Troubleshooting and Repair

6.1 Introduction

This chapter provides the most common problem encountered with the A440 notebook computer and some troubleshooting means. Some of the common problems are:

- System BIOS Related Problems
- LCD Display Problems
- System Power and Boot-Up Problems
- External Interface Problems (Serial, Printer, CRT, IR, USB, PS/2)
- Audio Problems
- PCMCIA Problems
- Power Management Problems
- Input Device Problems (Keyboard and Glidepad)

6.1.1 Helpful Starters

Here are a few helpful starters to begin with before troubleshooting the notebook:

- Is there any external power source connected to the computer?

- Does the battery installed been fully charged?

- Is the computer turn on and the POWER LED activated?

- Are all cables connected properly and securely?

- Are all needed device drivers been installed properly?

- Have you checked your AUTOEXEC.BAT and CONFIG.SYS files for errors?

- Is the Power Management function enabled under BIOS Setup? Press any key to wake system up again.

6.2 System BIOS Related Problems

This section provides you with information on how the BIOS handles errors encountered during POST (Power On Self Test) and translate them to beep codes and error messages. Refer to this whenever you encounter error messages or beep codes generated by the computer during startup.

6.2.1 POST Messages

The following is a summary of the Phoenix BIOS startup error messages that is displayed on the notebook's screen. These messages help you in understanding some of the notebook's problems that may be corrected by entering the BIOS SETUP program and checking the original values.

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Table 6-1(a)   POST Error Messages

Message	Possible Cause	Action
Diskette drive A failure	The drive failed or is missing. Floppy Disk Controller is disabled.	Check the drive to determine the problem. Enabled the FDD Controller.
Diskette read failure - press F1 to retry boot, F2 for SETUP utility	The diskette is either not formatted or is defective.	Replace the diskette with a bootable diskette and retry.
Display adapter failed, using alternate	The primary video adapter failed.	Check the primary video adapter.
Gate A20 failure	The keyboard controller is not accepting command, specifically, the enable and disable A20 command.	Check the keyboard controller and system board. Turn the power off, then back on again. If the problem persists contact qualified service personnel.
Fixed disk configuration error	The specified configuration is not supported or doesn't match the actual hardware installed.	Correct the fixed disk configuration.
Fixed disk controller failure	The fixed disk may be defective.	Try rebooting. If that doesn't work, replace the fixed disk.
Fixed disk read failure- press F1 to retry boot, F2 for SETUP utility	The fixed disk may be configured incorrectly or is defective.	Check the drive type selected in SETUP. Try rebooting. If that does not work, replace the fixed disk.
Pointer device failure	The PS/2-style mouse failed.	Try rebooting. If problem persists, check the mouse, it's cable and connector.
No boot device available - press F1 to retry boot, F2 for SETUP utility	Either diskette drive A:, the fixed disk, or both the diskette and fixed disk are defective.	Try rebooting. If problem persists, replace the diskette or the fixed disk.
No boot sector on fixed disk – press F1 to retry boot, F2 for SETUP utility	The C: drive is not formatted or is not bootable.	Format the C: drive and make it bootable.
Not a boot diskette - press F1 to retry boot, F2 for SETUP utility	The diskette in drive A: is not formatted as a bootable diskette.	Replace the diskette with a bootable diskette and try rebooting.
No timer tick interrupt	The timer chip has failed.	Check the system board, Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Shutdown failure	Either the keyboard controller is not accepting the reset command or the associated reset logic has failed.	Check the keyboard controller and system board. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Time of day not set - run SETUP program	Real Time Clock not set.	Run SETUP utility.

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Table 6-1(b)   POST Error Messages

Message	Possible Cause	Action
Timer 2 failure	The timer chip has failed.	Check the system board. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
F2 to enter ROM-based SETUP	Invalid configuration information must be changed.	You must run SETUP utility and correct configuration information.
Invalid configuration information - please run SETUP	Display adapter is configured incorrectly. Memory size is incorrect. Wrong number of diskette drives. Other configuration errors.	Run the SETUP utility.
Keyboard clock line failure	The keyboard, the keyboard cable connection, or the keyboard controller is defective.	Make sure the keyboard cable and keyboard are connected properly. Check the keyboard controller and the system board. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Keyboard data line failure	The keyboard controller firmware has failed.	Check the keyboard controller and system board. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Keyboard stuck key failure	A key is jammed.	Locate the jammed key and fix it. Make sure the keyboard cable and keyboard are connected properly. Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Memory failure at *hex-value*, read *hex-value*, expecting *hex-value*	Circuitry associated with the memory chips has failed.	Turn the power off, then back on again. If the problem persists, contact qualified service personnel.
Unexpected interrupt in protected mode	Hardware interrupt or NMI occurred while in protected mode.	Check the timer chip or the interrupt controller on the system board.
Real time clock failure	The RTC or battery failed.	Run SETUP and turn the power off and on. If the problem persists, replace the RTC battery. If the problem remains, contact qualified service personnel.

6.2.2   Informational Messages

This section lists the messages that provide information to the user but require no action.

Table 6-2   BIOS Informational Messages

Message	Meaning
nnnK Base Memory	The amount of base memory that tested successfully.
nnnK Extended	The amount of extended memory that tested successfully.
Memory tests terminated by keystroke	The message indicates that a user pressed the spacebar while memory tests were running and stopped the memory tests.
Press the F1 key to continue	This message indicates that an error was found during POST. Pressing the F1 key allows the system to attempt to reboot.
Beginning memory test Press the SPACEBAR to terminate the memory test	A user can stop the memory tests by pressing the spacebar.
Press the F1 key to continue, F2 to run the Setup utility	This message indicates that an error was found during POST. Pressing the F1 key allows the system to attempt to boot. Press F2 allows users to run the ROM-based SETUP utility to correct configuration information.

6.2.3   Beep Codes

Beep codes are used to identify a POST error that occurs when the screen is not available. Once the screen is operating, diagnostic messages are reported to the screen. There are beep codes for both fatal and non-fatal system board errors.

> ⓘ   No beep code is generated if a test is aborted while in progress. However, diagnostic cards can be installed in order to display the contents of the diagnostic port 80h and identify the area of failure.

Explanation of test terms for beep code table

The following terms are used in the Test Performed column of the beep code table:

1. **Pattern test** - One or more particular patterns are written to a location then read back from the same location. Examples of patterns used are 55h and AAh. If the value read does not match the value written, the test is considered a failure.

2. **Rolling ones test** - Several patterns are constructed. These patterns represent a one rolling through the given location. For example, to roll a one through three bits, the following patterns would be constructed: 001, 010, 011, 100, 101, 110, and 111. The patterns are written to the location and then read back, one by one. If the value read does not match the value written, the test is considered a failure.

3. **Rolling zeros test** - Several patterns are constructed. These patterns represent a zero rolling through the given location. For example, to roll a zero through three bits, the following patterns would be constructed: 011, 001, and 000. The patterns are written to the location and then read back, one by one. If the value read does not match the value written, the test is considered a failure.

4. **Checksum test** - All of the values in a given range of locations are added together. The

range includes a location which when added to sum of the ranges, will produce a known result, such as zero.

Beep codes for system board errors

Table 6-3 (a)   BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
none	01h	CPU registers test in progress or failure	Pattern test of most of the 16-bit CPU registers. Failure will result in a system halt.
1-1-3	02h	CMOS write/read test in progress or failure.	Rolling ones test in the shutdown byte (offset 0Eh) of the CMOS RAM. Failure will result in a system halt.
1-1-4	03h	ROM BIOS checksum test in progress or failure.	The range of ROM that includes the BIOS is checksummed. Failure will result in a system halt.
1-2-1	04h	Programmable interval timer 0 test in progress or failure.	Over a period of time, the current count values in timer 0 are read and accumulated by ORing them into the values read so far. It is expected that during the time period, all bits will be set. Failure will result in a system halt.
1-2-2	05h	DMA channel 0 address and count register test in progress or failure.	Rolling ones and rolling zeros test of the address and count registers of DMA channel 0. Failure will result in a system halt.
1-2-3	06h	DMA page register write/read test in progress of failure.	Pattern test of DMA page registers. Failure will result in a system halt.
1-3-1	08h	RAM refresh verification test in progress or failure.	Over a period of time, the refresh bit (bit 4) in port 60h is read and tested. The refresh bit should toggle from 0 to 1, then 1 to 0 within the time period. Failure will result in system halt.
none	09h	First 64K RAM test in progress.	No specific test is performed - just indicates that the test is beginning.
1-3-3	0Ah	First 64K RAM chip or data line failure, multi-bit.	The first 64K of RAM is tested with a rolling ones test and a pattern test. If any of the pattern tests fail, then the BIOS reports that multiple data bits failure. Failure results in a system halt.

