



# service bulletin

TO: SERVICE MANAGER  TECHNICIANS   
PARTS MANAGER

No. 95-9

## Diesel Fuel Filters and Fuel Additives

### Models

MCM/MIE D3.0L, D3.6L, D4.2L and D7.3L Diesels

### Situation

Possible contamination of diesel fuel and algae growth in the diesel fuel that could cause the blockage of the lift pump resulting in poor performance.

### Recommendation

It is recommended that in MerCruiser Diesel applications listed, a fuel filter be installed before the lift pump. MerCruiser recommends a Racor Model 500 with a 10 micron rating or equivalent type filter. This will help to filter out contaminants in diesel fuel. It is also recommended that a diesel fuel additive be added (to combat algae growth) particularly in warmer climates to reduce the chances of algae growth in the diesel fuel.

TO: SERVICE MANAGER  TECHNICIANS   
PARTS MANAGER

No. 89-25

## MerCruiser Diesel Service Manual

The MerCruiser Diesel Service Manual is now available. This manual will not be sent out in a service mailing. To order a manual contact your Regional Parts Department.

**MerCruiser Service Manual 90-814099**

## Owners, Service and Parts Manuals for B.M.W. Gasoline and Diesel Engines

Owners, Service and Parts Manuals for B.M.W. engines are now available from your Regional Distribution Center. Listed below are part numbers and models covered by each manual.

### Service Manuals – Gasoline Engines

B.M.W. B130	90-802128176
B.M.W. B190/220	90-02128178
B.M.W. B635	90-802128521
B.M.W. Power Steering	90-802128507

### Parts Manuals – Gasoline Engines

B.M.W. B130/190/220/635	90-802128041
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### Owners Manuals – Gasoline Engines

B.M.W. B130	90-802128395
B.M.W. B190/220	90-802128398
B.M.W. B635Z	90-802128517

### Service Manuals – Diesel Engines

B.M.W. D150	90-802128187
B.M.W. D190 Appendix	90-802128369
B.M.W. D636	90-802128424
B.M.W. D530 Appendix	90-802128476
B.M.W. Power Steering	90-802128507

### Parts Manuals – Diesel Engines

B.M.W. D150/190/530/636	90-802128040
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### Owners Manuals – Diesel Engines

B.M.W. D150/190	90-802128392
B.M.W. D530/636	90-802128496

### Service Manuals – Stern Drives (Gasoline and Diesel)

B.M.W. Stern Drive	90-802128186
B.M.W. Mark I/II Drives	90-816330

## Microfiche Parts Cards for B.M.W. Engines/Drives

In July of 1988, microfiche parts cards for B.M.W. Gasoline and Diesel engines were mailed to all MerCruiser Dealers. To order extra copies refer to your Regional Distribution Center.

**B.M.W. Microfiche Parts Cards P/N 90-816097**

## Converting B.M.W. Part Numbers to Quicksilver Replacement Part Numbers

To convert a B.M.W. part number to a Quicksilver replacement part number you must drop the first four (4) digits of the B.M.W. number and replace them with the numbers "Eight Zero" (80). Refer to example following.

### Example:

B.M.W. Number	0141 2128 398
Converted Quicksilver Number	80 2128 398

Quicksilver computers will accept this nine (9) digit number.

**V12 Engineering**

Box 50, Ontario, Canada P0X 1C0

[www.bmwmarine.net](http://www.bmwmarine.net)

TO: SERVICE MANAGER  TECHNICIANS   
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No. 89-16

## B.M.W. Stern Drive/Inboards Model D636 Diesel Engines (Grey Engines) Overheating

If experiencing an overheating condition with a BMW D636 diesel engine, one of or a combination of the following conditions may be the cause.

### Check the following first:

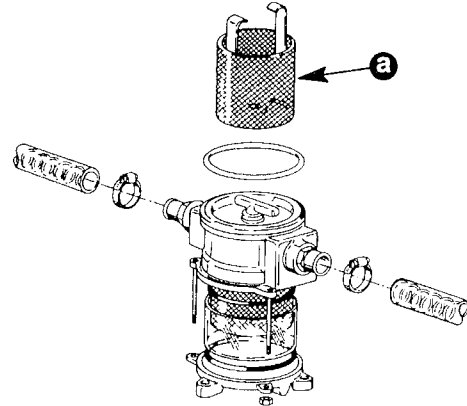
1. Check heat exchanger tank for coolant at proper level (1/2" – 3/4" [12mm – 20mm] below filler neck).
2. Check and compare temperature with an accurate independent instrument i.e. (possible malfunction of gauges, senders, wires, ground, etc.).
3. Pressure check cooling system and cap with automotive cooling system pressure tester. 14 PSI (100 kPa) required. Because old style coolant tank cap (single seal type) is vulnerable to leaking, recommend replacing with new style cap, P/N 63832A14.
4. Check engine circulating pump for possible malfunctions.
  - Loose/slipping alternator belt
  - Impeller vanes worn
  - Impeller shaft seal leaking
  - Impeller clearance to pump housing (.015" – .020"/.038mm – .050mm)

**NOTE:** Replace with new style pump, P/N 46-814255, if necessary.

5. Check engine coolant concentration to ensure 50/50 mixture.

**NOTE:** –34° F (–37° C) indicates a 50/50 mix. Use Quicksilver pre-mixed antifreeze P/N 92-813054A2 or an equivalent low-silicate brand. Using antifreeze other than Quicksilver Engine Coolant a low silicate 50/50 pre-mixed coolant with proper additives and manufactured for diesel engines must be used.

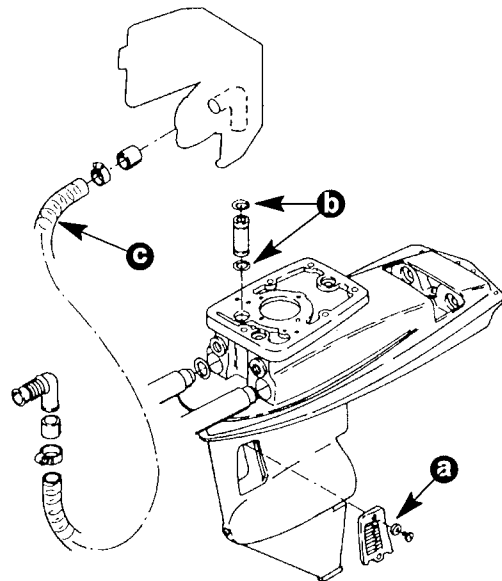
6. Check for raw water intake problems (refer to Figures 1 & 2).



50359A

a - Check Strainer for Restriction

**Figure 1. Raw Water Filter**



50360B

- a - Check Water Pick-Up for Restriction
- b - O-Rings Leaking, Not Sealing
- c - Inlet Hose Tore or Kinked

**Figure 2. B.M.W. Stern Drive**

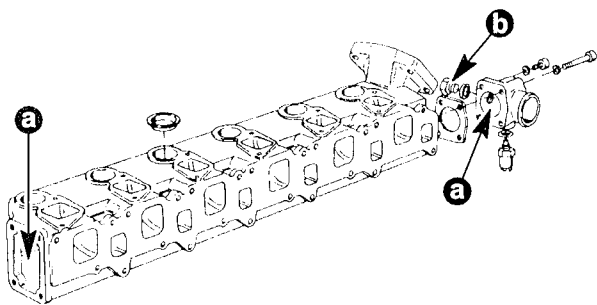
Other known problems are:

- Propeller ventilation (Inboard application)
  - Partially obstructed inlet sea water screen/cover
  - Interference of keel
  - Inlet hose collapsing during operation (must be wire reinforced hose).
7. Check for correct injection timing (refer to service manual specs).
  8. Using one of the following procedures check for exhaust gases entering closed cooling system.
    - a. Remove 1 in. (25mm) plug from rear of exhaust manifold (Figure 3, "b") and install water pressure gauge. If higher pressure is obtained than listed below, exhaust gases exist in system.

#### Coolant System Pressure

800 RPM (idle) 6 PSI (41 kPa)

3800 RPM (WOT) 20 PSI (137 kPa)



50361C

a - Water Passages Restricted

b - Remove Plug for Exhaust Pressure Check

**Figure 3. Intake/Exhaust Manifold**

- b. Replace hose between heat exchanger and engine circulating pump with clear plastic hose. (Figure 4, "b") Watch for gas bubbles.
9. Check the following if excessive pressure or gas bubbles are found.
    - a. Head gasket leakage by making a compression test.
    - b. Exhaust gases existing in the closed cooling system by using a combustion leak tester.

**NOTE:** Snap-on Tools has combustion leak tester available for testing coolant for exhaust gases. (Block Combustion Leak Tester P/N GA170B)

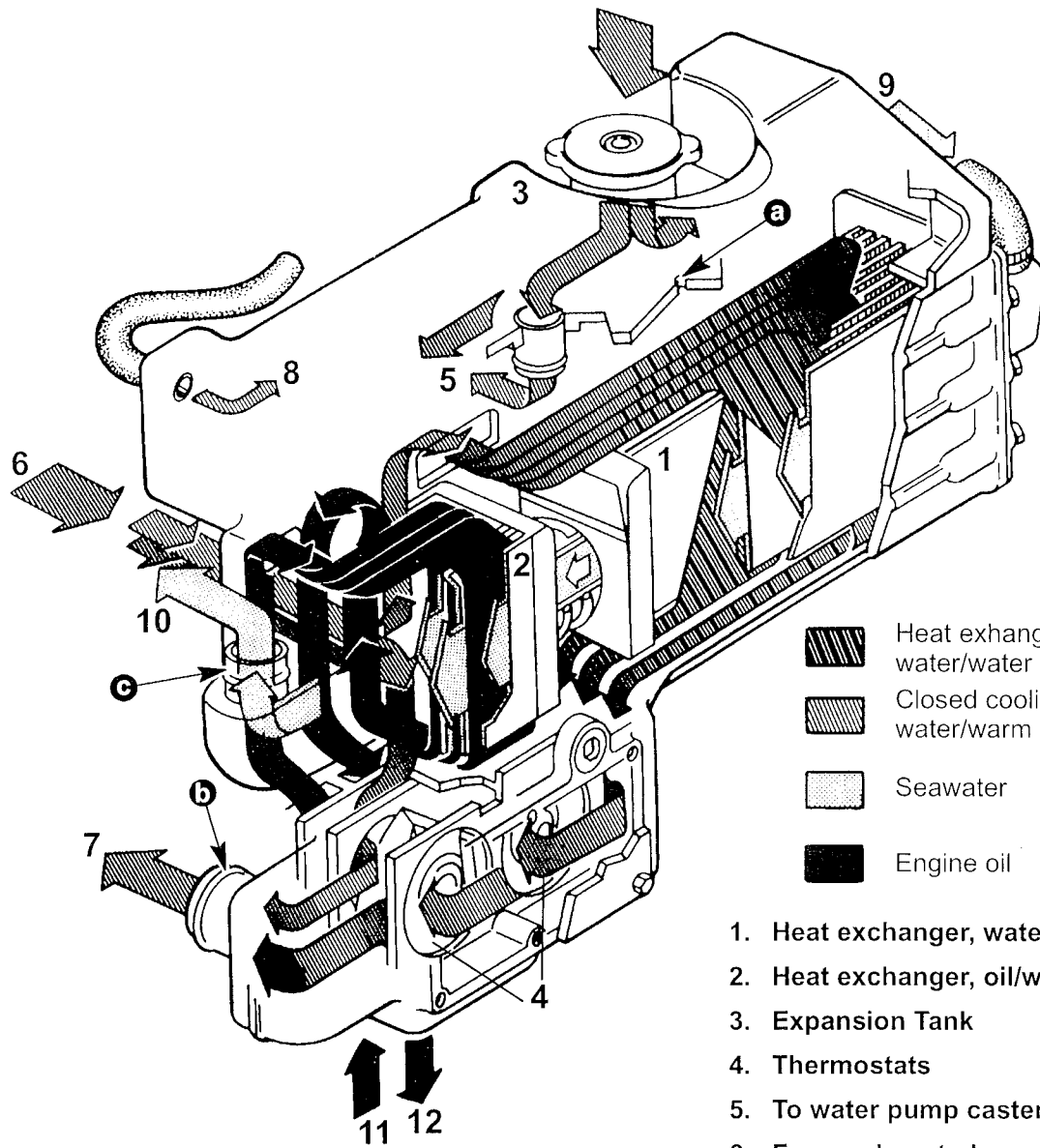
Snap-on Tools are readily available. For the nearest dealer or distributor in your state/country, contact the Snap-on home office in the U.S.A.

Snap-on Tools  
Kenosha, WI  
Phone: 414-656-5200  
Fax: 414-656-1403  
Telex: 431-1080 SNAP-ON-KNE





10. Check for air entering sea water cooling system.

Replace hose between heat exchanger and exhaust elbow with clear hose. (Figure 4, "c") Watch for air bubbles. If air bubbles are present the complete sea water system must be checked for leaks.
11. Check if vent hole in heat exchanger directly under filler cap is open. (Figure 4, "a")

**IMPORTANT: Hole diameter must not be enlarged from original size of 3/32" (2.5mm).**



23291

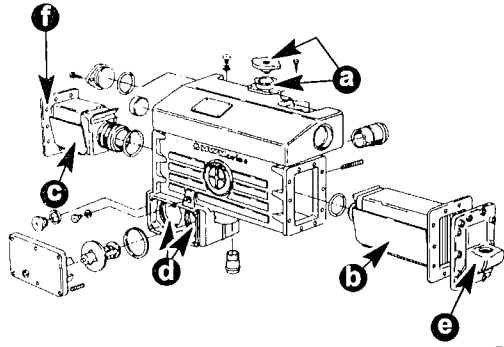
-  Heat exchanger, cold water/water
-  Closed cooling water/warm
-  Seawater
-  Engine oil

1. Heat exchanger, water/water
2. Heat exchanger, oil/water
3. Expansion Tank
4. Thermostats
5. To water pump castor
6. From exhaust plenum chamber
7. To water pump
8. From water manifold (pressure return pass)
9. From seawater pump
10. To exhaust gas end pipe
11. From oil temperature sender
12. To oil filter

- a - Vent Hole Must Not Be Restricted (View Through Filler Neck with Cap Removed)
- b - Install Clear Hose (Fresh Water)
- c - Install Clear Hose (Sea Water)

**Figure 14. Heat Exchanger Flow**

12. Check thermostats for proper opening degrees.  
170°F – 178°F (77°C – 81°C). (Figure 5, "d")

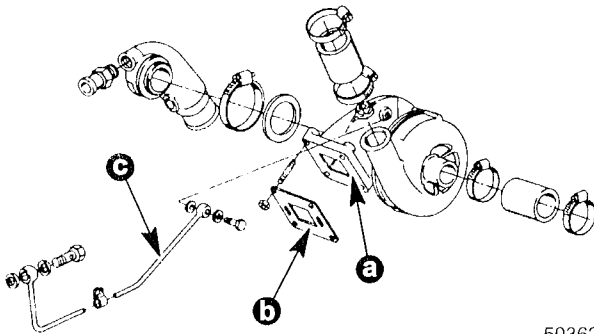


50360C

- a - Replace with New Double Lip Seal Cap and Neck
- b - Coolant Exchanger
- c - Oil Exchanger
- d - Dual Thermostats
- e - Raw Water Outlet
- f - Raw Water Inlet (Not Shown)

**Figure 5. Heat Exchanger Tank**

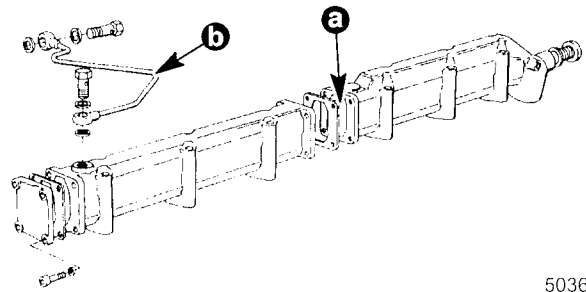
13. Check vent line from turbocharger to expansion tank (Figure 6, "c") and from water manifold to expansion tank (Figure 7, "b") are open.



50362

- a - Water Passages Restricted
- b - Gasket Leaking
- c - Vent Line Restricted

**Figure 6. Turbo Charger**



50361

- a - Water Passage Restricted
- b - Vent Line Plugged

**Figure 7. Water Manifold to Cylinder Heads**

If all previous steps are completed and the engine is still overheating, order a cooling system repair kit P/N 63832A25. The kit includes instructions for cleaning and flushing the entire cooling system and replacing and/or installing parts listed below.

**Repair Kit P/N 63832A25**

- New Circulating Pump
- Coolant Recovery Bottle
- Auxiliary Oil Cooler Kit
- Larger Sea Water Pump Cam
- Quicksilver Engine Coolant
- Quicksilver Cooling System Cleaner
- New Oil and Coolant Temp Senders
- Rubber Inserts
- New Heat Exchanger Filler Neck and Cap

**NOTE:** Instructions, packaged with the kit, **MUST BE** followed completely and correctly.

TO: SERVICE MANAGER  TECHNICIANS   
PARTS MANAGER

No. 89-2

## B.M.W. D190/D150 Models Overheating

The models listed above are B.M.W. production for which MerCruiser is responsible for service. When experiencing an overheating condition with these engines, MerCruiser suggests that the following procedures are used.

### Check The Following Points First:

- Cooling system at proper level. (1/2" – 3/4" [12–20mm] below filler neck)
- Malfunction of instruments (gauges, senders, wires, grounds, etc.)
- Check engine temperature with an accurate independent instrument
- Pressure check cooling system and cap using an automotive cooling system pressure tester, if available. 14 PSI (100 kPa). Replace with new cap, neck and coolant recovery bottle
  - Cap P/N 36-13130
  - Neck P/N 812658
  - Coolant Recovery Kit P/N 71587A7
  - And Hose P/N 32-19833-89

**NOTE:** A new style cap and neck must be used on all cooling systems. The old style cap, being a single seal type, is vulnerable to leaking. **The coolant bottle is for over-flow only and must remain empty when engine is cold.**

- Engine circulating pump malfunction
  - Loose alternator belt?
  - Impeller vanes worn?
  - Impeller shaft seal failure?
  - Impeller clearance to pump housing?  
015 –.020 (.038mm –.50mm)
  - Replace with new style pump  
(Date Code 7/87) P/N 46-814255  
(Figure 6C)
- Engine coolant concentration? (50/50 mix)

**NOTE:** –34° F (–37° C) indicates a 50/50 mix.

- Water intake blocked (Figure 1 & 2)
  - Propeller ventilation?
  - Interference of keel?
  - Inlet hose collapsing?  
(Check during operation)
- Injection timing correct?

### Check for Internal Engine Cooling Problems:

- Exhaust gases entering closed cooling system? Remove 1 in. (25mm) plug from rear of exhaust manifold (Figure 10B) and install water pressure gauge. If higher pressure is obtained than listed, exhaust gases exist in system. Make a compression test for head gasket leakage.
  - Coolant System Pressure
  - 800 RPM (Idle) 6 PSI (41 kPa)
  - 3800 RPM (WOT) 20 PSI (137 kPa)

OR

Replace hose between heat exchanger and engine circulating pump with clear plastic hose. (Figure 14B) Watch for gas bubbles.
- Exhaust gases existing in the closed cooling system may also be determined by using a combustion leak tester.

