Australian Government
Department of Industry, Innovation and Science

National Measurement Institute

Certificate of Approval

NMI 6/10B/71

Issued by the Chief Metrologist under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

Meridian Engineers TRACK-WEIGH Model 1A Train Weighing-in-motion Instrument

submitted by Meridian Engineers Pty Ltd
A1/118 Railway Street
West Perth WA 6005

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 106, *Automatic Rail Weighbridges*, dated July 2004.

This approval becomes subject to review on **1/06/21**, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 to 4 approved – variant 5 provisionally approved – interim certificate issued	6/05/03
2	Variant 6 approved	23/06/04
3	Pattern & variants 1 to 6 – certificate issued	24/06/04
4	Variant 2 amended – notification of change issued	5/05/05
5	Pattern & variants amended – variant 5 provisional status removed – notification of change issued	21/12/05
6	Variant 7 provisionally approved – variant 8 approved – interim certificate issued	9/03/06

Document History (cont…)

Rev	Reason/Details	Date
7	Variants 9, 10 & 11 provisionally approved, variant 12 approved – certificate issued	25/10/06
8	Variant 13 approved – certificate issued	30/10/07
9	Variant 14 provisionally approved – interim certificate issued	21/04/09
10	Pattern & variants 1 to 13 reviewed – variant 14 approved – certificate issued	12/03/10
11	Pattern & variants 1 to 14 amended, reviewed & updated – variants 15 to 18 approved – interim certificate issued	1/04/15
12	Pattern & variants 1 to 14 amended (variants 7, 9, 10, & 11 provisional status removed), **reviewed** & updated – variants 15 to 18 approved – certificate issued	24/11/16
	Note: Following the review mentioned in 12 above, certificate NMI 6/14H/7 has been issued, in which obsolete content has been removed, and the content revised and simplified.	

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI (or NSC) 6/10B/71' and only by persons authorised by the submittor.

It is the submittor's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificates No S1/0/A or No S1/0B.

This approval shall NOT be used in conjunction with General Certificate No 6B/0.

Special Conditions of Approval (pattern and all variants):

For this type of instrument, the ability to perform (and continue to perform) within specified maximum permissible errors can depend substantially on characteristics of the rail alignment and the stability of the material on which the rail sleepers rest (whether ballast, concrete footings or some other arrangement). However the National Measurement Institute is unable to clearly define particular requirements for material on which the rail sleepers shall rest.

It is the responsibility of the submittor to exercise control over any installation to ensure compliance with this approval and to ensure performance (and continued performance) within the appropriate maximum permissible errors.

The ability to perform within specified maximum permissible errors can also depend on characteristics of the rail vehicles being weighed (for example wagons with 'flat wheels', rubbing brakes or stiff couplings can be detrimental to performance). Consequently rail operators have a responsibility to ensure adequate maintenance of the rail vehicles (otherwise maximum permissible errors may not be able to be met).

In the event of unsatisfactory performance, allowable accuracy classes or modes of operation may need to be altered, additional conditions imposed or this approval may be withdrawn.

Special Conditions of Approval: (variant 11 only)

This approval is limited to the following three (3) instruments:

(a) Two Queensland Rail installations at Curragh, Qld, namely

- serial number 200532-ME-OneSteel 53-B-Tare, &
- serial number 200532-ME-OneSteel 53-B-Gross; and

(b) One Coal & Allied installation at Rio Tinto Hunter Valley #1 mine, NSW, namely

- serial number 200543-ME-RT 23 60-B-Gross.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.

Dr A Rawlinson

TECHNICAL SCHEDULE No 6/10B/71

Pattern: Meridian Engineers TRACK-WEIGH Model 1A Train Weighing-in- motion Instrument

Submittor: Meridian Engineers Pty Ltd
A1/118 Railway Street
West Perth WA 6005

1. Description of Pattern approved on 6/05/03

A Meridian Engineers TRACK-WEIGH model 1A weighing instrument for the determination (by measurement of axle forces) of the mass of each wagon and the total mass of a train, when weighed in motion. The TRACK-WEIGH model 1A system is a single point weighing system (with a set of two weighing sensors – one on each rail – designed to weigh each axle once). The instrument is approved for class 2 wagon weighing and class 0.5 (or 1 or 2) train weighing. The system uses Meridian Engineers model ME-AS41 weighing transducers and can measure a maximum wagon weight of up to 100 t, a minimum wagon weight of 15 t, and a scale interval of no greater than 200 kg, over a speed range of 0.1 to 6 km/h.

1.1 Weighing Transducers

Meridian Engineers model ME-AS41 weighing transducers (Figure 1) consist of a length of AS41 rail (of approximately 5 m in length). Each transducer has a number of strain gauges bonded to the rail and also K-type thermocouples for measurement of the rail temperature.

The ME-AS41 weighing transducers are welded into the rail line into which the system is installed and rest on sleepers (as shown in Figure 1). Each weighing transducer has a capacity of 12.5 t (i.e. the capacity for one axle is 25 t – one transducer for each rail).

Note: Alternative covering systems for the weighing transducers may be used as shown in Figure 3. Figure 3(a) shows a system with multiple transducer pairs with each weighing transducer covered by a stainless steel cover. Figure 3(b) shows a system with a single transducer pair (with each element of the weighing transducer covered by a separate stainless steel cover – hence providing space for a track switch which is also shown in the figure). Note that Figure 1 is a similar system to Figure 3(b), but using different covers to cover the transducer elements.

1.2 Track Switches

A Tiefenbach model 2N 59-1R-600-40 track switch is mounted as shown in Figure 1 to sense wheel position (additional track switches may also be provided).

