

FJ SERIES

INDUSTRIAL CRANE SCALES

INSTRUCTION MANUAL

own-FJ-v1.f 08.12.93 PH/RPK/RIW

INDUSTRIAL CRANE SCALES

AD
A&D Company Limited



Table of Contents

Compliance with FCC Rules	iii
Section A • Set-Up	
Unpacking Your Scale	2
Fitting the Batteries.....	2
Section B • Introduction	
Welcome	6
Features	6
Specifications.....	7
Description of Front Panel	8
Description of Button Operations.....	9
Section C • Calibration	
About Calibration.....	12
Calibration Procedure	12
Calibration - Front Panel.....	13
Gravity Compensation	13
Zero and Span Calibration	14
Calibration - Remote Controller.....	16
Gravity Compensation	16
Zero and Span Calibration	17
Calibration Errors	19
Section D • Weighing Mode	
Caution When Attaching Loads.....	22
Simple Weighing.....	23
Using ZERO to Tare	24
Weighing into a Container	24
Display Hold.....	25
Weighing Errors.....	26

Section F• Function Settings

Internal F-Functions	28
Changing the Function Settings.....	29
The F-Function Settings.....	31
F0 Battery Saving Timer.....	31
F1 Power Off 2% Check.....	31
F2 Zero Point Calibration	32
F3 Check Mode.....	33
F4 Internal Count Display.....	35
F5 Display Hold.....	35

Section AP Additional Cal. & Gravity Info.

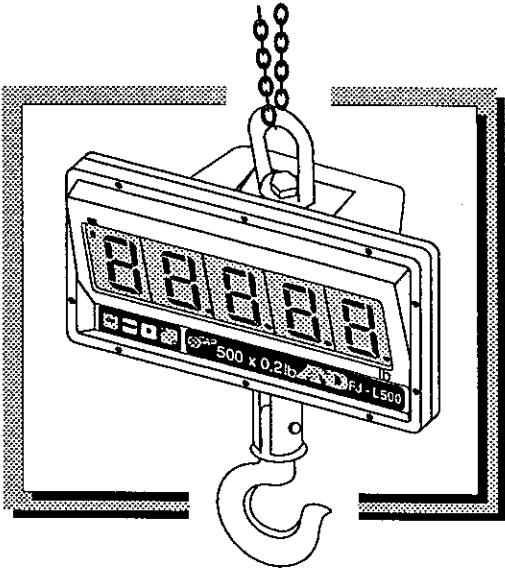
Gravity Compensation.....	38
Gravity Values at Various Locations.....	39
Acceleration Due to Gravity Table.....	39
World Map.....	40



FCC Rules

Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of 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. If this unit is operated in a residential area it might cause some interference and under these circumstances the user would be required to take, at his own expense, whatever measures are necessary to eliminate the interference.

(FCC = Federal Communications Commission in the U.S.A.)



FJ Series • Section A

Set-Up

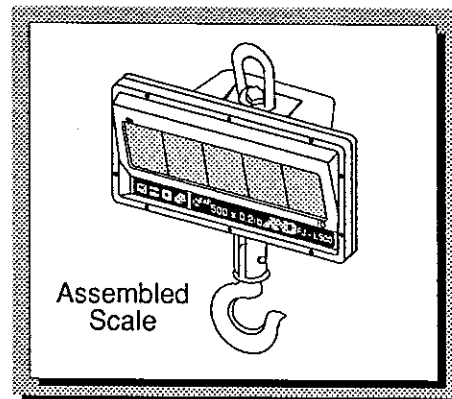
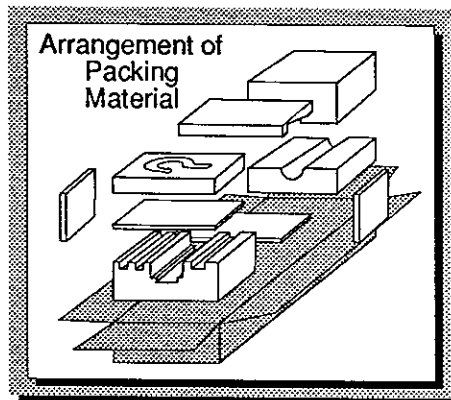


Unpacking your scale



Unpack the scale carefully and keep the packing material if you are likely to transport the scale again in the future.

- ▶ In the carton you will find this manual plus your fully assembled scale.



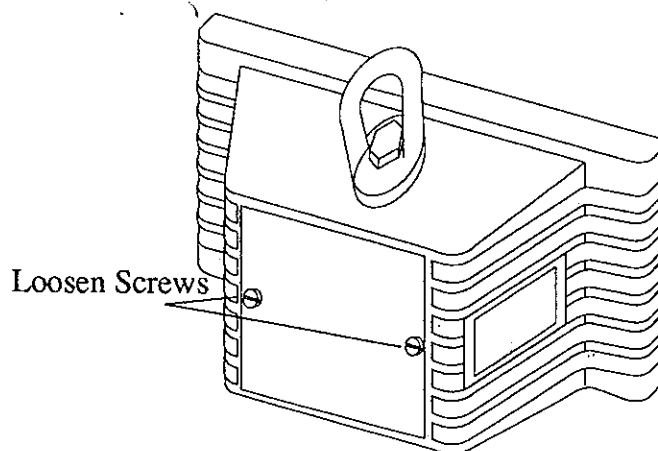
Fitting the Batteries



Your scale is supplied without batteries to allow air shipment. The scale requires 6 x 'D' cell to provide the power to drive the scale. These cells may be of any type but the longest life will be obtained from alkaline dry cells. An alternative is to use re-chargeable batteries such as ni-cad in which instance a suitable charger must also be supplied.

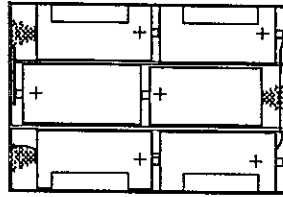
1

Loosen the 2 screws securing the battery cover plate to the case and remove the cover plate.



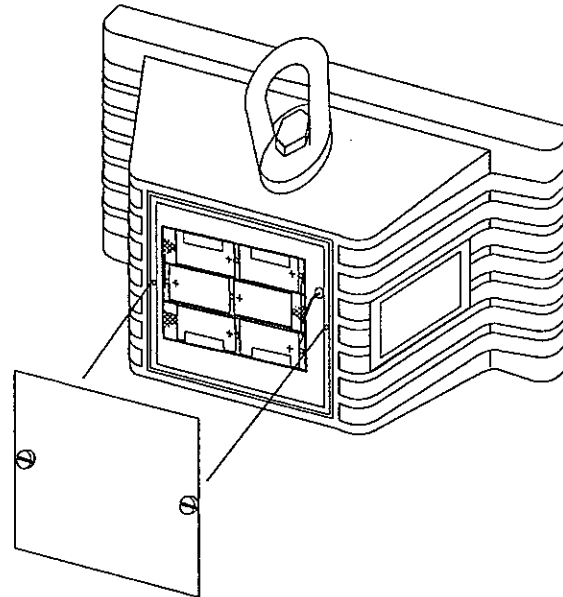
2

Fit the 6 x 'D' cells to the battery holder observing the correct orientation as shown.

