

# INSTRUCTION MANUAL

WEIGHING INDICATOR  
MODELS: AD-4321A/B

imno-4321-022a/b-v.2

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N.B. SPECIFICATIONS MAY BE CHANGED WITHOUT NOTICE BECAUSE OF IMPROVEMENTS

## 1. INTRODUCTION

*PLEASE READ THIS MANUAL CAREFULLY.*

This Instruction Manual concerns the AD-4321A and AD-4321B Weighing Indicators. AD-4321A is powered by AC electricity and AD-4321B by a 12V DC electricity supply. These Indicators are the product of years of design, development and in-field testing. They are designed to withstand harsh environmental conditions and each indicator is subjected to several levels of quality control before it leaves the factory.

Weighing Indicators are designed to amplify the analog output from a load cell, convert the analog signal to digital data and then display this data as a weight reading. AD-4321 is screened against RFI (radio frequency interference), employs FDC (full digital calibration) and contains "Watch Dog" — circuitry which constantly monitors the central processing unit and which will instantly reset the CPU if a software crash starts to develop. The optional waterproof case, Op-05, permits operation outside and the 12V DC powered AD-4321B may be operated virtually anywhere (e.g. connected to the battery of a car or 4-wheel drive vehicle). The basic unit may be used as a panel mounted or desk top weighing indicator.

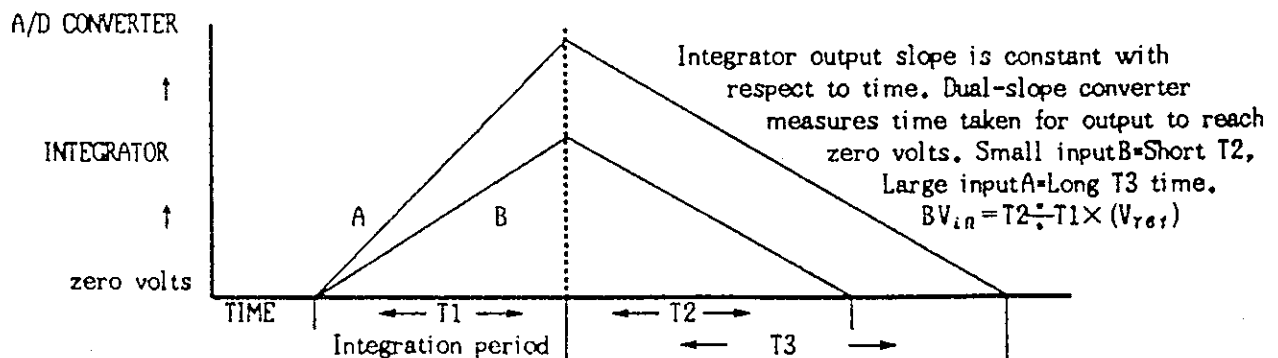
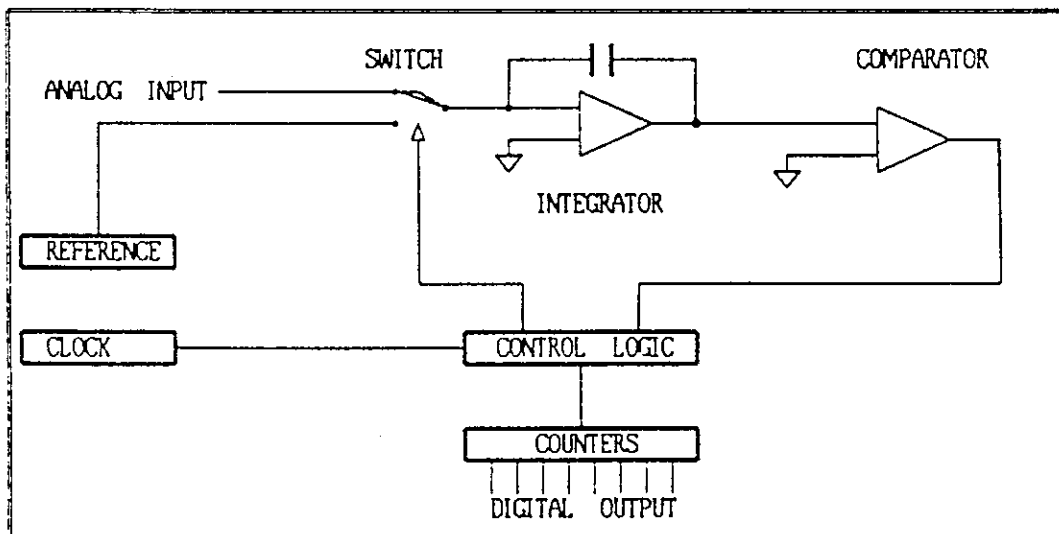
### *AD-4321A/B WEIGHING INDICATOR FEATURES*

1. Simple calibration via FDC function.
2. "WATCH DOG" virtually eliminates malfunctions commonly associated with computerised equipment.
3. Screened against RFI.
4. AD-4321B with Op-05 may be operated almost anywhere.
5. All keyboard functions (except Standby/Operate) may be initiated by remote control(cable)via a 7 pin DIN. socket in the rear panel.
6. All the dip-switches are conveniently located behind the small front panel cover.
7. For security the case and dip-switch panel may be sealed with wire and a crimped lead seal.
8. Convenient optional interfaces, parallel BCD and serial RS-232C/Current Loop (Passive).
9. High A/D resolution and high accuracy.
10. AD-4321 can drive up to 8 load cells (350 ohm).

## 2. SPECIFICATIONS

### 2-1 ANALOG INPUT AND A/D CONVERSION

MODEL N°	AD-4321A	AD-4321B
Input sensitivity	1.1μV/D to 120μV/D	0.91μV/D to 100μV/D (D=Min.div.)
Zero adjustment range	1mV to 30mV	0.8mV to 25mV
Load cell excitation	12VDC, 280mA (voltage sensing)	10VDC, 230mA (voltage sensing)
Input Impedance	10M ohm (min)	10M ohm (min)
Load cells (max)	8	8 (if DC power supply adequate)
Temp. coefficient	Zero $\pm (0.3\mu V \pm 0.0005\%$ of the initial zero offset voltage) / °C Span $\pm 5\text{ppm}/^\circ\text{C}$ of rdg.	
Input noise	0.6μVp-p	
A/D conversion method	True Integrating Dual-slope	
A/D resolution	130,000 counts (max)	
A/D conversion rate	4 conversions per second	
Display resolution	10000	



2-2 DIGITAL SECTION

MODEL N°	AD-4321A/B
Weight Display	7 digit high intensity cobalt-blue fluorescent tube
Height of Display	13mm
Under zero indication	Negative "—" sign (g segment of digit on left end of display)
ZERO annunciator	▽ center of zero (0±0.25D)
MD annunciator	▽ Motion Detection, indicator on when display is unstable
GROSS annunciator	▽ Gross Mode
NET annunciator	▽ Net Mode
TARE ENTERED LED	Tare weight stored in memory (LED=light-emitting diode pilot lamp)
POWER LED	AC or DC electricity supply is connected
STANDBY/OPERATE Key	Activates and de-activates the display and functions
ZERO Key	Zeros the display only when the display is stable (MD▽ is off)
TARE Key	Acquire Tare weight when stable, induce Net Mode & display zero
GROSS/NET Key	Change the mode from Gross to Net and vice versa
PRINT Key	Send a print command to a printer via Op-01 or Op-04
EXT. CTRL socket	Rem. Ctrl. for Zero, Tare, Gr/Net & Print functions via N/O switches
Dip-switch programming	Zero track 0.5D, 1.0D & 1.5D per sec. 0.5D, 1.0D & 1.5D per 2secs Motion Detection 1D or 3D per second Minimum Division (D) = 1, 2, 5, 10, 20, 50 scale intervals Decimal Point position. None or to 1, 2 or 3 decimal places Scale Capacities. 300/400/500/600/800/1,000/1,200/1,500/2,000/ 2,500/3,000/4,000/5,000/6,000/8,000/10,000/12,000/15,000/20,000/ 25,000/30,000/40,000/50,000/60,000/80,000/100,000/120,000/150,000 200,000/250,000/300,000/400,000/500,000=max. digital weight value which may be displayed (unrelated to decimal point or weight unit)

2-3 GENERAL

MODEL N°	AD-4321A	AD-4321B
Power (AC* 50 or 60Hz)	100, 120, 220, 240V AC ±1.5%/12VA	11-18VDC/300mA→630mA*
Weight	1.7kg (3.7lb)	1kg (2.2lb)
Operating Temperature	-10°C to +40°C (+14°F to +104°F)	
Max.Op.Humidity	95% Relative Humidity or less (non-condensing)	
Physical Dimensions	198(W) x 178(D) x 76(H)mm / 7.8" x 7.0" x 3.0"	

\* N.B. AD-4321A @ 12VA = 8 load cells and Option-01 or 04.

AD-4321B add 30mA for each load cell added plus 120mA for OP-01, 50mA OP-04, (300mA for no OP but 1LC)

2-4 OPTIONS

Note: Option-01 and Option-04 may not be installed simultaneously as they occupy the same space in the weighing indicator.

- 1) Option-01 Parallel BCD output for transmitting data to devices which have a BCD input capability. Printers AD-8113 & 8114B may be used when this option is installed.
- 2) Option-04 Serial RS-232C + 20mA Passive Current Loop Interface permits the use of printers AD-8115A/B & 8116 as well as allowing connection to most computers.
- 3) Option-05 Water proof, dirt proof and impact resistant case permits AD-4321A/B to be used in harsh environments.

2-5 ACCESSORIES

Load cell connector NJC-207-PF

7 Pin (DIN)\*EXT.CTRL.\* connector TCP0576 for cable remote control.

Fuse AD-4321A:- 100 or 120VAC = 0.5A & 220 or 240VAC = 0.3A  
AD-4321B:- 1A

Power Cable:- 1

Unit Stickers:- 1 set (Kg, g, t, Lb) but can be calibrated for any weight unit.

