

108-5114

2-Pos., Combination Connector  
Product Specification

("250" Series, Receptacle and Positive Lock Receptacles)

1. Scope:

This specification covers general product performance requirements and test methods for 2-Position, Combination Connector.

2. Product Part Numbers and Descriptions:

The products of the following part numbers shall be governed under this specification.

Part Number	Descriptions
170032-2 1-170032-2	"250" Series Receptacle Contact
170234-1	Positive Lock Receptacle Contact
170233-1	Positive Lock Receptacle Contact
171810	2-Position, Combination Connector Housing

3. Definitions of Terms:

For the purpose of this specification, the following terms shall be defined as follows:

3.1 Contact:

contact is a metallic, electrically conductive component member of connector.

3.2 Housing:

Housing is an electrically insulating plastic component member which encapsulates contacts.

3.3 Connector Assembly:

A connector assembly is an assembly of wire-crimped contacts and a housing properly assembled for electrical termination.


4. Material and Finish:

4.1 Contact:

Contacts shall be made of brass conforming to Alloy No. 260 of ASTM B 36, with or without post tin-plating.

4.2 Housing:

Housing shall be made of molded 6/6 Nylon resin.

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D	Revised FJ00-0882-93	5.0	KO	10/28/77	CHK	8-19-80							
C	Revised RFA-1961	5.4	AT	7/18/72	APB	8-18-80							
B1	Revised RFA-1481	5.4	AT	7/18/72	APB	8-18-80							
B	Translated	5.4	AT	7/18/72	APB	8-18-80	LOC	J	NO	A	108-5114	REV	E
LTR	REVISION RECORD	DR	CHK	DATE	SHEET 1 OF 10		Product Specification						
							2-Position, Combination Connector						

## 5. Product Design Feature, Construction and Dimensions:

## 5.1 Receptacle Contact:

Product design feature, construction and dimensions shall be conforming to the applicable customer product drawing(s). Receptacle contacts are the female contacts encapsulated in housing after wire crimping. Positive lock contacts are provided with locking device which functions to secure the contacts with the mated tab contacts after mating. To release locking mechanism, separate the parts by holding the housing. Locking mechanism is set in effect, when the parts are pulled by the crimped wire.

## 5.2 Housing:

Product design feature, construction and dimensions shall be conforming to the applicable customer product drawing(s).

"250" series, receptacle contacts is held secured by housing lance provided on housing cavity, while positive lock receptacles are secured by locking detent provided on the bottom area of housing which engages slot of contact.

Positive lock receptacle contacts are securely held in contact position by engagement of locking detent provided on the bottom area of housing into contact slot. When extraction of contact is required, extend out the bottom part of housing lightly to release contact locking.

## 6. Rating:

## 6.1 Temperature Rating:

Temperature rating must be within the range between -40 and 130 °C including the temperature rising resulted from the energized current load.

## 6.2 Applicable Wires:


For terminating 2-Position Combination Connector, the wires of the following sizes, conforming to JIS C 3406, Low Voltage Cables for Automobiles, shall be used.

Part Number	170032-2	170233-1	170234-1
Wire Size	1-170032-2		
Wire Size (mm <sup>2</sup> )	0.5 - 2.0	0.5 - 2.0	3.0 - 5.0
Insulation Diameter(mm)	2.2 - 3.1	2.2 - 3.1	3.8 - 4.9

## 7. Performance Requirements and Test Methods:

## 7.1 Performance Requirements:

When tested in accordance with the test methods specified in Para. 7.2, and test sequence specified in Para. 7.3, product performance shall be conforming to the requirements specified in Table 1.

