Travelling Beam + Recorder Unit
BM625 & BM626

Impact Test Equipment Ltd
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User Guide
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1 Introduction

The 3 metre long Travelling Beam Device is used to check for any irregularities in both concrete and bituminous road surfaces. A sensing unit comprising a wheel connected to an indicator provides a magnification of 4:1. Deviation of the surface from a straight line is shown on a scale graduated in increments of 2 mm up to 10 mm and 5 mm up to 25 mm. A dye-marker system is fitted which may be used to identify suspect areas. A vegetable dye mixed with water can be used in the reservoir. Outrigger wheels provide mobility on-site. The device is supplied as three sub-assemblies which are quickly assembled on-site.

The Travelling Beam Device is also available fitted with an Autographic Recorder, providing a permanent record of the surface profile. Records up to 1 kilometre can be recorded on the special chart paper rolls used.

2 Operation

A steering handle is attached to the rear pair of wheels allowing the operator to push the unit over the area to be checked. Indications of irregularity are easily noted by the operator. For increased manoeuvrability when not under testing conditions, the central sensing wheel can be locked up off the road surface.

3 Calibration

Calibration of the zero position of the beam may be conducted in the field by positioning the wheels at each end of the beam on suitable blocks (e.g. 2 Concrete Cubes etc.) and running a fine thread from one end of the beam to the other trapping the thread under two opposing wheels, then make sure the thread is tight. The sensing wheel can now be lowered using the pointer so the bottom edge of the centre sensing wheel just touches the thread. The pointer should now be on the zero line on the scale. If not, then any adjustment required to zero the pointer can be achieved by raising and lowering the leading end of the beam by undoing the locking nut and adjusting that end of the beam up or down as required until the correct zero setting is created. Make sure the locking nut is tightened when the zero position is correct. The travelling beam is now ready for operation.

4 Notes on Travelling Beam Device

This device is basically a stiff beam, effectively carried on a roadwheel at each end, at a fixed centre distance P (see figure 1).

There is a third ‘sending’ wheel positioned exactly at the mid-point between the road wheels, and spring mounted in such a way as to be able to move vertically up and down from a zero position. This zero position is dictated when the lowest points of all three wheels lie on a truly straight line. A scale and chart are provided in order to indicate the amount by which the sensing wheel moves above or below the zero position.

Theoretically, indication or departure of a surface from a specified form or datum (straight or otherwise) will require the device to be traversed along that datum independently of the surface being checked. **This condition cannot be met by any simple device moving on the surface which is being checked.**

The Travelling Beam is a simple device, and can only indicate deviations from a straight line at a point exactly halfway between the road wheels. By traversing the device along a surface, such deviations can be indicated on a continuous basis, but the trace obtained requires a certain amount of interpretation.

4.1 Referring to the illustrations in figure 1

The device is travelling along a truly straight surface, and the sensing wheel will remain at the zero position whilst this condition remains unchanged.

The front wheel of the device has encountered a bump, of height H. (For the purpose of these notes, H is chosen to be equal to the permitted height tolerance of bumps and depressions.) This raises the front wheel as shown, and causes the sensing wheel to be depressed below its zero position.

Due to the fact that the wheel is exactly halfway between the road wheels, the indicated amount of depression from zero will be equal to H/2, at a distance equal to P/2 from the bump which has caused it. This depression is a “ghost” indication.

The device has travelled along a further distance P/2 thus positioning the sensing wheel directly over the bump. In this condition, the trace will correctly indicate the direction and value of H.

When the device has progressed a further distance P/2, another “ghost” depressing of H/2, at P/2 from the bump, will be shown on the trace.

When the device has moved sufficiently to bring the rear road wheel down to a level surface, the sensing wheel will once again be at the zero position.

4.2 The following points should be noted:

If depressions are encountered, instead of bumps, the foregoing reasoning and results will apply but in reverse i.e. the “ghost” indications are always equal in magnitude to H/2. Therefore, if H is within the laid-down tolerance for the surface, then H/2 will obviously be well within. However, should condition 2 occur at the precise point where there is also a depression at the sensing wheel, then the depression depth can still be equal to H/2 before the trace is in excess of the permitted tolerance.

A simple aid to the interpretation of the trace would be a small transparent scale, having marks spaced at a distance corresponding to the chart length equal to a road distance of P/2; each side of a centre point. This would facilitate identification of the “ghost” images resulting from vertical displacement of a road wheel as distinct from that of the sensing wheel.

5 Autographic Recording Unit

When fitted to the Travelling Beam Device, this unit allows a record to be made of the trace.

A fibre tipped pen is located in the holder and allowed to rest against the recorder chart.

Note: the recorder chart may be sensitive or non-sensitive, but in both cases use the fibre tipped pen.

