FUEL+ Plus ™

Fuel Monitor

Model K

Operation and Installation

Version 3.1

Introduction

This manual gives detailed information on the installation and operation of **FUEL Plus**™. There is no requirement to understand all that is offered here. Skip those areas that are not of interest to you. The key to operating the display is the **flow chart** described in the *Display indicators and functions* section. It is at the back of this manual. Keep the loose leaf chart and Quick Guide on your bike. You will need it to set the clock.

If you like to know everything about what goes into and on your motorcycle and are not hesitant to disassemble the instruments, put it on yourself. Read all of the installation instructions before starting. Be careful with the instruments. If damaged it may cost you more to repair them than the cost of dealer installation. If you are not a mechanic, have your dealer install the fuel monitor for you. **If you need assistance**, call and ask for Dave. If after hours leave a message. The machine is checked on weekends too (unless at a rally).

To maintain the monitor once installed requires resetting the gauge at each fill up. The rest is automatic or optional and the information is there at anytime. **FUEL Plus**™ works in international units. The term *distance* refers to miles or kilometers and *volume* refers to gallons or liters. They apply to the units you have selected to use.

Use the information **FUEL Plus**™ provides for better fuel, time, and distance management. You will soon rely on it.

Thanks to users and dealers for your suggestions, keep them coming. Please report any problems and helpful hints.

Features

The **FUEL Plus**™ fuel monitor provides fuel information allowing an effective increase in range. It gives RANGE (miles/km to empty), percent of tank fill, RANGE TRACKING, distance to go, ECONOMY (consumption), distance marking, a 12hr or 24hr clock. Sub-functions are daily miles/km / time / avg. speed automatically reset after 1:00AM to 9:00AM and manually reset, running time from engine start (auto reset), distance from last fill up, and a 30,000 mile/km odometer manual reset, test data, adjustments for tank size if needed, and calibration for gallons or liters.

Economy is displayed based on a user selectable distance of .5mi. (.8km) to 40 miles (64km) and in mpg, m/L, km/L or L/100k depending on country of use. Economy as displayed by **FUEL Plus**™ should be used as a reference for your current conditions. Your average economy should be taken from the distance driven divided by the gasoline pumped. Resetting the fuel monitor is done with a press of a button at fill-up (filling full is required at each fuel stop). It then reads 100% fuel and gives range based on your current economy. As fuel is used and efficiency changes, new range information is calculated as you ride based on your riding style and current conditions.

Data stored in the fuel monitor is protected from loss, for a period of about 3 hrs, when the motorcycle battery is disconnected for service. The clock does not run during this time and will display 12:00 (flashing) when power is restored and **FUEL Plus**™ is started again. If data is lost, the fuel monitor will come back on with all LCD elements on *88:88* and all settings will need to be made just as on the first power up.

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Tamper lockout.

Unauthorized tampering is locked out by preventing changes in settings when the engine is off, ie. not running. Ignition on is not sufficient to unlock. The exceptions are when the unit is installed and not calibrated, when the clock is not set, and the destination is zero or negative you do not have to start the engine to set it. All display functions are readable if the engine is on or off. The settings are not changeable when the engine is off. All changes to settings will flash the symbol or display to indicate you are about to change it. If you are not sure what you are about to change, release the button before 5 seconds has elapsed to abort the change. Once the display starts flashing you may stop the engine but continue holding the button until the flashing stops to make changes. This guarantees no one can make unauthorized changes in your **FUEL Plus**™.

Display indicators and functions.

The fuel monitor takes input from three sources; the bike fuel control unit for fuel volume, the odometer for distance information, and the operator for display and settings by way of the two buttons previously used to set the factory clock. They are now labeled "F" (function) and "S" (set). These buttons do different actions depending on which function is displayed. Main functions are selected by the F button (left side). Functions can be selected at any time except during manual tank calibration. Functions rotate through RANGE, RANGE TRACKER (when on), DESTINATION (when on), ECONOMY, TIME, and Sub (additional functions), then back to RANGE.

Changes are made with the set button "S". **Symbols at the right of the display indicate what is being displayed.** Learn them and you will always know at a glance what function is displayed. Controlling the **FUEL Plus**™ with two

buttons requires an aid. A **flow chart** is provided to help understand how to get from one function to another. Keep it on the bike for reference. Find the box for the current function displayed (look for symbol) and push the button indicated on the connecting line to get to the desired function. The flow makes a continuous loop.

RANGE; $214r$

Displays range with available fuel (distance to empty). It's symbol is r. The S button selects the GAUGE. Go here to reset to 100% when filling the tank.

RANGE TRACKER; $12P$

Shows the difference in RANGE and DESTINATION. It will be positive, zero or negative. Keep it on the positive side to assure you have fuel to arrive at your destination.

DESTINATION; $202d$

Set a distance near your range on the tank or to a junction. It shows distance to go and is used by the RANGE TRACKER.

MARK; $8:6-$

To measure a distance the destination function can be set to count from a marked point. It is reset with a press of the S button. Destination and mark cannot be used at the same time.

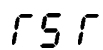### ECONOMY; $48E$

Displays distance divided by fuel volume. Miles per gallon in the US, Miles per liter in Britain, kilometers per liter and liters per 100 kilometers $5:4C$ (consumption).

GAUGE;   93ʳ

   Displays 0 to 100% fuel tank level. Select RANGE then the
   S button. Hold S to reset to 100% at fill-up.

TIME; ELAPSED TIME;   12:35

   Displays time in the mode it was set in (12hr or 24hr). The
   set button sets the mode and time. Elapsed time is reset on
   ignition ON and is selected by displaying the clock. Press
   S then F (within one second). The colon flashes to indicate
   elapsed time.

