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## Aircraft Weighing Guide

## **SAFETY SUMMARY**

The following general safety precautions must be observed during all phases of operation, service, and repair of this scale. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the scale. Intercomp assumes no liability for the customer's failure to comply with these requirements.

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### **DO NOT SUBSTITUTE PARTS OR MODIFY SCALE**

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Because of the danger of introducing hazards, do not substitute parts or perform any unauthorized modifications of the scale.

## **WARRANTY**

INTERCOMP CORPORATION (hereafter called "the company") warrants the ACDAWS Platform Weighing System which this document accompanies to be free of defects in materials and workmanship, and to operate according to design specifications for a period of one (1) year after receipt by the original purchaser. After authorized return (RMA#) to the company at the purchaser's expense, the company shall evaluate any returned equipment under warranty claim, and shall make such repairs or replacements as may be judged necessary, in as expeditious a manner as possible.

IN THE EVENT that the company determines the claim to be made as a result of improper use, abuse, modification, shipping damage, or other factors beyond the reasonable control of the company, the company will advise the purchaser of the estimated repair costs. The company makes no warranty other than that contained in this statement. No agent other than an executive officer of Intercomp Corporation is empowered to modify in any manner this statement of warranty.

HOW TO REACH Intercomp Service Department  
Things to know:

Inform the Service Dept. that the product is an ACDAWS series scale system.  
When was the ACDAWS series scale purchased?  
Where was the ACDAWS series scale purchased?  
What are the ACDAWS System and scale serial numbers?  
For Intercomp Service contact:

FAX # (763)-476-2613  
(763)-476-2531  
**1-800-328-3336**  
Email: [service@intercompco.com](mailto:service@intercompco.com)

## **COMPLIANCE WITH FCC RULES**

Please note that this equipment generates, uses, and can radiate radio frequency energy. If this equipment is not installed and used in accordance with the support manual, you are warned that it may cause interference to radio communications. This unit has been tested and has been found to comply with the limits for a Class A computing device pursuant to subpart J of part 15 of FCC Rules. These rules are designed to provide reasonable protection against interference when equipment is operated in a commercial environment. However, if this unit is operated in a residential area, it is likely to cause interference and under these circumstances the user will be required to take whatever measures are necessary to eliminate the interference at their own expense.

System Bill of Materials for: ACDAWS

QUANTITY	COMPONENT	COMP_DESC
3	ACDAWS-GENII	ACDAWS 15X15 10K LOW PRO SCALE
3	ACDAWS-RAMP	RAMP
3	ACDAWS-EXT	OVERRUN EXTENSION
1	100399	AC-AK ACCESSORY LEVELING KIT
1	140396	120/220VAC CHARGER, 3-50' CABLES
1	140021-GII	ACDAWS-GENII CASE (SET OF 2)
1	ACDAWS-OMM	ACDAWS OPERATOR/MAINTENANCE MANUAL

# Table of Contents

1	Introduction
2	ACDAWS Platform Scale
3	
4	
5	
6	
7	
8	

# Table of Contents

<b>AIRCRAFT WEIGHING GUIDE.....</b>	<b>1-4</b>
SAFETY SUMMARY .....	1-5
<i>DO NOT SUBSTITUTE PARTS OR MODIFY SCALE</i> .....	1-5
WARRANTY .....	1-5
COMPLIANCE WITH FCC RULES.....	1-5
<b>ACDAWS SYSTEM COMPONENTS.....</b>	<b>1-6</b>
<i>Packaging / Labeling</i> .....	1-8
<i>Specifications: ACDAWS-RAMP</i> .....	1-10
<i>Specifications: Overrun Extension ACDAWS-EXT</i> .....	1-11
<b>INTRODUCTION TO AIRCRAFT WEIGHING.....</b>	<b>1-12</b>
BEFORE YOU WEIGH .....	1-12
WEIGHING.....	1-13
<i>Load with Platforms:</i> .....	1-13
AFTER WEIGHING .....	1-13
<b>MODEL ACDAWS PLATFORM SCALE.....</b>	<b>2-1</b>
GENERAL INFORMATION.....	2-2
<i>Scope of manual</i> .....	2-2
<i>Features</i> .....	2-2
SPECIFICATIONS: ACDAWS PLATFORM SCALE SERIES .....	2-3
<i>Controls</i> .....	2-3
<i>Electrical</i> .....	2-3
<i>Performance</i> .....	2-3
<i>Environmental</i> .....	2-3
<i>Physical</i> .....	2-3
CONTROL PANEL SWITCHES AND INDICATORS.....	2-4
<i>Display Description</i> .....	2-4
<i>Control Switches</i> .....	2-5
On/Off.....	2-5
MODE.....	2-5
LB/KG.....	2-5
ZERO.....	2-5
THEORY OF OPERATION - PLATFORM SCALE.....	2-6
<i>Load sensor</i> .....	2-6
<i>Control Panel</i> .....	2-6
Weight determination:.....	2-6
User interface: .....	2-6
Power control:.....	2-7
Data communications:.....	2-7
<i>Detailed Operations</i> .....	2-7
<i>Latitude and Altitude Correction</i> .....	2-8
Overview.....	2-8
Correction Table .....	2-8
MAINTENANCE .....	2-9
<i>Complete list of required tools and materials</i> .....	2-9
<i>Spare parts list</i> .....	2-9
<i>Use of a load cell simulator</i> .....	2-10
<i>Setting the Mode Menu Parameters</i> .....	2-11
TROUBLESHOOTING.....	2-14
<i>Problem Table</i> .....	2-14
<i>Error Messages</i> .....	2-15
<i>Diagnostic tests and voltage measurements</i> .....	2-15
Charger voltage.....	2-15

Lamp .....	2-16
Keys .....	2-16
Power down shutoff .....	2-16
Load Cells .....	2-16
CALIBRATION .....	2-18
<i>Procedure: Calibration (Verification)</i> .....	2-18
Corner Calibration .....	2-18
Span Calibration .....	2-19
<i>Procedure: Calibration (Adjustment)</i> .....	2-20
Calibration Enable Jumper .....	2-20
How to Check and Set Corner Adjustment .....	2-21
Multiple Corner Adjustment .....	2-22
Single Corner Adjustment .....	2-23
Calibration Menu .....	2-24
Setting the Calibration Parameters .....	2-25
Multiple Graduation Break Points .....	2-25
Weight Calibration .....	2-26
Recommended Calibration Points for a 3 point span .....	2-26
<i>Theory of multi-point span correction</i> .....	2-28
DIAGNOSTICS .....	2-29

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# ACDAWS System Components

This section shows the basic components, storage location ( Section 1 page 8 and 9 ) and piece specifications ( Section 1 page 10 and 11 ) of the ACDAWS system.