Up to eight track switches are installed and operated by the wheels of the rail vehicles. The track switches provide the TRACK-WEIGH model 1A control system with logic signals to initiate the system, identify and distinguish locomotives from wagons, monitor train speed, and determine train roll-back.

1.3 Electronics Cabinet

The Meridian Engineers model ME-EC1 electronics cabinet (Figure 2) houses the control system which receives input signals from the weighing transducers, temperature sensors, track switches, and automatic vehicle identification systems (tag readers) if used, and processes this information using Meridian Engineers Rail-MASTER software (version 1.0) to determine wagon weights, total train weights and to determine unweighed vehicles (e.g. locomotives).

The electronics cabinet is provided with a socket for connection to a computer network, and contains:

- A Sola model UPS-400 (325W) uninterruptible power supply (and may also contain a mains isolation transformer);
- A National Instruments model PXI-1000B computer chassis with model PXI-8146RT controller card and model 6030E multi-function input/output card;
- A National Instruments model SCXI-1000 instrumentation chassis with model SCXI-1112 thermocouple input card and model SCXI-1520 strain amplifier (with SCXI-1314 interface card); and
- A K-type thermocouple temperature sensor which is able to detect and initiate warnings or shut-down of the system in the event of excessive electronics cabinet temperatures.

1.4 Indication

Meridian Engineers Rail-MASTER server software (version 1.0S) runs on the controller card in the ME-EC1 electronics cabinet.

With only server software, the system operates in automatic mode. A green indicator light on the electronics cabinet is illuminated while a train is being weighed. A red indicator light is illuminated if any fatal errors occur and the train would need to be reweighed. An optional LED display indicating the weight of the last wagon weighed may also be added to the electronics cabinet (Figure 2).

The progress and results of weighing operations may be viewed on a personal computer connected to the electronics cabinet via its network connection socket (either directly or via a computer network). The personal computer uses Meridian Engineers Rail-MASTER client software (version 1.0C) to access and display weighing operations and results.

Note: A personal computer for viewing weighbridge operations shall be available as part of the system, and shall be locally available at the time of verification.

The ME-EC1 electronics cabinet or the personal computer (running Rail-Master client software) shall be connected to a printer for the output of measurement reports. The measurement reports may in addition be provided to another computer system via a network or the internet.

An installation may operate in manual mode (alternative operation modes are described in variants 4 and 5). In manual mode an operator is required, and uses the Rail-MASTER client software to arm the weighbridge and end a train weighing sequence. The client software also provides the operator with a system status page to indicate if any faults develop.

When a weighing sequence is commenced (track switch activation occurs) the instrument is zeroed automatically prior to weighing beginning.

1.5 Printout

The wagon identification, information to identify the particular weighing (e.g. date and time of weighing, or date and sequence number), speed, individual wagon mass and total train mass are printed, as are any overspeed or other error messages.

Other information may also be printed but locomotive masses will not be printed.

Where an error has occurred in the weighing, a total train weight may be printed, but shall exclude any incorrectly weighed wagons and shall be printed with a message such as “TOTAL (Excluding incorrectly weighed wagons)”.

Note: Where an instrument is approved or verified for total train weighing only, the report should include a note “Instrument for total train weighing only”, or similar, in this case individual wagon mass values are not required to be included in the weighing report. However access to wagon weight values should be available for testing purposes.

1.6 Roll-back detection

The system will stop registering weights when a roll-back of rail wagons occurs. This is indicated by light signals to the operator. The Rail-MASTER server software maintains a count of the last axle number to cross the weighbridge. The system will recommence weighing when the train is back to the original position where the roll-back commenced. A wagon weight will not be displayed if any axle in the wagon was outside the acceptable speed range during the weighing process. In this case, to obtain an approved wagon weight, it will be necessary for the wagon to be reweighed completely.

Once a weight has been determined for a wagon (in the acceptable speed range), it can not be reweighed during the train weighing. This is the case even if the wagon is completely reversed over the weighbridge, then rolled forward over it again.

1.7 Specifications

In-situ performance of the instrument will depend on site conditions and train configuration. It may therefore be necessary following in-situ testing (and in the light of results obtained) to restrict the range of operation in ways such as:

- Limiting the maximum or minimum wagon weights.
- Limiting the allowable speed range(s).
- A combination of both the above.

Such restrictions shall be marked on the nameplate of the instrument and where operation occurs outside the acceptable range(s), weight values should not be shown and an error message should appear (similar to the current overspeed arrangement).

Instruments may have differing specifications as described above, but shall be within the limits shown below:

Accuracy class Train weighing	0.5, 1 or 2
Accuracy class Wagon weighing	2
Maximum capacity	25 t per axle
Minimum capacity	3.75 t per axle
Scale interval	100 or 200 kg
Maximum wagon weight	No. of axles x 25 t (or less)
Minimum wagon weight	No. of axles x 3.75 t (or more)
Maximum operating speed	6 km/h or less
Minimum operating speed	0.1 km/h or more

1.8 Markings

Instruments bear the following basic markings at each location having a weight indication or printing device (the values given are provided as an example only):

Manufacturer's name or mark	…..
Importer's name or mark	…..
Model designation	…..
Serial number of the instrument	…..
Pattern approval mark	NSC No 6/10B/71
Accuracy class	
Train weighing	0.5
Wagon weighing	2
Maximum capacity	Max (axle) 25 t
Minimum capacity	Min (axle) 3.75 t
Scale interval	d = 200 kg
Maximum wagon weight	No. of axles x 25
t Minimum wagon weight	No. of axles x
3.75 t Maximum operating speed	v max = 6 km/h
Minimum operating speed	v min = 0.1 km/h
Maximum number of wagons per train (If less than 60 wagons)	n max …..

