

PILOT GUIDE				Document Number PG	REVISION LEVEL Rev D
ORIGINATOR JRR			ISSUE DATE 04 May 2018	APPROVED BY JRR	
VISION HISTORY	REVISION DATE	REVISED BY	APPROVED BY	DESCRIPTION OF REVISION	
A	4 May 2018	JRR	JRR	INITIAL RELEASE	
B	3 Mar 2019	JRR	JRR	CHANGE CONTROL BOX TO CONTROLLER	
C	26 Mar 2020	TRR	TRR	ADDED FLOW CHARTS AND UPDATE FOR “A0 05”	
D	11 Mar 2022	TRR	TRR	ADDED VERISION INDEX & UPDATE FOR “A0 115”	

1) DESCRIPTION

The Transland manual hopper gate, which is installed on most agricultural aircraft, requires physical exertion to operate. The Reabe Smart Gate is a modification of the Transland gate to incorporate an electric power assist to the pilot. The Smart Gate also takes ground speed information from the agricultural GPS and adjusts the opening to correct the application rate for ground speed changes (constant rate application). The Smart Gate can also accept varying application rate commands from the agricultural GPS and adjust the opening to apply varying amounts of product on different areas of the same field (variable rate application).

Manual Control is still available to the pilot at any time by moving the original Gate Lever forward from its stow position to re-engage and over-ride electronic control.

The Reabe Power Gate consists of:

- a. A 24 volt to 12 volt converter mounted under the floor to provide 12 volt power
- b. A “Dry Gate/Liquid Gate” mode switch mounted on the lower dash which selects the mode of operation for the Controller
- c. A “Gate Open”/Gate Close” switch mounted by the throttle which provides electric open and close commands to the Controller
- d. A “Gate Fault” light mounted on the upper dash that warns the pilot of system issue/failure
- e. A “Gate Rock” light mounted on the upper dash that warns the pilot of a Gate obstruction
- f. A “Clean-out” button mounted on the lower left part of upper dash for momentary full open commands.
- g. A Proximity Sensor mounted aft of the Gate Lever to detect its stow position
- h. A hopper port valve to close the hopper sense line in liquid mode
- i. A Controller mounted on the lower dash (or in the radio stack), which receives GPS information, accepts pilot mode selection, pilot data input, airspeed and hopper vent pressure; then sends commands to the Power Unit
- j. A 12-volt Electric Power Assist Unit mounted on the back side of the Gate Box which receives electronic commands from the Controller or manual commands from the original Gate Lever and moves the Gate to the commanded position

2) CONTROL

For the Reabe Smart Gate to operate properly, the manual Gate must be adjusted and working properly. Power is provided through a 2 amp "Gate Control" and 20 amp "Gate Power" breaker. If master power is off or either breaker is off, the Gate will be controlled manually by the Gate Lever.

Dry mode is selected by the pilot using the "Dry/Liquid" Gate switch. In Dry Mode, the pilot enters into the Controller the pounds of payload loaded into the aircraft prior to flight. If "Variable" rate application is selected on the Controller, the Controller accepts application rate commands from the agricultural GPS, calculates required opening using saved Chemical data and signals the Power Unit to adjust the Gate opening accordingly. If "Constant" rate is selected on the Controller, the Controller modifies the pilot-selected Gate opening to correct for changes in ground speed as provided by the GPS. If "Basic" is selected on the Controller, no GPS Data is used. The Controller does not modify the pilot-selected opening on the Controller. At flying air speeds, the pilot commands the Gate to open and close by use of the "Gate Open/Gate Close" switch. At slower than flying speed, the "Gate Open/Gate Close" switch is disabled to prevent accidental opening on the ground. Whether flying or not, the "Cleanout" button will command a full open Gate when pressed and close, to the position selected by the "Gate Open/Gate Close" switch, when released. The Gate Lever must be in stow position for the "Cleanout" button to function.

In liquid mode as selected by the "Dry Gate/Liquid Gate" switch, the "Gate Open/Gate Close" switch is disabled and no commands are accepted from the GPS. Also the "Cleanout" button will command a full open Gate when pressed and close when released. The Gate Lever must be in stow position for the "Cleanout" button to function.

In all normal operations, the original Gate Lever is disconnected and stowed in the full aft position. The Manual Disconnect is a spring-loaded brass pin located on the Power Unit input shaft. To disconnect, pull the pin against spring and move Gate Lever to the stow position. At any time, the pilot can move the Gate Lever forward from the stow position and the Gate Lever will reconnect itself and become the primary control overriding all GPS and Controller commands, just like a car with auto park. The manual control overrides electronic control. While being operated manually the Power Unit will provide power assist to the pilot.

Emergency jettison of the payload is unchanged. The pilot moves the same Gate Lever forward as he had done for years. The Gate can also be closed after jettison of whatever amount the pilot wished to jettison.

NOTE for Manual Mode: When in manual mode the motor is constantly trying to amplify the force the pilot is applying to the dump lever. Make sure the vernier stop is moved far enough forward or disengaged as not to apply back pressure on the gate dump lever when in manual mode. Failure to reduce this commanded input pressure can lead to motor over working, overheating, safety shutdowns or even motor failure.

