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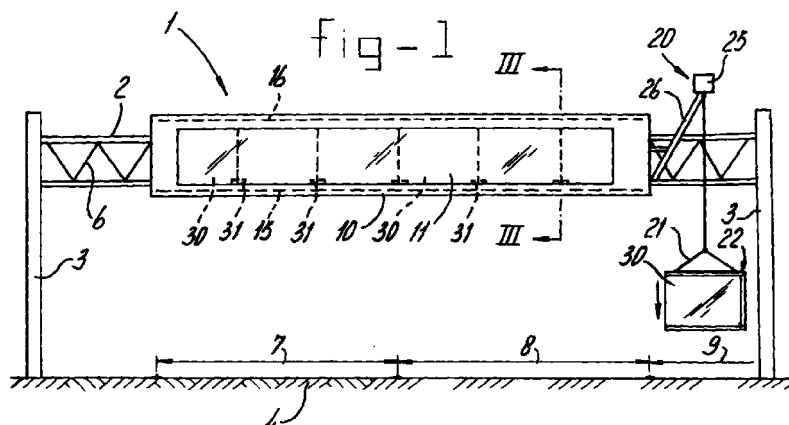
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(54) **Gantry and frame for supporting one or more signalling panels above a roadway, and methods for removing, installing and exchanging signalling panels**

(57) The invention relates to a gantry for supporting one or more signalling panels above a roadway. The gantry comprises a mast and a bearing arm, which is attached at a distance above the roadway and extends over the roadway, for the signalling panels. The bearing arm is provided with a main rail system which extends in its longitudinal direction, preferably supports the signalling panels and along which the signalling panels can be displaced. The signalling panels may be provided with wheels and/or shoes for running along the main rail system, the main rail system and the wheels and/or shoes then being designed in such a way that the main rail

system is substantially fixed in directions which are transverse with respect thereto. Furthermore, it is possible to provide an auxiliary rail system which is to be placed at one end of the main rail system, in line therewith, and into which a signalling panel can be transferred from the main rail system by being displaced along the main rail system and auxiliary rail system, after which the signalling panel can be fixed in the auxiliary rail system in order to be taken away together with the auxiliary rail system. The invention furthermore relates to methods for manipulating signalling panels.



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Description

[0001] The present invention relates to a gantry for supporting one or more signalling panels above a roadway, comprising a mast and a bearing arm, which is attached to the mast at a distance above the roadway and extends over the roadway, for signalling panels.

[0002] Such gantries which are arranged over the roadway and have signalling panels for giving signals to passing traffic are very generally known. By way of indication, reference may be made, for example, to US Patent 5,008,967, which relates to a gantry with a bearing arm which can be walked on. Arms, each bearing two traffic lights, are in this case attached to the bearing arm. To be able to reach the traffic lights for maintenance or repair purposes, a person has to ascend along the mast or in some other way in order to reach the catwalk of the bearing arm. This person can then move along the catwalk of the bearing arm and carry out his/her work. If the traffic lights in question are not easily or sufficiently accessible, it is also necessary to make use of, for example, a cherry picker which is positioned beneath the bearing arm and is able to lift a person up to the vicinity of the location where the work is to be carried out. Placing a cherry picker beneath the bearing arm has the drawback that at least one lane of the roadway has to be closed for this purpose. The drawback of carrying out the work from the bearing arm is that this entails the risk that parts or tools may fall down, and consequently, for safety considerations, one or more lanes of the roadway have to be closed, or at least the traffic on one or more lanes has to travel more slowly as a precaution. It will be clear that such situations result in queues, in particular on roadways on which the traffic is heavy.

[0003] One object of the present invention is to prevent the abovementioned drawbacks.

[0004] Within the context of the present invention, signalling panels are understood in a broad sense to mean road signs bearing traffic instructions, road signs bearing information, such as information on directions and distances to be travelled and other route information, and the signalling panels may be both panels with permanently visible information and signals, for example signs with text printed on them, as well as signalling panels with information which is not permanent but is predetermined, as well as panels with any information which can be stipulated in more detail and in particular can be programmed, and signals which may be supplied, for example, by radio or electronic means. The signalling panels may in this case be signalling panels with lights, such as for example LEDs, traffic lights and fibre-optic cable lights.