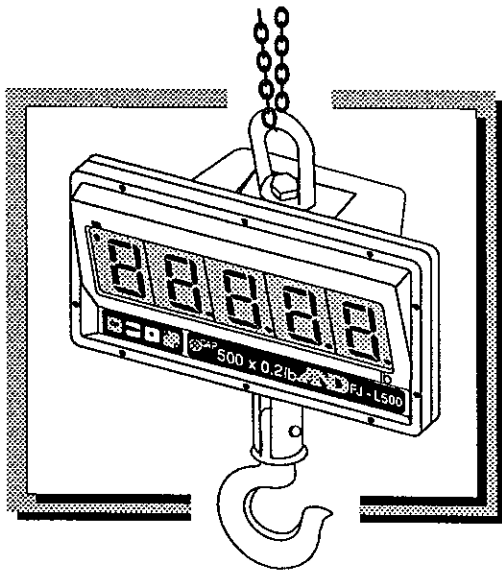


3

Replace the cover plate and tighten the screws.



Your scale is now ready for use.



FJ Series • Section B

Introduction



Welcome!

Thank You for Your **AND** Purchase!

This is an INSTRUCTION MANUAL for the FJ Crane Scale. The FJ Scale is the product of years of design, development, and in-field testing. Every care has been taken during the manufacturing process of this scale; and each scale is subjected to several levels of quality control before it leaves the factory to ensure that it will perform accurately and reliably for many years.



This section introduces you to some of the major features of your FJ. Please take a moment to familiarize yourself with these items as they could be helpful for proper operation.



Features

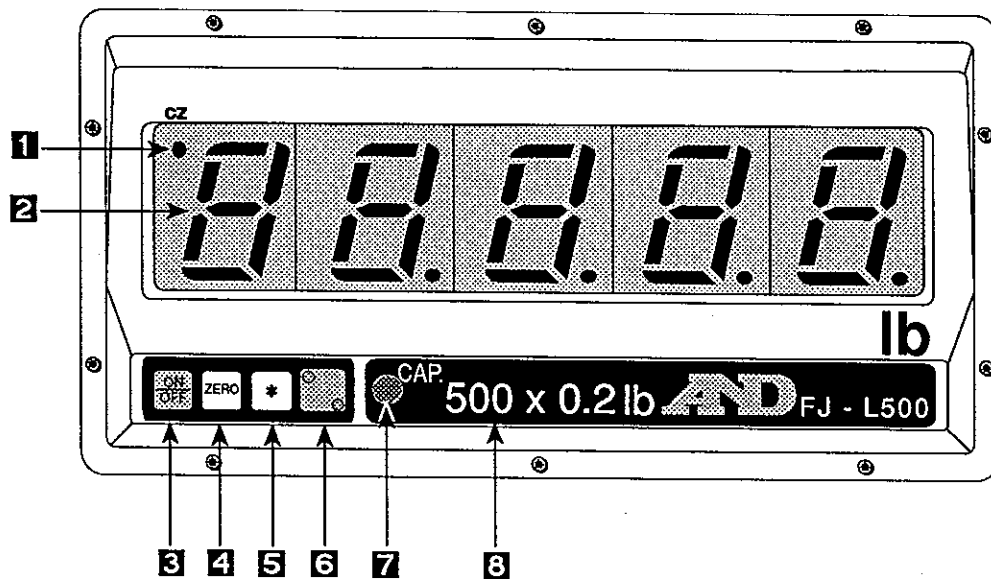
- Weighing units are **kg** kilogram. (**lb** pounds in the U.S.A. version)
- Waterproof to **IP-65** specifications.
- Large liquid crystal display for easy reading from a distance.
- Sealed aluminium casing for harsh environment working.
- Six capacities available to cover various applications.
- Optional remote controller available.
- Battery powered for convenient operation without trailing wires.
- Full digital calibration from front panel or from remote controller.
- Features swivel hook and bow nut for easy attachment.


Specifications

Description	FJ-K200	FJ-K500	FJ-T001	FJ-T002	FJ-T005	FJ-T010
Maximum Capacity	200 kg	500 kg	1000 kg	2000 kg	5000 kg	10000 kg
Min. Division	0.1 kg	0.2 kg	0.5 kg	1 kg	2 kg	5 kg
Description	FJ-L500	FJ-KL001	FJ-KL002	FJ-KL005	FJ-KL010	FJ-KL020
Maximum Capacity	500 lb	1000 lb	2000 lb	5000 lb	10000 lb	20000 lb
Min. Division	0.2 lb	0.5 lb	1 lb	2 lb	5 lb	10 lb
Packed Weight	-	20.1kg	20.1kg	33.1kg	43.9kg	-
Display Type	Liquid Crystal Display. Digital section - 7 segment x 5 digits 76mm height.					
Sensitivity Drift	13.5 p.p.m. / °C (typical)					
Operating Temperature	-10 °C ~ +45 °C 14 °F ~ 113°F.					
Power Supply <i>(Batteries)</i>	6 x 'D' cell dry batteries. Alkaline 600 Hours					
Dimensions <i>(Without hooks)</i>	450 mm x 230 mm x 185 mm			17.7 x 9.1 x 7.3 inches.		

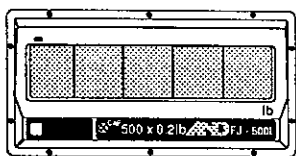


Description of Front Panel



- 1** **ZERO ANNUNCIATOR.**
To show the centre of ZERO.
- 2** **WEIGHT DATA DISPLAY.**
A 5 digit display that shows the weight on the crane scale.
If there is a weighing error then a message will appear in this area.
- 3** **ON/OFF PUSH BUTTON.**
To switch the scale ON or OFF.
- 4** **ZERO PUSH BUTTON.**
To set the scale reading to ZERO.
- 5** **AUXILIARY PUSH BUTTON.**
Used during scale calibration.
- 6** **CALIBRATION SWITCH COVER.**
Secures the calibration switch.
- 7** **REMOTE CONTROL SENSOR.**
Detects the controller commands.
- 8** **SCALE CAPACITY LABEL.**
Shows the scale size and weighing unit.

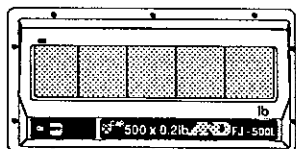
Description of Button Operations



The POWER ON/OFF Button



When the scale is OFF, pressing this button will switch the scale ON.

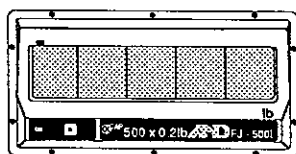


The ZERO Button



When the weight on the hook is within 2% of calibrated zero then pressing this button will set the display to zero. The full capacity of the scale will be available. (**ZERO** Function)

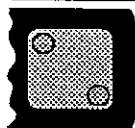
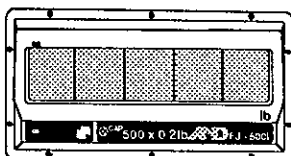
When the weight on the hook is greater than 2% of maximum then pressing this button will set the display to zero. The capacity of the scale will be reduced by the amount of this weight. (**TARE** Function)



The AUXILIARY Button



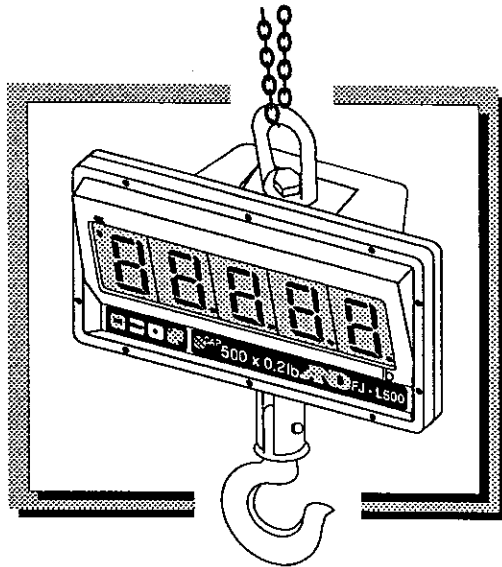
This Button is used during Calibration and to set the Functions of the Scale. Refer to **Sections C** and **F**. This Button is also used to access the Display Hold Function. Refer to **Section D**



The CALIBRATION Button

The Calibration Button is secured beneath a sealable Cover. To gain access to the Button break the seal, if fitted, and remove the 2 socket screws.

