



Title of Document:	HANDLING MANUAL	Issue No. CHM-1-151	Rev. 8
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Title subject:	XH Connector	Revision date: February 8, 2023	

This handling manual describes operation points of crimping, assembling, and mounting on PC boards for enhancing further reliability and developing performance of connector's features of XH connector.

C O N T E N T S

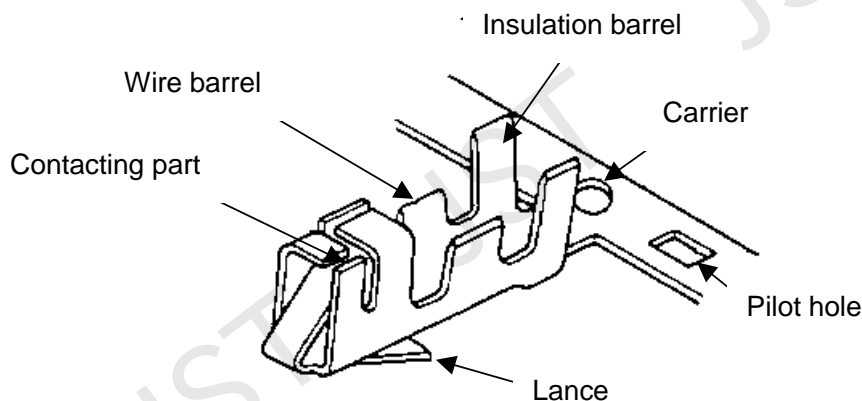
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1. Structure and Name

XH connector consists of the contact, the housing and the header.
On processing and assembling, understand each structure and each part name.

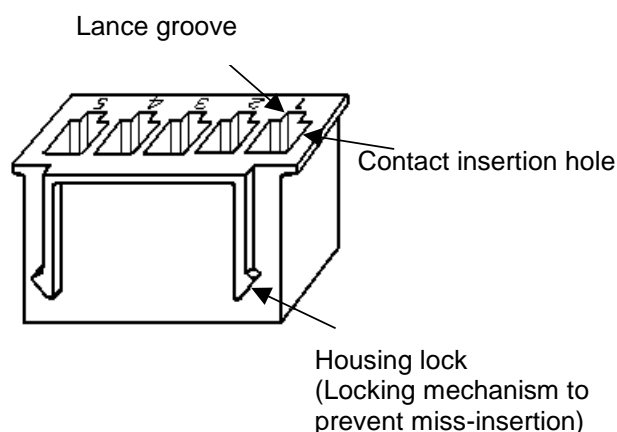
Contact



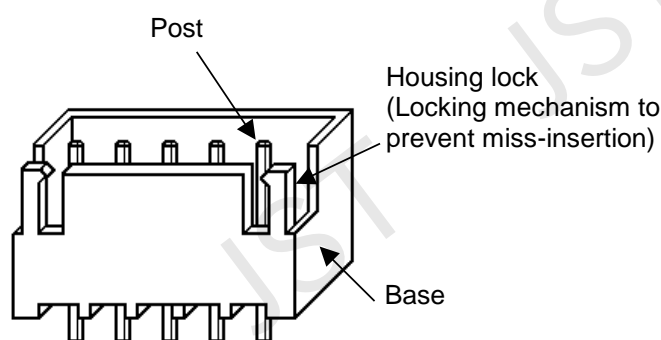
Functions of the contact each part

- (1) It holds wire insulation.
- (2) It crimps wire conductors.
- (3) It holds the housing to the contact.
- (4) Contacting part with header

Housing



Header (Top entry type)



2. Part Name and Model Number

Part name			Model No.
Contact	001 type	Phosphor bronze	SXH-001T-P0.6
	002 type	Phosphor bronze	SXH-002T-P0.6
Housing			XHP-*
Header	Top entry type		B*B-XH-A (LF)(SN)
	Side entry type		S*B-XH-A (LF)(SN)
			S*B-XH-A-1 (LF)(SN)

Note₁: Figures in (*) denote the circuit number.

Note₂: Identification marking "(LF)(SN)" stands for lead-free product.

