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MTA0090

MTA0091

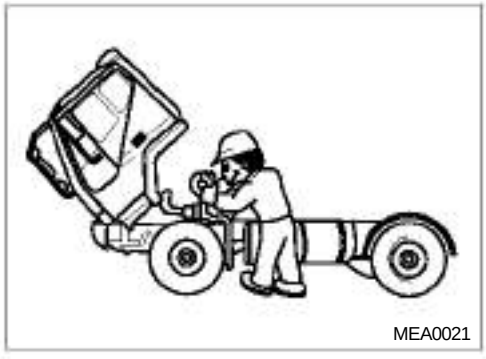
(4) During the first 4,000 km, limit engine speed to 70 percent of the maximum allowance, and frequently watch tachometer to prevent engine over-running while driving your vehicle.

Maximum allowable engine speed (rpm)

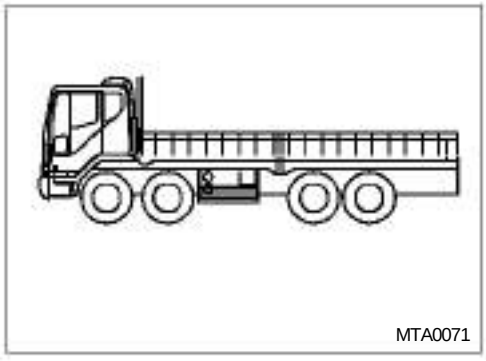
Engine	First 4,000 km	After 4,000 km
DE12TI	1,470	2,100
DE12TIS	1,470	2,100
DV15T	1,600	2,300
DV15TI	1,470	2,100
DV15TIS	1,470	2,100
DDC	1,260	1,800

MTA0050

3) Through check should be performed according to "CONTROLS AND INSTRUMENTS" and "BEFORE DRIVING OFF".


MEA0021

4) In order to operate your vehicle safely and dependably, it is imperative to perform necessary inspection and adjustment as outlined in "INSPECTION AND MAINTENANCE".

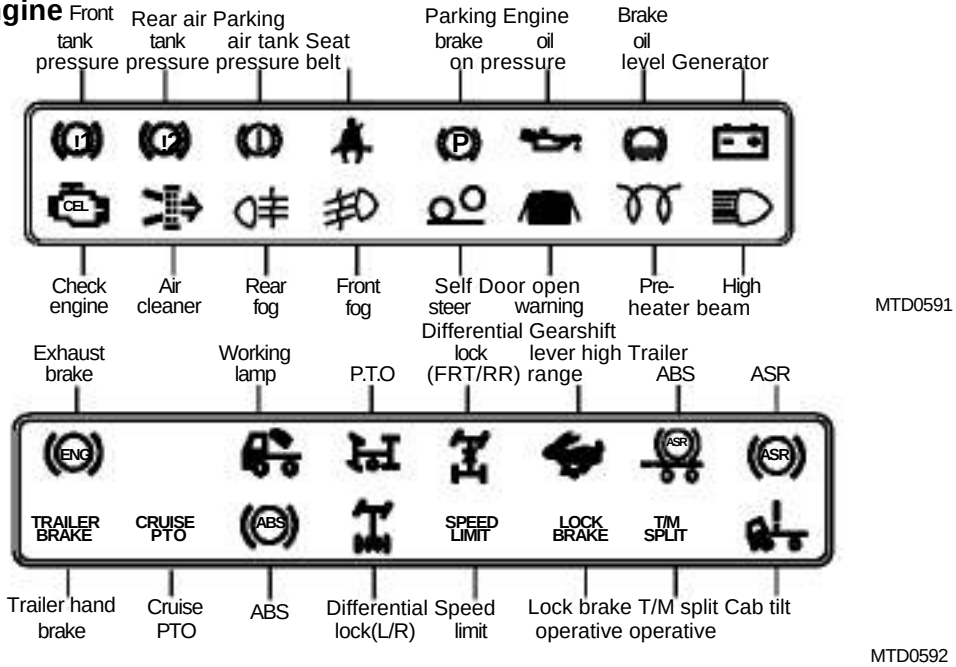

MTA0071

5) Overloading may not only shorten the service life of your vehicle but also cause serious problems against your safety. The weight of the payload must be within the GVW rating and distributed over the front and rear axles so as not to exceed their axle capacities. Refer to "SPECIFICATIONS AND SERVICE DATA" for GVW and Axle capacity.

(10) Miscellaneous indicator lamps and warning lamps

Indicator lamps come on when corresponding control levers or switches are in operation.When a warning lamp is lit while driving, immediately pull up your vehicle in the roadside, check to locate the cause of trouble, and take proper measures. In the case of serious trouble, call for check and proper services of your nearest Daewoo dealer.

