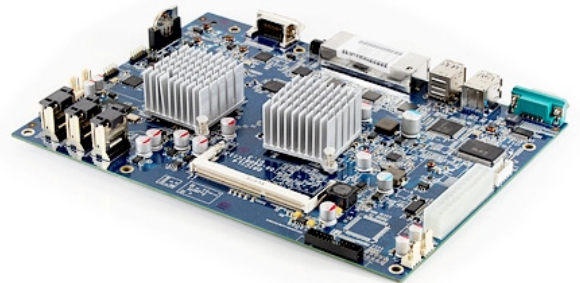




How to Replace Motherboard for 4 bay DiskStation



Revision 1.0

THIS DOCUMENT CONTAINS PROPRIETARY TECHNICAL INFORMATION WHICH IS THE PROPERTY OF SYNOLOGY INCORPORATED AND SHALL NOT BE DISCLOSED TO OTHERS IN WHOLE OR IN PART, REPRODUCED, COPIED, OR USED AS THE BASIS FOR DESIGN, MANUFACTURING, OR SALE OF APPARATUS WITHOUT WRITTEN PERMISSION OF SYNOLOGY INCORPORATED.

How to Replace Motherboard for 4 bay DiskStation

Table of Content

1.	Introduction	3
1.1	Applied Models & Required Components	3
1.2	Required Tools	4
2.	Replace for DS414, DS413, DS412+	5
2.1	Dismantle the defective motherboard	5
2.2	Install the replacement motherboard.....	16
3.	Replace for DS414j, DS413j, DS411+II, DS411+, DS411, DS411j	25
3.1	Dismantle the defective motherboard	25
3.2	Install the replacement motherboard.....	35

Revision History

Revision Number	Date of Issue	Summary of Change	By
v.1.0	2014/6/9	Initial version	Dennis Tang

How to Replace Motherboard for 4 bay DiskStation

1. Introduction

This SOP explains about the detailed steps for replacing motherboard on Synology's 4 bay DiskStation products.

1.1 Applied Models & Required Components

- Motherboard assembly of the DiskStation model for replacing:

Model	Motherboard Item Code	Description
DS414 (*)	80-D414R0012	ASSY PCBA ALL in1 SERVER DS414R1(EDM41L2) DISK STATION/ SYNOLOGY SMD V1.2
	80-DS4140013	ASSY PCBA ALL in 1 SERVER DS414(DDM41L2) DISK STATION/ SYNOLOGY V1.3
DS414j	80-D414J0011	ASSY PCBA ALL in 1 SERVER DS414J(DDD41L1) DISK STATION/ SYNOLOGY V1.1
DS413j	80-D413J0011	ASSY PCBA ALL in 1 SERVER DS413j(CDM41L1) DISK STATION/ SYNOLOGY V1.1
DS413	80-DS4130014	ASSY PCBA ALL in 1 SERVER DS413(CDF41L1) DISK STATION/ SYNOLOGY V1.4
DS412+ (*)	80-D412PR015	ASSY PCBA ALL in 1 SERVER DS412+R2(BDI41L2) DISK STATION/ SYNOLOGY V1.5
	80-D412PR014	ASSY PCBA ALL in 1 SERVER DS412+R1(BDI41L2) DISK STATION/ SYNOLOGY V1.4
	80-D412P0013	ASSY PCBA ALL in 1 SERVER DS412+(BDI41L2) DISK STATION/ SYNOLOGY V1.3
DS411+II	80-D411P2111	ASSY PCBA ALL in 1 SERVER DS411+II(ADI41L1) DISK STATION/ SYNOLOGY V1.1

How to Replace Motherboard for 4 bay DiskStation

Model	Motherboard Item Code	Description
DS411+	80-D411P0111	ASSY PCBA ALL in 1 SERVER DS411+(ADI41L1) DISK STATION/ SYNOLOGY V1.1
DS411	80-DS4110011	ASSY PCBA ALL in 1 SERVER DS411(BDM42L1) DISK STATION/ SYNOLOGY V1.1
DS411j	80-D411J0014	ASSY PCBA ALL in 1 SERVER DS411j(9DM41L1) DISK STATION/ SYNOLOGY V1.4

Note: For DS414 and DS412+, consult Synology for further information about the correct motherboard version before proceeding to replace.

1.2 Required Tools

- Screw Driver “+” Type: Suggested Bit Size PH#2
Note: If an automatic screwdriver is used, set its torque reading to be 4.5 (+/-0.2) kg/cm² in advance.
- Screw Driver “-” Type: Suggested a smaller bit size (For DS414j, DS413j, DS411+II, DS411+, DS411, DS411j)
- Aluminum Foil: 2pcs needed for one DS unit
Synology P/N: 13-050000010
Description: Conductive Tape (導電膠帶) AL 10*40mm T0.05 CAL-005
- Anti-static / Cotton Gloves

How to Replace Motherboard for 4 bay DiskStation

2. Replace for DS414, DS413, DS412+

Note: DS414 is hereunder the common example.

2.1 Dismantle the defective motherboard

2.1.1 Remove the front cover. (Fig. 1)



Fig. 1

2.1.2 Remove all the disk trays from the HDD chassis. (Fig. 2)

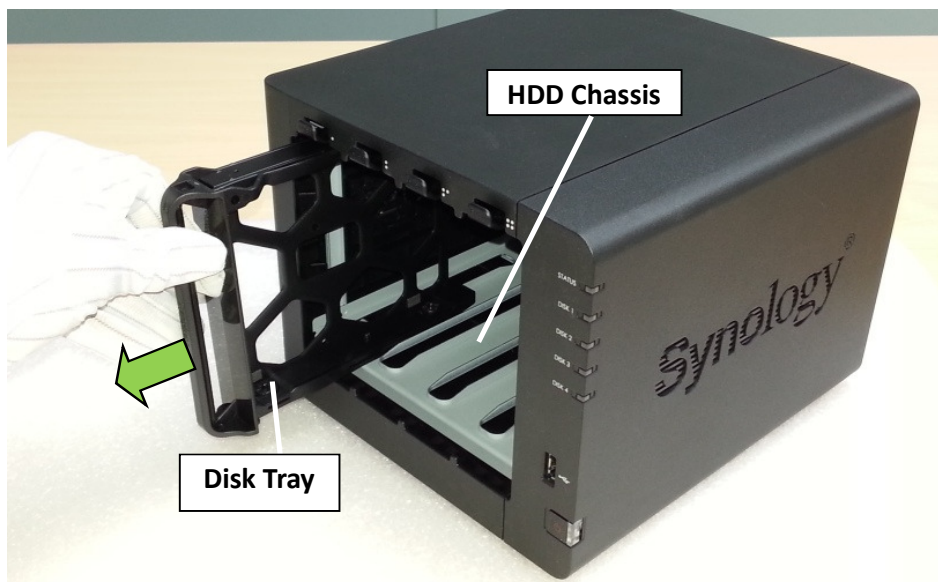


Fig. 2

How to Replace Motherboard for 4 bay DiskStation

2.1.3 Release the two (2) screws on the rear panel (Marked by the red circles). (Fig. 3)

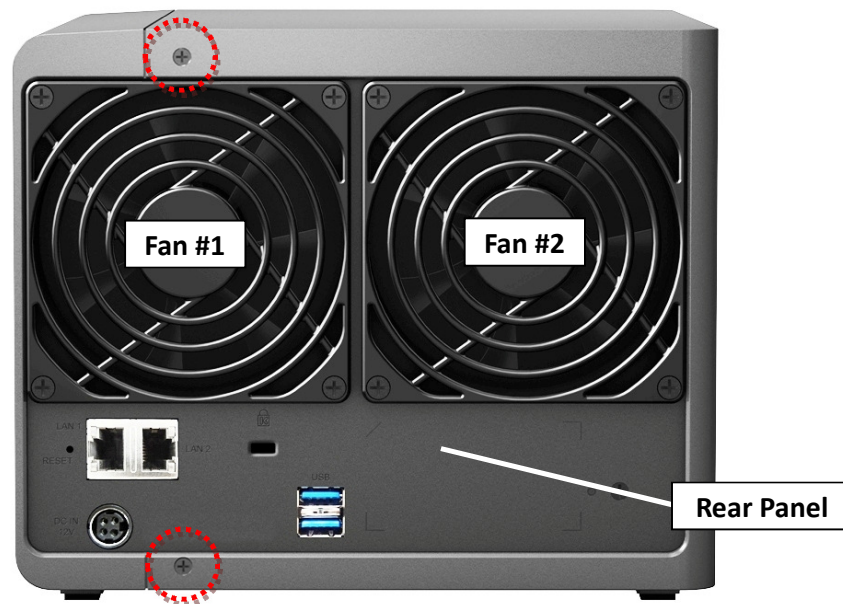


Fig. 3

2.1.4 The left cover clamps to the enclosure frame with the two (2) tenons on its interior (Marked by the red rectangle). (Fig. 4)

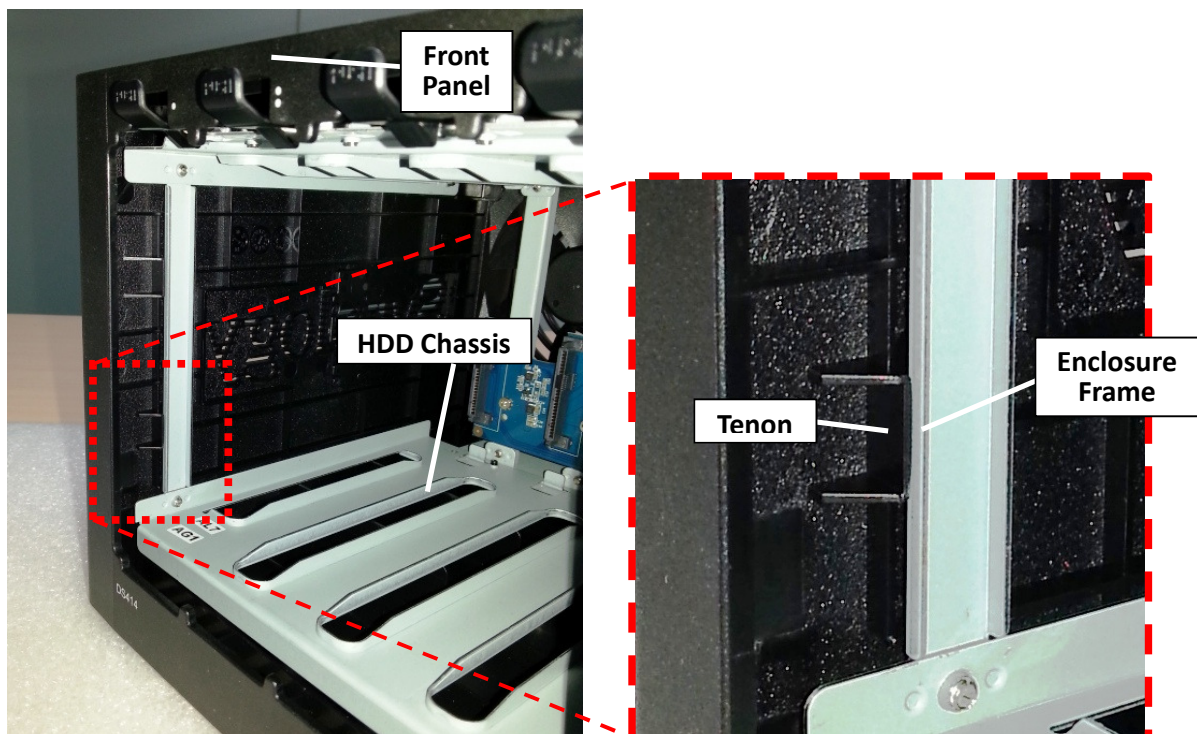


Fig. 4

How to Replace Motherboard for 4 bay DiskStation

Put your four fingers other than thumb over the enclosure frame. (Fig. 5)

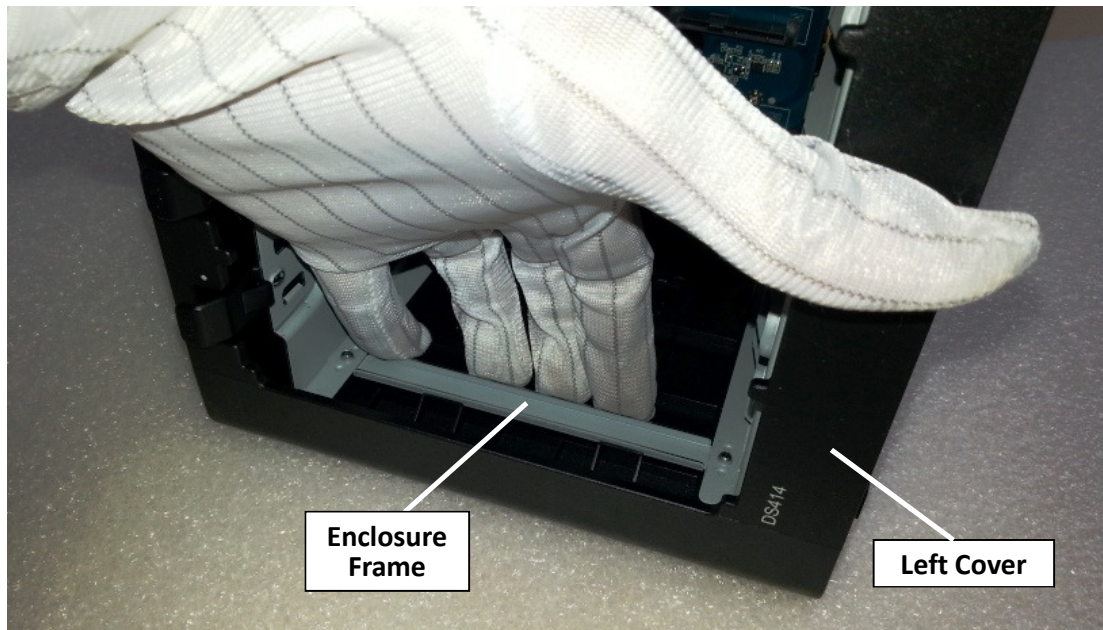


Fig. 5

2.1.5 Then put your thumb over the outer edge of the left cover to grab the enclosure frame and the left cover at the same time. Push to let the two tenons skim under and bypass the enclosure frame until the left cover and the enclosure frame/right cover are separated. (Fig. 6)

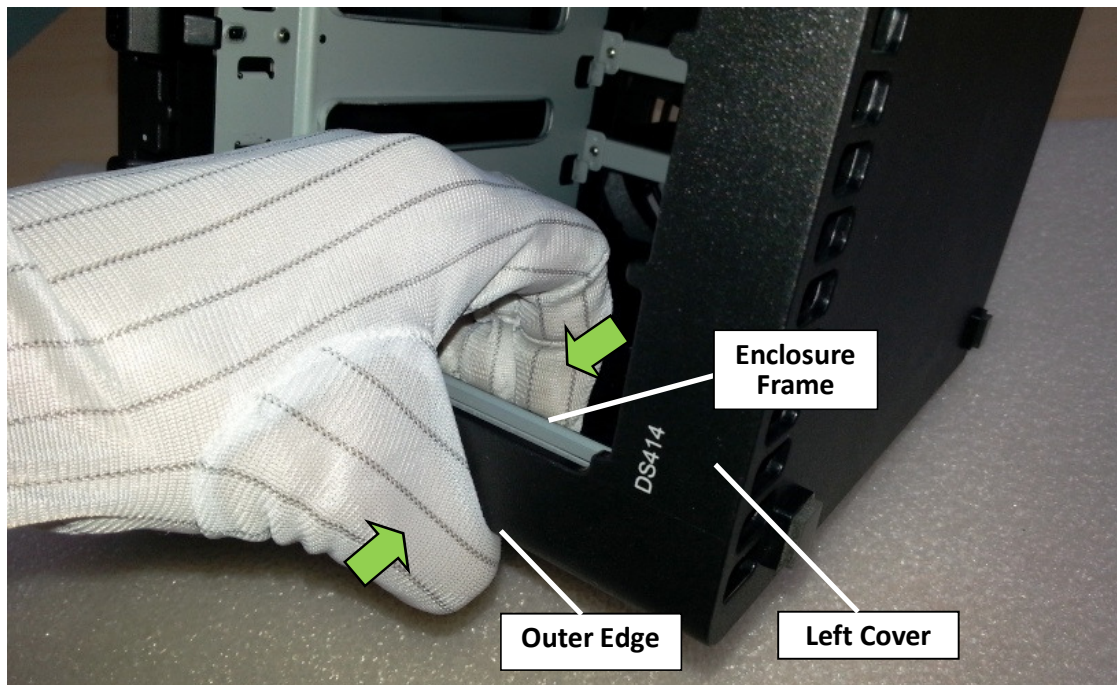


Fig. 6

How to Replace Motherboard for 4 bay DiskStation

Fig. 7 & 8 show the status before and after the tenons bypass the enclosure frame.

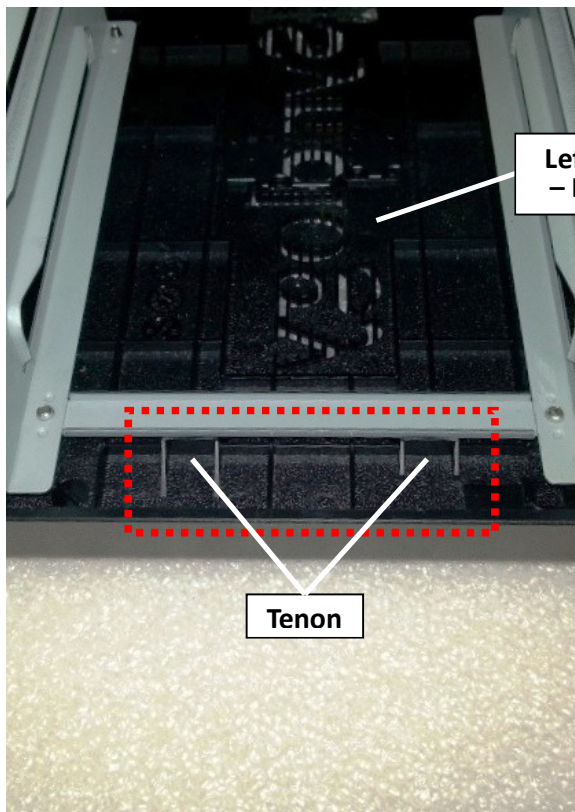


Fig. 7 – Before Bypassing

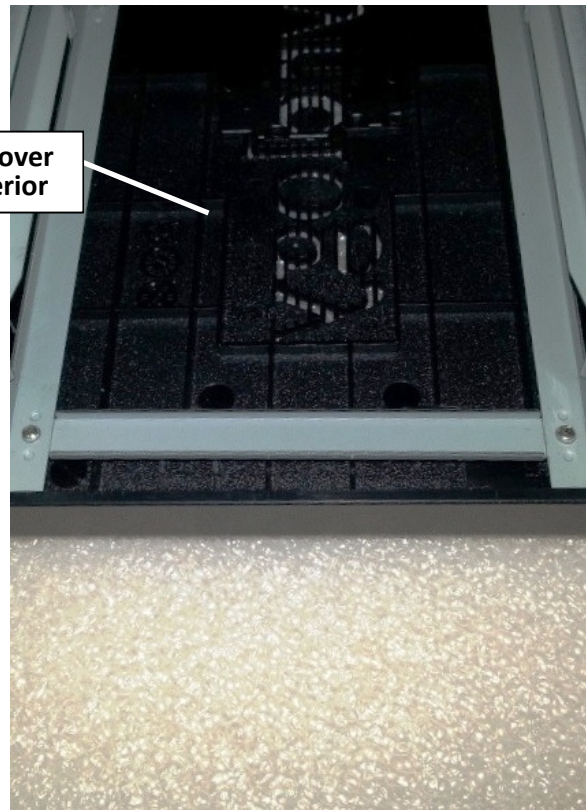


Fig. 8 – After Bypassing

Fig. 9 & 10 show the status before and after the left cover and the enclosure frame/right cover are separated.

