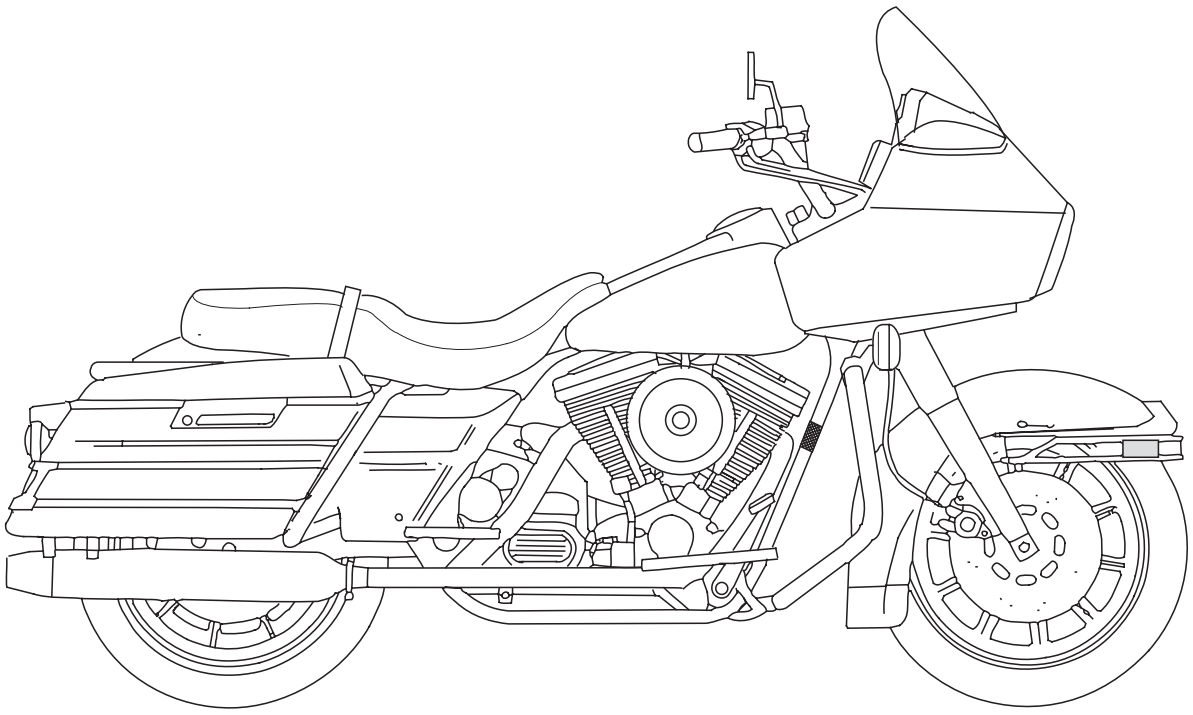
TECHNICAL TIPS

March 1998
TT#47



MOTOR HARLEY-DAVIDSON COMPANY®

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CHANGING EFI CALIBRATION

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TECH TIP #47

February, 1998

Batteries

When you encounter a low or dead battery and your diagnosis confirms it is not due to a malfunction with the charging system, the battery should be completely charged and load tested before filing a warranty claim.

It is the technician's responsibility to accurately and completely test any battery before warranty is considered. If you've already replaced a battery, the customer is gone, and the battery finally passes all tests, use it as a shop battery or dealer goodwill for the next customer with a similar problem. Please don't keep warranting battery after battery.

Our analysis of batteries returned in the last 90 days shows 98% with no problem found and they easily pass load tests after charging.

If you receive a bar code label for a sealed battery, the battery must be returned. Package it properly, the way you received it from us.

Do not replace sealed batteries for sides that appear "caved in" or warped. This condition does not affect battery function, it is merely a cosmetic issue.

Electrical Parts

When replacing electrical/electronic parts that are under warranty, they must be returned complete as manufactured. Do not cut leads to ease removal. Any electrical/electronic items returned without wires and/or terminals will not be credited under warranty.

