

## ACCESSORIES & EQUIPMENT

### Fully Automatic Convertible Top - Service Information - Cooper

## DESCRIPTION & OPERATION - FULLY AUTOMATIC CONVERTIBLE TOP

R52



**Fig. 1: Identifying Fully Automatic Convertible Top - R52**  
Courtesy of BMW OF NORTH AMERICA, INC.

### Introduction

**NOTE:** For additional convertible top overview information, see OVERVIEW OF HALL SENSORS IN CONVERTIBLE TOP , OVERVIEW OF HYDRAULIC CONVERTIBLE TOP COMPONENTS , and OVERVIEW OF MECHANICAL CONVERTIBLE TOP COMPONENTS

The MINI Convertible is equipped as standard with a fully automatic, electrohydraulic convertible top.

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The convertible top is opened in just 15 seconds at the touch of a button (without first having to be unlocked).

The convertible top has an integrated folding sunroof.

The folding sunroof can be opened freely to any position, also during vehicle operation (up to a speed of 120 km/h). The maximum opening of the folding sunroof is approx. 40 centimeters.

When the convertible top is opened, the folding sunroof is opened first. The side windows are then lowered and the roof pillars are automatically retracted.

The Z-shaped fold allows the convertible top to be folded away in a small space behind the rear seats. An additional cover is not necessary as the Z-shaped fold makes the convertible top cover itself.

The convertible top includes a heated rear glass window.

The fully automatic convertible top is controlled by the convertible top module (CVM).

A new feature on the MINI Convertible is the luggage compartment loading aid: The tensioning bracket can be raised by hand slightly to make it easier to load the luggage compartment (see Vehicle Owners Manual).

#### **Modifications (from manufacturers date 09/2005)**

From this point in time onwards, the convertible top has a stowage lock. This means that the convertible top is locked when it is opened and folded away. This in turn means that the convertible top is reliably held, even in extremely unfavorable circumstances in an accident.

The convertible top is fitted with 2 additional microswitches and 2 additional drives (actuators) for the stowage lock.

#### **Brief description of components**

The components that supply input signals for the electrohydraulic convertible top are as follows:

##### **1. Hall sensors for convertible top movement**

The following 5 Hall sensors are used to identify the position of the convertible top:

- Hall sensor for folding sunroof closed.
- Hall sensor for folding sunroof open (position during vehicle operation).
- Hall sensor for catch hook.
- Hall sensor for convertible top closed.
- Hall sensor for convertible top open.

The 5 Hall sensors tell the convertible top module which position the convertible top and folding sunroof are in. See **OVERVIEW OF HALL SENSORS IN CONVERTIBLE TOP** .

## 2. **Microswitch for rear shelf and microswitch for tensioning bar**

The microswitch for the rear shelf tells the convertible top module (CVM) whether the rear shelf (parcel shelf) is in the lowermost position. This lowermost position is a required condition for the convertible top to be folded away.

The microswitch for the tensioning bar tells the convertible top module (CVM) whether the tensioning bar is locked (required condition for convertible top to be folded away). For this to happen, the loading aid (tensioning bar) must be locked.

**NOTE: From manufacturer date 09/2005 there are 2 microswitches wired in series.**

## 3. **Microswitch for stowage lock left and microswitch for stowage lock right from manufacturer date 09/2005**

The two microswitches tell the Convertible Top Module (CVM) whether the roof pillar is locked on the left and right.

Only when this process is complete is the convertible top considered to be open.

The two microswitches are connected separately to the convertible top module (each microswitch has separate input).

## 4. **Convertible top control panel**

The control panel on the cowl tells the convertible top module to "open" or "close" the convertible top.

The convertible top control panel has 2 buttons: The "Open convertible top" and the "Close convertible top" buttons.

The control LED in the "Close convertible top" button indicates that the convertible top is moving.

Additional control functions for the convertible top are described under the heading "Operation".

The following control units are involved in the operation of the electrohydraulic convertible top:

## 5. **CVM: Convertible top module**

The convertible top module (CVM) controls all electrical and hydraulic functions of the convertible top. The convertible top module is connected to the K-bus. Convertible top module is installed on rear left side panel (removal of rear seat and side trim is necessary). There are 4 relays fitted next to convertible top module.

- 2 relays for the convertible top drive.
- 2 relays for the drive for locking the catch hooks and for the folding sunroof.