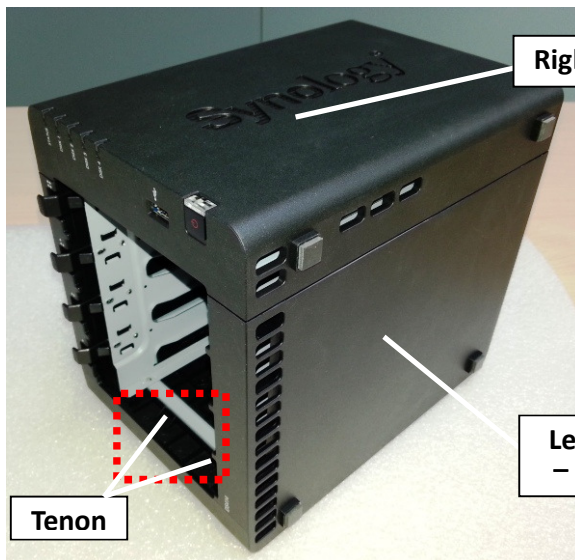


Fig. 9 – Before Separating

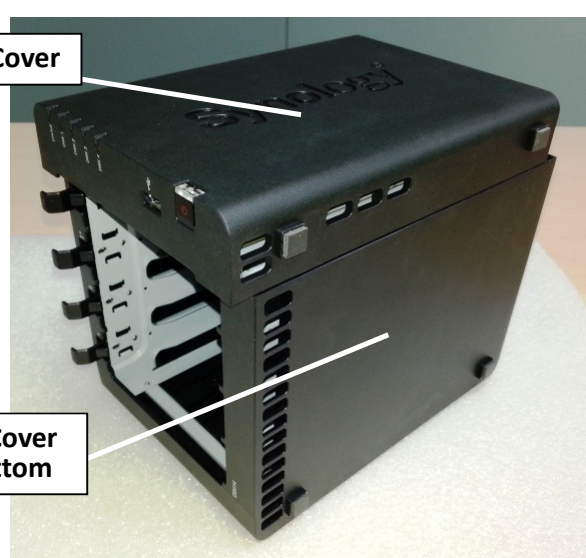


Fig. 10 – After Separating

How to Replace Motherboard for 4 bay DiskStation

- 2.1.6 Then slightly bend both the top and bottom portions of the left cover outwards, removing it from the HDD chassis. (Fig. 11)

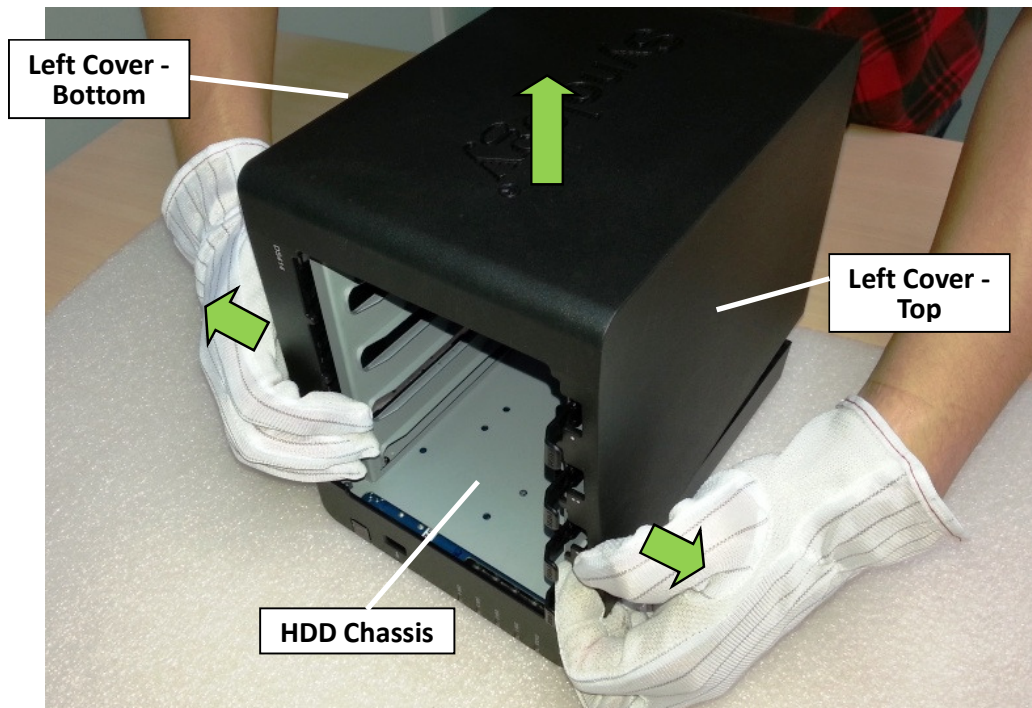


Fig. 11

Fig. 12 shows the status after the left cover and the HDD chassis are separated.

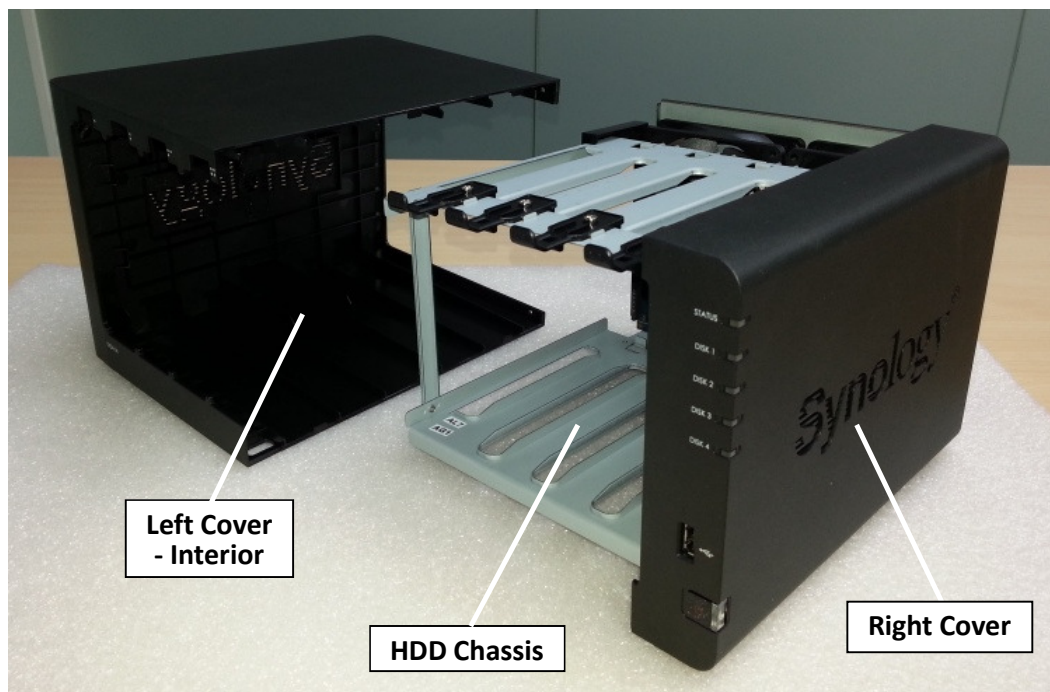


Fig. 12

How to Replace Motherboard for 4 bay DiskStation

- 2.1.7 Release the two (2) screws on the enclosure frame (Marked by the red circles) then remove the plastic bracket (Between fan #2 and the HDD chassis). (Fig. 13)

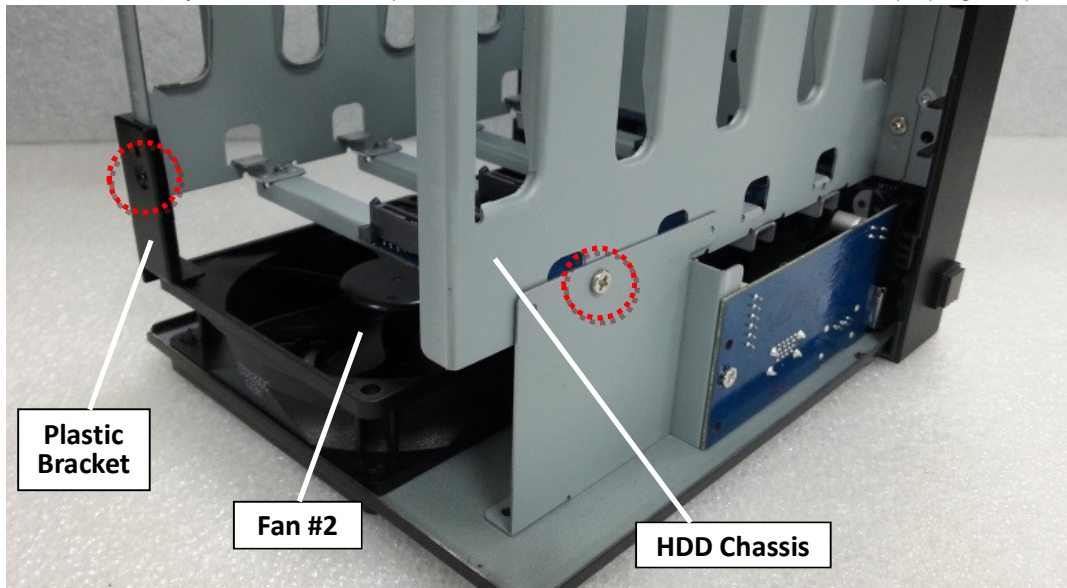


Fig. 13

- 2.1.8 Release the screw on the rear panel (Marked by the red circles). (Fig. 14)

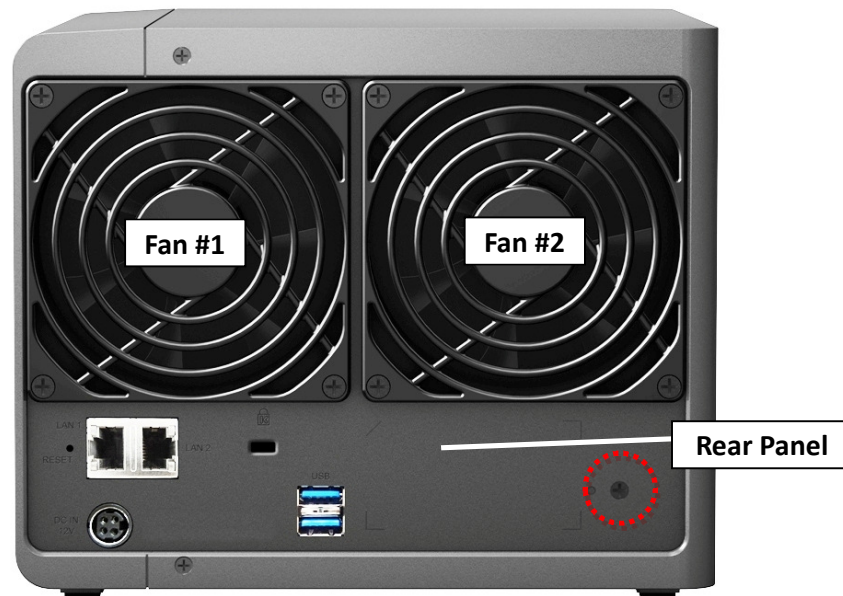


Fig. 14

How to Replace Motherboard for 4 bay DiskStation

2.1.9 Then remove the SATA backplane from the enclosure. (Fig. 15)

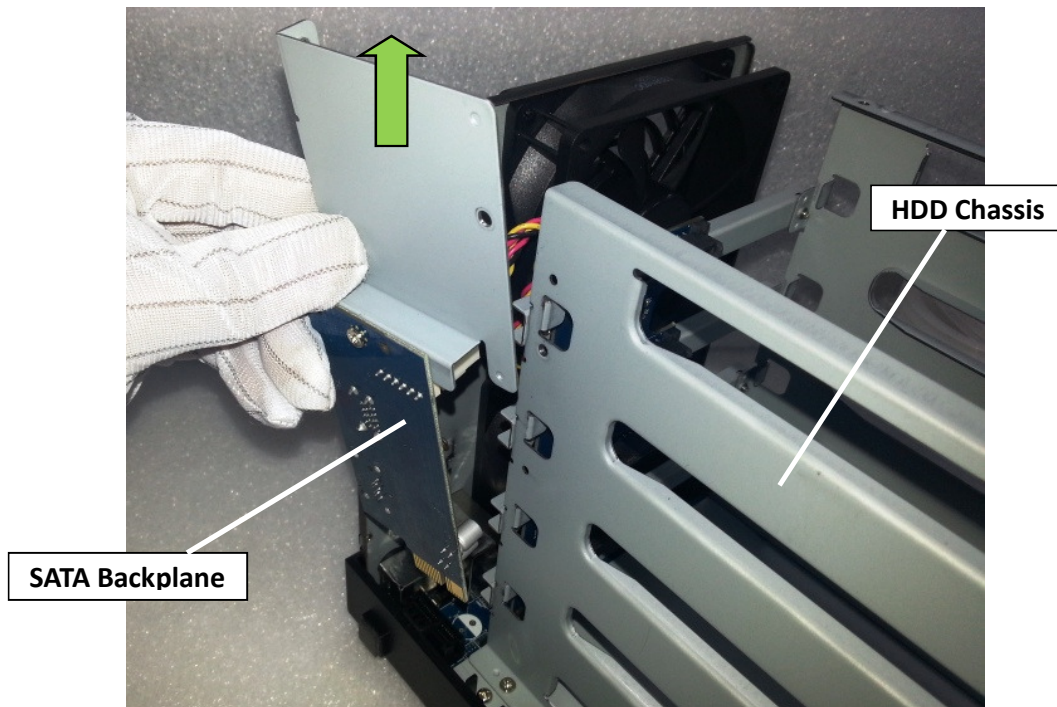


Fig. 15

2.1.10 Unplug the two (2) fan cable connectors (Marked by the red rectangle) which attach to the SATA backplane. (Fig. 16)

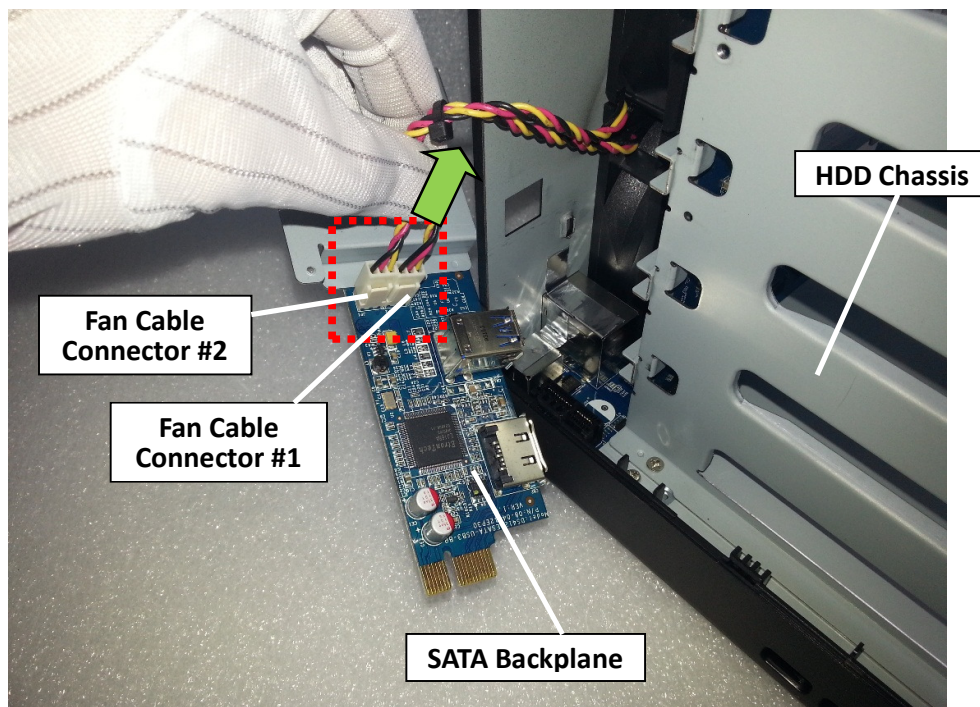


Fig. 16

How to Replace Motherboard for 4 bay DiskStation

- 2.1.11 Release the four (4) screws on the enclosure frame (Marked by the red circles). (Fig. 17 and Fig. 18)

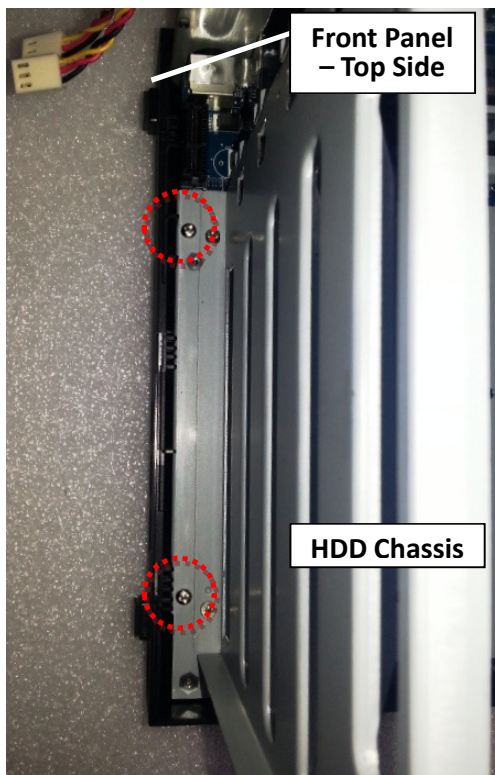


Fig. 17 - Right Side

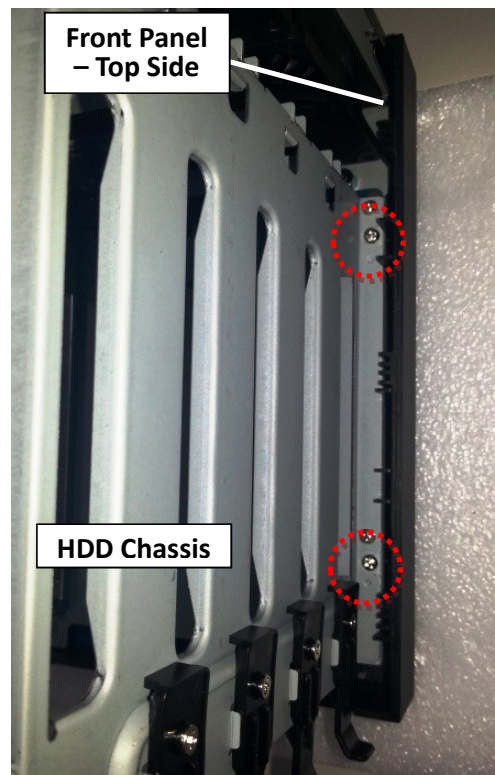


Fig. 18 - Left Side

- 2.1.12 Then slowly remove the HDD chassis from the enclosure. (Fig. 19)

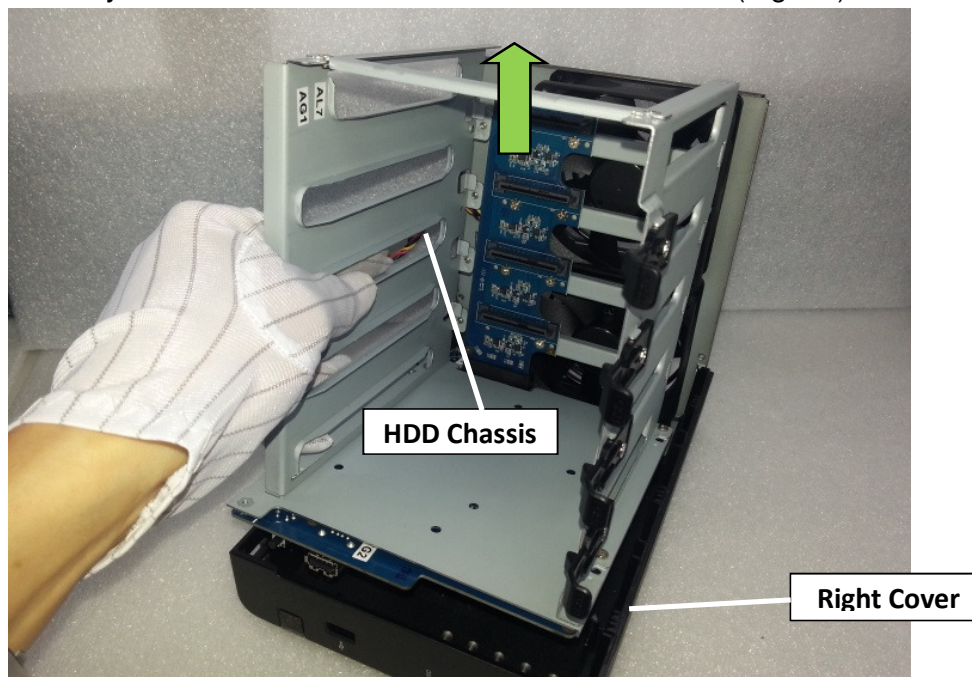


Fig. 19

How to Replace Motherboard for 4 bay DiskStation

The aluminum foil (Marked by the red rectangle) will be peeled off from the interior of the rear panel when the HDD chassis is removed. (Fig. 20)

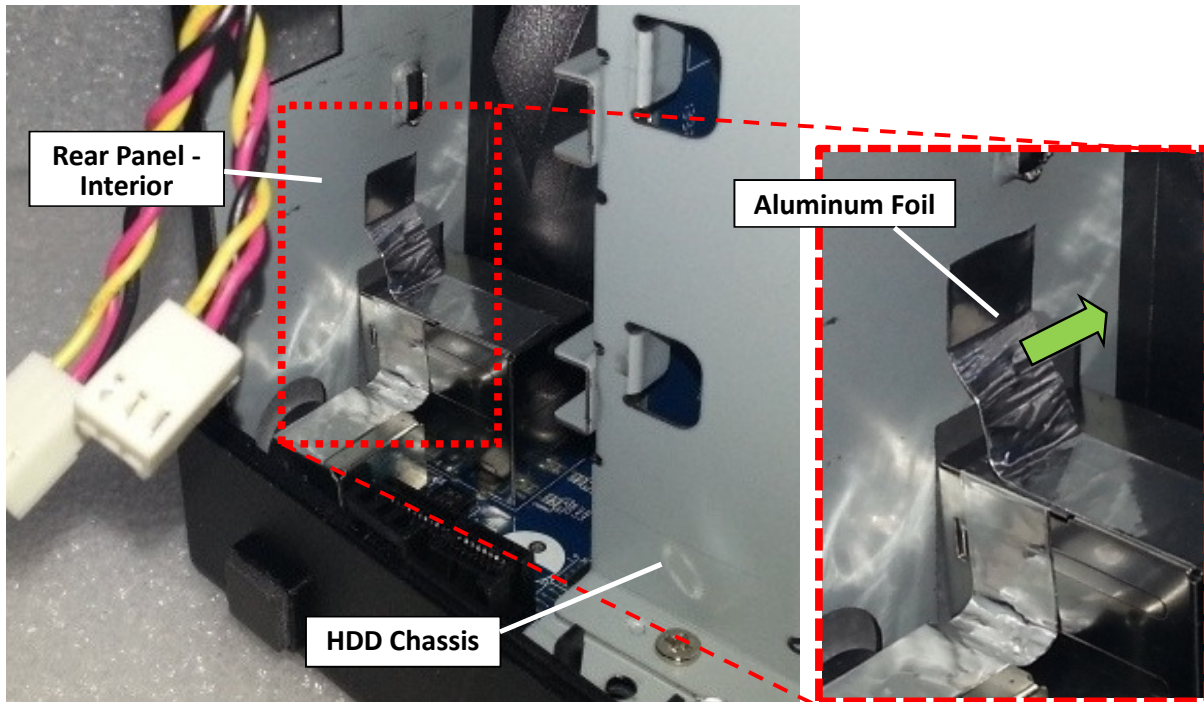


Fig. 20

Fig. 21 shows the status after the HDD chassis is separated with the right cover.

