MITSUBISHI
4/6/2005
LETTER TO ODI
ATTACHMENT
DOCUMENT NO. 13 - 25
PART 3 OF 4

Document No.13

Meeting Minutes : Document Number J801-B091
Approved by Interior Design Dept. Mr. Nakajima
Created on 01.5.31 by Electrical System Design Mr. Tozuka

<MMNA Headlamp Connector Melting Damage Meeting 01.5.31>
Attendees
Refer to attached list
Place
Okazaki Meeting Room S42

1. Report of Investigation Results for Actual Parts Recovered・・・Attachment①, ②Reference
・2 parts recovered locally (connector side only)・・・COM terminals with melting damage
(for reference, bench tested part at Ele testing (salt water droplet test) analyzed too)
- significant contact resistance : 146.6 (Lo) ／206.8 (Hi) mΩ ┐ cause at terminal
- resistance at clamp portion : 0.78～1.17 mΩ nominal value ┘
- Almost none detected for Cl. (significant detection for Cu, Ca, Sn) ⇒ believe salt water and/or salt are not causes
- No irregularities of crimp height as within standard and cross-section shape
- Observed wire bias, but what is the reason? (Ele testing) ⇒ applies to terminals 0.5～2sq. CAVS was made of 7 core wires, Judging as normal from wire compression ratio, contact resistance, fixed strength (Yazaki Corp.)
- Clamped by 0.5～2.0 bonding tool ⇒Cramp configuration in case of using 0.5 bonding tool ⇒Yazaki Corp.

2. Cause Clarification Discussions
1) Creep characteristic measurement status of Current harness side terminal・・・ Attachment③ (Yazaki Corp.)
(1)thermal stress relaxation characteristics of 312terminal (AMP name: Qterminal)
・Figure at right shows current status
・Plan to conduct up to 500 hours. Report for 300 hour point. (Yazaki Corp.⇒MMC)

2) Report on Wiggling Reproduction Test when Connecting Actual Vehicle Connector for ST28(24)／ST41・・・・Attachment ④, ⑤
- Simulation of MMNA production line assembly environment for actual vehicles
- Inserting once and the pushed side of the terminal demonstrates a tendency to widen (opens up to 0.7mm)
(countermeasure parts (NQ) inserted at an angle have no problems)
- the 2nd insertion, there is a tendency for further overall widening greater than the 1st insertion

- when the female terminal is at its widest, observation of the male bulb terminal bending is about 0.1mm

3) FTA Results (Ele testing) ・・・ Attachment ⑤

the related part of the vehicle is the part surrounding□

- No salt to oxidize. Water has relationship to corrosion (but contribution to this problem is small)
- Head LP temperature increase ・・report lately
- Metallic plate cracking ・・ cannot analyze
- Wiggling ・・ conduct reproduction test 2 above

<FTA Considerations>

The following are the factors that have been narrowed down as of today

① 5 items for terminal deformation

② 8 items for thermal stress relaxation due to irregular temperature increases

(③water is significantly impacts corrosion, but does not significantly impact melting damage)

3. Report on Results of Bench Temperature Measurements at Lamp Assembly for 6 Models ・・・・・Attachment ⑦ (Yazaki Corp.)

- temperature of GE bulb 10℃ higher than KOITO with the same lamp
- ST41 temperature 10℃ higher compared to JT44XL, DZL with lamp assembly with same bulb

⇒ ST41 (GE) is 20℃ higher compared to JT44XL(KOITO) (at bench test)

- Bulb base height from ground 30 to 50cm, windless

4. Report on Lamp Manufacturer Test same as 3 Above(Body Ext Design)・・Attachment ⑧

- bulbs (Lo terminal) with the same lamp exhibit temperature drops in descending order as follows Phillips>GE>Osram, but no major differences
- No difference with lamp assembly with same bulb (Phillips)
- Difference between Stanley and Yazaki bench test temperatures with Ele testing vehicles・・・Slight difference occure since wind convection cannot be avoided,

・・・・・Attachment ⑧'

- a difference in heat dissipation behavior from lamp assembly base was clarified as a result of the investigation

☆ Based on above 3 and 4, temperature increase values (Lo terminal) due to lamp assembly differences and differences in bulbs approximately 50 to 60℃.

5. E/ROOM Temperature (LH, close to H/Lamp, ambient temperature=40℃)

MMC measured temperature (reference data) ・・・・ Attachment ⑧"

	Idle (0.5h)	120km/h (3% slope to drive up)
ST22	91℃	88℃
ST	85℃	46℃
ST41	84℃	77℃

6. Bulb body type list for all models

(Direct-mount type)

・AMP (non-watertight) ・・HB2 ・・Brass+tin plating ・・affected by wiggling

・SEI (watertight) ・・HB5 ・・copper alloy ・・wiggle prevention design—ST22

・MCI (watertight) ・・{HB3, 4 / H1, H4} copper alloy ・・wiggle prevention design—2W00, 2J3SX

・Ele testing conduct idle soak test for each bulb type, depending on the results, to decide whether or not to extend testing necessary

・Drafting of proposed test method already completed

・Summary for Instances of Bulb terminal melting damage ・・・・ Attachment ⑩-1

Items indicated by MRDA

Bulb male terminal bend control modifications since 99.5.11. Melting damage continued to occur even after that time and thus not major cause.

・Market information analysis ・・・・・⑩-2

search by MB943696 and MU801307as key⇒ f36 value

MMNA production is rather significant

・ST41 0.73%

・ST24S/28 1.29%

・Domestic ST 0.1% level

・EU ST 0.02% level

3. Summary

1) Countermeasure Proposal

・Production Vehicle Countermeasure : change to NQ connector (Yazaki Corp.)

・Countermeasure for vehicles already sold : coordinate with MMA PSC (QP)

2) Cause (Inferred) : believe there are no regional characteristics in North America

・ENG ROOM temperature ST series : 80℃

\+ +

・H/LP temperature increase 50 to 60℃

↓ =130 to 140℃

exceeds heat stress relaxation temperature limit (120℃)

↓ wiggling, chattering

reached to melting damage? Conduct melting damage test (Yazaki Corp.)

3) Future Steps

① Conduct Melting Damage Reproduction Test (Yazaki Corp.)

heat stress relaxation ⇒ contact resistance increase ⇒ temperature increases

repetitive this cycle・・・validation of this mechanism

- ambient temperature 80℃
- H/LP・・13.3V terminal superimposed voltage (Lo beam)
- Water aspersion 10cc/day
- Conduct with lamp assembly
- after connector terminal wiggling (0.8mm gap level)
- insert interval after injecting water to allow for oxidation

② ST24/41 E/ROOM (around lamp) repair history investigation (Ele Sys Design⇒ MRDA)

③ North America ST, P45, MG engine room temperatures P45 (by 6/8), MG (by 6/14)
Measured temperatures for ST, JT41, MGX, DX

④ Line claim analysis for MMNA ST (98/7～ST41 mass production start～) (Yazaki Corp.)

⑤ measure H/LP Gravity & vibration frequencies for ① (by No1 vehicle testing) (by 6/8)

⑥ review FTA from perspective of unique characteristics of North America (Ele testing Ele Sys Design 6/8)

⑦ investigation of shipment status of spare parts

Document No.14

(Attachment ①,② for Document No.13)

Company	Mitsubishi Motors Corporation

Subject: MMNA Headlamp Connector Melting Damage Report
(Harness supplier terminal clamping control investigation)
Date of Issue: May 31, 2001
Report No.: J801-B901
Author: YAZAKI
Date of Test: Unknown (close to May 31, 2001)
Test Place: YAZAKI

Test Vehicle and Sample
Sample: Harness terminal
Plant: YAZAKI Niimi plant, Daitoh plant, EMI, YTMI

Scope(s)
Investigate control of terminal clamping activities at wiring harness supplier

Summary of Test Conditions and Test Results
- Conclusion:
(1)Contact force control, Wire tension (Fixing force) control
1)Contact force control : Not controling.
2)Wire tension (Terminal Fixing force) : controlling
(2)Applicator variation, clamping shape and press machine control

Machine	Type	Items Checked	Checking Frequency
Applicator	87	from Applicator Periodical Check Sheet	1 time/3months
Clamp press	YCM-2(2.5ton)	from YCM-2 Periodical Check Record Sheet	1 time/2years
Clamp tool	See below	Check terminal back for protrusions according to inspection standard, if protrusion observed change clamp tool	anytime

Terminal Part No.	Wire clamper	Insulation clamper	Anvil
7116-3355-02	7116-3356-A	7116-3355-A	7116-3355-A
7116-3356-02	7116-3356-A	7116-3355-A	7116-3355-A

(3)Delivered terminal parts inspection and history
1)Japan domestic factory: factory does not conduct delivery check, guaranteed by terminal supplier
2)EMI/YTMI: conduct visual, deformation, leak, and corrosion check

(4)Control of C/H (crimp height), C/W (crimp width)
YAZAKI conducts the following according to its own internal standard.

