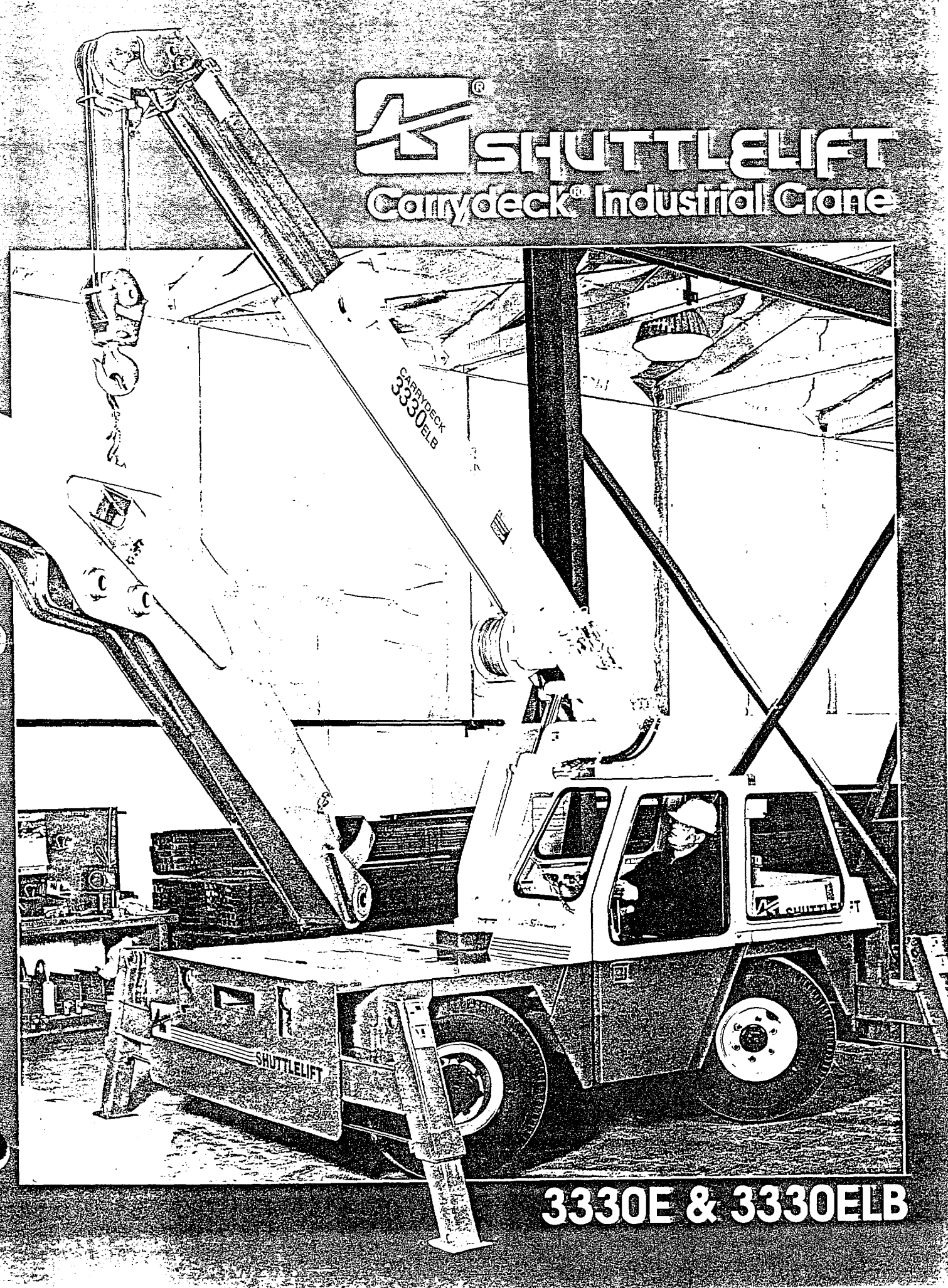
SHUTTLELIFT

Carrydeck® Industrial Crane

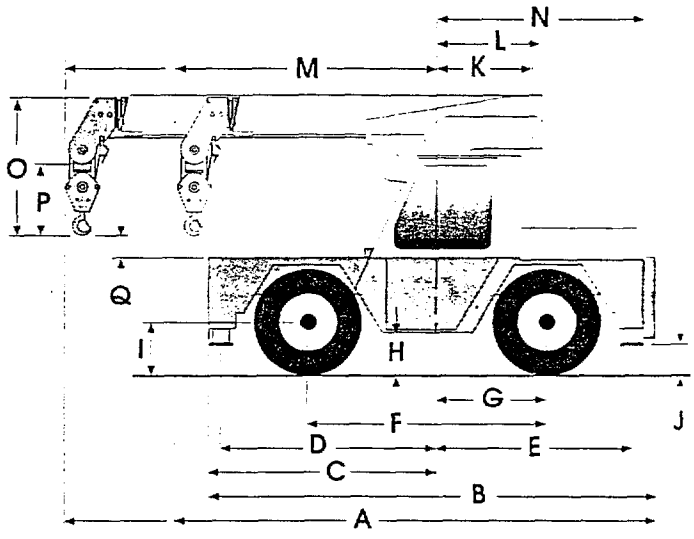


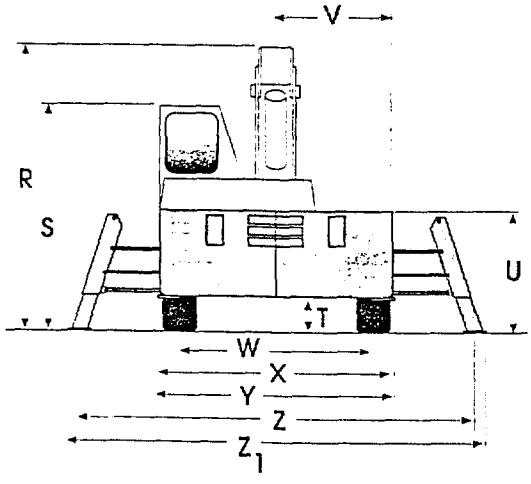
3330E & 3330ELB

SHUTTLELIFT

Carrydeck® Industrial Crane

DIMENSIONAL DATA:	U.S. (METRIC)
A: Overall length-transport position:	
3330E	12'11" (3.94 m)
3330E with counterweight	13'3" (4.04 m)
3330ELB	16'3" (4.95 m)
B: Overall length of frame	12'0" (3.66 m)
With rear counterweight	12'4" (3.76 m)
C: C_L rotation to front of frame	5'7" (1.70 m)
D: C_L rotation to C_L front outrigger	5'3" (1.60 m)
E: C_L rotation to C_L rear outrigger	5'11" (1.80 m)
F: Wheelbase	6'7" (2.01 m)
G: C_L rotation to C_L rear axle	3'7.5" (1.10 m)
H: Ground line to first step	1'4" (0.41 m)
I: Ground line to center of axle	1'6" (0.46 m)
J: Outrigger clearance	1'0" (0.30 m)
K: C_L rotation to boom pivot pin	2'11.75" (0.91 m)
