

Training Notes



pulsar
NS160

FI Twin Disc (ABS + USD)



- The Training Notes are a comprehensive training guide on service and maintenance operations and procedures to be followed by service personnel at authorised service centres and dealerships whilst attending to the Bajaj Pulsar NS 160 Fi USD with Twin channel ABS
- The Training Note covers standard workshop procedures, simplified for easy learning and understanding for service technicians worldwide.

NOTICE

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DOC. NO.: 71113354, REV. 00, AUGUST 2023

CIN L65993PN2007PLC130076

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Key Learning Points

- Understanding of salient features
- Understanding of technical specifications
- Understanding of instrument Cluster
- Understanding of PDI & PM chart with oil grade
- SOPS's understanding



CHAPTER 1

I Read I Learn

Identification

Salient Features

Technical Specifications

Pre-Delivery Inspection Checklist

Periodic Maintenance & Lubrication Chart

Important SOP



Identification

The Frame and Engine serial numbers are used to register the motorcycle. They are the unique alpha-numeric codes to identify your particular vehicle from others of the same model and type.



Frame Number Location

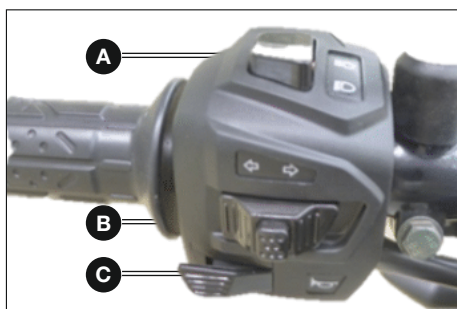
On LH Side of Steering Tube
(Alpha-Numeric - 17 Digits)



Engine Number Location

On LH Side Crankcase Near Gear
Change Lever (Alpha-Numeric - 11 Digits)

Control Switches



Left Handle Bar Switches

A. Dipper Switch : When headlight is ON, High or Low beam can be selected with the dipper switch. Hi beam indicator light located on Speedo console will light up when high beam is selected.

☰: High Beam ☷: Low beam

B. Turn Signal Switch : When the turn signal knob is turned to Left (↶) or Right (↷) respective indicator will start blinking, to stop blinking push the knob in & release.

C. Horn Button : (🔊) Press button for sounding horn.



D. Pass Switch : Press the switch to flash the head light. It is used to give signal to vehicles coming from opposite side while overtaking.



Identification



RH Control Switch

●	All lamps 'OFF'.
☹	While engine running, Tail lamp, Meter lamp and pilot lamp 'ON'.
☀	While engine running, Head lamp, Pilot lamp/s, Tail lamp and Meter lamps 'ON'.

E. Starter Button :

Starter button operates the electric starter when clutch lever is depressed with transmission in any gear.

It is recommended to start the engine with the transmission in neutral.

F. Engine Kill Switch :

The engine kill switch is for emergency use. During emergency move the engine kill switch to the 'OFF' (☹) position.

Speedometer display will work when both Ignition switch & kill switch are in 'ON' position.



CAUTION : While starting ensure that engine kill switch is in ON (☀) position. Keeping the kill switch in OFF position, engine will not start.

Steering Cum Ignition Lock



Steering cum Ignition Lock :

It has three positions.

●	LOCK: Steering locked. Ignition OFF.
☹	OFF: Steering unlock. Ignition OFF.
☀	ON: Steering unlock. Ignition ON.

To Lock the Steering : To lock the steering, turn the handle bar to the left side. Push & release the key. Turn the key to "LOCK" position and remove the key. Steering lock can be done on left handle position only.

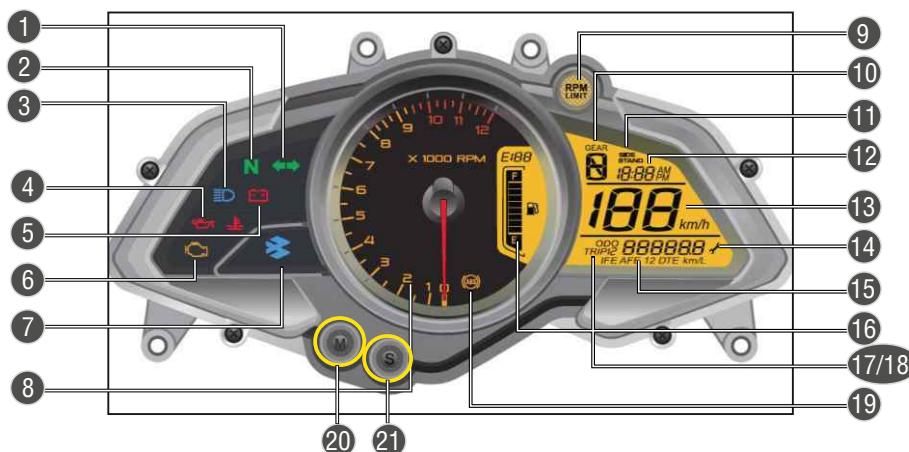
To Unlock the Steering : To unlock steering, insert the key in steering cum ignition lock & turn it clockwise to "OFF" or "ON" position.

Key : A common key is used for 'Steering cum Ignition lock', 'Fuel tank cap' & 'Rear Seat'.



Identification

Instrument Cluster Information



Speedometer display will work when both Ignition switch & kill switch are in 'ON' position.

1. **Turn Signal Indicator (LH & RH):** When Turn signal switch is turned to Left or Right, Turn pilot indicator LH or RH will flash.
2. **Neutral Indicator:** When the transmission is in Neutral, Neutral indicator will glow.
3. **Hi Beam Indicator:** When Headlight is 'ON' & Hi beam is selected with engine running, Hi beam indicator will glow.
4. **Low Oil Pressure Indicator:** It blinks when engine oil pressure is low.
5. **Low Battery Indicator:** It indicates between needs charging.
6. **Malfunction Indicator:** It glows whenever any abnormality is noticed in functioning of Fi system related components.
7. **Bajaj Logo:** Bajaj logo flying 'B' continuously glow.
8. **Tachometer Dial:** It shows engine speed in RPM.
9. **Engine Rev Indicator:** It glows when engine RPM exceed 9000 RPM. It indicates customer "Not to REV up engine beyond safe engine operating RPM".
10. **Gear Indicator:** It will display vehicle position from 1 to 5. It will display 0 when vehicle is in neutral position.
11. **Side Stand Indicator:** When Side stand is 'ON', the Side stand indicator will lit.
12. **Digital Clock:** It indicates time in HR : MM (AM/PM).
13. **Speedometer:** Vehicle speed will be displayed in digital form in Km / Hr.
14. **Service Reminder:** 'Wrench' symbol glows when ODO meter reading reaches to set Kms. It indicates vehicle is due for periodic service. This Icon will flash at... 1st- 450Kms, 2nd- 4450Kms, 3rd- 9450Kms, 4th- 14450Kms and subsequently at each 5000Kms. Icon will continue to glow till it is reset. This icon is to be reset after service is carried out. Service reminder reset is to be done at zero vehicle speed & zero engine speed.
15. **IFE / DTE / AFE:**
 - IFE (Instantaneous Fuel economy):** This will indicate fuel economy in km/L. at any given time.
 - DTE (Distance to empty):** It indicates the estimated distance that the vehicle can travel under current fuel economy & fuel level condition.
 - AFE1 (Average Fuel economy1):** This will indicate the average fuel economy in km/L in TRIP1 mode.
 - AFE2 (Average Fuel economy2):** This will indicate the average fuel economy in km/L. in TRIP2 mode.



Identification

Speedometer display will work when both Ignition switch & kill switch are in 'ON' position.

16. **Fuel Level Indicator:** It shows fuel level in fuel tank.
17. **Odometer:** The Odometer shows the total distance that the vehicle has covered. Odometer can not be reset to 'Zero'.
18. **Trip Meter:** Trip shows the distance traveled since it was last reset to zero.
19. **ABS Indicator:** With ignition switch ON the ABS indicator glows.
20. **Mode Button:** It is used for toggling between different modes e.g. ODO, trip1, Trip2, DTE and clock setting.
21. **Set Button:** Set button used for toggling between ODO to IFE, Trip 1 to AFE1, Trip2 to AFE2, DTE to Distance to next service and clock setting.

Speedometer Setting



1. Trip Meter Reset :

- Mode & Set push button is provided for selecting & resetting 'ODO/TRIP1/TRIP2'. LHS part of speedo console.

1	Press mode push button for less than 2 sec.	Mode changes from 'ODO/TRIP1/TRIP2'
2	Press set push button for more than 15 sec.	Press set push button for more than 15 sec.

2. Service Reminder Reset (🔧) :

'Wrench' symbol glows when ODO meter reading reached to set Kms.

This icon will glow at-

1st : 450 Kms 2nd : 4450 Kms
3rd : 9450 Kms 4th : 14450 Kms
& subsequently at each 5000 Kms.

Note : Bring the motorcycle at authorised BAL dealership for re-setting the service reminder icon.

Service Reminder Reset:-

Note: 1. To reset service reminder icon vehicle speed & engine RPM should be zero.

2. Service reminder re-set can be done in ODO/TRIP1/TRIP2.

Sr.No .	Step	Result	Illustration
1	Press 'MODE' push button & Turn ON ignition switch, Hold MODE push button for more than 10 seconds.	Service reminder icon will start blinking.	



Identification

Sr No	Step	Result	Illustration
2	Release mode push button & within the 10 seconds, press SET button for more than 5 second	Service reminder icon will get reset (Service reminder symbol turn off).	
3		Next service schedule in Km. is displayed as shown in photo. ODO / TRIP 1/ TRIP 2 (text) will turn OFF for 5 sec.	
4		After 5 sec. text will reappear with respective Km reading.	

Note: Prior service reminder reset is allowed only when DISTANCE TO SERVICE is less than or equal to 450 Kms.

(DISTANCE TO SERVICE = NEXT SERVICE SCHEDULE – PRESENT ODO)

Case – 1 = if distance to service is less than 450 Kms, then follow the steps given in above table.

M Case – 2 = if distance to service is more than 450 Kms, then Service icon will not reset (blinking continues), ODO/TRIP1/TRIP2 icon will blank out & ODO/TRIP1/TRIP2 digit field will display next service schedule km reading for duration of 5 seconds



Identification

e.g. 4th Service

Defined Km range for 4th Service = 14500 ~ 15000 Kms.

Service reminder icon will be ON at 14450 Kms.

Customer reported for service at ODO reading = 13150 Kms.

DISTANCE TO SERVICE = 14500-13150 = 1350 kms which is greater than 450 Kms.

Results:

- Service reminder icon will not reset
- Service reminder icon blinks continuously in selection mode and even while displaying next service schedule as per below point 4.
- ODO/TRIP1/TRIP2 text will turn off
- ODO/TRIP1/TRIP2 digit field will displays 14450 Kms (next service schedule) for duration of 5 seconds.



3. Clock Reset :

- Digital clock indicates time in HR & MM separated by colon ':'
- It is 12 hour clock.
- Initially ':' will be blinking
- Clock setting is possible in TRIP 1 mode only.

1.	Press mode push button for less than 2 sec.	TRIP1 Mode selected
2.	Press mode & set push button together for more than 2 sec.	':' stops blinking Digits starts blinking
3.	Press mode button for less than 1 sec.	Hour digits will increase by one
4.	Press set button for less than 1 sec.	Minutes digits will increase. If mode/set button is pressed continuously then digits will stop blinking.
5.	Press mode & set button together for more than 2 sec.	Set value will be saved Exit clock setting mode Digits stop blinking ':' start blinking
6.	Clock set mode is selected & no editing is carried out for more than 5 sec.	Auto exit without saving set value. If engine/vehicle rpm is given then system will exit from clock set mode without saving set value.



Salient Features



PERFORMANCE

	Key Features	Advantages	Benefits
	• 4 Valve Air & Oil cooled Engine with 2 spark plugs • Engine power: 17 Ps (12.5 KW) at 9000 rpm. • Engine torque: 14.6 Nm at 7250 rpm. • New generation closed loop BOSCH fuel injection • DC ignition system. • Molycote piston. • Oil cooler. • Oil jet in lubrication circuit. • Heavy duty gear box. • Viscus type air filter element.	• Smooth power delivery. • Optimum engine torque at variable engine speed. • Better drivability & knock free performance. • Consistent engine performance – Power, Pick up & Mileage. • Seamless changes in ignition maps for good engine performance. • Reduced friction of piston for long life. • Improve cooling efficiency in all riding conditions. • Improved life of engine components. • Suited for high speed driving. • Optimum utilization of engine torque. • Improved efficiency of filter.	Absolute joy to ride due to – • Better & optimum output. • Razor sharp response to throttle inputs. • More power in all load conditions, better torque at low rpm, less emissions. • Smooth gear shifting.

STYLE

	Key Features	Advantages	Benefits
	• Stylish split seats. • Two piece grab rail. • Clip on - split type handlebar. • Exposed, endless type of drive chain. • Centrally placed, split type under belly silencer. • Clear lens blinkers.	• Bold assertive stance, Sporty looks, brawny and definitely bold.	• Style that lets you break free from the mundane.



Salient Features

CONVENIENCE

	Key Features	Advantages	Benefits
	• LCD Speedo Console. • Low Battery level indicator. • Low Engine oil pressure indicator. • Digital speed indication. • Engine over speed limiter. • Tachometer for engine speed. • Gear position indicator • Instant Fuel Economy/ Average Fuel Economy / Distance to Empty • Maintenance free sealed battery.	• Fully equipped with fault/safety Indications, clock, service reminder & Trip meter with digital fuel gauge. • Early warning to prevent battery getting fully discharged. • Early warning to save damages to engine. • Easy to read at a glance. • Warns the rider to control revving of engine. • For monitoring engine speed and optimum sport riding. • Indicates in which gear the vehicle is being driven. • Determines Fuel consumption and the distance that can be travelled with the fuel in Fuel tank • Electrolyte topping up not required for its life.	• Ready information to customer available at his fingertips. • Indication for customer to take remedial action. • Easy to ride without any driving/ operating/ maintenance hassles.

SAFETY

	Key Features	Advantages	Benefits
	• Twin channel ABS Front Disc: 260mm Rear Disc: 230mm • Tubeless tyres. • Powerful DC projector head lamp.	• Contemporary design for best efficiency. • Smooth ride, slow deflation in case of punctures for good control. • Constant bright beam from head light even at low vehicle speeds and during idling too.	• Safety on road in high speed driving. • Highest stability & road grip. • Bright illumination in all situations of riding.



Technical Specifications

Engine & Transmission

Type	: Four stroke, Single cylinder oil cooled
No. of cylinders	: One
Bore	: 58 mm
Stroke	: 60.7 mm
Engine displacement	: 160.3 cc
Idling Speed	: 1500 ± 100 rpm
Max. net power	: 17 PS (12.5 KW) @ 9000rpm
Max. net torque	: 14.6 Nm @ 7250rpm
Ignition System	: DC
Spark Plug	: 2 Nos, BOSCH or CHAMPION
Spark Plug Gap	: 0.7 ~ 0.8 mm
Lubrication	: Forced lubrication
Transmission	: 5 speed constant mesh
Gear shifting	: 1 down 4 up

Engine Oil Details

Grade	: Grade - SAE 20W50 API SL JASO MA
Refill at servicing	: 1350 ml (1200ml + 150ml)
Overhaul	: 1550 ml (1400ml + 150ml) (additional 150 ml is for Oil Cooler)

Chassis & Body

Frame Type	: Perimeter
Suspension	Front : 33Ømm USD Fork Rear : Mono suspension with nitrox
Brakes	Twin channel ABS Front : Hydraulic disc brake, Ø260mm disc Rear : Hydraulic disc brake, Ø230mm disc
Tyres	Front : 100 / 80 - 17, 52 P Tubeless Rear : 130 / 70 - 17, 62 P Tubeless
Tyre Pressure	Front : 1.75 kg/cm ² (25.0 PSI) Rear (Solo) : 2.00 kg/cm ² (28.4 PSI) Rear (with Pillion) : 2.25 kg/cm ² (32.0 PSI)
Fuel Tank Capacity (Full)	: 12 Liters

Note : Always maintain Minimum 3 Litres of fuel in Fuel Tank for smooth functioning of vehicle.

Controls

Steering	: Handlebar
Accelerator	: On handle bar, RH grip
Gears	: Left foot pedal operated
Brakes	Front : On handle bar, RH lever Rear : Pedal operated by RH foot
Clutch	: Lever operated, left hand



Technical Specifications

Electricals

System	: 12 V (DC)
Battery	: 12V 4Ah, VRLA
Head Lamp	: 12V 35/35 W
Position Lamp	: 12V 3 W (2 nos.)
Tail / Stop Lamp	: LED
Side Indicator Lamp	: 10W
Neutral Indicator	: LED-Green
High Beam Indicator	: LED-Blue
Turn Signal Indicator	: LED-Green
Side Stand Indicator	: LCD
Speedometer Lamp	: LCD-Amber
IFE / AFE / DTE	: LCD
Low battery indicator	: LED-Red
Low oil pressure	: LED-Red
Service reminder	: LCD
Malfunction Indicator	: LED-Yellow
Bajaj logo	: LED-Blue
RPM Limit	: LED
ABS Indicator	: LED-Yellow
Rear number plate lamp	: 12V 3W
Horn	: 12V DC Type, 2A (82mm dia.)

Dimensions

Length	: 2017 mm
Width	: 804 mm
Height	: 1060 mm
Wheel Base	: 1372 mm
Ground Clearance	: 170 mm

Weights

Vehicle Kerb Weight	: 152 kg
Gross Vehicle Weight	: 302 kg

Performance

Maximum Speed, km/h	: 106 Kmph
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Fork Oil Details

Grade	: SAE 10W20 Bajaj Genuine Fork Oil
Quantity/Leg	: 180 ml / leg

Notes:

- Values given above are nominal & for guidance only, 15% variation is allowed to cater for production & Measurement.
- All dimensions are under un-laden conditions.
- Definitions of terminologies wherever applicable are as per relevant IS/ISO standards.
- Specifications are subject to change without notice.



Pre Delivery Inspection Checklist

Following is the checklist for carrying out PDI of "Pulsar NS160 Fi" motorcycle. This checklist is to understand various check points those are to be checked / inspected before delivery of the new vehicle.

This ensures trouble free vehicle delivery to the customer

Check & correct the below check points before starting the vehicle			
To Check	Check for	✓ If Ok	Observations / Remarks
		X If Not Ok	
Engine oil	Oil level between lower & upper mark / Top up if required (In both wheel touched to ground condition)		
Fuel tank / pipes	No leakage / Correct fitment		
Oil Cooler pipes	No leakage / Correct fitment		
Mirror	Fitment & Adjustment to ensure clear rear view		
Lock Operation	Steering cum Ignition lock, Seat lock, LH side cover lock, Petrol tank cap lock.		
Battery	Terminal voltage 12.8 V DC for VRLA Battery using battery tester		
	Tightness of battery terminals / cables / Petroleum Jelly application		
Front & Rear Brakes	a) No oil leakage from Master cylinder / Caliper / ABS unit / Hoses		
	b) Oil level in Master cylinder reservoir should be above 'Min.' marking in transparent window		
	c) Lever free-play at ball-end must be 12-18 mm		
Tyre Pressure	Front: 1.75 Kg / Cm ² (25.0 PSI)		
	Rear (with pillion): 2.25 Kg / Cm ² (32.0 PSI)		
Clutch/ throttle cable	Free play 2 ~3 mm		
Drive chain	Slackness 20 ~ 25 mm		
	Equal marking of chain adjusters on both side		
	No touching to chain case		
Fasteners (Check torque) Recommended Torque Wrench to be used for applying torque on nut -bolts as mentioned in PDI check sheet using reference torque chart. However if any major parts are required to be removed (Except side cover & seat) for accessibility of torque wrench, in those cases the tightness can be ensured using open end / ring spanner / box type spanner as applicable without removing those major parts	Engine stay Upper bolts : 2.5 ~ 3.0 Kgm		
	Engine stay Lower bolts : 4.5 ~ 4.7 Kgm		
	Rear Engine mounting bolts – 4.5 ~ 4.7 Kgm		
	Front Axle nut – 5 ~ 6 Kgm		
	Rear Axle nut - 8.0 ~ 10.0 Kg.m		
	RSA Mounting nut top / bottom nut - 3.2 ~ 3.8 Kgm		
	Front Fork Upper Bracket side bolts – 1.4 ~ 1.6 Kgm		
	Front fork under bracket bolts – 1.8 ~ 2.2 Kgm		
	Side stand bracket mounting bolt – 1.8 ~ 2.2 Kgm		



Pre Delivery Inspection Checklist

2. Check points during / after starting the vehicle			
Check & correct the below check points during / after starting the vehicle			
To Check	Check for	✓ If Ok X If Not Ok	Observations / Remarks
Switch operation	RH & LH control switch, ignition switch, clutch switch & brake switch (Front & Rear)		
Horn	Ensure no distorted sound		
All Bulbs working	Headlight, Tail / Stop lamp, Side indicators, Speedo bulbs, Number plate lamp		
Speedometer	Working of speedometer, Odometer, Trip meter, Fuel gauge.		
	Working of all signal indicators icons (Neutral, Turn signal, beam, Clock, Low battery indicator, Service reminder, Bajaj Logo) Important : Do not disconnect speed sensor cable. If vehicle is driven in speed sensor cable disconnected condition, it may result into complaints of less pick up & other drive-ability issues like hesitation etc. as the ECU cannot correctly provide the map.		
Headlamps	Focus Adjustment		
3. Check points during Test ride			
Check & correct the below check points during Test ride			
Gear shifting	Smooth operation		
Driveability	Throttle response		
	Brake effectiveness - Front & Rear		
Engine noise	No abnormal noise		
Front fork / steering	Smooth working by pumping movement & smooth operation (No play / No Sticky movement)		
Oil leakages	Specify source of leakages		
4. Visual inspection for dent, scratches, rust ...			
5. Clean the vehicle thoroughly before delivery to customer.			



Periodic Maintenance & Lubrication Chart

Sr. No.	PM Check Points	Recommended Frequency								Remarks
		Service	1st	2nd	3rd	4th	5th	6th	7th	
		KMS	500 ~ 750	4500 ~ 5000	9500 ~ 10000	14500 ~ 15000	19500 ~ 20000	24500 ~ 25000	29500 ~ 30000	
1	Clean the vehicle with water wash & dry completely		CL	CL	CL	CL	CL	CL	CL	Ensure to prevent water entry in Petrol tank, Silencer & electrical parts. Use caustic free detergent for washing
2	Engine oil	R	R	R	R	R	R	R	R	20W50 API SL/JASO MA Grade
3	Engine oil filter	R	R	R	R	R	R	R	R	Replace at first service & then every 5000km
4	Oil strainer	CL	CL	CL	CL	CL	CL	CL	CL	Oil strainer cleaning at the time of oil change
5	Spark plug functioning / Gap	CL, A, R			CL, A		CL, A		R	Replace at every 30000Kms
6	Air cleaner element*** & cover 'O' ring	R				R			R	Replace after every 15000 kms
7	Air filter drain tube	CL			CL		CL		CL	
8	Fuel pipes	C, R					C, R			Replace if required
9	Valve tappet clearance	C, A				C, A			C, A	Replace if required
10	Sealed drive chain cleaning & lubrication	CL, A, L	CL, A, L	CL, A, L	CL, A, L	CL, A, L	CL, A, L	CL, A, L	CL, A, L	Customer to apply OKS chain lube or equivalent spray at every 500 kms.Chain should be cleaned with SAE90 oil or BAL recommended chain cleaning spray at every 2500-3000kms by rotating the rear wheel
11	Silencer drain hole / tail pipe cleaning	CL		CL	CL	CL	CL	CL	CL	Clean at every 5000Kms
12	Brake pedal pivot pin	C, CL, L, R	C			C, CL, L, R			C, CL, L, R	Use recommended AP grease for lubrication.Before lubrication clean the pivot pin. Replace if required
13	Brake lining or pad wear	C,R	C,R	C,R	C,R	R	C,R	C,R	R	Replace brake shoes /brake pad at every15000 Kms



Periodic Maintenance & Lubrication Chart

Sr. No.	PM Check Points	Recommended Frequency								Remarks
		Service	1st	2nd	3rd	4th	5th	6th	7th	
		KMS	500 ~ 750	4500 ~ 5000	9500 ~ 10000	14500 ~ 15000	19500 ~ 20000	24500 ~ 25000	29500 ~ 30000	
14	Brake fluid level** - top up / replace	C, A, R				C, A			R	Use recommended brake fluid (DOT4).
15	Disc brake assy – check functionality, leakage or any other damage	C, A, R	C, A, R	C, A, R	C, A, R	C, A, R	C, A, R	C, A, R	C, A, R	Check source of leakage if any in brake system. Check brake hose condition.
16	All cables & rear brake pedal – free play	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	Replace cables if operations found hard
17	Wiring harness connections, routing, tie bands & clamps tightness. Conduit/PVC sleeve inspection	C, A, T	C, A, T	C, A, T	C, A, T	C, A, T	C, A, T	C, A, T	C, A, T	Damaged conduit/PVC sleeves protection by applying electrical tape
18	Battery, connection & health by load tester. Positive terminal CAP fitment	C, A, L, T	C, A, L, T	C, A, L, T	C, A, L, T	C, A, L, T	C, A, L, T	C, A, L, T	C, A, L, T	Apply petroleum jelly on battery terminals, Use recommended Midtronix battery tester & VRLA battery charger
19	Steering play	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
20	Steering stem bearing & Cap steering bearing (Plastic)**	C, C L, L			C, C L, L		C, C L, L		C, C L, L	Check & replace if damaged. Use Shell Gadus S3 V220C2 for lubrication.
21	Ignition switch barrel cleaning & handle bar control switches contacts cleaning	C, C L			C, C L	C, C L	C, C L	C, C L	C, C L	Use recommended Wd40 spray or equivalent.
22	Main stand & side stand pin**	CL, L			CL, L		CL, L		CL, L	Use recommended AP grease.
23	All fasteners tightness	C, T	C, T	C, T	C, T	C, T	C, T	C, T	C, T	



Periodic Maintenance & Lubrication Chart

Sr. No.	PM Check Points	Recommended Frequency								Remarks
		Service	1st	2nd	3rd	4th	5th	6th	7th	
		KMS	500 ~ 750	4500 ~ 5000	9500 ~ 10000	14500 ~ 15000	19500 ~ 20000	24500 ~ 25000	29500 ~ 30000	
24	General Lubrication	L	L	L	L	L	L	L	L	
25	EVAP system hose & drain EVAP "Y" connector	C, CL, R	C, CL	C, CL	C, CL	C, CL	C, CL	C, CL	C, CL	Replace hoses if found cut or damaged. drain EVAP "Y" connector every service.
26	Front fork pipe & dust cap cleaning**	C, CL, R	C, CL	C, CL	C, CL	C, CL	C, CL	C, CL	C, CL, R	Pull down the front fork dust cap and clean the fork pipe and dust cap with water, refit the dust cap to its original position after cleaning. Replace oil & oil seal & dust seal in pair every 30000km
27	Throttle body rubber duct (sleeve) hard resulting in loose fitmnet	C, R				C, R	C, R	C, R	C, R	Replace if required
28	Engine breather tube for cracks	C, R			C, R	C, R	C, R	C, R	C, R	Replace if required
29	HT coil connections	C, T			C, T	C, T	C, T	C, T	C, T	
30	Starter motor & starter relay connections	C, T			C, T	C, T	C, T	C, T	C, T	
31	Oil pressure indicator check on console post ignition ON	C	C	C	C	C	C	C	C	Icon should disapper post engine ON after 4500 RPM, If lamp is continuously ON at engine ON condition then replace.
32	Check fault code, clear fault history, update latest HEX file if applicable	C	C	C	C	C	C	C	C	



Periodic Maintenance & Lubrication Chart

Sr. No.	PM Check Points	Recommended Frequency								Remarks
		Service	1st	2nd	3rd	4th	5th	6th	7th	
		KMS	500 ~ 750	4500 ~ 5000	9500 ~ 10000	14500 ~ 15000	19500 ~ 20000	24500 ~ 25000	29500 ~ 30000	
33	Step pillion LH & RH (ball & plate)	CL, L, R		CL, L	CL, L	CL, L	CL, L	CL, L	CL, L	Replace ball & plate if required
34	Swing arm NRB	C, L, R								Lubricate every 40000km, replace if required
35	Rear sprocket fasteners for looseness	C, T	C, T		C, T		C, T		C, T	Use model wise torque values
36	Rear wheel rubber shock dampers for excess play	C, R			C, R		C, R		C, R	Replace if required
37	Fairing & windshield well nuts for rubber crack	C, R			C, R	C, R	C, R	C, R	C, R	Replace if required
38	Head light focus adjustment	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
39	Check & confirm all LED/bulbs are working	C, R	C, R	C, R	C, R	C, R	C, R	C, R	C, R	Replace if required
40	Tyre air pressure	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	Use model wise tyre pressure
41	Mirror position and joint firmness	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
42	SAI hoses- Check functionality leakage or any other damage**	C, R	C	C	C	C	C	C	C	Replace if cut / damaged



Periodic Maintenance & Lubrication Chart

Sr. No.	PM Check Points	Recommended Frequency								Remarks
		Service	1st	2nd	3rd	4th	5th	6th	7th	
		KMS	500 ~ 750	4500 ~ 5000	9500 ~ 10000	14500 ~ 15000	19500 ~ 20000	24500 ~ 25000	29500 ~ 30000	
43	SAI foam filter*	CL, R				CL			R	
44	Engine Foundation silent bushes**	C			CR		CR		CR	Replace if cut / damaged
45	Idle Speed / CO%	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	
* It is strongly recommended to use only recommended grade of oil.										
** As applicable to model										
*** More frequent cleaning is required while driving in dusty environment.										

C : Check, A : Adjust, CL : Clean, R : Replace, T : Tighten, L : Lubricate

Recommended Oil	SAE 20W50 API 'SL', or JASO 'MA'
Replacement Frequency*	1st replacement at 500-750 Kms./ 1st service. Thereafter at every 5000 Kms.
Recommended Quantity	Refill at servicing : 1350 ml.(1200ml.+150 ml.)
	During engine overhaul : 1550 ml.(1400ml.+150 ml.)
	(additional 150 ml is for Oil Cooler)

CAUTION:

- It is most important to adhere to recommended grade & frequency of oil change for long life of critical engine components.
- Do not reuse drained oil. Dispose drained engine oil in a manner which is environmental friendly.
- It is important to charge the VRLA Battery initially with recommended electrolyte only.

Important SOP



Pillion Footrest Lubrication



- Cleaning & lubrication of LH/RH pillion footrest is to be carried out at every 5000 kms to prevent jamming or sticky movement of LH/RH pillion footrest by using “DRYLUBE 1262 Spray”

Part No : 36314007

Manufacturer : Elite Industries, Thane

Applicable models :

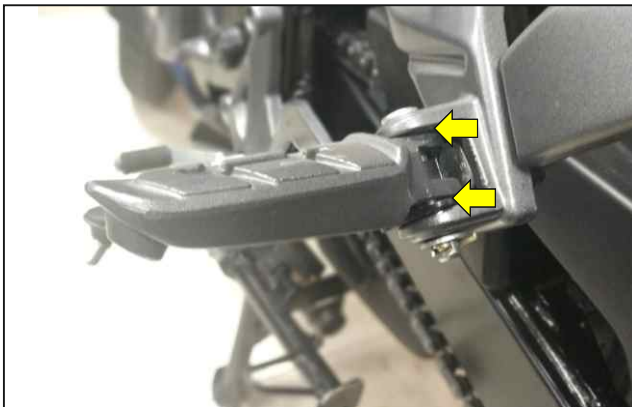
Pulsar NS160/NS200/RS200/Dominar 400/250

Benefits :

- Viscous coating gives excellent lubricity.
- Penetrates easily & forms protective coating.
- Protective coating inhibits corrosion.
- Water resistant.

Note :

Ensure area of pillion footrest is free from loose particles, dust & rust. If not wash the vehicle/pillion footrest area and dry it.



- Spray “DRYLUBE 1262” on footrest area without dismantling(in footrest open & folded condition) as shown.
- Ensure distance of about 8 inches while spray application.
- Ideally two coats are necessary. Allow to dry first coat & then apply second coat.
- After application, allow it to cure for 10 minutes.



Precautions :

- Do not clean with Kerosene or diesel as this will lead to dry joints getting sticky & creating noise.
- Do not lubricate the foot rest ball & plate area with grease or oil, as this will attract more dust & result in jamming of foot peg movement.



Important SOP

Fuel Pump Pressure Checking

Fuel Pump (Pressure / Delivery) Checking SOP is same as Dominar 400/Pulsar RS200



Fuel Pump Pressure checking unit :

Part Number : 37004451

Application :

For checking fuel pump pressure

Connect fuel pump checking unit to fuel pump outlet as shown.




Fuel Pump Module Values :

Parameter	Specification
Fuel pump pressure	2.45 - 2.55 bar (2.4 – 2.8 Kg/cm ²)
Fuel pump delivery liters per hour	10

Skill Tips for Tappet Setting



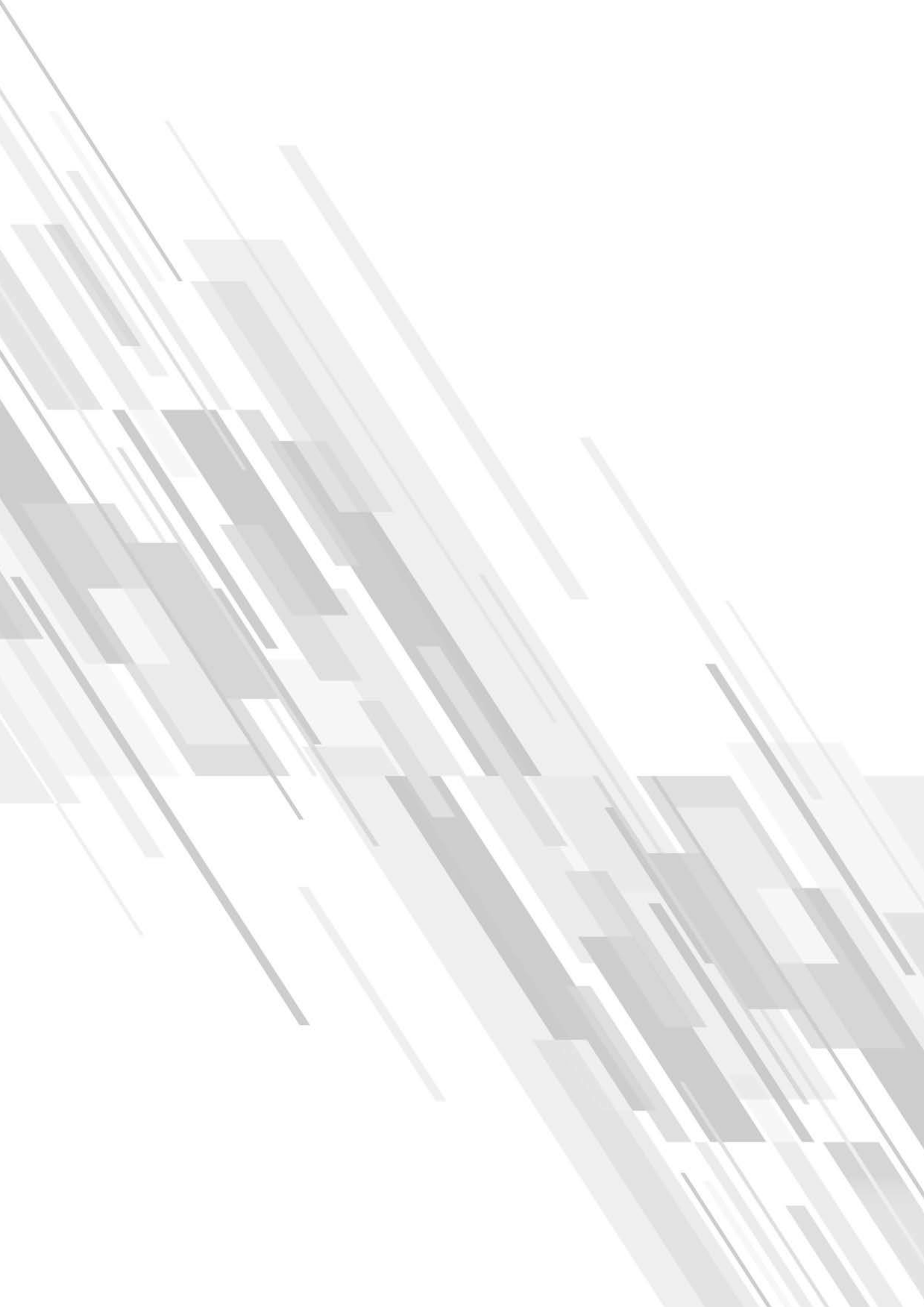
When adjusting the valve tappet clearance the cam sprocket “T” mark should be on the top side & the vertical line next to the “T” mark should match with the cylinder head casting line when viewed from one of the top side hole next to the mark





Notes

[illegible]



Key Learning Points

- Understanding harness routine & location of components
- Fuel pump filter replacement Sop
- Importance of EVAP System & its functioning
- Various SOP'S - Pump delivery & pressure Inspection



CHAPTER 2 Fuel System

Wiring Harness Routine (Bosch+ Varroc)

List of DTC code

SOP for Replacement of Filter in Asian Fuel Pump

SOP for Fuel Pump Delivery / Pressure Checking

Working EVAP system

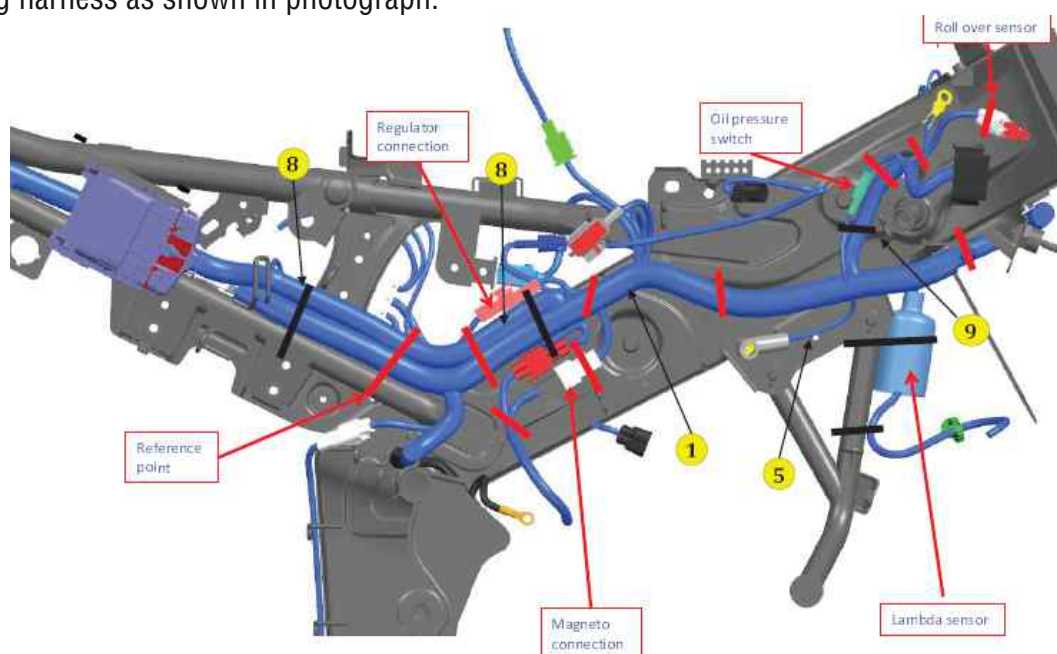
Do's and Don't's



BOSCH Make Wiring Harness Routine

SR. NO.	PART NO.	PART DESCRIPTION	QTY
1	JF402357	HARNESS WIRING	1
2	JF402332	CABLE BATTERY NEGATIVE	1
3	PA402207	CABLE RELAY- MOTOR	1
4	60111420	CABLE TIE LOCK 4.8 1.2 160 Pa66 B	1
5	JL402219	PIGTAIL OIL PRESSURE SWITCH	1
6	LDF00001	WASHER TOOTHED-ID 6.4XOD11XT 0.7	3
7	KAED0610	BOLT FLANGED M6X1	3
8	JD402212	BAND(LENGTH 200MM)	13
9	JD402217	BAND(L 150)	4
10	JD402216	BAND 300 MM	1
11	JY113901	HOLDER COUPLER	1
12	JY113821	SCREW BUTTON HEAD- M6X1XL12XBLACK	3

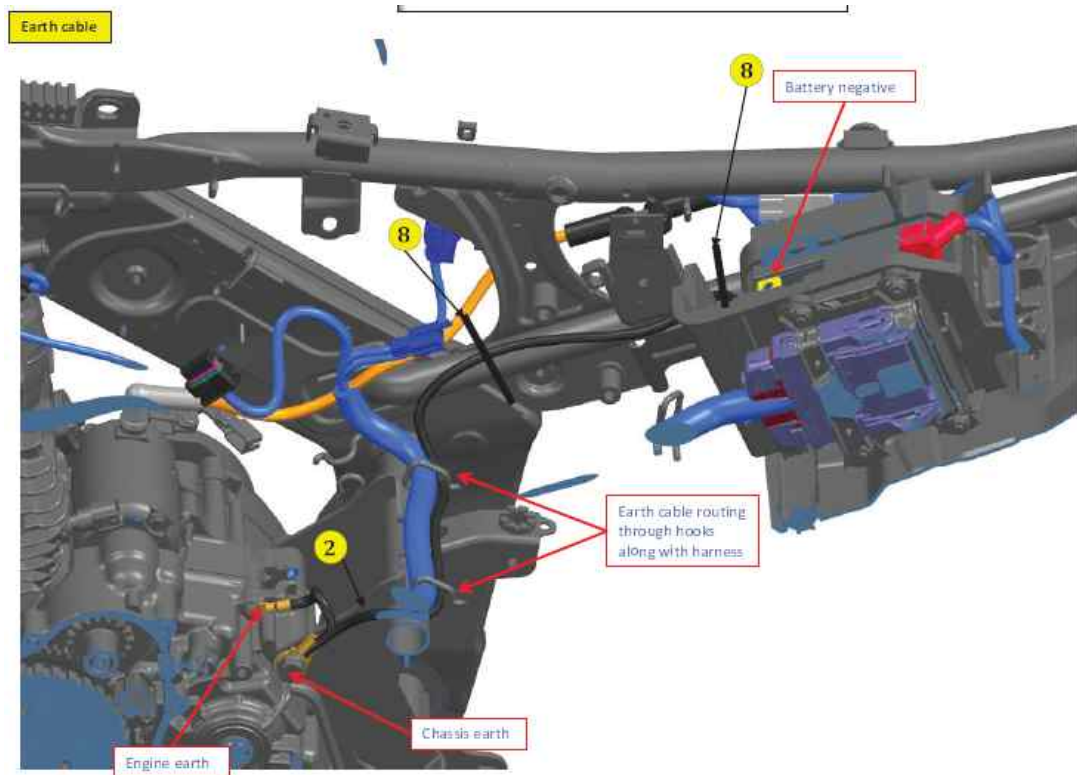
- Route the wiring harness as shown in photograph.



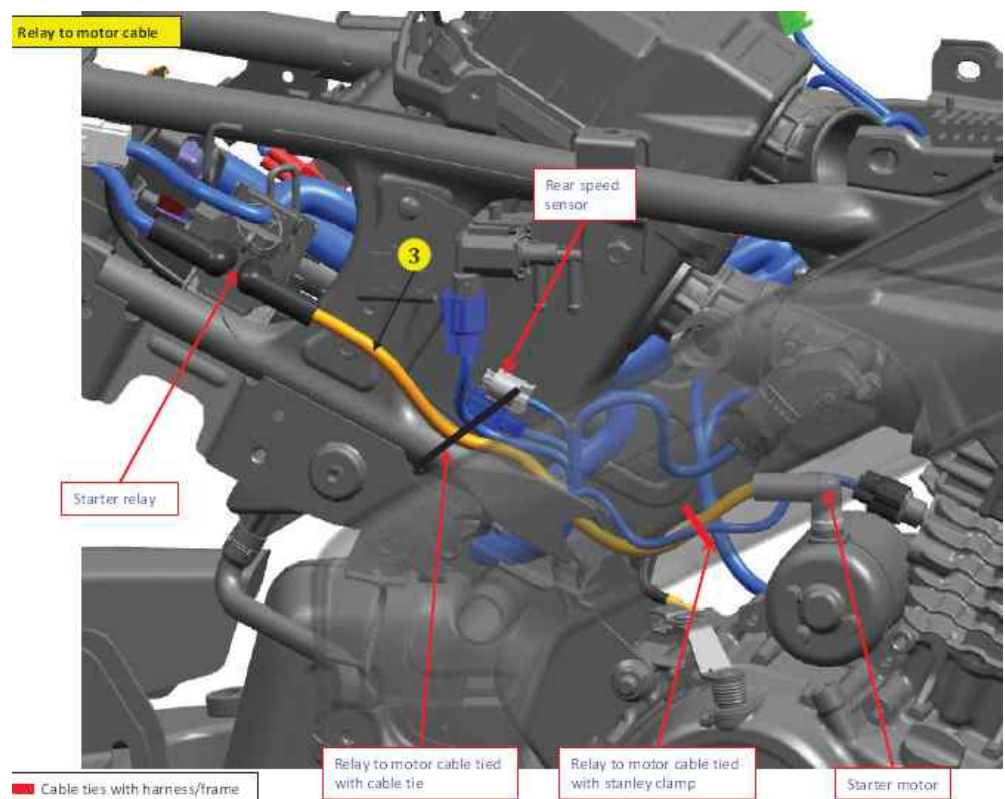
BOSCH Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



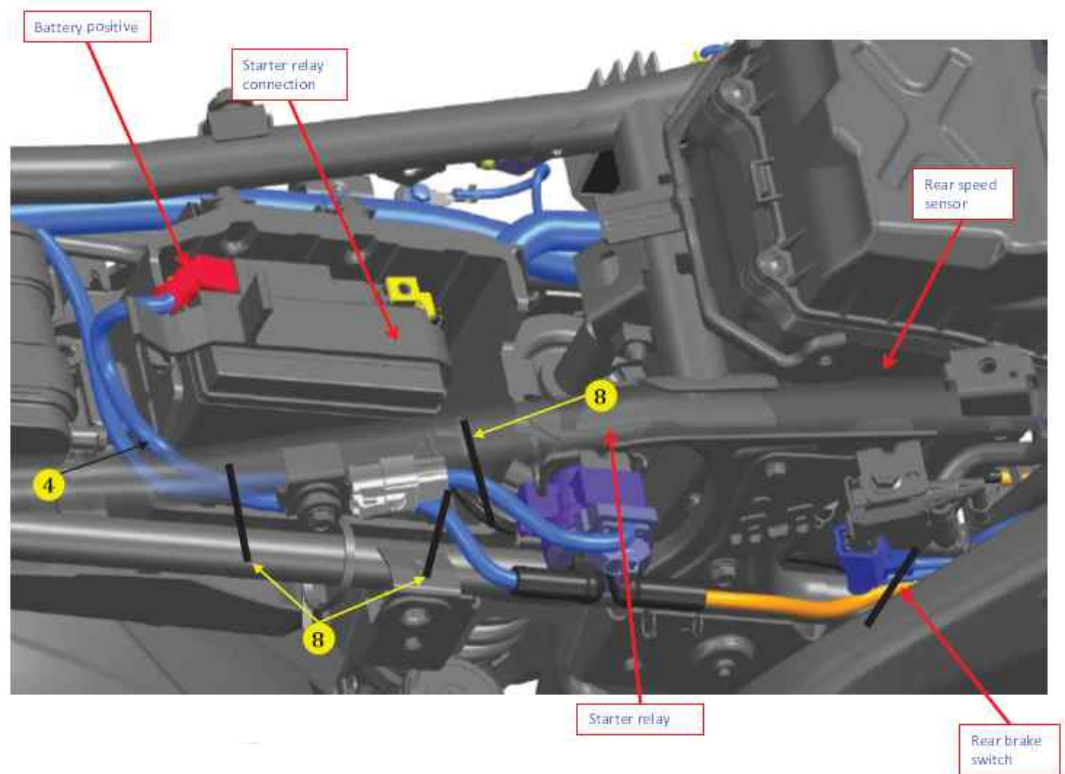
- Route the wiring harness as shown in photograph.



