

WEIGHING CONTROLLER

AD-4335

INSTRUCTION MANUAL



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1. INTRODUCTION

PLEASE READ THIS MANUAL CAREFULLY.

This Instruction Manual concerns the AD-4335 Weighing/Hopper Controller which can control up to four scales and 67 dispensing bins. Advanced data processing techniques allow this Controller to permit very flexible system designs as well as offering other advantages only possible with computerised equipment. If this Controller is, for instance, to be used in the food processing industry, it should be clear that the days when recipes had to be painstakingly reset each time via a multitude of thumbwheels, are well and truly over! Recipes/formulas can be speedily recalled, altered, monitored and controlled via a simple keyboard and visual display unit.

The incorporation of "Time Extrapolated Estimation" (TEE) and "Automatic Free Fall Compensation" (AFFC) means that bin control has never before been as fast, accurate or as simple as it is with AD-4335. TEE means that the judgement frequency is increased from the A/D conversion speed to a resolution of about 200 judgements per second and thus dispensing from bins can be very accurately controlled. AFFC is a function which draws inferences from past experiences of the Free Fall weight value and applies what it has learnt to control the volume of freely falling material in future weighing events.

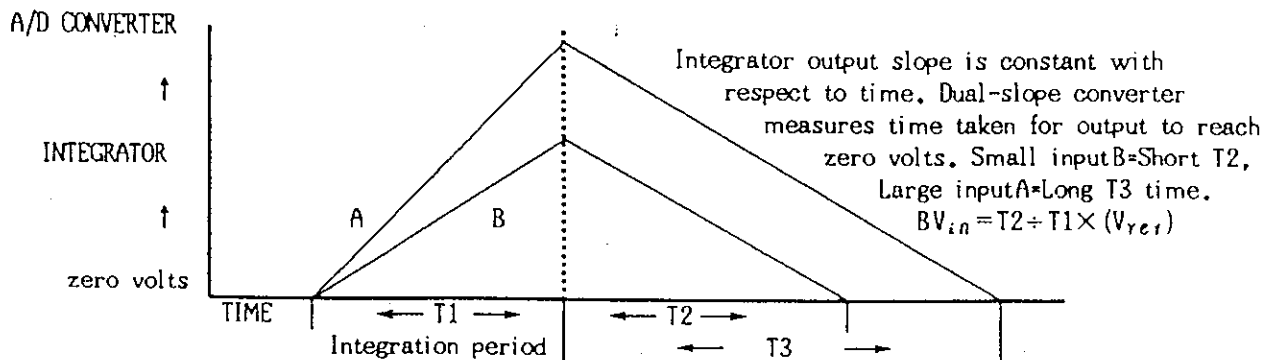
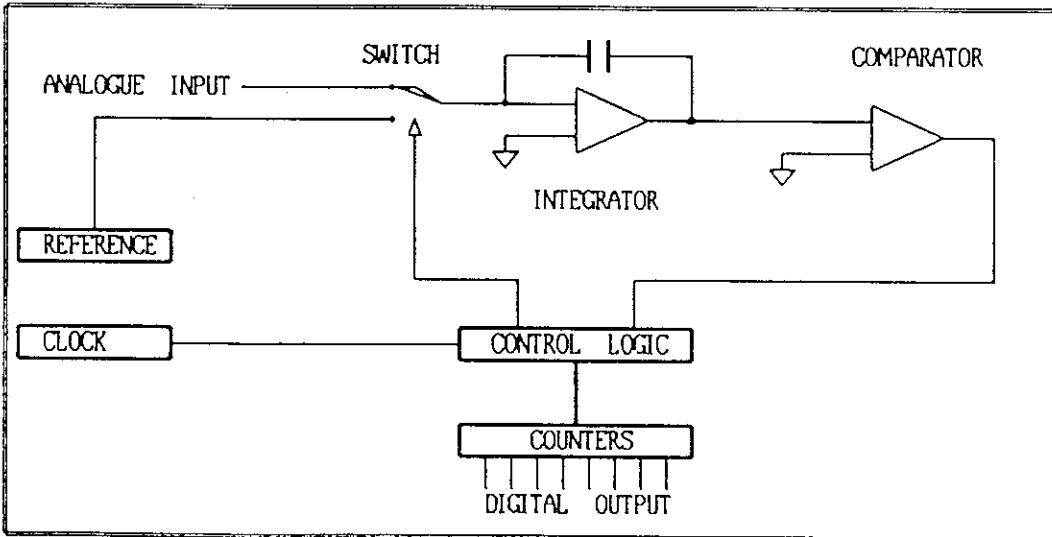
AD-4335 WEIGHING CONTROLLER FEATURES

1. Optically isolated analogue front end.
2. Accurate, stable and reliable dual-slope A/D converters.
3. Convenient RS-232C interface for Computers and Printers.
4. Ergonomically designed, colour coded dust-proof sheet keyboard.
5. Nickel Cadmium trickle charged battery back-up to protect all the volatile memory (including the internal clock) for up to ten days in the event of a power failure/interruption.
6. Incorporates "TEE" - Time Extrapolated Estimation - for very accurate control of filling and batching operations.
7. Clear 9 inch green CRT visual display unit and clear impact dot-matrix printing.
8. Can remember up to 194 different formulas (99 ingredients/67 bins).
9. High A/D resolution and high accuracy.
10. AD-4335 can drive up to 16 load cells (@ 350 ohms each).

2. SPECIFICATIONS

2-1 ANALOGUE INPUT AND A/D CONVERSION

MODEL N°	AD-4335
Input Sensitivity	0.7 μ V/D to 3.6 μ V/D (D=Minimum Division)
Zero adjustment range	36mV (Max) [Span=7mV to 36mV]
Load cell excitation	12VDC, 280mA (voltage sensing) can drive 4 LCs in parallel
Input Impedance	10M ohm (min)
Load cells (max)	4 per board * 350 ohms (8 for LC-B5103/4 for LC-T263A/LC-T363)
Temp.coefficient	Zero \pm (0.3 μ V \pm 0.005% of the initial zero offset voltage)/°C Span \pm 20ppm/°C of rdg.
Input noise	\pm 0.3 μ V p-p
A/D conversion method	True Integrating Dual-slope
A/D resolution	40,000 counts (max)
A/D conversion rate	15-16 conversions per second
Display resolution	10,000



2-2 DIGITAL SECTION

MODEL N°	AD-4335
Display Panel	9 inch green CRT visual display unit
Text Display	40 X 24 character display (960 character spaces)
Keyboard	32 keys and 6 LED (light-emitting diode) annunciators
Printer type	Impact 5 X 7 dot-matrix
Print lines	40 characters per line
Printing speed	1 to 2 lines per second
Paper	Normal roll paper, 69mm/2.72" wide
Internal Memory	64K bytes of DRAM working memory
Display Memory	16K bytes DRAM
Program Memory	128K bytes ROM
Data Memory	64K bytes CMOS RAM with NiCd battery back-up

2-3 GENERAL

MODEL N°	AD-4335
Power (AC• 50 or 60Hz)	100, 115, 200, 220, 240V AC ±1%; 200VA
Weight	30kg (66lb) approx.
Operating Temperature	-5°C to +40°C (+23°F to +104°F)
Max.Op.Humidity	95% Relative Humidity or less (non-condensing)
Physical Dimensions	350(W) x 450(H) x 420(D)mm / 13.8" x 17.7" x 16.5"

2-4 ACCESSORIES

Load cell connector NJC-207-PF, RS-232C connector HDB-25S,
 2 Coax connectors BNC-P-58U (external CRT & Optional Scoreboard)
 Bin Selector connector=361J032-AG & Sequence Control=361J024-AG
 Printer Ink ribbon and 3 rolls of paper
 Fuse 100 or 115VAC = 2A & 200, 220 or 240VAC = 1A

* WEIGHT CONVERSION TABLE *	
One Kg	= 2.204 62Lb (avoir) approx.
One g	= 0.035 27 oz (avoir) 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 216 imp.gal. (ale), 252 imp.gal. (wine). "weight" = volume X density*
One Lb	= 0.453 592 37Kg (UK) or 0.453 592 427 7Kg (USA)

*One imp.gal. of distilled water @ 62°F = 10Lb = 4.536Kg but also about 4.546 litres/dm³/Kg @ 4°C.

One litre of water @ 4°C = 1Kg. One US gal. is about 5/6 of an imp.gal. or about 3.785 litres (liters).

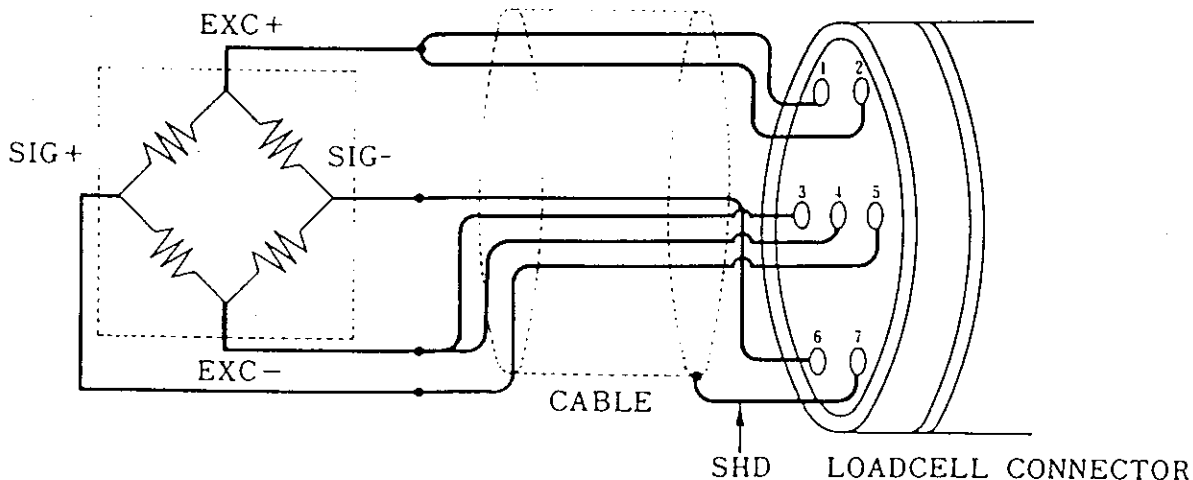
WARNING!! ONLY QUALIFIED ENGINEERS SHOULD INSTALL OR SERVICE THIS EQUIPMENT. ELECTRIC SHOCKS CAN CAUSE DEATH!

3. OPERATION

3-1 INSTALLATION

- Do not allow AD-4335 to be exposed to direct sunshine, sudden temperature changes, vibration, wind, water or excessive dirt.
- Earth via the power cable to the rear GND terminal. Ensure a good earth connection. Do not earth directly to other equipment.
- The analogue output from the load cell and the RS-232C input/output 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. Keep all cables/coax as short as possible.
- If the local AC electricity supply fluctuates by more than $\pm 10\%$, an AC regulator must be used to stabilise the power supply.

3-2 LOAD CELL CONNECTION



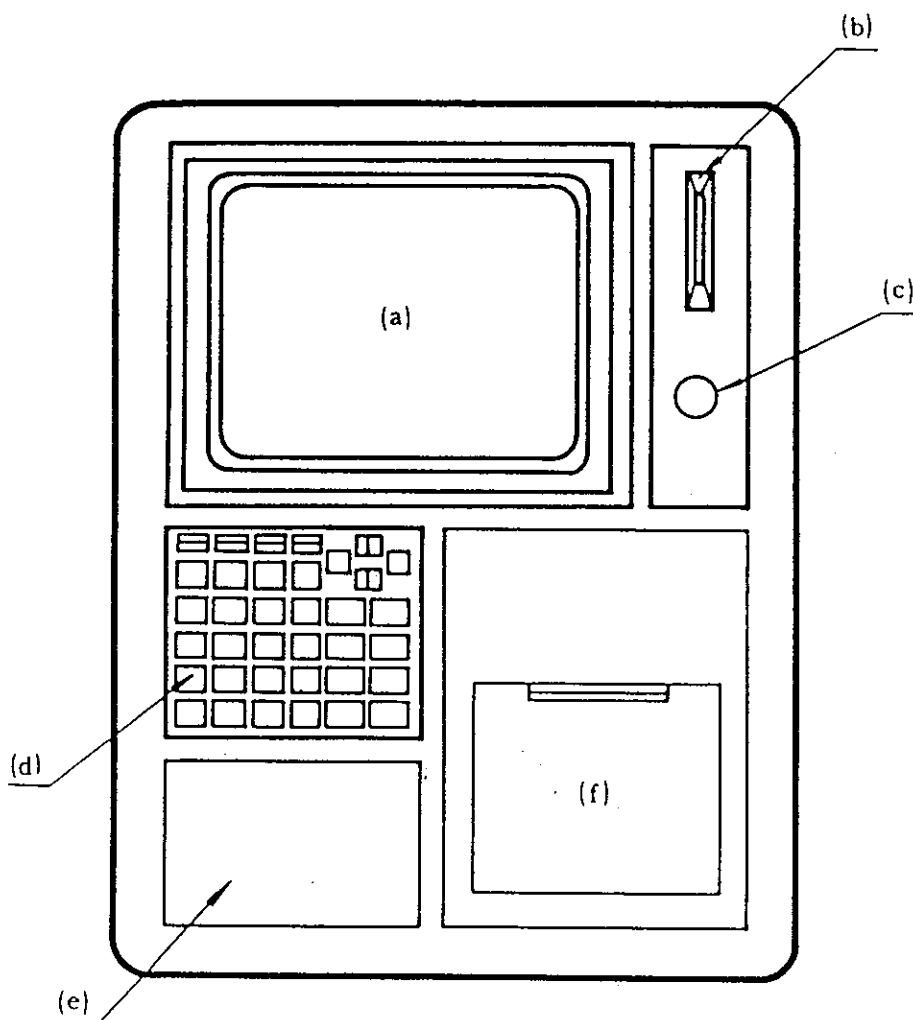
LOAD CELL PIN CONNECTIONS		CABLE COLOUR CODE	
PIN NUMBER	SIGNAL	LC-B5103,LC-T263,	LC-C861,LC-C872etc
1	EXCITATION + (EXC+)	RED	RED
2	SENSE + (SEN+)		
3	SENSE - (SEN-)		
4	EXCITATION - (EXC-)	BLACK	WHITE
5	SIGNAL + (SIG+)	GREEN	GREEN
6	SIGNAL - (SIG-)	WHITE	YELLOW
7	SHIELD (SHD)	ORANGE	WIRE

USE A SIX WIRE CABLE WITH SHIELD.

