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– Oil and Gas Projects – Refiners Projects and  
infrastructure Projects)



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# Inspections & Checklists

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# Objectives

- On completion of this lecture, you will be able to:
    1. Outline how to undertake workplace inspections.
    2. Detail the advantages and disadvantages of checklists.
    3. Formulate your own workplace inspection procedures and checklist.
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# Workplace Inspections

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# Why are workplace inspections important?

- Help prevent injuries and illnesses.
  - Identify and record hazards for corrective action.
  - It is an important part of the overall OHS program.
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# Purpose of Inspections

- Identify aspects of the working environment and work tasks that could contribute to injury/damage and thus allow unacceptable conditions or conduct to be addressed.
  - Review workplace standards in accordance with legal and company requirements.
  - Provide a systematic means, for those who are at risk of injury, to help control the working conditions.
  - Inspection are only part of the hazard control strategy. (Audits, safety procedures, training,
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- Monitor hazard controls (PPE – Engineering Controls – Policies – Procedures)
  - Recommend Corrective Actions.
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# Workplace inspection should be regular and used in combination with other tools

- Systems audits
  - Job Hazard Analysis
  - Consultative discussions
  - Tool box topics
  - Reviewing accident statistics and trends
  - HAZOP
  - Fault Tree Analysis
  - Risk Assessment
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# Develop Inspection Procedure

- **As a minimum, it is recommended that all facilities be inspected at least once a month.**
- **Should be planned and systematic.**
- **Every inspection must examine who, what, where, when and how.**
- **Pay particular attention to items most likely to develop unsafe or unhealthy conditions because of stress, wear, impact, vibration, heat, corrosion, chemical reaction or misuse.**
- **At the completion of each inspection, any deficiencies identified must be noted on the summary action.**
- **A debriefing should then be conducted with the area supervisor for rectification.**

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# Workplace Elements:

- Look at all workplace elements:
  - The environment: Noise, vibration, lights, temperature, and ventilation.
  - The equipment: materials, tools, and apparatus for producing a product or a service.
  - The process involves how the worker interacts with the other elements in a series of tasks or operations.
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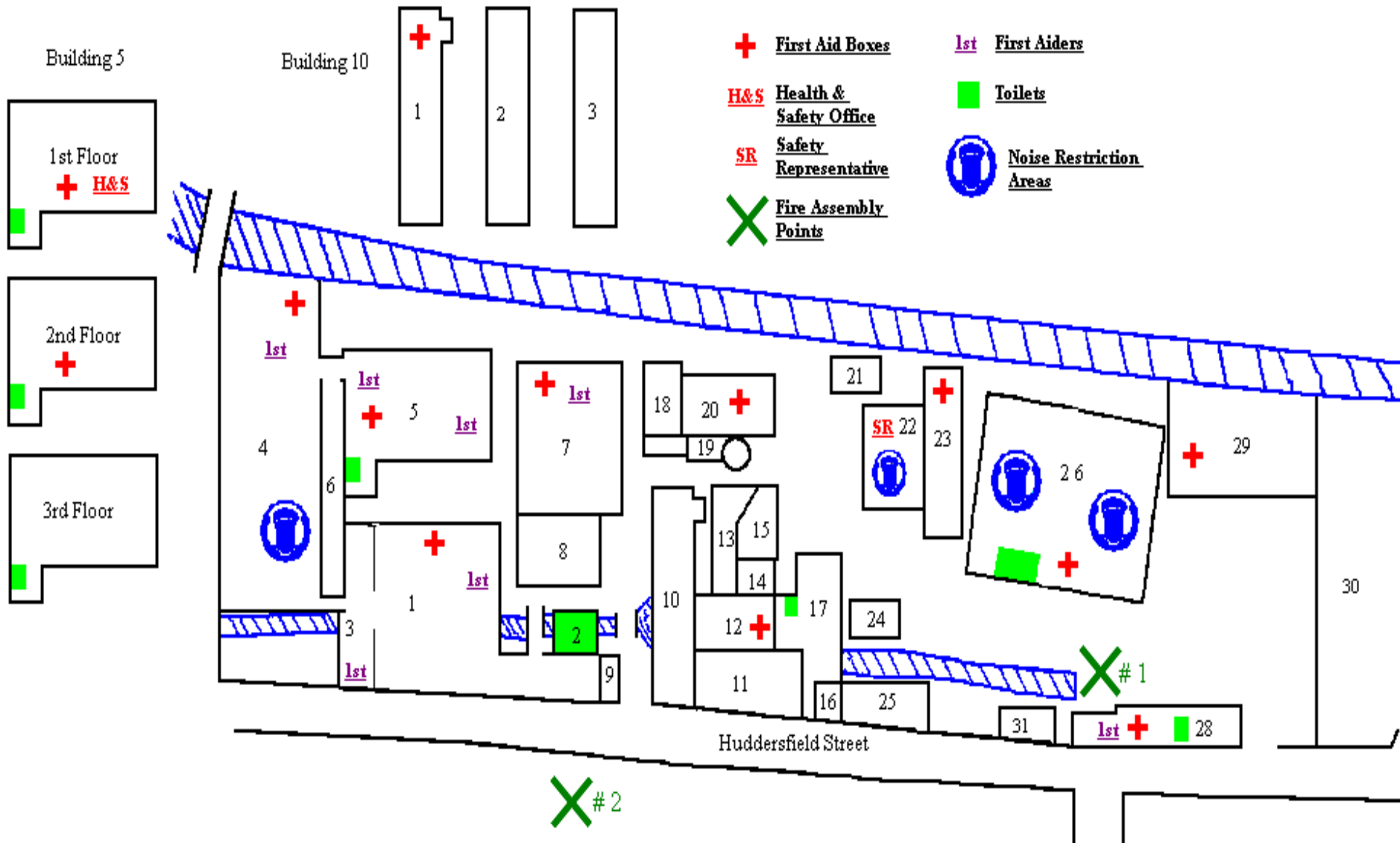
# What Type of Hazards do we look for in a workplace?

- Safety Hazards: Inadequate machine guards, unsafe workplace conditions, unsafe work practices.
- Chemical Hazards caused by solid, liquid, gas, dust, fume or mist.
- Ergonomics hazards: Repetitive and forceful movements, vibration, awkward postures.
- Physical Hazards: caused by noise, vibration, weather, heat, cold, radiation, and pressure.
- Biological Hazards: viruses, bacteria etc.

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# What Information needed:

- Diagram of Area: plant layout, areas
  - Equipment Inventory: types present
  - Chemical Inventory: chemicals used
  - Checklists
  - Reports.
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# Checklists

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# Develop Inspection Checklist

- Each workplace needs to define an “ultimate” checklist that covers all identified hazards and details the necessary procedures.
  - Because every workplace has unique and different hazards, it is essential that each workplace develop its own inspection procedure and checklist.
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# Continued