Capacity Sticker:-1

* WEIGHT CONVERSION TABLE *
One Kg = 2.204 62Lb approx.
One g = 0.035 27 oz(avoird) approx.
One t = tonne 1000Kg (Metric Ton) or 2204.62Lb approx.
= ton, long: (20 cwt)2240Lb or 1016.05Kg approx.
= ton, short: 2000Lb or 907.18Kg approx.
= tun 216imp.gal.(ale), 252imp.gal.(wine).weight=volumeXdensity*
One Lb = 0.453 592 37Kg(UK) or 0.453 592 427 7Kg(USA)

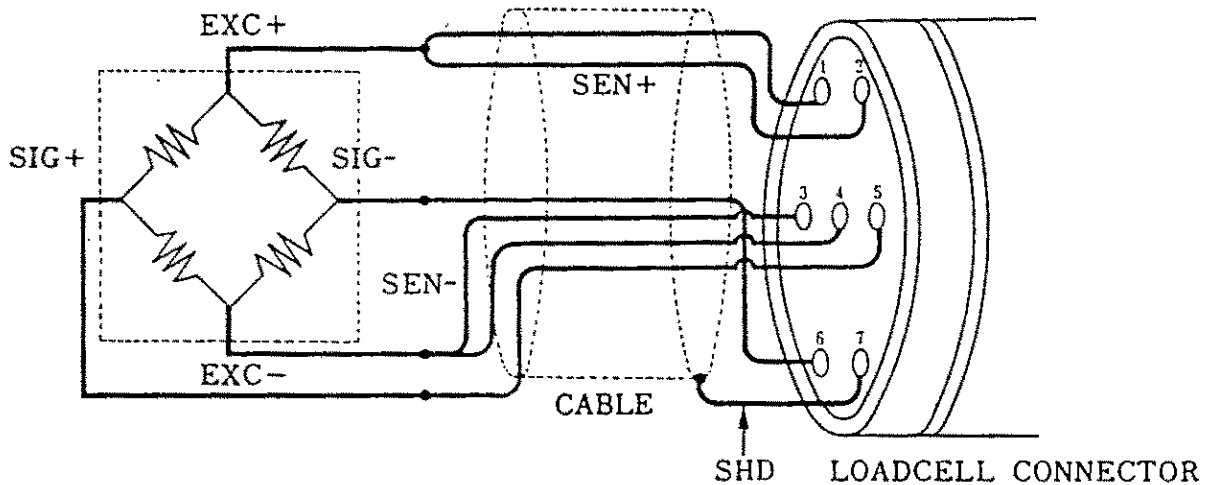
\*One imp.gal.of distilled water @ 62°F=10Lb(UK). One imp.gal=4.546litres (dm<sup>3</sup>) or kg approx.  
 One litre of water @ 4°C=1Kg. One US gal.is about 5/6 of an imp.gal.or about 3.785litres(liters).  
 One imp.gal. of water @ 62°F weighs about 4.536kg but 4.546 litres @ 4°C weigh 4.546kg.

### 3. OPERATION

#### 3-1 INSTALLATION

- a) Do not permit AD-4321 to be exposed to direct sunshine or sudden temperature changes.
- b) Earth via power cable. Do not earth directly to other equipment.
- c) The analog output from the load cell and the BCD or RS-232C signals are sensitive to electrical noise. Do not bind these cables together as it could result in cross-talk interference. Please also keep them well away from AC power cables.

#### 3-2 LOAD CELL CONNECTION

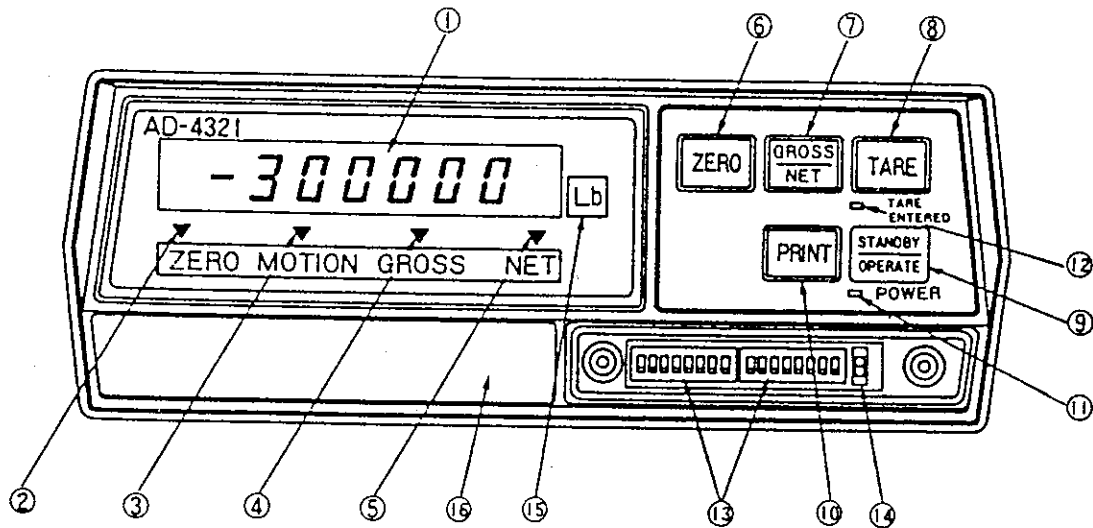


LOAD CELL PIN CONNECTIONS		CABLE COLOUR CODE	
PIN NUMBER	SIGNAL	LC-B5103, LC-T263,	LC-C861, LC-C872 etc
1	EXCITATION + (EXC+)	RED	RED
2	SENSE + (SEN+)		
3	SENSE - (SEN-)		
4	EXCITATION - (EXC-)	BLACK	WHITE
5	SIGNAL + (SIG+)	GREEN	GREEN
6	SIGNAL - (SIG-)	WHITE	YELLOW
7	SHIELD .... (SHD )	ORANGE	WIRE

USE A SIX WIRE CABLE WITH SHIELD.

If AD-4321 is located near the load cell you may use a 4 wire cable with shield but first connect pins 1 + 2 and 3 + 4 with independent jumper leads.

3-3 EXPLANATION OF FRONT PANEL



1. Weight Display
2. Zero Annunciator
3. Motion Detection (Instability) Annunciator
4. Gross Mode Annunciator
5. Net Mode Annunciator

6. **ZERO** key

This key will zero the display *iff* the offset from the initially calibrated zero is within  $\pm 2\%$  of the capacity programmed and *iff* motion is not being detected.

7. **GROSS/NET** key

This key will alternately switch the mode, weight display and annunciators between Net and Gross.

8. **TARE** key

This key will zero the display *iff* motion is not detected, switch the mode to Net and store the TARE weight in memory. The Zero annunciator will not switch on for a Tare zero and the key will not function if the weight data is negative or exceeds maximum capacity.

9. **STANDBY/OPERATE** key

This key turns the display on and off (not the power).

10. **PRINT** key

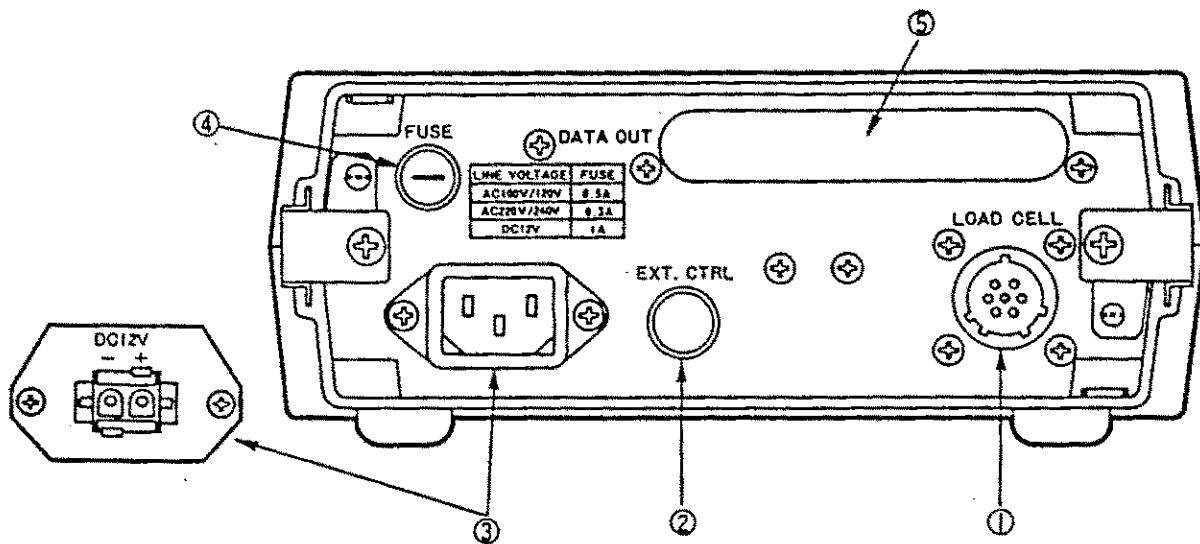
By pressing this key data may be transmitted to a printer via Op-01 (BCD output) or Op-04 (RS-232C interface).

\* *iff* - if and only if

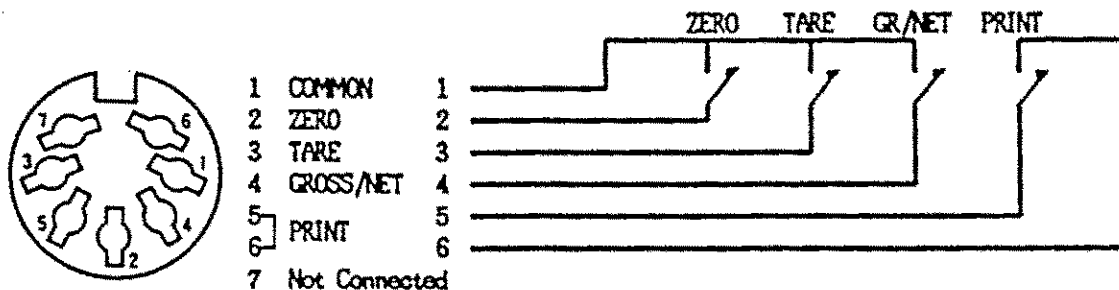


11. POWER LED (light-emitting diode)  
Illuminated when the indicator has AC/DC power supplied to it.
12. TARE ENTERED LED  
Illuminated when the TARE WEIGHT  $\neq 0$ .
13. Dip-switches SW 1 and SW 2  
For programming zero track, motion detection, minimum division, decimal point position and maximum capacity parameters.
14. Calibration Switch
15. Unit sticker location
16. Capacity sticker location

3-4 EXPLANATION OF REAR PANEL.



