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1 Cellphone appearance

2 Layout of motherboard

Front of motherboard:
Back of motherboard:
3 Baseband
3.1 LCD display

3.1.1 When the device is turned on there’s nothing on screen

- Screen is blank.
  - Check whether the connectors of the LCD are attached correctly. Re-install FPC. Check whether the cellphone works.
    - Y: OK
    - N: Check whether the EMI components in LCD channel on motherboard have dry joint problems. Re-solder the EMI components.
      - Y: OK
      - N: Replace the LCD module.
3.1.2 LCD backlight doesn’t light up.

Check whether connections between FPC of LCD module and connectors on motherboard are good. Reconnect them. Check whether LCD backlight works.

N

Check whether the output of the backlight circuit at the motherboard end is correct. Check whether chip U1601 works.

N

Replace U1601.

Y

Replace U1661.

Y

Y

OK

Y

Replace the LCD module.

OK

3.2 Cameras do not work properly.

3.2.1 Back camera does not work properly.
Can’t take photos.

Disassemble the unit. Check whether the Camera module is detached. Re-assemble the module. Check whether it can take photos.

- **Y**
  - OK

- **N**
  - Replace the Camera module. Check whether it can take photos.
    - **Y**
      - OK
    - **N**
      - Check the solder joints of the Camera module connectors. Repair soldering on the connectors. Check whether it can take photos.
        - **Y**
          - OK
        - **N**
          - Check whether the EMI components are integrated and check their solder joints. Repair the EMI components.
            - **N**
              - Repair soldering, and try again.
            - **N**
              - Re-solder or replace U1201.

- **N**
  - Check the solder joints of U1202.
3.2.2 Front camera doesn’t work properly.

Can’t take photos.

Disassemble the unit. Check whether the Camera module is detached. Re-assemble the module. Check whether it can take photos.

- Y: OK
- N: Replace the Camera module. Check whether it can take photos.

- Y: OK
- N: Check whether the module’s connectors are deformed.

- Y: Replace connector J1605.
- N: Check the solder joints of the Camera module connectors. Repair soldering on the connectors. Check whether it can take photos.

- Y: OK
- N: Check whether the EMI components are integrated and check their solder joints. Repair the EMI components.

- N: Repair soldering, and
- N: Check the solder joints of U1201.

- N: Re-solder or replace U1201.
3.3 Ring and Vibration

3.3.1 It does not vibrate.

It does not vibrate.

N

Check whether the solder joints of the motor and the peripheral components are normal. Re-solder and retry to see whether the problem is fixed.

Y OK

N

Replace the motor. Check whether the problem is fixed.

Y OK

N

Replace chip U1201.

3.3.2 It does not ring.
It does not ring.

Replace speaker. Retry to see whether it rings.

Check whether audio power amplifier on antenna sub-board has a dry joint problem or is damaged. Repair soldering or replace it. Try again to see whether it rings.

Check whether the connections of the main FPC connectors are OK.

Test with earphones. If there’s sound in earphones, then there is audio signal input. Check whether the components related to the audio power amplifier have dry joint problems. Re-solder. Check whether the problem is fixed.

Check PMU chip U1201. If it’s damaged, replace it.
3.4 Charging

3.4.1 It doesn’t show the charging indicator when charger is plugged in.
It doesn't show the charging indicator when charger is plugged in.

Y
Replace the charger. Check whether it can charge normally.

N
Replace the battery. Check whether it can charge normally and the battery’s voltage is lower than 3V.

Y
Replace the battery.

N
Check the solder joints of the components of the charging chip-module U1301. Re-solder. Check whether the problem is fixed.

Y
OK

N
Replace U1201.

Y
OK

N
Replace the charger.
3.4.2 It shows the charging indicator. But the battery can’t be fully charged.

It shows the charging indicator. But the battery can’t be fully charged.

Replace the battery and try again to see whether the battery can be fully charged.

- Y: OK
- N: Check the solder joints of charging chip U1301. Repair soldering. Try again.

Check the solder joints of charging chip U1301. Repair soldering. Try again.

- Y: OK
- N: Replace the components of module U1301. Try again.

Replace the components of module U1301. Try again.

- Y: OK
- N: Replace U1201.

Replace U1201.

- Y: OK
- N:
3.5 Keyboard and keyboard backlight

3.5.1 Keyboard can’t work properly.

- keyboard can’t work properly.
  - Check whether the touch panel isn’t connected properly or is damaged.
    - Y → OK
    - N → Replace motherboard.
3.5.2 **Keyboard backlight doesn’t light up.**

Keyboard backlight doesn’t light up.