Warning light "Gate Rock" illuminates if an object obstructed the Gate and may be cleared with the "Cleanout" button. Warning light "Gate Fault" illuminates if the Controller or Power Unit malfunctions. The Gate can be controlled with the Gate Lever by moving the lever forward to re-engage. The Power Unit may or may not provide power assist, depending on the nature of the failure, but the Power Unit will not impede the pilot's movement of the lever. The controller may attempt to reset the Power Unit to clear the fault and allow normal operation.

The "Alt" button and left knob can be used to override the airspeed switch to allow for testing flight features of the system while on the ground. This is done by simultaneously pressing both the "Alt" button and left knob. To exit simulated flight, controller power must be cycled.

3) GATE ADJUSTMENT

When hauling liquid payload, gate door must be adjusted per Transland or airframe recommendations to close square and just tight enough to be water tight. When hauling dry payload, Gate door must be adjusted to a loose fit to allow a soft operating gate with power off. As a shortcut to the loose fit adjustment, loosen the front Gate door adjustments approximately 6 turns on the 4) ¼ x 28 hinge adjusters. Then test with power off. Note: your aircraft may need a different adjustment, but the pilot must always be able to operate the Gate manually without power.

4) PROGRAMMING INSTRUCTIONS

The Instructions for Continued Airworthiness include programming of the Controller Setup for: GPS model selection, units of measure, setting Gate Home position, calibrating Gate opening. After this programming is completed by maintenance personnel, the Controller is ready for Manual or Basic operation.

5) WARNINGS & WARNING LIGHTS

"Gate Rock" Light. If the gate is obstructed, it will hold at the obstructed position and light the "Gate Rock" light. The pilot can then leave the obstruction or clear the obstruction by using the "Cleanout" button. During the time the "Gate Rock" light is on the unit is applying force to hold the gate in position, this heats up the Motor and can Lead to a Temp Warning. If you are continuously observing a Rock Light it is recommended to check your gate assembly for objects or buildup of material that could be causing a Jam.

"Gate Fault" Light. If the Controller or power unit malfunction the "Gate Fault" light will illuminate. The controller will attempt to auto reset the power unit. If fault light persists for more than 45 seconds. Pull "Gate Control" breaker and reset after 10 seconds to reboot Controller and clear "Fault". If fault is not cleared, pull both "Gate Power" and "Gate Control" breakers and reset after 10 seconds to reboot Controller and clear "Fault". If either breaker trips or fault cannot be cleared, pull both breakers and operate the Gate manually. Pilot can continue to work manually or repair at his discretion.

NOTE: When breaker is pulled, running total pounds, total loads and total pound onboard data is lost.

"GPS FAIL" indicates loss of GPS data. Correct GPS fault or select "Basic" mode.

"TEMP XX" indicates the Motors temp in degrees Celsius. If the Motor temp goes above 70 degrees Celsius you will get the "Temp XX" warning on the Display. If the temperature continues to rise the Motor will increase its sensitivity to Rocks or Jams.

It is recommended to take manual control of the gate if the Temp goes above 95 degrees Celsius.

-----Warning---Caution-----

If the TEMP goes above 105 degrees Celsius the Motor will power down to prevent damage.

6) AUTO CLOSE

Auto Close will reclose the Gate if the Gate opens for whatever reason, and was not commanded to open. The Gate Lever must be in stow position for the "Auto Close" feature to function.

7) MANUAL DISCONNECT

The Manual Disconnect is a spring-loaded brass pin located on the input shaft of the Power Unit. During normal (electric) operation, the Gate Lever is disconnected and stowed by pulling the brass pin against the spring and moving the Gate Lever full aft to the Stow position. The Gate Lever is held in the Stow (aft) position by a Breakaway Strap. If the aircraft is equipped with an under-floor Gate Stop adjuster, it can be used by adjusting the under-floor Gate Stop adjuster aft to hold the Gate Lever in the stowed position. Break away strap is recommended as under-floor Gate Stop release button needs to be monitored for smooth free operation.

When Manual Control is desired, move the Gate Lever forward to re-engage the Manual Disconnect. Adjust the Gate Stop Adjuster as needed for manual Gate settings.

8) OPERATION

Power on first Display "Start Up 0 Sensor". This is asking if you want to zero your airspeed and hopper pressure sensors. If you are on the ground and not in high winds you will normally want to zero your sensors by pressing "ENT" and "ENT" again to accept the zeroing of the pressure sensors. However if you are flying or parked facing into a strong wind or in a condition that you would have high or false zero pressure reading you will want to Cancel zeroing the pressure sensors by pressing "CLEAR" and "ENT" to accept Cancel zeroing the pressure sensors.

A. **BASIC MODE** (Gate Lever in "Stow") Press "BASIC"

I. LIQUID MODE

See 3) Gate Adjustment

1. Select "Liquid Gate" on Dry/Liquid Gate switch. The Controller will display "REABE LIQUID", the "Cleanout" button will function. The Reabe Hopper Gauge Display will show positive and negative boom pressure on the upper line, Liquid Quantity on the lower line, the "GND" light will light if power is at idle and "Suckback" light will light if a negative boom pressure is present. Emergency jettison is performed by moving the Gate Lever forward as the pilot has done for years. The Power Unit will provide assistance to the Gate Lever.

