Title of Document: **HANDLING MANUAL**	Issue No. CHM-1-082	Rev. 3
Customer:	Issue date: January 25, 1993	
Title subject: BL Connector (ST Type)	Revision date: May 15, 2023	

BL connector is the connector for short-circuit connection, considering the productivity as a substitute for 2-wire crimping.
This handling manual describes operation points of crimping, handling, etc. for good understanding about the function and the performance of BL connector.
Please read it through before using this connector.

C O N T E N T S

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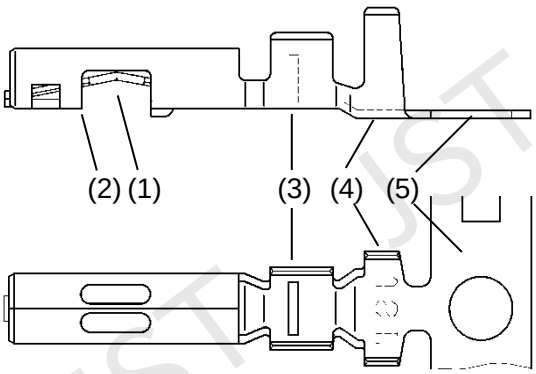
1. Structure and Name

BL connector consists of the socket contact and the housing where the contact is inserted in advance. The retainer is also available if necessary.

1-1 Socket contact



(1) Mating part: It mates with the pin contact.

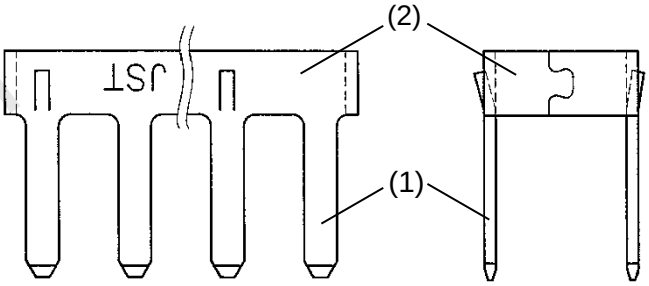
(2) Housing lance hooking part: It hooks the housing lance.

(3) Wire barrel: Crimping part of wire conductor

(4) Wire insulation barrel: It holds wire insulation.

(5) Strip carrier: It is the contact carrier.

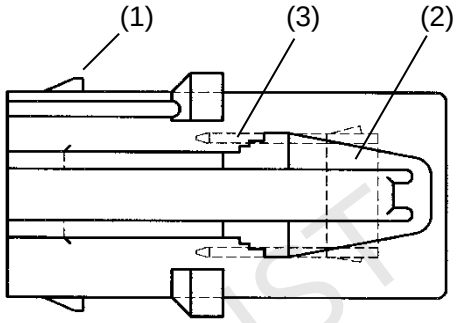
1-2 Tab contact (It has been inserted in the housing in advance.)



(1) Mating part: It mates with the socket contact. (Electrically contacting part)

(2) Short-circuit part: It short-circuits each tab.

1-3 Housing

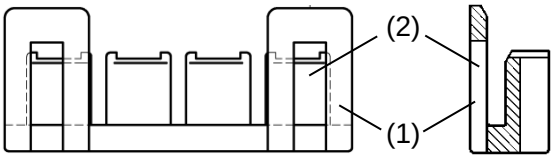


(1) Retainer lock receiving part: It locks the retainer.

(2) Panel lock: It fixes the receptacle housing to a panel.

(3): Tab contact (inserted in advance): It mates with the socket contact.

1-4 Retainer



(1) Retainer lock: It locks the retainer in the housing.

(2): Comb: It pushes the contact into the housing.

2. Model Number

(1) Socket contact

S S F - 2 1 T - P 1.4

- Configuration of contact
  - S: Chain terminal
  - B: Loose piece terminal
- S of SL connector
- Mating part is female type (Initial of female)
- Barrel size (Applicable wire range)
- T of tin-plated
- Mating part width of applicable pin contact

(2) Assembled housing with tab contact

B L - ** V S T

- BL connect
- Circuit No. in two-digits (e.g.: 8 circuits……08, 12 circuits……12)
- Auxiliary symbol
- Assembled connector (Identification No.)

(3) Retainer

H L S - ** V

- HL connector
- Retainer
- Auxiliary symbol
- Circuit No. in two-digits (e.g.: 8 circuit……08)

3. Storage

3-1 Storing the connectors

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.

