AMP

AMP ECONOSEAL* SERIES "J" CONNECTOR

Customer Manual

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CM-101J

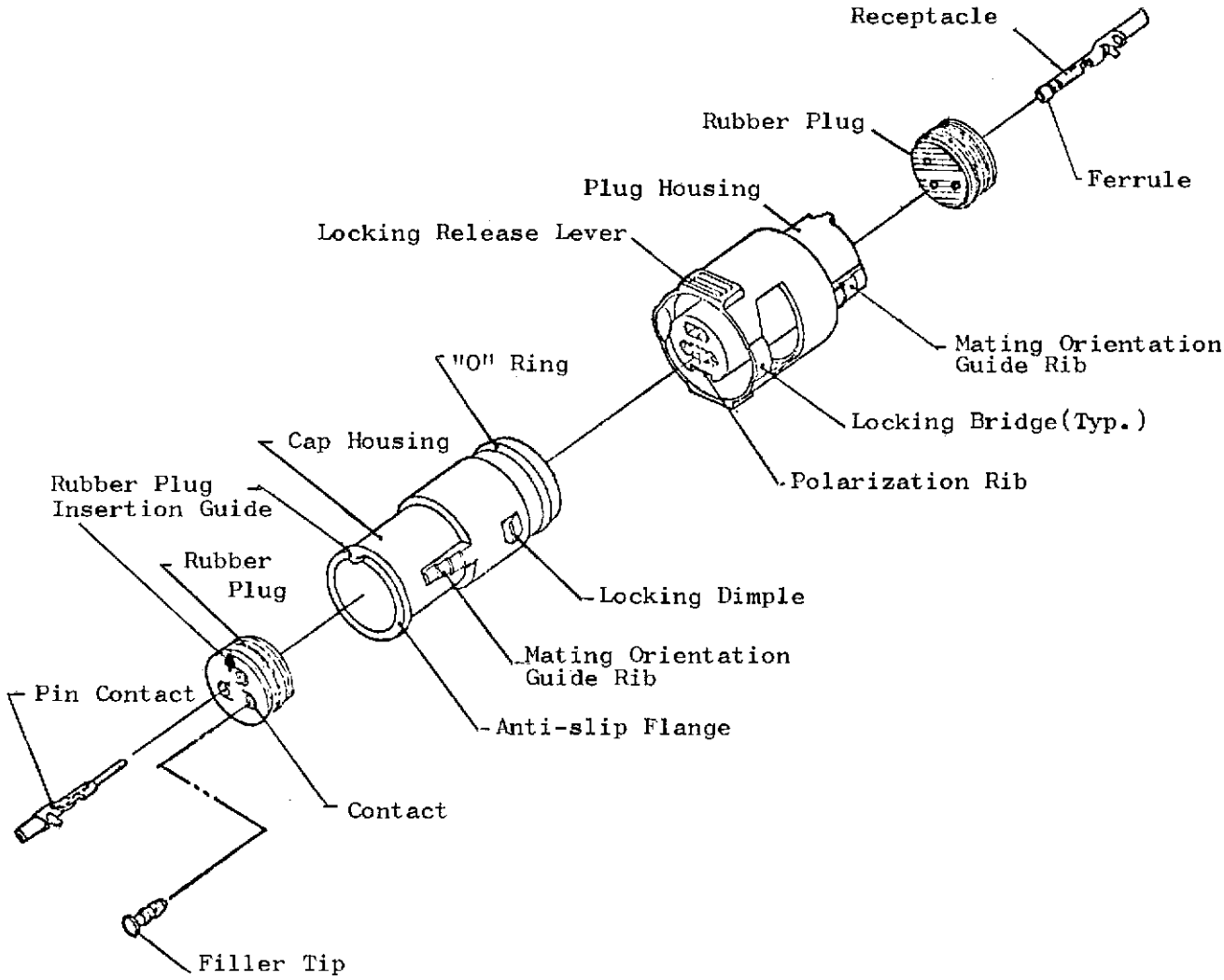
CUSTOMER MANUAL

AMP ECONOSEAL* Series "J" Connector

1. PRODUCT INTRODUCTION:

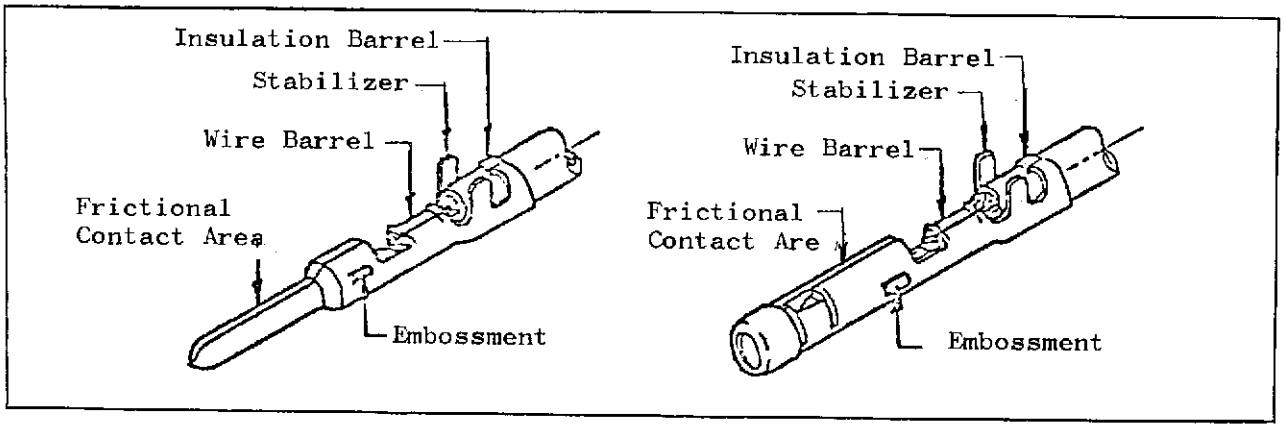
AMP ECONOSEAL* Series "J" Connector has been designed to provide a watertight termination for automotive use that withstands severe operational conditions of high temperature and water splashing in additions to detrimental affections from petrolic agents in the engine room.
Due to an improved design of locking arm contact, connector is highly resist ible to "Kojiri" deformation, eliminating contact jamming on locking lance. Housing is made of molded 6/6 Nylon. Being self-extinguishing and thermally stable, it will prevent wiring from inflaming failure. Contacts made of tin-plated brass assures reliable termination of the circuits.

