REPORT NO. 208-MGA-2004-DC002

DUMMY PERFORMANCE CALIBRATIONS
FMVSS 208

Ford Motor Company
2004 Ford Taurus Passenger Car
NHTSA NO. C40202

PREPARED BY:
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FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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OFFICE OF VEHICLE SAFETY COMPLIANCE
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EXTERNAL DIMENSIONS

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	792.3
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	452.6
C	H-POINT HEIGHT	Reference	81.3-86.3	83.7
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	145.3
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	77.5
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	129.5
G	BACK OF ELBOW TO WRIST PIVOT	Back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	250.2
H	HEAD BACK TO BACKLINE	Back of skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	44.0
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	284.8
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	195.7
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	536.8
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	364.2
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	402.2
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. “K”.	414-439.4	418.0

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	184.2
P	FOOT LENGTH	Tip of toe to rear of heal	218.5-233.7	228.2
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	470.0
S	HEAD BREADTH	The widest part of the head	137.1-147.3	143.6
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	182.4
U	HIP BREADTH	The widest part of the hip	299.7-314.9	309.1
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	358.7
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	88.2
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. “T”	528.3-548.7	544.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	875.8
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	784.2
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.0

DATA SHEET B3
HEAD DROP TEST (572.132)

Dummy Serial Number 517 Test Date 3/4/04

Technician Dave Wilcox

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive head drops are necessary)

___1. It has been at least 2 hours since the last head drop. (572.132(c)(5))
_X_ N/A, ONLY one head drop performed

_X_2. The head assembly consists of the complete head (880105-100X), the six-axis neck transducer (SA572-S11) or neck transducer structural replacement (78051-383X), and three (3) accelerometers (SA572-S4). (572.132(a))

_X_3. The head accelerometer mounting plate screws ((10-24 x 3/8 SHCS) are torqued to 9.0 Nm.

_X_4. Accelerometers and their respective mounts are smooth and clean.

_X_5. Torque the skull cap screws (10-24 x 1/2 SHCS) to 9.0 Nm.

_X_6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.136(m))

_X_7. The head assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))

Record the maximum temperature 22.0
Record the minimum temperature 21.8
Record the maximum humidity 36%
Record the minimum humidity 31%

_X_8. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.

Record findings and actions: No Damage.

_X_9. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.132(c)(2))

_X_ 10. Suspend and orient the head assembly as shown in Figure 5B. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.132(c)(3))
Record the actual distance __376 mm___

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

_X_ 11. The 1.57 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 6B. (572.132(c)(3))
Record the right side distance __500mm_____
Record the left side distance __500mm_____

_X_ 12. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.132(c)(4))
Record actual micro finish __656 x 10^{-6}mm_____

_X_ 13. The impact surface is rigidly supported. (572.132(c)(4))

_X_ 14. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.132(c)(4))
Record thickness __50.9 mm__
Record width __604 mm__
Record length __595 mm__

_X_ 15. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.132(b) & (572.132(c)(4))

_X_ 16. Complete the following table using channel class 1000 data. (572.132(b)):

Parameter	Specification	Result
Peak resultant acceleration	250 g ≤ x ≤ 300 g	269
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration ≤ 15 g	7

_X_ 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

Signature

3/4/04
Date

DATA SHEET B4
NECK FLEXION TEST (572.133)

Dummy Serial Number ___517___ Test Date ___3/4/04___

Technician ____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1_ (when successive flexion tests are necessary)

___1. It has been at least 30 minutes since the last flexion test. (572.137(q))
_X_ N/A, ONLY one flexion test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.0__
Record the minimum temperature __21.8__
Record the maximum humidity __36%__
Record the minimum humidity __31%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: ___No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 8B for the flexion test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 6.89 m/s to 7.13 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Flexion Test Results (572.133(b)(1) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		6.89 m/s ≤ speed ≤ 7.13 m/s	7.08 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	2.1 m/s ≤ ΔV ≤ 2.5 m/s	2.5 m/s
	@ 20 ms	4.0 m/s ≤ ΔV ≤ 5.0 m/s	4.28m/s
	@30ms	5.8 m/s ≤ ΔV ≤ 7.0 m/s	6.7 m/s
Plane D Rotation		Peak moment* 69 Nm ≤ moment ≤ 83 Nm during the following rotation range 77^o ≤ angle ≤ 91^o	_73_ Nm @ _87_ degrees
Positive Moment Decay** (Flexion)		Time to decay to 10 Nm 80 ms ≤ time ≤ 100ms	84 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii))

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follows this sheet.

Signature

3/4/04

Date

DATA SHEET B5
NECK EXTENSION TEST (572.133)

Dummy Serial Number ___517_____ Test Date ___3/4/04_____

Technician _____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _2__ (when successive extension tests are necessary)

_X_1. It has been at least 30 minutes since the last extension test. (572.137(q))
__ N/A, ONLY one extension test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.0__
Record the minimum temperature __21.8__
Record the maximum humidity __36%__
Record the minimum humidity __31%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: ___No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9B for the extension test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.95 m/s to 6.19 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Extension Test Results (572.133(b)(2) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		5.95 m/s ≤ speed ≤ 6.19 m/s	6.14 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	1.5 m/s ≤ ΔV ≤ 1.9 m/s	1.9 m/s
	@ 20 ms	3.1 m/s ≤ ΔV ≤ 3.9 m/s	3.8 m/s
	@30ms	4.6 m/s ≤ ΔV ≤ 5.6 m/s	5.5 m/s
Plane D Rotation		Peak moment* -65 Nm ≤ moment ≤ -53 Nm during the following rotation range 99^o ≤ angle ≤ 114^o	_-64_ Nm @ _110_ degrees
Negative Moment Decay** (Extension)		Time to decay to -10 Nm 94 ms ≤ time ≤ 114 ms	95 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follow this sheet.

Signature

3/4/04

Date

DATA SHEET B6
THORAX IMPACT TEST (572.134)

Dummy Serial Number __517_____ Test Date __3/5/04_____

Technician ____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive thorax impact tests are necessary)

__1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 11B.
_X_3. The complete assembled dummy (880105-000) is used (572.134(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. The weight of the shirt and pants shall not exceed 0.14 kg. (572.134(c)(1))
_X_4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.134(c)(2))
Record the maximum temperature _22.0__
Record the minimum temperature _21.7__
Record the maximum humidity _36%__
Record the minimum humidity _31%__
_X_5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material, chest displacement transducer assembly and the rear rib supports. Inspect for rib deformation using the chest depth gage. If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
_X_ - No damage
__ - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage _____
_____
__ - The following repairs or replacement was performed. Record
_____
_____
_X_6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 11B. The surface must be long enough to support the pelvis and outstretched legs. (572.134(c)(3))
_X_7. Level the ribs both longitudinally and laterally ± 0.5º and adjust the pelvis angle to 7º ± 2º. The angle may be measured using the special H-point tool (TE-2504)

that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block.

_X_ 8. The midsagittal plane of the dummy is vertical within ± 1º. (572.134(c)(3))

_X_ 9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5º of a horizontal line in the dummy's midsagittal plane. (572.134(c)(4))

_X_ 10. Align the adjustable neck bracket index marks to the "zero" position.

_X_ 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to the laboratory coordinate system. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.

_X_ 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.

_X_ 13. Place the arm assemblies horizontal ± 2º and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.

_X_ 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 180.

_X_ 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.134(c)(5)) The velocity of the test probe at the time of impact is 6.71 m/s ± 0.12m/s. (572.134(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.134(c)(6)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.134(c)(7))

_X_ 16. Complete the following table:

Thorax Impact Results (572.134(b) and 572.134(b)(1)&(2)

Parameter*	Specification	Result
Test Probe Speed	6.59 m/s ≤ speed ≤ 6.83 m/s	6.78 m/s
Chest Compression	50.0 mm ≤ compression ≤ 58.0 mm	53 mm
Peak force** between 50.0 and 58.0 mm chest compression	3900N ≤ peak force ≤ 4400N	3920 N
Peak force** between 18.0 and 50.0 mm chest compression	peak force ≤ 4600 N	yes
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	71%

*Time zero is defined as the time of initial contact between the test probe and the chest skin.
**Force = impactor mass x acceleration (572.134(b)(3))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve. (Figure 12B

_X_ 17. Plots of chest compression, acceleration, force, force versus deflection follow this sheet.

Signature

3/5/04
Date

DATA SHEET B7
TORSO FLEXION TEST (572.135)

Dummy Serial Number __517_____ Test Date __3/5/04_____

Technician _____Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive torso flexion tests are necessary)

___1. It has been at least 30 minutes since the last torso flexion test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 13B.
_X_3. The complete assembled dummy (880105-000) is used (572.135(c)(2)).
__ with legs below the femurs.
_X_ without legs below the femurs.
_X_4. The dummy assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.135(c)(1))
Record the maximum temperature __22.0__
Record the minimum temperature __21.9__
Record the maximum humidity __38%__
Record the minimum humidity __31%__
_X_5. Secure the pelvis to the fixture at the pelvis instrument cavity rear face by threading four ¼ cap screws into the available threaded attachment holes. Tighten the mountings so that the test material is rigidly affixed to the test fixture and the pelvic lumbar joining surface is horizontal. (572.135(c)(3))
_X_6. Attach the loading adapter bracket to the spine of the dummy as shown in Figure 13B**.** (572.135(c)(4))
_X_7. Inspect and adjust, if necessary, the seating of the abdominal insert within the pelvis cavity and with respect to the torso flesh, assuring that the torso flesh provides uniform fit and overlap with respect to the outside surface of the pelvis flesh. (572.135(c)(5))
_X_8. Flex the dummy forward and back 3 times such that the angle reference plane moves between 0° and 30° with respect to the vertical transverse plane. (572.135(c)(6))
_X_9. Support the dummy such that the angle reference plane is at or near 0° (vertical with respect to the vertical transverse plane). Wait at least 30 minutes before continuing. (572.135(c)(6))
_X_10. Remove all external support that was implemented in 9 above. (572.135(c)(7))
_X_11. Measure the initial orientation angle of the torso reference plane of the seated, unsupported dummy. (572.135(c)(7))
Record reference plane angle (max. allowed 20°)___18°___
_X_12.Attach the pull cable and the load cell. (572.135(c)(8))

_X_13. Apply a tension force in the midsagittal plane to the pull cable at any upper torso deflection rate between 0.5° and 1.5° per second, until the angle reference plane is at 45° ± 0.5° of flexion relative to the vertical transverse plane. (572.135(c)(9))
_X_14. Maintain angle reference plane at 45° ± 0.5° of flexion for 10 seconds. (572.135(c)(10))
_X_15. As quickly as possible release the force applied to the attachment bracket. (572.135(c)(11))
_X_16. 3 minutes after the release of the force, measure the reference plane angle. (572.135(c)(11))
_X_17. Complete the following table:

Torso Flexion Results (572.135(b), 572.135(c)(7), (572.135(c)(9))

Parameter	Specification	Result
Initial ref. plane angle	Angle ≤ 20°	18°
Torso rotation rate	0.5°/s ≤ rate ≤ 1.5°/s	1.0
Force at 45° ±0.5°	320 N ≤ force ≤ 390 N	334 N
Final ref. plane angle	Initial ref. plane angle ±8°	21°

Signature

2/18/04
Date

DATA SHEET B8
LEFT KNEE IMPACT TEST (572.136)

Dummy Serial Number __517_____ Test Date __3/5/04_____

Technician ____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __2__ (when successive knee impact tests are necessary)

_X_1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
__ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B
_X_3. The knee assembly (880105-528L), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-650), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.1__
Record the minimum temperature _21.7__
Record the maximum humidity _42%__
Record the minimum humidity _35%__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.136(c)(6))

_X_ 11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.08 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3570 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_ 12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

3/5/04

Date

DATA SHEET B9
RIGHT KNEE IMPACT TEST (572.136)

Dummy Serial Number ___517_____ Test Date __3/5/04_____

Technician ___Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1__ (when successive knee impact tests are necessary)

__1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B.
_X_3. The knee assembly (880105-528R), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-651), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.0___
Record the minimum temperature _21.7___
Record the maximum humidity _42 %___
Record the minimum humidity _35 %___
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5))
_X_11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.08 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3480 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

3/5/04

Date

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 517 **Test I.D:** D04501

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Peak Resultant Acceleration	G's	250 - 300	269	Pass
Peak Lateral Acceleration	G's	+/- 15	6.9	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

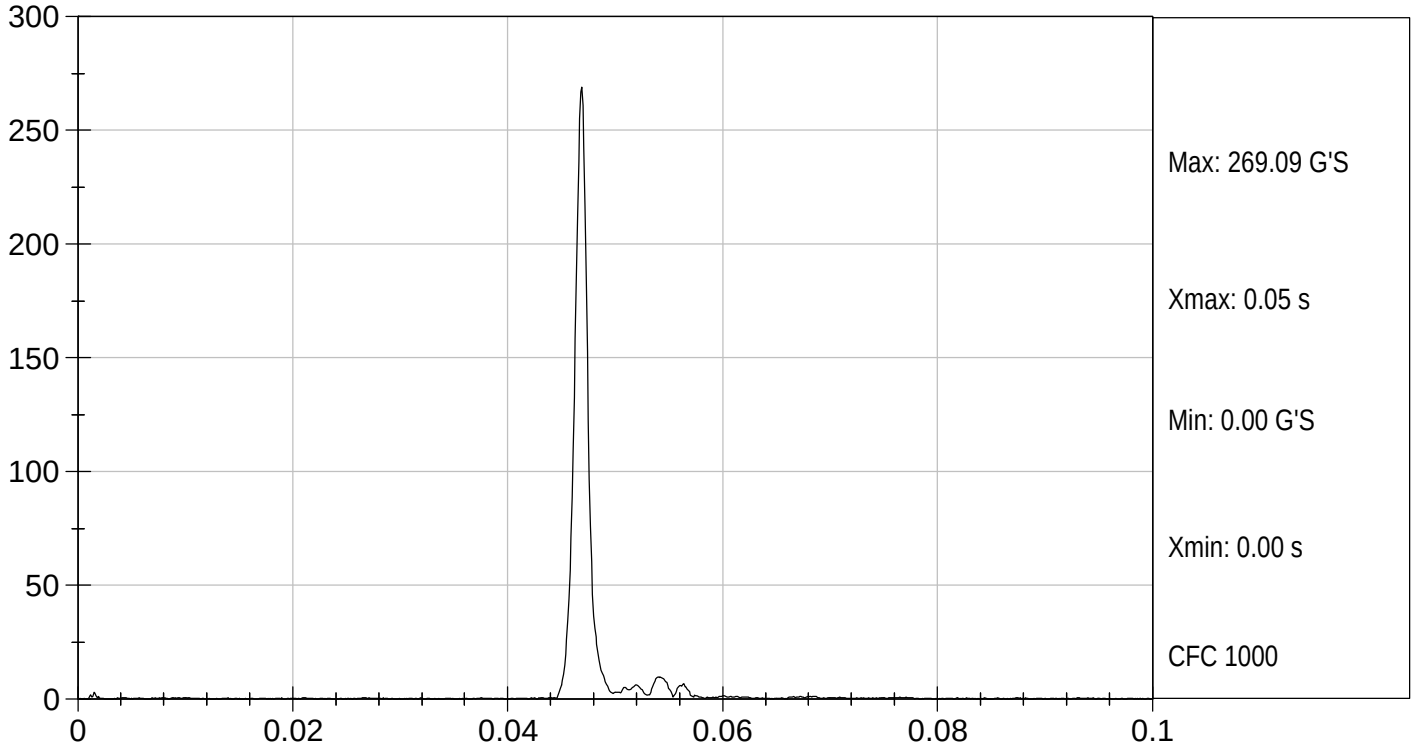
03/04/2004
Test Date

Jessica Hall
Approved By

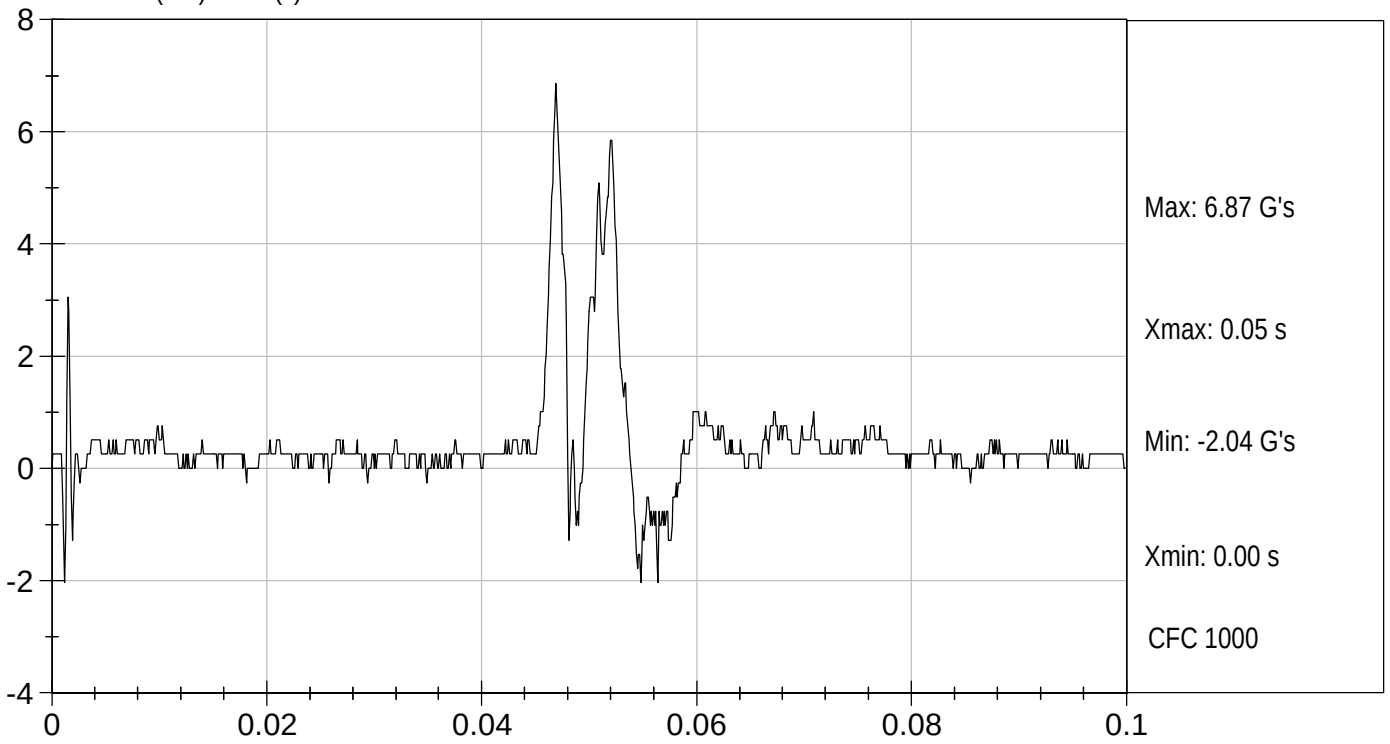
Test Desc: Head Drop
Componet ID: D04501

Test Date: 03/04/2004
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) Time (s)



HEAD Y (G's) Time (s)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04502

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity		%	10 to 70	35	Pass
Pendulum Speed		m/sec	6.89 to 7.13	7.08	Pass
Pendulum Deceleration	10 msec	msec	2.1 to 2.5	2.5	Pass
	20 msec	msec	4.0 to 5.0	4.8	Pass
	30 msec	msec	5.8 to 7.0	6.7	Pass
D Plane Rotation	Max	deg	77 to 91	87	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	73	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	84	Pass
			Overall Results		Pass

Laboratory Technician

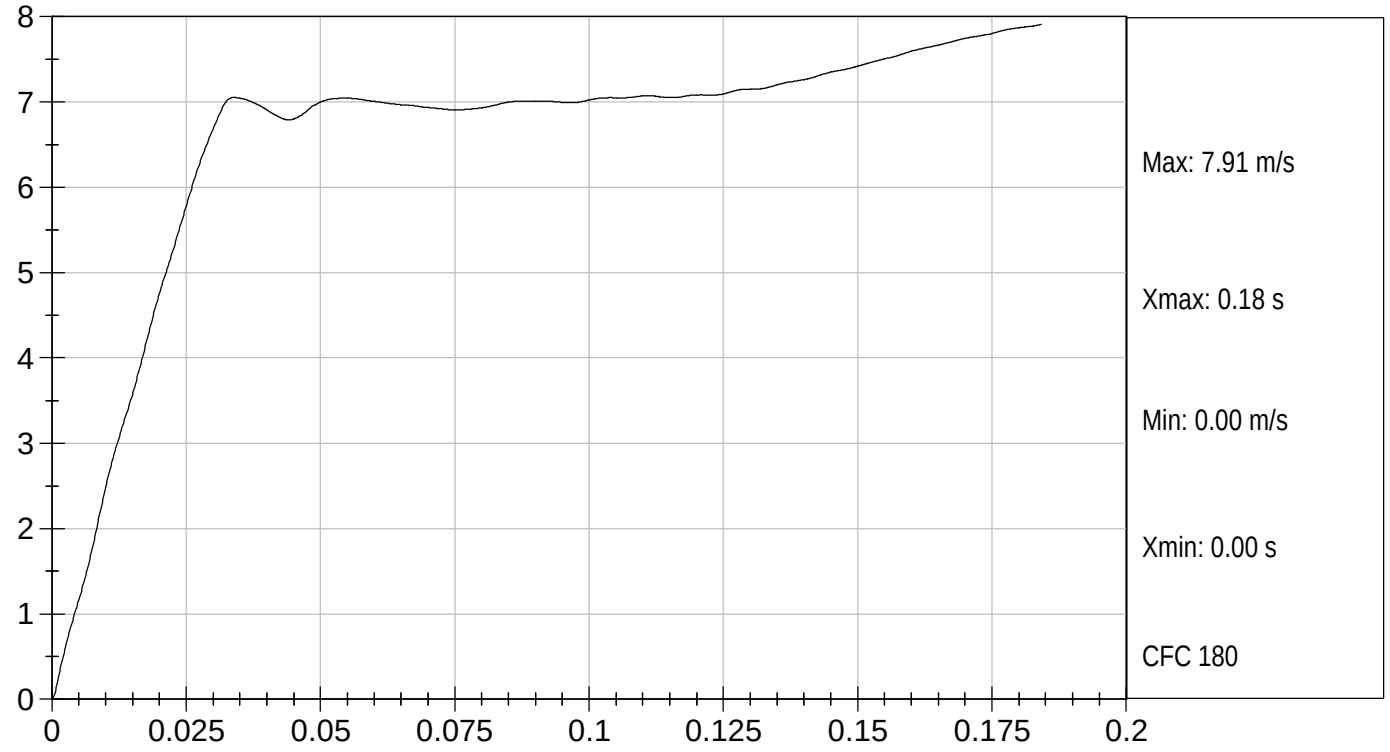
03/04/2004
Test Date

Jessica Hall
Approved By

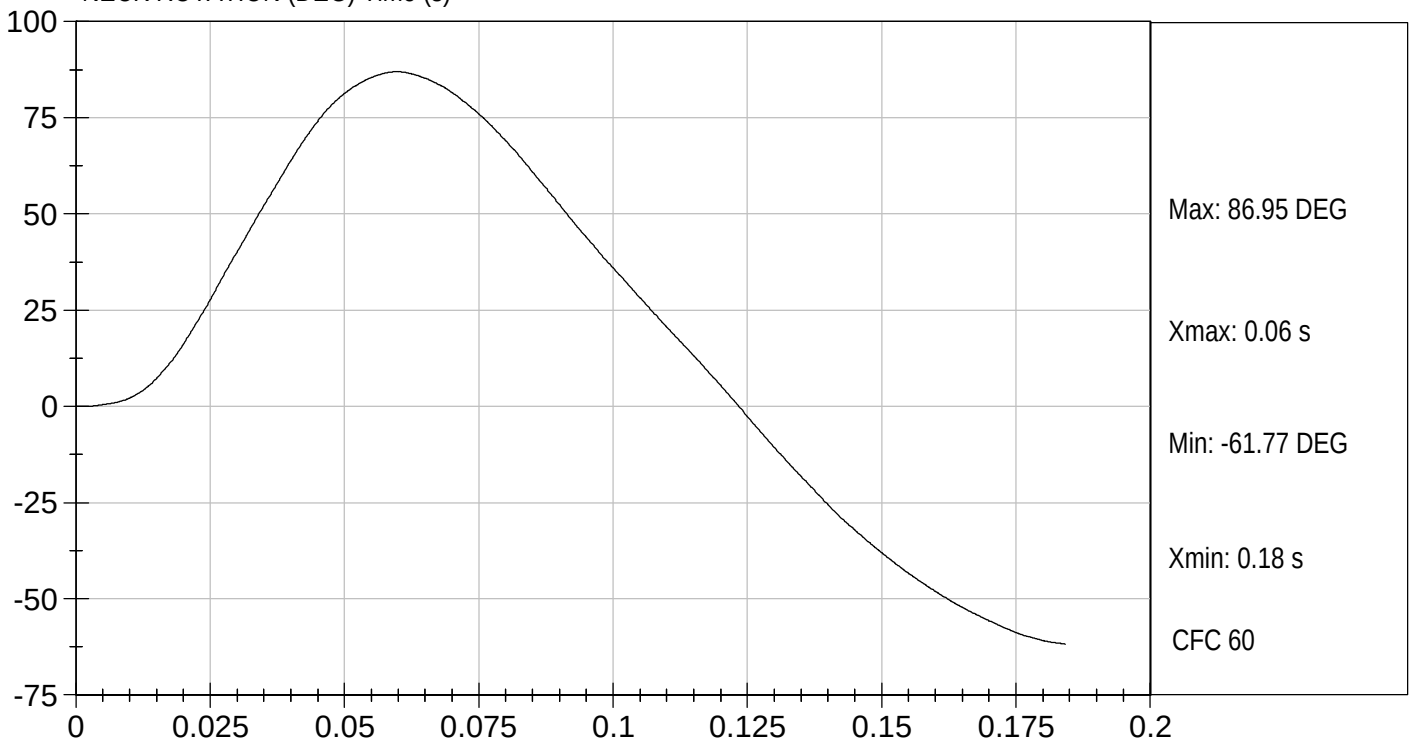
Test Desc: Neck Flexion
Componet ID: D04502

Test Date: 03/04/2004
Velocity: 23.24 ft/s, 7.08 m/s

PENDULUM DECELERATION (m/s) Time (s)

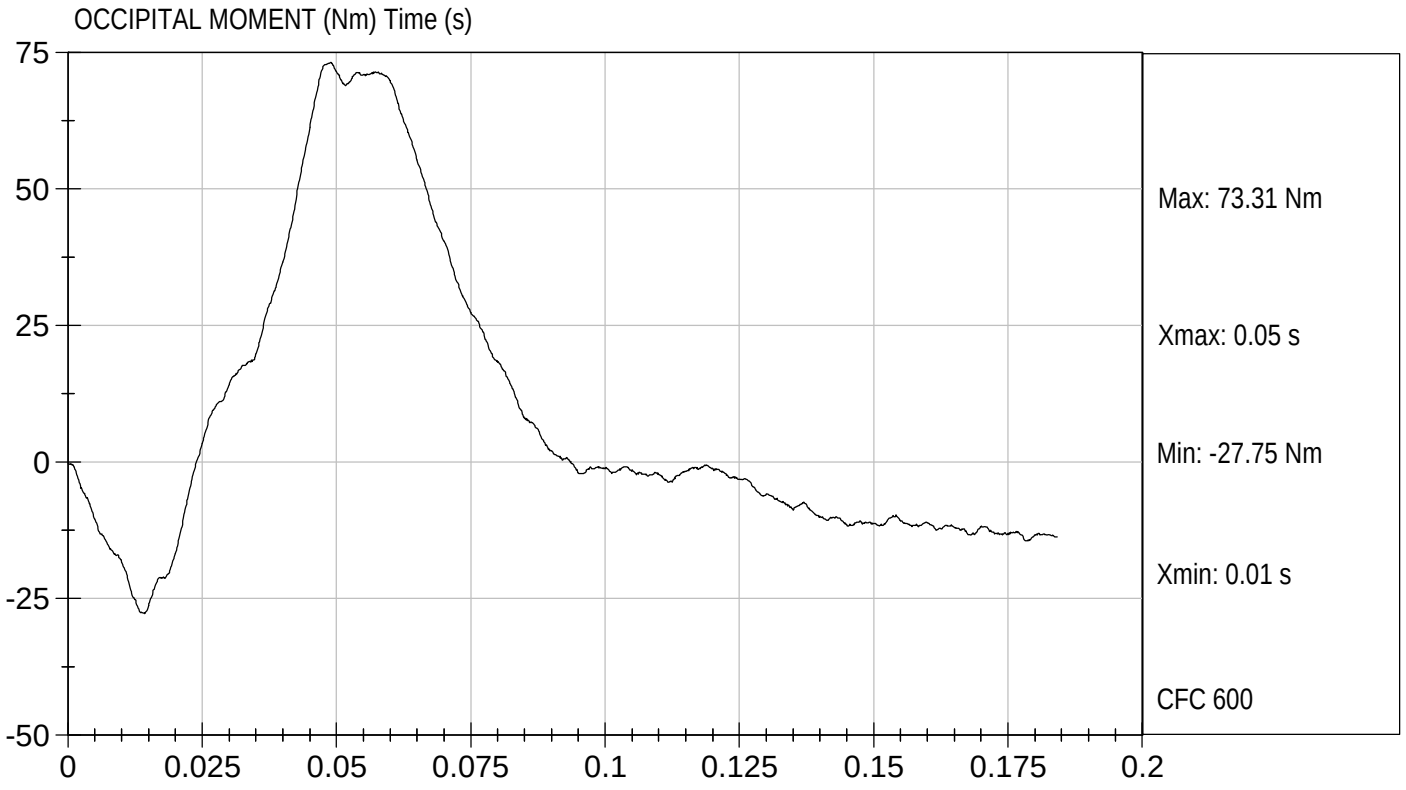


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Flexion
Componet ID: D04502

Test Date: 03/04/2004
Velocity: 23.24 ft/s, 7.08 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04503

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity		%	10 to 70	35	Pass
Pendulum Speed		m/sec	5.95 to 6.19	6.14	Pass
Pendulum Deceleration	10 msec	msec	1.5 to 1.9	1.9	Pass
	20 msec	msec	3.1 to 3.9	3.8	Pass
	30 msec	msec	4.6 to 5.6	5.5	Pass
D Plane Rotation	Max	deg	99 to 114	110	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-64	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	95	Pass
			Overall Results		Pass

Laboratory Technician

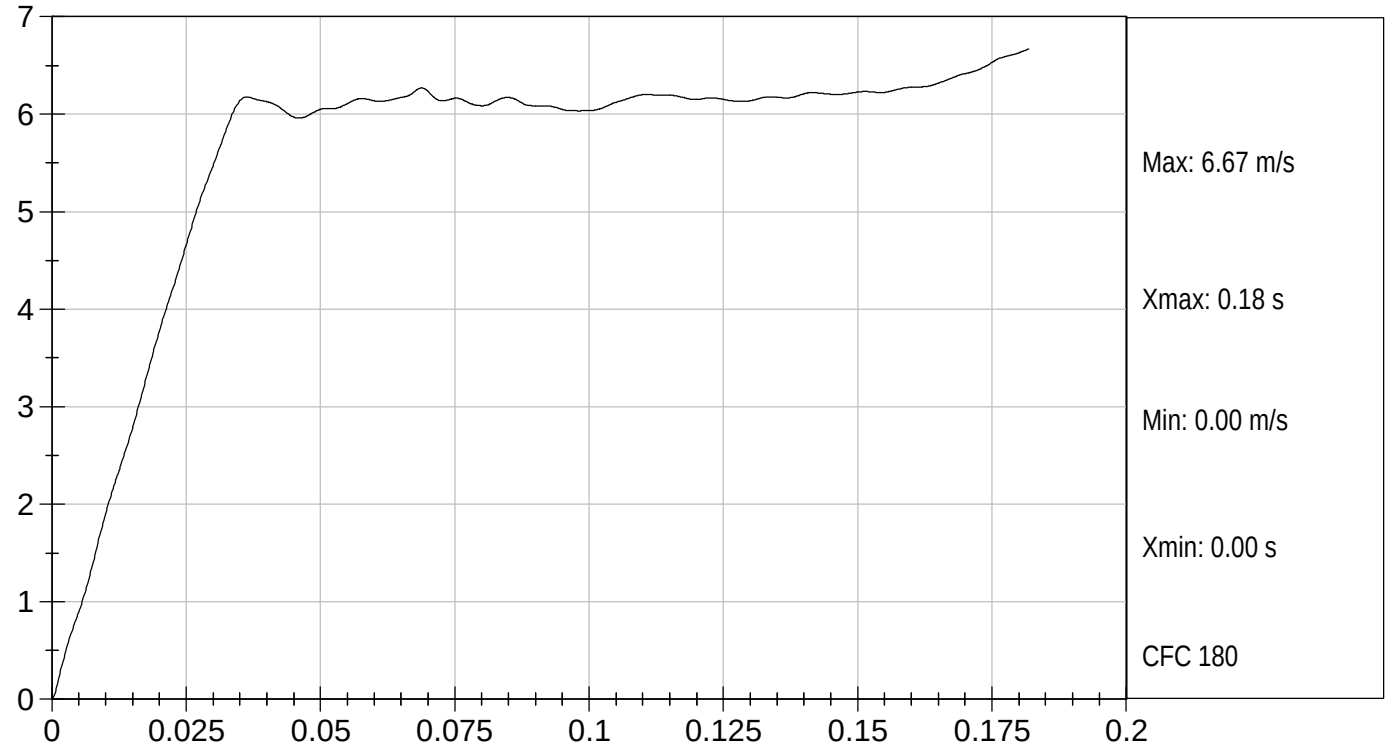
03/04/2004
Test Date

Approved By

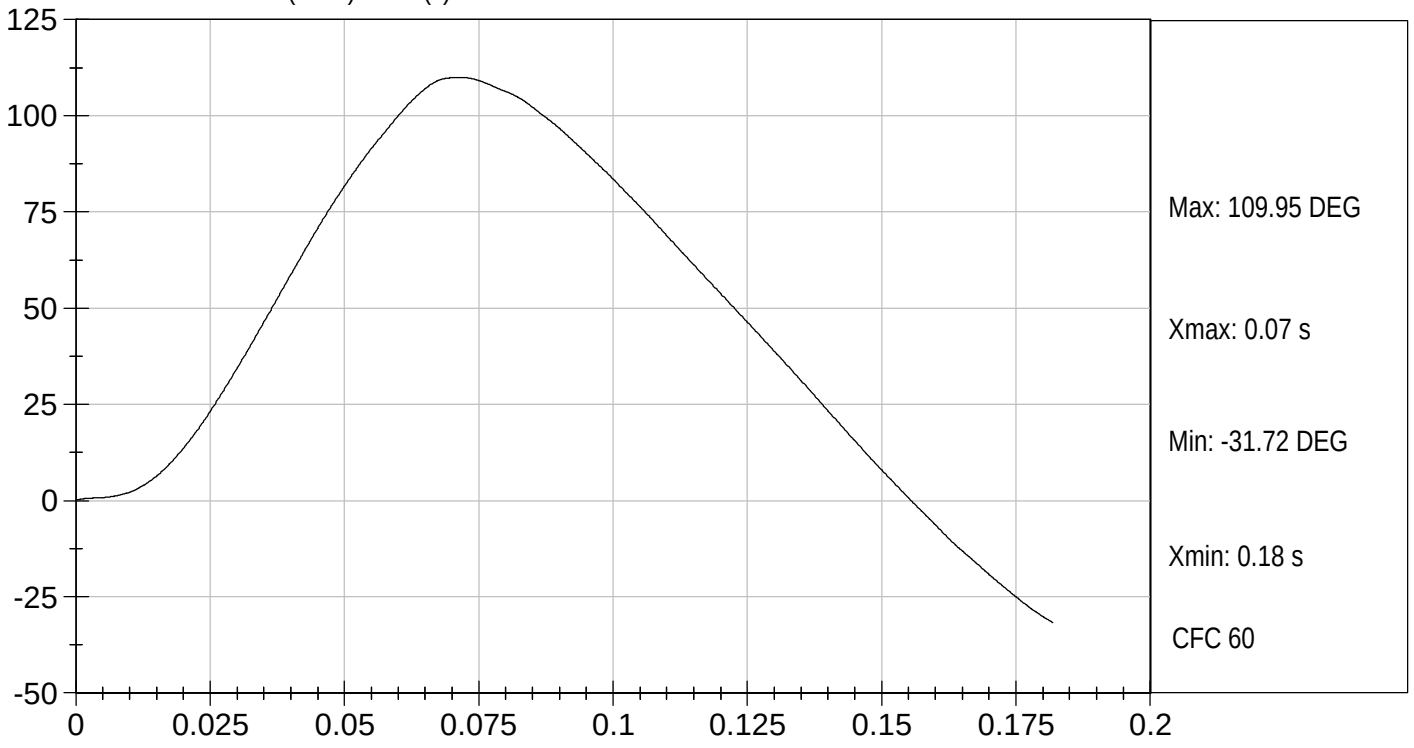
Test Desc: Neck Extension
Componet ID: D04503

Test Date: 03/04/2004
Velocity: 20.13 ft/s, 6.14 m/s

PENDULUM DECELERATION (m/s) Time (s)

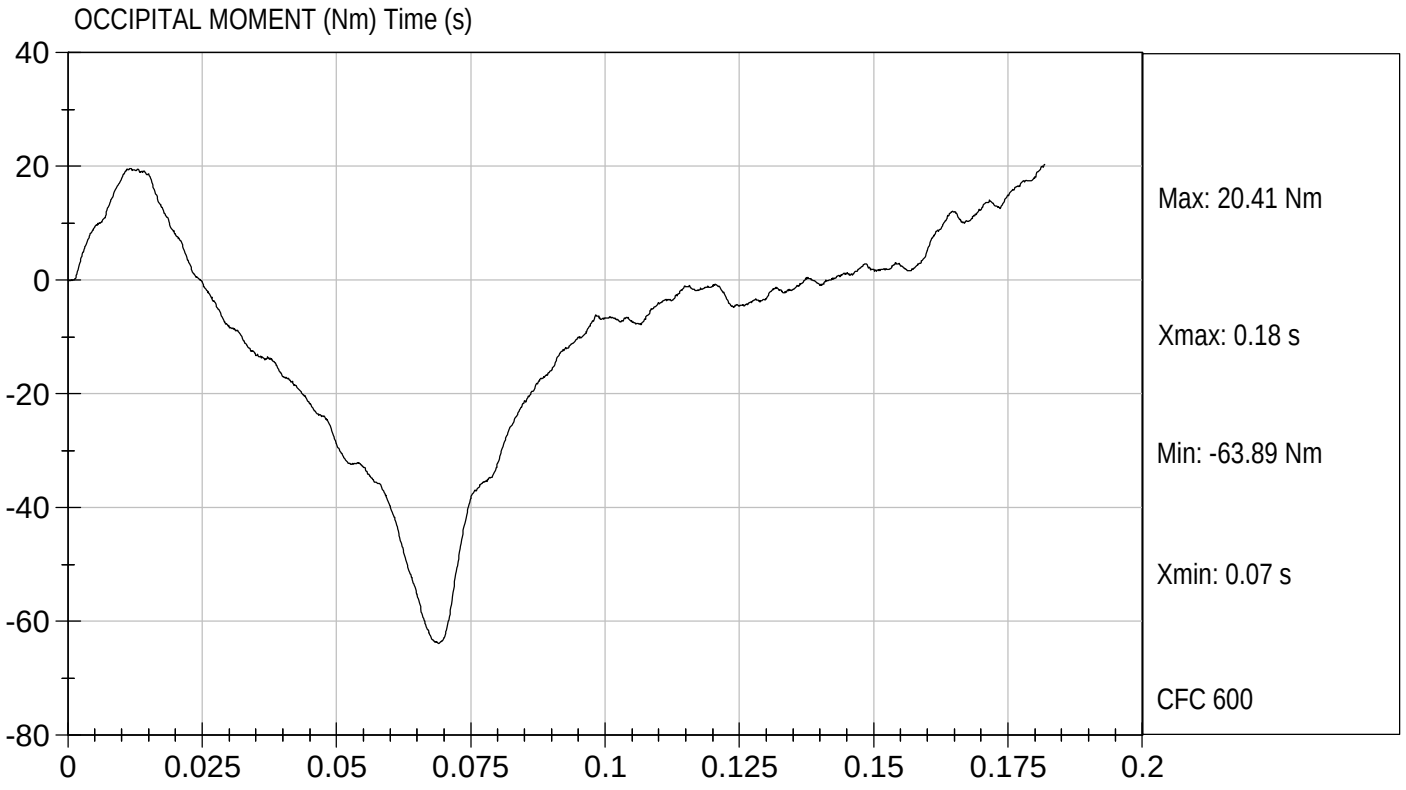


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Extension
Componet ID: D04503

Test Date: 03/04/2004
Velocity: 20.13 ft/s, 6.14 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04504

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.0	Pass
Relative Humidity	%	10 to 70	36	Pass
Probe Speed	m/s	6.59 to 6.83	6.78	Pass
Peak Deflection	mm	50 to 58	53.4	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	3.92	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Peak Force 18 mm - 50 mm	Yes/No	< 4600 N	Yes	Pass
		Overall Test Results		Pass

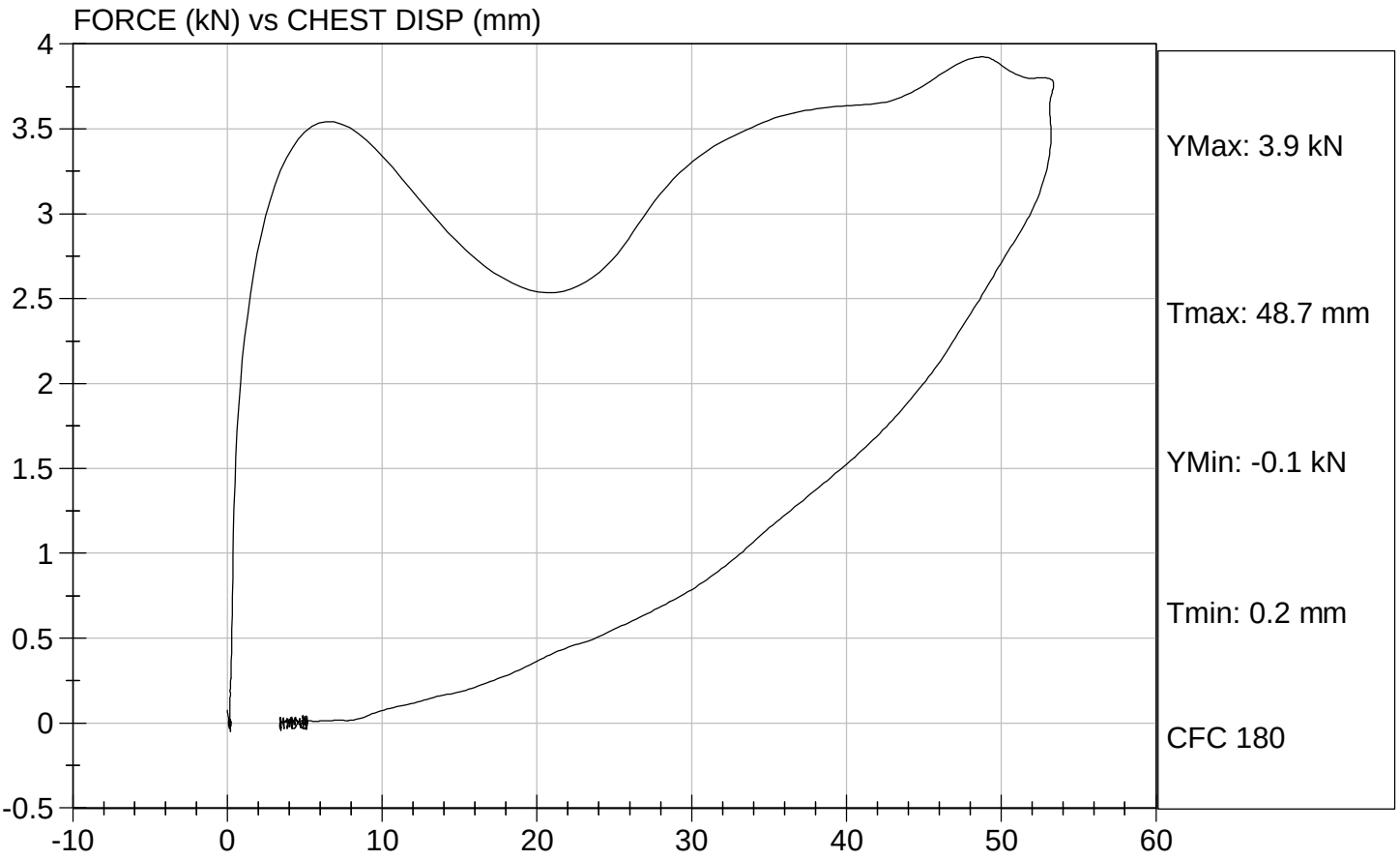
Laboratory Technician

03/05/2004
Test Date

Approved By

Test Description: Thorax Impact Test Date: 03/05/2004

Component: D04504 Speed: 22.23 ft/sec, 6.78 m/sec



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04505

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Speed	m/sec	2.07 to 2.13	2.08	Pass
Maximum Force	kN	3.45 to 4.06	3.48	Pass
		Overall Test Results		Pass

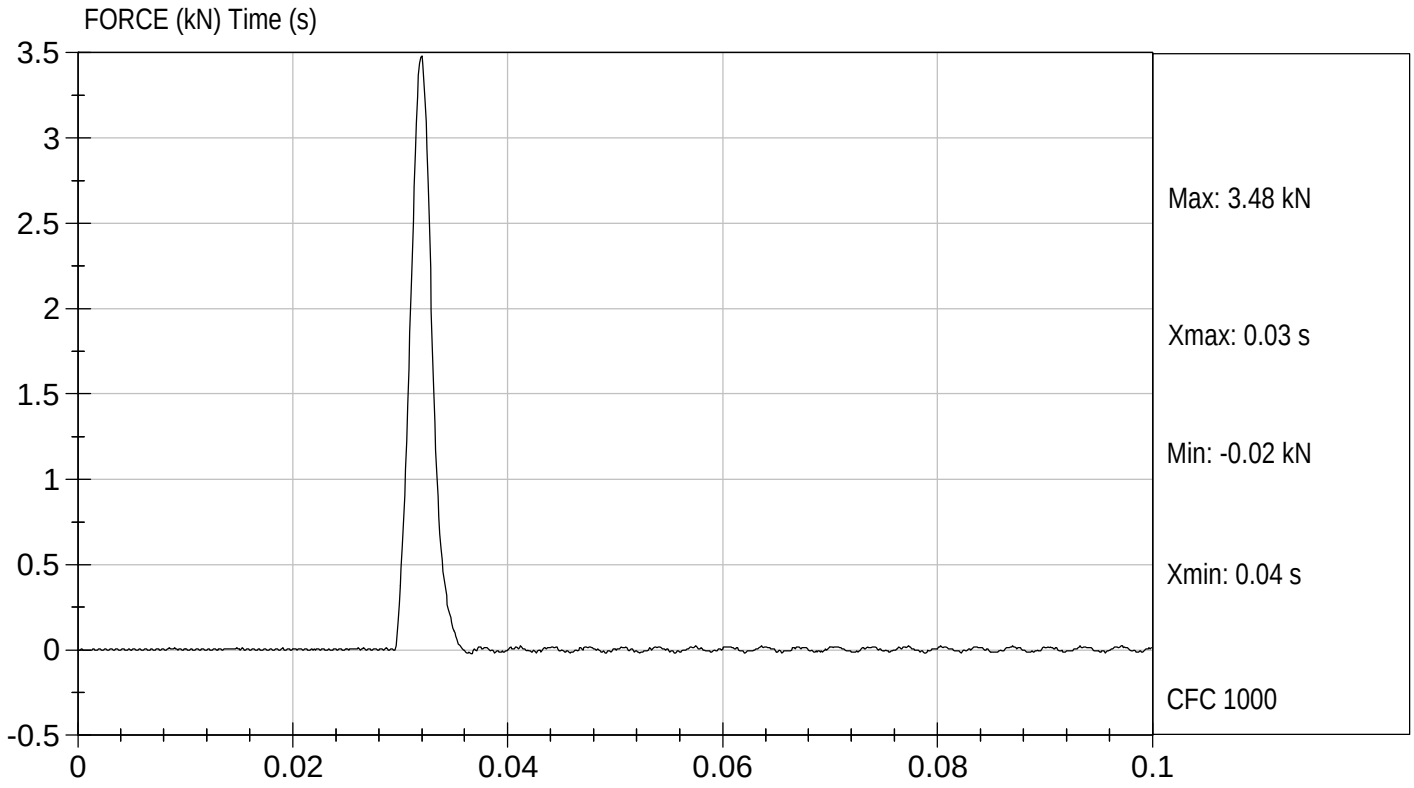
Laboratory Technician

03/05/2004
Test Date

Approved By

Test Desc: Right Knee
Componet ID: D04505

Test Date: 03/05/2004
Velocity: 6.81 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04506

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Speed	m/sec	2.07 to 2.13	2.08	Pass
Maximum Force	kN	3.45 to 4.06	3.57	Pass
		Overall Test Results		Pass

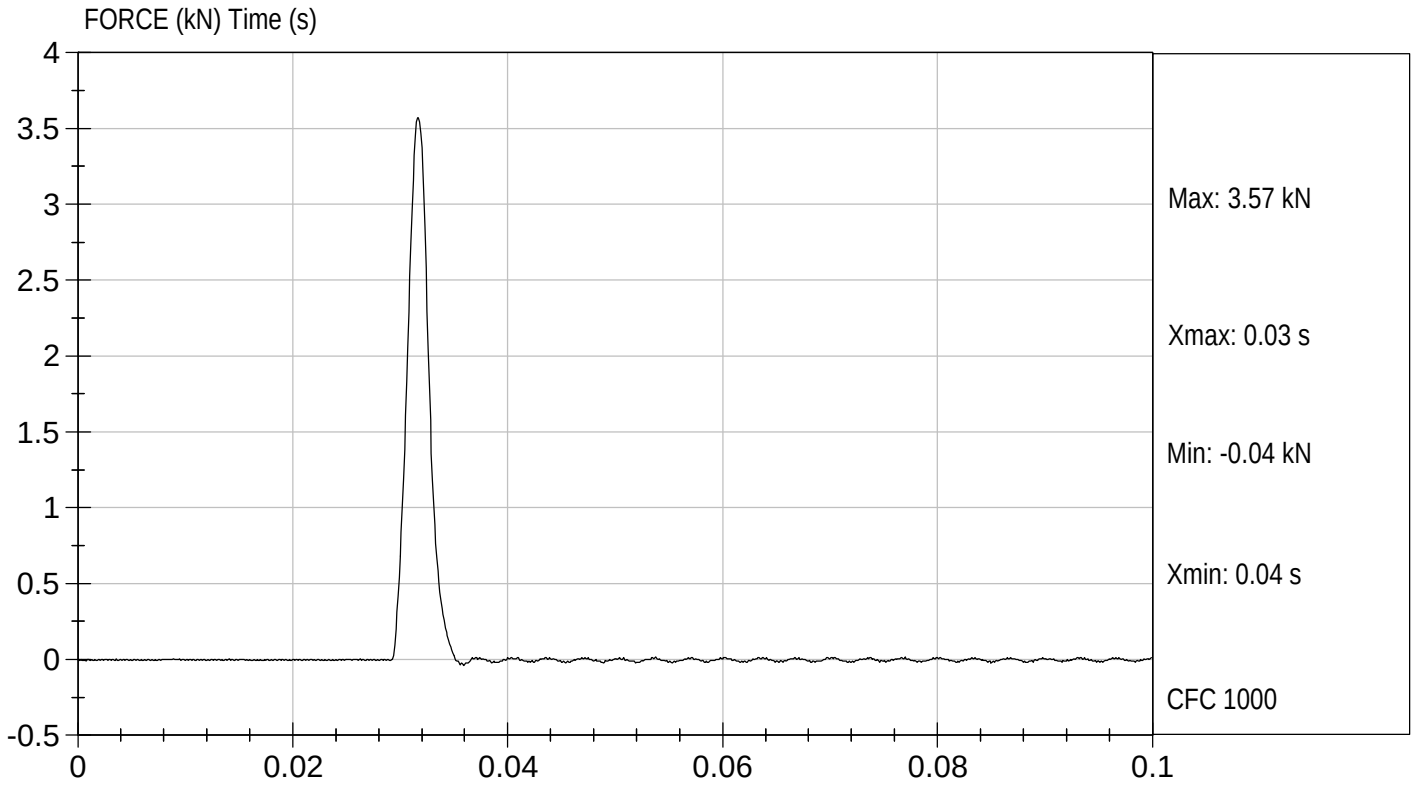
Laboratory Technician

03/05/2004
Test Date

Approved By

Test Desc: Left Knee
Componet ID: D04506

Test Date: 03/05/2004
Velocity: 6.84 ft/s, 2.08 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 517 **Test I.D:** D04507

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	21	Pass
Force at 45 deg	N	320 to 390	334	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Laboratory Technician

03/05/2004
Test Date

Approved By

DATA SHEET B3
HEAD DROP TEST (572.132)

Dummy Serial Number 517 Test Date 4/06/04

Technician Dave Wilcox

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive head drops are necessary)

____1. It has been at least 2 hours since the last head drop. (572.132(c)(5))
_X_ N/A, ONLY one head drop performed

_X_2. The head assembly consists of the complete head (880105-100X), the six-axis neck transducer (SA572-S11) or neck transducer structural replacement (78051-383X), and three (3) accelerometers (SA572-S4). (572.132(a))

_X_3. The head accelerometer mounting plate screws ((10-24 x 3/8 SHCS) are torqued to 9.0 Nm.

_X_4. Accelerometers and their respective mounts are smooth and clean.

_X_5. Torque the skull cap screws (10-24 x 1/2 SHCS) to 9.0 Nm.

_X_6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.136(m))

_X_7. The head assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))
Record the maximum temperature 21.8
Record the minimum temperature 21.5
Record the maximum humidity 29%
Record the minimum humidity 28%

_X_8. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: No Damage.