Timing	Measuring QTY	Tool	Record
when terminal replaced when wire size and/or type changed	first terminal last terminal	Micrometer	Working daily report

(5)Check for change in wire purchasing route and wire changes
Niimi factory/Daito factory (in Japan): procure from Hirosagawa factory Ohita part.
No change since 1998.
EMI・YTMI(Philippine): procure from YTMI and no change from 1996.

(6)Countermeasure part schedule plan
1)Niimi factory/Daito factory (in Japan):
Deliver 2 months after EO received
2)EMI・YTMI (Philippine)
Deliver 3 months after EO received

Comments

[redacted]

(EMI)

[redacted] 7116-3212-02
C/H 1.20~1.30
C/W 2.30~2.50

NO	C/H	C/W		
1	1.25	2.38	0.2	○
2	1.25	2.40	0.4	○
3	1.25	2.39	0.3	○
4	1.24	2.38	0.2	○
5	1.24	2.39	0.3	○

[redacted] 7116-3211-02
C/H 1.20~1.30
C/W 2.30~2.50

NO	C/H	C/W		
1	1.26	2.39	0.4	○
2	1.26	2.39	0.4	○
3	1.25	2.40	0.3	○
4	1.26	2.39	0.3	○
5	1.26	2.40	0.3	○

[redacted] 7116-3356-02
C/H 1.20~1.30
C/W 1.90~2.00

NO	C/H	C/W		
1	1.25	1.98	0.4	○
2	1.25	1.98	0.3	○
3	1.25	1.98	0.3	○
4	1.25	1.98	0.2	○
5	1.25	1.98	0.3	○

[redacted] 7116-3355-02
C/H 1.20~1.30
C/W 1.90~2.00

NO	C/H	C/W		
1	1.26	2.00	0.3	○
2	1.26	2.00	0.3	○
3	1.26	2.00	0.4	○
4	1.26	2.00	0.3	○
5	1.26	2.00	0.3	○

[redacted]

(YTMI)

[redacted] 7116-3212-02
C/H 1.20~1.30
C/W 2.30~2.50

NO	C/H	C/W		
1	1.24	2.39	0.2	○
2	1.25	2.39	0.2	○
3	1.25	2.39	0.2	○
4	1.24	2.40	0.2	○
5	1.25	2.39	0.2	○

[redacted] 7116-3211-02
C/H 1.20~1.30
C/W 2.30~2.50

NO	C/H	C/W		
1	1.25	2.38	0.2	○
2	1.25	2.39	0.3	○
3	1.25	2.40	0.4	○
4	1.25	2.39	0.3	○
5	1.25	2.39	0.3	○

[redacted] 7116-3356-02
C/H 1.20~1.30
C/W 1.90~2.00

NO	C/H	C/W		
1	1.24	1.98	0.2	○
2	1.24	1.99	0.2	○
3	1.24	1.98	0.5	○
4	1.24	1.99	0.4	○
5	1.25	1.99	0.5	○

[redacted] 7116-3355-02
C/H 1.20~1.30
C/W 1.90~2.00

NO	C/H	C/W		
1	1.24	1.99	0.2	○
2	1.24	1.98	0.2	○
3	1.25	1.98	0.3	○
4	1.25	1.99	0.2	○
5	1.25	1.98	0.2	○

[redacted]

H/[redacted]

[redacted]

	7116-3356-02
	C/H 1.20~1.30
	C/W 1.90~2.00

NO	C/H	C/W	[redacted]	
1	1.25	1.97	0.2	○
2	1.25	1.96	0.1	○
3	1.25	1.97	0.1	○
4	1.25	1.97	0.2	○
5	1.25	1.96	0.2	○

[redacted]	7116-3355-02
	C/H 1.20~1.30
	C/W 1.90~2.00

NO	C/H	C/W	[redacted]	
1	1.25	1.96	0.1	○
2	1.27	1.96	0.2	○
3	1.25	1.97	0.2	○
4	1.25	1.98	0.2	○
5	1.25	1.99	0.2	○

[redacted]

	7116-3356-02
	C/H 1.20~1.30
	C/W 1.90~2.00

NO	C/H	C/W	[redacted]	
1	1.25	1.98	0.3	○
2	1.25	1.99	0.3	○
3	1.25	1.99	0.2	○
4	1.24	1.99	0.2	○
5	1.24	1.99	0.3	○

[redacted]	7116-3355-02
	C/H 1.20~1.30
	C/W 1.90~2.00

NO	C/H	C/W	[redacted]	
1	1.25	1.97	0.2	○
2	1.25	1.98	0.3	○
3	1.25	1.98	0.3	○
4	1.25	1.98	0.3	○
5	1.25	1.98	0.2	○

Company	Mitsubishi Motors Corporation

Subject: Investigation of parts recovered from market
(Investigation of parts recovered from market)
Date of Issue: unknown
Report No.: N/A
Author: N/A (Yazaki)
Date of Test: unknown
Test Place: unknown (maybe YAZAKI in Washizu City)

Test Vehicle and Sample
Vehicle: Model(s): ST24S
Sample1: Recovered parts 256713 (April 12, 2001)
Sample2: Recovered parts 256491 (April 11, 2001)

Scope(s)
Investigate parts recovered from the market and contribute to analysis of root cause

Summary of Test Conditions and Test Results
-Conclusion:
(1)Visual inspection
No marks at mating side of terminals
corrosion present on terminal surface
(2)Electrical resistance values
Resistance at the clamp is relatively low, however the terminal contact resistance is significantly high.
(3)Impurities specifying investigation
After bench test, significant amount of chlorine (Cl) detected from the sample.
However, little Cl detected from the recovered samples.
(4)Terminal gap investigation
Com terminal gap wider than male terminal width (0.76mm), thus no contact
The deeper the terminal is from entrance of male connector, the wider the Com terminal gap becomes.
(5)Wiring hardness investigation
The exothermic source could not be identified as either the terminal contact or clamp.