[0005] Another object of the present invention is to overcome the above drawbacks.

[0006] The particular object of the present invention is to provide a gantry of the type referred to at the outset in which the signalling panels are accessible for maintenance, replacement, etc. without obstruction to the traffic, or at least with minimal obstruction.

5 nance, replacement, etc. without obstruction to the traffic, or at least with minimal obstruction.

[0007] According to the invention, the above objects are achieved by the fact that the bearing arm is provided with a main rail system which extends in the longitudinal direction thereof, preferably supports the signalling panels and along which the signalling panels can be displaced. By attaching the signalling panels to the bearing arm in such a manner that they can be displaced along the main rail system, they can, if appropriate in succession, be displaced to a location from which, if appropriate, they can be removed or dealt with in some other way for maintenance. Preferably, in this case, the signalling panels are also supported by the main rail system, i.e. signalling panels are suspended from the bearing arm via the main rail system even when the signalling panels are carrying out their signalling task and do not have to be displaced. However, it is equally conceivable for the signalling panels to be moved to their location where a signalling task is to be carried out by means of the main rail system and then to be uncoupled from the main rail system in order to be suspended from the bearing arm in some other way, which can be realized in various manners by an average person skilled in the art.

[0008] The gantry according to the invention may contain one signalling panel, but may also contain a larger number of signalling panels, in principle even an unlimited number of signalling panels. In this case, the number of signalling panels will tend to be limited more by the length of the bearing arm and the width of each signalling panel.

[0009] In order to ensure that the signalling panels are sufficiently securely attached to the bearing arm and will not become detached or start to flap, for example in the event of a strong wind, during use of the gantry for signalling purposes, it is advantageous, according to the invention, if the signalling panels are provided with wheels and/or shoes for engaging on the main rail system, the main rail system and the wheels and/or shoes being designed in such a manner that the panels are substantially fixed in the directions which are transverse with respect to the main rail system. Obviously, fixing in the longitudinal direction of the main rail system is also advantageous, but this can be achieved in a very wide variety of ways, for example by completely filling the main rail system with signalling panels or, if appropriate, placing spacers between adjoining signalling panels and positioning a stop or some other blocking means at the ends of the main rail system, preventing movement of the overall assembly in the longitudinal direction of the main rail system.

[0010] In order to make it easier to displace, in particular slide and/or shift, signalling panels in the main rail system, it is advantageous, according to the invention, if the main rail system extends horizontally. There is then no need to overcome or resist any force of gravity during displacement, the same, incidentally, also applying when the gantry becomes operative.

[0011] In order to protect the signalling panels and the rail system from the weather, and in particular also in order to be able to prevent the possibility of objects falling down onto the roadway during displacement of the signalling panels, it is advantageous, according to the invention, if the main rail system is accommodated in a housing, in which the signalling panels are or can be held as well. In this case, the housing will preferably be substantially completely closed, in which case, in order to ensure that the signalling panels are visible, a wall which is transparent in some way, for example a window preferably made from plastic, is positioned in front of the active surfaces of the signalling panels. In this context, a transparent wall is understood to mean a wall which is transparent to a sufficient extent for the signal given by the signalling panel behind it to be visible to the people in the traffic.

[0012] In order to be able to reach the signalling panels for maintenance, replacement, etc. without having to close or utilize a section of the roadway on which traffic is travelling, it is advantageous, according to the invention, if the main rail system at one end extends as far as or beyond a side of the roadway on which there is no traffic, such as for example the hard shoulder. The work can then be carried out from the side on which there is no traffic, in particular the hard shoulder in the case of a motorway.

[0013] In order, in particular in the case where there are two or more signalling panels, to be able to displace all the signalling panels with ease, it is advantageous, according to the invention, if signalling panels which adjoin one another in the longitudinal direction of the main rail system are or at least can be connected to one another by means of releasable coupling means. This is because connecting signalling panels which adjoin one another in the longitudinal direction of the main rail system by means of coupling means makes it possible to displace all the signalling panels by exerting a pulling or pushing force on only one of the signalling panels.

