



HARKEN[®]
PRO-TRIM
Installation Manual

Pro-Trim is a line-driven power-increasing system. It consists of a drive sheave with a shaft connected to take up spools via a gear set. The Drive Sheave box has a 4:1 mechanical advantage because of the larger sheave diameter compared to the axle. Three gear ratios are available in the dual spool assembly providing an overall mechanical advantage from 9:1 to 17:1.

Pro-Trim systems are custom designed to fit specific applications. For questions, or to place an order, please contact Harken®.

Part No.	Description	Overall Mechanical Advantage	Sheave/spool Ø		Dimensions (L x W x H)		Weight		Maximum working load		Breaking load	
			in	mm	in	mm	oz	g	lb	kg	lb	kg
C8986	Drive sheave	—	5.906	150	3.232 x 6.84 x 8.559	87 x 175 x 218	42	1191	500	227	1500	680
C9656	Dual spool assembly	9:1							1500	680	3000	1361
C9657	Dual spool assembly	14:1							1500	680	3000	1361
C9658	Dual spool assembly	17:1							1500	680	3000	1361
H-50575	Coupler shaft	—	—	—	7 x .625	177 x 17.875	—	—	—	—	—	—
H-44836	Universal coupler kit	—	—	—								

Suggested Hardware (See Diagrams)

Long Drive Shaft—use if Drive Sheave and Dual Spool Assembly will be separated.

Drive Shaft Universal Joint—angled shaft application.

Thru-Deck Sheaves for Traveler Ends—high-load.

Thru-Deck Sheaves for Drive Sheave—low-load.

Carbo Ti-Lite Blocks—allow fairlead with shock cord tension system.

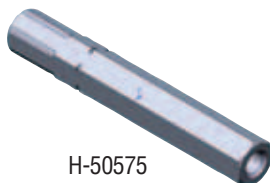
57 mm Carbo Blocks—turn drive sheave line on deck on either side of boat.

150 Cam-Matic Cam Cleats



C9656
C9657
C9658

Fastener secures dual spool assembly to coupler shaft.

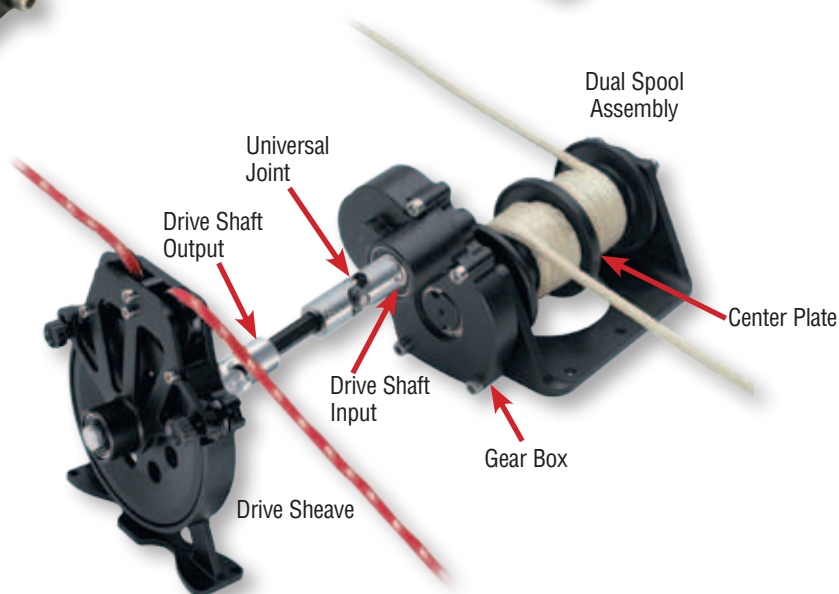


H-50575
Coupler shaft connects earlier version of C8986 to C9656, C9657, or C9658.

Comes with coupler shaft to directly couple to C9656, C9657 or C9658.



C8986



Drive Sheave Fasteners

Four 1/4" (6mm) round head or truss head machine screws
Four 1/4" (6mm) nuts and washers

Dual Spool Assembly Fasteners

Six 1/4" or 6mm round head or truss head machine screws
Six 1/4" or 6mm nuts and washers.

Drive Sheave Line and Cleat Location

Line Size/Type

3/8" (10mm) Line butt-spliced to form loop. Use softer line with core so you can do a good butt splice. Line does not have to be strong as the only load it sees is what someone can pull. Splice must be perfect with a smooth, constant diameter and no hard spots. Make sure the splice is done by someone that knows how.

Length

Mount 57mm Carbo blocks to footrests. Do not have Sheave Drive control line tight between blocks. Line should be just long enough so trimmer can sit out as far as possible and still operate control line. Do not make line excessively long either. Control line should have enough slack so that when you drop traveler it runs out other side and stays inside boat.

