4. 01 1. Sync HPOut and MinoOut Volume with Mister Volume. 2. Update Realtek 3D engine. 3. For SPIIF mate issue with SPIIF from SR 4. For special customize settings. 5. For DIMTesting Surprise Remove Hung up issue. 1. For special customize settings. A3.99 -1. For special customize settings. 2. For unknow chipset resource issue. 3. Fix CEN and SURR have output in 2 channel issue. 1. For special customize settings. 1. For special customize settings. A3.96 -1. For special customize settings. A3. 95 -1. Support Mino Out Select feature. For special customize settings. For SPHF no sound issue. Update Realtek 3D engine. 5. Support default PCMOut Volume adjustment feature. 6. Add customize settings feature for AMD CS5536 chipset. 7. Fix S3 hang up issue for AMD CS5536 chipset. 8. Install problem for Windows 98 se. A3. 94 - For special customize settings. Fix UAJ timer object doesn't initialize issue. Support Software Mcrophone Boost feature. For special customize settings. For VIA recording issue. 1. Fix CD In default volume issue Support AMD C55536(0x2093) chipset. For special customize settings. Uninstall issue when IS6.x built application in system. For special customize settings. Update Realtek 3D engine. 1. For special customize settings. 1. Fix Fujitsu blue screen issue on BSOD on LANCE2. For special customize settings. Fix All chipsets can't enter C3 state issue. 1. For special customize settings 2. Update Realtek 3D engine. 3. Fix delay issue in starting Windows. 1. Update Realtek 3D engine. 2. For special customize settings.

1. For special customize settings.

A3. 85 -

- Boardon tyt Update Realtek 3D engine.
 For special customize settings. 2. For Special Customize Sectings.
 3. For Fujitsu power nanagement issue.
 4. Wite installation progress and result to "C:\ALCSetup.log" within silent mode.
 5. Assign log file name and path for silent mode programissue.
 6. Upgrade setup programto IS11.5. A3. 84 -1. For special customize settings. A3 83 -1. Support Sensaura filter driver. For AC3 SPIIF issue when modern is present in AII chipsets. 3. For special customize settings. 1. Fix 8-channel line-out noise issue in MIIIA chipsets. 2. Update Realtek 3D engine. 3. For special customize settings. 1. Fix 8-channel noise issue for WIIIA chipsets. Fix "Wirld Of Wircraft" game noise issue in ATI chipsets. 3. Update Realtek 3D engine. 4. For special customize settings. 1. For special customize settings. 2. For modernremote vake up issue in ALI chipsets. 1. Manual setup driver setting "Add and renove program". 2. For special customize settings. A3. 78 -1. For special customize settings. 1. For special customize settings. 2. Update audio 3D engine. 3. Roll Back driver problem.4. Delete oeminf file for realtek in Windows x64 . A3. 76 -1. For special customize settings. Fix pop noise for ATI chipsets.
 Fix recording noise when below 48K samplerate. 4. Fix C3 state issue for AII chipsets.
 5. For AII 1689 chipsets can't record continue after power resume. 6. Mike driver package to be 8.3 format.
 7. Setup Package Delete older inf file (alcxyddi.inf) for updating driver.
 8. Setup Package General inf file name change to "Alcxau inf". **A3.75** -1. For special customize settings. 2. Update Realtek 3D engine. 3. Support for the WA Pro-over-S/PHIF Format.
 4. Support DIS function for ALC850. 5. Fix ALI 1689 chipsets can't record continue after power resume.6. Fixed driver package can't be removed on WnWE. A3. 74 -For special customize settings.
 Fix SPIIF streamling up by playing DVD.

- Driver general inf.
 Setup package application size and progress backward problem.
 Fixed driver package can't be removed on win98se.
 HT Scan on windows x64 os .

- A3. 73 -
- 1. For special customize settings.
- Support codec ALC653.
- 3. Fix record from SPITF IN have noise in hyper-thread mode.

Boarine tyt

A3. 72 -

- 1. For special customize settings.
- Midify initiate of IMA buffer allocate.
 Fix abnormal THD-N performance on A-D test.

A3. 71 -

- 1. For special customize settings.
- 2. Fix HT 12.1 IRM test fail issue.
- 3. Fix playback and record could not been played in the same time issue for ATI and nVidia chipsets.

