Training Notes

BAJAJ LOVED IN 70 COUNTRIES

pulsar NS200

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 200 Fi USD with Twin channel ABS-Euro 4. The Training Note covers standard workshop producers, simplified for easy learning and understanding for service technicians worldwide.

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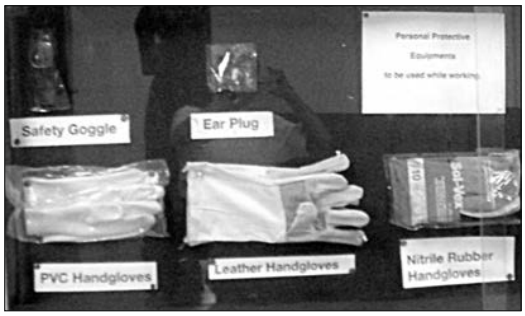
Key Learning Points

- Understanding workshop discipline and safety guidelines
- Precautions whilst handling tools and equipment

CHAPTER 1
WorkShop Safety & Procedures

Workshop Safety



1. Dress Code:

- Technicians must always be wearing shoes and dressed in clothing that is not too loose.
- Always use protective Equipment (PPE) like - Hand Gloves
- - Mask
- - Safety Goggle
- - Ear Plugs

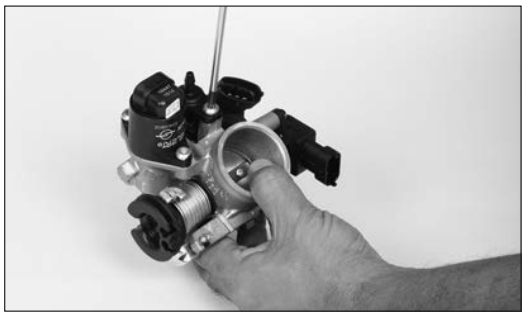
2. Fire Extinguisher:

- Install 'ISI' approved. Fire extinguishers - CO2 gas cylinders.
- Refill CO2 before the gas expires.
- Install Co2 gas cylinder at appropriate place

3. Safety Precautions whilst Operating Air Tools:

Air pressure tools operate on compressed air supplied by the shop Compressor and Air supply system.

Observe the following safety related precautions when using an air tool.



- It is advised to fit a pressure regulator (FRL:- Filter Regulator Lubricator) in the pneumatic line which supplies air pressure to the air tool. It regulates the outlet pressure to 6.5 Kg/cm2. This avoids the risk of personal injury.

Warning: Never use the blow gun to blow dust off your clothes and never point it at another person. The air pressure also thrusts dust particles at high velocity. These particles can penetrate into the

flesh or eyes. If high pressure air hits on open wound, it can force air into the blood stream which at times can even result in instant death due to cardiac arrest.

Workshop Safety

4. Hand Tools:

- Do not use worn out hand tools.
- Calibration of Workshop Equipment
  - Calibrate all Workshop and M and T Equipment once in a year.
- Avoid direct body contact with Petrol, Kerosene.

Caution: Prolonged contact of used oil can cause cancer.

5. Waste Oil Disposal:

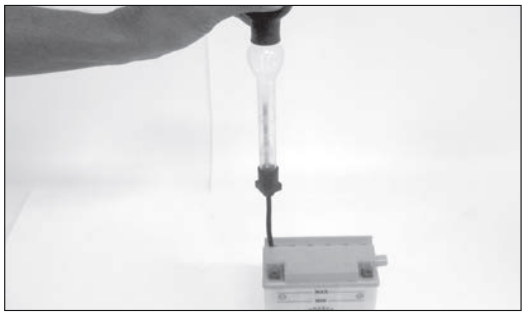
- Sell used oil only to Government approved re-cycle agencies.
- Collect used oil in oil disposer / barrel.
- Don't throw oil into the sewage line.
- Don't spill oil on the floor.

6. Precautions to be taken while handling Hydro-Electric Lift:

- Whilst raising / lowering ensure the vehicle is firmly mounted
- After raising the lifter bay, lock the lift.
- Don't put leg/hand in between while raising / lowering

Safety Tips

- Do not lower the lifter bay table without unlocking the lift lock.
- Do not work with loose clothing whilst working on the lifter bay.
- Do not keep hydraulic joints loose. Do not stand on the lifter bay when in operation.
- Keep fire away from the power pack. Avoid oil spillage around the working area.



7. Battery Acid Handling:

- Use hand gloves, wear apron and safety glasses
- Avoid contact of battery acid with skin
- Use plastic trays to keep charging batteries and avoid battery acid spillage

Brake Fluid Handling

- Store brake fluid in sealed container and avoid spillage.
- Avoid contact of brake fluid with skin.

Electrical Wiring

- Ensure that the points and switches are easily accessible and conduct periodic checks and repairs.

Notes

Key Learning Points

- Understanding of Sailent Features
- Understanding of technical specifications
- Understanding PDI & PM chart with oil grade
- SOP'S Understanding

CHAPTER 2
I Read ..... I Learn

Identification

Salient Features

Technical Specifications

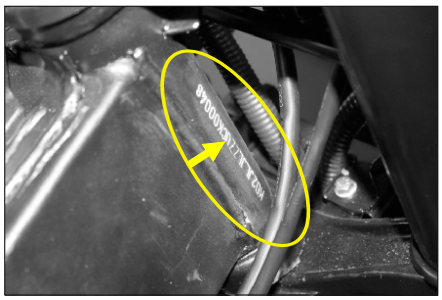
Pre-Delivery Inspection Checklist

Periodic Maintenance & Lubrication Chart

6 Key periodic service SOP'S

Identification

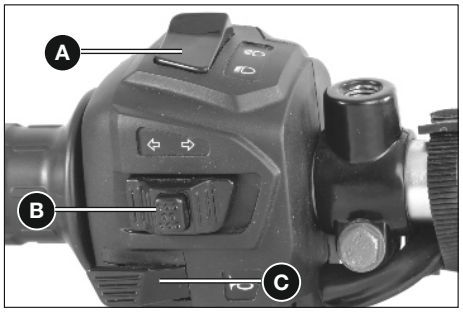
The Frame and Engine serial numbers are used to register the motorcycle. They are the unique alpha-numeric codes to identify your particular vehicle from others of the same model and type.



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

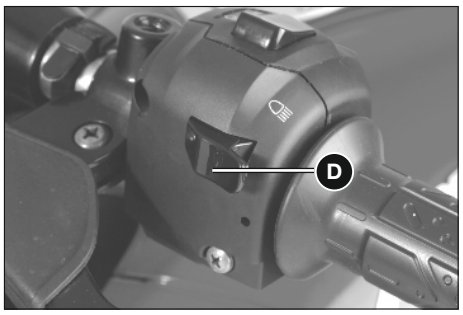


Left Handle Bar Switches

A. High / Low 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

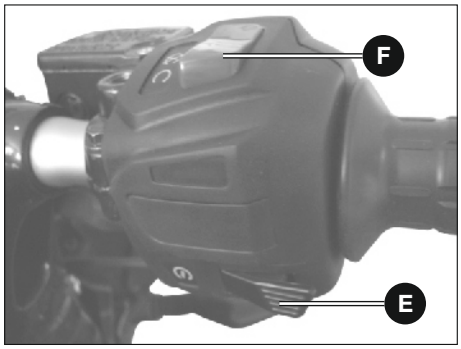
B. Turn Signal Switch : When the turn signal knob is turned to Left ( ) or Right ( ) respective indicator will start blinking, to stop blinking push the knob in & release.



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'.
≡OO≡	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.

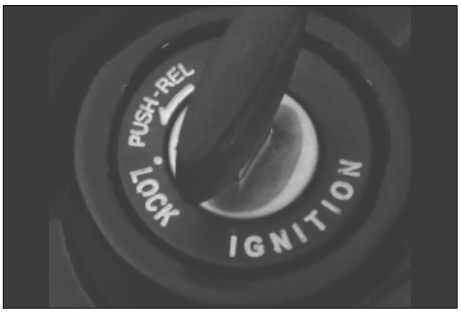
F. Engine Kill Switch :

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.

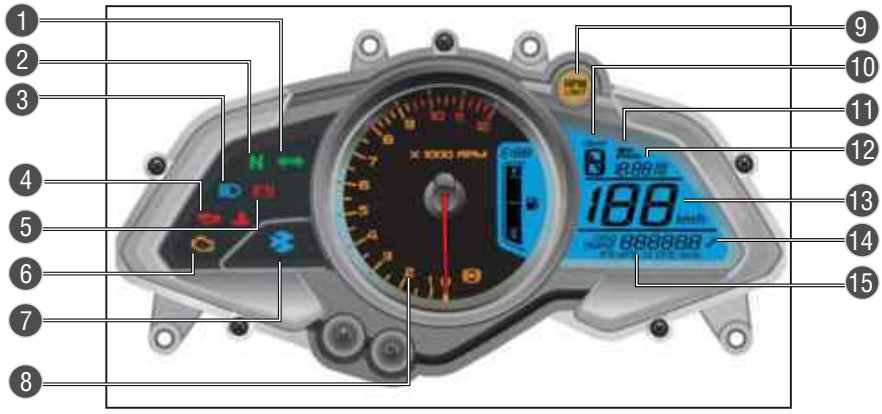
To Lock the Steering : To lock the steering, turn the handle bar to the left side. Push & release the key. Turn the key to "LOCK" position and remove the key. Steering lock can be done on left handle position only.

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

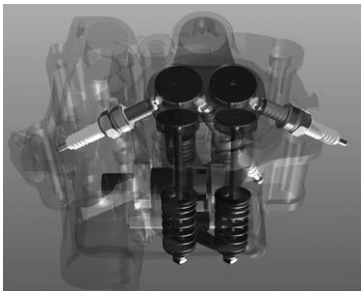
Instrument Cluster Information

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

16. **Coolant Temperature Indicator:** It blinks when engine coolant Temperature is more than 115 degrees centigrade..
17. **Fuel Level Indicator:** It shows fuel level in fuel tank.
18. **Odometer:** The Odometer shows the total distance that the vehicle has covered. Odometer can not be reset to 'Zero'.
19. **Trip Meter:** Trip shows the distance traveled since it was last reset to zero.
20. **ABS Indicator:** With ignition switch ON the ABS indicator glows.
21. **Mode Button:** It is used for toggling between different modes e.g. ODO, trip1, Trip2, DTE and clock setting.
22. **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.

Salient Features

PERFORMANCE



Key Features	Advantages	Benefits
• 4 Valve Liquid cooled Engine with 3 spark plugs • Engine power: 24.5 PS (18 KW) at 9750 rpm • Engine torque: 18.6 Nm at 8000 rpm • New generation Closed Loop Bosch Fuel Injection • DC ignition system. • Cylinder block with Coolant circulation passage. • Molykote piston • Oil jet in lubrication circuit. • Heavy duty gear box	• More power, Smooth power delivery, Complete utilization of engine torque Very Good driveability & knock free performance. • Consistent engine performance – • Power, Pick up & Mileage • Seamless changes in ignition maps for good engine performance • Good cooling of piston crown, reduced friction of piston • Improved life of engine components • Suited for high-speed driving.	Absolute joy to ride due to – • Highly optimized power & torque output • Razor sharp response to throttle inputs. • Smooth gear shifting

COMFORT

Key Features	Advantages	Benefits
• Mono Suspension with • Nitrox at rear. • Swing Arm with Needle bearings at pivot. • Wide Tyre at Front & Rear • New look Alloy Wheels	• High rigidity for good dynamic performance. • Good damping during high speed drive. • Low friction & rigid support • Good grip for high performance • Sporty looks, isolation of vibrations due to rubber damping.	• Smooth ride in any terrain. • Plush ride comfort for rider as well as pillion in all road conditions. • Excellent drive ability • Excellent road holding characteristics. • Vibration free ride.

Salient Features

SAFETY

Key Features	Advantages	Benefits
• Twin Channel ABS • Front Disc : 300 mm • Rear Disc : 230 mm • Tubeless tyres. • High strength robust perimeter frame. • Powerful DC head lamp. • Wider tyres & long wheelbase	• Contemporary design for best braking efficiency • Smooth ride, slow deflation in case of punctures for good control • Good rigidity and stability • Constant bright beam from Head Light even at low vehicle speeds and during idling too. • Good high-speed performance and stability	• Safety on road in high-speed driving. • Highest stability & road grip. • Bright illumination in all situations of riding

STYLE

Key Features	Advantages	Benefits
• Brawny looks. • Up side down (USD) fork. • Stylish Split Seat. • Two-piece Grab Rail. • Wolf eyed Head Lamp. • Clip on - Split type Handlebar. • Thicker tube Front Fork. – 33 mm dia. • Naked chain with 'O' ring. • 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.

Salient Features

CONVENIENCE

Key Features	Advantages	Benefits
• LCD speedo console. • Low Battery level indicator. • High coolant temp indicator. • Low Engine oil pressure indicator • Digital speed indication. • Trip meter to record two trips. • Reserve indicator warning LED. • Digital fuel gauge. • Engine over speed limiter. • Tachometer for engine speed. • Service Reminder • Real time clock • Gear Position Indicator. • Instant Fuel Economy/ Average Fuel Economy / Distance to Empty • Head lamp controller • Maintenance free sealed battery. • High capacity 'O' ring chain.	• Ease of reading. • Early warning to prevent battery getting fully discharged. • Early warning to save damages to engine. • Early warning to save damages to engine. • Easy to read at a glance. • Convenience for touring. • Reminder for fuel fills up. • Warns the rider to control revving of engine. • For monitoring engine speed and optimum sport riding. • Reminds rider about vehicle servicing. • Convenience • 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 • Intelligent battery save function, switches on head lamp only while engine is in running condition. • Topping up not required for its life. • High performance with good life.	• Easy to ride without any driving / operating / maintenance hassles.

Technical Specifications

Engine & Transmission

Type	:	Four stroke, Single cylinder. Liquid cooled
Bore	:	72.0 mm
Stroke	:	49.0 mm
Displacement	:	199.5 cc
Idling speed	:	1500 ± 100 rpm
Max. Net Power	:	24.5 PS (18 KW) at 9750 RPM
Max. Net Torque	:	18.6 Nm at 8000 RPM
Ignition system	:	DC
Spark plugs	:	3 Nos.
Spark plug gap	:	0.8 ~ 0.9 mm
Engine lubrication	:	Pressurized oil supply
Transmission	:	6 Speed constant mesh
Gear shifting pattern	:	1 Down 5 UP

Chassis & Body

Frame type	:	Perimeter
Suspension	:	Front - Ø33mm USD Fork
		Rear -Mono suspension with Nitrox
Brakes	:	Front - Hydraulically operated Disc type Ø300 mm with Twin channel ABS
		Rear - Hydraulically operated Disc type, Ø230 mm
Tyre size	:	Front -100/80-17, 52P tubeless
		Rear - 130/70-17,62P tubeless
Tyre Pressure	:	Front - 1.75 Kg/cm² (25 PSI)
		Rear (Solo) - 2.00 Kg/cm² (28.4 PSI)
		Rear (With Pillion) - 2.25 Kg/cm² (32 PSI)
Rims	:	Front - 2.50 x 17", 10 spoke alloy wheels
		Rear - 3.50 x 17", 10 spoke alloy wheels
Fuel tank capacity		
Full	:	12 Litres

Controls

Gears	:	Left foot operated
Brakes	:	Front - Lever operated, right hand
		Rear - Pedal operated, right foot
Clutch	:	Lever operated, left hand
Steering	:	Handlebar
Accelerator	:	On RH Handlebar

Technical Specifications

Electricals

System	:	12 V DC
Battery	:	12V 8 Ah VRLA
Headlamp	:	12V, 55 W / 60 W, H4
Position lamp	:	12V 5W (2 nos.)
Tail / stop lamp	:	LED
Side indicator lamp	:	12V 10W (4 Nos)
Neutral indicator	:	LED - Green
High beam indicator	:	LED - Blue
Turn signal indicator	:	LED – Green
Malfunction Indicator	:	LED - Yellow
RPM limit	:	LED - Amber
Coolant Temperature Indicator	:	LED - Red
Gear Indicator	:	LCD
IFE/AFE/DTE	:	LCD
Side stand indicator	:	LCD
ABS indicator	:	LED - Yellow
Speedometer backlight	:	LCD – Blue
Fuel Level Indicator	:	LCD - Bars
Low battery indicator	:	LED - Red
Low oil pressure indicator	:	LED – Red
Service reminder	:	LCD
Bajaj logo	:	LED – Blue
Rear number plate lamp	:	LED
Horn	:	12V DC Type 2A (82 mm dia.)

Dimensions

Length	:	2015 mm
Width	:	803.5 mm
Height	:	1075 mm
Wheel Base	:	1363 mm
Ground Clearance	:	169 mm

Weights

Vehicle Kerb Weight	:	158 kg
Gross Vehicle Weight	:	308 kg

Performance

Maximum Speed, km/h	:	125 Km/h

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 NS200 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.

To Check	Check for	✔ if OK / X if NOT ok	Observations / Remarks
1. Check points before starting of the vehicle			
Check & correct the below check points before starting the vehicle			
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		
Mirror	Fitment & Adjustment to ensure clear rear view		
Coolant	Coolant level between MIN & MAX mark, top up if required in cold condition (In both wheel touched to ground condition)		
	Ensure no leakage		
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: 25 PSI (1.75 Kg / cm2)		
	Rear (with pillion): 32 PSI (2.25 Kg / cm2)		
Clutch / Throttle Cable	Free play - 2 ~ 3 mm		
Drive Chain	Slackness standard - 15 ~ 25 mm		
	Equal marking of chain adjuster 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.	Engine stay Upper bolts : 2.5 – 2.7 Kg.m		
	Engine stay Lower bolts : 4.5 – 4.7 Kg.m		
	Rear Engine mounting bolts – 4.5 – 4.7 Kg.m		
	Front axle nut – 8.0 ~ 10.0 Kg.m		
	Rear axle nut - 8.0 – 10.0 Kg.m		
	Swing arm shaft nut - 13.0 ~ 15.0 Kg.m		
continued on next page	RSA Mounting nut top / bottom nut - 3.2 ~ 3.8 Kg.m		

Pre Delivery Inspection Checklist

To Check	Check for	P if OK X if NOT ok	Observations / Remarks
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	Front fork top/side bolts – 2.5~3.5 Kg.m		
	Front fork under bracket bolts – 1.8~ 2.2 Kg.m		
2. Check points during / after starting the vehicle			
Check & correct the below check points during / after starting the vehicle			
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.		
Head lamp	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	Servicing with water wash		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	SAE 20W50 API SL / JASO MA2 Grade, Fully Synthetic. Replace every 5000 km Top up every 2500 km
3	Engine oil filter	R	R	R	R	R	R	R	R	Replace at first service & then every 5000km
4	Oil strainer, Body centrifugal filter**	CL	CL	CL	CL	CL	CL	CL	CL	Oil strainer cleaning at the time of oil change.
5	Spark plug	CL,A,R			CL,A		CL,A		R	Replace at every 30000 km
6	Air cleaner element** & air filter cover "O" ring.	R					R			Replace at every 20000 kmS
7	Air filter drain tube	CL					CL			Clean at every 20000 kms.
8	Fuel pipe	C,R					C,R			Replace if required
9	Valve tappet clearance	C, A					C,A			Check & adjust every 20000 km
10	Sealed drive chain cleaning & lubrication	CL, L, A	CL, L, A	CL, L, A	CL, L, A	CL, L, A	CL, L, A	CL, L, A	CL, L, A	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

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	
11	Silencer tail pipe cleaning**	CL		CL	CL	CL	CL	CL	CL	
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 - Check wear indicator	C, R	C, R	C, R	C, R	R	C, R	C, R	R	Replace brake shoes /brake pad at every15000 Kms
14	Brake fluid level - top up / replace	C, A, R				C, A			R	Use recommended brake fluid (DOT4)
15	Disc brake assly -- 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 cable if operation found hard
17	Wiring harness connections, routing, tie bands & clamps tightness. Conduit/PVC sleeve inspection	C, A, R	C, A, R	C, A, R	C, A, R	C, A, R	C, A, R	C, A, R	C, A, R	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	

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	
20	Steering stem bearing*** & Cap steering bearing (Plastic)**	C,CL, L,R			C,CL, L,R		C,CL, L,R		C,CL	Check & replace if damaged. Use Shell Gadus S3 V220C2 for lubrication..
21	Steering stem bearing*** & Cap steering bearing (Plastic)**	C,CL	C,CL	C,CL	C,CL	C,CL	C,CL	C,CL	C,CL	Use recommended Wd40 spray
22	Main stand & side stand pin**	CL, L			C,CL		C,CL		C,CL	Use recommended AP grease.
23	All fasteners tightness	C, T	C, T	C, T	C, T	C, T	C, T	C, T	C, T	
24	General lubrication-Clutch lever, front brake lever, kick lever.	L	L	L	L	L	L	L	L	Use recommended AP grease.
25	Coolant level in expansion tank	C, A	C, A	C, A	C, A	C, A	C, A	C, A	C, A	Coolant top up if required.
26	Coolant hose damage/clamps/leakage	C		C	C	C	C	C	C	Replacement every 30000km or 3 years (whichever occurs earlier)
27	Radiator Fins	C		C	C	C	C	C	C	If damage is more than 30%, Replace Radiator.
28	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.
29	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

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	
30	Throttle body rubber duct (sleeve) hard resulting in loose fitment	C,R				C,R	C,R	C,R	C,R	Replace if required
31	Engine breather tube for cracks	C,R			C,R	C,R	C,R	C,R	C,R	Replace if required
32	Water pump seals	R								Replace every 40000km
33	HT coil connections	C, T		C, T	C, T	C, T	C, T	C, T	C, T	
34	Starter motor & starter relay connections	C, T		C, T	C, T	C, T	C, T	C, T	C, T	
35	Oil pressure indicator check on console post ignition ON	C	C	C	C	C	C	C	C	Icon should disappear post engine ON after 4500 RPM, If lamp is continuously ON at engine ON condition then replace.
36	Check fault code, clear fault history, update latest HEX file if applicable	C	C	C	C	C	C	C	C	
37	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
38	Swing arm NRB	CL, L, R								Lubricate every 40000km, replace if required
39	Rear sprocket fasteners for looseness	C, T	C, T		C, T		C, T		C, T	Use model wise torque values
40	Rear wheel rubber shock dampers for excess play	C, R			C, R		C, R		C, R	Replace if required
41	Fairing & windshield well nuts for rubber crack	C, R			C, R	C, R	C, R	C, R	C, R	Replace if required

Periodic Maintenance & Lubrication Chart

Sr No	PM checkpoints	Recommended frequency								Remarks
		Service	1st	2nd	3rd	4th	5th	6th	7th	
		Kms	500	4500	9500	14500	19500	24500	29500	
			~	~	~	~	~	~	~	
			750	5000	10000	15000	20000	25000	30000	
42	Head light focus adjustment	C,A	C,A	C,A	C,A	C,A	C,A	C,A	C,A	
43	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
44	Tyre air pressure	C,A	C,A	C,A	C,A	C,A	C,A	C,A	C,A	Use model wise tyre pressure
45	Mirror position and joint firmness	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

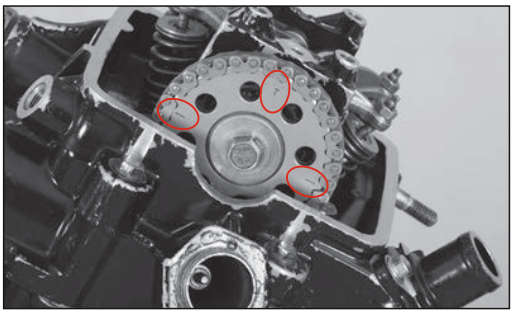
Recommended Oil	Recommended Oil
Replacement Frequency*	1st service. Thereafter at every 5000 kms. Topup every 2500km
Recommended Quantity	Refill at servicing : 1200 ml
	During engine overhaul : 1400 ml

CAUTION:

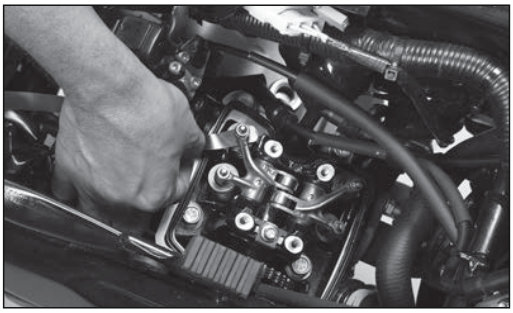
- It is most important to adhere to recommended grade & frequency of oil change for long life of critical engine components.
- Do not reuse drained oil. Dispose drained engine oil in a manner which is environment friendly.
- It is important to charge the VRLA Battery initially with recommended electrolyte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

6 Key Periodic Service SOP's

1. Tappet Setting



- Ensure that the piston is at the end of the compression stroke.
- Both rockers are the free.
- Ensure that the cam sprocket marks are parallel to the cylinder head surface.
- Check and adjust clearance of both, inlet and exhaust valves



Note:
Make one rotation of crankshaft and recheck the tappet clearance once again.
If found incorrect adjust it again.

Tappet Clearance	
Intake	**Exhaust**
0.05 mm	0.08 mm

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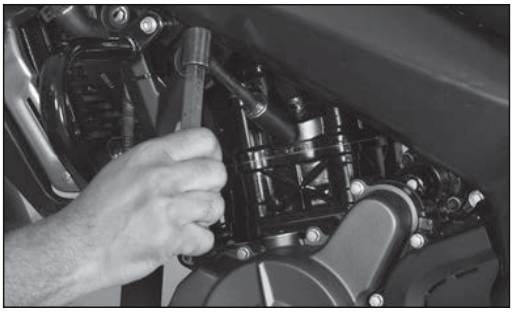
2. SOP for compression pressure checking (Dry Test)



- Warm the engine by riding the vehicle for about 1 km.
- Park the vehicle on levelled surface
- Disconnect all spark plug caps.
- Remove the RH side spark plug.
- Connect the compression gauge adapter and fit it.

- Open the throttle fully
- Crank the engine for 6 seconds
- Note the compression pressure

- Take 3 readings and calculate the mean of the 3 readings

Compression Pressure			
Details	**Kg/cm^2**	**PSI**	**Bar**
Std	11-13	156.4~185.0	10.78~12.74
Service limit	9.5	135.5	9.31

Periodic Service SOP

3. 'O' Ring Type Drive Chain Lubrication (On the vehicle)

- Park the vehicle on the service stand.
- Ensure free rotation of the rear wheel.
- Wipe / clean of dust using a lint free cloth.

- Shake the chain lube spray thoroughly.
- Hold the spray at a distance of 5 – 10 cm from the chain
- Rotate the wheel in the reverse direction when spraying. Spray on the middle section of the chain.

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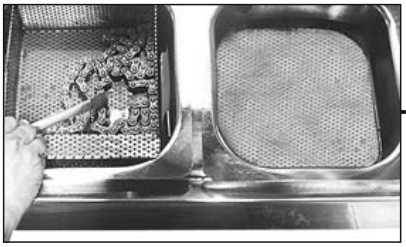
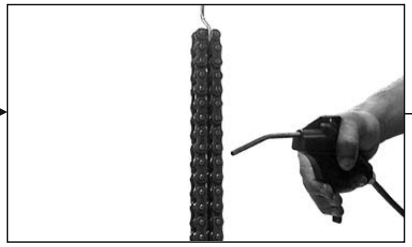
4. 'O' Ring Drive Chain Cleaning by Removing from Vehicle (Diesel + SAE 90 oil 1:1)

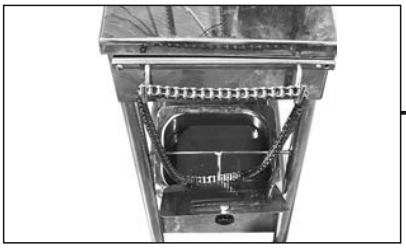


1st Stage :
Clean with Diesel + oil 1:1

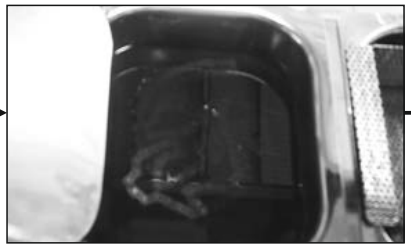
2nd Stage:
Clean with Diesel + oil 1:1



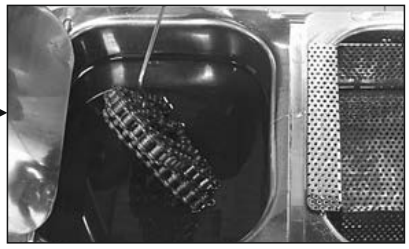
Blow Low Pressure
Compressed Air



Final Stage :
Hook chain for dripping of
excess oil



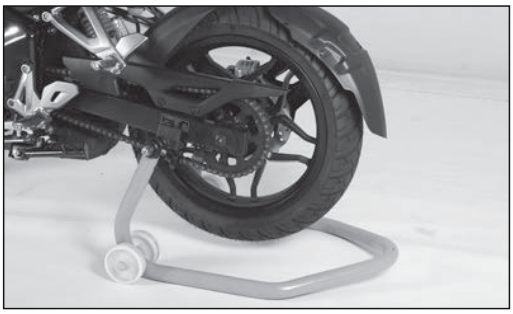
Soak into SAE 90 oil



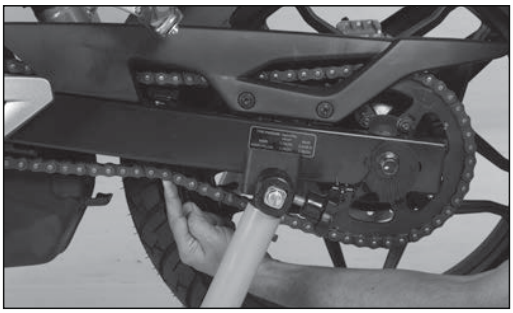
3rd Stage:
Dip into SAE 90 oil

Periodic Service SOP

5. Drive Chain Slackness Checking



- Park the vehicle firmly on the service stand.
- Rotate the rear wheel
- Adjust slackness if found incorrect

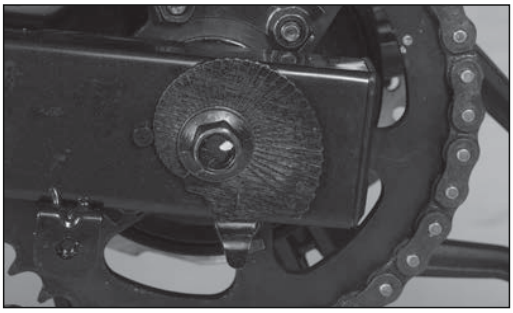


Drive chain Slackness	
Std	317.5 (20 Link)
Ser limit	323.2 (20 Link)

6. Drive Chain Slackness Adjustment

Loosen

- Rear axle nut

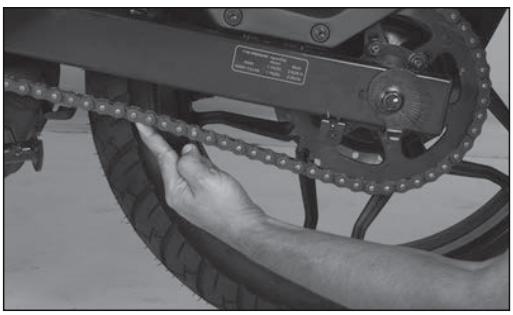


Adjust:

- LH chain adjuster
- RH chain adjuster

Note:

Ensure bolt LH/RH adjusters are adjusted equally



Tighten:

- Rear axle nut.
- Ensure correct chain slackness.

Notes

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 3
Fuel System

Wiring Harness Routing (Bosch & Varroc)

SOP for Replacement of Filter in Asian Fuel Pump

SOP for Fuel Pump Delivery & Pressure Inspection

Do's & Don;ts

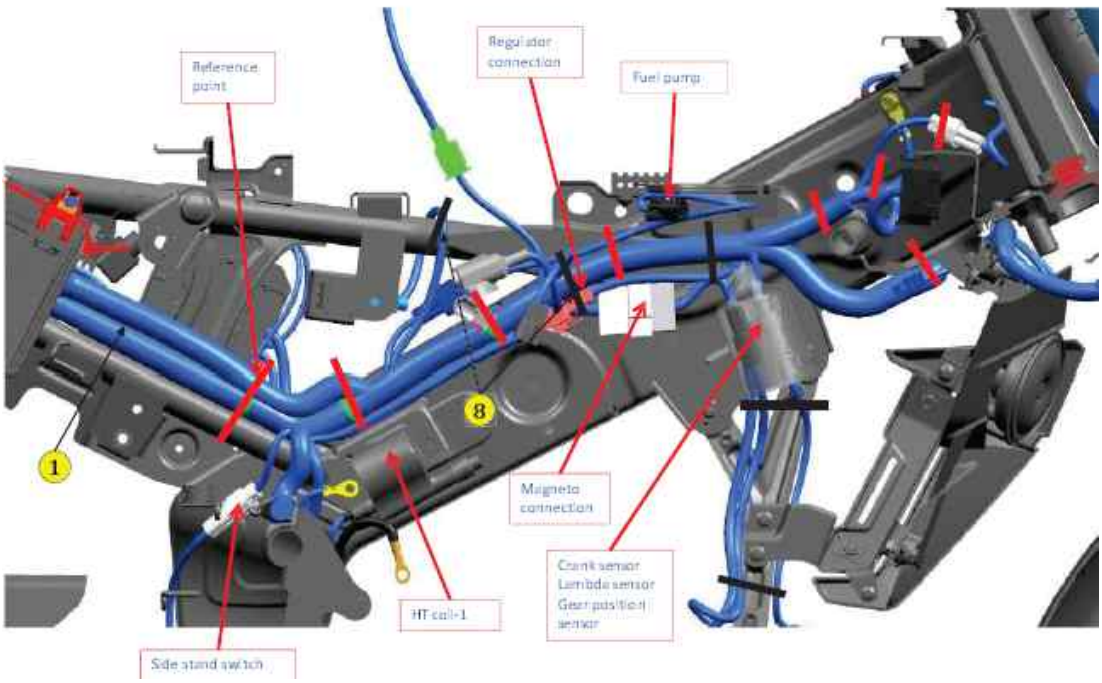
List of DTC codes

Working of EVAP System

BOSCH Make Wiring Harness Routine

SR. NO.	PART NO.	PART DESCRIPTION	QTY
1	JL402288	HARNESS WIRING	1
2	DT402223	CABLE EARTH	1
3	PA402207	CABLE RELAY-MOTOR	1
4	JL402219	PIGTAIL OIL PRESSURE SWITCH	1
5	LDF00001	WASHER TOOTHED-ID 6.4XOD11XT 0.7	3
6	KADF0610	BOLT FLANGED M6X1	3
7	JD402216	BAND 300MM	2
8	JD402212	BAND (LENGTH 200MM)	12
9	JD402217	BAND (L150)	3
10	JY113901	HOLDER COUPLER	1
11	Jy113821	SCREW BUTTON HEAD-M6X1XL12XBLACK	1

• Route the wiring harness as shown in photograph.



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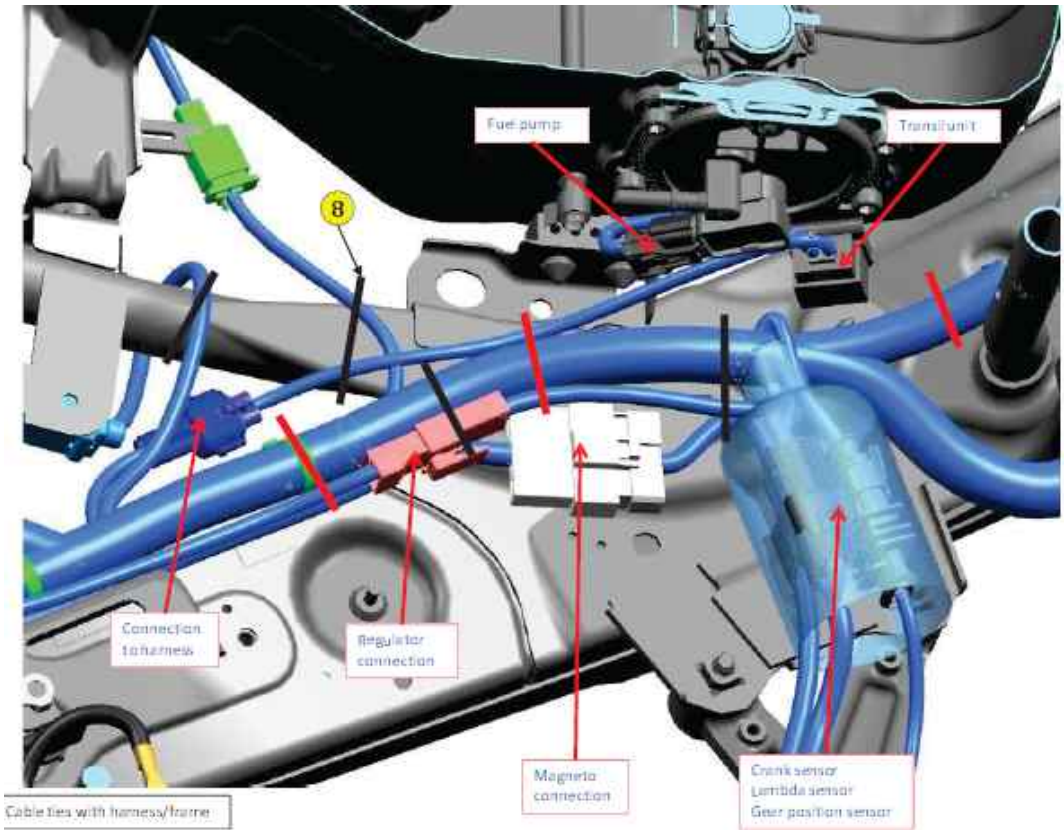

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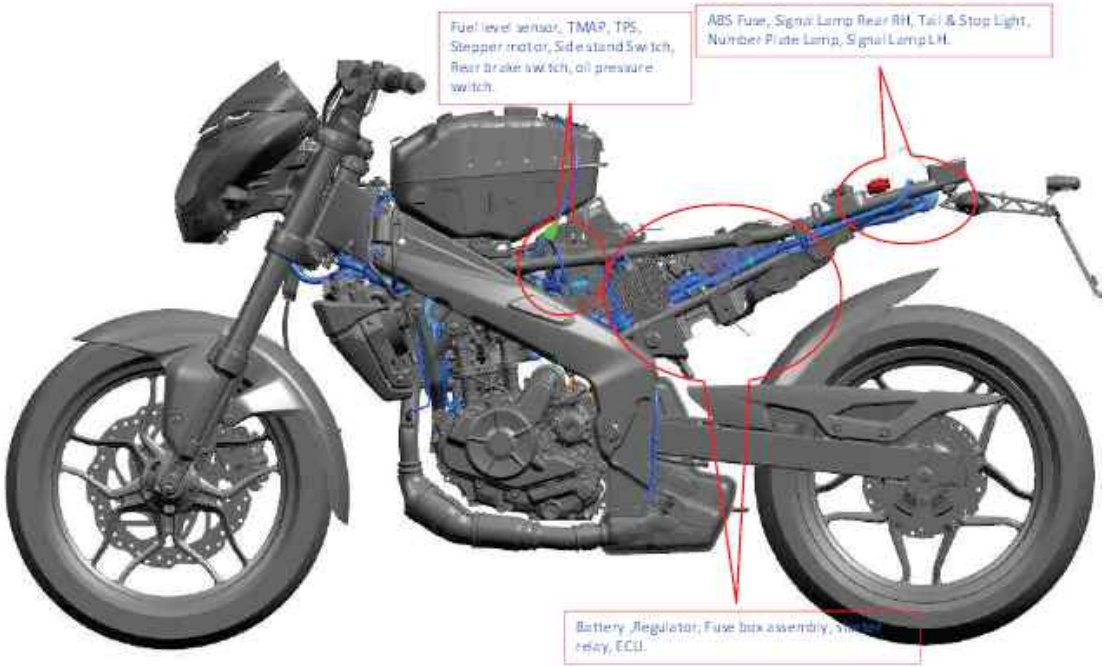

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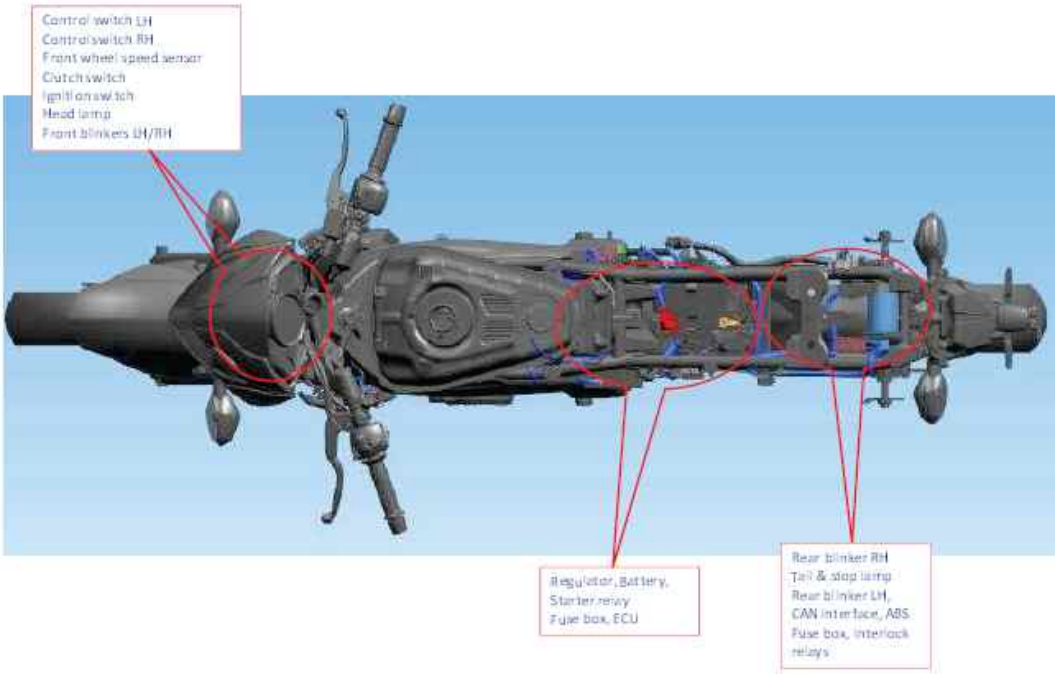

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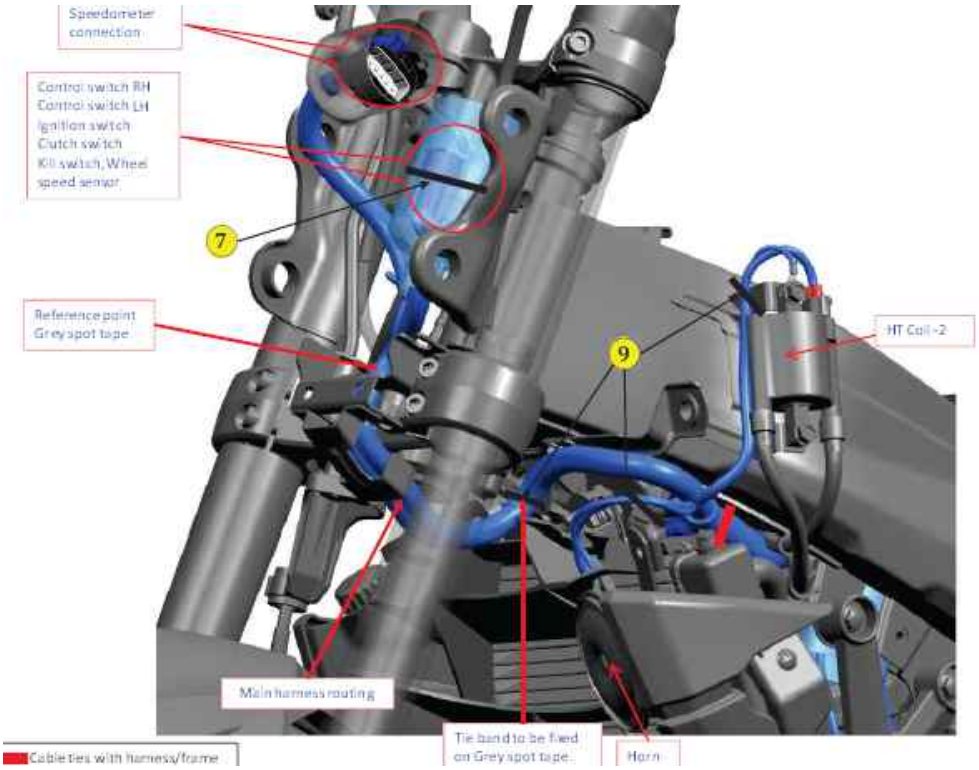

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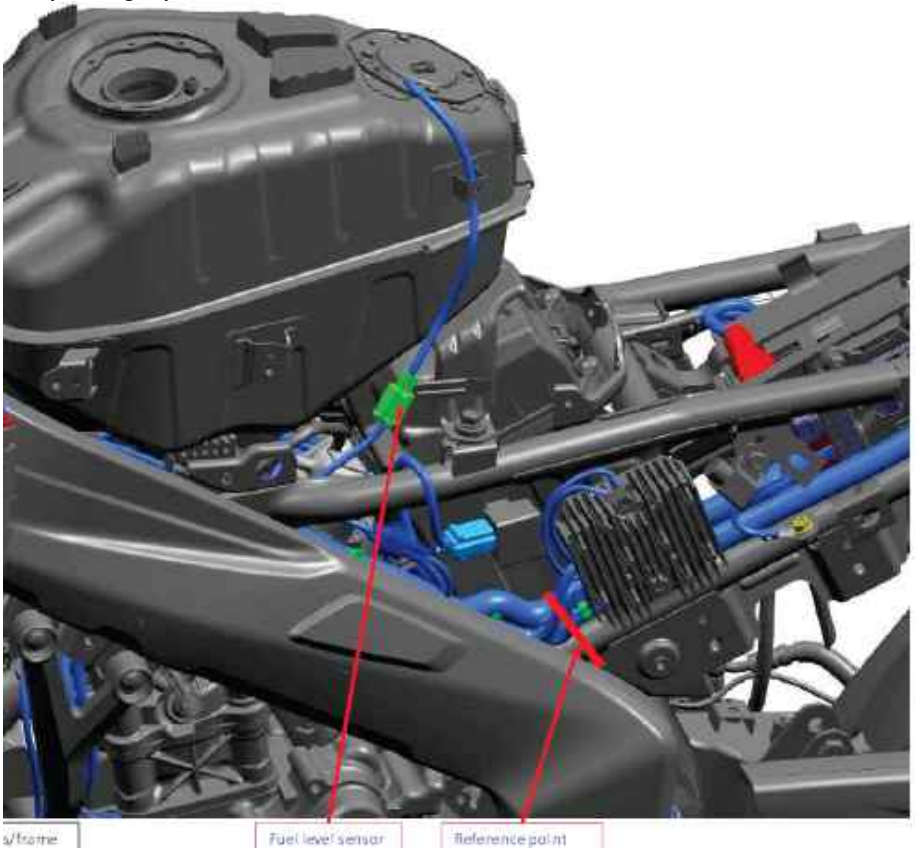

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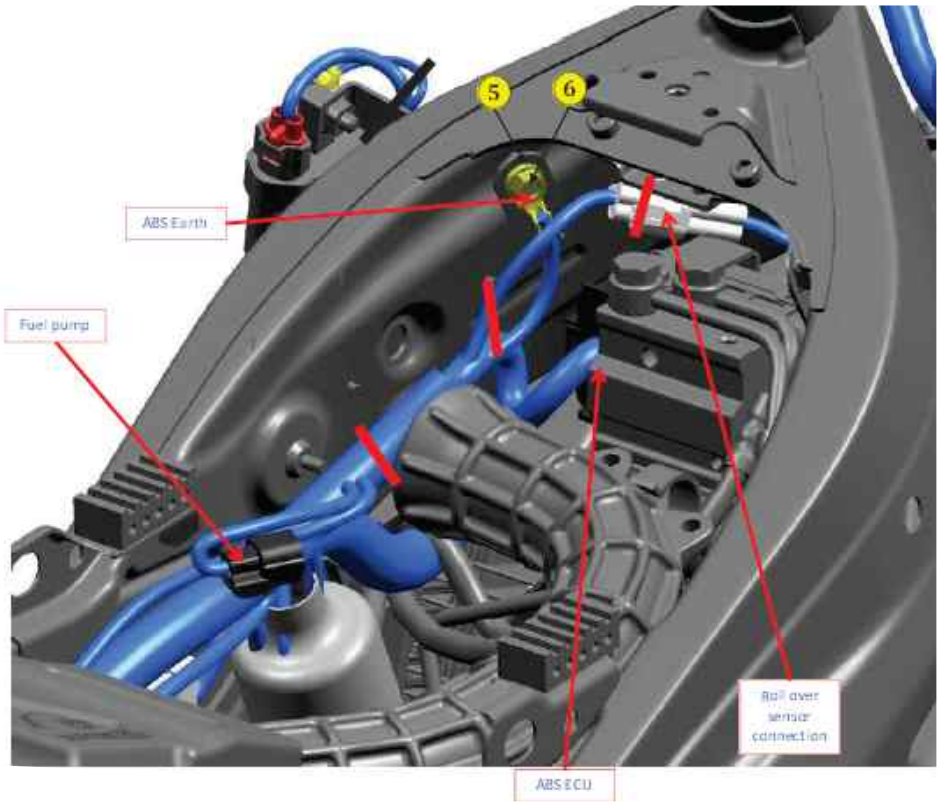

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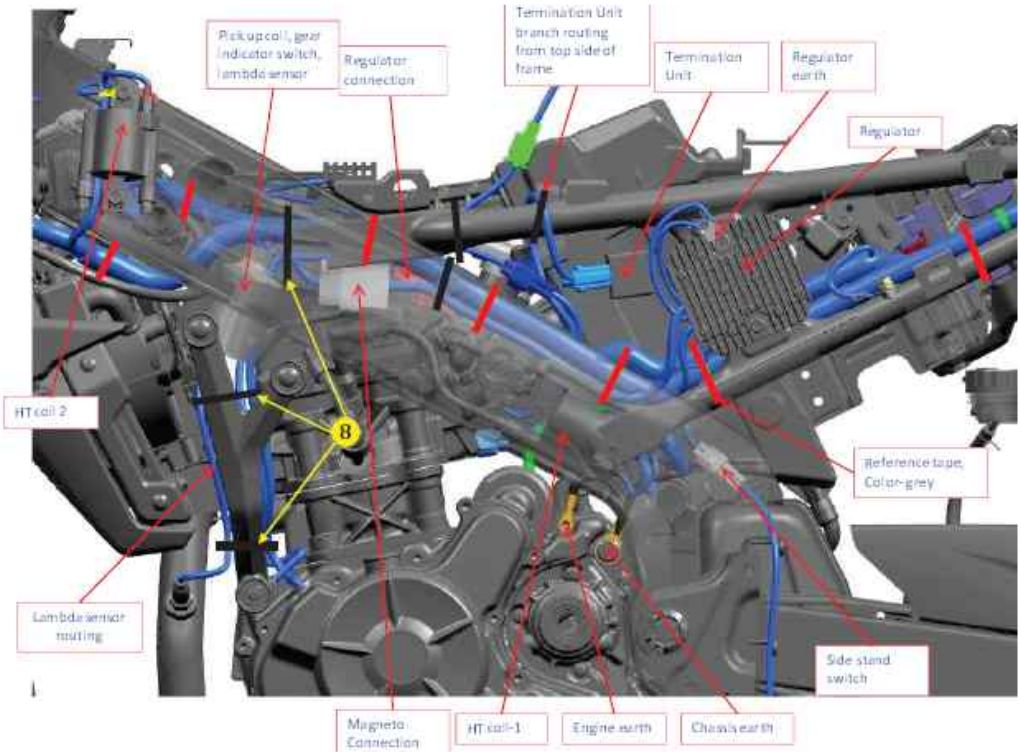