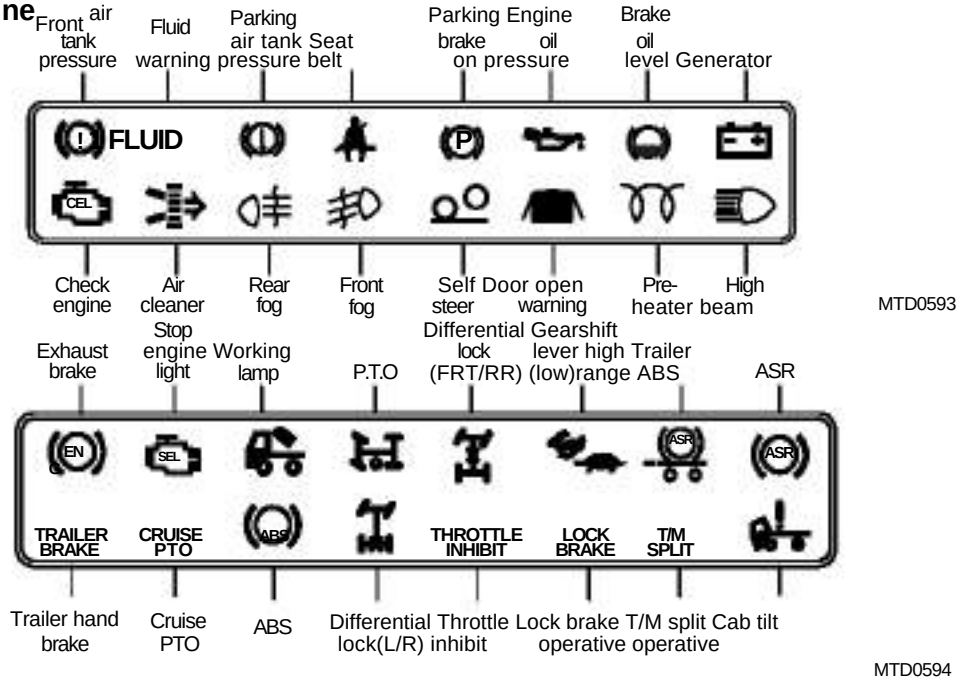
*** DE/DV Engine**



MTD0591

MTD0592

*** DDC Engine**



MTD0593

MTD0594

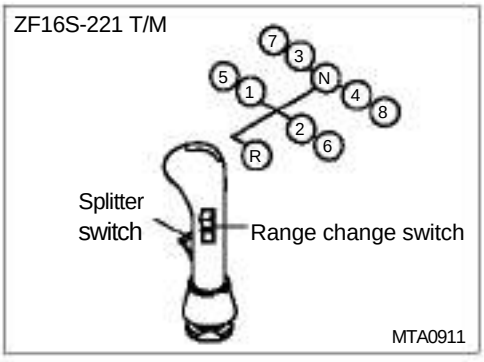
*** DDC Engine**

1. How to read engine diagnostic codes

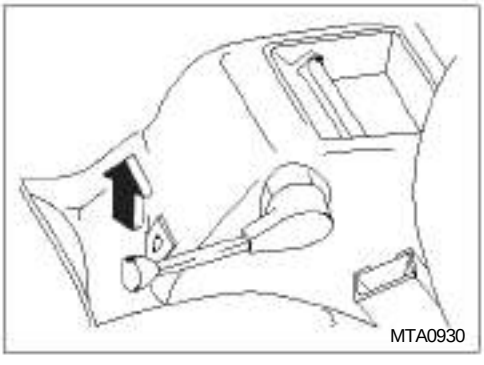
The active code will be flashed on the SEL(code "25" if there is no malfunction code). Then the inactive code will be flashed on the CEL(code "25" if there is no malfunction code).
The process of flashing all the inactive codes will repeat until the conditions for code flashing are no longer satisfied.