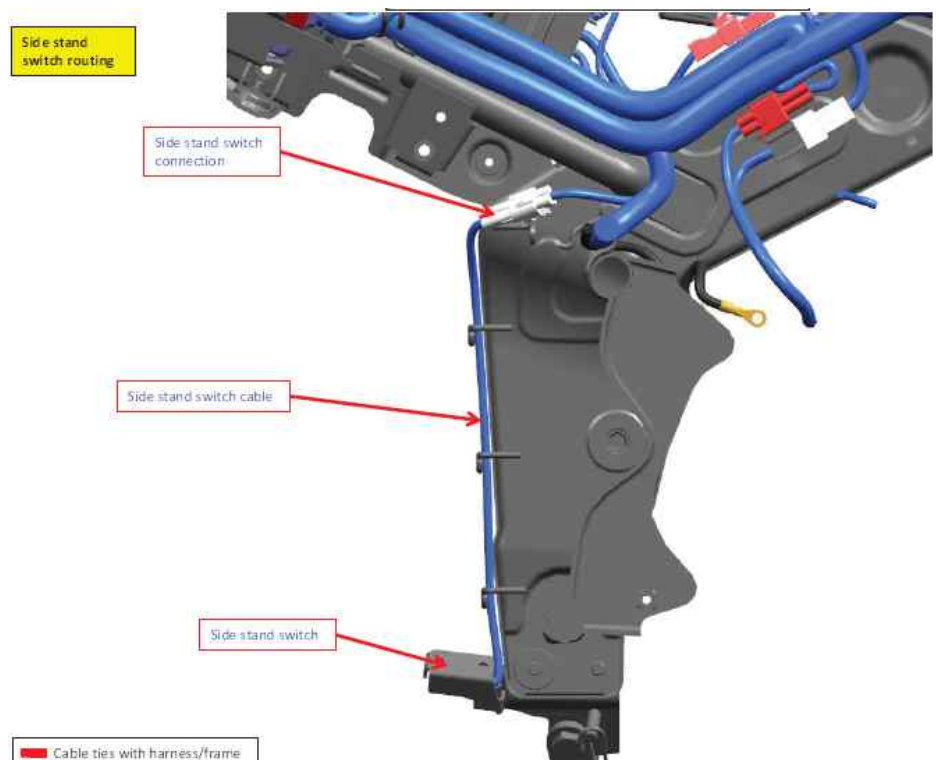


BOSCH Make Wiring Harness Routine

- Route the wiring harness as shown in photograph.



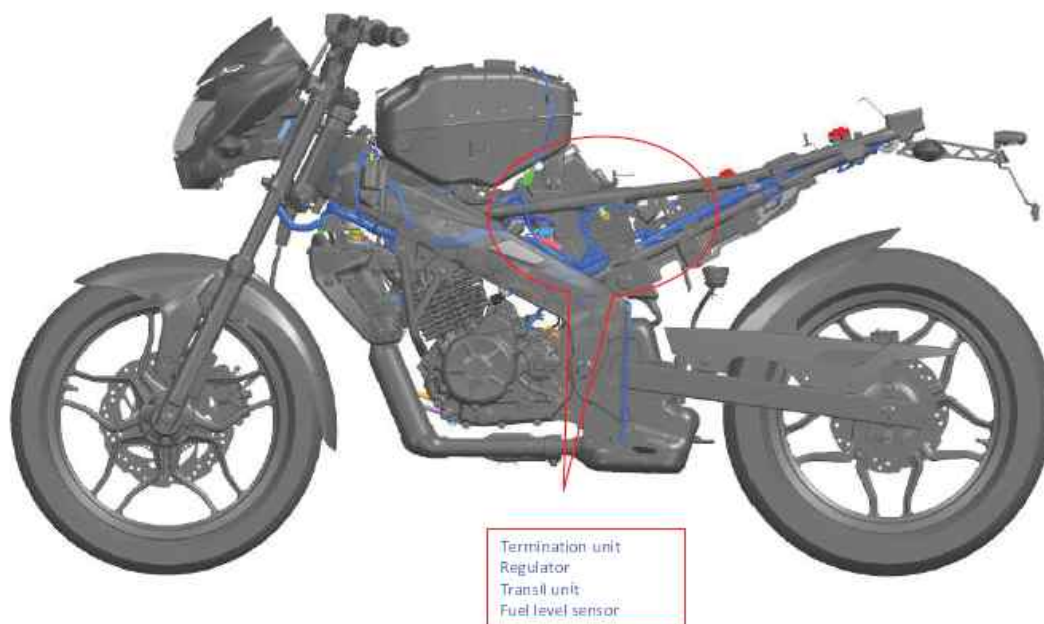
- Route the wiring harness as shown in photograph.



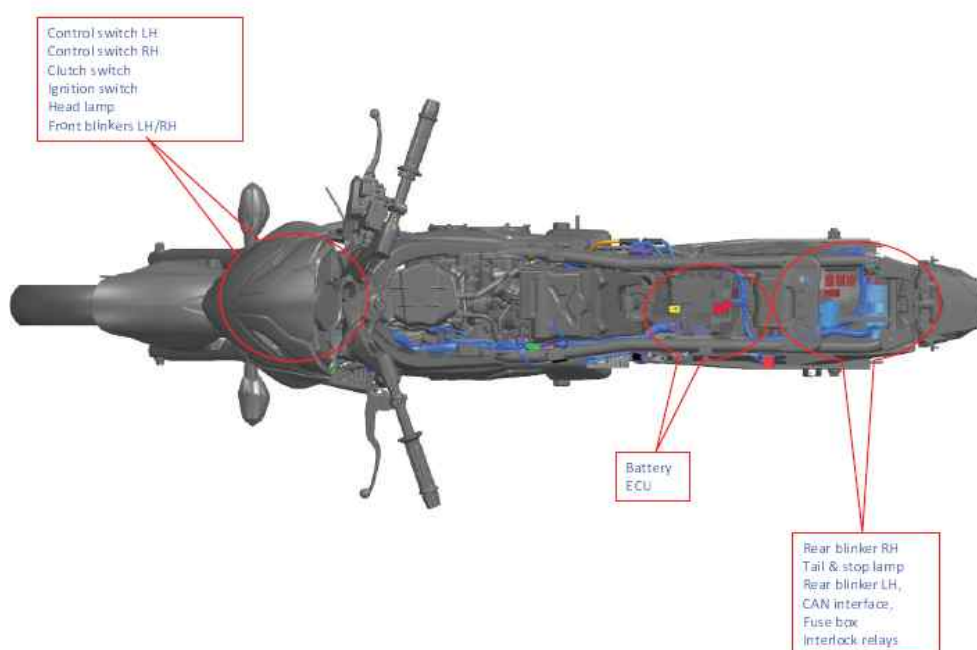


BOSCH Make Wiring Harness Routine

- Route the wiring harness as shown in photograph.



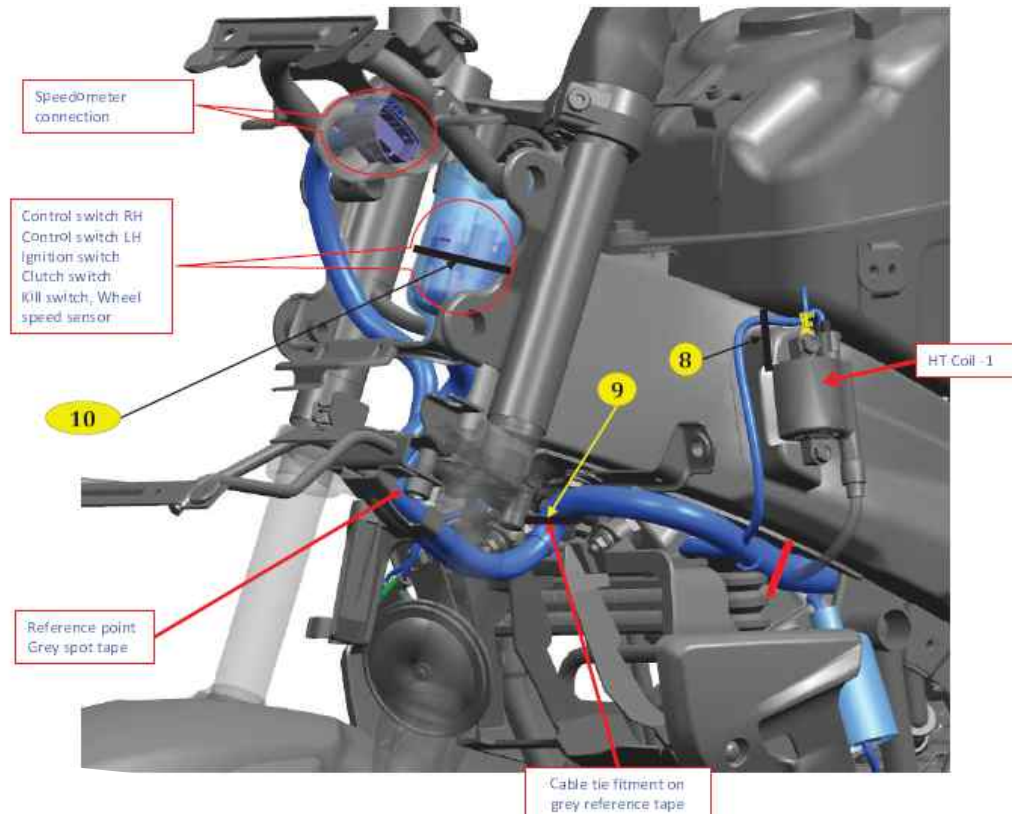
- Route the wiring harness as shown in photograph.



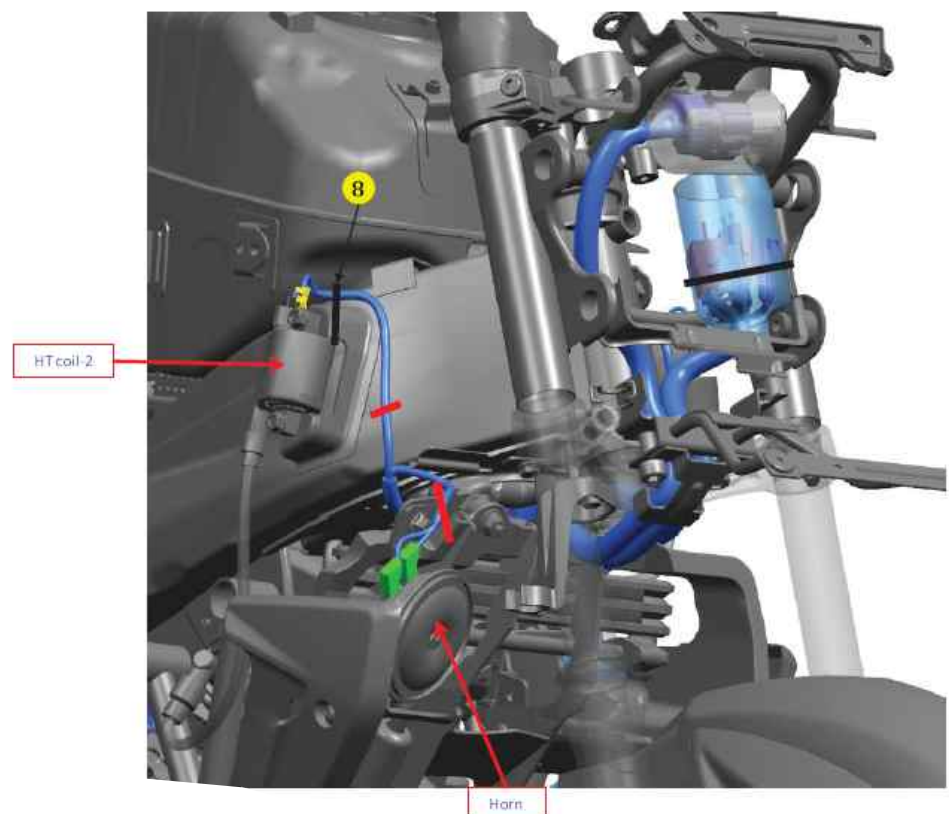


BOSCH Make Wiring Harness Routine

- Route the wiring harness as shown in photograph.



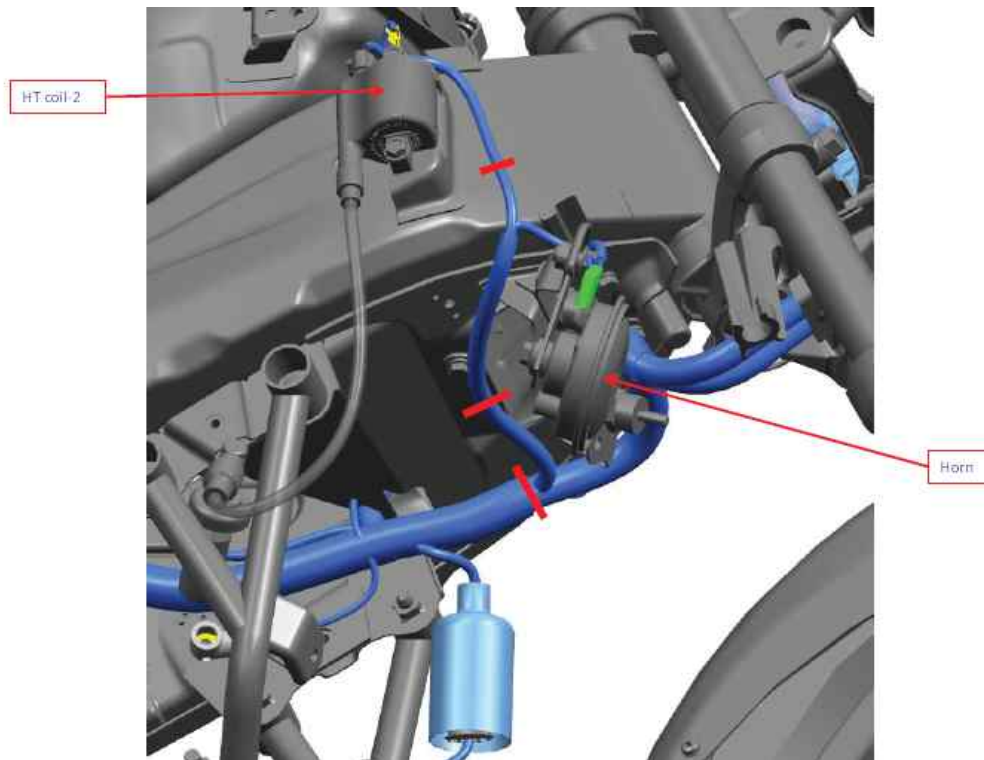
- Route the wiring harness as shown in photograph.



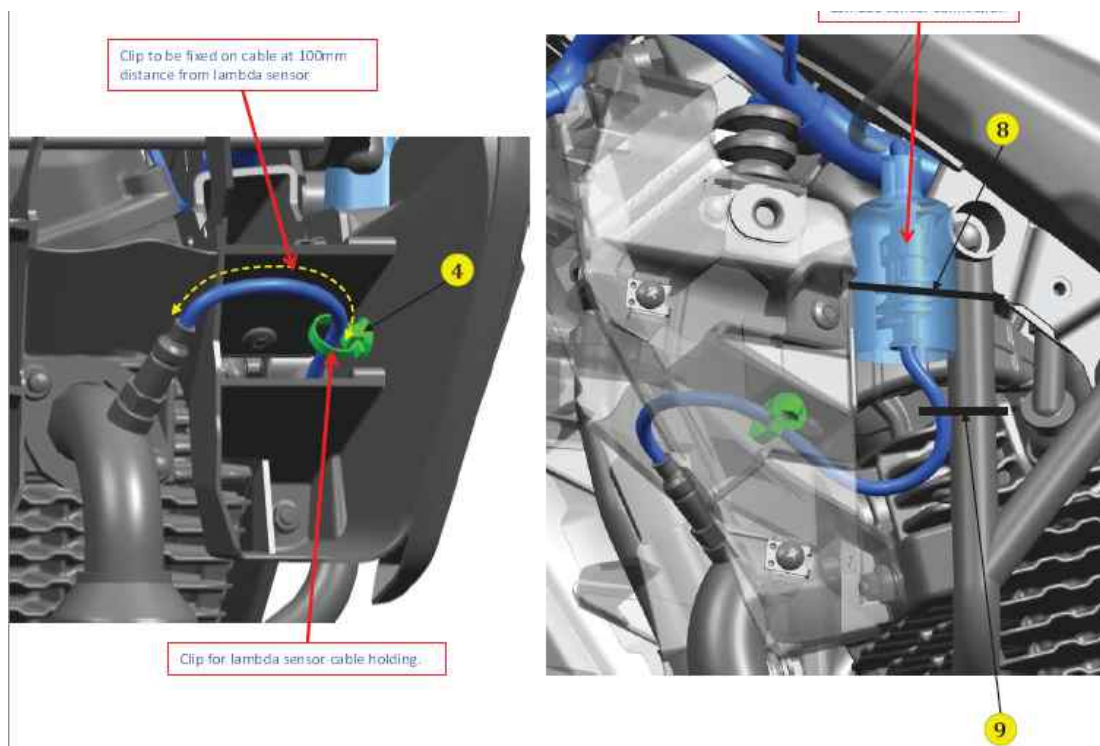
BOSCH Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



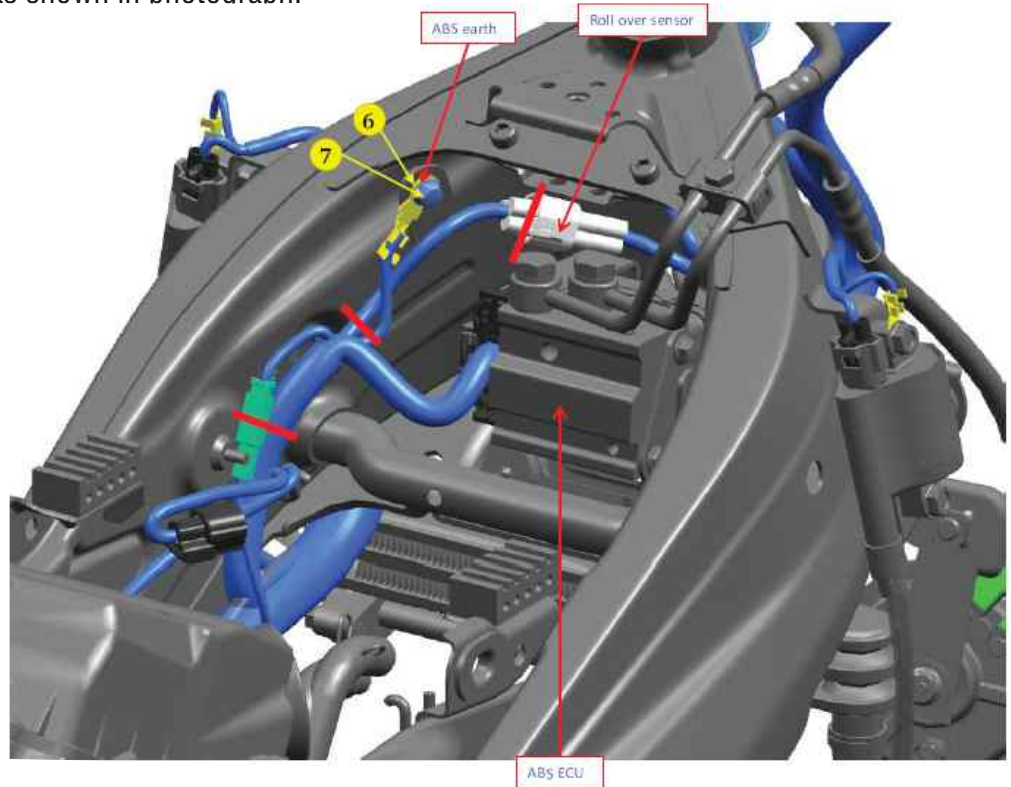
- Route the wiring harness as shown in photograph.



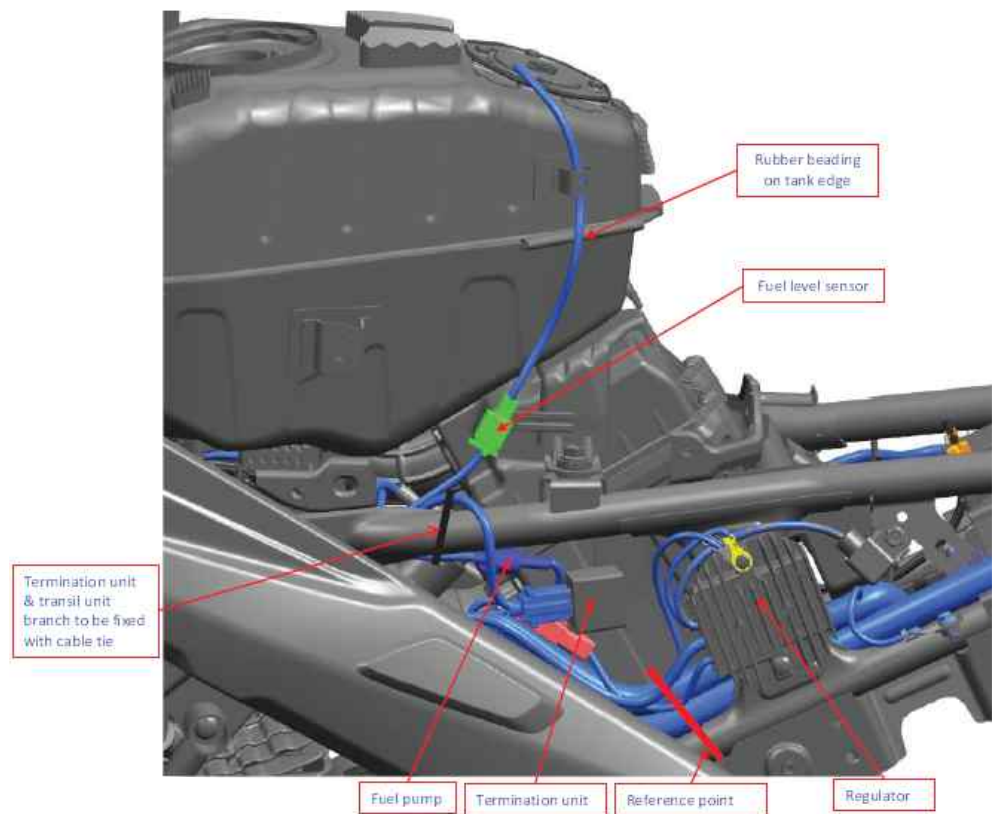
BOSCH Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



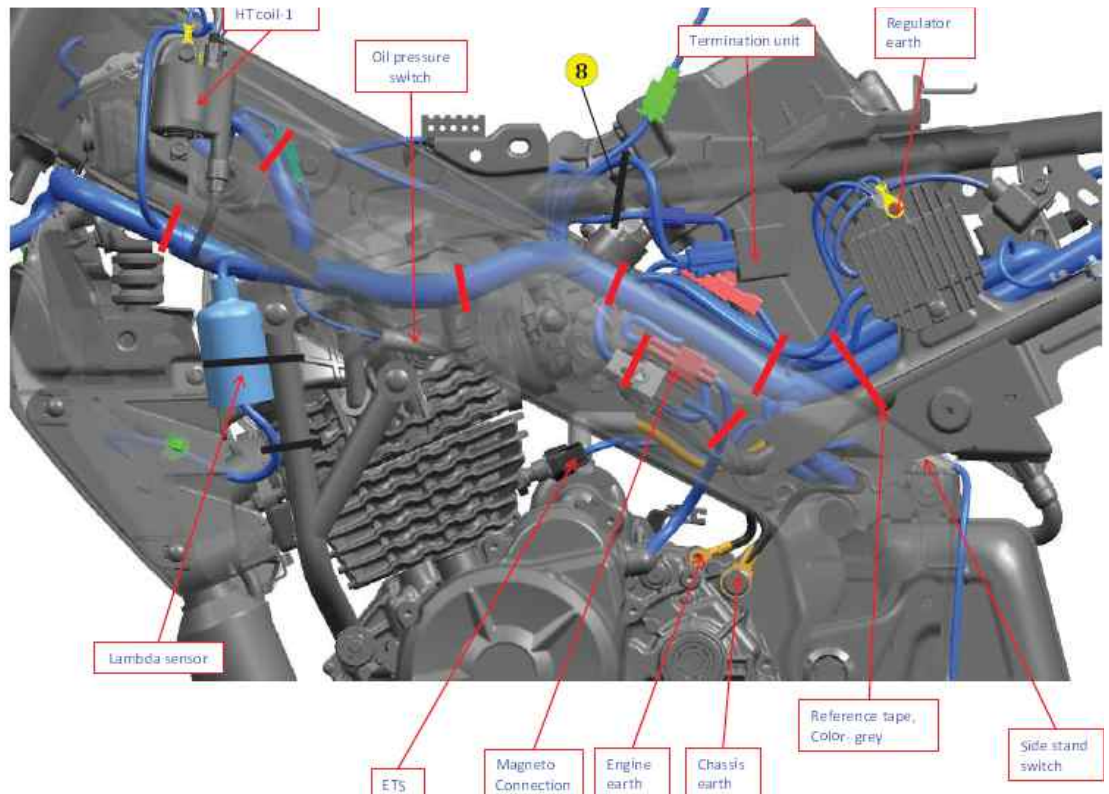
- Route the wiring harness as shown in photograph.



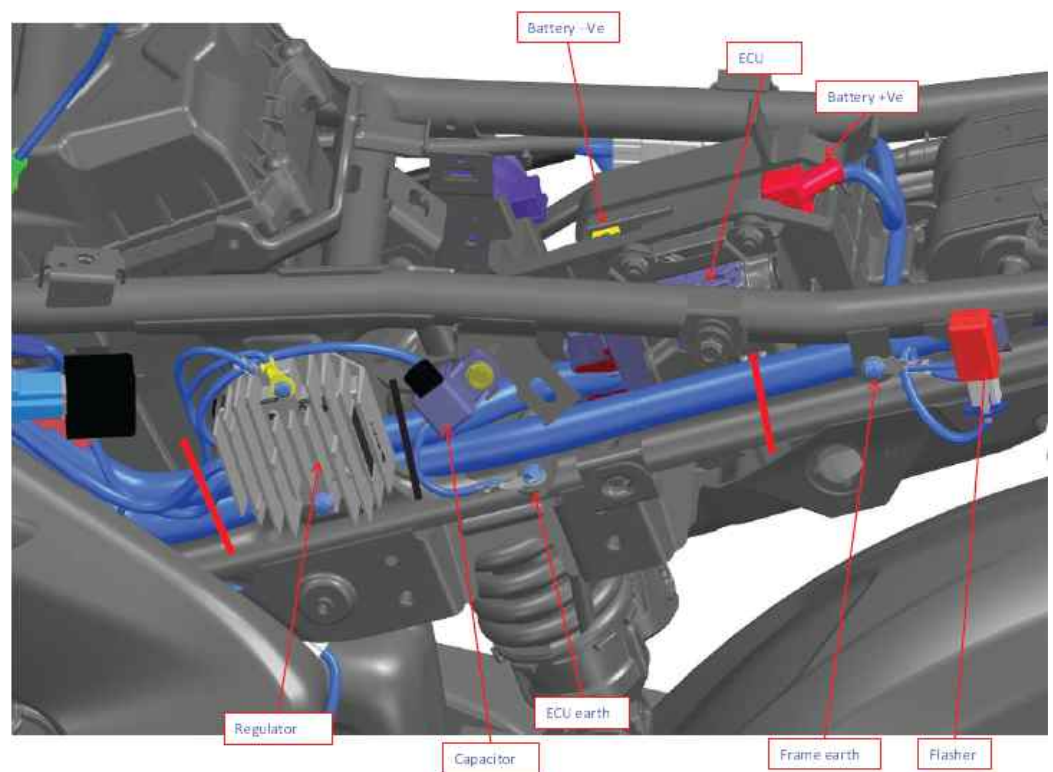


BOSCH Make Wiring Harness Routine

- Route the wiring harness as shown in photograph.



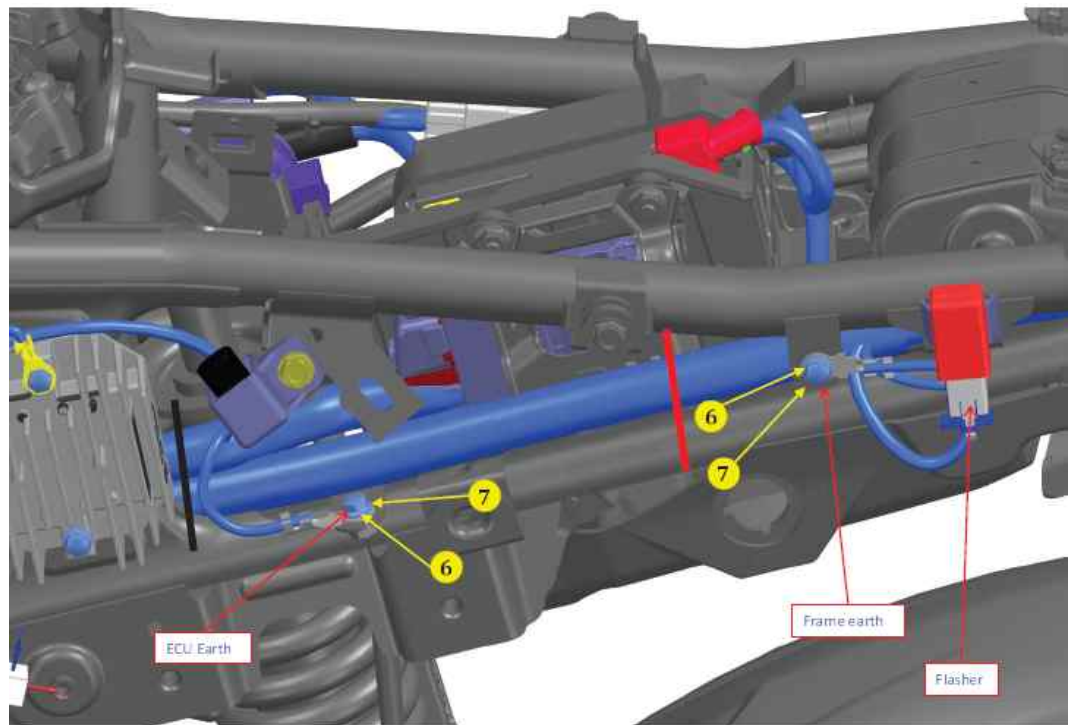
- Route the wiring harness as shown in photograph.



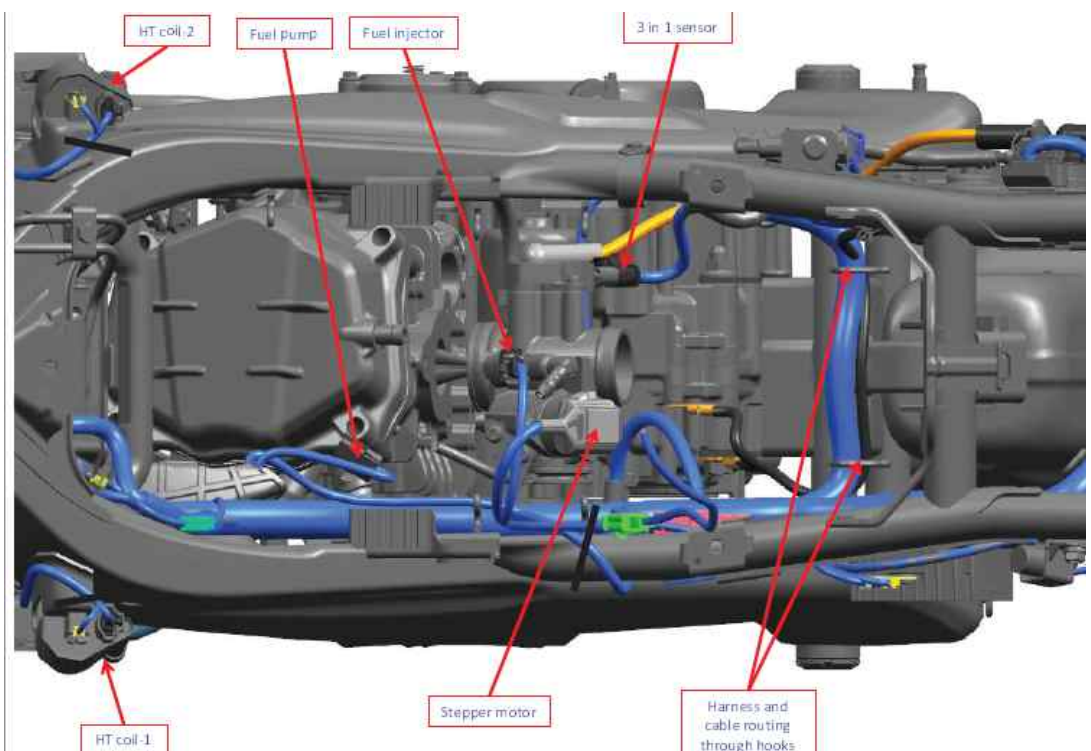
BOSCH Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.

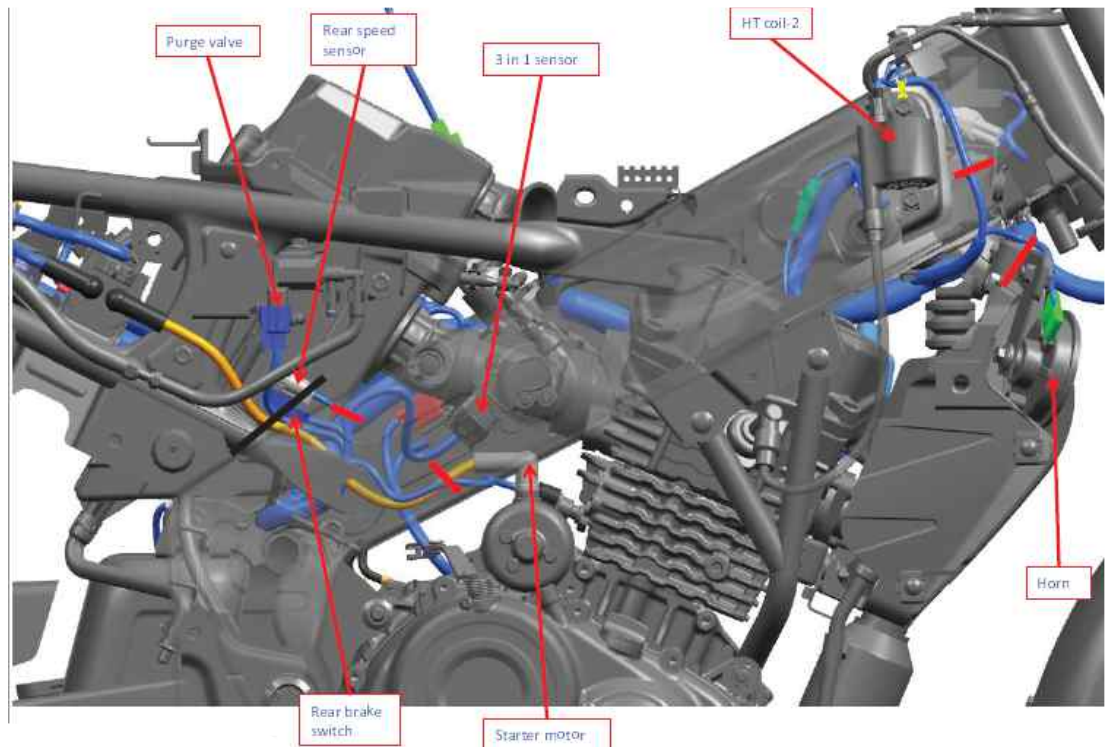


- Route the wiring harness as shown in photograph.

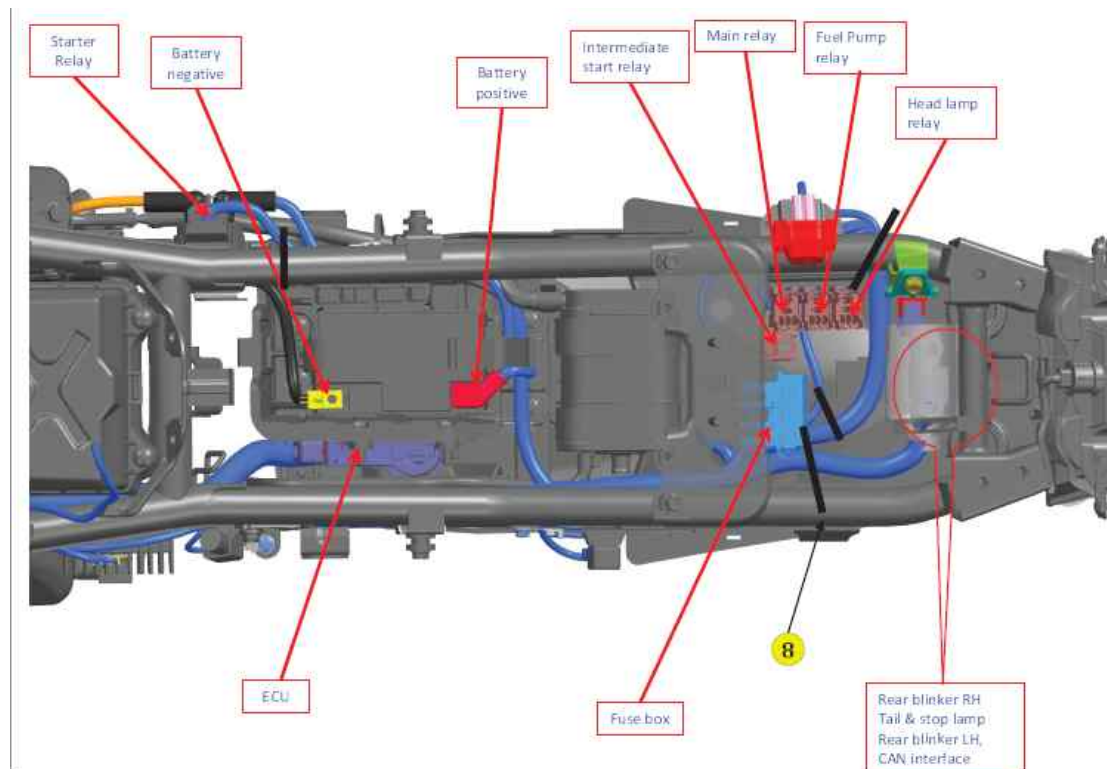




BOSCH Make Wiring Harness Routine



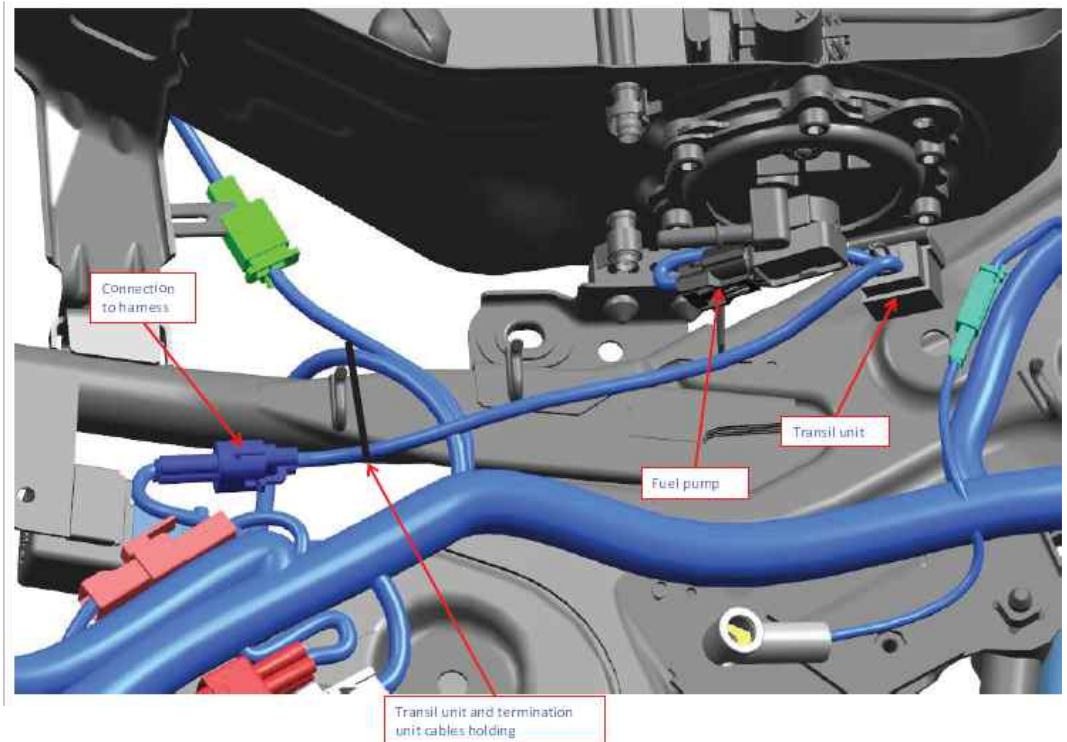
- Route the wiring harness as shown in photograph.



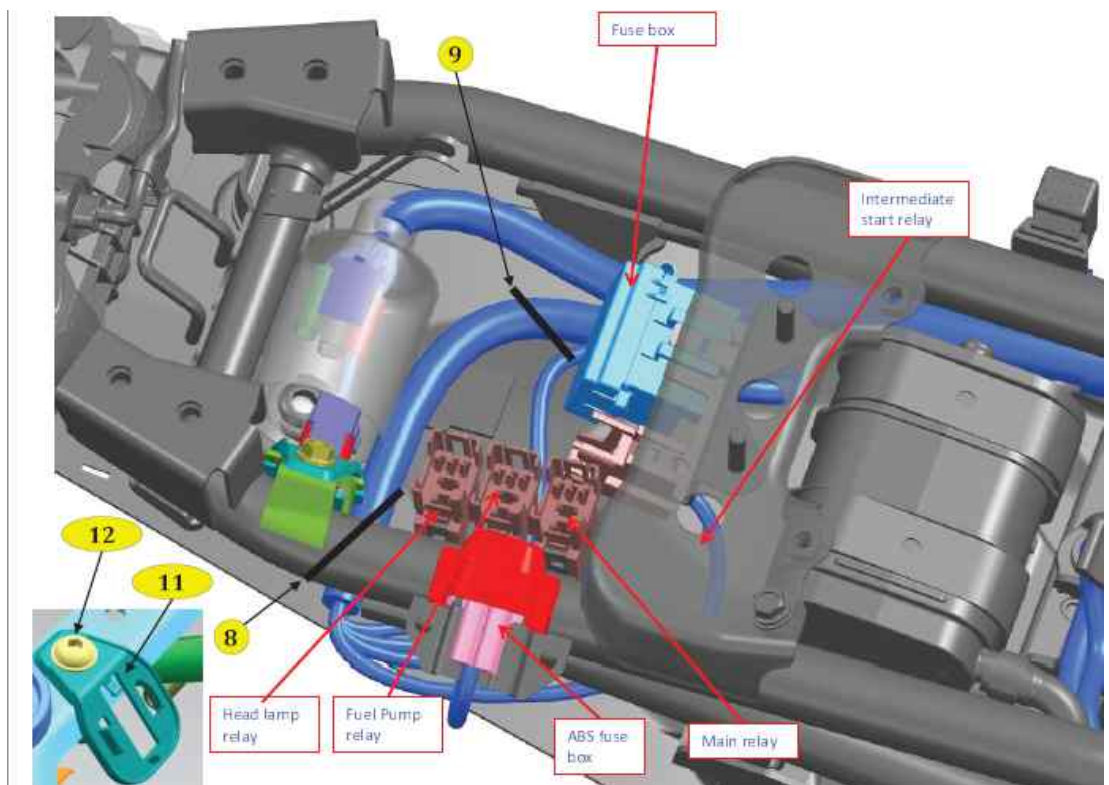


BOSCH Make Wiring Harness Routine

- Route the wiring harness as shown in photograph.



- Route the wiring harness as shown in photograph.

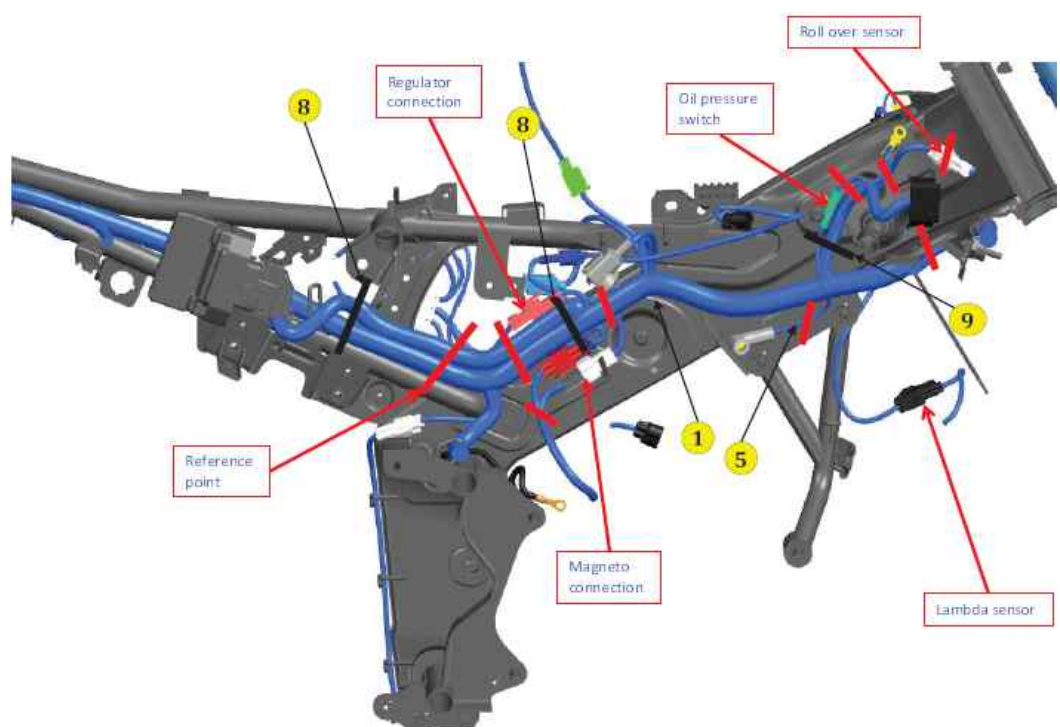




VARROC Make Wiring Harness Routine

SR. NO.	PART NO.	PART DESCRIPTION	QTY
1	Jf402359	HARNESS WIRING	1
2	JF402332	CABLE BATTERY NEGATIVE	1
3	Pa402207	CABLE RELAY- MOTOR	1
4	60111420	CABLE TIE LOCK 4.8 1.2 160 PA66 B	1
5	JL402219	PIGTAIL OIL PRESSURE SWITCH	1
6	LDF00001	WASHER TOOTHED-ID 6.4XOD11XT 0.7	3
7	KAED0610	BOLT FLANGED M6X1	3
8	JD402212	BAND(LENGTH 200MM)	14
9	JD402217	BAND(L 150)	5
10	JD402216	BAND 300 MM	1
11	GI402239	CLIP	1
12	PD402211	CLAMP FOR HEAD LAMP HARNESS	1
13	JY113901	HOLDER COUPLER	1
14	Jy113821	SCREW BUTTON HEAD-M6X1XL12XBLACK	1

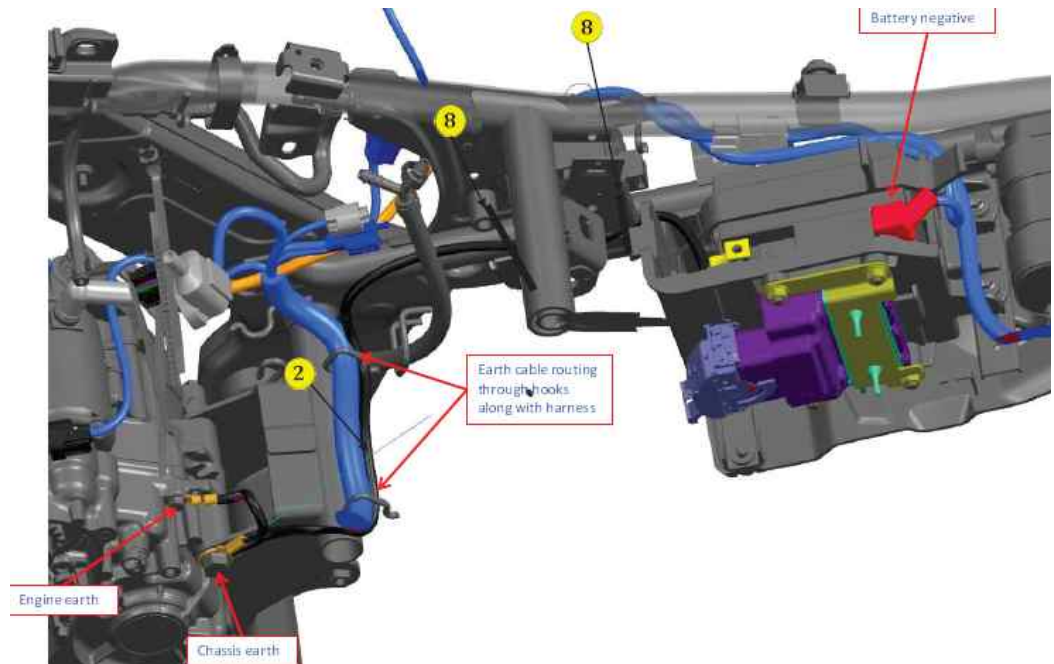
- Route the wiring harness as shown in photograph.



