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VERIFICATION D'UNE
BALANCE AXIALE
"SENSI-WEIGH"
Modèle T 100 T 811

CANQ
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116



547651

LABORATOIRE CENTRAL - MINISTÈRE DES TRANSPORTS

R A P P O R T

VERIFICATION D'UNE

BALANCE AXIALE

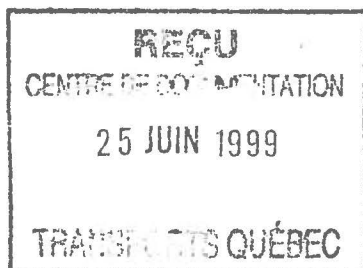
"SENSI-WEIGH"

Modèle T 100 T 811

MINISTÈRE DES TRANSPORTS
DIRECTION DE L'OBSERVATOIRE EN TRANSPORT
SERVICE DE L'INNOVATION ET DE LA DOCUMENTATION
930, ch. Ste-Foy, 6e étage
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CANQ
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GE
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116

Le 24 avril 1979



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LABORATOIRE CENTRAL - MINISTÈRE DES TRANSPORTSINTRODUCTION

Le présent rapport est le compte rendu d'un essai de vérification de la précision d'une balance axiale électronique achetée par le Ministère des Transports et devant servir pour l'application de la loi relative aux charges maximales des véhicules. Cette balance est une "Sensi-weigh", modèle T 100 T 811, manufacturée par la Firme Senstek Ltd de Saskatoon.

DESCRIPTION DE LA BALANCE

Cette balance est essentiellement composée de deux pièces. La première, une boîte métallique ayant une dimension de huit (8) pieds de longueur, onze (11) pieds de largeur, huit (8) pouces d'épaisseur et constituée d'un cadre rigide surmonté d'un plateau qui s'appuie à chacune de ses extrémités sur quatre (4) cellules de charge. Ces dernières ne sont que des poutres d'acier de 12" X 6" X 1 3/4" munies de jauge d'extension et installées en porte-à-faux entre le cadre rigide et le plateau. La deuxième pièce est un lecteur digital portable fonctionnant à l'aide de pile rechargeable. Un schéma de cette boîte et les spécifications du manufacturier sont inclus en annexe.

DESCRIPTION DE L'ESSAI

N'ayant pas à notre disposition les poids étalons normalement requis pour ce genre de vérification, nous avons opté pour la possibilité de superposer la balance "Sensi-weigh" sur le plateau de la balance

mécanique "TOLEDO" de St-Augustin. Cette dernière a une capacité de 50 000 kilogrammes et une précision de l'ordre de 0.1 pourcent. La firme "TOLEDO" a vérifié la calibration de cet appareil quelques jours auparavant.

Les poids utilisés comme charge sont d'une part un camion Kenworth ayant deux (2) essieux arrière en "tandem", espacés de 4' 6" c/c et équipés de pneus doubles 10.0 X 20, chargé de gravier, et d'autre part, dix (10) blocs de béton d'une dimension de 2' X 3' X 4' et d'un poids moyen de 1546 kilogrammes chacun. La balance "TOLEDO" est tarée pour compenser le poids de la balance "Sensi-weigh" qui est de 1335 kilogrammes. Donc lors de l'application de la charge, la lecture relevée sur la balance "TOLEDO" correspondra à 0.1 pourcent près, à la charge appliquée sur la balance électronique "Sensi-weigh" et, pour les fins de notre essai, sera considérée comme poids étalon.

PARTIE A

Lectures relevées en ayant comme poids les deux (2) essieux arrière du tandem du camion. Le camion a été déplacé à trois (3) reprises:

<u>Lecture No.</u>	<u>Poids étalons (Kg)</u>	<u>balance (Kg)</u>	<u>erreur (Kg)</u>	<u>erreur (%)</u>
1	17 880	17 730	- 150	- 0.84
2	17 890	17 640	- 250	- 1.40
3	17 840	17 710	- 130	- 0.73

Pour que le camion soit horizontal, son essieu avant est soulevé de huit (8) pouces et les blocs de béton sont ajoutés un à un. Des lectures sont relevées entre chaque bloc.

<u>Lecture No.</u>	<u>Poids étalon (Kg)</u>	<u>Balance (Kg)</u>	<u>erreur (Kg)</u>	<u>erreur (%)</u>
4	18 050	17 860	- 190	- 1.05
5	19 100	18 720	- 380	- 1.99
6	20 250	19 680	- 570	- 2.81
7	21 700	20 900	- 800	- 3.69
8	23 120	22 200	- 920	- 3.98
9	24 980	24 000	- 980	- 3.92
10	26 880	25 700	- 1 180	- 4.39
11	27 860	26 600	- 1 260	- 4.52
12	28 960	27 600	- 1 360	- 4.70
13	30 420	29 100	- 1 320	- 4.34
14	31 640	30 200	- 1 440	- 4.55

A 31 640 kilogrammes, soit à la charge maximum appliquée lors de nos vérifications, nous réajustons le "span" de l'appareil tel que décrit dans le manuel d'opération à l'article "F". Par la suite les blocs de béton sont enlevés un à un et des lectures sont relevées entre chaque bloc.

<u>Lecture No.</u>	<u>Poids étalon (Kg)</u>	<u>balance (Kg)</u>	<u>erreur (Kg)</u>	<u>erreur (%)</u>
15	31 620	31 600	- 20	- 0.06
16	30 360	30 500	140	0.46
17	28 550	28 900	350	1.23
18	27 450	27 900	450	1.64
19	25 980	26 600	620	2.39

<u>Lecture No.</u>	<u>Poids étalon (Kg)</u>	<u>Balance (Kg)</u>	<u>Erreur (Kg)</u>	<u>Erreur (%)</u>
20	24 940	25 700	760	3.05
21	23 080	24 000	920	3.99
22	20 140	21 300	1 160	5.76
23	19 080	20 300	1 220	6.39
24	17 980	19 260	1 280	7.12

Le camion est enlevé de sur la balance et la lecture de cette dernière devient 10. Le zéro de la balance n'est donc pas modifié de façon significative par l'ajustement du "span".

