



*Tools for data recovery experts*

## *Guide for using HddSurgery™ head change tools:*

- ***HDDS HGST 3.5" Ramp Set***

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# 1. Introduction

This guide is intended as a short course in handling of our tools for professionals in data recovery. It is assumed that the user is experienced in data recovery and familiar with "traditional" ways of saving data. This manual should not be taken as a guide for training.

Using these tools without adequate software support is not recommended. It is recommended to use some of the proven systems for cloning, such as Ace Lab, Salvation Data, Copy-r and other products.

It is possible to recover data without HddSurgery™ tools. In many cases, the known processes of hard drive head replacement are effective and sufficient. The general idea behind HddSurgery™ tools was to make sure that the process of replacing damaged hard drive heads goes with no errors. The use of HddSurgery™ tools prevents the ferromagnetic read/write heads to come in any kind of contact with the platter i.e. disk surface or other read/write heads. Also, with some basic procedures and short training, it is possible to let junior data recovery technicians handle complex tasks. With the development of these tools, we are trying to eliminate the element of luck that usually accompanies the process of data recovery.

Experienced data recovery technicians or engineers can have great success even without our tools, but they can have absolute security only by using HddSurgery™ tools.

Non-contact head replacement implies that there is no contact between the heads, or between heads and platters in the process of dismounting the donor heads and mounting heads on the patient drive. Traditional techniques of replacing the heads imply contact between the heads and contact of heads with the platters in data area. These problems especially come to light on drives that have suffered some form of physical damage.

This tool doesn't solve the head compatibility problem. It will only assure that the head replacement goes easily. If you have questions about compatibility, you can send them to HddSurgery™ support team on [support@hddsurgery.com](mailto:support@hddsurgery.com)

HddSurgery™ is not responsible for any eventual damage caused by usage of our tools. HddSurgery™ is not responsible for the data stored on the patient or donor hard drives.

## 2. HddSurgery™ HGST 3.5" Ramp Set head replacement tools

HddSurgery™ **HDDS HGST 3.5" Ramp Set** is a set of head replacement tools which can be used to safely and easily replace heads on the most of the modern 3.5" Hitachi Global Storage Technologies (HGST) hard drives which "park heads" on a ramp. Set contains 5 pairs of head replacement tools: **HGST 3.5" Ramp p1w**, **HGST 3.5" Ramp p2w**, **HGST 3.5" Ramp p2**, **HGST 3.5" Ramp p3** and **HGST 3.5" Ramp p5** which are used together with pair of **HGST 3.5" Support Tools**.



- **HGST 3.5" Ramp p1w**

This head replacement tool can be used on 3.5" HGST hard drive models PLAT, PLA, VLSA, VLAT and others which have 1 platter and with their heads parked on a white ramp with one track (one track - space for two heads).



- **HGST 3.5" Ramp p2w**

This tool is used on HGST 3.5" hard drives models VLAT, VLSA, DLAT, DLA and others with 2 and 1 platters, which park their heads on a white ramp with two or three tracks.



- **HGST 3.5" Ramp p2**

HGST 3.5" Ramp p2 head replacement tool can be used on 3.5" HGST hard drive models CLA, GLAT, GLA, SLA, DLE and others which have 2 and 1 platters and their heads parked on orange ramp with one or two tracks.



### ■ HGST 3.5" Ramp p3

HGST 3.5" Ramp p3 head replacement tool can be used on the 3 and 2 platter HGST drives which include models ALA, BLA, SLA and others. These drives have their heads parked on a orange ramp with three tracks.



### ■ HGST 3.5" Ramp p5

HGST 3.5" Ramp p5 head replacement tool can be used on 3.5" HGST hard drive models KLA, KLAT, ALA, ALE, ALS and other models which have 5, 4 and 3 platters and their heads parked on both - white and orange ramps with five tracks. This tool is used together with HGST 3.5" Support tool.

### ■ HGST 3.5" Support tool

HGST 3.5" Support tool is designed to support head (and magnet) replacement process on 3.5" HGST hard drive models KLA, KLAT, ALA, ALE, ALS and other models which have 5, 4 and 3 platters and their heads parked on both - white and orange ramps with five tracks. The upper and lower magnet of these drives are connected and can't be disassembled by classical methods. This means that heads must be disassembled together with the magnets. Support tool secures position of heads in relation to both magnets during heads replacement process.



### 3. Supported models

#### HDDS HGST 3.5" Ramp Set

List of Hitachi Global Storage Technologies families and models on which process of head replacement could be performed by using the ramp tools from HDDS HGST 3.5" Ramp Set.

<b>DESKSTAR 7K80</b>  HDS728040PLAT20 HDS728080PLAT20  HDS728040PLA320 HDS728080PLA380	<b>DESKSTAR 7K160</b>  HDS721616PLAT80 HDS721680PLAT80  HDS721616PLA380 HDS721680PLA380	<b>DESKSTAR 7K250</b>  HDS722540VLAT20 HDS722580VLAT20 HDS722512VLAT20 HDS722516VLAT20 HDS722516VLAT80	<b>DESKSTAR T7K250</b>  HDT722525DLAT80 HDT722516DLAT80 HDT722520DLAT80  HDT722525DLA380 HDT722520DLA380 HDT722516DLA380	<b>DESKSTAR 7K500</b>  HDS725050KLAT80
	<b>CINEMASTAR 7K160</b>  HCS721616PLAT00 HCS721680PLAT00  HCS721616PLA390 HCS721680PLA390	HDS722540VLSA80 HDS722580VLSA80 HDS722512VLSA80 HDS722516VLSA80  <b>(250GB models from this family are not supported)</b>		<b>DESKSTAR E7K500</b>  HDS725050KLA360 HDS725050KLA361
<b>DESKSTAR P7K500</b>  HDP725050GLAT80 HDP725040GLAT80 HDP725032GLAT80 HDP725025GLAT80 HDP725016GLAT80  HDP725050GLA380 HDP725050GLA360 HDP725040GLA380 HDP725040GLA360 HDP725032GLA380 HDP725032GLA360 HDP725025GLA380 HDP725016GLA380	<b>CINEMASTAR P7K500</b>  HCP725050GLAT80 HCP725032GLAT80 HCP725025GLAT80  HCP725050GLA380 HCP725032GLA380 HCP725025GLA380	<b>DESKSTAR 7K1000</b>  HDS721075KLA330 HDS721010KLA330	<b>CINEMASTAR 5K1000.B</b>  HCS5C1010DLE630 HCS5C1075DLE630 HCS5C1050DLE630 HCS5C1032DLE630 HCS5C1025DLE630	<b>CINEMASTAR 7K1000.B</b>  HCT721010SLA360 HCT721050SLA380 HCT721032SLA380 HCT721025SLA380 HCT721016SLA380
	<b>CINEMASTAR 5K1000</b>  HCS5C1010CLA382 HCS5C1075CLA382 HCS5C1050CLA382 HCS5C1032CLA382 HCS5C1025CLA382 HCS5C1016CLA382	<b>DESKSTAR 5K1000</b>  HDS5C1010CLA382 HDS5C1050CLA382		
		<b>DESKSTAR 5K1000.B</b>  HDS5C1010DLE630	<b>DESKSTAR 7K1000.B</b>  HDT721010SLA360 HDT721075SLA360 HDT721064SLA360 HDT721050SLA360 HDT721032SLA360 HDT721025SLA360 HDT721016SLA360	<b>DESKSTAR 7K1000.D</b>  HDS721010DLE630 HDS721075DLE630 HDS721050DLE630 HDS721032DLE630 HDS721025DLE630
		<b>DESKSTAR E7K1000</b>  HDE721010SLA330 HDE721075SLA330 HDE721050SLA330		

(Page 1)

## HDDS HGST 3.5" Ramp Set

List of the Hitachi Global Storage Technologies families and models on which process of head replacement could be performed by using ramp tools from HDDS HGST 3.5" Ramp Set.

DESKSTAR 7K1000.C  HDS721010CLA332 HDS721075CLA332 HDS721064CLA332 HDS721050CLA362 HDS721032CLA362 HDS721025CLA382 HDS721016CLA382 HDS721010CLA632 HDS721075CLA632 HDS721064CLA632 HDS721050CLA662 HDS721032CLA662 HDS721025CLA682 HDS721016CLA682	DESKSTAR 7K2000  HDS722020ALA330	DESKSTAR 5K3000  HDS5C3030ALA630 HDS5C3020ALA632 HDS5C3015ALA632	ULTRASTAR A7K1000  HUA721010KLA330 HUA721075KLA330 HUA721050KLA330
	DESKSTAR 7K3000  HDS723030ALA640 HDS723020BLA642 HDS723015BLA642	DESKSTAR 7K4000  HDS724040ALE640 HDS724030ALE640	ULTRASTAR A7K2000  HUA722020ALA330 HUA722010CLA330 HUA722050CLA330 HUA722010CLA331 HUA722050CLA331
		DESKSTAR 5K4000  HDS5C4040ALE630	
ULTRASTAR 7K3000  HUA723030ALA640 HUA723030ALA641 HUA723020ALA640 HUA723020ALA641 HUS723030ALS640 HUS723030ALS641 HUS723020ALS640 HUS723020ALS641	ULTRASTAR 5K3000  HUA5C3030ALA640 HUA5C3030ALA641 HUA5C3020ALA640 HUA5C3020ALA641	ULTRASTAR 7K4000  HUS724040ALE640 HUS724040ALE641 HUS724040ALA640 HUS724040ALA641 HUS724040ALS640 HUS724040ALS641 HUS724030ALE640 HUS724030ALE641 HUS724030ALA640 HUS724030ALA641 HUS724030ALS640 HUS724030ALS641 HUS724020ALE640 HUS724020ALE641 HUS724020ALA640 HUS724020ALA641 HUS724020ALS640 HUS724020ALS641	

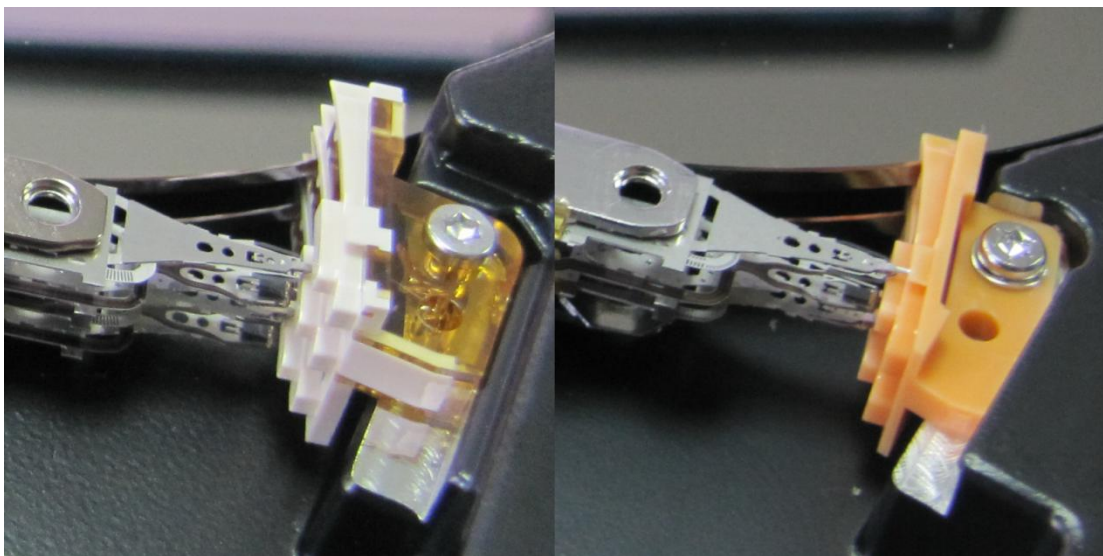
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## 4. Features of HDDS HGST 3.5" ramp tools

### Classification of HGST hard drives

Classification of HGST hard drives can be made by the color of their ramp. HGST stopped with production of the hard drives which have white ramps and thin platters ( $d=1.27\text{mm}\approx 0.05''$ ) during 2008. From 2008 HGST started with production of hard drives with orange ramps and thick platters ( $d=1.75\text{mm}\approx 0.07''$ ).