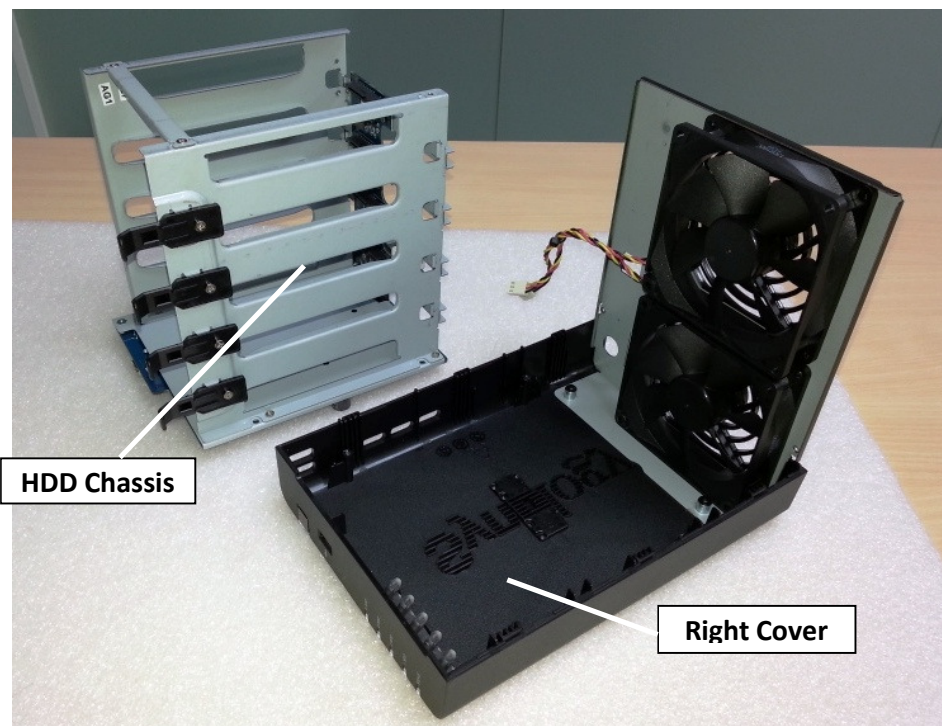


Fig. 21

How to Replace Motherboard for 4 bay DiskStation

2.1.13 Release the four (4) screws (Marked by the red circles). (Fig. 22)

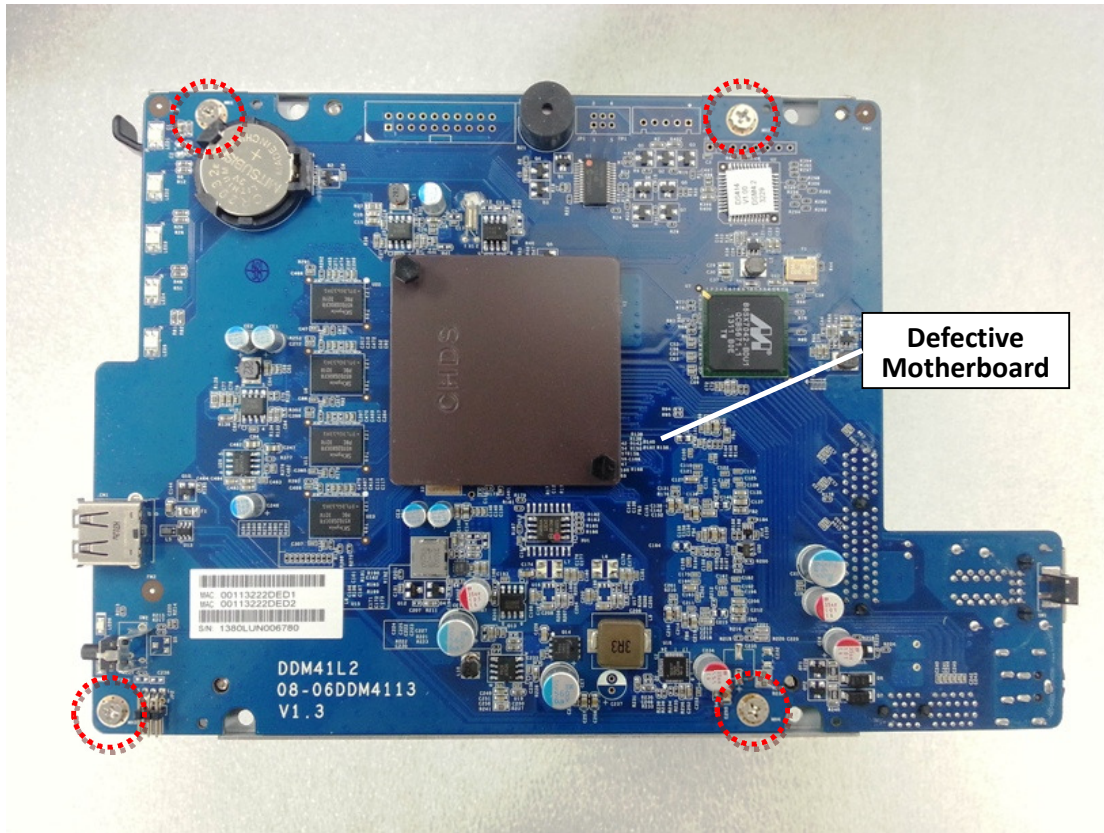


Fig. 22

2.1.14 Then remove the defective motherboard assembly. (Fig. 23)

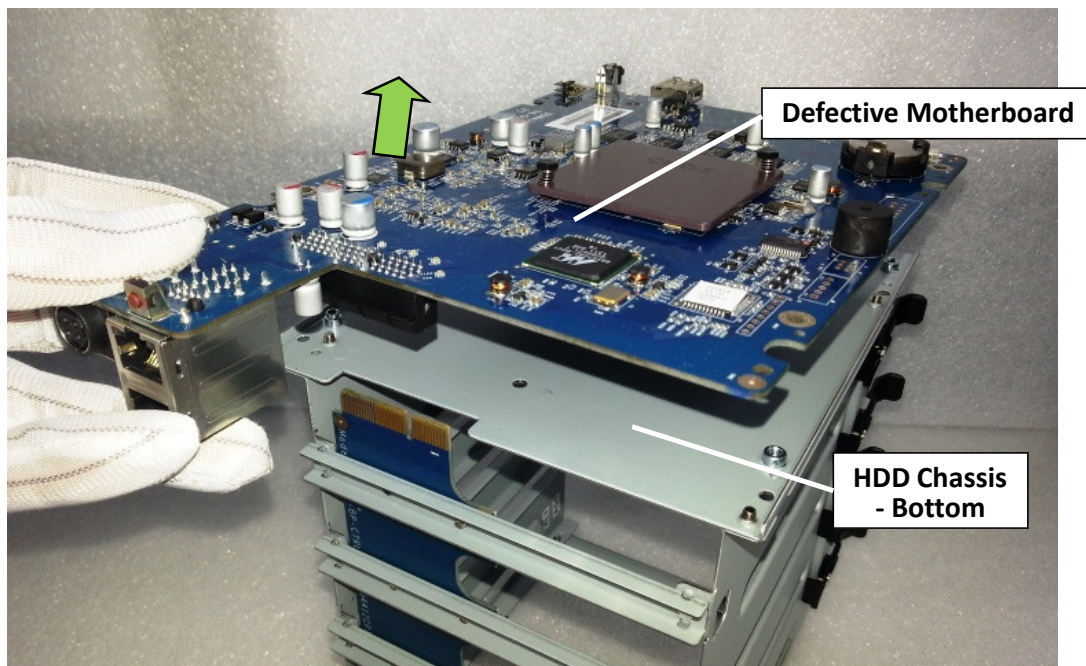


Fig. 23

How to Replace Motherboard for 4 bay DiskStation

2.1.15 Fig. 24 shows the status after the defective motherboard is removed from the HDD chassis.

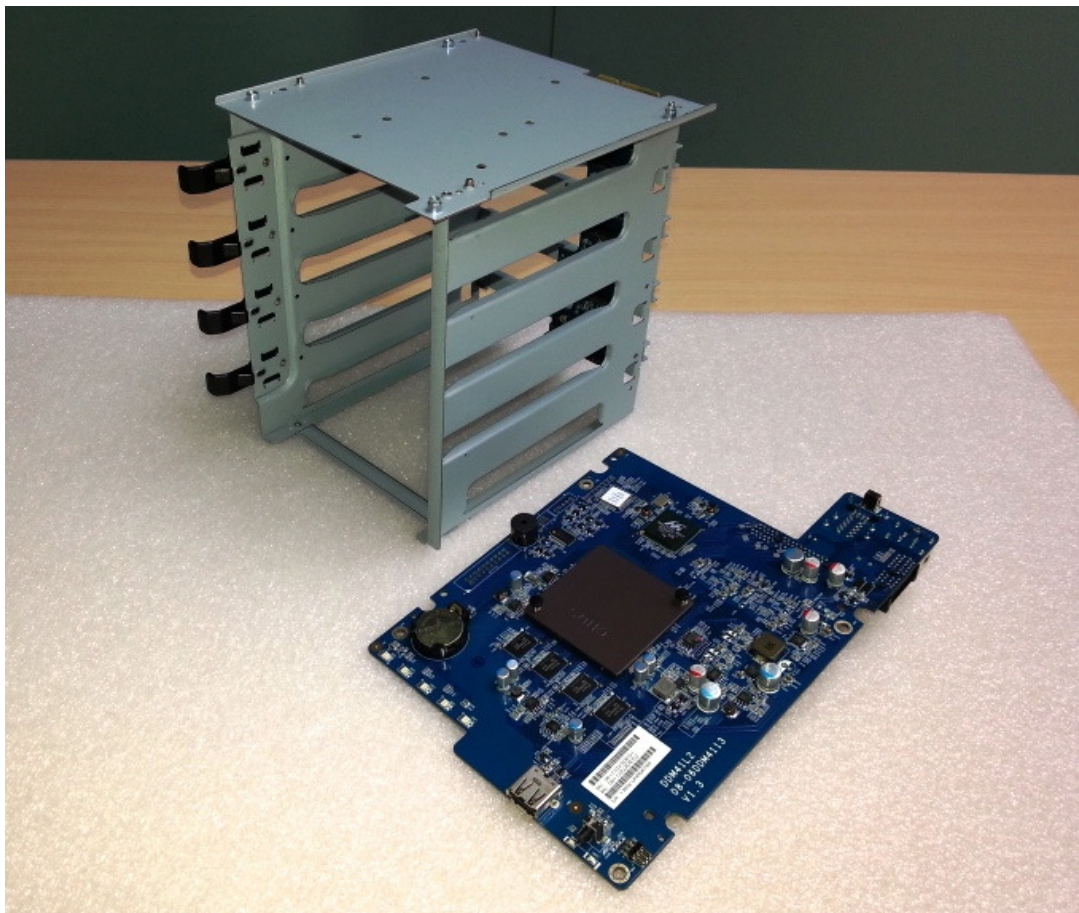


Fig. 24

How to Replace Motherboard for 4 bay DiskStation

2.2 Install the replacement motherboard

2.2.1 To install the replacement motherboard onto the enclosure, there are two (2) locations as follow for joining the two sides (Fig. 25):

Motherboard Side		Enclosure Side	
#1	PCI Express connector	#2	Bonding finger of the HDD backplane

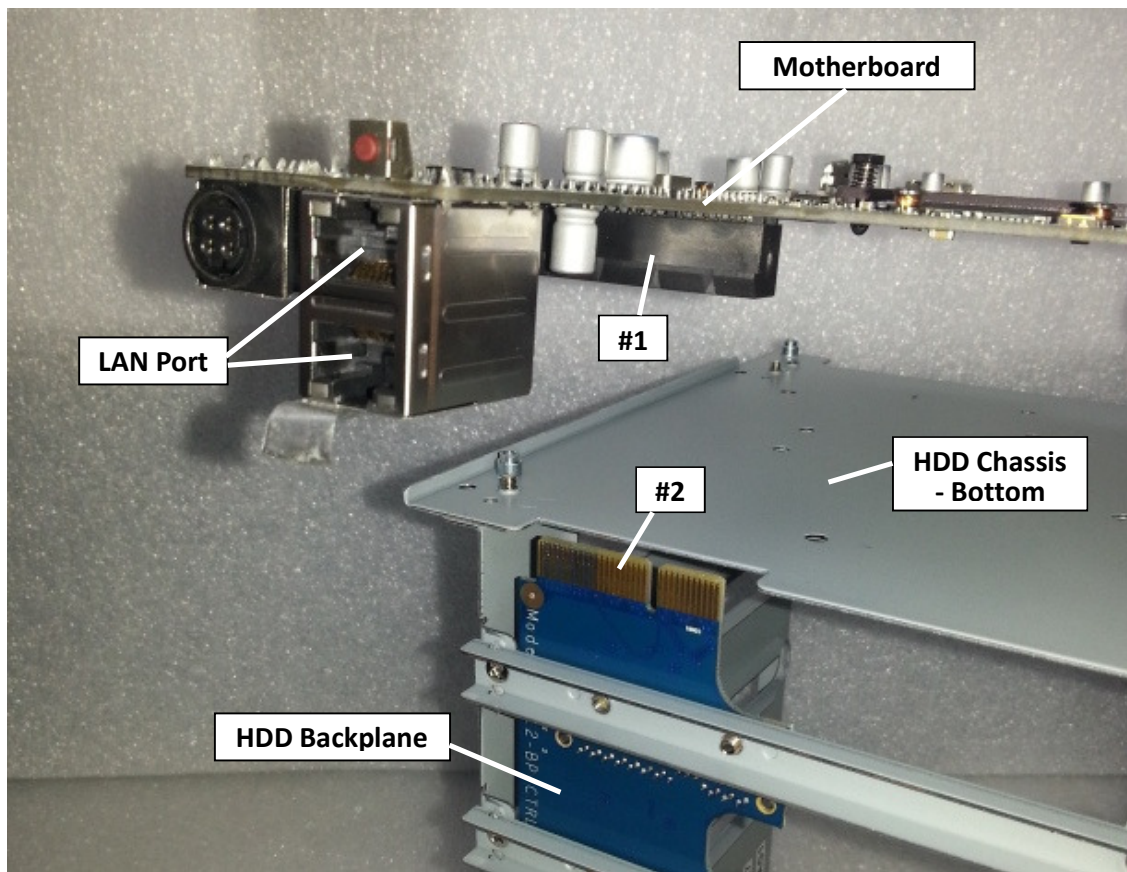


Fig. 25

How to Replace Motherboard for 4 bay DiskStation

Insert the replacement motherboard assembly to the same location of the defective one on the bottom of the HDD chassis. Then join them together with the bonding finger (#2) inserted into the PCI Express connector (#1) properly (Marked by the red rectangle). (Fig. 26)

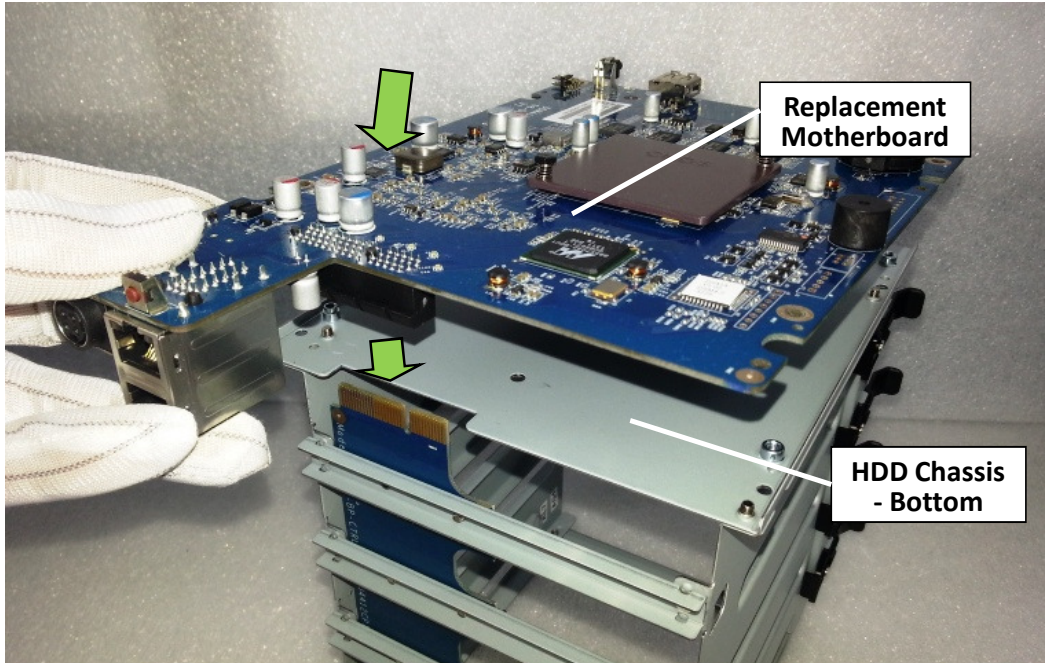


Fig. 26

2.2.2 Fix the four (4) screws (Marked by the red circles) to secure the replacement motherboard. (Fig. 27)

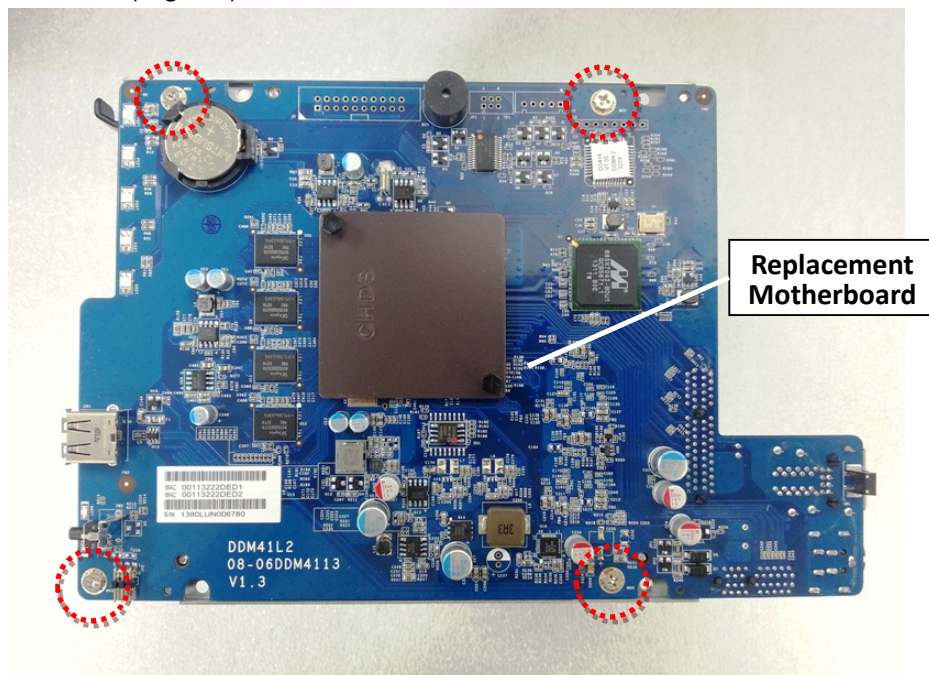


Fig. 27

How to Replace Motherboard for 4 bay DiskStation

2.2.3 Restore the HDD chassis into the enclosure. (Fig. 28)

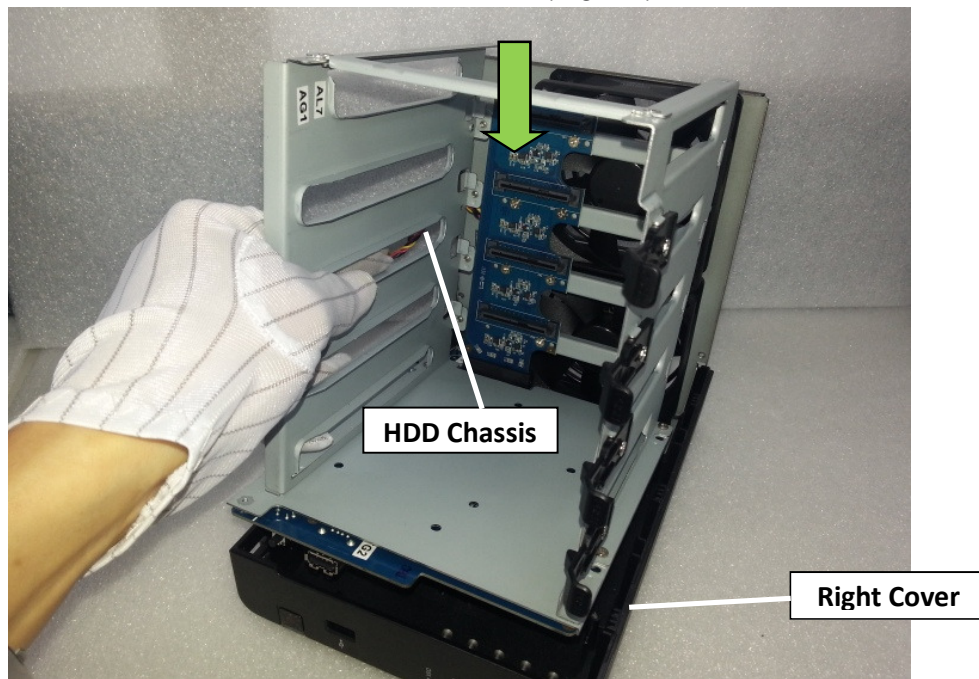


Fig. 28

2.2.4 Then fix the four (4) screws on the enclosure frame (Marked by the red circles) to secure the HDD chassis. (Fig. 29 and Fig. 30)

