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# INSTALLATION MANUAL FOR MECHANICAL PUSH PULL CONTROLS

“Leaders in Quality Marine Controls, Steering Gear, and Disc Brakes.”



## **NOTES ON WARRANTY**

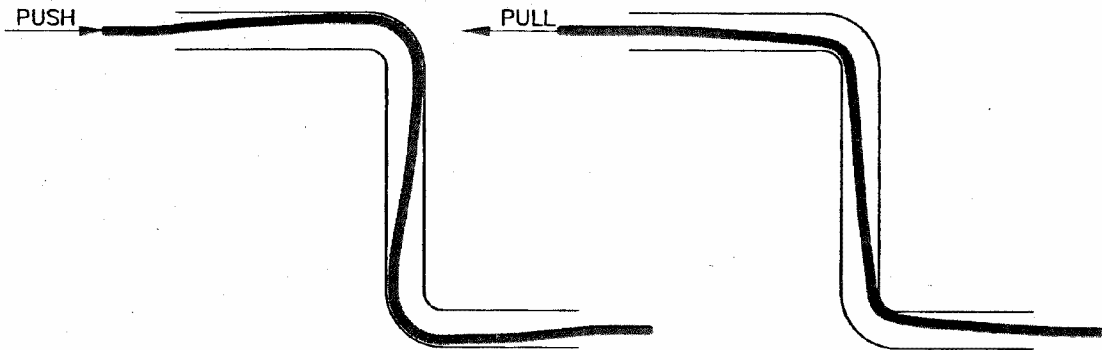
Kobel Manufacturing provides installation and maintenance instructions for its products. If these guidelines are not followed, the warranty will be voided.

For detailed instructions, please contact our Distributors or go to our website at <http://www.kobelt.com>

## Installation Instructions for Mechanical Push Pull Control Heads and Cables

The push pull cable is the easiest way of transmitting linear motion from a command handle to devices such as throttles, clutches, pumps and motors. If a push pull control system consists of just a single short cable, very little difficulty will be encountered in the installation. When a multitude of push pull cables, with relatively long cable runs and several bends are installed, one must pay close attention to installation details.

A push pull cable basically consists of a core and a casing whereby the core is pushed or pulled within the casing. The manufacturing process for such a cable is quite complex, a loose core within the casing will cause a lot of lost motion. If the core is slightly on the tight side, it will be hard to move because of the excess friction. It can be seen from the following sketches that when the cable core is pushed, it will take the longest route and when the push pull cable is pulled, it will take the shortest route.



This is known as lost motion and it is impossible to eliminate lost motion in a push pull cable. In a good quality cable, however, it is kept to a minimum.

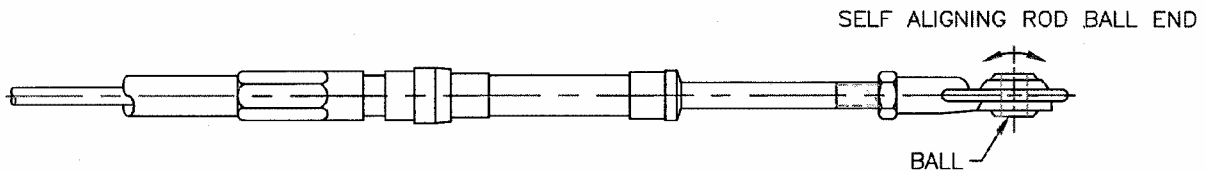
Kobel Manufacturing basically does not recommend solid core cables. A solid core cable would consist of a single wire that is, basically, ridged, whereas in a flexible cable the core itself is not rigid and therefore is easier to move and will consequently cause less friction when in operation. When a push pull cable is installed, it is extremely important not to put any severe kinks in the cable since this will permanently damage the core and casing and will make the cable stiff and inoperable, also premature failure will occur. It should also be noted to keep the cable away from extreme hot items, such as exhaust pipes and extreme cold items such as running a cable through a fish hold which is refrigerated.