L: Tailswing	3'7.75" (1.11 m)
M: C_L rotation to tip of head section	
3330E	6'7" (2.01 m)
3330ELB	9'7" (2.92 m)





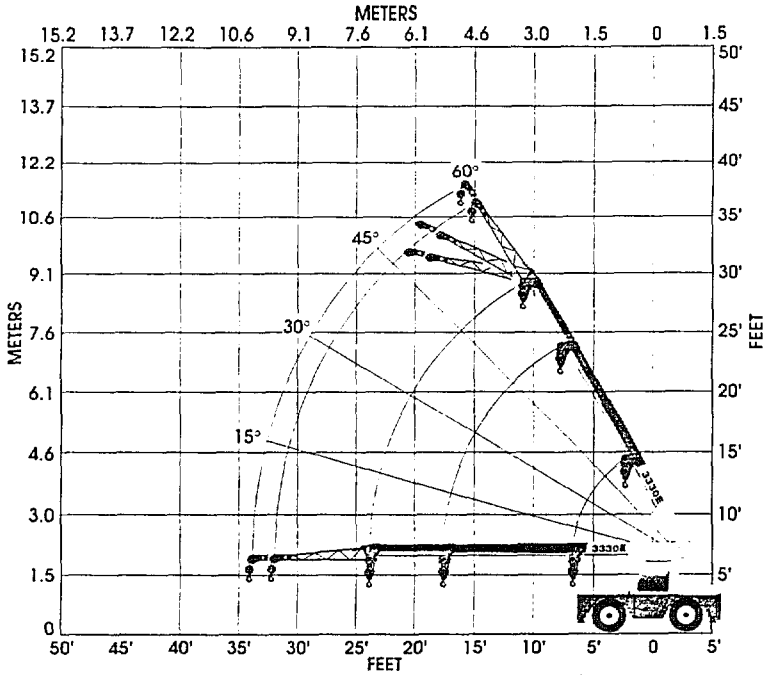
N: C_L rotation to rear of deck	6'4" (1.93 m)
O: Boom end height	
At 0° boom angle	3'9" (1.14 m)
At 60° boom angle	2'9.5" (0.85 m)
P: Length of hook block	1'9.5" (0.55 m)
Q: Height of hook from deck at 0°	8.75" (0.22 m)
R: Overall height—travel position	7'10" (2.39 m)
S: Height to top of cab	6'1" (1.85 m)
T: Ground clearance	9.5" (0.24 m)
U: Deck height	
On standard tires	3'3.5" (1.0 m)
On outriggers	3'7" (1.09 m)
V: C_L rotation to side of deck	3'2" (0.97 m)
W: Wheel tread	5'3" (1.60 m)
X: Frame width	6'4" (1.93 m)
Y: Overall width—outriggers retracted	6'7" (2.01 m)
Z: Outrigger spread C_L to C_L	11'2" (3.40 m)
Z_1: Overall width—outriggers extended	11'8" (3.56 m)

Note: All dimensions with standard tires unless otherwise noted.

