

# Introductory

## QUALIFICATIONS

Crane operation, to be safe and efficient, requires skill, the exercise of extreme care and good judgment, alertness and concentration, and a rigid adherence to proven safety rules and practices.

In general practice, no person should be permitted to operate a crane:

- (a) Who cannot speak the appropriate language or read and understand the printed instructions
- (b) Who is not of legal age to operate this type of equipment
- (c) Whose hearing or eyesight is impaired (unless suitably corrected — with good depth perception)
- (d) Who may be suffering from heart or other ailments which might interfere with the operator's safe performance
- (e) Unless the operator has been properly instructed
- (f) Unless the operator has demonstrated his instructions through practical operation, and has a thorough knowledge of this book
- (g) Unless the operator is familiar with hitching equipment and practices
- (h) Unless the operator becomes completely familiar with applicable ANSI standards and current safety requirements of the Occupational Safety and Health Act (OSHA)

## OPERATION

Before operating the crane the crane operator should carefully read and study the operation manual supplied with the crane by the crane manufacturer and note any special instructions not given previously by the proper instructor or supervisor.

Cranes may be either floor-controlled or cab-controlled depending upon the point from which the crane is operated.

With the mainline switch open (power off) the crane operator should operate each master switch or pushbutton in both directions so as to get the "feel" of each device and also determine that they do not bind or stick in any position. If any of them do, before doing anything else, the operator should report the condition to the proper supervisor.

### Learning the Controls

Having observed the feel of the controllers, the crane operator is now ready to try the crane with power applied.

After checking to be sure no one is on or near the crane, close the crane disconnecting means and press the "on" or "reset" button so that power is "on".

Try the hoisting motion first. The hook should be in an intermediate position. Move the master or pushbutton slowly in the "up" direction or press the "up" button in the pendant in the same manner. The resultant movement should correspond with master switch or pushbutton markings for all motions. Observe the speed increase in relation to the steps in the controller. Try to feel the steps in a pendant type controller. Move the hook to a position near the upper hook position and slowly inch the hook into the upper limit stop position. The limit switch should cause the

hoisting motion to stop at the upper limit of travel. If any malfunction of either the hoist brake or the limit switch is suspected, this condition should be reported to the supervisor before proceeding. The hoist limit switch should never be used as an operating control for stopping the load. It is to be considered as an emergency limit switch only.

Repeat this procedure with the trolley controller. If the trolley is not equipped with a brake, note how it can be stopped by momentarily operating the control in the first point of the reverse direction. This is known as "plugging". Next try the bridge motion, first making sure that the first movement is in the direction the bridge is free to travel. Check the stopping of the bridge by means of the brake and by plugging.

GOOD operators always remember and follow four simple rules:

1. Start all motions slowly, by moving the controller handle or pushbutton step by step until the fastest safe speed is reached.
2. Stop slowly, by bringing the master switch or pushbutton to the "off" position step by step so as to minimize "swinging" of the load, and unnecessary wear of the brakes.
3. Learn to judge the drift of each motion of the crane after power is removed. Proper use of this drift will facilitate spotting of the load, and minimize wear of crane components.
4. Handle the load in a safe manner with the area free of personnel and other obstructions.

## HANDLING THE BRIDGE TRAVEL MOTION

Before using the trolley or bridge of the crane, be sure the hook is high enough in the air to clear any obstruction or person below. Before a load is handled by the crane, the bridge should be brought in position so that it is directly over the load. Otherwise it will be impossible to "spot" the trolley and hoist hook over the load.

In addition to other operating controls, the bridge has a brake, usually operated by a foot pedal in the cab or an electric brake where pushbutton floor control is used. The purpose of this brake is to permit stopping the bridge exactly where desired. After the operator has learned the distance that the bridge travels after power is removed, the operator will be able to judge distances so that the need to use the bridge brake will be greatly reduced. On floor controlled cranes, the electric brake will set automatically when the pushbutton is released.

Start the bridge slowly and bring it up to speed gradually. Approaching the place where it is desired to stop the bridge, reduce the bridge speed. If the operator finds that the crane is going to "over-run" the point where the bridge is to be stopped, apply the bridge brake. If extra fine control or creeping speed is not provided, follow the practice of "inching", namely: move the controller handle or button on and off the point that produces a minimum of motion. This practice should be followed only as necessary because it causes extra wear on the controller contacts and the electric brake. Skidding of wheels when stopping will result in flat spots on the wheels and rough bridge action.