Comments

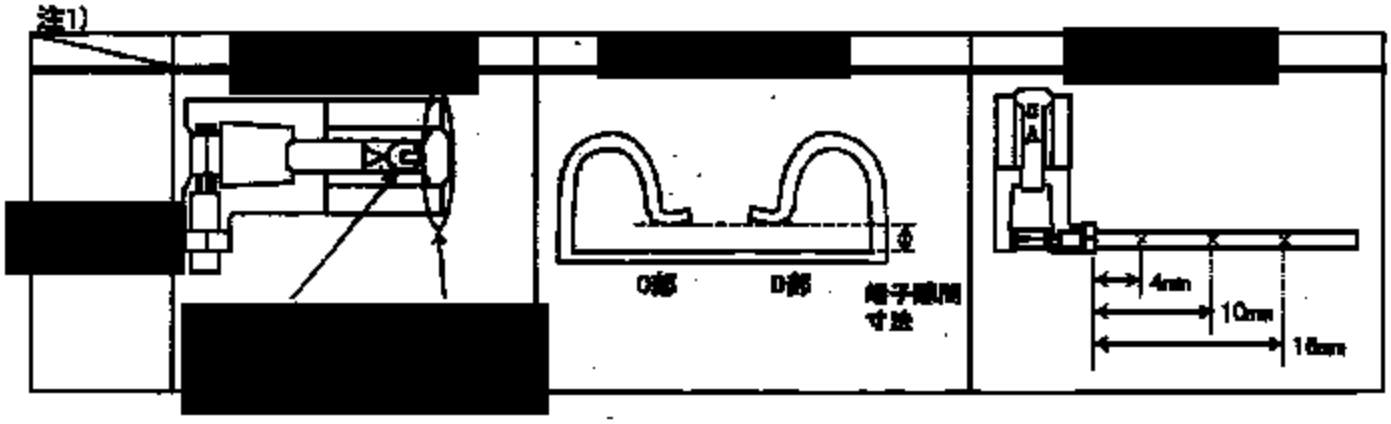
[redacted]

[redacted]	256713	256491	—
	2001.04.12	2001.04.11	—

[redacted]

			タンプ(C)	[redacted]	[redacted]
COM			測定不可 (0.48)	測定不可 (1.17)	—
Lo			4.28 (1.27)	146.6 (1.07)	—
Hi			9.80 (0.71)	206.8 (0.78)	—
Lo	A部	多	Cu, Sn, I	Cu, Sn	多 Cl, Fe, Cu, Zn, Sn
		少	O, S, Cl, K	O, Na, S, Cl, Ca	少 O
	B部	多	Cu, Sn	—	多 Cl, Cu, Sn
		少	O, Cl, Zn		少 O, Cr, Fe, Zn, Te
Hi	A部	多	Ca, Cu, Sn	Sn	—
		少	C, O, Mg, S, Cl, K, Zn	O, Na, S, Cl, Cu	
	B部	多	Cu, Sn	—	—
		少	C, O, Mg, Cl		
COM	C部		1.40(入口), 1.06(抜)	1.94(入口), 1.27(抜)	—
	D部		0.85	0.87	—
Lo	C部		0.68	0.66	—
	D部		0.68	0.68	—
Hi	C部		0.85	0.78	—
	D部		0.63	0.70	—
4mm			—	136	—
10mm			—	136	—
16mm			—	162	—

注1)



(所見)

[redacted]

mm) : 3.73
m) : 2.45

mm) : 2.38
m) : 1.24
) : 77.2

m) : 3.75
m) : 2.37

n) : 2.32
n) : 1.26
: 76.9

n) : 3.70
n) : 2.47

) : 2.41
) : 1.28
: 77.2

) : 3.71
) : 2.40

) : 2.40
) : 1.26
: 75.5

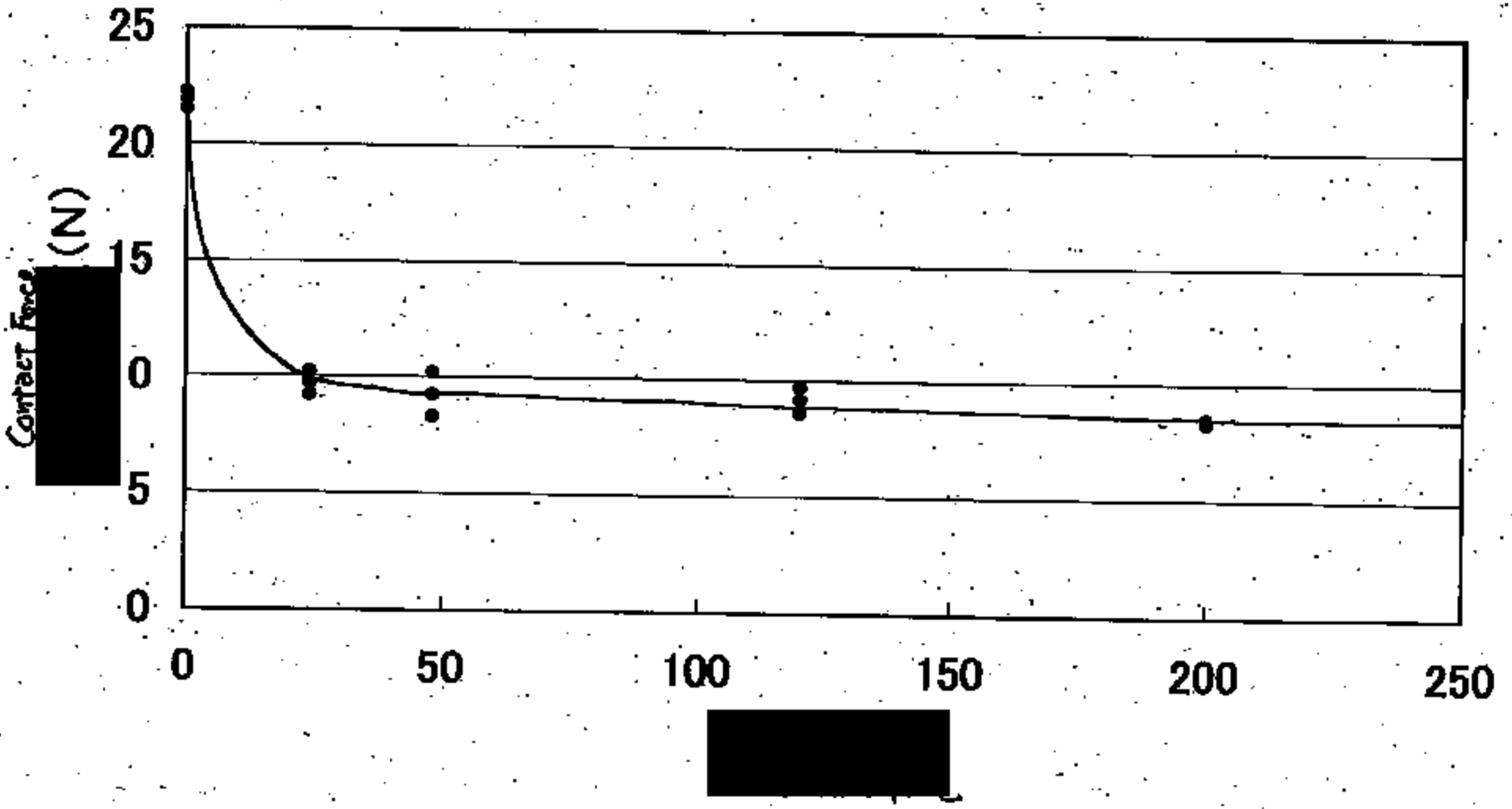
: 3.62
: 2.42

Document No.16

(Attachment ③ for Document No.13)

≪ Q Terminal stress relaxation by samples at Yazaki @100°C ≫

[redacted] 100°C



Document No.17

(Attachment ④ for Document No.13)

Company	Mitsubishi Motors Corporation

Subject: Comparison of Temperatures around Headlamps with Other Vehicles
(Headlamp temperature increase test)
Date of Issue: May 31, 2001
Report No.: None
Author: Sakamoto
Date of Test: Unknown (close to June 6, 2001)
Test Place: MMC Okazaki Plant

Test Vehicle and Sample
Vehicle: Model(s) and Model Year: ST41 02MY, ST28 02MY, Toyota Camry, ST22 02MY, PSU 04MY

Scope(s)
Terminal temperature increases after wiggling terminal could be the secondary cause of connector melting.
Headlamp body heat radiation, engine room atmospheric temperature, harness wire diameter, connector heat conductivity are listed as potential factors in increasing temperatures.
These factors are compared between ST28(ST24S),ST41, other MMC vehicles, and also other car manufacturers' vehicles.

Summary of Test Conditions and Test Results
・Conclusion:

(1)ST41 LO and COM terminal temperatures after idle saturation are about 30 degrees higher than 4 other vehicles.
(2)ST28 (24S) all 3 terminal temperatures after idle satulation are 5~10 degrees lower than Camry.
(3)The terminal temperature difference between LO and HI terminal is as large as 25 deg Celsius for ST41.