_X_9. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.132(c)(2))

_X_ 10. Suspend and orient the head assembly as shown in Figure 5B. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.132(c)(3))
Record the actual distance __376 mm___

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

_X_ 11. The 1.57 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 6B. (572.132(c)(3))
Record the right side distance __500mm_____
Record the left side distance __500mm_____

_X_ 12. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.132(c)(4))
Record actual micro finish __656×10^{-6}mm_____

_X_ 13. The impact surface is rigidly supported. (572.132(c)(4))

_X_ 14. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.132(c)(4))
Record thickness __50.9 mm__
Record width __604 mm__
Record length __595 mm__

_X_ 15. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.132(b) & (572.132(c)(4))

_X_ 16. Complete the following table using channel class 1000 data. (572.132(b)):

Parameter	Specification	Result
Peak resultant acceleration	250 g ≤ x ≤ 300 g	257
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration ≤ 15 g	10

_X_ 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

Signature

4/06/04
Date

DATA SHEET B4
NECK FLEXION TEST (572.133)

Dummy Serial Number ___517___ Test Date ___4/06/04___

Technician ___Dave Wilcox___

__Pretest calibration
_X_Post test calibration verification

Test attempt no._1_ (when successive flexion tests are necessary)

___1. It has been at least 30 minutes since the last flexion test. (572.137(q))
_X_ N/A, ONLY one flexion test performed
_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))
_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature 21.8
Record the minimum temperature 21.5
Record the maximum humidity 29%
Record the minimum humidity 38%
_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: ___No Damage.___

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: ___No Deterioration. Hardness OK.___

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)
_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))
_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 8B for the flexion test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 6.89 m/s to 7.13 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Flexion Test Results (572.133(b)(1) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		6.89 m/s ≤ speed ≤ 7.13 m/s	7.00 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	2.1 m/s ≤ ΔV ≤ 2.5 m/s	2.5 m/s
	@ 20 ms	4.0 m/s ≤ ΔV ≤ 5.0 m/s	4.7 m/s
	@30ms	5.8 m/s ≤ ΔV ≤ 7.0 m/s	6.6 m/s
Plane D Rotation		Peak moment* 69 Nm ≤ moment ≤ 83 Nm during the following rotation range 77° ≤ angle ≤ 91°	__74__ Nm @ __78__ degrees
Positive Moment Decay** (Flexion)		Time to decay to 10 Nm 80 ms ≤ time ≤ 100ms	84 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii))

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follows this sheet.

Signature

4/06/04

Date

DATA SHEET B5
NECK EXTENSION TEST (572.133)

Dummy Serial Number ___517_____ Test Date ___4/06/04_____

Technician _____Dave Wilcox_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1__ (when successive extension tests are necessary)

__1. It has been at least 30 minutes since the last extension test. (572.137(q))
_X_ N/A, ONLY one extension test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __21.8___
Record the minimum temperature __21.5___
Record the maximum humidity __29%___
Record the minimum humidity __28%___

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: __No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9B for the extension test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.95 m/s to 6.19 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Extension Test Results (572.133(b)(2) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		5.95 m/s ≤ speed ≤ 6.19 m/s	5.98 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	1.5 m/s ≤ ΔV ≤ 1.9 m/s	1.9 m/s
	@ 20 ms	3.1 m/s ≤ ΔV ≤ 3.9 m/s	3.6 m/s
	@30ms	4.6 m/s ≤ ΔV ≤ 5.6 m/s	5.2 m/s
Plane D Rotation		Peak moment* -65 Nm ≤ moment ≤ -53 Nm during the following rotation range 99^o ≤ angle ≤ 114^o	_-60_ Nm @ _107_ degrees
Negative Moment Decay** (Extension)		Time to decay to -10 Nm 94 ms ≤ time ≤ 114 ms	97 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follow this sheet.

Signature

4/06/04

Date

DATA SHEET B6
THORAX IMPACT TEST (572.134)

Dummy Serial Number __517_____ Test Date __4/06/04_____

Technician ____Dave Wilcox_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive thorax impact tests are necessary)

__1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 11B.
_X_3. The complete assembled dummy (880105-000) is used (572.134(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. The weight of the shirt and pants shall not exceed 0.14 kg. (572.134(c)(1))
_X_4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.134(c)(2))
Record the maximum temperature _21.8__
Record the minimum temperature _21.5__
Record the maximum humidity _29%__
Record the minimum humidity _28%__
_X_5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material, chest displacement transducer assembly and the rear rib supports. Inspect for rib deformation using the chest depth gage. If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
_X_ - No damage
__ - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage _____
_____
__ - The following repairs or replacement was performed. Record
_____
_____
_X_6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 11B. The surface must be long enough to support the pelvis and outstretched legs. (572.134(c)(3))
_X_7. Level the ribs both longitudinally and laterally ± 0.5º and adjust the pelvis angle to 7º ± 2º. The angle may be measured using the special H-point tool (TE-2504)

that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block.

_X_ 8. The midsagittal plane of the dummy is vertical within ± 1º. (572.134(c)(3))

_X_ 9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5º of a horizontal line in the dummy's midsagittal plane. (572.134(c)(4))

_X_ 10. Align the adjustable neck bracket index marks to the "zero" position.

_X_ 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to the laboratory coordinate system. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.

_X_ 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.

_X_ 13. Place the arm assemblies horizontal ± 2º and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.

_X_ 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 180.

_X_ 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.134(c)(5)) The velocity of the test probe at the time of impact is 6.71 m/s ± 0.12m/s. (572.134(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.134(c)(6)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.134(c)(7))

_X_ 16. Complete the following table:

Thorax Impact Results (572.134(b) and 572.134(b)(1)&(2)

Parameter*	Specification	Result
Test Probe Speed	6.59 m/s ≤ speed ≤ 6.83 m/s	6.75 m/s
Chest Compression	50.0 mm ≤ compression ≤ 58.0 mm	57 mm
Peak force** between 50.0 and 58.0 mm chest compression	3900N ≤ peak force ≤ 4400N	3960N
Peak force** between 18.0 and 50.0 mm chest compression	peak force ≤ 4600 N	yes
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	72%

*Time zero is defined as the time of initial contact between the test probe and the chest skin.
**Force = impactor mass x acceleration (572.134(b)(3))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve. (Figure 12B

_X_ 17. Plots of chest compression, acceleration, force, force versus deflection follow this sheet.

Signature

4/06/04
Date

DATA SHEET B7
TORSO FLEXION TEST (572.135)

Dummy Serial Number __517_____ Test Date __4/06/04_____

Technician _____Dave Wilcox_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive torso flexion tests are necessary)

__1. It has been at least 30 minutes since the last torso flexion test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 13B.
_X_3. The complete assembled dummy (880105-000) is used (572.135(c)(2)).
__ with legs below the femurs.
__ without legs below the femurs.
_X_4. The dummy assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.135(c)(1))
Record the maximum temperature __21.8__
Record the minimum temperature __21.5__
Record the maximum humidity __29%__
Record the minimum humidity __28%__
_X_5. Secure the pelvis to the fixture at the pelvis instrument cavity rear face by threading four ¼ cap screws into the available threaded attachment holes. Tighten the mountings so that the test material is rigidly affixed to the test fixture and the pelvic lumbar joining surface is horizontal. (572.135(c)(3))
_X_6. Attach the loading adapter bracket to the spine of the dummy as shown in Figure 13B**.** (572.135(c)(4))
_X_7. Inspect and adjust, if necessary, the seating of the abdominal insert within the pelvis cavity and with respect to the torso flesh, assuring that the torso flesh provides uniform fit and overlap with respect to the outside surface of the pelvis flesh. (572.135(c)(5))
_X_8. Flex the dummy forward and back 3 times such that the angle reference plane moves between 0° and 30° with respect to the vertical transverse plane. (572.135(c)(6))
_X_9. Support the dummy such that the angle reference plane is at or near 0° (vertical with respect to the vertical transverse plane). Wait at least 30 minutes before continuing. (572.135(c)(6))
_X_10. Remove all external support that was implemented in 9 above. (572.135(c)(7))
_X_11. Measure the initial orientation angle of the torso reference plane of the seated, unsupported dummy. (572.135(c)(7))
Record reference plane angle (max. allowed 20°)___17^0___
_X_12.Attach the pull cable and the load cell. (572.135(c)(8))

_X_13. Apply a tension force in the midsagittal plane to the pull cable at any upper torso deflection rate between 0.5° and 1.5° per second, until the angle reference plane is at 45° ± 0.5° of flexion relative to the vertical transverse plane. (572.135(c)(9))
_X_14. Maintain angle reference plane at 45° ± 0.5° of flexion for 10 seconds. (572.135(c)(10))
_X_15. As quickly as possible release the force applied to the attachment bracket. (572.135(c)(11))
_X_16. 3 minutes after the release of the force, measure the reference plane angle. (572.135(c)(11))
_X_17. Complete the following table:

Torso Flexion Results (572.135(b), 572.135(c)(7), (572.135(c)(9))

Parameter	Specification	Result
Initial ref. plane angle	Angle ≤ 20°	17°
Torso rotation rate	0.5°/s ≤ rate ≤ 1.5°/s	1.0
Force at 45° ±0.5°	320 N ≤ force ≤ 390 N	355 N
Final ref. plane angle	Initial ref. plane angle ±8°	20°

Signature

4/06/04
Date

DATA SHEET B8
LEFT KNEE IMPACT TEST (572.136)

Dummy Serial Number __517_____ Test Date __4/06/04_____

Technician ____Dave Wilcox_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive knee impact tests are necessary)

___1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B
_X_3. The knee assembly (880105-528L), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-650), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _21.8__
Record the minimum temperature _21.5__
Record the maximum humidity _29%__
Record the minimum humidity _28%__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.136(c)(6))

_X_ 11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.12 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3810 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_ 12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

4/06/04

Date

DATA SHEET B9
RIGHT KNEE IMPACT TEST (572.136)

Dummy Serial Number ___517_____ Test Date __4/06/04_____

Technician ___Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1__ (when successive knee impact tests are necessary)

___1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B.
_X_3. The knee assembly (880105-528R), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-651), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _21.9___
Record the minimum temperature _21.8___
Record the maximum humidity _29 %___
Record the minimum humidity _28 %___
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5))
_X_11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.10 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3660 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_12. Plots of acceleration versus time and force versus time follow this sheet.

Joe Fleck 4/06/04

Signature Date

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 517 **Test I.D:** D04751

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Peak Resultant Acceleration	G's	250 - 300	257	Pass
Peak Lateral Acceleration	G's	+/- 15	10.4	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

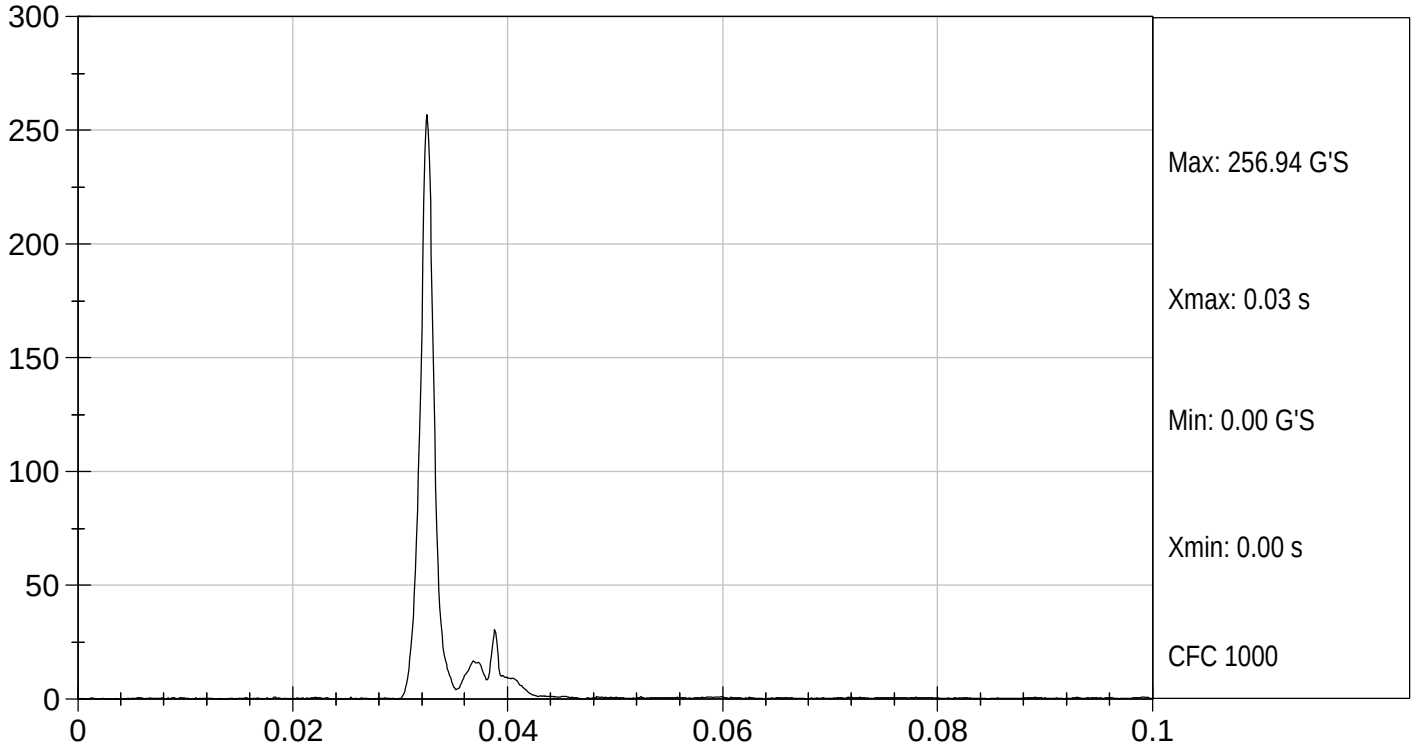
04/06/2004
Test Date

Approved By

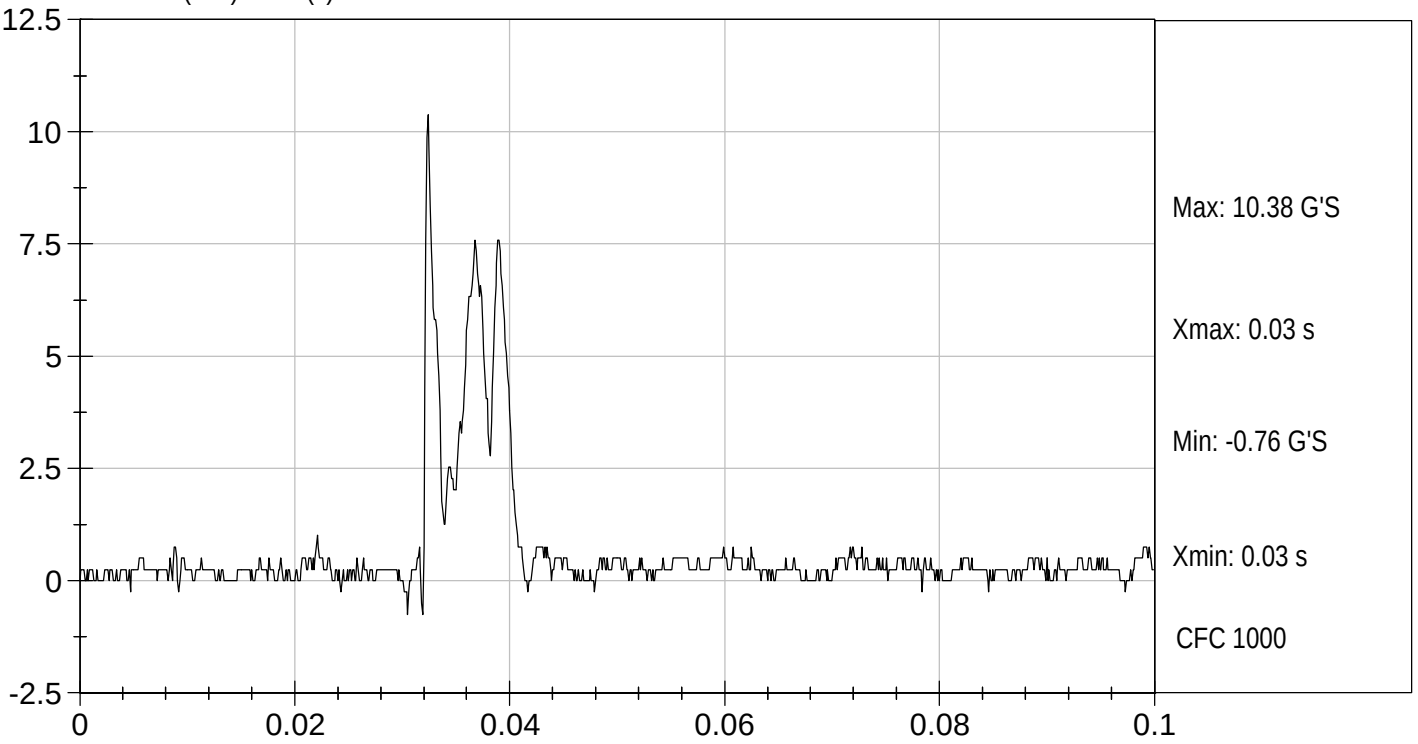
Test Desc: Head Drop
Componet ID: D04751

Test Date: 04/06/2004
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) Time (s)



HEAD Y (G'S) Time (s)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04752

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Speed		m/sec	6.89 to 7.13	7.00	Pass
Pendulum Deceleration	10 msec	msec	2.1 to 2.5	2.5	Pass
	20 msec	msec	4.0 to 5.0	4.7	Pass
	30 msec	msec	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	78	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	74	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	84	Pass
			Overall Results		Pass

Laboratory Technician

04/06/2004

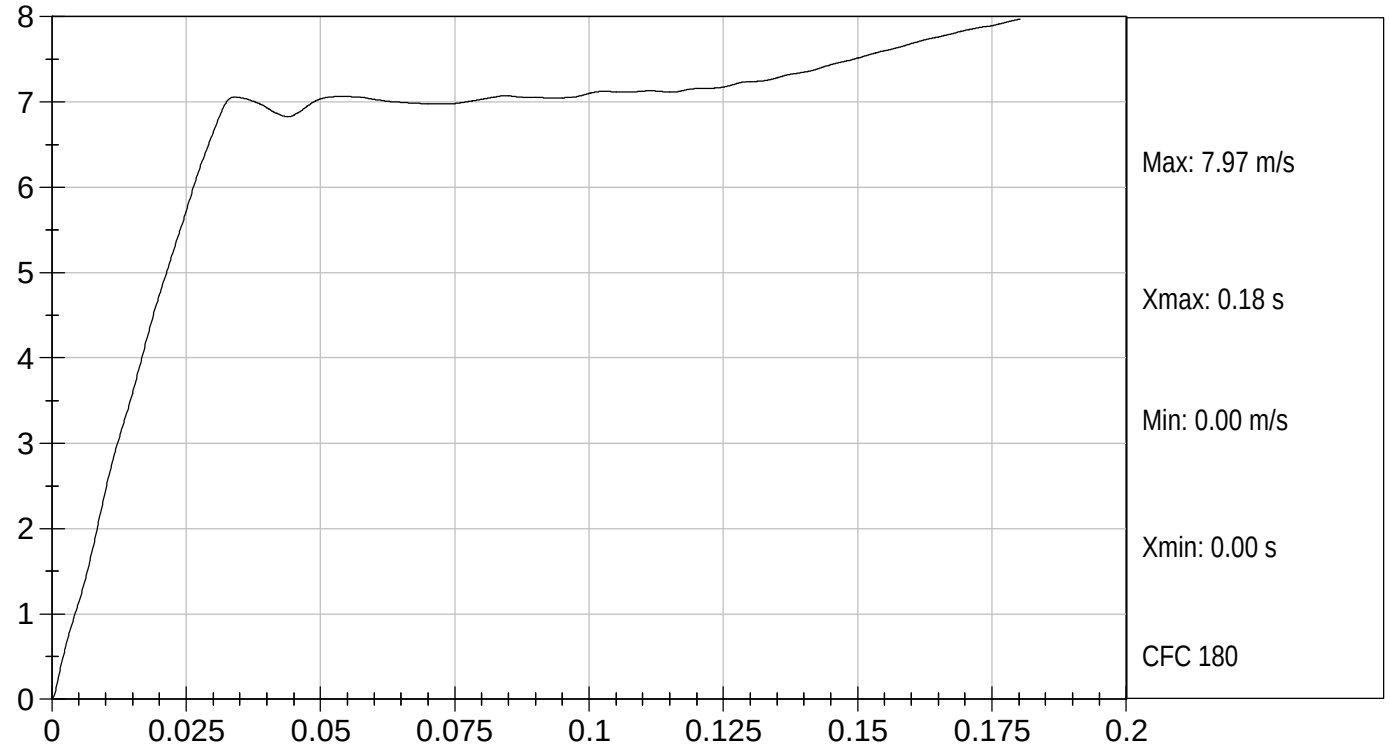
Test Date

Approved By

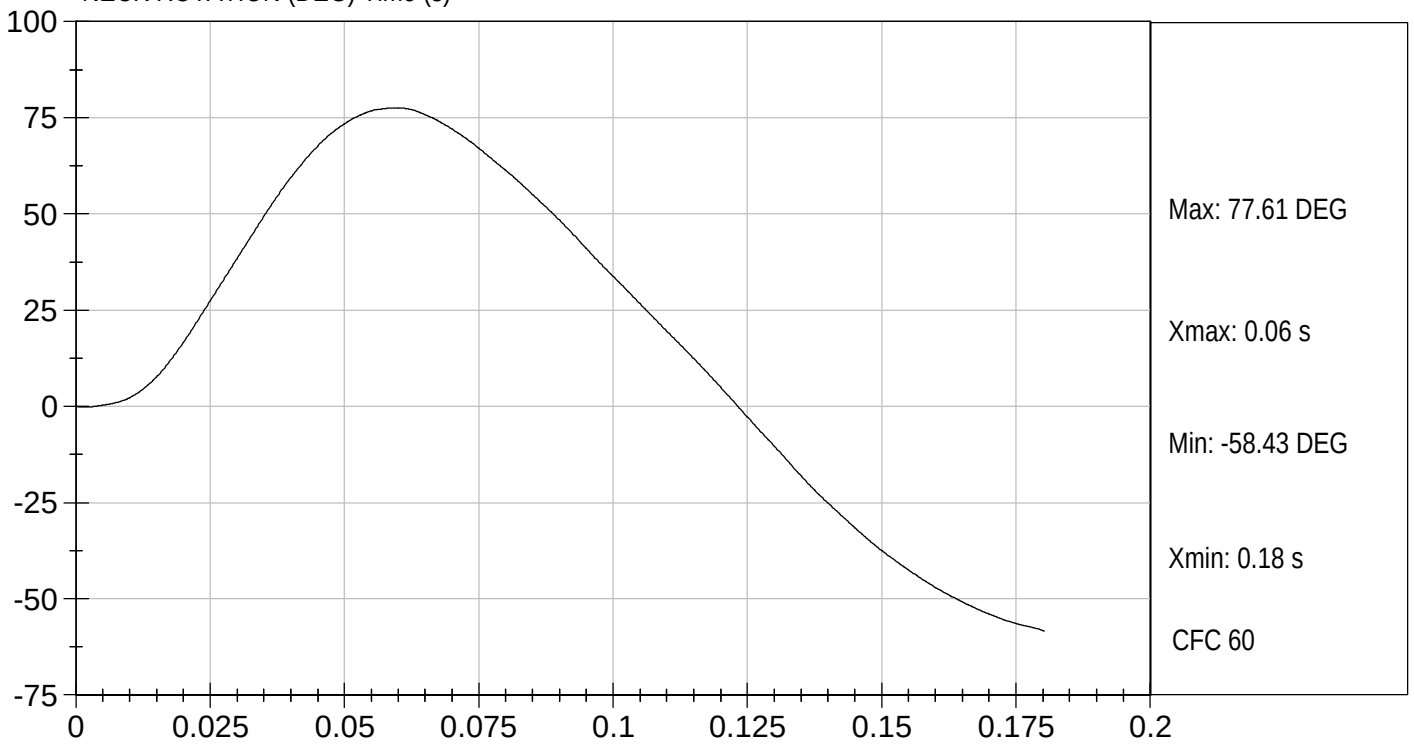
Test Desc: Neck Flexion
Componet ID: D04752

Test Date: 04/06/2004
Velocity: 22.97 ft/s, 7.00 m/s

PENDULUM DECELERATION (m/s) Time (s)

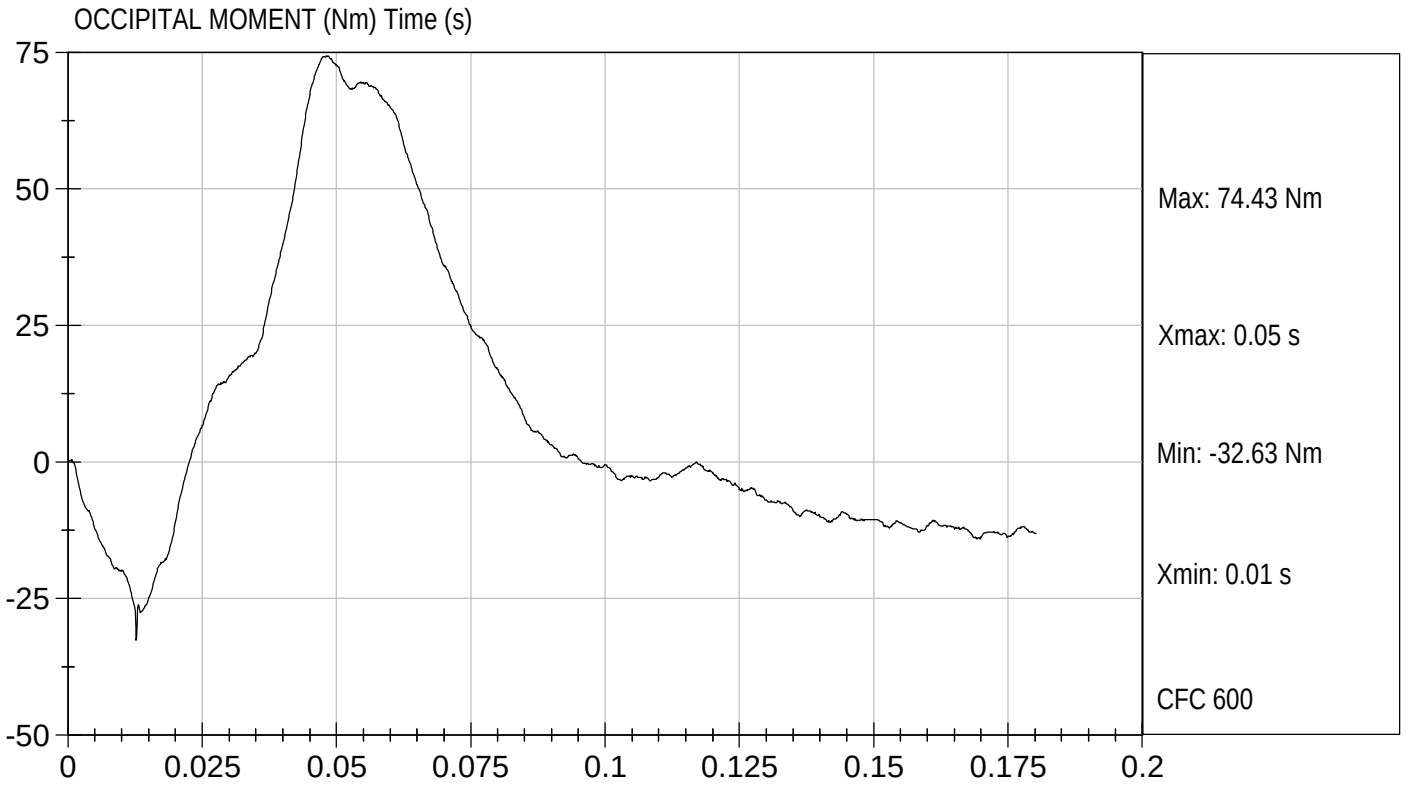


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Flexion
Componet ID: D04752

Test Date: 04/06/2004
Velocity: 22.97 ft/s, 7.00 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04753

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	29	Pass
Pendulum Speed		m/sec	5.95 to 6.19	5.98	Pass
Pendulum Deceleration	10 msec	msec	1.5 to 1.9	1.9	Pass
	20 msec	msec	3.1 to 3.9	3.6	Pass
	30 msec	msec	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	107	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-60	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	97	Pass
			Overall Results		Pass

Laboratory Technician

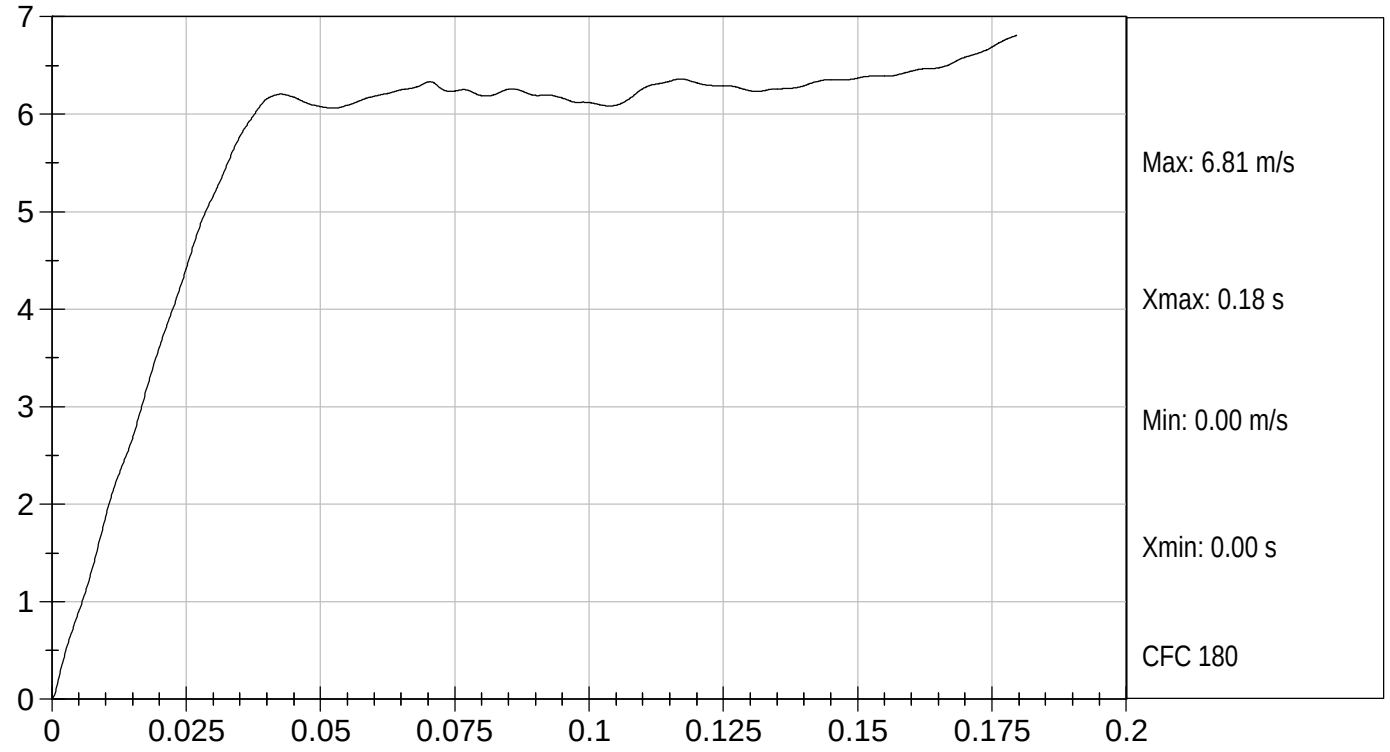
04/06/2004
Test Date

Jessica Hall
Approved By

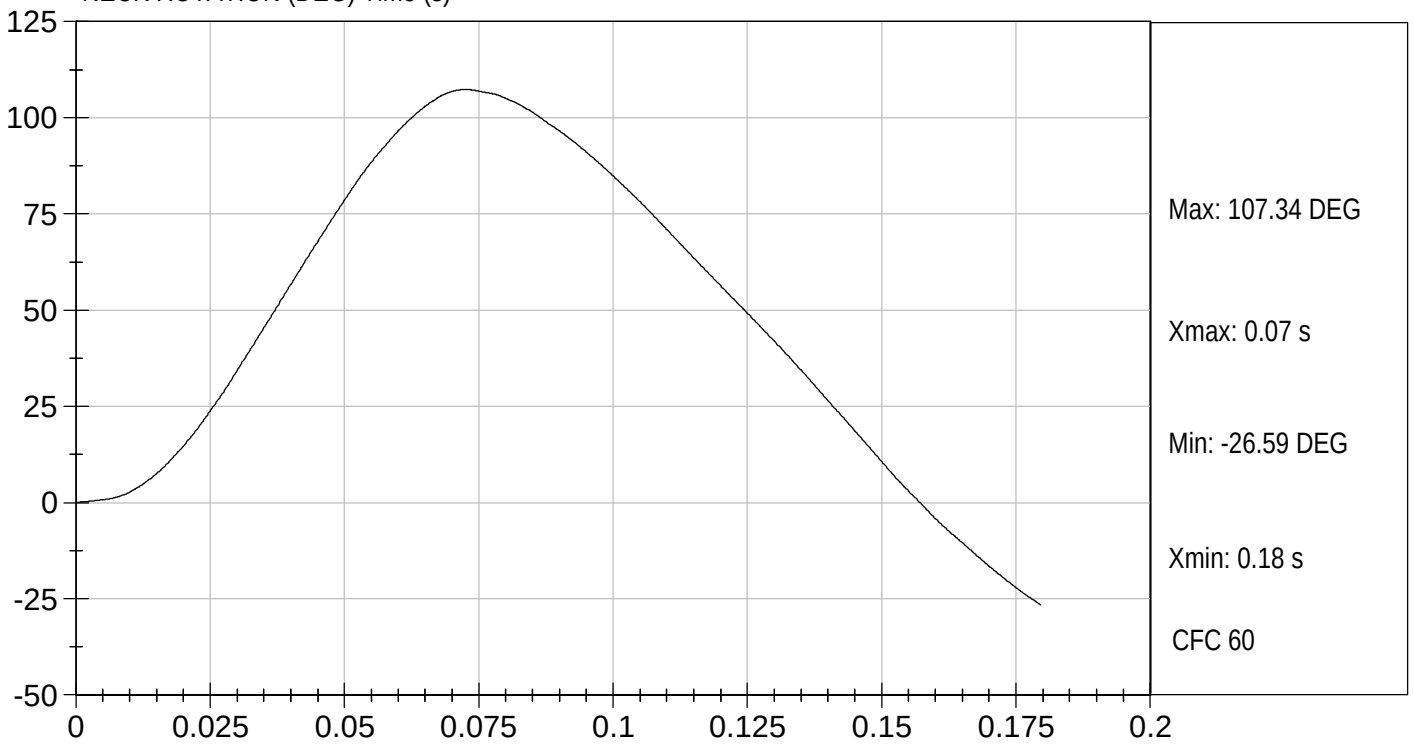
Test Desc: Neck Extension
Componet ID: D04753

Test Date: 04/06/2004
Velocity: 19.63 ft/s, 5.98 m/s

PENDULUM DECELERATION (m/s) Time (s)

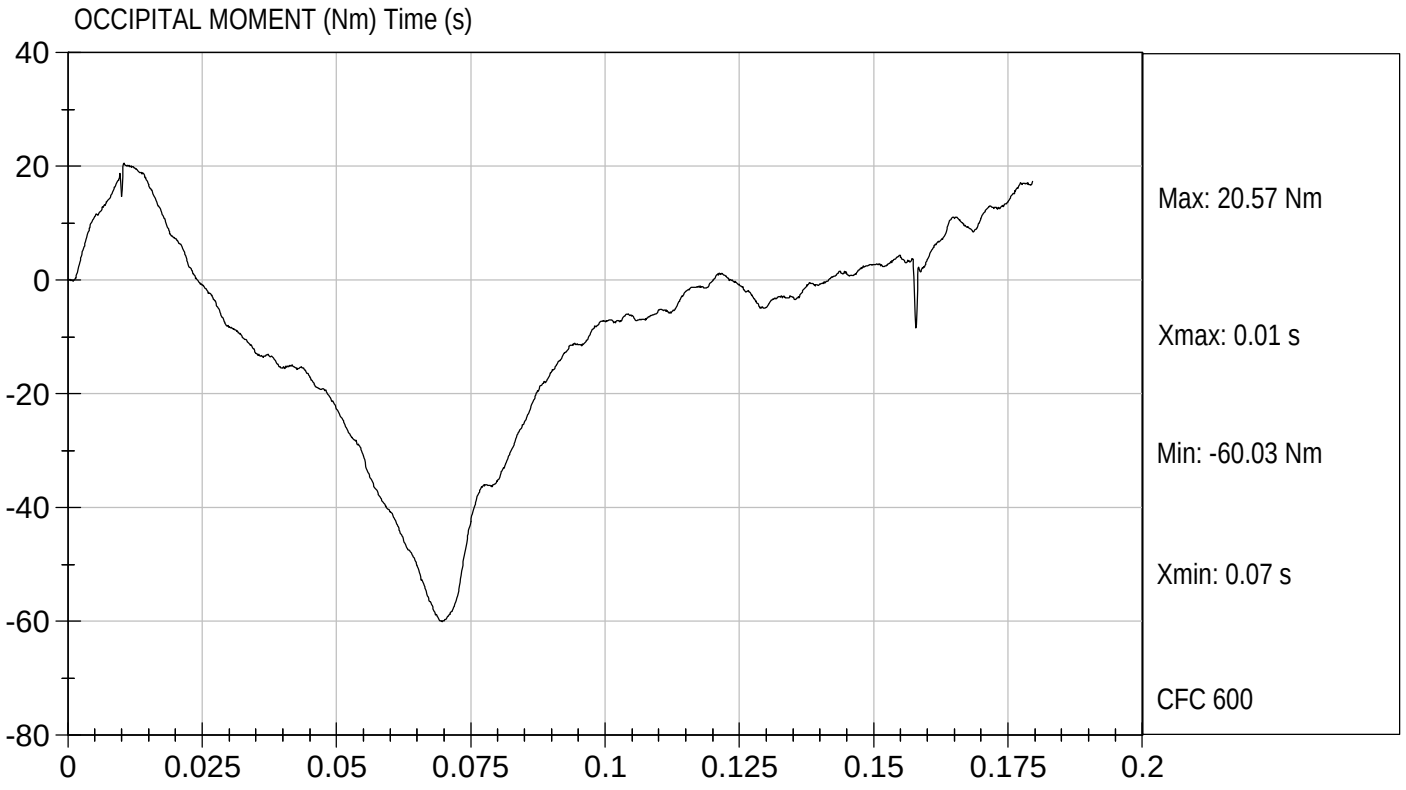


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Extension
Componet ID: D04753

Test Date: 04/06/2004
Velocity: 19.63 ft/s, 5.98 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04754

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Relative Humidity	%	10 to 70	29	Pass
Probe Speed	m/s	6.59 to 6.83	6.75	Pass
Peak Deflection	mm	50 to 58	56.8	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	3.96	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Peak Force 18 mm - 50 mm	Yes/No	< 4600 N	Yes	Pass
		Overall Test Results		Pass

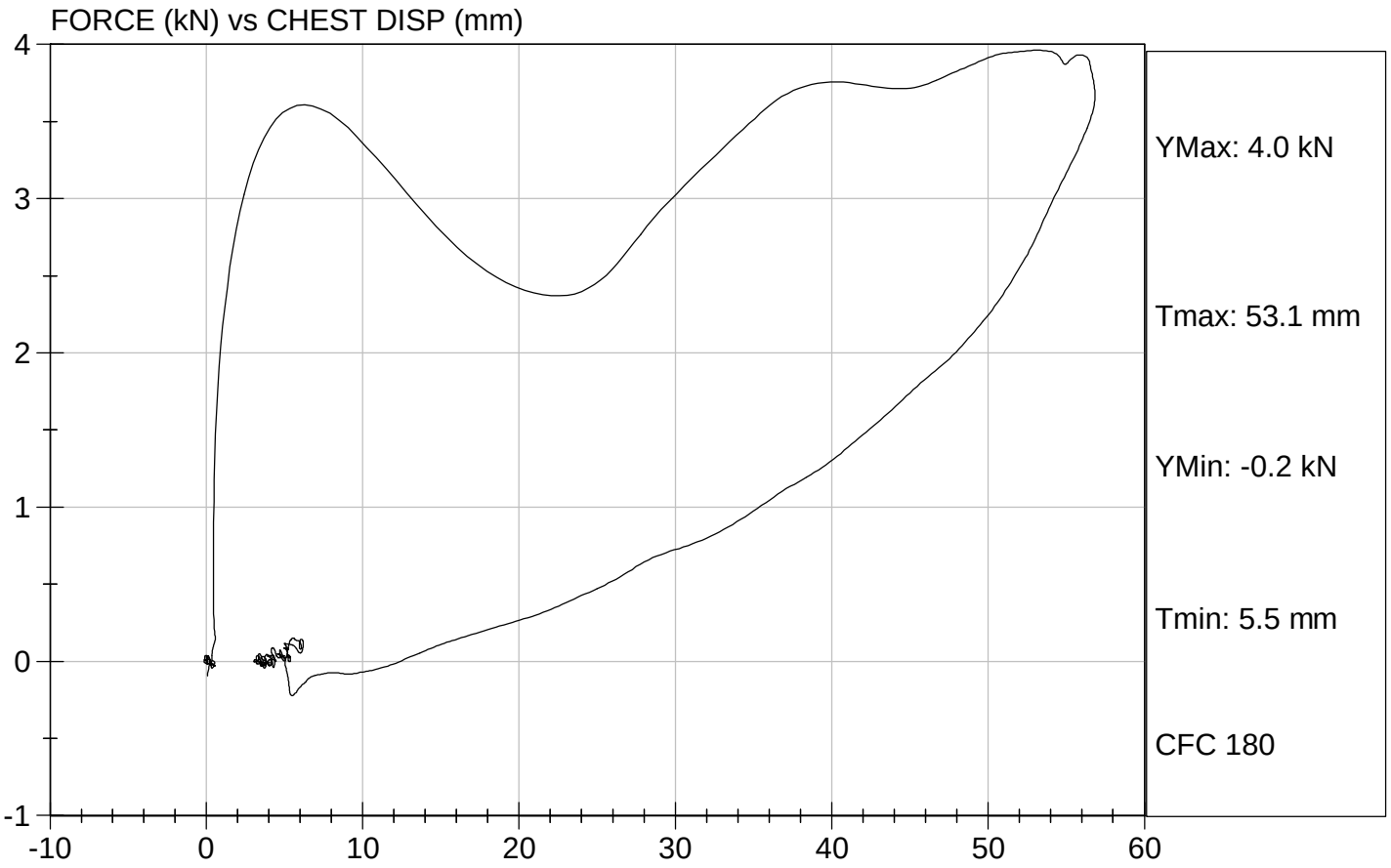
Laboratory Technician

04/06/2004
Test Date

Approved By

Test Description: Thorax Impact | Test Date: 04/06/2004

Component: D04754 | Speed: 22.13 ft/sec, 6.75 m/sec



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04755

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Speed	m/sec	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.66	Pass
		Overall Test Results		Pass

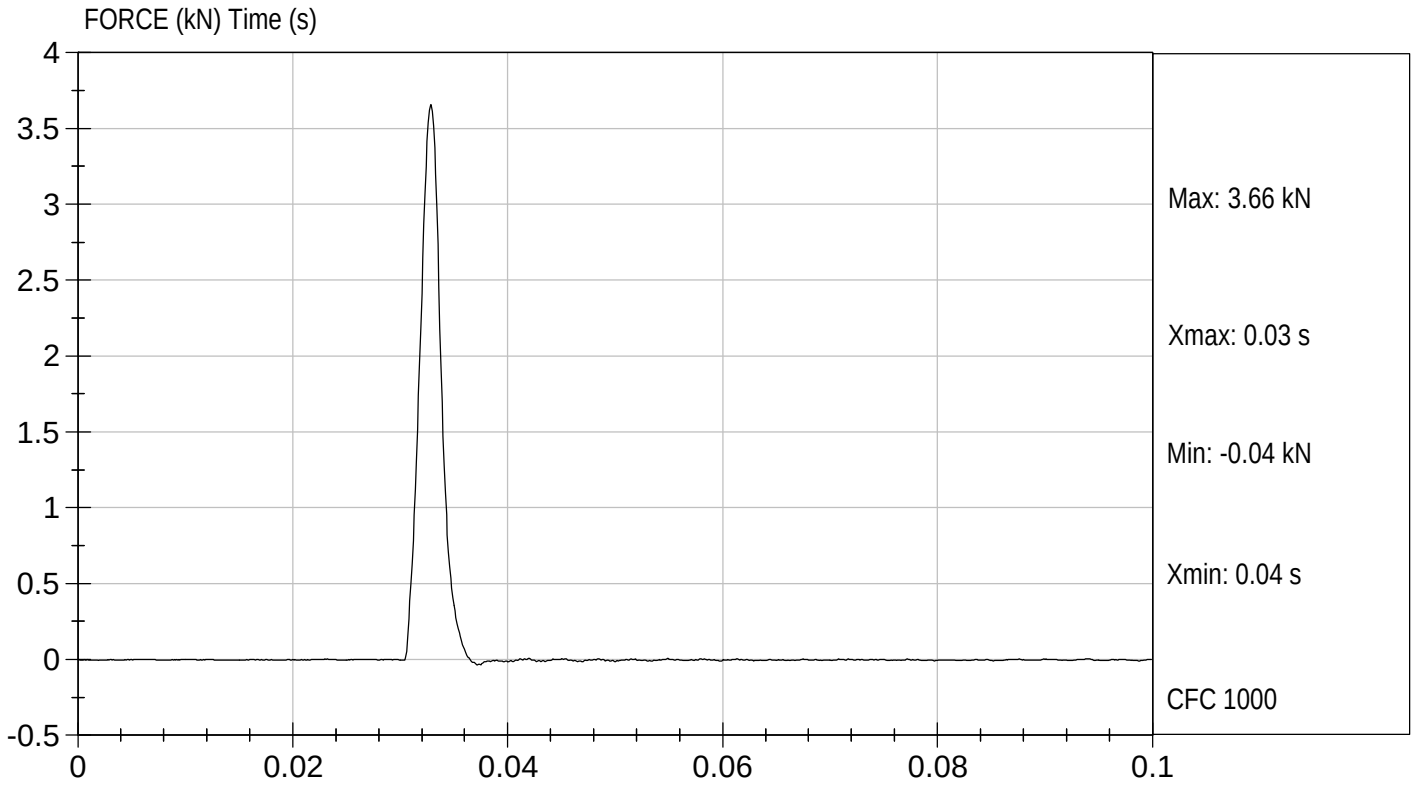
Laboratory Technician

04/06/2004
Test Date

Approved By

Test Desc: Right Knee
Componet ID: D04755

Test Date: 04/06/2004
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 517 **Test I.D:** D04756

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	28	Pass
Probe Speed	m/sec	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.81	Pass
		Overall Test Results		Pass

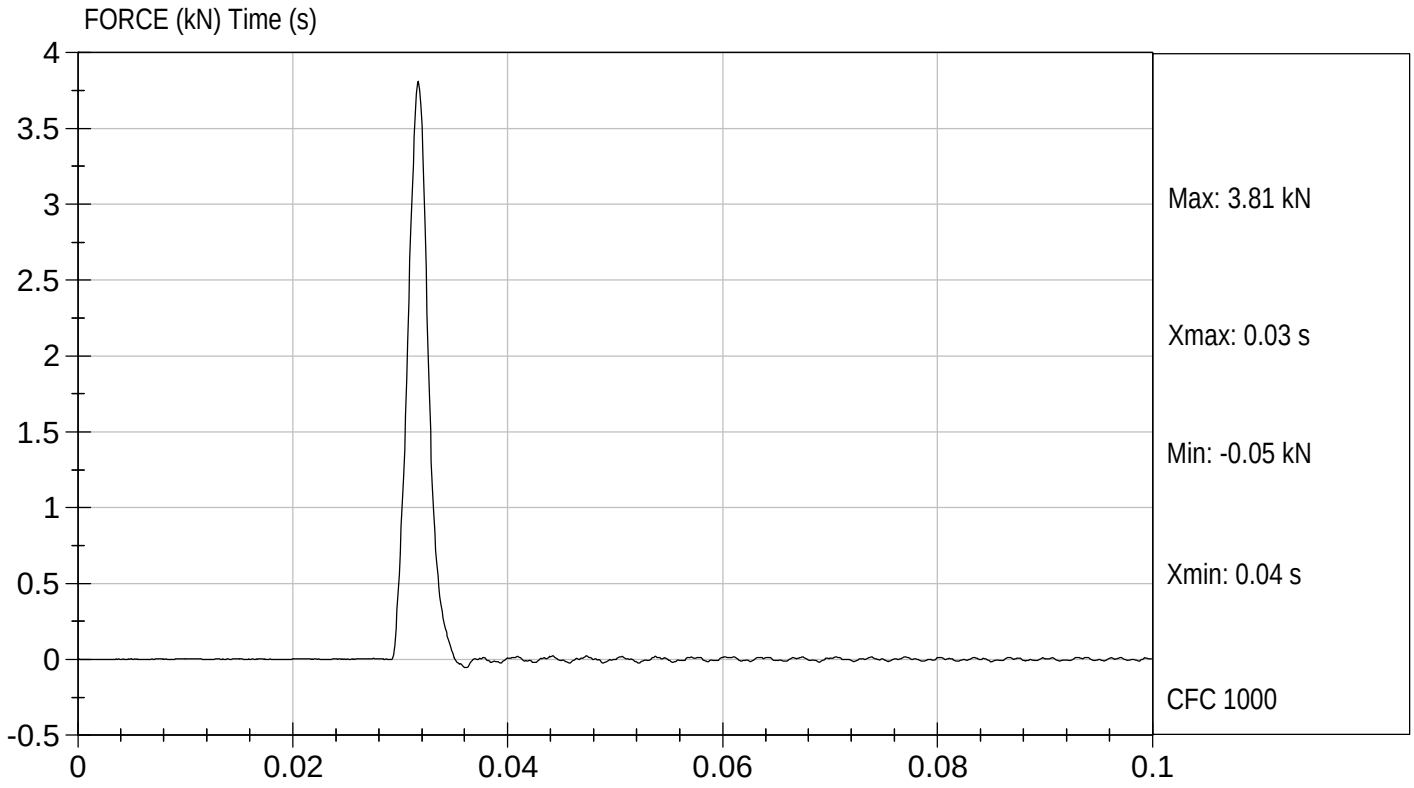
Laboratory Technician

04/06/2004
Test Date

Approved By

Test Desc: Left Knee
Componet ID: D04756

Test Date: 04/06/2004
Velocity: 6.96 ft/s, 2.12 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 517 **Test I.D:** D04757

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	29	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	20	Pass
Force at 45 deg	N	320 to 390	355	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Laboratory Technician

04/06/2004
Test Date

Approved By

DATA SHEET B1
DUMMY DAMAGE CHECKLIST

Dummy Serial Number ____517_____ Test Date ___3/26/04_____

Technician _____Jessica Gall_____

This check sheet is completed as part of the post test calibration verification.

_X_ Perform general cleaning.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber.			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer leads	Torn cables			X

Dummy Item	Inspect for	Comments	Damaged	OK
Accelerometer Mountings	Head mounting secure			**X**
	Chest mounting secure			**X**
Knees	Skin condition			**X**
	Insert (do not remove)			**X**
	Casting			**X**
Limbs	Normal movement and adjustment			**X**
Knee Sliders	Wires intact			**X**
	Rubber returned to “at rest” position			**X**
Pelvis	Broken			**X**
Other				**X**

If upon visual examination, damage is apparent in any of these areas, the appropriate engineer or engineering technician is to be consulted for a decision on repair or replacement of parts.
Repair or Replacement approved by:

Jessica Gall _____ 3/29/04_____
Signature Date

Describe the repair or replacement of parts:

Checked by
Jeff Loweneaugh _____ 3/29/04_____
Signature Date

EXTERNAL DIMENSIONS

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	780.2
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	443.0
C	H-POINT HEIGHT	Reference	81.3-86.3	85.1
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	145.0
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	76.4
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	128.0
G	BACK OF ELBOW TO WRIST PIVOT	Back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	255.8
H	HEAD BACK TO BACKLINE	Back of skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	45.0
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	280.2
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	193.0
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	545.0
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	365.2
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	400.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. “K”.	414-439.4	438.0

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	183.0
P	FOOT LENGTH	Tip of toe to rear of heal	218.5-233.7	226.2
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	475.8
S	HEAD BREADTH	The widest part of the head	137.1-147.3	142.0
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	180.5
U	HIP BREADTH	The widest part of the hip	299.7-314.9	305.1
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	359.0
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	85.5
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. “T”	528.3-548.7	538.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	857.6
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	789.0
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.0

DATA SHEET B3
HEAD DROP TEST (572.132)

Dummy Serial Number 506 Test Date 3/16/04

Technician Joe Fleck

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive head drops are necessary)

___1. It has been at least 2 hours since the last head drop. (572.132(c)(5))
_X_ N/A, ONLY one head drop performed

_X_2. The head assembly consists of the complete head (880105-100X), the six-axis neck transducer (SA572-S11) or neck transducer structural replacement (78051-383X), and three (3) accelerometers (SA572-S4). (572.132(a))

_X_3. The head accelerometer mounting plate screws ((10-24 x 3/8 SHCS) are torqued to 9.0 Nm.

_X_4. Accelerometers and their respective mounts are smooth and clean.

_X_5. Torque the skull cap screws (10-24 x 1/2 SHCS) to 9.0 Nm.

_X_6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.136(m))

_X_7. The head assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))

Record the maximum temperature 21.9
Record the minimum temperature 21.5
Record the maximum humidity 22%
Record the minimum humidity 21%

_X_8. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.

Record findings and actions: No Damage.

_X_9. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.132(c)(2))

_X_ 10. Suspend and orient the head assembly as shown in Figure 5B. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.132(c)(3))
Record the actual distance 376 mm

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

_X_ 11. The 1.57 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 6B. (572.132(c)(3))
Record the right side distance 502mm
Record the left side distance 502mm

_X_ 12. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.132(c)(4))
Record actual micro finish 656×10^{-6}mm

_X_ 13. The impact surface is rigidly supported. (572.132(c)(4))

_X_ 14. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.132(c)(4))
Record thickness 50.9 mm
Record width 604 mm
Record length 595 mm

_X_ 15. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.132(b) & (572.132(c)(4))

_X_ 16. Complete the following table using channel class 1000 data. (572.132(b)):

Parameter	Specification	Result
Peak resultant acceleration	250 g ≤ x ≤ 300 g	273
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration ≤ 15 g	7

_X_ 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

Joe Fleer
Signature

3/16/04
Date

DATA SHEET B4
NECK FLEXION TEST (572.133)

Dummy Serial Number ____506_____ Test Date ____3/23/04_____

Technician _____Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1_ (when successive flexion tests are necessary)

__1. It has been at least 30 minutes since the last flexion test. (572.137(q))
_X_ N/A, ONLY one flexion test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __21.5__
Record the maximum humidity __22%___
Record the minimum humidity __19%___

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: ___No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: ___No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 8B for the flexion test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 6.89 m/s to 7.13 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Flexion Test Results (572.133(b)(1) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		6.89 m/s ≤ speed ≤ 7.13 m/s	6.94 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	2.1 m/s ≤ ΔV ≤ 2.5 m/s	2.4 m/s
	@ 20 ms	4.0 m/s ≤ ΔV ≤ 5.0 m/s	4.7 m/s
	@30ms	5.8 m/s ≤ ΔV ≤ 7.0 m/s	6.6 m/s
Plane D Rotation		Peak moment* 69 Nm ≤ moment ≤ 83 Nm during the following rotation range 77° ≤ angle ≤ 91°	__76__ Nm @ __78__ degrees
Positive Moment Decay** (Flexion)		Time to decay to 10 Nm 80 ms ≤ time ≤ 100ms	82 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii))

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follows this sheet.

Joe Fleck
Signature

3/23/04
Date

DATA SHEET B5
NECK EXTENSION TEST (572.133)

Dummy Serial Number ____506_____ Test Date ___3/23/04_____

Technician _____Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1__ (when successive extension tests are necessary)

__1. It has been at least 30 minutes since the last extension test. (572.137(q))
_X_ N/A, ONLY one extension test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __21.5__
Record the maximum humidity __22%__
Record the minimum humidity __19%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: __No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9B for the extension test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.95 m/s to 6.19 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Extension Test Results (572.133(b)(2) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		5.95 m/s ≤ speed ≤ 6.19 m/s	6.13 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	1.5 m/s ≤ ΔV ≤ 1.9 m/s	1.8 m/s
	@ 20 ms	3.1 m/s ≤ ΔV ≤ 3.9 m/s	3.6 m/s
	@30ms	4.6 m/s ≤ ΔV ≤ 5.6 m/s	5.2 m/s
Plane D Rotation		Peak moment* -65 Nm ≤ moment ≤ -53 Nm during the following rotation range 99° ≤ angle ≤ 114°	_-57_ Nm @ _108_ degrees
Negative Moment Decay** (Extension)		Time to decay to -10 Nm 94 ms ≤ time ≤ 114 ms	98 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follow this sheet.

Joe Fleck _____ 3/23/04_____

Signature Date

DATA SHEET B6
THORAX IMPACT TEST (572.134)

Dummy Serial Number __506_____ Test Date __3/23/04_____

Technician ____Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive thorax impact tests are necessary)

__1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 11B.
_X_3. The complete assembled dummy (880105-000) is used (572.134(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. The weight of the shirt and pants shall not exceed 0.14 kg. (572.134(c)(1))
_X_4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.134(c)(2))
Record the maximum temperature _22.1__
Record the minimum temperature _21.5__
Record the maximum humidity _22%__
Record the minimum humidity _19%__
_X_5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material, chest displacement transducer assembly and the rear rib supports. Inspect for rib deformation using the chest depth gage. If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
_X_ - No damage
__ - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage _____
_____
__ - The following repairs or replacement was performed. Record
_____
_____
_X_6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 11B. The surface must be long enough to support the pelvis and outstretched legs. (572.134(c)(3))
_X_7. Level the ribs both longitudinally and laterally ± 0.5º and adjust the pelvis angle to 7º ± 2º. The angle may be measured using the special H-point tool (TE-2504)

that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block.

_X_ 8. The midsagittal plane of the dummy is vertical within ± 1º. (572.134(c)(3))

_X_ 9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5º of a horizontal line in the dummy's midsagittal plane. (572.134(c)(4))

_X_ 10. Align the adjustable neck bracket index marks to the "zero" position.

_X_ 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to the laboratory coordinate system. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.

_X_ 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.

_X_ 13. Place the arm assemblies horizontal ± 2º and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.

_X_ 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 180.

_X_ 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.134(c)(5)) The velocity of the test probe at the time of impact is 6.71 m/s ± 0.12m/s. (572.134(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.134(c)(6)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.134(c)(7))

_X_ 16. Complete the following table:

Thorax Impact Results (572.134(b) and 572.134(b)(1)&(2)

Parameter*	Specification	Result
Test Probe Speed	6.59 m/s ≤ speed ≤ 6.83 m/s	6.67 m/s
Chest Compression	50.0 mm ≤ compression ≤ 58.0 mm	52 mm
Peak force** between 50.0 and 58.0 mm chest compression	3900N ≤ peak force ≤ 4400N	4040 N
Peak force** between 18.0 and 50.0 mm chest compression	peak force ≤ 4600 N	yes
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	69%

*Time zero is defined as the time of initial contact between the test probe and the chest skin.
**Force = impactor mass x acceleration (572.134(b)(3))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve. (Figure 12B

_X_ 17. Plots of chest compression, acceleration, force, force versus deflection follow this sheet.

Signature _____ Date 3/23/04

DATA SHEET B7
TORSO FLEXION TEST (572.135)

Dummy Serial Number __506_____ Test Date __3/23/04_____

Technician _____Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive torso flexion tests are necessary)

__1. It has been at least 30 minutes since the last torso flexion test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 13B.
_X_3. The complete assembled dummy (880105-000) is used (572.135(c)(2)).
__ with legs below the femurs.
_X_ without legs below the femurs.
_X_4. The dummy assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.135(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __21.5__
Record the maximum humidity __22%__
Record the minimum humidity __19%__
_X_5. Secure the pelvis to the fixture at the pelvis instrument cavity rear face by threading four ¼ cap screws into the available threaded attachment holes. Tighten the mountings so that the test material is rigidly affixed to the test fixture and the pelvic lumbar joining surface is horizontal. (572.135(c)(3))
_X_6. Attach the loading adapter bracket to the spine of the dummy as shown in Figure 13B**.** (572.135(c)(4))
_X_7. Inspect and adjust, if necessary, the seating of the abdominal insert within the pelvis cavity and with respect to the torso flesh, assuring that the torso flesh provides uniform fit and overlap with respect to the outside surface of the pelvis flesh. (572.135(c)(5))
_X_8. Flex the dummy forward and back 3 times such that the angle reference plane moves between 0° and 30° with respect to the vertical transverse plane. (572.135(c)(6))
_X_9. Support the dummy such that the angle reference plane is at or near 0° (vertical with respect to the vertical transverse plane). Wait at least 30 minutes before continuing. (572.135(c)(6))
_X_10. Remove all external support that was implemented in 9 above. (572.135(c)(7))
_X_11. Measure the initial orientation angle of the torso reference plane of the seated, unsupported dummy. (572.135(c)(7))
Record reference plane angle (max. allowed 20°)___17°___
_X_12.Attach the pull cable and the load cell. (572.135(c)(8))

_X_13. Apply a tension force in the midsagittal plane to the pull cable at any upper torso deflection rate between 0.5° and 1.5° per second, until the angle reference plane is at 45° ± 0.5° of flexion relative to the vertical transverse plane. (572.135(c)(9))
_X_14. Maintain angle reference plane at 45° ± 0.5° of flexion for 10 seconds. (572.135(c)(10))
_X_15. As quickly as possible release the force applied to the attachment bracket. (572.135(c)(11))
_X_16. 3 minutes after the release of the force, measure the reference plane angle. (572.135(c)(11))
_X_17. Complete the following table:

Torso Flexion Results (572.135(b), 572.135(c)(7), (572.135(c)(9))

Parameter	Specification	Result
Initial ref. plane angle	Angle ≤ 20°	17°
Torso rotation rate	0.5°/s ≤ rate ≤ 1.5°/s	1.0
Force at 45° ±0.5°	320 N ≤ force ≤ 390 N	336 N
Final ref. plane angle	Initial ref. plane angle ±8°	21°

Joe Fleck
Signature

3/23/04
Date

DATA SHEET B8
LEFT KNEE IMPACT TEST (572.136)

Dummy Serial Number __506_____ Test Date __3/5/04_____

Technician ____Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive knee impact tests are necessary)

__1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B
_X_3. The knee assembly (880105-528L), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-650), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.1__
Record the minimum temperature _21.5__
Record the maximum humidity _22%__
Record the minimum humidity _19%__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.136(c)(6))

_X_ 11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.11 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3700 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_ 12. Plots of acceleration versus time and force versus time follow this sheet.

Joe Fleck
Signature

3/23/04
Date

DATA SHEET B9
RIGHT KNEE IMPACT TEST (572.136)

Dummy Serial Number ___506_____ Test Date __3/23/04_____

Technician ___Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1__ (when successive knee impact tests are necessary)

__1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B.
_X_3. The knee assembly (880105-528R), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-651), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.1___
Record the minimum temperature _21.5___
Record the maximum humidity _22 %___
Record the minimum humidity _19 %___
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5))
_X_11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.10 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3710 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

3/23/04
Date

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 506 **Test I.D:** D04581

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	250 - 300	273	Pass
Peak Lateral Acceleration	G's	+/- 15	6.6	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

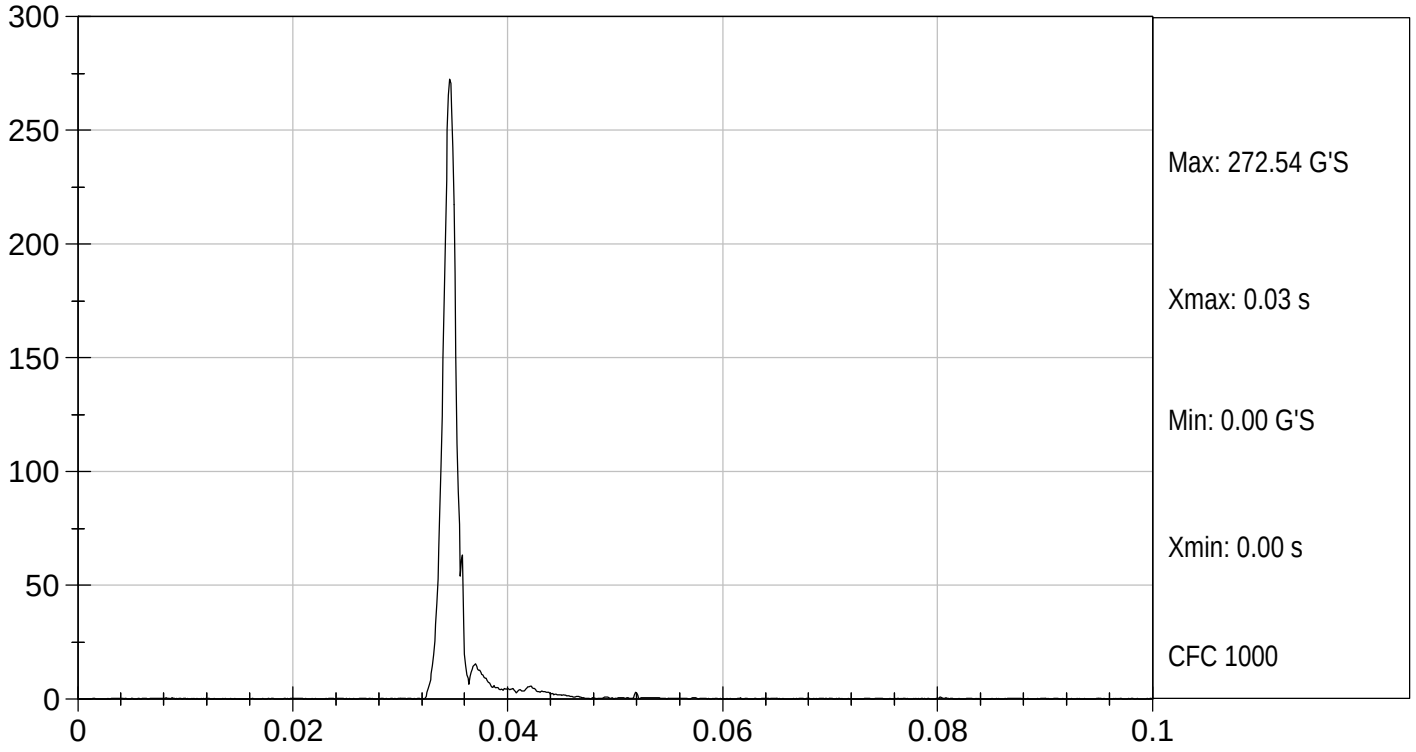
03/16/2004
Test Date

Approved By

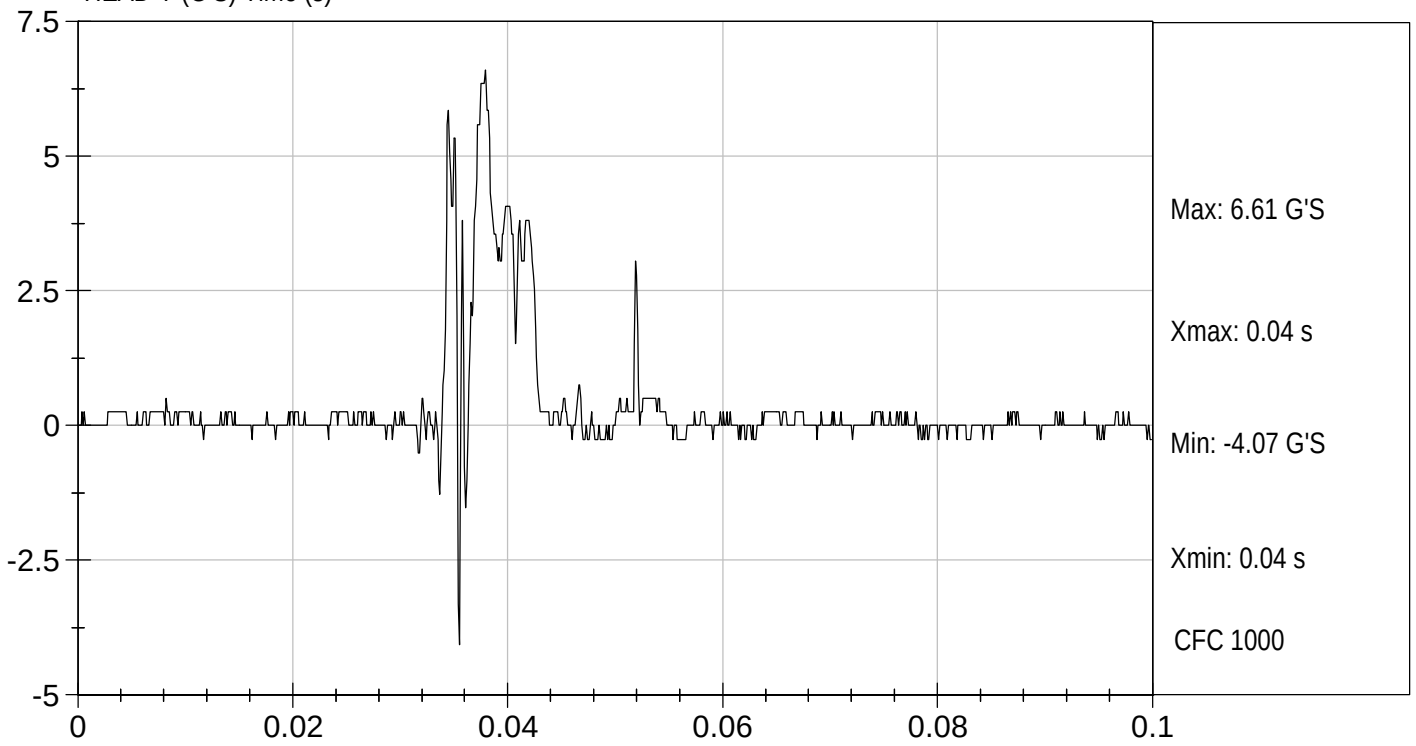
Test Desc: Head Drop
Componet ID: D04581

Test Date: 03/16/2004
Velocity: 0 ft/s, m/s

PEAK RESULTANT ACCELERATION (G'S) Time (s)



HEAD Y (G'S) Time (s)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04582

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Speed		m/sec	6.89 to 7.13	6.94	Pass
Pendulum Deceleration	10 msec	msec	2.1 to 2.5	2.4	Pass
	20 msec	msec	4.0 to 5.0	4.7	Pass
	30 msec	msec	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	78	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	76	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	82	Pass
			Overall Results		Pass

Joe Fleck

Laboratory Technician

03/23/2004

Test Date

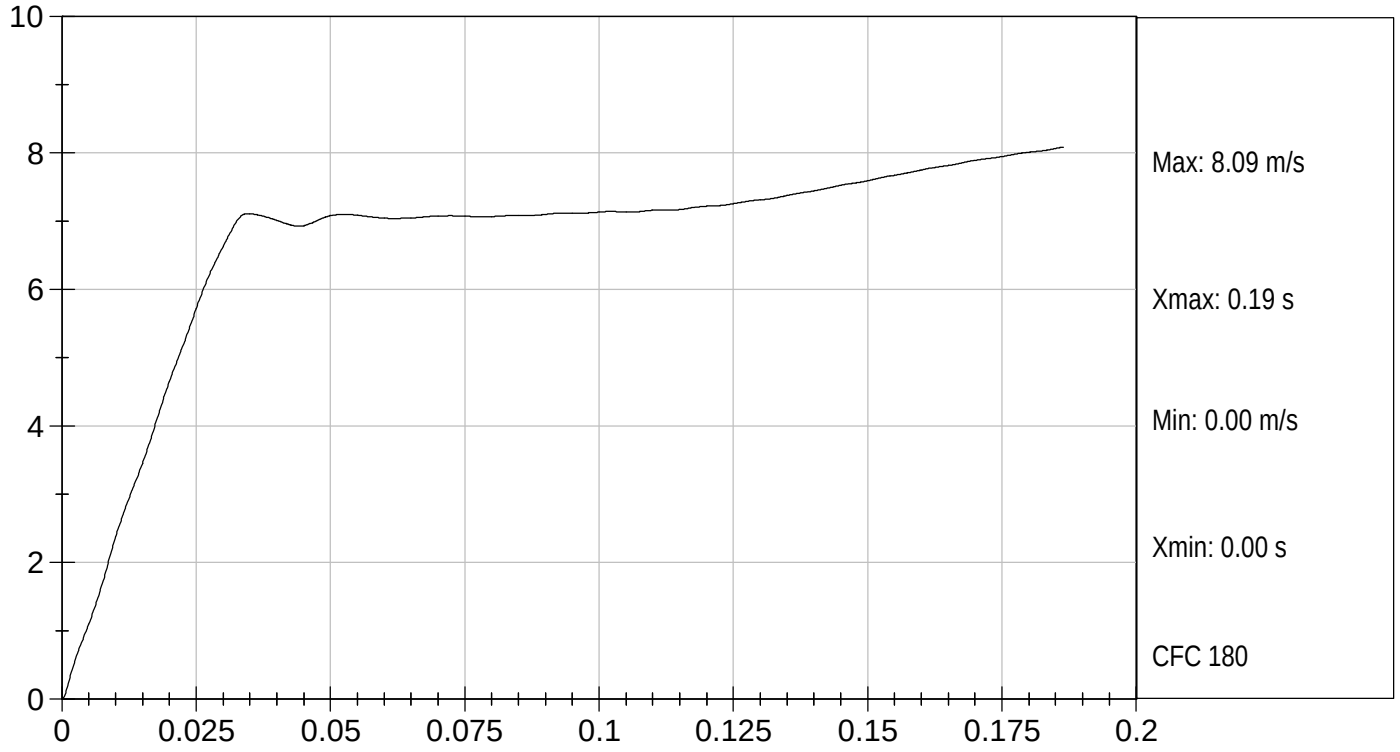
Jessica Gall

Approved By

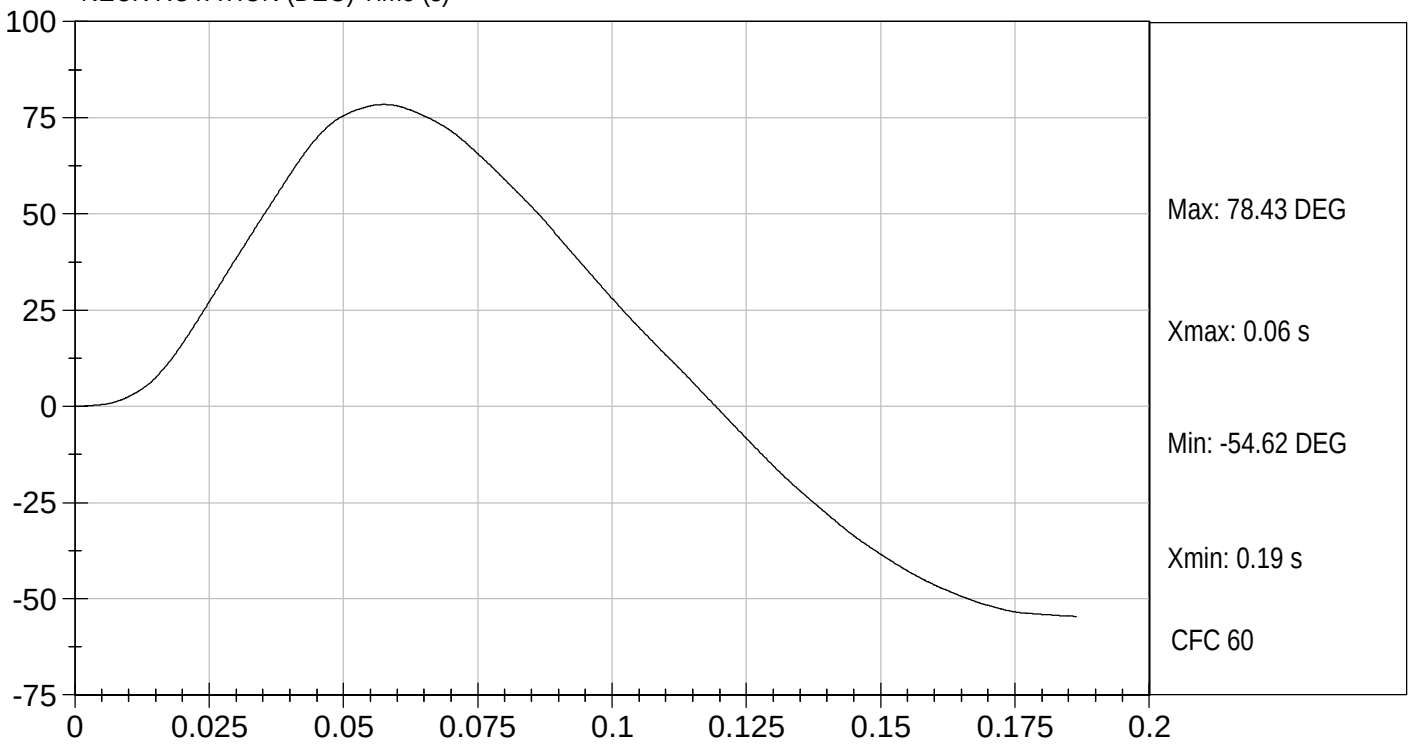
Test Desc: Neck Flexion
Componet ID: D04582

Test Date: 03/23/2004
Velocity: 22.78 ft/s, 6.94 m/s

PENDULUM DECELERATION (m/s) Time (s)

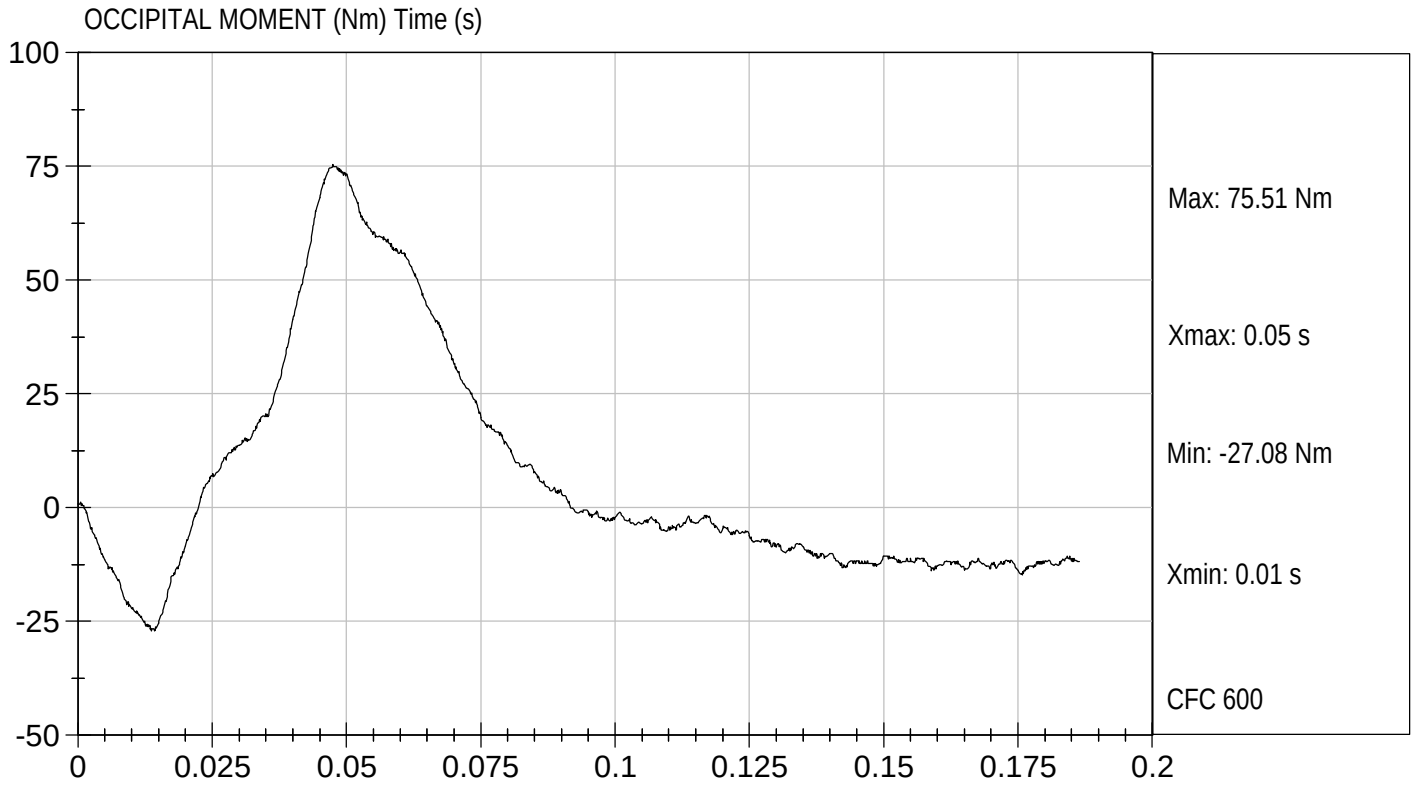


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Flexion
Componet ID: D04582

Test Date: 03/23/2004
Velocity: 22.78 ft/s, 6.94 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04583

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Speed		m/sec	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 msec	msec	1.5 to 1.9	1.8	Pass
	20 msec	msec	3.1 to 3.9	3.6	Pass
	30 msec	msec	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	108	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-57	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	98	Pass
			Overall Results		Pass

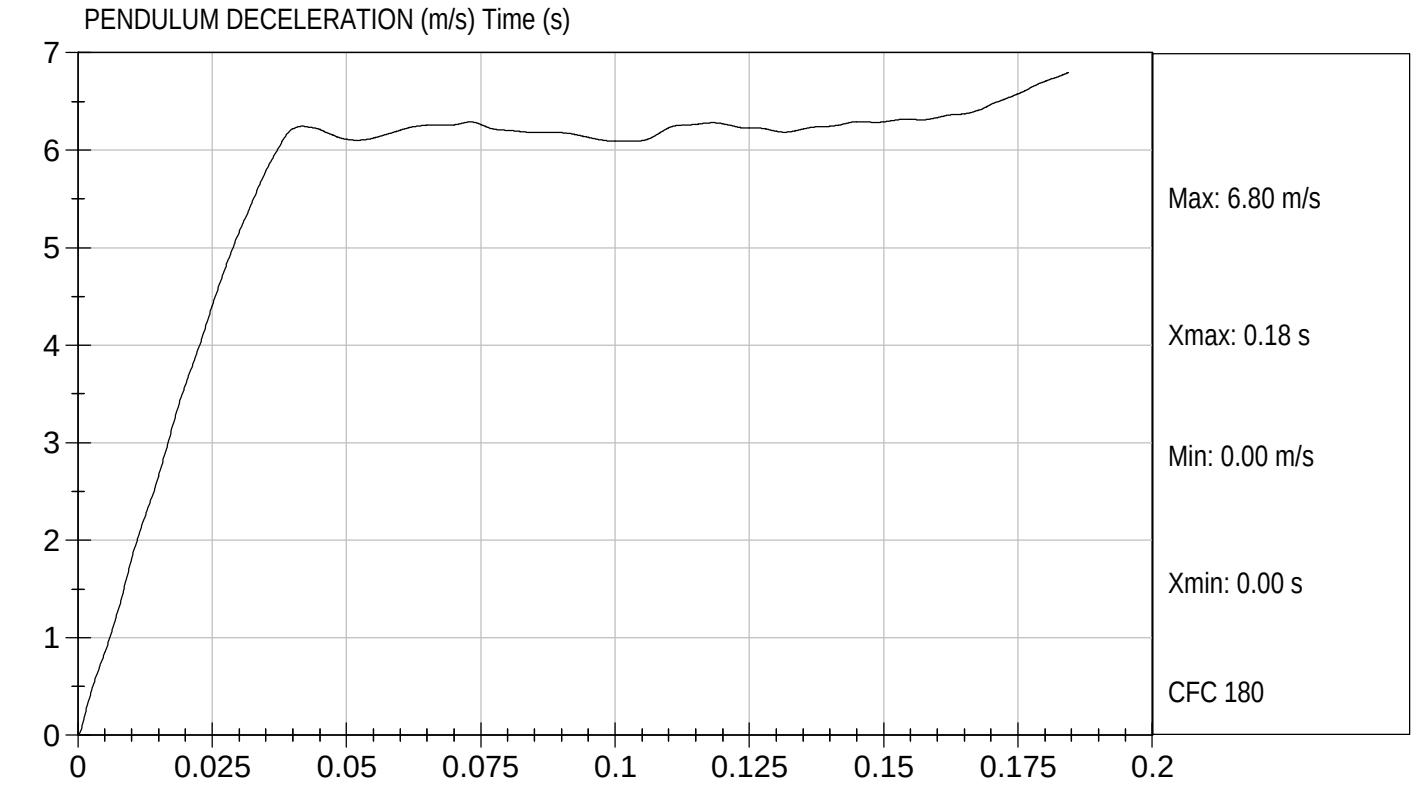
Laboratory Technician

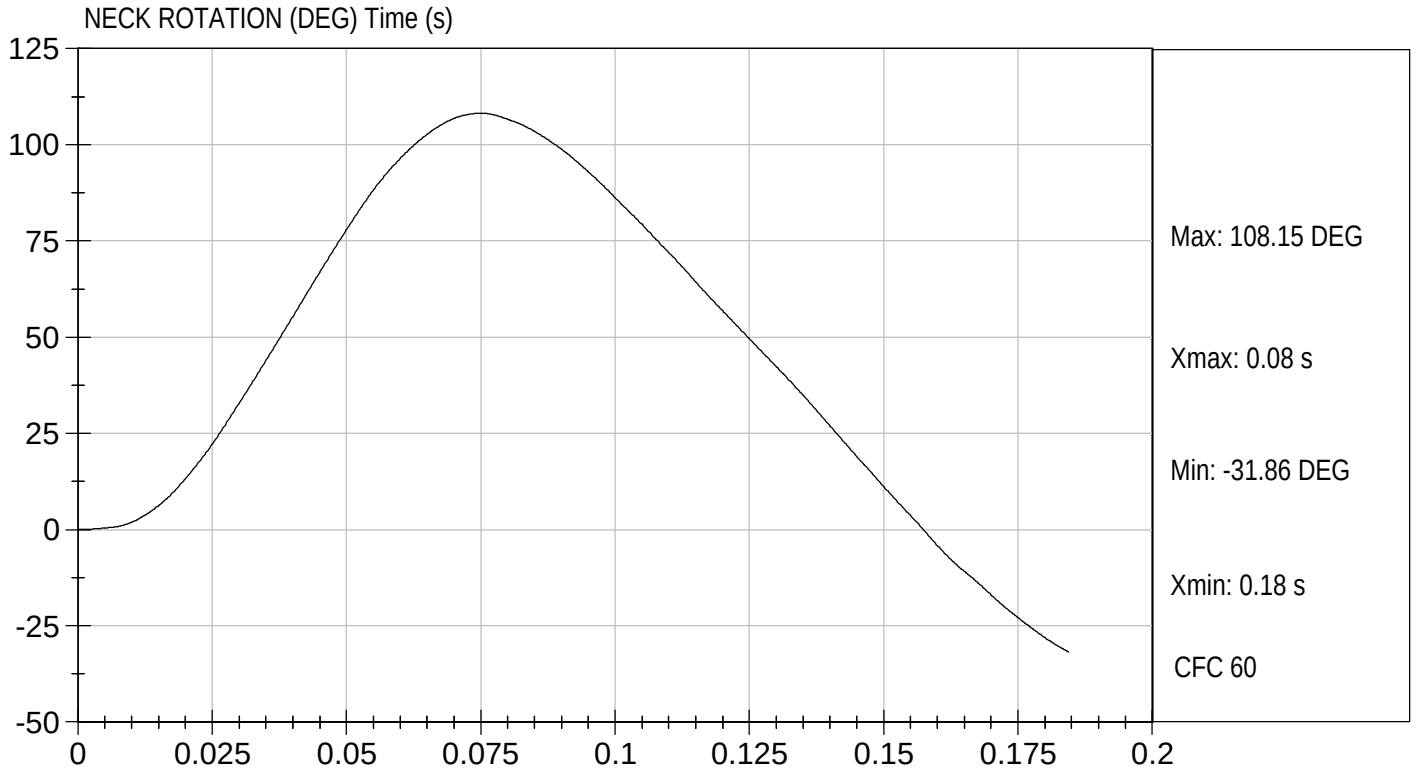
03/23/2004
Test Date

Approved By

Test Desc: Neck Extension
Componet ID: D04583

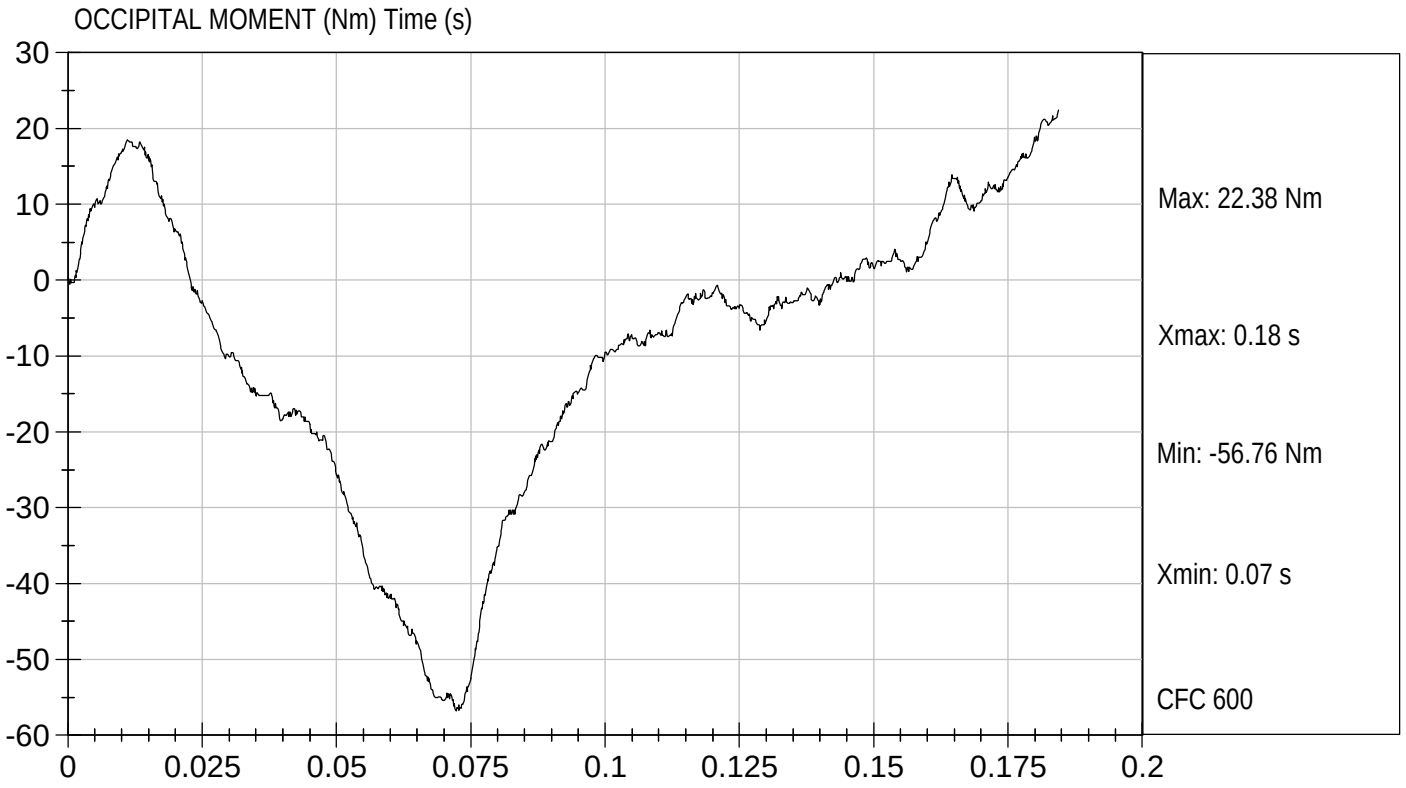
Test Date: 03/23/2004
Velocity: 20.1 ft/s, 6.13 m/s





Test Desc: Neck Extension
Componet ID: D04583

Test Date: 03/23/2004
Velocity: 20.1 ft/s, 6.13 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04584

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	6.59 to 6.83	6.67	Pass
Peak Deflection	mm	50 to 58	52.16	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.04	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	Yes/No	< 4600 N	Yes	Pass
		Overall Test Results		Pass

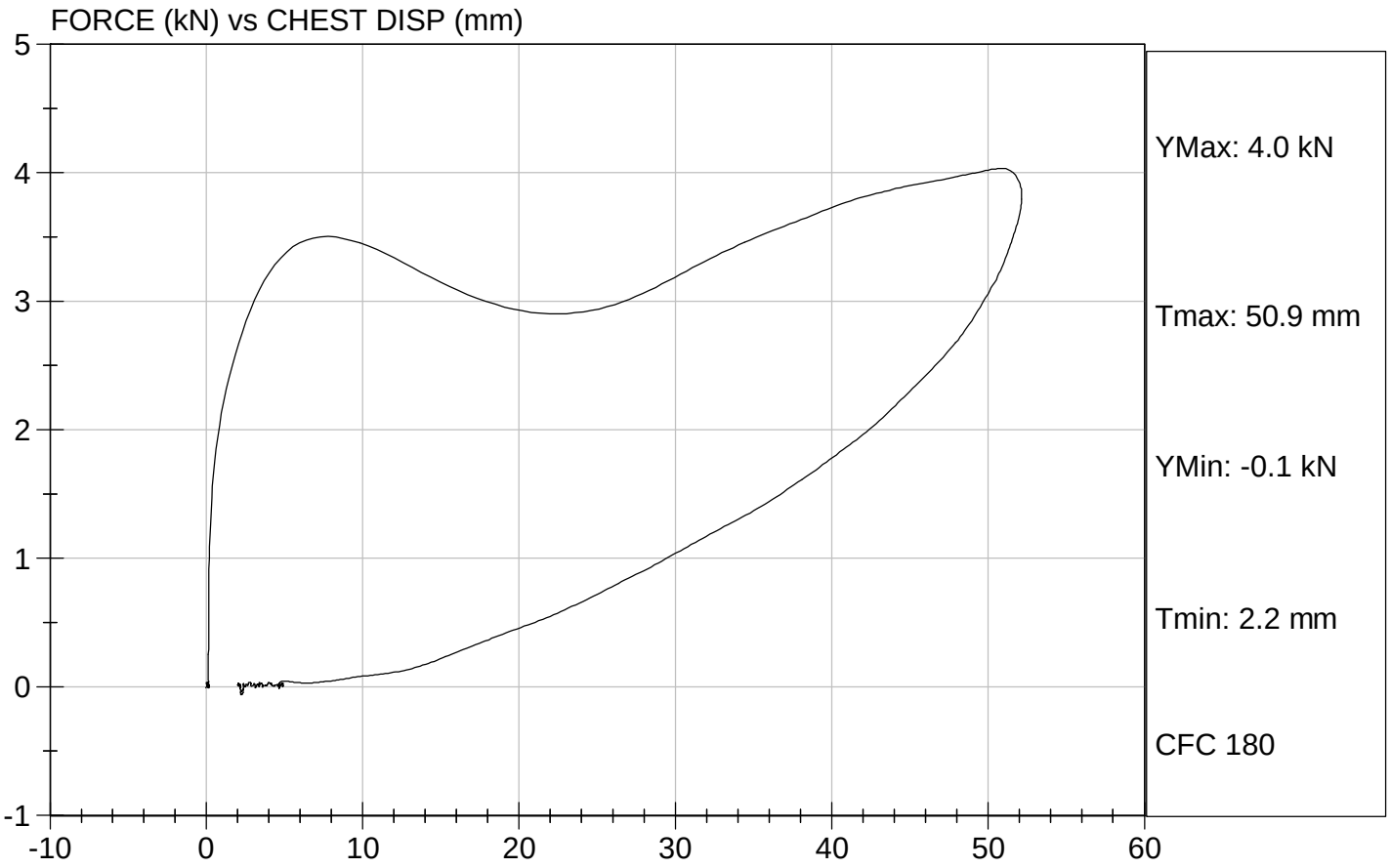
Joe Fleck
Laboratory Technician

03/23/2004
Test Date

Jessica Hall
Approved By

Test Description: Thorax Impact Test Date: 03/23/2004

Component: D04584 Speed: 21.87 ft/sec, 6.67 m/sec



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04585

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/sec	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.71	Pass
		Overall Test Results		Pass

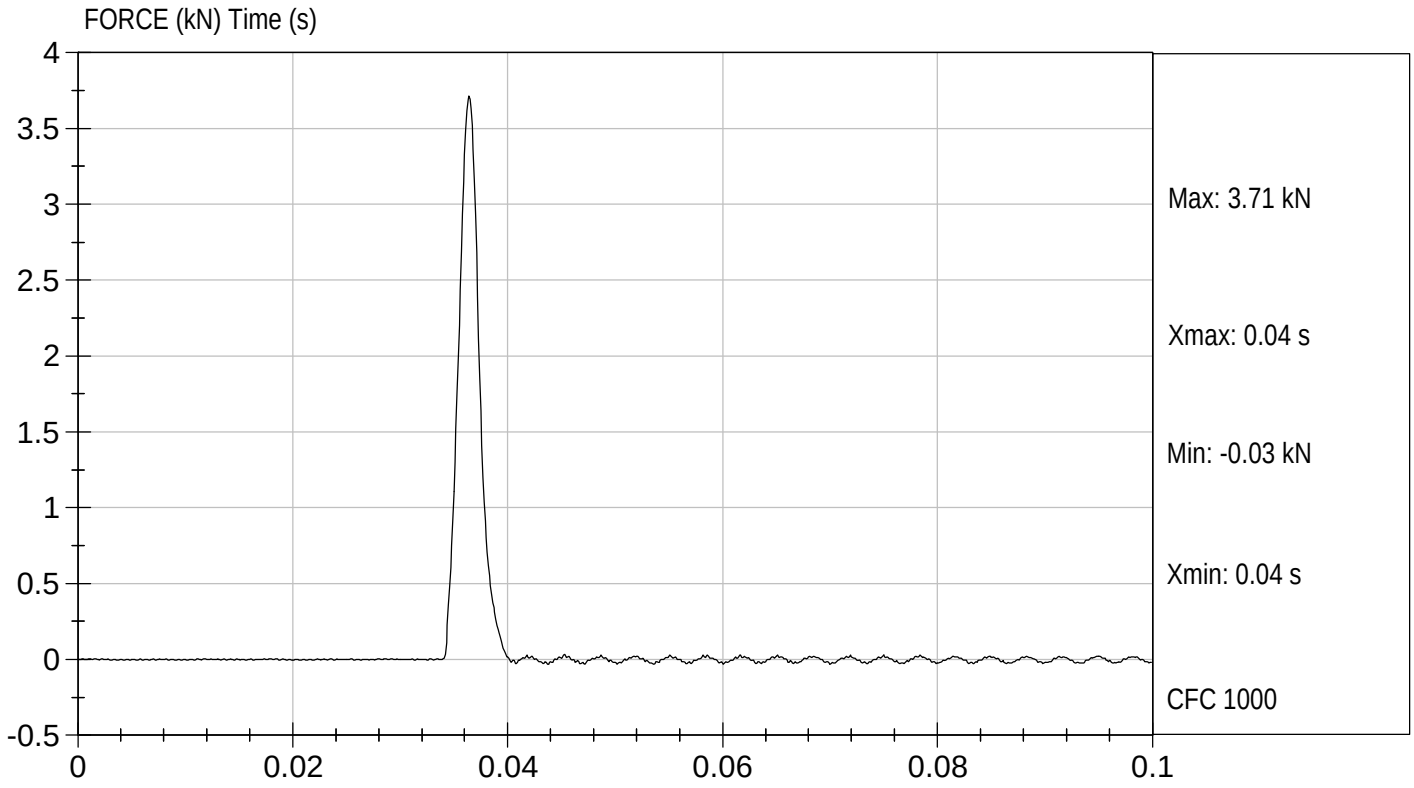
Jan Fleck
Laboratory Technician

03/23/2004
Test Date

Jessica Hall
Approved By

Test Desc: Right Knee
Componet ID: D04585

Test Date: 03/23/2004
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04586

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/sec	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.7	Pass
		Overall Test Results		Pass

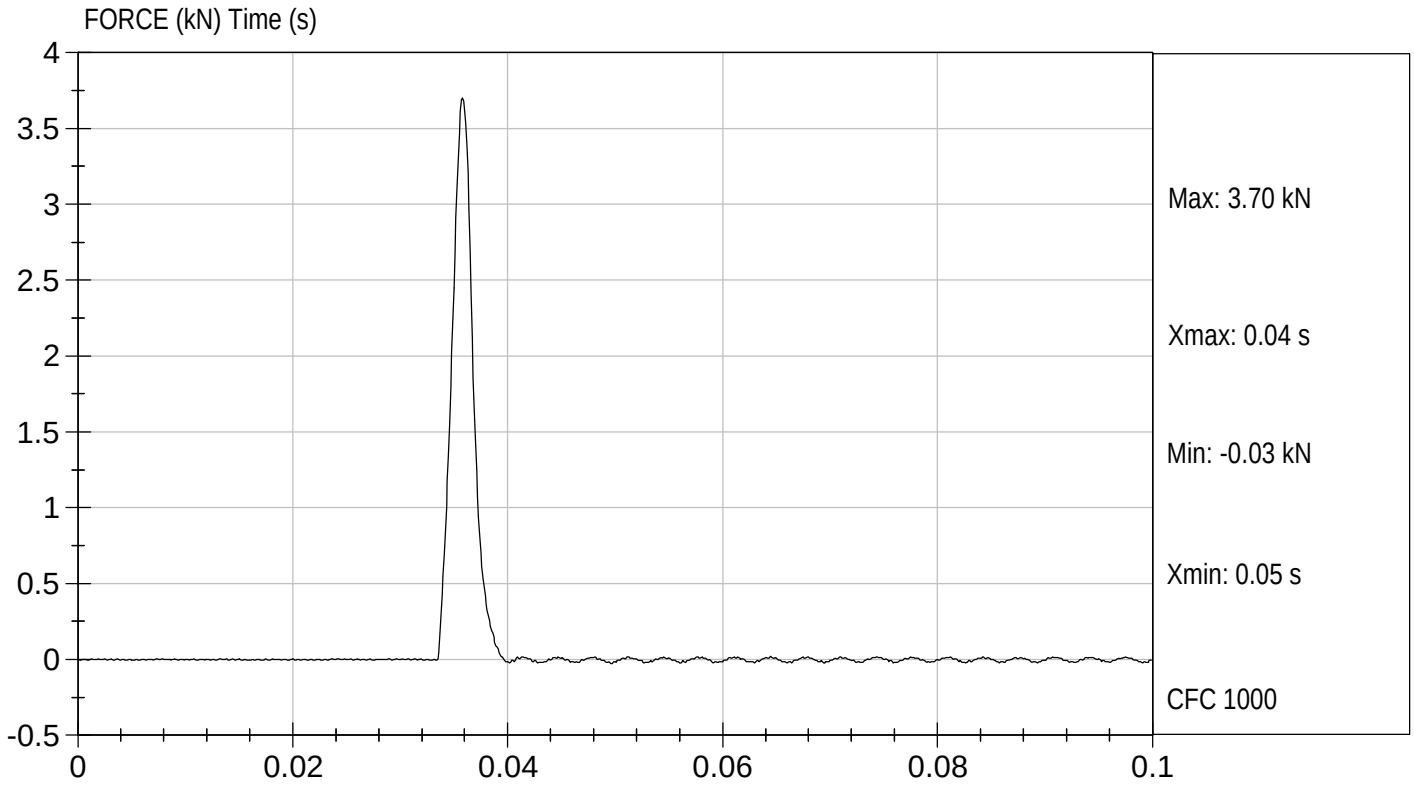
Laboratory Technician

03/23/2004
Test Date

Approved By

Test Desc: Left Knee
Componet ID: D04586

Test Date: 03/23/2004
Velocity: 6.93 ft/s, 2.11 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 506 **Test I.D:** D04587

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	21	Pass
Force at 45 deg	N	320 to 390	336	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Laboratory Technician

04/06/2004
Test Date

Approved By

DATA SHEET B3
HEAD DROP TEST (572.132)

Dummy Serial Number 506 Test Date 3/29/04

Technician Dave Wilcox

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive head drops are necessary)

___1. It has been at least 2 hours since the last head drop. (572.132(c)(5))
_X_ N/A, ONLY one head drop performed
_X_2. The head assembly consists of the complete head (880105-100X), the six-axis neck transducer (SA572-S11) or neck transducer structural replacement (78051-383X), and three (3) accelerometers (SA572-S4). (572.132(a))
_X_3. The head accelerometer mounting plate screws ((10-24 x 3/8 SHCS) are torqued to 9.0 Nm.
_X_4. Accelerometers and their respective mounts are smooth and clean.
_X_5. Torque the skull cap screws (10-24 x 1/2 SHCS) to 9.0 Nm.
_X_6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.136(m))
_X_7. The head assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))
Record the maximum temperature 23.0
Record the minimum temperature 22.1
Record the maximum humidity 37%
Record the minimum humidity 35%
_X_8. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: No Damage.
isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.132(c)(2))

_X_ 10. Suspend and orient the head assembly as shown in Figure 5B. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.132(c)(3))
Record the actual distance __376 mm___

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

_X_ 11. The 1.57 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 6B. (572.132(c)(3))
Record the right side distance __501mm_____
Record the left side distance __502mm_____

_X_ 12. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.132(c)(4))
Record actual micro finish __656×10^{-6}mm_____

_X_ 13. The impact surface is rigidly supported. (572.132(c)(4))

_X_ 14. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.132(c)(4))
Record thickness __50.9 mm__
Record width __604 mm__
Record length __595 mm__

_X_ 15. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.132(b) & (572.132(c)(4))

_X_ 16. Complete the following table using channel class 1000 data. (572.132(b)):

Parameter	Specification	Result
Peak resultant acceleration	250 g ≤ x ≤ 300 g	278
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration ≤ 15 g	12

_X_ 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

Signature

__3/29/04_____
Date

DATA SHEET B4
NECK FLEXION TEST (572.133)

Dummy Serial Number ____506_____ Test Date ____3/30/04_____

Technician _____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1_ (when successive flexion tests are necessary)

__1. It has been at least 30 minutes since the last flexion test. (572.137(q))
_X_ N/A, ONLY one flexion test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __22.0__
Record the maximum humidity __35%__
Record the minimum humidity __34%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: ___No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: ___No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 8B for the flexion test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 6.89 m/s to 7.13 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Flexion Test Results (572.133(b)(1) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		6.89 m/s ≤ speed ≤ 7.13 m/s	7.02 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	2.1 m/s ≤ ΔV ≤ 2.5 m/s	2.3 m/s
	@ 20 ms	4.0 m/s ≤ ΔV ≤ 5.0 m/s	4.5 m/s
	@30ms	5.8 m/s ≤ ΔV ≤ 7.0 m/s	6.5 m/s
Plane D Rotation		Peak moment* 69 Nm ≤ moment ≤ 83 Nm during the following rotation range 77^o ≤ angle ≤ 91^o	__77__Nm @ __82__degrees
Positive Moment Decay** (Flexion)		Time to decay to 10 Nm 80 ms ≤ time ≤ 100ms	85 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii))

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follows this sheet.