Front Brake Switch

Since the 1996 model year, technicians have been instructed how to install a front brake lever without damaging the brake switch. This is detailed in the service manual under " Front Brake Master Cylinder". During the 1997 model year, we continued to warranty damaged switches. Now we are going into the first riding season for 1998 models. We will stop warranty payments for brake switches when they are damaged. We ask our readers to please pass the word along.

Road King Fuel Gauges

The low fuel light should come on at approximately 1/4 tank. It seems several of you have, at one time or another, experienced the "low fuel level" light coming on at the wrong time. To accurately diagnose this problem, the technician needs to first confirm fuel level at the time light comes on. Does the gauge needle reflect actual fuel level? If it doesn't, you should check the fuel sending unit operation with a multi-meter per service manual. If gauge needle is accurate and light comes on with more than 1/4 tank of fuel remaining, then the light circuit is faulty and replacement of gauge is necessary. Remember that some customers will reference miles per gallon rather than total fuel used when light appears. Mileage will vary from one customer to the next and is determined by riding style, engine performance and weather.

Road Glides

During new vehicle set-up on Road Glides, the technician would be wise to pack electrical contact grease in the cruise control connector #17B, under right side cover, to protect against corrosion. There is nothing covering this connector when a cruise control module is not installed and grease may save you some trouble in the future if the customer wants a cruise kit installed.

EFI Idle

There was a recent revision to Stage I and Stage II instructions pertaining to setting hot/cold idle speeds. It is now recommended that the ECM fuse be removed for a minimum of 15 minutes after setting hot idle. This is also recommended on stock vehicles. You should make note of this in your Service Manual for future use.

Diagnostics for EFI

We are receiving a significant number of warranty claims concerning EFI Diagnostic procedures that indicate improper use of trouble code charts. Trouble code charts can only be used to pinpoint a problem that exists during diagnosis. This requires a current trouble code. Historic trouble codes indicate a problem existed some time in the past and is considered to be an intermittent condition. Only one condition/labor code will be allowed for a problem correction on 1998 EFI systems.

Paint

Did you know that to correctly compare replacement painted parts it needs to be done using natural light? It is possible to see a different shade or tint using artificial light. At both York and Tomahawk, natural spectrum light is used to determine accuracy of paint match.

Kent-Moore Tool

If dealers wish to do so, they can now purchase the suitcase that EFI tools are stored in. It is now available separately. The Kent-Moore/H-D Part Number is HD 41325-5. The cost for this is $59.95.

Stage Kit Calibration Changes

There is a chart attached to this issue to help technicians understand how to go from stock to any stage calibration or from one stage calibration to another.

Odometer Trip Knob

A replacement knurled nut for odometer trip reset knob on fairing models is now available. The kit will contain a black plastic washer and black chrome knurled nut. The Part Number is 68264-98.

Fairing Models

If you have a customer complaint of excessive heat coming from the engine, remove the fairing wind deflectors. This will allow more air to flow past the rider and help reduce the heat complaint.

FL Rear Fender Alignment

The following is a detailed sequence to correct a mis-aligned FLHT style rear fender.

1. Loosen all fasteners for rear fender, saddlebag supports, and rear engine guards.
2. Tighten left side lower bumper mounting bolts.
3. Tighten left side saddlebag rails to vertical support bracket.
4. Tighten left side upper two bolts on vertical support bracket to frame rail.
5. Tighten left side rear engine guard to frame.
6. Repeat this sequence for right side.

98 Sound System

Here are a couple of things you should be aware of if an owner of a 1998 FL with the Premium Sound System complains about a radio volume problem.

The '98 automatic volume control does not begin to take affect until 40 mph. Above 40 mph, the volume increase is so gradual the customer may not notice. To verify normal operation, put an air drill on the speedo cable end. By operating the drill above an indicated 40 mph, you will hear the volume increase.

If you receive a complaint about the rear volume control on an Ultra, be certain the customer understands this switch only affects the headset volume, not the rear speaker volume. The handlebar volume switch in the Fader mode controls the speaker volume.