Some backlights don’t light up

Is the main FPC connected properly?

LED is damaged, replace it.

OK

Replace U1201.
3.6 Audio problems during phone calls

3.6.1 You can’t hear the person you are talking to during a phone call.

The receiver is silent

Check whether the speaker is OK and connected properly.

N

Replace the speaker. Try again to see whether the problem is fixed.

N

Check whether B1481 and B1482 have dry joint problems. Repair soldering. Try again to see whether it rings.

N

Replace chip U1201
3.6.2 You can’t be heard by the person you are talking to during a phone call.

You can’t be heard by the person you are talking to.

Check to see whether MIC and surrounding components need to be re-soldered.

Y → Re-solder.

N

Replace microphone. Check whether the problem is fixed.

Y → OK

N

Check whether the main FPC is connected properly?.

Y → OK

N

Check U1201.
3.7 Device will not turn on.

Device will not turn on.

Check whether the power-on key is soldered properly or has a dry joint problem?  

- Y: Re-solder.
- N: Is there a big current when power supply of motherboard is the phone’s only power source?
  
  - Y: Motherboard is damaged. Replace motherboard. Troubleshoot the faulty board.
  - N: Can U2104 work properly at the frequency of 26MHz?
    
    - Y: Repair soldering, and try again.
    - N: Can X1301 work properly?
      
      - Y: Replace main chip U1201.
      - N: Repair soldering or replace X1301.
4 Radio frequency

4.1 GSM calibration during production

4.1.1 GSM AFC calibration

- Problem: AFC calibration failed.
- Reason: Connections of RF test cable are not reliable during the calibration. TCXO is fitted reversely or has a dry joint problem. Receiving channel is open.
- Troubleshooting:

  AFC calibration failed.
  
  Check whether connections of RF cable and fittings are reliable.
  
  N → Re-connect and calibrate.
  
  Y → Check whether the crystal (U2104) is fitted reversely or has a dry joint problem.
  
  Y → Re-solder.
  
  N → Is the separate calibration of GSM Rx Path Loss successful?
  
  Y → Analyse the Rx Path Loss problem at first.
  
  N → Replace main chip MT6166(U2101) or MT6582(U1201).

- Note: Normally you need to re-calibrate the corresponding components after the replacement.

4.1.2 GSM Rx Path Loss calibration

- Problem: Rx Path Loss calibration failed.
- Reason: During the calibration, connections of RF test cable are not reliable; components in receiving channel (such as RF connectors), PA module, saw filter and peripheral capacitors have
dry joint problems.

Troubleshooting:

- **Note:** Normally you need to re-calibrate the corresponding components after the replacement.

### 4.1.3 GSM AFC calibration

- **Problem:** APC calibration failed.
- **Reason:** During the calibration, connections of RF test cable are not reliable; PA module (U2102) is fitted reversely; PA module and peripheral circuits have dry joint problems; the patches of PA
module’s RF input circuits are shifted, and shield bracket is short circuit.

- **Troubleshooting:**

  1. **PCL calibration failed.**
     - Check the calibration report to see whether every frequency band failed.
     - **Did GSM frequency band fail?**
       - **Y:** Re-solder.
       - **N:** Does PA input R2105 have a solder short problem?
         - **Y:** Re-solder.
         - **N:** Does PA(U2102) have a dry joint problem?
           - **Y:** Re-solder.
           - **N:** Check the calibration report to see whether every frequency band failed.
     - **Y:** DCS/PCS frequency band failed.
     - **Is AGC calibration normal?**
       - **N:** Analyse AGC at first.
       - **Y:** Does PA module (U2102) have a dry joint problem?
         - **Y:** Re-solder.
         - **N:** Do APC circuit (R2111,R2112) have dry joint problems?
           - **Y:** Re-solder.
           - **N:** **N**

  2. **Did GSM frequency band fail?**
     - **Y:** Re-solder.
     - **N:** PA input R2105 has a solder short problem.
       - **Y:** Does PA input R2105 have a solder short problem?
         - **Y:** Replace corresponding.
         - **N:** Check RF receiver and transmitter MT6166(U2101) or baseband chip U1201.
       - **N:** PA input R2105 does not have a solder short problem.
         - **Y:** Does PA(U2102) have a dry joint problem?
           - **Y:** Re-solder.
           - **N:** Check the calibration report to see whether every frequency band failed.
         - **N:** Does PA(U2102) have a dry joint problem?
           - **Y:** Re-solder.
           - **N:** Check RF receiver and transmitter MT6166(U2101) or baseband chip U1201.

