



Australian Government
**Department of Industry,
Science and Resources**

**National
Measurement
Institute**

36 Bradfield Road, West Lindfield NSW 2070

Supplementary Certificate of Approval
NMI S858

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.

Elenium Model EFB17007011 Auto Bag Drop System for Airline Baggage Weighing

submitted by Elenium Automation Pty Ltd
7 Challenger Court
Essendon Fields VIC 3041

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 is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern approved – certificate issued	23/12/24

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI S858' and only by persons authorised by the submitter.

Note: The approved weighing instrument to which this system is attached shall also carry its own markings and pattern approval number.

It is the submitter'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.

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



Darryl Hines
Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE No S567

1. Description of Pattern **approved on 23/12/24**

An Elenium EFB17007011 auto bag drop (ABD) system (Figure 1).

The system is intended to be used for weighing of baggage as part of an airline self 'bag-drop' system. The 'bag-drop' functionality may be part of a more extensive airline check-in system, and may include functionality additional to just the weighing operations.

Note : References to 'airline' may also be taken to refer to 'airport' or 'airport baggage system operator' as appropriate depending on the operator of the system. References to 'bag' may be taken refer to any similar single item (e.g. suitcase or box).

1.1 Applicability of the system

The system is for use with:

An Atrax C24B weighing instrument having an operator model OP-960+ indicator (as described in variant 10 of approval NMI 6/9C/244B) with a second ('slave') model PP-950 indicator (passenger) which repeats the display of the OP-960+ indicator ('master'). The instrument provides the weight information for the Elenium control system.

The Atrax model C24B instrument is a class III weighing instrument with a maximum capacity of 100 kg and a verification scale interval of 0.1 kg and a minimum capacity of 2 kg.

1.2 Key Characteristics

The following are key characteristics of the pattern:

- (a) The system allows a pre-set tare value, associated with use of baggage trays (tubs), to be subtracted from the gross weighed value.

Note: The baggage trays used are nominally the same, and the system uses the same pre-set tare value for all trays. The system operator is responsible for ensuring that the pre-set tare value used is suitable for a particular airport to ensure correct weighing.

- (b) The net weight value determined for a bag is rounded down to the nearest multiple of 1 kg, prior to determining whether a bag exceeds the value allowed by the airline.

Note: The applicable baggage weight limits are the subject of particular airline policies and are NOT covered by this approval.

- (c) The system may totalise the rounded net weight values for determining whether a baggage allowance has been exceeded. See also the note regarding item (b) above.

- (d) The system does not determine excess baggage charges, or receive payments based on the weight. Such charge determinations are made, and payments received, through airline and other related systems.
- (e) The system provides a sequence of operations intended to ensure correct measurement, including arrangements for checking of the zero condition of the weighing instrument, disabling operation of the system if the weighing instrument is not at zero prior to a transaction, and requiring manual intervention of a supervisor/attendant to zero the operator through the supervisor/attendant mode of the ABD system.

1.3 Additional Characteristics

- (a) The system may include arrangements for indicating oversize baggage. This approval does NOT approve any aspect of the determination of baggage size.
- (b) Applicable baggage weight limits may be updated to the instrument without requiring re-verification of the system.
- (c) The 'bag-drop' functionality may be part of a more extensive airline check-in system, and may include functionality additional to just the weighing operations (e.g. related to client identification, check-in, seat allocation, safety and security). Such functions may be provided directly by the airline baggage weighing control system console, or by other equipment interfaced to it.
- (d) The ABD system will not necessarily process items up to the maximum capacity of the weighing instrument to which it is connected, nor down to its minimum capacity.
- (e) The nominal supply voltage is 240 V AC.

1.4 System Hardware

The ABD control system is comprised of the following (see Figure 2):

Note: For items below marked (*), 'Compatible and Equivalent' equipment may be used. 'Compatible and Equivalent' refers to equipment of the same or better specifications, requiring no changes to software for satisfactory operation of the complete system including all checking facilities.

(i) Customer interface screen

A Horsent model H1712P-UC 17 inch touch-sensitive liquid crystal display (*) which provides the interface to the system.

This screen also provides the interface ('administrative' panel) for the supervisor/attendant when appropriate (access to supervisor/attendant mode is restricted by use of an administrator PIN).

