

CORDEM Corporation

PBW-14RO



GOLO Power Winch Operation Manual

For all winches using the rotary switch control

Warnings and Disclaimers

Cordem and any other sellers hereby disclaim any liability or responsibility whatsoever for any injuries or damages resulting from improper use of the GOLO Power Winch, which includes: use for human support or transportation; use with loads surpassing Cordem specifications; operation with drum cable that is worn, inferior, damaged, or below Cordem safety factor specifications; placing excess cable on drum (which may cause slippage of cable over a drum flange); use of hooks without safety latches; insufficiently secured winches or loads; positioning of persons or property below or too near loads; unauthorized modification or repair of winches; incorrect use of controls; and failure to follow this Operation Manual. All warranties are strictly limited to the terms and conditions of the warranty card which accompanies each GOLO Power Winch.

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MODEL

Designation Codes

Winch Series:	12 = 1200 lb Rating*	7 = 700 lb Rating*
Voltage:	15 = 115 Volt	30 = 230 Volt
Switch Location (MO and MA):	S = Standard	R = Remote
Switch Type:	MO = Rotary Momentary Switch	MA = Rotary Maintained Switch
	RPNT = Remote Push Button Pendant	
	LVC = Low Voltage Control	
Quick-Disconnect:	X = Quick-Disconnect is installed	
Examples:	12-15 RPNT, 7-30 RMOX, 12-30 LVC	

Note: Only the rotary switch control is covered in this manual. Gearbox and motor information applies to all models.
Note: Remote controls come with 10 ft cords standard, but other lengths are available.

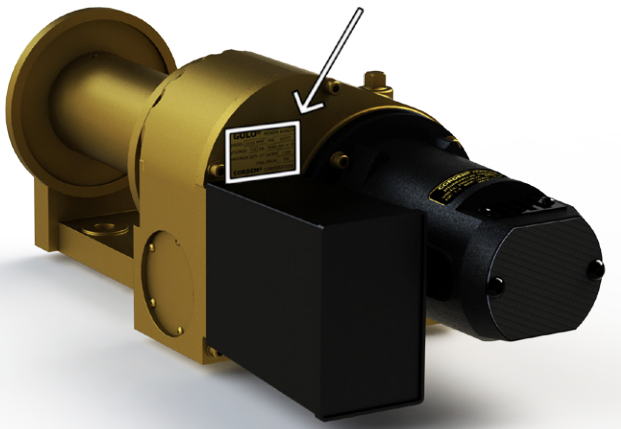
*See Safety Rule 5 on Page 3 for an explanation of load rating.

Identification

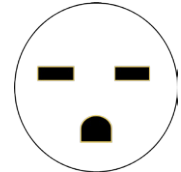
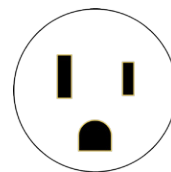
If the model and serial number label (Figure 1) is missing, the winch's model may be determined through the following:
Series: Running with no load, the 1200 series gearbox will turn the drum at approximately 33 RPM, while the 700 series will turn it at approximately 66 RPM.

Voltage: The voltage may be determined by looking at the plug shape (Figure 2). Cordem uses a standard NEMA 5-15 plug for 115 volt models, and a NEMA 6-15 plug for 230 volt models.

Switch Type: SMO and SMA controls are mounted on the control box. RPNT, RMO, and RMA controls are mounted on a pendant attached to the control box. The RMO and RMA have a rotary switch, while the RPNT has push buttons.



Model and Serial Number Label Location
Figure 1



NEMA 5-15 (115 Volts) NEMA 6-15 (230 Volts)
Figure 2

TECHNICAL SPECIFICATIONS

The duty cycle of the winch with a full load allows for 1 minute of continuous operation, followed by 1 minute of rest. At half load, the winch may be run continuously.

Max. Weight: 38 lb (17.25 kg) (cable not included)
 Height: 7.5 in (19 cm)
 Width: 8.3 in (21 cm)
 Length: 20.75 in (52.7 cm)

*The maximum number of layers varies with cable diameter.

Series	Layers of Cable around Drum	Lift Capacity (lb)	Line Speed (ft/min)		
			In	Out	No Load
1200	1 Full*	1200	17	37	28
		700	25	54	41
700	1 Full*	700	34	76	56
		400	50	112	82

Double drum values will differ. See Page 11 for details.

INSTALLATION

Mounting

1. The winch must be bolted onto a strong, stiff support.
2. Allow a safe operating area around the winch in order to avoid accidental contact with the cable or load.
3. Center the drum to the load. This will help to prevent the cable from winding onto one side and spilling over the flange.
4. Mount the winch level to a horizontal load to ensure that the winch is not unnecessarily strained.
5. To allow proper spooling of the cable, the fleet angle should be no more than 1.5° (Figure 3). The minimum distance between the winch and a load or pulley should be 11 ft (3.35 m), assuming that a drum divider is not being used.

Caution: Do not mount the winch in the base-vertical, drum-down position (Figure 4), as this will cause a gear set to rise above the oil level. All other horizontal and vertical positions are acceptable.

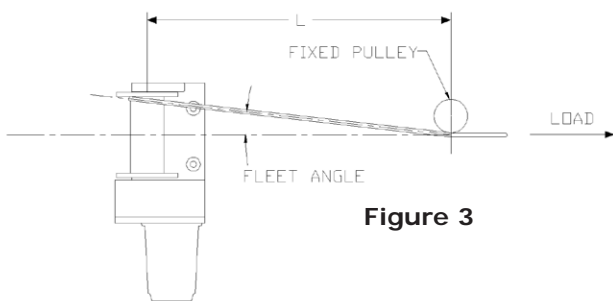


Figure 3

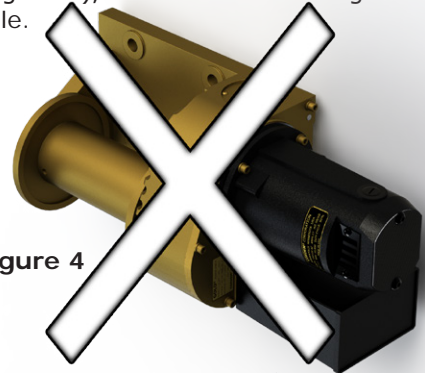
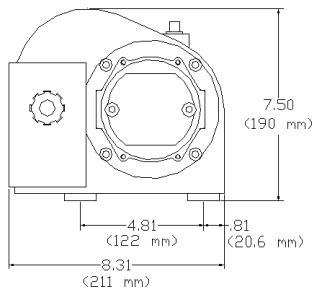
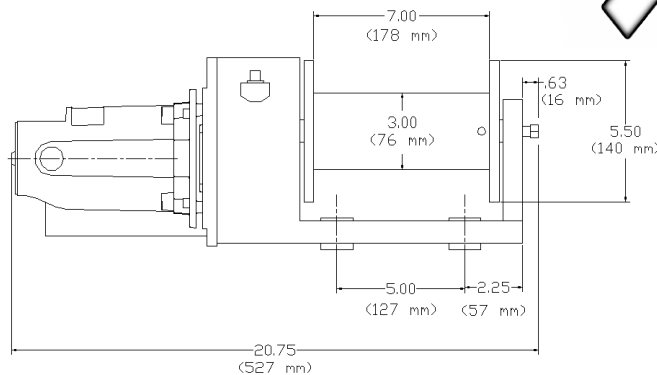


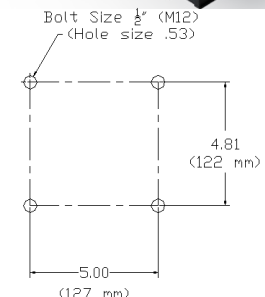
Figure 4



End View



Side View



Mounting Hole Pattern

Figure 5

Electrical Power

Before connecting the winch to a power source, consider the following:

1. Extension cords are potentially dangerous. We recommend using 12 gauge wire for cords exceeding 20 ft (6 m). Circuits for 115 VAC winches should be rated for 20 A. Circuits for 230 VAC winches should be rated for 10 A.
2. Never operate your power winch without first grounding it. If a 3-prong outlet is not available, use a standard adapter plug, making sure to connect the adapter ground wire.
3. Rotary switch controls will start the winch if they are set to IN or OUT as the power cord is plugged in.