II. **DRY MODE**

See 3) Gate Adjustment

1. Select "Dry Gate" on Dry Gate/Liquid Gate switch. Verify Manual Disconnect is disconnected, Gate Lever is aft in "**Stow**" position and held in place by Breakaway Strap or Gate Stop Adjuster. If Gate Lever is not in Stow position, it may indicate the Manual Disconnect is engaged, to disconnect, pull the brass pin against the spring and moving the Gate Lever aft into the Stow position, check that brass pin did not reengage.

Reabe Hopper Gauge Display will show: Current Gate position (opening in inches) on upper line, pounds on board on lower line, "Suckback" light will light when Gate is closed & locked, and "GND" light will light when airspeed is below flying speed.

When in flight, the "Cleanout" button will open Gate completely when pressed and return to the position selected by the Gate Open/Gate Close switch when released.

On the ground, with the Gate Open/Gate Close switch in Gate Open position, pressing the Cleanout button opens the Gate and stays open until "Gate Close" is selected.

2. **SELECT CHEMICAL** to be used. Note: to recall or store a chemical, a SD card must be in the card reader and Aircraft must be on the ground.

Press "Menu" and rotate right inner knob to "SELECT CHEM", then press "ENT":

a. **STORED CHEMICAL**. Rotate right outer knob to find your stored chemical, then press "ENT". Display shows "ACCEPT", press "ENT". Press "CLR" to exit menu

OR

b. **NEW CHEMICAL**. If chemical to be used is not stored: rotate right outer knob to find "NEW CHEM", then press "ENT". Display shows "ACCEPT", press "ENT". Press "CLR" to exit menu. NOTE: no accurate quantity data will be displayed on the 1st flight as the Controller learns the flow characteristics of the new chemical. Before the Controller is powered off but after the 1st flight, the flow characteristics of the new chemical should be saved (see 7)

3. Close Gate

4. **SET TARGET GATE OPENING** can be adjusted on the Controller in flight or on the ground.

ON GROUND

- a. Press "Speed" button, "Tar" or "Pos" is displayed indicating gate setting
- b. Rotate left knob to set Gate opening on Reabe Hopper Gauge Display.

IN FLIGHT

- a. Rotate left knob to set **"TAR" (target) Gate opening**.
5. While still on ground, enter POUNDS LOADED on Controller by using the right inner and outer knobs to select the pounds loaded, then press "ENT". The Controller will ask you to "ACCEPT" the pounds, then press "ENT" again. The load is now displayed as "QTY" on Reabe Hopper Gauge display.
6. "Gate Open/Gate Close" switch to dispense product. Gate will open to selected target Gate opening. "QTY" will count down to "0". If a "NEW CHEM" is being learned, "QTY" will not accurately display on the first load.

7. **SAVE NEW CHEMICAL**

- a. After flight but before Controller is powered off, press "MENU"
- b. Rotate right outer knob to "SAVE CHEM", then press "ENT"
- c. Display will show "NEW CHEM", rotate right outer knob to "SAVE AS", then press "ENT"
- d. Rotate the right inner and outer knobs to spell the name of the new chemical, then press "ENT"
- e. Display will show "ACCEPT", then press "ENT"
- f. Press "CLR" to exit menu

8. **SAVE NAMED CHEM** (update a named chem flow characteristic)

- a. After flight but before Power Off, press "MENU"
- b. Rotate right inner knob to select "SAVE CHEM", press "ENT"
- c. Rotate right outer knob to select "SAVE CHEM", press "ENT"
- d. Display shows "ACCEPT", press "ENT"
- e. Press "CLR" to exit to "SAVE CHEM"
- f. Press "CLR" to exit menu

- B. **MANUAL MODE** (Gate Lever NOT IN STOW)

See 3) Gate Adjustment

Manual Mode can be entered at any time by moving the Gate Lever forward from stow position until the brass pin of the Manual Disconnect re-connects.

In Manual Mode the following conditions exist:

- a. Gate Lever has priority over all switch and Controller commands (just as a car with Auto Park, manual inputs override electrical commands).
- b. "Cleanout" button is disabled.
- c. "Gate Open/Gate Close" switch functions in flight but at a very reduced movement speed.

- d. Gate opening is set using the Gate Stop Adjuster.
- e. Material is dispensed using the Gate Lever.
- f. Power Unit provides assistance to the Gate Lever.
- g. Chemical selection, hopper quantity, and total pounds loaded is available and performed as in Basic Mode (See 7AII)
- h. Controller and Power Unit can be turned off allowing the Gate to be operated without power assist.