・Measurements and/or Inspections:
(1)Power source
Engine off: fixed 13.3V from stable power source
Idle and driving: actual battery used
(2)Measurement level
Record stable saturated temperature by monitoring with hybrid recorder
(3)Driving conditions
Drive until temperature saturated and then leave at idle till temperature saturated again*
* Max temperature at idle: Drive until temperature saturates and soak at idle condition until saturated again.
Only reference value since such a long idle soak with headlamps on rarely occurs.
(This is only an abuse test to focus on potential differences between vehicles.)

(4)Measuring condition
At Eng off: other electrical loads off, engine room hood: open
At Idle : other electrical loads off, engine room hood: closed

Comments

資料④

[redacted]	02MY ST41 8G72 A/T			02MY ST25 4G64 M/T				97 トヨタ カムリ V6 A/T				02 ST22 8G72 A/T				PSU F試	
	2灯			2灯				2灯				2灯					
	GE HB2			GE HB2				HB2								シルバー	
	[redacted]																
25.0℃	←	-	-	22.0℃	←	-	-	23.0℃	←	-	-	24.0℃	←	-	-	48.0℃	←
65.0℃	[redacted]	40.0℃	96.6℃	65.5℃	83.5℃	43.5℃	61.5℃	58.0℃	89.0℃	35.0℃	66.0℃	67.0℃	83.5℃	43.0℃	59.5℃	59.4℃	79.2℃
57.5℃	114.6℃	32.5℃	89.6℃	76.5℃	78.4℃	54.5℃	56.4℃	53.5℃	89.0℃	30.5℃	66.0℃	75.0℃	78.4℃	51.0℃	54.4℃	53.3℃	75.1℃
38.0℃	96.0℃	13.0℃	71.0℃	53.0℃	82.0℃	31.0℃	60.0℃	59.0℃	92.5℃	36.0℃	69.5℃	71.0℃	82.0℃	47.0℃	58.0℃	65.2℃	82.7℃
102.0℃	146.7℃	77.0℃	121.7℃	103.0℃	119.4℃	81.0℃	97.4℃	82.0℃	112.9℃	59.0℃	89.9℃	124.0℃	119.4℃	100.0℃	95.4℃	182.3℃	191.0℃
110.5℃	147.6℃	85.5℃	122.6℃	102.0℃	118.0℃	80.0℃	96.0℃	86.0℃	117.5℃	63.0℃	94.5℃	-	-	-	-	80.3℃	97.4℃
31.5℃	75.0℃	6.5℃	50.0℃	29.0℃	55.0℃	7.0℃	33.0℃	32.0℃	69.5℃	9.0℃	46.5℃	47.0℃	55.0℃	23.0℃	31.0℃	45.8℃	64.6℃
29.0℃	70.0℃	4.0℃	45.0℃	23.0℃	47.0℃	1.0℃	25.0℃	29.0℃	68.0℃	6.0℃	45.0℃	42.0℃	47.0℃	18.0℃	23.0℃	42.5℃	59.2℃
44.5℃	78.0℃	19.5℃	53.0℃	37.0℃	38.0℃	15.0℃	16.0℃	29.0℃	67.0℃	6.0℃	44.0℃	-	-	-	-	-	-

[redacted]

(7)

Document No.18

(Attachment ⑤ for Document No.13)

Company	Mitsubishi Motors Corporation

Subject: Head Lamp Connector Terminal Wiggling Confirmation Test on Actual vehicles
(Terminal wiggling confirmation test)
Date of Issue: May 29, 2001
Report No.: C01-AA-287-033
Author: Endoh, Kawasaki, Itoh (Yazaki reps.)
Date of Test: Unknown (close to June 8, 2001)
Test Place: Yazaki (Washizu City)

Test Vehicle and Sample
Vehicle: Model(s): ST28, ST41
Sample:

Name	Type	P/N	Supplier
Terminal	Q	7116-3211	AMP
	NQ	7116-3400	YAZAKI
Female connector	Q	7123-3230	AMP
	NQ	7123-3233	YAZAKI

Scope(s)
Confirm extent of terminal widening from abusive wiggling on actual vehicles.
Wiggling is considered a potential factor in terminal widening.

Summary of Test Conditions and Test Results
・Conclusion:
Q type terminal seems more susceptible to wiggling action than NQ tpye terminal.
(1)Q type terminals:
1)Terminal gap is significantly widened from wiggling action
2)Wiggling up-down direction tends to make the Lo terminal gap widen
Wiggling left-right tends to make the COM terminal gap widen

(2)NQ type terminals:
No gap enlargement from wiggling action.

・Measurements and/or Inspections:
Conduct tests below for each vehicle with headlamps on both sides and Q&NQ terminals
Measure each terminal enlargement value according to the independent procedures below.
(1)No wiggling : n=1
(2)Up-down wiggling (Lo terminal rear most portion pushed down around vertical axis): n=2
(3)Left-right wiggling (COM terminal rear most portion pushed around horizontal axis) : n=2

Comments

表—2 [redacted]

車種	コネクタ	[illegible]	部位	測定部位	No	Hi [illegible]	Hi [illegible]	Lo [illegible]	Lo [illegible]	Com [illegible]	Com [illegible]
ST41	新品 Q·AMP	1	左	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			右	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		2	左	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			右	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	NG;先端	1	左	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			右	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		2	左	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			右	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

車種	コネクタ	[illegible]	部位	測定部位	No	Hi [illegible]	Hi [illegible]	Lo [illegible]	Lo [illegible]	Com [illegible]	Com [illegible]
ST28	新品 Q.AMP	1	左	全面	41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			右	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		2	左	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			右	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	NG;先端	1	左	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			右	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		2	左	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			右	全面	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Lo	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
				Com	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

表—3 [illegible]

車種	コネクタ	部位	測定部位	No	[illegible]
ST28	Q:AMP	左	Lo	[illegible]	[illegible]
			Com	[illegible]	[illegible]
			Hi	[illegible]	[illegible]
ST41			Lo	[illegible]	[illegible]
			Com	[illegible]	[illegible]
			Hi	[illegible]	[illegible]
ST28	NG;先端		Lo	[illegible]	[illegible]
			Com	[illegible]	[illegible]
			Hi	[illegible]	[illegible]
ST41			Lo	[illegible]	[illegible]
			Com	[illegible]	[illegible]
			Hi	[illegible]	[illegible]

[redacted]

[redacted]

[redacted]

(mm)

[redacted]	NO	Com[illegible]
—	—	0.04
Q	2	0.17
NG	11	0.65

Document No.19

(Attachment ⑦ for Document No.13)

Company	Mitsubishi Motors Corporation

Subject: Investigation of Temperature around Head Lamp
(Head Lamp Temperature Increase Test)
Date of Issue: May 29, 2001
Report No.: C01-AA-287-032
Author: Endoh, Kawasaki, Itoh, Imamura (Yazaki reps.)
Date of Test: Unknown (close to May 29, 2001)
Test Place: Yazaki (Washizu City)

Test Vehicle and Sample

Vehicle: Model(s): Sample: ○: Test conducted ◎: Connector Difference Confirmed

ST41	GE H4/HB2	PHILIPS H4	OSRAM H4	KOITO H4	KOITO H4/HB2
ST24S	◎	○	○	○	○
CK	○				
CBZ	○				
JT44X	○				
DZL	○				

Connector & terminal		P/N	Material
Yazaki	Connector	7123-3233-30	PBT
	Terminal	7116-3400-02	Copper Alloy t=0.4 Tin plating
AMP	Connector	7123-3230-30	66 nylon
	Terminal	7116-3211	Brass t=0.32 Tin Plating
		7116-3212	Brass t=0.32 Tin Plating

Scope(s)

Investigate and compare differences in bulb terminal temperature ranges for other MMC vehicles on bench.
Bulb terminal temperature is considered a potential secondary factor.
Investigate temperature differences according to different bulbs and connectors

Summary of Test Conditions and Test Results

•Conclusions:

(1)Difference in temperature increases due to different headlamp shape
The temperature increase value was highest for ST41, but there was no significant difference compared to other vehicles.

