

# Data Recovery Techniques



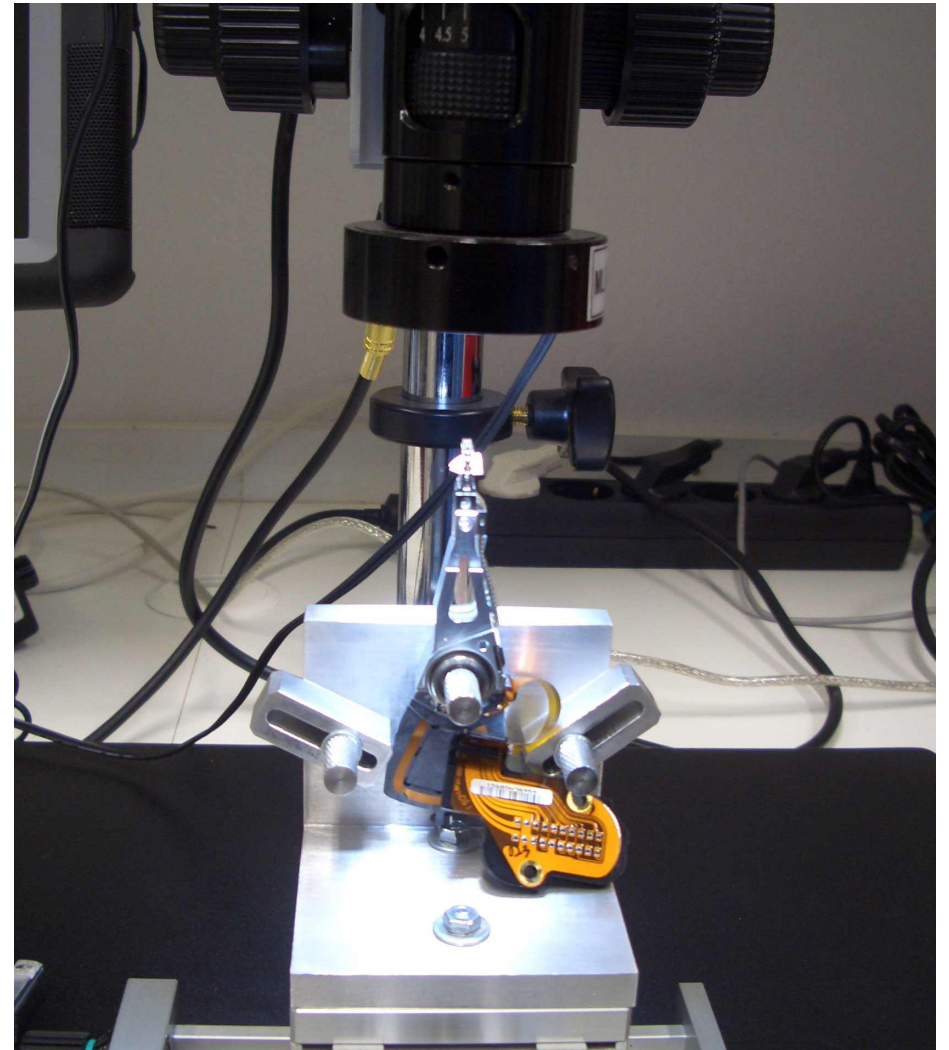
# Data Recovery Techniques



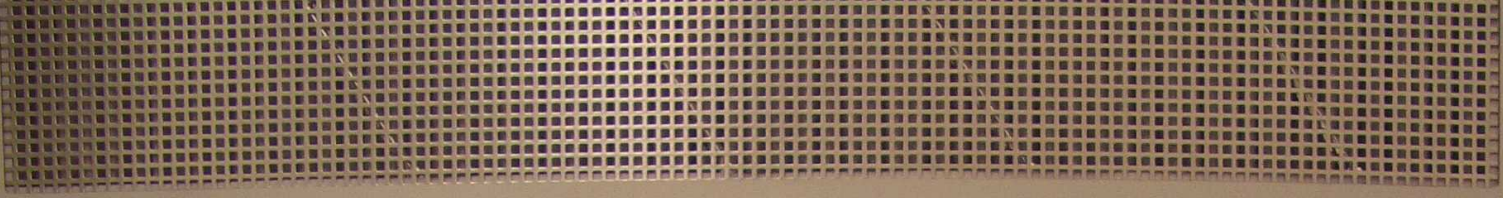
- Process Overview
- Lab Setup
- Physical Acquisition
- Disk Array Logic
- iSCSI / SAN / NAS
- Virtualization
- File Systems
- File Formats
- Result Verification
- Fun with Hard Drives

# Lab Setup

Clean Atmosphere  
Stereo / Video Microscopes  
Best Tool Quality  
Standard Tools  
Specially crafted Tools  
Lots of Computers  
Disk Arrays  
Lots of Adapters & Cables  
A Shitload of Disks

