WAITER's

LANDING GEAR CONTROLLER

COZY - BERKUT

THEORY OF OPERATION

Waiters Landing Gear Controller, Cozy/Berkut, Is designed around an industrial Programmable Logic Controller (PLC). Model # D0-05DR-D and Input Card D0-10ND3. These are available from Automation Direct.

WARNING - Automation Direct does NOT APPROVE these controllers for use in aviation. Use this controller at your own risk.

The firmware is written in Ladder Logic and allows the controller to safely and effectively manage the split gear configuration found on Cozy / Berkut style aircraft. The controller has intelligence built in to reduce the possibility of an accidental retraction of the main gear, yet provides the ability to retract and extend the nose gear while performing routine ground operations.

Integrated into the controller, are additional features that provide canopy warnings, gear alarms, and emergency operations.

The computer hardware interfaces to the following systems;

Retractable main gear, with left and right gear mechanically linked
Retractable main gear, with separate actuators for left/right gear legs
Infinity Gear NO STRUT RETRACTION
EZ Nose Lift - Nose gear actuator only (no need for controller or harnesses)
Speed Brake system – Electric actuator must have built-in end stop switches.
Other systems can be easily adapted.

There are basically five main functions of the computer controller:

1) Power up Self Test
2) Airborne Main and Nose extend/retract operation
3) Ground Nose extend/retract operation
4) Emergency Retract Operation
5) Alarming for gear down and canopy closed

REQUIREMENTS

POWER – Minimum voltage required is 9 volts. The Controller may switch itself off/on as the voltage continues to drop below this value.

SENSORS – All switch and sensors described in this manual and in the wiring diagrams MUST be installed and adjusted. Failure to do so will most likely result in an inadvertent gear retraction or a gear up landing.

WAIVER – The purchaser of this Controller must sign a Liability waiver.

CONTROLLER DIFFERENCES / FEATURES

There are two main differences between the original controllers, and the Waiter's Landing Gear Controller;

1) Integration of nose and mains into one operational unit,

2) Built in safety features prevent inadvertent gear retraction / extension during power-up.

INTELLEGENT NOSE / MAIN GEAR INTERCONNECTION

One switch, UP-OFF-DOWN, provides full functionality for both air and ground operation. Intelligence is built into the computer to reduce the likelihood of an inadvertent main gear retraction while on the ground. The main gear and nose gear now operate as one complete system, rather than two separate systems.

The nose gear can be extended, retracted, and stopped anywhere in its travel by placing the UP-OFF-DOWN switch in any of the three positions.

The main gear doesn't use the OFF position of the switch. It will always be in a full UP or DOWN mode, whatever was the last commanded.

SAFE POWER UP MODE

A key feature of this controller is its ability to analyze the current gear configuration, and make the safest possible determination on how to power up the gear computer, and what mode it should be in.

The simplest approach would be to just do what the switch says, i.e. if the switch is in UP, then retract the gear. Its EZ to see, this approach has a great deal of risk.

The approach used in this design is more complicated, and safeguards not only against inadvertent gear retractions, but inadvertent gear extensions. i.e. power cycled during cruise, and the gear switch was accidentally placed in the DOWN position.

The Gear computer attempts to reconcile the control switches against the actual position of the gear and its sensors. If the "rules" are not meet, the computer will stay in the SAFE POWER UP MODE indefinitely, until the pilot resolves the problem or makes a decision on what mode the computer should be in.

WHY IS MODE IMPORTANT

The Main gear has to remember what mode it's in. It can't use the UP OFF DOWN switch, because it may be in the OFF position. The "mode" is simply an internal software "switch", that's either in the EXTEND or RETRACT position. Normally, when power is on, the mode will follow the last position of the UP OFF DOWN switch.

A problem arises when power is first applied to the controller. If someone has tampered with any of the switches, or the gear has changed position, or there was a sensor failure, then the computer will attempt to resolve this by determining position

of the UP-OFF-DOWN switch, and reconciling this with the current gear positions and status switches.

