

# INSTRUCTION SHEET

**Buell**  
AMERICAN MOTORCYCLES

-J01535

Kit Numbers 82000-99Y, 82001-99Y and 82002-99Y

REV. 1-24-01

## RACE KITS

### GENERAL

#### CAUTION

These Race Kits are intended for high-performance racing (OFF ROAD USE) applications only. Use of these kits will reduce or void the Limited Warranty coverage. Motorcycles modified with some performance engine parts must not be used on public roads and in some cases may be restricted to closed-course competition. Not legal for sale or use in California on any pollution-controlled motor vehicles. Alterations of emission related components constitutes tampering under USEPA guidelines and can lead to substantial fines and penalties.

Engine related performance parts are intended for the Experienced Rider only.

These Race Kits fit the Buell 1999 Lightning® X1, Cyclone® M2 and Thunderbolt™ S3 motorcycles. This Instruction Sheet covers all three kits and is divided into sections covering the various parts.

1. Electronic Control Modules (ECM) and Ignition Module.
2. Race Header
3. Race Muffler
4. Race Air Cleaner

### ECM and IGNITION CONTROL MODULES

#### Lightning X1 and Thunderbolt S3

ECM Race Kit - Part No. 91437-99Y

#### Cyclone M2

Ignition Module Race Kit - 32680-96Y

### ECM Race Kit

#### Description

The ECM race kits for both the X1 and S3 are identical, their location on the vehicle differs.

#### CAUTION

This ECM Race module will allow the engine to rev up to 6800 rpm. It is extremely important that the rider use the tachometer and avoid harmful over-revving (an adjustable rev-limiter is available). Engine-related performance parts are intended for the experienced rider only.

### Installation

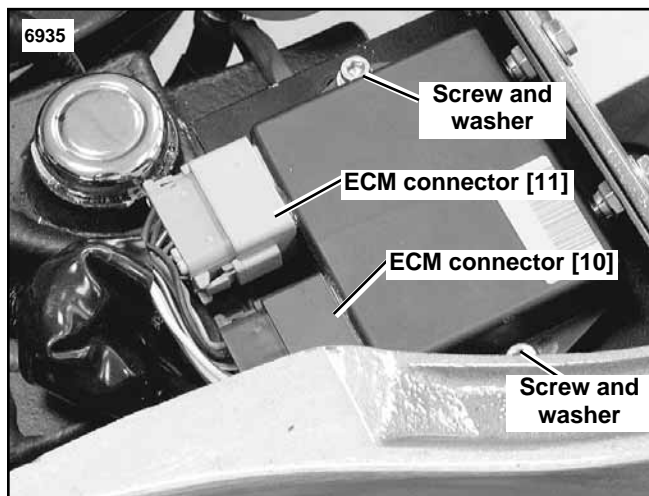


Figure 1. X1 ECM Location

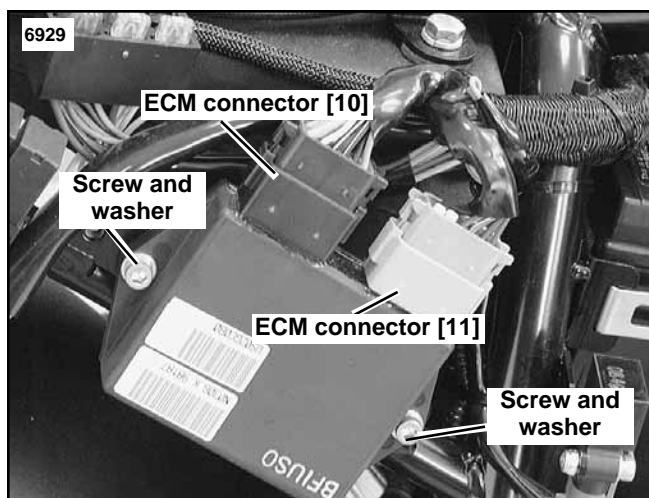


Figure 2. S3 ECM Location

#### CAUTION

The Race ECM is to be used only with Buell intake and exhaust components. Other aftermarket components may not be able to withstand the higher rpms and could be damaged. Buell Motorcycle Company is not liable for any damage caused by the use of intake or exhaust components not specified in this Instruction Sheet and not sold by an authorized Buell Dealer.

**⚠ WARNING**

To protect against shock and accidental start-up of vehicle, disconnect the battery cables, negative cable first, before proceeding. Inadequate safety precautions could result in death or serious injury.

**⚠ WARNING**

Always disconnect the negative battery cable first. If the positive battery cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious personal injury.

1. Disconnect battery cables, negative cable first.

**NOTE**

*A Service Manual for your motorcycle is available from your Buell Dealer.*

2. See the Owner's Manual and remove the seat and, on the S3, the tail section.
3. See Figure 1 or 2. Remove two screws and washers to detach ECM from bracket.
4. Unplug ECM connectors [10] and [11] and remove ECM.
5. Attach new, Race ECM connectors [10] and [11].
6. Align ECM with bracket mounting holes. Install using two screws and washers.

**⚠ WARNING**

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious injury.

7. Connect battery cables to battery, positive cable first.

**NOTE**

*The throttle position sensor must be re-zeroed. If the sensor is not calibrated, the vehicle may start and may run, but it will not perform to its specified performance*

8. Zero throttle position sensor using SCANALYZER (Part No. HD-41325). See Calibration Procedures in the Service Manual.

**⚠ WARNING**

After installing seat, pull upward on front of seat to be sure it is locked in position. If seat is loose, it could shift during vehicle operation and startle the rider, resulting in loss of control of vehicle and death or serious injury.

9. See Owner's Manual and install the seat and tail section on the S3 motorcycle.

## Ignition Module Race Kit

This ignition module is designed for replacement of the original equipment ignition module on specific Buell motorcycle models with dual fire electronic ignition. This module may be installed on the following 1996 and later motorcycle model bike series:

**BIKE SERIES**

S-1	S-1 "White Lightning"
S-2	S-2T
S-3 97-98	S-3T 97-98
M-2	

**CAUTION**

This Ignition Module Race Kit will allow the engine to rev up to 6800 rpm. It is extremely important that the rider avoid harmful over-revving. Engine-related performance parts are intended for the experienced rider only. An adjustable rev limiter may be installed for added assurance. See your Buell Dealer for product recommendation.

