STAGE 71
ELECTRICAL CONNECTIONS

In this stage, we connect the main lighting to the circuit board and test the effect. We also activate the bell pull, engine and horn sounds.

1. Plug cable L 71D into socket L on the circuit board 57E. This is in the recess beneath the stairs.
   **NOTE:** Cable C is shown plugged in (left), but you may not have fitted it yet.

2. Plug cable F 71E into socket F on the circuit board 57E.
   Again, cable C is shown plugged in (left), but you may not have fitted it yet.

**KEY TO PARTS**

- 71A Cable H
- 71B Cable J1
- 71C Cable M
- 71D Cable L
- 71E Cable F
- 71F Extender cable C

You will also need three AAA batteries. You may find it helpful to use tweezers to plug in the connections.
3. Fit three AAA size batteries into the battery box 56B. Ensure that you position the positive (+) and negative (−) terminals correctly, as shown.

4. Turn on the switch on the battery box 56B. (This is fitted to the underside of the rear platform 56A.)

5. Press the button on cable L 71D to illuminate the two LED panels and the small LED lamp on cable F 71E. You will see the glow of the lamps better if you turn down the lighting in the area where you are working. Make sure all the connectors are firmly in place as you work.

Always make sure the circuit board is turned off before connecting cables.

6. Place the lower deck roof assembly next to the lower deck assembly as shown. Identify the end of cable J-J1 55H, marked J, which is attached to the roof assembly. Plug it into socket J on the circuit board 57E. Pull the cord 55G to check the sound of the bell.
7 Plug the wide end of cable N 56C, coming from the roof assembly, into socket N on circuit board 57E. Again, cable C is shown plugged in, but is not fitted yet.

8 If you have fitted cable C 41K, unplug it from socket C on the circuit board 57E.

9 Plug one end of the extender cable C 71F to the end of cable C 41K and plug the other end into socket C on the circuit board 57E.

10 Press the switch 38N in the driver’s cab to check the horn sound. Press the switch 38M to check the LED lamps on the lower deck ceiling and the headlights and sidelights on the front of the bus, as shown in the insets below.
11 Plug cable H 71A into socket H on the circuit board 57E.

12 Plug cable M 71C into socket M on the circuit board 57E.

13 Press the button on the end of cable M 71C to check that the LED on the end of cable H 71A lights up. You will see the glow effect better if you darken the area where you are working.
Connect cable J1 71B to cable J-J1 55H. Press the button on the end of cable J1 71B to check the engine sound.
STAGE 72
UPPER DECK LIGHTING AND OTHER ELECTRICS

In this stage, we continue to fit the electrical connections, including the lighting for the upper deck and the rear lights.

KEY TO PARTS SUPPLIED

72A  Cable N
72B  Cable O
72C  Cable G

When working on the electrics, always make sure that the power is turned off before you plug in any cables.
1. Connect cable N72A to the free socket on the end of cable N56C (already attached to the circuit board). The LEDs on cable N72A are the lights for the ceiling of the upper deck.

2. After checking all of the connectors are fitted securely, press switch 38M to check that the LEDs illuminate on cable N72A. To see the glow effect better, darken the area where you are working.
3 Plug cable O 72B into socket O on the circuit board 57E.

4 Press switch 38M in the driver's cab to illuminate the red LEDs on cable O. Press the brake pedal 37A to see that the LEDs become brighter. These are the rear lights, which also act as brake lights.
5 Plug cable G 72C into socket G on the circuit board 57E.

6 Press switch 38M so that you can see two flashing LEDs on cable G 72C. These are indicators.
You may find it helpful to tidy the cables and hold them in separate bundles with small cable ties or short lengths of wire.
STAGE 73
SECOND SECTION OF THE CEILING FRAMEWORK

In this stage, fit a second section of framework to the underside of the floor of the upper deck. The ceiling of the lower deck will be fitted to this framework later.

**KEY TO PARTS SUPPLIED**

- **73A**  Second section of the ceiling framework
- **FM**  2.3 x 4mm (x10)
- **IP**  2.3 x 5mm (x5)
Position the second section of the lower deck ceiling framework **73A** on the underside of the floor of the upper deck. Note that there are four tabs on the end of part **73A**, each with two screw holes. These should be aligned with sockets on the previous section of framework **70A**. After making sure that the tabs are fully inserted, fix in place with eight **FM** screws.