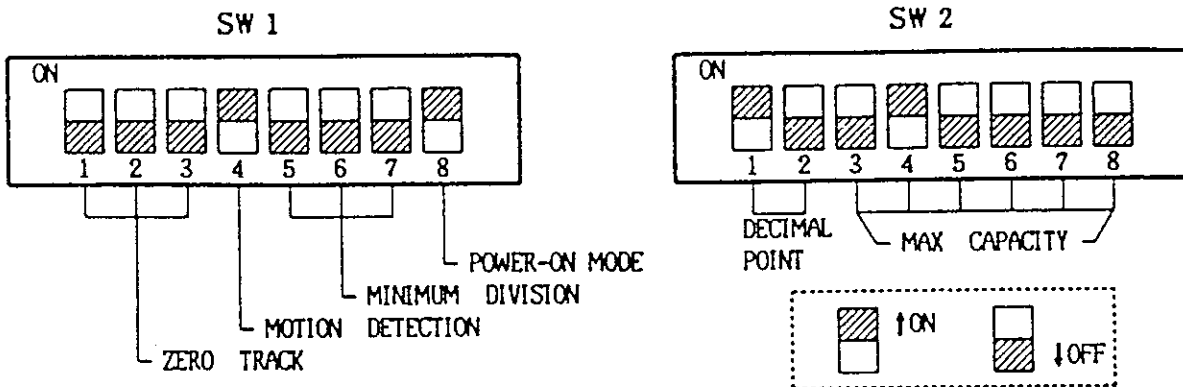
1. Load Cell Connector
2. External Control Input Socket  
Cable remote control is possible via N/O switches.



3. Power Input Socket  
With AD-4321B make sure that the battery is *NEVER* connected the wrong way around because the indicator will be damaged!!
4. Fuse Holder  
AD-4321A-0.5A for 100 & 120VAC and 0.3A for 220 & 240VAC.  
AD-4321B-1A for 12VDC
5. Data Out Connector (Op-01 or Op-04)

### 3-5 DIP-SWITCH PROGRAMMING

Zero track, Motion Detection, Minimum Division, Decimal Point and Maximum Capacity parameters may be programmed via SW 1 & SW 2.



#### 1. Zero Track Settings (\*=initial setting when unit is shipped)

SW 1			ZERO TRACK
1	2	3	
OFF	OFF	OFF	1.50 per 2 seconds*
ON	OFF	OFF	1.50 per second
OFF	ON	OFF	1.00 per 2 seconds
ON	ON	OFF	1.00 per second
OFF	OFF	ON	0.50 per 2 seconds
ON	OFF	ON	0.50 per second
OFF	ON	ON	No Zero Track
ON	ON	ON	No Zero Track

#### 2. Motion Detection. SW 1 Segment N° 4

OFF	3D per second
ON	1D per second*

#### 3. Minimum Division. SW 1

5	6	7	MIN. DIV.
OFF	OFF	OFF	1*
ON	OFF	OFF	2
OFF	ON	OFF	5
ON	ON	OFF	10
OFF	OFF	ON	20
ON	OFF	ON	50

#### 4. Power-on Mode. SW 1

8	POWER-ON MODE
OFF	DISPLAY READS "-----" WHEN ON "STANDBY" & STANBY/OPERATE MUST BE PRESSED FOR WEIGHING. POWER-FAILED INDICATION ON.
ON	DISPLAY WILL BE IN WEIGHING MODE AS SOON AS POWER IS CONNECTED. NO POWER-FAILED INDICATION TO FLAG LOST WEIGHING EVENT DATA.

\* Minimum Division bears no relation to decimal point location.

5. Decimal Point Position. SW 2 Segment Nos 1 & 2

1	2	DECIMAL POINT	
OFF	OFF	NO D.P.	0 0 0 0 0 0
ON	OFF	10 <sup>1</sup>	0 0 0 0 0.0*
OFF	ON	10 <sup>2</sup>	0 0 0 0.0 0
ON	ON	10 <sup>3</sup>	0 0 0.0 0 0

6. Maximum Capacity. SW 2 Segment Nos 3 to 8

The display will blank if the input exceeds 9D more than the maximum capacity set; e.g. for a capacity of 10,000 the number "10009" will be displayed but "10010" will not be displayed. Please note that the position of the decimal point is not relevant and that "10.009" will be treated in the same way as "1000.9" or "10009".

3	4	5	6	7	8	MAX CAPACITY
OFF	OFF	ON	OFF	ON	OFF	300
OFF	OFF	OFF	ON	ON	OFF	400
OFF	OFF	ON	ON	ON	OFF	500
OFF	OFF	OFF	OFF	OFF	ON	600
OFF	OFF	ON	OFF	OFF	ON	800
ON	OFF	OFF	OFF	OFF	OFF	1,000
ON	OFF	ON	OFF	OFF	OFF	1,200
ON	OFF	OFF	ON	OFF	OFF	1,500
ON	OFF	ON	ON	OFF	OFF	2,000
ON	OFF	OFF	OFF	ON	OFF	2,500
ON	OFF	ON	OFF	ON	OFF	3,000
ON	OFF	OFF	ON	ON	OFF	4,000
ON	OFF	ON	ON	ON	OFF	5,000
ON	OFF	OFF	OFF	OFF	ON	6,000
ON	OFF	ON	OFF	OFF	ON	8,000
OFF	ON	OFF	OFF	OFF	OFF	10,000*
OFF	ON	ON	OFF	OFF	OFF	12,000
OFF	ON	OFF	ON	OFF	OFF	15,000
OFF	ON	ON	ON	OFF	OFF	20,000
OFF	ON	OFF	OFF	ON	OFF	25,000
OFF	ON	ON	OFF	ON	OFF	30,000
OFF	ON	OFF	ON	ON	OFF	40,000
OFF	ON	ON	ON	ON	OFF	50,000
OFF	ON	OFF	OFF	OFF	ON	60,000
OFF	ON	ON	OFF	OFF	ON	80,000
ON	ON	OFF	OFF	OFF	OFF	100,000
ON	ON	ON	OFF	OFF	OFF	120,000
ON	ON	OFF	ON	OFF	OFF	150,000
ON	ON	ON	ON	OFF	OFF	200,000
ON	ON	OFF	OFF	ON	OFF	250,000
ON	ON	ON	OFF	ON	OFF	300,000
ON	ON	OFF	ON	ON	OFF	400,000
ON	ON	ON	ON	ON	OFF	500,000

There are some invalid combinations of Max. Capacity and Min. Division and these are shown on the next page.

7. Resolution

Resolution is related to the combination of Min. Division and Max. Capacity. The hatched area of the following table indicates combinations which are invalid and must be avoided or display will blank.

MIN. DIV. MAX. CAP.	1	2	5	10	20	50
300	1/300					
400	1/400					
500	1/500					
600	1/600	1/300				
800	1/800	1/400				
1,000	1/1000	1/500				
1,200	1/1200	1/600				
1,500	1/1500	1/750	1/300			
2,000	1/2000	1/1000	1/400			
2,500	1/2500	1/1250	1/500			
3,000	1/3000	1/1500	1/600	1/300		
4,000	1/4000	1/2000	1/800	1/400		
5,000	1/5000	1/2500	1/1000	1/500		
6,000	1/6000	1/3000	1/1200	1/600	1/300	
8,000	1/8000	1/4000	1/1600	1/800	1/400	
10,000	1/10000	1/5000	1/2000	1/1000	1/500	
12,000		1/6000	1/2400	1/1200	1/600	
15,000		1/7500	1/3000	1/1500	1/750	1/300
20,000		1/10000	1/4000	1/2000	1/1000	1/400
25,000			1/5000	1/2500	1/1250	1/500
30,000			1/6000	1/3000	1/1500	1/600
40,000			1/8000	1/4000	1/2000	1/800
50,000			1/10000	1/5000	1/2500	1/1000
60,000				1/6000	1/3000	1/1200
80,000				1/8000	1/4000	1/1600
100,000				1/10000	1/5000	1/2000
120,000					1/6000	1/2400
150,000					1/7500	1/3000
200,000					1/10000	1/4000
250,000						1/5000
300,000						1/6000
400,000						1/8000
500,000						1/10000

3-6 CALIBRATION (zero and span/max.capacity adjustment)  
After installation, load cell connection, dip-switch programming etc. you may proceed to calibrate AD-4321. Please remember to connect the power cable for AD-4321B correctly with regards to polarity (RED = + & BLACK = -) and to allow a warm-up period to achieve thermal stability in the load cell and either the A or B indicator. You should calibrate all weighing systems once every 3 to 6 months. For span calibration you will need a weight close to maximum capacity.