**CAUTION**

The Race Ignition Module is to be used only with Buell intake and exhaust components. Other aftermarket components may not be able to withstand the higher rpms and could be damaged. Buell Motorcycle Company is not liable for any damage caused by the use of intake or exhaust components not specified in this Instruction Sheet and not sold by an authorized Buell Dealer.

## Installation

**⚠ WARNING**

To protect against shock and accidental start-up of vehicle, disconnect the battery cables, negative cable first, before proceeding. Inadequate safety precautions could result in death or serious injury.

**⚠ WARNING**

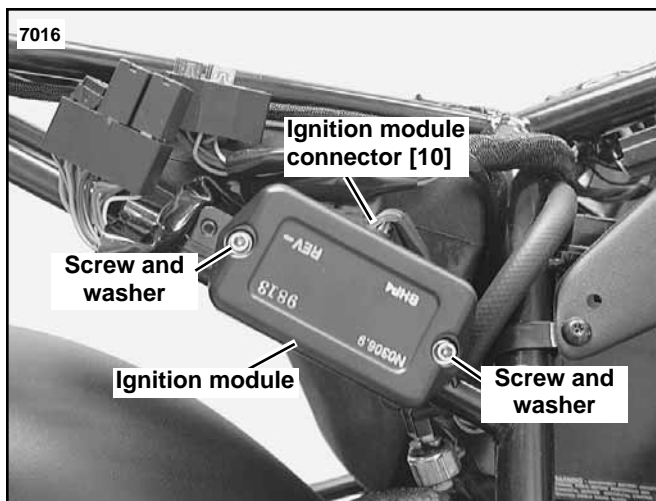
Always disconnect the negative battery cable first. If the positive battery cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious personal injury.

1. Disconnect battery cables, negative cable first.

**NOTE**

*A Service Manual for your motorcycle is available from your Buell Dealer.*

2. Refer to the Service Manual and remove seat and tail section.
3. Cut cable strap which secures main wire harness to side frame member.
4. See Figure 3. Disconnect ignition module connector [10] from main wiring harness.
5. Remove two screws and washers to detach ignition module from frame.



**Figure 3. Ignition module**

6. Fasten Racing Ignition module to frame using two screws and washers.
7. Attach ignition module connector to main wiring harness.
8. Secure main wiring harness to frame member with a new cable strap.

#### **⚠ WARNING**

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious injury.

9. Install battery cables, positive cable first.

#### **⚠ WARNING**

After installing seat, pull upward on front of seat to be sure it is locked in position. If seat is loose, it could shift during vehicle operation and startle the rider, resulting in loss of control of vehicle and death or serious injury.

10. Install tail section and seat. Refer to the Service Manual.
11. Test engine for proper ignition system operation.

## **MUFFLER AND HEADERS**

### **Description**

#### **CAUTION**

These Muffler and Header Kits are intended for high-performance racing (OFF ROAD USE) applications only. Use of these kits may reduce or void the Limited Warranty coverage. Motorcycles modified with some performance engine parts must not be used on public roads and in some cases may be restricted to closed-course competition. Not legal for sale or use in California on any pollution-controlled motor vehicles. Alterations of emission related components constitutes tampering under USEPA guidelines and can lead to substantial fines and penalties.

Engine related performance parts are intended for the Experienced Rider only.

-J01535

#### **NOTE**

The muffler kit, Part No. 91424-99Y is designed to fit the X1, S3, and M2 vehicles. The header kit Part No. 65400-99Y is designed for the X1 and S3 vehicles and the header kit, Part No. 91423-99Y is designed for M2 vehicles.

#### **NOTE**

The muffler and header kits are considered separate kits. However, both kits should be installed at the same time.

### **Muffler Race Kit - Part No. 91424-99Y**

#### **Lightning X1, Cyclone M2 and Thunderbolt S3**

QTY	PART NO.	DESCRIPTION
2	DA0500.10CZ	Flexlock, 5/16-18
2	AA0508.1CZ	Bolt, 5/16-18 X 1 in.
2	S 0123.2C	Muffler Mount
1	S1120.G	Clamp (200-71)
1	Not sold separately	Muffler, Race

### **Header Race Kit - Part No. 65400-99Y**

#### **Lightning X1 and Thunderbolt S3**

QTY	PART NO.	DESCRIPTION
1	Not sold separately	Header X1 Racing
1	S1120.G	Clamp (200-71)
1	S1121.G	Header Support
1	Y0305.8B	Wire Tie

### **Header Race Kit - Part No. 91423-99Y**

#### **Cyclone M2**

QTY	PART NO.	DESCRIPTION
1	Not sold separately	Header M2 Racing
1	S1120.G	Clamp (200-71)
1	S1121.G	Header Support

## **Stock Muffler Removal**

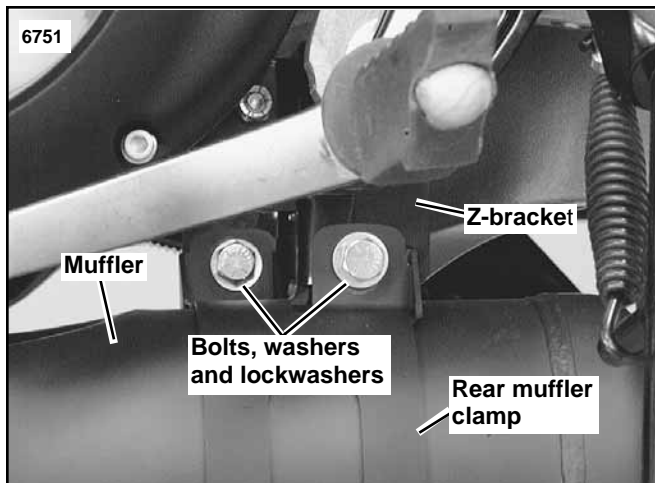
#### **⚠ WARNING**

To protect against shock and accidental start-up of vehicle, disconnect the battery cables, negative cable first, before proceeding. Inadequate safety precautions could result in death or serious injury.

#### **⚠ WARNING**

Always disconnect the negative battery cable first. If the positive battery cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious personal injury.

1. Disconnect battery cables, negative cable first.
2. On the X1 vehicles, remove chin fairing. See applicable Service Manual
3. On S3 Models with fairing lowers, remove right side fairing lower. Refer to applicable Service Manual.
4. On M2 Models, remove heat shield. Refer to applicable Service Manual.
5. See Figure 8. Loosen nut securing muffler clamp (9).



