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Don't Lift It... Hoist It

article and photos by Ron Muir

Own a heavy telescope? Having trouble getting it in and out of your vehicle? Want to save your back...or what's left of it after trying to move your big telescope too many times? If any of this seems familiar then you might want to think about using a hoist to do all the heavy lifting. Sure, a hoist may not be the answer for everyone's heavy telescope problems but it can certainly be the answer for some, just as it was for me.

In the past with other heavy telescopes I did the best I could with them and whatever type of vehicle I currently owned. This often meant I lifted much more weight than I should have, especially after a long observing session when all my buddies were either sacked out or had left earlier.

This time around before drawing up plans for my next telescope, I took a different tack by first determining which pickup truck could best accommodate my grand plan. There were two criteria that had to be met: 1. The truck selected had to have the largest bed size available and: 2. It must have the strongest bed sidewalls. At first blush one would think that the bed size would be the primary consideration for a large telescope. But, my plan to build in a permanent rotating hoist lead me to believe the strength of the sidewall was the most important factor. Because, no matter how big the bed is, if the scope can't be easily loaded and unloaded then bed size just didn't matter.

Operational requirements for the planned hoist dictated that the boom had to be extendable. It had to reach beyond the truck tailgate and still collapse sufficiently to swing through the camper shell opening. The entire assembly had to rotate almost 180 degrees and be convenient for one person to operate plus it must be easy to store away for transport. To insure the pier remained vertical as the boom rotated it had to be supported by a connecting lateral bracket to the bed sidewall and thus the need for a strong sidewall. This bracket had to be attached to the sidewall with multi-attachment points so it would distribute the lifting force evenly.

Clearly, this design is not the most structurally efficient approach, but by using strong enough materials for all the

Engine hoist with extended boom provides easy lifting of telescope components from well inside the truck bed.

component parts the design can be made to work. The combined weight of all the parts was not an issue because they would not be removed from the truck bed. The complete hoist mechanism consists of only five major components, the pier/boom, pier base, trolley assembly, lateral bracket and the winch (plus a few bearings, bolts, nuts and washers). Other than the winch, I constructed all the parts and sub assemblies. None of them were difficult to build or install.

