Tech Note: Coaxial Cable Overlay Guidelines

Tech Notes are announcements that help to communicate and track new information about Tesla Service concerns. Such concerns may or may not be VIN specific. These instructions assume knowledge of motor vehicle and high voltage electrical component repairs, and should only be executed by trained professionals. Tesla assumes no liability for injury or property damage due to a failure to properly follow these instructions or for repairs attempted by unqualified individuals.

This Service Document supersedes TN-20-17-001, dated June 6,2020. Each content change is marked by a vertical line in the left margin. Discard the previous version and replace it with this one.

To save cost and reduce the vehicle repair time, parts that enable the technician to replace just a single coaxial cable, and not an entire electrical harness, are becoming available. This document provides best-practice guidelines and supplements existing service manual procedures for overlaying coaxial video and audio cables onto electrical harnesses.

This document provides a basic process, and guidelines for specific components, to overlay a coaxial cable. The content is organized in this manner:

1. Determine the Cable Path
2. Prepare the Cable Path
3. Prepare the Cable
4. Overlay the Cable
5. General Tips
6. Component Specific Tips and Guidelines

Determine the Cable Path

1. Find the cable path endpoints.

   NOTE: The connections where the replacement cable will connect are the endpoints.

2. Use the RF Cables or RF/Special Cables page of the vehicle's Circuit Diagram at http://service.teslamotors.com to identify the endpoint connector names (Figures 1 and 2).

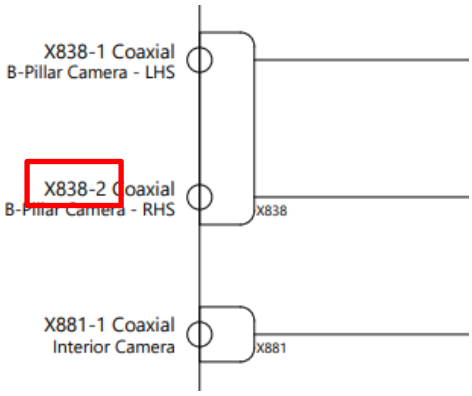

Figure 1

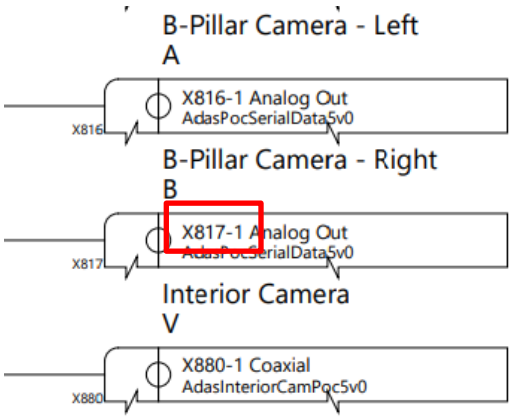

Figure 2

3. Use the vehicle's Connector Reference at http://service.teslamotors.com to determine the connector locations, types, gender, terminals to be reworked, and local cable paths as seen in the "Location:" images (Figures 3 and 4).