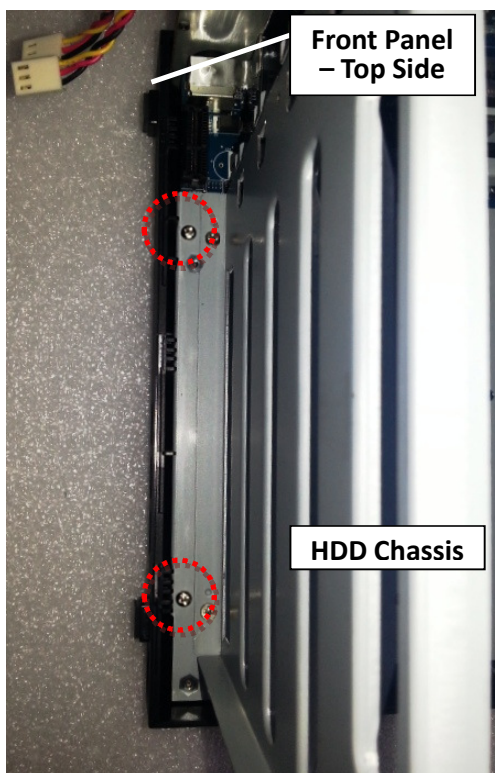


Fig. 29 – Right Side

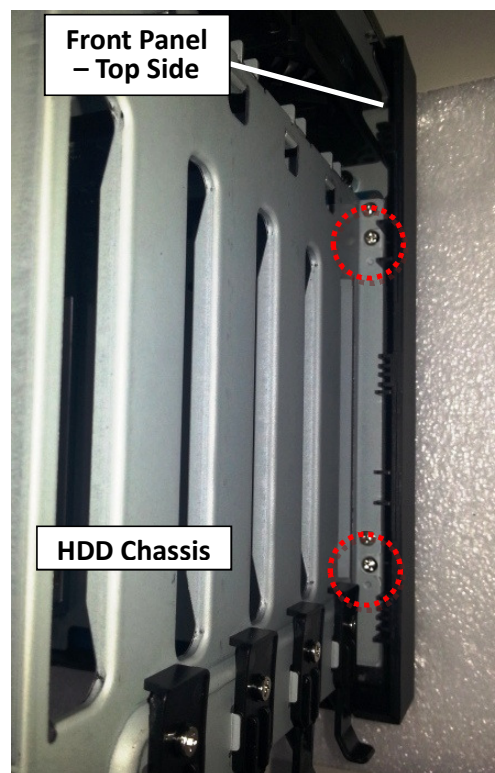


Fig. 30 – Left Side

How to Replace Motherboard for 4 bay DiskStation

2.2.5 Replace the two aluminum foils with new ones on the same locations. (Fig. 31)

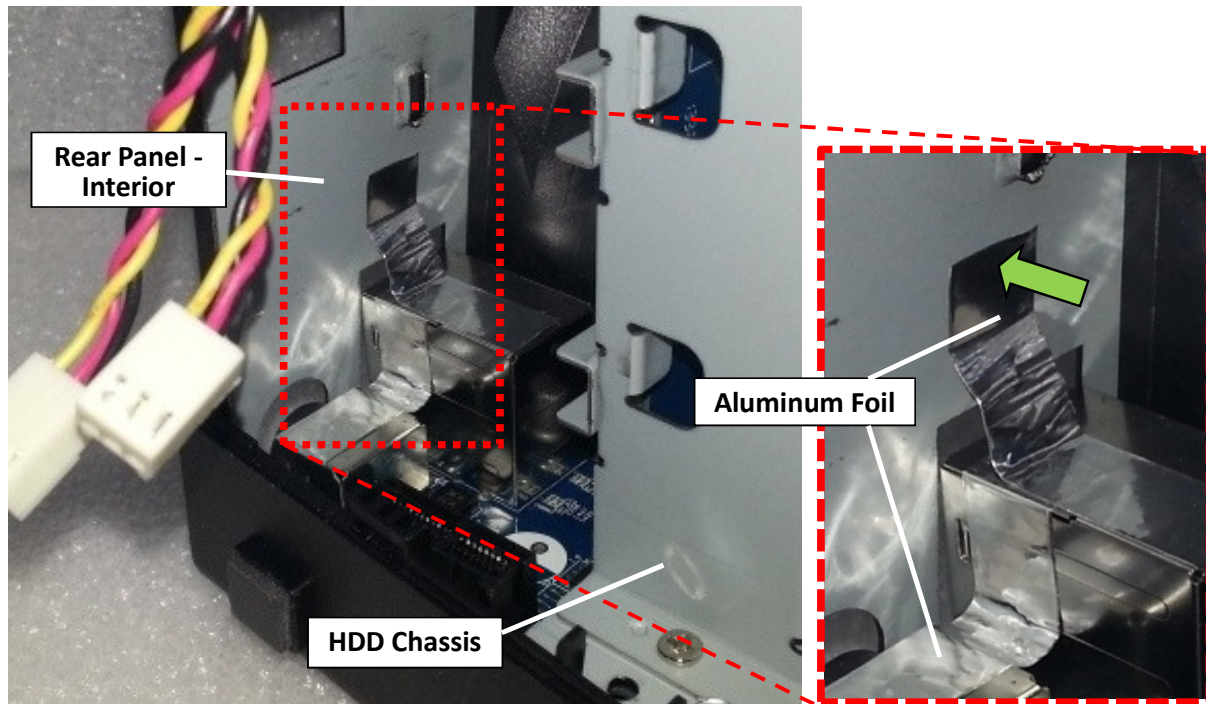


Fig. 31

2.2.6 Plug back the two (2) fan cable connectors (Marked by the red rectangle) to the SATA backplane. (Fig. 32)

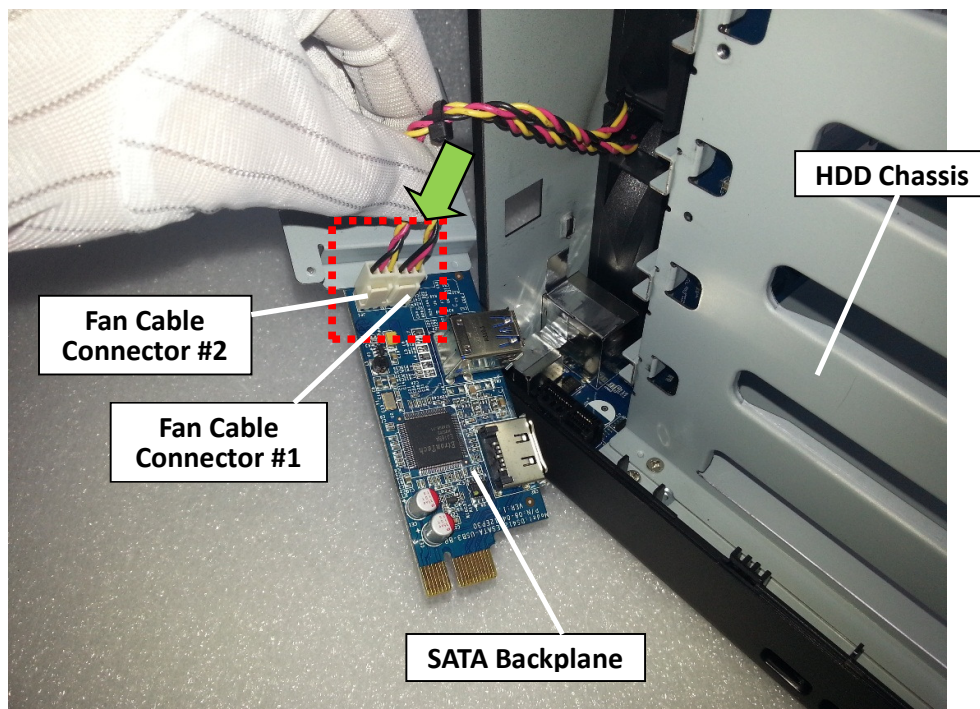


Fig. 32

How to Replace Motherboard for 4 bay DiskStation

2.2.7 Restore the SATA backplane into the enclosure. (Fig. 33)

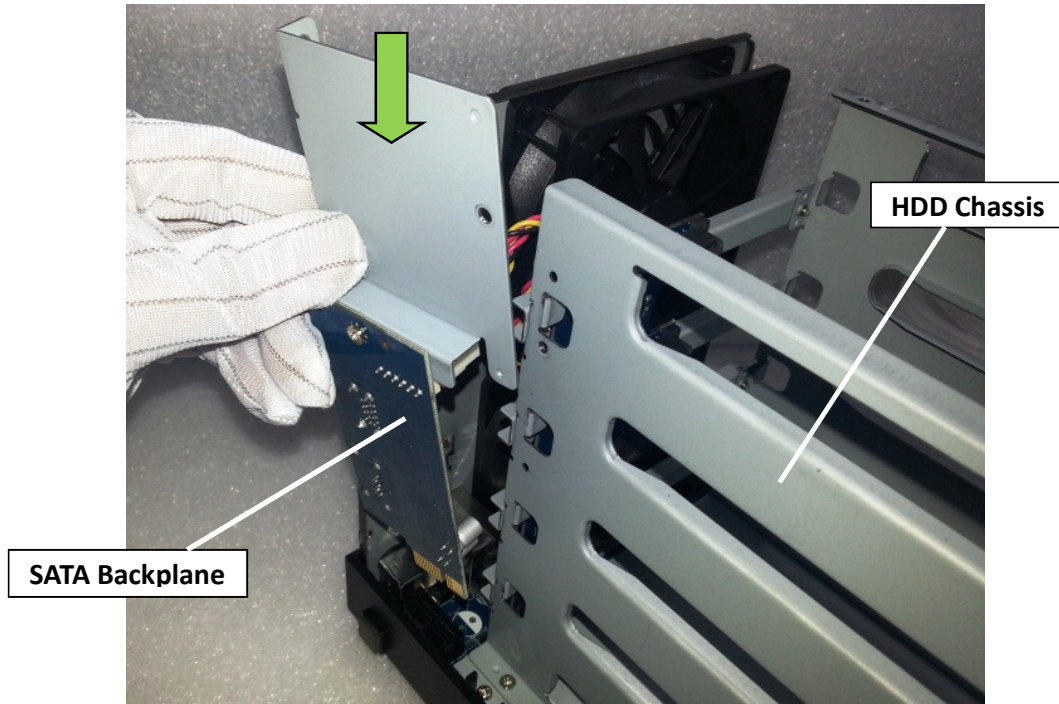


Fig. 33

2.2.8 Then fix the screw on the rear panel (Marked by the red circles). (Fig. 34)



Fig. 34

How to Replace Motherboard for 4 bay DiskStation

- 2.2.9 Restore the plastic bracket to connect the fan #2 with the HDD chassis. Then fix the two (2) screws (Marked by the red circles). (Fig. 35)

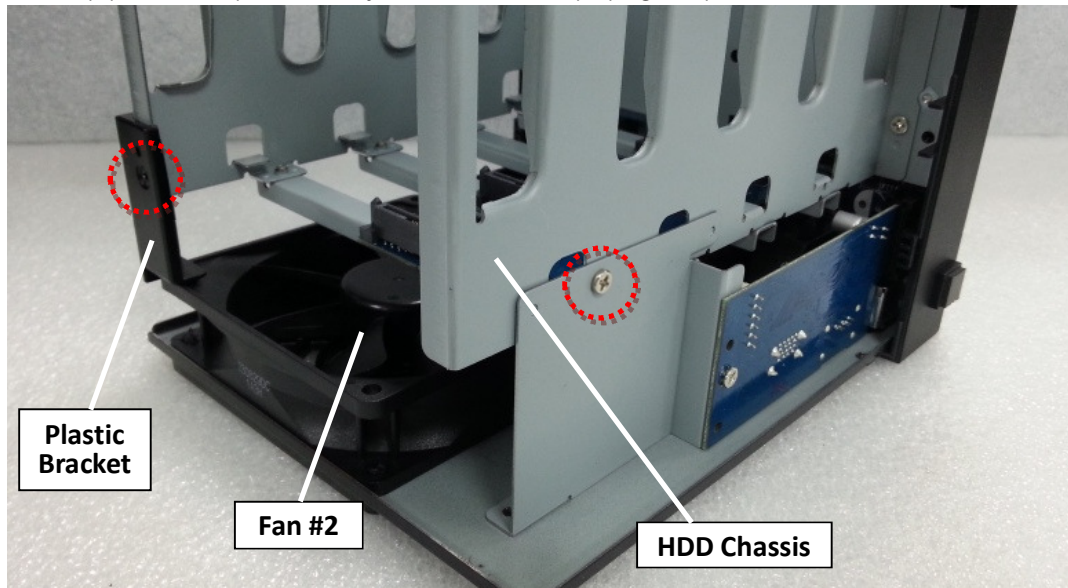


Fig. 35

- 2.2.10 Slightly bend both the top and bottom portions of the left cover outwards and put it back to the original location covering the HDD chassis. (Fig. 36)

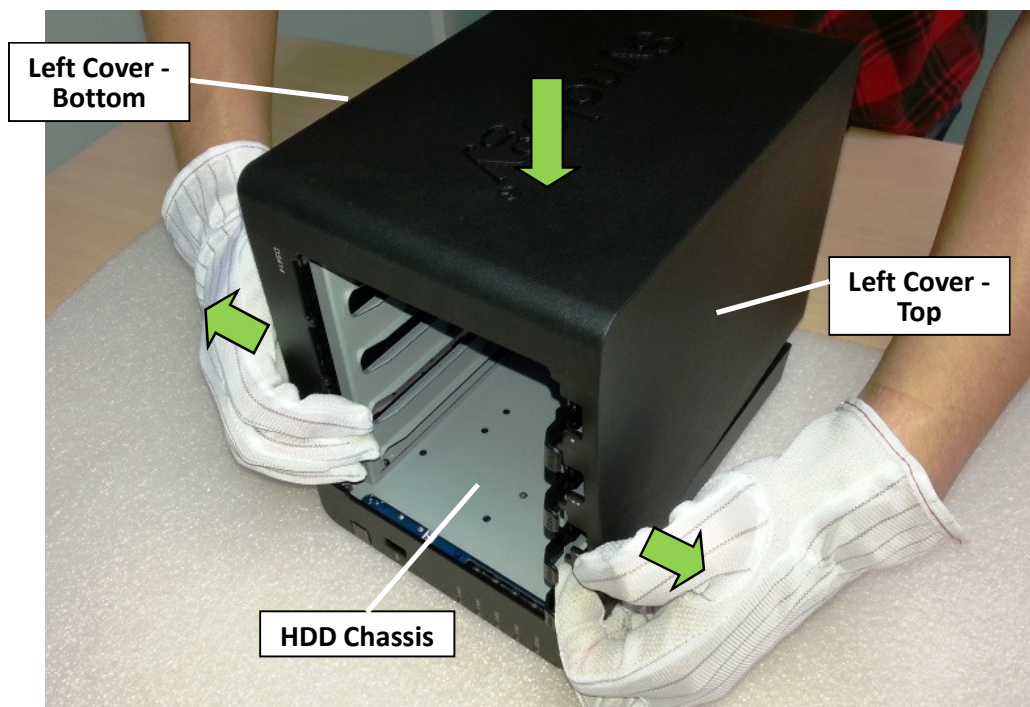


Fig. 36

How to Replace Motherboard for 4 bay DiskStation

- 2.2.11 Grab then push the enclosure frame and the left cover at the same time to join them together. Let the two tenons clamp to the enclosure frame properly. (Fig. 37)

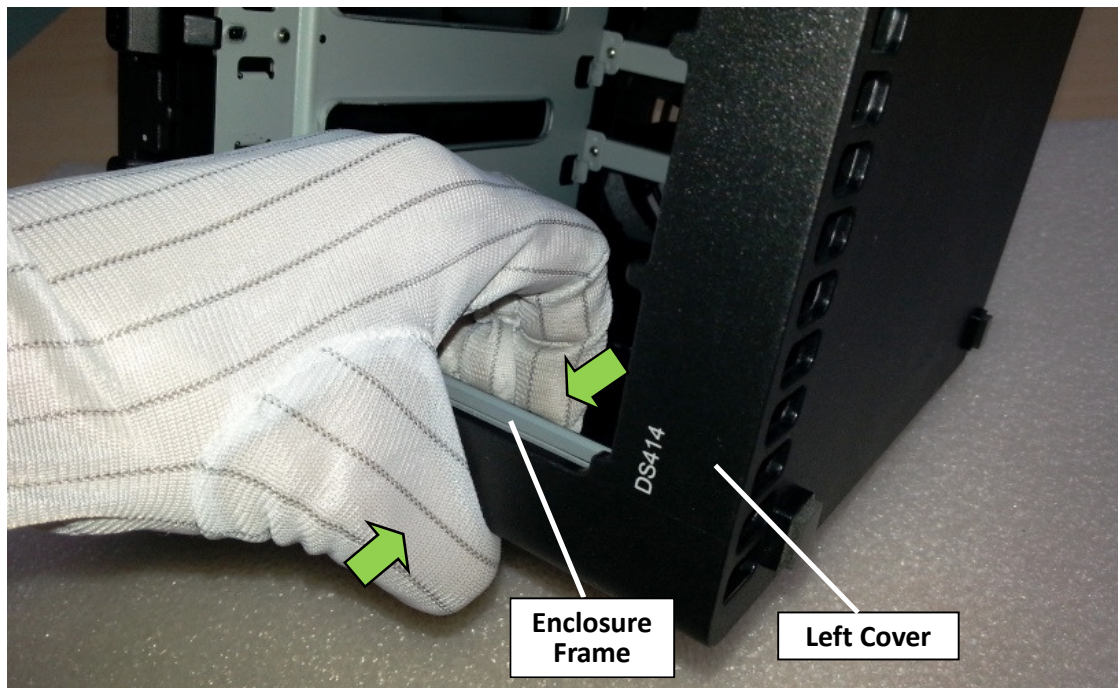


Fig. 37

Fig. 38 shows the status after the left cover the enclosure frame are joined together.

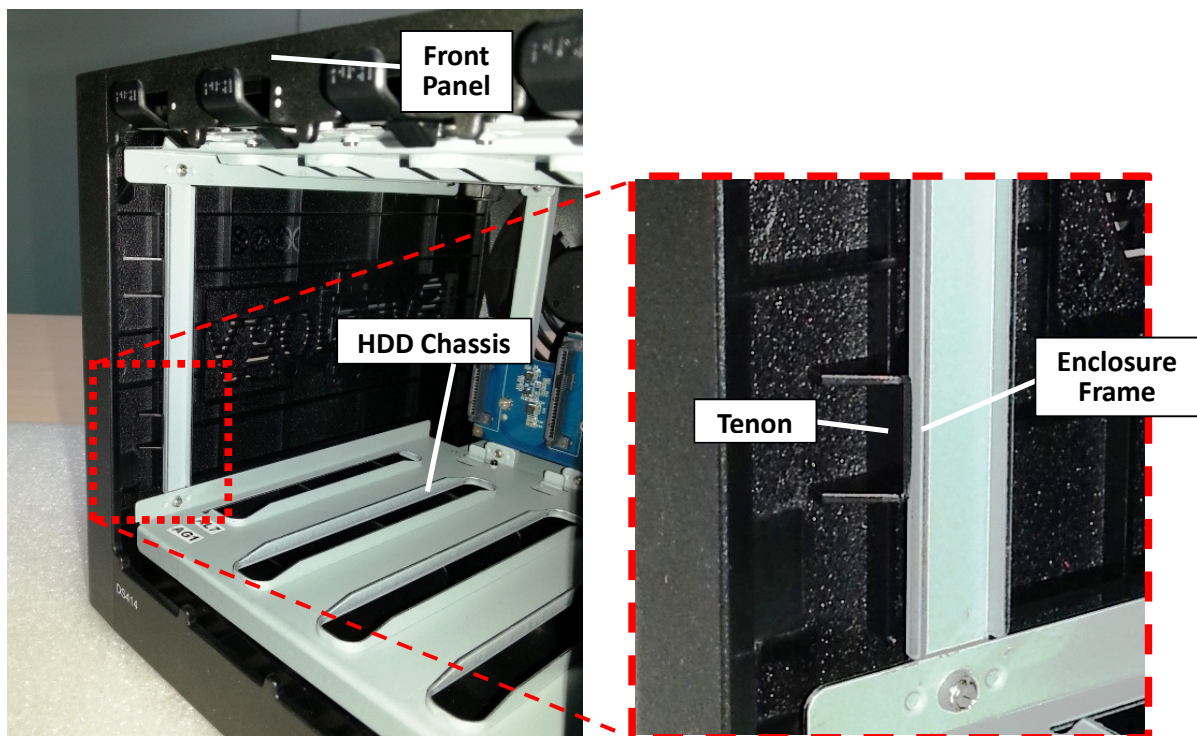


Fig. 38

How to Replace Motherboard for 4 bay DiskStation

Fig. 39 and 40 show the status before and after the tenons clamp to the enclosure frame.

