6/10B/64
7 April 2005

Australian Government

National Measurement Institute

12 Lyonpark Road, North Ryde NSW 2113

Cancellation

Certificate of

Approval No 6/10B/64

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

This is to certify that the approval for use for trade granted in Approval 6/10B/64 issued in respect of the

Bateman Kinhill Model BK01 Weighflask Hopper Weighing Instrument

submitted by Bateman Kinhill
299 Coronation Drive
Milton QLD 4064

has been cancelled in respect of new instruments as from 1 June 2005.

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

6/10B/64
28 June 2001

National Standards Commission

12 Lyonpark Road, North Ryde NSW

Certificate of Approval

No 6/10B/64

Issued 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

Bateman Kinhill Model BK01 Weighflask Hopper Weighing Instrument

submitted by Bateman Kinhill
299 Coronation Drive
Milton QLD 4064.

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.

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CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 April 2004, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No 6/10B/64 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 Commission 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 the Commission's Document NSC P 106.

The Commission reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

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

The pattern as approved herein or with substitute load cells and/or indicator and in other capacities, shall comply with General Certificate No 6B/0.

DESCRIPTIVE ADVICE

Pattern: approved 2 March 1999

- A Bateman Kinhill model BK01 Weighflask hopper weighing instrument of 85 000 kg maximum capacity.

Variant: approved 2 March 1999

1. The instrument used in a system for the sequential filling of train wagons.

Technical Schedule No 6/10B/64 describes the pattern and variant 1.

Variant: approved 10 April 2001

2. Variant 1 with a maximum capacity of 100 000 kg.

Technical Schedule No 6/10B/64 Variation No 1 describes variant 2.

FILING ADVICE

Certificate of Approval No 6/10B/64 dated 14 September 1999 is superseded by this Certificate, and may be destroyed. The documentation for this approval now comprises:

Certificate of Approval No 6/10B/64 dated 28 June 2001
Technical Schedule No 6/10B/64 dated 14 September 1999 (incl. Test Procedure)
Technical Schedule No 6/10B/64 Variation No 1 dated 28 June 2001
Figures 1 to 6 dated 14 September 1999

Signed by a person authorised under Regulation 60 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.

TECHNICAL SCHEDULE No 6/10B/64

Pattern: Bateman Kinhill Model BK01 Weighflask Hopper Weighing Instrument.

Submittor: Bateman Kinhill
299 Coronation Drive
Milton QLD 4064

1. Description of Pattern

A Bateman Kinhill model BK01 Weighflask hopper weighing instrument (Figure 1) consisting of a hopper load receptor of 85 000 kg maximum capacity with a verification scale interval of 50 kg.

1.1 Basework

The BK01 Weighflask weighing instrument has the weigh bin fully supported by 4 load cells.

1.2 Load Cells

Four HBM model C16AC3/60t load cells of 60 000 kg maximum capacity are used and are mounted as shown in Figure 2. The load cells are also described in the documentation of NSC approval No S348.

1.3 Indicator

A Salter Weigh-tronix model WI-125 digital indicator is used (Figure 3). The indicator is also described in the documentation of NSC approval No S335.

1.4 Markings

Instruments carry the following markings, in the form shown at right:

Manufacturer's mark, or name written in full	Bateman Kinhill
Indication of accuracy class	(III)
Maximum capacity	*Max* ..... kg *
Minimum capacity	*Min* ..... kg *
Verification scale interval	*e =* ..... kg *
Serial number of the instrument	……
Pattern approval mark for the instrument	NSC No 6/10B/64
Pattern approval mark for the load cells	NSC No S....
Pattern approval mark for the indicator	NSC No S....

* These markings shall also be shown near each reading face if they are not already located there.

1.5 Sealing Provision

Provision is made for the calibration adjustments in the indicator to be sealed by means of the method described in the approval documentation for the indicator.

1.6 Verification/Certification Provision

Provision is made for the application of a verification/certification mark.

In addition suitable provision must be made for the application of suitable verified masses to the instrument as required for verification and certification purposes. It may be necessary for such masses to be incorporated within the design of the instrument.

2. Description of Variant 1

The instrument used in a system for the sequential filling of train wagons.

2.1 The System

In addition to the equipment described for the pattern, the train wagon filling system comprises:

a) A Mitsubishi model MELSEC-A1561P programmable logic controller (PLC) connected to the indicator of the pattern;

b) A computer operator interface using software intended for “supervisory control and data acquisition” (SCADA);

c) Various photosensors used to detect the height and position of train wagons;

d) Various hydraulic cylinders used for raising and lowering verified masses (for the purpose of checking and verifying the instrument four verified 4250 kg masses are provided), opening and closing gates on the surge bin and BK01 Weighflask hopper, and moving the position of the train wagon filling chute (profile chute);

e) A billing system connected to a printer, a modem and a train wagon identification system; and

f) Two Railweight model WEIGHLINE train weighing-in-motion instruments which are similar to that described in NSC approval No 6/10B/62, but which are not verified.

Figure 4 shows a block diagram of the major electrical components in the system and how they are linked.

Note: Although the instrument loads train wagons sequentially in an automatic manner, the test procedure used is the same as that for a non-automatic weighing instrument.

2.2 Operator interface

The operator interface with the system is a computer using SCADA software which is used to start, stop and monitor the automatic cycle and is also used to apply the test masses. Data displayed on the screen is not used for trade purposes and the computer cannot be used to alter programming within the PLC.

Note: The term SCADA is a generic term referring to “supervisory control and data acquisition” systems. Different SCADA systems may be used depending on the installation, and the specific details of the billing system (below) may also vary according to conditions (e.g. particular configurations of the rail operator’s management information systems).

2.3 Billing System

The system is connected via the SCADA system to a billing system. The billing system is connected to a printer which is used to print-out the weight of each wagon at the completion of the weighing operation. The printout is the indication in use for trade. Figure 5 shows a typical printout.

The billing system also stores and provides information to the SCADA system regarding the identity of the wagons. To achieve this the billing system may obtain information from other computer systems such as the rail system operators’ management system; these may be accessed via modem or other communication networks. In addition the results of the weighing operation may be transferred to the rail operator’s management information systems.

In addition the billing system is connected to a wagon identification system which is used to identify each wagon as it passes the system during the loading operation. This information is passed to the SCADA system.

Any discrepancies between the wagon identity read on site and the expected wagon identity obtained from the billing system will cause an error, and loading will be automatically stopped.

2.4 Train Weighing-in-motion Systems

Two Railweight model WEIGHLINE train weighing-in-motion systems (non-verified) are used, and weight data from these two systems is fed into the PLC.

The first of the train weighing-in-motion systems is located prior to the BK01 Weighflask system and is used to weigh incoming empty wagons. If the weight of any these wagons exceeds the expected weight according to the train table database in the PLC, then these wagons are not loaded.

The second train weighing-in-motion system is located after the BK01 Weighflask system and is used to determine the load distribution in each wagon by weighing each bogie. Such information may be used to 'fine tune' the loading of the train (for example, the driver may be asked to alter the speed of the train).

Note: As these train weighing-in-motion systems do not determine the weight delivered into each wagon, they need not be verified.

2.5 Programmable Logic Controller (PLC)

A Mitsubishi model MELSEC-A1561P programmable logic controller (Figure 6) using A1SY10 and A1SJ7ICU24-R4 modules is used to control the weighing cycle. The train table, which includes identity code, tare weight and dimensions of each wagon, is downloaded from the billing system into the PLC. The PLC uses the train table data and data from the weight indicator and photosensors to open and close various gates and sequentially fill each wagon in the train.

2.6 Weighing and Loading Operation

a) Before and after each train is loaded a check of the calibration is carried out by automatically applying four verified 4250 kg masses using four hydraulic cylinder arrangements.

b) Prior to the arrival of the train, details such as the tare and gross weights of each wagon are transferred into the train table database in the PLC from the billing system. The train table can be viewed and scrutinised on the operator's SCADA system.

c) Using the SCADA system the instrument is set to automatic mode and the driver is instructed to approach the load out facility at a speed of 0.8 km/h (approx.). After the locomotives pass the BK01 Weighflask a profile chute (chute used to direct product into the wagon) is lowered into the correct position for loading of the wagons. The position of the chute is continually altered using data from a number of photosensors used to detect the height of each wagon.

d) The automatic operating sequence for each wagon is:

- As each wagon approaches ensure that the correct wagon is in place according to the train table and the train wagon identification system.
- Determine how much material is required for the wagon (i.e. the target weight) by looking up the train table in the PLC. If the empty weight of each wagon, as measured by the first train weighing-in-motion system, exceeds the prescribed empty weight in the train table then do not fill this wagon.