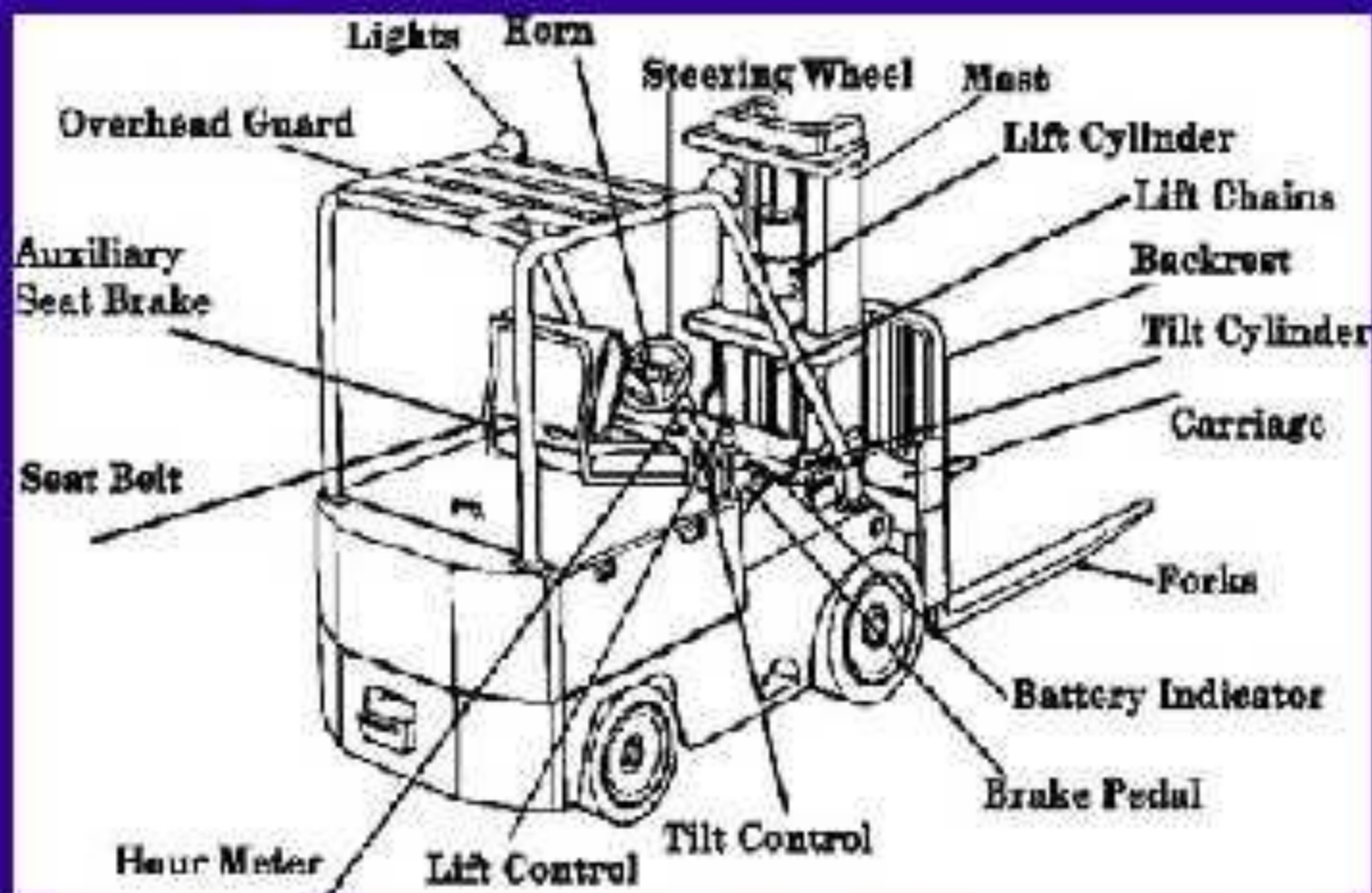
- Checklists should cover all potential hazards and therefore all workplaces should develop their own checklists in line with hazards present and areas where the accidents are occurring.
  - There are two different standard rating systems for describing hazards
    1. Yes/No or Satisfactory/unsatisfactory
    2. Scale system (poor – fair – good – very good – excellent, or 0 – 10)
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# Example Maintenance Workshop Inspection Checklist

- Are the aisles clear of rubbish?
  - Are the aisles clear of electrical leads?
  - Is the machine adequately guarded?
  - Adequate work space?
  - Does the machine have an emergency stop?
  - Is the workplace adequately lit?
  - Is the floor surface slip resistant?
  - Are safety signs displayed?
  - Is push stick used for cutting small pieces of wood?
  - Is there an appropriate first aid kit nearby?
  - Is the height of the table appropriate for the operator?
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# Components of a Forklift Truck\*



\*One of the most common types of powered industrial trucks

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# Forklift Inspection

- Engine oil level, fuel level, radiator water level.
  - Battery fully charged and secured in place.
  - Wheels and tires not worn or damaged
  - No damp spots or drips that may indicate a leak.
  - Horn working.
  - Floor brake, parking brake.
  - Steering moves smoothly.
  - Raising forks to the maximum height then lowering completely.
  - Tilt mechanism.
  - Cylinders and hoses not leaking.
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# Checklist for Visual Inspection:

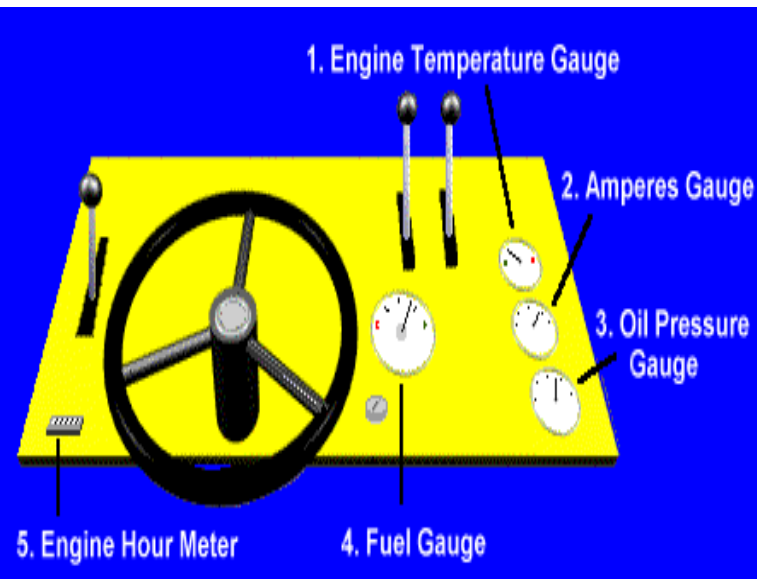
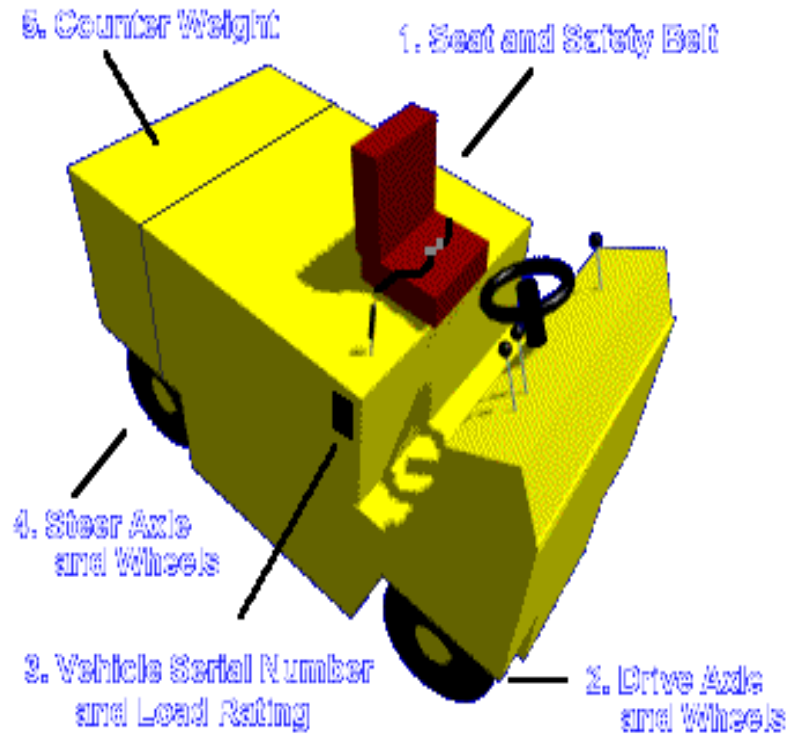
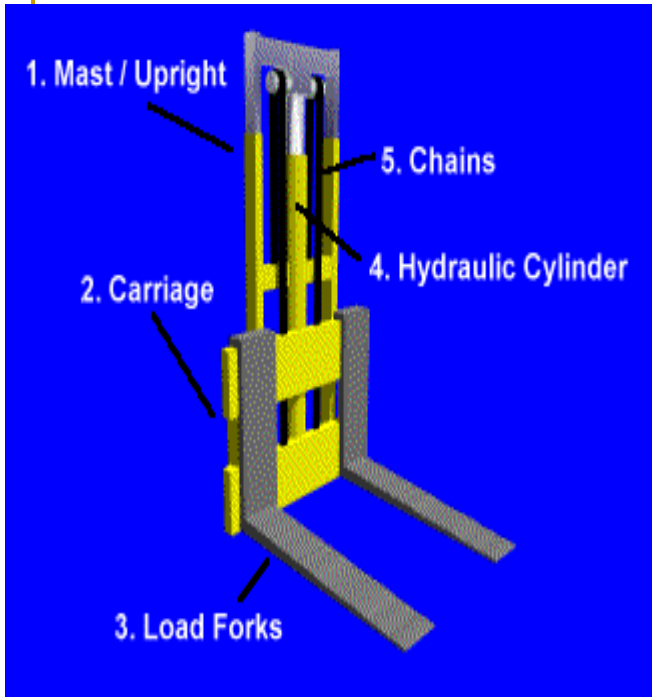
- Floor-clear of objects that could cause an accident.
  - No obstruction overhead.
  - Note any nearby objects to avoid as you drive away.
  - Fire extinguisher present and charged.
  - Engine oil level, fuel level, radiator water level.
  - Battery fully charged and securely in place.
  - Cables for exposed wires.
  - Battery plug connections not loose, worn or dirty.
  - Vent caps not clogged.
  - Electrolyte level in cells.
  - Bolts, nuts, guards, chains, or hydraulic hose reels not damaged, missing or loose.
  - Wheels and tires not worn or damaged.
  - Forks not bent or cracked.
  - Chain anchor pins not worn, loose or bent.
  - No damp spots or drips that may indicate a leak.
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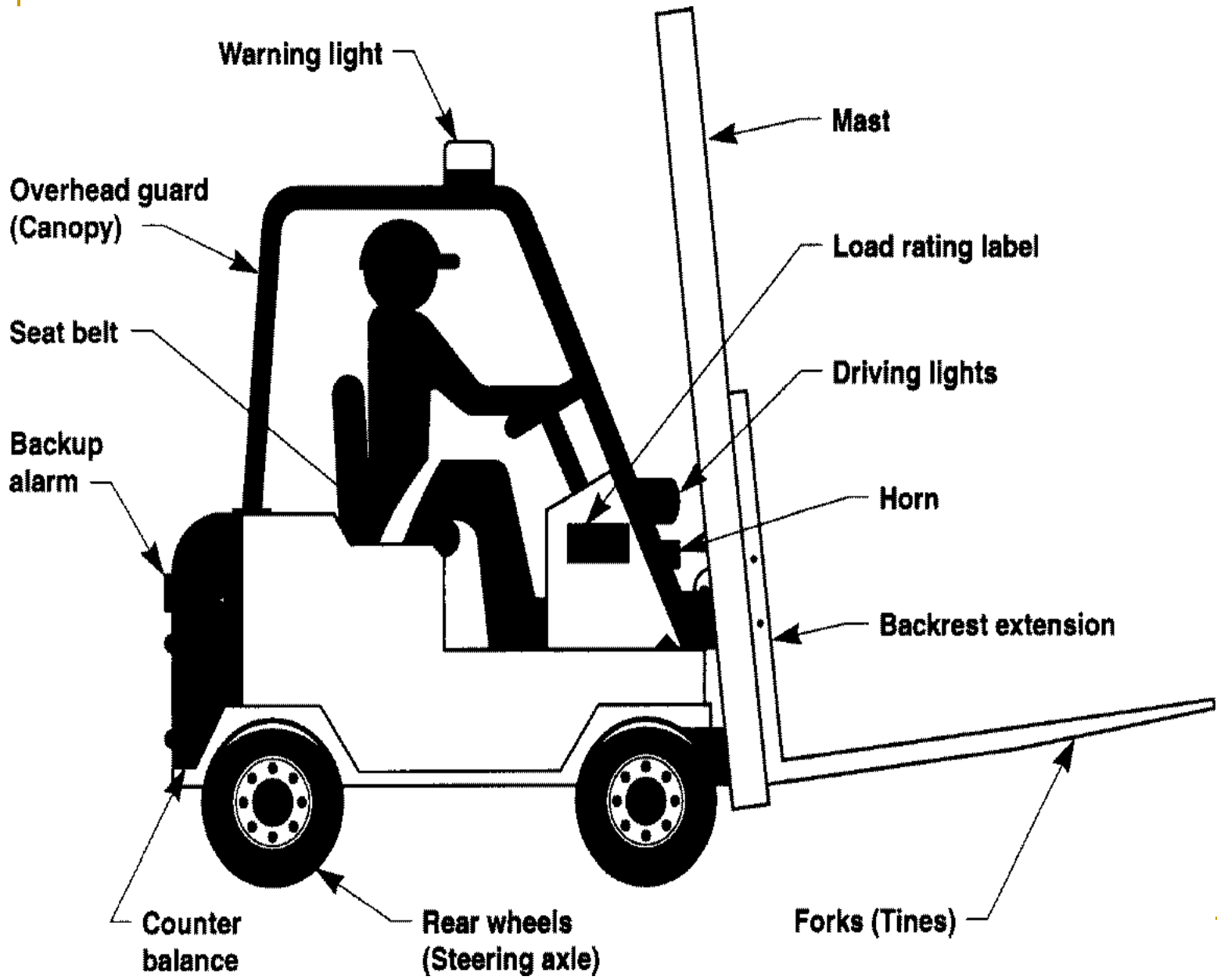