1.1 NOMENCLATURE OF AMP ECONOSEAL* CONNECTOR



1.2 CONTACTS:

1.2.1 NOMENCLATURE OF CONTACT:



1.3 APPLICABLE PRODUCT PART NUMBERS:

No. of Pos.	A M P Product Descriptions	Part Number
	2 mm Dia. Lanceless Pin Contact	170279-1
		170294-1
	2 mm Dia. Lanceless Receptacle Contact Assembly	170280-1
		170295-1
	Filler Tip	172189-1
	"O" Ring	172190-1, -4
1	Rubber Plug	172197-1
2	Rubber Plug	172200-1
3	Rubber Plug	172203-1, -2
4	Rubber Plug	172206-1
8	Rubber Plug	172193-1, -2
1	Plug Housing	172195-1, -4
1	Cap Housing	172196-1, -4
2	Plug Housing	172198-1, -4
2	Cap Housing	172199-1, -4
3	Plug Housing	172201-1, -4
3	Cap Housing	172202-1, -4
4	Plug Housing	172204-1, -4
4	Cap Housing	172205-1, -4
8	Plug Housing	172191-1, -4
8	Cap Housing	172192-1, -4

1.4 NUMBER OF POSITIONS AND HOUSING COLOR:

Number of Positions:

1, 2, 3, 4 and 8-position housing connectors are available. When any of the position is not required for contact termination, it will be closed by filling with a filler tip instead of contact. Therfore, an 8-position connector can be used for a 6-position wiring, or less.

Color of Housing and Other Components:

Housing:	-1 Natural, -4 Green
Filler Tip:	Natural
Rubber Plug:	Black
"O" Ring:	Black

2. DEFINITIONS OF TERMS:

2.1 CONTACT:

A contact is an electrically conductive metallic member of connector. A pin contact and a receptacle contact are avilable.

2.2 HOUSING:

A housing is an electricallly insulating plastic member of connector that encapsulates contacts in its cavities. A cap housing that encapsulates pin contacts and a plug housing that encapsulates receptacle contacts are available.

2.3 RUBBER PLUG:

A rubber plug is a rubber lid that fills opening of housing to provide a watertight closure of wire entry side of connector after having contacts piercing through it.

2.4 FILLER TIP:

A filler tip is a plastic tip that fills contact entry hole of rubber plug, used to close the connector position when any of the circuit is not required for termination.

2.5 "O" RING:

An "O" ring is a rubber ring that fills circumferential gap between plug and cap housing as they are mated, to provide a watertight matching of the connector.

2.6 CONNECTOR:

A connector is an assembly of housing with all the positions filled with contacts after piercing through rubber plug which is mounted on opening end of housing. A cap housing that encapsulates pin contacts in the housing cavities with rubber plug mates with a plug housing that encapsulates receptacle contacts in the housing cavities with rubber plug. The gap of these connectors is made watertight with the use of an "O" ring embedded in the groove of plug housing.

3. INSPECTION OF CONTACT AND HOUSING:

3.1 AMP's Shipping Inspection:

Prior to shipping, products are thorughly inspected by AMP in accordance with self-specified quality control procedures and regulations to cover all the data of manufacture in each lot produced. In case any defect is found on the product by the inspection, the cause of failure is sought for by the manufacturing history, and prompt countermeasure to correct the defect is taken immediately.
To identify the date of manufacture, the following coding system is used on each unit of package of products.

Example:

80 — The last two digits of the year of maufacture -- this means 1980.
40 — The ordinal number of the week of manufacture in the year
2 — The ordinal day of maufacture in the week -- Monday

4.2 Customer's Receiving Inspection:

Although the products are thoroughly inspected before delivery, it is recommended that the customer be attentive to confirm the status of products, to check out undesirable affection to the products incurred during transportation.

Contacts:

Item	Checking Points	Measuring Apparatus
Visual Insp.	(1) Configuration and Appearance	Visual
	(2) Plating Finish	Visual
	(3) Reeling Status of Strip Terminals	Visual
Dimensional Insp.	(1) Height and Width of Contact Wire Barrel	Callipers or equiv.
	(2) Height and Width of Contact Insulation Barrel	Callipers or equiv.
	(3) Height of Locking Lever	Callipers or equiv.

Housing:

Item	Checking Points	Measuring Apparatus
Visual Insp.	(1) Burrs, Discoloration and Deformation	Visual
	(2) Cracks, Breakage and Tip Off of Contacts	Visual
Functional Insp.	(3) Mating and Unmating Functions of Contacts Check to see if the contacts are normally inserted and extracted, and locked when mated. Confirm that no abnormal touch is perceived during handling for assembly processing.	Visual & Manual

Rubber Plug and "O" Ring:

Item	Checking Points	Measuring Apparatus
Appearance Inspection	(1) Burrs, Discoloration and Deformation	Visual
	(2) Cracks, Breakage, Tip Off and Scratch	
	(3) Dusty and Dirty Contamination	

Lot inspection of contacts, housing, rubber plug and "O" ring is performed in accordance with the following procedure:

(1) Lot classification according to one packaging unit with one specific date code of product.

(2) Apppearance inspection with the inspection level conforming to Class II of MIL-STD-105, and acceptance quality level (AQL) of 4.0%.

(3) Functional inspection on 5 pieces per inspection unit.

(4) When all results are satisfactory, the lot proves acceptable.

5. CONTROL OF CRIMPED PRODUCTS:

Crimping of contacts must be done by using AMP specified application tooling in accordance with the procedure specified in applicable instruction sheet.

After completion of one crimping lot, it is desirable to record part number, quality and date code for necessity of future reference.

