Service Manual of Lenovo A516 Mobile Phone
Preface

This manual is intended for online repair guidance and after-sale repair guidance of Lenovo A516 mobile phone produced by the Company.

The content of this manual will be upgraded according to the needs of technology development.

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1. Appearance

2. Layout of main board
   Front of main board:
Back of main board:
3. Baseband

Block diagram of hardware system
3.1 LCD display

3.1.1 No display on screen after power-on

White screen or blank screen without display; backlight with lighting

Check whether the connection of LCD FPC is good and re-assembled FPC phone is normal

Y → OK

N

Check whether the display is normal after replacing LCD,

Y → OK

N

Check whether the EMI device E1601, E1602, E1603 of LCD circuit on main board is welded incompletely; re-weld EMI device

Y → OK

N

Check whether there is cold solder joint on other device around LCD and on LCD connector.
3.1.2 LCD backlight without lighting

LCD backlight without lighting

Check whether the connection of FPC on LCD module and connector on main board is good and whether the LCD backlight is normal after reconnection

Y → OK

N

Re-verify whether the LCD backlight is normal after replacing LCD.

Y → OK

N

Check whether there are voltages more than 20V between both ends of C1606 when LCD is lit.

Y → If the backlight circuit is normal, it is the problem of LCD

N

Check the welding condition of U1601 and peripheral devices, including L1601, D1601, ,R1620,R1609,C1607

Y → OK

N
3.2 Camera defects

3.2.1 Rear camera defects

Can not take photos

Check to see whether the camera module is in the right position by disassembling and whether the module is OK after reassembling module

Y → OK
N

Whether the camera is OK after replacing the camera module

Y → OK
N

Check to see whether the camera module connector is welded well; whether the camera is OK after overlaying welding the connector?

Y → OK
N

Check to see whether the EMI device E1604,E1608,E1609 is complete and welding is in good condition; if not; repair EMI

N → Recheck after overlaying welding
N

Check to see whether the front camera is abnormal

Y → Recheck after replacing front camera
N

Check to see whether the main chip U1101,U1301 are normally welded?

N → Re-weld or replace U1101,U1301
3.2.2 Front camera defects

Can not take photos

Check to see whether the front camera is abnormal. After replacing it.

Y OK
N

Check whether camera module connector is well welded.

Y OK
N

Check whether the U1101 and U1301 are normally welded?

Y Re-weld or replace U1101 and U1301
N
3.3 Ring and vibration

3.3.1 No vibration

No vibration

N

Check whether the motor is interfered by structure; Recheck whether it is normal after reassembling the phone.

Y → OK

N

Replace the motor or main FPC to see whether it is ok? Check to see whether the circuit around the motor is normal

Y → OK

N

Replace U1301 chip
3.3.2 No ring

No ring

Replace Speaker and recheck whether it is normal? Y
Check to see whether the SPK contact shrapnel is normal?
N

Replace main FPC and check whether it is OK. Y
Check whether main FPC connector is welded well
N

Use earphone to test whether there is sound; if Y
there is sound from earphone, there is audio signal to input. Check whether U2 module device is of cold solder joint; recheck whether it is ok after re-welding.
N

Check to see whether the main chip U1301 is Y
damaged. Replace it if damaged.
N
3.4 Charging

3.4.1 No charging display after plugging the charger in

- No charging display after plugging the charger in
  - Check whether the charging is normal after replacing the charger.
    - Y: Replace the charger
    - N: Replace the battery and see whether the charging is normal? Measure the battery voltage to see whether it is less than 3V
      - Y: Replace the battery
      - N: Check to see whether U1302 module device is well welded? Whether it is normal after re-welding
        - Y: OK
3.4.2 Charging shown but not full charging

Replace the battery and then check whether it is fully charged

Y → OK

N → Check to see whether R1343 is well welded. During charging, measure whether the voltage between both ends of R1343 is over 80mV

Y → There is charging current; go to check the battery.

N → Replace U1302 module device and then recheck

Y → OK
3.5 Keyboard and keyboard backlight

3.5.1 Abnormal operation of side keys

- Abnormal side key
  - Check whether there are conditions like cold solder joint and short circuit on keyboard FPC? Whether it is ok after re-welding?
    - Y → OK
    - N → Y → OK
  - Check whether there are conditions like cold solder joint and missing device on the circuit device of side keys R1704, R1707, R1708
    - Y → OK
    - N → Replace side keys FPC
      - N → Replace U1101
3.5.2 Abnormal operation of CTP keyboard

CTP keyboard is invalid

Whether the CTP test is normal?

Y
CTP damaged, replace it

N
CTP fault

Replace CTP

N
Replace one CTP to see whether it is the problem of touch screen or main board?

Y
CTP damaged, replace it

N
It is the problem of CTP connector or main chip welding
3.6 Calling

3.6.1 No voice heard from the other side during the call

No voice heard from the other side during the call

Use earphone and hands-free to verify whether there is voice?

Y

Y

Replace the headphones and then recheck whether it is normal

N

N

Check whether B1401, B1403 are well welded. Re-weld and test

Y

OK

OK

N

Replace U1301

N

Cold solder joint of main chip or main chip is abnormal
3.6.2 No voice heard from your side during the call

No voice heard from your side during the call

Check whether MIC and the peripheral devices are well welded; whether it is ok after re-welding?

- Y: Re-weld
- N: Whether it is ok after replacing SUB board?

- Y: OK
- N: Whether it is ok after replacing main FPC?

- Y: OK
- N: Check whether MIC module device is well welded. Re-welded this device and see whether it is ok?

- Y: OK
- N: Check U1301
3.7 Power-on failure

Failed to Power-on

Check whether the power key FPC is assembled well, reassembling the power FPC?

Y → Re-weld

N → Power on the phone on separate main board, whether there is high current?

Y → The main board is damaged; replace the main board and check the failure board step by step

N → Check whether the 26MHz on U2106 is normal? Whether there is 26MHz signal on R2116?

N → Re-weld and recheck

Y → Check whether X1303, C1319, C1324 are well welded

N → Re-weld and recheck

Y → Check whether the main power supply of U1301 is normal? (VCORE, VPROC, VD18, VTCXO, VD25, VA1, VD28, VMC, etc.)

N → Re-weld or replace device U1301 to

Y → Replace the main chip U1101
3.8 Touch screen failure

Touch screen does not work

Check whether the touch screen FPC is assembled in place?

Y → Re-insert

N → Replace touch screen

Y → OK

N → Check whether J1603 touch screen connector is well welded and whether the J1603 peripheral circuit devices are well welded?

Y → OK

N → Check U1101
3.9 LCD on when close to the ear during the call; LCD off when away from the ear.

4. Radio frequency (RF)
### 4.1 Software Download Failure

- **Faults:** Software can't be normally downloaded.
- **Reason:** Baseband chip is oppositely pasted or is in cold solder joint; CRYSTAL is oppositely pasted (no clock signal) or is in cold solder joint.
- ** Shooting:**

![Diagram](image)

- Re-download software when it is normal after replacing elements.
4.2 Production calibration

4.2.1 AFC calibration

- Fault: AFC calibration Fail.
- Reason: RF test cable is not connected well during calibration; TCXO is oppositely pasted or in cold solder joint.
- Shooting:

  AFC calibration Fail

  Check whether RF cable and fixture is well connected?  
  N  Reconnect and calibrate  
  Y

  Check whether TCXO (U2104) is oppositely pasted?  
  Y  Re-weld U2104  
  N

  Check whether TCXO (U2104) is in cold solder  
  N  Replace PA (U2102)  
  Y

  Check whether there is power output from PA (U2102)  
  Y  Recalibrate  
  N

- Notes: Remember to recalibrate after replacing elements.
4.2.2 AGC

- Fault: AGC calibration Fail.
- Reason: RF test cable is not connected well during calibration; the devices in receiving cable are in cold solder joint (such as RF connectors, antenna switch, saw the filter and the surrounding capacitance).
- Shooting:

- Notes: Remember to recalibrate after replacing components.
4.2.3 APC

Fault 1

- Fault: APC calibration Fail.
- Cause: RF test cable is not connected well during calibration; PA is oppositely pasted; PA and peripheral circuit are in cold solder joint; The patch of RF input circuit of PA is deviated with short-circuit shield box.
- Shooting:

![Diagram of APC fault diagnosis]

- Notes: Remember to recalibrate after replacing components; the problem analysis of PCS TX APC is the same as DCS.
Fault 2:
- Fault: The output power of the mobile phone is too high.
- Cause: The cable isn't well connected in calibration.
- Shooting:

![Diagram showing Fault 2 solution steps]

Fault 3:
- Fault: After repeated calibration, the power is still low.
- Cause: Some element patches of PA and surrounding VAPC input are displaced or PA is damaged.
- Shooting:

![Diagram showing Fault 3 solution steps]

PA (U2102) may be partially damaged; recalibrate.