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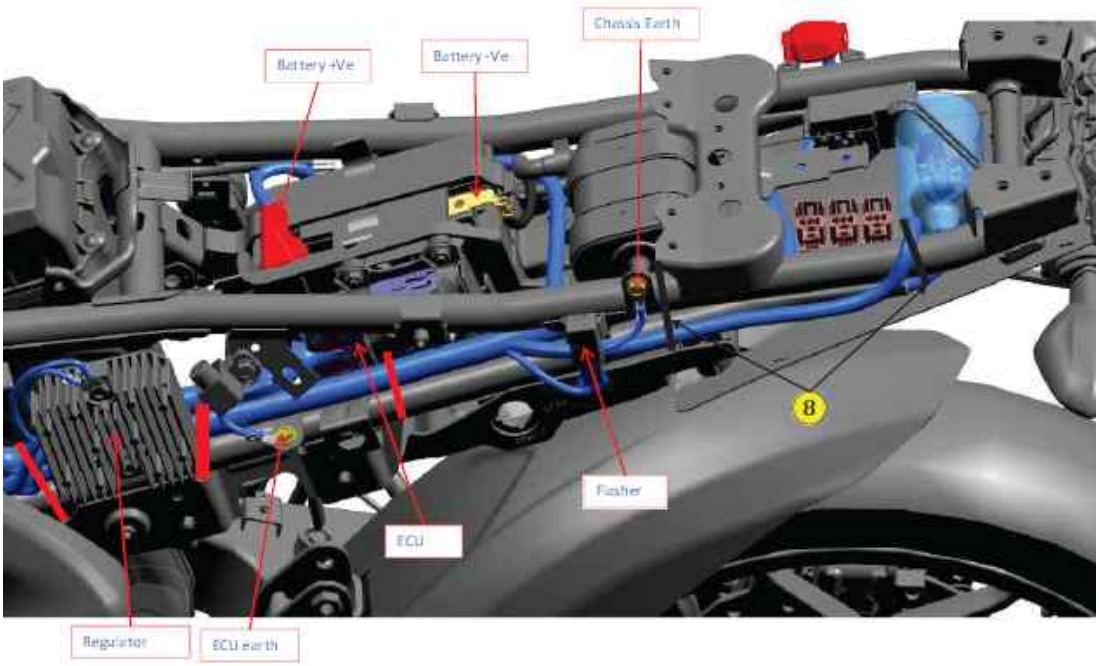

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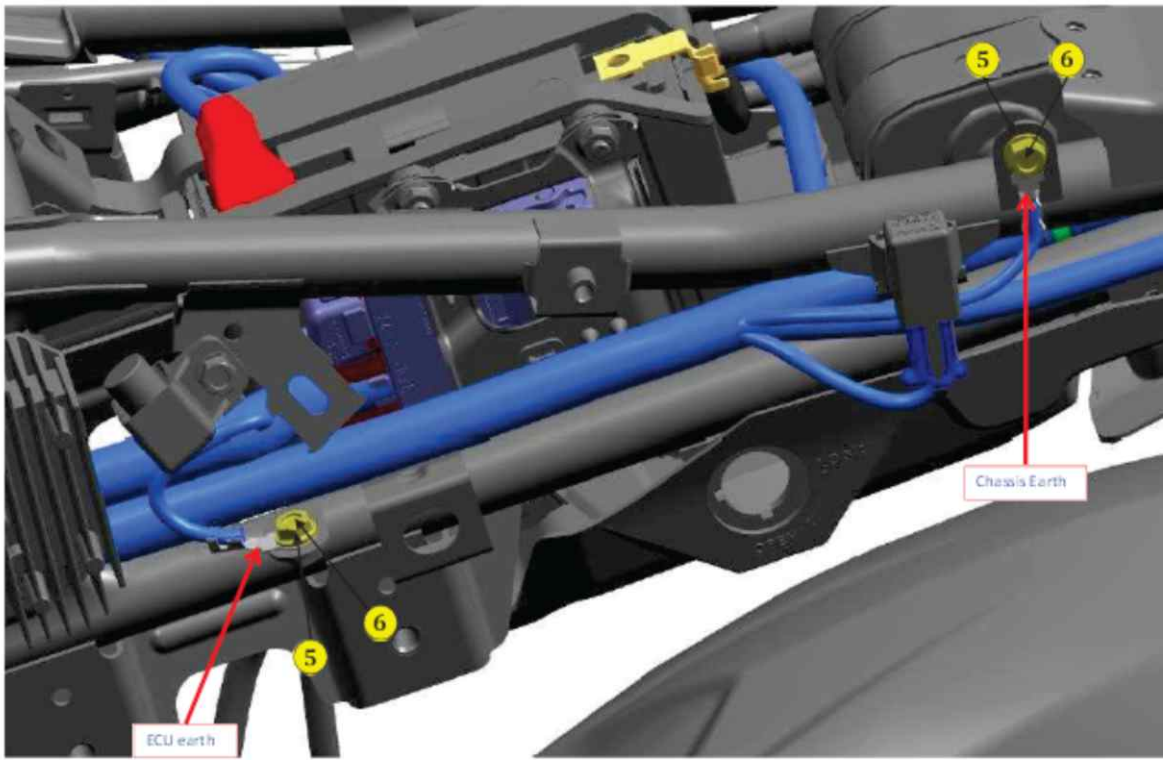

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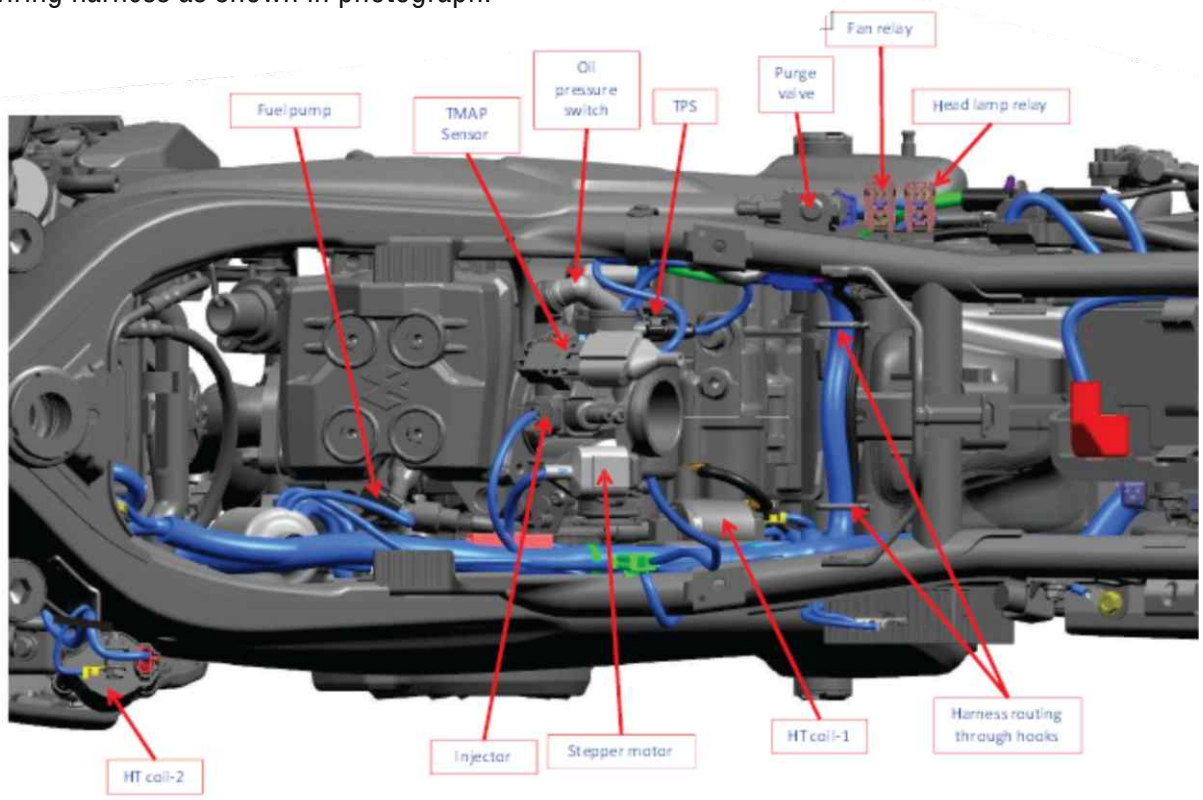

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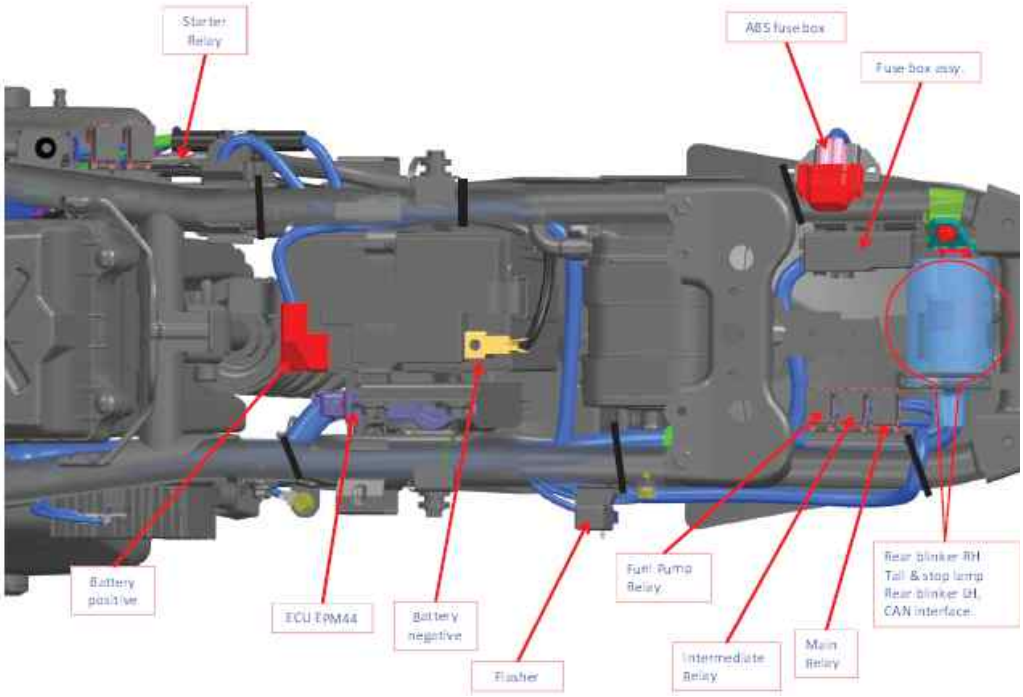

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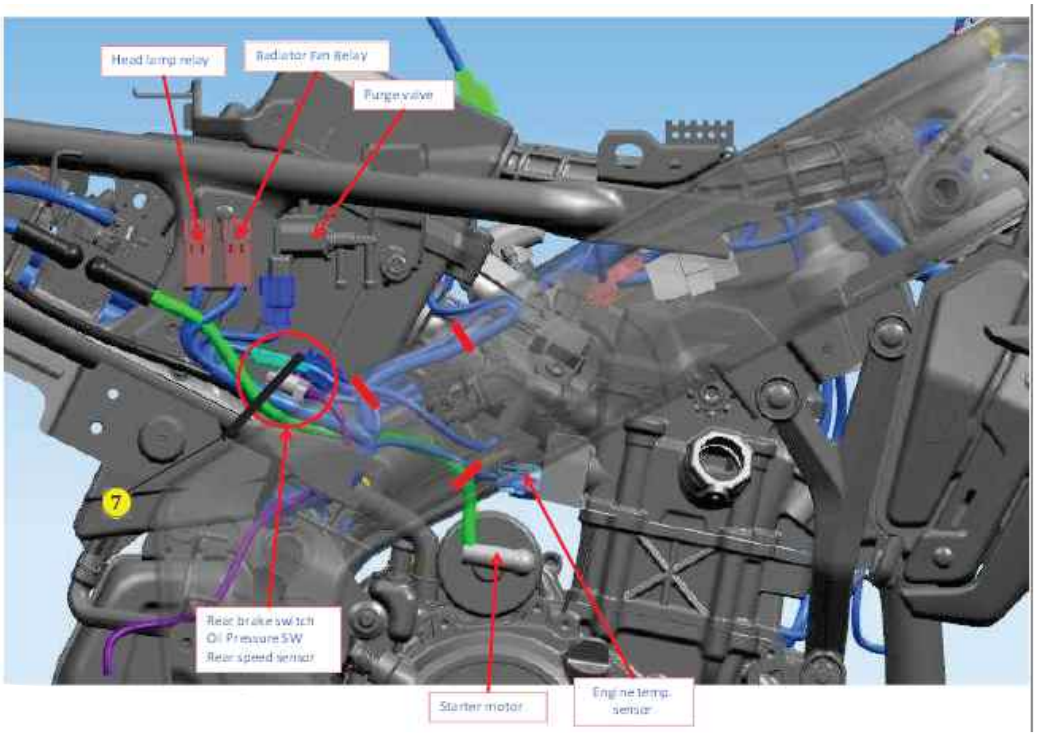

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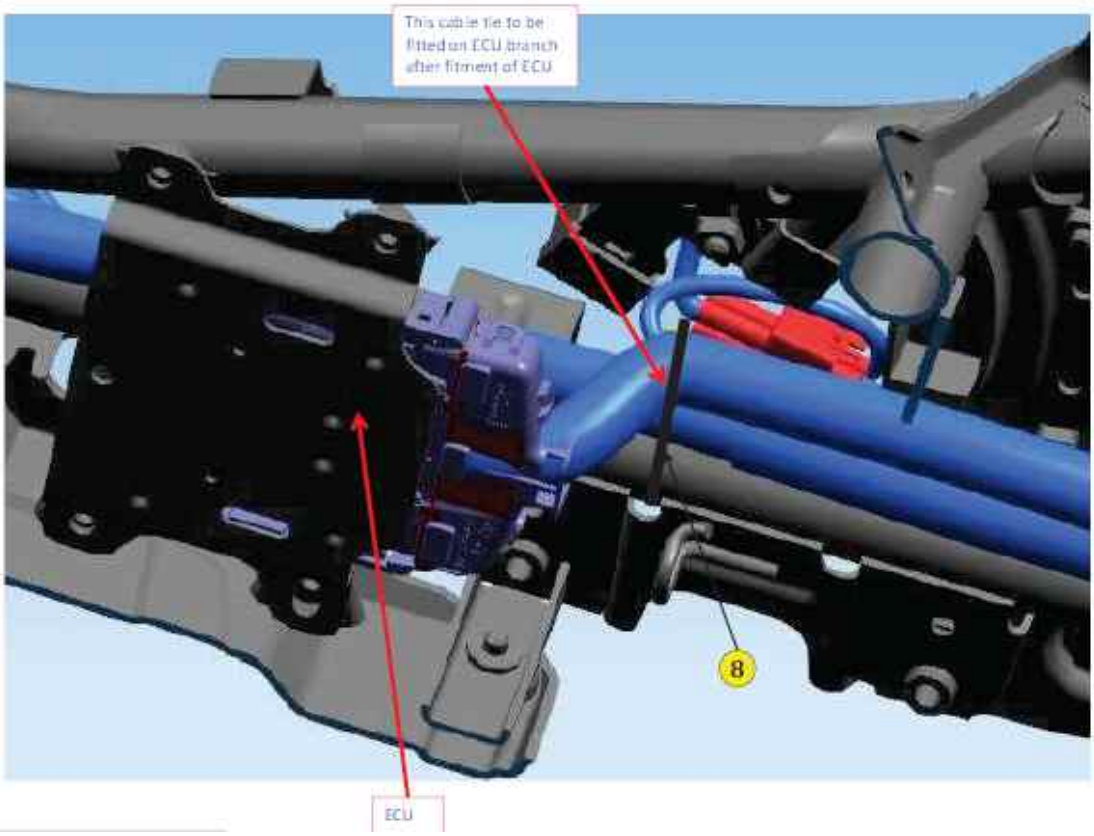

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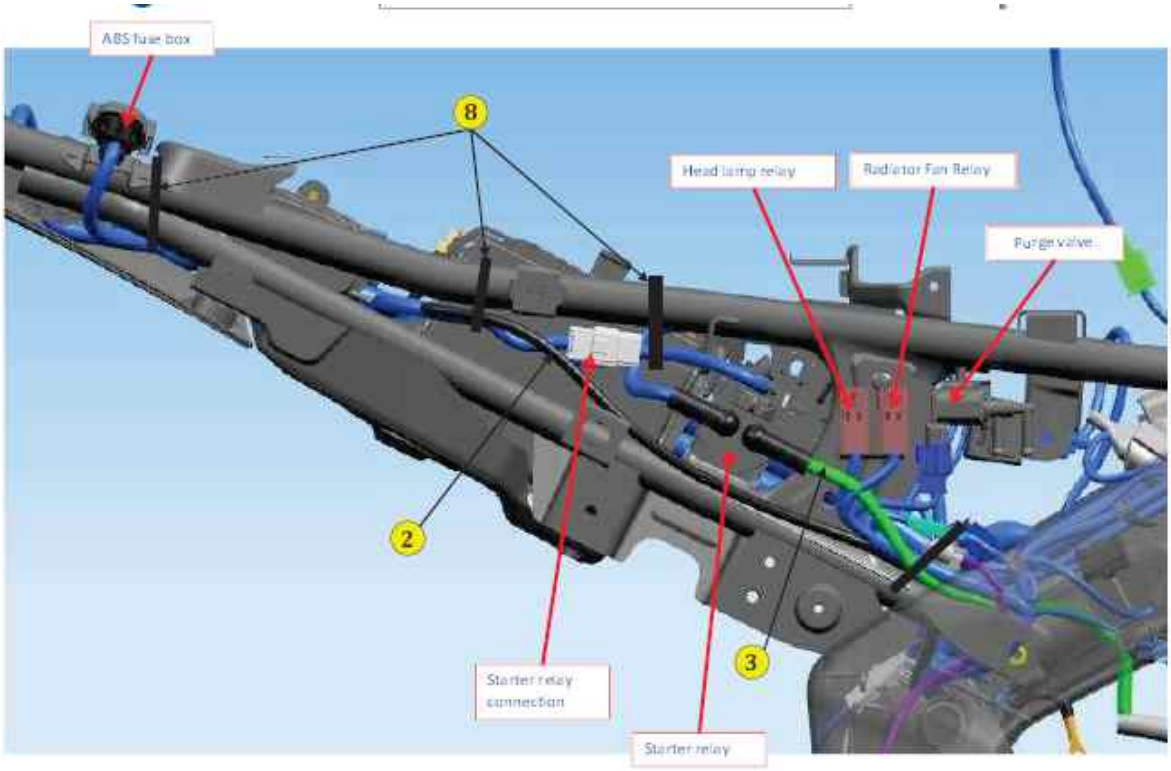
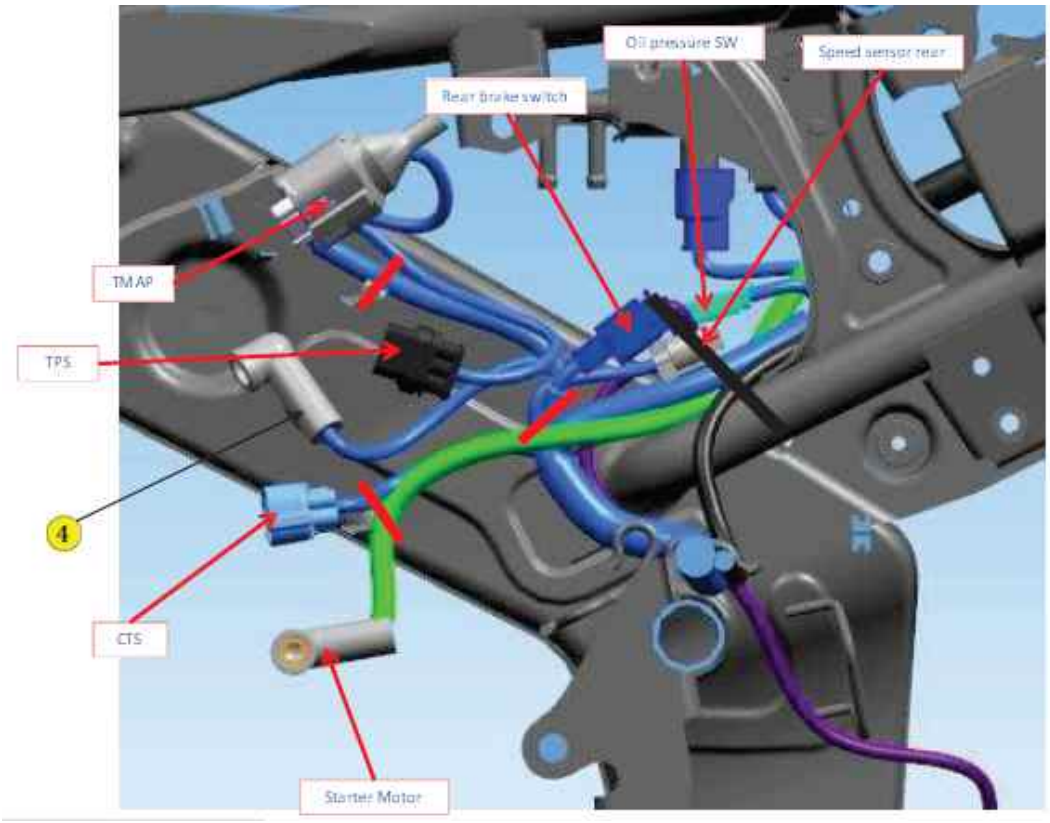


BOSCH Make Wiring Harness Routine

- Route the wiring harness as shown in photograph.



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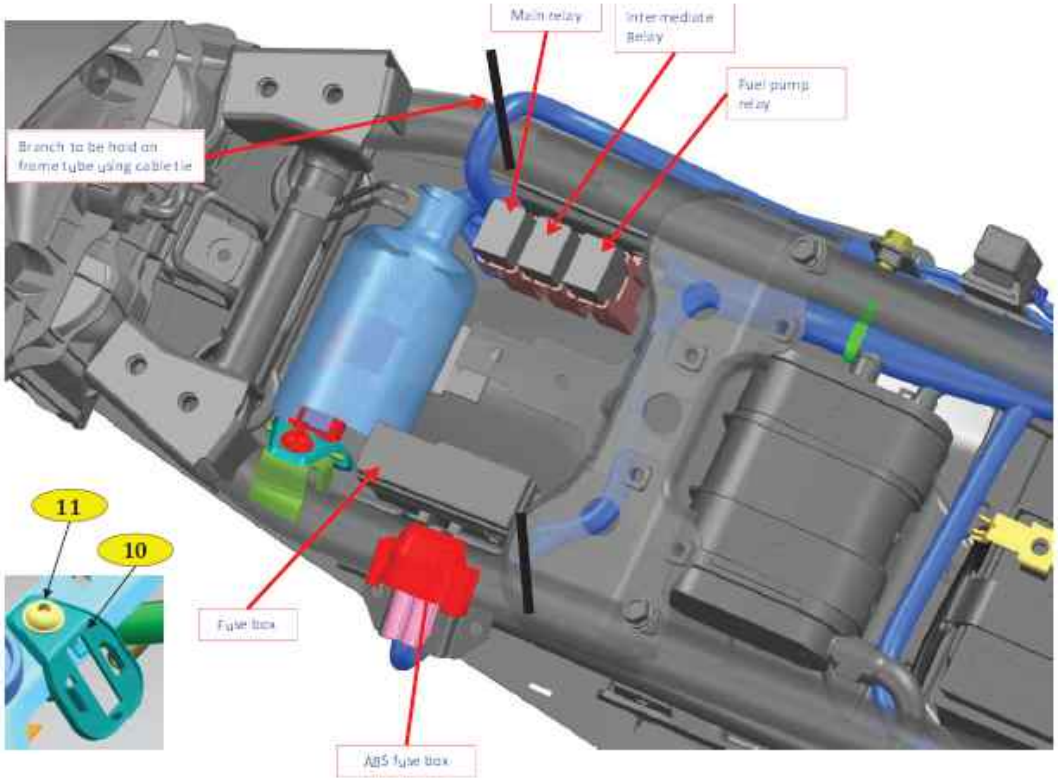

VARROC Make Wiring Harness Routine

SR. NO.	PART NO.	PART DESCRIPTION	QTY
1	JL402288	HARNESS WIRING	1
2	DT402223	CABLE EARTH	1
3	PA402207	CABLE RELAY-MOTOR	1
4	JL402219	PIGTAIL OIL PRESSURE SWITCH	1
5	LDF00001	WASHER TOOTHED-ID 6.4XOD11XT 0.7	3
6	KADF0610	BOLT FLANGED M6X1	3
7	JD402216	BAND 300MM	2
8	JD402212	BAND (LENGTH 200MM)	13
9	JD402217	BAND (L150)	2
10	GL402239	CLIP	1
11	JY113901	HOLDER COUPLER	1
12	Jy113821	SCREW BUTTON HEAD-M6X1XL12XBLACK	1

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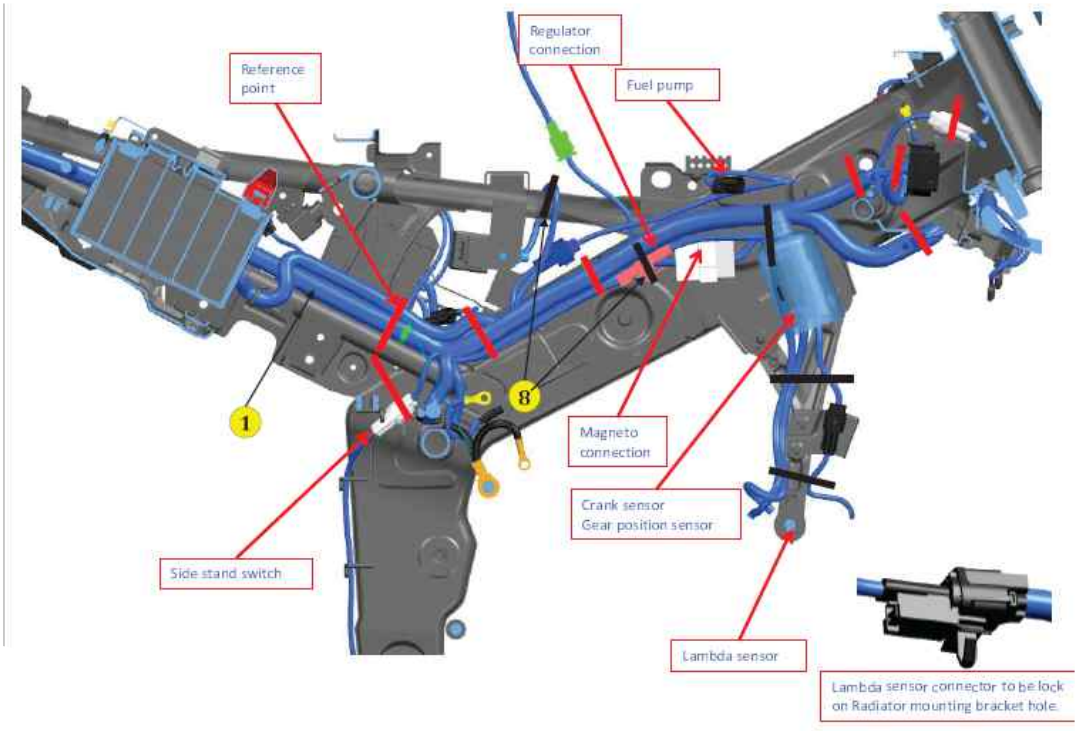

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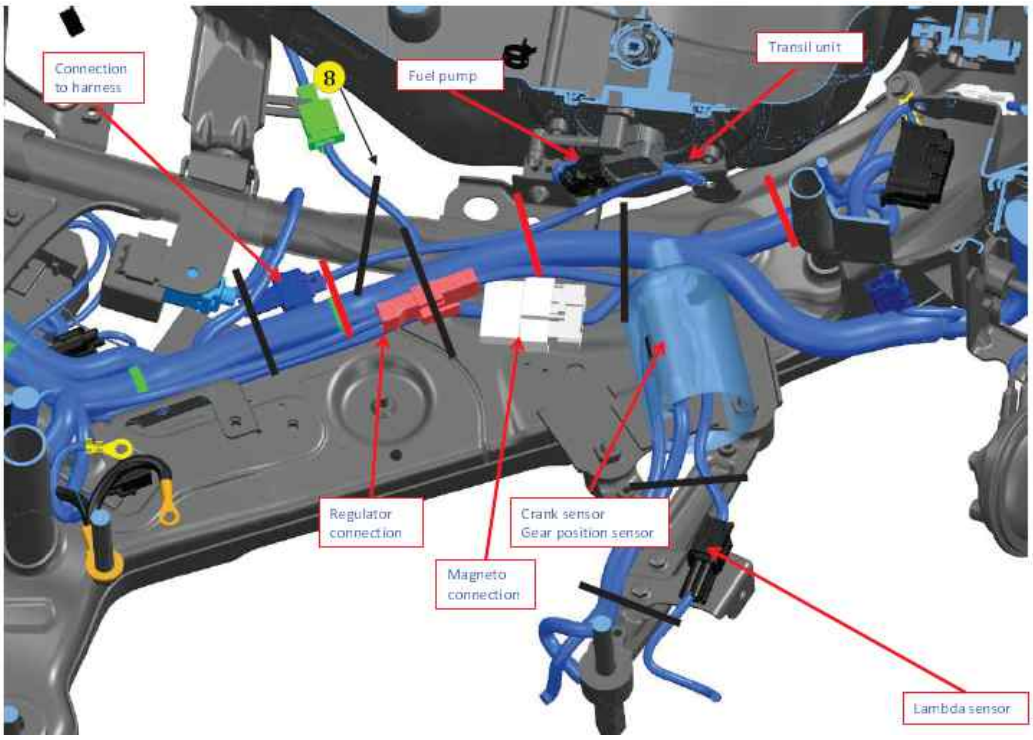

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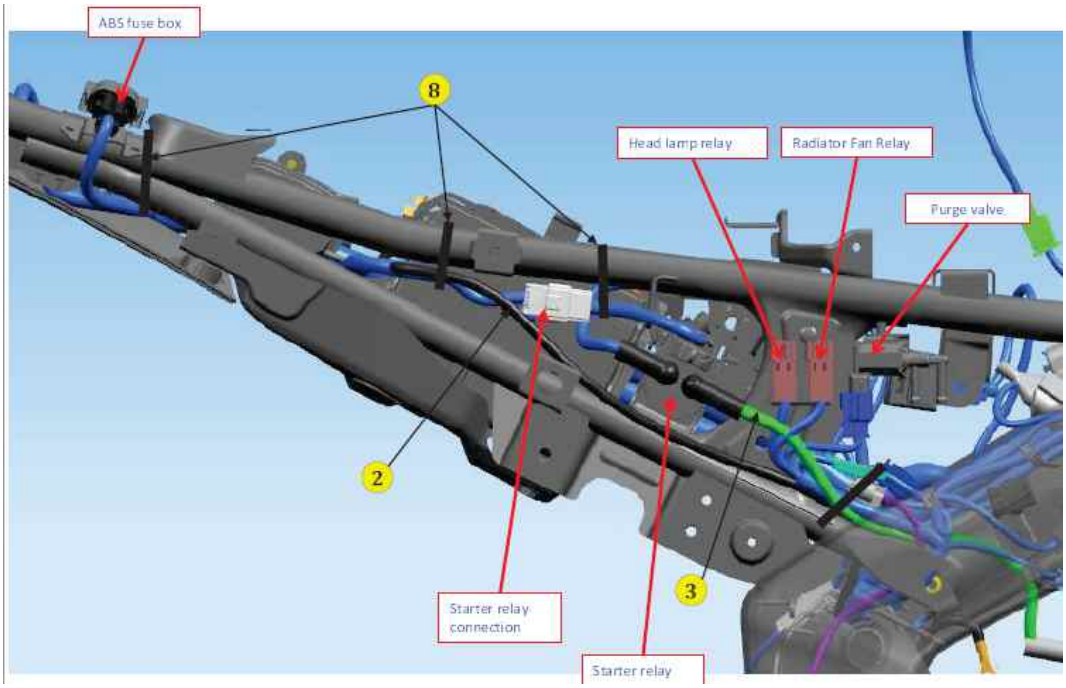

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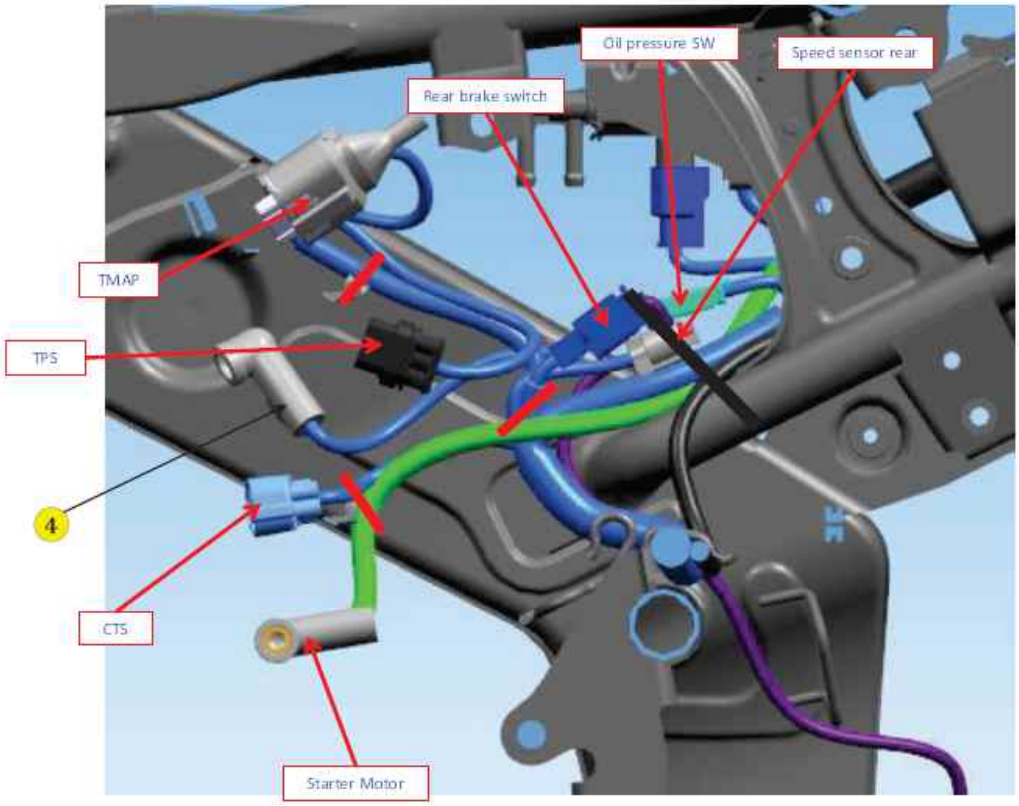

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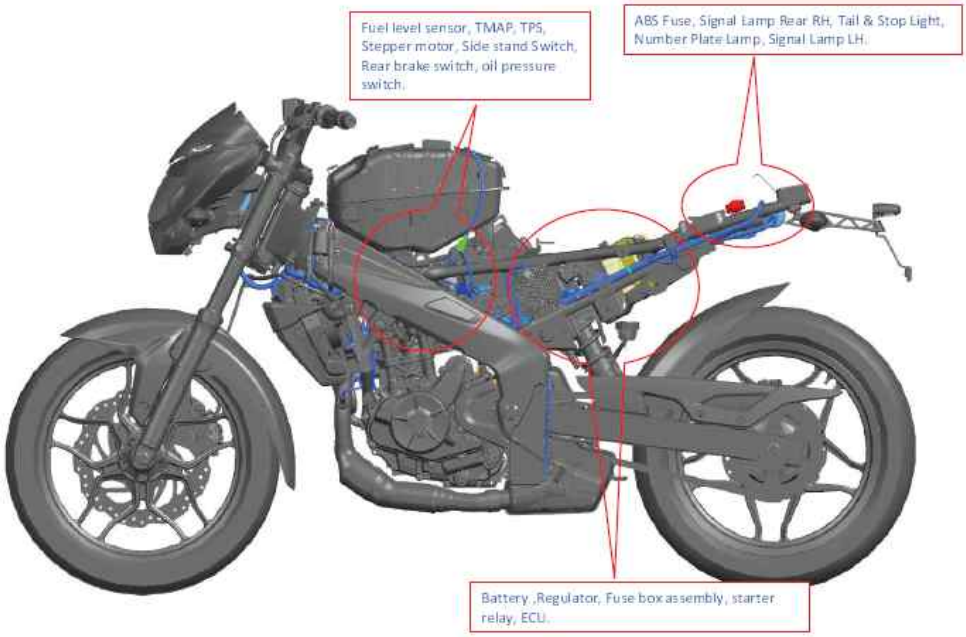

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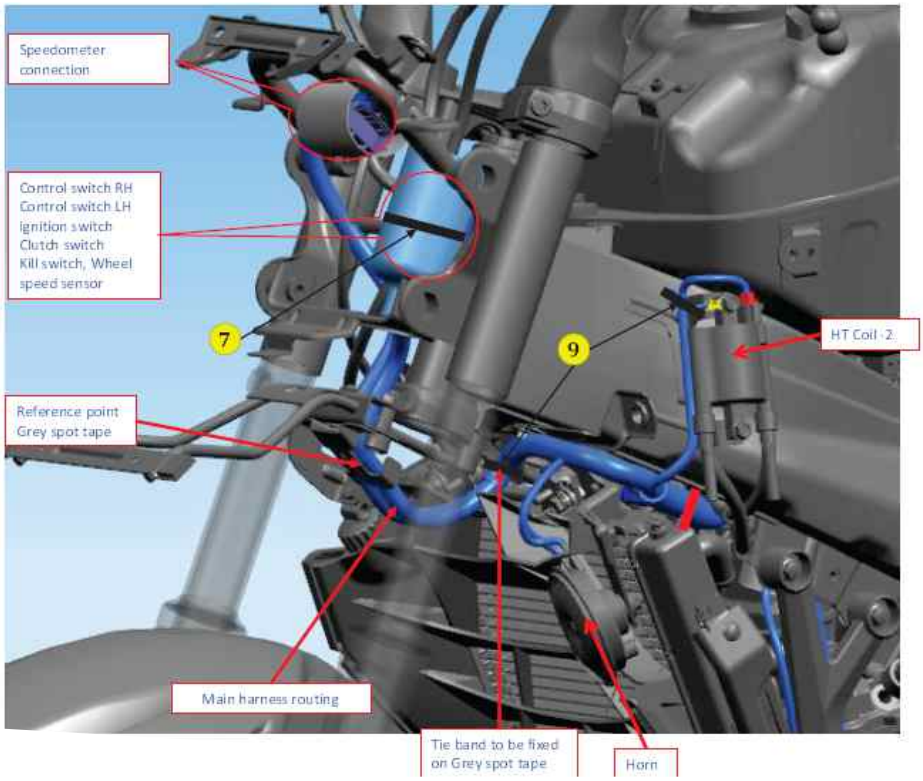
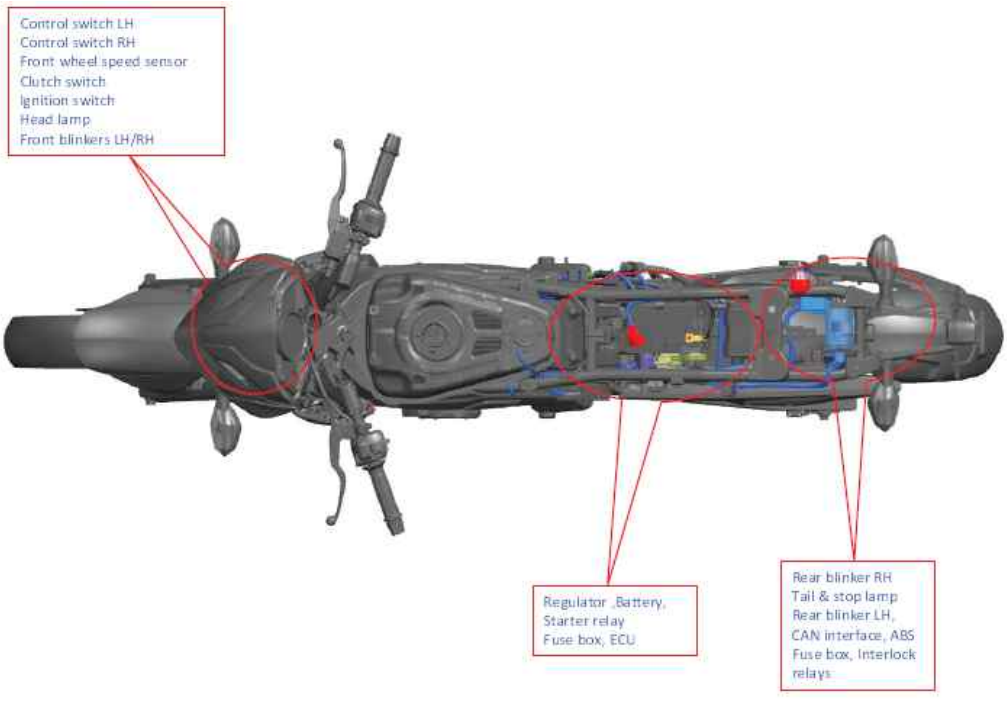
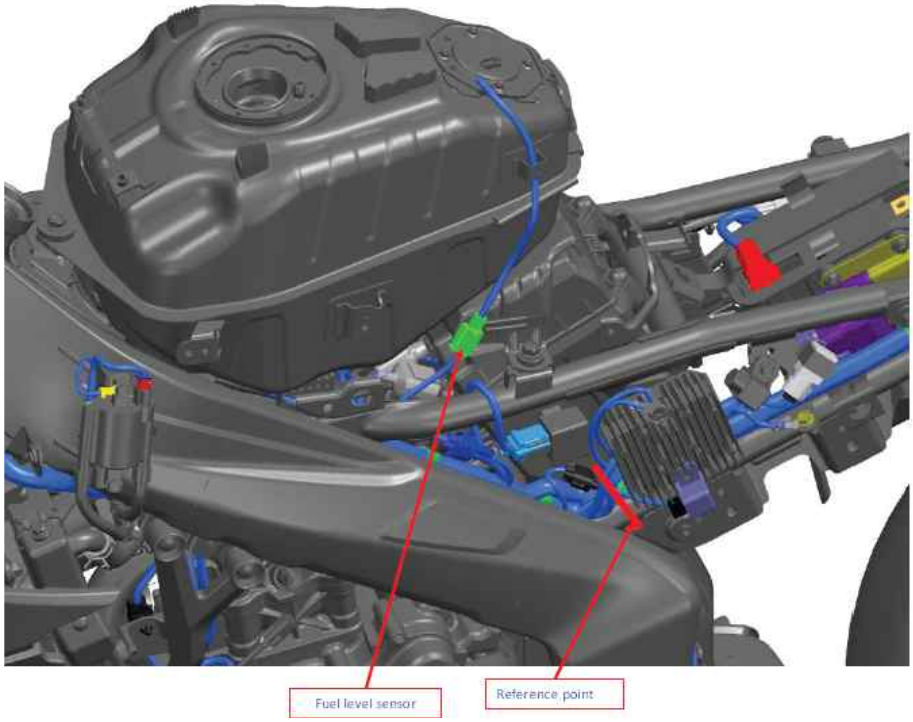


• Route the wiring harness as shown in photograph.



VARROC Make Wiring Harness Routine

• Route the wiring harness as shown in photograph.