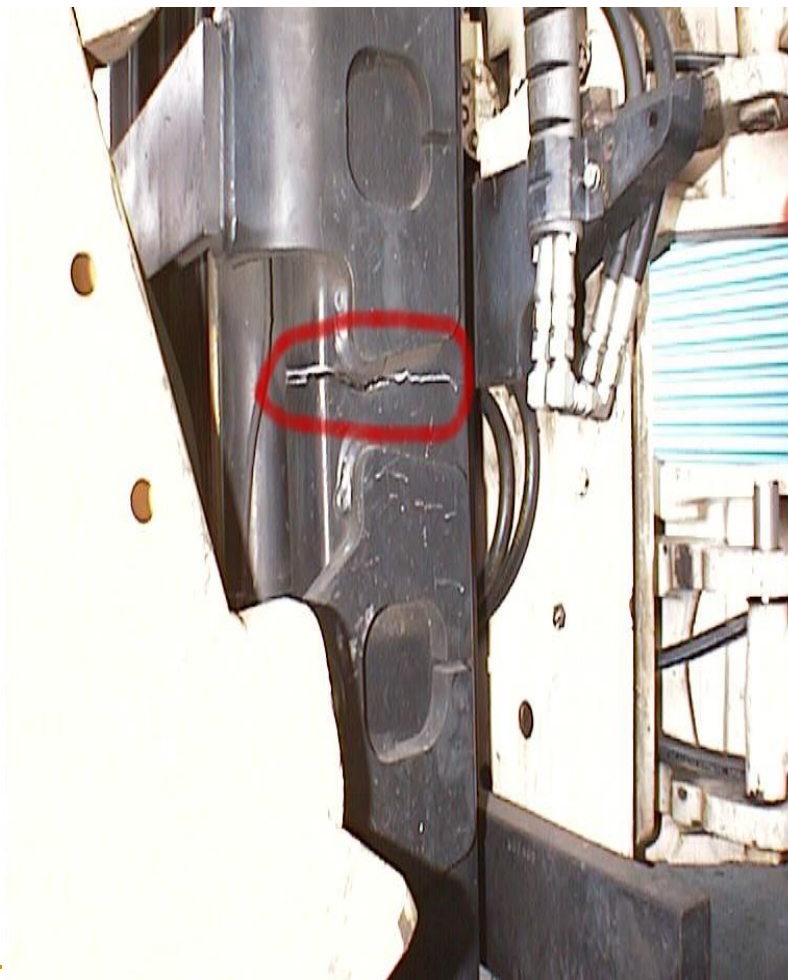


# تكملة الفحص





# Hazard???



G30S



**APPENDIX B:  
OPERATOR'S DAILY CHECK REPORT  
ENGINE-POWERED FORKLIFT TRUCKS**

Forklift Truck No. ....  
Date: .....  
Hour meter reading:  
Hours for shift: .....