Table 6-3 (b)   BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
1-4-2	0Dh	Parity failure first 64K RAM	At the completion of the rolling ones and pattern tests of the first 64K, the BIOS checks the parity error bits (bits 7 and 6) of port 60h. Failure results in a system halt.
2-1-1 2-1-2 2-1-3 2-1-4 2-2-1 2-2-2 2-2-3 2-2-4 2-3-1 2-3-2 2-3-3 2-3-4 2-4-1 2-4-2 2-4-3 2-4-4	10h-1Fh	First 64K RAM chip or data line failure on bit x	The first 64K of RAM is tested with a rolling ones test and a pattern test. If any of the rolling ones tests fail, then the BIOS reports the specific bit that failed. To determine the bit number from the diagnostic code, subtract 10h. For example, if 12h is displayed at the diagnostic port, bit 2 failed. Failure results in a system halt.
3-3-1	20h	Slave DMA register test in progress or failure.	Pattern test of channels 1 through 3 of the slave controller (starting port address = 02h). Failure results in a system halt.
3-1-2	21h	Master DMA register test in progress or failure.	Pattern test of channels 1 through 3 of the master DMA controller (starting port address = C4h). Failure results in a system halt.
3-1-3	22h	Master interrupt mask register test in progress or failure.	Rolling ones and zeros tests of the mask register of the master programmable interrupt controller (port 21h). Failure results in a system halt.
3-1-4	23h	Slave interrupt mask register test in progress or failure.	Rolling ones and zeros tests of the mask register of the master programmable interrupt controller (port A1h). Failure results in a system halt.
none	25h	Interrupt vector loading in progress.	No specific test is performed - just indicates that the Interrupt Vector table is being initialized.
3-2-4	27h	Keyboard controller test in progress or failure.	The self-test command (AAh) is issued to the 8042 (keyboard controller) and the results are monitored. Failure results in a system halt.

Table 6-3 (c)   BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
None	28h	CMOS RAM power failure and checksum calculation test in progress.	The power-fail bit in CMOS RAM is tested and the lower CMOS RAM area is being checksummed. A failure does not result in system halt.
None	29h	CMOS RAM configuration validation for video in progress.	No specific test is performed - just indicates that the configuration specified in CMOS for video is being matched against the actual installation. A failure does not result in a system halt.
3-3-4	2Bh	Screen memory test in progress or failure.	The video buffers (B0000h and B8000h) are tested with a pattern test and a rolling ones test. Failure will result in a beep code but not a system halt.
3-4-1	2Ch	Screen initialization in progress.	Until the video installation is confirmed, any calls to INT 10h Function 0 (set mode) will be prefaced with the diagnostic code. There is no expected failure from this.
3-4-2	2Dh	Screen retrace test in progress or failure.	Over a period of time, the retrace bit (bit0) in the appropriate CRT controller status register (either port 3BAh or 3DAh) is read and tested. The retrace bit should toggle from 0 to 1, then 1 to 0 within the time period.
None	2Eh	Search for video ROM in progress.	No specific test is performed by the system BIOS - just indicates that the BIOS is about to jump to the initialization code in the video option ROM.
none	30h	Screen running with video ROM.	No specific test is performed - just indicates that a video option ROM was found and believed to be operating.
none	31h	Monochrome monitor operable.	No specific test is performed - just indicates that the BIOS believes a monochrome monitor is installed and is operating.
none	32h	Color monitor (40-column) operable.	No specific test is performed - just indicates that the BIOS believes a color monitor is installed and is operating. The mode has been set to 40-column as selected by the user in CMOS RAM.
none	33h	Color monitor (80-column) operable.	No specific test is performed - just indicates that the BIOS believes a color monitor is installed and is operating. The mode has been set to 80-column as selected by the user in CMOS RAM.

Table 6-3 (d)   BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
4-2-1	34h	Timer-tick interrupt test in progress or failure.	All interrupts expect the timer-tick interrupt are masked off at the interrupt controllers. If a timer-tick interrupt does not occur during a specific time period, an error message is displayed on the screen. The system does not halt.
4-2-2	35h	Shutdown test in progress or failure.	A return address is stored in 40:67h and the processor is reset via the keyboard controller. If a timer tick occurs during this time period, an error message is displayed on the screen. Other failures are hard to detect. If possible, the BIOS will continue with POST, skipping the memory tests.
4-2-3	36h	Gate A20 failure.	To test extended memory, the processor must be placed in protected mode and the A20 line must be enabled. For the memory tests, the BIOS generally uses the keyboard controller to enable A20. If the A20 line is not properly set during the memory test, an error message is displayed on the screen and the memory test are suspended. The system does not halt.
4-2-4	37h	Unexpected interrupt in protected mode.	During the memory tests, the processor is placed in protected mode. All interrupts in the interrupt descriptor table are initialized to point to special handler that displays a message on the screen. All hardware interrupt are disabled. The system does not halt when an unexpected interrupt occurs.
4-3-1	38h	RAM test of memory above 64K in progress or failure.	The memory above the first 64K is tested with a rolling ones test and a pattern test. All success and failure messages are displayed on the screen and POST will continue.
4-3-2	3Ah	Programmable interval timer channel 2 test in progress or failure.	Over a period of time, the current count values in timer 2 are read and accumulated by ORing them into the values read so far. It is expected that during the time period, all bits will be set. If an error is detected, an error message will be displayed on the screen and POST will continue.
4-3-4	3Bh	Real-time clock test in progress or failure.	Over a period of time, the Update-In-Progress bit of Status Register A of the real-time clock is read and tested. The bit should toggle from 0 to 1 within the time period.

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Table 6-3 (e)   BIOS Beep Codes

Beep Code	Diagnostic Code	Description	Test Performed
4-4-1	3Ch	Serial port test in progress or failure.	Pattern test of one or more of the installed serial ports. If a failure is detected, an error message will be displayed and POST will continue.
4-4-2	3Dh	Parallel port test in progress or failure.	Rolling ones test is done to one or more of the installed parallel ports. If a failure is detected, an error message will be displayed and POST will continue.
4-4-3	3Eh	Math coprocessor test in progress or failure.	An integer load and store is performed with the math coprocessor. If the values do not match, an error message will be displayed and POST will continue.

6.2.4   Run-time Error Messages

Table 6-4   BIOS Run-time Error Messages

Message	Cause	Action
I/O card parity interrupt at *address*. Type (S)hut off NMI, (R)eboot, other keys to continue	Memory on a peripheral card has failed.	Check the memory cards installed in the system.
Memory parity interrupt at *address*. Type (S)hut off NMI, (R)eboot, other keys to continue	A memory chip(s) has failed.	Check the memory on the system board.
Unexpected HW interrupt *interrupt at address*. Type (R)eboot, other keys to continue	Hardware problem. Not displayed if the expected interrupt handler is not enabled.	Check all hardware in the system.
Unexpected SW interrupt *interrupt at address*. Type (R)eboot, other keys to continue	Error(s) in the software program. Not displayed if the extended interrupt handler is not enabled.	Turn the machine off and then on again. If doesn't work, check the program.
Unexpected type 02 interrupt at *xxxxh*. Type (S)hut off NMI, (R)eboot, other keys to continue	A parity error occurred, but the source can not be determined.	Turn the power off and then on again.

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6.3   Quick Troubleshooting

This section summarizes problems that may develop during system operation and lists suggested corrective actions to isolate problem properly.

Table 6-5 (a)   Quick Troubleshooting

Problem or Symptoms	Corrective Actions
No power (Power LED not on)	1. Check that the AC adapter is plugged into the DC-IN connector of the notebook. Also, that the AC adapter is plugged into a properly grounded AC power outlet. 2. If using the battery as main power source, check if the battery pack is of the right type, charged and is inserted correctly. 3. Check the internal DC-DC board of the notebook if it is inserted into the motherboard connector properly. Otherwise, replace the DC-DC board.
Power LED is on but no display and system does not turn on	1. Press power button for 4 seconds to reset hardware settings. Check if Power LED turns off. 2. Check memory module if it is inserted properly. Try to check also the module on the internal slot. 3. Reset CMOS RTC. 4. Replace memory module, CPU module, or DC-DC board.
Display on the LCD is unreadable	1. Adjust the brightness display controls. 2. Check if installed VGA driver is correct and resolution is set according to LCD size and type. 3. Check if the LCD cables are inserted properly. Check also connections inside the LCD panel. 4. Check LCD inverter board inside LCD panel if faulty. 5. Check the North Bridge chip on the motherboard if there is any cold or loosed soldering. 6. Replace the motherboard.
LCD screen does not show display	1. Check the LED Status Bar if Power Saving mode is activated. Press any key or press the power button to resume operation and display. 2. Check if the display output is switched to the external monitor. 3. Check if there is power. 4. Check if LCD cables are disconnected or loosed. 5. Replace LCD Inverter board found inside the LCD Panel.
Battery Power does not last or does not read properly under Win95/Win98	1. Make sure that the power management options under BIOS Setup are enabled and set properly. 2. Recharge the battery pack for at 3 least hours before using again. 3. Discharge and recharge the battery twice (Battery Low-Low Suspend Off) to allow more accurate reading of battery meter under Windows 95 or Windows 98. 4. Replace the battery pack.

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Table 6-5 (b)   Quick Troubleshooting

Problem or Symptoms	Corrective Actions
System halts during boot sequence	1. Check condition of selected bootload device (diskette or hard disk) for bad boot track or incorrect OS files. 2. Try booting from a new bootable diskette and recopy or repartition hard disk. 3. Check for any BIOS error messages on the display. 4. Replace motherboard.
I/O processing malfunctions	1. Check the connections of all internal devices. 2. Replace motherboard.
Diskette drive does not work	1. Check if FDD option is DISABLED under BIOS Setup program. 2. Check if floppy drive cable is connected properly. 3. Check diskette type if correct and not faulty. 4. Replace diskette drive. 5. Replace motherboard.
Hard disk drive malfunction	1. Check if hard disk drive is set properly on BIOS SETUP. 2. Check cables and connections. 3. Check if disk drive is good. Replace the drive. 4. Replace the motherboard.
CD-ROM drive malfunction	1. Check if drive is set properly on BIOS Setup. 2. Check if device driver is installed properly. Do not use other CD-ROM driver. 3. Check cables and connections. 4. Replace drive or motherboard.
Memory malfunction	1. Check if the memory module is inserted properly. Try to insert it also to the other slot. 2. Replace the memory module. 3. Replace the motherboard.
External keyboard or PS/2 mouse doesn't work	1. Check if keyboard or mouse is connected properly. Check PS/2 Y-cable if it is being used. Power off system first before plugging in the device. 2. Check PS/2 mouse driver if it is installed properly. 3. Replace the keyboard or mouse. 4. Replace the motherboard.
PCMCIA card does not work	1. Check if the PCMCIA card is inserted properly and all cables and connections are set. 2. Check the PCMCIA card driver installation for any IRQ or IO address conflict. Try to disable the COM2 port (SIR) inside the BIOS Setup menu to free up unused IRQ. 3. If PC card is not detected, insert it to the other PCMCIA slot. Otherwise, replace PC card. 4. Contact the PC card manufacturer for support. 5. Replace the motherboard.