- **Note:** Normally you need to re-calibrate the corresponding components after the replacement.
4.2 GSM comprehensive test

4.2.1 Switching spectrum and PVT template are over the limits.

- Switching spectrum and PVT template of three frequency bands (GSM, DCS and PCS) are over the limits.
- If C2111 on PA's V_ramp signal cable is damaged or has a dry joint problem, switching spectrum may become over the limits.
- Troubleshooting:

  Switching spectrum and Ramp Mask are over the limits.

  Check whether the voltage of Pin13 of PA module (U2102) is in the normal range.

  Check whether input and output matching components have dry joint problems.

  Replace components which have dry joint problems.
  Replace PA module as needed.

4.2.2 Frequency Error is too big.

- Problem: Frequency Error is over the limit in whole-unit test.
- Reason: TCXO’s VAFC input circuit has a problem.
- Troubleshooting:
4.2.3 Phase Error is too big.

- **Problem:** Phase Error is over the limit in whole-unit test.
- **Reason:** Capacitors in power feeding circuits of PA module and transceiver have dry joint problems. Or there’s short circuit between these capacitors and other resistors.
- **Troubleshooting:**

  Frequency Error is over the limit.

  Re-calibrate.

  Check whether U2104 is damaged or has a dry joint problem.

  Replace components which have dry joint problems.

  Check power feeding circuits of PA (U2102) and Transceiver (U2101).

  Replace components which have dry joint problems.
4.2.4 Power output related problems

- Problem: The device can turn on and receive signals normally. But there’s no power output or power output is very low, when it is trying to output power of double frequency bands or single frequency band.

- Reason: Many factors can cause no or low power output, such as when Transceiver output circuit, PA module input/output circuit, antenna connectors and antenna switch control signals or power feeding circuits have a problem. In particular:

  - **RF connector (CON2101)**
    
    Check whether connections between RF connector CON2101 and test probes of RF test cable are reliable; patches are fixed in the correct direction; or antenna connectors are damaged.

    Solution: Replace antenna connectors and ensure patches are in the correct direction.

  - **RF power amplifier (U2102)**
    
    A. Whether PA's control signal PA_ENABLE (Pin17) is at high level (about 2.8V); If it is at low level, PA will have no output;
    
    B. PA's power feeding pins Pin13, pin14; check whether power feeding voltage falls into normal range (normally 3.6V~4.2V);
    
    C. Check whether PA's RF input C2101, R2102, C2102 and R2105 have dry joint problems;
    
    D. Whether PA's RF input R2115 and C2131 have dry joint problems;
    
    E. PA's V_ramp control signal circuit: If C2111, R2111 and R2112 have dry joint or circuit break problems, PA's output power will be abnormal.

  - **Transceiver (U2101)**
    
    A. Check whether power feeding voltage of Transceiver (U2101) falls into the normal range. You can check power feeding voltage at the place where power feeding filter capacitor and U2101 are connected. Then check whether peripheral circuits have dry joint problems.
    
    B. Whether dry joint or short circuit problems exist on Transceiver (U2101) and its RF output matching circuits.

    If it’s permitted by whole-unit service terms and conditions, you can put the cell phone into constant-emission status of maximum power. Then detect power output of each module in the emission channel with probes from a spectrum analyzer. In normal circumstances,
    
    A. you can detect a power output about GSM 33dBm or DCS/PCS 30dBm at the output end of the RF connector;
    
    B. you can detect a power output about 32dBm or 29dBm at the place where PA output end pin26 is connected;
    
    C.
4.3 WCDMA calibration during production

4.3.1 WCDMA Rx Path Loss calibration

Problem: Item Rx Path Loss failed.
Reason: Receiving channel has a problem.
Troubleshooting:

Rx Path Loss failed.

Does PA module (U2202) have a dry joint problem?

Y → Re-solder.

N

Do duplexers U2201, U2204 and their channels have dry joint problems?

Y → Re-solder.

N

Does RF receiver and transmitter U2101 have a dry joint problem?

Y → Re-solder.

