BEST TUGS

— BECAUSE YOUR PLANE DESERVES IT —

BRAVO 5, 8, 12, & 18

USER MANUAL


BEST TUGS

INTRODUCTION

At BEST TUGS™, we pride ourselves on building the most innovative and advanced tugs in the world. We work diligently to ensure that the quality and workmanship of your tug exceeds your expectations and are confident that you will see the difference in every part of your BEST TUGS™ experience.

We designed this guide to provide you the information needed to make your experience even better... and while we are confident that this guide will answer your questions, we are always here to chat with you on the phone. You can reach us at 800-914-2003.

Thank you again for choosing BEST TUGS™.

BEST AVIATION PRODUCTS
252 West 3560 North
Spanish Fork, UT 84660
800.914.2003

UNCRATING INSTRUCTIONS

Please read these instructions before beginning. For any questions call us at 800.914.2003

Tools Needed:

- Phillips Head Screwdriver (Drill/Impact is easiest)
- 7/16 Socket

1. The lid is spray-painted with a red "1". Remove the screws marked with red paint. Remove the top lid from the crate.

2. The end panel is spray-painted with a red "2". Remove the screws marked with paint. Remove the panel from the crate.

3. Remove the plastic wrap from around the Control Arm. Kick (push-in) the 2-inch round button at the base of the control arm and rotate the Control Arm into the lowest operating position (FIG 1). Release to lock the arm in posistion. See page 8 for more instructions on adjusting the Control Arm.

FIG 1

4. On the lateral sides of the crate, marked with a red "3" - Remove the screws marked with red paint. These screws are in a 2x4 board, which is holding the control arm and tires in place. NOTE: Make sure to hold the boards as you remove screws to keep them from falling onto the tug's cover.

5. Cut the strap holding the cardboard box in place. This box holds the accessories for your tug. Remove the box from the crate.

Note: Foam filed tires have a screw in the tire from the factory. It is safe to remove the screw.

UNCRATING INSTRUCTIONS

Continued

6. Using the end of the crate, stack the 2x4's (step 4) on top of each other, as illustrated. (FIG 3)

7. Place the removed end wall with the ½" plywood resting on the 2x4's to create a ramp. (FIG 4)

   NOTE: The B5 comes with two (2) 2x4 boards in the crate, while the B8 and B12 come with three (3). Use the third 2x4 board to support the ramp, as shown in FIG 4 for the more substantial B8 and B12 models. The third board is not necessary for B5. If you have a painted floor, we recommend performing this step outside of the hangar to avoid any possible scuffs or scratches.

8. Turn the tug on by rotating the red E-Stop on the end of the control panel clockwise and pushing the master switch to the "on" position.

9. Set the direction to "PULL" and slowly twist the throttle to drive your tug out of the crate. See page 11 of your User Manual for further instructions on how to operate tug safely.

FIG 3

FIG 4

A couple notes:
The twisting and locking slides are attached to the QLF. They are listed for reference purposes. Be sure to remove the L-Handle Pin before rotating the control arm into the operating position. The contents in your crate may vary from the illustrations.

First Use

If you are using an Easy Load or Lazy Susan configuration: the tug comes from the factory with the tire cradle in a loaded position. Unlock the hook and then physically pull the locking hook back to release the cradle before physically moving the ramp to the loading position. Note: Before each use, double-check your loading tray. Repeat the step of manually lowering the ramp if needed.

Please Email cool pictures of your tug and plane to sales@besttugs.com. You may see it on our website or social media.
(By sending images, you expressly permit us to use these images for marketing purposes.)

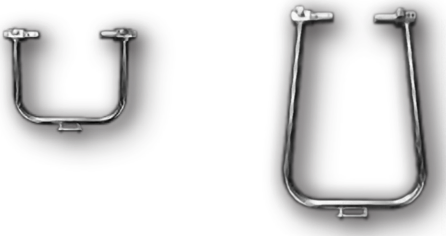
WHAT'S IN THE CRATE?

Standard Items

External Charger

L-Handle Pin *(in base of control arm)*

Quick Lock Fork (QLF)



Twisting Slide **Locking Slide**

Items Depending On Aircraft or Options on Tug

Cup Adapters

Wheel Chock Kit

Carabiner, Axle Strap, RGA Pin

Air Hose and Pressure Gauge

Jump Start Cords

CONTROL PANEL FUNCTIONS

1. **Emergency Stop Switch**
   Rotate clockwise to power on, push in to turn off. CAUTION! Do not turn off while in motion, unless an emergency stop is needed, this aggressively shuts down the system and locks parking brake.

2. **Master Switch**
   Turns tug on and off. NOTE: Tug will not turn on if E-Stop is depressed.