**NOTE:** Snap-on Tools has Combustion Leak Tester available for testing coolant for exhaust gases. (Block Combustion Leak Tester P/N GA170B)

Snap on tools are readily available in Europe. For the nearest dealer or distributor, contact the home office in the U.S.A.

Snap-On Tools  
Kenosha, WI  
Phone 414-656-5200  
Fax 414-656-1403  
Telex 431-1080-SNAP-ON-KNE

**V12 Engineering**  
Box 50, Ontario, Canada POX 100  
[www.bmwmarine.net](http://www.bmwmarine.net)

- Air entering seawater cooling system? Replace hose between heat exchanger and exhaust elbow with clear hose. (Figure 14C) Watch for air bubbles.

- Check if vent hole in heat exchanger directly under filler cap is open. (Figure 14A)
- Check thermostats for proper opening degrees. 170° F– 178° F (77° C – 81° C). (Figure 11D)
- Check vent line from turbocharger to expansion tank (Figure 12C) and from water manifold to expansion tank (Figure 9B) are open.

## All Previous Steps Checked and/or Completed and Engine Still Overheating, it will be Necessary to Clean and Flush the Closed Cooling System.

Following are procedures for cleaning and flushing the system.

1. Drain fresh water circuit of the engine.
2. Completely flush the cooling circuit using an alkaline based engine cleaner. Follow the instruction on the container for proper use.

### **NOTE:** Recommended Cleaners

Quicksilver Cooling System Cleaner  
P/N 92-814825

Caterpillar Cooling System Cleaner  
(Caterpillar Tractor Co.)

John Deere Cooling System Cleaner  
(Deere & Co.)

Nalprep 2001 (Nalco Chemical Co.)

Peak Professional Cooling System Cleaner  
(Northern Pestrochemical Co.)

Restore (Fleetguard Inc.)

3. To drain flushed engine remove hose between circulating pump and heat exchanger. (Figure 14B)
4. Remove plug (Figure 10B). Connect a clean water supply to the manifold where plug was removed.
5. Flush the system until the exiting water is clean.

**NOTE:** Flushed water will exit from the circulating pump hose and heat exchanger.

6. Reinstall plug after flushing is complete.
7. Remove circulating pump and inspect impeller and housing for cavitation. (Figure 6A) Also inspect for shaft deflection and worn or leaking seals. Replace old style pump (New Pump Date Code 7/87 and Above, Figure 6C)
8. Remove both seawater inlet and outlet covers located on the port and starboard side of the heat exchanger. (Figure 11E & F)

9. Remove the inner core of the oil and water exchanger using tool P/N 91-801761156. (Figure 5B)

**NOTE:** Not using the tool will cause damage to the core flange.

10. Inspect coolant core for any damage or restrictions. Replace if necessary.
11. Any brown scale or green slime found on the coolant core must be removed.

## ⚠ WARNING

**WEAR PROTECTIVE CLOTHING AND PROPER EYE PROTECTION WHEN USING ACID SOLUTION.**

- a. Submerge the core into a 20% solution of phosphoric acid and water or a 20% solution of muriatic acid and water.
  - b. Leave in solution for 20 minutes minimum, or until clean.
  - c. Remove and rinse the core thoroughly.
  - d. Or have a local radiator service shop clean the core.
12. Remove all gasket material on the core flange, end cap and housing face. Inspect inside the exchanger aluminum housing and clean if necessary.
  13. Before installing exchanger cores into housing, it will be necessary to crimp both baffles located on the side of exchangers.
    - a. Following are illustrations showing a correct and incorrect baffle. (Sketch C, Item B).
    - b. The side baffle must have a 10 degree angle from the core. The crimp applied to the baffle must also have a 10 degree angle, 1/4 in. (6mm) deep. (Sketch C, Item C).
    - c. Attached is a drawing of the tool needed to crimp the baffles of the core. (Sketch A & B)

**NOTE:** There are two different tools shown in the drawing. (Sketch A) Tool A is a permanent type tool for repetitive use. Tool B, being simpler, uses two pieces of flat stock steel of the correct length pressed together by two vise grips. (Sketch B)

**NOTE:** The baffle 10 degree 1/4 in. (6mm) crimp applied at the tip of the side baffles removes any wave in the baffle.

- d. Baffles on rear of both coolant and oil exchanger cores must be bent down. Caution must be taken not to damage core. (Figure 15)



- e. Install rubber baffle on the end of both cores. (Figures 16,17)

Rubber Baffles

Coolant Side	P/N 26-815173
Oil Side	P/N 26-815172

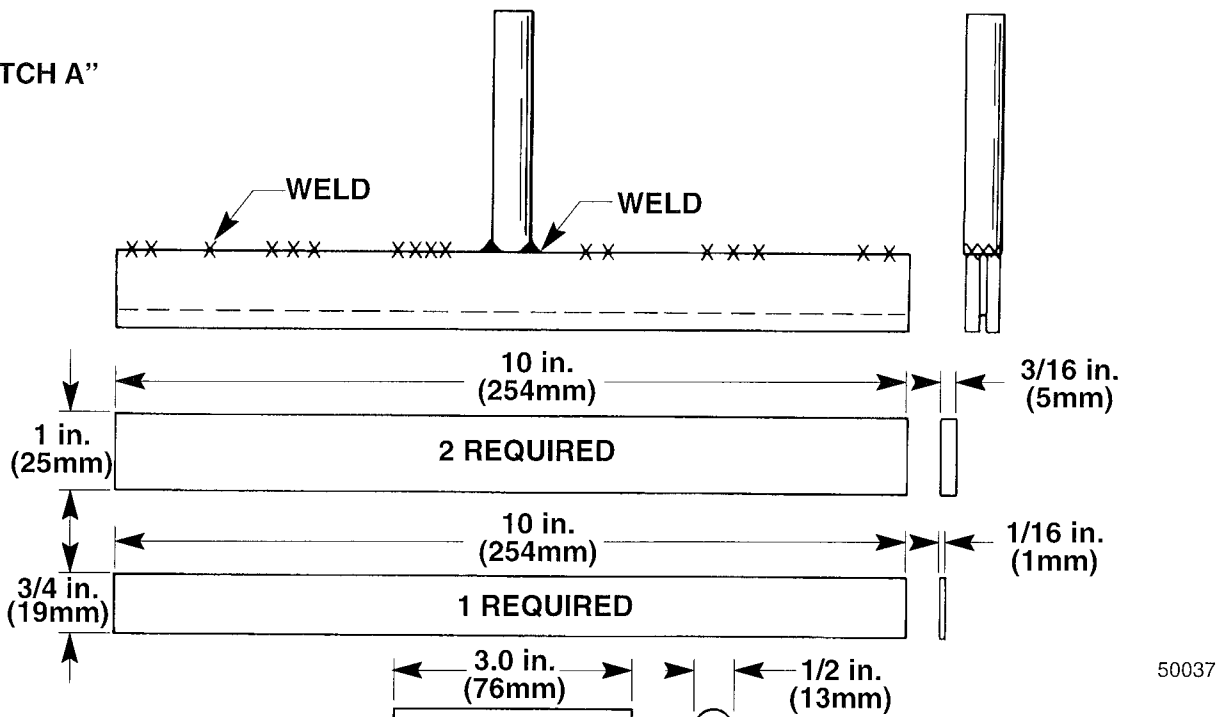
14. Lubricate and install new O-rings on exchanger core.  
 15. Apply Sealant 92-814826 or Loctite Master Gasket P/N 92-12564--1 on both sides of the cores sealing surfaces and carefully install core into aluminum housing, being careful not to damage O-rings.  
 16. Install clean end cap and tighten bolts securely.  
 17. Install circulating pump using a new gasket.

18. Make all hose connections and fill the system with Quicksilver Pre-mixed Anti-freeze P/N 92-813054A2 (Date code 11/88) or an equivalent low-silicate brand (1/2" – 3/4" [12 – 20mm] below filler neck).

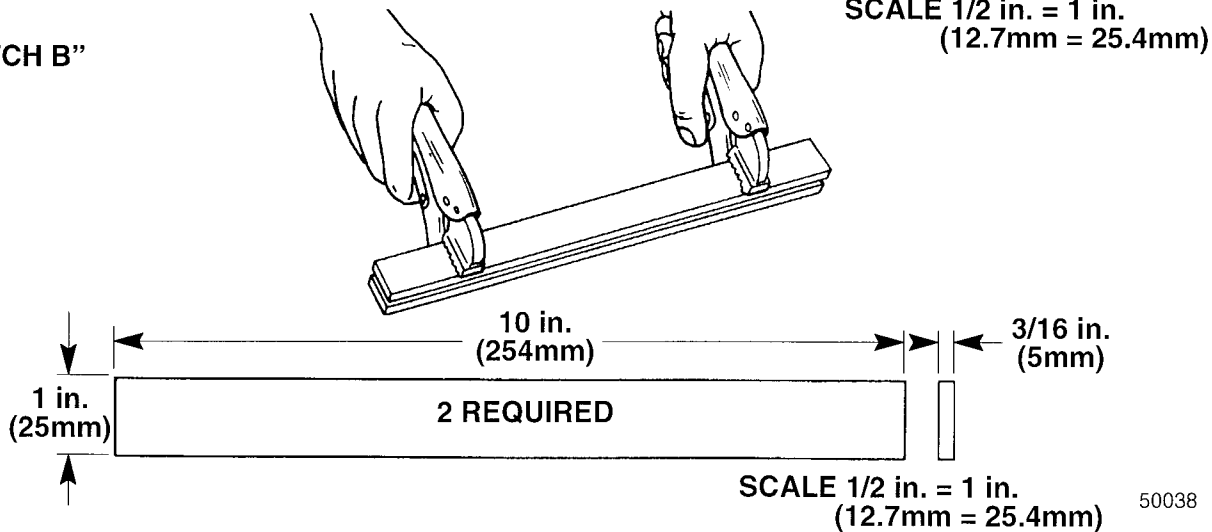
19. Deaerate cooling system by running engine at idle for 1 – 2 minutes with filler cap removed. Stop engine and top off coolant per item 18 preceding. Replace cap and run engine 5 – 10 minutes at 2000 – 3000 RPM. Allow engine to cool. Recheck coolant level and top off as required.

**NOTE:** Using anti-freeze other than Quicksilver Engine Coolant a low silicate 50/50 pre-mixed coolant with proper additives and manufactured for diesel engines must be used.

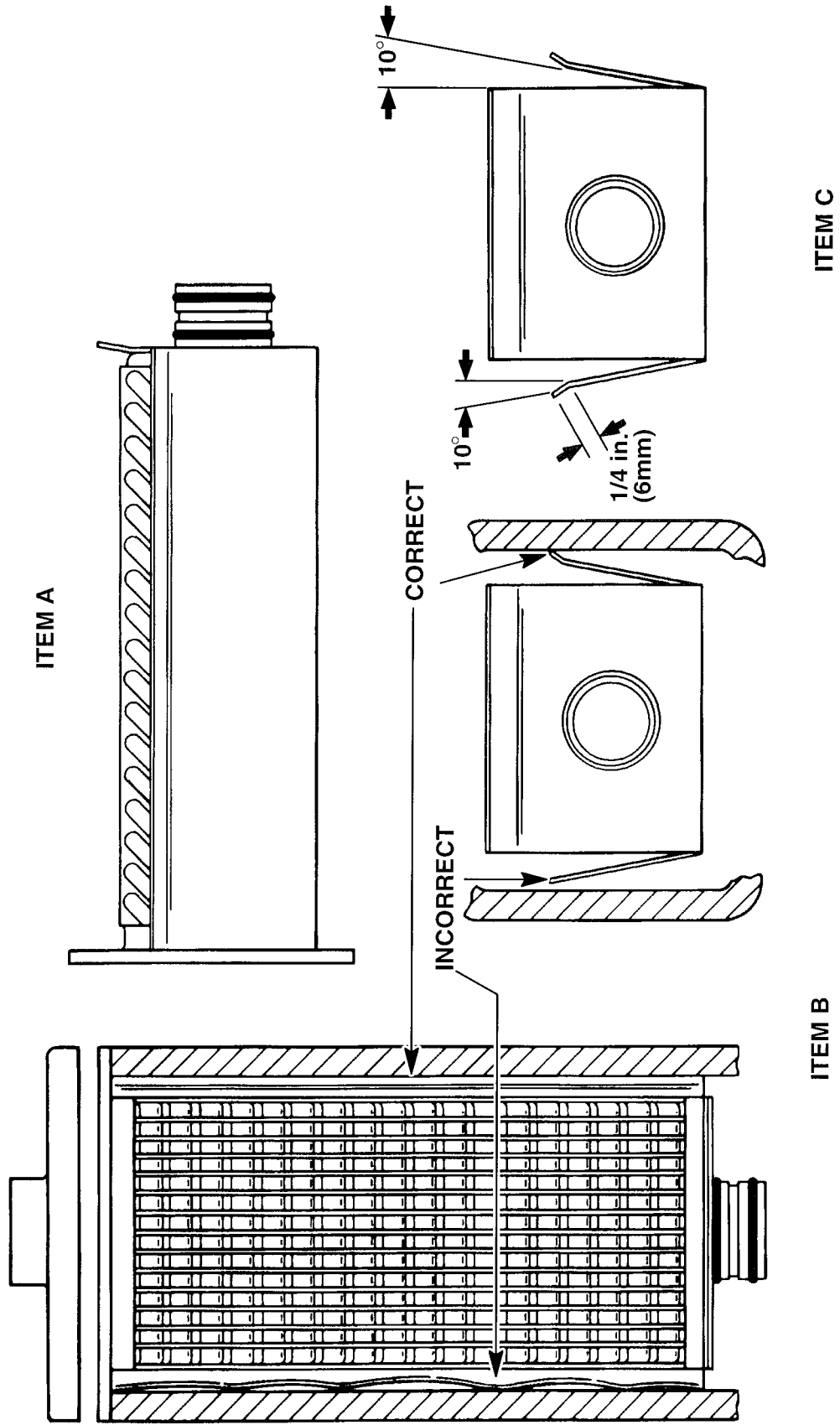
"SKETCH A"



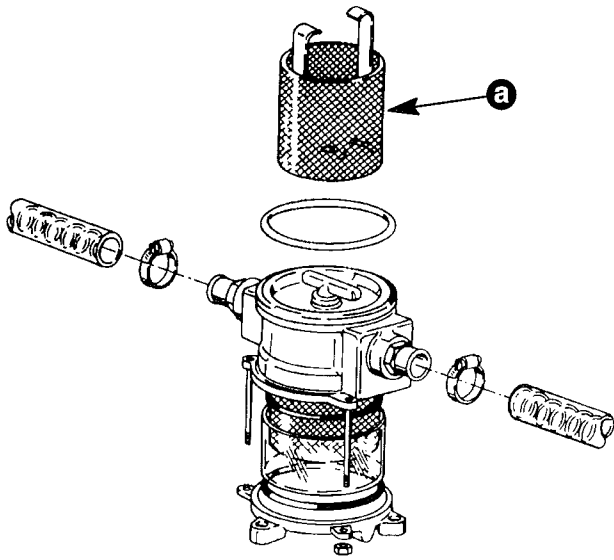
"SKETCH B"



“SKETCH C”



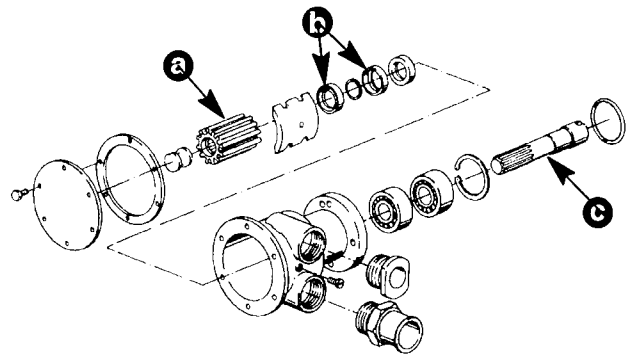
- Following are illustrations of Cooling System Checkpoints referred to in previous instructions.
  - Figure 1 – 5 refer to the raw water circuit.
  - Figure 6 – 14 refer to the fresh water circuit.