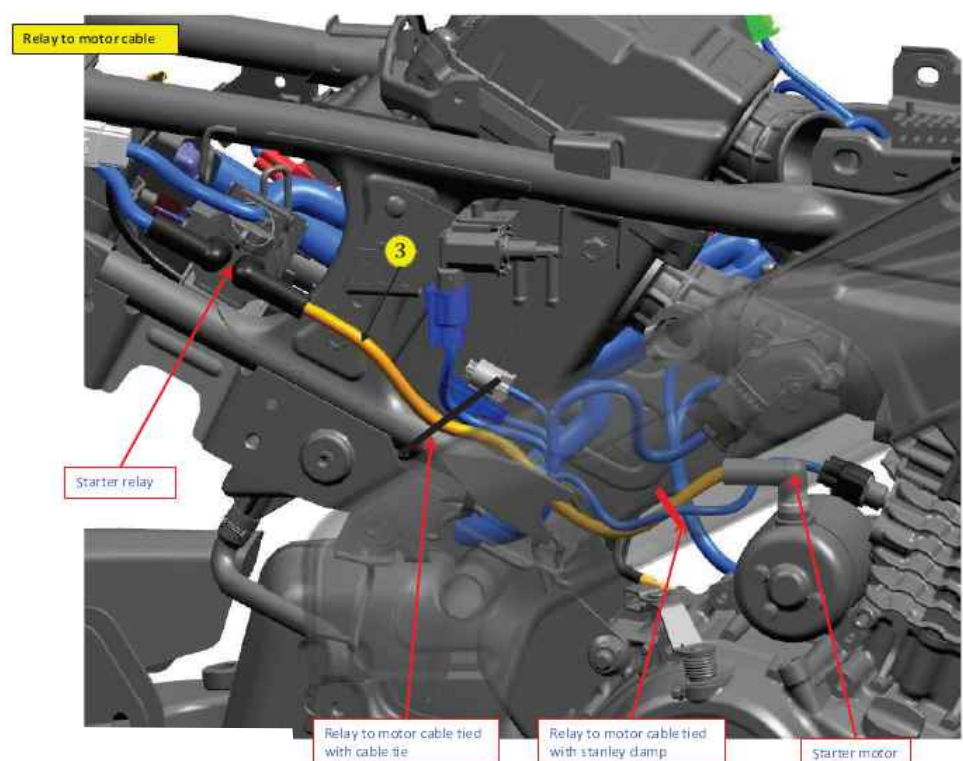
VARROC Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



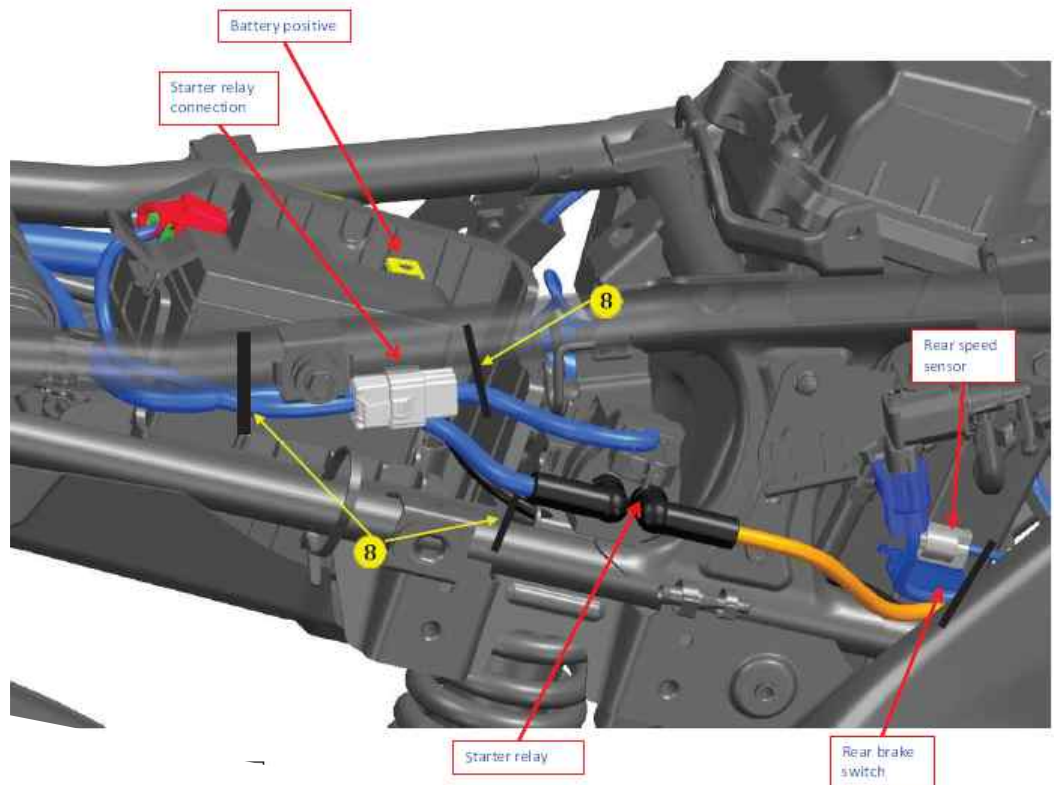
- Route the wiring harness as shown in photograph.



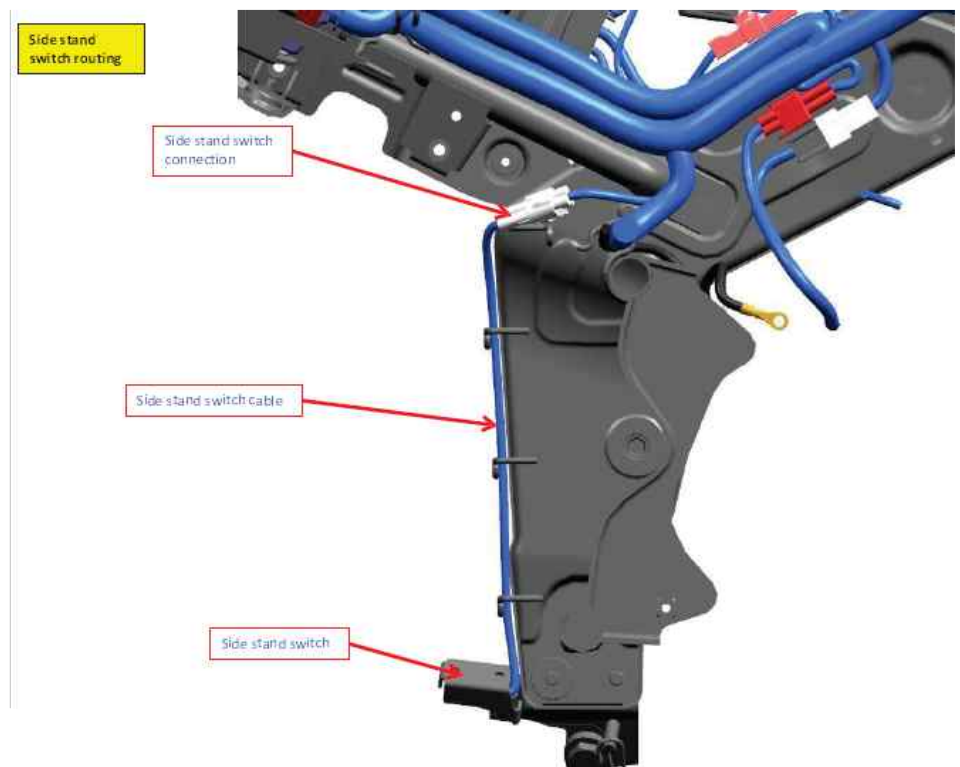
VARROC Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



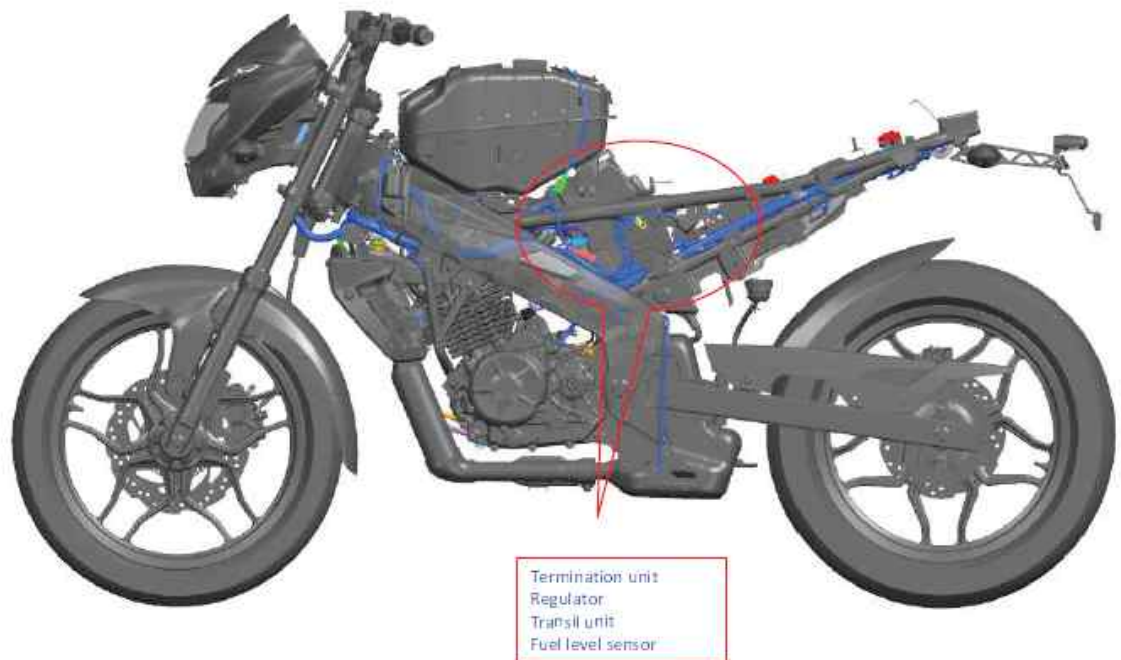
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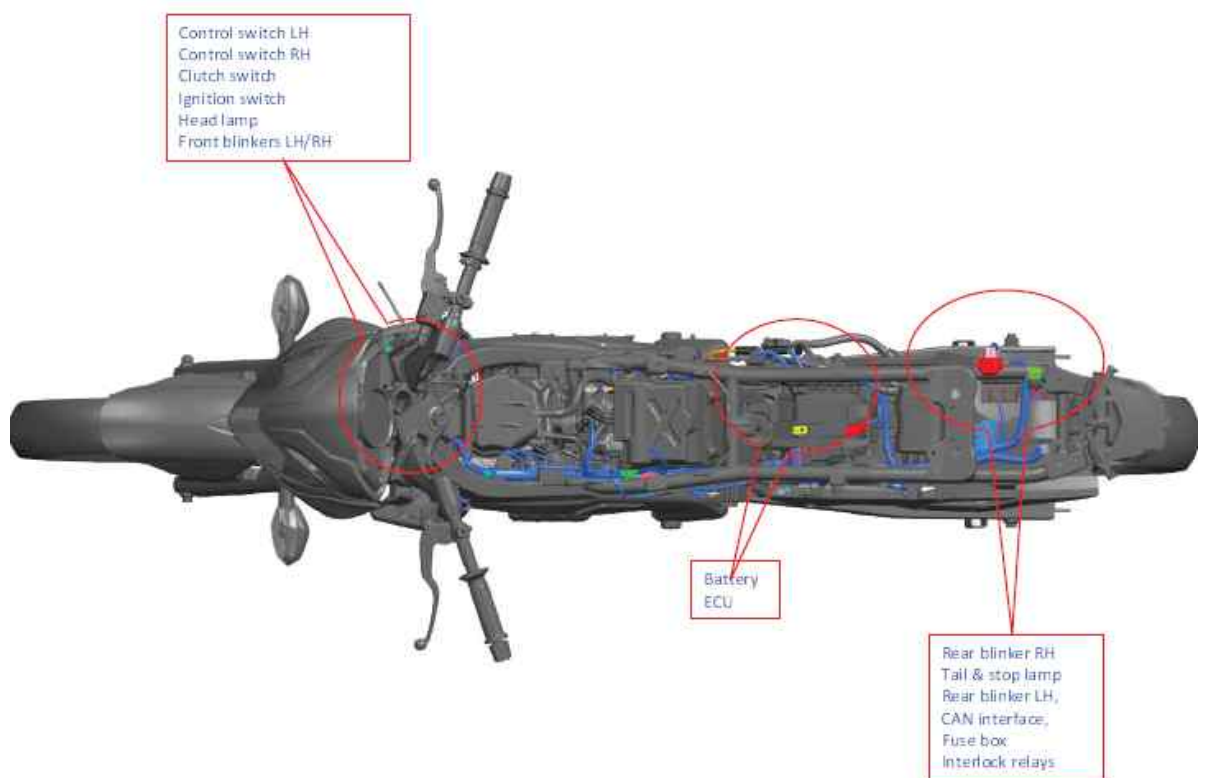
VARROC Make Wiring Harness Routine



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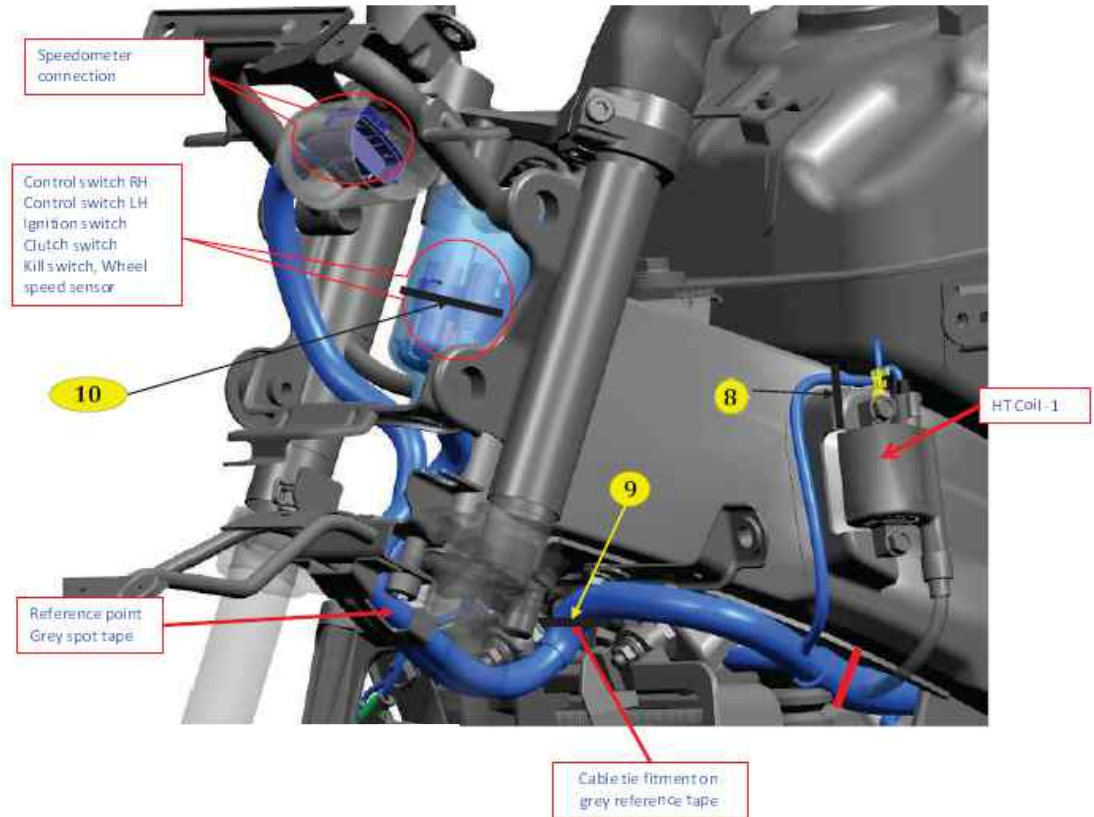
- Route the wiring harness as shown in photograph.



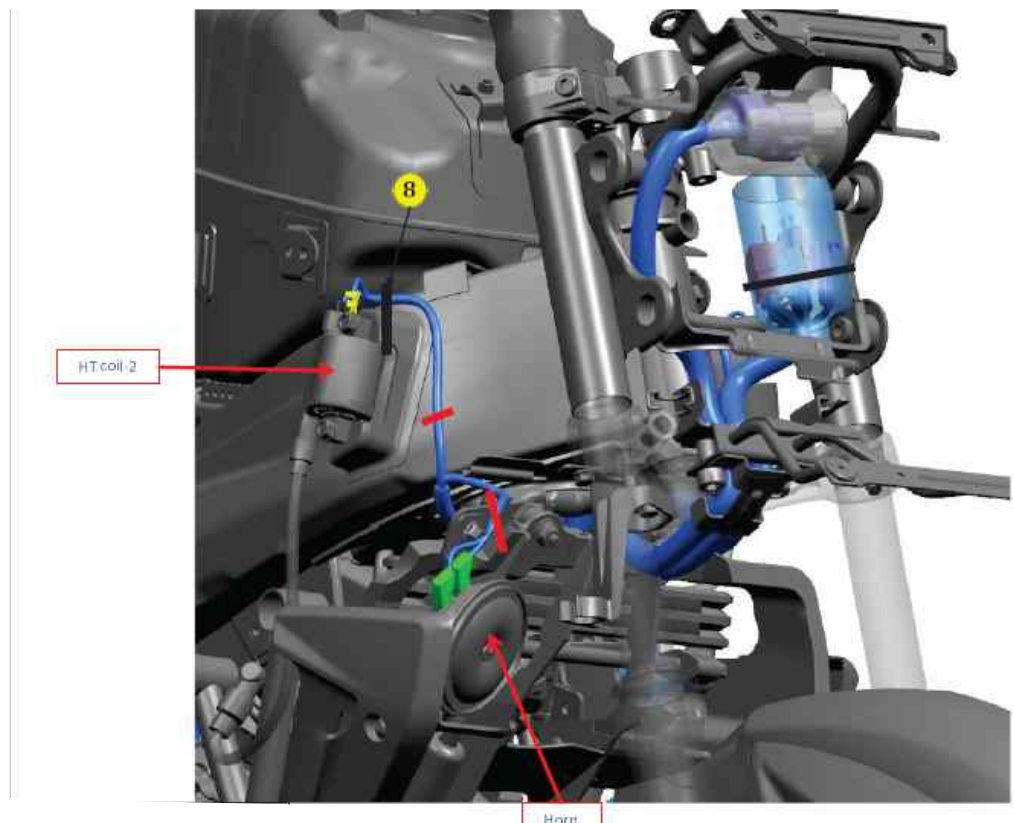
VARROC Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



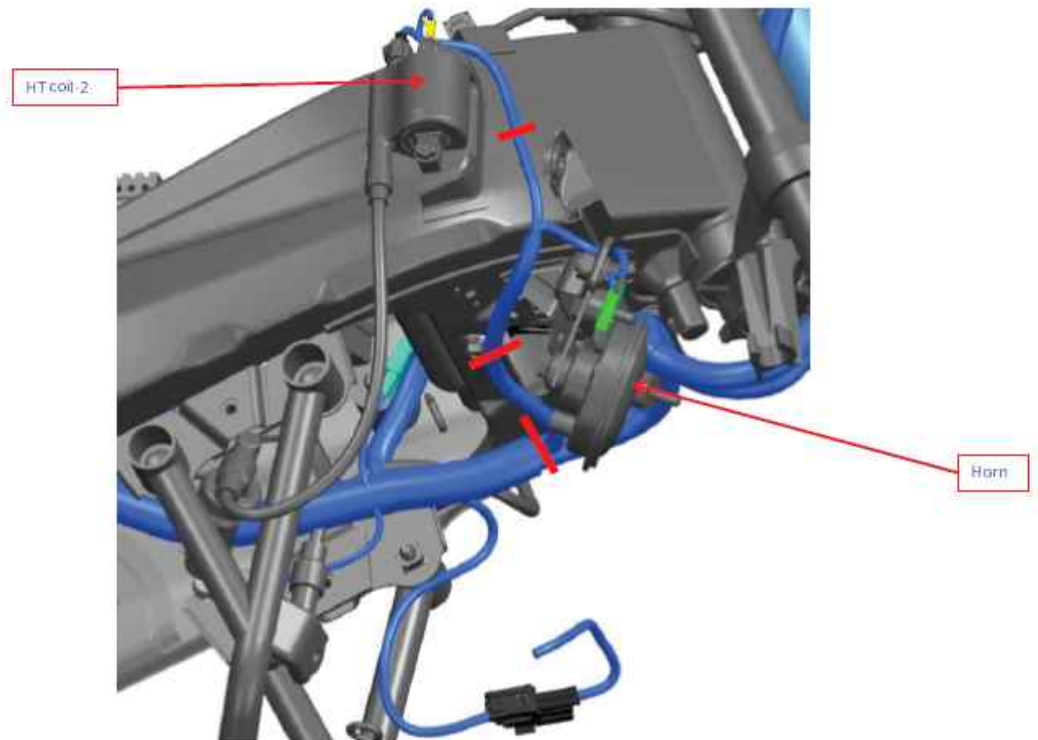
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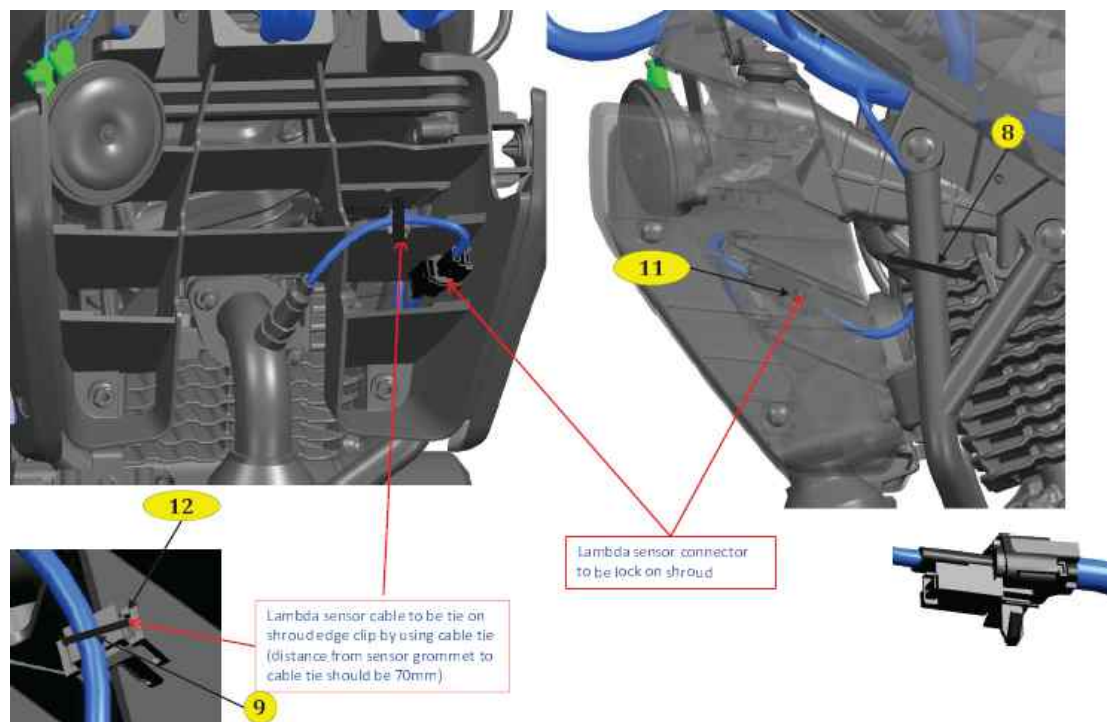
VARROC Make Wiring Harness Routine



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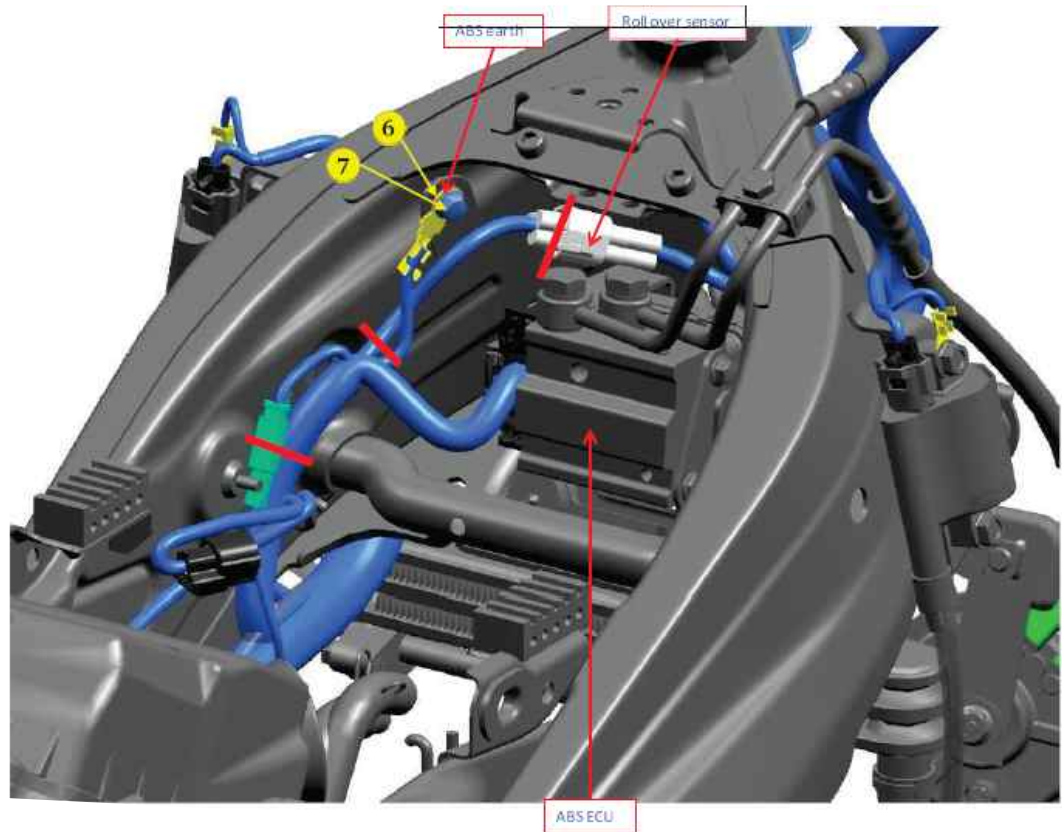
- Route the wiring harness as shown in photograph.



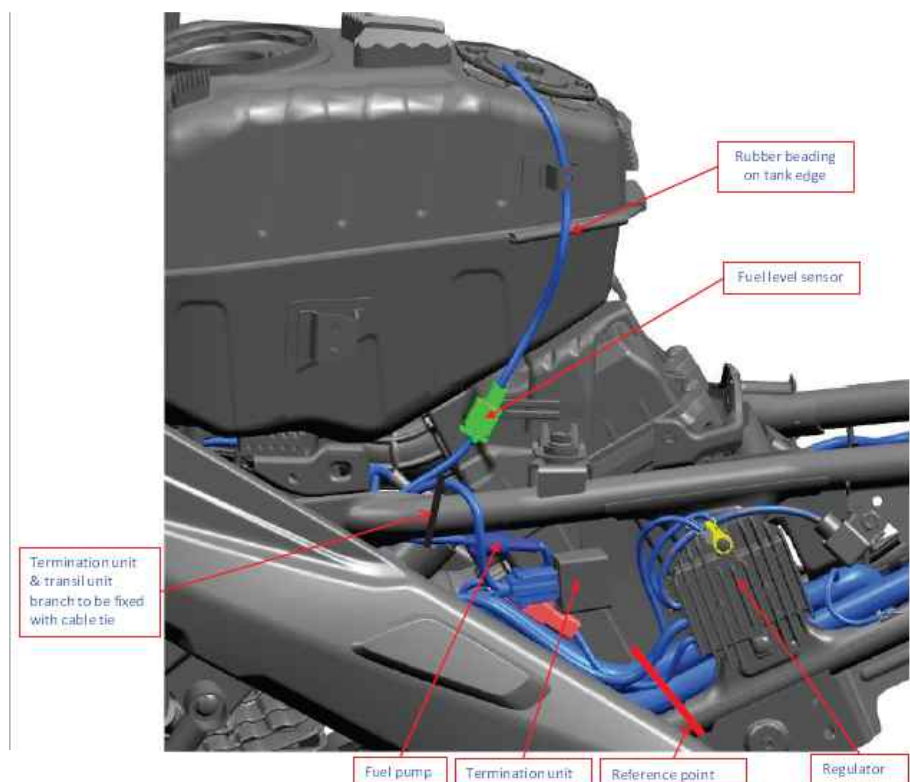
VARROC Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



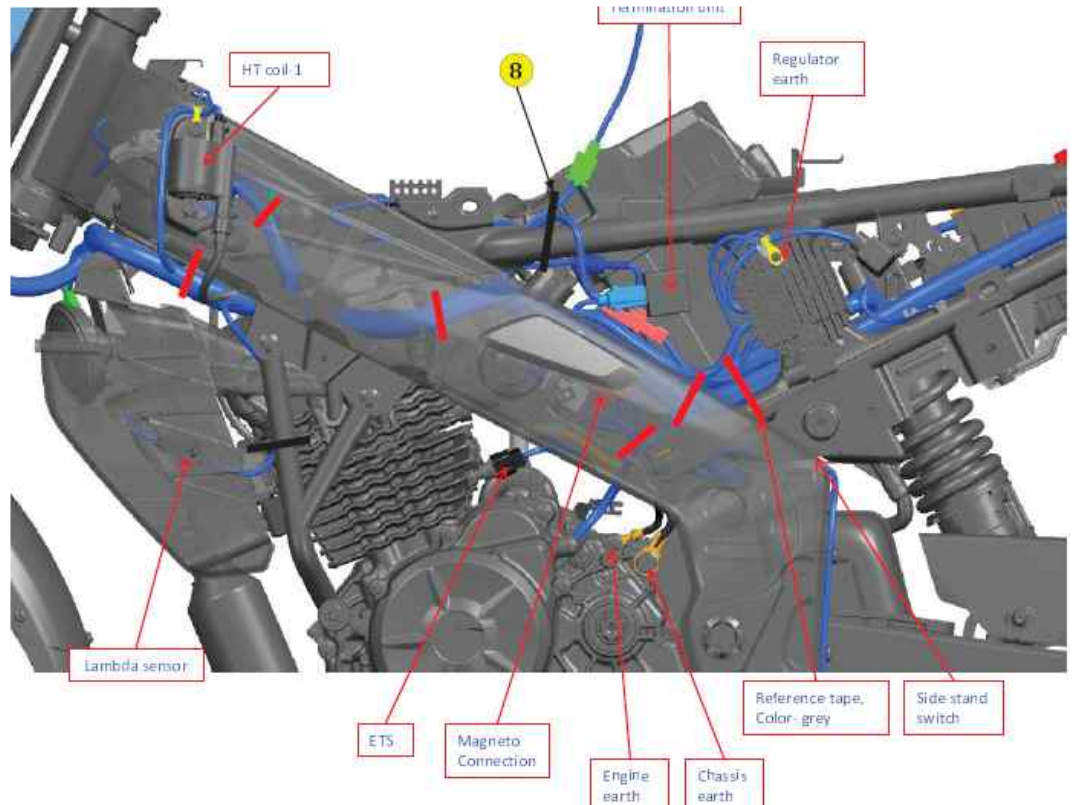
- Route the wiring harness as shown in photograph.



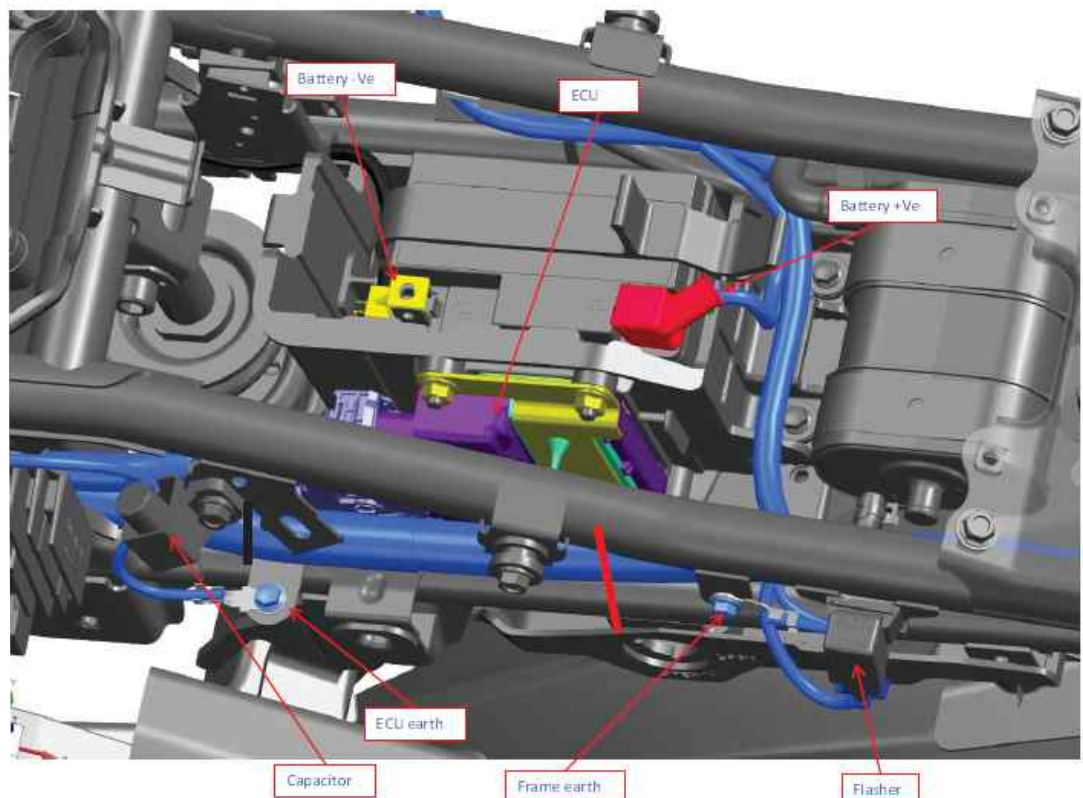
VARROC Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



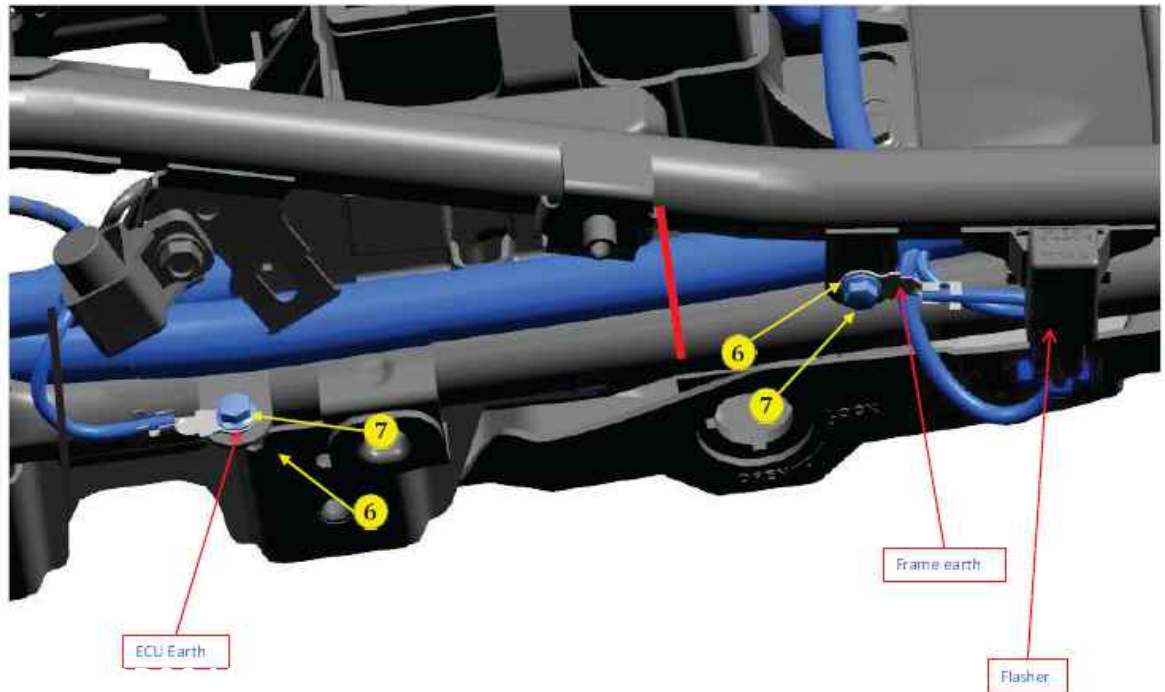
- Route the wiring harness as shown in photograph.



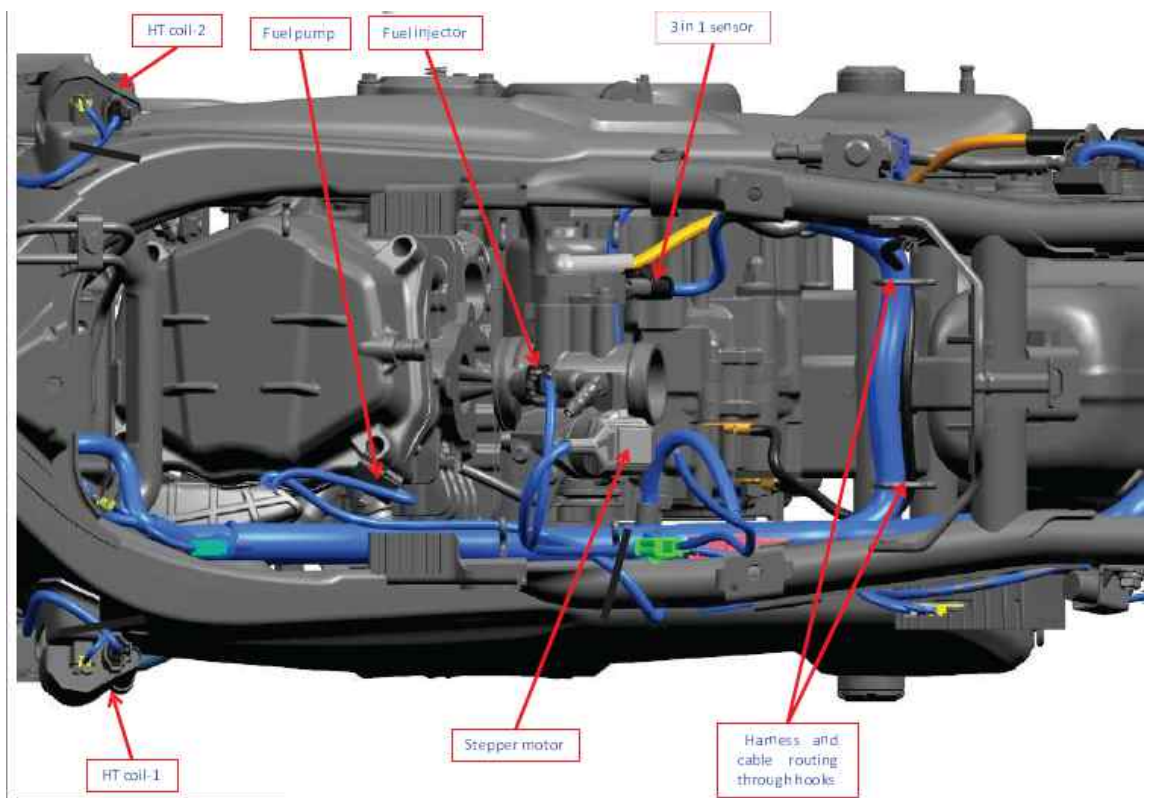
VARROC Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



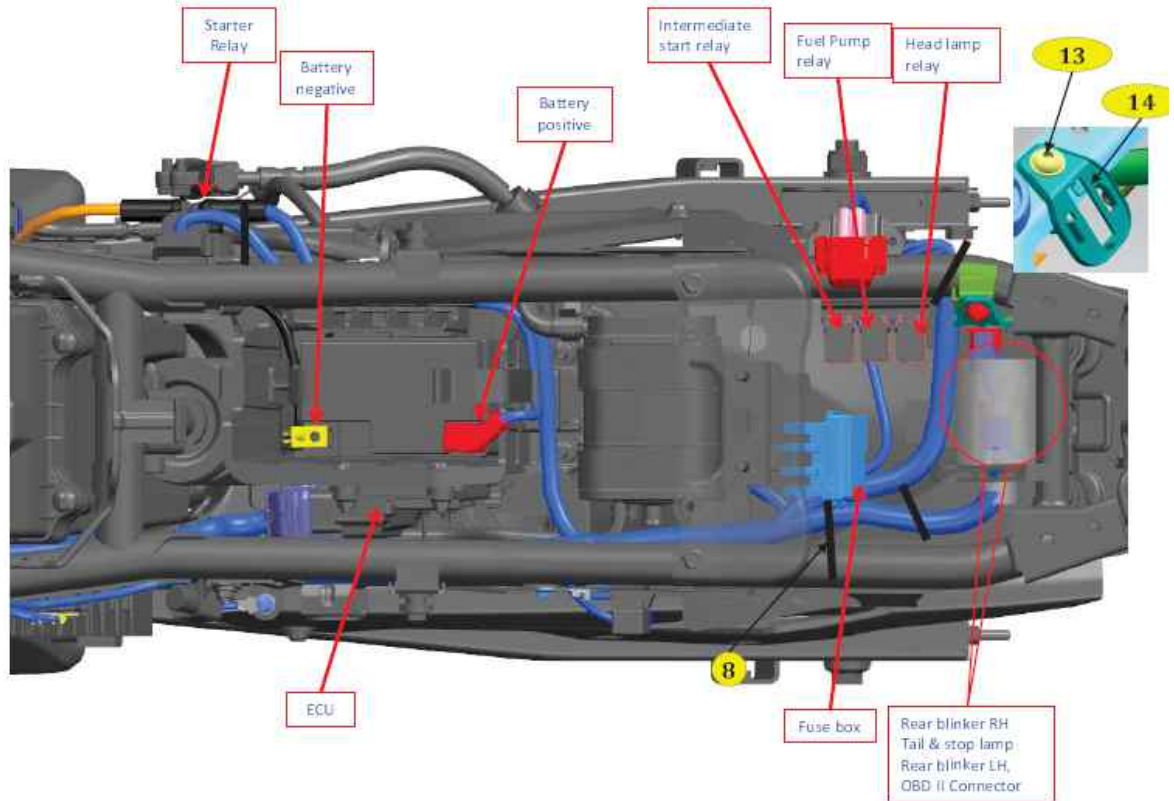
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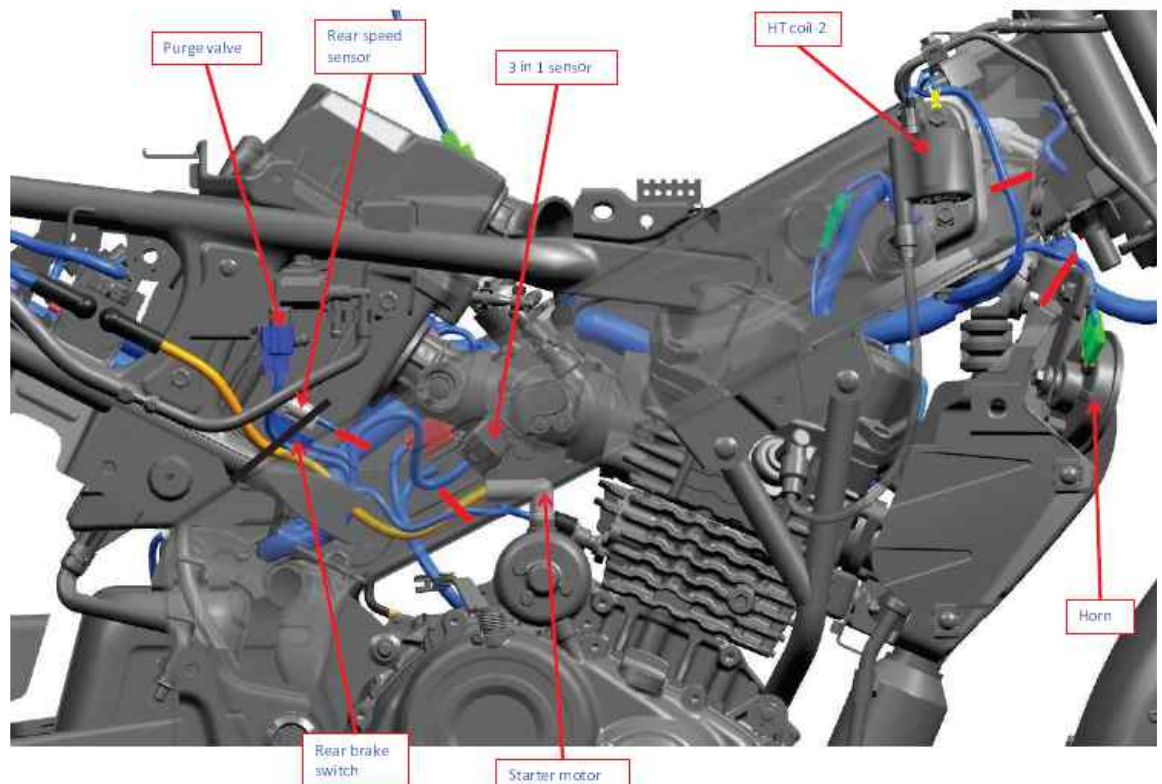
VARROC Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.



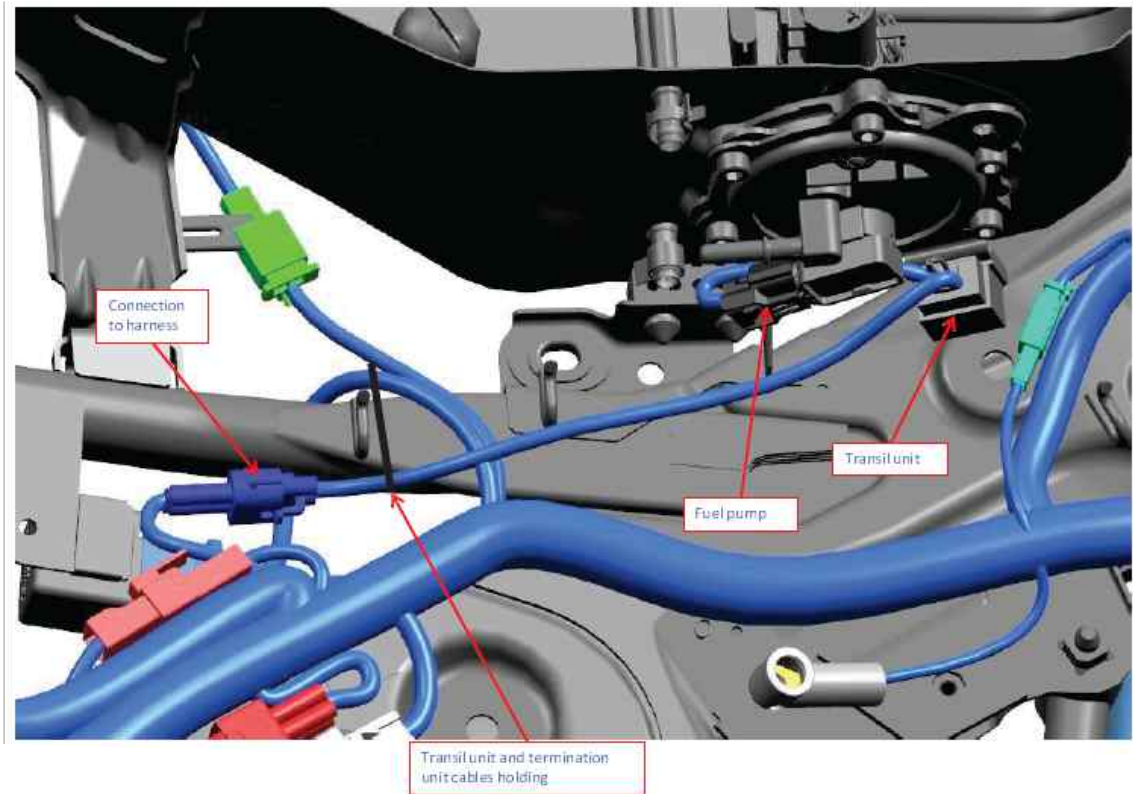
- Route the wiring harness as shown in photograph.



VARROC Make Wiring Harness Routine



- Route the wiring harness as shown in photograph.





List of DTC code

Sr. No.	P-Code	Drive Cycle	DTC meaning
1	P0123	1	Throttle/Pedal Position Sensor/Switch "A" Circuit High
2	P0122	1	Throttle/Pedal Position Sensor/Switch "A" Circuit Low
3	P0507	1	Idle Air Control System RPM Higher Than Expected
4	P0506	1	Idle Air Control System RPM Lower Than Expected
5	P0108	1	Manifold Absolute Pressure/Barometric Pressure Circuit High
6	P0107	1	Manifold Absolute Pressure/Barometric Pressure Circuit Low
7	P0629	1	Fuel Pump "A" Control Circuit High
8	P0628	1	Fuel Pump "A" Control Circuit Low
9	P0627	1	Fuel Pump "A" Control Circuit/Open
10	P0336	3	Crankshaft Position Sensor "A" Circuit Range/Performance
11	P0262	1	Cylinder 1 Injector Circuit High
12	P0261	1	Cylinder 1 Injector Circuit Low
13	P0201	1	Injector Circuit/Open – Cylinder 1
14	P0032	1	HO2S Heater Control Circuit High Bank 1 Sensor 1
15	P0031	1	HO2S Heater Control Circuit Low Bank 1 Sensor 1
16	P0030	1	HO2S Heater Control Circuit Bank 1 Sensor 1
17	P0692	1	Radiator Fan Control Circuit High
18	P0691	1	Radiator Fan Control Circuit Low
19	P0480	1	Radiator Fan Relay Control Circuit fault
20	P0132	1	O2 Sensor Circuit High Voltage Bank 1 Sensor 1
21	P0131	1	O2 Sensor Circuit Low Voltage Bank 1 Sensor 1
22	P0130	1	O2 Sensor Circuit Bank 1 Sensor 1
23	P0134	1	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 1
24	P1605	**	Malfunction Indicator Lamp (MIL) Control Circuit
25	P1604	**	Malfunction Indicator Lamp (MIL) Control Circuit
26	P0650	**	Malfunction Indicator Lamp (MIL) Control Circuit
27	P1504	1	Roll over sensor Short Circuit to battery
28	P1503	1	Roll over sensor Short Circuit to Ground
29	P1501	1	Roll over sensor Circuit signal non-plausible
30	P1502	1	Roll over sensor Circuit open



List of DTC code

Sr. No	P-Code	Drive Cycle	DTC meaning
31	P1508	1	Side Stand sensor Short Circuit to battery
32	P1507	1	Side Stand sensor Short Circuit to Ground
33	P1505	1	Side Stand sensor Circuit signal non-plausible
34	P1506	1	Side Stand sensor Circuit open
35	P0509	3	Idle Air Control System Circuit High
36	P0508	3	Idle Air Control System Circuit Low
37	P0511	3	Idle Air Control Circuit
38	P0689	**	ECM/PCM Power Relay Sense Circuit Low
39	P0112	1	Intake Air Temperature Sensor 1 Circuit Low
40	P0113	1	Intake Air Temperature Sensor 1 Circuit High
41	P0117	1	Engine Coolant Temperature Sensor 1 Circuit Low
42	P0118	1	Engine Coolant Temperature Sensor 1 Circuit High
43	P1608	**	Engine Speed Signal Circuit High
44	P1607	**	Engine Speed Signal Circuit Low
45	P1606	**	Engine Speed Signal Circuit Open
46	P0563	3	System Voltage High
47	P0562	3	System Voltage Low
48	P1510	3	System Voltage sensing failure in ECU
49	P0501	3	Vehicle Speed Sensor "A" Range/Performance
50	P0641	1	Sensor Reference Voltage "A" Circuit error
51	P0651	1	Sensor Reference Voltage "B" Circuit error
52	P0217	1	Engine Speed limited (limp home mode) due to engine coolant temp overheating
53	P0459	3	EVAP System Purge control valve circuit high
54	P0458	3	EVAP System Purge control valve circuit low
55	P0444	3	EVAP System Purge control valve circuit open
56	P0351	1	Ignition Coil "A" Primary Control Circuit/Open
57	P0352	1	Ignition Coil "B" Primary Control Circuit/Open
58	P0655	3	Temperature Warning Lamp circuit high
59	P0656	3	Temperature Warning Lamp circuit low
60	P0657	3	Temperature Warning Lamp circuit open

SOP for Replacement of Filter in Asian Fuel Pump



The Fuel Suction Filter in Aisan Fuel Pump has been made serviceable



Aisan Fuel Pump



Fuel Suction Filter



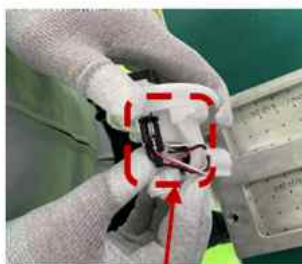
Following SOP is to be followed for replacement of Filter.

Guidelines for Filter Replacement :

- A. Filter to be replaced on Fuel Pumps where delivery of Fuel Pump is noticed to be lesser than specified.
- B. Filter replacement is not part of a PM schedule and is to be replaced as and when required.
- C. Clean the area around the snap-fit including the casing-filter press-fit portion.
- D. Don't touch the Terminals with bare hand, it may damage the circuit.
- E. Replacement of Filter should be performed in a clean environment to prevent foreign materials entering into the Fuel Pump body.
- F. Make sure that there are no scratches and foreign materials on the Gasket sealing surface, Fuel Feed port.
- G. Install a protective cap to the Fuel Feed port



Sealing Surfaces



Terminals Areas



SOP for Replacement of Filter in Asian Fuel Pump



Filter removal from casing :

A.Procedure

- 1.Cut the snap-fit receiver of the filter with a nipper as shown below.
- 2.Twist it, cut it and gently remove the filter.
- 3.Check the casing-filter press-fit portion. (No deformation, scratches, foreign materials, etc)

B.Precaution

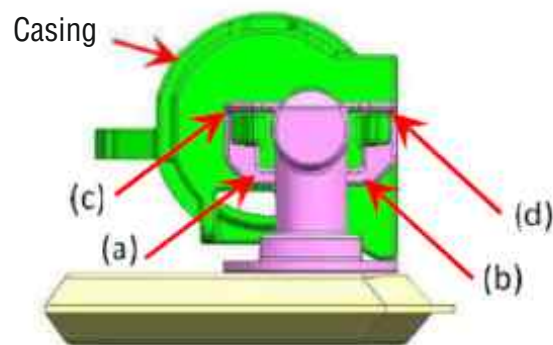
Make sure that there are no deformation, scratches or foreign materials on the snap-fit claws of the casing and sealing surfaces (casing-filter press-fit portion).



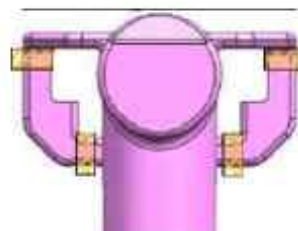
Cutting Image



Cutting Location Details



Cutting Position



After cutting (a) & (b), twist then cut © & (d).

SOP for Replacement of Filter in Asian Fuel Pump



New Filter assembly :

A.Procedure

- 1.Remove the dust cap from the Filter as shown in Figure 1.
- 2.Align the new Filter & Casing as shown in Figure 2.
- 3.Place the Fuel Filter on a flat surface (metal plate) from Filter side as shown in Figure 3.
- 4.Press it until the gap between Casing & Filter is zero and make sure that the snap-fits are properly fitted as shown in Figure 4.

B.Precautions

- 1.There should be no force applied on Holder Harness & Terminal area as shown in Figure 5.
- 2.Remove the dust cap of Filter only before assembly of the Filter.



Figure 1

Remove the Dust cap from the filter

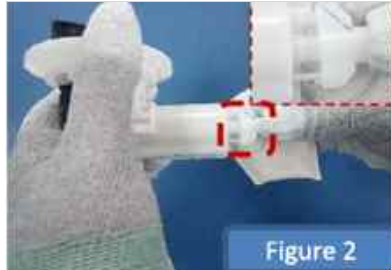


Figure 2

Align the Casing & Filter as shown in Fig.



Figure 3

Place the align part on metal plate from filter side

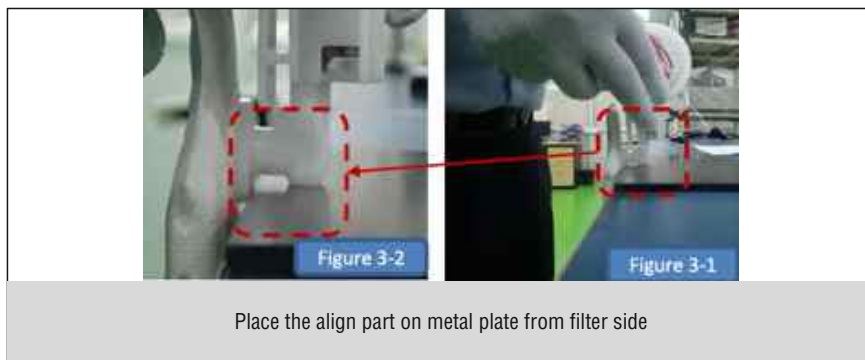


Figure 3-2

Figure 3-1

Place the align part on metal plate from filter side

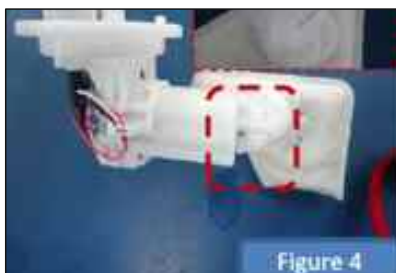


Figure 4

Check the gap between the Casing & Filter material

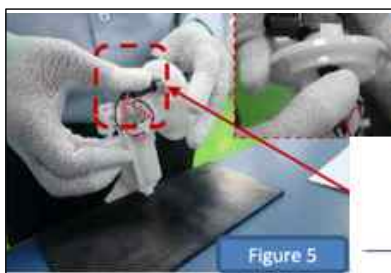


Figure 5

Do not apply load on this area because due to load these is chance of damage of holder harness





SOP for Replacement of Filter in Asian Fuel Pump

Check Points :

- A.** - Make sure that the snap-fits are securely fitted. Refer Figure 1 for “Snap Assembly details”.
 - Zero gap between Filter and Casing at press-fit portion. Refer Figure 2.
 - Check condition of Harness and Terminals. (No abnormality, damage, or rip on insulation, etc).
 - Confirm Fuel Pressure and delivery
 - Confirm Fuel Pump Performance during vehicle test.

B. Precaution

- If abnormality is noticed, replace Fuel Pump Assembly.

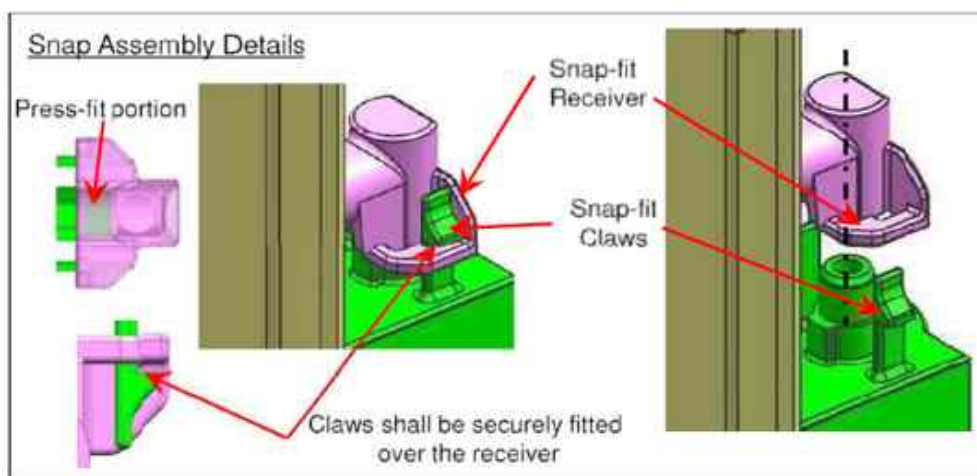


Figure 1

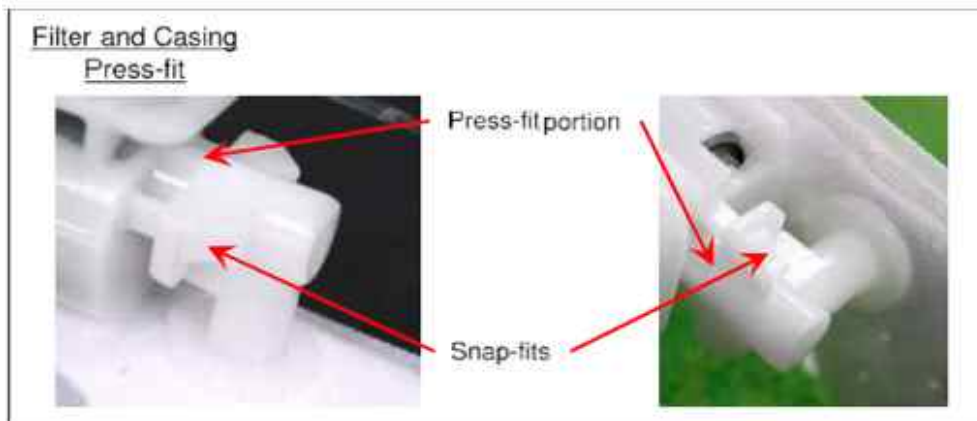
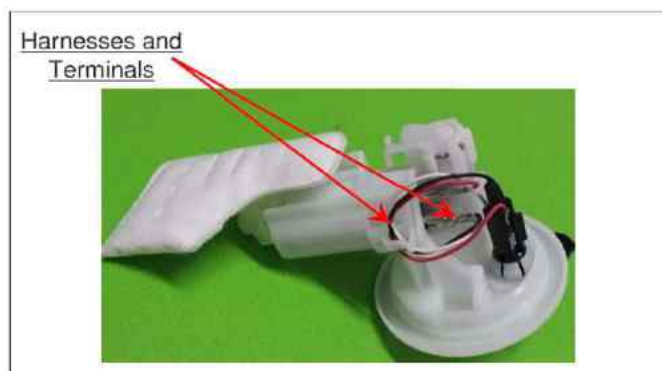


Figure 2

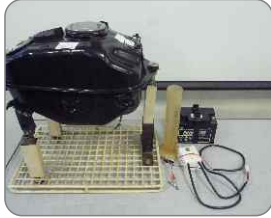




SOP's

Fuel Pump Delivery Inspection

Purpose of this test : To inspect correct quantity of fuel delivered through fuel pump for 10 seconds.



- Instruments required :
Pig tail
(BAL part no. : -----)
Measuring jar
Charged battery



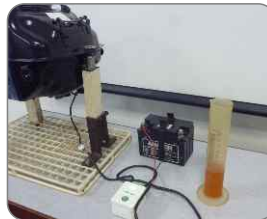
Keep petrol tank on plain surface.



Connect fuel pump delivery checking pigtail coupler to fuel pump coupler. Connect fuel pump delivery checking pigtail crocodile clips to 12V external battery source.



Hold the clean jar at the fuel pipe outlet for collecting the fuel Put ON the switch of the pigtail. Measure the fuel delivery for 10 seconds. After 10 seconds the pigtail building timer will cut off the pump supply



Quantity	Unit
110	milliliters

Fuel Pump Pressure Inspection

Purpose of this test : To measure the fuel pump delivery pressure.



- Instruments required :
Fuel pressure gauge
with connector



Remove:
Fuel pipe from the pump



Connect the fuel pressure gauge connector to fuel pump outlet

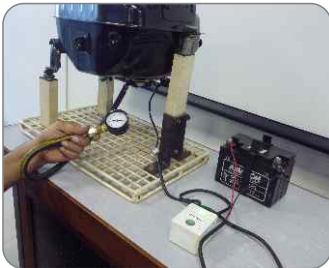
SOP's



Fuel Pump Pressure Inspection



Now connect the pigtail to battery terminals and its coupler to fuel pump.



1. Press the pigtail button
2. Observe the pressure that is displayed on the pressure gauge.

Specification	Unit
3.5	Bar
2.5	$\text{Kg/cm}^2 = 2.5 \text{ kg/cm}^2$



Note:

If the specification mention above is not achieved then confirm for no clogging of...

1. Tank air vent
2. Fuel line

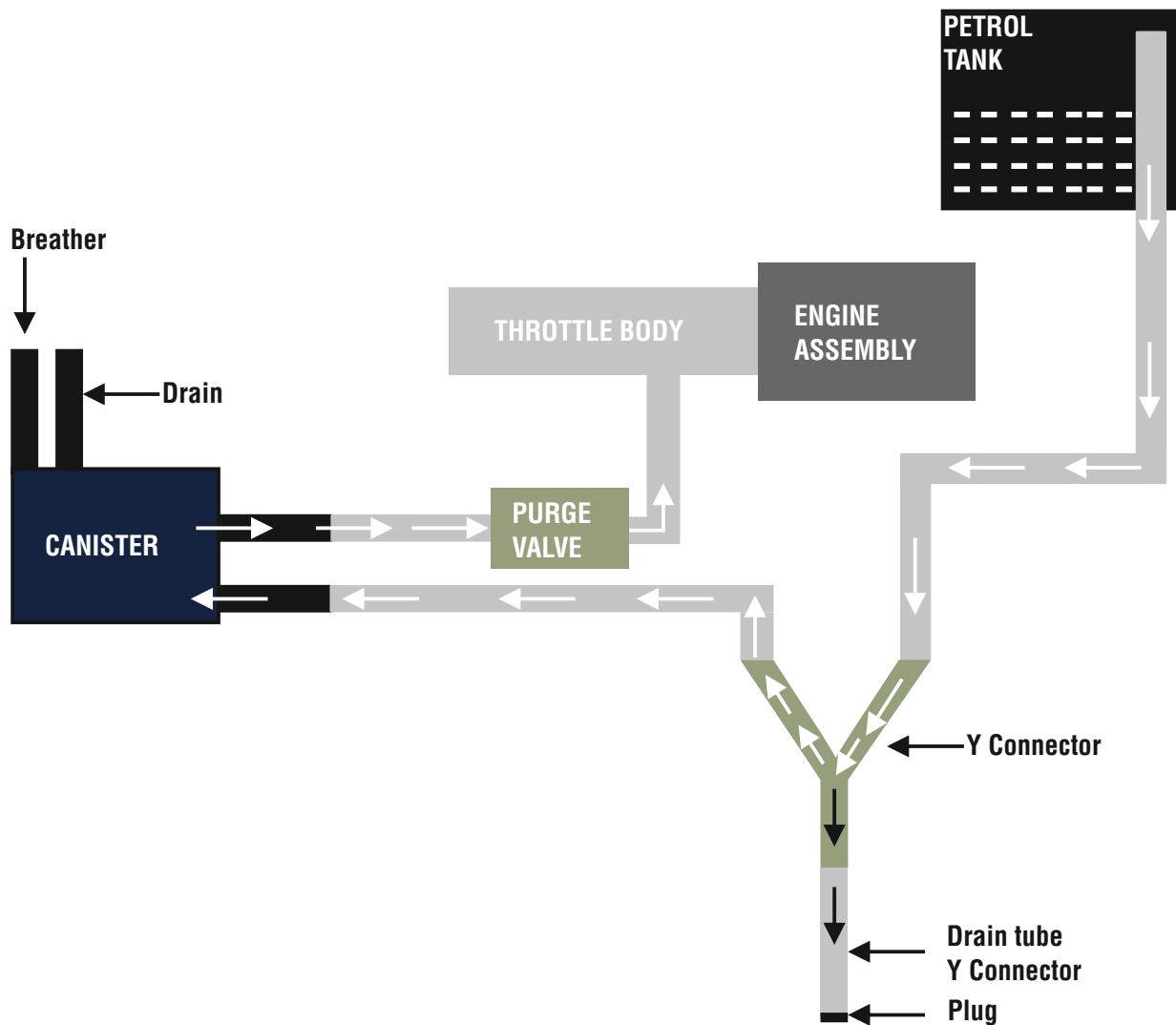
Also confirm for proper functioning of fuel pump.



Working of EVAP System

EVAP is a evaporative Emission system which prevents fuel vapors going to atmosphere by converting fuel vapors into fuel droplets through canister.

These fuel droplets are fed to engine through Purge valve

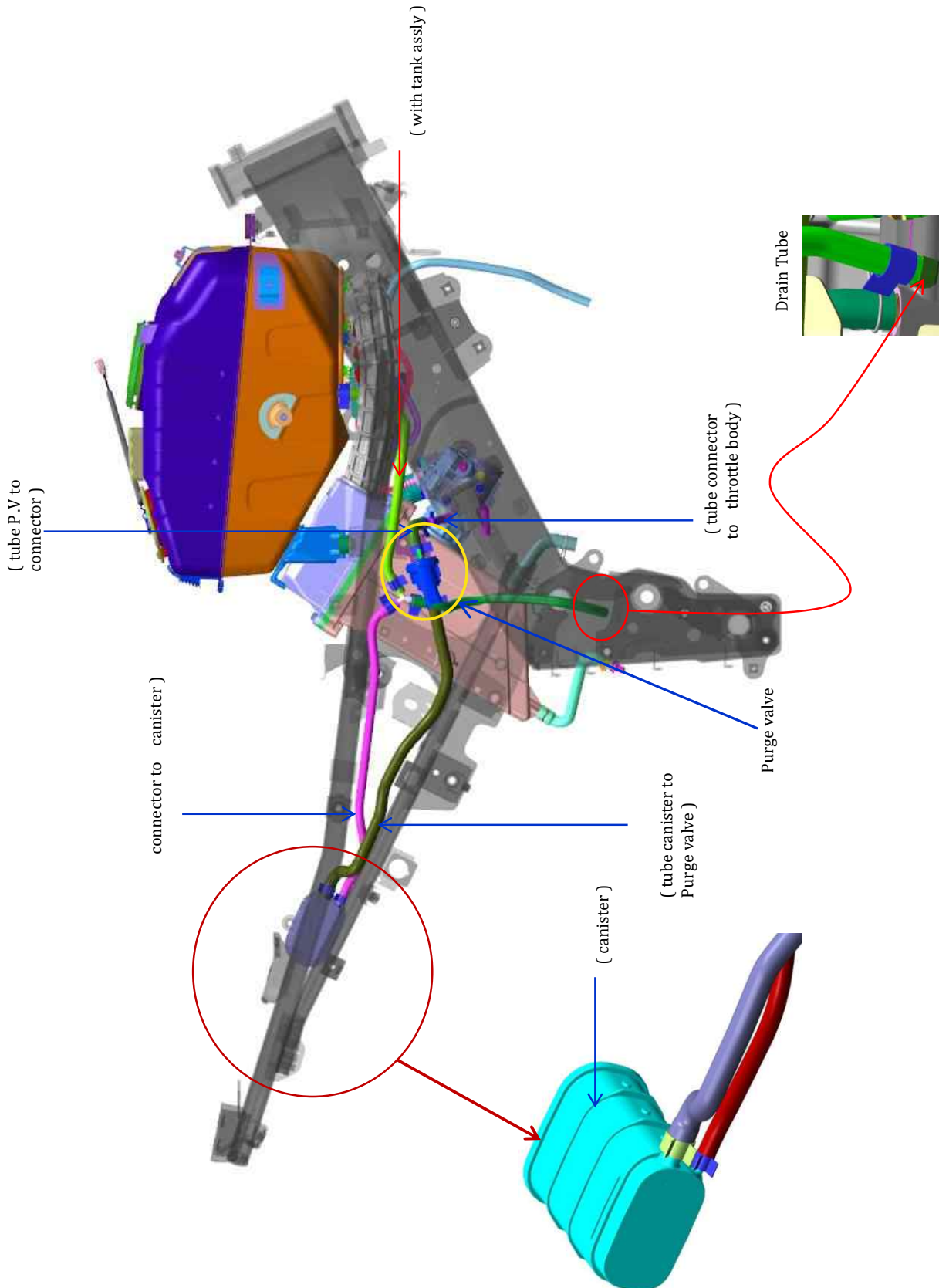


Working of EVAP :

1. Petrol vapours from petrol tank reaches canister assembly through Y connector
2. Vapours are absorbed in canister & while engine running vapours are sucked in engine through purge valve (one way type)
3. Excess vapours in canister are released to atmosphere (Rare case)
4. Life of canister is approx. equal to vehicle life.

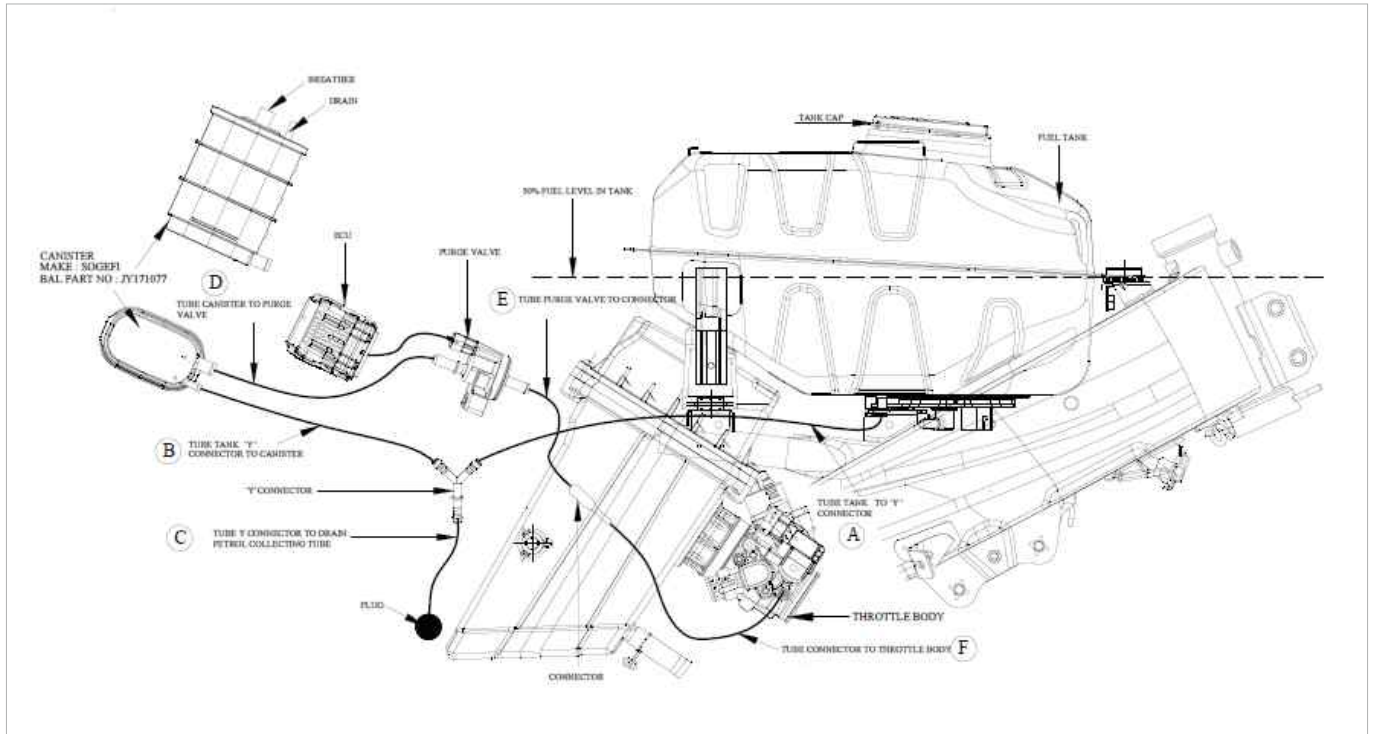


Working of EVAP System





Working of EVAP System



Do's & Don'ts

Precautions while working on fuel injection system

- This fuel injection system is designed to be used with a 12V VRLA battery as its power source. Do not use any other local battery.
- Do not reverse the battery cable connections. This might damage the ECU.
- To prevent damage to the fuel injection parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is ON, or while the engine is running.
- Take care not to short circuit the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Whenever the fuel injection electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (-) terminal.
- When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout the fuel hose.
- Do not operate the fuel pump if the pump is completely dry. The pump lubrication and cooling is done by the fuel itself.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning.



Notes

[illegible]

Key Learning Points

- Appropriate Torque Application for Various Engine Components
- Engine Dismantling
- Understanding of Standard Limits and Service Limits for all Engine Components



CHAPTER 3

Engine & Transmission

Service Limits

Tightening Torques

Special Tools

Engine Dismantling



Service Limits - Engine

Sr. No.	Parameter	Standard (in mm)	Service Limit (in mm)
1	Engine compression pressure	12 - 13 Kgf/cm ²	Min 9.5 Kgf/cm ²
2	Valve tappet clearance IN/EX	IN - 0.05 EX - 0.08	Not Applicable
3	Rocker arm shaft diameter	9.972 ~ 9.985	Not Applicable
4	Cam sprocket root outer diameter	70.84	Not Applicable
5	Cam lobe height (Exhaust)	30.2656	30.2156
6	Cam lobe height (intake)	30.465	30.415
7	Valve spring free length	38.6	37.5
8	Valve stem diameter intake	4.475 - 4.490	4.465
9	Valve stem diameter exhaust	4.455 - 4.470	4.445
10	Valve stem bent	0.01	> 0.01 replace
11	Cylinder head warp	0.03	0.05
12	Cam chain 20 links length	127 - 127.05	127.254
13	Cylinder - piston clearance	0.029 - 0.051	0.1
14	Piston Ring end gap (Top ring)	0.1 - 0.25	0.5
15	Piston Ring end gap (second ring)	0.4 - 0.55	0.7
16	Piston Ring end gap (oil ring)	0.2 - 0.7	1
17	Clutch spring free length	44	43
18	Friction plate thickness	3	2.8
19	Steel plate thickness	1.95	Not Applicable
20	Friction plate warp	0.1	Not Applicable
21	Steel plate warp	0.1	Not Applicable
22	Gear shift fork guide pin diameter	4.45 - 4.49	4.4
23	Gear shift drum groove width	4.55 - 4.7	4.75
24	Crankshaft runout	RH side : 0.08	RH side : 0.12
		LH side : 0.02	LH side : 0.05
25	Connecting rod side (axial) clearance	0.1 - 0.35	Not Applicable
26	Cam lobe width	8.9 - 9.1	Not Applicable
27	Shaft fork shift outer diameter	9.972 - 9.987	9.96
28	Fork shift inner diameter	10 - 10.022	10.03



Tightening Torque - Engine

Sr. No.	Parameter	Torque Value (Kgf-m)
1	Cover cylinder head bolts	1.0 ~ 1.1
2	Cylinder head bolts (4. nos)	2.2 ~ 2.5
3	Cylinder head bolt (1. nos)	2.2 ~ 2.5
4	Chain tensioner mounting bolt	1.0 ~ 1.1
5	Output sprocket bolts fitted on O/P shaft	0.8
6	Slack Side Guide Pivot bolt	1.0 ~ 1.1
7	Clutch cover bolts	1.0 ~ 1.1
8	Oil filter cover bolts	1.0 ~ 1.1
9	Crankcase joining bolts	1.0 ~ 1.1
10	Oil pump mounting bolts	0.5 ~ 0.7
11	Primary gear nut	6.0 ~ 6.5
12	Balancer bolt	1.9 ~ 2.1
13	Magneto cover bolts	1.0 ~ 1.1
14	Clutch nut	6.0 ~ 6.5
15	Camshaft sprocket bolt	1.6 ~ 1.8
16	Starter Motor mounting bolts	1.0 ~ 1.1
17	Magneto Rotor mounting nut	6.5 ~ 7.0
18	Guide Kick bolts	1.0 ~ 1.1
19	Spark Plugs (2 nos.)	1.3 ~ 1.7
20	Oil Strainer Cap	0.7 ~ 0.8
21	Temp Sensor on Block	1.3 ~ 1.7
22	Drum / Cam Allen bolt	1.0 ~ 1.1
23	Inhibitor nut	1.0 ~ 1.1
24	Stator Mounting bolt	0.7 ~ 0.8
25	Stopper Gear Starter mounting	0.5 ~ 0.7
26	Silencer mtg bolt at cylinder head	2.0 ~ 2.2
27	Bolt Shift Change	1.6 ~ 1.8



Special Tools



Cam Sprocket Holder

Part No : 37 1043 96

Application : For holding cam sprocket while removing cam sprocket allen bolt.



Magneto Rotor Holder

Part No : 37 1043 91

Application : To hold rotor while loosening / tightening its nut.



Magneto Rotor Puller

Part No : 37 0044 71

Application : For removing magneto rotor from crankshaft.



Primary Gear Holder

Part No : F4 1AJA 11

Application : To hold primary and secondary gear loosening / tightening the primary gear nut & special nut securing clutch.



Tappet Setting Tool

Part No : 37 1043 55

Application : For adjusting valve tappet clearance.





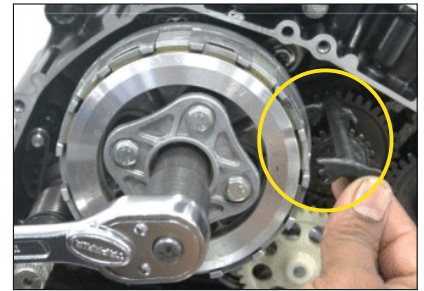
Special Tools



Clutch nut removing tool

Part No : 37 1043 16

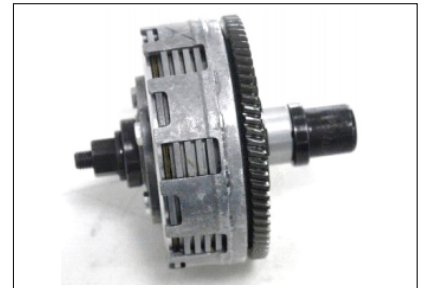
Application : To loosen / tighten special nut securing clutch.



Clutch Dismantling Tool

Part No : 37 1043 58

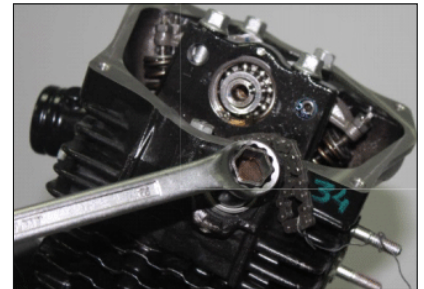
Application : To dismantle & assembled clutch.



Spark Plug Removal Tool

Part No : 37 1044 01

Application : For removing and refitting spark plug R.H. and L.H. side.



Tool to Remove & Fit Shaft Rocker

Part No : 37 1043 99

Application : To remove Rocker Shaft from cylinder head for all models plus C'shaft locking for D- 400/250



Bearing Driver Set

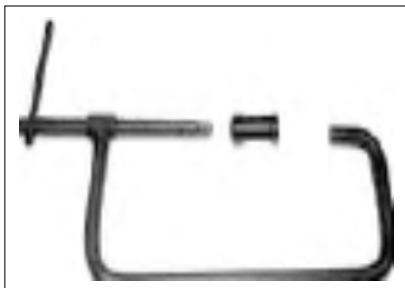
Part No : 37 1030 61

Application : Common bearing driver set for fitting & removing bearings from crankcase.





Special Tools



Adaptor & Valve Spring Compressor

Adapter Part No : 37 1031 08

Valve Spring Compressor : 37 1031 07

Application : To assemble / dismantle intake, exhaust valve.



Drift Piston Pin

Part No : 37 1043 92

Application : To remove & refit piston pin.



Engine Oil Pressure Checking Unit

Part No : 37 2040 31

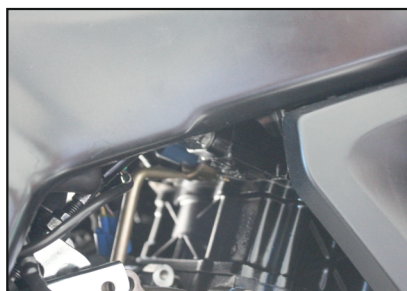
Application : For checking engine oil pressure.



Coolant temperature sensor removal & fitment

Part No : 37 1043 88

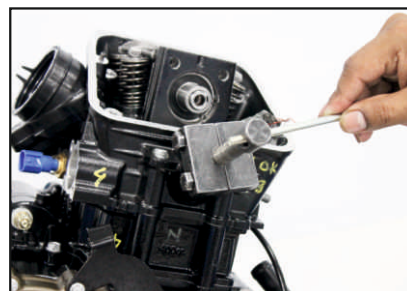
Application : For removing & fitting coolant temperature sensor.



Spark Plug Sleeve Removal Tool

Part No : 37 1043 09

Application : For removing sleeve of spark plug.





Special Tools



Input Shaft Bearing Extractor

Part No : 37 1043 97

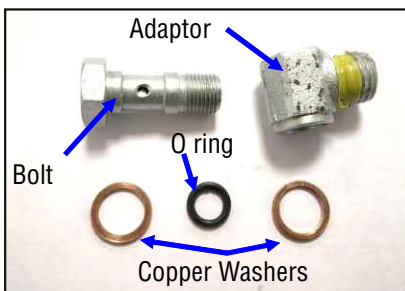
Application : For removing bearing of input shaft.



Output Shaft Oil Seal Fitment Tool

Part No : 37 1042 56

Application : For fitment of output shaft oil seal tool.



Engine oil pressure checking Adapter

Part no:37 2040 45

Application : To be fitted in "Oil pressure checking unit (P/N-37 204031) during engine oil pressure checking.



Crankshaft Removing Tool

Part No : 37 1044 06

Application : For removing crankshaft from crankcase.





Special Tools



Adapter Hot Air Blow Gun

Part No : 37104445

Application : This adaptor to be used with hot air blow gun(Part Number -37004413) for heating crankcase for easy fitment of balancer & crankshaft assembly together.





Engine Dismantling

Top Side Dismantling

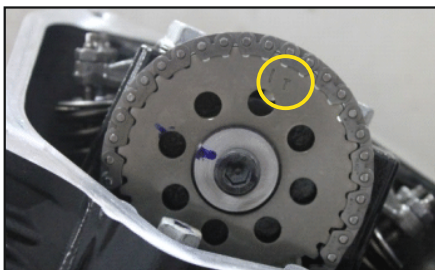


- Remove cylinder head cover mounting bolts (4 nos) with 8 mm T spanner & take out cylinder head cover along with gasket.

Note - Always loosen cylinder head cover mounting bolts in criss - cross pattern.



- Remove magneto cover mounting bolts (7 nos) with 8 mm T spanner in criss-cross pattern & remove magneto cover along with stator plate.
- Align the rotor marking w.r.t crankcase marking



- Check the cam sprocket T mark.

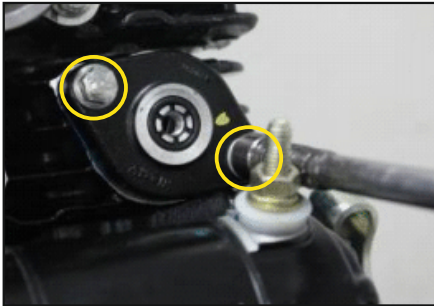


- Remove cam chain tensioner bolt with 10 mm T spanner & rotate chain tensioner screw in clockwise direction to take plunger backwards and lock it.





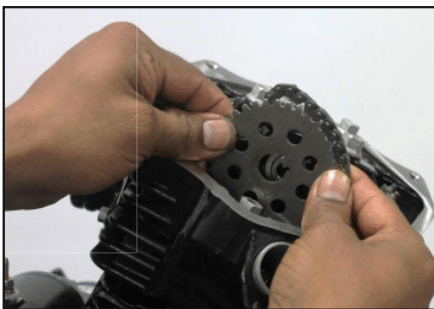
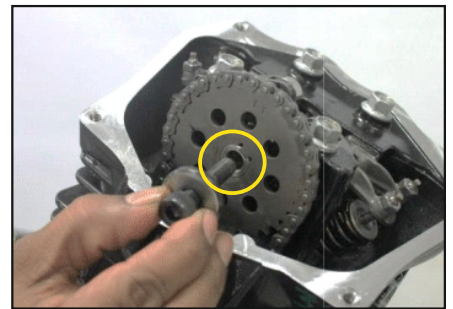
Engine Dismantling



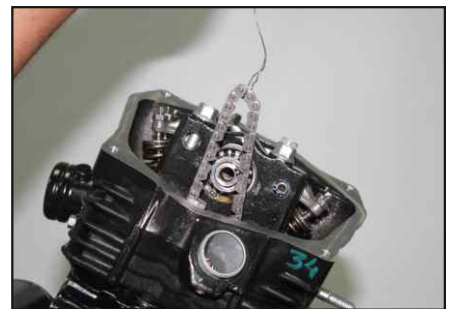
- Remove chain tensioner mounting bolts (2 nos) with 8 mm T spanner & take out chain tensioner along with gasket.



- Remove cam sprocket mounting bolt along with spacer with 6 mm allen key using cam sprocket holder.



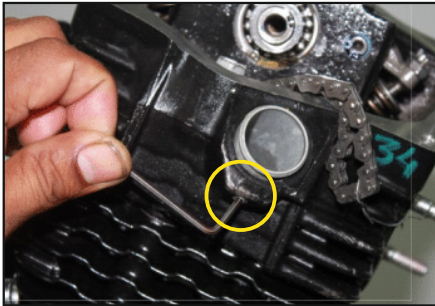
- Remove cam sprocket & tie cam chain by soft copper wire.



- Remove RH side spark plug with spark plug removing tool.



Engine Dismantling



- Remove grub screw with 2.5 mm allen key.

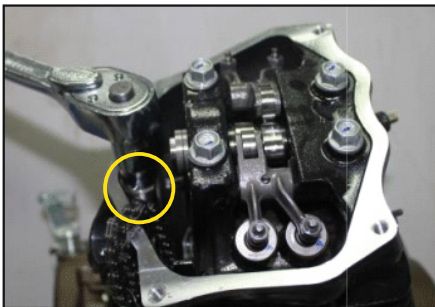
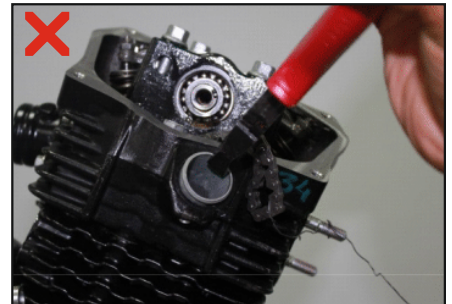


Part No : 37 1043 09

- Remove spark plug sleeve using spark plug sleeve removing special tool.

Note:-

Do not pull spark plug sleeve directly by plier, otherwise it would get damaged.



- Remove cylinder head mounting bolt with 12 mm spanner.



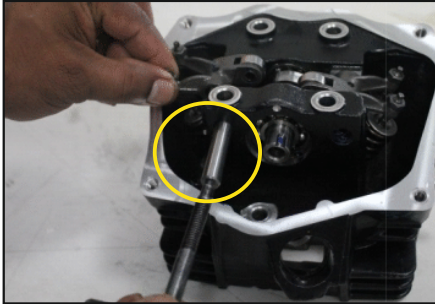
- Remove cylinder head mounting bolts (4 nos) with 12 mm spanner in criss-cross pattern & take out cylinder head assembly.



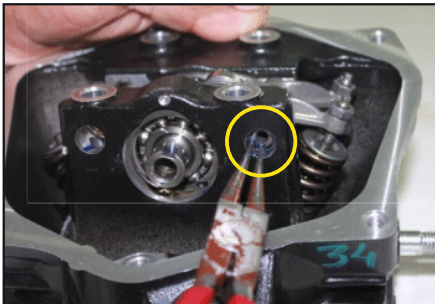
- Remove cam sprocket collar.



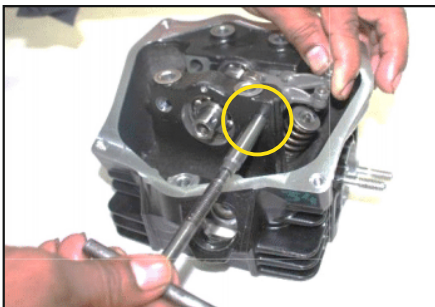
Engine Dismantling



- Remove rocker arm shaft (Intake) with rocker shaft removing tool & take out rocker arm & rocker arm shaft.



- Remove circlip of rocker arm shaft (Exhaust).



- Remove rocker arm shaft (Exhaust) with rocker shaft removing tool & take out rocker arm & rocker arm shaft.



- Remove Intake & Exhaust valves along with -
 - Retainer
 - Valve spring
 - Oil seal
 - Valve spring seat using valve spring compressor.

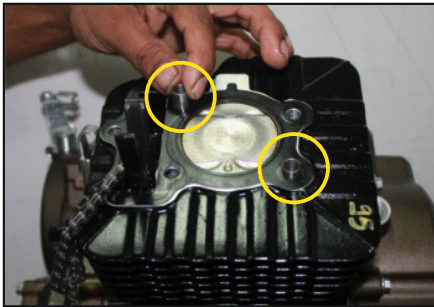


- Remove cam shaft locking clip & take out cam shaft assembly.

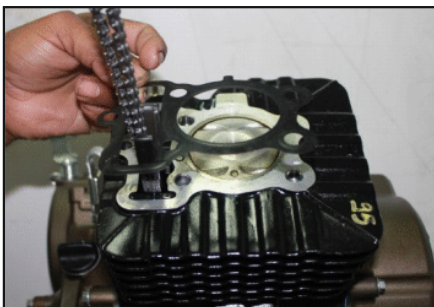




Engine Dismantling



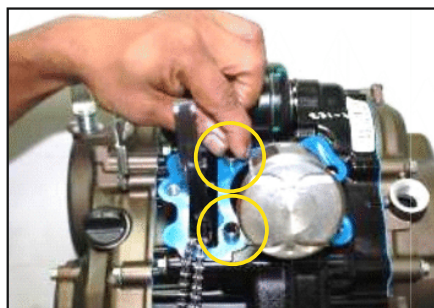
- Remove dowels (2 nos) on cylinder block.



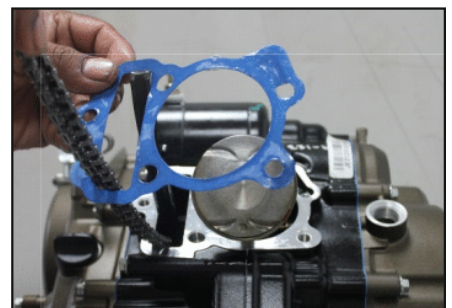
- Remove cylinder head gasket.



- Remove chain guide & cylinder block.



- Remove dowels (2 nos) on crankcase joining face.
- Remove cylinder block gasket.



- Cover the crankcase bore with clean cloth before removing piston pin locking clip.
- Remove piston pin locking clip.



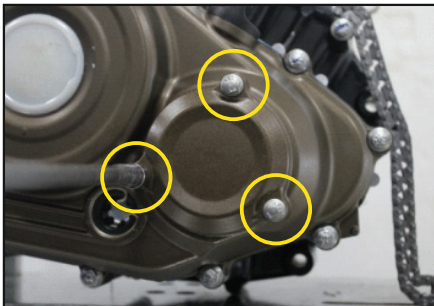
Engine Dismantling



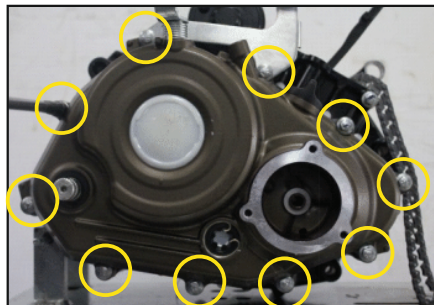
- Remove piston pin with special tool & take out piston.



Clutch Side Dismantling



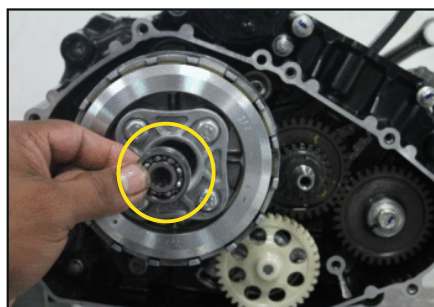
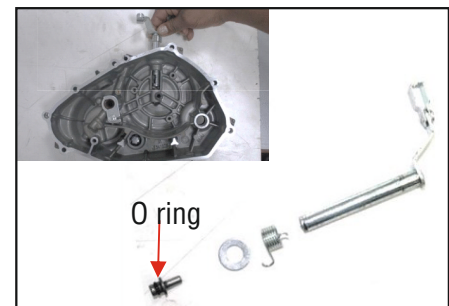
- Remove engine oil filter cover mounting bolts (3 nos) with 8 mm T spanner & take out engine oil filter.



- Remove clutch cover mounting bolts (10 nos) with 8 mm T spanner & take clutch cover along with clutch release shaft & clutch cable bracket.



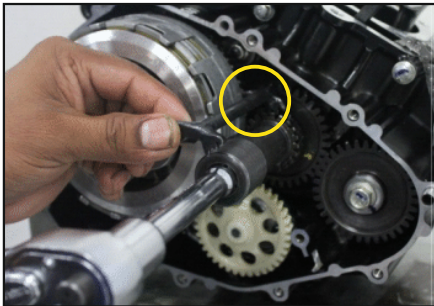
- Removal of clutch release shaft from clutch cover -
 - Remove push rod.
- Ensure O ring is in good condition
- Remove clutch release shaft along with torsion spring & plain washer.



- Remove Clutch thrust / lifter bearing.



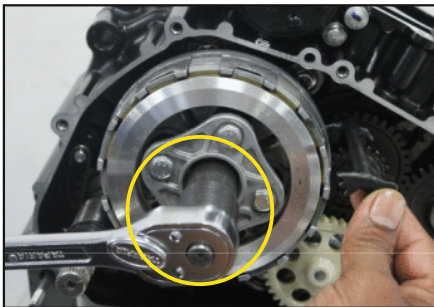
Engine Dismantling



- Using primary gear holder, loosen the primary gear nut with clutch nut removing special tool.

Skill Tip:-

Lock the special tool between teeth of primary gear & clutch housing gear from top.

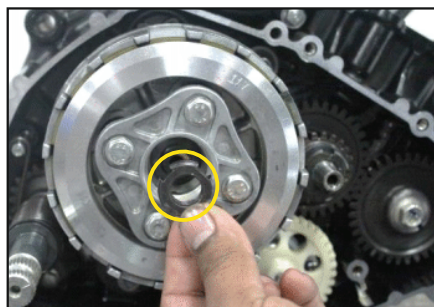


- Using primary gear holder, remove clutch nut with clutch nut removing special tool.

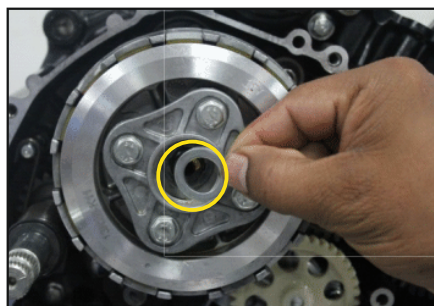
Skill Tip:-

Lock the special tool between teeth of primary gear & clutch housing gear from top.

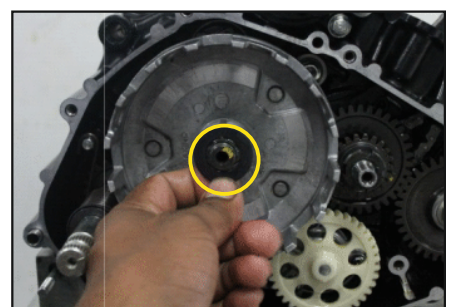
Z



- Take out clutch nut, belleville washer & plain washer.

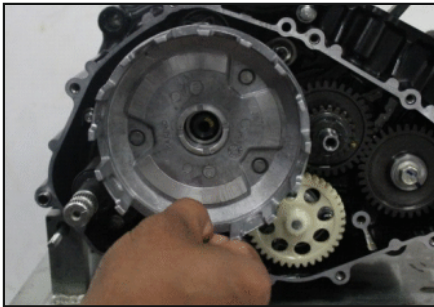


- Remove clutch stack complete.
- Remove plain washer.

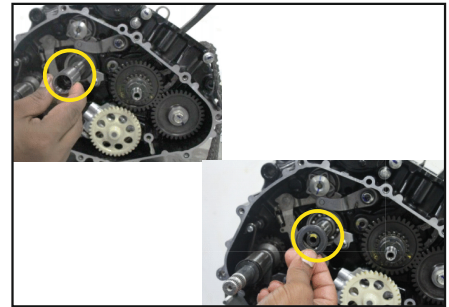




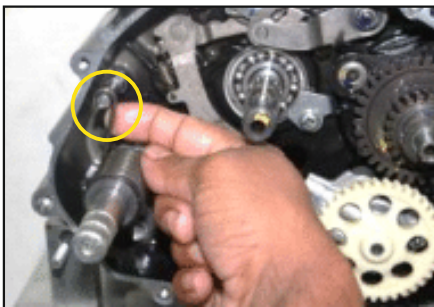
Engine Dismantling



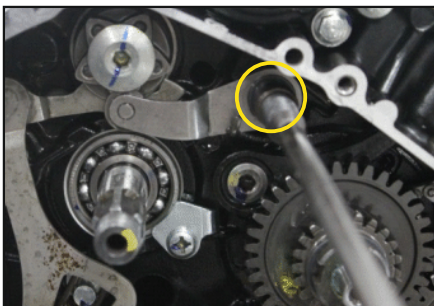
- Remove clutch housing.
- Remove clutch spacer & plain washer.



- Using clutch dismantling tool, remove -
 - 4 bolts
 - 4 springs
 - Clutch holder
 - Clutch hub
 - Friction plates (5 Nos)
 - Steel / pressure plates (4 Nos)
 - Wheel clutch



- Remove kick return spring from kick return spring mounting rod & take out kick shaft assembly.



- Remove inhibitor comp gear shift mounting nut with 10 mm T spanner.

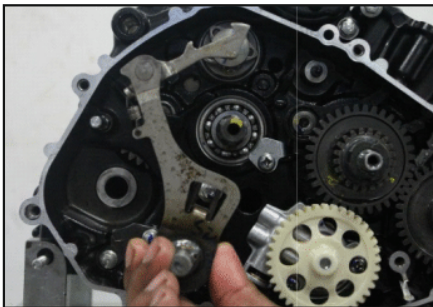
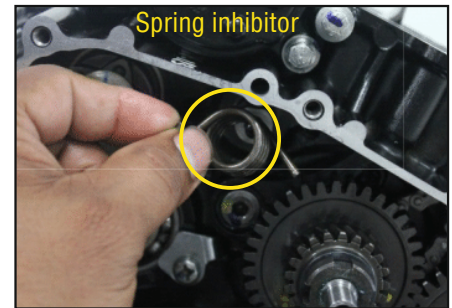


- Remove -
 - Plain washer
 - Inhibitor comp gear shift
 - Step washer
 - Spring inhibitor





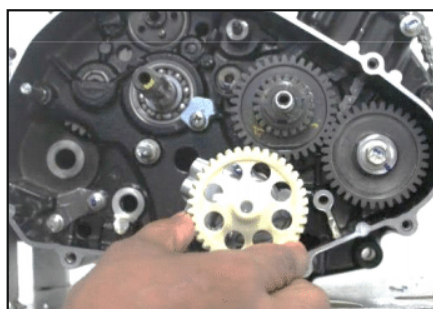
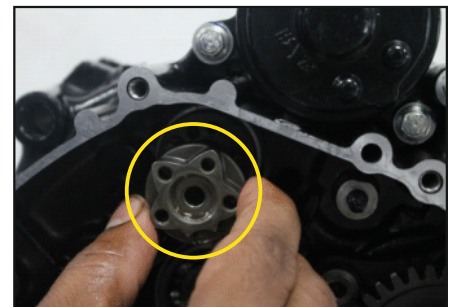
Engine Dismantling



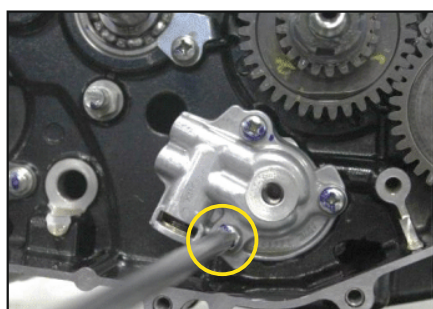
- Remove lever comp. gear shift.



- Remove guide gear shift mounting bolt with 5 mm allen key & take out guide gear shift.



- Remove oil pump driven gear.

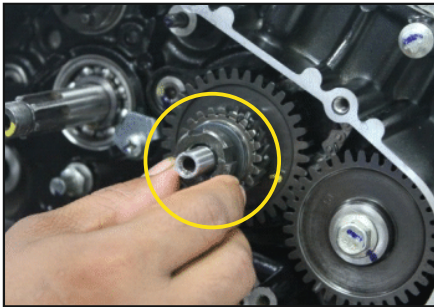


- Remove oil pump mounting screws (3 nos) with phillips head screw driver & take out oil pump body.

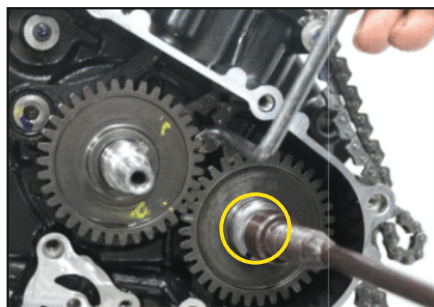




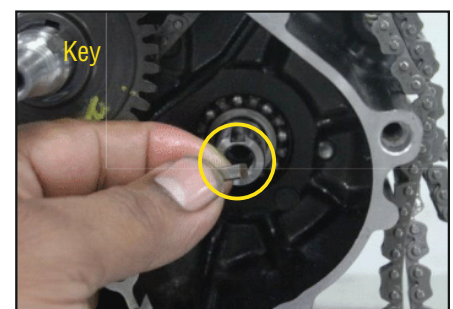
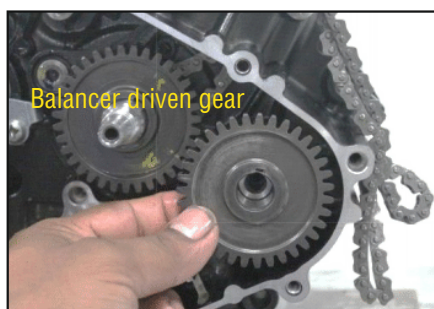
Engine Dismantling



- Remove primary gear nut & take out -
 - Plain washer
 - Primary gear



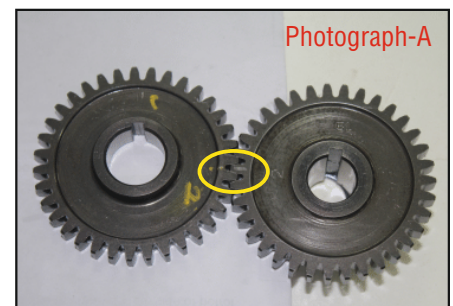
- Remove balancer driven gear mounting bolt along with washer with 12 mm T spanner using balancer gear holding tool & take out Bolt with washer, balancer driven gear and key.



- Remove balancer driving gear & key.

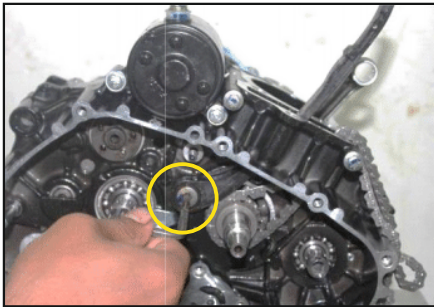
Note :

During assembly, match the marks on balancer drive & driven gear as shown in photograph-A

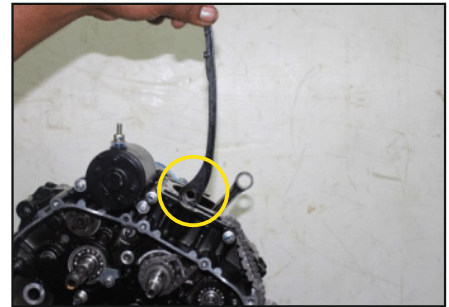




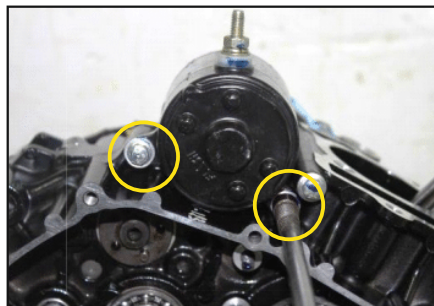
Engine Dismantling



- Remove chain guide mounting bolt with 5 mm allen key & take out chain guide.



- Remove timing chain from sprocket on crankshaft & take out timing chain.



- Remove starter motor mounting bolts (2 nos) with 8 mm T spanner & take out starter motor.



Magneto Side Dismantling



- Remove dowels (2 nos) & take out magneto cover gasket.



Engine Dismantling



- Remove gear starter clutch guiding / locking plate mounting screw with phillips head screw driver.



- Using magneto rotor holder, remove rotor mounting nut with 19 mm spanner.



- Remove plain washer.



- Using magneto rotor puller & 32 mm spanner, remove rotor.



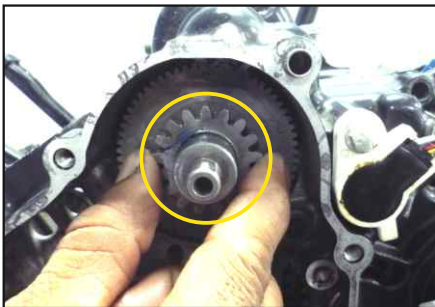
Engine Dismantling



- Remove key of gear starter clutch.



- Remove gear starter clutch.

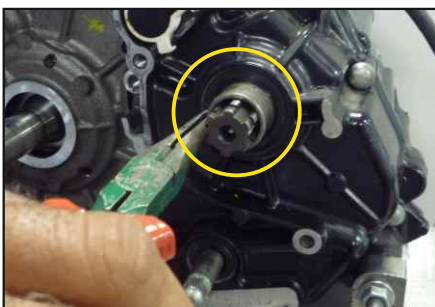


- Remove starter counter gear assembly.

Crankcase Splitting



- Using cam sprocket holder, remove output sprocket mounting bolts (2 nos) with 4 mm allen key & take out -
 - Lock plate
 - Output sprocket &
 - Spacer.

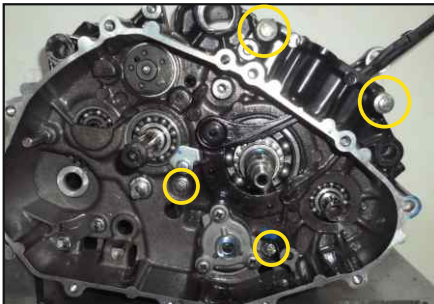




Engine Dismantling



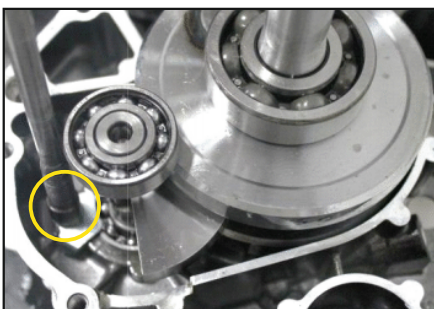
- Remove LH crankcase mounting bolts (9 nos) with 8 mm T spanner.



- Remove RH crankcase mounting bolts (4 nos) with 8 mm T spanner.



- Put the engine on engine work table & remove RH crankcase along with crankshaft & balancer assembly.



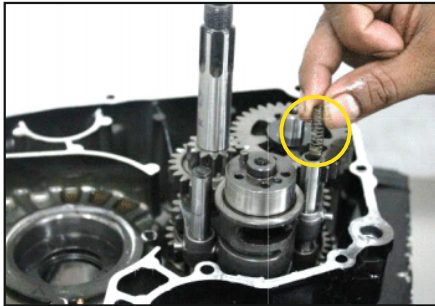
- Remove balancer bearing locking / stopper plate mounting bolt with 8 mm T spanner.



- Take out crankshaft & balancer assembly.



Engine Dismantling



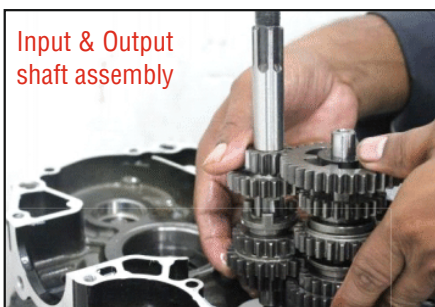
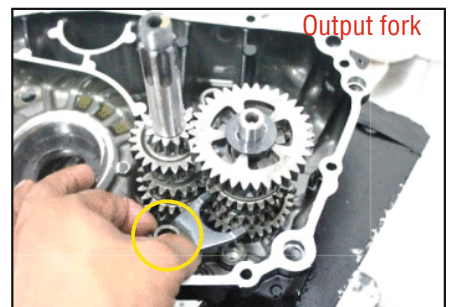
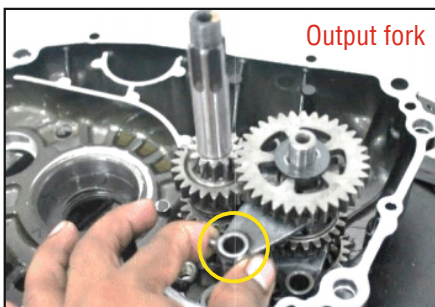
- Remove output fork shaft springs (2 nos, one at top & other at bottom) & take out output fork shaft.



- Remove input fork shaft.



- Remove gear change drum.
- Remove input fork (1 nos) & output forks (2 nos).



- Remove input & output gear shaft assembly.
- Remove washer plain of input gear shaft.





Notes

[illegible]

Key Learning Points

- Appropriate Torque Application for Various Frame Components
- Understanding of Standard Operating Procedure
- Understanding of Standard Limits and Service Limits for all Frame Components



CHAPTER 4 Frame & Suspension

Service Limits

Tightening Torques

Special Tools

Inverted Front Fork (Seat Pipe Design) - SOP

Front ABS Hose Routine

Rear ABS Hose Routine

ABS - Anti Lock Braking System

Standard Operating Procedure



Service Limits - Frame

Sr. No.	Parameter		Standard (mm)	Service Limits (mm)
1	Brake disc run out	Front	0.15 (only disc)	Not Applicable
		Rear	/ 0.25 (wheel assy)	
2	Brake disc thickness	Front	5	4.5
		Rear	4	3.5
3	Brake pad thickness	Front	9.35	4
		Rear	9	3.8
4	Axle run out		0.15 or less	0.25 or less
5	Axial wheel run out		0.5 or less	1.0 or less
6	Radial wheel run out		0.5 or less	1.0 or less
7	Drive chain slackness		20 - 25	40 - 45
8	Drive chain length		254 for 20Links	258.5 for 20Links
9	Rear sprocket warp		0.2 or less	0.2
10	Front fork spring free length		370	NA
11	Tyre tread depth	Front	4.7 - 5.3	Up to Tread Wear Indicator
		Rear	6.7 - 7.3	Up to Tread Wear Indicator
12	Fork Oil Quantity (PRF-001)		210 ml / leg	Not Applicable



Tightening Torque - Frame

Sr. No.	Parameter	Torque Value (Kgf-m)
1	RR Unit bolts	0.64 ~ 0.72
2	HT Coil bolts	1.0 ~ 1.2
3	Engine mounting bolt Front top	2.5 ~ 2.7
4	Engine mounting bolt front bottom	4.5 ~ 4.7
5	Engine mounting bolt rear	4.5 ~ 4.7
6	Steering slotted nut	0.5 ~ 0.6
7	RSA Top bolt	3.2 ~ 3.8
8	RSA Lower bolt	3.2 ~ 3.8
9	Swing arm shaft nut	13 ~ 15
10	LH Stay (Footrest Holder) bolt	1.8 ~ 2.2
11	RH Stay (Footrest Holder) bolt	1.8 ~ 2.2
12	Front fender bolt	0.6~0.7
13	Side stand bracket bolt	1.8 ~ 2.2
14	Front axle nut	5 ~ 6
15	Rear axle nut	8 ~ 10
16	Front disc mtg bolt	2.7 ~ 3.3
17	Front Sensor disc bolt	2.7 ~ 3.3
18	Front Caliper mtg bolts	2.2 ~ 2.8
19	ABS mounting on Frame bolts	0.8 ~ 1.2
20	Rear disc mtg bolt	0.9 ~ 1.1



Tightening Torque - Frame

Sr. No.	Parameter	Torque Value (Kgf-m)
21	Rear Sensor disc bolt	0.9 ~ 1.1
22	Rear Caliper mounting bolts	1.2 ~1.6
23	Rear Master cylinder mtg bolt	0.8 ~ 1
24	Rear sprocket nut on coupling	3.2 ~ 3.8
25	Rear brake pedal bolt	1.5 ~ 1.8
26	Handle bar holder bolts	1.8~2.0
27	Weight handle bar bolt	0.8 ~ 1
28	Fork Center bolt	4.5~5.0
29	Fork top mounting bolt	2.5 - 3.5
30	Fork (upper bracket side) bolt	1.4~1.6
31	Fork under bracket bolt	1.8~2.2
32	Tank mounting bolt	1.8 ~ 2.2
33	Fuel pump mounting bolts	0.65 ~ 0.8
34	Speedometer mounting nuts	0.3 ~ 0.5
35	Headlight mounting nuts/bolts	0.3~0.5
36	Chain cover bolt	0.8 ~ 1
37	Leg guard bolts	Top: 1 ~ 1.2
		Bottom : 1.8 - 2
38	Grab handle bolt	2.0 - 2.2



Special Tools



Fork clamping Block (Fork dia. 33mm)
Part No : 37 0044 89
Application : To hold the fork inner pipe using benchwise.



Oil seal & Guide bush fitment tool (Fork dia. 33mm)
Part No : 37 0044 91
Application : For fitment of oil seal & guide bush.



Oil seal protector tool (Fork dia. 33mm)
Part No : 37 0044 93
Application : To be used during fitment of oil seal.



Fork Special Bolt Tightening Tool
Part No. : 37 0044 68
Application : For tightening & loosening fork bolt



Installer Upper & Lower Bearing Race Frame
Part No : 37 1740 35
Application : To install upper & lower steering races / cones into their seats inside frame.





Special Tools



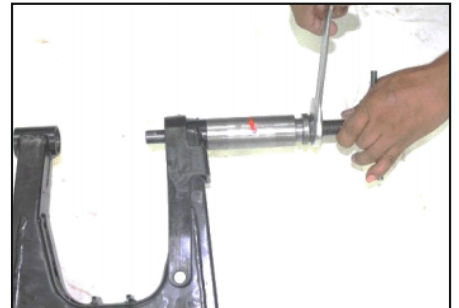
Bearing Race Extractor
Part No. : 37 0044 78
Application : To Pull out steering race from fork Under Holder Bracket.



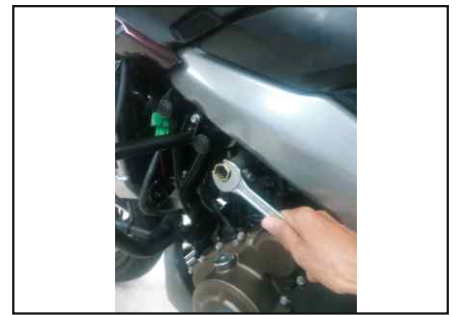
Steering Cone Remover
Part No. : 37 1805 06
Application : To remove steering cones from frame.



Swing arm NRB extractor & fitment tool
Part No. : 37 0044 73
Application : For extracting & fitment of NRB



21 mm Tube Spanner
Part No. : 37 1043 57
Application : For oil pressure sensor removal & fitment on vehicle.

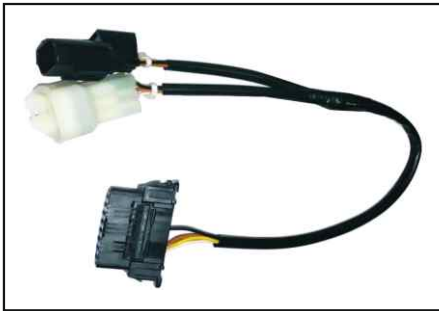


Pigtail 4 Pole to 2 Pole converter :
Part No. : 37 2040 35
Application : For connecting fuel pump delivery checking unit to fuel pump.





Special Tools



Pigtail for BOSCH Diagnostic tool

Part Number : 37004312

Application : For connecting bosch tool to new
CAN (OBD) coupler



Inverted Front Fork (Seat Pipe Design) - SOP

Assembly & Disassembly Procedure

Inverted SPD Fork Disassembly



Clamp Fork on vice with the help of the special nylon tool. Tool to be placed at the Under Bracket location of outer tube. Adjoined ID of tool to be maintained as $\varnothing 48\text{mm}$.

Open Fork Bolt by using wrench of size 22mm



Remove the Fork Bolt

To open Fork Bolt & Lock Nut, Clamp Fork Bolt by wrench of size 22mm & Lock nut by spanner size 18mm. Cross De torquing to be done.





Inverted Front Fork (Seat Pipe Design) - SOP



Open Lock Nut



Remove Fork Bolt & Lock Nut



Remove fork assembly from vice and drain the oil



Remove outer dust cap





Inverted Front Fork (Seat Pipe Design) - SOP



Remove inner dust seal



Remove circlip through screw driver



Separate Fork pipe assembly and Outer Tube Assembly by applying a pull force

Remove Fork pipe assembly from Outer Tube





Inverted Front Fork (Seat Pipe Design) - SOP



Clamp fork pipe assembly on vice with a special aluminium tool. Adjoined ID of tool to be maintained as Ø33 respectively for NS160



Apply heat gun to break the Loctite bonding of screw cap assembly. Heating to be done until the bond breaks. Open the screw cap assembly by spanner of 28mm for Ø33 (NS160).



Remove seat pipe assembly from fork pipe



Remove main spring and washer



Inverted Front Fork (Seat Pipe Design) - SOP



Disassembled Parts



Remove Slide bush from fork pipe

Subsequently remove all the remaining child parts





Inverted Front Fork (Seat Pipe Design) - SOP

Inverted SPD Fork Asassembly



Seat pipe assembly

Clamp fork pipe assembly on vice with the same special tool used for dis assembling the fork



Insert outer dust cap through thimble

Similarly insert dust seal, circlip, oil seal, washer through thimble.
Note:
1. Apply oil on the OD of oil seal for smooth insertion in tube
2. Apply grease BERUTOX FB22 on the oil seal and dust seal ID





Inverted Front Fork (Seat Pipe Design) - SOP



Insert guide bush



Insert slide bush



Slide bush to sit in the OD groove of fork pipe



Insert main spring





Inverted Front Fork (Seat Pipe Design) - SOP



Insert spacers for pre compression



Insert seat pipe assembly



Apply Loctite 243 on screw cap threading. Tight the seat pipe assembly to fork pipe assembly with a spanner of 28mm for Ø33 Tightening Torque: 75Nm



Insert outer tube through seat pipe assembly onto fork pipe assembly



Inverted Front Fork (Seat Pipe Design) - SOP



Insert guide bush and press through special aluminium tool. Tool dimension should be kept so as the ID after mating should be $\varnothing 33$ for NS160. One side of the tool is used to press Guide Bush and Other side is used to press Oil Seal.



Insert oil seal and press through fixture



Press circlip in groove



Press dust seal





Inverted Front Fork (Seat Pipe Design) - SOP



Press outer dust seal



Oil filling



Insert lock nut

Cross Torque fork bolt to lock nut with a spanner of 18mm on lock nut and 22mm on fork bolt (Torque of 30Nm)



Inverted Front Fork (Seat Pipe Design) - SOP



← Torque fork bolt to outer tube with a socket of 22mm. Tightening Torque: 30Nm

Leg Assembly complete →



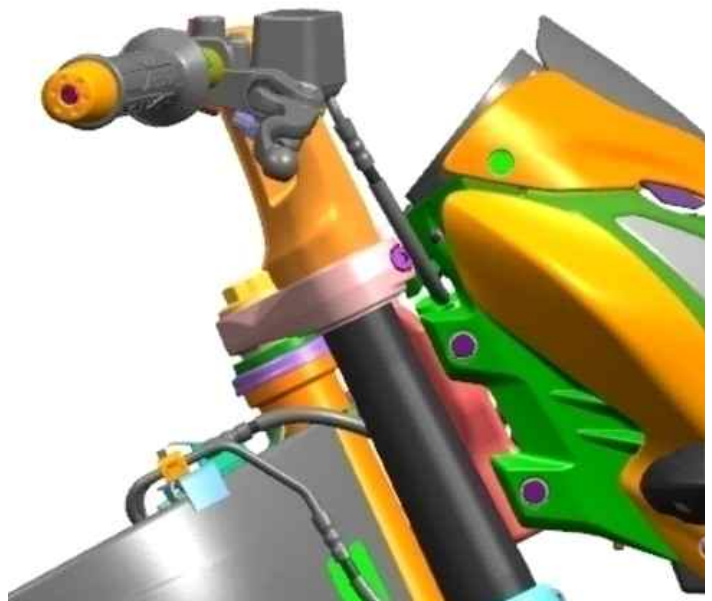


Front ABS Hose Routine

- Route brake hose from front master cylinder as shown in photograph .



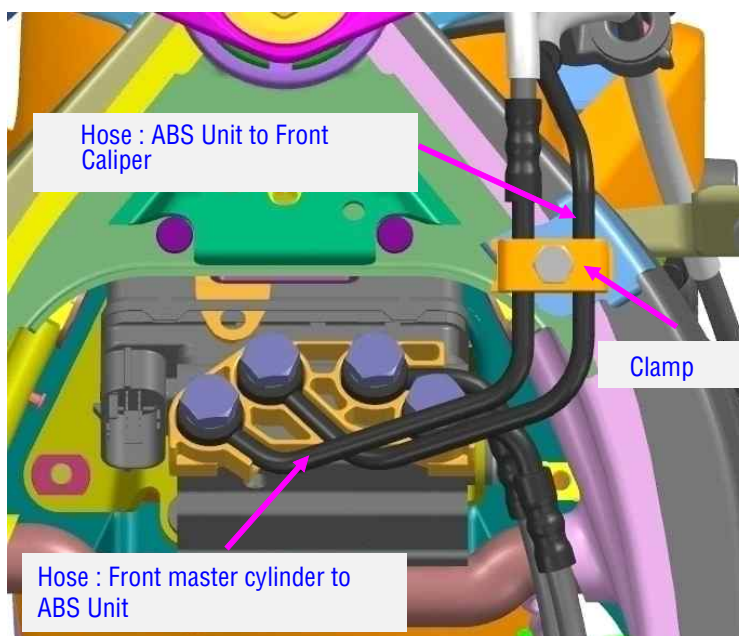
- Route brake hose as shown in photograph.



Front ABS Hose Routine



- Route brake hose through the clamp & connect to ABS Unit as shown in photograph.
- Route brake hose from ABS unit through clamp as shown in photograph



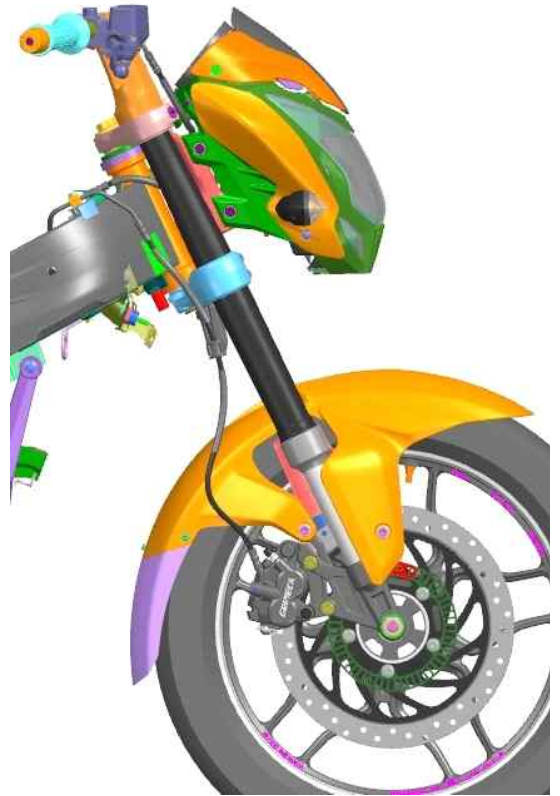
- Fit rubber grommet on brake hose from ABS unit through clamp as shown in photograph.





Front ABS Hose Routine

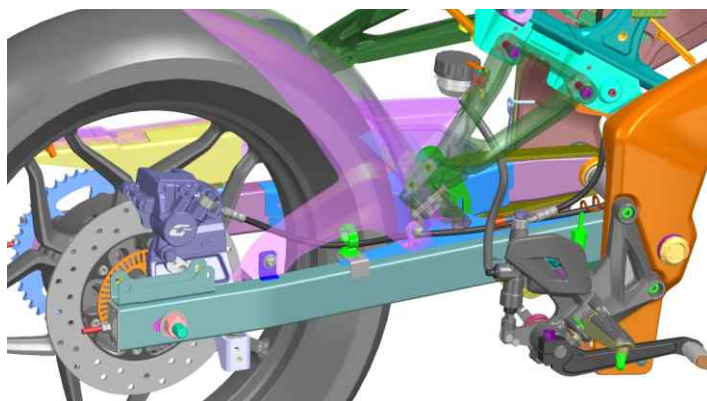
- Connect brake hose from ABS unit to front caliper as shown in photograph.



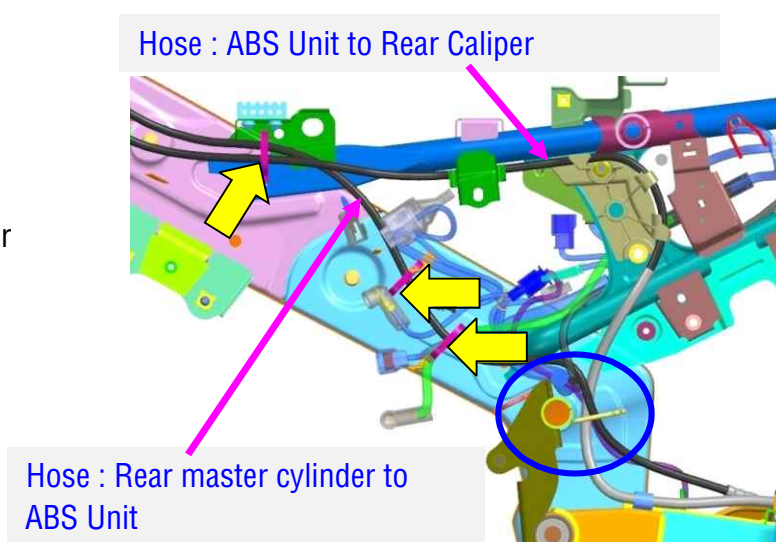
Rear ABS Hose Routine



- Route the brake hose from reservoir to rear master cylinder as shown in photograph.



- Route the brake hose from rear master cylinder through metal clamp as shown by blue circle in photograph.
- Tie the brake hose from rear master cylinder using cable tie (as shown by pink yellow arrows in photograph).

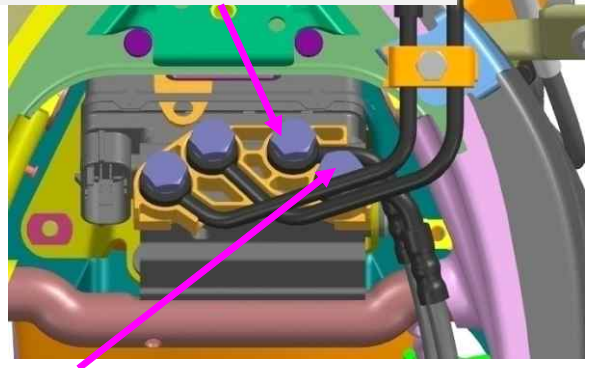




Rear ABS Hose Routine

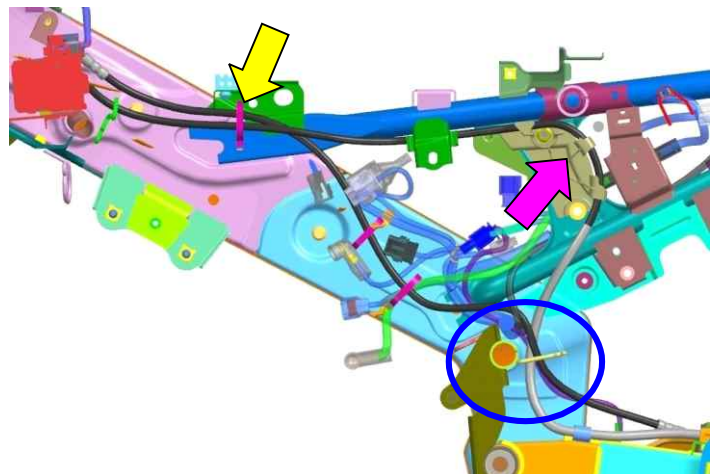
- Connect brake hose to ABS unit.

Hose : ABS Unit to Rear
caliper



Hose : Rear master cylinder to
ABS Unit

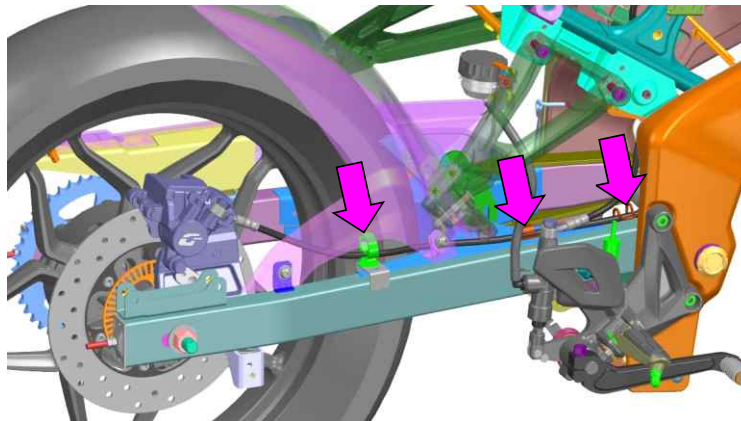
- Tie the brake hose from ABS unit using cable tie (as shown by yellow arrows in photograph).
- Route the brake hose from ABS unit through bracket brake hose rear as shown by pink arrow in photograph.
- Route the brake hose from ABS unit through metal clamp as shown by blue circle in photograph.



Rear ABS Hose Routine



- Route the brake hose through hose guide clamps as shown by pink arrow in photograph & connect to rear caliper.





ABS - Anti Lock Braking System

Function:

To prevent the wheels of vehicle from sudden locking during braking situations.

Benefits:

- Increase motorcycle stability & riding comfort.
- Best possible deceleration without wheel lock up.
- Reduced braking distance under many conditions.

Working:

In ABS system, the ABS unit detects the possibility of wheels getting locked by taking input from speed sensor located at both wheels. When the wheels are about to lock, the hydro-electrical controller controls brake caliper fluid pressure & thus prevent wheels from getting locked, avoiding possibility of accident.

Components of the ABS System:

ABS unit is a combination of Electrical & hydraulic controls. The ABS ECU receives pulse signal from both wheel speed sensors, accordingly it controls flow of brake fluid to caliper. ABS unit is located below fuel tank. The master cylinder to caliper assembly hydraulic connection of front wheel is routed through ABS unit. The signal from the wheel sensors opens or closes the solenoid valves in ABS unit there by controls flow of hydraulic oil to caliper assembly.

Solenoid Valve (Inlet):

It allows flow of brake fluid to caliper while braking.

Solenoid Valve (Outlet):

In case of wheel locking situation, it releases braking force applied on disc by allowing brake fluid to flow back to temporary reservoir.

ABS Indication Lamp:

When ignition switch is turned ON, ABS indicator will stay ON, until wheel speed is more than 10 km/hr, then ABS indicator goes OFF. If there is any problem with ABS system, the ABS indicator will blink indicating the problem in ABS system.

Wheel Speed Sensors:

These are HALL effect type speed sensors. They sense the pulse from sensor disc mounted on wheels & convey it to ABS Unit.

Pump:

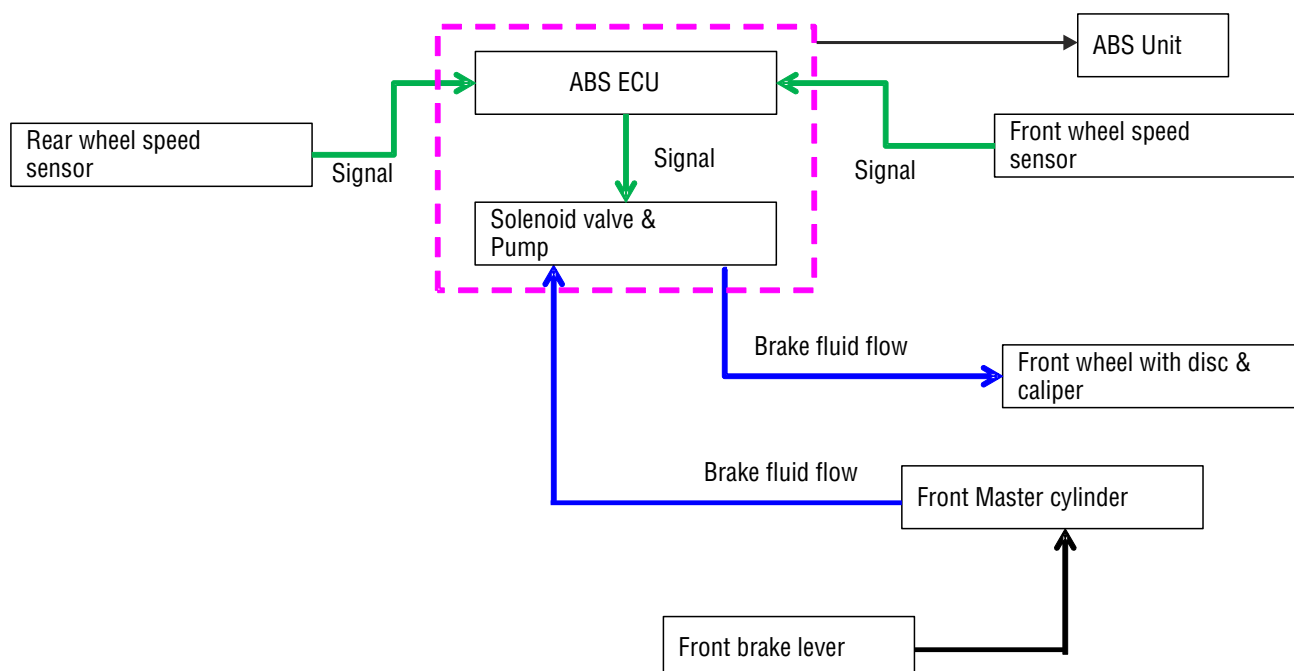
To built the pressure whenever is required.

Note: In case of ABS system failure Brake system will work as a normal hydraulic brake.

ABS - Anti Lock Braking System

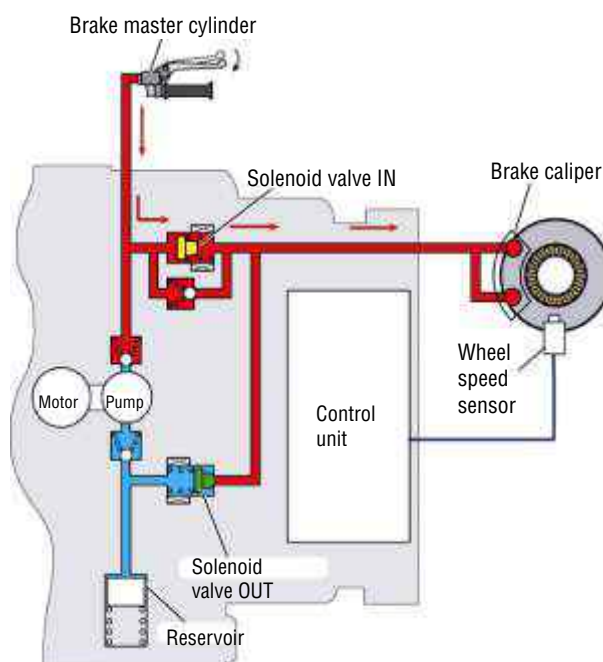


Block Diagram :



Normal braking (ABS not activated)

When the ABS is not activated, the electric signal from the control unit is off, the solenoid valve IN is open, and the solenoid valve OUT is closed. The fluid pressure in the master cylinder during braking is transmitted directly to the caliper through the solenoid valve IN. This is normal braking and the rider directly controls braking with the brake lever.





ABS - Anti Lock Braking System

Even though vehicle control is improved during emergency braking always maintain a safe distance between you and objects ahead. Vehicle speeds should always be reduced during extreme road conditions. The braking distance for motorcycle equipped with an anti-lock braking system may be longer than for those without it on rough road conditions. During these conditions the vehicle should be driven at reduced speeds.

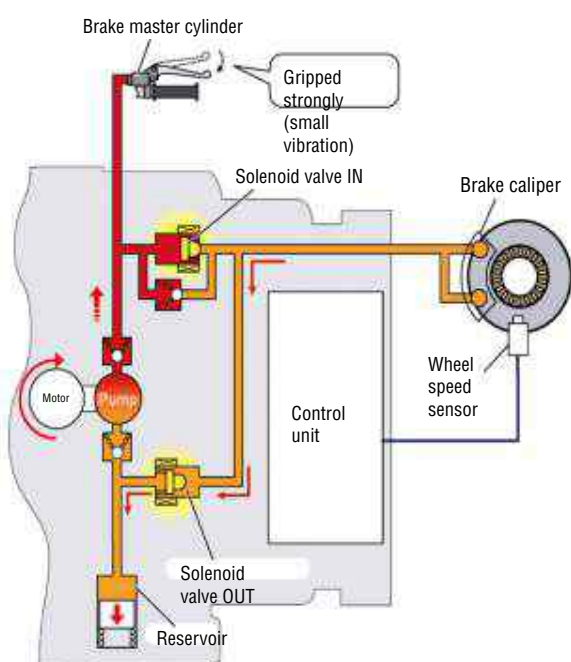
The ABS continuously senses the speed of the wheels. If the wheels are going to lock, the ABS system repeatedly modulates the hydraulic brake pressure to the wheels.

When you apply Front brake under conditions which may lock the wheels, rider will feel a corresponding sensation (pulsation) in the Front Brake Lever. This is normal and it means your ABS is active.

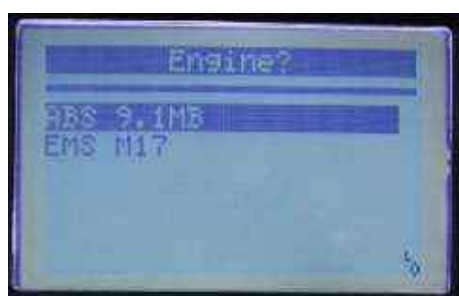
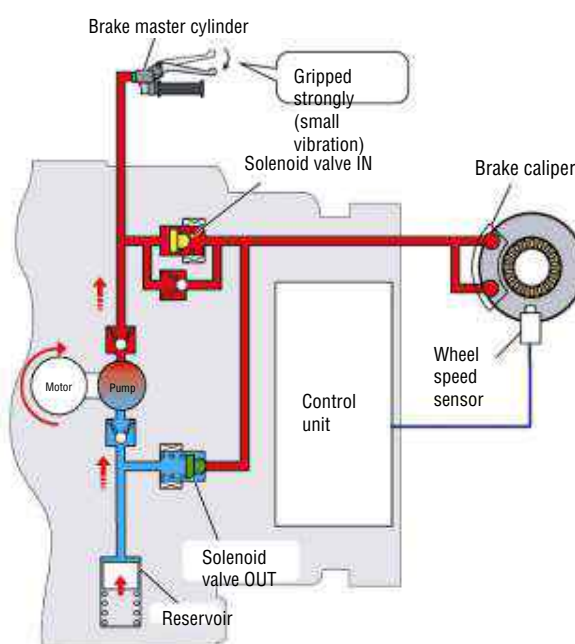
Also it is recommended to use both front & rear brakes simultaneously. Using front brake will give maximum effective braking.