(2)Difference in temperature increases due to different headlamp bulbs
GE had the highest temperature increase, but there was no significant difference compared with other vehicles

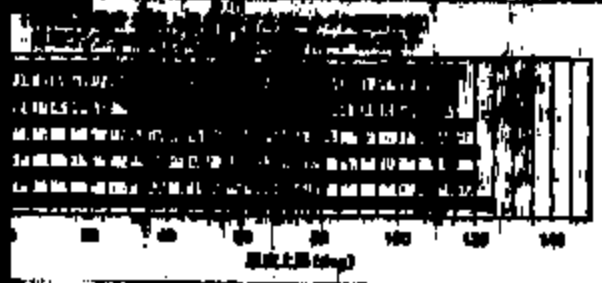
(3)Difference in temperature increases due to different connector types
No significant differences compared to other vehicles.

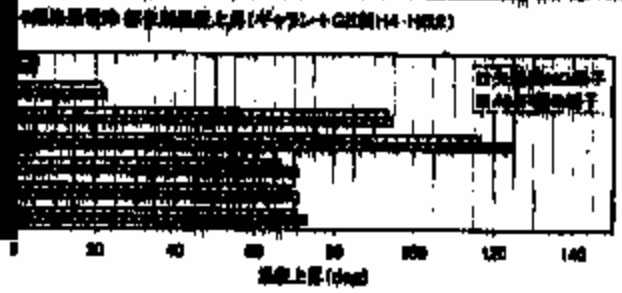
•Measurements and/or Inspections:

Apply DC 13.3V to headlamp and measure temperatures for each location
Measurements taken under windless conditions

Measurement locations)
1)Lamp terminal (Lo)
2)Lamp terminal (Com)
3)Lamp terminal (Hi)
4)Bulb body
5)Bulb body attachment hook
6)Harness surface: 1place 5mm away from COM terminal clamp
7)Atmospheric temperature behind connector

Comments





Document No.20

(Attachment ⑧' for Document No.13)

Company	Mitsubishi Motors Corporation

Subject: Investigation of Headlamp Connector Temperatures
(Headlamp temperature increase test)
Date of Issue: May 31, 2001
Report No.: None
Author: Sakamoto
Date of Test: May 31, 2001
Test Place: MMC Okazaki Plant

Test Vehicle and Sample
Vehicle: Model(s) and Model year: ST41 02MY, ST41 03MY, ST28 02MY, CK 02MY, Toyota Camry

Scope(s)

Terminal temperature increases after wiggling terminal could be the secondary cause of connector melting.
Headlamp body heat radiation, engine room atmospheric temperature, harness wire diameter, connector heat conductivity are listed as potential factors in increasing temperatures.
These factors are compared between ST28(ST24S),ST41, other Mitsubishi vehicles and also other car manufacturers' vehicle.

Summary of Test Conditions and Test Results
- Conclusion:
(1)For ST41 03MY, there are differences in temperature values between MMC actual vehicle test & Stanley bench test
—>Actual vehicle has higher temperature than the bench test.

(2)Stanley bench test shows approximately 10 deg difference between placement directly on a table and 100mm above table.
—>100mm offset results in 10 deg decrease. This may be partly from heat convection.

(1)Power source
Eng off: fixed 13.3V from stable power source
At idle and at driving : actual battery used
(2)Measurement level
Record stable saturated temperature by monitoring with hybrid recorder
(3)Driving conditions
After driving till the temperature satulated, then leave at idle till the temperature is satulated*.
* Max temperature at idle: Drive until temperature saturates and then soak at idle until saturated again
Only reference value since such a long idle soak with head lamps on rarely occurs.
(This is only an abuse test to focus on potential differences between vehicles.)

(4)Measurement conditions
At Eng off : other electrical loads off, engine room hood: open
At idle : other electrical loads off, engine room hood; closed

Comments

[redacted]

[redacted]

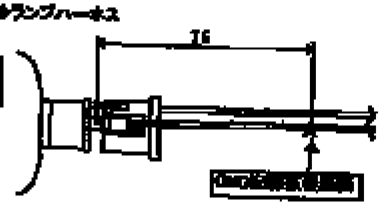
[redacted]	[illegible] A/T			[redacted]												02MY ST?? 4G94 M/T			02MY CK NAS			[redacted]		
	[illegible]	[redacted]	[redacted]	Eq. OF	[redacted]		Eq. OF	[redacted]		Eq. OF	[redacted]		[illegible]	[illegible]	Eq. OF	[redacted]		[redacted]			Eq. OF	[redacted]	
	21.6℃	-	-	25.5℃	←	←	24.5℃	[redacted]	←	25.5℃	[redacted]	→	28.7℃	25.5℃	22.6℃	-	-	21.5℃	[redacted]		21.1℃	[redacted]	
	111.6℃	-	-	112.5℃	134.7℃	138.6℃	115.6℃	131.5℃	128.5℃	120.5℃	-18.7	→	104.5℃	93.2℃	96.7℃	-	-	84.5℃	-	-	89.3℃	-	-
	93.0℃	-	-	100.1℃	135.6℃	151.7℃	104.7℃	133.3℃	134.6℃	108.6℃	-9.3	→	99.3℃	88.7℃	81.6℃	-	-	83.3℃	-	-	84.4℃	-	-
	80.9℃	-	-	89.7℃	136.5℃	147.3℃	94.2℃	109.9℃	137.3℃	96.5℃	-8.0	→	88.5℃	79.4℃	80.1℃	-	-	78.7℃	-	-	80.5℃	-	-
	124.3℃	-	-	148.6℃	168.6℃	165.5℃	142.7℃	158.4℃	[illegible]	130.5℃	+4.4	→	144.3℃	131.9℃	120.5℃	-	-	112.6℃	-	-	115.3℃	-	-
	-	-	-	172.3℃	154.7℃	138.5℃	111.1℃	134.2℃	140.3℃	107.5℃	+2.4	→	110.3℃	100.1℃	121.7℃	-	-	91.7℃	-	-	117.5℃	-	-
	41.4℃	-	-	58.6℃	88.3℃	96.6℃	42.6℃	85.7℃	80.2℃	48.4℃	+8.1	→	43.2℃	48.6℃	42.9℃	-	-	48.6℃	-	-	42.1℃	-	-
	-	-	-	27.6℃	76.6℃	81.4℃	28.2℃	77.4℃	77.9℃	38.5℃	+4.8	→	33.5℃	25.6℃	33.6℃	-	-	22.2℃	-	-	33.4℃	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	71.3℃	56.1℃	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	37.4℃	34.6℃	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	47.5℃	40.9℃	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	46.5℃	40.2℃	-	-	-	-	-	-	-	-	-

[redacted]

[redacted]

◆ランプ端子

◆ランプハーネス



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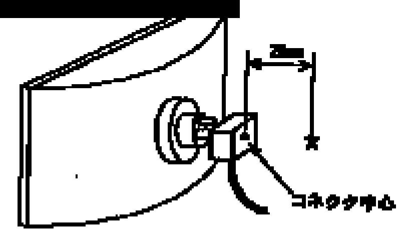


6

Document No.21

(Attachment ⑧ for Document No.13)

[redacted] MGR.