C. **CONSTANT RATE** (Gate Lever Stowed)

- a. Press "SPEED" button
- b. "Pos" or "Tar" is displayed on upper line, "SPEED" is displayed on lower line
- c. Rotate left knob to set target Gate position, Rotate right knob to set target air speed, press "ENT"
- d. Display shows "ACCEPT", press "ENT"
- e. Enter load using right knobs and press "ENT"
- f. Display shows "ACCEPT", press "ENT"

NOTE: In-flight "TAR" (target Gate setting) may be adjusted with left knob. "RT" (running total) is total pound loaded

9) MENU & SUB MENU (Software Version A0 115)

Press "MENU" and rotate right inner knob to select:

- "**CUR LOAD**" (adjust quantity loaded last time) Press "ENT", "ENT", adjust value, press "ENT", "ENT", "CLR"
- "**LOAD**" Displays total number of loads and running total "RT" pounds loaded. Press Right Knob Button to EDIT or RESET. Totals clear at Power Off
- "**SEL CHEM**" (needed for "QTY" display). Press "ENT", select: Named chemical from SD card or "NEW CHEM", press "ENT"
- "**SAVE CHEM**" (saves flow characteristics of chemical to SD card). Press "ENT" to select: SAVE CHEM (as shown), or "SAVE AS" (to assign a new name), Rotate Outer Right Knob to Select "Save" or "Save As". press "ENT", if "Save As" Use the right Dual Knobs to enter the name, press "ENT"
- "**CON RATE**" (needed for constant rate, to select target gate opening). Press "ENT", select Gate position, press "ENT"
- "**AUTO O/F**" (Needed On for GPS controlled ON OFF) Press "ENT", select ON or OFF, press "ENT"
- "**SPEED**" (needed for constant rate). Press "ENT", select airspeed, press "ENT"
- "**SWATH**" (needed for variable rate, can be entered via GPS). Press "ENT", select swath, press "ENT"
- "**SETUP**" (Selects the Setup Menu)

From the Setup Menu select one of the following and press "ENT":

- "**GPS**", press "ENT", select GPS model, press "ENT"
- "**CON RATE**", press "ENT", select: Gate "POSITION" (preferred), or "RATE" requires: swath, speed, chem
- "**GATESIZE**", press "ENT", select Gate size 5" or 7.5" (the controller must be reset, after size change)
- "**UNITS**", press "ENT": select "ENGLISH" or "METRIC", press "ENT"
- "**HOPPAINT**", press "ENT": Select On or Off (when on Paint relay only paints when gate open and hopper pressure is positive, only turn on once Hop Speed setting is figured out for your plane)
- "**HOP SPEED**" Set hopper pressure ratio (Zero of gauge only available on Ground)

"LIT TEST" press "ENT" to test lights

[Following are accessed on Ground only, and is part of initial setup. See ICA]

"MOTR POS" Show raw motor Position, Should Be between 500 and 2,000 when gate is closed

"SET HOME" Set home Gate position

"FIND STOP" Set full open position

"CAL GATE" Calibrate Gate opening

"AIR SPEED" Calibrate airspeed switch

"TRIM PER" Percentage of normal gate opening used when in trim pass mode

"SOFT VER" Display Software Version

"SWUPDATE" Load Software Update off SD card

To accept entry, press "ENT" or "CLR" to back up.

Press "CLR" to exit

10) QUICK KEYS

"ALT"+"LEFT KNOB BUTTON" – Force Flight Mode (only exit by Controller power cycle)

"CLR"+"MENU" – Reset Hopper Empty Signal (if the QTY jumped to 0 and it should not have try this)

"SPEED" – On ground brings up page to show Gate Position Target and GPS target Speed.

"ALT" + "SPEED" – TRIM PASS (only in flight) "ALT" + "SPEED" Buttons light up, reduces gate setting to percentage of gate opening selected in "TRIM PER" Setup Menu (auto exits when landing)

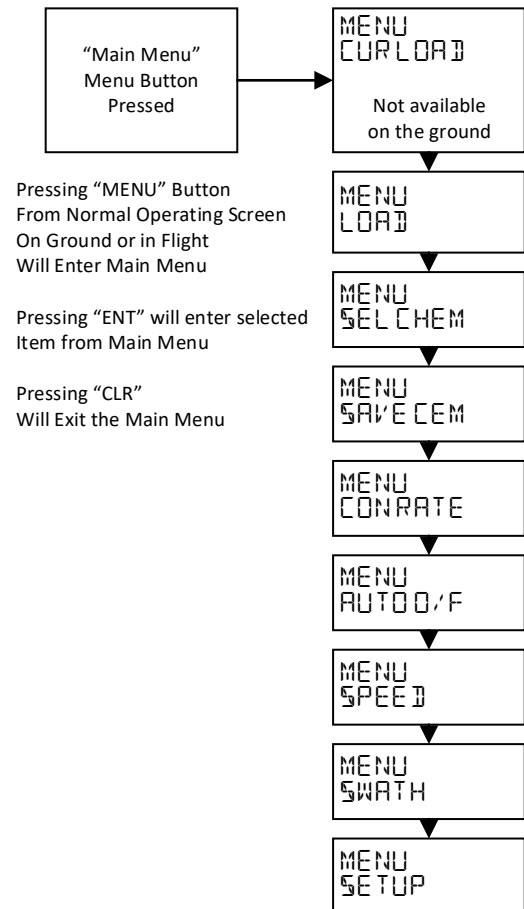
"ALT"+"CLR"+"MENU" – Force Ground Mode (only exit by Controller power cycle)