*Picture 4.1 (HGST hard drives with white (left) and orange ramps (right))*

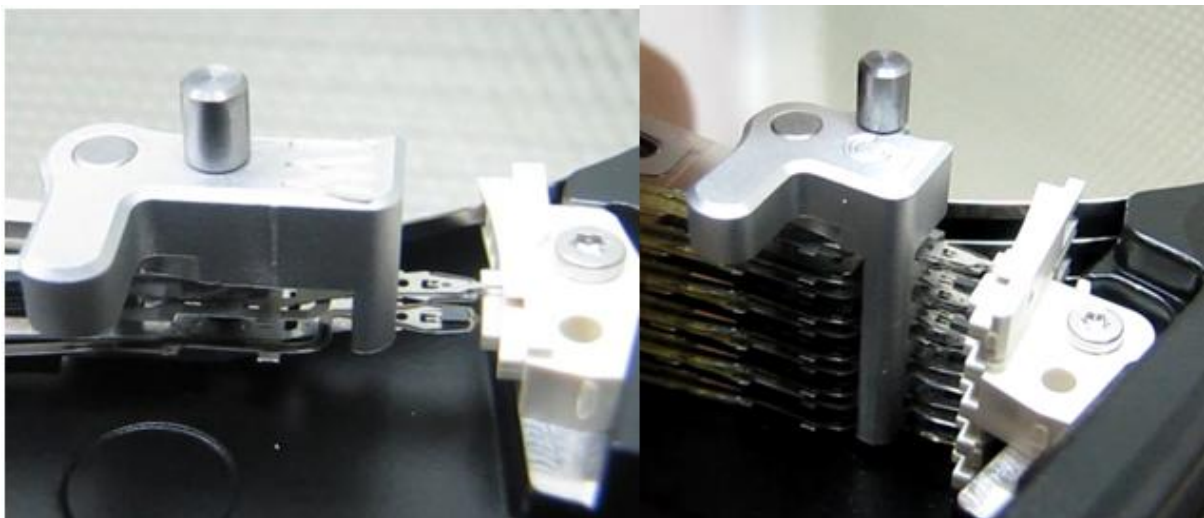
So, the tools which have w (white) suffix in their name - p1w and p2w, can be used only on the hard drives with white ramp. Tools without this suffix (p2, p3 and p5) are meant to be used on the drives with orange ramps.

However, due to limited available space in the hard drive casing, HGST hard drives with 4 and 5 platters are still produced with thin platters although manufacturers changed color of their ramps to orange in 2008 (pre-2008 drives have white ramps). Head replacement on these hard drives is performed by combined usage of Ramp tools p5 and Support tools.

## Securing of the HGST 3.5" ramp tools position on the heads

Most of the modern HGST hard drives have only one available hole on the actuator arm which should be used for mounting of the head replacement tool. As there is no available other hole, problem of the securing the tool's position on the heads is solved by implementing side-locking system. This means that the securing pin of the p2w, p2, p3 and p5 ramp tool is locking the tool's position by going to the side of the head assembly.

Ramp tool p1w is different from the other HGST 3.5" Ramp Set tools because it has securing pin which is going through the hole of the head arm. This is classical method which is used for locking the tool's position on the heads on previous products of HDDSurgery<sup>TM</sup>.

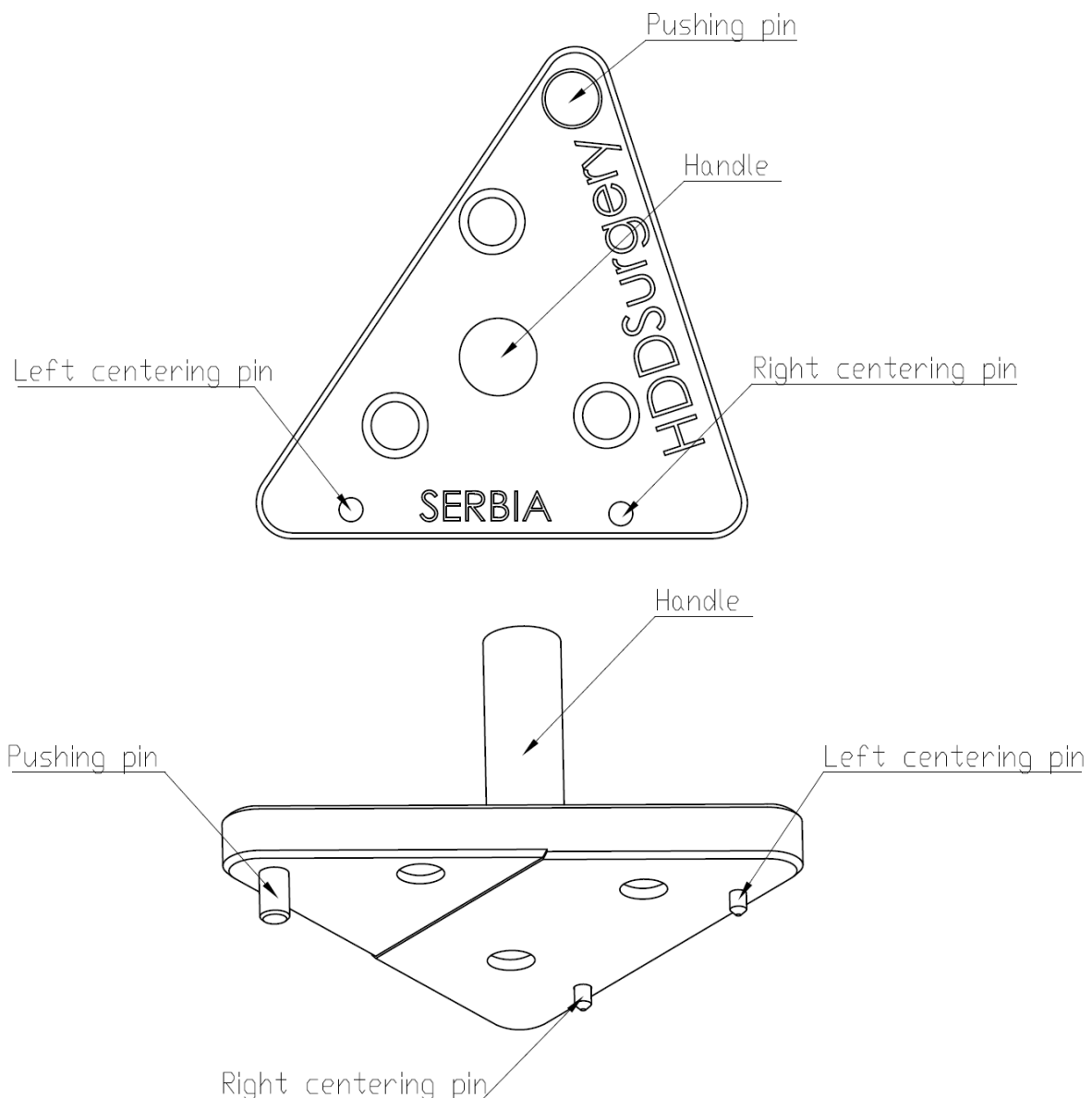


*Picture 4.2 (Classical method of locking the p1w tool on a head arm (left); Side locking system of the p5 tool (right);)*

## Features of the Support tool

Main parts of the HGST 3.5" Support tool are presented on picture 4.3. Right and left centering pins secure precise mounting position of the support tool on the head assembly and magnets, while pushing pin is used to control movement of the heads off and on the ramp.

Detailed instructions for use of the Support tool will be presented in Chapter 8.



Picture 4.3 (Support tool and its parts)

## 5. Handling the tools

When not in use, the tools should always be kept in a wooden box delivered with the tools. This way of keeping the tools prevents any possible damage which could appear when not handled properly.

When taking the tool out of the box, always hold it for the shank. Never hold the tool in the part where the head lifting snouts are.

Due to the sensitivity of hard drive platters to dust and any kind of contamination, be sure to clean the tools before their use. Tools can be cleaned with a piece of cotton wool and alcohol. When cleaning the head lifting snouts, be extremely gentle.



Picture 5.1. (HDDS HGST 3.5" Ramp Set)

## 6. Head replacement process with p1w

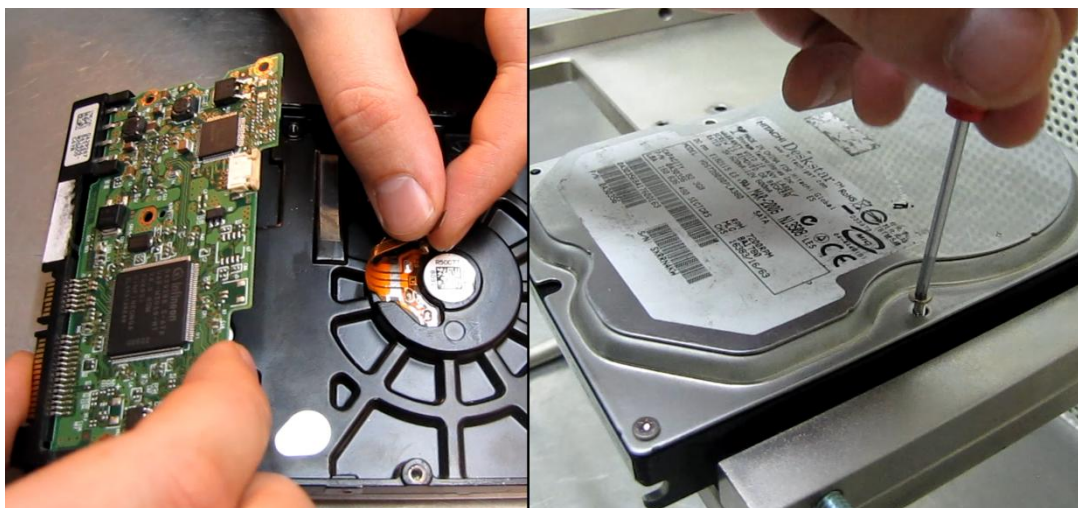
### Ramp tool

#### Preparing the hard drive for head replacement

To prepare the hard drive for head replacement process it is needed to dismount the PCB (circuit board on the bottom side) and to take off the lid from the top of the hard drive. Loosen and remove all the screws on the PCB, than pull out the flat cable from the connector and gently take of the board.

In order to easily dismount the heads later in the process, loosen the screw on the bottom side which is holding the head assembly just a little bit and then tighten it again.

After dismounting the PCB loosen all the screws and take off the lid.



*Picture 6.1 (Dismounting PCB (left) and unscrewing the lid (right))*



## Step 1 – Dismounting the upper magnet

Remove the upper magnet by using the needle-nose pliers. One side of pliers should be resting on the edge of the hard drive casing and one end of the open pliers should be under the magnet. Lift the magnet by pushing down the handles of the pliers while holding them tight.

Remove screws that are holding the flat cable connector and push the connector from the bottom upwards to release it. Pressure from below may cause the connector to pop out and possibly damage platters. Because of this, hold the top of connector with another hand while pushing it from the bottom. Before applying pressure, remove screws from their holes.

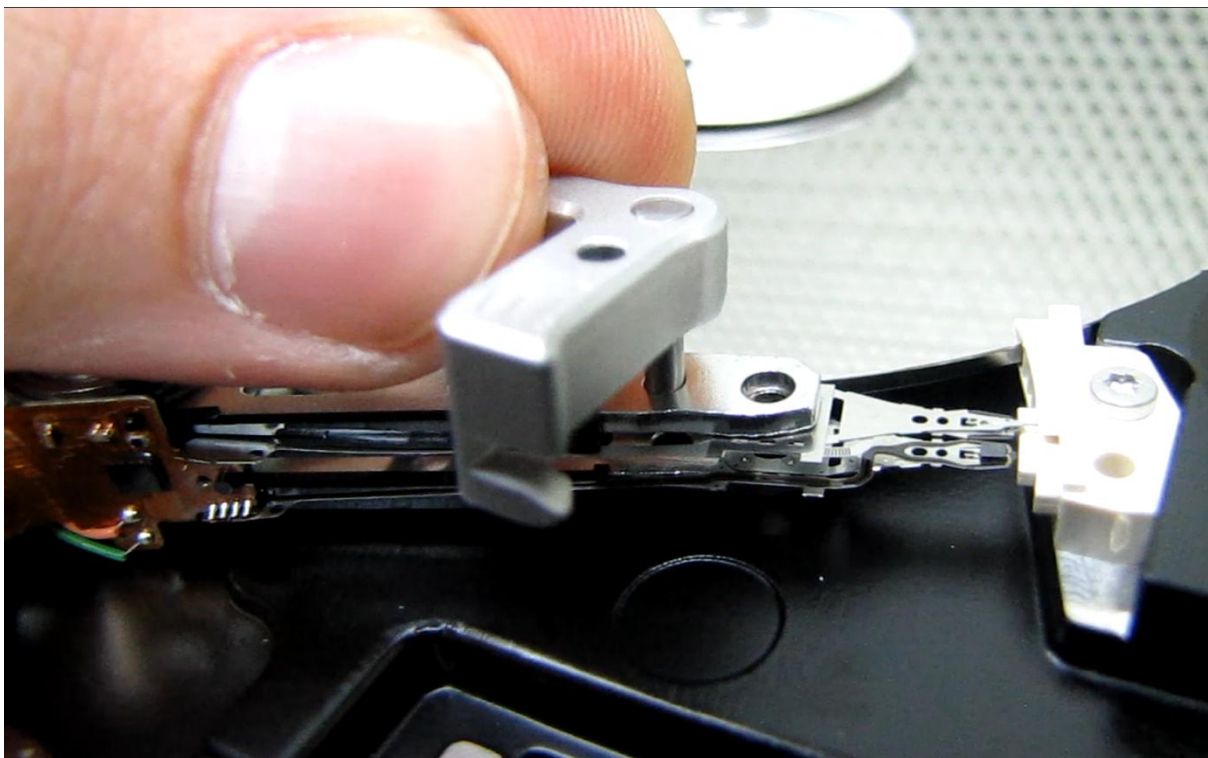


*Picture 6.2 (Dismounting the upper magnet by using needle-nose pliers)*

## Step 2 – Mounting the tool on the actuator arm

Carefully center the axle of the tool over the hole near the top of the head arm (near the heads themselves). Most of the HGST hard drives have only one hole near the top of the actuator arm which should be used for mounting the tool. However on hard drives which have 1 platter and white ramps with one track (for which p1w tools should be used) there are two holes at the end of the actuator arm and the tool's axle should be placed in the smaller one (see picture 6.3).