Use in Wet Environments

Be sure to protect the winch's controls from moisture as much as possible. Since the motor is not completely enclosed, it should be protected when operating under inclement weather conditions or near splashing water. We offer a motor and switch box shield (101081) for this purpose. Although the shield does not enclose the motor, it helps to protect the motor from moisture entering from the top.

SAFETY

1. Before operating the winch, ensure that it is properly installed (Page 2).
2. Never use the winch for any type of human support or transportation.
3. Cordem specifies a minimum cable safety factor of 5:1. This means the cable should be capable of supporting 5 times the intended load. We also recommend the use of safety latches on all hooks.
4. A minimum of 5 wraps of cable should be kept around the drum at all times. This reduces the load on the cable retaining bolt.
5. The number of layers of cable on the drum greatly affects the maximum load of the winch. Depending on the layer, a 1200 series winch will lift between 1200 and 700 lb (545-315 kg), and a 700 series will lift between 700 and 400 lb (315-180 kg). The maximum load decreases to the lower value as more layers are spooled around the drum, due to increasing torque. This effect may be eliminated through the use of a double drum (Page 11).

ROTARY SWITCH CONTROL

Direction Select Switch

On the rotary switch controls, all motor and drum direction control is accomplished by using the direction select switch. This switch may be located in a remote pendant (R- series) or on the control box itself (S- series).

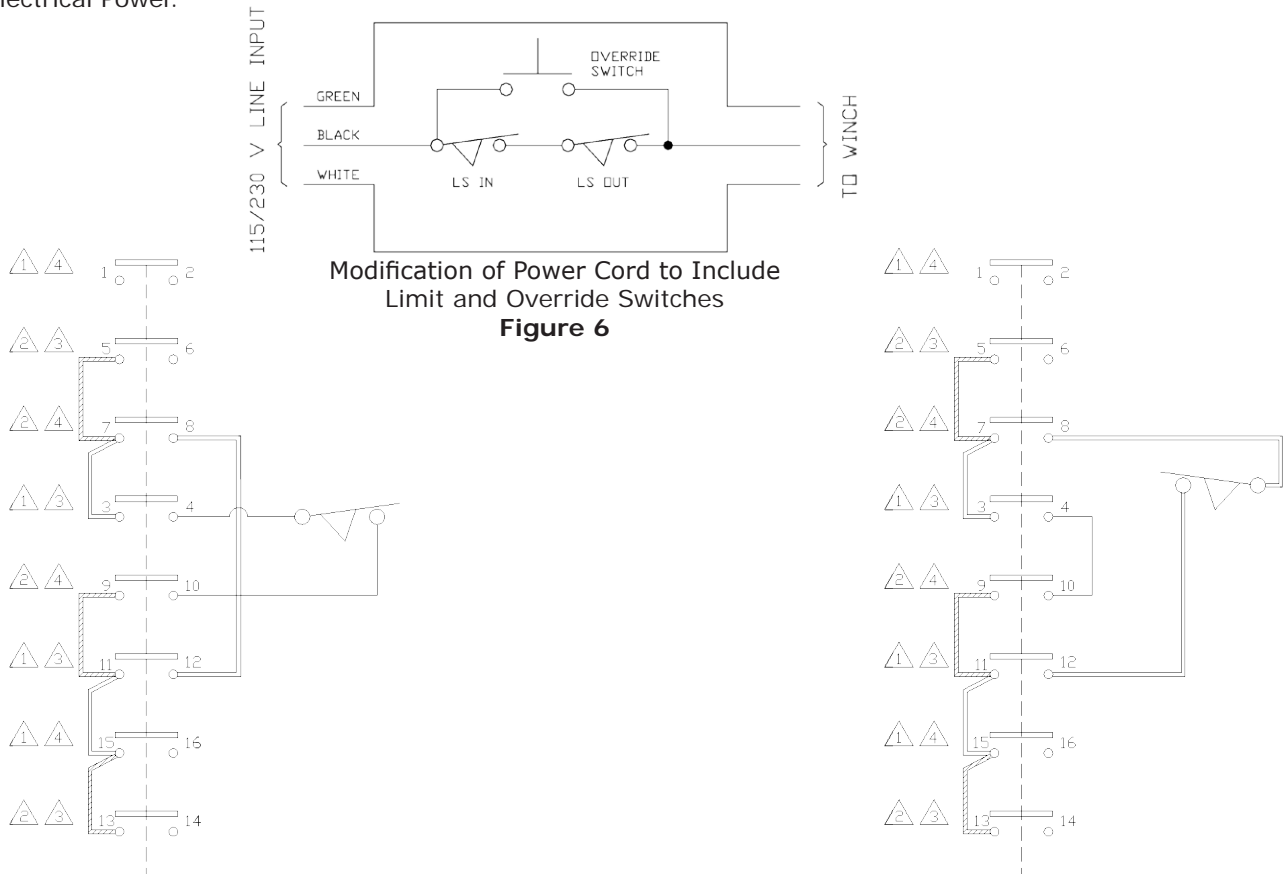
The direction select switch has 4 positions: IN-OFF-OFF-OUT. When the switch is in the IN or OUT positions, the motor will run and wind cable onto (IN) or off of (OUT) the drum. The OFF positions remove electrical power from the motor. Each OFF position operates the Trigger-Duodynamic braking system in the proper direction for the IN or OUT switch position next to it.

The direction select switch will either stay in place (-MA series) or need to be held in the IN or OUT position (-MO series). These are referred to as maintained and momentary switches. The -MA series may be useful for long pull/lift applications, but the -MO series is generally recommended for more accurate control.

Limit Switches

Limit switches can be used to stop the winch when the load reaches the switch.

Dynamic braking will not operate when the limit switches are hit. This is usually not a problem when lifting a load. Lowering a load without dynamic braking often results in the load drifting. Limit switches should be rated as described under Electrical Power.



To stop "IN" but with no brake, insert LS in place of jumper J4-10. Winch can still be run in "OUT" direction.

Figure 7a

To stop "OUT" but with no brake, insert LS in place of jumper J8-12. Winch can still be run in "IN" direction.

Figure 7b

MAINTENANCE

Authorized Service Under Warranty

Should any service difficulties arise while your winch is under warranty, contact your nearest distributor; if they cannot help you, contact Cordem directly. Repair work performed by anyone who has not received specific instructions from or been specifically authorized by Cordem Corporation will automatically void all warranty conditions of the product.

Braking System Maintenance

All GOLO Power Winch models incorporate the Trigger-Duodynamic braking system, along with self-locking worm gearing. This dynamic braking system dissipates energy by, in effect, turning the motor into a generator. This begins the process of converting kinetic energy into heat in the dynamic brake resistor. The self-locking worm gear arrangement then holds the load in place.

If you notice performance issues, including abrupt stopping of the load during the braking cycle, a delay before braking begins, the load moving slightly after the braking cycle, or a dramatic increase in arcing on the motor brushes, the load should be removed immediately and maintenance should be performed. We advise checking the brushes for loose wires and using a commutator stone to clean and condition the commutator surface.

Preventive Electrical Maintenance

Electrical Contacts: Check that all electrical connections and leads to the switch contacts are joined securely.

Brush Replacement: After replacing the brush (or armature), reseal the brushes by running the motor in both directions without any load until complete seating has occurred. Use compressed air to remove the dust created by this procedure.

Power Supply Issues

If the incoming voltage is too low, the winch will operate at a lower speed. Note that the measured voltage at the outlet will decrease when the winch is under load. Extension cords are often a problem. Make sure they are rated as described on Page 2 under Electrical Power.