#### NEW CALIBRATION PROCEDURE (Models shipped after January 1986)

1. Slide the calibration switch ON (i.e. up).
2. Press "STANDBY/OPERATE" once. "CAL" will be displayed for about three seconds and you may proceed with the old calibration procedure if you find it more convenient.
3. To employ the new calibration procedure, press the "ZERO" key once. "CAL-1" will be displayed for three seconds.
4. After confirming that nothing is on the weighing platform and that the Motion Detection annunciator is off, press the "STANDBY/OPERATE" key once. All the decimal points will be displayed for about three seconds followed by a display of six zeros with the fourth zero ( $10^3$ ) flashing. Zero calibration is finished. If only zero calibration is required, jump to step 11.
5. Unlike with the old calibration procedure, the new calibration procedure will allow you to set any figure for span calibration. This means that you can set the exact weight value for your calibration load even though it may not be an exact ton or tonne. If, for instance, the calibration load is a little over one long ton, say 2245.55Lb, this weight value can nevertheless be entered.
6. Load the calibration weight on the weighing platform.
7. The "ZERO", "GROSS/NET" and "TARE" keys can now be used to set the exact weight value for your previously defined standard weight. The "ZERO" key will move the flashing (cursor) digit left and the "TARE" key will move it right. The "GROSS/NET" key will increment the flashing digit from 0 → 9.
8. Having set the correct weight value for your calibration load and waited for the platform to become stable, press the "STANDBY/OPERATE" key once to enter the value. Seven decimal points will be displayed. Switch off the calibration switch, calibration is over.  
*Note: Calibration error messages are the same as for the old method.*

#### OLD CALIBRATION PROCEDURE

1. With the display off (on standby) slide the calibration switch, located to the right of dip-switch SW 2, ON (i.e. up).
2. Turn the display on via the "STANDBY/OPERATE" key.
3. AD-4321A/B will now be in calibration mode and will display "CAL" for about three seconds.
4. The display will then blank with the zero annunciator ON to indicate zero calibration mode.
5. Make sure that no load is being applied to the weighing system (that nothing is on the scale) and that the weighing platform is stable, not-in-motion. Press "STANDBY/OPERATE", all the decimal points will switch on for 3 secs and zero calibration will be over.

6. ZERO CALIBRATION PROBLEMS.

a) If "AAAAAAA" is displayed instead of the decimal points, the system is unable to achieve zero calibration because of an input which is too small (negative offset). Disconnect the power and add a resistor (50→500k ohms) between EXC+ and SIG+ at the load cell or connector.

b) If "UUUUUUU" is displayed instead of decimal points, the system is unable to achieve zero calibration because of an input which is too large and in this case add the resistor between EXC+ and SIG-. The resistor should have as high a resistance as possible, should be of the highest quality and should have the lowest temperature coefficient characteristics available.

c) If it is still impossible to achieve zero calibration the problem is either a bad load cell or a mistake in the load cell cable and connector wiring.

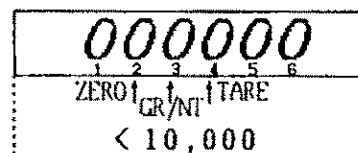
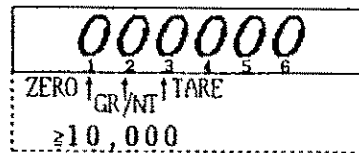
7. IF THERE ARE NO ZERO CALIBRATION PROBLEMS.

Next all the digits will display "0" with the Gross annunciator ON to indicate span calibration mode.

If only zero calibration is required you may avoid span calibration by pressing "STANDBY/OPERATE" at this point and then jumping to step number 11.

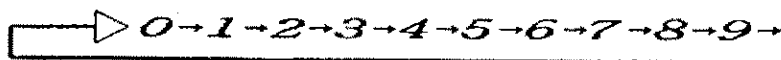
8. Place a standard load (e.g. 1 tonne or a short/long ton) equal to the maximum system capacity, on the weighing platform. If a load less than the maximum capacity is employed for span calibration, span errors may occur.

9. In span calibration mode the "ZERO", "GROSS/NET" and "TARE" keys permit the setting of up to three display digits. Thus 1 short ton could be represented as "1.0000t" or as "2000.0Lb" and 1 long ton as "2240.00Lb". If the display segments are numbered 1-6 from left to right then "ZERO", "GROSS/NET" and "TARE" will increment, in one digit steps, segments 1, 2 & 3 respectively if the capacity setting is ≥10,000. If the capacity setting is <10,000 then segments 2, 3 & 4 may be incremented via these keys.



To achieve a display of "02000.0Lb" it would be necessary to press "GROSS/NET" 2 times and a display of "2240.00Lb" would involve all three keys; "ZERO" × 2, "GROSS/NET" × 2 and "TARE" × 4.

If you make a mistake and press a key too many times you must advance through one complete cycle (10 steps) to return to the point at which you wish to stop.



Press the "STANDBY/OPERATE" key when the weighing platform is stable (wait for several seconds after applying the load). All the decimal points will switch on.

## 10. SPAN CALIBRATION PROBLEMS

a) If "LLLLLLL" is displayed instead of decimal points, there has been a decrease in the input voltage so check the load cell connections.

b) If "CCCCCCC" is displayed then a mistake has been made in the dip-switch programming and an invalid combination of Max. Capacity and Min. Division has been entered (see page 11).

c) If "-----" is displayed the output from the load cell is not enough for the span value entered. Change the load cell for one with a larger output, change the resolution (eg 10,000/1 to 10,000/2) or change the design of the weighing system.

d) If "UUUUUUU" is displayed the output from the load cell is too large. When a resistor has been added between EXC+ and SIG+ (see 6.a) change the resistor for one with greater resistance. Zero calibration must be checked and another resistor may need to be inserted between EXC+ and SIG- (see 6.b). Alternatively the design or load cell may need to be changed in order to yield a smaller output.

11. Switch the calibration switch OFF (downwards) when Span calibration has been successfully completed; the values for zero and span will be stored in non-volatile memory. Replace the panel cover. Check that the scale returns to zero and then recheck that the standard load yields the correct weight display. Recalibrate if necessary.

*\* If Calibration Mode is entered in error you may escape, without destroying the previously stored values for zero and span, in the following way: -*

- 1     *Disconnect power*
- 2     *Switch off the calibration switch*
- 3     *Reconnect power & press "STANDBY/OPERATE"*

**NOTE: LOAD CELL AND INPUT SENSITIVITY**

The relationship between load cell and the input sensitivity (X) for AD-4321 is as follows:-

LOAD CELL CAPACITY	-	"A"
RATED OUTPUT	-	"B" (mV/V)
MAX. CAPACITY	-	"C"
MIN. DIVISION	-	"D"
ACTUAL LOAD CELL RANGE USED	-	"a" ( $\frac{C}{A}$ )

AD-4321A.  $X_1 = B \times 12 \times a \times 1000 \times \frac{D}{C}$  (12 = 12V excitation voltage)

If  $X_1$  is within 1.1 to 120 $\mu$ V then the system design will be satisfactory for AD-4321A.

AD-4321B.  $X_2 = B \times 10 \times a \times 1000 \times \frac{D}{C}$

If  $X_2$  is within 0.91 to 100 $\mu$ V then the system design will be satisfactory for AD-4321B.

**EXAMPLE:-**

LOAD CELL CAPACITY	450lb	"A"
RATED OUTPUT	3mV/V	"B"
MAX. CAPACITY	300lb	"C"
MIN. DIVISION	0.05lb	"D"
ACTUAL L.C. RANGE USED	<del>188lb</del>	"a"

AD-4321A  $X_1 = 3 \times 12 \times \frac{300}{450} \times 1000 \times \frac{0.05}{3} = 4\mu V$  (design OK)

AD-4321B  $X_2 = 3 \times 10 \times \frac{300}{450} \times 1000 \times \frac{0.05}{3} = 3.3\mu V$  (design OK)

\* N.B. For a scale with a lever and multiple load cells, lever ratio and the number of load cells should be taken into consideration.



### 3-7 BASIC DESCRIPTIONS

- 1) Display Blank  
When the input signal is greater than 9D over the Max. Capacity programmed (also when it exceeds negative capacity limits) or when the input signal is not within 1mV to 36mV(AD-4321A)/ 0.8mV to 30mV(AD-4321B).
- 2) Clear Zero and Tare compensation values  
With the display off, press the "TARE" key and, while continuing to press "TARE", press the "STANDBY/OPERATE" key.
- 3) Zero limit  
When the total compensation value for zero (through zero key and zero track) exceeds  $\pm 2\%$  of capacity from the initially calibrated zero, AD-4321 will not accept Zero commands via the keyboard, remote switch or zero track.
- 4) "Watch Dog"  
This circuitry constantly monitors the central processing unit and will instantly reset the CPU if a software crash starts to develop.
- 5) "LO" Display  
For AD-4321B only when the DC electricity supply falls below the minimum level of 11V. Check the input voltage level.

### 3-8 OPERATION

- 1) Connect the power cable, the indicator will flag that there has been a power interruption with the display "- - - - -", if this display occurs at any other time you should regard it as a warning that volatile memory (weighing event data) will have been lost. Press the "STANDBY/OPERATE" key and the display will switch on. Please allow a warm-up period to achieve thermal stability in the load cell and indicator, zero will drift initially. To sustain thermal stability you should keep the indicator on "STANDBY" (Power LED on/display off) when not in use by leaving the power cable connected.
- 2) Press the "ZERO" key when the weighing platform is stable with nothing on it. The weight display will indicate zero with the Zero annunciator on.
- 3) Load the weighing platform with the container to be tared and when the display is stable press the "TARE" key. The weight display will indicate zero with the Net annunciator and Tare Entered LED on.
- 4) Fill the container and the display will indicate the Net weight of the contents. If an output option is installed, connected to a printer, you may wish to make a permanent record by pressing the "PRINT" key to register the Net (+Gross if required) weight.

#### 4. OPTIONS

OP-01 and OP-04

As these interfaces occupy the same space in the indicator, only one may be installed at a time

4-1 Option-01 is a parallel BCD (binary-coded-decimal) output card for interfacing the indicator to peripherals with a BCD input capability. A & D printers AD-8113 /AD-8114B or an A & D external display unit may be used when this option is installed.