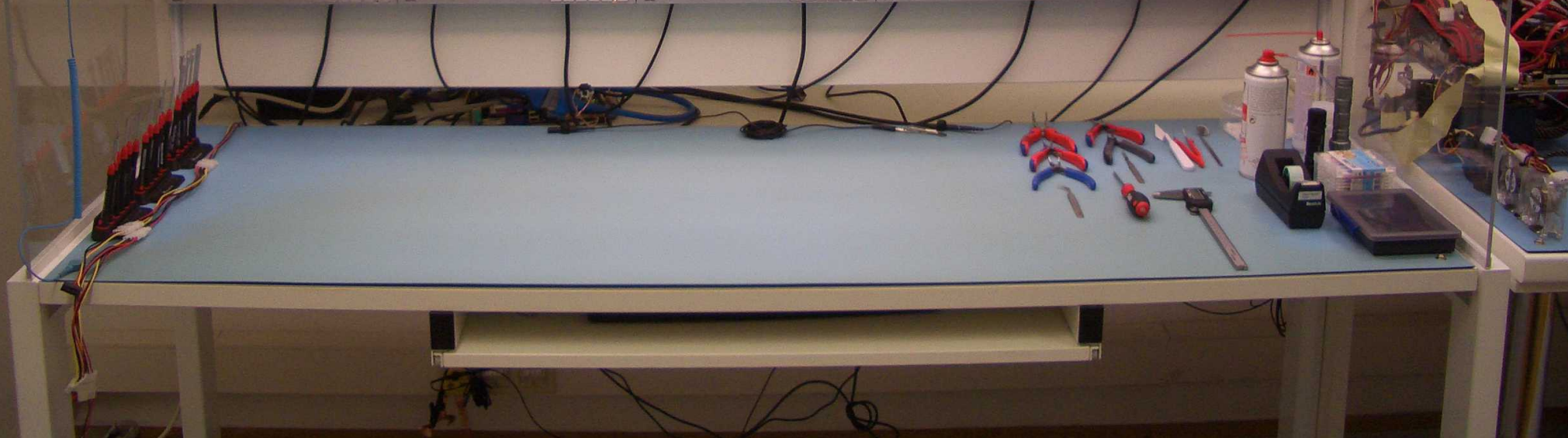






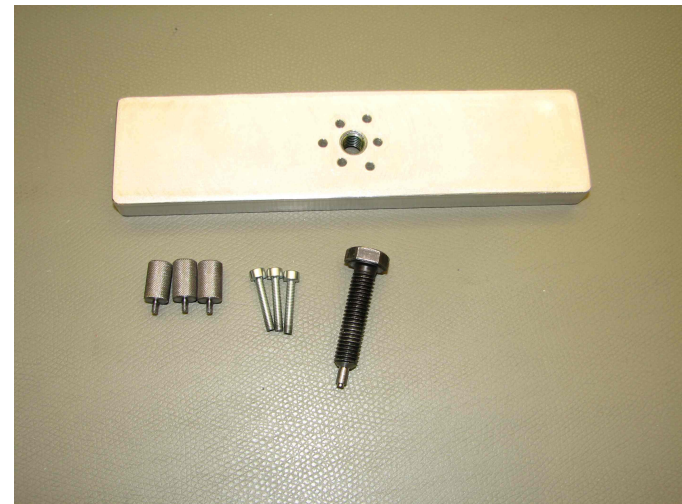
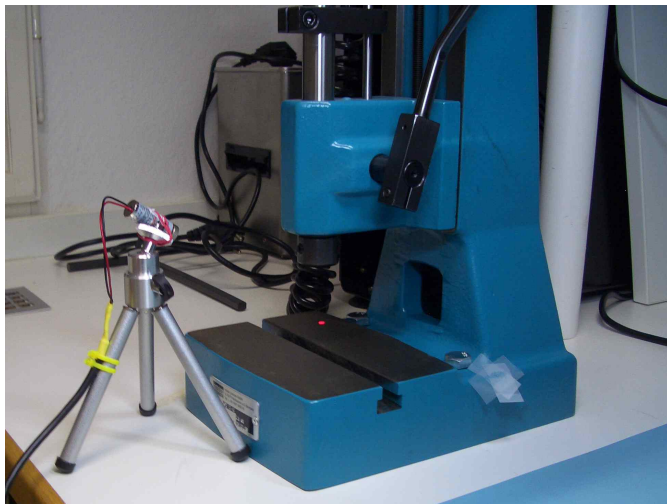
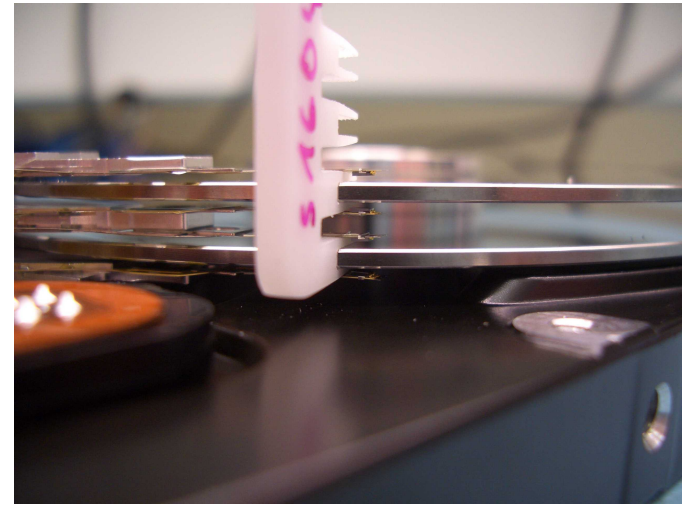
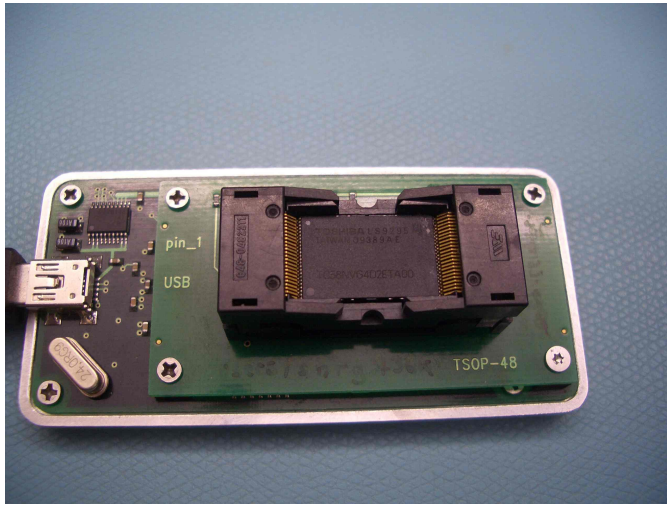
**ATINGO** DATA RESCUE  
www.atingo.com

Control panel with five indicator lights (green, green, green, yellow, red) and a digital display showing the number 449.





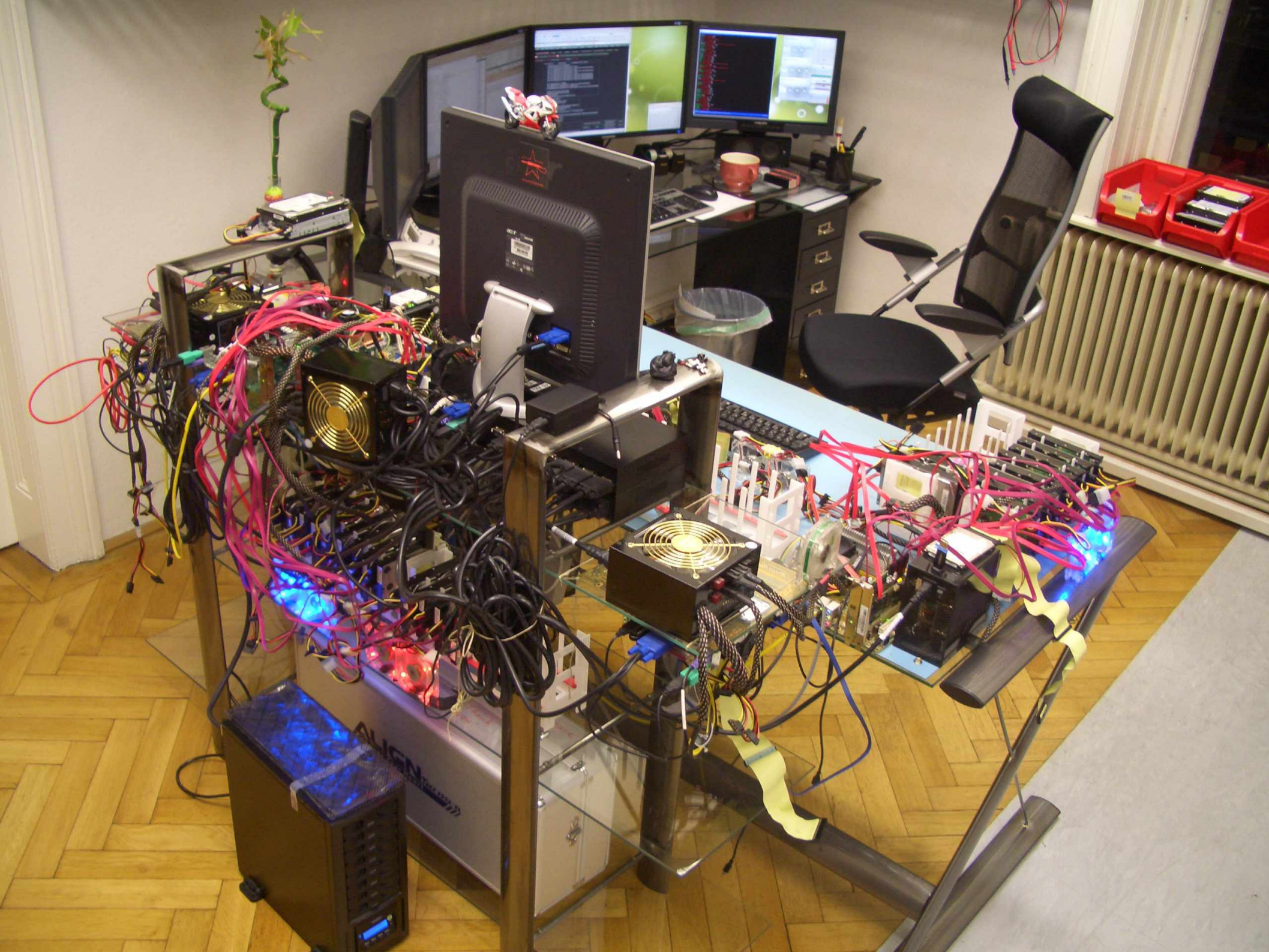
# Different Tools











# Physical Image Acquisition

## **Disk**

Spinning the Disk  
Manipulations  
Spin Stands  
Microscopes

## **Flash**

PCB Repair  
Desoldering Chips  
Chip Readers  
Sorting Blocks



# Physical Challenges

## Disk

Surface Damages  
Spindle / Motor / Bearings  
Read / write Heads  
Head / Surface “Stiction”  
Electronics  
Firmware Corruption  
Media Contamination  
Fire Impact  
Water Impact