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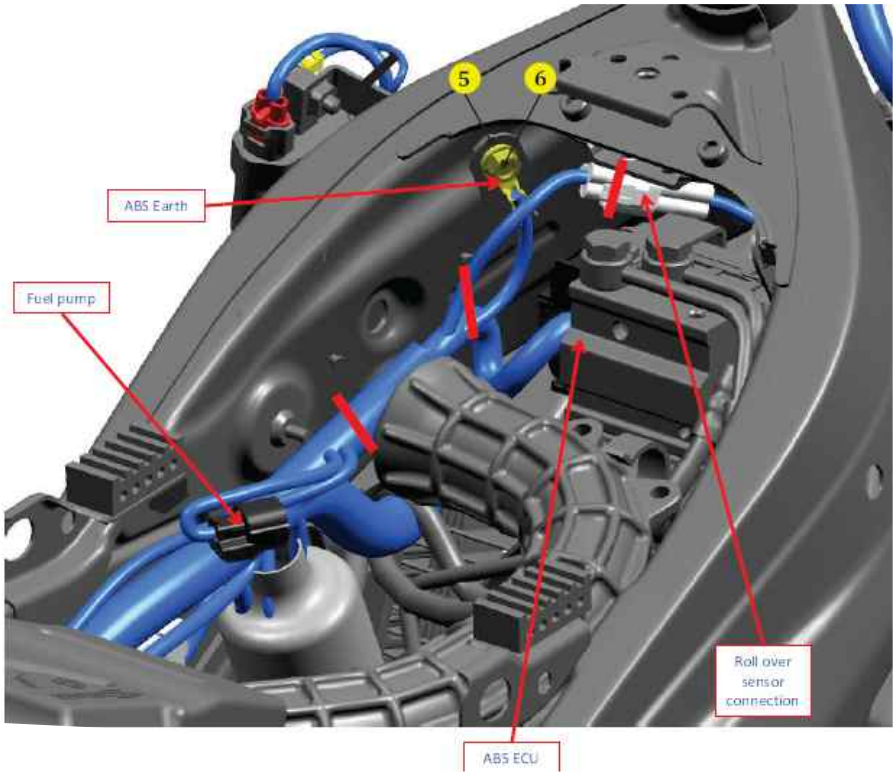

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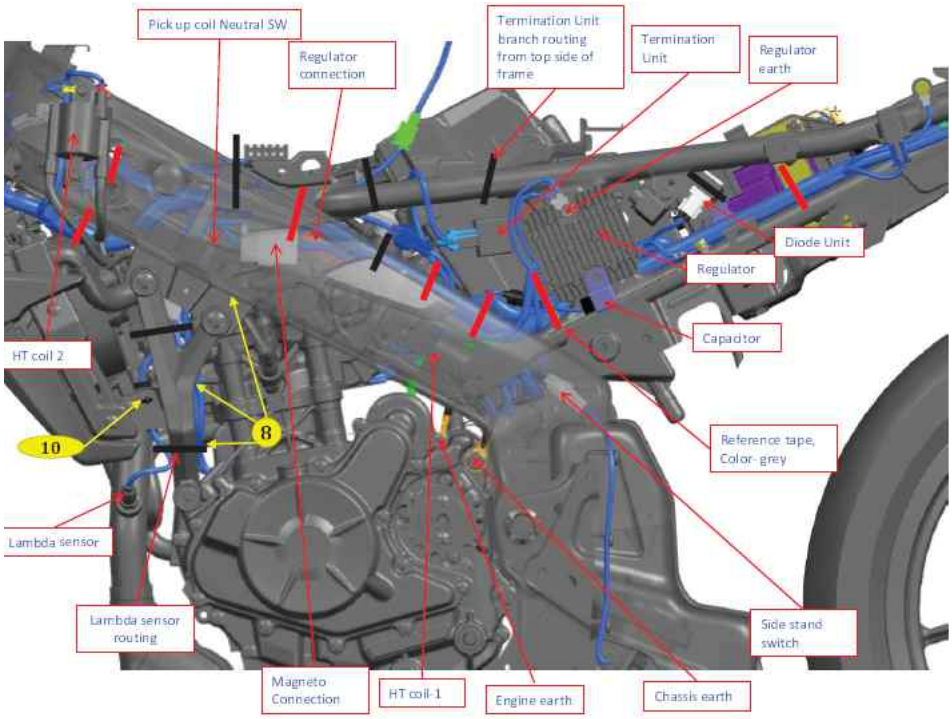

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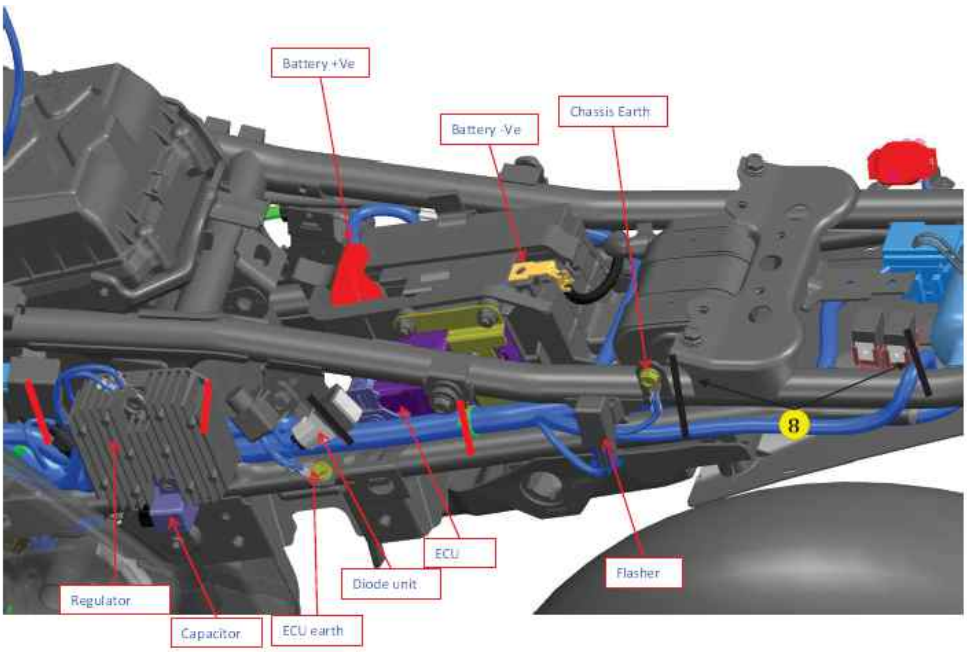

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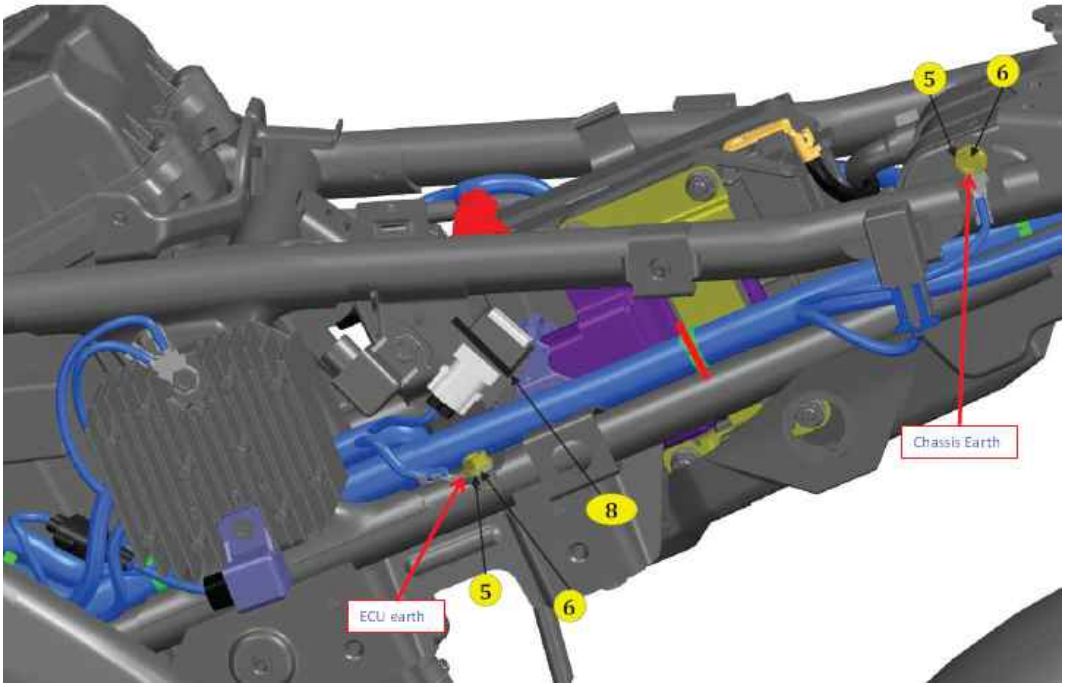

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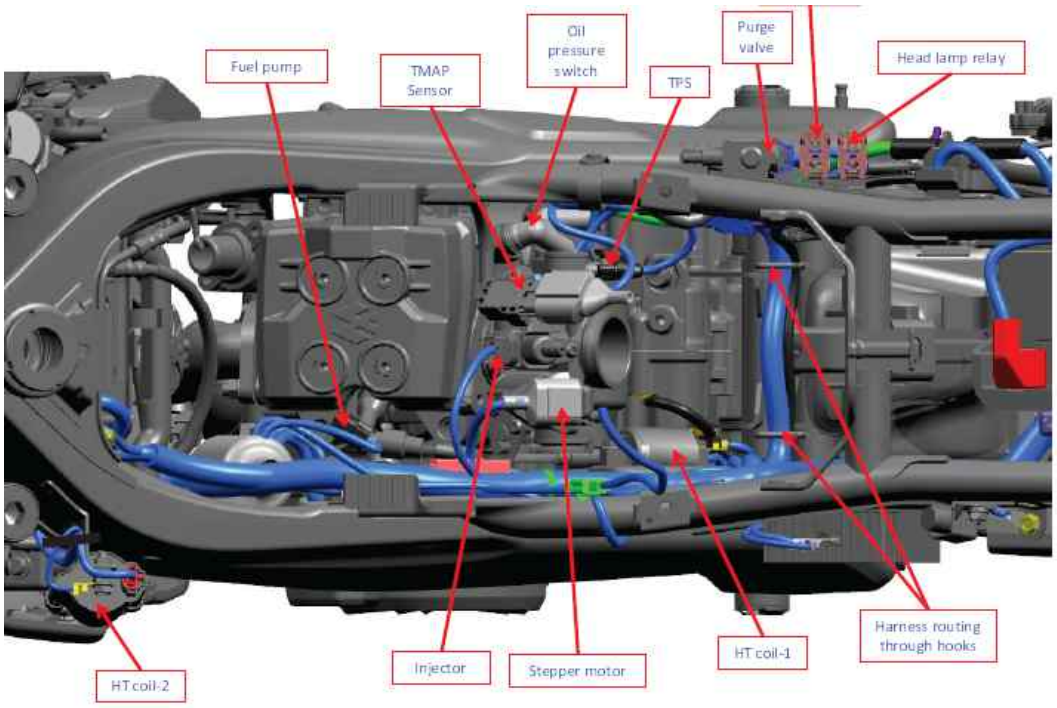

VARROC Make Wiring Harness Routine

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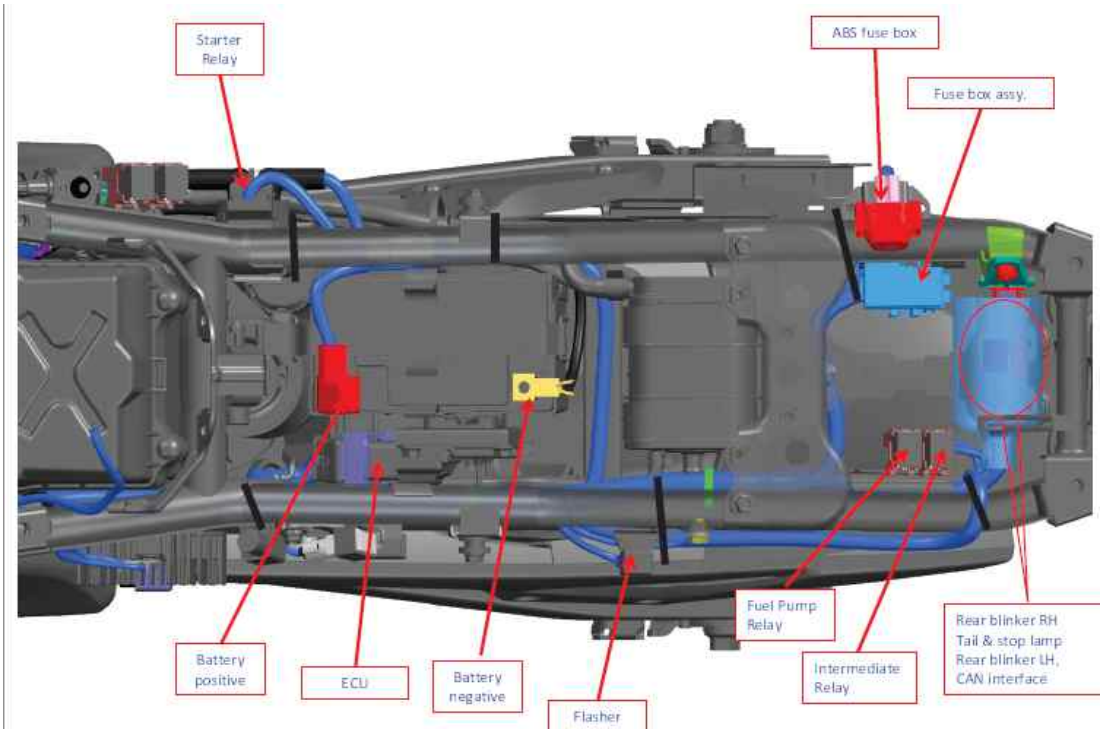

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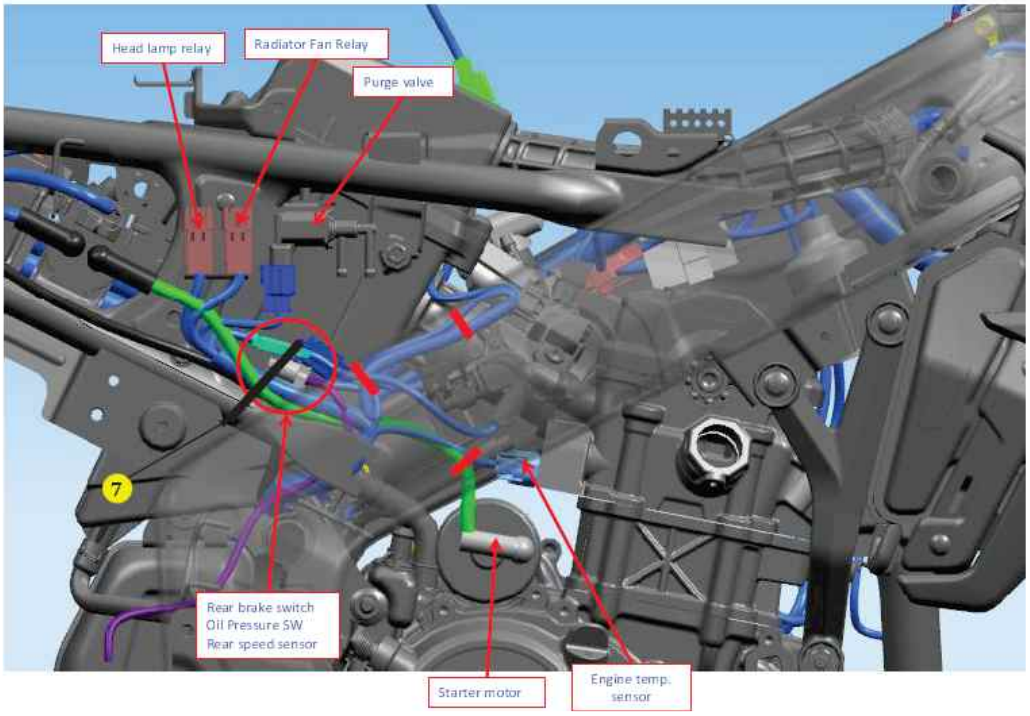
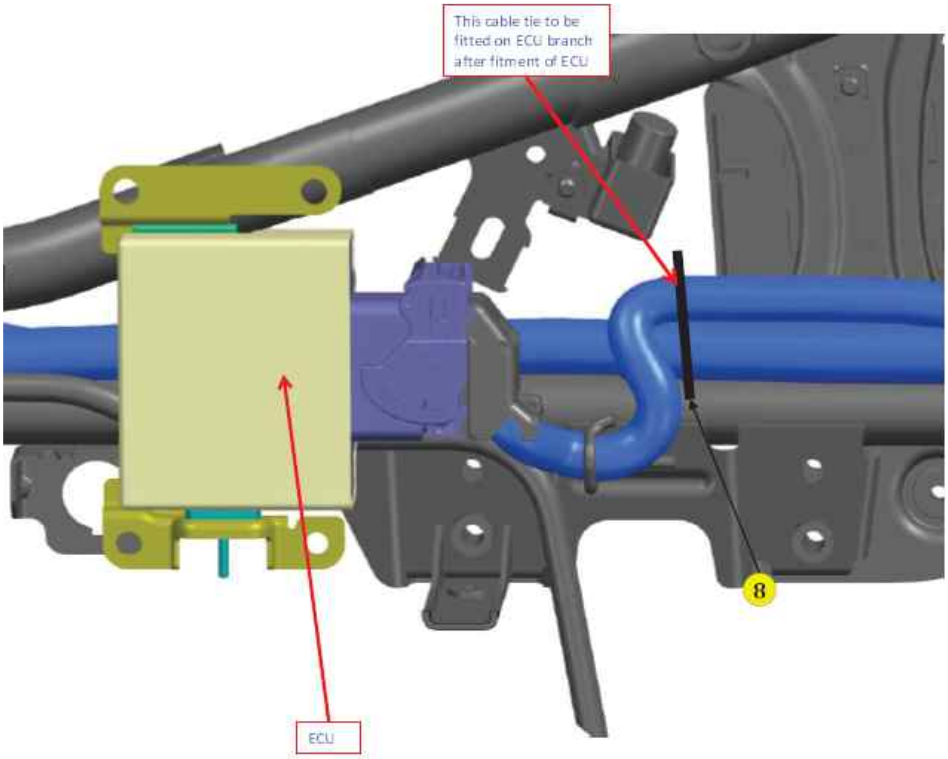


VARROC Make Wiring Harness Routine

- Route the wiring harness as shown in photograph.



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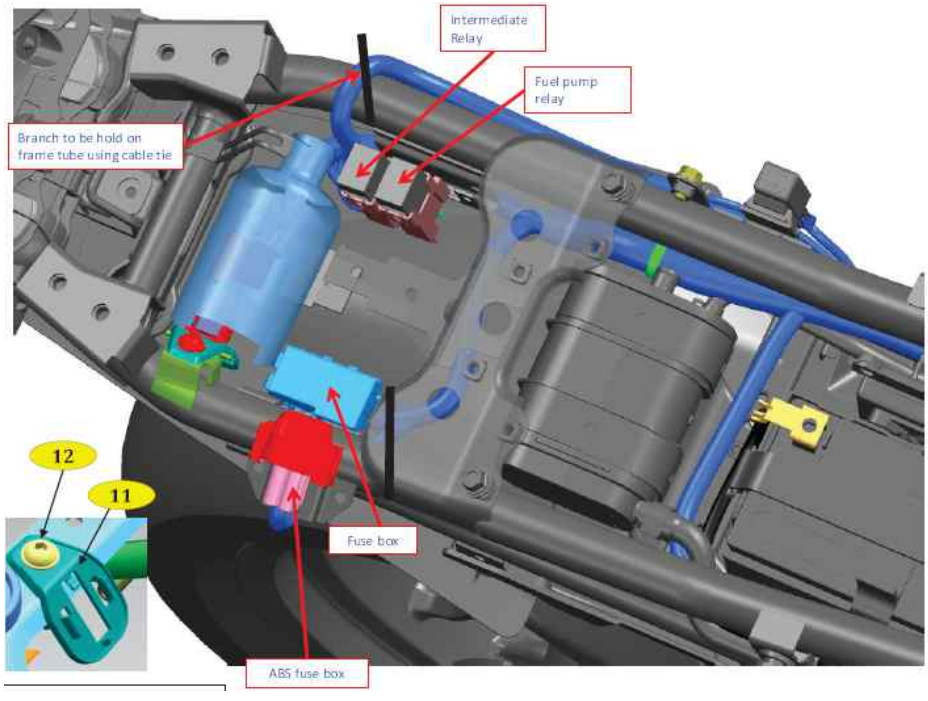
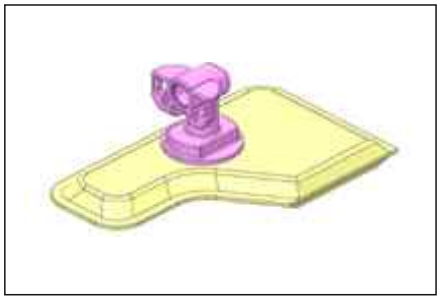


SOP for Replacement of Filter in Asian Fuel Pump

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

Aisan Fuel Pump



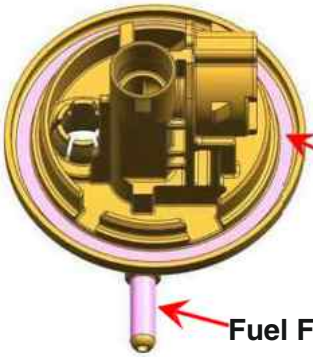
Fuel Suction Filter

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

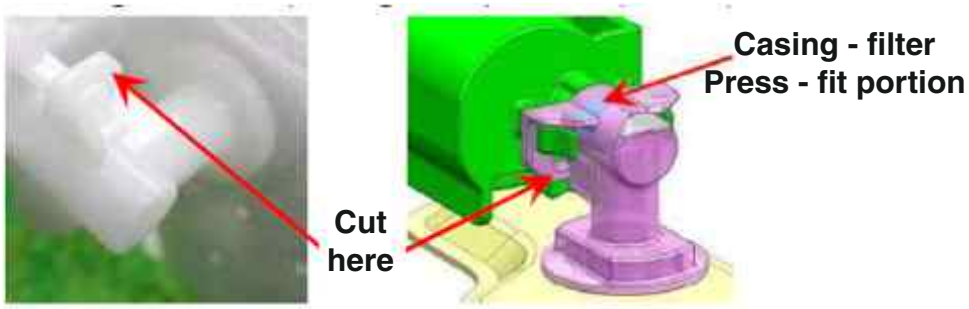
Filter removal from casing :

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)

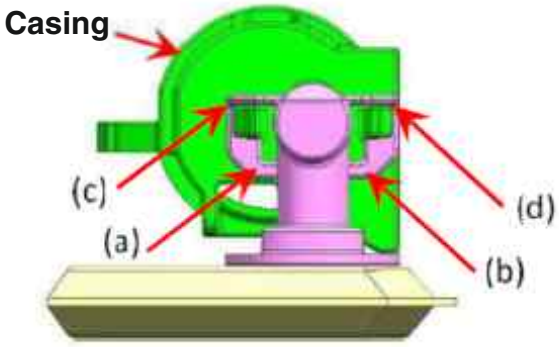
B. Precaution

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).

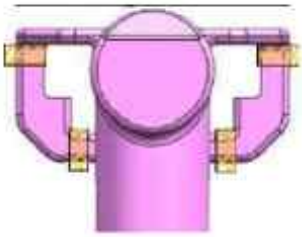


Cutting Image

Cutting Location Details



Cutting Position



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

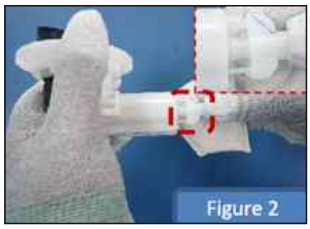
SOP for Replacement of Filter in Asian Fuel Pump

New Filter assembly :

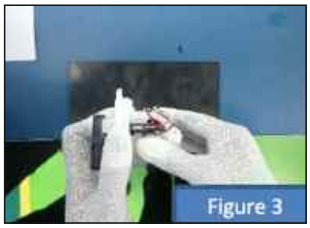
A. Procedure
1. Remove the dust cap from the Filter as shown in Figure 1.
2. Align the new Filter & Casing as shown in Figure 2.
3. Place the Fuel Filter on a flat surface (metal plate) from Filter side as shown in Figure 3.
4. Press it until the gap between Casing & Filter is zero and make sure that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

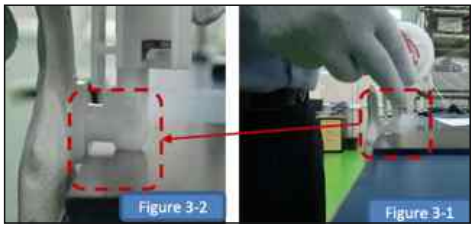
Remove the Dust cap from the filter



Align the Casing & Filter as shown in Fig.

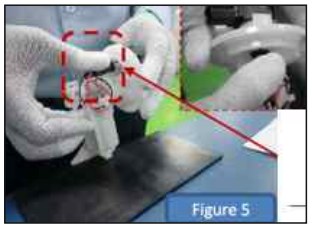


Place the align part on metal plate from filter side



Place the align part on metal plate from filter side

Check the gap between the Casing & Filter material



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.

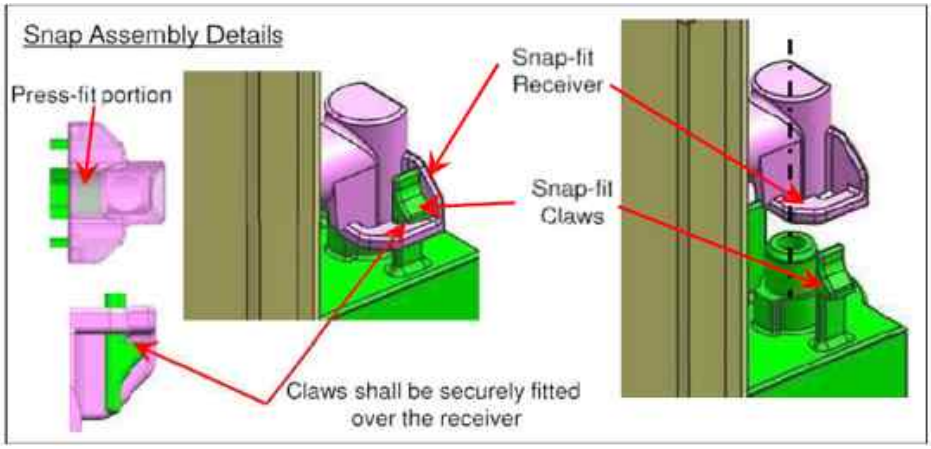


Figure 1

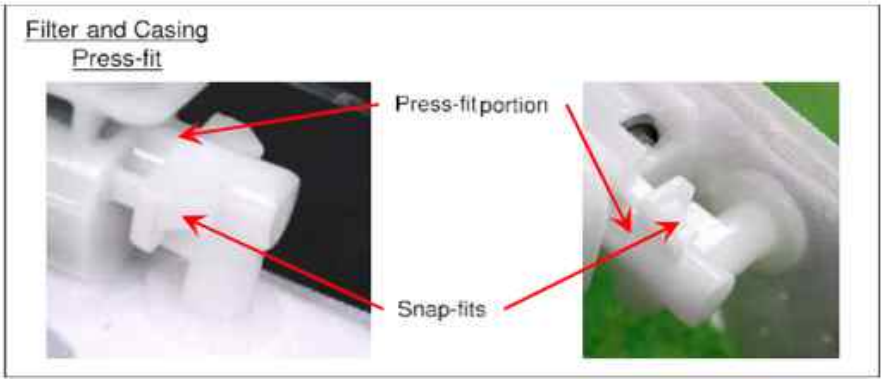
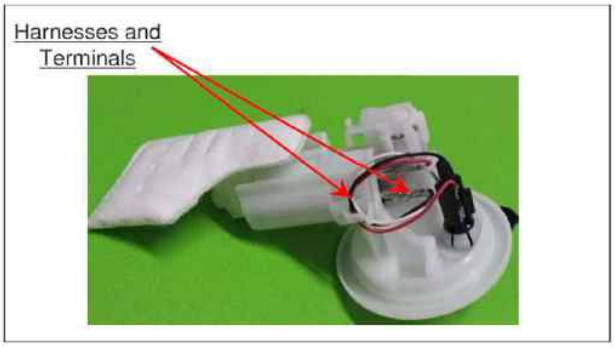


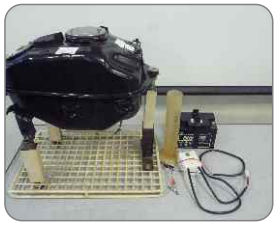
Figure 2



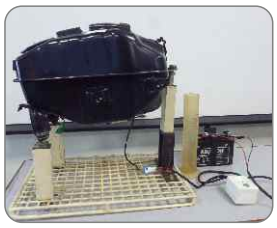
SOP's

Fuel Pump Delivery Inspection

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

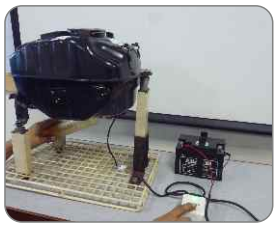


- Instruments required :
  Pig tail
  (BAL part no. : -------)
  Measuring jar
  Charged battery

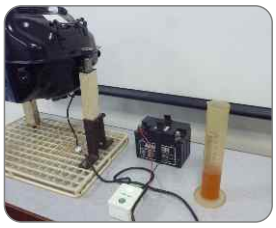


Keep petrol tank on plain surface.

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



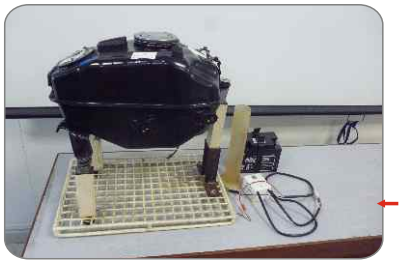
Quantity	Unit
110	mililiters

Fuel Pump Pressure Inspection

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

- Instruments required :
  Fuel pressure gauge with connector

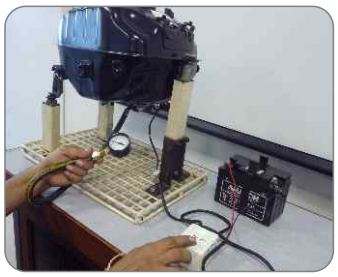
Remove:
Fuel pipe from the pump



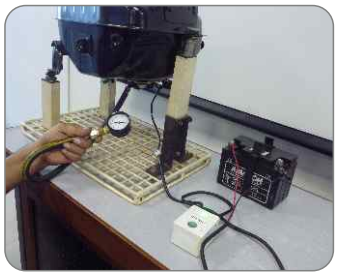
Connect the fuel pressure guage connector to fuel pump outlet

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	Kg/cm^2 =2.5 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.

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.

List of Diagnostic Trouble Codes

No.	P-Code	DTC meaning	DTC cause	Symptoms	To Check
1	P0123	Throttle/Pedal Position Sensor/Switch "A" Circuit High	Short circuit to battery voltage , short to sensor supply +5V	- Idle control is affected. - No overrun fuel cut -off happens. - Drivability is affected. - Load on engine (In tool, group1, entry5 is engine load which is equivalent to volumetric efficiency) is calculated based on Manifold Air Pressure sensor.	Throttle Position Sensor connections, wiring harness. Replace Throttle Position Sensor or Throttle body and check.
2	P0122	Throttle/Pedal Position Sensor/Switch "A" Circuit Low	Short circuit to Ground; open Circuit	- Idle control is affected. - No overrun fuel cut -off happens. - Drivability is affected. - Load on engine (In tool, group1, entry5 is engine load which is equivalent to volumetric efficiency) is calculated based on Manifold Air Pressure sensor.	Throttle Position Sensor connections, wiring harness. Replace Throttle Position Sensor or Throttle body and check.
3	P0507	Idle Air Control System RPM Higher Than Expected	Intake manifold leakage	Limited engine speed	Check for intake manifold leakage.
4	P0506	Idle Air Control System RPM Lower Than Expected	Torque loss of engine is too high		Check for any damage to engine (Damage inside engine - valve, piston, crank shaft etc).
5	P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High	Short Circuit to battery voltage ; Short Circuit to sensor supply; Open Circuit	Deactivation of manifold pressure diagnosis - Cold Start and after start is affected. - Altitude adaptation doesn't happen. - Secondary Load sensor i.e. Throttle Position Sensor is used for sensing load. - Drivability is affected. - Vehicle running in group injection mode (In ok case 1 injection happens in one cycle, but in case of this error 2 injections happen in one cycle and that is called group injection).	Temperature Manifold Air Pressure connections, wiring harness. Replace Temperature Manifold Air Pressure or Throttle body and check.
6	P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low	Short Circuit to Ground		
7	P0629	Fuel Pump "A" Control Circuit High	Short Circuit to battery voltage	Deactivation of power stage (power will not be given to fuel pump). Fuel Pump will not function.	Check fuel pump connections, wiring harness. Replace fuel pump and check.
8	P0628	Fuel Pump "A" Control Circuit Low	Short Circuit to Ground		
9	P0627	Fuel Pump "A" Control Circuit/Open	Open Circuit		

List of Diagnostic Trouble Codes

10	P0336 OR P0335	Crankshaft Position Sensor "A" Circuit	Loose connection, electrical disturbance, defective tooth wheel of Rotor (broken/damaged teeth)	-Resynchronization of crank wheel happens -Engine may not start/it stops -Engine may run irregular	Check for loose connections in pick up coil connection. Replace pick up coil and check.
11	P0339	Crankshaft Position Sensor "A" Circuit Intermittent	Loose connection, electrical disturbance, defective tooth wheel of Rotor (broken/damaged teeth)	-Resynchronization of crank wheel happens -Engine may not start/it stops -Engine may run irregular	Check for loose connections in pick up coil connection. Replace pick up coil and check.
12	P0262	Cylinder 1 Injector Circuit High	Short Circuit to battery voltage	- Engine doesn't start/stalls. - With intermittent error engine running irregular	Check for Injector connections. Replace injector and check
13	P0261	Cylinder 1 Injector Circuit Low	Short Circuit to Ground		
14	P0201	Injector Circuit/Open – Cylinder 1	Open Circuit		
15	P0032	HO2S Heater Control Circuit High Bank 1 Sensor 1	Short Circuit to battery voltage	- Lambda control activation is delayed. - Lambda sensor signal diagnosis is switched off. - Drivability may get affected. - Exhaust emissions are affected.	Check for lambda sensor connections, replace lambda sensor and check.
16	P0031	HO2S Heater Control Circuit Low Bank 1 Sensor 1	Short Circuit to Ground		
17	P0030	HO2S Heater Control Circuit Bank 1 Sensor 1	Open Circuit		
18	P0692	Radiator Fan Control Circuit High	Short Circuit to battery voltage	- Fan is not running. - Engine will heat up and seize and may cause damage to components.	Check for fan connections. Replace fan and check.
19	P0691	Radiator Fan Control Circuit Low	Short Circuit to Ground		
20	P0480	Radiator Fan Relay Control Circuit fault	Open Circuit		
21	P0132	O2 Sensor Circuit High Voltage Bank 1 Sensor 1	Short Circuit to battery voltage	- Lambda control is deactivated. - Drivability could be affected. - Exhaust emissions are affected.	Check for lambda sensor connections, replace lambda sensor and check.
22	P0131	O2 Sensor Circuit Low Voltage Bank 1 Sensor 1	Short Circuit to Ground		
23	P0130	O2 Sensor Circuit Bank 1 Sensor 1	Heater encoupling to sensor signal (In lambda (O2) sensor cable there are 4 wires. 2 for sensor and 2 for heater. If heater cable gets shorted to sensor cable, then this error pops up).		
24	P0134	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 1	Open Circuit signal or open Circuit Ground		
25	P1605	Malfunction Indicator Lamp (MIL) Control Circuit	Short Circuit to battery voltage	-	Check for MIL connections. Replace Speedometer console and check.
26	P1604	Malfunction Indicator Lamp (MIL) Control Circuit	Short Circuit to Ground		
27	P0650	Malfunction Indicator Lamp (MIL) Control Circuit	Open Circuit		

List of Diagnostic Trouble Codes

28	P1504	Side stand sensor Short Circuit to battery	Short Circuit to battery voltage	- No fuel pump safety shut-off, ignition cut-off or injection cut-off can happen in case of vehicle tilted/fall down.	Check for side stand sensor & roll over sensor connections. Replace side stand sensor or roll over sensor and check.
29	P1503	Side stand sensor Short Circuit to Ground	Short Circuit to Ground		
30	P1501	Side stand sensor Circuit signal non-plausible	No valid sensor signal is present		
31	P1502	Side stand sensor Circuit open	Open Circuit		
32	P1508	Side Stand sensor Short Circuit to battery	Short Circuit to battery voltage	Safety fuel cut-off is active when vehicle is not in neutral gear	Check for side stand sensor connections. Replace side stand sensor and check.
33	P1507	Side Stand sensor Short Circuit to Ground	Short Circuit to Ground		
34	P1505	Side Stand sensor Circuit signal non-plausible	No valid sensor signal is present		
35	P1506	Side Stand sensor Circuit open	Open Circuit		
36	P0509	Idle Air Control System Circuit High	Short Circuit to battery voltage	- Engine Start is affected. - Idle is not stable. - Vehicle crawling in low gear is affected.	Check for IACV connections. Replace IACV and check.
37	P0508	Idle Air Control System Circuit Low	Short Circuit to Ground		
38	P0511	Idle Air Control Circuit	Open Circuit		
39	P0689	ECM/PCM Power Relay Sense Circuit Low	Main relay is "sticky" and does not open properly	- ECU life may reduce.	Check main relay connection. Replace main relay and check.
40	P0112	Intake Air Temperature Sensor 1 Circuit Low	Short Circuit to Ground (note that the temperature and voltage are vice versa)	Intake air temperature value in deg C. is switched to a fixed value - Engine start and hot start is affected. - Drivability is affected.	Check for TMAP connections. Replace TMAP or throttle body and check.
41	P0113	Intake Air Temperature Sensor 1 Circuit High	Short Circuit to battery voltage (note that the temperature and voltage are vice versa)		
42	P0117	Engine Coolant Temperature Sensor 1 Circuit Low	Short Circuit to Ground (note that the temperature and voltage are vice versa)	Coolant temperature is predicted by ECU based on internal logic. - Engine Start affected depending upon ambient temperature. - Radiator Fan runs continuously. - Fuel consumption may get affected.	Check for CTS connections. Replace CTS and check.
43	P0118	Engine Coolant Temperature Sensor 1 Circuit High	Short Circuit to battery voltage (note that the temperature and voltage are vice versa)		
44	P1608	Engine Speed Signal Circuit High	Short Short Circuit to battery voltage	-	Check connections of engine speed signal to speedometer console
45	P1607	Engine Speed Signal Circuit Low	Short Circuit to Ground		
46	P1606	Engine Speed Signal Circuit Open	Open Circuit		

List of Diagnostic Trouble Codes

47	P0563	System Voltage High	Short Circuit to battery voltage	- No effect on drivability. - May affect Idle as IACV is closed. - May damage ECU and other components if voltage is too high and Voltage remaining high for longer time.	Check RR unit connections. Replace RR unit and check.
48	P0562	System Voltage Low	Short Circuit to Ground	- No effect on drivability but engine may hunt/stop if battery is fully discharged as ECU will stop functioning.	
49	P1510	System Voltage sensing failure in ECU	Battery voltage is measured incorrectly	Battery voltage is switched to fix value	Replace ECU and check.
50	P0501	Vehicle Speed Sensor "A" Range/Performance	Open Circuit	Vehicle speed not displayed.	Check for vehicle speed sensor connections. Replace vehicle speed sensor and check.
51	P1512	Vehicle Speed Sensor "B" Range/Performance	Open Circuit	Vehicle Speed not displayed	Check for vehicle speed sensor connections. Replace vehicle speed sensor and check.
52	P0641	Sensor Reference Voltage "A" Circuit error	Short Circuit to battery voltage	-	This is related to pin 3 of ECU which give power to Coolant Temperature Sensor, Manifold Air Pressure and Manifold Air Temperature . Replace ECU and check. Check connections and replace Coolant Temperature Sensor, Manifold Air Pressure and Manifold Air Temperature and check.
53	P0651	Sensor Reference Voltage "B" Circuit error	Short Circuit to Ground	-	This is related to pin 27 of ECU which give power to Throttle Position Sensor, roll over sensor, side stand sensor. Replace ECU and check. Check connections and replace Throttle Position Sensor, roll over sensor, side stand sensor and check.
54	P0217	Engine Speed limited (limp home mode)due to engine coolant temp overheating	Engine coolant temp overheating	Engine speed limited to lower RPM. If temp reaches 120°C then engine is shut down; If temp reduces to 110°C then there is no error anymore and P code is not active	Check coolant level, check oil level, check functioning of fan.

List of Diagnostic Trouble Codes

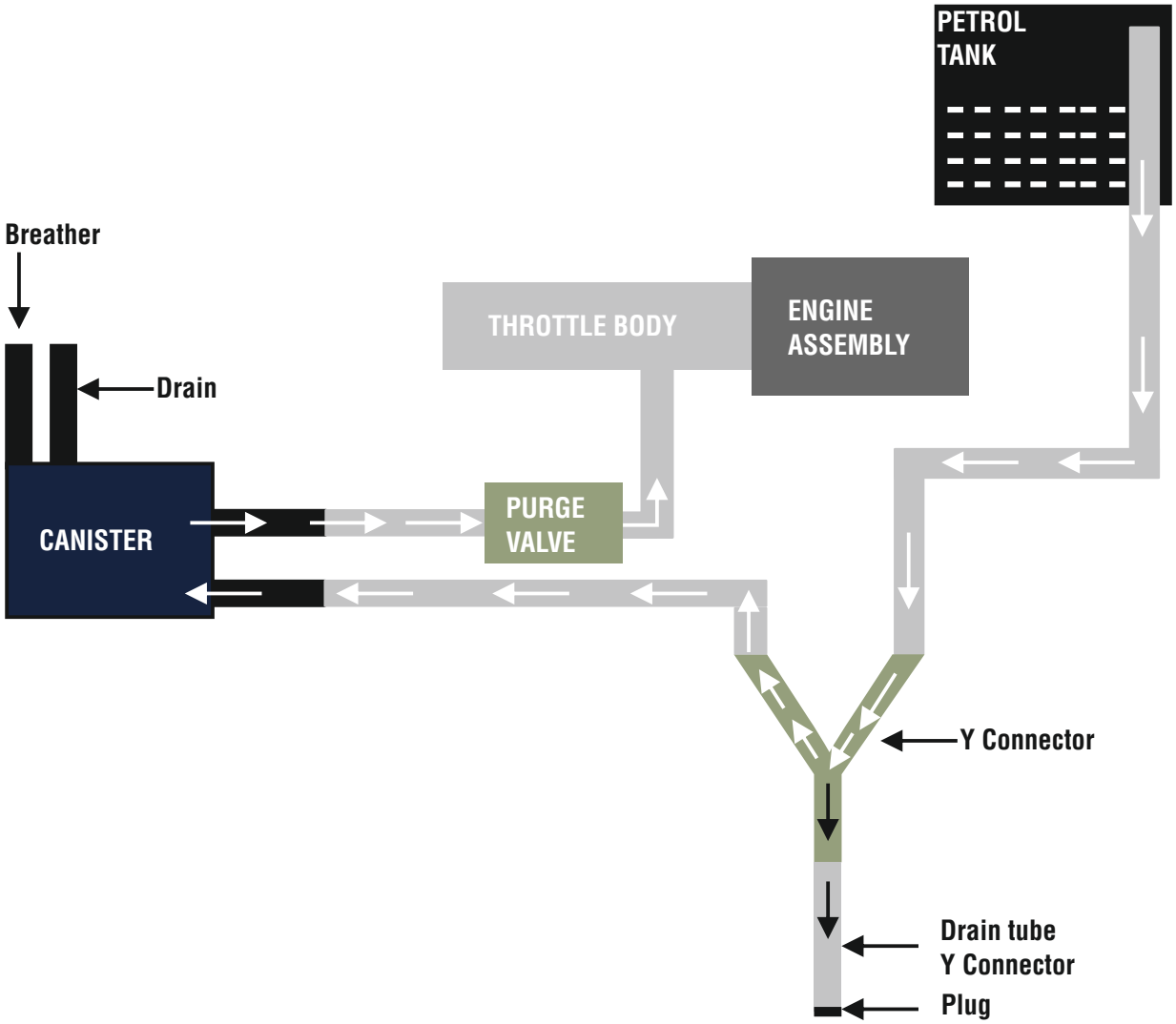
55	P0459	EVAP System Purge control valve circuit high	Short Circuit to battery voltage	Purging will not happen	Check for purge valve connections. Replace purge valve and check.
56	P0458	EVAP System Purge control valve circuit low	Short Circuit to Ground		
57	P0444	EVAP System Purge control valve circuit open	Open Circuit		
58	P0351	Ignition Coil "A" Primary Control Circuit/Open	Open Circuit; Short to ground	Ignition and Injection is cut off. Engine does not start.	Check primary ignition coil connections. Replace ignition coil and check.
59	P0352	Ignition Coil "B" Primary Control Circuit/Open	Open Circuit; Short to ground		Check secondary ignition coil connections. Replace ignition coil and check.
60	P0655	Temperature Warning Lamp circuit high	Short Circuit to battery voltage	Overheat indication on speedometer console will not function if engine overheats.	Check for connections to temperature warning lamp. Replace speedometer console and check.
61	P0656	Temperature Warning Lamp circuit low	Short Circuit to Ground		
62	P0657	Temperature Warning Lamp circuit open	Open Circuit		
63	P0106	Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance	Sensor signal value exceeds 1150 mbar or is less than 100 mbar.	Same as P0108	Same as P0108 (No.5)
64	P0069	Manifold Absolute Pressure - Barometric Pressure Correlation	Sensor signal value does not change by minimum 50 mbar after start.	Same as P0108	Same as P0108 (No. 5)
65	P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance / Bank 1	Sensor signal value exceeds 100 degC or is less than -30 degC.	Same as P0112	Same as P0112 (No. 40)
66	P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	Sensor signal value exceeds 145 degC or is less than -25 degC	Same as P0117	Same as P0117 (No. 42)
67	P2231	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1	Sensor voltage changes by more than 1 volt in 0.01 s.	Same as P0132	Same as P0132 (No. 21)
68	P0053	HO2S Heater Resistance Bank 1 Sensor 1	Heater resistance exceeds threshold 512 ohm	Same as P0032	Same as P0032 (No. 15)
69	P0133	O2 Sensor Circuit Slow Response Bank 1 Sensor 1	Sensor signal time switching exceeds threshold of 2.2 s.	Same as P0132	Same as P0132 (No. 21)
70	P0301	Cylinder 1 Misfire Detected	Angular acceleration exceeds threshold	Jerks in driving. Loss of torque	Fuel circuit, fuel quality, ignition circuit, spark plug, compression pressure
71	P0314	Cylinder 1 Misfire Detected - catalyst	Angular acceleration exceeds threshold	Jerks in driving. Loss of torque	Fuel circuit, fuel quality, ignition circuit, spark plug, compression pressure

Note: Short circuit to battery voltage means: The pin/wire which gives power supply to the sensor/actuator, comes in contact with the pin/wire which gives output of sensor.

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.

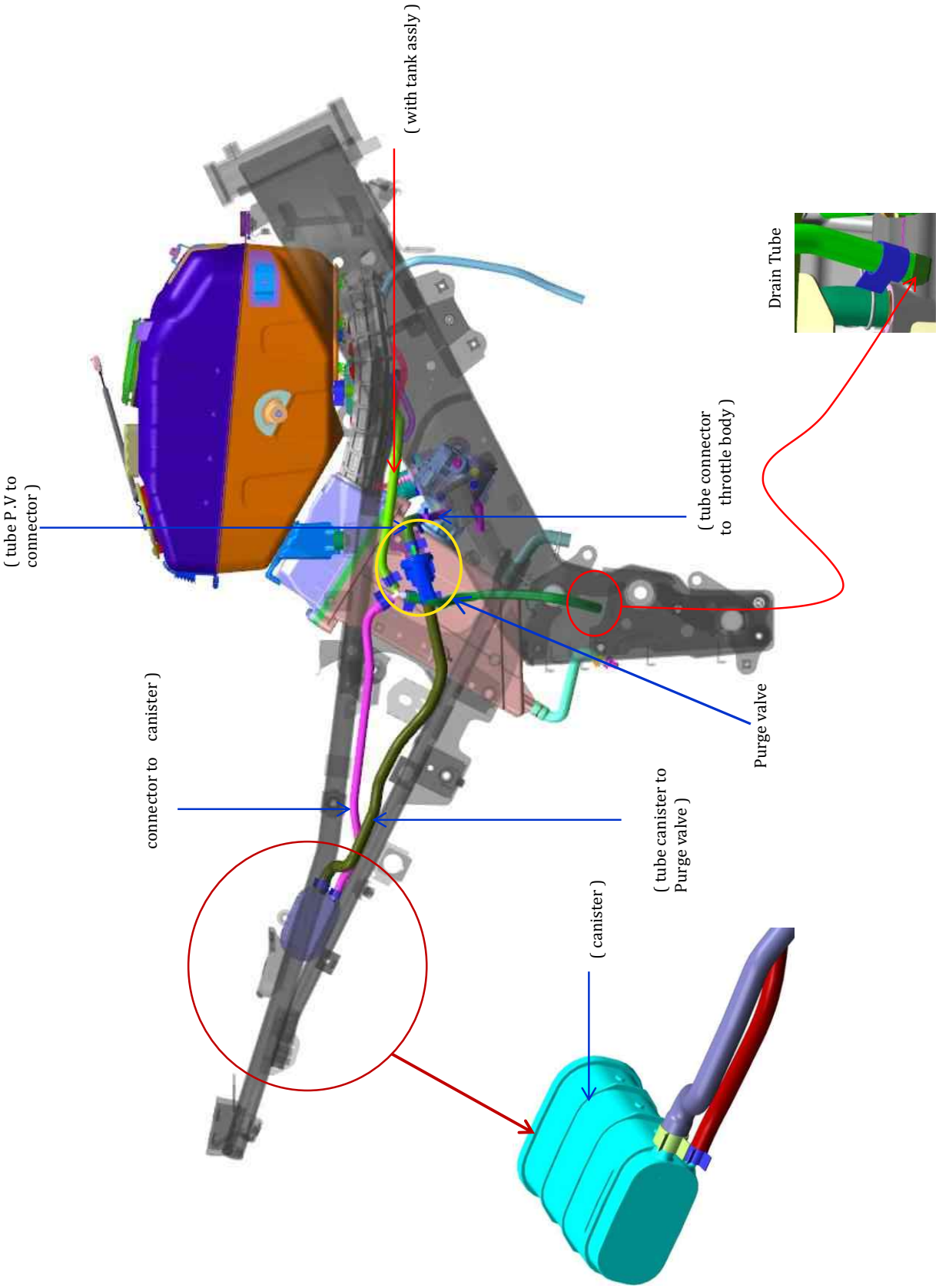
These fuel droplets are fed to engine through Purge valve



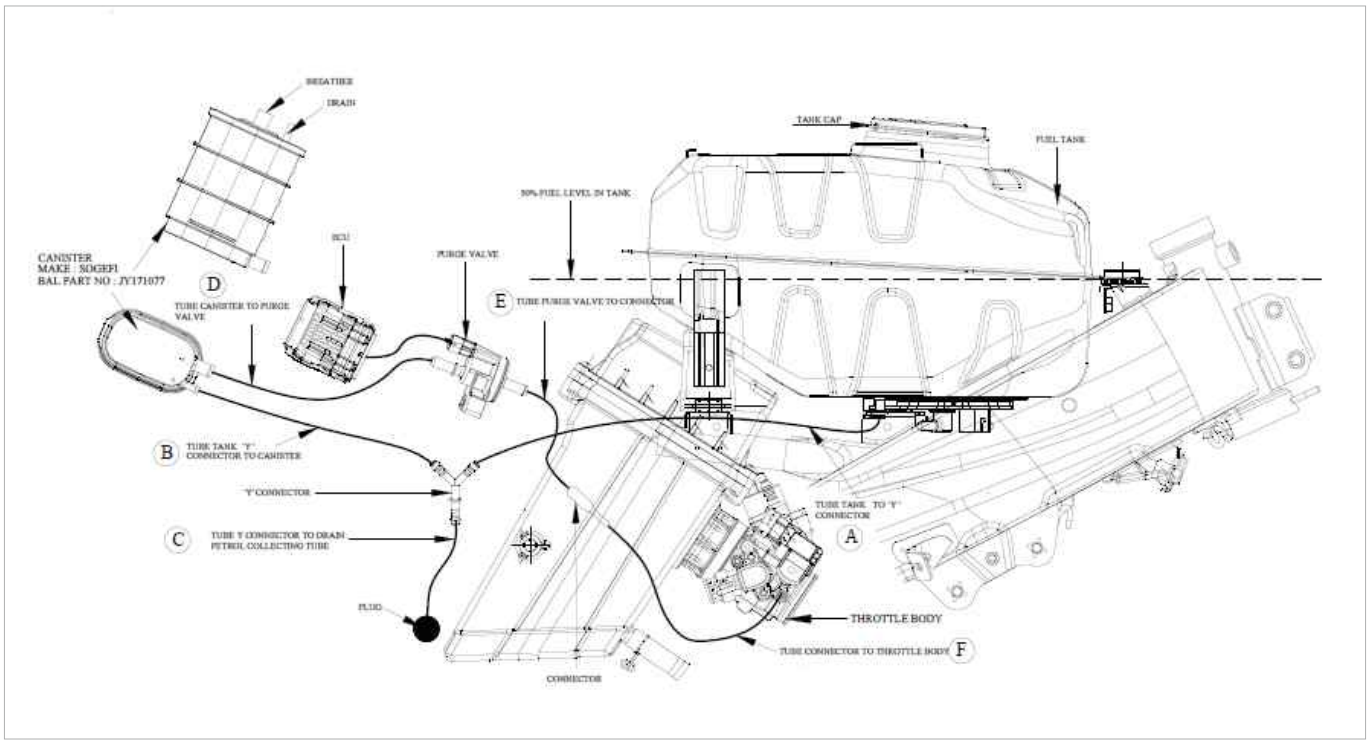
Working of EVAP :

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



Notes

Key Learning Points

- Understanding application of Special Tools
- Skill Tips
- Engine Dismantling SOP
- Understanding of Standard Limits and Service Limits for all Engine Components

CHAPTER 4

Engine & Transmission

Service Limits - Engine

Tightening Torques - Engine

Special Tools

Important Skill Tips

Engine Dismantling SOP

Service Limits - Engine

Sr. No.	Parameter	Standard (in mm)	Service Limit (in mm)
1	Engine compression pressure	11 - 13 Kgf/cm2	9.5 Kgf/cm2
2	Valve tappet clearance IN/EX	IN - 0.05 | EX - 0.08	Not Applicable
3	Rocker arm shaft diameter	9.991 ~ 9.98	9.97
4	Cam sprocket root outer diameter	66.78 Od & 68.72 PCD	-
5	Cam lobe height (Exhaust)	30.29	30.24
6	Cam lobe height (intake)	30.33	30.28
7	Valve spring free length	38.9	37.9
8	Valve stem diameter intake	4.483	4.465
9	Valve stem diameter exhaust	4.463	4.445
10	Valve stem bent	TIR 0.01	TIR 0.015
11	Piston diameter	71.964 ~ 71.976	-
12	Cam chain 20 links length	129.4	129.85
13	Cylinder - piston clearance	0.036 ~ 0.055	0.1
14	Piston Ring end gap (Top ring)	0.15 - 0.030	0.55
15	Piston Ring end gap (second ring)	0.030- 0.050	0.55
16	Piston Ring end gap (oil ring)	0.20 - 0.70	1
17	Clutch spring free length	44.6	43.6
18	Friction plate thickness	2.92 - 3.08	2.72
19	Steel plate thickness	1.52 - 1.68	1.47
20	Friction plate warp	0.1	Not Applicable
21	Steel plate warp	0.1	0.2
22	Gear shift fork guide pin diameter	4.45 - 4.49	4.40
23	Gear shift drum groove width	4.55 - 4.7	4.75
24	Crankshaft runout	0.02	0.05
25	Connecting rod side (axial) clearance	0.2 - 0.35	0.6
26	Cam lobe width	9.01 - 8.9	Not Applicable
27	Shaft fork shift outer diameter	11.966 - 11.984	11.95
28	Fork shift inner diameter	12 - 12.027	12.4
` 29	Clutch Stack up Height	25.4 - 26.4	Refer individual part service limit

Service Limits - Engine

Sr. No.	Parameter	Standard (in mm)	Service Limit (in mm)
30	Valve stem to valve guide clearance (Intake)	0.01 - 0.037	0.047
31	Valve stem to valve guide clearance (Exhaust)	0.03 - 0.057	0.067
32	Cylinder inside diameter	72.012 - 72.019	72.043
33	Clearance between Ring & Piston Groove (Top)	0.03 - 0.065	0.15
34	Clearance between Ring & Piston Groove (Second)	0.03 - 0.070	0.15
35	Clearance between Ring & Piston Groove (Oil)	0.035 - 0.110	-

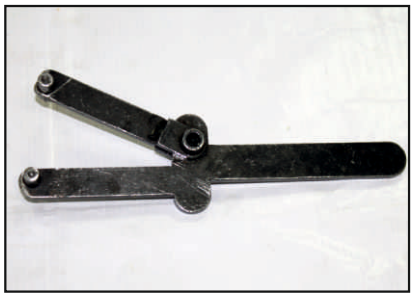
Tightening Torque - Engine

Sr. No.	Parameter	Torque Value (Kgf-m)
1	Spark Plug	1.3 - 1.5
2	Oil Strainer Cap (18 mm A/F)	0.8 - 1.0
3	Cap Oil Filter Cover Bolts	1.0 - 1.2
4	Chain Tensioner Mounting Bolts	1.0 - 1.2
5	Cylinder Head Cover Bolts	1.0 - 1.2
6	Output Sprocket Bolts	1.0 - 1.2
7	Stator Plate Mtg. Bolts	0.7 - 0.8
8	Eng. Mtg. Rr. Upper/Lower Bolts	2.5 - 3.0
9	Clutch Cover Bolts	1.0 - 1.2
10	Oil Pump Mounting Bolts	1.0 - 1.2
11	Coolant Temperature Sensor	1.2 - 1.4
12	Magneto Cover Bolts	1.0 - 1.2
13	Primary Gear Nut	5.9 - 6.1
14	Cam Shaft Sprocket Bolt	2.5
15	Nut Securing Clutch Assly	7.0 - 7.1
16	Magneto Rotor Mounting Nut	5.9 - 6.1
17	Stator Motor Mounting Nut	1.0 - 1.2
18	Inhibitor Nut	1.0 - 1.2
19	Guide Gear Allen Bolt	1.0 - 1.2
20	Clutch Holder Bolts	1.0 - 1.2
21	LH/RH Engine Stay Upper Bolts	2.5 - 2.7
22	LH/RH Engine Stay Lower Bolts	2.5 - 3.2
23	Silencer Joining Nut	1.0 - 1.2
24	Injector Mounting Bolt	0.8 - 1.0
25	Oil Pressure Sensor Nut	1.1 - 1.5
26	Bal. Driver Gear Mounting	5.9 - 6.0
27	Bal. Driven Gear Mounting (Allen)	2.2 - 2.5

Tightening Torque - Engine

Sr. No.	Parameter	Torque Value (Kgf-m)
28	Cylinder Head Small Bolts	1.0 - 1.2
29	Cylinder Head Big Bolts	4.4 - 4.6

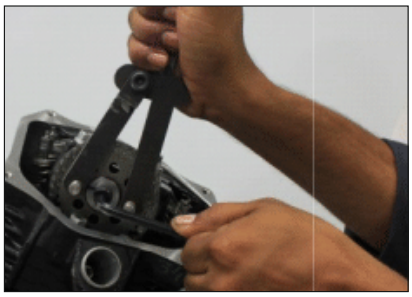
Special Tools



Cam Sprocket Holder

Part No : 37 1043 96

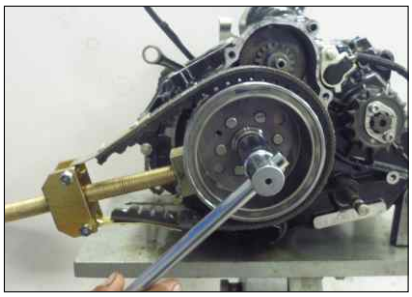
Application : For holding cam sprocket while removing cam sprocket allen bolt.