**Figure 4. Rear Muffler Mounts**

6. See Figure 4. Remove bolts, lockwashers and washers securing muffler to Z-bracket. Discard bolts.
7. See Figure 8. Loosen the four exhaust header nuts (20) using SNAP-ON SWIVEL SOCKET (Part No. PFSX916). Do not remove nuts.
8. Remove bolt (5) and locknut (6) with washers (7) from front muffler support (8).
9. Remove muffler (3) and muffler clamp (26). Discard clamp.
10. Remove locknuts (11), washers (12 and 13) and bolts (10). Remove the complete Z-bracket (4).

### Stock Exhaust Header Removal

1. For X1 and S3 Models only:
  - a. Remove any restrictive cable straps on oxygen sensor wiring and detach connector [137] from main wiring harness.
  - b. Remove oxygen sensor from exhaust header.
2. See Figure 8. Remove the four exhaust header nuts (20) using SNAP-ON SWIVEL SOCKET (Part No. PFSX916).
3. See Figure 5. Remove exhaust header by swiveling and lifting exhaust header. Slide exhaust header from under frame.
4. See Figure 8. Remove exhaust header clamp (22) and exhaust clamp retaining ring (23) from exhaust header. Retain for use with the new system.
5. Check exhaust port gasket (24) for wear. If necessary, replace gasket.

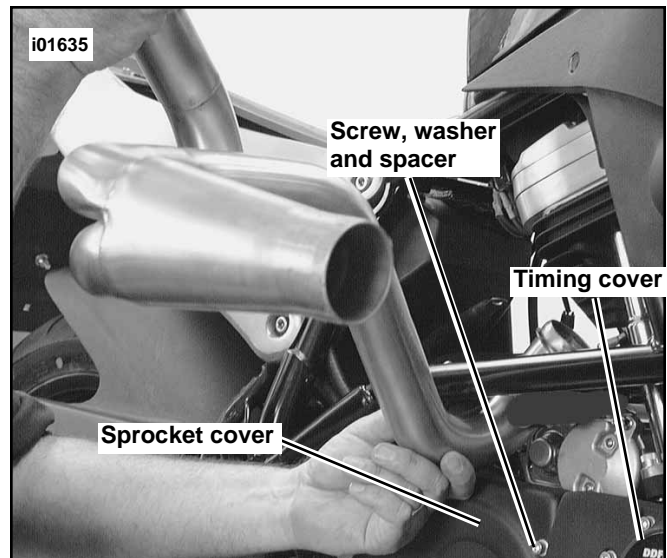
### Race Exhaust Header Installation

1. See Figure 8. Ensure that gasket (24) is in position and undamaged. Slide exhaust header clamps and clamp retaining rings over ends of race exhaust header.

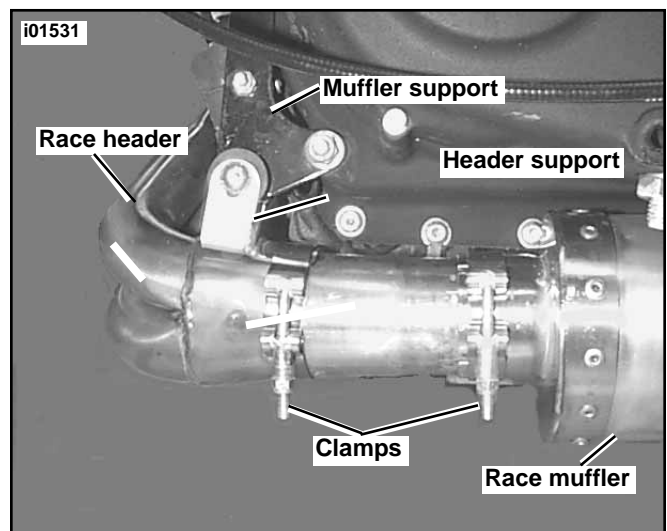
#### NOTE

See Figure 5. For ease of installation, remove screw, washer and spacer from sprocket cover. Be sure to replace after header is installed.

2. See Figure 5. Cover timing cover with a cloth and slide



**Figure 5. Exhaust Header Positioning**



**Figure 6. Race Exhaust System**

- exhaust header under frame by positioning as shown. Position rear end of exhaust header in rear exhaust port. Do not install exhaust header clamp over port.
3. Rotate exhaust header so that front end of exhaust header is in position at front port to cylinder head.
4. See Figure 8. Loosely fasten exhaust header to cylinder heads with nuts (20). Use SNAP-ON SWIVEL SOCKET (Part No. PFSX916).
5. See Figure 8. Install header support to muffler support with bolts, washers and locknuts. Loosely tighten.
6. For X1 and S3 Models only: using a non-silicone sealant, install oxygen sensor on header, threading oxygen sensor wire under frame. Tighten to 44 ft-lbs (59.7 Nm). Attach oxygen sensor connector [137]. Secure wiring and sensor with new cable straps.
7. Install front clamp over header and header support. Loosely tighten.

## Race Muffler Installation

1. Coat inside of muffler inlet with PERMATEX ULTRA-COPPER HIGH TEMP RTV SILICON GASKET material.
2. Place rear clamp onto header. Slide muffler inlet onto header and loosely tighten clamp.

### WARNING

Before tightening muffler hardware, position muffler to provide adequate clearance from shock absorber, side stand spring post and rear tire to prevent contact. Failure to provide adequate clearance may cause loss of control during motorcycle operation which could result in death or serious injury.

3. See Figure 7. Position muffler and install rear mounting support in rear muffler straps lockwashers, washers and the bolts from the kit Tighten to 17-19 ft-lbs (23-25.8 Nm).
4. Tighten header support to 17-19 ft-lbs (23-25.8 Nm).
5. See Figure 6. Tighten front and rear clamp to 20-25 ft. lbs. (33.9-40.7 Nm).
6. Tighten exhaust header nuts (20) to 6-8 ft. lbs. (8.1-10.8 Nm) using SNAP-ON SWIVEL SOCKET.

### WARNING

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious injury.

7. Connect battery cables to battery, positive cable first.
8. On X1 Models, reinstall chin fairing. Refer to applicable Service Manual.
9. On S3 Models with fairing lowers, reinstall lowers. Refer to applicable Service Manual.
10. On M2 Models, reinstall heat shield. Refer to applicable Service Manual.