Joe Fleck
Signature

3/30/04
Date

DATA SHEET B5
NECK EXTENSION TEST (572.133)

Dummy Serial Number ____506_____ Test Date ___3/30/04_____

Technician _____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1__ (when successive extension tests are necessary)

__1. It has been at least 30 minutes since the last extension test. (572.137(q))
_X_ N/A, ONLY one extension test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __22.0__
Record the maximum humidity __35%__
Record the minimum humidity __34%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: __No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9B for the extension test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.95 m/s to 6.19 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Extension Test Results (572.133(b)(2) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		5.95 m/s ≤ speed ≤ 6.19 m/s	6.12 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	1.5 m/s ≤ ΔV ≤ 1.9 m/s	1.8 m/s
	@ 20 ms	3.1 m/s ≤ ΔV ≤ 3.9 m/s	3.5 m/s
	@30ms	4.6 m/s ≤ ΔV ≤ 5.6 m/s	5.1 m/s
Plane D Rotation		Peak moment* -65 Nm ≤ moment ≤ -53 Nm during the following rotation range 99^o ≤ angle ≤ 114^o	_-59_ Nm @ _110_ degrees
Negative Moment Decay** (Extension)		Time to decay to -10 Nm 94 ms ≤ time ≤ 114 ms	100 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follow this sheet.

Joe Fleck _____ 3/30/04

Signature Date

DATA SHEET B6
THORAX IMPACT TEST (572.134)

Dummy Serial Number __506_____ Test Date __3/30/04_____

Technician ____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive thorax impact tests are necessary)

__1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 11B.
_X_3. The complete assembled dummy (880105-000) is used (572.134(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. The weight of the shirt and pants shall not exceed 0.14 kg. (572.134(c)(1))
_X_4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.134(c)(2))
Record the maximum temperature _22.1__
Record the minimum temperature _22.0__
Record the maximum humidity _35%__
Record the minimum humidity _34%__
_X_5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material, chest displacement transducer assembly and the rear rib supports. Inspect for rib deformation using the chest depth gage. If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
_X_ - No damage
__ - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage _____
_____
__ - The following repairs or replacement was performed. Record
_____
_____
_X_6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 11B. The surface must be long enough to support the pelvis and outstretched legs. (572.134(c)(3))
_X_7. Level the ribs both longitudinally and laterally ± 0.5º and adjust the pelvis angle to 7º ± 2º. The angle may be measured using the special H-point tool (TE-2504)

that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block.

_X_ 8. The midsagittal plane of the dummy is vertical within ± 1º. (572.134(c)(3))

_X_ 9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5º of a horizontal line in the dummy's midsagittal plane. (572.134(c)(4))

_X_ 10. Align the adjustable neck bracket index marks to the "zero" position.

_X_ 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to the laboratory coordinate system. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.

_X_ 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.

_X_ 13. Place the arm assemblies horizontal ± 2º and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.

_X_ 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 180.

_X_ 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.134(c)(5)) The velocity of the test probe at the time of impact is 6.71 m/s ± 0.12m/s. (572.134(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.134(c)(6)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.134(c)(7))

_X_ 16. Complete the following table:

Thorax Impact Results (572.134(b) and 572.134(b)(1)&(2)

Parameter*	Specification	Result
Test Probe Speed	6.59 m/s ≤ speed ≤ 6.83 m/s	6.75 m/s
Chest Compression	50.0 mm ≤ compression ≤ 58.0 mm	52 mm
Peak force** between 50.0 and 58.0 mm chest compression	3900N ≤ peak force ≤ 4400N	4320 N
Peak force** between 18.0 and 50.0 mm chest compression	peak force ≤ 4600 N	yes
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	70%

*Time zero is defined as the time of initial contact between the test probe and the chest skin.
**Force = impactor mass x acceleration (572.134(b)(3))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve. (Figure 12B

_X_ 17. Plots of chest compression, acceleration, force, force versus deflection follow this sheet.

Joe Fleck _____ 3/30/04

Signature Date

DATA SHEET B7
TORSO FLEXION TEST (572.135)

Dummy Serial Number __506_____ Test Date __3/23/04_____

Technician _____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive torso flexion tests are necessary)

__1. It has been at least 30 minutes since the last torso flexion test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 13B.
_X_3. The complete assembled dummy (880105-000) is used (572.135(c)(2)).
__ with legs below the femurs.
__ without legs below the femurs.
_X_4. The dummy assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.135(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __22.0__
Record the maximum humidity __35%__
Record the minimum humidity __34%__
_X_5. Secure the pelvis to the fixture at the pelvis instrument cavity rear face by threading four ¼ cap screws into the available threaded attachment holes. Tighten the mountings so that the test material is rigidly affixed to the test fixture and the pelvic lumbar joining surface is horizontal. (572.135(c)(3))
_X_6. Attach the loading adapter bracket to the spine of the dummy as shown in Figure 13B**.** (572.135(c)(4))
_X_7. Inspect and adjust, if necessary, the seating of the abdominal insert within the pelvis cavity and with respect to the torso flesh, assuring that the torso flesh provides uniform fit and overlap with respect to the outside surface of the pelvis flesh. (572.135(c)(5))
_X_8. Flex the dummy forward and back 3 times such that the angle reference plane moves between 0° and 30° with respect to the vertical transverse plane. (572.135(c)(6))
_X_9. Support the dummy such that the angle reference plane is at or near 0° (vertical with respect to the vertical transverse plane). Wait at least 30 minutes before continuing. (572.135(c)(6))
_X_10. Remove all external support that was implemented in 9 above. (572.135(c)(7))
_X_11. Measure the initial orientation angle of the torso reference plane of the seated, unsupported dummy. (572.135(c)(7))
Record reference plane angle (max. allowed 20°)__20^0__
_X_12.Attach the pull cable and the load cell. (572.135(c)(8))

_X_13. Apply a tension force in the midsagittal plane to the pull cable at any upper torso deflection rate between 0.5° and 1.5° per second, until the angle reference plane is at 45° ± 0.5° of flexion relative to the vertical transverse plane. (572.135(c)(9))
_X_14. Maintain angle reference plane at 45° ± 0.5° of flexion for 10 seconds. (572.135(c)(10))
_X_15. As quickly as possible release the force applied to the attachment bracket. (572.135(c)(11))
_X_16. 3 minutes after the release of the force, measure the reference plane angle. (572.135(c)(11))
_X_17. Complete the following table:

Torso Flexion Results (572.135(b), 572.135(c)(7), (572.135(c)(9))

Parameter	Specification	Result
Initial ref. plane angle	Angle ≤ 20°	20°
Torso rotation rate	0.5°/s ≤ rate ≤ 1.5°/s	1.0
Force at 45° ±0.5°	320 N ≤ force ≤ 390 N	327 N
Final ref. plane angle	Initial ref. plane angle ±8°	24°

Signature

3/30/04
Date

DATA SHEET B8
LEFT KNEE IMPACT TEST (572.136)

Dummy Serial Number __506_____ Test Date __3/31/04_____

Technician ____Dave Wilcox_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive knee impact tests are necessary)

__1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B
_X_3. The knee assembly (880105-528L), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-650), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.1__
Record the minimum temperature _21.5__
Record the maximum humidity _36%__
Record the minimum humidity _32%__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.136(c)(6))

_X_ 11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.10 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3580 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_ 12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

3/31/04

Date

DATA SHEET B9
RIGHT KNEE IMPACT TEST (572.136)

Dummy Serial Number ___506_____ Test Date __3/30/04_____

Technician ___Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1__ (when successive knee impact tests are necessary)

__1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B.
_X_3. The knee assembly (880105-528R), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-651), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.1___
Record the minimum temperature _22.0___
Record the maximum humidity _35 %___
Record the minimum humidity _34 %___
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5))
_X_11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.10 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3610 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

3/30/04
Date

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 506 **Test I.D:** D04681

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Peak Resultant Acceleration	G's	250 - 300	278	Pass
Peak Lateral Acceleration	G's	+/- 15	12.2	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

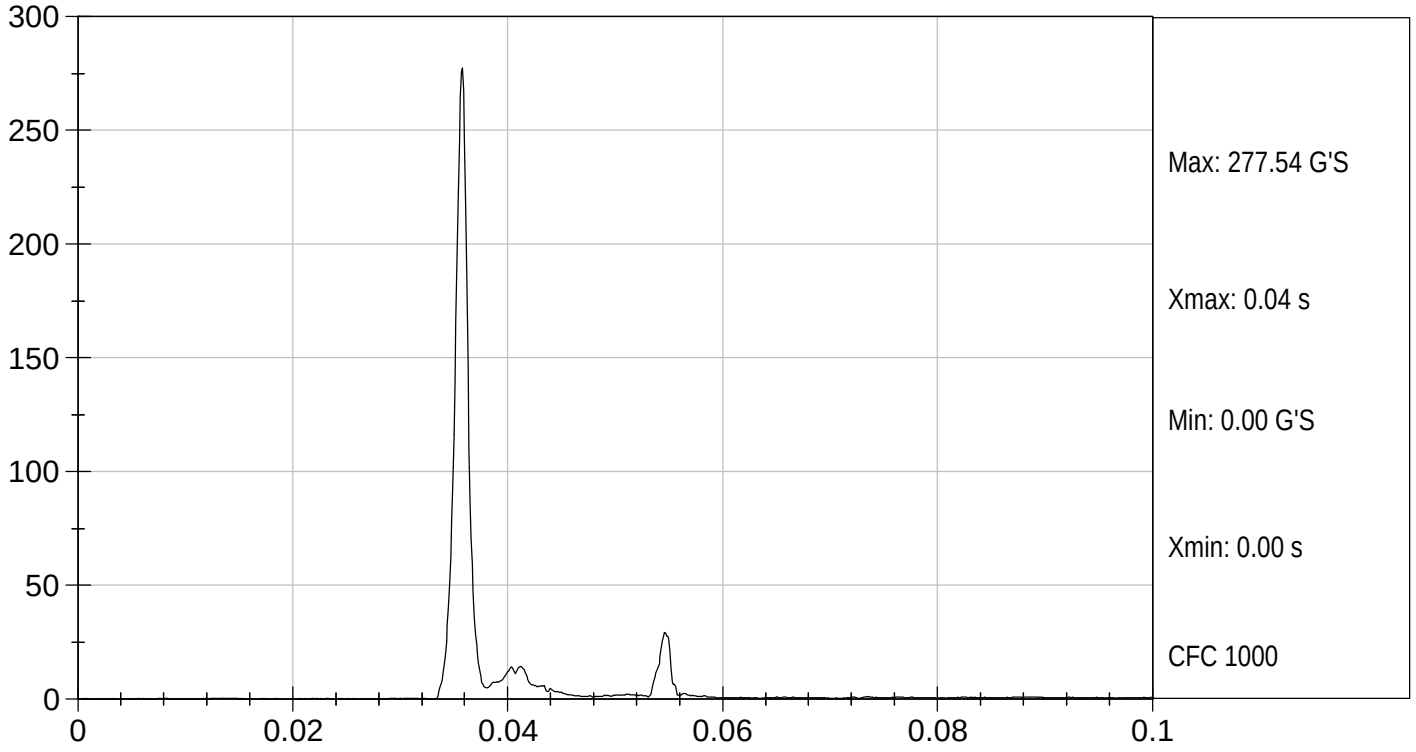
03/29/2004
Test Date

Jessica Hall
Approved By

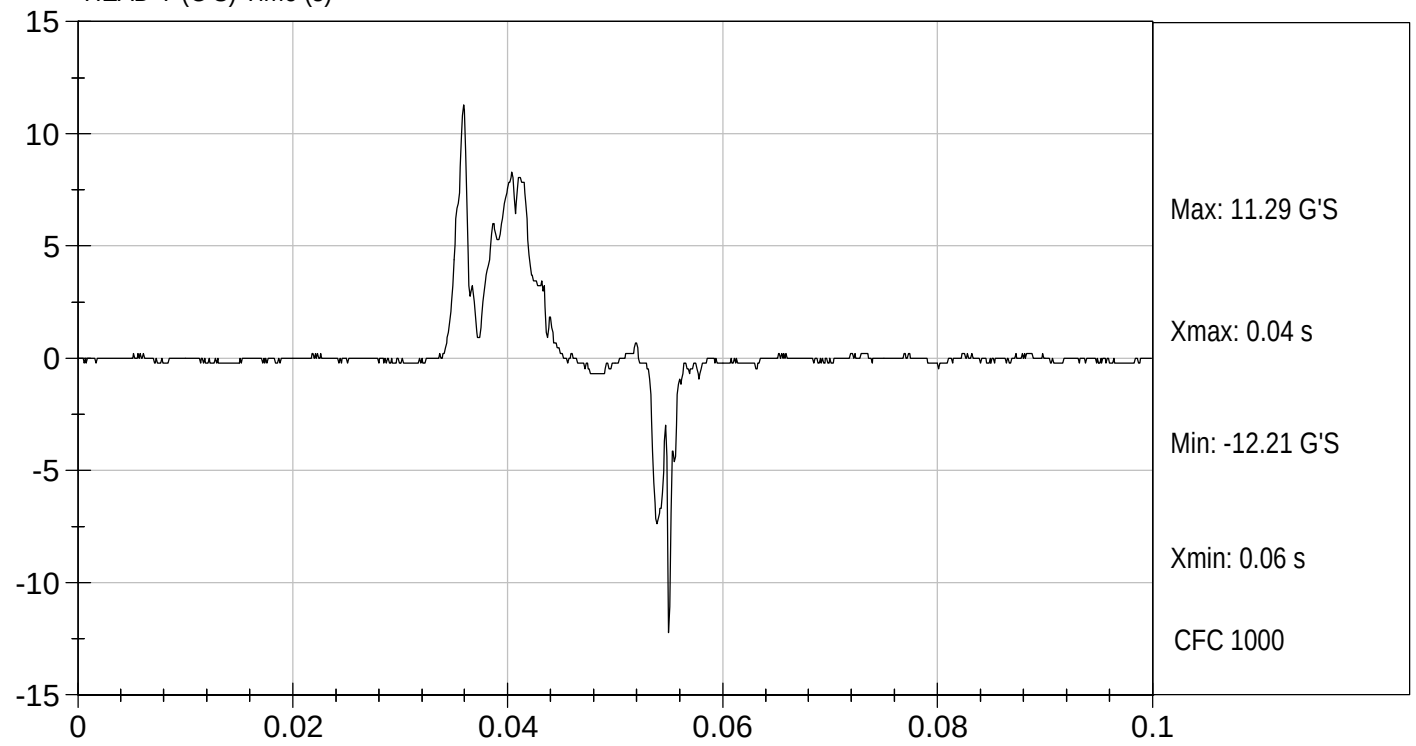
Test Desc: Head Drop
Componet ID: D04681

Test Date: 03/29/2004
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) Time (s)



HEAD Y (G'S) Time (s)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04682

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	35	Pass
Pendulum Speed		m/sec	6.89 to 7.13	7.02	Pass
Pendulum Deceleration	10 msec	msec	2.1 to 2.5	2.3	Pass
	20 msec	msec	4.0 to 5.0	4.5	Pass
	30 msec	msec	5.8 to 7.0	6.5	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	77	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	85	Pass
			Overall Results		Pass

Joe Fleck
Laboratory Technician

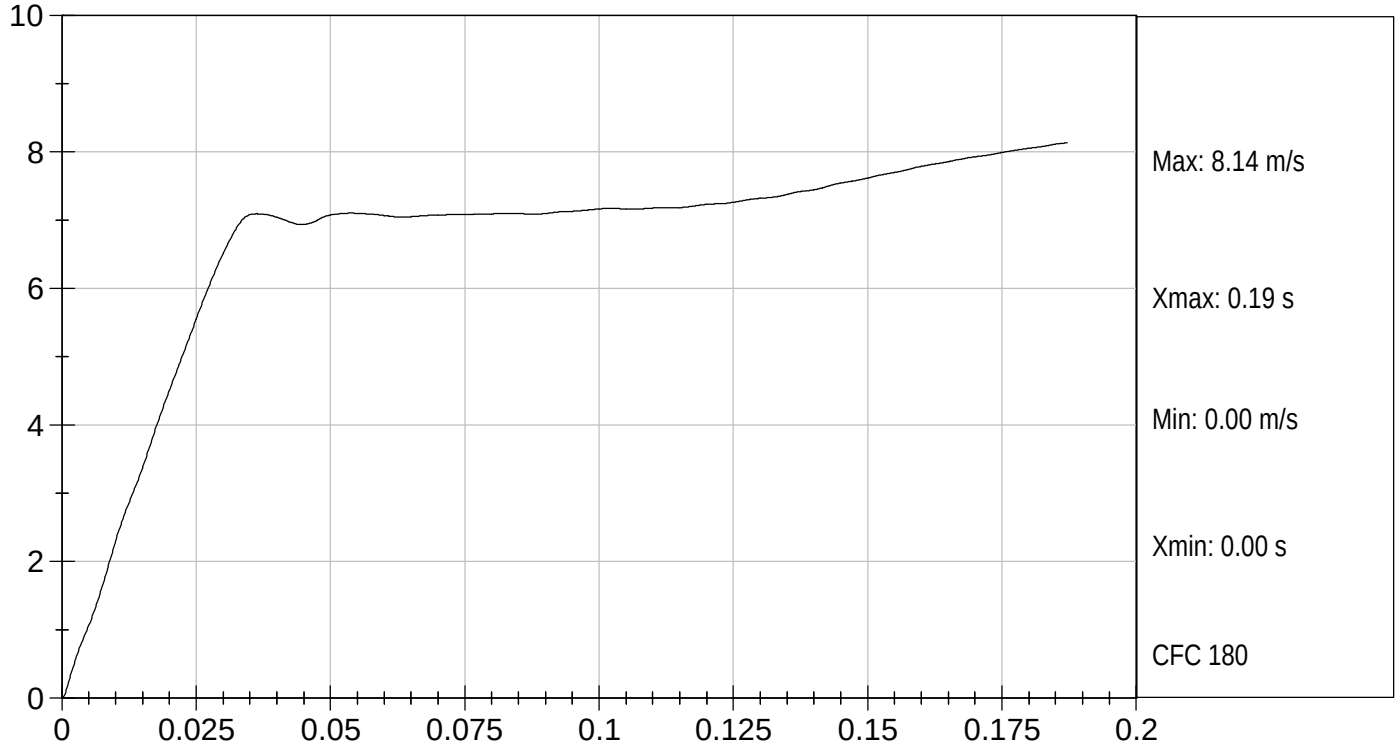
03/30/2004
Test Date

Jessica Hall
Approved By

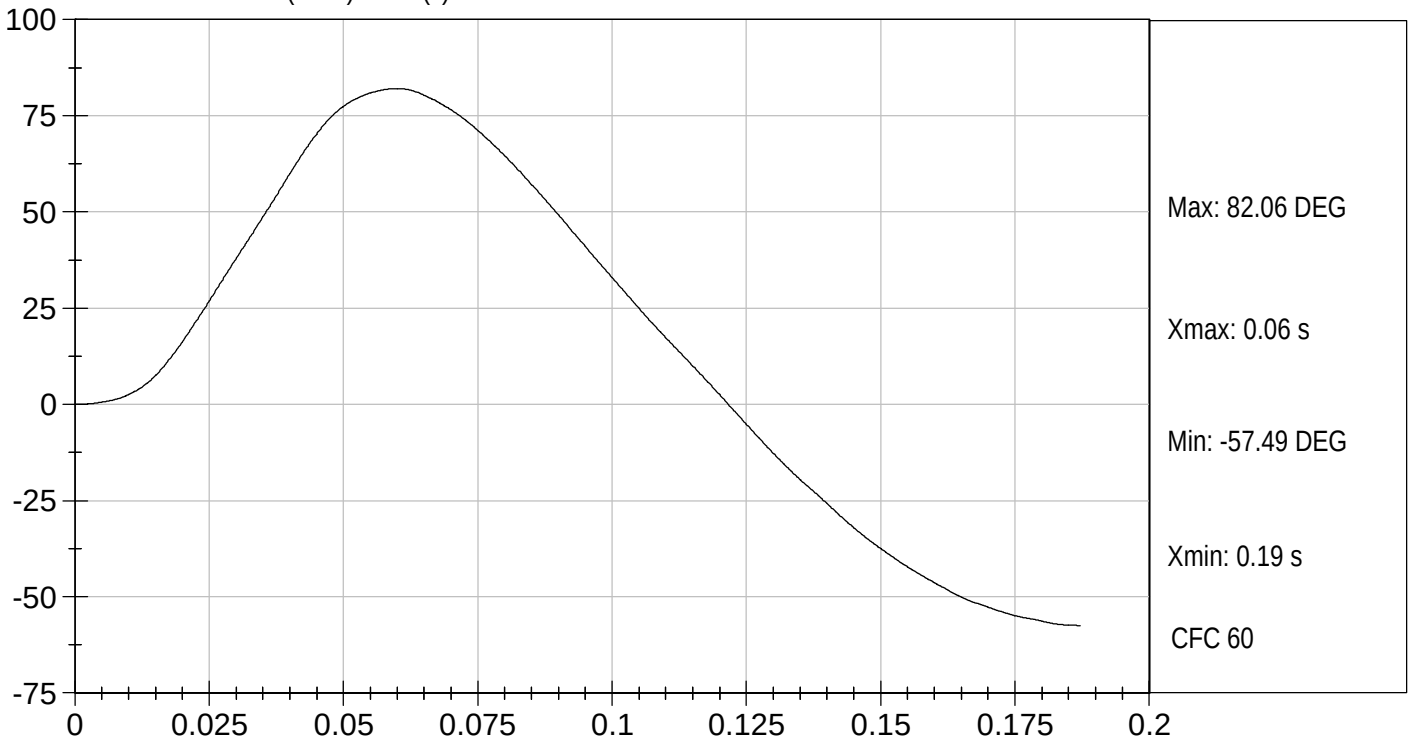
Test Desc: Neck Flexion
Componet ID: D04682

Test Date: 03/30/2004
Velocity: 23.03 ft/s, 7.02 m/s

PENDULUM DECELERATION (m/s) Time (s)

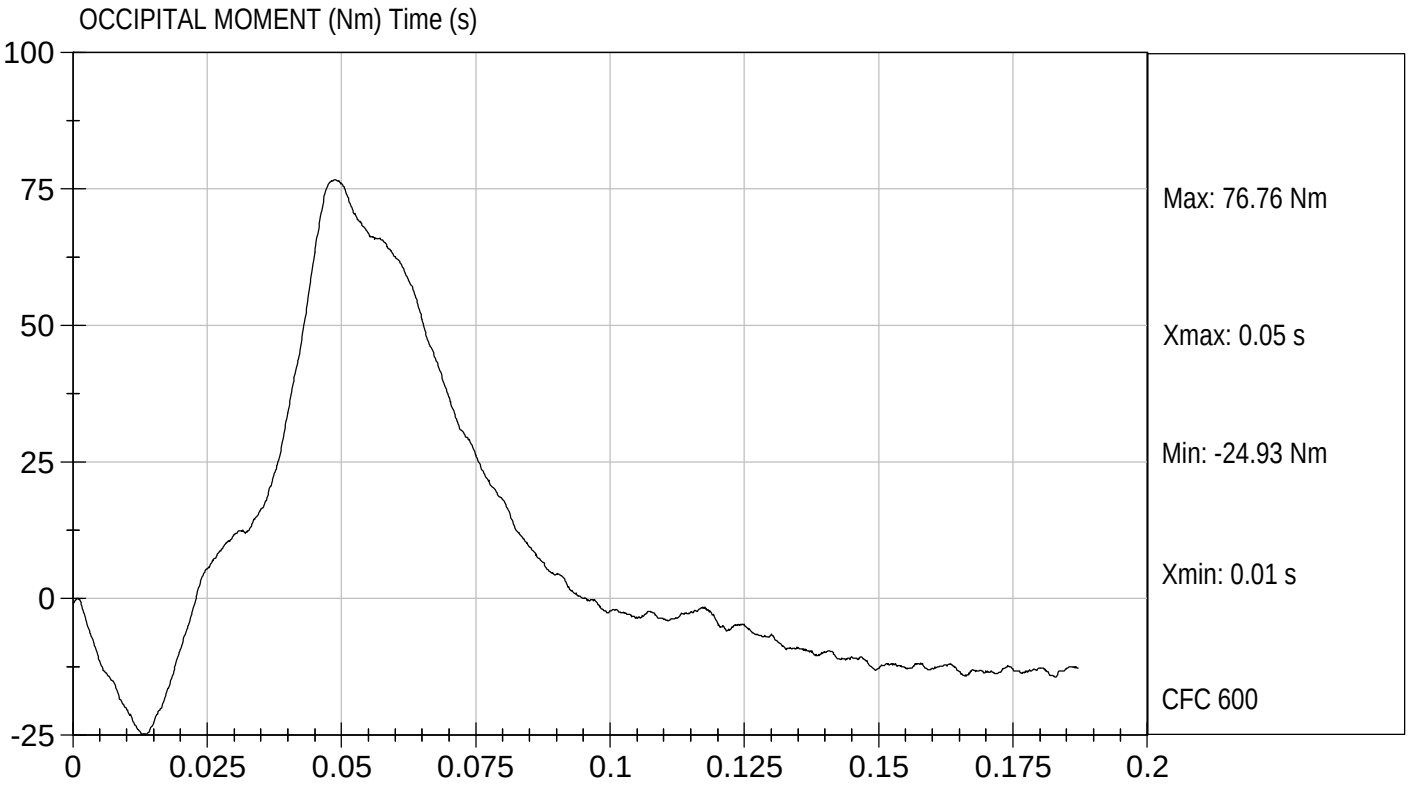


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Flexion
Componet ID: D04682

Test Date: 03/30/2004
Velocity: 23.03 ft/s, 7.02 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04683

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	35	Pass
Pendulum Speed		m/sec	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 msec	msec	1.5 to 1.9	1.8	Pass
	20 msec	msec	3.1 to 3.9	3.5	Pass
	30 msec	msec	4.6 to 5.6	5.1	Pass
D Plane Rotation	Max	deg	99 to 114	110	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-59	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	100	Pass
			Overall Results		Pass

Laboratory Technician

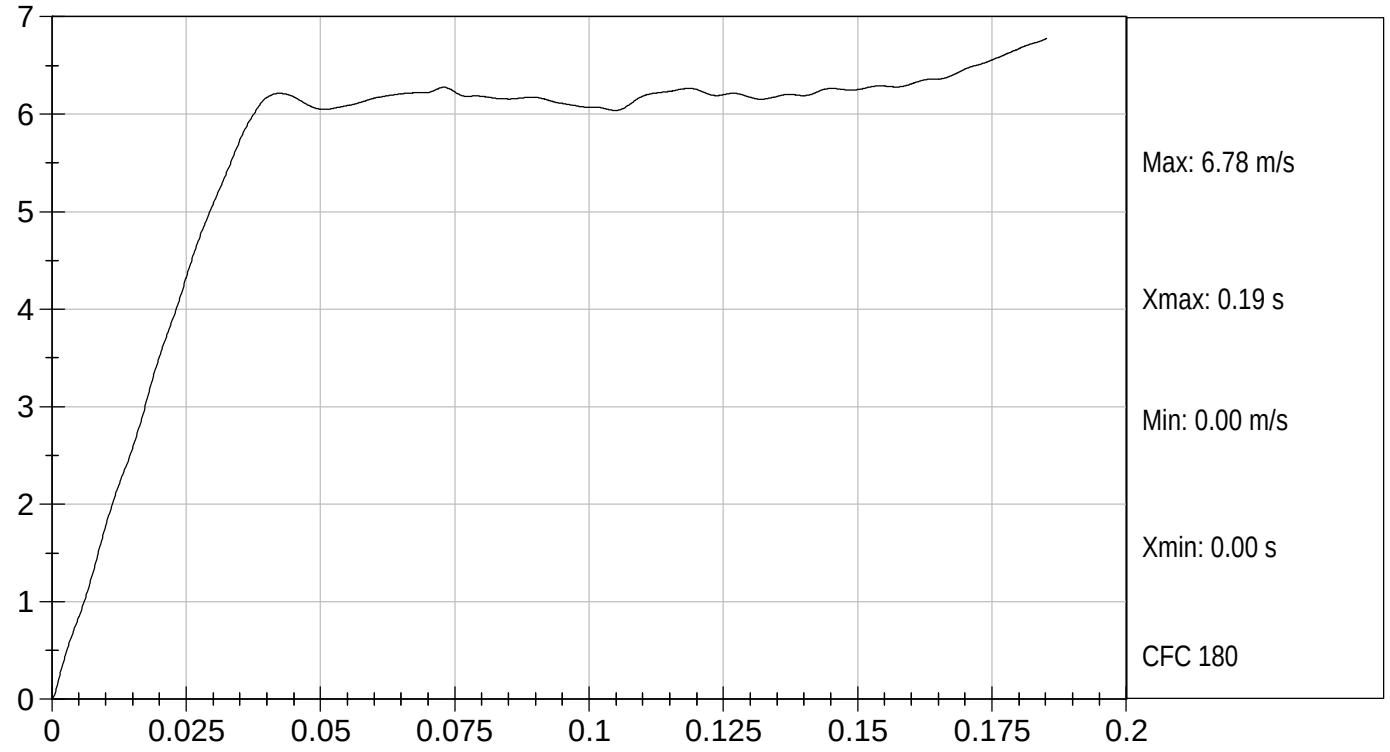
03/30/2004
Test Date

Approved By

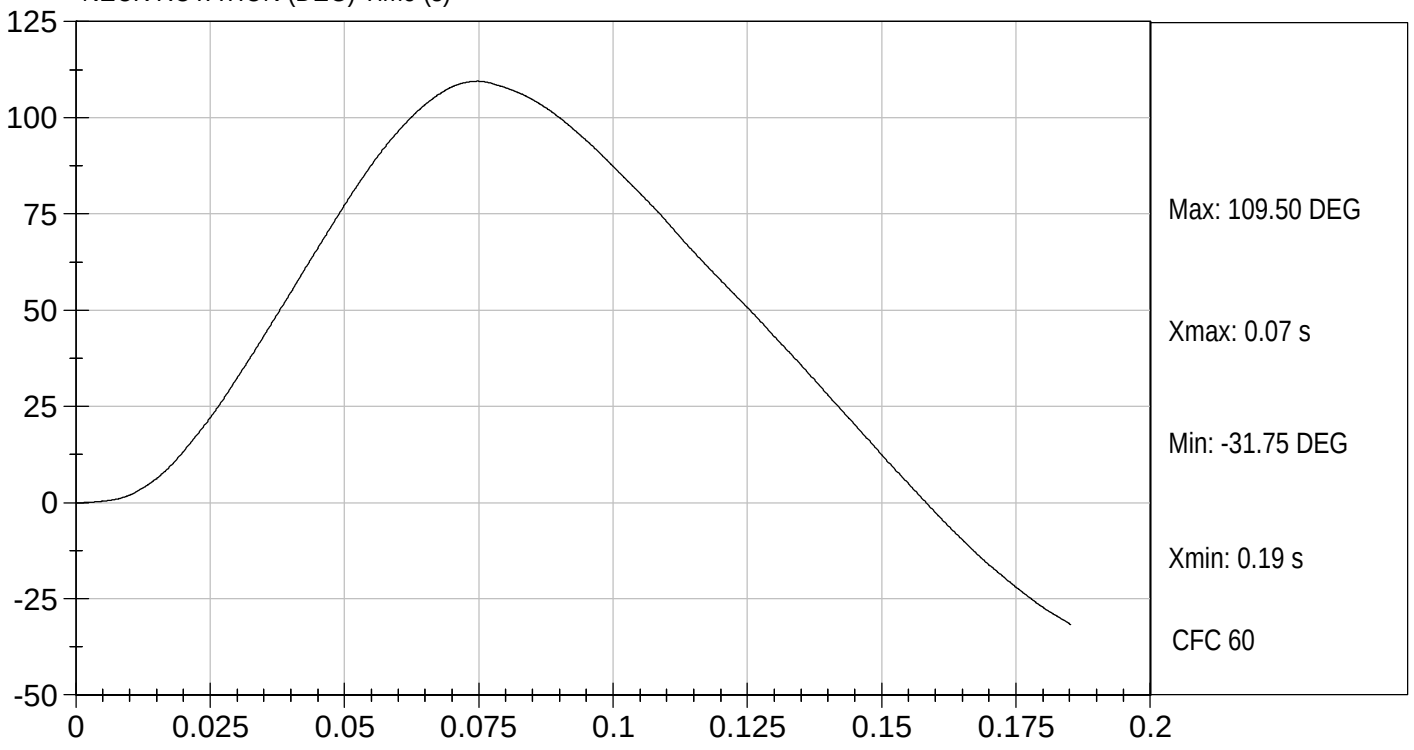
Test Desc: Neck Extension
Componet ID: D04683

Test Date: 03/30/2004
Velocity: 20.09 ft/s, 6.12 m/s

PENDULUM DECELERATION (m/s) Time (s)

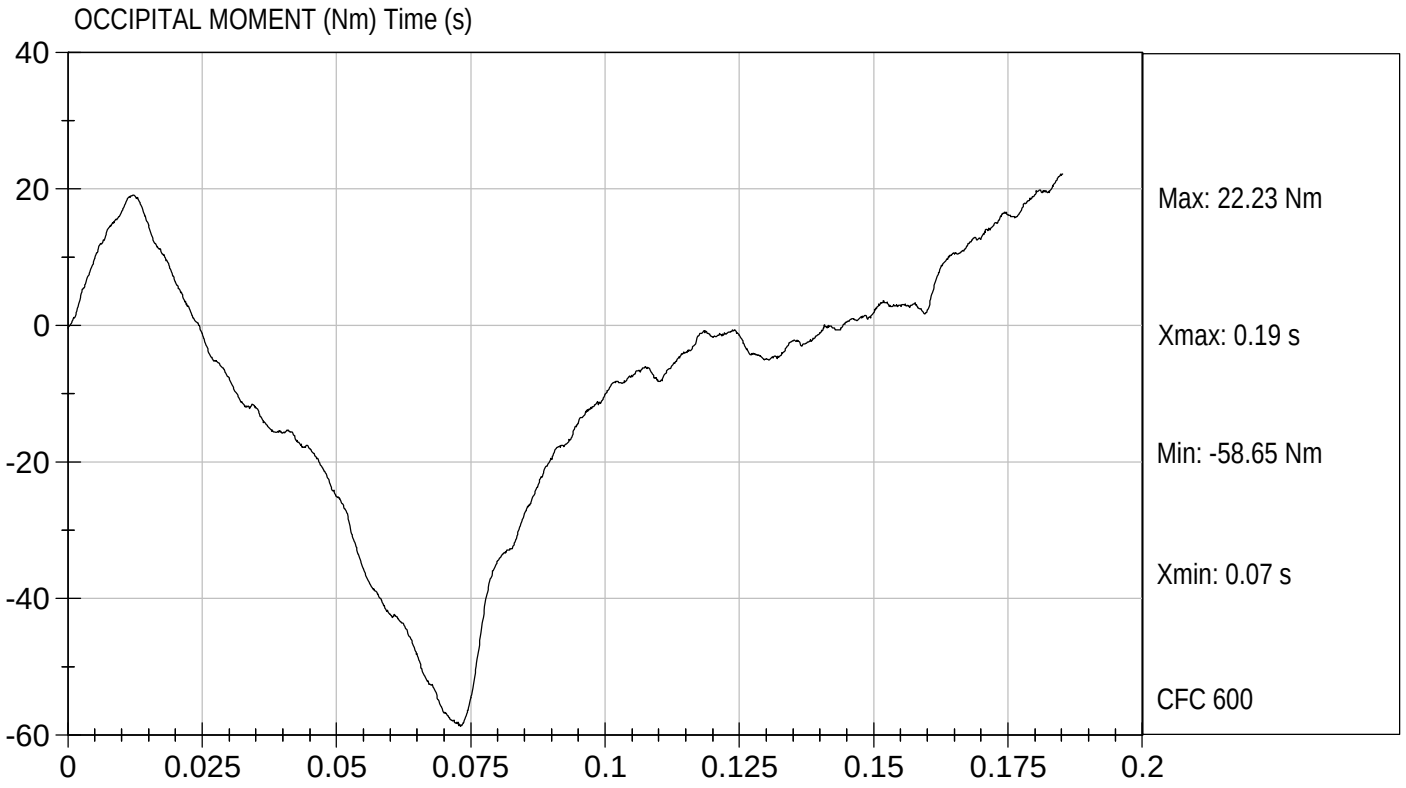


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Extension
Componet ID: D04683

Test Date: 03/30/2004
Velocity: 20.09 ft/s, 6.12 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04684

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.0	Pass
Relative Humidity	%	10 to 70	35	Pass
Probe Speed	m/s	6.59 to 6.83	6.75	Pass
Peak Deflection	mm	50 to 58	52.0	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.32	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	Yes/No	< 4600 N	Yes	Pass
		Overall Test Results		Pass

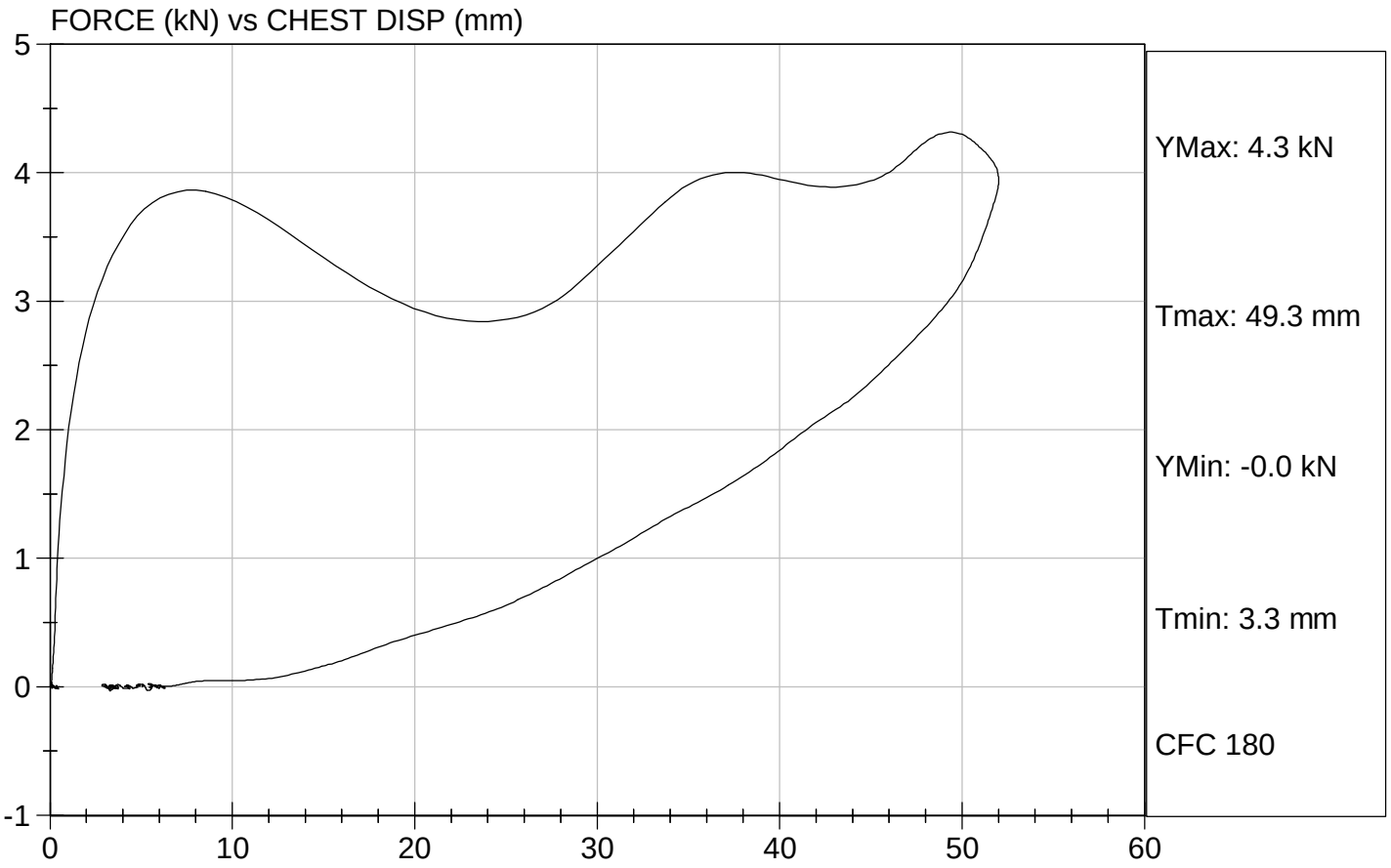
Joe Fleck
Laboratory Technician

03/30/2004
Test Date

Jessica Hall
Approved By

Test Description: Thorax Impact Test Date: 03/30/2004

Component: D04684 Speed: 22.14 ft/sec, 6.75 m/sec



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04685

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Probe Speed	m/sec	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.61	Pass
		Overall Test Results		Pass

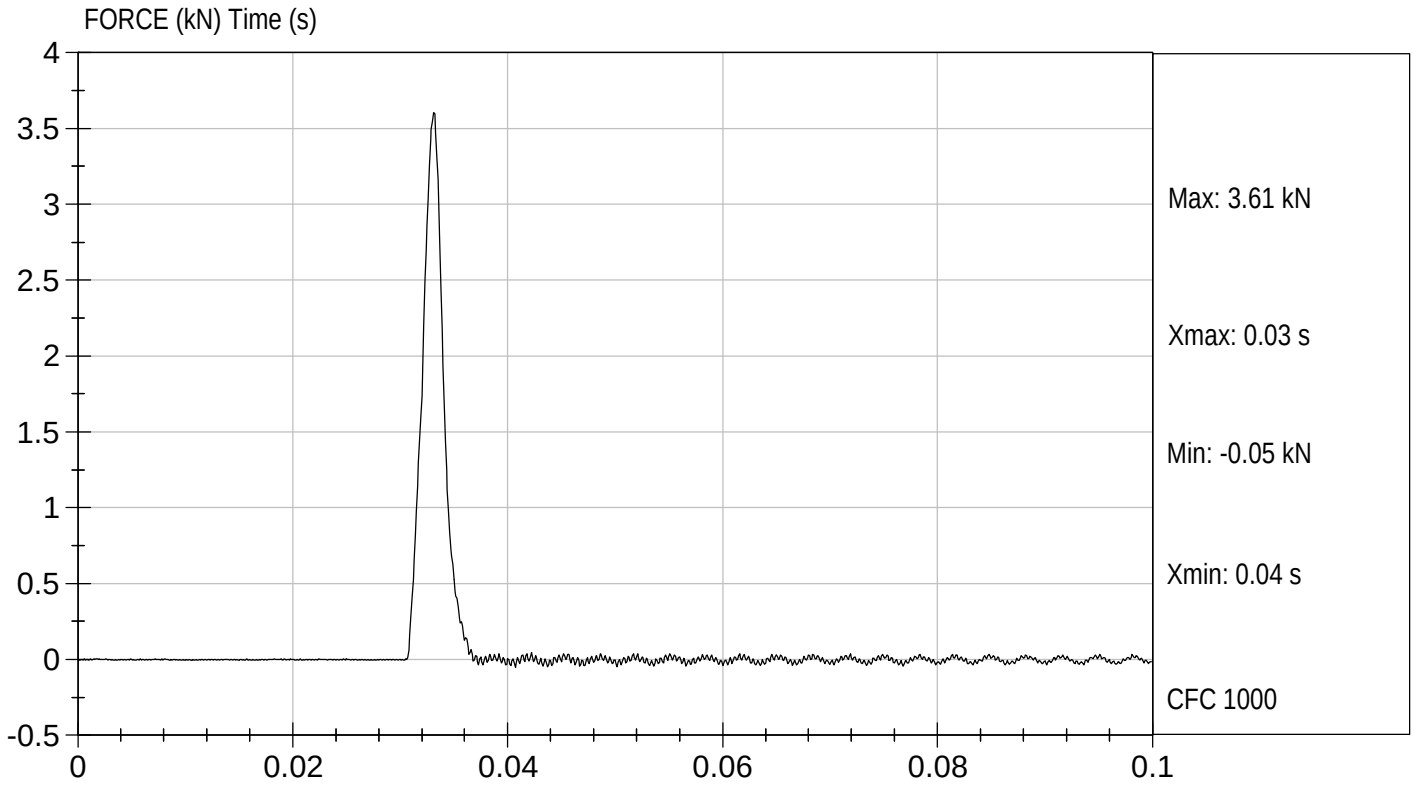
Laboratory Technician

03/30/2004
Test Date

Approved By

Test Desc: Right Knee
Componet ID: D04685

Test Date: 03/30/2004
Velocity: 6.9 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04686

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	36	Pass
Probe Speed	m/sec	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.58	Pass
		Overall Test Results		Pass

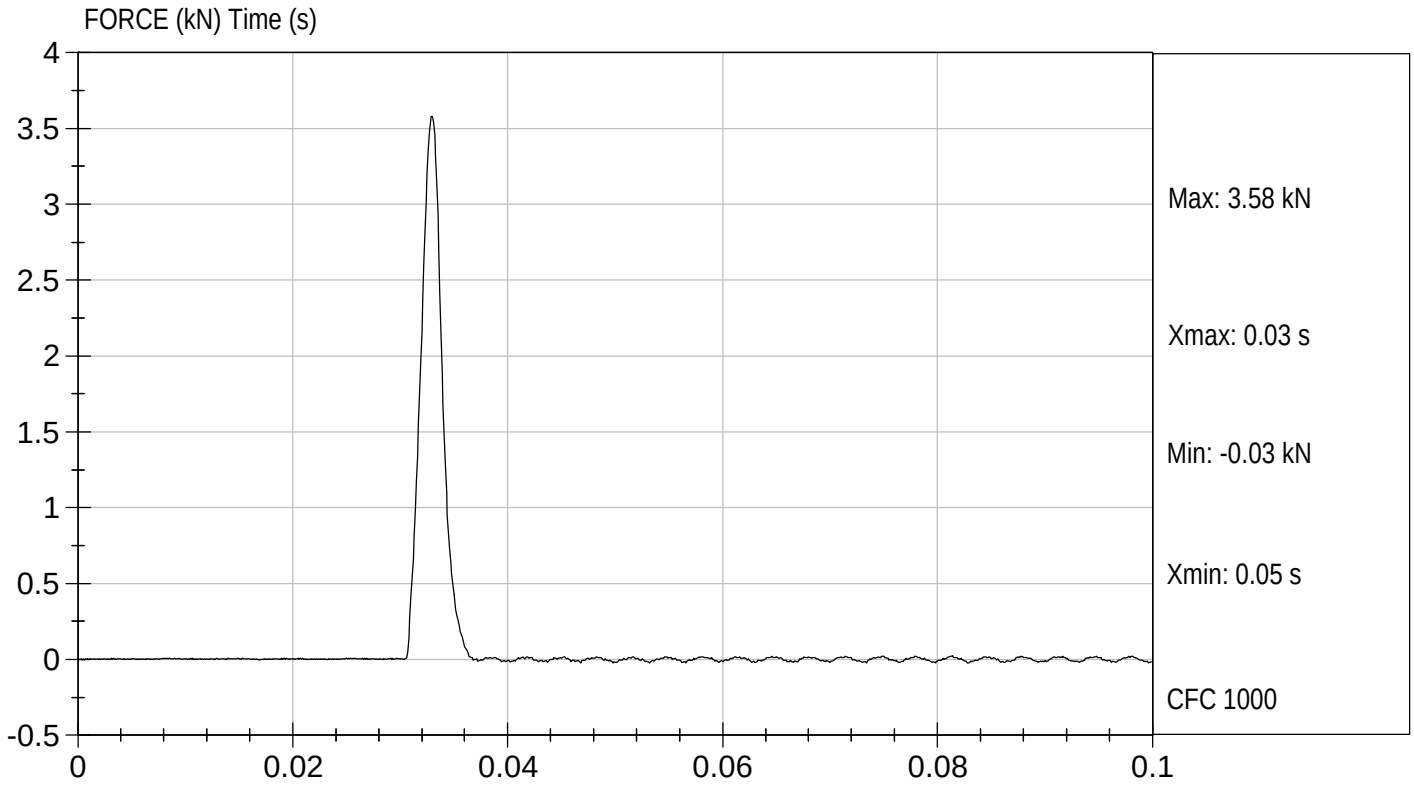
Laboratory Technician

03/31/2004
Test Date

Jessica Gall
Approved By

Test Desc: Left Knee
Componet ID: D04686

Test Date: 03/31/2004
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 506 **Test I.D:** D04687

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
Initial Angle	deg	0 to 20	20	Pass
Return Angle	deg	+/- 8	24	Pass
Force at 45 deg	N	320 to 390	327	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Laboratory Technician

04/06/2004
Test Date

Approved By

DATA SHEET B1
DUMMY DAMAGE CHECKLIST

Dummy Serial Number ____506_____ Test Date ___3/26/04_____

Technician _____Jessica Gall_____

This check sheet is completed as part of the post test calibration verification.

_X_ Perform general cleaning.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber.			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer leads	Torn cables			X

Dummy Item	Inspect for	Comments	Damaged	OK
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to “at rest” position			X
Pelvis	Broken			X
Other				X

If upon visual examination, damage is apparent in any of these areas, the appropriate engineer or engineering technician is to be consulted for a decision on repair or replacement of parts.
Repair or Replacement approved by:

Jessica Hall _____ 3/29/04_____
Signature Date

Describe the repair or replacement of parts:

Checked by
Jeff Levenhagen _____ 3/29/04_____
Signature Date

EXTERNAL DIMENSIONS

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	789.2
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	445.6
C	H-POINT HEIGHT	Reference	81.3-86.3	82.2
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	147.9
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	80.7
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	127.1
G	BACK OF ELBOW TO WRIST PIVOT	Back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	256.8
H	HEAD BACK TO BACKLINE	Back of skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	46.5
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	291.1
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	187.0
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	535.2
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	361.8
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	408.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. “K”.	414-439.4	423.6

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	188.7
P	FOOT LENGTH	Tip of toe to rear of heal	218.5-233.7	226.5
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	470.2
S	HEAD BREADTH	The widest part of the head	137.1-147.3	145.0
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	179.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	311.6
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	360.0
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	86.4
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. “T”	528.3-548.7	536.7
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	874.1
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	782.6
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.0

DATA SHEET B3
HEAD DROP TEST (572.132)

Dummy Serial Number 515 Test Date 2/02/04

Technician James Carney

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive head drops are necessary)

___1. It has been at least 2 hours since the last head drop. (572.132(c)(5))
_X_ N/A, ONLY one head drop performed

_X_2. The head assembly consists of the complete head (880105-100X), the six-axis neck transducer (SA572-S11) or neck transducer structural replacement (78051-383X), and three (3) accelerometers (SA572-S4). (572.132(a))

_X_3. The head accelerometer mounting plate screws ((10-24 x 3/8 SHCS) are torqued to 9.0 Nm.

_X_4. Accelerometers and their respective mounts are smooth and clean.

_X_5. Torque the skull cap screws (10-24 x 1/2 SHCS) to 9.0 Nm.

_X_6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.136(m))

_X_7. The head assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))

Record the maximum temperature 21.9
Record the minimum temperature 20.6
Record the maximum humidity 21%
Record the minimum humidity 19%

_X_8. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.

Record findings and actions: No Damage.

_X_9. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.132(c)(2))

_X_ 10. Suspend and orient the head assembly as shown in Figure 5B. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.132(c)(3))
Record the actual distance __376 mm___

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

_X_ 11. The 1.57 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 6B. (572.132(c)(3))
Record the right side distance __500mm_____
Record the left side distance __500mm_____

_X_ 12. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.132(c)(4))
Record actual micro finish __656 x 10^{-6}mm_____

_X_ 13. The impact surface is rigidly supported. (572.132(c)(4))

_X_ 14. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.132(c)(4))
Record thickness __50.9 mm__
Record width __604 mm__
Record length __595 mm__

_X_ 15. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.132(b) & (572.132(c)(4))

_X_ 16. Complete the following table using channel class 1000 data. (572.132(b)):

Parameter	Specification	Result
Peak resultant acceleration	250 g ≤ x ≤ 300 g	254
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration ≤ 15 g	13

_X_ 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

Jim Cooney
Signature

2/02/04
Date

DATA SHEET B4
NECK FLEXION TEST (572.133)

Dummy Serial Number ____515_____ Test Date ____2/02/04_____

Technician _____Jessica Gall_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1_(when successive flexion tests are necessary)

__1. It has been at least 30 minutes since the last flexion test. (572.137(q))
_X_ N/A, ONLY one flexion test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __21.9__
Record the maximum humidity __28%__
Record the minimum humidity __19%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: __No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 8B for the flexion test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 6.89 m/s to 7.13 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Flexion Test Results (572.133(b)(1) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		6.89 m/s ≤ speed ≤ 7.13 m/s	6.90 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	2.1 m/s ≤ ΔV ≤ 2.5 m/s	2.4 m/s
	@ 20 ms	4.0 m/s ≤ ΔV ≤ 5.0 m/s	4.6 m/s
	@30ms	5.8 m/s ≤ ΔV ≤ 7.0 m/s	6.5 m/s
Plane D Rotation		Peak moment* 69 Nm ≤ moment ≤ 83 Nm during the following rotation range 77^o ≤ angle ≤ 91^o	__76__ Nm @ _81__ degrees
Positive Moment Decay** (Flexion)		Time to decay to 10 Nm 80 ms ≤ time ≤ 100ms	84 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii))

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follows this sheet.

Jessica Gall
Signature

2/02/04
Date

DATA SHEET B5
NECK EXTENSION TEST (572.133)

Dummy Serial Number ___515_____ Test Date ___2/2/04_____

Technician _____Jessica Gall_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1__ (when successive extension tests are necessary)

__1. It has been at least 30 minutes since the last extension test. (572.137(q))
_X_ N/A, ONLY one extension test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __21.9__
Record the maximum humidity __28%__
Record the minimum humidity __19%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: __No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9B for the extension test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.95 m/s to 6.19 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Extension Test Results (572.133(b)(2) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		5.95 m/s ≤ speed ≤ 6.19 m/s	6.05 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	1.5 m/s ≤ ΔV ≤ 1.9 m/s	1.9 m/s
	@ 20 ms	3.1 m/s ≤ ΔV ≤ 3.9 m/s	3.9 m/s
	@30ms	4.6 m/s ≤ ΔV ≤ 5.6 m/s	5.5 m/s
Plane D Rotation		Peak moment* -65 Nm ≤ moment ≤ -53 Nm during the following rotation range 99^o ≤ angle ≤ 114^o	_-56_ Nm @ _108_ degrees
Negative Moment Decay** (Extension)		Time to decay to -10 Nm 94 ms ≤ time ≤ 114 ms	101 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follow this sheet.

Jessica Hall
Signature

2/02/04
Date

DATA SHEET B6
THORAX IMPACT TEST (572.134)

Dummy Serial Number __515_____ Test Date __2/2/04_____

Technician ____Jessica Gall_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive thorax impact tests are necessary)

_X_1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 11B.
_X_3. The complete assembled dummy (880105-000) is used (572.134(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. The weight of the shirt and pants shall not exceed 0.14 kg. (572.134(c)(1))
_X_4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.134(c)(2))
Record the maximum temperature _22.1__
Record the minimum temperature _21.6__
Record the maximum humidity _29%__
Record the minimum humidity _19%__
_X_5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material, chest displacement transducer assembly and the rear rib supports. Inspect for rib deformation using the chest depth gage. If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
_X_ - No damage
__ - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage _____
_____
__ - The following repairs or replacement was performed. Record
_____
_____
_X_6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 11B. The surface must be long enough to support the pelvis and outstretched legs. (572.134(c)(3))
_X_7. Level the ribs both longitudinally and laterally ± 0.5º and adjust the pelvis angle to 7º ± 2º. The angle may be measured using the special H-point tool (TE-2504)

that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block.

_X_ 8. The midsagittal plane of the dummy is vertical within ± 1º. (572.134(c)(3))

_X_ 9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5º of a horizontal line in the dummy's midsagittal plane. (572.134(c)(4))

_X_ 10. Align the adjustable neck bracket index marks to the "zero" position.

_X_ 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to the laboratory coordinate system. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.

_X_ 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.

_X_ 13. Place the arm assemblies horizontal ± 2º and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.

_X_ 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 180.

_X_ 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.134(c)(5)) The velocity of the test probe at the time of impact is 6.71 m/s ± 0.12m/s. (572.134(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.134(c)(6)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.134(c)(7))

_X_ 16. Complete the following table:

Thorax Impact Results (572.134(b) and 572.134(b)(1)&(2)

Parameter*	Specification	Result
Test Probe Speed	6.59 m/s ≤ speed ≤ 6.83 m/s	6.78 m/s
Chest Compression	50.0 mm ≤ compression ≤ 58.0 mm	54 mm
Peak force** between 50.0 and 58.0 mm chest compression	3900N ≤ peak force ≤ 4400N	3970 N
Peak force** between 18.0 and 50.0 mm chest compression	peak force ≤ 4600 N	yes
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	72%

*Time zero is defined as the time of initial contact between the test probe and the chest skin.
**Force = impactor mass x acceleration (572.134(b)(3))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve. (Figure 12B

_X_ 17. Plots of chest compression, acceleration, force, force versus deflection follow this sheet.

Jessica Hall
Signature

2/2/04
Date

DATA SHEET B7
TORSO FLEXION TEST (572.135)

Dummy Serial Number __515_____ Test Date __2/02/04_____

Technician _____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive torso flexion tests are necessary)

_X_1. It has been at least 30 minutes since the last torso flexion test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 13B.
_X_3. The complete assembled dummy (880105-000) is used (572.135(c)(2)).
__ with legs below the femurs.
__ without legs below the femurs.
_X_4. The dummy assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.135(c)(1))
Record the maximum temperature __22.4__
Record the minimum temperature __21.9__
Record the maximum humidity __28%__
Record the minimum humidity __19%__
_X_5. Secure the pelvis to the fixture at the pelvis instrument cavity rear face by threading four ¼ cap screws into the available threaded attachment holes. Tighten the mountings so that the test material is rigidly affixed to the test fixture and the pelvic lumbar joining surface is horizontal. (572.135(c)(3))
_X_6. Attach the loading adapter bracket to the spine of the dummy as shown in Figure 13B**.** (572.135(c)(4))
_X_7. Inspect and adjust, if necessary, the seating of the abdominal insert within the pelvis cavity and with respect to the torso flesh, assuring that the torso flesh provides uniform fit and overlap with respect to the outside surface of the pelvis flesh. (572.135(c)(5))
_X_8. Flex the dummy forward and back 3 times such that the angle reference plane moves between 0° and 30° with respect to the vertical transverse plane. (572.135(c)(6))
_X_9. Support the dummy such that the angle reference plane is at or near 0° (vertical with respect to the vertical transverse plane). Wait at least 30 minutes before continuing. (572.135(c)(6))
_X_10. Remove all external support that was implemented in 9 above. (572.135(c)(7))
_X_11. Measure the initial orientation angle of the torso reference plane of the seated, unsupported dummy. (572.135(c)(7))
Record reference plane angle (max. allowed 20°)___15^0___
_X_12.Attach the pull cable and the load cell. (572.135(c)(8))

_X_13. Apply a tension force in the midsagittal plane to the pull cable at any upper torso deflection rate between 0.5° and 1.5° per second, until the angle reference plane is at 45° ± 0.5° of flexion relative to the vertical transverse plane. (572.135(c)(9))
_X_14. Maintain angle reference plane at 45° ± 0.5° of flexion for 10 seconds. (572.135(c)(10))
_X_15. As quickly as possible release the force applied to the attachment bracket. (572.135(c)(11))
_X_16. 3 minutes after the release of the force, measure the reference plane angle. (572.135(c)(11))
_X_17. Complete the following table:

Torso Flexion Results (572.135(b), 572.135(c)(7), (572.135(c)(9))

Parameter	Specification	Result
Initial ref. plane angle	Angle ≤ 20°	15°
Torso rotation rate	0.5°/s ≤ rate ≤ 1.5°/s	1.0
Force at 45° ±0.5°	320 N ≤ force ≤ 390 N	377 N
Final ref. plane angle	Initial ref. plane angle ±8°	19°

Signature

2/02/04

Date

DATA SHEET B8
LEFT KNEE IMPACT TEST (572.136)

Dummy Serial Number __515_____ Test Date __2/02/04_____

Technician ____Jessica Gall_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive knee impact tests are necessary)

__1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B
_X_3. The knee assembly (880105-528L), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-650), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.4__
Record the minimum temperature _21.7__
Record the maximum humidity _28%__
Record the minimum humidity _19%__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.136(c)(6))

_X_ 11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.11 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3620 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_ 12. Plots of acceleration versus time and force versus time follow this sheet.

Jessica Gall
Signature

2/02/04
Date

DATA SHEET B9
RIGHT KNEE IMPACT TEST (572.136)

Dummy Serial Number ___515_____ Test Date __2/02/04_____

Technician ___Jessica Gall_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1__ (when successive knee impact tests are necessary)

__1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B.
_X_3. The knee assembly (880105-528R), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-651), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.5___
Record the minimum temperature _20.9___
Record the maximum humidity _28 %___
Record the minimum humidity _19 %___
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5))
_X_11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.13 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3620 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_12. Plots of acceleration versus time and force versus time follow this sheet.

Jessica Gall
Signature

2/02/04
Date

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 515 **Test I.D:** D04211

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Peak Resultant Acceleration	G's	250 - 300	254	Pass
Peak Lateral Acceleration	G's	+/- 15	12.8	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Jim Carney
Laboratory Technician

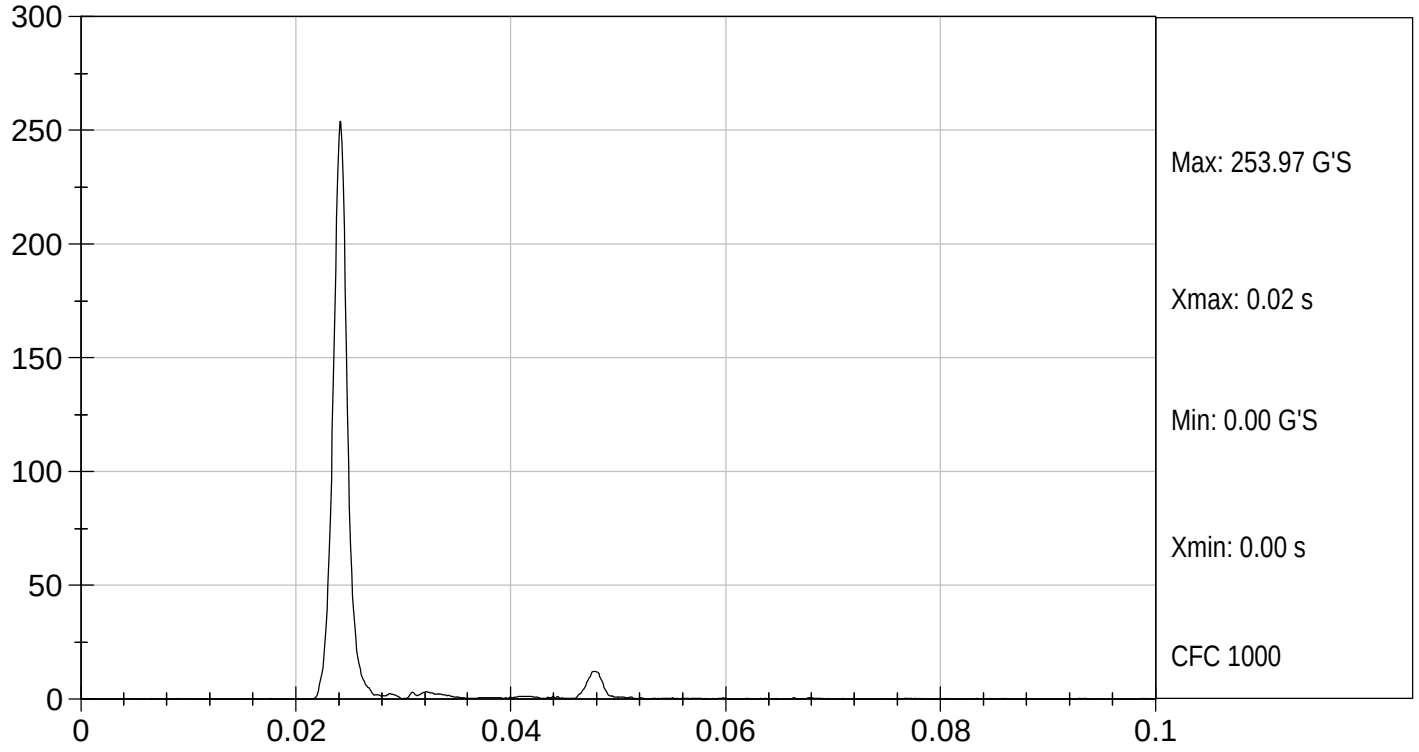
02/02/2004
Test Date

Jessica Hall
Approved By

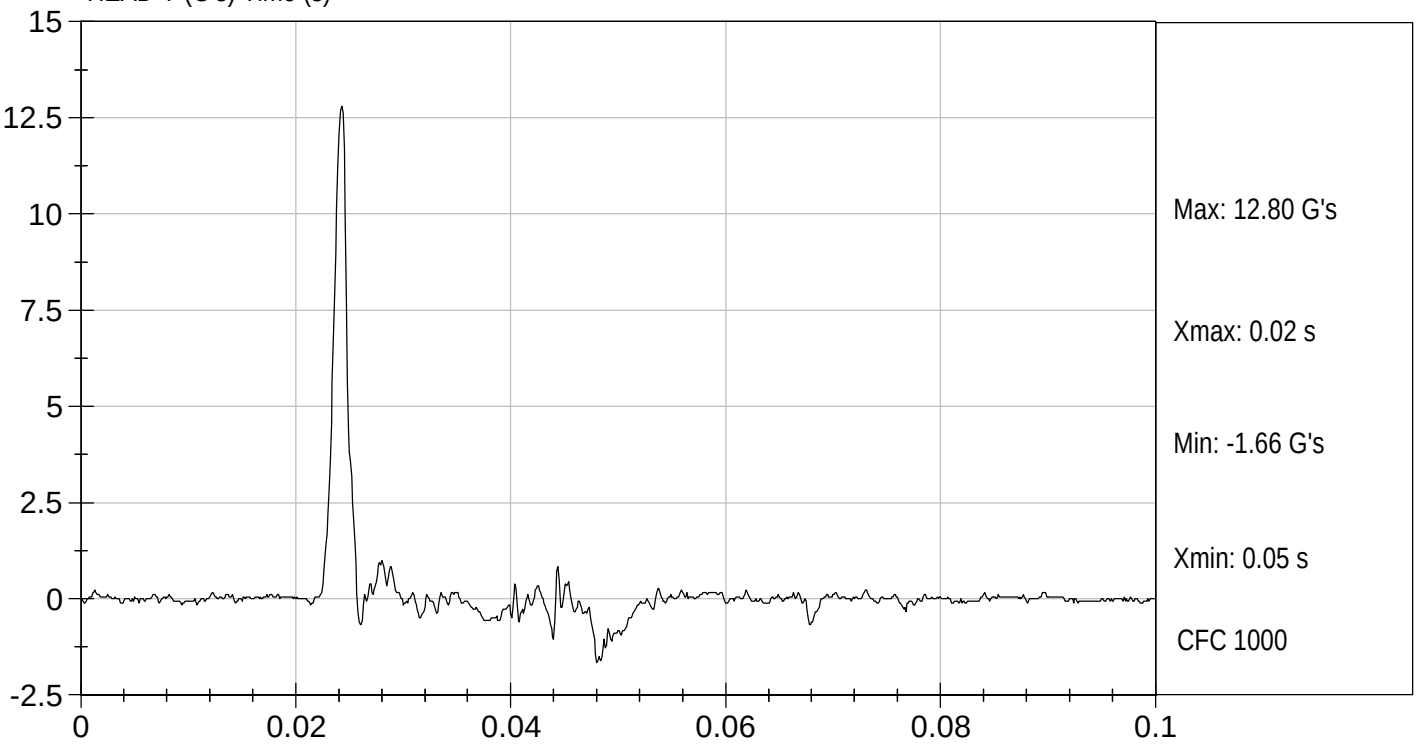
Test Desc: Head Drop
Componet ID: D04211

Test Date: 02/02/2004
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) Time (s)



HEAD Y (G's) Time (s)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04212

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.9	Pass
Laboratory Relative Humidity		%	10 to 70	28	Pass
Pendulum Speed		m/sec	6.89 to 7.13	6.90	Pass
Pendulum Deceleration	10 msec	msec	2.1 to 2.5	2.4	Pass
	20 msec	msec	4.0 to 5.0	4.6	Pass
	30 msec	msec	5.8 to 7.0	6.5	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	76	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	84	Pass
			Overall Results		Pass

Jessica Gall
Laboratory Technician

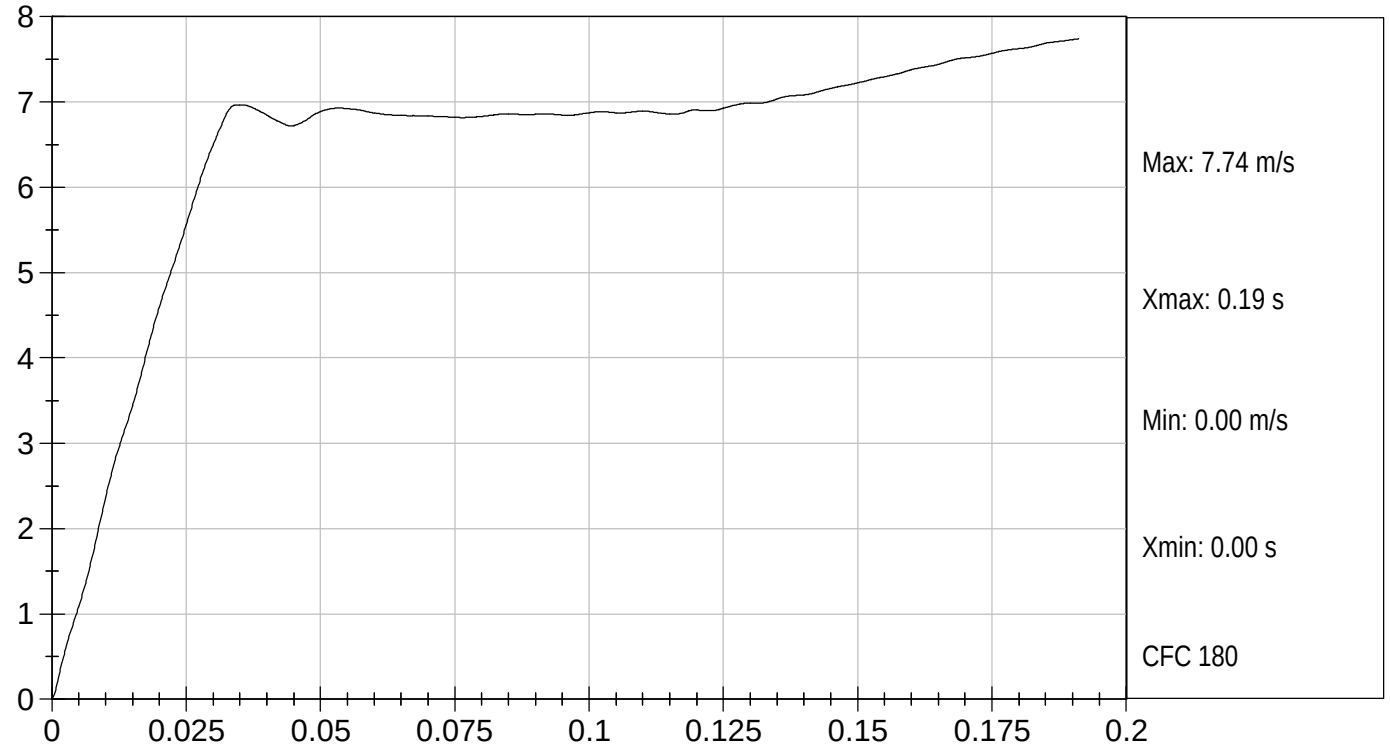
02/02/2004
Test Date

Jeff Levenhagen
Approved By

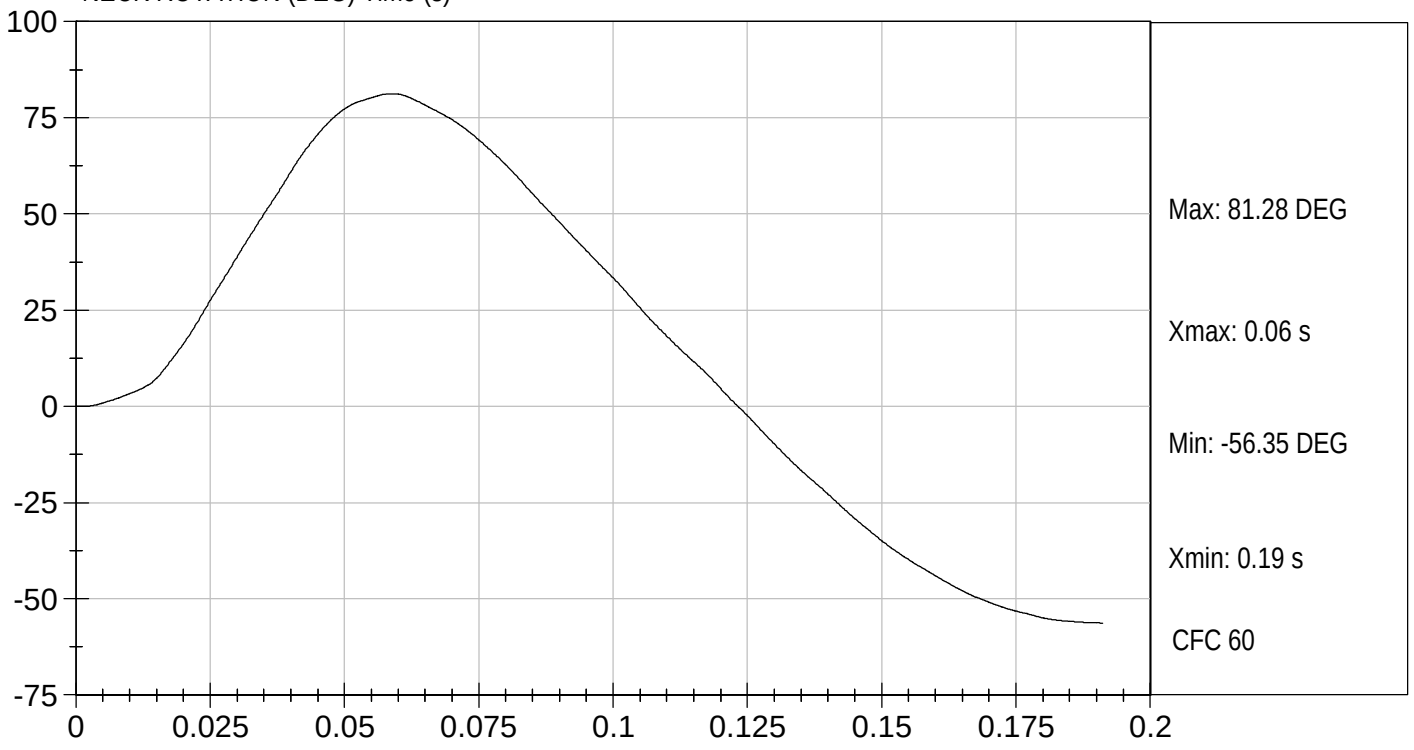
Test Desc: Neck Flexion
Componet ID: D04212

Test Date: 02/02/2004
Velocity: 22.64 ft/s, 6.90 m/s

PENDULUM DECELERATION (m/s) Time (s)

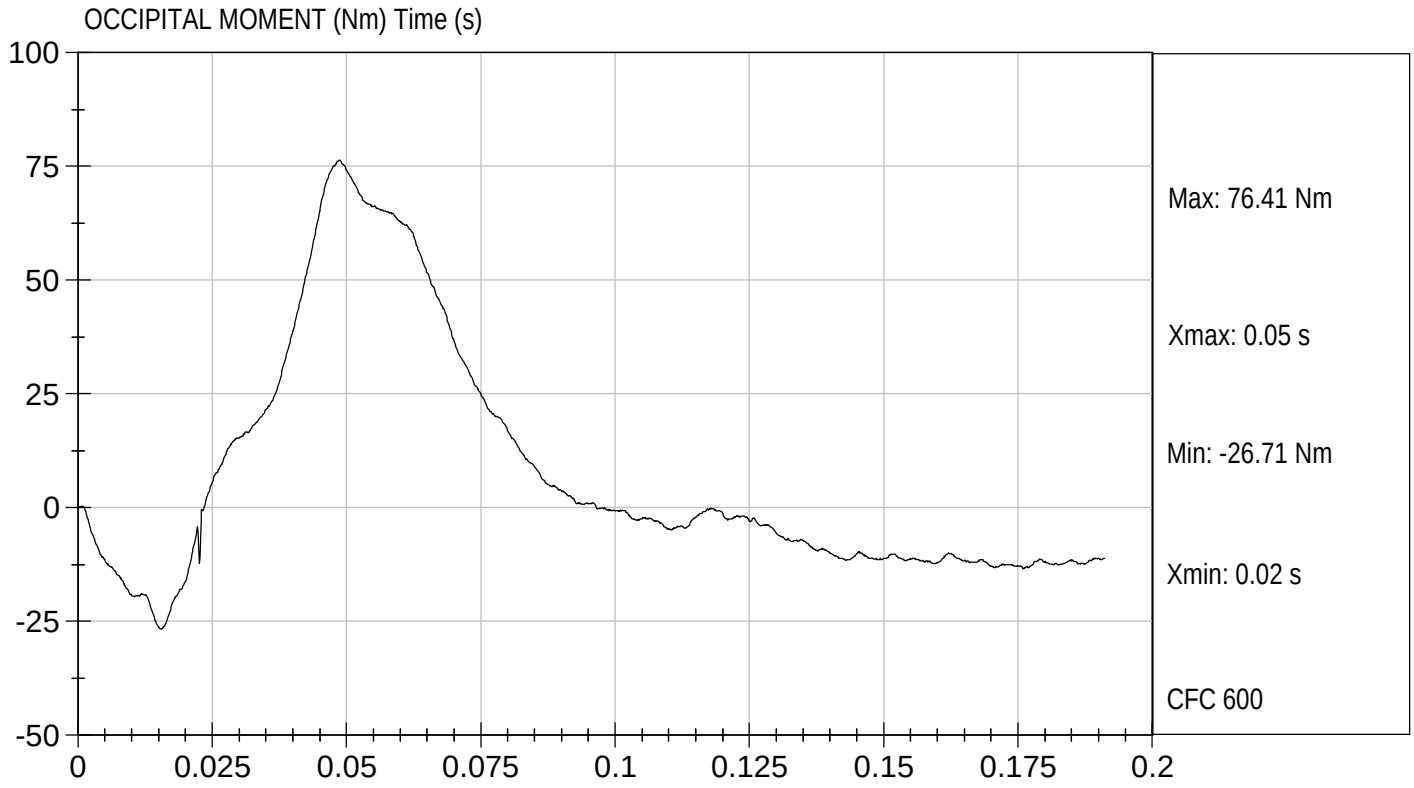


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Flexion
Componet ID: D04212

Test Date: 02/02/2004
Velocity: 22.64 ft/s, 6.90 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04213

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.1	Pass
Laboratory Relative Humidity		%	10 to 70	27	Pass
Pendulum Speed		m/sec	5.95 to 6.19	6.05	Pass
Pendulum Deceleration	10 msec	msec	1.5 to 1.9	1.9	Pass
	20 msec	msec	3.1 to 3.9	3.9	Pass
	30 msec	msec	4.6 to 5.6	5.5	Pass
D Plane Rotation	Max	deg	99 to 114	108	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-56	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	101	Pass
			Overall Results		Pass

Jessica Hall
Laboratory Technician

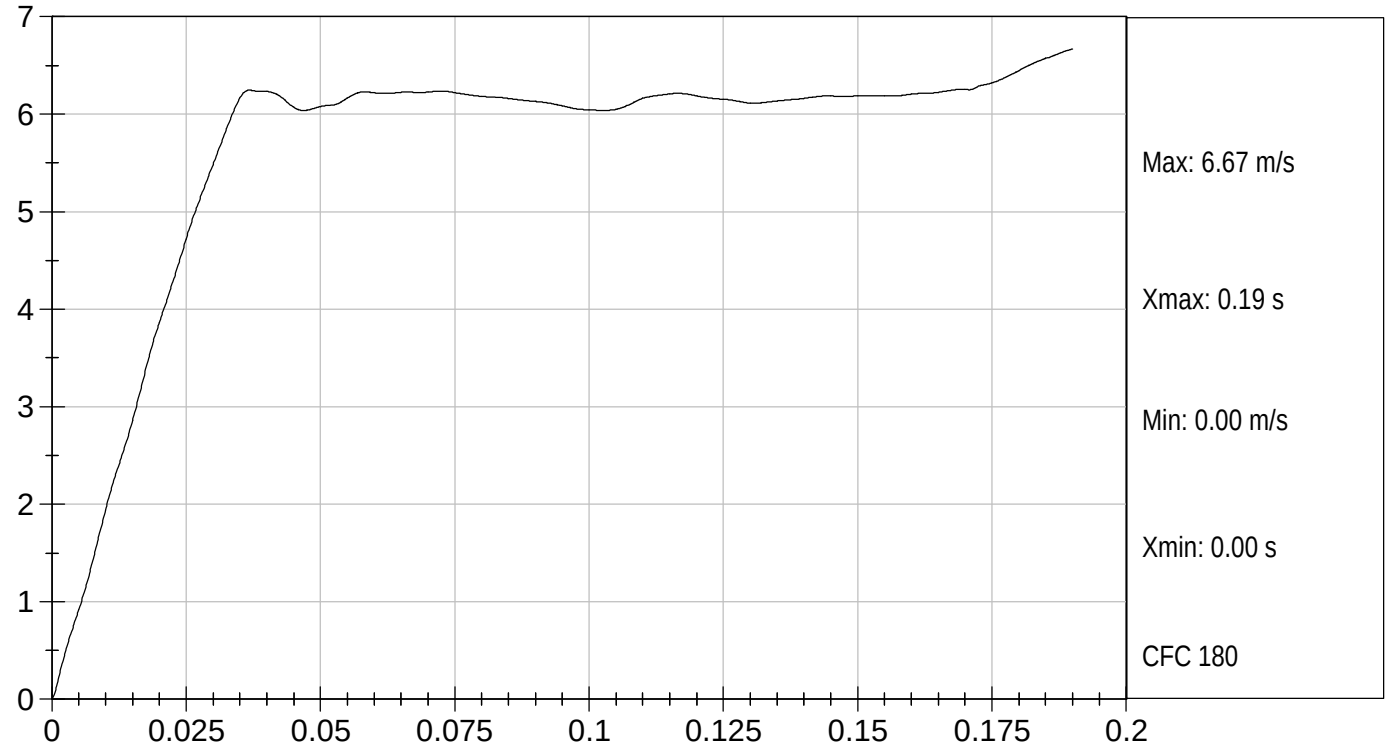
02/02/2004
Test Date

Jeff Loughlin
Approved By

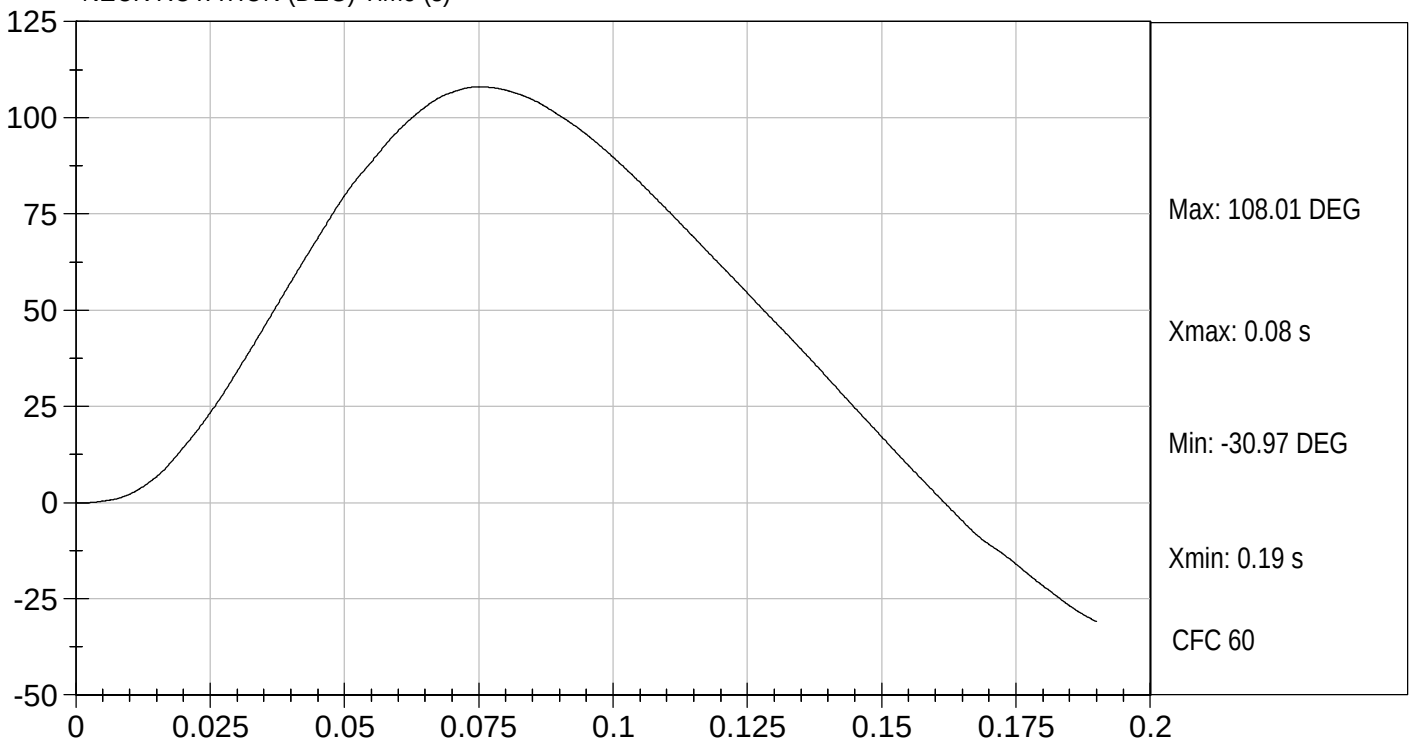
Test Desc: Neck Extension
Componet ID: D04213

Test Date: 02/02/2004
Velocity: 19.86 ft/s, 6.05 m/s

PENDULUM DECELERATION (m/s) Time (s)

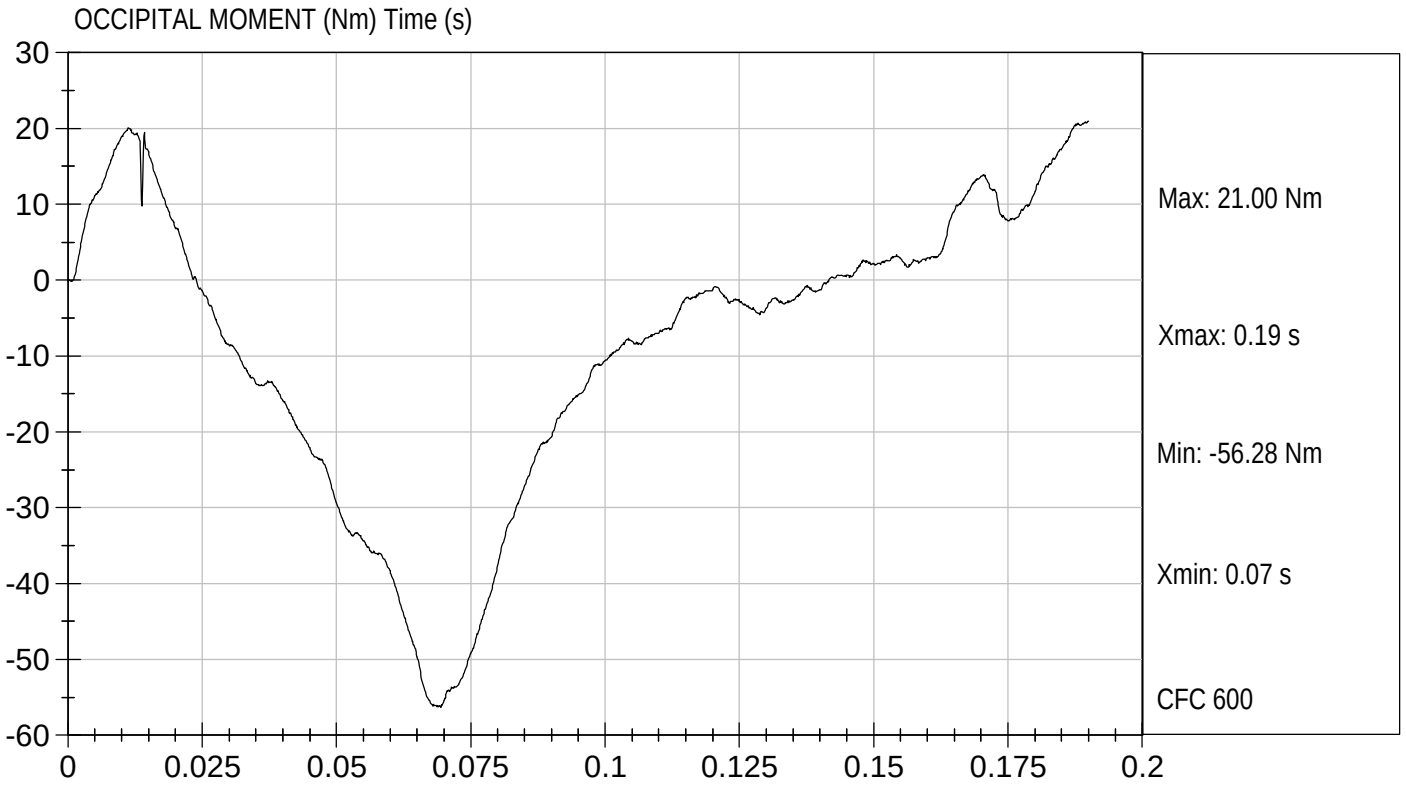


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Extension
Componet ID: D04213

Test Date: 02/02/2004
Velocity: 19.86 ft/s, 6.05 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04214

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.6	Pass
Relative Humidity	%	10 to 70	29	Pass
Probe Speed	m/s	6.59 to 6.83	6.78	Pass
Peak Deflection	mm	50 to 58	54.1	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	3.97	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Peak Force 18 mm - 50 mm	Yes/No	< 4600 N	Yes	Pass
		Overall Test Results		Pass

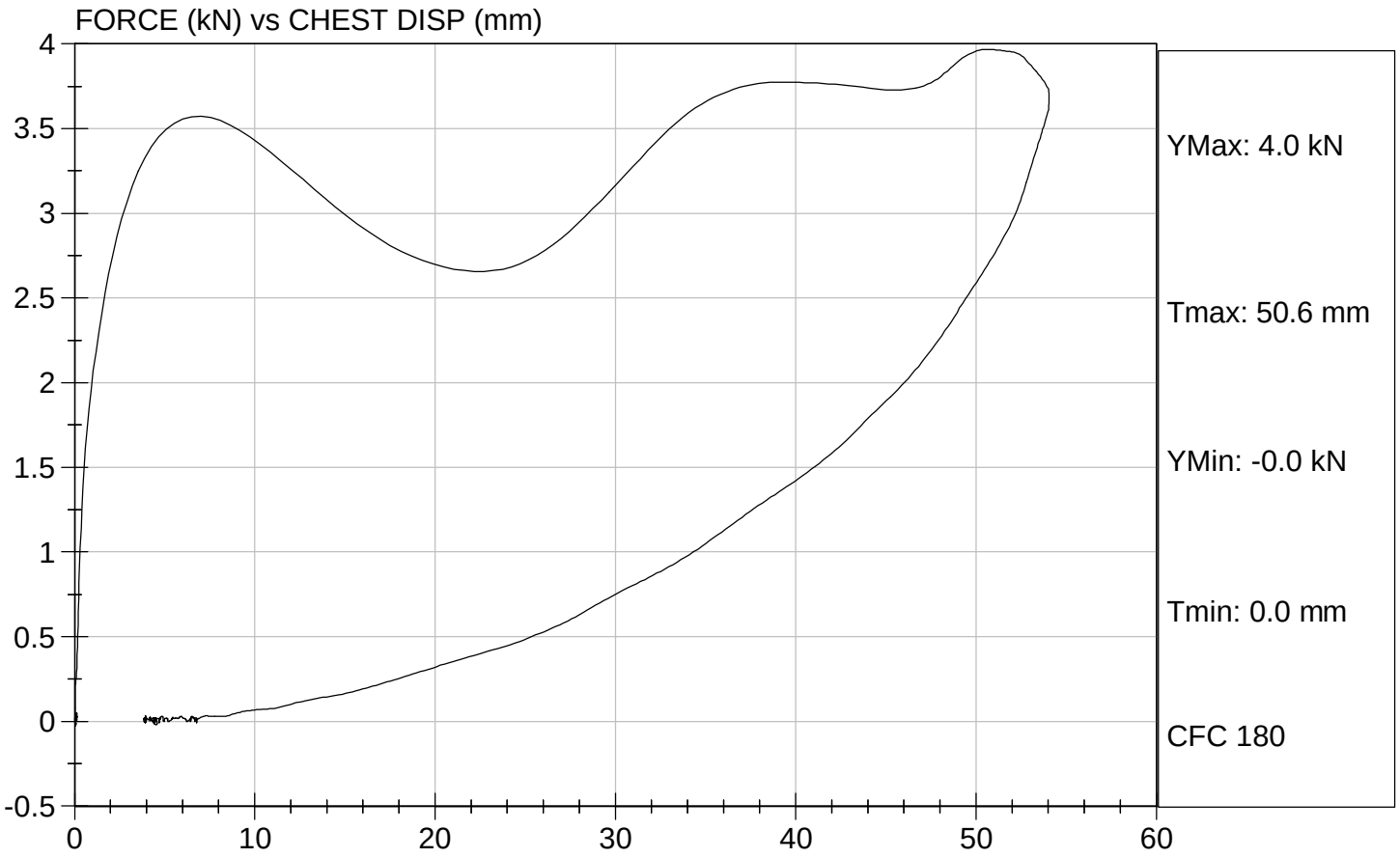
Jessica Hall
Laboratory Technician

02/02/2004
Test Date

Jeff Loughlin
Approved By

Test Description: Thorax Impact | Test Date: 02/02/2004

Component: D04214 | Speed: 22.24 ft/sec, 6.78 m/sec



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04215

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.5	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Speed	m/sec	2.07 to 2.13	2.13	Pass
Maximum Force	kN	3.45 to 4.06	3.62	Pass
		Overall Test Results		Pass

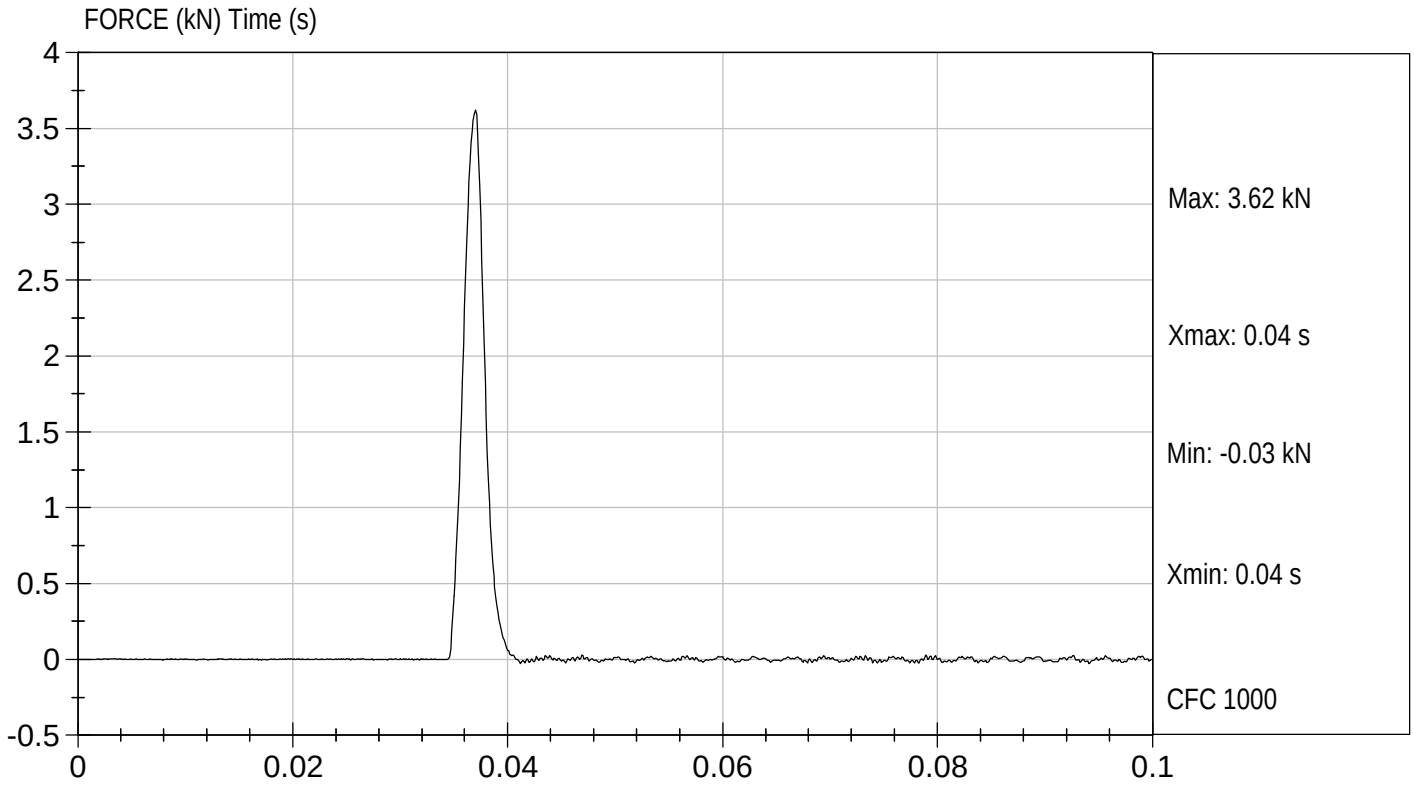
Jessica Hall
Laboratory Technician

02/02/2004
Test Date

Jeff Levenhagen
Approved By

Test Desc: Right Knee
Componet ID: D04215

Test Date: 02/02/2004
Velocity: 6.98 ft/s, 2.13 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04216

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Probe Speed	m/sec	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.62	Pass
		Overall Test Results		Pass

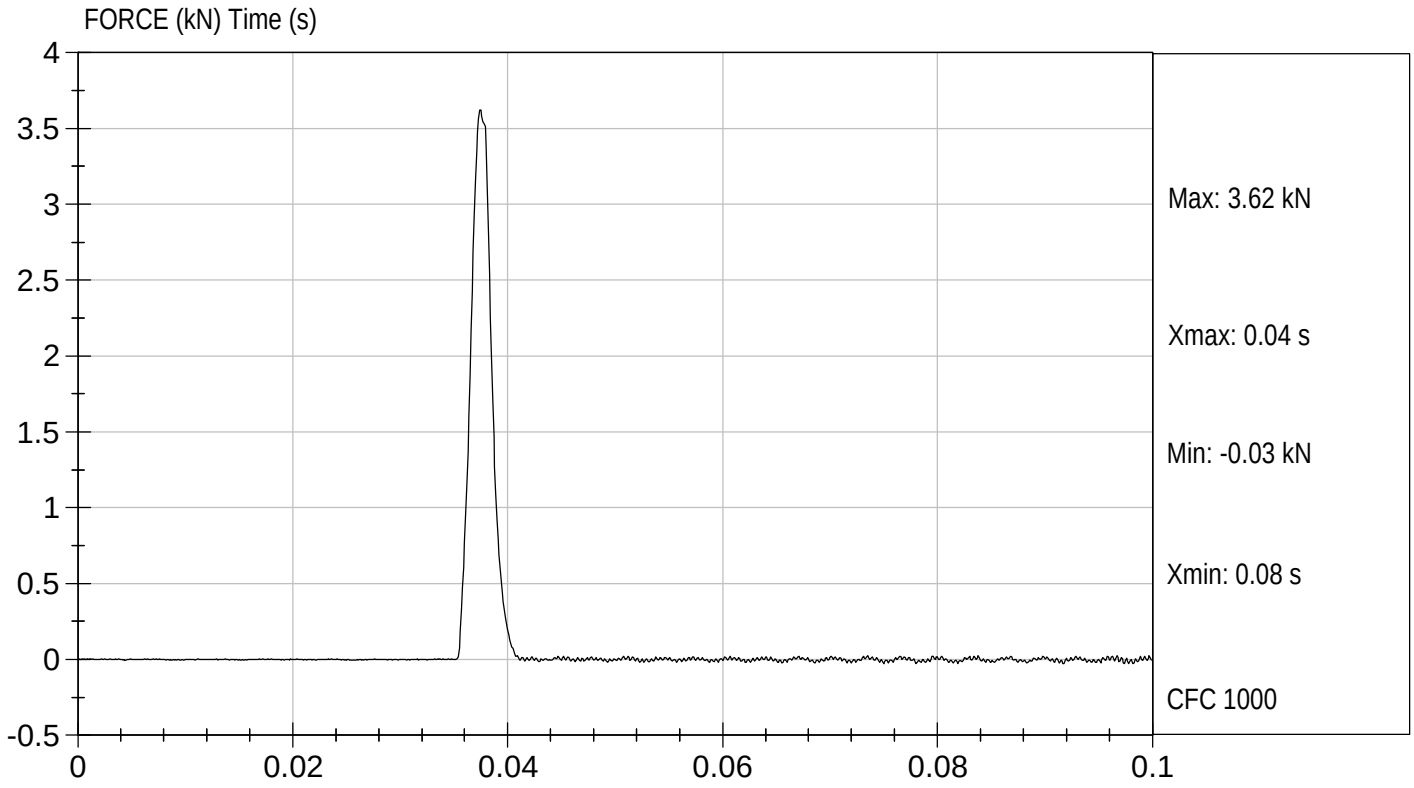
Jessica Gall
Laboratory Technician

02/02/2004
Test Date

Jeff Loughlin
Approved By

Test Desc: Left Knee
Componet ID: D04216

Test Date: 02/02/2004
Velocity: 6.92 ft/s, 2.11 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 515 **Test I.D:** D04217

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.4	Pass
Laboratory Relative Humidity	%	10 to 70	27	Pass
Initial Angle	deg	0 to 20	15	Pass
Return Angle	deg	+/- 8	19	Pass
Force at 45 deg	N	320 to 390	377	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Laboratory Technician

2/02/2004
Test Date

Approved By

DATA SHEET B3
HEAD DROP TEST (572.132)

Dummy Serial Number 515 Test Date 3/04/04

Technician Dave Wilcox

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive head drops are necessary)

___1. It has been at least 2 hours since the last head drop. (572.132(c)(5))
_X_ N/A, ONLY one head drop performed
_X_2. The head assembly consists of the complete head (880105-100X), the six-axis neck transducer (SA572-S11) or neck transducer structural replacement (78051-383X), and three (3) accelerometers (SA572-S4). (572.132(a))
_X_3. The head accelerometer mounting plate screws ((10-24 x 3/8 SHCS) are torqued to 9.0 Nm.
_X_4. Accelerometers and their respective mounts are smooth and clean.
_X_5. Torque the skull cap screws (10-24 x 1/2 SHCS) to 9.0 Nm.
_X_6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.136(m))
_X_7. The head assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))
Record the maximum temperature 22.0
Record the minimum temperature 21.8
Record the maximum humidity 35%
Record the minimum humidity 31%
_X_8. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: No Damage.

_X_9. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.132(c)(2))

_X_ 10. Suspend and orient the head assembly as shown in Figure 5B. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.132(c)(3))
Record the actual distance 376 mm

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

_X_ 11. The 1.57 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 6B. (572.132(c)(3))
Record the right side distance 499mm
Record the left side distance 499mm

_X_ 12. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.132(c)(4))
Record actual micro finish 656×10^{-6}mm

_X_ 13. The impact surface is rigidly supported. (572.132(c)(4))

_X_ 14. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.132(c)(4))
Record thickness 50.9 mm
Record width 604 mm
Record length 595 mm

_X_ 15. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.132(b) & (572.132(c)(4))

_X_ 16. Complete the following table using channel class 1000 data. (572.132(b)):

Parameter	Specification	Result
Peak resultant acceleration	250 g ≤ x ≤ 300 g	255
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration ≤ 15 g	3

_X_ 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

Signature

3/04/04
Date

DATA SHEET B4
NECK FLEXION TEST (572.133)

Dummy Serial Number ____515_____ Test Date ____3/04/04_____

Technician _____Dave Wilcox_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1_ (when successive flexion tests are necessary)

__1. It has been at least 30 minutes since the last flexion test. (572.137(q))
_X_ N/A, ONLY one flexion test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.0__
Record the minimum temperature __21.8__
Record the maximum humidity __35%__
Record the minimum humidity __31%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: ___No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: ___No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 8B for the flexion test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 6.89 m/s to 7.13 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Flexion Test Results (572.133(b)(1) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		6.89 m/s ≤ speed ≤ 7.13 m/s	7.00 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	2.1 m/s ≤ ΔV ≤ 2.5 m/s	2.3 m/s
	@ 20 ms	4.0 m/s ≤ ΔV ≤ 5.0 m/s	4.4 m/s
	@30ms	5.8 m/s ≤ ΔV ≤ 7.0 m/s	6.3 m/s
Plane D Rotation		Peak moment* 69 Nm ≤ moment ≤ 83 Nm during the following rotation range 77^o ≤ angle ≤ 91^o	__75__ Nm @ __82__ degrees
Positive Moment Decay** (Flexion)		Time to decay to 10 Nm 80 ms ≤ time ≤ 100ms	86 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii))

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follows this sheet.

Signature

3/04/04

Date

DATA SHEET B5
NECK EXTENSION TEST (572.133)

Dummy Serial Number ___515_____ Test Date ___3/04/04_____

Technician _____Dave Wilcox_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive extension tests are necessary)

__1. It has been at least 30 minutes since the last extension test. (572.137(q))
_X_ N/A, ONLY one extension test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.0___
Record the minimum temperature __21.8___
Record the maximum humidity __35%__
Record the minimum humidity __31%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: __No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9B for the extension test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.95 m/s to 6.19 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Extension Test Results (572.133(b)(2) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		5.95 m/s ≤ speed ≤ 6.19 m/s	6.13 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	1.5 m/s ≤ ΔV ≤ 1.9 m/s	1.9 m/s
	@ 20 ms	3.1 m/s ≤ ΔV ≤ 3.9 m/s	3.7 m/s
	@30ms	4.6 m/s ≤ ΔV ≤ 5.6 m/s	5.4 m/s
Plane D Rotation		Peak moment* -65 Nm ≤ moment ≤ -53 Nm during the following rotation range 99^o ≤ angle ≤ 114^o	_-60_ Nm @ _107_ degrees
Negative Moment Decay** (Extension)		Time to decay to -10 Nm 94 ms ≤ time ≤ 114 ms	98 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follow this sheet.

Signature

3/04/04

Date

DATA SHEET B6
THORAX IMPACT TEST (572.134)

Dummy Serial Number __515_____ Test Date __3/08/04_____

Technician ____Dave Wilcox_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive thorax impact tests are necessary)

__1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 11B.
_X_3. The complete assembled dummy (880105-000) is used (572.134(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. The weight of the shirt and pants shall not exceed 0.14 kg. (572.134(c)(1))
_X_4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.134(c)(2))
Record the maximum temperature _22.0__
Record the minimum temperature _21.5__
Record the maximum humidity _25%__
Record the minimum humidity _22%__
_X_5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material, chest displacement transducer assembly and the rear rib supports. Inspect for rib deformation using the chest depth gage. If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
_X_ - No damage
__ - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage _____
_____
__ - The following repairs or replacement was performed. Record
_____
_____
_X_6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 11B. The surface must be long enough to support the pelvis and outstretched legs. (572.134(c)(3))
_X_7. Level the ribs both longitudinally and laterally ± 0.5º and adjust the pelvis angle to 7º ± 2º. The angle may be measured using the special H-point tool (TE-2504)

that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block.

_X_ 8. The midsagittal plane of the dummy is vertical within ± 1º. (572.134(c)(3))

_X_ 9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5º of a horizontal line in the dummy's midsagittal plane. (572.134(c)(4))

_X_ 10. Align the adjustable neck bracket index marks to the "zero" position.

_X_ 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to the laboratory coordinate system. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.

_X_ 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.

_X_ 13. Place the arm assemblies horizontal ± 2º and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.

_X_ 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 180.