"(LF)(SN)" shall be displayed on product label.

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3. Storage

3-1 Storing the connector

Recommended storage condition: Temperature: 5 – 35 °C, Relative humidity 60 % or less
(Under packaging like the state of JST shipment)

Keep off direct sunlight, places exposing to such corrosive gas as industrial gas (generate from a stove and whatnot) and ammonia gas (generate from a toilet and whatnot) and dusty place.
Also, keep the storage room from condensation.

Note that the resin molding part may break due to transportation and handling, such as processing and mating, under dry or low temperature condition.

After unpacking, return the products in the original package to store.

3-2 Storing the crimped contacts

Not leaving the crimped contact to stand in a place exposed to high humidity and direct sunshine, and not placing them directly on the ground, keep them in a clean storage room.

4. Applicable Wire

Contact	SXH-001T-P0.6 (001 type)	SXH-002T-P0.6 (002 type)
Wire size	AWG #28 ~ #22	AWG #30 ~ #26
Insulation outer diameter	φ0.9 ~ φ1.9 mm	φ0.9 ~ φ1.3 mm
Conductor spec.	Annealed copper stranded tin-plated wire	

Note₃: Special wires such as solid wire, tin-coated wire, shielded wire and without plating wire cannot be used in principle. When using such special wires, contact JST.

Regarding shielded wire, refer to item 7-5 "Handling method of special wires."

Note₄: As the applicator dies of the contact 001 type and 002 type are different, check the model number and conduct the crimping operation.

5. Crimping Tool

Part name		Model No.
Semi-automatic press		AP-K2()
Applicator		MKS-L
Die	001 type	MK/SXH-001-06
	002 type	MK/SXH-002-06
Applicator with die	001 type	APLMK SXH001-06
	002 type	APLMK SXH002-06

Note₅: When crimping operation is conducted by using other than above applicator and die set, JST cannot guarantee the performance of connector.

6. Applicable PC Board

6-1 Applicable PC board thickness

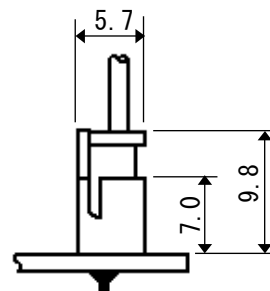
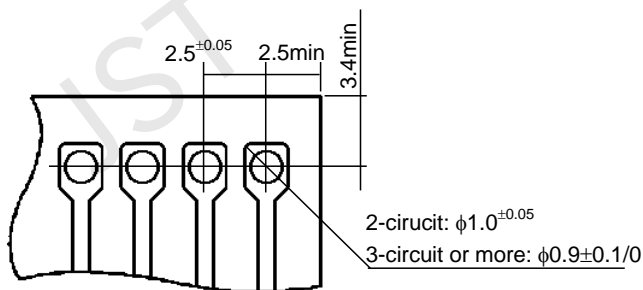
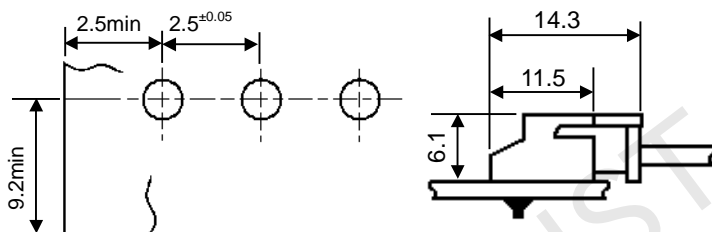
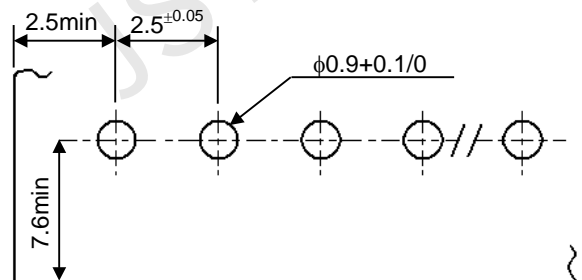
1.6 mm

6-2 PC board layout and assembly layout

Refer to the following figure for PC board layout. Tolerances for PC board are non-cumulative ± 0.05 mm for all centers.