3. **Multifunction**
   Note: this switch controls mutually exclusive options; it has three functions unless you only have the EZ Load. The Lazy Susan is a rotatable EZ Load.
   EZ Load
   (Two Position Switch)
   Up/Load Locks the cage in the load position. Down/Unload releases the cage
   The Lazy Susan
   (Three-Position Switch) Rotate/Up releases the Lazy Susan turntable The EZ load cage is also locked. Load allows locking the rotation when the pin aligns and locks the EZ Load. Unload/Down the turntable is locked, and the cage is released.
   Heli/Trailer Lift/High Lift
   (Two Position Switch) controls up/down motion. Motion starts when you push on the switch and stops when you release the switch, or the Lift has achieved max travel up or down. Note: When using the High Lift: do not move your plane in the elevated position while turning.

4. **Battery Charge Status**
   Recharge your tug when power indicates 70% (while tug is at rest.) When charging, turn your tug off.

5. **System Status Indicator**
   See Error Code Translations on page 14 for flashing light translations.

6. **Auto Park Indicator**
   The red light indicates that the parking brake is set. The brake engages when the tug comes to a stop and remains "in-park" when the system is powered down. Note: Always use wheel chocks

7. **Direction Control**
   Push/Pull

8. **LED LIGHT** (optional)
   Make sure this switch is off while the tug is charging.

9. **Air Compressor** (optional)
   When hooking up the included hose: Insert the air hose into the fitting while pulling the sleeve on the fitting away from the brass elbow connection. Release the fitting to lock air hose into place.

10. **High/Low Setting**
    Use "HIGH" for maximum speed, typically used for long-distance movements. Use the "LOW" setting when maneuvering in tight or restrictive areas for better control and safety. No damage will occur if the HIGH/LOW setting is changed while in motion.

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INITIAL USE

Adjusting the Control Arm

Your tug arrives fully assembled. Before first use, set the control arm to your preferred height. To do this, be sure you have a good hold on the control arm. Then kick (push-in) the large button at the control arm base and rotate the arm (FIG 5) until it is at your preferred angle. (Most users lower it to the bottom position.)

FIG 5

Once you have decided on the angle, release the button. The spring will lock the control arm in the selected position.

We strongly recommend using your tug without an aircraft attached to get used to the controls and movements; this is a very user-friendly system, but it can take a bit of practice to get familiar with initially. Change the drive direction (PUSH/PULL), vary the speed by slowly twisting the throttle as you begin moving. Make sure you are comfortable with the throttle, maneuverability, and functionality of the tug before moving your plane.

Please familiarize yourself with how long it takes for your tug to ramp up/down and stop; the"coast" when slowing is due to the software that protects your nose gear from unnecessary damage and stress. Take the time to get used to this feature and be aware of it as you move your aircraft.

Continued

EZ Load/ Lasy Susan

The Cage on the Ez Load/Lazy Susan needs to be adjusted to fit your specific tire. After you load your plane, adjust the width by adjusting the two sliders on the bottom of the Cage so that they are close to the tire's sidewalls. Remove the pins and adjust the sliders to the nearest hole, then put the pins back in.

The size of the wheel that can be loaded can be adjusted. Remove the thumbscrews and adjust the Cage so that it fits closely to your tire diameter. We designed the Cage to resist letting your tire pop out of the Cage. If you have not adjusted this feature, a tire could pop out of a loosely fitted Cage.

Warnings

Check the plane's surroundings, remove any obstructions, verify that your path is clear, and your propulsion systems (prop), wings, and tail, clears. Please verify that your wheel is secure on the tug, including strapping it down. Finally, remove the wheel chocks. You are ready to move your plane. Check your plane's POH to verify the maximum turn radius for your particular nose gear. The tug can turn your plane at an angle that may exceed the nose gear's maximum turn radius. BEST TUGS™ assumes no responsibility for any damage caused by the tug operator misusing the equipment. As the operator, you have the responsibility to be familiar with your tug, your plane, and their specific limitations.

Note: **E-Stop** means **EMERGENCY STOP**. Not power off, not stop my tug from moving—It means Stop now—I don't care if my tug and my plane's landing gear are damaged, because my plane going through the hanger wall, or trapping your body against the hanger wall, is much more expensive to repair.

When you shut down the tug with the E-Stop, all that energy in the motor controller has to go somewhere, and it does—destroying the controller over time.

First Time Set Up (QLF/Wheel Chock Kit)

NOTE: Quick Lock Fork and Wheel Chock Kit
ARE NOT USED TOGETHER

Setting Up the Quick Lock Fork

If equipped with the standard ramp

TIP: It is easier to set up your QLF
if you give yourself plenty of slack in the strap.

1. Right Fork - Push the spring-loaded locking slide on the right fork of the QLF to the left until it locks into place. It is locked when the slide does not return to the open position on its own. (FIG 7) To release the slide, lift the drop pin and allow it to return to its original position.