_X_ 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.134(c)(5)) The velocity of the test probe at the time of impact is 6.71 m/s ± 0.12m/s. (572.134(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.134(c)(6)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.134(c)(7))

_X_ 16. Complete the following table:

Thorax Impact Results (572.134(b) and 572.134(b)(1)&(2)

Parameter*	Specification	Result
Test Probe Speed	6.59 m/s ≤ speed ≤ 6.83 m/s	6.74 m/s
Chest Compression	50.0 mm ≤ compression ≤ 58.0 mm	56 mm
Peak force** between 50.0 and 58.0 mm chest compression	3900N ≤ peak force ≤ 4400N	3970 N
Peak force** between 18.0 and 50.0 mm chest compression	peak force ≤ 4600 N	yes
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	71%

*Time zero is defined as the time of initial contact between the test probe and the chest skin.
**Force = impactor mass x acceleration (572.134(b)(3))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve. (Figure 12B

_X_ 17. Plots of chest compression, acceleration, force, force versus deflection follow this sheet.

Signature

3/08/04
Date

DATA SHEET B7
TORSO FLEXION TEST (572.135)

Dummy Serial Number __515_____ Test Date __3/05/04_____

Technician _____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive torso flexion tests are necessary)

__1. It has been at least 30 minutes since the last torso flexion test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 13B.
_X_3. The complete assembled dummy (880105-000) is used (572.135(c)(2)).
__ with legs below the femurs.
__ without legs below the femurs.
_X_4. The dummy assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.135(c)(1))
Record the maximum temperature __21.9__
Record the minimum temperature __21.5__
Record the maximum humidity __38%__
Record the minimum humidity __35%__
_X_5. Secure the pelvis to the fixture at the pelvis instrument cavity rear face by threading four ¼ cap screws into the available threaded attachment holes. Tighten the mountings so that the test material is rigidly affixed to the test fixture and the pelvic lumbar joining surface is horizontal. (572.135(c)(3))
_X_6. Attach the loading adapter bracket to the spine of the dummy as shown in Figure 13B**.** (572.135(c)(4))
_X_7. Inspect and adjust, if necessary, the seating of the abdominal insert within the pelvis cavity and with respect to the torso flesh, assuring that the torso flesh provides uniform fit and overlap with respect to the outside surface of the pelvis flesh. (572.135(c)(5))
_X_8. Flex the dummy forward and back 3 times such that the angle reference plane moves between 0° and 30° with respect to the vertical transverse plane. (572.135(c)(6))
_X_9. Support the dummy such that the angle reference plane is at or near 0° (vertical with respect to the vertical transverse plane). Wait at least 30 minutes before continuing. (572.135(c)(6))
_X_10. Remove all external support that was implemented in 9 above. (572.135(c)(7))
_X_11. Measure the initial orientation angle of the torso reference plane of the seated, unsupported dummy. (572.135(c)(7))
Record reference plane angle (max. allowed 20°)___17°___
_X_12.Attach the pull cable and the load cell. (572.135(c)(8))

_X_13. Apply a tension force in the midsagittal plane to the pull cable at any upper torso deflection rate between 0.5° and 1.5° per second, until the angle reference plane is at 45° ± 0.5° of flexion relative to the vertical transverse plane. (572.135(c)(9))
_X_14. Maintain angle reference plane at 45° ± 0.5° of flexion for 10 seconds. (572.135(c)(10))
_X_15. As quickly as possible release the force applied to the attachment bracket. (572.135(c)(11))
_X_16. 3 minutes after the release of the force, measure the reference plane angle. (572.135(c)(11))
_X_17. Complete the following table:

Torso Flexion Results (572.135(b), 572.135(c)(7), (572.135(c)(9))

Parameter	Specification	Result
Initial ref. plane angle	Angle ≤ 20°	17°
Torso rotation rate	0.5°/s ≤ rate ≤ 1.5°/s	1.0
Force at 45° ±0.5°	320 N ≤ force ≤ 390 N	390 N
Final ref. plane angle	Initial ref. plane angle ±8°	19°

Joe Fleck
Signature

3/5/04
Date

DATA SHEET B8
LEFT KNEE IMPACT TEST (572.136)

Dummy Serial Number __515_____ Test Date __3/5/04_____

Technician ____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive knee impact tests are necessary)

_X_1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B
_X_3. The knee assembly (880105-528L), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-650), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _21.9__
Record the minimum temperature _21.5__
Record the maximum humidity _42%__
Record the minimum humidity _35%__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.136(c)(6))

_X_ 11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.10 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3680 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_ 12. Plots of acceleration versus time and force versus time follow this sheet.

Joe Fleck
_____
Signature

3/5/04
_____
Date

DATA SHEET B9
RIGHT KNEE IMPACT TEST (572.136)

Dummy Serial Number ___515_____ Test Date __3/5/04_____

Technician ___Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1__ (when successive knee impact tests are necessary)

_X_1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B.
_X_3. The knee assembly (880105-528R), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-651), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _21.9___
Record the minimum temperature _21.5___
Record the maximum humidity _42 %___
Record the minimum humidity _35 %___
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5))
_X_11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.10 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3550 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

3/5/04
Date

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 515 **Test I.D:** D04491

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Peak Resultant Acceleration	G's	250 - 300	255	Pass
Peak Lateral Acceleration	G's	+/- 15	2.7	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

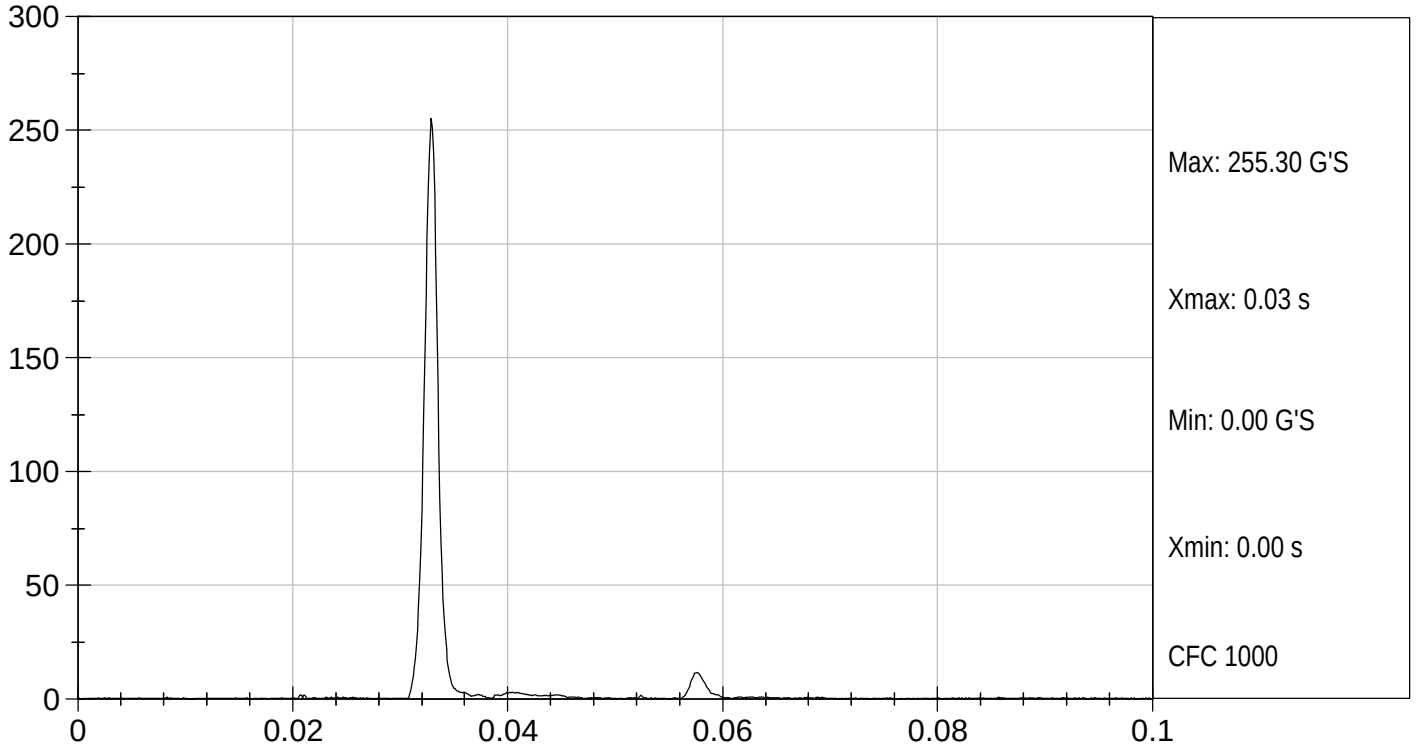
03/04/2004
Test Date

Jessica Hall
Approved By

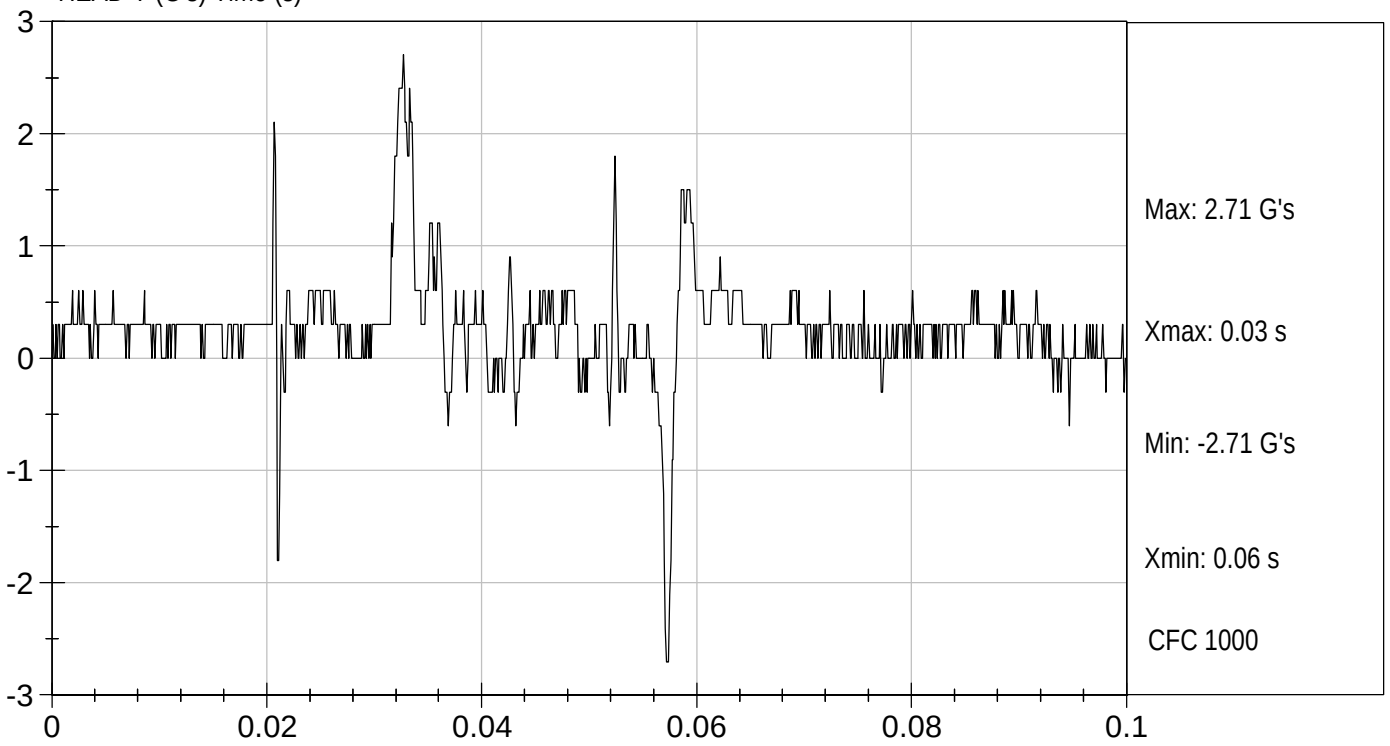
Test Desc: Head Drop
Componet ID: D04491

Test Date: 03/04/2004
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) Time (s)



HEAD Y (G's) Time (s)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04492

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity		%	10 to 70	35	Pass
Pendulum Speed		m/sec	6.89 to 7.13	7.00	Pass
Pendulum Deceleration	10 msec	msec	2.1 to 2.5	2.3	Pass
	20 msec	msec	4.0 to 5.0	4.4	Pass
	30 msec	msec	5.8 to 7.0	6.3	Pass
D Plane Rotation	Max	deg	77 to 91	82	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	75	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	86	Pass
			Overall Results		Pass

Laboratory Technician

03/04/2004

Test Date

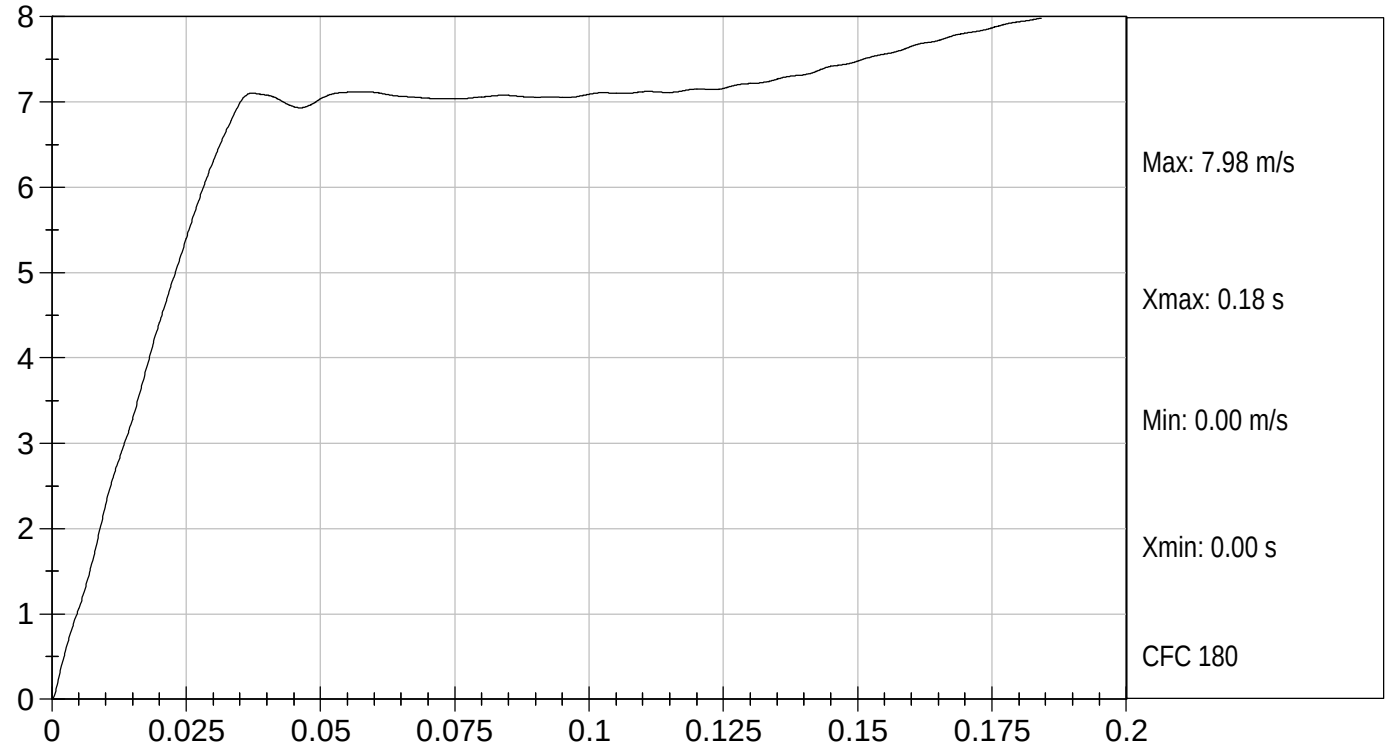
Jessica Hall

Approved By

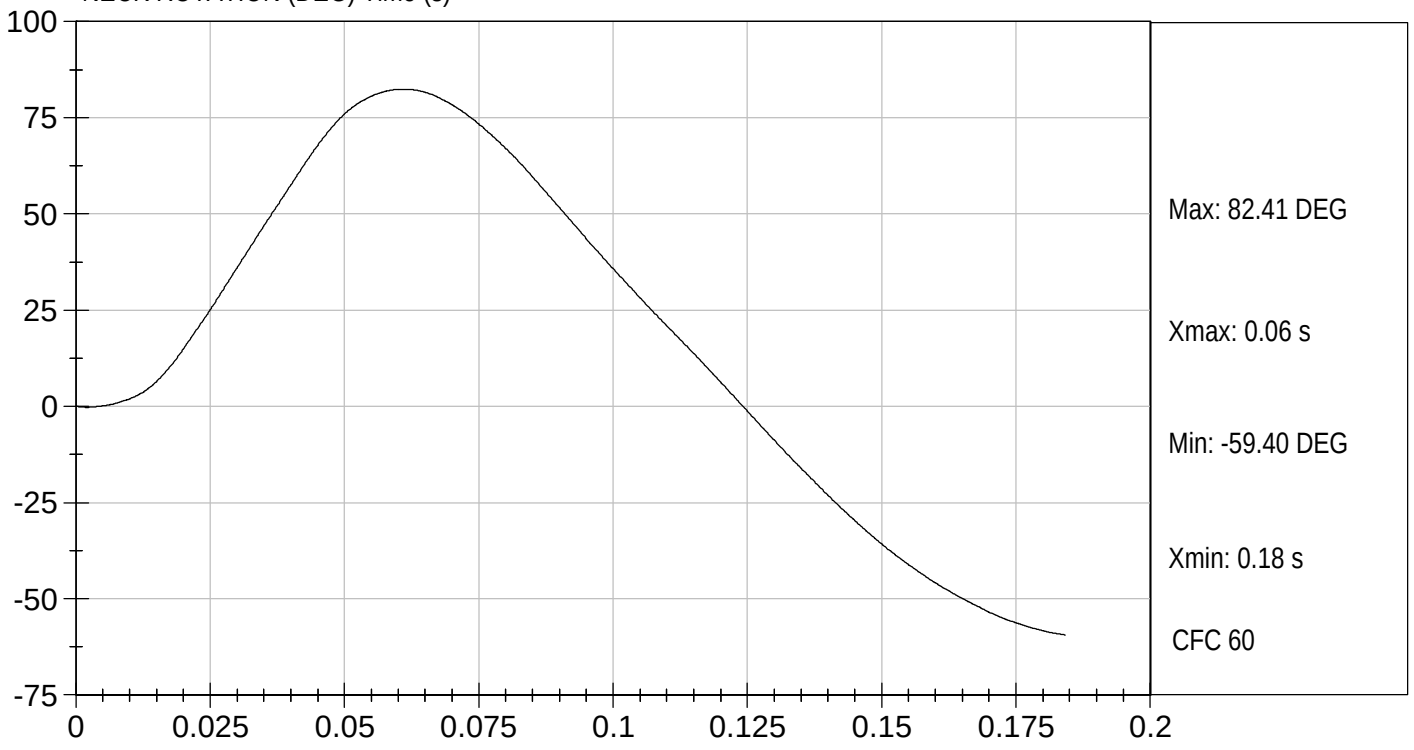
Test Desc: Neck Flexion
Componet ID: D04492

Test Date: 03/04/2004
Velocity: 22.96 ft/s, 7.00 m/s

PENDULUM DECELERATION (m/s) Time (s)

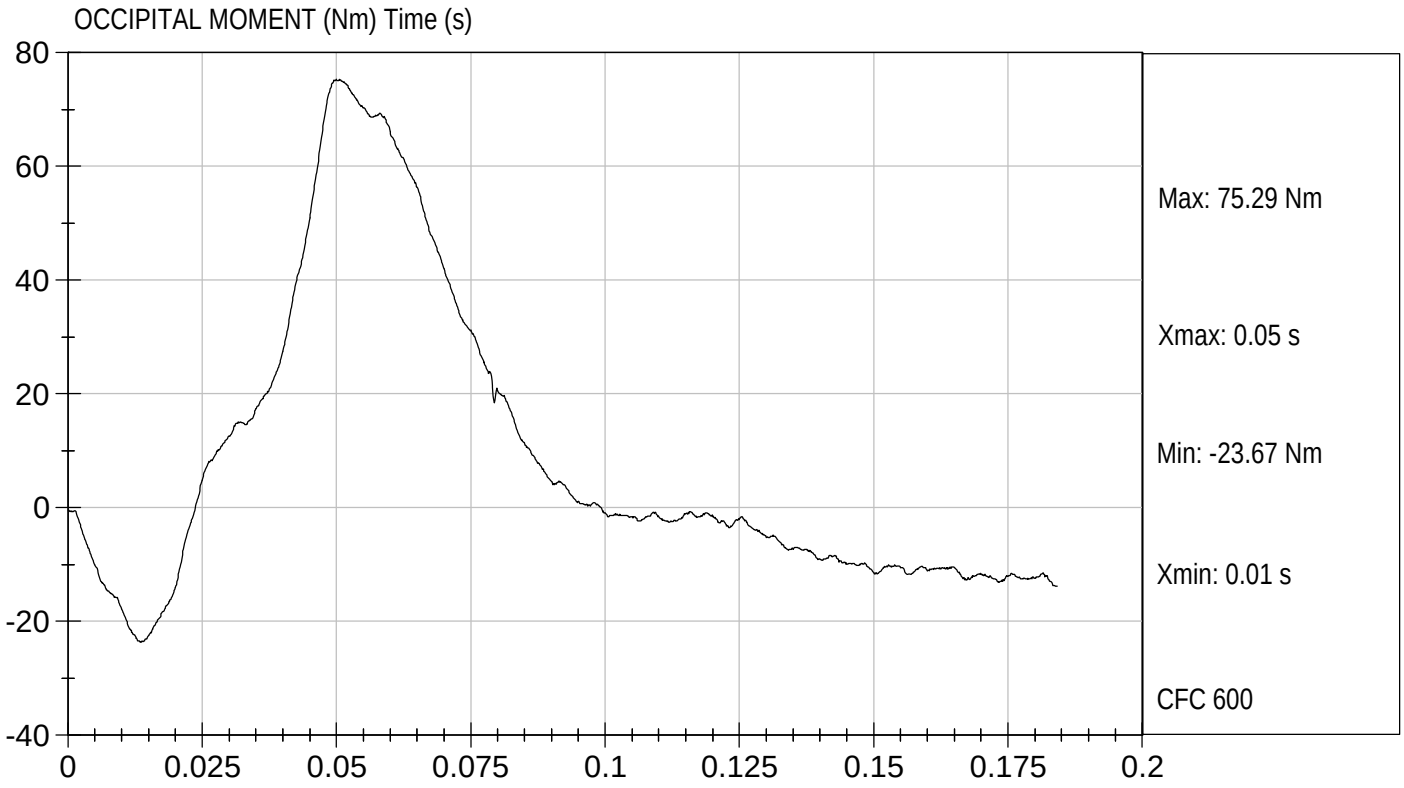


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Flexion
Componet ID: D04492

Test Date: 03/04/2004
Velocity: 22.96 ft/s, 7.00 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04493

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity		%	10 to 70	35	Pass
Pendulum Speed		m/sec	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 msec	msec	1.5 to 1.9	1.9	Pass
	20 msec	msec	3.1 to 3.9	3.7	Pass
	30 msec	msec	4.6 to 5.6	5.4	Pass
D Plane Rotation	Max	deg	99 to 114	107	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-60	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	98	Pass
			Overall Results		Pass

Laboratory Technician

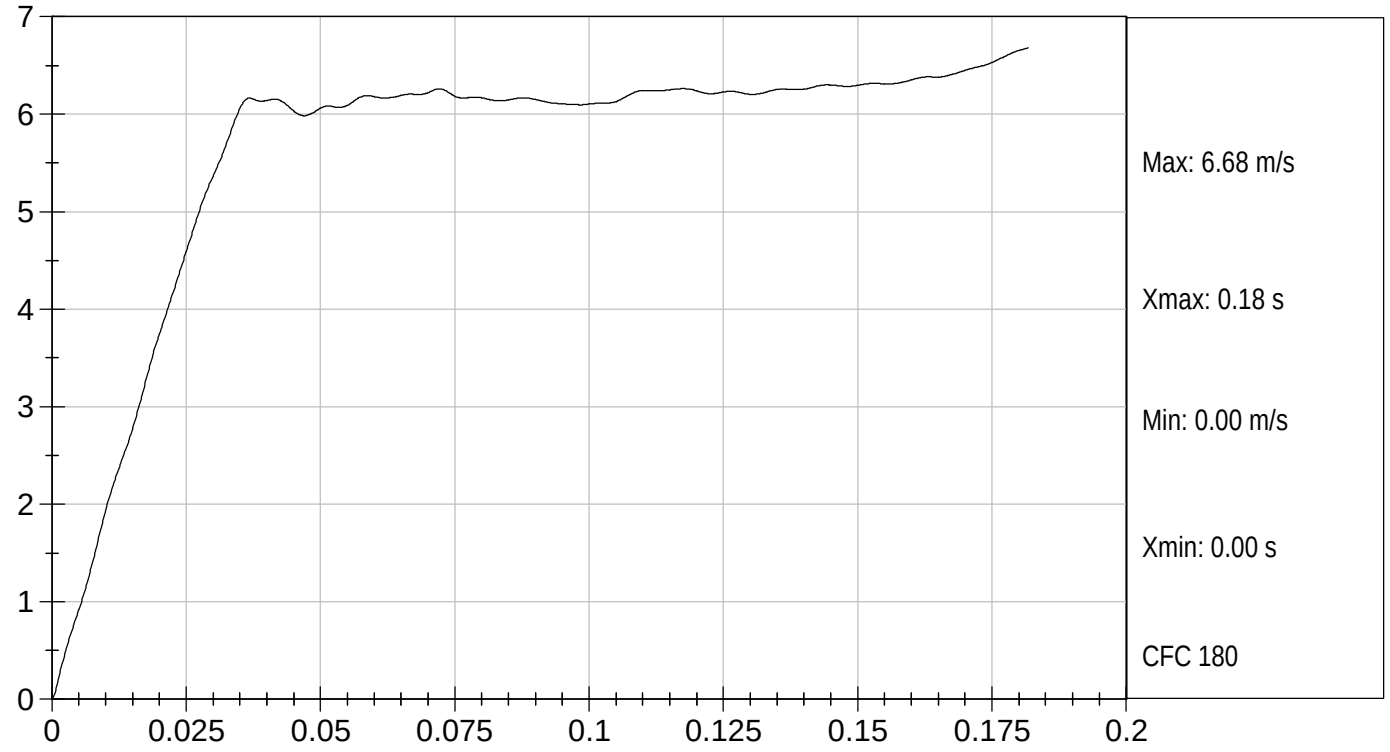
03/04/2004
Test Date

Jessica Hall
Approved By

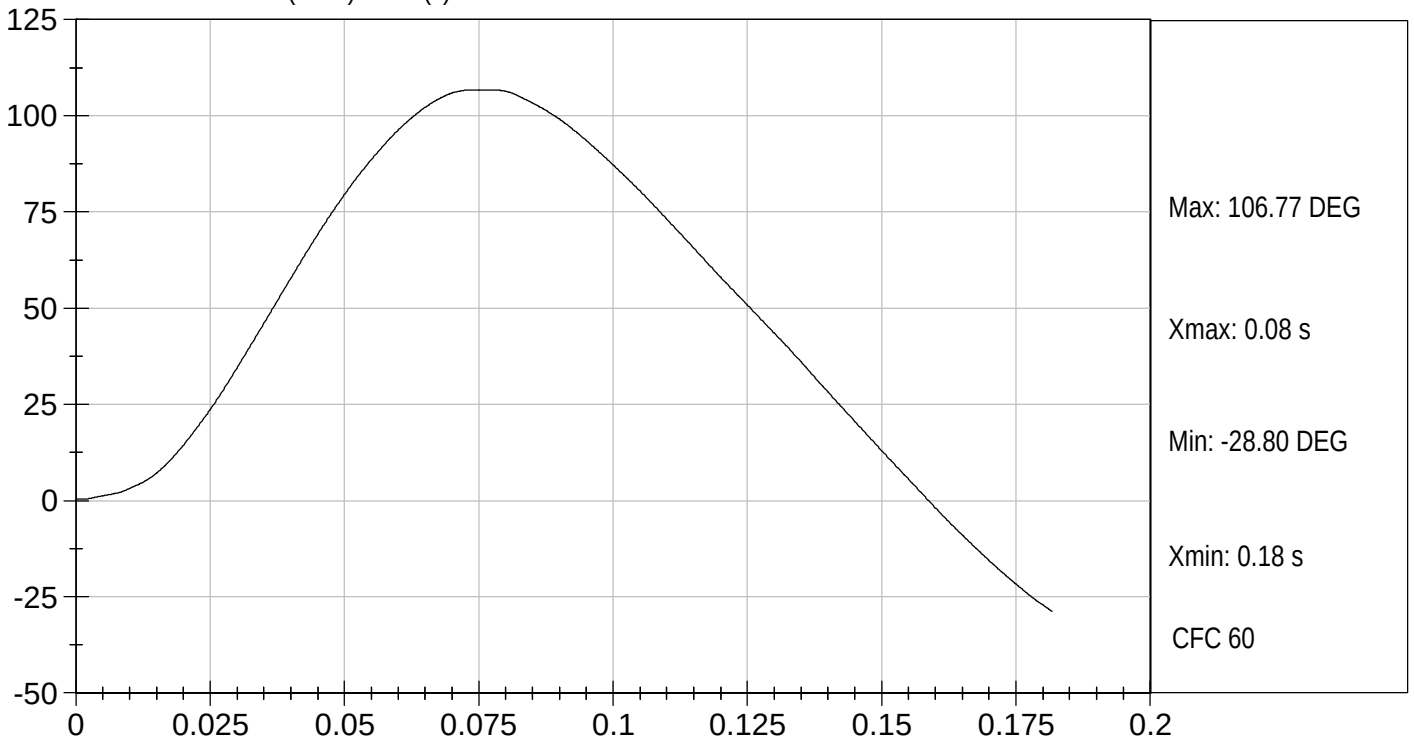
Test Desc: Neck Extension
Componet ID: D04493

Test Date: 03/04/2004
Velocity: 20.11 ft/s, 6.13 m/s

PENDULUM DECELERATION (m/s) Time (s)

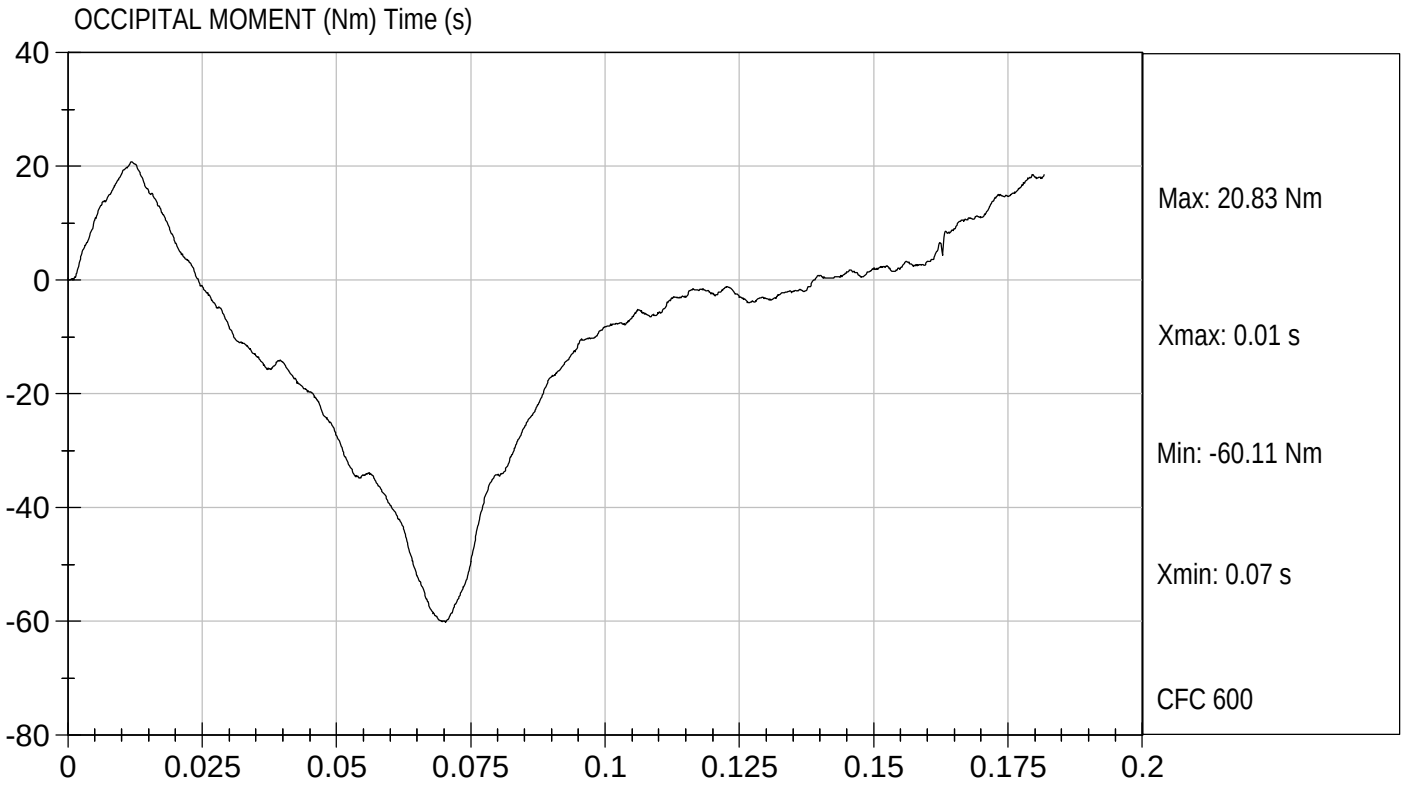


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Extension
Componet ID: D04493

Test Date: 03/04/2004
Velocity: 20.11 ft/s, 6.13 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04494

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.0	Pass
Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	6.59 to 6.83	6.74	Pass
Peak Deflection	mm	50 to 58	55.5	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	3.97	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Peak Force 18 mm - 50 mm	Yes/No	< 4600 N	Yes	Pass
		Overall Test Results		Pass

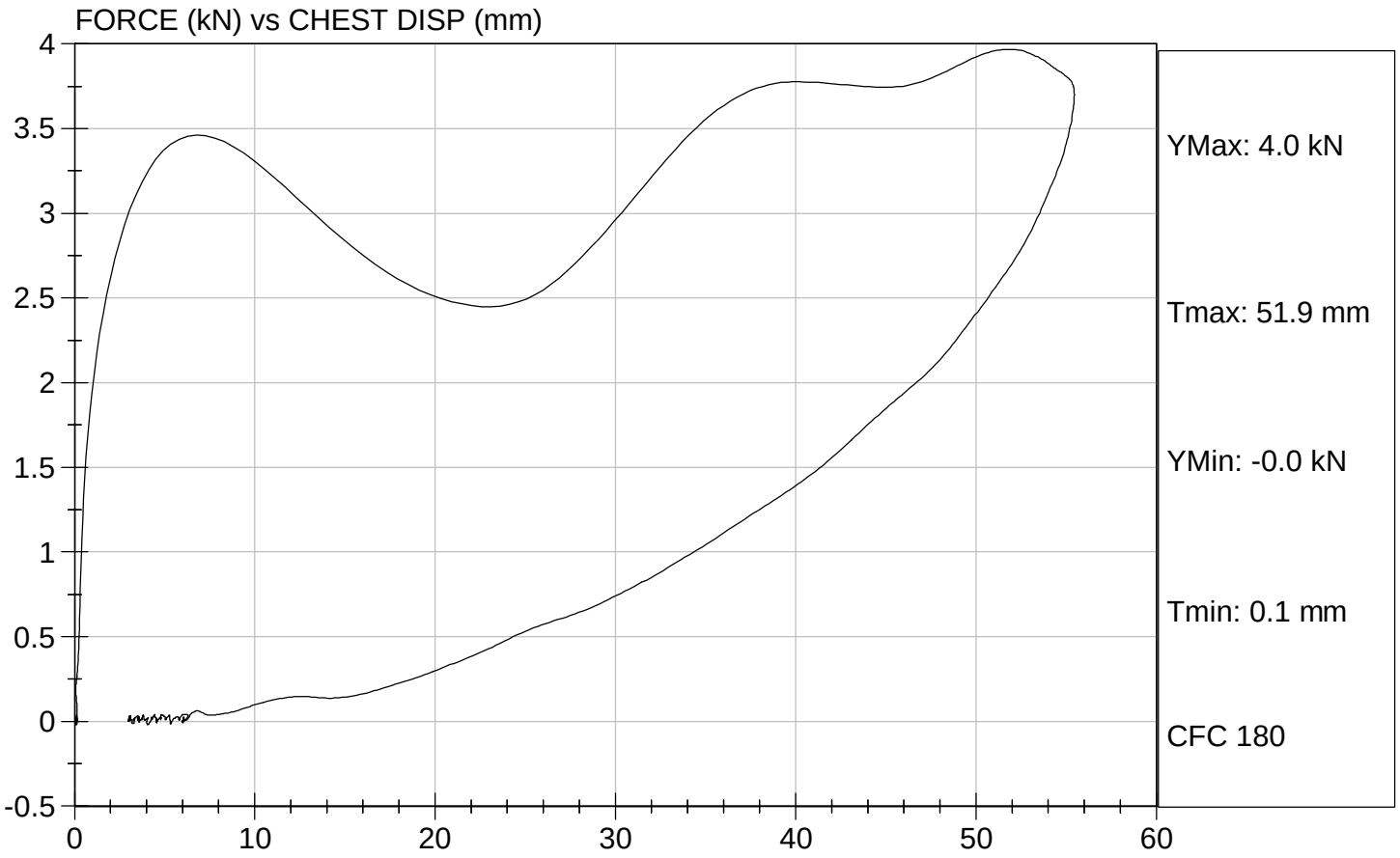
Laboratory Technician

03/08/2004
Test Date

Jessica Hall
Approved By

Test Description: Thorax Impact Test Date: 03/08/2004

Component: D04494 Speed: 22.1 ft/sec, 6.74 m/sec



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04495

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Speed	m/sec	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.55	Pass
		Overall Test Results		Pass

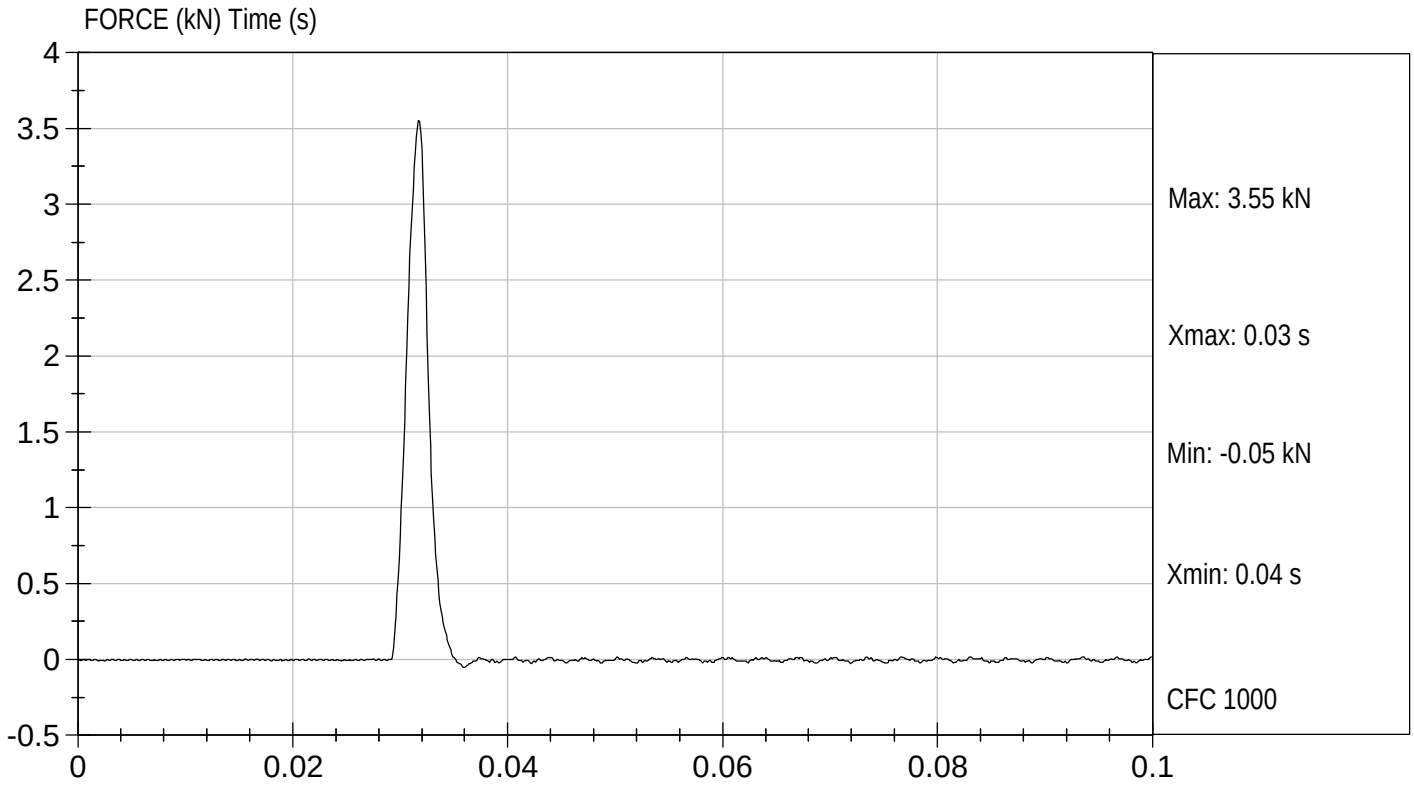
Laboratory Technician

03/05/2004
Test Date

Approved By

Test Desc: Right Knee
Componet ID: D04495

Test Date: 03/05/2004
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 515 **Test I.D:** D04496

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Speed	m/sec	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.68	Pass
		Overall Test Results		Pass

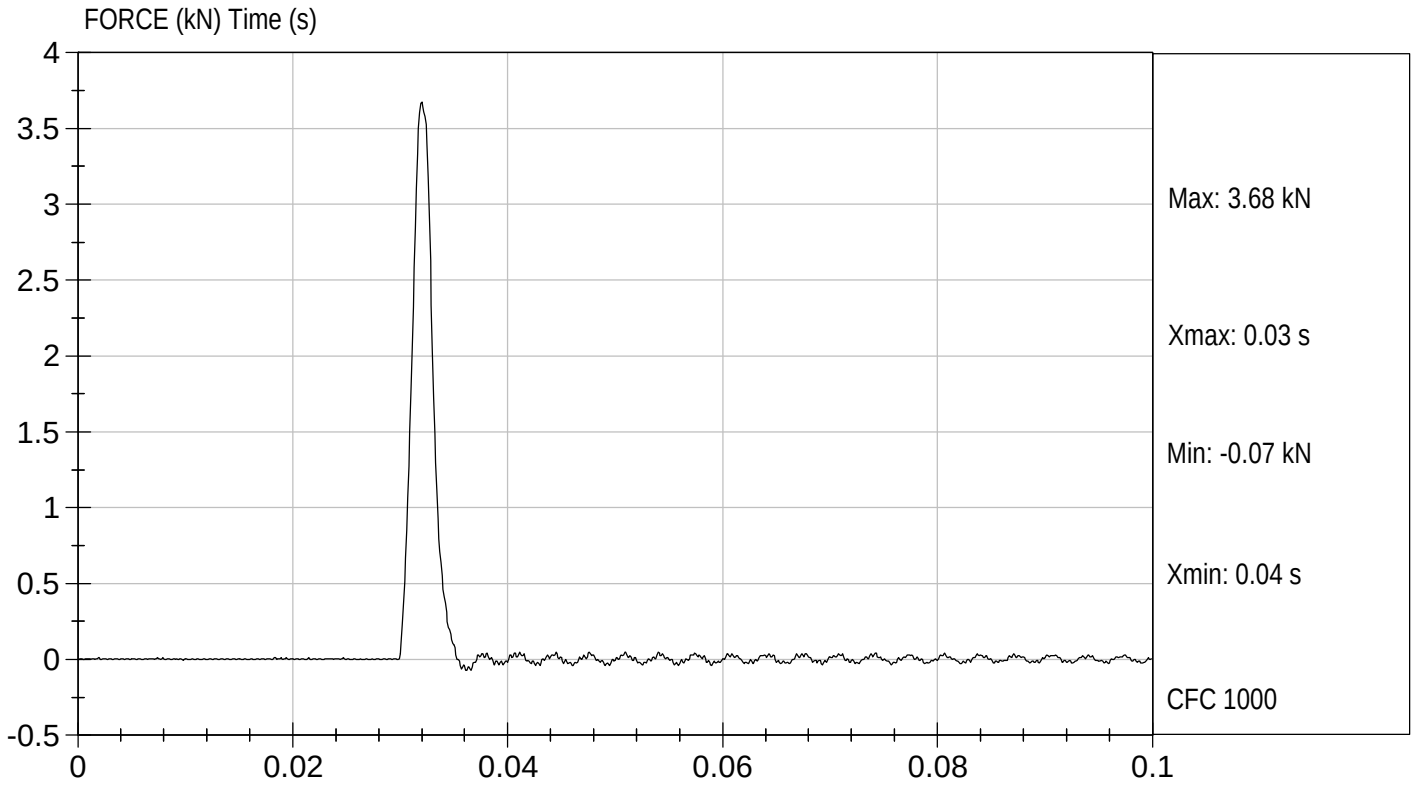
Laboratory Technician

03/05/2004
Test Date

Approved By

Test Desc: Left Knee
Componet ID: D04496

Test Date: 03/05/2004
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 515 **Test I.D:** D04497

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	19	Pass
Force at 45 deg	N	320 to 390	390	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Laboratory Technician

04/06/2004
Test Date

Approved By

DATA SHEET B1
DUMMY DAMAGE CHECKLIST

Dummy Serial Number _____515_____ Test Date __2/25/04____

Technician _____Jessica Gall_____

This check sheet is completed as part of the post test calibration verification.

_X_ Perform general cleaning.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber.			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer leads	Torn cables			X

Dummy Item	Inspect for	Comments	Damaged	OK
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to “at rest” position			X
Pelvis	Broken			X
Other				X

If upon visual examination, damage is apparent in any of these areas, the appropriate engineer or engineering technician is to be consulted for a decision on repair or replacement of parts.
Repair or Replacement approved by:

Jessica Hall _____ 2/26/04_____
Signature Date

Describe the repair or replacement of parts:

Checked by
Jeff Levenhagen _____ 2/26/04_____
Signature Date

EXTERNAL DIMENSIONS

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	780.2
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	443.0
C	H-POINT HEIGHT	Reference	81.3-86.3	85.1
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	145.0
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	76.4
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	128.0
G	BACK OF ELBOW TO WRIST PIVOT	Back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	255.8
H	HEAD BACK TO BACKLINE	Back of skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	45.0
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	280.2
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	193.0
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	545.0
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	365.2
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	400.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. “K”.	414-439.4	438.0

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	183.0
P	FOOT LENGTH	Tip of toe to rear of heal	218.5-233.7	226.2
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	475.8
S	HEAD BREADTH	The widest part of the head	137.1-147.3	142.0
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	180.5
U	HIP BREADTH	The widest part of the hip	299.7-314.9	305.1
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	359.0
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	85.5
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. “T”	528.3-548.7	538.0
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	857.6
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	789.0
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.0

DATA SHEET B3
HEAD DROP TEST (572.132)

Dummy Serial Number 506 Test Date 3/04/04

Technician Dave Wilcox

_X_ Pretest calibration
__ Post test calibration verification

Test attempt no. __1__ (when successive head drops are necessary)

__X__ 1. It has been at least 2 hours since the last head drop. (572.132(c)(5))
_X_ N/A, ONLY one head drop performed

_X_ 2. The head assembly consists of the complete head (880105-100X), the six-axis neck transducer (SA572-S11) or neck transducer structural replacement (78051-383X), and three (3) accelerometers (SA572-S4). (572.132(a))

_X_ 3. The head accelerometer mounting plate screws ((10-24 x 3/8 SHCS) are torqued to 9.0 Nm.

_X_ 4. Accelerometers and their respective mounts are smooth and clean.

_X_ 5. Torque the skull cap screws (10-24 x 1/2 SHCS) to 9.0 Nm.

_X_ 6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.136(m))

_X_ 7. The head assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))

Record the maximum temperature 21.8
Record the minimum temperature 21.0
Record the maximum humidity 31%
Record the minimum humidity 25%

_X_ 8. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.

Record findings and actions: No Damage.

_X_ 9. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.132(c)(2))

_X_ 10. Suspend and orient the head assembly as shown in Figure 5B. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.132(c)(3))
Record the actual distance 376 mm

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

_X_ 11. The 1.57 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 6B. (572.132(c)(3))
Record the right side distance 498mm
Record the left side distance 498mm

_X_ 12. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.132(c)(4))
Record actual micro finish 656×10^{-6}mm

_X_ 13. The impact surface is rigidly supported. (572.132(c)(4))

_X_ 14. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.132(c)(4))
Record thickness 50.9 mm
Record width 604 mm
Record length 595 mm

_X_ 15. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.132(b) & (572.132(c)(4))

_X_ 16. Complete the following table using channel class 1000 data. (572.132(b)):

Parameter	Specification	Result
Peak resultant acceleration	250 g ≤ x ≤ 300 g	270
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration ≤ 15 g	5

_X_ 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

Signature

3/04/04
Date

DATA SHEET B4
NECK FLEXION TEST (572.133)

Dummy Serial Number ____506_____ Test Date ____3/04/04_____

Technician _____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1_ (when successive flexion tests are necessary)

_X_1. It has been at least 30 minutes since the last flexion test. (572.137(q))
_X_ N/A, ONLY one flexion test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.0__
Record the minimum temperature __21.5__
Record the maximum humidity __35%__
Record the minimum humidity __30%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: ___No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: ___No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 8B for the flexion test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 6.89 m/s to 7.13 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Flexion Test Results (572.133(b)(1) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		6.89 m/s ≤ speed ≤ 7.13 m/s	6.92 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	2.1 m/s ≤ ΔV ≤ 2.5 m/s	2.3 m/s
	@ 20 ms	4.0 m/s ≤ ΔV ≤ 5.0 m/s	4.4 m/s
	@30ms	5.8 m/s ≤ ΔV ≤ 7.0 m/s	6.4 m/s
Plane D Rotation		Peak moment* 69 Nm ≤ moment ≤ 83 Nm during the following rotation range 77^o ≤ angle ≤ 91^o	__79__ Nm @ __81__ degrees
Positive Moment Decay** (Flexion)		Time to decay to 10 Nm 80 ms ≤ time ≤ 100ms	86 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii))

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follows this sheet.

Signature

3/04/04

Date

DATA SHEET B5
NECK EXTENSION TEST (572.133)

Dummy Serial Number ___506_____ Test Date ___3/04/04_____

Technician _____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1__ (when successive extension tests are necessary)

__1. It has been at least 30 minutes since the last extension test. (572.137(q))
_X_ N/A, ONLY one extension test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.0__
Record the minimum temperature __21.5__
Record the maximum humidity __35%__
Record the minimum humidity __30%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: __No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9B for the extension test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.95 m/s to 6.19 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Extension Test Results (572.133(b)(2) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		5.95 m/s ≤ speed ≤ 6.19 m/s	6.15 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	1.5 m/s ≤ ΔV ≤ 1.9 m/s	1.8 m/s
	@ 20 ms	3.1 m/s ≤ ΔV ≤ 3.9 m/s	3.7 m/s
	@30ms	4.6 m/s ≤ ΔV ≤ 5.6 m/s	5.3 m/s
Plane D Rotation		Peak moment* -65 Nm ≤ moment ≤ -53 Nm during the following rotation range 99^o ≤ angle ≤ 114^o	_-61_ Nm @ _112_ degrees
Negative Moment Decay** (Extension)		Time to decay to -10 Nm 94 ms ≤ time ≤ 114 ms	101 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follow this sheet.

Signature

3/04/04

Date

DATA SHEET B6
THORAX IMPACT TEST (572.134)

Dummy Serial Number __506_____ Test Date __3/05/04_____

Technician ____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive thorax impact tests are necessary)

__1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 11B.
_X_3. The complete assembled dummy (880105-000) is used (572.134(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. The weight of the shirt and pants shall not exceed 0.14 kg. (572.134(c)(1))
_X_4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.134(c)(2))
Record the maximum temperature _21.8__
Record the minimum temperature _21.5__
Record the maximum humidity _36%__
Record the minimum humidity _32%__
_X_5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material, chest displacement transducer assembly and the rear rib supports. Inspect for rib deformation using the chest depth gage. If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
_X_ - No damage
__ - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage _____
_____
__ - The following repairs or replacement was performed. Record
_____
_____
_X_6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 11B. The surface must be long enough to support the pelvis and outstretched legs. (572.134(c)(3))
_X_7. Level the ribs both longitudinally and laterally ± 0.5º and adjust the pelvis angle to 7º ± 2º. The angle may be measured using the special H-point tool (TE-2504)

that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block.

_X_ 8. The midsagittal plane of the dummy is vertical within ± 1º. (572.134(c)(3))

_X_ 9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5º of a horizontal line in the dummy's midsagittal plane. (572.134(c)(4))

_X_ 10. Align the adjustable neck bracket index marks to the "zero" position.

_X_ 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to the laboratory coordinate system. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.

_X_ 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.

_X_ 13. Place the arm assemblies horizontal ± 2º and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.

_X_ 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 180.

_X_ 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.134(c)(5)) The velocity of the test probe at the time of impact is 6.71 m/s ± 0.12m/s. (572.134(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.134(c)(6)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.134(c)(7))

_X_ 16. Complete the following table:

Thorax Impact Results (572.134(b) and 572.134(b)(1)&(2)

Parameter*	Specification	Result
Test Probe Speed	6.59 m/s ≤ speed ≤ 6.83 m/s	6.81 m/s
Chest Compression	50.0 mm ≤ compression ≤ 58.0 mm	52 mm
Peak force** between 50.0 and 58.0 mm chest compression	3900N ≤ peak force ≤ 4400N	3960 N
Peak force** between 18.0 and 50.0 mm chest compression	peak force ≤ 4600 N	yes
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	70%

*Time zero is defined as the time of initial contact between the test probe and the chest skin.
**Force = impactor mass x acceleration (572.134(b)(3))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve. (Figure 12B

_X_ 17. Plots of chest compression, acceleration, force, force versus deflection follow this sheet.