50359A

a - Check Strainer for Restriction

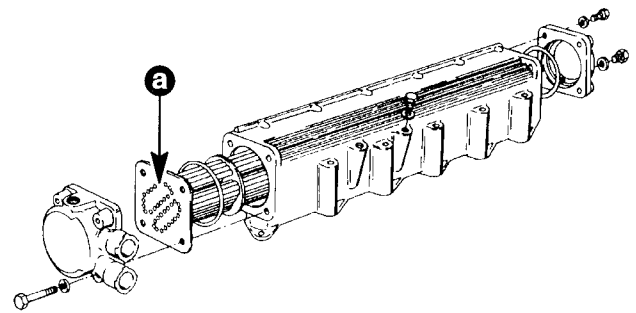
**Figure 1. Raw Water Filter**



50361A

a - Impeller Worn  
b - Worn Seal  
c - Shaft Deflection

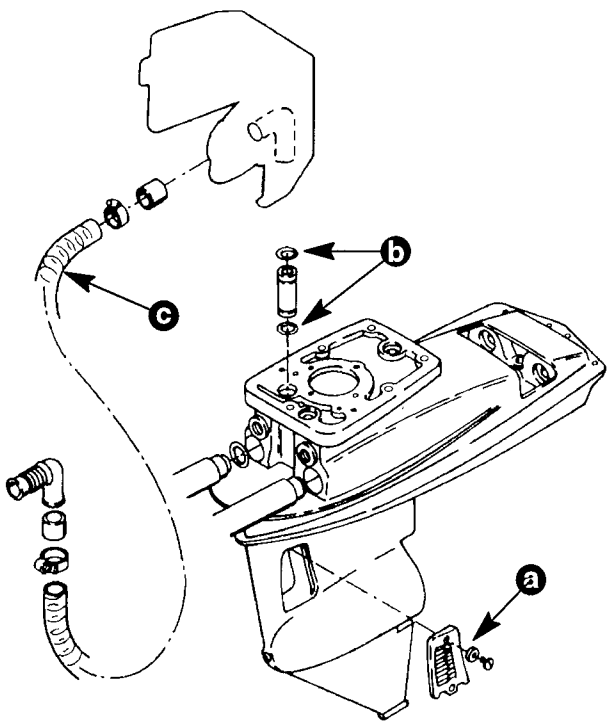
**Figure 3. Sea Water Pump**



50362B

a - Check Core for Restriction

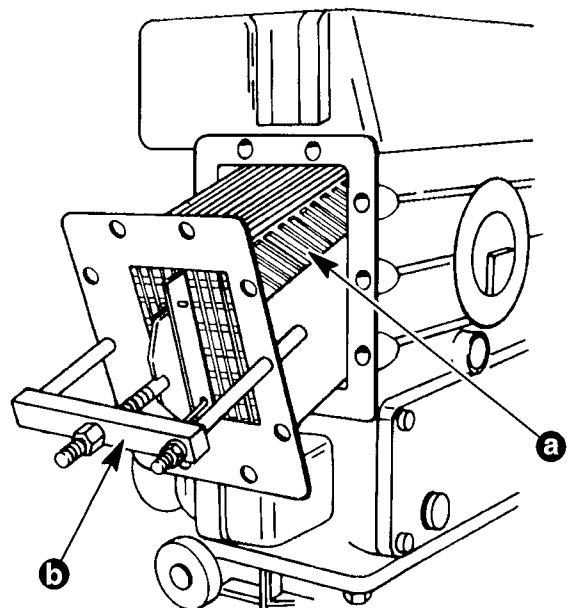
**Figure 4. After Cooler Manifold**



50360B

a - Check water Pick-Up for Restriction  
b - O-Rings Leaking, Not Sealing  
c - Inlet Hose Tore or Kinked

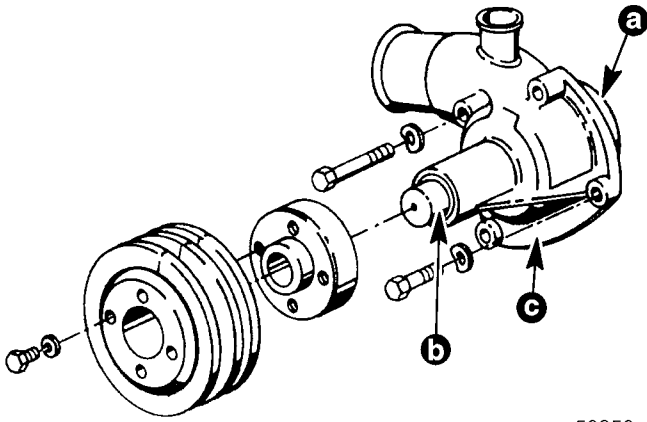
**Figure 2. B.M.W. Stern Drive**



50360

a - Check Core for Restriction  
b - Exchanger Puller (P/N 91-801761156)

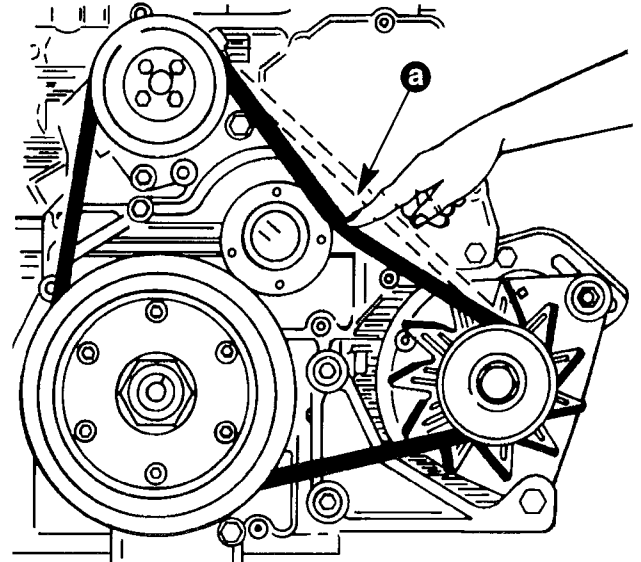
**Figure 5. Water/Coolant Heat Exchanger**



50359

- a - Check Impeller for Cavitation
- b - Check for Shaft Deflection/Seal Wear
- c - Date Code (7/87 or Newer)

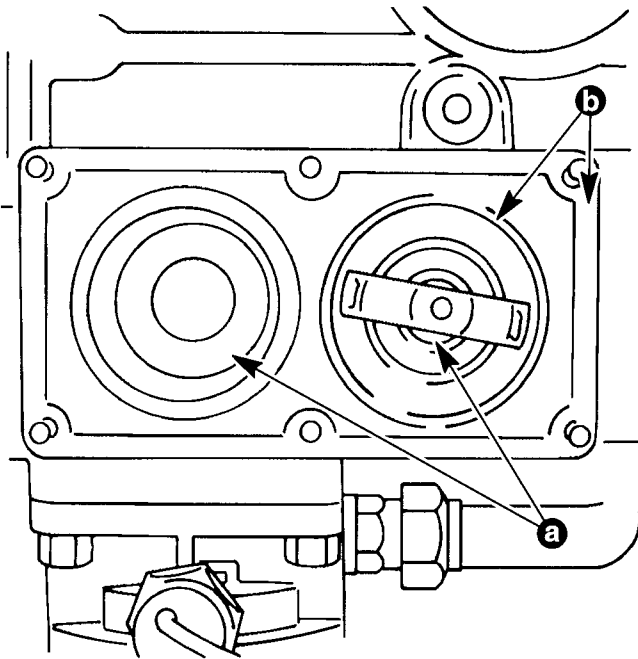
**Figure 6. Engine Circulation Pump**



50359

- a - Check Belt for Slipping or Loose

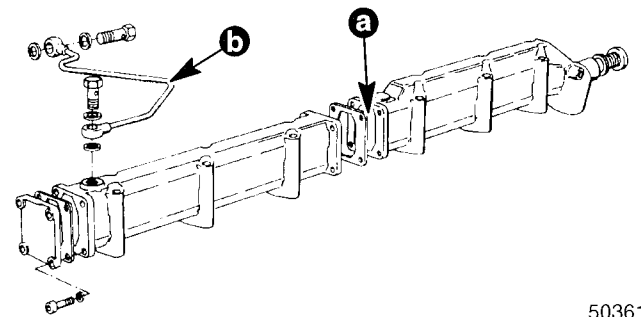
**Figure 8. Belt Tension**



50359

- a - Check Thermostat for Correct Temperature Opening
- b - Thermostat and Cover Sealing

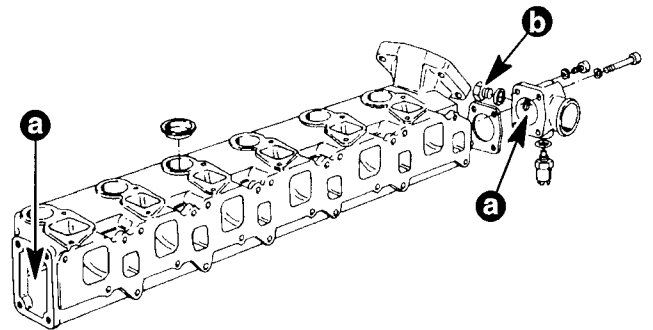
**Figure 7. Thermostats Housing**



50361

- a - Water Passage Restricted
- b - Vent Line Plugged

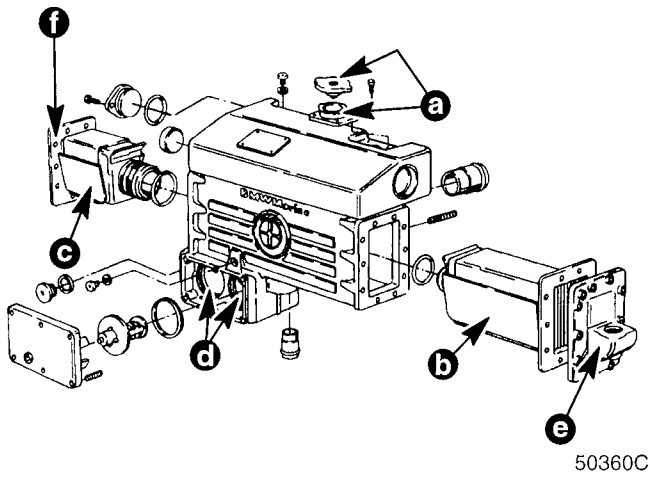
**Figure 9. Water Manifold to Cylinder Heads**



50361C

- a - Water Passages Restricted
- b - Remove Plug for Exhaust Pressure Check

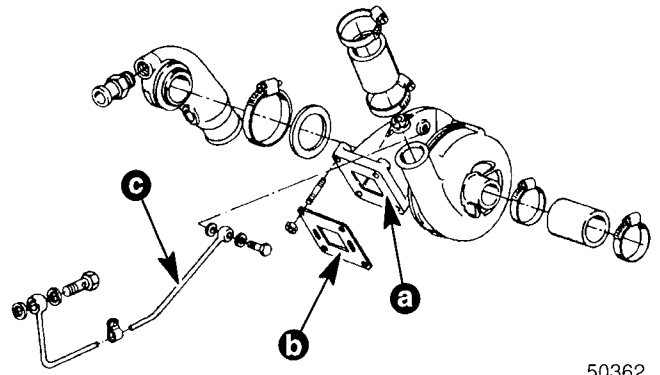
**Figure 10. intake/Exhaust Manifold**



50360C

- a - Replace with New Double Lip Seal Cap and Neck
- b - Coolant Exchanger
- c - Oil Exchanger
- d - Dual Thermostats
- e - Raw Water Outlet
- f - Raw Water Inlet (Not Shown)

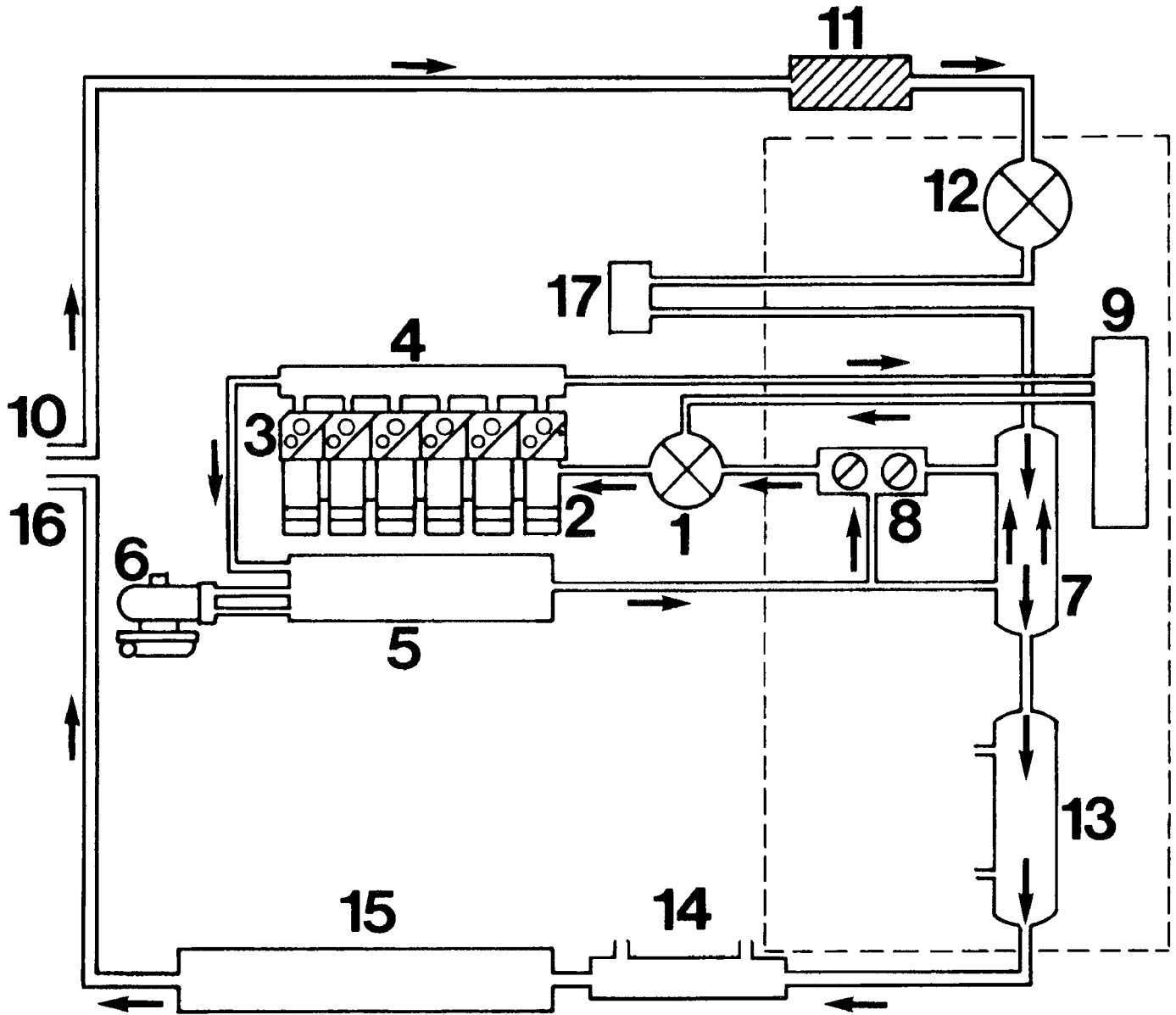
**Figure 11. Heat Exchanger Tank**



50362

- a - Water Passages Restricted
- b - Gasket Leaking
- c - Vent Line Restricted

**Figure 12. Turbo Charger**

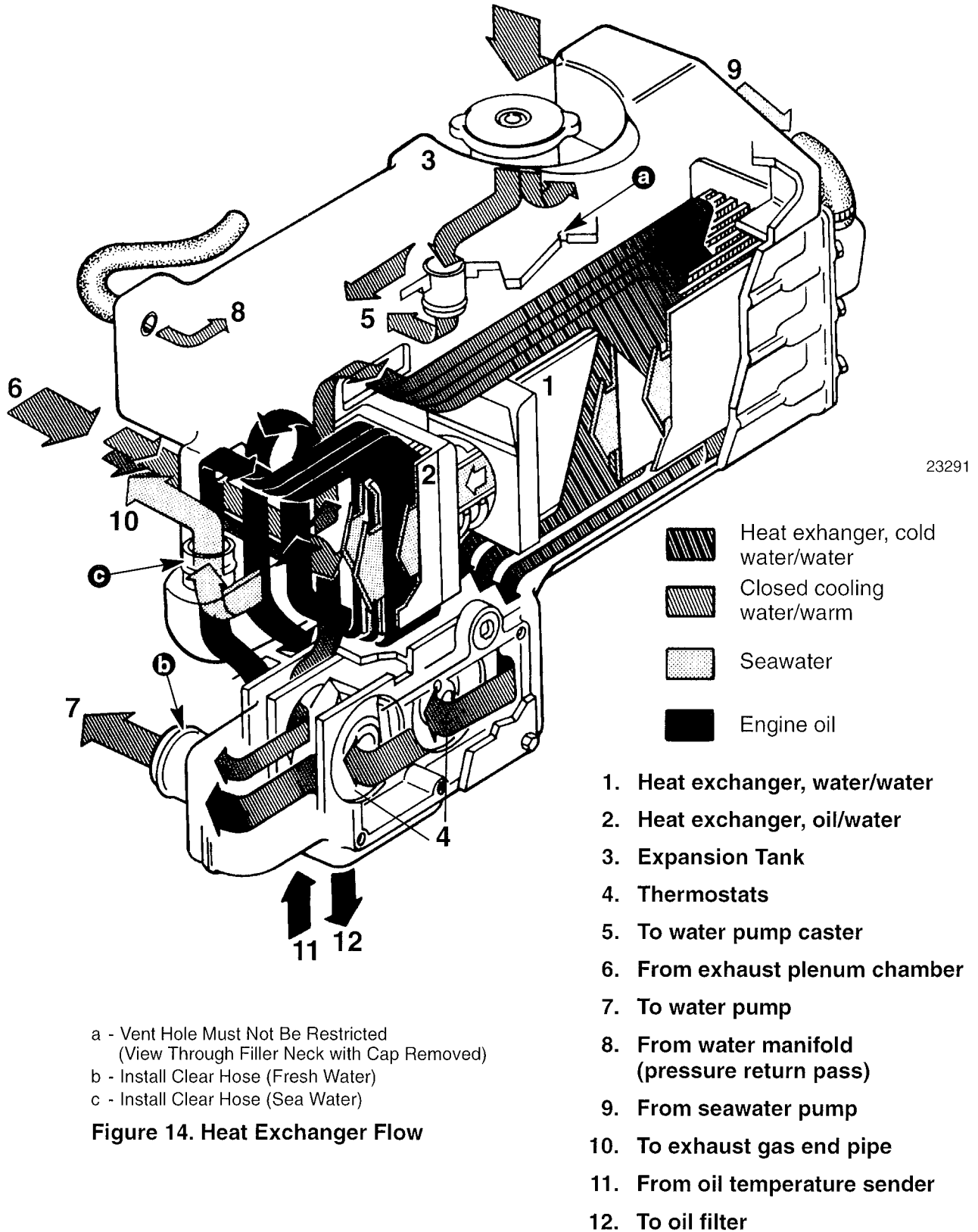


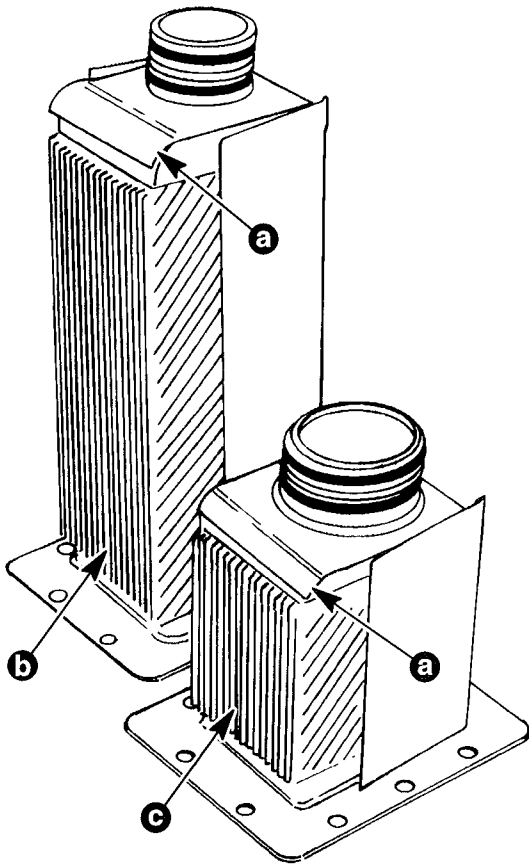
23178

**COOLING SYSTEM**

- |   |                                 |
|---|---------------------------------|
| 1. Fresh water pump                       | 9. Expansion tank               |
| 2. Engine block (upper section of liners) | 10. Raw water inlet             |
| 3. Cylinder heads                         | 11. Raw water filter            |
| 4. Water manifold                         | 12. Raw water pump              |
| 5. Exhaust manifold                       | 13. Heat exchanger Water/oil    |
| 6. Exhaust-gas turbine                    | 14. Exhaust pipe (water sleeve) |
| 7. Heat exchanger Water/water             | 15. Raw water outlet            |
| 8. Thermostats                            | 16. Intercooler                 |

**Figure 13. Water/Coolant Flow**

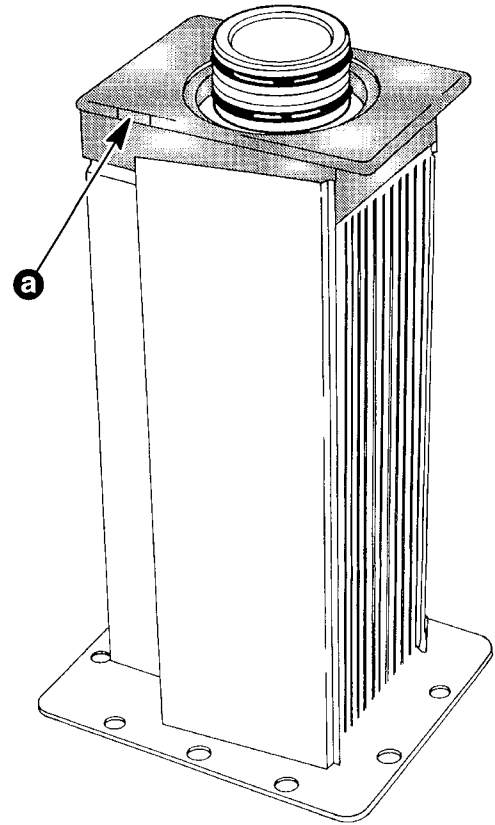




26403

- a - Bend Baffle Over Core As Shown. DO NOT Damage Core.
- b - Coolant Core
- c - Oil Core

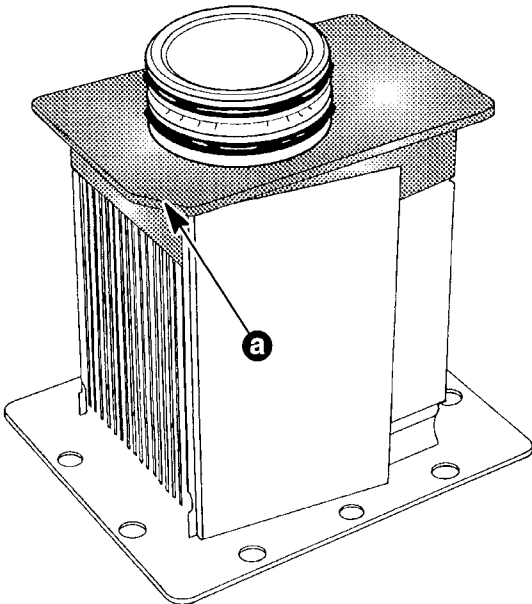
**Figure 15.**



70948

- a - Baffle Installed on Coolant Core (Full Corners)  
P/N 26-815173

**Figure 17.**



70949

- a - Baffle Installed on Oil Core (Notched Corners)  
P/N 26-815172

**Figure 16.**



TO: SERVICE MANAGER  TECHNICIANS   
PARTS MANAGER

No. 89-16

## B.M.W. Stern Drive/Inboards Model D636 Diesel Engines (Grey Engines) Overheating

If experiencing an overheating condition with a BMW D636 diesel engine, one of or a combination of the following conditions may be the cause.

