

CHAPTER 6



VEHICLE LIFTING AND HOISTING

OBJECTIVES

After studying Chapter 6, the reader will be able to:

1. Identify vehicle hoisting and lifting equipment.

2. Discuss safety procedures related to hoisting or lifting a vehicle.
3. Describe the proper methods to follow to safely hoist a vehicle.

KEY TERMS

Creeper (p. 77)
Floor Jack (p. 77)

Jack Stands (p. 77)
Safety Stands (p. 77)

FLOOR JACK

A **floor jack** is a hand-operated hydraulic device that is used to lift vehicles or components, such as engines, transmissions, and rear axle assemblies. Most floor jacks use four casters, which allow the jack to be easily moved around the shop. See Figure 6-1.

Safe Use of Floor Jacks

Floor jacks are used to lift a vehicle or major vehicle component, but they are not designed to hold a load. Therefore **safety stands**, also called **jack stands**, should always be used to support the vehicle. After the floor jack has lifted the vehicle, safety stands should be placed under the vehicle, and then, using the floor jack, lowered onto the safety stands. The floor jack can be lifted in position as another safety device but the load should be removed from the floor jack. If a load is retained on the floor jack, hydraulic fluid can leak past seals in the hydraulic cylinders, which would lower the vehicle, possibly causing personal injury. See Figure 6-2.

CREEPERS

When working underneath a vehicle, most service technicians use a **creeper**, which consists of a flat or concaved surface equipped with low-profile casters. A creeper allows the technician to maneuver under the vehicle easily.



FIGURE 6-1 A hydraulic hand-operated floor jack.



FIGURE 6-2 Safety stands are being used to support the rear of this vehicle. Notice a creeper also.

Safe Use of Creepers

Creepers can create a fall hazard if left on the floor. When a creeper is not being used, it should be picked up and placed vertically against a wall or tool box to help prevent accidental falls.

VEHICLE HOISTS

Vehicle hoists include older in-ground pneumatic/hydraulic (air pressure over hydraulic) and aboveground units. Most of the vehicle hoists used today use an electric motor to pressurize hydraulic fluid, which lifts the vehicle using hydraulic cylinders. Hoists are rated by the maximum weight that they can safely lift, such as 7,000 lbs to 12,000 lbs or more. Hoists can also have equal length arms or can be equipped with different length arms allowing the vehicle to be set so the doors can be opened and not hit the center support column. Many chassis and underbody service procedures require that the vehicle be hoisted or lifted off the ground. The simplest methods involve the use of drive-on ramps or a floor jack and safety (jack) stands, whereas in-ground or surface-mounted lifts provide greater access.

Setting the Pads Is a Critical Part of This Procedure

All automobile and light-truck service manuals include recommended locations to be used when hoisting (lifting) a vehicle. Newer vehicles have a triangle decal on the driver's door indicating the recommended lift points. The recommended standards for the lift points and lifting procedures are found in SAE Standard JRP-2184. See Figure 6-3.

These recommendations typically include the following points:

1. The vehicle should be centered on the lift or hoist so as not to overload one side or put too much force either forward or rearward. See Figure 6-4.

2. The pads of the lift should be spread as far apart as possible to provide a stable platform.
3. Each pad should be placed under a portion of the vehicle that is strong and capable of supporting the weight of the vehicle.
 - a. Pinch welds at the bottom edge of the body are generally considered to be strong.

CAUTION: Even though pinch weld seams are the recommended location for hoisting many vehicles with unitized bodies (unit-body), care should be taken not to place the pad(s) too far forward or rearward. Incorrect placement of the vehicle on the lift could cause the vehicle to be imbalanced, and the vehicle could fall. This is exactly what happened to the vehicle in Figure 6-5.