LUBRICATION

Throughout the operating life of the winch, make sure that the lubricant level is maintained at 2 1/8 in (5.4 cm) below the top of the filler plug (100221) opening (Figure 8). This is slightly less than 1 qt (950 ml) of oil. Too much lubricant will cause overheating; too little will cause gear failure.

The first change of the gear case lubricant should be performed after 50 hours of normal operation. After that, change the oil again every 250 hours of use. To change the oil, unscrew the filler plug and tip the winch upside-down until the case is completely drained. After this, we suggest you use a light flushing oil, and thoroughly drain it. After this second draining, place the winch in its normal upright position, and refill the gear box to the proper level with new gear lubricant.

We recommend Mobilgear 600 XP 320 lubricating oil. Acceptable alternatives include ConocoPhillips Compounded Gear Oil-7, and synthetic oils such as Texaco Pinnacle, Shell Hyperia, Royal Purple Synergy, and Mobil SHC 634. These are all high-grade worm gear lubricants for enclosed gear boxes, with an S.S.U. viscosity of at least 22 centistokes at 210°F (100°C). This corresponds with American Gear Manufacturers Association Grade 6. If you cannot obtain the proper worm gear lubricant, it is possible (on a temporary basis only) to use an SAE 90 automotive gear oil, which is likely available at a local gasoline station.

Note: No additional lubrication is necessary. All outside bearings are pre-lubricated and sealed.

Caution: Never check the gear case lubricant or fill with oil while the winch is running.

Caution: Avoid all lubricants that are not compatible with bronze gears. Some (especially older) EP lubricants are not compatible.

Temperature

It is very important to use a lubricant with a pour point 20°F (11°C) lower than the coldest expected temperature. We recommend using synthetic oils if ambient temperatures fall below 30°F (-1°C), or exceed 100°F (38°C).

CABLE

Selection

The following table can help you select the proper cable for your particular application. We recommend galvanized aircraft cable (7x19) for the winch drum because of its combination of strength, flexibility, and corrosion resistance.

Note: Cordem specifies a minimum cable safety factor of 5:1, and recommends using safety latches on all hooks.

Cable Diameter (in)	Drum Capacity (ft)*	Breaking Strength (lb)**	Maximum Operating Load (lb)
1/8	512	2000	400
5/32	325	2800	560
3/16	215	4200	840
7/32	165	5600	1120
1/4	135	7000	1400

*Usable cable length is about 4 ft less, as the first 5 cable wraps should always remain on the drum for safe operation.

**Based on galvanized aircraft cable (7x19).

Attachment

The cable lock bolt (100224) fastens the cable in place (Figure 8). To attach a cable, push the cable through to the opposite end of the hole, but be sure it doesn't protrude beyond the hole. This would cause it to interfere with the normal wrap of the cable on the drum. Tighten the cable lock bolt firmly.

Note: The cable must be wrapped in the correct direction around the winch drum. The proper direction is established when the cable follows the groove that leads from the cable hole.

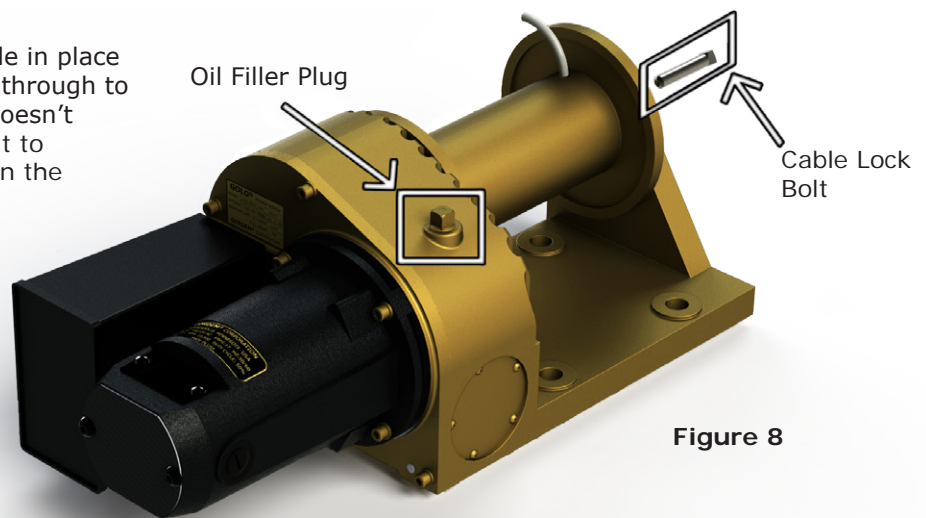


Figure 8

DISASSEMBLY

Oil and Housing Cover

1. Pour the oil out of the gear box.
2. Remove the housing cover (100102) by removing the 5 screws (100222) on the outer edge of the housing cover's face, along with the upper right screw holding the motor to the housing cover.

Caution: Whenever the cover is removed from the housing, be sure that the inside of the gear box is clean of all dirt and particles before reassembling.

Gear Box

1. Remove the 10 side cover screws (100253), both side covers (100251), and o-rings (100250). Earlier models will have gaskets (100252) instead of o-rings.
2. Remove the elastic stop nut (100213) at the end of the cross shaft (100105). Then remove the cross shaft.
3. Remove the double roll pin (100214), which holds the drum (100103) to the drum shaft (100104), and the outside drum snap ring (100206). Pull the worm gear (100406 or 100438) and drum shaft out of the housing.

Caution: Do not pull the drum shaft out without first removing the cross shaft. Doing so will damage the gear teeth.

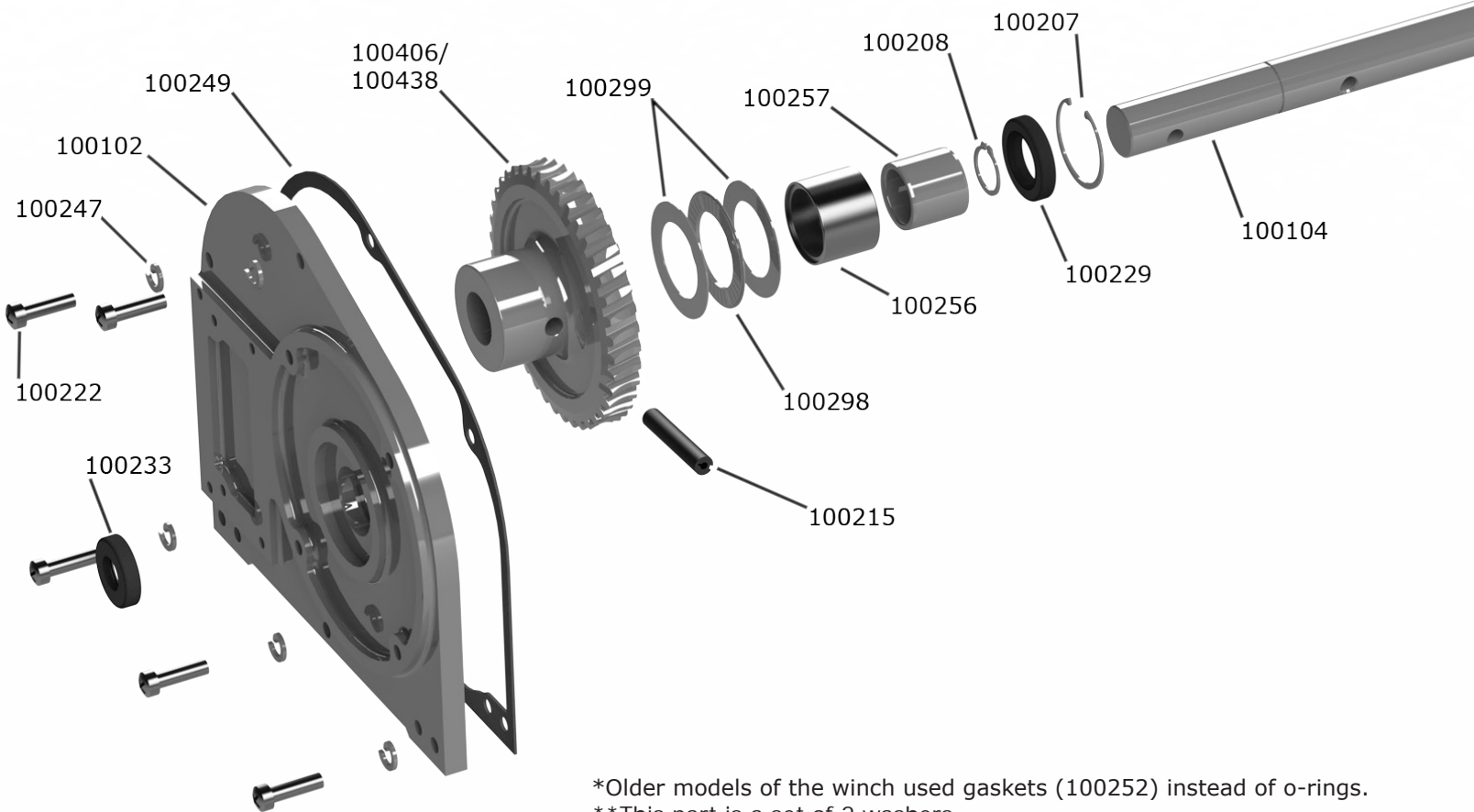
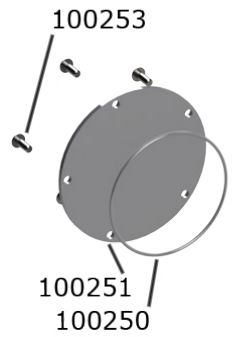
Motor