STANLEY. OHGAKI FACTORY. [redacted]

《Title: [redacted]》

[redacted]

BULB BODY (CONNECTOR SIDE BODY PORTION) / BULB BODY INSTALL HOOK. ST Measurement (LHD) ← MMC exposure test on vehicle (RHD) ← (OUTSIDE) [redacted] (LH side) [redacted] Loading ←

Measurement portion	ST測定(LHD) Loビーム点灯	Lo beam ON	MMC exposure test on vehicle (RHD) Hi beam ON Hiビーム点灯	Loビーム点灯	[redacted] Loading ←
	合上	Eng Off	アイドル時	アイドル時	Eng Off	合上
[redacted]	27.5	25.6	27.8	28.2	25.8	27.0
	86.2	112.3	134.7	138.0	120.3	86.3
	86.1	108.0	135.0	151.7	108.6	81.3
	82.8	89.7	116.5	147.0	90.0	77.9
	124.1	140.6	160.8	185.5	139.9	121.4
	105.4	109.4	132.9	149.8	107.8	104.8
	—	50.6	89.2	96.0	48.4	41.2
		27.4	27.6	81.4	30.3	29.0
	107.7	—	—	—	—	106.6
	108.0	—	—	—	—	109.7
		—	—	—	—	100.6
		03MY ST41 4G64			3ポジション保有のランプ	03MY ST41 4G64

[redacted]

Remarks 備考

[redacted]

(5/29)

Change terminal measuring point to be identical to MMC Loop body is lifted up 20mm from the top of table.

[redacted] BODY DESIGN
[redacted] TEMABA MGR.

HB2、H4バルブ温測結果

[redacted] RE : HB2_H4 BULB TEMPERATURE MEASUREMENT RESULT

2001年5月23日
スタンレー電気株式会社
STANLEY ELEC. 資料 (8)
2001/5/30 データ追加
-DATA ADDED

[redacted] measurement result is reported as follows:

[redacted] measurement result.

[redacted] tion of temperature after Hi&Lo simultaneous on,

[redacted] sure temperature of different bulb suppliers.

Stanley measured data(2) with same bulb, measure at different lamp bodies. (Bulb was unified as Philips)

	Bulb バルブ	Supplier メーカー	Lamp body 測定ランプ	Voltage 電圧	Hi/Lo mode Hi/Lo モード	バルブガラス温度:℃ ①Glass ②		バルブ端子温度:℃ ③	④	⑤	カラー 端子温度:℃ ⑥	⑦	⑧	⑨	備考 Remarks
HHC Harness Data	HB2	GE		13.2v	Lo	-	134.0	-	Bulb Terminal		Connector	111.0		-	
	HB2	GE		13.2v	Lo	122.0	138.0	-	-	-		97.0		-	エンジン切 EARS OFF
	HB2	T		13.2v	Lo	92.0	113.0	-	-	-		86.0		-	
	HB2	?		13.2v	Lo	116.0	113.0	-	-	-		85.0		-	
	HB2	GE		13.2v	Lo	-	135.0	-	-	-		100.0		-	T41 ﾗﾝﾌﾟ ｴﾝｼﾞﾝ切
	HB2	GE	ST41	13.2v	Lo	111.0	122.0	-104.0	106.1	98.2	87.6	92.0	81.6	45.0	
	(ISO)				Hi	135.0	165.0	128.0	130.0	121.0	105.2	104.8	103.1	48.0	
スタンレー測定データ(1)	HB2 (ST.)	GE	ST41	13.2v	Lo	108.0	123.2	-105.4	106.8	98.4	88.3	90.2	81.8	42.4	
					Hi	130.0	161.8	128.0	127.7	123.8	102.1	106.4	102.6	48.2	
Stanley measured data(1)	H4 (ST.)	オスラム Osram	ST41	13.2v	Lo	112.0	124.2	-98.4	108.4	98.0	87.2	87.7	83.1	48.0	
					Hi	138.4	166.8	128.8	130.6	124.8	100.9	109.8	103.0	85.2	
	H4 (ST.)	フィリップス Philips	ST41	13.2v	Lo	110.0	131.8	-112.0	116.8	102.8	100.8	107.3	88.8	50.0	
					Hi	136.0	162.8	130.4	136.7	122.6	114.5	106.5	107.6	62.6	
BULB CHANGED (2)	H4 (ST.)	フィリップス [redacted]	2P000 OK	13.2v	Lo	106.1	113.7	-98.7	108.2	98.8	88.7	88.0	84.4	44.0	
OTHER VEHICLES					Hi	132.3	146.1	127.4	131.8	128.0	100.4	109.8	107.8	47.0	
	H4 (ST.)	フィリップス	(ISOコネクト) Canty	13.2v	Lo	98.4	134.2	108.8	112.1	105.8	101.8	99.2	84.9	—	
					Hi	130.2	168.7	123.2	126.3	122.5	102.7	108.8	108.8	—	
スタンレー測定データ(2)	H4 (ST.)	フィリップス	カローラ Collora	13.2v	Lo	98.8	122.8	102.8	111.1	99.2	100.0	104.0	88.4	—	
					Hi	104.8	147.8	122.8	131.2	113.8	117.2	103.4	100.1	—	
他社測定値	H4 (ST.)	フィリップス	2P000 OK	13.2v	Lo	97.8	127.0	101.8	105.5	97.4	100.1	96.4	81.4	—	
					Hi	124.0	159.2	125.1	126.7	114.8	120.8	108.8	108.0	—	
⚠	HB2	GE		13.2v	Lo	108.8	138.8	-	-	-	108.8	113.2	88.7	58.8	エンジン切 EARS OFF
データ	HB2	GE		13.2v	Hi	138.8	160.8	-	-	-	138.8	134.7	116.8	88.2	アイドル時 IDLE
HHC Harness Data	HB2	GE		13.2v	Hi	148.8	148.8	-	-	-	151.3	138.8	147.8	88.8	アイドル時 IDLE
⚠	HB2	GE	ST41	13.2v	Lo	107.8	138.8	-	-	-	108.8	120.3	88.8	48.8	エンジン切 EARS OFF
スタンレー測定データ(3)	HB2	GE	ST41	13.2v	Lo	106.4	124.1	107.2	108	102.5	81.1	88.2	88.8	—	シャーク
	HB2	GE		13.2v	Lo	104.8	121.4	108.8	103.2	100.8	81.3	81.3	77.8	41.2	実車搭載 ATM 9.0℃

Extracted from sample.

Engine off. Atm 25.0℃ ※
Idle , Atm 27.8℃
Idle , Atm 28.2℃
Engine off. Atm 21.8℃
Sample submitted by Stan
HHC measured at Stan
Measure actual vehicle on board Atm. 9.0℃

※ Atm: Atmosphere

Stanley measured Data(3)

測定ポイント箇所 measuring points.

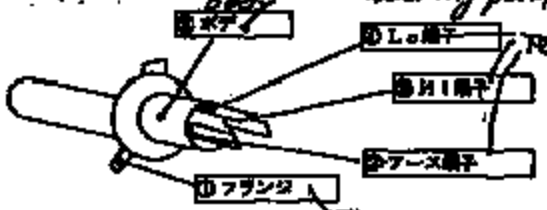


図1. バルブ
Fig1. Bulb

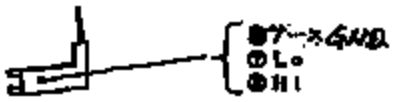


図2. ホルダ端子
Fig2. Terminal

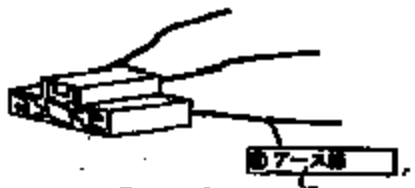


図3. ホルダ
Fig3. Connector

(2)まとめ CONCLUSION:
ランプ単体での温測を実施した結果、上記温測結果よりバルブメーカー違い並びに仕様違いによる大きな温度差はございません。
There is no significant difference among the bulb supplier & lamp bodies, from Lamp unit 単上 independent Temperature measurement test result.