SUB FUNCTIONS;   Sub

   Displays tank odometer "F" (miles/km From Fill up). Daily
   "dAY" miles(no symbol), time ":" and avg speed "A" (auto
   reset 1:00 - 9:00 am and manual reset). Average speed is
   based on first key on. Stops are included. It will be erratic
   for the first few minutes. 30,000 mi. odometer "odo"
   (manual reset).

TEST;   rSr

   Displays odometer counter, software version number, 11
   system variables, and display element test.   Used for
   diagnosing problems, *Changing units of measure,* and
   Changing consumption avg. distance.

   See the *Operation* section for selecting functions.

Fuel Monitor Installation

OVERVIEW.
You will remove the necessary fairing components and
instrument cluster. Remove the instrument back and case and
unclip the clock. Clip in the **FUEL Plus**™, solder one wire

inside. Drill a 1/16" hole in the back cover to route the fuel
wire and close the case. Connect a wire to the cable connector
on the injection control under the seat and run it to the back of
the instruments. Connect the fuel wire, put the instruments
back on, install the fairing panels.

Installation requires a 25 watt soldering iron, one 1/16" drill, 3,
4 or 5mm hex wrenches, and #1 Phillips screwdriver (short
required for early models). If your instrument cluster does not
have a factory clock, you need the clock trim #62 11 1 459 235
from your BMW dealer.

Reference to early and late models pertain to the connector
configuration on the back of the cluster. Early has separate
connectors and cover. Late models are one piece cover and
connector. Mechanical and soldering skills required.
**Record the serial number on the back of the circuit board
now.** You will not be able to get to it after installation!
Serial number   _ _ _ _ _ _
Accessing the back of the instruments.
K75S; remove the windshield, the turn light and remove the
faring screw underneath. Remove the other screws necessary
to take off the faring.
K100RT & LT; Remove the two bracket screws under the
instruments or removing the windshield will allow direct access
to the back. If your hands are small enough you can remove
the four screws without removing anything.
K1100LT; remove the windshield, disconnect the wiring and
remove the panel behind the instruments. Details follow.

(1) Remove the 6 Phillips head screws from the inside of the
fairing that attach the electric windscreen(EW). Be careful with
the shaped washers.

(2) Remove the 6 Phillips head screws from the outside of the
fairing that attach the EW.

(3) Tilt the windscreen assembly away from the bike slightly at the top. Next place a towel between the fairing and the EW.

(4) Lift the EW straight up enough to enable you to see and disconnect the one electrical connector. This connector is at the left lower edge of the EW when looking at it from the front of the bike.

(5) Carefully continue to lift the EW straight up until both of the water drain tubes have come out of the fairing clips. (These clips are at the very front of the fairing and are positioned directly over the two cutouts at the bottom front of the upper fairing.)

(6) Lay the EW on a towel or soft padding so you don't scratch it. This would be a good time to lube the two tracks for the EW.

(7) You can now remove the pod by loosening the four hex head mounting bolts.

(8) Lift the pod up slightly and remove the single screw holding the connector to the instrument pod.

Reverse the above to reinstall. Carefully route the drain hoses back down through the fairing and position them somewhere near where the clips are attached to the fairing. These hoses can be inserted into the clips after replacing the EW by reaching up through the cutouts at the bottom of the upper fairing.

You "might" want to modify the connector for the EW to make it a little easier to disconnect it from the wiring harness. There is a small slot in the bracket that this connector mounts to. I removed just a little piece of the connector housing to allow me to slide the connector for clearance when disassembling.

K1100 procedure provided by Mick McKinnon, AZ.

1. Installing the unit in the instrument cluster.
a. Removing the instrument cluster.
   Pull the clock fuse (clock will blank). Disconnect the battery ground wire. It can be disconnected at the frame end if no other wires connect to the battery terminal. Tape the end to insulate it if disconnecting at the frame.
b. Remove 4 Allen head screws from the rear of the cluster. Location shown after removed Fig. 1A. Shake the screws out when removing as they may fall into the faring when lifting the case off the bracket. On RT models you may remove two screws holding the bracket for the cluster and lean the cluster toward the rider for easier access to the back.
c. Remove the back support plate from the bracket and lift the instruments from the bracket.
d. **Early Models:** remove the rear cable cover with one Phillips head screw. Disconnect two connectors, a lip on the outer edge can be used to lift the connectors with a screwdriver blade. Pull straight out to prevent bending the pins.
   Late Models: remove cover/connector assembly together by loosening the hex screw in the center of the cover. The connectors will back out together.

2. Disassemble the cluster.
a. Remove 7 (9 late) Phillips screws and remove the back. Fig. 1B. Save the gasket for a spare. A new gasket is supplied. 1985 model shown in illustrations.
b. Remove 6 Phillips screws. Fig. 3A. Turn face up, pull out the trip knob 1/4" against the spring tension and lift the case up. It may need a little persuasion to break free. A short drop against the table top may dislodge it.
c. Bend a paper clip in an L shape and tape it to the face to hold RPM pointer away from the clock. Fig. 2A (Stay clear

of pointers) Remove the clock trim. Shown removed Fig. 2B.

Note. May require flexing left and right ends of instruments down and pushing up in the middle to allow the trim to clear the faces on each side. Units without a factory clock will require the purchase of trim #62 11 1 459 235 from your dealer.

d. Remove the clock module by releasing the clips at 4 corners. Bottom pair then top pair. Shown removed Fig. 2C.

e. Remove the lamp from the top and the socket from the bottom under the clock module. **FUEL Plus**™ is illuminated.

f. Feed the wire with the yellow end down on the left to the back side of the instruments. Feed the other wire through the lamp socket opening.

g. Install **FUEL Plus**™ by guiding the two pins into sockets on the board bottom and down into clips at 4 corners. Don't bend the two pins. Make sure both pins are in place. They are visible from the top of the board. Fig. 2D

h. Button Installation: This step removes the factory buttons and replaces them with buttons that are extended. The buttons are held by a flange around the stem that fits into a grove just below the face. The black plastic face is the top edge of the grove and the clear plastic underneath forms the bottom side.

Push the factory rubber buttons out from the inside of the cover. Apply a film of clear silicone gel around the grove with the cotton swab (supplied on the swab). Put the long end of the button into the hole from the top, push down from the top and pull from the bottom until the flange goes into the hole enough to start into the groove. Work the button up and down until the flange works into the grove. Turning the button from the bottom and working it up and down should do it.

Check the flange for folds by looking at it from the bottom. Rotate the button and watch the ring around the hole from the bottom. The image will be dark (in contact) or light (no contact) and should be even all the way around. A fold (no contact) will rotate with the button and must not be allowed to stay. A watertight seal is required here. If the flange has a fold and does not want to enter the grove then push the button out from inside and start over.

l. Wipe off the silicone on the face with isopropyl (rubbing) alcohol. Place the plastic overlay that has two holes over the holes before removing the paper on the adhesive. The top edge should line up with the "N" window bottom edge and the holes with the buttons. The bottom edge lays over the top edge of the clock window. Tape the top edge with masking tape to make a hinge. Flip the overlay up to remove the paper back. Be sure it is in place as the adhesive will separate if you try to remove it. Lay it in place and press it down for a few seconds rubbing over the whole surface.

The flange has to seal out water requiring it to fit tight. Use your thumb to press the buttons and switch the functions with a slow press/release, press/release action. Firmly press the buttons.

3. Assemble the cluster.

a. Plug in the soldering iron. Reinstall the original clock trim. Fig. 2B. Remove the paper clip from the face. Fig. 2A.

b. Pull out the trip knob on left to clear the face and place the case on the instruments. Press the buttons. You should be able to hear a faint snap of the switches. If you do not see *Troubleshooting, Button test* before continuing.   Hold instruments in the case and turn over on the face. Put in 6 short screws. Fig. 3A

c. Lay on the face and solder the wire with the yellow circuit protector to the left of three terminals on the back of the speedometer. Make one loop loose enough to slip on and

off. Don't crimp it tight, you may need to remove it for an update. Fig. 3B. Solder to the top pin, don't disturb the fine copper wire underneath or short the terminals. Unplug soldering iron.

d. **Early Models:** drill 1/16" hole through the back cover directly behind the lamp socket that was removed. Fig. 1C. **Late Models:** drill 1/16" hole in the boss under the brass insert. Fig. 1D. (was early model cover screw location)

e. Feed the wire through the drilled hole in the back cover. Place the cover on back then place the new gasket (supplied) around groove . Install with 7 (9 late) long screws. Fig. 1B.

1. Install the frame wire.
a. Connect to the fuel control unit.
   Raise the seat and remove the left side panel to gain access to the fuel control unit under the seat. Don't confuse it with the ABS connector (shorter).
b. Release the clip on the end of fuel control unit connector located under the end where wires leave the connector housing. Fig. 6A & B. This clip is difficult to release. Pushing in on the connector while holding against the back of control unit aids in releasing (three hands required). Push the top and bottom parts of the clip away from the connector. Swing the cable end away from the control unit to free the opposite end.
c. Plug in the soldering iron. Remove the plastic tie and pull the boot back over the cable exposing the wires and clamp. Fig. 6C.
d. Locate the yellow with grey strip wire (larger diameter wire). fig. 5. Motronic units may be a yellow/violet wire. Skin off insulation on about 3/16" length. Tin with solder (supplied). Wrap the bare end of circuit protector (yellow) around the tinned yellow/grey wire and solder. Unplug the soldering iron. Wrap with insulating tape. Fig. 5A.

SAFETY NOTE: The bulge at the end of the wire (yellow) is a 1K ohm resistor, it must be in place. It prevents a short in the new wire from damaging the BMW fuel control unit and causing motor stall.

e. Feed the free end of the wire through the boot. Fig. 5B & 6D. Remove the cable clamp with two screws on the bottom and place the wire under the clamp. Fig. 5B. Allow some slack and replace the clamp. Cover the connector with the boot and tie with the plastic tie (supplied). Fig. 5C. Do not place the end of tie on the bottom as it will interfere with the connector clip. Fig. 6C.
f. Spiral wrap the new wire around the cable and tie.
g. Reconnect to the fuel control unit by placing hook into the receptacle first. Fig. 5D. Push in the connector and verify the retaining clip locks in the connector. Fig. 5B.

2. Route to the instruments.
a. Route the wire to the instrument cluster connectors by following the cable to the tank. Tuck the wire between the tank and rubber mount and lead it to the front of the tank. Pull it up the front side and follow the cable to the instruments.
b. Put the female connector on the wire. Strip ½" and double over the bare wire to improve the connection.

3.Final assembly.
a. Install the instrument cluster.
   Early Models: Route the signal wire down between the pin rows. Connect the two cable connectors to rear of the cluster. Screw the cover on being careful not to drop the screw into the fairing.
   Late Models: Feed the new wire through the square hole in the bottom of the connector housing. Plug-in the factory connector. The retaining screw pulls in the connector.

b. Strip 1/2" of the fuel wire and double over the bare wire. Put the male connector on the wire. Plug the fuel wires together. Make sure the **blade** enters the metal **socket**.

c. Place the instrument cluster on the bracket, place the back support behind the case and install with 4 bolts and washers.

d. Connect the battery ground cable. Insert the clock fuse with an assertive motion to prevent intermittent power. **DO NOT** press the buttons. Follow the next step.

4.Check out.

a. Functional check. $88:88$

   The display will have all the elements on. Compare it with the figure at the right. If any element is not working the unit must be replaced. If the display is blank the battery failure function may have been triggered when connecting the battery. Turn the ignition key on then off. If still no display see the *Troubleshooting* section.

   Press F to select units by displaying the number corresponding to the units used in your country.

       1 = miles / gallons (US)
       2 = miles / liters (British)
       3 = kilometers / liters (metric)
       4 = liters / 100 kilometers (metric consumption)
       Press F to cycle through the proper number (1,2,3,4) then press S to set.

b. The display now has "75", press S if on a K75. If on a K100 or K1100 press F to display "100" and press S to select it. You are now at the RANGE function. The range displayed is from preset values and 14 miles (23km) of travel will update to your bike and driving. Follow the flow chart with the following check out to familiarize yourself with it.

c. Press the S button, the display should read 100% $100r$
   This is % fill of the tank. Reads 0-100%.

d. Press F twice. The display is economy. $48E$

e. Press F again. This is the time display. $12:45$
   Flashing 12:00 when it is not valid. It of course must be set. Set it later. See *Setting Clock* under *Operation*.

f. Press F again. You will have to hold it to get past the flashing 12:00. This is the path to the sub-functions. Tank odometer, daily miles/time/avg. speed, 30,000 mi. odometer, consumption distance, distance alarm, and test data used for diagnoses of problems with the fuel monitor. Changing the distance units (kilometer, miles, liters, gallons) is done at the end of this section. See *Changing units of measure*. If the display is left on Sub for 5 seconds it will toggle between RANGE and TIME.

g. Connections check (odometer & fuel control unit). Press F. This returns to the range display. Press S to display the gauge $100r$. Start the engine, press S and hold, it should flash the r symbol. If it does not flash the signal from the injectors is not present. Check for a loose connection or a pinched wire behind the instruments. Cover the display and see if the green back light is on. It is normal for the back light to dim and flicker at idle.

The next steps are used to check signal connections to the odometer. Press F four times to get to "Sub". Immediately press S seven times to get one step past "rSr". The display will read anything from "000" to "255". Start the engine on the center stand and spin the rear wheel. The number should advance about every second depending on the wheel speed. This checks the connection to the back of the speedometer. Press F to get back to RANGE.

Operation

CAUTION! Change settings only when stopped. Making changes may distract from your attention needed to drive safely.

1. Refilling the tank.   *100ʳ*

a. Fill the tank (engine off). You must reset at fill-up. Select the % full function with the S button from RANGE.

b. Press and hold the S button with the engine running. The symbol will flash to signal the impending reset of the fuel counter. Release the button after it stops flashing and the display will read 100%. All setting modes will flash to allow aborting the change by releasing the button early. The marker function is an exception.

c. **Each time you fill-up, you must do this step. Don't run the engine while filling.** Keep in mind that when you refuel you may have been traveling at a more economical speed and the new range may not be achievable. If you need more range, slow down.

d. You can calculate your economy for the previous tank by reading miles/km from fill up and dividing by gallons/liters to fill the tank. You must read the distance **F**rom **F**ill (symbol *F*) before resetting gauge to 100%.

3. Setting the clock   *12:06*

a. Select the clock with the F button. The clock display flashes 12:00 if invalid.

b. The engine must be running to set the clock unless the time was invalid.
    To set the hours and minutes press and hold the S button, the colon flashes, release while the hour flashes. *1 2 hr* is displayed.

c. The engine can now be turned off. Press S to select 12 hour periods and F for 24 hour periods. **Immediately** press F or S to set the hours and minutes. Set the minutes to one or two minutes fast then set the hours. **A pause of five (5) seconds will end the setting of hours and minutes and hold the clock.** The colon then flashes. When the time matches the clock press S (hold for a second). Be sure the colon stops flashing. If the 12 hour mode was selected press F for AM ”*A*” or S for PM “*P*”. This must be correct for the auto reset functions to work properly. 12:00 noon is 12:00PM.

d. **To set only the hours.** Select the clock with the engine running and hold the S button until the colon then the hours stop flashing. Press F to advance the hours and S to retard the hours. A 5 second pause will complete the change and signal by blinking the colon.

Note: At this point Fuel Point is ready to use for the basic functions. After you get familiar with it run it to empty “*0ʳ*” to make sure it is accurately tracking the fuel you are putting into the tank. Do this in an area near fuel or carry some with you in a safe container. In some cases less than the preset range can be obtained on tanks that have the flapper and cone installed in the filler neck. If you install **FUEL Plus**™ on a K1100 with the cone and pump fuel from a vapor recovery nozzle like is used in California you may run empty before zero miles is reached.   Do a trial run as described above. Assistance is available from Electronic Resources.

4. Destination.   *215 d*

a. When needed a destination can be set to give distance remaining. This can be a fuel stop in which the RANGE TRACKER can give you an instant account of achieving your destination. When the destination is set to zero it does not display. In that case select ECONOMY then press S to display destination. Hold S to set the distance to your next fuel stop or junction. F advances the right digit and S sets it then advances one digit left. F advances etc. Set three digits. The engine does not have to run to set it if it is zero

or negative. The value will decrease by one as soon as you roll off. That is because the fractional part is not displayed. 25.0 becomes 24.9, the .9 is dropped.

b. The limit for the destination is 799 miles or 999 km. The display shows tenths when less than 10 mi/km and displays negative to $2\,5\,0$-. The colon is used for the decimal point, $8{:}3d$ = 8.3. If you want to be alerted at a distance prior to reaching the destination set the alert.

c. Marker. $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad 8{:}2\text{-}$

The destination function can be used to measure distances when the destination is not used. Display the destination and set it to zero if not already. Press and release S and the display changes from $0{:}0d$ to $0{:}0$-. It now increments showing tenths to 24.9- and resets at 250-. One press of the S resets it to zero when the engine is running. This allows quick resetting. The negative indicates distance past the reset point.

5. Destination alert. $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad 5A$

a. The alert will switch the display to the destination and flash until you press S or F. The alert can be set to 0 (off), 1 to 99. Select $5u\,b$ and step down with S to $0\,A$. With the engine running hold S until it quits flashing. Press F to advance then S to set it. If you pass the number, set it then start again. When the destination is flashing press S and release to stop the flash.

6. Range Tracker. $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad 12P$

a. Range tracker displays the difference in the RANGE and DESTINATION. The purpose is to assure the rider will arrive at the set destination before running out of fuel. This function is only needed when the destination is near the normal range of the fuel in the tank and the destination is a fuel stop. At any point the rider can see if he is doing better than (positive), equal to (zero) or worse than (negative)

achieving the destination. More than minus 299- displays as " - - -". If you see this check your entry.

b. Setting the destination activates range tracker. When the range is short of the destination the display shows negative. 6 -. That means if you continue at the same rate you will run out of fuel 6 mi/km before your destination. Actually the margin will carry you further but don't count on it. Slowing down is the most effective way to improve economy to bring the range back up to achieve the destination. Hard acceleration should also be minimized. When the destination reaches zero range tracker no longer displays.

c. Another benefit from range tracker is the ability to get from point A to point B in the minimum time with the fuel available. Anytime the range tracker is positive you can run harder and faster. Under these circumstances make sure you have the correct distance to a fuel stop entered into the destination! Highway signs are not always correct.

7. Sub-functions $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad 5ub$

a. Miles/km on tank. $\quad\quad\quad\quad\quad\quad\quad\quad\quad 145F$

Resets at fill-up. Always reads miles/km from fill-up. Same as resetting the factory trip odometer at fill-up.

b. Daily miles/km, run time, avg. speed (includes stops) dAY

Automatically resets each day and can be manual reset. Reset occurs the first time the ignition is turned on after 1:00-9:00 AM. The display alternates "dAY", distance (no symbol), time "$:$", and the average speed "A". Manual reset by starting the engine and pressing S then immediately press and hold F until it quits flashing. See 7f to change auto-reset time.

c. 30,000 mi. odometer. $\quad\quad\quad\quad\quad\quad\quad\quad odo$

Manually reset with the S button while the engine is running. Hold S, flashes "r" then resets to 0. Going across country? It rolls at 30,000. The indication is miles/km divided by 10. Add one zero to the right of the number. 346 = 3,460 miles.

The display alternates "odo" and the miles/km. Maximum reading is 2999 (X10).

d. Changing consumption avg. distance.   *C on*

This distance is used for averaging the consumption of fuel and therefore calculating the range. See the *Advanced operation* section for details.

e. Set destination Alert.   *10A*

With the engine running hold S until it resets to zero. Press F to advance and then set the desired value with S (99max). If you pass the value, set it and start again.

f. Set daily reset time.   *E 2*

Default time is 2:00 am. With the engine running hold S until it quits flashing. Press F to select 1 - 9 then press S to set it.

8. Test Functions

a. Press F to select test function.   *rSr*

The table below shows the information read. Engine running is not required except to change consumption average distance, destination alert, tank volume, and units of measure.

b. Press the S button once gives the wheel counter. Used for testing the odometer input. Press S again and it gives the software version, press again for the distance units (75=mi. 47=Km.

c. Press S again. This starts the read out of system variables (10). This information is useful in diagnosing a malfunctioning monitor. All of the numbers will be three digits. This information may be required for service. Press S to step through or press F at any time to exit TST.

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Data table following *rSr*

Odometer input	000-255	reads random value
Software version	031	= version 3.1
Distance unit	075,047	075 = miles
		047 = kilometers
Flag 3	000-001	0 = gallons 1 = liters
Flag 2	000-255	no user definition
Flag 1	000-255	no user definition
Flag 0	000-255	no user definition
Fuel remaining (hi)	000-255	Fuel counter high byte
Fuel remaining (lo)	000-255	Fuel counter low byte
Displays "*Full*"	K75 or	K100/K1100
Fuel full (hi)	047	035 Tank volume high byte
Fuel full (lo)	057	106 Tank volume low byte

Displays "*F U E*" conversion to gallons or liters for economy

	K75		K100/1100	
	liters	gallons	liters	gallons
(hi)	002	009	001	007
(lo)	135	146	249	121

d. Display element test.   *88:88*

Verifying all the elements are on. Press F to exit to RANGE or go to the next step (don't press a button).

e. Changing units of measure.

Continued from above, hold S with the engine running, "*U*" flashes to indicate entering the change mode. Press F to select 1, 2, 3 or 4 by displaying the number corresponding to the units used in your country. 1 = miles & gallons. 2 = miles & liters. 3 = kilometers & liters. 4 = liters per 100 kilometers. Press F to cycle through 1,2,3,4,1,2, etc. then press S to set the proper number. Changing units from miles to kilometers will reset the 30,000 mi. odometer if the miles are greater than 18,750 (30,000km). You should only need to change it if crossing into a country using a different unit. US to Canada or Mexico.

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What to expect from **FUEL Plus**™.

Fuel Plus will allow you to keep accurate track of your fuel level. It allows you to quickly make a decision on when or where to stop to refuel. Accept range readings under cruising conditions. Ignore the values when coming off the highway and traveling at slower economical speeds unless that is going to become your new cruising speed. Idling at lights will temporally reduce your range. As you roll off the range will drop but start back up as you get some distance.

On short day trips you can check your return fuel requirements if returning the same route. Compare your daily miles to your range at the turn around point. If you have enough you don't have to stop for fuel. If it is close use the range tracker.

It is normal for the back light to dim and flicker at idle. If it is dim over 2000 RPM you have a charging problem. If you are using kilometers or auxiliary tanks the range above 299 will not have the "ʳ" in the display.

Advanced Operations (if you want to know)

Operating Principals

FUEL Plus™ is a small computer that gets input from the fuel injection system to keep track of fuel that is removed from the tank. The number of injectors on the K75 and K100 causes a difference in flow and the metering constants are different. This is the reason for setting the **FUEL Plus**™ for each model even though the tanks are the same. It gets input from the operator to tell it when the tank has been filled and to select functions. It also gets input from the odometer to tell how far the motorcycle has traveled. Economy as displayed is (distance/consumption) based on the value set in consumption average distance. The default is 128, equals about 20 miles (32km). Economy as displayed by **FUEL Plus**™ should be used as a reference for your current conditions. If you want

instant economy set the consumption average distance to a low number. Your average economy should be taken from the distance driven divided by the gasoline pumped. Range is economy times the fuel remaining. **FUEL Plus**™ uses an average based on the same consumption distance value as economy.

The odometers are simply distance traveled from last reset. The miles/km on tank reading is reset with the reset at fill-up. Daily miles/km, running time, and average speed are reset after 2:00AM and when the ignition is turned on. The 30,000 mile/km odometer is manually reset by the operator.

CAUTION: Do not change the settings while driving.

Custom tanks

FUEL Plus™ requires some alteration to operating if your motorcycle has auxiliary or added capacity fuel tanks.

One method is to replenish the main tank from the auxiliary tank topping it off each time. Operating **FUEL Plus**™ requires resetting each time the main tank is filled **to full**.

Another method is to manually calibrate **FUEL Plus**™ to the total capacity of fuel and reset only when topping off the tank(s) at the pump. This gives total RANGE at the time of filling. The **RANGE** AND **Miles/km from fill up** display will not have the "**r**" or "**F**" symbol when the number is 300 or more miles/km.

Manual calibration

This method is less convenient than the preset but will give more accurate measurement of fuel capacity on your motorcycle. It allows you to leave as much or as little fuel for a margin as you desire. You should not try to use all the fuel in the tank. A margin needs to be left to compensate for variations in temperature and ability to fill the tank(s) full each time.

1. Fill the fuel tank (engine off) then go to the `rSr` display. Step with the S button to the `Full` display. Start the engine, press and hold S until `CAL` changes to `75`. Press F twice to get to `CAL`. Stop the engine. It is now in the calibration mode, `CAL` is displayed, and no other functions are accessible. Don't press S while the engine is running until step 2. If you do the `CAL` will flash indicating it is about to end the calibration cycle. Releasing the button will leave it in the calibration mode. Remove ½ to 1 quart (½ to 1 liter) of fuel from the tank. This becomes your margin to assure you will still have fuel when **FUEL Plus**™ runs to empty. You may want to carry the fuel removed (maybe more) in a safe sealed container.

2. Ride until your tank is empty. The power will drop momentarily as the fuel pump gets air. You will be able to travel from 2 to 6 miles before it quits completely. Calibration measures the fuel used by the engine. At the point you first experience power loss hold the S button, `CAL` flashes then it goes to the RANGE display, release the button. This sets the new value for your bike and tank(s). **FUEL Plus**™ indicates 100% fuel but you need to reset it when you fill the tank(s). Use your spare fuel if needed then fill the tank(s) again and reset it to 100%. The range function will indicate range in miles/km with the "`r`" symbol to the right. If the range is greater than 299 it will not display the "`r`" symbol.

Recording the tank volume

This allows resetting the custom tank volume without going through the calibration again. If the memory is lost due to prolonged power failure this allows setting the tank volume back into memory. To record the manual calibration go to the test "`rSr`" section and step down to one past the "`Full`". **Tank volume high** (   ) and **low** (   ). Record the three digit numbers here for future reference.

Resetting the tank volume to a previously calibrated value**.** Go to the **Tank volume high** display described above and start the engine. Press and hold the S button, the number flashes indicating you are entering the set mode. When the number stops flashing you then can stop the engine. Press and hold F to advance the number. Stop a few numbers before the desired value and press and release to step to it. Be careful not to pass it as it is a long way around to it again. Press S to set it and step to the low value. With the engine running press and hold S to enter the set mode. Select the low value with F and press S to set it. The "`FUE`" display will be on. Press F to go to RANGE. Go back and verify the values as they are directly related to the accuracy of the range computations. To set to a **factory preset** step to the `Full` display, hold S (engine running) until the flashing `CAL` changes to `75`. Press S to set it for K75 or F to select `100` then press S to set it for K100/K1100.

Changing the tank full counter.

You can tweak the tank volume by adding or subtracting the full value. **Be sure to test it before relying on it.** You will need to know how the value is represented. The value used by **FUEL Plus**™ is two 8 bit binary numbers displayed in decimal. If you can do hexadecimal arithmetic you already know what to do. The high and low number must be converted to decimal if you want to add or subtract a percentage from the setting. Here is an example to subtract 5% from the value. That would leave more fuel when 0 miles is reached.
The stock value for a K100/1100 is 035, 106.
Decimal value = (Hi byte X 256) + lo byte
(35 X 256) + 106 = 9066
Subtract 5%, 9066 - (9066 X .05) = 8613 (round number)
convert back 8613/256= 033 (hi byte)
    8613 - (33X256) = 165 (lo byte)
Enter the new HI & LO values as described in *Resetting tank*

volume to a previously calibrated value. Record the new values.

Changing consumption average distance.

The value (1-255) is not a standard unit and compares to about 40 miles (64km) for the 255 value (128 default = 20 mi.). The value 1 is averaging about .5 mi. (.8km). The short average gives a fast response to the change in fuel flow and distance traveled. You can find the most economical speed with it set to 2. Ride slow (5th gear) until the economy indicates the highest. That will be really slow and not a practical speed unless you cannot find a station open then you may want to stretch it at that speed.