- Fill the BK01 Weighflask to the target weight by opening the gate on the surge bin. When the target weight is reached the surge bin gate is closed and after a settling time a reading is captured.
- Wait for the photosensors to detect the correct position of the wagon for loading.
- When the wagon is in the correct position begin loading of the wagon by opening the gate on the BK01 Weighflask hopper.
- Continue filling the wagon as it passes until the end of the wagon hopper is detected at which point the bottom gate on the hopper is closed. In most instances the hopper is emptied, however if there is any material remaining in the hopper then this forms part of the next load.
- Wait for 4 seconds after the bottom gate on the hopper is closed and capture a reading.
- Determine the weight of material deposited in the wagon. That is, the BK01 Weighflask full reading less the BK01 Weighflask empty reading.

If the last wagon in the train has been detected the process is stopped and a report printed. The printout is the indication in use for trade.

This information may also be transferred by the billing system to other management information systems.

2.7 Settling Time

Adequate time must be allowed between the completion of BK01 Weighflask filling or emptying operations (i.e. closure of the applicable gates) and the capturing of a weight reading to allow for the weight reading to clearly stabilise. This settling time may vary between installations depending on factors such as the hopper capacity, verification scale interval and material being weighed.

Note: It is important that a conservative approach is taken to the determination of the minimum settling time, i.e. the settling time should be set to a longer time where there is any doubt that stability has clearly been reached.

2.8 Markings

In addition to the markings described in clause **1.4** for the pattern, an appropriate minimum settling time shall be determined at the time of verification, and the instrument shall be marked with this value.

Minimum settling time ….. seconds

Note: For the instrument described in the pattern, of 85 000 kg maximum capacity and with verification scale interval of 50 kg and weighing coal, a minimum settling time of 4 seconds is considered to be suitable.

TEST PROCEDURE

Instruments should be tested in conjunction with any tests specified in the approval documentation for the indicator used, and in accordance with any relevant tests specified in the Inspector's Handbook.

Check printout against indicated weights plus total. The weight values before and after material discharge are to be observed and subtracted, and the result compared with the net weight printed. A check of the total net weight for a sequence of deliveries should be checked.

Maximum Permissible Errors at Verification/Certification

The maximum permissible errors for increasing and decreasing loads on initial verification/certification for loads, m, expressed in verification scale intervals, e, are:

$\pm 0.5\ e$ for loads $0 \leq m \leq 500$;
$\pm 1.0\ e$ for loads $500 < m \leq 2\ 000$; and
$\pm 1.5\ e$ for loads $2\ 000 < m \leq 10\ 000$.

6/10B/64
28 June 2001

TECHNICAL SCHEDULE No 6/10B/64

VARIATION No 1

Pattern: Bateman Kinhill Model BK01 Weighflask Hopper Weighing Instrument

Submittor: Bateman Kinhill
299 Coronation Drive
Milton QLD 4064.