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

4-1 Applicable wire per barrel size

Item		SSF-01T-P1.4	SSF-21T-P1.4
Applicable wire	Wire size (Cross section)	AWG#26 - #20 ($0.13mm^2$ - $0.5mm^2$)	AWG #22 - #18 ($0.3mm^2$ - $0.75mm^2$)
	Insulation O.D.	ϕ1.3 - ϕ2.2	ϕ1.5 - ϕ2.2

$Note_1$: The kind of wire conductors shall be annealed copper wires with tin plating.
$Note_2$: The thickness of the applicable panel is 0.7 mm – 2.0 mm.

4-2 Precautions

Special wires such as solid wire, tin-coated wire, shielded wire other than the above wires cannot be used in principle.
When using such special wires, contact JST in advance about the applicability.

5. Crimping Tool

Model number	Press	Applicator	Dies	Applicator with dies
SSF-01T-P1.4	AP-K2( )	MKS-L	MK/SSF/M-01-14	APLMK SSF/M01-14
SSF-21T-P1.4			MK/SSF/M-21-14	APLMK SSF/M21-14

$Note_3$: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the performance of the connector.

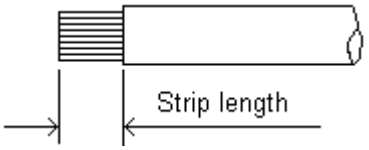
6. Crimping Operation

Use the proper applicator and properly adjust the crimp height of the crimping dies before the crimping operation so that the specified tensile strength can be obtained.

6-1 Wire strip length

When a wire is stripped, do not damage or cut off the wire conductors. As the wire strip length depends on type of wire and crimping method, decide the best wire strip length considering the processing condition.

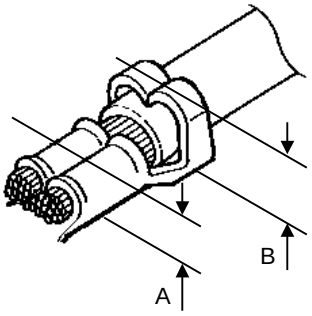
Contact	Strip length (mm)
SSF-01T-P1.4	2.9 – 3.4
SSF-21T-P1.4	3.0 – 3.5

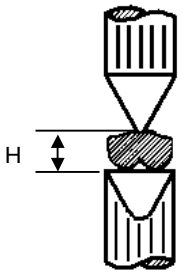


6-2 Crimping

6-2-1 Measurement of crimp height

According to a wire to be used, adjust the dials of the applicator to a proper crimp height.



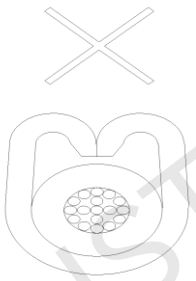


A: The crimp height at the wire barrel should be set to the pre-determined dimensions.

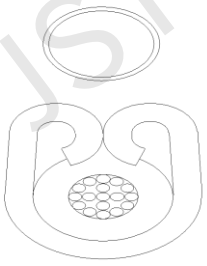
B: Adjust the crimp height at the wire insulation barrel to the extent that the wire insulation is slightly pressed, and set it so that crimping is not excessively.

H: Measure the crimp height at the center of the barrel using a specified micrometer.

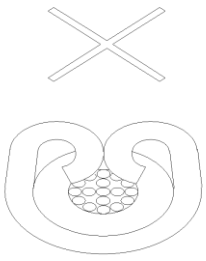
Crimping condition at the wire insulation barrel



Insufficient crimping
(pressed weak)
When tension applies to the wire, the wire insulation easily comes off the contact.



Good



Excessive crimping
(pressed excessively)
The barrel bites the wire, which may damage the wire conductors.