The markings shall reflect details for which the particular installation has been verified. The maximum and minimum wagon weights and maximum and minimum operating speeds may vary from those shown in the specifications (clause **1.7 Specifications**) but shall be within the limits specified there. For example, the maximum wagon weight will be related to the heaviest reference wagon used; the Commission should be consulted for guidelines regarding this.

Note 1: It is acceptable for more complex sets of markings to be provided. This may be necessary where (for example) it was necessary following in-situ testing to restrict operation to one speed range for wagon weighing and another speed range for train weighing. Such arrangements shall be clearly set out in the markings provided.

Note 2: Where an installation is only to be used with wagons of a particular configuration (e.g. all with 8 wheels) the maximum and minimum wagon weight values may be expressed as a value rather than the formula shown in the example.

1.9 Verification Provision

Provision is made for the application of a verification mark.

1.10 Sealing Provision

The calibration and set-up menus of the instrument are secured with a passcode, without which alteration of these items is not possible.

In addition a non-resettable 'calibration counter' is incremented whenever any calibration adjustment or set-up parameter is altered. The value of this calibration counter is shown in the 'registered calibration history table' (accessible through the calibration menu in the Rail-MASTER client software). The value of the 'calibration counter' at the time of verification shall be recorded on a destructible adhesive label attached to the instrument (so that any subsequent alteration to the calibration or parameters will be evident as the recorded value and the current calibration counter value will differ).

Note: There is provision for details regarding each alteration to be manually recorded by service personnel in the 'registered calibration history table'.

Physical sealing of the cards within the National Instruments model SCXI-1000 instrumentation chassis may also be provided.

2. Description of Variant 1 approved on 6/05/03

With alternative weighing transducers of differing capacities as shown in Table 1.

TABLE 1

Weighing transducer	ME-AS41	ME-RT19 68	ME-RT23 60	ME-RT23 50	ME-UIC60
Capacity of weighing transducer	20.5 t	22.5 t	20 t	18 t	20 t
Minimum capacity	1.25 t	1.25 t	1.25 t	1.25 t	1.25 t

Note 1: The second part of the model number refers to the rail cross section. The weighing transducer models ME-RT 19 68, ME-RT 23 60 and ME-RT 23 50 may be known as ME-AS68, ME-AS60 and ME-AS50, respectively according to the rail cross section.

Note 2: The description of the ME-AS41 weighing transducer in clause 1.1 Weighing Transducers is in accordance with an earlier specification of this transducer, in which the capacity of the weighing transducer was given as 12.5 t. Systems utilising this transducer may be altered in accordance with the increased weighing transducer capacity specification, in accordance with this variant. Note that suitable markings would need to be provided, and verification carried out in accordance with any increased capacity.

The ME series of weighing transducers consist of a length of rail (of approximately 5 m in length). Each transducer has a number of strain gauges bonded to the web of the rail; provision is also made for measurement of the rail temperature.

The weighing transducers are designed to be welded or bolted (using 'fish plates') into the rail line into which the system is installed and rest on sleepers or other supports (as shown in Figure 1).

Instrument specifications vary according to the capacity of the weighing transducer as shown in Table 2.

TABLE 2

Maximum capacity of	2 × capacity of weighing transducer instrument (per axle)
Minimum capacity	2 × minimum capacity (from Table 1 above)
Scale interval	100 or 200 kg
Maximum wagon weight	No. of axles×x maximum capacity of instrument (or less)
Minimum wagon weight	No. of axles × minimum capacity (or more)

3. Description of Variant 2 approved on 6/05/03

With various components of the pattern as listed below replaced by certain other compatible components.

- With alternative uninterruptible power supply units.
- With alternative National Instruments computer chassis, controller card and/or input/ output card e.g. The Commission has agreed to the following alternative components: computer chassis – models PXI-1011, PXI-1031 & PXI-1042 and controller card – models PXI-8145RT, PXI-8175RT, PXI-8176RT & PXI-8186RT.
- With alternative track switches.
- With an alternative enclosure for the instrument electronics, i.e. the appearance will vary from that in Figure 2. The enclosure may utilise an internal rack system for component mounting.

4. Description of Variant 3 approved on 6/05/03

With the system operating in a fully automatic mode. In this configuration additional track switches are used before the weighbridge, to arm the system as a new train approaches. The system is disarmed automatically once the last wagon has crossed the weighbridge. Light signals are provided for the train driver to indicate the weighbridge readiness to receive a train and any error conditions such as roll-back.

5. Description of Variant 4 approved on 6/05/03

With the TRACK-WEIGH system operating under the supervision of a plant control computer system (e.g. a Citect Plant control system). The plant control system shall be able to initiate the start and end of a train weighing sequence, and take appropriate action in the case of error conditions such as roll-back. This mode of operation is site specific and customised to the particular installation.

6. Description of Variant 5 provisionally approved on 6/05/03 approved on 21/12/05

Instruments with differing accuracy class and speed range specifications within the limits shown below.

Accuracy class Train weighing	0.5, 1 or 2
Accuracy class Wagon weighing	1 or 2
Maximum operating speed	110 km/h or less
Minimum operating speed	0.1 km/h or more

To achieve higher accuracy and/or higher speed ranges it may be necessary for additional weighing transducers to be connected in the rail line (allowing averaging of weight data from a number of weighing transducers).

Performance will be dependent on site specific conditions and it is the responsibility of the submittor (in consultation with the rail system operator) to determine the number of transducers necessary to meet the accuracy requirements.

Instruments may be known as TRACK-WEIGH model 1A, 2A, etc. according to the number of transducer pairs.

Note: Although instruments with specifications mentioned above are approved, the acceptability for use for trade is dependent on satisfactory performance at verification testing.

