

INSTRUCTION SHEET

Buell
AMERICAN MOTORCYCLES

-J02049

Kit Numbers 91421-99Y, 91420-99Y and 91422-99Y

REV. 10-26-00

AIR CLEANER RACE KITS

General

CAUTION

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. These kits are 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.

Description

The Air Cleaner Race Kits fit the Buell 1999 and later Lightning® X1, Cyclone® M2 and Thunderbolt™ S3 Motorcycles.

Lightning X1

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

This kit contains:

| Qty. | Part No. | Description |
|------|-----------|--------------------|
| 1 | 29179-88 | Venturi Ring |
| 1 | 29479-99Y | Air Filter, Racing |
| 1 | 56490-99Y | Clamp |

Cyclone M2

Race Air Cleaner Kit – 91421-99Y

This kit contains:

| Qty. | Part No. | Description |
|------|------------|------------------------------|
| 3 | 6321Y | Socket Head Cap Screw |
| 2 | 2405A | Phillips Head Cap Screw |
| 2 | 7573Y | Jam Nut |
| 1 | 45326-97Y | Hose, Fuel Proof, 3/8" ID |
| 2 | 29390-96YA | Fitting, Breather |
| 1 | 29179-88 | Venturi Ring |
| 2 | 29059-88A | Gasket, Air Cleaner |
| 1 | 29479-96Y | Air Filter, Racing |
| 1 | 29478-96Y | Cover, Racing Air Cleaner |
| 1 | 29610-99Y | Backing Plate Assembly, Race |
| 1 | 29480-96Y | Spacer, Carburetor, Racing |

Thunderbolt S3

Race Air Cleaner Kit – 91422-99Y

This kit contains:

| Qty. | Part No. | Description |
|------|-----------|------------------------------|
| 2 | 2405A | Phillips Head Cap Screw |
| 2 | 7573Y | Jam Nut |
| 1 | 45326-97Y | Hose, Fuel Proof, 3/8" |
| 2 | 29390-96Y | Fitting, Breather |
| 1 | 29179-88 | Venturi Ring |
| 2 | 29059-88A | Gasket, Air Cleaner |
| 1 | 29479-96Y | Air Filter, Racing |
| 1 | 29478-96Y | Cover, Racing Air Cleaner |
| 1 | 29462-99Y | Backing Plate Assembly, Race |
| 1 | 29480-96Y | Spacer, Carburetor, Racing |
| 1 | 69563-97Y | Zip Tie |

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 negative battery cable 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. See Figure 1. Remove two bolts (2) and washers (3) from front and one screw (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 bolts (12) from snorkel plate (13). Remove snorkel plate (13), snorkel (10) and gasket (14) from backplate (20).

X1 Model Race Air Cleaner Installation

1. See Figure 2. Install the Venturi ring. Carefully place Venturi on snorkel grommet (Item 19, Figure 1) and install bolts (Item 12, Figure 1) removed earlier using LOCTITE THREADLOCKER 243 (blue). Torque screws to 7-9 ft-lbs (9.5-12.2 Nm).
2. See Figure 1. Remove snorkel breather hose (11), tee (16) and rear breather hose (17).
3. See Figure 2. Install snorkel breather hose, 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 2.
6. Place new racing filter element into position in housing.

