CONTENTS

e. Compornents compatibility

⦿ Parent	● 100% compatible	◕ high compatible	◑	◔ low compatible	○ Original design

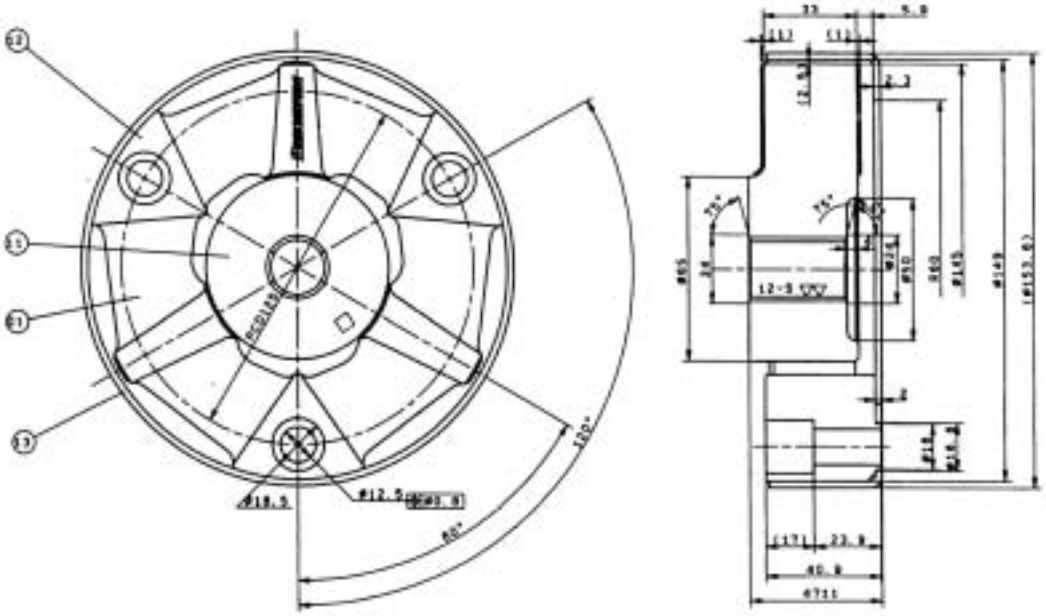
No.	Components		U20-3	U25-3	KX71-3(PP)	KX61-3(EU)	KX71-3(EU)	Remark
1	Track frame		○	⦿	◑	⦿	◑	
2	Front idler		○	⦿	●	●	●	
3	Track tension		◔	⦿	●	●	●	
4	Track roller		○	⦿	●	●	●	
5	Upper roller		●	⦿	●	●	●	KX91-3
6	Track shoe		○	⦿	●	●	●	W=300mm, 80 links
7	Swivel bearing		○	⦿	●	⦿	●	Different maker
8	Seat		●	⦿	◑	⦿	●	Full suspension seat
9	Swivel frame		◔	⦿	◑	⦿	●	
10	Engine mount		●	⦿	●	⦿	●	V1505
11	Pump mount		●	⦿	●	⦿	●	Different coupling maker
12	Bonnet		●	⦿	●	⦿	●	Different maker
13	Control box cover		●	⦿	⦿	●	●	
14	Canopy		●	⦿	●	⦿	●	≒ KX71-3
15	Cab		●	⦿	●	⦿	●	≒ KX71-3
16	Weight		◑	⦿	◑	⦿	⦿	
17	Fuel tank		●	⦿	●	⦿	●	Different maker
18	Electricl components	Starter	●	⦿	●	●	●	
		Alternater	●	⦿	⦿	●	●	
		Meter	●	⦿	⦿	●	●	
19	Label		◕	⦿	⦿	⦿	◕	
20	Hydro pump		◑	⦿	●	⦿	●	Fujikoshi
21	Control valve		◑	⦿	◑	⦿	◑	NA: Nabuco, EU: Hidra control
22	Swivel motor		◑	⦿	●	⦿	◑	
23	Travel motor		⦿	⦿	◑	⦿	⦿	EU: Transmittel & Kayaba NA: Kubota Seiki
24	Oil tank		●	⦿	●	⦿	●	
25	Swivel joint		●	⦿	●	⦿	●	
26	Pilot valve		●	⦿	◑	⦿	●	EU: Joystick type NA = KX121-3
27	Swing bracket		●	⦿	◕	⦿	●	
28	Boom		◑	⦿	◑	⦿	◔	
29	Arm		◑	⦿	⦿	⦿	◔	
30	Bucket link		●	⦿	⦿	⦿	◑	
31	Bucket		◕	⦿	⦿	⦿	◑	NA = KX91-3
32	Dozer blade		◕	⦿	●	⦿	◑	Different maker
33	Swing cyl.		●	⦿	◑	●	⦿	Different maker
34	Boom cyl.		○	⦿	◑	⦿	⦿	Different maker
35	Arm cyl.		◕	⦿	⦿	⦿	⦿	Different maker
36	Bucket cyl.		○	⦿	⦿	⦿	⦿	Different maker
37	Dozer cyl.		○	⦿	◑	⦿	⦿	Different maker