BCD OUTPUT TABLE

Pin No.	Signal	Pin No.	Signal
1	GROUND	26	N. C. Not Connected
2	$1 \times 10^0$	27	Net (Hi) , Gross (Lo)
3	$2 \times 10^0$	28	N. C.
4	$4 \times 10^0$	29	N. C.
5	$8 \times 10^0$	30	Print Trigger (AD-8113 only)
6	$1 \times 10^1$	31	N. C.
7	$2 \times 10^1$	32	N. C.
8	$4 \times 10^1$	33	M. D. (Lo=In-motion)
9	$8 \times 10^1$	34	} Unit A
10	$1 \times 10^2$	35	
11	$2 \times 10^2$	36	} Unit B
12	$4 \times 10^2$	37	
13	$8 \times 10^2$	38	
14	$1 \times 10^3$	39	} Unit B
15	$2 \times 10^3$	40	
16	$4 \times 10^3$	41	
17	$8 \times 10^3$	42	
18	$1 \times 10^4$	43	<u>Decimal Point <math>10^1</math></u>
19	$2 \times 10^4$	44	<u>Decimal Point <math>10^2</math></u>
20	$4 \times 10^4$	45	<u>Decimal Point <math>10^3</math></u>
21	$8 \times 10^4$	46	<u>Decimal Point <math>10^4</math></u>
22	$1 \times 10^5$	47	<u>OVERLOAD</u>
23	$2 \times 10^5$	48	N. C.
24	$4 \times 10^5$	49	Print Trigger/Data Valid Tr.
25	$8 \times 10^5$	50	<u>HOLD</u> (Input)

TTL level, positive logic, fan out 1.

Mating connector---:57-30500 (AMPHENOL)

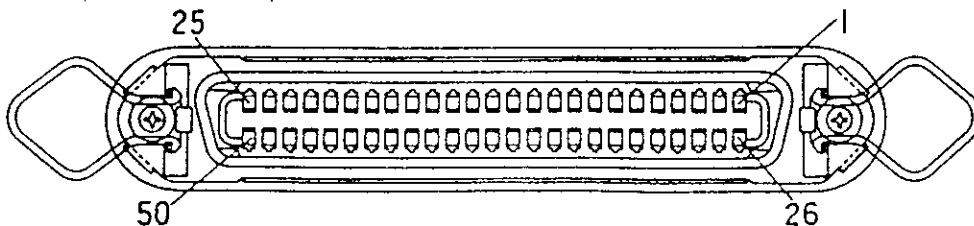
Print Trigger--- Pin N° 49 Positive pulse with approx. 1m. sec. width.

OVERLOAD--- Pin N° 47 is "Lo" for Overload but weight data 2→25 remains valid.

HOLD---Pin N° 50 is an Input Signal.

WARNING:- Only use the Pin N° 30 Print trigger with AD-8113.

OP-01



1) UNIT. BCD OUTPUT TO AD-8114B

When the indicator is connected to AD-8114B, select the unit to be transmitted (" "=space): Kg, " "g, t" " or no unit.

UNIT \ PIN N°	34	35	36	37	38	39	40	41
K g	L	L	L	H	L	H	L	L
" " g	L	L	L	H	H	H	H	H
t " "	H	H	H	H	H	H	L	H
No Unit	H	H	H	H	H	H	H	H

2) DECIMAL POINT

DECIMAL POINT	43	44	45	46
No Dec.Point	H	H	H	H
0 0 0 0 0.0	L	H	H	H
0 0 0 0.0 0	H	L	H	H
0 0 0.0 0 0	H	H	L	H

3) PRINT TRIGGER / DATA VALID TRIGGER

There are 4 types of print/data valid trigger:-

Mode 1 --- Send pulse when data is valid

Mode 2 --- Send pulse when data is stable and valid

Mode 3 --- Send pulse once only when "PRINT" is pressed

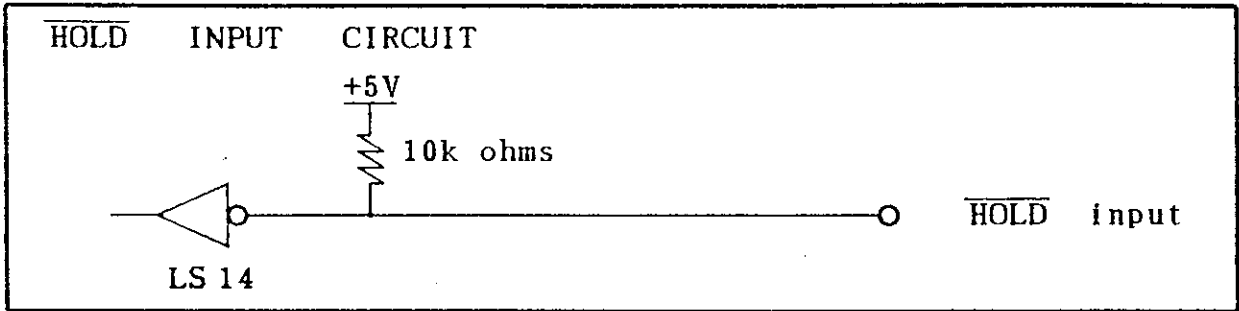
Mode 4 --- Send pulse once only when stable & "PRINT" pressed

Note: Data constantly changes with every sample so use data synchronized print trigger, data valid trigger or use HOLD input.

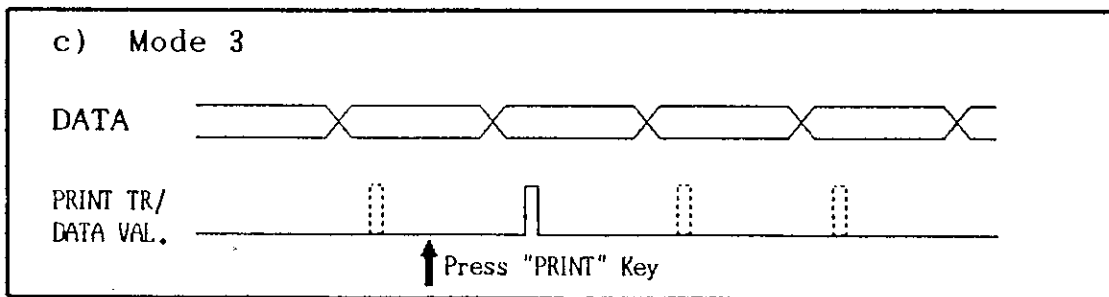
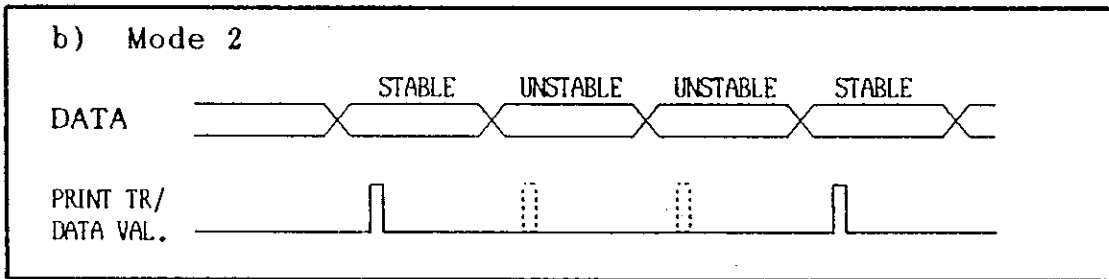
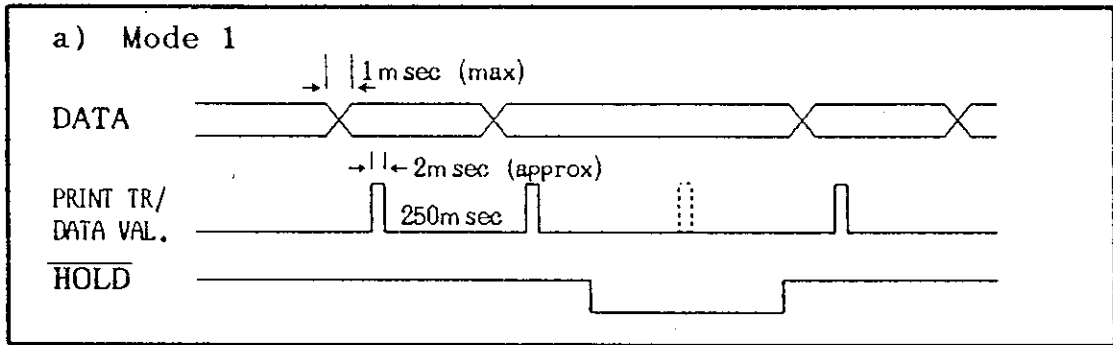
4) PRINT TRIGGER (AD-8113 only Pin N° 30)

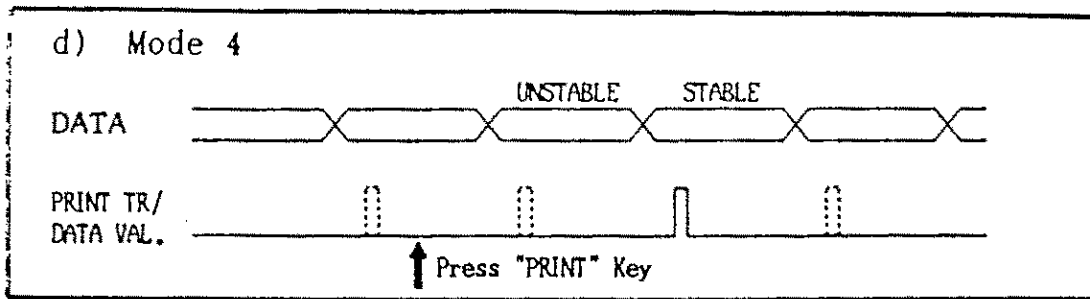
When AD-8113 is connected use the Pin 30 print trigger. A print command will be sent when "PRINT" is pressed iff dip-switch N° 6 on the BCD output card is switched ON, N° 7 is switched OFF and N° 8 is switched OFF.

- 5)  $\overline{\text{HOLD}}$  (INPUT)  
 When  $\overline{\text{HOLD}}$  input is Lo, data and weight display do not change.  
 The "ZERO", "TARE" or "GROSS/NET" keys will only effect the data and weight display when  $\overline{\text{HOLD}}$  is Hi.