The "Power up Evaluation Mode" places the system in a mode that corresponds to the safest operating position. Once the mode is set, the computer monitors the status switches and coordinates the relays, pumps, and valves, depending on what mode its in.

POWER UP EVALUATION

During the power up mode, the Computer provides one of five results. The power up test conditions are much more stringent than the normal test conditions.

These results can be paraphrased in the following manner;

1) (UP) The UP-OFF-DOWN switch is in the UP position. From the status of the landing gear switches and sensors, this is correct, so I will place the main gear in the RETRACT mode of operation.

2) (DOWN) The UP-OFF-DOWN switch is in the DOWN position. From the status of the landing gear switches and sensors, this is correct, so I will place the main gear in the ENTEND mode of operation. (all three must be down)

3) (OFF) The UP-OFF-DOWN switch is in the OFF position, From the status of the landing gear switches and sensors, I have determined the main gear is in the EXTEND mode, So I will place the main gear is its respective mode. (don't care about what position the nose gear is in)

4) I have determined that the gear switch is in the UP, DOWN, or OFF position, but I can't safely determine the position of the gear. I will NOT do anything further until you fix the problem

5) I have determined that the EMERGENCY RETRACT switch is in the RETRACT position. I will NOT do anything further until you put this switch in the OFF position.

The following conditions are evaluated during the power up, and must be ACTIVE in order to set the corresponding mode. Note that these conditions are more stringent then their "normal" operations counterparts.

ITEM 1 - Sets RETRACT mode on power-up if. This is the most stringent test.

RIGHT DOWN	False
LEFT DOWN	False
RIGHT UP	True
LEFT UP	True
Nose DOWN Limit	False
Nose UP Limit	True
UP Switch	True
DOWN Switch	False
Hyd UP Pres Low	False

Hyd DOWN Pres Low	True
Airspeed Low	False
Throttle Full	True
Throttle Off	False
Canopy Open	False
UP Interlock – Grounded	True
UP Interlock – Open	False
Alarm Mute	False
EMER Retract	False

ITEM 2 - Sets the EXTEND mode on power-up if;

(If switch is in EXTEND)

RIGHT DOWN	True
LEFT DOWN	True
RIGHT UP	False
LEFT UP	False
Nose DOWN Limit	True
Nose UP Limit	False
UP Switch	False
DOWN Switch	True
Hyd UP Pres Low	True
Hyd DOWN Pres Low	False
Airspeed Low	True
Throttle Full	False
Throttle Off	True
Canopy Open	DON'T CARE
UP Interlock – Grounded	DON'T CARE
UP Interlock – Open	DON'T CARE
Alarm Mute	False
EMER Retract	False

ITEM 3 - Sets the EXTEND mode on power-up if;

(If switch is in OFF, This is the least stringent)

RIGHT DOWN	True
LEFT DOWN	True
RIGHT UP	False
LEFT UP	False
Nose DOWN Limit	DON'T CARE
Nose UP Limit	DON'T CARE
UP Switch	False
DOWN Switch	False
Hyd UP Pres Low	True
Hyd DOWN Pres Low	False
Airspeed Low	True
Throttle Full	DON'T CARE

Throttle Off	DON'T CARE
Canopy Open	True
UP Interlock – Grounded	DON'T CARE
UP Interlock – Open	DON'T CARE
Alarm Mute	False
EMER Retract	False

In order for the computer to proceed to normal operation, the RETRACT or EXTEND mode must be set by ITEMS 1, 2, or 3.

WHAT TO DO

If the computer is stuck in the SAFE POWER UP MODE, The Warning horn will sound continuous, ½ second ON, ½ sec OFF, until the mode is determined by the operator.

To Force the mode to either RETRACT or EXTEND;

1) Verify that the EMERGENCY RETRACT is in the OFF position.

