



Intelift Balancers

Learning Objectives

At the conclusion of this module, you will understand IR Zimmerman Intelift Balancer:

- Operation
- Installation
- Troubleshooting & Maintenance

Audience

Ingersoll-Rand sales, distributor service, engineering and service personnel

Executive Summary

The basic design of the pneumatic balancer has not changed in over 40 years. We have revolutionized the controls with the Intelift. The first generation of electrical controls for pneumatic balancers in a manufacturing environment. The Intelift balancer will improve ergonomics, productivity and reduce operator fatigue.

Module Preview

1. What is the function of the encoder wheel?
 Sense load position Decipher messages Raise the load
2. What is the green button on the Intelift pendant for?
 Intelift Mode Power Off Power On
3. If air pressure is released from the piston chamber, the load will _____.
 Raise Lower Stay in place
4. The control best suited for a lifting, balancing and dumping applications is the _____ control.
 ZA BA Intelift

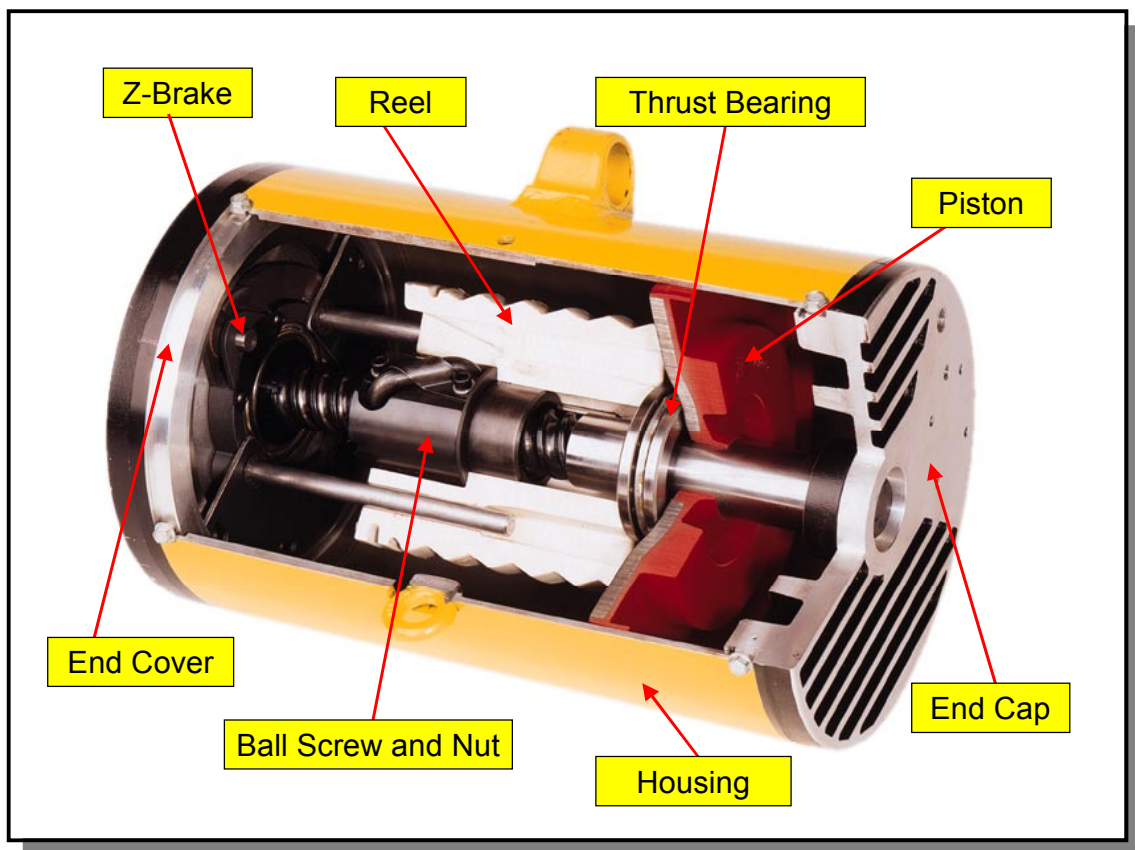
Benefits and Capabilities

An IR Zimmerman Intelift Balancer provides superior load control for precision placement of parts. The "Dump" feature will maintain the position of the load while the weight increases or decreases. The "Self Balance" feature will provide the operator the ability to move multiple loads with minimal effort. The "Smart Drop" feature will lower a load until the weight of only end effector is sensed and automatically releases the part.

The Intelift balancer provides lifting control that will provide the same functions as the current BA, EA, ZA controls and more in one concise easy to use package.

There are two distinct aspects of the Intelift balancer. The first is the mechanical portion, which is the same pneumatic balancer used for many years. The second aspect of the Intelift balancer is the electrical portion, which senses pressure and operator inputs to handle a load.