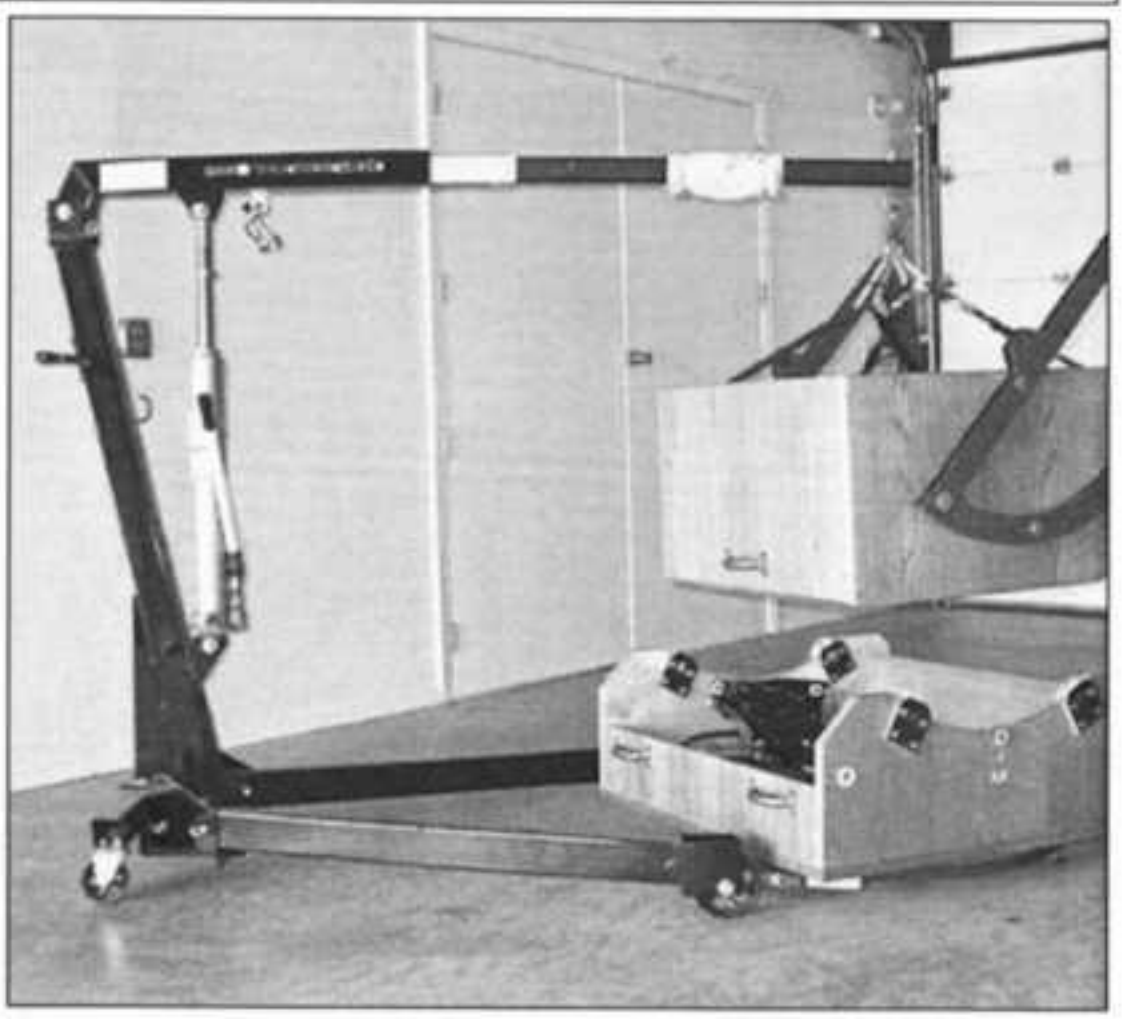
The pier is made of 1/4" wall X 3-1/2" OD mild steel pipe and is 39" tall. The boom is made of 1/4" wall X 2" mild steel square tubing and is 45" in length. The height of the pier and the length of the boom were limited by the inside opening dimensions of the camper shell. The trolley is made of 1/8" wall X 2-1/2" mild steel square tubing and is 28" in length. The trolley handle is 1/2" square tubing and the pulley is made from 2" flange washers. The boom angle brace and the winch mount are made from 1/8" wall X 2" mild steel square tubing.

The floor mounted pier pivot plate is made from 1/8" thick mild steel and is 9" square. The plate has a 2" tall X 4"OD ring welded in the center. The bottom end of the pier rests inside the ring. The lateral support bracket is made from 1/8"X 1-1/2" flat mild steel welded to a 2" tall X 4" OD ring that the pier slips through. The floor mounted ring, in conjunction with the bracket ring, maintains the vertical position of the pier and allows it to rotate freely.