## AIR CLEANER KITS

### Description

### WARNING

These Air Cleaner Race Kits are intended for high-performance racing (OFF ROAD USE) applications only. Use of these kits may reduce or void the Limited Warranty coverage. Motorcycles modified with some performance engine parts must not be used on public roads and in some cases may be restricted to closed-course competition. Not legal for sale or use in California on any pollution-controlled motor vehicles. Alterations of emission related components constitutes tampering under USEPA guidelines and can lead to substantial fines and penalties.

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### Lightning X1

Race Air Cleaner Kit - Part No. 91420-99Y

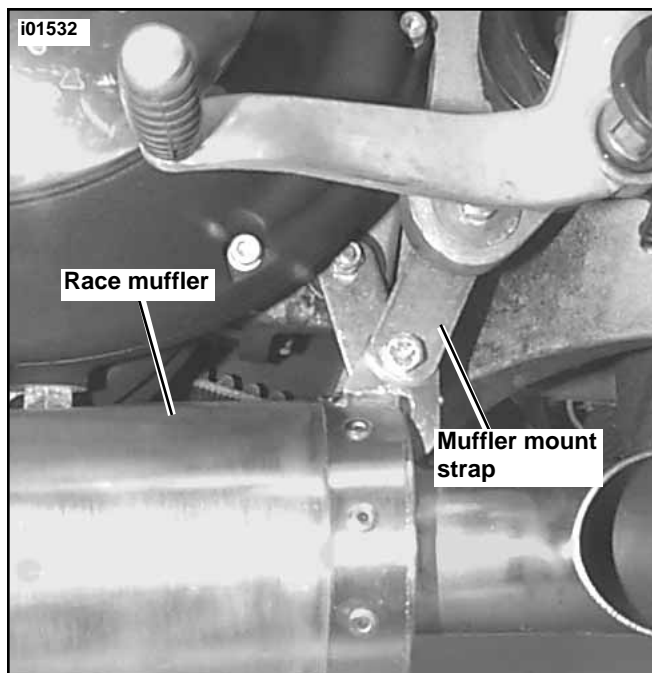


Figure 7. Race Muffler

This kit contains:

QTY	PART NO.	DESCRIPTION
1	29179-88	Venturi Ring
1	P1213.K	Air Filter, Racing
1	C0125.K	Clamp
1	J01749	Racing Tip Sheet

### Cyclone M2

Race Air Cleaner Kit - 91421-99Y

This Kit contains:

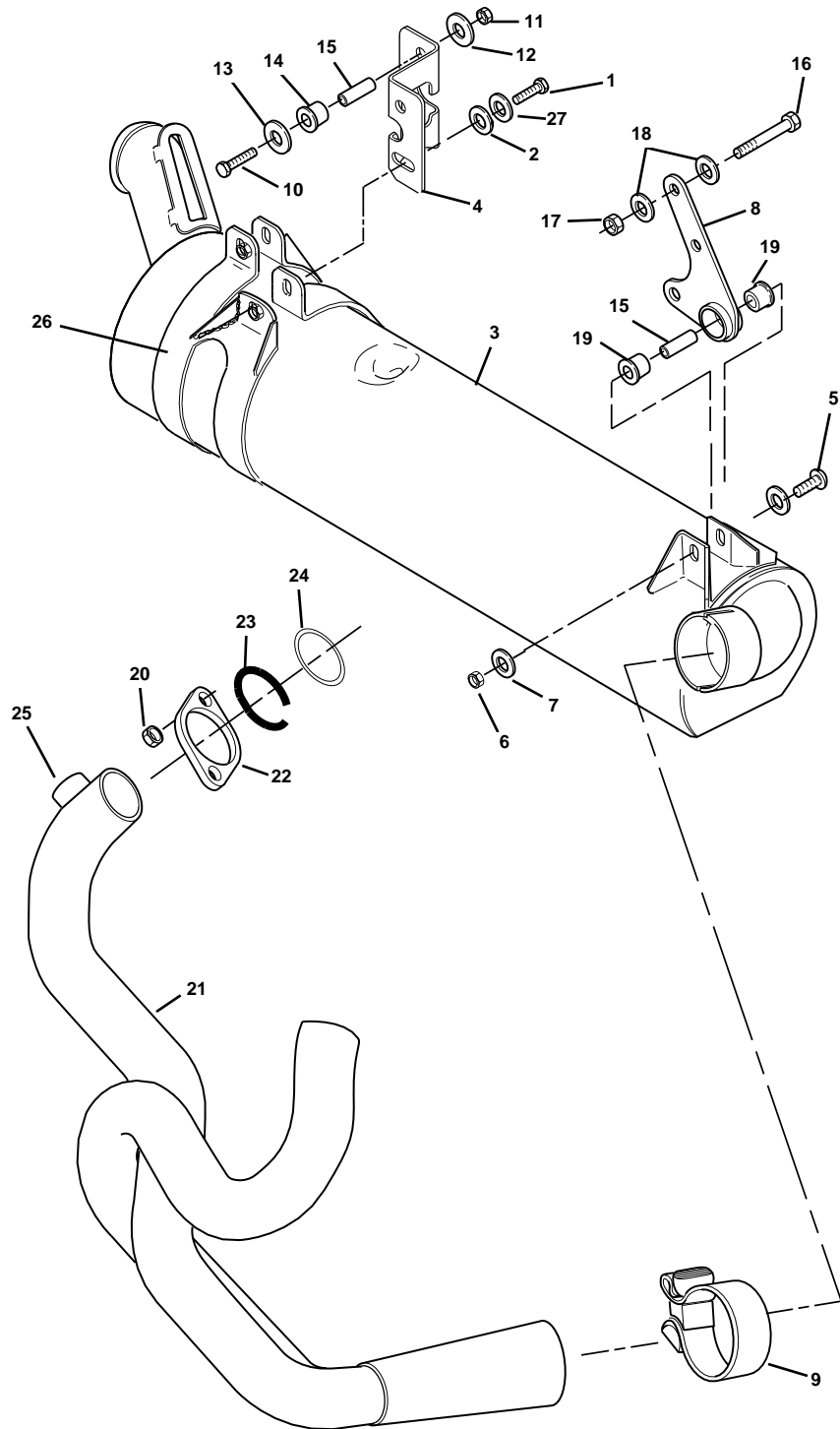
QTY	PART NO.	DESCRIPTION
3	AA0412.2CZ	Socket Head Cap Screw
2	2405A	Phillips Head Cap Screw
2	DA0400.4CZ	Jam Nut
1	63500-68	Hose, Fuel Proof, 3/8" ID
2	P0235.9B	Fitting, Breather
1	29179-88	Venturi Ring
2	29059-88A	Gasket, Air Cleaner
1	P1213.G	Air Filter, Racing
1	P1215.G	Cover, Racing Air Cleaner
1	P1216.L	Backing Plate Assembly, Race
1	P1217.G	Spacer, Carburetor, Racing
1	J01750	Racing Tip Sheet