Deck Cleat Positioning

Make sure that when you pull weather control line sheave, drive does not pull leeward line into cleat. If it does, mount block higher so when you pull from other side it will automatically uncleat.

Dual Spool Line (Aft Line that Runs to Car)

Line Size and Type

3/16" or 1/4" (5mm or 6mm) high-strength Spectra/Dyneema or similar.

Length

Line will wrap around Dual Spool assembly three times and run around through deck sheaves at traveler and end at cars. Lines will be quite tight when car is at end of track. When car is at center one side will be slack and will be taken up by shock cord tension system.

Shock Cord Tension System

Because line tension varies, due to line spooling on top of itself, a shock chord tension system must be used so line runs off Dual Spool Assembly when traveler is eased to leeward. See diagrams to follow.

Coupling Drive Sheave to Dual Spool Assembly

Direct Coupling

To simplify installation, mount Dual Spool Assembly and Drive Sheave together with single connecting shaft. This will work if mounting and exits for lines can come up through deck at suitable locations.

Coupling using Drive Shaft

If a shaft is required, use universal joint to couple shaft to output and input shafts at units. Universal joint will compensate for misalignments between Sheave Drive Assembly and Dual Spool Assembly.

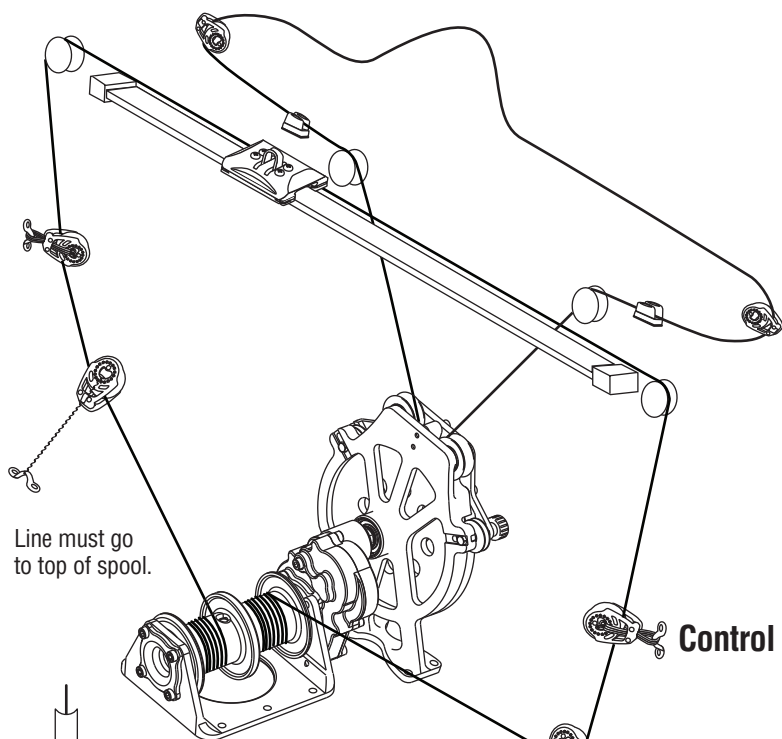


Control Line Alignment

Make sure there are direct leads to Dual Spool and Drive Sheave Assemblies (see diagram). Line loop at Drive Sheave must enter so it is in line with Thru-Deck sheaves. Line running to each spool must be perpendicular to spool axel so it does not pile up on one end of spool. Make sure first lead block is 3' (1 m) or more from Dual Spool Assembly.

Deck Blocks

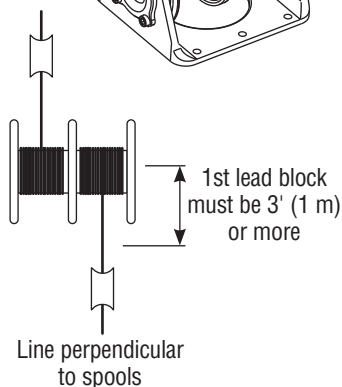
Mount 57mm Carbo blocks higher than cleat so that when you pull line from other side it will automatically uncleat. On some boats, the 2607 57mm Ti-Lite can be lashed to footrests.



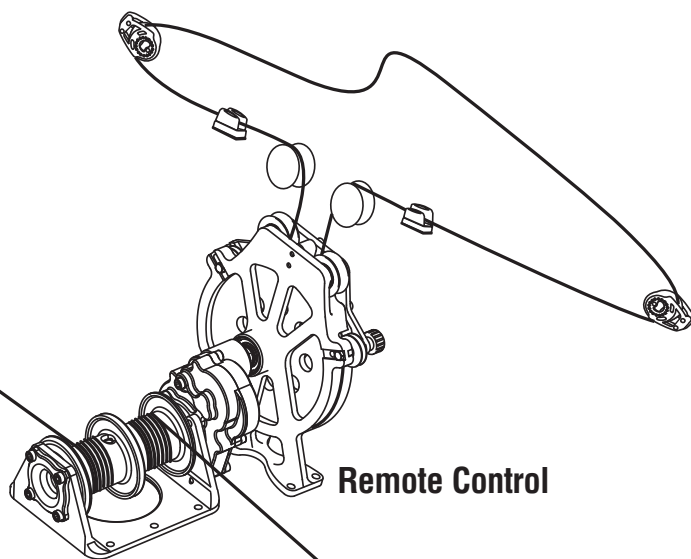
Line must go to top of spool.