PARTIE B

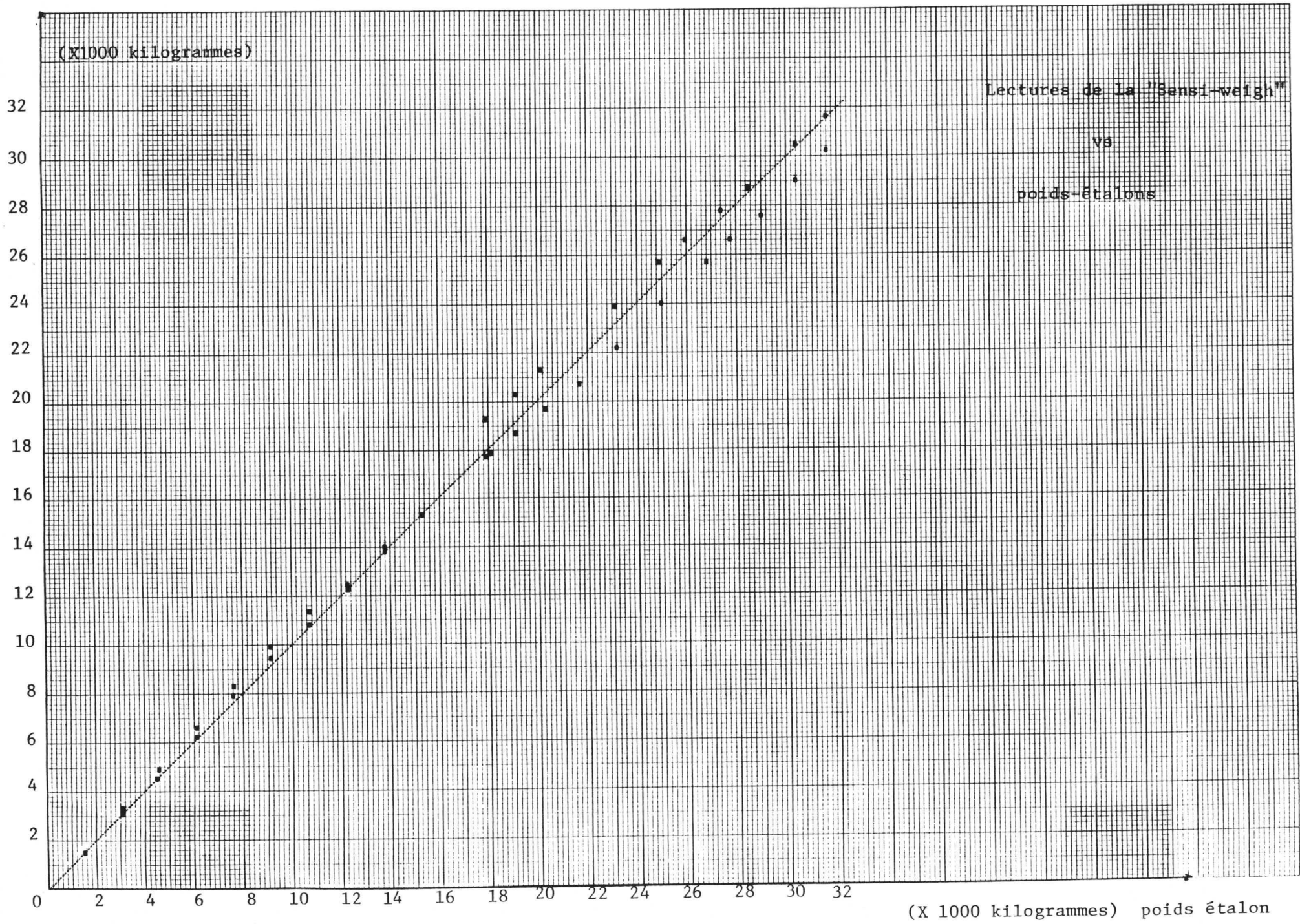
L'essai est répété de nouveau avec les blocs de béton seulement (sans le camion).

<u>Lecture No.</u>	<u>Poids étalon (Kg)</u>	<u>Balance (Kg)</u>	<u>Erreur (Kg)</u>	<u>Erreur (%)</u>
25	1 550	1 570	20	1.29
26	3 060	3 130	70	2.29
27	4 590	4 660	70	1.53
28	6 110	6 220	110	1.80
29	7 660	7 830	170	2.22
30	9 180	9 420	240	2.61
31	10 780	10 880	60	0.56
32	12 330	12 400	70	0.57
33	13 800	13 860	60	0.44
34	15 340	15 340	0	0
35	13 800	14 050	250	1.81

<u>Lecture No.</u>	<u>Poids étalon (Kg)</u>	<u>Balance (Kg)</u>	<u>Erreur (Kg)</u>	<u>Erreur (%)</u>
36	12 240	12 620	380	3.11
37	10 780	11 300	520	4.82
38	9 170	9 830	660	7.20
39	7 660	8 300	640	8.36
40	6 150	6 580	430	6.99
41	4 600	4 900	300	6.52
42	3 070	3 370	300	9.77
43	1 560	1 660	100	6.41
44	20	80	60	

Dans la zone normale d'utilisation de cette balance, soit entre 10 et 90 pourcent de la charge maximum permise, nous retrouvons des écarts allant jusqu'à 8.36 pourcent. De plus, ces écarts n'augmentent pas toujours de façon linéaire en fonction de la charge.

Pour ces essais, nous avons toujours utilisé le lecteur de la balance en position "Kg" et la lumière "off". Le positionnement du lecteur en position "Lbs" ou l'utilisation de la lumière au cours d'une pesée a pour effet de modifier de façon très appréciable la lecture, l'erreur étant encore plus élevée.