(ii) ABD system computer

An Intel NUC type computer (*) using Microsoft Windows 10 operating system running Qantas Bag Drop (BDA) Interface Application which interfaces to the airline computer system and all other components in the system for data interchange, and running Elenium CUSS software which controls the ABD system and is connected to the indicator of the weighing instrument, the customer interface screen, barcode scanners, BTP printer, receipt printer, LIDAR, light curtain(s), RFID reader, vision system and belt controller.

(iii) Printers

Two CUSTOM model KPM180H printers (*) are provided.

The printers are used to print (as appropriate):

- a customer baggage receipt (e.g. to be used for baggage reclaim) (see Figure 3a). This receipt is not for trade use; and/or
- a heavy baggage tag (see Figure 3b).

The system prevents operation in case of printer errors such as out of paper conditions, and provides warning indications prior to this.

(iv) Baggage tray (tub)

The system uses baggage trays, all nominally of similar weight. See note under item (a) of clause **1.2 Key Characteristics** above.

(v) Belt controller

The system utilises a Mitsubishi model FR-D720S-042SC-EC (*) Inverter Drive for conveyor belt drive control.

(vi) RFID tag reader

The system may utilise a Turck model TN920-Q175L200-H1147 or Sick model RFU630-13102 (*) RFID tag reader for operation with permanent bag tags (e.g., Qantas Q Bag Tag).

(vii) Bar code scanning

The system includes a Datalogic model GFS-4400 (*) bar code scanning device for reading boarding passes and retrieving passenger booking.

(viii) Light curtains, laser sensor, field sensors

The system utilises various sensors (e.g. light curtains, laser sensors (i.e., LIDAR) and photo-electric sensors optical sensors) to aid proper operation and for safe use of the system.

(ix) Vision system

The vision system uses multiple cameras and processing units to:

- capture and process the camera images to locate and decode barcodes on baggage tags and heavy tags; and
- capture and process camera images of the bag and belt area to measure and classify various aspects related to the suitability of the bag for injection to the baggage handling system; and
- measure bag dimensions; and
- identify the presence of soft-shaped bags or bags with straps; and
- identify the presence of a tub on the belt.

(x) Interface to airline computer system

The system interfaces to the airline's computer system and its databases to access passenger and flight details, store baggage information, and appropriate baggage limits to determine if baggage piece/weight limits exceed. The airline system

calculates excess baggage fees and charges any chargeable excess baggage fees to the passenger reservation. The payment is made at a subsequent system.

1.5 Software

Qantas Bag Drop Application (BDA) software version number is displayed in the top left corner of Administrative Panel (which is provided for use of supervisors/attendants). See Figure 7. It can be accessed by tapping the Qantas logo in the top left corner three times. The version number v2.3.2 or later are acceptable.

Elenium CUSS software version number is displayed in the top left corner of screen. The version number Elenium Suite v2.17.0 or later are acceptable. See Figure 7.

1.6 Operation and Checking Facilities

At the appropriate time in the customer 'bag-drop' procedure, the ABD system requests the customer to place their baggage on the weighing platform. The baggage may either be placed directly on the weighing platform (direct bag weighing) or may be placed in a baggage tray (tub) for weighing (e.g. for items which may be problematic in the baggage transfer system).

The system is also designed to correctly handle situations in which the customer places baggage on the weighing system prior to being requested in the 'bag-drop' procedure.

Note: It is assumed that prior to the weighing procedure, the baggage will have been tagged for identification purposes, either by use of bar coded tags provided at the time of check-in (obtaining boarding pass), or by use of an RFID bag tag (provided by the airline). If the baggage has not been tagged for identification purposes, the system will detect this and request tagging accordingly.

The typical weighing ('bag drop') procedure is as follows:

- passenger scans boarding pass.
 - system requests baggage to be placed on weighing conveyor either directly, or in a baggage tray (tub), dependent on the nature of the baggage.
- (a) Direct Bag Weighing
- passenger places baggage directly on the conveyor of the weighing instrument; and
 - baggage weight is determined from the weighing instrument and displayed on the customer interface screen (similar to Figure 6, but without the information relating to tub detection).
- (b) Using Baggage Tray

Where the ABD system detects that a baggage tray is being used, the weighing process is as follows:

- recalls the pre-set tare value of the baggage tray;
- reads the (gross) weight value from the approved weighing instrument;
- subtracts the pre-set tare value from the weight value provided from the approved weighing instrument; and
- provides a net weight value for the baggage, with suitable indication (see Figure 5).