## HANDLING THE TROLLEY TRAVEL MOTION

Before a load is handled, the trolley should be brought directly over the load that is to be handled. When the slack is taken out of the slings, if the trolley is not exactly over the load, bring it exactly over the load



before hoisting is continued. Otherwise the load will start swinging.

If the trolley is equipped with a brake, follow the instruction given for controlling the bridge.

If the trolley is not equipped with a brake, this motion may require more skillful handling than any other motion of the crane. As the operator becomes familiar with the crane he can gauge the amount of "drift" and allow for it. This will eliminate the necessity of quickly reversing power to the trolley motor to bring the trolley to a stop.

Always start the trolley motion slowly and reduce the trolley speed gradually. For very slight trolley movements, follow the practice of "inching" as described in "Handling the Bridge Travel Motion."

## HANDLING THE HOIST MOTION

After the hook has been brought over the load, lower it until the load can be attached to hook. As the hook approaches this level, reduce the speed so that the lowering can be stopped smoothly and quickly.

If load slings are used to handle the load, the slings should be fully seated in the saddle of the hook, the hook should be started upward slowly until all slack has been taken out of the slings, then the load should be lifted slowly until it is clear and it has been determined that the load is properly balanced and the slings properly placed. The hoisting speed may then be increased and maintained until the load is clear of all obstructions or if a hitcher gives the signal to stop.

When lowering loads, the lowering speeds should be gradually decreased until the load is near the place where it is to be stopped. If a hitcher is used it is very important that the operator pay particular attention to the directions of the hitcher. When the operator is signaled to continue lowering, it should be done at the slowest possible speed. If extra fine control is not provided, final spotting should be accomplished by following the practice of "inching" described in "Handling the Bridge Travel Motion."

When it is necessary that loads be raised or lowered extremely short distances, particularly when raising loads off the floor or out of machine tools or fixtures, the practice of "inching" may be followed if extra fine control is not provided. *Note:* A good operator always minimizes the number of inching operations.

The operator should check the hoist brake by raising the load a short distance and stopping. If the hoist brake allows excessive drift or does not hold, set the load on the floor and report the defect immediately to the Supervisor.



# General Rules

## KNOW YOUR CRANE

Crane operators, particularly of cab operated cranes, should be familiar with the principal parts of a crane and have a thorough knowledge of crane control functions and movements. (See Figure 1)