### Thunderbolt S3

Race Air Cleaner Kit - 91422-99Y

This Kit contains:

QTY	PART NO.	DESCRIPTION
2	2405A	Phillips Head Cap Screw
2	DA0400.4CZ	Jam Nut
1	63500-68	Hose, Fuel Proof, 3/8"
2	P0235.9A	Fitting, Breather
1	29179-88	Venturi Ring
2	29059-88A	Gasket, Air Cleaner
1	P1213.G	Air Filter, Racing
1	P1215.G	Cover, Racing Air Cleaner
1	P1216.M	Backing Plate Assembly, Race
1	P1217.G	Spacer, Race Carburetor
1	Y0305.8B	Zip Tie
1	J01749	Racing Tip Sheet



- |                   |                        |  |
|-------------------|------------------------|--|
| 1. Bolt           | 11. Locknut            | 21. Exhaust header                                 |
| 2. Washer         | 12. Washer             | 22. Exhaust header clamp                           |
| 3. Muffer         | 13. Washer             | 23. Exhaust clamp retaining ring                   |
| 4. Z-bracket      | 14. Rear muffer mount  | 24. Exhaust port gasket                            |
| 5. Bolt           | 15. Mount spacer       | 25. Oxygen sensor mount (On X1 and S3 models only) |
| 6. Locknut        | 16. Bolt               | 26. Muffer clamp                                   |
| 7. Washer         | 17. Locknut            | 27. Lockwasher                                     |
| 8. Muffer support | 18. Washer             |  |
| 9. Muffer clamp   | 19. Front muffer mount |  |
| 10. Bolt          | 20. Exhaust header nut |  |

Figure 8. Stock Exhaust System

#### NOTE

The Race Air Cleaner Kits for the S3 and M2 motorcycles are basically the same and are installed in the same way. The Race air Cleaner for the X1 Motorcycle is different and is installed differently.

### X1 Model Stock Air Cleaner Removal

#### WARNING

To protect against shock and accidental start-up of vehicle, disconnect the battery cables, negative cable first, before proceeding. Inadequate safety precautions could result in death or serious injury.

#### WARNING

Always disconnect the negative battery cable first. If the positive battery cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious personal injury.

1. Disconnect battery cables, negative cable first.
2. See Figure 9. Remove two screws (2) and washers (3) from front and one bolt (4) and washer (5) from back of air cleaner cover (1).
3. Remove air cleaner cover (1) and air filter (6).

4. Remove IAT sensor (8) from top of snorkel (10).
5. Remove hose (11) from snorkel (10).
6. Remove three screws (12) from snorkel plate (13). Remove snorkel plate (13), snorkel (10) and gasket (14) from back plate (20).

### X1 Model Race Air Cleaner Installation

1. See Figure 10. Install the Venturi ring. Carefully place Venturi on snorkel grommet (Item 19, Figure 9) and install bolts (Item 12, Figure 9) removed earlier using LOCTITE THREADLOCKER 243 (blue). Torque bolts to 7-9 ft-lbs (9.5-12.2 Nm).
2. See Figure 9. Remove snorkel breather hose (11), tee (16) and rear breather hose (17).
3. See Figure 10. Install snorkel breather hose (11), removed in Step 2, on rear breather bolt. Position as shown.
4. Install IAT sensor into clip.
5. Install clip onto backing plate.
  - a. Clean top of backing plate by wiping with a dry cloth and cleaning with alcohol.
  - b. Remove paper backing from clip and stick clip, with sensor, to top of backing plate as shown in Figure 10.