Balancer Operation



A fixed Ball Screw runs through the center of the Balancer. A Valox® Reel, with a Ball Nut pressed into one end and a Thrust Bearing pressed into the other, rides on the Ball Screw. The Piston rides on a sleeve covering the Ball Screw and pushes against the Thrust Bearing.

Air pressure pushes the Piston against the Thrust Bearing, forcing the Reel to rotate along the length of the Ball Screw, lifting the load. When the flow of air stops the load will be in a balance condition, it is possible to exert sufficient force to move the load. When pressure in the piston chamber releases, the load counter-rotates the Reel and lowers itself.

Z-Brake is the name of our patented Safety Retraction System. The Z-Brake will prevent uncontrolled upward travel of the wire rope if the load is lost or the wire rope breaks. It is installed in the End Cover as a standard part of the balancer (except in the 50 lb. Balancer).

Intelift Components

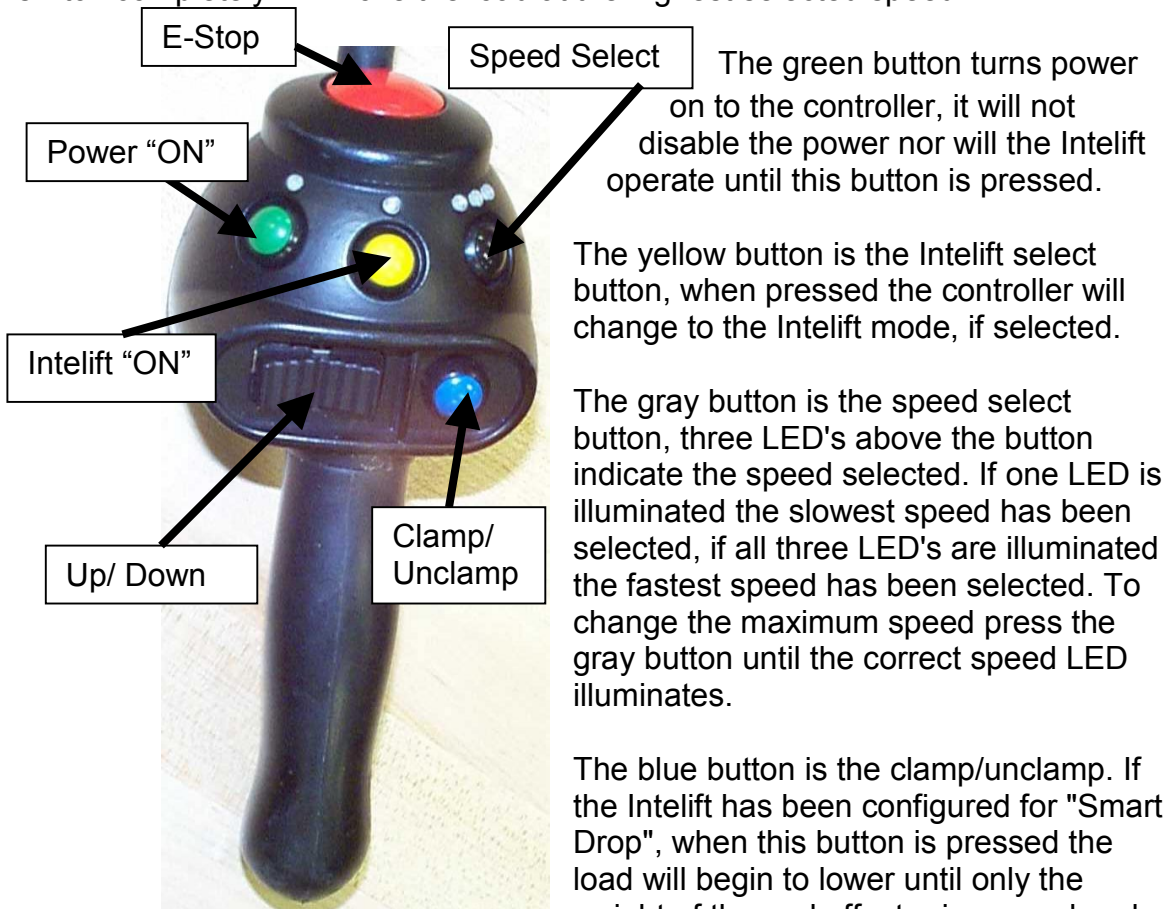
- Overview

The five basic components of the Intelift are the encoder, manifold, pendent, pressure sensor and controller. Each of these components provides inputs or feed back to the controller to accurately position and manipulate a load.

- Pendent Control

The pendent control processes inputs by the operator to raise or lower the load.