A3. 70 -

1. Add some customized settings.

- Add some customized settings.
 Add SPIIF IN pass throuth SPIIF Out item for some of AII and nVidia chipsets.
- 3. Fix AC3 SPILF blue screen issue when SPILF-out force to 44K
- Change IM. Threshold from 06 to 10 to decrease noise for AII SB400 chipset.
 Update 3D engine to fix Half Life 2(Game) no sound issue and some noise issues.

A3. 68 -

- 1. Add some customized settings.
- 2. Change IMA operation node.
- 3. Fix SPIIF out issue for AU1573 and AU1689.
- 4. Fix SPHF no output issue for digital and analog output mode in ALC658.

 5. Fix SPHF noise or no output issues in nVidia chipsets.
- 6. Fix audio can't be test in 3D Marks.
- 7. Fix UI2004 game noise issue.

A3. 67

- 1. Add some customized settings.
- 2. SPHF-out goes to AClink slot 6/9 for AH SB400 vhen modern present.
- 3. Add New feature: Disable Analog CD.
- 4. Fix issue: mano-out volume synchronize with Mister volume for ALC655 force 2 channel node.

A3. 66 -

- 1. Add some customized settings.
- 2. Enable Present ICH DMA hang up function in default.
- 3. Fix WircraftIII game noise issue.
- Add a new feature: Don't power taggle PR3 for ALC655 and ALC850.
 Support swapping center Left function for nvidia CR804 chipset.
 Support VALL for nvidia CR804 chipset.

A3. 65 -

- 1. Add some customized settings.
- 2. Fix SPHF OUT no sound for ALC650 codec after power resume.

A3 64 -

- 1. Add some customized settings.
- Update Realtek 3D engine.
 Support AC3 SPIIF and 8 channels for nVidia CR904.
- 4. Fix EAPD issue after \$1 or \$3 resume
- 5. Fix getposition not acceurate for ATI chipsets.

- 1. Add some customized settings.
- 2. Fix underrun noise issue by changing threshold value for ATi chipset.
- 3. Fix 'Winbench' application issue in 4 channel node when Sensaura engine is disabled.

- Add some customized settings.
 Fix SPHF Copy protect issue in Mediaplayer.
 Support AC3 SPHF and 8 channels for Ali1689 chipsets.
 Reduce PCP noise with EAPD for power change.

1. Add some customized settings.

- 1. Add some customized settings.
- 2. Add vorkaround code when pause IMA engine for ICHB / Hance Rapid.
 3. Fix bug for "Force 44K SPHF" feature when disable direct sound acceleration engine.
 4. Set Surr-out pin as HP-out pin for ALC655 when disable multi-channels function.

Boarine tyt A3.59 -1. Add some customized settings. 2. Add channel status information of SPIIF output for ATi chipset(SB150/SB200/SB250). Add some customized settings. Fix some U issues for Realtek control panel. 3. Fix some issues for ATi chipset(SRI50/SR200/SR250). 4. Solve pop noise for noise suppression feature. Add some customized settings. 2. Fix some issues for the certain page of control panel. 1. Add some customized settings. 2. Update directsound acceleration engine. 3. Fix the issue which control panel shows the improper itemin "Mcrophone" tab under some situation. Inprove the algorithmof Jack sensing. Add some customized settings. 3. Support ICHS. 4. Improve the algorithm for ALC250 Hardware EQ feature. 5. Fix the issue which AUX volume register will be set the improper value. 6. Improve the algorithm of Noise suppression feature. 7. Fix SPHF output issue for "WiveCyclic" architecture. A3 54 1. Add some customized settings. Support Mcrophone Noise Suppression feature. Toggle Vref before change Mcrophone jack type for AC97 2. 3 codecs. Midify Peak filter parameters for ALC655. A3.53 - Add some customized settings. Add "Remove recording IC offset" feature. 3. Fix Hardware EQ noise issue for ALC250. 4. Support 1 nVidia chipset (CKS). 5. Add vorkaround code for ATI chipset recording issue. 6. Support 8 channels playback feature for nVidia chipset with ALC850. 7. Fix the issue about SPILF function type feature with ALC850. 8. Midify Peak Filter parameters for ALC655 and ALC850. 9. Fix side channel noise issue for VIA chipset with ALC850. 10. Add a new feature: SPIIF out can be sent to ACLink for AII and nVidia Chipset. 11. Fix SPHF slot assignment error for ALC850. 12. Support "Smart GPIO Volume Control" & "DC Voltage Volume Control" features for ALC250 and ALC203. 13. Turn on bit 14 of DC97_AUHO_REG_INIERRUPT_ENABLE while audio playing for ATi chipset. 14. Add flexibility for "Preventing ICH hang up" feature. 15. Improve DirectMssic startup latency when HyperThreading was enabled. 16. Fix Pinball delay problemon Win2000. 17. This vesion does not include ALi 1535 chipset support. 1. Add some customized settings. Fix SPIIF output frequency issue for nVidia chipset. Bisable Hardware EQ first before restore Hardware EQ for ALC250 when resuem 4. Disable Hardware EQ first before restore Hardware EQ for ALC250 polling function. 5. Turn on UAJ function for ALC850. Set SPIIF control register to proper value when driver initialize. 7. Inprove Read/Wite codec register algorithm 8. Reduce resume time.