Make: .....  
Shift: .....  
Start: ..... End: .....

| CHECK EACH ITEM<br>if OK, write OK  | SHIFT |        |     | Explain below if<br>not OK or any<br>other action taken |
|---|-------|--------|-----|---|
|   | Start | During | End |   |
| 1. Fuel level<br>2. Oil level and pressure<br>3. Water level and fan belt<br>4. Brakes<br>5. Steering<br>6. Lights - head, tail warning and indicator<br>7. Horn<br>8. Hour meter and gauges<br>9. Tyres<br>10. Hydraulic controls<br>11. Other items |       |        |     |   |

Remarks or additional explanations or suggestions:

Operator's signature:

**APPENDIX A:  
OPERATOR'S DAILY CHECK REPORT  
BATTERY-POWERED FORKLIFT TRUCKS**

Forklift Truck No. .... Make: .....  
 Date: ..... Shift: .....  
 Hour meter reading: ..... Start: ..... End: .....  
 Hours for shift: .....

| CHECK EACH ITEM<br>if OK, write OK<br>taken     | SHIFT |        |     | Explain below if<br>not OK or any<br>other action |
|---|-------|--------|-----|---|
|   | Start | During | End |   |
| 1. Battery plug connection                      |       |        |     |   |
| 2. Battery charge and electrolyte               |       |        |     |   |
| 3. Battery load test                            |       |        |     |   |
| 4. Brakes                                       |       |        |     |   |
| 5. Lights - head, tail, warning, and indicating |       |        |     |   |
| 6. Horn   |       |        |     |   |
| 7. Hour meter                                   |       |        |     |   |
| 8. Steering                                     |       |        |     |   |
| 9. Tyre   |       |        |     |   |
| 10. Hydraulic controls                          |       |        |     |   |
| 11. Other items                                 |       |        |     |   |

Remarks or additional explanations or suggestions:

Operator's signature:

# Checklist

| item                               |     |    |     |         |        |
|------------------------------------|-----|----|-----|---------|--------|
|                                    | Yes | No | N/A | Comment | Action |
| Even surface<br>no holes?          |     |    |     |         |        |
| Emergency<br>lighting<br>operable? |     |    |     |         |        |
|                                    |     |    |     |         |        |
|                                    |     |    |     |         |        |



# Checklist

| Check Point               |             |      |         |      |           |       |  |
|---------------------------|-------------|------|---------|------|-----------|-------|--|
|                           | Not Present | Poor | Average | Good | Excellent | Score |  |
| Hand rails in good repair |             |      |         |      |           |       |  |
|                           |             |      |         |      |           |       |  |
|                           |             |      |         |      |           |       |  |

# Checklist

| Check Points                   | Not Present | Poor     | Aver.    | Good     | Excel.    | Score |
|--------------------------------|-------------|----------|----------|----------|-----------|-------|
|                                | <b>0</b>    | <b>2</b> | <b>4</b> | <b>7</b> | <b>10</b> |       |
| Chemicals Stored Appropriately |             |          |          |          |           |       |
|                                |             |          |          |          |           |       |
|                                |             |          |          |          |           |       |

### 3 Work environment

|   | Yes | No | n/a | Comments | Action |
|---|-----|----|-----|----------|--------|
| Are <i>general ventilation</i> provisions sufficient?                                       |     |    |     |          |        |
| Are <i>local exhaust systems</i> installed to remove harmful gases, vapours, fumes & dusts? |     |    |     |          |        |
| Is <i>temperature &amp; humidity</i> control sufficient?                                    |     |    |     |          |        |
| Is exposure to <i>noise</i> prevented?  |     |    |     |          |        |
| Are workers protected from <i>vibration</i> risk?   |     |    |     |          |        |
| Is <i>general purpose lighting</i> sufficient?  |     |    |     |          |        |
| Is <i>task lighting</i> provided where require?   |     |    |     |          |        |
| Is <i>glare</i> controlled?   |     |    |     |          |        |
| Do aisles & external areas have sufficient lighting?  |     |    |     |          |        |

## FLAMMABLE AND COMBUSTIBLE MATERIALS

- G Are combustible scrap, debris, and waste materials (oily rags, etc.) stored in covered metal receptacles and removed from the worksite promptly?
- G Is proper storage practiced to minimize the risk of fire including spontaneous combustion?
- G Are approved containers and tanks used for the storage and handling of flammable and combustible liquids?
- G Are all connections on drums and combustible liquid piping, vapor and liquid tight?

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- G Do storage rooms for flammable and combustible liquids have mechanical or gravity ventilation?
  
  - G Is liquefied petroleum gas stored, handled, and used in accordance with safe practices and standards?
  
  - G Are "NO SMOKING" signs posted on liquefied petroleum gas tanks?
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# Confined Spaces

- Is there a written permit-confined-space program?
- Is the program available for inspection?
- Are confined spaces thoroughly emptied of any corrosive or hazardous substances, such as acids or caustics, before entry?
- Before entry, are all pipelines to a confined space containing inert, toxic, flammable, or corrosive materials valved off and blanked or disconnected and separated?

- When using oxygen-consuming equipment (such as salamanders, torches, furnaces) in a confined space, is air provided to ensure combustion without reducing the oxygen concentration of the atmosphere below 19.5 percent by volume?
- Whenever combustion-type equipment is used in a confined space, are provisions made to ensure that the exhaust gases are vented outside the enclosure?
- Is each confined space checked for decaying vegetation or animal matter that may produce methane?
- Is the confined space checked for possible industrial waste that could contain toxic properties?
- If the confined space is below the ground and near areas where motor vehicles are operating, is it possible for vehicle exhaust or carbon monoxide to enter the space?

# Conducting a Mobile Crane Inspection

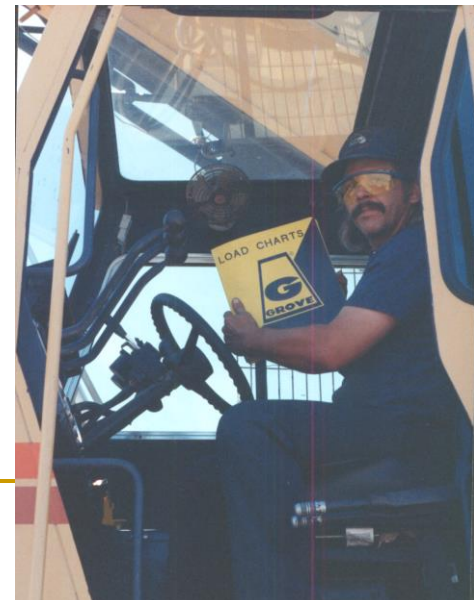
Consider the following when inspecting cranes:

- Request for and review all inspection and maintenance documents.
- Conduct a walk-around.
- Ask the operator, ground crew (riggers), and/or supervisors appropriate questions.
- Check crane set up and stability.



# Conducting a Mobile Crane Inspection

- Pre-Inspection
  - Operator Qualifications
  - Crane Records
- Crane Set-Up
  - Leveling
  - Outriggers
  - Stability
  - Structural Integrity
- Load Charts
  - Availability
  - Correct Use



# Crane Inspection Components

- Manufacturers' manuals
- Exposed moving parts
- Swing radius
- High voltage warning signs
- Boom stops
- Jib stops
- Boom angle indicators
- Boom hoist disconnects
- Anti-two blocking device
- Hydraulic functions
- Leveling
- Sheaves
- Drum lagging and flanges
- Boom assembly
- Hooks
- Hydraulic hoses & fittings
- Outriggers
- Load charts
- Wire rope (running & standing)
- Operator's compartment
- Access ladders