If AD-4335 is located near the load cells (within a few metres) 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 THE DISPLAY PANEL

The AD-4335 display panel has a 9 inch green CRT at location (a) on the diagram below. This visual display unit allows an operator to monitor and program weighing operations with ease. Programming can be carried out either via the keyboard at location (d) or, even more easily, via the optional Optical Punch-Card Reader at location (b). A key switch has been provided in order to protect the memory from being tampered with (REG), or to deny access to the computer (CPU); this is located at position (c). The analogue board[s] used in calibration of the (1-4) scales is/are located behind the metal panel cover at (e); this cover may be secured with a wire and crimped lead seal. The printer and the emergency RESET button are located behind the cover labelled (f) on the diagram below.



3-4 EXPLANATION OF THE KEYBOARD

Starting with the LED annunciators, when ON:- READY=ready to weigh; START=starting to weigh; FINISH=weighing finished; ERROR=weighing error; PRINTER=printer will print (press the key and the LED and printer will switch off); CHAR INPUT=letters may be entered via number codes (LED will remain off unless the key is pressed).

As for the keyboard, if an invalid key is pressed the error will be signalled by an alarm buzzer. The four "arrow" keys are for moving the cursor.

CHECK allows you to check if the span calibration has drifted.

ZERO NULL cancels a SCALE ZERO command.

SCALE ZERO may be used to zero the display.

SCALE SELECT may be used to select the scale (marked by a *).

CLEAR may be used to delete programming errors.

The YES/NO keys may be used to answer questions asked by the Controller.

ENTER terminates commands to the Controller.

The F1, F2 & F3 function keys are used in programming the Controller.

NEXT PAGE is used in a display mode when all the data can not be presented on one page.

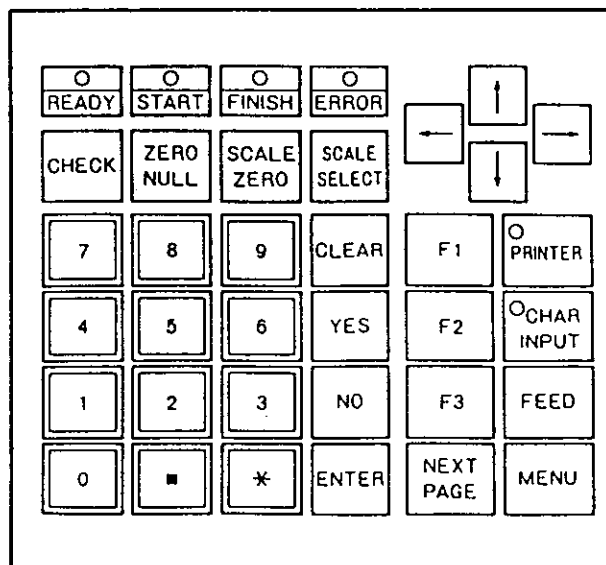
PRINTER key may be used to disable the printer (when the LED is OFF).

CHAR INPUT key may be used to enter letters rather than numbers.

FEED (paper feed) and PRINTER are the only two keys which are always active and never disabled.

MENU offers a list of display mode options and is the starting point for programming.

"." is the decimal point, * sometimes may be substituted for YES and the 8 to 9 number keys may be used to enter alphanumeric information.



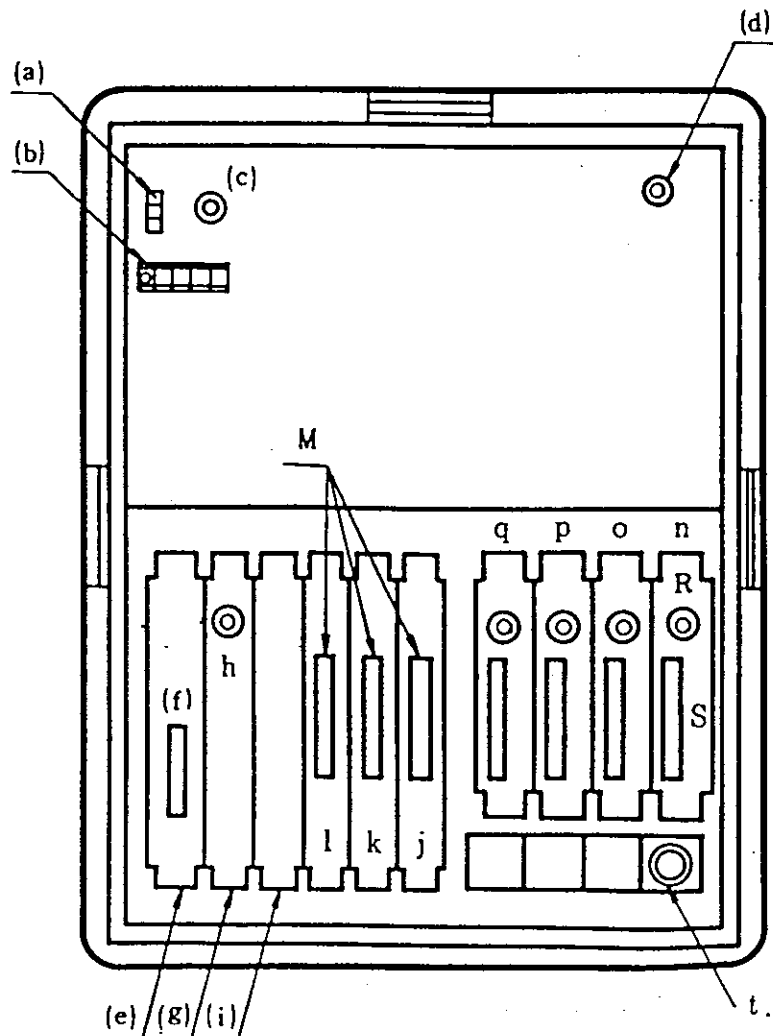
WARNING!! Electric shocks can cause death, avoid live AC power terminals!

3-5 EXPLANATION OF THE REAR PANEL

(a) is the location of the power switch and (b) the location of the 3 input terminals for the AC power supply; live, neutral & earth/GND. PLEASE NOTE THAT THIS EQUIPMENT MUST BE EARTHED. An anti-surge/time-lag fuse is located at (c) and the brightness control for the CRT visual display is at (d).

The PIO interface board is at (e) with an RS-232C output connector at (f); printers or computers may be connected via (f). The CPU board is at (g) with a coaxial output socket for an external CRT at (h). (i) is the location of the Memory Board and (l), (k) & (j) are the slots for the CH.3, 2 & 1 bin selection output boards. (j) is standard and will control 1-19 bins but (k) & (l) are optional(OP-02) and will control 20-43 and 44-67 bins respectively.

(q), (p), (o) & (n) is the location of the A to D conversion boards 4, 3, 2 & 1. (n), or board 1, is standard but the other three boards are optional (OP-01). These boards come with a coaxial output socket (R) for the OP-05 Net Weight Scoreboard and a sequence signal connector at (S). The load cell connector for each A/D board is located at the position (t) occupies.



3-6 DIP-SWITCH PROGRAMMING

Dip-switch programming is carried out via dip-switches located on the A to D conversion board[s] and the CPU board inserted into slots in the rear panel. One eight segment dip-switch assembly is located on each A/D board and two are located on the CPU board. In both cases the boards should be carefully removed from their slots for setting the switches and then, just as carefully, returned. After setting the switches the rear panel can be sealed with wire and crimped lead seals. The setting of the zero and span dip-switches located on the analogue board[s] in the front panel will be covered under CALIBRATION.

A/D BOARD (PC:621A) 8 SEGMENT DIP-SWITCH

SEG. N°	FUNCTION	ON/OFF			NOTE
1	MINIMUM DIVISION	X1=ON	X2=OFF	X5=ON	MIN.DIV.="D"
2	MINIMUM DIVISION	X1=ON	X2=ON	X5=OFF	NEVER OFF, OFF!
3	AC FREQUENCY 50/60Hz	50Hz=ON, 60Hz=OFF			RE:A/D ACCURACY
4	DIGITAL HYSTERESIS FUNC'N	USED=ON, UNUSED=OFF			
5	CHECK	DISABLED=ON			THUS KEEP IT OFF
6	ZERO TRACK ON/OFF	ZT ON=ON, ZT OFF=OFF			
7	COMMAND COMMUNICATION	ENABLED=ON			NORMALLY ON
*	WITH MAIN UNIT	DISABLED=OFF			
8	INTERNAL COUNT	NORMAL DISPLAY=ON			NORMALLY ON
*	INTERNAL COUNT	INTERNAL DISPLAY=OFF			

Segments 1 & 2 control the Minimum Division setting, the steps by which the least significant digit of the display will be incremented. A maximum display (of 10000 divided by 1) may be increased at the cost of decreased display resolution as the LSD moves from X1 to X2 to X5 (50000 divided by minimum steps of 5*D").

Segment 3 should be correctly set as the power frequency waveform could otherwise interfere with the A/D conversion process.

Segment 4 should be switched ON if small vibrations (1 or 2 counts) in the weighing system cannot be eliminated from the display by other methods (such as eliminating the cause of the problem!).

Segment 5 should always be kept OFF.

Segment 6 will track small drifts from the centre of zero when it is switched ON.

Segment 7 should be kept ON unless the A/D board is being used alone to drive an external display (for instance when something disastrous has happened to the CPU or CRT) in which case command communication with the main unit must be disabled. This switch must be used in conjunction with another switch inside the printer box. This second toggle switch must be pulled out and pushed up for ON or down for OFF.

Segment 8 should be kept ON under virtually all circumstances.

CPU BOARD TWO 8 SEGMENT DIP-SWITCHES SW1 & SW2

SW1

SEG. N°	FUNCTION	ON/OFF				NOTE
1	NUMBER OF SCALES 1-4	1-OFF	2=ON	3-OFF	4=ON	NUMBER OF
2	NUMBER OF SCALES 1-4	1-OFF	2=OFF	3=ON	4=ON	OP-01 BOARDS
3	CARD READER OP-03?	YES=ON		NO=OFF		
4	MEMORY OPTION-04?	YES=ON		NO=OFF		
5	WEIGHT UNIT SCALE 1	Kg=ON		t=OFF		FOR Lb SEE
6	WEIGHT UNIT SCALE 2	Kg=ON		t=OFF		SW2 SEGMENT
7	WEIGHT UNIT SCALE 3	Kg=ON		t=OFF		NUMBER 7
8	WEIGHT UNIT SCALE 4	Kg=ON		t=OFF		

SW2

SEG. N°	FUNCTION	ON	OFF
1	SETTING FORMULA N° & N° OF BATCHES	CPU OR KEYS	CPU NOT USED
2	JOB NUMBER INPUT	WITH N° INPUT	WITHOUT N° INPUT
3	REWRITE FREE FALL DATA IN MATERIAL TABLE	ENABLED	DISABLED
4	OUTPUT TIMING OF FINAL BATCH FINISH SIGNAL	ON BATCH START	BEFORE PRINTING
5	CHANNEL OUTPUT MODE/BIN SELECTION	BCD OUTPUT	BIT OUTPUT
6	CONDITION FOR PROCEEDING TO NEXT BATCH	EXTERNAL SIGNAL	NO CONDITION
7	OVERRIDE Kg AND t UNITS WITH Lb	ALWAYS Lb	Kg OR t, SW1
8	NOT USED	NOT USED	NOT USED

Segments 1-4 of SW1 must be set correctly for your unit or the weighing system will not work.

Segments 5-8 of SW1 may be used to set the Kg or t weighing units for each scale. You may not mix Kg or t on one scale with Lb on another scale because the units are unrelated to each other (when t=tonne).

Segment 1 of SW2 should be switched ON with the security key switched to "CPU" when the Formula Number and Number of Batches should be controlled by the CPU and not the keyboard or card reader. If the security key is not switched to "CPU" (and then removed), data from the keyboard and card reader will be received.

Segment 2 of SW2 allows a 4 digit Job N° to be input when it is ON.

Segment 3 of SW2. When this is ON the contents of the Formula Table, Material Table and Scale Program Table generally speaking cannot be altered unless the security key is switched to "REG". However if this segment is switched ON when automatic free fall compensation is in use, free fall data can be written in the Material Setting Table.

Segment 4 of SW2. When this is ON a Job finished signal will be output when the start signal for the final batch is sent. When it is OFF the signal is sent before printing and then switched off afterwards.