6-2-2 Check of crimping condition at the wire insulation barrel

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

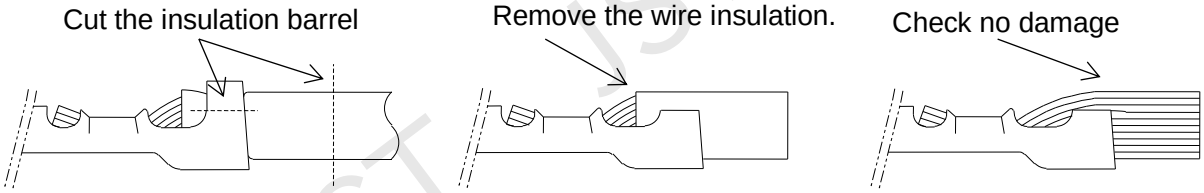


Table of Crimp height

Contact	Wire size	Crimp height (mm) (Crimp height at insulation part) (Note$_4$
SSF-01T-P1.4	AWG#26	0.80 ± 0.05 (1.9)
	AWG#24	0.80 ± 0.05 (2.0)
	AWG#22	0.85 ± 0.05 (2.0)
	AWG#20	0.95 ± 0.05 (2.0)
SSF-21T-P1.4	AWG#22	0.90 ± 0.05 (1.9)
	AWG#20	1.00 ± 0.05 (2.0)
	AWG#18	1.10 ± 0.05 (2.1)

Note$_4$: The crimp height at the insulation part is a reference value when wires of UL1007 are used. As the crimping condition varies depending on wire outer diameter and material, set the crimp height at the insulation part in line with the confirmation method shown above.

6-3 Tensile strength at crimped part

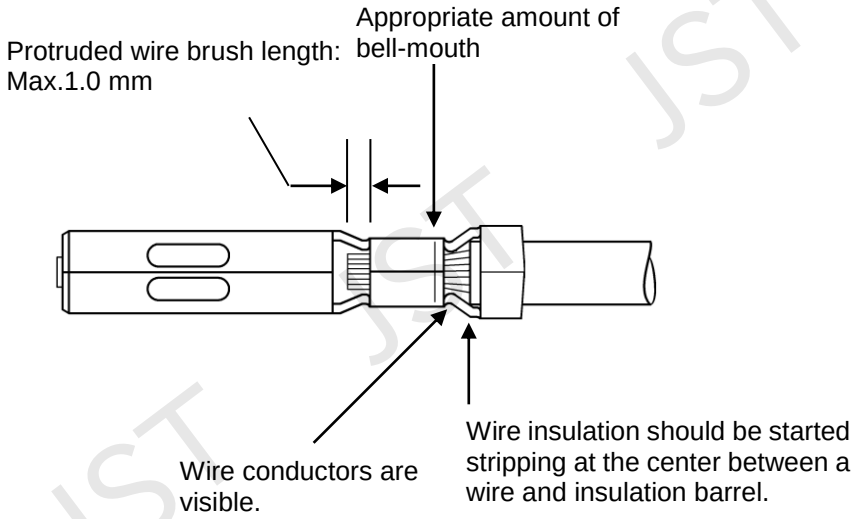
After adjusting the crimp height, check the tensile strength using the test samples, and then, start continuous crimping operation. In case the tensile strength greatly differs from the normal tensile strength (actual value), check if there is a defect. The actual value may be different depending on the difference in wire strength even if wire size is same.

Table of tensile strength at crimped part

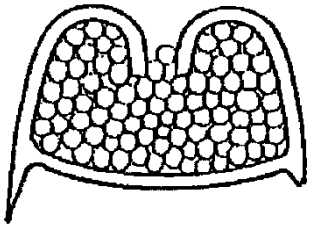
Contact	Wire size		Actual value [N]	Requirement of tensile strength [N]
SSF-01T-P1.4	AWG#26	0.13mm^2	31.4 - 41.2	19.6 min.
	AWG#24	0.2 mm^2	53.9 - 58.8	29.4 min.
	AWG#22	0.3 mm^2	87.2 - 90.2	44.1 min.
	AWG#20	0.5 mm^2	133 - 137	63.7 min.
SSF-21T-P1.4	AWG#22	0.3 mm^2	76.4 - 84.3	44.1 min.
	AWG#20	0.5 mm^2	119 - 125	63.7 min.
	AWG#18	0.75mm^2	180 - 192	78.4 min.