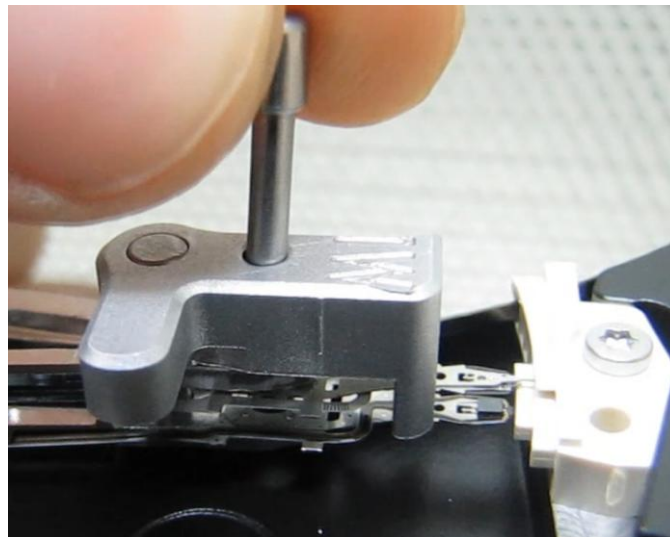
Take care that the snouts stand away from the heads, and put the axle of the tool through hole in the actuator arm. Axle of the tool should go easily through this hole.



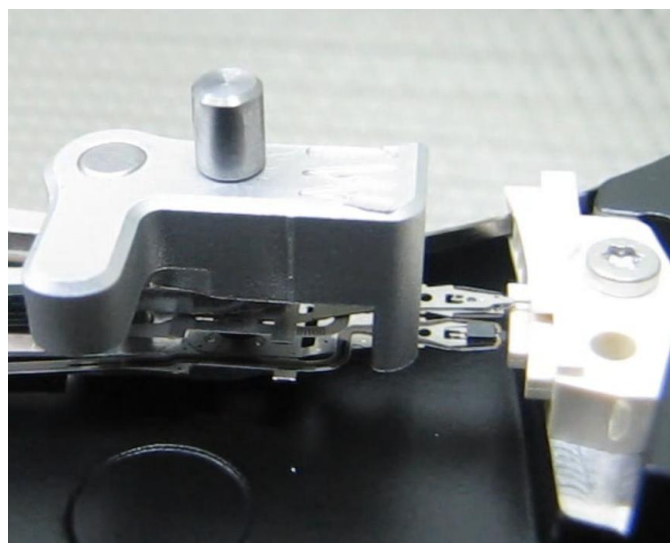
*Picture 6.3 (Mounting the tool on the actuator arm)*

## Step 3 – Securing the heads with the tool

Push the tool so the snouts go between the heads. These snouts will keep the distance between the heads and assure that the heads don't touch each other after sliding them off the ramp. Secure the tool in this position by providing securing pin. Pin should go through the hole easily. Securing pin will be placed through the actuator arm itself only when using p1w ramp tool.



*Picture 6.4 (Putting securing pin in the corresponding hole of the p1w tool)*



*Picture 6.5 (Heads secured with p1w ramp tool)*



## Step 4 – Removing the security brake(s)

Remove the security brake(s) with the tweezers. Some HGST hard drives have one and some two security brakes (both plastic and rubber one). Plastic brake should be removed first and then the rubber one. Be careful when grabbing the security brake because it can slip and fall on the platter if too much pressure is applied. Tweezers should grab the security brake in the thinner part and lift it up without moving in the other directions.

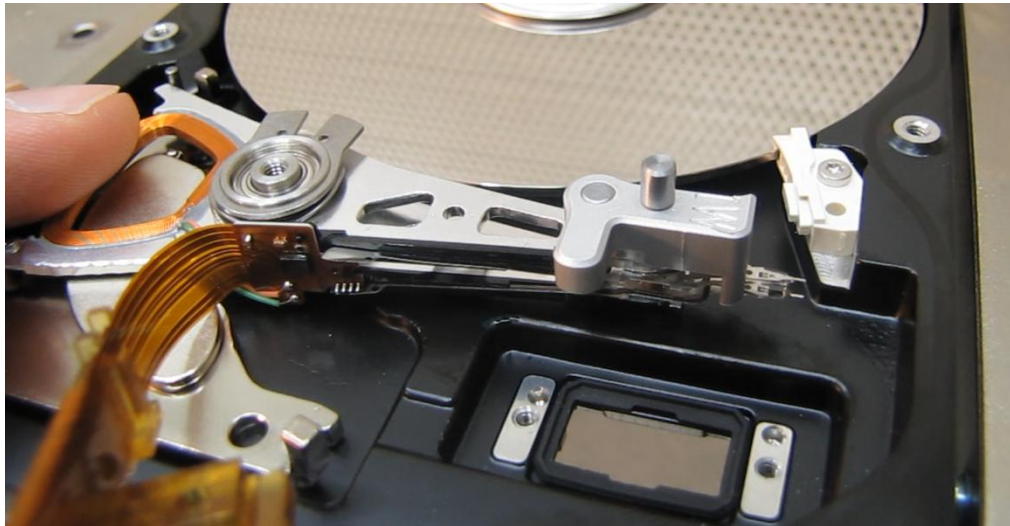
While removing rubber brake hold the end of the actuator arm with a finger. When rubber brake is removed, nothing else holds head assembly in its position.



*Picture 6.6 (Removing rubber brake with the tweezers)*

## Step 5 – Moving the heads off the ramp

Carefully move the heads off the ramp while controlling their movement with a finger at the end of the actuator arm. Tool's snouts will prevent the heads from touching each other when they are moved off the ramp.



*Picture 6.7 (Moving the heads off the ramp)*

## Step 6 – Removing the screw that holds the head arm

Loosen and remove the screw that's holding the head assembly connected to the donor drive casing. While loosening this screw, hold the head assembly with your other hand to prevent the heads from going back to the ramp area.



*Picture 6.8 (Removing screw that is holding the head arm connected to donor drive casing)*

## Step 7 – Dismounting the heads from a donor drive

To lift the head assembly, tweezers are needed. Use tweezers to grab the head assembly and pull the head arm up. To make sure that the head assembly goes straight up, use one finger to pull the back side of the head arm (side where the magnetic coil is) simultaneously. Don't try to dismount the heads by pulling the tool.

While lifting the donor head assembly up watch not to damage the heads. Especially take care that heads don't come in contact with the ramp. Because of strong bottom magnet's magnetic force, don't place actuator arm's steel shaft over it while lifting the head assembly up.



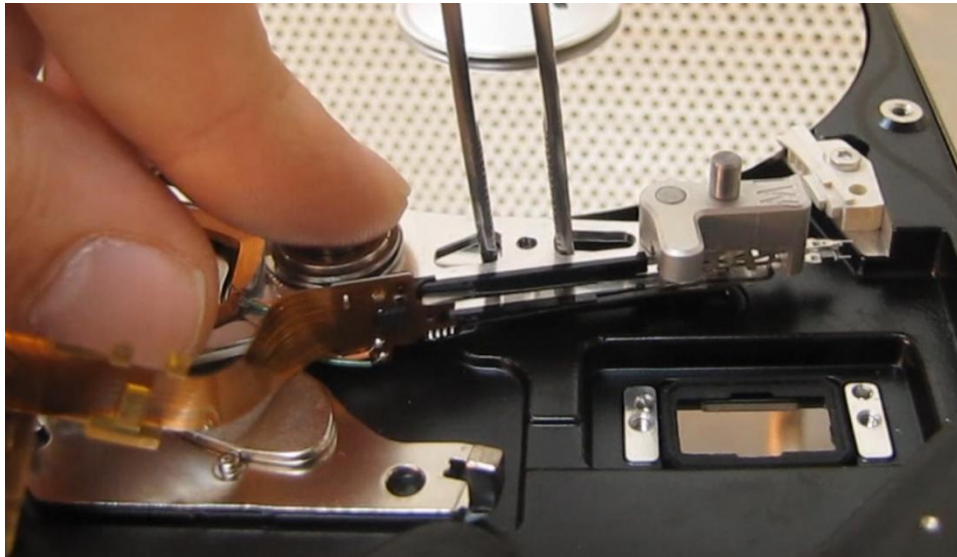
*Picture 6.9 (Dismounting the heads from donor drive)*



## Step 8 – Mounting the heads on a patient drive

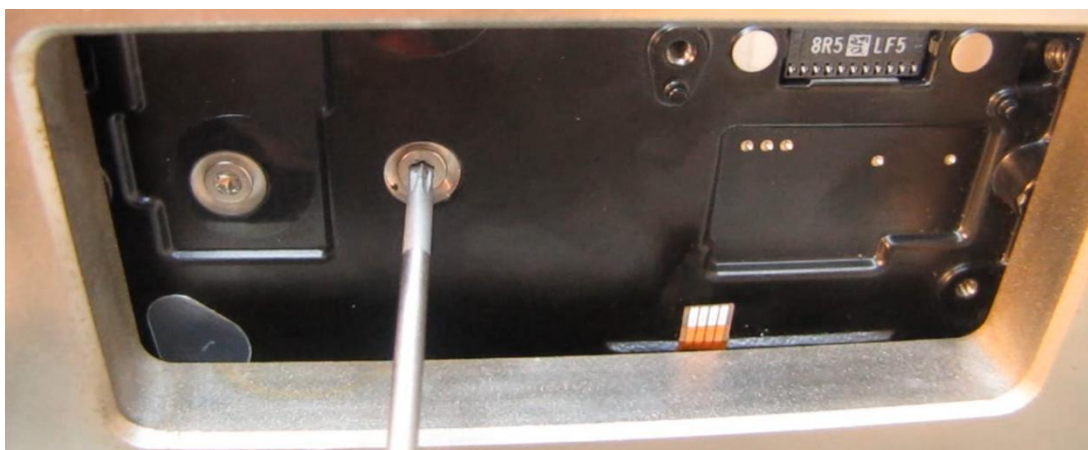
Place the head assembly to its place in a patient hard drive by using the tweezers. Assist the process with your other hand.

Watch not to damage the heads in the process. Especially take care that heads don't come in contact with the ramp. While placing the head assembly, watch not to place actuator arm's steel shaft over the bottom magnet.



*Picture 6.10 (Mounting the heads on a patient drive)*

When the head assembly is in its place, tighten the screw which is holding it from the bottom while holding the head assembly from above. Be sure to tighten this screw to assure good connection between the head arm and the patient hard drive casing.



*Picture 6.11 (Tightening the screw which is connecting head assembly with the patient drive casing)*

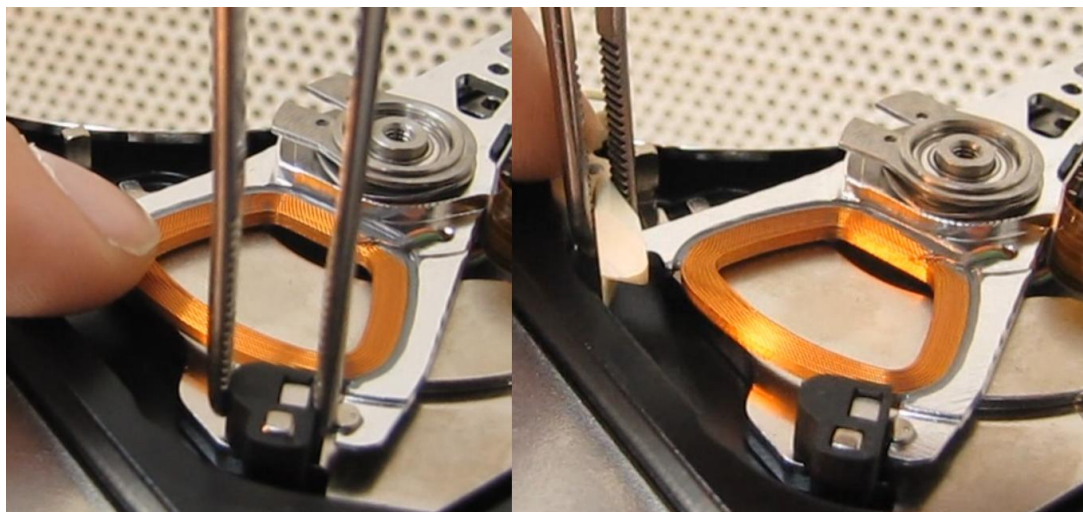
## Step 9 – Moving the heads to the patient drive's ramp

While controlling the head assembly movement with the finger at the end of the actuator arm, slide the heads to the patient drive's ramp.