Note₆: The dimensions above should serve as a guideline for drilling.

Take into consideration for the applicable PC board hole diameters because they differ according to piercing method and PC board material.

Top entry type**Side entry type**S*B-XH-A (LF)(SN)S*B-XH-A-1 (LF)(SN)

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7. Crimping Operation

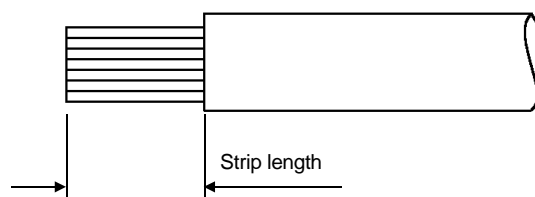
7-1 Wire strip

Check the following points for correct crimping in stripping wires.

- Check that conductors are free from biting of strip blade and the like or wire breakage.
- Check that the tip of conductors is arranged.
- Check that conductors do not become loosen.
- Check that conductors are free from foreign matters and the like.
- Check that insulation is cut at almost right angle to conductors.

As wire strip length differs depending on type of wire and crimping method, decide the best wire strip length considering processing condition.

Reference value of wire strip length: 2.1 – 2.6 mm



Note₇: Do not leave such a stripped wire for a long time in order to prevent the oxidation of the conductor surface, since such oxidation may lead to the fluctuation of the contact resistance.

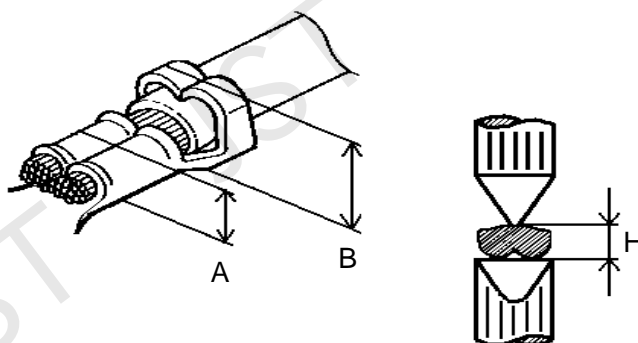
7-2 Crimping

Check the following items for correct crimping.

7-2-1 Crimp height

Measurement of crimp height

Measure the crimp height at the center of the barrel using a specified micrometer as shown in the figure below.



Measurement timing of crimp height

Check that proper crimping operation is conducted in the following timing.

- When operation starts at morning and afternoon.
- When operation finishes.
- When contact reel is exchanged.
- When crimping applicator is adjusted.
- When wire lot is changed.
- When crimping dies are exchanged.

Measurement items of crimp height

Wire barrel part (conductor part)

The crimp height at the wire barrel (conductor part) should be set to the pre-determined dimensions.

Table of crimp height: SXH-001T-P0.6 (001 type)

Wire size	Insulation O. D. (mm)	Crimp height (mm)	
		Conductor part	Insulation part (Ref. value)
UL1007 AWG #28	1.2	0.60 ~ 0.65 (Target: 0.62)	1.9 ~ 2.0
UL1007 AWG #26	1.3	0.65 ± 0.05	1.9 ~ 2.0
UL1007 AWG #24	1.5	0.70 ± 0.05	2.1
UL1007 AWG #22	1.6	0.75 ± 0.05	2.2

Table of crimp height: SXH-002T-P0.6 (002 type)

Wire size	Insulation O. D. (mm)	Crimp height (mm)	
		Conductor part	Insulation part (Ref. value)
UL1007 AWG #30	1.1	0.57 ~ 0.62	1.8
UL1007 AWG #28	1.2	0.60 ~ 0.65 (Target: 0.62)	1.9
UL1007 AWG #26	1.3	0.62 ~ 0.67 (Target: 0.64)	1.9

Insulation barrel part (insulation part)

Adjust and set the crimp height at the insulation barrel part (insulation part) as per finished outer diameter and kind of wire so that wire insulation does not come off the contact easily and is not crimped excessively.