7. Description of Variant 6 approved on 23/06/04

With the K-type thermocouple temperature sensors of the pattern replaced by LM35 semi-conductor type temperature sensors for the weighing transducers and for the electronics cabinet. This variant does not require the model SCXI-1112 thermocouple input card.

8. Description of Variant 7 provisionally approved on 9/03/06
approved on 24/11/16

The TRACK-WEIGH model 1AX, 2AX, etc. according to the number of transducer pairs. These models are similar to the model 1A, 2A, etc. respectively but with some changes including additional force sensing elements and modified compensation software which are intended to reduce possible effects of changes in the rail line condition (ballast movement for example).

The weighing transducers used in the model 1AX, 2AX, etc. have the same specifications as those mentioned in Table 1 of Variant 1, except that the model numbers have a “-X” suffix, e.g. ME-AS41-X.

The model 1AX, 2AX, etc systems may utilise either the model ME-EC1 electronics cabinet (of the pattern), or the model ME-EC2 electronics cabinet (see variant 10).

The variants 2, 3, 4, 5 and 8 may also apply to these model systems (variant 6 does not apply as the 1AX, 2AX etc systems already utilise the LM35 type temperature sensors).

9. Description of Variant 8 approved on 9/03/06

The TRACK-WEIGH systems (pattern or variants) fitted with approved Novaris load cell protection devices (as described in the documentation of approval NSC S366).

10. Description of Variant 9 provisionally approved on 24/10/06
approved on 24/11/16

The TRACK-WEIGH model 1BX, 2BX, etc according to the number of transducer pairs.

These models are similar to the pattern but in addition to the use of differing force transducer elements, they also incorporate changes (similar to those described in Variant 7) including additional force sensing capability and modified compensation software which are intended to reduce possible effects of changes in the rail line condition (ballast movement, for example).

The model 1BX, 2BX, etc systems may utilise either the model ME-EC1 electronics cabinet (of the pattern), or the model ME-EC2 electronics cabinet (see variant 10).

The variants 2, 3, 4, 5 and 8 may also apply to these model systems (variant 6 does not apply as the 1BX, 2BX etc systems already utilise the LM35 type temperature sensors).

Weighing Transducers

These models utilise force transducer elements (each having a number of strain gauges bonded to them) which are bolted on to the rail (in accordance with the manufacturer's procedures) and hence result in the rail becoming a weighing transducer.

Different weighing transducer models (see Table 3) are formed according to the rail type.

TABLE 3

Rail type	AS41	RT19 68 or AS68	RT23 60 or AS60	RT23 50 or AS50	UIC60	Onesteel 53
Weighing transducer	ME-yyyyy-BX where yyyyy is the Rail type above					
Capacity of weighing transducer	12.5 t	22.5 t	20 t	18 t	20 t	18 t
Minimum capacity of weighing transducer	1.25 t	1.25 t	1.25 t	1.25 t	1.25 t	1.25 t

Provision is also made for measurement of the rail temperature using LM35 semi-conductor type temperature sensors.

The weighing transducers are designed to form part of the continuous rail line in which the system is installed, and they rest on sleepers or other supports (as shown in Figures 1 and 3). Lengths of rail incorporating the weighing transducers may alternatively be welded or bolted (using 'fish plates') into the rail line.

Instrument specifications vary according to the capacity of the weighing transducer as shown in Table 4.

TABLE 4

Maximum capacity of instrument (per axle)	2 × capacity of weighing transducer
Minimum capacity (per axle)	2 × minimum capacity of weighing transducer (from Table 3 above)
Maximum wagon weight	No. of axles × maximum capacity of instrument (or less)
Minimum wagon weight	No. of axles × minimum capacity (or more)

The value of scale interval shall be 20, 50, 100, 200 or 500 kg and shall be chosen to satisfy the requirements of NMI R 106, Automatic Rail Weighbridges, dated July 2004 – in particular clauses 2.3 and 2.5.

11. Description of Variant 10 provisionally approved on 24/10/06
approved on 24/11/16

The pattern or variants using the Meridian Engineers model ME-EC2 electronics cabinet instead of the model ME-EC1 described for the pattern. The model ME-EC2 cabinet may also be known as a model MINI ME (Figure 4).

11.1 Electronics Cabinet

The Meridian Engineers model ME-EC2 electronics cabinet houses the control system which receives input signals from the weighing transducers, temperature sensors, track switches, and automatic vehicle identification systems (tag readers) if used, and processes this information using Meridian Engineers Rail- MASTER software (version 4.0) to determine wagon weights, total train weights and to determine unweighed vehicles (e.g. locomotives).

The electronics cabinet is provided with a socket for connection to a computer network, and contains:

- A computer main-board, hard disk and power supply board.
- A National Instruments model NI-PCI 6284 Data Acquisition Board.
- A Meridian Engineers model ME-WBMP-PCB01 control panel.
- An LM35 semi-conductor type temperature sensor to provide information to the system regarding the cabinet temperature.
- Novaris SL6-LCP-18 load cell protectors (optional).
- Novaris SL4-DIN18/SL2-DIN18 protectors (optional for track switches and
- LM35 sensors).

In addition, a power supply cabinet (ME-PS2 or ME-PS3) is supplied with mains power (230 V AC nominal), provides power to the electronics cabinet, and contains:

(i) For the ME-PS2:

- A power supply/battery backup controller (BCE4), and
- An 18 Amp hour battery; or

(ii) For the ME-PS3:

- A Powerware 9000 series uninterruptible power supply (UPS), and
- A Powertech 12V/4Amp switchmode power supply.

11.2 Indication

The Meridian Engineers Rail-MASTER server software (version 4.0S) runs on the computer main-board in the ME-EC2 electronics cabinet.