While you are fixing the ceiling framework, make sure that you do not damage the seats that are already fitted to the upper deck.

A Routemaster construction diagram, drawn up at the Chiswick Works, shows how the framework supports the floor of the upper deck and provides fixing points for the ceiling of the lower deck.
Check the fixing points for the rest of the framework: note that two of the screws fit into sockets on part 69A and two fit into sockets on part 68A. Fix in place with four IP screws, again taking care not to damage the previously fitted seats. The inset shows the framework in place.
The framework that the lower deck ceiling will be fitted to is fixed to the floor of the upper deck.
STAGE 74
UPPER DECK HANDRAILS

In this stage we supply part of the front wall of the upper deck and the rear wall, around the top of the stairs. Handrails are fitted to each of these sections.

KEY TO PARTS SUPPLIED

74A  Rear wall
74B  Lamp
74C  Handrail
74D  Handrail
74E  Handrail support
74F  Grab pole
74G  Front wall
74H  Front window frame
74I  Handrail
JP   2.3 x 4mm (x5)
AP   1.7 x 3mm (x4, silver)
1 Take the rear wall 74A, which will fit around the top of the stairs. Check the orientation of the part and push-fit the curved section of handrail 74C into the top of the wall. Push-fit the lamp 74B into the recess in the wall, so that the light bulb goes through the hole.

2 Turn the rear wall 74A around and push-fit the handrail support 74E into the notch in the top of the wall. Take the angled section of handrail 74D and fit one end into the socket in the curved handrail 74C. At the same time, fit the peg on the top of part 74E into the socket on the underside of part 74D.
3 Take the grab pole 74F and fit the peg on the lower end of the pole into the socket on the top corner of the rear wall 74A. At the same time, fit the peg on the side of the pole 74F into the socket at the end of part 74D.

4 Take the front wall 74G and check which side faces the inside of the upper deck. Take the handrail 74I and position it along the top edge of the front wall so that the screw holes in the rail are aligned with the sockets on the top edge of the front wall. Fix in place with three AP screws.
The front wall can now be fitted to the front of the upper deck, by inserting the three pegs on the lower edge of part 74G into the corresponding holes in the floor of the upper deck 69A. This fixing is not secure at this stage, so you may prefer to wait until you have the corner sections of the front wall before fitting part 74G in place.

Take the front window frame 74H and check which way round it should go. Align the tabs on the lower edge of part 74H with the sockets on the front wall 74G. Fix in place with four JP screws.
Finished Views

Store the rear wall carefully, as the grab pole can easily be snapped off.
STAGE 75
FRONT DESTINATION BLIND

The front destination blind, with a choice of route numbers and destinations, is fitted to the front of the bus.

KEY TO PARTS SUPPLIED

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Quantities</th>
</tr>
</thead>
<tbody>
<tr>
<td>75A</td>
<td>Frame</td>
<td></td>
</tr>
<tr>
<td>75B</td>
<td>Cog (x3)</td>
<td></td>
</tr>
<tr>
<td>75C</td>
<td>Cog (x2)</td>
<td></td>
</tr>
<tr>
<td>75D</td>
<td>Roller (x2)</td>
<td></td>
</tr>
<tr>
<td>75E</td>
<td>Blind</td>
<td></td>
</tr>
<tr>
<td>MM</td>
<td>2.0 x 4mm (x3)</td>
<td></td>
</tr>
<tr>
<td>LM</td>
<td>2.0 x 4 x 5mm (x4)</td>
<td></td>
</tr>
<tr>
<td>JP</td>
<td>2.3 x 4mm (x5)</td>
<td></td>
</tr>
</tbody>
</table>

Note that cogs 75C have squared off holes, to fit over the shafts on the ends of the rollers.
1. Take one of the cogs 75B and identify the fixing point on the side of the frame 75A; the cog fits over the small raised screw socket. Fix in place with an LM screw.

2. Take the roller 75D and slide the end with a shaft (circled in red) through the hole on one side of the frame 75A and across to the other side of the frame.