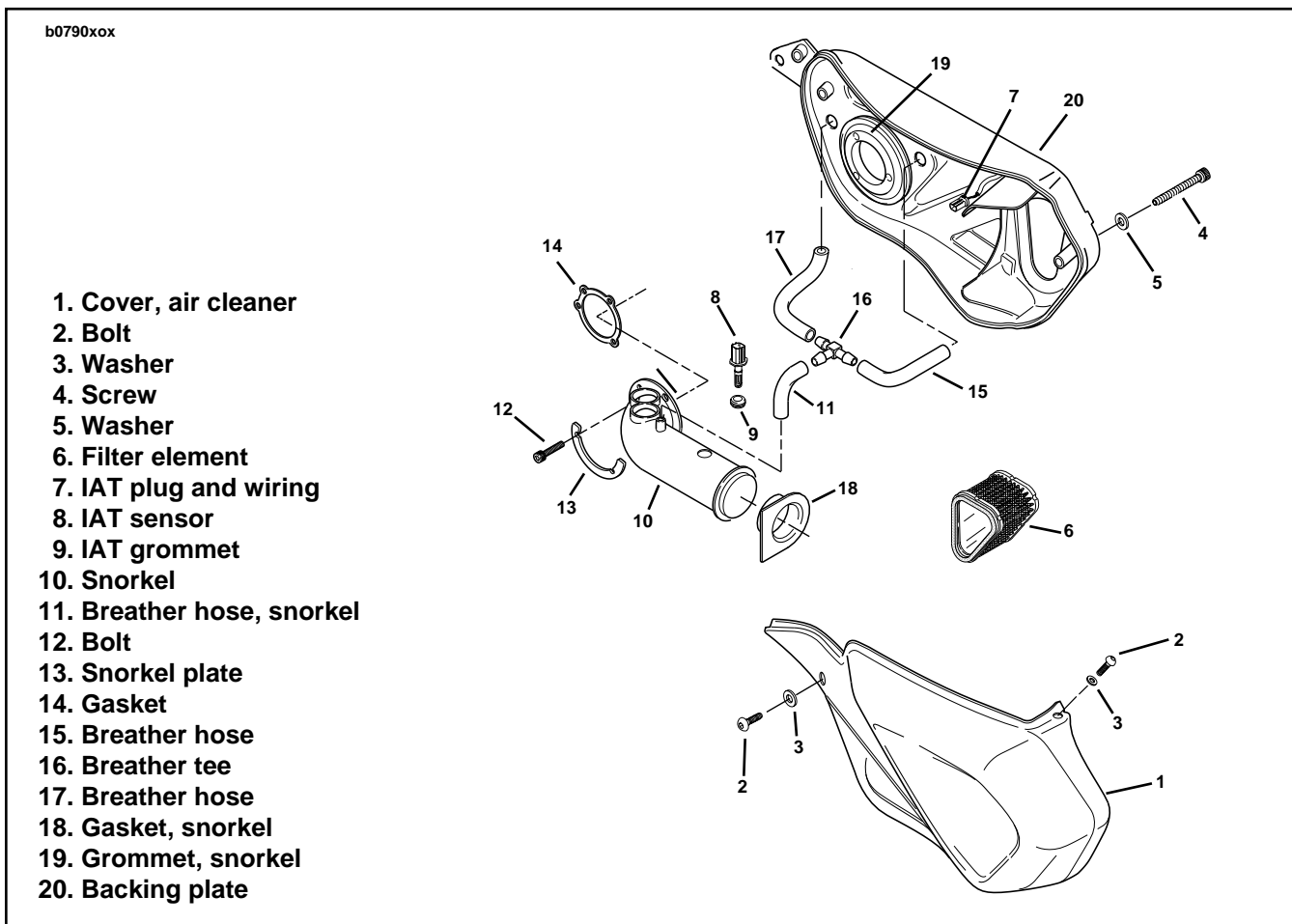


Figure 1. X1 Stock Air Cleaner

7. See Figure 1. 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 screw (4) and washer (5) first.
- c. Align air cleaner cover (1) and secure with two bolts (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 negative battery cable 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 3. Remove both front screws and nylon washers.
5. Remove both rear screws and nylon washers. Remove cover and air filter.
6. See Figure 4. 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 5. Press the catch on the intake air temperature (IAT) sensor.
 - b. While holding catch, remove sensor from the snorkel by pulling upward.

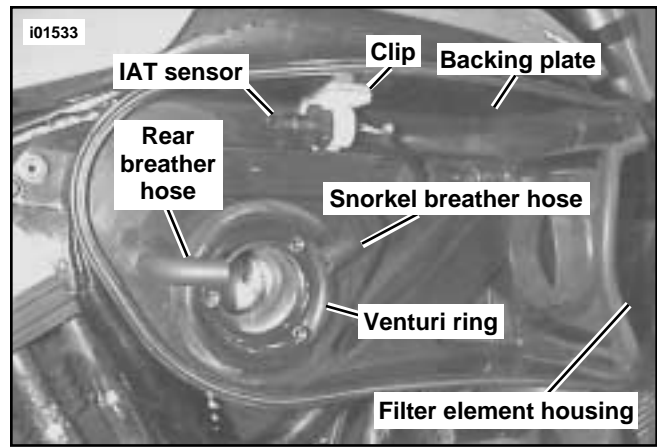


Figure 2. X1 Race Air Cleaner Installation

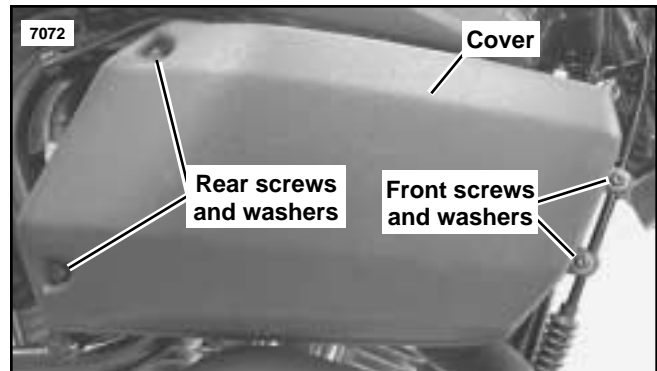


Figure 3. M2 or S3 Stock Air Cleaner Cover

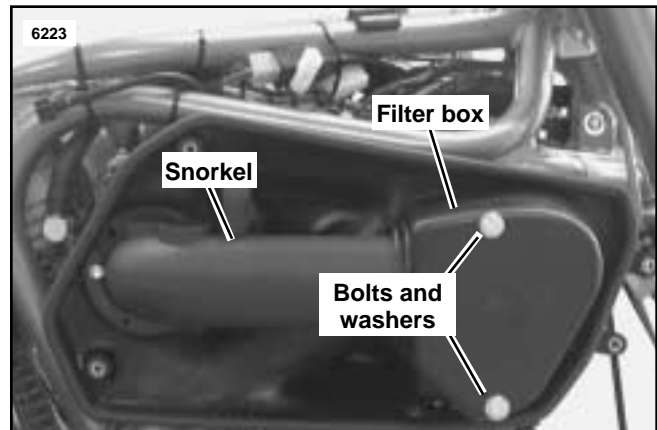


Figure 4. M2 or S3 Stock Filter Box

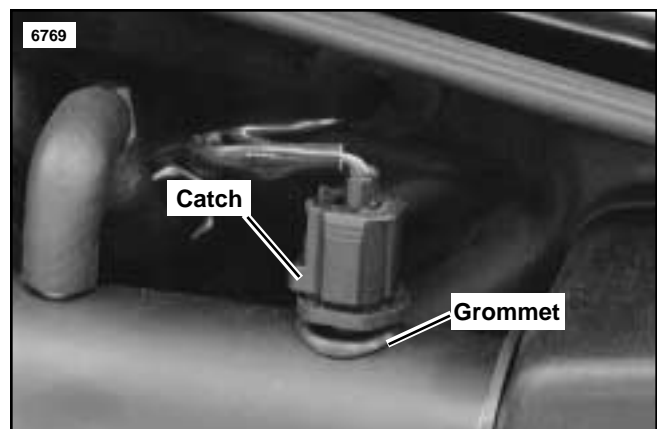


Figure 5. Model S3 Stock IAT Sensor

8. See Figure 6. Remove two screws and snorkel plate. Remove snorkel.
9. See Figure 7. 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 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 8. Remove nuts and bolts from front mount.
 - b. See Figure 9. 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 10. 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 5. Carefully remove IAT grommet from snorkel.
10. For S3 Models, see Figure 11. 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 11 or 12. Carefully install main breather hose into backplate.

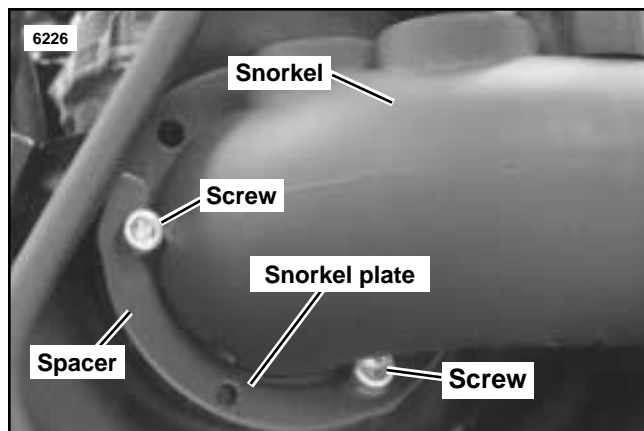


Figure 6. M2 or S3 Stock Snorkel Plate

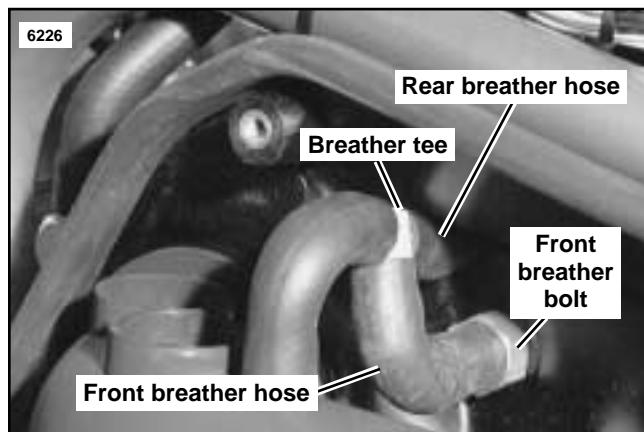


Figure 7. M2 or S3 Stock Breather Hoses

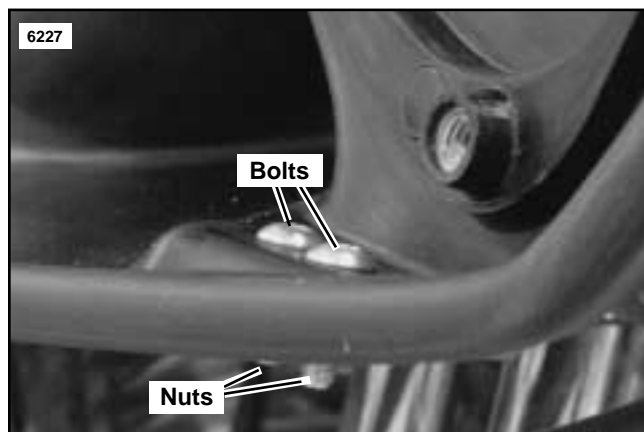


Figure 8. M2 or S3 Stock Air Cleaner Front Mount

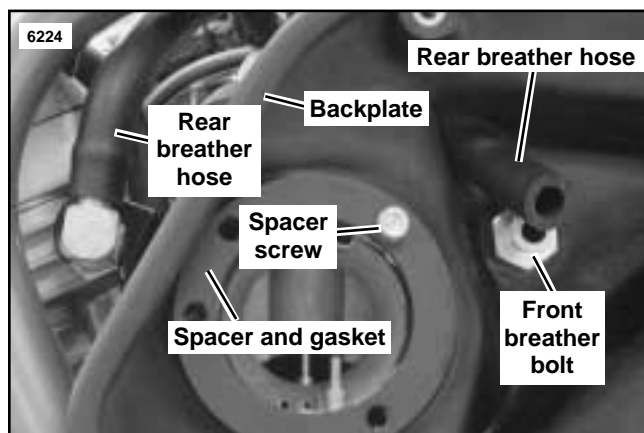


Figure 9. M2 or S3 Stock Air Cleaner Spacer

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 13. 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.

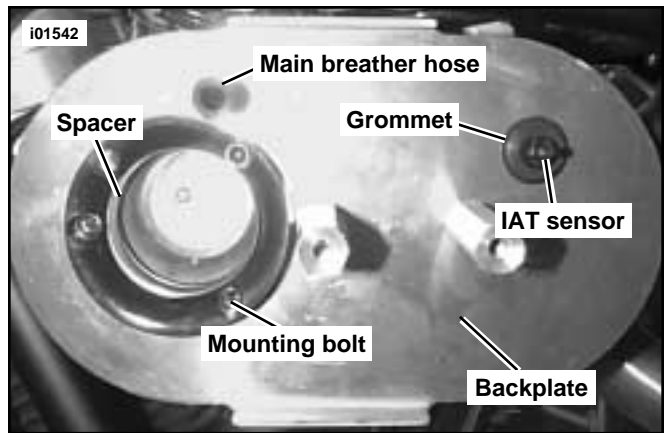


Figure 11. Model S3 Race Air Cleaner Backplate

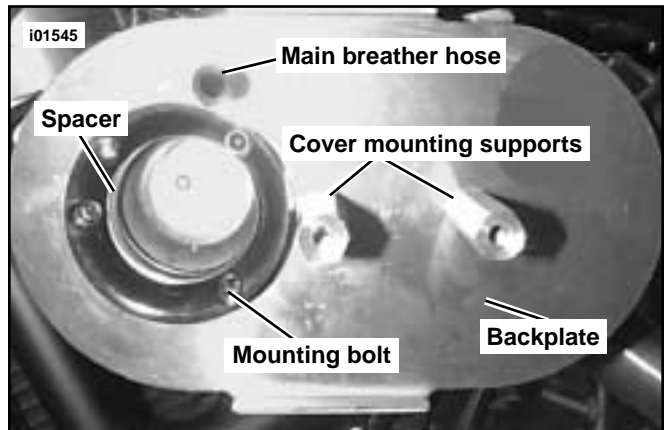


Figure 12. Model M2 Race Air Cleaner Backplate

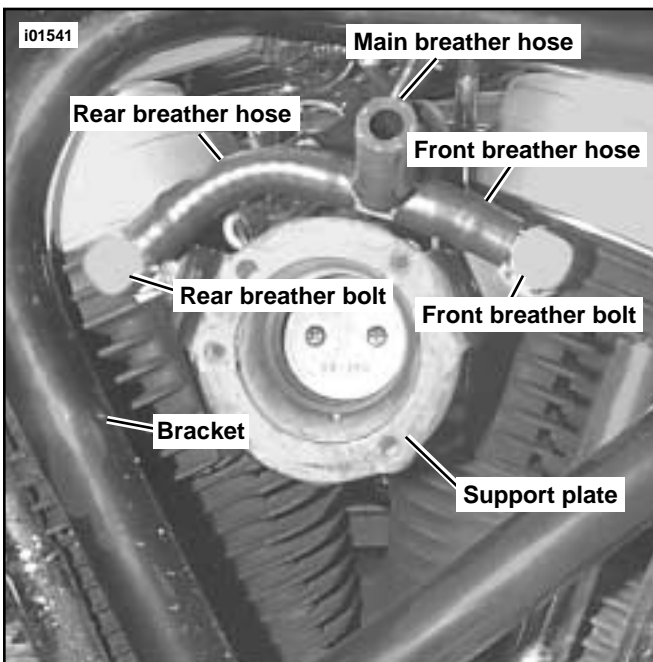


Figure 10. M2 or S3 Race Breather Hose Setup

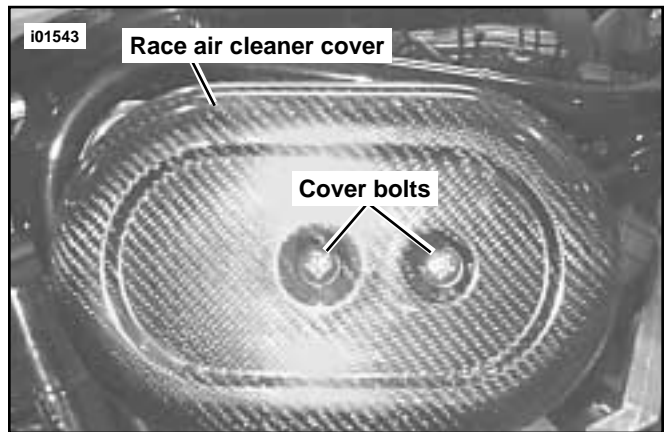


Figure 13. M2 or S3 Race Air Cleaner Cover

RACE TUNING TIP SHEET - FALL, 2000

Buell Lighting X1, Cyclone M2 and Thunderbolt S3 Series



Welcome to the World of Buell Racing

The following tips will help you along in building a 95, rear wheel HP Lightning Series engine for your Buell. This is a collection of tips from long time tuners such as Don Tilley, Rick Hutchins, and the folks from the Buell factory, on the preparation of your Buell for racing. We realize that each tuner has their own way of building engines, but we hope these tips will get you going in the right direction for good HP and reliable Buell racing. We definitely discourage radical work, as the top finishers in the Lightning Series ran minimal changes to the engine but paid close attention to the details.

These racing tips are being provided to you as a courtesy. Non-Buell (Aftermarket) products mentioned have not been tested by Buell. Buell cannot attest to the accuracy or reliability of this information or take responsibility for how these combinations perform.

Flywheels

- *The stock flywheels should need no additional modifications for racing, however the bottom ends of the connecting rods should be checked for excessive play periodically. Although some tuners have converted to after-market rods, most tuners are using the stock rods successfully.*

Cams

- *Excessive cam lifts should be avoided. Many tuners are using stock or slightly larger cams, depending on how well your heads flow air. Tuners that have tried high lift cams have experienced rocker arms hitting the top rocker box cover causing it to crack and develop an oil leak. High lift cams will also cause a reduction in low end power. You may have to grind extra clearance in top rocker box covers to avoid having rocker arms contacting cover. Stock lifters are used by many tuners, but periodically the roller end of the lifter should be inspected for excessive wear.*
- *Cam to lifter contact must always be checked if using other than stock cams. If contact is not maintained for 360 degrees, it is possible that the lifter is being held from complete contact by hitting the top edge of the cam bushing. A small relief is needed on the top side of the cam bushing to allow the lifter to drop down a bit to maintain contact with the cam lobe. Care must also be taken to inspect the anti-rotation pin to lifter travel. Certain cam grinds allow the end of the flat on the lifter to come in contact with the pin. Clearance must be ground on the side of the lifter to avoid contact during the highest part of cam lift—usually an extra .100 will do.*
- *Stock or after-market cams should have an extra .0002 clearance. It is recommended to clear the cam rather than the bushing.*

Exhaust/Intake - X1 and S3 Only

- *Use a free flowing air filter with a radiused entry for max air flow. Buell's new "race only" air cleaner kit (Part No. 91420-99Y for the X1 or Part No. 91422-99Y for the S3) will achieve this maximum air flow.*
- *A free-flowing exhaust system should be installed. Use the new race only header kit (Part No. 65400-99Y) and race muffler (Part No. 91424-99YA).*

Carburetion/Exhaust - M2 Only

- *A stock 40mm Kiehin carb must be used in Lightning Series races, but a jet kit should be installed for tunability. Use a free flowing air filter with a radiused entry for max air flow. Buell's new "race only" air cleaner kit P.N. 91421-99Y will achieve this maximum air flow.*
- *A free-flowing exhaust system should be installed. Use the new race only P.N. 91423-99Y header kit and P.N. 91424-99YA race muffler.*

Cylinder Heads

- *Thunderstorm Heads (Part No. 16797-98Y FRONT, and 16827-98YA REAR) will be the best all-around selection for Lightning Class racing (Thunderstorm heads require the use of Thunderstorm pistons for maximum performance).*
- *The most important part of your 95, rear wheel HP package will be cylinder heads that flow well. If you do not have the capabilities to do head work, you will have to go to a professional performance head service. Performance orientated Harley-Davidson/Buell dealerships, along with porting services that do Harley-Davidson heads, can handle this job. We again discourage radical work and emphasize that the following simple modifications are winning. See your Buell dealer for specifications.*
- *A multi-angle valve job should be done for maximum air flow. Install a Screamin' Eagle valve spring set, Part No. 18223-98. A compression ratio of 10:1 is ok.*

Pistons

- *If you do try after-market cams and larger valves, it is a must to check piston clearance. Severe damage can result if contact is made between pistons and valves. Exhaust valve-to-piston clearance should be .100 and the intake requires .080 valve-to-piston clearance.*
- *If using stock pistons, piston-to-wall clearance should be set to the service limit. After-market pistons should be set to the manufacturer's recommendations for road racing.*
- *Thunderstorm Heads require the use of Thunderstorm Pistons (Part No. 22676-98Y) for maximum performance.*

Oil Pump

- *The 1998 oil pump, Part No. 26204-98, will be an excellent choice for racing.*

Electrical Components

- *Buell Lightning Series: P.N. 32680-00, ignition module with the VOES operational should be installed on M2 models up to 2000 model year.*
- *Buell Cyclone M2 Series, 2001 and later models: P.N. 91438-01Y, ignition module, should be installed.*
- *Buell Lightning Series: engine control module should be installed on X1 and S3 models.*

For track use, the charging system may be removed for weight reduction.

More Information

- *Eliminate primary cover gasket. Seal cover using Yamabond #4 or equivalent.*
- *If rebalance is going to be done, a 60% factor should be used.*
- *Re-torque alternator nut to 210-215 ft-lbs. Use a drop or two of red Loctite on the nut.*
- *Inspect primary chain adjuster shoe for cracks. Replace as needed.*
- *For better front brake lever feel, install a #2 size steel braided brake line. Replace stock DOT 5 brake fluid with a high temperature DOT 3 or 4.*
- *For racing, it is important to convert to chain drive for a better gear ratio selection.*
- *For track use, you may wish to contact suspension experts.*
- ***For more information, or to have a question answered, contact your Buell Dealer, or call Henry Duga of Buell racing support at (262) 642-2020.***