



INTER-OFFICE MEMORANDUM

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To: Jerry Hicks  
c/o R. H. McDonald Assoc.

Date: June 20, 1978

Subject: MATTEL

In regard to the special connectors for Mattel, we did ship the 250 parts on June 15, 1978 and they should be at Mattel.

We have soldered the contact tails on a number of parts and the CDA 725 appears to solder well. Enclosed are samples.

We have also run some tests on insertion and withdrawal, contact resistance, and durability. Enclosed are the results to pass on to Mattel.

Please keep us advised of the progress of their program and see if we can't get the quantity order wrapped up.

M. G. Andre

MGA:beb  
encl.  
cc: J. Klimek

RECEIVED  
JUN 22 1978

R. H. McDONALD & ASSOC.

# METHODE ELECTRONICS, INC.

CHICAGO, ILLINOIS 60656

## TEST REPORT

<b>PART NO.</b> 186-413-01		<b>PART NAME</b> CONNECTOR, ELECTRICAL, RECEPTACLE			<b>REPORT NO.</b> 061578-12	
<b>PROJECT NO.</b>	<b>REQUESTED BY</b> M. ANDRE	<b>SPECIFICATION</b>	<b>DATE REC'D</b> 6/14/78	<b>DATE COMP'D</b> 6/15/78	<b>TESTED BY</b> T.P.	
<b>TEST</b> INDIVIDUAL CONTACT INSERTION AND WITHDRAWAL, CONTACT RESISTANCE AND DURABILITY CYCLING.					<b>APPROVED BY</b> ENGINEERING	
					QUALITY CONTROL	
					ACCEPTANCE	

### REQUIREMENTS:

- I. MEASURE THE FORCE REQUIRED TO ENGAGE AND SEPARATE A FLAT STEEL GAGE 0.062 INCH THICK INTO TEN (10) CONTACT PAIRS BEFORE AND AFTER CYCLING.
- II. MEASURE THE CONTACT RESISTANCE, EXPRESSED IN MILLIVOLTS, USING A DIRECT TEST CURRENT OF ONE AND FIVE AMPERES.
- III. THE CONNECTORS SHALL BE CYCLED 1000 TIMES WITH A 0.070 THICK FLAT STEEL BLADE.

### PROCEDURE:

TWO (2) METHODE CONNECTORS P/N 186-413-01 HAVING CDA 725 ALLOY CONTACTS SHALL UNDERGO AN INDIVIDUAL CONTACT INSERTION/WITHDRAWAL FORCE TEST, CONTACT RESISTANCE AND DURABILITY CYCLING TEST.

- I. A STEEL BLADE 0.062 INCH THICK SHALL BE SECURED TO A HAND HELD PUSH-PULL GAGE. THE FORCE REQUIRED TO ENGAGE AND SEPARATE THE TEST BLADE FROM THE INDIVIDUAL CONTACT PAIRS SHALL BE MEASURED INITIALLY AND UPON COMPLETION OF THE 100, 500 AND 1000 DURABILITY CYCLE.
- II. THE CONNECTORS SHALL BE MATED WITH A PRINTED CIRCUIT BOARD 0.062 INCHES THICK HAVING GOLD PLATED FINGERS. A DIRECT TEST CURRENT OF ONE (1) AMPERE SHALL BE APPLIED TO THE INDIVIDUAL CONTACT TAILS THROUGH TO THE P.C.B. USING A MILLIVOLTMETER, THE CONTACT RESISTANCE EXPRESSED IN MILLIVOLTS SHALL BE MEASURED ON A POINT ON THE CONTACT TAIL NEAR THE INSULATOR TO A POINT ON THE FINGER OF THE P.C.B. NEAR THE INSULATOR BODY. THE CONTACT RESISTANCE SHALL ALSO BE MEASURED USING A DIRECT TEST CURRENT OF FIVE AMPERES. THE READINGS SHALL BE MEASURED INITIALLY AND UPON COMPLETION OF THE 100, 500 AND 1000 DURABILITY CYCLE. THE CONTACT RESISTANCE SHALL ALSO BE MEASURED AS DESCRIBED ABOVE USING A TIN PLATED P.C.B.

III. USING A CYCLING MACHINE, THE CONNECTORS SHALL BE CYCLED 1000 TIMES AT A RATE OF 10 CYCLES PER MINUTE WITH A .070 THICK FLAT STEEL BLADE.

