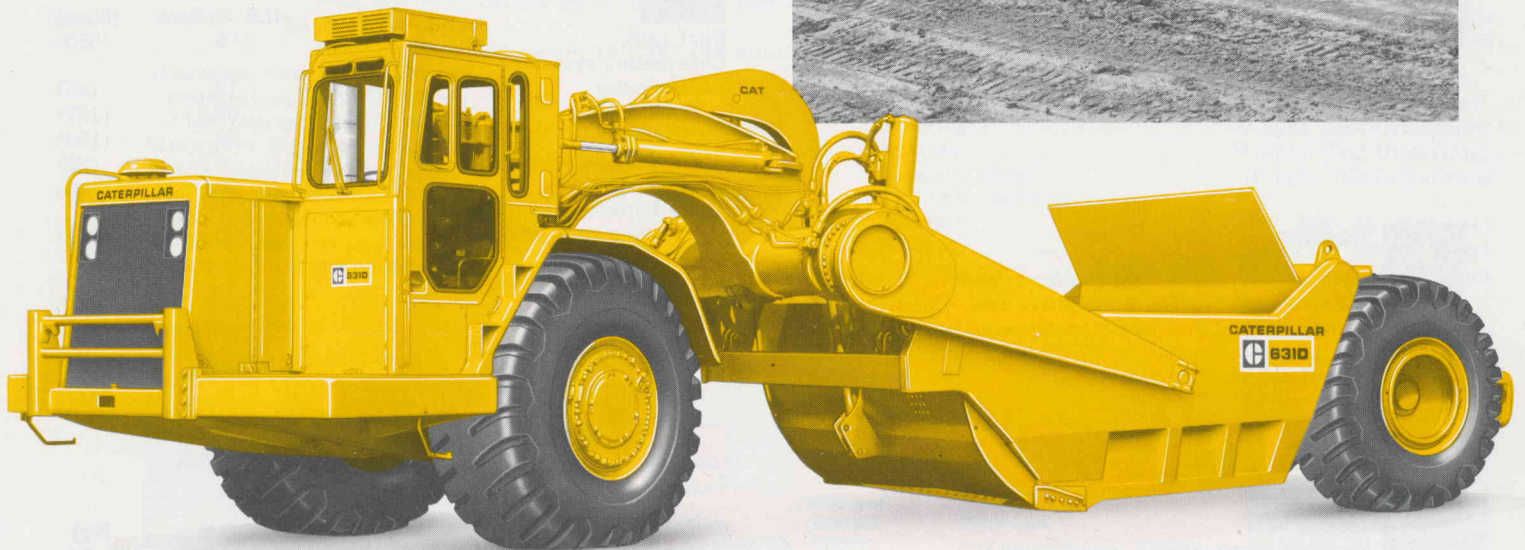


# CATERPILLAR

## 631D Wheel Tractor-Scraper

### Summary of features

- **21 cu. yd. (16.1 m<sup>3</sup>) capacity** (struck) . . . 31 cu. yd. (23.7 m<sup>3</sup>) heaped.
- **Cat Model 3408 Diesel Engine**, turbocharged and aftercooled to pack more air into the cylinders, provides 450 flywheel horsepower . . . and 1,099 cu. in. (18.0 litres) displacement.
- **Eight forward speeds** up to 30 MPH (48.3 km/h) with Cat semiautomatic power shift transmission.
- **Cushion hitch** absorbs haul road shocks . . . for higher usable speeds over rough terrain, less machine loping, faster cycle times, lower maintenance costs, longer machine life.
- **Double-acting hydraulics** supply positive cutting edge penetration, apron closure and material ejection.
- **90° steering both left and right**, even with ROPS . . . for maximum maneuverability.
- **Differential lock** . . . rigidly connects both drive wheels for positive traction.
- **Servicing ease** . . . easy access . . . localized service area . . . independent removal of major components.



Shown with optional ROPS cab, air conditioner and 37.25-35, 30 PR (E-3) tires.