Always slow down when cornering. The anti-lock brake system cannot prevent accidents resulting from excessive speeds. If the ABS warning light is on and stays on, you may have a problem with the ABS. In this case, however, your regular brakes will work normally.

When the ABS is activated
Pressure decrease



Pressure increase





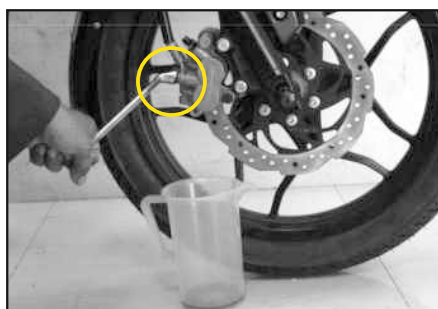
Standard Operating Procedure

Note: The images shown below for the SOPs does not resembles with the new bike. However the repair process recommended below is common for all models

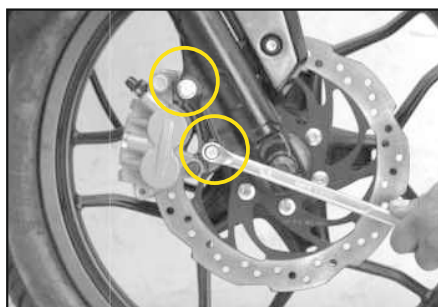
Caliper Piston Seals & Dust Seals Replacement



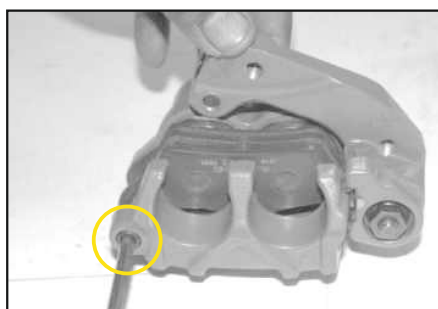
- Clean master cylinder & caliper thoroughly by low pressure water spray before opening master cylinder top cover & caliper bleeder screw.
- Drain the brake fluid from caliper assembly by removing rubber cap of air bleeder screw & using transparent PVC tube which will avoid spillage of brake fluid on caliper body / disc pads & also powder coating peel off / inefficient braking.



- Remove front brake hose caliper end banjo bolt with 14 mm spanner.
N o t e :
Keep the plastic jar below caliper assembly.



- Remove caliper assembly mounting bolts (2 nos) with 12 mm spanner & take out caliper assembly.



- Remove brake pads mounting bolt with 5 mm allen bolt & take out brake pads.





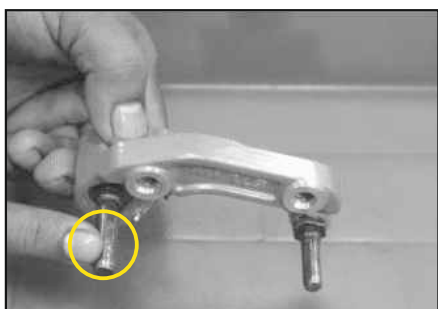
Standard Operating Procedure



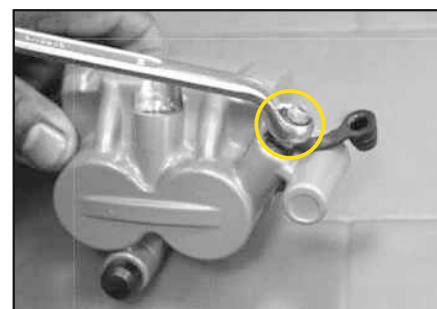
- Remove caliper pin holder bracket as shown in photograph.



- Clean the anchor pins thoroughly.



- Smear silicon grease on anchor pins.
- Remove air bleeding screw with 10 mm spanner.



- Remove pad spring.



- Remove piston by applying low pressure compressed air through banjo bolt hole. Due to compressed air pressure, the piston will be pushed out of caliper body.

Caution :

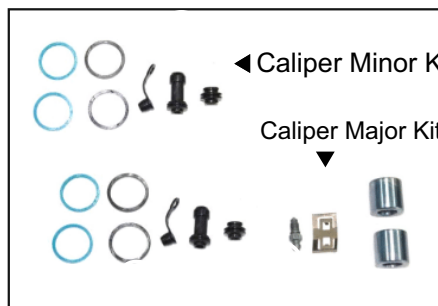
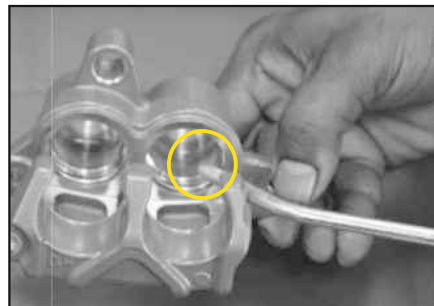
Do not apply high compressed air of pressure > 2 bars. This could cause the pistons to fly out from caliper body, causing damage to it & any one in the vicinity.



Standard Operating Procedure



- Remove all rubber parts
- Clean the caliper body with diesel / kerosene. Dry the caliper body with low compressed air.



- Replace caliper assembly major / minor kit.
- Smear silicon grease on piston OD & rubber parts.



- Fit oil seals & dust seals.
- Fit pistons in caliper body.



- Fit anchor pin grommet.
- Fit caliper anchor pin holder bracket on caliper body.

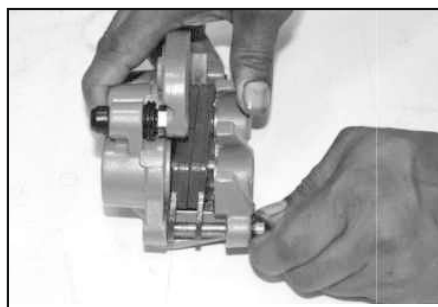


- Fit brake pad.
- Clean the brake pads by smooth emery paper.





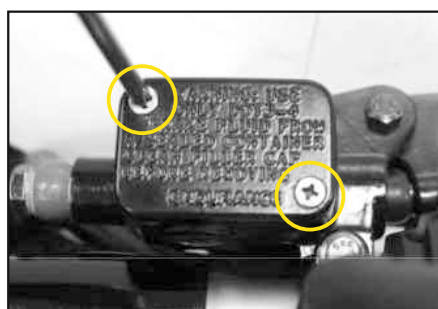
Standard Operating Procedure



- Fit the brake pads, insert allen bolt & tighten it with 5 mm allen key.
- Fit the air bleeding screw & tighten it with 10 mm spanner.



- Fit caliper assembly on front fork mounting & tighten mounting bolts with 12 mm spanner.
- Fit brake hose caliper end banjo bolt with 14 mm spanner.



- Remove master cylinder reservoir cover mounting screws with phillips head screw driver & take out -
 - Master cylinder reservoir cover
 - PVC cap &
 - Rubber diaphragm



- Fill the brake fluid above MIN level.



Standard Operating Procedure



- Remove the air by bleeding process as follows
 - Remove rubber cap from caliper's bleeder screw.
 - Fit a proper tube which fits snugly tight on the bleeder screw nipple.
 - Insert ring spanner through the pipe fitted on the bleeder screw nipple.
 - Connect the tube siphon pump's pipe and loosen the bleeder screw by the ring spanner.
 - Press the bellow of the Siphon pump in its valve open position. Then close the valve of the pump and release the bellow. Simultaneously press the brake lever to take out air trapped in the system. Carry out the same procedure until the entire air trapped in the system gets removed.
 - During this process continuously monitor and maintain the brake fluid level in the master cylinder reservoir slightly above the minimum mark.



- Refit the rubber diaphragm, PVC cap & master cylinder reservoir cap & tighten the mounting screws.
- Drive the vehicle & check the brake effectiveness.
- Use DOT-3 / DOT-4 brake fluid from a sealed container.
- Ensure no leakage of brake fluid through brake hose / benjo bolts / caliper assembly.
- Carry out air bleeding if required.

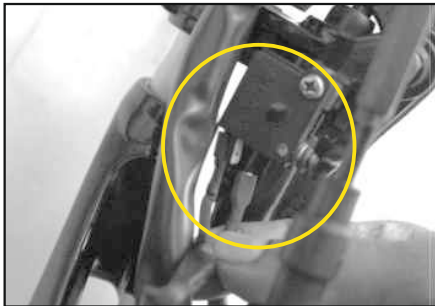
Master Cylinder Piston Kit Replacement



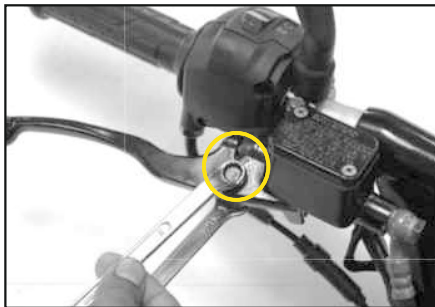
- Clean master cylinder & caliper thoroughly by keeping nozzle in spray mode before opening master cylinder top cover & caliper bleeder screw.
- Drain the brake fluid from caliper assembly by loosening air bleeder screw & using transparent PVC tube which will avoid spillage of brake fluid on caliper body / disc pads & also powder coating peel off / inefficient braking.



Standard Operating Procedure



- Remove front brake switch terminals.



- Remove front brake lever mounting bolt holding nut with 10 mm spanner & take out front brake lever.



- Remove front brake hose master cylinder end banjo bolt with 14 mm spanner.



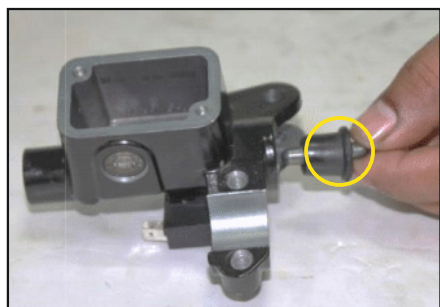
- Remove RH holder mounting bolts with 8 mm T spanner & take out master cylinder along with front brake switch.



- Remove master cylinder reservoir cover mounting screws with phillips head screw driver & take out -
 - Master cylinder reservoir cover
 - PVC cap &
 - Rubber diaphragm



Standard Operating Procedure



- Remove actuating shaft & grommet.



- Remove circlip & take out piston assembly.



- Clean master cylinder using brake fluid & apply low compressed air.



- Smear silicon grease on new piston seals of master cylinder piston kit.



- Insert the piston assembly in master cylinder from front brake lever side.
- Fit the circlip
- Fit actuating shaft & grommet
- Fit master cylinder on handle bar & tighten 8 mm 2 bolts with T spanner.
- Fit front brake lever & connect front brake switch terminals.
- Fit front brake hose & tighten banjo bolt.
- Fill brake fluid into master cylinder reservoir just above MIN level & carry out air bleeding.
- Fit diaphragm & master cylinder reservoir cap.
- Drive the vehicle and confirm brake effectiveness.



Standard Operating Procedure

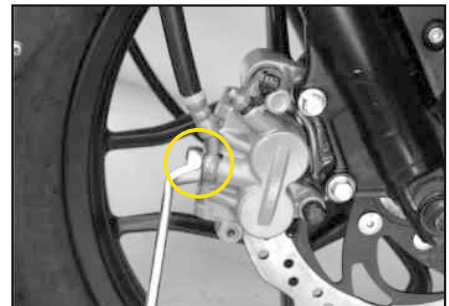
Front Brake Hose Replacement



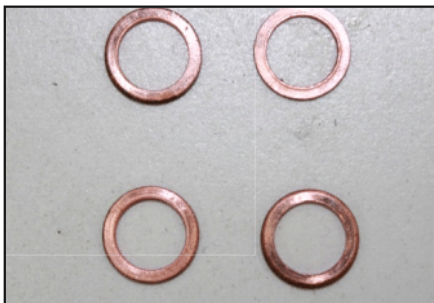
- Clean brake system by keeping nozzle in spray mode.
- Drain the brake fluid from caliper assembly by opening air bleeding bolt.



- Remove the brake hose mounting banjo bolts from both ends (master cylinder & caliper assembly) with 14 mm spanner.



- Cut the cable tie tied to front brake at master cylinder end & take out front brake hose.
- Refit the new brake hose pipe & replace copper washers fitted at both ends with new one.
- Route the front brake hose as shown in front brake hose routing given in control cable routing section & tighten master cylinder & caliper end banjo bolts.
- Remove master cylinder reservoir cover, PVC cap & take out rubber diaphragm.
- Fill the brake fluid in master cylinder reservoir & carry out bleeding operation.
- Fit rubber diaphragm, PVC cap & master cylinder reservoir cover.





Standard Operating Procedure

Front Brake Hose Replacement



- Clean brake system by keeping nozzle in spray mode.
- Drain the brake fluid from caliper assembly by opening air bleeding bolt.
- Tighten the air bleeder bolt on caliper assembly.



- Remove master cylinder reservoir cover mounting screws with phillips head screw driver & take out -
 - Master cylinder reservoir cover
 - PVC cap &
 - Rubber diaphragm



- Fill the DOT 3 / DOT 4 brake fluid in master cylinder.
- Conduct the air bleeding operation & maintain the brake fluid level above MIN mark.



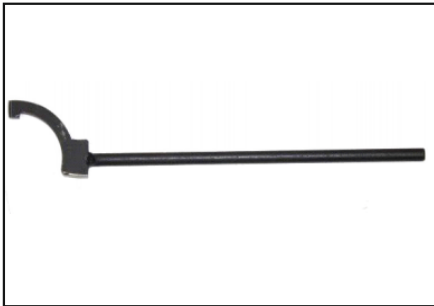
- Refit the rubber diaphragm, PVC cap & master cylinder reservoir cap & tighten the mounting screws.
- Drive the vehicle & check the brake effectiveness.
- Use DOT-3 / DOT-4 brake fluid from a sealed container.
- Ensure no leakage of brake fluid through brake hose / benjo bolts / caliper assembly.
- Carry out air bleeding if required.



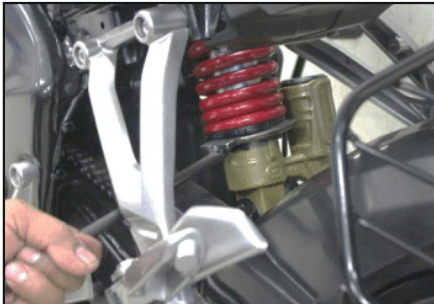
Standard Operating Procedure



Mono Shock Absorber Adjustment



- RSA spring tension can be adjusted with the help of special tool as shown in photograph to suit individual requirement as per load & road condition.



- Turn the adjuster cam on shock absorber to same required position. Setting the adjuster cam to higher notch position increases the spring stiffness & vice as versa.
- Shock absorber adjusted either too soft or too stiff could adversely affect riding comfort & vehicle stability.

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Key Learning Points

- Understand the initial battery charging procedure.
- Electrical Checking Procedure.
- Understand the standard operating procedure for electrical components removal & re-fitment
- Various wiring circuits.



CHAPTER 5 Electrical

Battery

Do's & Don'ts Generic

Electrical Parts Values

Electrical Circuit Diagrams (Bosch & Varroc)



Battery

Battery Technical Specification



• Make	Exide
• Terminal Voltage	12 Volt
• Type	VRLA Battery
• Capacity	4 Ah
• Charging Current Specification	4.0 Amp
• Charging Voltage Specification	14.5 ± 0.1 V
• Battery Charger	Metafab / Apple Energy Make

VRLA Battery Initial Filling

Step 1: Get the battery ready

Place the battery on a flat leveled and preferably on a insulated surface.

Remove the filler port seal of the battery.



Filler port seal

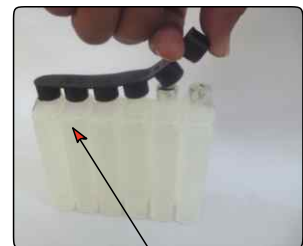
Step 2: Get the electrolyte ready

Remove electrolyte container from the packing.

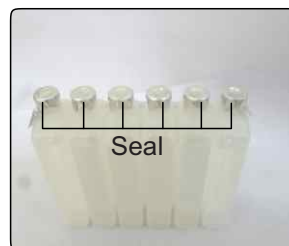
Remove the sealing cap plug strip.

Keep the sealing cap plug strip aside as this is to be used as battery sealing plug strip later.

Note: Do not puncture the seals manually.



Plug cap strip



Seal



Battery



Step 3: Fill the battery

Hold the electrolyte container upside down.

Place the container upright on battery. Match the 6 seals with the respective filler ports.

Note: Ensure the container is upright and not tilted. If tilted the electrolyte might fail to flow.

Now force the container down until seals get pierced, and electrolyte flows into the battery.



Step 4: Check the electrolyte flow

Make sure that air bubbles are visible in the electrolyte and which is seen in all the 6 tubes of the container.

Leave the container on the battery as it is for 30 minutes.



Step 5: Take away the bottles

Be sure that the entire electrolyte has flown down inside the battery.

Tap the bottom of the container and gently remove the empty container.



Step 6: Attach the sealing cap

Fit the sealing cap plug strip tightly on the filler ports of the battery.

Ensure by pressing firmly that the cap has become flush with the top surface of battery.



Step 7: Charge the battery

Charge the battery on BAL recommended VRLA battery charger as per std. SOP.



Never use conducting materials like screw drivers which can produce the spark near battery terminals.
Do not add any additional electrolyte.



Battery

Dos & Don'ts

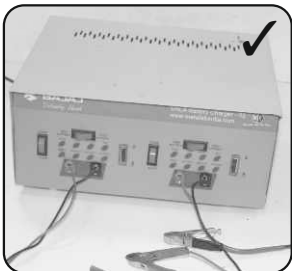
✓ Dos



- Apply petroleum jelly to battery terminals.



- Use proper tools. (10 mm T spanner or phillips screw driver).



- Always charge the battery with the help of BAL recommended VRLA battery charger.



- Check open circuit voltage by multimeter.



- Always use Midtronics battery tester for checking condition of VRLA battery.

✗ Don'ts



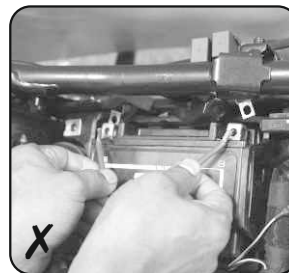
- Do not apply grease to poles / terminals.



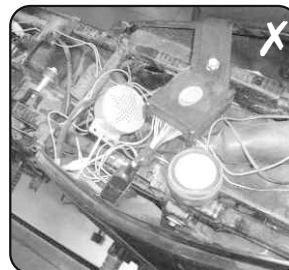
- Do not hammer battery terminals.



- Do not use any other battery charger for charging VRLA battery.



- Do not short circuits the poles to check battery condition.



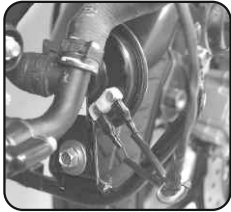
- Do not fit extra electrical accessories. This will result in wiring getting short & battery would get discharged. This will shorten life of battery.



Dos & Don'ts - Generic

Horn

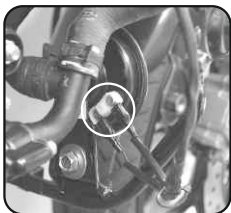
✓ Dos



Ensure that horn is firmly fitted on fairing structure central.



Ensure that horn is free from dust and mud accumulation.



Ensure that horn wires are intact.

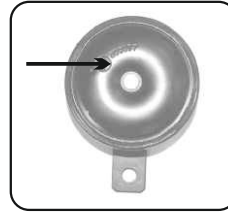


Ensure that horn switch button is operating freely.



Ensure that battery is fully charged.

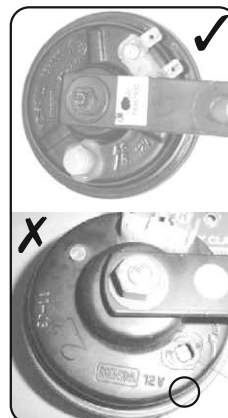
✗ Don'ts



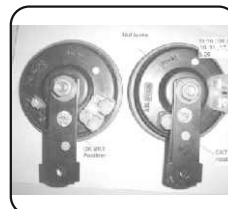
Do not apply pressurised water jet directly on horn resonator.



Never adjust nut on horn cap side & bracket end (back side) as it will result in horn malfunctioning & failure.



Do not remove silicon sealant from adjustment screw as it will result in water entry in horn.



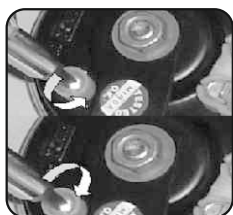
Do not hit by mallet / screw driver on horn resonator.



Dos & Don'ts - Generic



- Adjust horn by phillips screw driver
-without removing silicon sealant from adjustment screw.
-by rotating the screw in direction of arrow provided in the screw.



Ensure that resonator is not pressed by any portion of cables or wiring harness as it will result in distorted sound.

Ignition System

✓ Dos



- Always install recommended capacity of battery on the bike.
- Always replace spark plug by correct heat range plug.
- Check & adjust spark plug gap periodically. Adjust it to 0.7~0.9 mm by wire gauge.
- Replace spark plug at every 40,000 kms.
- Check for firm fitment of spark plug in cylinder head - Tightening torque 1.3 ~ 1.5 Kgm.
- Ensure H.T. cable secondary connection is firmly fitted in spark plug cap and H.T. coil.
- Ensure that magneto coupler is firmly fitted.
- Always use a right size socket during removal and re-installation of spark plug.
- During periodic service make use of spark plug cleaning machine to clean spark plug electrodes & check proper functioning of all spark plugs.

✗ Don'ts

- Do not replace spark plug by non recommended one (different heat range).
- Never short circuit H.T. coil primary wire to ground. It could lead to ECU failure.
- Do not adjust spark plug gap with any instruments like screw driver, pliers etc.



Dos & Don'ts - Generic

Lights

✓ *Dos*

- Ensure that there is no dust and water entry in bulb housing.
- Ensure that all fixing screw of bulb housing are intact.
- Ensure that Reflector / Glass of Head Lamp, Tail Lamp, Side indicator is intact.
- Check DC Voltage Regulator's output voltage periodically. Ensure that voltage is within specified limits.
- Check that couplers and wires of bulbs are in good condition.

✗ *Don'ts*

- Do not install a lower / higher capacity battery than what is recommended.
- While washing vehicle do not direct pressurized water jet on Head Light, Tail Light, Indicators.
- Do not drive the vehicle by keeping brake pedal pressed.
- Do not start Vehicle with light control switch in ON condition.

Switches



✓ *Dos*

- Always clean switch assembly with soft cloth.
- After washing the vehicle ensure to apply dry air on switches before operation.
- Ensure that rear brake switch is free from dust, dirt & mud Accumulation.
- Always ensure that grommets provided on clutch switch, front brake switch and rear brake switch are intact.
- Always apply WD-40 electrical contact cleaning spray to sticky switches.

✗ *Don'ts*

- Do not apply direct pressurized water jet on control switches.
- Do not lubricate electrical switches by oil or grease.
- Do not over tighten the switches.
- Do not add extra electrical loads e.g. musical horns, additional horns, buzzers as it will reduce switch contact life & battery life & battery life.
- Do not tamper / alter rear brake switch spring.
- Do not operate switch immediately after water servicing.



Electrical Parts Value

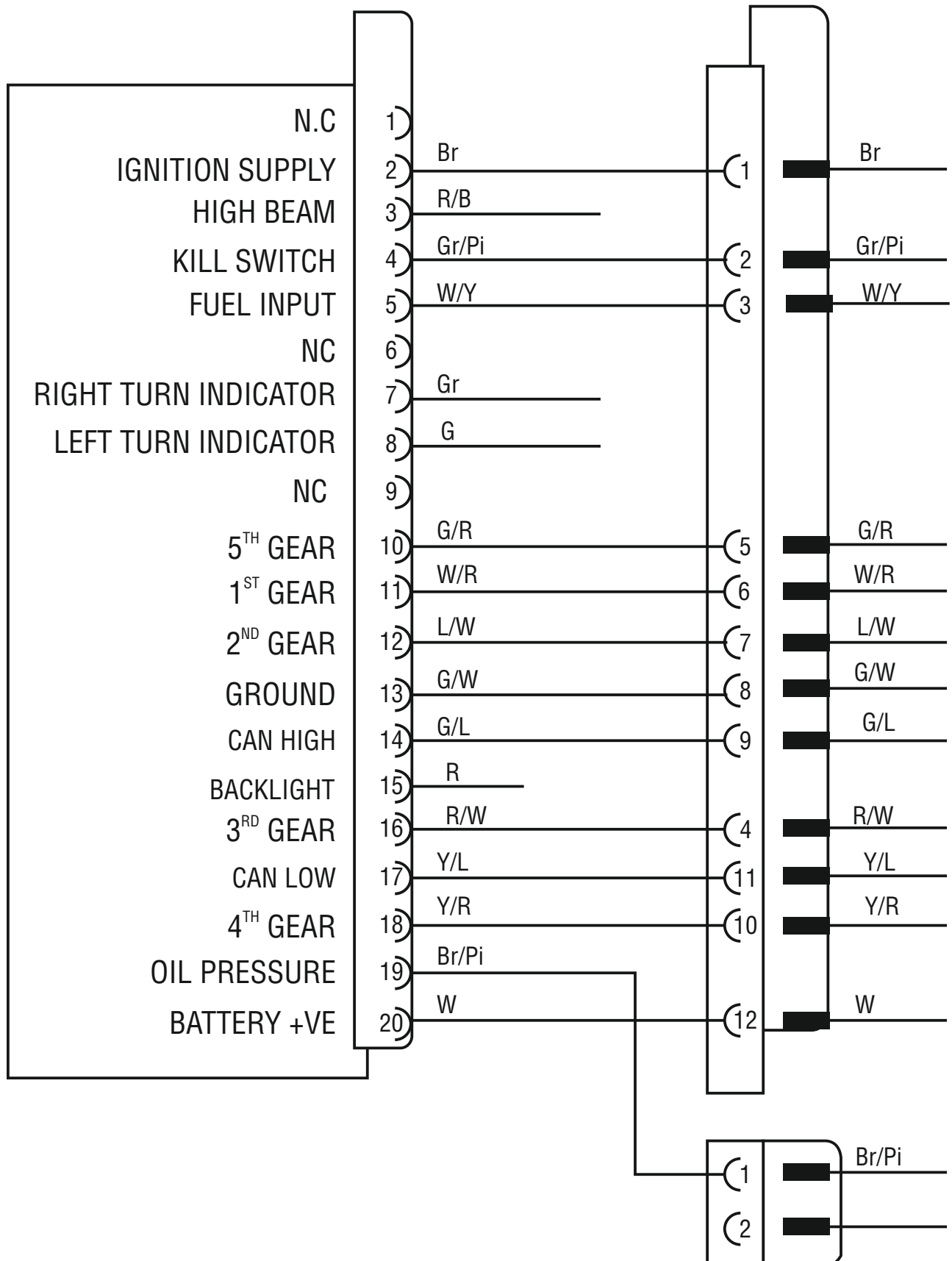
Components		Standard Value
Starter Relay Coil		3.9 Ohms $\pm$ 10%
Battery Charging Coil		0.4 to 0.6 Ohms
Pick Up Coil		390 $\pm$ 10% Ohms
DC Charging Voltage		14.5 $\pm$ 0.3 V
DC Charging Current		13.4 $\pm$ 0.6Amp @ 4000RPM @14V
Intermediate Relay resistance :		100 $\pm$ 10%
low oil pressure icon in speedometer console will on		Continuously ON: If RPM > 4500 Coolant temp range < 50°C
Fuel Injector resistance		12 $\pm$ 0.6 Ohms @ 20°C
Stepper Motor resistance :		51 Ω $\pm$ 10%
Crank Angle Sensor resistance		390 $\pm$ 10%Ohms
Roll Over Sensor	Input voltage:	5V
	Output voltage - Normal (Vehicle mounted condition)	3.51~3.71 V
	Output voltage - Tilted (More than 60 degree on either side)	0.14~0.54 V
Position/Pressure/Temperature sensor	Temperature Resistance	2000 Ohms @ 25°C
	Input voltage	5 V
	Pressure Output Voltage	0.4~4.65 V
	Throttle Output Voltage	Idle throttle: 0.468 V to 0.5 V Wide open throttle: 4.222 V to 4.622 V
Side Stand Switch	Input voltage (Side stand position any)	5 V
	Output voltage (Side stand position - OFF)	0.14~0.54 V
	Output voltage (Side stand -ON)	3.51~3.71 V
LH H.T. Coil resistance :	Primary	2.3 $\pm$ 10% Ohms
	Secondary	13 $\pm$ 20% K Ohms
RH HT coil resistance :	Primary	2.3 $\pm$ 10% Ohms
	Secondary	13 $\pm$ 20% K Ohms

Engine Temperature Sensor	Temperature in Degree Centigrade	Resistance in K Ohms
	0	27.015~29.032
	10	17.633~18.798
	20	11.814~12.469
	25	9.730~10.270
	30	8.058~8.505
	40	5.591~5.949
	50	3.956~4.243



Circuit Diagram - BOSCH

SPEEDOMETER PIN DETAILS



Circuit Diagram - BOSCH



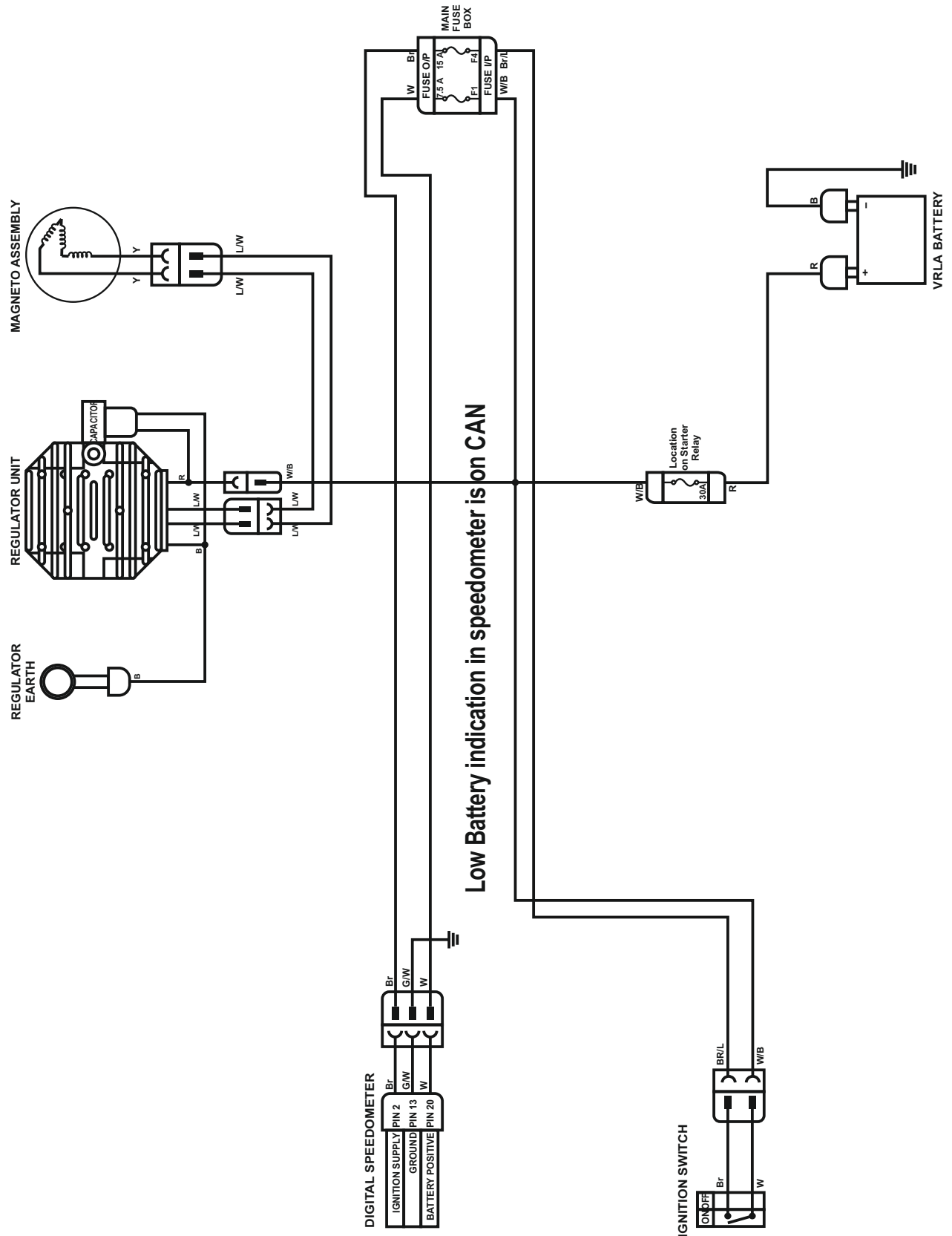
ECU PIN DETAILS

B/Y	(1)	Power Ground 1	Sensor Ground 1	44	Y/B
B/R	(2)	Ignition Driver 2	Stepper Driver D	43	L/B
Pi/B	(3)	Sensor Supply 1	Manifold Air Temp Sensor	42	G
W/R	(4)	Crankshaft Input (+)	Manifold Air Pressure Sensor	41	W/O
B/W	(5)	Injector Driver	Lambda Sensor	40	
V/B	(6)	Headlight Control Driver	Side Stand Switch	39	Pi
	(7)	Engine Speed Output	Side Stand Indication	38	
	(8)	NC	Can High	37	G/L
B/G	(9)	Sensor Ground	Can Low	36	Y/L
	(10)	Coolant Temperature Output	Starter Relay	35	R/G
L/G	(11)	Main Relay Driver	Canister Purge Valve	34	G/Pi
W/Br	(12)	Fuel Pump Relay	Ignition Keys	33	Gr/Pi
B/Y	(13)	Poka Yoke Input	Lambda Downstream Heater	32	
	(14)	Radiator Fan Relay	Stepper Driver C	31	Gr/W
L/Y	(15)	Lambda Sensor	Stepper Driver B	30	G/R
Br/G	(16)	Roll Over Sensor	Stepper Driver A	29	G/Y
LG	(17)	Neutral Switch	Lambda Upstream Heater	28	L/R
G/Br	(18)	Throttle Position Sensor	Sensor Supply 2	27	R/L
Y/W	(19)	Engine Temp Sensor I/P	Crankshaft Input (-)	26	B/Y
	(20)	NC	Power Supply After Main Relay	25	Br/W
Y/G	(21)	Clutch Switch	Ignition Driver 1	24	B
	(22)	Vehicle Speed Sensor	Power Ground 2	23	B/Y