17

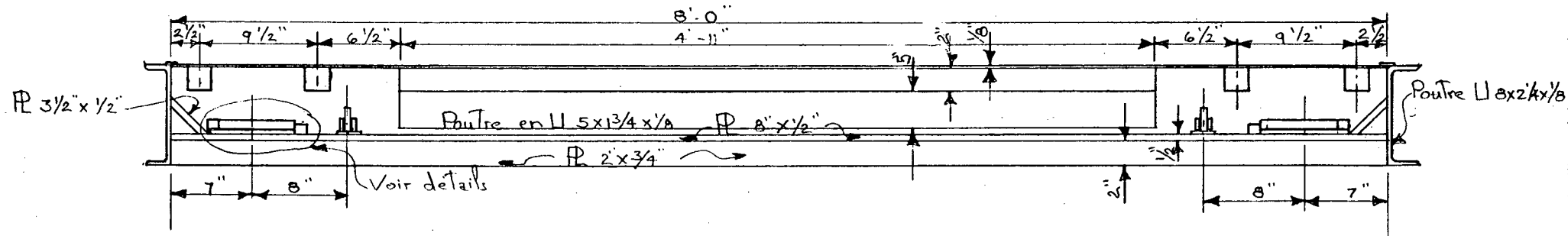
CONCLUSION

Malgré que la vérification de cette balance ne soit pas réalisée tout à fait comme les spécifications ASTM le recommandent, nous pouvons toutefois conclure que cette dernière n'a pas la précision, donc la publicité fait foi. Lors des essais, pour les lectures de charge entre 17 640 Kg et 31 640 kilogrammes, le pourcentage d'erreur a varié de - 1.05 à - 4.55 pourcent et après ajustement, a varié de - 0.06 à + 7.12 pourcent lors du retrait de ces mêmes charges. Pour des lectures entre 4 000 et 15 340 kilogrammes, ce pourcentage a oscillé entre 0 et 8.36 pourcent. La publicité relevée pour ce modèle de balance considère acceptable une erreur de 0.5 pourcent ou moins.

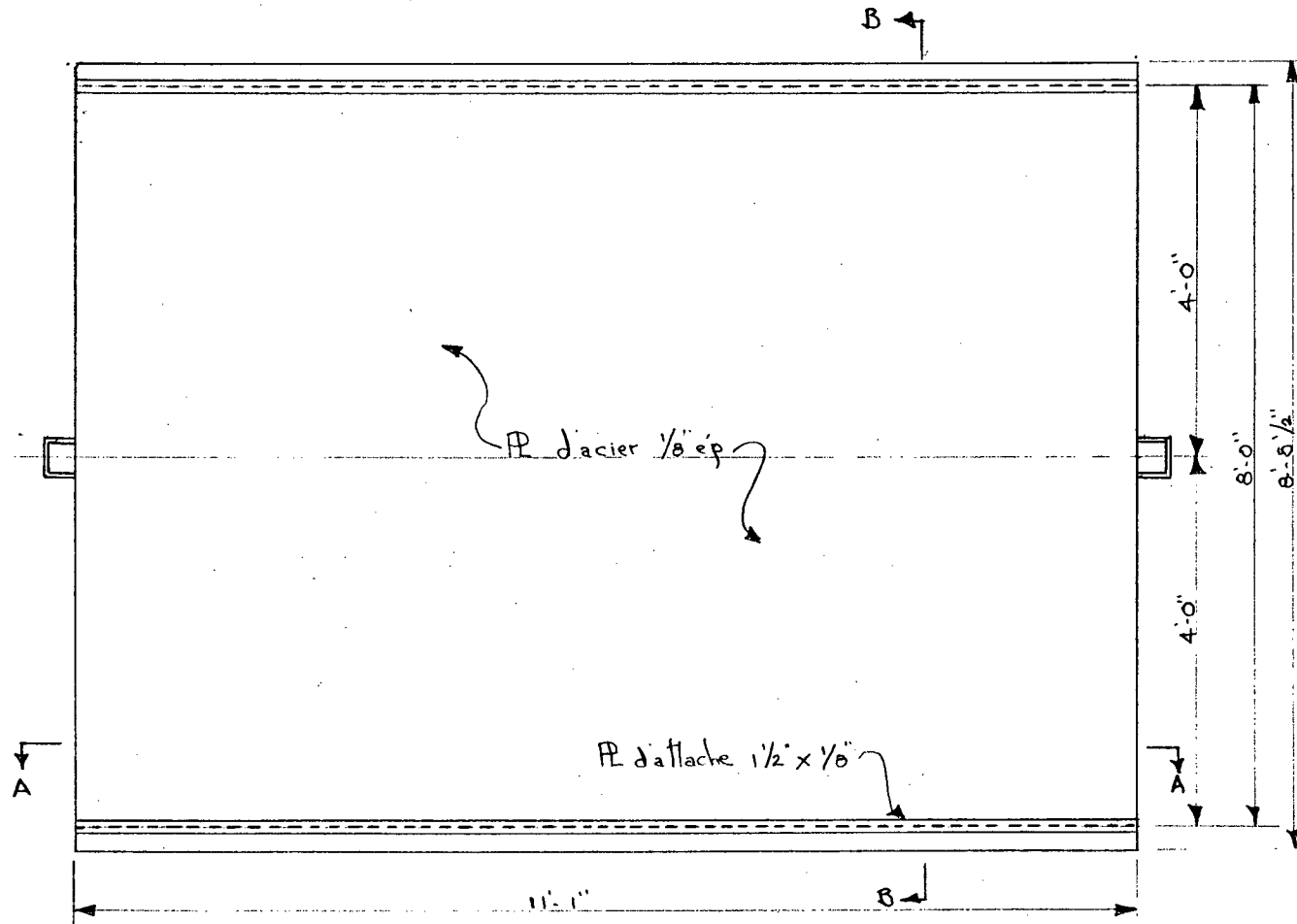
Compte-tenu des résultats, nous croyons que cette balance est tout-à-fait inadéquate pour l'application de la loi relative aux charges maximales des véhicules. De plus, nous doutons de la possibilité d'obtenir une précision de 0.5% avec le genre de cellule de charge utilisé sur cette dernière.

A N N E X E "A"

HEMA DE LA BALANCE "SENSI-WEIGH"

BALANCE

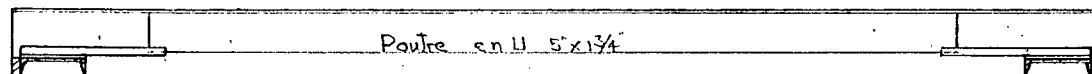
Vue de Profil
ech: 1" = 1.0"



