

Hydraulic Training Systems

Teaching and learning hydraulics in real-time



MF500-IS-TSE Hydraulic Implement and Articulated Steering System Module (optional)

Adding the optional, and affordable, “plug-and-play” hydraulic implement and articulated steering system trainer to the MF500-HT-TSE hydrostatic transmission trainer transforms it into a fully-functional front-end loader with articulated hydraulic steering, and a cylinder service center.



Optional hydraulic implement and articulated steering training module

Purpose -

Instructors who use actual front-end loaders for teaching bucket control hydraulic systems and hydraulic steering systems encounter the same problems as they do using a skid-steer type loader for teaching hydrostatic transmission systems - inherent safety hazards and the inability to safely load the bucket control and steering systems. Which arguably makes these types of vehicles useless for the purpose of technical education.

The MF500-IS-TSE hydraulic implement and articulated steering module is designed exclusively for educational purposes, which made safety our number one design objective.

Safety -

The MF500 designers identified four potential hazards associated with the use of front-end loaders in an educational setting:

1. Bucket riding - It is possible for a student to ride in the bucket of a front-end loader.
2. Foot pinch-point - It is possible for the bucket of a front-end loader to be inadvertently lowered onto a student's foot. This problem is of particular concern if the bucket is equipped with a float option. The float option makes it possible for the bucket to free-fall to the ground from any elevation if the float position is inadvertently selected.
3. Unsecured load - If a student placed an object in the bucket of a front-end loader to simulate load there is a possibility the load could fall out if the bucket is inadvertently tipped forward.
4. Lift arm and rollback mechanical locks - Most bucket mechanisms have integrated mechanical locking devices. However, some lock the cylinder rods only. In the event of a cylinder being removed it is possible to compromise safety.

The MF500 designers eliminated these hazards:

1. No floor surface in the bucket - Without a floor surface to stand on, students are not enticed into “riding” the bucket.
2. Bucket lip and sides do not touch the ground - The entire lower surface of the bucket is designed to stop at least 4” (10cm) off the ground to prevent foot crush hazards.
3. Safe and secure load - No floor means no loose loads, which can fall out accidentally. The load fastens securely to the bucket with redundant safety locks and pins.
4. Mechanical locks - The lift/lower, rollback/dump, and articulated steering mechanisms, are void of pinch-points. However, to give students a sense of reality, safety locking mechanisms identical to those used in industry were added so they can practice and learn how important mechanical locks are and how to properly use them.

In addition, the lift-cylinders are equipped with integral, non-adjustable, safety flow control orifices, which are designed to regulate descent velocity in the event of a hydraulic hose failure and when lowering a loaded bucket.

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Features and Benefits:

Load is mobile, safe, and environmentally friendly -

The load consists of a 70 gallon (265 liter) water tank, which is contained on a mobile fixture. Heavy-duty casters with four-wheel brakes support the load.

Load engagement in the bucket is simple, safe, and semi-automatic. The load assembly has two steel arms welded to a steel support bar. When the load is rolled into the bucket the arms engage two slots (one on either side) in the rear plate of the bucket. Once through the slots, the arms are locked into place with pins (chained to the bucket).

If a student forgets to install the pin(s) a redundant locking system automatically locks onto the bucket as it begins upward movement.



Compact -

Lab floor space is limited and expensive. The MF500-HT-TSE is designed with this in mind. With a footprint of only 64.0" (163cm) wide x 76.0" (193cm) long, it is a fraction of the size of an actual articulated machine, which makes it easy to maneuver and store.

The optional implement and articulated steering mechanism (MF500-IS-TSE) with a footprint of only 42.0" (107cm) wide x 75.0" (191cm) long sits on three wheels, which are positioned in the form of a tricycle making it easy to move and store.

Attaching or detaching the module is simple – wheel it into place, install two pins, connect two quick-connect fittings, plug in the 24VDC receptacle – and it's ready to go.

Cylinder rebuild station (optional) -

The integral cylinder rebuild station is designed to permit two groups of students to disassemble/assemble cylinders at the same time.

This feature enhances safety because without it students are forced to wrestle cylinders, which are either locked in a vice, or lying on a workbench. If the parts unexpectedly fall they can cause severe injuries to the legs and feet.



The cylinder repair station is designed with safety in mind. The student simply slides the cylinder into a cradle (no tools necessary) and installs a locking pin, which not only secures the cylinder but also prevents it from rotating when the student is loosening/tightening the gland.

Even if the student forgets to install the locking pin, the cylinder cannot move even when the load lifts up. To prevent oil from spilling onto the ground, two (2) removeable oil drip trays are strategically located on the table top.

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Specifications -

Pump:	Gear type - 0.77 in ³ /rev. (12.61 cm ³ /rev.) fixed displacement
Pressure:	2000 PSI (138 bar) maximum pressure
Directional control valve:	Sectional type (four sections) - inlet section, two spool sections, and outlet section. Section 1 - Inlet section with integral, adjustable pressure relief valve (cartridge-type) Section 2 - Three-position, four-way, cylinder spool configuration, load check valves, cylinder port relief valve (cartridge-type) and anti-cavitation valve (cartridge-type) Section 3 - Three-position, four-way, cylinder spool configuration, load check valves, two cylinder port/anti-cavitation combination valves (cartridge-type) Section 4 - Outlet section with power-beyond capability
Steering Orbitrol valve:	Closed-center
Differential Pressure Unloading valve:	Cartridge-type
Cross-port Relief valves:	Adjustable, cartridge-type
Cylinders:	Dual lift/lower, double-acting single rod cylinder: Bore - 1.5" (3.81 cm) Rod - 1" (2.54 cm) Stroke - 19" (48.26 cm) Gland type - threaded Rollback/dump cylinder: Bore - 1.0" (2.54 cm) Rod - 5/8" (1.59 cm) Stroke - 4" (10 cm) Steering cylinders: Bore - 1.0" (2.54 cm) Rod - 5/8" (1.59 cm) Stroke - 6" (15.2 cm)
Accumulator:	1 quart (0.95 Liter). Bladder-type.