3. The shaft at the end of the roller 75D is close to the cog fitted in step 1. Take the second cog 75B and fit it on to the second raised screw socket on the side of the frame 75A (circled). Fix in place with an LM screw.

4. Take the first cog 75C and fit it onto the shaft at the end of the roller 75D, on the outer edge of the frame 75A. Fix in place with an MM screw. **NOTE:** The toothed side of the cog faces towards the frame. The teeth will mesh with the cogs that have already been fitted. Hold the roller still with a pair of pliers while you fit the screw.
5. Take the third cog 75B and fit it on to the raised screw socket at the end of the frame 75A so that the teeth mesh with the cog fitted in step 3, as shown. Fix in place with an LM screw.

6. Peel the protective backing off the adhesive strip on the lower edge of the destination blind 75E.

7. Very carefully align the lower edge of the destination blind 75E with the black line on the roller 75D. Take your time to ensure the correct positioning and when you are happy that it is straight and central, stick the adhesive strip to the roller.

8. Identify cog 75C, fitted in step 4. Using a screwdriver, rotate the screw MM that holds the cog in place. Turn in a clockwise direction so that the blind 75E winds on to the roller 75D.
Take the second roller 75D. As before, slide the end with a shaft through the frame 75A and into the socket on the opposite side of the frame, beside the cogs that have been fitted. The inset shows the second roller in place.

Peel the protective backing off the free end of the blind 75E. Bring the lower edge of the blind up to align with the black line on the second roller 75D. When it is accurately aligned, straight and central, fix the self-adhesive strip in place on the roller.

Using a screwdriver, as in step 8, continue to turn the MM screw that holds the first cog 75C in place. Roll the blind 75E on to the roller 75D, leaving a very slight amount of slack in the blind (see step 12).
12 Leave a little slack in the blind, as indicated, fit the second cog 75C on to the end of the second roller 75D. The teeth will mesh with the adjacent cog 75B. Fix in place with an MM screw.

13 Align the screw holes in the tabs on the side of the frame 75A with the sockets in part 74G on the front of the upper deck. Fix in place with four JP screws.
STAGE 76
DRIVER’S CAB DETAILS

In this stage, the ceiling of the driver’s cab is supplied, together with levers and controls, which are fitted to the ceiling.

KEY TO PARTS

- **76A**: Driver’s cab ceiling
- **76B**: Cog
- **76C**: Cog axle
- **76D**: Winder socket
- **76E**: Winder
- **76F**: Cover
- **76G**: Control box
- **76H**: Stop indicator
- **76I**: Distributor box
- **76J**: Bracket
- **76K**: Cable
- **76L**: Cable
- **76M**: Lamp housing
- **76N**: Extender knob
- **76O**: Single bracket
- **76P**: Double bracket
- **76Q**: Tape strips (x8)

**Dimensions**
- **DP**: 1.7 x 4mm (x6)
- **KP**: 2.0 x 4mm (x2)
- **FM**: 2.3 x 4mm (x5)
- **EM**: 1.5 x 4mm (x7)
- **BP**: 1.5 x 3mm (x2)
- **MP**: 1.7 x 3mm (x2)

Some of the parts supplied with this stage will be used in the following stage. Store them carefully until they are needed.
1. Take the cover 76F and check the orientation. There are ribs along two edges on one side, and two pegs on the other side. Fit the pegs into the holes in the driver’s cab ceiling 76A as shown.

2. Turn the roof over so that you can fix the cover in place using a DP screw.

3. Fit the cog 76B over the matching hole in the upper side of the driver’s cab ceiling 76A. One side of the cog fits into the recess in the ceiling. Fit the stub axle 76C through the centre of the cog to hold it in place. Turn the ceiling over (holding the stub axle in place) and fix the stub axle 76C in place using a KP screw (inset right), taking care not to over tighten it.

4. Take the stop indicator 76H and fit it into the control box 76G so that the large screw sockets are aligned and the peg in the control box fits into the hole in the stop lever, as indicated by the dotted line. Fix in place with a BP screw.
Take the ceiling of the driver’s cab 76A and place it upside down so that you can see the front corner as shown. Check the fit of the peg on the stop indicator control box 76G in the hole at the front of the cab ceiling as indicated by the dotted line on the right in the diagram. Check the alignment of the raised screw socket on the distributor box 76I with the screw socket at the side of the cab ceiling (dotted line on the left).