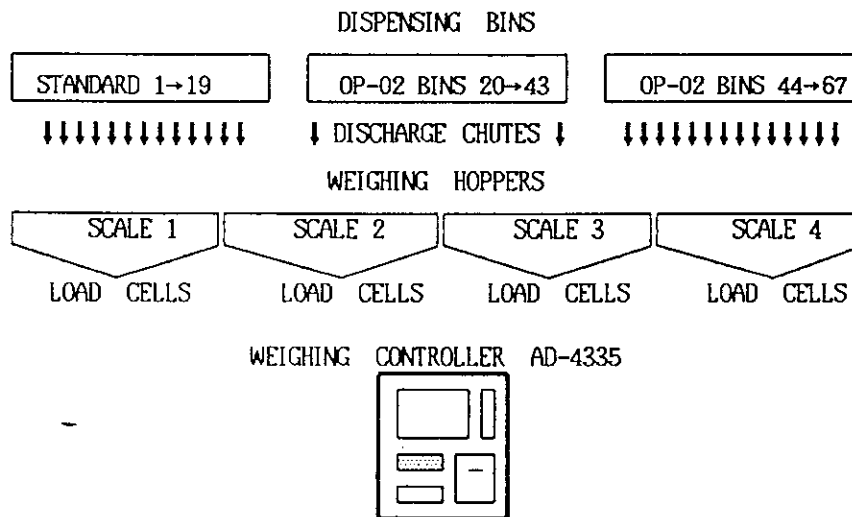
Segment 5 of SW2 controls the Channel output or rather bin selection output mode. If this switch is ON the signal is transmitted in BCD format but if it is OFF the signal is transmitted from the terminal of an assigned channel number.

Segment 6 of SW2. When ON the Controller will not proceed to weigh the first Batch in the next Job unless an external signal is applied to A8 on the number one A/D board, after printing, following a previously completed Job.

Segment 7 of SW2 will override SW1 segments 5-8 when ON and thus all the scales must be calibrated to read weights in pounds (Lb).

Segment 8 of SW2 has absolutely no purpose whatsoever!

LAYOUT OF WEIGHING SYSTEM



NOMENCLATURE:

"INGREDIENTS" are stored in dispensing "BINS". AD-4335 controls the "GATES" which open to allow ingredients to flow down "DISCHARGE CHUTES" to be weighed via "LOAD CELL" transducers in "WEIGHING HOPPERS" by the "WEIGHING CONTROLLER". A number of ingredients make up a "FORMULA", which when weighed is called a "BATCH". Batches are typically mixed and discharged after weighing. A number of batches make up a "JOB". The ingredients still in the chutes when the gates close are referred to as "FREE FALL" and when these ingredients are added to the "PRELIMINARY WEIGHT" of formulas already in the weighing hoppers, the "FINAL WEIGHT" or target weight of the product has been reached. In order to be able to close the gates completely at exactly the right moment in time, "FULL FLOW" is reduced to "DRIBBLE FLOW" at a point in time called "PRELIM". Dribble flow reduces oscillations in the scale and permits "TEE", which switches on at the prelim point, to make very accurate calculations.

3-7 CALIBRATION (ZERO AND SPAN ADJUSTMENT)

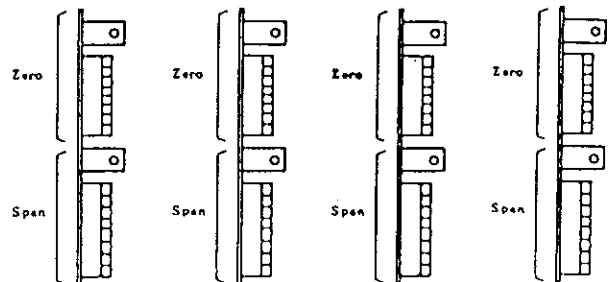
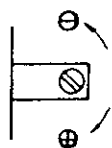
Calibration of the Controller is required when it is initially installed, when changing the installation site (or any part of the complete weighing system) and additionally every three months or so. "Weight" = Mass \times acceleration due to Earth gravity (about 9.8 metres per second per second in a vacuum) however gravity, air pressure and other factors vary from location to location and from time to time.

1. PREPARATION

- a) Install the Controller and program the dip-switches with reference to section 3-6. Connect the load cells installed on the scales to the Controller via the load cell input connectors. Make sure that all the solder joints are good and that the insulation/waterproofing of the connections and junction boxes located outside is thorough and complete. Take into account factors such as lever ratio and number of load cells when designing a weighing system to match this Controller's load cell input sensitivity parameters (0.7-3.6 μ V/D).
- b) Turn on the power and allow a warm-up period of at least 30 minutes to achieve thermal stability in the load cells and Controller.
- c) Obtain a standard load equal or close to the maximum capacity of the scale. Make sure that the scales are empty, clean with nothing liable to foul or induce friction in the weighing platform assembly. Switch OFF zero track.
- d) The Zero and Span dip-switches/adjustment trimmers are located on the 1-4 analogue board [s] found behind the panel cover below the keyboard. Board 1 is on the left and refers to Scale 1 on the visual display unit.

2. PROCEDURE

- a) ZERO ADJUSTMENT. Zero dip-switch segment N^o 1 has the least effect on zero offset adjustment and segment N^o 8 has the greatest effect.
- b) After bringing the display to a figure which is as close to zero as possible with the Zero dip-switch, final adjustment is carried out via the zero adjustment trimmer above it.
- c) After achieving an exact zero display proceed to span adjustment and place the standard known weight (e. g. 1 tonne) on the scale.
- d) SPAN ADJUSTMENT. Span dip-switch segment N^o 1 has the least effect on the span display and segment N^o 8 has the most effect.
- e) Bring the display to indicate a figure which is as close to the value of the standard weight as is possible with the Span dip-switch segments and then produce an exact weight display with the span adjustment trimmer.
- f) Remove the weight and recheck/trim zero (zero track should be off) and then replace the weight to recheck the span reading. If necessary repeat these steps until you obtain a clean return to zero and an exact standard weight display.
- g) When zero and span calibration have been completed for all the scales you may replace the panel cover, switch on zero track and commence weighing operations. Until the internal battery has had time to charge you should be especially careful to ensure that the power switch is never switched off or all the volatile memory, including the span and zero values, may be lost.



3-8 OPERATION

1. MEMORY BOARD INITIALISATION

This Weighing Controller contains volatile 64K CMOS RAM as data memory but this is protected by an internal rechargeable NiCd battery. When the Controller is first installed, this battery will probably have discharged and will require charging for about one day before the Controller can safely be switched off again.

After programming via the dip-switches and calibrating the scales, you may proceed to memory initialisation.

When the display is in "WEIGHING" mode, "KEY IN FORMULA # & ENTER" is displayed at the bottom of the screen with the flashing cursor at the top. If "Exec err-----" (execution/program run error) is displayed, simultaneously press both the "*<" and RESET buttons on the keyboard and inside the printer box respectively. "CHECK PROGRAM" will then be displayed with a list of 0→9 options. Ignore 0→8 options which are for use during manufacture and press "9". The screen will clear and then, if "00" is written in the data memory, "CHECK PROGRAM" will be displayed again --- this time only press the RESET button and the display will return to "WEIGHING" mode.

If "Exec err-----" is not displayed press "MENU" and when the menu is displayed select item number 4 ": INITIALIZE (CLEAR ALL TABLES)" and ENTER. When the Controller asks the question "CLEAR ALL TABLES ? Y/N" answer with YES rather than NO which would return you to menu. Each time a table has been initialised a * will be displayed on the screen and when all the tables have been initialised the display will automatically return to menu.

When an error occurs within a single table in one of the "DATA SETTING MODES" in future, this single table should be cleared via the "DELETE (3)" command with the security key switch set to "REG".

2. A/D BOARD INITIALISATION

This board uses the battery on the memory board to back-up Zero/Tare values held on this board. Thus if either board is disconnected these values will be lost and the problem will be indicated by "+ " or "- " being displayed without any weight value. After reconnection re-establish Zero/Tare values via the SCALE ZERO and ZERO NULL keys. Alternatively just "+ " or "- " displayed could mean that the weight value set via the SCALE PROGRAM TABLE is too small or that the displayed weight value has exceeded the maximum capacity by +10 counts (the point at which the display will blank).

3. PROGRAMMING EACH SETTING TABLE

When the display is in normal "WEIGHING" mode, press "MENU" and program the tables in the order of:- firstly "SCALE PROGRAM (3)", then "MATERIAL (2)" and lastly "FORMULA (1)".

```
-MENU-
*TABLE REGISTRATION
  :FORMULA TABLE           ( 1)
  :MATERIAL TABLE         ( 2)
  :SCALE PROGRAM TABLE    ( 3)
  :INITIALIZE (CLEAR ALL TABLES) ( 4)
**WEIGHING                  ( 5)
*TOTAL TABLE :GRAND TOTAL PRODUCT ( 6)
               :SUB TOTAL PRODUCT ( 7)
               :GRAND TOTAL MATERIAL ( 8)
               :SUB TOTAL MATERIAL ( 9)
               :PRODUCT TOTAL/JOB (10)
*FORMULA - PRODUCT TABLE (11)
*RECEIVE FROM EXT.DEVICE (12)
  TRANSMIT TO EXT.DEVICE (13)
*DATE/TIME SETTING        (14)
KEY IN DESIRED NUMBER & "ENTER" (  )
```

a) Scale Program Table

Access the Scale Program Table by pressing "3" and then "ENTER". When in Scale Program Display Mode you will be required to provide information concerning the :- NUMBER OF SCALES; MEMORY OPTION; CARD READER OPTION; SCALE 1; SCALE 2; SCALE 3; SCALE 4; DECIMAL POINT LOCATION; MAXIMUM CAPACITY; ZERO BAND; T1 (S) MAXIMUM WEIGHING TIME BEFORE TIME OVER; T2 (mS) MAXIMUM VALID TIME; BATCH FORMAT (1:CYCLE 2:WEIGHT) 1 or 2? PRINT EACH BATCH WEIGHT YES/NO? PRINT JOB WEIGHT DATA YES/NO? EDIT (1); REGISTER (2); DELETE (3); PRINT (4).

These headings will be explained on the next page.

SCALE PROGRAM TABLE

- i) Number of Scales. The number indicated by dip-switch segments 1 & 2 of SW1 on the CPU board should be displayed, this number must be correct for your weighing system or the system will not work.
- ii) Memory Option. This will depend on the setting of segment 4 of SW1. With the extra memory installed, 1 to 194 different formulas may be stored in memory but without it only 74 formulas may be stored.
- iii) Card Reader Option. This will depend on the setting of segment 3 of SW1. This optional card reader makes programming the controller simple enough for totally untrained personnel.
- iv) Unit. When displayed this will depend on the setting of segments 5 to 8 of SW1 and segment 7 of SW2. Either Kg, t or Lb may be displayed, however "t" should be taken to mean tonne only and no scales should be calibrated for an Lb based ton using "t" if any other scales are calibrated for kg or tonnes.
- v) Decimal Point Location. This can be set to one, two or three decimal places and should not be changed at a later date as to do so will interfere with the Grand Total/Sub Total accumulated memory and render it inaccurate. If you wish to convert a decimal pound display to a pounds and ounces (avoir) result, simply multiply the decimal fraction (only) by 16 *eg. 10.25lb = 10lb 4oz as 0.25 X 16=4.*
- vi) Maximum Weight Value. Set the maximum weight value up to which each scale may weigh. If this weight value is exceeded by +10 counts (minimum divisions) the weight display in weighing mode will blank for that scale and + or - will be displayed.
- vii) Zero Band. ^{ABSOLUTE VALUE}
① → POSITIVE When the weight in the weighing hopper falls to within this band the hopper will be assumed to be empty and a scale zero signal will be transmitted.
- viii) T1 (S) Maximum Weighing Time (before time over). If the time from the start of each weighing event to the end exceeds this time then a time over signal will be output. Faults of this nature may occur when a discharge chute becomes blocked (or if a bin is empty) and the target weight cannot be reached within time. T1 (S) can be set from 0 to 999 seconds but if 0 is set, no time over signal will ever be output.

ix) T2 (mS) Maximum Valid Time. This time represents the time taken for the weighing system to become stable after the gates have closed completely. If the weight was calculated from an analogue input at the point in time when the gates closed, the weight value would be clearly invalid. Thus several hundred milliseconds should pass before the analogue output from the load cell could be considered to be a valid representation of the Final Weight value. Free Fall must be given time to arrive and mechanical oscillations time to decay. This time can be set from 0 to 9999 milliseconds but as the A/D converter takes about 65ms for each conversion only multiples of 65 will be valid (there is no need to calculate this as the Controller will automatically round down to the nearest conversion point).

x) Batch Format (1:CYCLE 2:WEIGHT). The setting of this question depends upon whether you wish to define a "Batch" as a number of weighing events/cycles (as a group of ingredients making a formula) or as a weight.

xi) Print Each Batch Weight Yes/No? Answer yes if you require the printer to print after each batch and no if you don't.

xii) Print Job Weight Data Yes/No? As above, answer yes if you do, no if you don't require the printer to print job weight data.

xiii) Each data setting table has four display modes:-

"EDIT (1), REGISTER (2), DELETE (3) & PRINT (4)".