2. Engine diagnostic codes

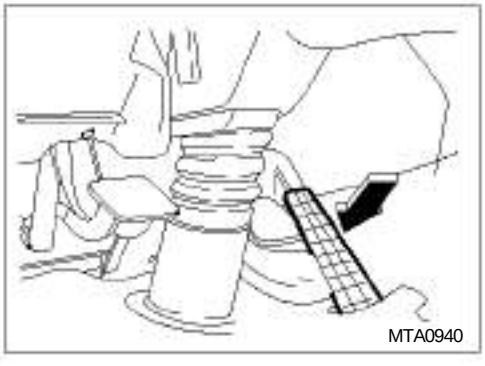
Codes	Description	Codes	Description
11	VSG sensor input voltage low	48	Fuel or air inlet pressure low
12	VSG sensor input voltage high	52	ECM A/D conversion fault
13	Coolant level sensor input voltage low	53	ECM non volatile memory fault
14	Oil, coolant, or intercooler, temp. sensor input voltage high	54	Vehicle speed sensor fault
15	Oil, coolant, or intercooler, temp. sensor input voltage low	55	J1939 data link fault 56 J1587 data link fault 57
16	Coolant level sensor input voltage high		J1922 data link fault
17	Bypass or throttle, valve position sensor input voltage	58	Torque overload
18	high Bypass or throttle, valve position sensor input	61	Injector response time long
21	voltage low	62	Aux. output short to battery(+) or open circuit, or mech. fault
22	TPS input voltage high TPS input voltage low	63	PWM drive short to battery(+) or open circuit.
23	Fuel temp. sensor input voltage high Fuel	64	Turbo speed sensor input fault
24	temp. sensor input voltage low	65	Throttle valve position input fault 66 Engine knock
25	No active codes		sensor input fault
26	Aux. engine shutdown #1, or #2, input active	67	Coolant or air inlet, pressure sensor input voltage fault
27	Air inlet or intake air, temp. sensor input voltage high	68	TPS idle validation switch open circuit or short to ground
28	Air inlet or intake air, temp. sensor input voltage low	71	Injector response time short
31	Aux. high side output open circuit or short to ground	72	vehicle overspeed
32	CEL or SEL short to battery(+) or open circuit	73	Gas valve position input fault or ESS fault 74
33	Turbo boost sensor input voltage high Turbo		Optimized idle safety loop short to ground
34	boost sensor input voltage low Oil pressure	75	ECM battery voltage high
35	sensor input voltage high Oil pressure sensor	76	Engine overspeed with engine brake
36	input voltage low	77	Fuel temperature high
37	Fuel pressure sensor input voltage high Fuel	81	Oil level, crankcase prs, dual fuel BOI, or exh. temp. volt high
38	pressure sensor input voltage low	82	Oil level, crankcase prs, dual fuel BOI, or exh. temp. volt low
41	Too may SRS (missing TRS) Too few SRS(missing	83	Oil level, crankcase prs, exhaust temp.,or external pump
42	SRS)		prs.,high
43	Coolant level low	84	Oil level or crankcase pressure, low
44	Oil, coolant, intercooler or intake air, temp. high	85	Engine overspeed
45	Oil pressure low	86	External pump or barometer, pressure sensor input voltage high
46	ECM battery voltage low	87	External pump or barometer, pressure sensor input voltage low
47	Fuel, air inlet, or turbo boost, pressure high	88	Coolant pressure low



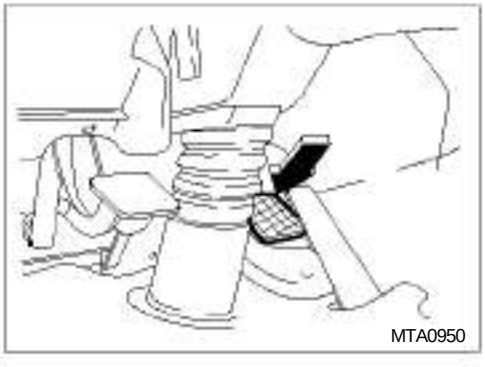
* In the case of ZF16S-221 transmission, when preparing to shift from 4th to 5th position, press the upper edge of the range change switch and then depress the clutch pedal and push the gearshift lever into the 1st position. When shifting from 5th to 4th position, reverse this procedure.



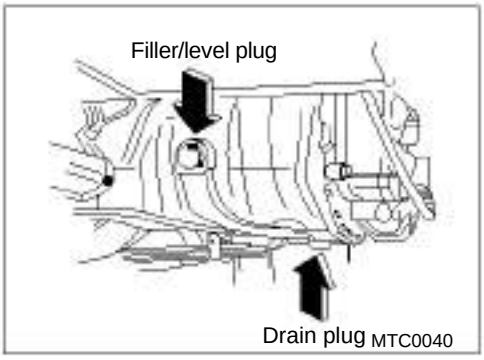
- **Trailer hand brake lever (for tractor and pull cargo)**
  Use this brake lever when preparing to reduce only trailer speed on a downhill.



- **Accelerator pedal**
  To avoid unnecessary increase in fuel consumption, the accelerator pedal should be operated smoothly and reasonably. Make sure that injection pump lever reaches maximum speed stopper when pressing accelerator pedal fully. If the lever won't reach the stopper, use accelerator pedal cable adjusting nut to adjust the cable length.



- **Brake pedal**
  When stopping your vehicle, do not press the pedal forcibly but try to press it repeatedly. On a downhill, use this pedal together with exhaust brake as required.