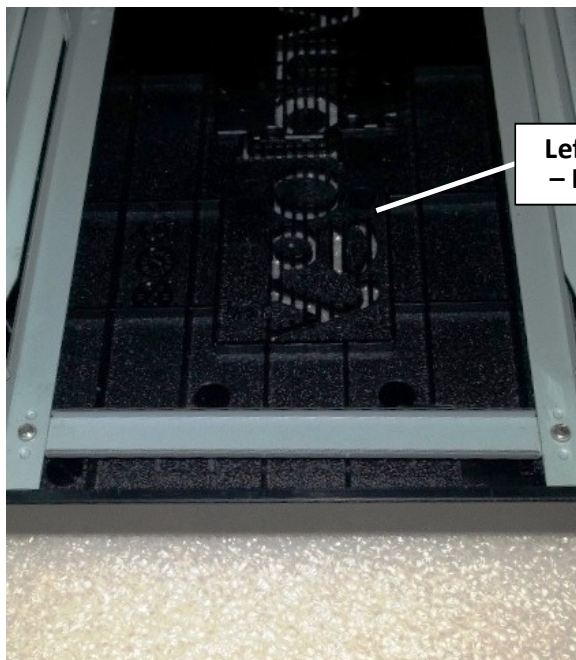


Fig. 39 – Before Clamping

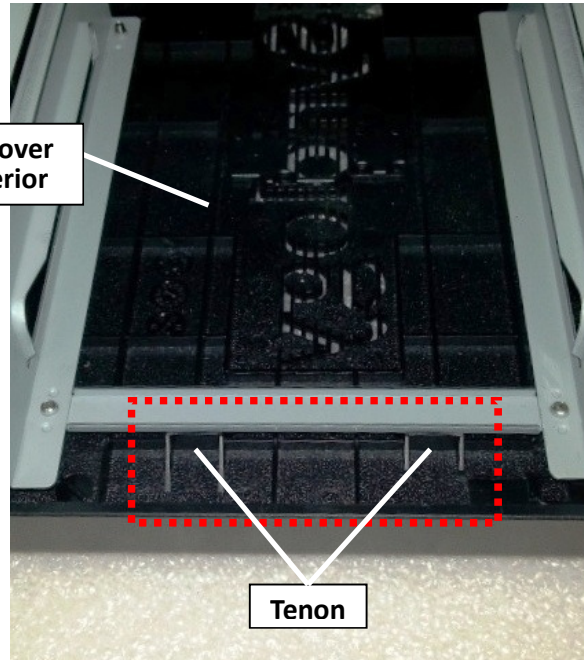


Fig. 40 – After Clamping

2.2.12 Fix the two (2) screws on the rear panel (Marked by the red circles) to secure the left cover. (Fig. 41)

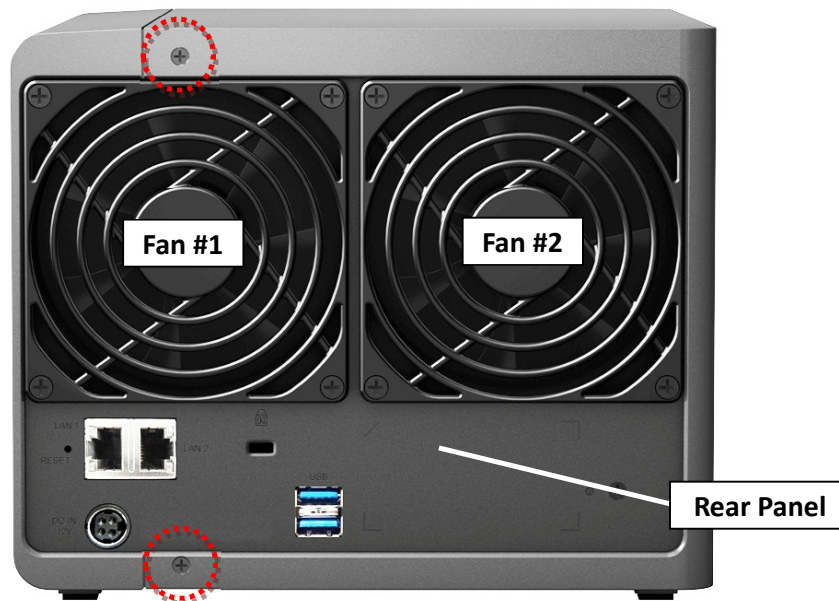


Fig. 41

How to Replace Motherboard for 4 bay DiskStation

2.2.13 Restore all the disk trays into the HDD chassis. (Fig. 42)

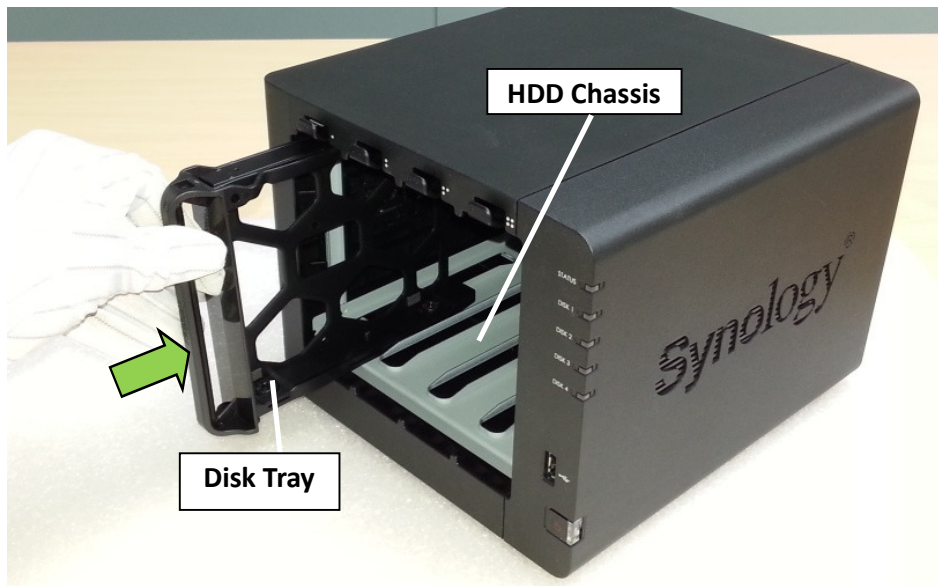


Fig. 42

2.2.14 Restore the front cover. (Fig. 43)



Fig. 43

2.3 The replacing task is completed.

How to Replace Motherboard for 4 bay DiskStation

3. Replace for DS414j, DS413j, DS411+II, DS411+, DS411, DS411j

Note: DS411+II is hereunder the common example.

3.1 Dismantle the defective motherboard

- 3.1.1 Release the four (4) hand screws on the rear panel (Marked by the red circles).
(Fig. 44)

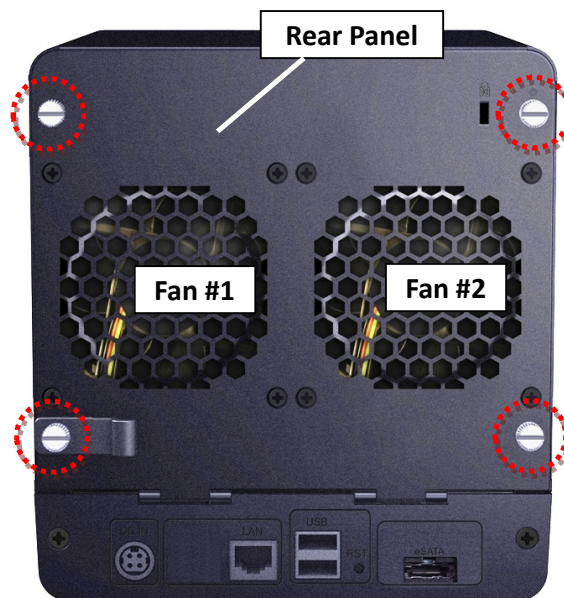


Fig. 44

How to Replace Motherboard for 4 bay DiskStation

3.1.2 Flip down the rear panel to open it. (Fig. 45)

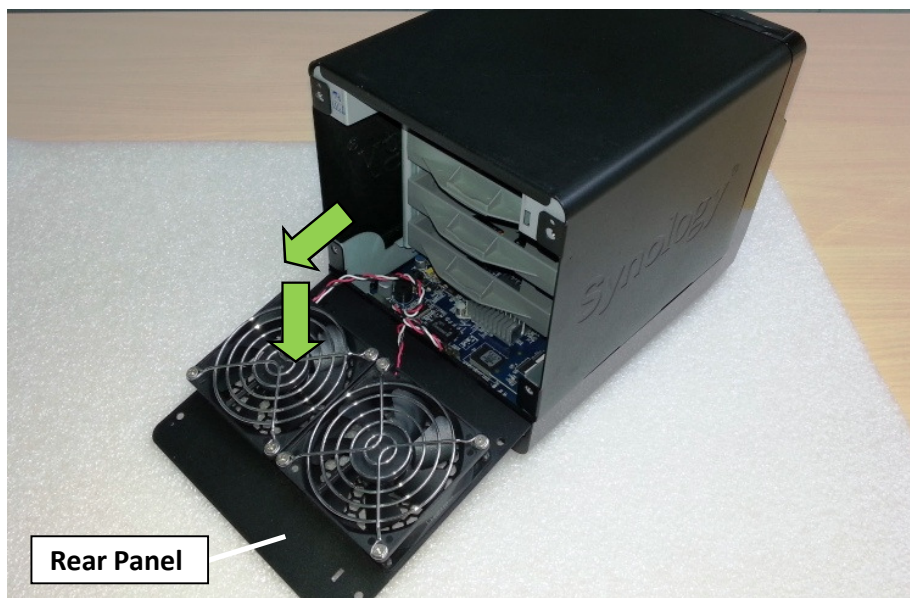


Fig. 45

3.1.3 Remove all the disk trays from the HDD chassis. (Fig. 46)

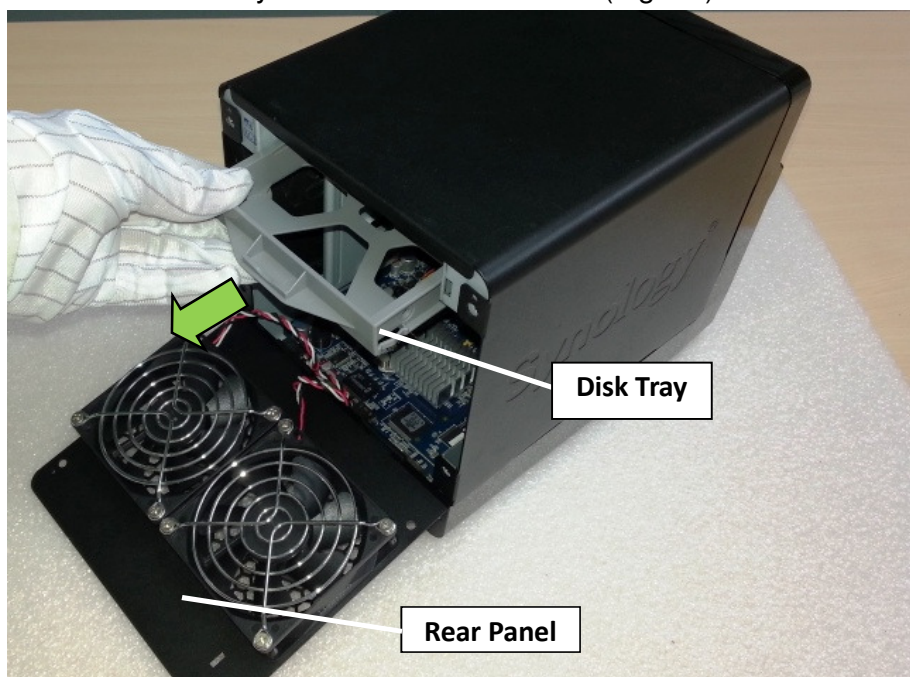


Fig. 46

How to Replace Motherboard for 4 bay DiskStation

3.1.4 Draw backwards then move up the enclosure cover to remove it. (Fig. 47)

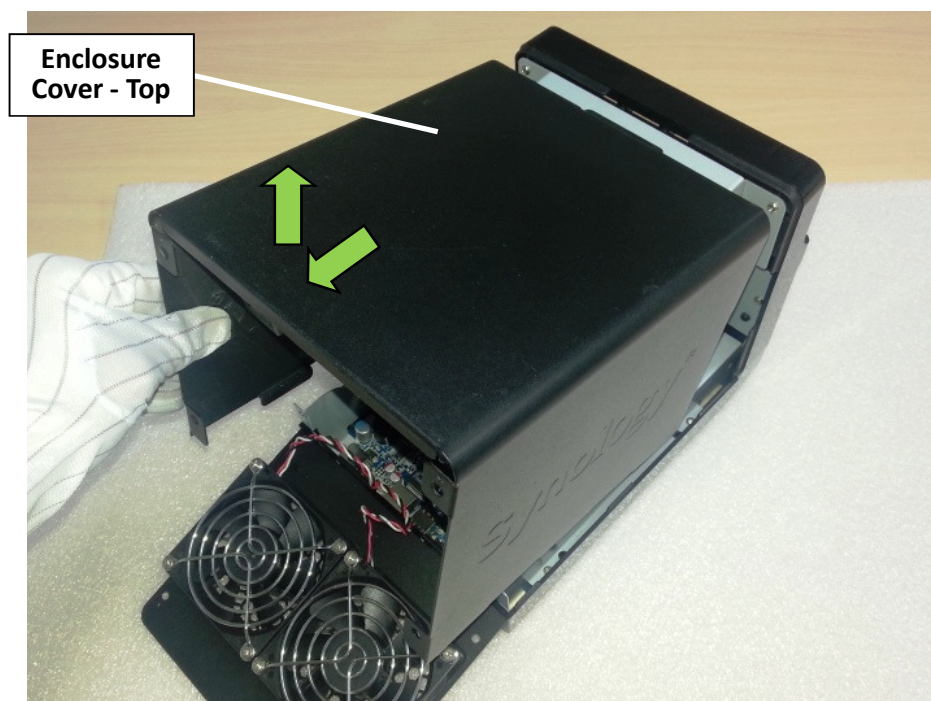


Fig. 47

Fig. 48 shows the status after the enclosure cover is removed.

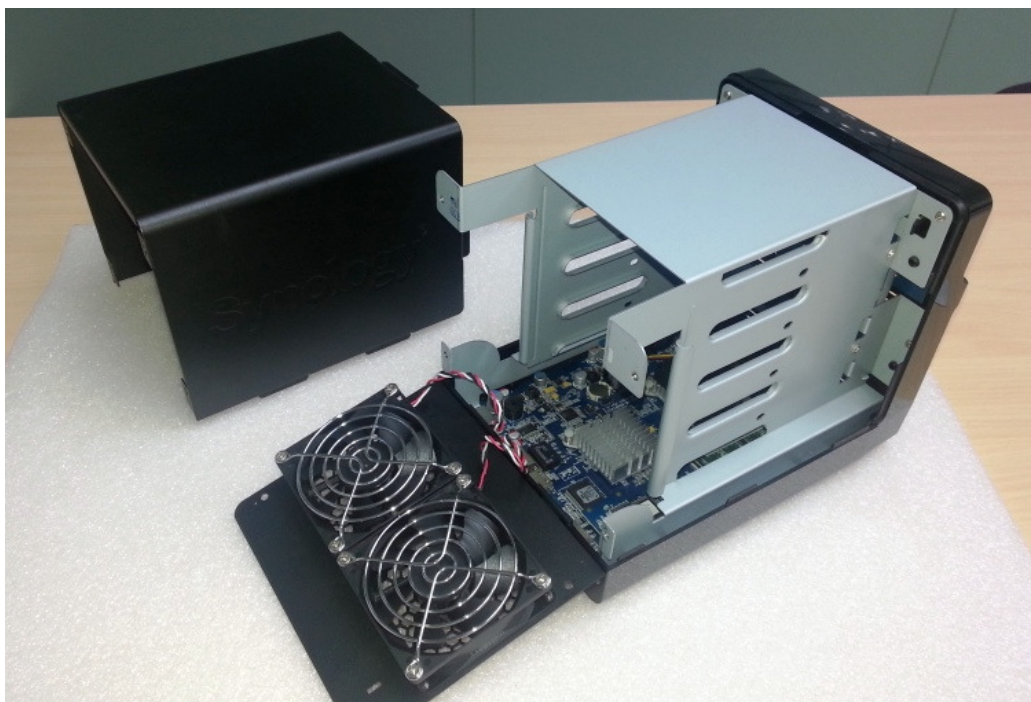


Fig. 48

How to Replace Motherboard for 4 bay DiskStation

3.1.5 Unplug the two (2) fan cable connectors (Marked by the red rectangle). (Fig. 49)

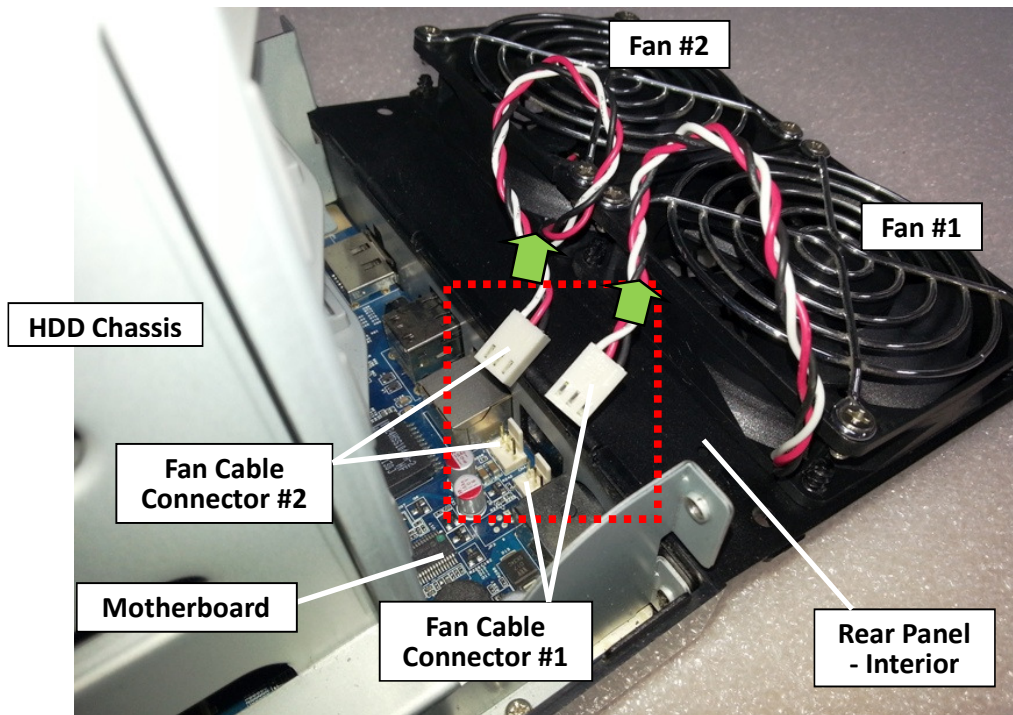


Fig. 49

3.1.6 Release the two (2) screws on each side of the enclosure interior (Marked by the red circles) which fix the bottom cover. (Fig. 50 for the right and Fig. 51 the left side)