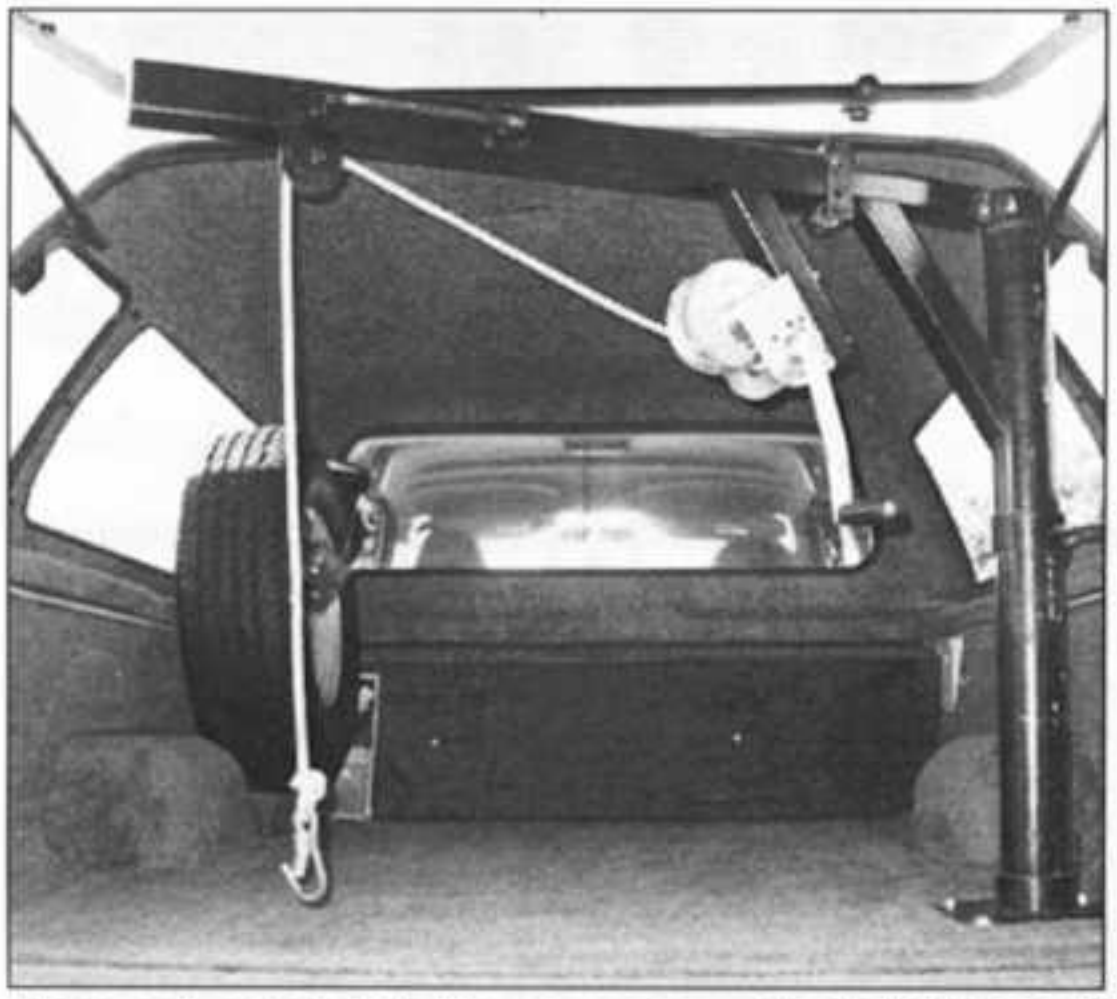
The trolley is free moving, even under loaded conditions. This ease of movement provides good control and accurate placement of the mirror box into the rocker box. The boom has two 1-1/4" OD X 1/2" ball bearings mounted on the top side one inch from the outer end. The inner end of the trolley has similar bearings mounted on the bottom and top so the friction between the trolley and boom is minimized in all positions, retracted or extended.

The winch is manufactured by Fulton Performance Products, model K105. It is a manually operated clutch winch and has an automatic built in brake system. The brake is actuated by turning the handle and will hold the load stationary whenever the handle is released. The automatic braking action prevents the load from accidentally dropping should the handle slip out of my hand. I initially used a simple, non-braking, "boat trailer type" winch and quickly understood that a slip of the hand could easily destroy many years worth of work. Thankfully this didn't happen but it is frightening to even think it could have.

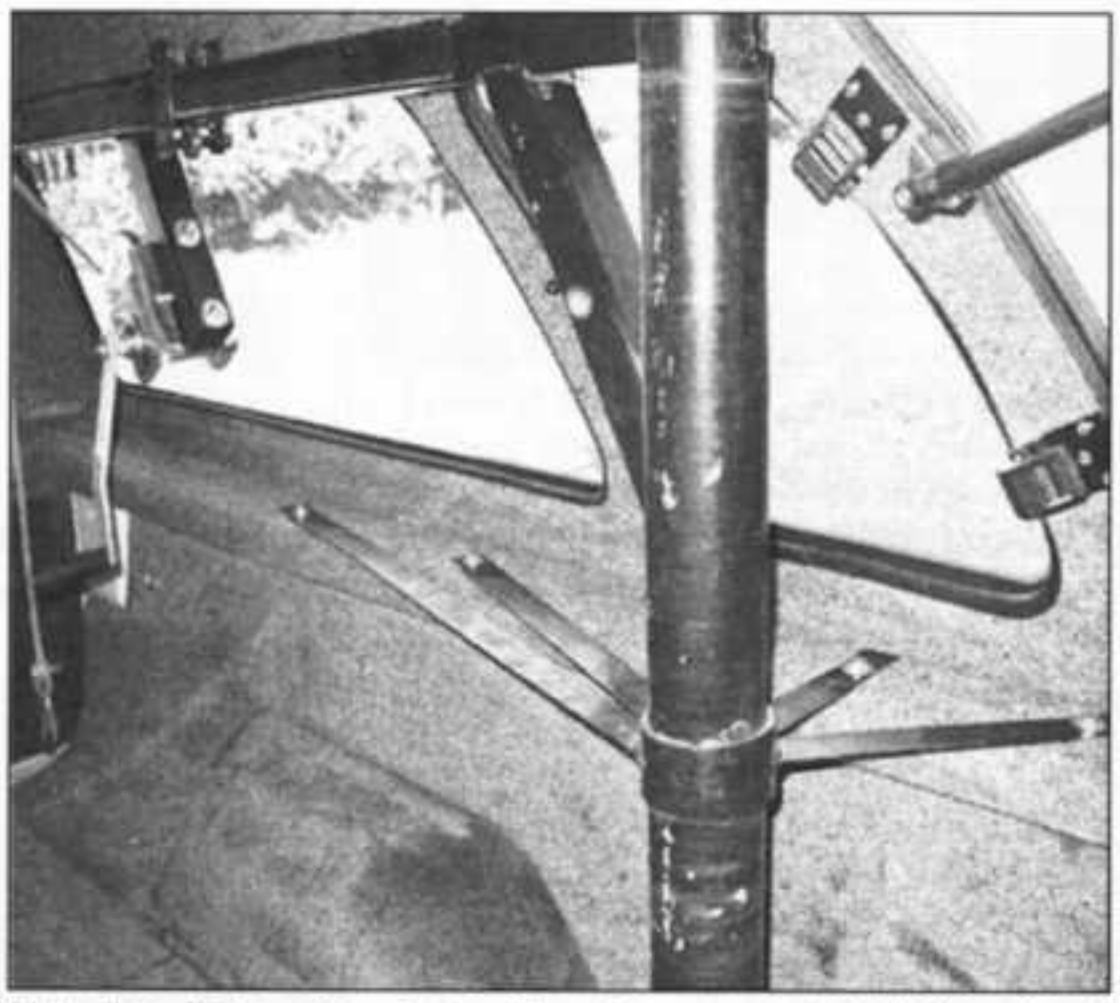
The hoist can be used to lift the entire optical tube assembly should maintenance be required on any of the rocker box components.



The engine hoist's splayed base design makes placement of mirror box into the rocker a simple operation.



Boom and retracted trolley can swing through camper shell opening.



Lateral bracket mounts to bed sidewall and evenly distributes lifting force in all boom positions.

The operation of the winch and rotating boom is convenient and easy to use. Because the trolley can extend 22" beyond the end of the boom, which is 45" in itself, I can lift the mirror box from outside the end of the tailgate and swing it into its transport location in the front of the truck bed before lowering it into place...no lifting at all!!!

I cannot say just how strong the design really is because it has never been tested to its catastrophic limits. I can say that I tested it with weights over 250 pounds and nothing bent or gave way, and most happily the bed sidewall didn't give either. At present the rope is the weakest component in the system and should be replaced with metal cable for heavier lifting. However, it would be hard to imagine a "portable" telescope requiring something stronger.

In addition to the truck bed hoist I took the "no lifting" idea one step further by investing in a simple and economical hydraulic engine hoist. I use this unit to move the scope components and other heavy objects around my workshop. Plus, whenever I need to lift the optical tube assembly out of the rocker box for maintenance I can do it with ease. This hoist has proven to be quite universal and a real back saver.

There is no doubt that these hoists, especially the one in the truck, will greatly extend my ability to continue using the 22" Dob as a "portable" telescope. Indeed, I do not have to lift any major part of the scope, or even the generator I sometimes need in the field. As a deep sky observer I travel to some very remote sites, often by myself. The bed hoist gives me the freedom to choose any site that is accessible with the truck, and still have complete confidence that I can set up and tear down the scope by myself, without any concern about straining my back... again.

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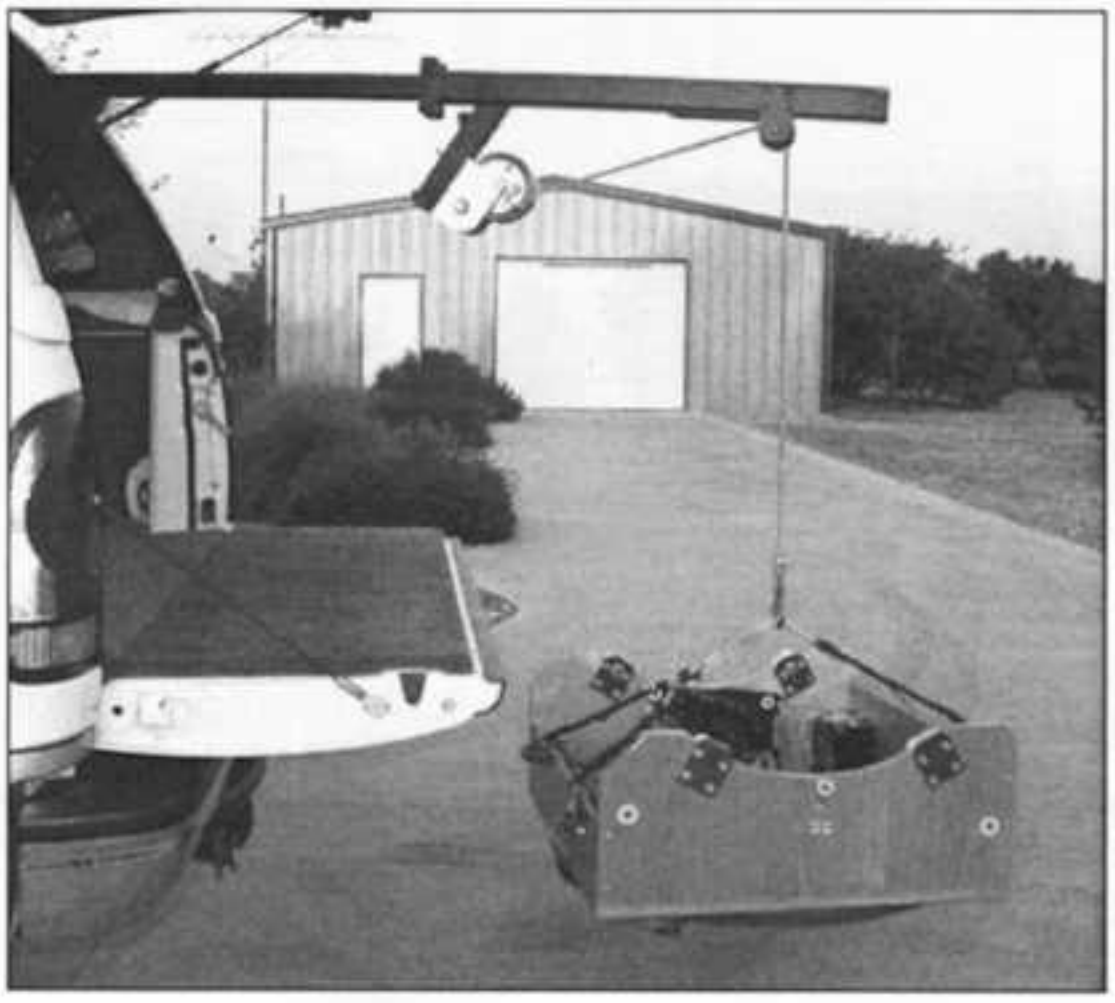
Engine hoist with extended boom provides easy lifting of telescope components from well inside truck bed.



The 130 pound mirror box positioned for installation with fully extended trolley.