The rocker switch functions the same as a gas pedal on a car. Depressing the switch completely will move the load at the highest selected speed.



release the part being handled.

The large red button on the pendent is the emergency stop button. If this button is pressed, power to the controller is disabled. To reset the E-Stop press the green button.

- **Force Sensing Control Handle**

The Force Sensing Control Handle is a load cell based handle. The load cell senses the force applied to the pendent. Lifting up or pushing down on the pendent deflects the load cell in the direction of movement. The load cell sends a signal to the controller to manipulate the load in the desired direction.



All of the buttons on the Force Sensing Handle have the same function as on the standard pendent. We remove the up/ down rocker switch because the load cell replaces their function.

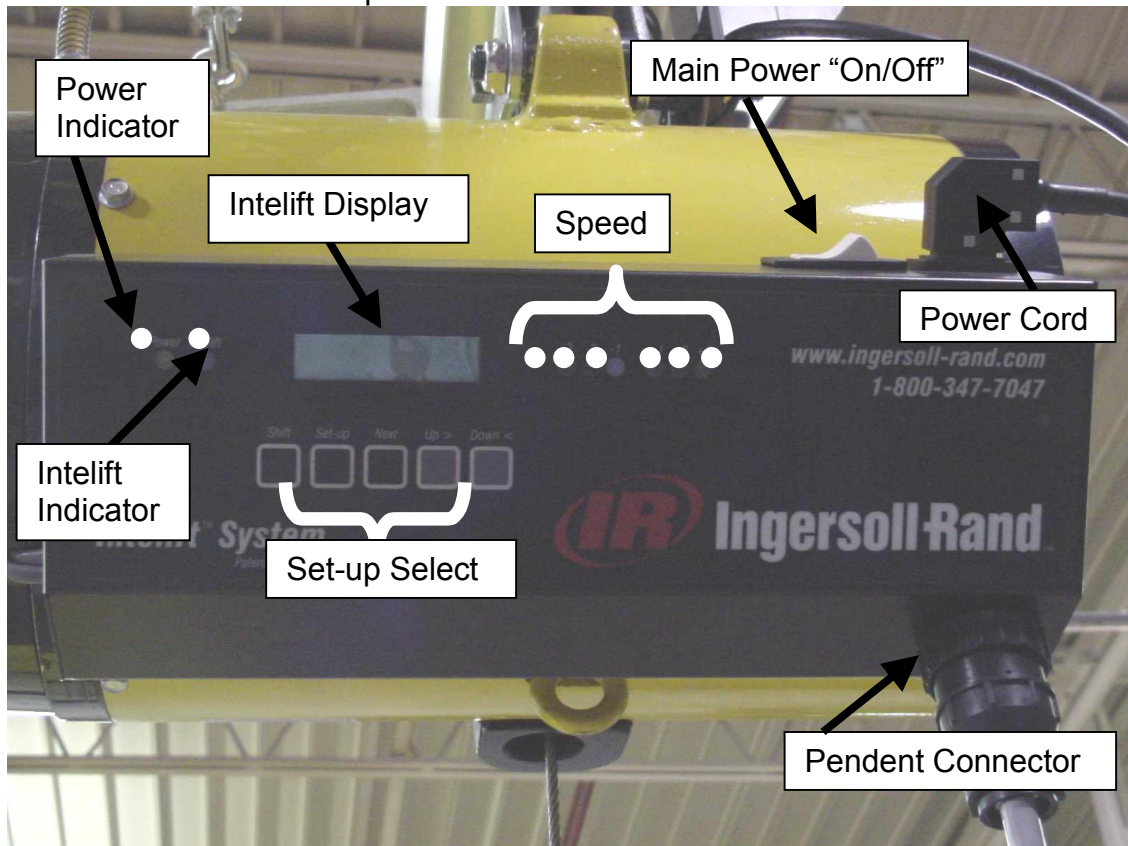
Manipulate the load at the pendent grip to ensure the load cell properly interprets the operator's input. The pendent is not required to be mounted to the pendent and can be remotely mounted on the handling device.

One end of the load cell is attached to a bracket that is fixed to the handling device. The other end of the load cell is attached to a maneuvering handle or Intelift pendent.

- **Controller**

The controller processes inputs from the pendent and signals from the manifold and encoder to determine if the load is raising, lowering, or if weight increases or decreases. Based on the inputs from the operator and the other signals the controller will send signals to the manifold assembly to open and close solenoids to increase and decrease pressure in the balancer as necessary.

The top right hand side of the controller is the location for the electrical power connection and the main power switch.



The top left of the controller is the power indicator. A green LED illuminates when power is on at the controller. Press the green power button on the pendent to turn on power.