Signature

3/05/04
Date

DATA SHEET B7
TORSO FLEXION TEST (572.135)

Dummy Serial Number __506_____ Test Date __3/05/04_____

Technician _____Dave Wilcox_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive torso flexion tests are necessary)

__1. It has been at least 30 minutes since the last torso flexion test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 13B.
_X_3. The complete assembled dummy (880105-000) is used (572.135(c)(2)).
__ with legs below the femurs.
__ without legs below the femurs.
_X_4. The dummy assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.135(c)(1))
Record the maximum temperature __21.9__
Record the minimum temperature __21.5__
Record the maximum humidity __38%__
Record the minimum humidity __35%__
_X_5. Secure the pelvis to the fixture at the pelvis instrument cavity rear face by threading four ¼ cap screws into the available threaded attachment holes. Tighten the mountings so that the test material is rigidly affixed to the test fixture and the pelvic lumbar joining surface is horizontal. (572.135(c)(3))
_X_6. Attach the loading adapter bracket to the spine of the dummy as shown in Figure 13B**.** (572.135(c)(4))
_X_7. Inspect and adjust, if necessary, the seating of the abdominal insert within the pelvis cavity and with respect to the torso flesh, assuring that the torso flesh provides uniform fit and overlap with respect to the outside surface of the pelvis flesh. (572.135(c)(5))
_X_8. Flex the dummy forward and back 3 times such that the angle reference plane moves between 0° and 30° with respect to the vertical transverse plane. (572.135(c)(6))
_X_9. Support the dummy such that the angle reference plane is at or near 0° (vertical with respect to the vertical transverse plane). Wait at least 30 minutes before continuing. (572.135(c)(6))
_X_10. Remove all external support that was implemented in 9 above. (572.135(c)(7))
_X_11. Measure the initial orientation angle of the torso reference plane of the seated, unsupported dummy. (572.135(c)(7))
Record reference plane angle (max. allowed 20°)___17°___
_X_12.Attach the pull cable and the load cell. (572.135(c)(8))

_X_13. Apply a tension force in the midsagittal plane to the pull cable at any upper torso deflection rate between 0.5° and 1.5° per second, until the angle reference plane is at 45° ± 0.5° of flexion relative to the vertical transverse plane. (572.135(c)(9))
_X_14. Maintain angle reference plane at 45° ± 0.5° of flexion for 10 seconds. (572.135(c)(10))
_X_15. As quickly as possible release the force applied to the attachment bracket. (572.135(c)(11))
_X_16. 3 minutes after the release of the force, measure the reference plane angle. (572.135(c)(11))
_X_17. Complete the following table:

Torso Flexion Results (572.135(b), 572.135(c)(7), (572.135(c)(9))

Parameter	Specification	Result
Initial ref. plane angle	Angle ≤ 20°	17°
Torso rotation rate	0.5°/s ≤ rate ≤ 1.5°/s	1.0
Force at 45° ±0.5°	320 N ≤ force ≤ 390 N	334 N
Final ref. plane angle	Initial ref. plane angle ±8°	20°

Signature

3/5/04
Date

DATA SHEET B8
LEFT KNEE IMPACT TEST (572.136)

Dummy Serial Number __506_____ Test Date __3/5/04_____

Technician ____Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. __1__ (when successive knee impact tests are necessary)

_X_1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B
_X_3. The knee assembly (880105-528L), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-650), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _21.0_
Record the minimum temperature _20.8_
Record the maximum humidity _41%_
Record the minimum humidity _35%_
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.136(c)(6))

_X_ 11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.09 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3700 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_ 12. Plots of acceleration versus time and force versus time follow this sheet.

Joe Fleck
_____
Signature

3/5/04
_____
Date

DATA SHEET B9
RIGHT KNEE IMPACT TEST (572.136)

Dummy Serial Number ___506_____ Test Date __3/5/04_____

Technician ___Joe Fleck_____

_X_Pretest calibration
__Post test calibration verification

Test attempt no. _1__ (when successive knee impact tests are necessary)

_X_1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B.
_X_3. The knee assembly (880105-528R), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-651), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _21.0__
Record the minimum temperature _20.8__
Record the maximum humidity _41 %__
Record the minimum humidity _35 %__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5))
_X_11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.07 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3620 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

3/5/04
Date

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 506 **Test I.D:** D04481

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
Peak Resultant Acceleration	G's	250 - 300	270	Pass
Peak Lateral Acceleration	G's	+/- 15	4.5	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Laboratory Technician

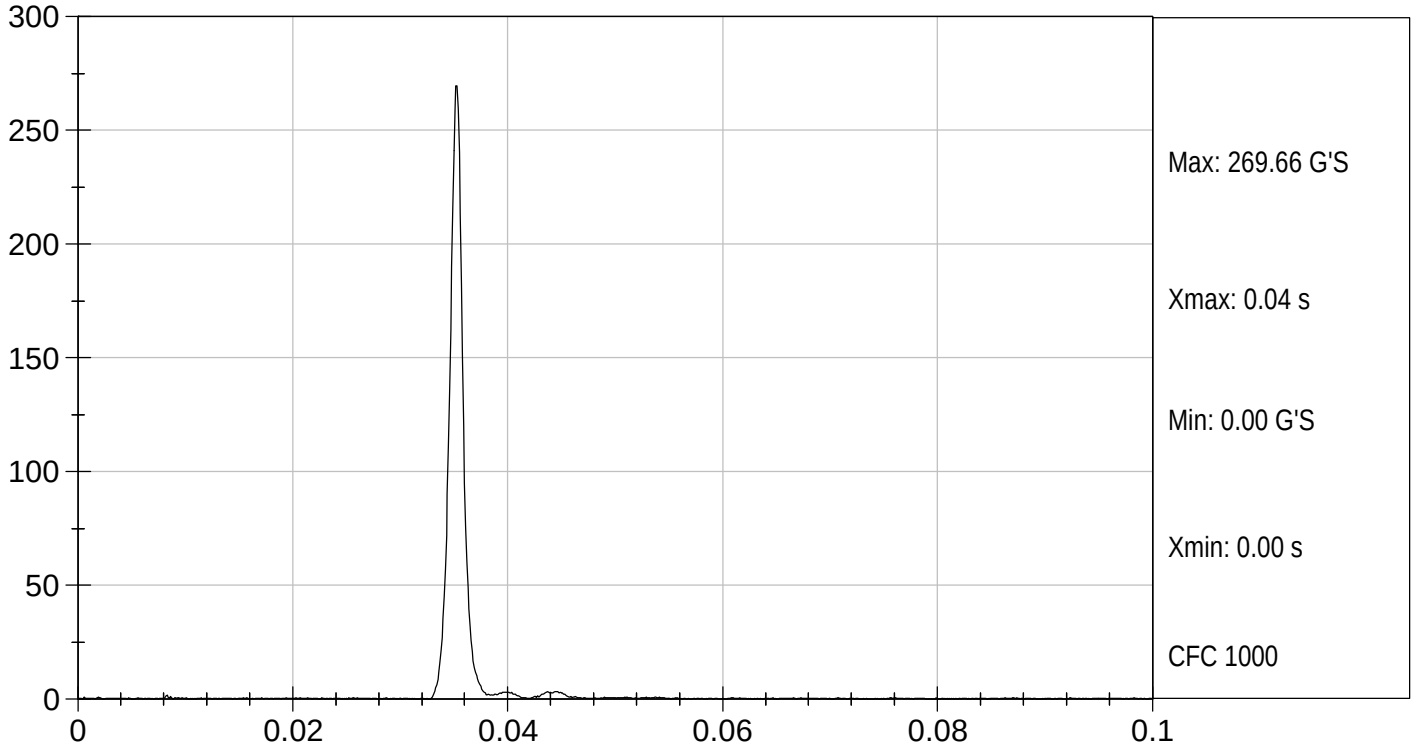
03/04/2004
Test Date

Jessica Hall
Approved By

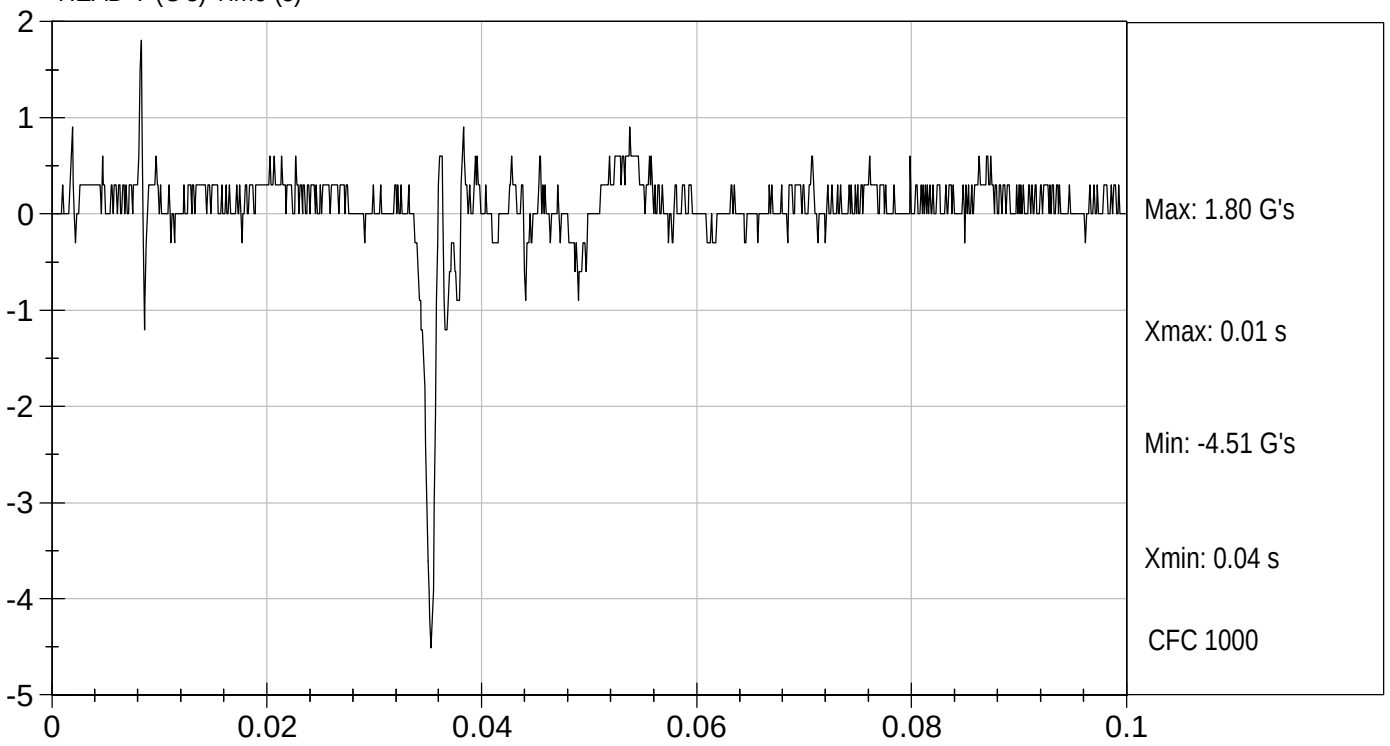
Test Desc: Head Drop
Componet ID: D04481

Test Date: 03/04/2004
Velocity: 0 ft/s, 0 m/s

PEAK RESULTANT ACCELERATION (G'S) Time (s)



HEAD Y (G's) Time (s)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04482

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity		%	10 to 70	35	Pass
Pendulum Speed		m/sec	6.89 to 7.13	6.92	Pass
Pendulum Deceleration	10 msec	msec	2.1 to 2.5	2.3	Pass
	20 msec	msec	4.0 to 5.0	4.4	Pass
	30 msec	msec	5.8 to 7.0	6.4	Pass
D Plane Rotation	Max	deg	77 to 91	81	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	79	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	86	Pass
			Overall Results		Pass

Laboratory Technician

03/04/2004

Test Date

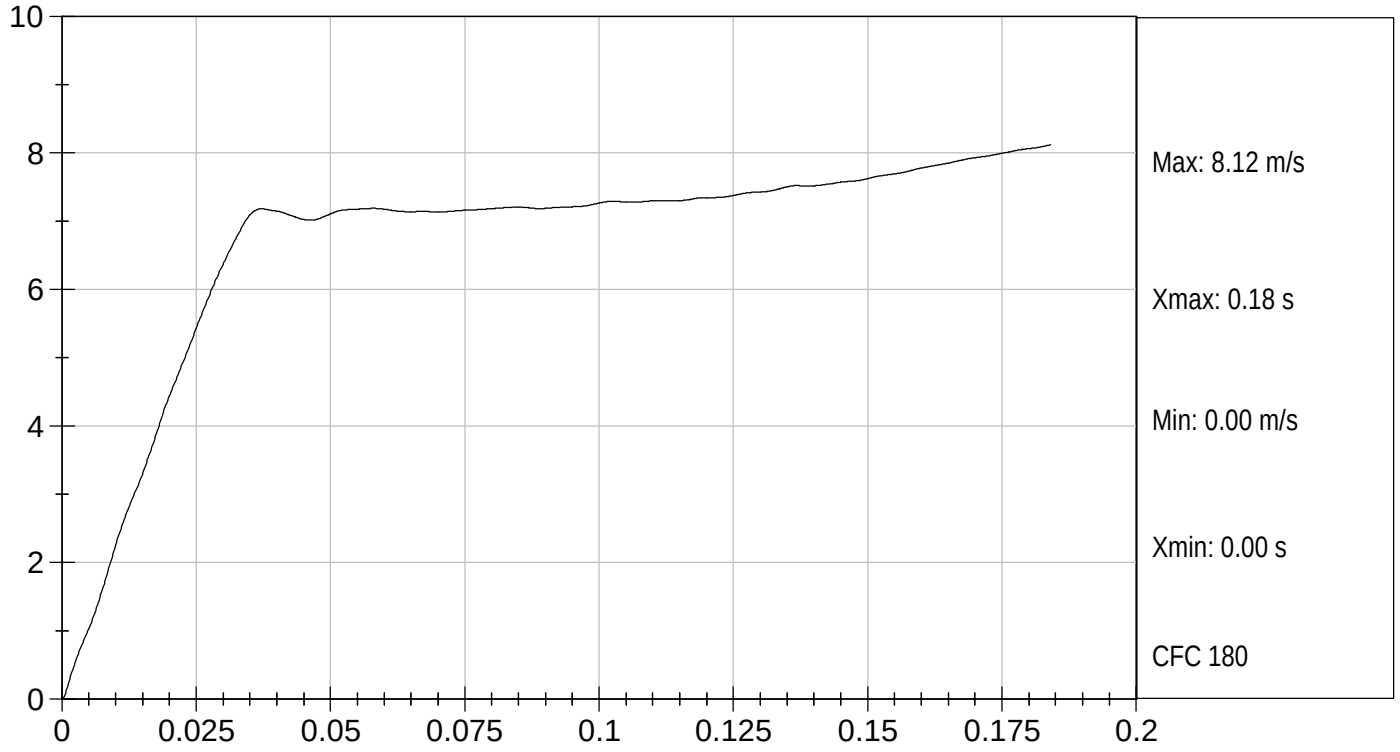
Jessica Hall

Approved By

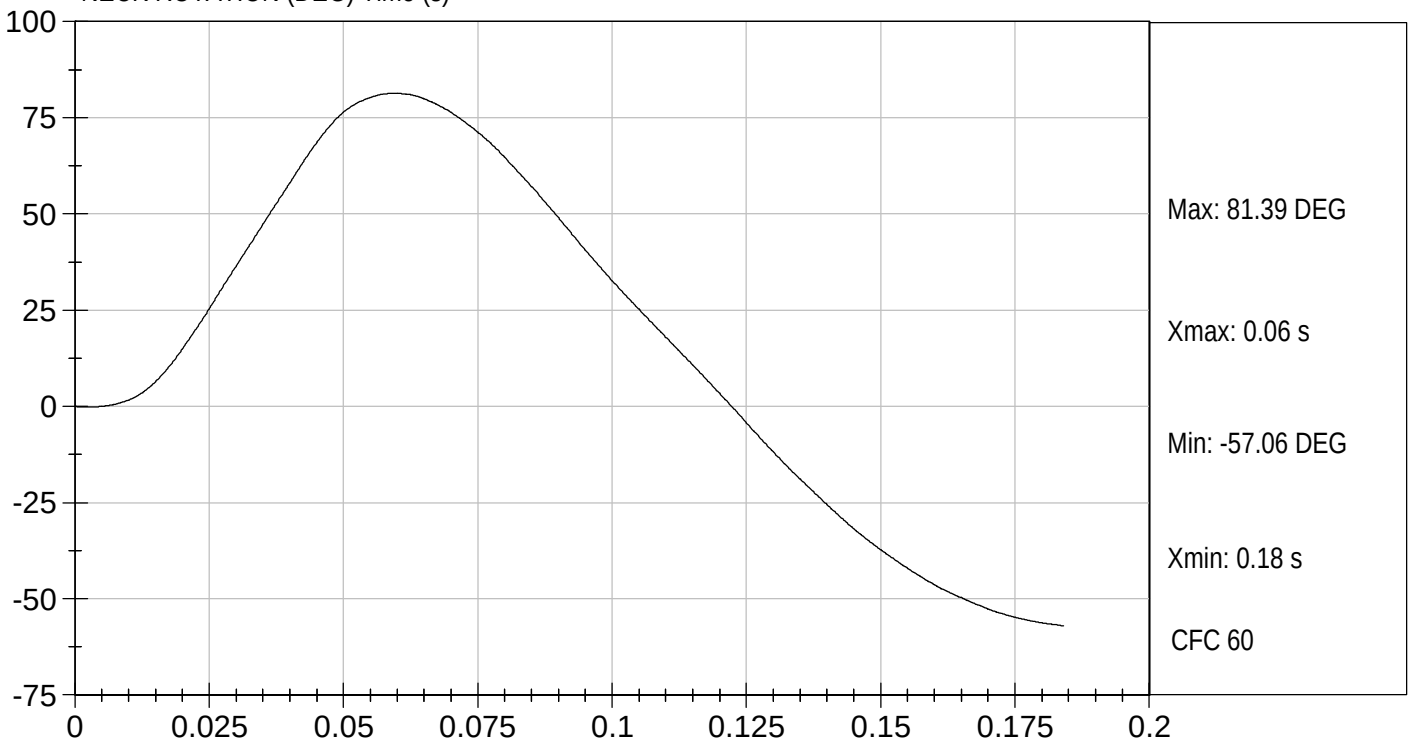
Test Desc: Neck Flexion
Componet ID: D04482

Test Date: 03/04/2004
Velocity: 22.7 ft/s, 6.92 m/s

PENDULUM DECELERATION (m/s) Time (s)

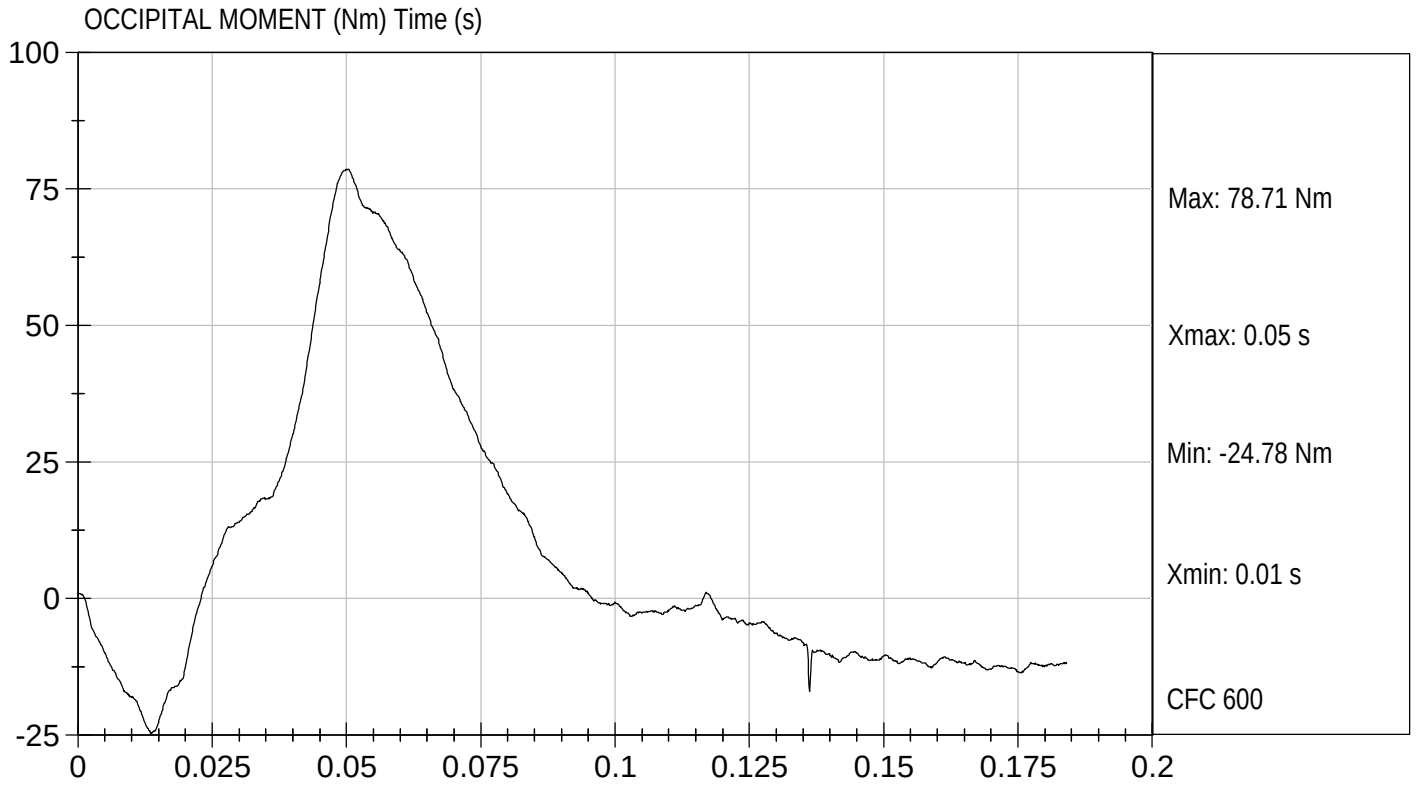


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Flexion
Componet ID: D04482

Test Date: 03/04/2004
Velocity: 22.7 ft/s, 6.92 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04483

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22	Pass
Laboratory Relative Humidity		%	10 to 70	35	Pass
Pendulum Speed		m/sec	5.95 to 6.19	6.15	Pass
Pendulum Deceleration	10 msec	msec	1.5 to 1.9	1.8	Pass
	20 msec	msec	3.1 to 3.9	3.7	Pass
	30 msec	msec	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	112	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-61	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	101	Pass
			Overall Results		Pass

Laboratory Technician

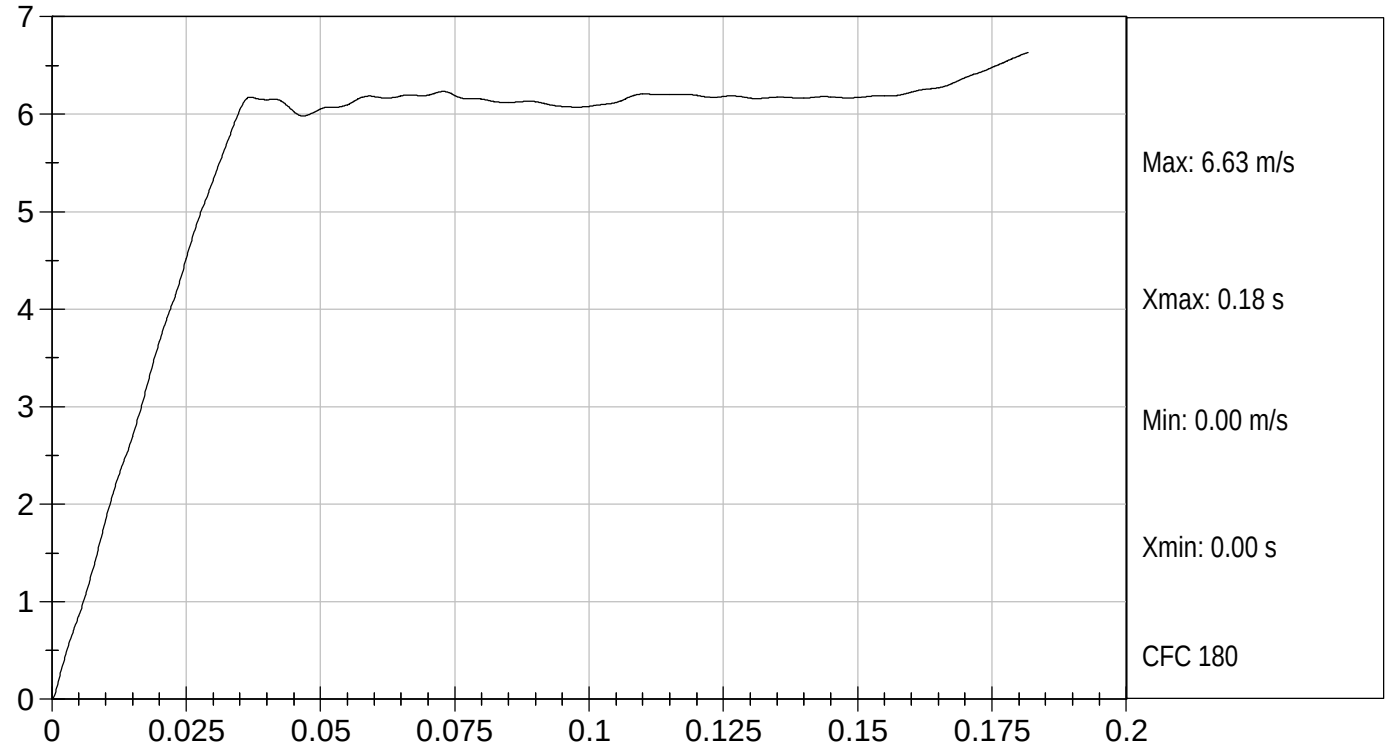
03/04/2004
Test Date

Jessica Hall
Approved By

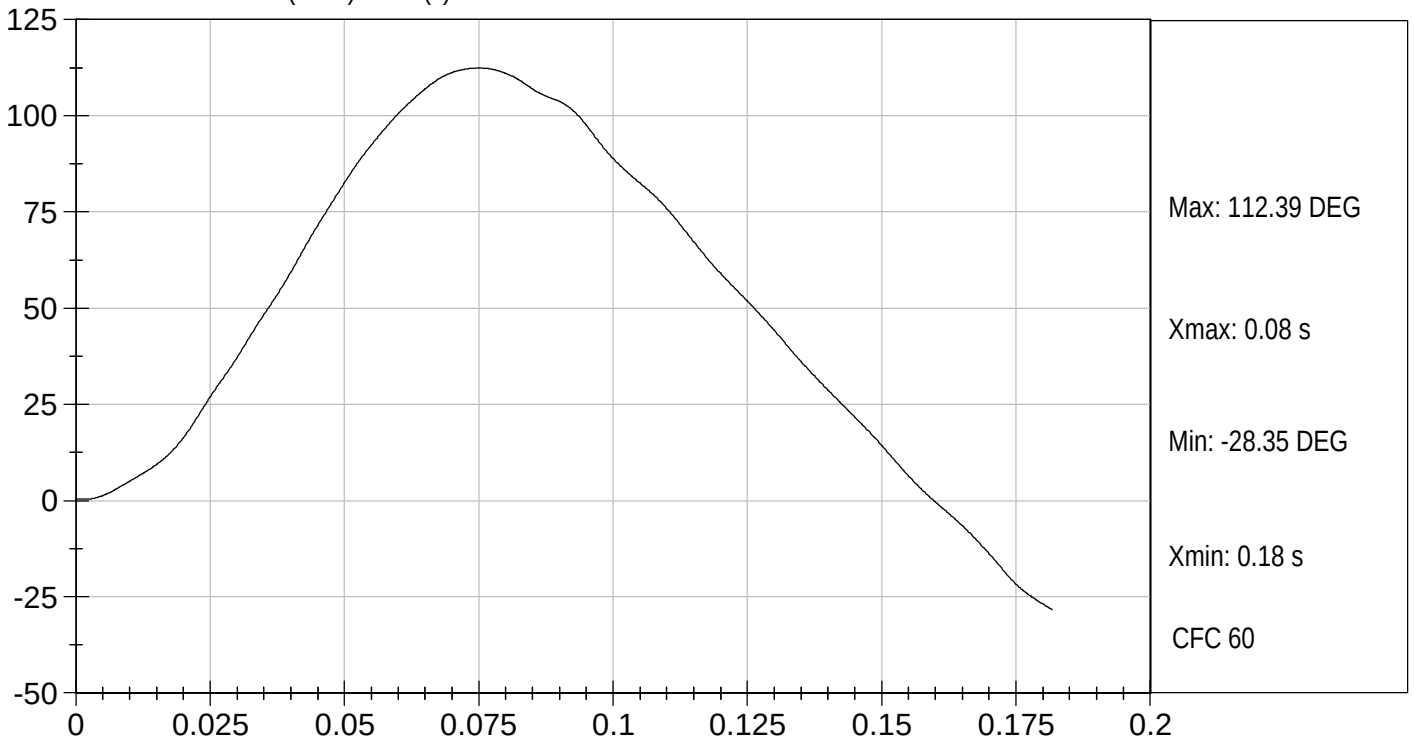
Test Desc: Neck Extension
Componet ID: D04483

Test Date: 03/04/2004
Velocity: 20.18 ft/s, 6.15 m/s

PENDULUM DECELERATION (m/s) Time (s)

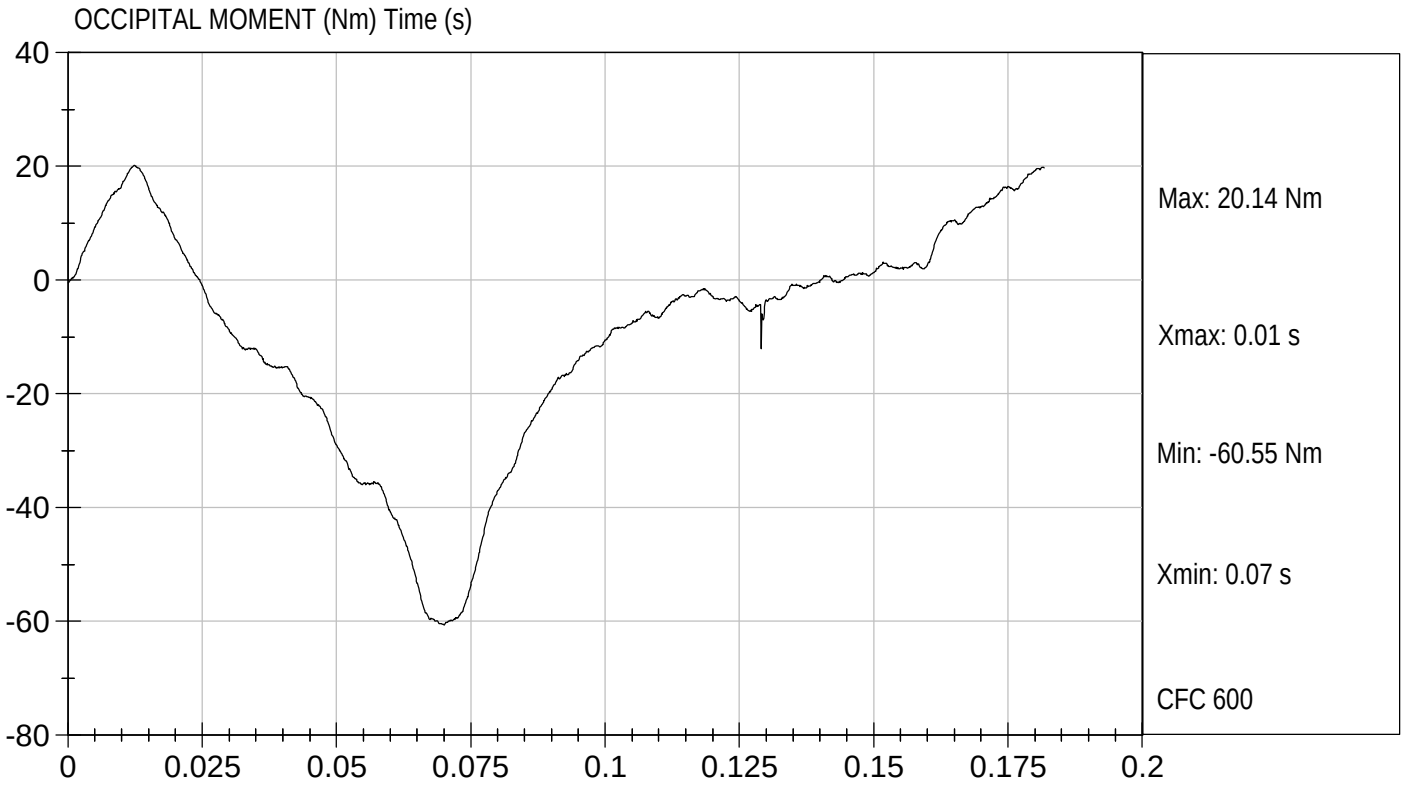


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Extension
Componet ID: D04483

Test Date: 03/04/2004
Velocity: 20.18 ft/s, 6.15 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04484

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.8	Pass
Relative Humidity	%	10 to 70	36	Pass
Probe Speed	m/s	6.59 to 6.83	6.81	Pass
Peak Deflection	mm	50 to 58	51.5	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	3.96	Pass
Internal Hysteresis	%	69 to 85	70	Pass
Peak Force 18 mm - 50 mm	Yes/No	< 4600 N	Yes	Pass
		Overall Test Results		Pass

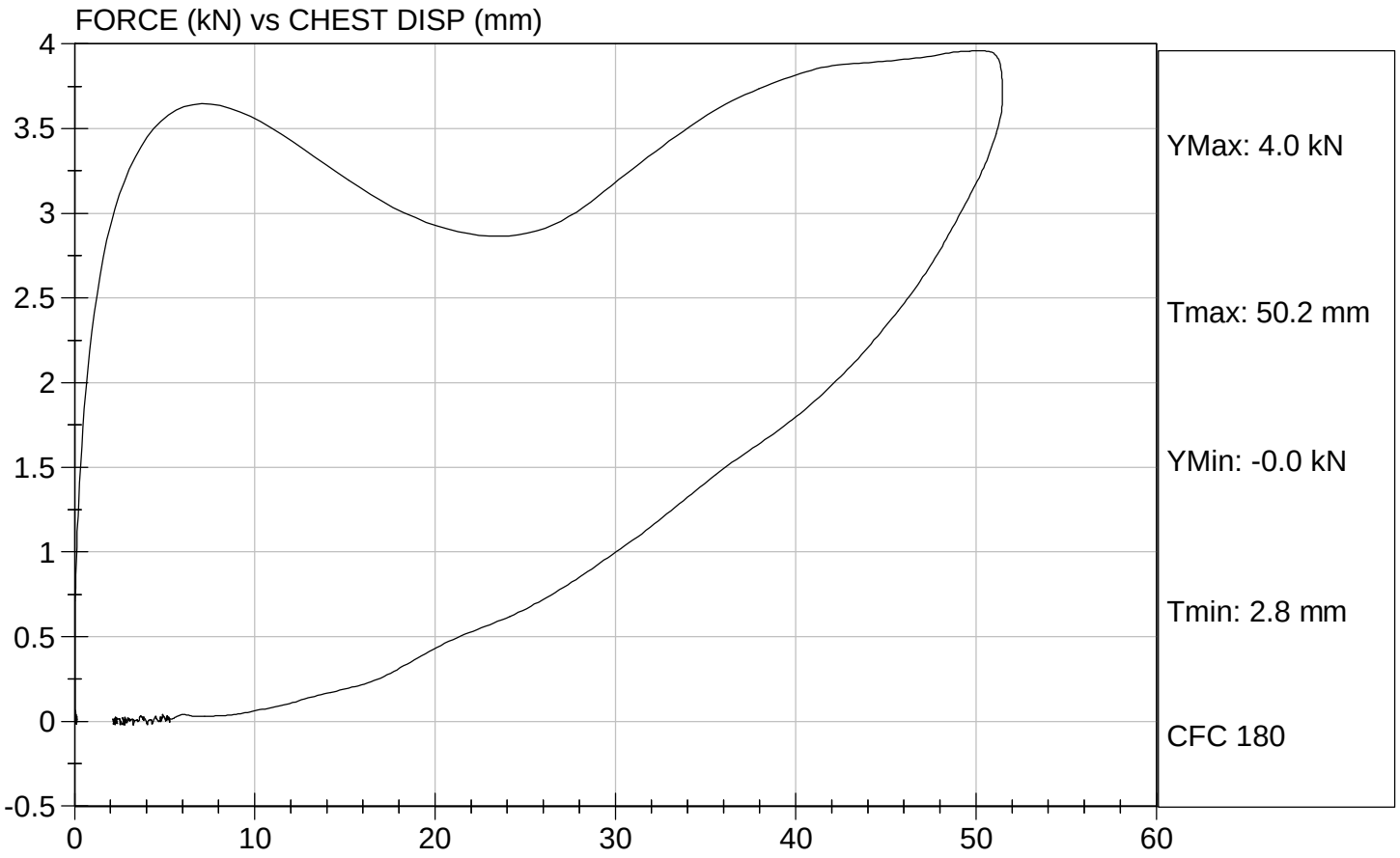
Laboratory Technician

03/05/2004
Test Date

Approved By

Test Description: Thorax Impact Test Date: 03/05/2004

Component: D04484 Speed: 22.35 ft/sec, 6.81 m/sec



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** d04485

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Speed	m/sec	2.07 to 2.13	2.07	Pass
Maximum Force	kN	3.45 to 4.06	3.62	Pass
		Overall Test Results		Pass

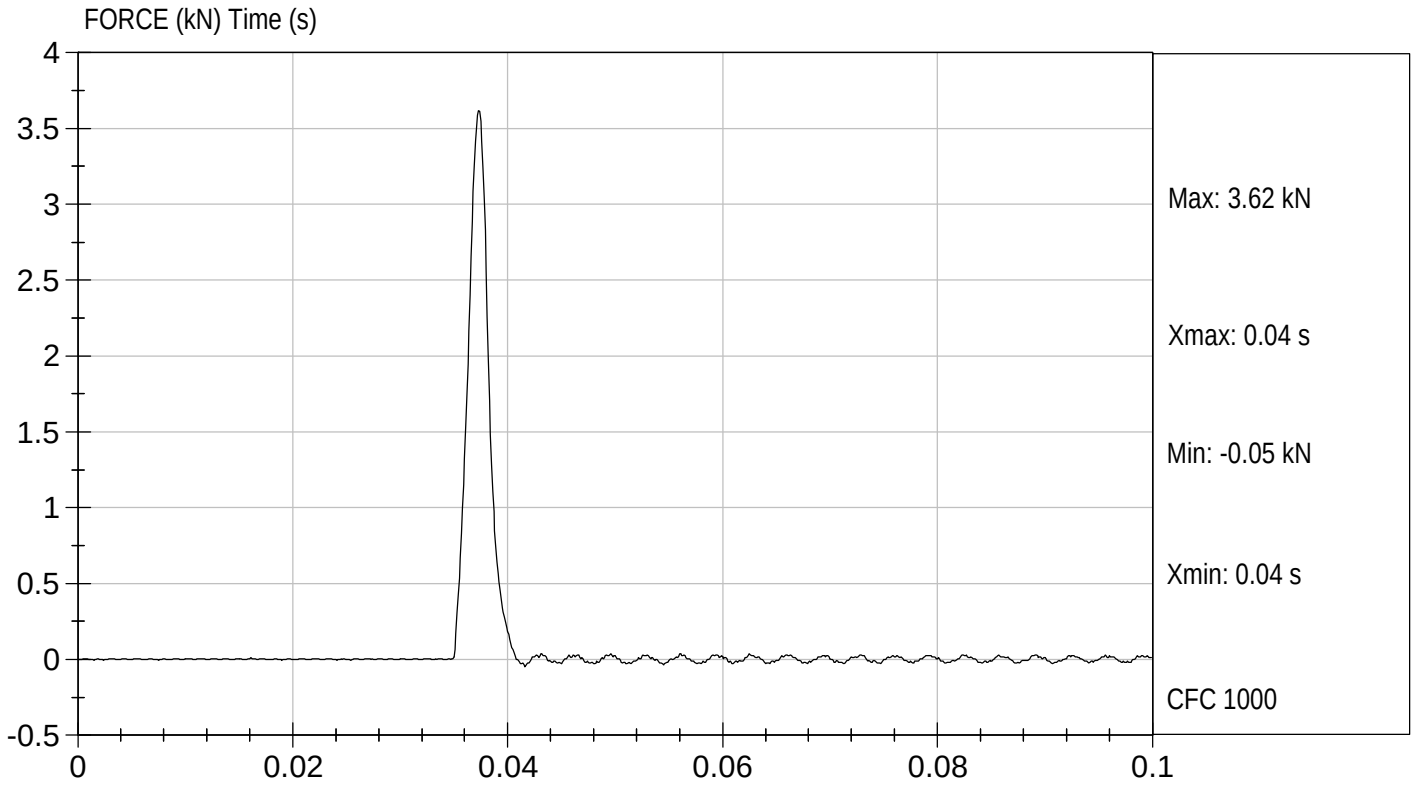
Laboratory Technician

03/05/2004
Test Date

Approved By

Test Desc: Right Knee
Componet ID: D04485

Test Date: 03/05/2004
Velocity: 6.79 ft/s, 2.07 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04486

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Probe Speed	m/sec	2.07 to 2.13	2.09	Pass
Maximum Force	kN	3.45 to 4.06	3.7	Pass
		Overall Test Results		Pass

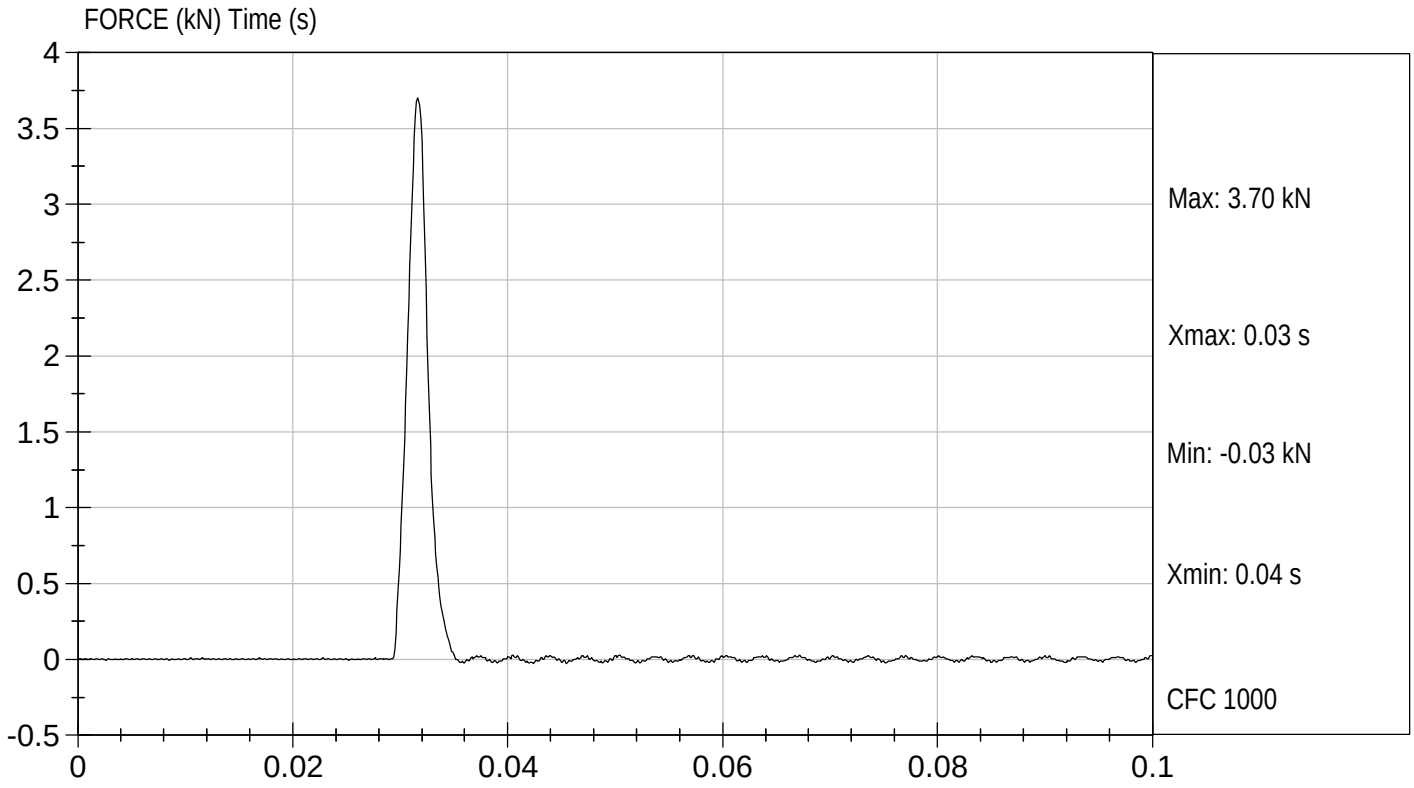
Laboratory Technician

03/05/2004
Test Date

Approved By

Test Desc: Left Knee
Componet ID: D04486

Test Date: 03/05/2004
Velocity: 6.87 ft/s, 2.09 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 506 **Test I.D:** D04487

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	20	Pass
Force at 45 deg	N	320 to 390	334	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Laboratory Technician

03/05/2004
Test Date

Approved By

DATA SHEET B3
HEAD DROP TEST (572.132)

Dummy Serial Number 506 Test Date 3/16/04

Technician Joe Fleck

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive head drops are necessary)

__X__1. It has been at least 2 hours since the last head drop. (572.132(c)(5))
_X_ N/A, ONLY one head drop performed
_X_2. The head assembly consists of the complete head (880105-100X), the six-axis neck transducer (SA572-S11) or neck transducer structural replacement (78051-383X), and three (3) accelerometers (SA572-S4). (572.132(a))
_X_3. The head accelerometer mounting plate screws ((10-24 x 3/8 SHCS) are torqued to 9.0 Nm.
_X_4. Accelerometers and their respective mounts are smooth and clean.
_X_5. Torque the skull cap screws (10-24 x 1/2 SHCS) to 9.0 Nm.
_X_6. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.136(m))
_X_7. The head assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.132(c)(1))
Record the maximum temperature 21.9
Record the minimum temperature 21.5
Record the maximum humidity 22%
Record the minimum humidity 21%
_X_8. Visually inspect the head skin for cracks, cuts, abrasions, etc. Repair or replace the head skin if the damaged area is more than superficial. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: No Damage.

_X_9. Clean the impact surface of the skin and the impact surface of the fixture with isopropyl alcohol, trichloroethane or equivalent prior to the test. (572.132(c)(2))

_X_ 10. Suspend and orient the head assembly as shown in Figure 5B. The lowest point on the forehead is 376.0 ± 1.0 mm (14.8±0.04 inch) from the impact surface. (572.132(c)(3))
Record the actual distance __376 mm___

NOTE: The masses of the suspension device and the accelerometer cables are to be kept as lightweight as possible to minimize their effect on the test results.

_X_ 11. The 1.57 mm (0.062 inch) diameter holes located on either side of the dummy's head are equidistance within 2 mm from the impact surface. A typical test setup is shown in Figure 6B. (572.132(c)(3))
Record the right side distance __502mm_____
Record the left side distance __502mm_____

_X_ 12. The impact surface is clean and dry and has a micro finish in the range of 203.2×10^{-6} mm (8 micro inches) to 2032.0×10^{-6} mm (80 micro inches) (RMS). (572.132(c)(4))
Record actual micro finish __656×10^{-6}mm_____

_X_ 13. The impact surface is rigidly supported. (572.132(c)(4))

_X_ 14. The impact surface is a flat horizontal steel plate 50.8 mm (2 inches) thick and 610 mm (24 inches) square. (572.132(c)(4))
Record thickness __50.9 mm__
Record width __604 mm__
Record length __595 mm__

_X_ 15. Drop the head assembly from a height of 376.0 ± 1.0 mm (14.8 inches ± 0.04 inches) by a means that ensures a smooth, instant release onto the impact surface. (572.132(b) & (572.132(c)(4))

_X_ 16. Complete the following table using channel class 1000 data. (572.132(b)):

Parameter	Specification	Result
Peak resultant acceleration	250 g ≤ x ≤ 300 g	273
Resultant versus time history curve	Unimodal	Yes
Oscillations after the main pulse	Less than 10% of the peak resultant acceleration	Yes
Lateral acceleration	y-axis acceleration ≤ 15 g	7

_X_ 17. Plots of the x, y, z, and resultant acceleration data follow this sheet.

Joe Fleck
Signature

3/16/04
Date

DATA SHEET B4
NECK FLEXION TEST (572.133)

Dummy Serial Number ____506_____ Test Date ____3/23/04_____

Technician _____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1_ (when successive flexion tests are necessary)

_X_1. It has been at least 30 minutes since the last flexion test. (572.137(q))
_X_ N/A, ONLY one flexion test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __21.5__
Record the maximum humidity __22%__
Record the minimum humidity __19%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: ___No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: ___No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 8B for the flexion test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 6.89 m/s to 7.13 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Flexion Test Results (572.133(b)(1) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		6.89 m/s ≤ speed ≤ 7.13 m/s	6.94 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	2.1 m/s ≤ ΔV ≤ 2.5 m/s	2.4 m/s
	@ 20 ms	4.0 m/s ≤ ΔV ≤ 5.0 m/s	4.7 m/s
	@30ms	5.8 m/s ≤ ΔV ≤ 7.0 m/s	6.6 m/s
Plane D Rotation		Peak moment* 69 Nm ≤ moment ≤ 83 Nm during the following rotation range 77° ≤ angle ≤ 91°	__76__ Nm @ __78__ degrees
Positive Moment Decay** (Flexion)		Time to decay to 10 Nm 80 ms ≤ time ≤ 100ms	82 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii))

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follows this sheet.

Signature _____ Date 3/23/04

DATA SHEET B5
NECK EXTENSION TEST (572.133)

Dummy Serial Number ____506_____ Test Date ___3/23/04_____

Technician _____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1__ (when successive extension tests are necessary)

__1. It has been at least 30 minutes since the last extension test. (572.137(q))
_X_ N/A, ONLY one extension test performed

_X_2. The components required for the neck tests include the head assembly (880105-100X), neck (880105-250), bib simulator (880105-371), upper neck adjusting bracket (880105-207), lower neck adjusting bracket (880105-208), six axis neck transducer (SA572-S11) and either three accelerometers (SA572-S4) or their mass equivalent installed in the head assembly as specified in drawing 880105-100X. Data from the accelerometers are not required. (572.133(b))

_X_3. The assembly soaked at a temperature between 20.6°C (69°F) and 22.2°C (72°F) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to a test. (572.133(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __21.5__
Record the maximum humidity __22%__
Record the minimum humidity __19%__

_X_4. Visually inspect neck assembly for cracks, cuts and separation of the rubber from the metal segments. Note: If the damage resulted from the vehicle crash test in which the dummy was an occupant, the damaged area is to be documented with photography and the post test calibration verification testing completed before any replacement or repairs are made.
Record findings and actions: __No Damage._____

_X_5. Inspect the nodding blocks (78051-351) for any deterioration, but when replacement is necessary, ONLY replace during pre-test calibration. Using a Shore “A” type Durometer, verify the hardness of the nodding blocks is between 80 and 90. Ensure the nodding blocks are installed correctly. (880105-250 and PADI page17).
Record findings and actions: __No Deterioration. Hardness OK._____

_X_6, Torque the jam nut (9000018) on the neck cable (880105-206) to 1.4 ± 0.2 Nm (12.0 ± 2.0 in-lb). (572.133(c)(2)

_X_7. The data acquisition system, including transducers, conforms to the requirements of SAE Recommended Practice J211/1 MAR95. (572.137(m))

_X_8. The test fixture pendulum conforms to the specifications in Figure 7B. (572.133(c)(3))

_X_ 9. The head-neck assembly is mounted on the pendulum so the midsagittal plane of the head is vertical and coincides with the plane of motion of the pendulum longitudinal centerline as shown in Figure 9B for the extension test. (572.133(c)(3))

_X_ 10. Install the transducers or other devices for measuring the "D" plane rotation with respect to the pendulum longitudinal centerline. Note: Plane "D" is the bottom horizontal surface of the skull. These measurement devices should be designed to minimize their influence upon the performance of the head-neck assembly. An example of a measurement device is shown in Figure 10B.

_X_ 11. With the pendulum resting against the honeycomb material, the neck bracket was adjusted until the longitudinal centerline of the pendulum was perpendicular ± 1 degree to plane "D" on the dummy's head.

_X_ 12. Release the pendulum and allow it to fall freely from a height to achieve an impact speed of 5.95 m/s to 6.19 m/s as measured at the center of the pendulum accelerometer. (572.133(c)(4)(i))

_X_ 13. Complete the following table:

Neck Extension Test Results (572.133(b)(2) & (572.133(c)(4)(I & ii)

Parameter		Specification	Result
Pendulum impact speed		5.95 m/s ≤ speed ≤ 6.19 m/s	6.13 m/s
Pendulum ΔV with respect to impact speed	@ 10ms	1.5 m/s ≤ ΔV ≤ 1.9 m/s	1.8 m/s
	@ 20 ms	3.1 m/s ≤ ΔV ≤ 3.9 m/s	3.6 m/s
	@30ms	4.6 m/s ≤ ΔV ≤ 5.6 m/s	5.2 m/s
Plane D Rotation		Peak moment* -65 Nm ≤ moment ≤ -53 Nm during the following rotation range 99° ≤ angle ≤ 114°	_-57_ Nm @ _108_ degrees
Negative Moment Decay** (Extension)		Time to decay to -10 Nm 94 ms ≤ time ≤ 114 ms	98 ms

*Moment about the occipital condyle = M_y – (0.01778 m x F_x) (572.133(b)(1)(ii)

My = Moment in Nm measured by the transducer

Fx = Force, in N measured by the transducer

**Time zero is defined as the time of initial contact between the pendulum striker plate and the honeycomb material. (572.133(b)(3)

_X_ 14. Plots of acceleration, velocity, y-axis moment, and x-axis force and y-axis moment about the occipital condyle follow this sheet.