- b. Boxed areas of the body are the best places to position the pads on a vehicle without a frame. Be careful to note whether the arms of the lift might come into contact with other parts of the vehicle before the pad touches the intended location. Commonly damaged areas include the following:
 1. Rocker panel moldings
 2. Exhaust system (including catalytic converter)
 3. Tires or body panels. (See Figures 6-6 and 6-7.)
4. The vehicle should be raised about a foot (30 centimeters [cm]) off the floor, then stopped and shaken to check for stability. If the vehicle seems to be stable when checked at a short distance from the floor, continue raising the vehicle and continue to view the vehicle until it has reached the desired height. The hoist should be lowered onto the mechanical locks, and then raised off of the locks before lowering.

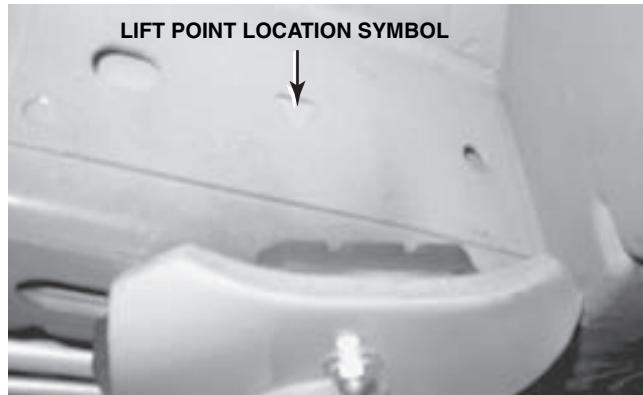


FIGURE 6-3 Most newer vehicles have a triangle symbol indicating the recommended hoisting lift points.

CAUTION: Do not look away from the vehicle while it is being raised (or lowered) on a hoist. Often one side or one end of the hoist can stop or fail, resulting in the vehicle being slanted enough to slip or fall, creating physical damage not only to the vehicle and/or hoist but also to the technician or others who may be nearby.



(a)



(b)

FIGURE 6-4 (a) Tall safety stands can be used to provide additional support for a vehicle while on a hoist. (b) A block of wood should be used to avoid the possibility of doing damage to components supported by the stand.

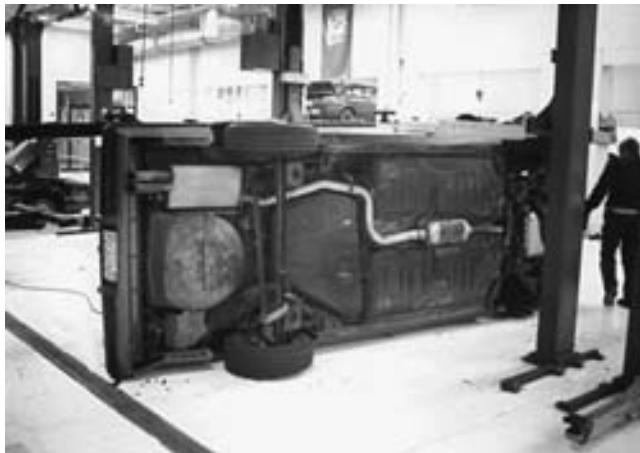
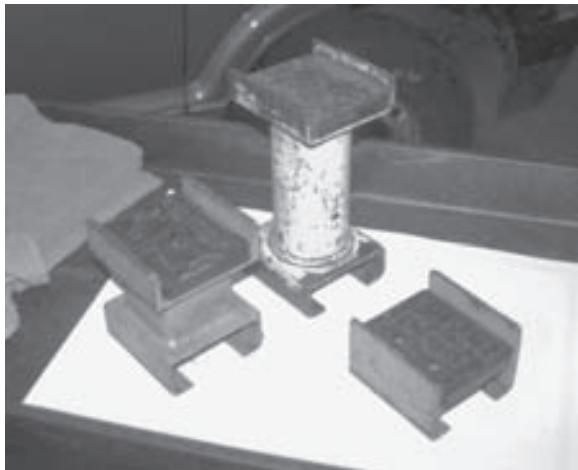


FIGURE 6-5 This vehicle fell from the hoist because the pads were not set correctly. No one was hurt, but the vehicle was a total loss.