⚠ *In certain Countries this Cover Plate may be wire sealed. Under no circumstances break this seal. Call for a qualified Scale Technician.*



FJ Series • Section C

Calibration



About Calibration

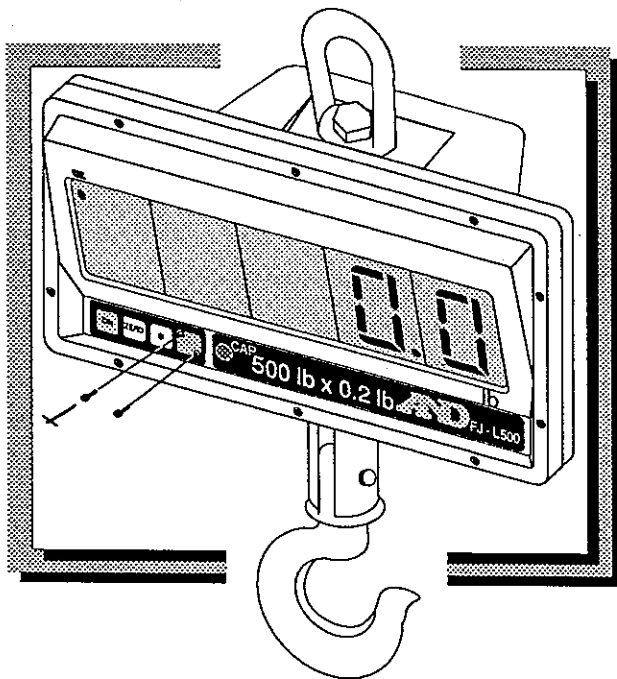


The initial Calibration of the FJ scale is carried out at your dealer's premises, prior to delivery of the Scale. Additional Calibration may be required if the Scale is moved often or over a substantial distance.



Calibration Procedure

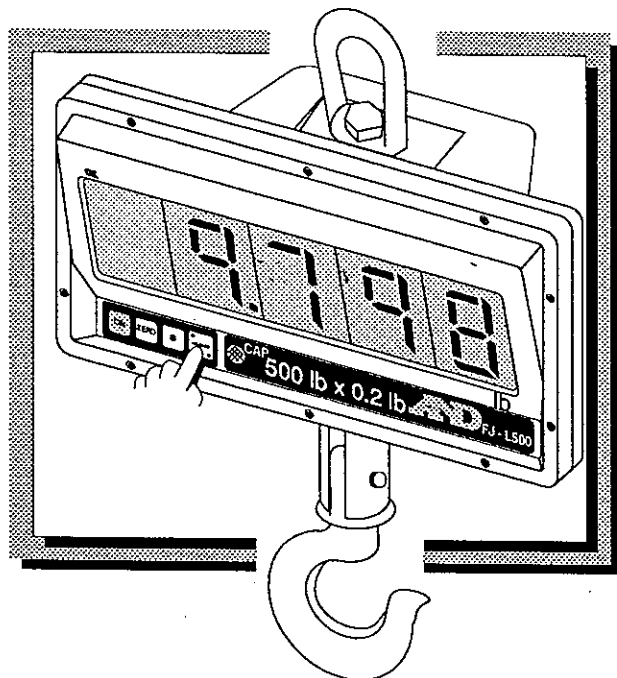
1



- ▶ Locate and remove the CAL switch cover

⚠ *In certain Countries this cover plate may be wire sealed. Under no circumstances break this seal. Call for a qualified scale technician.*

2



- ▶ Switch ON

⚠ *Immediately after switch on the Scale starts a 30 second warm up period. During this period access to the Calibration Routine is denied.*

- ▶ Press the CAL switch.

- The display will show the value of 'g'.

9.798

The factory or last setting



Calibration may be done either by using the front panel pushbuttons or by using the optional Remote Controller. If you wish to use the **Remote Controller** refer to the following Section "Calibration - Remote Controller".



Calibration - Front Panel



Gravity Compensation



If you do not wish to adjust the Gravity Compensation factor then by-pass this section by going to step 3. Refer to the Appendix (Section AP) for more information on Gravity Compensation.

1



- ▶ Use the **ZERO** button to move the flashing digit to the one you wish to change.

2



- ▶ Use the **AUXILIARY** button to change to the new value.



- Repeat steps 1 and 2 until the correct gravity compensation factor is shown.

3



- ▶ Press the **CALIBRATE** button.

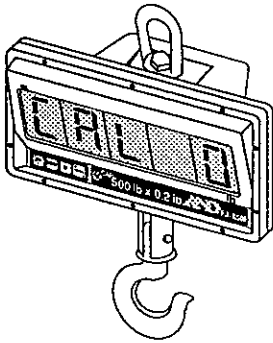
- The display will show **CAL 0**

Zero and Span Calibration



If you do not wish to carry out a calibration then leave the routine now by pressing the **ON/OFF** button.

1



- ▶ Ensure no weight is on the hook - no chains, slings etc.

2



- ▶ Press the **ZERO** button.

○ The display will show **CAL 0** with the **0** digit flashing.

3



- The display will show the suggested calibration mass.

e.g **500**

- ▶ Press the **AUXILIARY** button to select your desired calibration mass from the appropriate table.

SCALES CALIBRATED IN KILOGRAMS

	-----Calibration Mass-----							
FJ - K200	20	40	50	100	120	150	180	200
FJ - K500	50	100	150	200	250	300	400	500
FJ - T001	100	200	250	300	500	600	750	1000
FJ - T002	200	400	500	1000	1200	1500	1800	2000
FJ - T005	500	1000	1500	2000	2500	3000	4000	5000
FJ - T010	1000	2000	2500	3000	5000	6000	7500	10000

SCALES CALIBRATED IN POUNDS

	-----Calibration Mass-----							
FJ - L500	50	100	150	200	250	300	400	500
FJ - KL001	100	200	250	300	500	600	750	1000
FJ - KL002	200	400	500	1000	1200	1500	1800	2000
FJ - KL005	500	1000	1500	2000	2500	3000	4000	5000
FJ - KL010	1000	2000	2500	3000	5000	6000	7500	10000
FJ - KL020	2000	4000	5000	10000	12000	15000	18000	20000

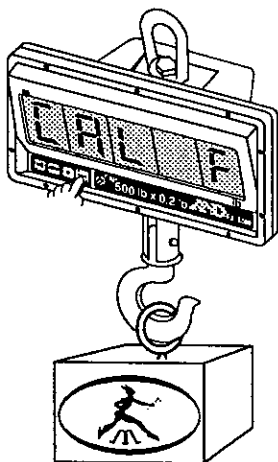
4



- ▶ When the desired calibration mass is displayed press the **CALIBRATE** button.

- The display will show **CAL F**.

5



- ▶ Add the chosen mass to the scale hook and press the **ZERO** button.

- The display will show **CAL F** with the **F** flashing.

- When calibration is complete the display will show **End**

6



- ▶ To leave the calibration routine press the **ON/OFF** button.

- The scale is now ready for use.

