



Australian Government
**National Measurement
Institute**

Bradfield Road, West Lindfield NSW 2070

Notification of Change
Certificate of Approval No 6/20A/5
Change No 1

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

The following changes are made to the approval documentation for the

Weighmate Model FL3-Y(b) Wheeled Loader Weighing Instrument

submitted by Weighmate Pty Ltd
 Unit 1, 91-93 Cowpasture Road
 Wetherill Park NSW 2164.

In Certificate of Approval 6/20A/5 dated 26 September 2003;

1. The Condition of Approval referring to the review of the approval should be amended to read:
 “This approval becomes subject to review on 1 September **2014**, and then every 5 years thereafter.”
2. The FILING ADVICE should be amended by adding the following:
 “Notification of Change No 1 dated 23 February 2010”

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

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke at the bottom.



Australian Government
**National Measurement
Institute**

12 Lyonpark Road, North Ryde NSW 2113

Certificate of Approval
No 6/20A/5


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
Weighmate Model FL3-Y(b) Wheeled Loader Weighing Instrument

submitted by Weighmate Pty Ltd
Unit 1, 91-93 Cowpasture Road
Wetherill Park NSW 2164.

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.

CONDITIONS OF APPROVAL

 This approval becomes subject to review on 1 September 2009, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 6/20A/5' and only by persons authorised by the submittor.

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.

The National Measurement Institute 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.

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

Special Conditions of Approval:

For this type of instrument, the ability to perform within the specified maximum permissible errors can depend substantially on characteristics of the wheeled loader to which it is fitted. Some designs of wheeled loaders simply may not be suitable for attachment of this weighing instrument, however the National Measurement Institute is unable to clearly define particular wheeled loaders, or categories of wheeled weighers, for which the instrument is unsuitable.

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

In the event of unsatisfactory performance this approval may be withdrawn.

DESCRIPTIVE ADVICE

Pattern: approved 31 August 2004

- The Weighmate model FL3-Y(b) class Y(b) automatic catchweighing instrument of 3000 kg maximum capacity with a verification scale interval of 5 kg fitted to an industrial waste bin pick up vehicle.

Variant: approved 31 August 2004

1. Approved for use with up to 600 verification scale intervals fitted to other industrial waste bin pick up vehicles.

Technical Schedule No 6/20A/5 describes the pattern and variant 1.

FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 6/20A/5 dated 17 May 2005
Technical Schedule No 6/20A/5 dated 17 May 2005 (incl. Test Procedure)
Figures 1 to 3 dated 17 May 2005



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

A handwritten signature in black ink, appearing to be 'J. H. T.', written in a cursive style.

TECHNICAL SCHEDULE No 6/20A/5

Pattern: Weighmate Model FL3-Y(b) Wheeled Loader Weighing Instrument
Submittor: Weighmate Pty Ltd
Unit 1, 91-93 Cowpasture Road
Wetherill Park NSW 2164

1. Description of Pattern

The Weighmate model FL3-Y(b) automatic catchweighing Instrument is intended for the determination of the net weight of the contents of waste bins picked up by (emptied into) an industrial waste bin pick up vehicle, to which the instrument has been fitted.

The Weighmate FL3-Y(b) is a class Y(b) automatic catchweighing instrument having a maximum capacity of 3000 kg, a verification scale interval (e) of 5 kg and minimum capacity of 50 kg.

The Weighmate FL3-Y(b) automatic catchweighing instrument comprises two weigh arms, a frame unit and a cabin unit. The weighing sequence follows an automatic process (albeit requiring control of the loading by the vehicle operator) to determine the net load deposited from an industrial waste bin into the waste vehicle whilst the bin is being emptied using the lifting mechanism of the vehicle.

Figure 1 shows a typical installation.

The electronic equipment and sensors are described below.

The indicator may be fitted with output sockets (output interfacing capability) for the connection of auxiliary and/or peripheral devices.

Notes: The movement of the vehicle and the lifting operations are controlled manually by the vehicle operator, however this is guided by signals from the instrument. When the instrument determines that operations are not in accordance with the required sequence or are outside predefined limits and hence results may be outside permissible errors, error signals will be generated. For this reason the instrument is considered to be an automatic catchweighing instrument.

Only the net load deposited is approved for trade use.

The particular vehicle to which the instrument was fitted for pattern approval testing was a Mitsubishi vehicle with Macdonald Johnson Scissorlift lifting apparatus/body.