[0014] According to an advantageous embodiment of the invention, the signalling panels may each comprise a multiplicity of LEDs. Each signalling panel may, for example, be equipped with a matrix of a large number of LEDs which are then activated so as to light up or not light up depending on the signal which it is desired to emit. The LEDs may, if appropriate, be suitable for giving different coloured signals, for example by using LEDs of different colours or by using LEDs which are able to emit light of more than one colour. Furthermore, the adjacent signalling panels may be connected to one another, in which case a signal which is to be emitted can be formed by means of LEDs on two or, if appropriate, more panels. The signal may, for example, be an arrow, a speed limit, an (overtaking) ban, a message, an indication that the lane has to be exited/must not be driven on, etc.

[0015] In order to make access to the signalling panels for maintenance purposes easier, it is advanta-

geous, according to the invention, if the gantry furthermore comprises an auxiliary rail system which is or can be releasably arranged next to and in line with the main rail system, and in which a signalling panel can be held and fixed by means of fixing means. A signalling panel can then be transferred from the main rail system into the auxiliary rail system by sliding and/or moving this signalling panel directly out of the main rail system into the auxiliary rail system. Then, the signalling panel, if appropriate inside the main rail system, can be inspected for repair or maintenance. However, it is highly advantageous if the signalling panel is uncoupled from the main rail system and the gantry together with the auxiliary rail system, in order then to be temporarily moved away together with the auxiliary rail system, in order, for example, to be able to remove a following signalling panel or, if appropriate, to be taken to a workplace for maintenance and/or repair.

[0016] In order to make it easy to put the signalling panels into the gantry or to remove them from the gantry, it is advantageous, according to the invention, if the gantry furthermore comprises a hoist device, which is or at least may be arranged at one end of the main rail system, and with which a signalling panel, which may be fixedly held in an auxiliary rail system according to Claim 9, can be hoisted up or lowered.

[0017] The invention furthermore relates to an assembly of a gantry according to the invention and one or more auxiliary rail systems, also according to the invention, which can be used in this gantry.

[0018] The invention also relates to an assembly of a gantry according to the invention and a hoist device according to the invention.

[0019] The invention furthermore also relates to a frame for signalling panels above a roadway, which frame is provided with attachment means for attaching the frame to a gantry, preferably the bearing arm thereof, characterized in that the frame is provided with a main rail system which extends in the longitudinal direction thereof, preferably supports the signalling panels and along which the signalling panels can be displaced. A frame of this nature can be designed in more detail as described in the characterizing clauses of Claims 2-10, in which case, in Claims 9 and 10, the word frame should be substituted for gantry.

[0020] The invention furthermore in particular also relates to a number of methods for handling one or more signalling panels. In particular, the invention relates to a method for removing a signalling panel from the gantry according to the invention, characterized

- in that a) an auxiliary rail system is placed at one end of the main rail system, in line with and adjacent to the latter;
- in that then b) the signalling panel is displaced out of the main rail system until it is fully in the auxiliary rail system;
- in that then c) the signalling panel is fixed in the

auxiliary rail system; and

- in that then d) the auxiliary rail system, with the signalling panel fixed therein, is removed from the main rail system and the gantry.

The advantages of this method will be clear from the description given above. In order, in the case of a plurality of signalling panels, to be able to remove a specific signalling panel, it is advantageous, according to the invention, if the steps a), b), c) and d) are repeated until one or more specific, desired signalling panels have been removed. If signalling panels which adjoin one another in the longitudinal direction of the main rail system are coupled together, it is advantageous, in the method according to the invention, if in step b) in each case the signalling panel which is closest to the end in question is pulled until it is inside the auxiliary rail system, and if before step d) or c) the signalling panel which is located in the auxiliary rail system is uncoupled from the signalling panel which adjoins it in the longitudinal direction of the rail system.