Vue en Plan
ech: $\frac{1}{2}'' = 1'-0''$

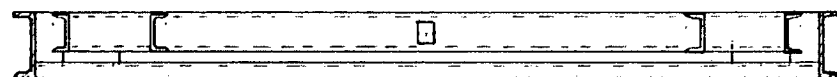
ANNEXE A

10/

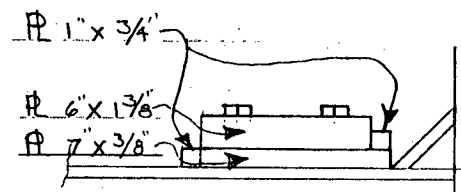


Poutre U 8x2 1/4x1/8

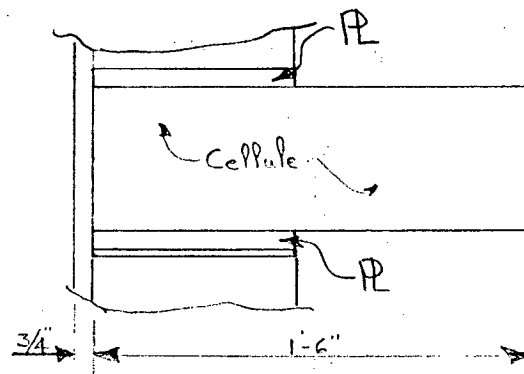
Coupe A-A
éch 1/2" = 1'-0"



Coupe B-B
éch 1/2" = 1'-0"



élevation
1/2" = 1'-0"



Vue en Plan
1/2" = 1'-0"

Détails de la Cellule Type

A N N E X E "B"

MANUEL D'OPERATION DE LA BALANCE

"SENSI-WEIGH"

SENSIEK LTD.

Specialists in Agricultural & Industrial Electronics

Head Office: 125 - 105th Street East
Saskatoon, Sask., Canada, S7N 1Z2
Phone (306) 374-3966

Branch Office: 6950 Wayzata Blvd.
132 Valley South Building
Minneapolis, Min., 55426
Phone (612) 544-3911

CANADIAN TRUCK SCALES PRICE LIST

Model	Single Axle Price	Tandem or 16 Wheeler Price	Ramp Price	Wheel Kit Price
T25310	\$2,000.00	-----	\$160.00	\$240.00
T50311	\$3,220.00	-----	\$245.00	\$360.00
T50T710	-----	\$2,750.00	\$160.00	\$810.00
T50T810	-----	\$3,040.00	\$160.00	\$810.00
T75T811	-----	\$3,680.00	\$190.00	consult factory
T100T811	-----	\$4,130.00	\$245.00	consult factory
T100T1211	-----	\$5,450.00	\$245.00	consult factory
T150T811	-----	\$5,650.00	\$310.00	consult factory

★ Custom designed scales on request.

Large Display — Truck operator may read the weight of each axle or tandem from inside the cab.
Display size range from 2.7 in. to 12 in. in height
6" high - \$600.00

Other Options — Printer with totalizing feature - \$700.00
Digital readout instrument - \$470.00

Instrument Extension Cable
50 ft. length — \$56.00
100 ft. length — \$96.00

Prices do not include Federal Sales Tax or Provincial Tax.
All Prices subject to change without notice.

F.O.B. Saskatoon

SENSI-WEIGH TRUCK PLATFORM SCALE SPECIFICATIONS

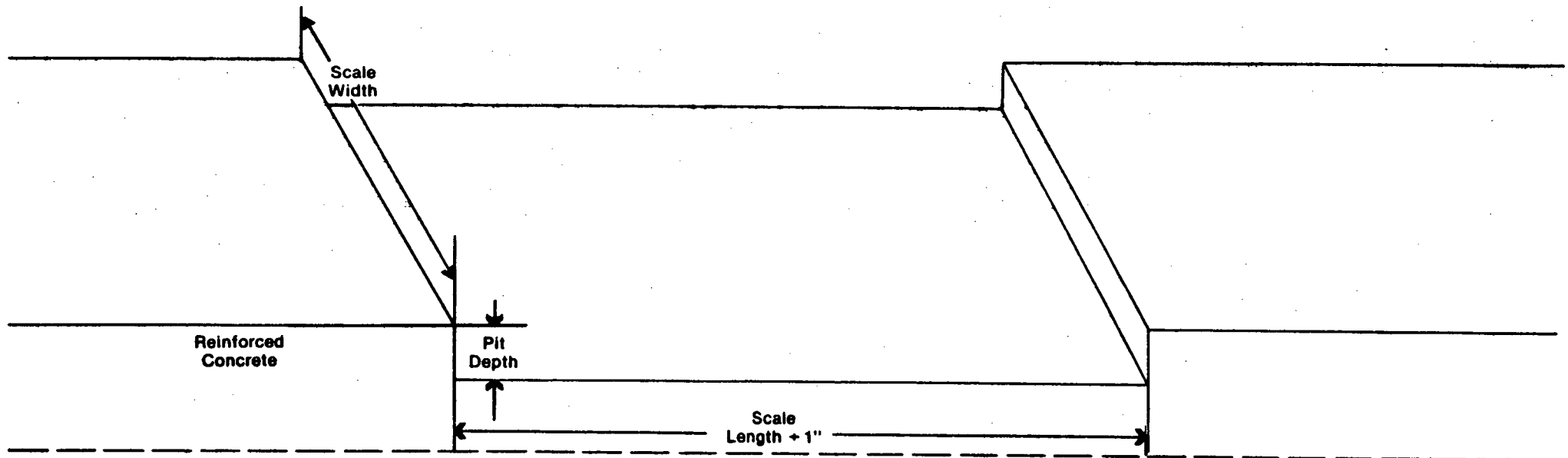
Dimensions

Model	Width		Length		Height		Pit Depth		Pad Dimensions		Capacity	
	in.	(m)	in.	(m)	in.	(cm)	in.	(cm)	ft.	(m)	lb.	(kg)
T25	120	(3.05)	37	(.94)	5	(12.7)	4½	(11.4)	2'8" x 10	(.81 x 3.05)	25,000	(11,500)
T50	133	(3.38)	42	(1.07)	6.75	(17.1)	6¼	(15.9)	3 x 11	(.914 x 3.35)	50,000	(23,000)
T50T710	120	(3.05)	90	(2.29)	6.75	(17.1)	6¼	(15.9)	7 x 10	(2.13 x 3.05)	50,000	(23,000)★
T50T810	120	(3.05)	102	(2.59)	6.75	(17.1)	6¼	(15.9)	8 x 10	(2.44 x 3.05)	50,000	(23,000)★
T75T811	133	(3.38)	102	(2.59)	6.75	(17.1)	6¼	(15.9)	8 x 11	(2.44 x 3.35)	75,000	(34,000)★
T100T811	133	(3.38)	103	(2.62)	8.75	(22.2)	8¼	(21.0)	8 x 11	(2.44 x 3.35)	100,000	(45,000)★
T150T811	133	(3.38)	103	(2.62)	8.75	(22.2)	8¼	(21.0)	8 x 11	(2.44 x 3.35)	150,000	(68,000)★