With only server software, the system operates in automatic mode. A green indicator status light on the control panel is illuminated when the system is functioning normally. The status indicator light is illuminated red if any fatal errors occur and the train would need to be re-weighed.

The progress and results of weighing operations may be viewed on a personal computer connected to the electronics cabinet via its network connection socket (either directly or via a computer network). The personal computer uses Meridian Engineers Rail-MASTER client software (version 4.0C) to access and display weighing operations and results. The Rail-MASTER client software can also be installed and run simultaneously with the Rail-MASTER server software on the ME-EC2 main board computer. In this case a monitor screen can be connected directly to the ME-EC2 and a separate personal computer is not necessary.

Note: A personal computer for viewing weighbridge operations shall be available as part of the system, and shall be locally available at the time of verification.

The ME-EC2 electronics cabinet or the personal computer (running Rail-Master client software) shall be connected to a printer for the output of measurement reports. The measurement reports may in addition be provided to another computer system via a network or the internet.

An installation may operate in manual mode (alternative operation modes are described in variants 4 and 5). In manual mode an operator is required, and uses the Rail-MASTER client software to arm the weighbridge and end a train weighing sequence. Alternatively, START, STOP and RESET buttons on the control panel allow the operator to control the weighbridge manually without using the client software. The client software also provides the operator with a system status page to indicate if any faults develop.

When a weighing sequence is commenced (track switch activation occurs) the instrument is zeroed automatically prior to weighing beginning.

12. Description of Variant 11 provisionally approved on 24/10/06
approved on 24/11/16

The TRACK-WEIGH model 1B, 2B, etc systems which are similar to the model 1BX, 2BX, etc systems (variant 9), however these models do not incorporate the additional force sensing elements and related software which are mentioned in variant 7 (i.e. in this respect they are similar to the model 1A, 2A, etc of the pattern).

The weighing transducer models are similar to those in Table 3 of variant 9, however the models numbers are in the form ME-yyyyy-B.

These systems may utilise either the model ME-EC1 electronics cabinet (of the pattern), or the model ME-EC2 electronics cabinet (of variant 10).

The variants 2, 3, 4, 5 and 8 may also apply to these model systems (variant 6 does not apply as the 1BX, 2BX etc systems already utilise the LM35 type temperature sensors).

NOTE: These installations are not currently in use for trade (at time of publication), but are considered to be approved should they be required for use for trade at a later date (and satisfactorily pass verification testing).

13. Description of Variant 12 approved on 24/10/06

The pattern or variants (whether or not using the ME-EC1 or ME-EC2 electronics cabinet) using Meridian Engineers Rail-MASTER software version 4.0 (4.0S for server, 4.0C for client). This software version is able to support systems with or without the additional force sensing elements incorporated in the model 1AX, 2AX … and 1BX, 2BX … systems (variants 7 and 9).

14. Description of Variant 13 approved on 29/10/07

A version of the TRACK-WEIGH model 1BX, 2BX, etc (variant 9), in which the transducer modules have a different cover (see Figure 5) and in which the wiring arrangement differs such that a separate junction box is provided for each transducer (Figure 6), rather than having the connections within the transducer cover.

The weighing transducer model is in the form ME-yyyy-BX-PTD where yyyy is the rail type (as per Table 3).

15. Description of Variant 14 provisionally approved on 6/05/03 approved on 24/11/16

The ME-TrackWeigh-nBXD system (nBXD representing 1AX, 2AX, etc. according to the number of transducer pairs).

These models are similar in principle to the model 1A, 2A, etc, however they use ME-Boltweigh weighing transducers and a different electronics arrangement incorporating a Meridian ME-CANAMP-R004 module.

15.1 Weighing Transducers

The weighing transducers used in the model -1BXD, -2BXD, etc systems have the same specifications as those mentioned in Table 1 of Variant 1, except that the model numbers are in the form ME-Boltweigh-…. (where ….. represents the rail type, e.g. ME-Boltweigh-AS41 rather than ME-AS41). The weighing transducer is formed by a rail section to which two Meridian model ME-Boltweigh elements are attached.

15.2 Electronics System/Software

The Meridian model ME-Boltweigh weighing transducers are connected to a junction box cabinet (Figure 6) which contains a Meridian ME-CANAMP-R004 module which converts analogue signals from the transducers to digital signals for communication to the Meridian Engineers Rail-MASTER software – communication is by means such as RS-232/422 interface, CAN ('controller area network'), or wireless networking connection.

The junction box cabinet may also have facilities for obtaining data from vehicle identification systems (e.g. an RFID tag reader), and track switches.

The system uses Meridian Engineers Rail-MASTER software to process information from the junction box cabinet and hence determine axle load values, and the total vehicle mass. The Meridian Engineers Rail-MASTER software (version 5.0) runs on a personal computer connected to the junction box cabinet by various means as indicated above.

15.3 Power Supply

The junction box cabinet (see clause 1.3 above) operates with 12 – 24 V DC, which may be supplied by a solar power system (solar panel recharging 12 V battery), or from mains AC power via an AC/DC adaptor.

15.4 Interfaces

The instrument may be fitted with interfaces (including wireless) for the connection of auxiliary and/or peripheral devices. Any interfaces shall comply with clause 5.3.6 of document NMI R76 (the basic intent of which is that it shall not be possible to alter weighing results via the interfaces).

Any measurement data output from the instrument or its interfaces shall only be used in compliance with General Supplementary Certificate No S1/0/A or No S1/0B (in particular in regard to the data and its format).

Indications other than the indications of measured mass (i.e. axle loads and total vehicle mass) displayed either on the indicator or on an auxiliary or peripheral device, are not considered to be approved under this certificate.

15.5 Sealing Provision

Sealing is as described for the pattern, however the reference to physical sealing of the SCXI-1000 should be interpreted as "Provision is also made for physical sealing of the cards within the junction box cabinet".