1. After removing the housing cover as described above, remove the worm (100109) from the motor shaft.
2. Remove the 3 screws (100244) which hold the motor to the housing cover, and pull the motor from the housing cover.

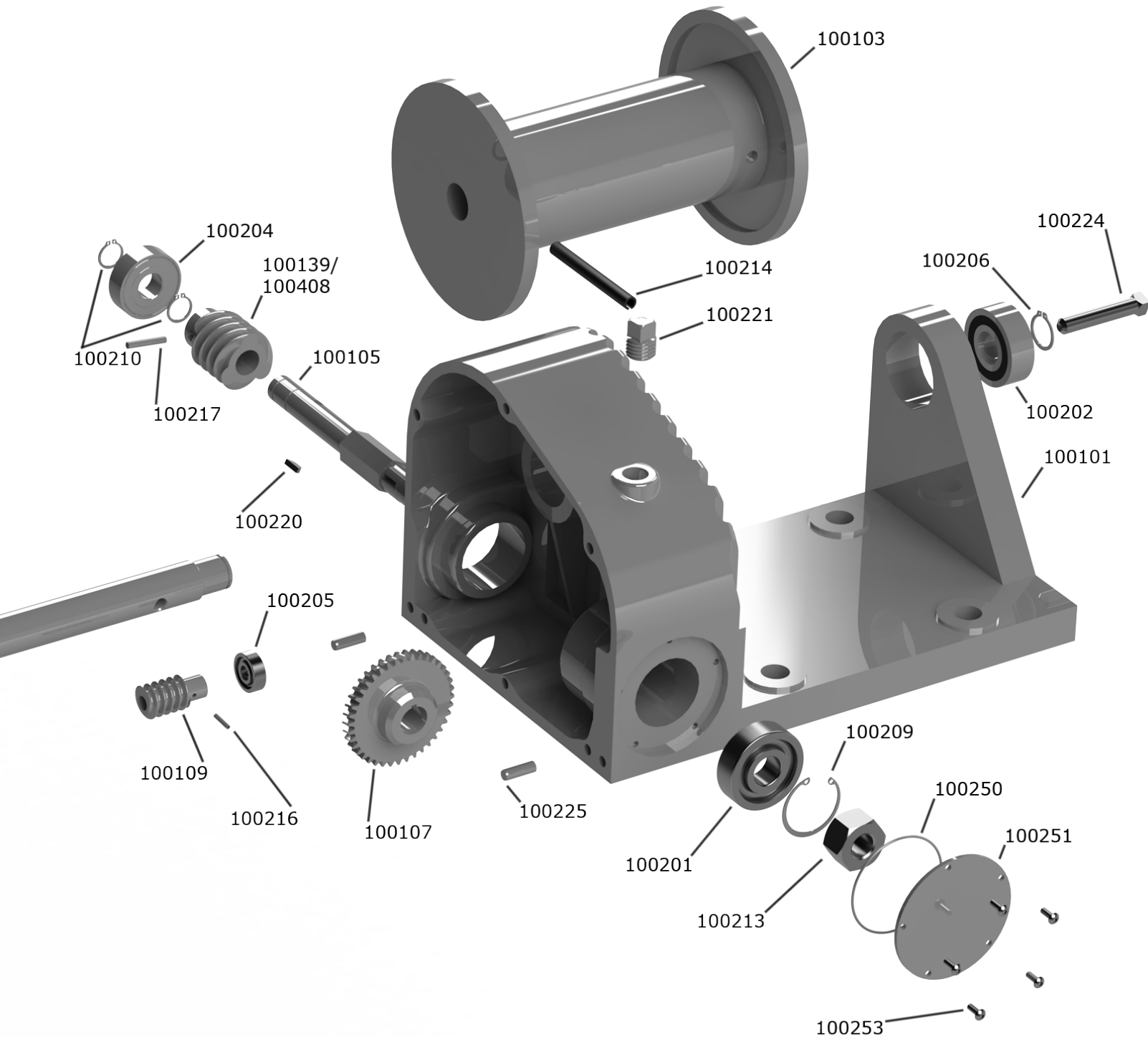
DRAWINGS

Main Assembly

Description	Quantity	Part Number	Description	Quantity	Part Number
Gear Housing	1	100101	Oil Pipe Plug	1	100221
Gear Box Housing Cover	1	100102	1/4-20 x 7/8 SHC Screw	5	100222
Cable Drum	1	100103	1/4-20 x 1 1/4 SHC Screw	1	100223
Drum Shaft	1	100104	3/8-16 x 2 Square Head Set Screw	1	100224
Cross Shaft	1	100105	1/4 x 3/4 Dowel Pin	2	100225
Input Gear	1	100107	Drum Shaft Oil Seal	1	100229
Input Worm	1	100109	Motor Shaft Oil Seal	1	100233
700 Series Output Worm	1	100139	Lubricating Oil (Not shown)		100238
Nut End Cross Shaft Bearing	1	100201	1/4 Lock Washer	9	100247
Outside Drum Bearing	1	100202	Gear Housing Gasket	1	100249
Cross Shaft Bearing	1	100204	Side Cover O-Rings*	2	100250
Motor Shaft Housing Bearing	1	100205	Side Cover	2	100251
Outside Drum Shaft Snap Ring	1	100206	Side Cover Screw	10	100253
Needle Bearing Snap Ring	1	100207	Drum Shaft Needle Bearing	1	100256
Inside Drum Shaft Snap Ring	1	100208	Drum Shaft Race Bearing	1	100257
Nut End Snap Ring	1	100209	Output Gear Thrust Bearing	1	100298
Cross Shaft Snap Ring	2	100210	Output Gear Thrust Washer	1**	100299
Cross Shaft Nut	1	100213	1200 Series Output Gear	1	100406
Drum Roll Pin	1	100214	1200 Series Output Worm	1	100408
Output Gear Roll Pin	1	100215	700 Series Output Gear	1	100438
Input Worm Roll Pin	1	100216			
Output Worm Roll Pin	1	100217			
Input Gear Key	1	100220			



*Older models of the winch used gaskets (100252) instead of o-rings.
 **This part is a set of 2 washers.