3330E & 3330ELB

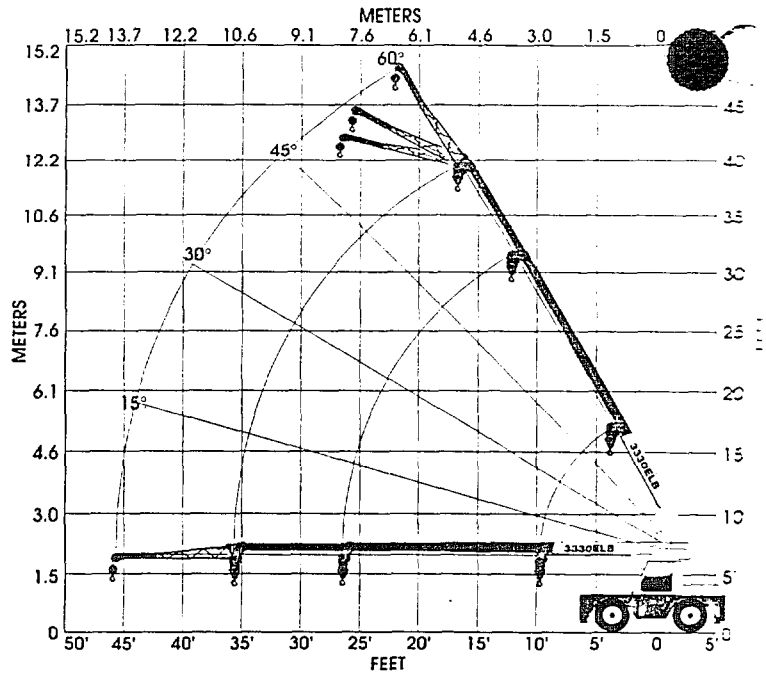
Dimensions and Specifications

OPERATING DATA



3330E 3 AND 4-SECTION BOOM WITH 8' (2.4 m) JIB

8.5 ton (7.7 metric ton) main block, 100 lb (45.4 kg). 4.1 ton (3.6 metric ton) ball and hook, 50 lb (22.7 kg). 8' Jib (stowed on main boom) 100 lb (45.4 kg).



3330ELB 3 AND 4-SECTION BOOM WITH 10' (3.0 m) JIB

8.5 ton (7.7 metric ton) main block, 130 lb (58 kg). 4.1 ton (3.6 metric ton) ball and hook, 50 lb (22.7 kg). 10' Jib (stowed on main boom) 170 lb (77.2 kg).

1. The rated loads are the maximum lifting capacities as determined by operating radius only. Any combination of boom lengths and angles may be used to obtain operating radius. The operating radius is the horizontal distance from a projection of the axis of rotation to the supporting surface, before loading, to the center of the vertical hoist line or tackle with load applied.

2. The rated loads shown on full extended outriggers do not exceed 85% of actual tipping. The rated loads shown on rubber do not exceed 75% of actual tipping. These ratings are based on freely suspended loads with the machine leveled, standing on a firm, uniform supporting surface. Practical working loads depend on supporting surface operating radius, and other factors affecting stability. Hazardous surroundings, experience of personnel and proper handling must all be taken into account by the operator.

3. Rated loads shown in the shaded areas are based on structural strength and/or strength of material and not on the stability of the machine.

4. The weights of all load handling devices such as hooks, hook blocks, slings, etc., except the hoist rope, shall be considered as part of the load.

5. Ratings on outriggers are based with all outriggers fully extended and fully down.

6. Ratings on rubber depend on tire capacity, condition of tires, and proper inflation pressure. Loads on rubber may be transported at maximum speed of 2.5 mph (4 km/h) on a smooth, hard, level surface, with boom retracted to shortest length possible and centered over front. Pick and carry is not allowed with loads on jib.

7. For operating radius not shown, use load ratings of the next larger radius.

8. The maximum combined total boom and deck load is 12,000 lb (5440 kg). For deck loads only, the maximum load is 14,000 lb (6350 kg) with 10 x 15 tires.

9. Cable capacity with 7/16" (11 mm) diameter 6 x 9 galvanized EIPS-IWRC is 5,000 lb (2268 kg) per part of line.

10. No external side load is to be induced on boom.

11. Operation of this equipment in excess of rating charts and disregard of instructions is dangerous and voids warranty.

12. Operate jib on outriggers only.

13. Operate personnel platform on outriggers only.

14. With boom attachments such as jib or work platform, boom must be fully retracted and forward unless on outriggers.

GENERAL INFORMATION

Boom topping angle ..... [illegible]
Unit weight (approximate):
Standard boom ..... 14,250 lb (6464 kg)
Long boom ..... 17,280 lb (7840 kg)
Outrigger pad size ..... 7.4" x 7.8"
(188 mm x 198 mm)

SERVICE CAPACITIES

Fuel tank ..... 18.5 gal (70 L)
Hydraulic system ..... 30 gal (114 L)
Hydraulic reservoir ..... 23.5 gal (89 L)
Cooling system ..... 15 qt (14 L)
Transmission/
torque converter ..... 4 gal (15.1 L)
Differential
Hurth ..... 9 qt (8.5 L)

WINCHES

Main winch:
Drum diameter ..... 9.69" (246 mm)
Wire rope diameter ..... 7/16" (11 mm)
Wire rope length:
Standard boom ..... 150' (45.7 m)
Long boom ..... 204' (62.2 m)
Line speed ..... 118 fpm (36 m/min)
Line pull ..... 4,600 lb (2087 kg)

Recessed winch (optional):
Drum ..... 2.5" diameter x 9.0" long
(64 mm x 229 mm)
Wire rope diameter ..... 1/4" (6 mm)
Wire rope length ..... 100" (2.54 m)
Line speed/pull ..... 9 fpm (2.7 m/min)
@ 4,000 lb (1814.4 kg)
15 fpm (4.6 m/min) @ no load
Drum clutch release for manual pullout

