FG SERIES

BENCH & PLATFORM SCALES

INSTRUCTION MANUAL

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BENCH & PLATFORM SCALES

MODEL
FG 150K
FG 60K
FG 30K

A&D Company, Limited

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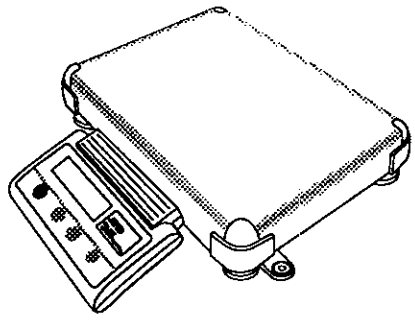
Compliance with FCC Rules

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.)



FG• Section A

Introduction

Introduction to the FG

Thank You For Your Purchase of an A&D Scale

Every care has been taken during the manufacturing process of this scale to ensure that it will perform accurately and reliably for many years.

Electronic Platform Scales are in one sense extremely simple products, that is they are very easy to use. In another sense they are rather complex in that they are high technology products. This manual will try to tell you in simple language how this scale works and how to get the most out of it in terms of performance.

The FG series platform scales are the product of years of research, design, development and in-field testing. They incorporate the latest advances in electronic and mechanical engineering and offer increased features and increased functions all at a reduced cost.

There are two versions, an American (decimal pound / kilogram) version with units conversion and tare function, and an International (kg only) version with a full range zero function.

The FG scale is designed to be operated with an AC adapter, but may be operated on six AM3 ('AA' type) 1.5V dry batteries.

The FG scales use a sharp, 22mm high LCD display. You can make sure that all of the display segments are working properly by pressing the **ON/OFF** key. The A/D converter is highly accurate and there is complete RFI shielding for the analog section.

Battery operation permits the scale to be operated anywhere. Continuous operation will be possible for between 50 to 100 hours on one set of batteries at 20°C/68°F (dependent on the type of batteries used).

The weighing platform is of a rugged stainless steel type. The Display Pod can be mounted on the side or end of the weighing platform, removed and used with option 01 as a wall mounted weighing indicator or placed on an optional display column. Optional RS–232C Interface and current loop interfaces are available for connection to a printer or computer. A carrying handle is also optional.

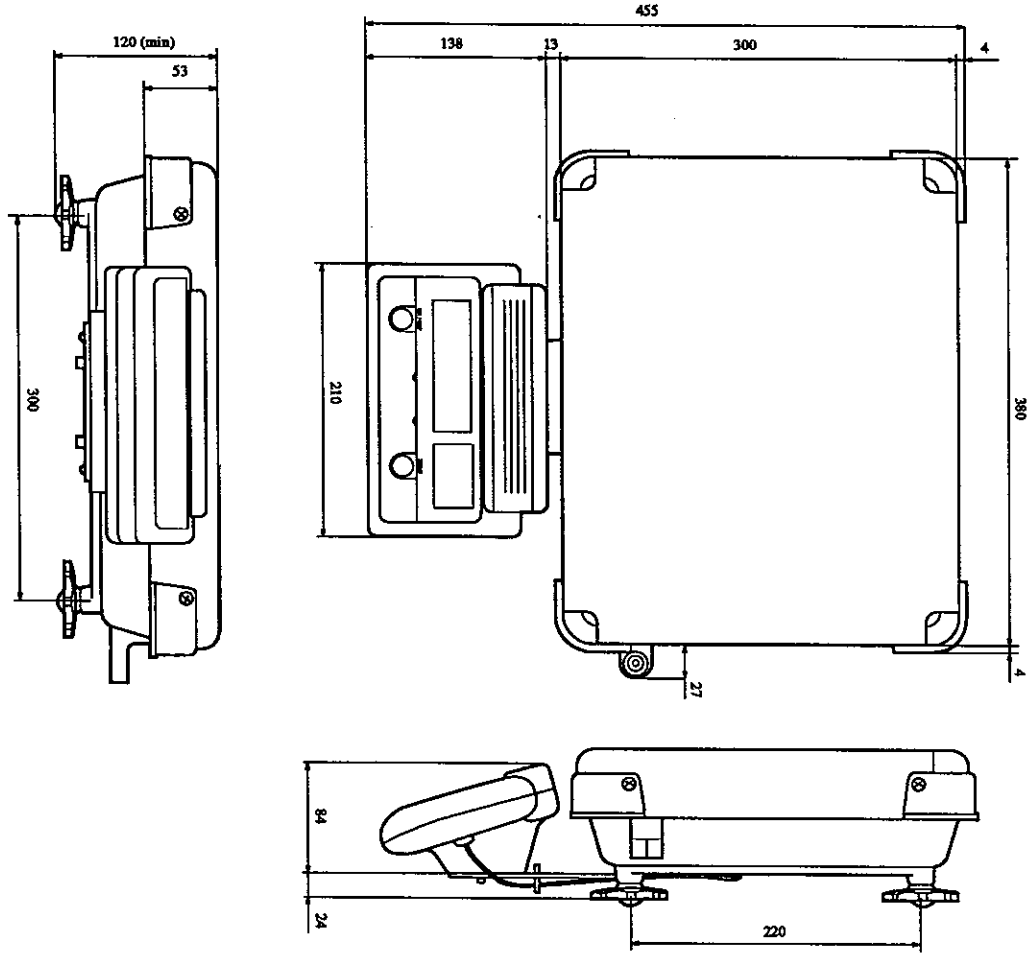
Options include :

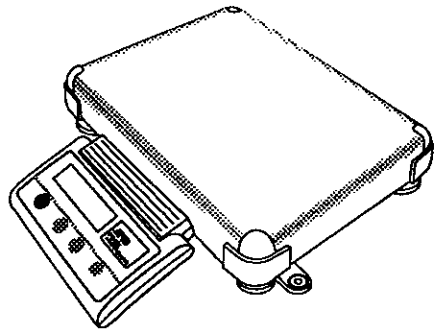
OP-01	...	Wall mounting bracket.
OP-02	...	Display column with tilt bracket.
OP-03	...	RS-232C Interface board.
OP-04	...	Printer stand for the AD-8121 printer
OP-05	...	Current loop interface
OP-06	...	Carrying handle

Specifications

Mode	FG 150K	FG 60K	FG 30K
Capacity and resolution kg	150kg x 50g	60kg x 20g	31kg x 10g
Capacity and resolution lb	300 x 0.1 lb	150 x 0.05 lb	60 x 0.02 lb
Calibration weight kg	Adjustable from 0.1 to 150	Adjustable from 0.1 to 60	Adjustable from 0.1 to 30
Calibration weight lb	Adjustable from 1.0 to 300	Adjustable from 0.1 to 150	Adjustable from 0.1 to 60
Pan size mm	300 x 380		
Pan size inches	11.8 x 15.4		
Weight	8.5kg Standard version		
Power	9V DC from an AC adapter or 6 x AM3 'AA' size batteries		
Battery life	Approx. 50 hours with manganese type cells/100 hours with alkaline, at 20°C/68°F		
Operating temperature	-5°C~35°C/23°F~95°F		

Specifications subject to change for improvement without notice.





FG• Section B

Installation

Installation of the FG

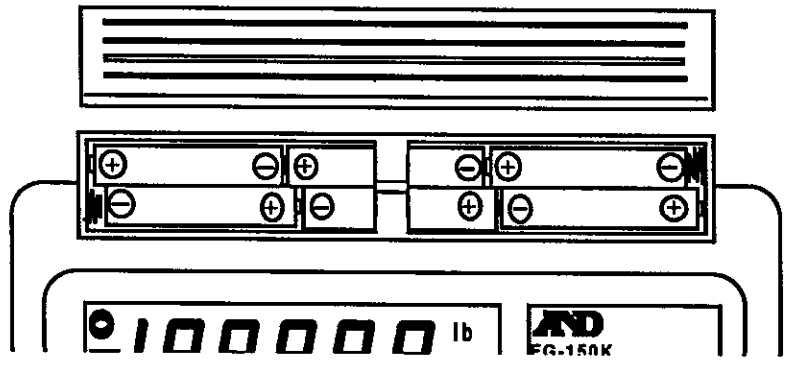
MODELS: FG–150K, FG–60K, FG–30K

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

In the carton you should find this manual, plus:

- o Weighing Platform .
- o AC Adapter
- o Display Pod Dust Cover

Place the scale on a firm weighing table, or flat floor and turn the adjustable feet until the bubble level shows that the scale is level. Insert the batteries (if used) and plug in the AC/DC adapter. The AC input requirements could be 100, 120, 220 or 240 Volts (50/60Hz) depending on the area in the world so please verify that the adapter is correct. The DC output should be 9 Volts (please note that an alternative 9V DC power supply might not be stable enough for this scale.



Battery Installation: Remove the cover at the top of the display by lifting it straight up. Insert the center batteries first by slipping them under the center bridge. Then insert the remainder using care to note the polarity. Place the cover back in place and press down to seat it.