Reassembly Notes:

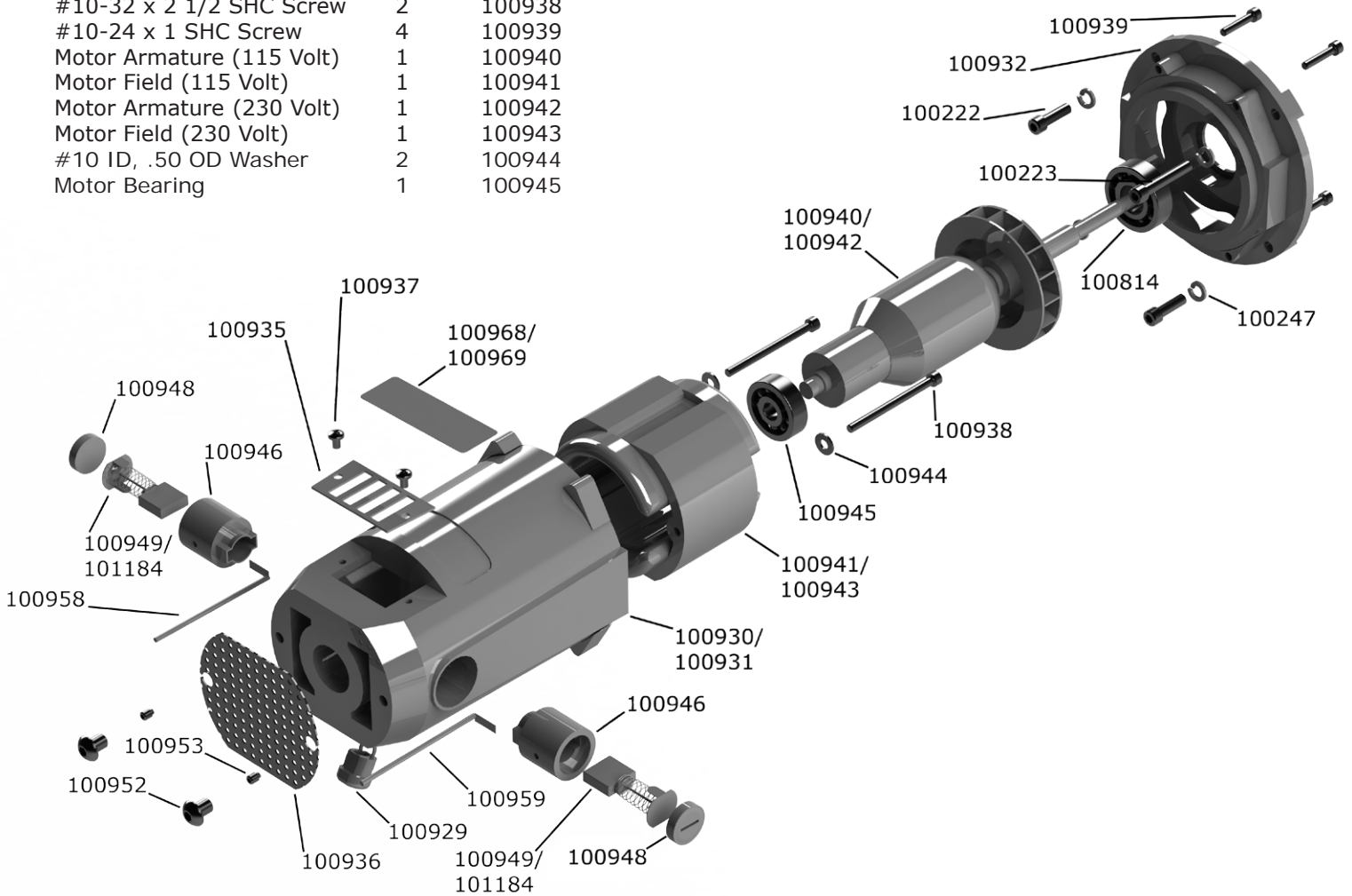
1. Cordem recommends applying Loctite 515 on the housing (100101) and cover (100102) prior to installing the housing gasket (100249).
2. Verify that the motor shaft bearing (100205) is seated in the housing.
3. Ensure that the output gear (100406 or 100438) is seated. The hub of the gear should be level to the top of the housing within .015 inches. If it's too high, the thrust bearing (100298) and washers (100299) are not seated on the gear.
4. Use an anti-galling lubricant on the pipe plug (100221).

Motor Assembly

Description	Quantity	Part Number
1/4-20 x 7/8 SHC Screw	3	100222
1/4-20 x 1 1/2 SHC Screw	1	100223
Washers	4	100247
Spade Terminals (Not shown)	4	100666
Heat Shrink Tube (Not shown)	1	100790
Motor Bearing	1	100814
Grommet	1	100929
Motor Body (115 Volt)	1	100930
Motor Body (230 Volt)	1	100931
Motor Flange	1	100932
Brush Access Cover	1	100935
Cover Screen	1	100936
Brush Access Cover Screw	2	100937
#10-32 x 2 1/2 SHC Screw	2	100938
#10-24 x 1 SHC Screw	4	100939
Motor Armature (115 Volt)	1	100940
Motor Field (115 Volt)	1	100941
Motor Armature (230 Volt)	1	100942
Motor Field (230 Volt)	1	100943
#10 ID, .50 OD Washer	2	100944
Motor Bearing	1	100945

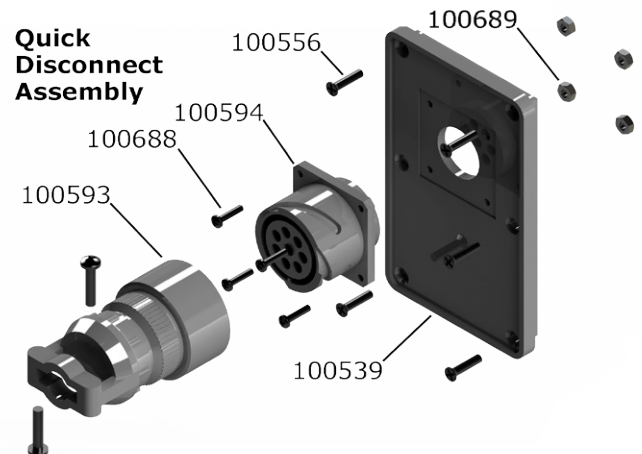
Description	Quantity	Part Number
Brush Holder	2	100946
Brush Cap	2	100948
Brush Set (115 Volt)	1*	100949
5/16-18 x 3/8 BHC Screw	2	100952
#10-32 x 1/4 HDP Set Screw	2	100953
Motor Lead Wire (Black)	1	100958
Motor Lead Wire (Blue)	1	100959
Motor Label (115 Volt)	1	100968
Motor Label (230 Volt)	1	100969
Brush Set (230 Volt)	1*	101184

*This part is a set of 2 brushes.