Control at Traveler

Shock Cord



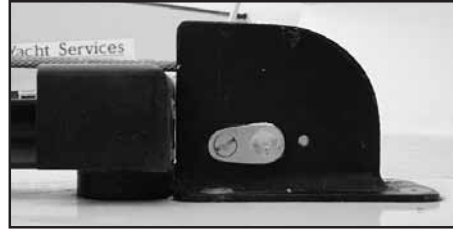
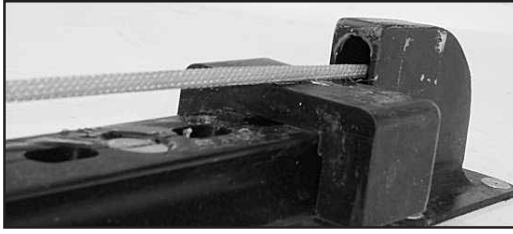
Line perpendicular to spools



Remote Control

Block must articulate

Shock cord may need to turn and run through block to have enough scope.

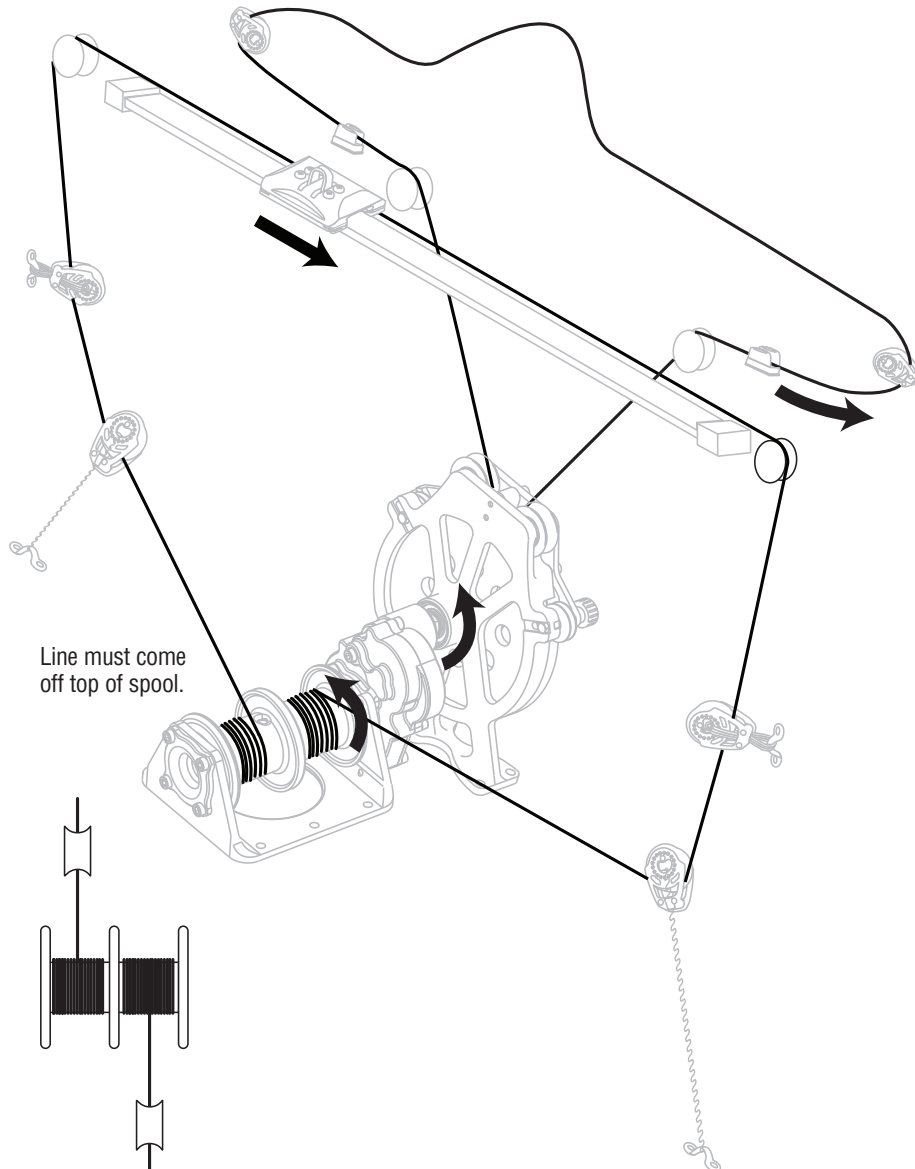


Loading Traveler Control Line to Dual Spool Assembly

1. Start with line on roll, not cut to length.
2. Run line from one end of track along length to other end and into thru-deck sheave.
3. Run line through lead and tensioning blocks mounted to shock cord.
4. Once inside, run line to one side of take-up spool. Wrap line around spool 2 or 3 times. This is important so dead-end knot will not take shock load as car runs to end of track. Note direction of spool rotation.