6) BCD TIMING DIAGRAMS





7) BCD DIP-SWITCH SETTINGS (\*\* initial setting when unit is shipped)

SWITCH N°			UNIT
1	2	3	TYPE
OFF	OFF	OFF	No Unit
ON	OFF	OFF	" " g
OFF	ON	OFF	t " "
ON	ON	ON	K g *

SWITCH N°		MODE
4	5	TYPE
OFF	OFF	MODE 1 *
OFF	ON	MODE 2
ON	OFF	MODE 3
ON	ON	MODE 4

SWITCH N°			PRINTER
6	7	8	TYPE
ON	OFF	OFF	AD-8113 ONLY
OFF	ON	ON	ANY BUT AD-8113*

DISCONNECT THE POWER  
CABLE BEFORE ALTERING  
THE DIP-SWITCH SETTINGS!

8a) EXAMPLE:- CONNECTING AD-8113

Use a KO:145 interface cable between the BCD output port of the indicator and the input port of the printer. Program the Unit and Decimal Point settings on AD-8113. The position of switches 1,2 & 3 on the BCD output card is not important for AD-8113 but switches 4 & 5 should be OFF, switch 6 should be ON and 7 & 8 should be OFF. You may use either AD-8113's "PRINT" switch or the one on AD-4321A/B.

8b) EXAMPLE:- CONNECTING AD-8114B

Use a KO:145 interface cable between the BCD output port of the indicator and the input port of the printer. Program the Unit setting via switches 1, 2 & 3 on the BCD output card; AD-8114B is not able to print Lb.

Effects of Print Trigger/Data Valid Trigger Mode (on AD-8114B):	
MODE 1	— Print via AD-8114B "PRINT" Switch. Manual Single Printing (preferred mode) or Manual Continuous Printing Mode only.
MODE 2	— AD-8114B may not be used with AD-4321A/B in Mode 2.
MODE 3	— Print via AD-4321A/B "PRINT" Switch. AD-8114B Externally Asynchronised Print Command Mode only.
MODE 4	— Print via AD-4321A/B "PRINT" Switch. Printing waits until the Data is "Stable". AD-8114B Externally Asynchronised Print Command Mode only.

If AD-4321 is disconnected from its power supply, invalid data will be transmitted via the BCD option when it is reconnected. Invalid data will also be transmitted while AD-4321 is in calibration mode. AD-8114B Gross Mode print marker "i" may be deleted by disconnecting the line to Pin N° 27 on the BCD connector.

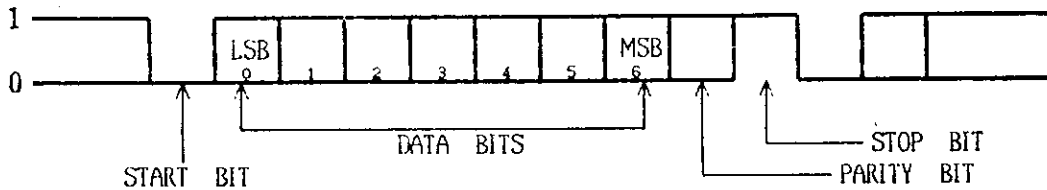
4-2 Option-O4 is a serial RS-232C interface card for interfacing AD-4321A/B to an AD-8115 scale printer, an AD-8116 compact printer or to another external device such as a computer.

a) Specifications

Type-----EIA-RS-232C  
 Passive 20mA Current Loop

Method-----Half-duplex, asynchronous transmission

Format-----Baud rate : 600 or 2400 (dip-switch selectable)  
 Data bit : 7  
 Parity bit : 1 (EVEN)  
 Stop bit : 1  
 Code : ASCII



RS-232C	20mA Cur., Loop
1 = -5V → -15V	20mA
0 = +5V → +15V	0mA

b) Transmission modes

Three transmission modes are available from both RS-232C and Current Loop, "Stream" Mode (SM), "Keyboard Print Control" (KPC) Mode and Auto-Print. A fourth, "Command" Mode, is only available from RS-232C.

In Stream Mode data will be transmitted continuously unless the BUSY input is low (Current Loop Pins 1+4 linked to pull 4 low), when it will be stopped.

In KPC Mode one weight data reading only will be transmitted when the AD-4321 "PRINT" key is pressed, unless the BUSY input is low.

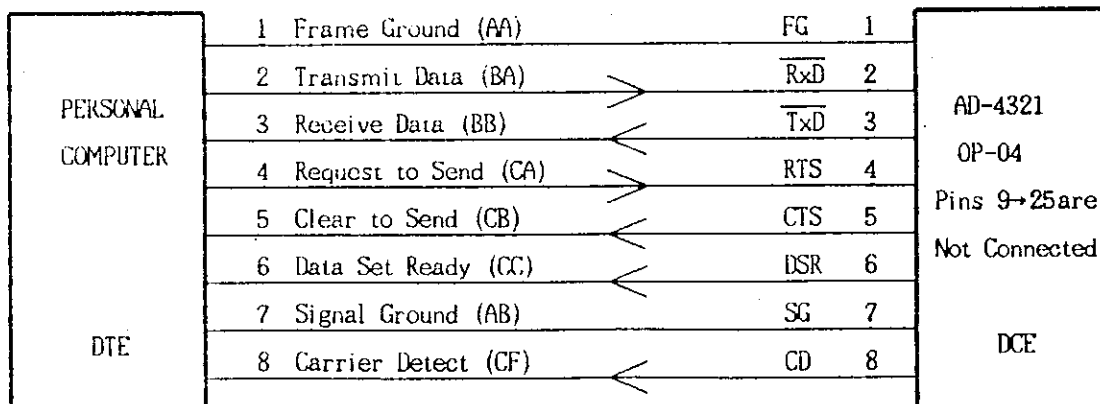
In Command Mode data will only be sent when a "READ" command is received from an external device, BUSY input is invalid. Auto-Print means that data will be transmitted for printing once per weighing event (resetting when display is <100D).

c) Connection: AD-8115, AD-8116 and other devices.

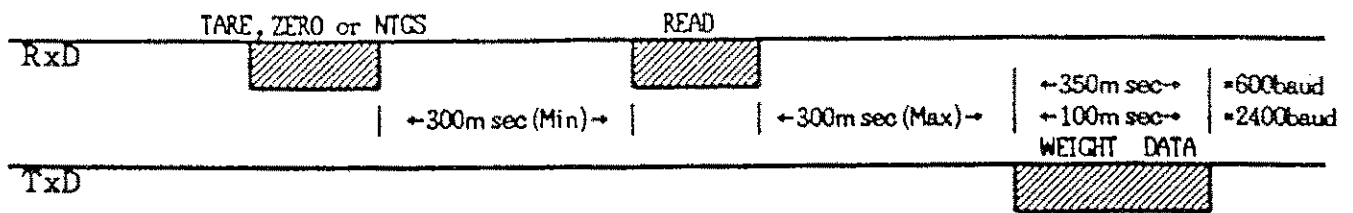
Use the AD-8115 interface cable KO:254 to connect the printer to AD-4321's RS-232C I/O port. Select Stream Mode at 2400 baud, Format 1.

AD-8116 uses a KO:256 interface cable. Select SM (AD-8116 Mode 2), KPC or Auto-Print Mode (AD-8116 Mode 1) at 2400 baud, Format 1.

AD-4321 is designated as Data Communication Equipment for other devices.



d) Command Mode Timing (RS-232C only)



i) READ Command. RxD----- (READ) (CR) (LF)

e. g.

52	45	41	44	0D	0A
R	E	A	D	CR	LF

When this READ command is received, a weight data sample immediately following the command will be transmitted. No further commands will be accepted during the 300msec. (Max) delay preceding Weight Data Transmission or during such transmission (350m sec=600 baud or 100msec=2400 baud).

ii) TARE Command. RxD----- (TARE) (CR) (LF)

When this TARE command is received, the TARE function of the indicator will be activated. After the 300m sec. (Min) delay following TARE (or ZERO or NTGS), a READ command will be accepted, but do not send it any sooner. A "TARE Command" (like the "TARE" key) is invalid if the weighing platform and weight data samples are unstable.

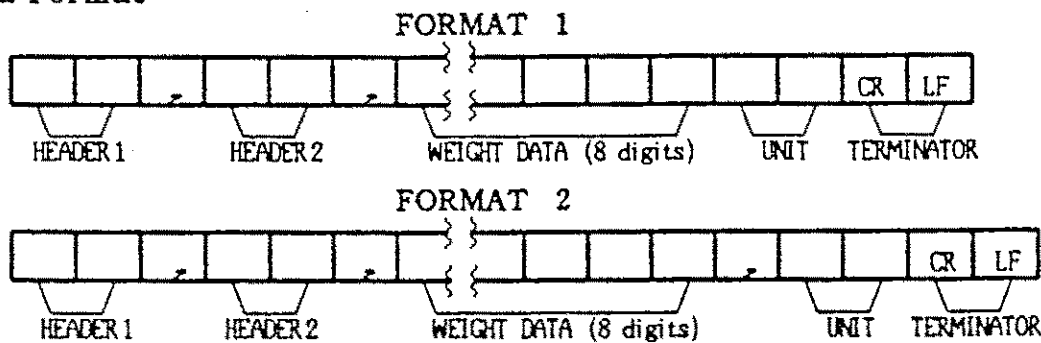
iii) ZERO Command. RxD----- (ZERO) (CR) (LF)

Has the same effect as pressing the "ZERO" key, invalid when unstable. See TARE above for timing.

iv) NET/GROSS Command. RxD----- (NTGS) (CR) (LF)

Has the same effect as pressing the "GROSS/NET" key. See TARE above for timing.

e) Data Format



Three types of HEADER 1 are transmitted:

- OL-----Overload
- ST-----Display is Stable (not-in-motion)
- US-----Display is Unstable (in-motion)

Two types of HEADER 2 are transmitted:

- NT-----Net Weight (in Net Mode)
- GS-----Gross Weight (in Gross Mode)



Weight data samples are transmitted by ASCII numerals including the following codes:

- 2D (HEX) ----- "-" (minus)
- 2B (HEX) ----- "+" (plus)
- 20 (HEX) ----- " " (space)
- 2E (HEX) ----- "." (decimal point)

Units are transmitted as:- Kg, " " g, " " t and Lb (" " = space)

Terminator= (CR) (LF)