### Caterpillar engine

Flywheel horsepower @ 2000 RPM ..... 450

*The net power at the flywheel of the vehicle engine operating under SAE standard ambient temperature and barometric conditions, 85° F. (29° C) and 29.38" Hg (995 mbar), using 35 API gravity fuel oil at 60° F. (15.6° C). Vehicle engine equipment includes fan, air cleaner, water pump, lubricating oil pump, fuel pump, air compressor and alternator. Engine will maintain specified power up to 7,500 ft. (2300 m) altitude.*

Caterpillar four-stroke-cycle, 65° V-8 diesel Model 3408 with 5.4" (137 mm) bore, 6.0" (152 mm) stroke and 1,099 cu. in. (18.0 litres) displacement.

Turbocharged and jacket water aftercooled. Integral inlet manifold porting with two intake and two exhaust valves per cylinder. Valves are actuated by a pushrod mechanism. Single camshaft is mounted into "V" of engine. Variable timing fuel system. Adjustment-free fuel pumps, non-clogging injection valves and precombustion chamber design.

Uses economical No. 2 fuel oil (ASTM Specification D396), often called No. 2 furnace or burner oil, with a minimum cetane rating of 35. Premium quality diesel fuel can be used, but is not required.

24-volt direct electric starting system. Glow plugs for preheating precombustion chambers.

# 631D

## Wheel Tractor-Scraper



### transmission

Cat-built, eight-speed semiautomatic powershift with single-lever shift control. All shifts up or down from 2nd to the gear selected are automatic. Upshifting is limited to speed selected by control lever. Reverse, 1st and 2nd are manually controlled. A foot control holds transmission in any gear. Standard downshift inhibitor helps prevent engine overspeed due to improper downshifts.



### differential control

Cat-built differential lock, engaged by foot pedal, positively prevents either drive wheel from spinning free in poor traction conditions. Allows normal differential action when not engaged.



### final drives

Compact planetary design and full-floating axles, independently removable from wheel mounting. Service-free, double-row roller bearings. Assemblies protected with Duo-Cone® floating ring seals.



### steering

Two double-acting hydraulic cylinders. Hydraulic follow-up system for automotive feel. Positive, well-modulated flow control for constant steering response. Full 90° right or left, unrestricted by ROPS.

Width required for curb-to-curb turn ..... 40'1" (12.2 m)



### brakes

(System meets OSHA regulations.)

Air-actuated, cam-operated, expanding-shoe type (sequenced to brake scraper first). Air-actuated emergency braking system and spring-actuated, oil pressure-disengaged parking brake are standard. Optional hydraulic retarder.



### tires

Productive capabilities of the 631D are such that, under certain job conditions, Ton-MPH (tkm/h) capabilities of standard or optional tires could be exceeded and therefore limit production. Caterpillar recommends the user evaluate all job conditions in order to make proper tire selection. Consult tire manufacturer for specific data.

Standard for tractor and scraper:  
Conventional, 33.25-35, 38 PR (E-3)

Optional for tractor and scraper:  
Conventional, 37.25-35, 30 PR (E-3)  
Radial steel cord, 33.25-35



### cushion hitch and gooseneck

Parallelogram-type linkage connects two-piece hitch. Vertically mounted hydraulic cylinder transfers road shocks to two nitrogen accumulators. Controlled oil flow dampens "rebound" oscillation. Leveling valve automatically centers piston in cylinder for all scraper loads. Cushion ride lockout control retains positive cutting edge down-pressure for scraper loading and fill spreading. Cushion hitch makes extensive use of steel castings, eliminating many welded joints. Double kingbolt design withstands high external forces, allows easy installation and removal. Box-section gooseneck reduces plate and weld stresses. One-piece fabricated draft tube and wide-mounted bowl lift cylinders reduce stress in draft frame.



### service refill capacities

|  | U.S. Gallons | (litres) |
|--|--------------|----------|
| Fuel tank .....  | 250          | (950)    |
| Lubricating systems:                                   |              |          |
| Crankcase .....  | 12           | (45)     |
| Transmission .....                                     | 33.5         | (127)    |
| Differential .....                                     | 36           | (136)    |
| Final drive — each side .....                          | 6.5          | (25)     |
| Cooling system .....                                   | 37           | (140)    |
| Total hydraulic system<br>(steering and scraper) ..... | 90           | (341)    |