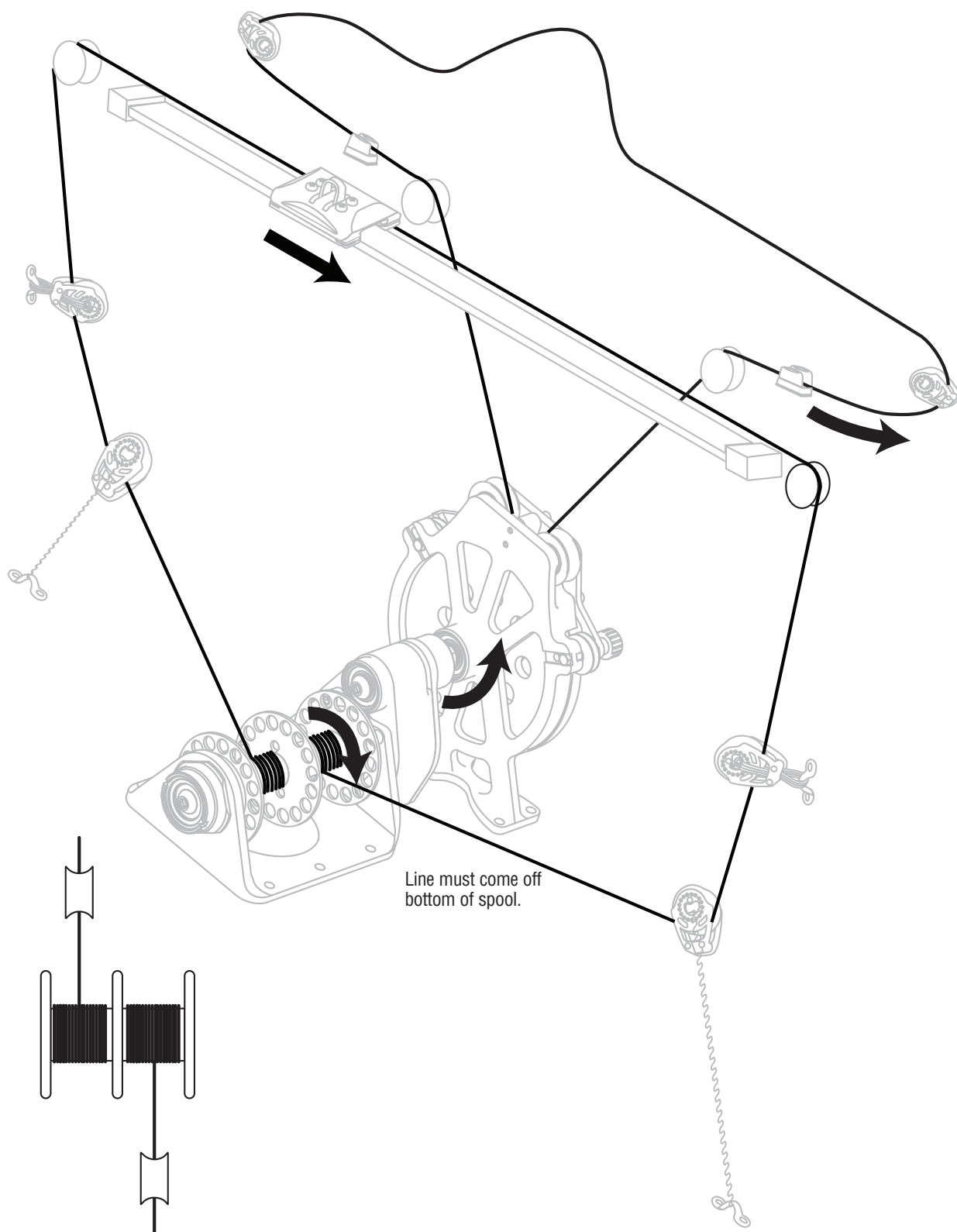
Dual Spool Assembly (C9656, C9657, C9658)

Spool assembly rotates in same direction as shaft. Keep this in mind when winding line onto spools so car moves in desired direction when pulling sheave drive loop. Note that line comes off the top of spools—see diagram.



Units built in 2008 (C8440)

Dual Spool rotates opposite direction as shaft. Keep this in mind when winding line onto spools so car moves in desired direction when pulling sheave drive loop. Note that the line comes off the bottom of the spools with the C8440 in the diagram.



Loading Traveler Control Line to Dual Spool Assembly (continued)

5. Dead-end to center plate. Make sure there are 2 or 3 wraps on take-up spool.



6. Position car at end so it is opposite where line runs through deck. Cut line off roll. Temporarily knot line to car.
7. While keeping tension on line, turn Dual Spool so line winds up and car is at end where line runs through deck.
8. To lead other side, run line from spool located at car, along track length, into thru-deck sheave and down to open side of Dual Spool.
9. Wrap line 2- or 3-times around take-up spool in opposite direction as first line was wrapped. Dead-end line to center plate of take-up spool. Make sure there are 2 or 3 wraps on take-up spool.
10. Cut line off roll and temporarily knot line to car.
11. Check spooling so that when you pull one end of line off take-up spool, line winds onto other side of take-up spool.
12. Do not splice line directly to car. Have an eyesplice about 6" (152 mm) from car. Do a lashing between car and eyesplice. This allows adjustment later.
13. Tension system using lashing when car is at one end of track. Move car to middle of track. There will be slack in line.
14. Tension shock cord mounted below deck to take up slack.

Using System

Avoid car crashing from one side to other. Make sure car is cleated off at center for prestarts and downwind. Cleat lines when moored or docked.

There will always be a some movement when your car is pinned in middle for prestart or on downwind legs. This is not a big issue. At start you always bias it so car stays just above middle on starboard side.

When you go into tack have control line in your hand. Once you feel line unload on current tack, you already have new side in your hand because you are pulling it though block on other side. Pull fast if you want traveler to windward. In light air, pull car up to new windward side but keep your weight to leeward. If you want traveler to leeward, start letting control out and car will go to leeward but always load it so sheave drive doesn't free-wheel. If free-wheeling is a problem, loosen locking knobs and press pusher sheave against line and tighten.



Maintenance

Decouple drive shaft. Remove gear cover and clean and regrease.

Inspect and replace all worn or damaged line or shock cord.

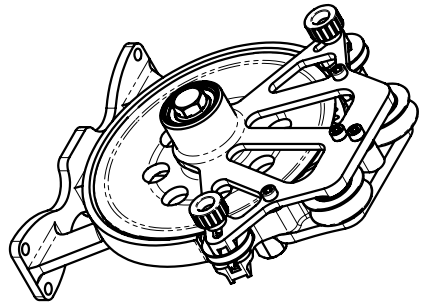
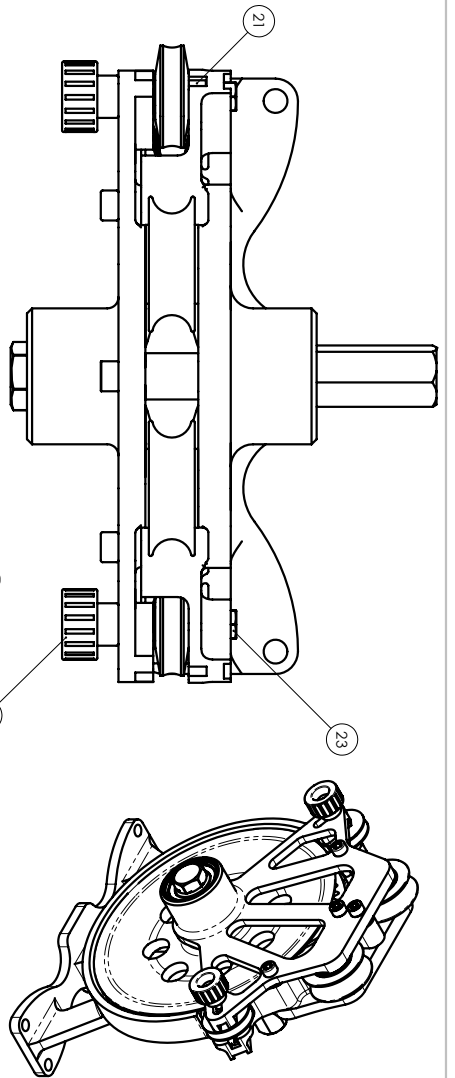
Troubleshooting

Problem – Can't pull traveler up or there is to much force.

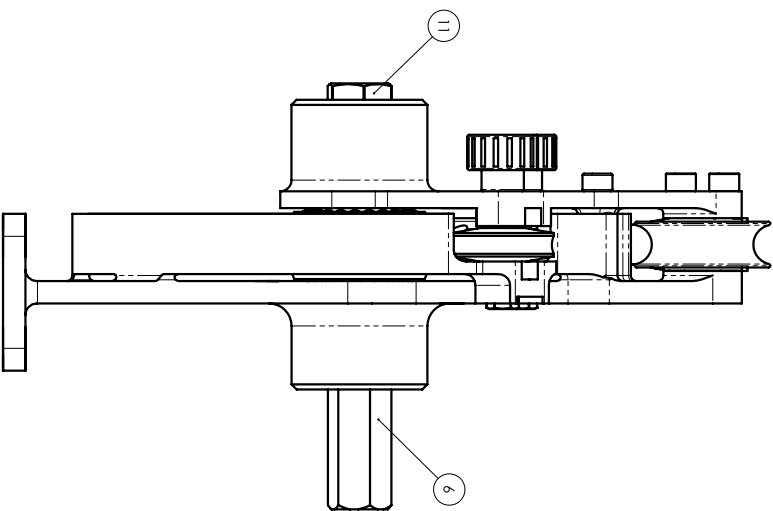
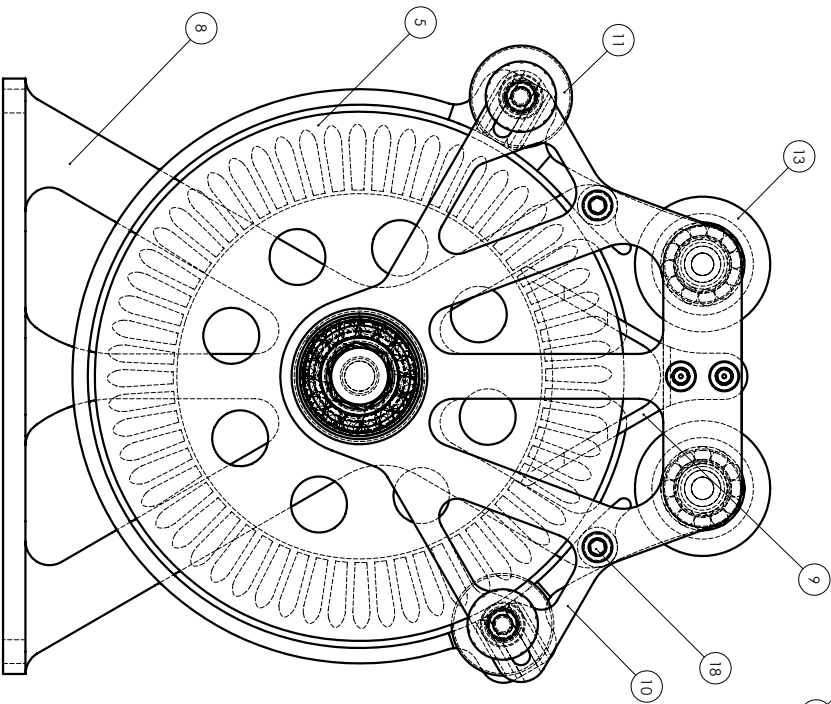
Solution – Make sure line is centered on dual spools and at right angle to the spool.

Problem – Line piles up on leeward side of Dual Spool Assembly

Solution – Use shock cord tensioning system.

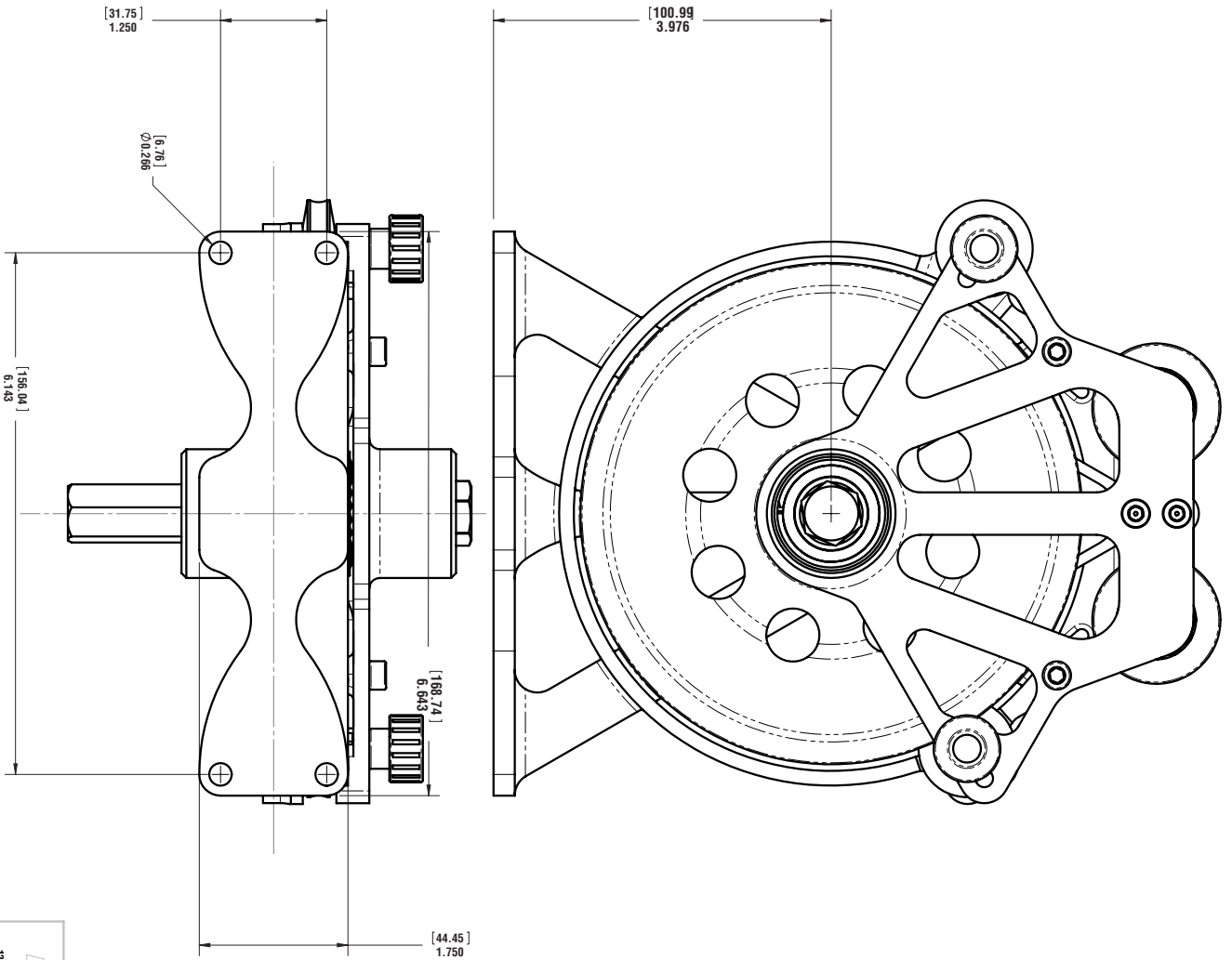


NO. /QTY	DRAWING NO.	PART NO.	DESCRIPTION
1	B-731653		PLASTIC CAGE 480 BEARING
2	H-40544A		DRIVE SHAFT WASHER
3	H-40549A		DRIVE SHAFT INNER RACE
4	H-40551A		SMALLEY RING (DNH-32-502)
5	H-42957		60X RADIALITY DRILLED DRIVE SHAFT
6	H-44149		DRIVE SHAFT
7	H-44837		U-JOINT W/ M5 SET SCREW
8	H-46371		PRIMARY FRAME
9	H-46372		STRIPPER
10	H-46373		FRAME COVER
11	H-46375		PUSHER SHEAVE
12	H-46376		PUSHER SHEAVE AXLE
13	H-5653A	265	38mm BIG BULLET SHEAVE
14	H-42137	HCP1146	SMALLEY RING (N5T-68-502)
15	H-46377	H52 HCTP	MS308 FLUTED KNOB
16	H-44154	H511151	M10 X 1.5 X 12mm HHB
17	H-45450	H5398	M5X0.8 X 30mm SH CS
18	H-40925	H53982	M5X0.8 X 16 SHCS
19	H-46378	H5	M50.8 X 35mm HHB
20	H-22555A	HSB241	5/32" DELRIN BALL



HARKEN INCORPORATED 1251 E. Wisconsin Avenue Pewaukee, Wisconsin 53072 Fax: 262-691-3807			
ALL DIMENSIONS IN INCHES TOLERANCES EXCEPT ANGLES	DECIMAL	ANGULAR	
FRACTIONAL	HOLE DIMENSION		
FINISH			
CARD			
DRAWN BY	EB	MATERIAL	VARIOUS
SCALE	1:1		
DATE	3/5/2008		
DRAWING NO.	H-46370		
	C8986		

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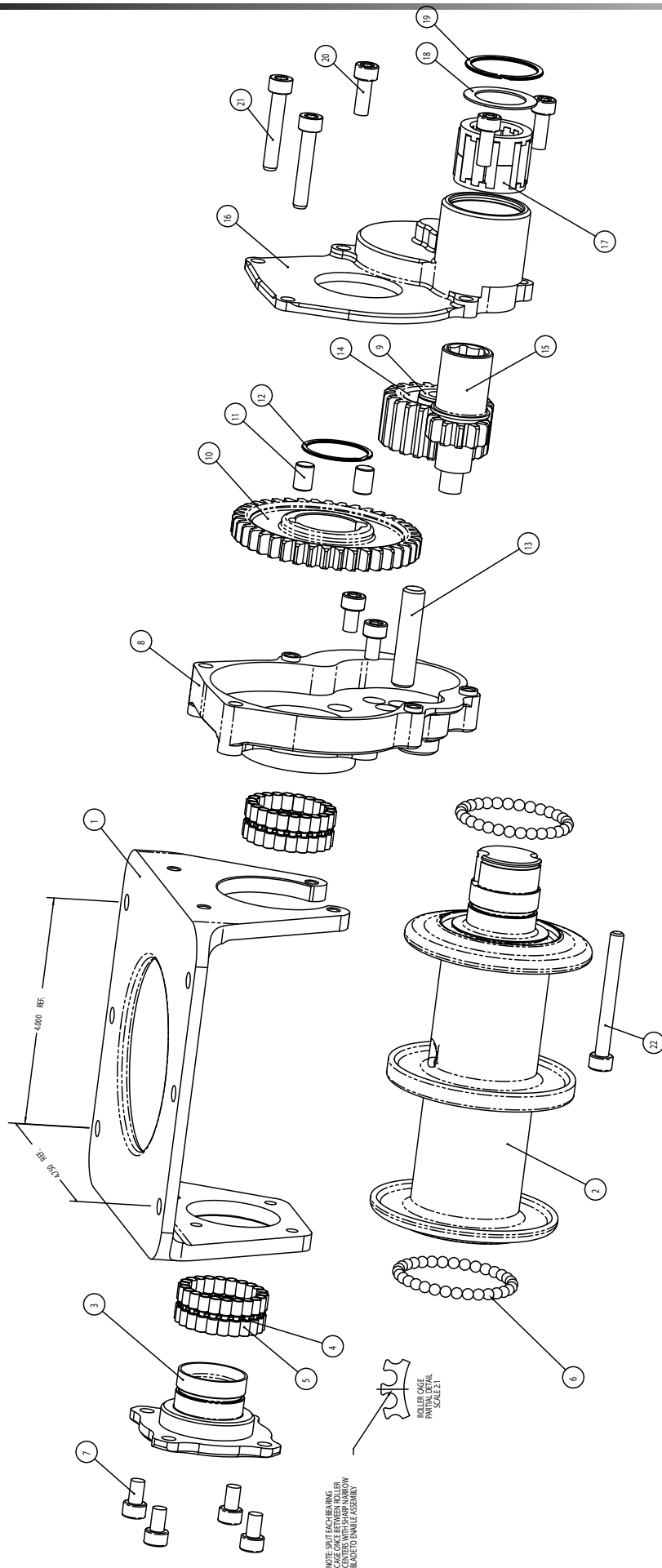
DECIMAL .0005
FRACTIONAL 1/64

C896 ASSEMBLY
PRO-TRIM V.2 DRIVE SHEAVE UNIT

DESIGNED BY: EB
DRAWN BY: EB
CHECKED BY: EB
DATE: 3/5/2008

DATE: 3/5/2008
C896

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NO.	QTY.	DRAWING NO.	PART NO.	MATERIAL	DESCRIPTION	NO.	QTY.	DRAWING NO.	PART NO.	MATERIAL	DESCRIPTION
1	1	H-50341	-	6061-T6 AL	SPOOL FRAME	12	1	H-50354	HCP1927	302 SS	SMALLEY RING (WS-109-S02)
2	1	H-50342	-	6061-T6 AL	DUAL LINE SPOOL	13	1	H-50352	-	316 SS	IDLER SHAFT
3	1	H-50345	-	6061-T6 AL	BEARING RACE	14	1	H-50348	-	17-4 PH SS COND. H925	9.83 IDLER GEAR
4	2	H-21636B	-	DELTRIN 527 UV BK701	CAGE	15	1	H-50346	-	17-4 PH SS COND. H925	INPUT GEAR SHAFT
5	44	H-21637A	-	TORLON 4203L	ROLLER	16	1	H-50344	-	6061-T6 AL	GEAR BOX COVER
6	62	H-22556A	HSB240	BLACK DELTRIN	3/16" DELTRIN BALL	17	1	B731653	-	VARIOUS	PLASTIC CAGE 480 BEARING
7	6	H-49339	HFS1213	316 SS	M6 X 1.0 X 10 SHCS	18	1	H-40544A	-	BLK DELTRIN	DRIVE SHAFT WASHER
8	1	H-50343	-	6061-T6 AL	BASE BOX	19	1	H-40551A	-	302 SS	SMALLEY RING (DNH-32-S02)
9	3	H-43838	-	G300	IGUS BEARING GFI 0607-06	20	3	H-40692	HFS747	316 SS	M6 X 1.0 X 16 SHCS
10	1	H-50347	-	17-4 PH SS COND. H925	OUTPUT GEAR	21	2	H-50353	HFS1215	316 SS	M6x1.0 X 35MM SHCS
11	2	H-50355	-	316 SS	OUTPUT SHAFT KEY	22	1	H-37735A	HFS1058	S.S. TYPE A4	M6x1x55 SHCS

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