4) Transmission oil

(1) Oil level check

At end of first 1,000km and thereafter at every 4,000km driving, check oil level and replenish if oil remains below the level plug.

(2) Oil or oil filter change

Specifications: API GL-4, SAE 80W90

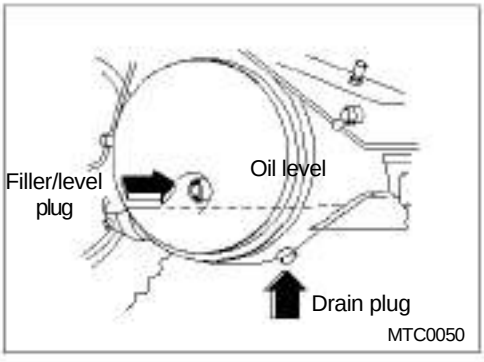
Tropical region specifications:

API GL4, SAE85W140(thermostat-open 71°C)

Engine oil API CD/CE/CF/SF/SG,SAE 30(ZF T/M)

* Drain the oil while it is hot.

Model	Change intervals	Capacity
T10S6	At end of first 4,000km, Every 24,000km or 6months	14L(PTO:15L)
T14S10		18L(PTO:19L)
ZF16S-151	At end of first 1,000km, Every 45,000km or every 12 months	11L
ZF16S-221		13L



5) Rear axle oil

(1) Oil level check

Check oil level at end of first 1,000km and thereafter every 4,000km for new vehicle, and replenish if the oil remains below the level plug.

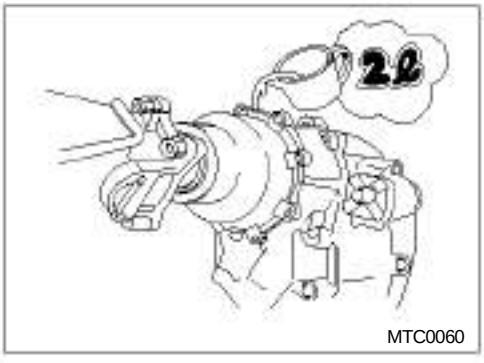
(2) Type of oil

Specifications: API GL-5, SAE 80W90

Tropical region specifications:

API GL5, SAE85W140 (thermostat-open 71°C)

* When changing oil for the forward rear axle, be sure to change oil for inter-differential (about 2L)(Tong-il inter-differential: 1.5L) at the same time.

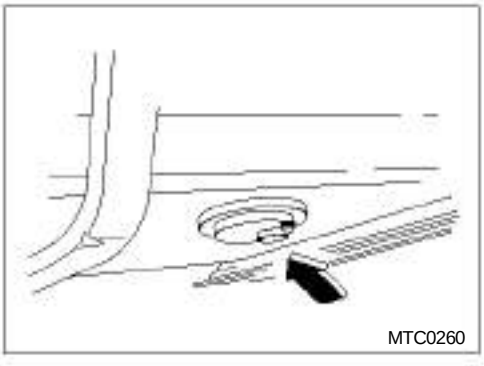


Model		Change intervals	Capacity
Hyundai dymos	R185HT	At end of first 4,000km, Every 24,000km or 6months	Front:20L, Rear:12L
	R178HT		
Tong-il	T12H		15L
	T15HT		Front:13L, Rear:10L
	T14HT		
	THR20ST		Front:14L, Rear:12L Wheel hubs:2.5L
RABA			↑
Meritor	RS26-163	At end of first 5,000km, Every 30,000km	22.5L
	RS26-185		22L

Engine model	Injection pressure
DE12TI	220/160 kg/cm^2
DE12TIS	220 kg/cm^2
DV15T	210 kg/cm^2
DV15TI	204 kg/cm^2
DV15TIS	250 kg/cm^2
DDC	352 kg/cm^2

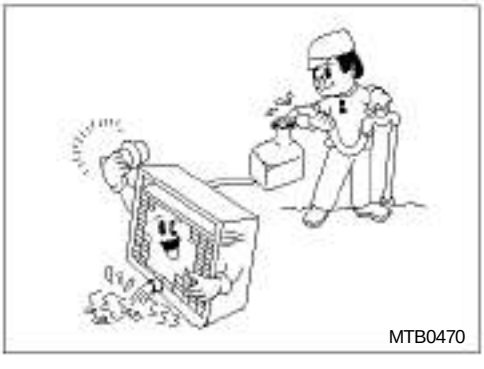
11) Injection nozzle

At end of first 5,000km and thereafter at every 10,000km (DDC engine:192,000km) for new vehicle, check injection pressure and spray condition of injection nozzle. As nozzle test is required to make such inspection, contact your nearest Daewoo dealer for nozzle test.