   The controller will NEVER go past the SAFE POWER UP MODE if the EMERGENCY RETRACT switch is in the RETRACT position.

2) The UP OFF DOWN switch must be cycled. Move it to any position, then move it again to the position desired.

   NOTE: If the switch is placed in the UP position, ALL conditions for a normal gear retraction must be correct, or the alarm will chirp once a second and the main gear will NOT enter the RETRACT mode

   There are NO conditions to place the gear in the EXTEND mode.

   An indication that the mode was accepted by the computer will be an immediate 2 chirps of the warning horn.

EMERGENCY RETRACT MODE

In the Event that the pilot decides to do a last second retract of the gear. i.e. The engine is out, and the pilot thought he could make the runway, but now realizes he can't. If the pilot decides to retract the gear by using the normal UP-OFF-DOWN switch, the system safeguards may not allow it (i.e. the aircraft is to slow and the gear is locked out from retracting).

The EMERGENCY RETRACT switch overrides ALL and starts the retraction process immediately.

All three gear will start retracting.

The Speed Brake will also be commanded to retract (If its installed)

DIRECTION DELAY

This feature protects the Hydraulic pump and Nose gear motor from quick direction changes.

A ½ second delay is introduced if the direction is change to quickly

ALARMING

This controller supplies meaningful, prioritized alarms for several situations.

Gear is not down when its supposed to be.

Canopy is not down when its supposed to be

Stuck ALARM MUTE switch

Unresolved gear position when the Gear computer first starts up

PILOT INTERFACE – The following lights and switches perform the functions indicated

UP-OFF-DOWN switch - Performs multiple functions, depending on mode.

1) From the NORMAL MODE. Allows the pilot to extend and retract the gear.

2) From the NORMAL MODE. When parked, allows the pilot to extend/retract the nose gear only (Canopy open and airspeed < 85kts).

3) From the POWER UP MODE. If the computer cannot reconcile the gear position, use this switch to force the computer into EXTEND or RETRACT mode.

ALARM MUTE button – Performs multiple functions, depending on mode.

1) From Normal Mode. When momentarily pressed, Squelches the alarm for 10 seconds. (Canopy alarm does NOT squelch)

2) From Normal Mode. If held in (or stuck) for longer than 30 seconds, will generate an alarm.

EMERGENCY RETRACT switch – Located at the top left of the instrument panel. Covered and safety tied with break-away wire. Overrides all safety rules and Retracts all three gear.

When powering up the gear controller, this switch must be OFF, or the gear controller stays in the power up test mode indefinitely.

AUX GEAR - Located on the left side of the instrument panel, grouped with the landing gear circuit breakers. Covered and safety tied with break-away wire. Supplies power to the Aux Gear control circuits. (see below)

OFF / AUX GEAR EXTENSION switch – Located behind the throttle inside the armrest. This switch is spring loaded to the OFF position.

AUX GEAR EXTENSION position –

When held in this position, Aux Power is applied directly to the Main Gear DOWN Power Solenoid, bypassing all computer control.

This position also applies Aux Power directly to the Nose Down Relay.

CAUTION – The Gear Controller circuit breaker MUST be pulled before using the AUX GEAR EXTENSION switch. Failure to do so can result is serious damage to the electrical system.

INSTALLATION PLANNING

PLC RUN – TERM – STOP switch

<u>This switch must be in the RUN position.</u>

TERM is used during programming, and STOP halts the controller

PLC INPUTS / OUTPUTS

Review the Switch Planning Chart (SwitchPlanning.pdf) very carefully to get a complete picture of what / how the sensors and switches should be wired.