RATED LOAD CAPACITIES

330E

Operating Radius	3-Section Boom or 4-Section Boom With 4th Retracted			4-Section Boom Extended			Pick & Carry — Boom Centered Over Front — 3-Section Boom or 4-Section Boom	
	On Rubber	On Full Extended Outriggers		On Rubber	On Full Extended Outriggers			
	Less Jib 360°	Less Jib 360°	w/8' Jib 360°	Less Jib 360°	Less Jib 360°	w/8' Jib 360°	4th Retracted	4th Extended
5' (1.5 m)	9,500 lb (4310 kg)	17,000 lb (7710 kg)	2,900 lb (1310 kg)	6,100 lb (2770 kg)	6,100 lb (2770 kg)	—	10,000 lb (4540 kg)	4,500 lb (2040 kg)
6' (1.8 m)	6,700 lb (3040 kg)	14,500 lb (6580 kg)	2,900 lb (1310 kg)	6,100 lb (2770 kg)	6,100 lb (2770 kg)	—	7,600 lb (3450 kg)	4,500 lb (2040 kg)
8' (2.4 m)	4,300 lb (1950 kg)	11,600 lb (5260 kg)	2,500 lb (1130 kg)	3,500 lb (1590 kg)	5,300 lb (2400 kg)	3,000 lb (1360 kg)	5,600 lb (2540 kg)	4,000 lb (1810 kg)
10' (3.0 m)	3,000 lb (1360 kg)	10,000 lb (4540 kg)	2,300 lb (1040 kg)	2,400 lb (1090 kg)	4,700 lb (2130 kg)	2,800 lb (1270 kg)	3,600 lb (1630 kg)	2,700 lb (1220 kg)
12' (3.7 m)	2,300 lb (1040 kg)	8,800 lb (3990 kg)	2,100 lb (950 kg)	1,800 lb (820 kg)	4,400 lb (2000 kg)	2,600 lb (1180 kg)	2,800 lb (1250 kg)	2,000 lb (910 kg)
14' (4.3 m)	1,800 lb (820 kg)	6,600 lb (2990 kg)	2,000 lb (910 kg)	1,300 lb (590 kg)	4,400 lb (2000 kg)	2,300 lb (1040 kg)	2,200 lb (1000 kg)	1,500 lb (680 kg)
16' (4.9 m)	1,400 lb (640 kg)	5,300 lb (2400 kg)	2,000 lb (910 kg)	1,100 lb (500 kg)	4,400 lb (2000 kg)	2,200 lb (1000 kg)	1,700 lb (770 kg)	1,200 lb (540 kg)
17.2' (5.2 m)	1,150 lb (520 kg)	4,700 lb (2130 kg)	2,000 lb (910 kg)	1,000 lb (450 kg)	4,400 lb (2000 kg)	2,100 lb (950 kg)	1,600 lb (730 kg)	1,100 lb (500 kg)
18' (5.5 m)	1,000 lb (450 kg)	4,400 lb (2000 kg)	2,000 lb (910 kg)	1,000 lb (450 kg)	4,400 lb (2000 kg)	2,100 lb (950 kg)	1,100 lb (500 kg)	1,100 lb (500 kg)
20' (6.1 m)	— —	— —	2,000 lb (910 kg)	800 lb (360 kg)	3,800 lb (1720 kg)	2,000 lb (910 kg)	— —	900 lb (410 kg)
22' (6.7 m)	— —	— —	2,000 lb (910 kg)	600 lb (270 kg)	3,200 lb (1450 kg)	2,000 lb (910 kg)	— —	700 lb (320 kg)
24' (7.3 m)	— —	— —	2,000 lb (910 kg)	500 lb (230 kg)	2,900 lb (1320 kg)	2,000 lb (910 kg)	— —	600 lb (270 kg)
26' (7.9 m)	— —	— —	2,000 lb (910 kg)	— —	— —	2,000 lb (910 kg)	— —	— —
28' (8.5 m)	— —	— —	— —	— —	— —	2,000 lb (910 kg)	— —	— —
30' (9.1 m)	— —	— —	— —	— —	— —	2,000 lb (910 kg)	— —	— —
32' (9.8 m)	Shaded area is structural strength. Do not rely on tipping.			—	—	1,800 lb (820 kg)	— —	— —

330ELB

Operating Radius	3-Section Boom or 4-Section Boom With 4th Retracted			4-Section Boom Extended			Pick & Carry — Boom Centered Over Front — 3-Section Boom or 4-Section Boom	
	On Rubber	On Full Extended Outriggers		On Rubber	On Full Extended Outriggers			
	Less Jib 360°	Less Jib 360°	w/10' Jib 360°	Less Jib 360°	Less Jib 360°	w/10' Jib 360°	4th Retracted	4th Extended
5' (1.5 m)	10,000 lb (4540 kg)	17,000 lb (7710 kg)	— —	— —	— —	— —	10,000 lb (4540 kg)	— —
6' (1.8 m)	7,700 lb (3490 kg)	15,700 lb (7120 kg)	— —	— —	— —	— —	9,500 lb (4310 kg)	— —
8' (2.4 m)	4,800 lb (2180 kg)	12,400 lb (5620 kg)	2,200 lb (1000 kg)	4,800 lb (2180 kg)	4,900 lb (2200 kg)	— —	8,900 lb (4040 kg)	4,500 lb (2040 kg)
10' (3.0 m)	3,400 lb (1540 kg)	10,200 lb (4630 kg)	1,900 lb (850 kg)	3,900 lb (1770 kg)	4,300 lb (1950 kg)	— —	6,100 lb (2770 kg)	4,300 lb (1950 kg)
12' (3.7 m)	2,400 lb (1090 kg)	8,800 lb (3990 kg)	1,700 lb (780 kg)	2,800 lb (1270 kg)	3,800 lb (1720 kg)	1,900 lb (860 kg)	4,500 lb (2040 kg)	3,800 lb (1720 kg)
14' (4.3 m)	1,800 lb (820 kg)	7,100 lb (3220 kg)	1,600 lb (710 kg)	2,200 lb (1000 kg)	3,400 lb (1540 kg)	1,700 lb (770 kg)	3,500 lb (1590 kg)	3,400 lb (1540 kg)
16' (4.9 m)	1,300 lb (590 kg)	5,800 lb (2630 kg)	1,500 lb (680 kg)	1,800 lb (820 kg)	3,100 lb (1410 kg)	1,650 lb (750 kg)	2,800 lb (1270 kg)	3,100 lb (1410 kg)
18' (5.5 m)	1,000 lb (450 kg)	4,400 lb (2000 kg)	1,500 lb (680 kg)	1,500 lb (680 kg)	2,900 lb (1320 kg)	1,600 lb (720 kg)	2,400 lb (1090 kg)	2,800 lb (1270 kg)
20' (6.1 m)	800 lb (360 kg)	3,700 lb (1680 kg)	1,500 lb (680 kg)	1,200 lb (540 kg)	2,900 lb (1320 kg)	1,600 lb (720 kg)	1,900 lb (860 kg)	2,300 lb (1040 kg)
22' (6.7 m)	700 lb (320 kg)	3,100 lb (1410 kg)	1,500 lb (680 kg)	900 lb (410 kg)	2,900 lb (1320 kg)	1,500 lb (680 kg)	1,700 lb (770 kg)	2,000 lb (910 kg)
24' (7.3 m)	500 lb (230 kg)	2,700 lb (1220 kg)	1,500 lb (680 kg)	700 lb (320 kg)	2,800 lb (1270 kg)	1,500 lb (680 kg)	1,400 lb (640 kg)	1,700 lb (770 kg)
26' (7.9 m)	400 lb (180 kg)	2,300 lb (1040 kg)	1,500 lb (680 kg)	600 lb (270 kg)	2,600 lb (1180 kg)	1,500 lb (680 kg)	1,300 lb (590 kg)	1,400 lb (640 kg)
28' (8.5 m)	— —	— —	1,500 lb (680 kg)	500 lb (230 kg)	2,200 lb (1000 kg)	1,500 lb (680 kg)	— —	1,300 lb (590 kg)
30' (9.1 m)	— —	— —	1,500 lb (680 kg)	400 lb (180 kg)	2,000 lb (910 kg)	1,500 lb (680 kg)	— —	1,100 lb (500 kg)
32' (9.8 m)	— —	— —	1,500 lb (680 kg)	300 lb (135 kg)	1,700 lb (770 kg)	1,500 lb (680 kg)	— —	1,000 lb (450 kg)
34' (10.4 m)	— —	— —	1,500 lb (680 kg)	200 lb (90 kg)	1,500 lb (680 kg)	1,500 lb (680 kg)	— —	900 lb (410 kg)
36' (11.0 m)	— —	— —	1,500 lb (680 kg)	200 lb (90 kg)	1,400 lb (640 kg)	1,500 lb (680 kg)	— —	800 lb (360 kg)
38' (11.6 m)	— —	— —	— —	— —	— —	1,400 lb (635 kg)	— —	— —
40' (12.2 m)	— —	— —	— —	— —	— —	1,300 lb (590 kg)	— —	— —
42' (12.8 m)	— —	— —	— —	— —	— —	1,150 lb (520 kg)	— —	— —
44' (13.4 m)	— —	— —	— —	— —	— —	1,050 lb (480 kg)	— —	— —
46' (14.0 m)	Shaded area is structural strength. Do not rely on tipping.			—	—	930 lb (420 kg)	— —	— —

3330E & 3330ELB SPECIFICATIONS

STANDARD EQUIPMENT

- 3330E—3-section boom 6' 4" (1.93 m) to 18.5' (5.58m)
- 3330ELB—3-section boom, 9'4" (2.84 m) to 27'2" (8.28 m)
- All load carrying cylinders include load hold check valves
- 8.5 ton (7.7 metric ton) double sheave hook block, 8.25" (210 mm) pitch diameter sheaves
- 42 ft^2 (3.90 m^2) carrydeck
- All steel cab structure less glass (top safety plate standard)
- Adjustable operator's seat with seat belt
- Electric horn
- Lights—head, tail, rear work, stop and turn signals
- Engine hourmeter
- Outriggers—hydraulic telescoping box—front and rear with independent control for each side
- 4-speed power shift transmission
- Power steering—hydraulic
- 10 x 15 tires
- Boom angle indicator
- 7/16" (11 mm) diameter 6 x 19 galvanized EIPS-IWRC wire rope
- Double blocking automatic boom extend kickout
- Backup alarm
- Cummins 4b3.9 diesel engine
- Hurth axle with no-spin differential (2-wheel steer)
- Winch—anti two block kickout

OPTIONAL EQUIPMENT

- 3330E—4-section manually engaged boom—6'4" (1.93 m) to 24'8" (7.52 m)
- 3330ELB—4-section manually engaged boom—9'4" (2.84 m) to 36'8" (11.17 m)
- Enclosed cab (with windshield wiper)
- Adjustable operator cushion seat with seat belt
- 4-wheel/crab steer Hurth drive/steer axle with no-spin differential
- Continental TM 2.7 gas/LP engine

ACCESSORIES & ATTACHMENTS

- Cold-start kit
- LMI indicator system
- Flashing strobe light
- Rear hitch
- Front hitch
- Jib—8' (2.44 m) or 10' (3.05 m)
- Electric recessed winch
- 4.1 ton (3.6 metric ton) hook and ball
- Heater and defroster (hot water)
- Spare wheel and tire—front and rear
- Engine shut-down gauges
- 3330E—heavy lift counterweight kit
- 2 man work platform
- High rail attachment

HYDRAULIC SYSTEM

Main pump: Tandem gear-type with two sections and flow divider.

Section 1 ..... 30 gpm (113.6 L/min)
Section 2 ..... 21 gpm (79.5 L/min)

Swing system: 360° hydraulic swing system has positive operator control. Swing speed: continuous at 2.05 rpm.