MTC0260

12) Fuel tank

Remove drain plug from fuel tank, and take out the strainer to clean it at every 8,000km.
Clean the inside of the fuel tank and drain water and sediments at every 24,000km.

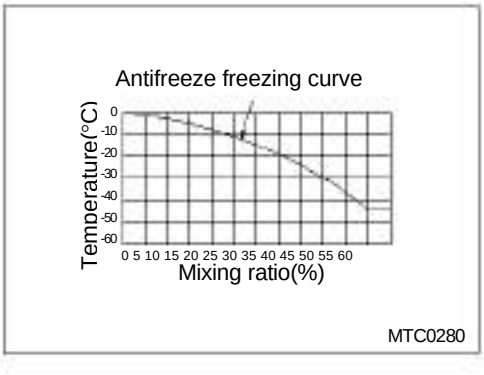

MTB0470

13) Change of coolants

Drain the coolant by opening the radiator drain cock, engine water drain cock and oil cooler cover plug. After completely draining off, close the drain cock and fill with water. Run the engine for about 10 minutes and then recheck the coolant level. In the case that antifreeze is added to coolant, it is advisable to clean the inside of the radiator and engine water jacket 2 times a year(in spring and autumn).

Specifications: EDS M - 8207

Engine model	Coolant volume
DE12TI	39.6L
DE12TIS	39L
DV15T	38.6L
DV15TI	39.6L
DV15TIS	40L 45L
DDC	

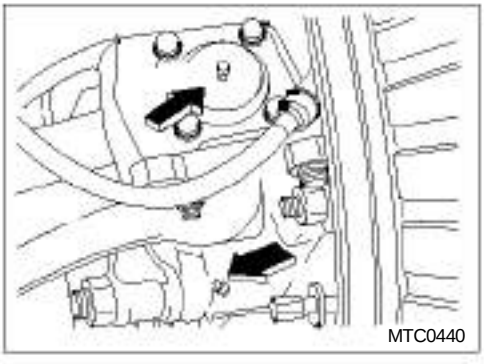


MTC0280

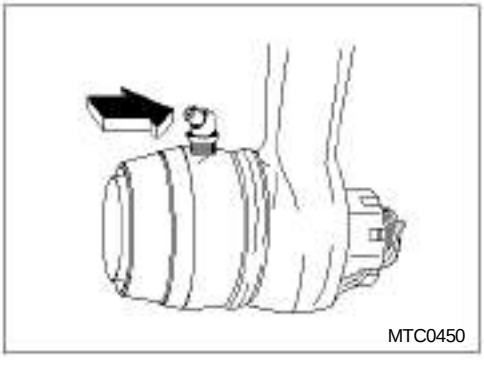
* Antifreeze and water mixing ratio: 50/50 for all around the year
* Operation and care in cold weather.

(5) Greasing points(nipples)

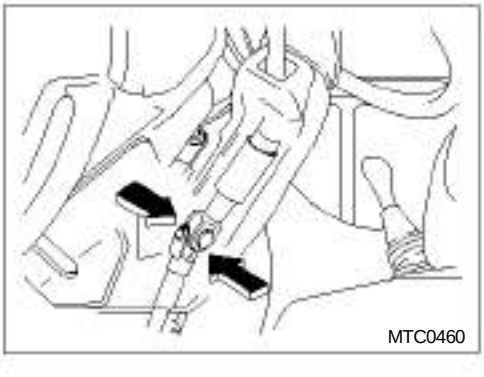
Use a greasing pump to inject every 15,000km of grease to each nipple.



- **King pin**



- **Drag link**



- **Inside spline shaft of steering column**

3. PERIODIC INSPECTION CHART

To ensure driving safety and maximum operating economy, periodic inspection and maintenance should be performed in accordance with the maintenance schedules as shown in the following chart. More frequent maintenance is required under severe conditions such as repeated short trip, driving on rough or dusty roads, driving in extremely cold weather, or driving on salted roads.