*Picture 6.12 (Moving the heads to the patient drive's ramp)*

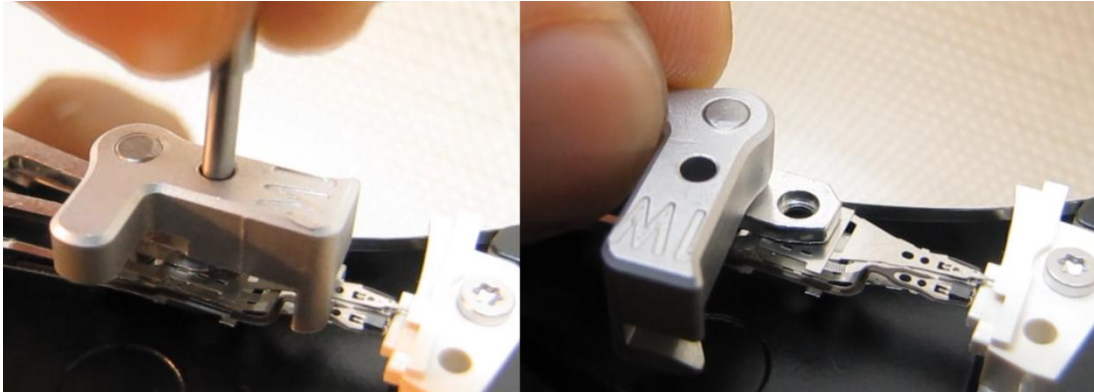
While keeping the heads position on the ramp by holding end of the actuator arm with the finger, put the security brake(s) to their places by using the tweezers. If there are two brakes, first place rubber brake - which will secure heads position on the ramp and then the plastic one.



*Picture 6.13 (Left - Placing rubber security brake; Right - Placing plastic security brake)*

## Step 10 - Dismounting the tool and finishing process

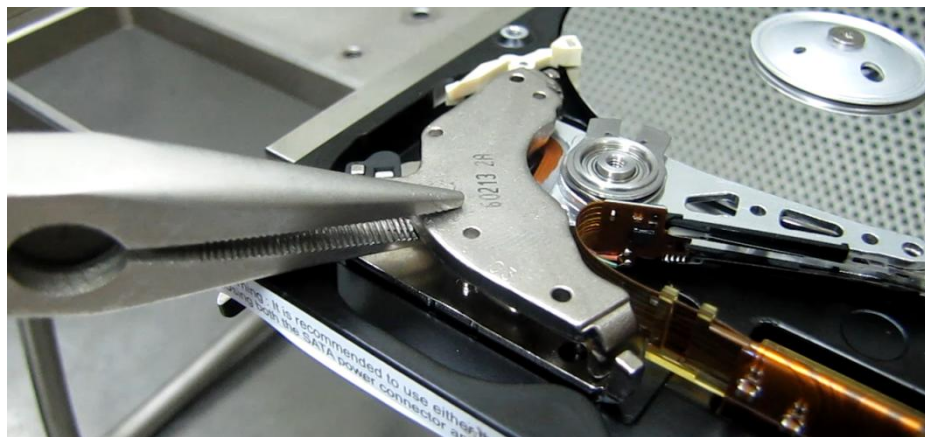
Remove the securing pin from the tool. Scroll the tool away from the heads. While gently holding the actuator arm, pull the axle of the tool out of the hole by holding the tool for its handle.



*Picture 6.14 (Left - Removing securing pin; Right - Dismounting the p1w ramp tool)*

Place the connector on its place and tighten the two screws that are holding it.

Put back the magnet by using the needle-nose pliers. Be careful when putting back the magnet because of magnetic force and use the leverage (like when You took it off).



*Picture 6.15 (Putting back the upper magnet)*

Put the lid and PCB back and clone the disk.



## 7. Head replacement process with p2w, p2 and p3 Ramp tools

### Step 1 – Mounting the tool on the actuator arm

Dismount PCB and loosen just a little bit the screw on the bottom side which is holding the head assembly and then tighten it again. This is needed in order to easily dismount head assembly later in the process.

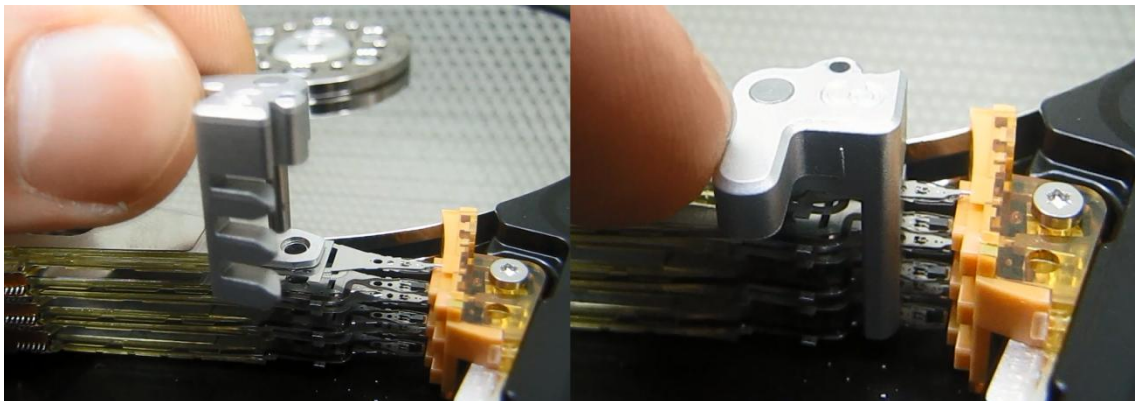
Open the hard drive casing and remove the upper magnet by using the needle-nose pliers. On some drives upper magnet is connected with the casing with a screws. On such drives firstly remove the screws and then upper magnet.

Remove screws that are holding the flat cable connector and push the connector from the bottom upwards to release it.

Carefully center the axle of the tool over the hole near the top of the head arm (near the heads themselves). Take care that the snouts stand away from the heads, and put the axle of the tool through the hole. Axle of the tool should go easily through this hole. Push the tool so the snouts go between the heads. These snouts will keep the distance between the heads and assure that the heads don't touch each other.

#### **!!! VERY IMPORTANT !!!**

**Don't secure the tool with the securing pin at this moment. On some models there is a danger that securing pin will fall on the top platter if it is placed at this moment.**

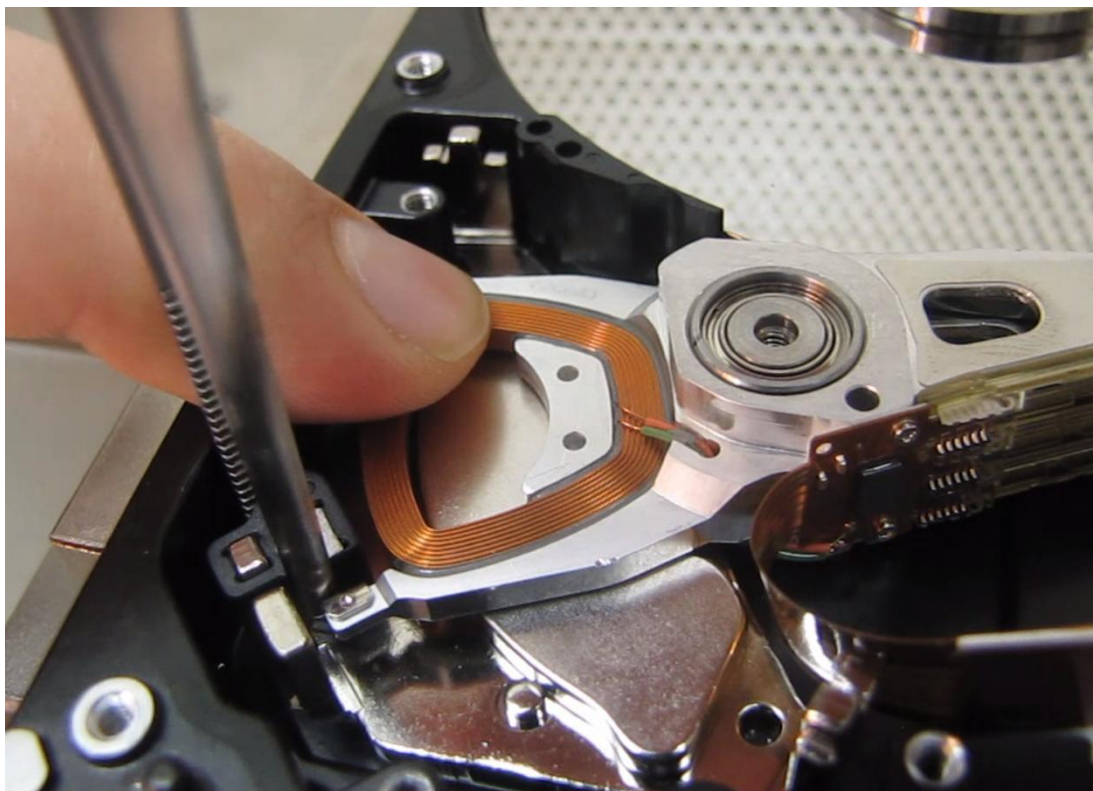


*Picture 7.1 (Mounting the tool on the actuator arm)*

## Step 2 – Removing the security brake(s)

Remove the security brake(s) with the tweezers. Some HGST hard drives have one and some two security brakes (both plastic and rubber one). Plastic brake should be removed first and then the rubber one. Be careful when grabbing the security brake because it can slip and fall on the platter if too much pressure is applied. Tweezers should grab the security brake in the thinner part and lift it up without moving in the other directions.

While removing rubber brake hold the end of the actuator arm with a finger. When rubber brake is removed, nothing else holds head assembly in its position.



*Picture 7.2 (Removing rubber brake)*



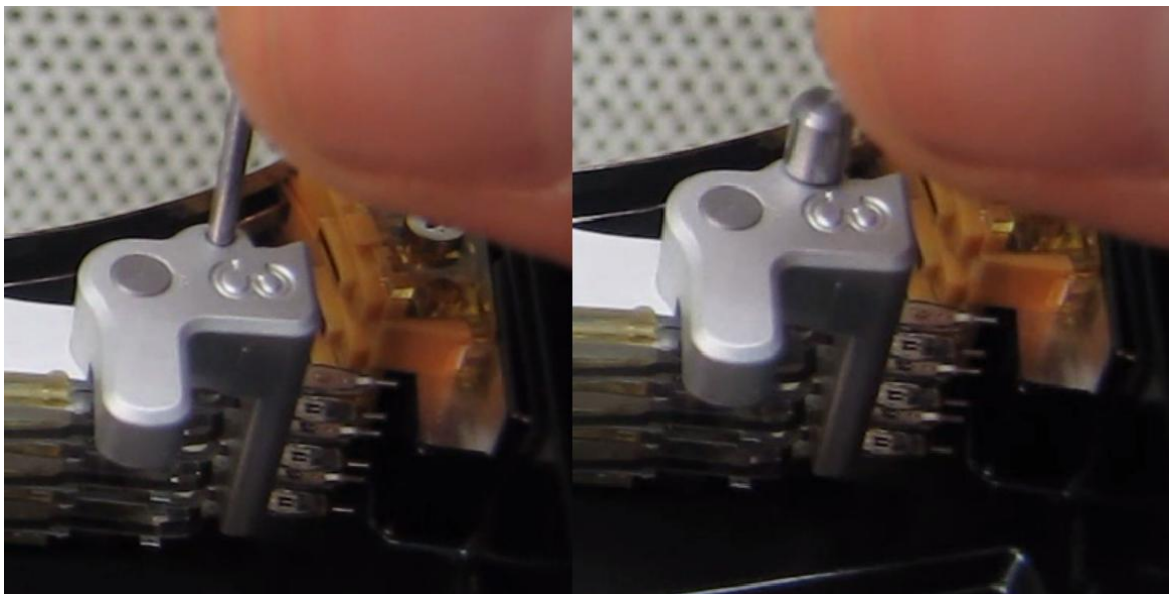
## Step 3 – Moving the heads off the ramp and securing the tool with the heads

Carefully move the heads of the ramp while controlling their movement with a finger at the end of the actuator arm. Tool's snouts will prevent the heads from touching each other when they are moved off the ramp.