1. Description of Variant 2

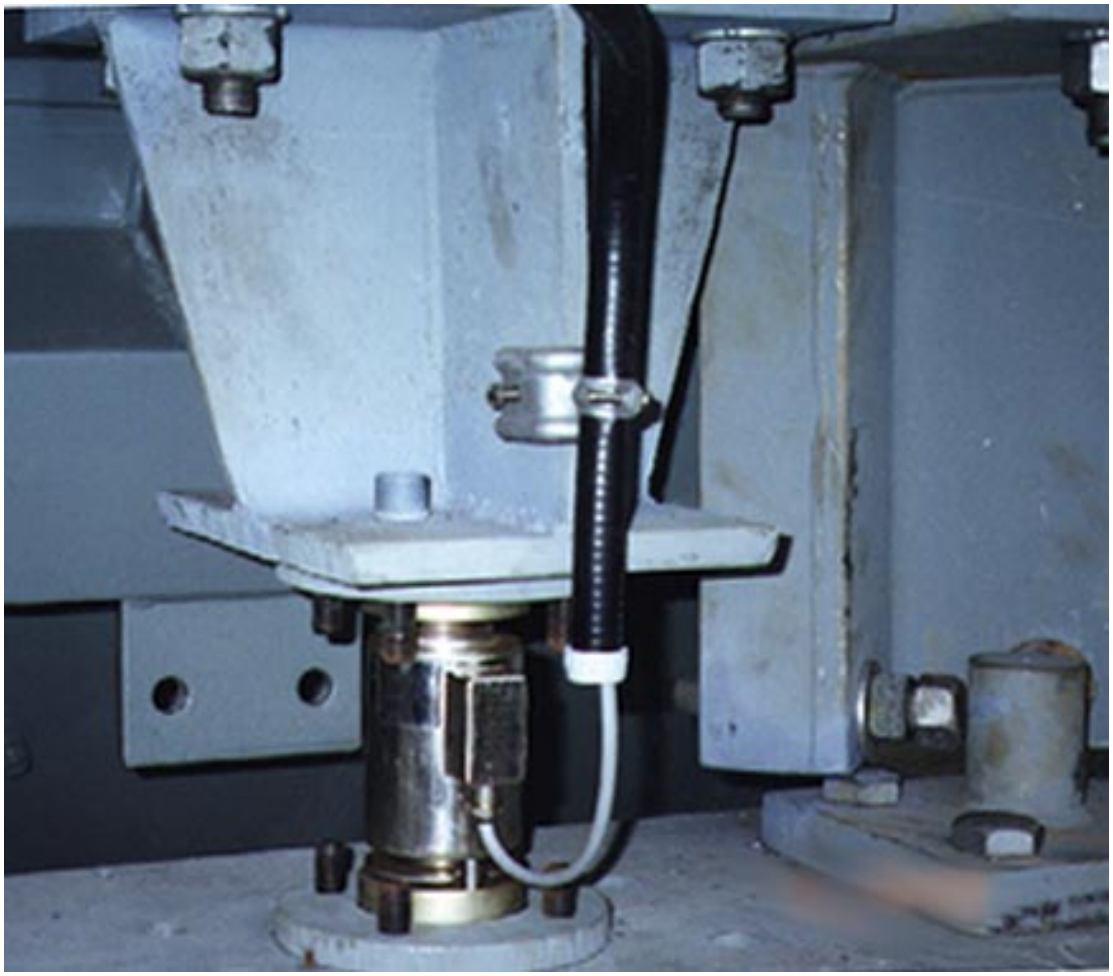
The system described for variant 1 with a maximum capacity of 100 000 kg and with a verification scale interval of 50 kg.

Four HBM model C16AC3/40t load cells of 40 000 kg maximum capacity are used, mounted as shown in Figure 2. The load cells are also described in the documentation of NSC approval No S370.