INSTRUMENTATION:

<u>INSTRUMENT OR EQUIPMENT</u>	<u>MANUFACTURER</u>	<u>MODEL NO.</u>	<u>SERIAL NO.</u>
CYCLING MACHINE	METHODE	5195	CD188
MILLIVOLTMETER	KEITHLEY	150B	57374
AMMETER	SIMPSON	#9	CD178
POWER SUPPLY	ELECTRO	H	2998
PUSH-PULL GAGE	HUNTER SPRING	LO-2	5201
BLADE	METHODE	.062	
BLADE	METHODE	.070	

RESULTS:

TWO (2) METHODE CONNECTORS P/N 186-413-01, HAVING CDA 725 ALLOY CONTACTS, UNDERWENT AN INDIVIDUAL CONTACT INSERTION/WITHDRAWAL FORCE TEST, CONTACT RESISTANCE AND DURABILITY CYCLING TEST AS OUTLINED ABOVE.

- I. THE RESULTS OF THE INDIVIDUAL ENGAGING AND SEPARATING FORCES MAY BE FOUND ON THE FOLLOWING PAGES.
- II. THE RESULTS OF THE CONTACT RESISTANCE MAY BE FOUND ON THE FOLLOWING PAGES.
- III. UPON COMPLETION OF THE 1000 CYCLE WITH THE 0.070 THICK STEEL BLADE, THERE WAS NO EVIDENCE OF DAMAGED CONTACTS.

INDIVIDUAL INSERTION AND WITHDRAWAL USING AN .062 STEEL BLADE. READINGS EXPRESS IN OUNCES.

<u>CONTACT POSITION</u>	<u>INITIAL</u>			
	<u>#1</u>		<u>#2</u>	
	<u>ENG.</u>	<u>SEP.</u>	<u>ENG.</u>	<u>SEP.</u>
2	7.5	4.0	9.2	4.5
6	8.0	4.2	9.4	3.6
10	7.5	4.0	9.5	3.8
14	7.2	4.0	8.2	4.4
18	7.2	3.5	8.2	3.8
22	7.8	3.5	10.0	4.5
26	8.0	4.0	8.2	4.2
30	8.2	4.0	9.0	4.2
34	9.2	4.6	10.2	4.8
38	8.8	4.6	10.0	4.6
HI	9.2	4.6	10.2	4.8
LO	7.2	3.5	8.2	3.6
AVG.	7.9	4.0	9.2	4.2

AFTER 100 CYCLES W/.070

AFTER 500 CYCLES W/.070

CONTACT POSITION	#1		#2		#1		#2	
	ENG.	SEP.	ENG.	SEP.	ENG.	SEP.	ENG.	SEP.
2	9.2	4.0	16.0	5.2	15.8	11.0	12.0	6.5
6	9.8	4.0	14.0	5.5	16.5	10.0	17.0	8.2
10	8.8	3.8	12.0	5.2	13.5	10.2	13.0	6.0
14	9.4	4.2	12.0	4.0	16.5	9.0	12.0	8.0
18	11.0	4.0	10.5	6.0	15.5	12.5	16.8	8.2
22	12.2	4.6	13.0	6.0	16.5	7.0	17.5	11.5
26	11.8	3.2	12.2	5.0	17.0	7.2	15.5	7.5
30	11.0	5.2	11.8	5.8	18.0	6.5	17.0	9.5
34	12.5	5.5	15.2	6.2	18.5	10.5	17.8	5.5
38	12.5	3.8	14.8	6.5	19.0	11.0	18.5	10.0
HI	12.5	5.5	16.0	6.5	19.0	12.5	18.5	11.5
LO	8.8	3.2	10.5	4.0	13.5	6.5	12.0	5.5
AVG.	10.8	4.2	13.2	5.5	16.7	9.5	15.7	8.1

AFTER 1000 CYCLES W/.070

CONTACT POSITION	#1		#2	
	ENG.	SEP.	ENG.	SEP.
2	7.0	3.2	6.8	4.0
6	18.8	4.2	12.5	10.0
10	14.5	5.2	13.0	11.0
14	15.0	6.5	15.0	12.8
18	15.5	9.0	14.0	9.5
22	16.5	10.0	17.0	15.0
26	17.5	10.0	18.8	15.0
30	17.5	11.0	16.5	13.5
34	17.0	14.0	15.0	13.2
38	18.8	15.0	19.0	16.0
HI	18.8	15.0	19.0	16.0
LO	7.0	3.2	6.8	4.0
AVG.	15.8	8.8	14.8	12.0