Take the two cables 76K and 76L. Note that 76L is slightly longer. Fit one end of each cable onto the two pegs on the side of the control box 76G. Note that 76K goes on to the peg nearest to the stop indicator on the control box (circled). Fit the other end of cable 76K on to the peg at the end of the arm on the distributor box 76I. Fit the other end of cable 76L onto the peg in the centre of the hub near the end of the distributor box 76I.

In these steps, for clarity we have shown the cables 76K and 76L shaped to fit around the edge of the assembly. The cables are actually straight.

Take the ceiling of the driver’s cab 76A and place it upside down so that you can see the front corner as shown. Check the fit of the peg on the stop indicator control box 76G in the hole at the front of the cab ceiling as indicated by the dotted line on the right in the diagram. Check the alignment of the raised screw socket on the distributor box 76I with the screw socket at the side of the cab ceiling (dotted line on the left).

Fit parts 76I and 76G in place on the cab ceiling 76A and fix in place with two DP screws. The two cables fit around the edge of the cab ceiling.

With the cables 76K and 76L arranged around the corner of the cab ceiling as shown, fit the bracket 76J in place so that the cables run through the channel. Fix in place with two EM screws.
9 Fit the winder socket 76D into the shaped hole in the cab ceiling 76A, near the stop indicator. The locating peg on the underside of part 76D fits into the shaped hole. Then fit the winder 76E into the winder socket 76D. Hold the winder and socket in place while you turn the ceiling over.

10 Fix the winder and socket in place from the top of the ceiling 76A using an MP screw.

11 Fit the two pegs on the lamp housing 76M into the corresponding sockets in the ceiling of the driver’s cab 76A.

12 Hold the lamp housing 76M in place while you turn the ceiling over. Fix the lamp housing in place using two DP screws.
The parts supplied with this stage that have not yet been used will be fitted following the instructions in stage 77.

A cog and other accessories have been fitted to the ceiling of the driver’s cab.
STAGE 77
ELECTRICS AND ROOF PANEL

The roof panel that fits above the bonnet next to the driver’s cab is supplied, together with two handles. We re-arrange the electrical connections to add further fittings to the driver’s cab.

1 Unplug cable H 71A (red and black), cable M 71C (red and green) and cable L 71D (black and white) from the circuit board 57E. Disconnect cable J1 71B from cable J-J1 55H (inset below).

KEY TO PARTS

77A Roof panel
77B Handle
77C Circlip
77D Handle
FM 2.3 x 4mm screws (x5)
EM 1.5 x 4mm red screws (x3)
2. Take cable H 71A (inset below). Fit the lamp on the end of the cable into the lamp housing 76M, inserting it from the top of the ceiling of the driver's cab 76A.

3. To anchor the lamp on cable 71A in place, insert the peg of the extender knob 76N between the black insulated parts of the cable 71A and into the hole in the lamp housing 76M.

4. Take cable M 71C (inset). Fit the switch at the end of the cable into the single bracket 76O.

5. Fit the single bracket 76O on the driver's cab roof so that the screw holes on part 76O align with the screw sockets circled in light blue. At the same time, the switch on the end of cable 71C fits into the extender knob 76N (circled in red, as indicated by the red dotted line). Fix the bracket in place with two black EM screws, supplied with stage 76.
6. Take cables 71D and 71B (inset, right). Fit the switches on the ends of the cables into the double bracket 76P. **NOTE:** The black and white cable is on the right and the green and yellow cable is on the left.

7. Align the screw holes on bracket 76P with the screw sockets on the roof of the driver’s cab (circled in light blue) as indicated by the dotted lines. Fix the bracket in place with two black EM screws, supplied with stage 76 (inset above).

8. Run the cables 71A, 71C, 71D and 71B across the roof of the cab, fitting them into the groove. Fix in place with two stickers 76Q.
9 Take the upper floor last worked on in stage 75 along with four FM screws supplied with the previous stage. Position the driver’s cab ceiling 76A in the front right-hand corner of the underside of the upper deck as shown, so that the screw sockets are aligned. **NOTE:** the cables fit into a notch in the cross strut of the frame 73A (circled) as indicated by the red dotted line. Fix the ceiling in place with four FM screws.

