



## **PRT-1553 Installation** **(ZT04-98-001)**

### **Background**

The PRT-1553 is a shielded cable repair kit designed to repair Mil-Std-1553 and other shielded cable which have minor insulation and shield braid damage. These repair kits are not “splice kits” and any cable exhibiting damage that affects primary wire insulation below the shield is not repairable using this kit alone! Never attempt to use this kit to repair cables with damaged primary wires unless an approved primary wire repair device has been installed prior to utilizing this kit. Each PRT-1553 kit contains a length of Z-3250 EMI Shielding Tape and a piece of PRT-ES Tubing. The EMI tape will be utilized to repair the shield damage and the tubing will create an environmentally sealed and electrically insulated repair of the cable jacket.

### **The Problem**

Photograph #1 illustrates a classic example of a shielded electrical cable that has suffered insulation and shield damage. The damage level is severe enough to cause EMI leakage in addition to exposing the shield braid to corrosion. However, the primary wire insulation is still intact and cutting the wire in half to install a wire splice is typically undesirable as this type of repair may affect the wires overall electrical resistance and would create a very stiff area that may lead to future failure. The PRT-1553 kit was developed to create a quick, reliable repair of both the shield and outer jacket insulation that is virtually as good as the original cable. The advantage of using a PRT-1553 kit on minor insulation and shield damage is that it can be installed quickly with minimal harness and connector disassembly and is far more rugged and reliable than a temporary tape wrap repair. A PRT-1553 repaired cable will provide many years of service assuming it's installed correctly.

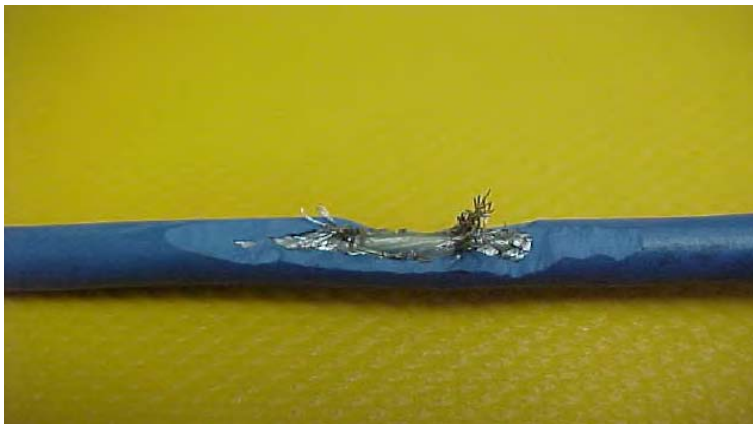


Photo 1: Cable Jacket and Shield braid damage

## Installation

- 1) Measure the outside diameter of the damaged cable at a location away from the defect using a caliper. Use Table 1 and find the measured cable diameter in column 1. Select the correct PRT-1553 repair kit size and part number from column 2.

**Table 1 PRT-1553 Sizing Chart**

<b>Cable Diameter Inches (mm)</b>	<b>PRT-1553 P/N: ZT04-KT-001-(xx)</b>	<b>Cable Diameter Inches (mm)</b>	<b>PRT-1553 P/N: ZT04-KT-001-(xx)</b>
<b>0.075 – 0.125</b> (2 – 3.2)	<b>-01</b>	<b>0.50 – 0.62</b> (13 – 16)	<b>-11</b>
<b>0.126 - 0.174</b> (3.2 – 4.5)	<b>-03</b>	<b>0.63 – 0.74</b> (16 – 19)	<b>-13</b>
<b>0.175 – 0.249</b> (4.5 – 6.3)	<b>-05</b>	<b>0.75 – 0.87</b> (19 – 22)	<b>-15</b>
<b>0.25 - 0.37</b> (6.3 – 9.5)	<b>-07</b>	<b>0.88 – 0.99</b> (22 – 25)	<b>-17</b>
<b>0.38 – 0.49</b> (9.5 – 13)	<b>-09</b>		

- 2) Clean the cable jacket surface around the damaged area and at least 2.0 inches on either side. Use Isopropyl Alcohol (IPA) and a clean cloth to remove all dirt, grease and oil residue from the cable jacket.
- 3) Trim away any loose jacket material as necessary. (Photo 2 & 3)



Photo 2: Typical cable jacket damage.