5.1 To fit Recorder Chart

Remove both retaining caps and fit the new chart on the left hand pillar. Feed the paper across the front of the flat recording area around the inside of the tension pin and attach with adhesive tape to the take up drum. Wind the drive wheel to ensure the paper is being correctly fed and replace the retaining caps.

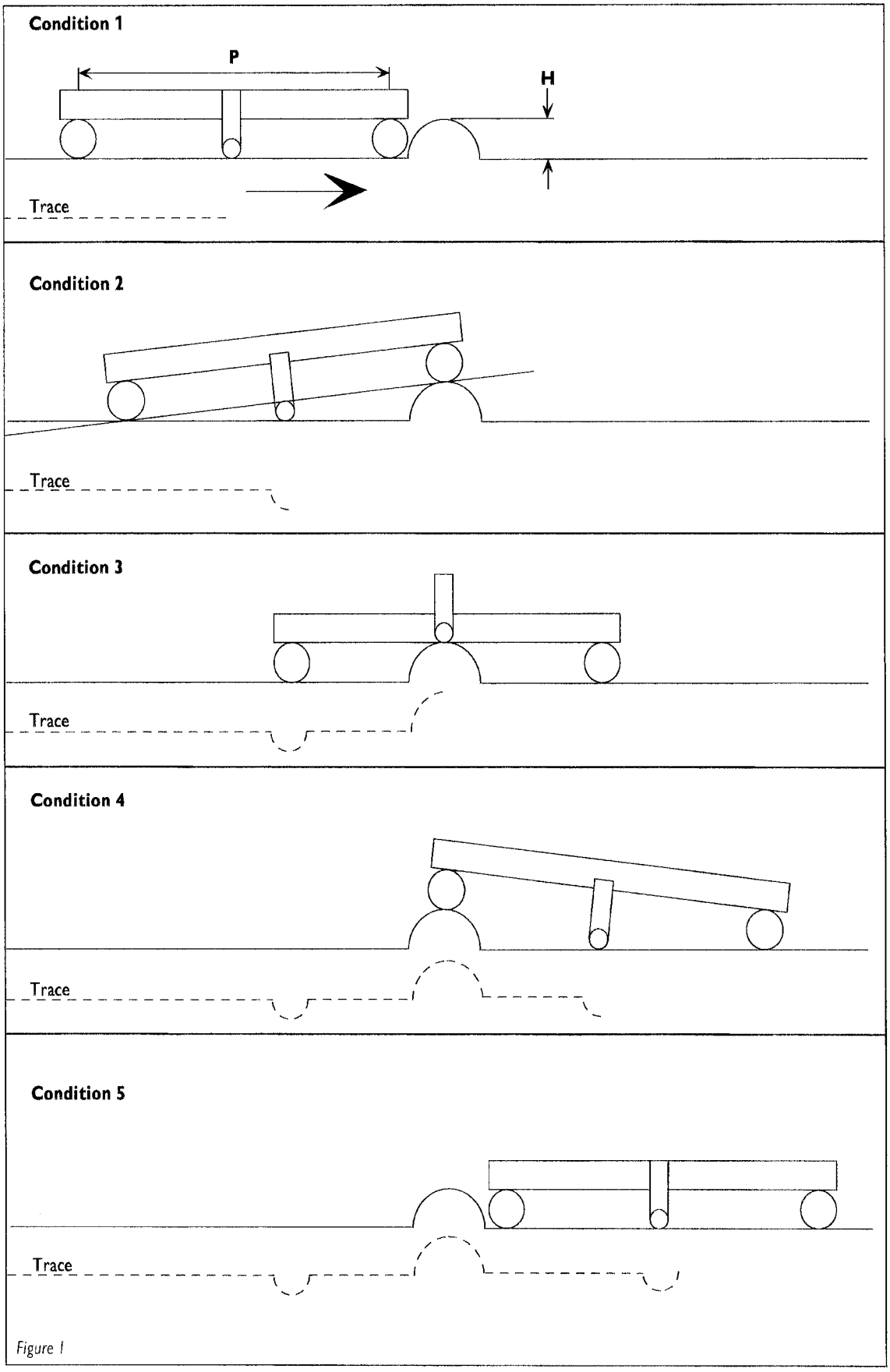

Condition 1
P
H
Trace
Condition 2
Trace
Condition 3
Trace
Condition 4
Trace
Condition 5
Trace

Figure 1

Fitting Recording Unit toTravelling Beam.

1) Fit bearing block item 26 and rod end item 58 assembly to the inside of travelling beam using 2 screws item 44.