### Check the following first:

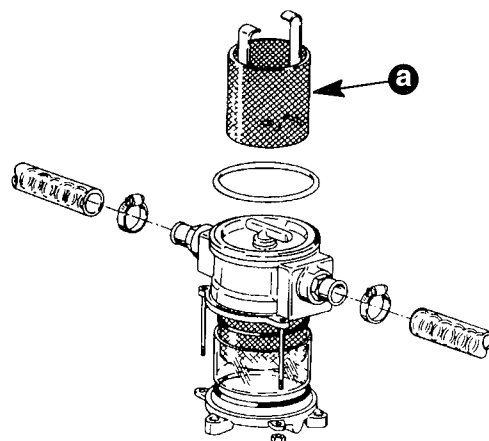
1. Check heat exchanger tank for coolant at proper level (1/2" – 3/4" [12mm – 20mm] below filler neck).
2. Check and compare temperature with an accurate independent instrument i.e. (possible malfunction of gauges, senders, wires, ground, etc.).
3. Pressure check cooling system and cap with automotive cooling system pressure tester. 14 PSI (100 kPa) required. Because old style coolant tank cap (single seal type) is vulnerable to leaking, recommend replacing with new style cap, P/N 63832A14.
4. Check engine circulating pump for possible malfunctions.
  - Loose/slipping alternator belt
  - Impeller vanes worn
  - Impeller shaft seal leaking
  - Impeller clearance to pump housing (.015" – .020"/.038mm – .050mm)

**NOTE:** Replace with new style pump, P/N 46-814255, if necessary.

5. Check engine coolant concentration to ensure 50/50 mixture.

**NOTE:** -34° F (-37° C) indicates a 50/50 mix. Use Quicksilver pre-mixed antifreeze P/N 92-813054A2 or an equivalent low-silicate brand. Using antifreeze other than Quicksilver Engine Coolant a low silicate 50/50 pre-mixed coolant with proper additives and manufactured for diesel engines must be used.

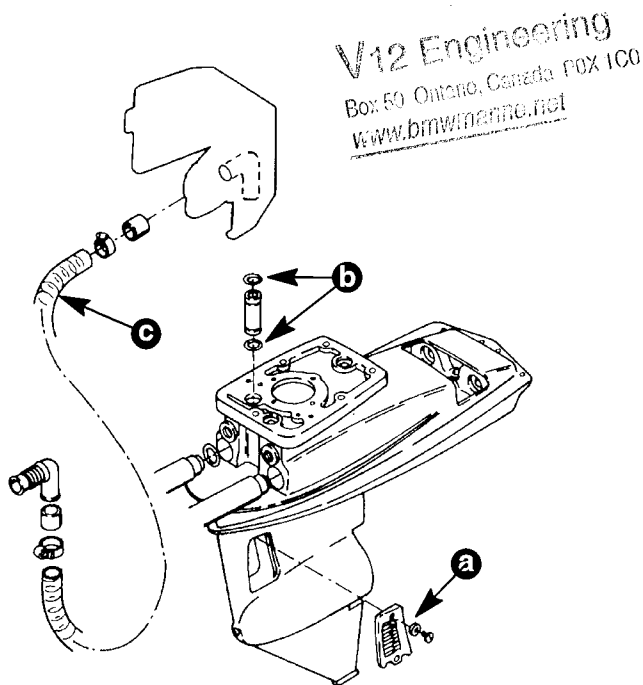
6. Check for raw water intake problems (refer to Figures 1 & 2).



50359A

a - Check Strainer for Restriction

**Figure 1. Raw Water Filter**



50360B

a - Check Water Pick-Up for Restriction  
b - O-Rings Leaking, Not Sealing  
c - Inlet Hose Tore or Kinked

**Figure 2. B.M.W. Stern Drive**

Other known problems are:

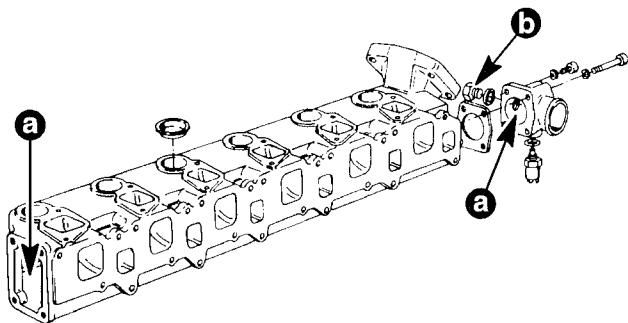
- Propeller ventilation (Inboard application)
  - Partially obstructed inlet sea water screen/cover
  - Interference of keel
  - Inlet hose collapsing during operation (must be wire reinforced hose).
7. Check for correct injection timing (refer to service manual specs).
  8. Using one of the following procedures check for exhaust gases entering closed cooling system.

- a. Remove 1 in. (25mm) plug from rear of exhaust manifold (Figure 3, "b") and install water pressure gauge. If higher pressure is obtained than listed below, exhaust gases exist in system.

### Coolant System Pressure

800 RPM (idle) 6 PSI (41 kPa)

3800 RPM (WOT) 20 PSI (137 kPa)



50361C

a - Water Passages Restricted

b - Remove Plug for Exhaust Pressure Check

**Figure 3. Intake/Exhaust Manifold**

- b. Replace hose between heat exchanger and engine circulating pump with clear plastic hose. (Figure 4, "b") Watch for gas bubbles.
9. Check the following if excessive pressure or gas bubbles are found.
    - a. Head gasket leakage by making a compression test.
    - b. Exhaust gases existing in the closed cooling system by using a combustion leak tester.

**NOTE:** Snap-on Tools has combustion leak tester available for testing coolant for exhaust gases. (Block Combustion Leak Tester P/N GA170B)

Snap-on Tools are readily available. For the nearest dealer or distributor in your state/country, contact the Snap-on home office in the U.S.A.

Snap-on Tools

Kenosha, WI

Phone: 414-656-5200

Fax: 414-656-1403

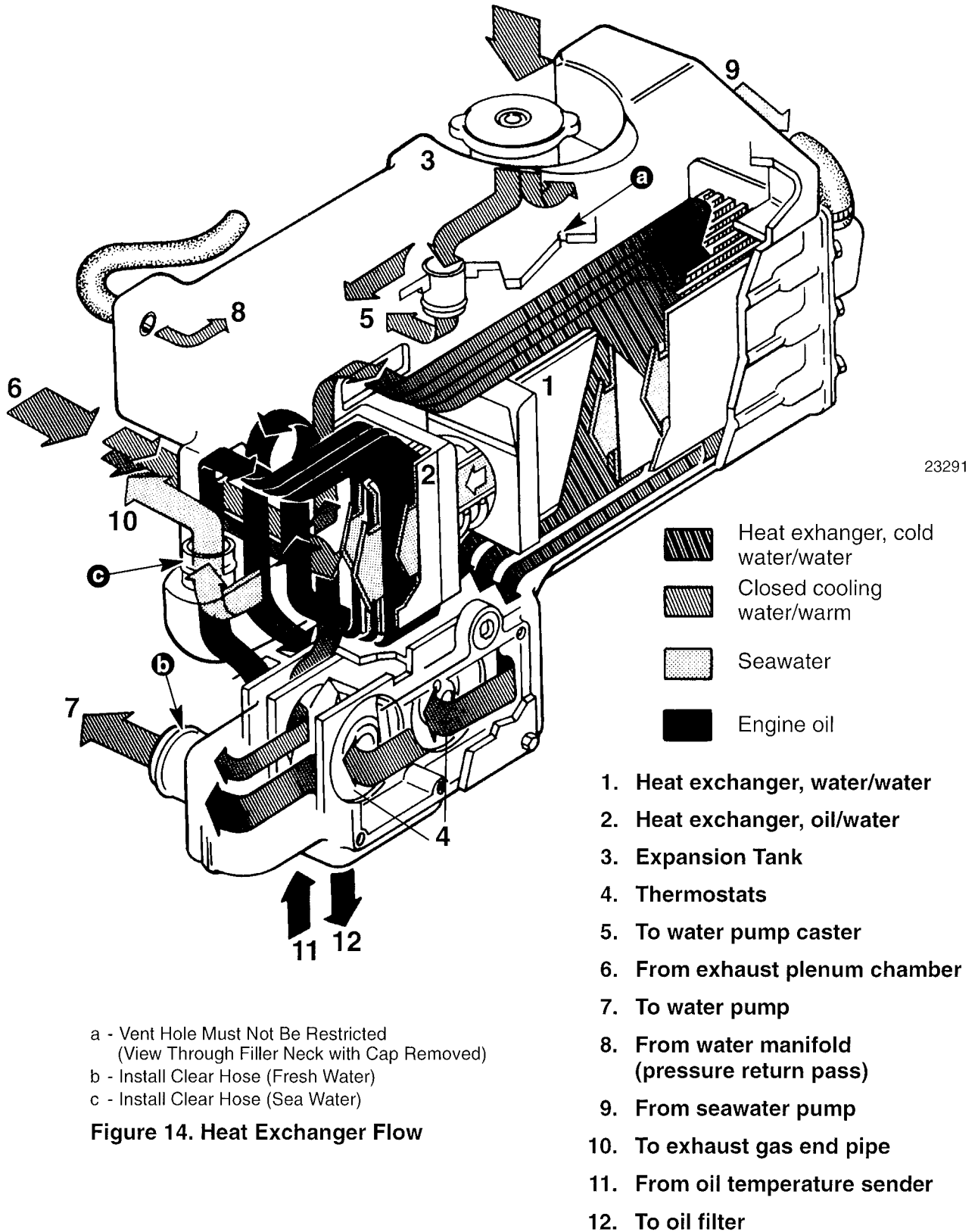
Telex: 431-1080 SNAP-ON-KNE

10. Check for air entering sea water cooling system.

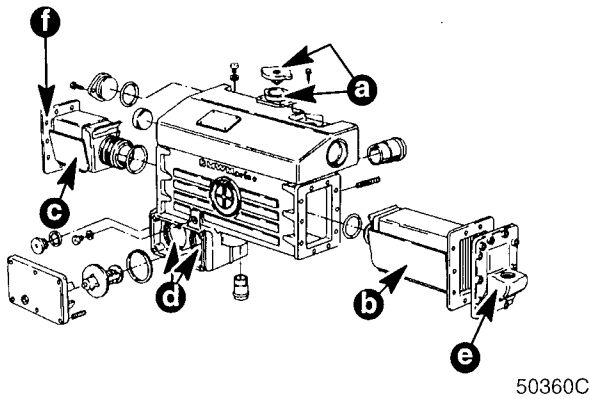
Replace hose between heat exchanger and exhaust elbow with clear hose. (Figure 4, "c") Watch for air bubbles. If air bubbles are present the complete sea water system must be checked for leaks.

11. Check if vent hole in heat exchanger directly under filler cap is open. (Figure 4, "a")

**IMPORTANT: Hole diameter must not be enlarged from original size of 3/32" (2.5mm).**



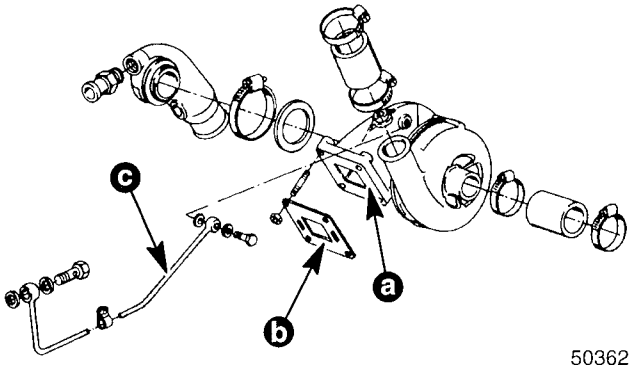
12. Check thermostats for proper opening degrees.  
170°F – 178°F (77°C – 81°C). (Figure 5, "d")



- a - Replace with New Double Lip Seal Cap and Neck
- b - Coolant Exchanger
- c - Oil Exchanger
- d - Dual Thermostats
- e - Raw Water Outlet
- f - Raw Water Inlet (Not Shown)

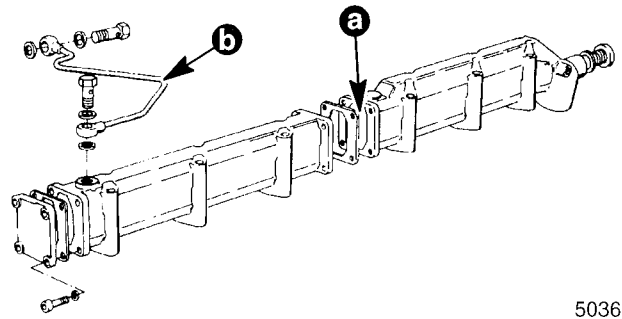
**Figure 5. Heat Exchanger Tank**

13. Check vent line from turbocharger to expansion tank (Figure 6, "c") and from water manifold to expansion tank (Figure 7, "b") are open.



- a - Water Passages Restricted
- b - Gasket Leaking
- c - Vent Line Restricted

**Figure 6. Turbo Charger**



- a - Water Passage Restricted
- b - Vent Line Plugged

**Figure 7. Water Manifold to Cylinder Heads**

If all previous steps are completed and the engine is still overheating, order a cooling system repair kit P/N 63832A25. The kit includes instructions for cleaning and flushing the entire cooling system and replacing and/or installing parts listed below.

**Repair Kit P/N 63832A25**

- New Circulating Pump
- Coolant Recovery Bottle
- Auxiliary Oil Cooler Kit
- Larger Sea Water Pump Cam
- Quicksilver Engine Coolant
- Quicksilver Cooling System Cleaner
- New Oil and Coolant Temp Senders
- Rubber Inserts
- New Heat Exchanger Filler Neck and Cap

**NOTE:** Instructions, packaged with the kit, **MUST BE followed completely and correctly.**



# service bulletin

TO: SERVICE MANAGER  TECHNICIANS   
 PARTS MANAGER

No. 88-7

REVISED  
3-9-89

## Diesel Bravo Two/Inboard Engine Packages MCM 530 D-TA 636 D-TA Bravo Two MIE 530 D-TA 636 D-TA Inboard

### Tune-Up Specifications

MODEL	D530	D636
*Horsepower @ 3800 RPM	150	180
*Kilowatts	111	132
Displacement	182 CID (3.0L)	219 CID (3.6L)
Engine Type – Diesel	5 Cylinder	6 Cylinder
Bore	3.622 in. (92mm)	
Stroke	3.543 in. (90mm)	
Compression Ratio	22:1	
Compression Pressure Max. Pressure Difference:	348 – 377 PSI (2399 – 2581 kPa) 72 PSI (496 kPa)	
Maximum Governed RPM @ WOT	4250	4350
Recommended Maximum RPM	3800	
Idle RPM in Forward Gear	750	
Fuel Injectors	Bosch	
Injector Firing Order	1-2-4-5-3	1-5-3-6-2-4
Timing BTDC	.034 in (0.86mm)	
Fuel Injection Pressure	2247 PSI (15492 kPa)	
Internal Pump Pressure	22.7 PSI (156 kPa) at 800 RPM	
	106.6 PSI (735 kPa) at 4200 RPM	
Turbocharge Air Pressure	12 – 14 PSI (83 – 97 kPa)	
Oil Pressure	@ 750 RPM	
	@ 3800 RPM	
Thermostat – Oil	180° F (82° C)	

continued page 2

## Tune-Up Specifications (cont. from page 1)

MODEL	D530	D636
*Total Oil Capacity	9.5 U.S. Qts. (9L)	10.5 U.S. Qts. (10L)
Δ Oil Pan Capacity	7.5 U.S. Qts. (7L)	8.5 U.S. Qts. (8L)
Δ Oil Filter Capacity	1 Qt. (1L)	
Δ Oil Cooler Capacity	1 Qt. (1L)	
Closed Cooling Capacity	11.5 U.S. Qts. (11L)	12.5 U.S. Qts. (12L)
Thermostats – Water	170° – 178° F (77° – 81° C)	
Valve Clearance Intake/Exhaust	.012 in. (0.3mm)	
Drive Unit Oil Capacity	2.5 U.S. Qts. (2.37L)	

\*Always use dipstick to determine exact quantity of oil required.

Δ Approximate

\*Continuous effective braked output per DIN 6271, Part 1, Supplement 1.