### Selecting a Location for the Push Pull Control Head

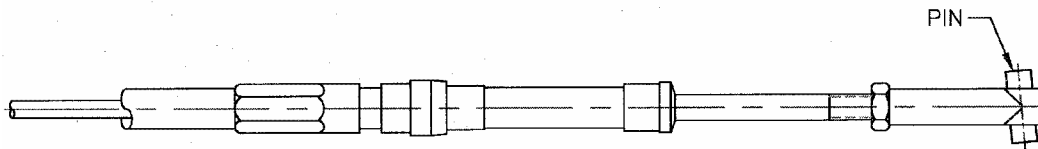
It is important the sufficient room be allowed to, first of all, install a control head on a flat and even foundation that is sufficient to withstand the human force exerted on the control handle and there must also be enough room for the control handles to be moved to either full extended position.

## Cable Connection

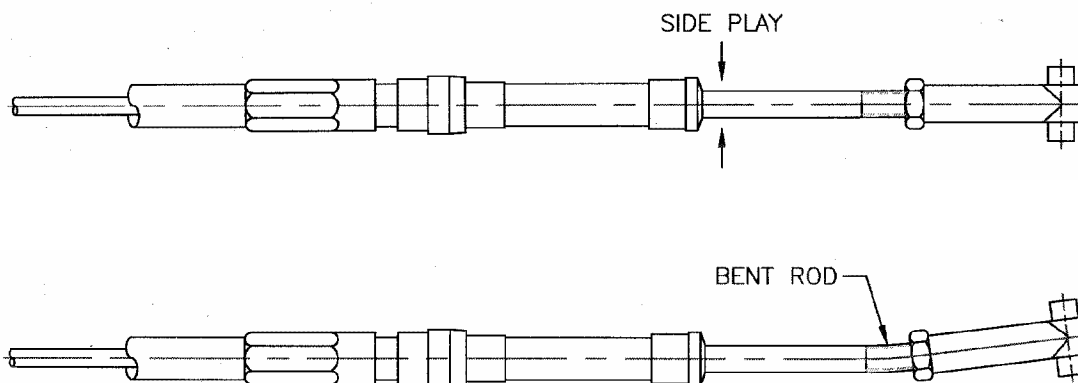
A ball rod end at the cable end is a self-aligning device and cannot cause any friction between the cable clamp and the lever actuating the cable core.



If there is misalignment on the cable end, extreme friction can be generated between the cable end and the cable sleeve, there should be a slight amount of sideways movement at all times to make sure the cable will slide easily.

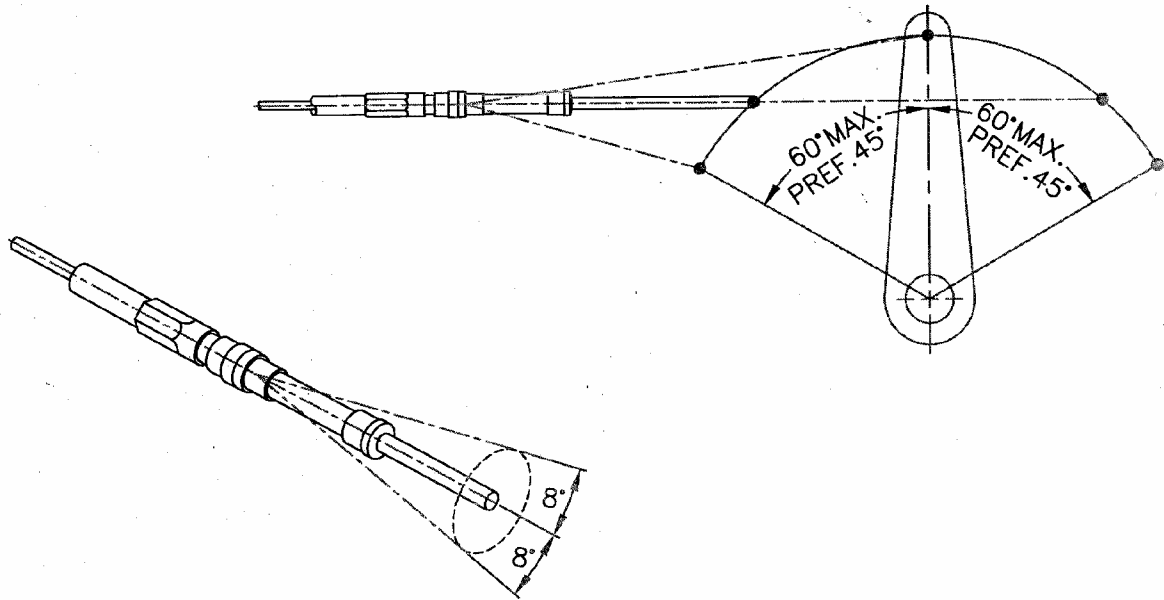


When the cable is installed, it should be checked to see that there is side clearance between the sleeve and the core rod and no misalignment at either the clamp or the control head which will make the cable stiff, as previously mentioned.