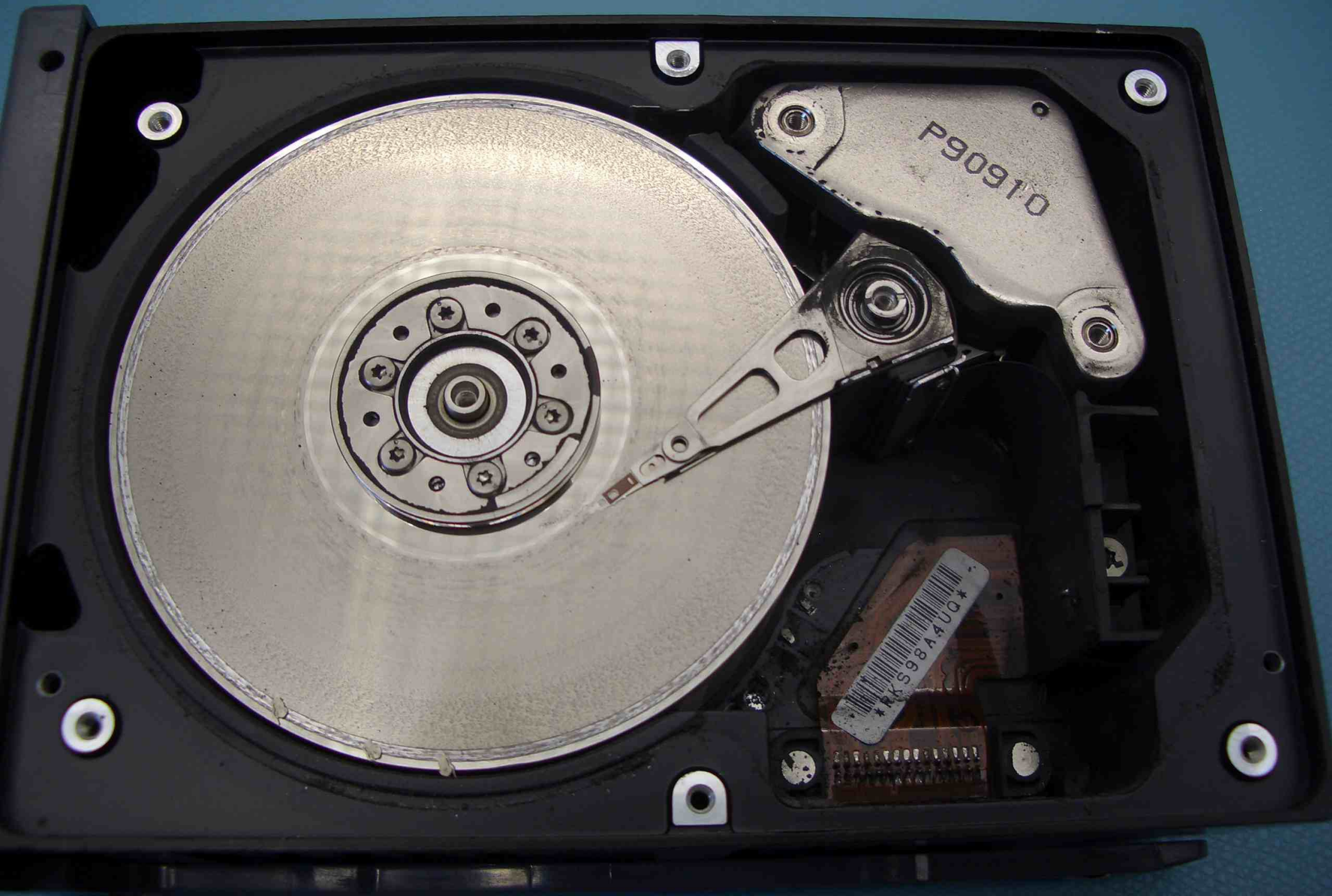
## Flash

PCB Defects  
Firmware Bugs  
List Corruptions  
Controller Defects  
Memory Defects  
Mechanical Impact