## Electrical Specifications

Electrical System	12-volt Negative (-) Ground
Alternator Rating	75 Amps
Recommended Battery Rating	12v, 110Ah Minimum 600 Amps Cold Cranking Amperage
Starter	12v, 2.7 kW

Identification Number	No Load Test					Brush Spring Length
	Volts	Min. Amps	Max. Amps	Min. RPM	Max. RPM	
801333980 (Bosch) 0001 362304	11.5	125			7000	21/64 in. (8.5mm)

## Torque Specifications

Cylinder head bolts	118 lb. ft.	(160 N.m)
Side bolts	59 lb. ft.	(80 N.m)
Rocker arm bracket	81 lb. ft.	(110 N.m)
Connecting rods	62 lb. ft.	(83 N.m)
Flywheel	81 lb. ft.	(110 N.m)
Pulley nut, crankshaft	115 lb. ft.	(155 N.m)
Oil drain plug	59 lb. ft.	(80 N.m)
Engine suspension	37 lb. ft.	(50 N.m)
Oil pump	21 lb. ft.	(28 N.m)
Rear main bearing housing	21 lb. ft.	(28 N.m)
Flywheel housing	37 lb. ft.	(50 N.m)
Fuel injector nut	21 lb. ft.	(28 N.m)
Cap nuts of injection lines	159 lb. in.	(18 N.m)
Exhaust manifold	25 lb. ft.	(33 N.m)
Intake manifold	25 lb. ft.	(33 N.m)
Main bearing flanges	32 lb. ft.	(43 N.m)
Valve cover	89 lb. in.	(10 N.m)
Oil pan	97 lb. in.	(11 N.m)
Water manifold	80 lb. in.	(9 N.m)
Turbocharger	18 lb. ft.	(24 N.m)
Oil supply lines between cooler and crankcase	18 lb. ft.	(24 N.m)
Oil thermostat	71 lb. in.	(8 N.m)
Injection pump gear	66 lb. ft.	(90 N.m)
Glow plugs	18 lb. ft.	(24 N.m)
Injection pump fastening nuts	23 lb. ft.	(31 N.m)
Exhaust clamp	21 lb. ft.	(28 N.m)
Alternator, pulley fastening nut	43 lb. ft.	(58 N.m)
Alternator bolt, lower	39 lb. ft.	(53 N.m)
Alternator bolt, upper	78 lb. ft.	(105 N.m)
Alternator armature	35 lb. ft.	(48 N.m)

**UNIT OF MEASUREMENT**  
in. (mm)

### Internal Engine Specifications

#### CYLINDER BORE

Model	530 D-TA	636 D-TA
Diameter	3.622 (92)	
Out of Round	.004 (0.1) Max.	

#### PISTON

Clearance		.010 (0.25) Max.
Piston Wear		.004 (0.1) Max.
Diameter Standard Size	VERSION A	3.618 – 3.6185 (91.900 – 91.910)
	B	3.6185 – 3.619 (91.910 – 91.920)
Diameter First Over-size	A	3.6429 – 3.6432 (92.530 – 92.540)
	B	3.6432 – 3.6436 (92.540 – 92.550)
Max. Weight Diff. Between Pistons in One Engine.		5 grams
Piston Protrusion From Upper Edge of Crankcase		.019 – .022 (0.48 – 0.57)
	.056 (1.42)	
		.023 – .026 (0.58 – 0.67)
Gasket Size * Used	.060 (1.52)	
		.027 – .030 (0.68 – 0.77)
	.064 (1.62)	

\*When replacing all gaskets on a single engine, use size .060 (1.52mm) gasket.

If replacing an individual gasket, use the same size removed.

### PISTON RINGS

Oil	Compression	Groove Side Clearance	Production	Tapered		
				TOP	2nd	
Oil	Compression	Groove Side Clearance	Production	TOP	.003 (.082)	
				2nd	.0035 (0.09)	
	Gap	Production	TOP	.016 (0.40)		
			2nd	.010 (0.25)		
	Gap	Service	TOP	.025 (0.65)	2nd	.018 (0.45)
Oil	Groove Side Clearance	Production	.001 (0.30)			
			Service	.003 (0.070)		
	Gap	Production		.010 (0.25)		
			Service	.023 (0.58)		

#### PISTON PINS

Diameter	1.1807 – 1.1809 (29.990 – 29.996)
Clearance	.00095 – .00178 (0.024 – 0.045)



## CRANKSHAFT

Main Journal	Diameter	Front	2.4801 – 2.4807 (62.995 – 63.010)
		Center	2.4805 – 2.4811 (63.005 – 63.020)
		Rear	2.755 – 2.7559 (69.985 – 70.000)
Main Brg. Clearance	Clearance	Front	.002 – .0045 (0.050 – 0.115)
		Center	.0011 – .0029 (0.030 – 0.073)
		Rear	.0016 – .00275 (0.040 – 0.070)
Main Journal Wear			.0039 (0.10) Max.
Crankshaft End Play			.0048 – .0127 (0.121 – 0.323)
Connecting Rod Journal			2.1236 – 2.1242 (53.940 – 53.955)

## RODS

Color	Letter Code	Con Rod Weight*
Sky Blue	C	1120 – 1130 gr.
White	D	1130 – 1140 gr.
Yellow	E	1140 – 1150 gr.
Red	F	1150 – 1160 gr.
Green	G	1160 – 1170 gr.
Blue	H	1170 – 1180 gr.
Rod Bearing Clearance		.00078 – .0029 (0.020 – 0.074)

\*Max. difference in weight of connecting rods must not exceed 10 gr. in one engine.

## CAMSHAFT

Lobe Lift	Intake	1.7992 (45.70)
	Exhaust	1.7771 (45.14)
Journal Diameter		2.106 – 2.1066 (53.495 – 53.510)
Run-Out		.0019 (0.05)

## VALVE SYSTEM

Lifter Type		Solid	
Valve Lash	Intake	.012 (0.30)	
	Exhaust	.012 (0.30)	
Face Angle	Intake	55°	
	Exhaust	45°	
Seat Angle	Intake	55°	
	Exhaust	45°	
Seat Width	Intake	.1075 – .1354 (2.73 – 3.44)	
	Exhaust	.0965 – .1189 (2.45 – 3.02)	
Stem Clearance	Intake	.0015 – .0028 (0.040 – 0.073)	
	Exhaust	.0024 – .0032 (0.060 – 0.083)	
Valve Spring	Free Length		1.70078 (43.20)
	Height Spring @ Test Load	Closed @ 75 lbs. (33 – 35 kg)	1.457 (37)
		Open @ 200 lbs. (88 – 94 kg)	1.048 (26.61)

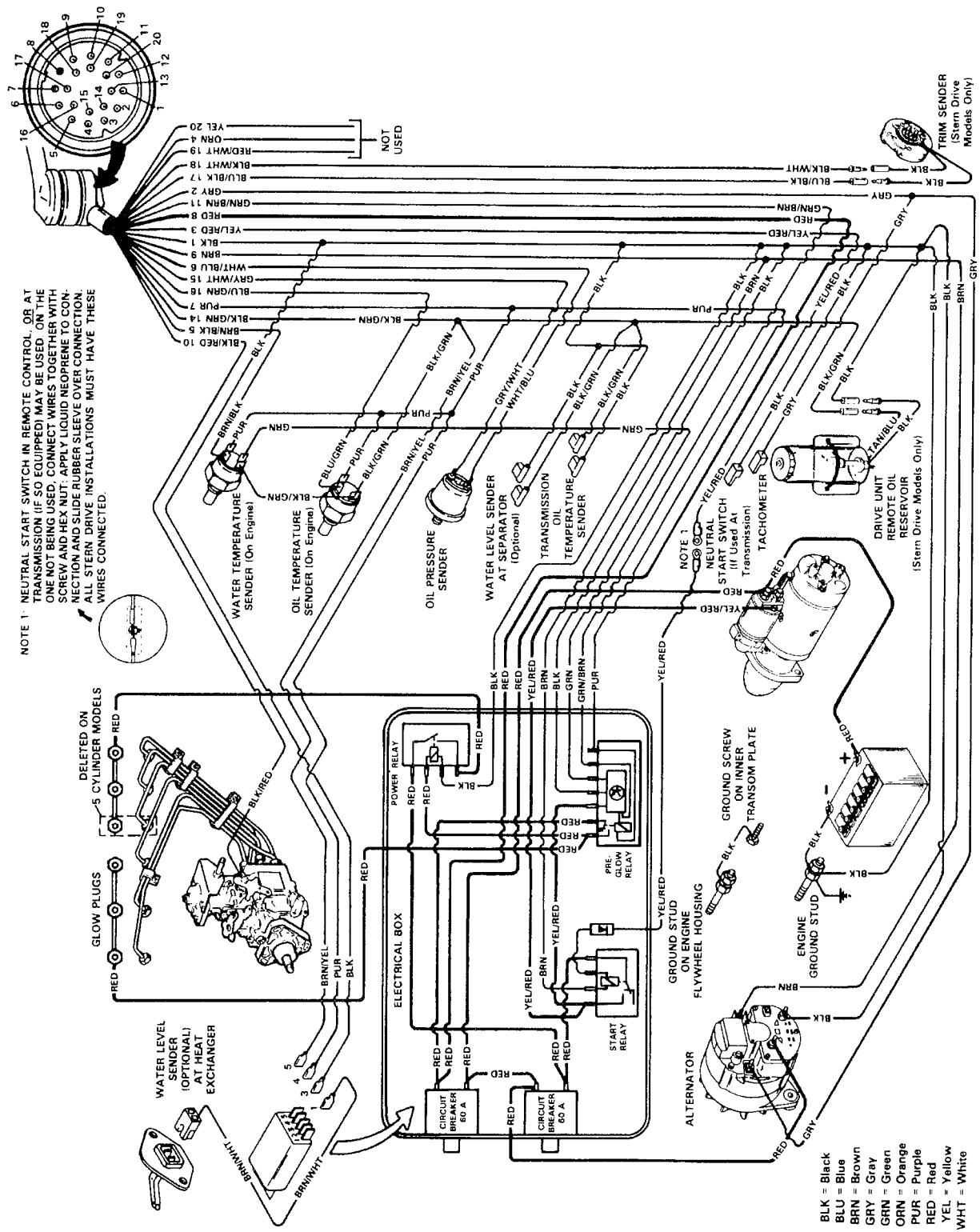
## CYLINDER HEAD

Height of Cyl. Head	3.543 + -.002 (90 ± 0.05)
Refacing Head	Max. .0079 (0.20)

## FLYWHEEL

Runout – Face	.004 (0.10)
Runout – Bore	.004 (0.10)

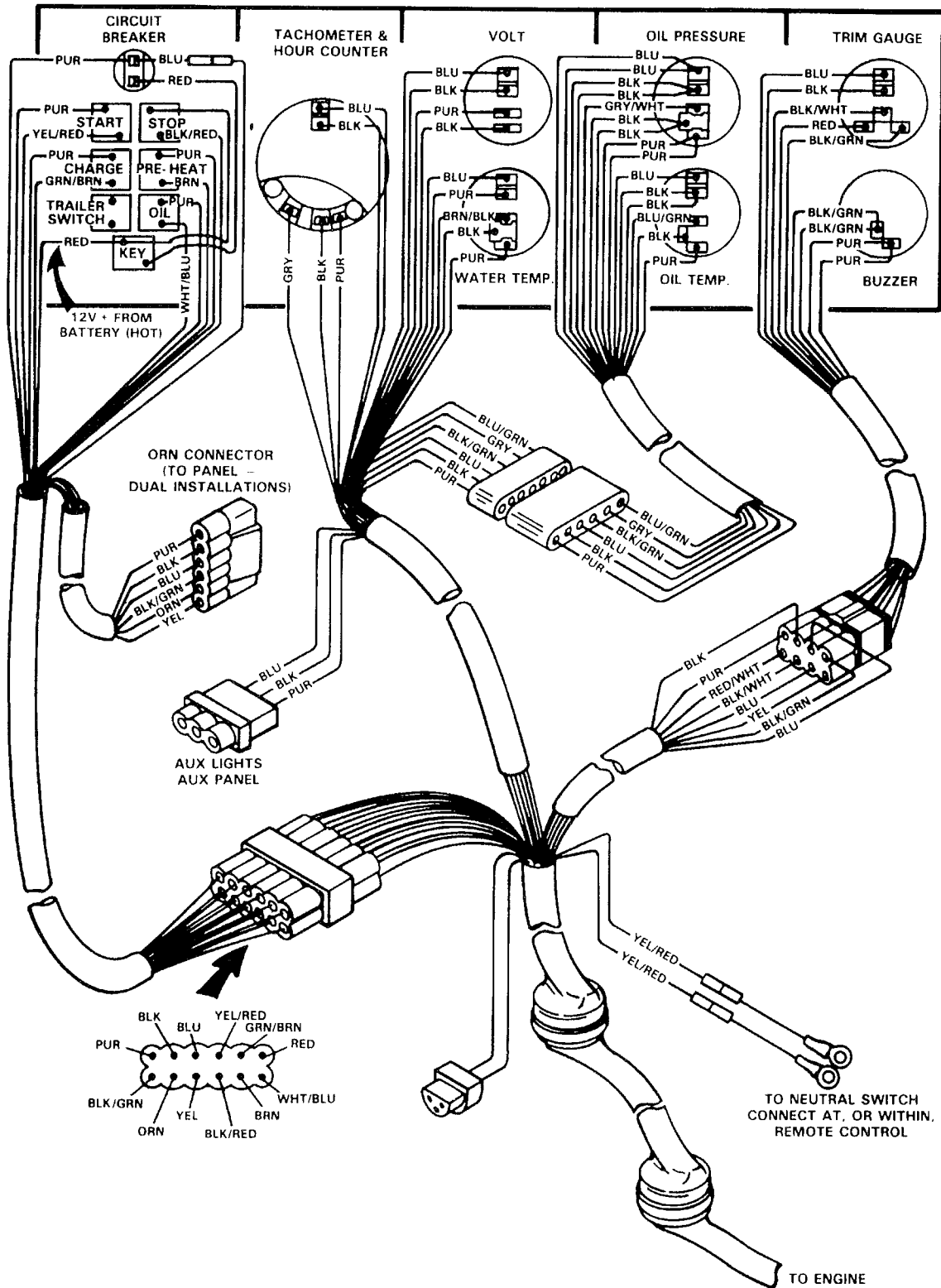
# Wiring Diagram (530 D-TA/636 D-TA Engine)



NOTE 1: NEUTRAL START SWITCH IN REMOTE CONTROL, OR AT TRANSMISSION (IF SO EQUIPPED) MAY BE USED ON THE ONE NOT BEING USED. CONNECT WIRES TOGETHER WITH SCREW AND HEX NUT. APPLY LIQUID NEOPRENE TO CONNECTION AND SLIDE RUBBER SLEEVE OVER CONNECTION. ALL STERN DRIVE INSTALLATIONS MUST HAVE THESE WIRES CONNECTED.

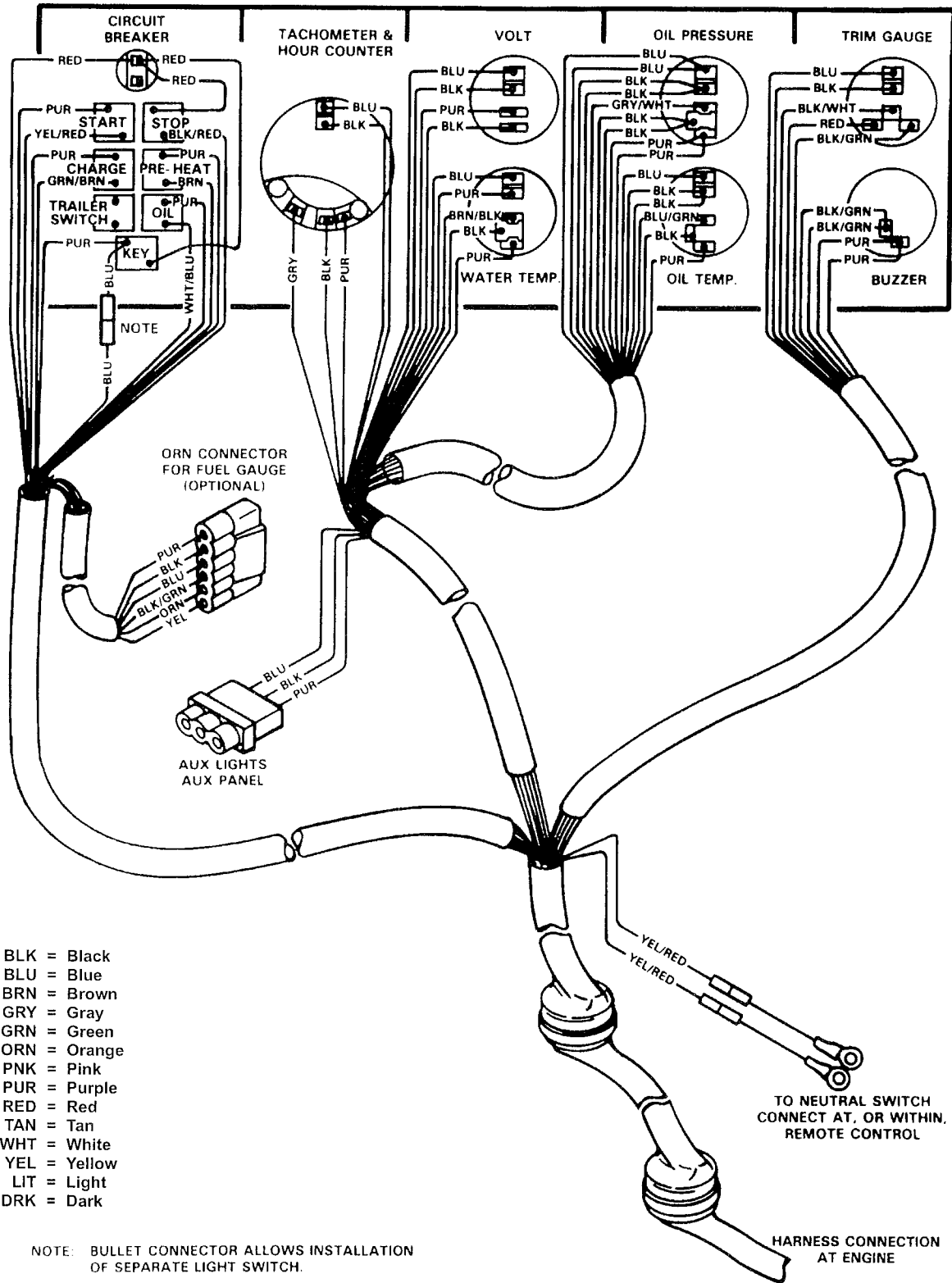
- BLK = Black
- BLU = Blue
- BRN = Brown
- GRN = Gray
- ORN = Orange
- PUR = Purple
- RED = Red
- YEL = Yellow
- WHT = White