Units

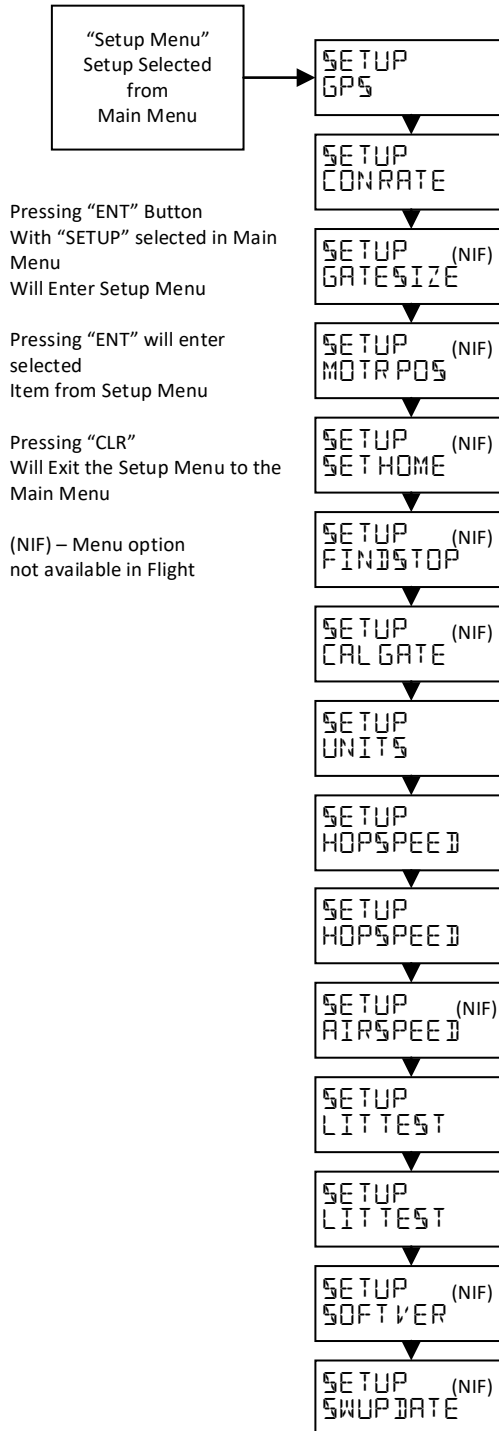
	English	Metric
Swath	Feet	Meters
Gate Opening	Inches	cm
Speed	MPH	MPH
Weight	Lbs	Kgrams
Rate	Lbs/Acr	Kg/HAc

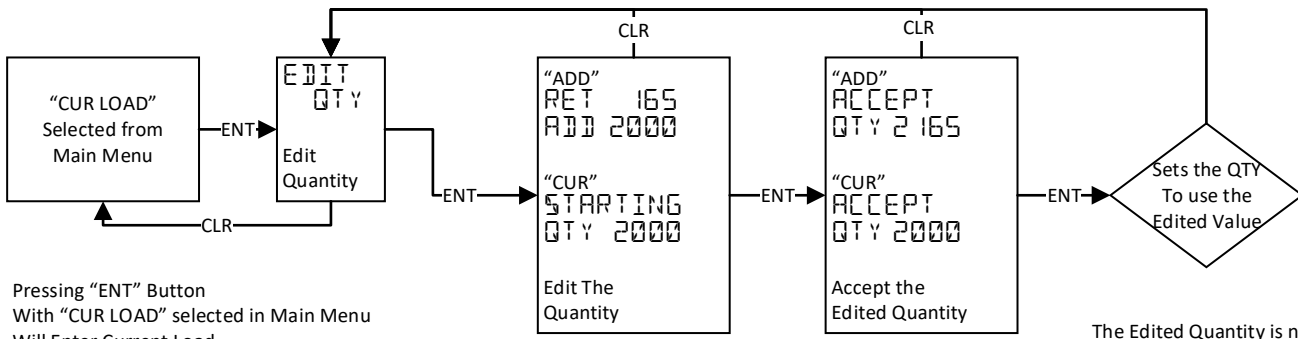
11) FUNCTION FLOW CHARTS

Main Menu Options and Order



Setup Menu Options and Order





Pressing "ENT" Button
 With "CUR LOAD" selected in Main Menu
 Will Enter Current Load