II.Machine Body

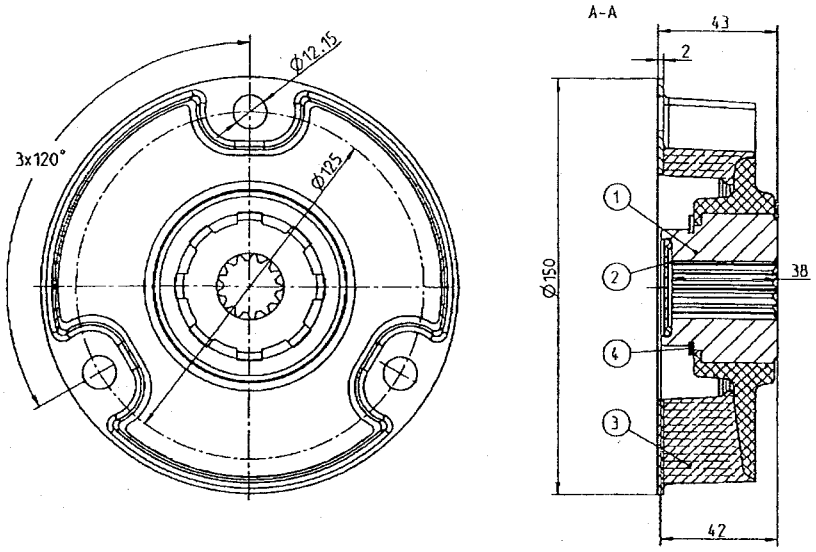
a. Main component

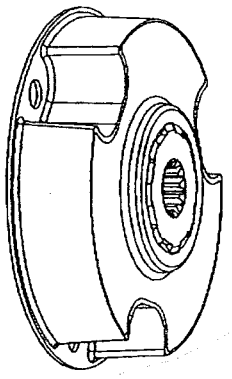
1. Pump coupling

1-1 KX71-3 PP - version

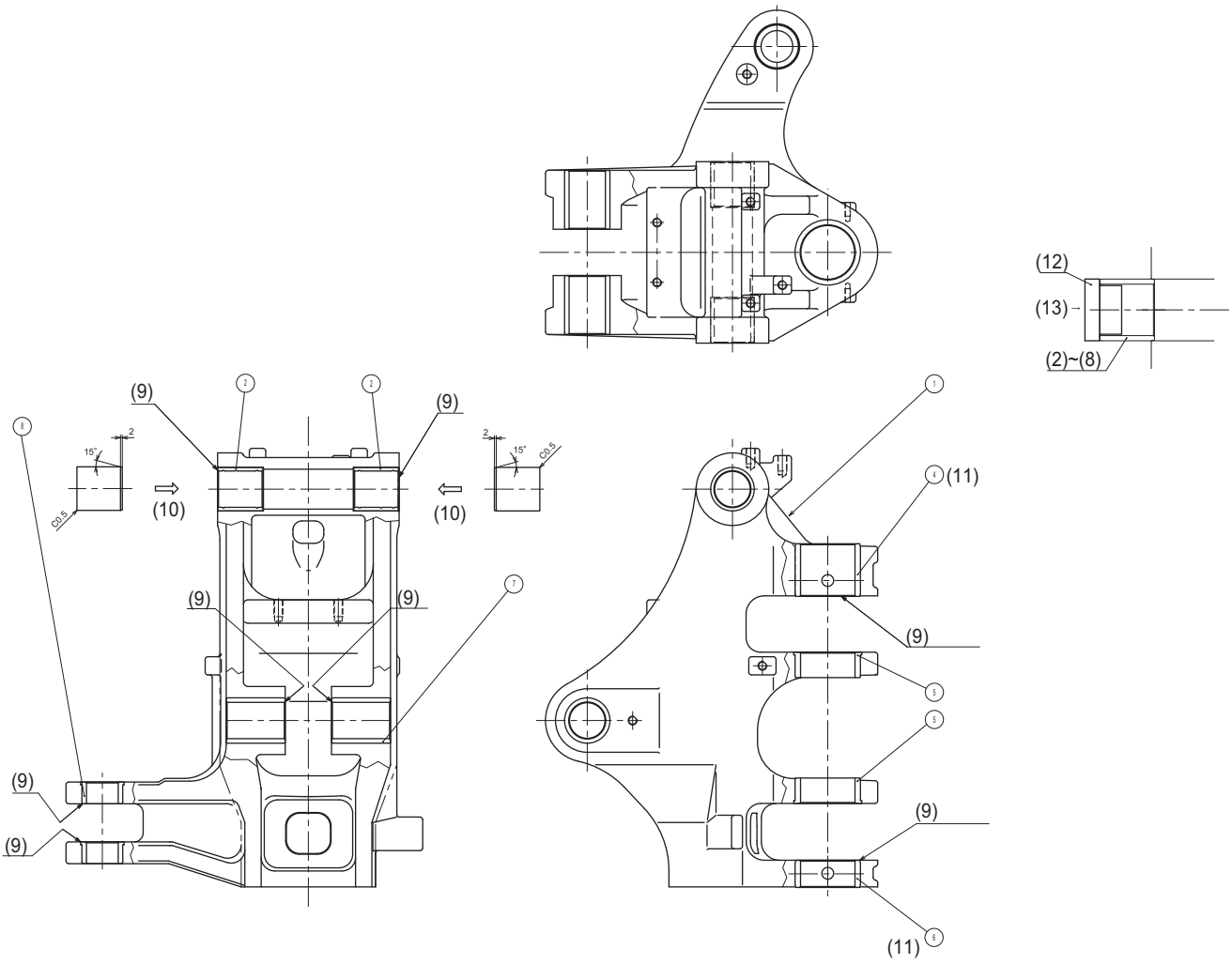


1-2 KX61-3, KX-71-3 EU- version





4. Swing bracket



(1) Swing bracket
(2) ~ (8) Bushing
(9) Side of the bush ( ) should flash the face.
(10) Bush press-fitting direction
(11) Check the bushing direction.
(Bolt hole should meet.)
(12) Jig.
(13) Pressing

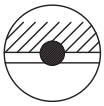
Remarks: Service limit of pin and bush wear.
Pin : -1.0mm (-0.01 in.)
Bush : +1.0mm (+0.04in.)

b. Water and oil quantity

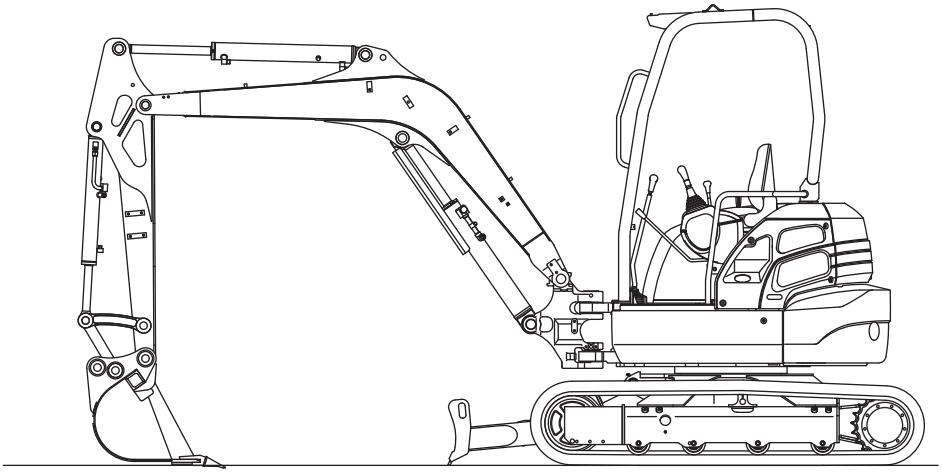
	Unit	KX61-3 (EU)	KX71-3 (EU)	KX-71-3 (PP)	Remarks
Radiator	L US gal	5.4 1.42	←	←	Kubota LLC-N-50F 50%
Reserve tank	L US gal	1.1 0.29	←	←	
Engine Crank case Without filter	L US gal	4.5 1.18	←	←	SAE10W30(CD) Gauge center
Hydraulic oil Full	L US gal	53.0 14.0	←	←	ISO 46
Hydraulic oil Tank gauge center	L US gal	38.0 9.35	←	←	ISO 46
Wheel motor	L US gal	0.6 0.16	←	←	SAE90 (API GL-4)
Track roller	cc US gal	80.0 0.02	←	←	SAE30(CD)
Upper roller	cc US gal	60.0 0.02	←	←	SAE30(CD)
Front idler	cc US gal	75.0 0.02	←	←	SAE30(CD)
Fuel tank	L US gal	45.0 0.01	←	←	

Inspection of hydraulic oil

When checking the hydraulic oil level, satisfy the following conditions and make sure the oil level is above the center the oil gauge.