**ACDAWS cases, set of 2**

**( Part # 140021-GII, which consists of #ACDAWS-CASE A and #ACDAWS-CASE B )**

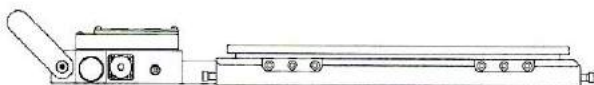
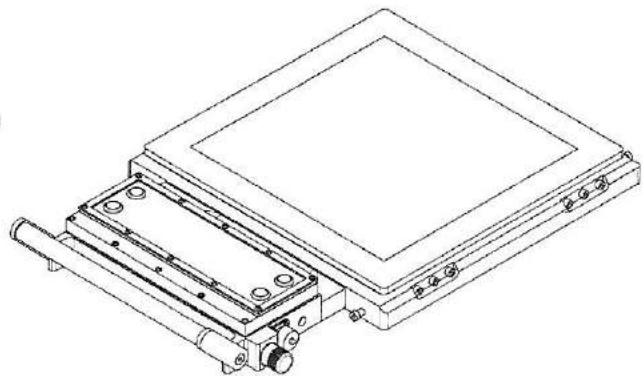
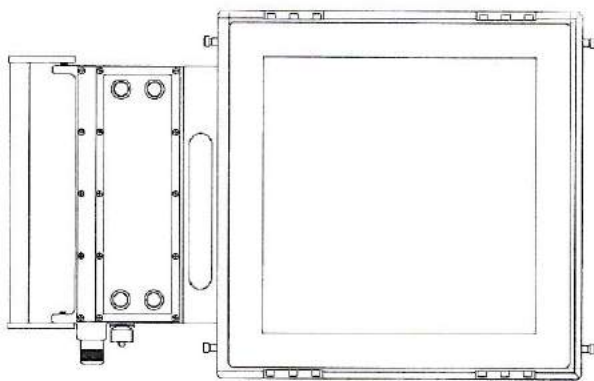


**Case A, 1 of 2**

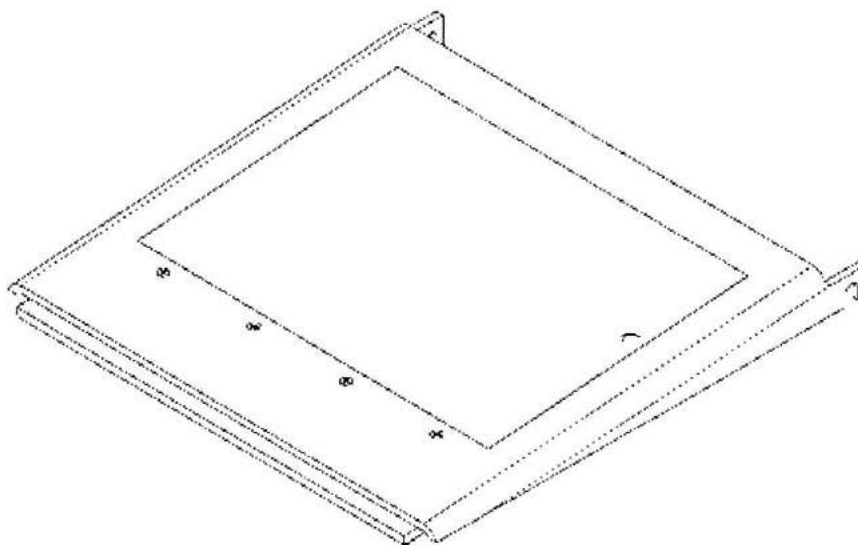


**Case B, 2 of 2**

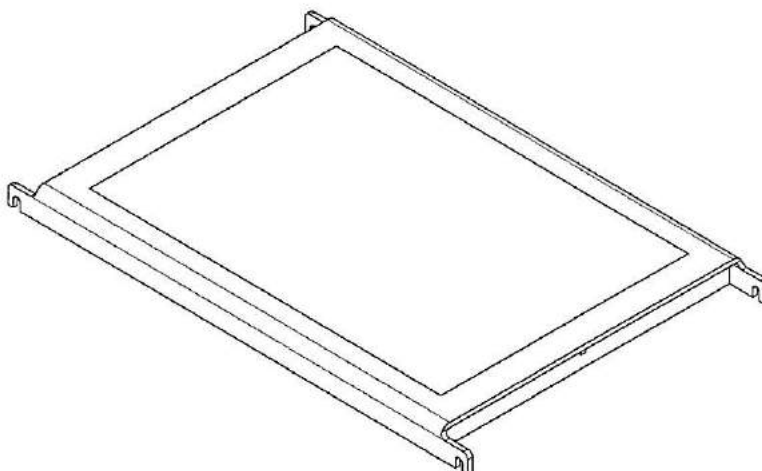
**ACDAWS 15X15 10K low profile scale ( Part # ACDAWS-GENII )**