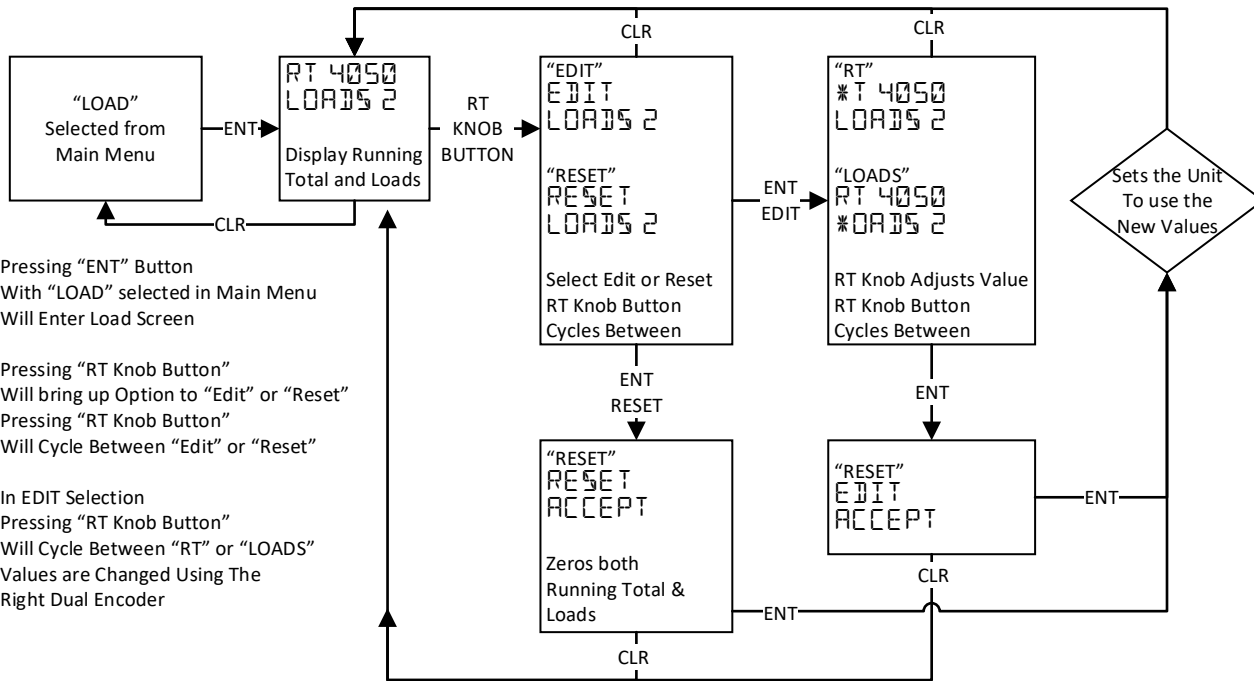
If the unit added to your last Load
 (you returned with a load)
 Hitting Enter to edit the Quantity will
 Take you to the "ADD" Screen
 This shows:
 Quantity you Returned with (RET)
 Quantity Added (ADD)

If the unit DID NOT add to your last Load
 (you returned Empty)
 Hitting Enter to edit the Quantity will
 Take you to the "CUR" Screen
 This shows:
 Quantity your Starting
 Quantity (QTY)

Quantities are Edited
 using the Right Dual Encoder

The Edited Quantity is not used
 until the Pilot Accepts the
 new QTY Value

Current Load



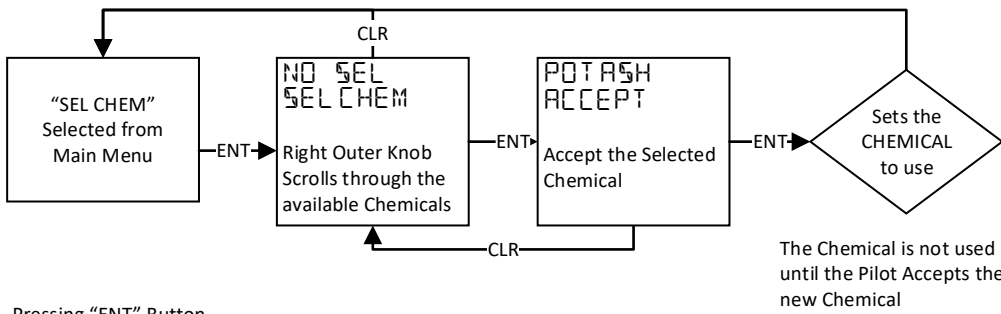
Pressing "ENT" Button
 With "LOAD" selected in Main Menu
 Will Enter Load Screen

Pressing "RT Knob Button"
 Will bring up Option to "Edit" or "Reset"
 Pressing "RT Knob Button"
 Will Cycle Between "Edit" or "Reset"

In EDIT Selection
 Pressing "RT Knob Button"
 Will Cycle Between "RT" or "LOADS"
 Values are Changed Using The
 Right Dual Encoder

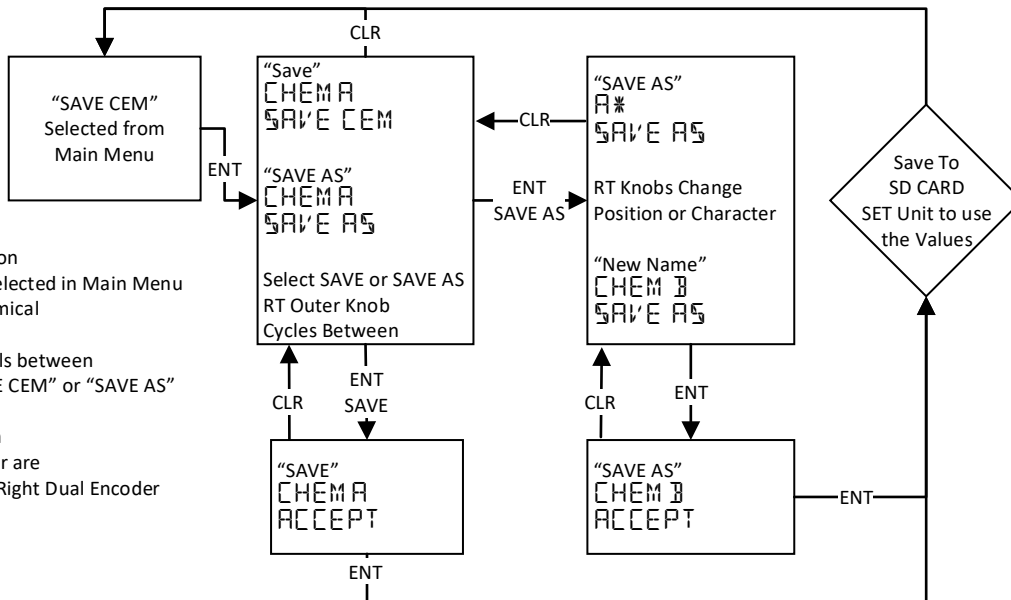
The Edited Quantity is not used until the
 Pilot Accepts the new Values