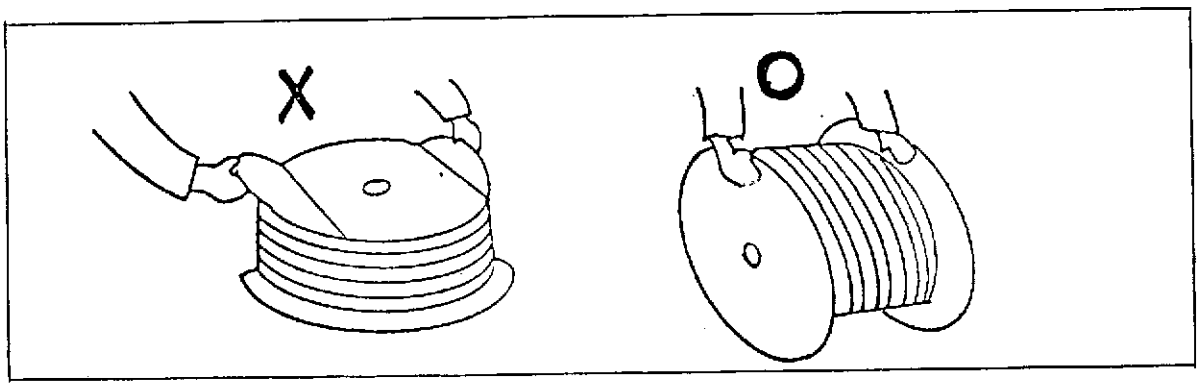
5.1 STORAGE AND TRANSFER OF REELED TERMINALS:

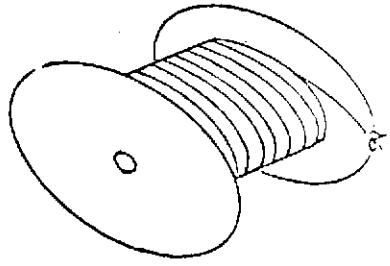
(a) Avoid leaving terminal reel in an open area without wrapping it with proper material.

(b) Do not lift up and carry the terminal reel by gripping the edges of reel, lest it should result damage of reel, causing spoiling of terminals before application.

(c) Avoid storing terminal reels in a moist area or dusty place. Stock contacts in a comparatively dry and clean place where the temperature of 5 - 35°C with the relative humidity of 45 - 85% is maintained without keen influence of the direct sunlight.

(d) When the terminal reel is not in use for a long time, remove it from the machine, and fasten the end of terminal strip onto the edge of reel with the use of proper string as shown in the next page.





Fasten the end of terminal strip onto the edge of reel with the use of proper string.

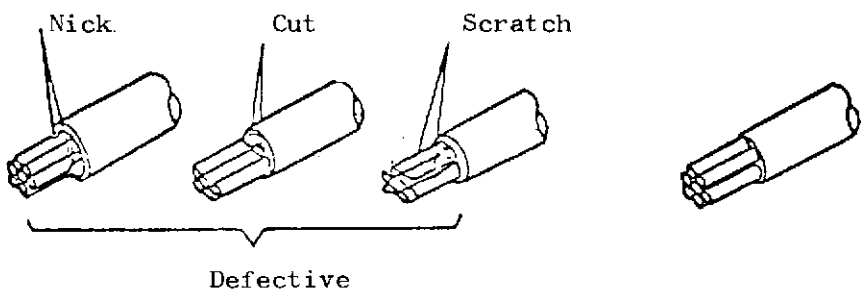
4.2 REFERNECE DOCUMENTS FOR CRIMPING OPERATION:

IS-031J	Instruction Sheet for Small Stamped Super CHAMP Tool #720781-3
114-5039	Crimping Locking Arm Connector Contacts
CM-022J	Operation and Maintenance of AMP-O-LECTRIC* Automachine
AI-8025	Miniature Quick Change Applicator
IS-048J	Straight Action Hand Tool #720758-1 for Bulkhead Contacts
IS-081J	AMP Extraction Tool #723905-1 for Locking Arm Contacts

The above listed documents should be referred to for the specific details of crimping and assembly operation.

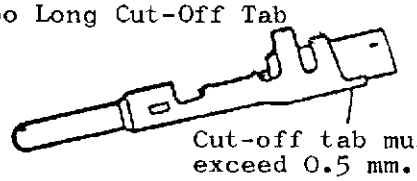
Wire Stripping:

When stripping the wires, care must be taken not to nick, cut and scratch the wire strands.



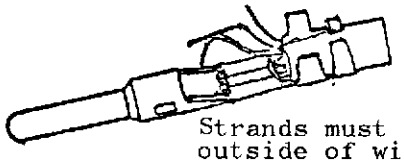
(b) Examples of Defective Contacts:

(1) Too Long Cut-Off Tab



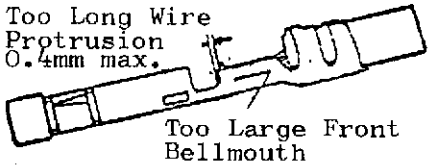
Cut-off tab must not exceed 0.5 mm.

(2) Misgripping of Strands:



Strands must not appear outside of wire barrel.

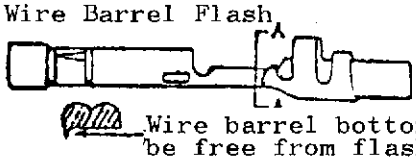
(3) Too Long Wire Protrusion 0.4mm max.



Too Large Front Bellmouth

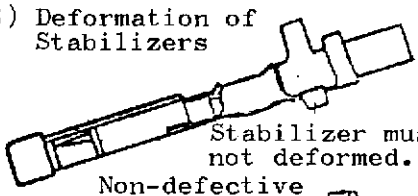
(Rear bellmouth must be within 0.13 - 1 mm after crimping.)

(4) Wire Barrel Flash



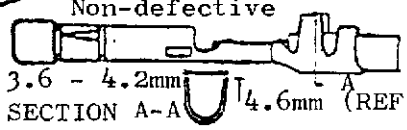
Wire barrel bottom must be free from flash and burrs.