### weights on wheels

(total unit, approximate, without ROPS)

| Empty:  | Lb.     | (kg)     |
|---|---------|----------|
| Tractor — 68% .....   | 58,800  | (26 670) |
| Scraper — 32% .....   | 27,700  | (12 570) |
| Total .....   | 86,500  | (39 240) |
| <b>Loaded, based on 75,000 lb.</b><br>(34 020 kg) rated load: |         |          |
| Tractor — 52% .....   | 84,600  | (38 380) |
| Scraper — 48% .....   | 76,900  | (34 880) |
| Total .....   | 161,500 | (73 260) |



### capacity

|                          |                                   |
|--------------------------|-----------------------------------|
| Rated load .....         | 75,000 lb. (34 020 kg)            |
| Heaped, SAE rating ..... | 31 cu. yd. (23.7 m <sup>3</sup> ) |
| Struck, SAE rating ..... | 21 cu. yd. (16.1 m <sup>3</sup> ) |



## design

Low and extra-wide scraper bowl is operated by high-speed hydraulics. Cutting edge near center of bowl for minimum material travel. Power-closing apron. Hydraulic dozer-type ejector. Reinforced box-section construction with extensive use of high-tensile-strength steel. Wide-mounted bowl lift cylinders. Minimum transporting width from inside-mounted apron arms and removable draft arms. Cantilever-mounted wheels with Lifetime-Lubricated bearings and Duo-Cone® floating ring seals.



## operating data

|   |  |
|---|--|
| Maximum depth of cut  | 19" (483 mm)                               |
| Width of cut (outside router bits)  | 11'5.5" (3490 mm)                          |
| Cutting edge dimensions:  |  |
| Standard, center section  | .88" x 16" x 62"<br>(22 x 406 x 1570 mm)   |
| Each end section  | .88" x 13" x 35"<br>(22 x 330 x 900 mm)    |
| Optional, center section . . .  |  |
| available in thickness up to  | 1.62" (42 mm)                              |
| Each end section . . .  | available in thickness up to 1.62" (42 mm) |
| Maximum available hydraulic penetration force @ cutting edge (approximate), empty             |  |
|   | 48,000 lb. (21 770 kg)                     |
| Maximum depth of spread   | 16.7" (424 mm)                             |
| Apron opening, bowl 6" (150 mm) off ground level  |  |
|   | 6'7" (2010 mm)                             |
| Apron closure force with cutting edge fully raised and apron opened 12" (300 mm), approximate |  |
|   | 38,000 lb. (17 240 kg)                     |



## hydraulics

Bowl, apron and ejector individually controlled. Bowl lever has raise, hold, power down and quick-drop positions. Trigger on bowl lever allows simultaneous apron closure with bowl actuation. Apron lever has open, hold, positive close and detented float positions. Ejector lever has forward, hold and detented return positions. Automatic kickout on return.

Bowl uses two 7.2" (183 mm) bore and 34.4" (870 mm) stroke, double-acting cylinders with special quick-drop valves. Carry check valves isolate circuit from load in hold position. Wide, low bowl for large payloads and excellent loadability.

Apron uses one 8.2" (208 mm) bore and 28.6" (730 mm) stroke, double-acting cylinder with multiplier linkage controlling force, speed and length of travel. Closure force regulated by relief valve protecting apron and bowl. Sequence relief valve protects circuit when bowl is raised with apron closed.

Ejector uses one 8.2" (208 mm) bore and 74" (1880 mm) stroke, double-acting cylinder.

Hydraulic circuits are filtered closed systems. Single reservoir with separate pumps for scraper-steering control and cushion hitch:

### Output @ 2000 RPM:

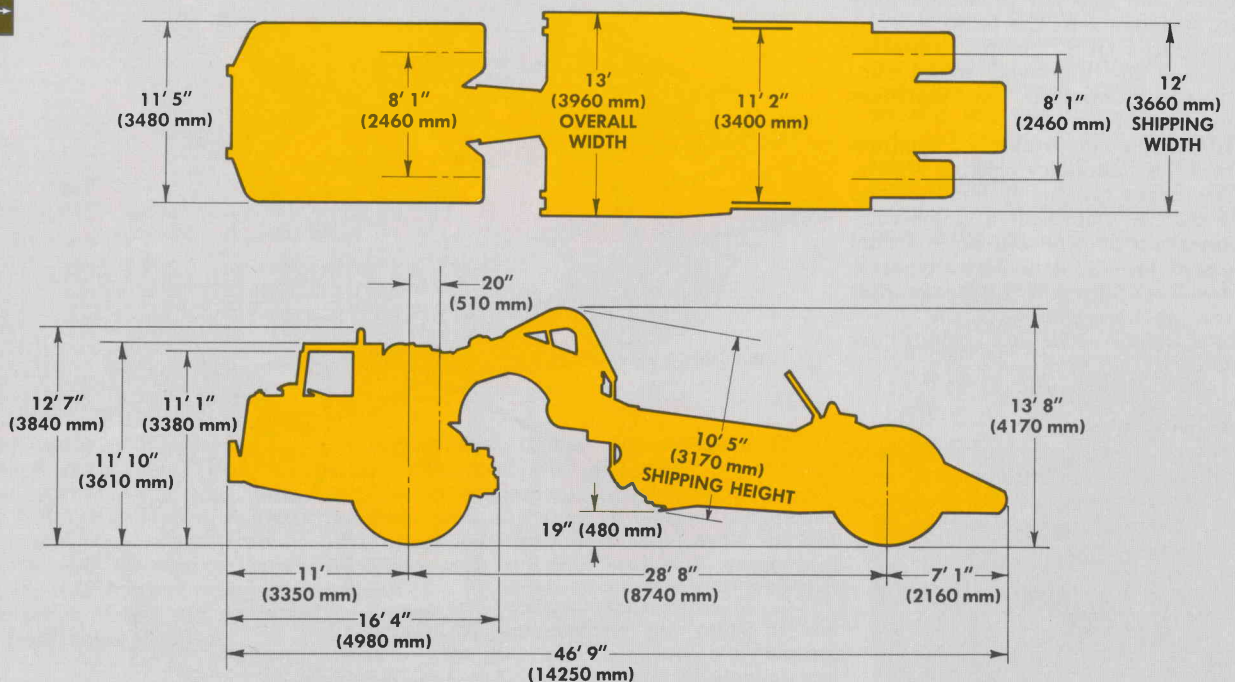
|               |                         |
|---------------|-------------------------|
| Steering      | 99 gpm (384 litres/min) |
| Scraper       | 91 gpm (352 litres/min) |
| Cushion hitch | 16 gpm (63 litres/min)  |

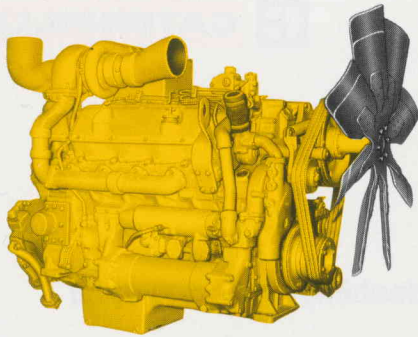
### Relief valve setting:

|               |                    |
|---------------|--------------------|
| Scraper       | 2000 psi (141 bar) |
| Steering      | 1725 psi (121 bar) |
| Cushion hitch | 2300 psi (162 bar) |