SHEET				AMP (Japan), Ltd. TOKYO, JAPAN		
2 OF 10		LOG	A	NO	108-5114	
		REV	E			
NAME						
Product Specification						
2-Position, Combination Connector						

Test Item (Test Method Paragraph Number)	Initial Performance Requirements	Performance Requirements After Environmental Conditioning
Appearance, Conformance of Product (Para. 7.2.1)	When visually inspected, product shall show no evidence of cracks, damages, chipping off, breakage, loose of parts, rust and fusion that are detrimental to connector functions	
Connector Insertion Force (Para. 7.2.2)	9.8 - 49 N (1.0 - 5.0 kgf)	
Connector Extraction Force (Para. 7.2.3)		
Termination Resistance (Para. 7.2.4)	3.0 mV/A Max.	6.0 mV/A Max.
Handling Touch at Assembly (Para. 7.2.5)	No abnormal touch that causes operators' fatigue and pain shall be perceived.	
Insulation Resistance (Para. 7.2.6)	100 MΩ Min.	
Dielectric Strength (Para. 7.2.7)	Connector assembly shall withstand AC 1,800V for 1 minute without showing abnormalities.	
Contact Retention Force (Para. 7.2.8)	"250" Series Receptacle Contact ----- 59 N (5kgf) Min.	
	Positive Lock Receptacle Contact ----- 39 N (4kgf) Min.	
Contact Locking Strength (Para. 7.2.9)	98 N (10kgf) Min.	
Crimp Tensile Strength (Para. 7.2.10)	Wire Size	Tensile Strength (Min)
	mm <sup>2</sup>	N (kgf)
	0.5	88 (9.0)
	0.85	127 (13.0)
	1.25	167 (17.0)
	2.0	245 (25.0)
	3.0	343 (35.0)
	5.0	343 (35.0)
Vibration High Frequency (Para. 7.2.11)	//	When tested in accordance with the test sequence specified in Table 3, performance requirements shall be met.
Physical Shock (Para. 7.2.12)		
Thermal Shock (Para. 7.2.13)		
Salt Spray (Para. 7.2.14)		

Table 1

SHEET

AMP (Japan), Ltd.  
TOKYO, JAPAN

3 OF 10

LOC

J

A

NO

108-5114

REV

E

NAME

Product Specification

2-Position, Combination Connector

## 7.2 Test Methods:

## 7.2.1 Appearance, Conformance Check of Product:

Visually and tactually inspect appearance of product to confirm if any abnormalities such as cracks, damages, breakage, loose of parts, rattling, rust, fusion and deformation that are detrimental to connector functions, are evident.

## 7.2.2 Connector Insertion Force:

Fasten one half of paired connector onto the head of tensile testing machine and apply an axial push-in load to the counterpart connector to mate by operating the head to travel with the speed at a rate of 100mm approximately a minute, until the connectors are fully mated. The force required to mate shall be measured and recorded.

## 7.2.3 Connector Extraction Force:

Fasten one half of mated connector onto the head of tensile testing machine and apply an axial pull-off load to the counterpart connector to unmate by operating the head to travel with the speed at a rate of 100mm approximately a minute, until the connectors are separated. The force required to unmate shall be measured and recorded. For this test, connector locking device shall be not set in effect.

## 7.2.4 Termination Resistance:

Mated pair of connectors shall be tested after the connector is wired as shown in Fig. 1, by applying closed circuit current of 1A at open circuit voltage of 12V DC. Millivolt drop of the circuit shall be measured by probing at the points 75mm apart from the wire crimp after the temperature rising of the circuit becomes stabilized. (The points between Y and Y' in Fig. 1.)

Termination resistance is obtained by calculation from the millivolt drop value, after deducting the resistance of the wire of 75mm used for wiring.

