SHOP MANUAL

KOMATSU

FB10/14/15/18-5
FB15H/18H-5
FB15H1/18H1-5
FB15SH/18SH-5

MACHINE MODEL	SERIAL No.
FB10/14/15/18-5	: 30001 and up
FB15H/18H-5	: 40001 and up
FB15H1/18H1	: 40001 and up
FB15SH/18SH-5	: 50001 and up

KOMATSU FORKLIFT

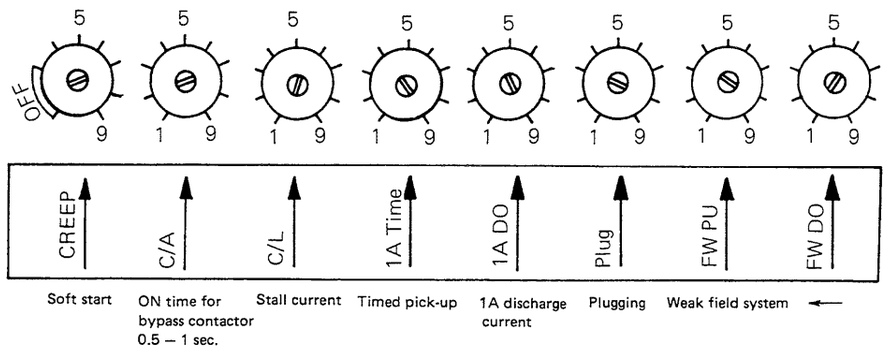
PROCEDURE FOR ADJUSTING VOLUME OF PRINT CARD ON GE CONTROLLER

Table 6

Adjustment volume / Model	Soft start	On time for bypass contactor (1A)	Lock current	Timed pick-up	1A discharge current	Plugging	Weak field system	←
	CREEP	C/A	C/L	1A TIME	1A DO	PLUG	FW PU	FW DO
FB15SH-5 FB18SH-5	6	7	6.2	5	8	4		
FB20SH-3 FB30S-3	8	8	9	5	8	5.5		

Adjustment for new card or card that is out of adjustment

The SCR panel is set at the factory to match the motor and truck, so there is no need to adjust it again. The card uses a one-rotation type potentiometer, and the box is marked with a dial. Use these positions as a guide when adjusting. The diagram below is for use in explaining the method of adjustment. It does not indicate the actual positions of the knobs.

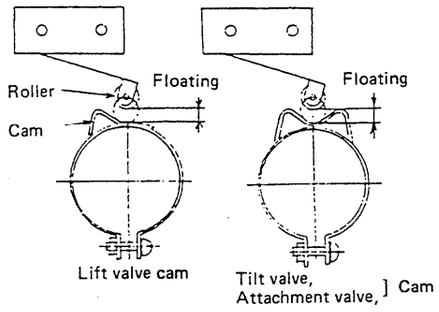


On new cards, all the knobs are turned fully counter-clockwise to position 1, so adjust them to match the truck after installing them. Turn the knob clockwise to increase the function.

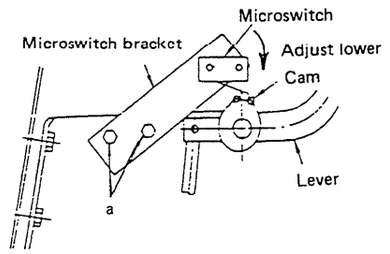
METHOD OF ADJUSTMENT FOR CONTROL VALVE MICROSWITCH

Purpose
Explained below is how to repair the working equipment in the event of malfunctioning due to the contact between the control valve microswitch roller and cam having worsened as a result of rough handling of the control valve lever.

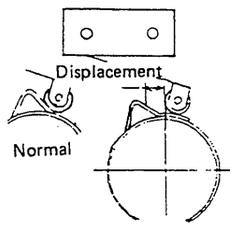
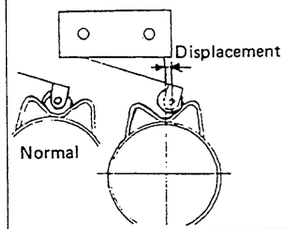
Floating of Roller from Cam (at Lever Neutral)



Method of Adjustment
Slacken the microswitch bracket fixing bolts "a" and adjust the bracket mounting position for the can lower.