EDIT (1) mode permits the operator to change data entered in the table. After pressing 1 and ENTER the display will be in Edit mode and the cursor can be moved around the screen by means of the 4 arrow keys. Place the cursor on top of the character space to be edited, type in the new data and then press ENTER. Press F1 to exit Edit mode and then proceed to REGISTER (2) the fresh data with the security key switch turned to "REG", answer the question REGISTER OK? Y/N with YES unless you have made a mistake. If you do not register the correction, the old data will remain in the memory backed up by the battery and the new data will be lost when you exit this table, YOU HAVE BEEN WARNED!!

DELETE (3) mode will clear all entered data if the question DELETE OK? Y/N is answered with YES. In the case of the Scale Program Table, Capacity will revert to 30,000 and D. P. Location, Zero Band, T1 & T2 will all be reset to 0 with the Minimum Weight Amount [%] set as 10% of the Batch Total Weight.

PRINT (4) may be used to obtain a hard copy print-out of the data set in each table but this command will only work if the keyboard Printer key LED is ON.

Press MENU in order to be able to return to the Menu display so that you may select the next setting table to be edited.

b) Material Table

Access the Material Table by pressing "2" and then "ENTER". When in Material Table display mode you will be required to provide information on two screens (screen A and screen B) concerning the materials which are to be weighed. These materials may be referred to as "Ingredients" as they are the elements of "Formulas" which will be set-up in the Formula Table. In the Material Table you will be required to tell the Controller which ingredients you have put in which bins and which scales these bins are connected to via discharge chutes. Data entered in the Formula Table must be in logical steps; i. e. do not place data concerning discharge into Scale 2 between entries concerning discharge into Scale 1. The Controller will start at the top of the Formula Table and work down so deal first with Scale 1, then 2, then 3. and finally Scale 4 (if applicable). Ingredients listed in the Material Table in bins 1 to 67 (max) plus alternative bin contents up to 99 (max) should also be grouped logically for ease of operation. Liquids to be weighed, such as water, may need to be added last to formulas so bear this in mind. One litre of water weighs one kilogram (at 4°C) and one imperial gallon of water weighs ten pounds avoirdupois (at 62°F). The letters of ingredient names may be input via two number codes when the CHAR INPUT key LED is ON; these codes are as follows:-

A	B	C	D	E	F	G	H	I	J	K
60	61	62	63	64	65	66	67	68	69	70

L	M	N	O	P	Q	R	S	T	U	V
71	72	73	74	75	76	77	78	79	80	81

W	X	Y	Z	&	*	+	%	-	.	/
82	83	84	85	90	94	95	96	97	98	99

Use code 48 to insert a space between letters and press F2 to switch between screen A and screen B.

MATERIAL TABLE SCREEN A

i) Ingredient Name. Up to 99 ingredient names of 8 character spaces may be stored in memory on six different pages (press NEXT PAGE for the next page). Names entered on screen A are copied on to screen B automatically and can be called for a formula simply by specifying the ingredient # on the left side of the screen. The CLEAR key may be used to delete mistakes made during entry. After registering your Material Table obtain a print out of the table (screen A and screen B) as this will help you to make up formulas in the Formula Table.

ii) Scale Number. Having entered the ingredient name you should next inform the Controller where the ingredient will go (which scale it will be weighed in). As already mentioned liquid ingredients may be weighed rather than measured by volume but wave propagation must be kept to a minimum. If a submerged filling probe is employed to overcome waves/scale load oscillation, please take liquid displacement into consideration when calculating the weight of the liquid.

iii) Bin Number. Where will the ingredient be stored, which bin is connected by a discharge chute to the scale specified above? CH1 bin selection output board line A-6 from the output socket should be connected to Bin number 1.

iv) Free Fall. (F. F.) How much Free Fall is there likely to be when considering this material and the length of the discharge chute? Answer this question with a weight value between 0 and 9999 (any unit) and ENTER. The cursor will next stop under A.F.F.C. (automatic free fall compensation) if you wish to take advantage of this function press YES and a * will be placed next to the F. F. weight value (if you press NO the space will remain blank). The first weighing event will be based on your estimation of F. F. but for subsequent events the F. F. setting will be based on the Controller's experience of what actually happened last time.

v) Limit (to AFFC). Obviously the Controller should be given parameters within which to work when it is drawing inferences from the implications of past F. F. weighing events or it could derive outrageous suppositions from a system fault!! The weight value limits within which AFFC may function can be set from 0 to 9999 and if these limits are exceeded the Controller will assume that there has been some kind of fault (eg. gate failure) and will revert to the previous F. F. setting.

vi) Preliminary. At this point in time the Controller will send a signal to the gates controlling the rate of discharge from the bins in order to cut full flow to dribble flow. TEE will switch on so that the Controller may accurately assess when the gates should be closed completely (pre-act). This preliminary weight value point in time before the target/final weight has been reached can be set from the target/final weight value less 0 to 9999 units. Thus, if the target weight is 10,000lb and you wish the flow to be cut to dribble at 9,000lb, set PRELIM at 1000 (lb).

MATERIAL TABLE SCREEN B

- i) Ingredient number, ingredient name, scale number and bin number will all automatically be copied from screen A. On screen B you will be required to enter data concerning Hi & Lo limit final weight parameters and an accurate estimation of the period of time (in milliseconds) it will take the bin gates to open and to close.
- ii) Hi/Lo Limit. If the final weight must be very accurate you may wish to set Hi and Lo limit parameters. Hi/Lo limits may be set from 0 to 9999. If the target weight is 100.00kg (capacity is 20000 divided by 2 "D") and the final weight must be at least 99.80kg and not more than 100.20kg, set both Hi and Lo Limits to 20 (0.20kg); if 0 is set the function will switch OFF. If the Hi limit is exceeded an overweight signal will be transmitted but if the Lo limit is not met the Controller will automatically attempt (up to 10 times) to add a bit more of the ingredient to make up the difference and bring the final weight to within limits.
- iii) Gate opening time. The amount of time it takes for the gate to open may be set from 0 to 990 milliseconds in steps of 10ms (rounded down if not correct).
- iv) Gate closing time. The amount of time it takes for the gate to close may be set from 0 to 975 milliseconds in steps of 65ms (rounded down if not correct).

-MATERIAL TABLE-							A
INGRED'T	SCL	BIN	A.F.F.C.				
#	NAME	#	#	F.F.	LIMIT	PRELIM.	
1	SUGAR	1	1	20.0 *	10.0	40.0	
2	BUTTER	1	2	10.0 *	5.0	20.0	
3	FLOUR	1	3	20.0 *	10.0	40.0	
4	EGGS	1	4	10.0 *	5.0	20.0	
5	SALT	1	5	0.1 *	0.1	0.1	
6	COCOA	1	6	5.0 *	2.5	10.0	
7	MILK	1	7	5.0 *	2.5	10.0	

-MATERIAL TABLE-							B
INGRED'T	SCL	BIN	LIMIT		G.TIMER		
#	NAME	#	#	HI	LO	OPN CLS	
1	SUGAR	1	1	10.0	10.0	200 195	
2	BUTTER	1	2	5.0	5.0	200 195	
3	FLOUR	1	3	10.0	10.0	200 195	
4	EGGS	1	4	5.0	5.0	200 195	
5	SALT	1	5	0.1	0.1	200 195	
6	COCOA	1	6	2.5	2.5	200 195	
7	MILK	1	7	2.5	2.5	200 195	

-SCALE PROGRAM TABLE-		
NUMBER OF SCALES	2	
MEMORY-OPTION	NIL (32KB)	
CARD-OPTION	NIL	
	SCALE1	SCALE2
D.P.LOCATION	1	1
CAPACITY	2000.0	2000.0
ZERO BAND	5.0	5.0
T1 (S)	999	999
T2 (mS)	9945	9945
T1: MAX WEIGHING TIME (S)		
T2: MAX VALID TIME (mS)		
JOB (1:BATCHES 2:WEIGHT) 1or2 ? (2)		
MINIMUM WEIGHT AMOUNT [..%]	(10)%	
PRINT EACH BATCH WEIGHT ?	(F)	
PRINT JOB WEIGHT DATA ?	(F)	

c) Formula Table

Access the Formula Table by pressing "1" and then "ENTER". When in Formula Table Mode you will be required to provide information concerning the Formula Code #, the Product name, the Formula Total Setting (Batch Total), the Ingredient code numbers and the Final or target weight for each ingredient. Entering an Ingredient code number in the column next to a Formula table line number will automatically recall the ingredient name associated with that number. All the other data concerning each ingredient (set up in the Material Table) is implicitly understood by the Controller and, apart from the Scale and Bin number, not displayed in this table. As already mentioned, because the Controller will start at the top of this table and work down when calling ingredients to be weighed, you may not insert data concerning one scale in a block concerning another. If you try to register such an error you will be informed of your mistake with the display "ERROR CAN'T REG.". You may wish to separate displayed data concerning one scale from another by "ENTERING" a blank line between the data blocks, however, such "blank" lines will not be printed.

Press "NEXT PAGE" if you have more than 16 ingredients in any Formula. Up to 32 Ingredients, displayed on two pages, may be entered for each Formula. Up to 74 Formulas may be registered in the basic Controller and up to 194 Formulas may be registered in a Controller with extra memory (Option-04).

The display modes EDIT (1), REGISTER (2), DELETE (3) & PRINT (4) were all explained in the SCALE PROGRAM section of this manual; RECALL (5) permits you to jump to another Formula after the display "KEY IN FORMULA # & "ENTER"". Remember to REGISTER your Formulas and Ingredients in the Formula & Material Tables!! If a new formula is similar to another previously registered, recall the old formula, change the name, number and one or two ingredients and then re-register this new formula.

FORMULA TABLE

- i) Formula Code #. 2 or 3 digits ---- 1→74 basic or 1→194 with Option-04.
- ii) Product Name (or number). Enter letters via the CHAR [acter] INPUT key as for the ingredient names (8 character spaces available).
- iii) Formula Total Setting. The total weight for this formula, or put another way the weight of this batch, which may become a fraction of the job total when the Controller is in weighing mode if the job cannot be completed in one batch.
- iv) Final Weight. This weight represents the ideal target weight for each ingredient and should be the post Free Fall weight. Do not enter 0 or the gates won't open! For very small quantities, Free Fall should equal Final Weight.

4. OTHER OPERATIONS

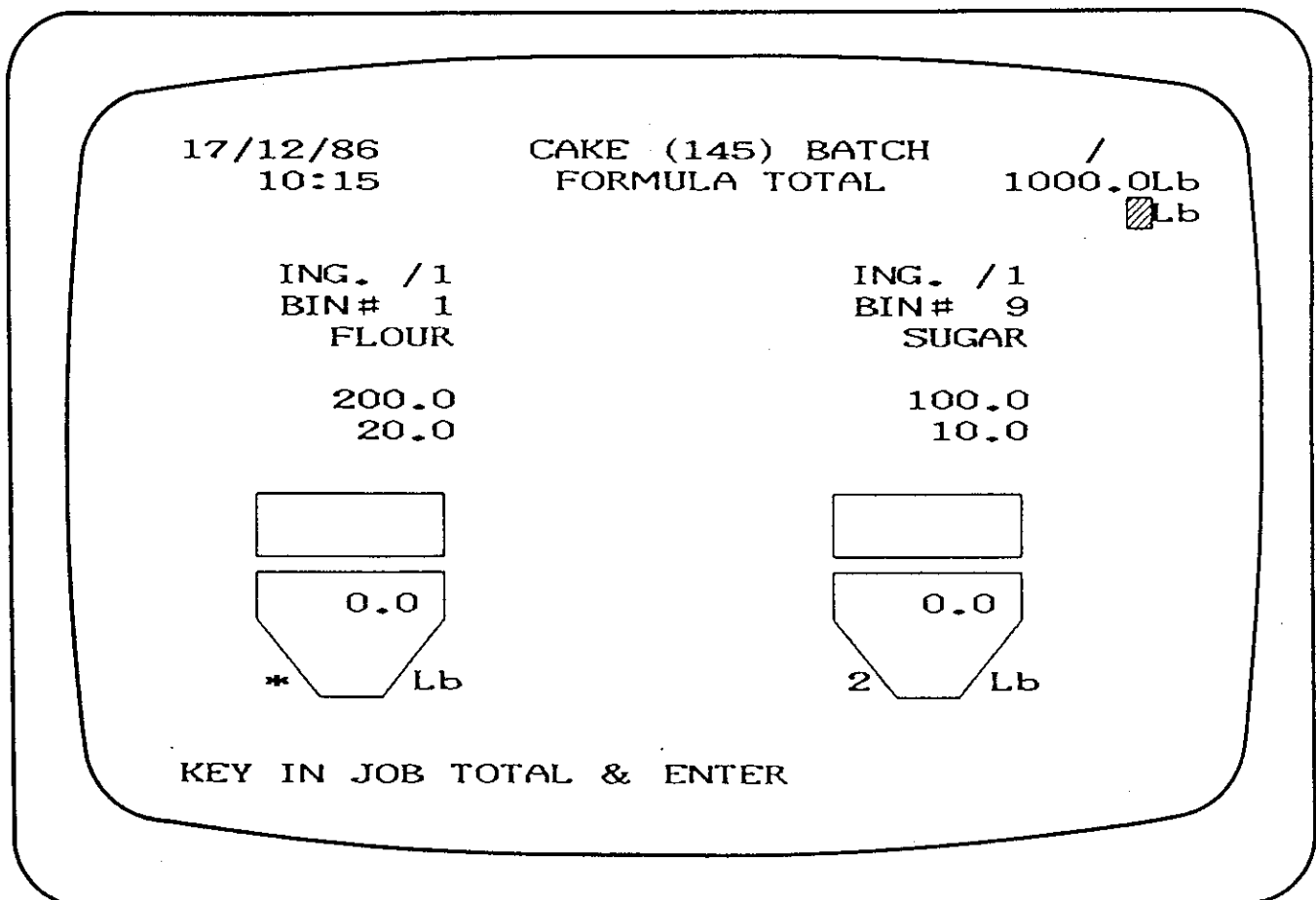
We have dealt with items 1 to 4 on the MENU display and the other 5 to 14 items are reasonably self-explanatory. As always, experimenting is the easiest way to learn about, and find your way around, a system.

a) Weighing (5).