CYLINDERS

	CYCLE TIME	
	1000 rpm	2200 rpm
Hoist cylinder (full stroke):		
Extend	42.7 sec	12.6 sec
Retract	33.6 sec	9.9 sec
Crowd cylinder (full stroke):		
3330E		
Extend	71.2 sec	20.9 sec
Retract	29.0 sec	8.5 sec
3330ELB		
Extend	106.9 sec	31.4 sec
Retract	43.5 sec	12.8 sec
Outriggers:		
Out	9.2 sec	2.7 sec
Down	16.4 sec	4.8 sec
Up	12.3 sec	3.6 sec
In	5.1 sec	1.5 sec

DRAWBAR PULL

Unit equipped with 10 x 15 tires, diesel engine and no load on deck.

1st gear ..... 10,850 lb (4922 kg)
2nd gear ..... 5,925 lb (2688 kg)
3rd gear ..... 3,175 lb (1440 kg)
4th gear ..... 1,800 lb (816 kg)

Note: Wheels will spin before reaching these values.

ENGINE

Make and model ..... Cummins 4b3.9 diesel
Number of cylinders 4
Horsepower ..... 71 @ 2200 rpm

Optional

Make and model ..... Continental TM 2.7
Fuel ..... Gas or dual fuel (Gas/LP)
Horsepower ..... Gas 68 @ 2650 rpm
LP 60 @ 2650 rpm

ELECTRICAL

Starting ..... 12 volt electric
Battery (1) ..... 530 CCA @ 0° F (-18° C) for 30 sec. rate
(2 batteries with recessed winch or cold-start option)
Alternator ..... 63 amp

TRANSMISSION

Make ..... ITL PS 720 Powershift
Type ..... 4-speed forward/4-speed reverse with electric powershift on column

DRIVE AXLE

Make ..... Hurth
Location ..... Front of vehicle

DRIVE/STEER AXLE (OPTIONAL)

Make ..... Hurth
Location ..... Front of vehicle

STEERING AXLE (NON-DRIVE)

Make ..... Shuttlelift
Location ..... Rear of vehicle

TIRE SIZE

10.00 x 15 14PR pneumatic (standard)

TURNING SPECIFICATIONS

Turning radius:
2-wheel steer ..... 14'8" (4.47 m)
4-wheel steer ..... 10'2" (3.10 m)

TRAVEL SPEEDS

(Forward and reverse — standard tires)
2-Wheel Steering:
1st gear ..... 4.0 mph (6.4 km/h)
2nd gear ..... 7.1 mph (11.4 km/h)
3rd gear ..... 12.7 mph (20.4 km/h)
4th gear ..... 22.6 mph (36.4 km/h)

MAXIMUM GRADEABILITY

(PAVED SURFACE)
1st gear and torque converted (calculated), standard tires
No load 63%
12,000 lb (5443 kg) load 29%
Note: Gradeability is a measure of tractive effort only and does not represent grades on which the machine can operate.

NOTE: All specifications are stated in accordance with PCSA definitions, SAE standards or recommended practices, where applicable.

IMPORTANT: Shuttlelift reserves the right to change these specifications without notice and without incurring any obligation relating to such changes.

SHUTTLELIFT®

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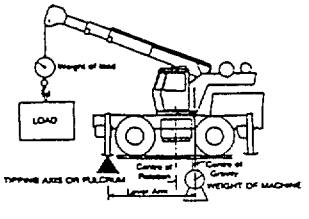
FACTORS THAT DETERMINE SAFE WORKING LOADS

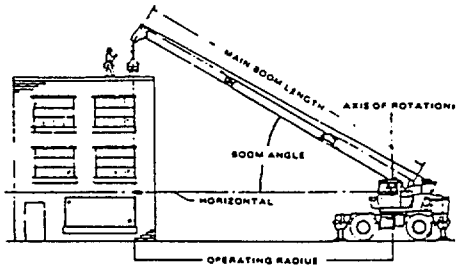
1. The save working loads of a crane are the maximum loads under specified conditions for which a crane may be used.
2. Safe working loads, as specified on crane manufacturer's and government statute approved rating charts, are based on uniform world standards of crane design and take into account appropriate factors of safety based on crane design technology, extensive testing and experience.
3. Rating charts show vital information that effect the safe working load capacities of each particular crane and these differ between makes, models and types. The operator must know a particular crane's capacity under all conditions and configurations.
4. Load charts capacities are based on ideal conditions seldom achieved under actual working conditions. It is extremely important not only to know how to determine the capacity from the chart but also to recognize the factors which can reduce the capacity.
5. Crane manufacturer's safe working loads are based on cranes in good condition and apply only to machines which are standing or installed on a LEVEL, FIRM and UNIFORM supporting surface. Safe working loads apply only to freely suspended loads. Weights of hooks, hook blocks, slings and all other handling devices must be considered as part of the load.
6. Safe working loads are for cranes with the correct counterweight fit as specified by the manufacturer.
7. The approved rating plate or chart in the crane cab tells the operator what the crane can do and also what the crane cannot do.