FLHRC Saddlebags

A number of FLHRC leather saddlebags have been warranted for appearance of the leather. There is a manufacturer's tag attached to every saddlebag explaining the characteristics of the natural leather cover. These characteristics include scars, grain lines, wrinkles and creases. These are normal and not a defect. Fingernail and other scratches are not covered. Leather is porous and organic and will settle into its own distinct form with exposure to sun, rain and time. This is also normal.

Some dealers are continuing to replace saddlebags due to lid contact with detachables. A necessary spacer kit must be installed when using detachable kits. Even with the spacer kit, some contact will occur with parts of the vehicle. The bottom line is that Harley-Davidson will not offer credit for issues regarding leather appearance. Harley-Davidson offers many leather care products for our riders to use on these saddlebags and you can suggest the rider purchase them. If saddlebags are replaced under warranty for these issues, the claim will not be honored and parts will NOT be returned.

In the near future, there will be a repair kit offered for BAD or BROKEN hinges or springs. At this time you should not replace the saddlebag. Instead, call Customer/Tech Service Touring Group to have a new hinge spring sent to you.

Calling Harley-Davidson

Are you using SPOC (Single Point of Contact)? The purpose of SPOC is to make it easier for dealers to call Harley-Davidson for any reason by having one phone number to call. SPOC is staffed with Parts and Accessory Representatives and Vehicle Account Representatives in 4 to 6 person teams with each team responsible for all dealer calls within their district. SPOC Representatives will take care of many issues including Dealer Parts Orders and Vehicle Sales Account questions. Any help needed regarding technical issues will be forwarded by SPOC to the Customer/Tech Service operator. All Goodwill Policy adjustments should be sent using the same fax number as before. The fax number is (414) 343-[redacted]

For clarification, when you call SPOC and select option #4 (Technical Question), this will still be answered by a SPOC Representative and will be forwarded to a Customer/Tech Service operator.

Tech Tips From The Field

Carbureted Vehicles

A quick, easy and accurate method to achieve perfect intake manifold alignment every time is to use your inclinometer. Simply take a reading from the cam cover and transfer this to the intake manifold spigot. To simplify tightening the manifold, change the two allens on the primary side to hex head bolts, Part Number 3987.

Submitted by Master of Service Technology Robert Hoffman of Harley-Davidson of Long Branch, Dealer #3099.

XL 5 Speed Shift Drum

Having shifting problems on 5 speed XL/s? During inspection of shifter assembly, check the shift detent pins on the end of the shift drum. The pins should have an installed height of .326"-.334". If you find the pin height outside this range, replacing the shift drum is the recommended repair.

Submitted by Technician Russell Glashan of Southside Harley-Davidson of Indianapolis, Dealer #1242.

EFI PERFORMANCE PRODUCTS

Questions and Concerns about the New Stage Upgrade Kits from Screamin' Eagle

There has been a whole new set of issues raised with the recent introduction of the latest performance products from Screamin' Eagle for EFI model bikes. Please follow along as we address some of the more common concerns we hear from the field.

It is commonly asked "Why?" do we sell the "EFI High Flow Air Cleaner and Breather Kit" (#29364-97) as a stand alone accessory when the instruction sheets with this kit clearly tell you that the ECM must be recalibrated to avoid driveability problems or possible engine damage?

The reason for this stand alone kit was to supply a breather kit to the customer who has gone to the after market world for a mapping change that requires a more free flowing air breather. If the customer is just wanting to add more performance and has not done any other modifications, then they are the customer for a Stage 1 Kit, (29386-95 for 96 and earlier, 29387-97A for 97 and later). This kit includes the Air Cleaner Kit and the cartridge for a more complete upgrade than just a fuel adjustment like the after market kits offered.

Why are there two different Stage 1 and Stage 2 Kits?

