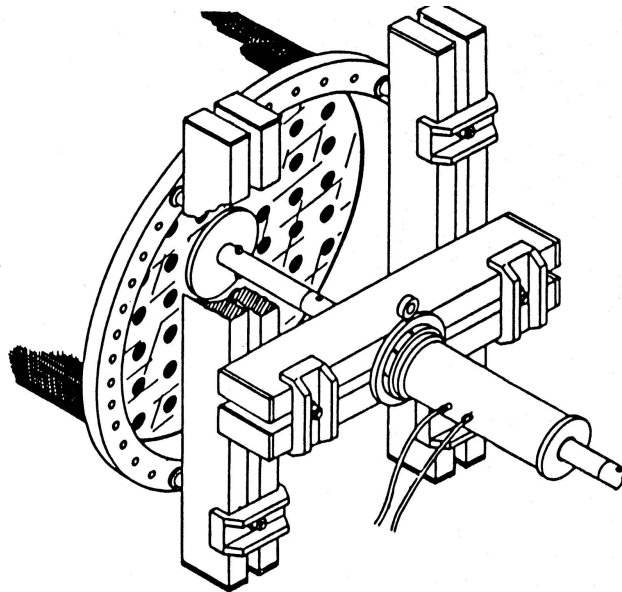


# HydraPULL

## Hydraulic Bundle Extractor

### MODEL MK-1085



## Assembly and Operation Instructions

# BASIC OPERATION

## Hydraulic Bundle Extractor

### MODEL MK-1085

#### **PUSH MODE:**

Essentially this Hydraulic Tube Bundle Extractor operates as a jack to remove the heat exchanger bundle from the exchanger shell. Push rod extensions are added to the hydraulic cylinder at the completion of each stroke series and the cycle is repeated as necessary for complete removal of the tube bundle.

#### **PULL MODE:**

In order to use the Hydraulic Tube Bundle Extractor to pull bundles into the heat exchanger shell, the operation is reversed and a cable is used. The cable is inserted through a tube in the heat exchanger and attached to a pull plate. The other end of the cable is attached to a pull rod and the rod and bundle are pulled into the exchanger shell as the pump retracts the cylinder and pulls. The operation is repeated as necessary to locate the bundle at the proper position in the heat exchanger shell.

#### **CAPACITY OF MK-1085 UNIT**

Hydraulic Cylinder	50 tons
Minimum Exchanger Diameter	20 inches
Maximum Exchanger Diameter	90 inches
Maximum Exchanger Length	20 feet
Maximum Stroke of Cylinder	6 inches
Maximum Push/Pull Length	20 feet

Each unit is furnished with adjustable mounting apparatus consisting of a bridge on which the cylinder is mounted and to which the bridge extensions are attached. Push rod extensions are furnished in convenient lengths for use on bundles from 3 feet to 20 feet. Other items furnished as standard equipment include standoff legs, hydraulic hoses with quick connectors, hand-operated two-stage hydraulic pump and all necessary bolting for assembly and mounting on exchanger.

#### **I. INITIAL SET-UP**

Unpack the unit, clean and inspect for possible shipping damage. Lay the unit out in an area where each part may be identified. The unit is now ready for assembly and operation.

The Hydraulic Cylinder is then screwed into the bridge at the Cylinder Mounting Flange. Tighten the Hydraulic Cylinder securely. Next insert the Push Plate Rod into the Push Plate and secure

with Push Plate Locking Pin. Slide the Push Rod Spacer over the Push Plate rod and insert through Hydraulic Cylinder from the side of the Bridge that will face the exchanger bundle.

## II. MOUNTING UNIT ON EXCHANGER – GENERAL

Select the proper combination of mounting components to match exchanger size.

The MK-1085 Hydraulic Tool Bundle Exchanger is mounted on the exchanger as a Bridge or a combination of the Bridge and Bridge Extension by using the unit mounting accessories. On exchangers of 18" to 54" only the Bridge is required. From 54" to 90" both the Bridge and Bridge Extensions are used.

### A. Mounting and Initial Break Position 18" to 54"

On smaller exchanger (up to approximately 50") only the Bridge is normally required.

- A1. Screw a tie down Rod completely through a Stand-Off Leg until 4" to 5" of the rod extends past the small diameter end of the Stand-Off Leg. Repeat this stem for the second Stand-Off Leg.
- A2. Insert the long end of each Tie Down Rod (extending from large diameter end of Stand Off Leg) through the slot in the middle of the Bridge, one Rod at each end of the Bridge.
- A3. Fit one Bridge Tie Down Mounting Bracket over the extended end of each Tie Down Rod. Place one Mounting Bracket Washer and Mounting Bracket on Tie Down Rod. Screw down firmly against Bridge Tie Down Mounting Bracket, but do not tighten mechanically.
- A4. Lift assembled unit (Bridge with Hydraulic Cylinder, Stand-Off Legs, Tie Down rods, Push Plate and Push Plate Rod) into place and mount to exchanger shell by extending Tie Down rods through exchanger flange bolt holes. Fasten securely with Mounting Bracket Washers and Nuts.
- A5. Align mounted unit so that Push Plate will push against center of exchanger tube bundle. Securely tighten all 4 Mounting Bracket Nuts.

### **Notice:**

To obtain maximum performance from the MK-1085 Hydraulic Tube Bundle Extractor, the Bridge and Bridge Extensions must always be mounted parallel to the face of the tube sheet that is to be removed.

- A6. After mounting is completed connect the 2 Hydraulic Pump Hoses to the Hydraulic Cylinder and Hydraulic Pump. Ensure that the Hose Couplings

are connected tightly or the ball check valves will not allow pressure inside the Hydraulic Cylinder.

**Notice**

Refer to Hydraulic Pump Operating Instructions and comply with all information for assembly and operation.