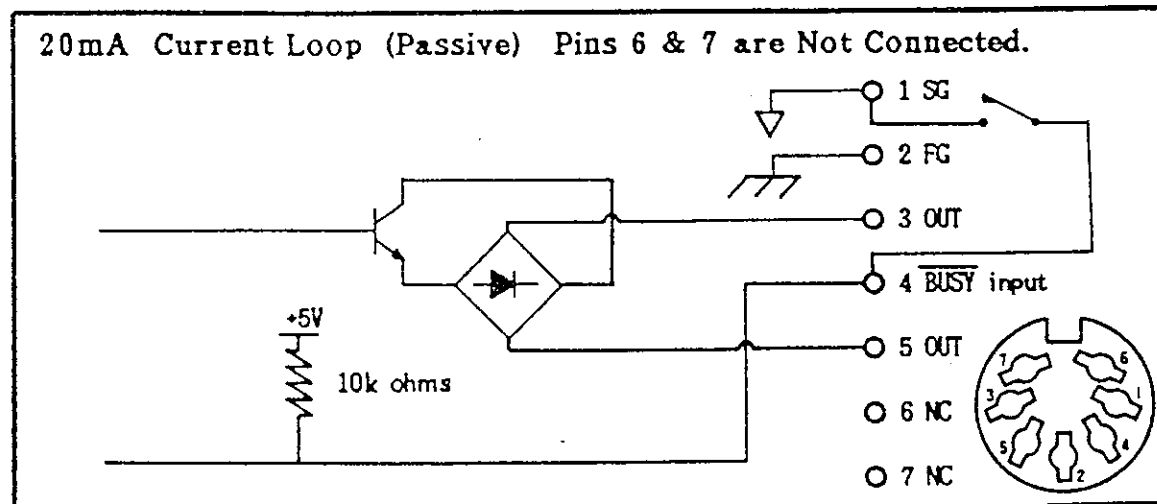
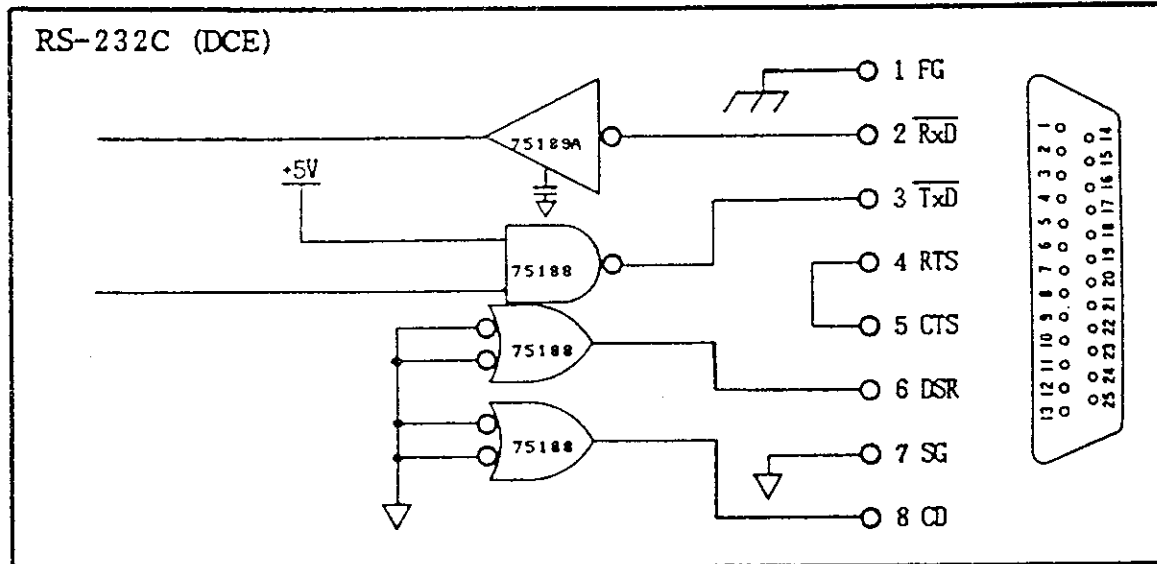
EXAMPLE. Weight= 367.0Kg (Gross Mode, Stable Weight).

FORMAT 1

53	54	2C	47	53	2C	2B	30	30	33	36	37	2E	30	4B	67	0D	0A
S	T	,	G	S	,	+	0	0	3	6	7	.	0	K	g	CR	LF

For FORMAT 2 there is an extra [ ] (2C) between 367,0 and Kg

f) CIRCUIT DIAGRAMS





g) RS-232C Dip-switch Settings (\*= initial setting when unit is shipped)

SWITCH N° 1	BAUD RATE
ON	600 baud
OFF	2400 baud *

2	3	DATA TRANSMISSION MODE
ON	ON	AUTO-PRINT MODE
ON	OFF	COMMAND MODE
OFF	ON	K P C MODE
OFF	OFF	STREAM MODE *

4	5	UNIT
ON	ON	Kg *
ON	OFF	" " g
OFF	ON	" " t
OFF	OFF	Lb

6	DATA FORMAT
ON	FORMAT 2
OFF	FORMAT 1 *

DISCONNECT THE POWER CABLE BEFORE ALTERING THE DIP-SWITCH SETTINGS!

h) Sample Computer Program, Command Mode/Format 2.  
NEC PC-9801 (Microsoft BASIC)

```

10 OPEN "COM:E71NN" AS #1
20 PRINT #1, "CLEAR"
30 FOR I = 1 TO 400: NEXT I
40 PRINT #1, "READ"
50 INPUT #1, A$, B$, C$, D$
60 PRINT A$, B$, C$, D$
70 CLOSE #1
80 END

```

EXPLANATIONS

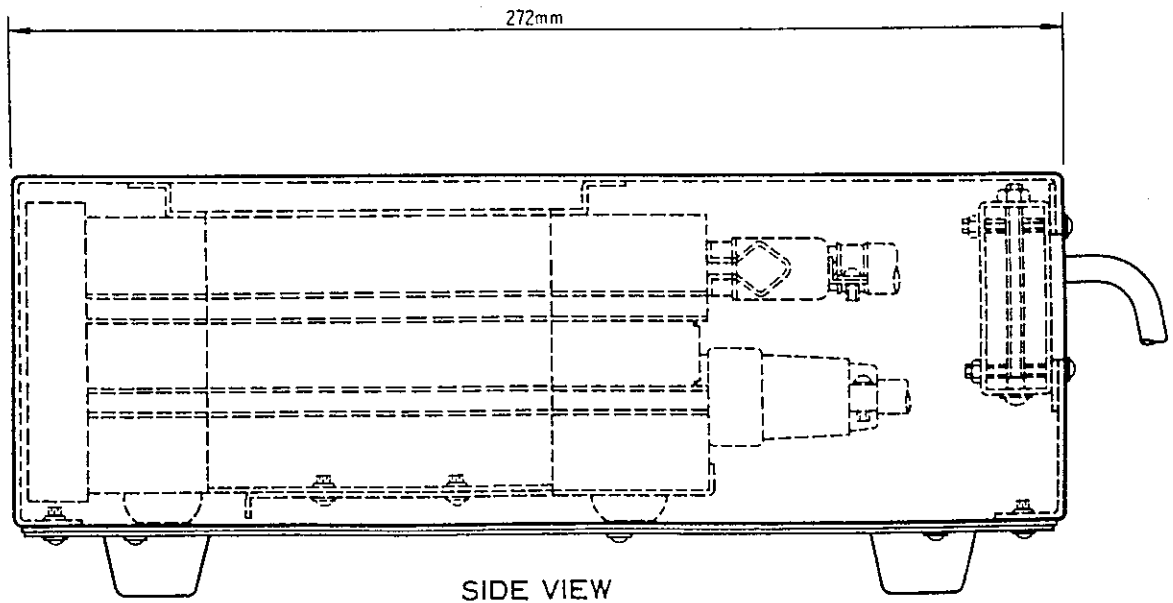
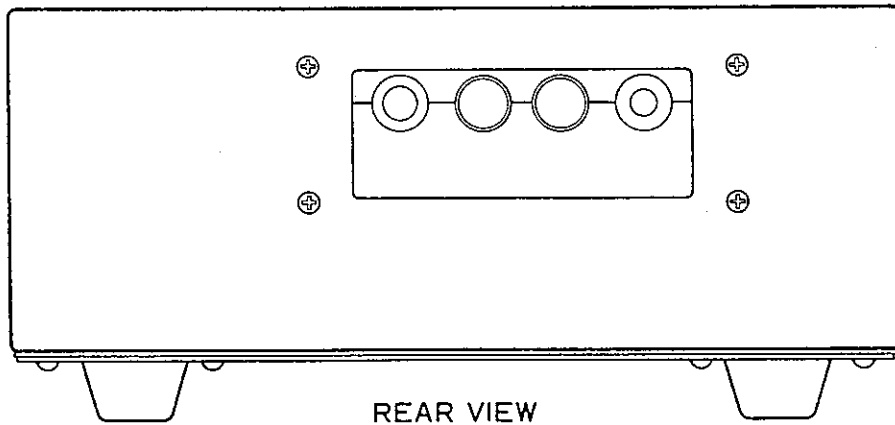
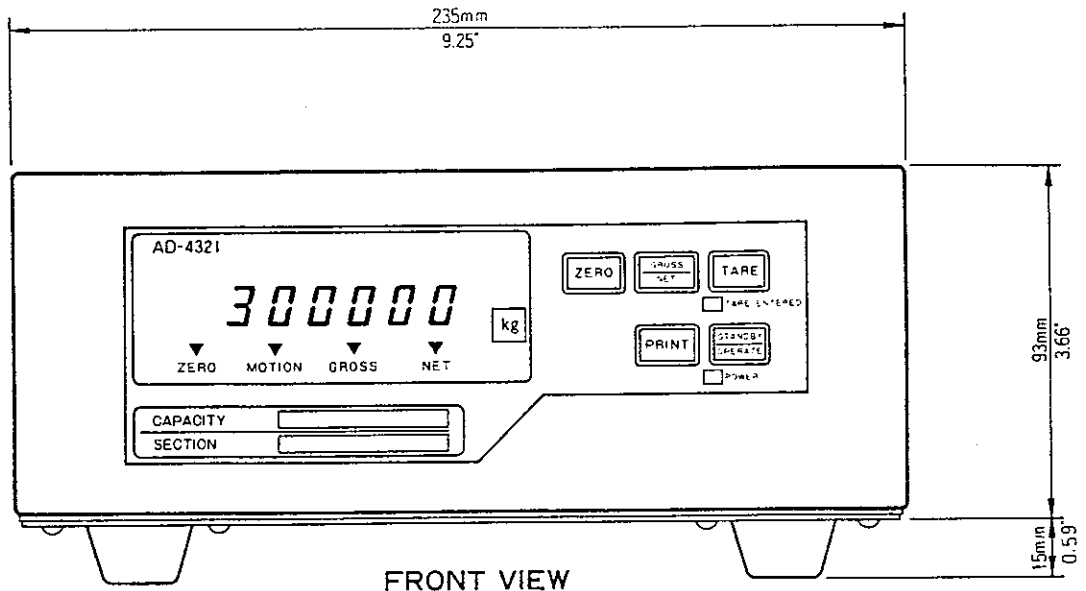
```

10 Open the RS-232C interface file. Parity bit:Even "E", Data
    bit 7, Stop bit 1 ("NN" for PC-9801 BASIC dialect) File #1.
20 Transmit (CLEAR) (CR) (LF) in order to clear AD-4321's
    interface of spurious data transmitted when the computer was
    powered-up. Only necessary once at the start of operations.
30 Delay between commands.
40 Transmit (READ) (CR) (LF) to AD-4321.
50 Receive the Weight Data from AD-4321.
    HEADER 1 = A$
    HEADER 2 = B$
    WEIGHT DATA = C$
    UNIT = D$
60 Display the Data on the VDU (e.g. "ST GS 00367.0 Kg")
70 Close the RS-232C interface file.
80 END