QD Assembly

Description	Quantity	Part Number
Box Cover (Quick Disconnect)	1	100539
#6-32 x 5/8 FHP Screw	6	100556
QD Plug	1	100593
QD Bayonet Receptacle	1	100594
QD Bayonet Connector (Includes 100593, 100594)	1	100605
#4-40 x 1/2 PHP Screw	4	100688
#4-40 Hex Nut	4	100689



SMO/SMA Assembly

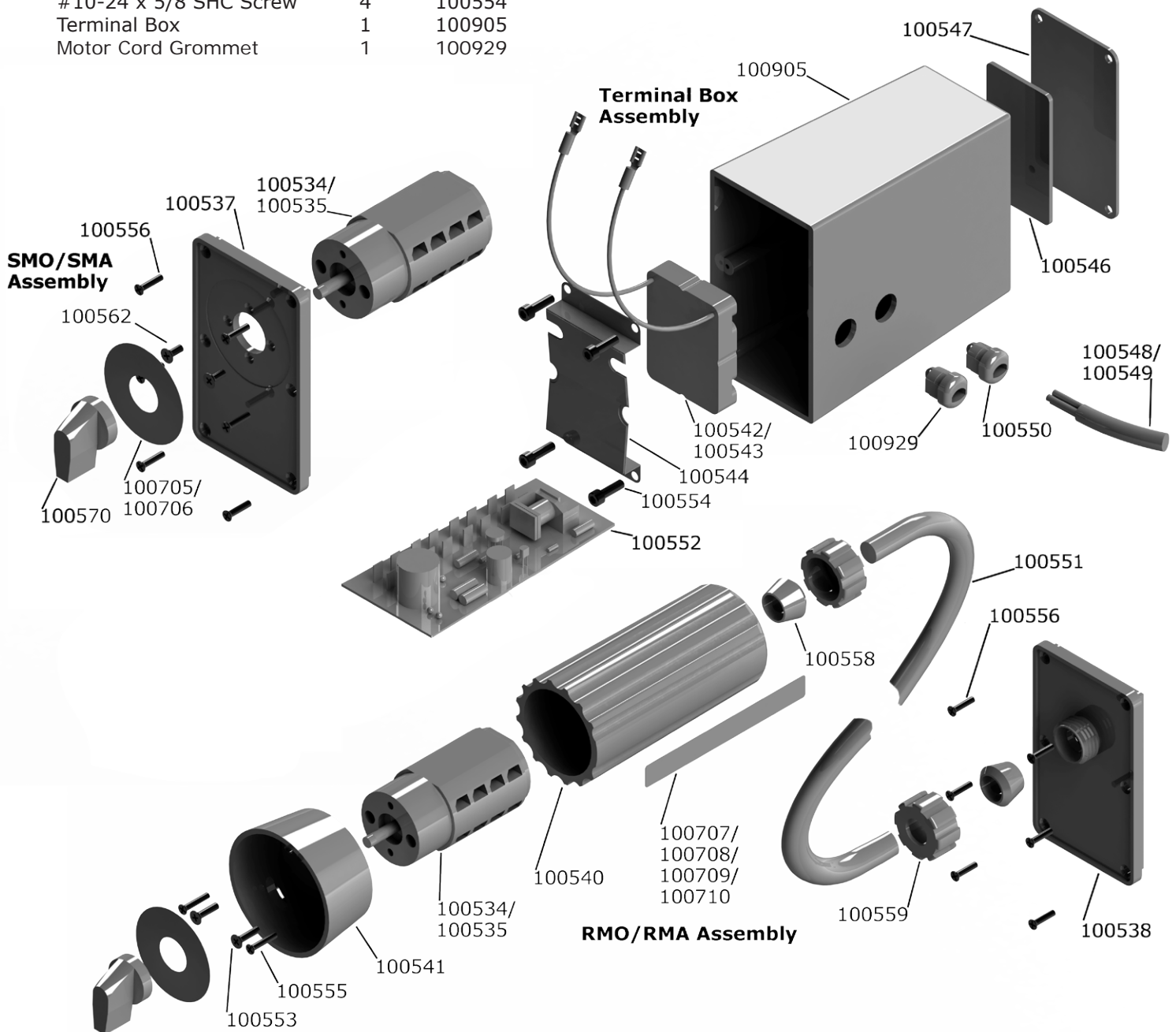
Description	Quantity	Part Number
Momentary Switch	1	100534
Maintained Switch	1	100535
Box Cover (SMO and SMA)	1	100537
#6-32 x 5/8 FHP Screw	6	100556
M4 x 10mm FHP Screw	2	100562
Switch Knob Assembly	1	100570
Momentary Switch Label	1	100705
Maintained Switch Label	1	100706

Terminal Box Assembly

Braking Resistor (115 Volt)	1	100542
Braking Resistor (230 Volt)	1	100543
Spring Clip and Insulator	1	100544
Box Heat Sink Plate	1	100546
Cover Heat Sink Plate	1	100547
Power Cord (115 Volt)	1	100548
Power Cord (230 Volt)	1	100549
Power Cord Grommet	1	100550
Trigger Circuit Assembly	1	100552
#10-24 x 5/8 SHC Screw	4	100554
Terminal Box	1	100905
Motor Cord Grommet	1	100929

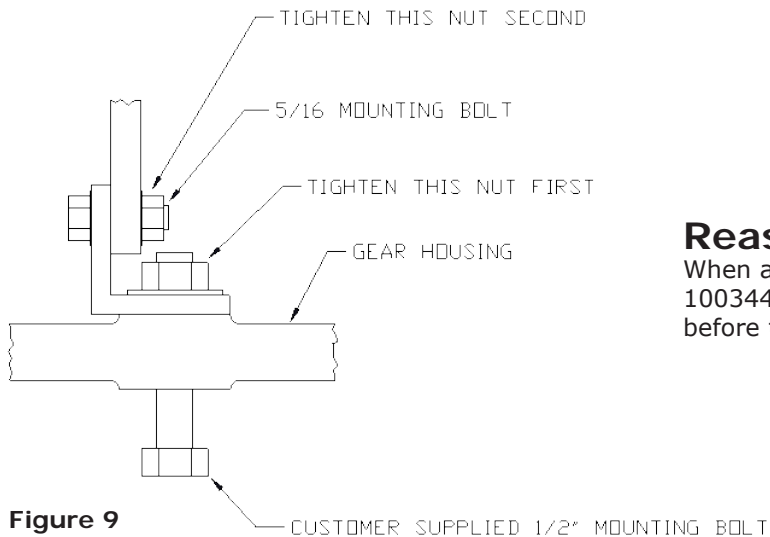
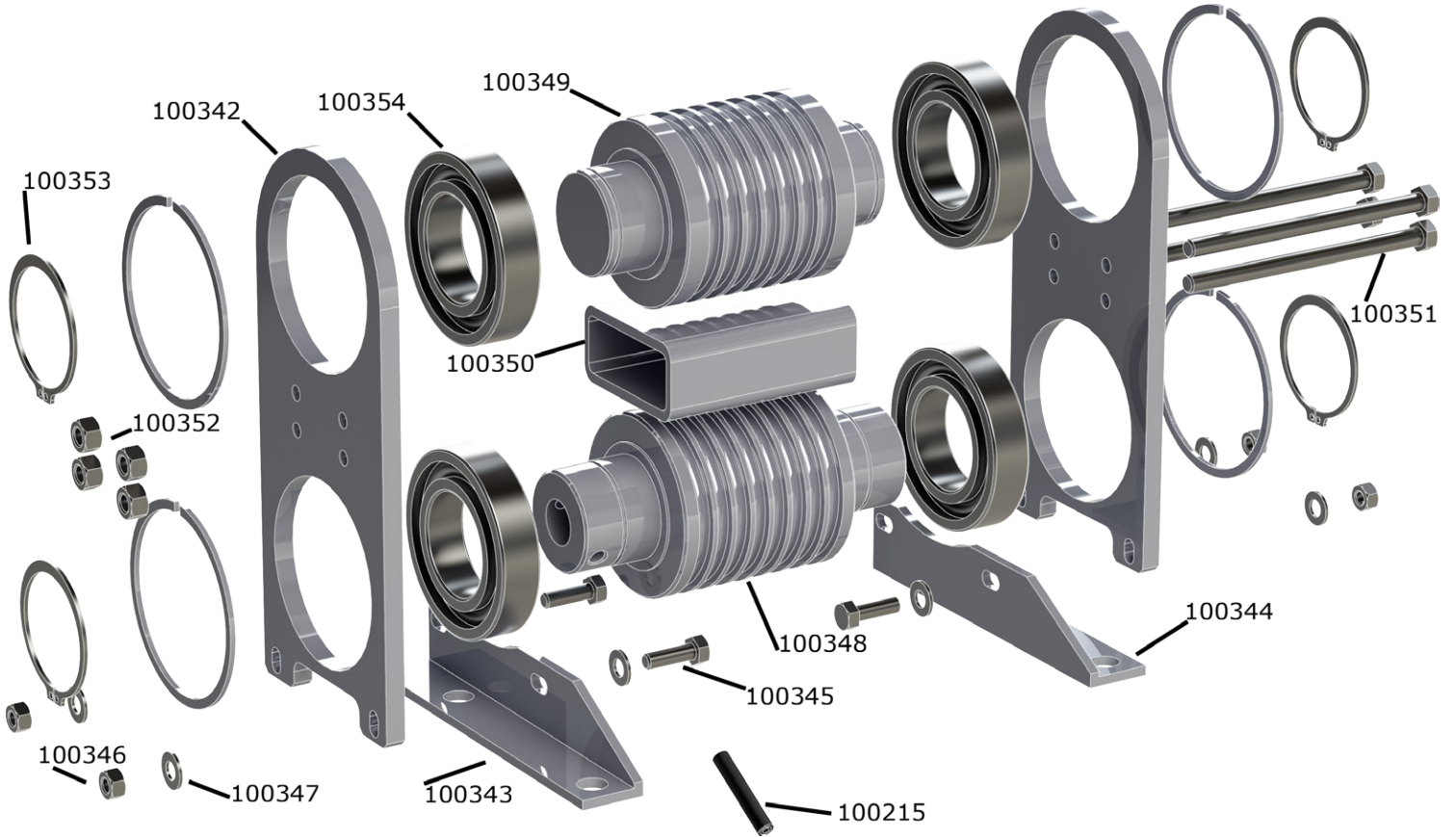
RMO/RMA Assembly