(a)

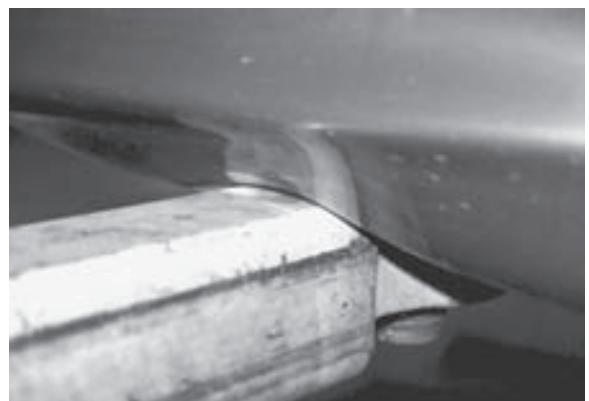


(b)

FIGURE 6-6 (a) An assortment of hoist pad adapters that are often necessary to safely hoist many pickup trucks, vans, and sport utility vehicles. (b) A view from underneath a Chevrolet pickup truck showing how the pad extensions are used to attach the hoist lifting pad to contact the frame.



(a)



(b)

FIGURE 6-7 (a) In this photo the pad arm is just contacting the rocker panel of the vehicle. (b) This photo shows what can occur if the technician places the pad too far inward underneath the vehicle. The arm of the hoist has dented in the rocker panel.

NOTE: Most hoists can be safely placed at any desired height as long as it is high enough for the safety latches to engage. For ease while working, the area in which you are working should be at chest level. When working on brakes or suspension components, it is not necessary to work on them down near the floor or over your head. Raise the hoist so that the components are at chest level.

5. Before lowering the hoist, the safety latch(es) must be released and the direction of the controls reversed. The speed downward is often adjusted to be as slow as possible for additional safety.

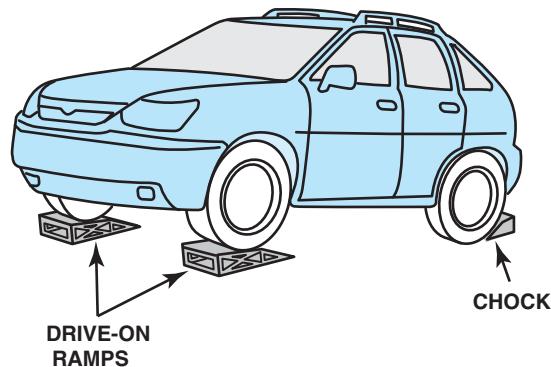


FIGURE 6-8 Drive-on-type ramps. The wheels on the ground level must be chocked (blocked) to prevent accidental movement down the ramp.

DRIVE-ON RAMPS

Ramps are an inexpensive way to raise the front or rear of a vehicle. See Figure 6-8. Ramps are easy to store, but they can be dangerous because they can “kick out” when driving the vehicle onto the ramps.

CAUTION: Professional repair shops do not use ramps because they are dangerous to use. Use only with extreme care.

HOISTING THE VEHICLE Step-by-Step



STEP 1

The first step in hoisting a vehicle is to properly align the vehicle in the center of the stall.



STEP 2

Most vehicles will be correctly positioned when the left front tire is centered on the tire pad.



STEP 3

Most pads at the end of the hoist arms can be rotated to allow for many different types of vehicle construction.



STEP 4

The arms of the lifts can be retracted or extended to accommodate vehicles of many different lengths.



STEP 5

Most lifts are equipped with short pad extensions that are often necessary to use to allow the pad to contact the frame of a vehicle without causing the arm of the lift to hit and damage parts of the body.



STEP 6

Tall pad extensions can also be used to gain access to the frame of a vehicle. This position is needed to safely hoist many pickup trucks, vans, and sport utility vehicles.

(continued)

HOISTING THE VEHICLE continued



STEP 7

An additional extension may be necessary to hoist a truck or van equipped with running boards to give the necessary clearance.