Magneto Rotor Holder

Part No : 37 1043 91

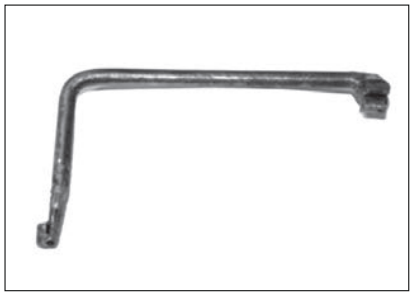
Application : To hold rotor while loosening / tightening its nut.



Magneto Rotor Puller

Part No : 37 0044 71

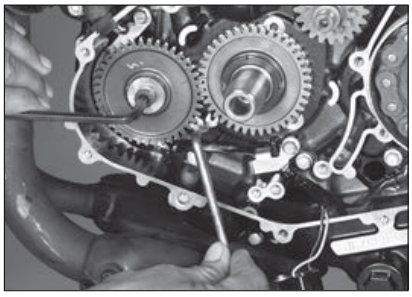
Application : For removing magneto rotor from crankshaft.

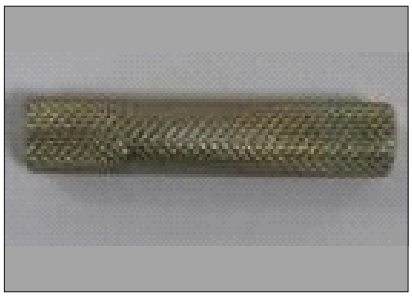


Primary Gear Holder

Part No : 37 0041 54

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

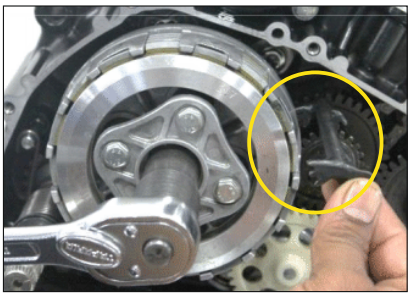
Application : For adjusting valve tappet clearance.

Special Tools

Clutch nut removing tool

Part No : 37 1043 16

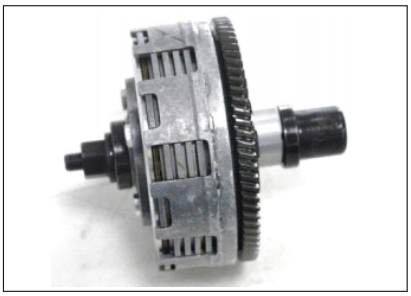
Application : To loosen / tighten special nut securing clutch.



Clutch Dismantling Tool

Part No : 37 1043 58

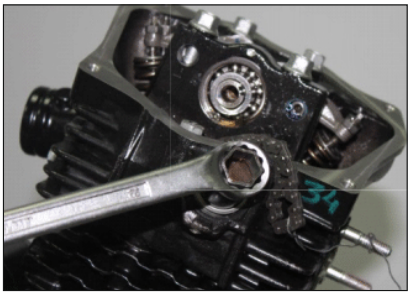
Application : To dismantle & assembled clutch.



Spark Plug Removal Tool

Part No : 37 1044 01

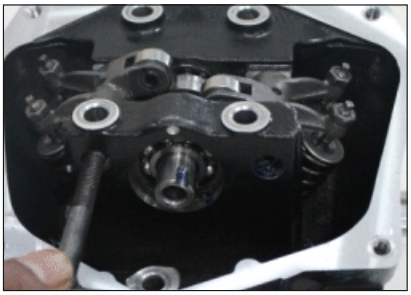
Application : For removing and refitting spark plug R.H. and L.H. side.



Tool to Remove & Fit Shaft Rocker

Part No : 37 1043 99

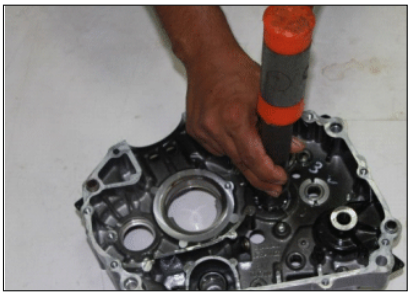
Application : To remove Rocker Shaft from cylinder head for all models plus C'shaft locking



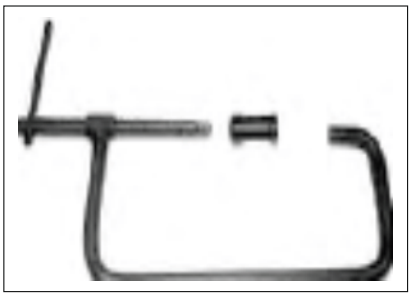
Bearing Driver Set

Part No : 37 1030 61

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



Special Tools



Adaptor & Valve Spring Compressor

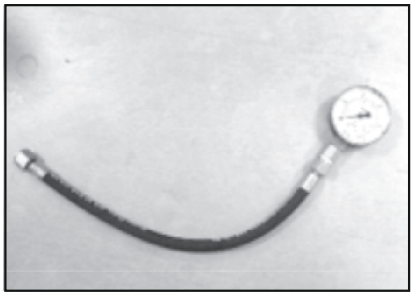
Adapter Part No : 37 1031 08
Valve Spring Compressor : 37 1031 07

Application : To assemble / dismantle intake, exhaust valve.

Drift Piston Pin

Part No : 37 1043 92

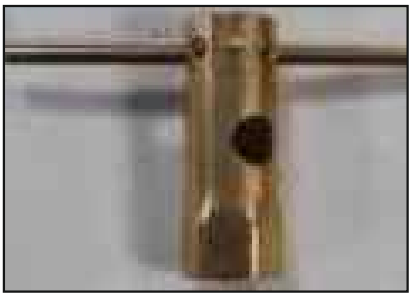
Application : To remove & refit piston pin.



Engine Oil Pressure Checking Unit

Part No : 37 2040 31

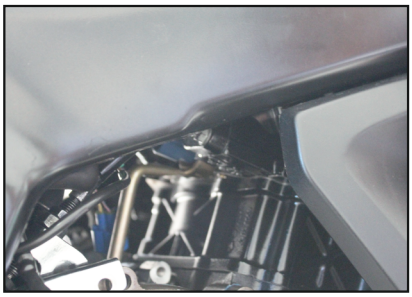
Application : For checking engine oil pressure.

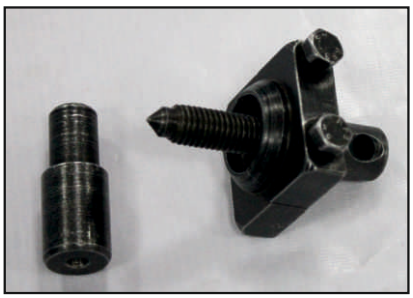


Coolant temperature sensor removal & fitment

Part No : 37 1043 88

Application : For removing & fitting coolant temperature sensor.

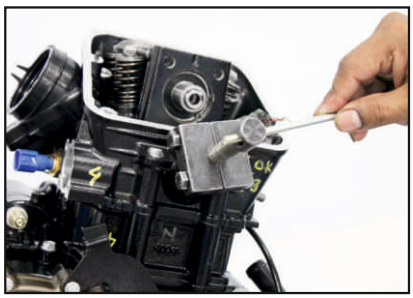




Spark Plug Sleeve Removal Tool

Part No : 37 1043 09

Application : For removing sleeve of spark plug.

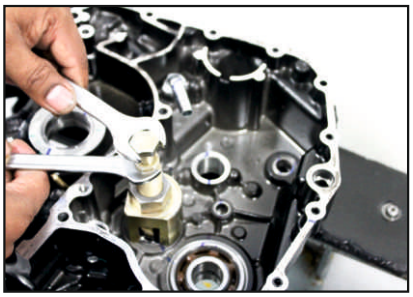


Special Tools

Input Shaft Bearing Extractor

Part No : 37 1043 97

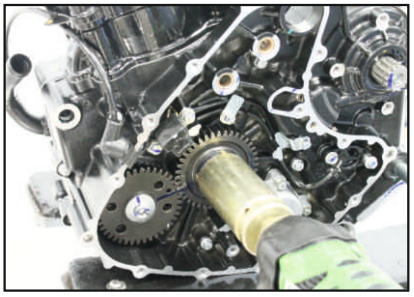
Application : For removing bearing of input shaft.



Balancer Lock Nut Tightening / Removing Tool

Part No : 37 0041 60

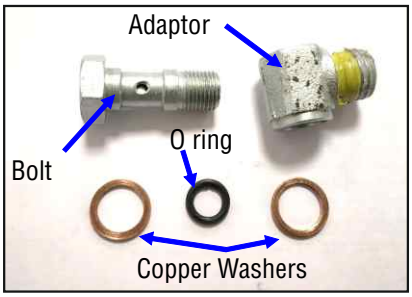
Application : For balancer lock nut removing & torque application while tightening.



Output Shaft Oil Seal Fitment Tool

Part No : 37 1042 56

Application : For fitment of output shaft oil seal tool.

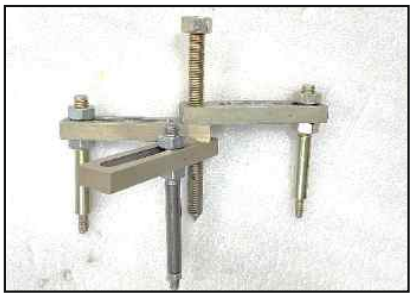


Engine oil pressure checking Adapter

Part no : 37 2040 45

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

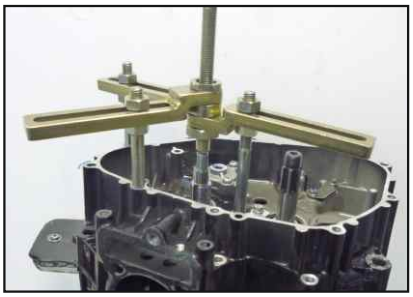
Special Tools



Crankshaft Removing Tool

Part No : 37 1044 06

Application : For removing crankshaft from crankcase.

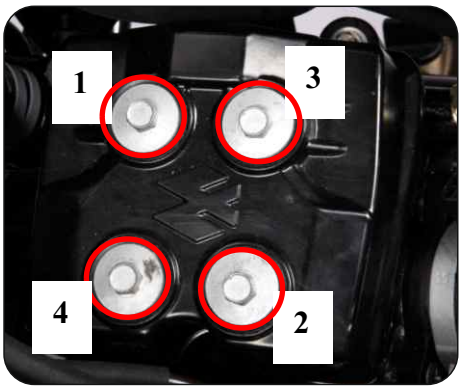


Adapter Hot Air Blow Gun

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.

Important Skill Tips



Cylinder Head Cover Dismantling

Always loosen 4 bolts in crisscross pattern.

Tightening Torque : 1.0 ~ 1.2Kg.m

TDC Position for Valve Timing

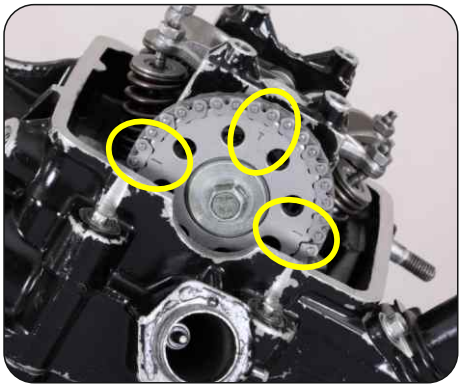
Check piston TDC position, Valve timing & Valve Tappet clearance before dismantling cylinder head.

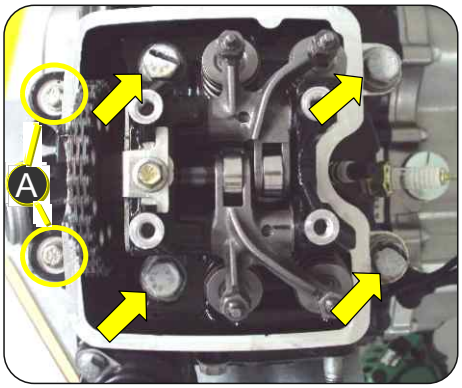
Intake Valve

Tappet clearance: 0.05 mm

Exhaust valve

Tappet clearance: 0.08 mm





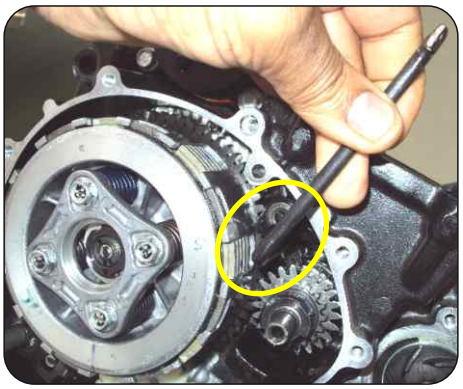
Cylinder Head Bolts Loosening Sequence

Always loosen cylinder head short bolts (A) first and then loosen cylinder head long bolts (4 nos) in crisscross pattern.

Important Skill Tips

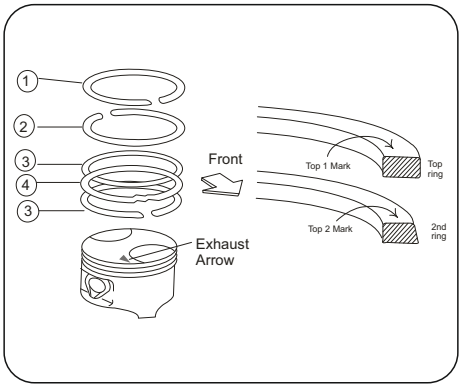
Piston Pin Circlip

While removing / refitting piston pin circlip (snap ring), cover the crankcase bore with clean lint free cotton cloth to arrest circlip / snap ring falling inside the engine so as to avoid subsequent un-necessary opening of engine.



Primary Gear Holding

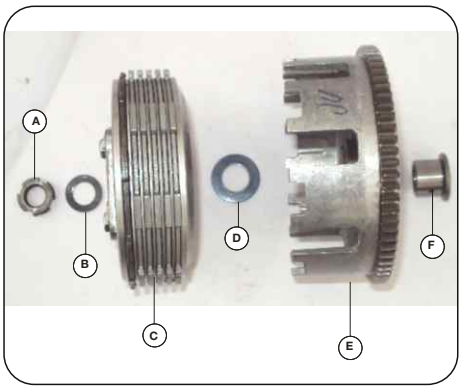
While loosening 'Primary Gear Nut' & 'Clutch Special Nut', hold 'Primary Gear' and 'Clutch Housing Gear' by placing special tool from top.



Piston Ring Fitment

- Piston rings must always be fitted with respect to exhaust mark on the piston
- First place the bottom oil rail ring with end gap 30° towards left of the exhaust mark in the last groove.
- Place oil expander ring with butting end downward & end gap facing opposite to the exhaust mark.
- Now fit top oil rail ring on the expander ring with end gap 30° towards right of the exhaust mark.
- Fit the second piston ring with 'Top 2' mark facing upward and end gap facing opposite to the exhaust mark.
- Finally fit the first ring with 'Top 1' mark upward and end gap facing towards the exhaust mark.
- Remember fitment of 2nd ring upside down may lead to passing of oil above the piston and ultimately leading to smoky exhaust.

Important Skill Tips



Clutch Washer Sequence

A : Special nut

B : Belleville washer

C : Clutch stack

D : Plain washer

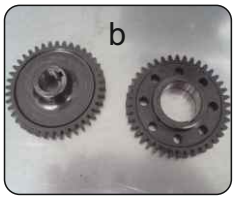
E : Clutch housing

F : Collar bush

Counter Gear Washers

a. When fitting spacer on allen bolt ensure that plain side of spacer face outside.

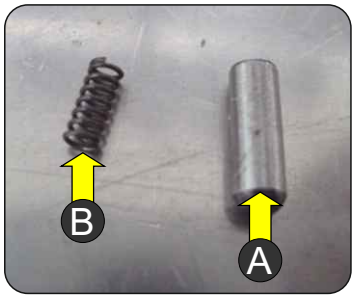
b. When fitting ensure that bal. driven & driving gear collar side face inside.



Cylinder Head Bolts Loosening Sequence

Always loosen cylinder head short bolts (A) first and then loosen cylinder head long bolts (4 nos) in crisscross pattern.

Ensure pin (A) & spring (B) is to be collected & carefully on removal of neutral switch.

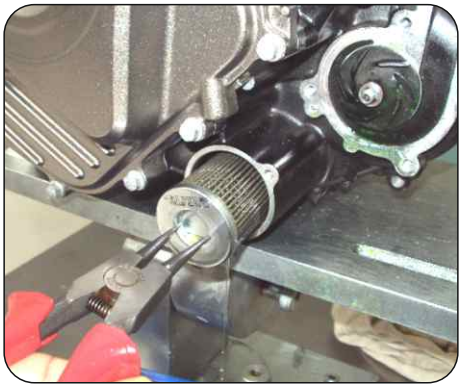


Important Skill Tips

When dismantling engine .....

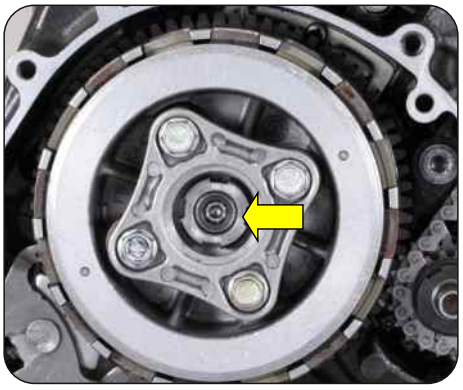
Do not insert a sharp object in-between water pump rotor & crank case.

Tab the balancer shaft to remove rotor



When removing oil filter.....

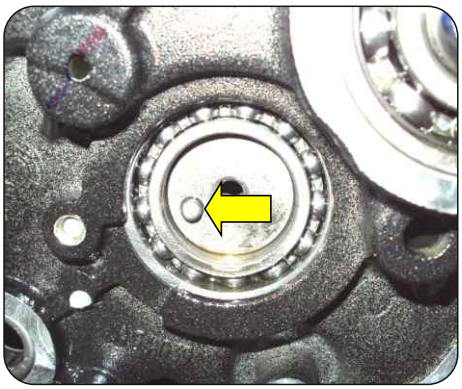
Use external expanding circlip plier to pull out the oil filter.



Clutch Special Nut

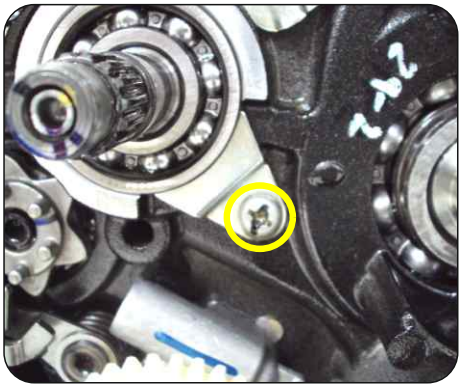
- Special nut for clutch on input shaft is having left hand threading.
  Loosening direction: Clockwise
  Tightening direction: Counter-clockwise
- Use special tool while loosening / tightening special nut.

Important Skill Tips



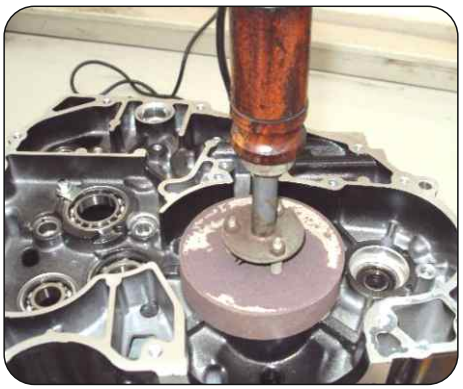
Collect guide gear pin on removal of guide gear.

Ensure fitment of spacer when assembly guide gear



Remove input shaft bearing stopper on clutch side for fitment of crank case splitting tool.

Important Skill Tips



Using engine heater heat the crank case clutch side for smooth & easy fitment of crankshaft bearing.

Note: *Use old type heater or you may use heat blow gun.*

Ensure oil passages are not blocked.

- Ensure that the oil passage going towards orifice is cleared.
- The orifice outlet is cleared.

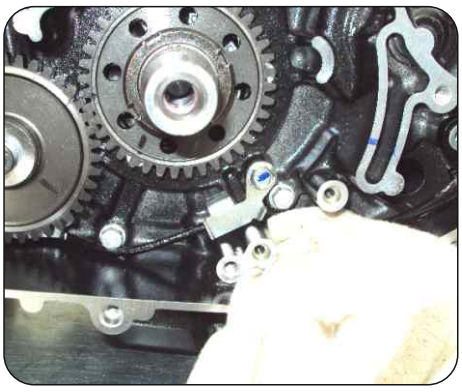
Use grease to fix the springs when assembling. This is to avoid falling of the spring.

Important Skill Tips

When aligning the marks for bal. driven & driver gear always ensure...

- Piston is at TDC position.
- Primary gear mark is align with crankcase mark.

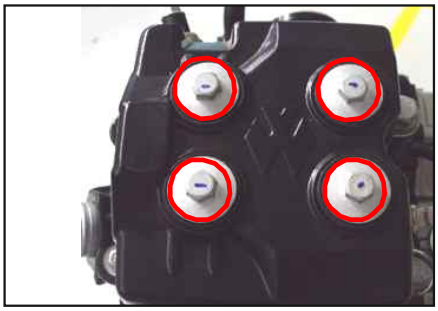
Balancer driven & driver gear marks are inline with each other.



Close the bore of magnet side crank case using a lint free cloth when fitting the harness guide. This is to avoid bolt falling inside the crank case.

Engine Dismantling

Top Side Dismantling

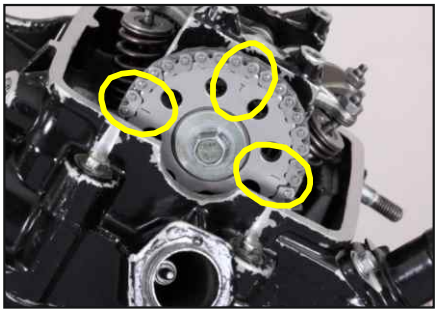


Dismantling - Cover Cylinder Head
Remove
•4 Bolts (10mm A/F)
Skill Tip : Always loosen cylinder head cover bolts in criss - cross pattern.

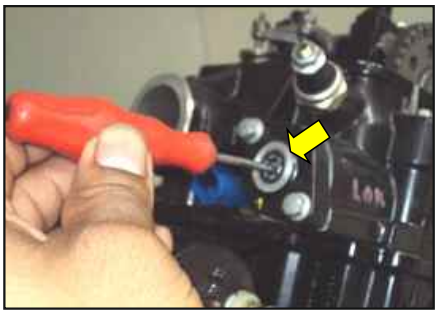
•Cylinder head cover with gasket (rubber beading type)

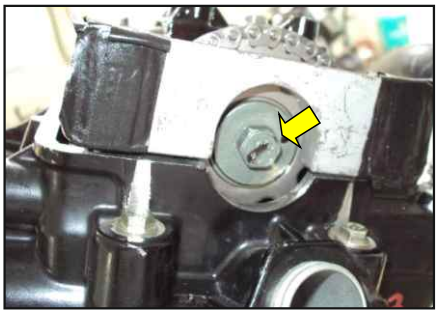
Check TDC Position
•Align rotor mark w.r.t. Crankcase LH.

•Check cam sprocket marks from RH side.



Cam Chain Tensioner
Remove
•One Bolt (A) (10 mm A/F)
•'O' Ring
•Rotate chain tensioner's screw in clockwise direction to take plunger backward & lock it .
•Two bolts (B) (8mm A/F) M6
•Take out tensioner.
•Take out gasket chain tensioner.





Cam Sprocket
Using Special tool 37 1042 54 Cam Sprocket holder
Remove
•Bolt special flanged (12mm A/F)
•Cam Sprocket
•Spacer cam shaft
Skill Tip : Tie chain by soft copper wire.

Engine Dismantling

Remove

- Spark plug RH

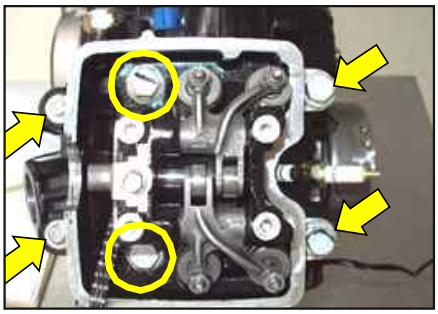
Remove

- Grub screw
- Sleeve spark plug RH.

Skill Tip : Rotate sleeve before pulling out Cover sleeve portion by cotton cloth & then pull out by plier.

CAUTION

Do not pull out sleeve directly by plier otherwise it would get damaged.

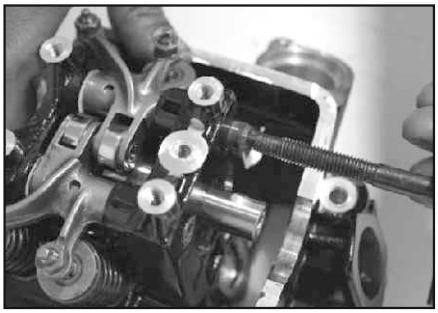


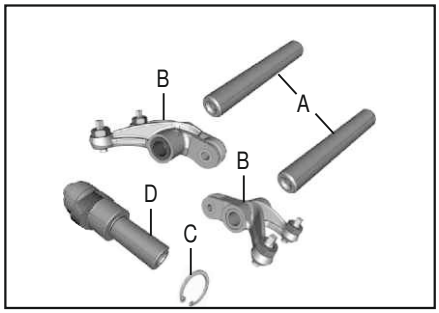
Cylinder Head Bolts

Remove

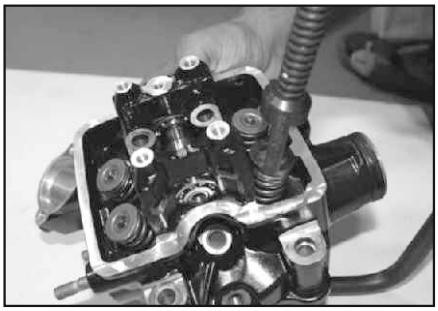
- 2 Cylinder head short bolt (A) (8 mm A/F) M6 x 120
- 4 Cylinder head long bolts (B) (12 mm A/F) M10 x 147
- Take out cylinder head assembly complete

Skill Tip : Always loosen smaller bolts of cylinder head first & then loosen longer bolts in crisscross pattern to avoid cylinder head warpage.

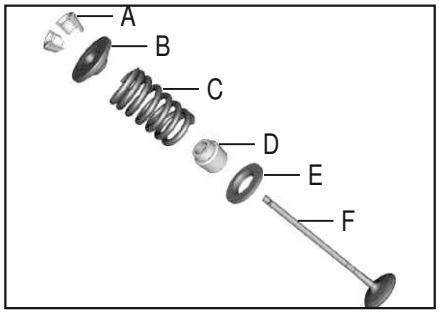




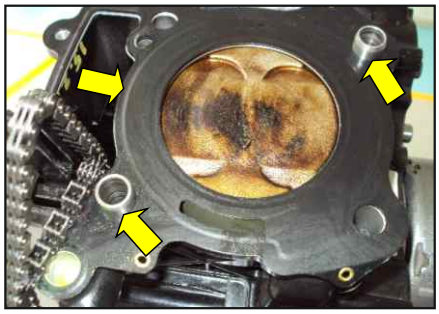
Engine Dismantling

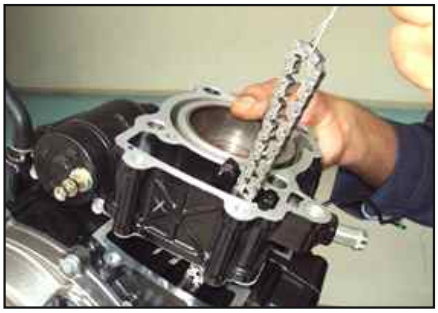


Using Valve Spring Compressor - Adaptor - 37103108
Remove
- Collets (A)
- 4 Retainers (B)
- 4 Valve Springs (C)
- 4 Valve Oil Seals (D)
- Valve Spring Seats (E)
- 2 Exhaust & 2 Intake Valves (F)

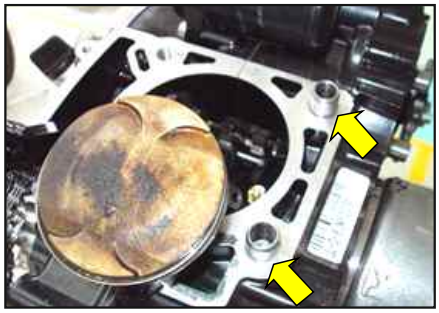


Cylinder Piston Assly.
Remove
- Gasket Cylinder Head
- Chain Guide
- 2 Dowels
- Cylinder Block





Remove
- Gasket cylinder block (A)
- 2 Dowels (B)

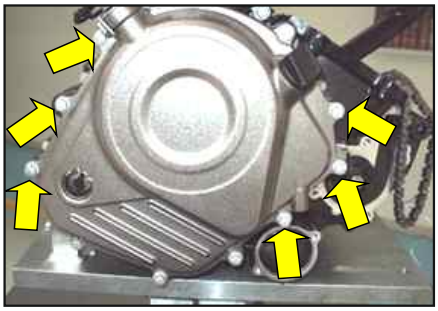


Using Piston Pin Drift
Part No: 37101006
Remove
- Snap ring (Circlip)
- Piston pin
- Piston Assembly

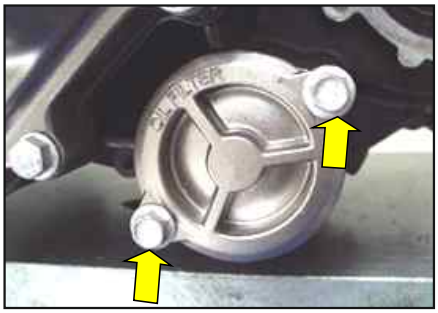
Skill Tip : Cover crankcase bore by clean lint free cloth while dismantling piston circlip / snap ring.

Engine Dismantling

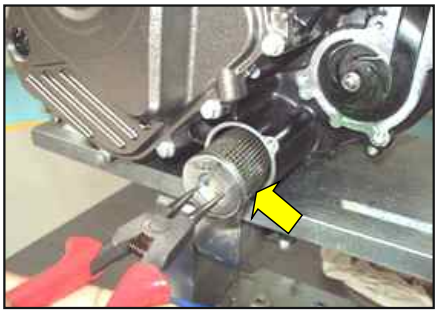
Clutch Side Dismantling

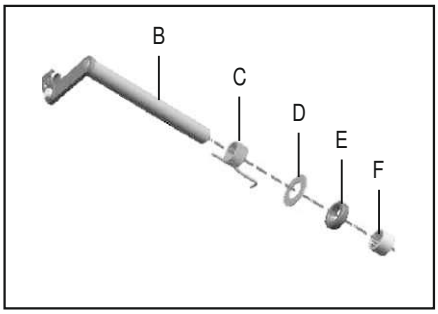


Cover Clutch
Remove
- 11 Bolts (8mm A/F) M6 x 30.
- Clutch Cable Bracket
- Cover clutch
- Clutch cover gasket.
- 2 dowels.

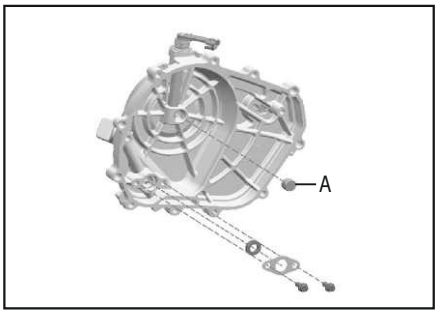


Oil Filter
Remove
- 2 flanged bolts (8mm A/F) M5 x 16
- 'O' ring.
- Cap oil filter.
- Oil filter.





Shaft Clutch Release
Remove
- Push rod (A).
- Shaft clutch release (B)
- Spring (C) (lever clutch)
- Plain washer (D).
- Seal oil (E).
- Needle bearing (F).



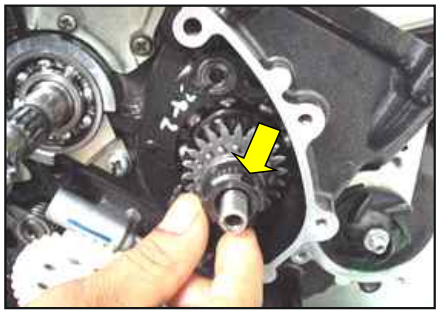
Remove
- Clutch lifter bearing.

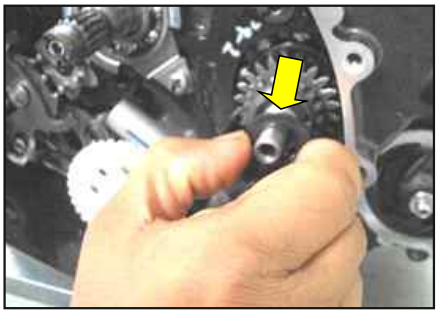
Engine Dismantling

Using Primary Gear Holder Special Tool 37004154 & Special Socket for Clutch Nut 3710DJ43
Remove

- Nut sprocket drive lock.

Skill Tip : Lock Special tool between the teeth of primary gear & clutch housing gear from top.

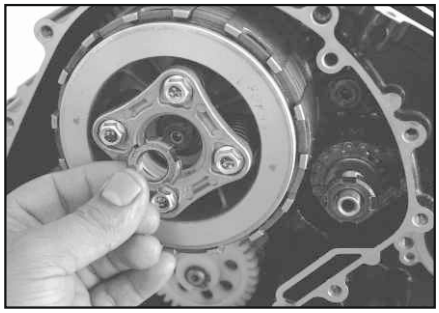


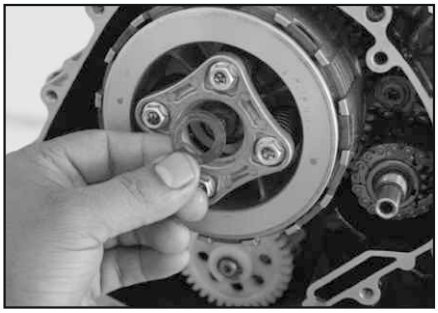


- Remove Belleville washer.

Remove

- Special nut for clutch



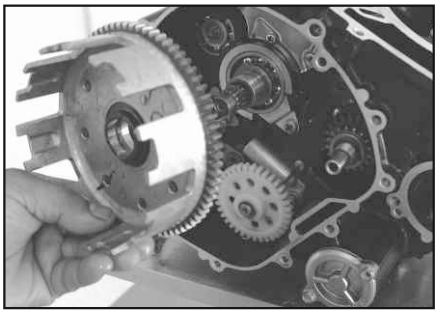


- Belleville washer

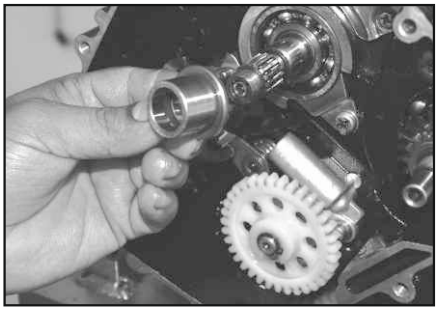
Engine Dismantling

Remove

- Clutch stack complete
- Plain washer
- Timing chain
- Clutch housing



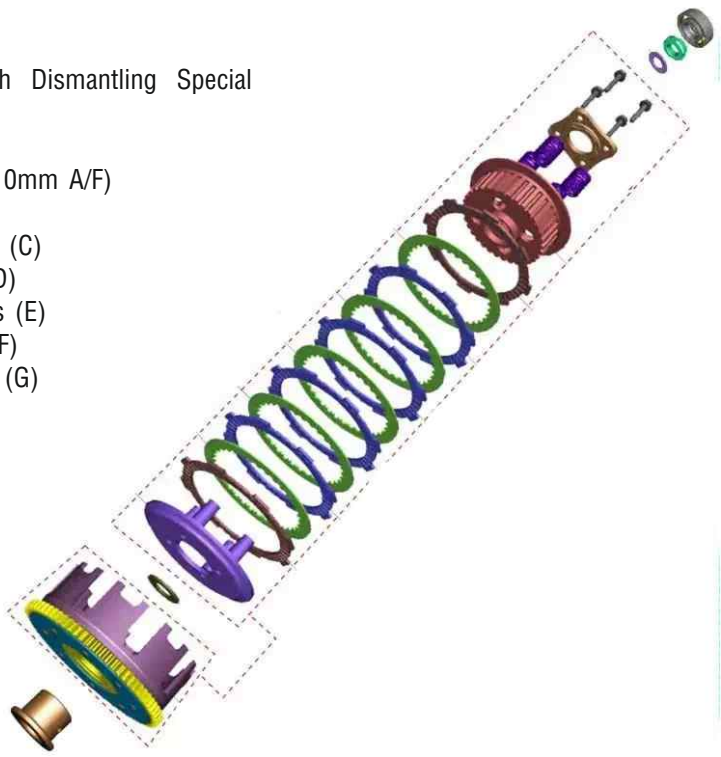
Skill Tip : Clutch Nut must be removed by rotating it in clockwise direction.



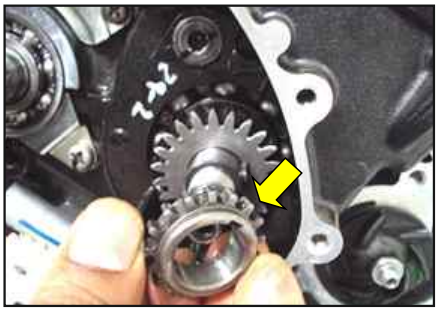
- Remove Collar bush.

By using Clutch Dismantling Special Tool Pulsar
Remove

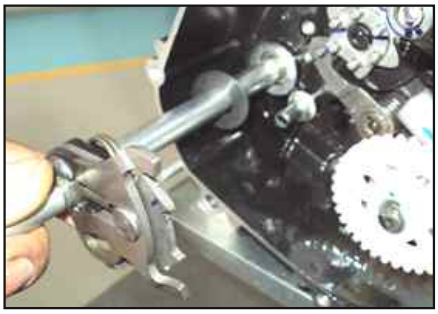
- 4 bolts (A) (10mm A/F)
- 4 springs (B)
- Holder Clutch (C)
- Clutch Hub (D)
- Friction Plates (E)
- Steel Plates (F)
- Wheel Clutch (G)



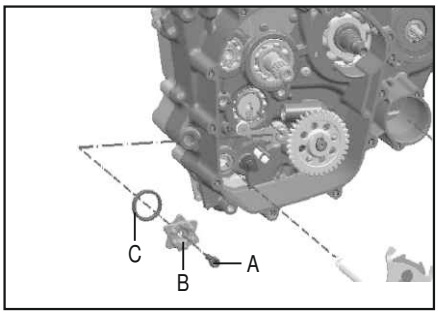
Engine Dismantling



Removal of Primary Gear
Remove
- Sprocket crankshaft.
- Gear primary drive with wood ruff key.
- Spacer crankshaft.

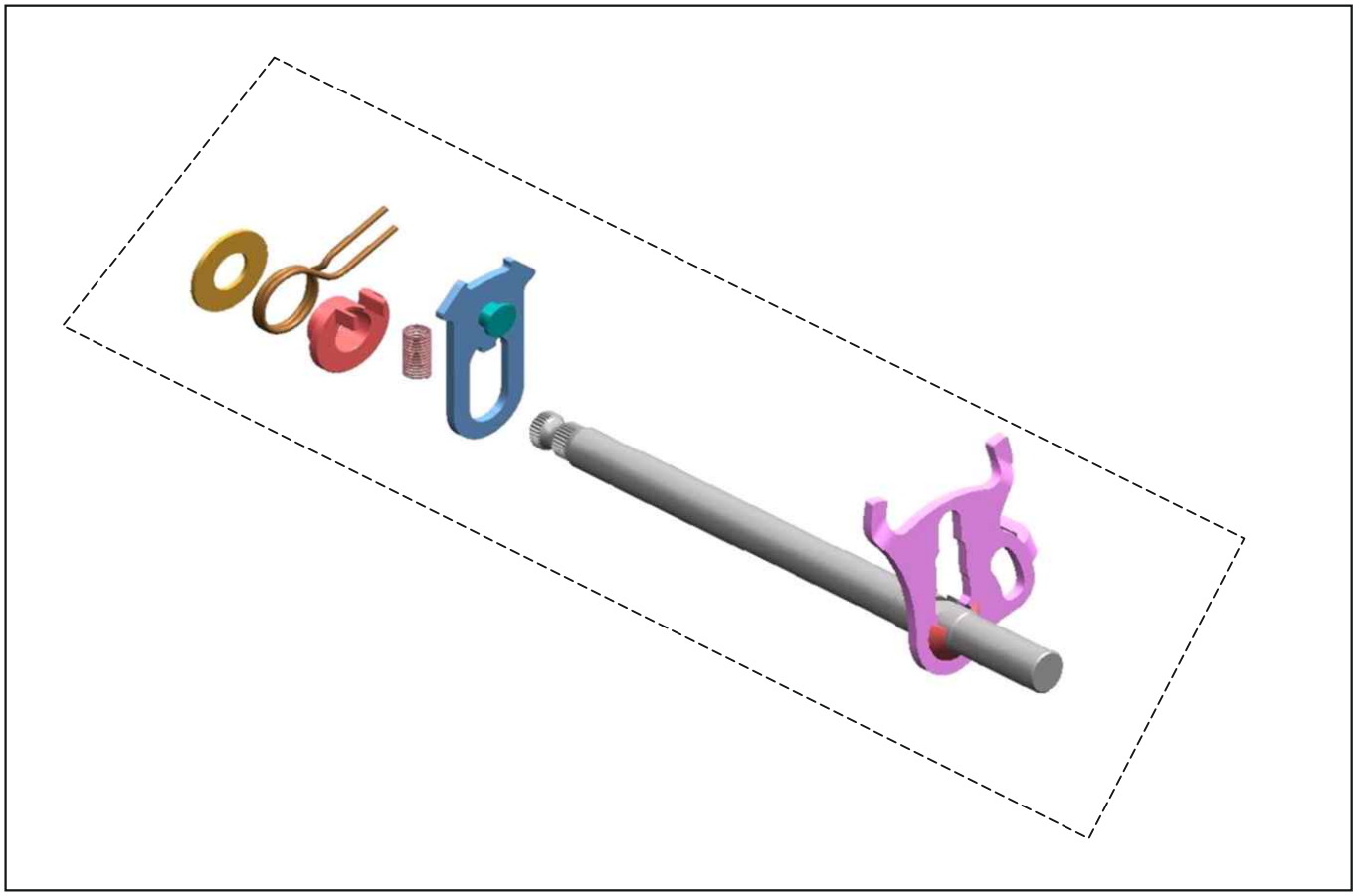


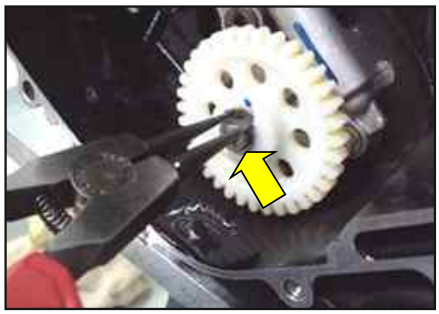
Gear Shift Mechanism
Remove
- Lever gear change shaft.
- Stopper drum bolt (mm A/F).
- Washer (bigger dia).
- Inhibitor gear shift lever.
- Washer (smaller dia).
- Drum stopper spring.



Remove
- Allen bolt (A).
- Gear shift guide (B).
- Spacer (C).

Engine Dismantling





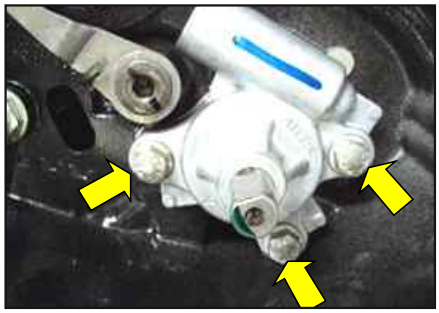
LUBRICATION SYSTEM DISMANTLING

OIL PUMP

Remove

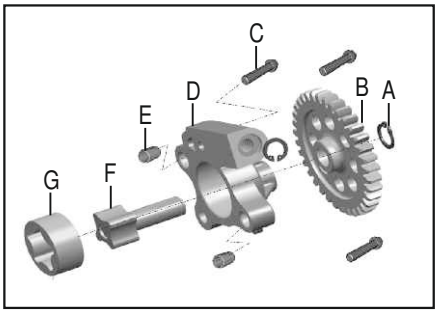
- Circlip (A).

- Oil pump drive gear (B).

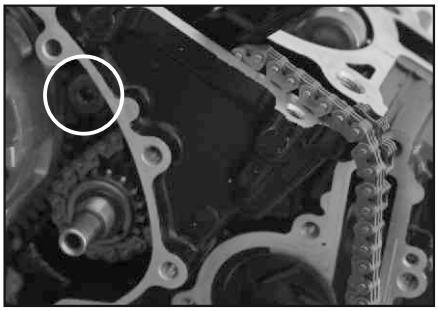


Remove

- 3 flanged bolts (C) (8mm A/F) M6 x 30.
- Oil pump body (D).
- 2 Dowels (E)
- Inner (F) & outer (G) rotor

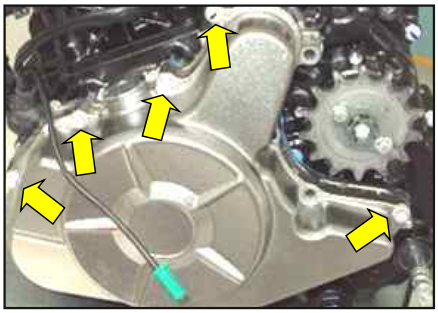


Engine Dismantling



Remove
- Pivot bolt
- Chain Guide (Slack Side)
- Cam / Timing Chain

Magneto Side Dismantling



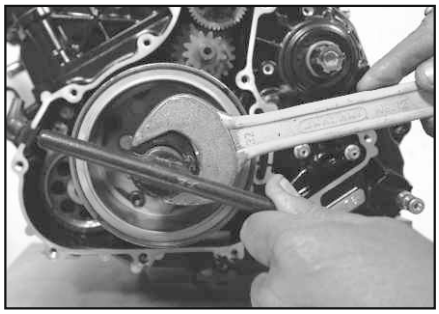
Dismantling - Cover Magneto

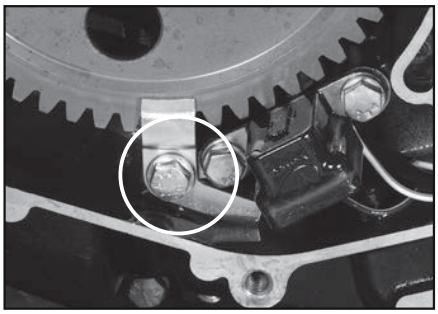
Remove
- 9 bolts (8mm A/F) M6 X 30
- Magneto Cover

Skill Tip : Loosen magneto cover bolts in criss-cross pattern.

Using Rotor Holder H6 0721 00 & Rotor Puller 37 0041 55

Remove
- Hex flanged bolt (14 mm A/F)
- Belleville washer (A)
- Rotor (B) & its key.

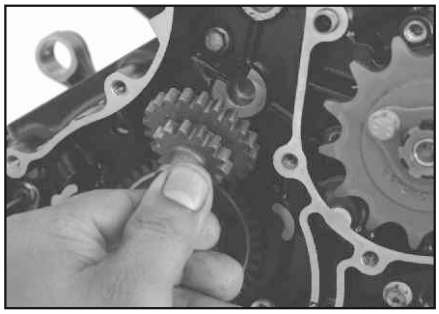




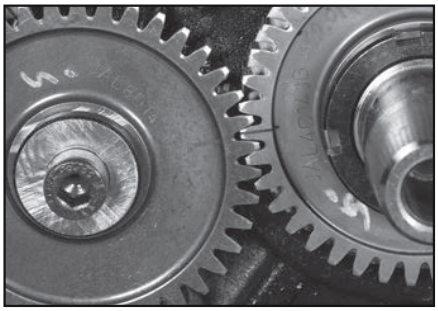
Remove
- Bolt

  Stopper for gear starter clutch

Remove
- Starter counter gear 1
- Starter counter gear 2



Engine Dismantling

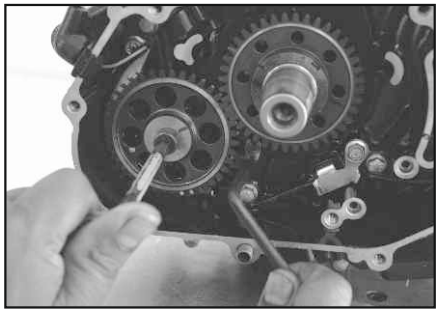


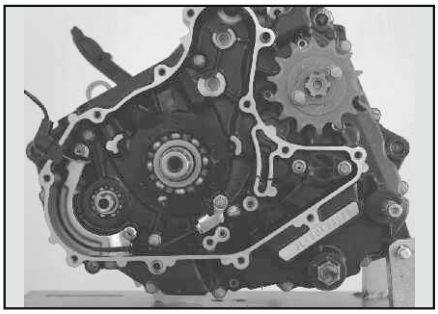
Inspect for correct alignment marks for the balancer drive and driven gear.

Balancer Drive & Driven Gear

Remove

- Nut balancer drive lock by using special tool.
- Belleville washer.
- Balancer drive gear.
- Key wood ruff.
- Allen bolt.
- Special washer.
- Gear balancer driven.
- Square key.