Best Conditions for Weighing

- o The Scale must be level (check the bubble level).
- o Best temperature is about 20°C/68°F at about 50% Relative Humidity.
- o The weighing table, if used, should be of a solid construction.
- o Corners of rooms are best as they are less prone to vibrations.
- o Don't install the scale in direct sunlight.
- o Try to ensure a stable AC power supply when using an adapter.
- o Clean the scale with mild soap and water (don't use solvents).

Understanding the FG Scale

How does the scale work?

action of gravity. This scale operates using a highly accurate and sensitive Load Cell. Load Cells work by detecting stress in the cell (a carefully machined metal bar) by means of strain gauge transducers bonded to the upper and lower surfaces. As the Load Cell bends, the analog output signal from the strain gauge varies. This signal is amplified and used as the input signal for an analog to digital converter. The final digital signal is used to calculate the weight for the display. In future we will call the object a "mass" and the measurement of its massiveness on Earth its "weight" (weight = mass times acceleration due to "g").

What is gravity?

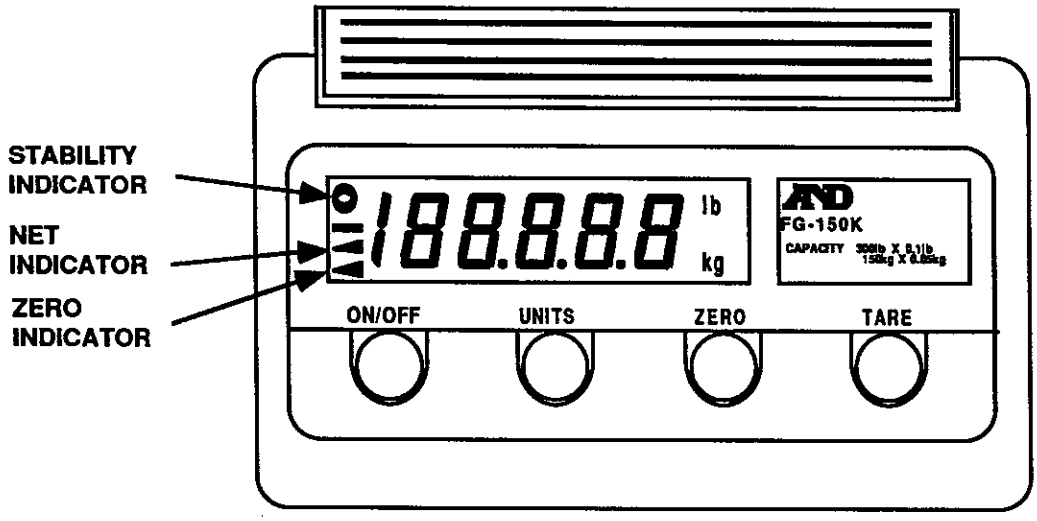
Gravity is a force of attraction between material objects in space. The Earth is a large material object (mass) in space and things on its surface at sea level, in a vacuum, accelerate towards its center at a speed of about 9.80665m/s^2 (32.174ft/s^2). Fortunately they don't get there because the surface of the Earth stops them. Unfortunately, this "g" value varies from location to location by about ±0.3% because the force decreases with altitude above sea level or, more correctly, the distance from the center of the Earth ("g" is inversely proportional to the square of the distance between masses). The North and South poles are closer to the center of the Earth than the equator so "g" is greater at the poles and changes with latitude. The sun and the moon have an inconsistent effect with regards to gravity. Air buoyancy acts against gravity by making a mass float upwards at a rate of ≈ 0.0012g (±10% @ 20°C) per cm^3 of air displaced, but this also varies.

What is calibration?

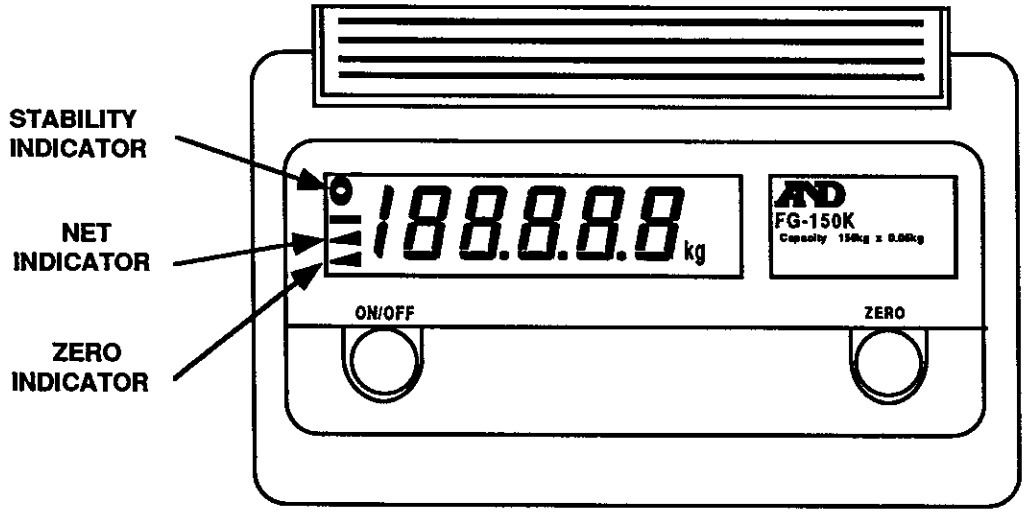
When we weigh a mass we are trying to find its weight expressed as pounds or kilograms. Because "g" and other factors vary from location to location, we must calibrate the scale whenever we move it otherwise a mass of 30kg(lb) might display 30.00kg(lb) in one location and 30.08kg(lb) in another (i.e.: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

Note: If this scale is used as a commercial scale, then the end user may not be permitted to calibrate it. In this case, calibration would be carried out by the responsible authorities, and the calibration settings would then be sealed. Re calibration should be carried out every six months, or if the scale is moved a substantial distance.

Understanding the Display



American Version

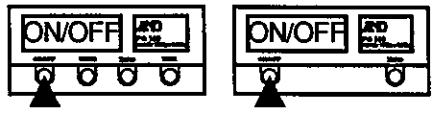


International version

International version ,versus the American version.

In counties that use only kilograms, there is no need for the **UNITS** key. The **ZERO** key on the International version performs the same function as the **ZERO** and the **TARE** keys on the American version. The **TARE** key is required only for commercial use in the U.S.A.

The ON/OFF Key



After pressing the **ON/OFF** key, you will see all of the segments appear for a couple of seconds.

o Starting at the left end of the display you will see a circular stability indicator, a minus weight display symbol, a triangular NET indicator and ZERO indicator. Next you can see the main display "18 8.8.8.8".

- o On the right you will see the abbreviation "lb" for pounds and "kg" for kilograms.
- o The display will start a count down sequence. During this sequence the scale will check all of its internal functions.
- o After a few moments the circular stability indicator, zero indicator, main display (reading zero) and a unit ("kg", or "lb") will remain.
- o The scale will switch off automatically if the display remains at zero for five minutes, but this function can be deactivated.
- o Also, "Lb" (large L) will be displayed on the main display if the power in the batteries is too low for reliable weighing and "E" ("kg", or "lb") will be displayed if the scale is overloaded.

The Units Key

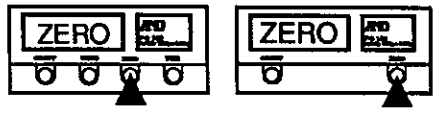
Used only on the American version.

The **UNITS** key will shift the display between "kg" and "lb.

DECIMAL POUNDS (lb). Decimal pounds are a relatively modern invention since pounds (avoirdupois) are traditionally divided by units of 16 rather than 10. The pound can be traced back to Roman times when it was known as the "libra" weight unit and the "lb" abbreviat on comes from this ancient unit. The lb is based on the average weight of 7000 grains of English corn (wheat not maize) and one "grain" unit equals 0.06479891 grams. 10 lb is the weight of 1 imperial gallon of water at 62°F. One pound has been defined as being equal to 0.45359237 kg so this is the conversion factor used to convert from kilograms to a decimal pound display or vice versa. Decimal pounds are used in various industries because of simple decimal arithmetic.

KILOGRAMS (kg). The kilogram (1,000 grams) is the SI base unit of mass and is the mass of a platinum-iridium cylinder at BIPM, Paris. It is almost but not quite, the weight of one cubic decimeter of water at 4°C. In fact, one liter of water (one kilogram) occupies a volume of 1.000028dm^3 at standard atmospheric pressure of 1.01325 X 10^5 N/m^2. The FG platform scale can be calibrated for span at maximum capacity for best accuracy (or less than maximum capacity if reduced accuracy can be tolerated) in kilograms or pounds (avoir).

The ZERO Key



The **ZERO** key is only valid if the stability indicator is on.

American version:

The **ZERO** key returns the scale to the center of zero when the weighing pan is empty, and should not be confused with the **TARE** key which re–zero's the display and places the scale in NET mode.

When the display shows a small deviation from zero and the weighing pan is empty (and the tare function is not being used), then press the **ZERO** key to return the display to "0.00". If there is a large deviation from zero, than there may be something else wrong, like the weighing pan touching something.

If the **ZERO** key will not set the display to zero when the power is turned on, then you should carry out ZERO CALIBRATION

International version:

The **ZERO** key returns the scale to zero over the entire span range.