In this example of a Weighing mode display the Formula number has been entered and the controller is asking for the total weight of this job, after entry the cursor will disappear. It can be regained by pressing F1 (before the start signal only).

A Cake recipe/formula is being made up in two scales calibrated for pounds. Scale 1 will fill first and is marked with a * to indicate this.

The Final Weights and Free Fall Weights of the two ingredients are displayed above the pictures representing the scales. The weight of the ingredient presently being weighed will be displayed in the "bin" box above the scale while a running total of the weight of all the ingredients weighed so far will be displayed in the scale picture. At present the scales are empty so 0.0Lb is being displayed.



After you have replied to "Key in Job Total & Enter" the cursor will be removed from the screen and the system will be ready to accept a weighing start signal. The Job number may also be entered if CPU dip-switch SW2, segment 2, is ON.

b) Total Table (6→10).

* The Grand Total tables are designed to be used as monthly report tables while the Sub Total tables are designed to be used as daily report tables. After printing the contents at the end of each day or month the contents should be deleted.

* Grand Total weight data may be displayed up to 12 digits and Sub Total data up to 8 digits. If these limits are exceeded the overflow will be ignored.

* Once the decimal point position has been set in the Scale Program Table it should not be altered as to do so will disrupt the Total tables. If change is imperative the total tables should be adjusted in EDIT mode to bring them in line with the new setting in the Scale Program Table. No such adjustment is necessary if the weight unit is changed from kilogram to tonne with the decimal point shifted from 0 to 3 decimal places because 1,000kg is the same as 1.000t for totalisation.

* If you wish to change the contents of a bin for a new ingredient and alter the Material Table settings, *you must clear the Total memory first* of all the data concerning the old ingredient or the totalising memory will be confused.

* Unlike the data setting tables, the total tables do not require the security key to be turned to "REG" for alterations.

* Product Total/Job memory has a memory stack limited to 20 jobs. If this limit is exceeded the stack is added to from the bottom and the oldest entry is deleted from the top.

c) Formula - Product Table (11).

Product Names which have been entered may be listed on the screen (more than one page) or printed by the printer.

d) Receive from an External Device/Transmit to an External Device (12 &13).

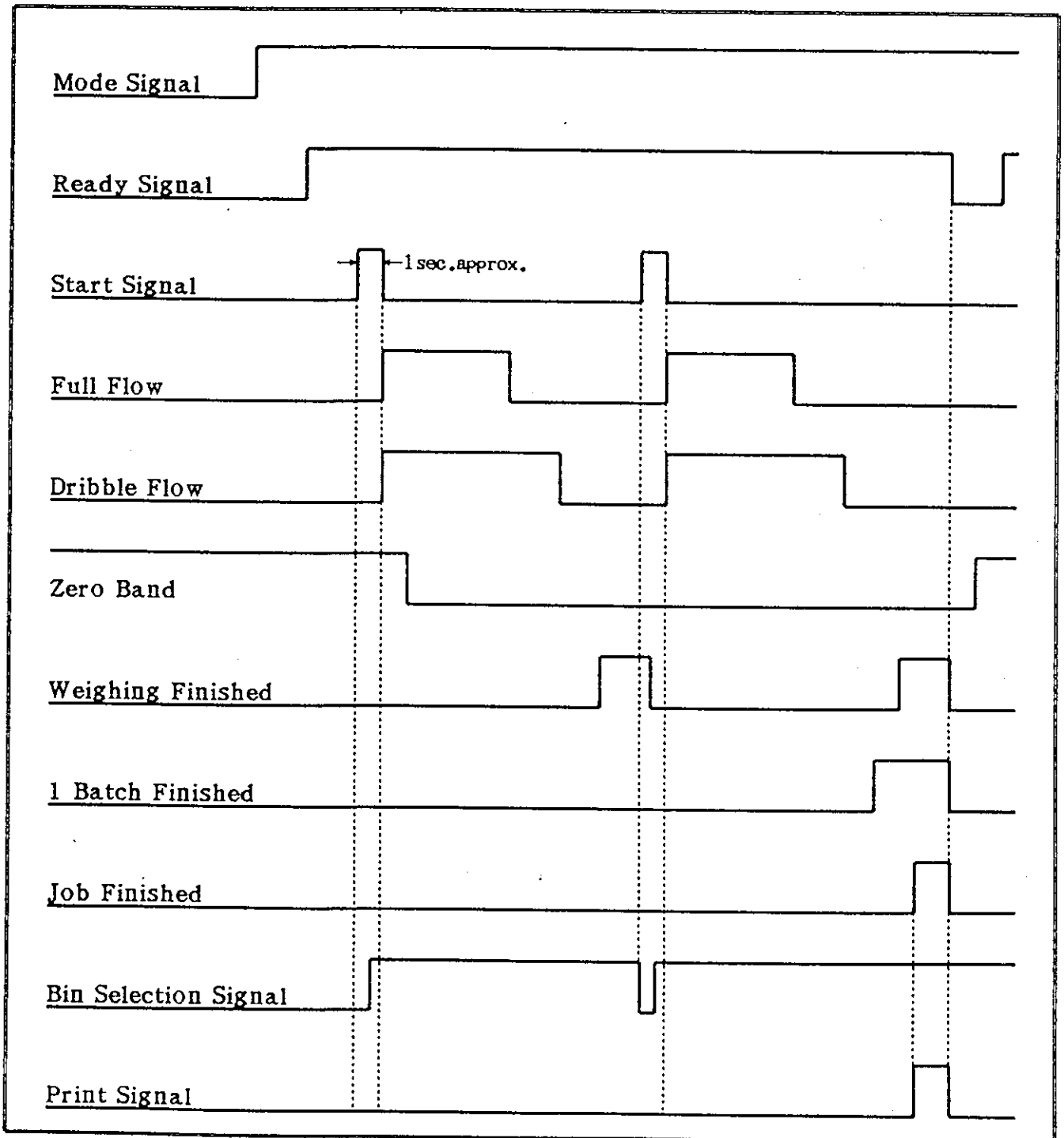
Enter either (12) or (13) and then use F2 to switch between the screens concerned with either transmitting to, or receiving data from, an external device such as a computer.

e) Date/Time Setting (14).

After the time and date have been set this calendar function will automatically advance. The year number must be set manually each year, as must February 29th in leap years.

Signal Timing:

- * Compulsory finish signal may be sent during "WEIGHING" if, for instance, a bin becomes empty. There will be a slight delay of 2 or 3 seconds before weighing operations are suspended.
- * Mode Signal is off when the Controller's display is in Data Setting mode and on when in Weighing mode.
- * Ready LED comes on after the Formula number and number of batches has been set in Weighing mode and turns off after completing the job. Input the first batch Start Signal after the Ready Signal switches on.



I/O Terminals:

* A/D Board [s] 1→4

PIN NUMBER	SIGNAL	PIN NUMBER	SIGNAL
A-1	OUTPUT COMMON	B-1	OUTPUT COMMON
A-2	LO LIMIT	B-2	ERROR
A-3	HI LIMIT	B-3	TIME OVER
A-4	A/D ERROR	B-4	WEIGHING FINISHED
A-5	1 BATCH FINISHED	B-5	SCALE ZERO OVER
A-6	DRIBBLE FLOW	B-6	FULL FLOW
A-7	ZERO BAND	B-7	D ₀
A-8	D ₂	B-8	D ₁
A-9	SCALE ZERO (INPUT)	B-9	ZERO NULL (INPUT)
A-10	TARE (INPUT)	B-10	TARE RESET (INPUT)
A-11	COMPULSORY FINISH (INPUT)	B-11	START SIGNAL (INPUT)
A-12	BIN READ FINISH (BCD)	B-12	INPUT COMMON

* CH/Bin Selection Output Board [s] 1→3

PIN NUMBER	CH-1	CH-2	CH-3	PIN NUMBER	CH-1	CH-2	CH-3
A-1	BATCH END	BIN 20	BIN 44	B-1	BIN 8	BIN 32	BIN 56
A-2	JOB END	BIN 21	BIN 45	B-2	BIN 9	BIN 33	BIN 57
A-3	MODE SIG	BIN 22	BIN 46	B-3	BIN 10	BIN 34	BIN 58
A-4	READY SIG	BIN 23	BIN 47	B-4	BIN 11	BIN 35	BIN 59
A-5	JOB MEM+→	BIN 24	BIN 48	B-5	BIN 12	BIN 36	BIN 60
A-6	BIN 1	BIN 25	BIN 49	B-6	BIN 13	BIN 37	BIN 61
A-7	BIN 2	BIN 26	BIN 50	B-7	BIN 14	BIN 38	BIN 62
A-8	BIN 3	BIN 27	BIN 51	B-8	BIN 15	BIN 39	BIN 63
A-9	BIN 4	BIN 28	BIN 52	B-9	BIN 16	BIN 40	BIN 64
A-10	BIN 5	BIN 29	BIN 53	B-10	BIN 17	BIN 41	BIN 65
A-11	BIN 6	BIN 30	BIN 54	B-11	BIN 18	BIN 42	BIN 66
A-12	BIN 7	BIN 31	BIN 55	B-12	BIN 19	BIN 43	BIN 67
A-13				B-13			
A-14				B-14			
A-15	COMMON	COM	COM	B-15	COM	COM	COM
A-16	COMMON	COM	COM	B-16	COM	COM	COM

N. B. "JOB MEM+→" means Job Totalisation Memory Overflow.

* CH/Bin Selection Output Board (s) BCD Transmission

PIN NUMBER	CH-1	PIN NUMBER	CH-2
A-1	BATCH END	A-1	10 ¹ -8
A-2	JOB END	A-2	4
A-3	MODE SIGNAL	A-3	2
A-4	READY SIGNAL	A-4	1
A-5	JOB TOTAL MEMORY OVERFLOW	A-5	10 ⁰ -8
A-6		A-6	4
A-7		A-7	2
A-8		A-8	1
A-9	SCALE #1 BIN READ COMMAND	A-9	10 ¹ -8
A-10	SCALE #2 BIN READ COMMAND	A-10	4
A-11	SCALE #3 BIN READ COMMAND	A-11	2
A-12	SCALE #4 BIN READ COMMAND	A-12	1
A-13		A-13	
A-14		A-14	
A-15	CH-1 OUTPUT COMMON	A-15	CH-2 OUTPUT COMMON
A-16	CH-1 OUTPUT COMMON	A-16	CH-2 OUTPUT COMMON
B-1		B-1	10 ⁰ -8
B-2		B-2	4
B-3		B-3	2
B-4		B-4	1
B-5	10 ¹ -8	B-5	10 ¹ -8
B-6	4	B-6	4
B-7	2	B-7	2
B-8	1	B-8	1
B-9	10 ⁰ -8	B-9	10 ⁰ -8
B-10	4	B-10	4
B-11	2	B-11	2
B-12	1	B-12	1
B-13		B-13	
B-14		B-14	
B-15	CH-1 OUTPUT COMMON	B-15	CH-2 OUTPUT COMMON
B-16	CH-1 OUTPUT COMMON	B-16	CH-2 OUTPUT COMMON

4. OPTIONS

4-1 OPTION-01 ANALOGUE PLUS A/D CONVERTER BOARDS

The basic AD-4335 is equipped with one analogue board and one A/D Converter board which may be used to control one scale. If you wish the Controller to control more than one scale (up to 4) you should install extra Option-01 boards. After installation the CPU board dip-switch segments 1 & 2 of SW1 should be reset to show the number of scales which are now being controlled.

4-2 OPTION-02 CH/BIN SELECTION OUTPUT BOARDS

The basic AD-4335 is equipped with one bin selection output board (CH.1) which may be used to control up to 19 bins. If your system includes more than one scale you may also need to control more than 19 bins. Two more control boards may be added with each one controlling 24 extra bins. The first extra board will control bins 20 to 43 and the second bins 44 to 67.

4-3 OPTION-03 OPTICAL PUNCH-CARD READER

With this option installed programming the controller for number of batches, formula etc. may be left in the hands of relatively untrained personnel. The operator simply has to insert a small plastic punch-card into input slot and the optical reader will read the data and program the Controller automatically.

