percent for at least four hours prior to a test.

(2) Attach the dummy (with or without the legs below the femurs) to the fixture in a seated posture as shown in Figure N5.

(3) Secure the pelvis at the pelvis instrument cavity rear face by threading four ¼ in 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.

(4) Flex the thorax forward three times between vertical and until the torso reference plane, as shown in figure N5, reaches 30 ± 2 degrees from vertical. Bring the torso to vertical orientation, remove all externally applied flexion forces, and wait 30 minutes before conducting the test. During the 30-minute waiting period, the dummy's upper torso shall be externally supported at or near its vertical orientation to prevent sagging.

(5) Remove the external support and wait two minutes. Measure the initial orientation of the torso reference plane of the seated, unsupported dummy as shown in Figure N5. This initial torso orientation angle may not exceed 22 degrees.

(6) Attach the loading adapter bracket to the spine of the dummy, the pull cable, and the load cell as shown in Figure N5.

(7) Apply a tension force in the midsagittal plane to the pull cable as shown in Figure N5 at any upper torso deflection rate between 0.5 and 1.5 degrees per second, until the torso reference plane is at 45 ± 0.5 degrees of flexion relative to the vertical transverse plane as shown in Figure N5.

(8) Continue to apply a force sufficient to maintain 45 ± 0.5 degrees of flexion for 10 seconds, and record the highest applied force during the 10-second period.

(9) Release all force as rapidly as possible, and measure the return angle at 3 minutes or any time thereafter after the release.

§ 572.126 Knees and knee impact test procedure.

(a) *Knee assembly*. The knee assembly is part of the leg assembly (drawing 127–4000–1 and –2).

(b) When the knee assembly, consisting of knee machined (drawing 127–4013), knee flesh (drawing 127–4011), lower leg (drawing 127–4014), the foot assembly (drawing 127–4030–1 (left) and –2 (right)) and femur load transducer (drawing SA572–S10) or its structural replacement (drawing 127–4007) is tested according to the test procedure in section 572.127(c), the peak resistance force as measured with the test probe mounted accelerometer must be not less than 2.0 kN (450 lbf) and not more than 3.0 kN (625 lbf).

(c) *Test procedure*. The test procedure for the knee assembly is as follows:

(1) Soak the knee assembly in a controlled environment at any temperature between 18.9 and 25.6 °C (66 and 78 °F) and a relative humidity from 10 to 70 percent for at least four hours prior to a test.

(2) Mount the test material and secure it to a rigid test fixture as shown in Figure N6. No contact is permitted between any part of the foot or tibia and any exterior surface.

(3) 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.

(4) Guide the pendulum so that there is no significant lateral vertical or rotational movement at time-zero.

(5) The test probe velocity at the time of contact shall be 2.1 ± 0.03 m/s (6.9 # 0.1 ft/s).

§ 572.127 Test conditions and instrumentation.

(a) The test probe for thoracic impacts shall be of rigid metallic construction, concentric in shape, and symmetric about its longitudinal axis. It shall have a mass of 2.86 ± 0.02 kg (6.3 ± 0.05 lbs) and a minimum mass moment of inertia of 622 kg-cm^2 (0.55 lbs-in-sec^2) in yaw and pitch about the CG.

⅓ of the weight of the suspension cables and their attachments to the impact probe must be included in the calculation of mass, and such components may not exceed five percent of the total weight of the test probe. The impacting end of the probe, perpendicular to and concentric with the longitudinal axis, must be at least 12.7 mm (0.5 in) long, and have a flat, continuous, and non-deformable 101.6 ± 0.25 mm (4.00 ± 0.01 in) diameter face with a maximum edge radius of 12.7 mm (0.5 in). The probe's end opposite to the impact face must have provisions for mounting of an accelerometer with its sensitive axis collinear with the longitudinal axis of the probe. No concentric portions of the impact probe may exceed the diameter of the impact face. The impact probe shall have a free air resonant frequency of not less than 1000 Hz.