The TARE Key

Used only on the American version.

The **Tare** key is valid only if the stability indicator is on.

The **TARE** key re–zero's the display up to the maximum capacity of the scale, places the scale in NET mode, and should not be confused with The **ZERO** key which returns the scale to the center of zero when the weighing pan is empty.

The tare weight (container weight) subtracts from the range of the scale.

The INDICATORS

VERSION	INTERNATIONAL	AMERICAN
INDICATOR	WHAT IT IS USED FOR	
○	STABILITY OF THE WEIGHING SYSTEM	
▬	SIGN OF ITEM BEING WEIGHED	
◀	NET INDICATOR	
◀	ZERO DISPLAY INDICATOR	

Automatic Power Off Function

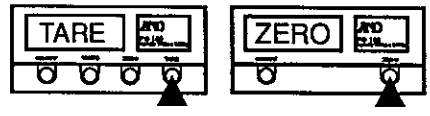
The FG scale comes with an *automatic power-off function* which turns the main display off after five minutes to conserve power. It only works if the display shows "0.00" - any other reading and the scale will remain on.

You can disable the Automatic Power-Off Function using the software. By doing this, the scale will always remain <u>on</u> until it is turned off using the **ON/OFF** key. You can reactivate this function at any time. It is best to use the AC adapter if the scale must remain on for long periods of time.

*To turn **OFF** the Automatic Power-Off Function (until reactivated):*

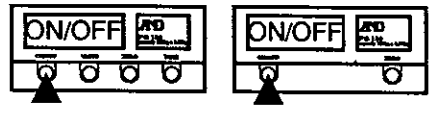
Step 1. Turn the display **OFF**.

Step 2.



Press and hold the **TARE** (or **ZERO**) key.

Step 3.

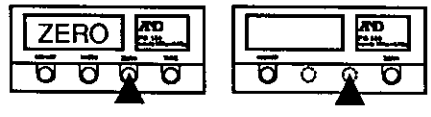


While holding the **TARE** (or **ZERO**) key press the **ON/OFF** key.

DISPLAY

"F1 1" will be displayed, which means the display will cut **OFF** after five minutes.

Step 4.

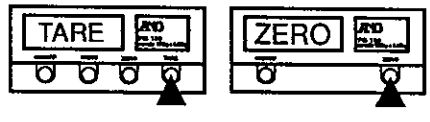


Press the **ZERO** (or the hidden) key.

DISPLAY

"F1 0" will be displayed, which means the automatic power-off function is disabled.

Step 5.

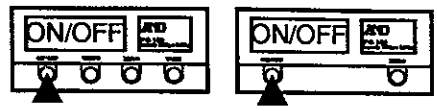


Press the **TARE** (or the **ZERO**) key twice.

DISPLAY

You have now disabled the function.

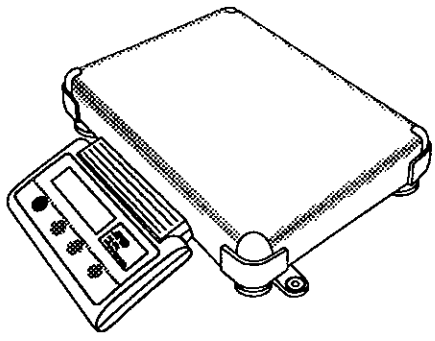
Step 6.



Press **ON/OFF** twice to return to normal weighing mode.

Note: *The automatic power-off function is now disabled - the scale will remain **ON** until turned off.*

To reactivate the automatic power-off function, follow the above steps, but enter "F1 1" with the **ZERO** key in Step 4.



FG• Section C

Calibration

Calibration of the FG

Attention

In territories where the FG scale is registered for commercial use, the end-user will not be permitted to break the seals to carry out span calibration for himself. In this case, calibration would be carried out by the responsible authorities, and the calibration settings would then be sealed. The scale must be shipped to the end-user in a fully assembled form for commercial use.

Calibration of the scale is required when it is initially installed, if the scale is moved a substantial distance, or in accordance with local regulations. This is necessary because the weight of a mass in one location is not necessarily the same in another location. Also, with time and use, mechanical deviations can occur. "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). So, gravitational acceleration is greatest at the poles, least at the equator and decreases with altitude.

When we weigh a mass we are trying to find its weight expressed as pounds or kilograms. Because "g" and other factors vary from location to location, we must calibrate the scale whenever we move it otherwise a mass of 30kg might display 30.00kg in one location and 30.08kg in another.

The FG series is also equipped with a gravity compensation function which means that it can be calibrated in one location and then adjusted to match the acceleration of gravity at another location. We call this "setting the value of 'g". If you wish to take advantage of this feature, please read the GRAVITY COMPENSATION FUNCTION section.

Please Note

You will need to re calibrate and reset the value of "g" (if for different location use) after a memory loss, Load Cell change, or a new main circuit board.

Zero and Span Calibration

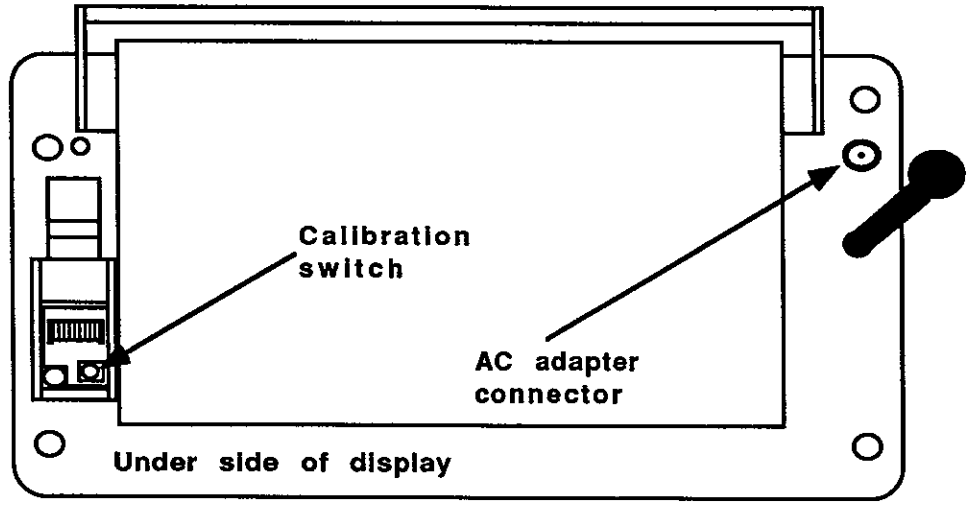
The FG platform scale uses a calibration system called **"FDC™"** for Full Digital Calibration. This means that the zero point and maximum capacity points are entered digitally through the keyboard, and it makes the calibration method very easy to remember. FG scales can be calibrated using "kg" (kilogram) or "lb" (pound avoirdupois) calibration weights at maximum capacity or at a selected value. **Maximum capacity calibration is preferred, if possible, to reduce the risk of span errors at weights above the calibration point.**

Scale	Capacity and resolution	Calibration weight kg	Calibration weight lb
FG-150K	150 x 0.05 kg 300 x 0.1 lb	Adjustable from 0.1 to 150	Adjustable from 1.0 to 300
FG-60K	60 x 0.02 kg 150 x 0.05 lb	Adjustable from 0.1 to 60	Adjustable from 0.1 to 150
FG-30K	31 x 0.01 kg 60 x 0.02 lb	Adjustable from 0.1 to 30	Adjustable from 0.1 to 60

Specifications subject to change for improvement without notice.

Step 1. Warm up the scale for at least 10 minutes before making adjustments. You must be careful of the auto-off function, which turns off the display after five minutes. This can be avoided by:
- Placing an object on the weighing pan,
- Setting the Tare function so the display shows a negative number after the container weight is set and the container removed,
- Disable the auto-off function.

Step 2. With the display ON, remove the calibration plate - Press the **CAL** switch.

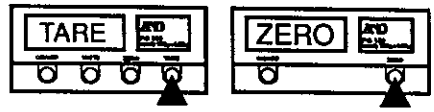


You will now see a display of "09.798" or "09.777" (7 denoting any other three numbers already set into memory). This is the value of "g", or gravity.

Please Note

If you are going to set the value of gravity ("g") for a customer at a different geographical location, see the Gravity Compensation Function.

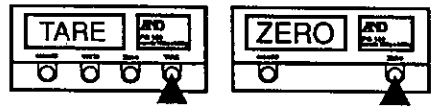
Step 3. Press **TARE** (or **ZERO**).



DISPLAY:

You should now see a display of "CAL 0", with the circular stability indicator on.

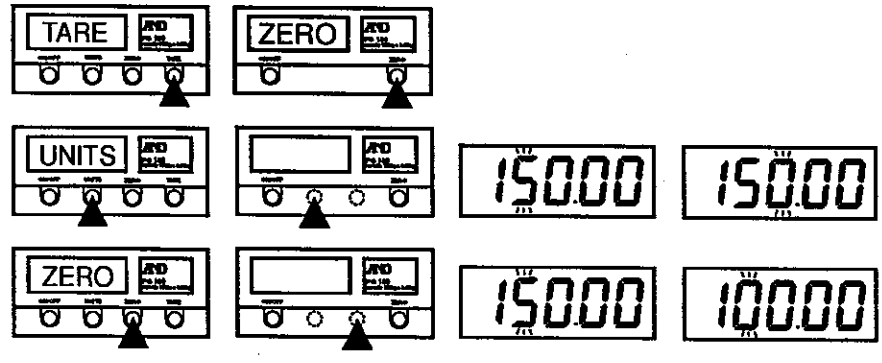
Step 2. Press **TARE** (or **ZERO**) to enter the zero point.



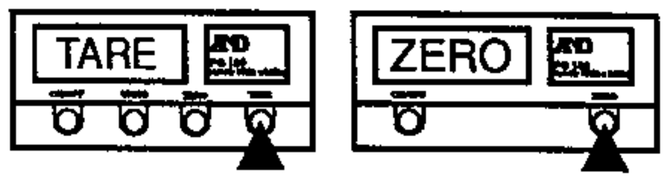
DISPLAY:

Step 3. **American version only.** Select the desired "CAL 1", "CAL 2" by pressing **ZERO** key to move between them. "CAL 1" is for calibration in kilograms and "CAL 2" is for calibration in decimal pounds.

Step 4. Press **TARE** (or **ZERO**). The display will indicate the span weight to be calibrated with. At this point you may set in the exact calibration weight you wish to use. Use full span for best accuracy, or select a calibration weight using the **UNITS** (or hidden) key to move to the digit you want to change and the **ZERO** (or hidden) key to increment that digit. Once you have set in the weight to be used to calibrate with, place that weight on the weighing platform. The use of a calibration weight that is less than 2/3 of the capacity of the scale being calibrated is not recommended.



Step 5. After the circular stability indicator comes on, press **TARE** (or **ZERO**) to enter the data for the calibration weight used.

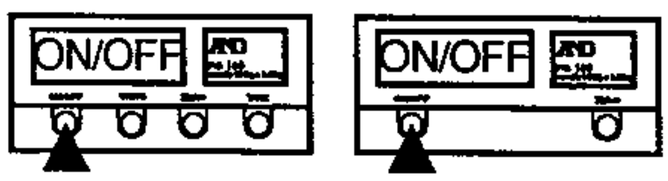


NOTE: If "-CAL E" is displayed when you press **TARE** (or **ZERO**), the scale cannot enter the capacity value because the calibration mass is smaller than the value entered at step 4. Verify that everything is correctly set.

DISPLAY:

"End" will be displayed.

Step 6. Press **CAL** switch. The calibration data will be stored and the scale will return to normal operation.



If the calibration mass entered at step 4 was correct, but no weight was placed on the weighing pan prior to pressing **ZERO** (or **TARE**), the scale will calibrate to zero and will only read zero. If you find that this is the case, verify that everything is correctly set and calibrate the scale again, placing the calibration weight on the weighing platform prior to pressing **ZERO** (or **TARE**).

Please Note *:Before customer delivery:*
In areas where the FG scale is registered for commercial use, the calibration port cover and the load cell connector cover must be sealed (To deny access to the calibration switch. Also, the end-user will not be permitted to remove any cover from the display pod as he could thereby press the calibration switch).

END End of ZERO AND SPAN CALIBRATION procedure.

Gravity Compensation

This scale is equipped with a gravity compensation function which means that it can be calibrated in one location and then adjusted to match the acceleration of gravity at another location.

Dealers and Weights & Measures authorities may find this function useful as it will save them having to transport up to 300lb or 150kg in calibration weights to the end-user's location during scale installation. It is solely for this use (when the scale is to be transported to a different geographical area), and it is not intended, nor needed for local or on-sight calibration.

- The FG scale was calibrated in Tokyo before shipping so, if you do not wish to calibrate the scale again, you can simply set the known acceleration rate (SETTING THE VALUE OF "g") for your customer's location (or your own if it is to be used locally).
- Otherwise, you must complete Zero and Span Calibration, and you will be overriding the "g" function.
- If you are going to use the gravity compensation function (SETTING THE VALUE OF "g"), then you must:
  1. Set the known acceleration rate ("g") for your location.
  2. Carry out Zero and Span Calibration.
  3. Then, set in the value of "g" at the end-user's location.
  4. Ship to the end user; the scale will not be accurate in your local area.
- 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:

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

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

- Alternatively, please refer to the *Gravity Values at various locations* for the value of "g" at various world wide locations or plot the end-user's position in terms of latitude and altitude using the *Acceleration due to Gravity table.*

Setting the Value of "g"

Please read the GRAVITY COMPENSATION FUNCTION section before starting this procedure

Step 1. Warm up the scale for at least 10 minutes before making adjustments. You must be careful of the auto-off function, which turns off the display after five minutes. This can be avoided by:

- Placing an object on the weighing pan,
- Setting the Tare function so the display shows a negative number after the container weight is set and the container removed,
- Disable the auto-off function (see AUTOMATIC POWER OFF FUNCTION).

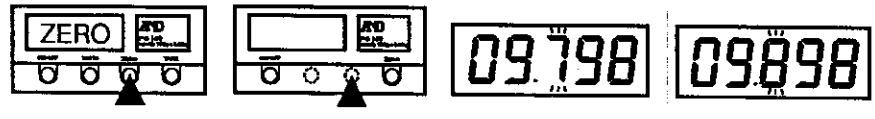
Step 2. With the display ON, remove the calibration plate - Press the **CAL** switch.

DISPLAY: 09.798 or 09.777

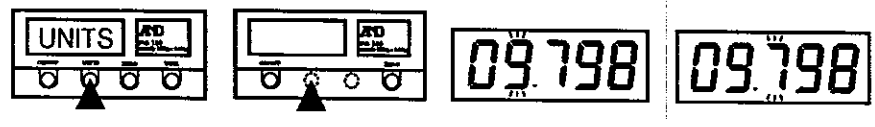
You will now see a display of "09.798" or "09.777" (7 denoting any other three numbers already set into memory). This is the value of "g", or gravity. The display "09.798" stands for 9.798m/s^2, which is the approximate acceleration of gravity in Tokyo, Japan (sea level at 36° latitude). Acceleration due to gravity changes with latitude because the North and South poles are closer to the center of the planet earth than the equator.

- To set the value of "g", the function keys are used in the following manner.

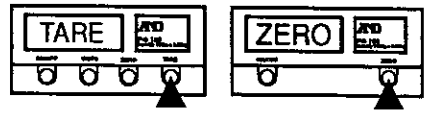
Step 2. Use **ZERO** (or hidden) key to increase the digit that is flashing incrementally by one, (i.e.: 1-2-3).



Step 3. After the desired digit is displayed, use **UNITS** (or hidden) key to shift the cursor left to the next digit.



Step 4. After the desired number is displayed, press **TARE** (or **ZERO**) to enter the setting into memory and proceed to the ZERO AND SPAN CALIBRATION section **or step 5 if you are setting "g" for a customers site.**



Step 5. Turn **OFF** the unit and seal the calibration port cover (To deny access to the calibration switch).

Step 6. Ship to the end user; the scale will not be accurate in the local area.

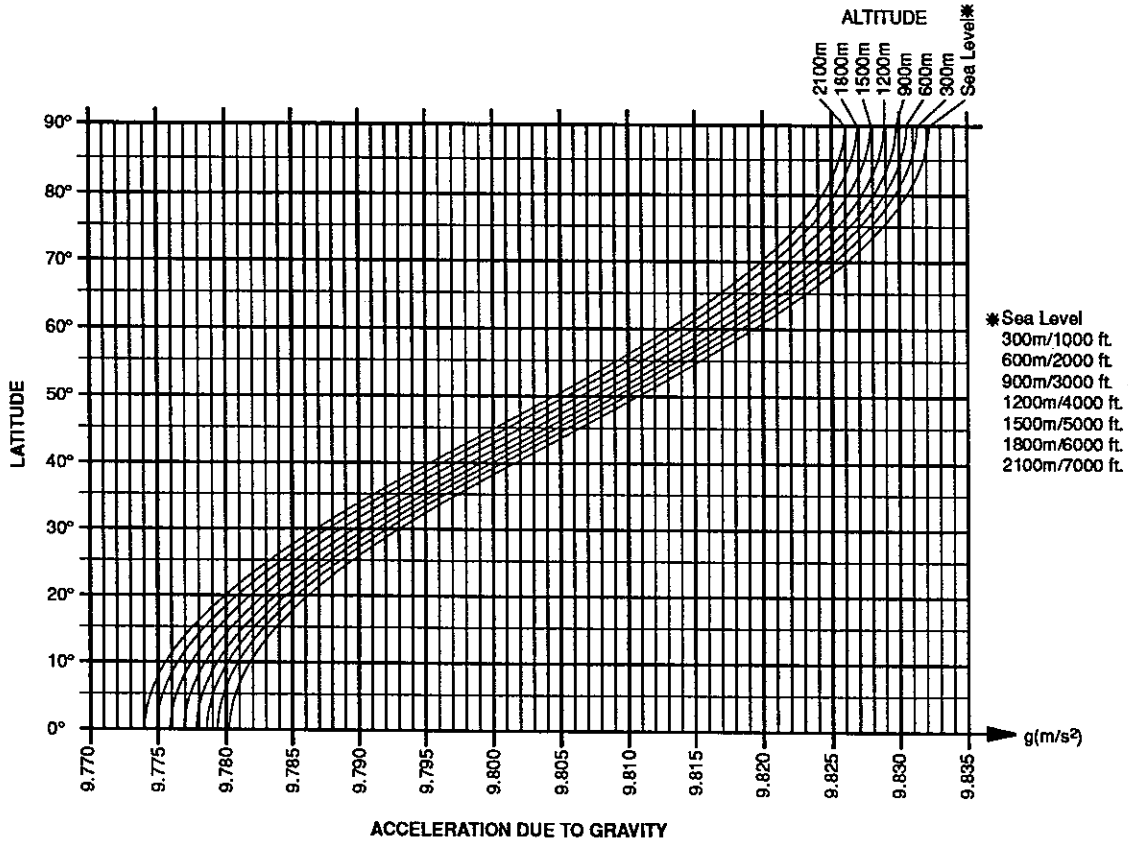
Please Note *Before customer delivery:*
In areas where the FG scale is registered for commercial use, the calibration port cover must be sealed (To deny access to the calibration switch). The end-user will not be permitted to remove any cover from the display pod as he could thereby press the calibration switch. The scale must be shipped to the end-user in a fully assembled form for commercial use.