★ Tandem axle capacity

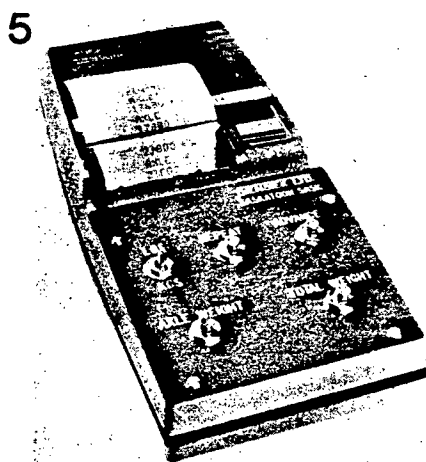
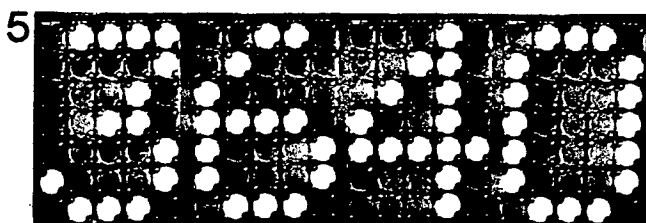
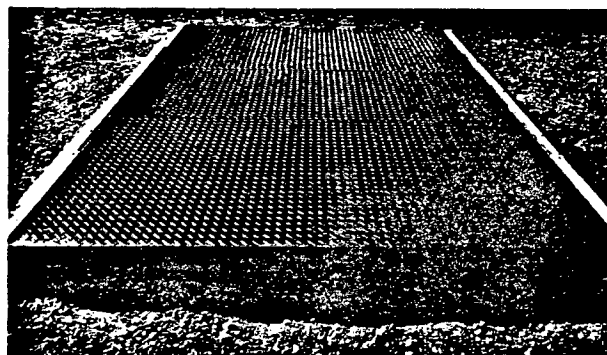
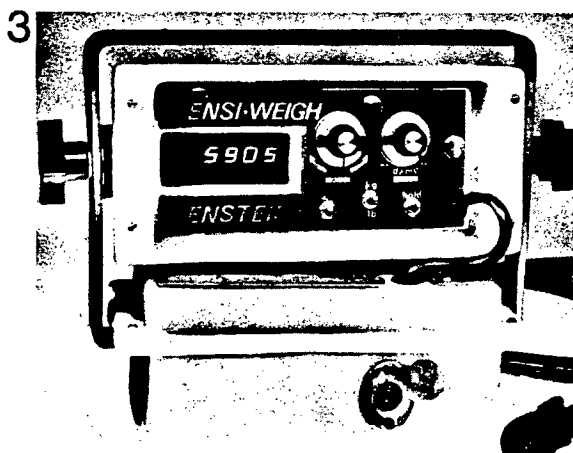
Accuracy — ½ %

Pit for Permanent Installations:



The Senstek All-Electronic Truck Scale provides low cost dependability and accuracy. That's its primary advantage over conventional scales which are expensive to purchase and maintain.

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1. Since the Senstek scale uses solid state electronics, there are no moving parts to go out of order or replace. It isn't necessary to sign a costly scheduled maintenance contract and dig a deep pit for a Senstek truck scale.

2. There are Senstek-engineered load cells in each corner of the platform and therefore it doesn't have to be level to weigh accurately.

3. A digital readout operates off AC or rechargeable batteries (charger supplied) and registers in pounds and kilograms with an accuracy of $\frac{1}{2}\%$.

A zero control eliminates weight of snow and gravel build up on the platform while a damping control eliminates fluctuation due to wind gusts. A hold switch maintains a reading after the vehicle has left the platform too.

4. There are nine models available, in semi-permanent and portable configurations, ranging in capacity from 25,000 to 150,000 lbs. The semi-permanent scale requires a shallow recess, while the trailer mounted portable unit is equipped with heavy-duty on/off ramps and sets up in five minutes.

5. Big electro-mechanical signboard displays, and printer with axle and total weight printout are optional.

The Senstek scale comes with a one year warranty. Since all electronics are housed in a lightweight case, a replacement will be shipped out immediately if there is a breakdown, or a backup unit may be purchased at a fraction of the cost for a maintenance contract.

SENSEK LTD.

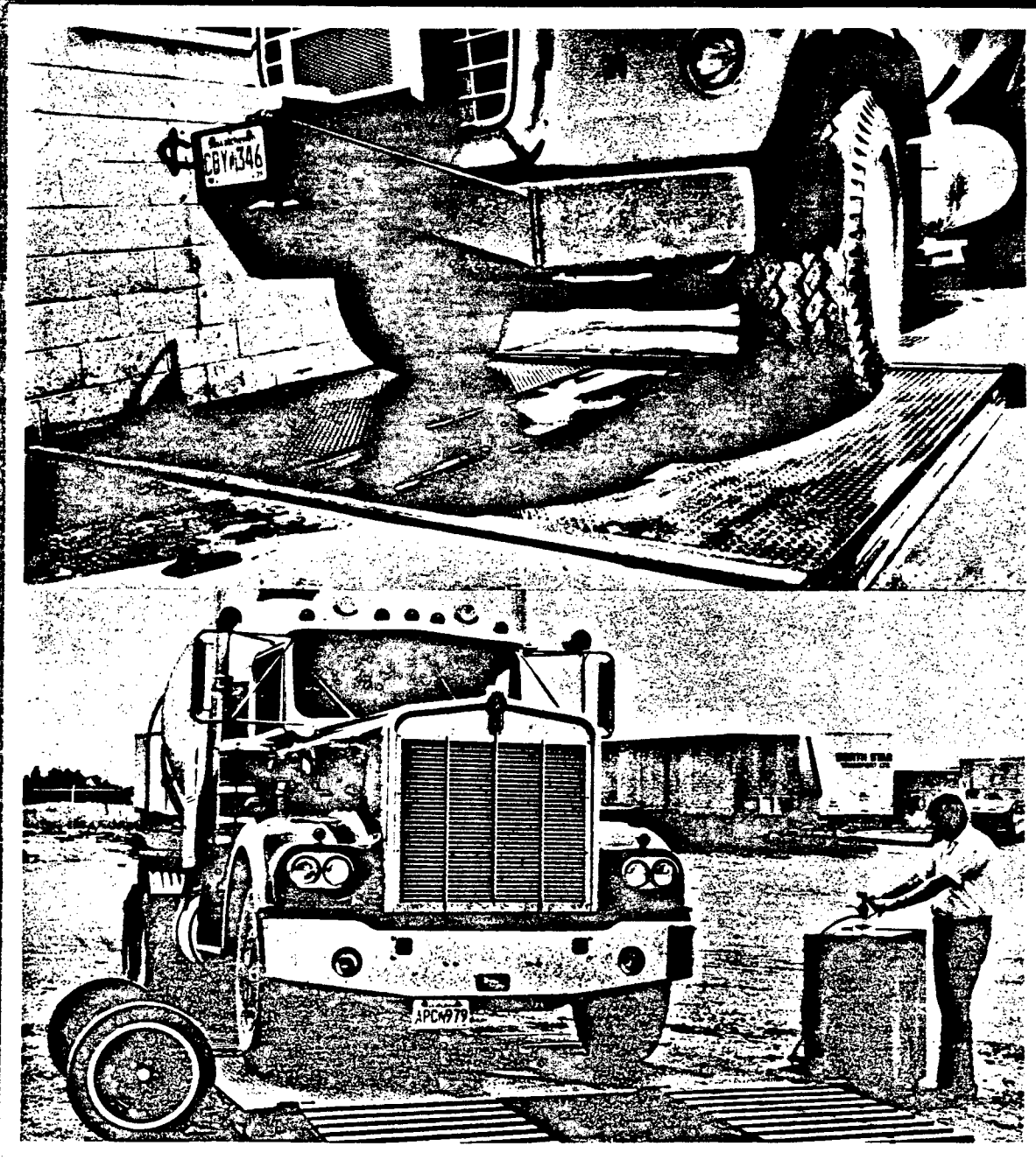
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Specialists in Agricultural & Industrial Electronics