Next to the power indicator is the Intelift indicator. A red LED illuminates and flashes when the controller is in an Intelift mode. To activate an Intelift mode press the yellow button on the pendent. If the yellow indicator is does not turn "on", no Intelift mode is active.

To the right of the Intelift indicator is the Intelift display. This screen provides a display of selected Intelift modes as well as set up and testing of the Intelift system.

To the right of the Intelift display are 6 green LED's, the speed indicators illuminate as the load raises and lowers. If the speed select button on the pendent is in the slowest mode, only one LED will illuminate when the load

moves up or down. The faster the speed setting at the pendent, the more LED's illuminate when the load moves.

Below and to the left of the speed indicators are the set-up select buttons. These buttons will toggle through the various set up functions to place the Intelift into operation.

The pendent cable connects to the lower right receptacle.

- **Manifold Assembly**

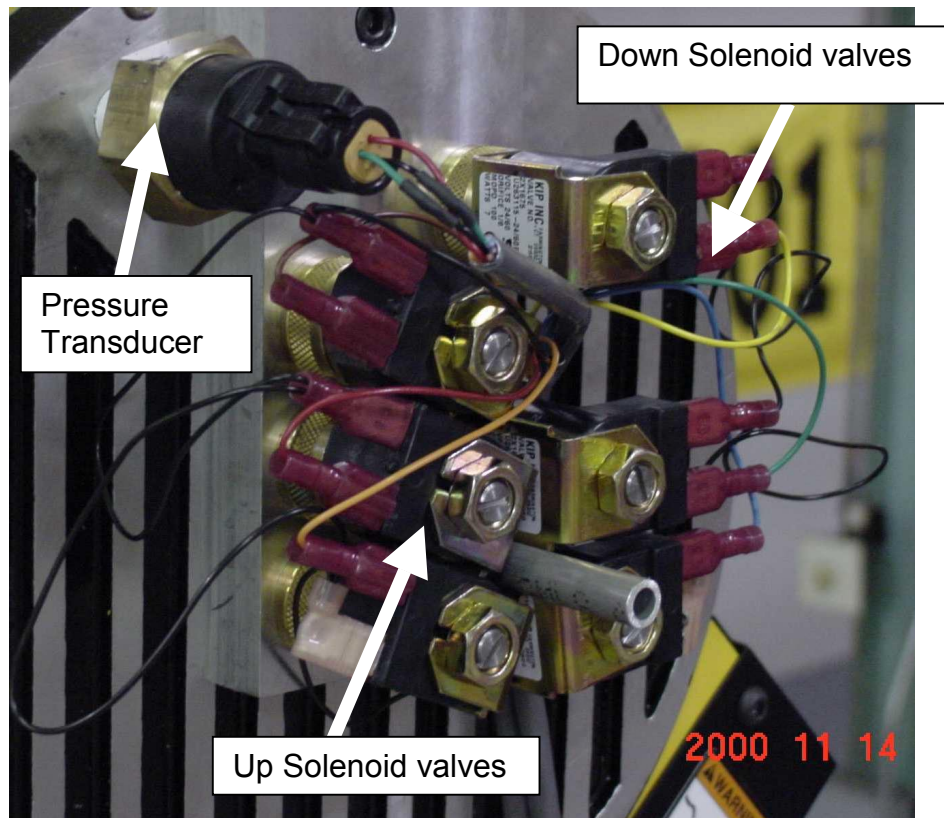
The manifold assembly is located on the end cap end of the balancer, the same end as the controls on an air balancer. The black plastic housing protects the components from dirt, debris and accidental contact.

The manifold consists of six solenoid valves, a pressure sensor and a 1/4-NPT port to connect the air supply.

Three solenoids control the up speed and three solenoids control the down speed of the load. The solenoid valves open sequentially to increase or maintain speed.