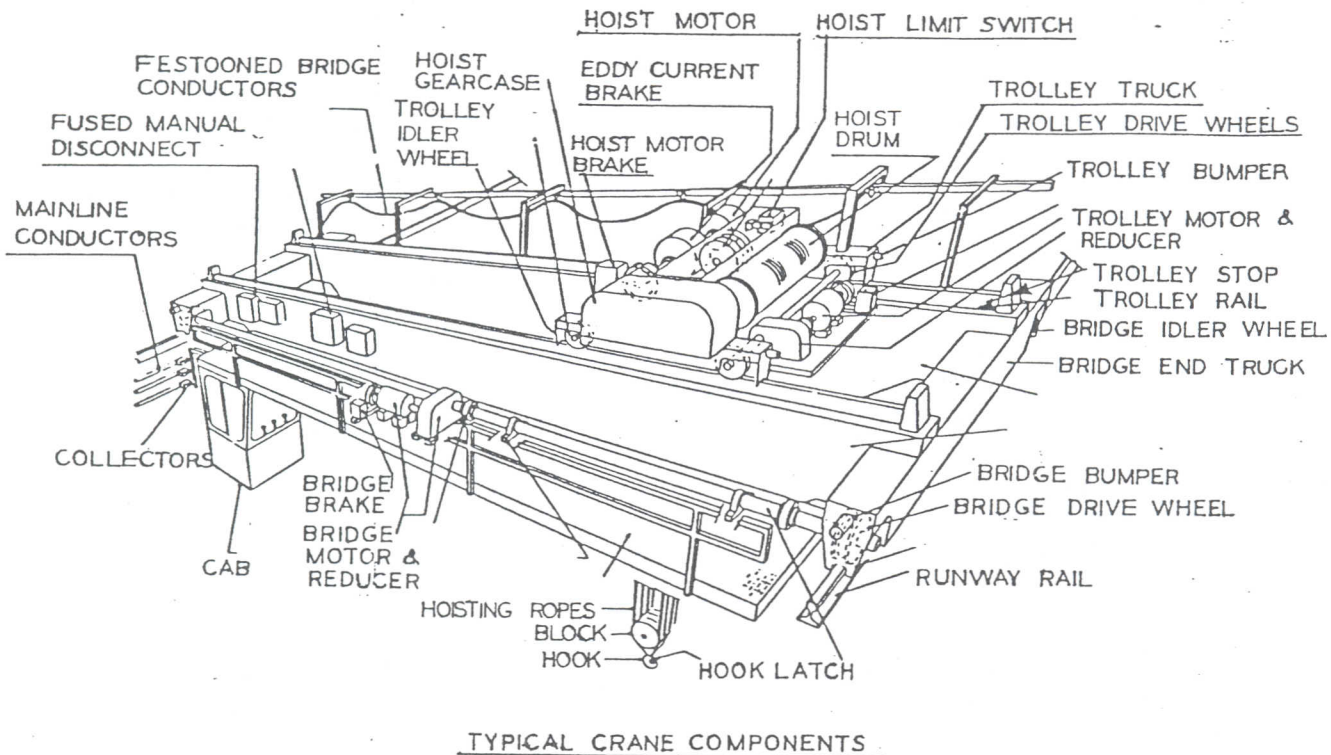


Figure 1 — Bridge Crane

Both the crane operator and the person hitching (or rigging) the load should be required to know the location and proper operation of the main runway conductor disconnecting means for all cranes in the area.

## RESPONSIBILITY

Each crane operator should be held directly responsible for the safe operation of the crane. Whenever there is any doubt as to SAFETY, the crane operator should stop the crane and refuse to handle loads until (1) safety has been assured or (2) has been ordered to proceed by the Supervisor, who then assumes all responsibility for the SAFETY of the lift.

Do not permit ANYONE to ride on the hook or a load.

## DON'T ARGUE

Cab controlled crane operators should never argue with personnel on the floor. The crane operator's job requires close cooperation with the hitcher.

All disagreements concerning crane operation should be called to the attention of the Supervisor.



## ENTERING A CRANE (CAB OPERATED CRANES)

Crane operators should enter and leave cranes only at designated places using the platform, steps or ladder provided — unless otherwise authorized by the Supervisor.

Both hands should be used when ascending or descending a crane ladder. Keep hands free. A handline should be used for lifting or lowering material, tools, lunch buckets, etc. Operators should fasten handlines securely to the crane or building structure, not to themselves.

## HOUSEKEEPING

Good housekeeping must be maintained at all times. The crane operator is expected to keep the crane cab and access clear and clean.

Do not permit loose objects such as tools, bolts, boards, etc. around the cab or on the crane for they are a safety hazard.

## INSPECTION

Test all controls on the crane at the beginning of each shift. Be sure the limit switches, brakes, ropes, hooks and other protective devices are in good working order. Check crane for proper functioning of all controls, and check for loose or damaged parts.

Whenever the operator finds anything wrong or apparently wrong, the problem should be reported immediately to the proper Supervisor.

## SIGNALS

Standard crane signals (See Figure 2) should be accepted only from ONE authorized person — except where it is apparent that to do so would result in an accident.

Obey a STOP signal at all times, no matter who gives it.

Loads should not be moved unless the standard crane signals are clearly given, seen and understood.

Unusual signals are seldom required, but if used they should be thoroughly understood by the crane operator and authorized person giving signal.