```

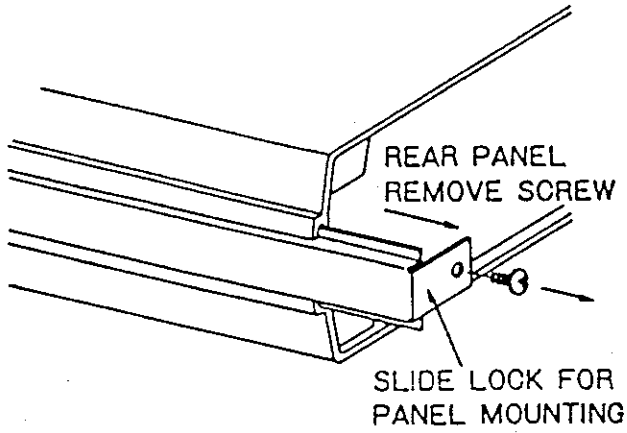
N. B. An RS-232C connector is not provided with Op-04 but a 7 pin DIN Current Loop connector (JA:TCP0576) is provided as an accessory.

4-3 Option-05 Rugged Waterproof Case.

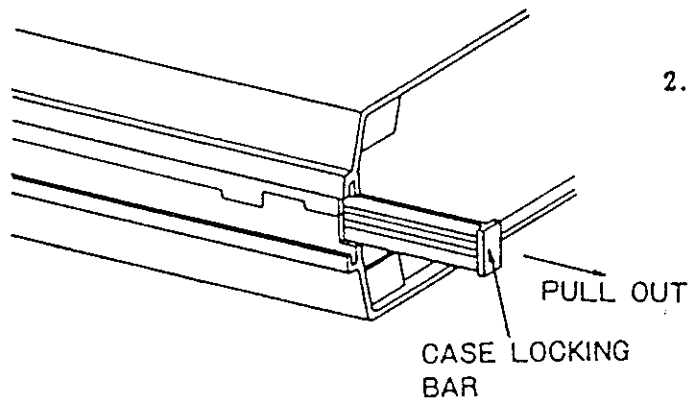
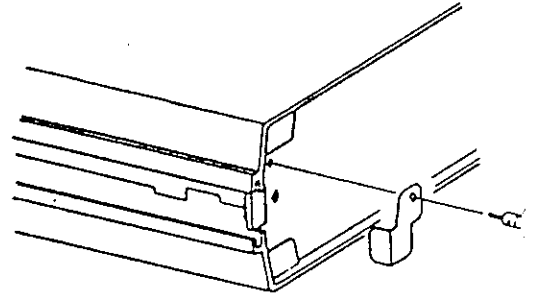


5. DIAGRAMS

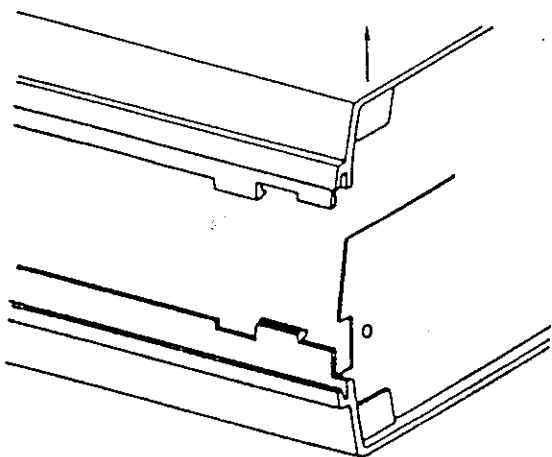
5-1 OPENING THE CASE



1. Unscrew the rear panel slide-lock screws on either side of the case and remove the slide locks. Also unscrew the anti-tamper fixing screw and remove the bracket.

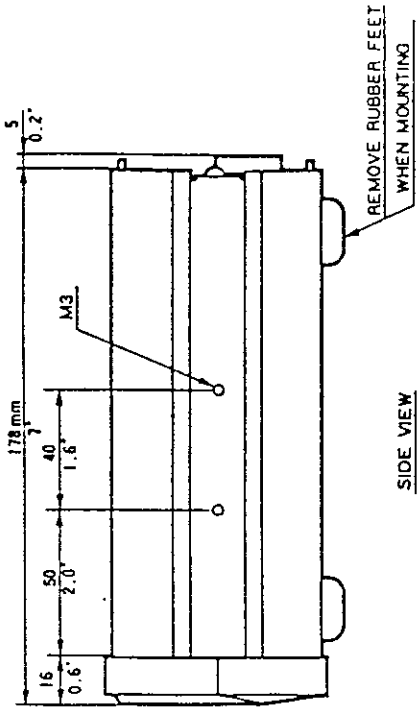


2. Pull out the two case locking bars.

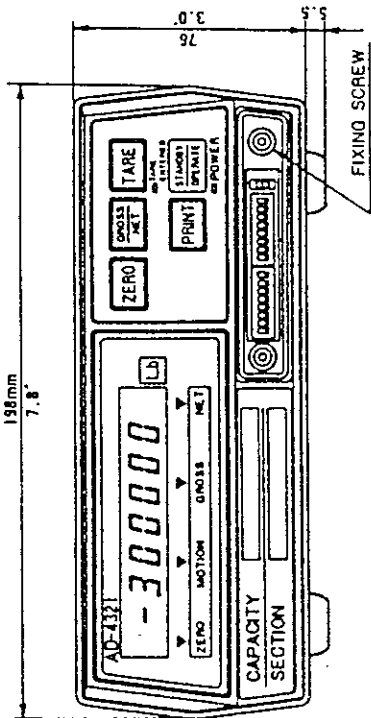


3. Gently separate the two halves of the case.

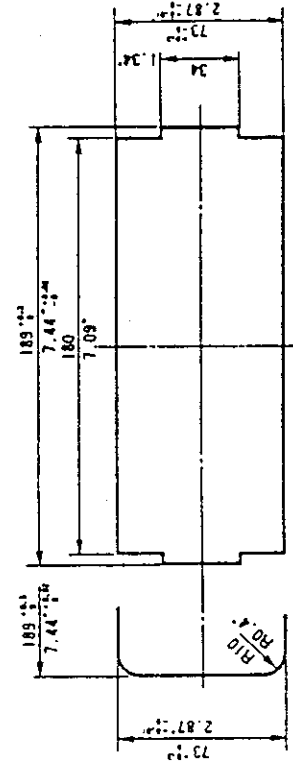
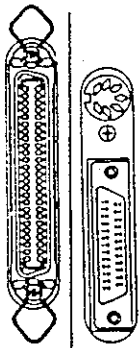
5-2 FRONT, SIDE AND REAR ELEVATIONS



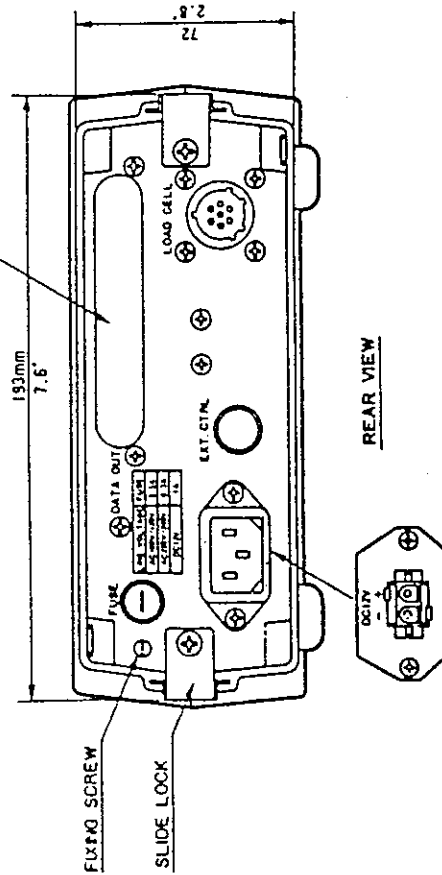
SIDE VIEW



FRONT VIEW



PANEL CUTOUT ± SIZE



REAR VIEW

FOR AD-4321B THE AC INPUT SOCKET IS REPLACED BY A DC INPUT SOCKET.

# **AND**

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