1.1 Weigh Arms

The system uses two weigh arms (Figure 2a) which are inserted into the lifting slots provided in an industrial waste bin to support the bin during lifting/emptying.

Each weigh arm incorporates two Kelba model KA-1000-T load cells (Figure 2b). A load receptor in each arm rests directly on the loading area of the load cells.

In addition, each weigh arm incorporates a 'weigh arm unit' (WAU) electronic module, mounted at the vehicle end of the weigh arm.

Each WAU includes:

- circuitry to perform analogue to digital conversion and provide an output as a digital signal;
- an accelerometer to provide information regarding the tilt of the weigh arm;
- memory so that calibration data can be stored within it, and so that the digital signal output can be adjusted to standard values; and
- an electronic serial number (within memory), and a counter which is incremented each time the calibration data is altered (to provide a means for sealing).

1.2 Frame Unit (FU)

The two weigh arms are connected by cable to a 'frame unit' (FU – see Figure 3a) which is mounted to the lifting arm of the bin lifting/emptying mechanism.

The FU includes an accelerometer to detect the status of tilt of the lifting/emptying mechanism (e.g. loading, unloading, weighing position, bin emptying position).

The FU also includes processing and data storage circuitry, date and time clocks, and a backup battery to maintain date and time clocks in the event of disconnection of the system from the vehicle power supply.

The FU uses weight and tilt information from the weigh arm units together with tilt information from its own accelerometer to determine the status in the lifting/emptying cycle, to guide the lifting/emptying process by providing signals to the vehicle operator (via the cabin unit), and to determine the net weight received by analysing the weight and tilt information at the appropriate stages of the lifting/emptying process.

If the signals (weight values and tilt values) are outside various pre-set expected conditions, the FU will provide error signals.

1.3 Cabin Unit (CU)

The operator interface is provided by a 'cabin unit' (CU – see Figure 3b) located within the cabin of the vehicle and connected by cable to the frame unit. The cabin unit is also connected to the power supply of the vehicle, and power is supplied to the FU and weigh arm units via the cabin unit.

The CU contains two displays, a multi-line alphanumeric liquid crystal display (LCD), a numeric light emitting diode (LED) display, and three operator control buttons. The CU includes an on-off switch and interface ports for the connection of a computer (for configuration purposes, or for downloading results of the weighing process).

The CU is also able to provide audio output signals to the vehicle operator.

The CU is also able to store weight and identification data for later printing or downloading to computer systems.

The CU is primarily a digital display device – it does not process data obtained from the FU, but only stores and displays/communicates that information when it is to be used.

Note: Both the FU and CU contain electronic serial numbers and the corresponding serial number must be registered with each unit before communications between the FU and CU can proceed.

1.4 Power Supply

The instrument is powered by the vehicle power supply (battery) of 12 to 32 V DC.

1.5 Operation Sequence

Two modes of operation of the instrument are possible:

- 'Semi-Static Mode' in which the lower display (LCD) indicates 'Semi-Static Mode' and 'LEGAL FOR TRADE USE'. This mode is approved for trade use; and
- 'Dynamic Mode' in which the lower display (LCD) indicates 'Dynamic Mode' and 'NOT LEGAL FOR TRADE'. Use in this mode is not approved for trade use.

The normal operation sequence of the instrument in 'Semi-Static Mode' is as follows:

- (a) Whilst the vehicle is travelling from site to site the lifting arm is down and the weigh arms are vertical.
- (b) When approaching the industrial waste bin to pick up, lift and empty it, the lifting arm is down and the weigh arms are positioned approximately horizontally (within limits set for the accelerometers in the weigh arms).

At this point the FU determines an initial value (effectively a zero point) which is determined with substantially greater precision than $\pm 0.25e$, and a deviation outside a range of 4% of the maximum capacity of 3000 kg will be detected and cause an error signal. Note however that it is the difference between values determined at points (d) and (f) below which are important for the determination of net weight rather than this zero point.

At this point the upper display (LED) will show 0, but without a 'kg' symbol.

- (c) The vehicle moves forward to the industrial waste bin, inserting the weigh arms into the lifting slots provided.

- (d) The bin (containing waste) is lifted from the ground and the weigh arms kept approximately level. A value (not for trade use, flashing, and without a 'kg' symbol) appears in the upper (LED) display, and the CU beeps until lifting is stopped and a suitable initial (full) weight value is obtained by the system (this value is not displayed other than in the LED display and without the 'kg' symbol – it is not for trade use). At this point a single longer beep is heard.
- (e) Lifting of the waste bin is then continued until the bin has been inverted and emptied into the waste vehicle (this is sensed by the accelerometers within the FU and WAU).
- (f) The waste bin is then returned to a similar position to (d) – i.e. with the weigh arms approximately level, and the bin lifted from the ground.