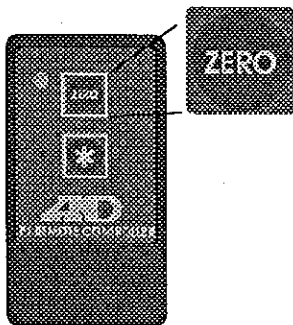
Calibration - Remote Controller

Gravity Compensation



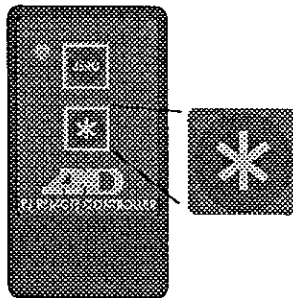
If you do not wish to adjust the Gravity Compensation factor then by-pass this section by going to step 3. Refer to the Appendix (Section AP) for more information on Gravity Compensation.

1



▶ Use the **ZERO** button to move the flashing digit to the one you wish to change.

2

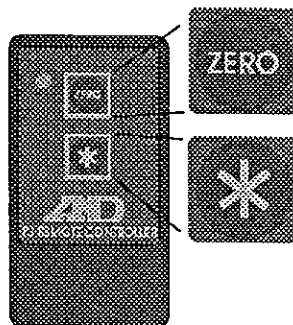


▶ Use the **AUXILIARY** button to change to the new value.



○ Repeat steps 1 and 2 until the correct gravity compensation factor is shown.

3



▶ Press and hold the **ZERO** and then press the **AUXILIARY** button.

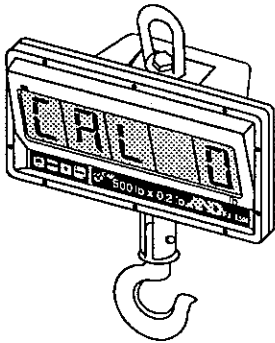
○ The display will show **CAL 0**

Zero and Span Calibration



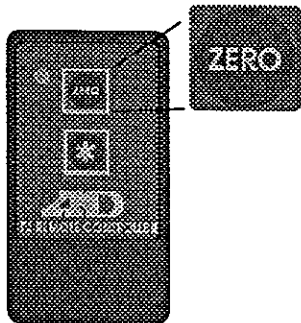
If you do not wish to carry out a calibration then leave the routine now by pressing the **ON/OFF** button on the front panel.

1



▶ Ensure no weight is on the hook.

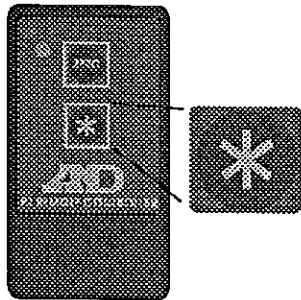
2



▶ Press the **ZERO** button.

○ The display will show **CAL 0** with the **0** digit flashing.

3



○ The display will show the suggested calibration mass.

e.g **500**

▶ Press the **AUXILIARY** button to select your desired calibration mass from the appropriate table.

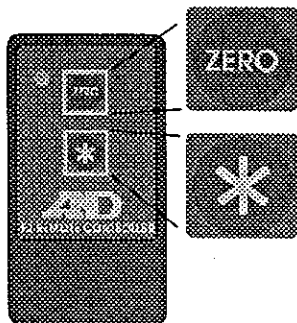
SCALES CALIBRATED IN KILOGRAMS

	-----Calibration Mass-----							
FJ - K200	20	40	50	100	120	150	180	200
FJ - K500	50	100	150	200	250	300	400	500
FJ - T001	100	200	250	300	500	600	750	1000
FJ - T002	200	400	500	1000	1200	1500	1800	2000
FJ - T005	500	1000	1500	2000	2500	3000	4000	5000
FJ - T010	1000	2000	2500	3000	5000	6000	7500	10000

SCALES CALIBRATED IN POUNDS

	-----Calibration Mass-----							
FJ - L500	50	100	150	200	250	300	400	500
FJ - KL001	100	200	250	300	500	600	750	1000
FJ - KL002	200	400	500	1000	1200	1500	1800	2000
FJ - KL005	500	1000	1500	2000	2500	3000	4000	5000
FJ - KL010	1000	2000	2500	3000	5000	6000	7500	10000
FJ - KL020	2000	4000	5000	10000	12000	15000	18000	20000

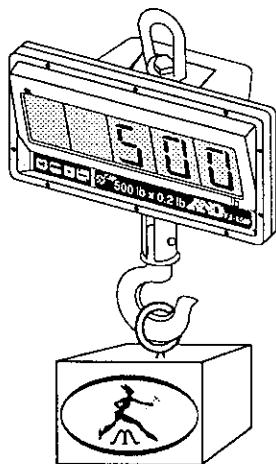
4



▶ Press and hold the **ZERO** and then press the **AUXILIARY** button.

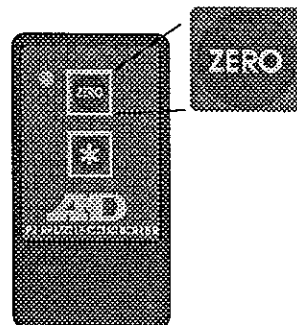
○ The display will show **CAL F**

5



▶ Add the chosen mass to the scale hook.

6



▶ Press the **ZERO** button again.

○ The display will show **CAL F** with the **F** flashing.

○ When calibration is complete the display will show **End**

7



▶ To leave the calibration routine press the **ON/OFF** button on the Front Panel.

○ The scale is now ready for use.

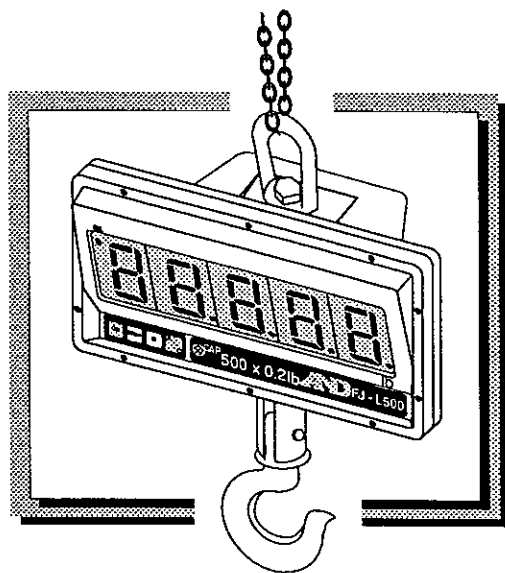


Calibration Errors



Errors may occur during the calibration of your scale. An error message will be displayed which will assist you in correcting the error and thus completing the calibration successfully.

<i>Err 2</i>	<input type="radio"/> Loadcell output is too small.
<i>Err 3</i>	<input type="radio"/> Loadcell output is too large.
<i>Err 4</i>	<input type="radio"/> Span error.



FJ Series • Section D

Weighing Mode



Caution when attaching loads



Loads may disengage from the hook if proper procedures are not followed.

A falling load may cause serious injury or death.

The hook must always support the load. The load must never be supported by the latch.

Never apply more force than the hook's assigned Working Load Limit (WLL) rating.

Never apply more force to the scale than the maximum capacity of the scale.

Read and understand these instructions before using the scale.

- 1 Do not swivel the S-322 swivel hook while it is supporting the load.

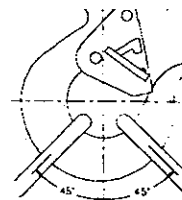
- 2 Always make sure that the hook supports the load.