In either case, the weight information from the weighing instrument is provided (unrounded).

The passenger baggage allowance (e.g. according to ticket class, frequent flyer status, etc) is provided by the airline's computer system. The ABD system checks the unrounded weight of the baggage against the remaining allowance of the passenger booking, and determines and initiates actions such as the following (and in some cases a combination of these):

- the baggage is within appropriate allowance and can be 'checked-in' (following which a baggage receipt is provided). If the weight of the baggage is greater than 23 kg, a heavy bag tag is printed. The baggage is required to be tagged with the heavy bag tag before 'checked-in'.
- the baggage is too heavy to be allowed, (or is required to be checked in using a manual system).
- the baggage is in excess of the applicable allowance.

In the latter case the BDA interface application rounds down the excess weight and sends the rounded weight value to the airline's computer system for the calculation of any applicable charges.

Note: The existing practice (*) in the airline industry is that baggage limits are commonly determined using values in whole kilograms only. Consequently the value determined by the weighing instrument is truncated (rounded down to a whole kilogram value). This rounded value is used by the airline's computer system for determination of baggage limits and excess baggage charges. Where a total of several baggage weights is provided, this is based on a summation of these truncated weight values. The system may also have provision for an additional allowance (e.g. where an additional 1 kg is accepted before a bag is considered to exceed allowable limits or before additional fees are charged).

The charge is presented to the passenger on the screen with offer to accept. The passenger may be offered an opportunity to repack baggage. If the charge is accepted by the passenger, the BDA adds the charge to the passenger booking record in the airline's computer system, and the baggage is 'checked-in' (following which a baggage receipt is provided). Payment of excess baggage charges is made using other airline systems.

In addition the system facilitates operation in a 'piece rate' mode, in which airlines permit a certain number of bags per passenger provided that each bag is below a certain weight. In the 'piece rate' mode the ABD system is utilised to determine whether the baggage is within the weight limit. Sample Custom Interface Screens in this mode are shown in Figure 6.

Note: The weight values are displayed un-rounded (although the determination of whether baggage is within the weight limit may involve rounding down of the weight value).

The determination of the appropriate baggage allowance and charge is considered to be outside the scope of this certificate.

1.7 Zero

The automatic zero tracking facility of the weighing instrument shall be enabled.

In addition, the Elenium ABD system has provision to check whether the weighing instrument is at zero as part of its sequence of operations, and periodically. Where these checks determine that the zero of the instrument is not correctly set, the system enters a non-operational state and requires the intervention of a supervisor/attendant to manually check and re-zero the instrument using the →0← ZERO button on the Atrax display unit (e.g., OP-960+ indicator).

1.8 Pre-set Tare

The pre-set tare value (subtracted from the gross weight in the case of use of a baggage tray) shall have the same scale interval as the weighing instrument.

1.9 Verification Provision

The Elenium ABD system has provision for the application of a verification mark.

1.10 Descriptive Markings

The Elenium ABD system is marked with the following data (shown below at right):

Manufacturer's name or mark	Elenium Automation (#)
Model number	EFB17007011
Serial number
Maximum capacity	<i>Max</i> = kg (*)
Minimum capacity	<i>Min</i> = kg (*)
Verification scale interval	<i>e</i> = kg (*)
Pattern approval mark	NMI S858
Special temperature limits (*)

These markings are in addition to markings required in the approval of the weighing instrument to which the ABD system is connected.

(*) These markings shall be the same as those of the weighing instrument to which the ABD system is connected.

(#) May also be known as a Qantas instrument.

Note: The special temperature limits reflect those of the weighing instrument.

TEST PROCEDURE No S858

The maximum permissible errors applicable are those applicable to the weighing instrument to which the ABD system is connected (or in Schedule 1 of the *National Trade Measurement Regulations 2009*). The weighing instrument to which the ABD system is connected shall be verified in accordance with any tests specified in the approval documentation for the weighing instrument, and in accordance with any relevant tests specified in the National Instrument Test Procedures. The following are additional tests to be carried out for verification of the ABD system.

The use of a supervisor/attendant tag to access the 'administrative' screen and any keys or tools to access the indicator of the weighing instrument will be required.