END End of SETTING THE VALUE OF "g" procedure.

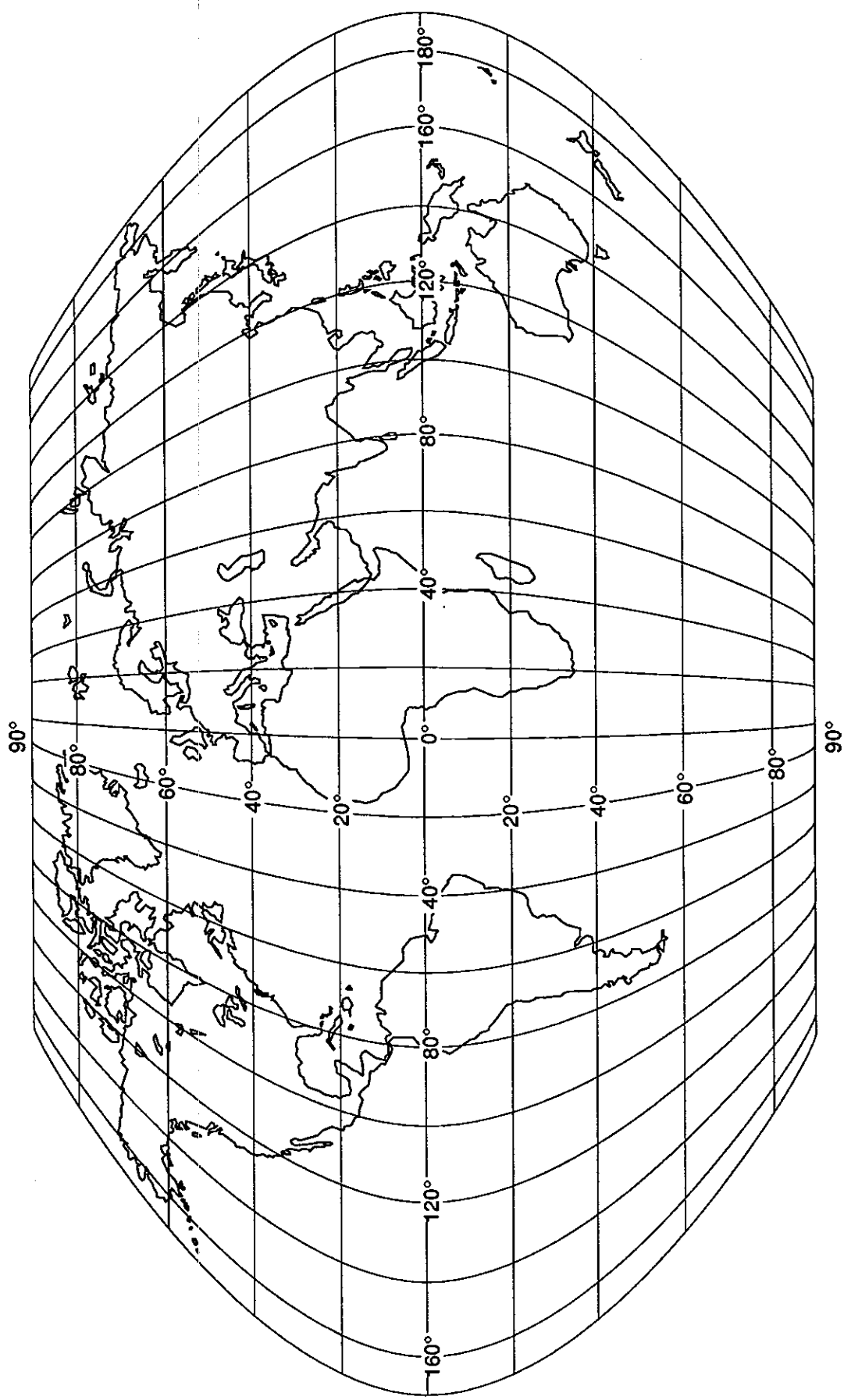
Gravity Values at Various Locations

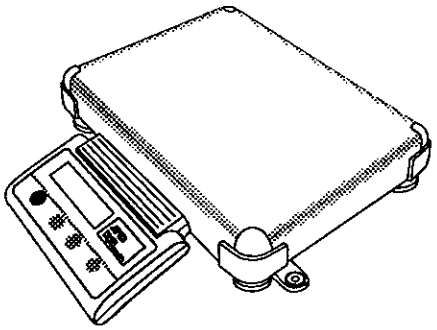
Calcutta	9.788	m/s^2	Paris	9.809	m/s^2
Capetown	9.796	m/s^2	Rio de Janeiro	9.788	m/s^2
Chicago	9.803	m/s^2	Rome	9.803	m/s^2
Amsterdam	9.813	m/s^2	Manila	9.784	m/s^2
Athens	9.800	m/s^2	Melbourne	9.800	m/s^2
Auckland NZ	9.799	m/s^2	Mexico City	9.779	m/s^2
Bangkok	9.783	m/s^2	Milan	9.806	m/s^2
Birmingham	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
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

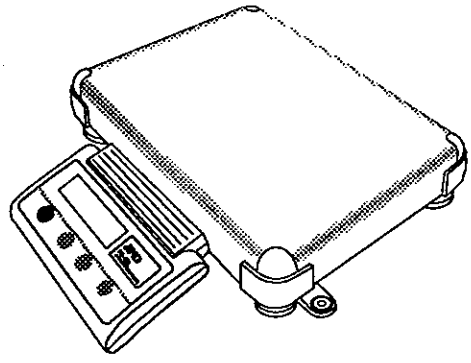




FG• Section D

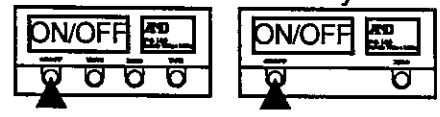
Weighing

Weighing



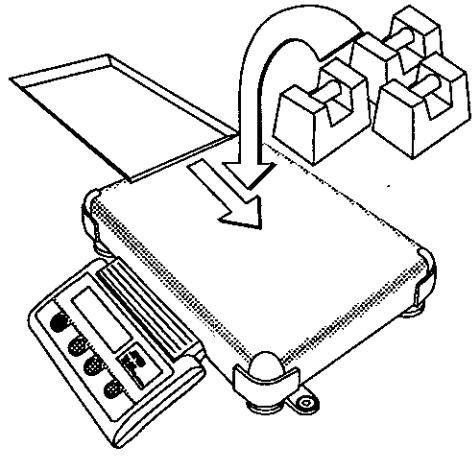
Simple Weighing

1) Turn the display on via the **ON/OFF** key.



2) Weigh in kilograms (or for the decimal pound / kilogram version, select the pound mode using the **UNITS** key.

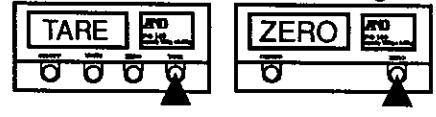
3) Place the object(s) on the pan and read the weight when stable.



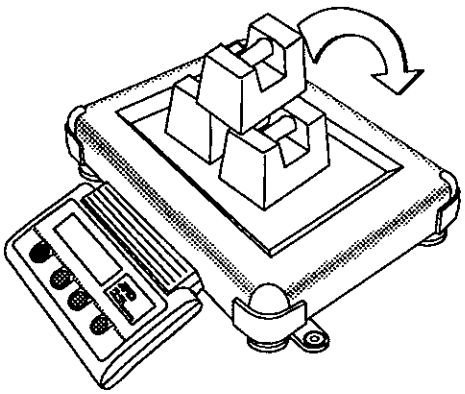
Weighing into a Container

1) Place the container on the pan.

2) Press **TARE** (or **ZERO**) to cancel the weight.