A value (flashing, and without a 'kg' symbol – it is not for trade use) appears in the upper (LED) display, and the CU beeps until lifting is stopped and a suitable final (empty) weight value is obtained by the system (this value is not displayed other than in the LED display and without the 'kg' symbol – it is not for trade use). At this point a single longer beep is heard.

- (g) The waste bin is then lowered to the ground. Once the weight value is below a pre-set value (indicating that the bin is on the ground), the system calculates the Net Weight from the values determined at (d) and (f) above.

This net value is displayed as a constant (non flashing) value on the LED display of the CU, and the 'kg' symbol is illuminated. This value is approved and suitable for trade use.

This net weight value is also shown with a number identifying the weighing (dump) in the lower display (LCD) of the CU as:

NET WT:kg
Net Weight
LEGAL FOR TRADE USE
Dump #

- (h) The operator may then proceed to move to pick up another bin at the same location, or may return the weigh arms to vertical to travel to another location.

1.6 Printer

A printing unit may be attached to the FL3-Y(b) cabin unit (CU), for the production of tickets automatically or by manual command.

Any ticket produced for trade use shall not include any weight value other than a net weight value determined in step (g) above. The printout shall include information to identify the particular 'pick up' (the 'dump number', time and date). Where the total of a number of 'dumps' is printed, the net weight of each individual dump shall also be printed. Additional information may also be printed (product description, customer name etc).

Note: In addition to the 'Auxiliary Comms Port' (the lower of the two communication ports provided on the side of the cabin unit) which is used for connection of a printer or for downloading of stored results (see below), an additional interface port (the upper of the two, also known as 'Peripheral Comms Port' or 'Victor Port') is used for the connection to a PC running Weighmate software for calibration, adjustment, troubleshooting or servicing purposes. Communications through this latter port can only be enabled through use of a password entered in the Cabin Unit menus.

Note: Any ticket from this instrument which is not legal for trade use (e.g. a reading obtained with the instrument in 'Dynamic Mode' (see clause **1.5 Operation Sequence**) shall indicate that the measurement is 'NOT LEGAL FOR TRADE'.

1.7 Additional Features

The system has certain additional functions, including:

- Facilities for use with industrial waste bin identification systems (e.g. RFID);
- A totalisation facility (accumulated net weight); and
- Provision for storage of net weight values together with identifying information ('dump number', time and date). Valid net weight values which are legal for trade are identified by a code "AD0c" within the data records.

The instrument may have other additional functions. These functions (other than the indications of measured net weight – displayed either on the indicator or on an auxiliary or peripheral device), are not approved for trade use.

1.8 Display Check

A display check is initiated whenever power is applied.

1.9 Verification/Certification Provision

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

1.10 Descriptive Markings and Notices

Instruments carry the following markings:

Manufacturer's mark, or name written in full
Name or mark of manufacturer's agent
Indication of accuracy class	Class Y(b)
Pattern approval mark for the instrument	NMI 6/20A/5
Maximum capacity	<i>Max</i> kg * †
Minimum capacity	<i>Min</i> kg *
Verification scale interval	<i>e</i> = kg *
Serial number of the instrument #

* These markings shall also be shown near the display of the result if they are not already located there.

Serial numbers of the components (cabin unit, frame unit, weigh arms) may be accessed by the procedure described in clause **1.11 Sealing Provision**.

† In some installations it may not be possible for the vehicle to lift waste bins of the maximum capacity for which the instrument is approved (e.g. due to the hydraulic lifting limit valves having been set to a lower value for safety purposes). In this case the maximum capacity marked on the instrument should be the maximum load which can be lifted, and this is the maximum load which should be used for testing purposes.

In addition, the value of the calibration event counter at the time of verification/certification shall be recorded on a destructible adhesive label attached to the instrument (refer to clause **1.11 Sealing Provision**).

1.11 Sealing Provision

Unauthorised access to the calibration features of the instrument is prevented by a password. To ensure that password protection is set, carry out the following procedure:

- Switch on the CU using the switch at the left of the CU housing.
- Press the ENTER key a number of times (until a menu commencing with "1. Send Single Weight" appears).
- Using the up and down arrow keys (↑ and ↓) select item '3. Diagnose & Setup' from this menu, and then press ENTER.
- In the next menu use the arrow keys to select item '1. Setup & Diagnose' and then press ENTER.
- In the next menu you are asked to confirm. Use the arrow keys to select item 'Yes' and then press ENTER.