Load



Pressing "ENT" Button
 With "SEL CHEM" selected in Main Menu
 Will Enter Select Chemical

Select Chemical

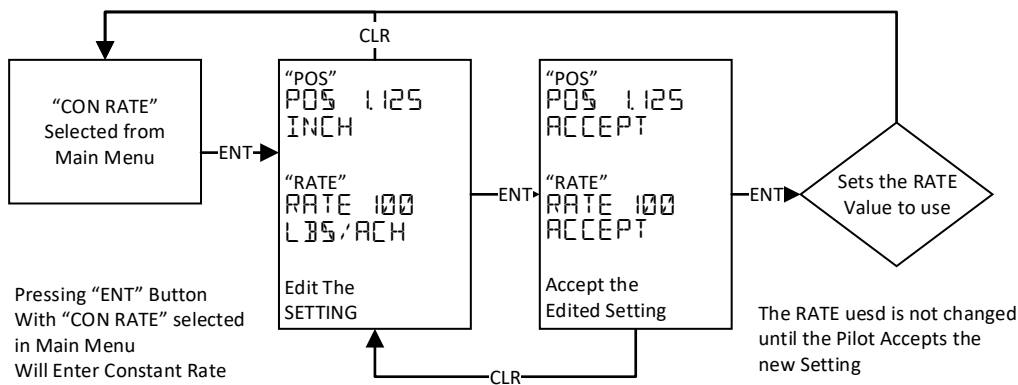


Pressing "ENT" Button
 With "SAVE CEM" selected in Main Menu
 Will Enter Save Chemical

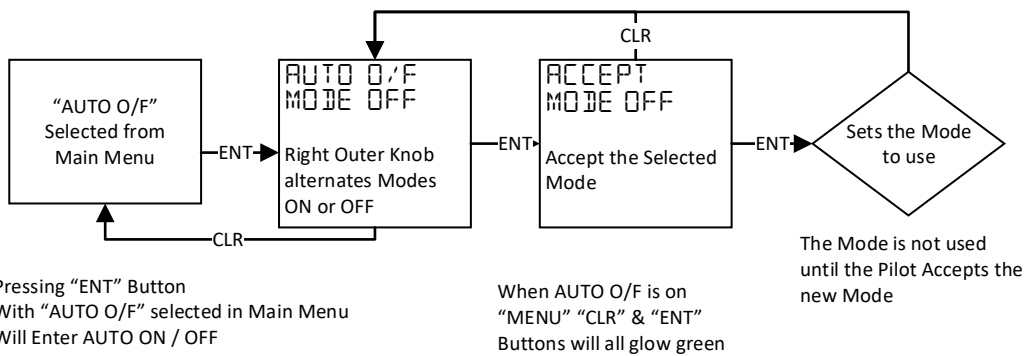
RT Outer Knob Scrolls between
 The Option to "SAVE CEM" or "SAVE AS"

In SAVE AS Selection
 Position or Character are
 Changed Using The Right Dual Encoder