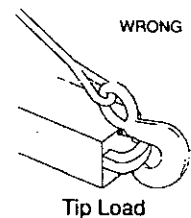
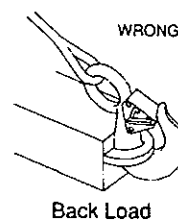
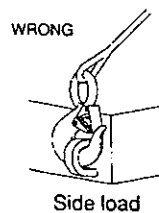
- 3 The latch must never support the load.



- 4 When placing 2 slings in the hook, make sure the angle from the vertical to the outermost leg is not greater than 45°, and that the included angle does not exceed 90°.

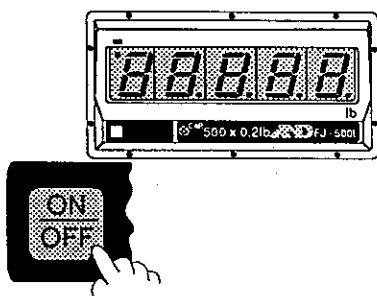


- 5 Never side load, back load or tip load a hook. See drawing.



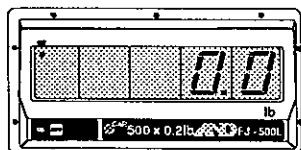
Simple Weighing

1

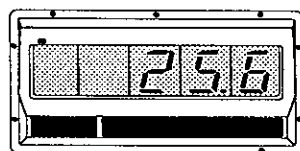


▶ Press the **ON/OFF** key.

○ The display will come ON with all segments lit.

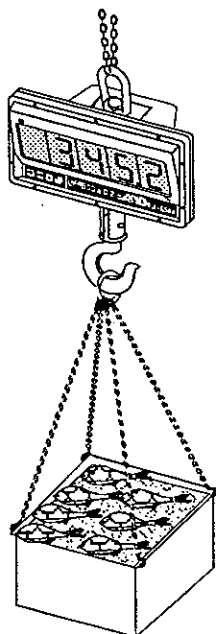


○ Moments later, '0.0' is displayed, and the '■' CENTER OF ZERO INDICATOR will come ON.



⚠ If the load is not within 2% of Calibrated Zero then the display will show the actual weight.

2



▶ Load the object to be weighed.

○ The display will show the object's weight.

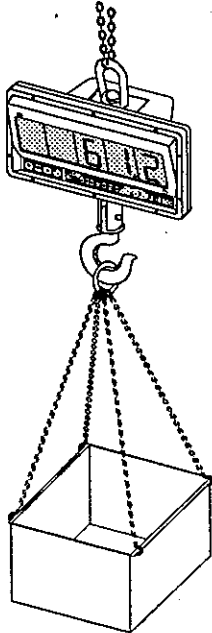


Using ZERO to Tare (or ZERO key on Remote)



Weighing into a Container

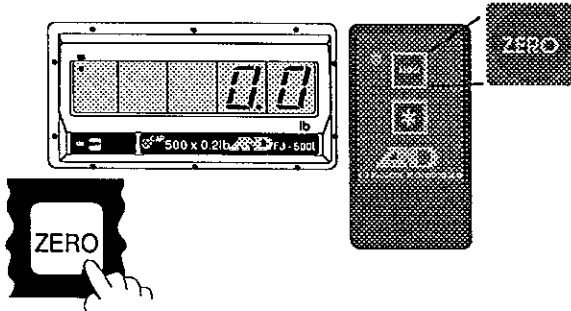
1



- ▶ Place lifting accessories (eg. shackles, hooks, chains, empty container etc.) on the FJ hook

- The display will show the accessory tare weight.

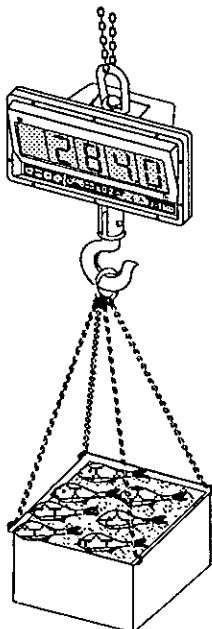
2



- ▶ Press the **ZERO** on the FJ front panel or the *FJ Remote Control* to tare the weight.

- The display goes to zero.

3



- ▶ The item to be weighed can now be loaded.

- The display will show the item's weight.

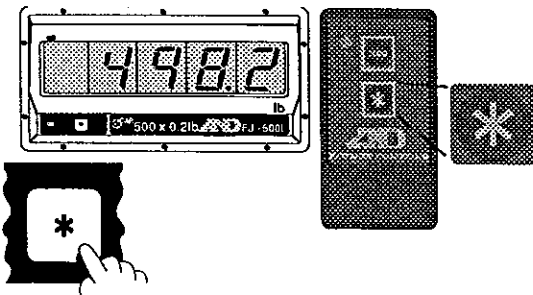


Display Hold (Software version 1.02 and above)



The **AUXILIARY** button can be used to hold the display reading. The function of the **AUXILIARY** button is controlled by function **F5**, before using this function, set the display hold mode as described in section F.

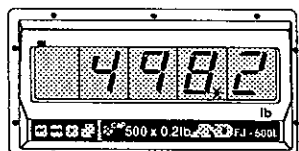
1



▶ Load the item to be weighed.

▶ Press **AUXILIARY** on the FJ front panel or remote control.

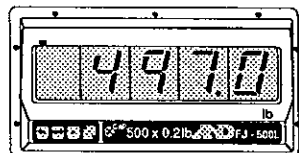
2



○ The decimal point will now flash.

○ The displayed weight will not change, even if the scales load changes.

3



▶ Press **AUXILIARY** again to reset the display hold and display the actual weight.

○ The decimal point will stop flashing and the actual weight will be displayed.

○ The display hold will also be reset after approximately 2 minutes, when a weighing error occurs or, when **F5** is set to 2, the actual weight varies by more than ± 5 graduations from the value held.

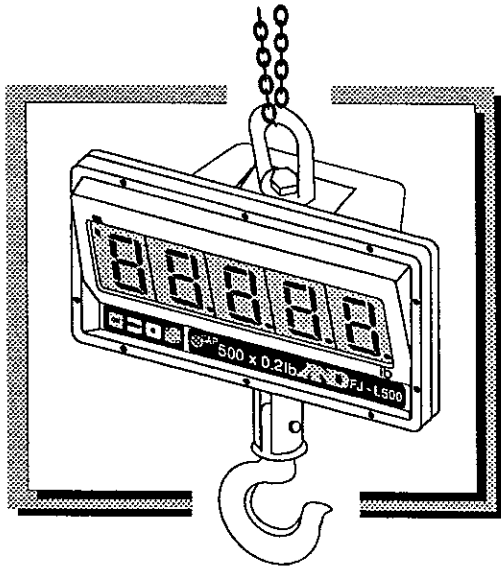


Weighing Errors



It is possible that upon switching on your scale an error message is displayed. The significance of these errors is shown below.

Message	Meaning	Action to be Taken
<i>E r r 1</i>	Failure to verify the contents of the E ² ROM	Call technician.
<i>E</i>	Positive overload.	Remove weight from the scale.
<i>-E</i>	Negative overload.	Remove weight from scale and re-zero.
<i>l o b</i>	Low battery voltage	Replace the batteries.



FJ Series • Section F

Function Settings



Internal F-Functions



Your FJ scale has a number of internal software parameters that enable you to set the power saving feature, re-set the Zero and check the scale operation. An overall F-Function list is shown below.