*Picture 7.3 (Moving the heads off the ramp)*

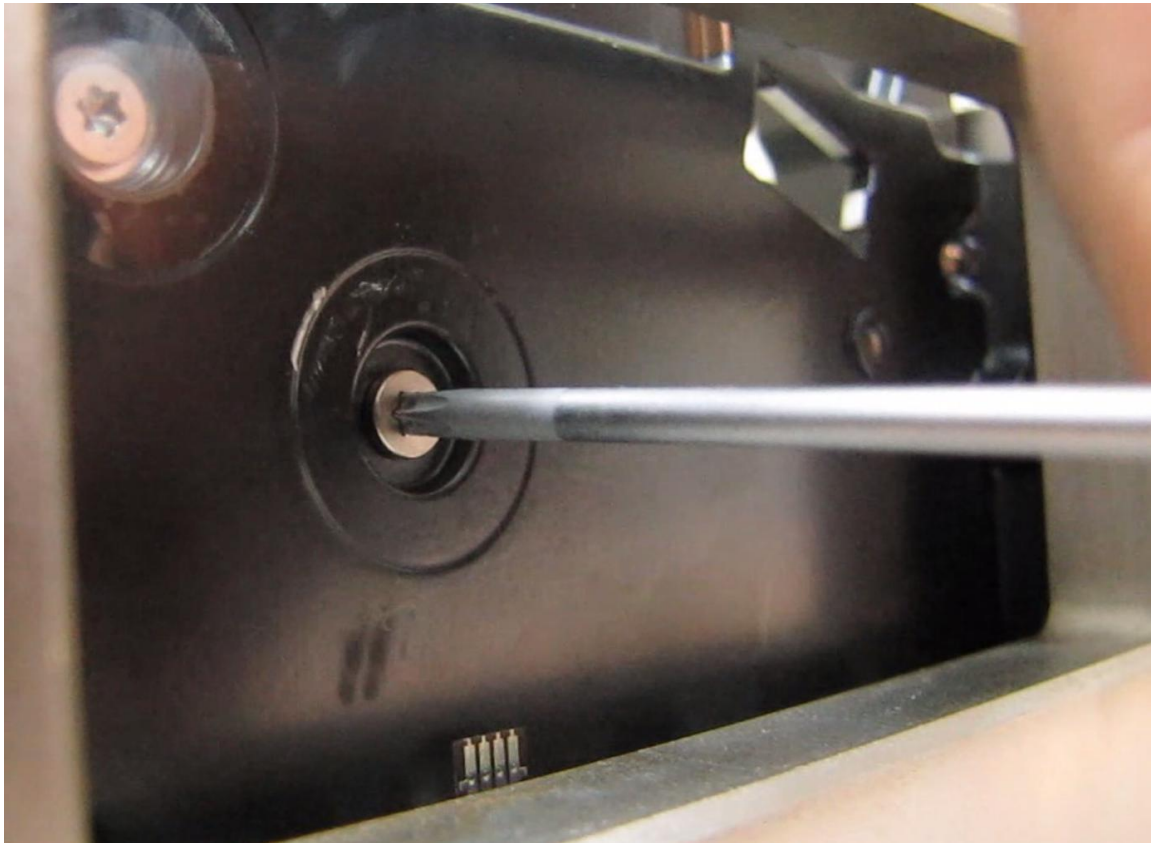
When the heads are off the ramp, secure the tool's position on them by providing securing pin. Ramp tools p2w, p2, p3 and p5 have implemented side-locking system which means that securing pin locks the tool's position on the heads by going to the side of the heads.



*Picture 7.4 (Securing the heads with the tool)*

## Step 4 – Removing screw that is holding the head arm

Loosen and remove the screw that's holding the head assembly connected to the donor drive casing. While loosening this screw, hold the head assembly with your other hand to prevent the heads from going back to the ramp area.

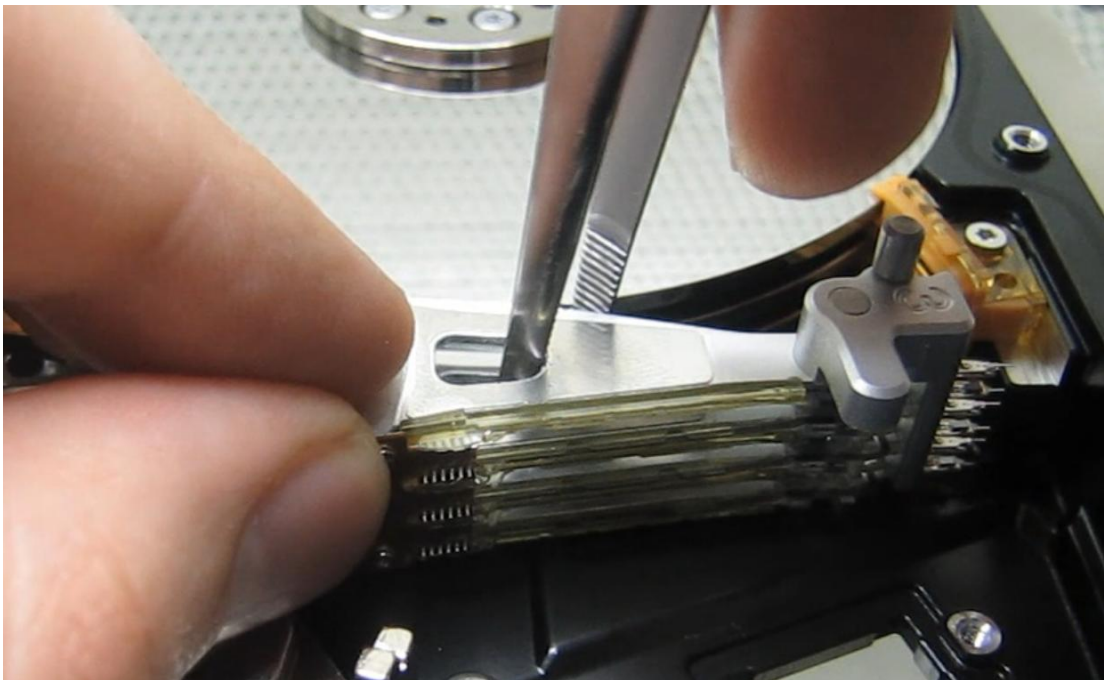


*Picture 7.5 (Removing screw that is holding the head arm connected to donor drive casing)*

## Step 5 – Dismounting the heads from a donor drive

To lift the head assembly, tweezers are needed. Use tweezers to grab the head assembly and pull the head arm up. To make sure that the head assembly goes straight up, use one finger to pull the back side of the head arm (side where the magnetic coil is) simultaneously. Don't try to dismount the heads by pulling the tool.

While lifting the donor head assembly up watch not to damage the heads. Especially take care that heads don't come in contact with the ramp. Because of the strong bottom magnet magnetic force, don't place actuator arm's steel shaft over it while lifting the head assembly up.



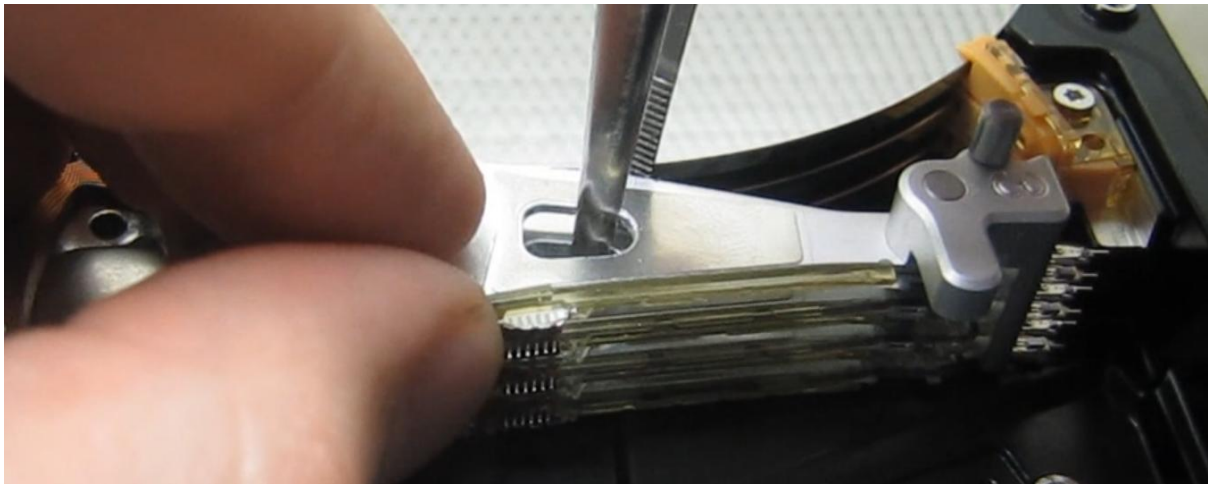
*Picture 7.6 (Dismounting the heads from donor drive)*



## Step 6 - Mounting the heads on a patient drive

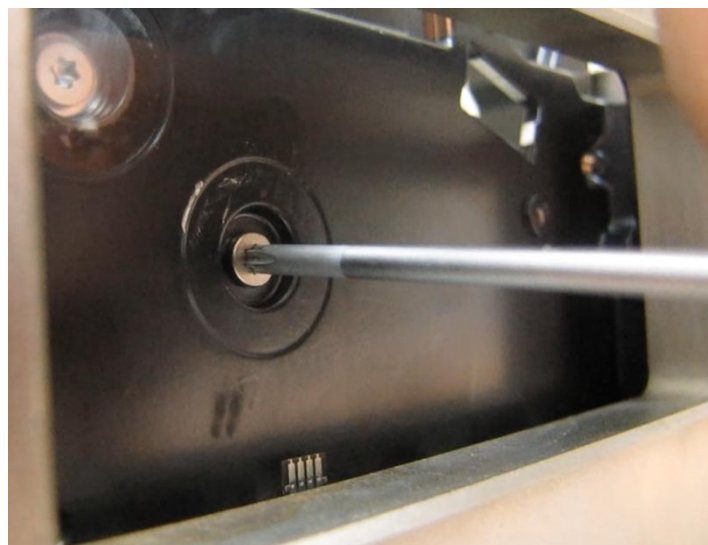
Place the head assembly to its place in a patient hard drive by using the tweezers. Assist the process with your other hand.

Watch not to damage the heads in the process. Especially take care that heads don't come in contact with the ramp. While placing the head assembly, watch not to place actuator arm's steel shaft over the bottom magnet.



*Picture 7.7 (Mounting the heads on a patient drive)*

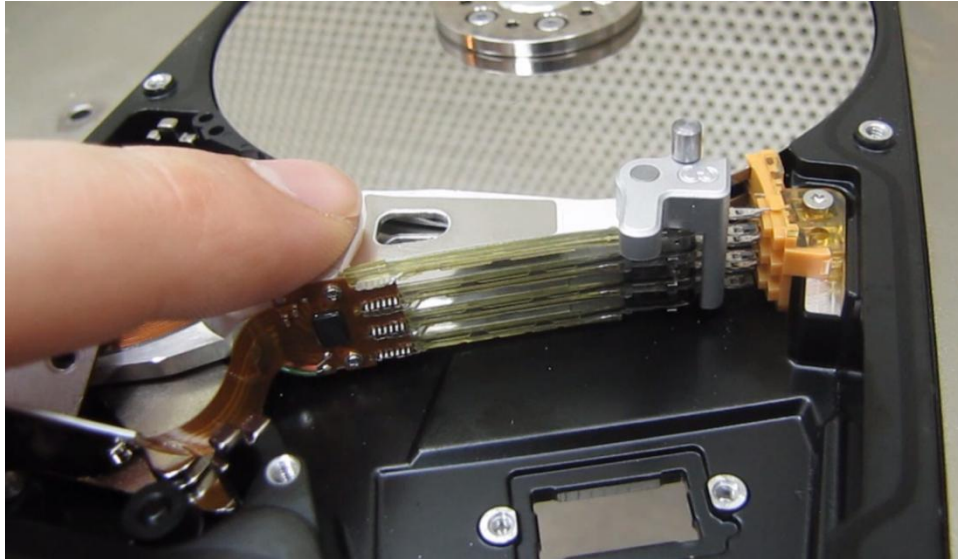
When the head assembly is in its place, tighten the screw which is holding it from the bottom while holding the head assembly from above. Be sure to tighten this screw to assure good connection between the head arm and the patient hard drive casing.