# Standard Hand Signals

OPERATOR SHOULD WEAR PROPER SAFETY CLOTHING

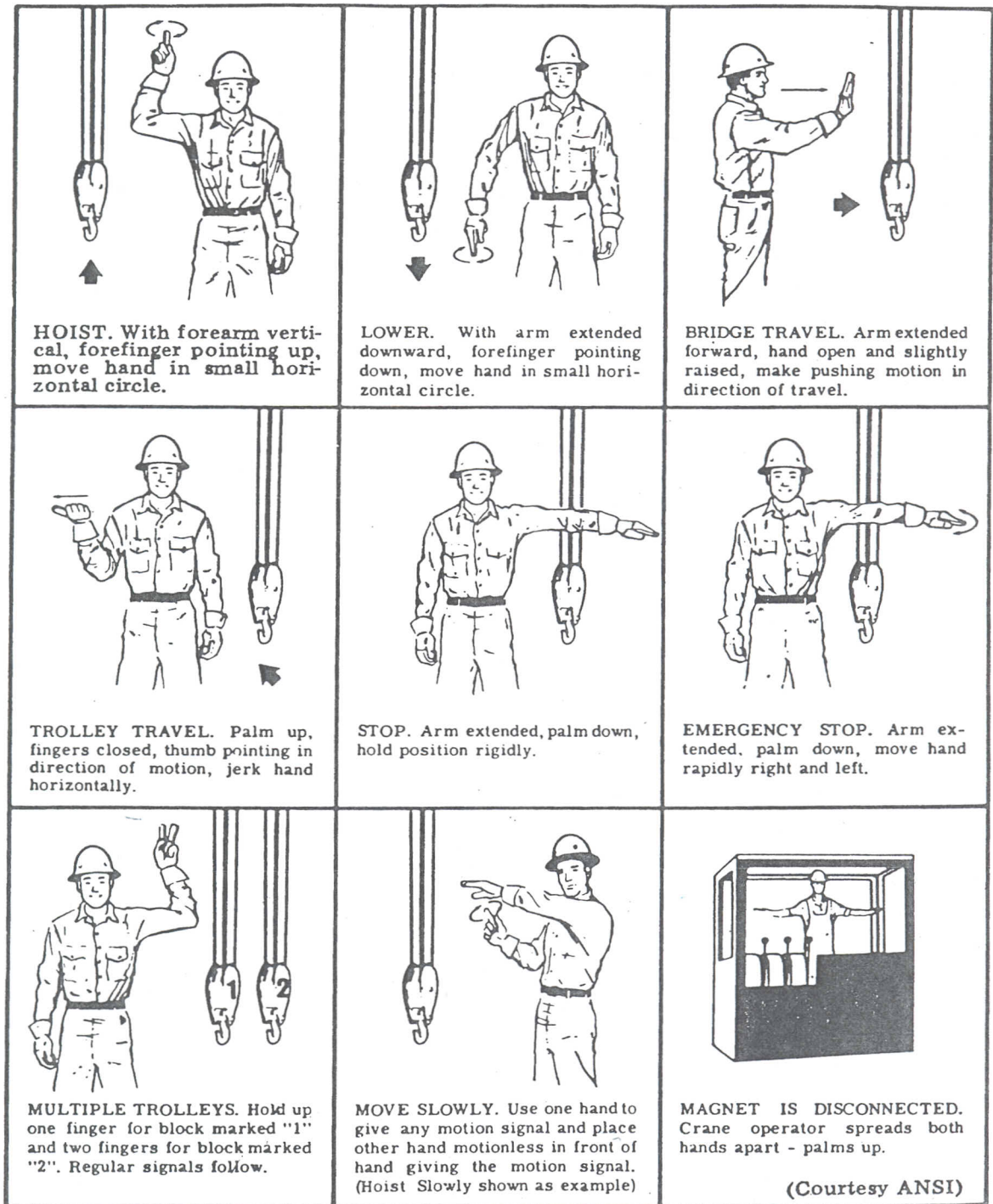


Figure 2

## STAY ALERT

The crane operator should keep hands on the handles of the controller or master switches which control the motions in operation so stops can be made quickly in case of an emergency. Stand up, when necessary to improve vision, when making a lift or when moving a load in any direction. Be especially alert for any unusual sounds or warnings. Danger may be present that the crane operator cannot see.

# Operating Rules

One measure of a good crane operator is the smoothness of operation of the crane. Jumpy and jerky operation, flying starts, quick reversals and sudden stops are the "trademarks" of the careless operator. The good operator knows and follows these tried and tested rules for safe, efficient crane handling.

1. Crane controls should be moved smoothly and gradually to avoid abrupt, jerky movements of the load. Slack must be removed from the sling and hoisting ropes before the load is lifted.
2. Center the crane over the load before starting the hoist to avoid swinging the load as the lift is started. Loads should not be swung by the crane to reach areas not under the crane.
3. Crane hoisting ropes should be kept vertical. Cranes shall not be used for side pulls.