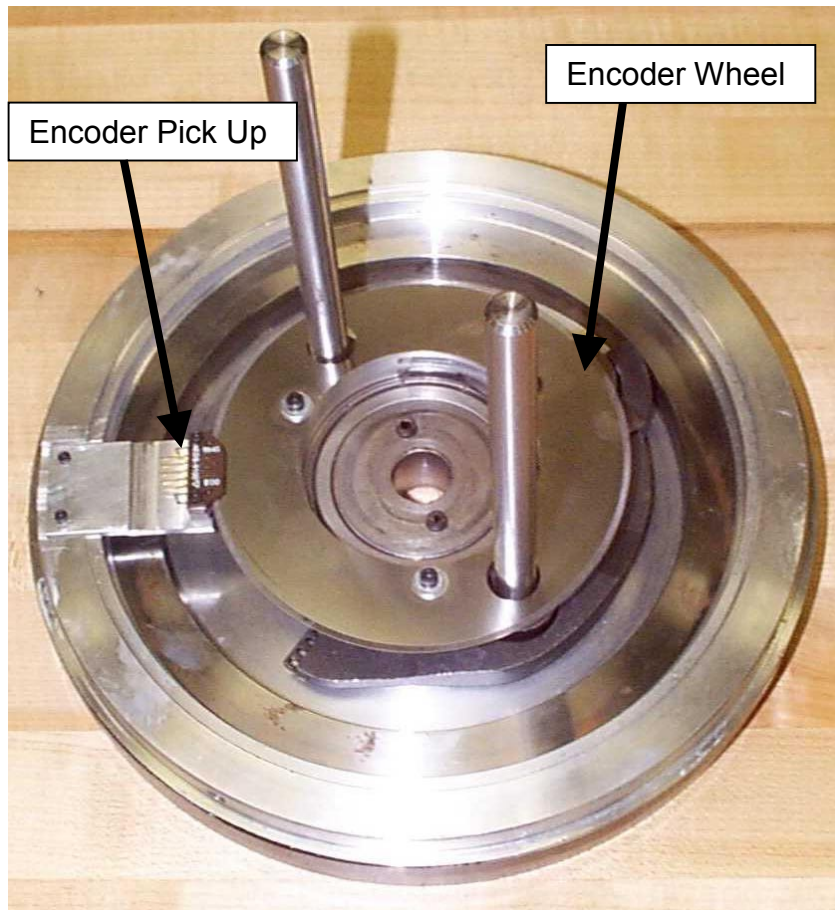
The pressure sensor sends signals to the controller providing pressure data from the piston chamber as the load moves up and down. These signals help the controller determine if the load is increasing or moving depending on the Intelift mode selected.

The 1/4-NPT port is located on the top of the manifold allows a fitting to be installed directly to the manifold providing a solid connecting point for the air supply.



- **Encoder Assembly**

The encoder assembly is located inside the end cover of the balancer, the opposite end from the manifold assembly.



The encoder senses the position of the balancer throughout the travel and sends these signals back to the controller to help determine positioning and speed.

There are 1270 slots in the encoder wheel which makes the positioning very sensitive.

The encoder pickup is a two-channel configuration. The pickup can determine whether a load is moving up or down and at what speed by the

rate and direction that the slots move.

Exercises in Intelift Components

1. The rocker switches on the pendent provide ___ inputs to the controller.
___ Raise/ Lower ___ Left/ Right ___ Stop/ Go

2. How does the load cell know which way to move the load?
___ Rocker switches ___ Time lapse ___ Direction of deflection

3. What do the six LEDs on the controller display?
___ Hours to quitting time ___ Up/ Down speed ___ Cycles

4. What do the solenoid valves do?
___ Count cycles ___ Engage the brake ___ Increase/ decrease air pressure

Intelift Modes

The Intelift balancer has four different modes of operation to provide the maximum flexibility in a single unit. Each mode provides the operator with an ergonomic method of handling material. The modes are Dynamic lift and lower, Dump, Float and Smart Drop.

- **"Dynamic lift and lower"** provides the same operation as an air hoist to lift and lower heavy material with precision placement. This mode requires the use of the Up/Down rocker switch on the pendant.
- The **"Dump"** mode maintains the end effector in a vertical position as the weight increases or decreases. The encoder is the primary input for this mode, when the load stops; the controller receives a signal noting the position. If the load increases or decreases sufficiently to move the encoder wheel, the controller will raise or lower the load as required to maintain the position.
- **"Float"** mode provides the operator the ability to move the load by hand. The pressure sensor sends a signal to the controller noting the air pressure in the piston chamber to balance the load. When the force exerted on the load increases or decreases pressure in the piston chamber a signal goes to the controller to increase or decrease the pressure in the piston chamber. If the load raises, the pressure in the piston chamber will decrease; the controller will automatically add pressure to the piston chamber to balance the load. If the load lowers, the pressure increases in the piston chamber and controller will release pressure to balance the load.
- The **"Smart Drop"** mode uses the Interlock function of the Intelift. The weight of the end effector is set during the set up mode. When the "Smart Drop" button, is pressed the load (end effector and part) will lower until only the weight of the end effector is sensed. The part will then automatically release. The "Smart Drop" mode will use electrically controlled pilot valves.