*Picture 7.8 (Tightening the screw which is holding head assembly from the bottom)*

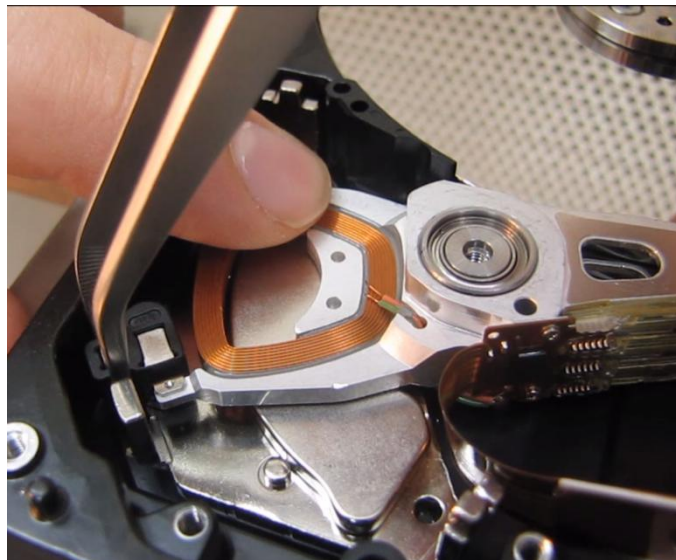
## Step 7 - Moving the heads to the patient drive's ramp

While controlling the head assembly movement with the finger at the end of the actuator arm, slide the heads to the patient drive's ramp.



*Picture 7.9 (Moving the heads to the patient drive's ramp)*

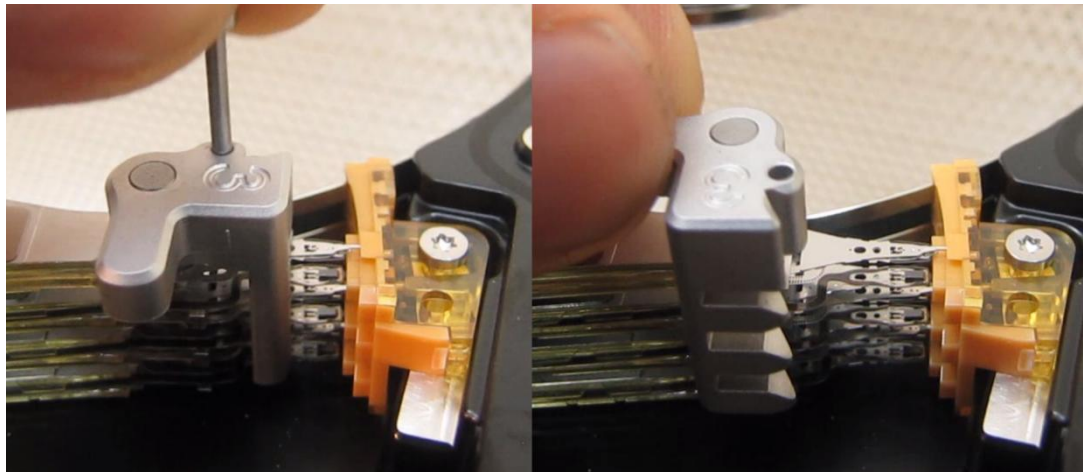
While keeping the heads position on the ramp by holding end of the actuator arm with the finger, put the security brake(s) to their places by using the tweezers. If there are two brakes, first place rubber brake - which will secure heads position on the ramp and then the plastic one.



*Picture 7.10 (Placing the security brake to its place in a patient drive)*

## Step 8 - Dismounting the tool and finishing process

Remove the securing pin from the tool. Scroll the tool away from the heads. While gently holding the actuator arm, pull the axle of the tool out of the hole by holding the tool for its handle.



*Picture 7.11 (Dismounting the tool from the actuator arm)*

Place the connector on its place and tighten the two screws that are holding it.

Put back the magnet by using the needle-nose pliers. Be careful when putting back the magnet because of magnetic force and use the leverage (like when You took it off). Place back the screws on the magnet (if there are any) and tighten them up.

Put the lid and PCB back and clone the disk.

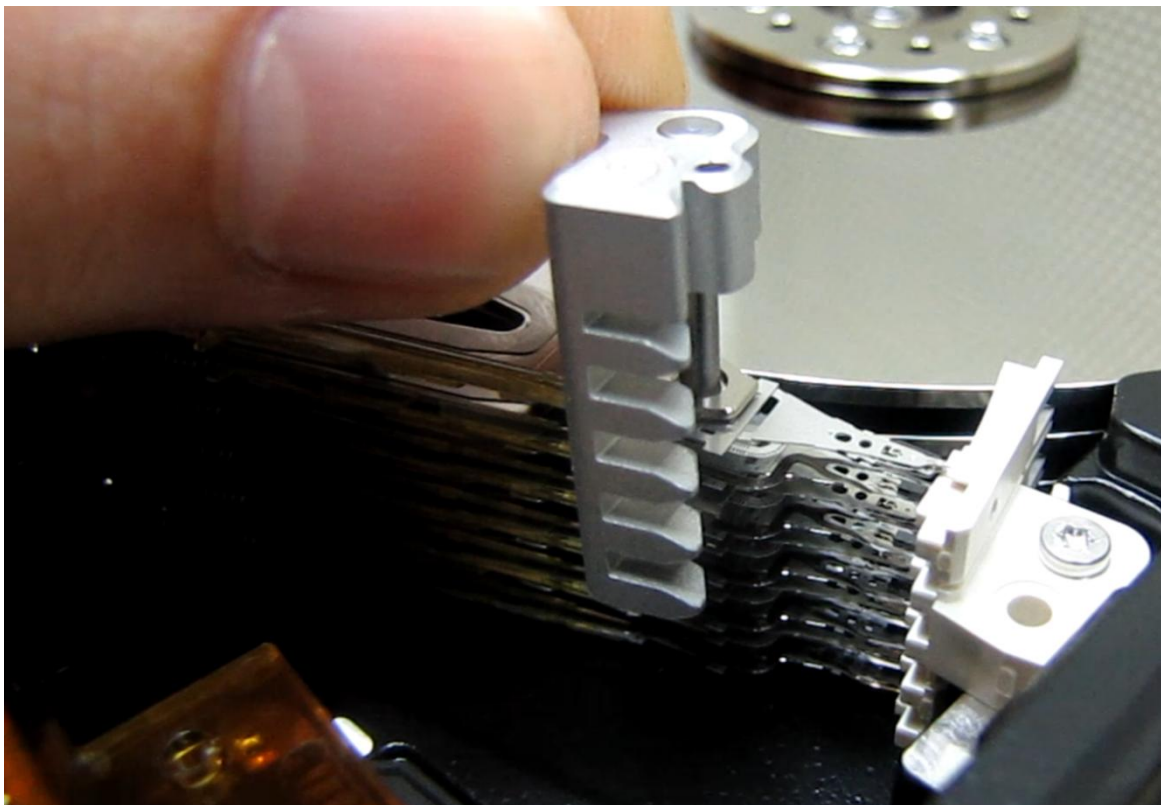
## 8. Head replacement process with p5 Ramp and Support tool

### Step 1 – Mounting the tool on the actuator arm

Dismount PCB and loosen just a little bit the two screws on the bottom side which are holding the head assembly and bottom magnet and then tighten them again. This is needed in order to easily dismount heads and magnets later in the process.

Open the hard drive casing, remove screws that are holding the flat cable connector and push the connector from the bottom upwards to release it. Pressure from below may cause the connector to pop out and possibly damage platters. Because of this, hold the top of connector with another hand while pushing it from the bottom. Before applying pressure, remove screws from their holes.

Carefully center the axle of the tool over the hole near the top of the head arm (near the heads themselves). Take care that the snouts stand away from the heads, and put the axle of the tool through the hole. Axle of the tool should go easily through this hole.



*Picture 8.1 (Mounting p5 ramp tool on the head assembly)*



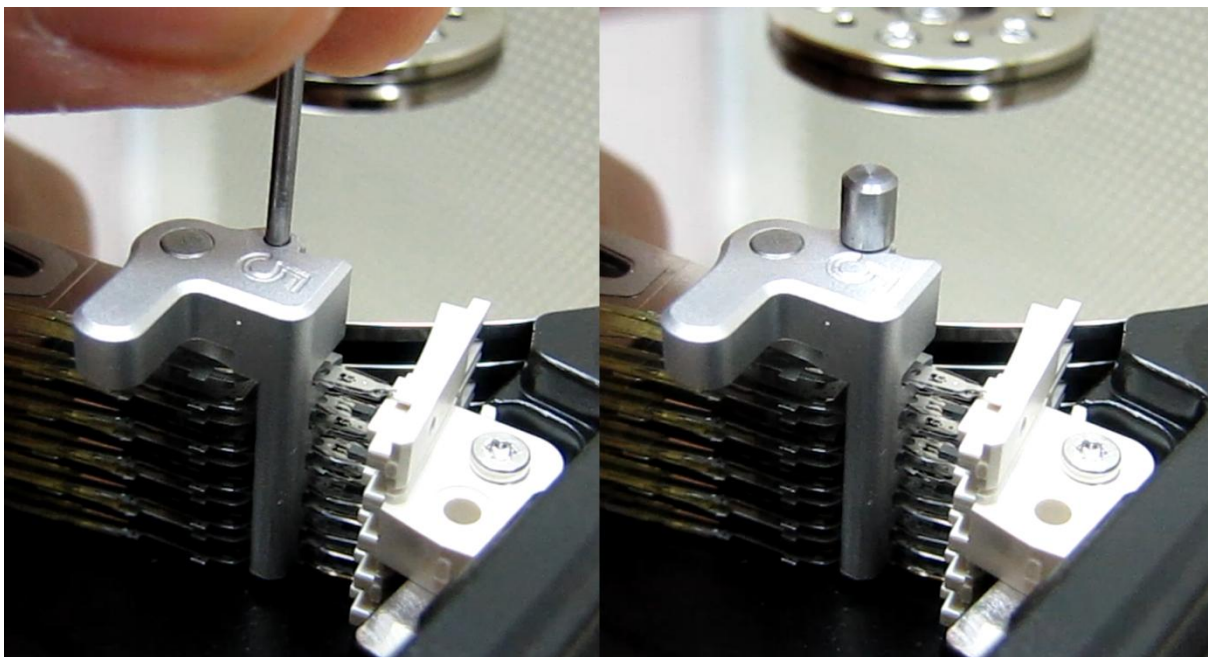
## Step 2 – Securing the heads with the tool

Push the tool so the snouts go between the heads. These snouts will keep the distance between the heads and assure that the heads don't touch each other. Secure the tool in this position by providing securing pin.

HDDS HGST 3.5" Ramp tool p5 has side-locking system. This means that security pin will lock the tool by going on the side of the head assembly, in narrow space between heads, ramp and platters.

### !!! VERY IMPORTANT !!!

Due to large diversities in HGST drive mechanics, there is a possibility that securing pin won't go through on certain models. If that happens, use the tool without pin.



*Picture 8.2 (Securing the heads with the p5 ramp tool)*

Remove the security brake carefully by using the tweezers. Watch not to touch the platters with the tweezers. After removing the brake, heads will slide to the right just a little bit, but won't slide off the ramp.

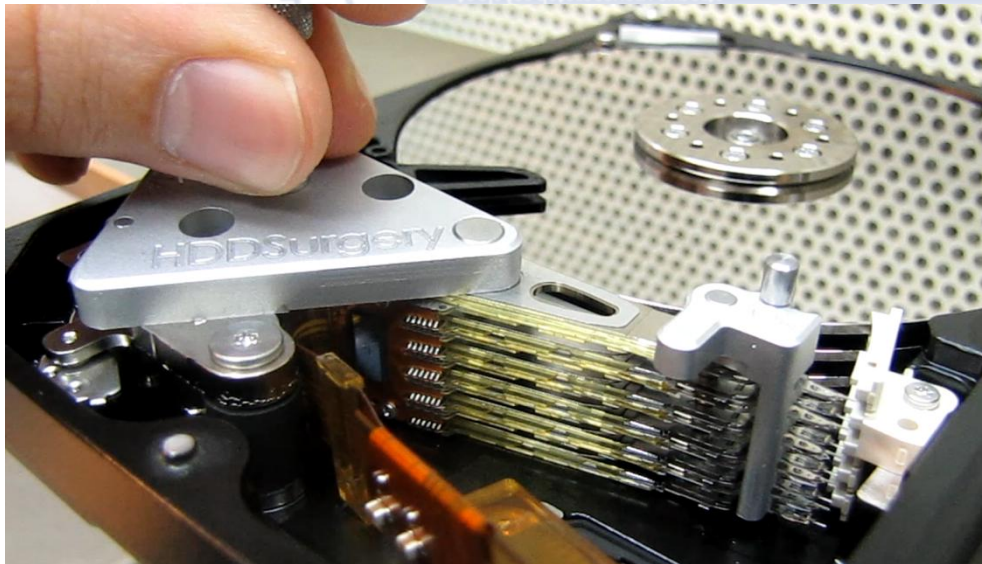


## Step 3 – Mounting the support tool on actuator arm and upper magnet (moving the heads off the ramp)

Mount the support tool on the upper magnet. First center right centering pin over its adequate hole while other pins are lifted up (picture 8.3). After that, place the pushing pin in adequate ellipsoid hole of the actuator arm and gently slide the heads of the ramp as far as possible, while the left centering pin is still lifted up. Moving the support tool will place its holes in line with the adequate holes on the upper magnet and the head assembly. When heads are off the ramp and the corresponding holes are concentric, place the third pin in its place. Only when the holes are concentric third pin will be able to enter its hole.