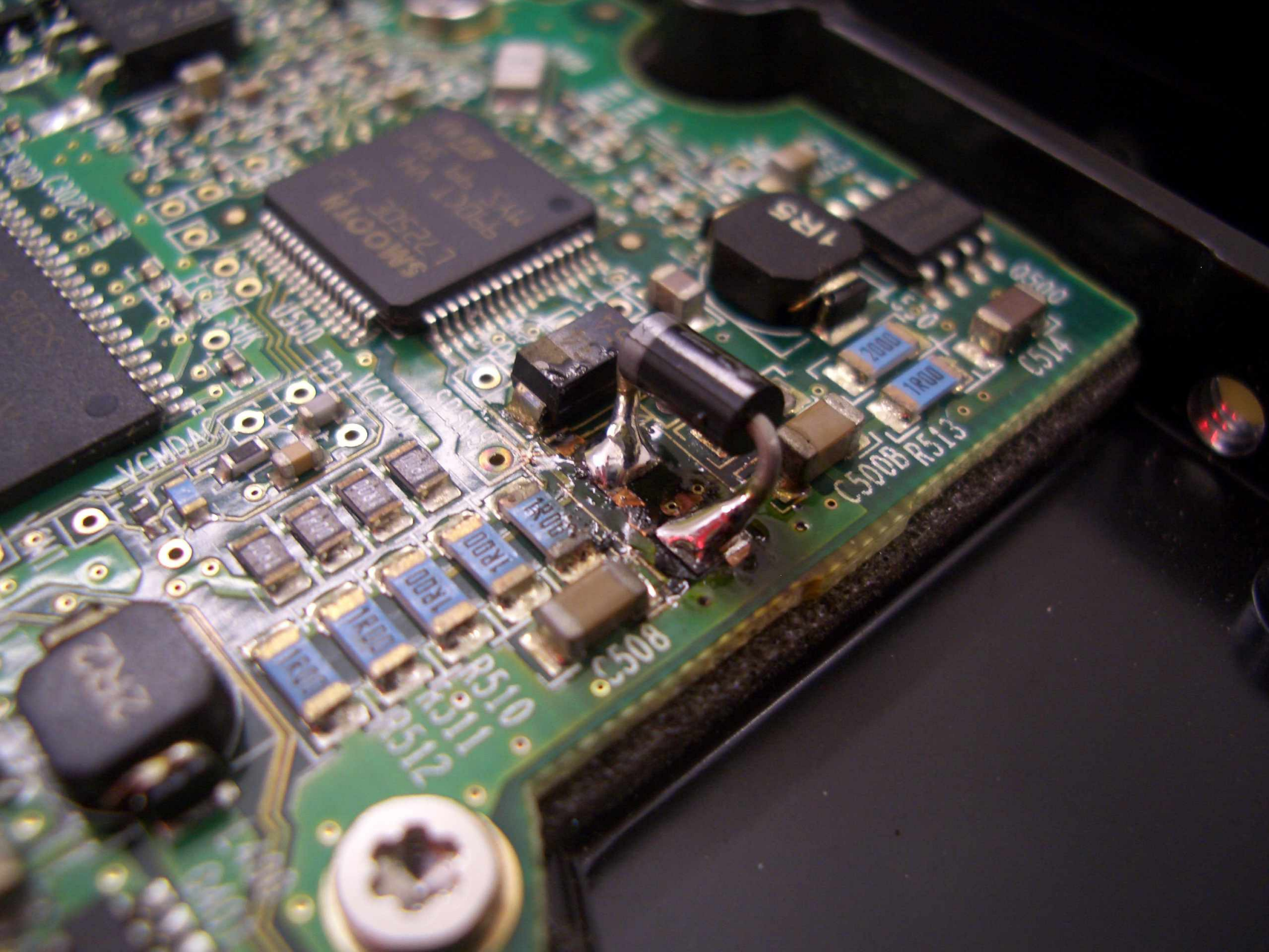
P90910

PK S98A4UQ







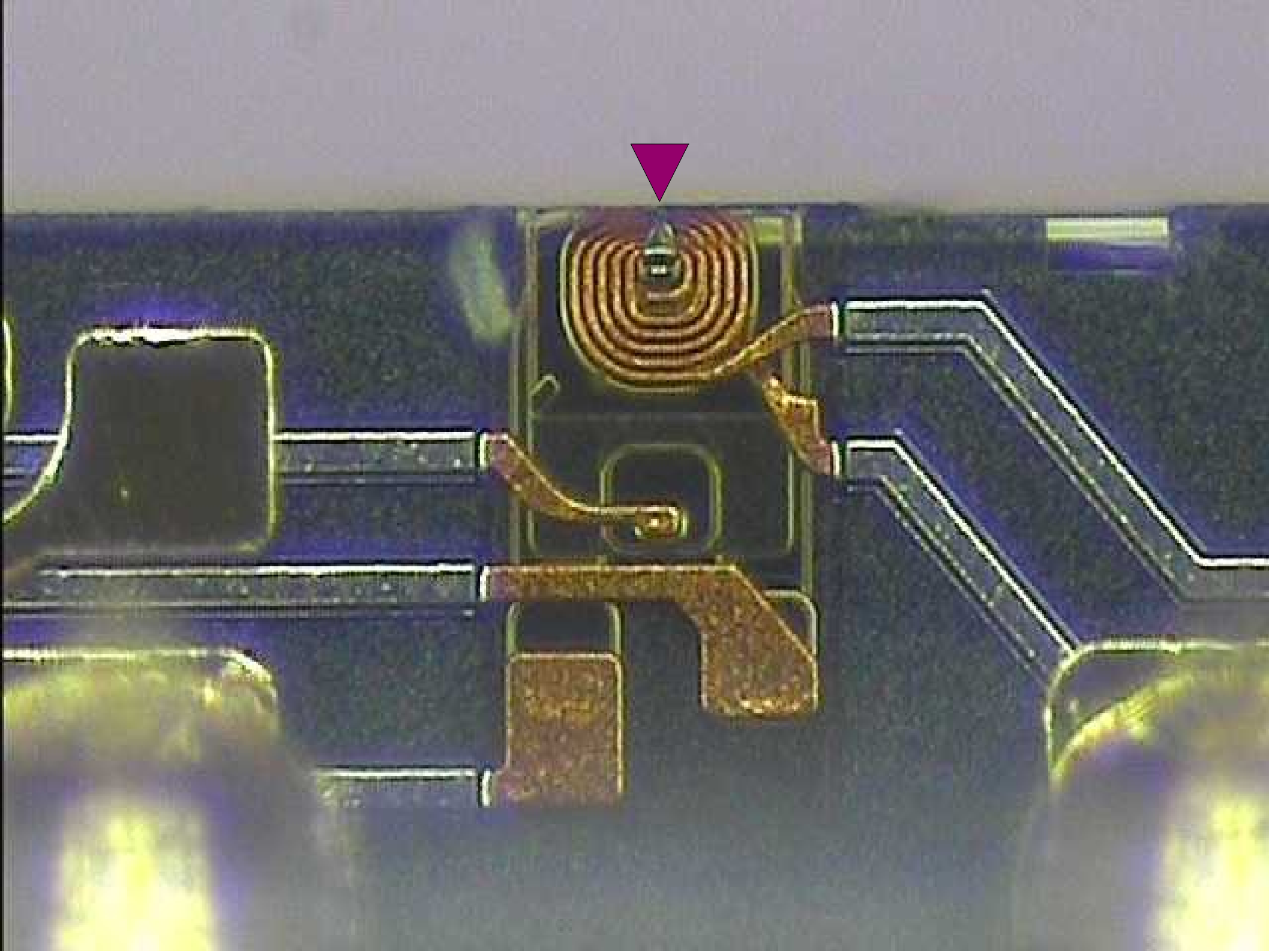




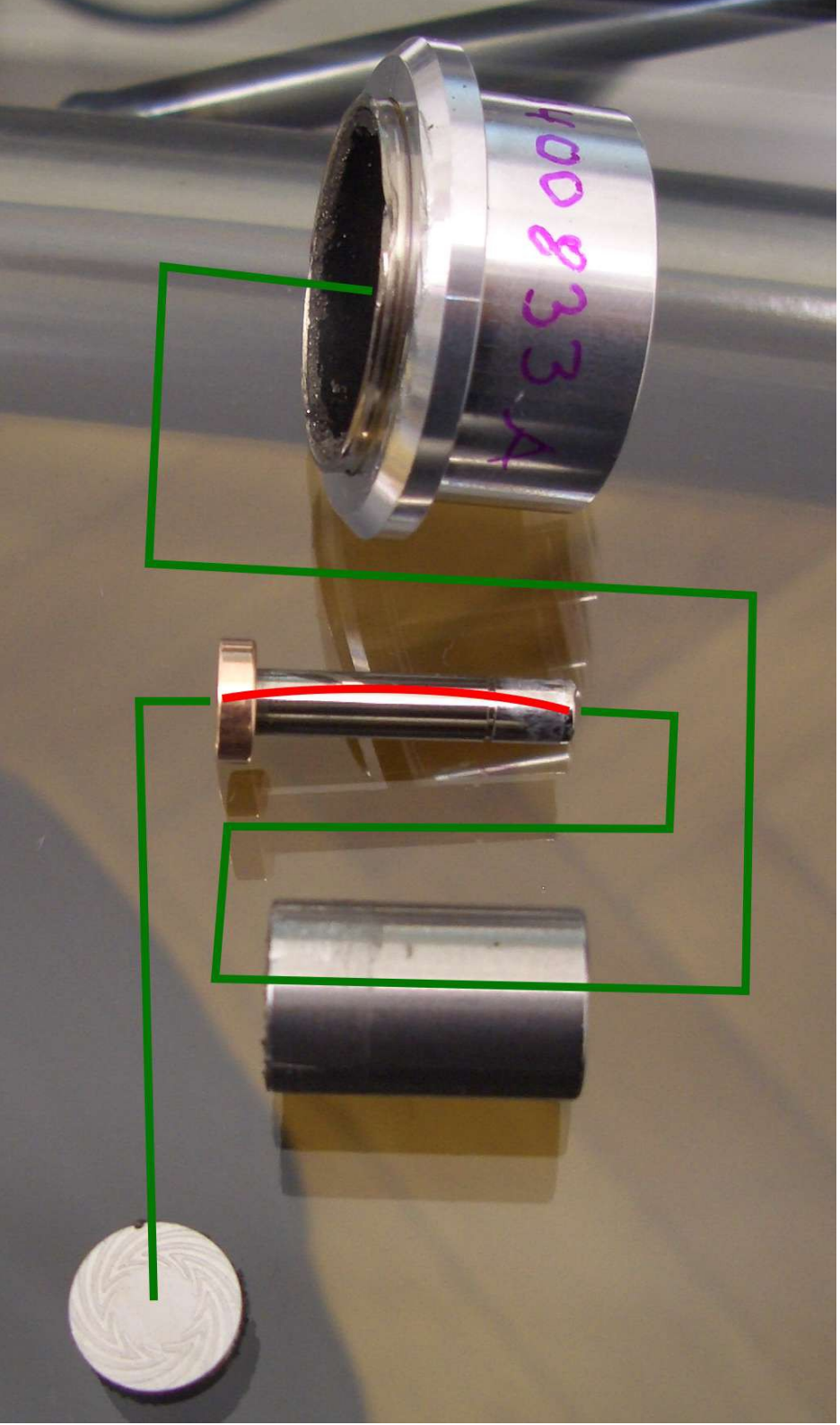








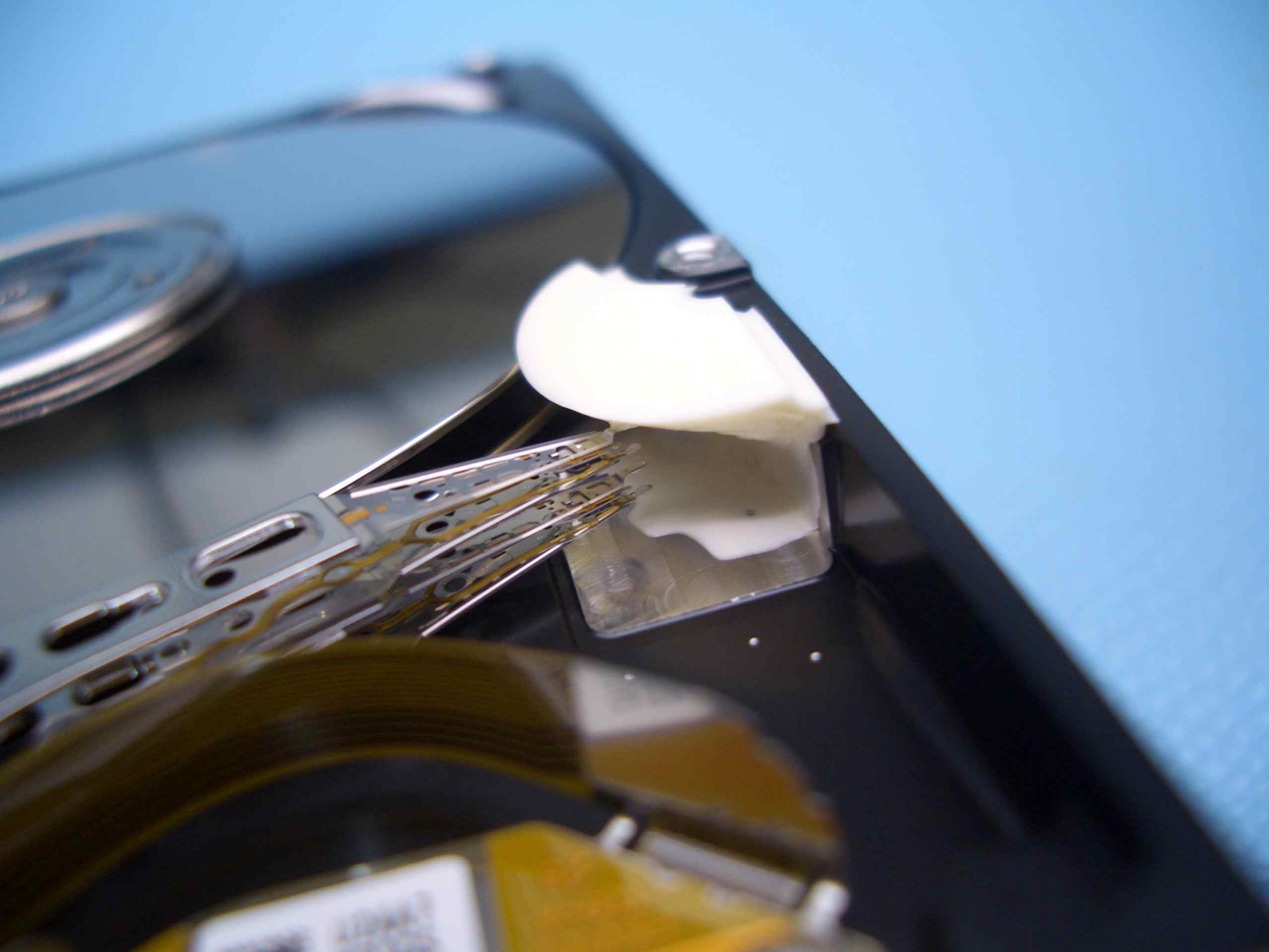