Intelift Installation

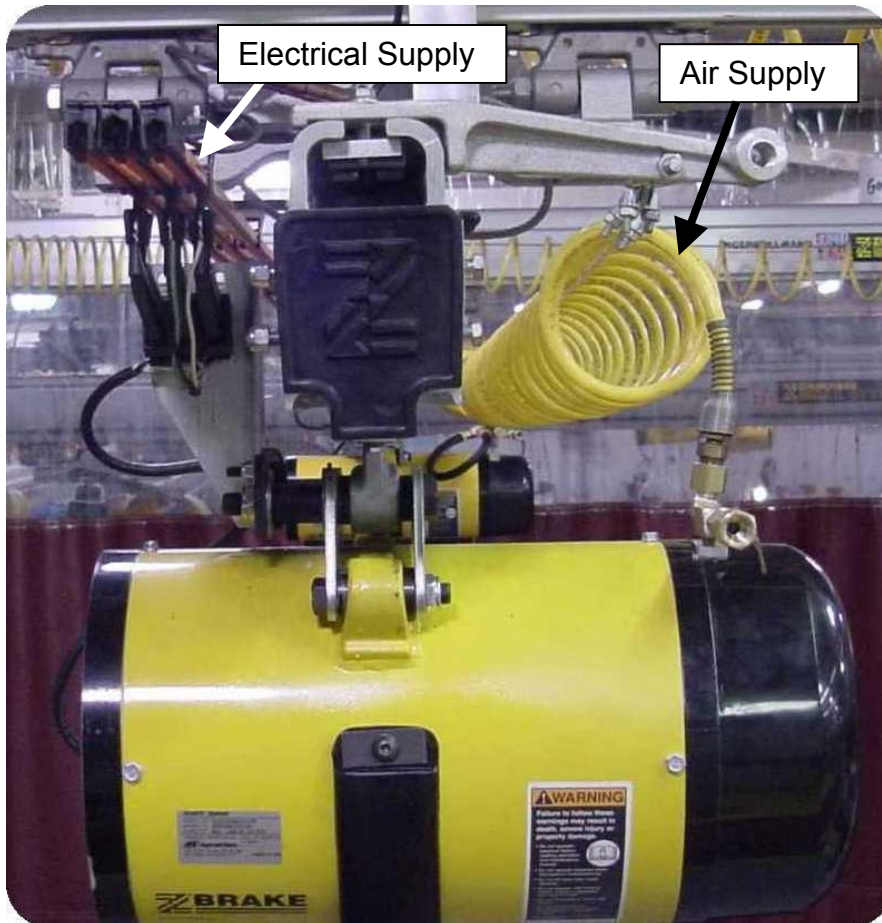
- **Overview**

There are four basic steps to installing and setting up an Intelift balancer. We will review each step in detail below.

- **Preparation**

Inspect the components received to ensure that no visible damage has occurred to the Intelift balancer during shipment. Report any damage to the receiving department. Also, contact the distributor for assistance with replacing the damaged components.

The next step of the preparation is to ensure that the festooning for both the electrical and pneumatic supplies are properly installed. We recommend using Insul-8's "Cluster Bar" for the electrical festoon. This provides a safe and robust system to provide electricity to the Intelift. We also recommend using the standard Ingersoll-Rand Zimmerman air supply kits.



The preferred method of festooning is to install the electrification to one side of the runway and the pneumatic supply to the opposite side of the runway. This will prevent the two different supplies from entangling or abrading each other.

- **Installation**

Step one of the installation process is to install the suspension kit to the balancer. We provide instructions in the Zimmerman Balancer Service Manual and a supplemental sheet provided with the suspension kit.

Install the balancer to the rail system. Remove the bridge end stops. Ensure the balancer is in the correct orientation to connect the electrical to the end of the balancer where the plug connects. This will reduce the likelihood of the pneumatic supply and electrical supply from entangling each other. Install the balancer to the bridge and reinstall the end stops.

Install the end effector. Refer to the Zimmerman Balancer Service Manual to determine the proper height to install the load hook. Install the load hook. Connect the air supply to the end effector and connect the control handle to the Intelift. The Intelift control handle uses a 19-pin connector that has notches to index it to the correct position. NEVER FORCE THE CONECTOR, CHECK FOR CORRECT ALIGNMENT OF NOTCHES AND PINS IF DIFFICULT TO SECURE.

Connection of the power sources. Connect the electrical supply to the Intelift controller and the pneumatic supply to the manifold assembly.

Exercises in Intelift Modes/ Installation

1. What motion does the "Dynamic lift and lower" mode provide?
 Raise/ lower Left/ Right Hop/ Skip
2. What does the "Dump" mode control?
 Raise speed Vertical position Home position
3. When you use "Float" mode, the load must be manipulated by _____?
 Rocker switches Telepathy Hand
4. If "Smart Drop" mode is used the end effector must be equipped with what?
 Horn Electric Control Valves Flashing light
5. What is the very first step of the installation process?
 Inspect equipment Install end effector Turn on electricity
6. After installing the Intelift to the rail system what is the next step?
 Turn on electricity Inspect equipment Install end effector
7. What is the last step of installing an Intelift?
 Connect air and electric Install end effector Coffee break

• Set-up

Perform the "Initial Set-up" refer to the Intelift Balancer Manual pages 6- 10.