1. Check the version number of the measurement related system software, as described in clause **1.5 Software**.
2. Check, for baggage items without use of a baggage tray (tub);
 - at or close to (but above) the minimum capacity (*Min*) of the weighing instrument,
 - close to (but above) the 'underweight' limit set by the airline for carriage of baggage (e.g. 2 kg),
 - close to (but below) the 'overweight' limit set by the airline for carriage of baggage (e.g. 32 kg), and
 - at or close to the maximum capacity (*Max*) of the weighing instrument, that the indication of luggage weight on the Customer Interface Screen is identical to that on the indicator of the approved weighing instrument.
3. Check, for baggage items using a baggage tray (tub) detected by vision system;
 - close to (but above) any 'underweight' limit set by the airline for carriage of baggage (e.g. 2 kg), and
 - close to (but below) the 'overweight' limit set by the airline for carriage of baggage (e.g. 32 kg), that
 - (i) the indication of gross weight is identical to that on the indicator of the approved weighing instrument
 - (ii) the calculation of net weight is arithmetically correct, i.e. gross weight – baggage tray (tub) value as displayed on the instrument = net weight, and
 - (iii) the luggage weight displayed is the same as the calculated net weight.
4. For a sample transaction (of one piece of luggage resulting in an Exceeded Baggage Allowance), check that if the Excess value of the baggage weight displayed on the Customer Interface Screen is truncated (rounded down to a whole kilogram value).
5. Check that the automatic zero tracking facility of the weighing instrument is enabled (e.g. by slowly successively adding 10 small loads of 20 g each and ensuring that the instrument remains at zero).
6. Check that the 'light curtain' devices or similar laser or optical sensors are operating (see clause 1.4 (viii) of the Technical Schedule), by attempting to weigh a luggage item whilst holding its handle, and by attempting to weigh a

luggage item whilst pushing the item from the side. A warning or error signal should occur.

FIGURE S858 – 1



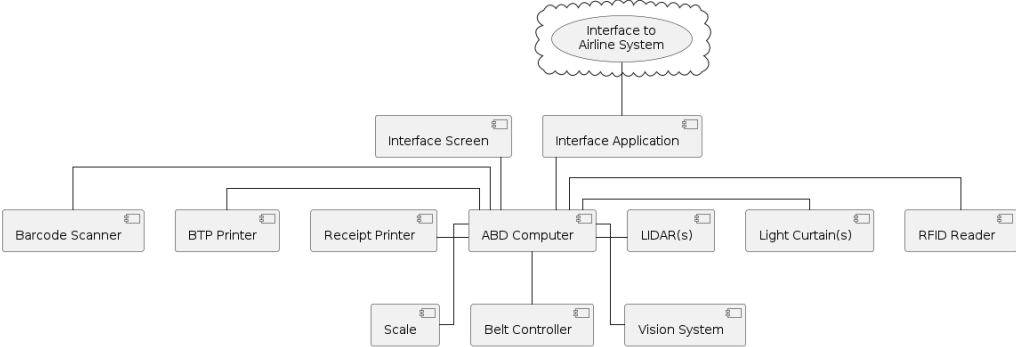
(a) System Single Arrangement



(b) System Dual Arrangement

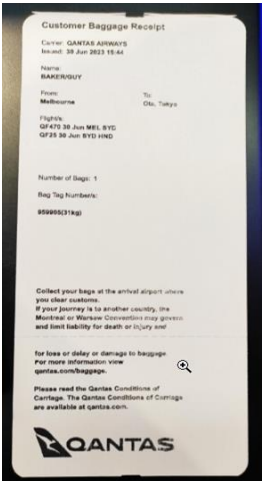
Elenium ABD Self Bag-drop Control System
for Airline Baggage Weighing