Table 6-5 (c)   Quick Troubleshooting

Problem or Symptoms	Corrective Actions
Glidepad does not work	1. Check if PS/2 mouse driver is properly installed. Remove any external PS/2 mouse.
	2. Check the glidepad cable inside the system if it is inserted properly.
	3. Replace the glidepad module.
	4. Check the keyboard controller chip for any cold or loosed soldering.
	5. Replace the motherboard.
Serial device does not work	1. Check if Serial Port is set to ENABLED under BIOS Setup program (Advanced menu).
	2. Check if serial device is connected properly.
	3. If using serial mouse, check if Internal Touchpad is disabled under BIOS Setup. On Windows 95 or 98, check if it detects the serial mouse in System Device Manager under the Control Panel.
	4. Check if mouse driver is installed properly.
	5. Replace serial device.
	6. Check the South Bridge chip on the motherboard for any cold or loosed soldering.
	7. Replace the motherboard.
Parallel device does not work	1. Check if Printer is set to ENABLED under BIOS Setup program (Advanced menu).
	2. Check if all connections are properly set.
	3. Check if external device is turned on.
	4. Check if Printer Mode is set properly.
	5. Check the South Bridge chip on the motherboard for any cold or loosed soldering.
	6. Replace the motherboard.
IR Port does not work.	1. Check if IR port (COM2) is enabled under BIOS Setup (Advanced Menu).
	2. Check if IR driver is properly installed under Win95. Refer to Chapter 2.
	3. Check if File Sharing and Computer name is set properly on both sides.
	4. Check if Infrared Monitor is activated.
	5. Check if IR ports on both ends are not blocked or obstructed.
	6. Check the IR module.
	7. Check the I/O controller chip on the motherboard for any cold or loosed soldering.
	8. Replace the motherboard.

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Table 6-5 (d)   Quick Troubleshooting

Problem or Symptoms	Corrective Actions
USB Port does not work	1. Check if USB port option under BIOS Setup is ENABLED. 2. Check if USB device connection is OK. Unplug and re-plug the device. 3. Check if the USB port driver and the USB device driver are installed. 4. Replace USB device or contact USB device manufacturer for support. 5. Replace motherboard.
Audio components does not work	1. Check external connections if OK and volume mixer is set properly. 2. Check audio source (CD, tape, etc.) if faulty. 3. Check if audio driver is installed. 4. Check internal connections for speaker and microphone if not working. 5. Check audio board, cables and connections. 6. Replace motherboard.

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6.4   Component-Level Troubleshooting

This section provides an easy to follow flowcharts for performing component-level troubleshooting on the A440 notebook.

6.4.1   General Overview

The component-level troubleshooting is broken down as follows:

Troubleshooting Item	Figure
Starting Check	Figure 6-1
Memory Interface Check	Figure 6-2
CRT Interface Check	Figure 6-3
FDD Interface Check	Figure 6-4
HDD Interface Check	Figure 6-5
Internal Keyboard Interface Check	Figure 6-6
Glidepad Interface Check	Figure 6-7
CD-ROM Interface Check	Figure 6-8
Charger Board Interface Check	Figure 6-9
Serial Port Interface Check	Figure 6-10
Ext. Keyboard Interface Check	Figure 6-11
PS/2 Mouse Interface Check	Figure 6-12
Printer Port Interface Check	Figure 6-13
Audio Port Interface Check	Figure 6-14
PCMCIA Interface Check	Figure 6-15
USB Port Interface Check	Figure 6-16
IR Port Interface Check	Figure 6-17
LCD Panel Interface Check	Figure 6-18
Suspend Function Check	Figure 6-19
LED Indicator Function Check	Figure 6-20
Cover Switch Function Check	Figure 6-21
Internal Modem / LAN Interface Check	Figure 6-22
DC-DC Check	Figure 6-23
TV Out Check	Figure 6-24

6.4.2 Starting Check

```
                    ┌─────────┐
                    │  START  │
                    └─────────┘
                         │
                         ▼
        ┌──────────────┐   NO   ┌────────────────────┐
        │ +5Vs = 5V    │───────▶│ Check Q61, Pin3 =   │
        │ +3Vs = 3.3V  │        │ 12V, Q43 Pin 7 = 5V,│
        └──────────────┘        │ Check DC-DC         │
          YES  │                └────────────────────┘
               ▼                          │
        ┌──────────────┐   NO   ┌────────────────────┐
        │ Check CPU10  │───────▶│ Check U34 &         │
        │ Check Vcore7 │        │ Max1710             │
        └──────────────┘        └────────────────────┘
          YES  │                          │
               ▼                          │
        ┌──────────────┐   NO   ┌────────────────────┐
        │ Check AHCLK  │───────▶│ Check U24, Pin45    │
        └──────────────┘        └────────────────────┘
          YES  │                          │
               ▼                          │
        ┌──────────────┐   NO   ┌────────────────────┐
        │ Check DSC P4 │───────▶│ Check U20, PIN 2    │
        └──────────────┘        └────────────────────┘
          YES  │                          │
               ▼
                    ┌─────────┐
                    │   END   │
                    └─────────┘
```
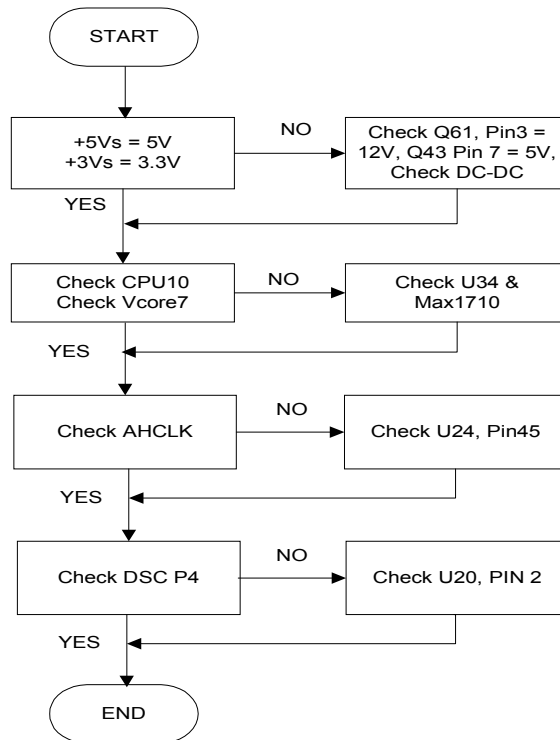
Figure 6-1   Starting Check

6.4.3 Memory Interface Check

```
                    ┌─────────┐
                    │  START  │
                    └─────────┘
                         │
                         ▼
        ┌──────────────────┐   NO   ┌────────────────────┐
        │ Check Memory Vcc= │───────▶│ Check DC-DC Board   │
        │ 3.3V             │        └────────────────────┘
        └──────────────────┘                 │
          YES  │                             │
               ▼                             │
        ┌──────────────────┐   NO   ┌────────────────────┐
        │ Check RAS         │───────▶│ Check SKT1, SKT2    │
        │ (0~3),CAS (0~7)   │        └────────────────────┘
        └──────────────────┘                 │
          YES  │                             │
               ▼                             │
        ┌──────────────────┐   NO   ┌────────────────────┐
        │ Check MA(0~13)    │───────▶│ Check RP20, RP21    │
        └──────────────────┘        └────────────────────┘
          YES  │                             │
               ▼                             │
        ┌──────────────────┐   NO   ┌────────────────────┐
        │ Check MD(0~63)    │───────▶│ Check SKT1 & SKT2   │
        └──────────────────┘        │ (0~63)              │
          YES  │                    └────────────────────┘
               ▼
                    ┌─────────┐
                    │   END   │
                    └─────────┘
```
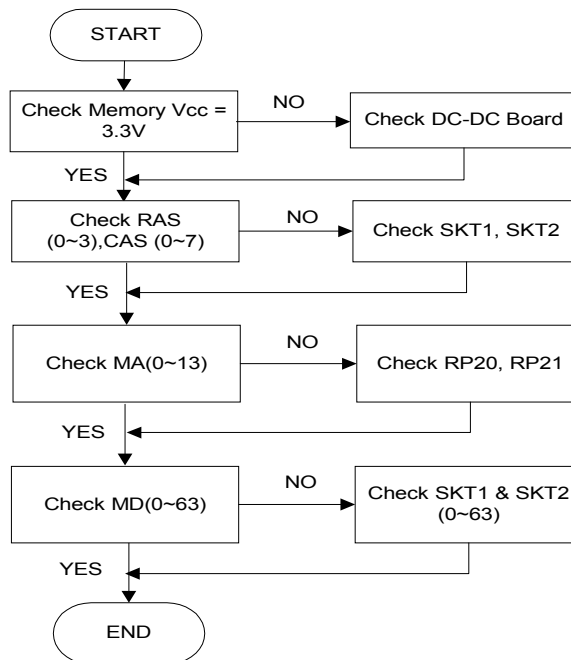
Figure 6-2   Memory Interface Check