It is possible that a cable end may become bent either in transit during an installation or simply gets hit after it is installed. This, in fact, will also cause binding between the core rod and the sleeve.

Felsted™ has a swivel deflection rate of 8°. In other words, when the cable goes through an arch it should not exceed 16° in total and it should be deflected on either side in equal amount. When the cable is in the middle arch position, it should be in a straight line, as illustrated on the drawing below.



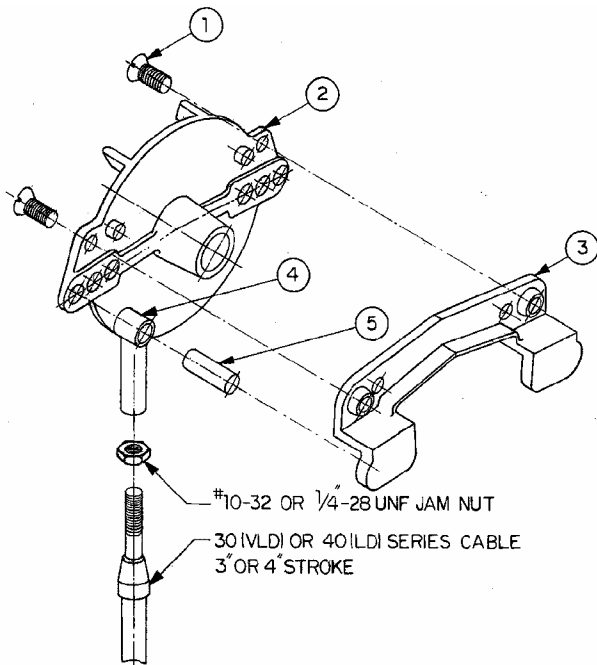
If the cable end is attached to a lever, the lever will go to an arch and it is, therefore, important that the cable clamp is located on the halfway point on the arch (or in the mid position). The lever will be pushing the cable to one side when in one extreme position and it will pull the cable to the opposite side in the other extreme. When a push pull cable is installed, it is important to make a nice even round sweep. Sharp bends must always be avoided. A bend radius of 8" (200 mm) minimum is required. Under no circumstances should a cable be curled up. If a cable is too long, it should be replaced with a cable that will allow a clean sweep in the corners (no excess). A push pull cable is, basically, not designed to push or pull heavy loads. If, for example, a cable is required to push or pull a small load with a relatively long cable having a lot of bends, the push required to operate the load will multiply with each bend because of the friction between the cable core and casing. It is, therefore, important to keep the bends to a minimum and as generous as possible. Even though the Felsted™ cable is an extremely well designed cable, too many bends and too long a cable can still make a system inoperable.

When installing adapter units to the cable end, it is important not to twist the core. Should a fitting prove to be relatively tight on the thread, a pair of pliers or electrical stake on pliers are well suited to hold the cable core from turning while twisting the adapter unit. When holding the cable end, it is of extreme importance not to cause any damage to the rod. To do so it is best to hold the cable right at the end of the thread. A damaged cable rod will damage the cable seal thus allowing moisture and dirt to enter the cable casing.

## INSTALLATION INSTRUCTIONS FOR DUAL LEVER PUSH-PULL CONTROLS

In order to provide a satisfactory push-pull control system, the following points must be observed:

1. Control head must be installed on a flat and clean surface to avoid binding in the bearing sections.
2. When attaching the cable to the control head or the engine, it is important not to twist the inner core of the control cable, as this will cause additional friction.
3. The cables must be routed in a manner to have as few bends as possible and also to avoid sharp bends.
4. Ensure that all fasteners are tightened. For installations subject to severe vibration, secure screws with Loctite™ or similar.
5. Lubricate bearings and other moving parts with all-purpose grease occasionally.



