WAITER's

LANDING GEAR CONTROLLER

LE-2

THEORY OF OPERATION

Waiters Landing Gear Controller, LE-2, is designed to safely and effectively manage the split gear configuration found on Long EZ style aircraft. The controller has intelligence built into it 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 address, canopy warnings, gear alarms, emergency operations, and a built in test feature for evaluating system input / output control performance.

The computer hardware interfaces to the following systems;

Infinity Aerospace Retractable Main gear system.
EZ Nose Lift - Nose gear actuator only (no need for controller or harnesses)

Other systems can be easily adapted.

There are basically seven 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) Ancillary control
6) Alarming
7) INPUT / OUTPUT Self Testing

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) Main gear sequencing method,

3) Built in safety features prevent inadvertent gear retraction / extension during powerup.

Individual strut switches replaced with single pressure switch that monitors the pressure applied to the struts to compress them.

NOTE – There are advantages to using a pressure switch instead of using individual oleo strut position switches. The pressure switch is adjusted several hundred psi higher (i.e 1200psi) than required to

hold the struts compressed (i.e. 1000 psi) This method allows us to recognize that the struts are losing their pressure, and re-pressurize them BEFORE they start to extend.

When using individual position switches on each strut, it's possible for the struts to extend inside the wheel well, and depending how much sloop is in the switches, they may not signal that the struts have extended.

GROUND OPERATION –OLEO STRUT RETRACTION

The original Infinity controller performed its "OK to retract" checks AFTER the oleo struts were compressed. Example, if the retract interlocks were tied to the canopy and airspeed switches as recommended by Infinity, and someone placed the switch in the UP position while the aircraft was parked, the gear would actually start the retraction cycle, the oleo struts would compress, and the sequence would stop because of the interlocks.

During the oleo strut compression, DOWN pressure is reduced to zero. This could leave the gear vulnerable to an inadvertent retraction if there is any failure in the strut valve.

On Waiter's controller, the retraction cycle does not begin until all conditions are satisfied. I.e., The oleo struts will NOT start compressing until all safety interlocks are satisfied.

This feature adds approximately 8 - 10 seconds of warning that a retraction cycle is taking place. In the example given above, When the switch is placed in UP, The pump will not start and the oleo struts will not retract.

If the pump does starts running, the oleo struts will immediately start to compress. You have about 8 - 10 seconds to flip switches or pull breakers. Because when the oleo struts are fully compressed, the gear is going to retract.

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, of there was a sensor failure, then the computer then 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 six results. 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.

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.

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.

6) The ALARM MUTE switch was pressed when power was applied, and has been pressed for greater than 5 seconds. I will enter the SWITCH SELF TEST MODE mode.

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

ITEM 1 - Sets RETRACT mode if;

X0 = TRUE UP Pressure OK
X1 = FALSE DWN Pressure OK
X2 = TRUE Strut Pressure OK
X3 = TRUE Strut Pressure OK
X4 = FALSE Nose DOWN Limit
X5 = TRUE Nose UP Limit

X6 = TRUE UP Switch
X7 = FALSE DOWN Switch

X100 = FALSE LEFT Gear Down
X101 = FALSE RIGHT Gear Down
X102 = EITHER
X103 = EITHER Test Canopy Closed
X104 = EITHER Test Gear Down
X105 = TRUE Canopy Closed
X106 = FALSE UP Interlock – GROUNDED
X107 = TRUE UP Interlock – UN-GROUNDED
X110 = FALSE Alarm Mute
X111 = FALSE EMER Retract

ITEM 2 - Sets the EXTEND mode if;

(If switch is in EXTEND)

X0 = FALSE UP Pressure OK
X1 = TRUE DWN Pressure OK
X2 = FALSE Strut Pressure OK
X3 = FALSE Strut Pressure OK
X4 = TRUE Nose DOWN Limit
X5 = FALSE Nose UP Limit

X6 = FALSE UP Switch
X7 = TRUE DOWN Switch

X100 = TRUE LEFT Gear Down
X101 = TRUE RIGHT Gear Down
X102 = EITHER
X103 = EITHER Test Canopy Closed
X104 = EITHER Test Gear Down
X105 = EITHER Canopy Closed
X106 = EITHER UP Interlock – GROUNDED
X107 = EITHER UP Interlock – UN-GROUNDED
X110 = FALSE Alarm Mute

X111 = FALSE EMER Retract

ITEM 3 - Sets the EXTEND mode if;

(If switch is in OFF)

X0 = FALSE UP Pressure OK
X1 = TRUE DWN Pressure OK
X2 = FALSE Strut Pressure OK
X3 = FALSE Strut Pressure OK
X4 = EITHER Nose DOWN Limit
X5 = EITHER Nose UP Limit

X6 = FALSE UP Switch
X7 = FALSE DOWN Switch

X100 = TRUE LEFT Gear Down
X101 = TRUE RIGHT Gear Down
X102 = EITHER
X103 = EITHER Test Canopy Closed
X104 = EITHER Test Gear Down
X105 = EITHER Canopy Closed
X106 = EITHER UP Interlock – GROUNDED
X107 = EITHER UP Interlock – UN-GROUNDED
X110 = FALSE Alarm Mute
X111 = FALSE EMER Retract

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 chirp once every 2 seconds.