6-4 Crimping appearance

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

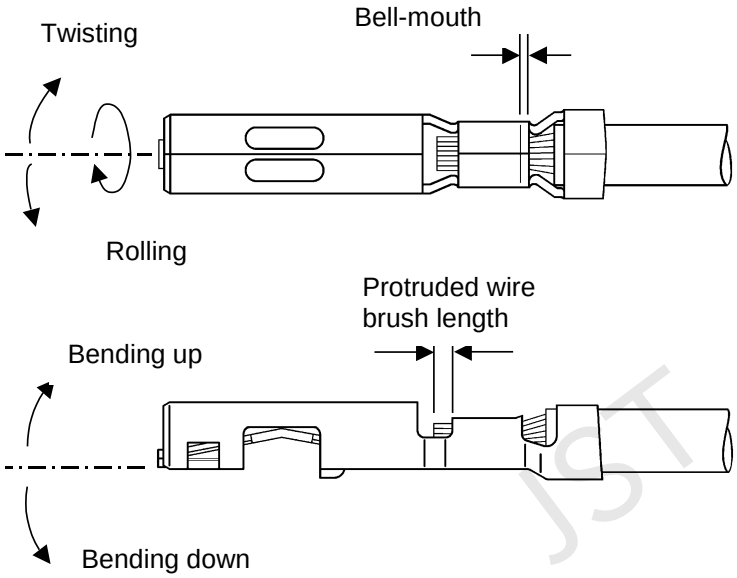


No opening is made.
(Wire must not be visible.)



No large burr is made.

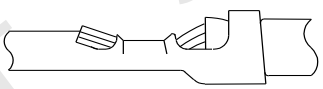
① Part name of crimped contact



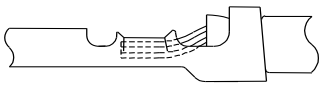
Item	Ref. value
Bending up	Approx. 2° max.
Bending down	Approx. 3° max.
Twisting	Approx. 3° max.
Rolling	Approx. 3° max.
Bell-mouth	Approx. 0.1 ~ 0.4 mm
Protruded wire brush length	Approx. 0.5 ~ 1.0 mm

② Bending up, bending down, twisting and rolling
Note that bending up/down, twisting and rolling may cause the difficulty in the insertion of the contact into the housing, the deterioration in the contact retention force and poor mating.

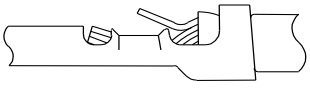
③ Examples of defective crimping



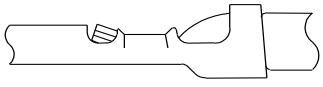
Long protruded wire brush



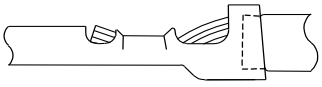
Short protruded wire brush



Stray wire conductors



Wire barrel bitten with wire insulation



Short protruded wire insulation

6-5 Precautions for the handling of the crimped contact

As the crimped contact before inserting into the housing is subject to the deformation, etc. by external forces, pay careful attention to the following 4 points for the handling:

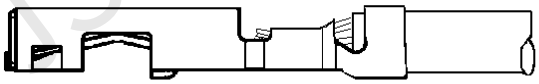
① Pay attention not to deform the crimped contact or adhere foreign substances on it. When bundling, limit the number of the quantities not to deform and protect the contact part.

② Do not stack too much quantity of the crimped contacts nor place anything on them, because the weight of themselves may deform the contact and troubles such as defective contacting.

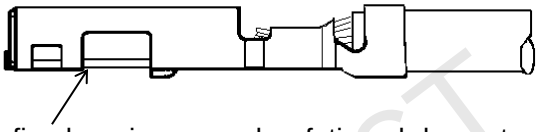
③ When the crimped contact is taken out of the bundle, do not pull a wire as much as possible but hold the wire near the crimped section and take it out.

④ Handle the socket contact with care because applying an external load to the mating part may cause deformation including fatigue on the unfixed spring of the socket contact.

○: Normal socket contact



×: Abnormal socket contact



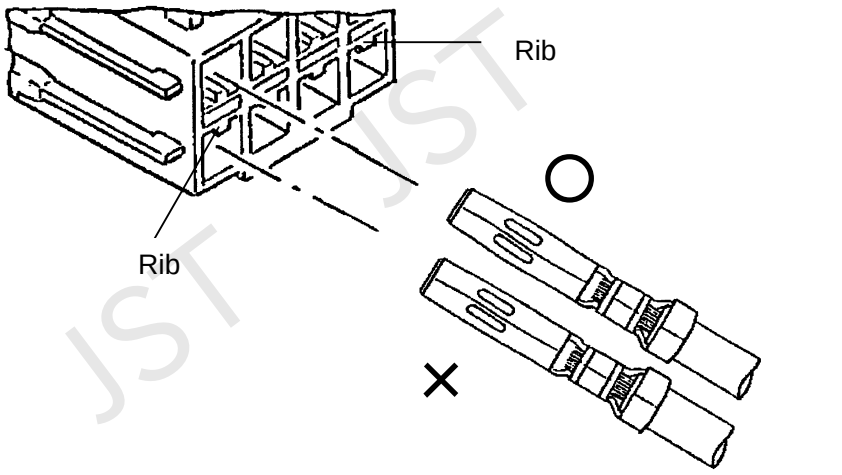
Unfixed spring may be fatigued by external load.