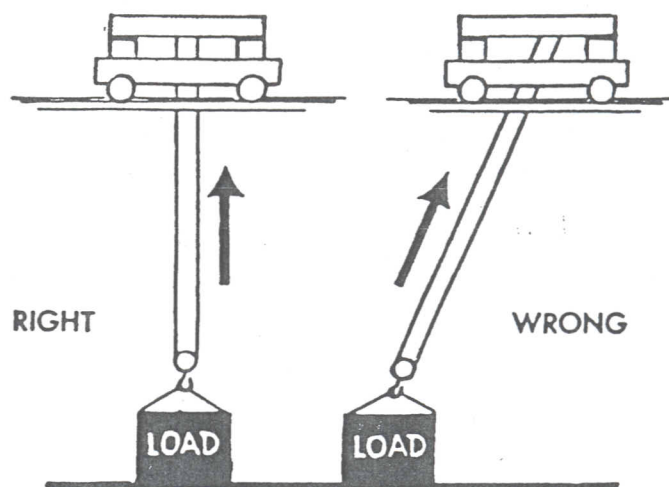


Figure 3 — Center Crane Over Load Before Lifting

4. Never lower the block below the point where less than two full wraps of rope remain on the hoisting drum. Should all the rope be unwound from the drum, be sure it is rewound in the correct direction and seated properly in the drum grooves or otherwise the rope will be damaged and the hoist limit switch will not operate to stop the hoist in the high position.
5. Be sure everyone in the immediate area is clear of the load and aware that a load is being moved. Sound the warning device (if provided) when raising, lowering or moving loads wherever people are working to make them aware that a load is being moved.
6. Do not make lifts beyond the rated load capacity of the crane, sling chains, rope slings, etc.
7. Do not operate the crane if limit switches are out of order or if ropes show defects, or wear.
8. Make certain that before moving the load, load slings, load chains, or other load lifting devices are fully seated in the saddle of the hook.
9. When a duplex hook (double saddle hook) is used, a double sling or choker should be used to assure that the load is equally divided over both saddles of the hook.



10. On all capacity or near capacity loads, the hoist brakes should be tested by returning the master switch or pushbutton to the OFF position after raising the load a few inches off the floor.

If the hoist brakes do not hold, set the load on the floor and do not operate the crane. Report the defect immediately to the Supervisor.

11. Check to be sure that the load is lifted high enough to clear all obstructions and personnel when moving bridge or trolley.

12. At no time should a load be left suspended from the crane unless the operator is at the master switches or pushbutton with the power on, and under this condition keep the load as close as possible to the floor to minimize the possibility of an injury if the load should drop. When the crane is holding a load, the crane operator should remain at the master switch or pushbutton.

13. When a hitcher is used, it is the joint responsibility of the crane operator and the hitcher to see that hitches are secure and that all loose material has been removed from the load before starting a lift.

14. Do not lift loads with any sling hooks hanging loose. (If all sling hooks are not needed, they should be properly stored or use a different sling.)

15. All slings or cables should be removed from the crane hooks when not in use. (Dangling cables or hooks hung in sling rings can inadvertently snag other objects when the crane is moving.)

16. Crane operators should not use limit switches to stop the hoist under normal operating conditions. (These are emergency devices and are not to be used as operating controls.)

17. Do not block, adjust or disconnect limit switches in order to go higher than the switch will allow.

18. Upper limit switches (and lower limit switches, when provided) should be tested in stopping the hoist at the beginning of each shift, or as frequently as otherwise directed.

19. Never move loads carried by magnets or vacuum devices over anyone. Loads, or parts of loads, held magnetically may drop. Failure of power to magnets or vacuum devices will result in dropping the load unless a backup power supply is furnished.

20. Molten metal shall never be carried over people.

21. If the electric power goes off, place your controllers in the "OFF" position and keep them there until power is again available.

22. Before closing main or emergency switches, be sure that all controllers are in "OFF" position so that the crane will not start unexpectedly.

23. If plugging protection is not provided always stop the controllers momentarily in the "OFF" position before reversing — except to avoid accidents.

(The slight pause is necessary to give the braking mechanism time to operate.)

24. Whenever the operator leaves the crane this procedure should be followed:

- (a) Raise all hooks to an intermediate position.
- (b) Spot the crane at an approved designated location.
- (c) Place all controls in the "OFF" position.



(d) Open the main switch to the "OFF" position.

(e) Make visual check before leaving the crane.

Note: On yard cranes (cranes on outside runways), operators should set the brake and anchor securely so the crane will not be moved by the wind.

25. When two or more cranes are used in making one lift, it is very important that the crane operators take signals from only one designated person.

26. Never attempt to close a switch that has an "OUT OF ORDER" or "DO NOT OPERATE" card on it. Even when a crane operator has placed the card, it is necessary to make a careful check to determine that no one else is working on the crane, before removing the card.

27. In case of emergency or during inspection, repairing, cleaning or lubricating, a warning sign or signal should be displayed and the main switch should be locked in the "OFF" position. This should be done whether the work is being done by the crane operator or by others. On cab operated cranes when others are doing the work, the crane operator should remain in the crane cab unless otherwise instructed by the Supervisor.

28. Never move or bump another crane that has a warning sign or signal displayed.

Contacts with runway stops or other cranes shall be made with extreme caution. The operator shall do so with particular care for the safety of persons on or below the crane, and only after making certain that any persons on the other cranes are aware of what is being done.

29. Do not change fuse sizes. Do not attempt to repair electrical apparatus or to make other major repairs on the crane unless specific authorization has been received.

30. Never bypass any electrical limit switches or warning devices.

31. Load limit or overload devices shall not be used to measure loads being lifted. This is an emergency device and is not to be used as a production operating control.