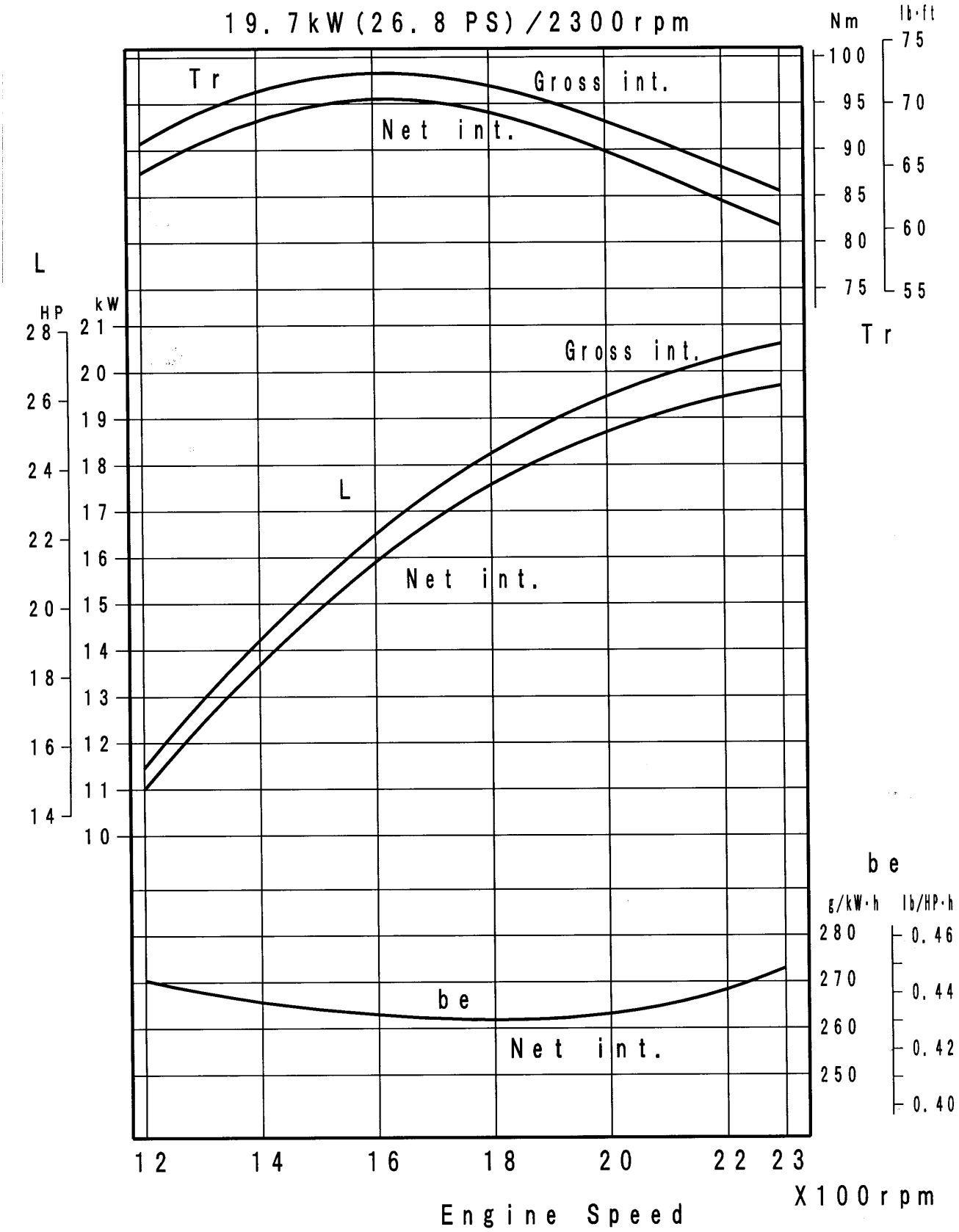

The oil level is within the shaded area shown in the figure at left.

1) Oil temp. should be between 10 ~ 30 °C, 50 ~ 86 °F.
2) Stance of front attachment :
   Swing : Straight forward
   Arm : Vertical to the ground
   Bucket : On the ground at its bottom
   Dozer blade : Down to the ground

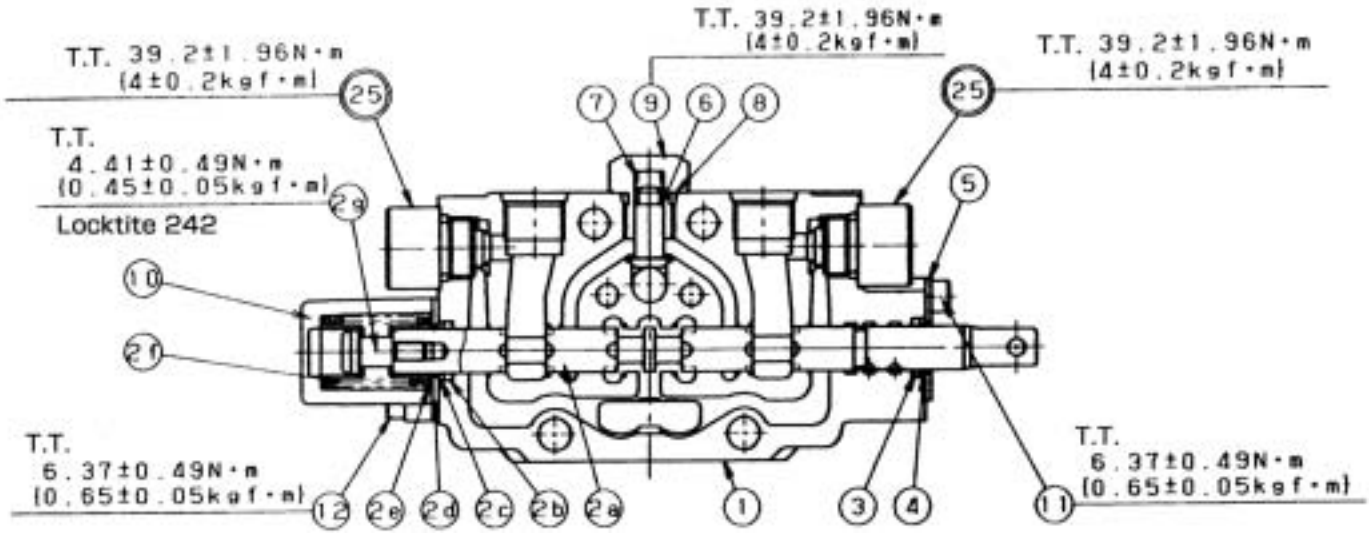


3)Air breather hose is connected to the oil tank. (Not pressurized type.)