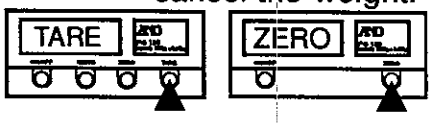
3) Fill the container until the target weight is reached. When adding more than one ingredient to the container, press **TARE** (or **ZERO**) after each one.



Weighing out of a Container

1) Place the full container on the pan.

2) Press **TARE** (or **ZERO**) to cancel the weight.

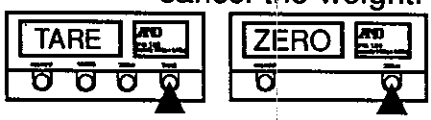


3) Scoop the amount of material you need out of the container with reference to the negative display.

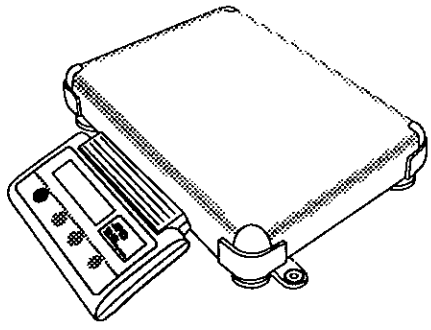
Deviational Weighing

1) Place a reference object on the pan.

2) Press **TARE** (or **ZERO**) to cancel the weight.



- Comparative objects placed on the pan will now show their deviation from the reference weight (zero) in terms of a ± weight display.

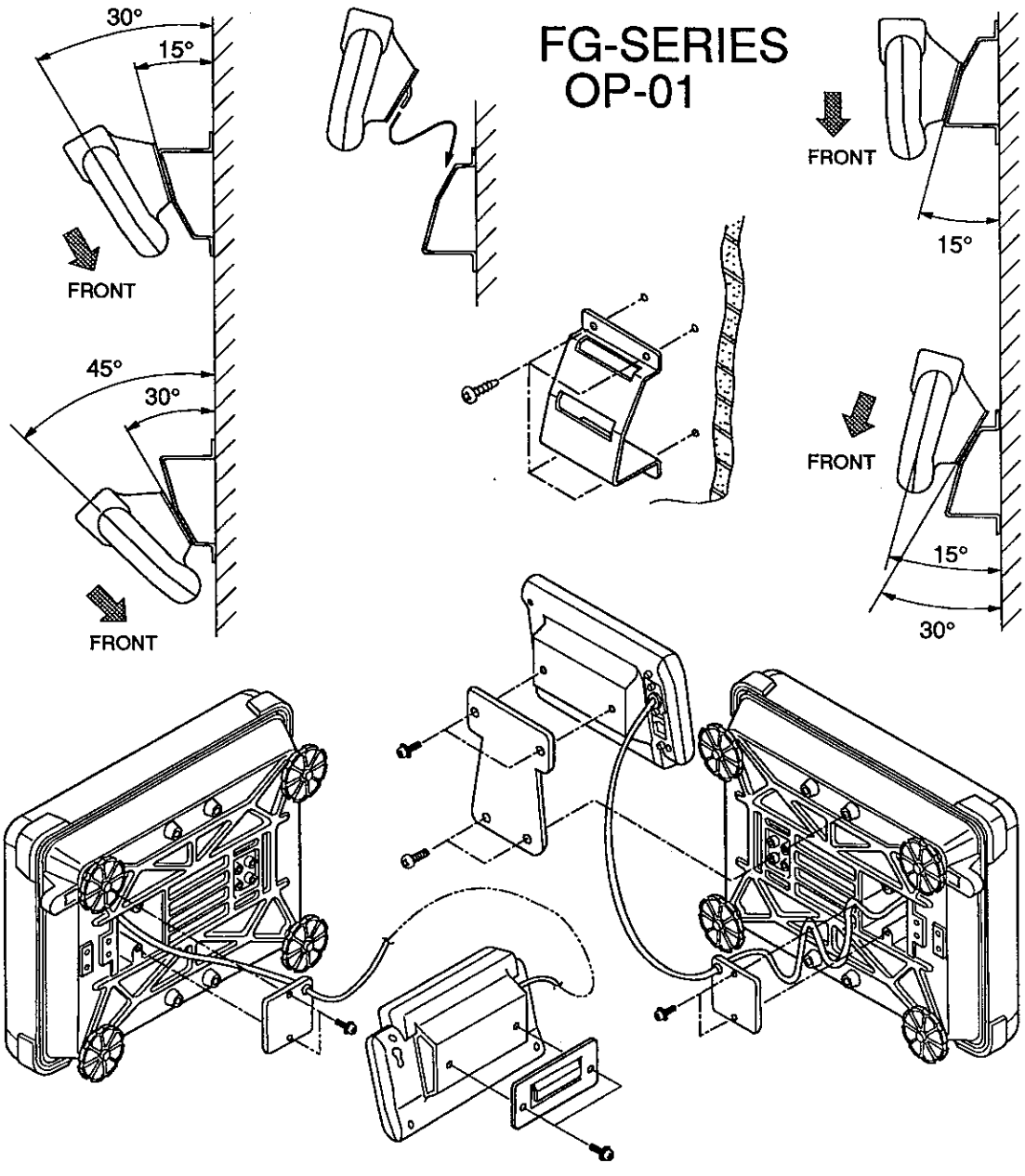


FG• Section E

Options

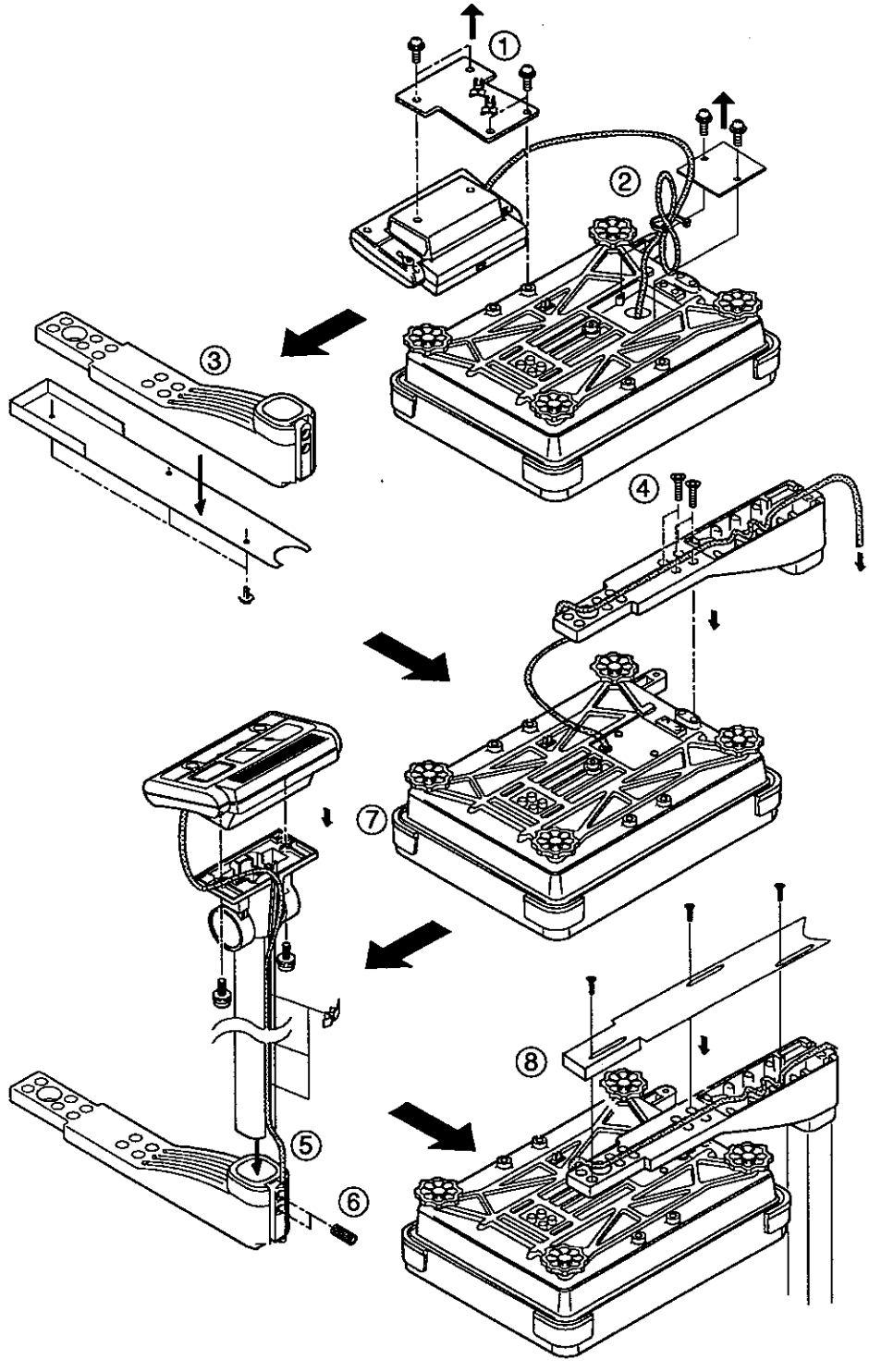
Wall Mount Bracket OP-01

This wall mount bracket is designed for mounting the display head separately from the base. The base should be positioned such that the cable will not touch the base and cause error.