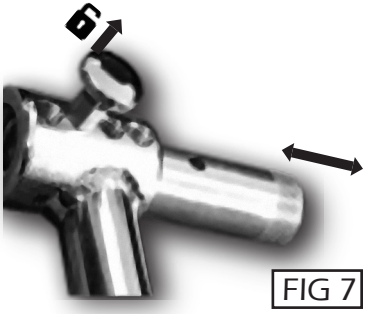


FIG 7

2. Place the QLF over/in the nose gear connection.

3. Left Fork - Lift the drop pin on the left fork and rotate the slide until it fits firmly against the nose gear. (FIG 8) The less slop and wiggle, the better. Once the slide is fitting snugly, release the drop pin and continue twisting until it falls into place to lock the slide. See FIG 10 and FIG 11.

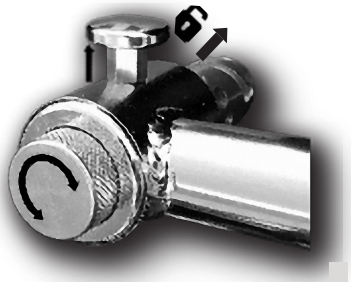


FIG 8

Setting Up Wheel Chock

The wheel chock drops into the loading tray between the two brackets. Line up the holes on the RGA with the bracket holes in the loading tray and insert the pin. Make sure both ends of the pin are visible and fully inserted. (FIG 12)

FIG 9

First Time Set Up (QLF/Wheel Chock Kit)

Continued

Switching from Wheel Chock to QLF

Pull the long pin and remove the wheel chock from the loading tray and take the carabiner off the tow strap. Take the winch strap in one hand and the QLF in the other. Take the QLF pin out of its hole by pushing the springing wedge down and removing the pin. Slip the winch strap onto the pin and push the pin to the original position. (FIG 9) Line the strap loop up with the QLF pin holes then push the pin back through the strap and QLF holes. Ensure the spring wedge holds the pin in place.

Now that your wheel chock is set up for your specific plane, you are ready to winch it into place and move your aircraft.

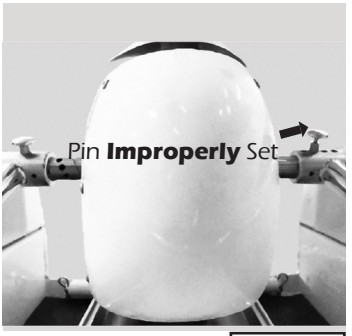


FIG 10

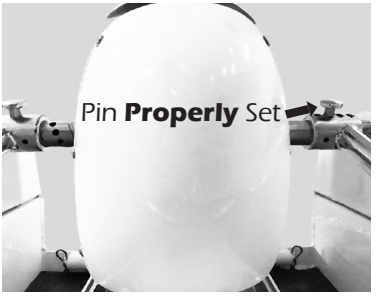


FIG 11

DO NOT USE QUICK LOCK FORK AND THE WHEEL CHOCK KIT AT THE SAME TIME

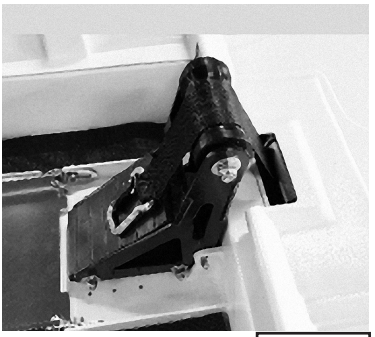


FIG 12

See BestTugs.com for instructional videos on loading.

Loading Your Plane (Standard Ramp)

Double-check your attachments to make sure they are correctly attached, and the setup steps followed.

1. Chock aircraft mains. Position tug with nose wheel centered on the ramp. Until you are comfortable with the tug's operation, turn the tug off for the safest loading.

2. Put the winch in neutral/reverse and pull enough slack in the strap to attach QLF for wheel pant planes or axle strap for retractable gear aircraft.

3. Before you begin winching, flip the switch (FIG 13) on the B5 winch to the forward position (counter-clockwise (FIG 14) for B8 and B12-18) and winch the plane onto tug's loading tray.

B5 Winch

FIG 13

B9 / B12 Winch

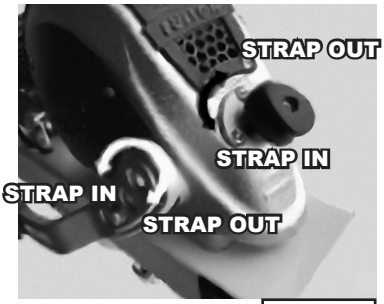


FIG 14

Note: If you are comfortable with your throttle, you can choose to winch the plane onto the tug while very slowly driving the tug forward, which makes winching easier. Keep wheels chocked if you decide to use this method.

Moving Your Plane

Check the surroundings of the plane, remove any obstructions, including the wheel chocks.

Make sure the tug is in proper mode (PUSH/PULL) then twist the throttle to start moving.