From 9-2005, stowage lock relay is located under stowage lock drive.

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**Fig. 2: Locating Convertible Top Module And Relays**  
Courtesy of BMW OF NORTH AMERICA, INC.

Figure legend:

1. Convertible Top Module (CVM)
2. Relay 1 For Locking Mechanism and Folding Sunroof (Close)
3. Relay 2 For Locking Mechanism and Folding Sunroof (Open)
4. Stowage Lock Drive Left
5. Stowage Lock Relay
6. Relay 1 Convertible Top Drive (Open)
7. Relay 2 For Convertible Top Drive (Close)

Convertible top module is connected to vehicle electrical system with 2 connectors. See PIN ASSIGNMENT FOR 14-PIN (X13037) CONNECTOR and PIN ASSIGNMENT FOR 6-PIN (X13038) CONNECTOR.

### **PIN ASSIGNMENT FOR 14-PIN (X13037) CONNECTOR**

<b>Pin No.</b>	<b>Type <sup>(1)</sup></b>	<b>Description</b>
1	A	Actuation for relay for locking mechanism and folding sunroof (opening)
2	V	Power supply for convertible top module (terminal 30)

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3	M	Earth for convertible top module
4	A	Actuation for relay for locking mechanism and folding sunroof (close)
5	A	Actuation for control LED
6	E	Signal for CLOSE CONVERTIBLE TOP button
7	E	Signal from OPEN CONVERTIBLE TOP button
8	E	Up to 9-2005, signal from microswitch for tensioning bar (loading aid folded up); From 9-2005, signal from microswitch for tensioning bar (loading aid folded up) and signal from microswitch for rear shelf (rear shelf fully down) in series.
9	E	Up to 9-2005, signal from microswitch for rear shelf (rear shelf fully down); From 9-2005, signal from microswitch for stowage lock left.
10	E	From 9-2005, Signal from microswitch for stowage lock right.
11	A	Actuation for relay 1 for convertible top (open).
12	A	Actuation for relay 2 for convertible top (close).
13	.....	From 9-2005, Actuation for stowage lock relay.
14	E/A	K-bus to general module.

(1) A - Output, E - Input, E/A - Input and Output, M - Ground, V - Supply

### PIN ASSIGNMENT FOR 6-PIN (X13038) CONNECTOR

Pin No.	Type <sup>(1)</sup>	Description
1	A	Power supply for Hall Sensors
2	E	Signal from "convertible top closed" Hall sensor
3	E	Signal from "folding sunroof open" Hall sensor
4	E	Signal from Hall sensor for catch hook
5	E	Signal from "convertible top open" Hall sensor
6	E	Signal from "folding sunroof closed" Hall sensor

(1) A - Output, E - Input

## 6. GM: General Module

The General Module (GM) controls the power windows.

The general module gives the convertible top module the following information through the K-bus:

- Auto-remote opening with remote control
- Auto-remote opening or closing with the driver's door lock

In addition, the general module also controls the heated rear window (condition: the convertible top is closed).

#### **7. KOMBI: Instrument cluster**

The instrument cluster (KOMBI) provides the signals for "road speed" and "outside temperature".

Both signals are sent to the convertible top module via the general module on the K-bus.

The following actuators are controlled on the electrohydraulic convertible top:

#### **8. Convertible top drive: electric motor and hydraulic pump**

There is a hydraulic cylinder on each of the left and right-hand main pillars.

An electric motor with hydraulic pump drives the convertible top via the two cylinders.

The direction of movement of the convertible top (open or close) is controlled by 2 relays. Depending on the direction of movement, pressure is applied to either the piston side or the connecting rod side of the hydraulic cylinders (dual effect). This is done by the hydraulic pump being actuated either clockwise or anticlockwise.

#### **9. Drive for locking mechanism and folding sunroof**

The drive for the locking mechanism and the folding sunroof is an electric motor with gearbox. The electric motor performs the following functions on the convertible top:

- Open and close folding sunroof
- Lock and unlock catch hook on cowl

These drives are also actuated via 2 relays.

#### **10. Drive for stowage lock left and drive for stowage lock right >from 09/2005**

The two drives each move the catch via a Bowden cable. The catch locks the roof pillar when the convertible top is open. The convertible top module actuates the two drives via a common relay.