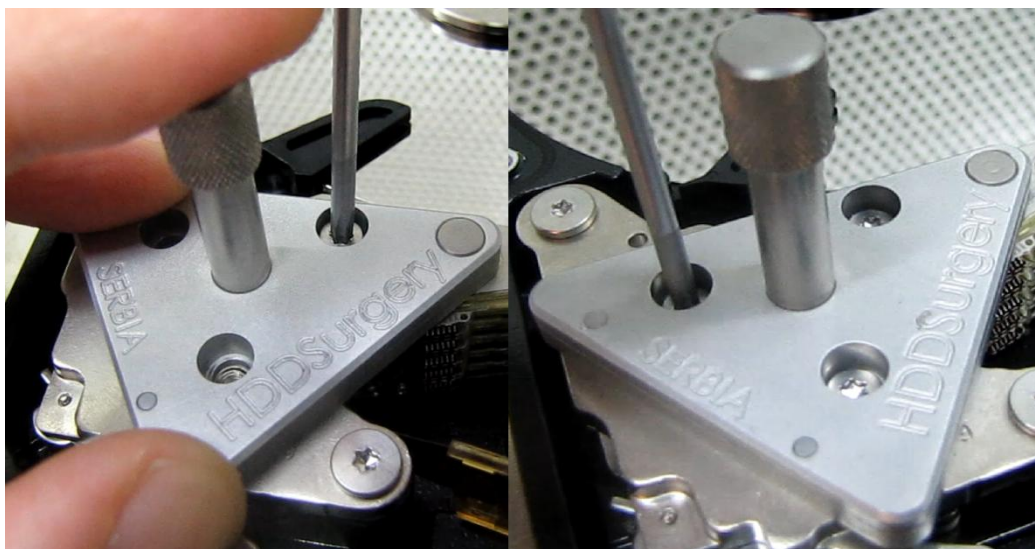


*Picture 8.3 (Mounting support tool)*



*Picture 8.4 (Moving the heads off the ramp)*

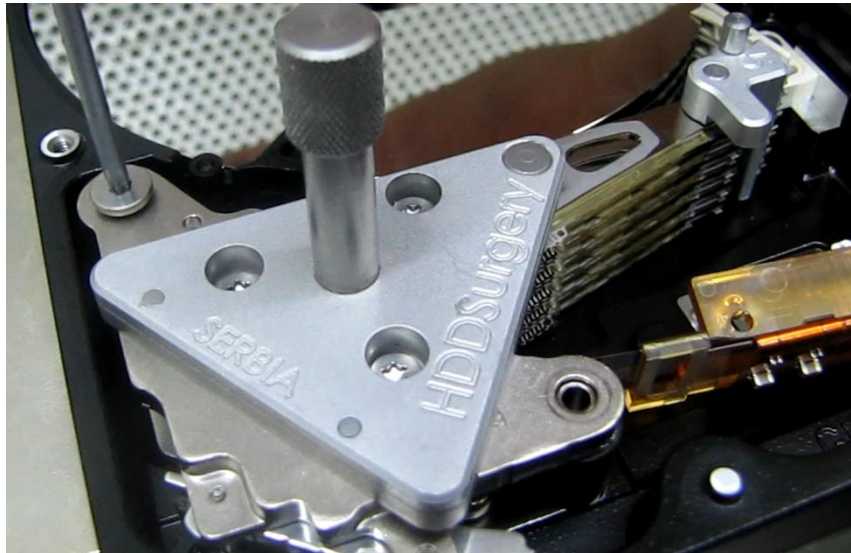
Hold the support tool in position while placing the screws in their original places (3 screws from the lid). First place the largest screw in the hole of the support tool which corresponds to the hole of the actuator arm's shaft and tighten it. Release support tool and place the other two (smaller) screws in their holes and tighten them.



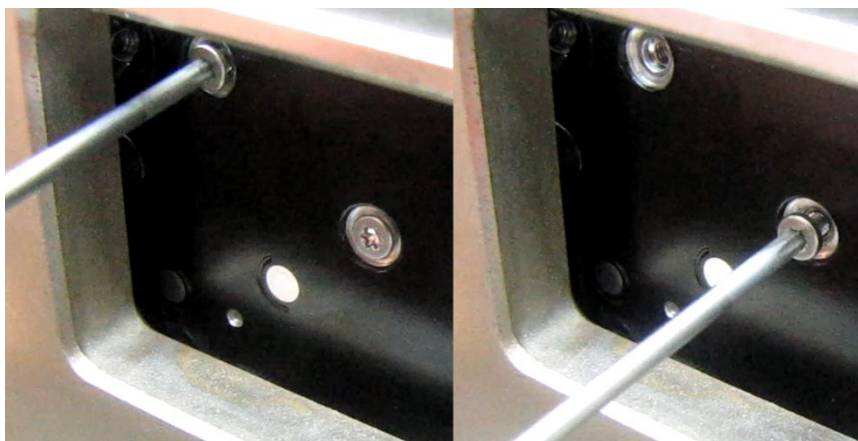
*Picture 8.5 (Screwing support tool on the head assembly and upper magnet)*

## Step 4 – Removing the screws which are holding both magnets and head assembly

Loosen and remove two longer screws from the upper magnet (picture 8.6). Then remove screw which is holding bottom magnet from below (picture 8.7 - left). Finally, remove screw which is holding head assembly connected to the hard drive casing (picture 8.7 - right). After removing these four screws, heads and magnets are completely disconnected from donor hard drive.



*Picture 8.6 (Removing two longer screws from the upper magnet)*



*Picture 8.7 (Left - Removing screw which is holding magnets from below; Right - Removing screw which is holding head assembly connected to the donor drive casing)*

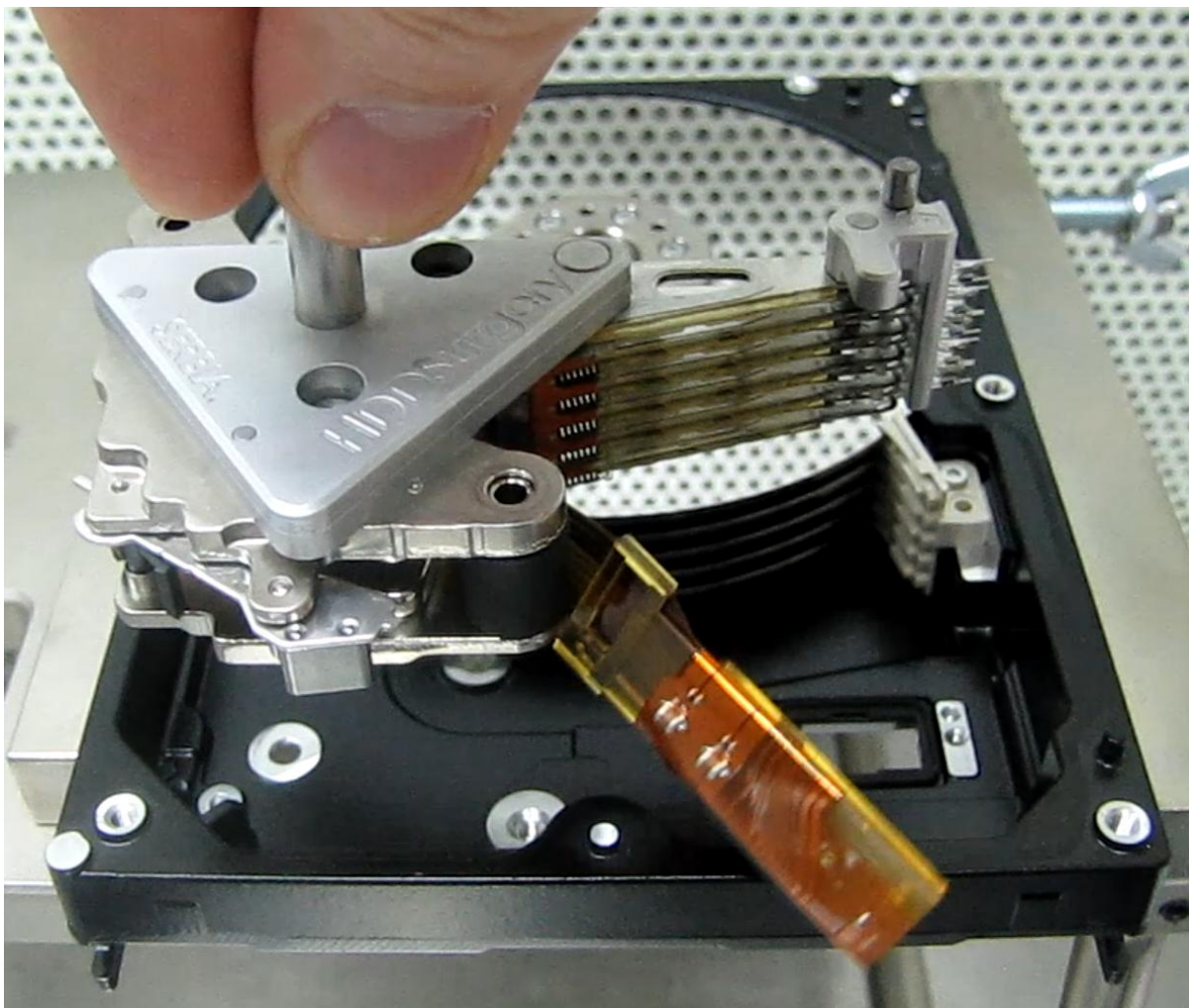


## Step 5 – Dismounting the heads and magnets from a donor drive

### !!! VERY IMPORTANT !!!

Before dismounting the heads and magnets from donor drive, check once again three screws in the support tool. If they got loosened in the process, tighten them firmly again.

Hold the handle of the support tool and gently pull it up together with head assembly and magnets. Watch not to damage heads in the process. Especially take care that heads and the ramp don't come into contact.



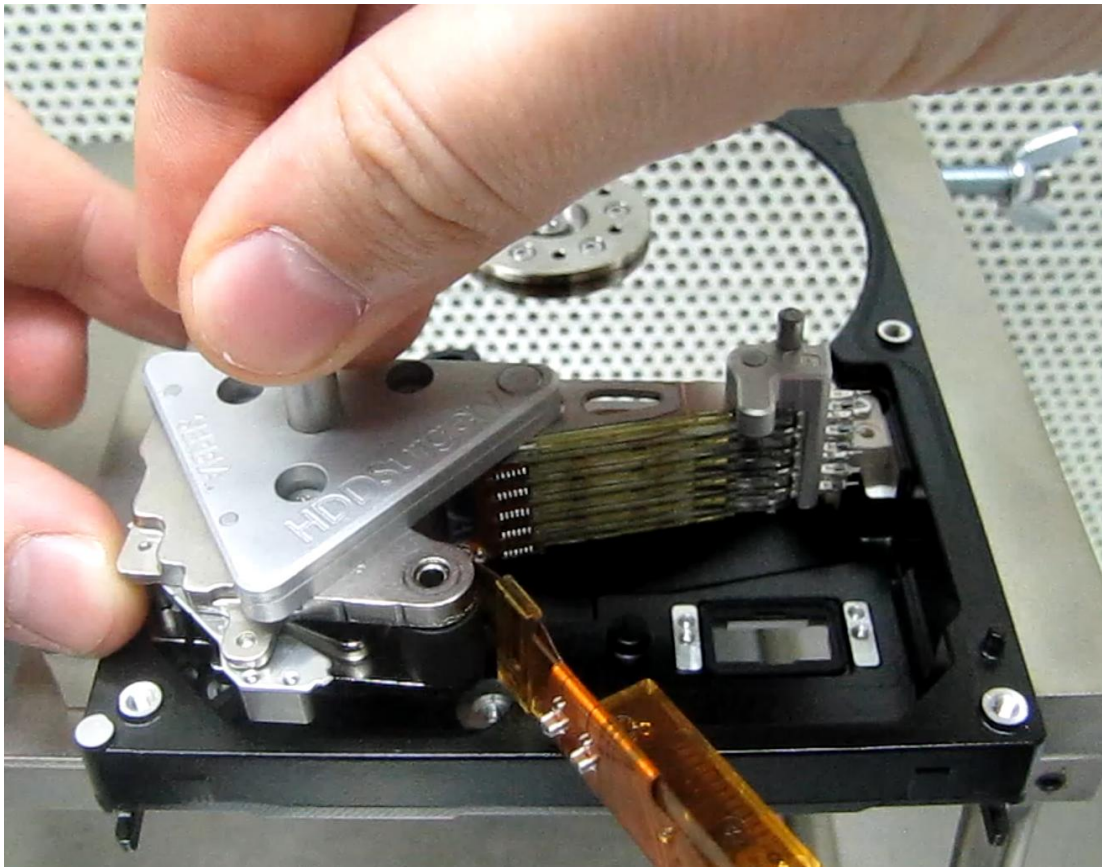
*Picture 8.8 (Dismounting the heads and magnets from a donor drive)*

## Step 6 – Mounting the heads and magnets in a patient drive

Carefully place the head assembly to its place in patient drive by holding the handle of the support tool. Assist the process with your other hand and keep the magnet's brake mechanism in the space between magnets. Watch not to damage heads, especially be careful that heads don't come in contact with the ramp.