# Wiring Diagram (Old Style MCM Instrumentation)



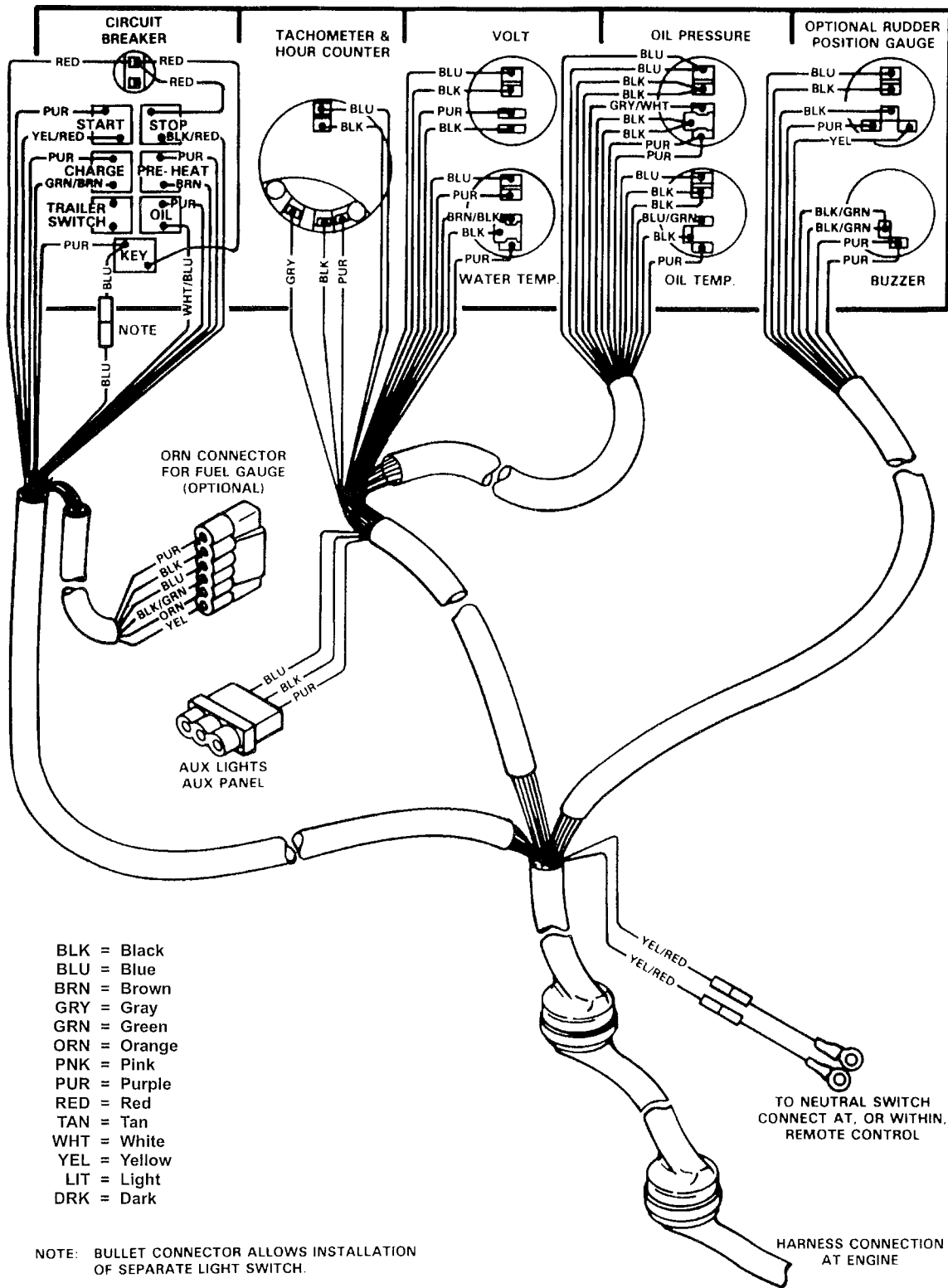
23722

# Wiring Diagram (New Style MCM Instrumentation)



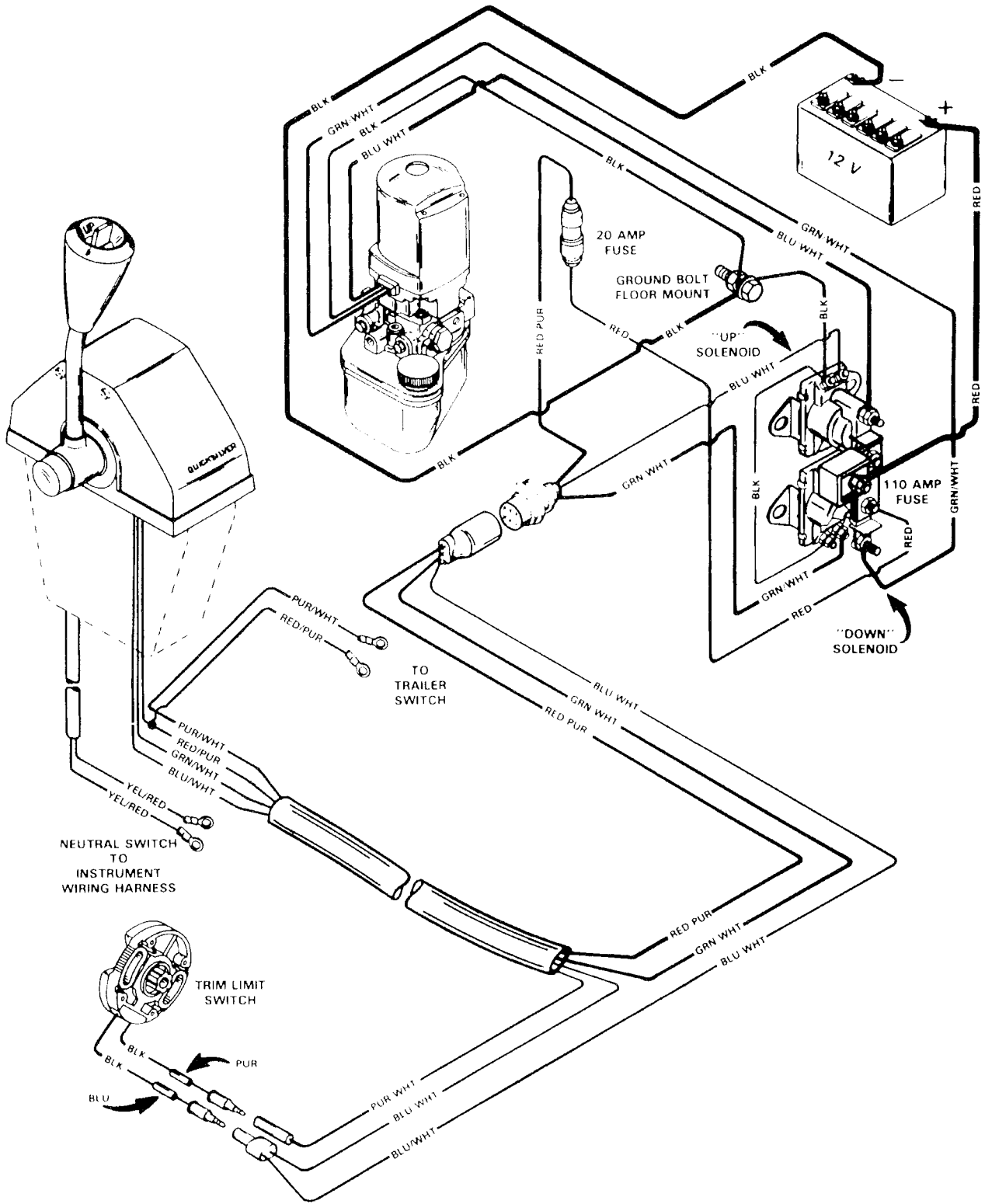
24642

# Wiring Diagram (MIE Instrumentation)



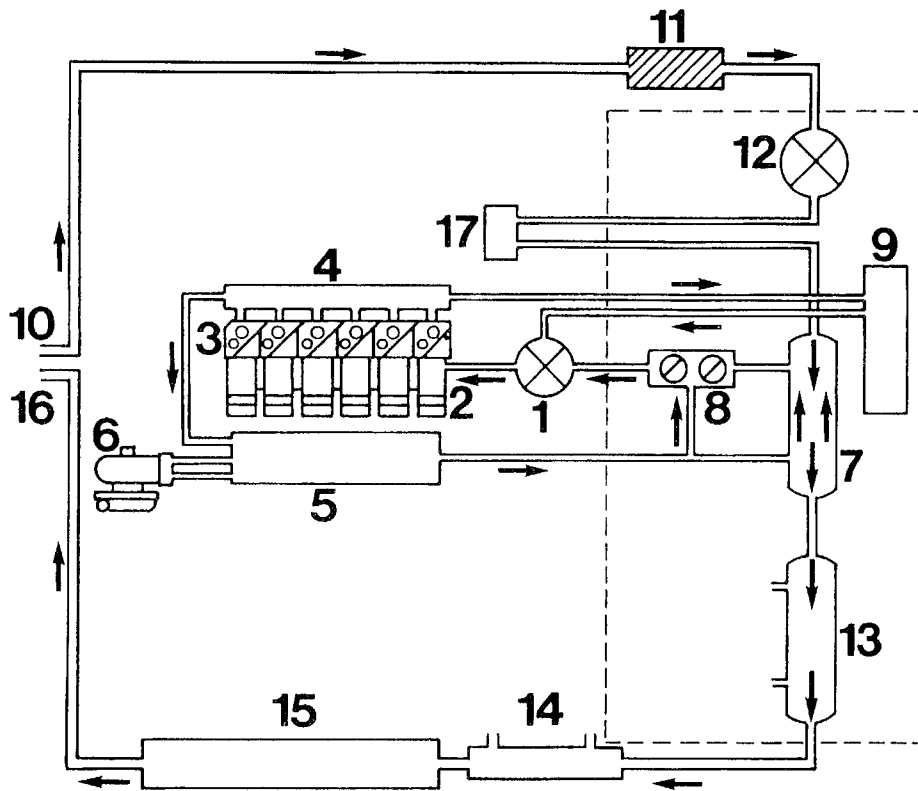
24641

# Wiring Diagram (MCM Power Trim)



23726

## Water Flow Diagram

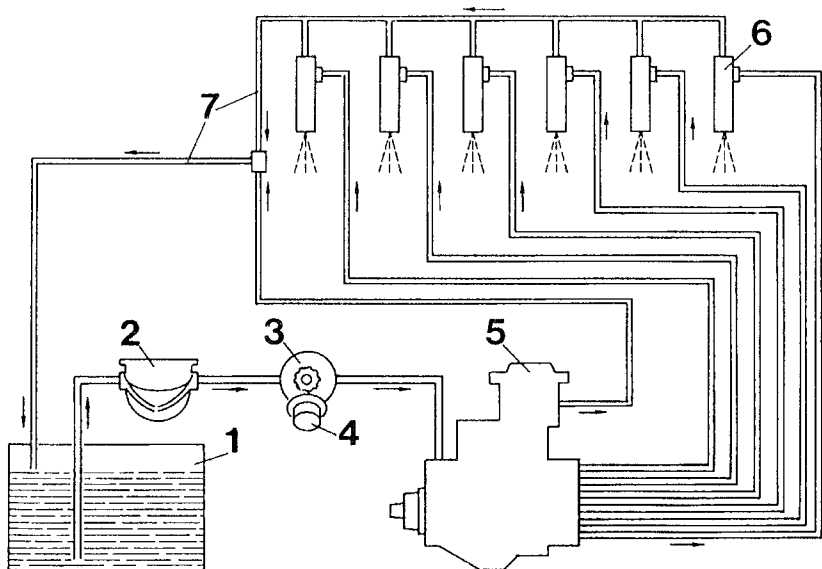


### COOLING SYSTEM

1. - Fresh water pump
2. - Engine block (upper section of liners)
3. - Cylinder heads
4. - Water manifold
5. - Exhaust manifold
6. - Exhaust-gas turbine
7. - Heat exchanger
8. - Thermostats
9. - Expansion tank
10. - Seawater inlet
11. - Seawater filter
12. - Seawater pump
13. - Heat exchanger; Water/oil
14. - Power Steering Fluid Cooler
15. - Exhaust pipe (water sleeve)
16. - Seawater outlet
17. - Intercooler

23178

## Fuel System Flow Diagram



### FUEL SYSTEM FLOW DIAGRAM

1. - Fuel tank
2. - Fuel pump with hand priming
3. - Fuel filter
4. - Hand primer
5. - Injection pump
6. - Injection nozzle
7. - Fuel return line

23288

TO: SERVICE MANAGER  TECHNICIANS   
 PARTS MANAGER

No. 88-7

REVISED  
3-9-89

## Diesel Bravo Two/Inboard Engine Packages MCM 530 D-TA 636 D-TA Bravo Two MIE 530 D-TA 636 D-TA Inboard

### Tune-Up Specifications

MODEL	D530	D636
*Horsepower @ 3800 RPM	150	180
*Kilowatts	111	132
Displacement	182 CID (3.0L)	219 CID (3.6L)
Engine Type – Diesel	5 Cylinder	6 Cylinder
Bore	3.622 in. (92mm)	
Stroke	3.543 in. (90mm)	
Compression Ratio	22:1	
Compression Pressure Max. Pressure Difference:	348 – 377 PSI (2399 – 2581 kPa) 72 PSI (496 kPa)	
Maximum Governed RPM @ WOT	4250	4350
Recommended Maximum RPM	3800	
Idle RPM in Forward Gear	750	
Fuel Injectors	Bosch	
Injector Firing Order	1-2-4-5-3	1-5-3-6-2-4
Timing BTDC	.034 in (0.86mm)	
Fuel Injection Pressure	2247 PSI (15492 kPa)	
Internal Pump Pressure	22.7 PSI (156 kPa) at 800 RPM	
	106.6 PSI (735 kPa) at 4200 RPM	
Turbocharge Air Pressure	12 – 14 PSI (83 – 97 kPa)	
Oil Pressure	@ 750 RPM 22 – 36 PSI (152 – 248 kPa)	
	@ 3800 RPM 50 – 94 PSI (344 – 648 kPa)	
Thermostat – Oil	180° F (82° C)	

continued page 2



## Tune-Up Specifications (cont. from page 1)

MODEL	D530	D636
*Total Oil Capacity	9.5 U.S. Qts. (9L)	10.5 U.S. Qts. (10L)
Δ Oil Pan Capacity	7.5 U.S. Qts. (7L)	8.5 U.S. Qts. (8L)
Δ Oil Filter Capacity	1 Qt. (1L)	
Δ Oil Cooler Capacity	1 Qt. (1L)	
Closed Cooling Capacity	11.5 U.S. Qts. (11L)	12.5 U.S. Qts. (12L)
Thermostats – Water	170° – 178° F (77° – 81° C)	
Valve Clearance Intake/Exhaust	.012 in. (0.3mm)	
Drive Unit Oil Capacity	2.5 U.S. Qts. (2.37L)	

\*Always use dipstick to determine exact quantity of oil required.

Δ Approximate

\*Continuous effective braked output per DIN 6271, Part 1, Supplement 1.

## Electrical Specifications

Electrical System	12-volt Negative (-) Ground
Alternator Rating	75 Amps
Recommended Battery Rating	12v, 110Ah Minimum 600 Amps Cold Cranking Amperage
Starter	12v, 2.7 kW

Identification Number	No Load Test					
	Volts	Min. Amps	Max. Amps	Min. RPM	Max. RPM	Brush Spring Length
801333980 (Bosch) 0001 362304	11.5	125			7000	21/64 in. (8.5mm)

## Torque Specifications

Cylinder head bolts	118 lb. ft.	(160 N.m)
Side bolts	59 lb. ft.	(80 N.m)
Rocker arm bracket	81 lb. ft.	(110 N.m)
Connecting rods	62 lb. ft.	(83 N.m)
Flywheel	81 lb. ft.	(110 N.m)
Pulley nut, crankshaft	115 lb. ft.	(155 N.m)
Oil drain plug	59 lb. ft.	(80 N.m)
Engine suspension	37 lb. ft.	(50 N.m)
Oil pump	21 lb. ft.	(28 N.m)
Rear main bearing housing	21 lb. ft.	(28 N.m)
Flywheel housing	37 lb. ft.	(50 N.m)
Fuel injector nut	21 lb. ft.	(28 N.m)
Cap nuts of injection lines	159 lb. in.	(18 N.m)
Exhaust manifold	25 lb. ft.	(33 N.m)
Intake manifold	25 lb. ft.	(33 N.m)
Main bearing flanges	32 lb. ft.	(43 N.m)
Valve cover	89 lb. in.	(10 N.m)
Oil pan	97 lb. in.	(11 N.m)
Water manifold	80 lb. in.	(9 N.m)
Turbocharger	18 lb. ft.	(24 N.m)
Oil supply lines between cooler and crankcase	18 lb. ft.	(24 N.m)
Oil thermostat	71 lb. in.	(8 N.m)
Injection pump gear	66 lb. ft.	(90 N.m)
Glow plugs	18 lb. ft.	(24 N.m)
Injection pump fastening nuts	23 lb. ft.	(31 N.m)
Exhaust clamp	21 lb. ft.	(28 N.m)
Alternator, pulley fastening nut	43 lb. ft.	(58 N.m)
Alternator bolt, lower	39 lb. ft.	(53 N.m)
Alternator bolt, upper	78 lb. ft.	(105 N.m)
Alternator armature	35 lb. ft.	(48 N.m)

**UNIT OF MEASUREMENT**  
in. (mm)

### Internal Engine Specifications

#### CYLINDER BORE

Model	530 D-TA	636 D-TA
Diameter	3.622 (92)	
Out of Round	.004 (0.1) Max.	

#### PISTON

Clearance		.010 (0.25) Max.
Piston Wear		.004 (0.1) Max.
Diameter Standard Size	VERSION A	3.618 – 3.6185 (91.900 – 91.910)
	B	3.6185 – 3.619 (91.910 – 91.920)
Diameter First Over-size	A	3.6429 – 3.6432 (92.530 – 92.540)
	B	3.6432 – 3.6436 (92.540 – 92.550)
Max. Weight Diff. Between Pistons in One Engine.		5 grams
Piston Protrusion From Upper Edge of Crankcase		.019 – .022 (0.48 – 0.57)
	.056 (1.42)	
		.023 – .026 (0.58 – 0.67)
Gasket Size * Used		.060 (1.52)
		.027 – .030 (0.68 – 0.77)
	.064 (1.62)	

\*When replacing all gaskets on a single engine, use size .060 (1.52mm) gasket.

If replacing an individual gasket, use the same size removed.