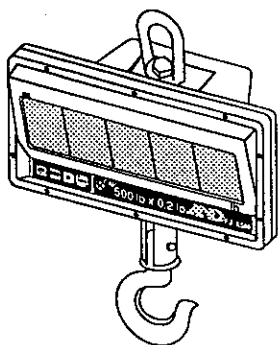
All of the F-Functions have initial settings from the factory, or possibly from your dealer. You may change these settings easily as you need them, or as conditions vary.

F-Functions can be set using the method as explained in the section CHANGING F-FUNCTIONS. The individual settings for each group are detailed in the following section THE F-FUNCTION SETTINGS

<i>F 0</i>	Auto Power Off Time Setting.
<i>F 1</i>	Auto Power Off Condition.
<i>F 2</i>	User Zero calibration.
<i>F 3</i>	Check Mode.
<i>F 4</i>	Internal Count Display
<i>F 5</i>	Display Hold

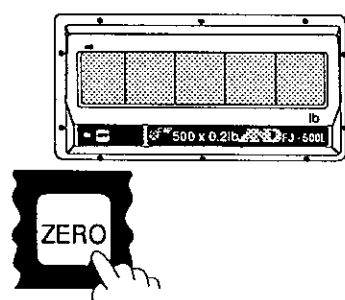
Changing the Function Settings

1



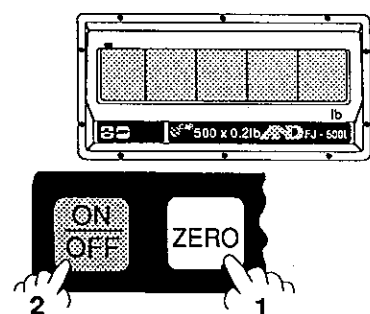
- ▶ Ensure that the scale is switched OFF.

2



- ▶ Press and HOLD the **ZERO** button.

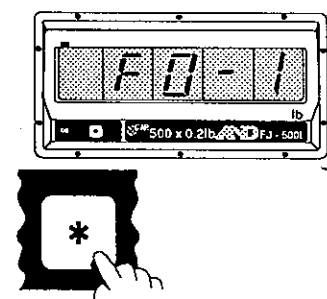
3



- ▶ Whilst holding the **ZERO** button switch ON the scale by pressing the **ON/OFF** button.

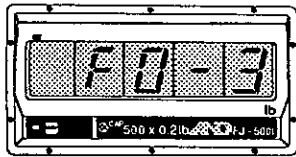
- The display will show **F0-1** the previous setting.

4



- ▶ Use the **AUXILIARY** button on the front panel to step through to your desired value.

5



▶ Press the **ZERO** button on the front panel to record the changes into the scale memory.

○ The display will show the next function setting.

F1-1



▶ Repeat Steps 4 and 5 to set Function *F1*.

○ The scale will now show Function *F2*.

▶ To return to the normal weighing mode press the **ON/OFF** button.

▶ To carry out a ZERO ONLY re-calibration press the **ZERO** button.



The F-Function Settings

Ⓕ Denotes Factory Setting.

F0

Battery Saving Timer

This Function sets the battery saving time out period. The scale will switch OFF if the reading has been STABLE for the set time. See also function **F1**

Ⓕ 0	No auto Power off - the scale is powered until the <input type="checkbox"/> ON/OFF button is pressed.
1	5 minute time out.
2	15 minute time out.
3	30 minute time out.
4	60 minute time out.

F1

Power Off 2% Check

This Function determines if the battery saving circuit works at any weight or at near ZERO only.

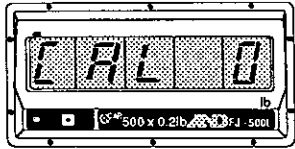
Ⓕ 0	Power OFF will occur at any stable weight.
1	Power OFF will only occur within 2% of ZERO and stable weight.

F2

Zero Point Calibration

This Function is provided to allow the operator to re-calibrate the ZERO point if necessary. This may be required if, for example, a hook has been replaced with a heavier, or lighter, item. This calibration does not affect the accuracy of the scale.

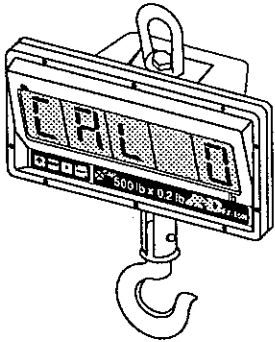
1



▶ Press the **AUXILIARY** button.

○ The scale will show **CAL 0**

2

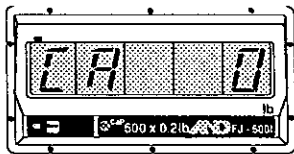


▶ Ensure no weight is on the hook.

○ If the present weight is not within the permitted zero range, the scale will display :



3

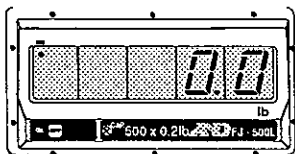


▶ Press the **ZERO** button.

○ The scale will show **CAL 0** with the **0** digit flashing.

○ When the new ZERO point has been established the scale will show **End**

4



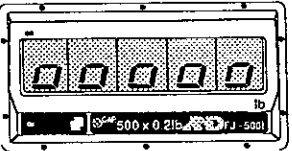
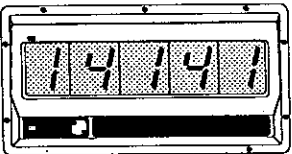
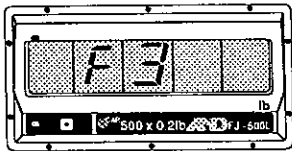
▶ Press the **ON/OFF** button once to turn the scale off and then once again to return to the weighing mode.

○ The scale will show **0.0**

F3 Check Mode

This Function is provided to allow the operator to check the operation of the scale buttons and of the Remote Controller. Additionally this function provides internal A to D counts to aid fault diagnosis by a technician.

1

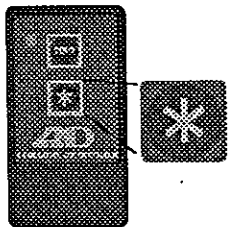
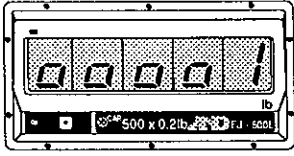
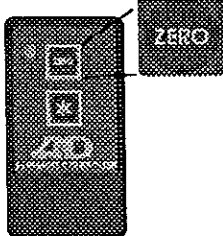
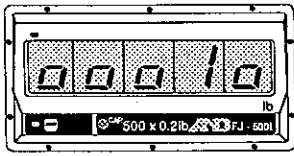

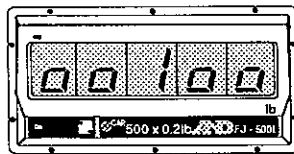

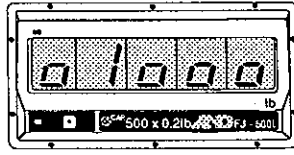

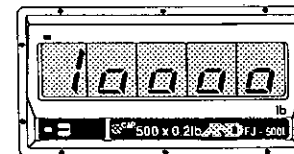

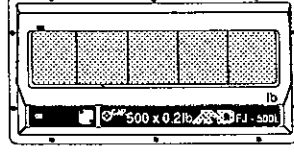


▶ With the scale showing **F3** press the **AUXILIARY** button.

- The scale will show, typically, **05982** - the A to D count at ZERO for a few seconds.
- The display will then show, typically, **14141** - the A to D count at full span.
- The display will then show, **00000** - the key test pattern.

2

▣ The keys can then be tested as shown.

Key to Press	Display to See
	
	
	
	
	
	

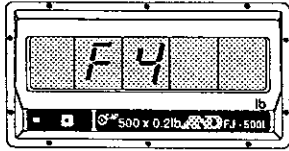
○ The scale is now OFF.