Make sure you familiarize yourself with how long it takes for your plane to ramp up/down and stop.

When slowing, the "coast" is due to the software that protects your nose gear from unnecessary damage and stress.

(Note: E-Stop overrides the soft auto-stop feature. You could damage your plane and or tug)

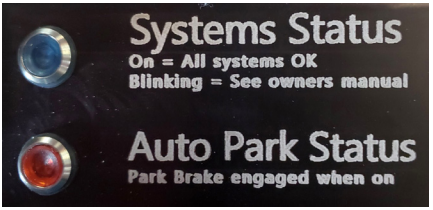
Take the time to get used to the soft auto stop feature and be aware of it when moving your aircraft.

We strongly recommend moving your tug without aircraft attached to get used to the controls and movements. As you are moving your plane, be sure your nose gear can handle the turns you are taking.

As the operator, you are responsible for knowing the limitations of your specific aircraft.

Parking

Your tug has an automatic parking brake that engages when you stop your tug. A red light on the control panel lights up to show the brake has been appropriately set. When you are ready to move, rotate the throttle, and the brake disengages automatically. NOTE: Tug's parking brake acts as a secondary brake, always use wheel chocks to park your aircraft safely.



If anything ever looks wrong or like it may damage your aircraft, please call us. 800.914.2003

Unloading Your Plane (Standard Ramp)

Make sure the tug is in line with the plane. Chock the aircraft mains.

Crank the winch handle slightly to release stress on winch direction selector; switch to unload/ neutral.

Select "PULL" on the control panel and slowly drive tug away from aircraft.

Always use wheel chocks when loading and unloading your plane.

CAUTION

The winch handle rotates quickly as your plane unloads from the tug, keep hands clear (FIG 15)

Leave the slack left from unloading the plane unspooled; this leaves the attachment/strap ready to be attached for your next flight.

FIG 15

Lazy Susan/EZ Load Operation

Your cage can and should be adjusted to more tightly fit your wheel. Both the diameter (thumbscrews) and width (slider) can be adjusted. See Initial Use on page 7 for set up instructions.

If you have a Lazy Susan, lock the rotation before loading or unloading. Locked, the Lazy Susan now behaves as an EZ Load. Be sure your tug and aircraft are in line with each other before loading/unloading to avoid damage to your tug/aircraft.

To lock the Lazy Susan so it cannot rotate, engage the locking mechanism by selecting Load or Unload/Down, depending on what you are going to do, and line up the plane and tug until the locking mechanism engages. You can not unload a plane until the Lazy Susan is aligned AND locked. To allow the Lazy Susan to rotate—push Rotate/UP, to disengage the locking mechanism.

In the Unload/Down switch position (hold the silver button down on older models), the EZ load locking device releases when the weight of the plane's wheel shifts from contacting the ramp and presses against the back of the Cage. Note: this is a safety feature to prevent the tug from releasing while you are pulling your tug.

Loading:

Make sure the ramp is down. If it is not in the down position, select Unload/Down and manually lower the ramp. Drive the tug under your wheel. When your plane is loaded correctly, the ramp automatically locks into the upright and locked position. Tip:Nose heavy planes may need to inflate their tug wheels to 45 lbs and or adjust (two allens screws) the ramp height.

Unloading:

Select Unload/Down on the rocker switch (silver button on older models) to allow your plane to unload.

Carefully move the tug towards the chocked aircraft; this causes the nose wheel to contact the back of the Cage, relieving pressure from the ramp and disengages the locking device. Then as you pull away from the plane, the tire pushes the ramp open.

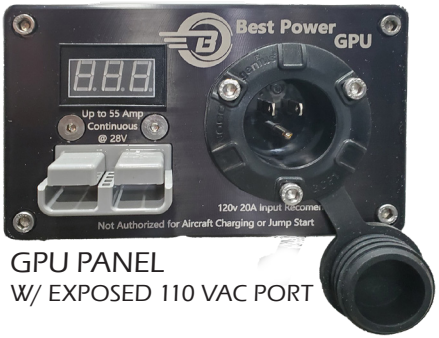
An advanced maneuver is; while moving the plane towards you, press the Unlock on the rocker switch (silver button on older models) to allow the locking device to release when the ramp pressure is removed, then reverse the throttle. The tug's autothrottle allows the plane to continue to move towards you for a moment during the autothrottle's slow-down/reverse. That lets your plane press against the back of the Cage, removing the pressure against the locking device, and then you can pull the tug from under your wheel.

Power Options

JumpStart: Provides High cold-cranking amps to assist in starting your engine (12 Vdc and 24 Vdc). This option uses power from your tug's batteries to assist your aircraft's batteries when starting your plane. Note: Even when the tug is off, the JumpStart panel is live! (Although the readouts won't show until the tug is on.)