CRANE CAPACITY

1. A full understanding of and complete compliance with approved rating plates and charts and knowledge of the basic principles of how a crane is rated are essential requirements for crane operators and users.
2. The maximum rated capacity (the maximum weight a crane can safely lift) is figured at the minimum radius with the minimum length of boom. From there on no two crane lifting charts are the same.
3. Cranes differ. Some cranes are superior lifters "in close" with short booms, and others prove best at greater reaches because of better stability, light weight booms, or a different crane geometry.
4. A crane's rated lifting capacities are dependent on three main factors:

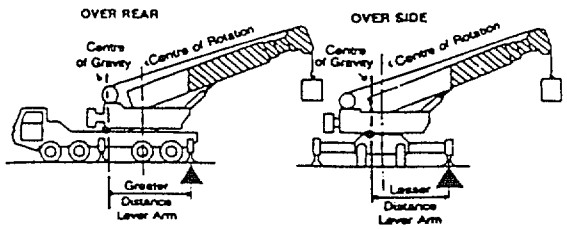


   a. The weight of the crane
   b. The strength of the crane
   c. The stability of the crane
5. The stability of a crane is the ability of a crane to resist tipping.
6. The strength of a crane is the ability of the main structural and mechanical components to resist failure under load.
7. In general terms, on most cranes the lifting capacity is limited by structural strength when the working radius is small and by stability when the working radius is large.



8. The diagram illustrates the changing distances between the center of gravity and the fulcrum point as a crane is slewed from over the rear to over the side.
9. The weight of the boom and rigging projecting beyond the fulcrum point reduce the stability of the crane.
10. On truck cranes, capacities over the rear are generally greater due to the front of a carrier acting as additional counterweight.
11. To lift a load at a given radius there must be some weight to counter balance the load being lifted. A crane uses its own weight plus counterweight to give stability to the machine.
12. On mobile cranes outriggers provide additional stability and reduce the amount of counterweight required. The weight of structural and mechanical parts acting behind the fulcrum point also act as coutnerweight. The fulcrum point of a crane with outriggers is the nearest outrigger or outriggers to the load. On crawler cranes or mobile cranes operating free on wheels, it is the crawler tracks or tires nearest the load.
13. The ability of a crane to lift a given load and retain stability is dependent on the amount of weight reacting at the center of gravity point of the crane and the distance from the center of gravity to the fulcrum point.
14. For a crane to remain stable the distance from the center of gravity to the fulcrum point multiplied by the weight of the crane must be greater than the distance from the fulcrum point to the center of the load multiplied by the weight of the load.
15. NOTE: The stability factor often changes dramatically as a crane is slewed due to the changing distance between the center of gravity point and the fulcrum point.

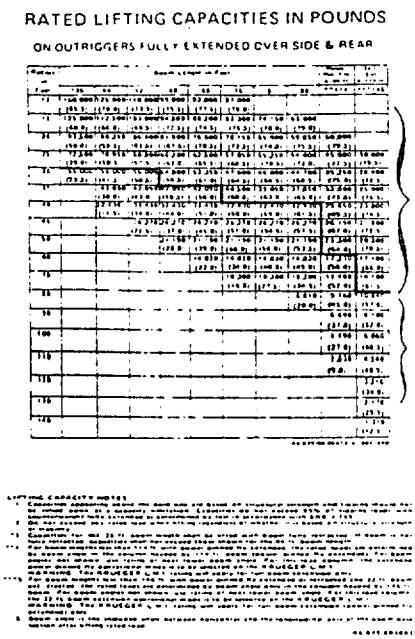
16. Structural strength factors are also affected because of greater leverage on outrigger beams, etc. These are the reasons why many crane manufacturers show different operating area capacities on rating charts: over the rear, over the side or 360 degree.



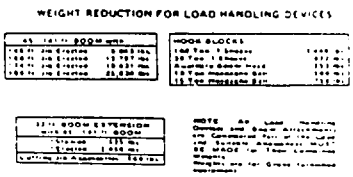
RATING AND CAPACITY CHARTS

1. Strength and Stability Factors
   a. Stability means the ability of a crane to resist tipping.
   b. Manufacturers rated capacities and load charts on most cranes are limited by both strength and stability factors.
   c. Capacities limited by structural strength are based on the yield strength of components with a safety factor.
   d. The rating charts on most cranes have a bold line (or shaded area) dividing the chart into two segments. This shows the operator which capacities are limited by structural strength and which are limited by stability.
   e. Ratings above the line are based on structural strength and the ratings below the line are based on machine stability.
   f. It is extremely important to know the difference between strength and stability. If a crane is overloaded in one case a structural or mechanical component of the crane will fail and in the other case the crane will overturn. Safe working loads shown in the stability area of the rating charts are based on a percentage of the ultimate load which will cause tipping.
   g. The manufacturer loads the crane and determines for every situation listed in the load chart how much weight it takes to make the crane tip. These loads are called the tipping loads.
   h. To maintain a margin of safety, tipping loads are then reduced by a percentage set by national standards to develop the rated loads listed in the load chart of the machine for every situation. Charts are marked accordingly with the percentage that applies to each particular crane.
   i. The ultimate load will be the tipping load for certain cranes but for others a structural failure would occur before the crane reached a tipping condition. In these cases the ultimate load will relate to the manufacturer's design capacity of the crane. The percentage margin between the safe working load and the ultimate load is a safety margin to allow for the various forces which effect on the crane in operation. These include allowances for wind loading and for dynamic forces set up by normal operational movement of the crane and load.
   j. NOTE: Always use the load chart to determine capacity. Never use signs of tipping to determine capacity limits as there is no warning of an impending structural failure.

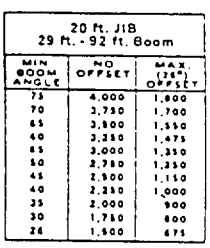
2. Load Capacity Charts



   a. Load charts contain a large amount of information which must be thoroughly understood by the operator.
   b. With a known load the operator can determine the correct radius and boom length to enable the load to be lifted safely to the desired position.
   c. Capacity charts show the operator what the machine can safely handle. Exact weight, boom length and radii should be checked and verified with the capacity chart before lifting a load.
   d. They specify the safe working loads for various boom and jib angles.
   e. They state which lifting areas the capacities apply to: over the side, over the rear, over the front or 360 degree.



   f. They indicate which capacities are limited by stability and which are limited by structural strength.