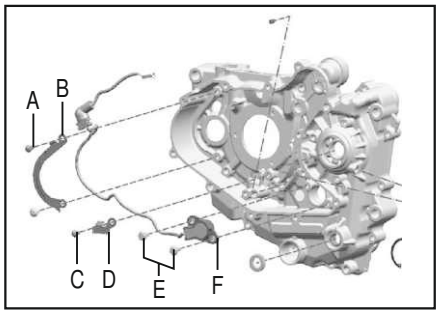


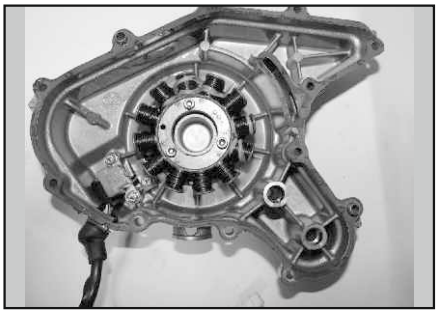


Neutral Indicator Switch

Remove

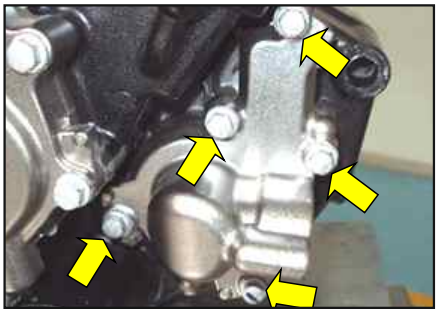
- 2 bolts (A) (8 mm A/F) M5x10
- Bracket harness upper (B).
- 1 bolt (C) (8 mm A/F) M5x10
- Bracket harness lower (D).
- 2 bolts (E) (8 mm A/F) M5x16
- Neutral indicator switch (F).

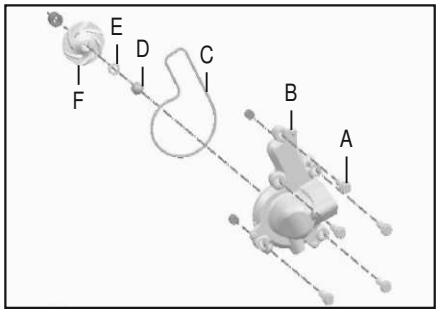




Remove

- 2 bolts (8 mm A/F) M5 x 13.
- Pick up coil
- 1 Bolt (8mm A/F) (B) M5 x 6
- Stopper plate (D).
- Stator plate assembly 3 allen bolts (4 mm A/F) M5 x 0.8 x 35

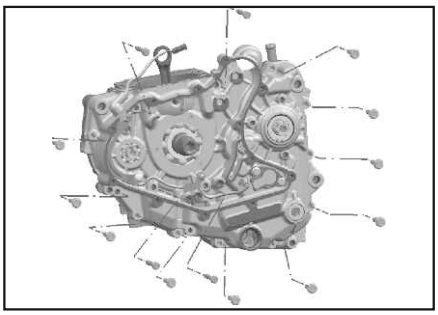




Engine Dismantling

Crankcase Splitting

Remove
- 4 long bolt (A) (8mm A/F) M6 x 60
- 10 Short Bolt (B) Magneto Side (8mm A/F) M6 x 45

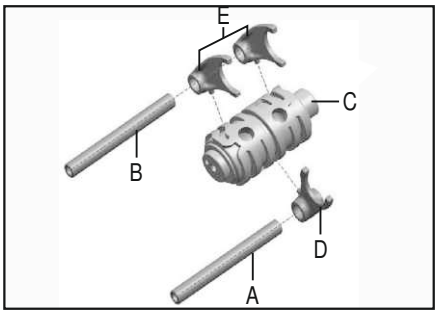


Dismantling - Crankcase
By using Crankcase Splitting Special Tool
Remove
- Remove RH side crankcase.
- Crankcase gasket.
- 2 dowels (dia 14)

Crankshaft Removal

Remove Crankshaft

Crankshaft Removal
Remove
- Shaft Fork Shift (A) Input & Output (B) with 2 springs.
- Gear Change Drum (C)
- Washer 1st Gear Output.
- Washer below 2nd gear Input
- Shift Fork - Input (D) / Output (E).
- Input shaft assembly
- Output shaft assly.



Notes

Key LearningPoints

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

CHAPTER 5

Frame & Suspension

Service Limits - Frame

Tightening Torque - Frame

Special Tools

Dismantling & Assembling of USD fork

Working of ABS Brake System

Dismantling & Assembling of Front Disc Brake

ABS HOSE ROUTINE SOP

Service Limits - Frame

Sr. No.	Parameter		Standard (mm)	Service Limits (mm)
1	Brake disc run out	Front	0.15 (only disc) / 0.25 (wheel assy)	Not Applicable
		Rear		
2	Brake disc thickness	Front	5	4.5
		Rear	4	3.5
3	Brake pad thickness	Front	9.35	4 - 4.5
		Rear	9	4 - 4.5
4	Axle run out		TIR 1.0mm or Less	TIR 2.0 mm
5	Axial wheel run out		TIR 1.0mm or Less	TIR 2.0 mm
6	Radial wheel run out		TIR 0.8 mm or Less	TIR 2.0 mm
7	Drive chain slackness		15 - 20	45 - 50
8	Drive chain length		317.5 for 20 Links	323.5 for 20 Links
9	Rear sprocket warp		0.2 or less	0.3
10	Front fork spring free length		370	NA
11	Tyre tread depth	Front	4.5+ /- 0.3	Up to Tread Wear Indicator
		Rear	6+ /- 0.3	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	ECU mounting bracket nuts	0.64 - 0.72
2	RR Unit bolts	0.64 - 0.72
3	HT Coil bolts	1.0 - 1.2
4	Engine mounting bolt Front top	2.5 - 2.7
5	Engine mounting bolt front bottom	4.5 - 4.7
6	Engine mounting bolt rear	4.5 - 4.7
7	Steering slotted nut	0.5 - 0.6
8	RSA Top bolt	3.2 - 3.8
9	RSA Lower bolt	3.2 - 3.8
10	Swing arm shaft nut	11.0 - 13.0
11	LH Stay (Footrest Holder) bolt	1.8 - 2.2
12	RH Stay (Footrest Holder) bolt	1.8 - 2.2
13	Front fender bolts	0.6 - 0.7
14	Side stand mounting bolt	1.8 - 2.2
15	Front axle nut	8.0 - 10.0
16	Rear axle nut	8.0 - 10.0
17	Front disc mtg bolt	2.7 - 3.3
18	Front Sensor disc bolt	2.7 - 3.3
19	Front Caliper mtg bolts	2.2 - 2.8
20	ABS mounting bolts	0.6 - 0.7

Tightening Torque - Frame

Sr. No.	Parameter	Torque Value (kgf-m)
21	Rear disc mtg bolt	0.9 - 1.1
22	Rear Sensor disc bolt	0.9 - 1.1
23	Rear Caliper mounting bolts	1.2 - 1.6
24	Rear Master cylinder mtg bolt	0.8 - 1.0
25	Rear sprocket nut on coupling	3.5 - 3.8
26	Rear brake pedal bolt	1.5 - 1.8
27	Handlebar holder bolts	1.8 - 2.0
28	Weight handlebar bolt	0.8 - 1.0
29	Fork Center bolt	4.5 - 5.0
30	Fork top bolt	2.5 - 3.5
31	Fork (upper bracket side) bolt	1.4 - 1.6
32	Fork under bracket bolt	1.8 - 2.2
33	Tank mounting bolt	1.8 - 2.2
34	Fuel pump mounting bolts	0.65 - 0.8
35	Speedometer mounting nuts	0.3 - 0.5
36	Headlight mounting nuts/bolts	0.3 - 0.5
37	Chain cover bolt	0.8 - 1.0
38	Leg guard bolts	Top: 1 - 1.2 Bottom: 1.8 - 2
39	Grab handle bolt	2 - 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

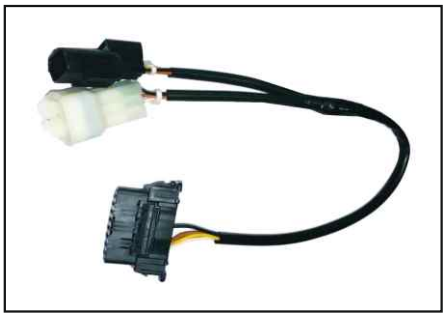
Application : For tightening & loosening fork bolt

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



Pigtail for BOSCH Diagnostic tool

Part Number : 37004312

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

Fuel Pump Delivery Output checking unit

Part Number : 37204030

Bearing Race Extractor

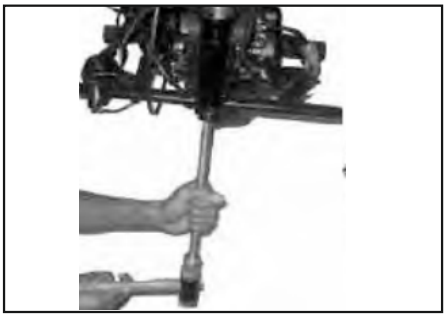
Part No. : 37 0044 78

Application : To Pull out steering race from fork Under Holder Bracket.

Steering Cone Remover

Part No. : 37 1805 06

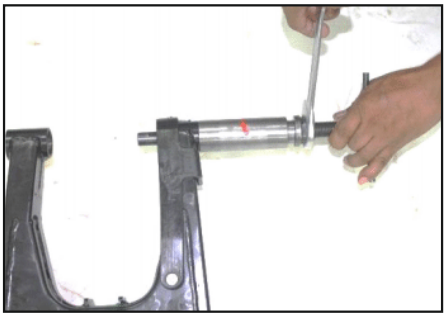
Application : To remove steering cones from frame.



Swing arm NRB extractor & fitment tool

Part No. : 37 0044 73

Application : For extracting & fitment of NRB



Special Tools

21 mm Tube Spanner

Part No. : 37 1043 57

Application : For oil pressure sensor removal & fitment on vehicle.

Dismantling & Assembling of USD Fork

Assembly & Disassembly Procedure

FORK OVERHAUL

- Take out fork leg assembly from vehicle.

- Remove outer pipe from fork top bolt threading as shown in photograph.

- Remove fork pipe top bolt using adaptor fork top bolt holding lock nut on piston rod with 18 mm spanner.

- Take out fork pipe top bolt & lock nut.

- Take out fork oil.

Dismantling & Assembling of USD Fork

- Hold fork leg assembly as shown in photograph & take out dust cap

- Using appropriate size flat head screw driver, remove dust seal.

Note :

- Ensure no dent/damage to fork inner pipe while using screw driver.

- Remove lock oil seal using appropriate size flat head screw driver from it's seat.

Note :

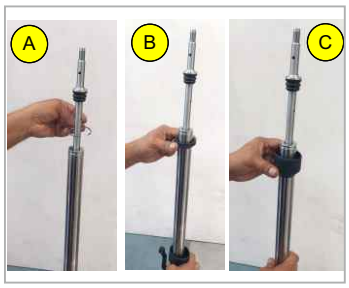
- Ensure no dent/damage to fork inner pipe while using screw driver
- Replace oil seal lock with new one, if found bend /damage.

- Take out lock oil seal.

Dismantling & Assembling of USD Fork

- Hold the inner pipe & outer tube. Pull to detach inner pipe & outer tube along with dust seal, dust cap & lock oil seal.

Note :
Avoid any damage to fork inner pipe.



- Hold fork leg assembly as shown in photograph & take out –

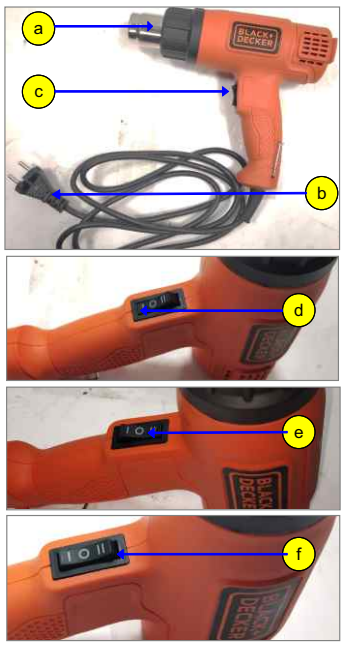
  A – Lock oil seal

  B – Dust seal

  C – Dust cap

- Remove oil seal using appropriate size flat head screw driver as shown in photograph.

Note :
Cover screw driver with cotton cloth to avoid damage
Hold outer tube as shown in photograph-D & take out washer.



•Hot Air Blow Gun(P/N 37 0044 13) Information :

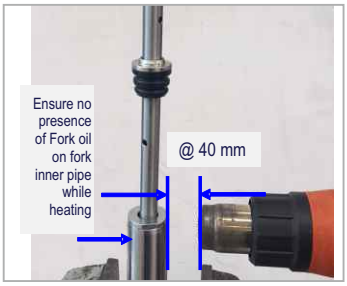
a – Outlet Nozzle
b – Chord with pin
c – Heating mode selection button
d – Slow heating mode
e – Fast heating mode
f – Heat mode selection button “OFF”

Precautions to be taken :
- Always keep nozzle away from chord.
- Always ensure that heat selection button is “OFF” & disconnected from power supply when unattended.
- Always store in dry & locked up place.
- Always stay alert during usage of gun.
- Do not touch the outlet nozzle in any condition during usage or immediately after usage.
- Do not direct hot air blast towards people or flammable objects.

Dismantling & Assembling of USD Fork

- Hold fork inner pipe using fork clamping block, Fork Inner pipe holding Sleeve(P/N 37004505) & bench vice as shown in photograph.

- Connect hot air blow gun chord socket to 230V AC single phase power supply & start the supply.



- Put Heating mode selection button to “fast heating mode” & hold gun at a distance @ 40 mm from inner pipe as shown in photograph for 2 – 3 Minutes.

- Put OFF supply to hot air gun & keep it on safe place.

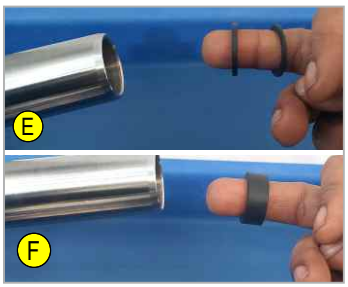
- Remove screw cap inner pipe with 30 mm spanner.

- Take out piston rod assembly along with screw cap inner pipe.

- Take out fork inner pipe from clamping block & vice.

Dismantling & Assembling of USD Fork

- Take out fork oil as shown in photograph.



- Take out -
  E & F - Set of spacers
  G – Main spring

NOTE :
Quantity & thickness of spacer are subject to change as shown in photograph E & F.

Fork sub parts cleaning :-

- Clean fork inner pipe, internal threaded portion & screw cap inner external threaded portion using nylon brush.

- Clean fork inner pipe and outer tube with clean lint free cotton cloth.

- Pour diesel/kerosene in fork inner pipe by closing other end with hand.
- After pouring diesel/kerosene, shake fork inner pipe as shown in photograph.

Dismantling & Assembling of USD Fork

- Pour diesel/kerosene in fork outer tube by closing other end with hand.
- After pouring diesel/kerosene, shake fork outer tube as shown in photograph

- Blow low pressure compressed air through from inner pipe and outer tube.

- All fork sub parts to be cleaned using diesel / kerosene.

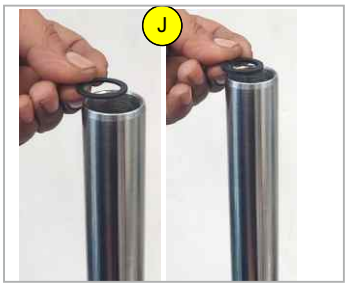
Note :
Ensure rubber parts (O rings , seal etc) are not to be cleaned with above mention cleaning agent

Assembly

- Insert the following parts in fork inner pipe as shown in photograph-

H – Main spring

I & J – Spacers



NOTE :

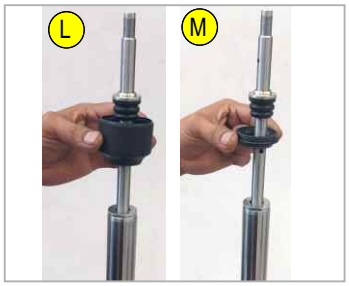
- Quantity & thickness of spacer are subject to change as shown in photograph I & J.
- Main spring to be assembled as shown in photograph – K

Dismantling & Assembling of USD Fork

- Insert piston assembly.
- Apply 2 to 3 drops of "Loctite Thread locker(243)" on threading of screw cap inner pipe.

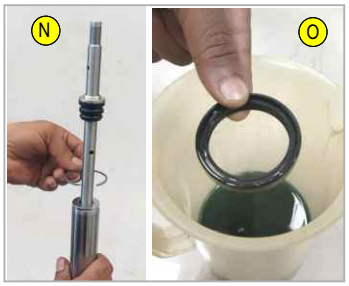
Note : Loctite should not drop on any other part except thread area of screw cap inner pipe.

- Hold fork inner pipe with clamping block & vice.
- Prefit it with hand & confirm proper thread matching. Then use 30 mm spanner for complete tightening as shown in photograph.
- Remove fork inner pipe from clamping block & vice.

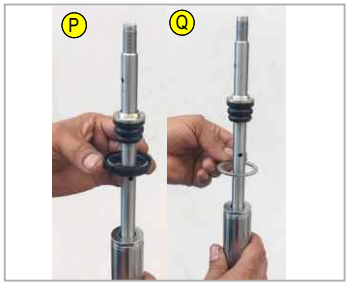


- Insert the following parts on fork inner pipe as shown in photograph-

L – Dust cap
M – New Dust seal
N - Lock oil seal
O - Dip new oil seal in fork oil before use.
P – New Oil seal
Q – Washer .



Note – Replace with new one if found bend.
R– Outer tube

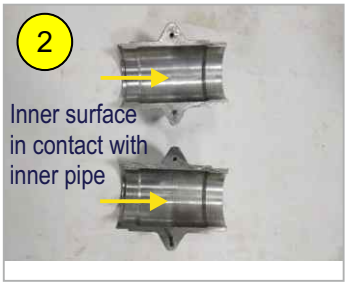


- Hold fork leg assembly as shown in photograph.

Dismantling & Assembling of USD Fork

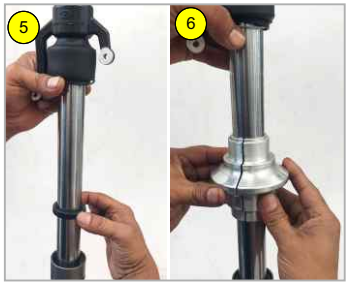
- Special tool for oil seal fitment

1 – Assembled condition
2 – Split condition
3 – Assembly on fork inner pipe
4 – Identification: Oil seal side , to be used for oil seal fitment



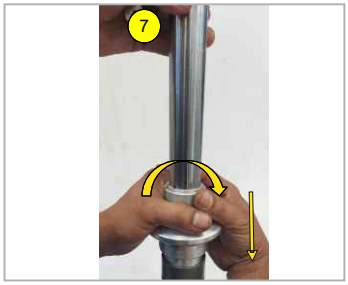
Note :
- Replace with new one if found damaged.
- Do not use tool If dent/scratch mark found on tool inner surface(in contact with inner pipe), bush/oil seal fitment side.

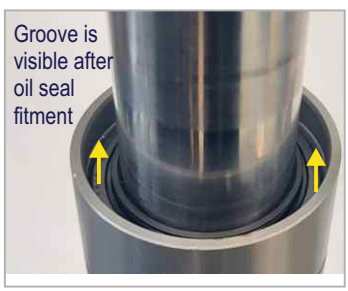
- Insert washer in outer tube



- **Oil seal fitment in outer tube :**

5. Insert oil seal in outer tube
6. Assemble special tool on inner pipe
7. Use special tool for oil seal fitment.
   Rotate & push tool special tool for oil seal fitment
- Take out special tool.





- Ensure that oil seal is properly fitted & groove(in which lock oil seal get fitted) is visible.

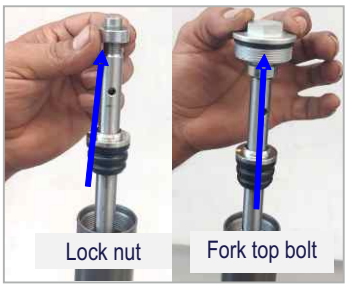
Dismantling & Assembling of USD Fork

- Insert lock oil seal. Fit lock oil seal using appropriate size flat head screwdriver.

  Ensure that "Tuck" sound is heard during lock oil seal fitment in it's groove.

  Ensure that lock oil seal is freely rotating in groove by using screwdriver.

- Fit dust seal and dust seal cap.



- Prefit lock nut completely. Prefit fork top bolt completely as shown in photograph.
- Holding fork top bolt, loosen lock nut by hand till it touches to top bolt.

  Tighten lock nut with 18 mm spanner, holding fork top bolt as shown in photograph.

- Fill the correct quantity of recommended fork oil.

- Prefit fork top bolt in outer pipe.

  Check the working of leg assembly by pressing outer tube from top side in the direction of arrow as shown in photograph.

Working of ABS Brake 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 defects 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.

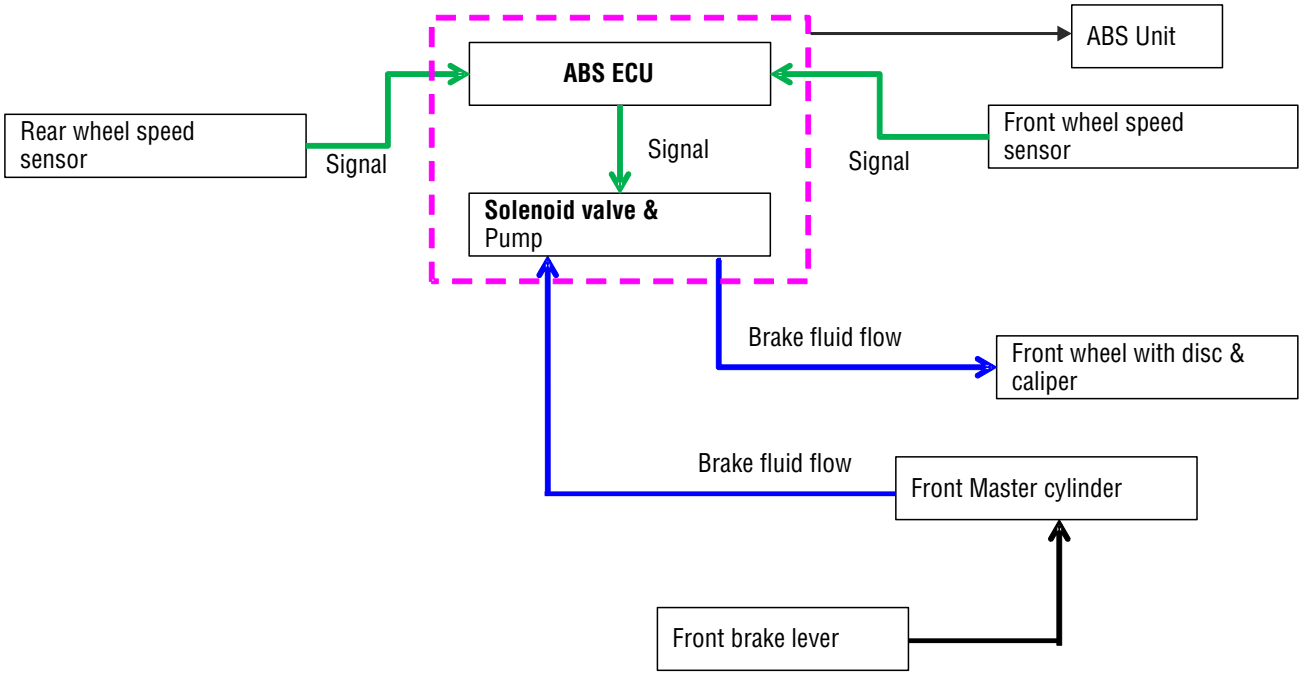
Pump:

To built the pressure whenever is required.

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

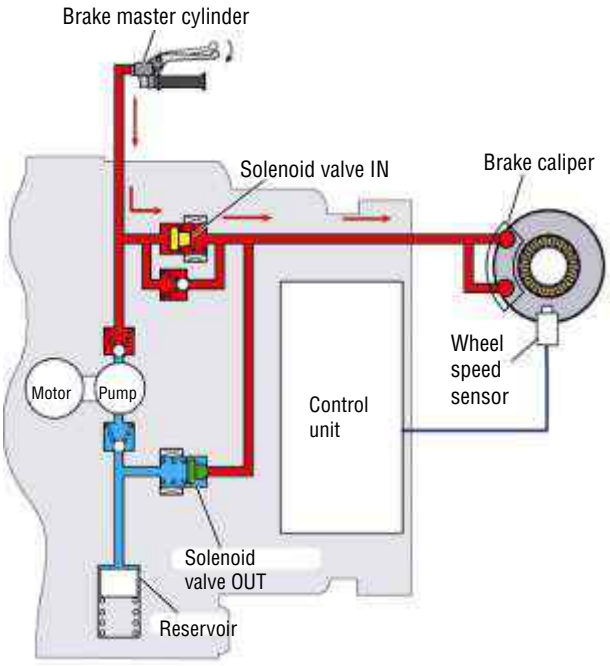
Working of ABS Brake System

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.



Working of ABS Brake 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.

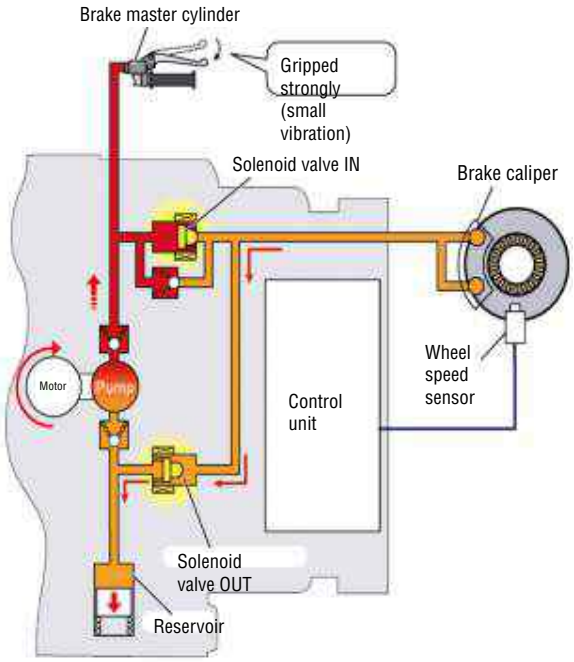
When you apply Front brake under conditions which may lock the wheels, rider will feel a corresponding sensation (pulsation) in the Front Brake Lever. This is normal and it means your ABS is active.

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

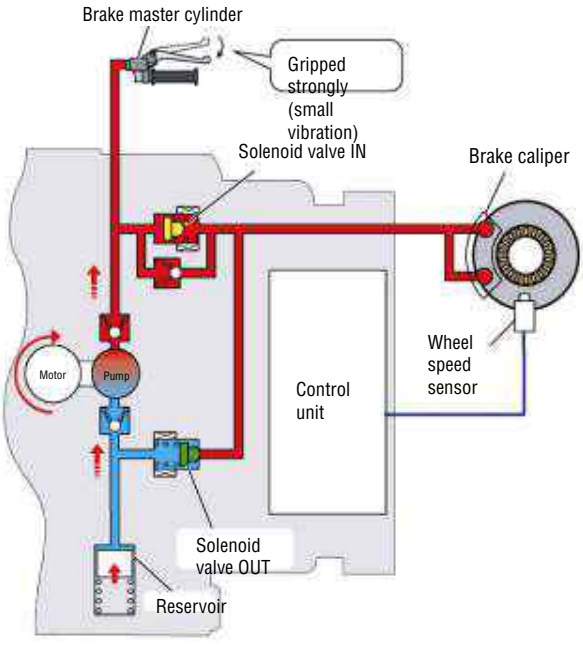
Always slow down when cornering. The anti-lock brake system cannot prevent accidents resulting from excessive speeds. If the ABS warning light is on and stays on, you may have a problem with the ABS. In this case, however, your regular brakes will work normally.

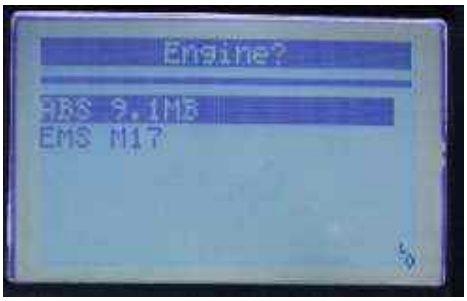
When the ABS is activated

Pressure decrease



Pressure increase

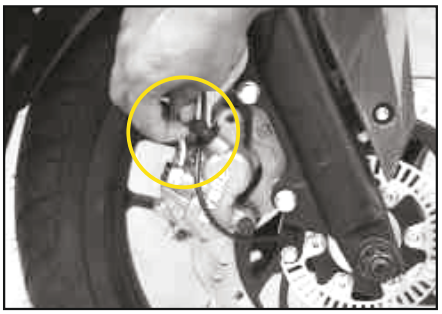




Dismantling & Assembling of Front Disc Brake

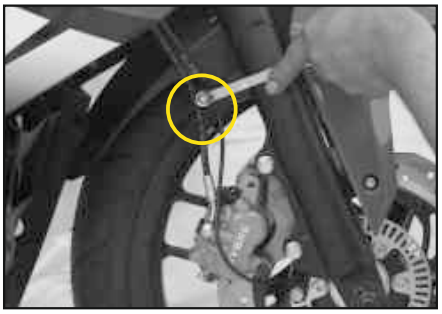
Note: *The images shown below for the SOPs does not resembles with the new bike. However the repair process recommended below is common for all models*

Caliper Anchor Piston Seal & Dust Seal Replacement

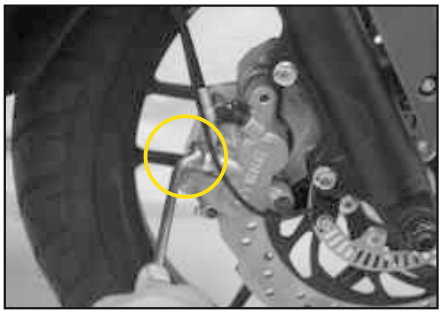


- Clean Caliper assembly thoroughly by low pressure water spray before opening caliper bleeding screw.
- Remove bleeder nut rubber cap.

- Drain the brake fluid from caliper assembly by loosening air bleeder nut with 8 mm spanner & using transparent PUC tube which will avoid spillage of brake fluid on caliper body / disc pads & also powder coating peel off / inefficient braking

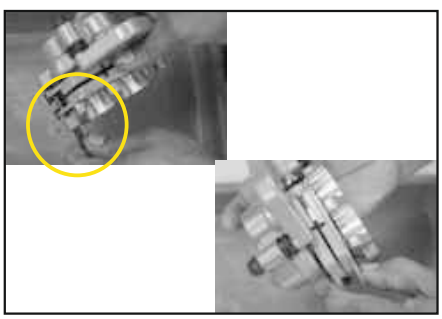


- Remove front brake hose and wheel speed sensor cable mounting bracket bolt with 8 mm spanner.
- Remove front brake hose banjo bolt with 14 mm spanner.



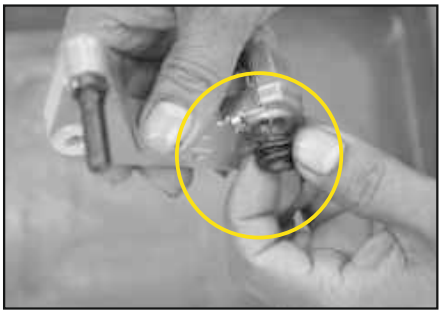
- Remove caliper mounting bolts (2 nos) with 12 mm spanner & take out caliper assembly.

- Remove brake pedal mounting pin lock clips (2 nos) with plier.
- Take out brake pad mounting pin & brake pads.

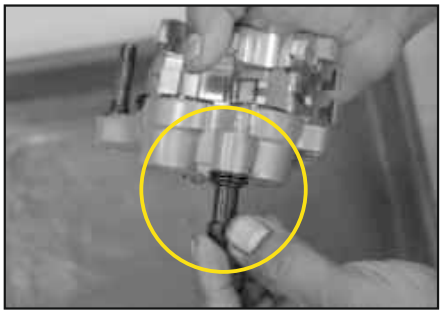


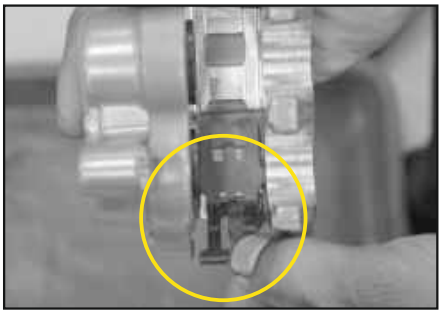
Dismantling & Assembling of Front Disc Brake

- Remove caliper anchor pin holder bracket.

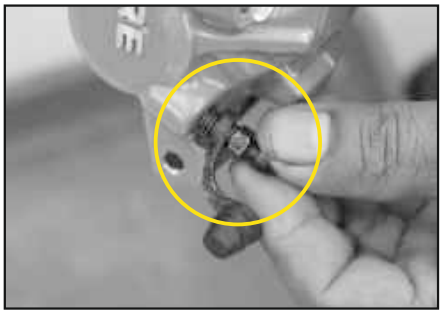


- Remove rubber parts from caliper body.



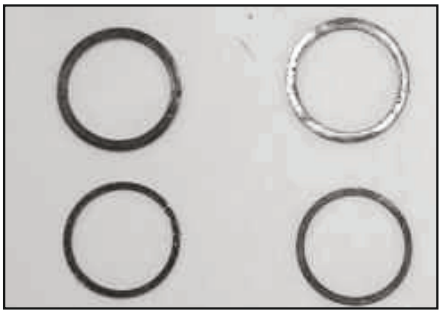


- Remove brake pad spring.
- Remove bleeder nut & it's cap.



- Remove caliper pistons by applying low compressed pressurized air (> 2 bar) through banjo bolt hole.

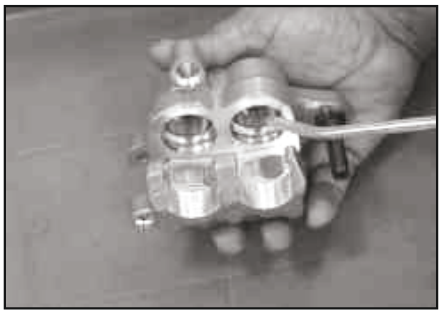
  Note :- Don't apply high compressed air pressure > 2 bar. This could cause piston to fly out from caliper body causing damaged to it & any one in the vicinity.



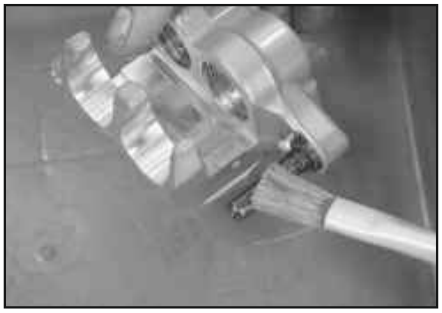
- Remove dust seals & oil seals.

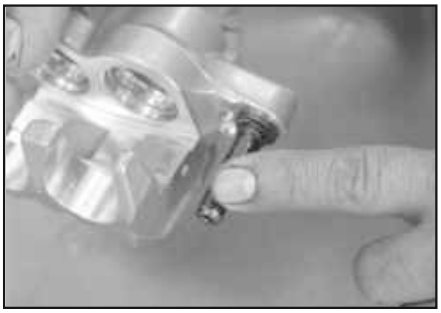
Dismantling & Assembling of Front Disc Brake

- Clean caliper body by diesel / kerosine.
- Dry caliper body by applying low pressure compressed air.



- Clean the anchor pin and holder bracket thoroughly.



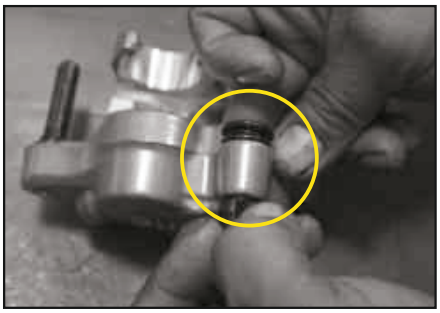


- Smear silicon grease on anchor pins evenly.

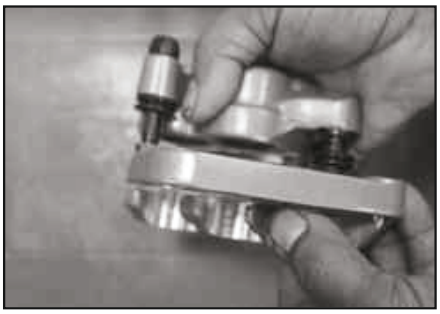
- Fit new dust seal and oil seal in caliper body.
- Smear silicon grease on piston OD & rubber seals.

- Fit caliper pistons.

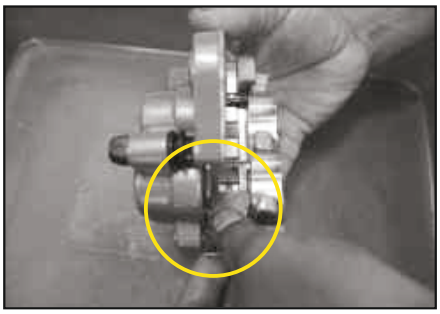
Dismantling & Assembling of Front Disc Brake

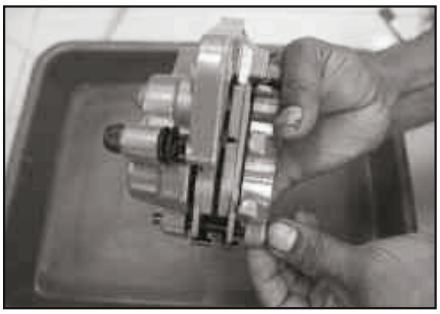


- Fit all rubber parts.

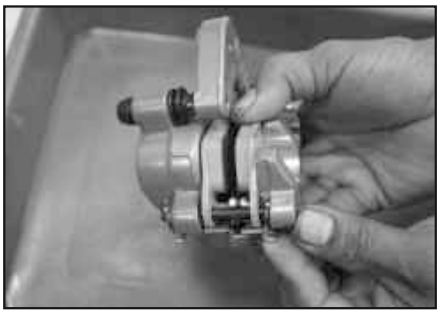


- Fit anchor pin holder bracket.
- Fit brake pad spring.

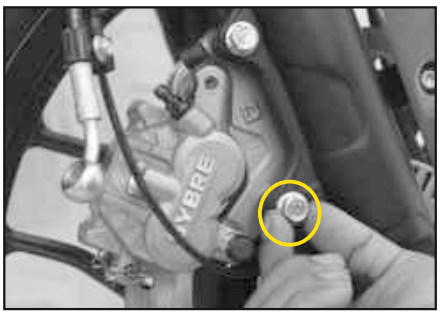




- Clean brake pads by sand / polish paper.
- Fit brake pad, brake pad mounting pin & brake pad mounting pin lock.



- Fit bleeder nut along with rubber cap with 8 mm spanner.
- Fit caliper body on fork location Pre-fit caliper mounting bolt & tighten it to recommended torque by torque wrench.



Dismantling & Assembling of Front Disc Brake

- Pre-Fit air bleeder nut with 8 mm spanner.

- Remove master cylinder cover mounting screws (2 nos) with phillips head screw driver & take out master cylinder cover.

- Remove PVC cap & rubber diaphragm.

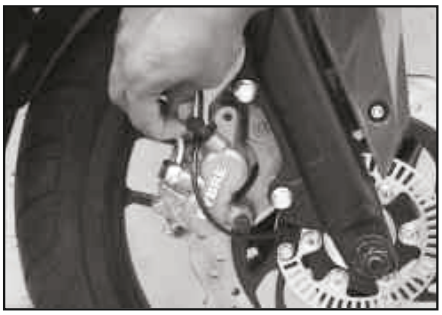
- Fill the master cylinder reservoir by recommended brake fluid (DOT 4)
- Fit a proper tube which fits slightly tight on bleeder screw nipple.

- Insert 8 mm ring spanner through pipe fitted on bleeder screw nipple.
- Connect tube to siphon pumps pipe and loosen bleeder nut by ring spanner.

Dismantling & Assembling of Front Disc Brake

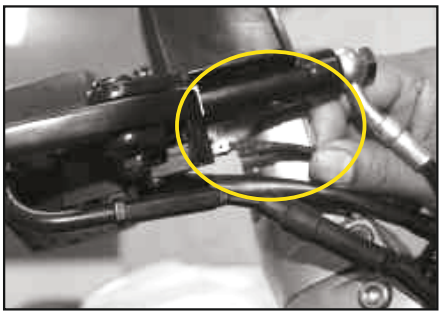
- Press bellow siphon pup in its valve open position then close the valve of pump & release the bellow, simultaneously press the brake lever to take out air trapped in the system. Carry out the same procedure until entire air trapped in the system gets removed.
- During this process continuously monitor & maintain the brake fluid level in master cylinder reservoir slightly above MIN mark.
- Ensure front wheel is rotating freely.
- Tighten bleeder nut.
- Route front wheel speed sensor cable inside bleeder rubber cap as shown in photograph & fit rubber cap.
- Fit rubber diaphragm, PVS cap & master cylinder cover.

Master Cylinder Piston Kitt Replacement

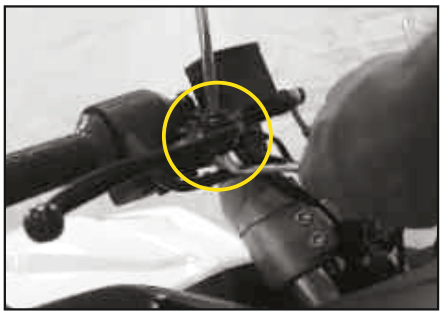


- Clean master cylinder thoroughly by keeping nozzle in spray mode before opening master cylinder top cover.
- Remove bleeder nut rubber cap.

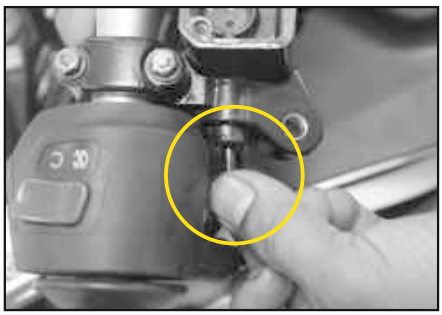
- Drain the brake fluid from caliper assembly by loosening air bleeder screw & using transparent PVC tube which will avoid spillage of brake fluid on caliper body / disc pads & also powder coating peel off / inefficient braking.



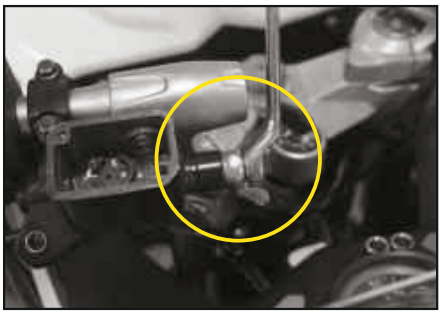
- Remove front brake switch terminal connectors.
- Remove front brake lever mounting nut with 10 mm spanner holding with phillips head screw driver



- Take out front brake lever.
- Remove master cylinder reservoir cover, PVC cap & rubber diaphragm.
- Remove actuating shaft.

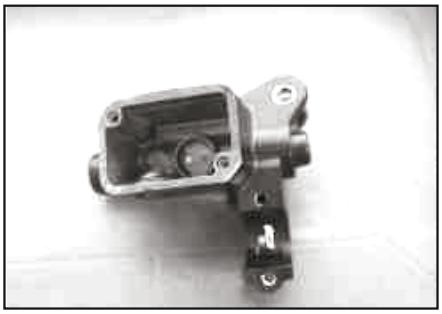


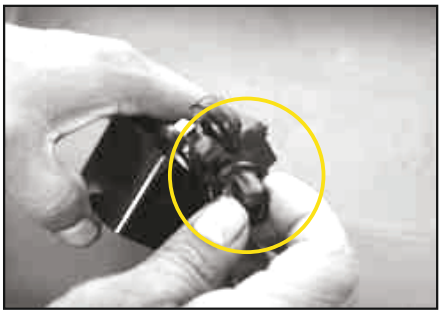
Dismantling & Assembling of Front Disc Brake



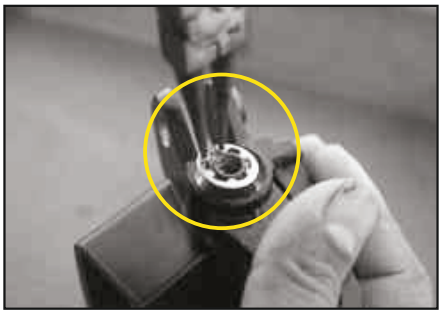
- Remove front brake hose mounting bolt with 14 mm spanner from master cylinder end.
- Take out front brake hose.

- Remove master cylinder mounting bolts (2 nos) with 8 mm spanner & take out master cylinder.





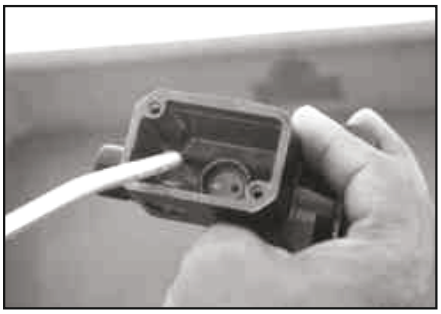
- Remove actuating shaft rubber boot.
- Remove master cylinder piston air clip.



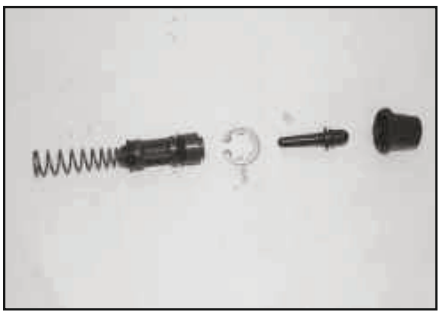
- Insert blunt tipped screw driver from banjo bolt side and push piston towards brake lever side. ensure master cylinder does not get damaged due to screw driver
- Take out piston assembly from brake lever side.

- Clean master cylinder with brake fluid.

Dismantling & Assembling of Front Disc Brake



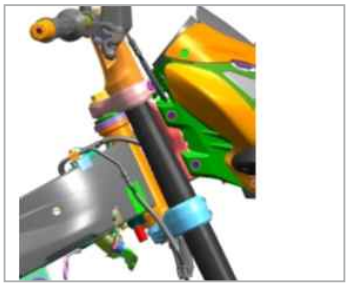
- Dry master cylinder with low compressed air pressure (> 2 bar)



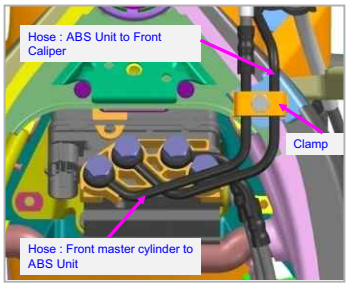
- Smear silicon grease on new piston seals of master piston kit.
- Fit new master cylinder piston inside master cylinder from brake lever side.
- Fit air clip actuating shaft rubber boot and actuating shaft.
- Fit master cylinder on vehicle.
- Fit brake hose replace copper washer with new one.
- Fit front brake lever.
- Fill brake fluid & carry out air bleeding.
- Fit master cylinder diaphragm. PVC cap and cover.

ABS HOSE ROUTINE SOP

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

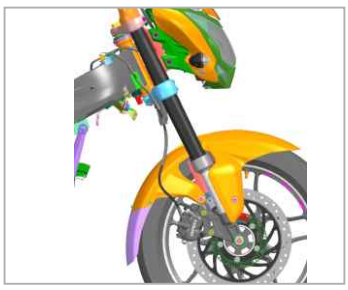


- Route brake hose as shown in photograph.



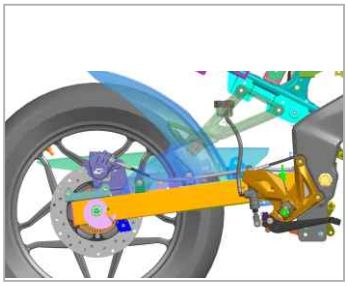
- Route brake hose through the clamp & connect to ABS Unit as shown in photograph.
- Route brake hose from ABS unit through clamp as shown in photograph.

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

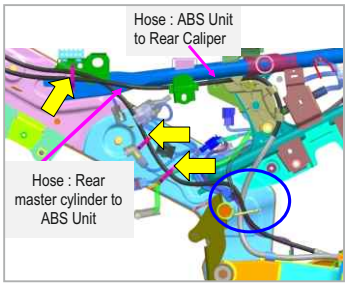


- Connect brake hose from ABS unit to front caliper as shown in photograph.

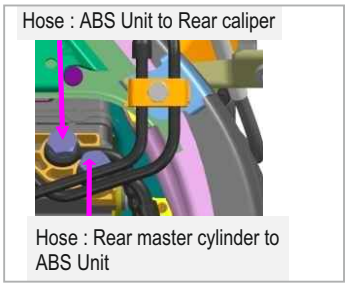
ABS HOSE ROUTINE SOP



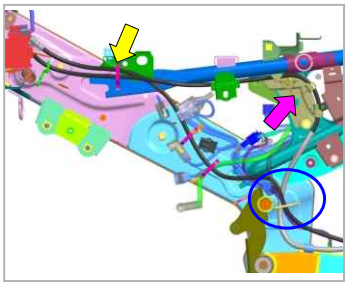
- Route brake hose from front master cylinder as shown in photograph.



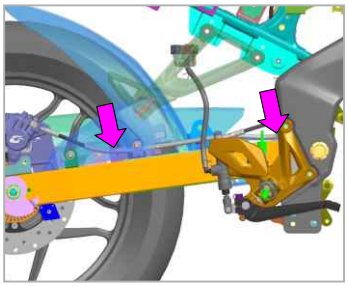
- Route brake hose as shown in photograph.



- Connect brake hose 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.



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

Notes

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 6
Electrical

VRLA Battery Initial Filling

VRLA Battery Charger & its Charging SOP

Electrical Checking Procedure

Do's & Don'ts

Electrical Circuit Diagrams (Bosch & Varroc)

VRLA Battery Initial Filling

Battery Technical Specification

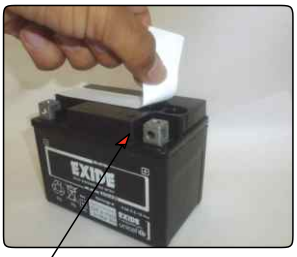
• Make	Exide
• Terminal Voltage	12 Volt
• Type	VRLA Battery
• Capacity	8 Ah
• Charging Current Specification	4.0 Amp
• Charging Voltage Specification	14.5 V ± 0.2 VDC
• Battery Charger	Metafab / Apple Energy Make

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.



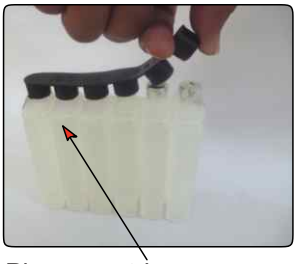
Step 2: Get the electrolyte ready

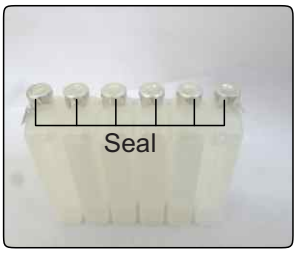
Remove electrolyte container from the packing.

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.