(5) Deformation of Stabilizers



Stabilizer must be not deformed.

Non-defective

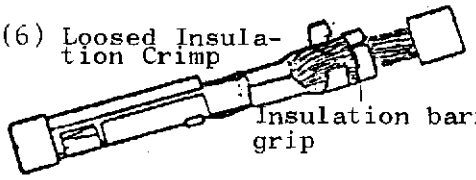


3.6 - 4.2mm

SECTION A-A

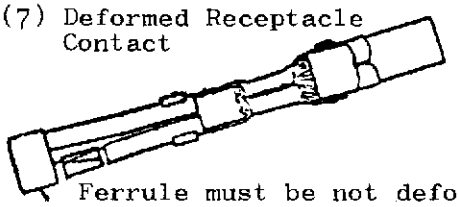
4.6mm (REF.)

(6) Loosed Insulation Crimp



Insulation barrel must grip

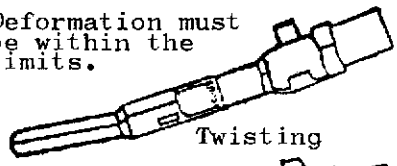
(7) Deformed Receptacle Contact



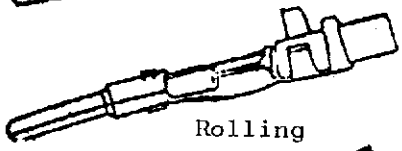
Ferrule must be not deformed.

(8) Deformed Contacts

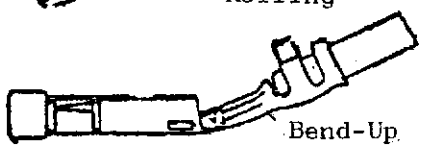
Deformation must be within the limits.



Twisting



Rolling



Bend-Up

Bend-Down

Bend Up	Bend Down	Twisting	Rolling
3° max.	3° max.	3° max.	5° max.

The degree of deformation must be measured by the aid of graduator-attached magnifying glass. Inspection of contact is performed by selecting sample pieces from a lot of products manufactured under the same condition between the operational adjustments, taking one piece as a unit of inspection. Sampling of products is done in accordance with MIL-STD-105.
The fundamental checking points of contact are as shown in the figures above, and other checking points can be added to confirm more specific characteristic of contact required by the manufacturing circumstance.

4.2.1 CRIMPING BY AMP AUTOMATIC TERMINATING MACHINE:

When crimping by AMP automatic terminating machine, first, confirm the number of applicator and contact number and wire sizes and crimp data as shown in the list below.

Contact Number	Applicator Number	Wire Size (mm^2)	Wire Barrel Crimp Width (mm)	Wire Barrel Crimp Height (mm)	Insulation Barrel Crimp Width (mm)	Insulation Barrel Crimp Height (mm)
170279-1 170280-1	722752-1 722752-2	0.5	2.29	1.22	3.3	To be adjusted according to the size of wire used
		0.85		1.35		
		1.25		1.5		
		2.0		1.78		
170294-1 170295-1	721334-1 721334-2	0.5	2.03	1.13	3.3	To be adjusted according to the size of wire used
		0.85		1.22		

The wires conforming to JIS C 3406 must be used for termination.

4.2.2 CRIMPING BY HAND TOOL (P/N 720758-1):

For repair and maintenance purposes, loose piece contacts are available by purchasing from AMP under separate number of control. These loose piece contacts are crimped by using a hand crimping tool which is specially desined for termination.
It is not recommended that you use strip contact for hand tool application, because preforming of stabilizer is done by automatic machine processing and without this appropreate forming cannot be attained.
When crimping contact by using hand tool, read instruction sheet IS-048J carefully, which is attached to the hand tool.

Contact Type	Loose Piece Part Number	Strip Form Part Number	Applicable Wire Size, (mm^2)
Pin Contact	170292	170279	0.5, 0.85, 1.25, 2.0
Socket Contact	170293	170280	

4.3 TROUBLESHOOTING:

To remedy malfunctional symptoms, appropreate troubleshooting must be followed by reading separately prepared customer manual CM-022J for AMP-O-LECTRIC* Automatic Terminating Machine, and AI-8025 for Quick-Change Miniature Applicator.

4.4 CONTROLLING INPROCESS PRODUCTS:

4.4.1 INSPECTION OF CONNECTOR:

Inspection Unit of Product: A wire-crimped contact lead
Lot of Inspection: A group of products produced under the same manufacturing condition performed between specific adjustments of applicator.
Inspection Procedure: As shown in the tables below.

Classification	Time of Inspection	Sampling	Level	Inspection Items
First Piece Inspection	On the initial set up of applicator with the wire to be crimped.	5 pcs.	Ac 0 Re 1	Appearance and dimensional inspections (All items listed in Table below)
Lot Inspection	At the beginning of work every day	5 pcs.	Ac 0 Re 1	Same as above
	In the period of continuous production	MIL-STD-105, Level S-3, AQL 1.0%		Appearance (all items) &. dimensional inspection (Items 2 & 5 in table below)

Item	Check Points	Measuring Apparatus
Appearance Inspection	1. Conductor cut or not gripped in the wire barrel	Visual
	2. Defective crimped shap(Forming of bellmouth) (Protrusion of conductor from front edge of wire barrel)	"
	3. Defective bottom on crimp (Flash)	"
	4. Incomplete crimp of contact portion	"
	5. Defective configuration of contact portion	"
	6. Inclination of locking lever	"
Dimensional Inspection	1. Cut-off tab length:(0.9mm max.)	Vernier Callipers
	2. Stabilizer dimensions:(Width 3.6 - 4.2mm)	" "
	3. Contact deformation:(Bend, twisting, rolling)	Magnifier
	4. Crimp height: (Specified height $\pm$0.05mm)	Micrometer
	5. Bellmouth: (Front) 0.4 mm max.(*0.1 - 0.4 mm)	Vernier Callipers
	6. " (Rear) 0.13 - 1.0 mm	" "

* Applicable to P/N's 170294 &. 170295

4.4.2 STORING:

(1) Products must be stored in a clean place. They should be covered or wrapped with vinyl sheet to protect from contamination of duct and foreign particles, when they are left in an open area for the next work day.