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 RETRCAT switch is in the ON 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 at a ¾ second rate 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 beeps of the warning horn, two flashes of ALL lights, then normal indications on the lights.

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.

Full retract takes about 15 seconds, so plan ahead.

DIRECTION DELAY

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

NOSE GEAR – Provides a ½ second delay between direction changes. This allows the motor to come to a full stop before being commanded to run in the opposite direction.

MAIN GEAR – The main gear is a little more complicated, because the hydraulic pump motor is made up of two separate windings, one for each direction. The engineering approach was to design the electrical interface so that its impossible to energize both windings simultaneously. This approach uses two relays, one controls the direction, and one controls the power.

Example: When changing hydraulic pump direction, the DIRECTION DELAY will de-energize the power relay, wait ¼ second, energize (or de-energize) the direction relay to change directions, Wait ¼ second, then reenergize the power relay. This delay ensures that no power is being applied to the pump when we change directions. The ½ second total delay should also ensure the pump has slowed down or come to a stop before changing directions.

ALARMING

This controller supplies meaningful, prioritized alarms for several situations.

Gear not down when its supposed to be.

Canopy 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.

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 pressed, Squelches the alarm for 10 seconds. (Canopy alarm does NOT squelch)

2) From Normal Mode. If held for longer than 10 seconds, will generate an alarm.

PUMP DIRECTION - Located on the Gear Indicator panel, shows the current status of the Main Gear Hydraulic pump. These LEDs light to indicate Hydraulic pump running UP or DOWN.

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)

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

AUX GEAR EXTENSION position –

The UP-OFF-DOWN switch MUST be in the DOWN position.

When held in this position, Aux Power is applied directly to the Main Gear DOWN Power Solenoid (RC2), bypassing all computer control.

This position also applies Aux Power directly to the Nose Down Relay (RC7).

AUX OLEO STRUT EXTENSION position –

The UP-OFF-DOWN switch MUST be in the DOWN position.

When held in this position, Aux Power is applied directly to the Main Gear DOWN Power Solenoid (RC2), bypassing all computer control.

AT the same time, Aux Power is also applied directly to the Oleo Strut Solenoid. When the Oleo Strut Solenoid energizes, it bleeds hydraulic pressure from the strut, allowing it to extend.

WARNING – Do NOT perform this feature if the gear is still in the wheel well.

NORMAL MAIN AND NOSE OPERATION

Normal operations are performed by a three position switch. UP – OFF – DOWN

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 both of the side brace switches signal they are over centered.

At this time the corresponding LEFT –and RIGHT GEAR DOWN lights will illuminate.

3) A ten second timer (oleo strut timer) starts when both over center (down lock) switches are closed

4) The Oleo Strut Solenoid is energized for the duration of the 10 second timer. The main gear oleo struts continue to extend during this time.

5) Upon completion of the 10 second timer, the computer monitors the Down Pressure switch.

6) When the down pressure switch closes, the Down pump contactor opens to shut off the pump.

NOTE If the Down pressure switch opens (low pressure), or either the side brace Over Center switches opens, the sequence restarts at #1

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
The Nose Up contactor is energized and continues until the UP Lock switch signals the computer to remove power. There are no safeguards for nose gear retraction. 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 conditional on the following;

X105 = TRUE Canopy Closed
X106 = FALSE UP Interlock – GROUNDED
X107 = TRUE UP Interlock – UN-GROUNDED
X111 = FALSE EMER Retract

X105 – The Canopy must be closed. When the canopy is closed, the switch contacts connected to X105 shorts to ground. This will be interpreted as a TRUE by the controller.

X106 – This circuit must be OPEN. If this switch contact is grounded, the main gear will NOT retract.

Example: There could be numerous items connected in parallel, between X106 and ground. A Mercury switch that is adjusted so when the plane is parked on its nose, the switch is shorted.

X107 – this circuit must be grounded, if this circuit is OPEN, the main gear will NOT retract.

Example: There could be numerous items however, they must be connected in series. All switches must be shorted in order to make X107 connect to ground. I.e. A switch that closes when the throttle is at full. This switch would be connected between X107 and ground.