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6.4.4 CRT Interface Check

```
                    ┌─────────┐
                    │  START  │
                    └─────────┘
                         │
                         ▼
          ┌──────────────────┐   NO   ┌──────────────────┐
          │  Check CN18 and  │───────▶│ Check L25, L26,  │
          │    CRT cable     │        │ L27, L42, L43    │
          └──────────────────┘        └──────────────────┘
                 │ YES ◀──────────────────────┘
                 ▼
          ┌──────────────────┐   NO   ┌──────────────────┐
          │  Check VGA clock │───────▶│ Check U24 Pin2   │
          │ OSC NB=14.318MHz │        │                  │
          └──────────────────┘        └──────────────────┘
                 │ YES ◀──────────────────────┘
                 ▼
              ┌─────────┐
              │   END   │
              └─────────┘
```
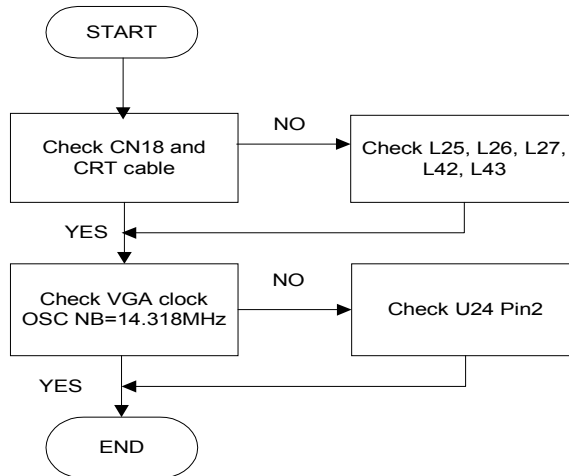
Figure 6-3   **CRT Interface Check**

6.4.5 FDD Interface Check

```
                    ⑤
                    │
                    ▼
          ┌──────────────────┐   NO   ┌──────────────────┐
          │ Check BIOS Setup │───────▶│ Enter Correct FDD│
          │      Menu        │        │      Type        │
          └──────────────────┘        └──────────────────┘
              │ YES ◀──────────────────────┘
              ▼
          ┌──────────────────┐   NO   ┌──────────────────┐
          │ Check if FDD is  │───────▶│ Format Diskette or│
          │properly formatted│        │  Change Diskette │
          └──────────────────┘        └──────────────────┘
              │ YES ◀──────────────────────┘
              ▼
          ┌──────────────────┐   NO   ┌──────────────────┐
          │ Check FDD Power  │───────▶│Check I/O board,  │
          │                  │        │CN613 Pin22,24,26=│
          │                  │        │       5V         │
          └──────────────────┘        └──────────────────┘
              │ YES ◀──────────────────────┘
              ▼
          ┌──────────────────┐   NO   ┌──────────────────┐
          │ Check Motor of FDD│──────▶│ Check I/P board  │
          │    operation     │        │CN613 Pin17,Signal C│
          └──────────────────┘        └──────────────────┘
              │ YES ◀──────────────────────┘
              ▼
          ┌──────────────────┐   NO   ┌──────────────────┐
          │   Check Seek     │───────▶│ Check CN11, Pin42,│
          │   operation      │        │     45, 35       │
          └──────────────────┘        └──────────────────┘
              │ YES ◀──────────────────────┘
              ▼
          ┌──────────────────┐   NO   ┌──────────────────┐
          │Check Read or Write│──────▶│ Check CN11, PIN43,│
          │   operation      │        │    44, 47        │
          └──────────────────┘        └──────────────────┘
              │ YES ◀──────────────────────┘
              ▼
           ┌─────────┐
           │   END   │
           └─────────┘
```

Figure 6-4   **FDD Interface Check**

6.4.6   HDD Interface Check

```
                        ⑥
                        │
                        ▼
  ┌──────────────────┐  NO  ┌──────────────────────┐
  │ Check BIOS Setup │─────▶│ Enter correct HDD type│
  │ Menu             │      │ or set to AUTO       │
  └──────────────────┘      └──────────────────────┘
          │ YES  ◀─────────────────┘
          ▼
  ┌──────────────────┐  NO  ┌──────────────────────┐
  │ Check if HDD is  │─────▶│ Use DOS FDISK and    │
  │ properly formatted│      │ FORMAT               │
  └──────────────────┘      └──────────────────────┘
          │ YES  ◀─────────────────┘
          ▼
  ┌──────────────────┐  NO  ┌──────────────────────┐
  │ Check HDD Power  │─────▶│ Check I/O board, CN612│
  │                  │      │ Pin2, 3, 4           │
  └──────────────────┘      └──────────────────────┘
          │ YES  ◀─────────────────┘
          ▼
  ┌──────────────────┐  NO  ┌──────────────────────┐
  │ Check HDD Data   │─────▶│ Check I/P board CN612 │
  │ Bus              │      │                      │
  └──────────────────┘      └──────────────────────┘
          │ YES  ◀─────────────────┘
          ▼
  ┌──────────────────┐  NO  ┌──────────────────────┐
  │ Check HDD Address│─────▶│ Check I/O Board CN612,│
  │ Bus              │      │ Pin10,12,9,PDA0,PDA1, │
  └──────────────────┘      │ PDA2                 │
          │ YES  ◀──────────└──────────────────────┘
          ▼
       ╭────────╮
       │  END   │
       ╰────────╯
```
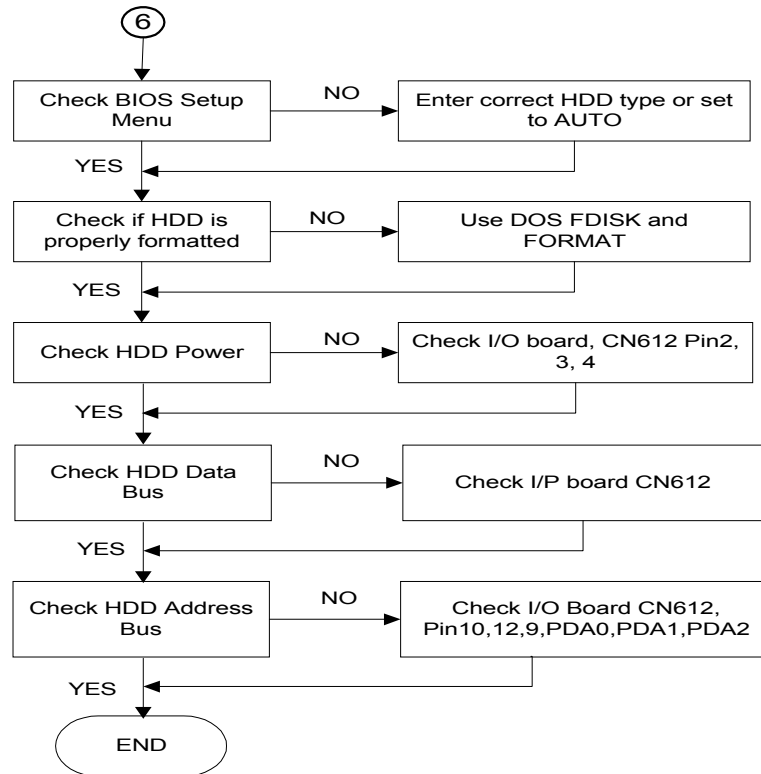
Figure 6-5   **HDD Interface Check**

6.4.7   Internal Keyboard Check

```
                        ⑦
                        │
                        ▼
  ┌──────────────────┐  NO  ┌──────────────────────┐
  │ Check the keyboard│─────▶│ Check FPC cable if   │
  │ FPC cable        │      │ broken or not        │
  └──────────────────┘      └──────────────────────┘
          │ YES  ◀─────────────────┘
          ▼
  ┌──────────────────┐  NO  ┌──────────────────────┐
  │ Check Keyboard   │─────▶│ Check U26            │
  │ Interrupt        │      │ Pin 23, IRQ1         │
  └──────────────────┘      └──────────────────────┘
          │ YES  ◀─────────────────┘
          ▼
  ┌──────────────────┐  NO  ┌──────────────────────┐
  │ Check Keyboard   │─────▶│ Check K/B connector  │
  │ scanning signals │      │ and check AIO to AMB │
  └──────────────────┘      │ connector            │
          │ YES  ◀──────────└──────────────────────┘
          ▼
       ╭────────╮
       │  END   │
       ╰────────╯
```
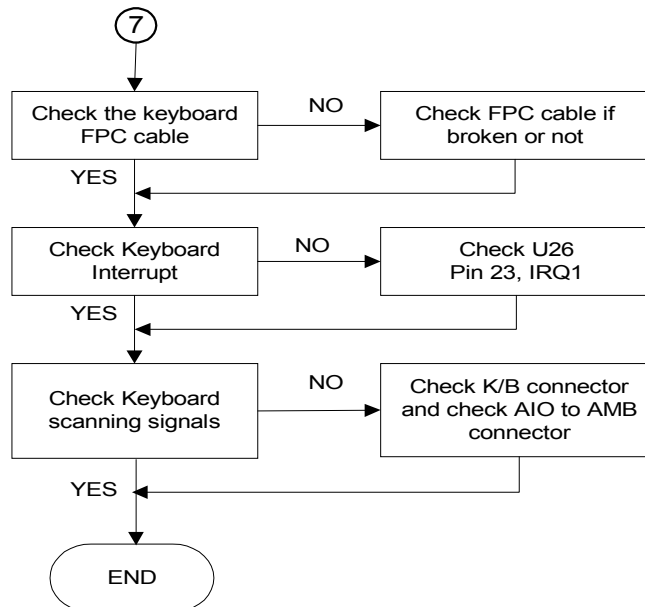
Figure 6-6   **Internal Keyboard Check**