Displacement between Roller and Cam in Circumferential Direction (at Lever Neutral)

	Lift Valve	Tilt Valve/Attachment Valve
Displacement between roller and cam in circumferential direction		
Method of Adjustment	Adjust the cam position in the circumferential direction until the cam contacts the roller. (Contractor specifications an hydraulic SCR's lift 1st-stage switch.)	Adjust the cam position in the circumferential direction so that the roller at the center of the recess between the two cam lobes.

Note:
With the hydraulic SCR, the lift lever is equipped with 2 sets of switch and cam, i.e. the 1st and 2nd stages. Adjust the 2nd-stage switch by shifting the cam position from the 1st stage so that it turns on when the lift lever stroke is within the range of 70 to 80 mm.

General Cautions

1. If there is floating or displacement between the cam and the roller, the pump motor starts suddenly after the control valve's hydraulic circuit opens, in which case oil flows; the working equipment is therefore prone to a shock when it is started.
   So eliminate floating or displacement so that the control valve circuit opens only after the switch activates.
2. The control valve microswitch lever must not be bent too harshly with pliers, etc. to remove floating or displacement, or the switch will malfunction or breakdown.

FOREWORD

Proper operation, maintenance, troubleshooting and repairs are necessary to preserve the performance of vehicles and engines (engine-powered forklift trucks) over a long period of time and to ensure that fault and breakdowns do not occur.
The object of this Shop Manual is to provide the information necessary especially in connection with the performance of inspections and repairs mainly in the maintenance areas.
For this purpose, it includes sections on "General Specifications", "Checks and Adjustments", "General Disassembly and Assembly", "Disassembly and Assembly of Components" and the "Electrical System".
Maintenance data necessary for the performance of maintenance on the machines is also included, but reference should be made to the Operation and Maintenance Manual for further details.
Reference should also be made to this manual in connection with correct operation of the machine.

The content of the items mentioned above is as follows.

General and Specifications
This chapter indicates the name of each part of the machine, and the installation positions of the operating devices and instruments.

Checks and Adjustments
This chapter gives the details required for the disassembly and reassembly of machines such as tightening torque, allowances, as well as the wear limits of the parts. However, when necessary, data in line with the procedure mentioned in the following sections, "General Disassembly and Assembly" and "Disassembly and Assembly of Components" is indicated.

General Disassembly and Assembly
The procedure when disassembling a machine comes within one of the two following categories. In the first, the machine, including the frame, is made up roughly of seven component parts, i.e.: a mast section, a cylinder section, a reach leg, a transfer section, a motor section, a pump section and a frame.
This chapter contains details of how to disassemble and assemble these components. The other category of disassembly and assembly is the disassembly and assembly of component parts referred to in the following chapter.

Disassembly and Assembly of Components
This chapter provides additional explanation concerning those of the seven component parts, as touched upon in the preceding chapter, whose disassembly procedure is particularly complicated and for which special care is needed when adjusting. Mention is also made of the functions and structures of the component parts.

Electrical system
Explanation is provided in this chapter of the electrical parts used inside the machine. Troubleshooting when a breakdown occurs is also described.

Reference should be made to the "General Shop Manual" for safe oprating and working methods which serve as the basis for the performance of repair and inspection works on machines.

SERVICE INFORMATION

Method of adjustment for control valve microswitch 60- 2
Procedure for adjusting volume of print card on GE controller 60- 3