Photo 3: Damaged insulation removed.

- 4) Determine if the cable damage has caused any broken or severely distorted shield braid strands (Photo 1). If no shield braid damage is evident proceed to step 8. If the shield braid is damaged, carefully inspect the primary wire insulation and determine if it is damaged. If the primary wire insulation is damaged, **STOP!** Primary wire damage is not repairable using this kit alone. If the primary wire insulation is not damaged proceed to Step 5.
- 5) Remove the jacket insulation back 1.0 inches from each side of the central damaged area (Photo 4).
- 6) Fold and dress any broken shield braid strands back over the undamaged braid area. Insure that all broken strands are facing away from the primary wire insulation so they cannot cause a puncture and short circuit. (Photo 5)



Photo 4: Insulation removed around braid damage



Photo 5. Broken shield strands dressed back smoothly.

- 7) Use the piece of Z-3250 Tape supplied in the kit to repair the damaged EMI shield. Peel back the paper release liner from the adhesive side of the Z-3250 Tape approximately 1-inch. Apply the adhesive side of the tape directly to the metal shield braid, beginning where the jacket insulation stops. Spirally wrap the tape over the entire shield braid area using a 50% overlap technique. (Photo 6 & 7)
- 8) Using the PRT-1553 insulation tubing supplied in the kit, wrap the tubing around the cable so the amber colored hot melt adhesive material faces the cable. In all cases, the PRT-1553 tubing should extend beyond the shield repair area by at least 1/2-inch on each end. Peel back the paper release liner covering the adhesive strip on the outside of the tubing about half way. Overlap the tubing so the edge without the adhesive just covers all of the exposed adhesive, but no more! Peel back the remaining release liner and finish sealing the tubing. (Photo 8)

Note:

For small damage areas you can cut the repair tubing and shielding tape to an appropriate length using a pair of scissors. Insure the tubing overlaps each end of the original cable jacket a minimum of 1/2 inch.



Photo 6: Wrap damaged shield braid with Z-3250 Tape.



Photo 7: Finished shield braid repair.

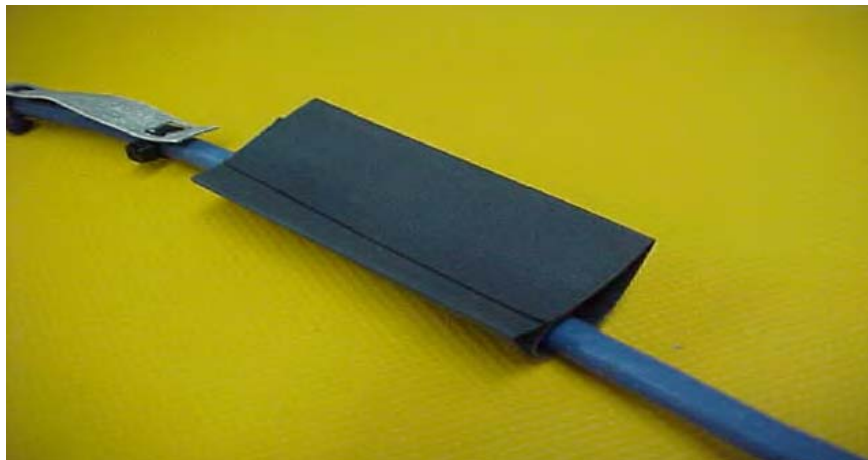


Photo 8: PRT-1553 Tubing sealed around cable

- 9) Center the PRT-1553 tubing over the damaged cable area and orientate so the overlap seam covers the defect area.
- 10) PRT-1553 tubing requires a hot air type of heat gun with a temperature setting of approximately 150-160°C to shrink the tubing and allow the hot melt adhesive to flow. For best results, use a heat gun with a small reducer nozzle that will localize the heat stream. (Photo 9)

**Caution:**

When shrinking PRT-1553 **do not** use a heat reflector designed to spread the heat evenly around the tubing.



Photo 9: Reducer nozzle on heat gun.