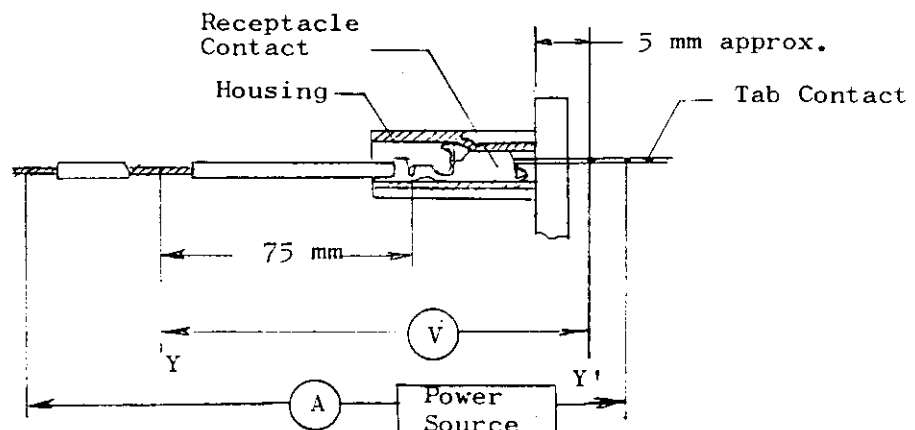


Fig. 1

SHEET		<b>AMP</b>		AMP (Japan), Ltd. TOKYO, JAPAN	
4 OF 10		LOC	A	NO 108-5114	REV E
NAME		Product Specification			
		2-Position, Combination Connector			

### 7.2.5 Handling Touch at Assembly:

Manually repeat insertion and extraction of connector and confirm if any abnormal touch is perceived.

### 7.2.6 Insulation Resistance:

Contact-loaded and mated pair of connectors shall be tested for insulation resistance, after wiring as shown in Fig. 2, by applying test potential of DC 500V between the adjacent contacts and between the contacts and the ground.

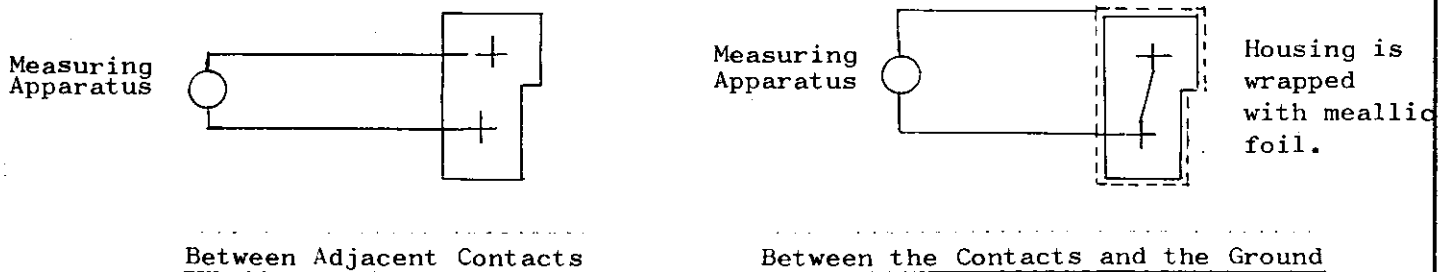


Fig. 2

### 7.2.7 Dielectric Strength:

Contact-loaded and mated pair of connectors shall be tested for dielectric strength, after wiring as shown in Fig. 2, by applying test potential of AC 1,800V in commercial frequency between the adjacent contacts and between the contacts and the ground at increasing rate of 500V a second, and after the specified voltage is reached, hold the potential for 1 minute, and inspect connector for evidence of abnormalities appearing after the loading.

### 7.2.8 Contact Retention Force:

Insert contact into housing which is crimped on an approximately 100mm long, 0.85mm<sup>2</sup> or greater wire. The contact-loaded connector shall be securely fastened onto the head of tensile testing machine. The contact retention force shall be tested by applying an axial pull-off load to the end of crimped wire by operating the head to travel with the speed at a rate of 100mm a minute approximately. The force required to dislodge the contact from the housing, shall be measured and recorded.