Service intervals(mileage x 1,000km) / Check item	First 1,000km	4	8	12	16	20	24	28	32	36	40	44	48		
• ENGINE (DE/DV)															
Dry type air cleaner-Clean	As required			●			●			●					●
Dry type air cleaner element-Replace	When														●
Wet type air cleaner oil-Change	contaminated	Every 5,000Km													
Valve clearance-Check/adjust	When ●	Every 10,000Km													
Engine oil and filter change	contaminated ●	Short distance travel(in city): every 10,000km, Long distance travel(at high speed): every 15,000km													
Fuel filter-Drain		Every 10,000km													
fuel filter-Change		Every 20,000km													
Nozzle injection pressure/injection conditions		First 5,000km , Every 10,000km													
Injection timing-Check								●							●
Function of air compressor															●
Looseness in exhaust pipings		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Fuel tank-drain/Strainer-Clean			●		●		●		●		●		●		●
Fuel tank-Inside wash								●							●
Coolant change(Include artifreeze)/Inside wash		Every 6 months change													
• CLUTCH															
Functions		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pedal free play & stroke		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Booster(mini-pack) exhaust cover-clean		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Clutch fluid-Change		Inspection and supplement: Every 4,000Km Change: Every 24,000Km or 12 months													
• TRANSMISSION															
Oil leakage	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Oil change(Except ZF T/M)		First 4,000Km, Every 24,000Km or 6 months													
Oil-Change(ZF Transmission)		First 5,000Km, Every 45,000Km or 12 months													
Looseness of gear controller															●
• PROPELLER SHAFT															
Loose connection check				●			●			●					●
Wear of universal joint and spline															●
Looseness in bearing and related parts															●
• FRONT AND REAR AXLES															
Looseness in front wheel bearing				●			●			●					●
Looseness in rear wheel bearing							●								●
Looseness in axle shaft clamp bolt		●	●	●	●	●	●	●	●	●	●	●	●	●	●
Axle oil leakage	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rear axle oil change		First 4,000Km, Every 24,000Km or 6 months													
Rear axle oil change(RABA, Meritor)		First 5,000Km, Every 30,000Km													
Front alxe inspection-Crack,Damage,Wrench												●			

S CO

2) How to read tachograph records

FIG 1,2

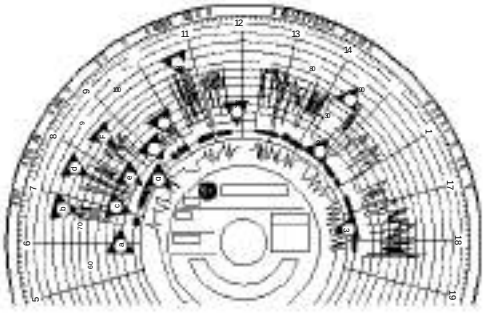
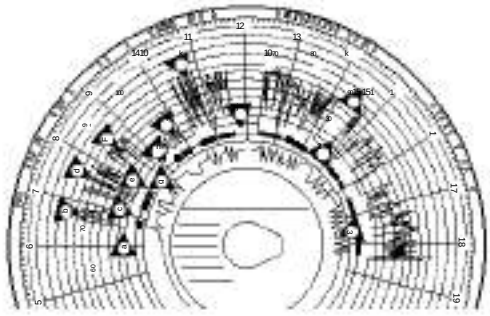
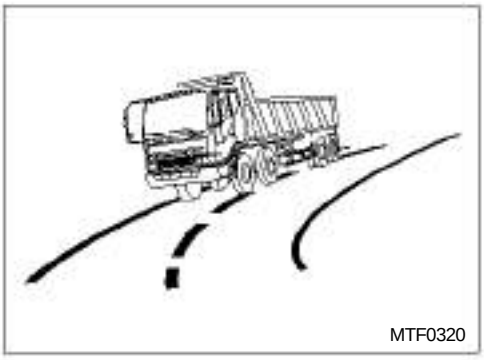


FIG 3



MTF0020

1. Speeds at which the vehicle is driven and duration of each trip
2. Time and duration of each stop
3. Distance travelled for each trip
4. Example: The following is a recording example to contain vehicle running information.
   a. 06:15 Insertion of recording chart or opening or closing of the cover b.
   06:38-06:54 Trip to a cargo loading point. Travelled distance: 11.5km
   c. 06:54-07:19 Time spent for loading
   d. Trip record during cargo delivery: It is shown that the vehicle was frequently driven at high speeds to travel a short distance. This will result in uneconomical operation. e.
   The vehicle was put to stop for 20 minutes.
   f. A trip to the neighboring town, showing a very stable and economical driving. g.
   The distance travelled is 25km.
   h. Parking for 30 minutes
   i. Record on cargo delivery. It is known that the vehicle speed was more economical than in the case of (b) above, despite that short distance trips were made repeatedly.
   j. It is shown that the vehicle was stopped, and the cover was opened at 11:50 and closed at 12:12. k.
   Record on returning trip shows what is the most uneconomical driving habit.


MTF0320

(7) How to operate

a. When operating the vehicle, be plainly dressed, and make sure of the route in advance keeping busy or smooth traffic sections and obstacles in mind.