The RANGE uses this average distance for calculation also and the large value will level off the peaks and valleys. If you want more response to you fuel usage set it for a smaller value as follows. Select "5ᵤ b" then press S until the "C o n" is displayed. With the engine running hold the S until it quits flashing (kill engine if you like) and increment the value with the F button. Press S to set it. If you pass it run it around again, it rolls at 255 to 1.

Changing fuel conversion.

The conversion factor used to give economy or consumption can be calibrated to your bike. This is **not** used to calculate your range and has no effect on it. The flow rate varies among bikes and this will cause a small error depending on how much different the preset value is from your bike. If you want to tweak it do the following.

The fuel counts per gallon or liter will be measured and then entered in the conversion value location. You need to record the fuel count at the time you fill the tank, subtract it from the full value to get the count for the gallons / liters pumped. Run at least 75% of the tank, more is more accurate. Fill the tank and record the amount pumped. Before resetting **FUEL**

Plus™ to 100% go to "Fuel remaining (hi) & (lo) and record the values. These are the two values before "*Full*". Now reset to 100%.

Convert the two values to decimal as described in the *Changing the tank full counter*. Subtract the value for fuel remaining from the full value and divide it by the gallons / liters pumped to fill the tank. Convert that back into the two binary values. Go to the "FUE" and step one more to display the hi value. With the engine running hold the S to reset and press F to increment. Press S to set it and S again to go to the lo value. Do the same there. F gets you back to RANGE. **Note.** If you are using a custom conversion it must be entered again after changing units or selecting a preset K75, K100/1100 calibration.

Battery drain during storage

FUEL Plus™ uses more current than the clock it replaced. If you store your bike for more than a month the current drain can be reduced by removing and immediately replacing the fuse (third down under left side cover) for the clock. Have the display on one of the **main** functions when removing power. The interruption in power causes it to stop. Be sure the fuse is in place during storage to retain the memory. **FUEL Plus**™ will blank but maintain the fuel data. The clock will not run. When you turn on the ignition **FUEL Plus**™ will start and display the clock, flashing 12:00 to remind you to set it. You do not have to start the engine to set it when it flashes.

Troubleshooting

1. Blank display.
   a. No power. Check battery connection.
   b. Power failure from disconnecting the battery. See c.
   c. Power failure mode triggered while connecting the battery. Turn ignition key on then off. The time display should be on.

d. Power pins not engaged on the bottom of **FUEL Plus**™ module.
e. Defective unit.
2. Tank gauge won't reset to 100%.
    a. Engine off. Engine must be running.
3. Range indications in error.
    a. Calibration preset for wrong model. Check data table.
    b. Calibration cut short or fuel added during manual calibration. Recalibrate the tank.
    c. Intermittent connections to the odometer or fuel control unit. The most common cause is the fuel wire disconnected or pinched behind the instruments. See *Check out* step 7.
    d. Range displays 999, gauge remains at 100%, back light does not come on when the engine is running. If all the above, the fuel wire is shorted or disconnected.
4. Daily miles/km resets in the afternoon or evening.
    a. Clock not set to correct time or AM/PM incorrect. Reset the clock.
5. Button test
    a. If either of the buttons don't seem to work press and listen for a faint click. If no click is heard the switch is either defective or the circuit board may not be seated in the clips and is holding the switch on.
6. Full reset and setup. Do this after your mechanic fowls it.
    a. Go to Sub and step through test data until you get to "Full". Pull the third fuse down and wait several minutes for the display to go blank.
    b. After about 30 seconds replace the fuse. Go to "Check out" and follow the instructions.

Causes for error.

Error in range is usually small enough to be ignored. There should be a margin allowed in the calibrated tank to prevent using all the fuel from accumulated errors. About 10 miles or a quart of fuel should be allowed for a margin on manually calibrated tanks. The following conditions will cause some error.

Non stock tire diameter (rear).
    The circumference of the tire will cause the odometer to be off and can be checked by comparing the factory odometer with a measured mile/km. The range will have the same error because the fuel monitor uses the factory odometer.

Units conversion.
    The conversion to kilometers has an error of -0.8%. When 1008.5km has been traveled the odometer on **FUEL Plus**™ reads 1000km. Miles have no error in conversion.

Partial tank fill.
    The fuel monitor uses the calibrated tank volume to calculate range. If the tank is not filled to the same level as calibrated it will be short and the range indicator will be longer than the actual range.

Improper calibration will give incorrect information.
    Ending calibration before empty or adding fuel during calibration period.

Fuel temperature variations.
    The temperature of the fuel when pumped and when burned in the engine will cause volume differences and error. The margin of fuel at empty will more than offset this error.

Fuel system maintenance.
    If the fuel system pump, injector(s), or pressure regulator is serviced the fuel monitor should be re-calibrated for best accuracy on manually calibrated tanks.

Limited warranty

This product is warranted against manufacturing defects in material and workmanship for a period of 24 months from the date of purchase from an authorized dealer. Within this period Electronic Resources will repair or replace the product without charge if shipping to Electronic Resources is prepaid. Proof of purchase is required.

This warranty does not cover damage or failure caused by abuse, misuse, or faulty installation.

Electronic Resources is not responsible or liable for indirect, special, or consequential damages arising out of or in connection with the use or performance of the product or other damages with respect to loss of property, loss of revenues or profit, or the costs of removal, installation or reinstallation.

Except as provided herein, Electronic Resources makes no warranties, express or implied, including warranties of merchantability and fitness for a particular purpose. Some states do not allow the limitation or exclusion of incidental or consequential damages and some states do not allow limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

This warranty gives specific legal rights and you may have other rights which vary from state to state.

Repair fee

FUEL Plus™ modules out of warranty will be repaired for a fixed fee if the following conditions are met.