- 9. Add "Renove Recording DC offset" feature.
- 10. Check ALC850 JD5 to decide if support 8-channels feature.
- 11. Fix SPHIF output slot assignment error for ALC850.

1. Add ICH2, ICHB and ATI Chipset IDs.

- Support ALC850.
 Add some customized settings.
- 3. Use "Wive PCI" architecture for ATI chipset.
- 4. Inprove Jack Sensing algorithm to eliminate noise.

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- 5. Show "Real-Time SPHF-in Munitor" node for nVidia chinset.
- 6. Renove ICH2/ICH3/ATi chipsets IDs.
- 7. Change JD bit definition of Front-out detection function for ALC658 (C version / D version). 8. Set "Direct D4C Mode" to Summation of D4C and analog inputs if H/w EQ is bypassed for ALC250.

- 1. Midify some customize settings.
- Fine tune some registers for ALC655 to avoid noise.
 Fine tune Surround DAC Volume and Center/IFE DAC volume for ALC655.
- 4. Set ALC655 Vrefout as 4V for 1 customer.
 5. Fix Intel audio device IMA hang up issue for some customers.

A3. 48

- 1. Add some customize settings.
- 2. Turn on "Ignore SPIIF in Invalid Bit" option as default if codec support.
- 3. Set Pin 47 as EAPD pin and turn off SPILF in function as default for ALC2508ALC203.

 4. Use "WiveCyclic" architecture under Windows 98 Gold version.
- 5. Midify Realtek control panel that don't detect UAJ automatically while Windows start for some customer's request.
 6. Fix the failures on HT 9.6 (WinNE) "IS Position Accuracy" test.
- 7. Fix the problem with SPIIF output through DirectSound.
- 8. Prevent potential discontinuities in 8-bit streams.
- 9. Prevent potential audio systembanes on badly behaved audio drivers.

A3. 47

- Add some customize settings.
 Turn off SPHF-In Schmitt Trigger Control for ALC655.
- 3. Fix the problem that AC3 stream will hang with the older revision of VIA8233 under Win98 SE.
- 4. Fix the problem that AC3 streamwill be abnormal with Direct sound API.
 5. Add hand-shaking protocol between audio driver and moderndriver for ATI chipset.
 6. Disable "Mc2 Select" node in mixer for ALC655/ALC658.
- 7. Fix the bugcheck DI in HCT verifier for nVidia chipset.

A3. 46

- 1. Add some customize settings.
- 2. Add Hardware EQ function for ALC250.
- Support independent SPHF engine for nVidia CKB chipset.
 Midify driver for UAJ function.
 Midify UAJ thresholds for ALC658.

- Fix audio driver bug for AII chipset.
- 7. Fix audio driver bug about nVidia independent SPHF engine.
- 8. Change direct sound acceleration engine. (New engine require DirectX 8.1 under Windows 98 SE).

A3 45

- 1. Add some customize settings
- 2. Reduce resume time for VIA chipset.
- 3. Midify mixer volume control algorithm for multi-channels codec to prevent the value of mixer out of rang
- 4. Implement ATI dedicate SPIIF IM engine.
- 5. Support ALC250 and ALC658.
- 6. Fix the problem that Jack Sensing will hang in Windows 988E.
- 7. Fix ICH pause IM issue.