- A7. Place the 3-position control valve lever to the side which extends the Hydraulic Cylinder when the Hydraulic Pump is used. Extend the Hydraulic Cylinder ram fully until the Push Rod Spacer is Firmly Butted against the Push Pin.

**Caution:**

Never use Push Plate Locking Pin inserted in hole of Extension rods to make initial break. Damage to the Pin and/or Extensions may occur.

- A8. Continue pumping until the initial break is made.
- A9. Reverse the Hydraulic Pump and ram to original position.

**Push or Extraction Procedure 18" to 54"**

Extraction of the tube bundle can be made more efficient if a vibrating device is attached to the exchanger shell and operated while pressure is being applied by the MK-1085 Extractor.

- A10. Insert Push Rod Locking Pin into the Push Plate Rod between the Push Plate and the Spacer.
- A11. Stroke the Hydraulic Pump to push the tube bundle a minimum of 9" inches. Return ram to original position and move Push Rod Locking Pin to the next hole and repeat pumping procedure.
- A12. Continue operation until tube bundle is out of exchanger shell by screwing in additional Push Rod Extensions and moving Push Rod Locking Pin after each cycle.

**A. Mounting and Initial Break Position 54" to 90"**

For larger exchangers (approximately 50" to 90") a combination of the Bridge and Bridge Extensions will be necessary.

- B1. Set up equipment in the same procedure as in Section A above (18" to 50") except the Bridge Extensions will also be used.

B2. Install Bridge Extensions first, in a pattern not to exceed mounting length of Bridge. Stand Off Legs, Tie Down Rods, Mounting Bracket Washers and Nuts, Bridge Extension Tie Down Mounting Brackets (2) will be used.

**Notice:**

Mounting Brackets (1) and (2) are not interchangeable.

B3. After Bridge Extensions are mounted and securely fastened, install Bridge across face of Bridge Extensions using Rod Washer Plate and Bridge Mounting Brackets.

B4. Make initial break in the same procedure as for 18" to 50" exchanges, noted in Section A above.

**Caution:**

Never use Push Plate Locking Pin inserted in hole of Extension Rods to make initial break. Damage to the Pin and/or Extensions may occur.

**Push or Extraction Procedure 50" to 90"**

Follow the same steps as detailed in Section A.

**General Cautionary Notes to Initial Break and Extraction Operations for all size Exchangers:**

Personnel should stand clear of the exchanger and extractor work area while pressure is being applied. The hydraulic cylinder in the MK-1085 is a source of tremendous energy. If breakage should occur it will most likely be in the area of the mounting studs (Tie down Rods). The stud size of the heat exchanger flange is the limiting factor which prevents use of larger Tie down Rods.

The Hydraulic system should never be disconnected while under pressure.

Use of Safety Glasses by personnel is recommended at all times.

**B. Pulling Operation 18" to 54"**

To pull a tube bundle back into the exchanger shell, the MK-1085 must be taken down from the push position and re-installed. The Bridge and Hydraulic Cylinder are reserved so that stroking the pump will "pull" the tube bundle rather than push.

C1. Mount the MK-1085 using all equipment items noted. The Stand-Off legs may be butted face to face to provide additional distance between the Tube Bundle

Extractor and incoming tube bundle. Extension Tie down rods are used if additional length is required.

- C2. Slide the Wire Rope through a tube in the center of exchanger bundle and pull the Push Plate Rod already installed. Loop the Wire Rope through the Push Rod Locking Pin hole (5/8 in) and secure with Wire Rope Clips.
- C3. Tie off opposite end of Wire Rope with Push Plate Pull Plate Pull Plate Locking Pin and Wire Rope Clips.

**Notice:**

Premium grade extra strength Paulsen XL-25 (28,000lb) wire rope was supplied with this unit. Do not substitute lesser quality wire rope. If replacement is required, reorder equal quality material.

- C4. Add additional Extension Rods to Push Plate Rod until they extend through Hydraulic Cylinder. Install Push Rod Locking pin.
- C5. Stroke pump and pull tube bundle until Wire Rope loop in Push Plate Rod reaches Hydraulic Cylinder. Remove and reinsert Push Plate Locking Pin to each succeeding pin hole as Extension Rods are pulled through into Hydraulic Cylinder.
- C6. If necessary, re--install MK-1085 at opposite end of exchanger in the push mode and continue operation until tube bundle is in place.

**C. Pulling Operation 54" to 90":**

For larger exchanger (approximately 50" to 90") a combination of the Bridge and Bridge extensions will be necessary.

- D1. Set up equipment in the same procedure as in Section C above (18" to 50") except the Bridge Extensions will also be used.
- D2. Install Bridge Extensions first, in a pattern not to exceed mounting length of Bridge. Stand Off legs, Tie down Rods, Mounting Bracket, Washers and Nuts and four bridge extension tie down mounting brackets (2) will be used.

**Notice:**

Mounting brackets and are not interchangeable.

- D3. After Bridge Extensions are mounted and securely fastened, install Bridge across face of Bridge Extensions using Rod Washer Plate and Bridge Mounting Brackets. Note that the Bridge and Hydraulic Cylinder are now reversed.

D4. Follow the same steps as detailed in Section C to pull tube bundles.

**General Cautionary Notes to Pulling Operations for all size Exchangers;**

Personnel should stand clear of the exchanger and extractor work area while pressure is being applied. The Hydraulic Cylinder MK-1085 is a source of tremendous energy. If breakage should occur, it will most likely be in the area of the mounting studs (Tie Down Rods). The stud size of the heat exchanger flange is the limiting factor that prevents use of larger Tie Down Rods. Use of safety glasses by personnel is recommended at all times. The Hydraulic system should **never** be disconnected while under pressure.