SECTION INDEX

00. FOREWORD

01. GENERAL AND SPECIFICATIONS

10. REMOVAL AND INSTALLATION

20. DISASSEMBLY AND ASSEMBLY

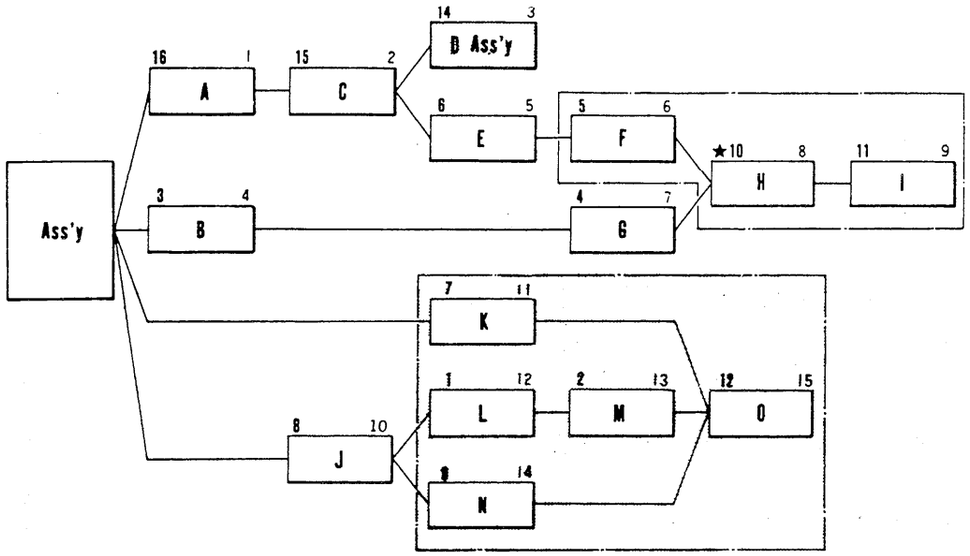
30. ELECTRICAL SYSTEM

40. TESTING AND ADJUSTING

50. APPENDIX (1)(2)

60. SERVICE INFORMATION

DISASSEMBLY AND ASSEMBLY DIAGRAM



DISASSEMBLY DIAGRAMS

Sequential procedure to be followed when disassembling a machine or its components are illustrated in these manuals in the form of a diagram; no sentential descriptions are provided. Therefore, you are required to be familiar with such diagrams by thoroughly understanding the following descriptions. The disassembling diagrams include the following information:

- Sequential procedure to be followed when disassembling a machine or a component thoroughly
- The shortest procedure which requires the minimum number of parts to be removed from the machine prior to removal of a desired component part
- The same as above necessary to remove a desired assembly

HOW TO READ THE DIAGRAMS

In the diagram shown as an example on the preceding page, the name of machine (or assembly) to be disassembled is shown in the square at far left. All other squares represent parts or sub-assemblies to be removed from the preceding parts or sub-assembly. Mutual relations between the parts (or sub-assembly) can be classified as follows:

-

"C" can not be removed unless "A" is removed.
-

Both "D" and "E" can be removed after "C" is removed.
-

"H" cannot be removed unless both "F" and "G" are removed.
- This indicates an assembly composed of enclosed parts such as "F", "H" and "I". To remove these parts as an assembly, it is necessary to remove previously all parts connected to the lines leading from the left-hand edge of the block.

Temperature

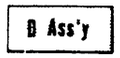
Fahrenheit-Centigrade Conversion. —A simple way to convert a Fahrenheit temperture reading into a Centigrade temperature reading or vice versa is to enter the accompanying table in the center or boldface column of figures. These figures refer to the temperature in either Fahrenheit or Centigrade degrees.
If it is desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left.
If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