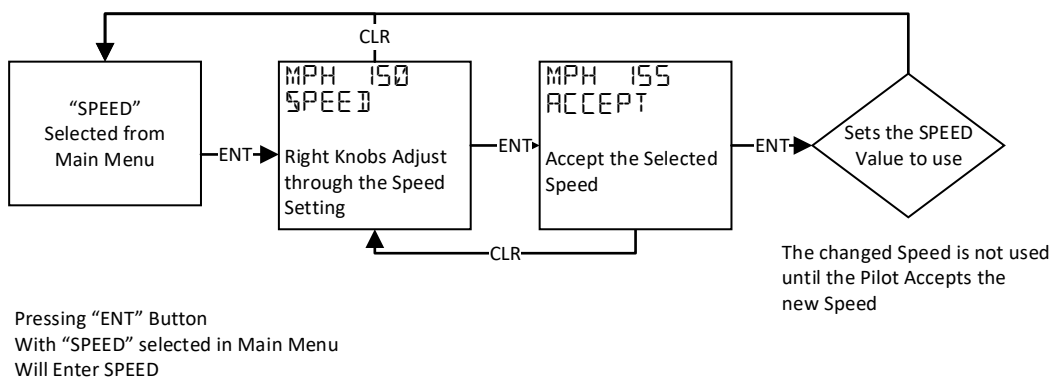
Save Chemical



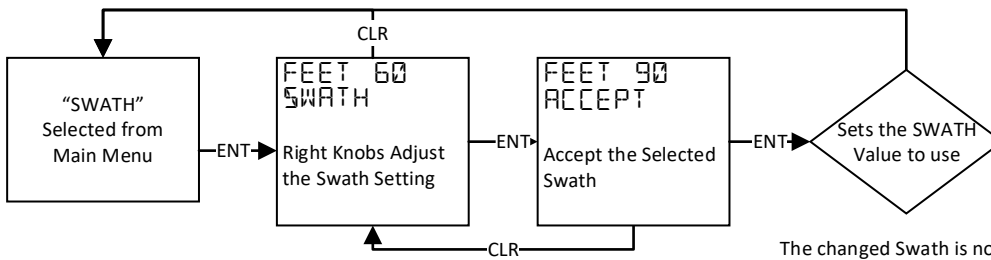
Constant Rate



Auto On / Off



Speed



The changed Swath is not used until the Pilot Accepts the new Swath

Pressing "ENT" Button
With "SWATH" selected in Main Menu
Will Enter Swath

Swath

12) Software Rev Change log

- Rev A0 115 -- Fixed Swath setting issue in Metric Units
- Rev A0 114 -- added serial speed change for Serial GPS, Added UBLOX 8 GPS code for constant rate
- Rev A0 113 -- Ag Pilot X variable Rate Test Software
- Rev A0 112 -- Added Trim Pass sub menu and EEprom storage.
- Rev A0 111 -- Removed Requirement of Ground only for Load Cal Error Enter and Clear buttons
- Rev A0 110 -- Increased Max open setting on 7.5" gate from 3.5" to 4.5"
- Rev A0 109 -- Fixed protocol issue with "Satloc +" flow Was KG/Sec Now KG/Ha
- Rev A0 108 -- Fixed Find Stops to be less harsh, also fixed jam/rock issues to take current power level as starting setting before lowering current.
- Rev A0 107 -- Added SatLoc + and SatLoc L as options;
Satlock + is new protocol for GPS control; Satloc L is Legacy satloc setting.
- Rev A0 106 -- Added AgPilotX and AG Nav GPS to selection screen
Set AG NAV to use auto Boom off of Application State -21 is "on" all others is "off", not Application Rate
- Rev A0 105 -- Disabled Pin 8 input for gate EPS fault Indication, Discreet output is not provided by EPAS unit on fault line, In Future software/hardware This line can be used as a Discreet I/O line
Added Ag Pilot X CAN auto On/OFF message
- Rev A0 104 -- fixed map_float_reverse function, this was causing gate to incorrectly map flow rate to gate position
- Rev A0 103 -- Added Gate Open message and warning Indication when in Liquid mode. (there was no way to know if your gate was open or closed when in liquid)
Added Motor Fault Message reading to light fault light; Added Motor Fault Message Reading to attempt Motor Reset
- Rev A0 102 -- Changed input torque settings to 10Nm 1200 (1280) from 1500
Added CAN bus output from controller to GPS
Added CAN Bus SOG input for Agpilot X GPS
Added .25 Second timeout on Auto Open command
Fixed issue where in constant Rate and Variable rate flight mode with GPS link or Fail upper line would not update
- Rev A0 101 -- Added HopPaint to setup; When on GPS Paint relay shuts off when Hopper Pressure drops, Marking the end of where you ran out. (Must have GPS paint Relay installed)

- Rev A0 100 -- added negative Values to HopSpeed Setting to allow for low/bad seals in hopper.
- Rev A0 12 -- Added 7.5" gate software (must Reboot after changing gate size in Menu -> Setup -> Gate Size)
Find stops is now smoother and doesn't slam as hard
When lever is stowed and gate is closed motor is off, rather than in assist and waiting.
Increased suckback zone
- Rev A0 11 -- Increased torque value needed to trigger exit of open or close command when lever is stowed.
- Rev A0 10 -- Spray On/Off not looking at hopper pressure
- Rev A0 9 -- Increased range of allowable Gate Set home
- Rev A0 8 -- Fixed Auto On Off and added Spray On/Off output on Blue line
- Rev A0 7 -- upped to 7 second close trial; Fixed jolt when going from position move to current hold
fixed open jolt timer when going open from a jammed close
- Rev A0 6 -- Serial Output off in Liquid mode.; .025" increment adjustments
- Rev A0 5 -- Added Number to Chemical Save as; Fixed Save as Compare and replace function
Load Counter displayed in flight (in Place of Chem Selected)
Added the ability to edit the Load Counter and Running total
Updated Menu Structure to move more common Items to beginning of menu
SD - card Re-mounting so card can be ejected and re-inserted; Update Via SD Card
- Rev A0 4 -- Not Documented I Think SD Update
- Rev A0 3 -- 1/16 increments through; Auto Close feature added
- Rev A0 2 -- Added 2 bytes to end of message to Upper Display
- Rev A0 1 -- Original Release