- Install push-pull cable in cable connector (item 4) together with a jam nut.
- Loosen flat head screw (item 1) to separate pin retainer (item 3) from pivot plate (item 2). Screws (item 1) are provided with sufficient length to allow for pin insertion without total screw removal.
- Insert pin (item 5) into cable connector (item 4). Apply a small amount of grease to pin.
- Now install cable connector between pivot plate and pin retainer, and tighten screws securely.

Note: The pivot plate is equipped with several attaching points for the cable connector to provide appropriate stroke.

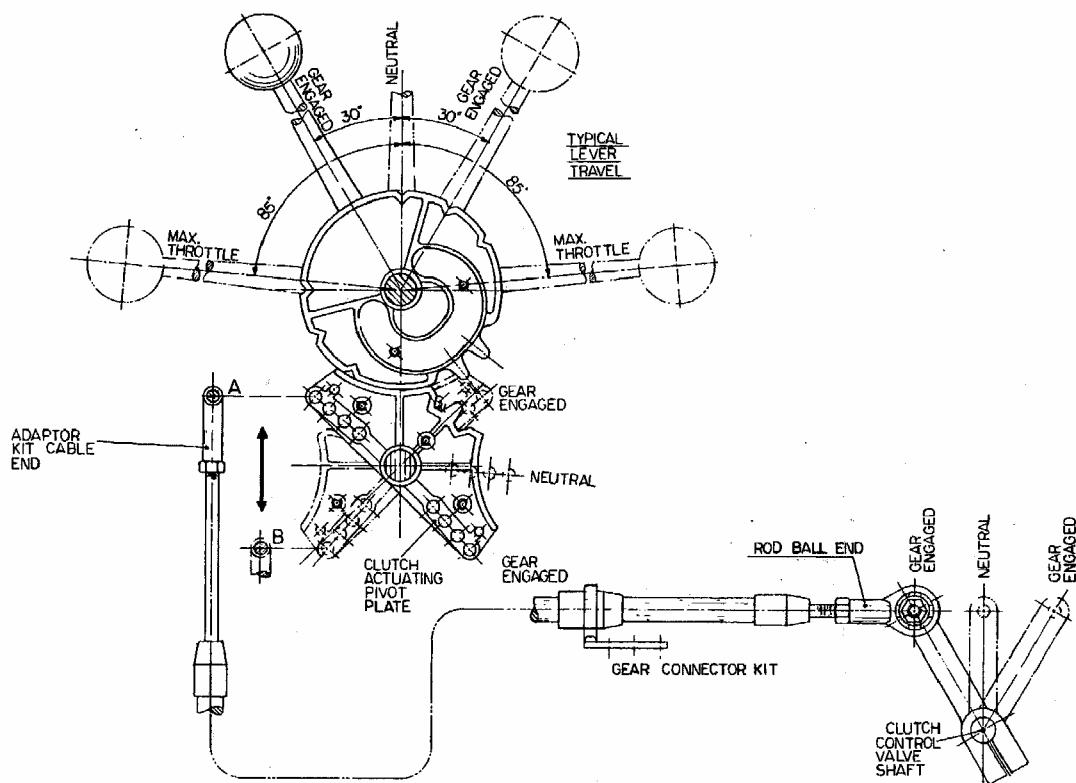
## INSTALLATION INSTRUCTIONS FOR SINGLE LEVER CONTROLS: MODELS 2046, 2048, 2049,, 2050, 2051 AND 2054

In order to provide a satisfactory push-pull control system, observe points 1 – 5 on the reverse side.

Initially install the cables with the cable clamps to the support bracket. As illustrated in the drawing in position A (showing the clutch actuating pivot plate in the gear engaged position, and the control handle in the full speed position) the cable must pass slightly beyond the attaching point on the clutch actuating pivot plate in the pull mode. The cable must also go slightly beyond position B in the push mode with the control head in a full speed position.

In order to obtain equal travel in both positions on the cable, the adaptor kit cable-end must be adjusted accordingly. After the proper position is found, the cable-end is attached to the clutch actuating pivot plate. The locking nut must be secured. This will ensure that no mechanical binding takes place in the cable or the control head. It is also very important that the clutch control valve goes from neutral to both gear engaged positions without bottoming. A slight amount of end play is essential.