FIGURE 6/10B/64 - 1

Bateman Kinhill Model BK01 Weighflask Hopper Weighing Instrument

FIGURE 6/10B/64 - 2

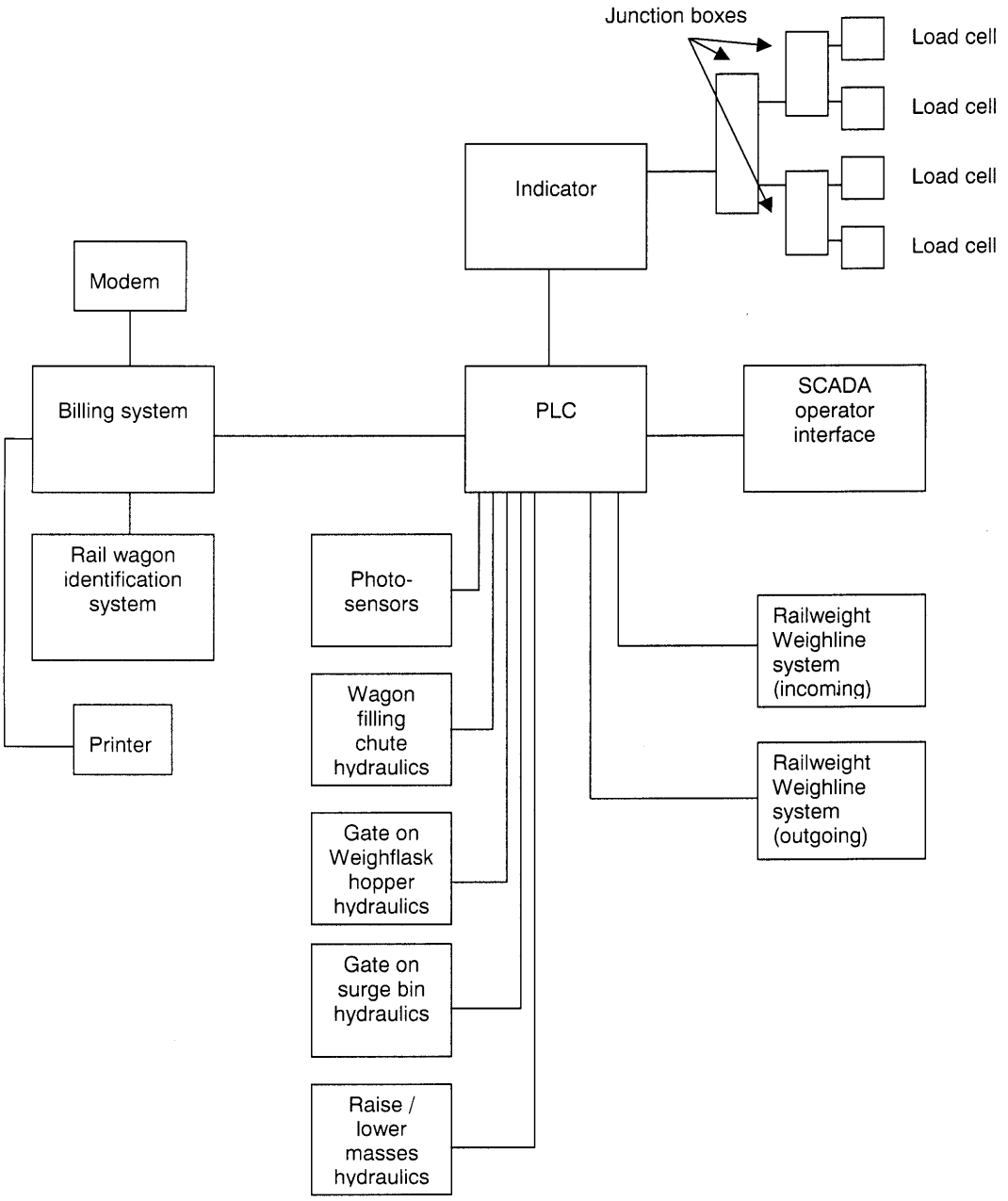


Load Cell Mounting

FIGURE 6/10B/64 - 3

Salter Weigh-Tronix Model WI-125 Digital Indicator

FIGURE 6/10B/64 - 4



System Layout - Variant 1

FIGURE 6/10B/64 - 5

SAMPLE CONSIGNMENT NOTE PRINTOUT
MORANBAH NORTH

TRAIN ID: VO6M **ORIGIN DATE:** 05/09/1998

		SEQUENCE	WAGON	CANCELLED
CONNOTE 1:	FN15298	From: 1	1st: vhsqb 47052	From:
		To: 112	Last: vazq 42950	To:
CONNOTE 2:		From:	1st:	From:
		To:	Last:	To:
CONNOTE 3:		From:	1st:	From:
		To:	Last:	To:

OPERATOR SN: 016119 **LOADER ID:** 9217

TRAIN SHEET CORRECT: YES

START DATE: 05/09/1998 **START TIME:** 10:25

SCALE ZERO: YES **DIRECTION:**

SEQ NO.	WAGON	NETT WEIGHTS	Fault/Error Message
1	77.59	Tonnes	
2	77.78	Tonnes	
3	77.85	Tonnes	
4	78.18	Tonnes	
5	77.84	Tonnes	
.			
.			
. . . . .			
65	63.04	Tonnes	
66	63.26	Tonnes	
67	63.09	Tonnes	
68	63.10	Tonnes	
.			
.			
. . . . .			
109	63.01	Tonnes	
110	61.58	Tonnes	
111	63.34	Tonnes	
112	63.15	Tonnes	

TOTAL TRAIN NETT WEIGHT : 7786.25 TONNES
TOTAL TRAIN GROSS WEIGHT (not to be used for trade) : 9982.20 TONNES