JumpStart Panel

GPU: The Ground Power Unit is used to power your avionics and other lower power demand systems in your aircraft from the standard 110 Vac wall connection. You have 28.5 Vdc at 25/50 Amps. Note: Do not use the GPU to power air conditioning or pitot tubes. Warning: battery damage is possible—the GPU should not be used to charge either the tugs or the aircraft's batteries!



GPU PANEL
W/ EXPOSED 110 VAC PORT

JumpStart + Boost: Press the silver button to the right of the JumpStart JumpStart panel, and the tug gives you thirty minutes (from the time you pushed the button.) with over 28 Volts from the GPU and all those amps from the batteries providing power to the plane. The disadvantage of using only the JumpStart option is that you are using the tugs batteries that discharge with time, and some planes require over 28 Volts before they can recognize the external power source. With the JumpStart plus Boost, you can combine both sources of power for an excellent source of current at the correct voltage to start your plane.

JumpStart Panel
w/Silver Boost Button

Plug the cable into your plane first! Which service your plane gets depends on which power panel you insert the cable.
See page 16

Storage

Store your tug in an area that is dry and safe from the elements. Electrical systems are not affected by limited exposure to rain and snow. We do not recommend extended exposure.

If you do not plan on using your tug for an extended period, leave your tug plugged in so the smart charger can take care of the battery.

Always turn off your tug and accessories.

Maintenance

Tighten the wheel lugs once a quarter to 70 ft/lbs. The recommended tire pressure for inner tube equipped tires is 30 PSI. The caster wheel needs to be re-greased every two years for continuous use.

Tighten chains every 12 months for safe operation. To tighten chains, remove the six (6) screws around the perimeter of the cover, loosen five (5) bolts on the motor mount. Using a pry bar, tighten the chains by pushing against the axle until there is little to no slack in the chains, while keeping chain tension, re-tighten bolts. If you have any questions about this process, give us a call.

Winch straps (on tugs equipped with winches): Before each use, check straps for damage or loose stitching. If the strap is damaged, replace it before use. Replace your winch straps annually; there is cumulative UV and oxidation damage that can be invisible to the eye.

BEST TUGS™ will replace your strap once a year for free—as long as you own your tug. Just pay shipping and handling. Call sales at 800.914.2003 to order; exclusions apply.

The Lazy Susan option needs to have the central bolt tightened and moving parts lube with lightweight oil annually. It is found under the Romeo and centered under the Lazy Susan. Failure to maintain this may cause the failure of the bearing ring. Loosen the locking nut and tighten the central nut until tight, but not so tight that the Lazy Susan cannot rotate. Re-tighten the locking nut after you have completed the adjustments.

If the Lazy Susan's locking mechanism fails to engage, disconnect the wires (unplug the pins) of the solenoid (Left side when looking from the ramp side and golden in color) and twist counterclockwise to remove. On older models, manually align the Lazy Susan until you find the only opening. Clean the opening below of oils and debris. Replace the solenoid and re-plug in the wires.

Battery Care

Your tug has a smart charger with trickle charge and battery maintenance cycles. To charge, plug the charger cord into the tug, then the power cord into a standard power outlet. You cannot overcharge when using the included charger.

Always turn off the master switch when charging.

We suggest charging your tug when the battery falls below around 70% (at rest) for optimal battery life (for sure before 30% at rest). Note: The tug continuously and instantaneously calculates the state of charge, which is why the percentage fluctuates while moving your plane. We have seen as low as a 10% charge displayed when using a fresh battery and moving a heavy plane. To read the resting battery's charge, leave the tug at rest for at least 60 seconds. We have seen a 10% drop from freshly charged just by moving the tug in and out of the hanger. The discharge rate is non-linear.

If you notice shorter times needed between charges, your batteries are beginning to wear out.

Lead Acid batteries are surprisingly delicate—damaged by direct and indirect effects: environmental, user induced, misapplication, and on and on. For instance, charging with a voltage above 14.4 volts or

Battery Care

Continued

allowing the battery to discharge completely are the two most common ways to damage a lead-acid battery.

Even new batteries can be ruined in just a few weeks by being discharged too much or left uncharged for too long; for this reason, Best Tugs cannot warranty the batteries as we have no control over the end-users' actions.

Modern microprocessor-based smart chargers use switching circuits; they are lightweight and designed to protect themselves against reverse polarity connection. They also have an annoying feature of not charging if the battery's voltage is below some arbitrary value.

If you left the tug on and it no longer charges, a cheap 12-volt car charger with a volt-meter is your best option to try and restore the battery. Note: Most local battery/automotive stores carry replacement batteries.

To recover the battery pack or diagnose their condition:

- Connect a twelve (12) Volt charger with a meter across the terminals of each battery, one battery at a time.
- If you get a reading of zero (0) volts, a short circuit has occurred, replace the battery.
- If your battery reads less than 10.5VDC when charging, then the battery has a dead cell, replace the battery
- The battery charger indicates fully charged, but the voltage is below 12.4VDC? The battery is sulfated, replace the battery soon.