# Manufacturer's Operating and Maintenance Manuals



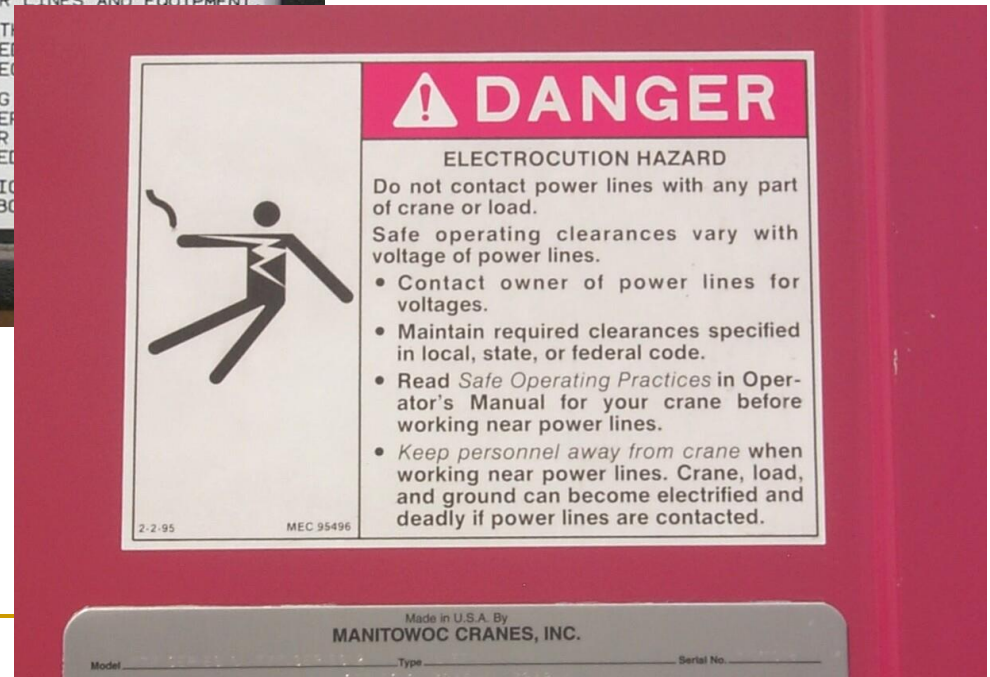
# Exposed Moving Parts



# Swing Radius



# High Voltage Warning Signs



# Boom stops

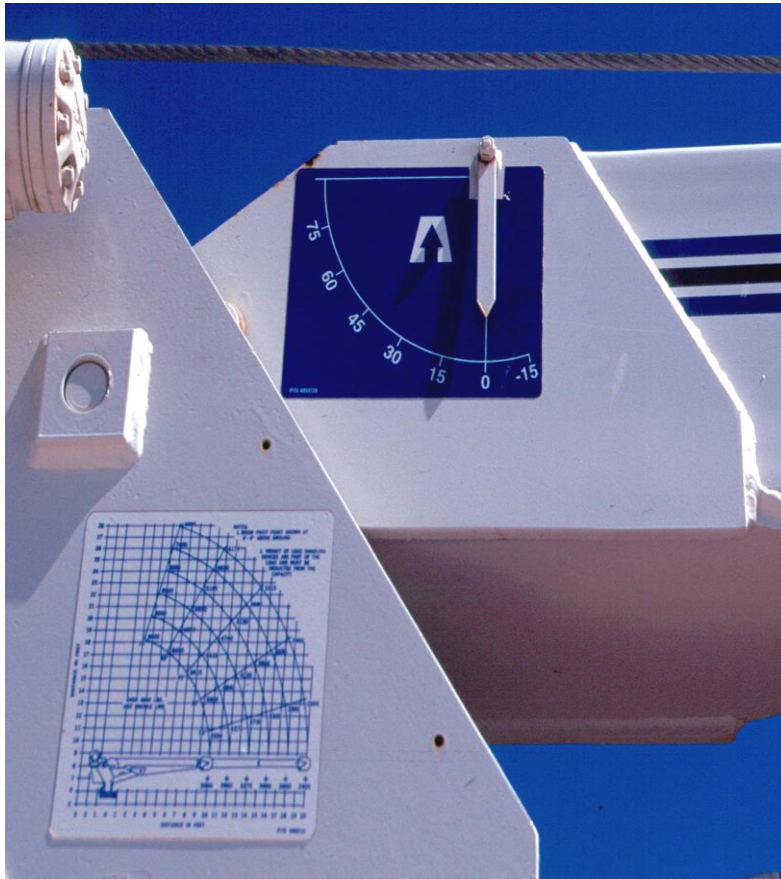


# Jib stops

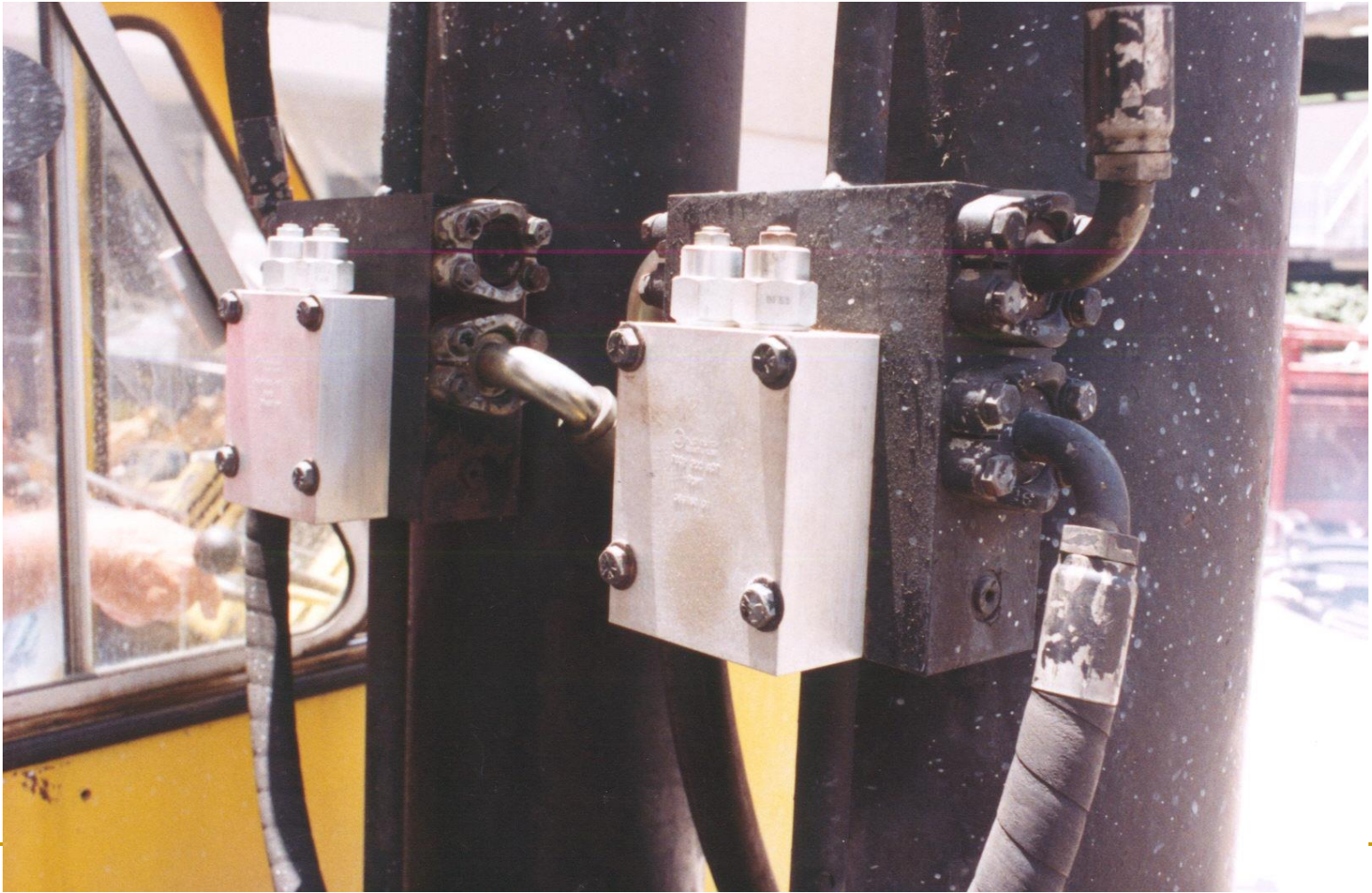




# Boom Angle Indicators



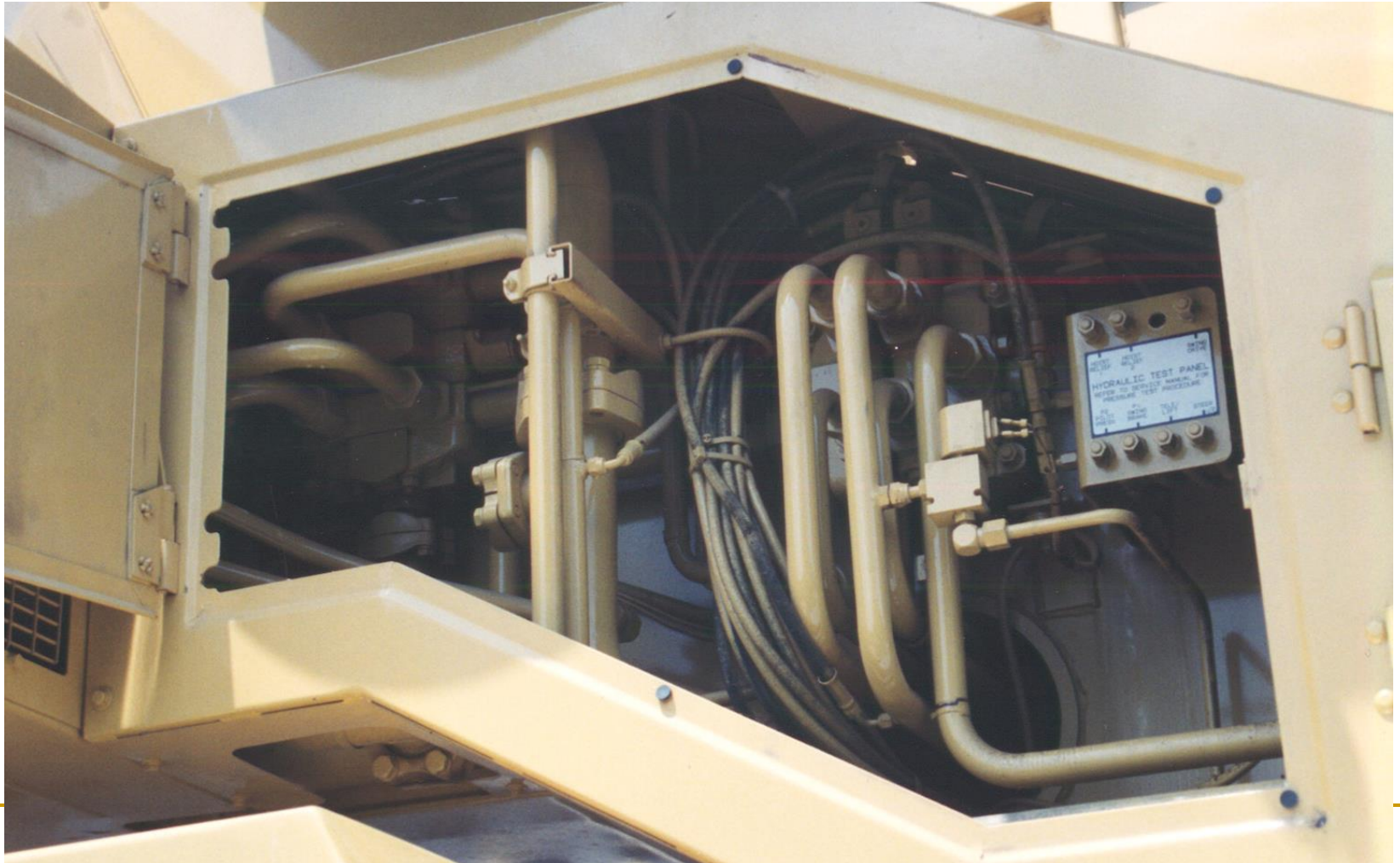
# Boom Hoist Disconnects



# Anti-Two Block Devices



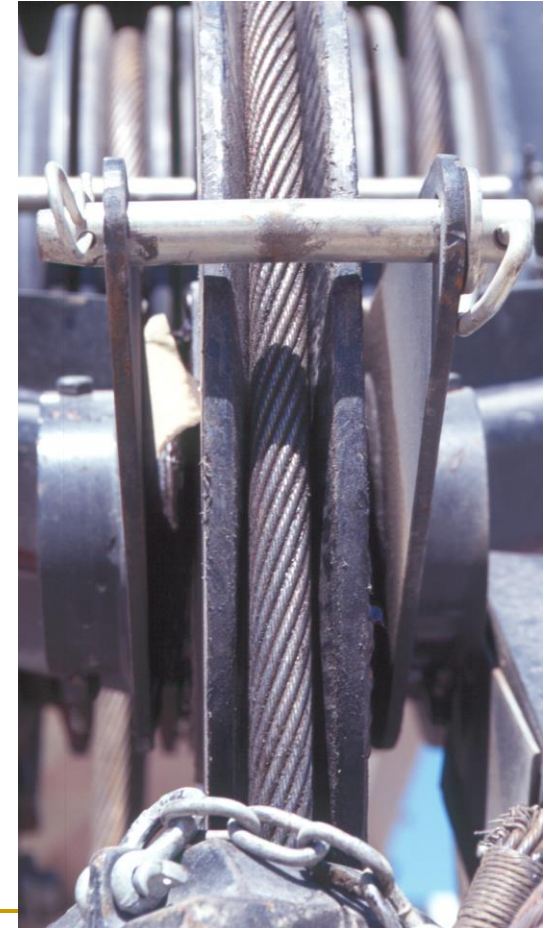
# Hydraulic Functions



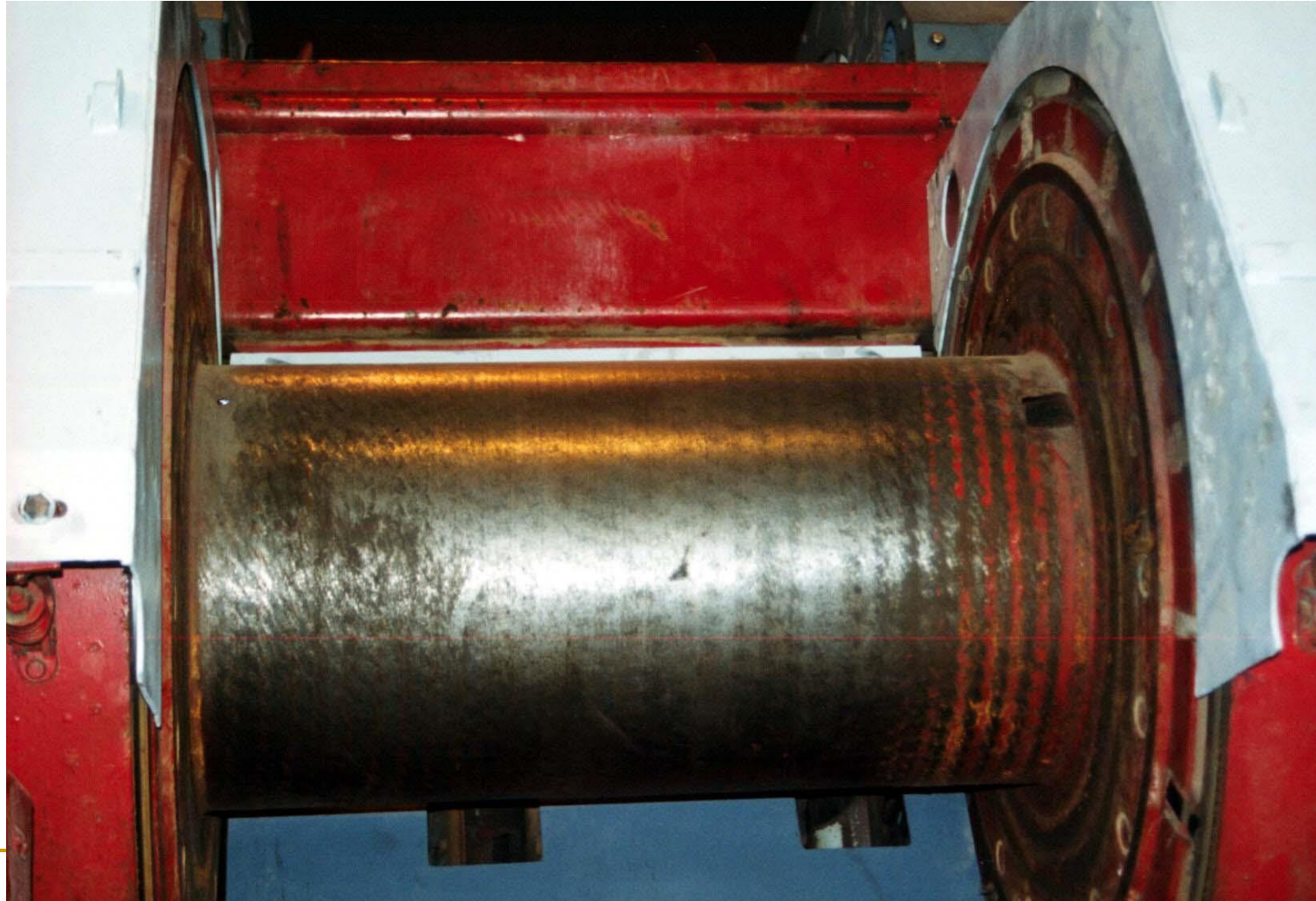
# Leveling of the Crane



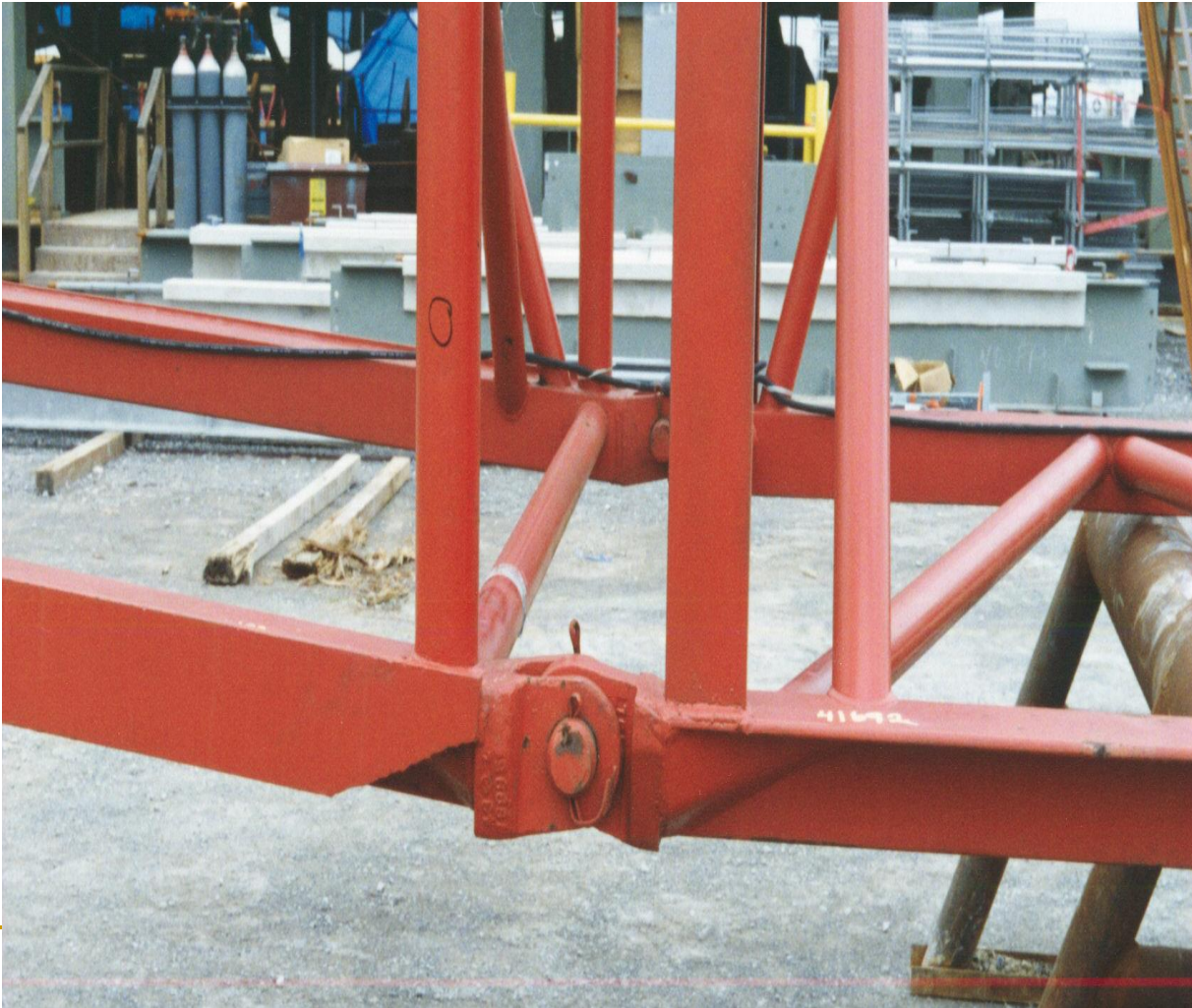
# Sheaves



# Drum Lagging and Flanges



# Components of the Boom Assembly

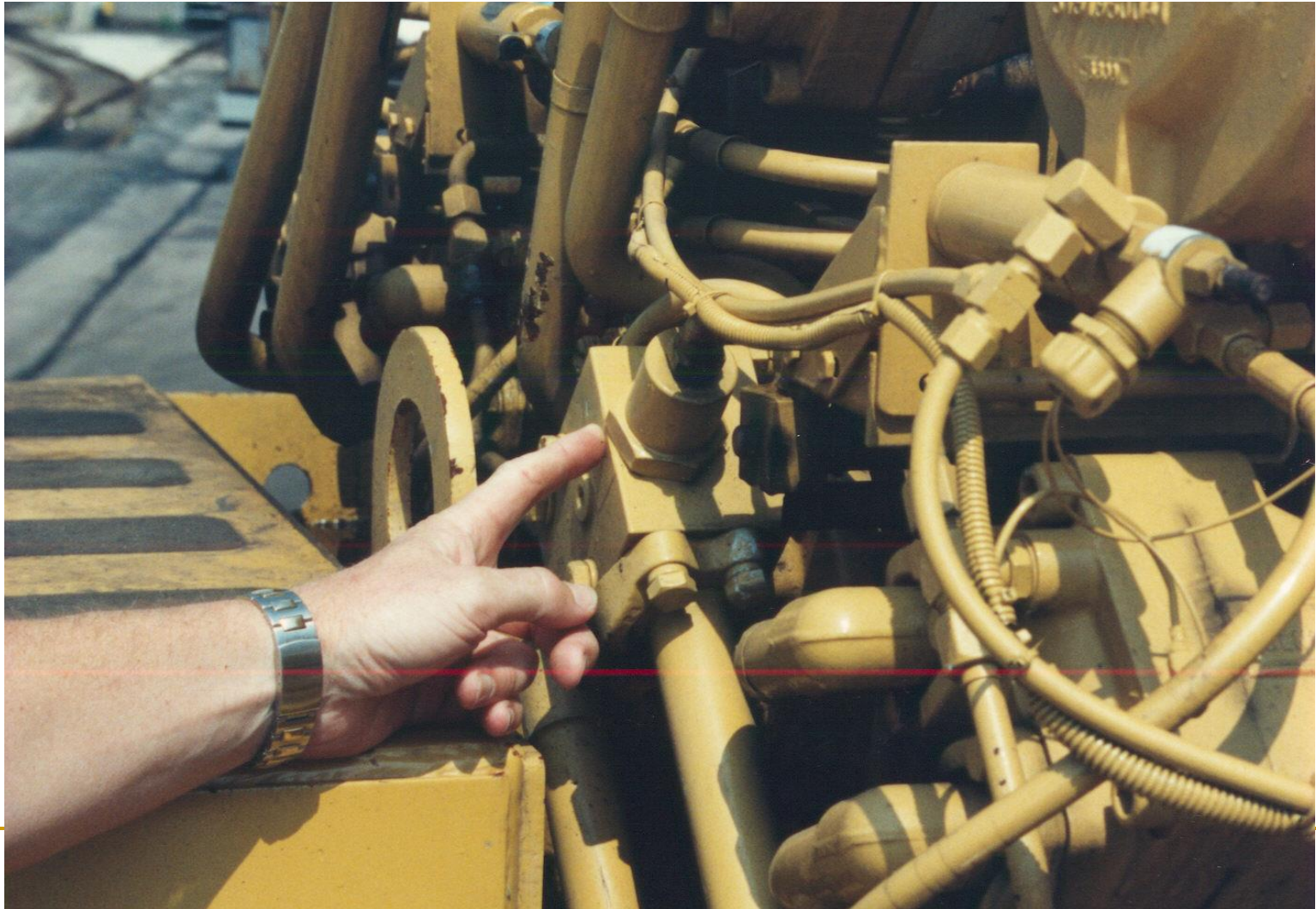






## Hooks

# Hydraulic Hoses & Fittings,



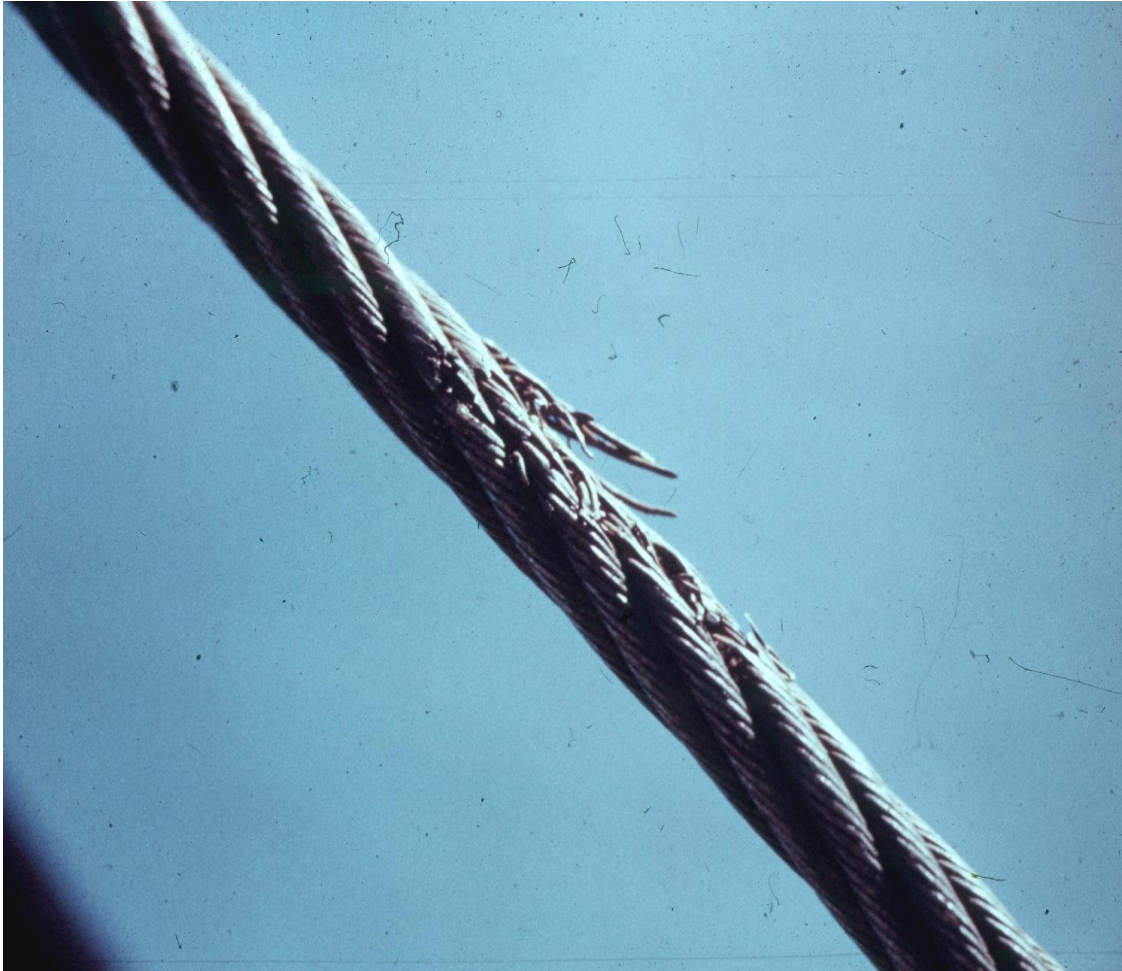
# Outriggers & Beams



# Load-Rating Chart



# Wire Rope



# Operator's Compartment



# Access Ladder



# Tower Cranes

- **Visual Examination**
- **Overload Test** (swl raised to sufficient height to ensure that each tooth of the train of gears is subjected to the load then lowered to 100 mm to 200 mm above the ground.
- SWL should then be increased by 25 % and this load hoisted sufficiently to ensure that each tooth of the train of gears is subjected to the overload then lowered to 100 mm to 200 mm just clear of the ground.
- For horizontal jib cranes with trolleys the trolley should be set at the maximum radius for swl.
- ~~Swl (100 mm to 200 mm) – 25 % of swl (100 mm to 200 mm)~~



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# Continued

- Indicator test:
  - The crane should never loaded beyond 100 % of its swl.
  - The radius at which the test load corresponds to 110 % of the swl should be marked and the test load should never be taken beyond this point.
-

# Types of inspections and checks

- **Frequent inspections occur every day**
- **Periodic inspections occur monthly**
- **Depend upon regulation and equipment involved**