You'll need to also review the wiring diagrams. (DualSupply.pdf)

PLC CONNECTIONS

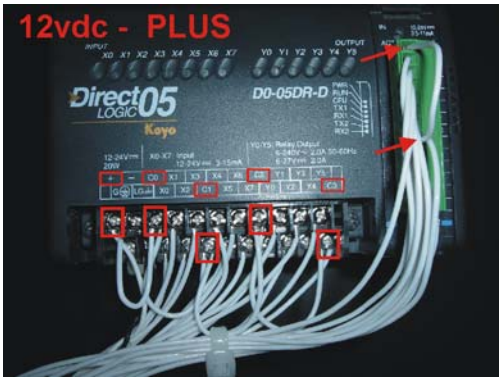
Connections to the PLC are made with screw terminals.

Strip back ¼ of insulation from the wire, Solder tin the exposed wire. Insert the wire under the correct terminal then snug the screw down.

DO NOT OVERTIGHTEN the screws as the strip very easily.

Use extreme care when determining what terminal is used to insert wires,. Because of the small size of the terminals and the close proximity of other terminal, its very easy to use the incorrect terminals.

POWER TERMINALS



SENSORS AND SWITCHES (INPUTS)

ALL switches and sensors MUST be connected properly in order to achieve the protection that is supplied by this controller.

The Installation, wiring and adjustment of the switches and associated wiring should only be performed by a qualified aviation electrician.

HYDRAULIC PRESSURE SWITCH

There are two (or three) pressure switches used to control the Hydraulic pump. This switch is Normally closed when the pressure is low, and opens when the pressure reaches the set point. These switches can be purchased from Velocity Aircraft.

NORMAL MAIN AND NOSE OPERATION

Normal operations are performed by a three position switch. Double Pole Double Throw (DPDT), UP – OFF – DOWN

Part # S7AL-R0 is a 3 position switch that locks in all three positions. This switch can be purchased from Digikey for about $18.

DOWN (EXTEND)

Any time the UP – OFF – DOWN switch is placed in the DOWN position, the MAINS and NOSE will attempt to extend. With the exception of DIRECTION DELAY, there are no safeties associated with the DOWN mode.

If the UP – OFF – DOWN is placed in the UP position during the extend process, both, the main and nose will stop were they're at, and one second later (DIRECTION DELAY) they will start the retract process. (provided proper UP conditions are meet)

NOSE GEAR SEQUENCE

The nose down contactor is energized and continues until the nose DOWN LOCK switch closes to signal the computer to remove power from the contactor.

The GREEN NOSE DOWN light will illuminate when the DOWN switch is closed.

The nose extension can be stopped by moving the selector switch to the OFF or UP positions. The OFF position will stop the nose gear where its at. (The OFF position will not stop the main gear extension)

MAIN GEAR SEQUENCE

1) The main gear Down pump contactor is energized.

2) It stays energized until the Hyd DOWN Pres Low switch deactivates. activates. The switch deactivates when the hydraulic pressure is high enough.

UP (RETRACT)

Anytime the switch is in the UP position, the status of other system components will be validated before retraction is allowed to take place (i.e airspeed, canopy, tilt, and throttle). Once the conditions are validated, the retraction begins and cannot be canceled if one of the conditions changes. The only way to stop retraction once it is started is to place the switch in the opposite (EXTEND) position (MAIN GEAR) or the OFF position (NOSE GEAR)

NOSE GEAR SEQUENCE

Retraction of the nose gear is conditional upon the Canopy.

CANOPY OPEN - If the canopy is OPEN, AND the airspeed is less than 85 kts, the nose gear can be extended and retracted. There are no other safeguards

CANOPY CLOSED – If the canopy is closed, the nose gear follows the same rules as the main gear;

1) Main UP Switch	True
2) Airspeed Low	False
3) Throttle Full	True
4) Canopy Open	False
5) UP Interlock – Grounded	True
6) UP Interlock – Open	False
7) EMER RETRACT	False

The Nose Up contactor is energized and continues until the UP Lock switch signals the computer to remove power. The nose retract can be stopped by moving the selector switch to the OFF or DOWN positions. The OFF position will stop the nose gear at its current position. (The OFF position does not stop the main gear retraction)

MAIN GEAR SEQUENCE

Main gear retraction is ALWAYS conditional on the following;

1) Main UP Switch	True
2) Airspeed Low	False
3) Throttle Full	True
4) Canopy Open	False
5) UP Interlock – Grounded	True
6) UP Interlock – Open	False
7) EMER RETRACT	False

1) Place the main control switch in the UP position.