6.4.8 Glidepad Interface Check

```
                    ( 8 )
                      |
                      v
    +------------------+   NO    +----------------------+
    | Check Glidepad Data |------>| Check Audio Board CN6, |
    | Signal           |         | Pin2, GLPDATA Signal  |
    +------------------+         +----------------------+
         | YES                            |
         v<------------------------------+
    +------------------+   NO    +----------------------+
    | Check Glidepad   |------>| Check Audio board CN6  |
    | signal CLK       |         | Pin3, GLPCLK signal   |
    +------------------+         +----------------------+
         | YES                            |
         v<------------------------------+
    +------------------+   NO    +----------------------+
    | Check Glidepad   |------>| Check CN6 ( On Audio   |
    | Power            |         | Board ), Pin 1= 5V    |
    +------------------+         +----------------------+
         | YES                            |
         v<------------------------------+
    +------------------+   NO    +----------------------+
    | Check Glidepad IRQ |------>| Check U26 ( M38867 )  |
    |                  |         | Pin 22, IRQ 12        |
    +------------------+         +----------------------+
         |                               |
         v<------------------------------+
      (  END  )
```
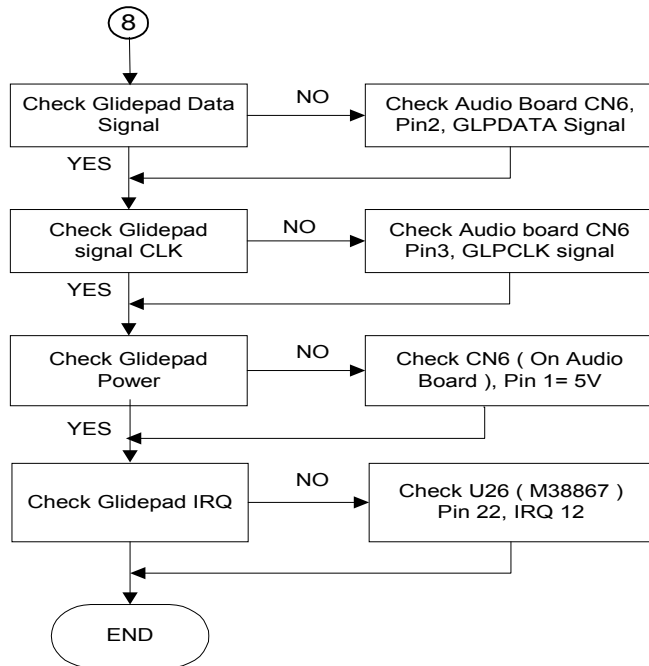
Figure 6-7   Glidepad Interface Check

6.4.9 CD-ROM Interface Check

```
                    ( 9 )
                      |
                      v
    +------------------+   NO    +----------------------+
    | Check CD-ROM     |------>| Check CN12, Pin        |
    | Power            |         | 38,39,40,41,42 =  5V  |
    +------------------+         +----------------------+
         | YES                            |
         v<------------------------------+
    +------------------+   NO    +----------------------+
    | Check CD-ROM Data |------>| Check CN12 SDD        |
    | Bus              |         | (0~15)                |
    +------------------+         +----------------------+
         | YES                            |
         v<------------------------------+
    +------------------+   NO    +----------------------+
    | Check CD-ROM     |------>| Check CN12, Pin        |
    | Address Bus      |         | 33,31,34,             |
    |                  |         | SDA0,SDA1,SDA2        |
    +------------------+         +----------------------+
         | YES                            |
         v<------------------------------+
    +------------------+   NO    +----------------------+
    | Check IRQ Signal |------>| Check CN12 Pin29,      |
    |                  |         | IRQ15                 |
    +------------------+         +----------------------+
         |                               |
         v<------------------------------+
      (  END  )
```
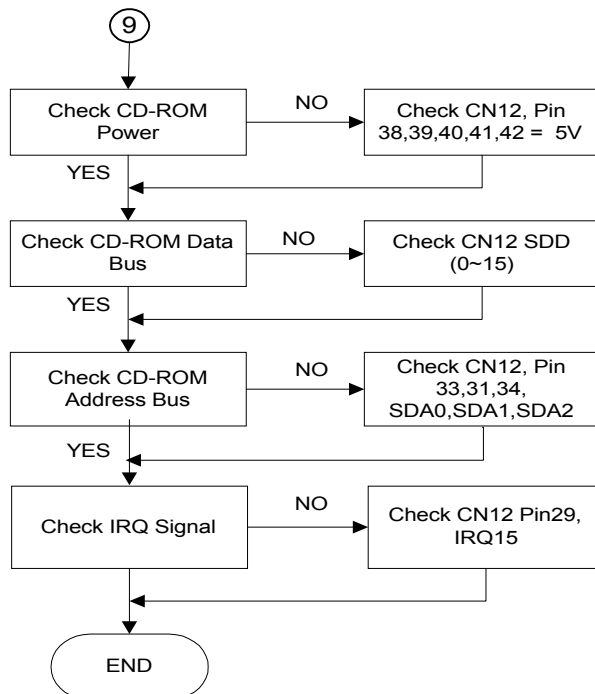
Figure 6-8   CD-ROM Interface Check

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6.4.10 Charger Board Interface Check

```
                    (10)
                     │
                     ▼
          ┌──────────────────────┐
          │  Plug-in AC adapter  │
          └──────────────────────┘
                     │
                     ▼
          ┌──────────────────┐   NO   ┌────────────────────┐
          │   DC_IN = 20V    │──────▶ │  Check M/B TW1, F1 │
          └──────────────────┘        └────────────────────┘
              │ YES ◀─────────────────────────┘
              ▼
          ┌──────────────────┐   NO   ┌────────────────────┐
          │     Q6 = 5V      │──────▶ │  Check AIO CHG_EN  │
          └──────────────────┘        └────────────────────┘
              │ YES ◀─────────────────────────┘
              ▼
          ┌──────────────────┐   NO   ┌────────────────────┐
          │  Charge Battery  │──────▶ │ Check U1, Q6, Q7,  │
          │                  │        │        Q8          │
          └──────────────────┘        └────────────────────┘
              │ YES ◀─────────────────────────┘
              ▼
          ┌──────────────────┐   NO   ┌────────────────────┐
          │ Check SMBC, SMBD │──────▶ │ Check U602, U401,  │
          │                  │        │        F601        │
          └──────────────────┘        └────────────────────┘
              │                                 │
              ▼                                 ▼
          ┌────────┐               ┌──────────────────────┐
          │  END   │◀──────────────│  Check Battery Pack  │
          └────────┘               │   Voltage & Temp     │
                                   └──────────────────────┘
```
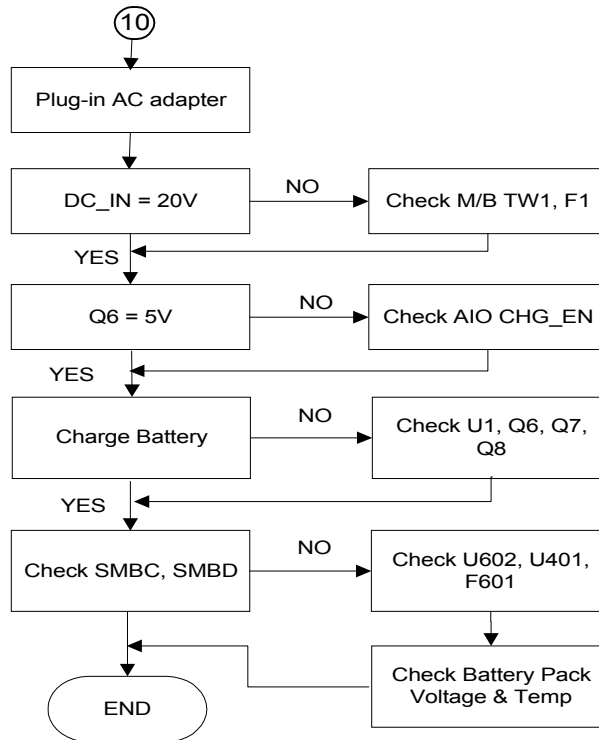
Figure 6-9   Charger Board Interface Check

6.4.11 Serial Port Interface Check

```
                    (11)
                     │
                     ▼
          ┌──────────────────────┐   NO   ┌────────────────────┐
          │   Check BIOS Setup   │──────▶ │ Enter correct type │
          │                      │        │      for COM1      │
          └──────────────────────┘        └────────────────────┘
              │ YES ◀─────────────────────────┘
              ▼
          ┌──────────────────────┐   NO   ┌────────────────────┐
          │  Check Transmitting  │──────▶ │     Check U3       │
          │       Signal         │        │  (MAX3243) SOUT1   │
          └──────────────────────┘        └────────────────────┘
              │ YES ◀─────────────────────────┘
              ▼
          ┌──────────────────────┐   NO   ┌────────────────────┐
          │   Check Receiving    │──────▶ │     Check U3       │
          │       Signal         │        │  (MAX3243) SIN1    │
          └──────────────────────┘        └────────────────────┘
              │ YES ◀─────────────────────────┘
              ▼
          ┌────────┐
          │  END   │
          └────────┘
```
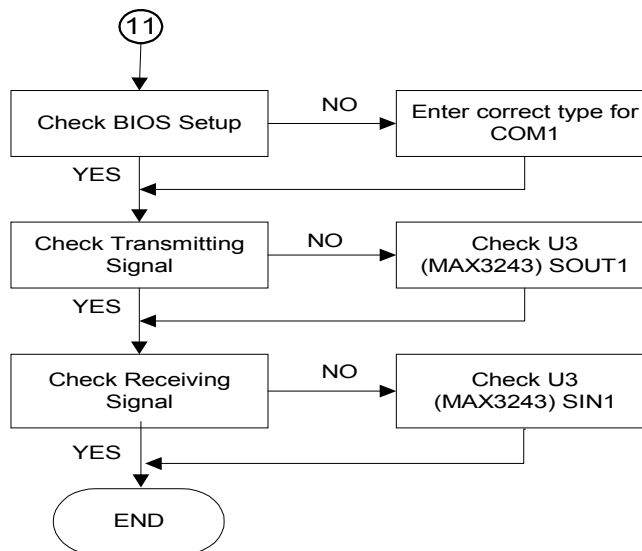
Figure 6-10   Serial Port Interface Check