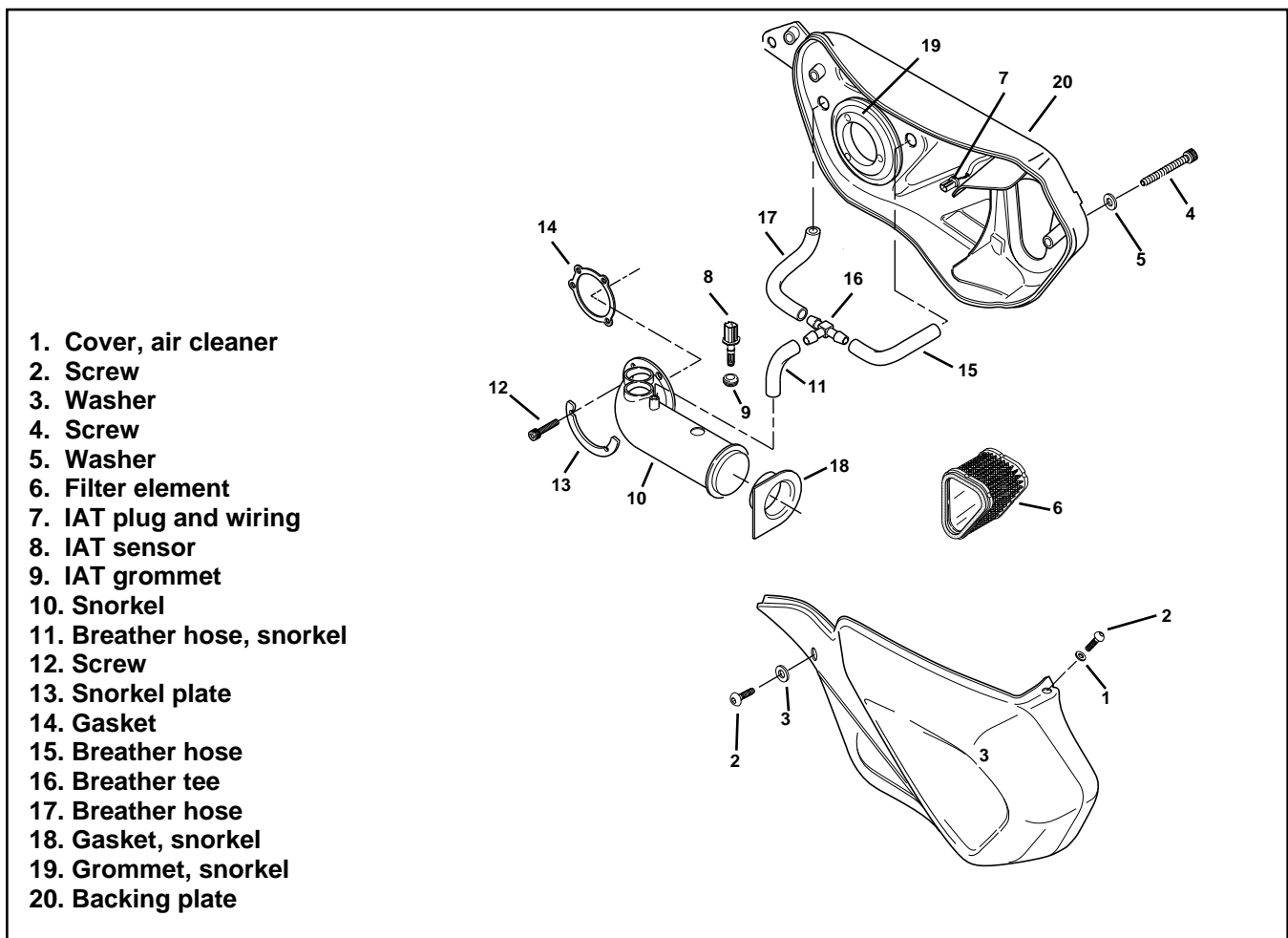


Figure 9. X1 Stock Air Cleaner

6. Place new racing filter element into position in housing.
7. See Figure 9. Reinstall air cleaner cover.
  - a. Position air cleaner cover (1) over air cleaner backing plate (20), making sure air filter element is correctly positioned.
  - b. Install long bolt (4) and washer (5) first.
  - c. Align air cleaner cover (1) and secure with two screws (2) and washers (3) using LOCTITE THREADLOCKER 243 (blue). Torque to 27-29 in-lbs (3.1-3.3 Nm).

**⚠ WARNING**

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious injury.

8. Connect battery cables to battery, positive cable first.

## M2 or S3 Model Stock Air Cleaner Removal

**⚠ WARNING**

To protect against shock and accidental start-up of vehicle, disconnect the battery cables, negative cable first, before proceeding. Inadequate safety precautions could result in death or serious injury.

**⚠ WARNING**

Always disconnect the negative battery cable first. If the positive battery cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious injury.

1. Disconnect battery cables, negative cable first.
2. On S3 models equipped with touring package, remove nut and washer holding right fairing lower to bracket on swingarm/drive support.
3. To separate air cleaner cover from right fairing lower on S3 models equipped with touring package, remove two mounting bolts and washers.
4. See Figure 11. Remove both front screws and nylon washers.
5. Remove both rear and rear screws and nylon washers. Remove cover and air filter.
6. See Figure 12. Remove two bolts and washers from filter box. Slide filter box forward away from snorkel.
7. On the Model S3 vehicles, detach the IAT Sensor before removing the snorkel.
  - a. See Figure 13. Press the catch on the intake air temperature (IAT) sensor.
  - b. While holding catch, remove sensor from the snorkel by pulling upward.