Are all batteries fully charged? The tug should be able to resume normal functions. If not, call us.

12 Volt 35 AH Sealed AGM Battery.

Acceptable brands include Duracell, UPG, Bright Way Group, Panasonic, Interstate, and others. (The previous are registered trademarks of the respective companies.)
Length: 7.68 in
Width: 5.12 in
Height: 7.09 in
Voltage: 12
Lead Acid Type: Deep Cycle
Capacity: 35AH
Chemistry: Lead Acid
Lead Acid Design: AGM
Product Category: Sealed Lead Acid
Product Subcategory: Deep Cycle
Terminal Type: M6 Nut and Bolt, NB, Nut, and Bolt.

Error Code Translations

Most codes are safely reset by turning the tug off, waiting five seconds, then back on again. If the system fails to reset please contact BEST TUGS™ at 800.914.2003 for assistance.

Blue LED Light off: System powered down after 20 minutes of no use.

Blue LED Light on: Controller operational, no faults.

All codes have two parts. Count the sequence of flashes (*) to identify code.

Common codes are **blue**.

	Flashes	Meaning
1,1	* *	**Aircraft Chocked or Brake Set**
1,2	* **	Throttle Fault
1,3	* ***	Speed Limit Fault
1,4	* ****	**Low Battery (Charge Required ASAP)**
1,5	* *****	**Over Voltage (Unplug tug before use)**
2,1	** *	Main Contactor Driver Failed Open
2,3	** ***	Main Contactor Stuck, driver fail, or brake coil
2,4	** ****	Main Contactor Driver Failed Closed
3,1	*** *	HPD Fault
3,2	*** **	Brake on (Electromagnetic brake open or shorted)
3,3	*** ***	Pre-Charge Fault (Low Battery)
3,4	*** ****	Brake Off (Electromagnetic Brake open or shorted)
3,5	*** *****	**HPD Fault** (Throttle was engaged when tug was turned on)
4,1	**** *	Current Fault (controller failure, motor or wire failure)
4,2	**** **	Motor voltage (short in motor or wiring)
4,3	**** ***	EEPROM Failure
4,4	**** ****	Power Section Fault

Common Controller Error Codes for the B12 & B18

50: Under Voltage
52: Under temperature
53: Over Temperature
90: Motor Over Temp Cutback
95: Controller Under Temp
96: Stall Detected
97: Controller Over Temp
99: Undervoltage Cutback
102: User pressed the E-Stop

TROUBLE SHOOTING

QUESTION	SOLUTION
The tug was left on and the batteries are dead	A cheap 12 volt battery charger (commonly found at Walmart) can sometimes save the batteries. If recovery is unsuccessful, replacement batteries can be purchased at most battery/automotive stores in the U.S.
Quick Lock Fork and Retractable Gear Attachment were used at same time.	DO NOT use these two attachments together. Please go to pages 9 and 10 for instructions
The master switch is "on" but the tug is not moving.	There are two possible solutions. 1. Tug will turn off computer after 20 minutes of inactivity. To reset computer, turn the tug's master switch off for three seconds and then back on. 2. Make sure the red E-Stop is not pushed in. The tug will not turn on unless E-Stop has been twisted out.
I started to move my plane, but my tug stopped, a light is flashing.	See Error Code Translations on page 18 for details.
Tug died outside of hangar with the parking brake engaged.	There is a manual override under the cover. It is a handle on the motor pointing at the batteries. Pull it up (it will only pop up a few degrees) the parking brake will disengage and allow the tug to be pushed freely.

Critical Cautions

Our tugs do not instantly stop. This feature is to protect your aircraft's landing gear. Failure to compensate for this soft stop can cause damage to your aircraft. "Slowly" is the word to live by when you are in tight spaces or loading the tug. We recommend practicing with the tug before using it on your aircraft to allow familiarization with this soft stop feature. Exception: E-Stop stops the tug NOW! An emergency stop can damage the landing gear and damage the tug's motor control module. The "E" in E-stop stands for EMERGENCY.

Chock your mains! You don't want to push your aircraft into the hanger wall...

During operation, be aware of your surroundings. Never put yourself between the tug and any object! A tug capable of pushing thousands of pounds of aircraft can push you against an obstacle with thousands of pounds of pressure. There is a risk of serious injury, death, or dismemberment. Proper operation is your responsibility.

Best Tugs™ tugs do not have secondary brakes—the motor/transmission provides all braking. Your aircraft can roll freely if your transmission fails. As the operator, it is your responsibility to keep your aircraft within safe limits. Never move an aircraft on a slope or environment where the loss of tug breaking would put you or your aircraft in danger.