**Ramp ( Part # ACDAWS-RAMP )**



**Overrun Extension (Part # ACDAWS-EXT )**



**Accessories**



100399 - AC-AK  
ACCESSORY LEVELING KIT



140396 - 120/220VAC  
CHARGER, 3-50' CABLES

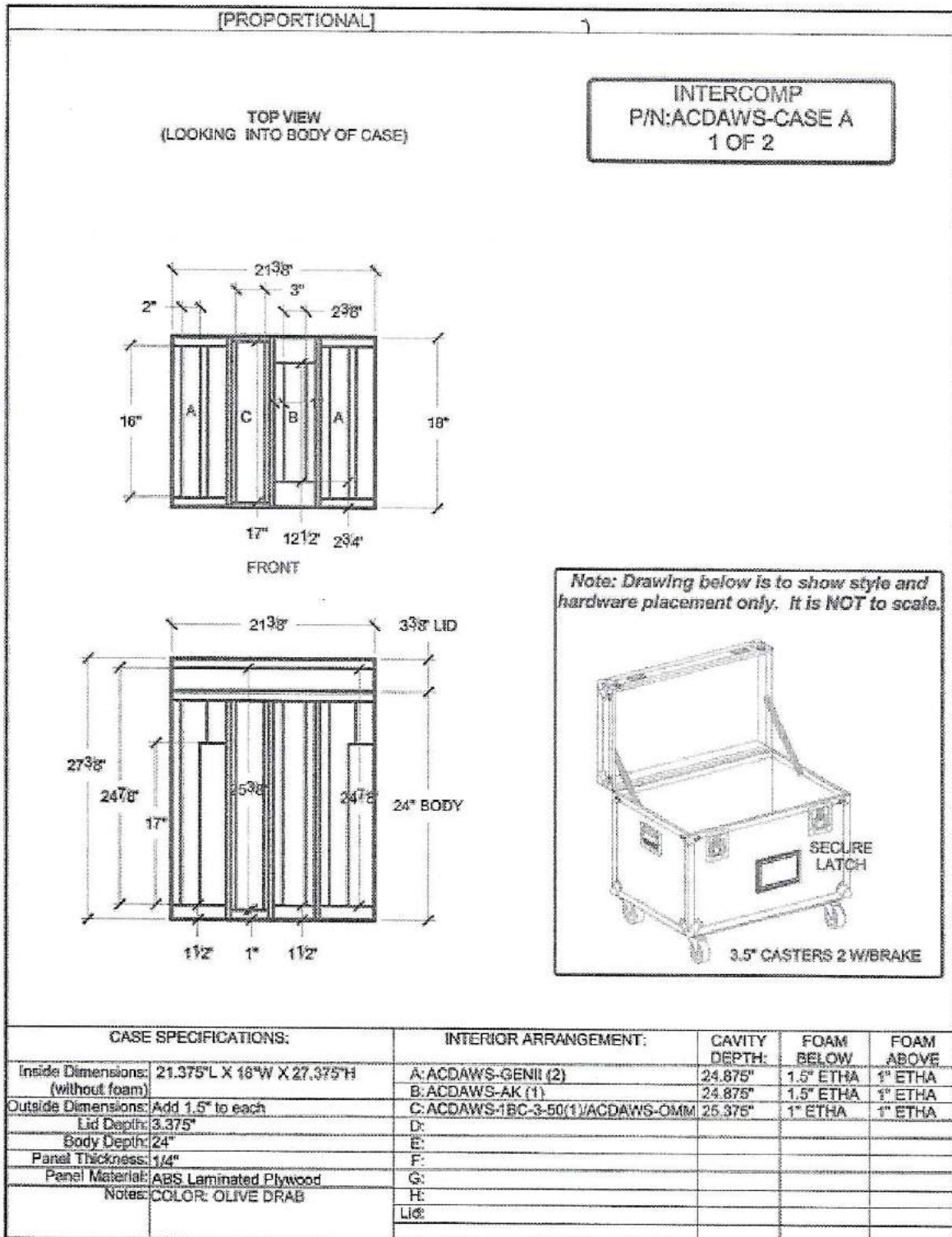


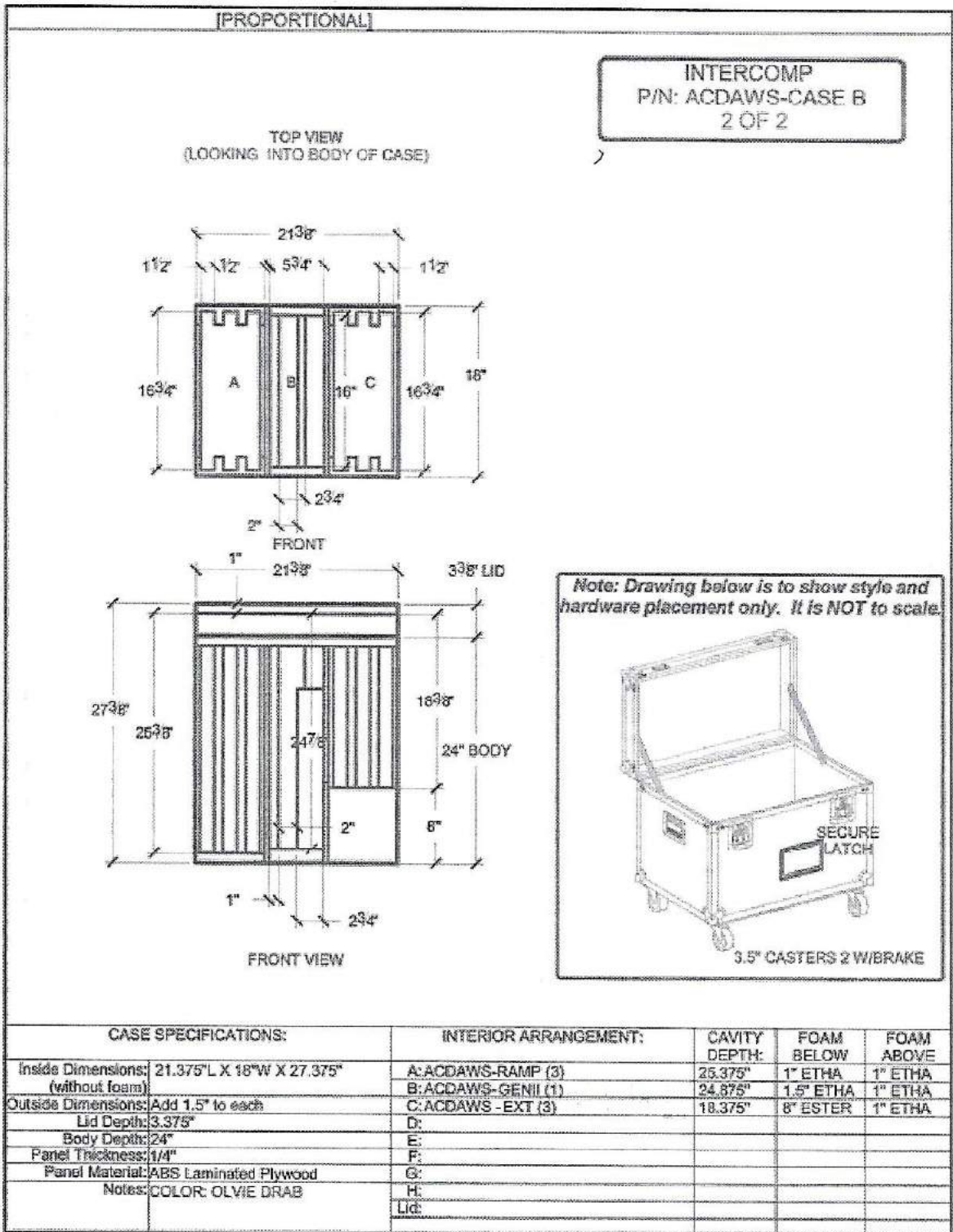
700253 – This Manual