10 Continue to run the cables to the rear of the bus, so that they fit in the notches of the cross struts of frames 73A and 70A. Towards the back of the assembly, the cables fit into a notch in the longitudinal strut of frame 70A. Use five pieces of sticky tape to hold the cables to the underside of the upper deck.

11 Fit the knob on the end of the handle 77B through the hole in the recess in the roof panel 77A. Take the circlip 77C and fit it over the neck of the knob to anchor it in place (inset).
12 Position the handle 77D at the side of the roof panel 77A so that the locating pin fits in the central hole and the screw holes are aligned. Fix in place with two red EM screws.

13 Position the roof panel on the underside of the upper floor, next to the ceiling of the driver’s cab, as shown. Fix part 77A to the frame 73A using four FM screws supplied with this stage.

Finished views
STAGE 78
INTERIOR UPPER DECK WALLS

The walls of the bus have inner and outer panels. Here we fit the inner panels on the left-hand side of the upper deck to the floor, and secure the seat frames in place.

KEY TO PARTS

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>DP</th>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>78A</td>
<td>Left front inner side wall of upper deck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78B</td>
<td>Seat fixture (x9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78C</td>
<td>Left back inner side wall of upper deck</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DP 1.7 x 4mm (x31)
IP 2.3 x 5mm (x11)
1. Take the front inner side wall 78A and identify the inside (the diagram on the left shows the outer side of the wall). Take four of the seat fixtures 78B and position them on the inside of the wall. Screw each one in place with two DP screws. The inset below shows the fixtures in place, viewed from the inside.

2. In the same way, take the rear section of the inner wall 78C. Fix five seat fixtures 78B to the inside of the wall panel using two DP screws for each fixture. The inset below shows the five seat fixtures in place.
3. Take the upper deck assembly from stage 77. Position the rear inner wall 78C against the left side of the deck. The screw holes in the tabs at the base of part 78C align with screw sockets at the edge of the floor, parts 68A and 67A. On the inside, the screw sockets at the ends of the seats will align with the seat fixtures 78B fitted in step 2. Fix in place with three IP screws.

4. Starting with the rear seat frame, check that the screw hole in the tab on the back of the left seat frame 66E is aligned with the seat fixture 78B. Fix in place with a DP screw. Repeat along the next four seats to hold the left seat frames 64A (x2) and 64B (x2) in place (inset).

When fitting the screws, you may find it easier if you use a fine file to enlarge the hole in the seat bracket slightly. This will clear away any remaining plastic from the manufacturing process.
5 If not already fitted, fit the front wall panel 74G in place, as described in stage 74, step 6. Fit the front left wall panel 78A in place. Note that at the rear edge, there are tabs that interlock with recesses on part 78C (circled in light blue). The screw holes in the tabs at the base of part 78A align with screw sockets at the edge of the floor, parts 69A and 68A. Two screw sockets at the front edge align with sockets in the front wall 74G. Fix part 78A in place with six IP screws.

6 As described in step 4, fix the next seat frame (65A) in place using a DP screw. Fit each of the remaining seat frames (2 x 65B and 65A) in place using a DP screw (inset).
STAGE 79
INTERIOR UPPER DECK WALLS

In a similar way to the previous stage, we fit the inner panels on the right-hand side of the upper deck to the floor, and secure the seat frames in place.
1 Take the rear inner side wall 79C and identify the inside (the diagram on the left shows the outer side of the wall). Take four of the seat fixtures 79B and position them on the inside of the wall. Screw each one in place with two DP screws. The inset below shows the fixtures in place, viewed from the inside.

2 In the same way, take the front section of the inner wall 79A. Fix four seat fixtures 79B to the inside of the wall panel using two DP screws for each fixture. The inset below shows the four seat fixtures in place.
3 Take the upper deck assembly from stage 78. Position the front inner wall 79A against the right side of the deck. The screw holes in the tabs at the base of part 79C align with screw sockets at the edge of the floor, parts 68A and 69A. At the front, two screw holes align with holes in the lower part of the front of the bus, part 74G. On the inside, the screw sockets at the ends of the seats will align with the seat fixtures 79B fitted in step 2. Fix in place with six IP screws.