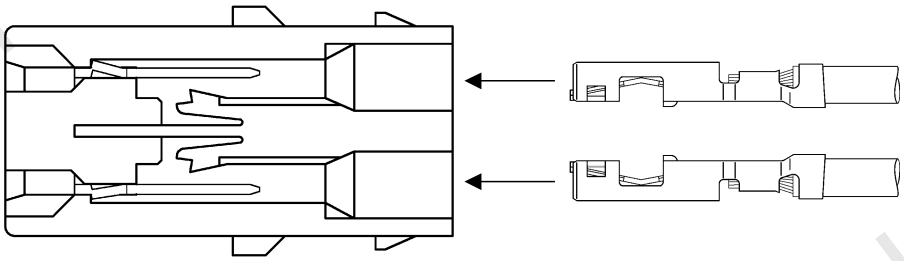
7. Connector Assembly

7-1 Inserting the contact in the housing

When the crimped contact is inserted into the housing, note that BL connector has orientation.

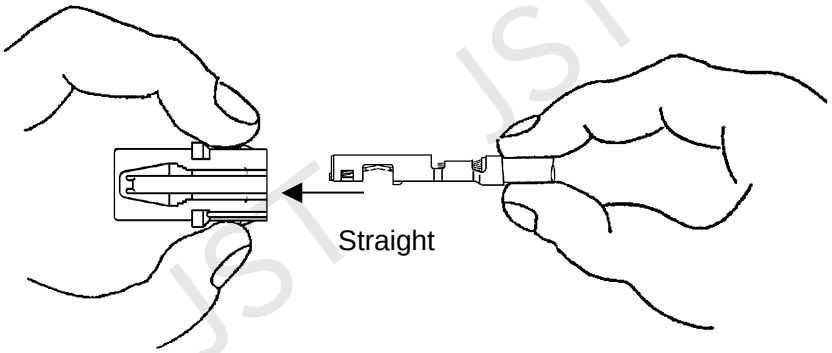
Insert the crimped contact so that the back of the contact turns to the ribbed side (showing circuit numbers) of the housing as below.





7-2 Points in inserting the crimped contact into the housing

① Insert the crimped contact parallel to the housing without prying or stopping.

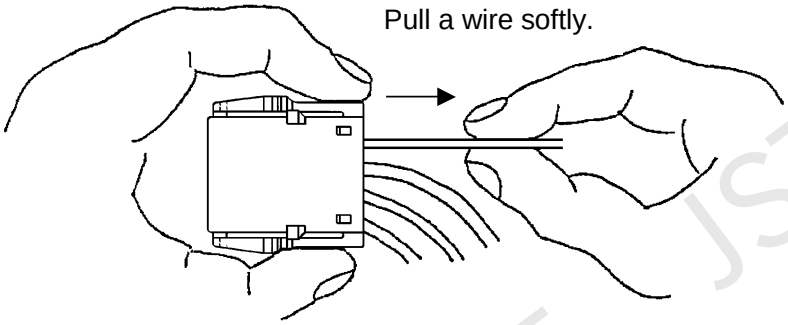


② When the insertion is difficult, do not insert it forcibly but check the insertion direction and no abnormalities on the contact and the housing.

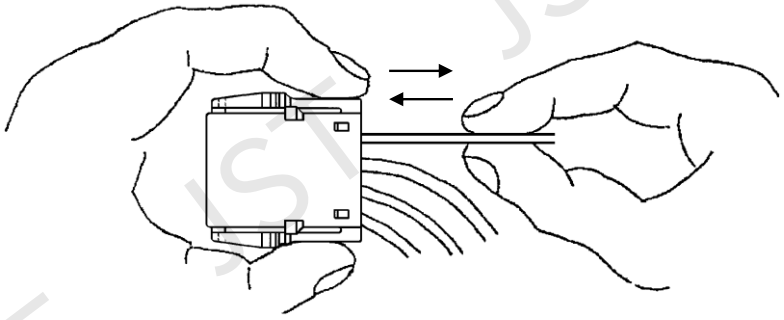
7-3 Checks when inserting the crimped contact into the housing

Check secure locking per each insertion whether the contact is inserted into the housing or not.