F4

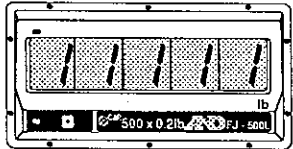
Internal count display

This Function provides a Display Segment Test and a Internal A to D Counts Display to aid fault diagnosis by a Technician.

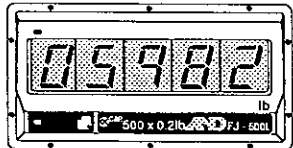
1



▶ With the scale showing **F4** press the **AUXILIARY** button.



○ The Scale will first perform a segment test counting from **11111** through to **99999**.



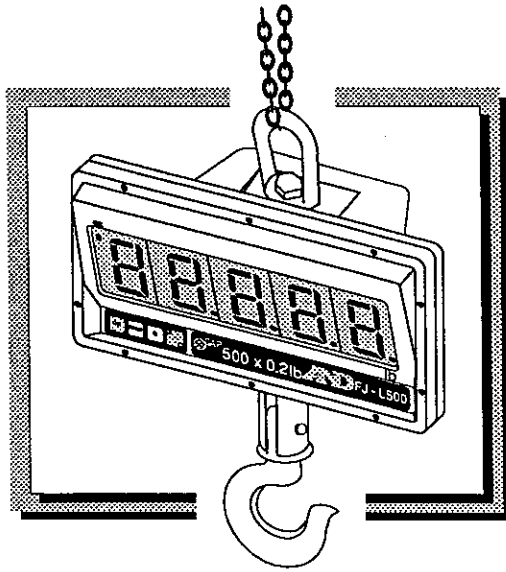
○ The scale will then show, typically, **05982** - the A to D count for the presently applied load.

F5

Display Hold (Software version 1.02 and above)

This function sets the operation of the **AUXILIARY** button as a display hold button during weighing mode.

0	No display hold function.
1	Hold when the AUXILIARY button is pressed, release when the AUXILIARY button is pressed again.
2	As for F5 - 1 but released also when the weight shifts by ± 5 graduations.



FJ Series • Section AP

Appendices



Additional Cal. & Gravity Info.



Gravity Compensation



This additional information is intended for those users that are working with gravity variations, such as scale shipment over a long distance after calibration. It is solely for this use (when the FJ scale is to be transported to a different geographical area), and it is not intended, nor needed for local or on-site calibration. In other words: *Don't worry about it unless you need it.*



As stated earlier, calibration of the FJ is required when it is initially installed, if it is moved often, or if it is moved a substantial distance. Gravity compensation can be necessary because the weight of a mass in one location is not necessarily the same in another location. "Weight" equals mass times acceleration due to Earth's field of gravity. The internationally adopted value for gravitational acceleration is 9.80665 m/s^2 (32.174 ft/s^2) in a vacuum. However, this varies by about ± 0.3 percent depending on how far you are from the Earth's center of mass. Mass distorts space in such a way that the gravitational power of attraction is inversely proportional to the square of the distance between material objects (if non-gravitational forces are ignored).

When we weigh a mass, we are trying to find its weight expressed in pounds or kilograms. Because "g" and other factors vary from location to location, we must calibrate the FJ whenever we move it. Otherwise, a mass of 30kg might display 30.00kg in one location and 30.08kg in another (ie: "g" may have changed by +0.267%. $w=m \times g$). This would be an error, but it can be prevented by placing an accurate mass on the weighing device (say 30kg) and then telling the FJ, in effect, "this is what 30kg weighs at this location so please display 30.00kg"..... this is calibration.

- It is best to set the "g" with the actual value of gravity, measured at the location. This can be found in reference tables for the country (or area), or sometimes from a physics laboratory at a local academic institution. Also, if you know the latitude and altitude, you can use the following formula:

Helmert's formula can be used to find the value of "g", the acceleration due to terrestrial gravity, for a given latitude and altitude:

$$g = 9.806\ 16 - 0.025\ 928 \cos 2\lambda + 0.000\ 069 \cos^2 2\lambda - 0.000\ 003\ 086H$$

"g" is in m/s^2 , " λ " means latitude and "H" is meters above sea level.

- Alternatively, please refer to the attached table for the value of "g" at various world wide locations or plot the end-user's position in terms of latitude and altitude on the enclosed graph.

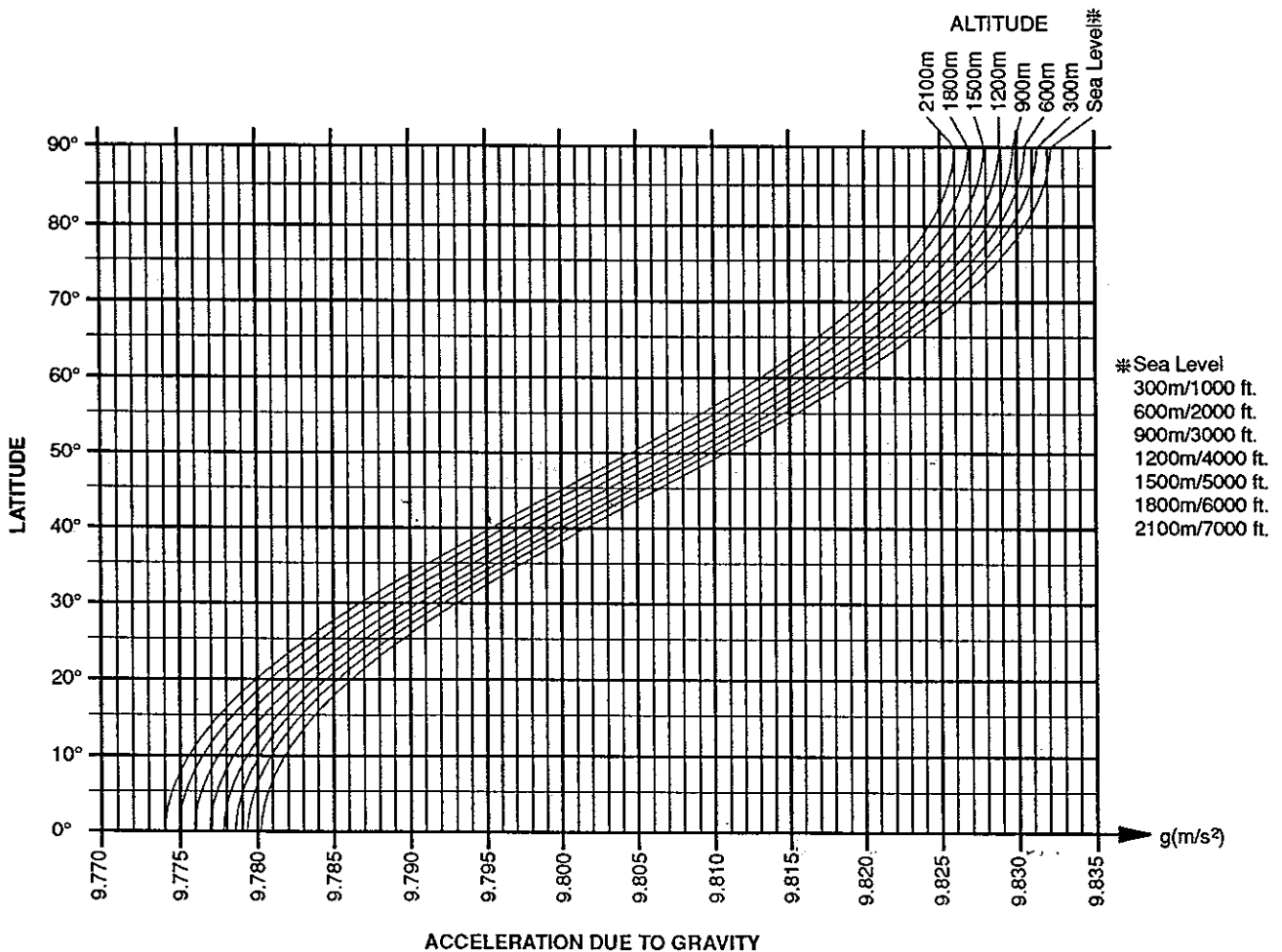


Gravity values at various locations

Amsterdam	9.813 m/s ²	Manila	9.784 m/s ²
Athens	9.800 m/s ²	Melbourne	9.800 m/s ²
Auckland NZ	9.799 m/s ²	Mexico City	9.779 m/s ²
Bangkok	9.783 m/s ²	Milan	9.806 m/s ²
Birmingham	9.813 m/s ²	New York	9.802 m/s ²
Brussels	9.811 m/s ²	Oslo	9.819 m/s ²
Buenos Aires	9.797 m/s ²	Ottawa	9.806 m/s ²
Calcutta	9.788 m/s ²	Paris	9.809 m/s ²
Capetown	9.796 m/s ²	Rio de Janeiro	9.788 m/s ²
Chicago	9.803 m/s ²	Rome	9.803 m/s ²
Copenhagen	9.815 m/s ²	San Francisco	9.800 m/s ²
Cyprus	9.797 m/s ²	Singapore	9.781 m/s ²
Djakarta	9.781 m/s ²	Stockholm	9.818 m/s ²
Frankfurt	9.810 m/s ²	Sydney	9.797 m/s ²
Glasgow	9.816 m/s ²	Taichung	9.789 m/s ²
Havana	9.788 m/s ²	Taiwan	9.788 m/s ²
Helsinki	9.819 m/s ²	Taipei	9.790 m/s ²
Kuwait	9.793 m/s ²	Tokyo	9.798 m/s ²
Lisbon	9.801 m/s ²	Vancouver, BC	9.809 m/s ²
London (Greenwich)	9.812 m/s ²	Washington DC	9.801 m/s ²
Los Angeles	9.796 m/s ²	Wellington NZ	9.803 m/s ²
Madrid	9.800 m/s ²	Zurich	9.807 m/s ²

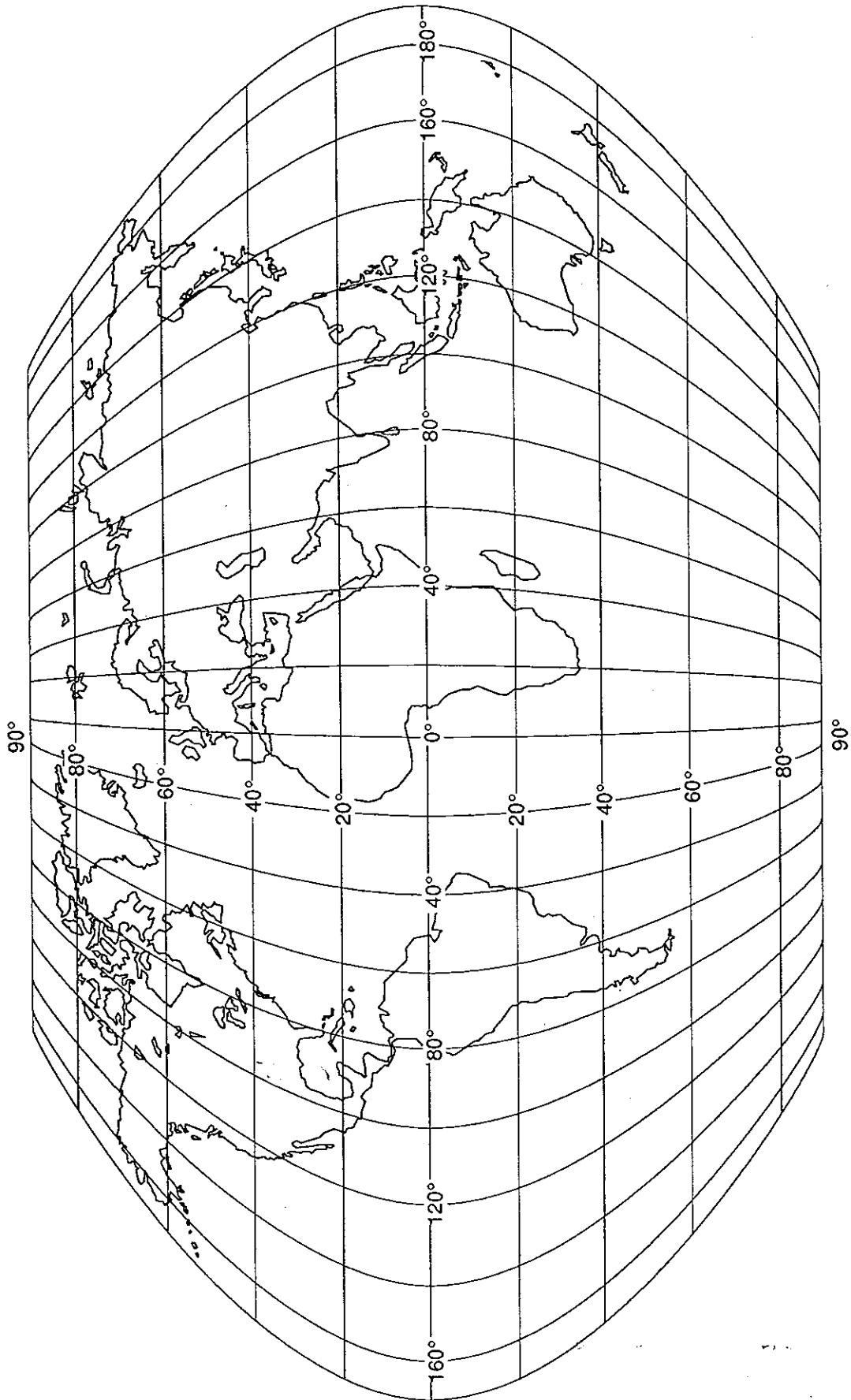


Acceleration due to Gravity table





World Map





A&D Company, Limited

3-23-14 Higashi-Ikebukuro, Toshima-ku, Tokyo 170 Japan
Telephone: (03) 5391-6132 Fax: (03) 5391-6129 Telex: 2422816 AANDD J

A&D ENGINEERING, INC.

1555 McCandless Drive, Milpitas, CA. 95035 U.S.A.
Telephone: (408) 263-5333 Fax: (408) 263-0119

A&D INSTRUMENTS GmbH

Lyoner Straße 36, D-6000 Frankfurt/Main 71, Germany
Telephone: (069) 666-7006 Fax: (069) 666-6831 Telex: 417 0586 ANDI D

A&D MERCURY PTY. LTD.

32 Dew Street, Thebarton, South Australia 5031
Telephone: (08) 352-3033 Fax: (08) 352-7409

A&D KOREA Limited

RM. 312. Hanam Bldg. 44-27, Yoido-Dong, Youngdeungpo-Ku, Seoul, Korea
Telephone: (02) 784-4264 Fax: (02) 784-6557

A&D INSTRUMENTS LTD.

Abingdon Science Park, Abingdon, Oxford, OX14 3 YS U.K.
Telephone: (44) 235-550420 Fax: (44) 235-550485