# Typical Drop Damage



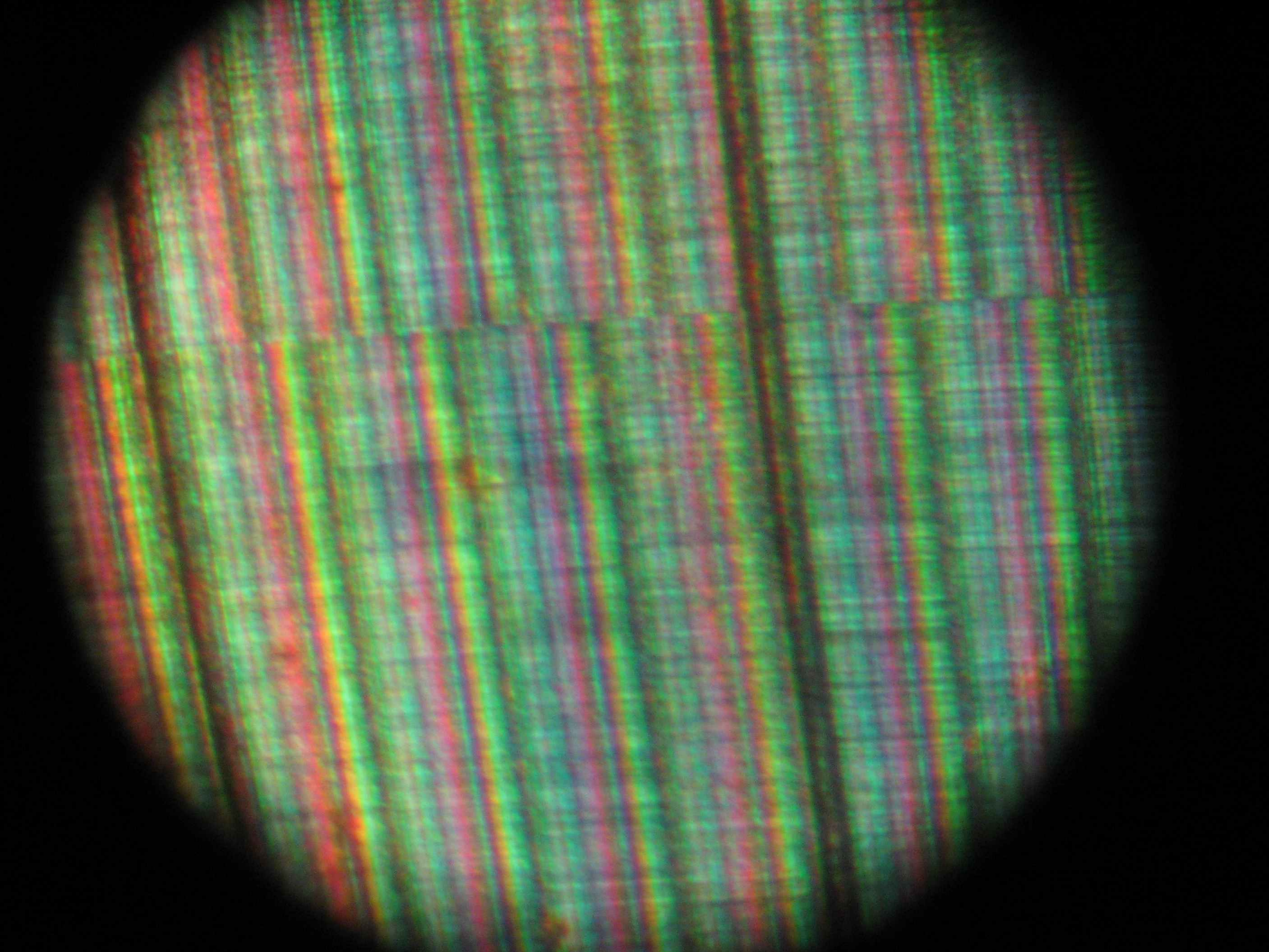
FDB dismantled



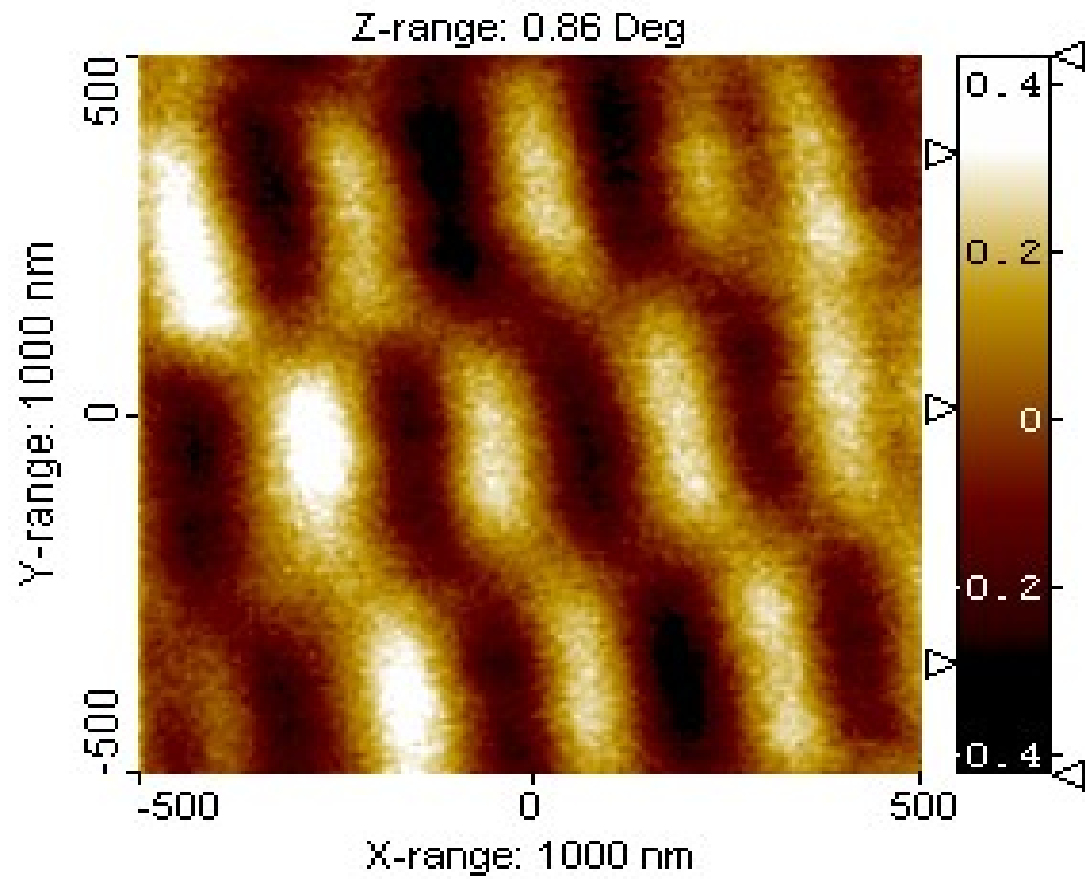








# Last Resort: MFM Imaging





SAMSUNG 843  
K9MDGZ8U5M  
SCK0  
YWG408PG

SAMSUNG  
S3C49RBX01-YH40  
N171NMMY4  