16. Description of Variant 15 approved on 1/04/15

Instruments similar to variant 14, utilizing Meridian ME-CANAMP-R004SC (single channel) modules. See NMI 6/14H/7 for further description in relation to these modules.

17. Description of Variant 16 approved on 1/04/15

The pattern or variants using Transient Controls model TC-LC18, TC-LC32, TC-LC18D or TC-LC32D load cell protection devices. See NMI 6/14H/7 for further description in relation to these modules.

18. Description of Variant 17 approved on 1/04/15

Instruments using Meridian Engineers RailMaster® software (version 6). See NMI 6/14H/7 for further description in relation to this software.

19. Description of Variant 18 approved on 1/04/15

Instruments for which only the Total Train Weight is approved for trade use.

The instrument markings and reports shall include a clear indication that wagon weight values are not approved for trade use.

For some installations wagon weight values may only be approved for trade use in particular conditions (e.g. for weighing in one direction) – in such cases the instrument markings shall reflect this.

TEST PROCEDURE

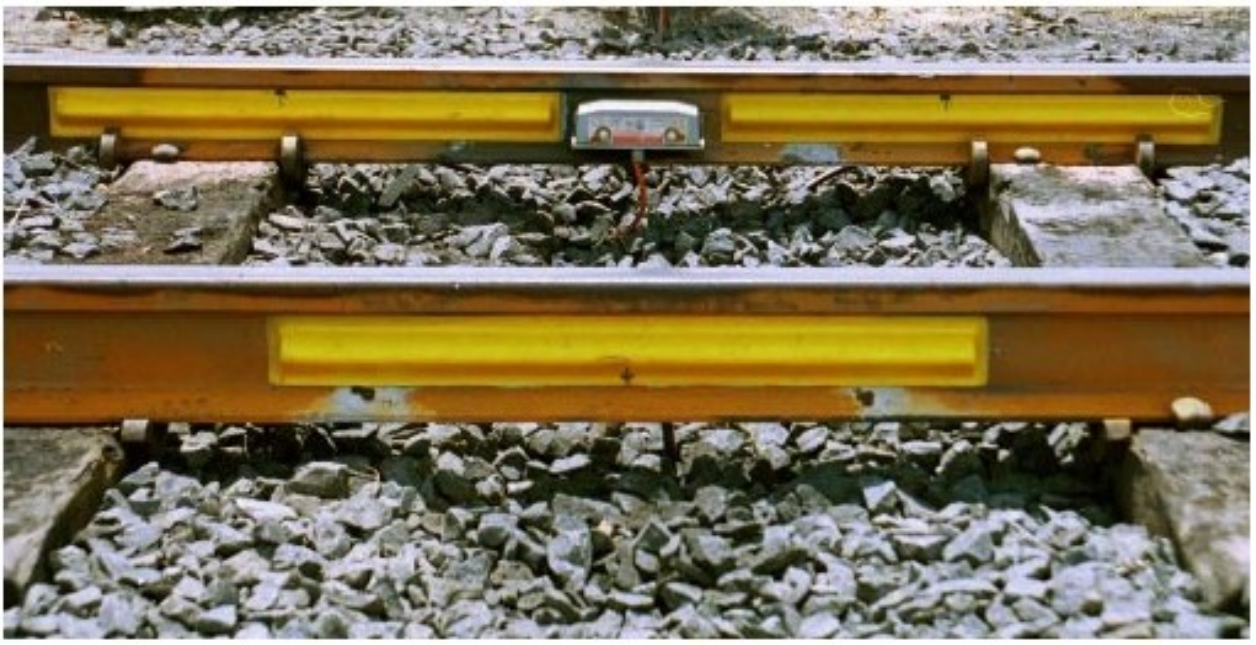
Instruments shall be tested in accordance with any relevant tests specified in the National Instrument Test Procedures.

The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

Maximum Permissible Errors

The maximum permissible errors are specified in Schedule 1 of the *National Trade Measurement Regulations 2009*.