(2) Proper number of contact-crimped wires to be bundled should not much exceed one hundred. It is recommended to cover the crimped portion with a vinyl bag.

(3) Piling a large number of crimped leads roughly causes entanglement of contacts resulting deformation and malfunction of contacts.

(4) When to separate crimped wires from the bundle, care must be taken to prevent the locking lance from being deformed by entanglement and catching

(5) It is not recommended to attempt mating male and female contacts without use of housing application, because it often results deformation of female contact.

5. HARNESS ASSEMBLY MAKING:

5.1 Insertion of Contacts and Rubber Plug into Housing:

Refer to instruction sheet, IS-100J for details of contact insertion into rubber plug with the use of insertion tool 724658-1.

****
IMPORTANT
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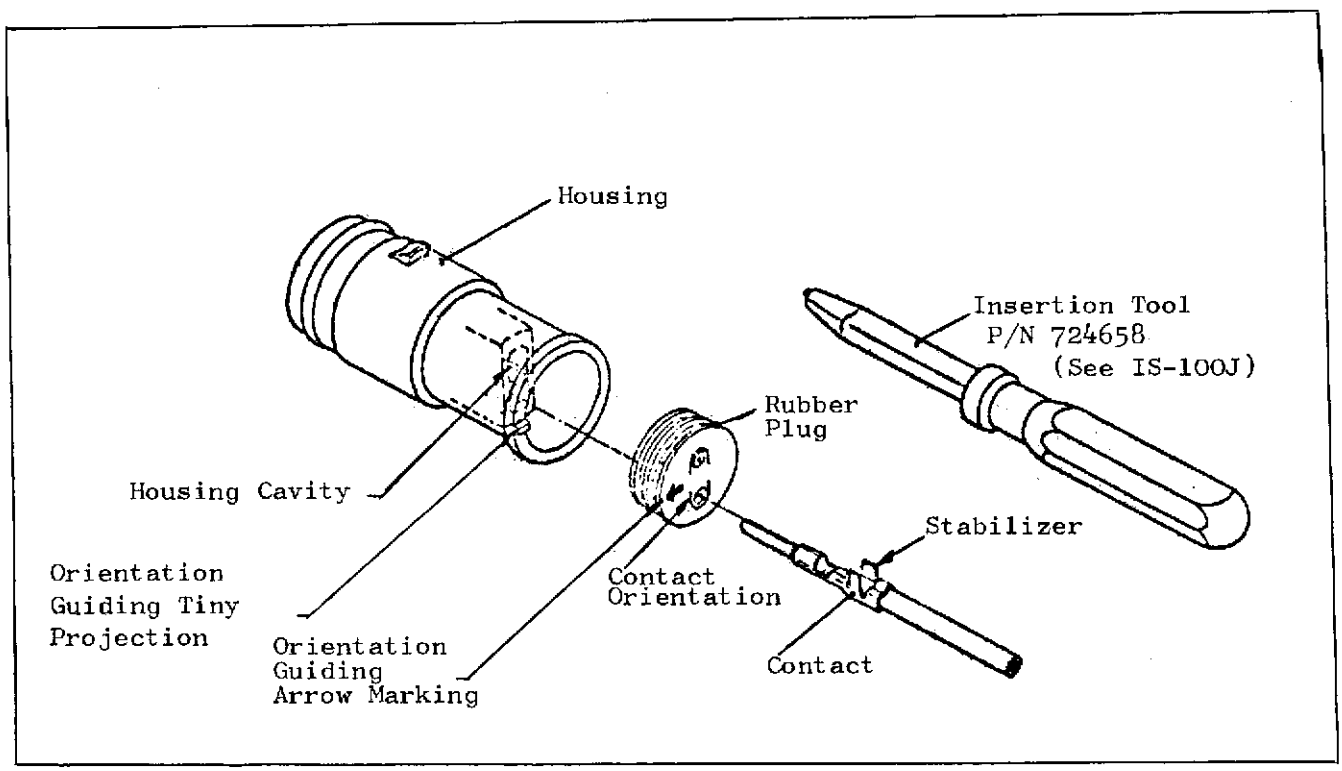
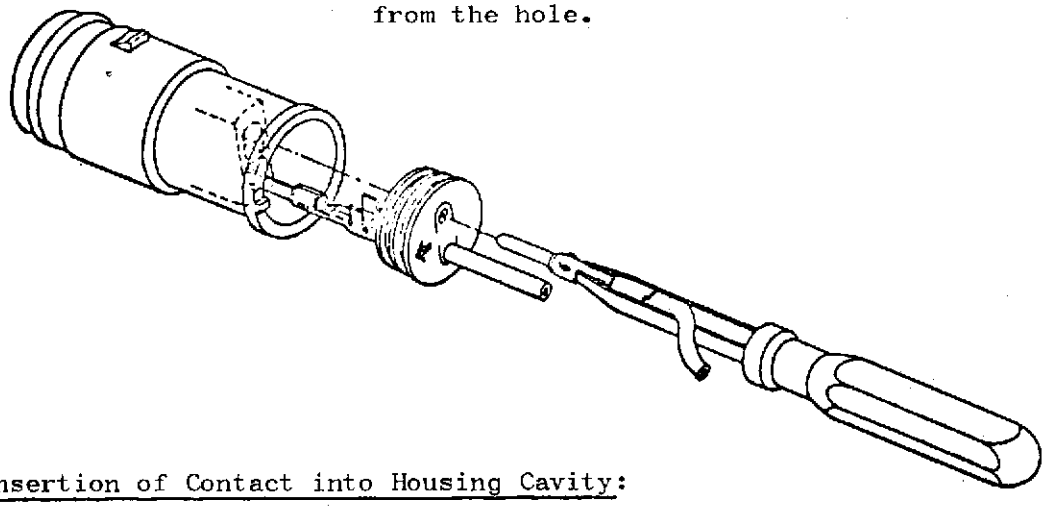
It is important to set contact rightly aligned with a "U" shaped cut line on the surface of rubber plug, before inserting contact into rubber plug with the use of insertion tool. Inserted contact must be snugly embedded in so designated cut-out hole of rubber plug, as shown in IS-100J.