(5)

Document No.22

(Attachment ⑧" for Document No.13)

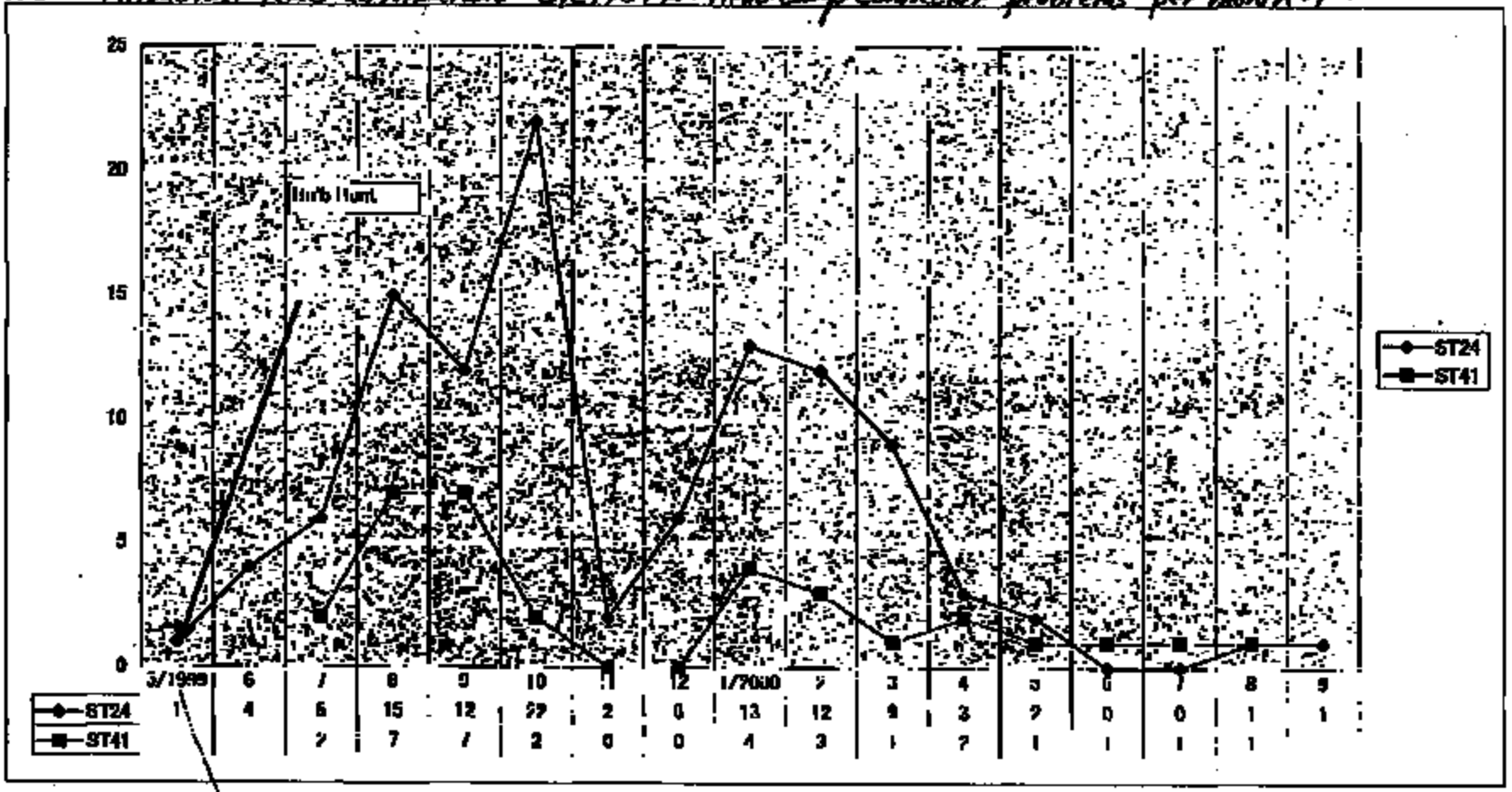
※TITLE : ENGINE [redacted]
エンジン
Based on
at Idle &
Summarize
previous

OBJECT VEHICLES 調査車両	測定条件(高温度 40℃) アイドル Idle	120km/h, 3% 走行	Shipment Testing Report No. 実試報告書番号
ST41 MMMA 01MY 6G72	83.6℃	76.6℃	XLJ1-160463
ST24S F2[redacted] 4G64	85.3℃	84.3℃ (70k,6%)	XLJ1-126803
ST22 MMMA 6G72	91.7℃	88.2℃	XLJ1-152149
YR DOM 6G72 4WD 5AT	81.4℃	71.7℃	T261-R026
JT41 4G93 GDI F[redacted]	84.9℃	46.1℃	XLJ2-148678
JT45 4G93 GDI T/C F[redacted]	72.1℃	80.1℃	XLJ2-152936
JT44X			
JT44XL 02MY 4G93 GDI	80.0℃	74.6℃	XLJ2-160904
DZL 02MY 4G64 GDI 4AT	80.2℃	69.2℃	XLJ2-155348
DZ			データなし No data
DZX			データなし No data
DX 98MY 4G63 4AT [redacted]	75.8℃	62.9℃	XLJ1-033719 (T264-T049)
MQX 4G18 F2[redacted]	63.7℃	54.7℃	XLJ1-120388 (T264-T061)
CK 00MY DOM 4M41	66.2℃	51.3℃	XLJ1-133704
KR 01MY DOM 4G93 T/C [redacted]	65.0℃	54.0℃	XLJ1-154242
P MMA[redacted]	82.3℃	77.0℃	XLJ1-012276 (T267-Q017)
P45			データなし No data
MG DOM 4G93 T/C A/T	100.6℃	75.6℃	XLJ1-020647 (T267-R032)
MG DOM 4G15 4WD A/T	72.9℃	69.5℃	XLJ1-020576 (T267-R030)
W 95DOM 4D56 T/C 4WD [redacted]	81.3℃	72.6℃	XLJ1-014746 (T267-Q025)
NQZ DOM 4G63 MPI T/C 4WD	81.4℃	61.4℃	XLJ1-161662

Document No.23

(Attachment ⑩-1 for Document No.13)

Title : Mitsubishi R&D Information ST24/ST41 Headlamp Connector problems per month



5/1納入分よりバルブ曲がり対策品
Bulb bent modification done from 5/1 delivered lot.

(10)

資料(9)-1

Document No.24

(Attachment ⑩-2 for Document No.13)

Appendix 付表 生産月分析 Cumulation per month

Vehicle / Date / Qty / # of replacement / cost

資料(10)-2

車名	生産年月	台数	件数	F%	金額	EPUS
ST24	[illegible]	13	0	0.00	[illegible]	[illegible]
ST24	[illegible]	10	0	0.00	[illegible]	[illegible]
ST24	[illegible]	[illegible]	0	0.00	[illegible]	[illegible]
ST24	[illegible]	[illegible]	0	0.00	[illegible]	[illegible]
ST24	[illegible]	3	0	0.00	0	[illegible]
ST24	[illegible]	[illegible]	0	0.00	[illegible]	1
ST24	[illegible]	[illegible]	[illegible]	0.00	[illegible]	[illegible]
ST24	[illegible]	[illegible]	4	[illegible]	[illegible]	13
ST24	[illegible]	3117	[illegible]	[illegible]	[illegible]	21
ST24	[illegible]	[illegible]	17	[illegible]	[illegible]	25
ST24	[illegible]	5545	[illegible]	0.30	[illegible]	[illegible]
ST24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ST24	[illegible]	[illegible]	2	[illegible]	[illegible]	1
ST24	[illegible]	[illegible]	5	0.11	[illegible]	[illegible]
ST24	[illegible]	[illegible]	14	[illegible]	[illegible]	[illegible]
ST24	[illegible]	[illegible]	17	[illegible]	[illegible]	[illegible]
ST24	[illegible]	[illegible]	12	[illegible]	[illegible]	[illegible]
ST24	[illegible]	[illegible]	[illegible]	0.11	[illegible]	[illegible]
ST24	[illegible]	[illegible]	2	[illegible]	[illegible]	2
ST24	[illegible]	[illegible]	0	0.00	0	[illegible]
ST24	[illegible]	[illegible]	0	[illegible]	0	0
ST24	[illegible]	[illegible]	1	[illegible]	[illegible]	0
ST24	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]
ST24	200010-	[illegible]	[illegible]	[illegible]	0	0
ST24	200011-	[illegible]	0	0.00	[illegible]	0
ST24	200012-	[illegible]	0	[illegible]	[illegible]	0
ST24	200101-	[illegible]	0	[illegible]	0	0
ST24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0
ST24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ST24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