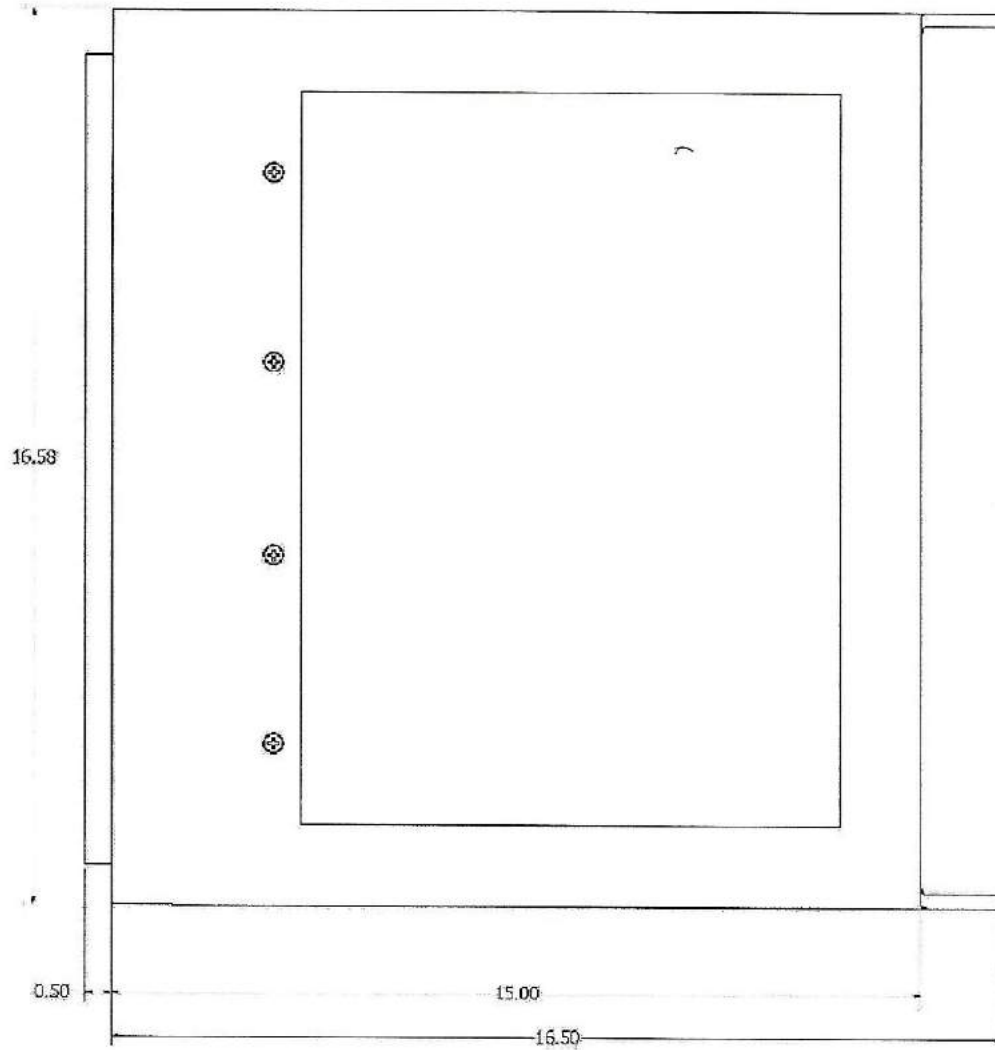
## Packaging / Labeling

Transport Case	Heavy duty, lockable Padded to fit and protect items of system #ACDAWS Labeled IAW MIL-STD-1472 and MIL-STD-130M
Setup time	Less than 10 minutes to unpack and setup. Less than 10 minutes to disassemble and pack.