- At this point a password is required, indicated by a screen indicating:

```
Enter Password
ABCDEFGHIJKLMNQRST
UVWXYZ0123456789 #
PWD: *****
```

To return to the initial state without entering a password, switch the CU off and then on again using the switch at the left of the CU housing.

In addition, evidence of unauthorised alteration to the calibration can be obtained from three non-resettable calibration event counters (one for the FU and one for each of the weigh arms). These increment each time that calibration details for the respective module are altered.

The values of these calibration event counters, the serial numbers of the particular modules comprising the instrument, and associated software version numbers may be accessed as follows:

- Hold the enter key of the CU, and switch on the system using the switch at the left of the CU housing.
- Press the ↑ key until data for all 4 items is shown similar to that below (i.e. v0.0 and CAL 000 are not valid). Note that if v0.0 appears, the weigh arms may be in a 'sleeping state', and it may be necessary to: move the weigh arms vertical – wait 20s – move the weigh arms horizontal – wait 20s – move the weigh arms vertical – wait 20s – move the weigh arms horizontal; and then repeat pressing the ↑ key.

	Module	S/N	Software Ver.	Cal. Counter
CU 01999 v9.4	CU	01999	v9.4	
FU 05177 v9.4 CAL 088	FU	05177	v9.4	088
1W 09901 v9.4 CAL 003	1W	09901	v9.4	003
2W 09904 v9.4 CAL 004	2W	09904	v9,4	004

Notes:

- 1W indicates first weigh arm.
- 2W indicates second weigh arm.
- the CU does not contain calibration factors so it does not have a Cal. Counter.

The values of the calibration event counters at the time of verification/certification shall be recorded on a destructible adhesive label attached to the instrument.

Any subsequent alteration to the calibration will be evident as the recorded values and the current calibration counter values will differ.

2. Description of Variant 1

The Weighmate model FL3-Y(b) class Y(b) automatic catchweighing instrument similar to the pattern but fitted to different industrial waste bin pick up vehicles.

The instrument is approved with a verification scale interval of 5 kg, a maximum capacity of from 50 to 600 verification scale intervals and a minimum capacity of no less than 10 verification scale intervals.

Note regarding Maximum Capacity:

- Where it is not possible for in-situ testing to be carried out close to the designed maximum capacity of the instrument (i.e. 3000 kg) due to a limited lifting capability of the pick up vehicle, the instrument may be marked with a maximum capacity representing the maximum load for which in-situ testing has been carried out. Use above this maximum capacity value is not legal for trade use, therefore this should only be carried out where it is clear that it is not possible to lift loads greater than this value.

TEST PROCEDURE

Automatic Catchweighing Instrument

None of the following overrides the need to ensure that safe working practices are carried out.

Note: A uniform test procedure appropriate to this type of instrument has not yet been developed. If such a test procedure becomes available in the future, it may be appropriate to apply that procedure to testing of this instrument. In the meantime the following test procedure is recommended.

Maximum permissible errors for class Y(b) instruments

The maximum permissible error for any load equal to or greater than the minimum capacity (*Min*) and equal to or less than the maximum capacity (*Max*) in automatic operation (dynamic weighing) shall be as specified below. (Note that the maximum permissible error value includes the digital rounding error of the indicating device.)

Load (m) expressed in verification scale intervals (e)	Maximum permissible errors for class Y(b) instruments	
	Initial verification	In-service
$0 \leq m \leq 50$	$\pm 1.5 e$	$\pm 2 e$
$50 < m \leq 200$	$\pm 2.0 e$	$\pm 3 e$
$200 < m \leq 1\ 000$	$\pm 2.5 e$	$\pm 4 e$

Testing

The following tests may be applied to the instrument in-situ (fitted to the waste bin pick up vehicle). However it is recognised that conducting these tests in-situ involves considerable practical difficulties, and that the design of the instrument is such that it may be appropriate for a two-part testing process to be used to overcome some of these practical difficulties. A possible two-part process is described below. Use of the two-part process shall be at the discretion of the applicable State or Territory Trade Measurement Authority.

- Weighing performance

Place known net loads (e.g. pre-weighed with suitable accuracy on a separate non-automatic weighing instrument) into a waste bin and weigh these loads using the FL3-Y(b) whilst dumping into the vehicle.

Carry this out with net loads of close to minimum capacity, close to maximum capacity and just below a load of 200e (e.g. just below 1000 kg for the pattern).

Repeat five times with each load.

- Eccentric loading
Place a known net load (of approximately 1/3 maximum capacity) into a waste bin, locating it (as much as practically possible) in an area of 1/4 the waste bin; weigh this load using the FL3-Y(b) whilst dumping into the vehicle. This should be carried out with the load at the left, right, front and rear of the waste bin.
- Tilting
Place a known net load (of approximately 1/3 maximum capacity) into a waste bin, weigh this load using the FL3-Y(b) whilst dumping into the vehicle, carrying out the weighing by having the weigh arms tilted (display flashing and CU beeping as described in (d) and (f) of the procedure in clause **1.5 Operation Sequence**), and gradually reducing the degree of tilt until a weight value is acquired (single longer beep).
Carry this out with the weigh arms initially tilted forward and with the weigh arms initially tilted backward.
- Additional check
Check that when a measurement is carried out with the instrument in 'Dynamic – NOT FOR TRADE USE' mode (see clause **1.5 Operation Sequence**), any ticket/receipt from this instrument indicates that the measurement is 'NOT LEGAL FOR TRADE'.

Two-part testing process

The two-part testing process involves testing of various aspects of the major instrument modules in the manufacturer's premises, with the results of this testing being relied on to justify a reduced set of testing of the complete instrument (modules connected and installed on the vehicle).

Part A – Testing at manufacturer's premises

Note: It would be expected that the manufacturer would be a licensed certifier to carry out this testing.

Testing of the major instrument modules (Weigh Arms, including Weigh Arm Unit; Frame Unit; and Cabin Unit) would be carried out in accordance with procedures established by the manufacturer (Refer to Weighmate documents *Weigh Arm for FL3-Y(b) Calibration Procedures Revision 6* and *Frame Unit (FU for FL3-Y(b) Testing & Commissioning Procedures Revision 3.1)*).

Following successful testing, the Weigh Arm Unit and Frame Unit would be sealed (by affixing a destructible adhesive label carrying the calibration counter value applicable at the time of testing). A test report, summarising the testing carried out and also including the calibration counter value would be provided with each module. Note that the Cabin Unit does not contain any metrologically significant calibration/adjustment parameters and hence a calibration counter for this module is not required.

Part B – Testing in-situ

Note: It would be expected that this testing would be carried out by a licensed certifier (whether or not the manufacturer) or a trade measurement authority.

Once the modules have been installed (fitted to the waste bin pick up vehicle), details of the connected modules (serial numbers, software version numbers and calibration counter values where appropriate) can be determined (see clause **1.11 Sealing Provision**).

The verifier/certifier would then compare this information with that provided in the test reports of the modules carried out in Part A, to ensure that the serial numbers and calibration counter values are the same, and that the test results are satisfactory.

Relying on the testing carried out in Part A, the verifier/certifier then would carry out a reduced set of tests on the complete installation.

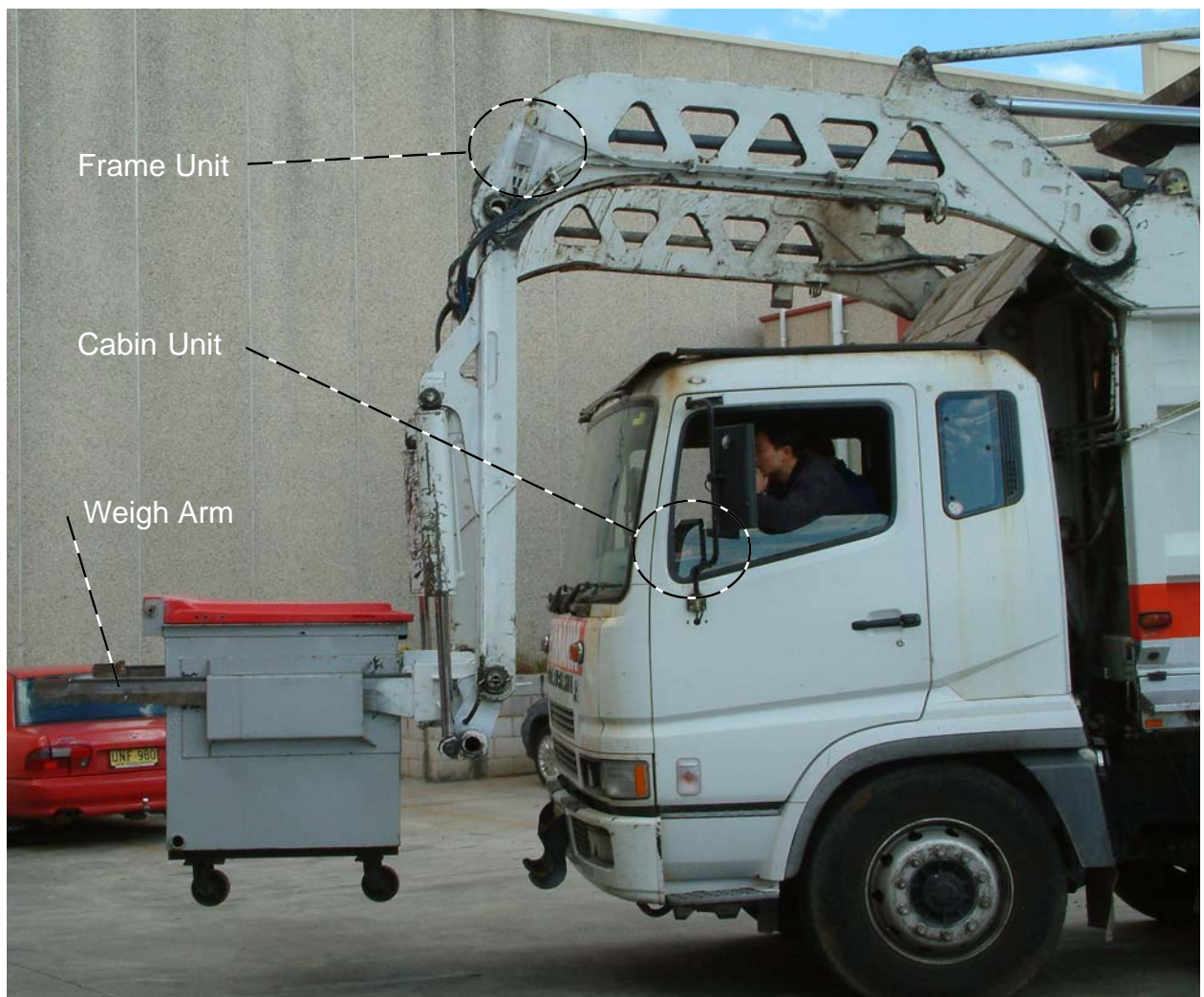
This testing should comprise at least the following:

- A check that the sequence of operation of the instrument is satisfactory (Refer to the document *Weighmate FL3-Y(b) System Final Testing and Commissioning Procedures Revision 4.2*).
- A check that when a measurement is carried out with the instrument in 'Dynamic – NOT FOR TRADE USE' mode (see clause **1.5 Operation Sequence**), any ticket/receipt from this instrument indicates that the measurement is 'NOT LEGAL FOR TRADE'.
- A sequence of 5 lifts (measurements) of a load close to (but above) minimum capacity.
- A sequence of 5 lifts (measurements) of a load of at least 75% of the maximum capacity marked on the instrument.

Each of these measurements may be carried out as follows:

- (a) Semi-Static Mode' in which the lower display (LCD) indicates 'Semi-Static Mode' and 'LEGAL FOR TRADE USE'. This mode is approved for trade use.
- (b) With loads of known value (e.g. pre-weighed with suitable accuracy on a separate non-automatic weighing instrument).
- (c) Commencing with the weigh arms vertical (point (d) in the Operation Sequence), lower the weigh arms and allow the FU to initialise (point (e) in the Operation Sequence).
- (d) Pick up the known load (points (g) and (h) in clause **1.5 Operation Sequence**), recording the acquired value at point (h) (when the long beep is heard). This value may be used as the measurement.
- (e) Each measurement value shall be within the maximum permissible error (i.e. when compared to the known load).

FIGURE 6/20A/5 – 1



Weighmate Model FL3-Y(b) Wheeled Loader Weighing Instrument

6/20A/5
17 May 2005

FIGURE 6/20A/5 – 2



(a) Weighmate Weigh Arm



(b) Kelba Model KA-1000-T Load Cell

FIGURE 6/20A/5 – 3



(a) Weighmate Frame Unit (FU)

'kg' will only be illuminated for Net values which are 'Legal For Trade'



(b) Weighmate Cabin Unit (CU)