It is also important that the contact-mounted rubber plug must be applied to housing in the correct orientation in alignment of arrow marking of rubber plug with a tiny projection on the edge of housing entry opening.



Contact Insertion into Rubber Plug:

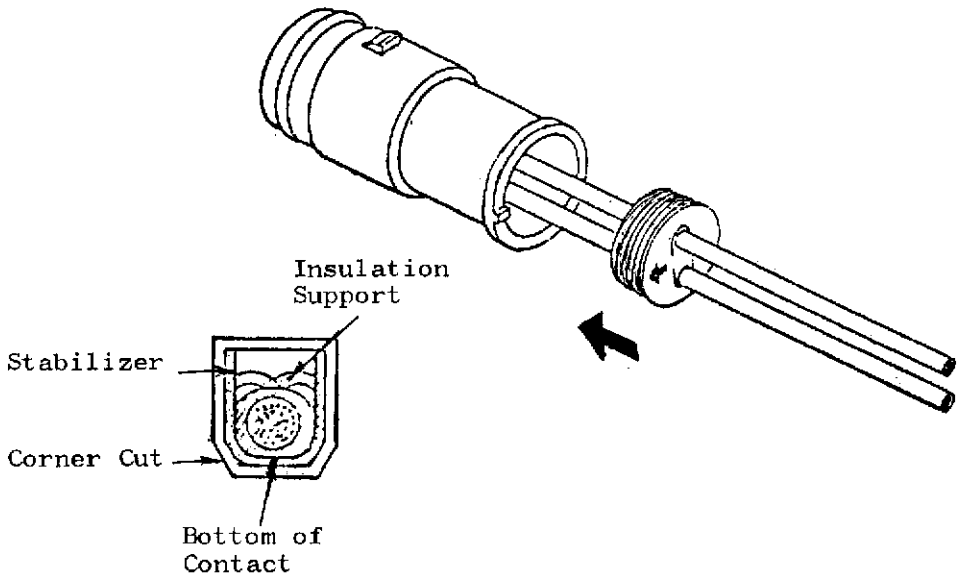
Apply tip of insertion tool to cylinderical body portion of contact, and set in place snugly to hold the contact on the tool.
Then, insert contact into mounting hole of rubber plug in correct orientation to fit into "U" shaped cut line of rubber plug. Contact stabilizers must pass through the side of open ends of "U" letter. When contact passed through the hole completely, gently pull back the tool to be extracted from the hole.



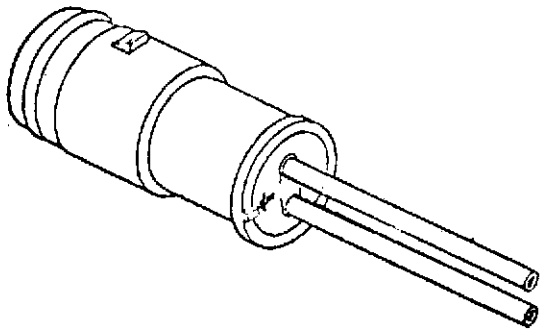
Insertion of Contact into Housing Cavity:

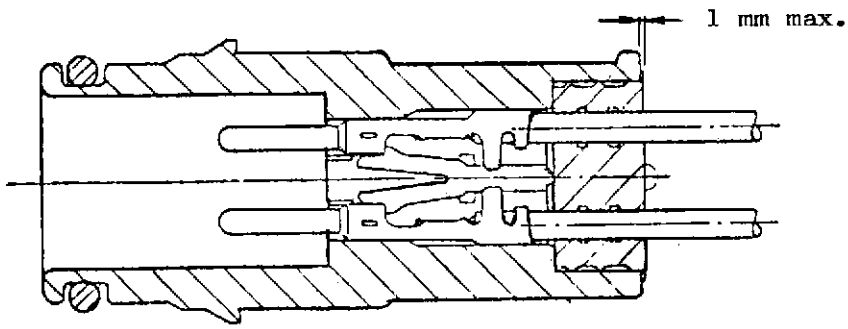
When to insert contact into housing cavity, it is important to have contact bottom facing to inside wall of corner-cut side of the cavity as shown in the figure below. With the contact bottom facing to the cavity wall, slide the contact as far as it goes until it bottms in the cavity. When the contact reaches the bottom, a small clicking sound is heard, and the contact becomes secured in position. Make sure by pulling back the wire slightly if the contact is locked in position.

When extraction of contact is required, use AMP specified extraction tool 723905-1 in accordance with the instruction sheet, IS-081J.



First, have the arrow marking of rubber plug set aligned with a tiny projection on the edge of housing entry opening to obtain the correct orientation. Draw circumferential edges of rubber plug through the edge of housing entry, and insert it by pressing evenly to make a uniform sink in the housing. The upper surface of rubber plug must be flush with the edge of housing, or higher than it within 1mm.
Use height of a tiny projection on the edge of housing entry for estimating the height of rubber plug over the housing edge. This projection is just 1 mm high.