4-4 OPTION-04 EXPANDED MEMORY

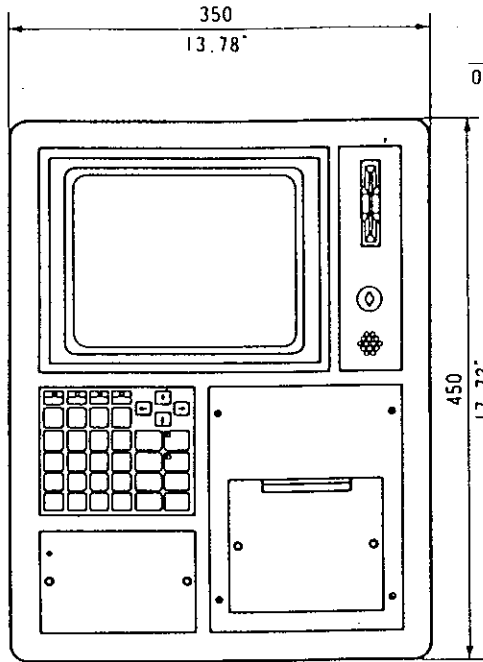
The basic AD-4335 comes equipped with enough memory to store up to 74 formulas of 32 ingredients (maximum). Option-04 permits you to store up to 194 formulas of 32 ingredients (120 extra formulas). Such a memory expansion may be needed in large operations, especially when programming is carried out via Option-03.

4-5 OPTION-05 NET WEIGHT SCORE BOARD[s]

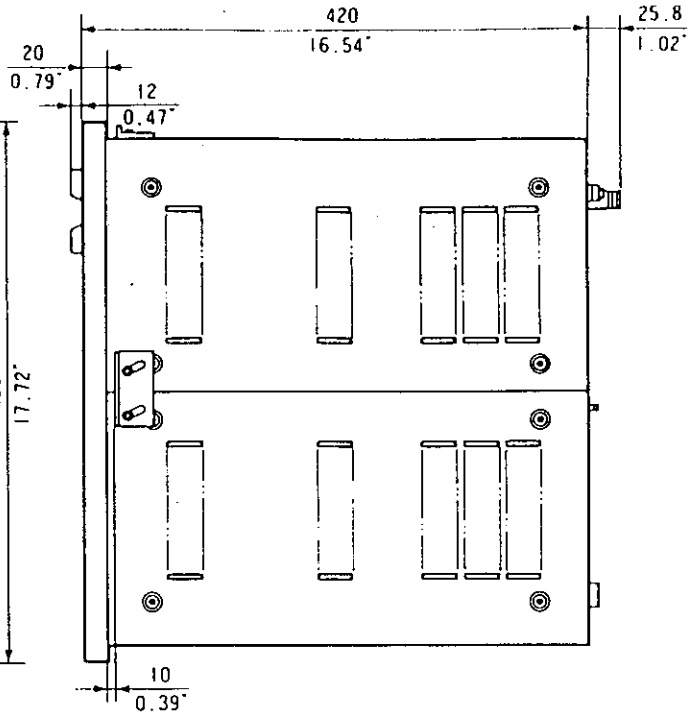
One external display board may be connected to each A/D conversion board (1 to 4) so that the net weight of that scale may be read at a location remote from AD-4335. Option-05 Score Boards may be needed when you require weight display read-outs at, for instance, the scales.

5. DIAGRAMS

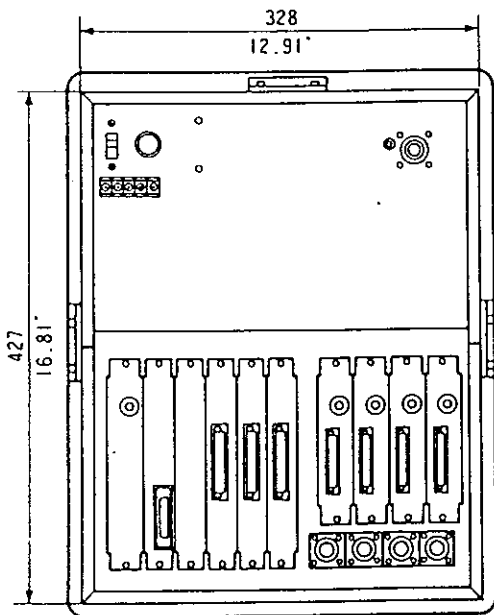
5-1 FRONT, SIDE AND REAR ELEVATIONS



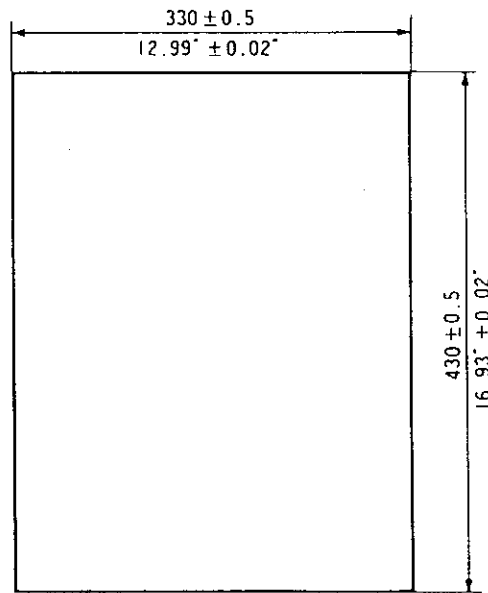
FRONT VIEW



SIDE VIEW



REAR VIEW



PANEL CUT

UNIT : $\frac{\text{mm}}{\text{inch}}$

6. APPENDIX

6-1 OPTION-03 OPTICAL PUNCH-CARD READER

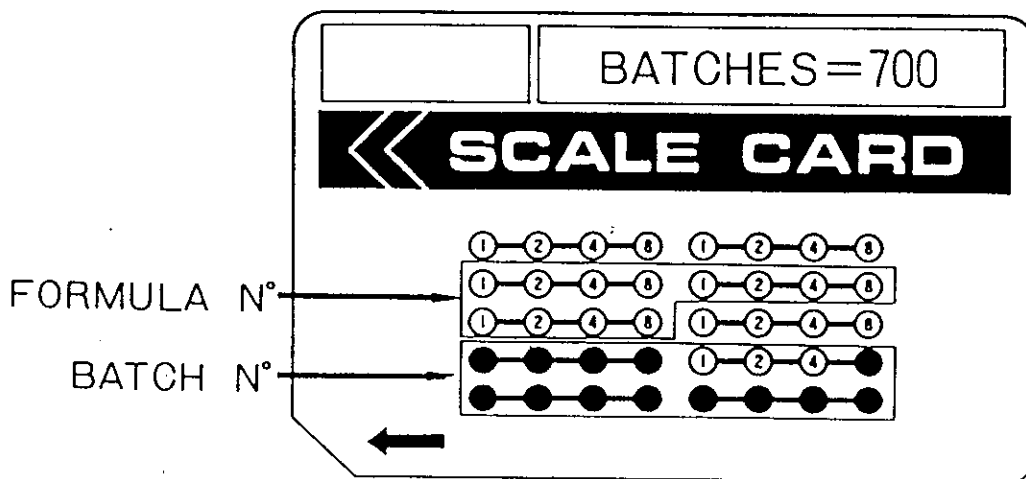
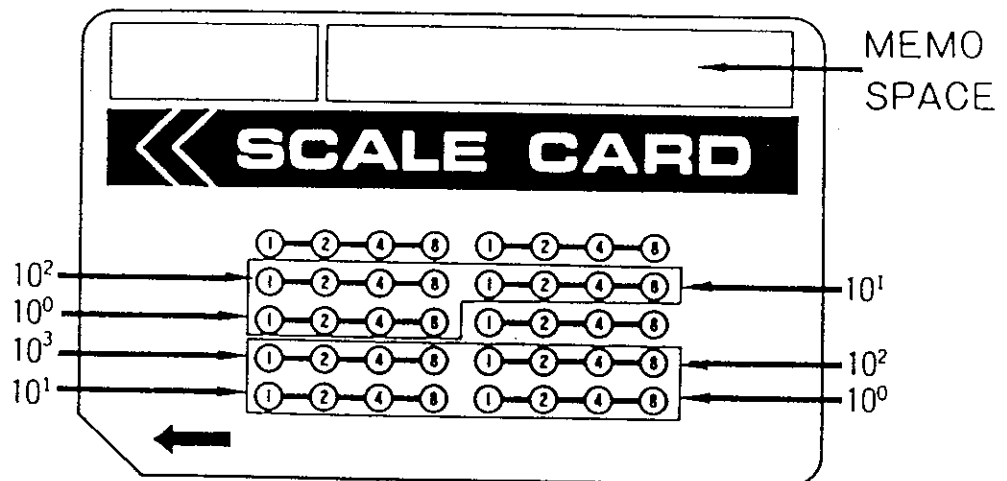
Formula number and number of batches may be entered very simply by inserting a card. The upper section of the card is for Formula numbers and the lower section for number of batches. Alternatively Formula number may be set by punch card and batch number via the keyboard, or vice versa. The security key-switch should be turned hard left or right (REG), it should not be set to "CPU".

A HOLE in the card is read as "0" and NO-HOLE as "1".

EXAMPLE: When the number of batches = 700

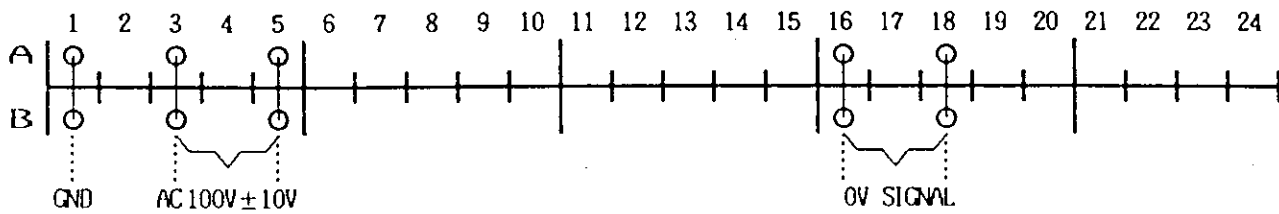
Spaces 1, 2, 4 & 8 of 10^3 , 10^1 & 10^0 should be punched out (0 00).

$1+2+4(=7)$ of 10^2 should be left in with space 8 punched out (0700).



6-2 OPTION-05 NET WEIGHT SCORE BOARD(s) 1→4

CONNECTION



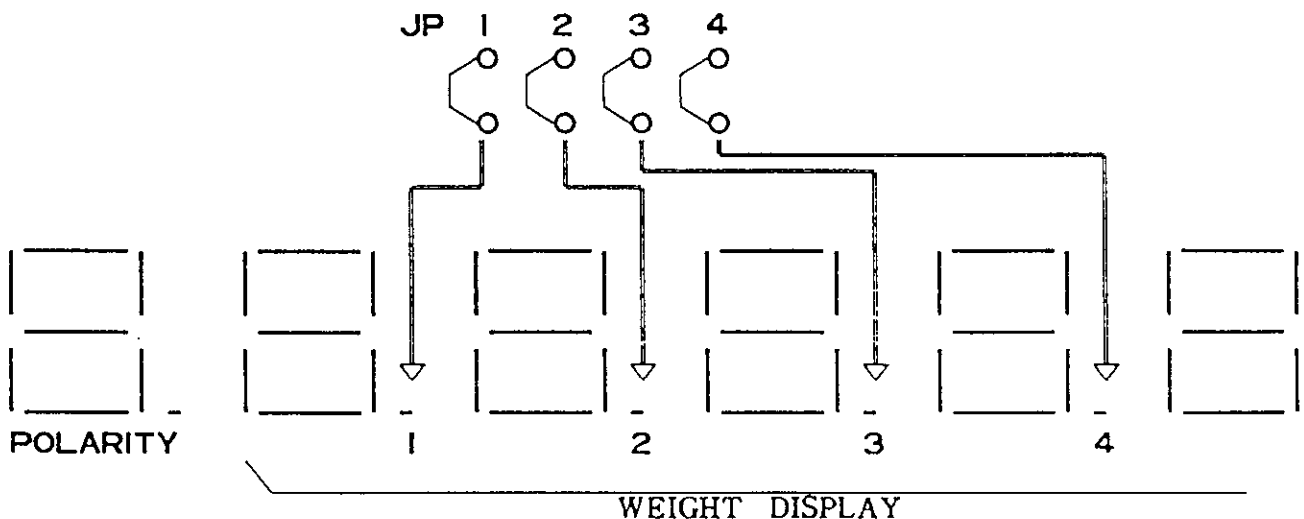
Pins 1, 3, 5, 16 & 18 are used with sides A & B shorted.

Take a coax cable to the external display connector on the A/D board located in the rear panel of AD-4335.

SIGNAL=CORE and OV=SHIELD.

SETTING THE DECIMAL POINT

Remove the front panel of the Option-05 seven segment, six character display unit. Each score board unit can display an LED decimal point in order to give one, two, three or four decimal places. Setting the location of the decimal point is achieved by cutting the power links to the three decimal point positions not required. Behind the front panel you will find JP links 1, 2, 3 & 4 which correspond to the decimal point positions on the display panel; e.g. If you wish the display to read to two decimal places you should cut links 1, 2 & 4.



6-3 EIA-RS-232C INPUT/OUTPUT PORT

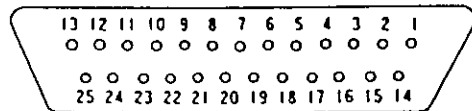
This board is labelled "PIO" but is in fact a serial I/O board. The Controller is designated as Data Communication Equipment.

- Modes:-
1. RxD from external device.
 2. TxD to external device.
 3. Input formula number and batch number in weighing mode.
 4. Transmit weight data at the end of a batch.