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6.4.12 External Keyboard Check
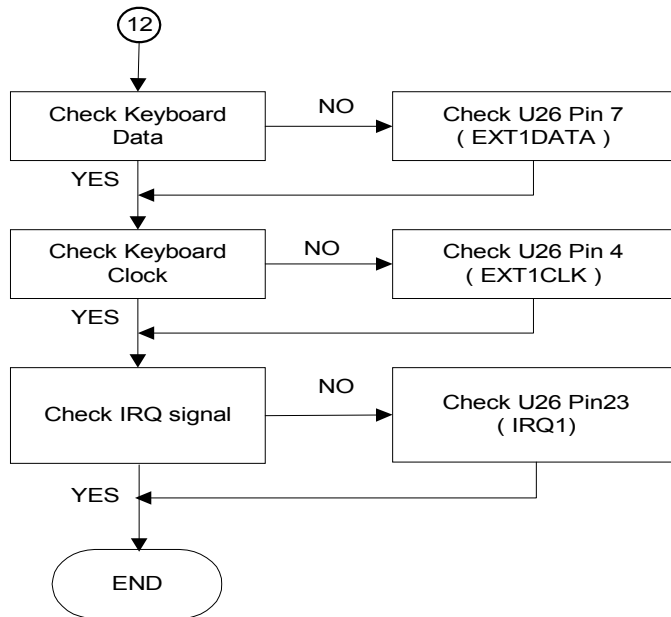
Figure 6-11   Internal Keyboard Check

6.4.13 PS/2 Mouse Interface Check

Figure 6-12   Internal Keyboard Check

6.4.14 Printer Port Interface Check

Figure 6-13   Printer Port Interface Check

6.4.15 Audio Port Interface Check

Figure 6-14   Audio Port Interface Check

6.4.16 PCMCIA Interface Check

Figure 6-15   PCMCIA Interface Check

6.4.17 USB Port Interface Check

Figure 6-16   USB Port Interface Check

6.4.18 IR Interface Check

```
                    (18)
                     │
                     ▼
          ┌──────────────────┐    NO    ┌──────────────────┐
          │  Check IR Power  │─────────▶│ Check I/O board  │
          │                  │          │ U604             │
          └──────────────────┘          │ Pin 1 = +5V      │
                     │ YES              └──────────────────┘
                     │◀─────────────────────────┘
                     ▼
          ┌──────────────────┐    NO    ┌──────────────────┐
          │ Check IR         │─────────▶│   Replace IR     │
          │ Component        │          │                  │
          └──────────────────┘          └──────────────────┘
                     │ YES              │
                     │◀─────────────────┘
                     ▼
          ┌──────────────────┐    NO    ┌──────────────────┐
          │ Check IR signal  │─────────▶│ Check I/O board  │
          │                  │          │ U604,            │
          └──────────────────┘          │ Pin 8, 9 Signal  │
                     │ YES              └──────────────────┘
                     │◀─────────────────────────┘
                     ▼
               ╭──────────╮
               │   END    │
               ╰──────────╯
```
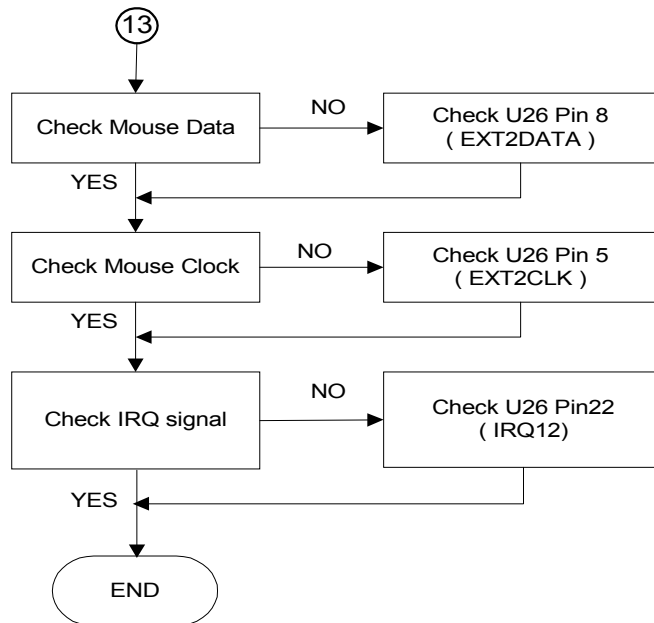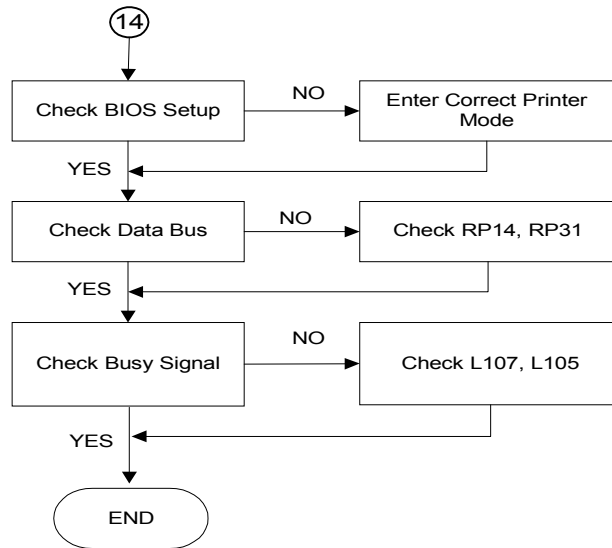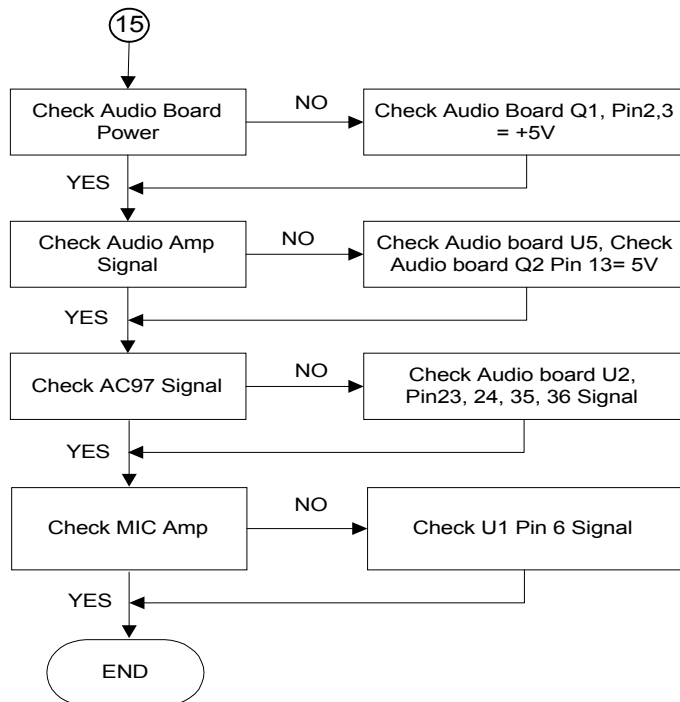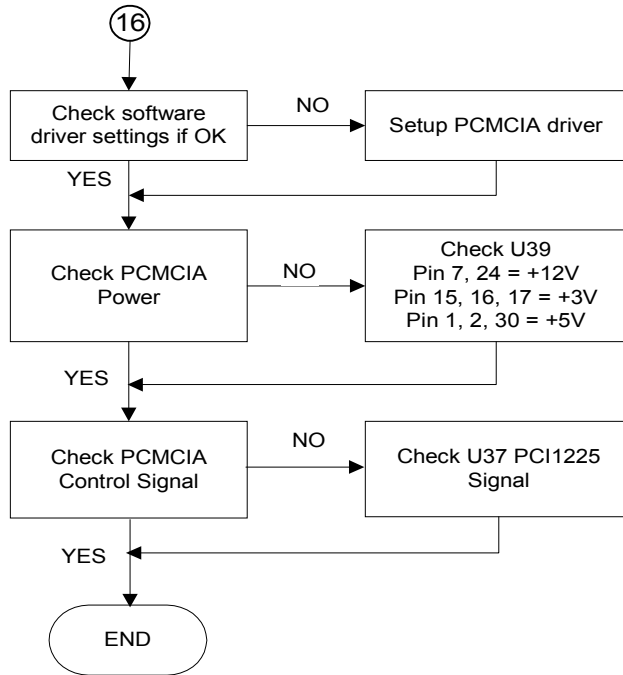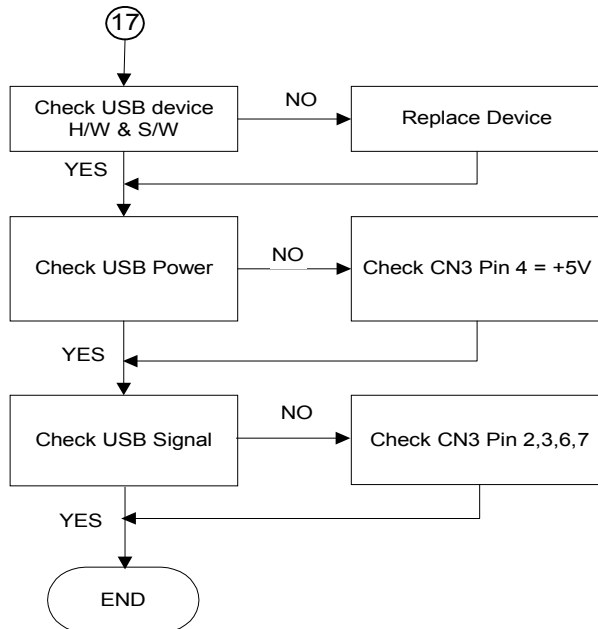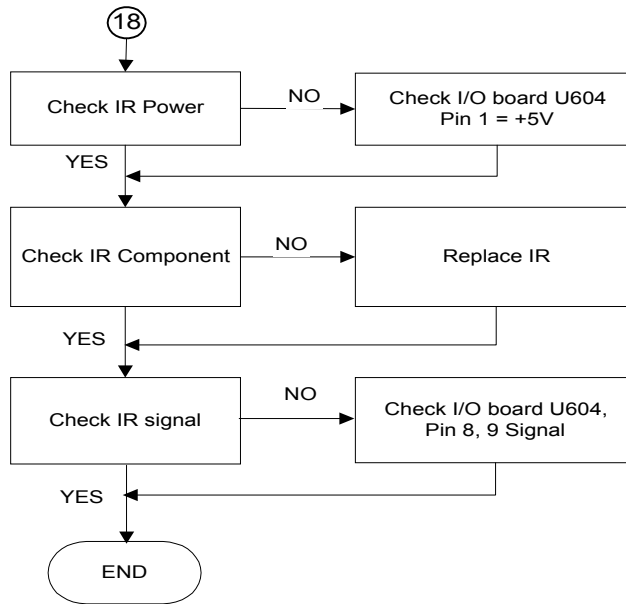
Figure 6-17   IR Port Interface Check