°C		°F	°C		°F	°C		°F	°C		°F
–40.4	–40	–40.0	–11.7	11	51.8	7.8	46	114.8	27.2	81	117.8
–37.2	–35	–31.0	–11.1	12	53.6	8.3	47	116.6	27.8	82	179.6
–34.4	–30	–22.0	–10.6	13	55.4	8.9	48	118.4	28.3	83	181.4
–31.7	–25	–13.0	–10.0	14	57.2	9.4	49	120.2	28.9	84	183.2
–28.9	–20	–4.0	–9.4	15	59.0	10.0	50	122.0	29.4	85	185.0
–28.3	–19	–2.2	–8.9	16	60.8	10.6	51	123.8	30.0	86	186.8
–27.8	–18	–0.4	–8.3	17	62.6	11.1	52	125.6	30.6	87	188.6
–27.2	–17	1.4	–7.8	18	64.4	11.7	53	127.4	31.1	88	190.4
–26.7	–16	3.2	–7.2	19	66.2	12.2	54	129.2	31.7	89	192.2
–26.1	–15	5.0	–6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
–25.6	–14	6.8	–6.1	21	69.8	13.3	56	132.8	32.8	91	195.8
–25.0	–13	8.6	–5.6	22	71.6	13.9	57	134.6	33.3	92	197.6
–24.4	–12	10.4	–5.0	23	73.4	14.4	58	136.4	33.9	93	199.4
–23.9	–11	12.2	–4.4	24	75.2	15.0	59	138.2	34.4	94	201.2
–23.3	–10	14.0	–3.9	25	77.0	15.6	60	140.0	35.0	95	203.0
–22.8	–9	15.8	–3.3	26	78.8	16.1	61	141.8	35.6	96	204.8
–22.2	–8	17.6	–2.8	27	80.6	16.7	62	143.6	36.1	97	206.6
–21.7	–7	19.4	–2.2	28	82.4	17.2	63	145.4	36.7	98	208.4
–21.1	–6	21.2	–1.7	29	84.2	17.8	64	147.2	37.2	99	210.2
–20.6	–5	23.0	–1.1	30	86.0	18.3	65	149.0	37.8	100	212.0
–20.0	–4	24.8	–0.6	31	87.8	18.9	66	150.8	40.6	105	221.0
–19.4	–3	26.6	0	32	89.6	19.4	67	152.6	43.3	110	230.0
–18.9	–2	28.4	0.6	33	91.4	20.0	68	154.4	46.1	115	239.0
–18.3	–1	30.2	1.1	34	93.2	20.6	69	156.2	48.9	120	248.0
–17.8	0	32.0	1.7	35	95.0	21.1	70	158.0	51.7	125	257.0
–17.2	1	33.8	2.2	36	96.8	21.7	71	159.8	54.4	130	266.0
–16.7	2	35.6	2.8	37	98.6	22.2	72	161.6	57.2	135	275.0
–16.1	3	37.4	3.3	38	100.4	22.8	73	163.4	60.0	140	284.0
–15.6	4	39.2	3.9	39	102.2	23.3	74	165.2	62.7	145	293.0
–15.0	5	41.0	4.4	40	104.0	23.9	75	167.0	65.6	150	302.0
–14.4	6	42.8	5.0	41	105.8	24.4	76	168.8	68.3	155	311.0
–13.9	7	44.6	5.6	42	107.6	25.0	77	170.6	71.1	160	320.0
–13.3	8	46.4	6.1	43	109.4	25.6	78	172.4	73.9	165	329.0
–12.8	9	48.2	6.7	44	111.2	26.1	79	174.2	76.7	170	338.0
–12.2	10	50.0	7.2	45	113.0	26.7	80	176.0	79.4	175	347.0

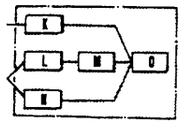
kgm to ft.lb

1 kg.m = 7.233 ft.lb

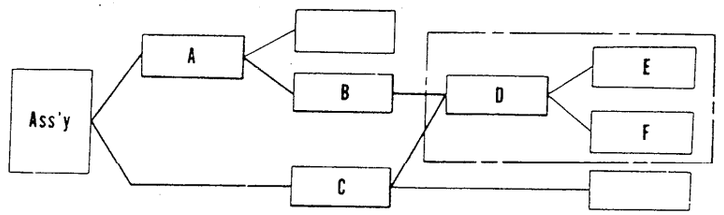
	0	1	2	3	4	5	6	7	8	9
		7.2	14.5	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	396.6	303.8	311.0	318.3	325.5	332.7	340.0	347.2	354.4
50	361.7	368.9	376.1	383.4	390.6	397.8	405.1	412.3	419.5	426.8
60	434.0	441.2	448.5	455.7	462.9	470.2	477.4	484.6	491.8	499.1
70	506.3	513.5	520.8	528.0	535.2	542.5	549.7	556.9	564.2	571.4
80	578.6	585.9	593.1	600.3	607.6	614.8	622.0	629.3	636.5	643.7
90	651.0	658.2	665.4	672.7	679.9	687.1	694.4	701.6	708.8	716.1
100	723.3	730.5	737.8	745.0	752.2	759.5	766.7	773.9	781.2	788.4
110	795.6	802.9	810.1	817.3	824.6	831.8	839.0	846.3	853.5	860.7
120	868.0	875.2	882.4	889.7	896.9	904.1	911.4	918.6	925.8	933.1
130	940.3	947.5	954.8	962.0	969.2	976.5	983.7	990.9	998.2	1005.4
140	1012.6	1019.9	1027.1	1034.3	1041.5	1048.8	1056.0	1063.2	1070.5	1077.7
150	1084.9	1092.2	1099.4	1106.6	1113.9	1121.1	1128.3	1135.6	1142.8	1150.0
160	1157.3	1164.5	1171.7	1179.0	1186.2	1193.4	1200.7	1207.9	1215.1	1222.4
170	1129.6	1236.8	1244.1	1251.3	1258.5	1265.8	1273.0	1280.1	1287.5	1294.7
180	1301.9	1309.2	1316.4	1323.6	1330.9	1338.1	1345.3	1352.6	1359.8	1367.0
190	1374.3	1381.5	1388.7	1396.0	1403.2	1410.4	1417.7	1424.9	1432.1	1439.4



This is an assembly of which the disassembling procedure is described separately.