- 11) Begin shrinking the PRT-1553 tubing by directing the heat source at the adhesive overlap area near the center of the repair tubing. (Photo 9) Apply heat to the adhesive overlap area only! The overlap area will tend to curl up into a “U” shape as it is heated. Continue applying heat in short bursts to this area until the surrounding tubing begins to pull the “U” shape back down flat. Do not be afraid to apply extra heat to the overlap area, as it will take extra dwell time for the inside layer of the overlap to begin to shrink. Do not be alarmed if the outer layer of the overlap flap tends to lift off the adhesive and curl back slightly during initial heat exposure. With continued heating, this lifted area will generally lay back down on its own, if not, lightly tap the lifted edge as necessary with a wooden Popsicle stick. Do not squeeze the PRT-ES when tapping the lifted lip down. Use extreme caution when touching the tubing as it will be hot and sticky. Shrink the overlap seam area over it’s entire length before attempting to recover the remaining tubing. (Photo 10)



Photo 10: Overlap seams curled up prior to full shrinkage.

- 12) Once the overlap seam area has fully shrunk you may apply heat to any remaining areas of the tubing that have not yet shrunk. Continue to apply heat until the hot melt adhesive begins to ooze out and creates a fillet around the cable circumference at each end. (Photo 11) Heat the remaining tubing slowly and evenly. Too much heat, applied too quickly in one location will cause the hot melt adhesive to expand unevenly and possibly rupture the overlap seam.
- 13) Once complete and while the assembly is just warm to the touch, use your thumb to rub the tubing overlap seam area and remove any exposed closure adhesive. The excess adhesive will ball up ahead of your thumb. Discard any residue.

**Caution:** DO NOT attempt to remove excess adhesive using solvents.

- 14) Allow the assembly to fully cool to room temperature before placing assembly back in service.



Photo 11: Finished PRT-1553 jacket with good adhesive fillet

## Repair Kit Unavailable

If PRT-1553 repair kits are unavailable it is possible to create a similar repair using the materials shown in Table 2. This type of repair is limited to cable diameter larger than 1-inch (25mm). The difference is that the PRT™ Tubing, Z-3250 Tape and Z-Block (135) Tape must be procured separately.

- 1) Use Table 2 to find the measured cable diameter in column 1 and select the sizes of each material listed in columns 2, 3 and 4.
- 2) Prepare the cable as described in the “Standard Installation” steps 1 to 6.
- 3) Cut a strip of Z-3250 Tape from the roll long enough to wrap the shield defect area on the cable using a 50% overlap technique (see “Standard Installation” step 7).
- 4) If necessary, cut the Z-Block hot melt tape (P/N: ZT02-03-002) to the width shown in Table 2 using a pair of scissors. Insure that the paper release liner has been removed from the amber colored hot melt tape prior to wrapping the cable. Helically wrap the tape over the previously installed shielding tape and overlap the original cable jacket a minimum of 1-inch at both ends. Use a soldering iron or the hot tip of the heat gun to melt the last tape wrap so the tape sticks to itself. (Photo 12)

### Caution:

Keep the Z-Block tape wrap buildup to a minimum. Too much tape may cause a seam rupture in the PRT™ Tubing.

- 5) Install the PRT™ tubing around the cable as described in the “Standard Installation” step 8 and follow steps 9 thru 14 to complete the installation.



Photo 12: Z-Block Tape wrapped around cable.

Table 2 Raw Material Part Numbers & Sizes

<b>Cable Diameter</b> inch (mm)	<b>PRT™ Tubing</b> p/n: ZT98-04-016-#	<b>Z-3250 Tape</b> p/n: ZT93-03-003- <sup>*</sup> (width, in.)	<b>Z-Block (135) Tape<sup>1</sup></b> p/n: ZT02-03-002 (width, in.)
1.0 to 1.12 (25 – 29)	#9	1.0	1.0
1.13 to 1.24 (29 - 32)	#10	1.0	1.0
1.25 to 1.37 (32 - 35)	#11	1.0	1.0
1.38 to 1.49 (35 – 38)	#12	1.0	1.0
1.50 to 1.62 (38 – 41)	#13	1.0	2.0
1.63 to 1.74 (41 – 44)	#14	1.0	2.0
1.75 to 1.87 (44 – 48)	#15	1.0	2.0

<sup>1</sup> Z-Block Tape is available in two melt temperature ratings. Z-Block (100) will melt and flow around 110°C while Z-Block (135) flow at around 140°C. Standard PRT-ES materials use the Z-Block (135) material but either can be used and is dependant on operating temperature of the system being repaired. All Z-Block tapes are provided in 2.0 inch wide rolls and may be cut to the desired width using a pair of scissors.

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