[0021] The invention furthermore in particular also relates to a method for placing a signalling panel in a gantry according to the invention, characterized

- in that i) the signalling panel is or has been placed and fixed in an auxiliary rail system;
- in that ii) the auxiliary rail system is connected to one end of the main rail system, in line with said end;
- in that then iii) the fixing of the signalling panel to the auxiliary rail system is eliminated, and
- in that after that iv) the signalling panel is moved out of the auxiliary rail system into the main rail system.

The advantages of this method according to the invention will also be clear from the description given above. If appropriate, in this method according to the invention, prior to step iv) the signalling panel which is located in the auxiliary rail system can be coupled to a further signalling panel which is located at the end of the main rail system, inside the latter.

[0022] The invention furthermore in particular also relates to a method for replacing one or more signalling panels in a gantry according to the invention, characterized

- in that the steps a) to d) of the method for removing a signalling panel are repeated until all the signalling panels which are to be replaced have been removed from the gantry;
- in that the signalling panels which are to be replaced are then exchanged for new signalling panels; and
- in that then i) to iv) of the method for installing a signalling panel are repeated until all the signalling panels which have been removed but are not to be replaced and/or new signalling panels have been

put back into the gantry.

[0023] In the following text, the present invention will be explained in more detail with reference to an exemplary embodiment which is shown in the drawing, in which:

Figure 1 shows a diagrammatic view of a gantry according to the invention which is positioned over a roadway;

Figure 2 shows a diagrammatic, perspective, detailed view of an auxiliary rail system, with hoist device, which is connected to the main rail system, and

Figure 3 shows a cross section on III-III from Figure 1.

[0024] Figure 1 shows a highly diagrammatic view of a gantry 1, comprising two masts 3 which are positioned on either side of the roadway 4 and between them support a horizontal bearing arm 2. In this case, the bearing arm 2 comprises three horizontal bars 5 which are arranged in a triangular pattern, with sloping struts 6 between them. However, it will be clear that the bearing arm 2 may be designed in a completely different way within the scope of the invention.

[0025] In this example, the roadway 4 comprises a left-hand lane 7, a right-hand lane 8 and a hard shoulder 9.

[0026] A housing 10 is arranged on the bearing arm 2 and has a transparent, sealed window 11, behind which there are one or more signalling panels which are denoted by dashed lines as 30 in Fig. 1 and are visible to people in traffic at least when those panels are emitting a signal via the window 11.

[0027] As should be clear from Figure 3, the housing 10 is attached to the bearing arm 2 by means of top clamping means 12, which are clamped securely onto the top, front bar 5, and bottom clamping means 13, which are clamped securely onto the bottom bar 5. In order to be able to adjust the position of the housing 10 with respect to the vertical, so that the signalling panels themselves are in a vertical position or, if appropriate, are inclined downwards at a specific desired angle, the intermediate arm 14 between the housing 10 and the bottom clamping means 13 is designed so that its length can be adjusted.

[0028] The housing 10, which is substantially closed and of which at least the right-hand end (as seen in Figure 1) and, if appropriate, also the left-hand end is provided with a removable end closure, is provided on the inside with a main rail system which comprises a bottom rail 15 and a top rail 16. If the bottom rail and the top rail were both to be of U-shaped design, were to be aligned with respect to one another and were to have an internal width equal to the thickness of the bottom or top edge of the signalling panels 30, the bottom and top edges of the signalling panels 30 could be fitted directly

into the bottom and top rails, respective. However, in order to make it easy to displace the signalling panels, it is advantageous, according to the invention, if the signalling panels are provided, on their top and bottom sides, with running means, for example wheels or easily movable shoes, which interact with the respective rail; if appropriate these features may be provided in combination. In the exemplary embodiment shown, wheels 17 and 18 have been selected for both the bottom side and the top side. In this case, the wheels 17 and 18 and the bottom and top rails 15 and 16 are designed, in combination, in such a manner that it is impossible, or at least scarcely possible, for the signalling panel 30 to move in any transverse direction with respect to the main rail system 15, 16. In this context, a transverse direction is understood to mean a direction which is parallel to the plane of the drawing in accordance with Figure 3. If the bottom rail 15 is of U-shaped design, it will be clear that the signalling panel 30 can be raised slightly due to the slight clearance at the top rail 16 between the wheel 18 and the top side of the top rail 16, but this can still be regarded as being substantially fixed in the vertical transverse direction.