FINISH DATE: 05/09/1998 **FINISH TIME:** 14:20

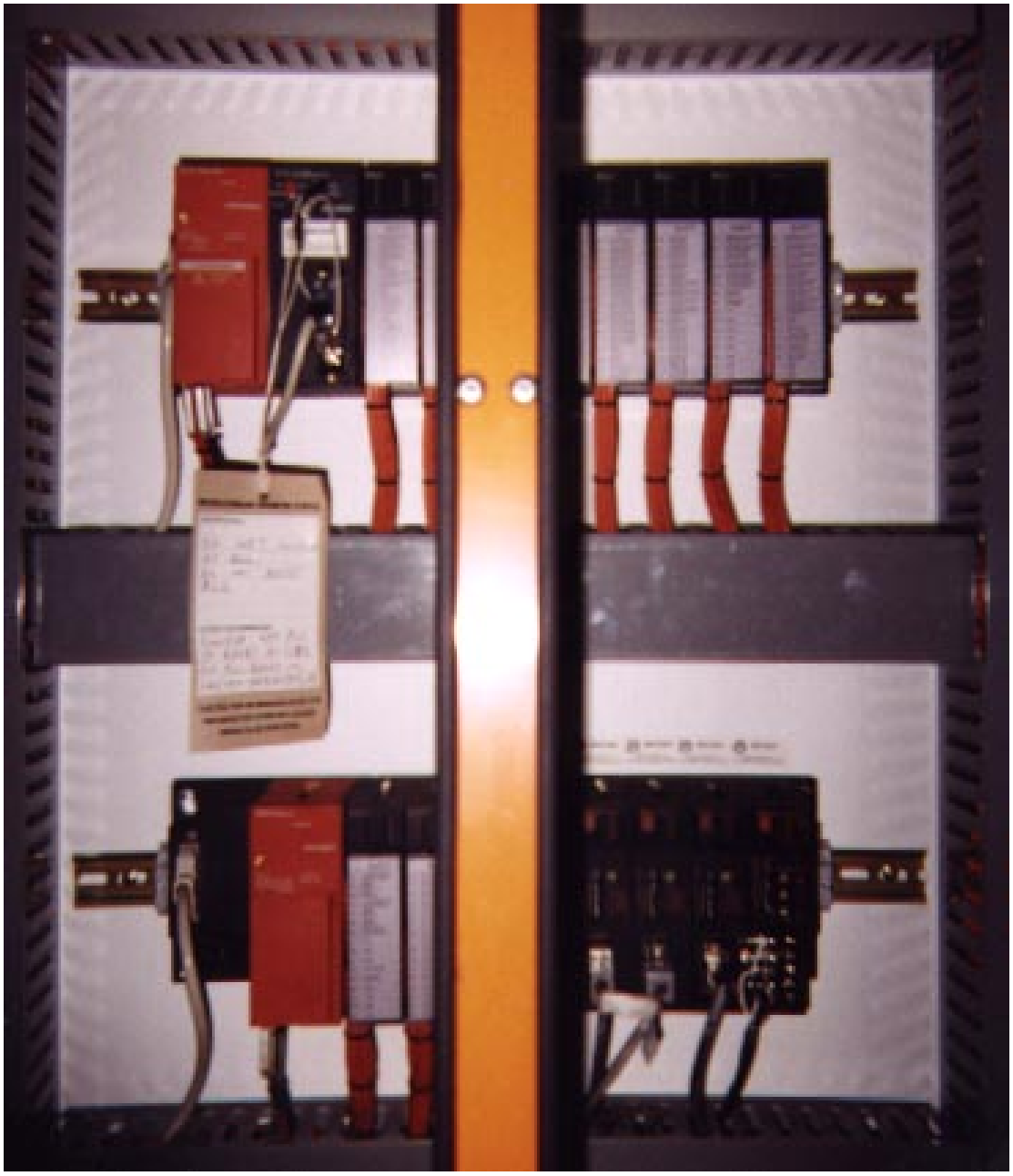
WAGONS NOT LOADED
TOTAL NUMBER OF WAGONS NOT LOADED

OVERLOADED / UNDERLOADED WAGONS TO ADJUST

TOTAL NUMBER OF OVER/UNDER WAGONS TO ADJUST 0

Typical Printout - Variant 1

FIGURE 6/10B/64 - 6



Mitsubishi Model MELSEC-A1561P PLC