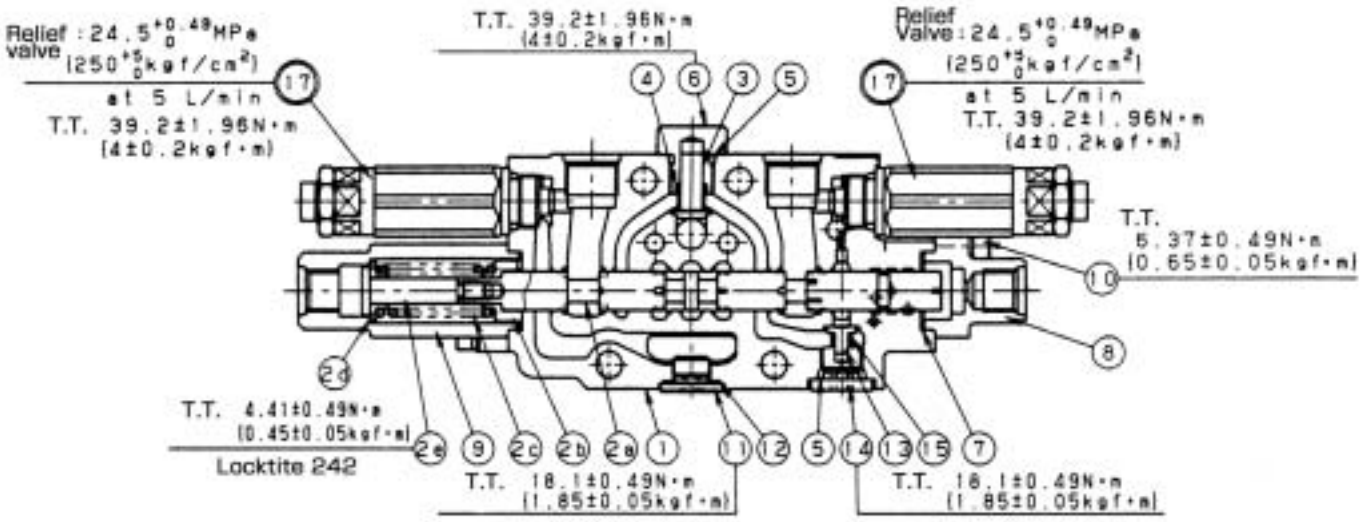
e. Performance curve : KX71-3 PP, V1505-E2-BH-10