[0029] As indicated by dashed lines in Figure 1, the top rail 16 and the bottom rail 15 extend at least as far as the right-hand end of the housing 10. If appropriate, the rails 15 and 16 may also extend as far as the left-hand end, but in that case it is advantageous, in the section between the left-hand end and the window 11, for spacers to be placed in the rails 15 or 16 or for a stop to be placed on the rails 15 and 16 at the location of approximately the left-hand end of the window 11, so that the signalling panels, in the exemplary embodiment six (indicated by dashed lines in Figure 1), can all be pushed from the right-hand side to a location precisely behind the window 11 without them being pushed on too far or without the possibility of them subsequently sliding to the left. In this case, according to the invention it is extremely advantageous for the signalling panels 30 to be coupled to one another, in the sense that signalling panels which adjoin one another in the longitudinal direction of the main rail system are connected to one another via simple connecting means (indicated highly diagrammatically by 31 in Fig. 1) in such a manner that it is possible to pull the signalling panel 30 which is located on the far right and, in so doing, at the same time to pull with it signalling panels 30 which are located to the left of this panel. In this way, each signalling panel 30 can be removed from the housing 10 one by one from the right-hand side.

[0030] In order to make it easier to take signalling panels 30 out of the housing and place them in the housing, it is possible, according to the invention, to provide a hoist device and/or an auxiliary frame 22 with an auxiliary rail system 23, 24, which are illustrated in particular in Figure 2.

[0031] The hoist device 20 comprises a hoist mechanism 25 with cable 21 for attaching to the auxiliary

frame 22 and an inclined bar 26 and horizontal bar 27 for attaching the hoist mechanism 25 to the housing 10. The attachment to the housing 10 by means of inclined bar 26 and horizontal bar 27 may be removable, in which case the hoist device 20 is put in place only when it is required and after the end has been removed from the housing. By paying out or hauling in the cable 21, it is possible to move the auxiliary frame 22 upwards or downwards.

[0032] The auxiliary frame 22 comprises a substantially U-shaped system of rods which can be fitted into the sleeve cavities 28 and 29 (Figure 2) of the housing 10. On its top side, the bottom horizontal bar bears a bottom auxiliary rail 23 which, in the position in which it has been fitted into the sleeve cavity 28, lies precisely in line with the bottom main rail 15. The top horizontal bar of the frame bears a top auxiliary rail 24 on its underside, which top auxiliary rail, when the top horizontal bar has been fitted into the sleeve cavity 29, lies precisely in line with the top main rail 16. The horizontal dimension of the auxiliary frame 22 is such that a signalling panel 30 can be held fully therein. Thus, the right-hand signalling panel 30 in the housing can be pulled until it is completely or almost completely inside the auxiliary frame 22, in the auxiliary rails 23, 24. Then, the signalling panel 30 which is located furthest to the right is uncoupled from the following signalling panel 30, which is coupled thereto on the left-hand side, after which the signalling panel 30 which is situated furthest to the right and has been uncoupled from the signalling panel 30 which adjoins it on the left-hand side, can be pushed further until it is completely inside the auxiliary frame 22 and can be fixed thereto, and the auxiliary frame 22, holding the signalling panel 30 which is furthest to the right and has already been uncoupled from the housing 10, can be moved downwards, for example by means of the hoist device 20. Then, a following signalling panel 30 can be removed, etc. It will also be clear that the signalling panels 30 can be placed into the housing 10 in a similar manner but in reverse order.

Claims

1. Gantry for supporting one or more signalling panels above a roadway, comprising a mast and a bearing arm, which is attached to the mast at a distance above the roadway and extends over the roadway, for the signalling panels, characterized in that the bearing arm is provided with a main rail system which extends in the longitudinal direction thereof, preferably supports the signalling panels and along which the signalling panels can be displaced.
2. Gantry according to Claim 1, furthermore comprising one or more signalling panels.
3. Gantry according to Claim 2, characterized in that the signalling panels are provided with wheels

and/or shoes for engaging on the main rail system, the main rail system and the wheels and/or shoes being designed in such a manner that the signalling panels are substantially fixed in directions which are transverse with respect to the main rail system.