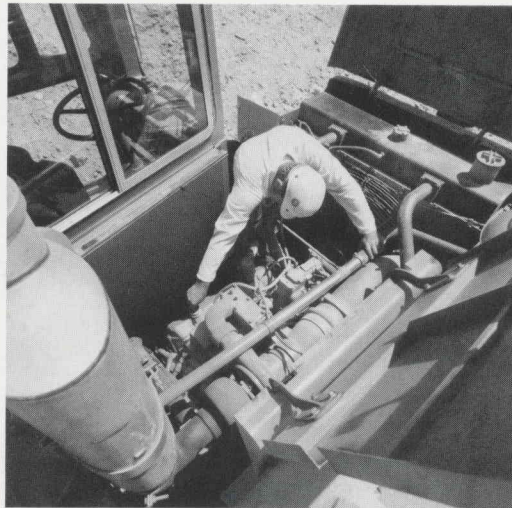


## dimensions





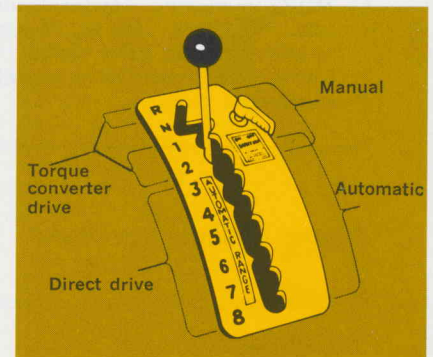
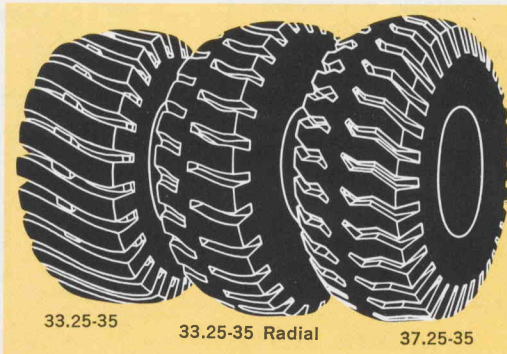
**Reliability and durability** . . . that's what you get from the 450 flywheel horsepower Cat Model 3408 diesel, a 65° V-8. Turbocharged and jacket water aftercooled for efficient fuel combustion, the 3408 offers performance with serviceability, long component life, simplified rebuild procedures.



**Servicing ease** reduces downtime on the 631D:

- Two-piece hinged hood and hinged door on left front of tractor offer easy access to engine.
- Independent removal of major components.
- Crankcase guard under tractor has three-section hinged design.
- Easily accessible hydraulic lines and wiring.
- Hydraulic tank mounted to the front of fuel tank on right front deck.
- Sight gauges for transmission and differential.
- Increased lubrication intervals - every 100 hours - for nearly all hitch and steering fittings.
- Push-button operation of air tank drains.

**Choice of standard and optional tires** is available for a wide variety of applications. Select the standard 33.25-35, 38 PR (E-3) for good performance on many jobs. Optional radial steel cords in this size are also available. Optional wider tire, 37.25-35, 30 PR (E-3), has a larger contact area to reduce ground pressure and increase flotation. Machines equipped with this tire can negotiate poorer underfoot conditions and travel faster on soft materials.



**Strengthened for rock service:**

**Bowl**

1. Bottom - top plate.\*
2. Bottom - bottom plate.\*
3. Side sheets.
4. Side bottom rails.\*
7. Cutting edges.\*
8. Cutting edge support.\*
9. Router bit support.\*

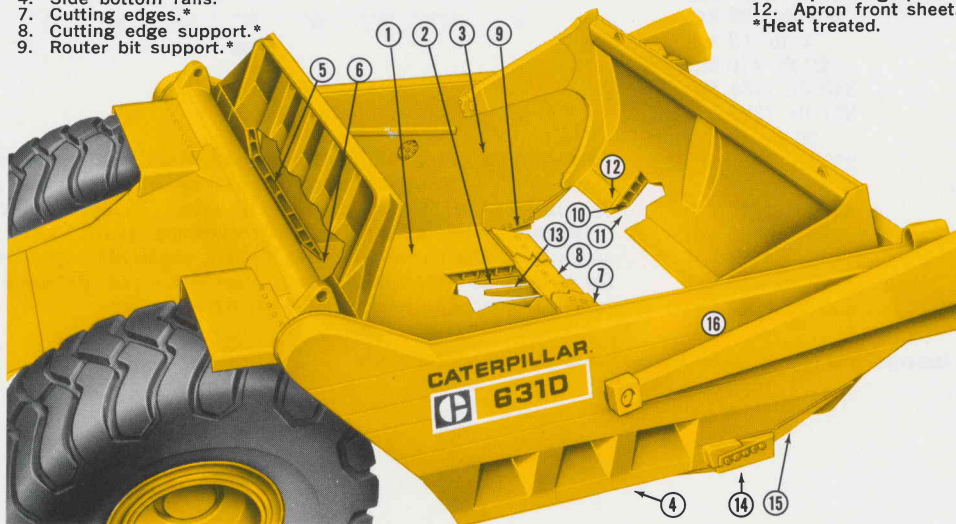
13. More cutting edge support ribs.
14. Router bits.
15. Router bit support reinforcement.
16. Side reinforcement plate.