FIGURE S858 – 2



Elenium ABD Self Bag-drop Control System Overview
for Airline Baggage Weighing

FIGURE S858 – 3



(a) Sample Printout – Baggage Receipt



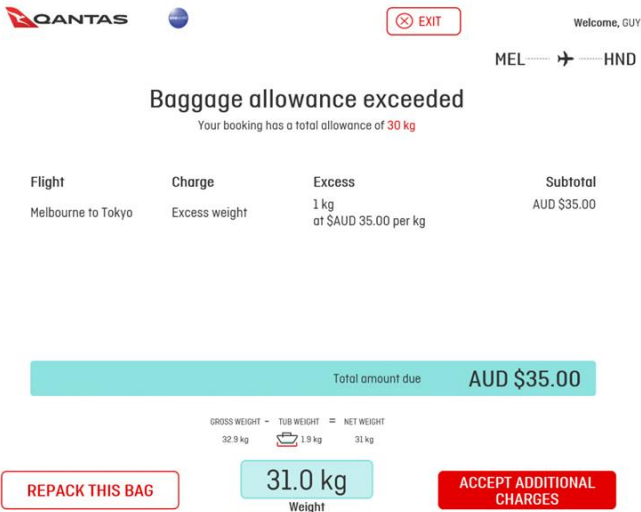
(b) Sample Printout – Heavy Bag Tag

FIGURE S858 – 4



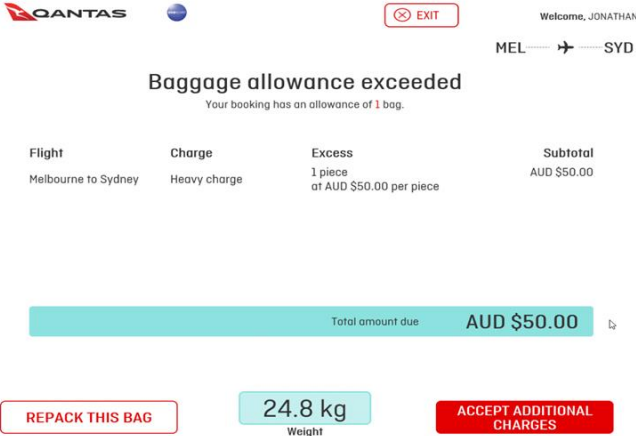
(a) 'Entry' Screen (Airport May Vary)

FIGURE S858 – 5



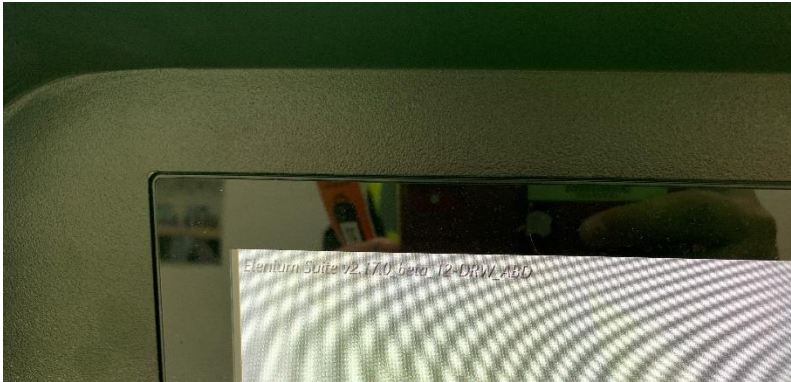
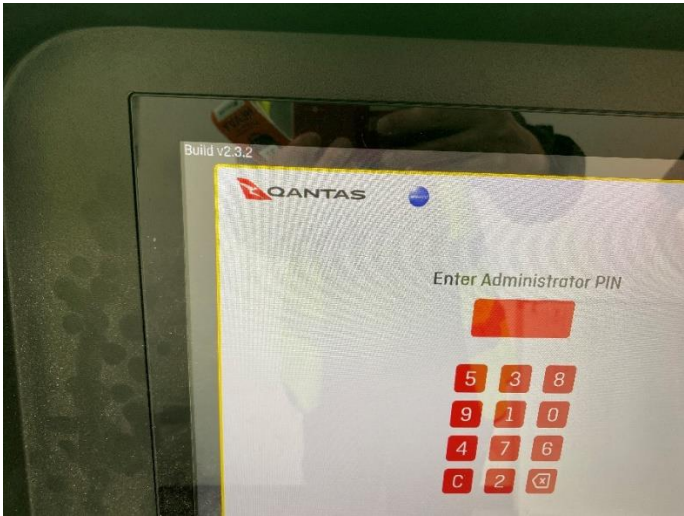
(a) Sample Customer Interface Screen (QANTAS)
(Showing Deduction of Tub Tare Weight)

FIGURE S858 – 6



(c) Sample Customer Interface Screen (QANTAS)
(Showing Piece Based Excess Charge)

FIGURE S858 – 7



System Software Version Numbers
In Top Left Corner of Screen

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