Safety features:

- Self-contained mechanical lock - lift/lower mechanism
- Self-contained mechanical lock - rollback/dump mechanism
- Self-contained mechanical locks - steering mechanism
- Safe-T-Bleed® installed on all cylinder ports to facilitate safe de-energization and verification procedures and drip-free and safe air-bleeding procedures
- Industry-standard Warning and Caution decals - Multi-lingual warning and caution decals are placed wherever necessary on the machine
- Zero pinch-points

Diagnostics:

Diagnostics on the implement system are in real-time because the implement system operates under actual working and load conditions.

Wear-type faults are designed into the pump, pressure relief valve, directional control valves, and cylinders. Directional control valve diagnostics includes precision leak detection using FPTI™'s exclusive pressure/leak test technology. Students learn to isolate leakage between a cylinder port cartridge valve and wear between the spool and bore.

Options:

Pump:	Pressure-compensated, variable volume Pressure-compensated, variable volume with load-sense
Directional Control Valve:	Electro-hydraulic control Hydraulic pilot with joystick control - - Single-axis Load-sense
Cylinders:	Internal magnet for position feedback

All FPTI™ simulators are available for operation at any voltage or frequency

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Shipping Specifications -

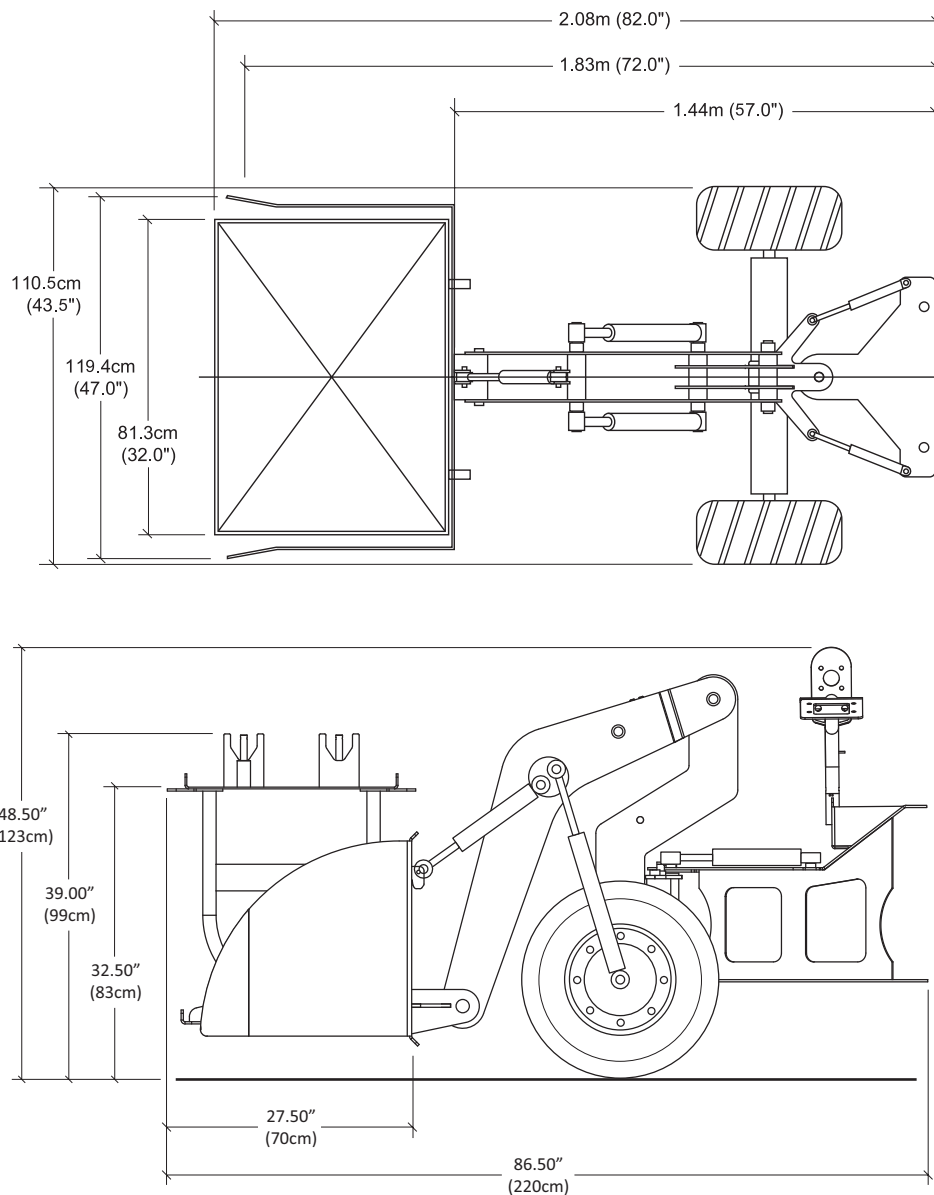
Shipping weight (does not include pallet or packaging):
560 lbs (254 kgs)

Shipping dimensions:

45.0" (114cm) tall x 42.0" (107cm) wide x 75.0" (191cm) long

Warranty -

FPTI™ warrants its products against defect in materials or workmanship for a period of two (2) years from date of delivery.



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