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# Frequent inspections

- Daily pre-operational walk-around or pre-startup check
  - Exposed moving parts should be guarded/isolated
  - High voltage warning signs are displayed
-

# Frequent inspections

- Crane components
- Wire ropes
- Freedom of rotation of all swivels
- Tires



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# Frequent inspections

- Batteries
  - Proper lubrication
  - Fluid leaks
  - Sheaves, drums, rigging, hardware, attachments
-

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# Frequent inspections

- Operating mechanisms
  - Guardrails, handholds, steps
  - Platforms/walkways
  - Turntable connections
-

# Frequent inspections

- Boom and jib
  - Look for straightness/damage
  - Corrosion
  - Cracking/peeling paint
  - Bent lacing



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# Frequent inspections

- Outriggers

- Distortion/cracking
  - Welds
  - Extension/retraction of beams
  - Floats
-



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# Frequent inspections:

## Pre-startup

- Cab
    - ❑ **Cleanliness of cab**
    - ❑ **Control labeling**
    - ❑ **Function of gauges, lights, signals**
    - ❑ **Service/parking brake**
    - ❑ **Seat and cab door operation**
    - ❑ **Inspection and maintenance records**
-

# Frequent inspections: Pre-startup

- Fire extinguisher
  - Accessibility of fire extinguisher
  - Rating of extinguisher – 5BC or higher
  - One extinguisher at each operator station



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# Frequent inspections:

## Pre-startup

- **Field of vision**
    - ❑ **Broken/cracked windows**
    - ❑ **Adjustment/operation of brakes/clutches**
    - ❑ **Operation/calibration of boom hoist lockout**
    - ❑ **Gauges and warning lights**
    - ❑ **Controls**
-

# Periodic inspections

- Performed monthly and/or annually
- Inspection varies depending on crane use and site conditions



# Periodic inspections

- Maintain records on:
  - brakes
  - crane hooks
  - hoist chains
  - ropes



# Periodic inspections

- Inspection records must include the:
  - **date of the inspection**
  - **signature of the inspector**
  - **serial number of critical component**



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# Periodic inspections - check for:

- Structural damage
  - Cracks in welded connections
  - Damage or defects of sheaves
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# Periodic inspections - check for:

- Main hoist and auxiliary drum damage/defects
  - Even distribution of the wire rope on hoist drum
  - Proper wire rope integrity
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# Periodic inspections - check for:

- Excessive wear of brake and clutch parts
  - Worn, cracked, distorted parts
  - Defects/damage to the main boom, jib, boom extensions
-

# Periodic inspections - check for:

- Repairs that meet manufacturer's specifications
- Defects/damage of the load hooks/hook block



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# Periodic inspections - check for:

- Excessive wear of the drive sprockets/chain stretch
  - Positive stops on jibs
  - Deterioration of hydraulic components
  - Stamps of working pressure on flexible hoses
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# Periodic inspections - check for:

- Defects/damage to the turntable
  - Permanent/legible ID numbers
  - Securing/locking of counterweight
  - Easy access to the cab
-

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# Periodic inspections - check for:

- Proper function of boom stops, hoist disconnects, boom angle indicator, jib stops
  - Proper operation of power plants
  - Proper functioning of all other operating mechanisms
-

# Periodic inspections

- Do not use damaged/unsafe equipment until repairs have been made



# Maintenance procedures

- Preventive maintenance keeps cranes in good operating condition