Optional Display Column OP-02

The support and column with tilt bracket is designed for mounting the display head on the rear of the base, raised for better viewing when the base is on or near the floor. The following drawings display the scale in various stages of assembly.



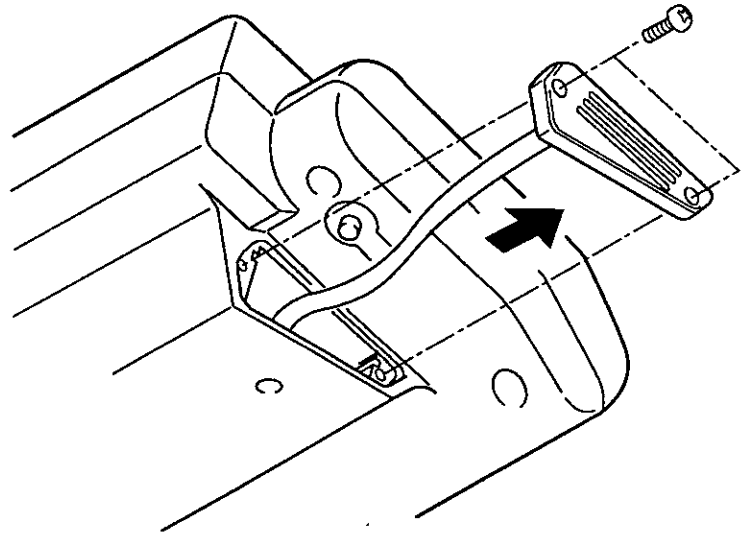
Installation Procedure

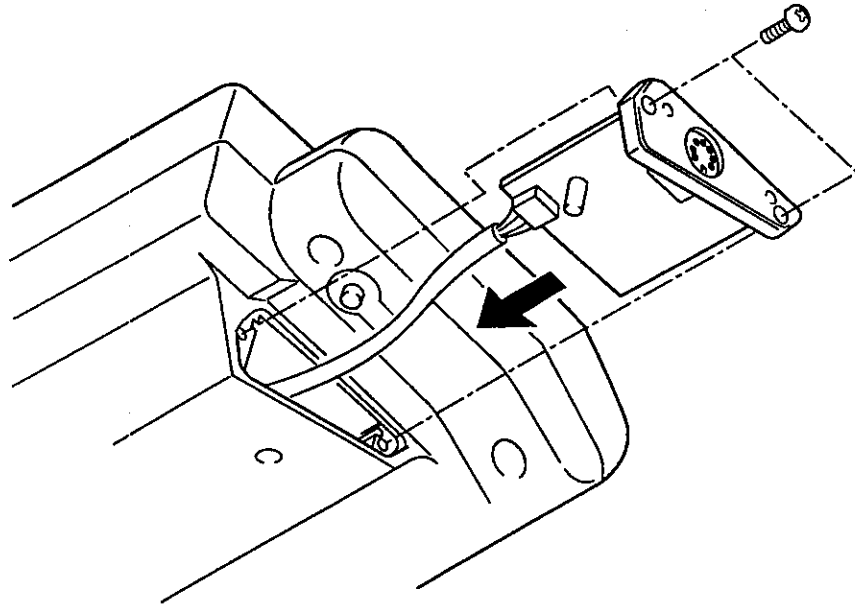
The column support bracket, column and tilt bracket are installed in the following procedure.

1. Invert the base on a soft surface and remove the screws from the display pod support plate. This will allow the display pod to be remotely located. Set the plate aside.
2. Remove the cover plate from the base and extend the cable to it's full length (do not pull on the cable). Replace the cover plate.
3. Remove the bottom plate from the column support bracket and set it aside for installation in step 8.
4. Route the display pod cable as shown in the drawing and affix the column support bracket to the base using 4 screws from the option kit.
5. Insert the column fully into the column support bracket (it is a tight fit and may require some force to seat the column.
6. Affix the column to the support bracket using the 2 Hexagonal (Allen) bolts from the option kit.
7. Install the display pod on the tilt bracket. Dress the cable in the slot on the rear side of the column.
8. Dress the remaining cable in the cavity at the bottom of the column and install the column support bracket cover (removed in step 3).
9. Place the scale back on it's feet. Adjust the feet while observing the bubble level to assure that the scale is level again.
10. Press the OFF/ON key and check the scale for proper operation.
11. Retain removed parts for later use if the scale must be broken down and restored to it's original configuration.

RS-232C Interface OP-03

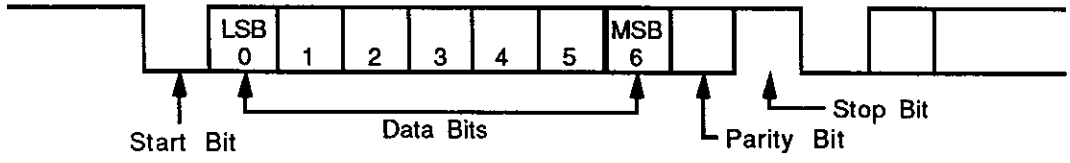
The RS-232C option mounts on the left side of the display pod. With the unit turned off, remove the cover, connect the cable to the connector on the rear edge of the board and insert the option in the body and replace the screws. See pages 31 and 32 for the setup procedure.



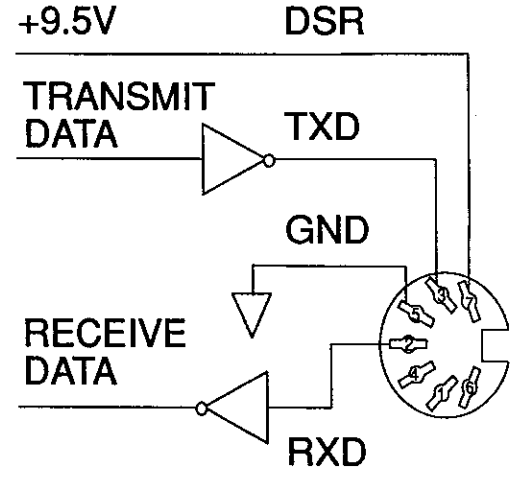


RS-232C Specifications

Type	EIA-RS-232C
Method	Asynchronous Transmission.
Format	Baud rate: 2400
	Data bit: 7
	Parity bit: 1 Even
	Stop bit: 1
	Code: ASCII



RS-232C
1 = - 5V to - 15V
0 = +5V to +15V



Communication Modes

There are two communication modes: **STREAM** and **COMMAND**:

STREAM mode: Data is transmitted continuously at the display update speed rate.

COMMAND mode: The scale is controlled by commands from the external instrument:

Selecting Communication Modes

o You can set the communication mode as follows:

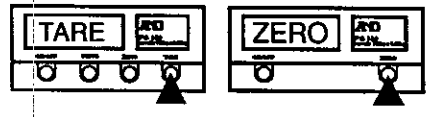
"F2 0" : STREAM mode. This mode is the required setting when connecting the AD-8116/AD-8117 printer.

"F2 1" : COMMAND mode. The terminator is <CR>+<LF>.

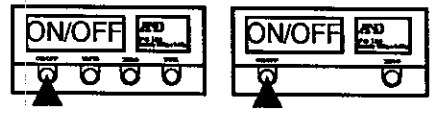
"F2 2" : This command is not used, but will be displayed.

o *To set the COMMUNICATION Mode:*

Step 1. Turn the display **OFF**.

Step 2. 

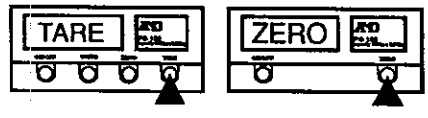
Press and hold the **TARE** (or **ZERO**) key.

Step 3. 

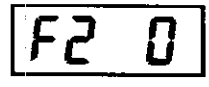
While holding the **TARE** (or **ZERO**) key press the **ON/OFF** key.

DISPLAY 

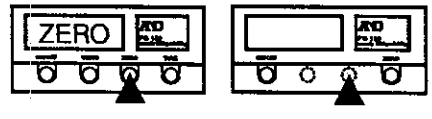
"F1 1" or "F1 0" will be displayed.

Step 4. 

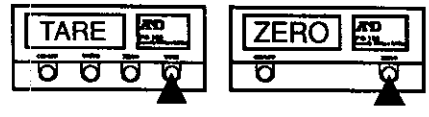
Press the **TARE** (or **ZERO**) key.

DISPLAY 

"F2 0", "F2 1" or "F2 2" will be displayed.

Step 5. 

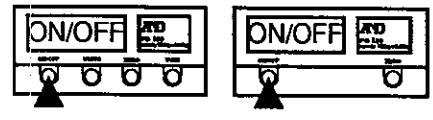
Press the **ZERO** (or hidden) key to select the mode desired, as listed above.

Step 6. 

Press the **TARE** (or **ZERO**) key.

DISPLAY 

"End" will be displayed.

Step 7. 

Press **ON/OFF** twice to return to normal weighing mode.