Turn on main power to the Intelift.

Turn main air supply on to the Intelift.

Press and release the power "ON" button on the pendent. You should hear a beep from the controller, noting power is active. The controller will automatically initiate a self-test that lasts approximately 3 seconds, during the initial start up of the Intelift the red light will illuminate until the set up is complete.

If any buttons are depressed while the self-test is in progress the Intelift will become inoperable and the red LED on the controller will illuminate constantly.

Upon completion of the self-test, press and release the "Setup" button. This will take you through a series of menus and steps to properly configure the Intelift to your application.

The first screen is the Intelift mode. To select the Intelift mode depress the Up/ Down keys to toggle through the options.

Depress the "Next" button once you have selected the desired mode. You will then be in the Interlock mode screen. The end effector design must include the electronic interlock. If your end effector uses the standard pneumatic interlock, select "None."

Depress the "Next" button once you have selected the correct mode. The next step is to "tare" the end effector. This will provide the controller with the exact weight of the end effector. This is very important if you select the "Interlock" modes. Depress and release the Up or Down switch on the controller.

Depress the "Next" button on the controller. You then tare the Up/ Dn control. Depress and release the Up or Down switch on the controller.

Depressing the "Set-up" key completes the set-up for the Intelift, making the Intelift ready for production use. The parameters you have just established remain in the controller memory as defaults, even if power is lost to the controller.

If an Intelift moves to another area, we advise that the set up parameters be reviewed to ensure they are correct for the application.

Functional Test

- **Dynamic Lift/ Lower**

Use the rocker switch to maneuver to the part.

Engage the part.

Depress the Up. The end effector and part should lift.

Depress the speed select button until the load moves at a comfortable speed.

Depress the DN to verify that the speed is correct.

- **Force Sensing Control Handle**

Move the end effector to the part handled.

Push down on the control handle to engage the part.

Lift up on the control handle and raise the load.

The load should move smoothly with minimal effort.

- **Float Mode**

Push the Intelift button on the pendent

Engage the part.

Raise the load by lifting the end effector.

Move the load up/down by hand not using the pendent.

The load should move smoothly with minimal effort.

- **Smart Drop Mode**

Push the Intelift button on the pendent

Move the end effector to the part handled.

Engage the part.

Raise the load approximately 6".

Press and release the clamp/unclamp button.

Smart Drop- the load should lower the 6 inches and release the part when supported.

- **Dump Mode**

Push the Intelift button on the pendent

Move the end effector to the part handled.

Engage the part.

Raise the load approximately 12".

Begin dumping of the load.

The load should remain in the same position as the weight decreases.

Exercises in Intelift Set-up/ Functional Test

1. To power up the Intelift ____ activates the system.
____ Raise/ Lower switch ____ Switch on controller ____ Green button on pendent
2. How do you access the Setup menu?
____ Setup button ____ Shift button ____ Next button
3. What is the function of the "Next" button?
____ Change menu screen ____ Change selection ____ No function
4. If using the Force Sensing Control Handle or "Float" mode how is the load moved?
____ Rocker Switch ____ PLC ____ By hand

Intelift Troubleshooting

- **Basics**

In order to properly troubleshoot a malfunction it is necessary to gather as much information regarding the failure as possible.

- When did the failure occur?
- Was the unit in use?
- Did the part drop?
- Was power on?
- Was maintenance performed to the Intelift recently?

Never overlook the obvious solution. Power may have turned off and not properly turned back on.

We recommend that you component troubleshoot the Intelift system to minimize down time and spare parts required to be kept in inventory. Inventory is minimize due to the fact that you can keep four major components on hand for replacements rather than over 100 connectors, valves and switches.

- **Troubleshooting Table**

We have provided a troubleshooting reference guide in the Intelift manual on page 16. We have made every effort to outline the most likely failures and the most likely cause of those failures. These troubleshooting procedures will provide

you with a starting point of reference. Depending on the nature of the failure additional troubleshooting may be required beyond that of the manual.

- **Schematic Drawings**

A Schematic drawing of the electrical configuration of the Intelift is included with the manual on page 8. The schematic will help you determine the wiring layout of the cables connecting to the controller and pin layout for each connector.

Perform continuity checks on each cable associated with a suspect component to verify that the wiring is functional before replacing the part. The wiring receives greater stress and abuse than the actual component, from people pulling on connectors and cables to maneuver the equipment.

There are fuses in the controller to protect the internal circuitry. The fuses are .2, .5 and 4 amperes. The .2-amp fuse protects the main logic circuit. The .5-amp protects the functions in the pendent. The 4-amp fuse protects the entire system.