Method 1: Pull a wire with a force of approx. 10N which is gently pulled by thumb and forefinger and check secure locking of the contact into the housing.



Method 2: Push and pull the inserted wire in back-and-forth direction to find a backlash of the contact inside the housing.



Feeling looseness: Good

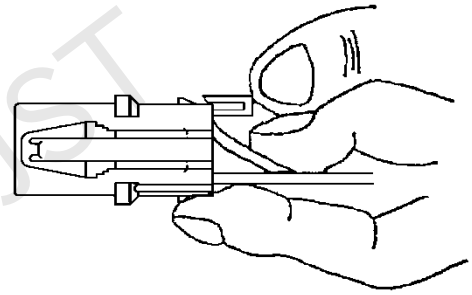
Disconnection of wire: Defective

Note$_5$: When such an abnormality as poor crimping or deformation is found on the contact in inserting the contact, do not use it.

7-4 Inserting the retainer

① Insert the retainer after all the contacts are completely inserted into the housing.
<u>After inserting the retainer, the contact cannot be inserted anymore.</u>

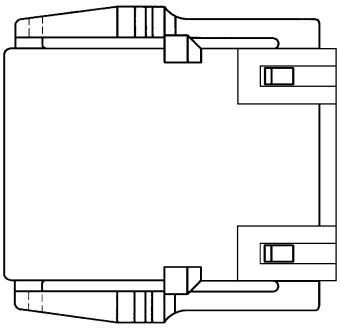
② Insertion method
Face the comb of the retainer toward the wire side and push it without stopping until being locked.
When locked, you can hear a click.



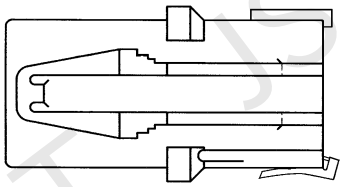
Make the housing and the retainer parallel and insert the retainer while pushing both the right and left ends without stopping to fasten the both locks simultaneously.

③ Check after inserting the retainer

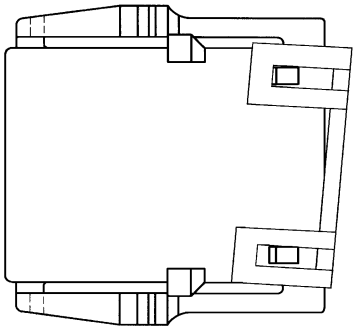
Check visually that the retainer lock is firmly inserted at both sides and the back and forth of the housing.



Assembly layout



The retainer floats without being locked.



Only one side is locked.

8. How to Extract Crimped Contact from Housing in Case of Mis-insertion

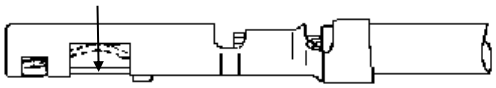
When the crimped contact is inserted into an improper circuit hole, conduct the following points:

① Do not reuse the once used housing and contact but use the new one in principle.
(The method of extracting the contact from the housing is as below.)

② When the inserted contact in an improper circuit is extracted from housing and the contact is reused for some reasons.

- Only a specified person extracts the contact.
- In case the contact and the housing are reused, the reuse should be once.
  From twice, use the new contact and housing.
- Check that the extracted contact is free from deformation, and reuse it (once).
  If such an abnormality as deformation is found on it, replace it with the new contact.

Fatigue on the spring of the mating part

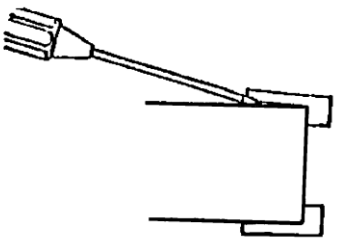


Example: Deformation on the mating part of the socket contact

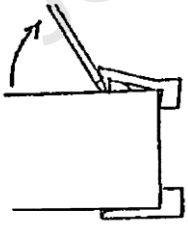
- When the parts are reused, check more strictly than usual after inserting the contact whether the contact comes off or not by pulling wires gently.
  When the contact comes off the housing, use the new housing.
- Be sure to use the JST specified tool. (Extraction tool No.: SLJ-1.4)
  Do not use other than JST specified tool, because the mating part may be deformed.