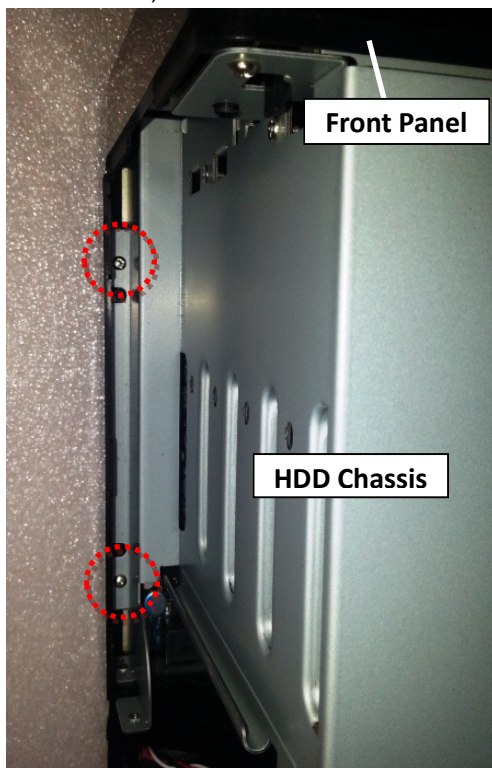


Fig. 50 – Top View, Right Side

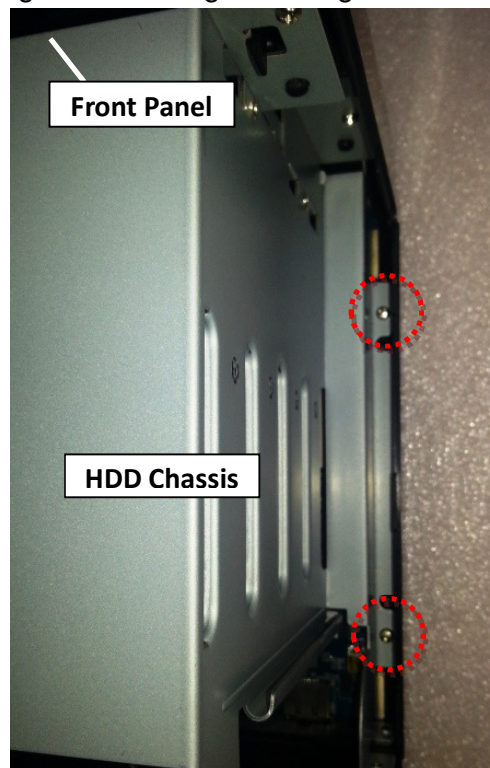


Fig. 51 –Top View, Left Side

How to Replace Motherboard for 4 bay DiskStation

3.1.7 Release the two (2) screws on the rear panel (Marked by the red circles). (Fig. 52)

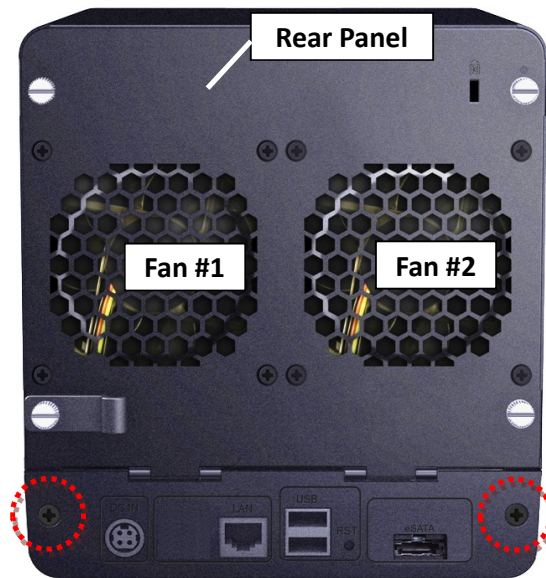


Fig. 52

3.1.8 Remove the bottom cover. (Fig. 53)

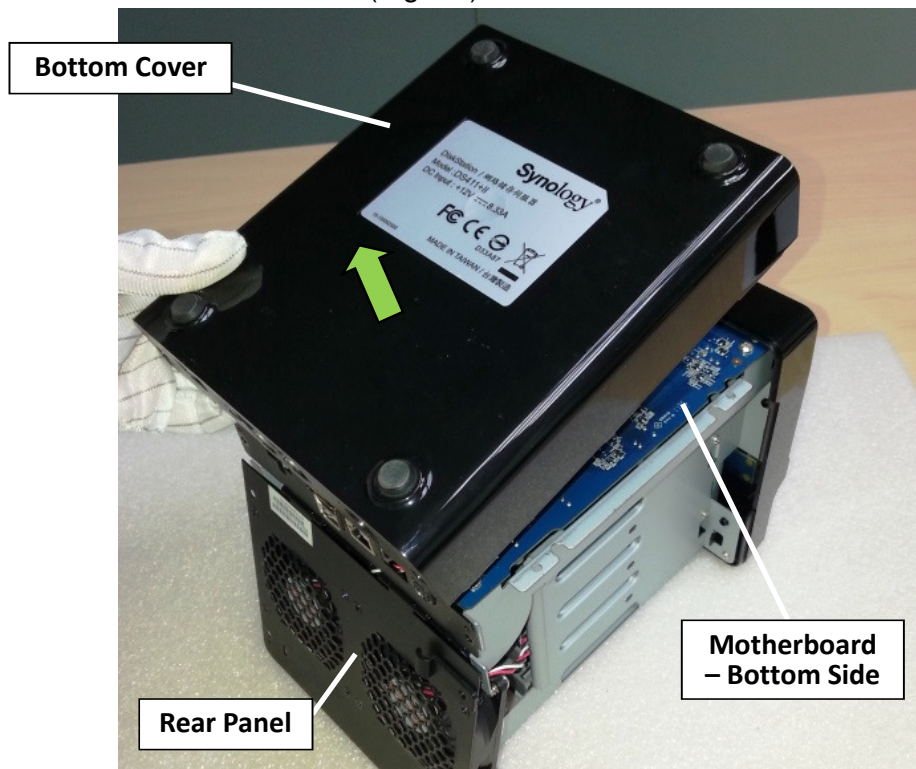


Fig. 53

How to Replace Motherboard for 4 bay DiskStation

3.1.9 Remove the rear panel. (Fig. 54)

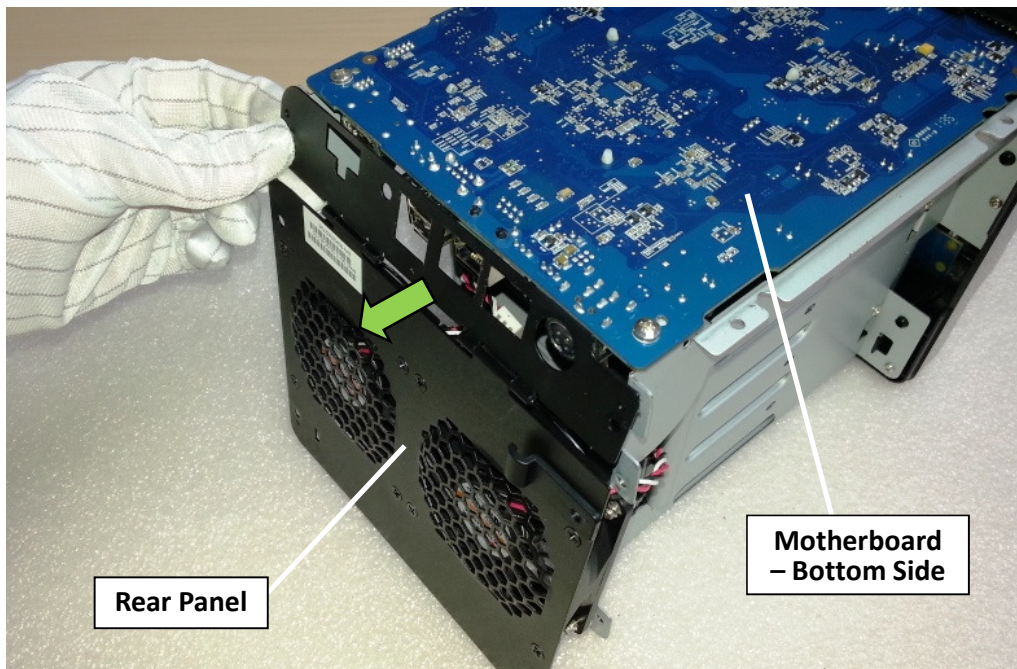


Fig. 54

3.1.10 Release the two (2) screws on each side of the front panel interior (Marked by the red circles). (Fig. 55 for the right side and Fig. 56 the left side)

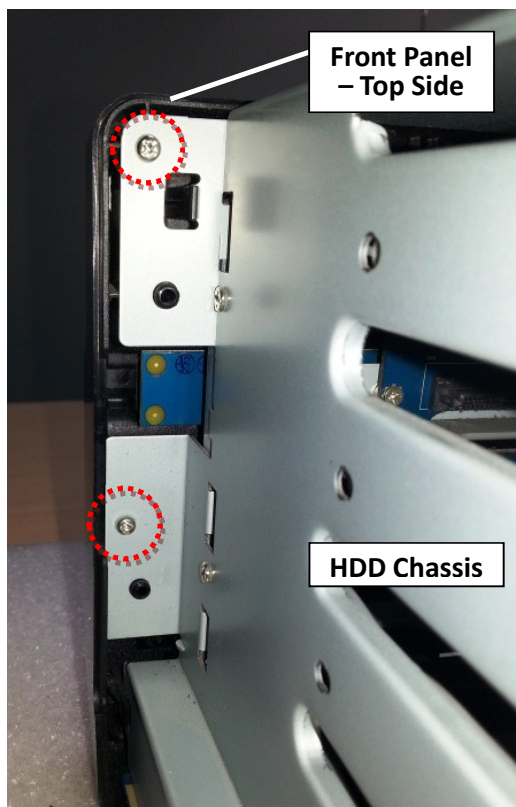


Fig. 55 – Right Side

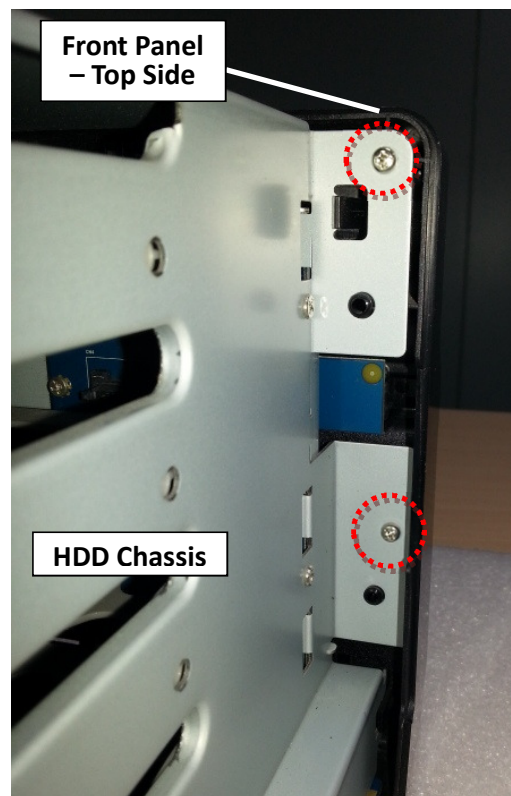


Fig. 56 – Left Side

How to Replace Motherboard for 4 bay DiskStation

- 3.1.11 Release the tenon on each side of the front panel interior (Marked by the red circles). Then push the front panel outwards to remove it from the enclosure. (Fig. 57 for the right side and Fig. 58 the left side)

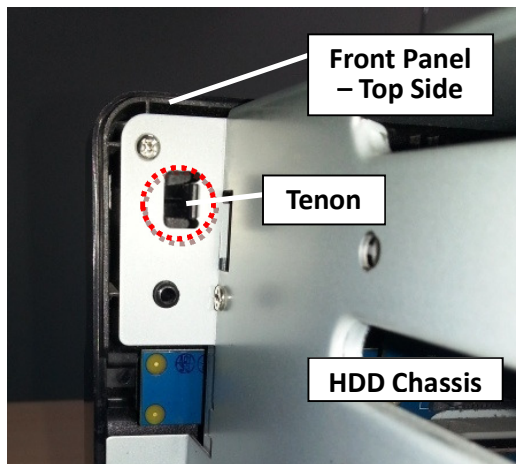


Fig. 57 – Right Side

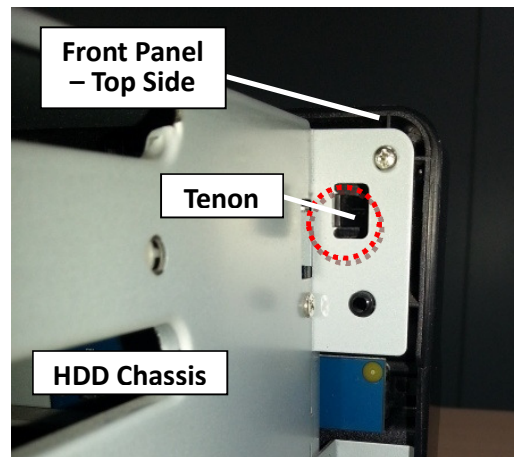


Fig. 58 – Left Side

- 3.1.12 Use a small flat tool (e.g. A screwdriver of “-” type) to slightly bend outwards the tenon on each side of the front panel interior for releasing. (Marked by the red rectangle in Fig. 59, showing the left side). Then push the front panel outwards to release it from the enclosure. Do in the same way for the right side. (Fig. 60)

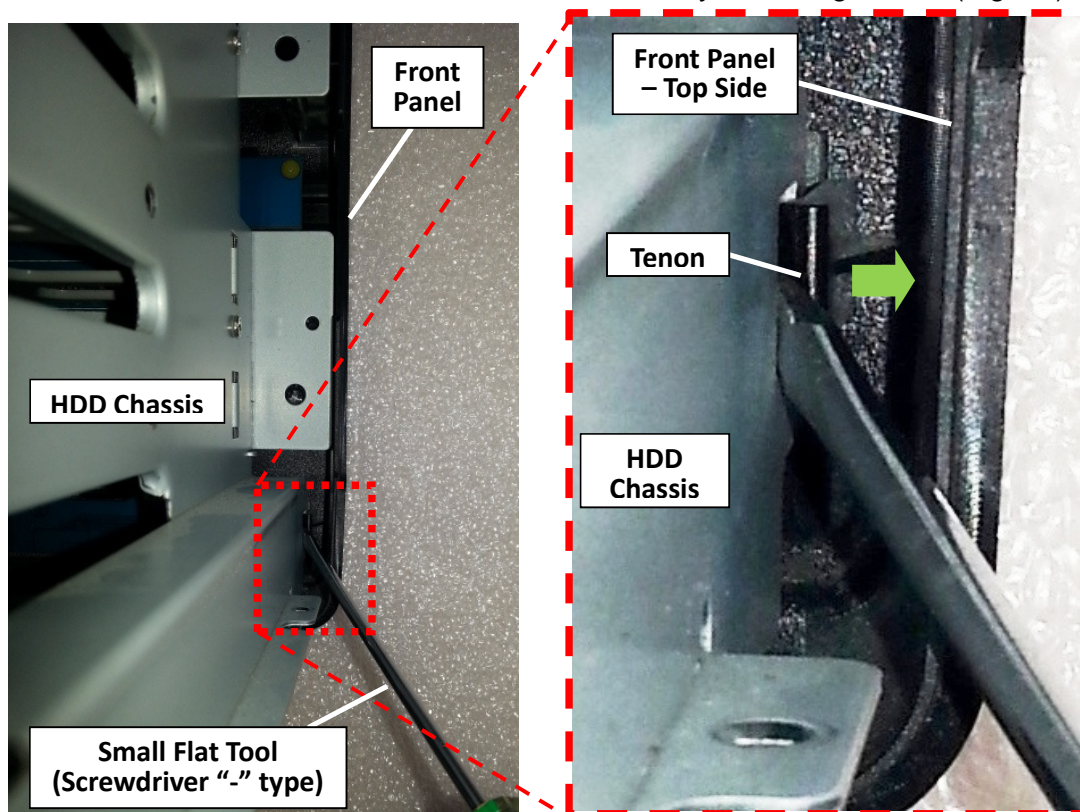


Fig. 59 – Top View, Left Side

How to Replace Motherboard for 4 bay DiskStation

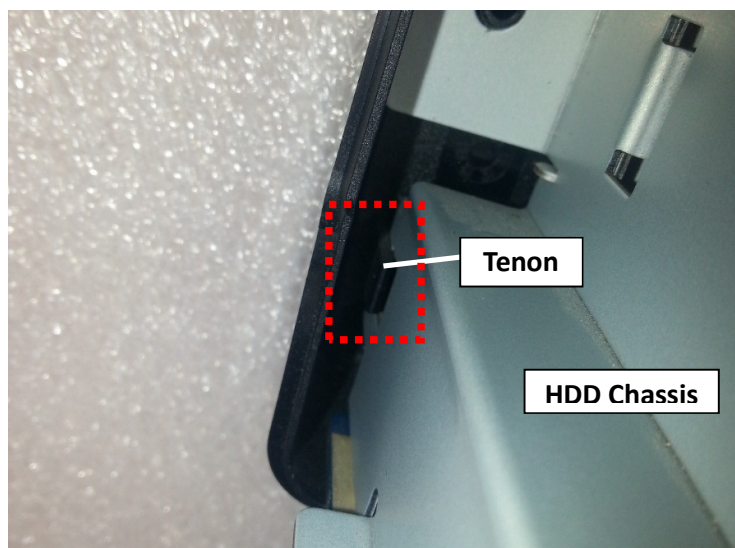


Fig. 60 – Top View, Right Side

3.1.13 Remove the front panel from the enclosure. (Fig. 61)

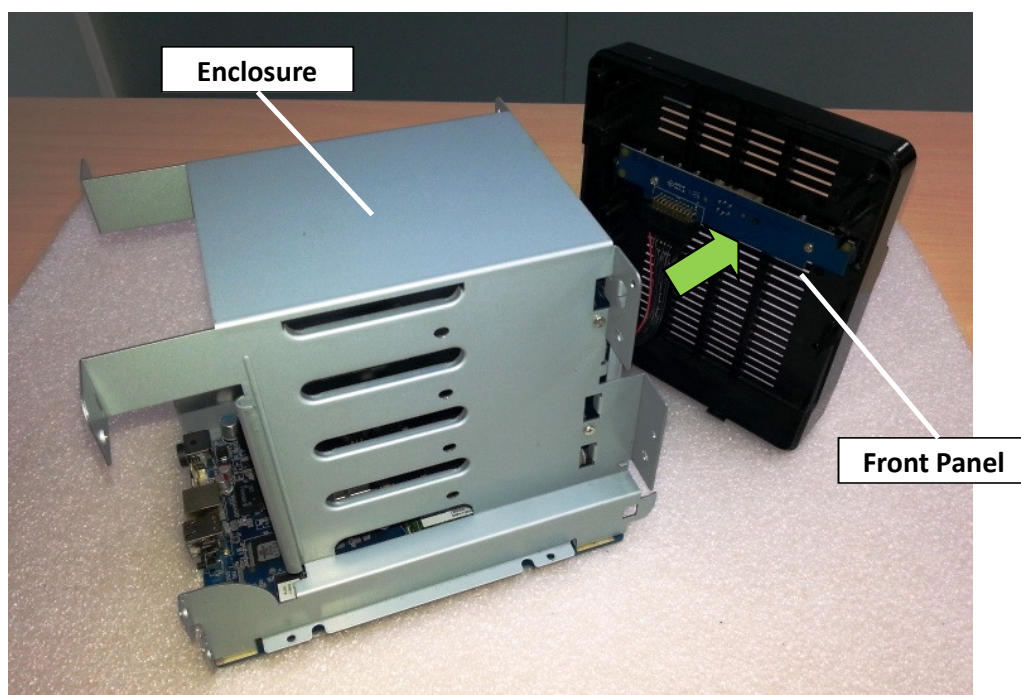


Fig. 61

How to Replace Motherboard for 4 bay DiskStation

- 3.1.14 Release the front cover from the enclosure. Then unplug the LED board cable connector (Marked by the red rectangle) from the LED board. (Fig. 62)

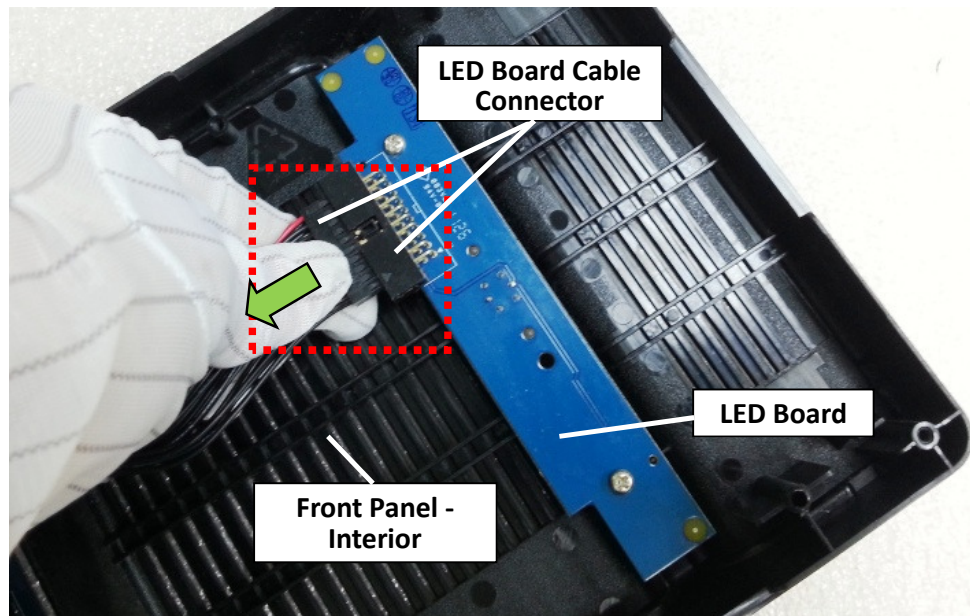


Fig. 62

- 3.1.15 Release the four (4) screws (Marked by the red circles). (Fig. 63)

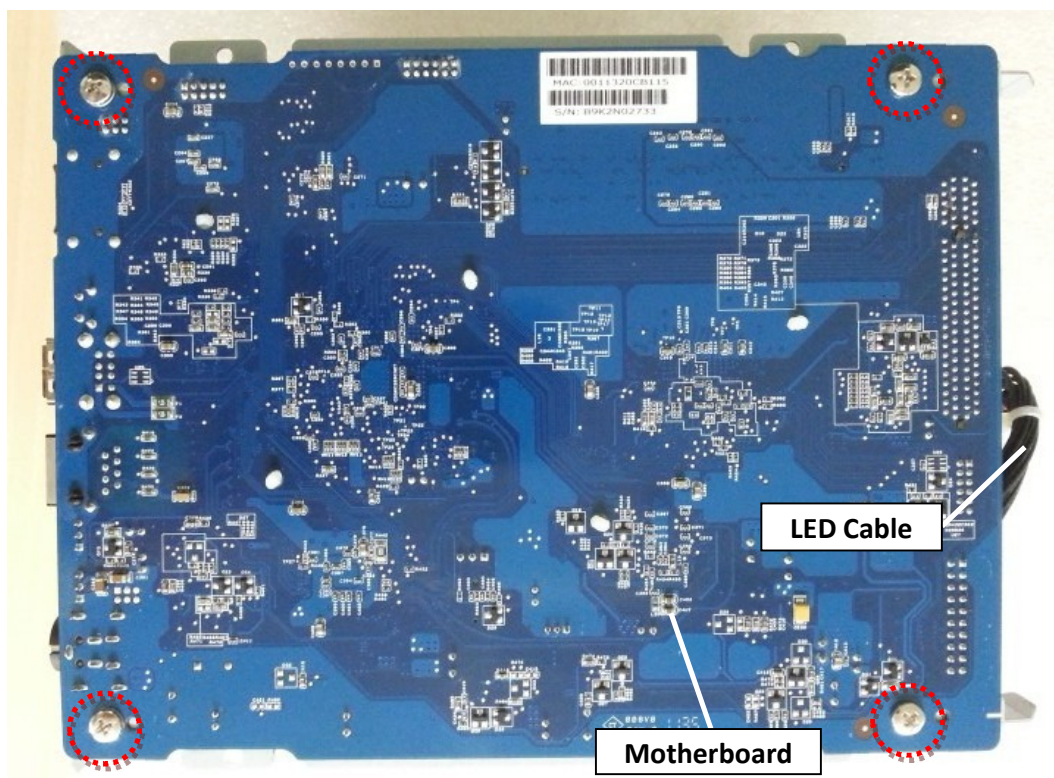


Fig. 63 – Top View

How to Replace Motherboard for 4 bay DiskStation

3.1.16 Then remove the motherboard from the bottom of the enclosure. (Fig. 64)

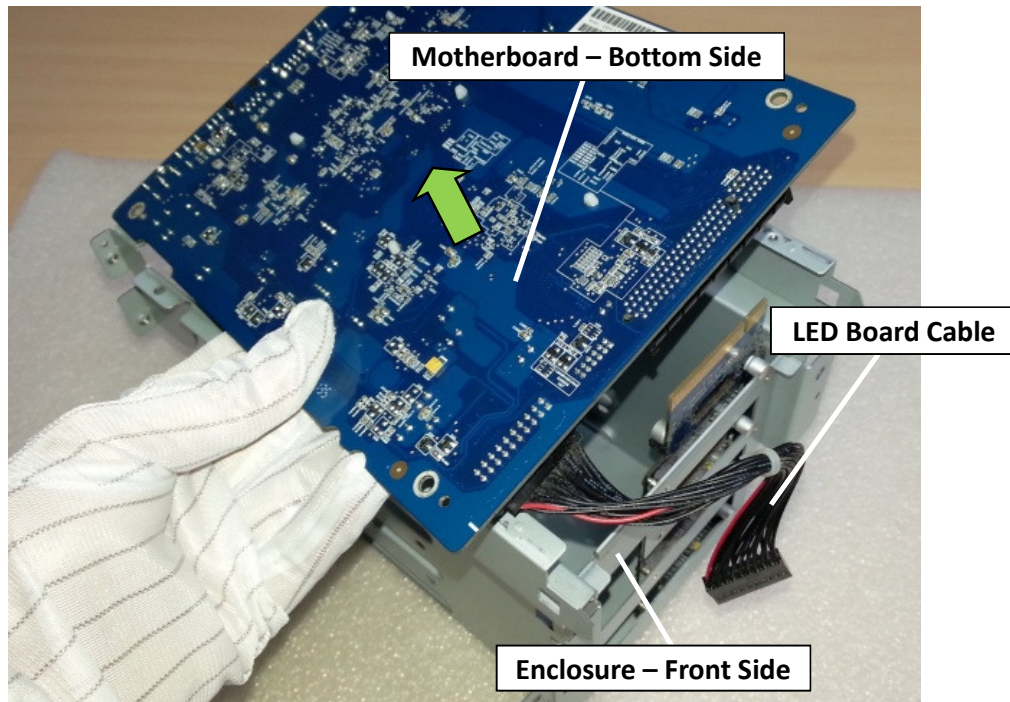


Fig. 64

Fig. 65 shows the status after the motherboard is removed.