### PISTON RINGS

Compression	Groove Side Clearance	Production	T O P			
			2 n d	Tapered		
Oil		Production	2 n d	.003 (.082)		
			Service	.0035 (0.09)		
	Gap	Production	T O P	.016 (0.40)		
			2 n d	.010 (0.25)		
	Gap	Service	T O P	.025 (0.65)	2 n d	.018 (0.45)
Oil	Groove Side Clearance	Production	.001 (0.30)			
		Service	.003 (0.070)			
	Gap	Production	.010 (0.25)			
		Service	.023 (0.58)			

#### PISTON PINS

Diameter	1.1807 – 1.1809 (29.990 – 29.996)
Clearance	.00095 – .00178 (0.024 – 0.045)

## CRANKSHAFT

Main Journal	Diameter	Front	2.4801 – 2.4807 (62.995 – 63.010)
		Center	2.4805 – 2.4811 (63.005 – 63.020)
		Rear	2.755 – 2.7559 (69.985 – 70.000)
Main Brg. Clearance	Clearance	Front	.002 – .0045 (0.050 – 0.115)
		Center	.0011 – .0029 (0.030 – 0.073)
		Rear	.0016 – .00275 (0.040 – 0.070)
Main Journal Wear			.0039 Max. (0.10)
Crankshaft End Play			.0048 – .0127 (0.121 – 0.323)
Connecting Rod Journal			2.1236 – 2.1242 (53.940 – 53.955)

## RODS

Color	Letter Code	Con Rod Weight*
Sky Blue	C	1120 – 1130 gr.
White	D	1130 – 1140 gr.
Yellow	E	1140 – 1150 gr.
Red	F	1150 – 1160 gr.
Green	G	1160 – 1170 gr.
Blue	H	1170 – 1180 gr.
Rod Bearing Clearance		.00078 – .0029 (0.020 – 0.074)

\*Max. difference in weight of connecting rods must not exceed 10 gr. in one engine.

## CAMSHAFT

Lobe Lift	Intake	1.7992 (45.70)
	Exhaust	1.7771 (45.14)
Journal Diameter		2.106 – 2.1066 (53.495 – 53.510)
Run-Out		.0019 (0.05)

## VALVE SYSTEM

Lifter Type		Solid	
Valve Lash	Intake	.012 (0.30)	
	Exhaust	.012 (0.30)	
Face Angle	Intake	55°	
	Exhaust	45°	
Seat Angle	Intake	55°	
	Exhaust	45°	
Seat Width	Intake	.1075 – .1354 (2.73 – 3.44)	
	Exhaust	.0965 – .1189 (2.45 – 3.02)	
Stem Clearance	Intake	.0015 – .0028 (0.040 – 0.073)	
	Exhaust	.0024 – .0032 (0.060 – 0.083)	
Valve Spring	Free Length		1.70078 (43.20)
	Height Spring @ Test Load	Closed @ 75 lbs. (33 – 35 kg)	1.457 (37)
		Open @ 200 lbs. (88 – 94 kg)	1.048 (26.61)

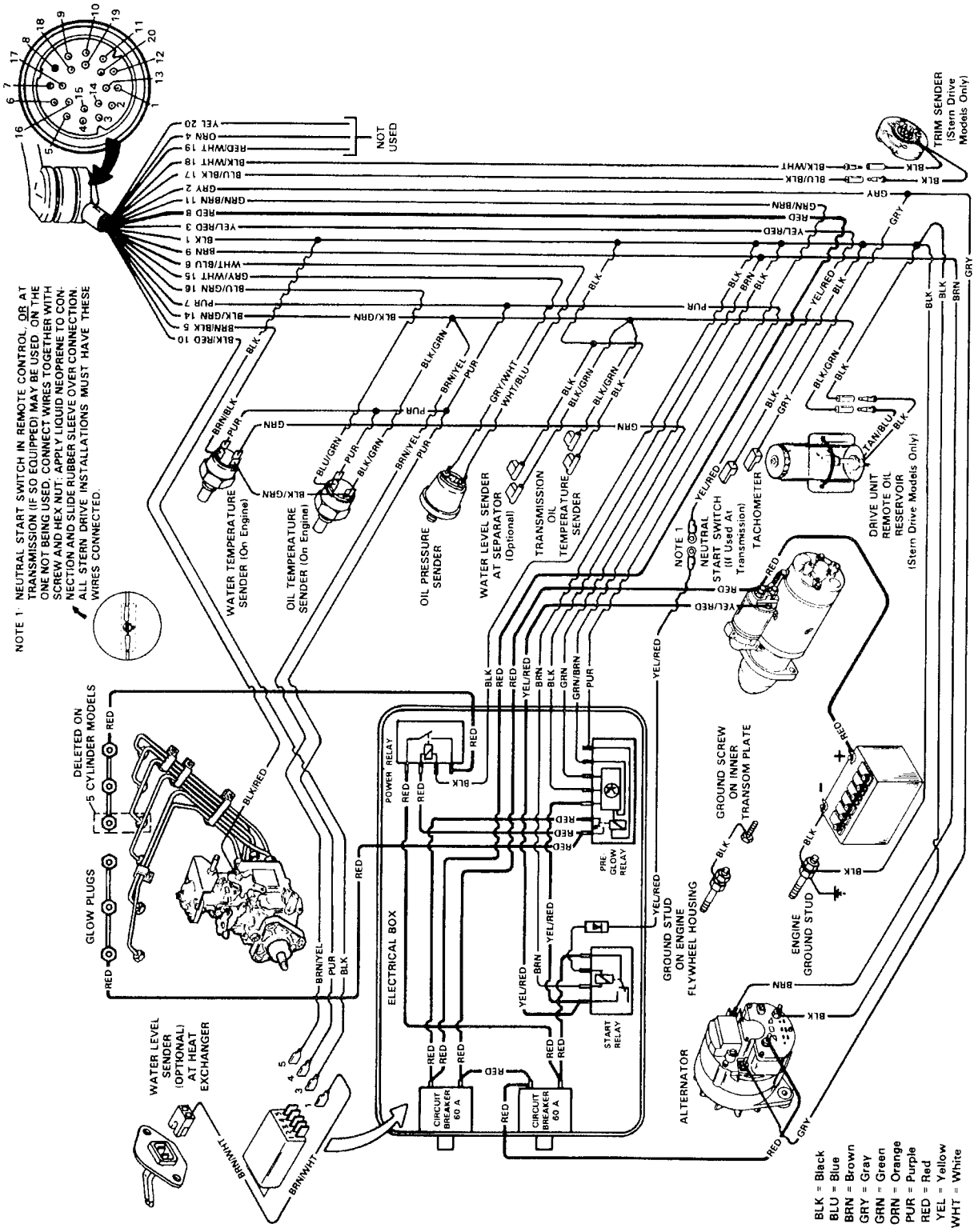
## CYLINDER HEAD

Height of Cyl. Head	3.543 + -.002 (90 ± 0.05)
Refacing Head	Max. .0079 (0.20)

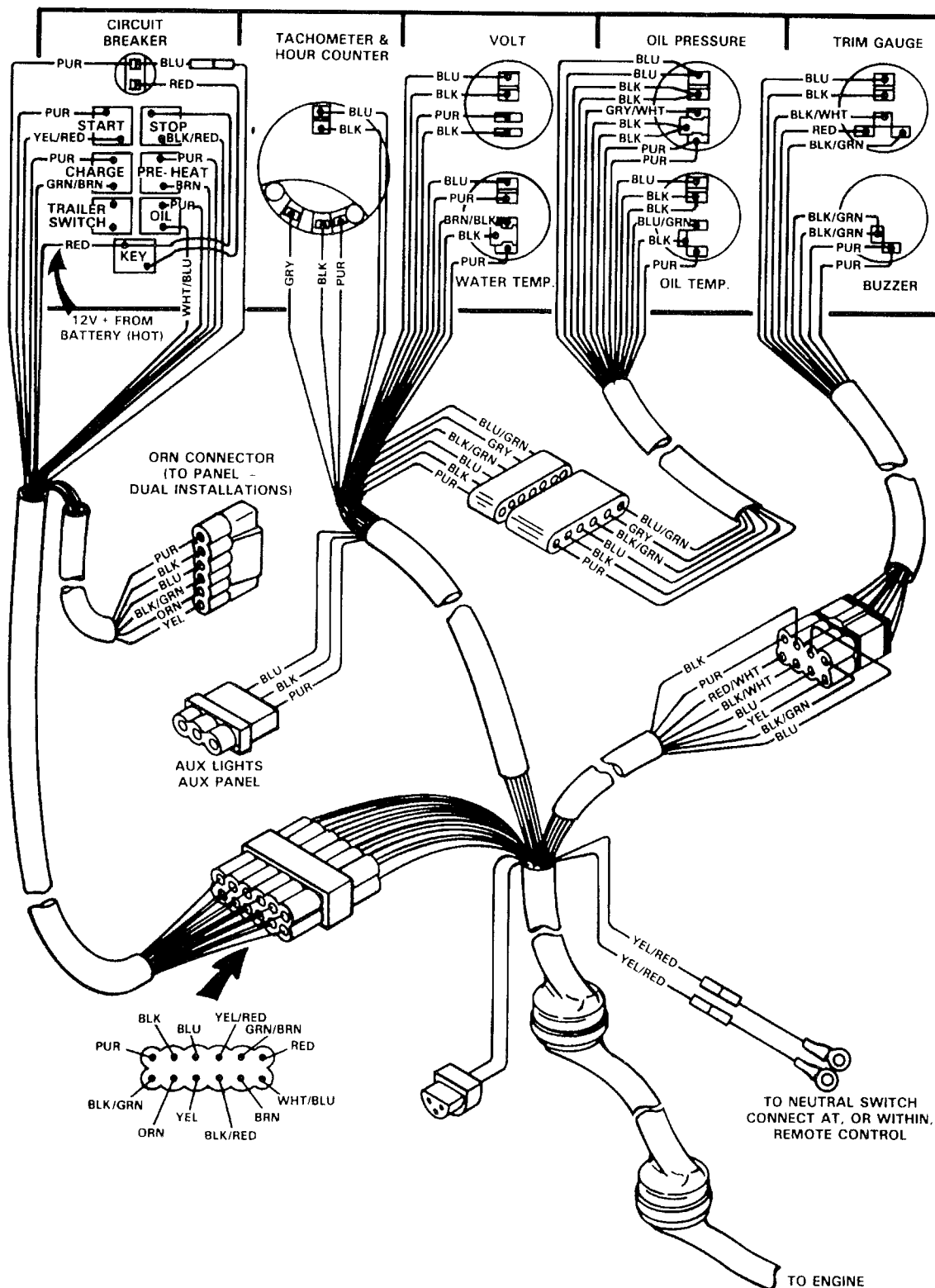
## FLYWHEEL

Runout – Face	.004 (0.10)
Runout – Bore	.004 (0.10)