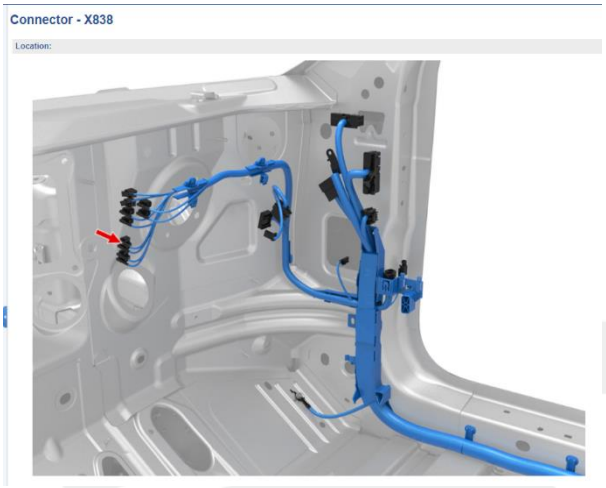

Figure 3

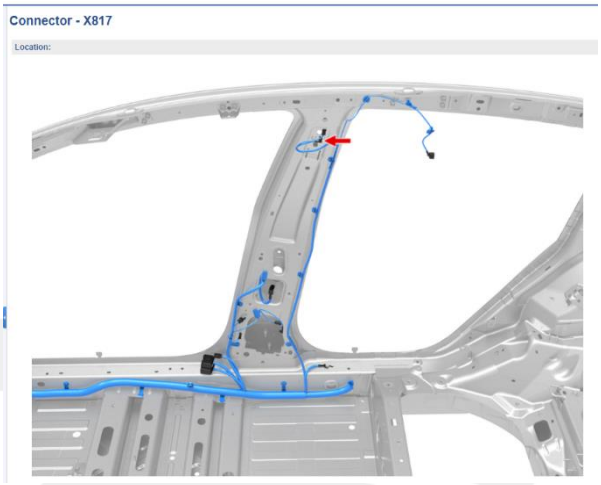

Figure 4

4. Compare the local cable paths of the endpoints and visualize the full cable path from one endpoint to the other endpoint.

5. Determine the starting endpoint where the replacement cable begins the feed through the vehicle.

TIP: If a cable path has many turns or passes through multiple openings, consider finding the midpoint of the path and feeding both ends of the cable from that midpoint.

Prepare the Cable Path

1. Make sure to have determined the cable path and endpoints.
2. Prepare the vehicle by removing components to allow access to the cable path.
3. Release electrical harness clips that will provide easier access.
4. Open electrical harness cable ties that can be reclosed later.
5. Move obstructions out of the cable path.
6. Identify sharp turns that might damage the cable.

CAUTION: Make sure the replacement cable bend radius is always greater than 15mm (Figure 5). If necessary, find an alternate route.