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;

The Hydraulic pump starts in the retract mode.

The Oleo Strut Solenoid energizes.

The oleo struts start compressing.

When the oleo Struts Compressed Pressure > 1100 psi, the Pressure switch closes, and the oleo Strut Solenoid de-energizes.

The Gear now swings to the retract position.

When the retract pressure reaches 450lbs. the hydraulic pump shuts off.

1) The Up pump is turned on if ANY of the following is true. The pump will continue to run for 1/3 second after ALL of the conditions are false. This prevents the pump from doing quick ON-OFF-ON cycles if the oleo strut solenoid switches in and out.

Up Pressure to low
Struts Compressed Pressure < 1200 psi

2) The Oleo strut Solenoid is energized (compress the oleo strut) anytime the following is true

Struts Compressed Pressure < 1200 psi

NOTE – There are advantages to using a pressure switch instead of using individual oleo strut position switches. The pressure switch is adjusted several hundred psi higher (i.e 1200psi) than required to hold the struts compressed (i.e. 1000 psi) This method allows us to recognize that the struts are losing their pressure, and re-pressurize them BEFORE they start to extend.

When using individual position switches on each strut, it's possible for the struts to extend inside the wheel well, and depending how much sloop is in the switches, they may not signal that the struts have extended.

NOTE – If a single "pressure" switch is used, X2 and X3 must be jumpered so they both see the pressure switch. If individual strut "micro-switches" are used, one switch goes to X2 and the other goes to X3.

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 or the CANOPY light.

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 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 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

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 12 - 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.

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 12 - 15 seconds.

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

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

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 Gear / System Alarm. This contact should drive a relay, that in turn drives a loud audible alarm. Most 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

1) Canopy Open (X105) **AND** Full Throttle is applied (X103) (Constant alarm)

2) ALARM MUTE button engaged. (Chirps once per second)

MUTABLE ALARMS

1) ALL 3 GEAR not Locked **AND** X104 - Test Gear Down is grounded

2) MAIN GEAR not Locked **AND** X104 - Test Gear Down is grounded AND Canopy Open (X105)

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) Observe the Down hydraulic pressure. If the pressure is low (below 550 psi) the Hydraulic pump will cycle after power is applied.

2) Verify EMERGENCY RETRACT is OFF and safety tied with Break-Away wire.

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

EXTERIOR INSPECTION

4) Remove the ground safety locks, if installed.

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

APPLY MASTER POWER CHECKLIST

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

2) The Hydraulic Pump may cycle on for 10 seconds if the Down Hydraulic pressure was low.

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

4) Test the ALARM HORN. Momentarily press the ALARM MUTE button, yhe 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 80 kts.

Throttle must be FULL

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

Retract cycle takes approximately 15 seconds

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

3) Verify UP Hydraulic pressure > 450 psi.

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 10 seconds

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

4) Verify Down Hydraulic pressure > 550 psi.

POST SHUTDOWN CHECKLIST

INTERIOR INSPECTION

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

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

3) Observe the Down hydraulic pressure > 550 psi.

EXTERIOR INSPECTION

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

5) Install Ground Safety locks if available

EMERGENCY PROCEDURES

AUXILIARY ELECTRICAL GEAR EXTENSION

Located under the EMERGENCY GEAR protective panel, is a three position switch labeled GEAR-OFF-STRUT. The switch is centered OFF, and momentary contacts to the other two positions, GEAR and STRUT

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

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-STRUT 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.

CAUTION - The MAIN gear DOWN Pressure sensor is NOT utilized to stop the pump. You MUST monitor the DOWN Pressure and release the AUX button when the DOWN PRESSURE starts building up to 550 lbs. This is an indication that the mains are down and locked.

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 (550 lbs) 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.

After main gear is down, you can extend the Main Gear Oleo Struts by doing the following;

5) Remove the safety pin from the GEAR-OFF-STRUT switch guard. This pin is normally installed to prevent the inadvertent extension of the strut while the gear is still in the wheel well.

6) Press and hold the auxiliary GEAR-OFF-STRUT switch in the STRUT position. The DOWN Pump will run in order to bleed the pressure from the struts. When the struts are extended (visually verify) release the button, and reinstall the pin.

7) Re-verify that the MAIN Gear DOWN pressure is at 550 lbs.

8) Return the AUX CONTROL POWER switch (under cover on power panel) to the OFF position, close the cover.

EMERGENCY MANUAL EXTENSION

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

50 amp for Infinity Main Gear

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.

5) If Equipped, Use the AUXILIARY STRUT EXTENSION switch to extend the struts.

(NOTE: The success of the emergency strut extension will depend on what failed, The aircraft can be landed safely with the struts compressed)

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

1.1.2 BETA NOT RELEASED