1. Offer applies to the original purchaser only and purchase receipt (or copy) must accompany order.
2. The shipping is prepaid to the factory.
3. The unit is in repairable condition. Units with component failure are repairable. Units with physical damage to the circuit board may not be repairable and Electronic Resources has final judgment on repairability.
4. Removal and installation not included.
5. Send repair fee of $35 plus return shipping with defective unit or request COD on return shipment (UPS COD fee and shipping will be added).

Extended service plan

A lifetime service plan is available to the original purchaser for $15. Send **ALL** the following **within 30 days of purchase** date to qualify. *Repair fee* conditions apply. Updates to functions excluded.

Your name, address, and phone (printed).
Copy of the receipt if not purchased from ER.
Serial number, it's on the back of the unit.
$15 check or money order, no cash.

ELECTRONIC RESOURCES

505 Skylark Drive

Oklahoma City, OK 73127

(405) 495-1560 FAX 495-2370

www.fuelplus.com

www.electronic-resources.com

dave@electronic-resources.com

Specifications

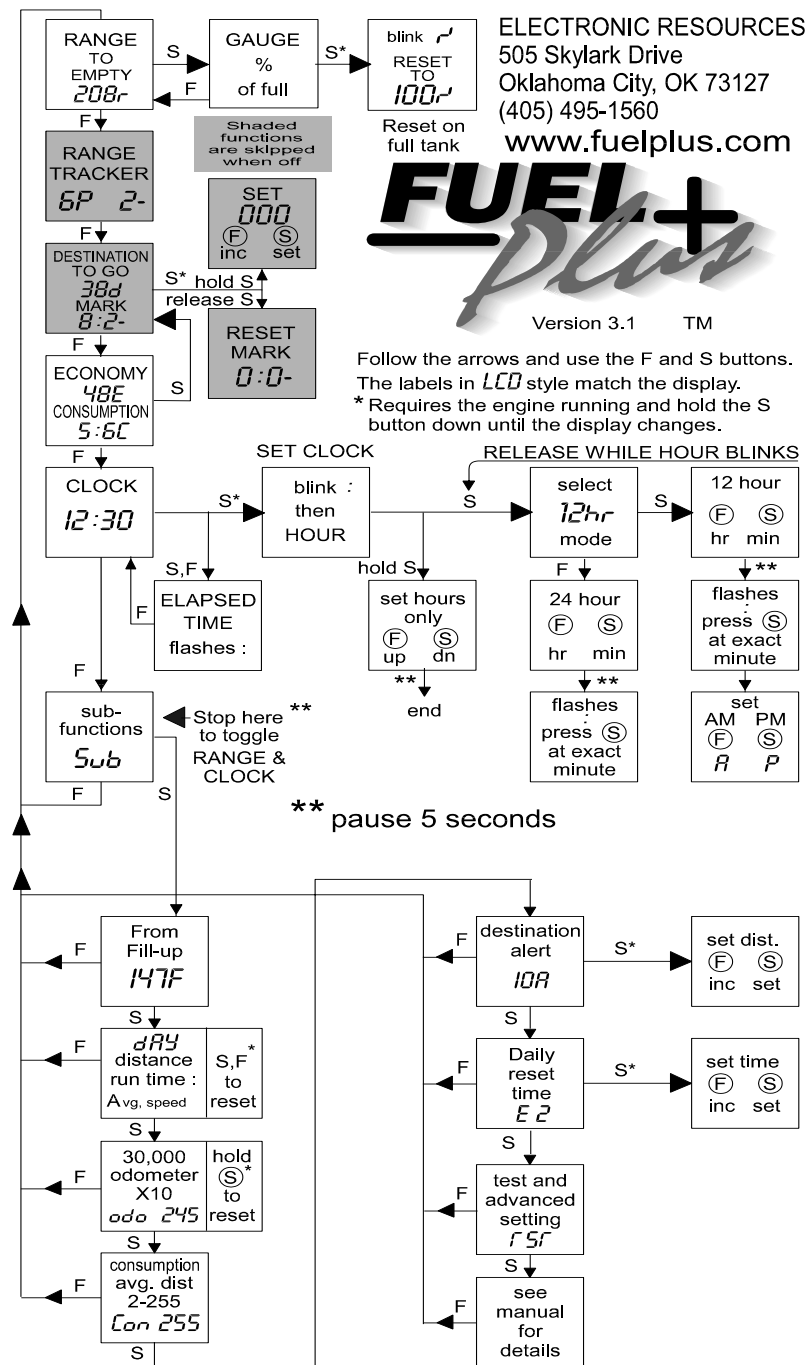|	
Voltage	12.5 to 18V
Current draw	engine off 6ma.
	engine running 55ma.
	low drain (display blank) 35ua
Display limits (not necessarily achievable)	
Range	0 to 999mi/km
Gauge	0-100%
Range Tracker	299-,2999
Destination	tenths 9.9 to 24.9-, 799mi, 999km to 250-
Alert (destination)	1 to 99mi/km
Economy	99m/g, 29.9m/l, 29.9k/l, 29.9l/100k
Clock	accurate ±15 sec./mo., 12hr or 24hr
Elapsed time (engine run time)	0:00 to 29:59
Daily distance	2999
" time	0:00 to 29:59
" average speed	299
Odometer X10	2999
Distance to average for range and economy	
	.5 mi. (.8 km) to 40mi (64km)

NOTES

ELECTRONIC RESOURCES
505 Skylark Drive
Oklahoma City, OK 73127
(405) 495-1560
www.fuelplus.com

FUEL Plus

Version 3.1   TM

Follow the arrows and use the F and S buttons.
The labels in *LCD* style match the display.
* Requires the engine running and hold the S
button down until the display changes.

** pause 5 seconds

NOTES