This indicates an assembly composed of enclosed parts. All of the enclosed parts may be removed individually according to the procedure shown by this diagram, or may be removed first as an assembly and then divided into individual parts according to the separately illustrated disassembly diagram.



ASSEMBLY DIAGRAM

When a part (or an assembly) in the diagram is specified as an object to be removed, trace all paths leading the specified part (or the block of the specified assembly) to the original machine (or assembly) located at the far left of the diagram. The parts arranged in such paths are the minimum parts necessary to be removed. In the diagram above, for example, the part "D" (or an assembly composed of "D", "E" and "F") can be removed after removing only the parts "A", "B" and "C" arranged on the thick lines.

SYMBOL AND NUMERALS ABOVE A SQUARE

- The mark ★ is a reference to a note describing the precautions to be followed when removing the part.
- The boldface numeral located at the top left of a square corresponds to the index number used in the structural drawing to indicate that part. Only in the disassembly diagram indicating the general disassembly of a machine (or an assembly), however, is another form of numerals such as 12-24 used, **12** corresponds to the item code number used on each page as part of the page numbers, and **24** corresponds to the index number used in the structural drawing.
- The numeral located at the top right of a square indicates the disassembling order recommended by Komatsu.

The same manner as described above to read the disassembly drawings are also applicable to the assembly drawings. A part (machine chassis, case, etc.) with which the assembling procedure is to be started is indicated in the square located at the far left end in the diagram. All other squares represent parts (or sub-assemblies) to be installed to the preceding parts or sub-assemblies.
In the assembly diagrams, in which all parts are arranged in the sequence of assembly from left to right, the parts have mutual relations with each other as shown in the following:

-

"B" cannot be installed unless "A" is installed.
-

Both "D" and "E" can be installed after "C" is installed.
-

"H" cannot be installed unless both "F" and "G" are installed.

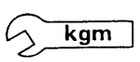
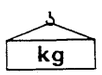
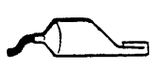
All marks and numerals have the same designations as described for the disassembly diagram.

PRECAUTIONS WHEN PERFORMING THE SERVICE WORK

Always pay attention to 'Safety' before starting any work — this is important.
Never attempt any work where danger to yourself or to other persons.
Whenever work requiring safety precautions are described in this manual, a flag mark ⚠ inserted, always make double sure that safety measures are taken.
Other unmarked work, should always be performed after studying and using your common sense to prevent accidents.

DESCRIPTION OF THE SYMBOLS

The symbols described below are used in this manual for convenience and better understanding.

Symbol	Item	Description
	Safety	Special safety precautions are needed to perform the work.
	Note	Special technical precautions are needed to perform the work.
	**Tightening Torque**	Fastening parts that require specified tightening force when assembling.
	**Weight**	Weight of parts or systems
	**Coat**	Places to be coated with adhesives, etc. when assembling.
	Bolt	Quantity of bolts when disassembling or assembling.