STEP 8

Position the front hoist pads under the recommended locations as specified in the owner's manual and for service information for the vehicle being serviced.



STEP 9

Position the rear pads under the vehicle under the recommended locations.



STEP 10

This photo shows an asymmetrical lift where the front arms are shorter than the rear arms. This design is best used for passenger cars and allows the driver to exit the vehicle easier because the door can be opened wide without it hitting the vertical support column.



STEP 11

After being sure all pads are correctly positioned, use the electromechanical controls to raise the vehicle.



STEP 12

Raise the vehicle about 1 foot (30 cm) and stop to double-check that all pads contact the body or frame in the correct positions.

HOISTING THE VEHICLE continued



STEP 13

With the vehicle raised about 1 foot off the ground, push down on the vehicle to check to see if it is stable on the pads. If the vehicle rocks, lower the vehicle and reset the pads. Be sure the safety is engaged before working on or under the vehicle.



STEP 14

This photo shows the pads set flat and contacting the pinch welds of the body.



STEP 15

Where additional clearance is necessary for the arms to clear the rest of the body, the pads can be raised and placed under the pinch weld area as shown.



STEP 16

When the service work is completed, the hoist should be raised slightly and the safety released before using the hydraulic lever to lower the vehicle.



STEP 17

After lowering the vehicle, be sure all arms of the lift are moved out of the way before driving the vehicle out of the work stall.



STEP 18

Notice that all of the lift arms have been neatly moved out of the way to provide clearance so that the tires will not contact the arms when the vehicle is driven out of the stall.

SUMMARY

- Whenever a vehicle is raised off the ground, it must be supported using safety stands.
- Creepers should be stored vertically to prevent the possibility of stepping on it, which could cause a fall and personal injury.
- Always adhere to the specified hoisting locations as found in service information.
- Adapters or extensions are often needed when hoisting pickup trucks or vans.

REVIEW QUESTIONS

- Why must safety stands be used after lifting a vehicle with a floor jack?
- What precautions should be adhered to when storing a creeper?
- What precautions should be adhered to when hoisting a vehicle?

CHAPTER QUIZ

- A safety stand is also called a _____.
 a. Jack
 b. Jack stand
 c. Bottle jack
 d. Safety stool
- A creeper should be stored _____.
 a. Vertically
 b. Under a vehicle
 c. Flat on the floor
 d. Upside down on the floor
- The SAE standard for hoist location is _____.
 a. J-1980
 b. SAE-2009
 c. JRP-2184
 d. J-14302
- Tall safety stands would be used to _____.
 a. Support an engine while the vehicle is hoisted
 b. Lift a vehicle
 c. Lift a component such as an engine high off the ground
 d. Both b and c
- Commonly damaged areas of a vehicle during hoisting include _____.
 a. Rocker panels
 b. Exhaust systems
 c. Tires or body panels
 d. All of the above
- Pad extensions may be needed when hoisting what type of vehicle?
 a. Small cars
 b. Pickup trucks
 c. Vans
 d. Either b or c
- Technician A says that a hoist can be stopped at any level as long as the safety latch engages. Technician B says that the vehicle should be hoisted to the top of the hoist travel for safety. Which technician is correct?
 a. Technician A only
 b. Technician B only
 c. Both Technicians A and B
 d. Neither Technician A nor B

8. Before lowering the vehicle, what should the technician do?
- a. Be sure nothing is underneath the vehicle
 - b. Raise the vehicle enough to release the safety latch
 - c. Be sure no one will be walking under or near the vehicle
 - d. All of the above
9. Technician A says that a creeper should be stored vertically. Technician B says that a creeper should be stored on its casters. Which technician is correct?
- a. Technician A only
 - b. Technician B only
 - c. Both Technicians A and B
 - d. Neither Technician A nor B
10. When checking for proper pad placement, how high should the vehicle be raised?
- a. About 2 inches (5 cm)
 - b. About 6 inches (15 cm)
 - c. About 1 foot (30 cm)
 - d. About 3 feet (91 cm)