#### **11. Control LED in the control panel on the cowl**

**NOTE: The control LED is actuated by the convertible top module.**

**Condition:** The control LED in the control panel **flashes red** under the following conditions:

- Movement of the convertible top is interrupted due to a malfunction
- Button not pressed (released) and the convertible top has not reached a secure end position
- Ambient temperature between -10 °C and +80 °C
- Road speed greater than 4 km/h
- Signal from the "Open convertible top" button or signal for "Auto-remote opening". Rear shelf **not** completely lowered or tensioning bar **not** locked (control LED flashes with higher frequency).

**Condition:** The control LED **lights up red** while the convertible top is moving. **Manufacture date from 09/2005 .**

When the folding sunroof is open, this will be indicated by the control LED when vehicle operation is ended. The control LED will flash for 5 seconds. The following conditions must apply:

- Folding sunroof open
- Terminal R off
- Driver's door open

### System functions

**The electro-hydraulic convertible top comprises the following functions:**

- Automatically opening and closing the convertible top with the two buttons on the control panel
- Stowage lock for open convertible top. (**Manufacturer date from 09/2005**)
- Auto-remote opening and closing of the convertible top
- Emergency closure of the convertible top by hand
- Overheating protection for hydraulic pump
- Safety function
- Heated rear window (**Manufacturer date from 09/2005**) .

**For automatic opening and closing of the convertible top, the following conditions must be satisfied:**

- On-board supply voltage greater than 10 volts.
- Terminal "R" ON (signal from general module).
- Ambient temperature between -10 °C and +80 °C (signal from instrument cluster).
- Road speed over 4 km/h (signal from instrument cluster).
- Front side windows lowered slightly (signal from general module).
- Rear side windows lowered fully (signal from general module).
- Rear shelf (= parcel shelf) down, only for automatic opening (signal from microswitch for rear shelf).

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- Tensioning bar locked (signal from microswitch for tensioning bar).
- Temperature in hydraulic pump not exceeded (calculated in convertible top module).
- The engine must be running (depending on control unit encoding).

To automatically open or close the convertible top, press the appropriate button in the control panel. The red control LED in the "Close convertible top" button lights up to indicate that the convertible top is moving.

#### **Automatic opening function operates as follows:**

- Press and hold the "Open convertible top" button.
- The folding sunroof is fully opened.
- Release the "Open convertible top" button, the press and hold it again.
- The front side windows are lowered slightly.
- The rear side windows are lowered fully.
- The convertible top is released at the cowl.
- The convertible top moves to the rear and is folded away behind the rear seats.
- **The following items apply for vehicles manufactured from 09/2005**

When the "convertible top open" Hall sensor is reached, the catches are opened.

The microswitches for the stowage lock are activated.

The actuation of the stowage lock drives is ended.

The convertible top material is pressed together by the run-on of the hydraulic pump (1 second).

After 2 seconds, the side windows are raised to the stop, provided the button is pressed and held. When the button is released, the closing of the windows can only be completed using the power-window switches.

#### **Automatic closing function operates as follows:**

- Press and hold the "Close convertible top" button.
- The front side windows are lowered slightly.
- The rear side windows are lowered fully.
- The stowage lock is opened on both sides. (Manufacturer date from 09/2005).
- The convertible top is raised and moved to the front (catch hooks open).
- The actuation of the stowage lock drives is ended when the "convertible top open" Hall sensor switches. (Manufacturer date from 09/2005).
- The catch hooks move into the cowl and are then locked
- The folding sunroof is closed.
- The side windows are raised.



**Stowage lock**

**NOTE:** For the stowage lock to be actuated when the convertible top is opened, the "convertible top open" Hall sensor signal must be present.

From manufacturer date 09/2005 the following applies:

- When the convertible top is opened, the convertible top must be recognized as being folded away. The "convertible top open" Hall sensor provides the signal. See **54 34 192 REMOVING AND INSTALLING/REPLACING STOWAGE LOCK (09/2005)**.
- During closing, the stowage lock drives are actuated. If the "convertible top open" Hall sensor has not switched after 4 seconds (value encoded), the convertible top module (CVM) will deactivate the convertible top drive

**Auto-remote opening and closing of the convertible top**

- **Auto-remote opening with remote control**

Press and hold the "Open" button on the remote control: The folding sunroof is opened.

Press and hold the "Open" button on the remote control a second time:

After approx. 4 to 5 seconds, the convertible top will start to move. Keep the "Open" button pressed until the convertible top is folded away.