**Ejector**

5. Front sheet.
6. Bottom rail.

**Apron**

10. Lip - channels.\*
  11. Lip - large plate.\*
  12. Apron front sheet.\*
- \*Heat treated.

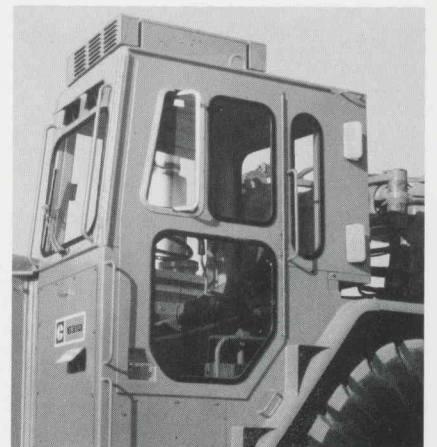


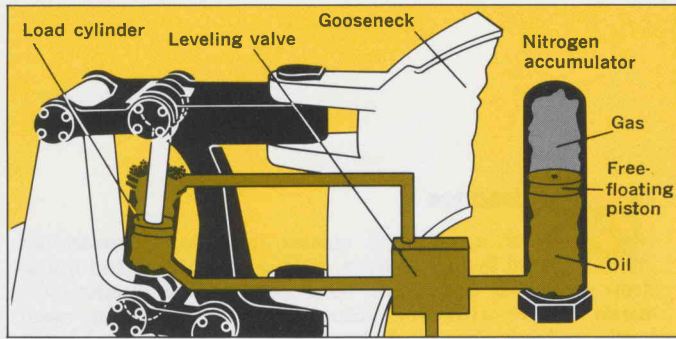
**For rock application**, a Special Application Scraper is available. Complete bowl is box sectioned for maximum strength, and high-tensile steel is used in high wear and stress areas. Extensive heat treatment is used in bowl bottom plates, side bottom rails, cutting edge support, router bit support and apron front sheet and lip.

**For a smoother, quieter ride**, optional ROPS sound-suppressed cab is isolated - entirely secured on rubber mountings, with no metal-to-metal contact. Sound is further suppressed with insulated right and back walls, a roof headliner and positive seals on doors and windows.

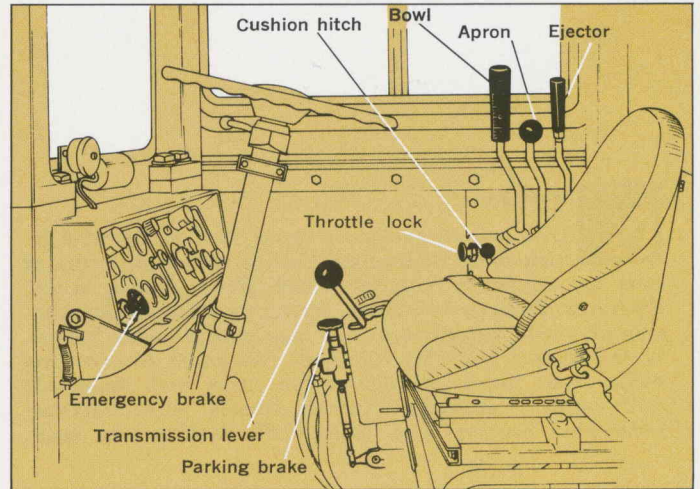
Ventilation is provided by air vents in key areas to give maximum air flow, a side wing on the door and a sliding glass window on the right. An optional air conditioner is available.

**Cat 8-speed semiautomatic transmission** combines automatic shifting with high torque multiplication and direct drive mechanical efficiency. Reverse, 1st, 2nd and the highest desired gear are manually selected. The transmission shifts up and down automatically between 2nd and the highest selected gear. Reverse and gears 1 and 2 are torque converter drive for powerful rimpull needed for loading and dumping. Gears 3 through 8 are direct drive for quick acceleration and high hauling speeds. A hydraulic governor monitors ground speed to control shifting between 2nd and the highest selected gear . . . reducing the possibility of lugging and overspeed. Downshift inhibitor, which helps prevent engine overspeed due to improper downshifts, is standard.





**Cushion hitch** provides smoother hauling and higher usable speeds. It connects two separate tractor and scraper castings at the top and bottom by mechanical links, forming a pivoting parallelogram arrangement which allows vertical movement between the two sections. A hydraulic cylinder connects the links from the bottom tractor pivot to the top scraper pivot. When the 631D hits a bump, the load cylinder forces oil into two nitrogen-over-oil accumulators. The accumulators cushion the bump like a shock absorber. The system can handle several shocks at the same time to reduce machine bounce. And that means greater productivity . . . longer machine life . . . reduced haul road maintenance . . . less operator fatigue.