Circuit Diagram - BOSCH

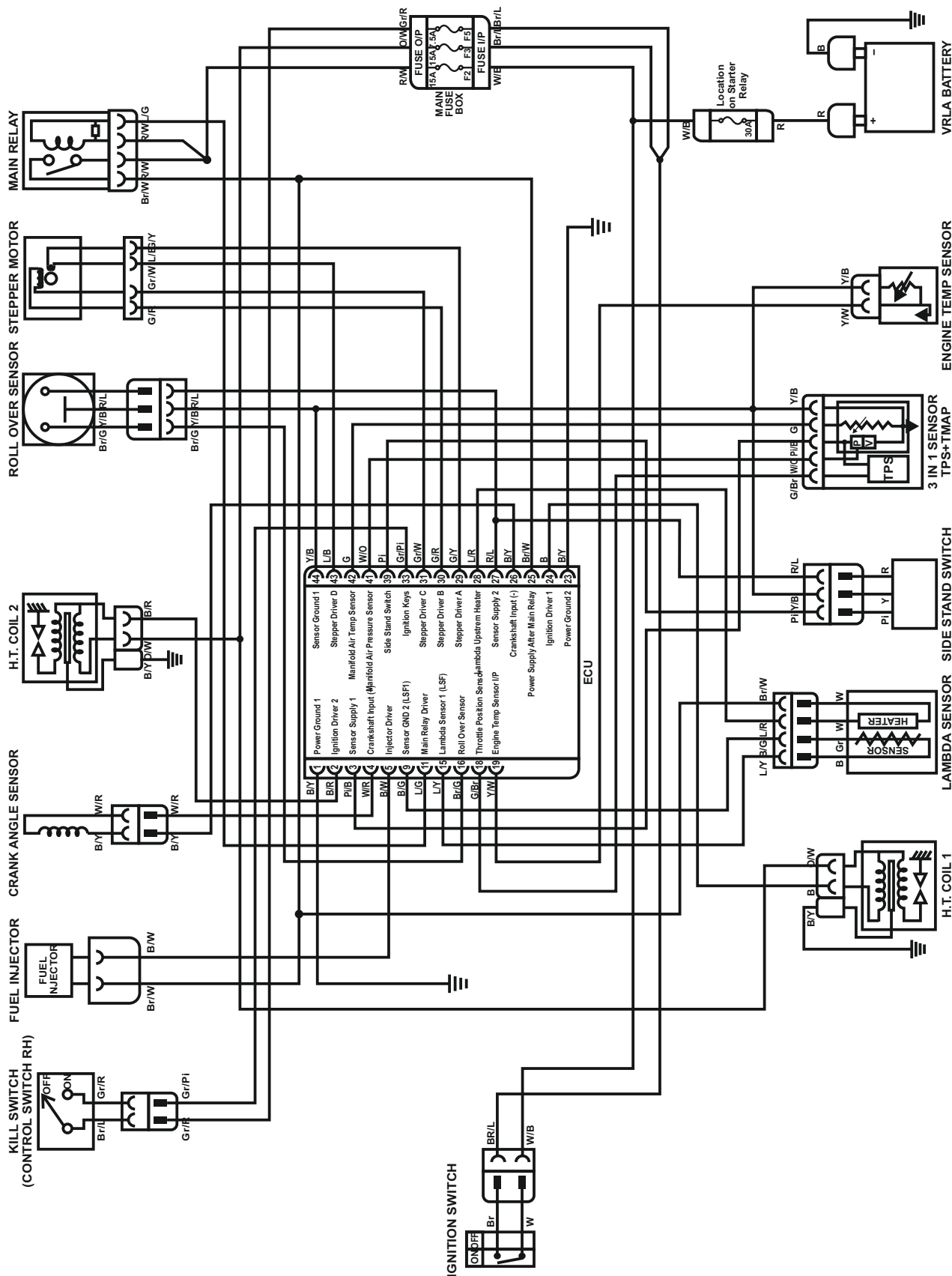
Battery Charging Circuit



Circuit Diagram - BOSCH



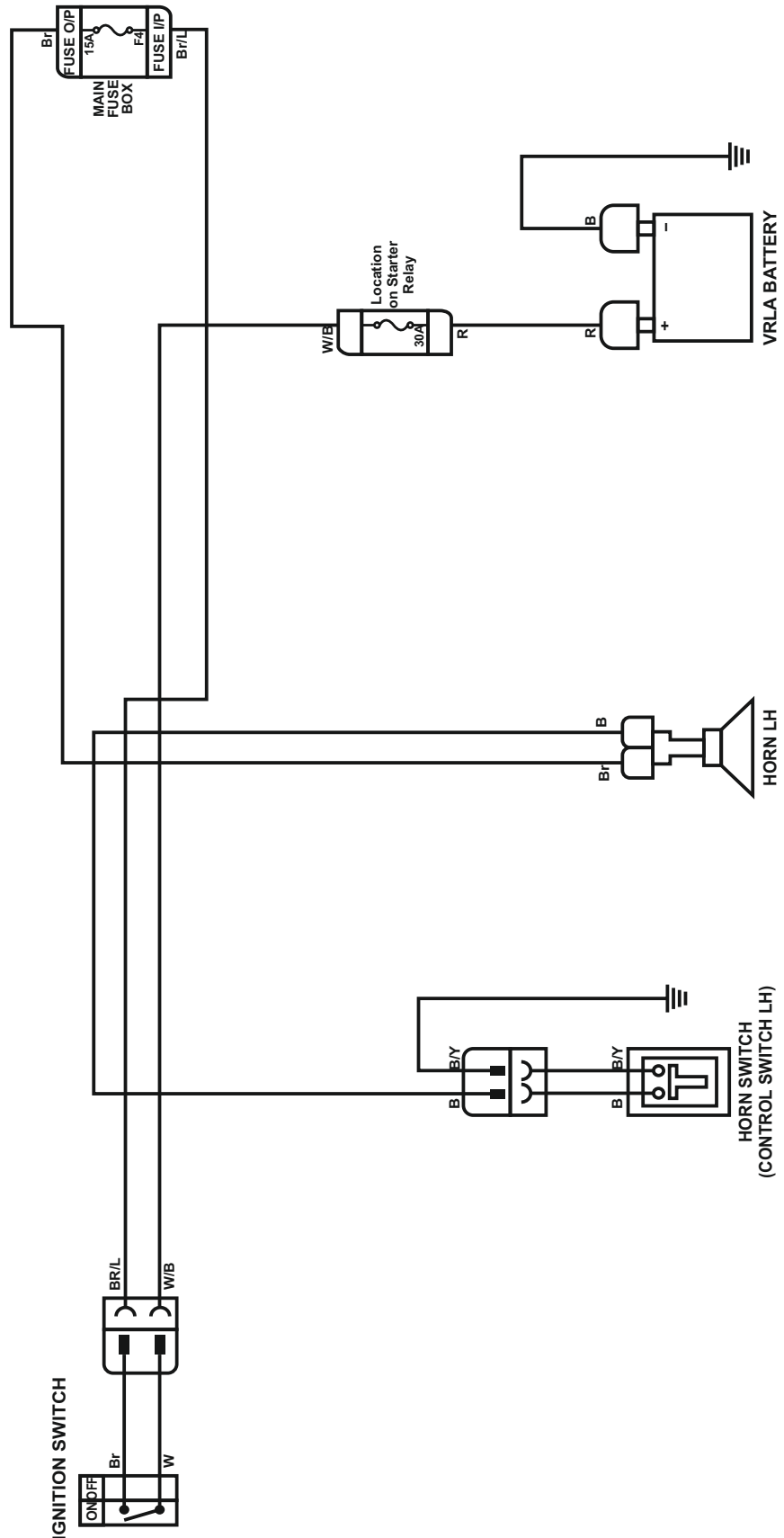
Ignition Circuit



Circuit Diagram - BOSCH



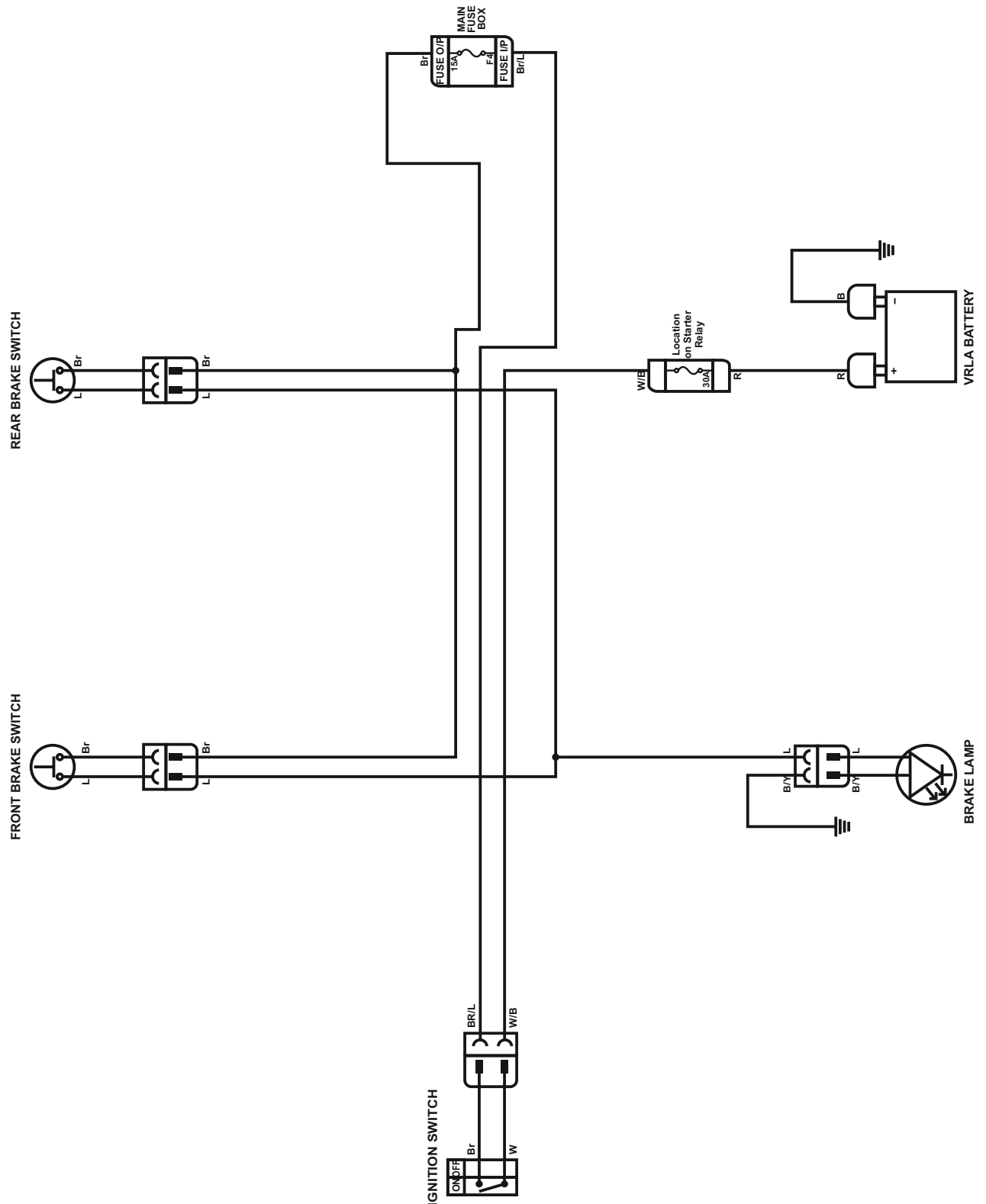
Horn Circuit



Circuit Diagram - BOSCH



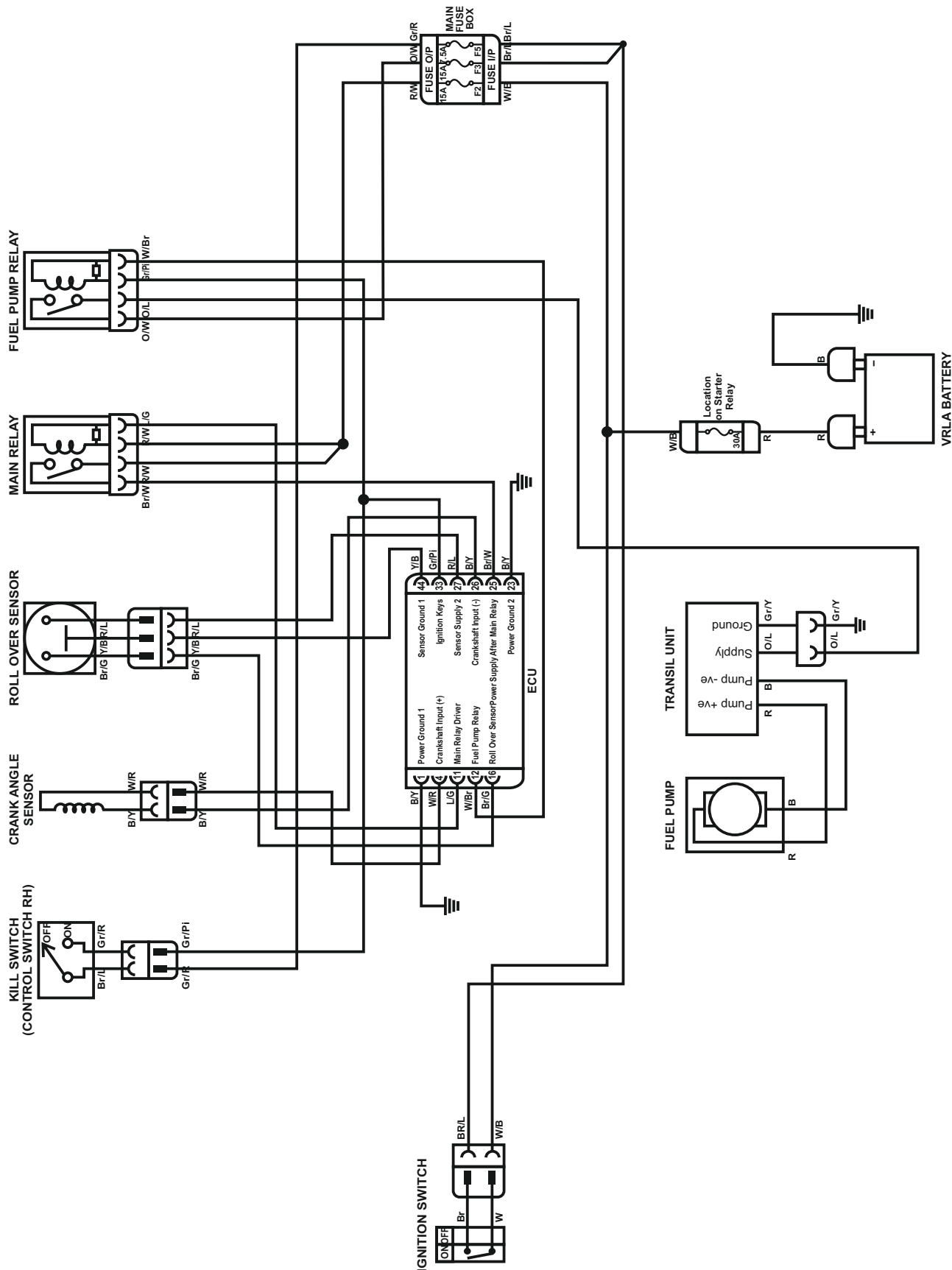
Brake Lamp Circuit





Circuit Diagram - BOSCH

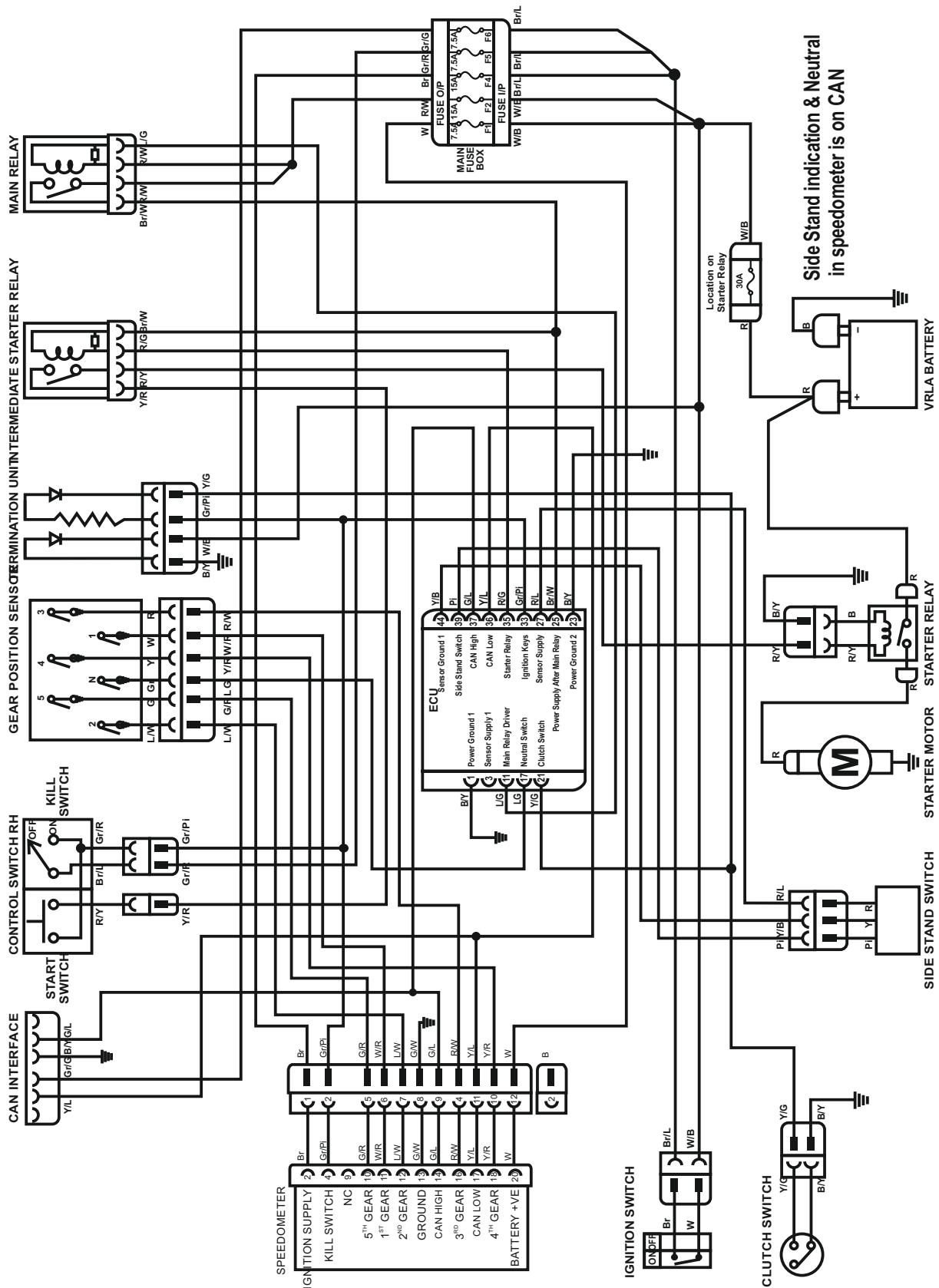
Fuel Pump Circuit



Circuit Diagram - BOSCH



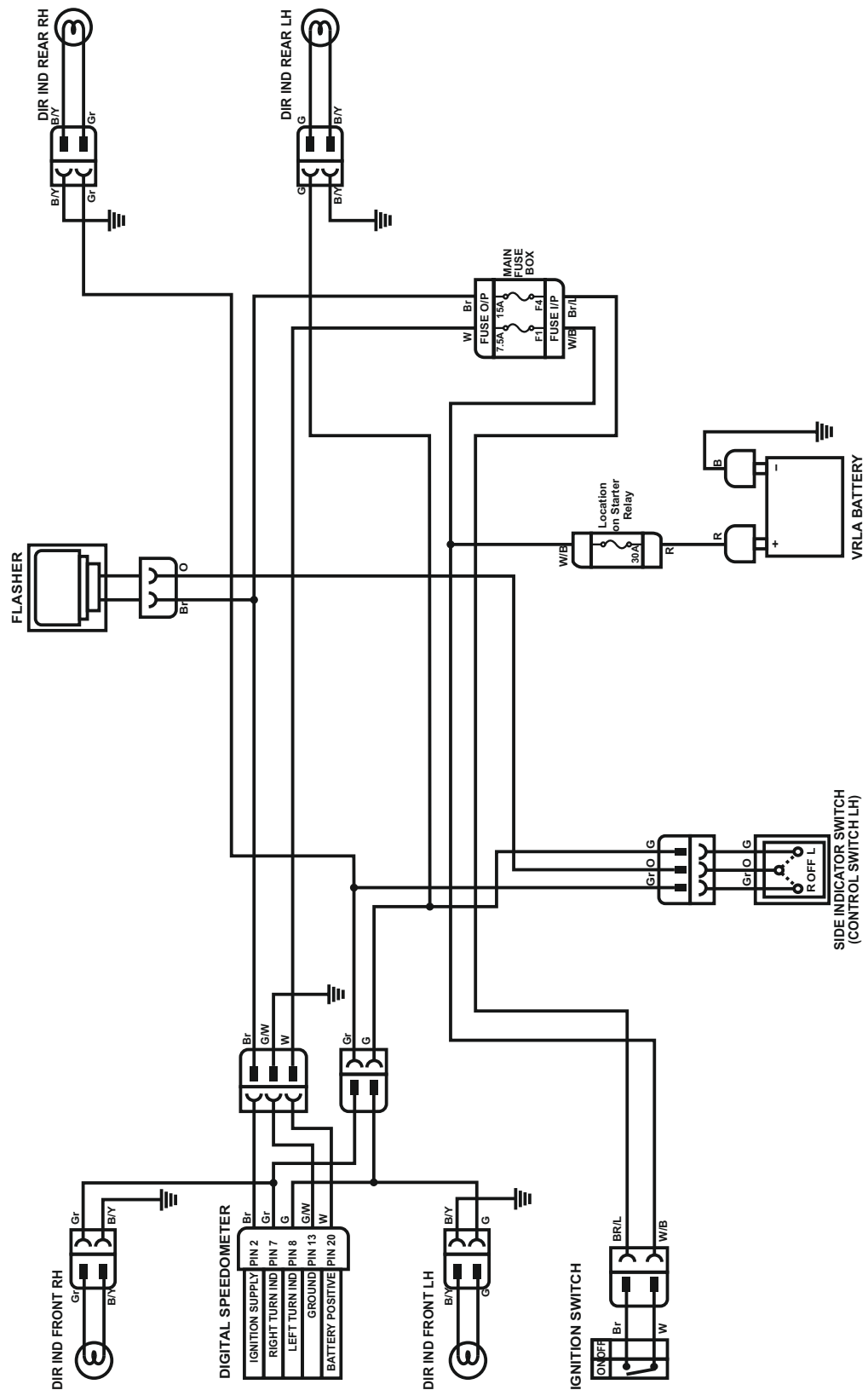
Starter Motor Cum Side Stand Switch Indication Circuit





Circuit Diagram - BOSCH

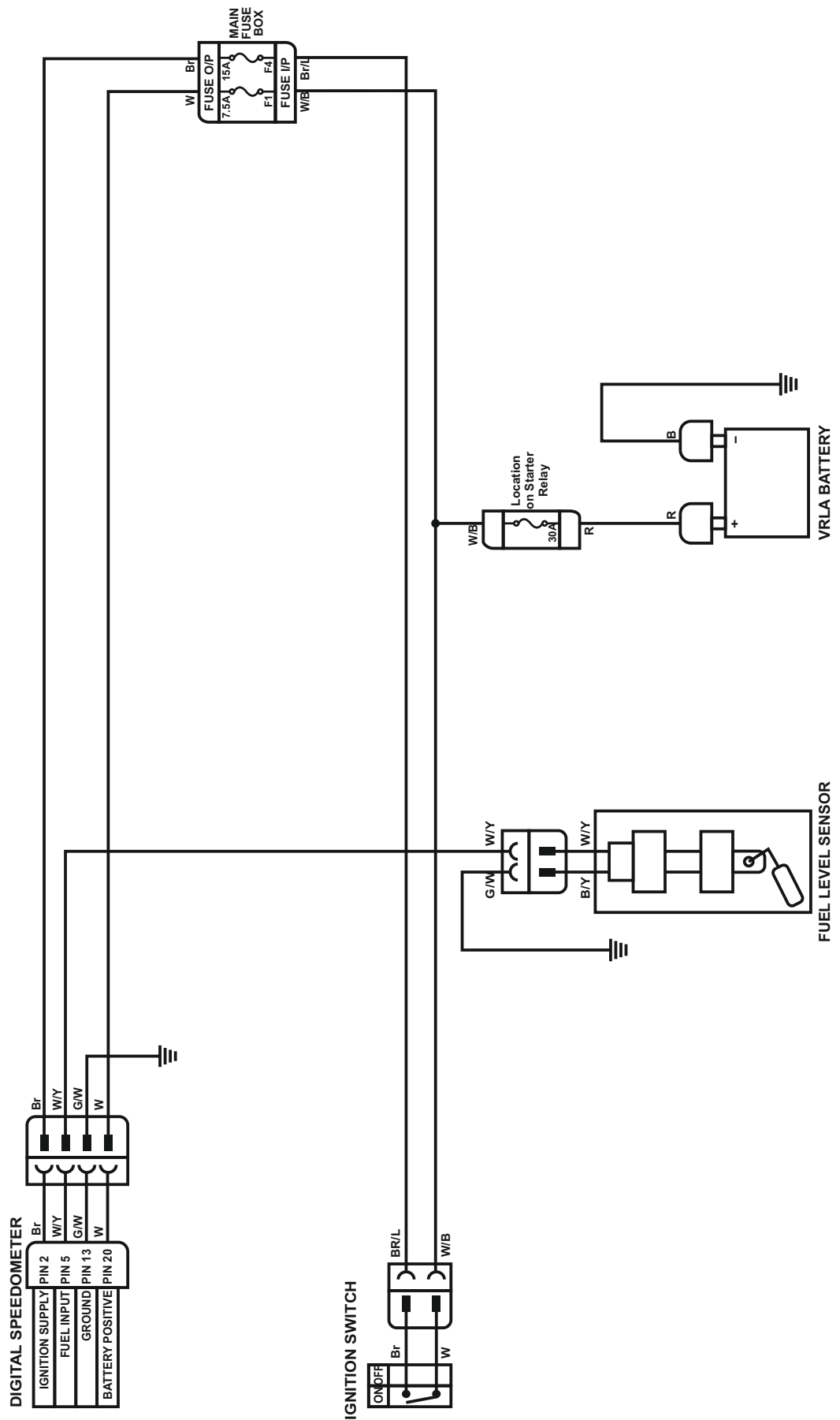
Side Indicator Circuit



Circuit Diagram - BOSCH



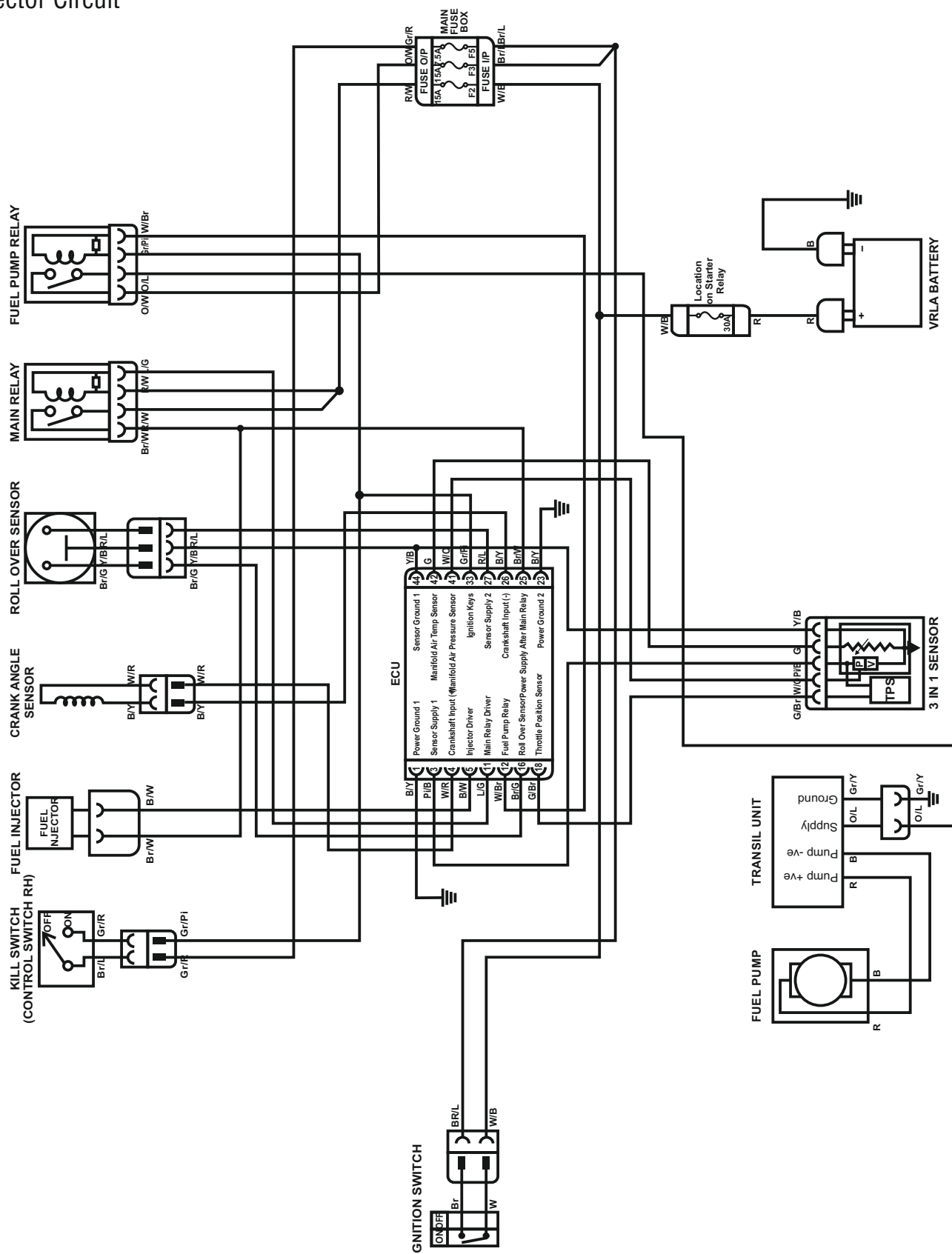
Fuel Meter Circuit





Circuit Diagram - BOSCH

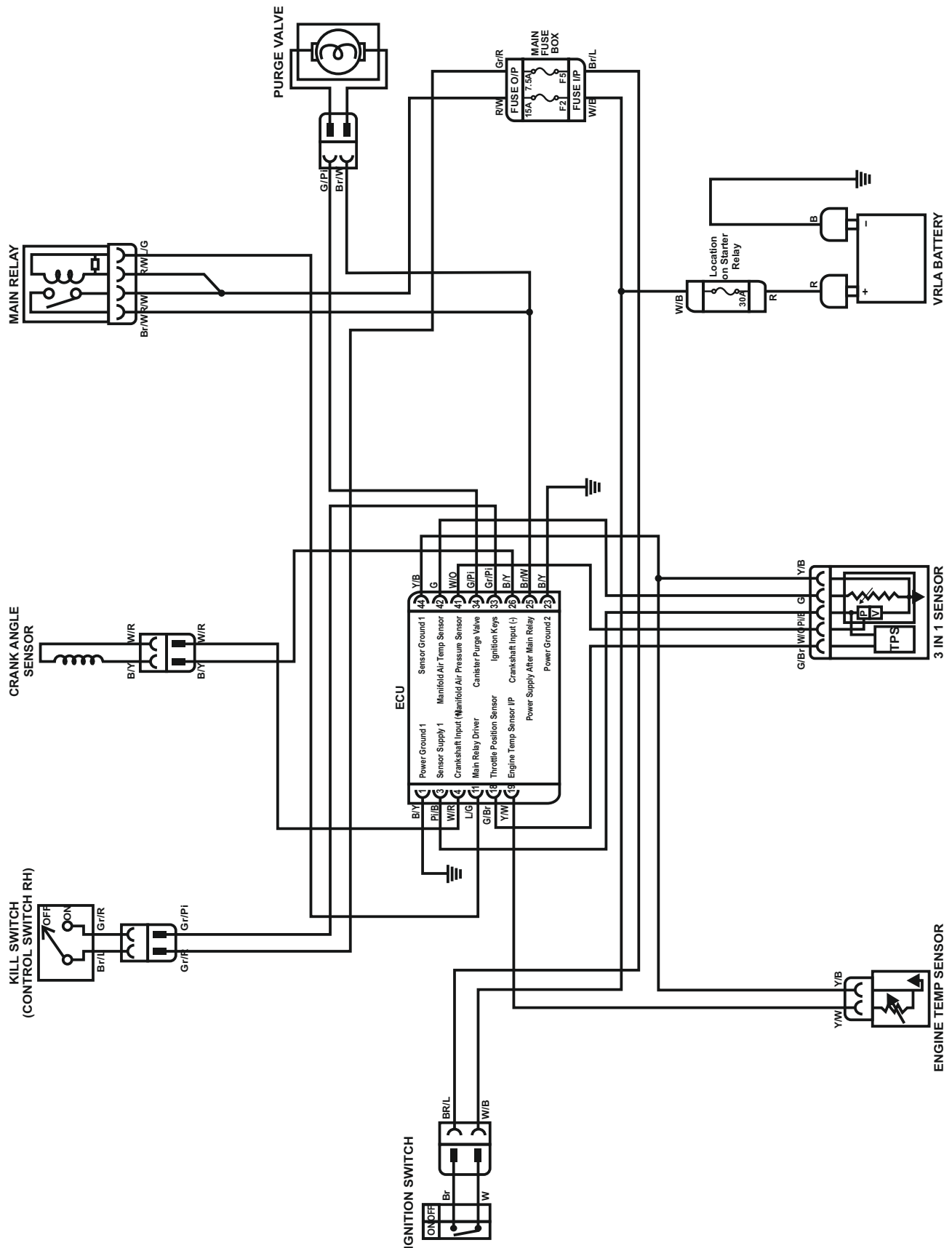
Fuel Injector Circuit





Circuit Diagram - BOSCH

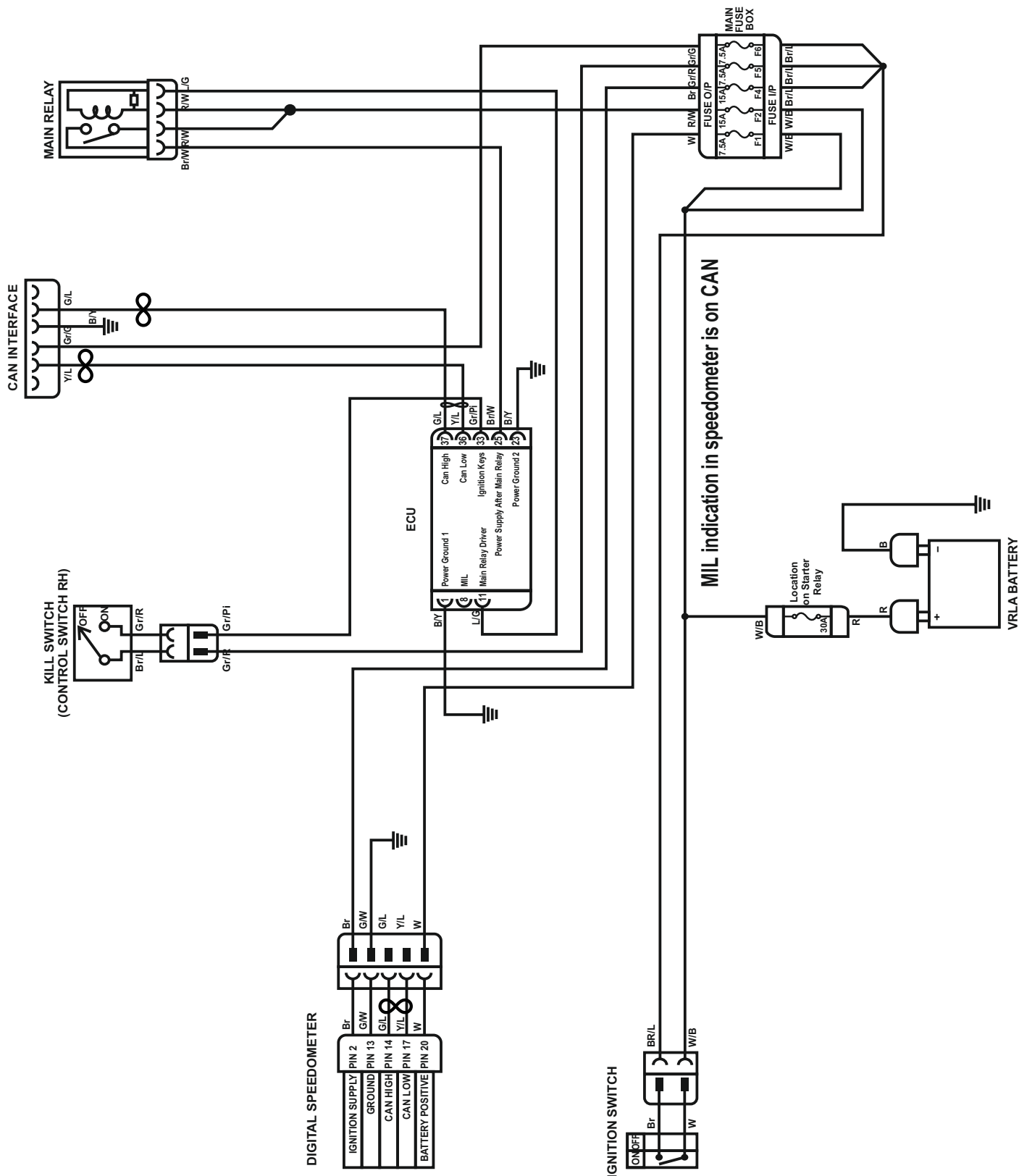
EVAP Purge Valve Circuit





Circuit Diagram - BOSCH

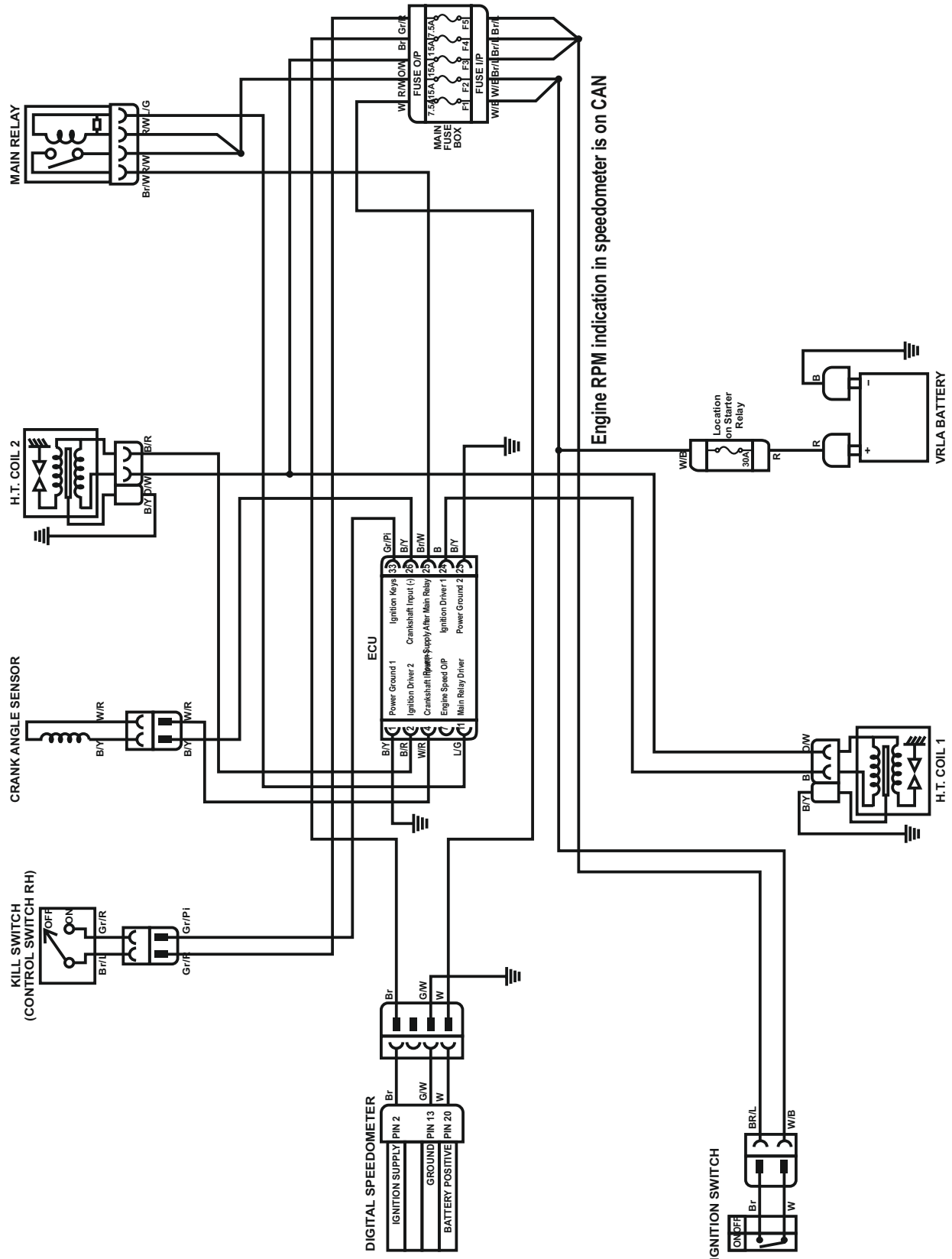
MIL Indication Circuit





Circuit Diagram - BOSCH

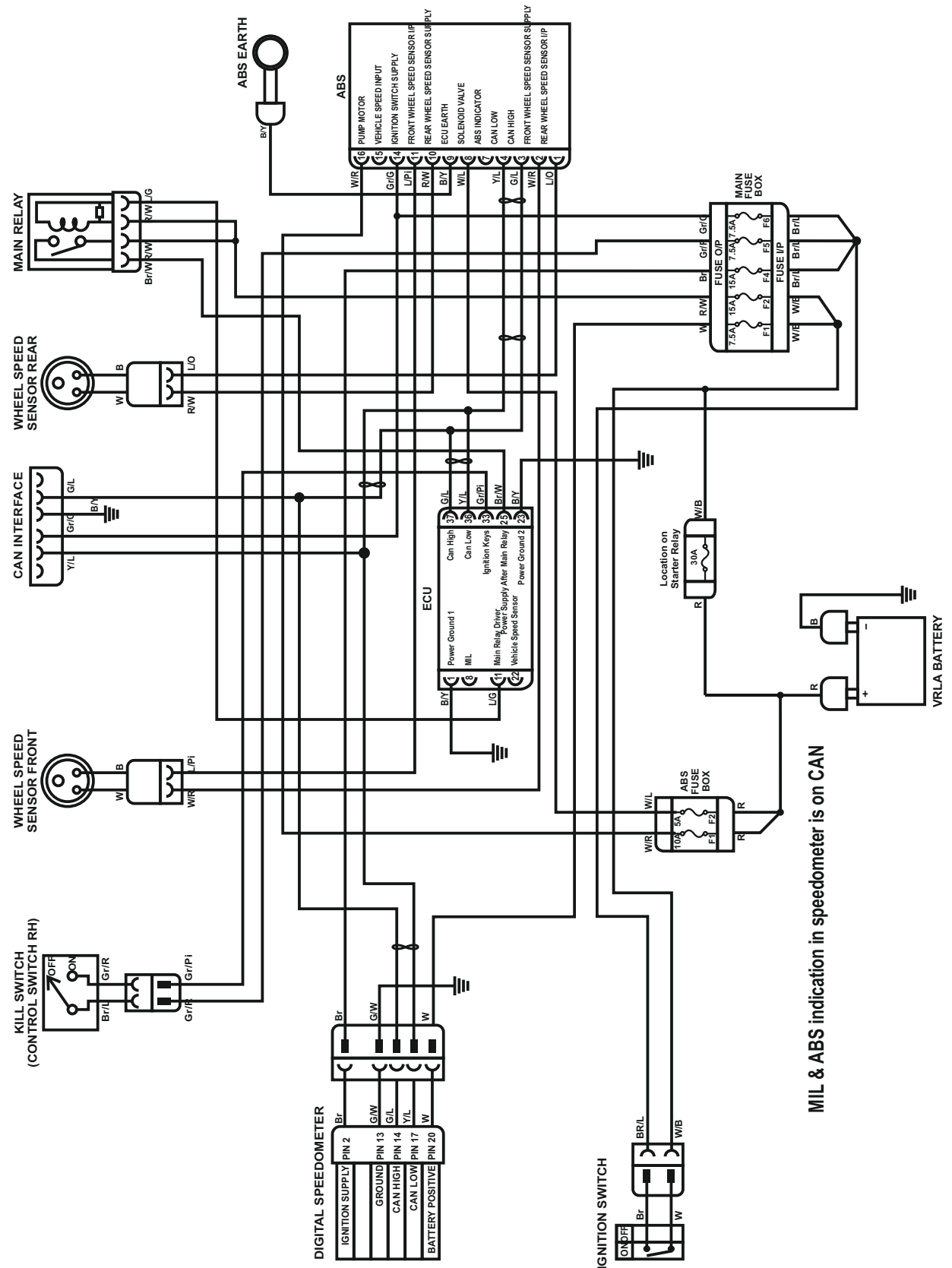
Engine RPM Indication Circuit





Circuit Diagram - BOSCH

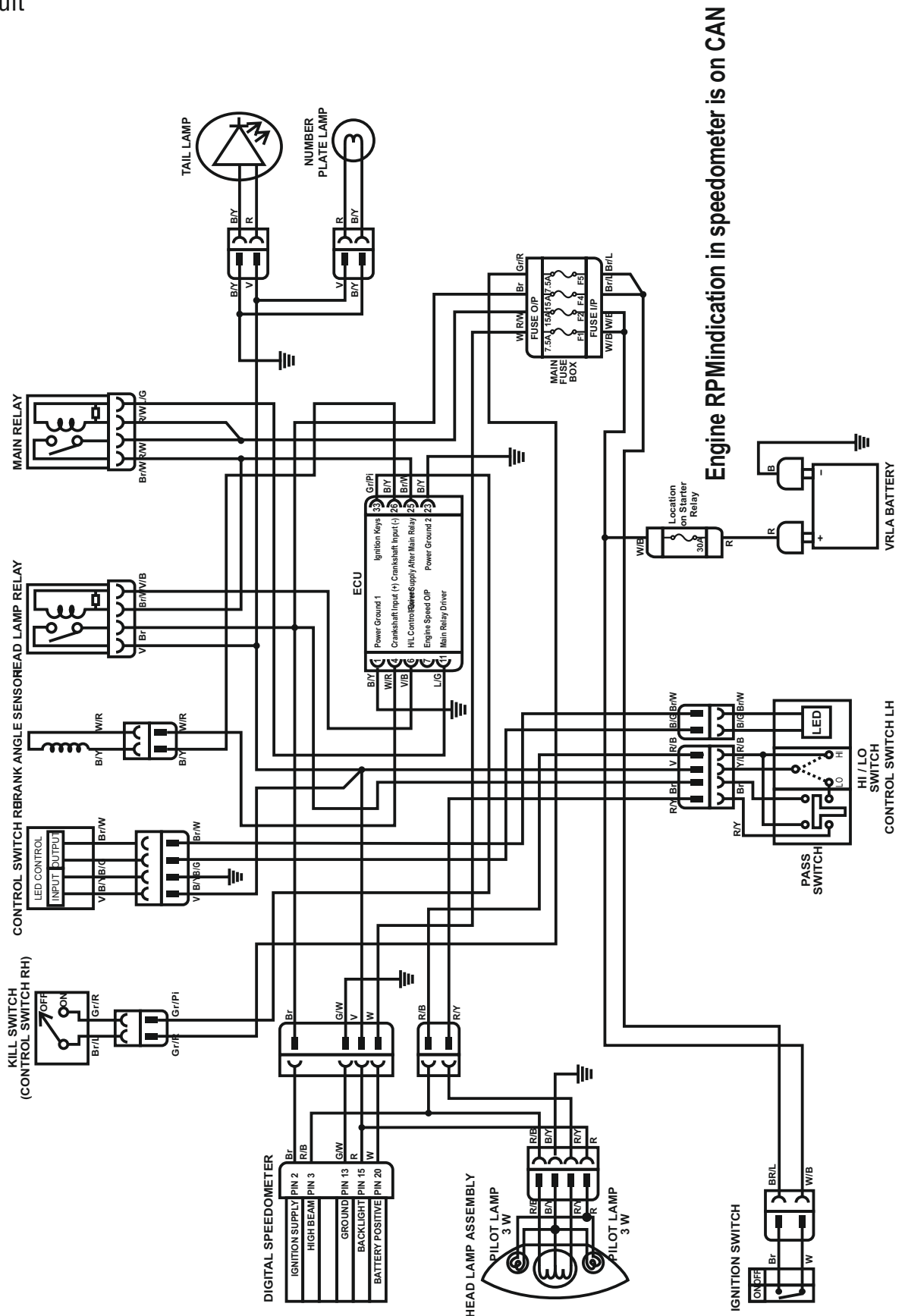
ABS Circuit



Circuit Diagram - BOSCH

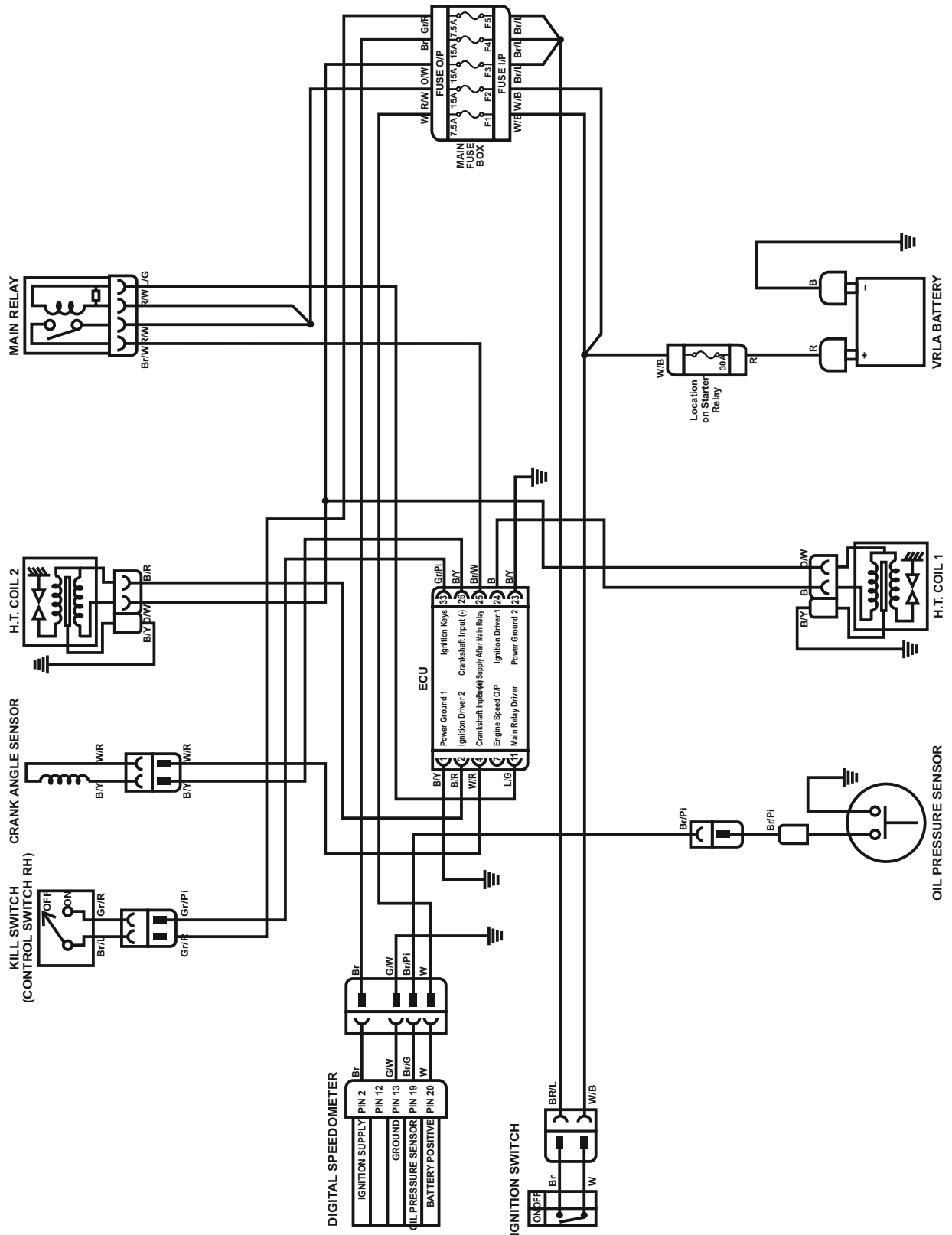


Lighting Circuit





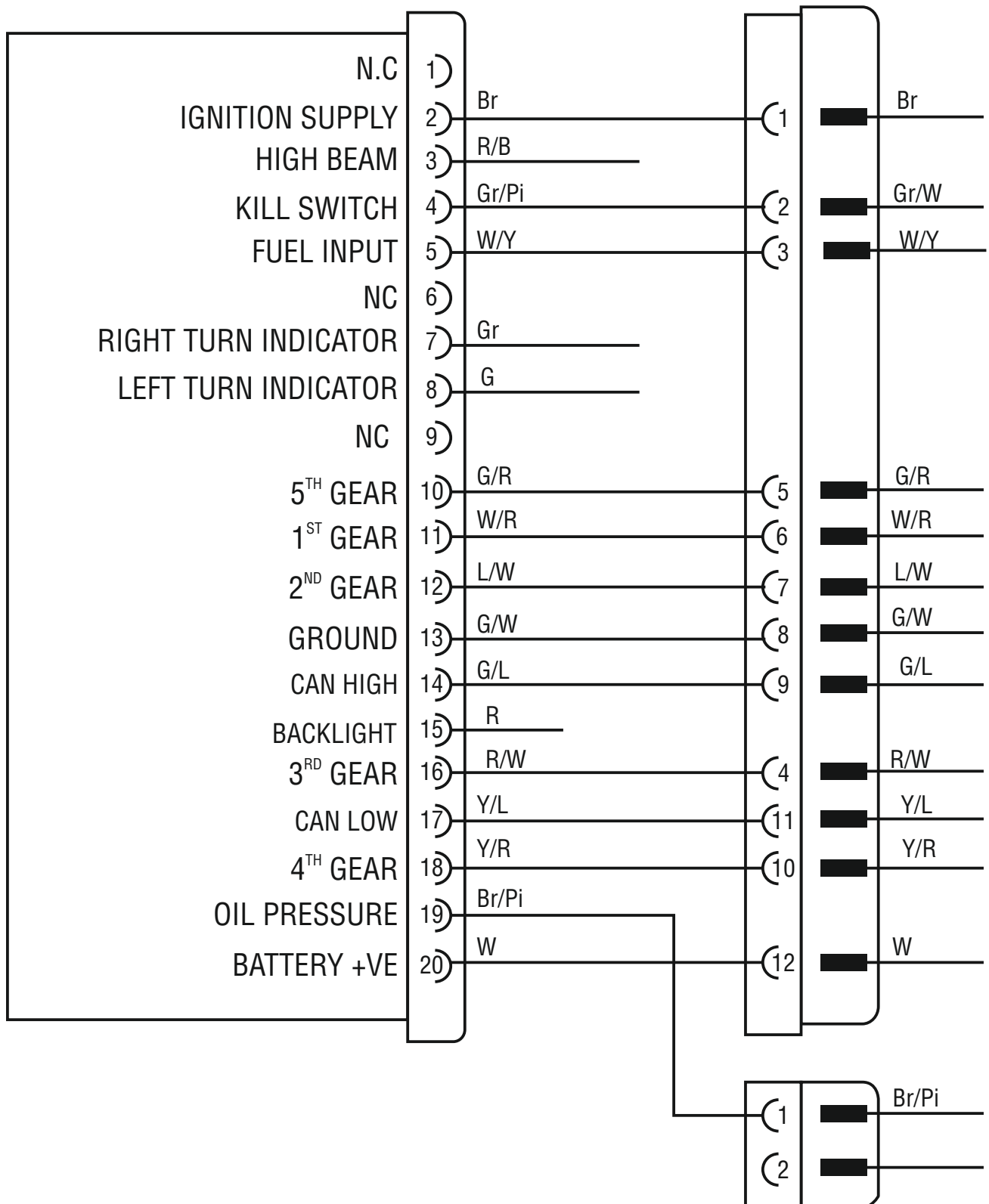
Low Oil Pressure Indication Circuit





Circuit Diagram - VARROC

SPEEDOMETER PIN DETAILS





Circuit Diagram - VARROC

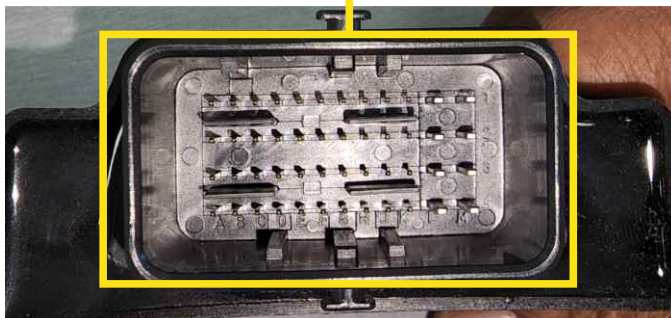
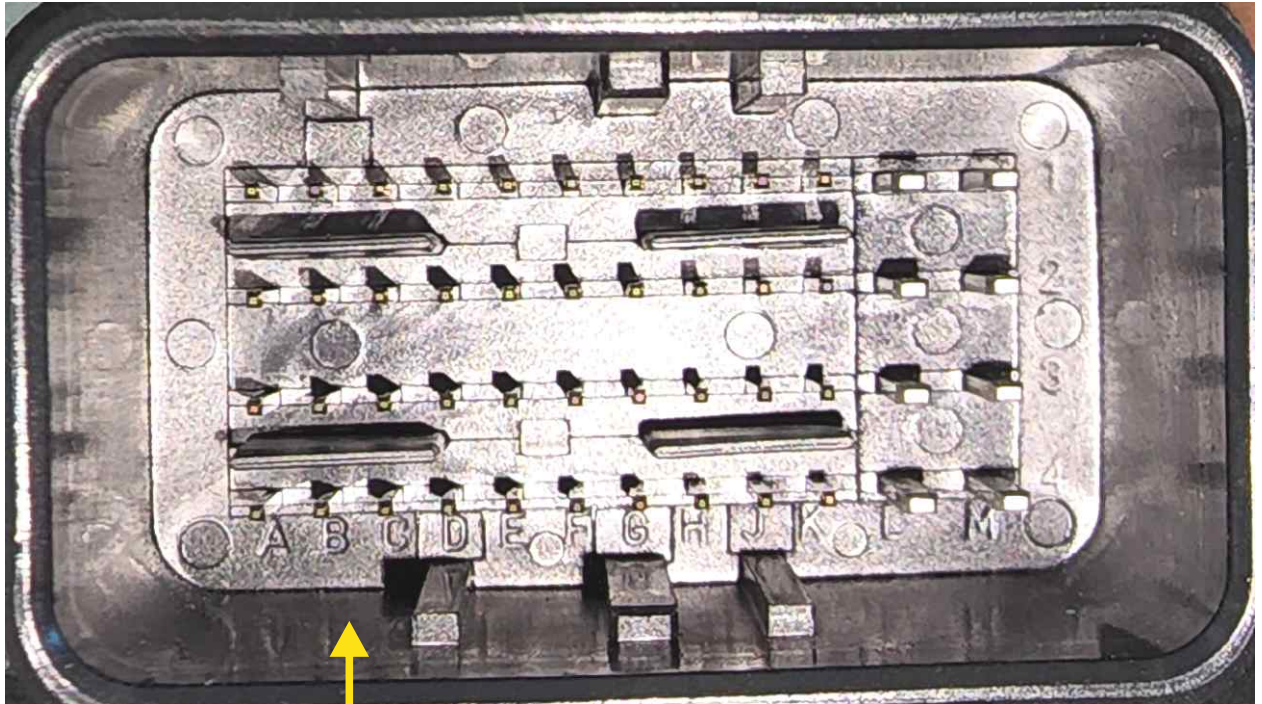
ECU PIN DETAILS

R/L	(1A)	NC	Ground Power	4M	B/Y
	(1B)	5V Sensors	Sensor Ground	4L	Y/B
W/R	(1C)	Crank +ve	Over Temp. LED	4K	
B/Y	(1D)	Crank -ve	Sensor Oil Temp.	4J	
	(1E)	Fan Cooler Relay	Sensor Air Temp.	4H	G
	(1F)	Side Stand indicator	Engine Temp. Sensor	4G	Y/W
R/G	(1G)	Starter Relay Auxillary	Tachometer	4F	
	(1H)	MIL LED	Staper Out B -ve	4E	Gr/W
B/W	(1J)	Injector	Staper Out B +ve	4D	G/R
	(1K)	Injector	Staper Out A -ve	4C	L/B
	(1L)	Hego heater 1	Staper Out A +ve	4B	G/Y
	(1M)	Hego heater 2	Head Light	4A	V/B
W/Br	(2A)	Fuel Pump	Kill (stop) Switch ON	3M	Br/W
L/Y	(2B)	Sensor Lambda	Battery Voltage	3L	W
Y/L	(2C)	CAN LOW	Spare Analog	3K	
G/L	(2D)	CAN HIGH	Gear Sensor	3J	
	(2E)	Sensor Lambda Develop	Manifold Air Pressure Sensor	3H	W/O
	(2F)	Switch Starter	Throttle Sensor	3G	G/Br
	(2G)	Switch Kill	Rollover Sensor	3F	Br/G
LG	(2H)	Neutral Switch	Brake Switch	3E	
	(2J)	Vehicle Speed input	Clutch Switch	3D	Y/G
	(2K)	K Line	Switch Side stand	3C	Pi
B	(2L)	Spark 1 (HT coil)	Sensor Lambda 2	3B	
B/R	(2M)	Spark 2 (HT coil)	Canister	3A	G/Pi