kg/cm² to lb/in²

1 kg/cm² = 14.2233 lb/in²

	0	1	2	3	4	5	6	7	8	9
		14.2	28.4	42.7	56.9	71.1	85.3	99.6	113.8	128.0
10	142.2	156.5	170.7	184.9	199.1	213.4	227.6	241.8	256.0	270.2
20	284.5	298.7	312.9	327.1	341.4	355.6	369.8	384.0	398.3	412.5
30	426.7	440.9	455.1	469.4	483.6	497.8	512.0	526.3	540.5	554.7
40	568.9	583.2	597.4	611.6	625.8	640.1	654.3	668.5	682.7	696.9
50	711.2	725.4	739.6	753.8	768.1	782.3	796.5	810.7	825.0	839.2
60	853.4	867.6	881.8	896.1	910.3	924.5	938.7	953.0	967.2	981.4
70	995.6	1010	1024	1038	1053	1067	1081	1095	1109	1124
80	1138	1152	1166	1181	1195	1209	1223	1237	1252	1266
90	1280	1294	1309	1323	1337	1351	1365	1380	1394	1408
100	1422	1437	1451	1465	1479	1493	1508	1522	1536	1550
110	1565	1579	1593	1607	1621	1636	1650	1664	1678	1693
120	1707	1721	1735	1749	1764	1778	1792	1806	1821	1835
130	1849	2863	1877	1892	1906	1920	1934	1949	1963	1977
140	1991	2005	2020	2034	2048	2062	2077	2091	2105	2119
150	2134	2148	2162	2176	2190	2205	2219	2233	2247	2262
160	2276	2290	2304	2318	2333	2347	2361	2375	2389	2404
170	2418	2432	2446	2460	2475	2489	2503	2518	2532	2546
180	2560	2574	2589	2603	2617	2631	2646	2660	2674	2688
190	2702	2717	2731	2745	2759	2773	2788	2802	2816	2830
200	2845	2859	2873	2887	2901	2916	2930	2944	2958	2973
210	2987	3001	3015	3030	3044	3058	3072	3086	3101	3115
220	3129	3143	3158	3172	3186	3200	3124	3229	3243	3257
230	3271	3286	3300	3314	3328	3343	3357	3371	3385	3399
240	3414	3428	3442	3456	3470	3485	3499	3513	3527	3542

Kilogram to Pound

1 kg = 2.2046 lb

Kilogram	0	1	2	3	4	5	6	7	8	9
		2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.53	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

Pound to Kilogram

1 lb = 0.4536 kg

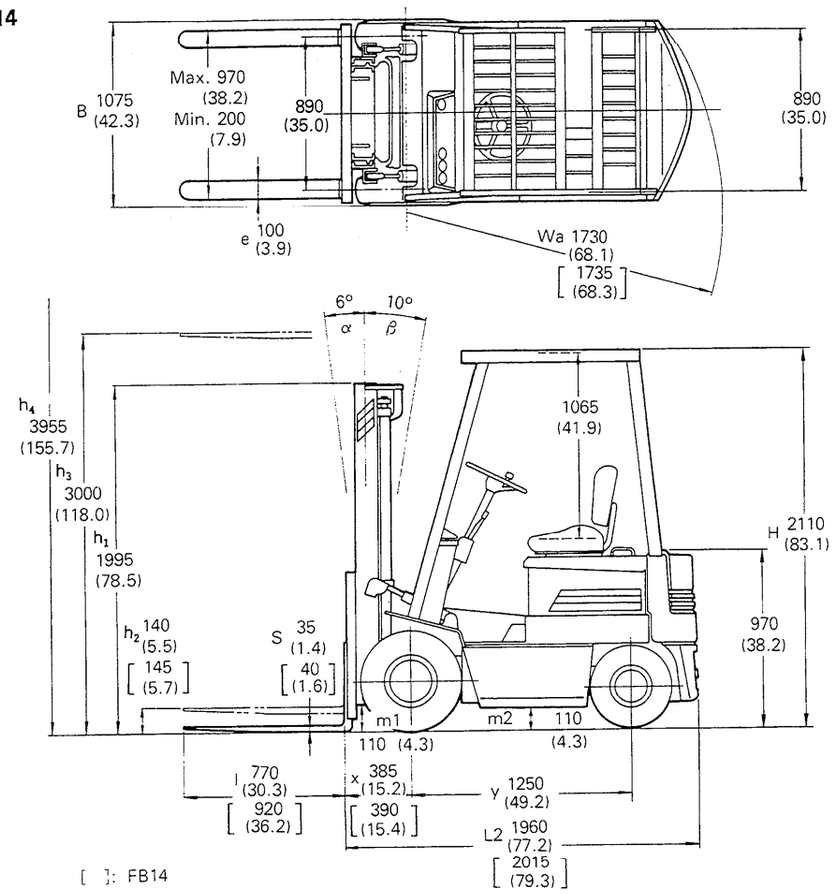
Pound	0	1	2	3	4	5	6	7	8	9
		0.454	0.907	1.361	1.814	2.268	2.722	3.175	3.629	4.082
10	4.536	4.990	5.443	5.897	6.350	6.804	7.257	7.711	8.165	8.618
20	9.072	9.525	9.979	10.433	10.886	11.340	11.793	12.247	12.701	13.154
30	13.608	14.061	14.515	14.969	15.422	15.876	16.329	16.783	17.237	17.690
40	18.144	18.597	19.051	19.505	19.958	20.412	20.865	21.319	21.772	22.226
50	22.680	23.133	23.587	24.040	24.494	24.948	25.401	25.855	26.308	26.762
60	27.216	27.669	28.123	28.576	29.030	29.484	29.937	30.391	30.844	31.298
70	31.752	32.205	32.659	33.112	33.566	34.019	34.473	34.927	35.380	35.843
80	36.287	36.741	37.195	37.648	38.102	38.555	39.001	39.463	39.916	40.370
90	40.823	41.277	41.731	42.184	42.638	43.091	43.545	43.999	44.452	44.906