# Wiring Diagram (530 D-TA/636 D-TA Engine)

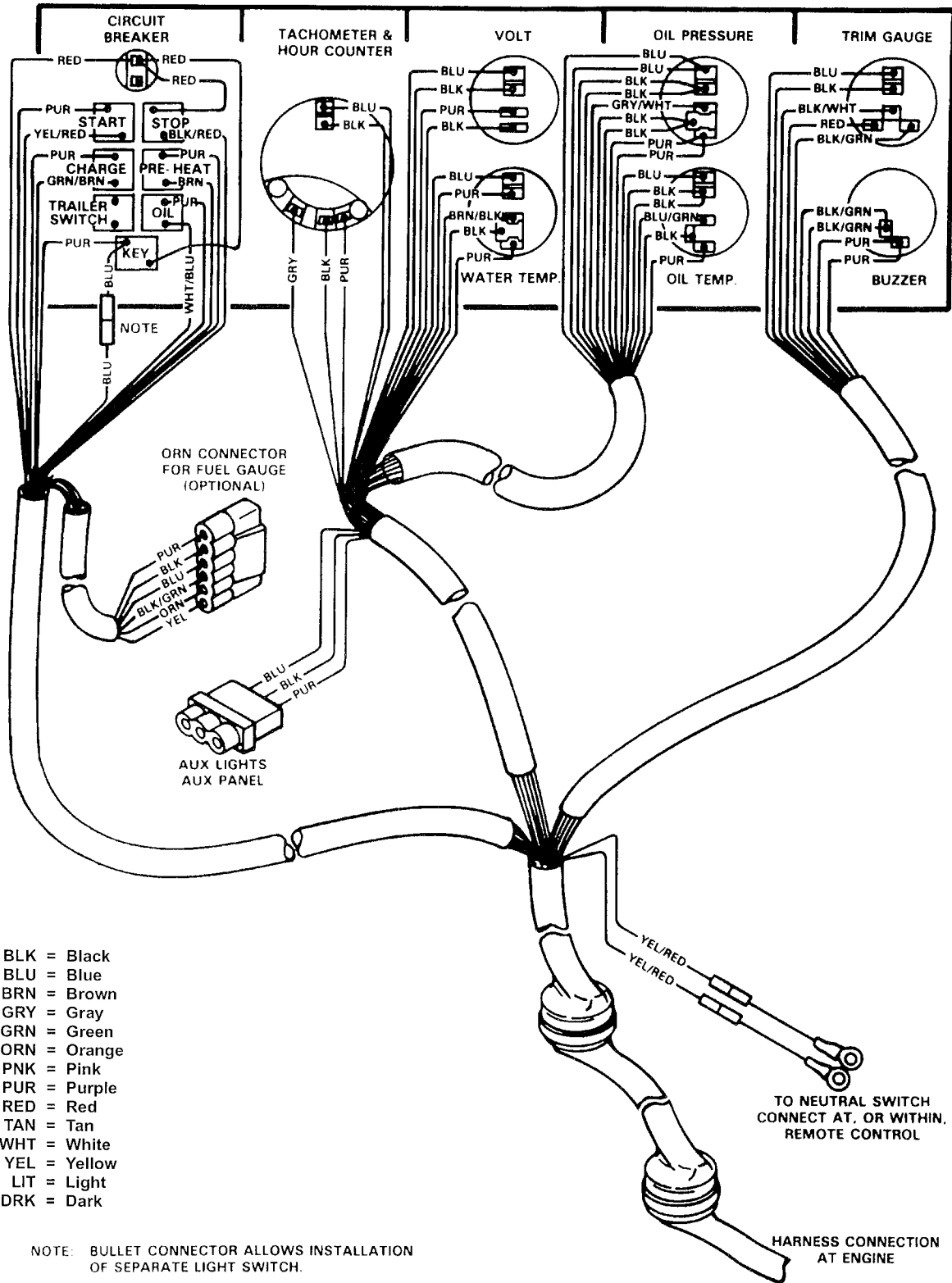


# Wiring Diagram (Old Style MCM Instrumentation)



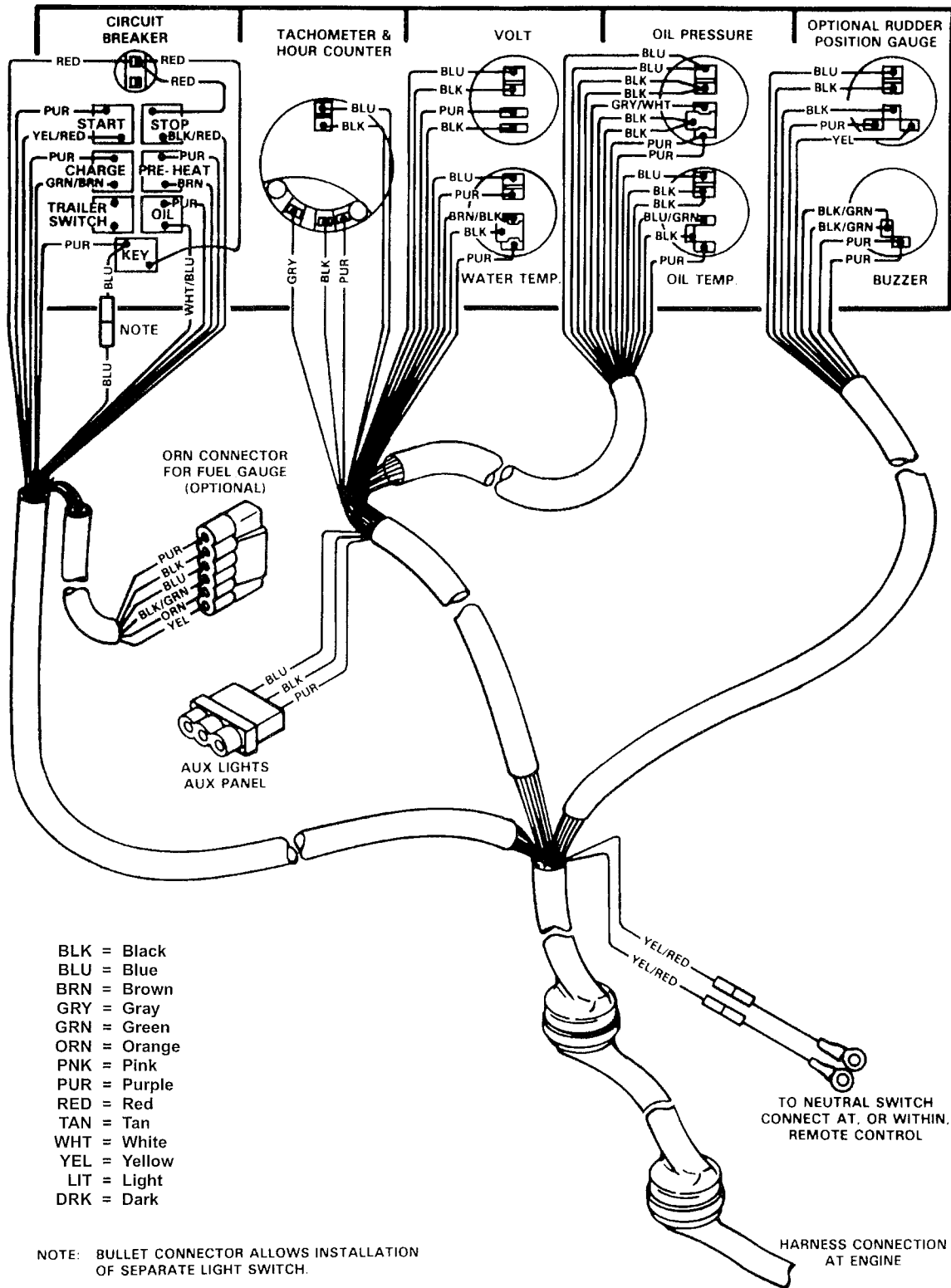
23722

# Wiring Diagram (New Style MCM Instrumentation)



24642

# Wiring Diagram (MIE Instrumentation)

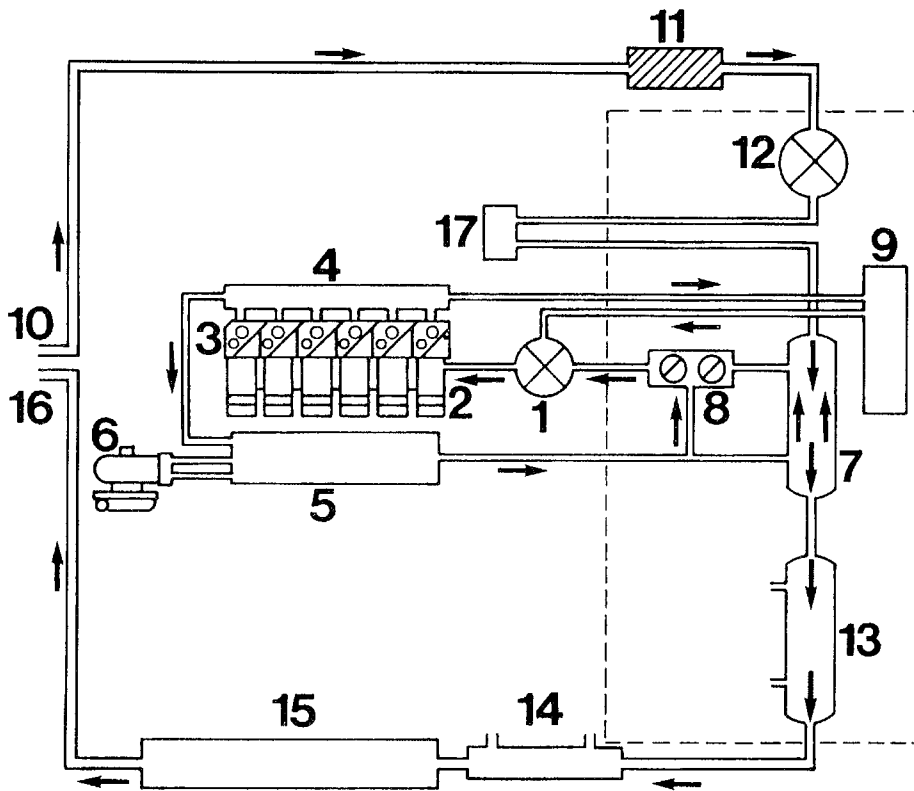


24641





## Water Flow Diagram

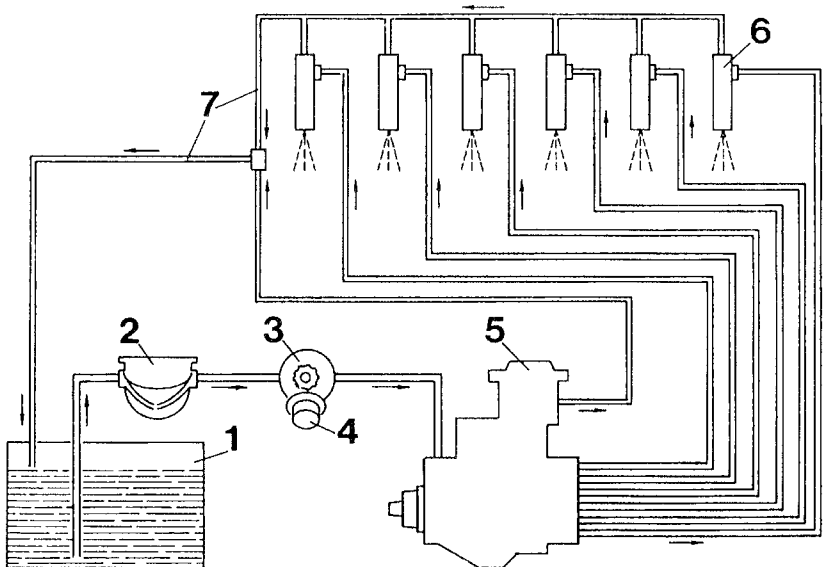


### COOLING SYSTEM

1. - Fresh water pump
2. - Engine block (upper section of liners)
3. - Cylinder heads
4. - Water manifold
5. - Exhaust manifold
6. - Exhaust-gas turbine
7. - Heat exchanger
8. - Thermostats
9. - Expansion tank
10. - Seawater inlet
11. - Seawater filter
12. - Seawater pump
13. - Heat exchanger; Water/oil
14. - Power Steering Fluid Cooler
15. - Exhaust pipe (water sleeve)
16. - Seawater outlet
17. - Intercooler

23178

## Fuel System Flow Diagram



### FUEL SYSTEM FLOW DIAGRAM

1. - Fuel tank
2. - Fuel pump with hand priming
3. - Fuel filter
4. - Hand primer
5. - Injection pump
6. - Injection nozzle
7. - Fuel return line

23288

## Diesel Engine Idle RPM

### Models

MCM 530, 636 D-TA Bravo One/Two  
MCM D183, D219, D254 Turbo AC Bravo One/Two  
MIE 530, 636 D-TA Inboard  
MIE D183, D219, D254 Turbo AC Inboard

### Idle RPM

Launch boat and tie it securely to the dock. Start engine and run it until it reaches normal operating temperature. Using an accurate service tachometer, please set these engines at 750 RPM in forward gear. Do not set idle RPM lower than 750 in forward gear.

### Problem

If RPM is set below 750 (in forward gear), the following problems may occur.

1. Gear “rattle” in the stern drive or in the inboard transmission.
2. Insufficient engine oil pressure to lubricate the upper part of the engine, thereby damaging the valve train.

**V12 Engineering**  
Box 50, Ontario, Canada POX 1C0  
[www.brwmarine.net](http://www.brwmarine.net)

TO: SERVICE MANAGER  TECHNICIANS   
PARTS MANAGER

No. 89-16

## B.M.W. Stern Drive/Inboards Model D636 Diesel Engines (Grey Engines) Overheating

If experiencing an overheating condition with a BMW D636 diesel engine, one of or a combination of the following conditions may be the cause.

### Check the following first:

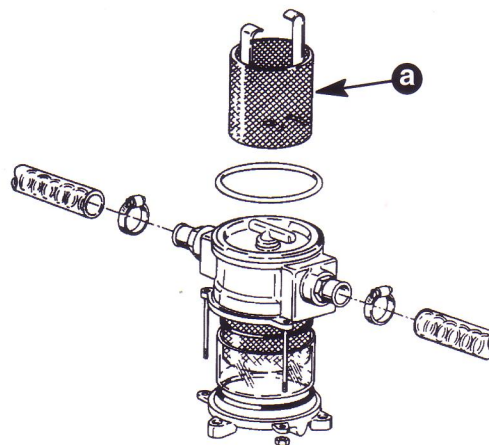
1. Check heat exchanger tank for coolant at proper level (1/2" – 3/4" [12mm – 20mm] below filler neck).
2. Check and compare temperature with an accurate independent instrument i.e. (possible malfunction of gauges, senders, wires, ground, etc.).
3. Pressure check cooling system and cap with automotive cooling system pressure tester. 14 PSI (100 kPa) required. Because old style coolant tank cap (single seal type) is vulnerable to leaking, recommend replacing with new style cap, P/N 63832A14.
4. Check engine circulating pump for possible malfunctions.
  - Loose/slipping alternator belt
  - Impeller vanes worn
  - Impeller shaft seal leaking
  - Impeller clearance to pump housing (.015" – .020"/.038mm – .050mm)

**NOTE:** Replace with new style pump, P/N 46-814255, if necessary.

5. Check engine coolant concentration to ensure 50/50 mixture.

**NOTE:** -34° F (-37° C) indicates a 50/50 mix. Use Quicksilver pre-mixed antifreeze P/N 92-813054A2 or an equivalent low-silicate brand. Using antifreeze other than Quicksilver Engine Coolant a low silicate 50/50 pre-mixed coolant with proper additives and manufactured for diesel engines must be used.

6. Check for raw water intake problems (refer to Figures 1 & 2).

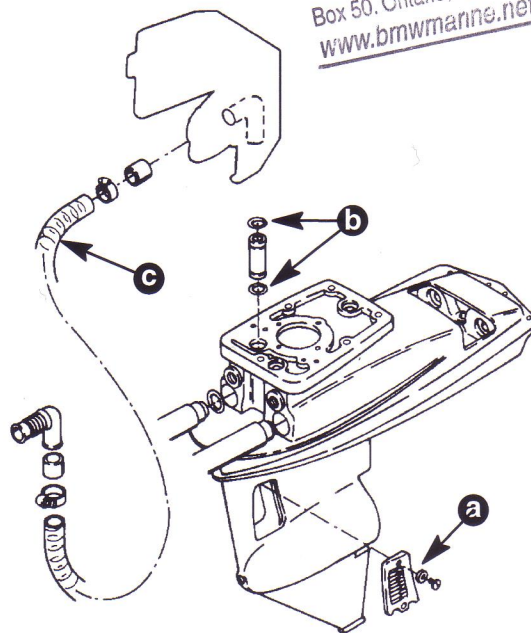


50359A

a - Check Strainer for Restriction

**Figure 1. Raw Water Filter**

**V12 Engineering**  
Box 50, Ontario, Canada P0X 1C0  
[www.bmwmarine.net](http://www.bmwmarine.net)



50360B

a - Check Water Pick-Up for Restriction  
b - O-Rings Leaking, Not Sealing  
c - Inlet Hose Tore or Kinked

**Figure 2. B.M.W. Stern Drive**

Other known problems are:

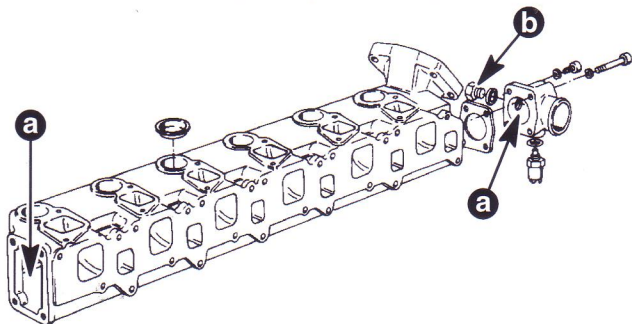
- Propeller ventilation (Inboard application)
  - Partially obstructed inlet sea water screen/cover
  - Interference of keel
  - Inlet hose collapsing during operation (must be wire reinforced hose).
7. Check for correct injection timing (refer to service manual specs).
  8. Using one of the following procedures check for exhaust gases entering closed cooling system.

- a. Remove 1 in. (25mm) plug from rear of exhaust manifold (Figure 3, "b") and install water pressure gauge. If higher pressure is obtained than listed below, exhaust gases exist in system.

### Coolant System Pressure

800 RPM (idle) 6 PSI (41 kPa)

3800 RPM (WOT) 20 PSI (137 kPa)



50361C

a - Water Passages Restricted

b - Remove Plug for Exhaust Pressure Check

**Figure 3. Intake/Exhaust Manifold**

- b. Replace hose between heat exchanger and engine circulating pump with clear plastic hose. (Figure 4, "b") Watch for gas bubbles.

9. Check the following if excessive pressure or gas bubbles are found.

- a. Head gasket leakage by making a compression test.
- b. Exhaust gases existing in the closed cooling system by using a combustion leak tester.

**NOTE:** Snap-on Tools has combustion leak tester available for testing coolant for exhaust gases. (Block Combustion Leak Tester P/N GA170B)

Snap-on Tools are readily available. For the nearest dealer or distributor in your state/country, contact the Snap-on home office in the U.S.A.

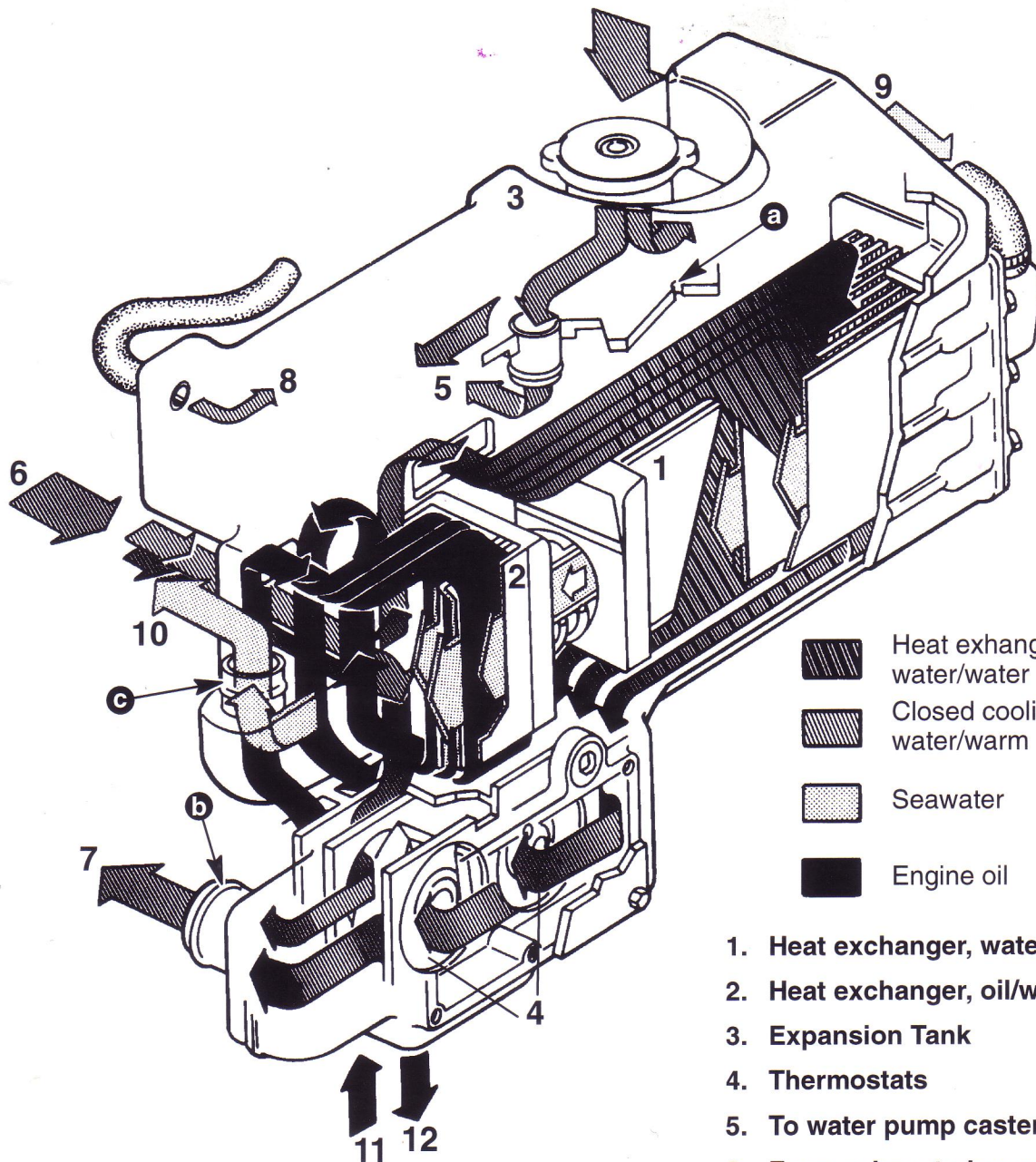
Snap-on Tools  
Kenosha, WI  
Phone: 414-656-5200  
Fax: 414-656-1403  
Telex: 431-1080 SNAP-ON-KNE

10. Check for air entering sea water cooling system.





Replace hose between heat exchanger and exhaust elbow with clear hose. (Figure 4, "c") Watch for air bubbles. If air bubbles are present the complete sea water system must be checked for leaks.

11. Check if vent hole in heat exchanger directly under filler cap is open. (Figure 4, "a")

**IMPORTANT: Hole diameter must not be enlarged from original size of 3/32" (2.5mm).**



23291

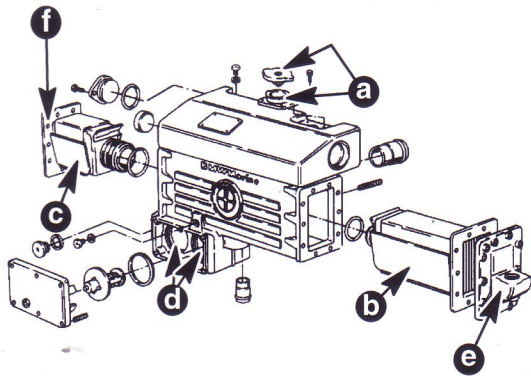
-  Heat exchanger, cold water/water
-  Closed cooling water/warm
-  Seawater
-  Engine oil

1. Heat exchanger, water/water
2. Heat exchanger, oil/water
3. Expansion Tank
4. Thermostats
5. To water pump caster
6. From exhaust plenum chamber
7. To water pump
8. From water manifold (pressure return pass)
9. From seawater pump
10. To exhaust gas end pipe
11. From oil temperature sender
12. To oil filter

- a - Vent Hole Must Not Be Restricted  
(View Through Filler Neck with Cap Removed)
- b - Install Clear Hose (Fresh Water)
- c - Install Clear Hose (Sea Water)

**Figure 14. Heat Exchanger Flow**

12. Check thermostats for proper opening degrees.  
 170°F – 178°F (77°C – 81°C). (Figure 5, "d")

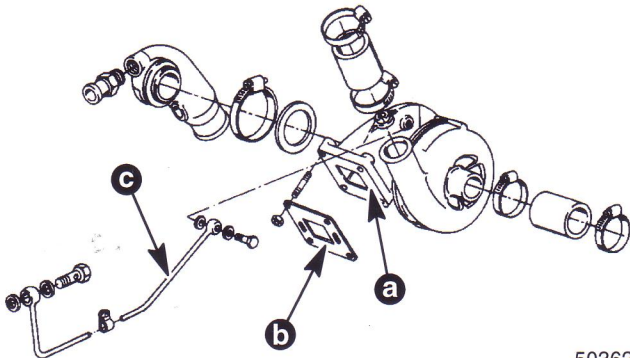


50360C

- a - Replace with New Double Lip Seal Cap and Neck
- b - Coolant Exchanger
- c - Oil Exchanger
- d - Dual Thermostats
- e - Raw Water Outlet
- f - Raw Water Inlet (Not Shown)

**Figure 5. Heat Exchanger Tank**

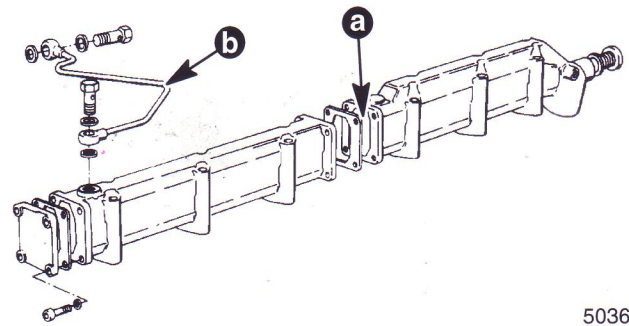
13. Check vent line from turbocharger to expansion tank (Figure 6, "c") and from water manifold to expansion tank (Figure 7, "b") are open.



50362

- a - Water Passages Restricted
- b - Gasket Leaking
- c - Vent Line Restricted

**Figure 6. Turbo Charger**



50361

- a - Water Passage Restricted
- b - Vent Line Plugged

**Figure 7. Water Manifold to Cylinder Heads**

If all previous steps are completed and the engine is still overheating, order a cooling system repair kit P/N 63832A25. The kit includes instructions for cleaning and flushing the entire cooling system and replacing and/or installing parts listed below.

**Repair Kit P/N 63832A25**

- New Circulating Pump
- Coolant Recovery Bottle
- Auxiliary Oil Cooler Kit
- Larger Sea Water Pump Cam
- Quicksilver Engine Coolant
- Quicksilver Cooling System Cleaner
- New Oil and Coolant Temp Senders
- Rubber Inserts
- New Heat Exchanger Filler Neck and Cap

**NOTE:** Instructions, packaged with the kit, **MUST BE** followed completely and correctly.