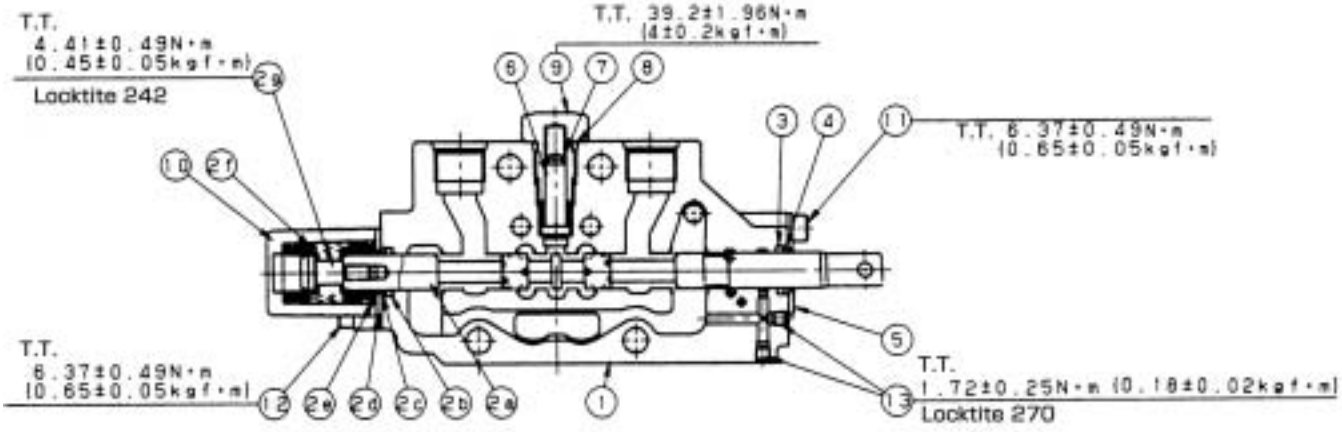
4-4 E-E : Service section



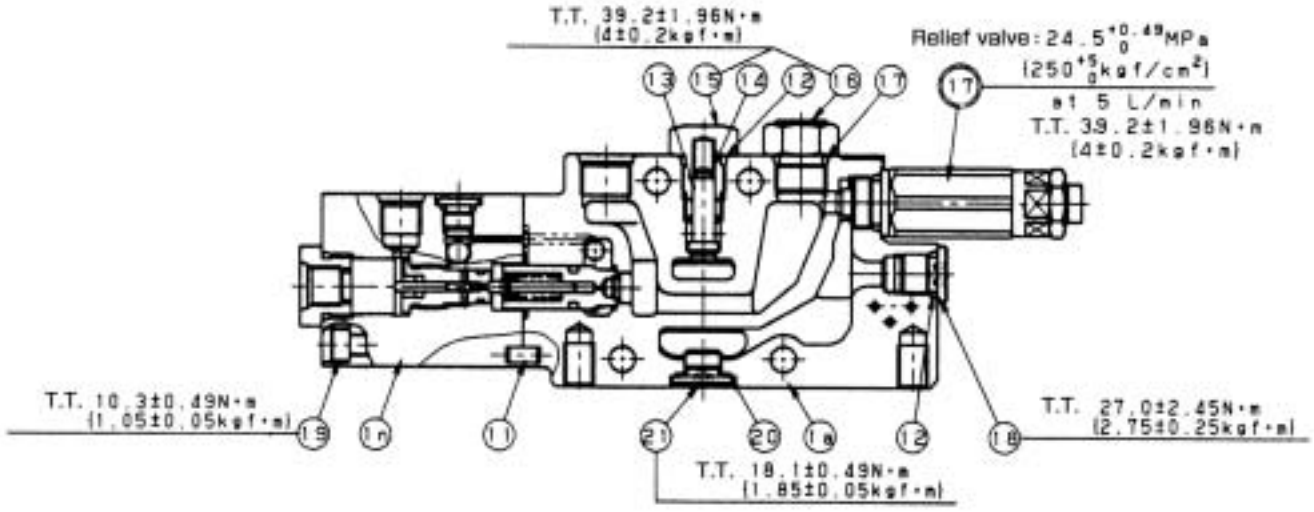
4-5 F-F : Arm section



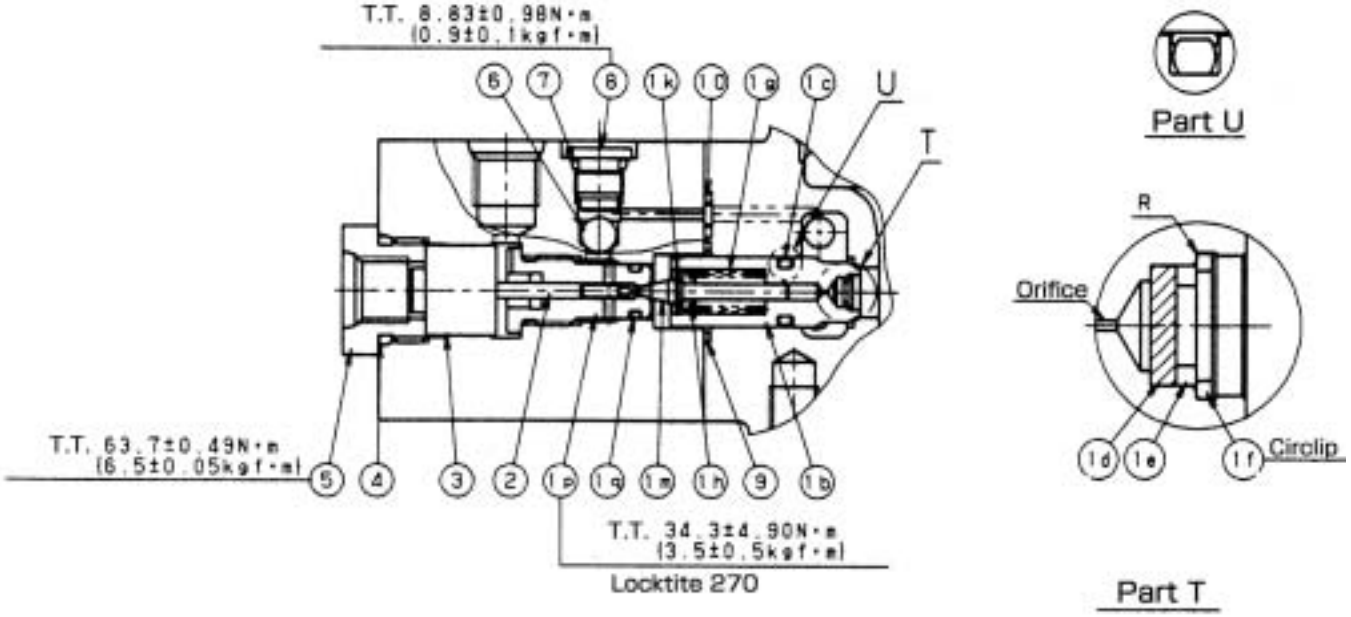
4-6 G-G : Travel R section



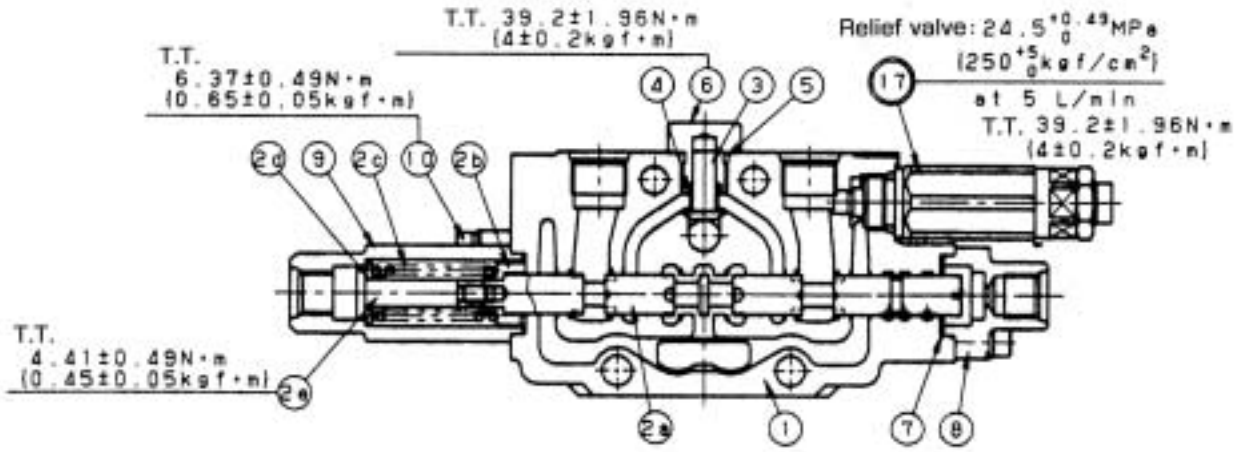
4-10 K-K : Boom lock valve



4-11 N-N : Book lock



4-12 L-L : Bucket section



g. Swivel motior

1. Technical data

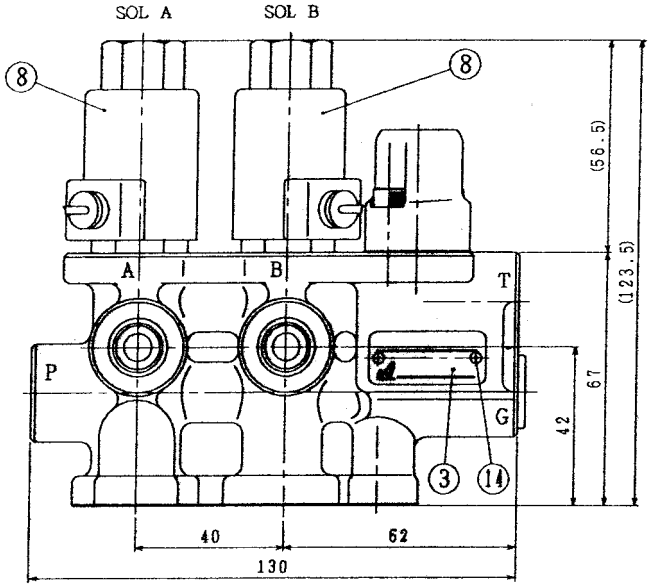
Items		Unit	KX61-3 EU	KX71-3 EU	KX71-3 PP
Manufacturere			Nachi - Fujikoshi Corp.		
Type			PCR-1B-05A-P-8289A	PCR-1B-05A-P-8290A	
Motor capacity		cc/rev (in^3/rev)	20.0 (1.22)	22.1 (1.35)	←
Gear reduction ratio			10	10	←
Total displacement		cc/rev (in^3/rev)	20.0 (1.22)	22.1 (1.35)	←
Pump oil delivery		l/min (G/min)	16.8 (4.44)	18.4 (4.86)	←
Motor assy speed		RPM	84	83.3	←
Swivel bearing / pinion teeth			80 / 9	80 / 9	←
Swivel speed		RPM	9.5	9.4	←
Motor brake valve setting pressure		MPa (kgf/cm^2)	17.7 at 18 l/min (180)	17.7 at 16 l/min (180)	←
Motor brake valve cracking pressure		MPa (kgf/cm^2)	15.7 at 1 l/min (160)	←	←
Parking brake friction torque		N·m (kgf/cm^2)	68.4 (6.98)	←	←
Brake release pressure	Max.	MPa (kgf/cm^2)	4.9 (50.0)	←	←
	Min.	MPa (kgf/cm^2)	2.0 (20.4)	←	←
Check valve cracking pressure		MPa (kgf/cm^2)	0.02 (0.2)	←	←
Port T allowable pressure (Normal)		MPa (kgf/cm^2)	1.0 (10.2)	←	←
Drain port allowable pressure (Normal)		MPa (kgf/cm^2)	0.2 (2.04)	←	←
Swivel speed for 3 turns		sec.	18.9	19.1	←
Swivel block performance at engine stop		mm/min (inch/min)	0, < 5 (0.2) (Condition : Front horizontal, heaped bucket, 20° slope, oil tem. 50 ±50°C)		
Swivel block performance at engine running		mm/min (inch/min)	0, <30 (1.18) (Condition : Engine idling, lever unlock)		
Capable swivel rotation angle		deg.	21.3, >19	18.8, >17	16.0, >14
Sluggish at bucket tip		mm (inch)	60 (2.36), <73 (2.87) (Condition : Push with 5kgf and set zero point, and reversely push with 30 kgf.)		