Figure 5

7. Look for edges along the cable path that might rub and damage the cable (Figures 6, 7, and 8).

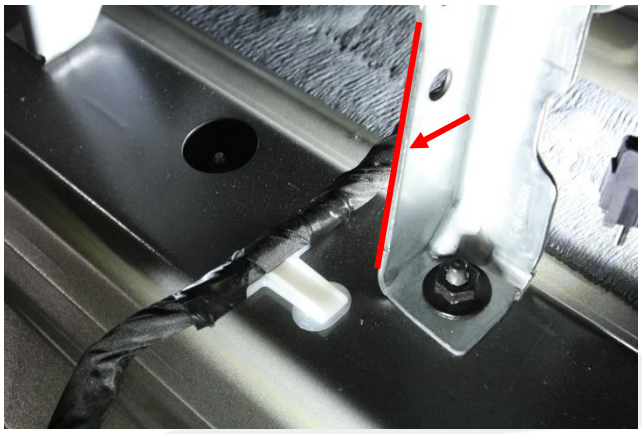

Figure 6

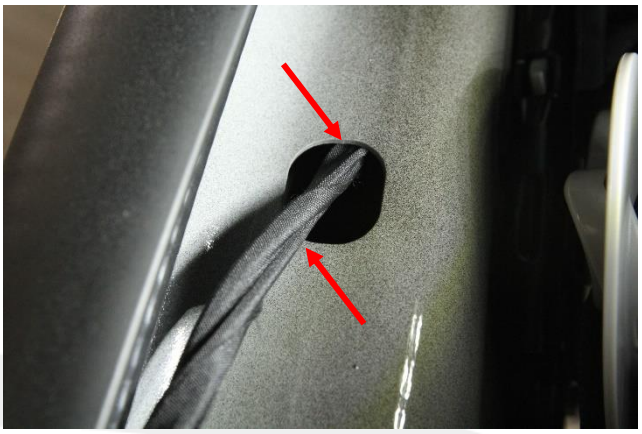

Figure 7

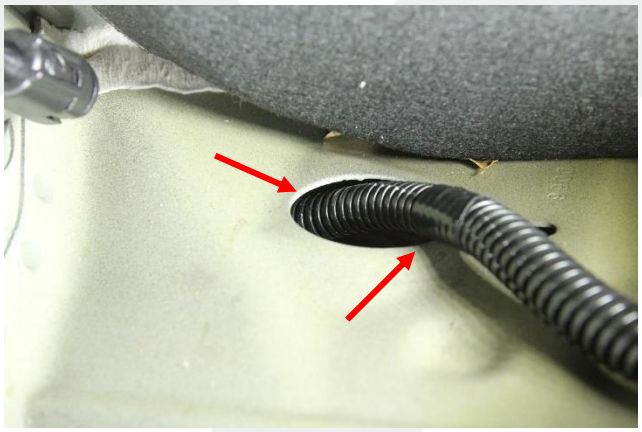

Figure 8

NOTE: If use of retaining clips and edge clips cannot mitigate contact with the edges, find an alternate route.

8. Utilize portions of the electrical harness where the replacement cable can be protected with existing corrugated tubing.

9. If the defective cable has a short run of corrugated tubing that is easily removed, remove the corrugated tubing for later reuse with the replacement cable (Figure 9).

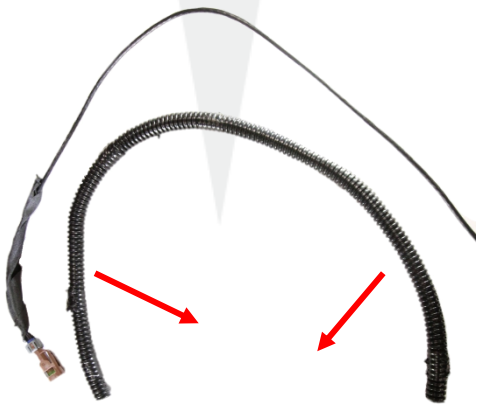

Figure 9

TIP: If the electrical harness has a short run of corrugated tubing that is easily removed, consider putting the replacement cable inside of the corrugated tubing (Figure 10).

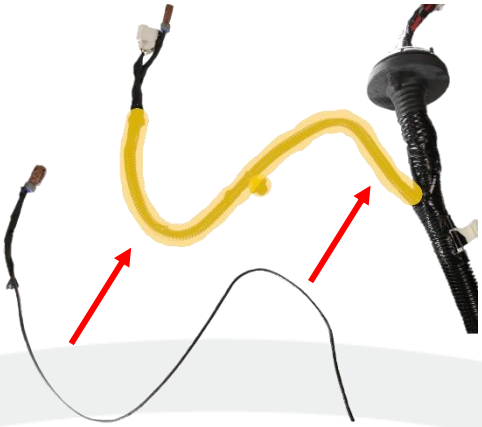

Figure 10

Prepare the Cable

1. Make sure to have prepared the cable path.
2. If the replacement cable is supplied within an electrical harness, carefully open the harness by unwrapping tape, opening clips and cutting cable ties to remove the cable from that harness.

CAUTION: Do not attempt to pull the cable through the electrical harness (Figure 11).

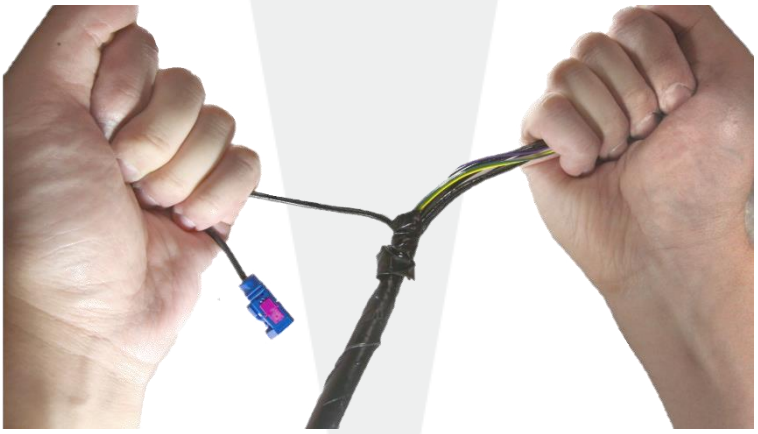

Figure 11

3. If the replacement cable converges with other cables into one connector of the replacement cable electrical harness, remove the replacement cable from that connector (Figures 12, 13, and 14).

Figure 12

Figure 13

Figure 14

NOTE: Repeat if the other end of the replacement cable converges with other cables into another connector.

4. Identify the feed end of the replacement cable.

NOTE: Make sure that the feed end of the replacement cable is of the correct gender.

5. If not already done, remove the connector housing from the feed end of the cable (Figures 15 and 16), and then wrap the terminal with yellow tape to protect the terminal and make it more visible (Figure 17).

Figure 15

Figure 16

Figure 17

NOTE: If the connector housing has been removed from the non-feed end, wrap that terminal with black tape to protect the terminal.

6. If the replacement cable was shipped in a coiled state, gently reverse the coil of the cable to help straighten the cable, making sure not bend the cable tighter than a 50mm radius.

7. Clean the length of the cable with an alcohol wipe.

TIP: Wrap one end of the cable with the wipe and carefully draw the cable through the wipe.

8. Wrap the entire length of the cable with electrical or colorplast felt tape.

   Unroll approximately 100mm of tape, press the centerline of the tape to the cable, fold the tape over the cable to wrap the cable, unroll approximately 100mm of tape, press the centerline of the tape to the cable, and so on (Figure 18).

✓ **Figure 18**

NOTE: Do not unroll excessive tape, as this creates the opportunity for off center alignment, or the tape catching and folding upon itself (Figure 19).

✗ **Figure 19**

Overlay the Cable

1. Make sure to have prepared the cable.
2. Start the feed end of the replacement cable into the cable path.
3. Consider each turn, each opening, and each obstruction passed as a segment of the cable path.
4. Move as much length of the replacement cable as possible around each turn, through each opening, or past each obstruction before moving on to the next segment of the cable path.

   CAUTION: Use care not to damage a grommet/boot when moving the replacement cable through the grommet/boot. If the grommet/boot is removed or dislodged, make sure that it is properly reseated.

   CAUTION: If moving the replacement cable along the cable path becomes difficult, do not pull or put undo strain on the replacement cable. Inspect the cable path to determine why the replacement cable is binding.

5. After the feed end of the replacement cable has reached the endpoint, inspect the cable path.

   If there is excess replacement cable length at the endpoints, follow the cable path and manage slack at each turn, opening, and obstruction.

CAUTION: Make sure that the replacement cable bend radius is always greater than 15mm (Figure 20).

Figure 20

6. Remove the defective cable's terminals from their connector housings.
7. Remove the tape protecting the ends of the replacement cable.
8. Install the terminals of the replacement cable into the connector housings, and then connect the connectors.
9. Either remove the defective cable entirely, or cut the terminals from the ends of the defective cable, and then wrap the ends with tape.

CAUTION: Do not pull a defective cable through an electrical harness (Figure 21).

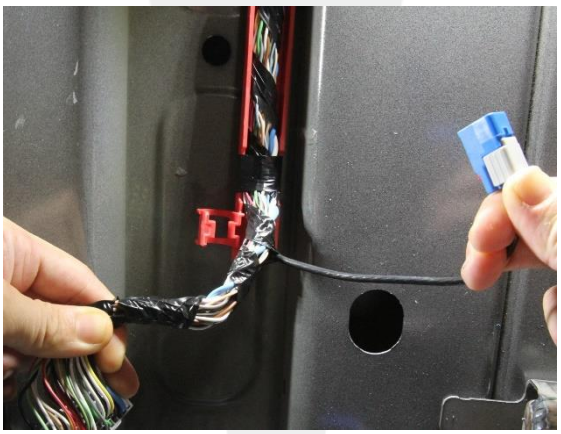

Figure 21

10. Secure the replacement cable to the electrical harness with cable ties or tape wrappings spaced at 150mm to 200mm intervals (Figure 22).

Figure 22

⚠ **CAUTION:** Never tighten a cable tie so tight as to deform the replacement cable (Figure 23).

Figure 23

ⓘ **TIP**: If a cable tie for the replacement cable will overlap an existing cable tie for the electrical harness, consider removing the existing cable tie and bundle the replacement cable and harness together with one cable tie at that location.

10. Fasten clips, close cable ties, and return obstructions to their original positions.

11. Install components that were removed.

General Tips

- A loose cable can become a source of NVH issues. Restrain the replacement cable where NVH issues might occur. Use retaining clips, cable ties, and edge clips as appropriate.

- The replacement cable is of the same length as the defective cable within the electrical harness. Therefore, when laying a replacement cable onto the outside of the harness, the replacement cable might travel a path that is longer than the defective cable inside the harness. In this situation, move the replacement cable to the inside of turns, to shorten the cable path.

- If an overlaid cable causes the electrical harness bundle to be too wide to pass through an opening without rubbing, cut the tape from the bundle at the opening, creating an un-taped area with a width of approximately 100 mm. This makes a break the electrical harness bundle. Press the overlay cable into the bundle at the break, pushing adjacent cables and wires aside. Then wrap the break with tape tightly, keeping the overlay cable in the bundle.

Component Specific Tips and Guidelines

Forward Facing Triple Camera

- This overlay *cannot be performed on Model X* without compromising the fit and finish of the headliner and interior trim. For Model X, replace the entire harness.
- Lower the headliner completely to gain better access to the front of the electrical harness.
- Follow the same cable path turns as the defective cable, do not deviate from the original cable path.

⚠ **CAUTION:** This is especially important when exiting the A-pillar. There is a slight curve at the transition that must be matched (Figure 24).

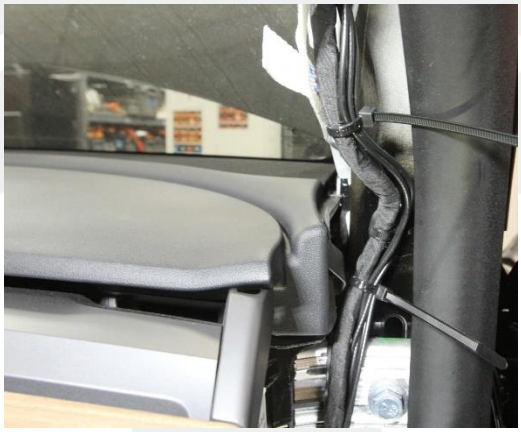

Figure 24

- Take care not to separate the glued electrical harness from the headliner. If separated, re-glue.
- Fasten cable ties at electrical harness splits

Side Repeater and B-Pillar Cameras

- If possible, reuse the corrugated tubing of the defective cable. Wrap the corrugated tubing with harness tape where the replacement cable is exposed to the environment.
- If possible, reuse the retaining clips of the defective cable that are secured to the vehicle body. Remove the defective cable from the retaining clips, and then attach the replacement cable to the clips with harness tape.
- Use cable ties at 150 mm to 200 mm intervals.
- Minimize unrestrained side repeater replacement cable contact with hard parts or body panels to reduce the possibility of NVH issues.
- Make sure to remove the connector housing before moving the replacement cable through the grommet, and make sure that the grommet is properly seated.

Reverse Camera

- The inside of the liftgate/trunk lid has little working space, therefore the liftgate/trunk lid electrical harness must be separated from the liftgate/trunk lid for this overlay.
- Make sure to remove the connector housing before moving the replacement cable through the grommet, and make sure that the grommet is as straight or as flat as possible.
- Make sure that the grommet is properly seated at both the liftgate/trunk lid and the body.