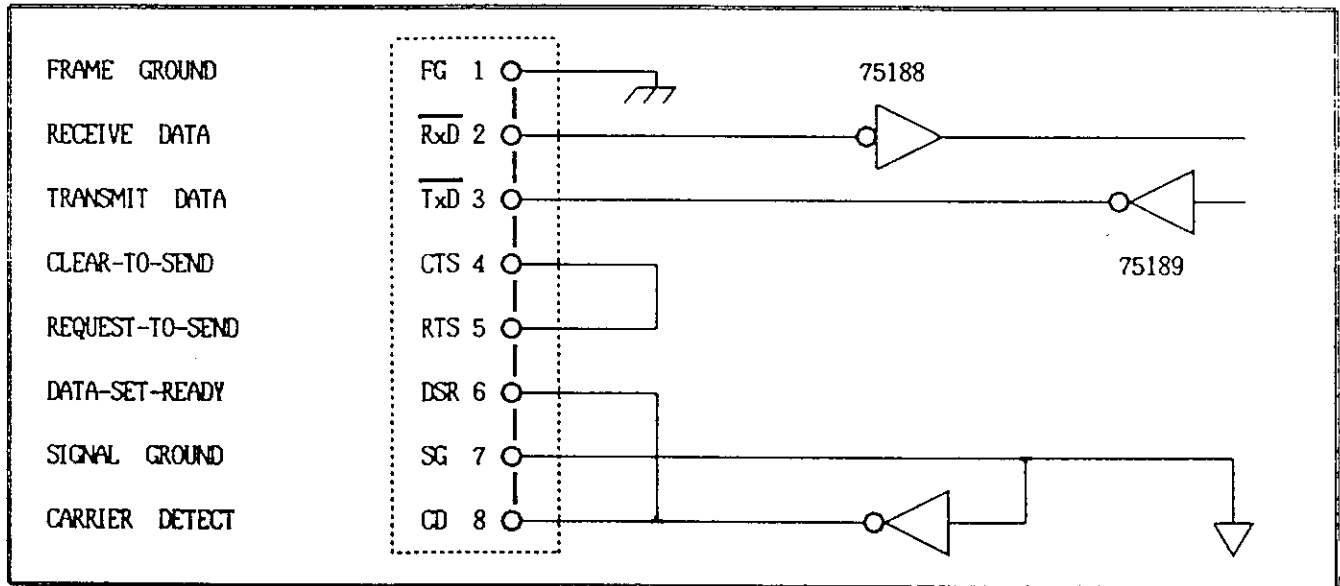
Method:- Half-duplex, asynchronous transmission.

Format:-

- 600 baud = short J1
- 2400 baud = short J2
- Data bits = 8
- Parity bit = 1 (EVEN)
- Stop bits = 2
- Code = ASCII



CONTROLLER I/O CIRCUIT AND RS-232C PIN CONNECTIONS. PINS 9-25 ARE NOT CONNECTED.



I/O DATA FORMAT AND DISPLAY

Enter transmission mode by pressing "13 ENTER" in MENU mode. Five options for transmission of data will be displayed on the CRT screen.

- TRANSMIT TO EXT. DEVICE -
- 1: TRANSMIT ALL FORMULA TABLES
 - 2: TRANSMIT SPECIFIC FORMULA TABLES (max 20)
 - 3: TRANSMIT ALL MATERIAL TABLES
 - 4: TRANSMIT SPECIFIC MATERIAL TABLES (max 20)
 - 5: TRANSMIT ALL FORMULA & MATERIAL TABLES
 - F2: SHIFT TO RECEIVE MODE

Thus you may transmit the contents of all the tables by pressing "5 ENTER" and "YES" in order to start. "NO" is invalid but you may escape by pressing F2 twice, once to enter receive mode and once to switch back to transmit. Transmission of all of the data in both tables may take quite a while so you may wish to opt for transmission of limited or specific data instead.

Enter reception mode by pressing "12 ENTER" from MENU or F2 from transmission mode. Three options will be displayed on the CRT screen.

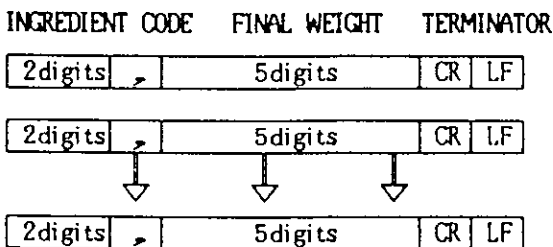
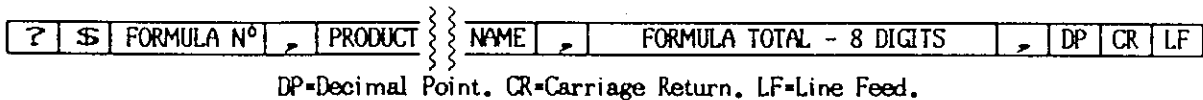
-RECEIVE FROM EXT. DEVICE -
 YES : START RECEIVING DATA
 F1 : STOP RECEIVING DATA
 F2 : SHIFT TO TRANSMIT MODE

DATA FORMAT

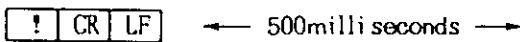
Data is sent by ASCII and includes the following special codes:-

- ? (3FH) : START CODE
- ! (21H) : END CODE
- \$ (24H) : START OF FORMULA N°
- = (3DH) : START OF INGREDIENT NAME
- , (2CH) : BETWEEN DATA BLOCKS
- [CR][LF] : TERMINATOR, CR or CR & LF

FORMULA TABLE

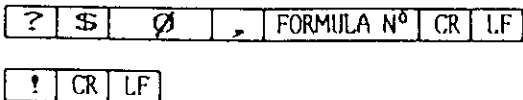


At the end of each Formula table send



and then leave a 500msec period before starting the next table.

An unregistered Formula table will be transmitted as:-



MATERIAL TABLE

?	=	I	C	INGREDIENT	NAME	"	S#	BIN N°	FREE	FALL	AC
---	---	---	---	------------	------	---	----	--------	------	------	----

IC=Ingredient Code. Ing. Name=8 digits. " =Space. S#=Scale Number. AC=AFFC, ON=1 & OFF=0

AFFC LIMIT	PRELIMINARY	HI LIMIT	LO LIMIT	GATE OPEN
------------	-------------	----------	----------	-----------

GATE CLOSE	CR	LF
------------	----	----

=	I	C	INGREDIENT	NAME	"	S#	BIN N°	FREE	FALL	AC
---	---	---	------------	------	---	----	--------	------	------	----

IC=Ingredient Code. Ing. Name=8 digits. " =Space. S#=Scale Number. AC=AFFC, ON=1 & OFF=0

AFFC LIMIT	PRELIMINARY	HI LIMIT	LO LIMIT	GATE OPEN
------------	-------------	----------	----------	-----------

GATE CLOSE	CR	LF
------------	----	----



When all the data has been sent transmit

!	CR	LF
---	----	----

leave a 2 second delay period and then transmit

!	CR	LF
---	----	----

to indicate all data transmission is at an end.

ERROR MESSAGES

INPUT ERRORS

- ERROR 1 : Data received before receive mode start
- ERROR 2 : Not ready to accept data
- ERROR 3 : Can't find ? or !
- ERROR 4 : Formula table received Ingredient Code >32
- ERROR 5 : Material table received Ingredient Code >99

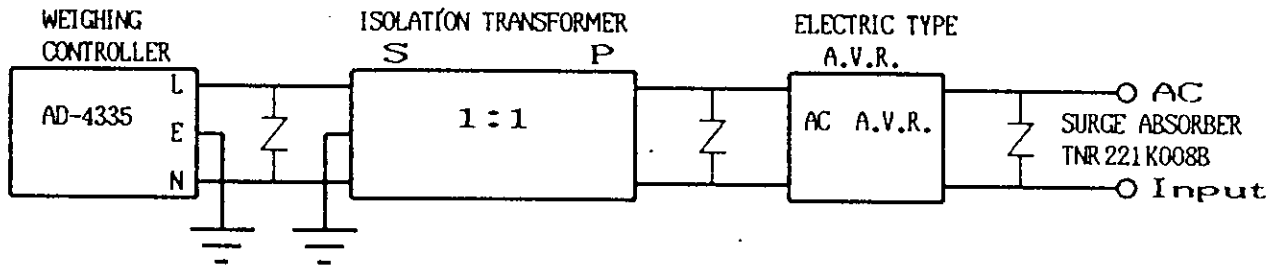
OUTPUT ERRORS

- ERROR 10: Formula table transmission error
- ERROR 11: Product name transmission error
- ERROR 12: Formula table transmitted Ing. Code >32
- ERROR 13: Product code transmission error
- ERROR 14: Final weight value error
- ERROR 15: Material table transmitted Ing. Code >99
- ERROR 16: Ingredient Code transmission error
- ERROR 17: Ingredient Data transmission error
- ERROR 18: Blank space in Bin number missing
- ERROR 19: Scale number transmission error
- ERROR 20: Bin number transmission error
- ERROR 21: AFFC, Prelim, GT OPN, GT CLS or HI/LO Lim

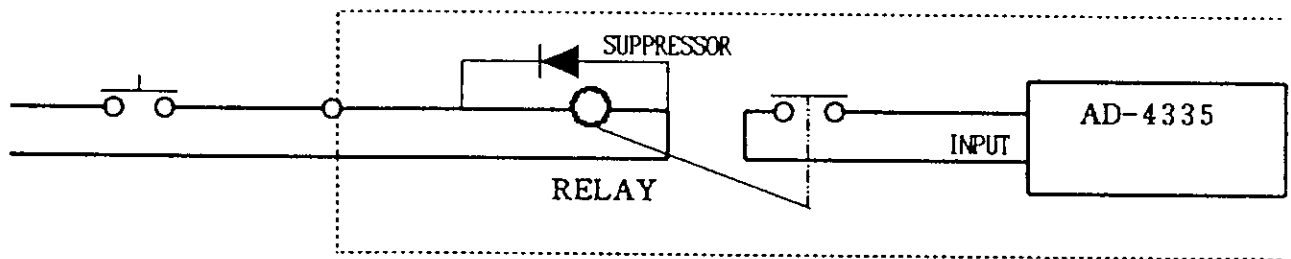
6-4 GENERAL INFORMATION

Keep the power cable well away from any analogue or digital signal cables and keep the signal cables separated. Keep all cables/coax as short as possible.

If the local AC electricity supply fluctuates by more than $\pm 10\%$ you must use an automatic voltage regulator (AVR) to stabilise the power supply. Interference carried in the AC electricity supply should be filtered out with an Isolation Transformer.

