DRAGONFLY

Antenna Tying Procedure

Chart, arrow

Description automatically generated

Kyushu Institute of Technology

BIRDS-X project

Revision History

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| --- | --- | --- | --- |
| **Date** | **Revision Number** | **Writer** | **Annotations** |
| 2024//15 | NC | Merisa | Initial Release |
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**Kapton extension**

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| **Step#** | **1** | **Put 200 mm of the back side of Kapton tape on the table and attach it with adhesive tape.** | | | | |
| **Note** | **The first layer of Kapton tape** | | | | | |
| A metal ruler and yellow tape  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| Kapton tape | | 2 |  |
| Adhesive tape | | 2 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **2** | **Put two 350 mm wires in the middle of the Kapton tape.** | | | | |
| **Note** | **Align the wires in the center of the tape. One end is for attaching with the antenna element, and another end is for attaching with antenna deployment.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| Kapton tape | | 2 |  |
| Wire | | 4 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **3** | **Put 300 mm Kapton tape adhesive side over the wires and step 2 Kapton tape.** | | | | |
| **Note** | **The second layer of Kapton tape** | | | | | |
| A person sitting on a chair with a ruler and a long ruler  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| Kapton tape with PE lines | | 2 |  |
| Kapton tape | | 2 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **4** | **Place another 2 layers of 300 mm of adhesive side of Kapton tapes on step 3 Kapton extension.** | | | | |
| **Note** | **There are 4 layers of Kapton tape in this step** | | | | | |
| A ruler and yellow tape on a white surface  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| 2 layers of Kapton tape with wires | | 2 |  |
| Kapton tapes | | 4 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **5** | **Turn the Kapton tape extension upside down and attach the tips with adhesive tape.** | | | | |
| **Note** |  | | | | | |
| A ruler and a long thin line  Description automatically generated with medium confidence | | | Parts | | | |
| Name | | Qty. | Check |
| 4 layers of Kapton tape with wires | | 8 |  |
| Adhesive tape | | 4 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **6** | **Place another 2 layers of 200 mm Kapton tape adhesive side over the Kapton tape extension step 5.** | | | | |
| **Note** |  | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| 4 layers of Kapton tape with wires | | 2 |  |
| Kapton tapes | | 4 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **7** | **Cut off the excess Kapton tape to approximately 3 mm in width with scissors.** | | | | |
| **Note** |  | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| 6 layers of Kapton tape with wires | | 2 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