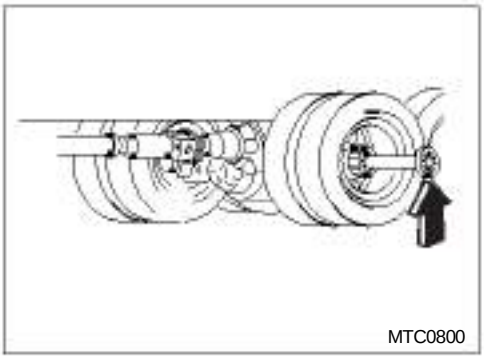
b. On slopes, gear down appropriately in advance. On the downgrade, use the same change group as that for slopes.

c. Namely, if running up a slope with the 5th gear applied, use the 5th gear on the downgrade, too and do not use a high gear(8th gear).

(8) Operating of the clutch

The clutch pedal must always be depressed fully for each gear shift movement.

If the clutch is not engaged or disengaged completely, or if the clutch discs have been excessively worn, gearshift problems will occur. In addition, wear on the synchronizers and at the gear teeth and dogs will be greatly increased.


MTC0800

(9) Towing away

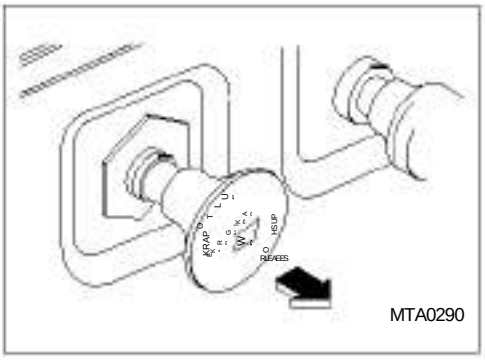
If the vehicle suffers a breakdown and has to be towed away, note the following precautions.

a. If the towing distance is 50km or less

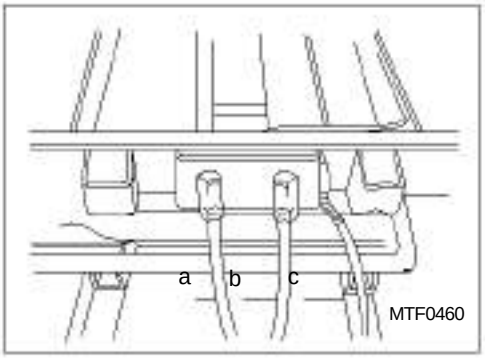
Put the gearshift lever in the neutral position(on the shaft for the 5th and 6th gears) in the HIGH range and keep the towing speed within 60 km per hour. If the gearshift lever would not be put in the neutral position,disconnect the rear axle shaft before having your vehicle towed.

b. If the towing distance is more than 50km

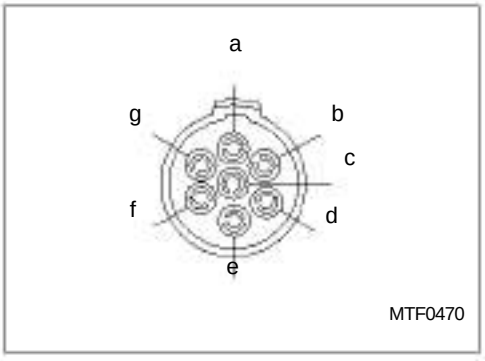
Separate the propeller shaft from the rear axle.



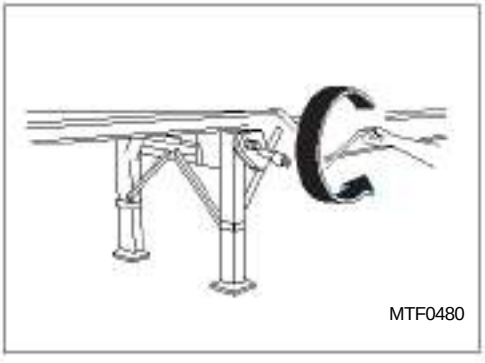
3. Pull the parking brake valve of the tractor before connecting the air hoses.
   Pull the parking brake valve of the tractor, and the trailer will be subjected to braking force when connecting the air hoses.



4. Be sure to connect the air hoses of the same color.
   a. Blue: Service brake line
   b. Red: Emergency brake line
   c. Jumper cable: Harness
   If air leaks is found from the connecting sections after connecting the air hoses, do again the connecting operation.

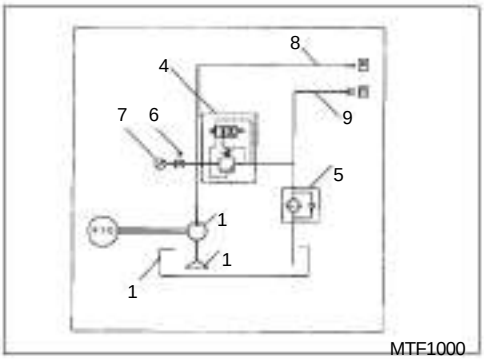


5. Jumper cable(Harness)
   a. White: Earth b.
   Black: Spare
   c. Yellow: Turn signal lamp(left side)
   d. Red: Stop lamp
   e. Green: Turn signal lamp(right side)
   f . Brown: Tail/license plate lamp
   g. Blue: Back up lamp



6. Turn the lag gear crank handle anti-clockwise to insert support leg(in the case that the trailer is not of a mechanical type).