6.4.19 LCD Panel Interface Check

```
                    (19)
                     │
                     ▼
          ┌──────────────────┐    NO    ┌──────────────────────┐
          │ Check LCD power  │─────────▶│   Check U21          │
          └──────────────────┘          │   Pin 1, 3 = +3V     │
                │ YES                   └──────────────────────┘
                │◀──────────────────────────────┘
                ▼
          ┌──────────────────┐    NO    ┌──────────────────────────┐
          │ Check LCD Control│─────────▶│ Check CN17 Pin 56 (Enalcp)│
          │ Signal           │          │ 60 (Contrast), 63 (Invena)│
          └──────────────────┘          │ 65 ( Brightness)          │
                │ YES                   └──────────────────────────┘
                │◀──────────────────────────────┘
                ▼
          ┌──────────────────┐    NO    ┌──────────────────────────┐
          │ Check LCD clock  │─────────▶│ Check CN17 Pin 51 (SCLK) │
          │ Signal           │          │ 53 (SFLM), 57 (SLP), 59 (SDE)│
          └──────────────────┘          └──────────────────────────┘
                │ YES                   │
                │◀──────────────────────┘
                ▼
          ┌──────────────────┐    NO    ┌──────────────────────────┐
          │ Check LCD Data   │─────────▶│ Check CN17 LCD0~23 Signal│
          │ Signal           │          │                          │
          └──────────────────┘          └──────────────────────────┘
                │ YES                   │
                │◀──────────────────────┘
                ▼
          ┌──────────────────┐    NO    ┌──────────────────────────┐
          │ Check Different  │─────────▶│ Check U23, LV010+-, LV011+-,│
          │ Signal           │          │ LV012+-, LV01+-          │
          └──────────────────┘          └──────────────────────────┘
                │ YES                   │
                │◀──────────────────────┘
                ▼
           ╭──────────╮
           │   END    │
           ╰──────────╯
```
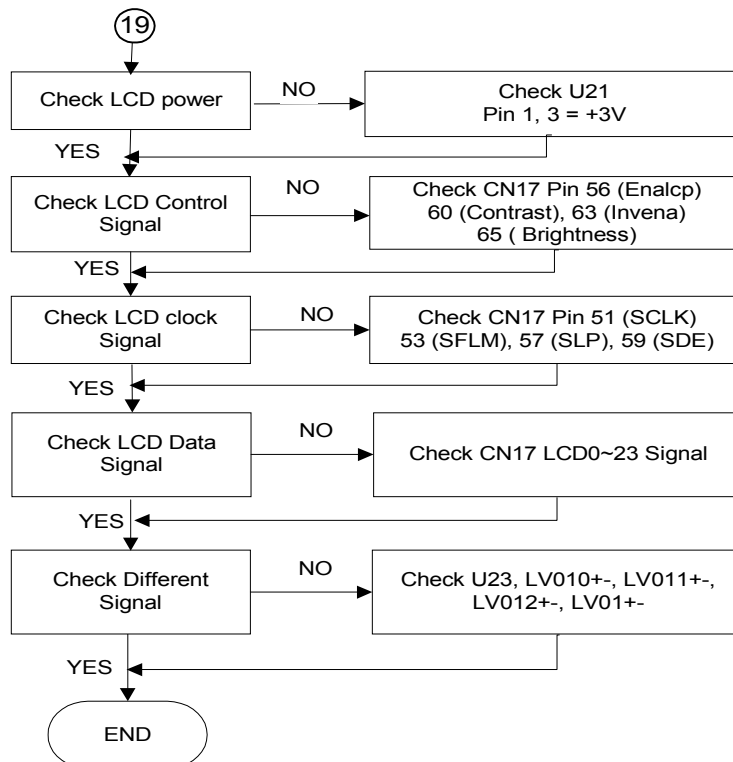
Figure 6-18   LCD Panel Interface Check

6.4.20 Suspend Function Check

```
                          ⟨20⟩
                           │
                           ▼
              ┌────────────────────────────┐
              │  Check BIOS Power Management │
              │        if it is set to       │
              │      Save to RAM or DISK     │
              └────────────────────────────┘
                           │
                          YES
                           │
                           ▼
              ┌────────────────────────────┐
              │   Execute Suspend routine by │
              │  pressing <Fn>+<F4> keys or  │
              │     pressing cover switch    │
              └────────────────────────────┘
                      │                  │
          ┌───────────┘                  └───────────┐
          ▼                                          ▼
  ┌─────────────────┐                      ┌─────────────────┐
  │  Suspend to RAM  │                      │  Suspend to DISK │
  └─────────────────┘                      └─────────────────┘
          │                                          │
          ▼                                          ▼
  ┌─────────────────┐                      ┌─────────────────┐
  │    Check U16     │                      │  Check U16, Pin 28│
  │ Pin 27 (STR#) = 0V│                     │   ( STD# = 0V )   │
  │ Pin 28 (STR#) = 0V│                     └─────────────────┘
  └─────────────────┘                                │
          │                                          ▼
          ▼                                ┌─────────────────┐
  ┌─────────────────┐                      │ Resume operation │
  │ Resume operation │                      └─────────────────┘
  └─────────────────┘                                │
          │                                          ▼
          ▼                                ┌─────────────────┐
  ┌─────────────────┐                      │  Check U16 , Pin28│
  │  Check U16, Pin27 │                     │  ( STD# = 3.3V )  │
  │  ( STR# = 3.3V )  │                     └─────────────────┘
  └─────────────────┘                                │
          │                                          │
          └────────────────┬─────────────────────────┘
                           ▼
                       ⟨ END ⟩
```
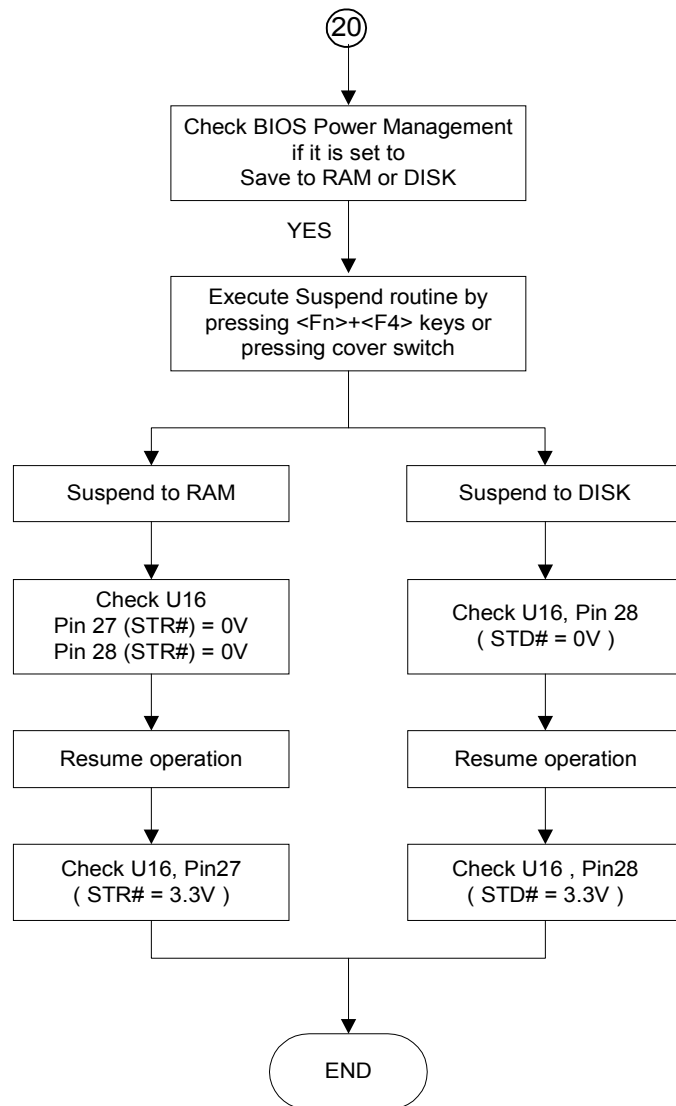
Figure 6-19   Suspend Function Check