VRLA Battery Initial Filling

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 tilled. If tilled 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

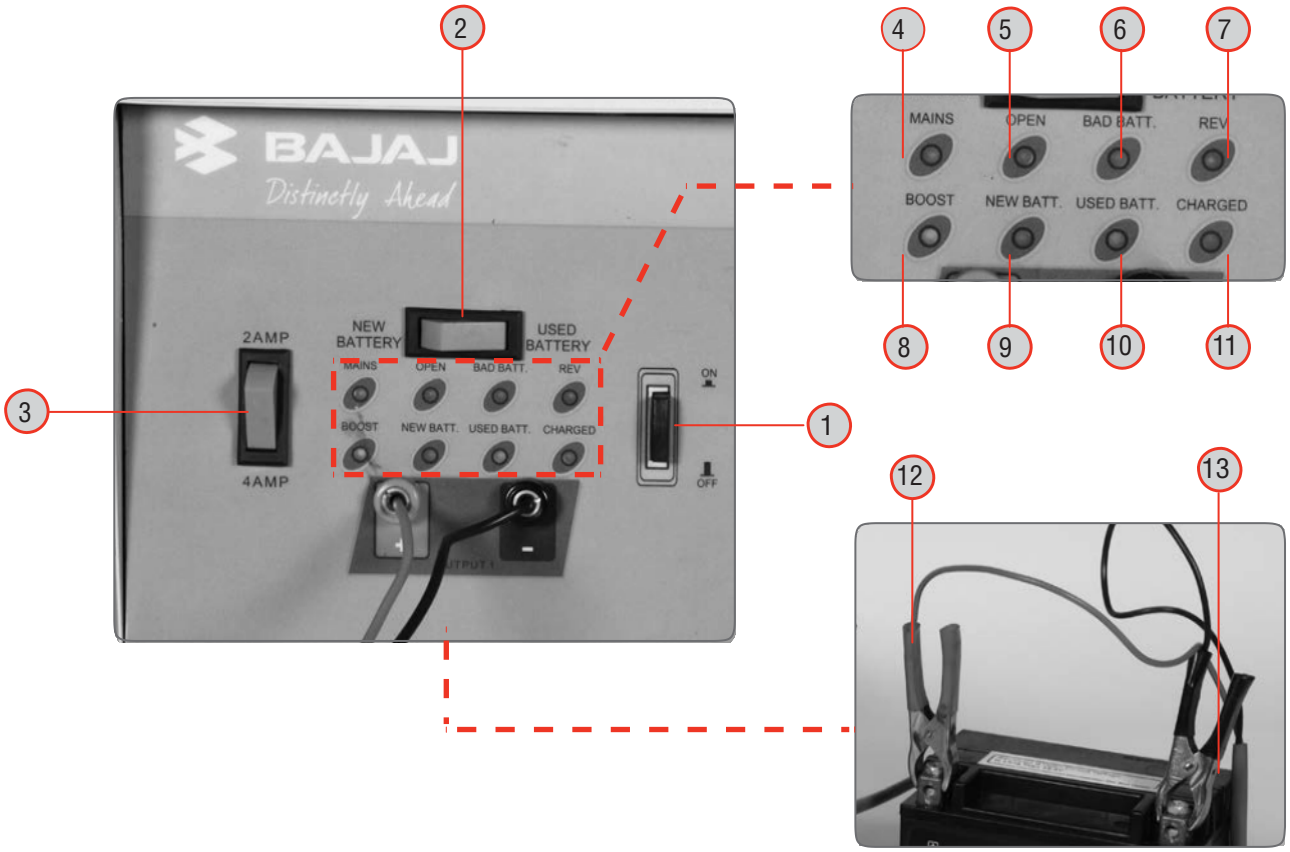
Charge the battery on BAL recommended VRLA battery charger as per std. SOP.

Caution

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

VRLA Battery Charger & its Charging SOP

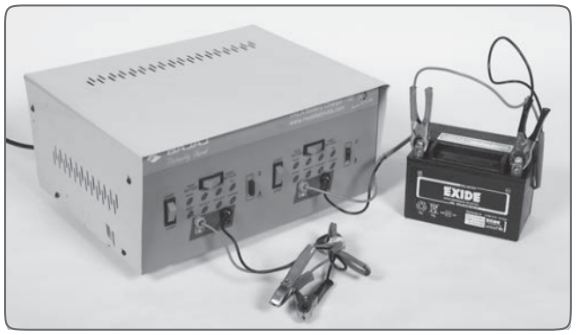
Metafab VRLA Battery Charger Indication Display



1. ON / OFF Switch
2. New battery / use battery switch
3. 2 Amp / 4 Amp current selection switch
4. Main power supply indication light (Green)
5. Open circuit indication light (Red)
6. Bas battery indication light (Red)
7. Reverse polarity indication light (Red)
8. Boost indication light (White)
9. New battery indication light (Yellow)
10. Use battery indication light (Blue)
11. Charged indication light (Green)
12. -ve terminal (Black)
13. +ve terminal (Red)

VRLA Battery Charger & its Charging SOP

Battery Charging Procedure for Metafab make VRLA Battery Charger



Charging SOP	Refer Charger Photo
Remove battery from vehicle and Clean battery thoroughly.	-
Connect battery charger to 230 V AC single phase power supply and switch on the button of main supply.	-
"Connect battery charger leads to battery terminals. Red lead to +ve terminal and Black lead to-ve terminal."	13 12
Switch on the battery charger main switch. Green LED will glow.	4
If Red LED glows it indicates reverse polarity connection.	7
"Select charging current 2 Amps or 4 Amps. **(2 Amps for 3 Ah / 4 Ah / 5 Ah VRLA batteries, 4 Amps for 6 Ah / 8 Ah / 10 Ah VRLA batteries)."**	3
Select and press the charging switch for new battery or use battery (Green and Blue LED glow for new and use battery)	2 4 10
If Red LED blinks it indicates open circuit situation.	5
Battery charger detects the battery voltage. If it is less than 5 volts it will switch over to Boost charging mode White LED below the “Boost” will glow	8
"Battery charger detects battery voltage after every 3 minutes. If voltage increases above 5 volts it switches over to selected charging mode ie NEW/ USED."	9 10
Charging duration in this mode is 30 minutes. If the battery voltage is less than 5 volts after 30 minutes a Red LED indicating a bad battery will glow. This indicates the battery is not suitable for charging.	6
"If battery charger is switches to NEW/USED charging mode, the battery would undergo charging for 5 to 14 hours depending on battery condition."	-
After completion of battery charging a Green LED will glow to indicate completion of charging.	11
Switch off the main switch and disconnect the battery from the charger	-
Reconnect the battery terminals on vehicle.	-
Apply petroleum jelly to battery terminals.	-

Note: During charging if the battery is disconnected, an audio indicator will beep for 2 minutes with a Red LED blinking to indicate open circuit situation.

Electrical Checking Procedure

Components		Standard Value
Starter Relay Coil		3.9 Ohms ± 10%
Battery Charging Coil		0.4 to 0.6 Ohms
Pick Up Coil		390 ± 10% Ohms
DC Charging Voltage		14.4 ± 0.2 V
DC Charging Current		17.2 ± 0.5Amp @ 4000RPM @14V
Horn		2.5A Max @12V
low oil pressure icon in speedometer console will on		Continuously ON: If RPM > 4500 Coolant temp range < 50°C continuously for Time > 30 sec.
Roll Over Sensor	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
	Input voltage:	5V
Crank Angle Sensor resistance		390± 10% Ohms
TMAP sensor	Resistance	2 + 0.5 K Ohms @ 25 C
	Input Voltage	5V
	Output Voltage	0.4 ~ 4.65 V
sensor	Input voltage	5V
	Output voltage throttle	0.49 V
	Output Voltage wide open throttle	4.48 V
	Coil Resistance	2000 ± 600

Electrical Checking Procedure

Components		Standard Value
Stepper Motor resistance :		51 ± 10%
Intermediate Relay resistance :		100 ± 10%
Side Stand Switch	Input voltage (Side Stand position - any)	5V
	Output voltage (Side Stand position - OFF)	0.14 ~ 0.54 V
	Side stand Side (Stand position - ON)	3.51 ~ 3.71 V
Fuel Injector resistance		12 ± 0.6 Ohms @ 20^{0}C
LH H.T. Coil resistance :	Primary	0.7 ± 10%
	Secondary	13.5 ± 20% K
RH HT. Coil resistance :	Primary	2.3 ± 10% Ohms
	Secondary	13 ± 20% K Ohms
Radiator Fan	Fan motor START at temperature	98 Degree C
	Fan motor OFF at temperature	92 Degree C

	Temperature in Degree Centigrade	Resistance in K Ohms
Coolant Temperature Sensor	0	5.3 ~ 6.11
	10	3.44 ~ 3.92
	20	2.28 ~ 2.58
	25	1.88 ~ 2.12
	30	1.55 ~ 1.75
	40	1.06 ~ 1.21
	50	0.75 ~ 0.86

Do's & Don'ts

Battery

Dos

- DO Apply petroleum jelly to terminal post

- DO – Use proper equipment for testing

- DO – Use correct tools

Don'ts

- DON'T Apply Grease to terminal post

- DON'T Short circuit the terminal post

- DON'T – Use wrong tools

Do's & Don'ts

Horn

Dos

- Adjust horn sound by rotating the Phillips screw in the direction of arrow provided on horn.

Don'ts

- Never adjust the nut on horn cap side and bracket end (horn back side) as it will result in horn malfunctioning and failure.
- Do not remove silicon sealant from adjustment screw as it will result in water entry inside the horn.

Switches

Dos

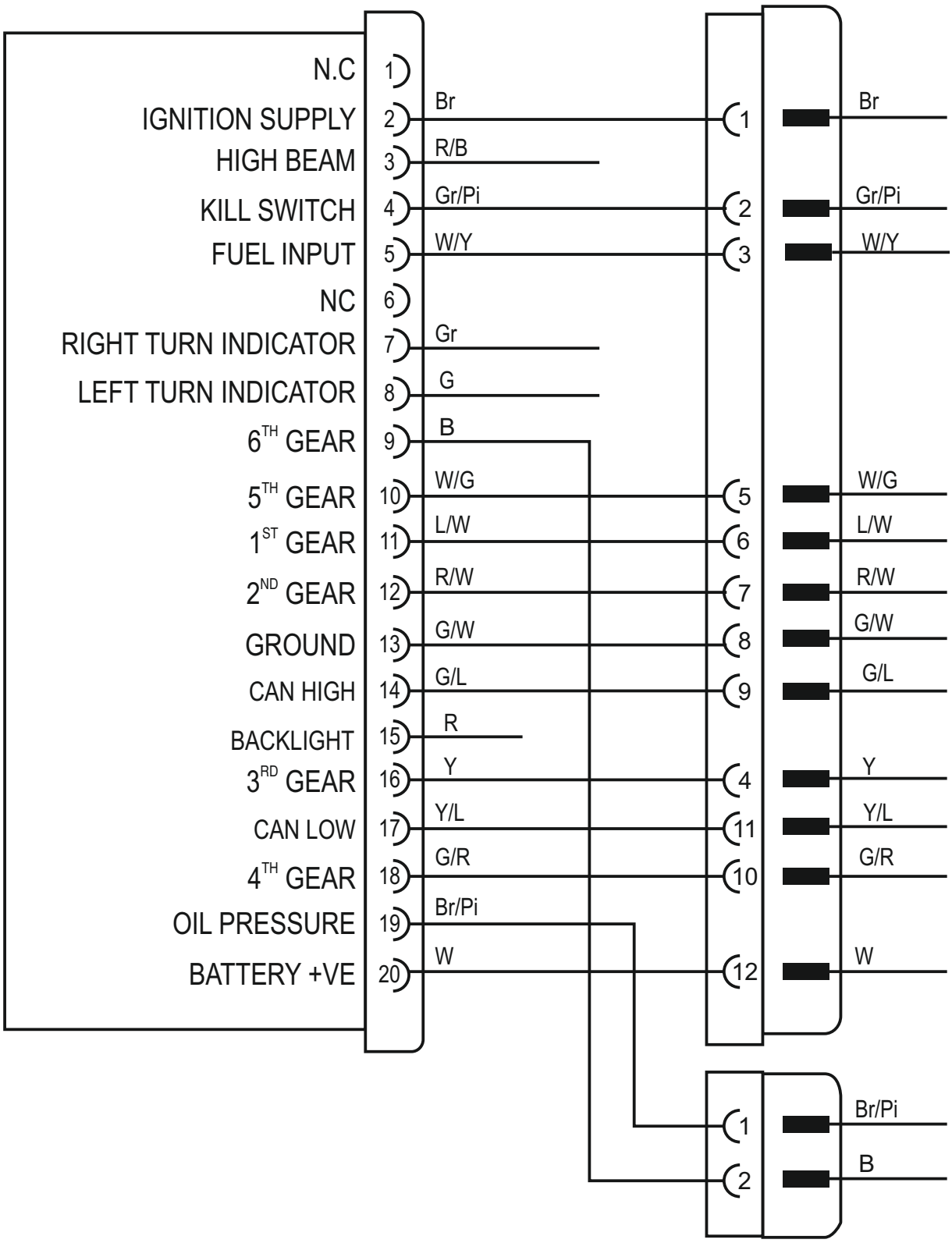
- After washing the vehicle ensure to apply dry air on switches before operation.
- Ensure that grommets provided on clutch switch, front brake switch and rear brake switch are intact.

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 switch mounting screw.