2) Airspeed Switch – The airspeed must be above 85kts (sensor switch adjusted to 85 kts)

3) The throttle must be full

4) The Canopy must be closed

5) This Interlock input must be shorted to ground.

6) This Interlock input must be open (not shorted to ground)

7) The EMER RETRACT switch must be OFF

Once the sequence is started, the only way to abort it is the place the switch in the DOWN (extend) position. The OFF position does not stop main gear retraction

Once all these conditions are met, the gear will start retracting. If all conditions are not meet when the switch is moved to the UP position, the ALARM horn will chirp once a second until the conditions are meet.

The UP Pump continues to run until the Hyd UP Pres Low switch deactivates (Pressure is now OK).

OFF (center position)

This switch position performs two functions:

1) Disables all three gear UP LOCK red lights. This is great for flying at night when the UP lights can be very distracting. Does not effect the DOWN lights.

2) Stops the nose gear were its at in its travel. Disables nose gear switch monitoring

NOTE: The OFF position does NOT affect the main gear. The Main gear stays in the last mode it was in. If the mains were retracting, they will continue to retract and behave as if the switch were still in the UP position. If the mains were extending, they will continue to extend and behave as if the switch were still in the DOWN position.

DIRECTION DELAYS
The CPU provides a one half second delay between changing modes i.e. if you move the switch to DOWN, then immediately back to UP again, there will be a one half second delay before the UP command is issued to the contactor. This delay provides time for the pump or motor to come to a full stop, before changing direction. The delay is valid for both, the Main Gear Up / Down Pump, and the Nose gear Up / Down motor.

GROUND NOSE OPERATION

To allow independent nose gear operation, the CANOPY must be OPEN, and the Airspeed must be less than 85 kts.

The UP-OFF-DOWN switch is identical for ground operations, except the Main gear will not retract. The nose gear can be stopped at any position simple by placing the switch in the OFF position.

EMERGENCY RETRACT OPERATION

These procedures must be committed to memory, and occasionally practiced and reviewed.

RETRACTING NOSE ONLY

The Nose only retract would be useful in the event of total brake system failure, and you decide to collapse the nose in order to bring the aircraft to a stop.

NOTE
With the original manual retract system, once the nose gear is no longer over center, the Boston drive gear strips and the nose drops instantly. HOWEVER, With this system, the retract process will take 10 - 15 seconds. Think early.

1) Pull the 50 amp MAIN GEAR PUMP breaker. This should have been mounted close to the EMERGENCY RETRACT switch.

WARNING

If you fail to pull this circuit breaker, the mains will also retract.

2) Break the safety wire on the EMERGENCY RETRACT switch.

3) Place the EMERGENCY RETRACT switch in the RETRACT position.

NOTE: If the Speed brake is deployed, it will also retract when the EMER RETRACT switch is activated.

RETRACTING ALL GEAR

In the event of an off field landing, it is often more survivable to land with the gear retracted. Each situation must be evaluated, and have appropriate options available.

When the EMERGENCY RETRACT switch is placed in the RETRACT position, it overrides all other switches and safety items, including the UP-OFF-DOWN switch, and starts the retraction process.

The complete retract process will take XXX seconds.

1) Break the safety wire on the EMERGENCY RETRACT switch.

2) Place the EMERGENCY RETRACT switch in the RETRACT position.

NOTE: If the Speed brake is deployed, it will also retract when the EMER RETRACT switch is activated.

ABORTING THE EMERGENCY RETRACT

In order to minimize the re-extension time, its important to perform these steps in the order listed

1) Move the UP-OFF-DOWN switch to the DOWN position.