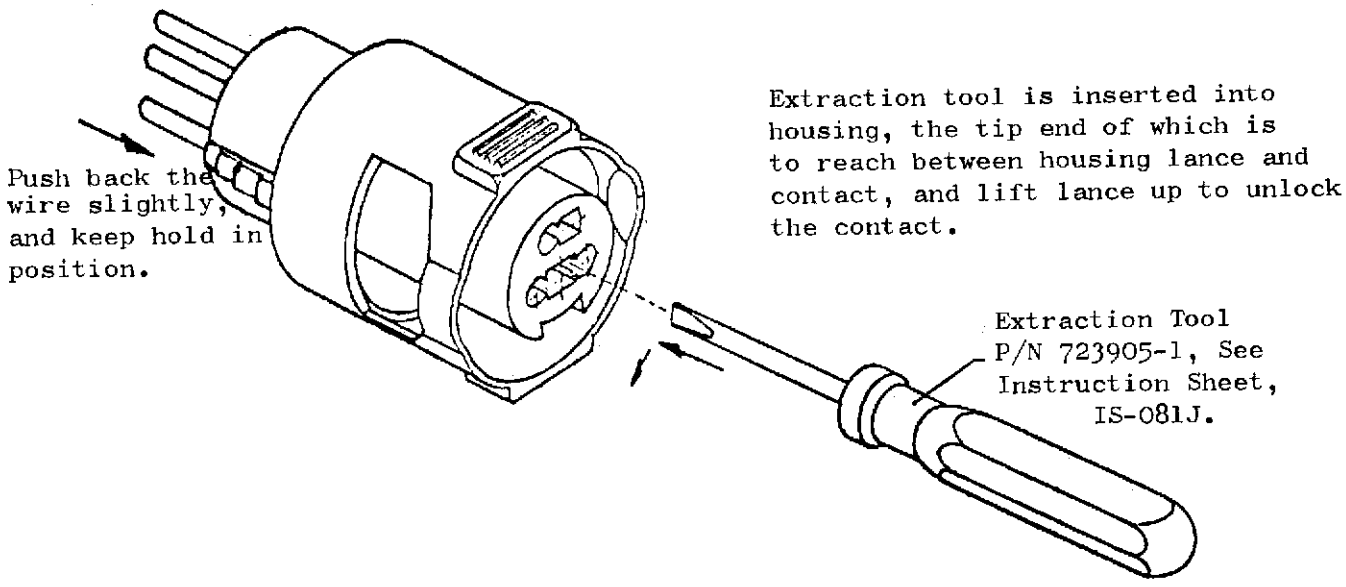


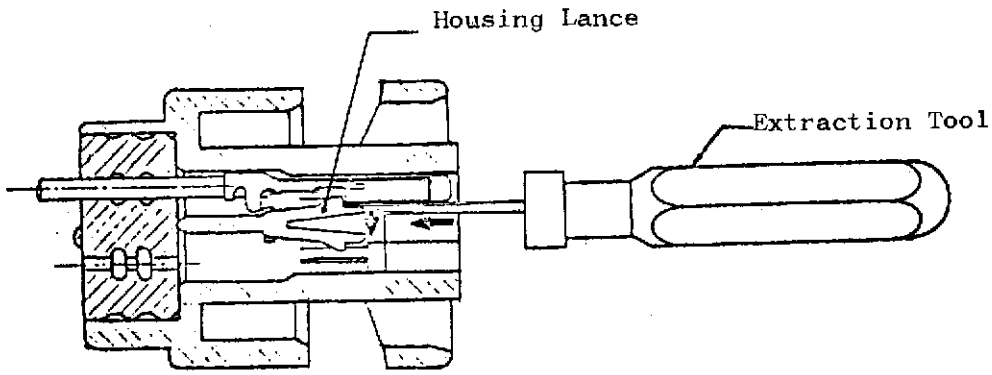
5.2 EXTRACTION OF CONTACT:

Push back the wire of contact you desire to extract inward of housing. This will slacken tensive locking of housing lever in housing cavity. Keep hold of wire in position, then insert extraction tool into the cavity from the mating side of connector, until the tip end of tool reaches and bump against the wall of locking lance in housing cavity.

Affirming that the tip end of tool is against the housing lance, move tool toward center of housing to unlock the contact, and pull the contact by the wire at the same time. Now the contact can be easily extracted from housing.

When extracting contacts from rubber plug assembled, 2-position or larger connector housing, unlock the contact one by one, by using extraction tool, and pull back to a length of approximately 3mm to make the unlocked contacts loosed condition in the cavities, until all the contacts are unlocked. Then, pull the wires to extract contacts and rubber plug at the same time.



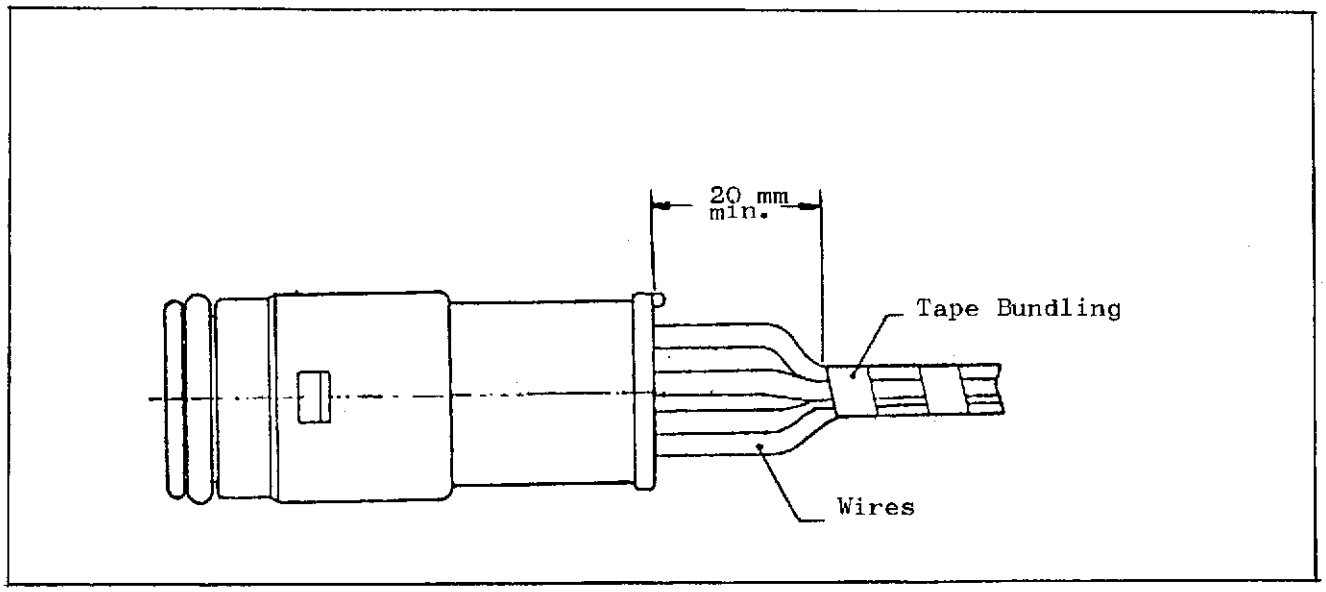


When reinsertion of contact is required, check the contact carefully to see if it is not deformed or damaged in reference to the figures of defective contacts shown in Para. 4.2 (b).