N

Check U1201.
### 4.3.2 WCDMA TPC calibration

Problem: Item TPC failed.
Reason: Emission channel has a problem.
Troubleshooting:

- **TPC failed.**
  - Check whether connections of RF cable and fittings are reliable.
  - **Y** Re-connect and calibrate.
  - **N**
    - Do RF connector CON2101, PA module (U2202), C2218 and C2219 have dry joint problems?
      - **Y** Re-solder.
      - **N**
        - Is WCDMA PA (U2202) fitted reversely? Or does it have a dry joint problem?
          - **Y** Re-solder.
          - **N**
            - Is WCDMA RF receiver and transmitter (U2101) fitted reversely? Or does it have a dry joint problem?
              - **Y** Re-solder.
              - **N**
                - Check U1201.

4.4 WCDMA comprehensive test

4.4.1 ACLR or SEM

Problem: ACLR or SEM.
Reason: It’s not calibrated; or WCDMA PA (U2202) has a dry joint problem; or RF receiver and transmitter (U2101) is faulty.
Troubleshooting:

\[\text{ACLR or SEM} \rightarrow \text{Re-perform WCDMA calibration. Then check whether the problem is fixed.} \]

\[\text{N} \rightarrow \text{Re-solder PA (U2202) or replace PA and components in emission channel. Then check whether the problem is} \]

\[\text{N} \rightarrow \text{Re-solder or replace the receiver and transmitter.} \]

4.4.2 The results of PowerControl comprehensive test are not good.

Problem: PowerControl
Reason: It’s not calibrated; or just passed the critical point of calibration.
Troubleshooting: Re-calibrate.

4.4.3 FrequencyErr

Problem: FrequencyErr
Reason: It’s not calibrated; or there’s outside interference.
Troubleshooting: Re-calibrate.
### 4.5 WiFi test

Problem: Can’t find WiFi  
Reason: WiFi/BT/GPS/FM four-in-one chip (U2301) and its surrounding circuits have soldering problems.  
Troubleshooting:

![WiFi Troubleshooting Diagram]

### 4.6 Use of Bluetooth

Problem: Can’t find Bluetooth.  
Reason: WiFi/BT/GPS/FM four-in-one chip and its surrounding circuits have soldering problems.  
Troubleshooting:

![Bluetooth Troubleshooting Diagram]
4.7 GPS - search satellites and locate

Problem: GPS can’t find satellites, and can’t locate.
Reason: WiFi/BT/GPS/FM four-in-one chip and its surrounding circuits have soldering problems.
Troubleshooting:

GPS can’t find satellites.

- Does MT6627(U2301) have a dry joint problem?
  - Y  Re-solder.
  - N

- Do U2301, U2302 have dry joint problems?
  - Y  Re-solder.
  - N

Replace main chip MT6627(U2301).

4.8 FM - search channels

Problem: FM can’t find channels.
Reason: WiFi/BT/GPS/FM four-in-one chip and its surrounding circuits have soldering problems.
Troubleshooting:

FM can’t find channels.

- Does MT6627(U2301) have a dry joint problem?
  - Y  Re-solder.
  - N

- Do U2301, U2302 have dry joint problems?
  - Y  Re-solder.
  - N

Replace main chip MT6627(U2301).
5 How to assemble and dissemble LENOVO S930

5.1 Assembly sequence of LENOVO S930

Fig. 5-1  Main assembly exploded view of LENOVO S930

5.2 Dos and don’ts when assembling LENOVO S930

(1) To avoid interference with the FPC of LCD itself, the LCD gasket should not be
assembled slant.

(2) Assemble fixture should be used to assemble TP to front housing.

(3) Before assembling motherboard to the front cover assembly, make sure that the silicone cushion on the P-sensor sensor is fitted properly.

(4) When welding volume key FPC to motherboard, make sure that FPC is in direction frame on motherboard and it should not to be slant.

(5) When attaching the volume key FPC to the front cover, align it with the aligning frame. The position must be exact.

(6) Soft part of volume key should be pressed to socket in back housing(WIFI antenna asm) and volume key position must be exact.

(7) There should be no gap between front housing and WIFI antenna asm when they are assembled together. All snaps should work. Check snaps near headset jack and bottom two corners.

(8) When assembling cables, make sure cables are well organized. To avoid interference with the case, all cables must be in their exact position.

(9) When assembling the main/sub camera, connectors should be fit after camera itself, and make sure the connectors are located correctly.

(10) When dissembling the motherboard, lift the speaker box module on the top at first to avoid any damage on the module.

(11) Lock TF connector cover after taking off TF card. Be sure that connector cover is in lock position when the phone is packed.

(12) Main camera conductive tape should be in exact position and not be out of socket or on socket wall.