### 7.2.9 Contact Locking Strength (Applicable to Positive Lock Receptacle Only):

Insert contacts into housing which are crimped on approximately 100mm long, 0.85mm<sup>2</sup> or greater wires. The contact-loaded connector shall be mated and securely fastened onto the head of tensile testing machine by its mated tab contacts as the parts are locked by locking mechanism set in effect. The connector shall be tested by applying an axial pull-off load to the mated connector by operating the head to travel with the speed at a rate of 100mm a minute approximately. The force required to unmate the connector with or without breackge of locking mechanism, shall be measured and recorded.

SHEET



AMP (Japan), Ltd.  
TOKYO, JAPAN

5 OF 10

LOC  
J

A

NO

108-5114

REV  
E

NAME Product Specification  
2-Position Combination Connector

### 7.2.10 Crimp Tensile Strength:

Securely fasten a contact onto the head of tensile testing machine, which is crimped on an approximately 100mm long wire, and apply an axial pull-off load to the crimped wire by operating the head to travel with the speed at a rate of 100 mm a minute approximately. The force required to pull off the wire from the wire crimp, or to break the wire shall be measured and recorded.

### 7.2.11 Vibration, High Frequency:

Contact-loaded and series-wired connector assembly shall be tested for current stability under high frequency vibration. The connector assembly shall be securely fastened on the vibration plate of testing machine as shown in Fig. 3, and the circuit shall be energized with closed circuit current of 1A at open circuit voltage of 12V DC. With this condition, test vibration, with acceralated velocity of  $44\text{m/s}^2$  (4.5G) at sweeping frequencies to reciprocate between 20-200Hz one cycle a minute, shall be applied. This vibratile test condition is applied for 8 hours to each plane of X and Y axes. During the vibration, the circuit shall be monitored for detecting electrical discontinuity greater than 1 microsecond taking place in the circuit. The detector shall be set to be able to indicate a millivolt drop greater than 1 V/A in the test circuit.

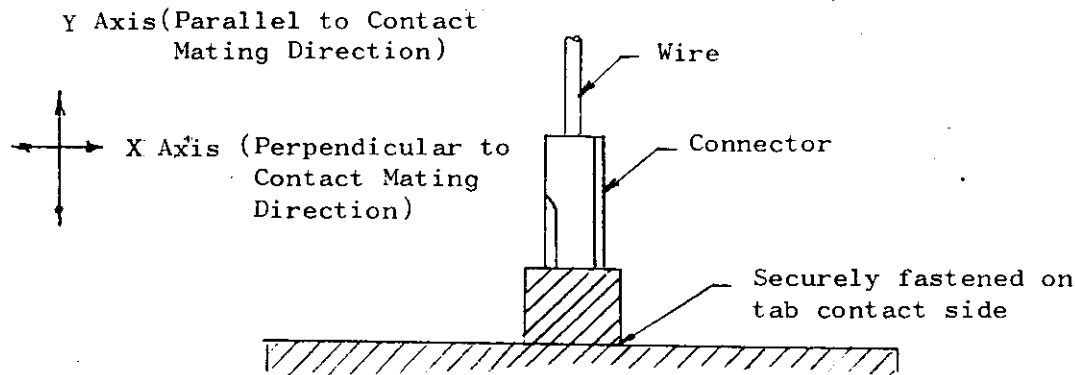


Fig. 3

### 7.2.12 Physical Shock:

Contact-loaded and series-wired connector assembly shall be tested for stability under physical shock produced by the physical shock testing machine conforming to SAE J 577. The connector assembly shall be securely fastened on the tester whose testing table is suspended by the tension of a spring load of 265-314N (27-32kgf) and vibrated by a reciprocating cam drop depth of 3.2mm at a rate of 12.5 Hz. The test shall be performed for one hour each to X and Y axes respectively. During the vibratile conditioning, closed circuit current of 1A at open circuit voltage of 12V shall be applied, and the test circuit shall be monitored for detecting electrical discontinuity greater than 1 microsecond taking place in the circuit. The detector shall be set to be able to indicate millivolt drop greater than 1 V/A in the test circuit.