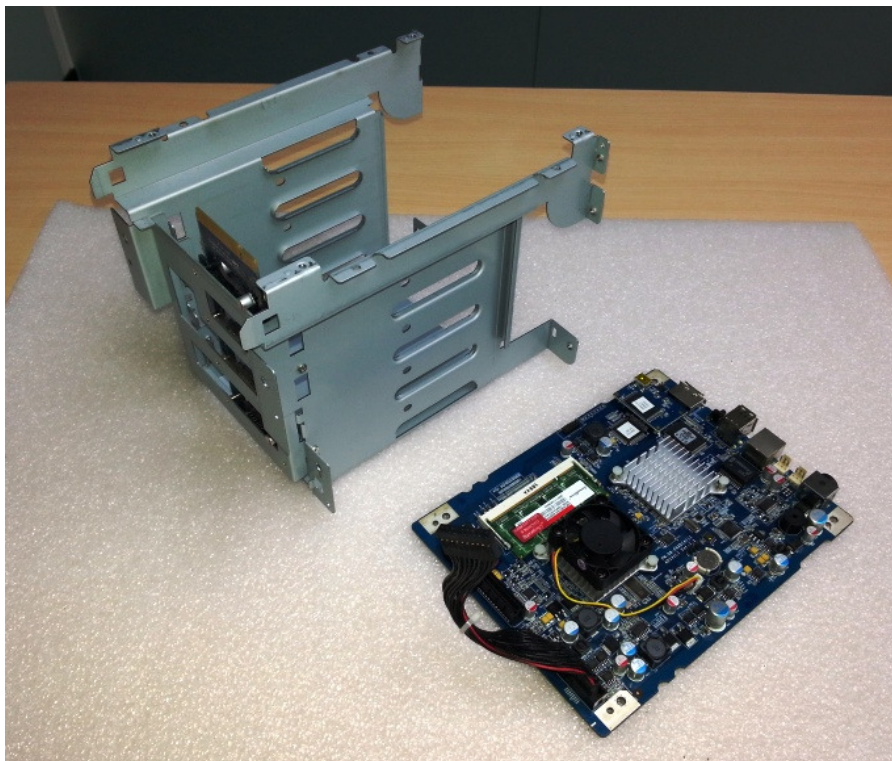


Fig. 65

How to Replace Motherboard for 4 bay DiskStation

3.2 Install the replacement motherboard

3.2.1 Remove the LED board cable from the defective motherboard then install it to the same location on the replacement board. To install the replacement motherboard into the enclosure, there are two (2) locations as follow for joining the two sides:

Motherboard Side (Fig. 66)		Enclosure Side (Fig. 67)	
#1	PCI Express connector	#2	Bonding finger of the HDD backplane

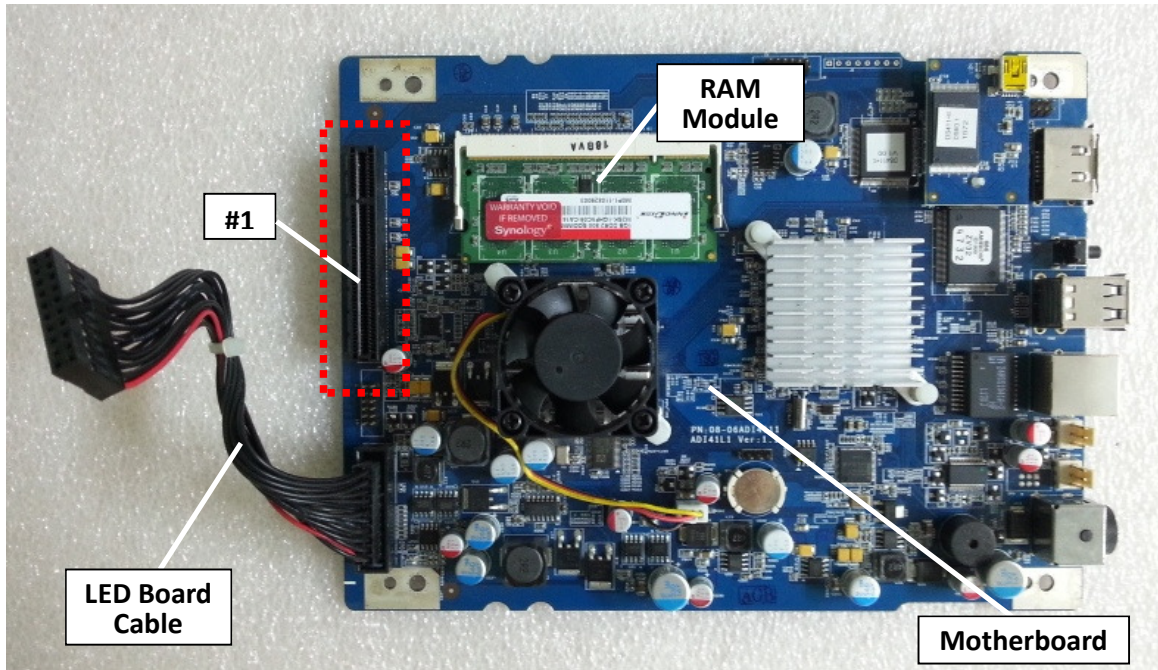


Fig. 66 – Motherboard Side

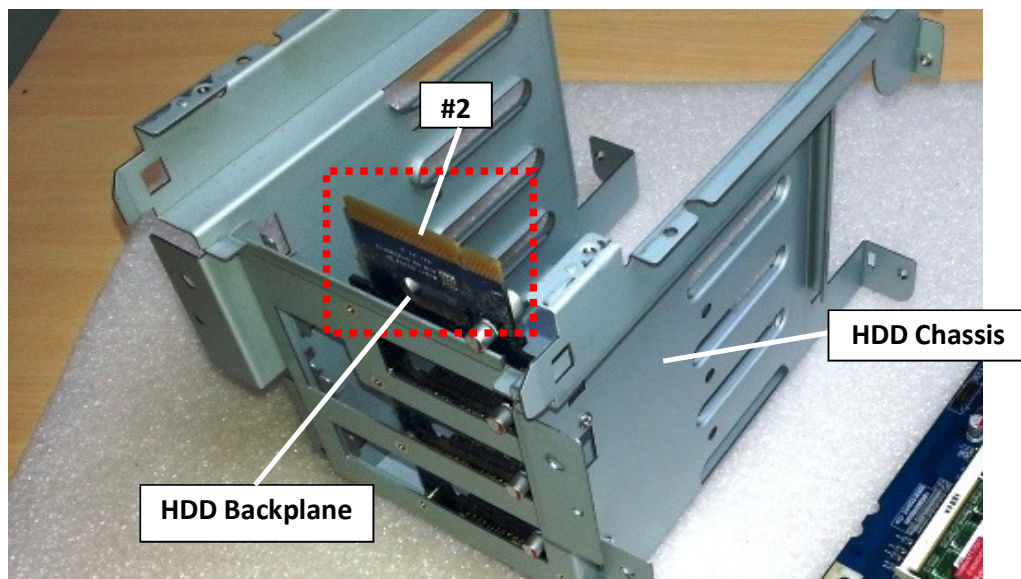


Fig. 67 – Enclosure Side

How to Replace Motherboard for 4 bay DiskStation

Join the motherboard and the enclosure together with the bonding finger of the HDD backplane (#2) inserted into the PCI Express connector (#1) properly. (Fig. 68)

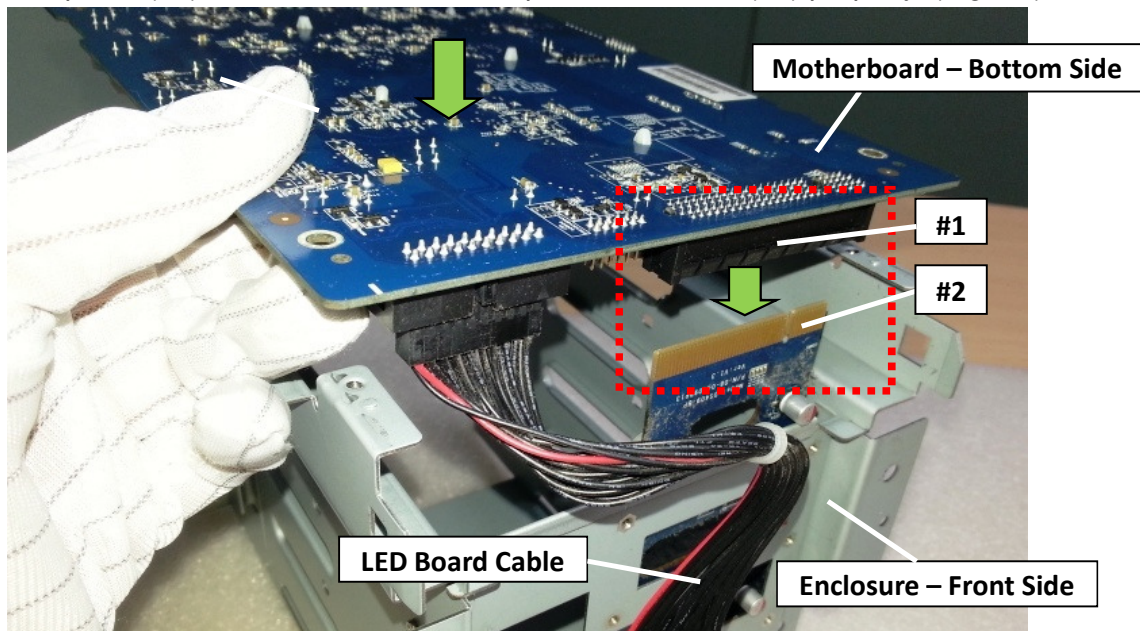


Fig. 68

3.2.2 Fix the four (4) screws (Marked by the red circles) to secure the motherboard. (Fig. 69)

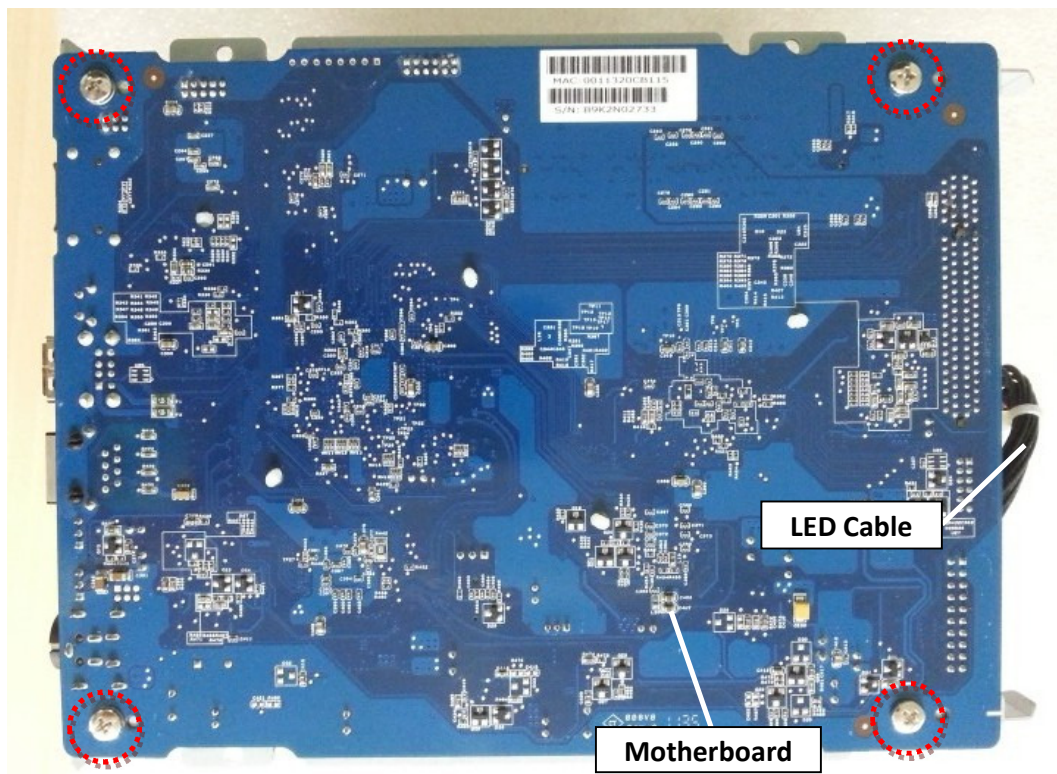


Fig. 69 – Top View

How to Replace Motherboard for 4 bay DiskStation

3.2.3 Plug back the LED board cable connector to its original location (Marked by the red rectangle) on the interior of the front panel. (Fig. 70)

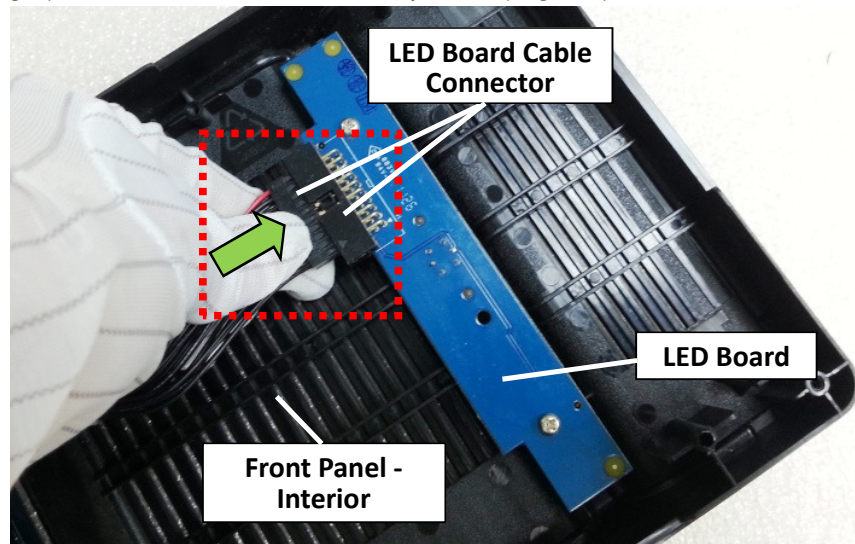


Fig. 70

3.2.4 To restore the front panel on the enclosure, the four (4) tenons and openings for joining the two sides are as follow:

Front Panel Side (Fig. 71)		Enclosure Side (Fig. 72 and 73)	
#3	Tenon	#4	Opening
#5	Tenon	#6	Opening
#7	Tenon	#8	Opening
#9	Tenon	#10	Opening

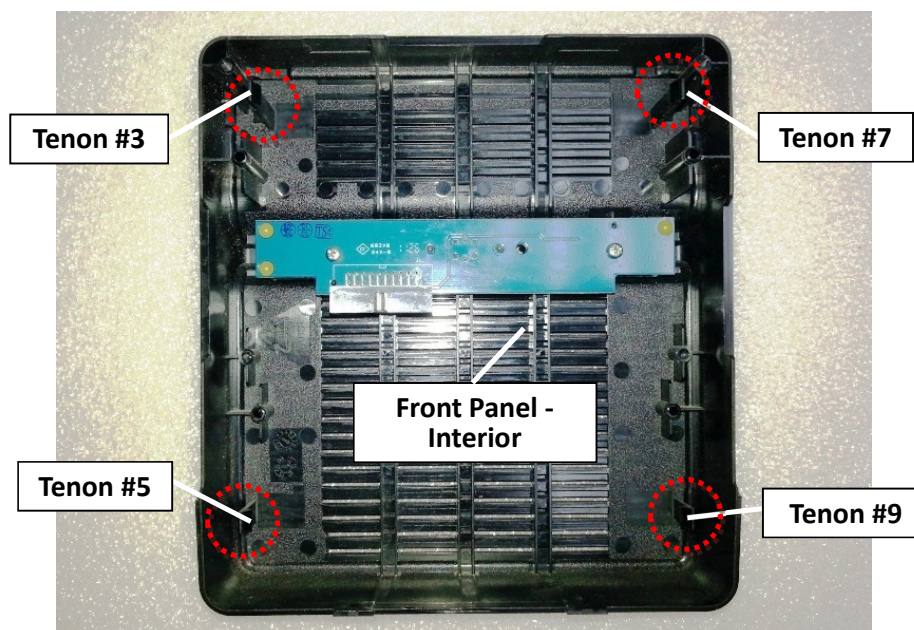


Fig. 71 – Font Panel Side

How to Replace Motherboard for 4 bay DiskStation

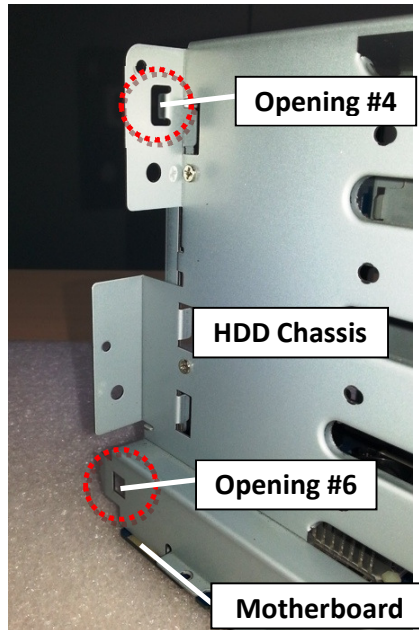


Fig. 72 – Right, Enclosure Side

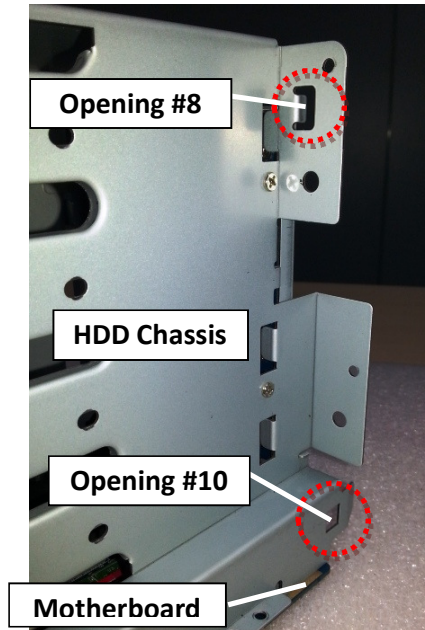


Fig. 73 – Left, Enclosure Side

Restore the front panel to its original location on the enclosure with the above-mentioned tenons and openings joined properly. (Fig. 74)

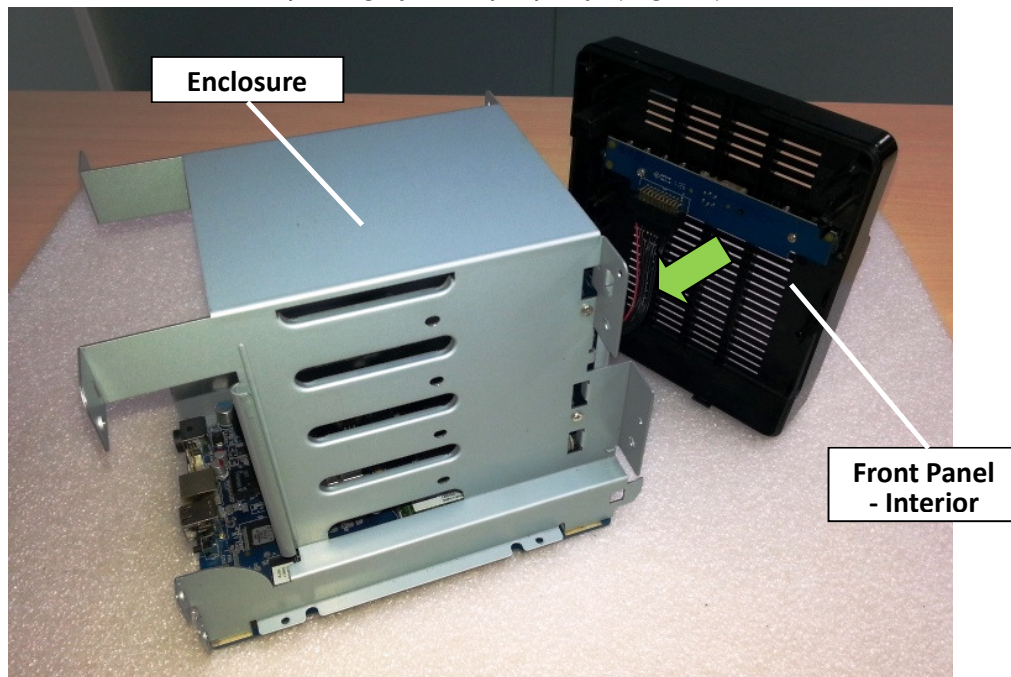


Fig. 74

How to Replace Motherboard for 4 bay DiskStation

3.2.5 Fix the two (2) screws on each side of the front panel interior (Marked by the red circles). (Fig. 75 for the right side and Fig. 76 the left side)