2) Move the EMERGENCY RETRACT switch back to its original OFF position.

3) If the 50 amp Main Gear breaker was pulled, push it back in.

ALARMING

A set of contacts (Y5) is dedicated to a Canopy / Gear / System Alarm. This contact should drive a relay, that in turn drives a loud audible alarm.

Canopy and stuck switch alarms cannot be muted.

Gear alarms can be muted by momentarily pressing the ALARM MUTE button. Muting disables the alarm feature (open the contacts) for a period of 10 seconds, regardless of new or old alarms.

NON-MUTE ALARMS

CANOPY NOT CLOSED - Canopy Open **AND** Full Throttle is applied (Constant alarm)

ALARM MUTE SWITCH STUCK – the Alarm Mute switch has been active for greater than 30 seconds.

MUTABLE ALARMS

GEAR NOT DOWN – There are two tiers of alarms for gear warnings, these are decided based on the canopy position.

IF CANOPY CLOSED – The alarm will sound for the following conditions:

If the Airspeed is less than 85 knots (airspeed sensor open) AND all three gear are NOT down (three green).

OR

If the throttle is moved to idle AND all three gear are NOT down (three green).

IF CANOPY OPEN – Both Mains MUST be down (two green).

AUDIBLE CHIRP

POWER UP - 2 quick chirps if power up OK.

MUTE BUTTON PRESSED - If the MUTE button is pressed, but no alarms exist, the alarm horn will chirp once. This brief chirp verifies that the MUTE button and the Alarm system are functional.

GEAR RETRACT NOT ALLOWED - The UP-OFF-DOWN switch is in the UP position, but the conditions are not correct to allow the gear to retract. The alarm system will chirp once per second until either the UP-OFF-DOWN is repositioned, OR, the conditions for retract all become OK and the gear starts to retract.

AUDIBLE ½ sec ON - ½ sec OFF

MUTE BUTTON STUCK - If the MUTE button is stuck for longer than 30 seconds, The alarm will sound ½ second ON – ½ second OFF until the button is no longer stuck.

CHECKLIST INSERTS

CHECKLIST

Incorporate the following into the appropriate sections of your current checklist.

PRE-ELECTRICAL POWER INSPECTION CHECKLIST

Perform the following prior to applying power to the aircraft

INTERIOR INSPECTION

1) Verify EMER RETRACT switch is OFF and safety tied with Break-Away wire.

2) Verify UP-OFF-DOWN switch is in the OFF position.

EXTERIOR INSPECTION

3) Remove the ground safety locks, if installed.

4) Verify the Main Gear is down and the lock device is engaged.

APPLY MASTER POWER CHECKLIST

1) While turning on the MASTER, The Alarm horn will give two quick "chirps".

2) Verify the status of the main and nose gear with the status lights.

3) Test the ALARM HORN. Momentarily press the ALARM MUTE button, the audio alarm will chirp once

GROUND OPERATION CHECKLIST

1) Use the UP-OFF-DOWN switch as required to raise / lower the nose for Passenger / Pilot entry or exit.

TAXI CHECKLIST

1) Verify UP-OFF-DOWN switch is in the DOWN position.

2) Verify gear status, THREE GREEN

PRE TAKEOFF CHECKLIST

1) Verify UP-OFF-DOWN switch is in the DOWN position.

2) Verify gear status, THREE GREEN gear down and locked

POST TAKEOFF CHECKLIST

Airspeed must be greater than 85 kts.

Throttle must be FULL

1) Move UP-OFF-DOWN switch is in the UP position.

   Retract cycle takes approximately 12 seconds

2) Verify gear status, THREE RED gear up and locked

CRUISE CHECKLIST

1) OPTIONAL - move UP-OFF-DOWN switch is in the OFF position. This extinguishes the Three RED gear up and locked lights.

LANDING CHECKLIST

1) Verify airspeed is below the maximum gear speed

2) Move UP-OFF-DOWN switch to the DOWN position.