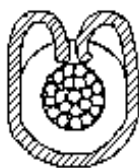
Crimping condition at wire insulation barrel

AWG#22 ~ 24 (UL1007 type)

○ Good

× Excessive crimping

× Insufficient crimping



AWG#26 ~ 30 (UL1007 type)

○ Good

× Excessive crimping

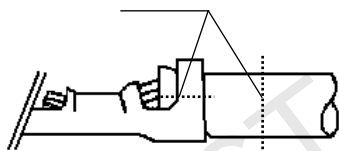
× Insufficient crimping



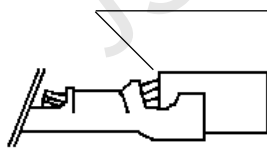
Checks of crimping condition at wire insulation barrel

Cut only the wire insulation barrel, remove the wire insulation and check if the wire conductors are not damaged.

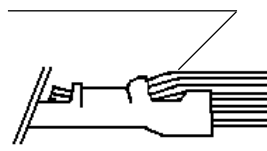
Cut the insulation barrel



Remove the wire insulation.



Check no damage



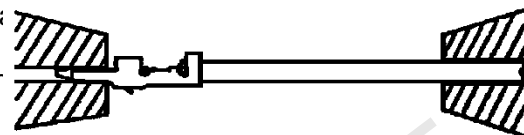
7-3 Tensile strength at crimped part

Measurement method

Pulling load shall be applied between a correctly crimped contact and the wire at a constant speed.

The load to pull the wire out of the contact or break the wire shall be measured.

(Testing speed: 25 mm/min.)

Measurement timing of crimp height

Check that proper crimping operation is conducted in the following timing.

- When operation starts at morning and afternoon.
- When operation finishes.
- When contact reel is exchanged.
- When crimping applicator is adjusted.
- When wire lot is changed.
- When crimping dies are exchanged

Table of tensile strength at crimped part

Wire size	Requirement N min.	Actual value (Reference value) N
UL1007 AWG #30	7.8	14.7 ~ 19.6
UL1007 AWG #28	9.8	19.6 ~ 29.4
UL1007 AWG #26	19.6	39.2 ~ 49.0
UL1007 AWG #24	29.4	58.8 ~ 68.6
UL1007 AWG #22	39.2	68.6 ~ 88.2

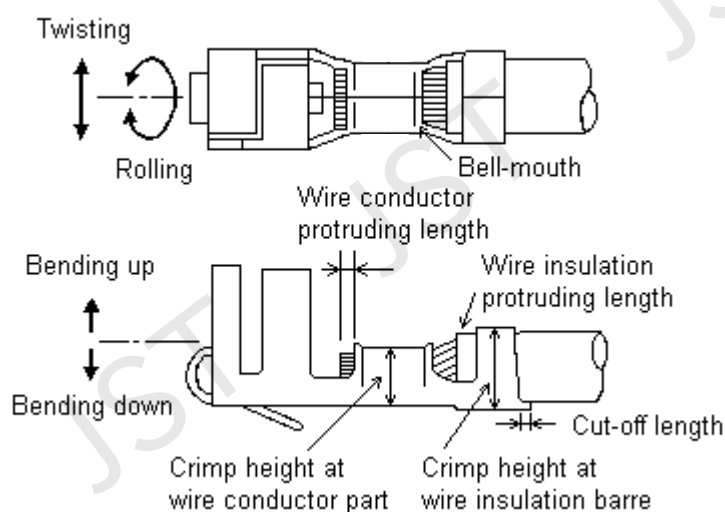
Note₈: The tensile strength may be different even in the same wire size due to the difference in strength of wire itself.

If you compare the value with the normal tensile strength (measured values) and find large differences, it sometimes is defective, so please check it.