Description	Quantity	Part Number
Momentary Switch	1	100534
Maintained Switch	1	100535
Box Cover (RMO and RMA)	1	100538
Remote Control Barrel	1	100540
Remote Control Cap	1	100541
14 Gauge 8 Conductor Cable (-10 indicates 10ft. cable; other lengths available)	1	100551-10
M4 x 16mm FHP Screw	2	100553
#6 FHP Wood Screw	2	100555
Cover Mounting Screw	6	100556
Cable Bushing	2	100558
Plastic Cable Nut	2	100559
Switch Knob Assembly	1	100570
Momentary Switch Label	1	100705
Maintained Switch Label	1	100706
12-30 Warning Label	1	100707
7-30 Warning Label	1	100708
12-15 Warning Label	1	100709
7-15 Warning Label	1	100710



Double Drum

Description	Quantity	Part Number	Description	Quantity	Part Number
Roll Pin	1	100215	8-Groove Drum (Driver)	1	100348
Side Plate	2	100342	7-Groove Drum (Idler)	1	100349
Left Bracket	1	100343	Spacer Bar	1	100350
Right Bracket	1	100344	3/8-16 x 5-1/2 Hex Cap Screw	4	100351
5/16-18 x 1 Hex Cap Screw	4	100345	3/8-16 Hex Nut	4	100352
5/16-18 Hex Nut	4	100346	Drum Snap Ring	4	100353
5/16 SAE Washer	8	100347	Drum Bearing	4	100354



Reassembly Note:

When attaching to the winch, the brackets (100343 and 100344) should be securely attached to the housing (100101) before tightening the cross screws (100345) (Figure 9).

DOUBLE DRUM

Theory of Operation

The cable enters the drum assembly on the lower drum, wraps between the lower and upper drums, and then is fed out from the lower drum (Figure 10). The cable grooves on the drums are circular, not helical, which permits continuous feed of the cable in either direction.

The driving force on the cable is developed by the successive wraps on the power drum. The tension increment in each wrap over the power drum will be $T_2/T_1 = e^{uB}$ wherein:

T_2 = tension out

T_1 = tension in

u = coefficient of friction

B = arc of contact (in radians)

e = base of the natural logarithm system (2.718)

The coefficient of friction is normally .10 or greater, even with oil or grease on the cable. The arc of contact is 180 degrees, or π radians. Therefore, the tension increment per 180-degree wrap on the power drum is:

$$T_2/T_1 = 2.718^{(.1)(3.14)} = 1.369$$

Depending on the direction of approach of the cable from the external loop, there will be 6, 7, or 8 half-wraps of cable on the power drum, giving an overall ratio of:

$$(1.369)^6 = 6.58 \text{ for 6 half-wraps}$$

$$(1.369)^7 = 9.01 \text{ for 7 half-wraps}$$

$$(1.369)^8 = 12.33 \text{ for 8 half-wraps}$$

The minimum line tension to develop the 1200 lb capacity of the winch (1200 series) will then be:

$$1200/6.58 = 182\# \text{ for 6 wraps}$$

$$1200/9.01 = 133\# \text{ for 7 wraps}$$

$$1200/12.33 = 97.3\# \text{ for 8 wraps}$$

This shows that moderate initial tension in the outer cable loop is sufficient to deliver the winch's rated force to drive the cable. Cable tension may be controlled by the use of a turnbuckle or by use of an adjustment pulley in the cable circuit. We recommend a cable diameter of .25 in.

Mounting

When the cable approach is from the top, there are 2 options for attaching the cable to the drums. The favored approach is to use pulleys to spread the cables out so they can reach the driving (bottom) drum without touching the idler drum (Figure 11). This allows you to use all 8 grooves of the driving drum. Alternately, you can place the incoming and outgoing cable along the outermost grooves of the idler drum (Figure 12). This limits you to using only the 6 inner grooves of the driving drum.

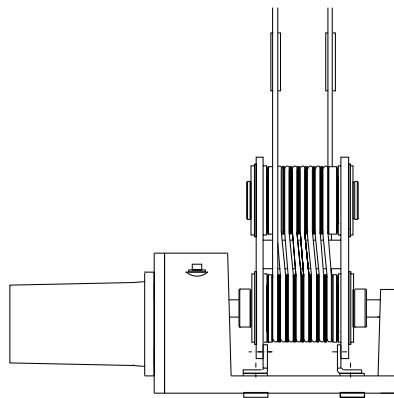


Figure 11

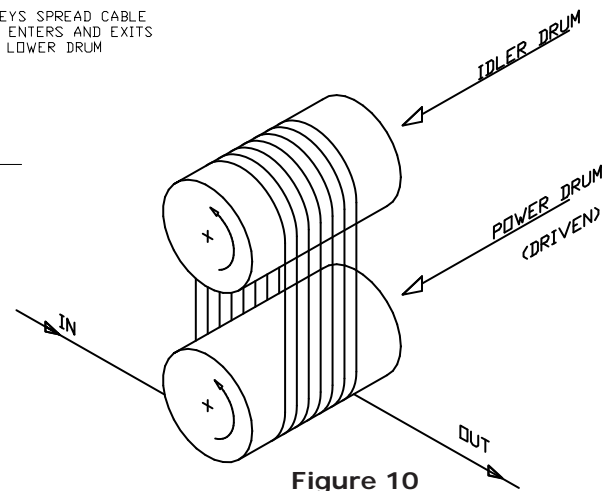
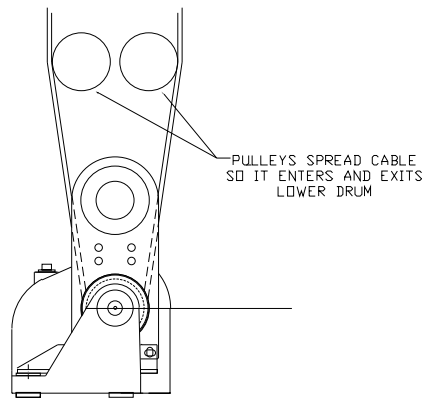