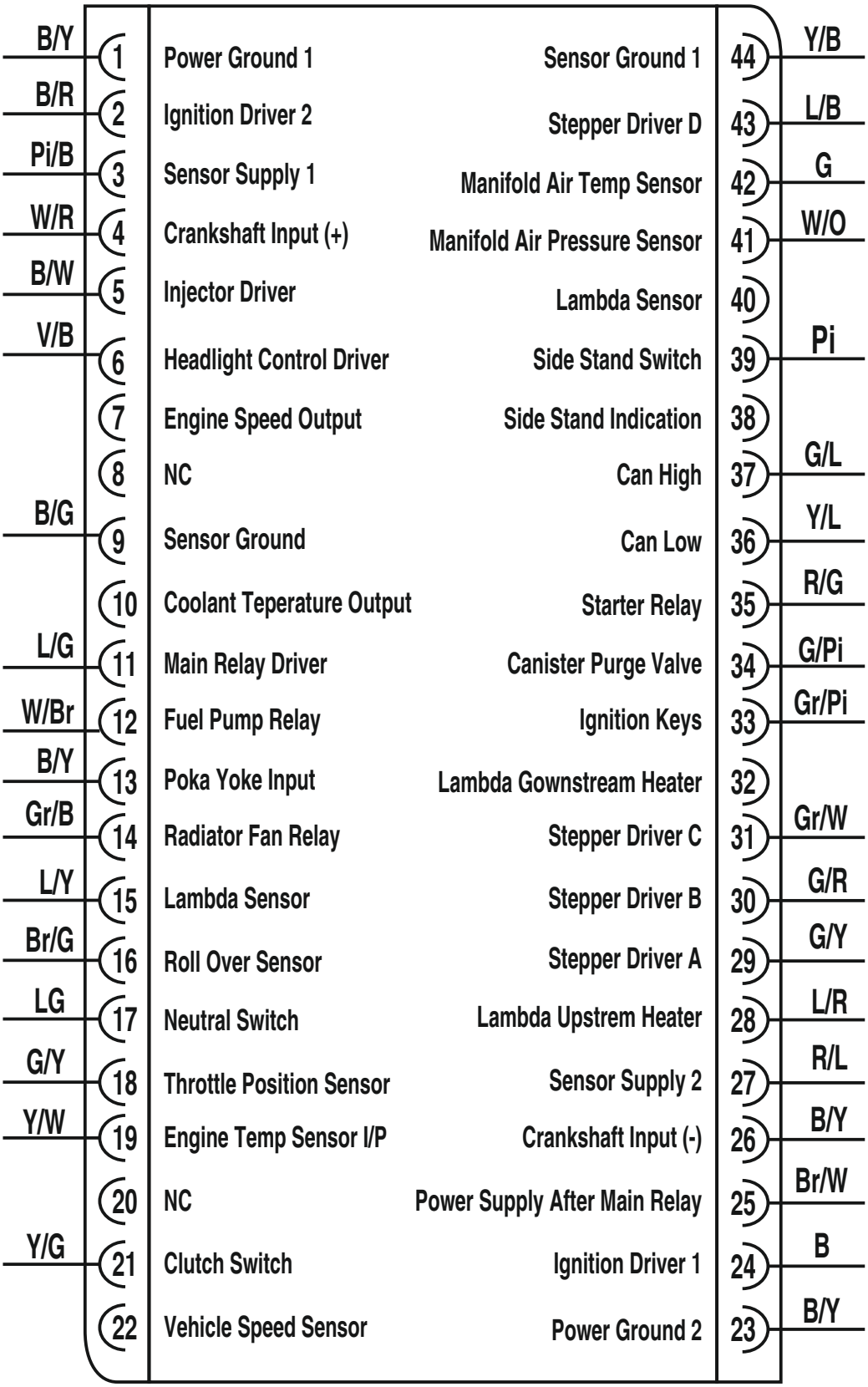
Electrical Circuit Diagrams : BOSCH

SPEEDOMETER PIN DETAILS



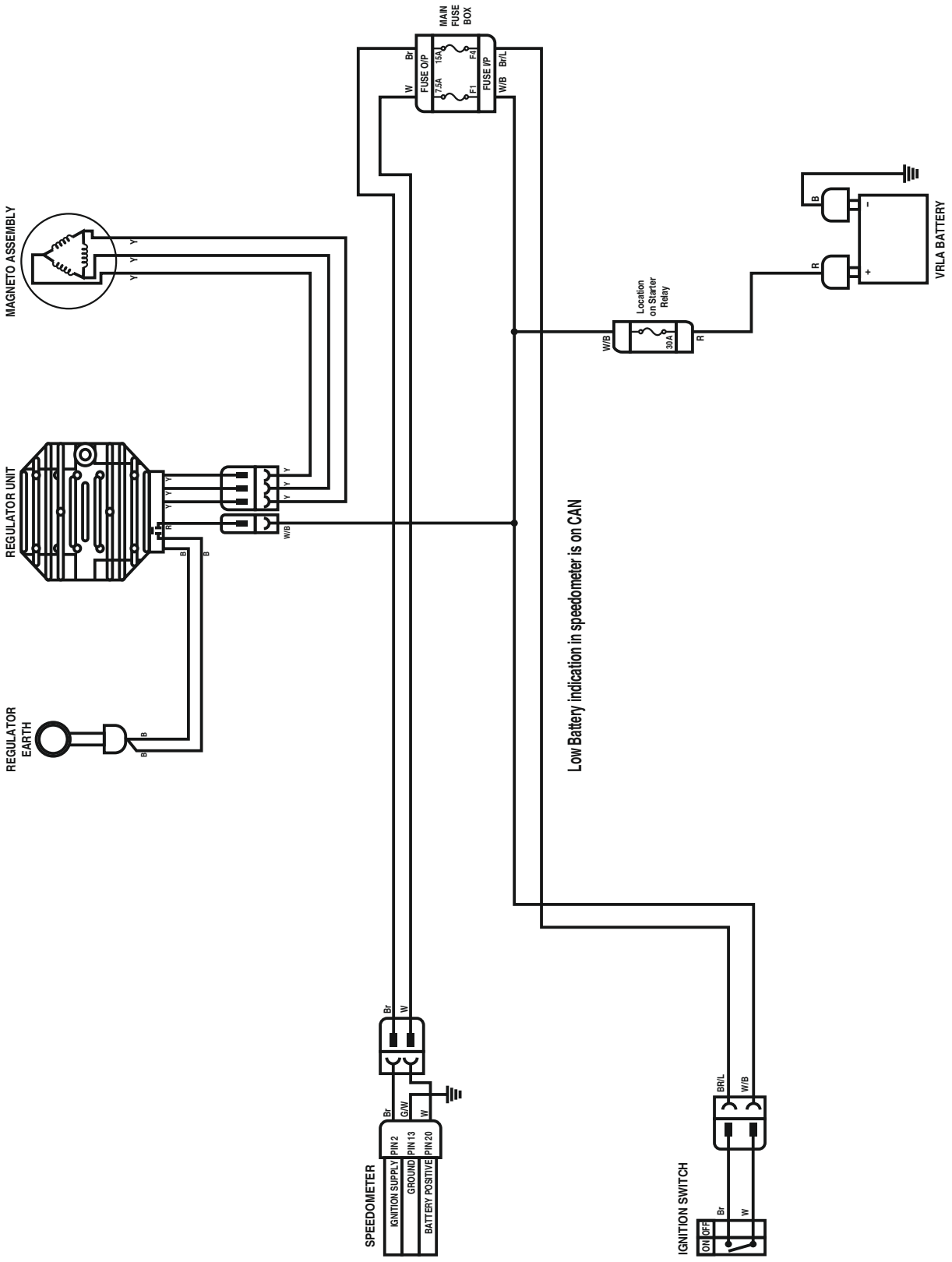
Electrical Circuit Diagrams : BOSCH

ECU PIN DETAILS



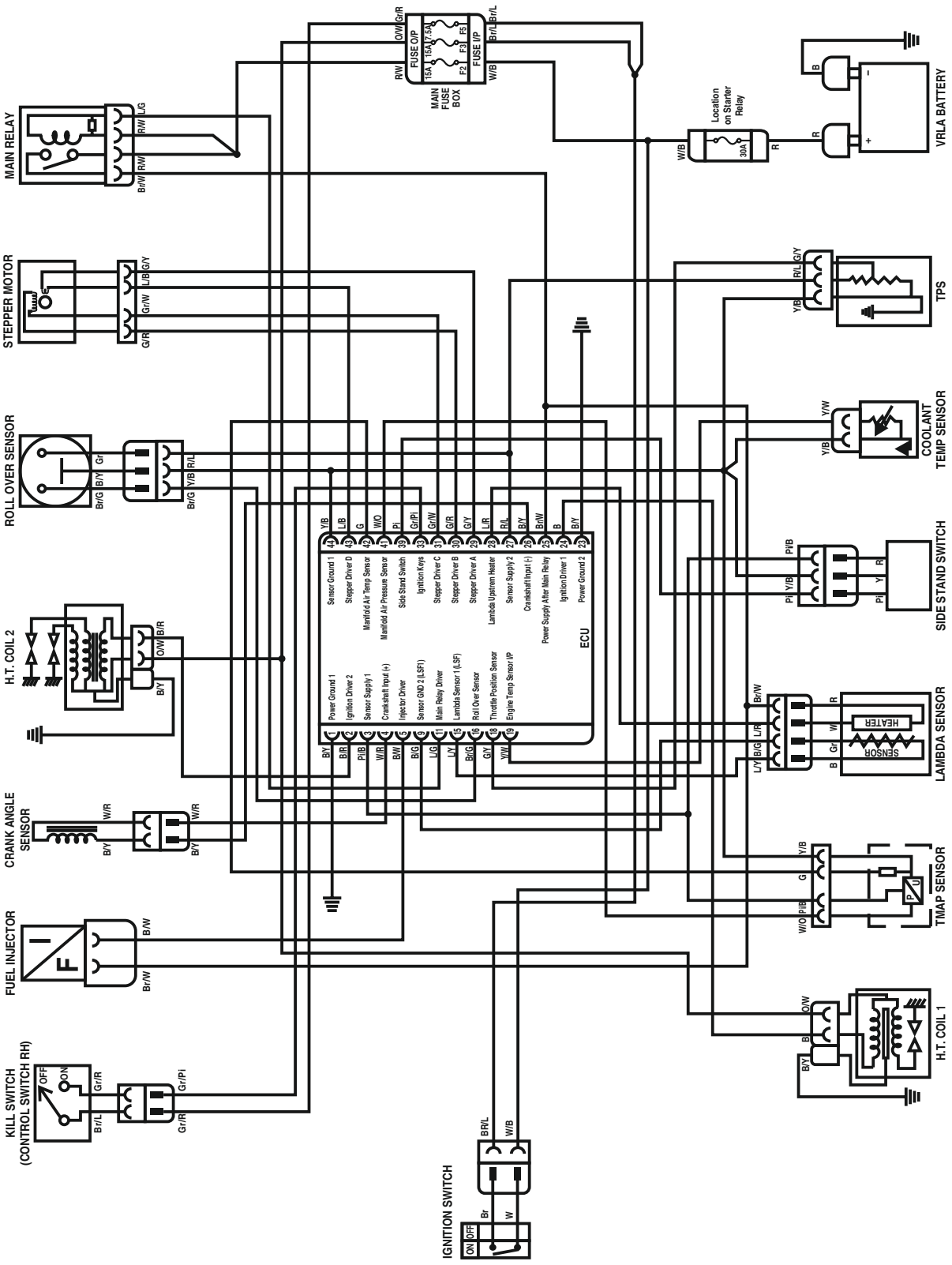
Electrical Circuit Diagrams : BOSCH

BATTERY CHARGING CIRCUIT



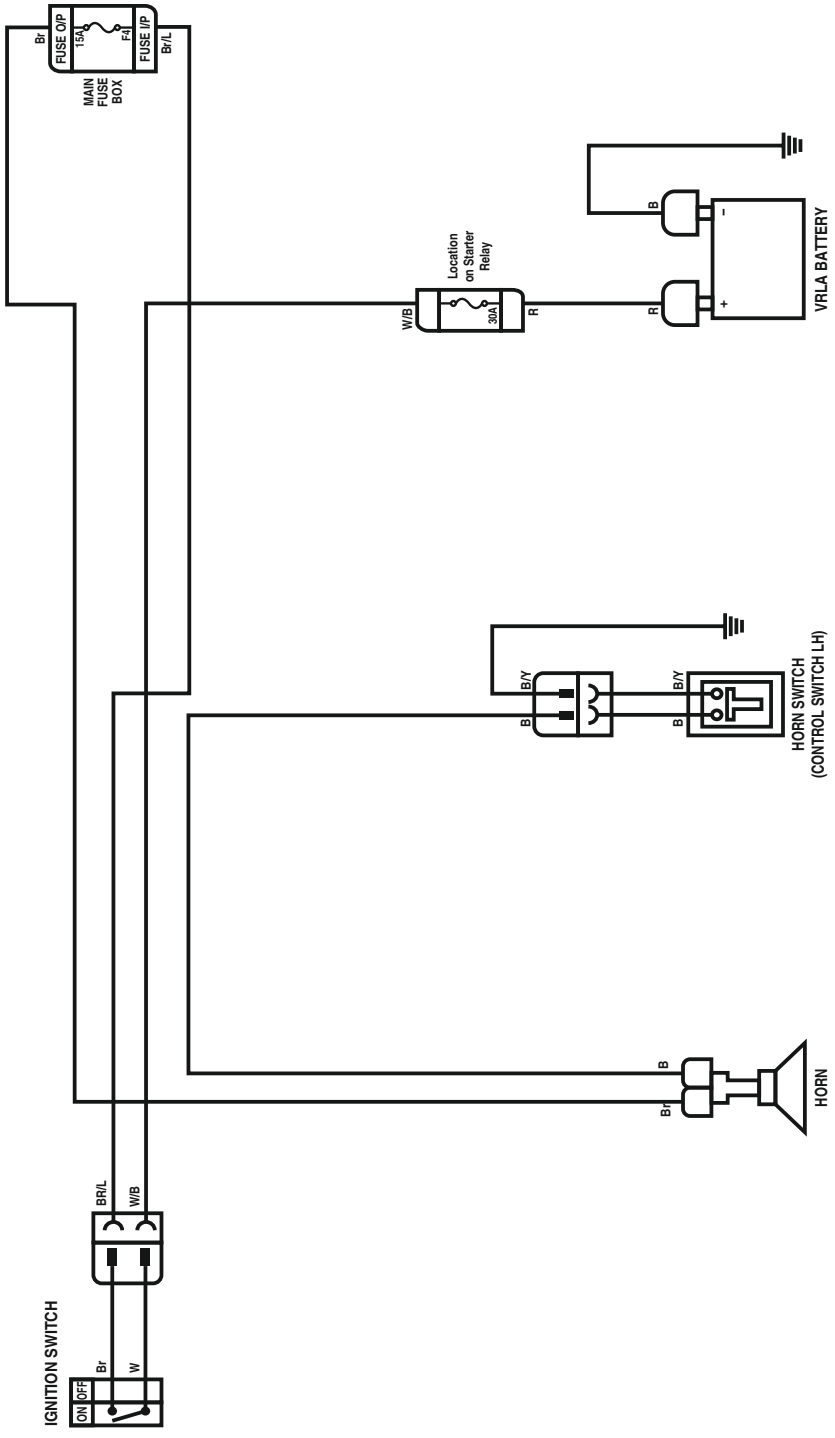
Electrical Circuit Diagrams : BOSCH

IGNITION CIRCUIT



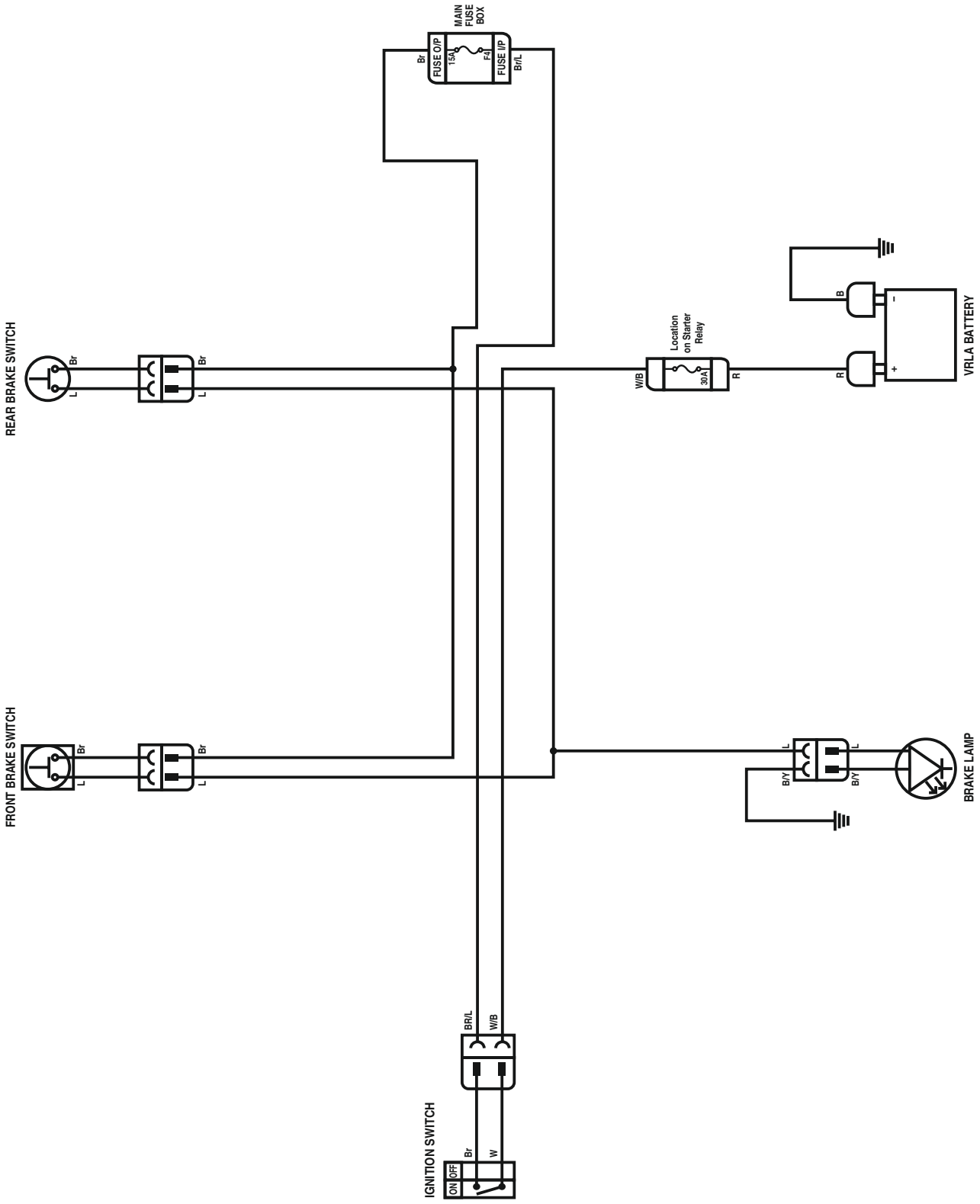
Electrical Circuit Diagrams : BOSCH

HORN CIRCUIT



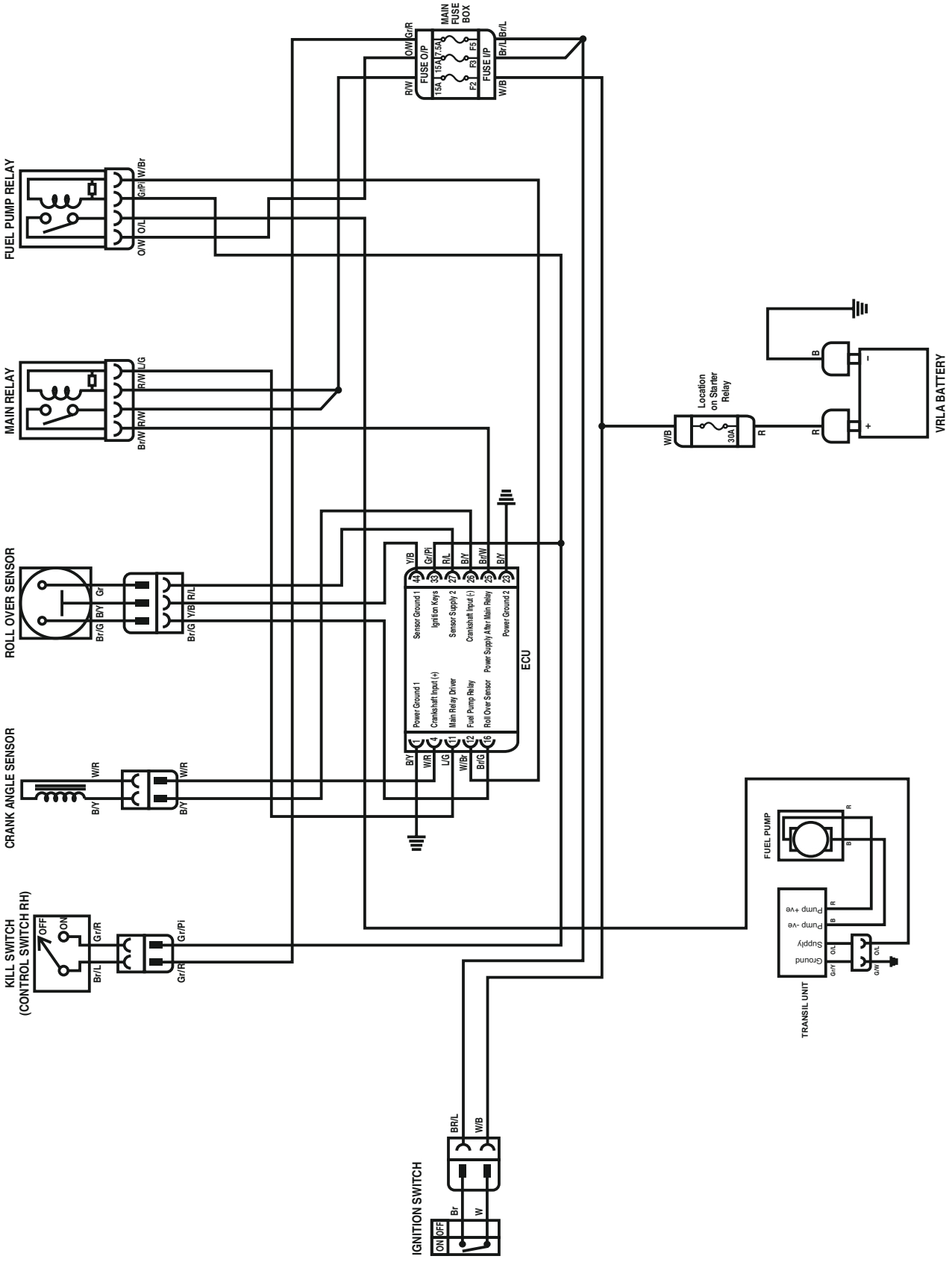
Electrical Circuit Diagrams : BOSCH

BRAKE LAMP CIRCUIT



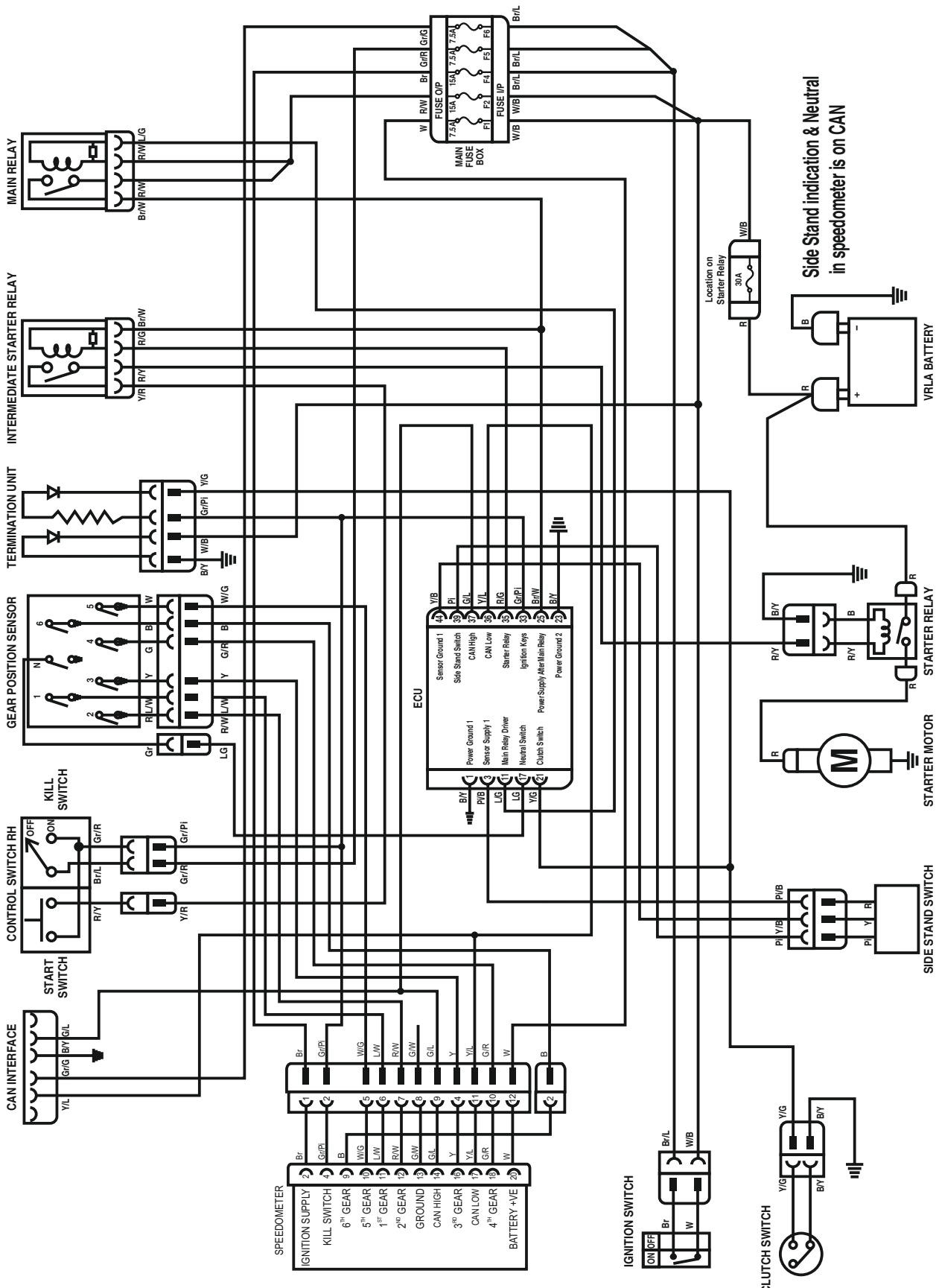
Electrical Circuit Diagrams : BOSCH

FUEL PUMP CIRCUIT



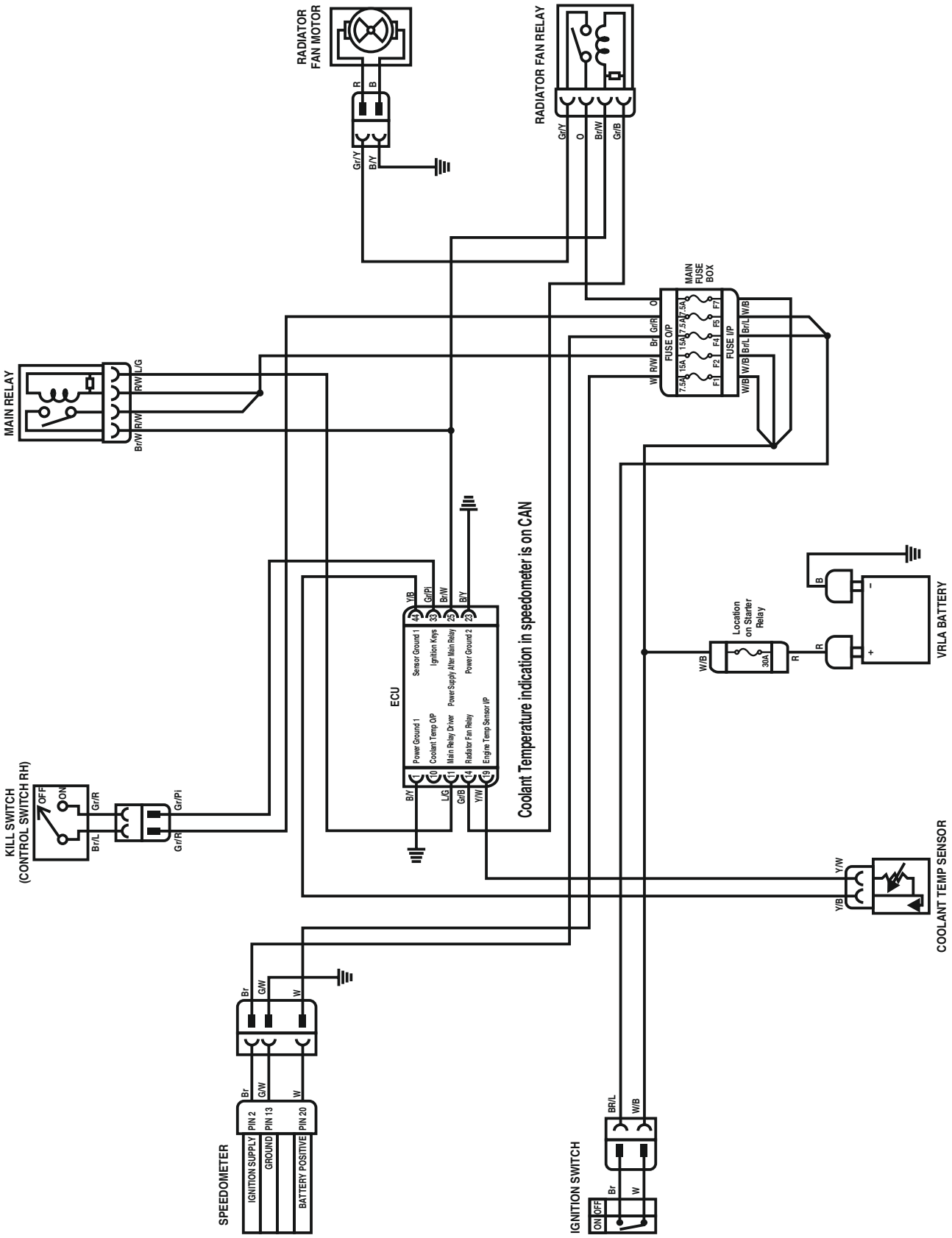
Electrical Circuit Diagrams : BOSCH

STARTER MOTOR CUM SIDE STAND INDICATION CIRCUIT



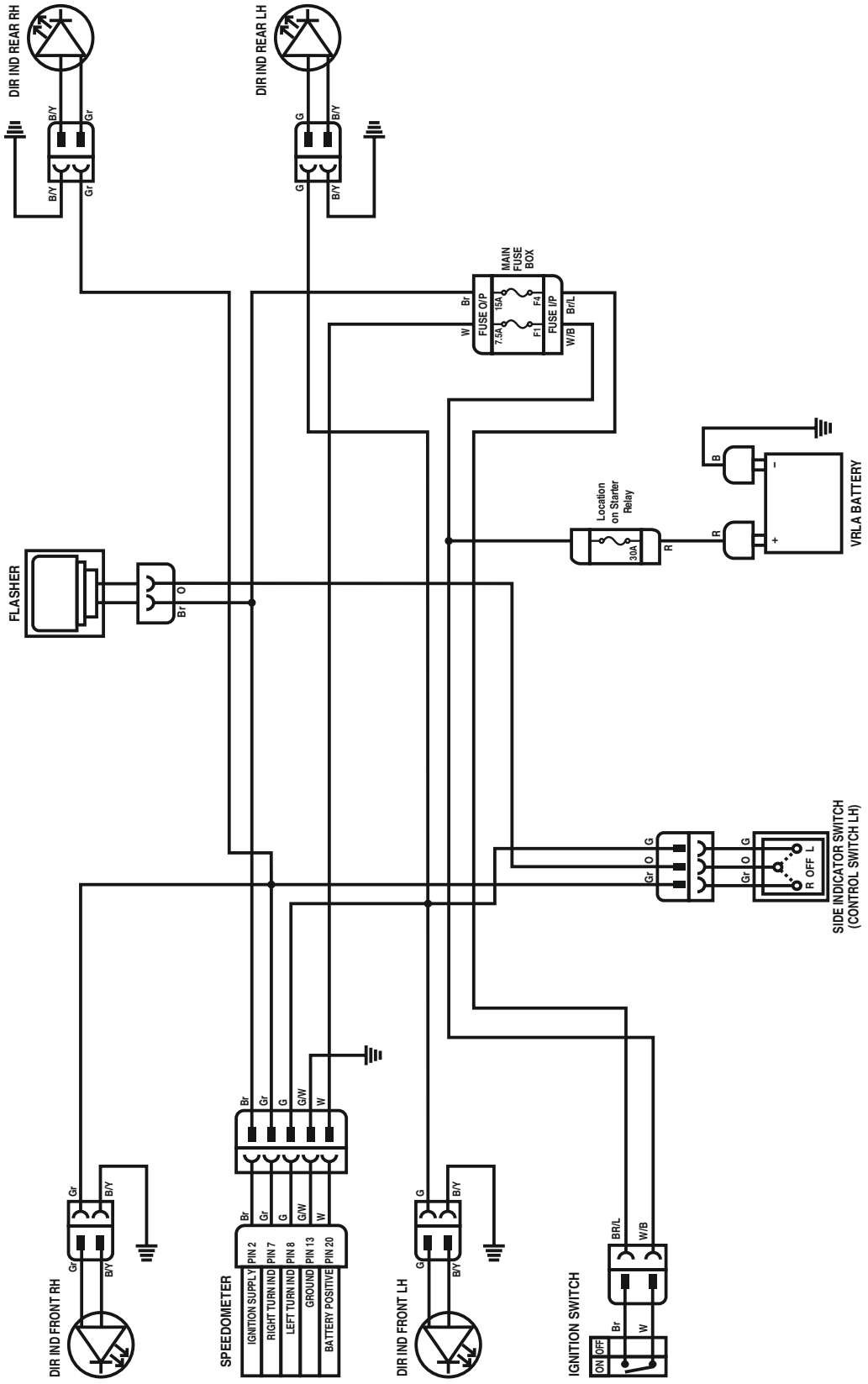
Electrical Circuit Diagrams : BOSCH

RADIATOR FAN MOTOR CIRCUIT



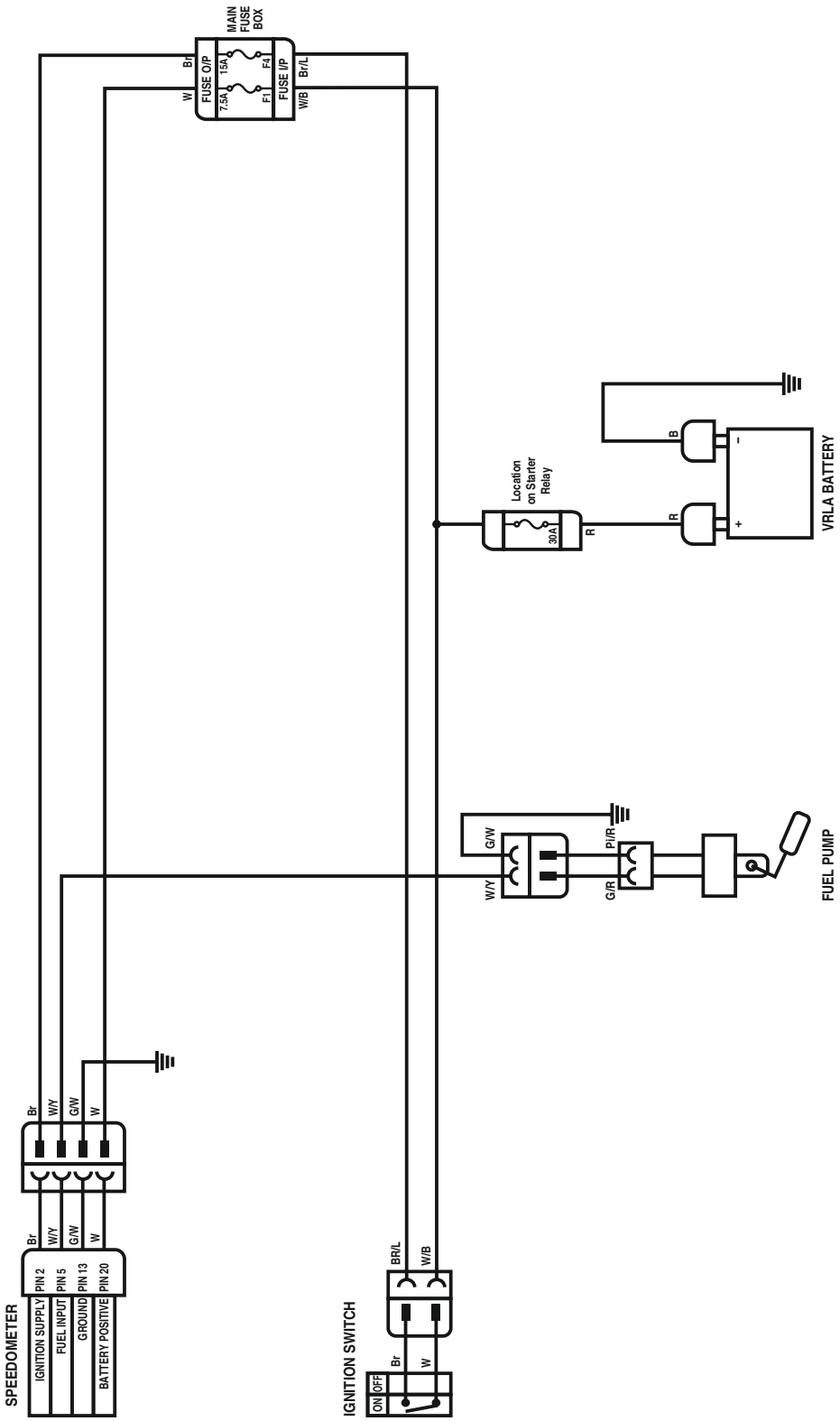
Electrical Circuit Diagrams : BOSCH

SIDE INDICATOR CIRCUIT



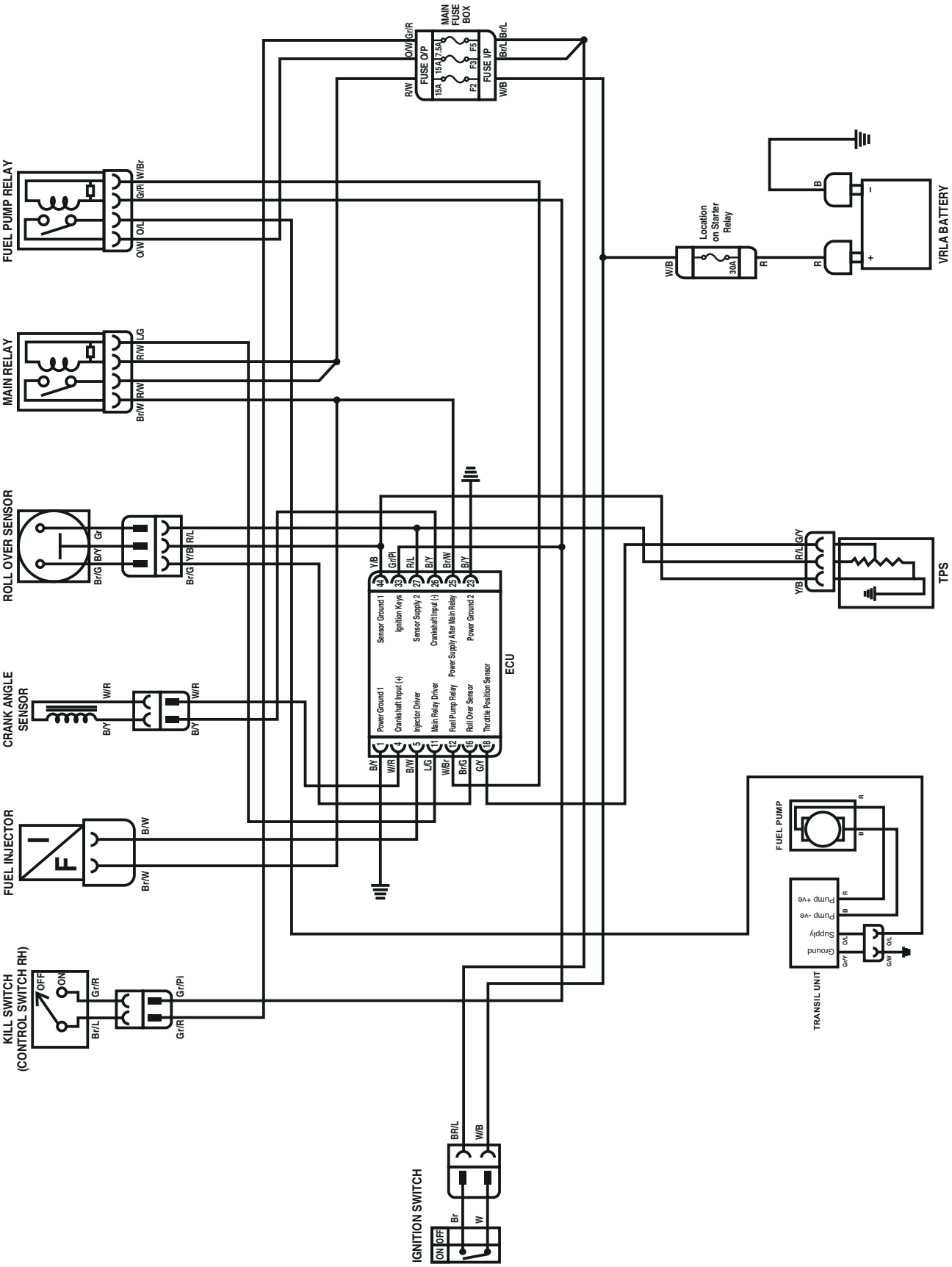
Electrical Circuit Diagrams : BOSCH

FUEL METER CIRCUIT



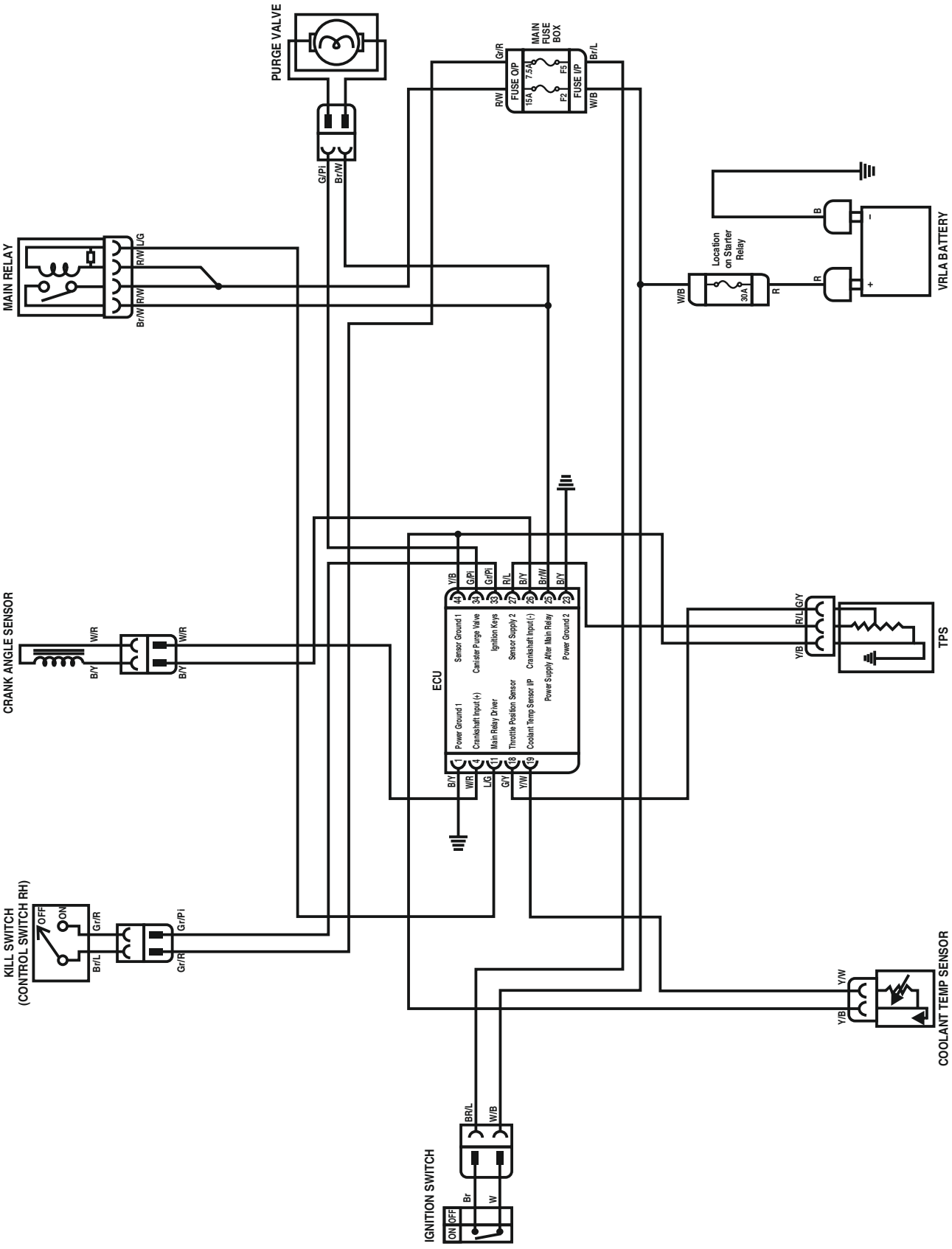
Electrical Circuit Diagrams : BOSCH

FUEL INJECTOR CIRCUIT



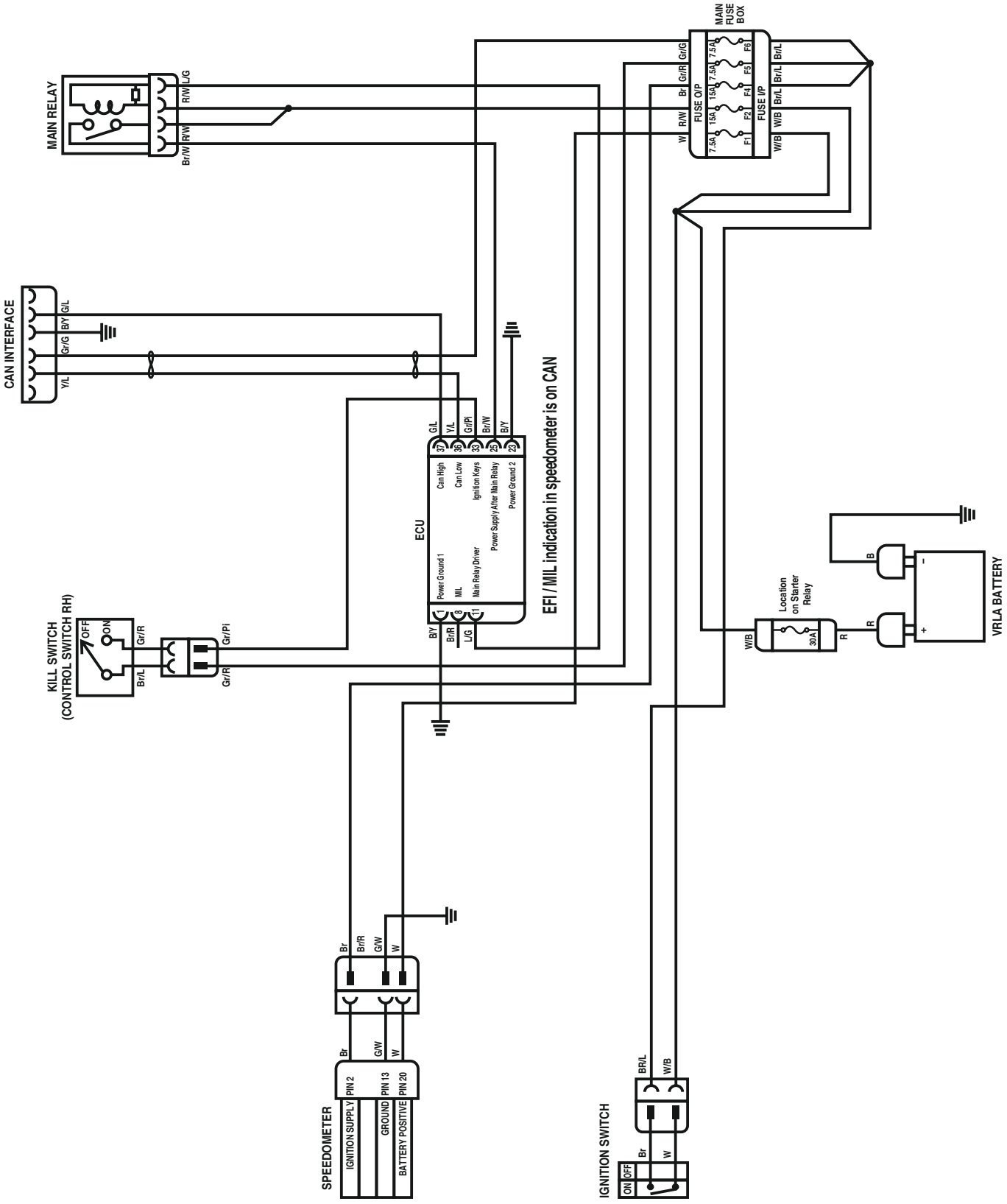
Electrical Circuit Diagrams : BOSCH

EVAP PURGE VALVE CIRCUIT



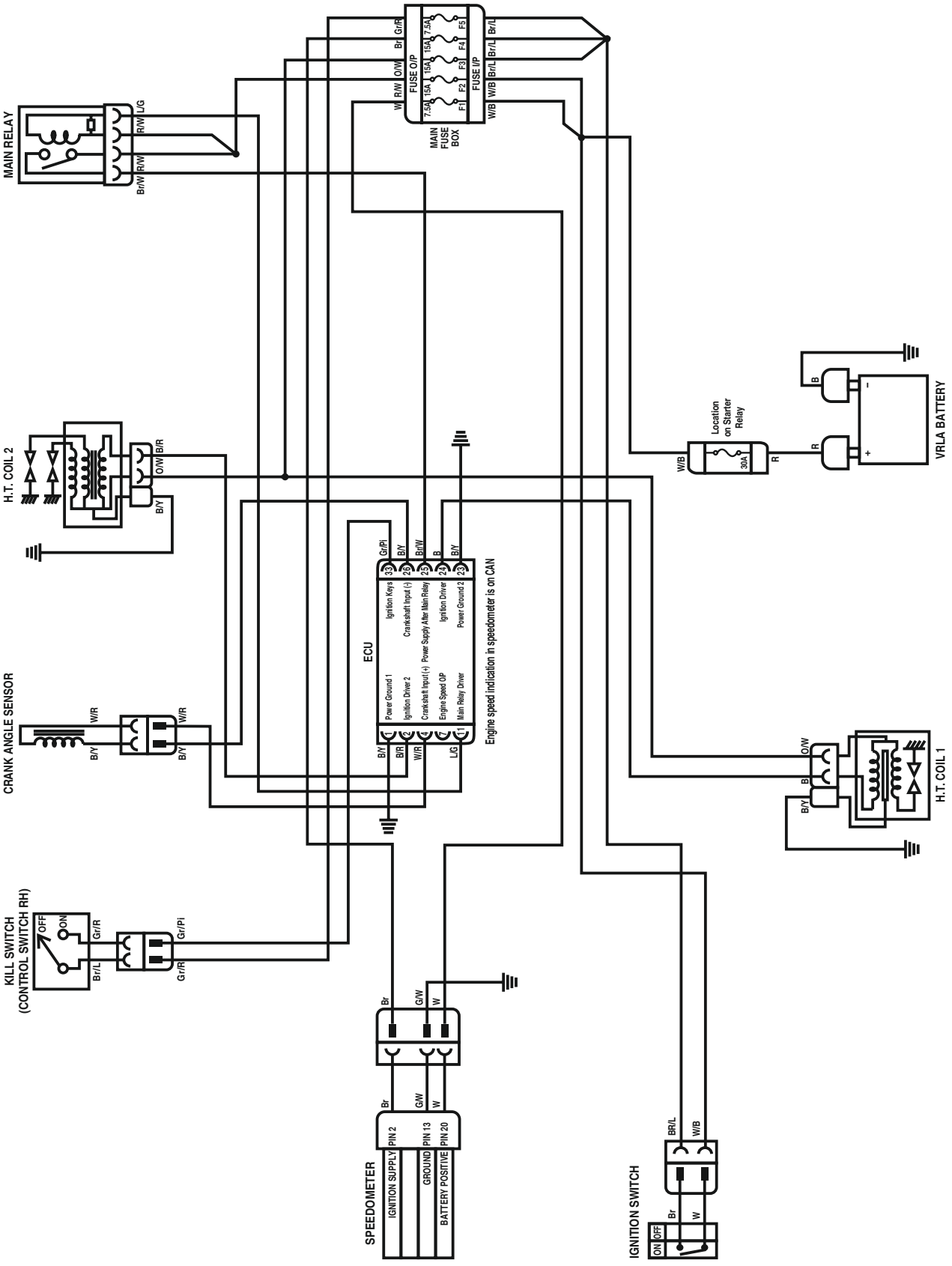
Electrical Circuit Diagrams : BOSCH

MIL INDICATION CIRCUIT



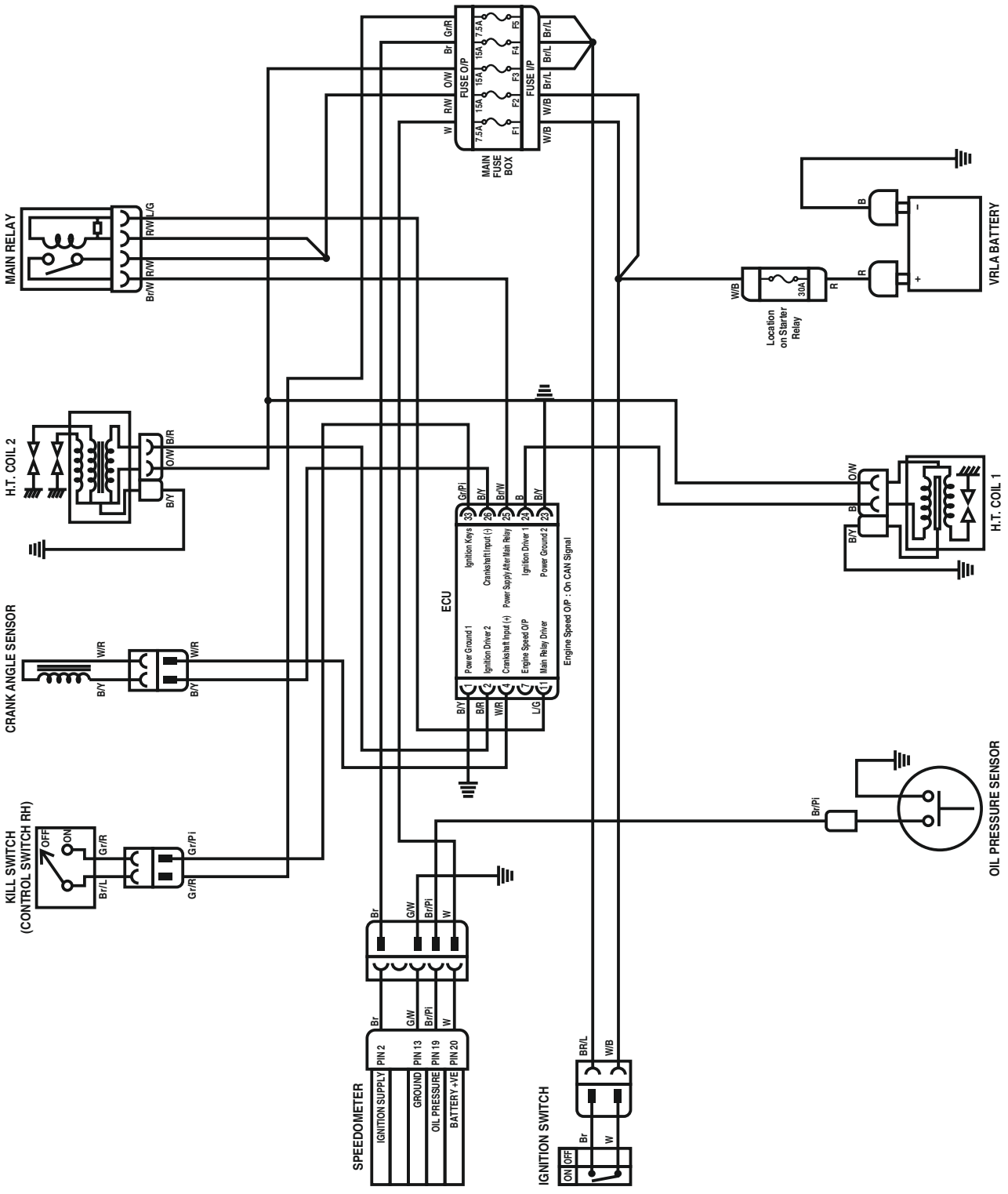
Electrical Circuit Diagrams : BOSCH

ENGINE RPM INDICATION CIRCUIT



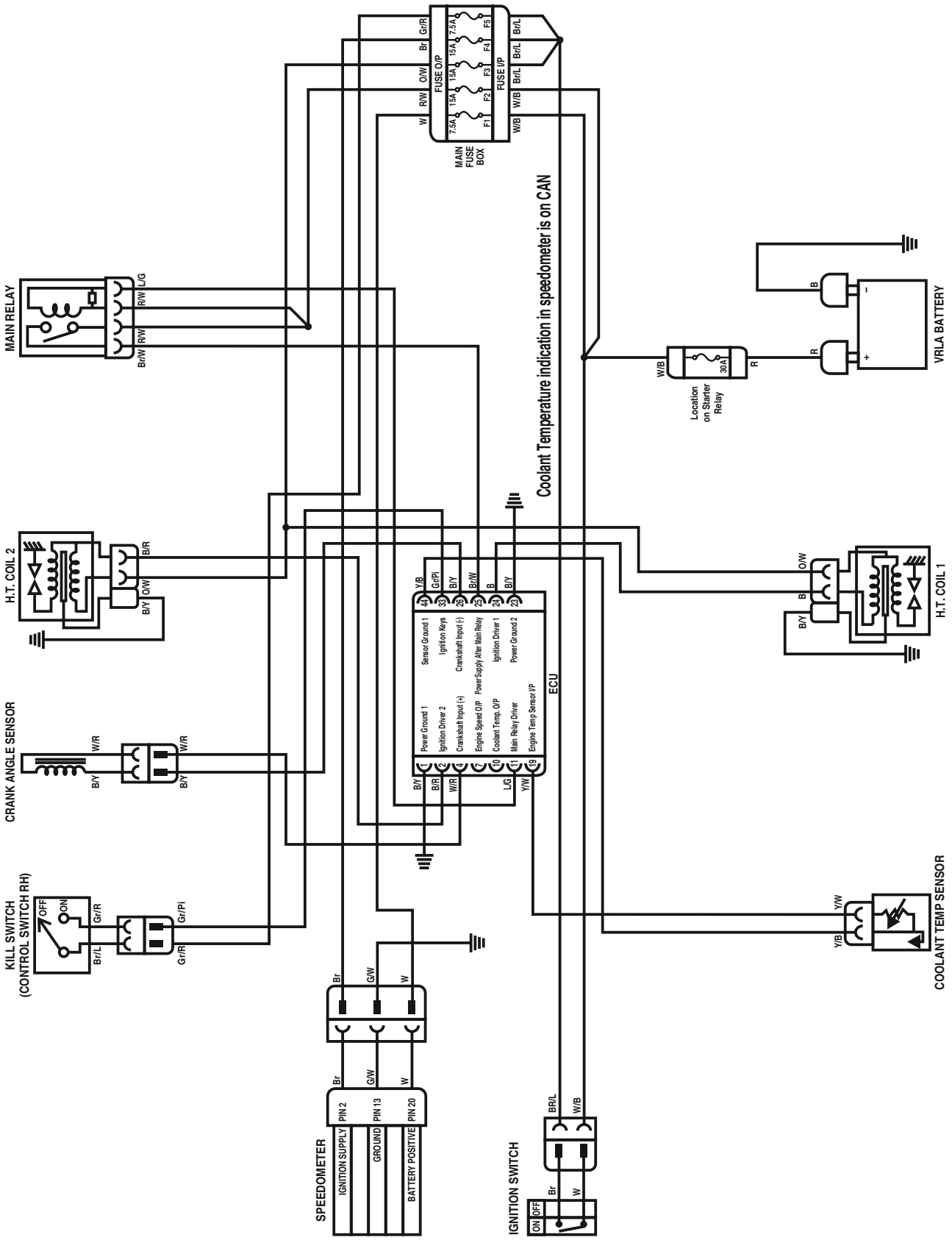
Electrical Circuit Diagrams : BOSCH

LOW OIL PRESSURE INDICATION CIRCUIT



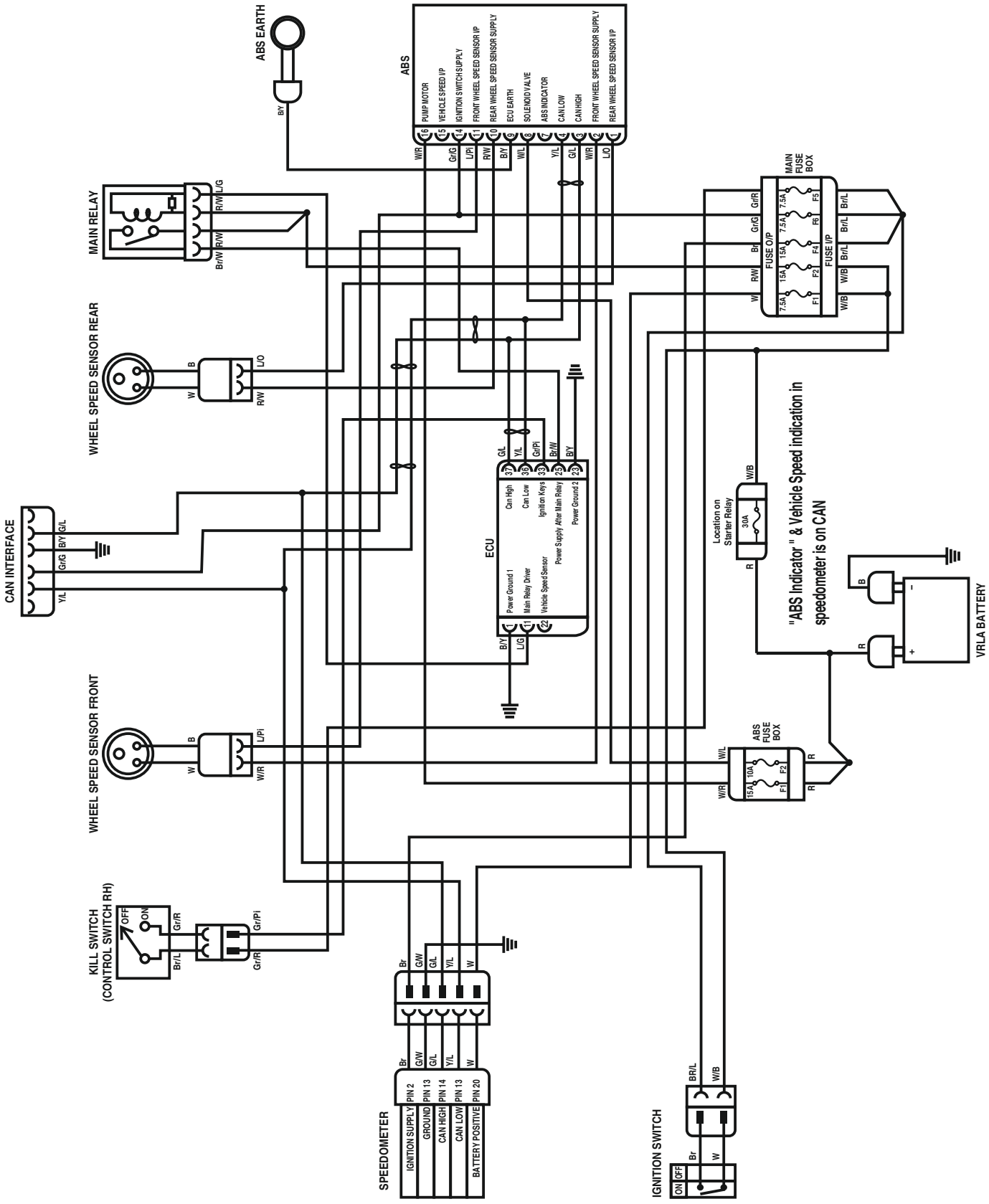
Electrical Circuit Diagrams : BOSCH

HIGH ENGINE TEMPERATURE INDICATION CIRCUIT



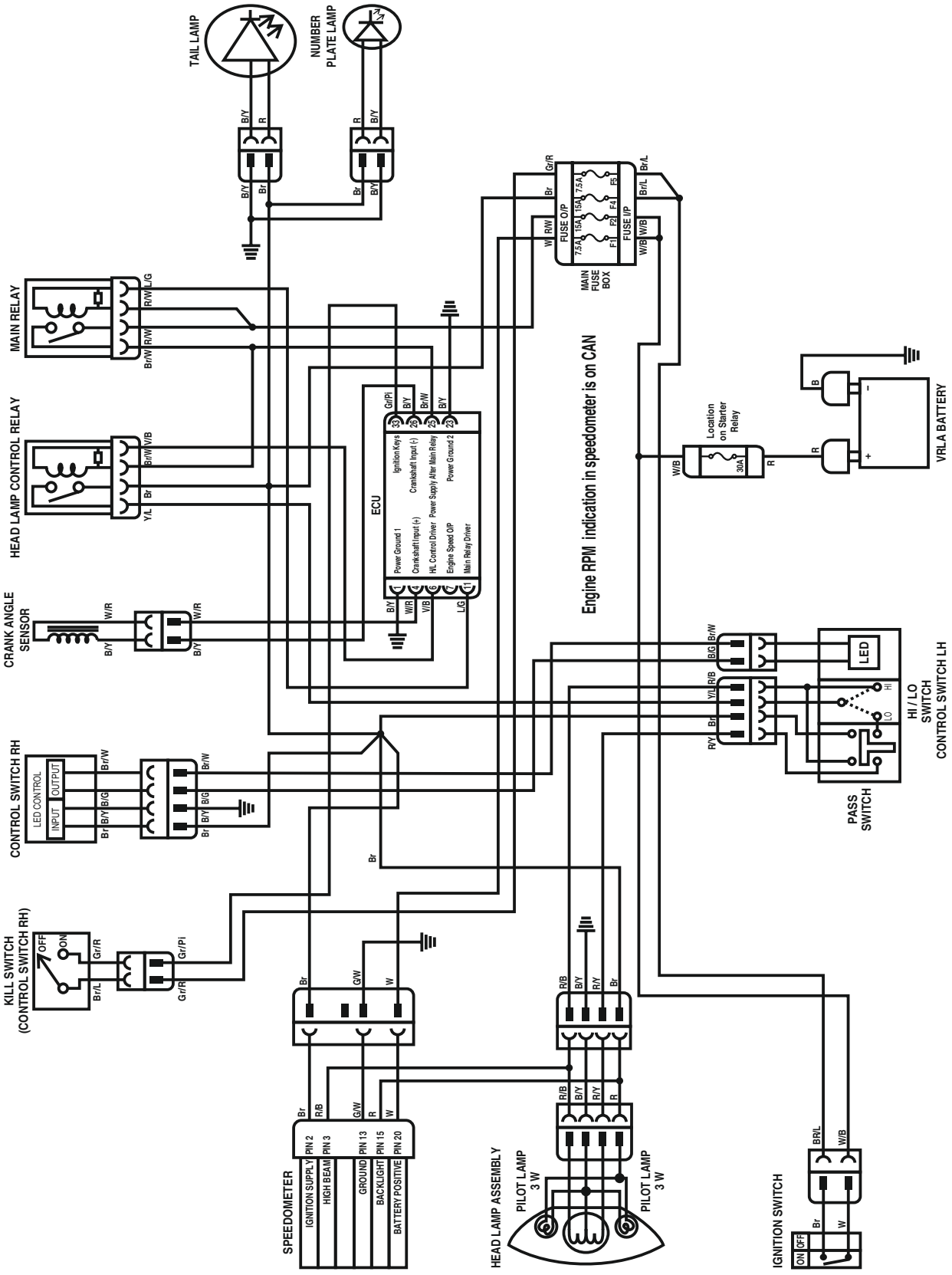
Electrical Circuit Diagrams : BOSCH

ABS CIRCUIT



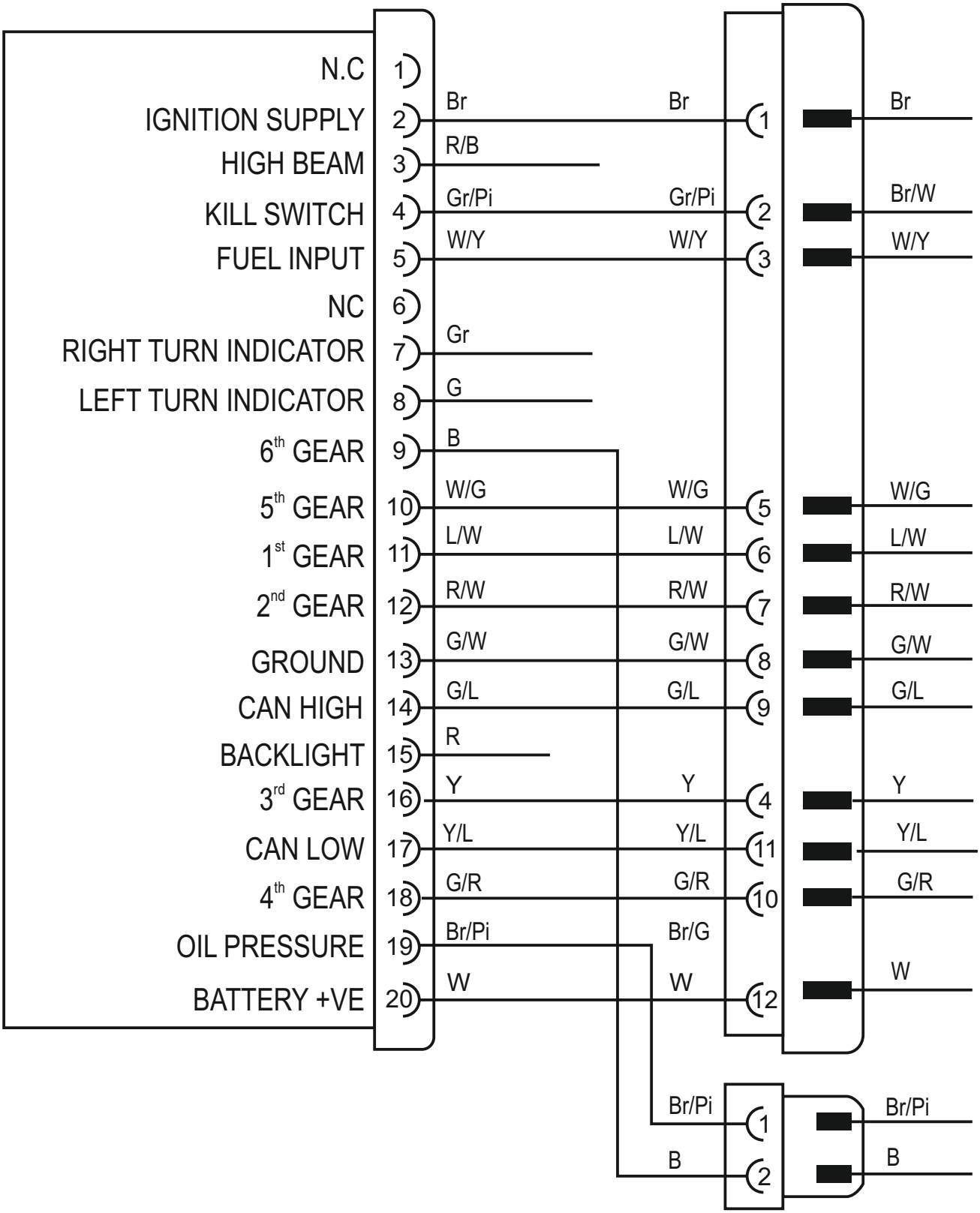
Electrical Circuit Diagrams : BOSCH

LIGHTING CIRCUIT