- Follow the company's preventive maintenance program



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# Maintenance procedures - precautions:

- Move the crane where it will create minimum interference with other cranes
  - Turn all controls to the “off” position
  - Lock the main/emergency switch in the “off” position
-



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# Maintenance procedures - precautions:

- Place “Out of order” signs on the crane
  - Provide rail stops
  - Ensure guards are reinstalled after maintenance
-

# Maintenance procedures - precautions:

- Only designated personnel can perform repairs



# Maintenance procedures - precautions:

- Some components must be regularly adjusted to maintain proper operation
  - **Limit switches**
  - **Control systems**
  - **Brakes**
  - **Power plants**

# Hazard of overhead lines

- Maintain appropriate line clearance
- Direct contact
- Indirect contact



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# Hazard of overhead lines

- Preferred methods of safety around overhead lines include:
    - **de-energizing and grounding all electrical lines**
    - **erecting insulating barriers**
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# Hazard of overhead lines

- Voltages 50 kv or less, the clearance distance is 10 feet
  - Voltages greater than 50kv, the clearance is 10 feet plus 4 inches for every 10 kv over 50 kv
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# Hazard of overhead lines

- When the vehicle is in transit, and the structure is lowered:
    - **the clearance distance is 4 feet for 50 kv or less; or**
    - **4 feet plus 4 inches for every 10 kv over 50 kv for voltage greater than 50 kv**
-

# Hazard of overhead lines

- Use signalmen to assist in maintaining proper clearances where vision is obstructed
  - **Hand signals**
  - **Chart of hand signals**





# Hazard of overhead lines

- Use nonconductive tag lines to stabilize the load
- Use insulating boots and gloves