# Tying procedure

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| **Step#** | **8** | **Attach the nichrome wire to the -Y panel** | | | | | | |
| **Note** | **・ Apply the Loctite** | | | | | | | |
| A computer screen shot of a blue square  Description automatically generatedA computer screen shot of a blue square  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| -Y panel | | | | 1 |  |
| Nichrome wire | | | | 1 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-4 | | 0.176 | 2 |  |
| Nut | SLBNR2 | | - | 2 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **9** | **Fasten the deployment mechanism to the -Y panel** | | | | | | |
| **Note** | **- Adjust the position of the feeding point wire to align with the antenna element holes of the antenna deployment**  **- Apply the Loctite** | | | | | | | |
| A computer screen shot of a blue and grey square  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| -Y panel | | | | 1 |  |
| Deployment mechanism | | | | 1 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 0.176 | 4 |  |
| Nut | KNTR2 | | - | 4 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **10** | **Attach dipole antennas to the deployment mechanism** | | | | | | |
| **Note** | **- Align dipole antennas with the feeding point wire carefully. Make sure they touch perfectly.**  **- Apply the Loctite** | | | | | | | |
| A close-up of a metal object  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| Deployment mechanism | | | | 1 |  |
| Dipole VHF antenna elements | | | | 2 |  |
| Dipole UHF antenna elements | | | | 2 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 0.176 | 8 |  |
| Nuts | M00202000020000000 | | 0.176 | 8 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **11** | **Tie a Kapton tape extension to the end of the VHF antenna. Cover the knot with a small piece of Kapton tape.** | | | | |
| **Note** | **・Cover the edge of the hole through which the wire passes with Kapton.**  **・Pass the wire through the hole at the end of the antenna and tie it by two half-hitches.**  **・Pass another wire through the same hole and tie it with two half-hitches.**  **・Cover knots with Kapton tape** | | | | | |
| A needle with a blue thread  Description automatically generated    A long metal object with a brown handle  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Kapton tape extension | | 1 |  |
| Kapton tape | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **12** | **Fold the antenna along with the deployment mechanism guide.** | | | | |
| **Note** |  | | | | | |
| A person holding a piece of paper  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **13** | **Embed the wires of the Kapton tape extension on the guide position (R0.7) for a heat cutter.** | | | | |
| **Note** | **Trim the excess Kapton tape extension to fit the length with the deployment mechanism.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **14** | **Put the wires of the Kapton tape extension into the hole for the heat cutter area.** | | | | |
| **Note** | **Hold the antennas by a clipper to keep the antennas in place.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **15** | **Using tweezers, pass the wires through the nichrome wire** | | | | |
| **Note** | **Make sure the wires touch the nichrome wire.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
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| **Step#** | **16** | **Make a loop on one of the wires.** | | | | |
| **Note** |  | | | | | |
| A close-up of a antenna panel  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
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| **Step#** | **17** | **Pass the wires through the R0.7 chamfered hole of heat cutter tying area.** | | | | |
| **Note** | **Leave the made loop on the side of heat cutter.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **18** | **Put the end of wire through the made loop and tie it by pushing the end of wire to opposite side of heat cutter.** | | | | |
| **Note** | **- Adjust the position of the knot to the heat cutter side to fold the antenna element tightly**  **- Apply epoxy on the knot** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **19** | **Repeat step 16 to 18 with the other wire.** | | | | |
| **Note** | **- Adjust the position of the knot to the heat cutter side to fold the antenna element tightly**  **- Apply epoxy on the knot** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **20** | **Cut off the excess wires** | | | | |
| **Note** |  | | | | | |
| A blue and white electronic device  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **21** | **Attach the nichrome wire to the +Y panel** | | | | | | |
| **Note** | **・ Apply the Loctite** | | | | | | | |
| A computer screen shot of a blue square  Description automatically generatedA computer screen shot of a blue square  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| +Y panel | | | | 1 |  |
| Nichrome wire | | | | 1 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-4 | | 0.176 | 2 |  |
| Nut | SLBNR2 | | - | 2 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **22** | **Fasten the deployment mechanism to the +Y panel** | | | | | | |
| **Note** | **- Adjust the position of the feeding point wire to align with the antenna element holes of the antenna deployment**  **- Apply the Loctite** | | | | | | | |
| A computer screen shot of a blue and grey square  Description automatically generatedA computer screen shot of a blue and white object  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| +Y panel | | | | 1 |  |
| Deployment mechanism | | | | 1 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 0.176 | 4 |  |
| Nut | KNTR2 | | - | 4 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
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| **Step#** | **23** | **Attach dipole antennas to the deployment mechanism** | | | | | | |
| **Note** | **- Align dipole antennas with the feeding point wire carefully. Make sure they touch perfectly.**  **- Apply the Loctite** | | | | | | | |
| A close-up of a metal object  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| Deployment mechanism | | | | 1 |  |
| Dipole VHF antenna elements | | | | 2 |  |
| Dipole UHF antenna elements | | | | 2 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 0.176 | 8 |  |
| Nuts | M00202000020000000 | | 0.176 | 8 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **24** | **Tie a Kapton tape extension to the end of the VHF antenna. Cover the knot with a small piece of Kapton tape.** | | | | |
| **Note** | **・Cover the edge of the hole through which the wire passes with Kapton.**  **・Pass the wire through the hole at the end of the antenna and tie it by two half-hitches.**  **・Pass another wire through the same hole and tie it with two half-hitches.**  **・Cover knots with Kapton tape** | | | | | |
| Close-up of hands in gloves holding a needle  Description automatically generated  A needle with a blue thread  Description automatically generated    A long metal object with a brown handle  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Kapton tape extension | | 1 |  |
| Kapton tape | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **25** | **Fold the antenna along with the deployment mechanism guide.** | | | | |
| **Note** |  | | | | | |
| A person holding a piece of paper  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **26** | **Embed the wires of the Kapton tape extension on the guide position (R0.7) for a heat cutter.** | | | | |
| **Note** | **Trim the excess Kapton tape extension to fit the length with the deployment mechanism.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
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| **Step#** | **27** | **Put the wires of the Kapton tape extension into the hole for the heat cutter area.** | | | | |
| **Note** | **Hold the antennas by a clipper to keep the antennas in place.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
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| **Step#** | **28** | **Using tweezers, pass the wires through the nichrome wire** | | | | |
| **Note** | **Make sure the wires touch the nichrome wire.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
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| **Step#** | **29** | **Make a loop on one of the wires.** | | | | |
| **Note** |  | | | | | |
| A close-up of a antenna panel  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
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| **Step#** | **30** | **Pass the wires through the R0.7 chamfered hole of heat cutter tying area.** | | | | |
| **Note** | **Leave the made loop on the side of heat cutter.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **31** | **Put the end of wire through the made loop and tie it by pushing the end of wire to opposite side of heat cutter.** | | | | |
| **Note** | **- Adjust the position of the knot to the heat cutter side to fold the antenna element tightly**  **- Apply epoxy on the knot** | | | | | |
| A diagram of a antenna panel  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **32** | **Repeat step 29 to 31 with the other wire.** | | | | |
| **Note** | **- Adjust the position of the knot to the heat cutter side to fold the antenna element tightly**  **- Apply epoxy on the knot** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **33** | **Cut off the excess wires** | | | | |
| **Note** |  | | | | | |
| A blue and white electronic device  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |