

# DATA RECOVERY SERVICE CENTRE TRAINING (WORKSHOP TRAINING)

## Module D2 Hard disk PCB repair training

### D2.1 SMD Basic electronics for hard disk components and PCB repair

- ⌚ Basic electronics fast revision
- ⌚ Working concept of electronics component resistor, capacitor, diode, transistor, fuse, tvs diode, MOSFET, etc.
- ⌚ Multimeter basic concept, testing different components
- ⌚ Measuring and Identify ok, Short, Open components
- ⌚ Introduction to component of hard disk PCB , resistor, capacitor, diode, transistor, MOSFET chips
- ⌚ Removing and Inserting Different components
- ⌚ Working concept of chips,

### D2. 2 Common problems in hard disk due to pcb fault

- ⌚ Totally dead Hard Drive does not spin up
- ⌚ When hard disk connects to computer, computer does not start or hangs
- ⌚ Broken power connectors
- ⌚ Broken data connectors
- ⌚ Spindle/arm driver chip failure
- ⌚ You can see a burned component on the hard drive circuit board.
- ⌚ Connector of motor or head is damaged
- ⌚ Printed circuit board failures including pre-amplification
- ⌚ TVS diode blow up
- ⌚ Protection fuse, 0ohms resistor open
- ⌚ PCB Damaged due to liquid
- ⌚ Fire Damage
- ⌚ Ceramic capacitor short
- ⌚ Mosfet short, or not giving output
- ⌚ Data connector resistor open
- ⌚ Electric shock
- ⌚ Pcb circuit open / short

### D2.3 INTRODUCTION HARD DISK PRINTED CIRCUIT BOARD, BLOCK DIAGRAM , SECTION OF PCB

#### INTRODUCTION TO DIFFERENT SECTION OF HARD DISK

- a. Introduction & Block diagram of hard disk printed circuit board
  - ⌚ Identify different chips on hard disk

- ⌚ Mcu, driver chip, flash ram chip , buffer chip
- ⌚ Identify different component on hard disk
- ⌚ Resistor, capacitor, tvs diode, transistor, fuse , inductor, rectifier
- ⌚ identify circuit types, no models
- ⌚ Block diagram of hard disk pcb
- ⌚ How pcb work
- ⌚ Identify hard disk pcb

#### HARD DISK SECTION

- b. Hard disk Power section normal molex, sata
- c. Hard disk Dc to dc converter power section
- d. Hard disk Data section connection sata pata
- e. Hard disk Firmware section
- f. Hard disk Ram/ Buffer section
- g. Hard disk Vcm controller section
- h. Hard disk Spindle motor controller
- i. Hard disk Mcu section
- j. Hard disk Pre amplifier section
- k. Hard disk Head contact section
- l. Hard disk Spindle motor section

#### **D2.4 Power section & DC to DC converter, (Mosfet & other smd component working and power detail in hard disk )**

- ⌚ Types of hard disk power connector
- ⌚ Power input (sata pata)
- ⌚ Pata old Molex 4 pin (5v & 12v)
- ⌚ Sata connection 15 pin (5v, 3.3v, 12v)
- ⌚ Checking hard disk open short thru power connector
- ⌚ Understanding Protection circuit
- ⌚ Semi conductor mosfeter transistor Manufacture
- ⌚ Semi conductor mosfet transistor components
- ⌚ Tvs diod, 0ohms resistor, fuse,

- ⌚ Dc to dc converter
- ⌚ Transistor used as switching
- ⌚ Step down from 5v to 2.5
- ⌚ Mosfet working function
- ⌚ Testing of mosfet in hard disk pcb
- ⌚ Linear output,
- ⌚ swithching output
- ⌚ work of inductor in hard disk
- ⌚ PWM controller IC
- ⌚ Power supply to different chips

**D2.5 Mcu section, Data section, preamp section** head (chip working concept power main signals)

- ⌚ Data section of hard disk
- ⌚ Sata connection 7 pin
- ⌚ Signal detail of sata connection
- ⌚ Pata connection of hard disk 40pin
- ⌚ Signal detail of pata connection
- ⌚ Connection detail of sata and pata connector
- ⌚ Main control chip MCU manufacture (ardent, agere, pokar, seaglet, oscar, beagle, dsp, lucent, quantum, wdtsiemens, shxxx, tlxxx)
- ⌚ Hard disk mcu chips (
- ⌚ Working detail of MCU chip
- ⌚ Connection detail of MCU
- ⌚ Voltage of hard disk MCU chip
- ⌚ Hard disk head connector
- ⌚ Pin out detail of hard disk head connector
- ⌚ Main signals detail of head contact
- ⌚ Working concept of hard disk preamp
- ⌚ Hard disk preamp chip manufacture with identify
- ⌚ Hard disk preamp chips
- ⌚ Pin detail of hard disk preamp chip

- ⌚ Connection of head, vcm coil, micro actuator
- ⌚ Types of hard disk head
- ⌚ Ferrite heads
- ⌚ Amr heads
- ⌚ Thin film heads
- ⌚ Metal in gap (MIG) heads
- ⌚ Tunneling magnetoresistive (TMR)
- ⌚ Perpendicular magnetic recording (PMR)
- ⌚ Giant magneto resistive (GMR)

## **D2.6 Buffer Ram, flash rom section (working concept types and main signals)**

- ⌚ Hard disk RAM BUFFER Chip
- ⌚ Hard disk RAM BUFFER
- ⌚ Working function of Buffer chip
- ⌚ Pin detail voltage supply of buffer chip
- ⌚ Datasheet study of buffer chip
- ⌚ Connection of buffer chip with other chip
- ⌚ Hard disk EEPROM FLASH Chip manufacturer
- ⌚ Hard disk EEPROM Flash chips
- ⌚ Working function of EEPROM
- ⌚ Pin detail of EEPROM
- ⌚ Connection of Flash EEPROM chip with other chip

## **D2.7 VCM Motor controller & read channel chip working concept and main signals**

- ⌚ Hard disk Read Channel Chip manufacturer
- ⌚ Hard disk Read channel chips
- ⌚ Working function of read channel chip
- ⌚ Pin detail , voltage supply of read channel chip
- ⌚ Hard disk motor controller chip manufacturer
- ⌚ Hard disk motor controller chips

- ⌚ Working function of motor controller chips
- ⌚ Pin detail, voltage supply of motor controller chip
- ⌚ Spindle motor power supply from motor controller chip
- ⌚ Switching , linear mosfet power controller
- ⌚ Connection detail of motor controller chip with other chip

## **D2. 8 Live pcb tracing, different volt of pcb, fault finding of hard disk pcb**

Online offline

- ⌚ Offline tracing of hard disk pcb with multimeter
- ⌚ Testing power connector main volt
- ⌚ Testing tvs diode
- ⌚ Testing all capacitor
- ⌚ Testing spindle motor continuity
- ⌚ Online Live tracing of PCB with multimeter
- ⌚ Testing Power of mcu
- ⌚ Testing Power on buffer chip
- ⌚ Testing Power on read write chip
- ⌚ Testing Power on spindle motor

## **D2. 9 Identify hard disk pcb no for donor pcb (Samsung, Seagate, wd, Hitachi, Ibm, Maxtor,)**

- ⌚ Hard disk model no
- ⌚ Hard disk pcb no
- ⌚ Hard isk pcb printer no
- ⌚ Matching criteria of different hard disk
- ⌚ Seagate Hard Drive PCB Swap Replacement Guide:
- ⌚ Western Digital PCB Swap Replacement Guide
- ⌚ Samsung PCB Swap Replacement Guide
- ⌚ IBM Hitachi PCB Swap Replacement Guide
- ⌚ Maxtor PCB Swap Replacement Guide
- ⌚ Hitachi PCB Swap Replacement Guide
- ⌚ Toshiba PCB Swap Replacement Guide
- ⌚ When firmware replacement is important
- ⌚ What is glist, plist on hard disk

- ⌚ Service area on hard disk platter
- ⌚ Which models required firmware chip replacement after swapping PCB
- ⌚ Which models required no firmware replacement after swapping PCB

#### **D2.10 Replacing component and IC`s of hard disk (demo, video)**

- ⌚ Removing and inserting of different component from hard disk PCB
- ⌚ Removing resistor, mosfet, transistor, diode, fuse demo
- ⌚ Removing and inserting of different chips from hard disk PCB
- ⌚ Firmware chip, replacement idea
- ⌚ **Hard disk socket and connector**