Leaving the master switch on allows the battery to discharge relatively rapidly. A fully discharged battery can lead to a drastically shortened battery life. The tug is always using a small amount of power, even with the master switch off. Keeping our smart three-phase charger (fast charge, trickle charge, and maintenance mode) connected if you are not going to use the tug for a while will help prevent this. You cannot leave the charger connected for too long. Note: the charger's sensors will not charge a battery bank once it discharges below approximately 50% of the bank's nominal voltage. Instructions for potential recovery are in the battery care section. A discharged battery and freezing temperatures almost always leads to battery replacement.

Overloading the tug and how it affects your transmission. Or---
Going into the red zone of the Loaded Weight chart.

Example 1: You have a standard B5 tug you bought for your Cirrus, and you do your buddy a favor and move their King Air—you have just damaged the gears. Failure is now a matter of when—not if.

Example 2: You used the standard B5 tug you bought for your Cirrus, and pulled your Cirrus up a 3-degree slope—you have just damaged the gears. Failure is now a matter of when—not if.

If you find that you have the wrong tug for your plane's environment, please call us and exchange it for the appropriate model. We have a 30-day exchange policy; you only pay for the price difference and freight.

Exceeding the parameters of the tug can cause future power train failure. Best Tugs™ tugs load ratings are for hard flat and level surfaces. Use on a slope drastically changes those parameters. The steeper the grade, the more energy it takes to move your plane—it is as if the plane's load parameter increased. The transmission's gears have a superior hardened surface; a one-time event that exceeds the tug's parameters can degrade that surface—eventually leading to total failure.

Rough surfaces, such as grass, can increase the rolling resistance of your tires. The lower your tire pressure, the larger the tire's contact patch, the more extreme the

tire deflection, resulting in more rolling resistance. It now takes more energy to move the airplane—which is functionally equivalent (In regards to the loaded weight charts) to the plane weighing more. Even a ten percent under-inflation could cause your load to be over the limit—you have just damaged the gears. Failure is now a matter of when—not if.

Understanding the Loaded Weight Charts: You are looking at the load on the tug in pounds against the time (Duty Cycle in 15-minute blocks) that the tug can sustain that load. The load is also a factor of the slope a tug is driven on—flat terrain is easy; once you get started, it takes almost no energy to keep moving. However, when you are going up a slope (degree), or through rough terrain, you are using lots of energy for every inch you pull the thousands of pounds of your plane. That energy is converted to heat, which destroys your power train. Moving aircraft long distances also causes heat buildup, drastically reducing the tugs life span.

The larger the tug, with an appropriately smaller than rated load, the longer a tug can be in continuous usage. If you must move your aircraft a long-distance, slow down, or pause now and then to allow for heat dissipation.

LOADED WEIGHT

These charts show the load capacity, in U.S. pounds, that each tug is capable of—for a specific grade, in degrees, for a given 5 minute use/rest duty cycle, in perectage.

B5 Load & Duty Cycle

Pounds / Degrees	2,500	3,750	5,000
0.0	100	100	100
0.5	100	90	68
1.0	99	66	N/A
1.5	78	52	N/A
2.0	64	N/A	N/A
2.5	55	N/A	N/A
3.0	N/A	N/A	N/A

B5 Commercial Load & Duty Cycle

Pounds / Degrees	2,500	3,750	5,000
0.0	100	100	100
0.5	100	100	100
1.0	100	98	73
1.5	100	77	58
2.0	95	64	N/A
2.5	81	54	N/A
3.0	71	N/A	N/A

B8 Load & Duty Cycle

Pounds / Degrees	4,000	6,000	8,000
0.0	100	100	100
0.5	100	86	64
1.0	94	63	N/A
1.5	74	N/A	N/A
2.0	61	N/A	N/A
2.5	52	N/A	N/A
3.0	N/A	N/A	N/A

B8 Commercial Load & Duty Cycle

Pounds / Degrees	4,000	6,000	8,000
0.0	100	100	100
0.5	100	100	100
1.0	100	100	79
1.5	100	83	62
2.0	100	69	51
2.5	88	58	N/A
3.0	76	51	N/A

LOADED WEIGHT

Continued

B12 Load & Duty Cycle			
Pounds / Degrees	**6,250**	**9,375**	**12,500**
0.0	100	100	100
0.5	100	87	65
1.0	96	64	N/A
1.5	75	50	N/A
2.0	62	N/A	N/A
2.5	53	N/A	N/A
3.0	N/A	N/A	N/A

B12 HD Load & Duty Cycle			
Pounds / Degrees	**6,250**	**9,375**	**12,500**
0.0	100	100	100
0.5	100	100	77
1.0	100	75	57
1.5	89	59	N/A
2.0	74	N/A	N/A
2.5	63	N/A	N/A
3.0	55	N/A	N/A

B18 Load & Duty Cycle			
Pounds / Degrees	**9,000**	**13,500**	**18,000**
0.0	100	100	100
0.5	100	84	63
1.0	92	62	N/A
1.5	73	N/A	N/A
2.0	60	N/A	N/A
2.5	51	N/A	N/A
3.0	N/A	N/A	N/A