01. GENERAL AND SPECIFICATIONS

Overall dimensions and specifications 01- 2
Standard tightening torque 01-10
Periodical replacement of safety-assuring parts 01-12

OVERALL DIMENSIONS AND SPECIFICATIONS

FB10,14



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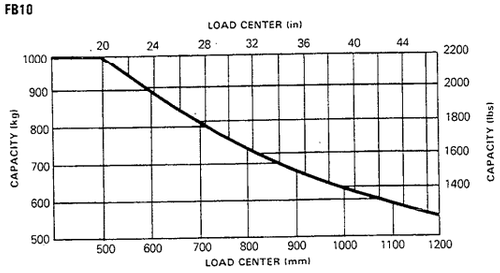

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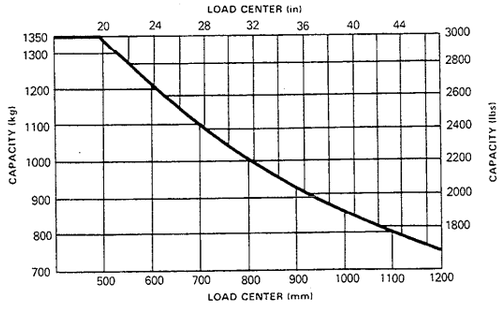

Capacities shown are for trucks equipped with 2-stage view mast up through 4000mm (157in.) maximum fork height, 970mm (38.2in) carriage, 770mm (30.3in.) [920mm (36.2in.)] forks. Contact your distrivutor or dealer for capacity information with other equipment. [ ]: FB14.

Liter to U.K. Gallon

1 ℓ = 0.21997 U.K. Gal

	0	1	2	3	4	5	6	7	8	9
		0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.950	4.179
20	4.399	4.619	4.839	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.969	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.778
50	10.998	11.281	11.438	11.658	11.878	12.098	12.318	12.528	12.758	12.978
60	13.198	13.418	13.638	13.858	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.037	18.257	18.477	18.697	18.917	19.137	19.357	19.577
90	19.797	20.017	20.237	20.457	20.677	20.897	21.117	21.337	21.557	21.777

U.K. Gallon to Liter

1 U.K. Gal = 4.5461 ℓ

	0	1	2	3	4	5	6	7	8	9
		4.55	9.09	13.64	18.18	22.73	27.28	31.82	36.37	40.92
10	45.64	50.01	54.55	59.10	63.65	68.19	72.74	77.28	81.83	86.38
20	90.92	95.47	100.01	104.56	109.11	113.65	118.20	112.74	127.29	131.84
30	136.38	140.93	145.47	150.02	154.57	159.11	163.66	168.21	172.75	177.30
40	181.84	186.39	190.94	195.48	200.03	204.57	209.12	213.67	218.21	222.76
50	227.30	231.85	236.40	240.94	245.49	250.03	254.18	259.13	263.67	268.22
60	272.77	277.31	281.86	286.40	290.95	295.50	300.04	304.59	309.13	313.68
70	318.23	322.77	327.32	331.86	336.41	340.96	345.50	350.05	354.60	359.14
80	363.69	368.23	372.78	377.33	381.87	386.42	390.96	395.51	400.06	404.60
90	409.15	413.69	418.24	422.79	427.33	431.88	436.42	440.97	445.52	450.06