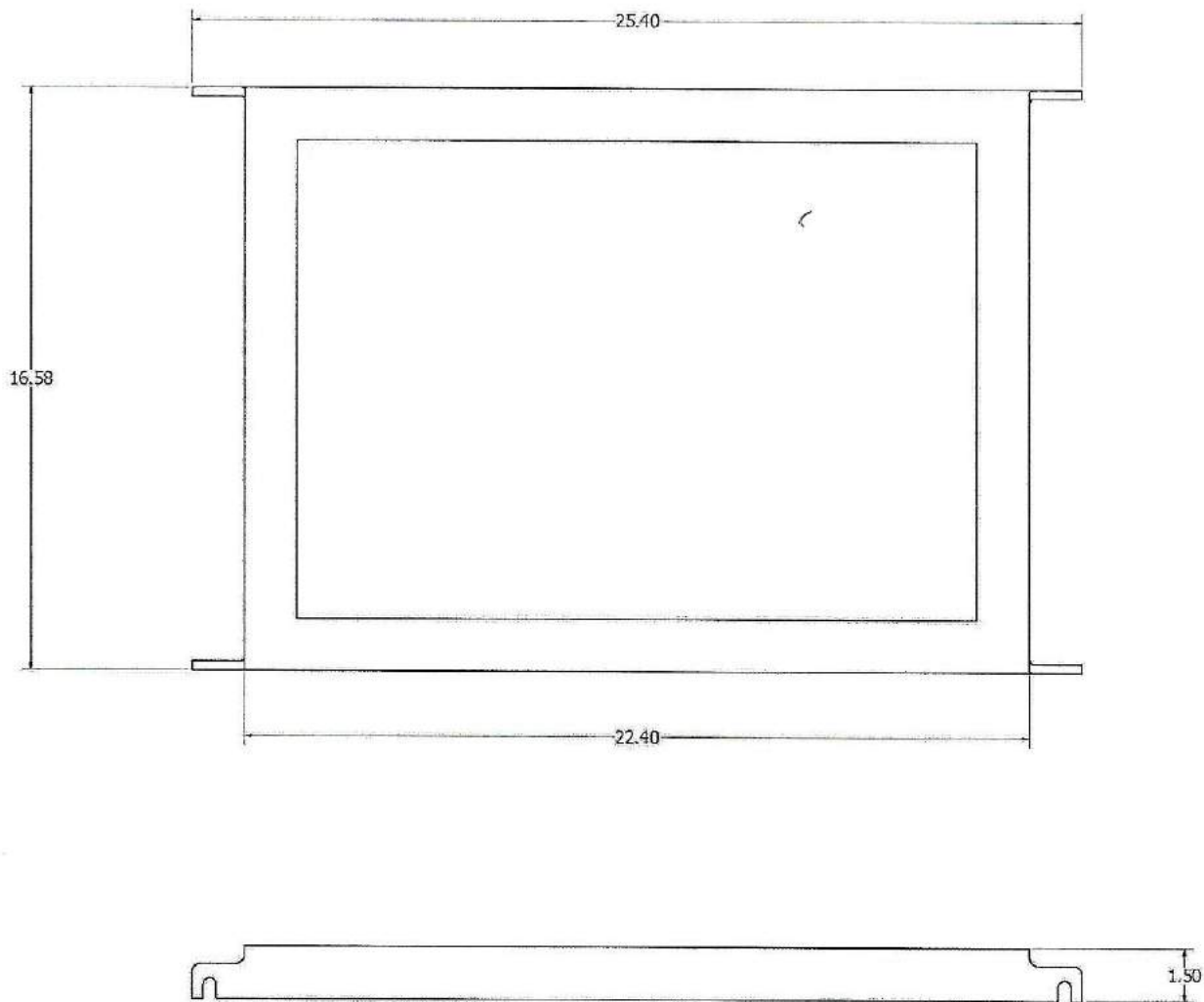




## Specifications: ACDAWS-RAMP



## Specifications: Overrun Extension ACDAWS-EXT



# Introduction to Aircraft Weighing

## Before You Weigh

Aircraft must be weighed before we can determine the center of gravity. The only way to find the weight is to use accurate and calibrated scales. Also, the weighing site should be prepared and the aircraft must be brought to a standard configuration.

Before weighing certain factors must be prepared. These fall in the categories of plane and site preparation.

The floors should be leveled to 1/4 inch per foot (1.2°). It is possible to compensate for greater slopes mathematically but a level floor is best.

The hanger must be free of drafts or stray wind currents. Any air currents across the wings or tail will be sensed as changes in weight. Close hanger doors (if you have any). Turn off all blowers and air conditioning while weighing.

The plane must be prepared for weighing. We assume that a standardized checklist is used for this task. This list is available from the aircraft manufacturer. Some items on this list would be: The aircraft should be washed and dried, tires inflated, struts serviced, engines serviced, plane de-fueled, all interior stations cleaned and brought to standard conditions. All the aircraft contents must be inventoried. A weight without an accurate inventory is of no value. In addition, flap position, horizontal stabilizer, seat position, etc. are all set according to manufacturers' recommendations.

It is convenient to charge the scales the day before the weight job. At this time check that the scales are within the specified calibration interval. Allow the scales to acclimate to the temperature in the hanger before use.

Arrange the scales in the required configuration. The detailed operation section of this manual gives specific details for configuration and use.

Connect any cables as required. Turn the scales on. Intercomp scales are stable within 3 minutes after turning on.

Zero each pad, and verify a displayed zero weight. Load the scales. This varies according to the type of scales used. Please check manufacturers' recommendations for any special weighing or leveling fixtures.

# Weighing

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## Load with Platforms:

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Release the aircraft brakes. Push the plane onto the scales. Use chocks or towbar to control the aircraft. Read and record all weights. Tow the aircraft off the pads. Verify and record that all scales return to zero. Where possible, exchange pads between positions. Tow the aircraft on the pads. Record the weights. Remove the aircraft from the pads. Verify record that the scale returns to zero.

Compare the weights obtained from the first and second weighings. The weights should agree within a specified tolerance. This tolerance varies with the application but a common figure is 0.25%. Repeat the weighing with scale rotation if there is not agreement. Check to see if a particular pad is weighing too much or too little. (A high or low reading moves with the cell). When you have agreement, average the two closest readings.

**NOTE:**

While it is not strictly necessary to do two or more weighings during a weigh job with scale rotations between positions the benefit of catching potential human or machine error outweighs the cost in time. Intercomp recommends this as the best practice, regardless of the brand or type of scale used.

## After Weighing

This is where you would normally calculate any scale factor corrections such as latitude or altitude corrections. Intercomp equipment calculates this automatically.

Calculate MAC if your CG is specified this way.

Compare your readings with your calculated values. They should agree closely. Some possible reasons for discrepancy: weighing error (residual fuel, residual water, equipment, etc.); operator error in recording values; calculation errors; charting errors; scales past due calibration

**Intercomp**<sup>®</sup>  
advanced weighing technology ... by any measure

**Model ACDAWS Platform Scale**

NSN: 6670-01-568-1177

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# General Information

The Intercomp Model ACDAWS Aircraft Weighing System provides the capability to weigh light to medium capacity aircraft. The weight display is selectable to either pounds or kilograms. Each pad provides latitude and altitude correction to maximize weight accuracy. The large (1.0 in/2.54 cm) display with automatic back lighting provides superior viewing under all conditions.

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## Scope of manual

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This operations manual describes the Intercomp Model ACDAWS low profile platform specifications, detailed operating procedures, and calibration.

This manual is separated into several sections, each containing information on a different aspect of the platform. The specifications outline the design parameters for the scale. The detailed operation section outlines the correct use of the scale for most applications. The calibration section explains how to set the platform's adjustments.