FIGURE 6/10B/71 - 1

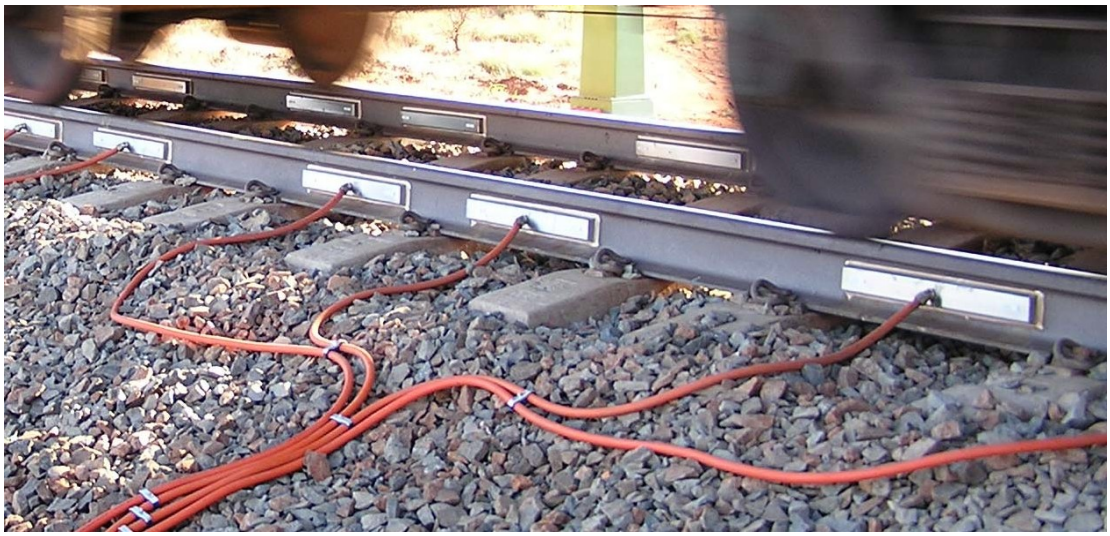


Meridian Engineers Model ME-AS41 Weighing Transducers

FIGURE 6/10B/71 – 2

Meridian Engineers Model ME-EC1 Electronics Cabinet

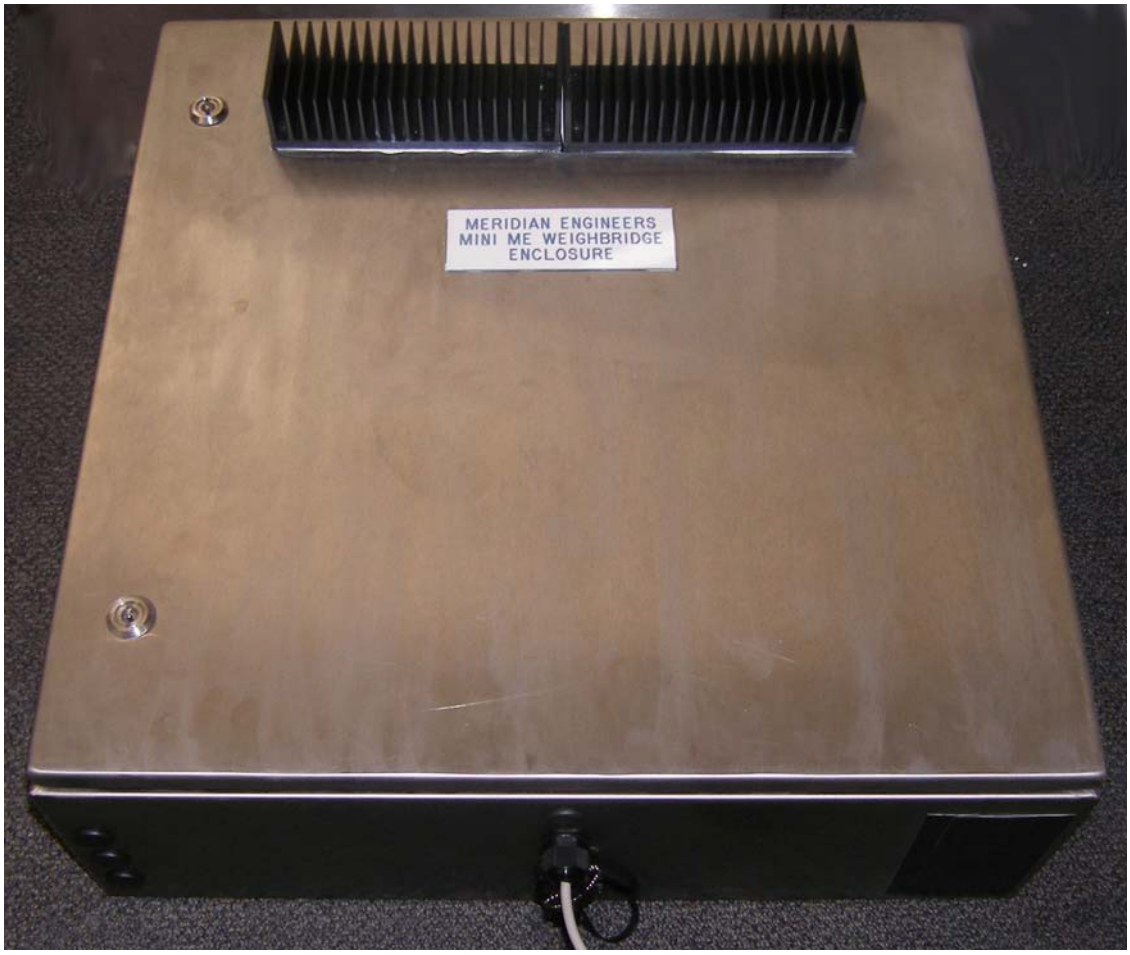
FIGURE 6/10B/71 – 3



(a) High speed TRACK-WEIGH 8A system (ME-AS68-A transducers)

(b) Low speed TRACK-WEIGH 1A system (ME-AS60-A transducers)