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4. Gantry according to one of the preceding claims, characterized in that the main rail system extends horizontally.

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5. Gantry according to one of the preceding claims, characterized in that the main rail system is accommodated in a housing in which the signalling panels can also be held.

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6. Gantry according to one of the preceding claims, characterized in that the main rail system at one end extends as far as or beyond a side of the roadway on which there is no traffic, such as the hard shoulder.

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7. Gantry according to one of the preceding claims, comprising two or more signalling panels, characterized in that signalling panels which adjoin one another in the longitudinal direction of the main rail system are or can be connected to one another by means of releasable coupling means.

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8. Gantry according to one of the preceding claims, characterized in that the signalling panels each comprise a multiplicity of LEDs.

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9. Gantry according to one of the preceding claims, characterized in that it furthermore comprises an auxiliary rail system which is or can be releasably arranged next to and in line with the main rail system, and in which a signalling panel can be held and fixed by means of fixing means.

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10. Gantry according to one of the preceding claims, characterized in that the gantry furthermore comprises a hoist device, which is or may be arranged at one end of the main rail system, and with which a signalling panel, which may be fixedly held in an auxiliary rail system according to Claim 9, can be hoisted up or lowered.

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11. Assembly of a gantry according to one of Claims 1-8 and an auxiliary rail system according to the characterizing clause of Claim 9.

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12. Assembly, preferably according to Claim 11, of a gantry according to one of Claims 1-8 and a hoist device according to the characterizing clause of Claim 10.

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13. Frame for signalling panels above a roadway, which frame is provided with attachment means for

attaching the frame to a gantry, preferably the bearing arm thereof, characterized in that the frame is provided with a main rail system which extends in the longitudinal direction thereof, preferably supports the signalling panels and along which the signalling panels can be displaced.

14. Method for removing a signalling panel from a gantry according to one of Claims 1-8, characterized

- in that a) an auxiliary rail system is placed at one end of the main rail system, in line with and adjacent to the latter;
- in that then b) the signalling panel is displaced out of the main rail system until it is fully in the auxiliary rail system;
- in that then c) the signalling panel is fixed in the auxiliary rail system; and
- in that then d) the auxiliary rail system, with the signalling panel fixed therein, is removed from the main rail system and the gantry.

15. Method according to Claim 14, characterized in that the steps a), b), c) and d) are repeated until one or more specific, desired signalling panels have been removed.

16. Method according to Claim 15, characterized in that the signalling panels which adjoin one another in the longitudinal direction of the main rail system are coupled together, and in that during step b) in each case the signalling panel which is closest to the end in question is pulled until it is in the auxiliary rail system, and in that before step d) or c) the signalling panel located in the auxiliary rail system is uncoupled from the signalling panel which adjoins it in the longitudinal direction of the rail system.

17. Method for placing a signalling panel in a gantry according to one of Claims 1-8, characterized

- in that i) the signalling panel is or has been placed and fixed in an auxiliary rail system;
- in that ii) the auxiliary rail system is connected to one end of the main rail system, in line with said end;
- in that then iii) the fixing of the signalling panel to the auxiliary rail system is eliminated, and
- in that after that iv) the signalling panel is moved out of the auxiliary rail system into the main rail system.

18. Method according to Claim 17, characterized in that before step iv) the signalling panel which is located in the auxiliary rail system is coupled to a further signalling panel which is located in the main rail system, at the end thereof.

19. Method for replacing one or more signalling panels in a gantry according to one of Claims 1-8, characterized

- in that the steps a) to d) according to Claim 13 5
are repeated until all the signalling panels
which are to be replaced have been removed
from the gantry;
- in that the signalling panels which are to be
replaced are exchanged for new signalling pan- 10
els; and
- in that then the steps i) to iv) according to Claim
16 are repeated until all the signalling panels
which have been removed but are not to be 15
replaced and/or new signalling panels have
been put back in the gantry.

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