**Caution:** Your ACDAWS scale is covered by a one-year warranty and should be referred to the factory for maintenance within the warranty period. Attempts to make any extensive repairs within the warranty period may invalidate the warranty. If repairs are needed after the warranty period, only qualified technicians should attempt such repairs.

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## Features

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Independent weight readout on each Platform.

Accuracy of  $\pm 0.1\%$  of applied load or one graduation, whichever is greater.

Lb or kg selectable readout.

Ability to apply latitude and altitude correction values

Auto zero tracking automatically corrects zero-weight display shifts.

5½ digit LCD readout, with automatic backlighting.

Input Power: 5 to 15 VDC. External charger option allows 100 to 250 VAC, 50 to 60 Hz.

RFI/EMI protection.

Automatic shut-off to conserve battery life.

Low battery detection with automatic shutoff to protect batteries.

Built-in self-diagnostics to check: Load cells, Memory, Display, AD converter, and Power supply.

Weigh pads manufactured from high strength aluminum alloys.

Carrying cases for weigh pads and platform scales.



# Specifications: ACDAWS Platform Scale Series

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## Controls

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**General:** Zero, Lbs/Kg, On/Off, Mode.  
**Latitude Correction:** Ability to apply correction values.  
**Display:** 5 digit liquid crystal display (LCD), with automatic backlighting.  
**Indicators:** On-screen Lb/Kg.

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## Electrical

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**Power source required:** 5 to 15 VDC, 120 VAC, optional 240 VAC.  
**Charging Voltage:** 10 volts to 15 volts DC.  
**Batteries:** 6-AA size Rechargeable Nickel-Cadmium cells.  
**Charging Current:** 50 mA.  
**Charging Time:** 2 days for a full charge  
**Battery endurance:** 20 to 150 hours, depending on wireless and backlight use  
**Auto Shut-off:** Selectable from 1 to 240 minutes  
**Filtering:** 6 Pole, 10 Hertz low pass.  
**Auto-Zero:** Satisfies all HB-44 requirements.

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## Performance

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**Speed:** 2 seconds to typical reading (static).  
**Accuracy:** +/- 0.1% of applied load or one display graduation, whichever is greater.  
This accuracy statement includes and covers all standard sources of error including: Calibration uncertainty, platform loading errors, deviations in displayed weight over a 30 minute period, non-linearity, repeatability, display increment rounding, and operation over a temperature range of -10 to +40 deg C. The accuracy also includes operation on a floor slope up to +/- 2.1% in any direction  
**Calibration interval:** Twelve months.  
**Overload capacity:** 50% overload with no damage

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## Environmental

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**Humidity:** 10 to 95% Non-Condensing.  
**Temperature:** **Operating:** -10 C to +40 C. / +14 F to +104 F.  
**Storage:** -40 C to +75 C. / -40 F to +170 F.

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## Physical

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**Capacity:** 10000 lb / 5000 kg X 2 lb / 1 kg  
**Weight:** 50 lbs. / 22.5 kg  
**Dimensions Overall:** 31.5" X 21 X 3" / 80 cm X 53.3 cm X 7.6 cm  
**Dimensions Platform:** 15" X 15" X 1.7" / 38.1 cm X 38.1 cm X 4.3 cm

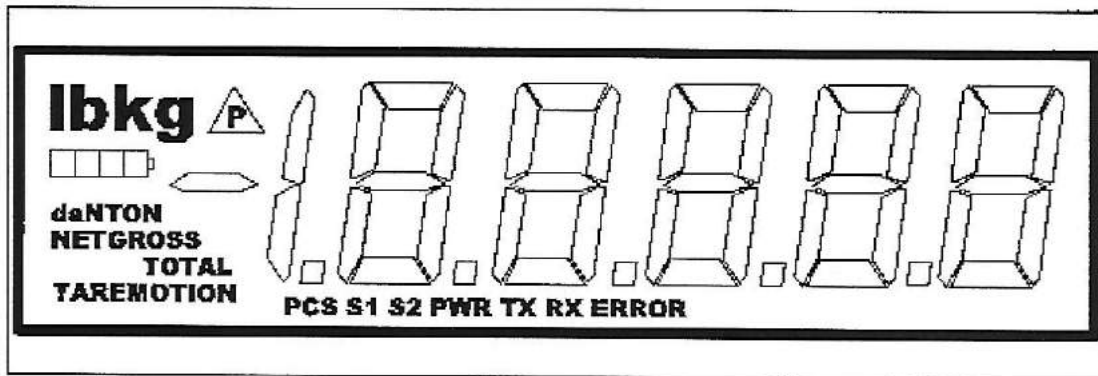
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# Control Panel Switches and Indicators

The control panel for the weighing platform is in the front section of the scale, along with the electronics of the system. The control panel has a liquid crystal display (LCD) screen and several control switches.

## Display Description

The display is a Liquid Crystal Display unit, providing one line of 5 1/2 digits. The screen shows the weight read from the scale, displayable in pounds or kilograms. Information displayed includes indicators for both "lb" and "kg", a segment bar to show battery charge level, error conditions and set-point indicators when set-point thresholds are reached. The display contains an automatic backlight for use in low-light conditions.



## Control Switches

### On/Off

Applies power to the weighing system electronics. When power is first applied, the weighing system rapidly performs a self-test of the scale and the internal electronics. When the tests have completed successfully, the system begins weighing. If a problem is detected, the screen displays an error message. This switch also turns off the power to the weighing system electronics.