### !!! VERY IMPORTANT !!!

**Keep magnet's brake mechanism in the space between magnets.  
(Action of the left hand's thumb on picture 8.9)**



*Picture 8.9 (Mounting the heads and magnets in a patient drive)*

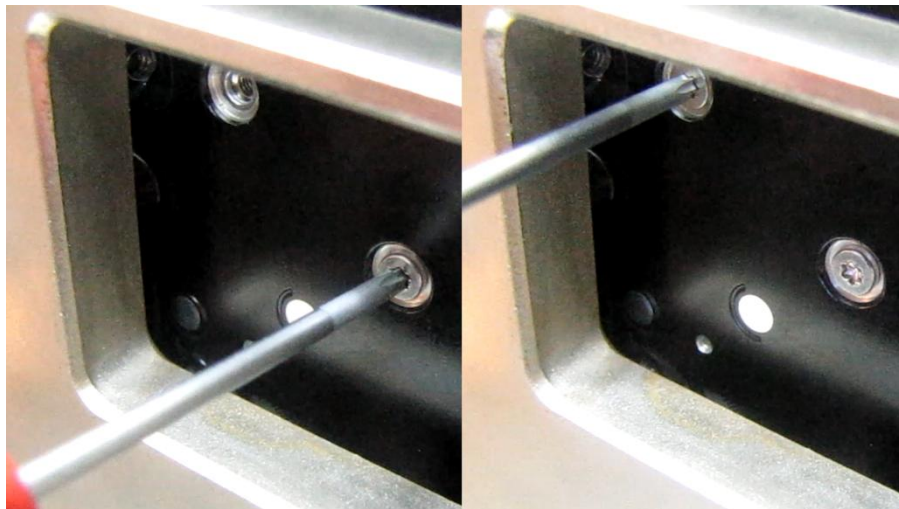
Check that all of the four screw holes on magnets and head assembly are concentric with the corresponding holes in the patient hard drive casing.



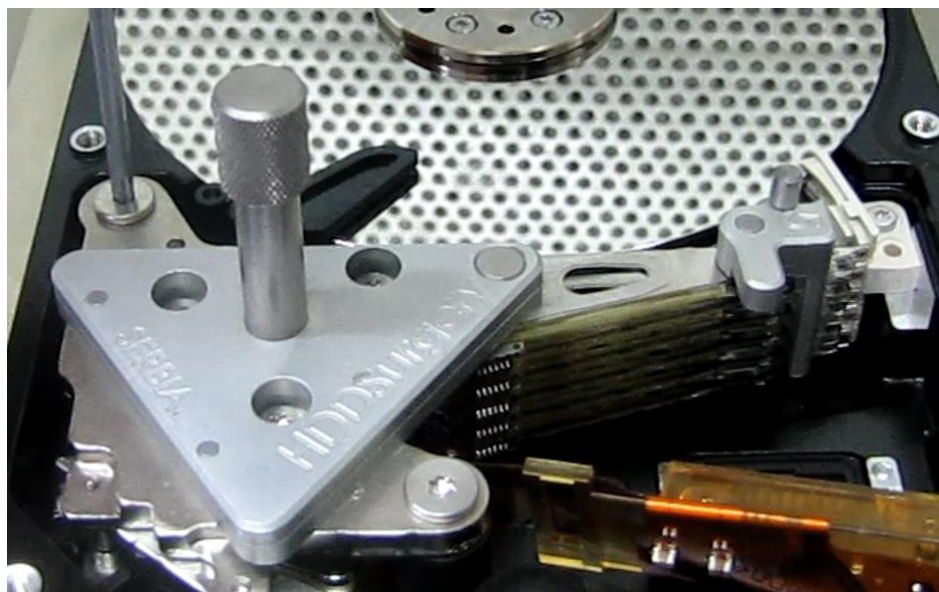
## Step 7 – Tightening the screws that are holding the actuator arm and magnet

When head assembly and magnets are on their place in patient drive, put back the screws which are holding the actuator arm and magnets on the bottom side of the Hard Drive casing, and tighten them.

Put back the two longer screws which are holding the magnets from the top side.



*Picture 8.10 (Left - Tightening the screw which is holding head assembly connected to the patient drive casing; Right - Tightening the screw which is holding magnets from below)*



*Picture 8.11 (Tightening two screws which are holding magnets from above)*

## Step 8 – Moving the heads to the ramp and dismounting the support tool

First loosen the screws that are connecting support tool and the upper magnet and then, while holding the support tool loosen the screw that is connecting support tool with the head assembly. There is no need to remove the screws from the support tool at this moment, just be sure that they are completely loosened.

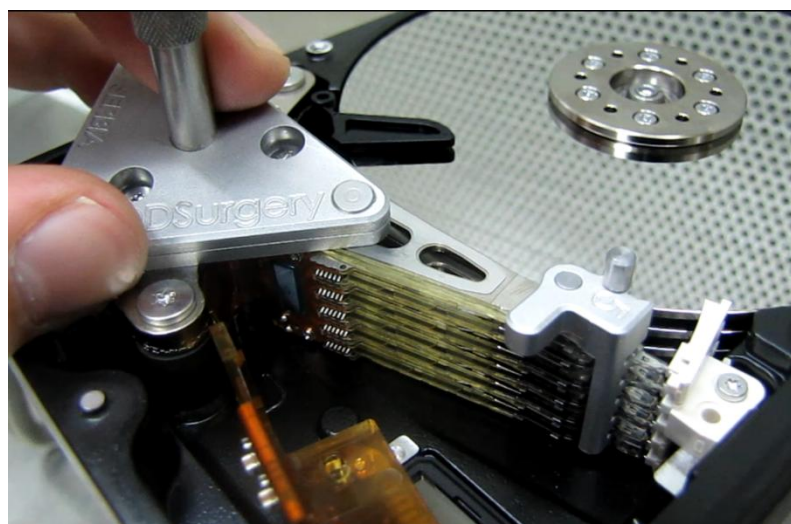


*Picture 8.12 (Unscrewing support tool from the head assembly and upper magnet)*

Lift the corner of the tool where the left centering pin is while securing that the right centering pin and pushing pin remain in their positions. Let the heads slide back to the ramp while controlling their movement with the pushing pin. When heads are on the ramp, dismount support tool by lifting it up.

**!!! VERY IMPORTANT !!!**

**On some HGST models heads won't slide back until pushing the magnet's brake mechanism inwards. (Action of the screwdriver on picture 8.14)**

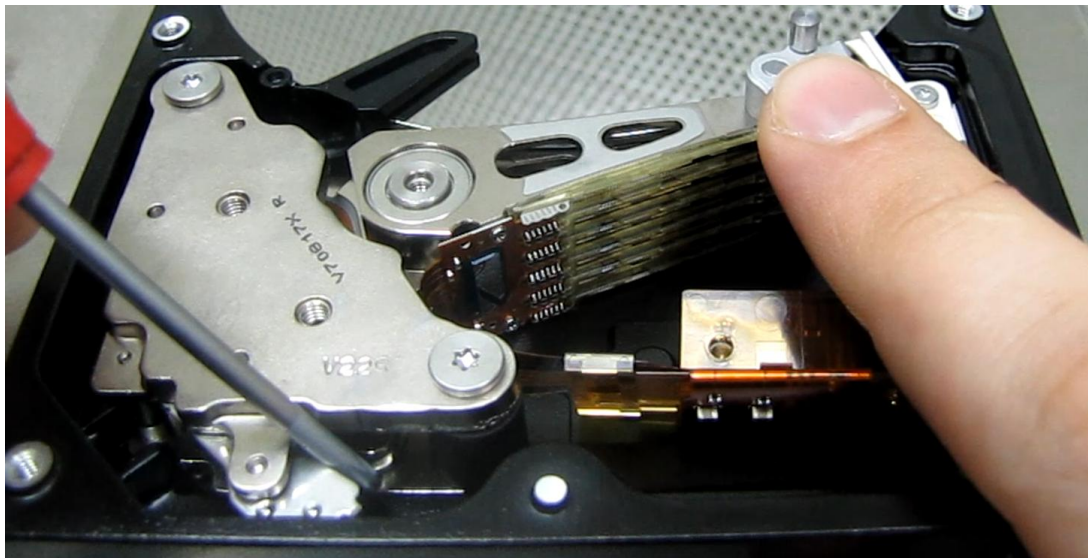


*Picture 8.13 (Moving the heads to the ramp)*



## Step 9 – Putting patient drive security brake back

When heads are back on the ramp and support tool is removed, patient drive security brake should be placed on its place. To do this, first push magnet's brake mechanism inward (action of screwdriver on picture 8.14) and then slide heads slightly to the left by pushing the handle of the ramp tool p5. This will uncover the security brake hole in patient drive casing.



*Picture 8.14 (Moving the heads to the left of the ramp)*

While keeping the heads position on the ramp by holding the handle of ramp tool p5, grab the security brake with the tweezers and put it back to its place in patient drive.

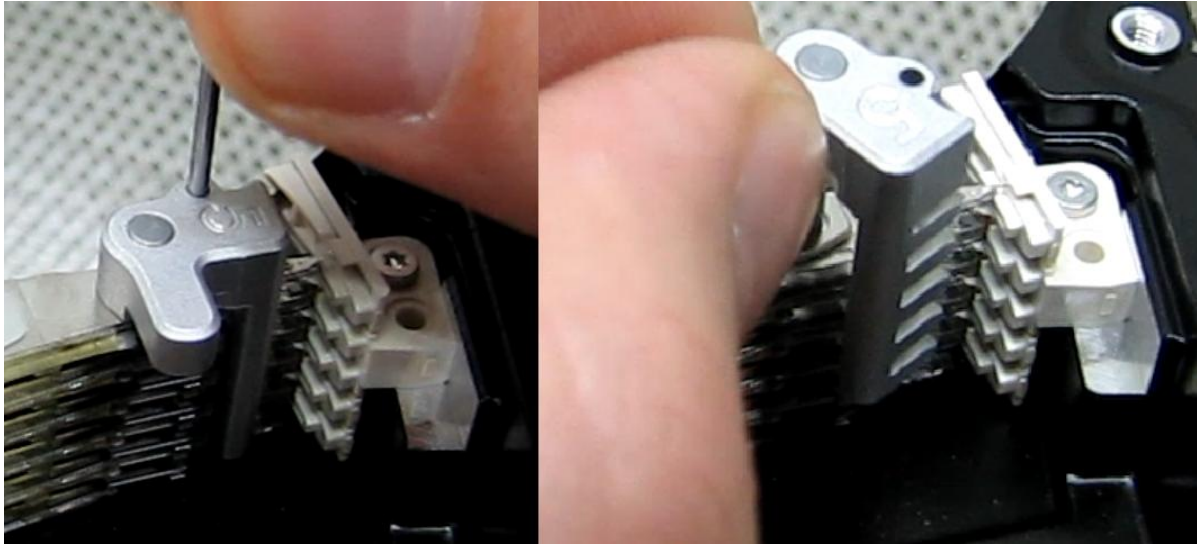


*Picture 8.15 (Putting patient drive security brake back)*



## Step 10 – Dismounting the tool and finishing the process

Remove the securing pin from the tool. Scroll the tool away from the heads. While gently holding the actuator arm, pull the axle of the tool out of the hole by holding the tool for its handle.



*Picture 8.16 (Dismounting the tool)*

Tighten screws which are holding the flat cable connector and close the disk by putting the lid back.

Put PCB back and clone the drive.

## 9. Conclusion

This guide was written by HDDSurgery™ team and it is based on our experience acquired during process of development, design and testing.

HddSurgery™ is not responsible for any possible consequential damage, including loss or recovery of data or any other damage made by using or working with HddSurgery™ tools.

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<http://www.hddsurgery.com/>

Also you can watch the videos that show how these tool work on our YouTube channel:

<http://www.youtube.com/user/HddSurgery>

If you have any doubts or questions regarding use of HDDS HGST 3.5" Ramp Set, you can contact our support team any time:

[support@hddsurgery.com](mailto:support@hddsurgery.com)