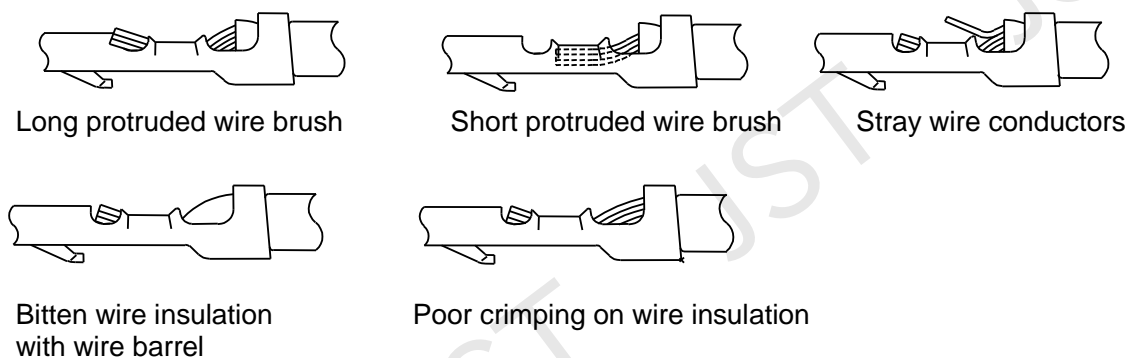
7-4 Crimping appearance

Check the crimping appearance visually for correct crimping with equipment such as a loupe.

Part name of crimped contact



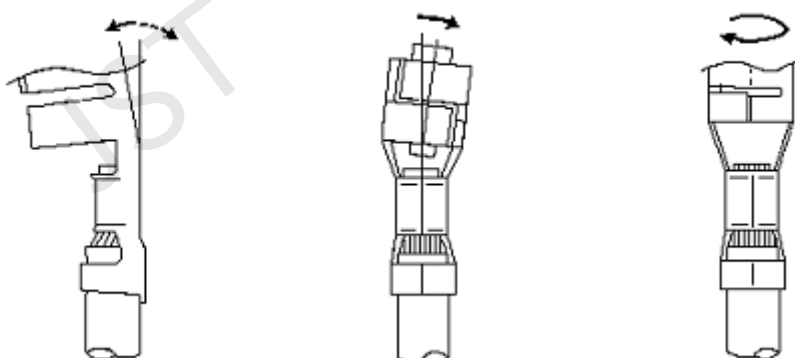
Item	Reference value
Bending up	Approx.3° max.
Bending down	Approx.3° max.
Twisting	Approx.4° max.
Rolling	Approx.5° max.
Bell-mouth	Approx.0.1 ~ 0.4 mm
Cut-off length	Approx.0 ~ 0.3 mm
Protruded wire brush length	Approx.0.3 ~ 0.8 mm
Crimp width of standard wire barrel	(1.5mm)

Examples of defective crimpingBending up, bending down, twisting and rolling

Bending up/down

Twisting

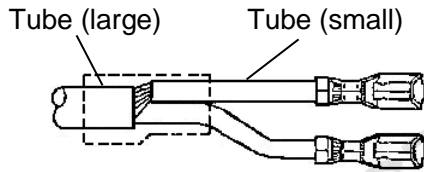
Rolling

***Bending up/down, twisting and rolling**

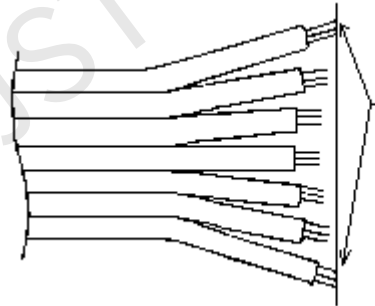
Note that bending up/down, twisting and rolling may lead to deterioration of the contact insertion and the contact retention force as well as poor crimping.

7-5 Handling method of special wires

Split length of core wire and braided shielding wires



Split length of flat-ribbon cables



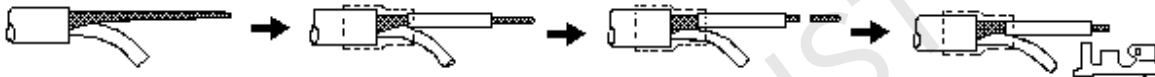
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ones.

The processing shown above is necessary for special wires when the contact is inserted into the housing to ensure good insertion and to prevent the deformation and wire cutting in inserting the contact. After inserting the contact into the housing, adjust the split length of the braided shielding wire and flat-ribbon cable so that tension do not apply to the smaller size wire for braided shielding wires, and so that tension is not applied to the both sides only for flat-ribbon cables.