### MODE

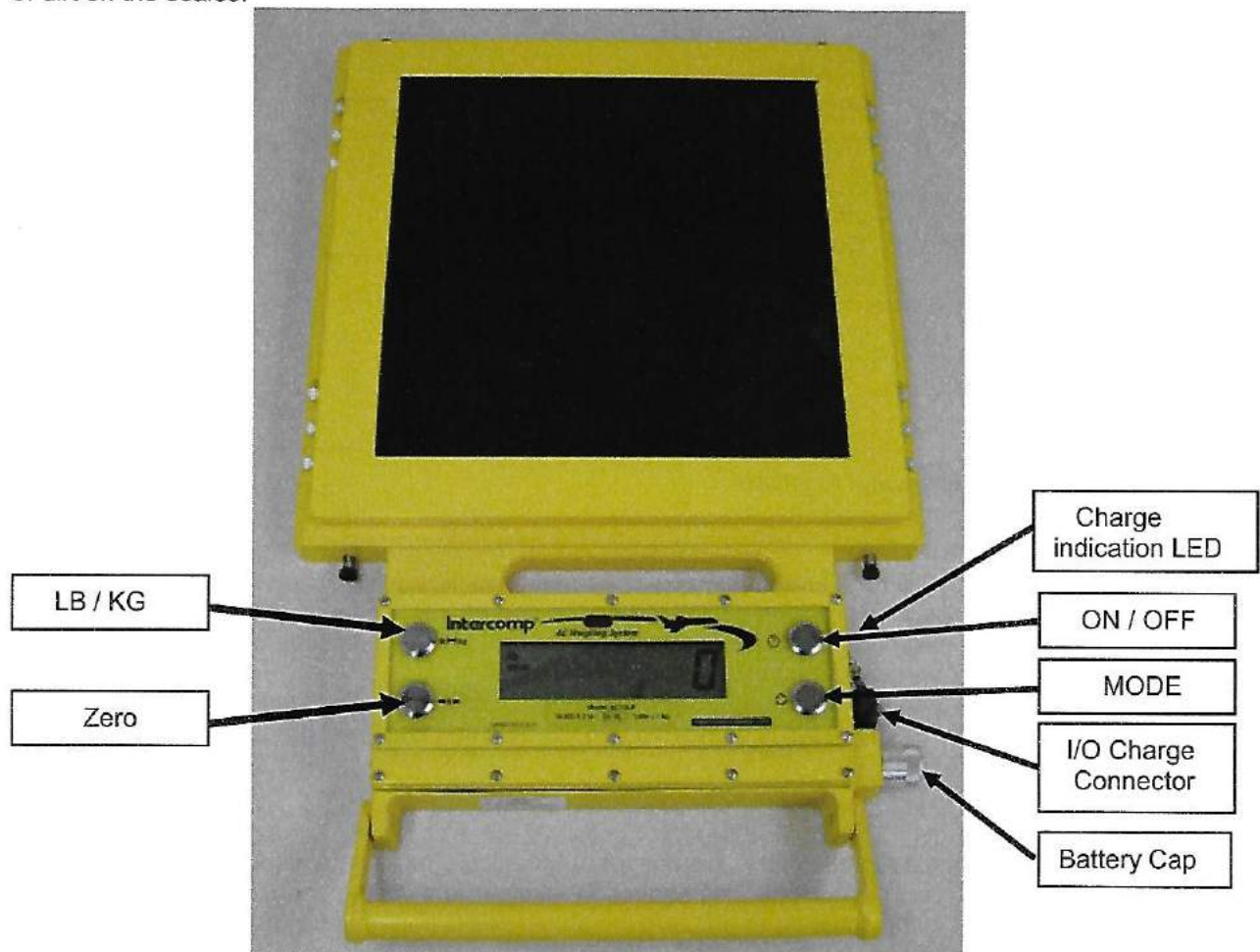
The Mode button cycles through the scale set-up menu when in run mode and cycles through the calibration menu when in the cal mode. (See procedures section for these operations)

### LB/KG

Toggles the weighing system between pound (English) and kilogram (SI metric) units of measure. When you press this switch, the system switches to the nearest comparable value in the selected system.

### ZERO

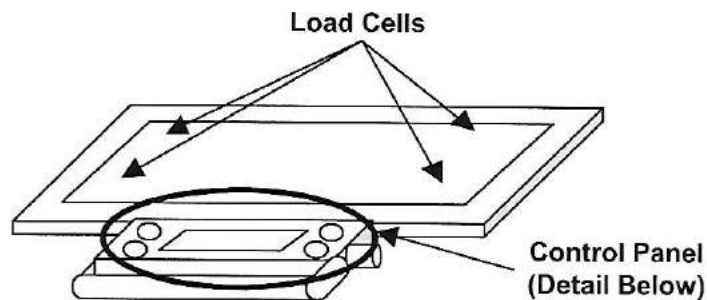
Sets the weighing system to read zero pounds or kilograms. If pressed while a scale holds weight, that weight becomes the zero condition for the scale. This can be useful to cancel the weight of any weighing fixtures, such as tail cones or wheel chocks. When the weight is removed, a negative weight displays until the system is re-zeroed. Please note that this system contains a feature called Auto Zero Tracking (AZT), which corrects for slight zero shifts during normal operation. An example of a zero shift could be a buildup of dirt on the scales.



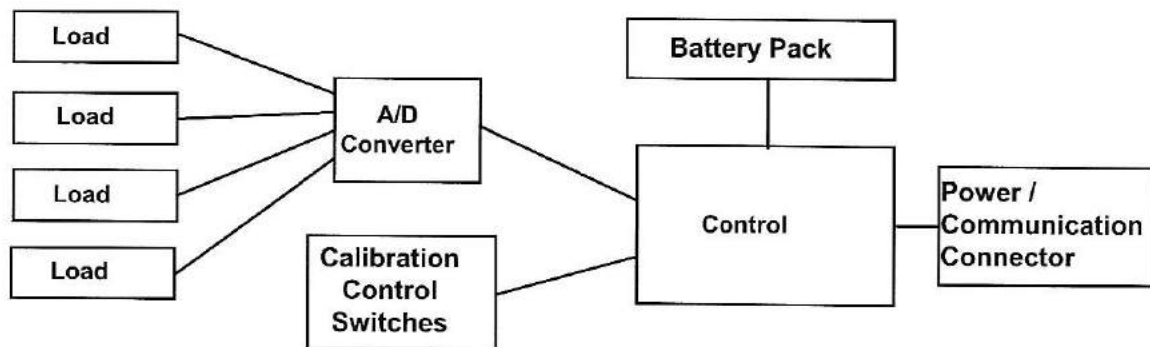
# Theory of operation - Platform Scale

## Load sensor

The load to be measured is applied to the platform top. This force is coupled to the load cells. If the load is centered, each load cell receives one fourth of the applied load. The load cells produce an output signal proportional to the applied load. This signal ranges from about 0 millivolts for no load to about three millivolts for a full load of 2500 pounds (1130 kilograms) at the load cell. The load cells contain circuitry to compensate for changes in temperature in the weighing environment. There are no field serviceable components inside a load cell; a cell must be replaced if found defective.