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6.4.21 LED Indicator Function Check

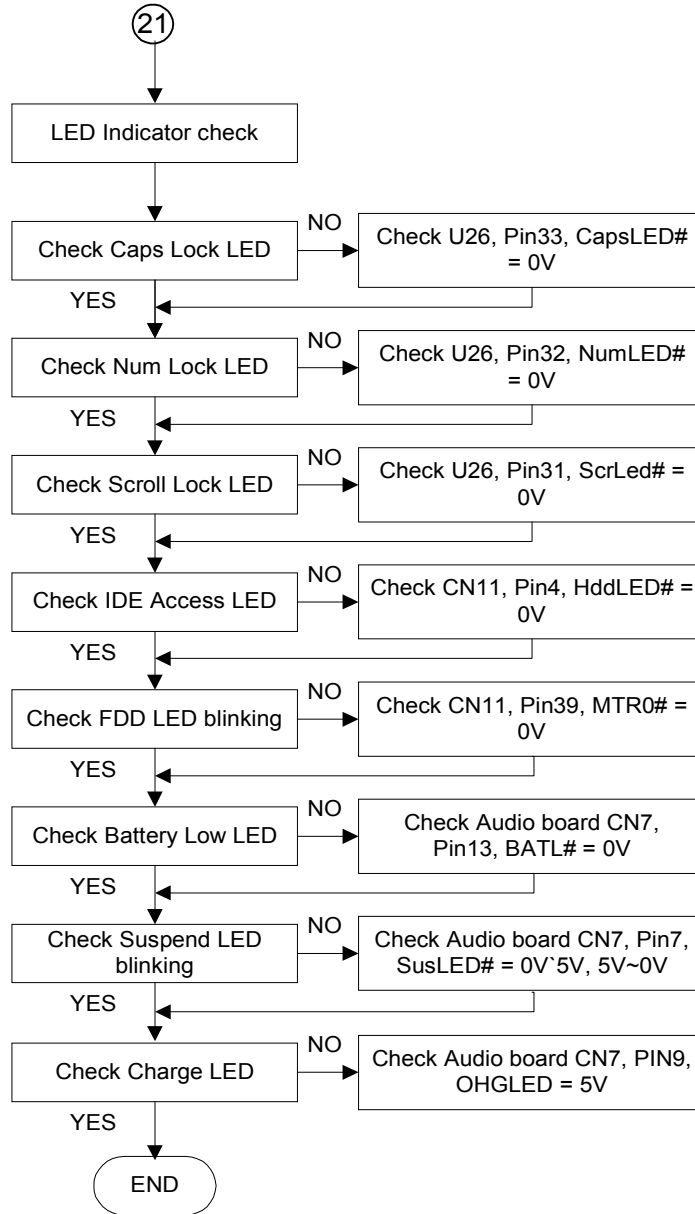**Figure 6-20   Suspend Function Check**

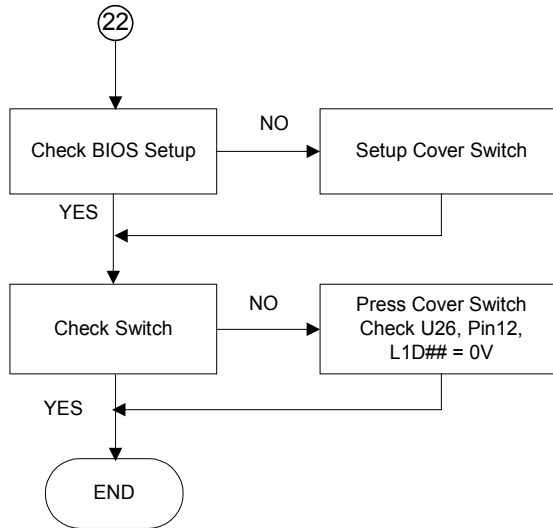## 6.4.22 Cover Switch Function Check

Figure 6-21   Cover Switch Function Check

6.4.23 Internal Modem or LAN Port Check
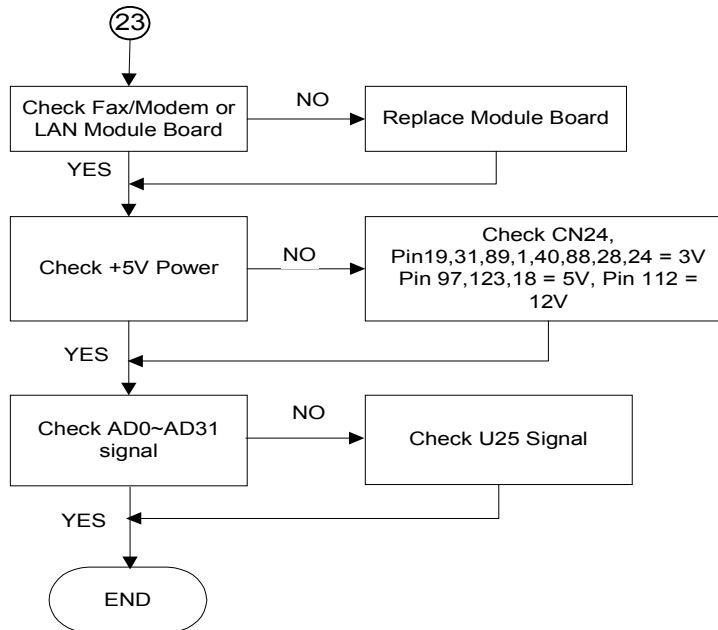

Figure 6-22   Internal Fax/Modem Port Check

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6.4.24 DC-DC Power Check
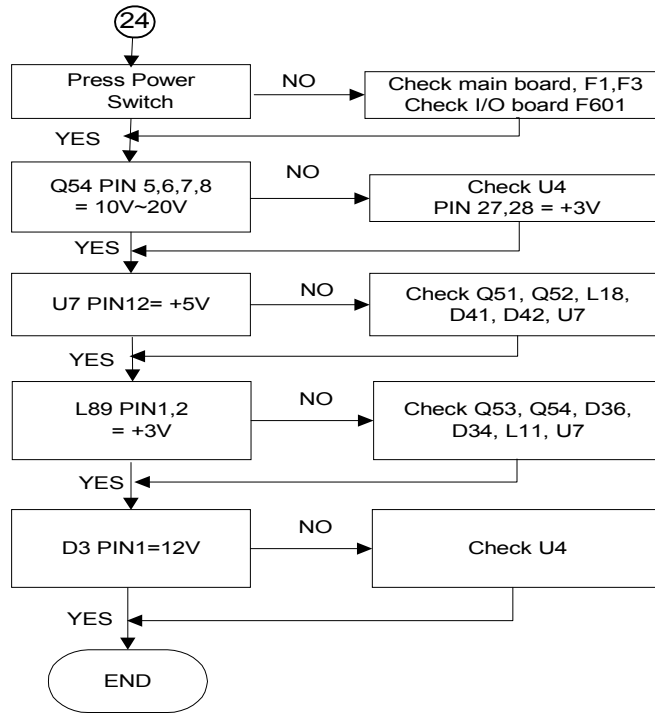

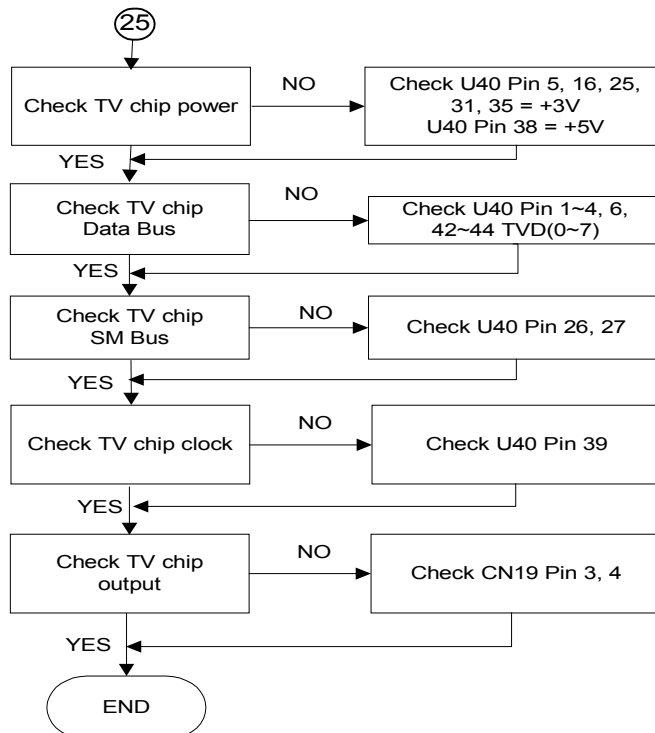**Figure 6-23   DC-DC Power Check**

6.4.25 TV Out Check

Figure 6-24   TV Out Check