As there is no anti-trap circuit, auto-remote closing with the remote control is **not** possible.

- **Auto-remote opening with the key in the driver's door lock**

While the convertible top is moving, hold the key in the "close" position in the lock.

Auto-remote opening via the lock is not possible.

**Emergency closure of the convertible top by hand**

In the event of a failure of the electrohydraulic drive, the convertible top can also be closed manually (emergency closure).

Emergency closure runs as follows:

- Open the tailgate.
- Open the loading aid locking mechanism.
- Remove the first aid kit from the left-hand luggage compartment trim panel and the cover behind it.
- Use the Allen wrench (on-board tool kit) to turn the screw that is now accessible on the hydraulic pump valve block through 1.5 turns anticlockwise.

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- On vehicles manufacturer from 09/2005, release the stowage lock with a screwdriver (on-board tool kit) on one side of the vehicle. Lift the guide rail slightly and slide the first aid pouch (for example) under it. Then release the stowage lock with a screwdriver on the other side of the vehicle. The convertible top can now be lifted out.
- At the same time, lift the convertible top out at the guide rails and move it forwards to the cowl.
- Lever off the cover in the folding sunroof frame.
- Insert the Allen wrench (on-board tool kit) into the socket and press so that the coupling can be felt to move up.
- Turn the Allen wrench clockwise to lock the convertible top.
- Close the loading aid locking mechanism.

#### **Overheating protection for hydraulic pump**

The hydraulic pump is protected against overload by the convertible top module having a limited running time.

The running time is calculated as follows:

When the hydraulic pump is switched on, a counter starts counting up (1 per second). When the hydraulic pump is switched off, the counter starts counting down (1 every 20 seconds).

The counter for the overheating protection is counted down when the ignition is OFF. Condition: Counter over 100.

The system counts down until the counter reaches 100 again.

The control unit then goes into sleep mode.

If the counter exceeds a threshold value, the hydraulic pump can no longer be actuated (encoded cooling down period: approx. 20 minutes).

To prevent a total failure for 20 minutes, an advance warning is given.

For an encoded period of time, the convertible top can then only be closed (provided the convertible top is not completely folded away).

To prevent misuse, the counter reading is retained even if the battery terminals are disconnected.

#### **Safety function**

If a button in the control panel is still registered as being pressed 30 seconds after the convertible top has stopped moving: A fault will be stored in the convertible top module.

#### **Heated rear window**

The heated rear window is not a system function of the convertible top module.

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The heated rear window is actuated by a signal from the heater control panel via the general module. Condition: The convertible top is closed.

The convertible top module supplies these signals via the K-bus.

### Operation

The MINI Convertible has the following buttons for opening the convertible top:

- The "Open convertible top" button in the control panel on the cowl
- The central locking button on the center console
- The "Open" button on the remote control

The convertible top can only be opened with the central locking button and the remote control.

The way the convertible top opens may differ. See **CONVERTIBLE TOP OPENS REFERENCE CHART**.

### CONVERTIBLE TOP OPENS REFERENCE CHART

Application	Control panel button	Central locking button	Remote control button
Press once and hold	Folding sunroof opens fully	Folding sunroof and side windows open fully	Folding sunroof and side windows open fully
Press twice and hold	Side windows open fully, convertible top is opened and side windows are raised	Convertible top opens, side windows are raised	Convertible top opens, side windows remain open

### Convertible Top Notes

The following information is available for service staff:

- Do not open convertible top manually if an electrical fault develops. Emergency manual opening should only be performed in service in absolutely exceptional circumstances because of the risk of possible damage.
- Only operate convertible top when engine is running. To protect battery, operate top whenever possible with engine running.
- If battery has been disconnected, power windows, which are actuated by general module, must be initialized.
- Opening convertible top with remote control takes longer. If OPEN button on remote control is pressed once and held, folding sunroof will open. To open convertible top, button must be pressed a second time and held for approximately 4 to 5 seconds. This time is needed to ensure radio contact is reliably established.
- Hydraulic fluid is lifetime fluid.
- Hydraulic system bleeds itself. Bleeding is not necessary.
- Convertible top as a whole does not need adjustment. Convertible top has fixed screw fastening points.

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- At least 3 people are needed for removing and installing convertible top.
- Convertible top is delivered in transport mode.
- Hydraulic pump restarts when "open convertible top" button is pressed.