SHEET		<b>AMP</b>		AMP (Japan), Ltd. TOKYO, JAPAN	
6 OF 10		LOC J	A	NO 108-5114	REV E
NAME Product Specification					
2-Position, Combination Connector					

## 7.2.13 Thermal Shock:

Contact-loaded and mated pair of connectors shall be exposed under heat/cold conditioning for 5 cycles in the sequence specified in Table 2. After completion of conditioning, connector shall be reconditioned in the room temperature and be subject to subsequent measurements.

Test Sequence	Test Procedure
1	130 $\pm$ 5°C for 0.5 hour
2	Room Temperature for 5 minutes Max.
3	-40 $\pm$ 5°C for 0.5 hour
4	Room Temperature for 5 minutes


Table 2

## 7.2.14 Salt Spray:

Contact-loaded and mated pair of connectors shall be exposed under salt spray conditioning conforming to EIA-364-26C for 2 cycles of 24 hours with suspending interval for 1 hour taking between the cycles. After completion of test conditioning, the sample connectors shall be rinsed in tap water and dried in the room temperature for 1 hour, before undergoing subsequent measurements.

## 7.3 Test Sequence:

Tests shall be performed in accordance with the test sequence specified in Table 3.

SHEET				AMP (Japan), Ltd. TOKYO, JAPAN	
7 OF 10		LOC J	A	NO 108-5114	REV E
NAME Product Specification					
2-Position, Combination Connector					

Test Item	Item Group	Test Sequence					
		I	II				III
Appearance, Conformance of Product		1					
Connector Insertion Force		2					
Connector Extraction Force		4					
Termination Resistance		3	2	4	6	8	10
Handling Touch at Assembly		7					11
Insulation Resistance		5					
Dielectric Strength		6					
Contact Locking Strength		8					12
Contact Retention Force		9					
Crimp Tensile Strength							1
Vibration, High Frequency			3				
Physical Shock				5			
Thermal Shock					7		
Salt Spray						9	


Table 3

8. Quality Assurance Provisions:

8.1 Test Conditions:

Unless otherwise specified, all the test shall be conducted in any combination of the following test conditions.

Temperature:	15	-	35 °C
Relative Humidity:	45	-	75 %
Atmospheric Pressure:	86.7	-	107kPa
	(650	-	800mmHg)

SHEET				AMP (Japan), Ltd. TOKYO, JAPAN	
8 OF 10		LOC J	A	NO 108-5114	REV E
NAME Product Specification					
2-Position, Combination Connector					



## 8.2 Test

## 8.2.1 Test Specimens:

All the test specimens to be used for the tests shall be prepared in accordance with AMP Application Specifications, 114-5032, Crimping Positive Lock Receptacle (Domestic Products) and 114-5032, Crimping Positive Lock Receptacle, by using the wires of the sizes specified in Table 4. Test specimens used for this evaluation should not have Bend-up, down, twist, rolling of more than 5 degrees. Unless otherwise specified no sample shall be reused.

## 8.2.2 Number of Specimens:

The number of samples to be employed for the tests shall be not less than 10 sets per test group as specified.

## 8.2.3 Mating Tab Contact:

The tab contact to be used as a counterpart contact, shall be fabricated in accordance with the specifications shown in Fig. 4.