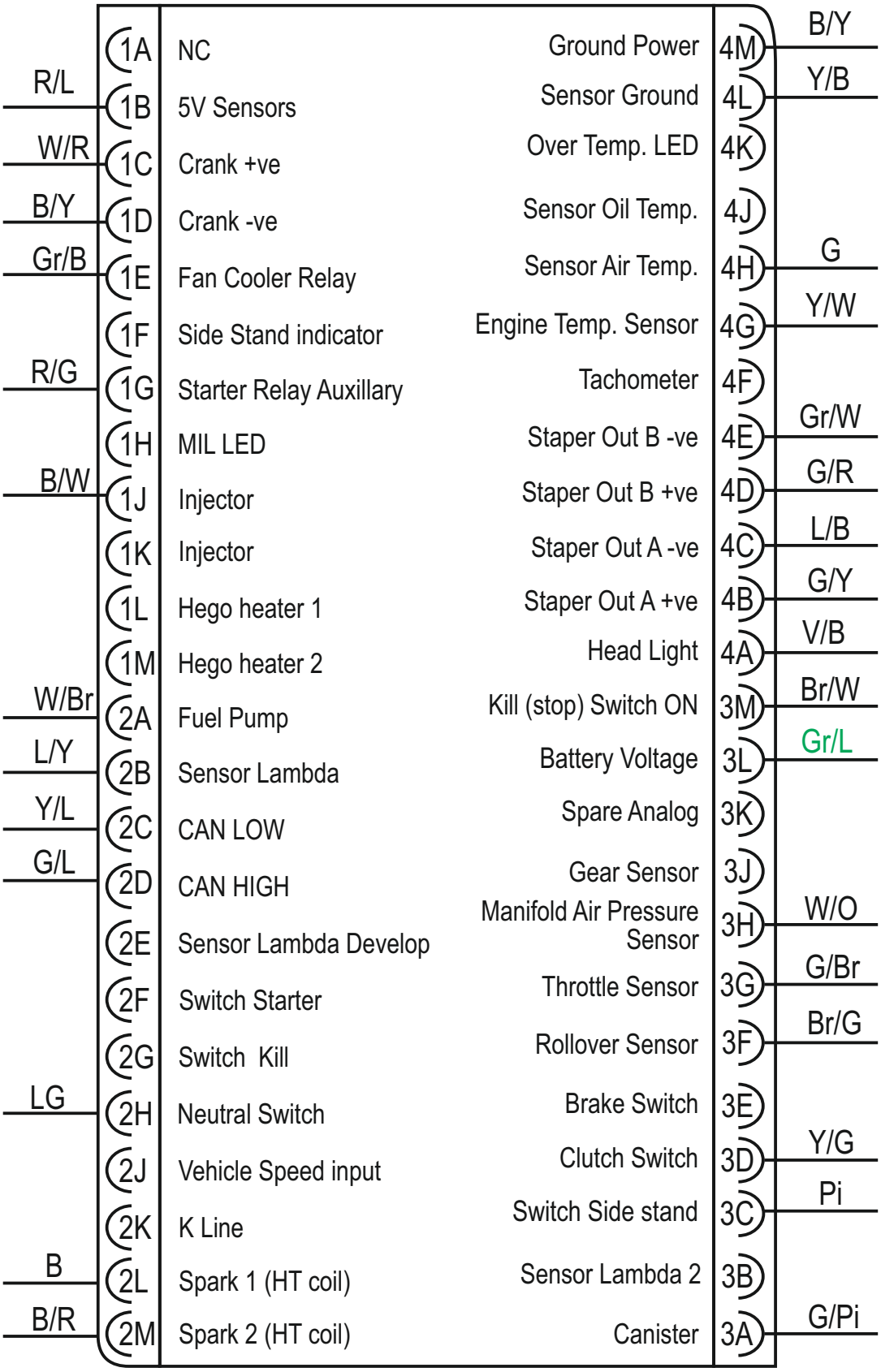
Electrical Circuit Diagrams : VARROC

SPEEDOMETER PIN DETAILS



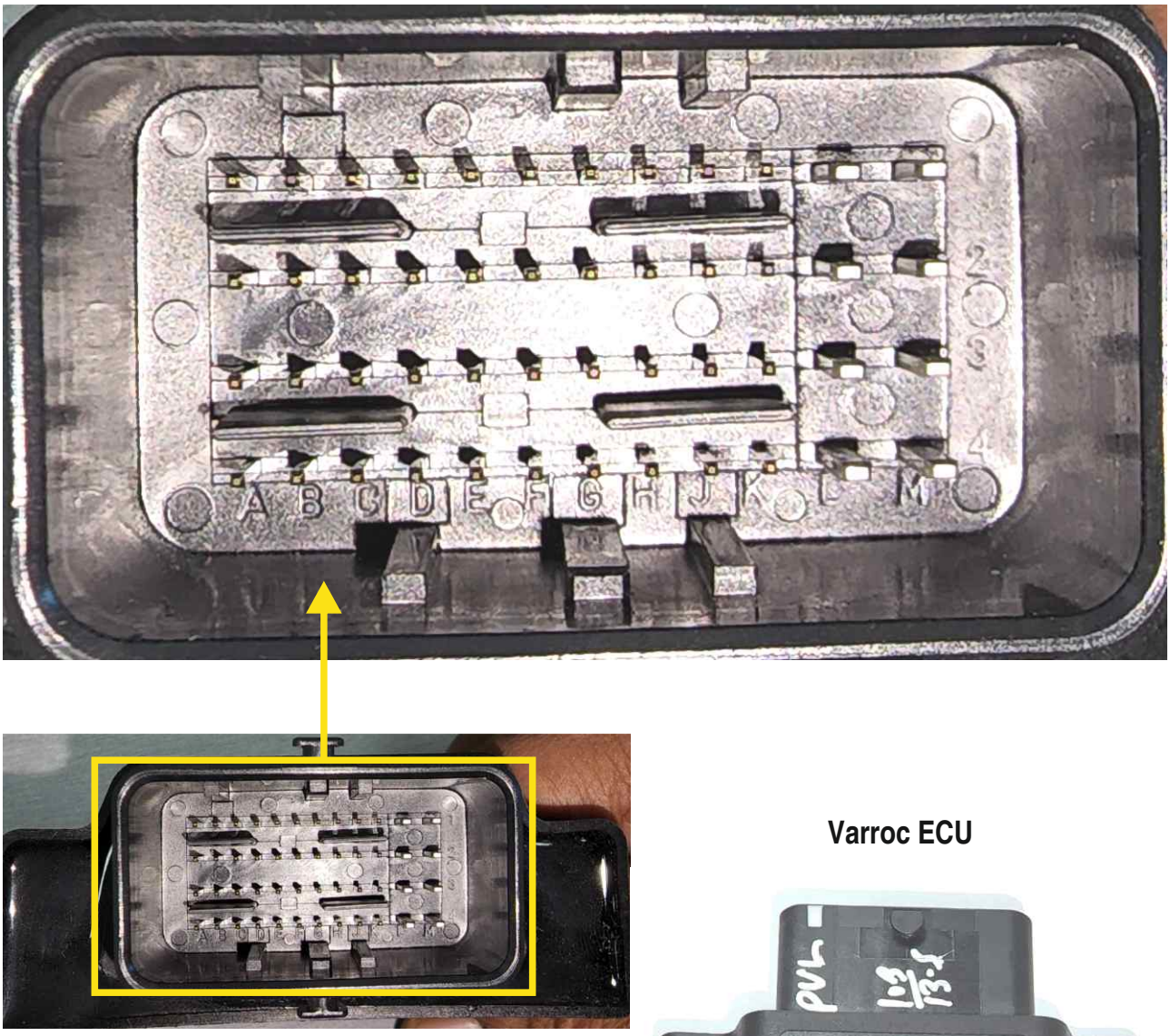
Electrical Circuit Diagrams : VARROC

ECU PIN DETAILS



Electrical Circuit Diagrams : VARROC

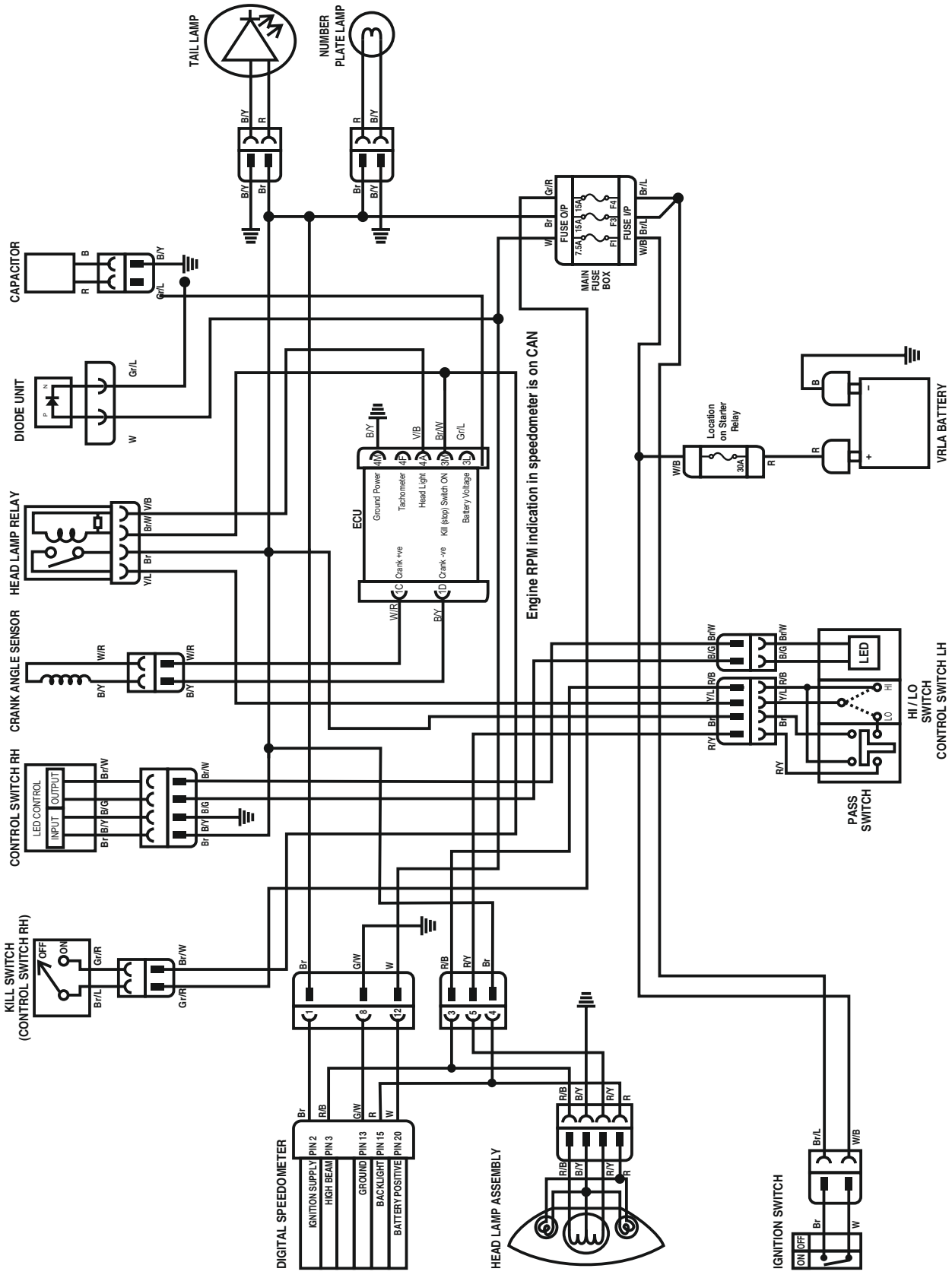
ECU PIN



Varroc ECU

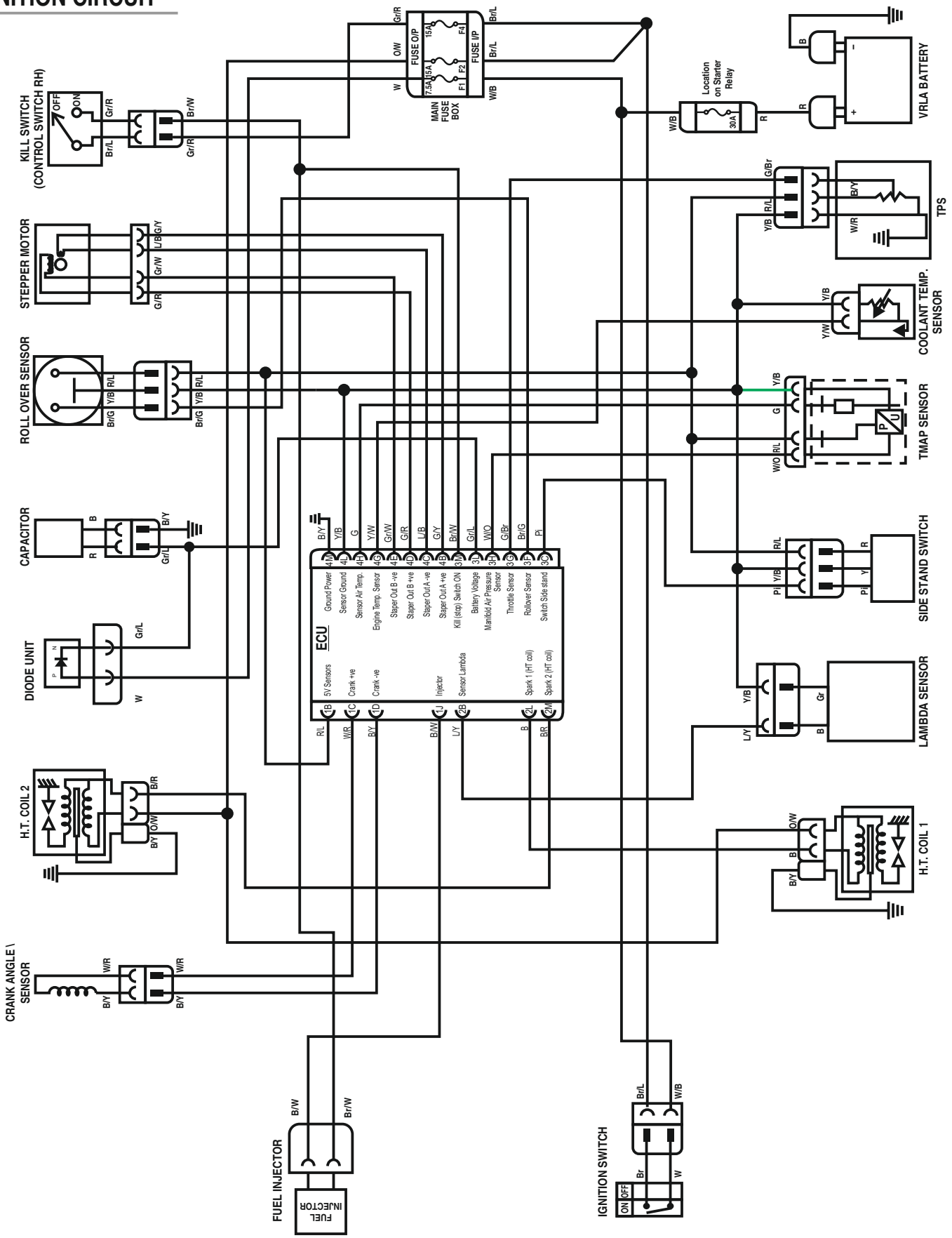
Electrical Circuit Diagrams : VARROC

LIGHTING CIRCUIT



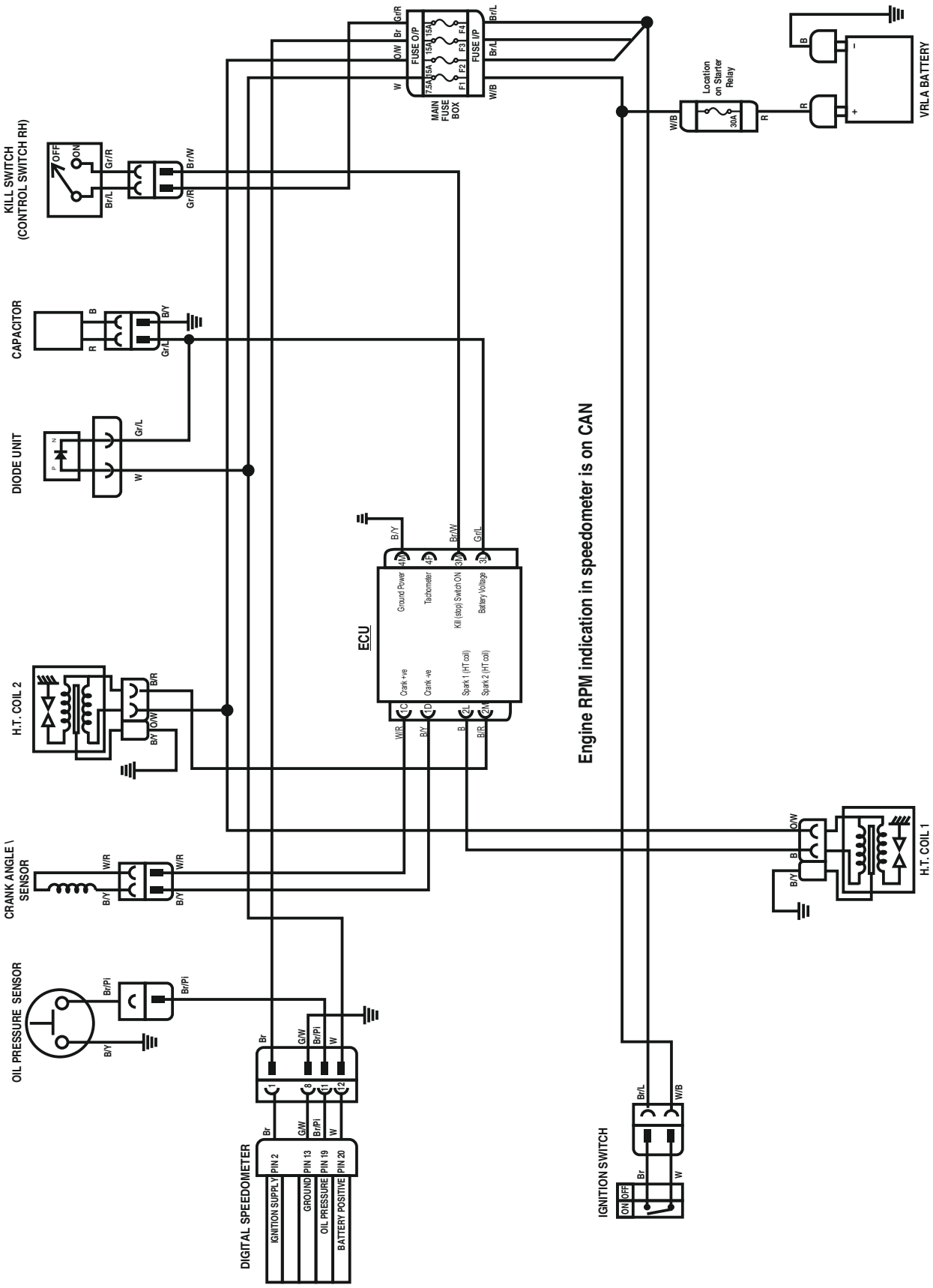
Electrical Circuit Diagrams : VARROC

IGNITION CIRCUIT



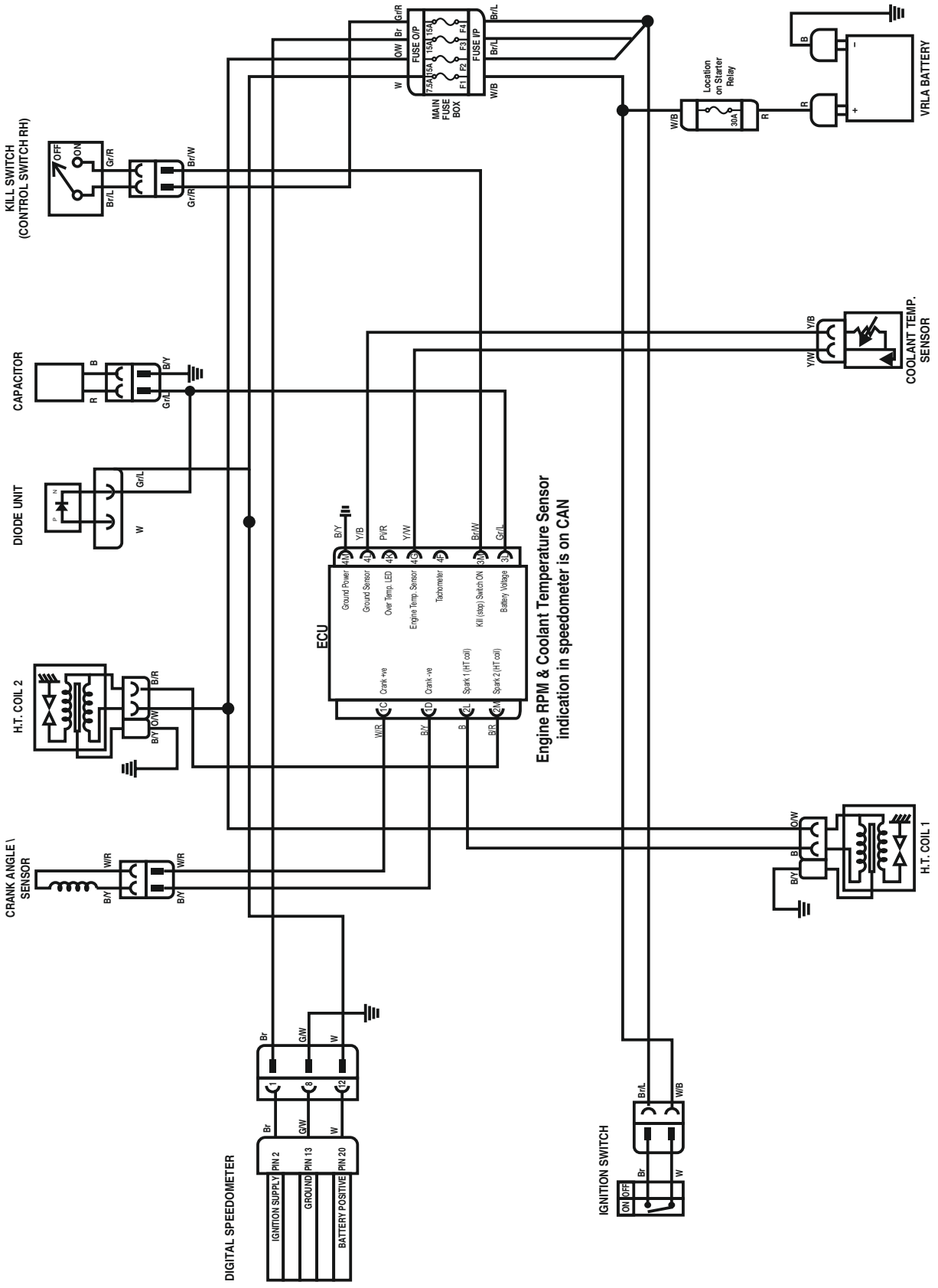
Electrical Circuit Diagrams : VARROC

LOW OIL PRESSURE INDICATION CIRCUIT



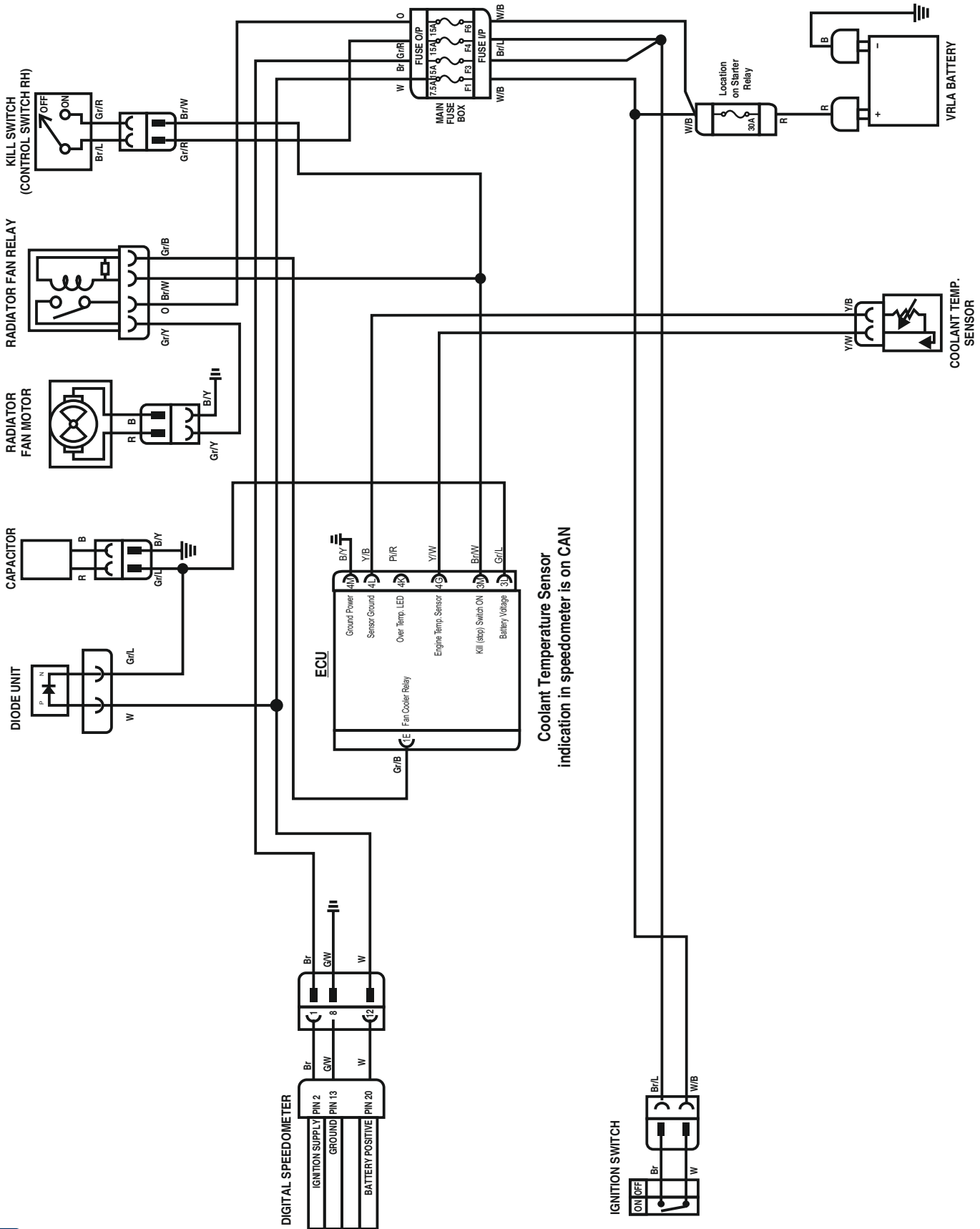
Electrical Circuit Diagrams : VARROC

HIGH ENGINE TEMPERATURE INDICATION CIRCUIT



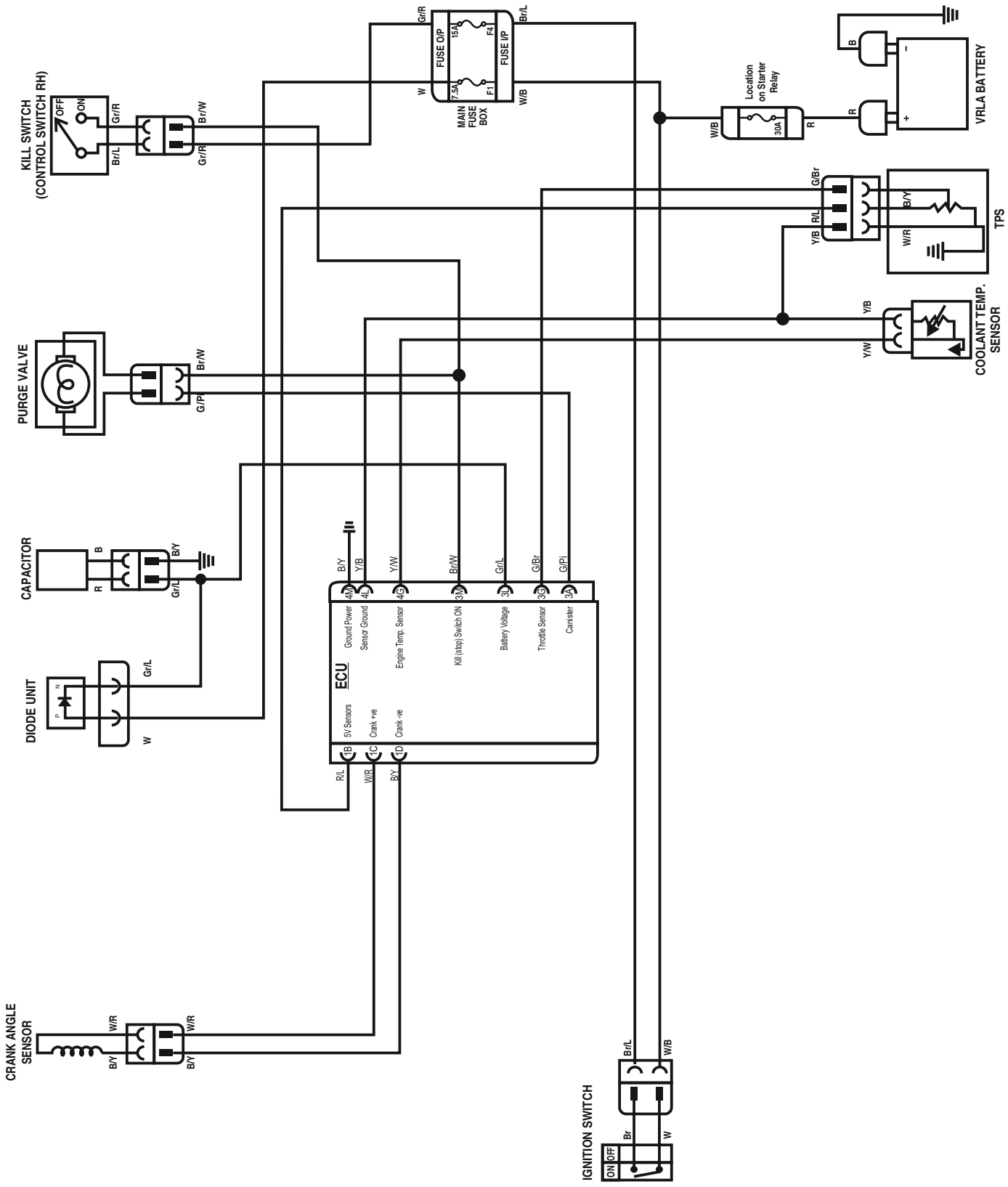
Electrical Circuit Diagrams : VARROC

RADIATOR FAN MOTOR CIRCUIT



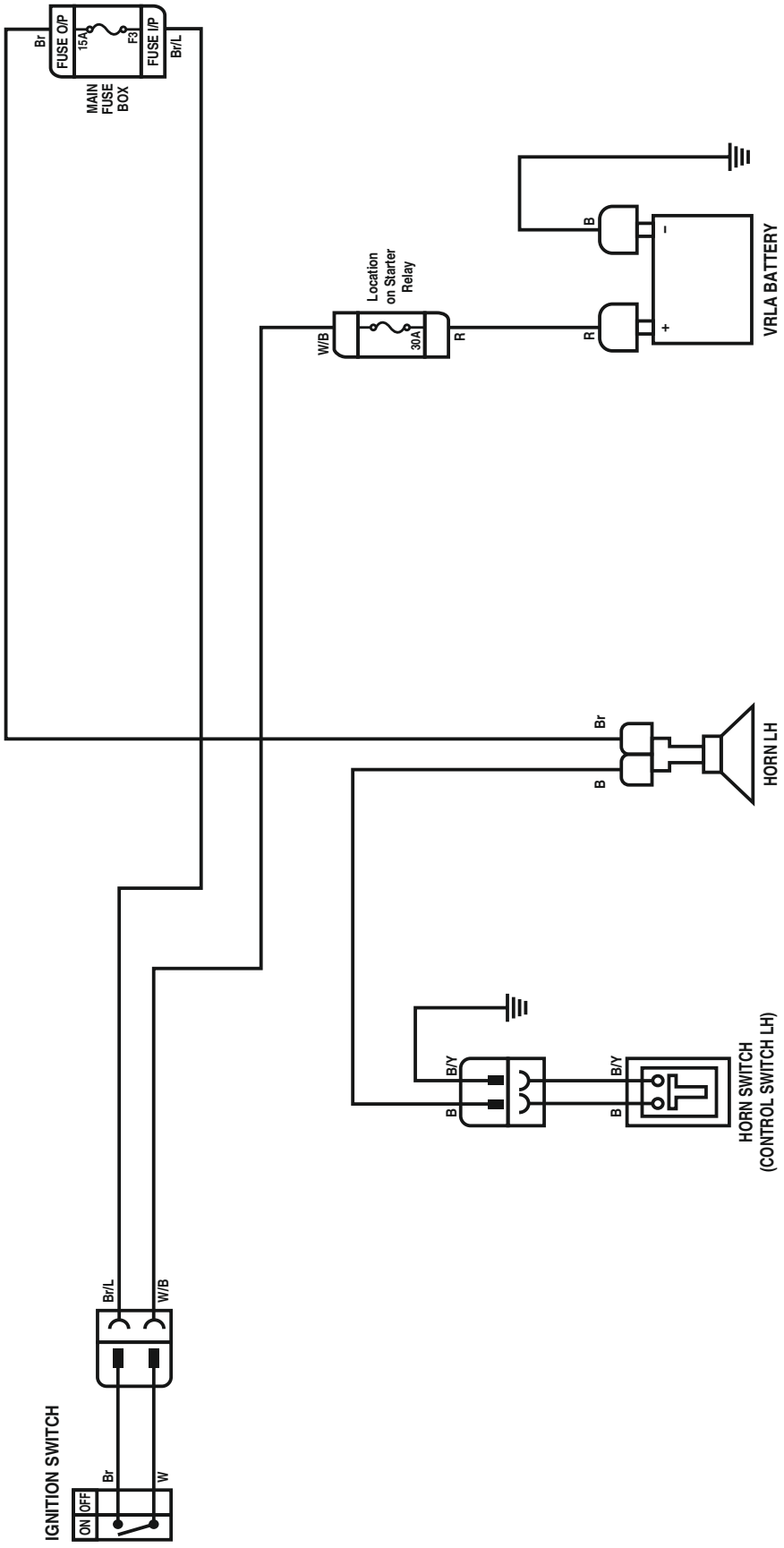
Electrical Circuit Diagrams : VARROC

EVAP PURGE VALVE CIRCUIT



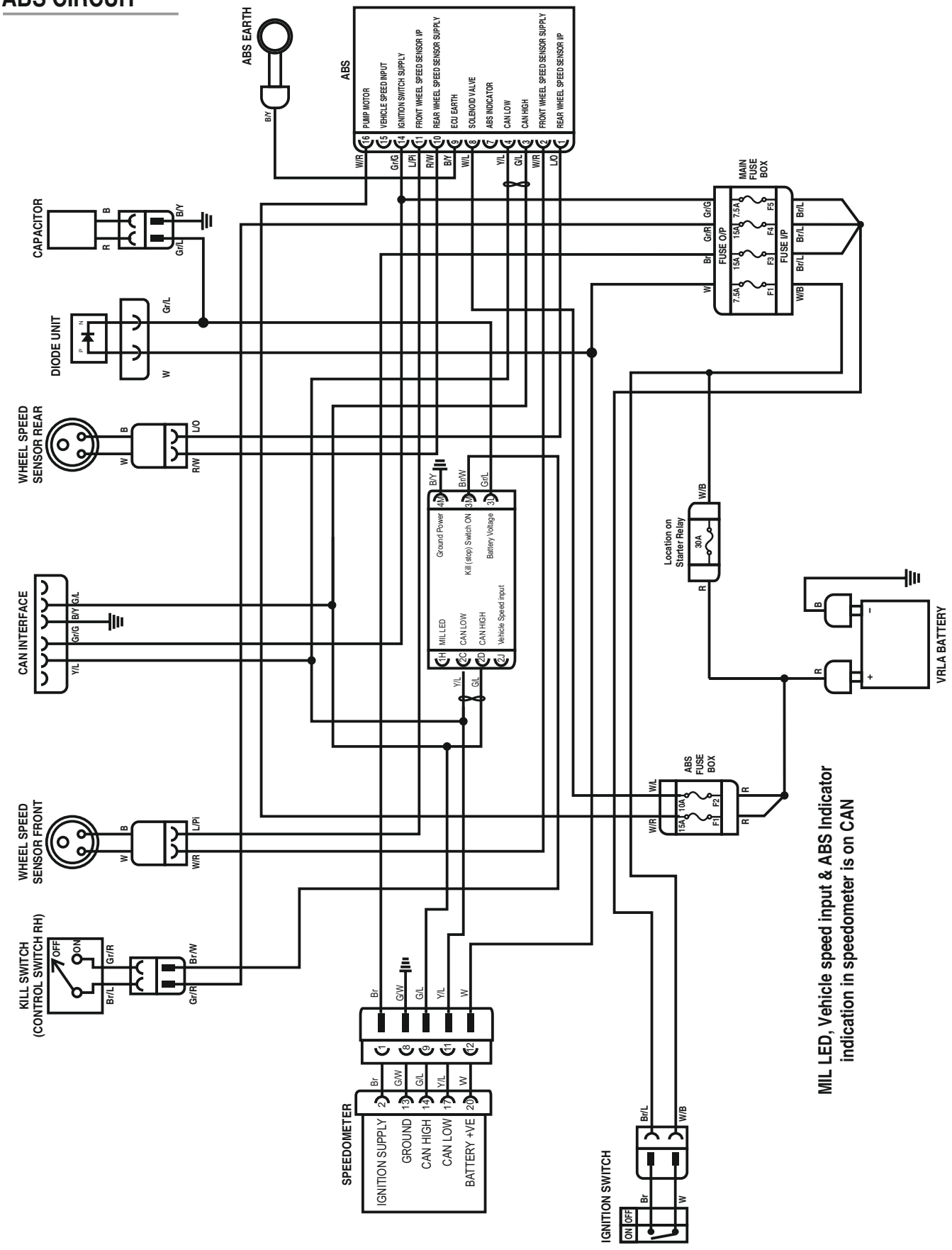
Electrical Circuit Diagrams : VARROC

HORN CIRCUIT



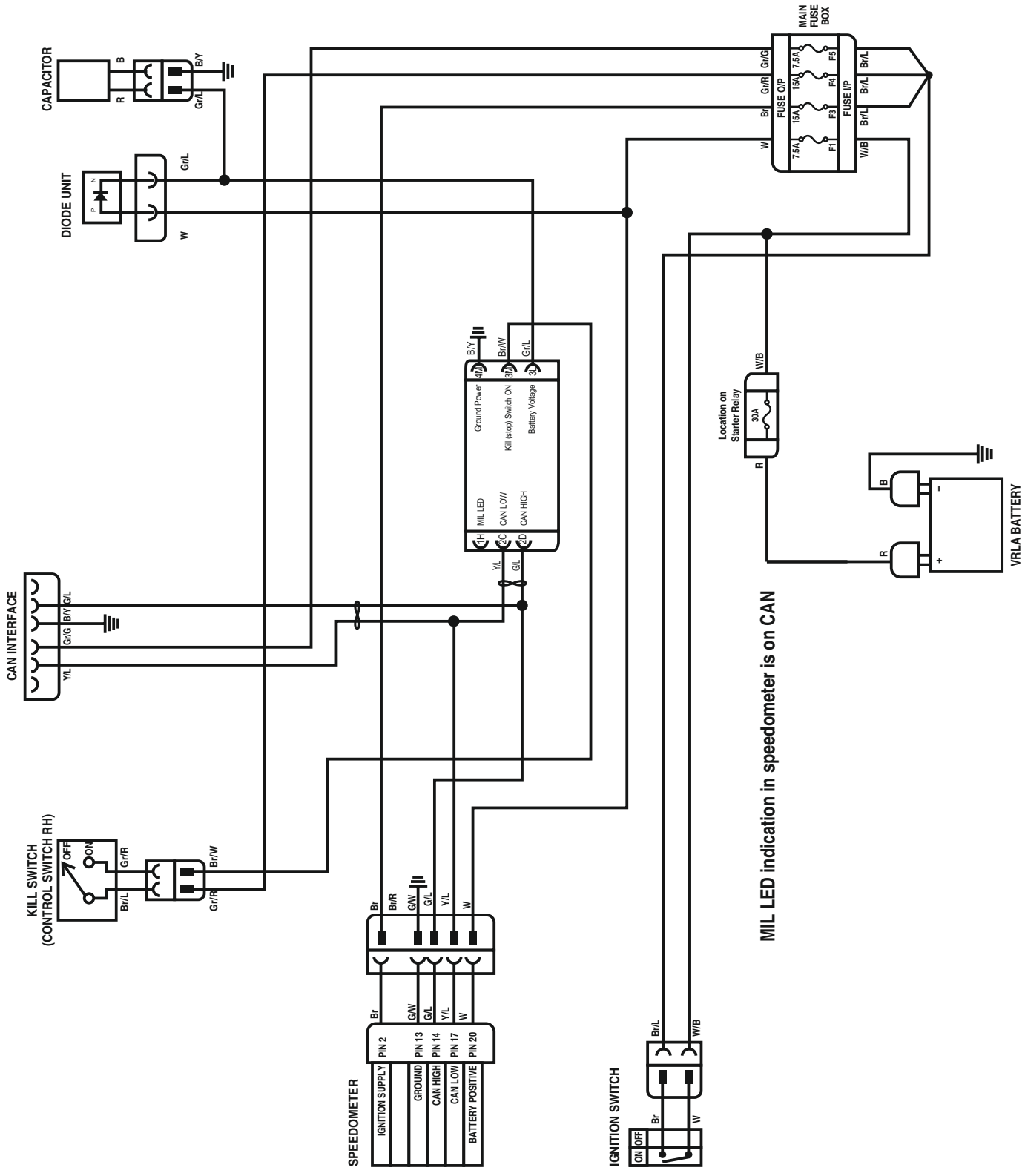
Electrical Circuit Diagrams : VARROC

ABS CIRCUIT



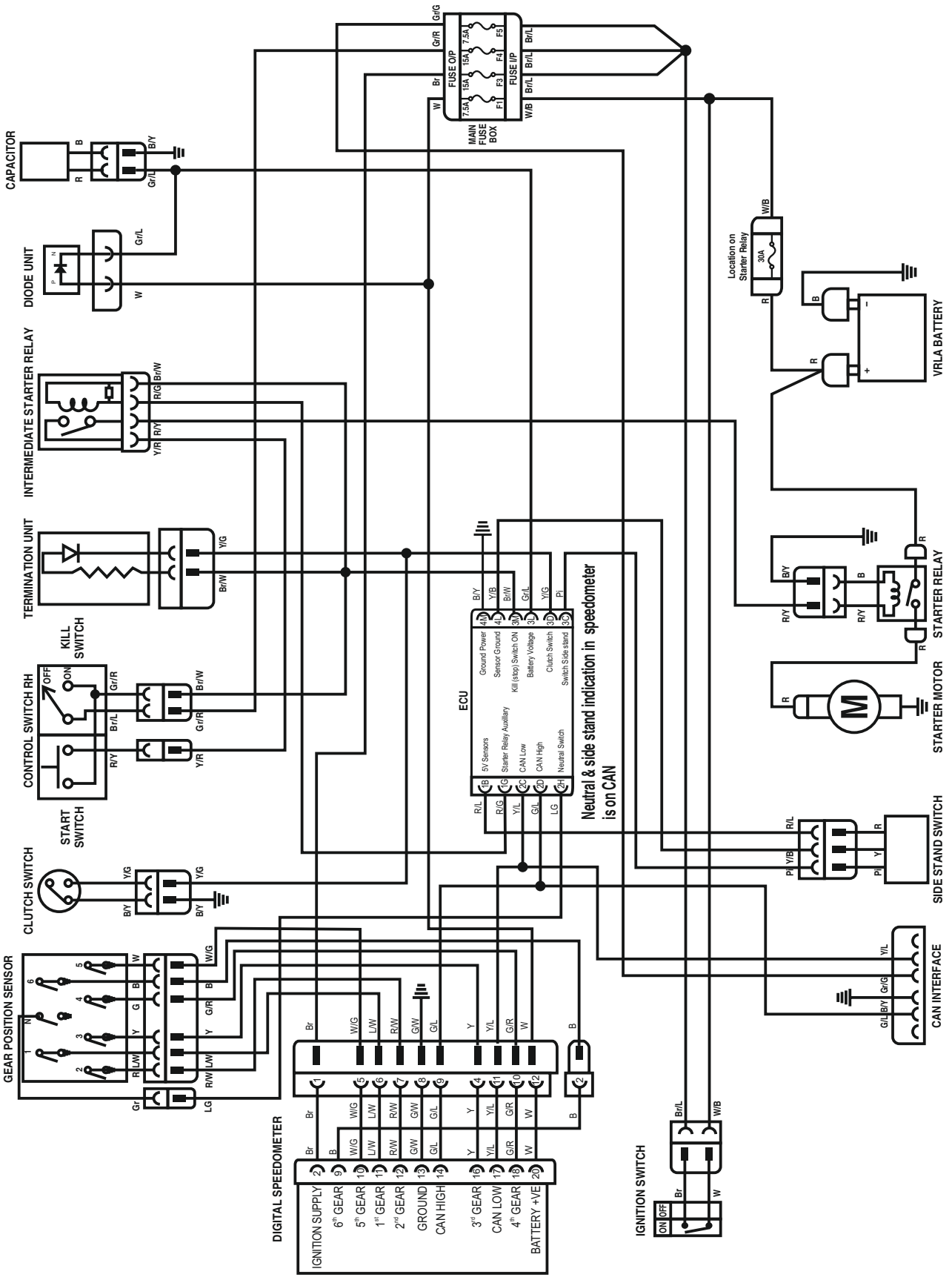
Electrical Circuit Diagrams : VARROC

MIL CIRCUIT



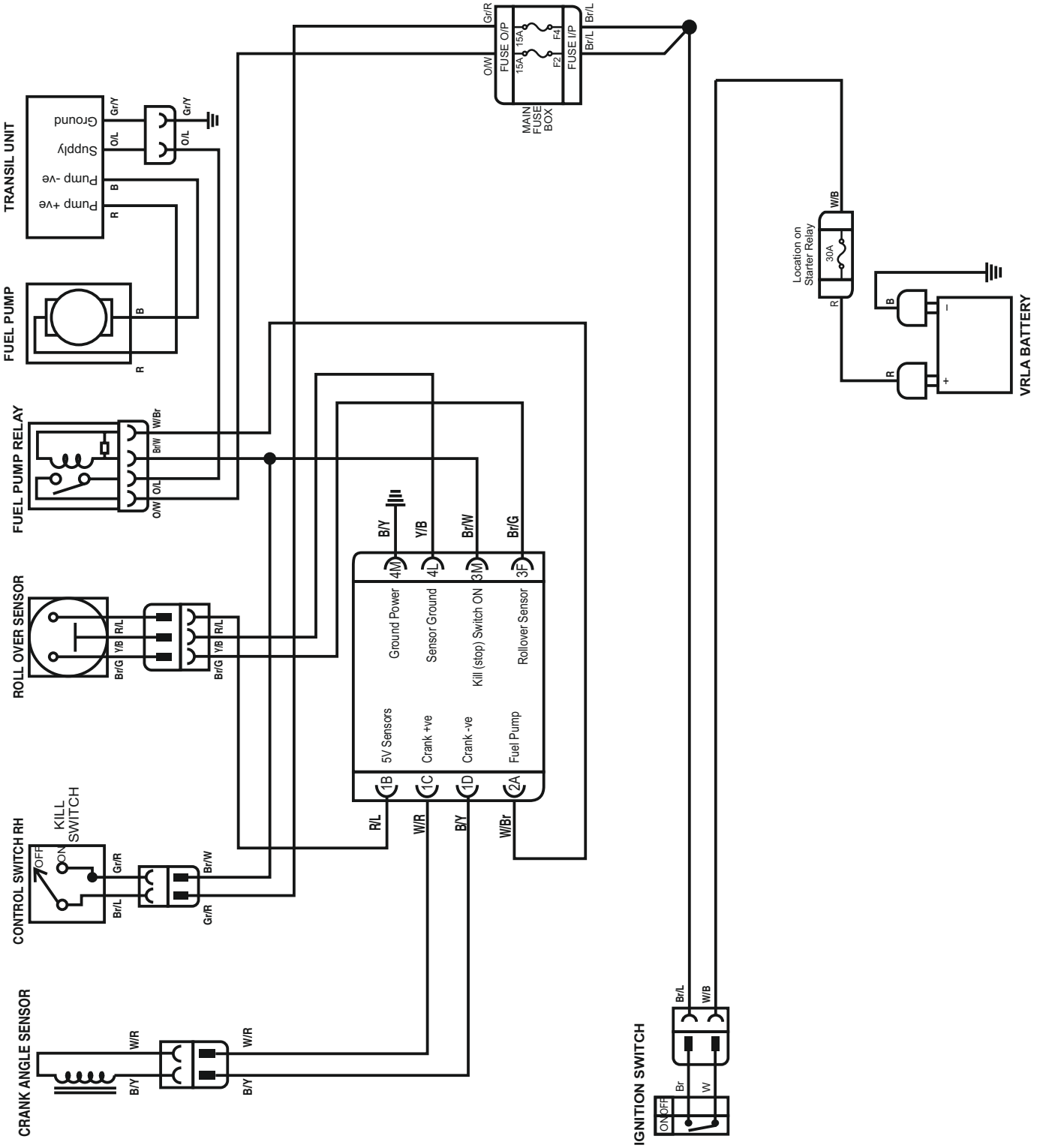
Electrical Circuit Diagrams : VARROC

STARTER MOTOR CUM SIDE STAND SWITCH CIRCUIT



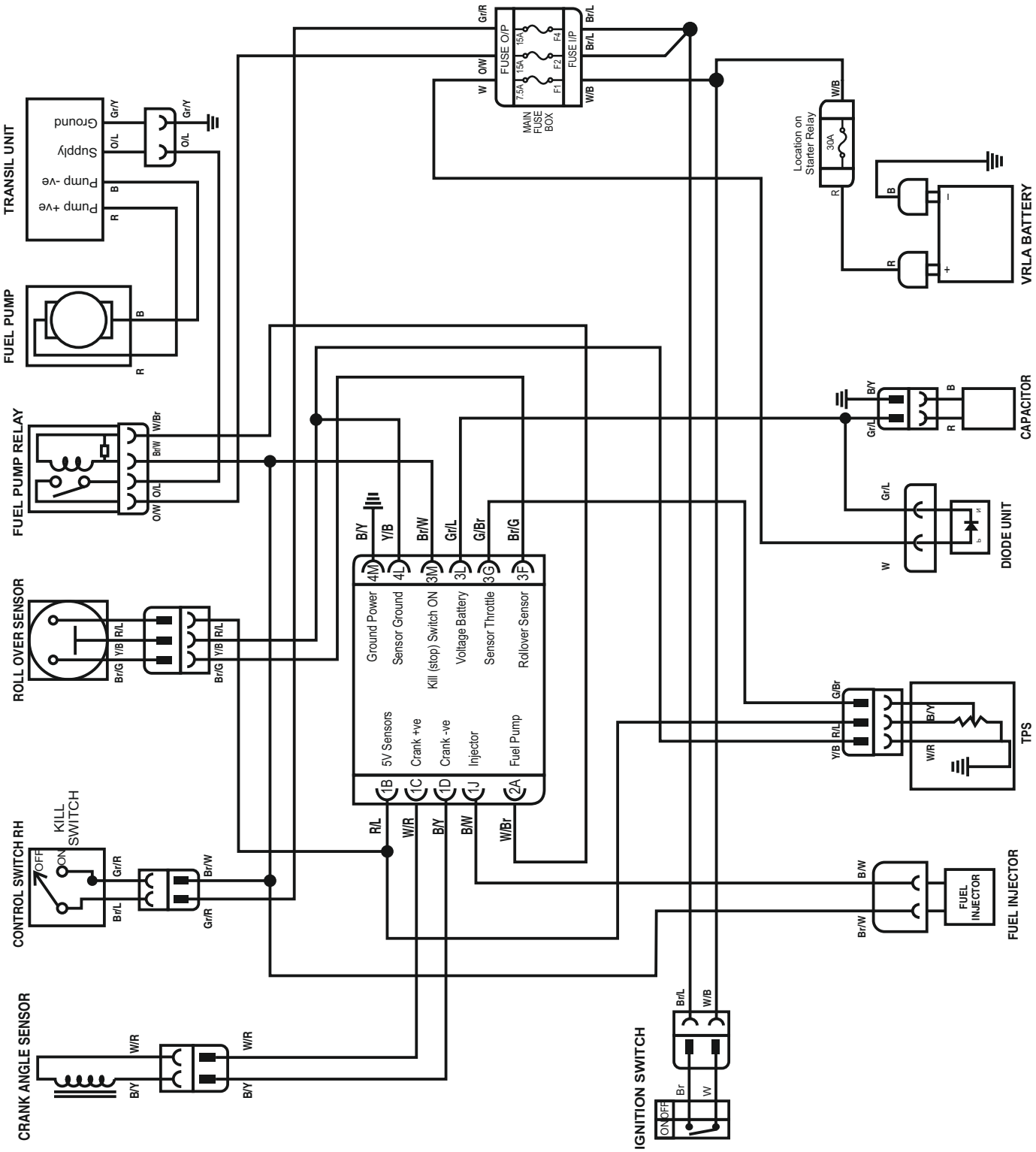
Electrical Circuit Diagrams : VARROC

FUEL PUMP CIRCUIT



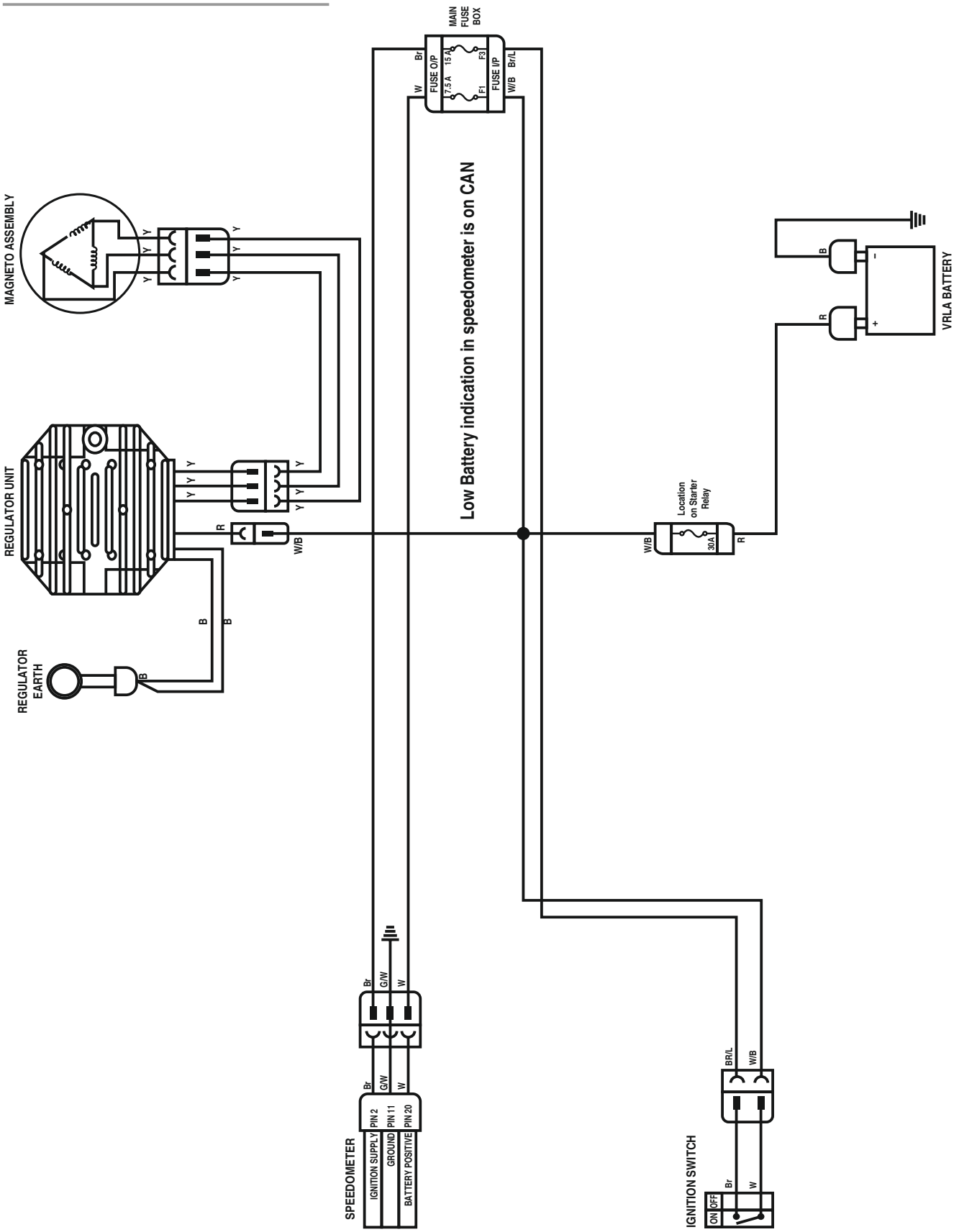
Electrical Circuit Diagrams : VARROC

FUEL INJECTOR CIRCUIT



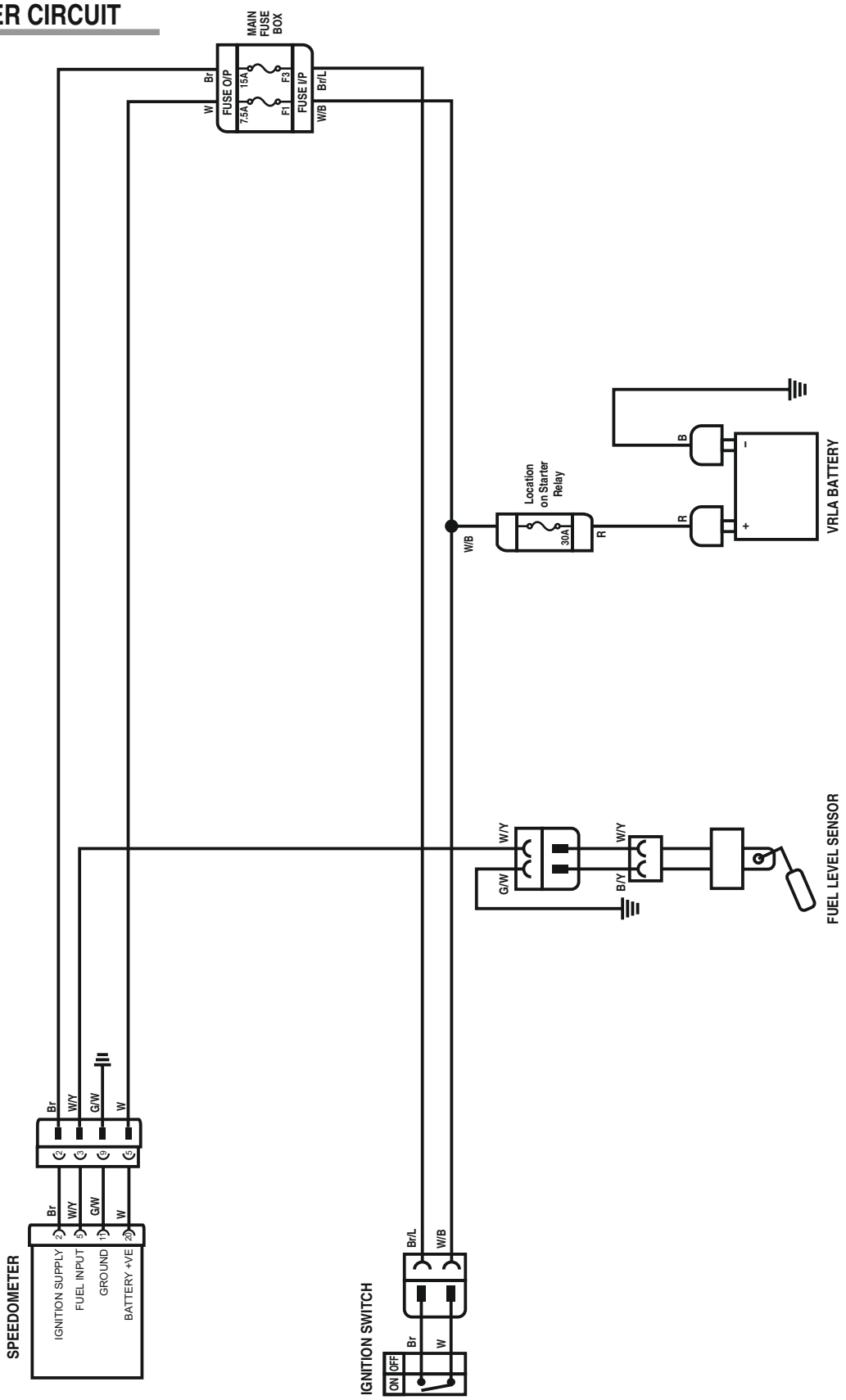
Electrical Circuit Diagrams : VARROC

BATTERY CHARGING CIRCUIT



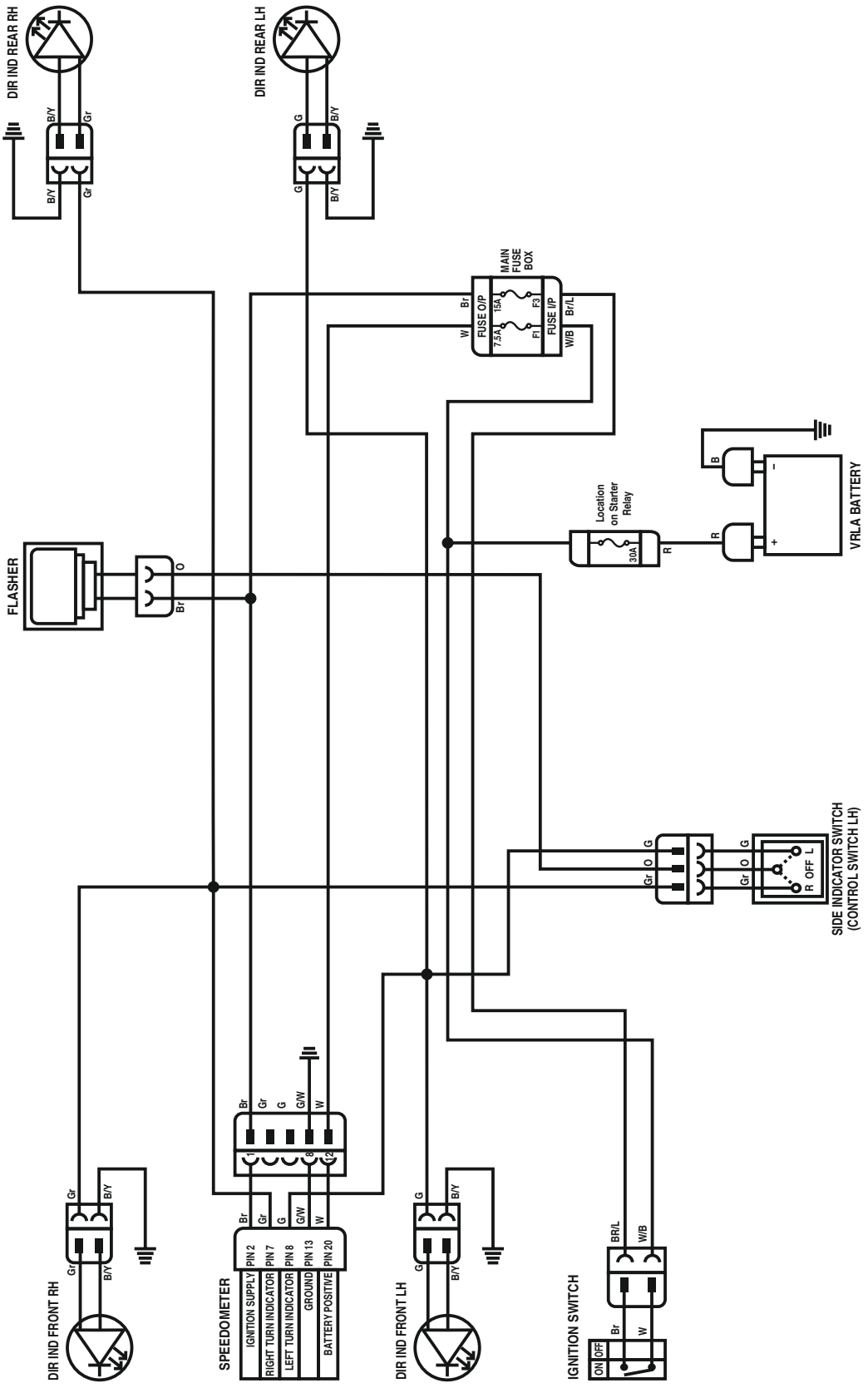
Electrical Circuit Diagrams : VARROC

FUEL METER CIRCUIT



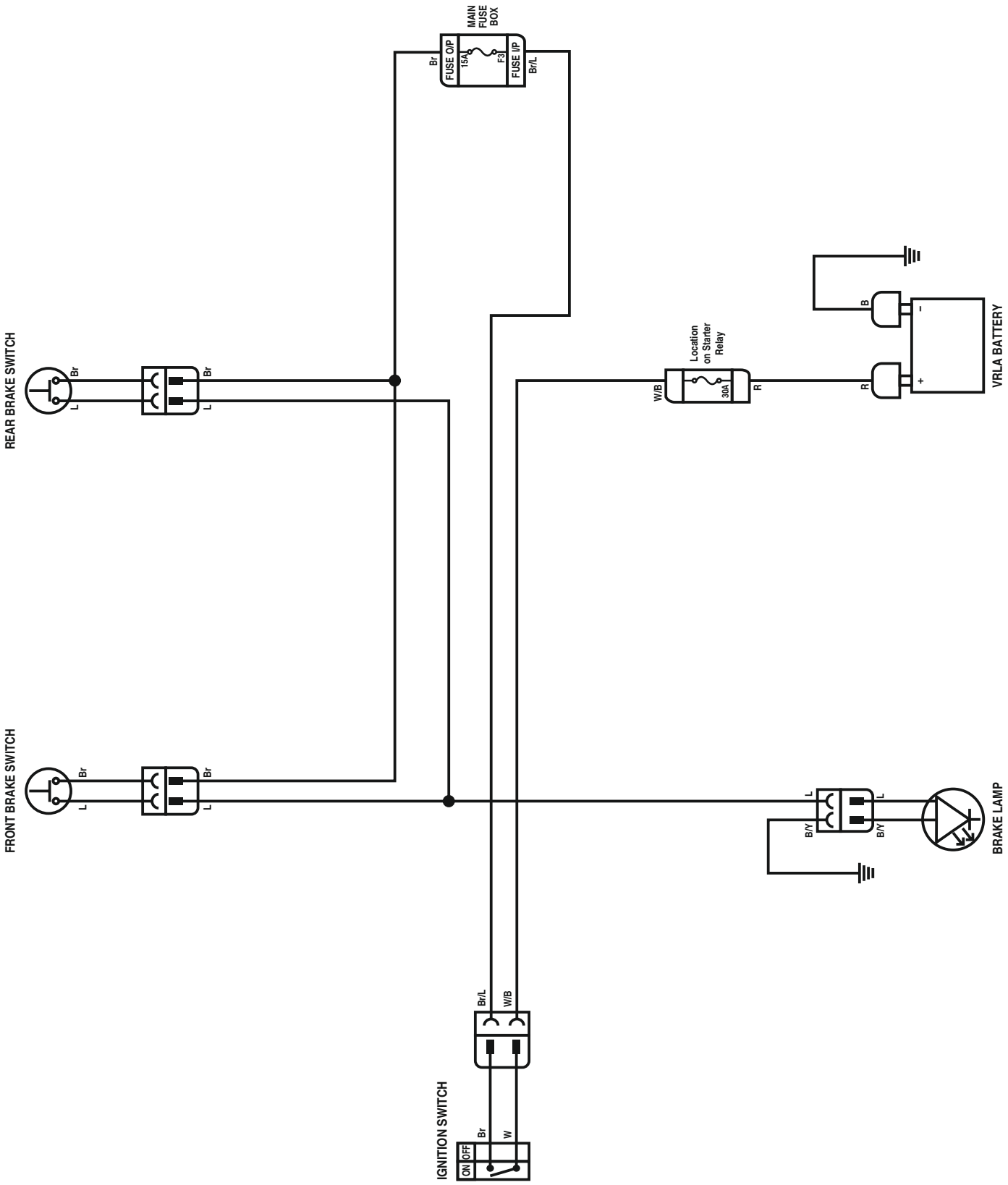
Electrical Circuit Diagrams : VARROC

SIDE INDICATOR CIRCUIT



Electrical Circuit Diagrams : VARROC

BRAKE LAMP CIRCUIT



pulsar NS200

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