Replace Vramp circuit: R2111, R2112, C2111
4.3 Fault in complete set test/ rework

4.3.1 Switch spectrum & PVT template with excessive standard

- **Fault:** The switch spectrum and PVT template of GSM and DCS frequency bands are excessive.
- **Cause:** The cold solder joint or damage to R2204, R2210 in V_ramp of PV may result in the excessive switch spectrum.
- **Shooting:**

  **Switch spectrum and Ramp Mask with excessive standard**

  Measure to see whether the voltage of Pin16 of PA (U2102) is in the normal range (1.8V or less)?

  Check whether the input and output matching is in cold solder joint?

  Replace the elements in cold solder joint
  Replace PA if necessary
4.3.2 High Frequency Error

- Fault: Frequency Error exceeds standard in complete set test.
- Cause: There is problem in VAFC input circuit of TCXO.
- Shooting:

4.3.3 High Phase Error

- Fault: Phase Error exceeds standard in complete set test.
- Cause: The capacitors of power supply part of PA and transceiver are in cold solder joint or in short circuit with other resistance.
- Shooting:
4.3.4 Power output problems

- Fault: Normally power-on and receive, but when outputting two frequency bands or single frequency band power, there is no input power or the input power is very low.
- Cause: There are many reasons for no output power or very low power, which may be the results of faults of Transceiver output part, PA input and output circuit, antenna connector and antenna switch control signal or power supply circuit. Specific circumstances are:

  - **RF connector (CON2101)**
    - Checking: Whether RF connector CON701 and the test probe of RF test cable are well connected or the patch is oppositely pasted or the antenna connector is damaged.
    - Shooting: Replace antenna connector and ensure right direction of patch.

  - **RF power amplifier (PA)**
    - A. Whether the control signal PA_ENABLE (Pin17) of PA is high level (about 2.8V); if it is low level, there is no output of PA;
    - B. Check the Pin3 Pin4 of PA power supply part to see whether the power supply voltage is in the normal range (typically 3.6V ~ 4.2V);
    - C. Whether the RF input parts of PA(C2101,R2102,C2102,R2105) are in cold solder joint;
    - D. Whether the RF output (R2115,C2113,C2131,C2114 )of PA is in cold solder joint;
    - E. Part circuit of V_ramp control signal of PA(R2111,R21123,C2111): if it is in old solder joint or in interruption of circuit, PA also has no output power.

  - **Transceiver (U2101)**
    - A. Whether the power supply voltage of Transceiver (U2101) is within normal range; check the power supply voltage between power supply filtration capacitor and U2101 connection and then check whether the surrounding circuit is in cold solder joint.
    - B. Whether there is cold solder joint or short circuit in Transceiver (U2101).
If it is possible to repair the complete set, the output power of each module on transmission channel can be detected through spectrum analyzer probes when keeping the phone in the constant state of maximum power. Under normal circumstances,
A. About GSM 33dBm and DCS/PCS 30dBm output power can be detected on the output end of RF connector.
B. About 3dBm output power can be detected on matching circuit C2101 and C2102 of PA input end;
C. About 32dBm or 29dBm output power can be respectively detected on pin14 connection of PA output end;
D. About 3dBm output power can be detected on pinA11 and pinB8 of Transceiver (U2101) output end.

4.4 WCDMA forecast

4.4.1 RSSI_Cal

Fault: RSSI fails
Cause: There are problems in receiving channel
Repair manner:

Check whether High Band (L2232, C2232, C2234) or Low Band (R2256, C2248, L2241, U2207, C2249, C2250, L2243) and the surrounding circuit devices are in cold solder joint or partially pasted

4.4.2 TPC_Cal

Fault: TPC fails
Cause: There are problems in transmission channel
Repair manner:

TPC

Check whether RF cable and fixtures are well connected?