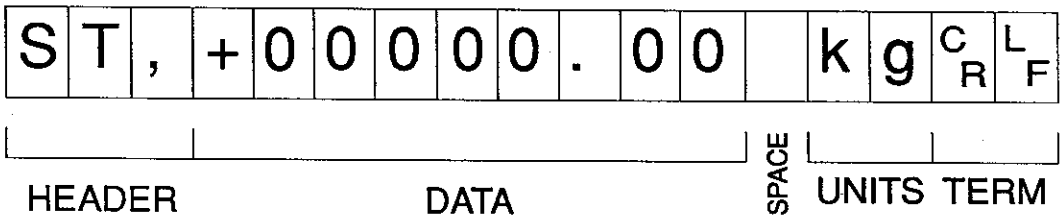
Data Format

Three types of output HEADER are transmitted:

OL - Overload/Underload (E, -E)
ST - Display is Stable in kg, or lb
US - Display is Unstable (in-motion)

Data samples are transmitted by ASCII, including these codes:

2D (HEX) "–" (minus)
2B (HEX) "+" (plus)
2E (HEX) "." (decimal point)



- o Terminator will always be <CR> <LF> for transmission data.
- o Data is always transmitted as 9 digits, including ±00000.00.
- o Overload will be transmitted with "OL" as header and then "±99999.99".
- o The unit transmitted is "kg" (and "lb" on the American version).

Command Format

The types of COMMANDS accepted:

International version

Q <term> : Send data
Z <term> : Zero the display.
T <term> : Zero the display.

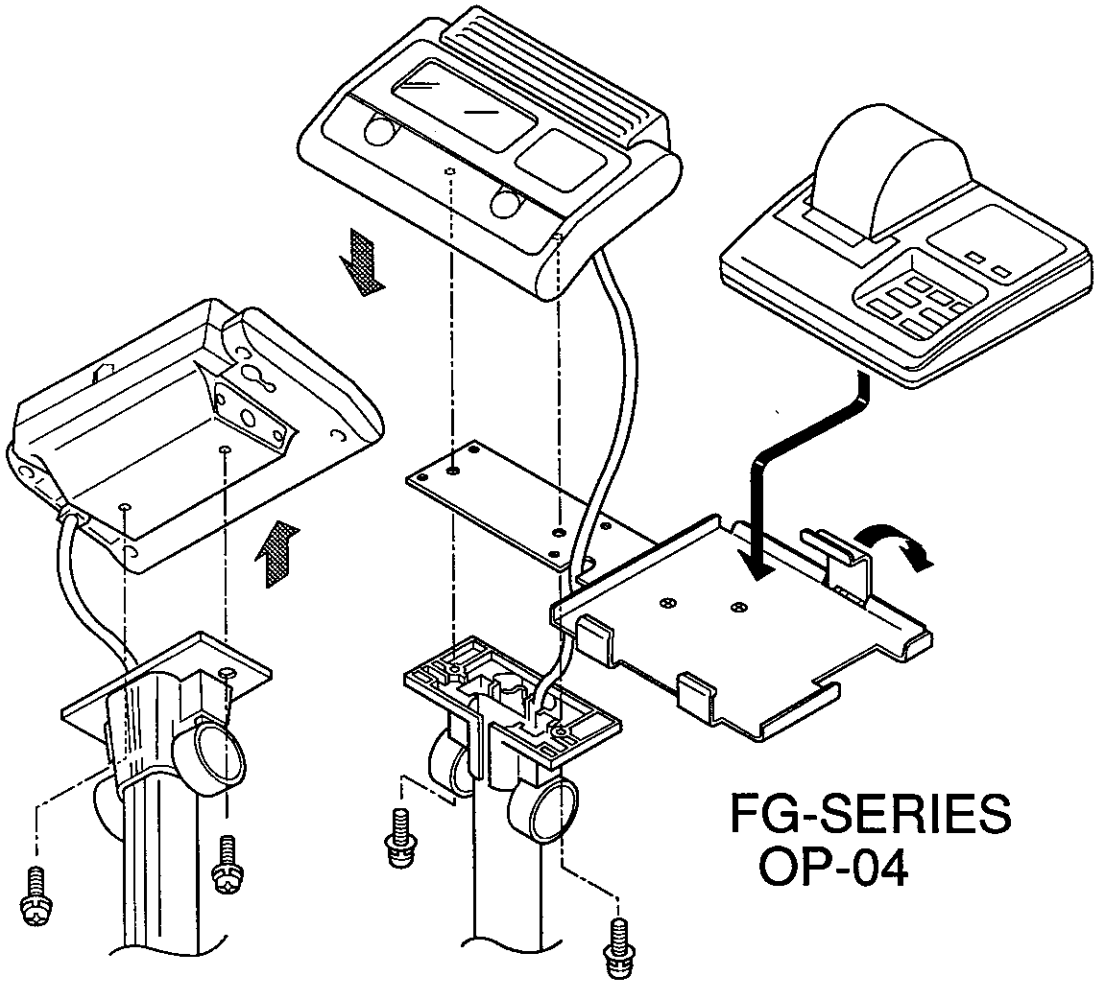
American version

Q <term> : Send data.
Z <term> : Zero the display.
T <term> : Tare the display.
U <term> : Change the Units

- o <term>, is the terminator, <CR> + <LF>.
- o There must be a delay time of more than 500 milliseconds between two continuous commands.

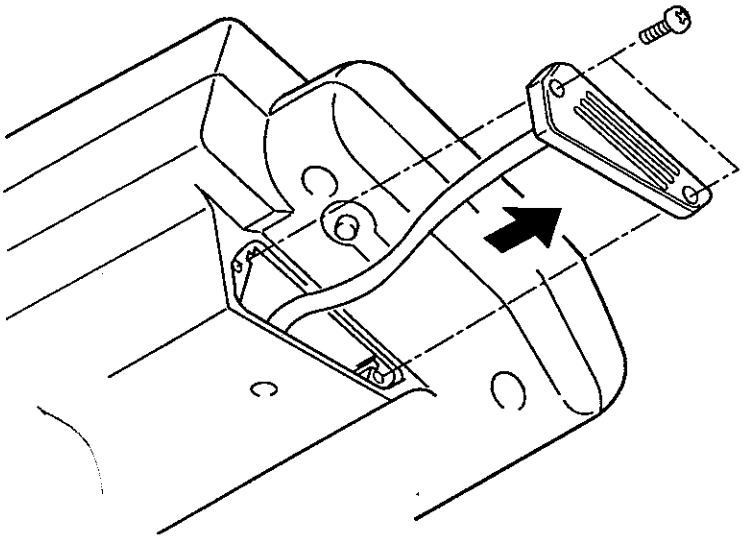
Printer Mount OP-04

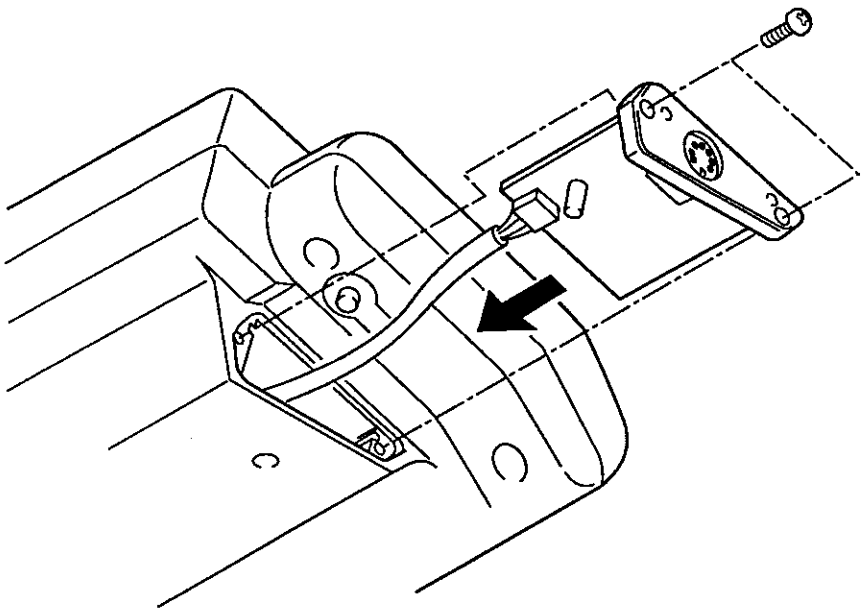
This bracket was designed to be used with option -2, to provide a mount for the AD-8121 printer beside the head.

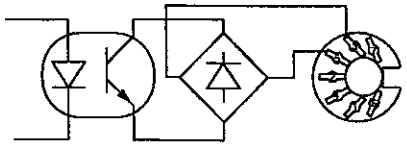


Current Loop Interface OP-05

This interface was designed to drive a printer or remote display in current loop mode. With the unit turned off, remove the cover, connect the cable to the connector on the rear edge of the board and insert the option in the body and replace the screws. Set the RS-232 output to stream mode (see pages 31 and 32)







Circuit diagram

Carrying Handle OP-06

This option is designed to attach in place of the head mount plate. It provides a simple method of carrying the scale in applications where the scale must be moved often.