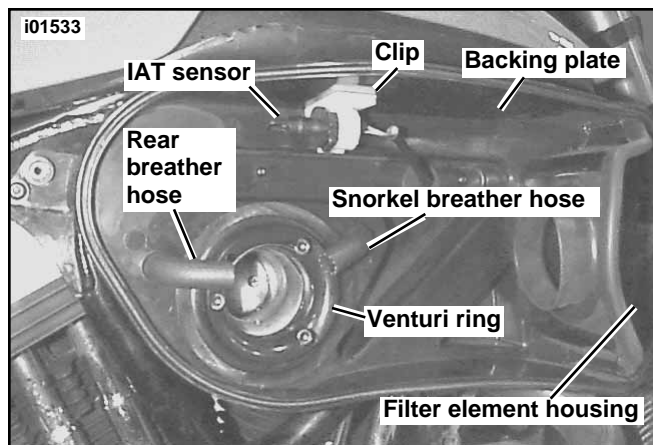


Figure 10. X1 Race Air Cleaner Installation

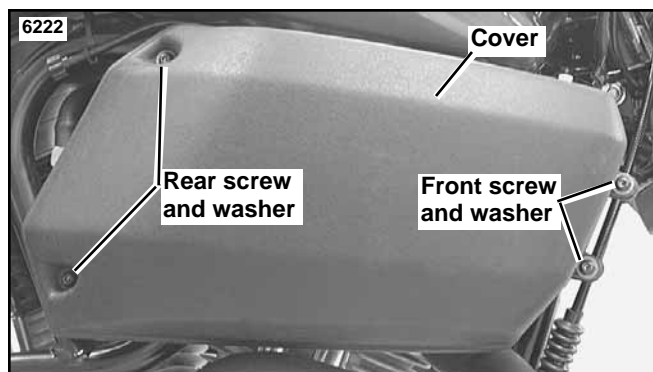


Figure 11. M2 or S3 Stock Air Cleaner Cover

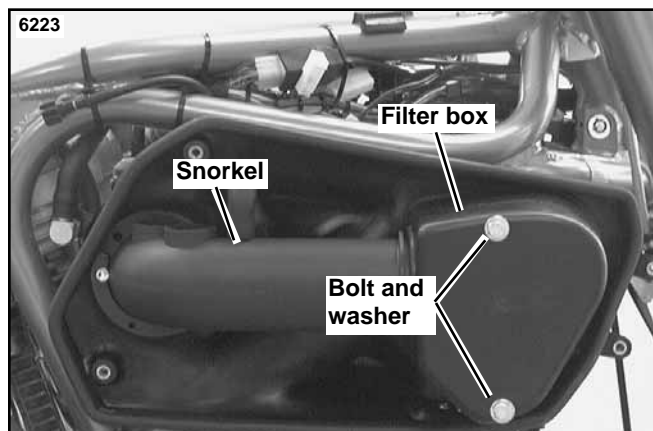


Figure 12. M2 or S3 Stock Filter Box

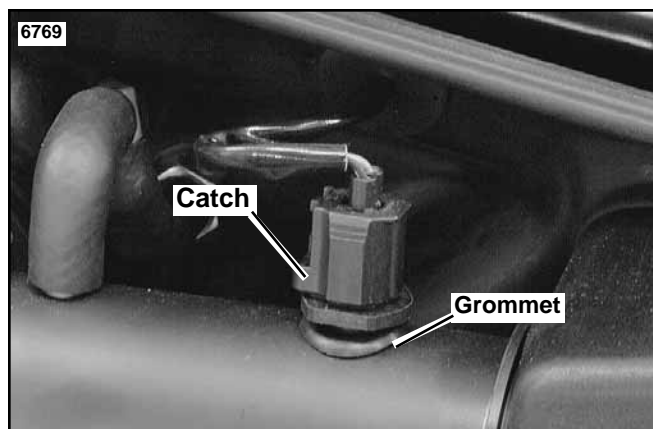


Figure 13. Model S3 Stock IAT Sensor



8. See Figure 14. Remove two screws and snorkel plate. Remove snorkel.
9. See Figure 15. Disconnect hoses.
  - a. Detach breather tee from rear breather hose.
  - b. Detach front breather hose from front breather bolt.
10. On the S3 model vehicles and before the backplate is removed, unseat the IAT sensor wiring grommet from the backplate. Gently pull the IAT sensor wiring through the backplate.
11. Detach backplate.
  - a. See Figure 16. Remove nuts and bolts from front mount.
  - b. See Figure 17. Remove spacer screw, spacer and gasket.
  - c. Remove front breather bolt.
  - d. Pull backplate away from motorcycle and rear breather hose. On California models, slide fresh air inlet hose from carbon canister through backplate.

## M2 or S3 Race Air Cleaner Installation

1. See Figure 18. Install new 90° front breather bolt. Tighten jam nut.
2. Remove rear breather bolt.
3. Install new rear 90° breather bolt until it no longer clears the bracket. Tighten jam nuts.
4. Cut the new hose to lengths of 1-1/2 in. (38.1 mm), 2 in. (50.8 mm) and 3 in. (76.2 mm).
5. Attach the 1-1/2 in. (38.1 mm) hose to the front breather bolt.
6. Attach tee to front breather hose.
7. Attach the 2 in. (50.8 mm) hose to the tee and to the rear breather bolt.
8. Attach the 3 in. (76.2 mm) hose to tee.
9. For S3 Models, see Figure 13. Carefully remove IAT grommet from snorkel.
10. For S3 Models, see Figure 19. Install IAT sensor grommet into backplate.
11. For M2 or S3 Models, remove paper backing from one of the gaskets and carefully place it on the back of the backplate. Ensure that the bolt holes on the gasket and backplate are correctly aligned.
12. For S3 Models, cut wire tie holding IAT sensor to frame and insert IAT sensor into grommet.
13. See Figure 19 or 20. Carefully install main breather hose into backplate.