Extend cycle takes approximately 12 seconds

3) Verify gear status, Three GREEN gear down and locked

GROUND OPERATIONS CHECKLIST

Canopy OPEN

Nose gear can be positioned using the UP-OFF-DOWN switch.

Mains will NOT retract.

Canopy CLOSED

Full safeties apply to the mains and the nose; the nose gear will not retract.

POST SHUT-DOWN CHECKLIST

INTERIOR INSPECTION

1) Verify EMER RETRACT is OFF, and safety tied with Break-Away wire.

2) Verify UP-OFF-DOWN is OFF position.

EXTERIOR INSPECTION

3) Verify both Main Gear side brace are over center.

4) Install Ground Safety locks if available

EMERGENCY PROCEDURES

AUXILIARY ELECTRICAL GEAR EXTENSION

Located under the EMERGENCY GEAR protective panel, is a two position switch labeled GEAR-OFF. The switch is spring loaded OFF.

In the event of a landing gear computer failure, this switch can be used to directly energize the DOWN HYDRAULIC PUMP SOLENOID, and the NOSE EXTEND MOTOR.

1) Pull the GEAR CONTROLLER 10 AMP circuit breaker. This will prevent any extraneous signals from being issued by a faulty controller.

2) Gear switch in the DOWN position.

3) Break the safety wire on the AUX CONTROL POWER switch (under cover on power panel) and move it to the ON position.

4) Press and hold the auxiliary GEAR-OFF switch in the GEAR position.

The Down Hydraulic pump will start and the nose gear motor will extend.

You MUST monitor the systems manually, as there is no automatic shutoff features without the computer.

When Either the Mains OR the Nose DOWN indicators light, release the switch.

CAUTION – When the Nose gear reaches its full DOWN position, the clutch inside the actuator will start to slip. This can be heard and felt as a pop, pop, pop, as the clutch slips.

If the main gear is extended before the nose is completely down, then momentarily release the Auxiliary GEAR button, and pull the 50 AMP Main Landing Gear circuit breaker. This will prevent the pump from running as you continue to hold the Auxiliary GEAR button, in order to get the nose gear to completely extend.

If the nose gear reaches its down position before the mains, then pull the 10 AMP Nose Gear circuit breaker. This will prevent the nose gear motor from running as you continue to hold the Auxiliary GEAR button, in order to get the main gear completely down.

EMERGENCY MANUAL EXTENSION

Manufactures procedures normally recommend pulling their main power breaker prior to manual extension. THIS IS MANDATORY,

50 amp for Custom main

10 amp for EZNoseLift

1) UP OFF DOWN gear switch in DOWN position.
2) Pull the GEAR CONTROLLER 10 AMP circuit breaker. This will prevent any extraneous signals from being issued by a faulty controller.
3) Follow the emergency procedures recommended by the landing gear manufacture.
4) Verify all three gear are DOWN and LOCKED.

EMERGENCY RETRACT - NOSE ONLY

1) Pull the 50 amp MAIN GEAR PUMP breaker.

WARNING

If you fail to pull this circuit breaker, the mains will also retract.

2) Break the safety wire on the EMERGENCY RETRACT switch.

3) Place the EMERGENCY RETRACT switch in the RETRACT position.

EMERGENCY RETRACT - ALL GEAR

1) Break the safety wire on the EMERGENCY RETRACT switch.

2) Place the EMERGENCY RETRACT switch in the RETRACT position.

REVISION HISTORY

2.1.2	31 MAY 2007	Correct for N.C. vs N.O. on the Hydraulic switch.
2.1.1	29 MAY 2007	Stuck MUTE button alarms ½ sec ON ½ sec OFF
2.1.0	26 MAY 2007	Change logic of Canopy Open and Airspeed Sensor
2.0.1	23 MAY 2007	INITIAL RELEASE
1.1.2		BETA NOT RELEASED