Signature _____ Date 3/23/04

DATA SHEET B6
THORAX IMPACT TEST (572.134)

Dummy Serial Number __506_____ Test Date __3/23/04_____

Technician ____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive thorax impact tests are necessary)

__1. It has been at least 30 minutes since the last thorax impact test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 11B.
_X_3. The complete assembled dummy (880105-000) is used (572.134(b)) and is dressed in a form fitting cotton stretch above-the-elbow sleeved shirt and above-the-knee pants. The weight of the shirt and pants shall not exceed 0.14 kg. (572.134(c)(1))
_X_4. The dummy assembly soaked at a temperature between 20.6°C (69ºF) and 22.2°C (72ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.134(c)(2))
Record the maximum temperature _22.1__
Record the minimum temperature _21.5__
Record the maximum humidity _22%__
Record the minimum humidity _19%__
_X_5. Remove the chest skin and visually inspect the thorax assembly for cracks, cuts, abrasions, etc. Particular attention should be given to the rib damping material, chest displacement transducer assembly and the rear rib supports. Inspect for rib deformation using the chest depth gage. If any damage is noted repair and/or replace the damaged components unless the damage resulted from the vehicle crash test in which the dummy was an occupant in which case the damage must be documented and post test calibration verification testing completed before any repairs or replacements are made.
_X_ - No damage
__ - Damage from crash test, no repairs or replacement because this is a post test calibration verification. Record damage _____
_____
__ - The following repairs or replacement was performed. Record
_____
_____
_X_6. Seat the dummy, (chest skin still removed) without back and arm supports on the test fixture surface as shown in Figure 11B. The surface must be long enough to support the pelvis and outstretched legs. (572.134(c)(3))
_X_7. Level the ribs both longitudinally and laterally ± 0.5º and adjust the pelvis angle to 7º ± 2º. The angle may be measured using the special H-point tool (TE-2504)

that inserts into the pelvic structure and extends outward beyond the pelvic skin surface or by using the surface of the pelvic adaptor block.

_X_ 8. The midsagittal plane of the dummy is vertical within ± 1º. (572.134(c)(3))

_X_ 9. The longitudinal centerline of the test probe is centered within ±2.5 mm of the midsagittal plane of the dummy and is 12.7 mm ± 1mm below the horizontal peripheral centerline of the No. 3 rib and is within 0.5º of a horizontal line in the dummy's midsagittal plane. (572.134(c)(4))

_X_ 10. Align the adjustable neck bracket index marks to the "zero" position.

_X_ 11. Record locations such as the rear surfaces of the thoracic spine and the lower neck bracket reference with respect to the laboratory coordinate system. These reference measurements are necessary to ensure the dummy is in the same position after the chest skin is installed. The reference locations must be accessible after installation of the chest skin. It may be necessary to leave the chest skin zipper unfastened until the references are checked and fasten it just prior to the test.

_X_ 12. Install the chest skin and reposition the dummy as described in the preceding paragraph using the reference measurements recorded.

_X_ 13. Place the arm assemblies horizontal ± 2º and parallel to the midsagittal plane. The arms are held in place by tightening the adjustment nut that holds the arm yoke to the clavicle assembly.

_X_ 14. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 180.

_X_ 15. Impact the anterior surface of the thorax with the test probe so the longitudinal centerline of the probe is within 2º of a horizontal line in the dummy's midsagittal plane at the moment of impact. (572.134(c)(5)) The velocity of the test probe at the time of impact is 6.71 m/s ± 0.12m/s. (572.134(b)) The probe is guided so there is no significant lateral, vertical or rotational movement during the impact. (572.134(c)(6)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.134(c)(7))

_X_ 16. Complete the following table:

Thorax Impact Results (572.134(b) and 572.134(b)(1)&(2)

Parameter*	Specification	Result
Test Probe Speed	6.59 m/s ≤ speed ≤ 6.83 m/s	6.67 m/s
Chest Compression	50.0 mm ≤ compression ≤ 58.0 mm	52 mm
Peak force** between 50.0 and 58.0 mm chest compression	3900N ≤ peak force ≤ 4400N	4040 N
Peak force** between 18.0 and 50.0 mm chest compression	peak force ≤ 4600 N	yes
Internal Hysteresis***	69% ≤ hysteresis ≤ 85%	69%

*Time zero is defined as the time of initial contact between the test probe and the chest skin.
**Force = impactor mass x acceleration (572.134(b)(3))

***Area under loading curve minus the area under the unloading curve divided by the area under the loading curve. (Figure 12B

_X_ 17. Plots of chest compression, acceleration, force, force versus deflection follow this sheet.

Signature _____ Date 3/23/04

DATA SHEET B7
TORSO FLEXION TEST (572.135)

Dummy Serial Number __506_____ Test Date __3/23/04_____

Technician _____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive torso flexion tests are necessary)

__1. It has been at least 30 minutes since the last torso flexion test. (572.137(q))
_X_ N/A, ONLY one thorax impact test performed
_X_2. The test fixture conforms to the specifications in Figure 13B.
_X_3. The complete assembled dummy (880105-000) is used (572.135(c)(2)).
__ with legs below the femurs.
__ without legs below the femurs.
_X_4. The dummy assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.135(c)(1))
Record the maximum temperature __22.1__
Record the minimum temperature __21.5__
Record the maximum humidity __22%__
Record the minimum humidity __19%__
_X_5. Secure the pelvis to the fixture at the pelvis instrument cavity rear face by threading four ¼ cap screws into the available threaded attachment holes. Tighten the mountings so that the test material is rigidly affixed to the test fixture and the pelvic lumbar joining surface is horizontal. (572.135(c)(3))
_X_6. Attach the loading adapter bracket to the spine of the dummy as shown in Figure 13B**.** (572.135(c)(4))
_X_7. Inspect and adjust, if necessary, the seating of the abdominal insert within the pelvis cavity and with respect to the torso flesh, assuring that the torso flesh provides uniform fit and overlap with respect to the outside surface of the pelvis flesh. (572.135(c)(5))
_X_8. Flex the dummy forward and back 3 times such that the angle reference plane moves between 0° and 30° with respect to the vertical transverse plane. (572.135(c)(6))
_X_9. Support the dummy such that the angle reference plane is at or near 0° (vertical with respect to the vertical transverse plane). Wait at least 30 minutes before continuing. (572.135(c)(6))
_X_10. Remove all external support that was implemented in 9 above. (572.135(c)(7))
_X_11. Measure the initial orientation angle of the torso reference plane of the seated, unsupported dummy. (572.135(c)(7))
Record reference plane angle (max. allowed 20°)___17°___
_X_12.Attach the pull cable and the load cell. (572.135(c)(8))

_X_13. Apply a tension force in the midsagittal plane to the pull cable at any upper torso deflection rate between 0.5° and 1.5° per second, until the angle reference plane is at 45° ± 0.5° of flexion relative to the vertical transverse plane. (572.135(c)(9))
_X_14. Maintain angle reference plane at 45° ± 0.5° of flexion for 10 seconds. (572.135(c)(10))
_X_15. As quickly as possible release the force applied to the attachment bracket. (572.135(c)(11))
_X_16. 3 minutes after the release of the force, measure the reference plane angle. (572.135(c)(11))
_X_17. Complete the following table:

Torso Flexion Results (572.135(b), 572.135(c)(7), (572.135(c)(9))

Parameter	Specification	Result
Initial ref. plane angle	Angle ≤ 20°	17°
Torso rotation rate	0.5°/s ≤ rate ≤ 1.5°/s	1.0
Force at 45° ±0.5°	320 N ≤ force ≤ 390 N	336 N
Final ref. plane angle	Initial ref. plane angle ±8°	21°

Joe Fleck
Signature

3/23/04
Date

DATA SHEET B8
LEFT KNEE IMPACT TEST (572.136)

Dummy Serial Number __506_____ Test Date __3/5/04_____

Technician ____Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. __1__ (when successive knee impact tests are necessary)

_X_1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B
_X_3. The knee assembly (880105-528L), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-650), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.1__
Record the minimum temperature _21.5__
Record the maximum humidity _22%__
Record the minimum humidity _19%__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5)) Neither the suspension hardware, suspension cables, nor other attachments to the probe, including the velocity vane, make contact with the dummy. (572.136(c)(6))

_X_ 11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.11 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3700 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_ 12. Plots of acceleration versus time and force versus time follow this sheet.

Joe Fleck
Signature

3/23/04
Date

DATA SHEET B9
RIGHT KNEE IMPACT TEST (572.136)

Dummy Serial Number ___506_____ Test Date __3/23/04_____

Technician ___Joe Fleck_____

__Pretest calibration
_X_Post test calibration verification

Test attempt no. _1__ (when successive knee impact tests are necessary)

_X_1. It has been at least 30 minutes since the last knee impact test. (572.137(q))
_X_ N/A, ONLY one knee impact test performed
_X_2. The test fixture conforms to the specifications in Figure 14B.
_X_3. The knee assembly (880105-528R), lower leg structural replacement (880105-603), lower leg flesh (880105-601), ankle assembly (880105-660), foot assembly (880105-651), and femur load transducer (SA572-S14) (may use the load cell structural replacement (78051-319)) were used. (572.136(b)(1))
_X_4. The knee assembly soaked at a temperature between 18.9°C (66ºF) and 25.6°C (78ºF) and at a relative humidity from 10% to 70% for a period of at least four (4) hours prior to this test. (572.136(c)(1))
Record the maximum temperature _22.1__
Record the minimum temperature _21.5__
Record the maximum humidity _22 %__
Record the minimum humidity _19 %__
_X_5. Mount the test specimen and secure it to the rigid test fixture. (572.136(c)(2))
_X_6. No parts of the foot or tibia contact any exterior surface. (572.136(c)(2))
_X_7. Align the test probe so that throughout its stroke and at contact with the knee it is within 2 degrees of horizontal and collinear with the longitudinal centerline of the femur. (572.136(c)(3))
_X_8. The probe is guided so there is no significant lateral, vertical or rotational movement during the impact with the knee. (572.136(c)(4))
_X_9. The data acquisition system, including transducers, must conform to the requirements of SAE Recommended Practice J211/1 MAR95 (572.136(m)) Class 600.
_X_10. Contact the knee with the test probe at a speed between 2.07 m/s and 2.13 m/s. (572.136(c)(5))
_X_11. Complete the following table:

Knee Impact Results (572.136(b)(1) and 572.136(c)(5))

Parameter	Specification	Result
Probe speed	2.07 m/s ≤ speed ≤ 2.13 m/s	2.10 m/s
Peak resistance force*	3450 N ≤ force ≤ 4060 N	3710 N

*Force = impactor mass x deceleration (572.136(b)(2))

_X_12. Plots of acceleration versus time and force versus time follow this sheet.

Signature

3/23/04
Date

MGA RESEARCH CORPORATION

HEAD DROP TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 506 **Test I.D:** D04581

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	22	Pass
Peak Resultant Acceleration	G's	250 - 300	273	Pass
Peak Lateral Acceleration	G's	+/- 15	6.6	Pass
Unimodal	Yes/No	NA	Yes	Pass
Oscillations	Yes/No	within 10% of peak	Yes	Pass
		Overall Test Results		Pass

Joe Fleck
Laboratory Technician

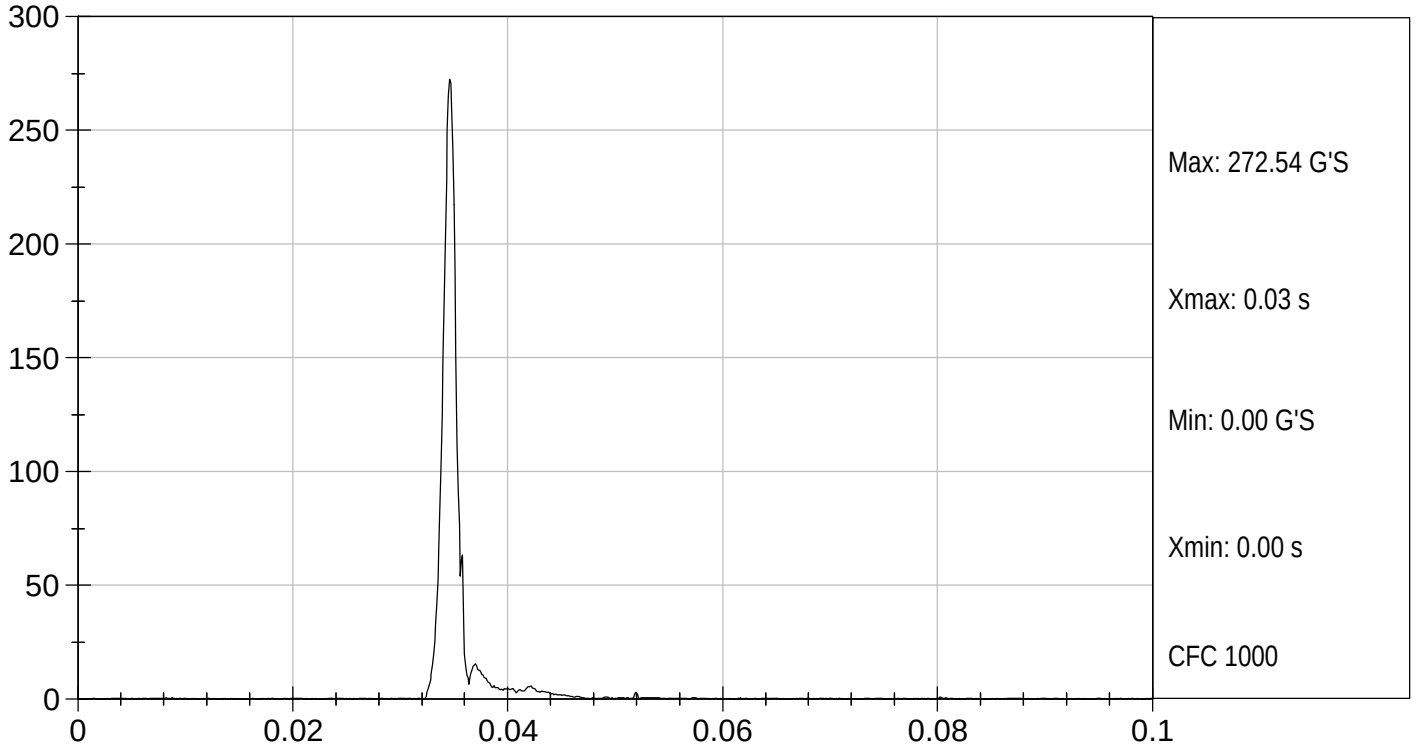
03/16/2004
Test Date

Jessica Hall
Approved By

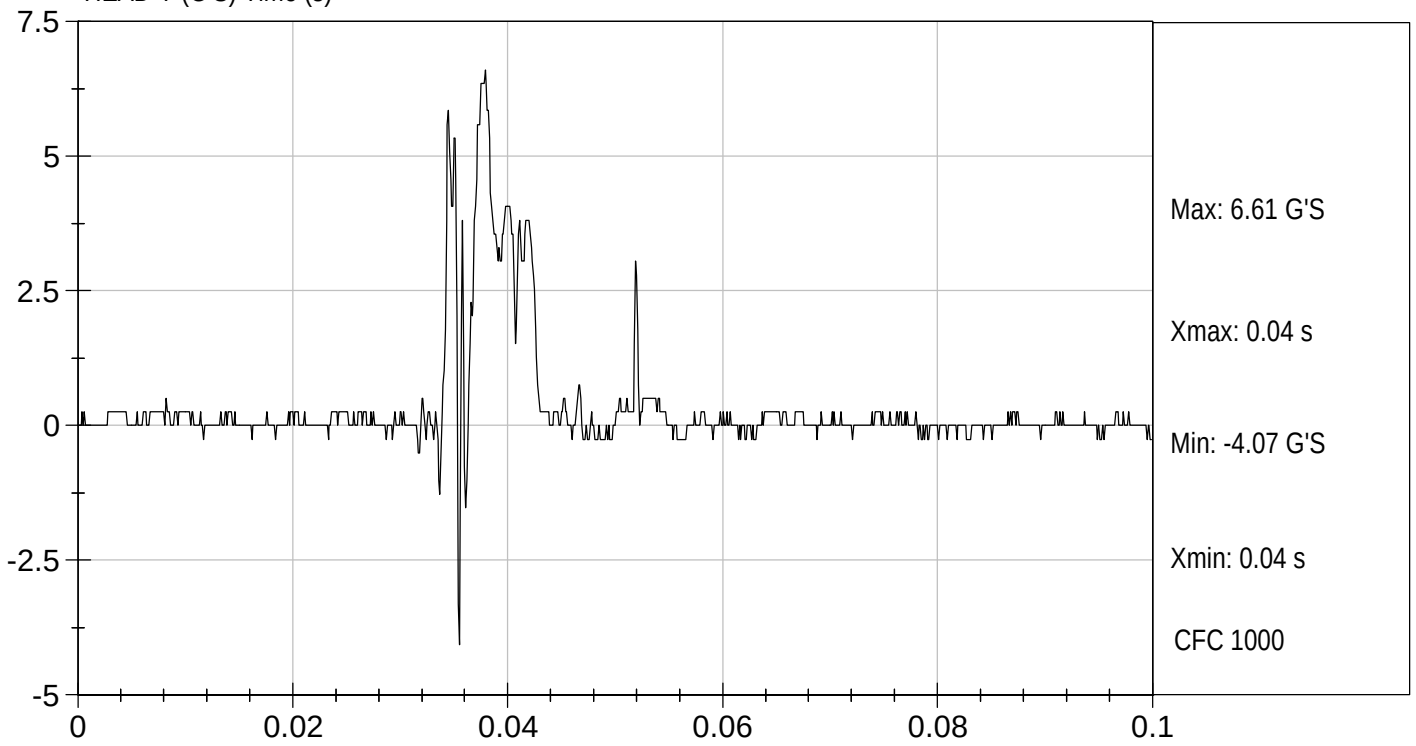
Test Desc: Head Drop
Componet ID: D04581

Test Date: 03/16/2004
Velocity: 0 ft/s, m/s

PEAK RESULTANT ACCELERATION (G'S) Time (s)



HEAD Y (G'S) Time (s)



MGA RESEARCH CORPORATION

NECK FLEXION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04582

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Speed		m/sec	6.89 to 7.13	6.94	Pass
Pendulum Deceleration	10 msec	msec	2.1 to 2.5	2.4	Pass
	20 msec	msec	4.0 to 5.0	4.7	Pass
	30 msec	msec	5.8 to 7.0	6.6	Pass
D Plane Rotation	Max	deg	77 to 91	78	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	76	Pass
Positive Moment Time Curve Decay to 10 Nm		msec	80 to 100	82	Pass
			Overall Results		Pass

Joe Fleck

Laboratory Technician

03/23/2004

Test Date

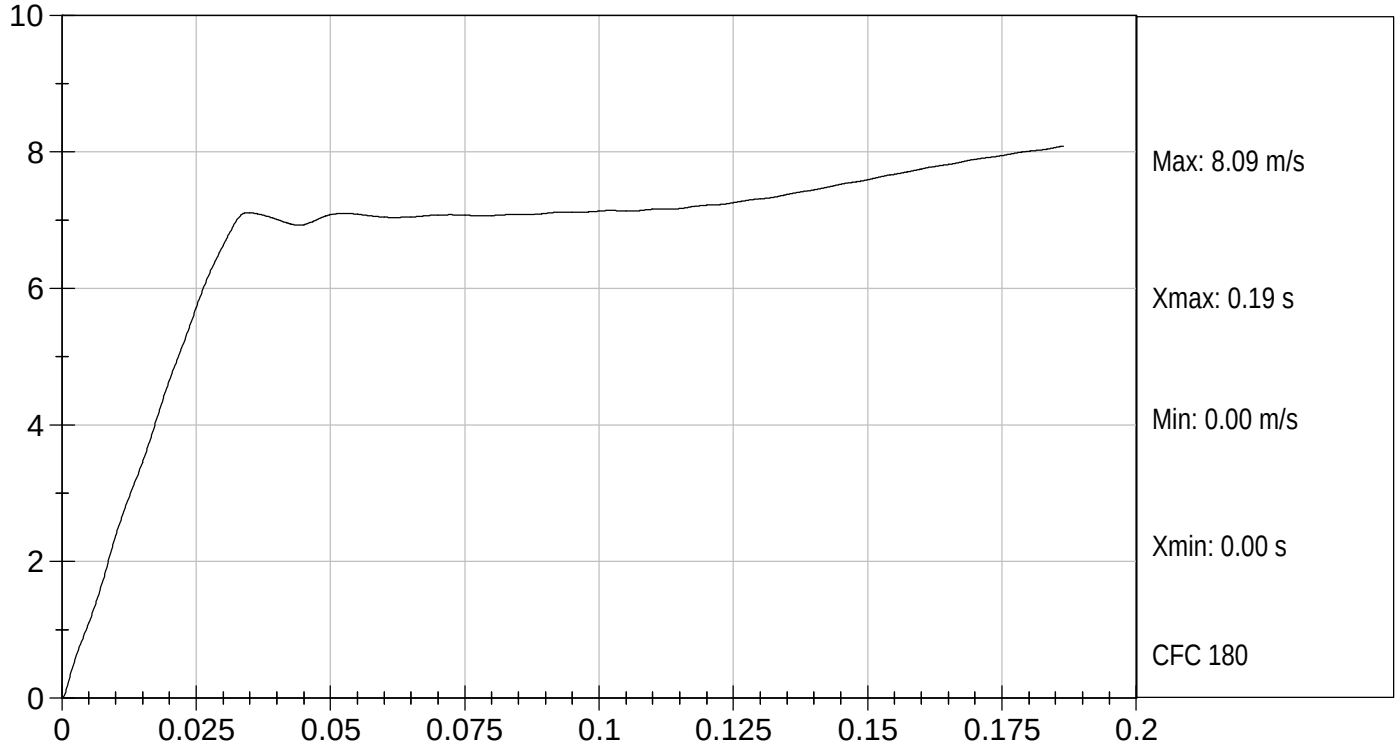
Jessica Hall

Approved By

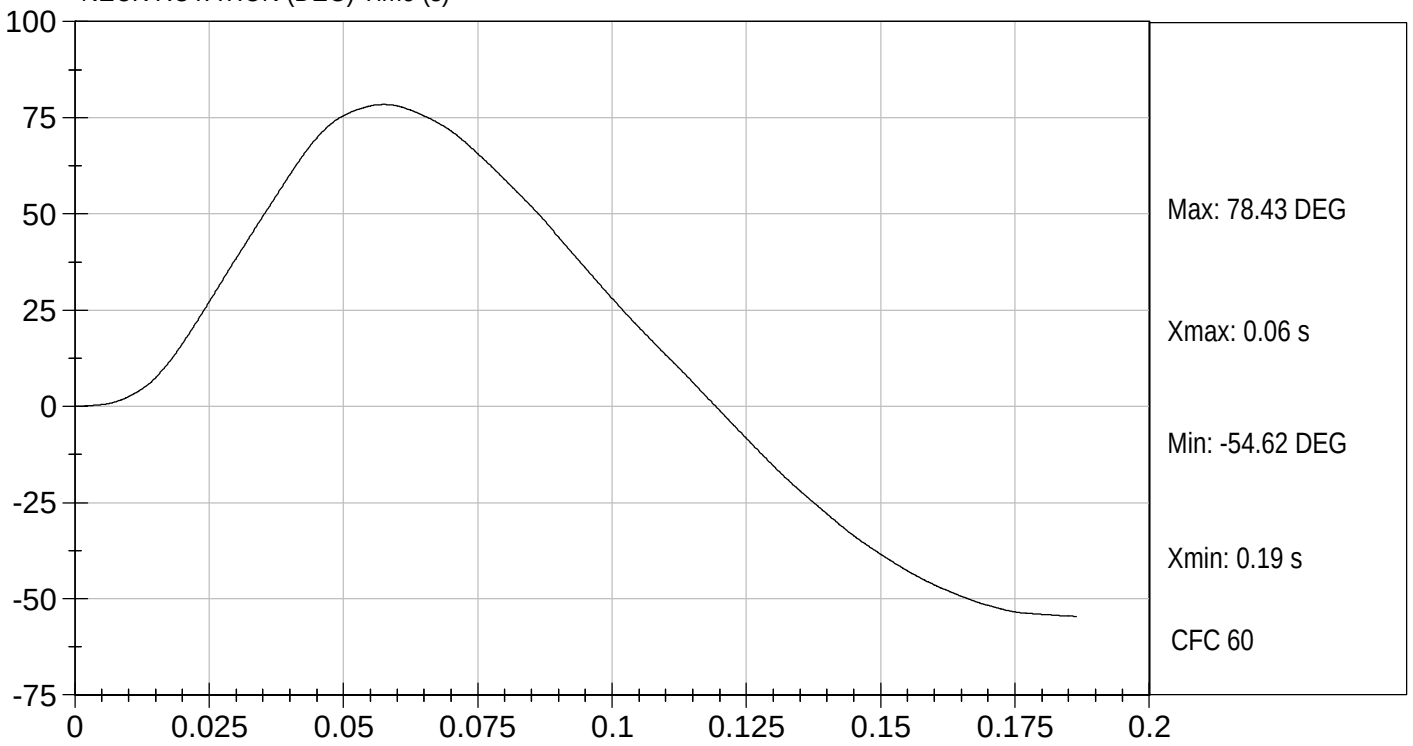
Test Desc: Neck Flexion
Componet ID: D04582

Test Date: 03/23/2004
Velocity: 22.78 ft/s, 6.94 m/s

PENDULUM DECELERATION (m/s) Time (s)

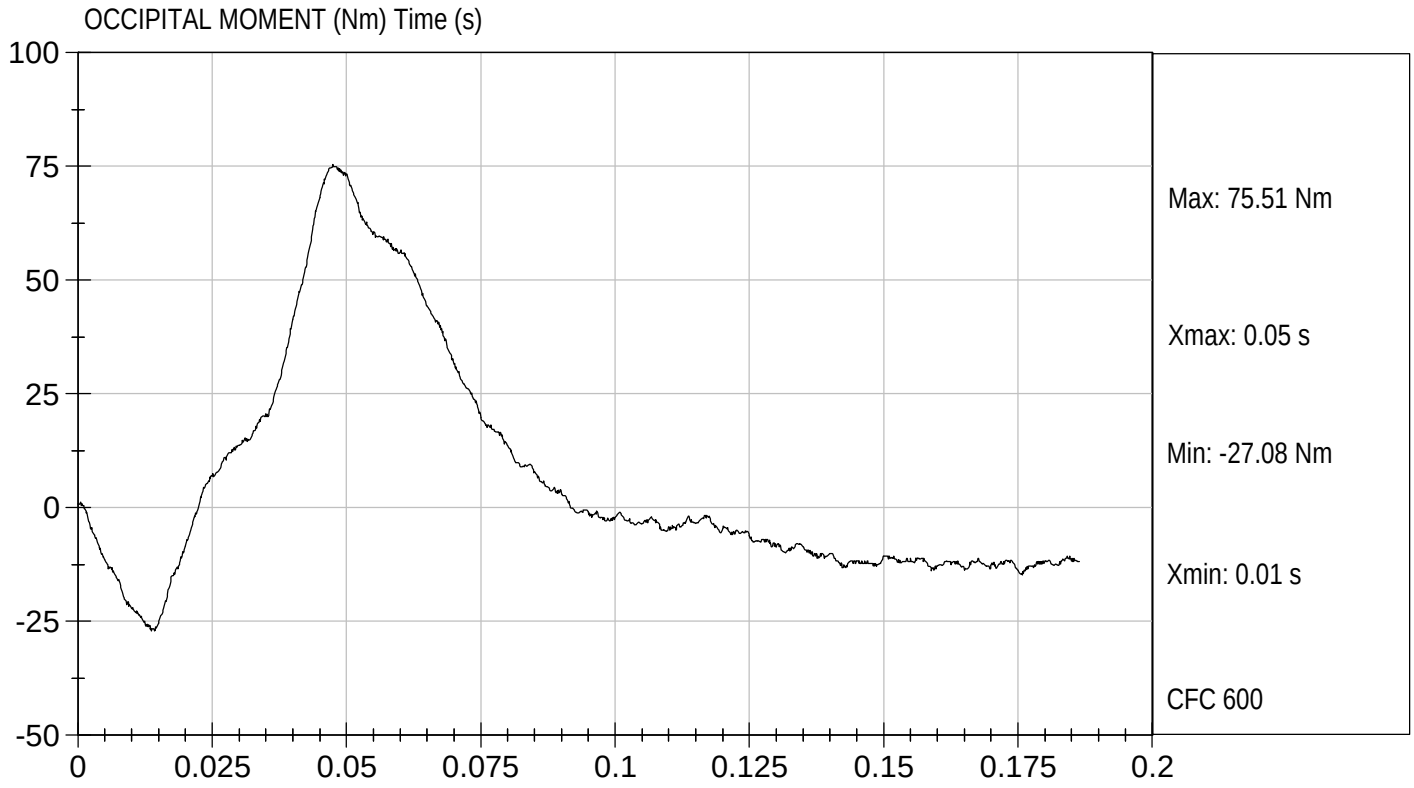


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Flexion
Componet ID: D04582

Test Date: 03/23/2004
Velocity: 22.78 ft/s, 6.94 m/s



MGA RESEARCH CORPORATION

NECK EXTENSION TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04583

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	19	Pass
Pendulum Speed		m/sec	5.95 to 6.19	6.13	Pass
Pendulum Deceleration	10 msec	msec	1.5 to 1.9	1.8	Pass
	20 msec	msec	3.1 to 3.9	3.6	Pass
	30 msec	msec	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	108	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-57	Pass
Negative Moment Time Curve Decay to -10 Nm		msec	94 to 114	98	Pass
			Overall Results		Pass

Joe Fleck
Laboratory Technician

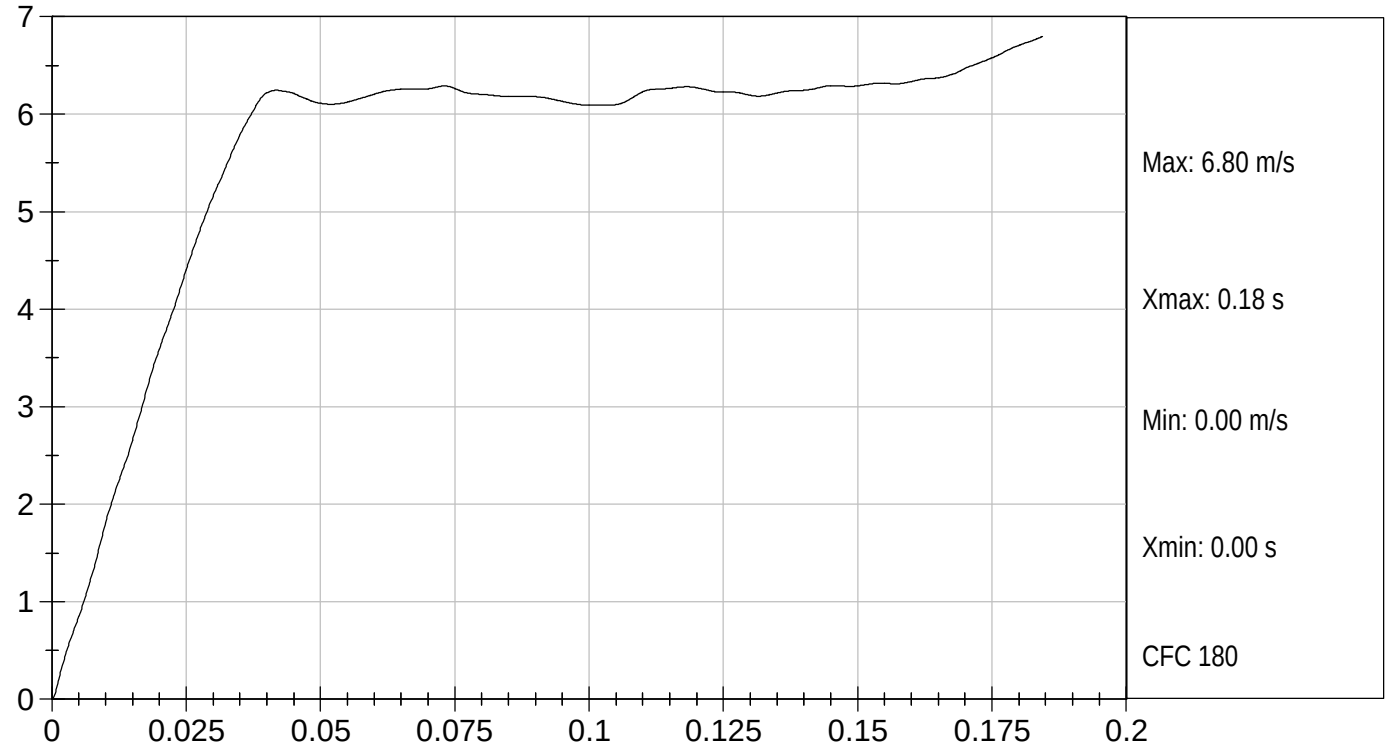
03/23/2004
Test Date

Jessica Hall
Approved By

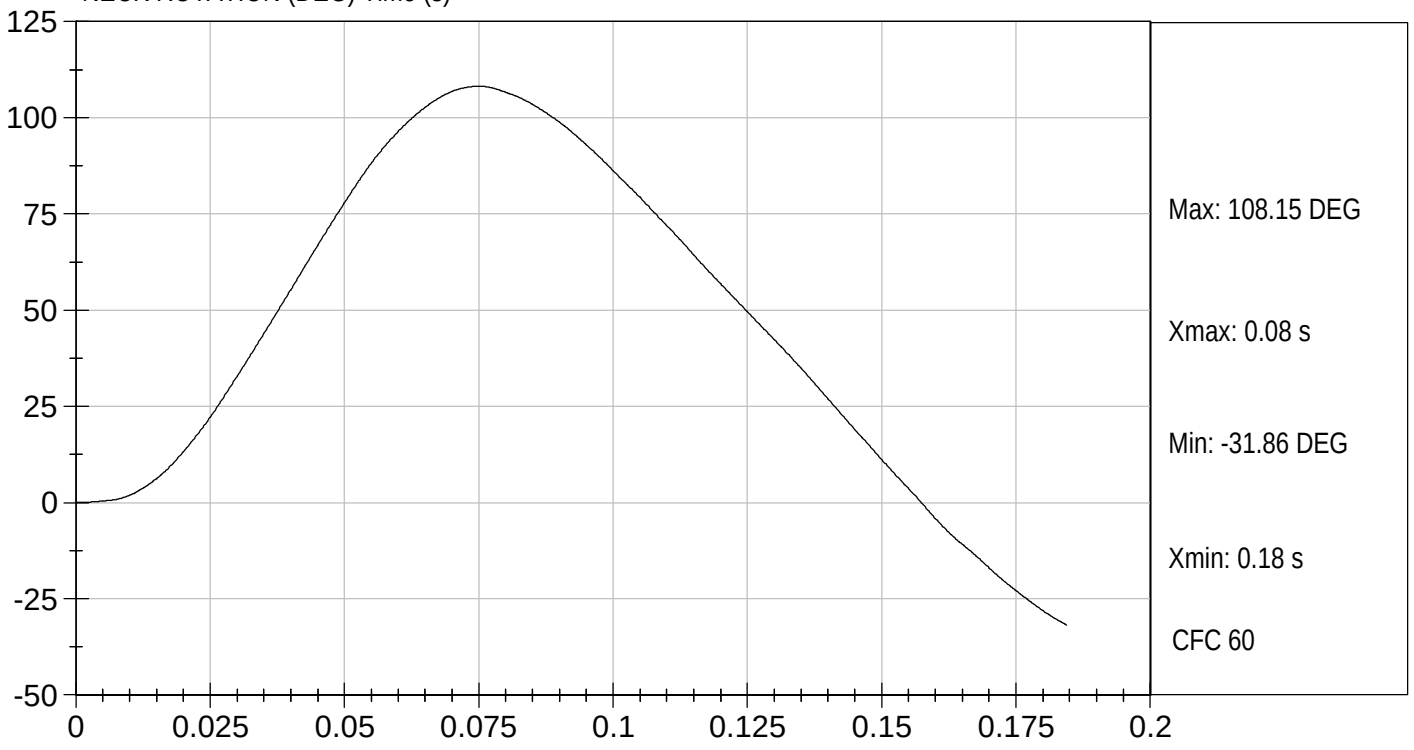
Test Desc: Neck Extension
Componet ID: D04583

Test Date: 03/23/2004
Velocity: 20.1 ft/s, 6.13 m/s

PENDULUM DECELERATION (m/s) Time (s)

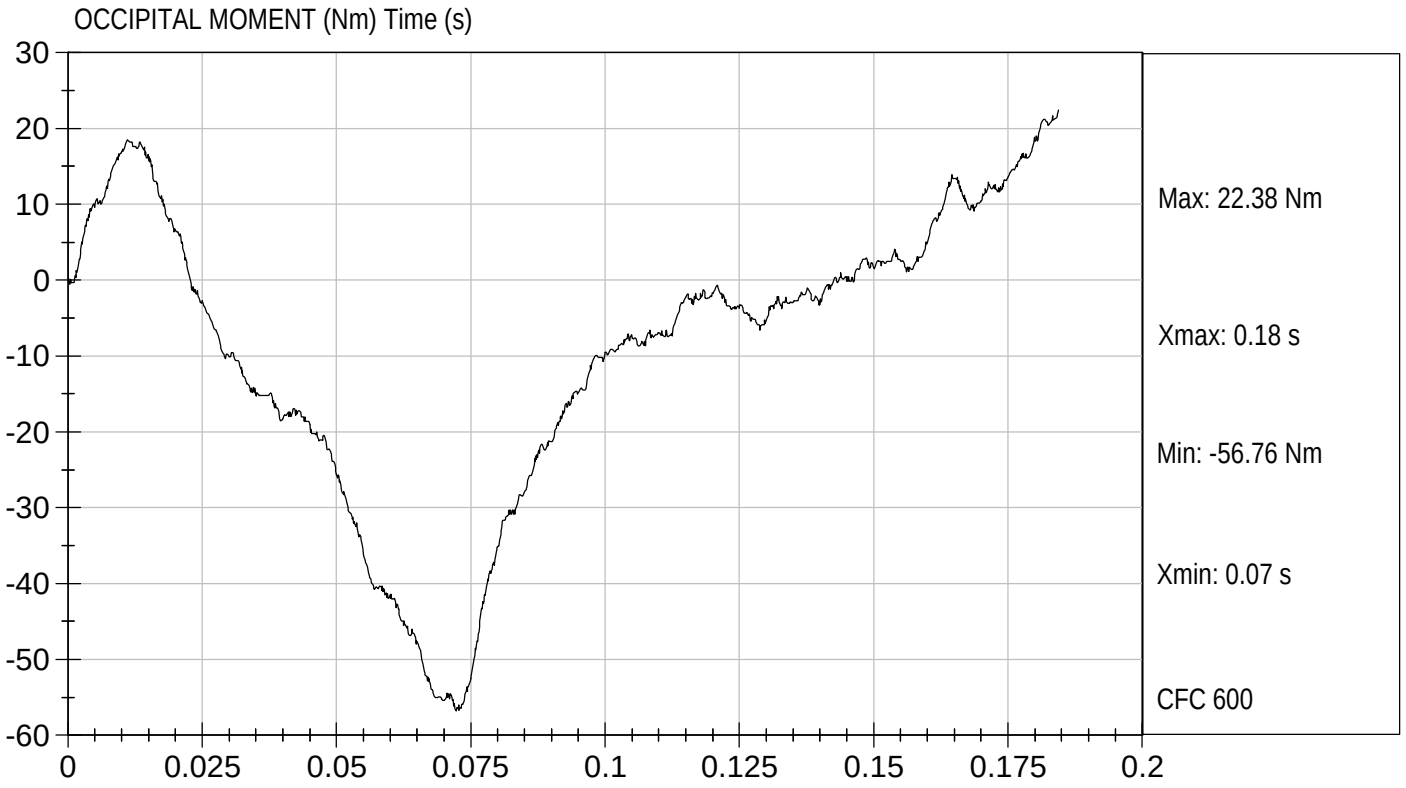


NECK ROTATION (DEG) Time (s)



Test Desc: Neck Extension
Componet ID: D04583

Test Date: 03/23/2004
Velocity: 20.1 ft/s, 6.13 m/s



MGA RESEARCH CORPORATION

THORAX IMPACT

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04584

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.5	Pass
Relative Humidity	%	10 to 70	22	Pass
Probe Speed	m/s	6.59 to 6.83	6.67	Pass
Peak Deflection	mm	50 to 58	52.16	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.04	Pass
Internal Hysteresis	%	69 to 85	69	Pass
Peak Force 18 mm - 50 mm	Yes/No	< 4600 N	Yes	Pass
		Overall Test Results		Pass

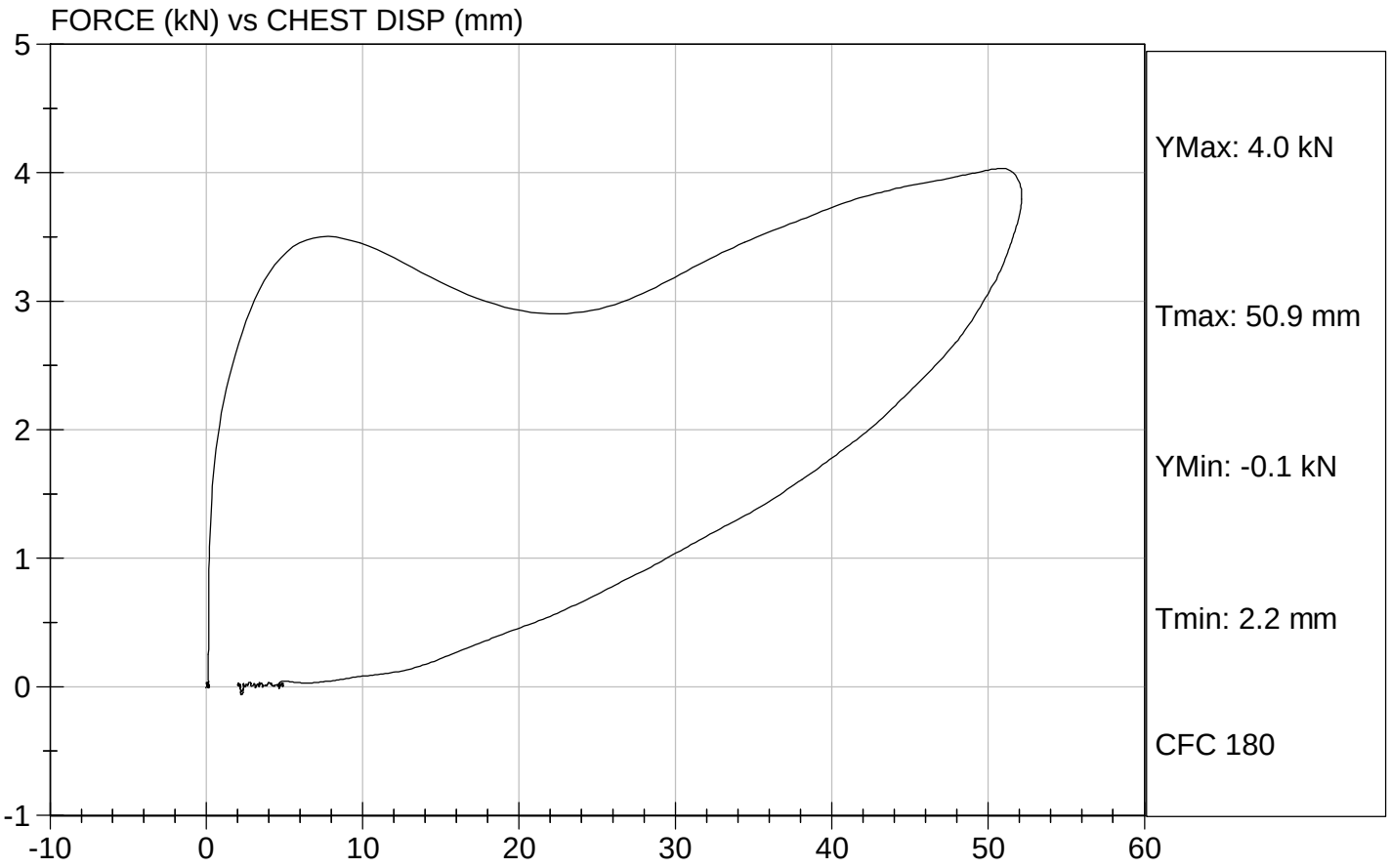
Joe Fleck
Laboratory Technician

03/23/2004
Test Date

Jessica Hall
Approved By

Test Description: Thorax Impact Test Date: 03/23/2004

Component: D04584 Speed: 21.87 ft/sec, 6.67 m/sec



MGA RESEARCH CORPORATION

RIGHT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04585

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/sec	2.07 to 2.13	2.10	Pass
Maximum Force	kN	3.45 to 4.06	3.71	Pass
		Overall Test Results		Pass

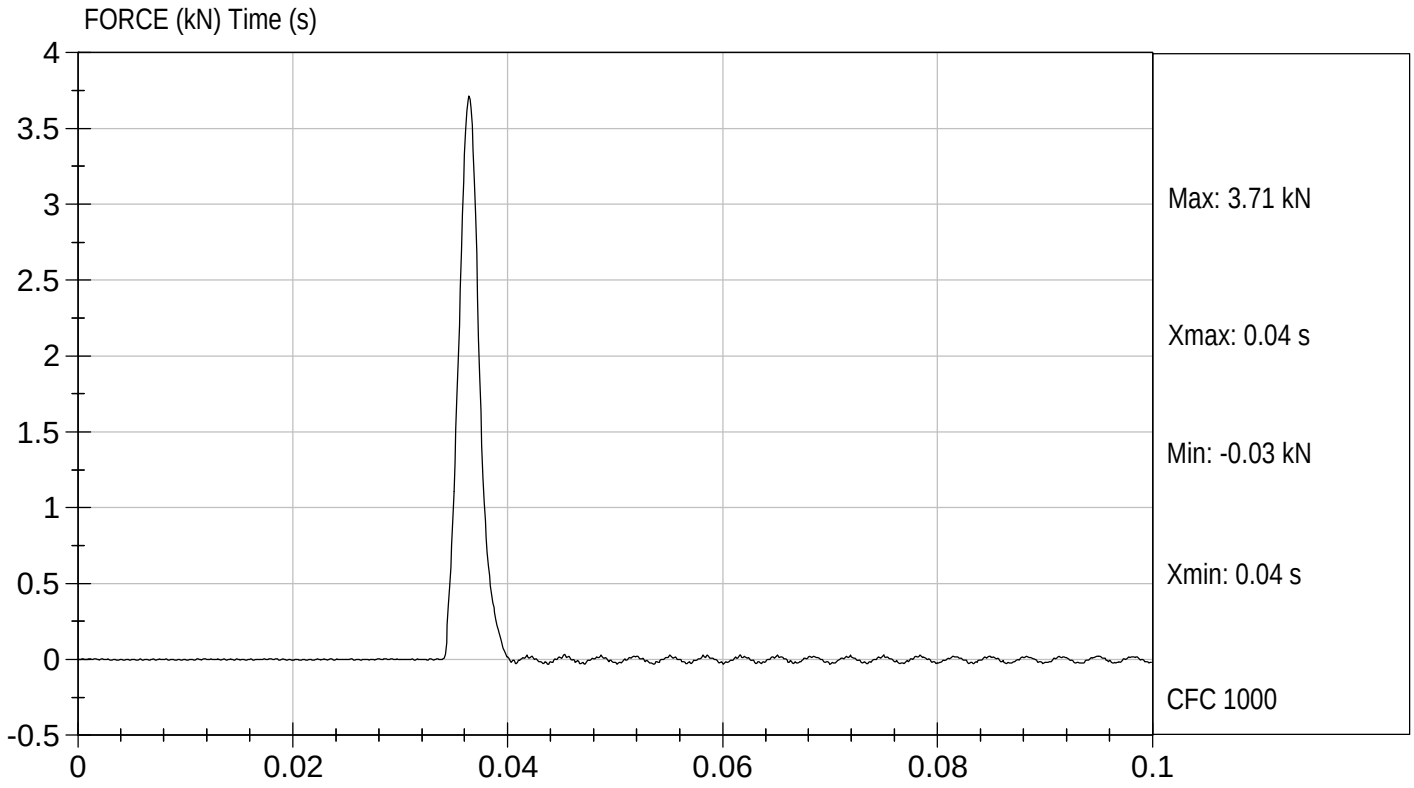
Laboratory Technician

03/23/2004
Test Date

Approved By

Test Desc: Right Knee
Componet ID: D04585

Test Date: 03/23/2004
Velocity: 6.89 ft/s, 2.10 m/s



MGA RESEARCH CORPORATION

LEFT KNEE IMPACT TEST

HYBRID III 5TH PERCENTILE

ATD Serial No: 506 **Test I.D:** D04586

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Probe Speed	m/sec	2.07 to 2.13	2.11	Pass
Maximum Force	kN	3.45 to 4.06	3.7	Pass
		Overall Test Results		Pass

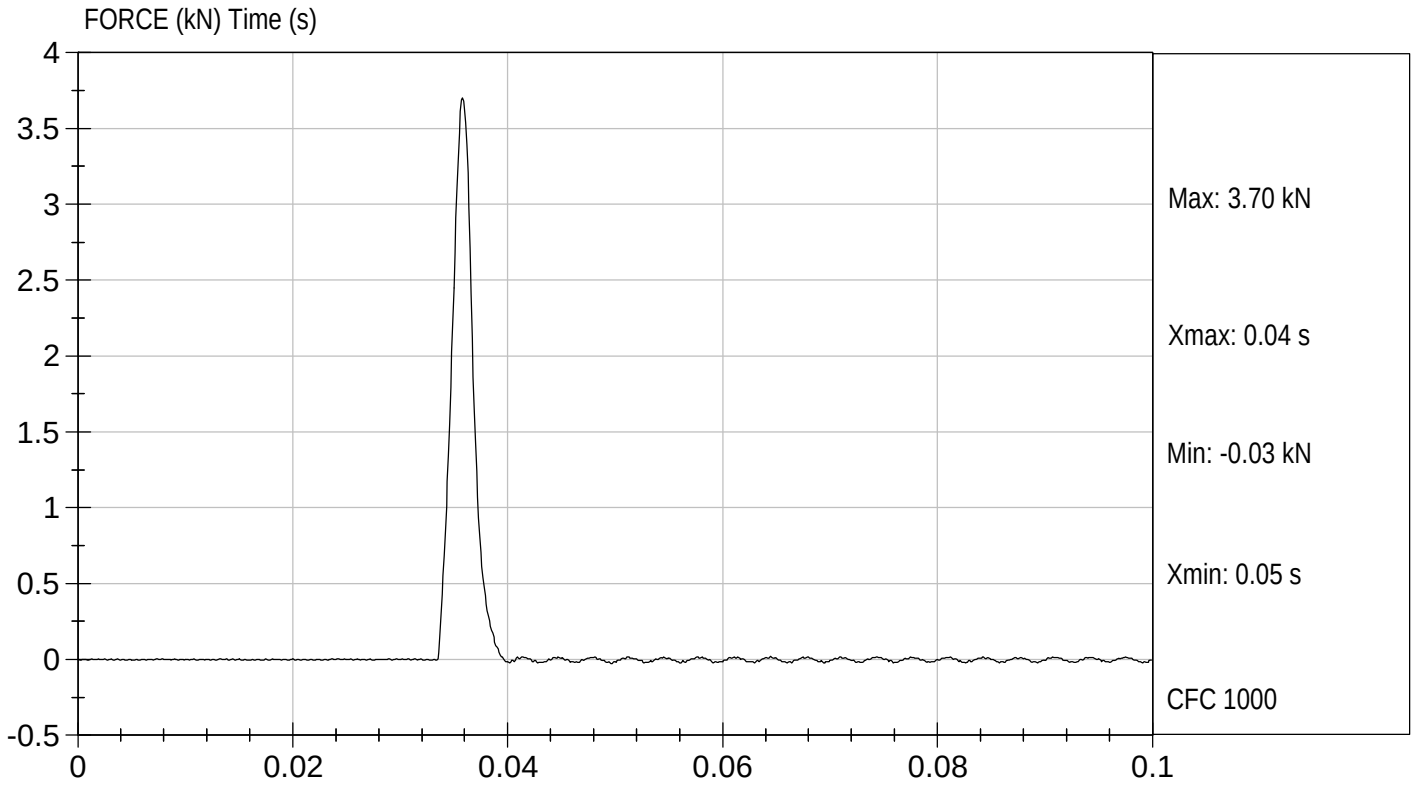
Joe Fleck
Laboratory Technician

03/23/2004
Test Date

Jessica Hall
Approved By

Test Desc: Left Knee
Componet ID: D04586

Test Date: 03/23/2004
Velocity: 6.93 ft/s, 2.11 m/s



MGA RESEARCH CORPORATION

TORSO FLEXION TEST

HYBRID III 5th PERCENTILE

ATD Serial No: 506 **Test I.D:** D04587

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	22.1	Pass
Laboratory Relative Humidity	%	10 to 70	20	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	21	Pass
Force at 45 deg	N	320 to 390	336	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 - 1.5	1.0	Pass
		Overall Result		Pass

Joe Fleck
Laboratory Technician

04/06/2004
Test Date

Jessica Hall
Approved By

DATA SHEET B1
DUMMY DAMAGE CHECKLIST

Dummy Serial Number ____506_____ Test Date ___3/12/04_____

Technician _____Jessica Gall_____

This check sheet is completed as part of the post test calibration verification.

_X_ Perform general cleaning.

Dummy Item	Inspect for	Comments	Damaged	OK
Outer skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber.			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer leads	Torn cables			X

Dummy Item	Inspect for	Comments	Damaged	OK
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to “at rest” position			X
Pelvis	Broken			X
Other				X

If upon visual examination, damage is apparent in any of these areas, the appropriate engineer or engineering technician is to be consulted for a decision on repair or replacement of parts.
Repair or Replacement approved by:

Jessica Hall _____ 3/15/04_____
Signature Date

Describe the repair or replacement of parts:

Checked by
Jeff Loewenhagen _____ 3/15/04_____
Signature Date