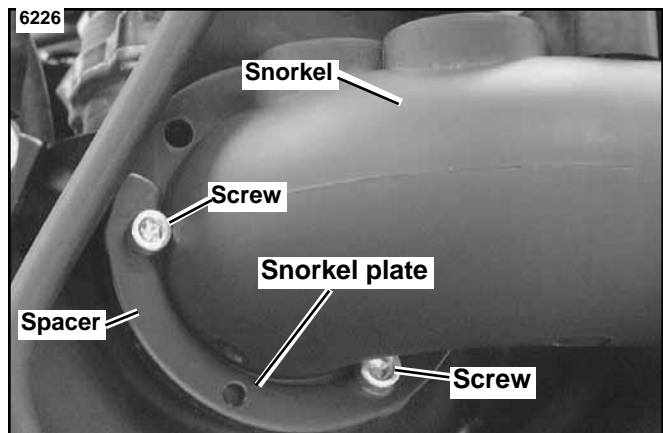


Figure 14. M2 or S3 Stock Snorkel Plate

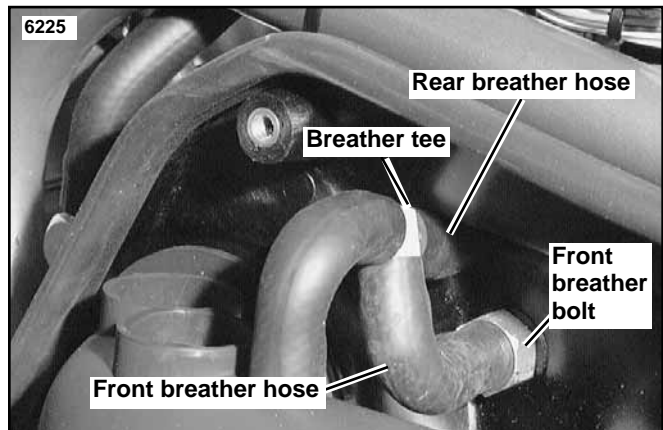


Figure 15. M2 or S3 Stock Breather Hoses

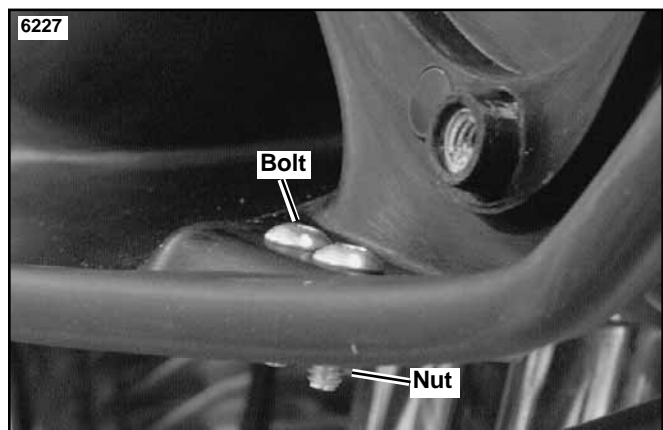


Figure 16. M2 or S3 Stock Air Cleaner Front Mount

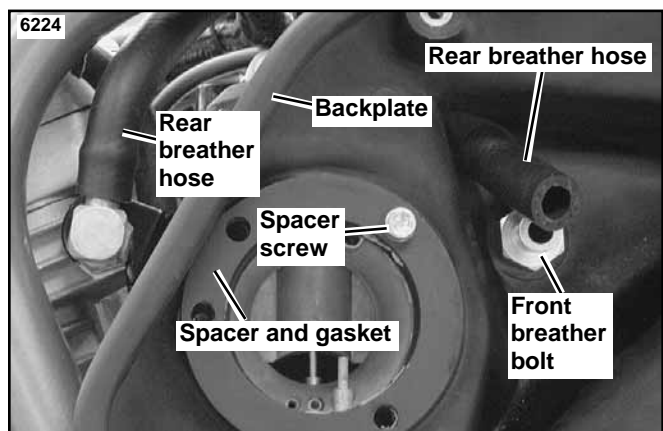


Figure 17. M2 or S3 Stock Air Cleaner Spacer

14. Remove paper backing from one of the gaskets and carefully place it on back of spacer. Ensure that the gasket and spacer bolt holes are correctly aligned.
15. Install backplate.
  - a. Place spacer behind backplate and line up bolt holes. Gasket on spacer is to be facing throttle body.
  - b. Install Venturi ring into backplate hole.
  - c. Using LOCTITE THREADLOCKER 243 (blue), install mounting bolts through Venturi ring, spacer and backplate holes. (For S3 models use bolts removed earlier. For M2 models use new bolts). Tighten to 7-9 ft lbs (9.5-12.2 Nm).

#### CAUTION

Ensure that IAT sensor wire does not contact engine. If it does, the wire insulation will be damaged which could lead to damage of the sensor wire and failure of the IAT sensor.

16. For S3 Models, attach IAT sensor wire to frame with a wire tie. Ensure that wire is secured away from the engine.
17. See Figure 21. Install air filter element and air cleaner cover using bolts. Tighten until snug.

#### WARNING

Always connect the positive battery cable first. If the positive cable should contact ground with the negative cable installed, the resulting sparks may cause a battery explosion which could result in death or serious injury.

18. Connect battery cables to battery, positive cable first.

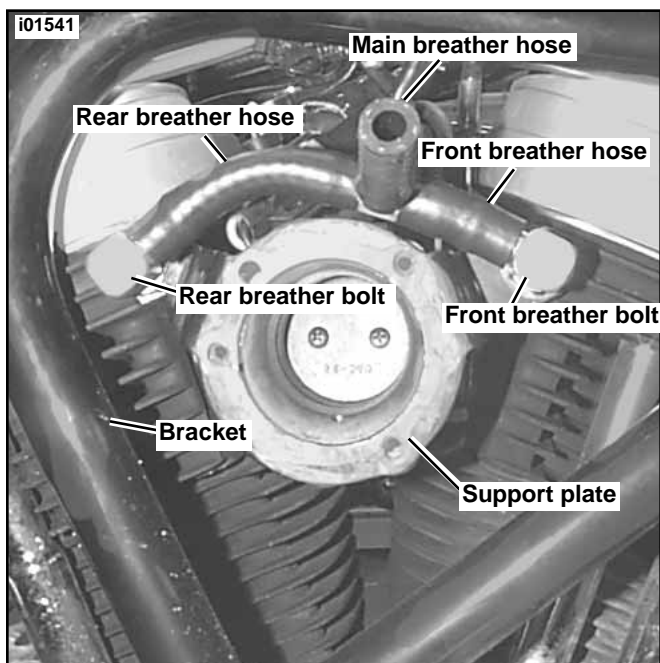


Figure 18. M2 or S3 Race Breather Hose Setup

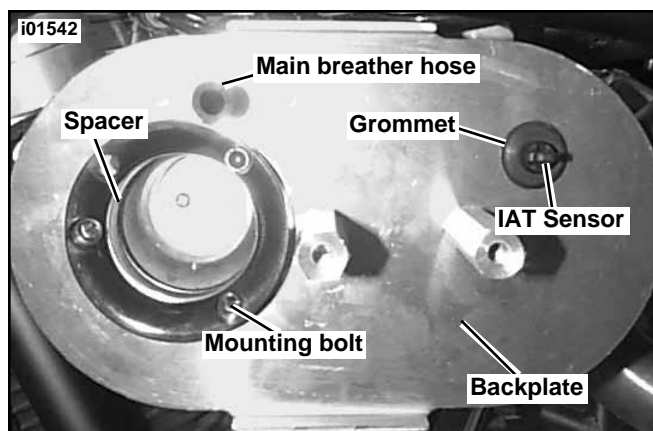


Figure 19. Model S3 Race Air Cleaner Backplate

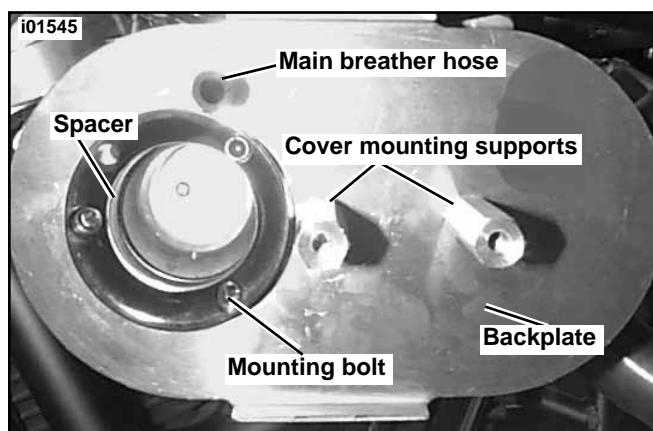


Figure 20. Model M2 Race Air Cleaner Backplate

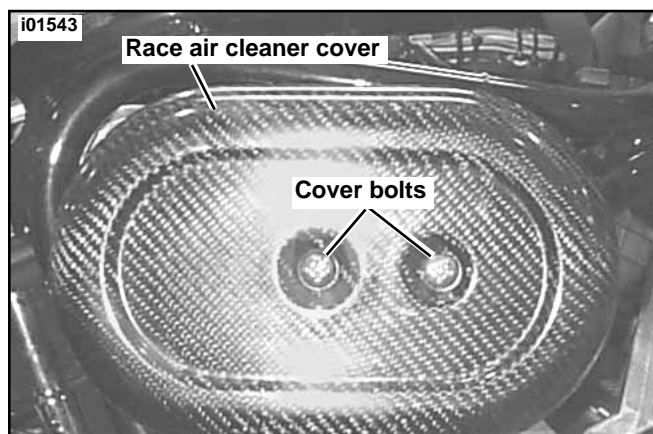


Figure 21. M2 or S3 Race Air Cleaner Cover