B18 HD Load & Duty Cycle			
Pounds / Degrees	**9,000**	**13,500**	**18,000**
0.0	100	100	100
0.5	100	86	64
1.0	94	63	N/A
1.5	74	N/A	N/A
2.0	61	N/A	N/A
2.5	52	N/A	N/A
3.0	N/A	N/A	N/A

B18 Commercial HD Load & Duty Cycle			
Pounds / Degrees	**9,000**	**13,500**	**18,000**
0.0	100	100	100
0.5	100	100	77
1.0	100	75	56
1.5	88	59	N/A
2.0	73	N/A	N/A
2.5	62	N/A	N/A
3.0	54	N/A	N/A

Note: The issue with power train damage is that it is cumulative. Typically it does not cause immediate catastrophic system failure, but rather a one-time out-of-spec usage could damage hardened gear coating such that regular in-specs operation is now causing small cumulative damage every time you use it.

Optional Accessories

	Bravo B5	Bravo B8	Bravo B12	Bravo B12 Heavy Duty	Bravo B18	Bravo B18 Heavy Duty	Bravo B18 Heavy Duty
LED Flood Lamp	X	X	X	X	X	X	X
Compressor	X	X	X	X	X	X	X
Jump Start	360A	720A	1080A	1080A	1080A	1080A	1080A
Continuous Ground Power	27A	56A	56A	56A	56A	56A	56A
Jump Start Boost	27A	27A/56A	27A/56A	27A/56A	27A/56A	27A/56A	27A/56A
Extinguisher	X	X	X	X	X	X	X
Tundra PKG	X	X	X		X		
Heli Lift	X	X	X		X		
USB Cup Holder	X	X	X	X	X	X	X
High Lift		X	X	X	X	X	X
Standard Ramp	X	X	X	X	X	X	X
Double Wide Ramp	X	X	X	X	X	X	X
Easy Load 18" or 22"	X	X	X	X	X	X	X
Lazy Susan 16"	X	X	X	X	X	X	X
Lazy Susan 18"				X		X	X
High Lift		X	X		X		
Trailer Attachment	X	X	X		X		
Under Glow	X	X	X	X	X	X	X

LED Flood Lamp - The control panel light switch controls the action of the light when the main power switch is on.
Compressor – The control panel switch enables the pump. Note: The compressor turns off automatically at 110 PSI, and automatical turns on at or less than 90 psi.
JumpStart / GPU /Boost - Always connect the aircraft first before plugging into the tug. Warning: Sparks can occur during connection. Not to be used to run air-conditioning or while Pitot heater is on.
Extinguisher – Type BC.
Tundra Package – Proper air pressure must be maintained, or the inner-tube could slip, ripping the valve stem out. Note the tires use a 3.00x4 inner-tube.
High Lift – Electrically activated lift that lifts the tire cage 12 inches to allow the tail to enter through the hanger door. The High Lift control is on the control panel.
Standard Ramp – default tire ramp, handles up to a 7.5" wide tire.
Double Wide Ramp – extra-wide tire ramp, handles up to 14" wide tire.
Easy Load 18" or 22"—Captures the tire in a Cage. Can lock or unlock the Cage from the control panel.
Lazy Susan 16" or 18" - Captures the tire in a Cage. Can lock or unlock and rotate the Cage from the control panel.
Under Glow - LED accent lights. Depending on the selected options, you have an on/off switch or remote control. Note: Under-glow only functions when the tug is on.

Warranty

Best Tugs™ does not warranty batteries

Best Tugs™ includes a one (1) year warranty on all parts, including the drive train, from date of delivery. Warranty excludes labor and the cost of shipping. Call sales if you want to purchase the optional extended warranty.

This warranty does not apply to any Best Tugs™ component(s) that have damage caused by, misuse of the vehicle, accidents, collision or object striking the vehicle, vandalism, fire, explosion, water damage, customer-applied chemicals to painted surfaces, improper handling or application, nor does it extend to Best Tugs™ parts which have been repaired or altered outside of Best Tugs™ provided maintenance of an authorized service representative. Furthermore, any modification of Best Tugs™ electrical system MUST be pre-approved and documented in writing by Best Tugs™. Failure to do so voids the unit's electrical component warranty. Best Tugs™ parts which have been repaired or altered outside of Best Tugs™ provided maintenance of an authorized service representative, as well as any modification of a Best Tugs™ tug, MUST be pre-approved and documented in writing by Best Tugs™. Failure to do so voids the warranty.

Exclusions may apply. Visit BestTugs.com for the full and overriding warranty. Exclusions may apply.

Best Tugs

Because Your Plane Deserves It

Contact us at support@besttugs.com
sales@besttugs.com
or call **1-800-914-2003**
Sales Ext 2
Support Ext 3

Release Date: June 2021

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