4 Fit the rear right wall panel 79C in place. Note that at the front edge, there are recesses that interlock with tabs on part 79A (circled in light blue). The screw holes in the tabs at the base of part 79C align with screw sockets at the edge of the floor, parts 67A and 68A. Fix part 79C in place with three IP screws.
5 Starting with the rear seat frame, align the screw hole in the tab on the back of the seat frame 62B with the seat fixture 79B. Fix in place with a DP screw. Repeat along the next four seats to hold the right seat frames 62A (x2) and 63B in place (inset).

When fitting the screws, you may find it easier if you use a fine file to enlarge the hole in the seat bracket slightly. This will clear away any remaining plastic from the manufacturing process.

6 Continue to the front of the bus fixing the next seat frame (62B) in place using a DP screw. Fit each of the remaining seat frames (2 x 63A and 63B) in place using a DP screw (inset).
STAGE 80
FRONT WINDOWS AND ELECTRICS

We start work on the front windows and the frame for the front blind. We also add extender cables to the electrics for the lights and bell/buzzer sound.

KEY TO PARTS

80A  Inner front window frame
80B  Window panes (x2)
80C  Left bar
80D  Right bar
80E  Window winders (x2)
80F  Front frame
80G  Wind-down windows (x2)
80H  Front blind frame
80I  Pane
80J  Cable F (grey-white)
80K  Extender cable F (grey-white)
80L  Extender cable JK (green-yellow-black-red)
AP   1.7 x 3mm (x5)
CM   1.7 x 4mm (x10)
AM   1.7 x 3mm (x5)

1. Fit the pane 80I on to the inside of the front blind frame 80H, with the raised screw sockets on part 80H fitting into the recesses in part 80I. The circular indentations in part 80I (circled) are at the bottom. Fix together with four AP screws.
2. Take the front frame 80F. Fit the shaped ends of the wind-down windows 80G into the grooves in part 80F, ensuring parts 80G are at the top of the window openings, with the long ‘metal’ edge at the top.

3. Fit the inner front window frame 80A on the inside of the front frame 80F enclosing the wind-down windows 80G. The gloss finish of part 80A is facing away from you in this diagram. Fix together with four AM screws.

4. Fit one of the window panes 80B on the inside of the window frame 80A. Fix in place with four CM screws. Repeat to fit the second window pane 80B (inset above).

5. Take the two bars 80C and 80D. Check that you have them the right way round. Part 80C has the winder socket at the top left and 80D has it at the top right. Fit the winders 80E in place (push-fit connections). Push-fit the bars to the front wall of the bus 74H as shown in the inset.
At present, pushing the 'bell' buttons on the platform gives a buzzer sound. To change this to a bell sound (the same as the cord pull) an additional cable needs to be fitted. On the circuit board 57E, disconnect cable J (55H, green-yellow-black-red) and cable K (53D, red-black). Plug the green-yellow-black-red extender cable supplied with this stage (80L) into socket J on the circuit board 57E. Leave socket K unplugged (inset below).

Identify the two sockets on the end of extender cable JK (80L). Take the sockets on the end of cable K (53D) and cable J (55H), which were unplugged in step 6, and plug them into the respective sockets of extender cable JK (80L). The inset shows the arrangement from a different angle.

Test that the bells work by pulling the cord on the ceiling of the lower deck (55G) and pushing the bells 53D (inset, below).
If you want a buzzer sound, plug the socket labelled K on the end of the black-red extender cable (80L) into the socket marked K on the circuit board 57E. Pull the cord and press the buttons (as in step 8) to check that the buzzer sound is working.

Take the black-white cable L (71D) and plug it into socket L in the circuit board 57E (inset, right).

The grey-white extender cable 80K needs to be fitted into cable F (71E). Begin by disconnecting the intermediate plug in the grey-white cable F (circled, above). Fit the grey-white extender cable F (80K) between the two connectors in cable F (71E, circled, below).

Press switch 71D in the driver’s cab (inset, right) to check the LEDs glow (circled in red, below).
Connect grey-white cable F (80J) to the free socket of extender cable F (80K, circled in blue). As in the previous step, press switch 71D to check LEDs glow (circled in red, right).

The front window assembly has been started, and cables have been extended.