A3 44 -

- Support independent SPIIF engine for nVidia MP2 chipset under Windows 98 SE.
- 2. Inprove the initialize procedure and the IMA access algorithm for VIA chipsets.

 3. Add some customize settings.
- 4. Apply the Channel Order and FIFO Flush procedure for ATI A41 chipset.

A3. 43 -

- Support ALC203 UAJ function.
 Add some customize settings.
- 3. Support independent SPILF engine for VIA 8233 (Only for never chipset version) under Windows 98 SE.
- 4. Fix hang up issue when systemsuspend for Ali 1563 chipset.
- Fully support Jack sensing function with multiple language.
 Fix Jack sensing problem with DirectX 6.1.

A3. 42 -

- Support ALC655.
 Midify driver for some customized settings.
- 3. Add SPILF function for nVidia chipsets.
- Zero recording data when recording gain is mated.
 Support independent SPIIF engine for VIA 8233 (Only for never chipset version).

A3. 41 -

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- 1. Midify driver for some customized settings.
- 2. Support ATI SB200 south bridge.
- Support Intel ICH5 south bridge.

- 1. The setting of switching Center/LFE is saved before systemis shut down, restored after systemboot
- 2. Fix click noise generated by playing short time wave.
- 3. Fix some problem about AC3 streamfor VIA chipset.
- 4. Add some customize settings.

A3. 38 -

- Fix some problem for Ali 1563 chipset.
- 2. Set 1 timer to check SPHF in status for ALC650 ver. F
- 3. Save playback volume value to registry key when the mixer is adjusted.
 4. Combine Cyclic WMdriver and PCI WMdriver.

- 1. Undate DirectSound 3D Positional Audio Engine to fix some noisy problem for some DirectSoundSD game (like Unreal Tournament 2003).
- 2. A3D compatible
- 3. Correct the gain settings of master volume for ALC650 ver. F

A3. 36

- 1. Restore AC97REG_EXT_AUTO_CTRL value first when resuming from suspend. Otherwise, Sample rate can't be restored because VRA was not enabled.
- Support 6-bits capability for Master Volume control if hardware support it.
 Also set GPIO for Jack Sharing with ALC650 ver. E exceept some special models.
 Add 1 customized settings "Disable3DepthLine" to disable 3D Depth mixer Line.

A3 35 -

- 1. change company name from "Avance" to "Realtek".
- add some new ID of notherboard
- 3. change some default settings for specific medels

A3. 32 -

- 1. compensate the gain for 3D sound when 2 speaker mode was selected.
 2. support nemory I/O for ICHI/ICH5 chipset
 3. support SPIIF AC-3 playback using DirectSound API for ICHI/SiS chipset
 4. correct DataRange declaration of S/PIIF pin to avoid blue screen on Win2000 with DirectX 8.1 installed.

A3. 30 -

- turn on/off EAPD by GP10 for specific model
 correct EAX initial setting.

- 3. support I3112 interface 4. fix vake on ring problem
- support DirectSound 3D positional audio by using HRF algorithm
 Add "Loudness" control for ALC202/ALC202A.

A3. 29 -

- Add "S/PHF IN/OUT Pass-Through" node for specific model 1.
- fix S/HIIF-In Realtine menitor noise issue
- fully support EAX compatible sound effect fix S1 suspend/resume failure problem for some specific model using SiS audio controller only disable "3D depth" line for specific model 4.
- duplicate analog input source according to output channel mode support DirectSound hardware acceleration features by default
- fix WnDVD problem when enabling video acceleration

A3. 26 -

- Inprove compatibility with Agere software modem
 Inprove recording quality when IIE was in P10 mode.
 Remove 3D Depth mixer line for some models

A3. 23

- Add "Loudness" mixer control for ALC650 front channel.
- Add "SPIIF in pass through to SPIIF output" option for specific model. Remove 3D depth mixer line.
- 4. Inprove compatibility with WinD/D 4.0 playing AC3 bit streamthrough DirectSound API.
 5. Inprove recording quality for some specific models.