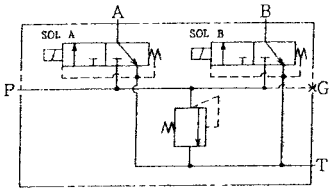
j. Accessories of hydraulic components

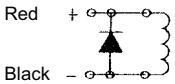
1. Unload valve (Change valve) : North America and Oceanea - version

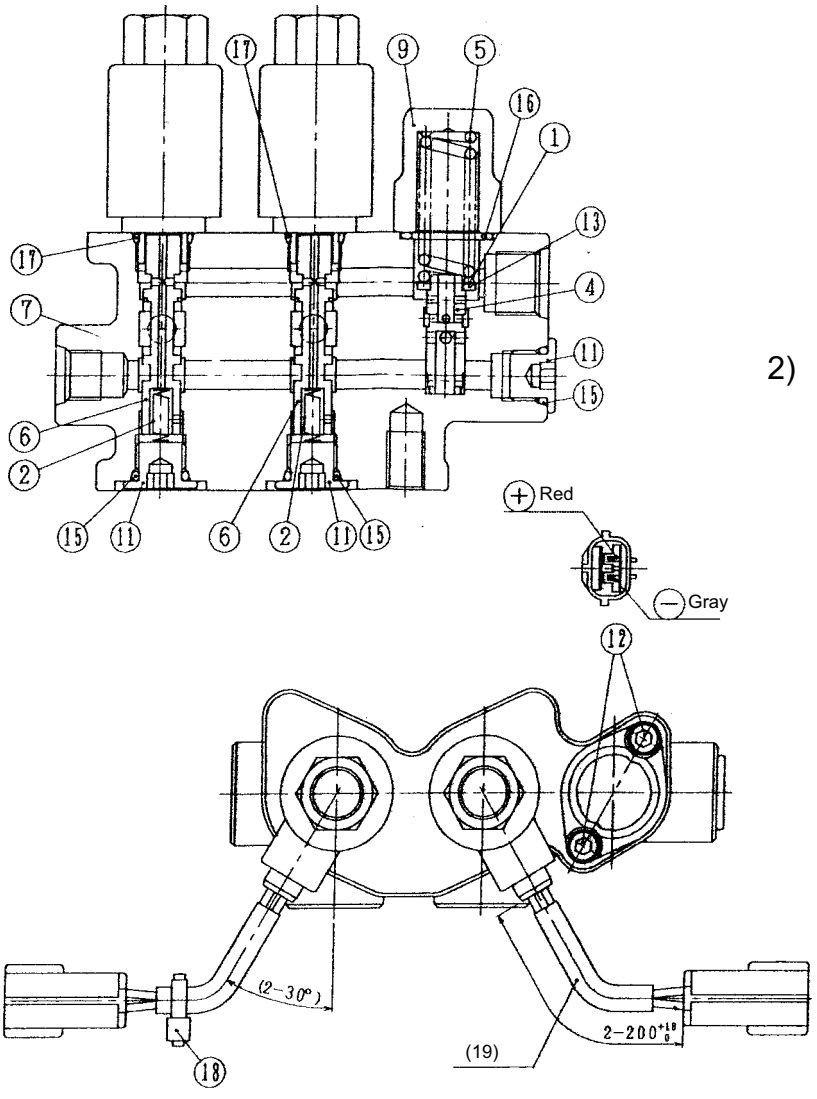
1-1 Structure

Maker : Nishina









(1)	Shim	(11)	Plug
(2)	spring	(12)	Hollow bolt
(3)	Name plate	(13)	Washer
(4)	Plunger	(14)	Screw
(5)	Spring	(15)	O-ring
(6)	Spool	(16)	O-ring
(7)	Body	(17)	O-ring
(8)	Solenoid	(18)	Cable clamp
(9)	Cover	(19)	Protection tube

2) Specifications

(1)	Rated voltage:	DC 10.8 ~ 14.4V
(2)	Current:	1.2 A at 20 °C
(3)	Insulation:	JIS C 4003 H
(4)	Coil resistance:	Approx. 12 Ω
(5)	Surge killer:	Diode
(6)	Relief valve set pressure:	$3.9^{+0.2}_{0}$ MPa ($40^{+0.2}_{0}$ kgf/cm^2) at 6l/min
(7)	Cracking pressure:	3.4 MPa (35kgf/cm^2) at 2l/min p → A, B
(8)	Back pressure:	0.2 MPa (2.0 kgf/cm^2) or less
(9)	Port size:	A, B, G = pF 1/4 P, T = pF 3/8
(10)	Tightening torque :	PF 1/4:26.5 N·m (2.7kgf·m) M5:3.92 N·m (0.4kgf·m) M10:21.6N·m (2.2kgf·m)

V.Electrical System

a. Development concept

1. Background of Adoption of New Meter

(1) The L1 (3-ton class) Series, which was released in Japan in 1999 for domestic users, adopted a new meter of LCD type (called YUYU NAVI). Since then, this meter has been one of the sales points of the Series.
(2) Presently, the new meter is applied to only models for domestic users. No models for overseas users adopt this meter.
(3) The new meter has a stable reputation for providing advanced performance, convenience, and user-friendliness. This sales point should be added to models for overseas users.

2. Features of New Meter

(1) Advanced performance:
Digital display (multi-language support), alarm sound, and design performance (see fig. 2 on the right-hand side)
(2) Parts integration:
Relays and controllers supporting a variety of functions for conventional models are integrated into the new meter for space saving and high cost performance. (Relays partly need to be installed externally.)
(3) Functions in a Wide Variety
1. Warning and self-diagnostic functions:
The following items are displayed on the LCD with graphics, failure (warning) numbers, and characters along with an alarm sound.
• Remaining fuel (see fig. 3 on the right-hand side)
• Oil pressure (see fig. 4 on the right-hand side)
• Charge (see fig. 5 on the right-hand side)
• Overvoltage
• Overheating
2. Inspection time instruction function:
"SERVICE HOURS" appears whenever the time has come for the inspection and replacement of the oil filter as explained in the manual, and prompts the user to make an inspection.
3. Fuel replenishment assist function:
The meter beeps intermittently at the time of fuel replenishment, and the interval between beeps is shortened when the tank is almost filled to prevent the fuel from overflowing.
The beep functions with the key turned OFF, but one of the switch needs to be pressed.
4. Service tester function:
This function allows the monitoring of the operation of electrical devices (e.g., an oil pressure switch) connected to the meter and provides the history of failures resulted in the past (see figs. 6 and 7 on the right-hand side).
While in harness manipulation mode, it is possible to diagnose and single out harness components that have internal failures (e.g., contact failures).
5. Other functions
• Low Travel speed reset at the time of restarting the engine (if the engine is turned OFF with high - low switch set to the high range).
• Engine start check (preventing the engine from starting with the lever unlocked).
• Starter motor automatic disconnection → Auto release
• Auto glow
• Built-in hour meter and display
• Built-in tachometer and display
6. Expansion function for the future (Presently not scheduled to adopt for KX61-3)
• Monitoring with theft prevention set up
• Service port (thumb) hand-held proportional control
• Air-conditioner idling control
• Auto idling