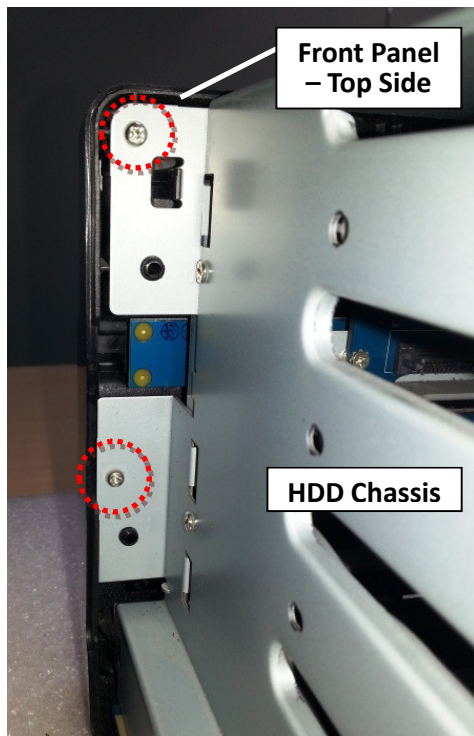


Fig. 75 – Right Side

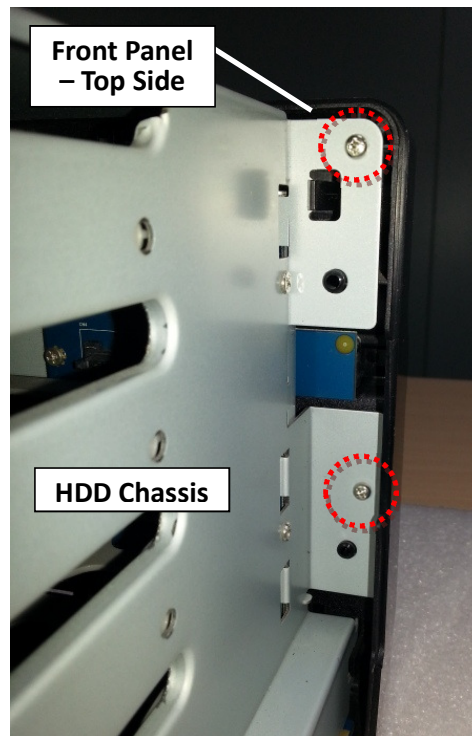


Fig. 76 – Left Side

3.2.6 Restore the rear panel to its original location. (Fig. 77)

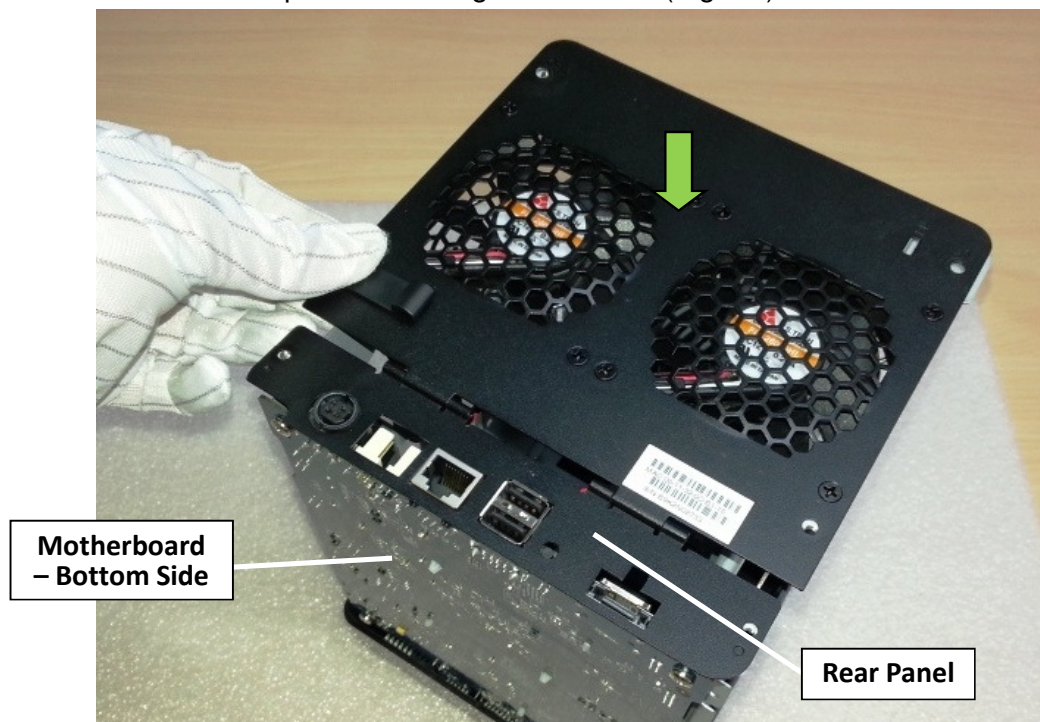


Fig. 77

How to Replace Motherboard for 4 bay DiskStation

3.2.7 Restore the bottom cover to its original location. (Fig. 78)

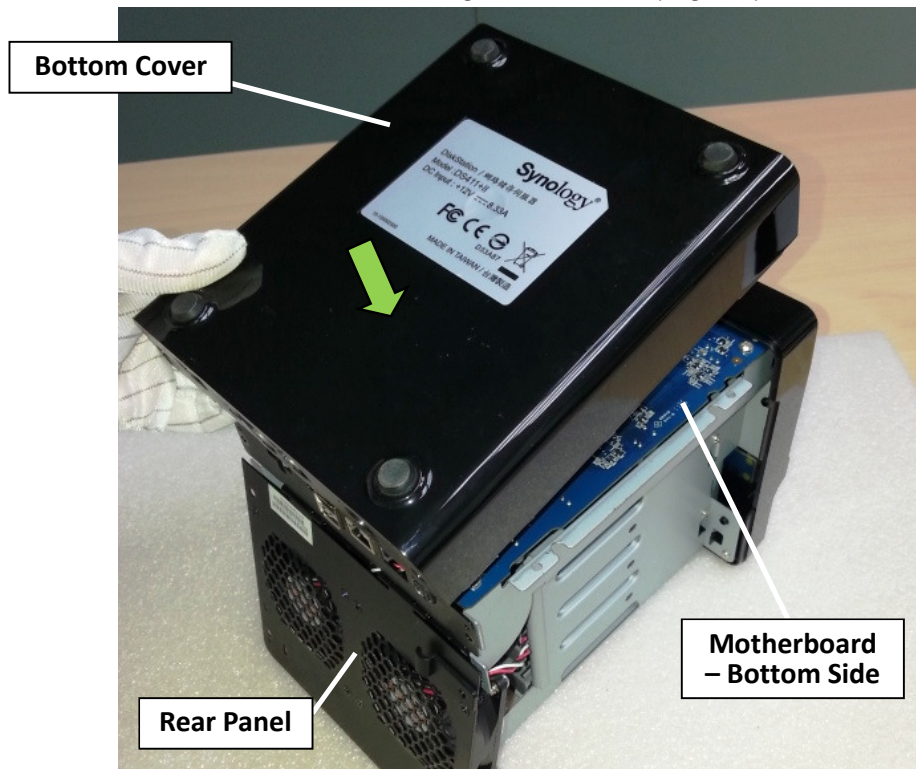


Fig. 78

3.2.8 Fix the two (2) screws on the rear panel (Marked by the red circles). (Fig. 79)

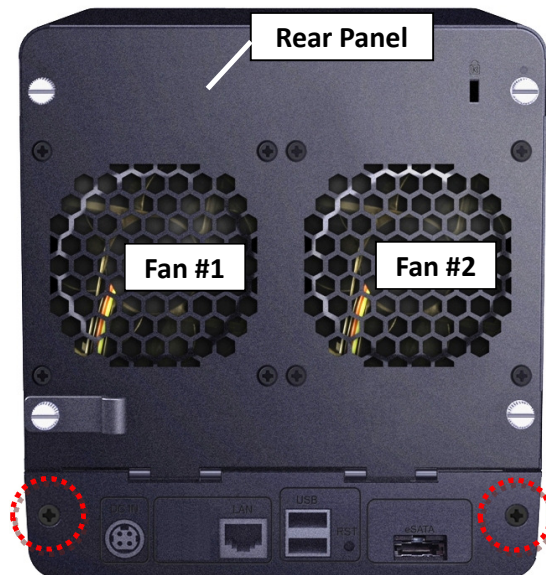


Fig. 79

How to Replace Motherboard for 4 bay DiskStation

3.2.9 Fix the two (2) screws on each side of the enclosure interior (Marked by the red circles) to secure the bottom cover. (Fig. 80 for the right and Fig. 81 the left side)

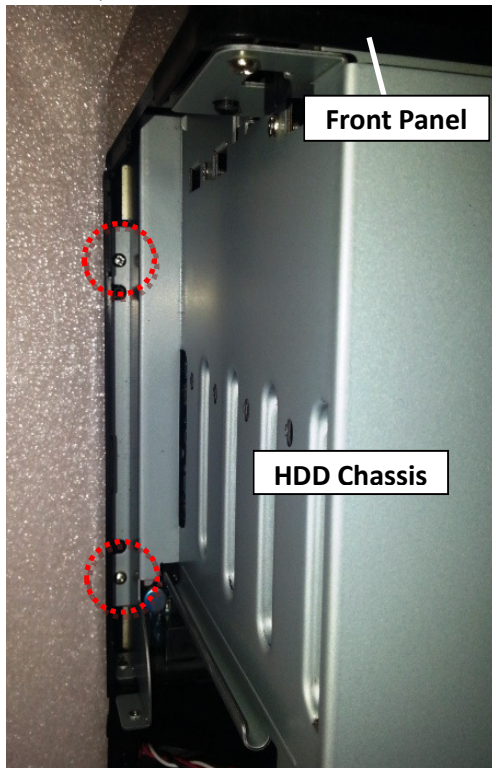


Fig. 80 – Right Side

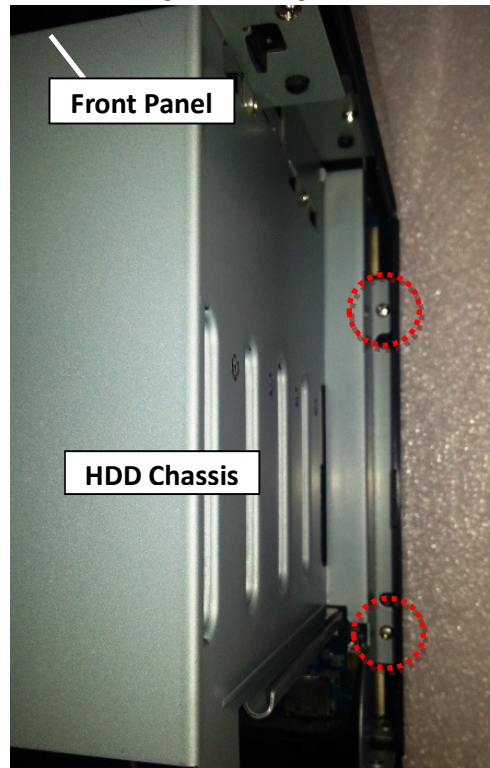


Fig. 81 – Left Side

3.2.10 Plug back the two (2) fan cable connectors (Marked by the red rectangle). (Fig. 82)

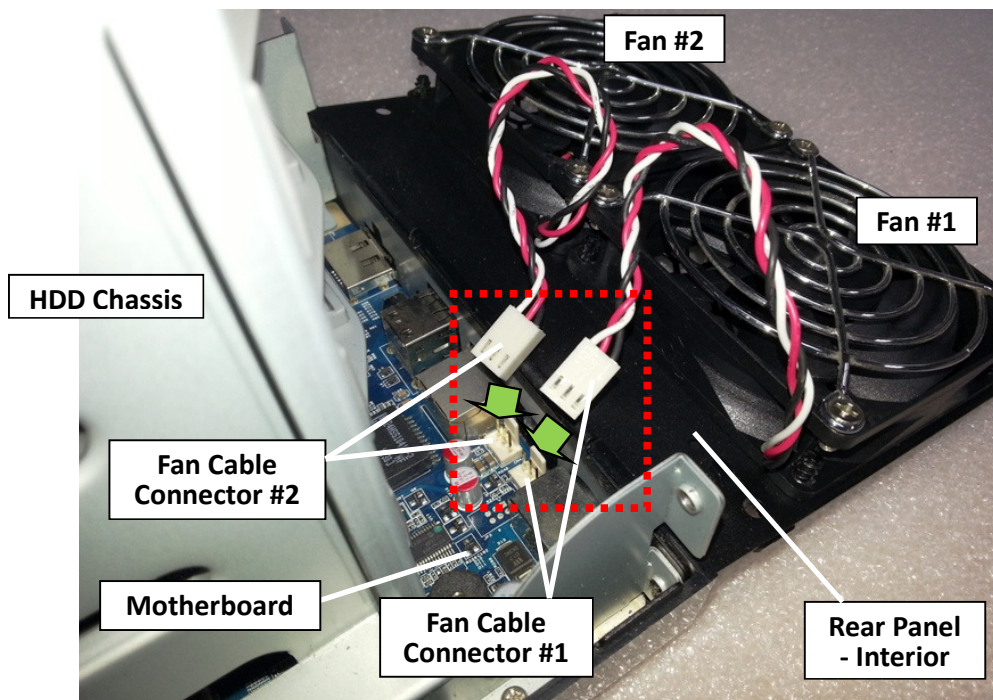


Fig. 82

How to Replace Motherboard for 4 bay DiskStation

3.2.11 Restore the enclosure cover to its original location. (Fig. 83)

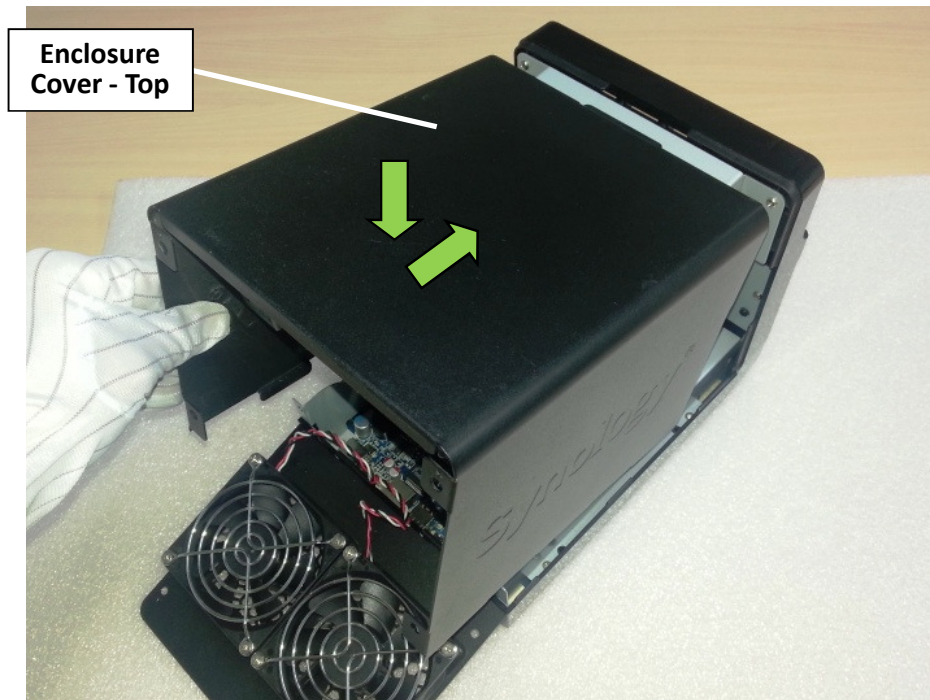


Fig. 83

3.2.12 Restore all the disk trays into the HDD chassis. (Fig. 84)

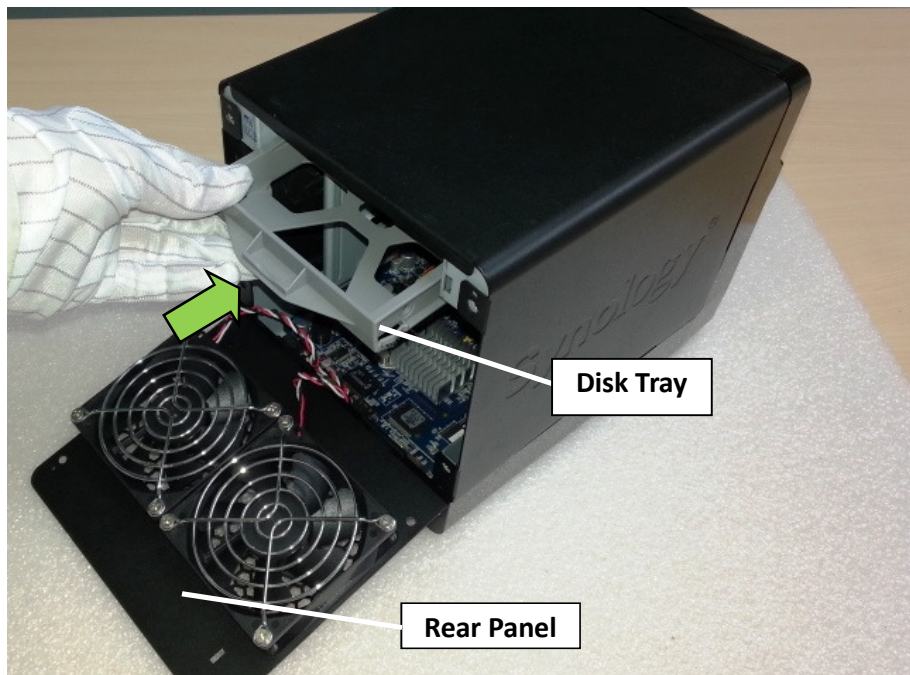


Fig. 84

How to Replace Motherboard for 4 bay DiskStation

3.2.13 Flip up the rear panel to close it. (Fig. 85)

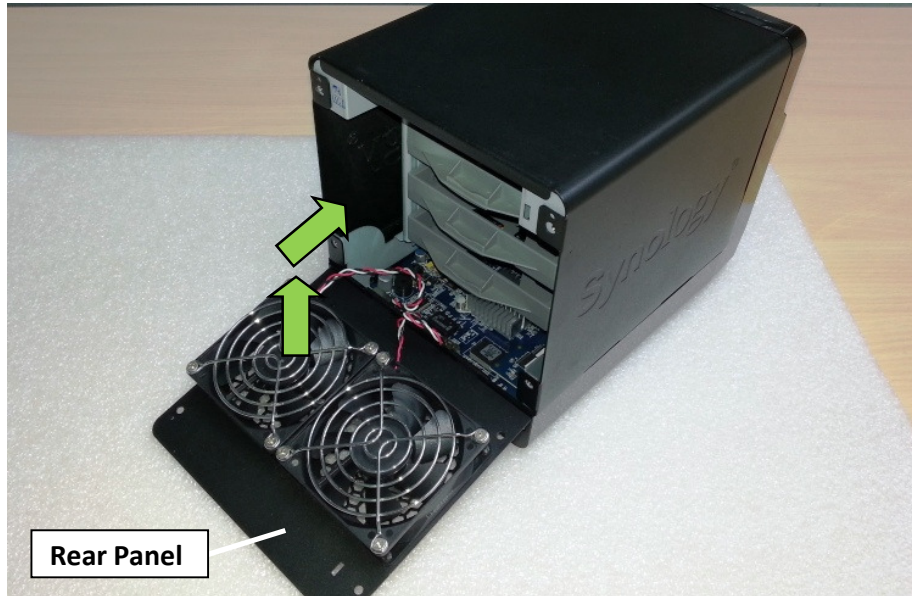


Fig. 85

3.2.14 Fix the four (4) hand screws on the rear panel (Marked by the red circles) to secure the rear panel. (Fig. 86)

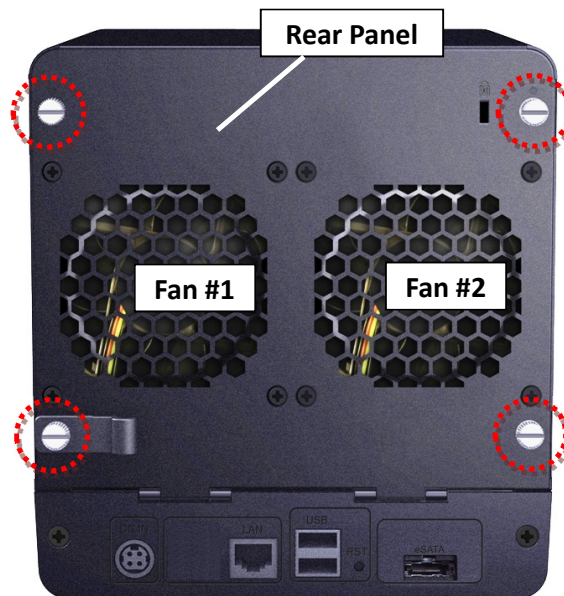


Fig. 86

3.3 The replacing task is completed.