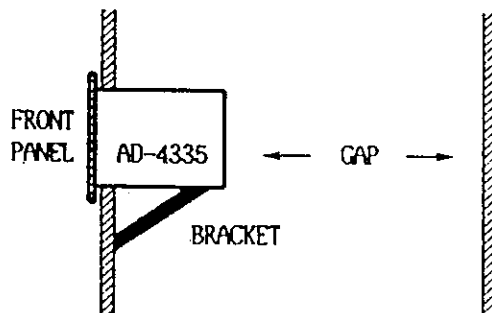


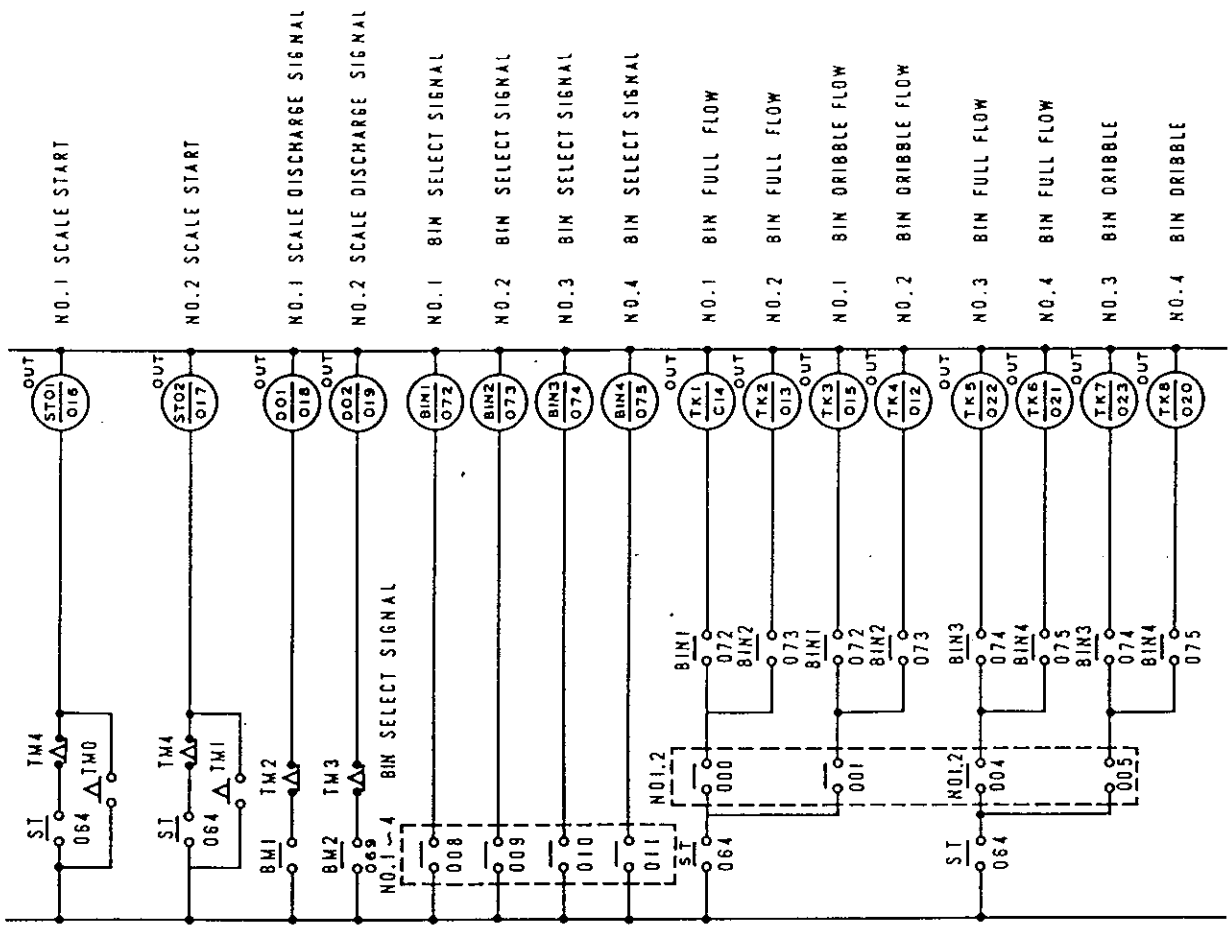
WIRING INPUT/OUTPUT CIRCUIT



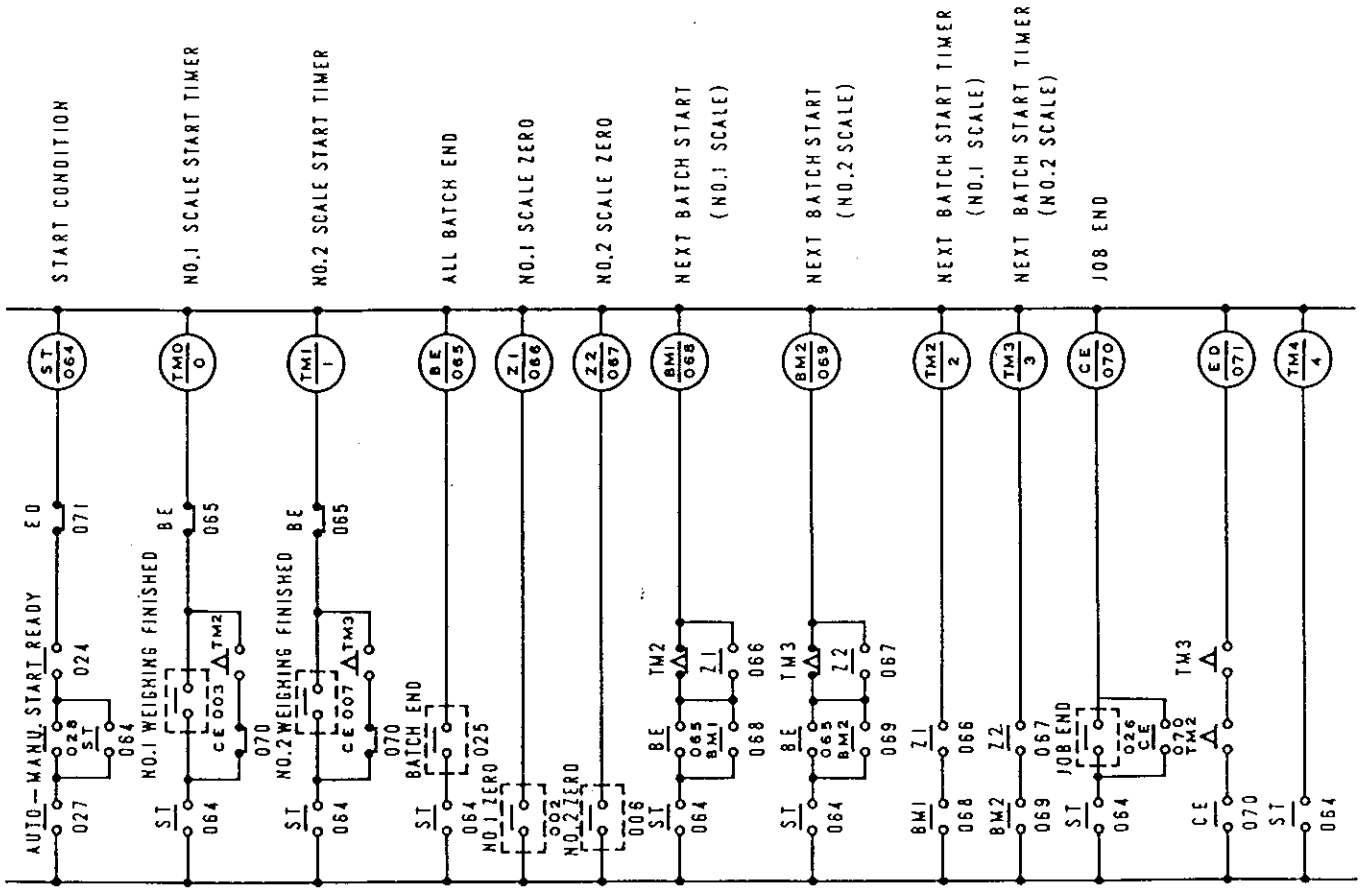
PANEL MOUNTING

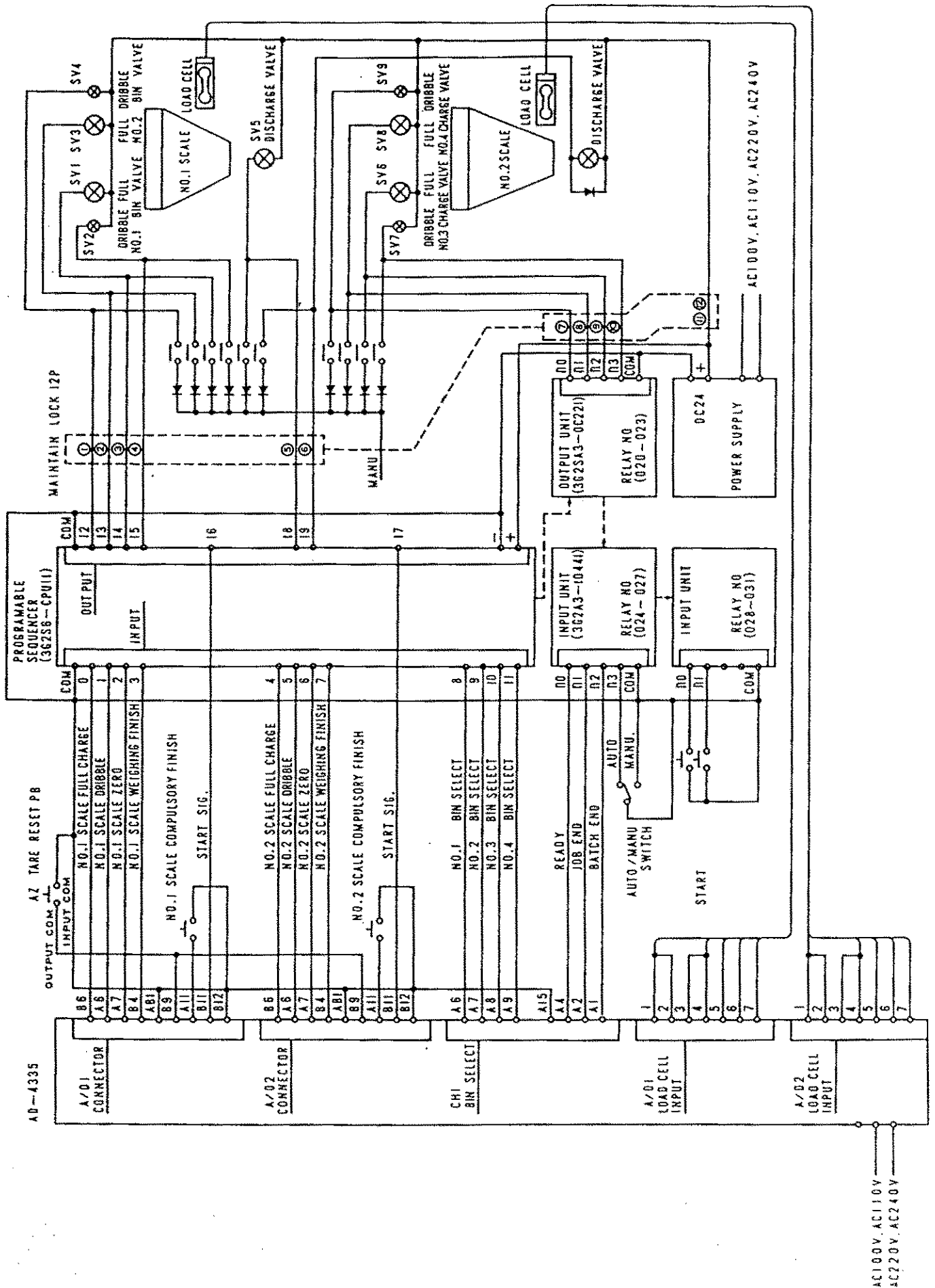
As this Weighing Controller weighs about 30kg (66lb) you must ensure that it is properly supported when it is panel mounted. A reasonably large space should be left behind the equipment for ease of maintenance.



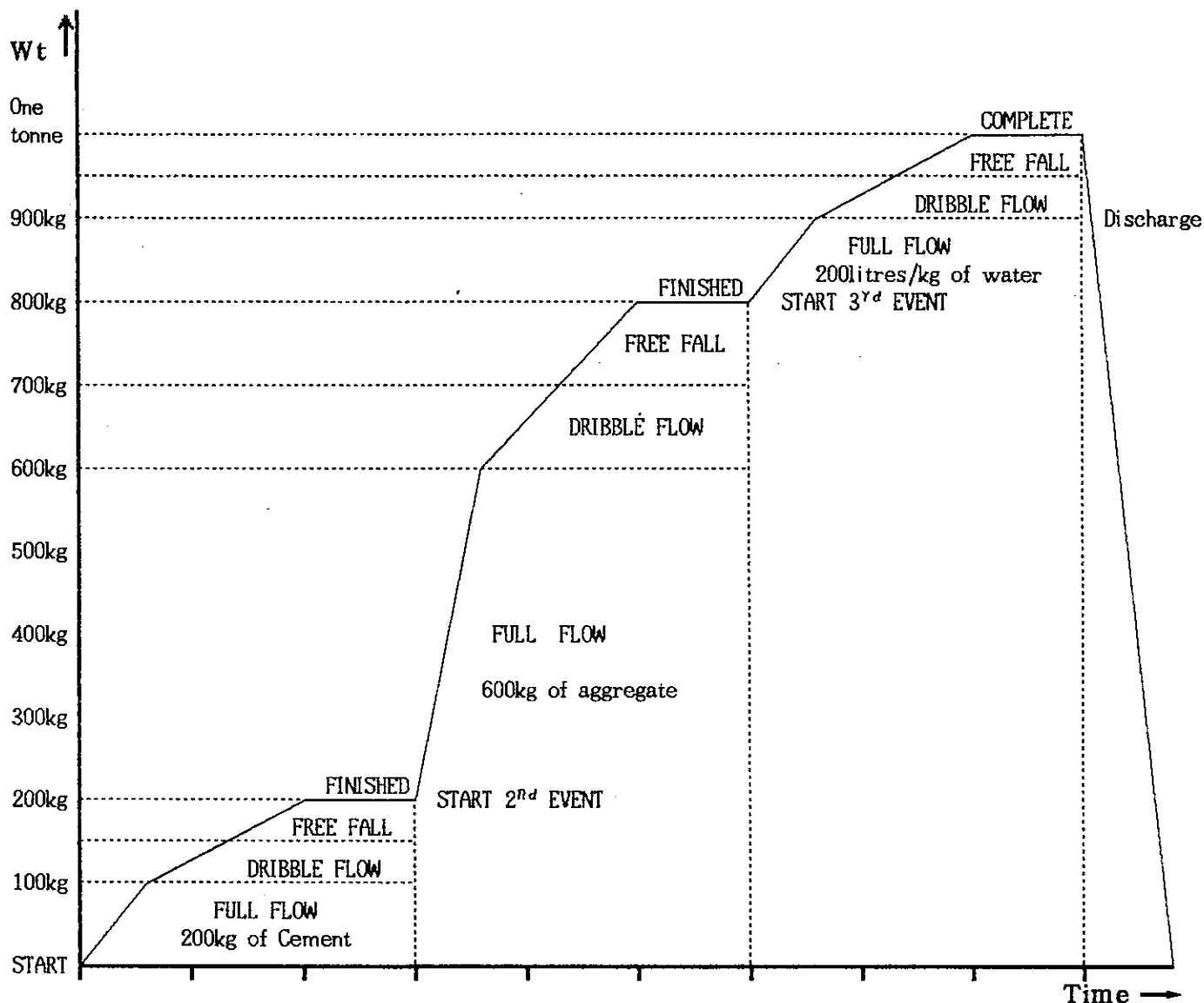


CIRCUIT EXAMPLE(2SCALES, 4BINS)





CONCRETE BATCHING



In the formula example above concrete is being weighed in a weighing hopper. The first ingredient to be weighed is cement/lime, the second sand/aggregate and the third water. The formula (or batch) is then discharged for mixing. Each ingredient (material) is weighed during the course of a weighing event. At the start of a weighing event (START signal input) the gates (or valves) are fully open, permitting FULL FLOW. Later full flow is reduced to DRIBBLE FLOW at the PRELIM[inary] point and TEE switches on. Finally at the PRE-ACT point the gates/valves are closed completely and FREE FALL collects in the weighing hopper. At the end of each event FINISHED is displayed and at the end of the batch COMPLETE is displayed.