0839  
ARM

SAMSUNG 843  
K9MDGZ8U5M  
SCK0  
YWG408PG

SAMSUNG 840  
K9M56323PT-LG75  
YWG408PG

SAMSUNG 843  
K9MDGZ8U5M  
SCK0  
YWG408PG

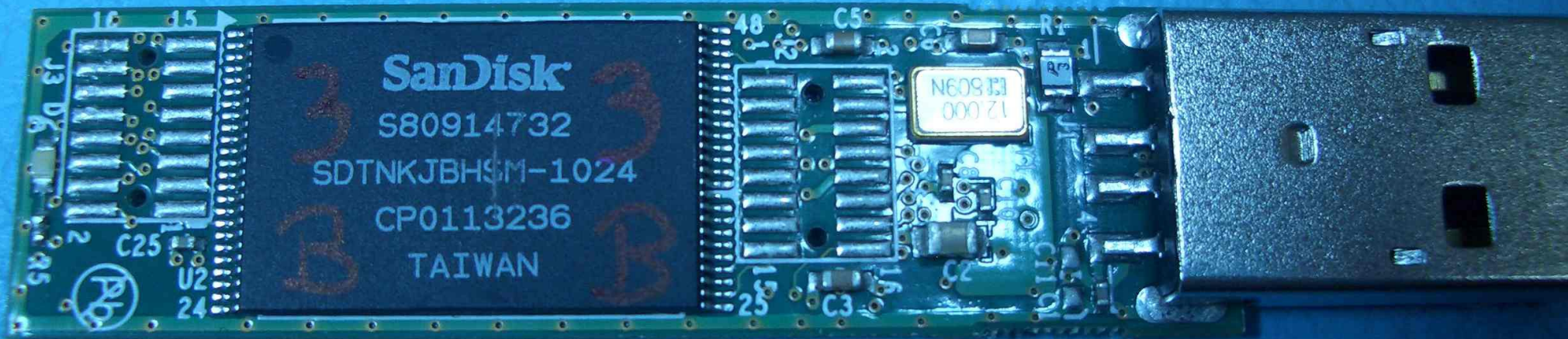
SAMSUNG 843  
K9MDGZ8U5M  
SCK0  
YWG408PG