Crimping of braided shielding wires

After slightly twisting the braided shielding wires, trim the tip with a nipper to arrange and crimp the contact. If the tip is not arranged, the contact may not be crimped properly. When the conductor cross-sectional area of the braided shielding wire is over that of the applicable wire range, adjust the cross-sectional area so that it conforms to the crimp height of the applicable range, and do crimping operation.

The insulation outer diameter of the tube should conform to the one applicable to the contact.



7-6 Precautions for the handling of the crimped contact

As the crimped contact before inserting into the housing is exposed, it is easy to be deformed by an external force. Pay careful attention to the following 2 points for the handling:

- ① Protect the contacts by wrapping with paper to prevent from the deformation and the adhesion of foreign substances, and keep them in an adequate box.
- ② Do not stack too much quantity of the crimped contacts nor place anything on them, because the weight of themselves may cause deformation of the contact and troubles such as defective contacting.

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8. Harness Assembly Operation

Harness assembly operation is a very important process to decide the connector's performance and the harness quality. Careful operation is required for the harness assembly as well as the said crimping operation.

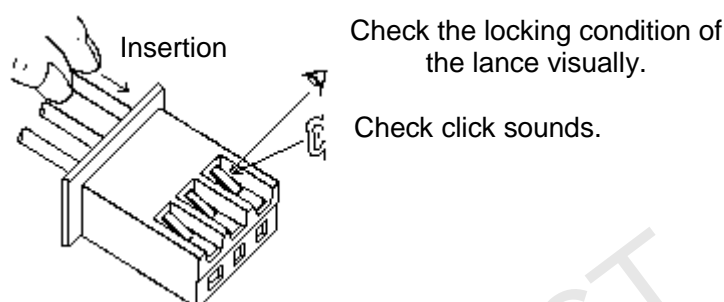
8-1 Before inserting the crimped contact into the housing

Before inserting the contact into the housing, check the following points:

- ① Do not place other things on or near working table and do not conduct any other works on the same working table to prevent from operation mistake.
- ② Do not use the contact that is improperly crimped and deformed (such as at the lance and the PC board insertion part).

8-2 Inserting the contact into the housing

- ① Hold the contact with its lance part up, and align the contact lance guide of the housing with the contact lance, and then, insert the contact parallel to the insertion axis.



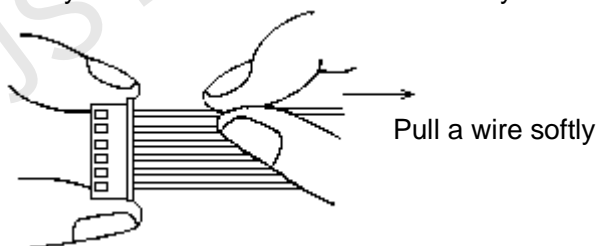
Precautions for inserting the contact

Do not tilt the contact to the direction that the contact lance is pushed or insert the contact prying up and down or right and left, because such handling may deform the contact lance and the mating part.

- ② Insert the contact into the housing without stopping to the innermost. When the contact is fully inserted into the housing, the housing lance clicks and there is feeling of response.

8-3 Check after inserting crimped contact into housing

Check secure locking per each insertion by pulling a wire softly with a force of approx. 3N. Besides, check visually that each contact lance is securely locked to the housing lance.



Note₉: When wires are pulled with too much force, the contact lance may be deformed, and the contact may come off the housing.