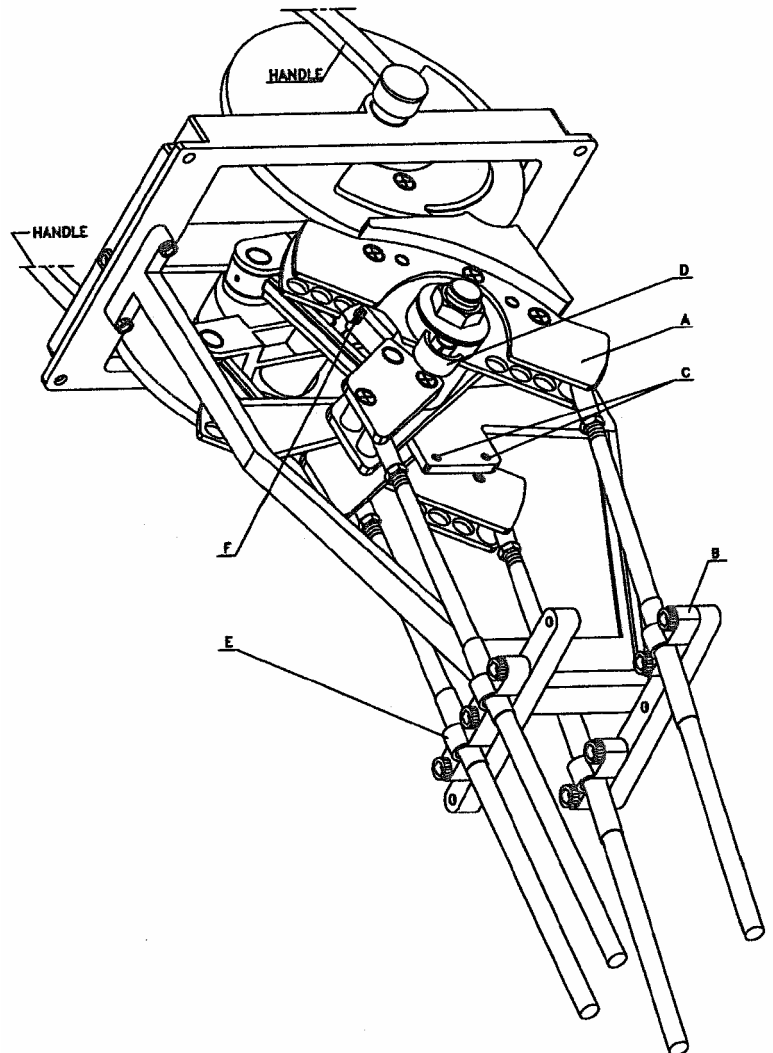
The throttle cable attached to the throttle actuating pivot plate must also operate within the available stroke of the cable and, again, the adaptor kit cable-end must be adjusted in such a manner to avoid bottoming of the control cable in either direction. In order to obtain full handle travel in the speed range, it is important to select the appropriate connection point for the adaptor kit on the throttle pivot plate.



## Installation and Adjustment Instructions for Model 2047 Single Lever Mechanical Control Head

The 2047 control head is intended to control two hydraulic gear boxes with lever type valves and two engines with lever type speed control devices. The control head must be installed in a location where there is sufficient space to operate the control handles and the surface where the control head is mounted, must be flat and smooth and solid enough to withstand the human effort imposed on the handle. The control head lever mechanism for the clutch and the throttle are arranged so that the cable can be installed to either push or pull. The clutch valve mechanism on a marine gear is arranged so that it requires approximately 2¾" (70 mm) or 3" (76 mm) of travel. Consequently, the cable must be attached on the clutch cam, item "A", in the outermost hole of the support bracket, as shown in our illustration, connection point "B". A neutral safety switch can also be installed which attaches to the mounting holes, as illustrated as item "C" and is operated by cam "D".

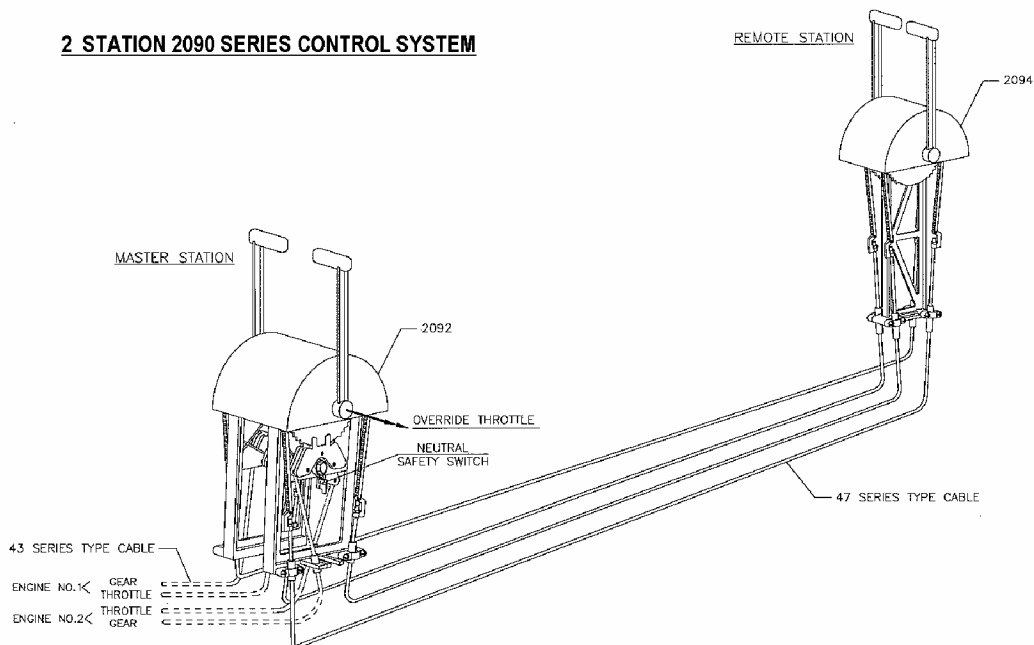
It is possible that on some marine applications with twin engines, both engines are turning in the same direction and therefore one gear box is running in the reverse gear position when driving the propeller ahead. In this particular installation the cable can be connected on the opposite side of the support bracket and cam to give a push and pull mode for either gear. The throttle is always connected with a double clamp (item E) to provide either push or pull for the throttles. By installing a cable on the opposite side of the support bracket and cam the movement is reversed. The maximum throttle travel that can be obtained is 2 3/8" or 60 mm. There are three different mounting holes provided for the cable adaptor and the proper connection point must be selected in order to achieve idle to full speed on the engine speed device. The 2047 control head is ideal for a single station application only and must not be connected to any other control device. In order to accelerate the engine in a neutral position the handles must be pulled out sideways to provide neutral engine speed. The throttle is equipped with a nylon friction block (item F) that can be adjusted with a 3/16 hex wrench from the top side, with the dome removed.





## Installing Pull-Pull and Push-Pull Cables on the 2090 Series Control

The 2090 series provides single lever control from two control stations. The Kobelt 2090 series control operates on a pull-pull cable system between the control heads. These cables, Felsted 47 series cables, operate in a pull mode only giving better performance and eliminating lost motion.



Push-Pull cables, Felsted 40 series cables, are used to connect the head to the engine clutch and throttle. 43 series are recommended. The installation instructions for the push-pull control cables are the same as the single lever control. Pull-Pull cables, needed to interconnect the control heads, should be installed last.

After the master station is connected to the engine, the cables can be connected from the master station to the remote station. It is important that the cables are of the right lengths. Too short a cable can result in tight bends which will increase friction. Too long a cable will also result in extra loops, which will again generate additional friction to the operation. Either of the above can make the control stiff and difficult to operate.

After the cable is attached with the clamps on the bottom of the supports of the control heads, the chain can be placed over the sprocket. When the control head is in the neutral position, with handle in mid-position, the loose ends of the chain should be equal in length on either side of the sprocket. The cable core is equipped with two nuts on either end. One of the nuts must be removed and the cable-end passed through the adaptor link. The nut can then be re-installed.

It is also important to remember that in order to get the handles in both stations moving in the same direction, the cable must be crossed between the control heads, i.e. the forward cable from the master station is attached to the aft side of the remote station and the forward cable of the remote station is attached to the aft side of the master station.