10. HYDRAULIC DEVICE OF CAR CARRIER

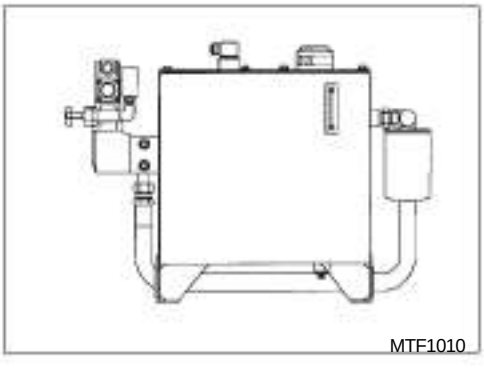


Circuit diagram

1. Oil tank
2. Suction strainer
3. Gear pump
4. Solenoid relief valve
5. Return valve
6. Stopping valve
7. Pressure gauge
8. Oil hose - Socket
9. Oil hose - Plug

Operation

Hydraulic pressure is generated by gear pump driven by PTO. Oil with high pressure is then transferred to the unit of the car carrier and its pressure is maintained below(4) solenoid relief valve preset pressure (100kg/cm^2). Operation of solenoid valve is activated by a switch on car-carrier unit with a PTO switch while the key is 'ON'.

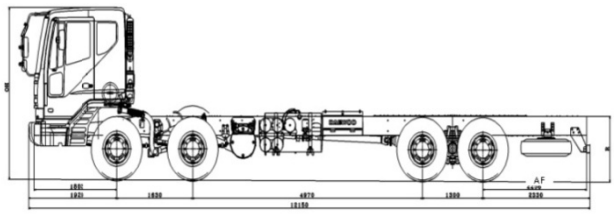


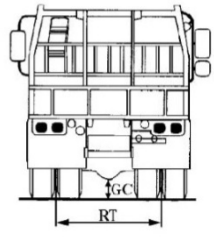
Oil tank

1. Oil capacity : 30l (up to the indication mark of gauge)
2. Suction strainer : Passing by flow : 50l/min(mesh 150)
3. Oil type : ISO VG 32
4. Interval for replacement : Every 1 year after initial change at 3 months.
   (Suction strainer needs to be replaced at the same time)

ENGINE	Manufacturer	DOOSAN INFRACORE
	Model	DE12TIS
	Emission certificate	EURO Ⅱ
	Type	Turbo intercooled, diesel engine
	Maximum power	340ps (250kw)/ 2,100rpm
	Maximum torque	145kg.m (1421N.m)/ 1,260rpm
	No. of cylinder	In Line 6- cylinder
	Bore × Stroke	123 × 155(mm)
	Displacement	11,051cc
	Controller type	Mechanical
	Air cleaner	Dry paper elements
CLUTCH	Type	Hydraulic control with air assisted Dry single plate with diaphragm
	Plate diameter	Outside diameter : 430mm(17 ″)
TRANSMISSION	Model	T15S6
	Speed	6 Forward / 1 Reverse
	Gear ratio	1st 7.263
		2nd 4.207
		3rd 2.526
		4th 1.569
		5th 1.000
		6th 0.699
		Reverse 6.857
FRONT AXLE	Type	Reverse elliot "I" beam
	Axle capacity	6,500kg
REAR AXLE	Type	Banjo single reduction
	Final drive ratio	5.571
	Axle capacity	23,000kg
TIRE & WHEEL (Standard)	Tire	12R22.5-16PR
	Disc wheel	8.25V × 22.5
	No. of wheel studs	10

DIAGRAM





DIMENSIONS (mm)	Overall	Length	OL	12,150
		Width	OW	2,495
		Height	OH	2,915
	Tread	Front	FT	2,050
		Rear	RT	1,855
	Wheelbase		WB	7,900
	Rear axle to frame		AF	2,435
	Ground to roof		GR	2,915
	Frame-ground above bogie		R	1,110
	Usable cab to axle		CA	7,025
	Min. ground clearance			270

WEIGHTS (kg)	Chassis weight	Front	6,170
		Rear	4,010
		Total	10,180
	Curb weight		10,180
	Axle load	Front	13,000
		Rear	23,000
	Permissible G.V.W		36,000

PERFORMANCE	Max. speed	(km/h)	110
	Max. gradeability	(%)	56.4
	Min. turning radius	(m)	11.8