name	English	meaning and explanation
data055	Other menu	Literary it means other menus.
data056	Circuit check Engine stop	This means micro computor is ready to check electrical harness conditions, break or breaking. In this case, for your sefety engine should be off.
data057	Checking touch harness	This means micro computor is checking the harness conditions. Service personnel is required to put hands on the suspected harness, then controller detects the break of harness.
data058	AI motor drive	This display letter means that AI motor can be controlled by just pressing switches on the panel board. Aim of this function is to adjust AI motor link to fit the cable not by the accel knob but by switch.
data059	Max Idle (C.W.) (C.C.W)	Max(CW) means AI motor link moves toward engine speed Max. direction. Idle(CCW) means AI motor link moves toward engine speed idle direction.
data060	All fail record	With this display on, all fail records will be shown up on LCD.
data061	EEPROM read	This display means that data in the EEPROM will be shown up on LCD.
data062	1234 FEDC FEDC FEDC FEDC FEBA FEDC FEDC FEDC FEDC 23	These figures and letters indicate the data of EEPROM. Data can be scrolled up by pressing the switch.
data063	LCD check	This indication shows that micro computor is checking the LCD function.
data064		This shows LCD condition.
data065		This shows LCD condition.
data066		This shows LCD condition.
data067	Service hour meter 1234.3 h	This indicates the service hours of the machine.
data068	Set up hour meter 1234.3 h	This indicates the hours of machine set up.
data069	Soft version 12345	This indicates the software version of main controller.
data070	Set up	This means initialization of the machine main controller.
data071	Enigne start	This indicates that operator is required to start engine.
data072	Set up AI	This means initialization of the AI system.
data073	Accel max	This indicates that operator is suggested to turn the accel knob to Max engine speed.
data074	Accel idle	This indicates that operator is suggested to turn the accel knob to idle engine speed.
data075	Finish key off	This means all initialization process has completed and operator is suggested to turn off key.
data076	Set up machine	This means initialization of the machine.
data077	Set up solenoid	This means initialization of the solenoid valve.
data078	Set up idle 1200 r/min	This means initialization of the engine idle speed.
data079	Set up overheat warning	This means initialization of engine overheat warning system.
data080	Overheat temp. 114 ℃ -10 ℃	This indicates the overheat temp. setting value.
data081	32 1500 HR service	This indicates service hour to conduct maintenance job.
data082	Made in Japan Made in Germany	These indicates where machine was manufactured.
data083	Lever Travel Start	These letters and signs indicate the switch conditions; safety lock lever, travel high speed and main key position at start or not.
data084	31 Lift up unload lever	This indicates that operator is suggested to lift up unload lever(safety lock lever).
data085	Simple mode	Simple mode means that min. fail indications are shown up on LCD.

3-9 All Fail Record

All the accumulated failure records can be shown by selecting Other menu, Other menu, and All fail record (See Fig.6.).

By selecting All fail record, the first hour meter items generated after shipping through the last one will be shown.
There are 19 types of failure diagnostic items, and the details of each type of item can be checked. The hour meter will, however, remain even after the failure records are deleted.

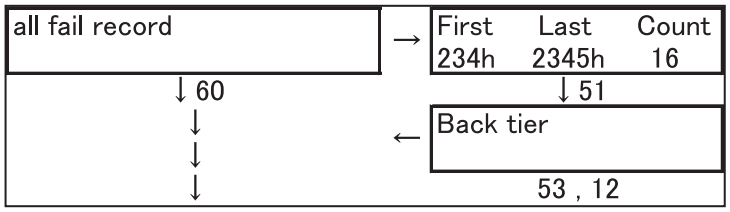


Fig.6 All Fail Record

3-10 EEPROM read

The data of the EEPROM can be checked by selecting Other menu, Other menu, and EEPROM read. (See Fig.7.)

Ten items are displayed on each page in hexadecimal, and 13 pages will be used in total.
The EEPROM consists of 128 x 16 bits.

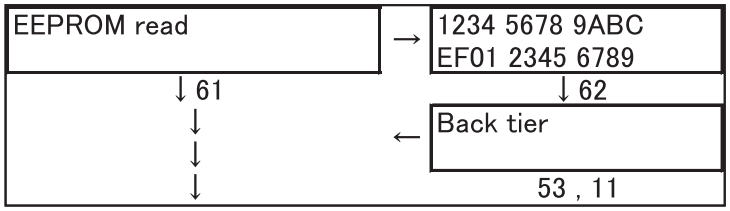


Fig.7 EEPROM read

3-11 LCD inspection

The dot type of the LCD can be checked by selecting Other menu, Other menu, and LCD check. (See Fig. 8.)

Checkered pattern 1, checkered pattern 2, and the outer frame will be displayed. Checkered pattern 1 and checkered pattern 2 are opposite to each other in dot ON-OFF pattern. Missing dots can be checked by using this function. (See Figs.9 and 10.)