8-1 Extracting the retainer

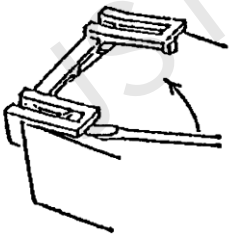
①

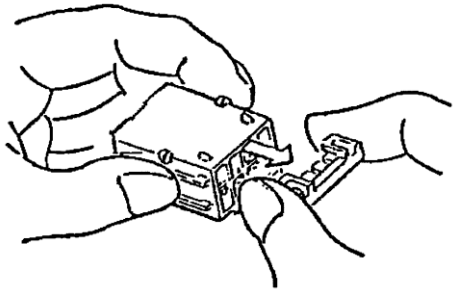


②



③

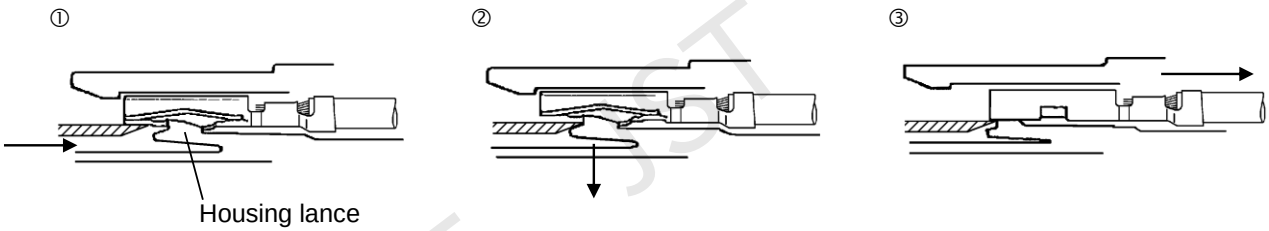




(1)→(2) Insert the extraction tool almost parallel to the housing into one side of the retainer lock part and lift the retainer to unlock with the extraction tool.
Do not lift the retainer higher than the height of the retainer receiving part of the housing, because the retainer may break.

(3) After unlocking, pull the retainer backward to extract it from the housing.

8-2 Extracting the contact



① Prepare the extraction tool, SLJ-1.4.

② Insert SLJ-1.4 parallel to the housing between the tongue part at the front end of the housing lance and the contact from the mating direction.

③ Push the tongue part down to release the housing lance.

④ With the housing lance released, pull a wire softly and extract the crimped contact from the housing. When the contact cannot be extracted even by pulling wires gently, do not pull them out by force but try again back to step ①.

Note$_6$: When the contact is extracted or re-inserted, do the extraction/insertion operation in a straight. Prying operation and insertion and extraction at an angle may deform the mating part.

9. Control Points of Crimping Operation and Harness Assembly

The operations of crimping and assembly affect the reliability (defective rate) of the connector.
It is recommended that the operations of crimping and assembly and finished products are controlled concentrating upon the following check points:

Process	Check point	Description
Crimping	Appearance	① Check that model Nos. of the contact and the applicator are adequate for wires to be used. ② Check that wires are crimped at the normal position. ③ Check that the crimped configuration is normal and excessive burr does not appear. ④ Check that uncrimped wires are not left behind. ⑤ Check that the contact is not bent, deflected or deformed. ⑥ Check that the contact is free from dirt, scratches, stains or discoloration.
	Tensile strength	① Check that the crimp height and the tensile strength are adequate.
Harness assembly	Appearance	① Check that the contact is properly inserted into the housing. ② Check that the contact is securely locked with the housing. ③ Check that there is no miss-wiring. ④ Check that the housing is free from dirt, scratches, stains or discoloration.
Finished product (Harness)	Appearance	① Follow all descriptions stated above in “Appearance.”
	Continuity	① Check that the harness passes continuity test.

10. Handling Precautions

① Fasten the tip of the remaining chain contacts with a wire, a string, and the like. to the reel so as not to unravel, and store it in a carton box.

② Be sure to use JST specified jig (SLJ-1.4) for extracting the contact from the housing in such an inevitable case as miss-wiring.

③ Do not always apply external forces to the connector assembly other than tension or a load generated in normal wire handling operation.
Handle wires so as not to apply external force to the connector and wires (approx. 30N max.) by giving considering for keeping a distance from the connector and fixing wires because tension applied to the wires damages the contact area and the crimping section, leading to poor contact.

④ Insert the connector in a panel at an environment of ordinary temperature 10°C ~ 35°C as much as possible.