As you can see by the P&A catalog information, there is a model year split for 96 and 97 models. The difference being that the ECM that is the stock equipment on a 95 or 96 EFI model bike is not programmable. The ECM on 97's and later is programmable. With the #29386-95 Stage 1 Kit and the #29933-97A Stage 2 Kit, you will receive a new programmable ECM. A note of Caution! Remember that any early 97 EFI bike that has not had the Product Program 5 upgrade will not accept a Stage upgrade. Refer to Service Bulletin M-1067 to verify this has been done.

Can we reuse the Stage cartridges more than once?

No, they are good for one time use only as far as inputting the Stage upgrades into an ECM. However, do not discard that cartridge when the upgrade is complete because that cartridge will always contain the "Stock Mapping" for returning an ECM to stock configuration at a later date. Again a note of Caution! DO NOT turn off a bike during the stage upgrade input to the ECM. You will likely lose the Stage upgrade program and it will not be retrievable. You will be buying another cartridge to finish the job. Allow the data transfer to take place, wait for the message on the scanalyzer display that indicates upgrade completed.

Why would a customer want to go back to "Stock Mapping"?

If the customer finds that the Stage 1 kit doesn't give the performance expected, they might want to upgrade one more level to the Stage 2 kit. At that point, the customer can then purchase the larger injectors, the SE-3 cam, and the Stage 2 cartridge separately. The ECM must be returned to stock mapping in order for the Stage 2 program to be input. Remember at that point, however, the Stage 1 performance program is lost. The part numbers for the larger injectors, the SE-3 cam, and the Stage 2 cartridge are shown on the "Service Parts" page on the Instruction sheets supplied with a complete Stage 2 Kit. You can also obtain a separate Stage 1 cartridge and that part number is shown on the "Service Parts" page of the Stage 1 kit Instruction sheets.

What if the customer wants a more aggressive cam put in with his Stage 2 upgrade, will it still be warrantable?

No, it will not be covered with his O.E. warranty. Any alteration from the Stage 1 or 2 kit contents will void their powertrain warranty.

What exhaust should we use in conjunction with these Stage upgrades?

Dyno testing has shown that our new touring mufflers work the best. If you are allowing more air and fuel into the engine then you want to allow it to escape efficiently also. Dyno testing has shown is that our new touring mufflers work the best and are emission compliant in their stock configuration. The dB rating of our stock FL touring mufflers is around 80dB.This level will not be affected with the new touring mufflers. These mufflers will allow the proper amount of flow necessary to give the customer the maximum benefit of his Stage upgrade. You definitely want to stay away from using "straight pipes"/"drag pipes" or mufflers that have a "straight through" design to their internal chamber with these upgrade kits. The EFI upgrade kits were designed and Dyno tested with a "baffled" style exhaust for their maximum benefit and capability.

Is the Stage 3 cartridge and mapping change streetable?

As the catalog tells you, this performance cartridge is **"For race applications only."** As the catalog copy also tells you, this cartridge was designed for use with more radical modifications than any normal road rider would be using. Be careful where you use this program and be sure that your customer is aware of the major differences in what the engine would require to make this upgrade to his bike.

I own a '97' EFI bike today, but next spring I will be getting a new '98' model, do I have to buy a whole new kit again?

Not necessarily. Some Stage 1 and 2 components such as injectors, air cleaner, exhaust, and the ECM can be transferred to the new bike. Fitting a used cam into a new cam bearing and vice versa would not be advisable. Consider the circumstances carefully before you proceed with a straight exchange.

I put a Stage upgrade into the ECM and now the bike isn't running right, do we have a bad cartridge?

Probably not. In the case of a Stage 2 upgrade, you have had various areas of the motor apart installing the cam and the injectors. To install these components you have had to disconnect, and ultimately disturb, the engine temp. sensor, the injector connections, and the cam position sensor. It would be advisable to recheck these connections as well as see what your scanalyzers data monitor readings tell you before pointing the finger at a kit component. It may also be advisable to get these readings, to get a base line of what the bike is doing, BEFORE you start the installation of any kit. When the bike is dropped off for the upgrade question the rider if they have been experiencing any driveability problems.