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   g. The operator must be guided by the ratings on the chart and understand the conditions which effect the capacity.

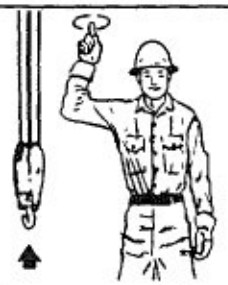
h. A jib capacity chart and notes are also included as part of the load chart to list the capacities for the degree of offset and boom angle.

i. An important portion of the load chart is the section concerning notes to lifting capacities. Be sure to read all notes carefully do that you understand what each one means.

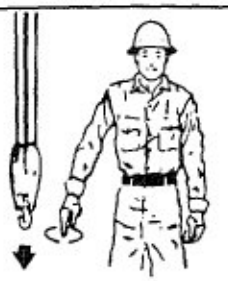
OTHER INFORMATION ON PLATES AND CHARTS

1. Typical details included on many rating plates.
   a. Deductions from main boom ratings with jib fitted
   b. Correct jib offset angles
   c. Minimum permissible boom angles
   d. Weight of hook blocks
   e. Free on wheels ratings
   f. Pick and Carry ratings
   g. Correct boom telescoping procedure
   h. Correct rope reeving
   i. Permissible line loads
   j. Load telescoping limitations
   k. Tire inflation pressures and on rubber rating speed limitations.
   l. THE OPERATOR must be aware of all special conditions on the rating charts for each particular crane.

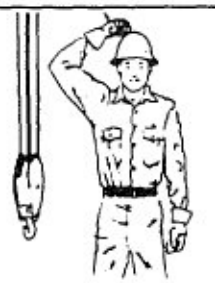
HAND SIGNALS



HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.

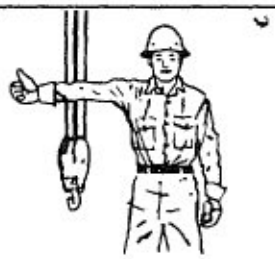


LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.



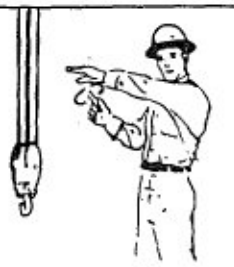
USE MAIN HOIST. Tap fist on head, then use regular signals.

USE WHIP LINE. (Auxiliary Hoist) Tap elbow with one hand, then use regular signals.

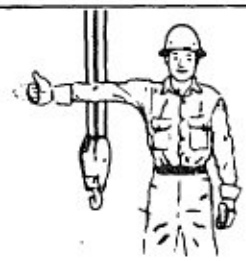


RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.

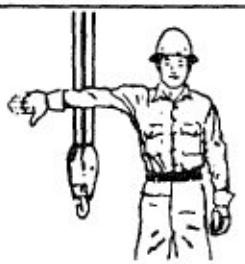
LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.



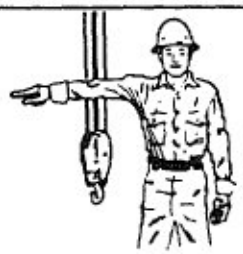
MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)



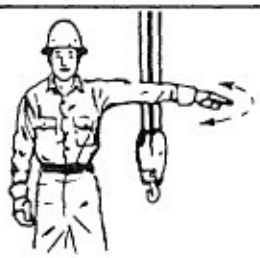
RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up. Flex fingers in and out as long as load movement is desired.



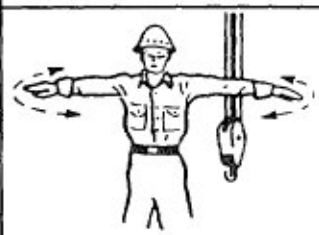
LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.



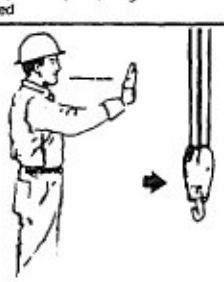
SWING. Arm extended, point with finger in direction of swing of boom.



STOP. Arm extended, palm down, move arm back and forth horizontally.



EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.



TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

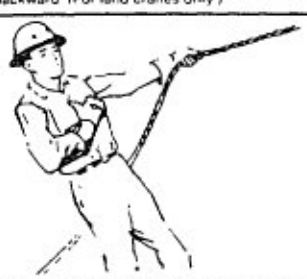
DOG EVERYTHING. Clasp hands in front of body.

TRAVEL. (Both Tracks) Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward. (For land cranes only.)

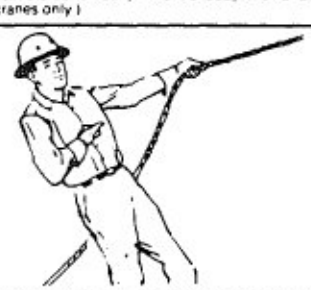
TRAVEL. (One Track) Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For land cranes only.)

EXTEND BOOM. (Telescoping Booms) Both fists in front of body with thumbs pointing outward.

RETRACT BOOM. (Telescoping Booms) Both fists in front of body with thumbs pointing toward each other.



EXTEND BOOM. (Telescoping Boom) One Hand Signal. One fist in front of chest with thumb tapping chest.



RETRACT BOOM. (Telescoping Boom) One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.