**Convenient controls** are designed to improve operator efficiency:

- Bowl-apron trigger control enables operator to position bowl and lower apron with one lever.
- Apron "float" and ejector "return" positions are detent-held to free operator's hand for other controls.
- Throttle lock (optional) holds throttle in high idle position during long hauls or when climbing grades.
- Emergency brake button control located on dash.
- Familiar location of transmission console and scraper controls at operator's right.



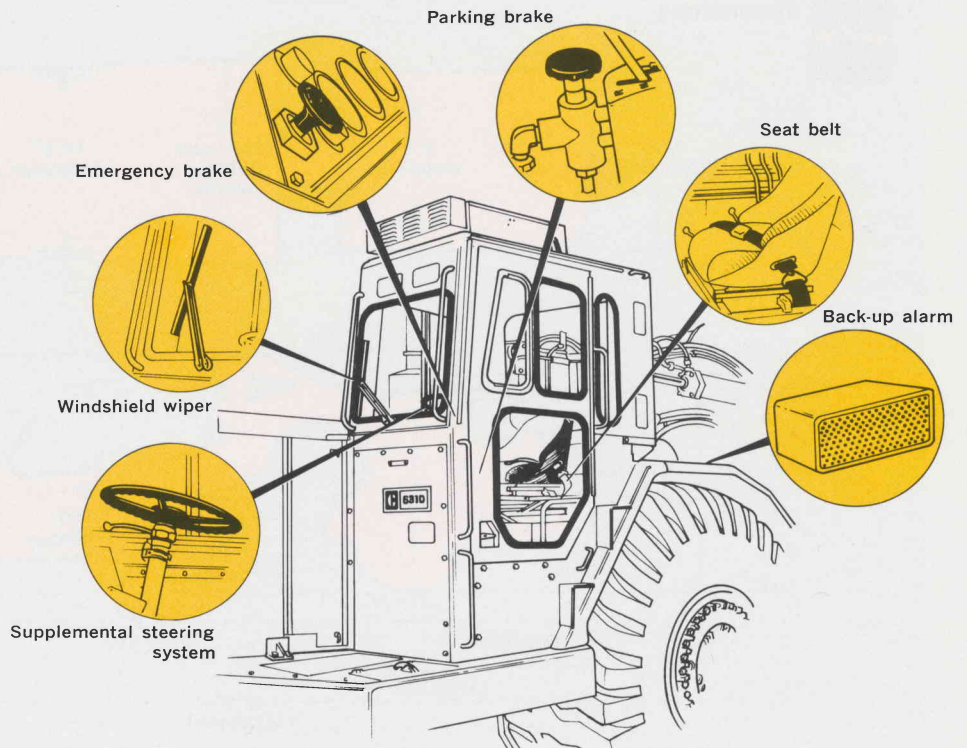
**Large capacity and wide, low bowl design** . . . coupled with low weight-to-horsepower . . . add up to excellent loadability, maximum loads and high productivity. Angle and height of ejector are designed for optimum load retention and material rolling action. And you get these time-proven features: positive bulldozing ejection, powerful double-acting hydraulics and cantilever-mounted wheels.

**Machine and operator protection** have been designed into the 631D:

- Integral ROPS canopy, vibration isolated for improved sound suppression, standard on machines sold in U.S.A.
- Oil-disc parking brake . . . separate from the emergency braking system.
- Emergency braking system designed so that no failure of a single component on the line will cause a total loss of brakes. Automatically actuates if operator fails to engage after warning horn sounds.
- Seat belt, windshield wiper are standard.

**And these options:**

- Ground-driven supplemental steering system . . . supplies hydraulic pressure for steering if engine stops.
- ROPS sound-suppressed cab.
- Back-up alarm.





### standard equipment

24-volt direct electric starting. 50-amp alternator. Two 220-amp-hour, 12-volt batteries. Suction fan. Muffler. Crankcase guard. Dry-type air cleaner with automatic dust ejector. 8-speed semiautomatic power shift transmission. Downshift inhibitor. Differential lock. Coolant flow indicator. Cushion hitch. Quick-drop bowl control valve. Combination bowl-apron control lever. Parking brake. Emergency braking system. Brake shields. Horn. ROPS canopy (U.S.A. only). ROPS mounting. Hydraulically adjustable suspension seat. Seat belt. Operator's station with vibration isolators. Electric hour meter. Windshield wiper. Dash lights. Headlights. Rear-mounted floodlight. Vandalism protection group.