Y → Reconnect and calibration

N → Whether RF connector CON2101, Tx module U2101 and the surrounding circuit devices are in cold solder joint?

Y → Re-weld

N → Whether WCDMA PA U2202, U2203 is oppositely pasted or in cold solder joint?

Y → Re-weld

N → Whether the duplexer U2201 and U2207 through which WCDMA transmission channel passes

Y → Re-weld
4.5 WCDMA comprehensive test

4.5.1 ACLR or SEM

Fault: ACLR or SEM
Cause: No calibration or WCDMA PA (U2202, U2203) is in cold solder joint; RF transceiver (U2105) doesn’t work well.
Repair manner:

4.5.2 ILPC comprehensive test abnormal

Fault: ILPC
Cause: No calibration or just passing calibration.
Repair manner: The same as 4.5.1.

4.5.3 FrequencyErr

Fault: FrequencyErr
Cause: No calibration, or suffered outside interference
Repair manner: Recalibrate WCDMA and test; replace U2104.
5. Structure assembly

a) 5.1 Assembly process sequence of Lenovo A516 main body

As the explode drawing 5-2

2) Assemble BB Shielding(10) to Main PCB(17); Assemble Conductive Adhesives of shielding(23/24) to BB Shielding and RF Shielding;

3) Assemble Volume Key FPC(22) and Power Key FPC(21) to Main PCB(17);

REMARK: All units of the Front Housing Assembly have been assembled already.
4) Assemble Three LCD conductive adhesive(8/30) and LCD Thermal conductivity of graphite and LCD(3) to the Front Housing Assembly(5). Watch out the Location of the Position Line;

5) Assemble The LCD buffer foam (2) to the TP component(1) by the jig paste ;

6) The assembly hole of the sensor module TP through the front shell, the TP module (1) attached to the front housing corresponds to the position of the sinking platform;

7) Fix Receiver (16) and P-sensor silica gel(7) to the Front Housing Assembly too;

    REMARK: All units of the Front Housing Assembly have been assembled already.

8) Fix Front camera to Front Housing; Fix Main FPC and Cable Line to Main PCB; Assemble Main PCB(5) to the Front Housing Assembly, and fasten them by five PCS Screws(27); Fix TP FPC and LCD FPC and Front Camera and Back Camera to Main PCB;

9) Fix Main FPC to Front Housing Assemble;

10) Fix Loudspeaker Seal Foam(35) and Sub PCB Conductive Adhesives and Speaker Conductive to Sub PCB Assembly; Fix MIC Silicone Case to MIC;

11) Fix Main PFC(32) to Sub PCB Assembly, Fix Assemble PCB to the Front Housing Assembly;
12) organized Main PFC and Cable

13) Assemble Battery Compartment Stickers (39) to Stainless Steel Frame for Cell;

REMARK: All units of Front Housing Assembly have been assembled already.

14) Assemble Volume Key (20) and Power Key (13) to the Back Housing Assembly;

15) Assemble Loudspeaker (36) to the Back Housing Assembly (26);

16) Assemble the Assembled Back Housing Assembly to Front Housing Assembly, Assemble Battery Compartment Stickers and Network Card and Main Label to Stainless Steel Frame for Cell;

17) Fasten them by Six Screws (27);

18) Assemble Camera Lens (29) to the Back Housing Assembly (26);

19) Assemble Battery Cell (40) to the assembly;

20) Assemble Battery Cover (28) to the assembly, Open the phone.

That is the process of A516 mobile assembly

5.2 Precautions in Lenovo A516 main body assembly

1) Fastening the Screws needs appropriate strength, after fastening must check up that the up and down cover is locked in place, and without looseness;

2) Pressure shall be ensured when assembling CTP components to
make it fully paste with front shell;

3) When Assembling the TP FPC, it must make sure Connector fasten in place;

4) When Assembling the LCD FPC and Back Placed Camera, it must make sure Connector fasten in place

5) When Assembling Cable, it must make sure that the Cable is very tidy, lest Cable offsets and interfere with shell.

### 5.3 Precautions in disassembly of Lenovo A516 main body for repairing

1) Disassemble the board connector of LCD, CTP and FPC before disassembling main board;

2) The PCB is thinner, Be careful when disassembling the PCB;

3) Be careful when disassembling CTP to prevent FPC from being pulled apart.