1. Support S/PIIF-In function for ALC650 ver. E

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A3. 21 - Fix Front Mc problem Turn off "Analog input bypass to surround" when enter Dt mode. Change back the default volume of Mister to the middle position. Add "EnableDCVoltageControl" customized option for ALC202/ALC202A. Support customized DirectSound 2D/3D Acceleration (bypass knixer). Add "EnableDS3Library" customized option to emble it. It is turned off by default. Add "Prevent Register Reset" customized option for VIA8233. Only ALC201 series and ALC650 series can use "Enable 3.3V support" customized option. For ALC202/A, it is work autometically. Reset IMA when change state to Pause for ICHA to fix HT DiectSound failure in WinMs. To avoid mapping lost on Win98SE by raising IRQ level and adding TagCount before get mappings. Disable "Phone Line" for some specific models. Improve S/WSRC (if needed) quality to neet PC99 requirement. Mite SPHF while master volume was mated. 5. Improve EAX 1.0 compatible issue. Midify nixer control for multiclanuel output - master/front/surround/center/subwoofer line. a. The master volume/mate control will adjust all of front/surround/center/subwoofer volume/mate now to avoid confusion. b. The independent front/surround/center/subwoofer line offer volume control to balance the multichannel output. 2. Support "Front Mc" instead of Mc2. 3. Support Center and LFE output syap function. 4. Turn off analog input pass to surround function when suspend. 5. To avoid mapping lost on Win98SE (it can also fixed by QFE). 6. Improve S/WSRC (if needed) quality to neet PC99 requirement. 7. Mate SPHF while master volume was mated. A2. 84 -1. Support ALC650. A2.82 -1. Support ICH 2. Implement worksround for Intel 440MK audio controller 3. Set analog CD Maximum volume to 12dB. A2.81 -A2. 80 -1. Renove "SPHF SRC" Node if turn on "Enable 48K SPHF" option. 2. Turn on "Saving LED power" feature for G version 3. Save/Restore AC97 extended registers when Suspend/Resume 4. Midify Servie() function for set SPIIF Invalid bit. 5. Midify data 0 insertion method for SPHF. 6. Fix C3/C4 issue. A2.73 -1. Support ALC202A. A2. 71 -A2.70 -1. set CD Miximum volume to +12dR A2. 62 -A2. 61 -A2.60 - Fix 484th if SPILF SRC was enabled. Fix NI4 driver for IRQ sharing on VIA8233A A2.58 -1. Support ALC101. A2. 56 -A2. 55 -1. update VXD driver for VIA8233A.

A2. 53 -A2. 52 -

Support VIAS233A amilio controller.
 Eliminate the PCM noise while playing AC-3 stream through SPHF-out.
 Power down EAPD when master volume mate.

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- 4. Fix HT full duplex unstable problem for VIA8233 andio controller.
 5. The driver now support only VID/IID/SVID/SSID entry for WILL requirement

A2. 51 -

A2. 50 -

- Fix HT ACPI stress device I/O test for VIA8233.
 Inprove compatibility with software modern for power management.

1. The driver now support the VID/IID entry

A2. 46

- Add customized options.
 Mite volume when volume slider was adjusted to the bottom.

A2. 45 -

- 1. Support ALC201A.
- The driver only support the VID/IID/SVID/SID entry to meet the INF requirement for PCI devices for WIL logo.

A2. 43 -

- 1. Add SPIIF Mate control and SPIIF SRC On/Off control.
- 2. Modify 3D depth control behavior. When the slider was adjusted to the bottom the 3D depth will be turned off.

 3. Sound Effect Control Panel now installed by setup program
- It will not be installed with INF file.
- 4. AvRack support CD track auto-load function.

A2. 42 -

- 1. Add Mc2 select control
- Inprove MR card compatibility
 Change volume default settings

A2. 40 -

- Enable ALC201 3.3V function (INF optional)
 Auto Power down DAC/ADC (INF optional)
- 3. Avoid scandisk problemon some machines
- Fix HT system test for VIA 686 (ACPI / Stress Device I/O)
 Change version number to 5.10.00 xxxxx for WnXP versioning requirement

- 6. Save/Restore recording max setting
 7. Improve compatibility with PCTel MR card
 8. Fix hang problem while burn in PowerDVD on some machines.
 9. Fix lawy color machines are problem.
- 10. Add MC 20dB Boost control on recording MC source line
- 11. Add Subsystem IDs