A bike comes in from the road, how do we know what program is in the bike?

The opening menu on your scanalyzer will tell you what if any kit is in the bike as far as a mapping change. As you install Stage 1, 2 or even Stage 3 kits in different models write down the various numerical codes that follow the "Stage 1" or "Stage 2" information from your scanalyzer so you become familiar with them.

Will we have to reset anything after a Stage kit is installed?

You will probably have to reset the Hot and Cold idle settings on the bike but remember to follow the instructions that come with the kit completely before you alter anything that was working fine before you started.

What changes can the customers expect to their fuel economy?

As with any performance upgrade whether it is on a carbureted bike or an EFI bike there is always a trade off. Fuel economy is usually the fall guy in performance upgrades. The riding style of the customer will also play a big factor in that equation.

Where can we get more complete information on these kits so we can explain to the customer what the costs of installation and time needed will be?

Besides the information in the catalog, use the "Fax on Demand" system through your dealership. Get an advance copy of the Instruction sheets for these kits so you and your parts people will have a better base of information to answer the questions you and the customers want to know. If necessary, you can contact the support staff at Harley-Davidson Customer Service and we will try and assist you as well.

John Rickerts, P&A Fitment Group

JUST MY OPINION…

From time to time, I have the opportunity to talk to dealership technicians about various things pertaining to Harley-Davidson motorcycles. Recently I was mentally reviewing some of these conversations and thinking about what had been discussed. Some of our technicians have said they would like to have a greater opportunity to learn. The Motor Company provides information through several sources, PHD tape, service manual, Tech Tips and service bulletins, to name a few. Although these sources all provide good information they are limited in their scope. I mean, they are all product specific. Technicians have stated: "I've taken all of the training Harley-Davidson has to offer, so where do I go from here," or "What is the next level of training Harley-Davidson is going to offer?" I believe that this next level may not be within the walls of Harley-Davidson, but rather outside of Harley-Davidson. What I'm saying is that you may have to take it upon yourself to get this next level of training. This training can take on several forms. One being that you can read books written about motorcycles or component parts (i.e., carbs, EFI, brakes...) that address, in detail, the finer points of how these machines and components function. Problem is, most books of this type may not be found in your average book store and they may not be about Harley-Davidson motorcycles specifically. They are about the theory of how things work and how they work relative to other components. This, in my opinion, is "the next level" of training. After several years of field experience you have gained an understanding of what's happening. Your quest now is to understand why it happens.

In an effort to help you on this journey, I have the following information:

Book sources:
(None being recommended or endorsed by HDMC, just letting you know what's out there and where it can be found.)

MotorBooks International-Source for many different types of books. Give them a call at (800) 826-6600.

The Racing Motorcycle: A technical guide for constructors by John Bradley. This book is the first of what may be a two part series. Primarily about chassis, but does have some good engine information.

Euro Spares

1351 46th Avenue
San Francisco, CA 94122
voice/fax 415-665-3363
Net address: racebook@eurospares.com
Web page: eurospares.com (If you can check out his web page).

Motorcycle Tuning: Chassis by John Robinson: This book is about chassis components. It has a lot of good information on motorcycle chassis.

V-Twin Tuner's Handbook by Sam Dinish: This is a two book set, one book with a lot of information, the other is how to calculate different stuff. Mostly about performance engines.

On the Internet: " www.amazon.com" is the address for a book source index.

Another good source of books is the used book stores. These places can be a gold mine for subject specific books. If you decide to look at books that are not motorcycle specific, but rather subject specific, I would suggest books that have either "basic" or "for non-engineers" in the title or description.