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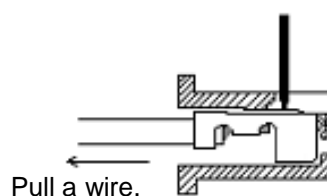
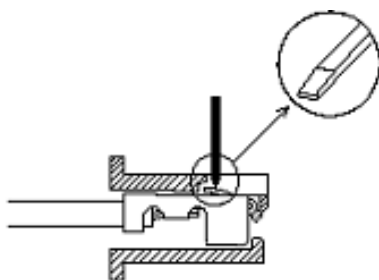
8-4 How to extract the crimped contact from the housing in case of mis-insertion

When the contact is inserted into an improper circuit hole, conduct the following points:

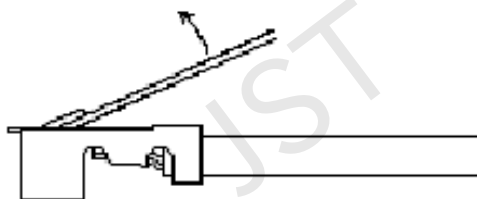
- ① Do not reuse the housing that the contact was extracted once but use a new one.
(The method to extract the contact from the housing is as below.)
- ② When the contact that is inserted into an improper circuit is extracted from the housing
 - Only a specified person conducts the operation.
 - The reuse should be once and replace it with the new contact after the twice.
 - The contact lance should be pushed up to the original position.
 - After the repair, be sure to check the inserted contact as shown in item 8-3.
If it comes off the housing, use the new one.

How to extract the crimped contact from the housing

- ① Push the contact lance with the extraction tool, XJ-06.
- ② Pull out a wire with pushing the contact lance.



- Precautions for reusing the mis-inserted contact
Insert a sharp-pointed tool like a cutter blade to raise the contact lance.
At this time, raise it up to the same height as the lance height of the unused contact which is not inserted into the housing.



Note₁₀: Do not raise the lance excessively.

Also, when you want to use something like a needle to raise it, handle with care because such a tool may insert into the extraction hole of the lance, and the curl part sometimes is deformed.

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9. Inspection of Finished Product (Continuity Check)

9-1 Simple wiring inspection using a tester

- ① Do not insert a tester stick into the mating part.
The inadequate diameter and the prying operation of the tester stick may deform the mating part.
- ② Contact the tester stick with the wire insulation side by inserting it from the entrance of the contact, and do the inspection.

9-2 Wiring inspection using an inspection jig

Note the following points:

- ① Use the header applicable to the connector for inspection.
Do not remove the housing wall of the header. (Allowed for the locking part only)
If removed, the contact may be pried easily during the inspection, possibly leading to poor contact.
- ② Use the header free from deformation, damage and stains. If found, replace it with a new one. The periodical replacement of the header should be conducted as well.
- ③ Mate and unmate the connector with care, holding the housing without prying.
When the inspection board is used, design it considering that the mating and unmating operation is not difficult.
- ④ Do not touch the inspection pin with the lance part, because the contact lance consists of a spring.
Deformation on the curl part and the lance part may cause the disconnection of the contact.

10. Header

10-1 Soldering

- ① Floating from PC boards
The header of the XH connector has the retention mechanism not to separate from a PC board in inserting.
However, when the header floats due to such an external factor as force and vibration, push the header softly so that the bottom of the header closely touches the PC board surface, and then, solder the connector.
- ② Flux
Use rosin type flux.
As inorganic flux may corrode the header housing, do not use it.
- ③ Dip soldering
Do soldering at the temperature range of 245°C ~ 260°C within 3 to 5 seconds.
- ④ Soldering by hand and soldering repair
When soldering or soldering repair for bridge is conducted with a soldering iron, note the following points, because the header housing may deteriorate due to heating.

Soldering iron:	Use a soldering iron with small heat capacity (40W max.).
Soldering time:	Do soldering quickly within 3 seconds.
Soldering method:	Do not apply external force by such an operation as pushing the header post with the tip of the soldering iron during soldering.

- ⑤ Cleaning operation
In normal flux cleaning, the cleaning solvent does not affect the header of the XH connector.
However, when polluted cleaning solvent by flux is left on the header, note that poor contact and other defects may be caused.

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11. Handling Precautions

- ① Do not stain the contact with household goods such as oils, detergent, seasoning and fruit juice.
If stained, never use the stained contact.
- ② When the harness product is mated and unmated with the counterpart one mounted on a PC board, do the operation with holding the housing main body.
When it is difficult to hold the housing main body due to connector's connecting and mounting condition, support it by your finger and hold all wires to give an even load to them.
(Note that the mating and unmating operation with applying a load to some wires only may cause breakage of the connector.)