Figure 10

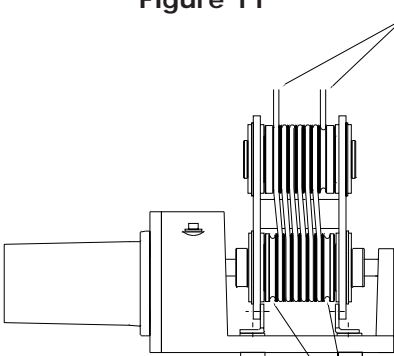
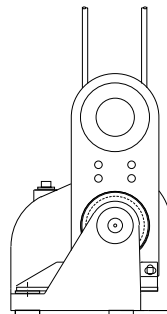


Figure 12

CABLES RIDE IN OUTSIDE GROOVES OF UPPER DRUM



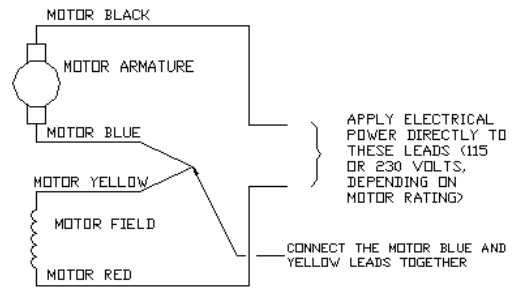
OUTER GROOVES OF DRIVER DRUM ARE NOT USED

ELECTRICAL DIAGRAMS

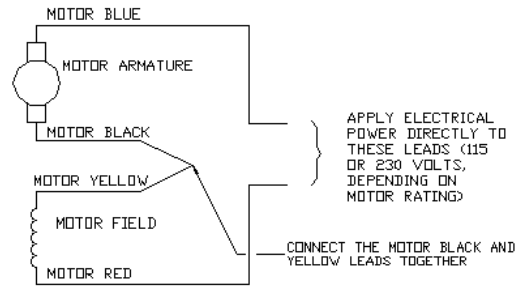
If the control fails in the winch, or you suspect other electrical problems, you can connect power directly to the winch motor (Figure 13).

1. Disconnect the 4 motor lead wires from the rest of the control.
2. Connect 2 of the wires directly together.
3. Connect the remaining 2 motor wires directly to the AC supply.

Caution: This will prevent the winch's dynamic brake from functioning. When lowering a load, the load may not stop when power is removed. Cycle the power on and off to prevent the load from lowering too quickly.



MOTOR CONNECTIONS FOR "OUT" DIRECTION



MOTOR CONNECTIONS FOR "IN" DIRECTION

Figure 13
Connecting Power Directly to Motor

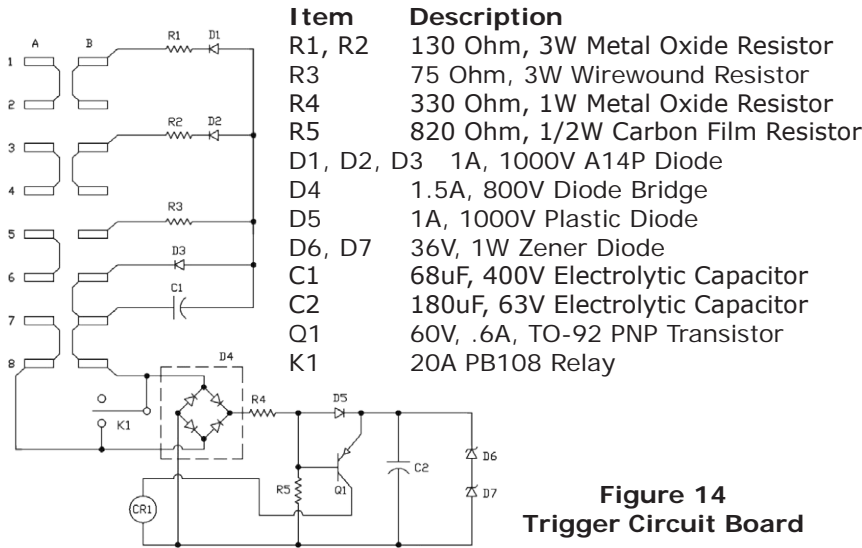


Figure 14
Trigger Circuit Board

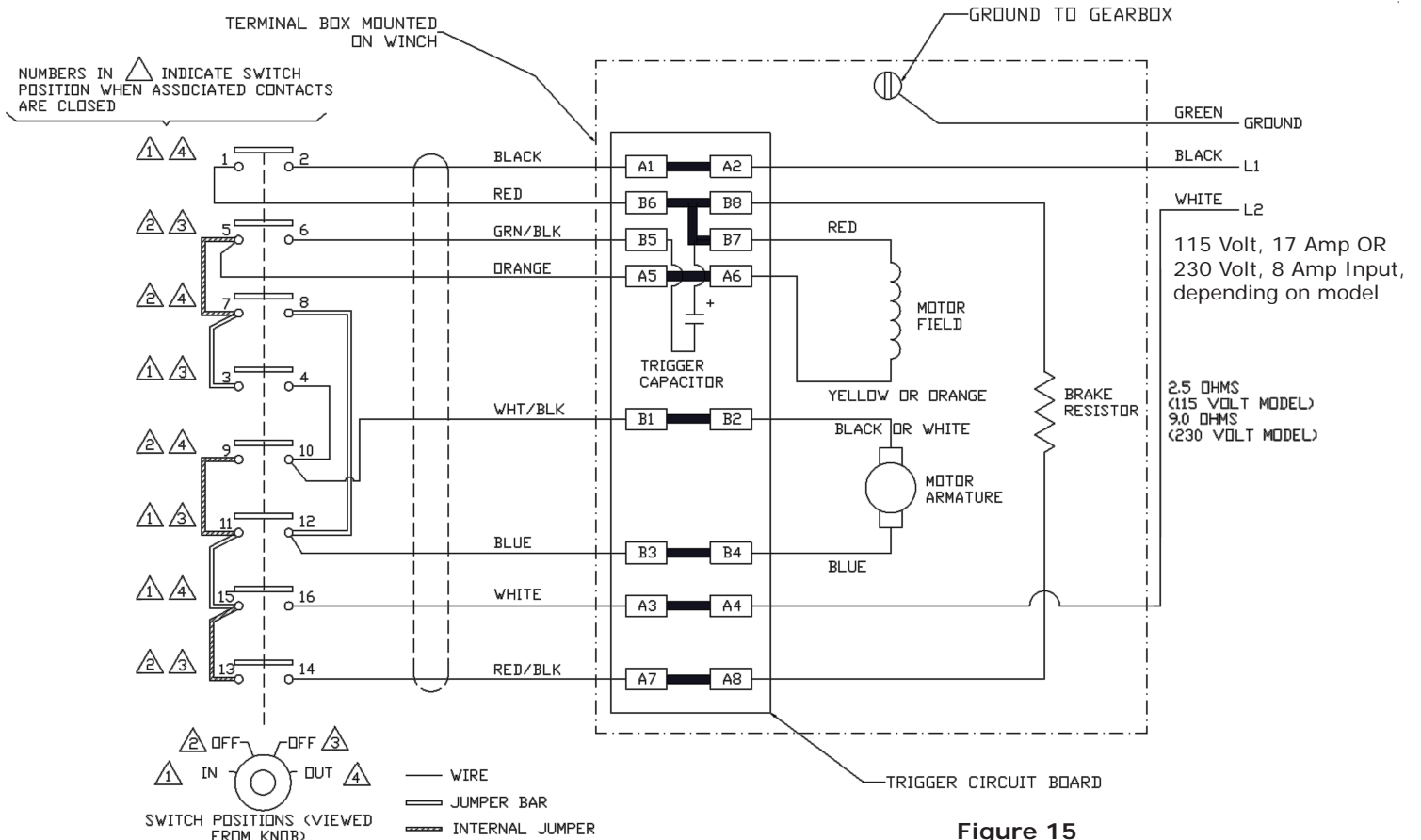


Figure 15
RMO Schematic

CORDEM Corporation