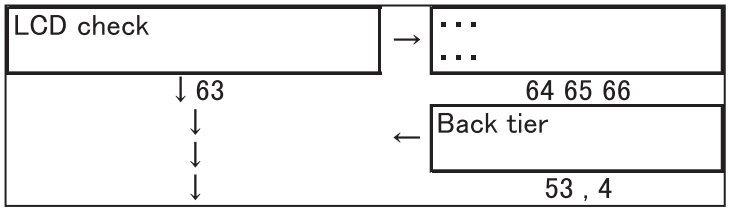


Fig.8 LCD check

Fig.9 Frame Display

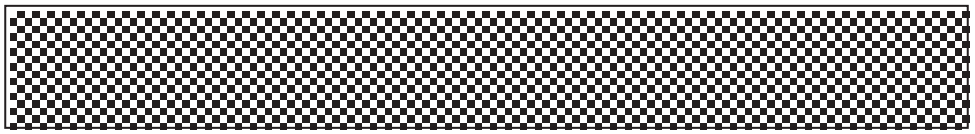
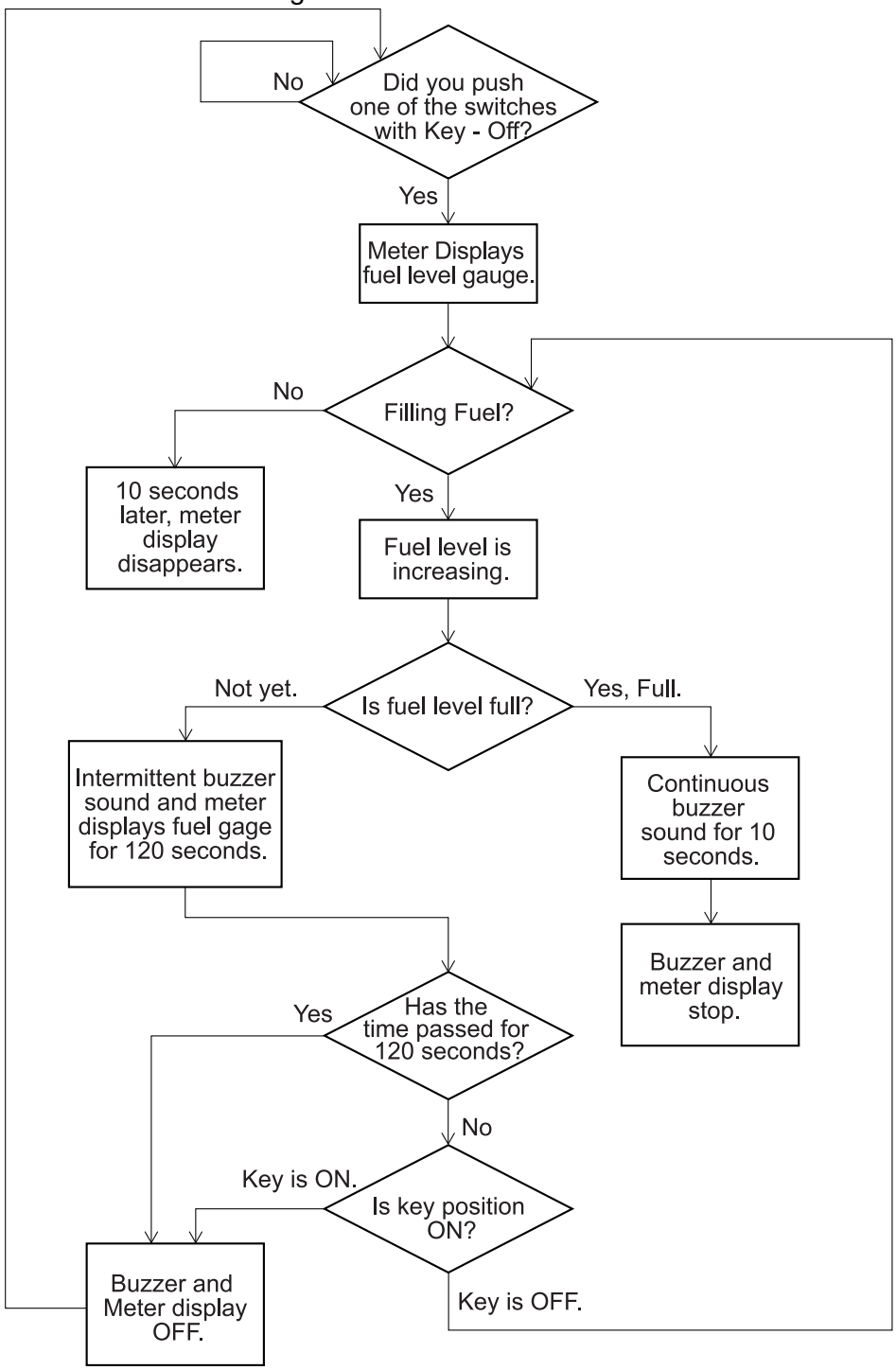


Fig.10 Checkered Pattern

3. Fuel Replenishment Assist Function
While replenishing fuel by pressing any switch after the key is turned OFF, the buzzer interval will change according to the quantity of fuel replenished. When the fuel in the tank is not much, the buzzer will be heard at long intervals. When the quantity approaches the full tank level, the intermittent buzzer continues at shorter intervals. When the tank is full, the buzzer will be heard continuously with no intervals to prevent the fuel from overflowing from the tank.



- Beep sound disappears approx 10 seconds after reaching to full of fuel.
- If fuel fank isn't full, keep sound continues to sound for two minutes in order to alarm.

3-20 Service hour meter

A service maintenance message will appear when the preset hour meter item is activated.
The message will disappear in 10 seconds. Hereafter, whenever the key is turned OFF and ON, the message will appear for the first 10 seconds.
There are two modes (i.e., auto mode and manual mode) to turn OFF the inspection icon perfectly, either of which is selectable by the user's settings.
While the system is in auto mode, the icon will disappear when the key is turned OFF and ON 10 times in total. Then icon will not appear again with the key further pressed. This is convenient because the icon will disappear only with the key turned OFF and ON, in which case the actual maintenance of the equipment will be up to the user's choice.
While in manual mode, the icon will disappear with the working lamp pressed continuously for 3 seconds. In this case, the message will be eliminated after the user's maintenance work. Therefore, the problem of the careless omission of maintenance will be prevented. This method is, however, complicated. Therefore, it is necessary for each dealer to make maintenance management.
When all the described inspection items in the Operation Manual are considered, a message will be displayed at 50-hour intervals, which is not so meaningful. In view of the foregoing, important items (e.g., items related to the engine oil, operating oil, air filter, and engine oil filter) should be targeted so that a message will appear in the case of maintenance necessity for any of these items. The meter with North American specifications and that with European specifications share the same software, but the timing of maintenance varies with the specifications and the size of the system. Therefore, the displayed frequency of each item is changed according to the specifications. Fig. 2 shows an example of the display of the KX41-3 with North American specifications.
Usually, the service hour meter advances in synchronization with the hour meter, thus causing no problems. If the hour meter is replaced, however, the new hour meter will start with zero hour. In that case, the service hour meter will be asynchronous. Due to ethics reasons, the system cannot incorporate functions that allow the alternation of the hour meter. There are, however, no problems in altering the service hour meter. Therefore, items that can be input for the service hour meter have been prepared.

KX41-3 Service Hour Meter with North American Specifications

No.	Check points		Intervals	Hour meter indicator									Consequently
				50	100	250	300	500	550	750	800	1000	
1	Engine oil		change	○			○		○		○		every 250 hrs
2	Hydraulic oil											○	every 1000 hrs
3	Air filter element	Outer element	replace									○	every 1000 hrs
		Inner element										○	every 1000 hrs
4	Drive unit oil		change		○			○				○	every 500 hrs
5	Engine oil filter		replace	○			○		○		○		every 250 hrs
6	Hydraulic return filter element					○				○			every 500 hrs
7	Hydraulic suction filter element											○	every 1000 hrs

The message appears. The message shows up as follows.

Fig. 2

EU - version machine

A message appears initial at 50-hour intervals and 250-hour intervals (i.e., every 250, 500, 750, and 1000 hours).