Circuit Diagram - VARROC



ECU PIN



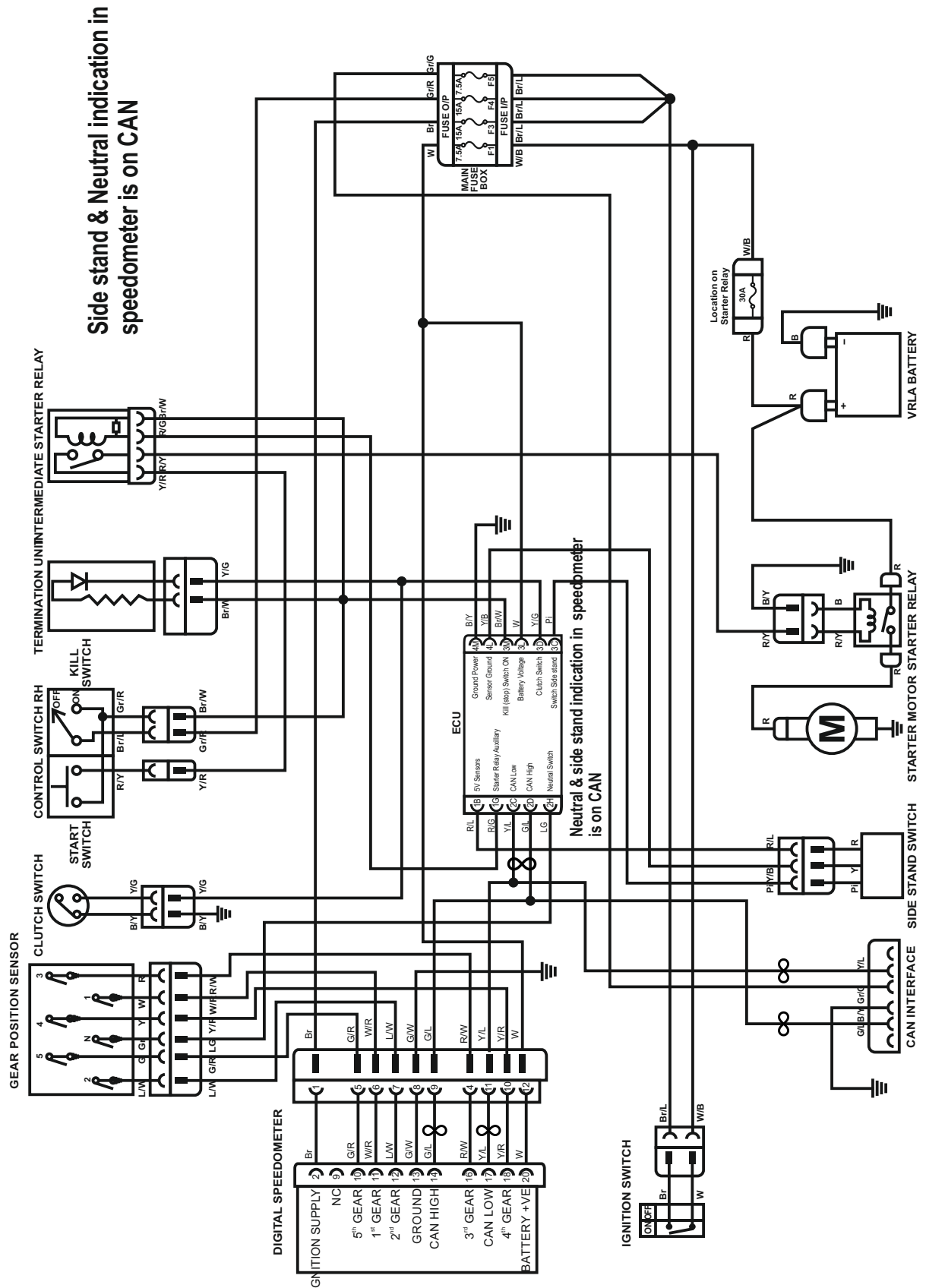
Varroc ECU





Circuit Diagram - VARROC

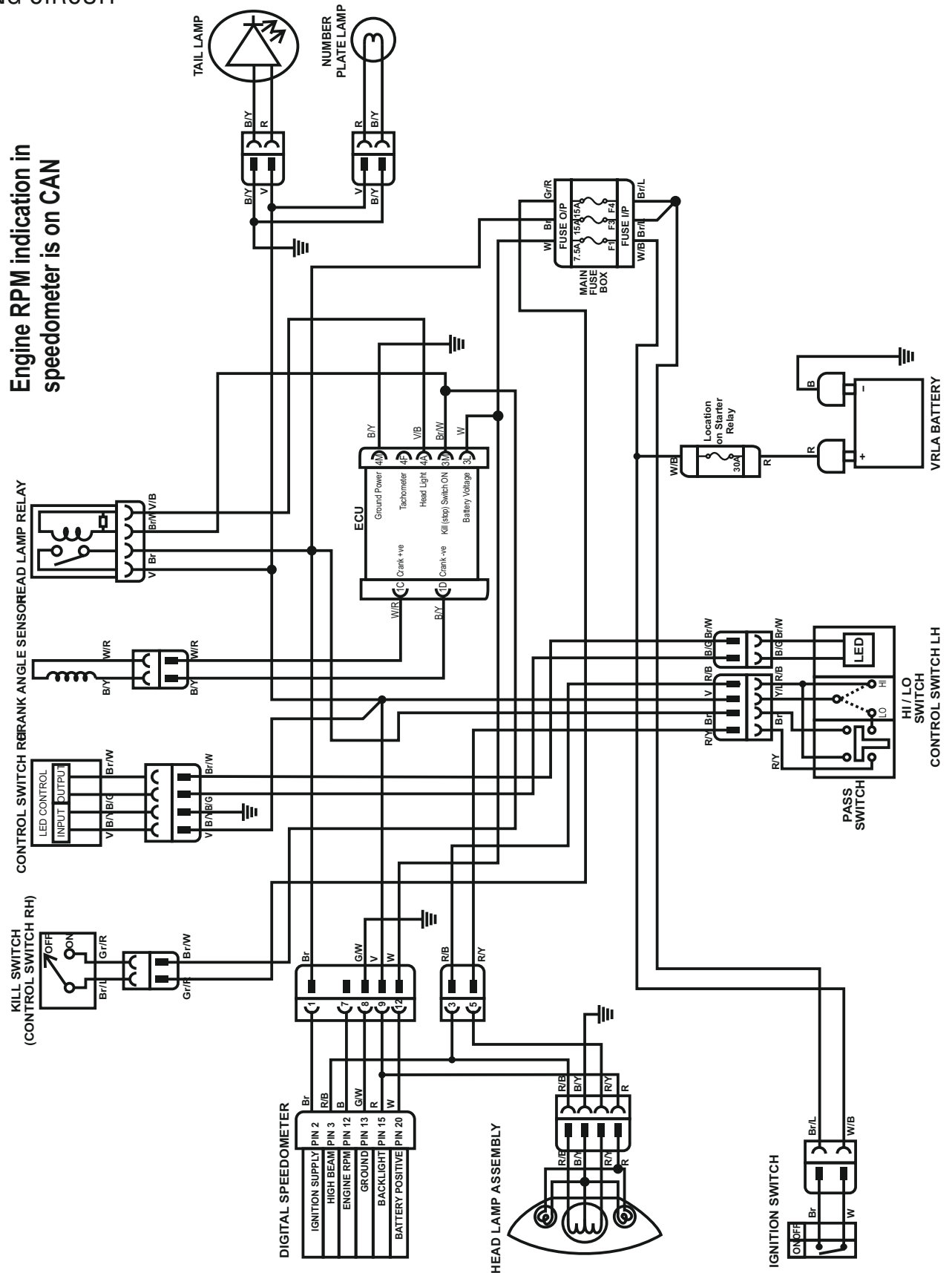
STARTER MOTOR CUM SIDE STAND SWITCH CIRCUIT



Circuit Diagram - VARROC



LIGHTING CIRCUIT



The diagram illustrates the electrical system for an engine, centered around the ECU (Engine Control Unit). The ECU is connected to various sensors and actuators, including the Ignition Switch, Fuel Injector, Crank Angle Sensor, H.T. Coil 1, H.T. Coil 2, Roll Over Sensor, Stepper Motor, Kill Switch, Main Fuse Box, and VRLA Battery. The diagram uses color-coded wires and labels to identify each component and its connection points.

ECU Pinout:

- Pin 1: 5V Sensors
- Pin 2: Ground Power
- Pin 3: Sensor Ground
- Pin 4: Sensor Air Temp
- Pin 5: Crank +ve
- Pin 6: Crank -ve
- Pin 7: Engine Temp. Sensor
- Pin 8: Staper Out B -ve
- Pin 9: Staper Out B +ve
- Pin 10: Staper Out A -ve
- Pin 11: Staper Out A +ve
- Pin 12: Kill (stp) Switch ON
- Pin 13: Battery Voltage
- Pin 14: Manifold Air Pressure Sensor
- Pin 15: Throttle Sensor
- Pin 16: Rollover Sensor
- Pin 17: Switch Side stand
- Pin 18: Spark 1 (HT coil)
- Pin 19: Spark 2 (HT coil)

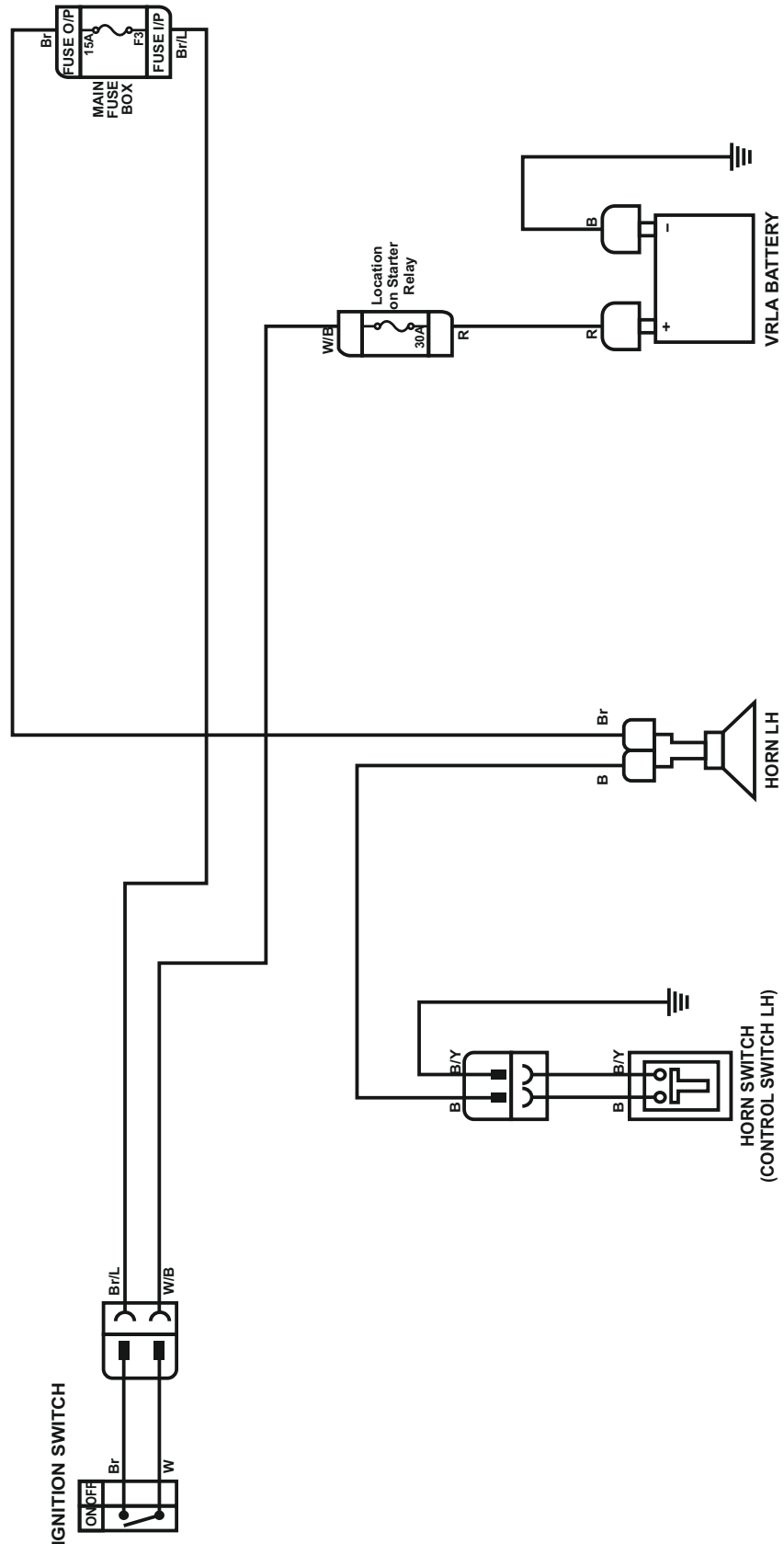
Wiring Details:

- Ignition Switch:** Connected to the ECU's Kill (stp) Switch ON pin (Pin 12) and the Main Fuse Box.
- Fuel Injector:** Connected to the ECU's Crank +ve pin (Pin 5) and the Main Fuse Box.
- Crank Angle Sensor:** Connected to the ECU's Crank -ve pin (Pin 6) and the Main Fuse Box.
- H.T. Coil 1:** Connected to the ECU's Spark 1 (HT coil) pin (Pin 18) and the Main Fuse Box.
- H.T. Coil 2:** Connected to the ECU's Spark 2 (HT coil) pin (Pin 19) and the Main Fuse Box.
- Roll Over Sensor:** Connected to the ECU's Rollover Sensor pin (Pin 16) and the Main Fuse Box.
- Stepper Motor:** Connected to the ECU's Staper Out B -ve pin (Pin 8) and the Main Fuse Box.
- Kill Switch:** Connected to the ECU's Kill (stp) Switch ON pin (Pin 12) and the Main Fuse Box.
- Main Fuse Box:** Contains fuses for the Ignition Switch, Fuel Injector, Crank Angle Sensor, H.T. Coil 1, H.T. Coil 2, Roll Over Sensor, Stepper Motor, Kill Switch, and VRLA Battery.
- VRLA Battery:** Connected to the Main Fuse Box and the ECU's Ground Power pin (Pin 2).

Circuit Diagram - VARROC



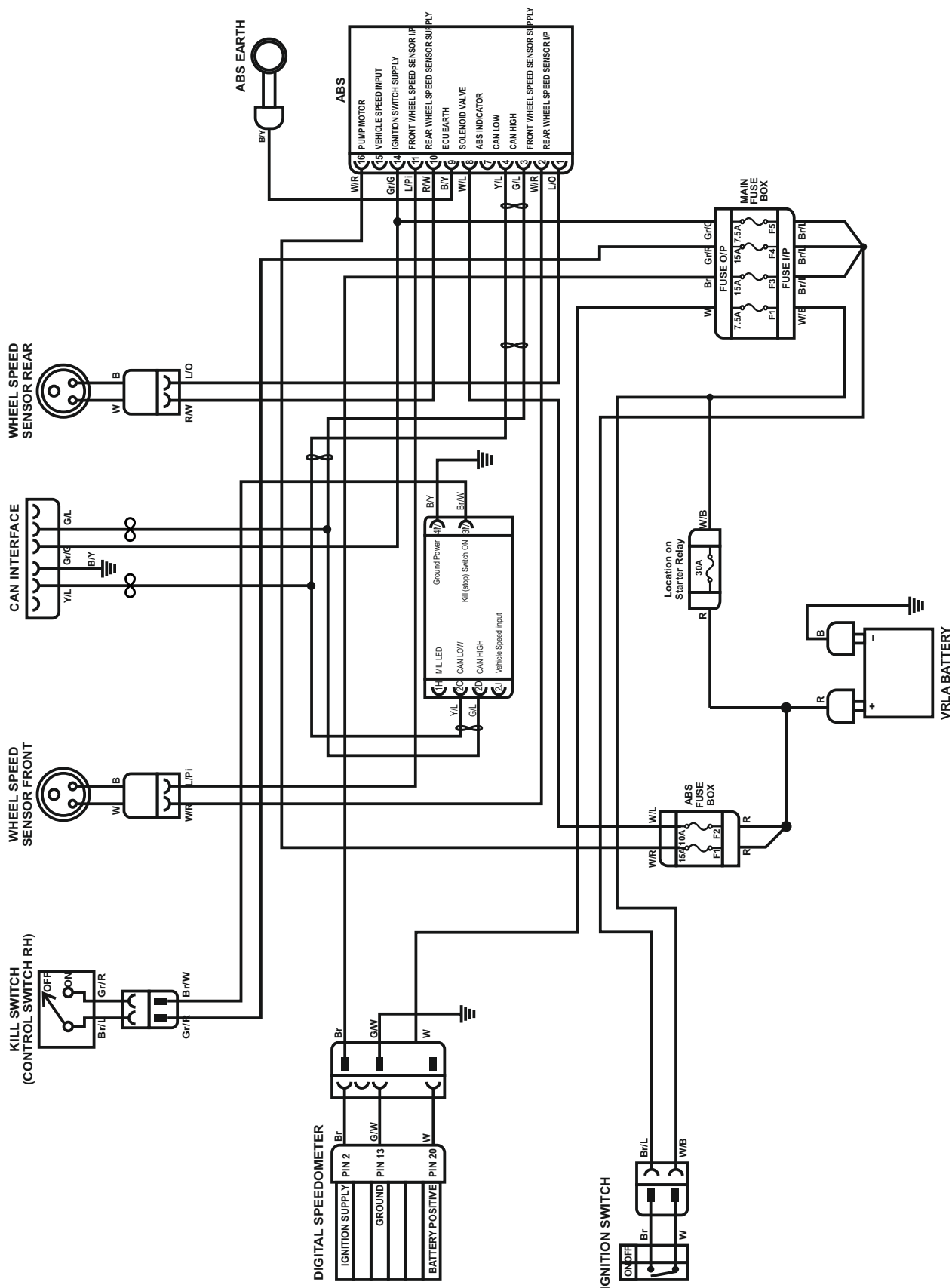
HORN CIRCUIT





Circuit Diagram - VARROC

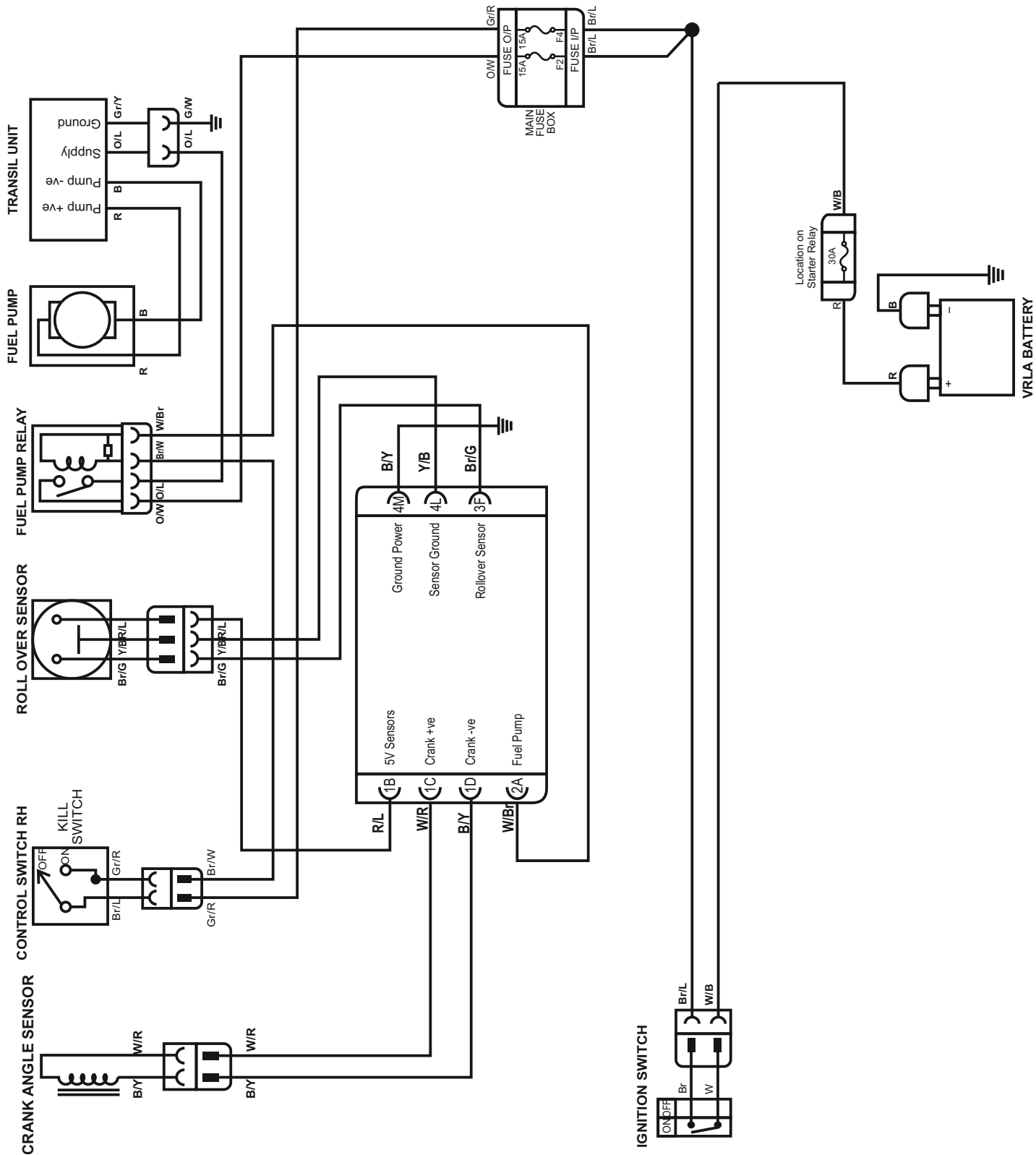
ABS CIRCUIT



Circuit Diagram - VARROC



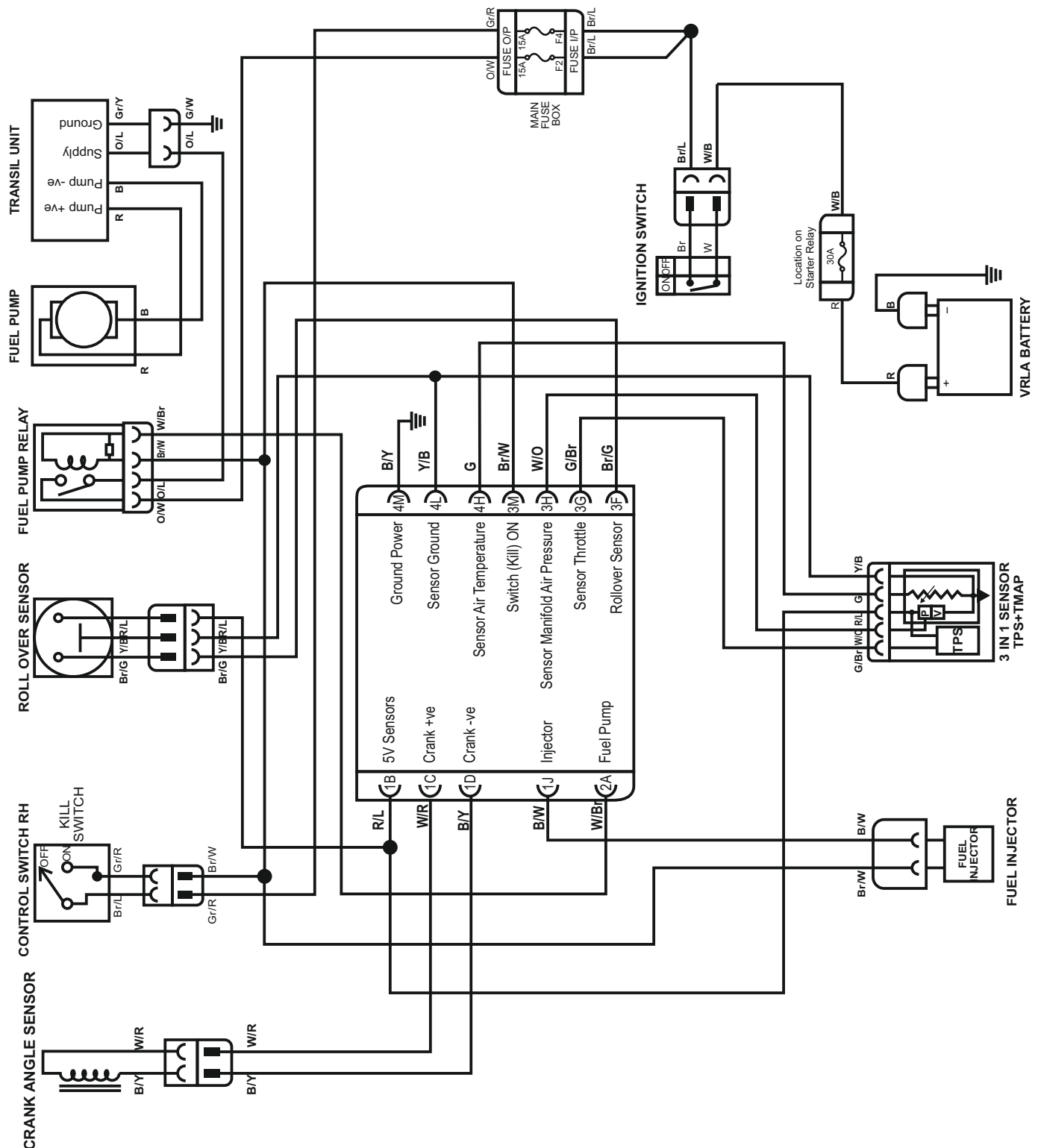
FUEL PUMP CIRCUIT





Circuit Diagram - VARROC

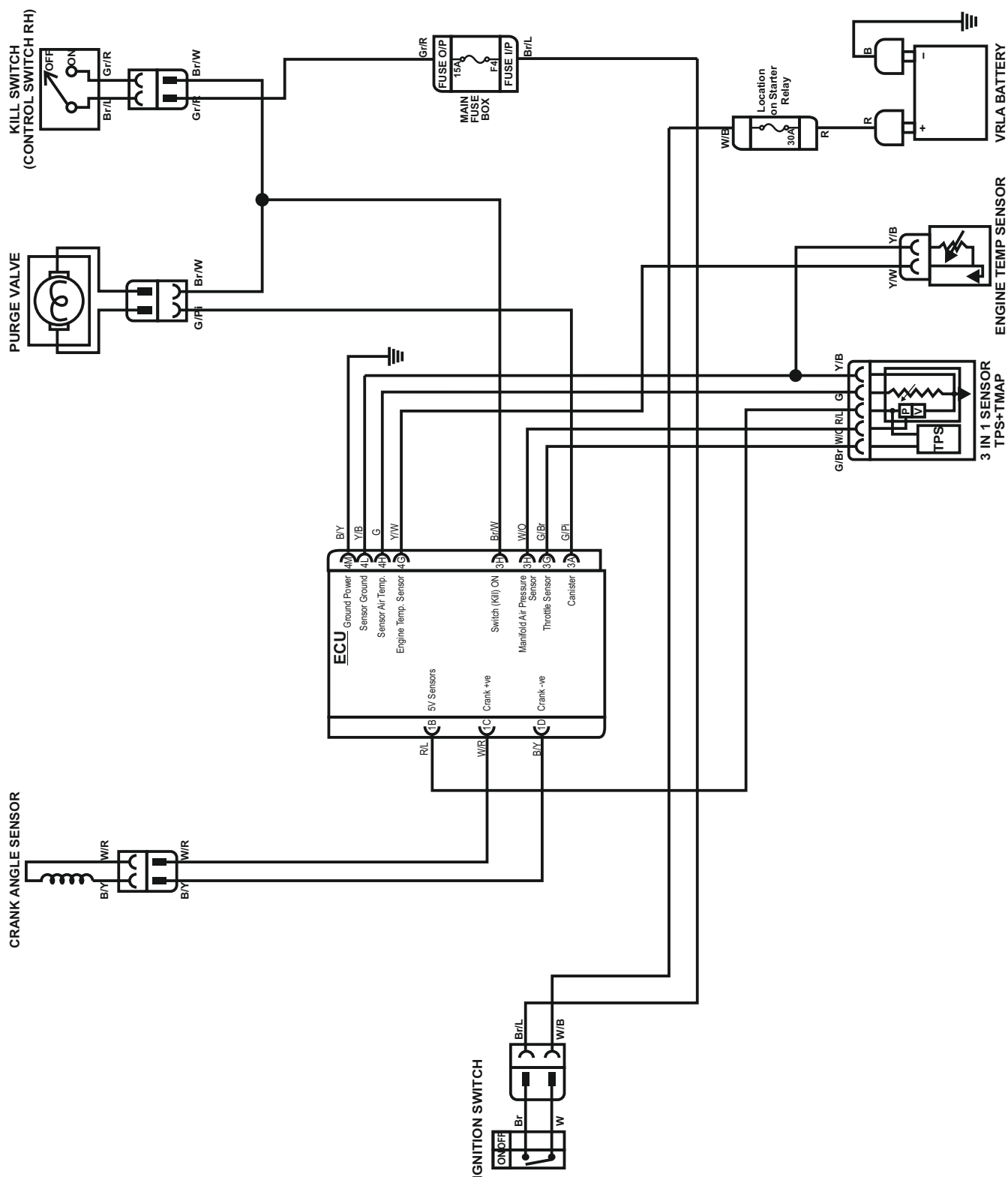
FUEL INJECTOR CIRCUIT



Circuit Diagram - VARROC



EVAP PURGE CIRCUIT

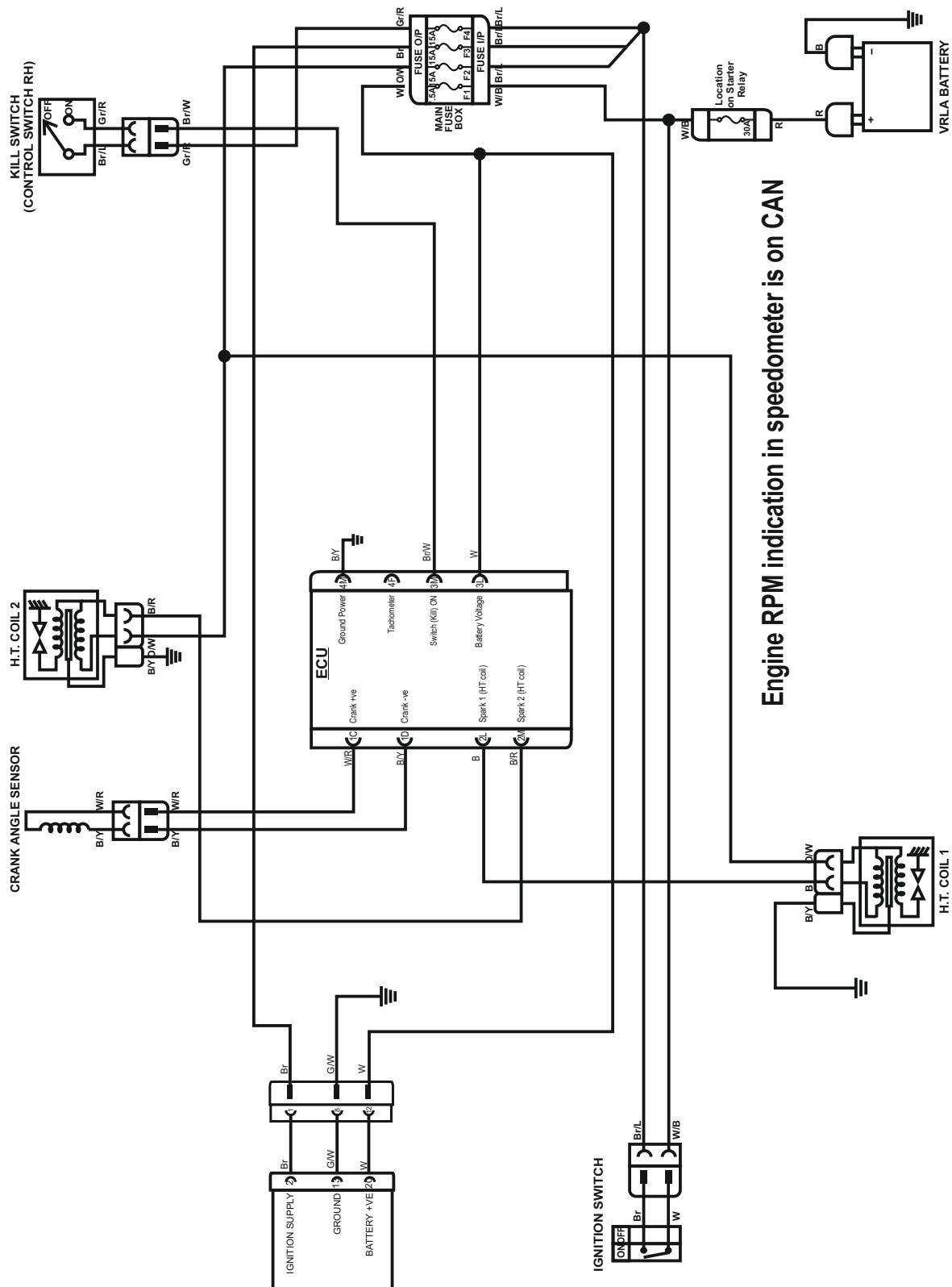


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Circuit Diagram - VARROC



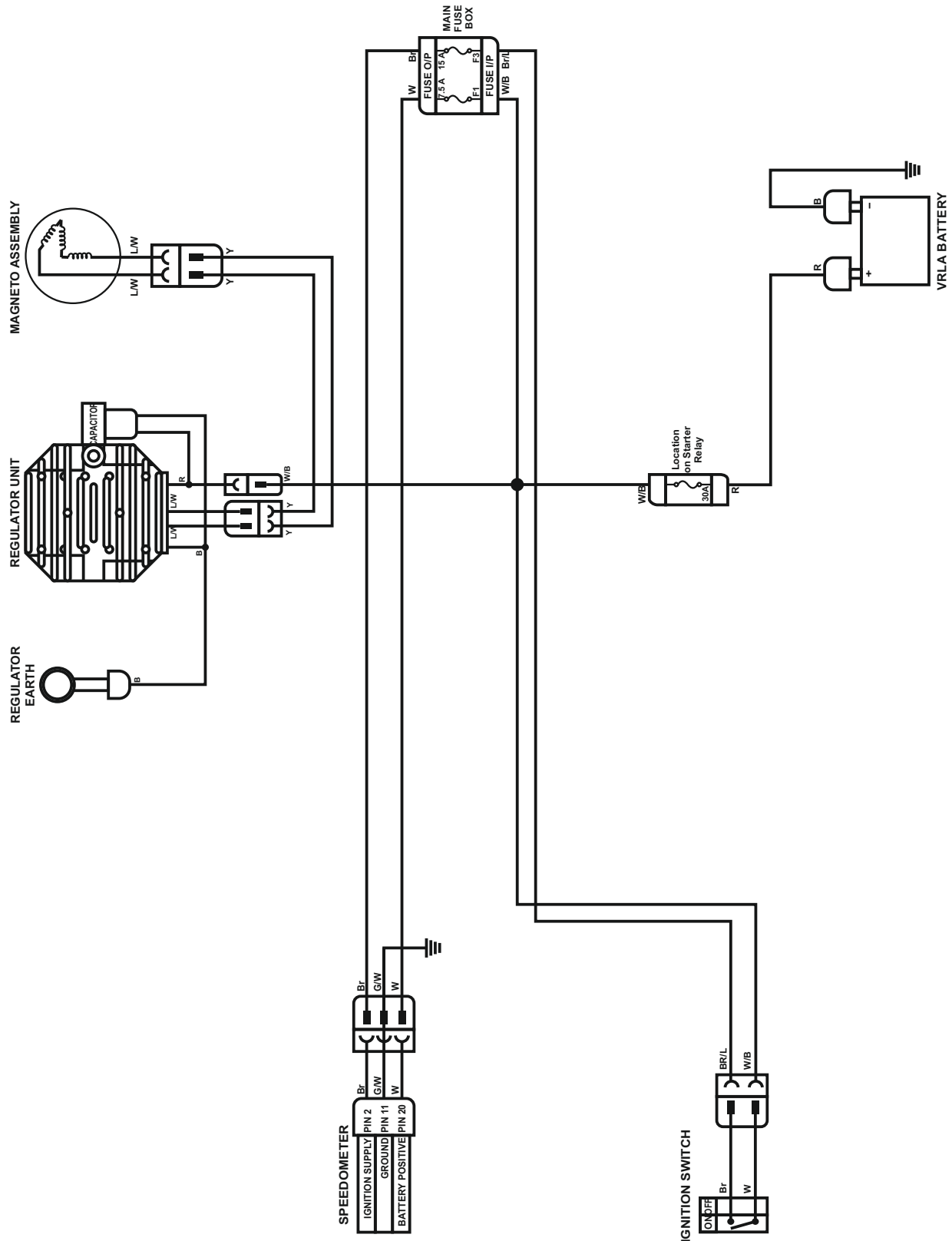
ENGINE RPM INDICATION CIRCUIT





Circuit Diagram - VARROC

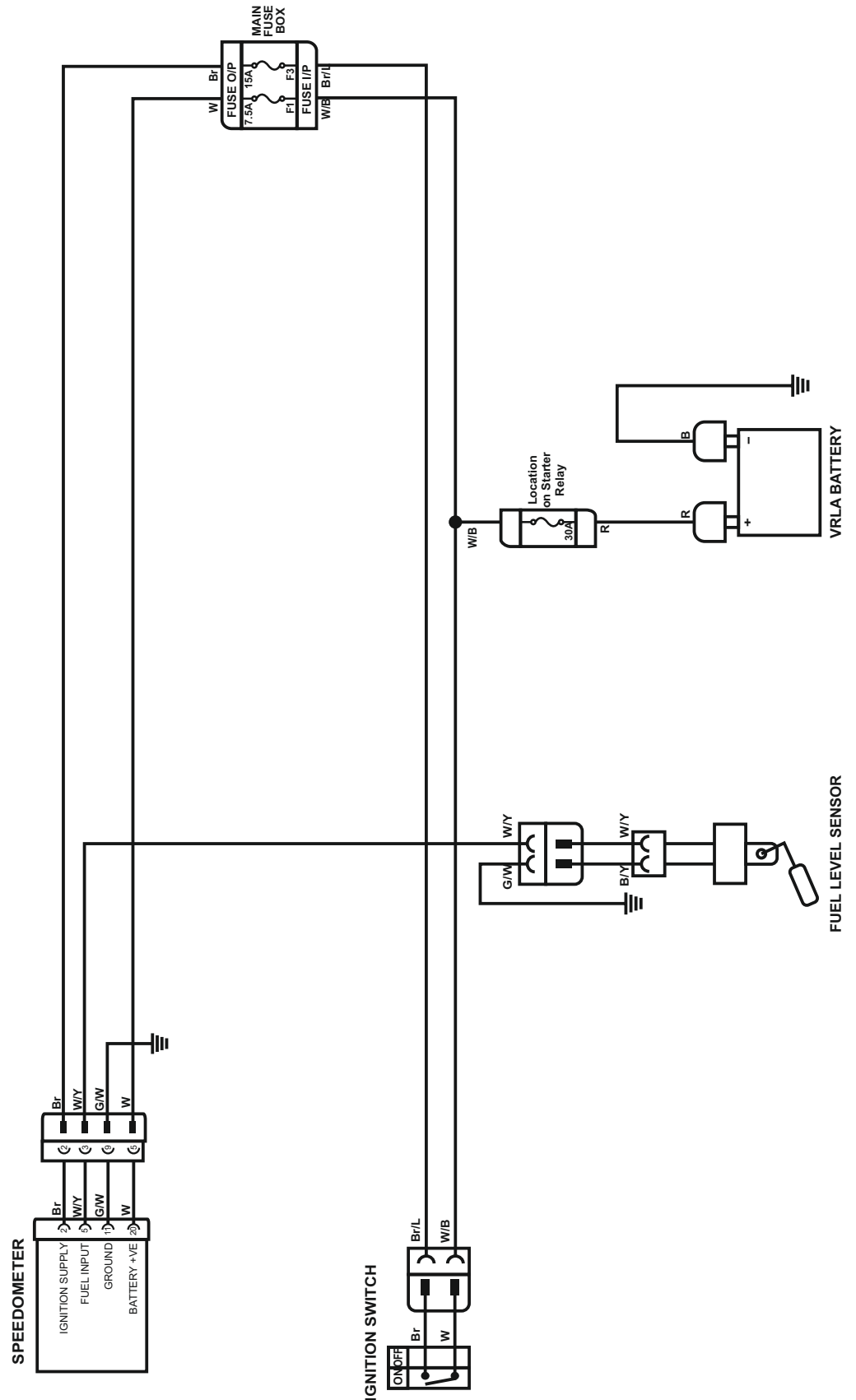
BATTERY CHARGING CIRCUIT



Circuit Diagram - VARROC



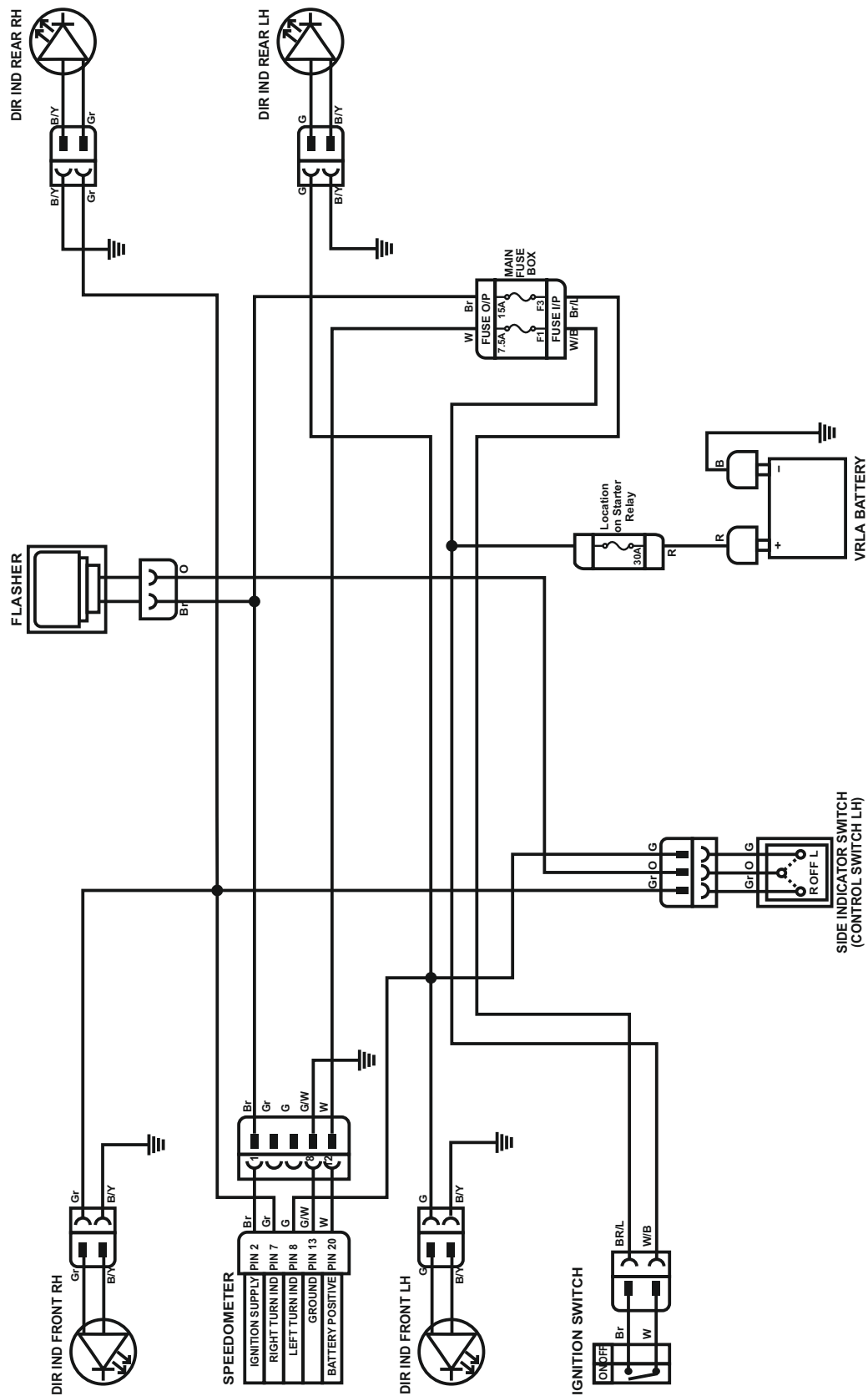
FUEL METER CIRCUIT





Circuit Diagram - VARROC

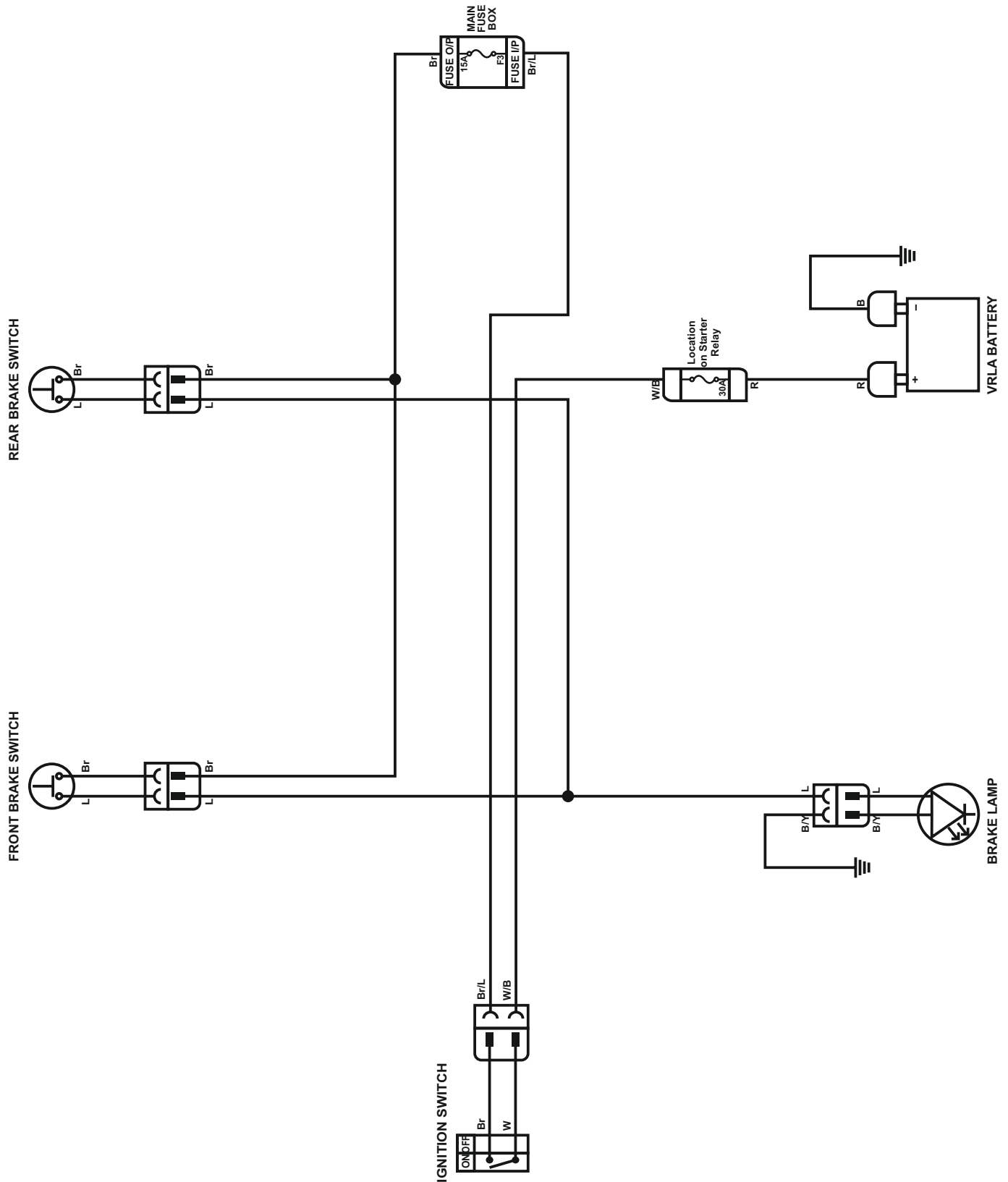
SIDE INDICATOR CIRCUIT



Circuit Diagram - VARROC



BRAKE LAMP CIRCUIT





pulsar
NS160
FI Twin Disc (ABS + USD)

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