Load cell Placement



System Schematic Diagram

## Control Panel

The control panel performs several functions:

### Weight determination:

1. Each load cell signal is read individually. This information is read several times a second.
2. The load cell signals are combined digitally using the corner compensation calibration.
3. The user entered latitude and altitude is applied to the readings. The latitude and altitude settings may be entered or verified during every weighing if desired.
4. The control panel then applies a multi-point calibration factor that is calculated during the calibration procedure. The result is converted into the selected units and graduations and then displayed

### User interface:

A light sensor is mounted next to the display; this sensor automatically turns on a display backlight in response to the ambient lighting conditions. The control panel also contains the control switches. These switches can be used to turn the scale on or off, zero the scale, select pound or kilogram weight displays, and to enter the scale's operating parameters.

### Power control:

The control panel conditions the input power received through the power connector to charge a string of rechargeable batteries. The operating input is designed to accept any voltage between 5 and 15 volts to operate. However, a minimum of 10 V (10 to 15 VDC) is needed for charging the internal batteries. The battery indicator on the front display will cycle through it's level indicators when charging and display the batteries charge level when running on battery power. When the battery voltage is too low a "Lo.BAt" message will be on the display.

### Data communications:

The control panel can communicate with an external computer using RS-485 signals routed through the COM connector. This data is formatted in a compressed format designed to reduce communications time. All scale functions may be controlled through this port.

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## Detailed Operations

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This section explains the details of operating the ACDAWS Aircraft Weighing system.

1. Check for obvious damage to the control panel and display unit. Verify that the scale is within the calibration interval.
2. Select a power source. The weighing system can obtain power from any of these sources:
  - When AC power is available, plug the charger pack into the jack located in the lower right corner of the control panel. This allows full-time weighing system use.
  - Any 10 to 15 volt DC power source may be used in place of the charging pack. An example would be a vehicle battery. An optional cable is required to make this connection. Please note that each pad requires 0.05 Amp charging current.
  - The weighing system can operate using internal rechargeable batteries. Battery life depends on a number of factors (The biggest factors are battery capacity, backlight use, and wireless use). Using fully charged 2500mAh 'AA' NiMH batteries results in battery life of 20 to 150 hours, depending on wireless and backlight use. When the scale is connected to an external power source, the batteries will recharge. Allow 2 days for a full charge. In order to extend the serviceable life of the batteries, it is recommended not to leave the batteries charging for more than 2 weeks continuously.
3. Place the Pads. The ACDAWS Aircraft Weighing System is a very accurate weighing system that is simple to set up and use. However, the accuracy depends on proper pad placement. Make sure they are properly centered for the wheelbase of the aircraft, and accurately leveled.

**NOTE:** The floors should be level to 1/4 inch per foot (1.2°). It is possible to compensate for greater slopes mathematically but a level floor is best. The easiest way to check the pad leveling is to use a carpenter's level. Each pad must be in full contact with the supporting surface. A pothole, uneven floor, or use of shim stock under part of the scale can damage the scale.

4. Push or tow the aircraft onto the pads. Align all wheels as nearly centered as possible upon each of the pads during weighing.

**NOTE:** The aircraft brakes should be released, when weighing using platforms scales. You may use chocks to control the aircraft during weighing. This reduces the possibility of sideways stress causing weight shift during measurements.

## Latitude and Altitude Correction

### Overview

The force of attraction of the Earth to any object varies with latitude and altitude. In general, an object weighs the most at sea level at the poles, and the least at the equator and to a lesser effect, higher altitudes. This effect is small, but it must be considered to achieve the scales rated accuracy of 0.1%. Note that this adjustment is only performed when moving the scales to a new location or when the scales are calibrated. You may inspect these values at any time. When the proper altitude and latitude values are set the ACDAWS will adjust the displayed weight to show what the object being weighed would weigh if it were placed at sea level, 45 degrees latitude. Changing the scales Latitude and Altitude settings will be discussed in the Setting the Mode menu parameters section.

### Correction Table

This table shows the latitude and altitude correction values used:

deg/ft	0	1000	2000	3000	4000	5000	6000	7000
0	1.0027	1.0028	1.0029	1.0030	1.0031	1.0032	1.0033	1.0034
5	1.0026	1.0027	1.0028	1.0029	1.0030	1.0031	1.0032	1.0033
10	1.0025	1.0026	1.0027	1.0028	1.0029	1.0030	1.0031	1.0032
15	1.0023	1.0024	1.0025	1.0026	1.0027	1.0028	1.0029	1.0030
20	1.0021	1.0022	1.0023	1.0024	1.0025	1.0025	1.0026	1.0027
25	1.0017	1.0018	1.0019	1.0020	1.0021	1.0022	1.0023	1.0024
30	1.0014	1.0015	1.0016	1.0017	1.0017	1.0018	1.0019	1.0020
35	1.0009	1.0010	1.0011	1.0012	1.0013	1.0014	1.0015	1.0016
40	1.0005	1.0006	1.0007	1.0008	1.0009	1.0010	1.0011	1.0012
45	1.0000	1.0001	1.0002	1.0003	1.0004	1.0005	1.0006	1.0007
50	0.9996	0.9997	0.9998	0.9999	1.0000	1.0001	1.0002	1.0003
55	0.9991	0.9992	0.9993	0.9994	0.9995	0.9996	0.9997	0.9998
60	0.9987	0.9988	0.9989	0.9990	0.9991	0.9992	0.9993	0.9994
65	0.9983	0.9984	0.9985	0.9986	0.9987	0.9988	0.9989	0.9990
70	0.9980	0.9981	0.9982	0.9983	0.9984	0.9985	0.9986	0.9987
75	0.9978	0.9979	0.9979	0.9980	0.9981	0.9982	0.9983	0.9984
80	0.9976	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981	0.9982
85	0.9974	0.9975	0.9976	0.9977	0.9978	0.9979	0.9980	0.9981
90	0.9974	0.9975	0.9976	0.9977	0.9978	0.9979	0.9980	0.9981