Checking housing is also important before reusing. Carefully inspect if the housing is normal without showing evidence of defects, especially on the housing lance for its normal function.

6.2 TAPE BUNDLING OF WIRES:

Wires leading out of connector housing must have proper slack at the portion next to housing outlet to relieve strain applied to the wires by a sudden jerk. Therfore, tape bundling should start with a certain clearance to housing as shown in the figure on the next page.



5.4 CIRCUIT INSPE CTION OF HARNESS ASSEMBLY:

5.4.1 CIRCUIT INSPECTION OF HARNESS ASSEMBLY:

After completion of harness assembly, a 100% circuit inspection should be performed, before installation to final assembly.

(a) Use of plug housing assembly is appropreate to make a circuit inspection of cap housing assembly and vice versa. It is also proper to use a specifically prepared probing contact for checking circuit continuity. In any way, handling connector must be moderate, lest it should result detrimental affection to the parts, during inspection.

(b) Do not attempt to check continuity of receptacle contact by carelessly inserting a probing contact into the receptacle. This often cause deformation of contact accidentally.

5.4.2 STORING:

(a) Assembled harnesses must be stored in a clean, dry place. Do not leave the product harness under open dusty or moist circumstance. Always warp or cover with proper materials such as vinyl sheet or bag, when storing in an open area for the next work day.

(b) Since smooth surface matching is the soul of this product concept, contamination of foreign particle falling on the surfaces of mating parts must be strictly avoided. From this point of view, the surfaces of "O" ring and inside of mating area must be kept clean.

(c) When storing cap housing in bulk container, care should be taken not to have locking release arches of cap housing left under the pressure that affects them to be depressed during storage. Keeping under this condition for a long time will result undesirable deformation.

5.4.3 TRANSPORTATION:

(a) When to transfer assembled connector harnesses due to manufacturing reasons, carry them in a proper container which protects them from degradation by moisture, rain and dust. Care should be taken not to handle them roughly.

(b) The container must be readily identified by the marking that carries product part numbers and quantity accordingly.

6. INSTALLATION OF CONNECTOR TO MOTOR VEHICLES:

Installation of connectors to final motor vehicle assembly should be done in accordance with the assembly procedure, established respectively at each plant of the users.

6.1 INSPECTION BEFORE ASSEMBLY:

Before final application, at least, the following points should be checked at all times.

(a) Tape bundling of wires -- if the clearance is more than 20 mm from the end of housing outlet.
(b) Contact locking conditions, whether or not securely locked
(c) Any abnormalities appearing on housing and contact surfaces, --- discoration deformation, cracks etc., especially on locking arches and rubber plug.
(d) Any evidence of parts contamination and physical damages on surface matching parts, i.e. "O" ring and rubber plug, --- appearing if any,
(e) Any other defective factors involved with the parts and accessories.

6.2 IMPORTANT POINTS AT ASSEMBLY:

(a) When to mate cap housing and plug housing, find the right inserting orientation by the indication ribs on the side of housings.
(b) Avoid unnecessary insertion and extraction repeatedly.
(c) The probe contacts used to check circuit continuity should be specifically designed to make contact without diameter extending affection to pin-accepting area of receptacle contact.
(d) If extraction of contact is required, perform in accordance with the procedure stated in Para. 5.2.
(e) Before reinsertion of contact, check carefully for deformation of contact.
(f) Handling of harness assembly must be done moderately. NEVER attempt to throw harness onto the floor or work bench, or to drag the harness over the floor. Do not carry harnesses by holding connector housing, and when the wires are entangled or caught on other projecting item, do not pull the wires forcingly, lest connector should be ill-affected.
(g) When to unmate connectors, hold conectors firmly, and separate straight without "Kojiri" actions with the locking arch release knobs depressed.

6.3 REFERENCE DOCUMENTS FOR ASSEMBLY:

The following documents should be referred to as required at assembly.

IS-081J	Extraction Tool, 723905-1	Contact Drawings: 170292, 170293
IS-048J	Crimping Tool, 720758-1	170297, 170298
IS-100J	Insertion Tool 724658-1	

7. IMPORTANT NOTES FOR HANDLING CONNECTOR DURING MAINTENANCE SERVICE OF CAR:

(a) When to separate connectors, hold them firmly and separate straight along the connector working axis without "Kojiri" bending and twisting action.
(b) Do not pull the connector by the wires. Avoid applying excessive load to the connector at all times.
(c) Avoid unnecessary insertion and extraction repeatedly.
(d) Degree of parts wear must be checked at the time of disassembly for repair and maintenance, and damaged termination must be replaced with new parts.
(e) When evident degradation is found on housing parts, replace with new parts. Remove dirt, greasy stains and foreign particles from connectors when heavy contaminants are found on and around the connector.
(f) When checking circuit continuity, do not insert probing point into receptacle contact.
(g) When removal of contacts is required, perform in accordance with the procedure stated in Para. 5.3.
(h) Before reinsertion of contact, thorough checking should be done to confirm if no abnormalities are found on the contact.
(i) If tape bundling is required at the portion next to wire outlet of housing, proper slackening clearance must be taken as stated in Para. 5.3.
(j) When replacing disassembled parts, securely restore the fasteners and supporting rigs and clamps as they were before disassembly. Under unsupported condition, connector tends to be ill-affected.

Use Super CHAMP Tool, P/N720781-1 for terminating loose piece contacts, which has been designed for repair and maintenance use in the field. Refer to IS-031J for detailed operation procedure, attached to the tool.