The other form is night school at a junior or community college. All right stop your groaning, it ain’t that bad. These places are usually cheap and have small class sizes. They usually offer some technical courses in electronics, engineering, or machine shop, Stop by and pick up a catalog. While you are there, you may want to visit with the finance guy and see if Uncle Sam has any money available for you. You may also want to ask if they allow "auditing" a class. Auditing is when you take a class but you do not have to do any homework or even buy the book. What you do is sit in class and listen to the lecture and get the information you want. You are not responsible for anything. Be warned though, you will get out of it what you put into it. You will need to check with the school and see how they administer this, don't take my word for fact on this. Some times an audit class is at a reduced cost. You can also check with the teacher and see if they will let you "sit in" on the class for free. Remember to get this, you have to talk just right, but hey there are only two answers to the question and one of them is the one you are looking for. Finally, for those who say, "I don't get paid to go to school" or something to that affect, good, keep thinking like that and leave that seat open for one of those technicians that is willing to make a small sacrifice. That technician will be making more than you and also get the better jobs. The way it works is" first show me...then I pay".

...I Could Be Wrong

Mike Rheam, Developmental Service Eng.

CHANGING EFI CALIBRATION

Desire Stage 1 Calibration into ECM	Desire Stage 2 Calibration into ECM
FROM: Original Factory Cal. TO: Stage 1 Cal. ***PROCEDURE:*** 1) Insert Stage 1 Cartridge into Scanalyzer 2) Choose "P&A Calibration" at the "Select" Menu, then proceed with reflash.	***FROM: Original Factory Cal. TO: Stage 2 Cal.*** ***PROCEDURE:*** 1) Insert Stage 2 Cartridge into Scanalyzer 2) Choose "P&A Calibration" at the "Select" Menu.
FROM: Stage 2 Cal. TO: Stage 1 Cal. ***PROCEDURE:*** 1) Insert Stage 1 Cartridge into Scanalyzer 2) Choose "Original Factory" at the "Select" Menu, then proceed with reflash. 3) Then choose "P&A Calibration" at the "Select" Menu, then proceed with reflash.	***FROM: Stage 1 Cal. TO: Stage 2 Cal.*** ***PROCEDURE:*** 1) Insert Stage 2 Cartridge into Scanalyzer 2) Choose "Original Factory" at the "Select" Menu, then proceed with reflash. 3) Then choose "P&A Calibration" at the "Select" Menu, then proceed with reflash.
FROM: Stage 3 Cal. TO: Stage 1 Cal. ***PROCEDURE:*** 1) Insert Stage 3 Cartridge into Scanalyzer 2) Choose "Original Factory" at the "Select" Menu, then proceed with reflash. 3) Insert Stage 1 Cartridge into Scanalyzer 4) Then choose "P&A Calibration" at the "Select" Menu, then proceed with reflash.	***FROM: Stage 3 Cal. TO: Stage 2 Cal.*** ***PROCEDURE:*** 1) Insert Stage 3 Cartridge into Scanalyzer 2) Choose "Original Factory" at the "Select" Menu, then proceed with reflash. 3) Insert Stage 2 Cartridge into Scanalyzer 4) Then choose "P&A Calibration" at the "Select" Menu, then proceed with reflash.
Desire Stage 3 Calibration into ECM	**Desire Original Factory Calibration into ECM**
FROM: Original Factory Cal. TO: Stage 3 Cal. ***PROCEDURE:*** 1) Insert Stage 3 Cartridge into Scanalyzer 2) Choose "P&A Calibration" at the "Select" Menu.	***FROM: Stage 1 or 2 Cal. TO: Original Factory Cal.*** ***PROCEDURE:*** 1) Insert Stage 1, 2 or 3 Cartridge into Scanalyzer 2) Choose "Original Factory" at the "Select" Menu, then proceed with reflash.
FROM: Stage 1 or 2 Cal. TO: Stage 3 Cal. ***PROCEDURE:*** 1) Insert Stage 3 Cartridge into Scanalyzer 2) Choose "Original Factory" at the "Select" Menu, then proceed with reflash. 3) Then choose "P&A Calibration" at the "Select" Menu, then proceed with reflash.	***Note*** Only a Stage 3 Cartridge can change an ECM's calibration from Stage 3 to Original Factory.
Stage Calibrations are good for one time installation only. Once removed, it is lost.	