INITIAL READINGS

CONTACT POSITION	GOLD PLATED P.C.B.				TIN PLATED P.C.B.			
	1 AMP		5 AMPS		1 AMP		5 AMPS	
	#1 M.V.	#2 M.V.	#1 M.V.	#2 M.V.	#1 M.V.	#2 M.V.	#1 M.V.	#2 M.V.
2	12.5	11.0	48.0	50.0	10.0	9.0	58.0	50.0
6	13.0	11.5	51.0	53.0	10.0	9.5	52.0	48.0
10	12.0	11.0	54.0	47.0	9.5	8.5	48.0	47.0
14	10.0	16.0	48.0	48.0	9.0	9.0	48.0	47.0
18	10.0	11.5	55.0	51.0	9.0	9.0	48.0	48.0
22	10.0	10.0	52.0	47.0	9.5	10.0	48.0	53.0
26	10.0	10.0	46.0	54.0	10.0	10.0	49.0	53.0
30	11.5	10.0	48.0	47.0	11.0	10.5	48.0	55.0
34	11.0	10.0	58.0	46.0	9.0	9.0	50.0	44.0
38	14.0	10.5	50.0	50.0	11.0	9.0	48.0	48.0
HI	14.0	16.0	58.0	54.0	11.0	10.5	58.0	55.0
LO	10.0	10.0	46.0	46.0	9.0	8.5	48.0	44.0
AVG.	11.4	11.2	51.0	49.3	9.8	9.4	49.7	49.3

AFTER 100 CYCLES W/.070

2	11.5	14.0	65.0	67.0	11.5	9.5	52.0	62.0
6	11.0	11.0	64.0	53.0	11.5	9.5	53.0	53.0
10	10.5	10.5	54.0	52.0	11.5	9.0	48.0	50.0
14	11.0	11.0	55.0	50.0	10.0	9.5	50.0	55.0
18	11.0	10.5	56.0	51.0	11.0	9.0	49.0	58.0
22	10.5	11.0	56.0	52.0	11.5	10.0	50.0	50.0
26	10.5	11.5	52.0	55.0	12.0	10.0	59.0	54.0
30	10.0	10.0	50.0	53.0	8.5	9.0	46.0	49.0
34	10.5	9.5	51.0	50.0	9.0	9.0	49.0	50.0
38	10.0	10.0	53.0	52.0	9.0	9.0	48.0	50.0
HI	11.5	14.0	65.0	67.0	12.0	10.0	59.0	62.0
LO	10.0	9.5	50.0	50.0	8.5	9.0	46.0	49.0
AVG.	10.7	10.9	55.6	53.5	10.5	9.4	50.4	53.1

AFTER 500 CYCLES W/.070

2	16.0	14.0	70.0	68.0	12.0	11.5	64.0	61.0
6	13.0	11.5	62.0	58.0	11.5	9.5	61.0	52.0
10	12.0	10.0	56.0	53.0	10.0	9.0	61.0	52.0
14	12.5	9.5	56.0	50.0	10.0	9.0	50.0	51.0
18	12.0	10.0	50.0	51.0	9.5	9.0	49.0	51.0
22	14.0	10.0	58.0	52.0	10.0	9.0	51.0	49.0
26	13.0	10.5	52.0	55.0	10.0	9.5	52.0	50.0
30	10.5	10.0	53.0	51.0	10.0	9.5	51.0	50.0
34	10.5	10.0	57.0	50.0	10.5	9.5	54.0	52.0
38	11.0	10.0	54.0	53.0	10.0	10.0	54.0	48.0
HI	16.0	14.0	70.0	68.0	12.0	11.5	64.0	61.0
LO	10.5	9.5	52.0	50.0	9.5	9.0	51.0	48.0
AVG.	12.5	10.6	56.8	54.1	10.4	9.6	53.9	51.4

AFTER 1000 CYCLES W/.070

CONTACT POSITION	GOLD PLATED P.C.B.				TIN PLATED P.C.B.			
	1 AMP		5 AMPS		1 AMP		5 AMPS	
	#1 M.V.	#2 M.V.	#1 M.V.	#2 M.V.	#1 M.V.	#2 M.V.	#1 M.V.	#2 M.V.
2	12.5	13.0	66.0	60.0	11.5	11.5	58.0	55.0
6	10.0	10.0	51.0	60.0	10.0	10.5	51.0	48.0
10	10.0	10.0	54.0	56.0	10.0	11.0	52.0	48.0
14	10.5	10.0	54.0	58.0	10.0	11.5	55.0	50.0
18	9.0	9.5	48.0	54.0	10.0	10.5	53.0	50.0
22	10.0	10.0	54.0	53.0	10.0	10.5	50.0	48.0
26	10.0	10.0	51.0	52.0	10.0	10.5	52.0	51.0
30	10.5	11.0	56.0	60.0	9.0	9.5	48.0	49.0
34	12.5	11.5	65.0	60.0	10.0	10.0	54.0	50.0
38	12.5	10.0	65.0	54.0	10.0	10.0	53.0	51.0
HI	12.5	13.0	66.0	60.0	11.5	11.5	58.0	55.0
LO	9.0	9.5	51.0	52.0	9.0	9.5	48.0	48.0
AVG.	10.8	10.5	46.6	56.7	10.1	10.6	52.6	50.0