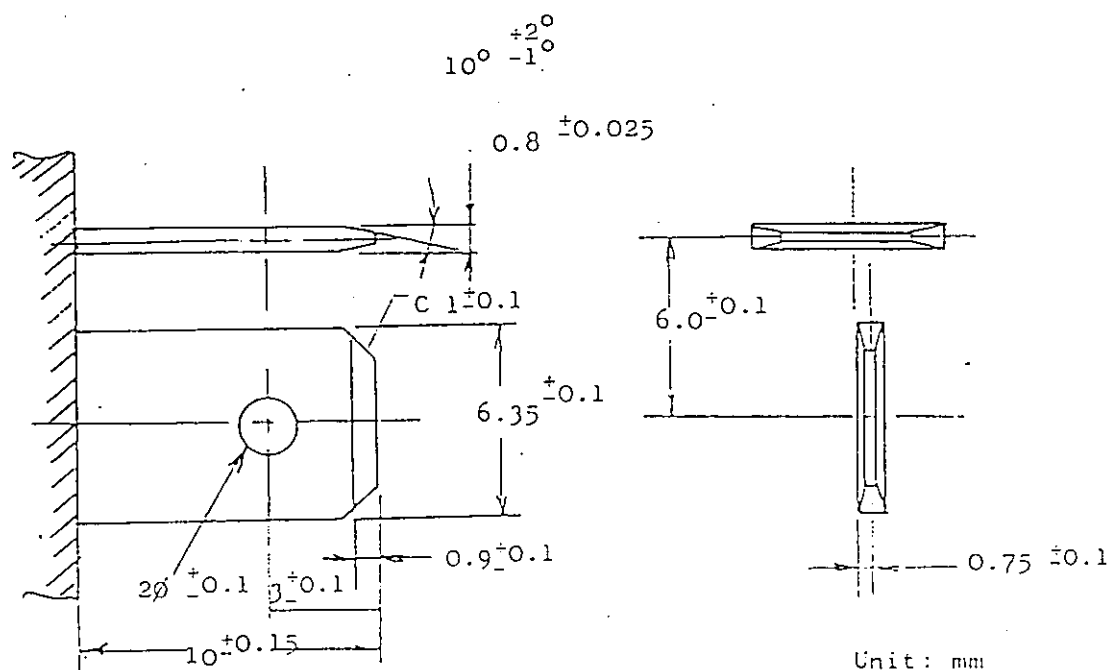


Fig. 4

Note: Refer to Drawing No. 116-5077 when to fabricate this tab.

SHEET		<b>AMP</b>		AMP (Japan), Ltd. TOKYO, JAPAN	
9 OF 10	LOC J	A	NO 108-5114	REV E	
NAME Product Specification					
2-Position, Combination Connector					

## 8.2.4 Applicable Wire Sizes:

The wires of the following sizes shall be used for crimping the samples for performance tests.

Wire Size		Strand Composition		Calculated Cross-sectional Area	
mm <sup>2</sup>	(AWG)	Strand Dia-meter (mm)	Number of Strands	mm <sup>2</sup>	CMA
0.5	(#20)	0.32	7	0.56	1111
0.85	(#18)	0.32	11	0.88	1746
1.25	(#16)	0.32	16	1.28	2540
2.0	(#14)	0.32	26	2.09	4128
3.0	(#12)	0.32	41	3.30	6509
5.0	(#10)	0.32	65	5.23	10319

Table 4


## 9. Special Instructions at Assembly:

## 9.1 Crimping and Handling of Products:

In order to maintain reliable quality of terminated contacts, crimping shall be performed in accordance with AMP Application Specifications, 114-5032 and 114-5029.

## 10. Reference Documents:

- (7002)  
JASO D-605-74: Automotive Multipole Connector  
JASO 7101: Test Methods for Molded Plastic Parts  
JIS C 3406: Low Voltage Cables for Automobiles  
JIS D 0204: Method of High and Low Temperature Test for Automobile Parts  
JIS D 1601: Vibratile Testing Method for Automobile Parts  
JIS D 5500: Lighting and Signalling Equipment for Automobiles  
EIA-364-26C: Salt Mist Testing Method for Electronic Component Parts

SHEET				AMP (Japan), Ltd. TOKYO, JAPAN	
10 OF 10	LOC J	A	NO 108-5114	REV E	
NAME Product Specification					
2-Position, Combination Connector					