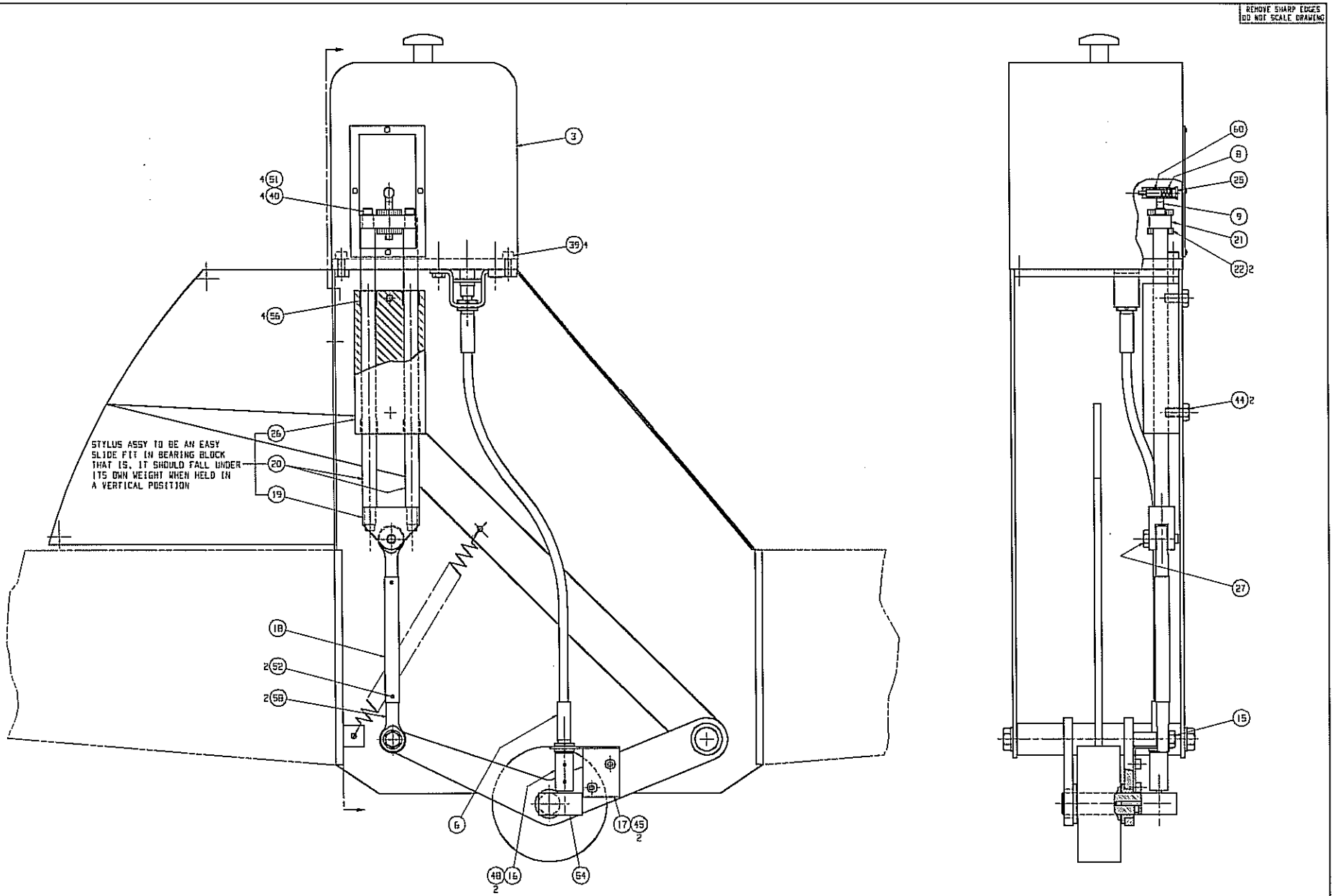
2) Fit the flexible drive item 6 to chart spooling device item 3.

3) Remove cover from item 3 and fit to travelling beam using 4 screws item 39. Allow flexible drive to drop freely inside the travelling beam.

4) Fit shaft of gearbox item 54 (already fitted to flexible drive) into the hole in the end of the wheel spindle and secure bracket item 17 to the travelling beam lever using 2 screws item 45. This can be tricky because of the lack of space but can be done with manipulation.

5) Tighten grub screw in wheel spindle to secure gearbox shaft.

6) Fit rod end item 58 to travelling beam lever using bolt item 15.


REMOVE SHARP EDGES
DO NOT SCALE DRAWING
STYLUS ASSY TO BE AN EASY SLIDE FIT IN BEARING BLOCK THAT IS, IT SHOULD FALL UNDER ITS OWN WEIGHT WHEN HELD IN A VERTICAL POSITION
3
4 51
4 40
39 4
4 56
25
20
19
18
2 52
2 58
6
17
45 2
48 2
16
54
60
8
25
9
21
22 2
44 2
27
15
DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED - GENERAL TOLERANCES X ± 0.5 X.X ± 0.2 X.XX ± 0.1 ANGULAR ± 1°
MATERIAL SEE PARTS LIST
FINISH NONE
1ST ANGLE PROJ
A1
DESCRIPTION "AUTOGRAPHIC RECORDER UNIT"