車名	生産年月	台数	件数	F%	金額	EPUS
ST41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ST41	[illegible]	[illegible]	1	[illegible]	7770	21
ST41	[illegible]	[illegible]	17	0.71	117284	[illegible]
ST41	[illegible]	[illegible]	[illegible]	0.61	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ST41	[illegible]	[illegible]	12	[illegible]	[illegible]	[illegible]
ST41	[illegible]	[illegible]	4	0.17	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ST41	[illegible]	[illegible]	2	[illegible]	[illegible]	4
ST41	[illegible]	[illegible]	11	0.34	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	0.27	[illegible]	14
ST41	[illegible]	[illegible]	5	0.17	[illegible]	11
ST41	[illegible]	[illegible]	7	0.13	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	0.14	[illegible]	11
ST41	[illegible]	[illegible]	14	[illegible]	[illegible]	[illegible]
ST41	[illegible]	7017	11	0.24	[illegible]	[illegible]
ST41	[illegible]	[illegible]	2	[illegible]	[illegible]	1
ST41	[illegible]	7141	[illegible]	0.00	0	0
ST41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2
ST41	[illegible]	[illegible]	7	0.11	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ST41	[illegible]	[illegible]	4	[illegible]	[illegible]	4
ST41	[illegible]	[illegible]	2	[illegible]	[illegible]	[illegible]
ST41	[illegible]	10148	[illegible]	[illegible]	[illegible]	1
ST41	[illegible]	[illegible]	1	[illegible]	3004	0
ST41	[illegible]	[illegible]	1	[illegible]	3006	0
ST41	[illegible]	[illegible]	1	[illegible]	[illegible]	0
ST41	[illegible]	[illegible]	[illegible]	0.00	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	0.00	[illegible]	[illegible]
ST41	[illegible]	[illegible]	[illegible]	0.00	[illegible]	0
ST41	[illegible]	[illegible]	0	0.00	[illegible]	[illegible]
ST41	[illegible]	[illegible]	0	0.00	[illegible]	[illegible]
ST41	[illegible]	[illegible]	0	0.00	0	[illegible]
ST41	[illegible]	[illegible]	[illegible]	0.00	[illegible]	0
ST41	[illegible]	[illegible]	[illegible]	0.00	[illegible]	0

(1)

Document No.25

Meeting Minutes : Document Number J801-B097

Approved by Interior Design Dept. Mr. Nakashima

Created on June 6, 2001 by Electrical system Design(Ele Sys Design) Mr. Tozuka

(ST Headlamp Connector Melting Countermeasure Meeting June 6, 2001)

Attendees

Yazaki Corp: Mr. Sugiyama, Mr. Ito, Mr. Goto, Mr. Matsuo, Mr. Ohmura

Mitsubishi Motors Corp.: Mr. Nakashima, Mr. Harada, Mr. Tozuka, Mr. Tatemoto, Mr. Kamiya, Mr. Sakamoto

1. June 4, 2001 problem parts returned from 7 instances via MRDA (including 3 bulbs and 1 bulb base returned)

Particular Items:

- wide affected region including CA, PA, DE, MI
- one case of reoccurrence after replacing at 3,000 miles
- Age deterioration · necessary to investigate cause and countermeasures
- Determine measures after analyzing cases 1 by 1

2. Detailed Analysis (meeting discussion for initial analysis level)

Overall: Significant probability of heat dissipation due to arc from melting condition (would not go to this extent from Joule heat?)

→Previously conducted testing where arc made to intentionally jump (Yazaki→MMC)

① No.5: no arc marking on bulb terminal, only marking believed to be from sliding marking

② No.2: bulb Lo filament has severe damage, and observed yellow color around Lo in bulb

Arc marking on bulb COM terminal

Deformation of the connector Hi terminal believed to be from factors such as driver servicing

Connector COM terminal seem to be widened…detailed investigation necessary

③ No.4 : Connector COM terminal widening is significant

No tin-plating luster for Hi, Lo, believed to be advanced corrosion

④ No.1: bulb & connector cannot-separate sample, Yazaki Corp. will investigate in detail

⑤ No.6: 1st connector melting damage, replaced with repair connector, reoccurrence at 3000mile (3 month period)

Connector Hi, Lo terminal are clean with no corrosion

Connector COM terminal itself also tin specimen has no discoloration and clean

⑥ No.7: Connector COM terminal lost retention and fell off due to melting damage.

The COM terminal which fell of has a gap widened to approximately 0.8mm

⑦ No.3: housing, COM, Lo terminals both have thermal deformation
Housing cracks and COM terminal irregular deformation are assumed to be occurring from mechanical damage when taking out the bulb from the connector

3. Future Steps

1) Schedule for Analyzing today's 7 samples (Yazaki Corp: by June 11th)

<1>Connector: Analysis Content

① terminal gap
② resistance values (clamp portion & overall terminal)
③ arc markings
④ bulb & connector cannot separate sample returned part resistance values (break bulb glass and analyze), breakdown analysis
⑤ surface analysis for only parts with tin plating discoloration
⑥ inferences for increased temperature from melting damage area (only this one by 6/15)

<2>Bulb: Bulb Investigation (Stanley Corp.)

- Filament damage
- analysis of yellow color fouling onto glass
- investigation of black discoloration of base

2) Inferences of Problem Causes

<1> Correlation with previous Column S/W Recall:

①problem occurred continuously after replacement with countermeasure parts on 00/10/27,which shows weak relationship with occurrences

<2> Aasume cause is due to factor other than column S/W when Hi/Lo are both turned on simultaneously

- Turn on Hi & Lo at the same time at bench and monitor melting location (Ele testing 6/6~)

<3>Possibility of Melting due to Arc

- bench testing preparations underway –Test to be done on 31 May.
- Wiggling + high temperature + vibration + water drop (Yazaki Corp.: jig by6/8, test after 6/11)
- The results of previously conducted Yazaki Corp test showed similar melting to the Lo terminal at 0.8mm gap+vibration

<4>FTA Review

- difference between Domestic/North America ST

according to analysis results, only the salt difference – this was not a major factor according to the analysis result.

- Difference between ST and P45 for North America

<5>Considerations for reason to concentrate occurrence on COM terminal

- From the fixed bulb structure (if Lo beam frequency is taken as a major precondition) when applying current to Lo terminal, horizontal vibration , arc more readily occurs at the COM terminal (Mechanically, COM and Hi may be the same. The current existence difference makes COM occur more.)

<6>Consideration for reasons occurring only in North America

- Difference in base bulb retention strength (spring strength) ? (by 6/)
- Is DRL assembly aftermarket kit a factor?
- Each group reviews and submits potential factors (addressed to Mr. Nakashima Manager by 6/7)

(51

[redacted]

01. 6. 6
内装部

[redacted]

NO	車種	VIN		ENG	[redacted]				備考
1	00galant	4A3AA46G4Y	[redacted]	4G64/A/T	1L,CHICAGO	[redacted]	2	29865	RH
2	00galant	4A3AA46G5Y		4G64/A/T	CA,CORONA	99,10,14	01,5,2	29621	
3	00galant	4A3AA46G0Y		4G64/A/T	TX,HOUSTON	00,1,20	01,5,1	26761	LH,[redacted]
4	00eclipse	4A3AC84L9Y		6G72/A/T	NY,ELMHURST	99,7,13	01,5,2	14420	RH
5	00eclipse	4A3AC54L0Y		6G72/M/T	DE, WILMINGT	99,10,21	01,4,16	24000	LH,[redacted]
6	00eclipse	4A3AC54L5Y		6G72/A/T	PA,PHILA	99,11,22	01,1,10	16895	
							01,4,13	19583	
7	01eclipse	4A3AC84H1I		6G72/A/T	NY,GLENDALE	01,,1,9	01,5,2	3402	RH

[redacted]

,01,4,16