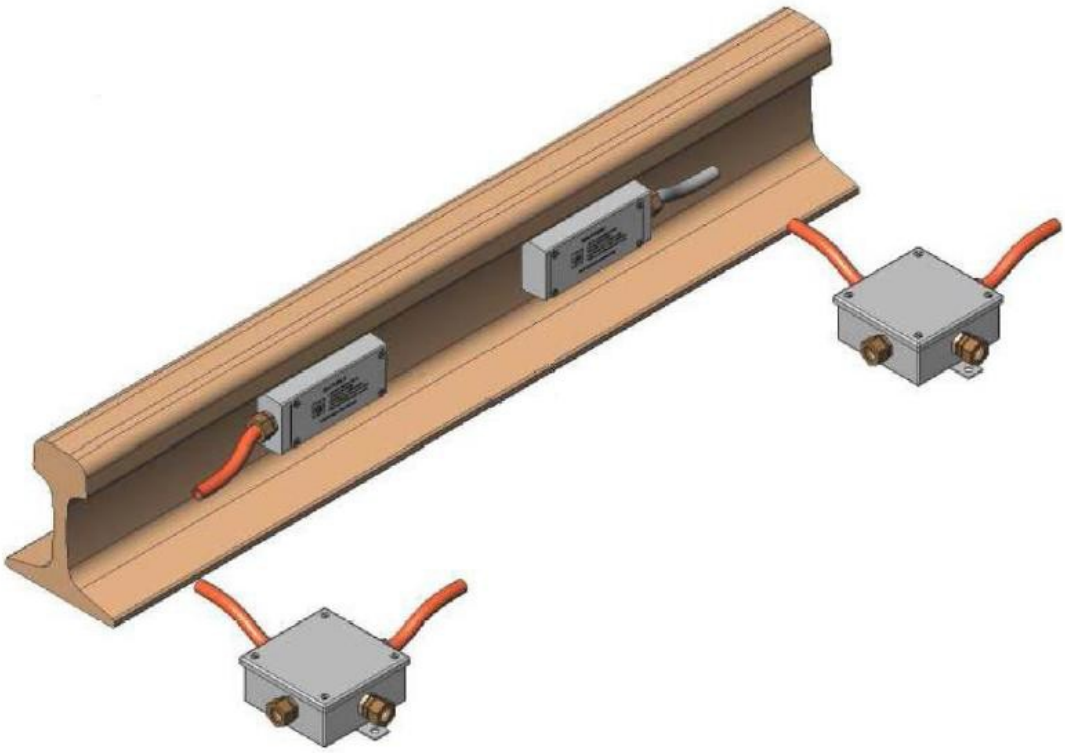
FIGURE 6/10B/71 – 4



Meridian Engineers Model ME-EC2 Electronics Cabinet (aka model MINI ME)

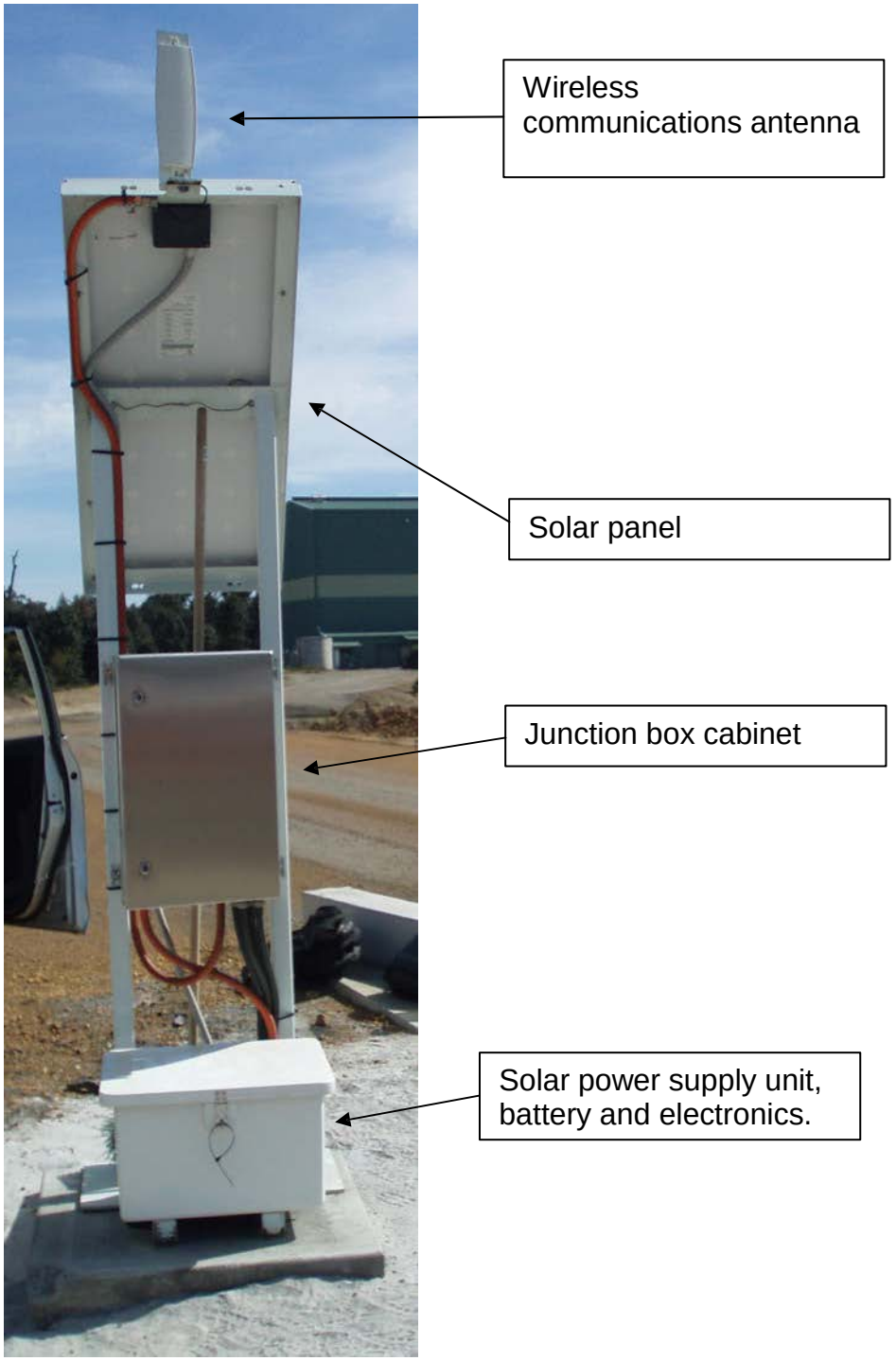
FIGURE 6/10B/71 – 5

(a) Transducer Module With a Different Cover



(b) Separate Junction Box For Each Transducer

FIGURE 6/10B/71 – 6



Meridian Engineers Model ME-TrackWeigh-nBXD Junction Box Cabinet – Variant 14
(in this case shown with solar power supply and wireless communication antenna)

~ End of Document ~