All input, output and voltages associated with the Intelift are low voltage 24VAC and 12VDC or less, providing a safe operating system with reliable signal integrity.

All plugs and connectors have index marks to prevent the incorrect connection and possible damage to the pins. The connectors are also twist and lock to provide a secure non-loosening connection.

- **"QA" Self Test**

On the control panel to the left of the "Set up" key is the "Shift" key. The shift key will conduct a self-test of the Intelift to verify that signals are being sent and received between components.

Use the self-test only when the unit is not in production. The handling device should not have a part engaged. Ensure the air supply to the Intelift is off or there is sufficient headroom for the end effector to cycle up and down without hitting an obstruction or the floor.

Remove power from the Intelift at the pendent E-stop. Press and hold the "Shift" key. Have an assistant restore power to the Intelift by pressing and releasing the pendent "Power" button.

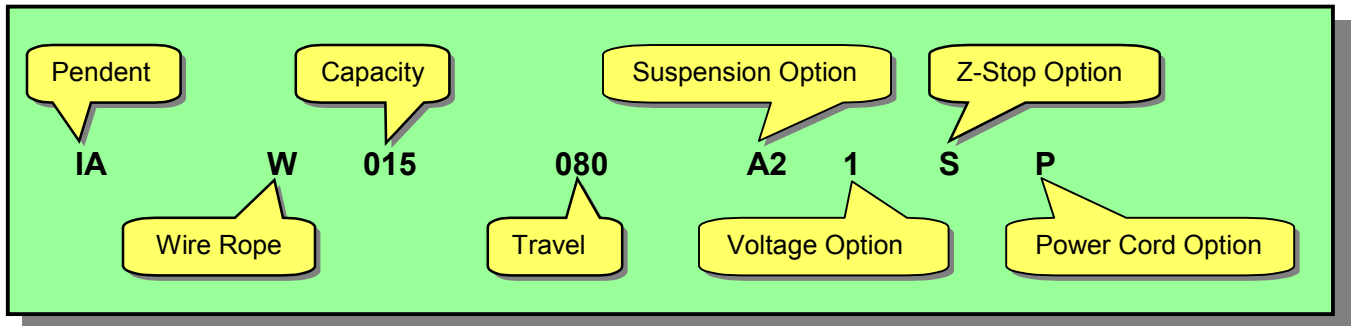
The Intelift will automatically begin the self-test operation. The Intelift display will change to show four values. The upper left is the encoder output signal. The upper right displays the output from the rocker switch on the pendent. The lower right is the signal from the pressure transducer. The lower left displays any buttons depressed on the controller (Shift, Set up, etc.). You will also see all of the LEDs on the controller illuminate and go off verifying operation.

The controller will open and close solenoid valves to verify their operation. The encoder will send signals to the controller to verify movement. The rocker switch on the pendent when depressed provides a voltage output on the Intelift display.

As the self-test occurs the values for each of the items shown on the Intelift display should change. The information is key to determining whether or a component is functioning correctly or if a cable or wire is broken. If the Intelift display has no value or the value does not change, check the wiring between the controller and the suspect component before replacing the part.

Intelift Model Identification

The Intelift balancer is a configured product. The sequence of letters and numbers represent the controls, rated capacities, travel and options.



Module Review

1. What is the recommend style of troubleshooting?
 Component replacement Piece (Diode/ Transistor) replacement
 Replace entire unit
2. Where can you find a schematic of the Intelift circuit?
 Inside the controller Maintenance Manual Sales brochure
3. Perform the QA Self Test when?
 Before installation In production Not in production
4. What does the QA Self Test do?
 Verify inputs and outputs Show how the Intelift works Checks parts for accuracy

Glossary

Intelift – Electrically controlled pneumatic balancer
Force Sensing Control Handle – Intuitive pendent for manipulating a load by hand
Encoder – Electro mechanical device that can sense speed and direction of rotation
Dump – control mode will hold a position regardless if the load increases or decreases

Smart Drop – control mode that will lower a load until the end effector weight is sensed, then releases part.

QA – Quality Assurance

Answers

Module Preview:

1. Sense load position
2. Power On
3. Lower
4. Intelift

Exercises in Intelift Components:

1. Raise/Lower
2. Direction of deflection
3. Up/Down speed

Exercises in Modes/ Installation:

1. Raise/lower
2. Vertical position
3. Hand
4. Electric control valves
5. Inspect equipment
6. Install end effector
7. Connect air and electric

Exercise in Set-up/ Functional Test

1. Green button on pendent
2. Set-up button
3. Change menu screen
4. By hand

Module Review:

1. Component replacement
2. Maintenance manual
3. Not in production
4. Verify inputs and outputs

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