SAMSUNG 843  
K9MDGZ8U5M  
SCK0  
YWG408PG

SAMSUNG 843  
K9MDGZ8U5M  
SCK0  
YWG408PG

80451-148  
94V-0  
9024





SanDisk

S80914732

SDTNKJBHSM-1024

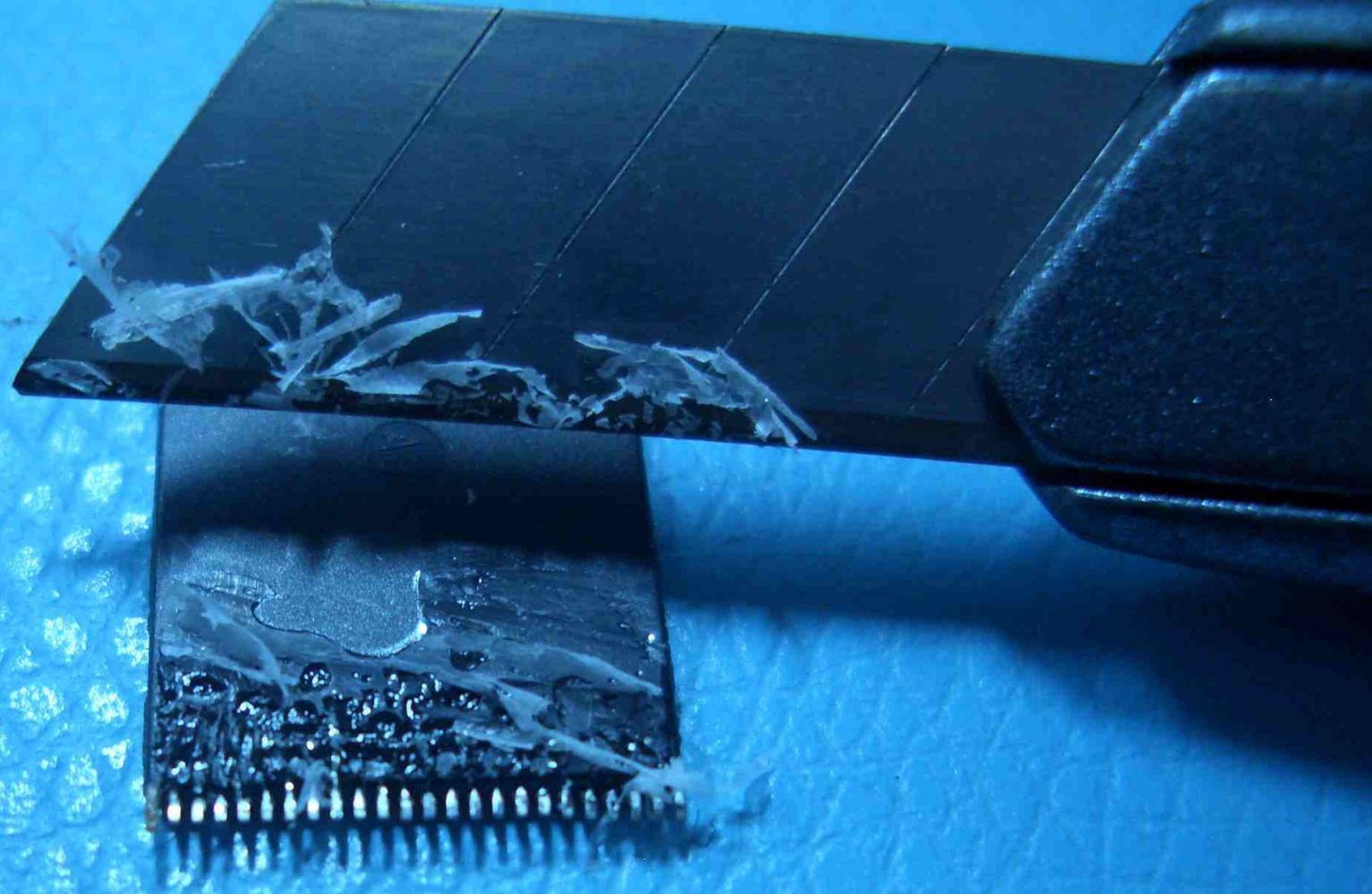
CP0113236

TAIWAN

N6091B1  
00071







A106

TF12G2AA  
A0825  
218544

2

TSOP-48

Wipac





# Fun with Hard Drives

Disks found: 2

Identify info for drive 1 configured as PRImaryMAster:

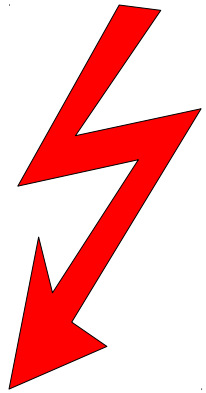
Model: HTS721080G9AT00  
Serial: MPD4N7Y4HDV9VL  
Revision (ATA Version): MC40A51A (ATA/ATAPI-6)  
Current (Default) CHS: 16.383:16:63 (16.383:16:63)  
48 bit LBA Capacity: 156.301.488 Blocks  
Current Multiple Mode (Max): 1 (16)  
Max PIO mode: 4  
Current DMA/UDMA (Max): -/5=ATA100(2=16MB/5=ATA100)  
Security :

Identify info for drive 2 configured as SECondaryMAster:

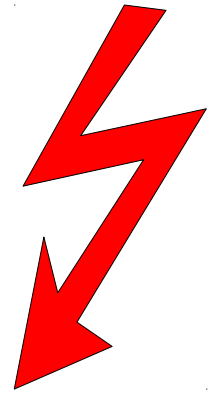
Model: HACKED BY CCC ←  
Serial: 9RW1H2Y3  
Revision (ATA Version): 3.AAD (ATA/ATAPI-7)  
Current (Default) CHS: 16.383:16:63 (16.383:16:63)  
48 bit LBA Capacity: 156.301.488 Blocks  
Current Multiple Mode (Max): 1 (16)  
Max PIO mode: 4  
Current DMA/UDMA (Max): -/5=ATA100(2=16MB/5=ATA100)  
Security :







# WARNING



Your Disks **will** eventually get **BRICKED!**

**Never** use Data Disks for Experiments!

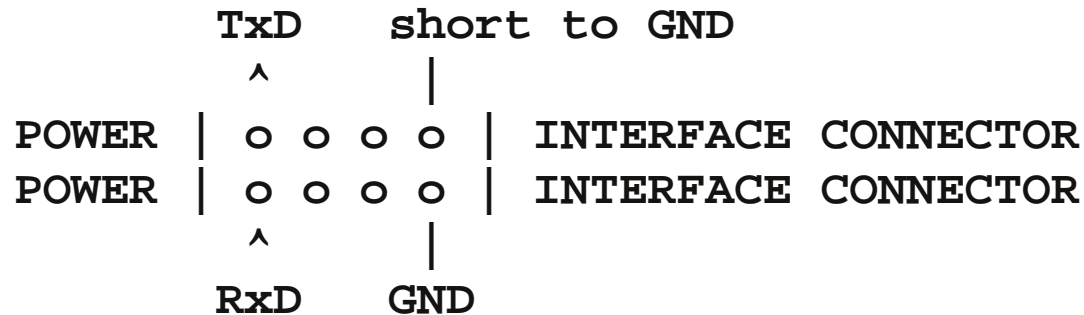
Do ~~not~~ try this at Home!

Signals are 3.3 Volts

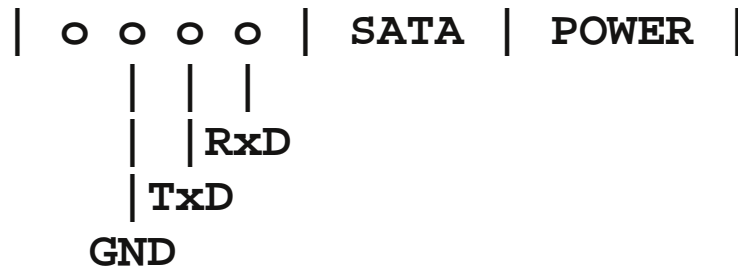
Commands are different across Families!