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Printed in Canada

Accurate SENSTEK All-Electronic Truck Scales Save You Money



**OPERATORS
MANUAL**

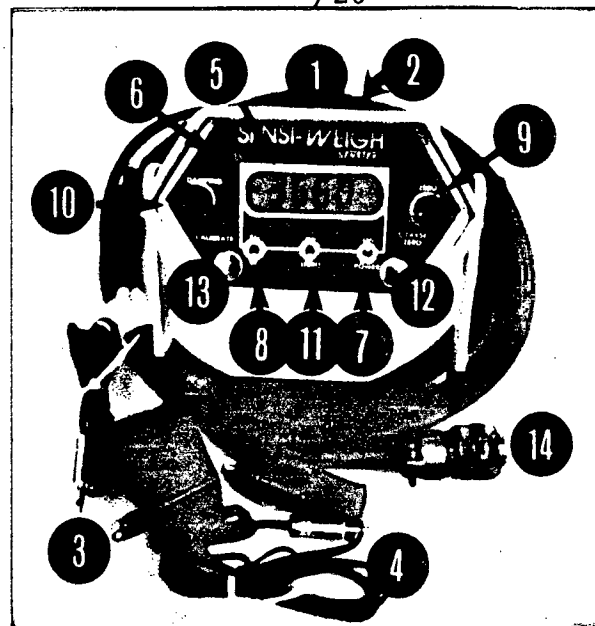
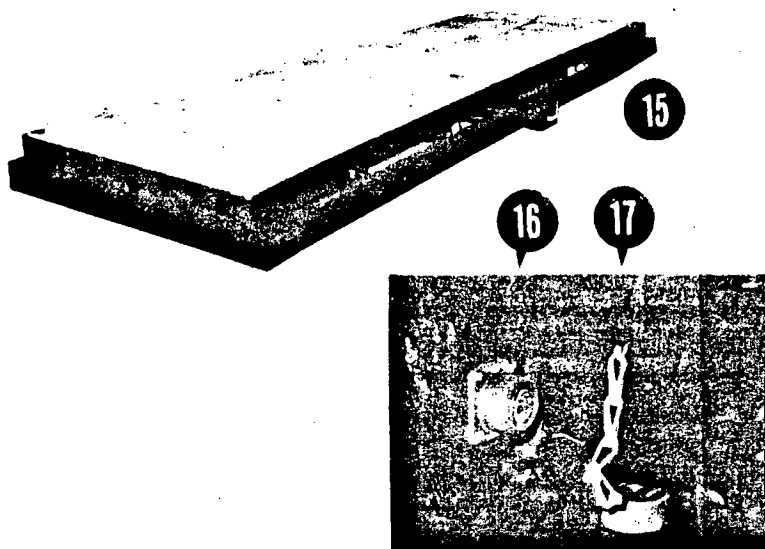
SENSI-WEIGH

DESIGNED AND MANUFACTURED BY:

SENTEK LTD.

SASKATOON, CANADA

Specialists in Agricultural Electronics



CONTROLS AND COMPONENT DETAILS

1. Instrument Box - Contains the control electronics for the weigh scale.
2. Charger Plug - Battery charger input.
3. A.C. Charging Unit - Can be used to charge the instrument battery. The charger can be left plugged in continuously.
4. Cigarette Lighter Charging Unit - Can be used to charge the instrument battery. The charger can be left plugged in continuously.
5. Digital Readout - Instantaneously reads weight on scale platform. Reading can vary from minus weights to a positive weight reading of slightly above capacity.
6. Low Battery Indicator - A letter "L" illuminates when the battery is mostly discharged. The instrument should be recharged to maintain the units accuracy.
7. Power Switch - Controls the power to the weigh scale.
8. K.G./Lbs Switch - Selects which unit of weight that is indicated by the digital readout (K.G. = Kilograms Lbs = Pounds)
9. Zero Knob - Used to balance the scale (obtain a reading of 000) when there is no weight on the platform.
10. Damp knob - Used to "damp" out movement of animal so as to stabilize the weight reading.
11. Light Switch - Illuminates the digital readout in poorly lit conditions. Note: Using the light reduces the battery life from 80 hours to 20 hours.
12. Coarse Zero Adjust - Adjusts zero setting so as to bring zero knob (7) into range. (remove plug)
13. Calibration Adjusts -
14. Male plug - Connects instrument box to scale platform.
15. Scale Platform - Consists of lower stationary frame and upper floating weight platform.
16. Female Socket - Receptical of male plug from instrument box.
17. Dust Cap - Covers female socket to exclude moisture and dust when scale is not in use.

A. Connect male plug (14) to female socket (16) on scale platform (15).

B. Turn on power switch. (7)

C. Select unit of weight (switch 8) K.G. = Kilograms, LBS. = Pounds.

D. Zero Scale - Turn the zero knob (9) to obtain a reading of zero. If the zero knob will "NOT" turn far enough to zero reading, a coarse zero adjustment is required. (Coarse Zero Adjustment - Remove silver button to expose the coarse zero adjust setting (12). Turn fine zero adjust knob (9) to the center of rotation, 5 turns from either end. With fine blade screwdriver, make coarse zero adjust as close as possible. Make fine adjustment with fine zero knob.) The zero may be readjusted while weighing to cancel out any residue that may collect on the platform. Remember -- always to replace silver button, or dust will accumulate in box.

E. Weighing Procedure - The weight will automatically register when the truck is on the platform. If the reading bounces because of the truck movement, turn the damp knob (10) clockwise. This electronically damps the scale to stabilize the reading. The hold switch (11) will retain the weight reading even after the truck is driven off of the scale.

F. Calibration - Have a loaded truck weighed on an accurate scale, the closer the truck weights to the capacity of the scale the more accurate the scale can be calibrated. Turn the zero knob (9) to obtain a reading of zero. Drive the truck on the scale, remove the silver button (13) and with a fine blade screwdriver adjust screw on the blue potentiometer to the weight of the axle or axles. Continue weighing and calibrating each of the axles to ensure proper calibration. Remember - Make sure reading is zeroed before driving on the scale.

G. Turn off power switch when not in use.

H. Battery Recharging - The low battery indicator is only a warning that the battery is almost fully discharged. An approximate life of $\frac{1}{2}$ hour remains after which the instrument will automatically turn itself off which prevents battery damage. Turn off power switch and recharge the battery (approximately 10 hours required for a full charge.) The charger can as well be left plugged in continuously without any resulting damage.

MAINTENANCE:

A. Instrument box storage: Store instrument box in the house. The battery is lead-acid and can be damaged by extreme cold when discharged.

B. Scale Platform: The scale platform is sealed against moisture and can, therefore, remain outdoors all year round. However, proper drainage is essential to ensure proper operation.

TROUBLE SHOOTING:

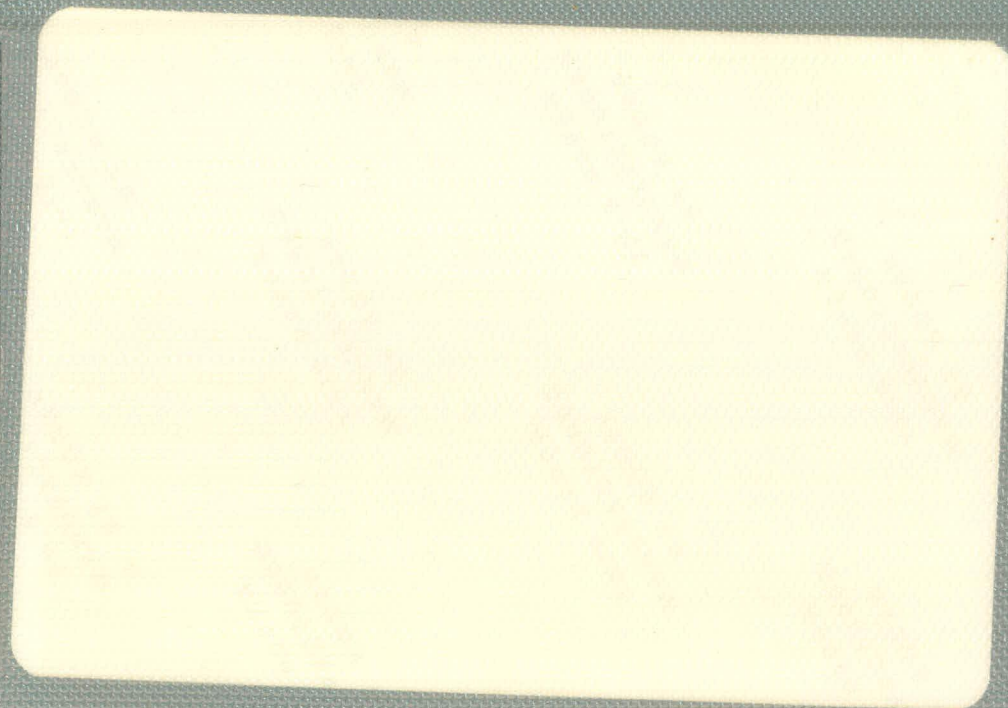
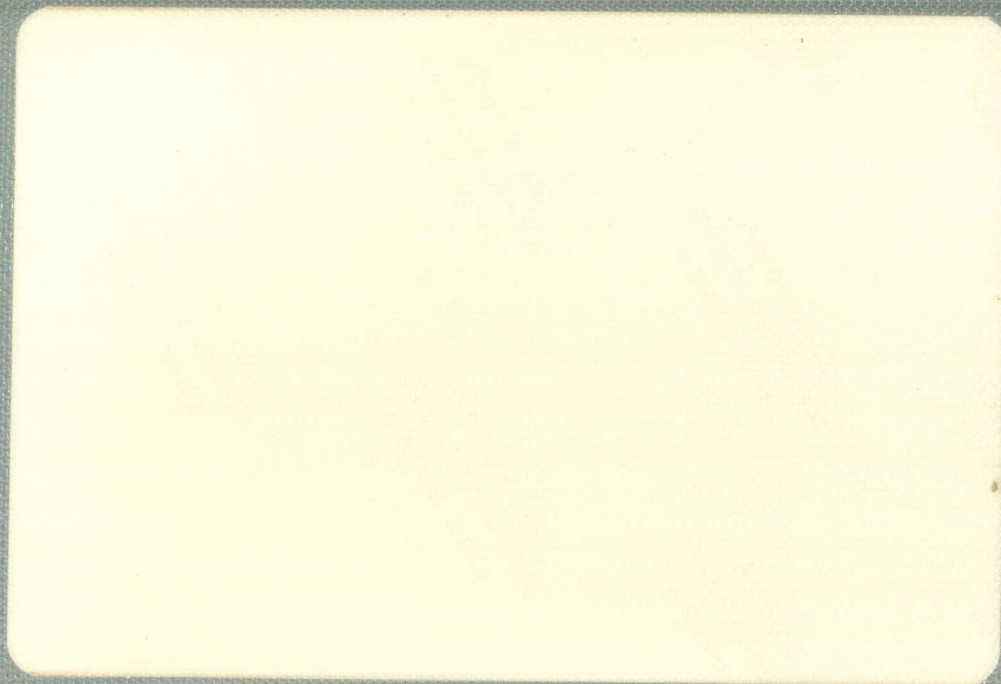
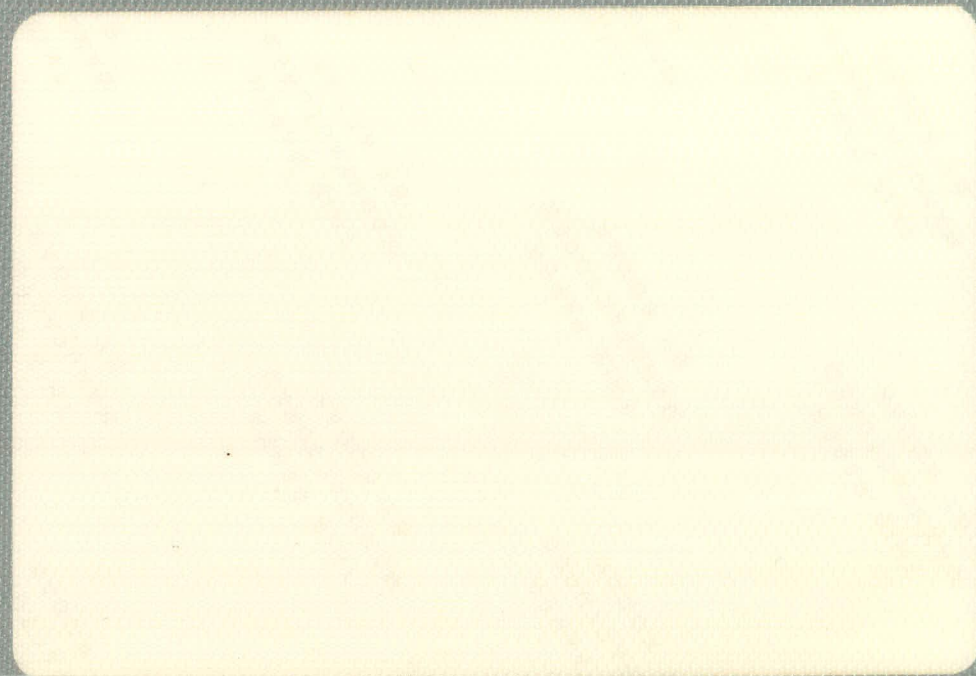
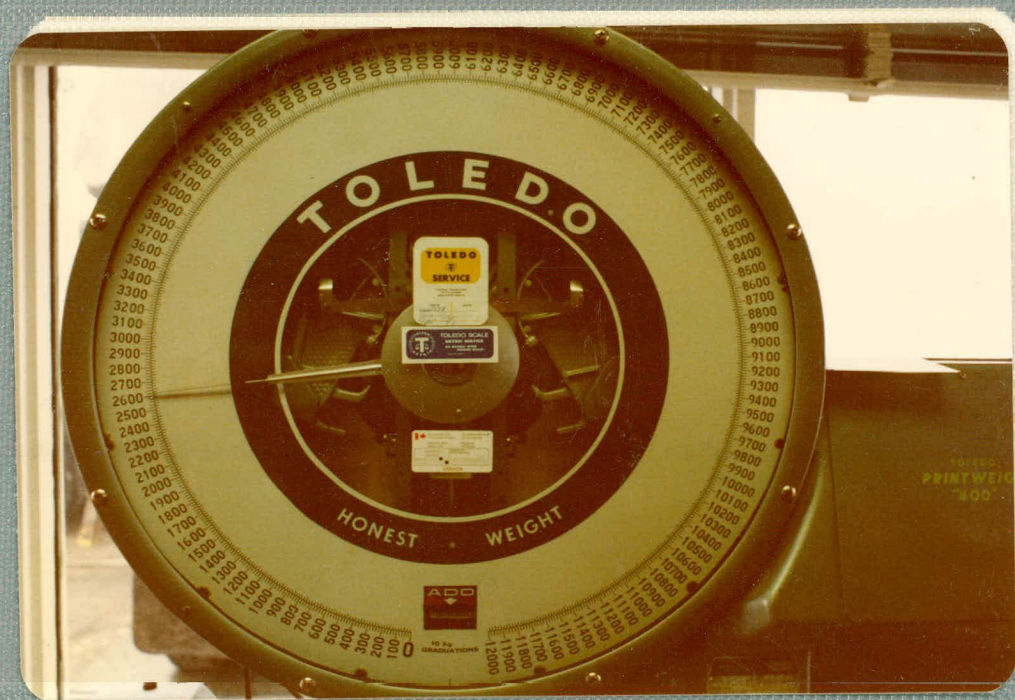
- A. Read operating instructions carefully.
- B. Generally speaking, if any malfunction should occur, it will most likely be in the instrument box unless the scale platform has been physically damaged. A quick test to determine if the problem exists in the scale platform or the instrument box is as follows:
- With the instrument box disconnected from the platform, turn on the power switch. For a normal operating instrument box, the readout should go to a high positive reading. If no reading appears, charge battery. No attempt should be made to repair the instrument before consulting the factory.
- C. Reading Unstable-
- Excessive movement (increase damp setting).
 - High voltage power lines nearby.
 - C.B. or two-way radios nearby.
 - Tightening plug on scale frame.
- D. Trouble shooting scale platform-
- a) Weight depends upon where load is placed on scale:
- Acceptable error 1/2% of load being weighed.
 - Obstruction touching top frame of scale.
 - Return for readjustment or request detailed adjustment information.
- b) Weight consistently in error-
- Acceptable error 1/2% of load being weighed.
 - Obstructions touching top frame of scale.
 - Insure that standard weight used is correct (feed bags tend to lose moisture; use salt blocks).
 - Return for readjustment or request detailed adjustment information.

A N N E X E "C"

PHOTOGRAPHIES DE LA BALANCE

ET DE L'ESSAI





MINISTÈRE DES TRANSPORTS



QTR A 134 685