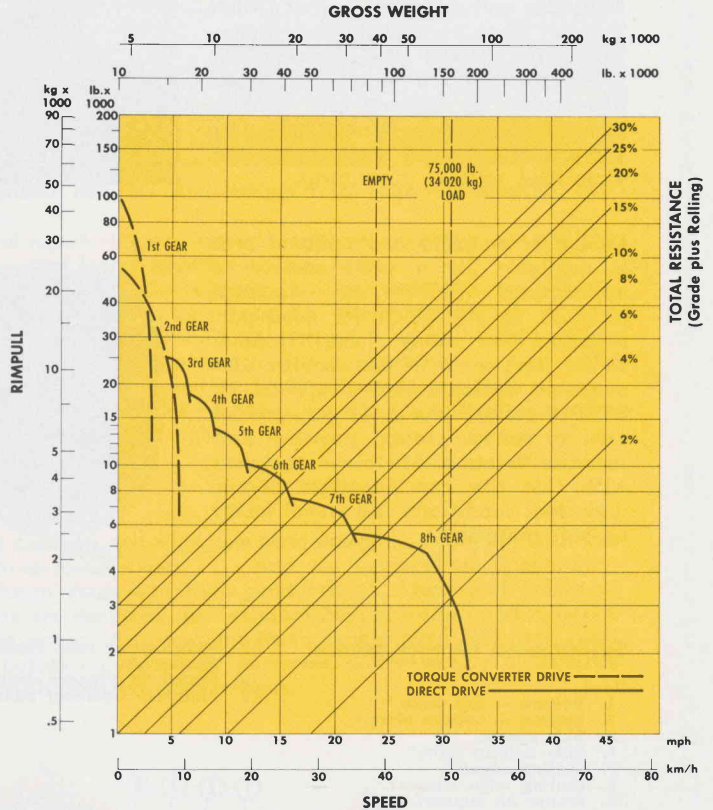


### optional equipment

(with approximate installed weights)

|   |                    |
|---|--------------------|
| Air conditioner/heater .....                                | 262 lb. (119 kg)   |
| Back-up alarm .....   | 7 lb. (3 kg)       |
| Cab, ROPS, sound suppressed .....                           | 825 lb. (374 kg)   |
| Canopy, ROPS (standard in U.S.A.) .....                     | 600 lb. (272 kg)   |
| Fast-fill fuel system, automatic<br>or manual shutoff ..... | 7 lb. (3 kg)       |
| Fast oil change system .....                                | 10 lb. (5 kg)      |
| Fenders, scraper .....                                      | 340 lb. (154 kg)   |
| Heater, cab, roof-mounted .....                             | 212 lb. (96 kg)    |
| Heater, engine coolant .....                                | 5 lb. (2 kg)       |
| Hood door, right side .....                                 | 22 lb. (10 kg)     |
| Power train guard .....                                     | 340 lb. (154 kg)   |
| Retarder, hydraulic .....                                   | 371 lb. (168 kg)   |
| Starting receptacle .....                                   | 20 lb. (9 kg)      |
| Supplemental steering system .....                          | 225 lb. (102 kg)   |
| Tires, set of two, tractor and scraper:                     |                    |
| 37.25-35, 30 PR (E-3) .....                                 | 490 lb. (222 kg)   |
| 33.25-35, radial steel cord .....                           | 124 lb. (56 kg)    |
| 33.25-35, radial steel cord .....                           | -470 lb. (-213 kg) |
| Tool kit .....  | 23 lb. (10 kg)     |
| Travel brackets .....                                       | 550 lb. (249 kg)   |

## gradeability/speed/rimpull



**To determine gradeability performance:** Read from gross weight down to % of total resistance. (Total resistance equals actual % grade plus 1% for each 20 lb./ton (10 kg/t) of rolling resistance.) From this weight-resistance point, read horizontally to the curve with the highest obtainable speed range, then down to maximum speed. Usable rimpull depends upon traction available and weight on drive wheels.

Materials and specifications are subject to change without notice.