# Connecting a Terminal

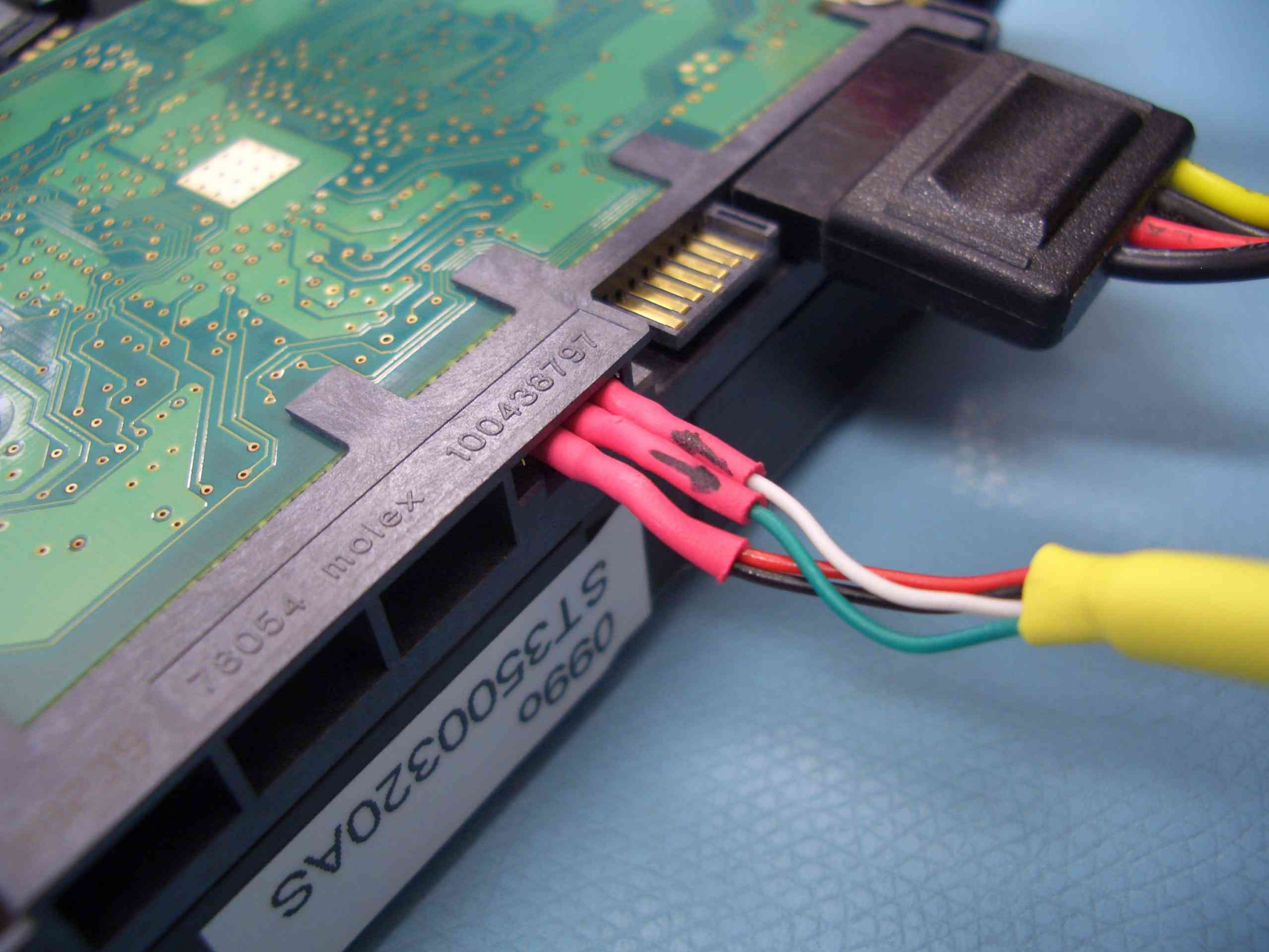
## Seagate PATA Terminal



## Seagate SATA Terminal







131834001  
molex 100438797

0990  
ST3500033204S



380215A



# Control Codes 7200.10

- ^Z: Enter Terminal Diagnostics
- ^A: View Firmware Revision
- ^B: View Temperature
- ^C: Reset
- ^D/^N: Set Tracing Bits up/down
- ^L: View Platform Information
- ^U: View raw AT Stuff

# Some Useful Commands

## Read individual Temp. Sensors

T>/7

7>D,1

Temp Diode 007B

( 38 C )

Cert Temp = ( 36 C )

7>D,2

Preamp temp = ( 66 decimal C )

## Assign a new Serial Number

T>R

T>#

Enter Drive S/N **MELISSA**

Enter Packwriter S/N

T>W



# Adjust Model Name

**Model Name will be changed to “HACKED BY CCC”**

```
T>F
SetStuff->ASCII1B4841
Stuff key 1b -> 48 41
T>F
SetStuff->ASCII1C434B
Stuff key 1c -> 43 4b
T>F
SetStuff->ASCII1D4544
Stuff key 1d -> 45 44
T>F
SetStuff->ASCII1E2042
Stuff key 1e -> 20 42
T>F
SetStuff->ASCII1F5920
Stuff key 1f -> 59 20
T>F
SetStuff->ASCII204343
Stuff key 20 -> 43 43
T>F
SetStuff->ASCII214320
Stuff key 21 -> 43 20
T>W
```

# Sneak a Peek

			7>I										
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(A)	
	ZONE	HEAD	MRBIAS	ATTR	VGAR	ACCR	CTFR	CTFRNG	BOOST	TDTARG	MRASYM	PLOPHS	
Head 00	0	0	11	3	63	5	2f	6	15	b4	96	4	
	1	0	11	3	64	5	2c	6	14	b4	9a	4	
	2	0	11	3	66	5	2a	6	14	b4	9c	4	
Zone 00:	00018	- 01B6F	1466	(05BA)	923.225								
	3	0	11	3	68	5	27	6	15	b4	90	4	
Zone 01:	01B70	- 03F2D	1430	(0596)	900.000								
	4	0	11	3	6b	5	24	6	12	b4	94	4	
Zone 02:	03F2E	- 05F03	1393	(0571)	878.225								
	5	0	11	3	6b	4	20	6	13	b4	92	4	
Zone 03:	05F04	- 081C7	1351	(0547)	854.377								
	6	0	11	3	70	4	1c	6	12	b4	94	4	
Zone 04:	081C8	- 0A2C9	1320	(0528)	829.492								
	7	0	11	3	71	4	18	6	14	b4	8e	4	
Zone 05:	0A2CA	- 0C849	1265	(04F1)	800.460								
	8	0	11	3	74	4	13	6	16	b4	8e	4	
Zone 06:	0C84A	- 0F3D7	1210	(04BA)	765.725								
	9	0	11	3	73	4	10	6	18	b4	8e	4	
Zone 07:	0F3D8	- 11A51	1155	(0483)	733.064								
	a	0	11	3	6c	3	c	6	12	d7	8e	4	
Zone 08:	11A52	- 147D3	1100	(044C)	691.935								
	b	0	11	3	87	3	38	5	d	d8	92	4	
Zone 09:	147D4	- 165B5	1045	(0415)	662.462								
	c	0	11	3	89	3	31	5	e	d8	8c	4	
Zone 0A:	165B6	- 18A09	990	(03DE)	627.096								
	d	0	11	3	8b	3	2b	5	f	d8	8e	4	
Zone 0B:	18A0A	- 1AAA7	935	(03A7)	593.841								
	e	0	11	3	8d	2	24	5	f	d8	8a	4	
Zone 0C:	1AAA8	- 1CE97	880	(0370)	554.516								
	f	0	11	3	8f	2	1d	5	11	d8	88	4	
Zone 0D:	1CE98	- 1E891	825	(0339)	527.046								
	10	0	11	3	77	3	2a	5	4	d8	90	4	
Zone 0E:	1E892	- 206D7	770	(0302)	491.474								
Zone 0F:	206D8	- 2206D	708	(02C4)	457.258								
Reserve:	13BCC	- 13D49	640	(0280)	524.653								
Total KBAs = 095991E2													



# Play

Thanks for your Attention!

Any Questions?