(b) The test probe for knee impacts shall be of rigid metallic construction, concentric in shape, and symmetric about its longitudinal axis. It shall have a mass of 0.82 ± 0.01 kg (1.8 ± 0.02 lbs) and a minimum mass moment of inertia of 34 kg-cm^2 (0.03 lbs-in-sec^2) in yaw and pitch about the CG. ⅓ of the weight of the suspension cables and their attachments to the impact probe must be included in the calculation of mass, and such components may not exceed five percent of the total weight of the test probe. The impacting end of the probe, perpendicular to and concentric with the longitudinal axis, must be at least 12.7 mm (0.5 in) long, and have a flat, continuous, and non-deformable 76.2 ± 0.2 mm (3.00 ± 0.01 in) diameter face with a maximum edge radius of 12.7 mm (0.5 in). The probe's end opposite to the impact face must have provisions for mounting an accelerometer with its sensitive axis collinear with the longitudinal axis of the probe. No concentric portions of the impact probe may exceed the diameter of the impact face. The impact probe must have a free air resonant frequency of not less than 1000 Hz.

(c) Head accelerometers shall have dimensions, response characteristics, and sensitive mass locations specified in drawing SA572–S4 and be mounted in the head as shown in drawing 127–0000 sheet 3.

(d) *Neck force/moment transducer.* (1) The upper neck force/moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572–S11 and be mounted in the head-neck assembly as shown in drawing 127–0000 sheet 3.

(2) The optional lower neck force/moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572–S26 and be mounted as shown in drawing 127–0000 sheet 3.

(e) The thorax accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572–S4 and be mounted in the torso assembly in triaxial configuration at T4, and as optional instrumentation in uniaxial for-and-aft oriented configuration on the most anterior ends of ribs #1 and #6 and at the spine box at the levels of #1 and #6 ribs as shown in 127–0000 sheet 3.

(f) The chest deflection transducer shall have the dimensions and response characteristics specified in drawing SA572–S50 and be mounted in the upper torso assembly as shown in 127–0000 sheet 3.

(g) The optional lumbar spine force-moment transducer shall have the dimensions, response characteristics, and sensitive axis locations specified in drawing SA572–S12 and be mounted in the lower torso assembly as shown in drawing 127–0000 sheet 3 as a replacement for lumbar adaptor 127–3005.

(h) The optional iliac spine force transducers shall have the dimensions and response characteristics specified in drawing SA572–S13 and be mounted in the torso assembly as shown in drawing 127–0000 sheet 3 as a replacement for ASIS load cell 127–3015–1 (left) and −2 (right).

(i) The optional pelvis accelerometers shall have the dimensions, response characteristics, and sensitive mass locations specified in drawing SA572–S4 and be mounted in the torso assembly in triaxial configuration in the pelvis bone as shown in drawing 127–0000 sheet 3.

(j) The femur force transducer shall have the dimensions and response characteristics specified in drawing SA72–

S10 and be mounted in the leg assembly as shown in drawing 127–0000 sheet 3.

(k) The outputs of acceleration and force-sensing devices installed in the dummy and in the test apparatus specified by this part must be recorded in individual data channels that conform to SAE Recommended Practice J211, Rev. Mar95 ''Instrumentation for lmpact Tests,'' except that the lumbar measurements are based on CFC 600, with channel classes as follows:

(1) Head acceleration—Class 1000

(2) Neck:

(i) Forces—Class 1000

(ii) Moments—Class 600

(iii) Pendulum acceleration—Class 180

(3) Thorax:

(i) Rib acceleration—Class 1000

(ii) Spine and pendulum accelerations—Class 180

(iii) Sternum deflection—Class 600

(4) Lumbar:

(i) Forces—Class 1000

(ii) Moments—Class 600

(iii) Flexion—Class 60 if data channel is used

(5) Pelvis accelerations—Class 1000

(6) Femur forces—Class 600

(l) Coordinate signs for instrumentation polarity shall conform to the Sign Convention For Vehicle Crash Testing, Surface Vehicle Information Report, SAE J1733, 1994–12.

(m) The mountings for sensing devices shall have no resonance frequency less than 3 times the frequency range of the applicable channel class.

(n) Limb joints must be set at one G, barely restraining the weight of the limb when it is extended horizontally. The force needed to move a limb segment shall not exceed 2G throughout the range of limb motion.

(o) Performance tests of the same component, segment, assembly, or fully assembled dummy shall be separated in time by period of not less than 30 minutes unless otherwise noted.

(p) Surfaces of dummy components may not be painted except as specified in this subpart or in drawings subtended by this subpart.

FIGURES TO SUBPART N

Figure N 1

HEAD DROP TEST SET-UP SPECIFICATIONS

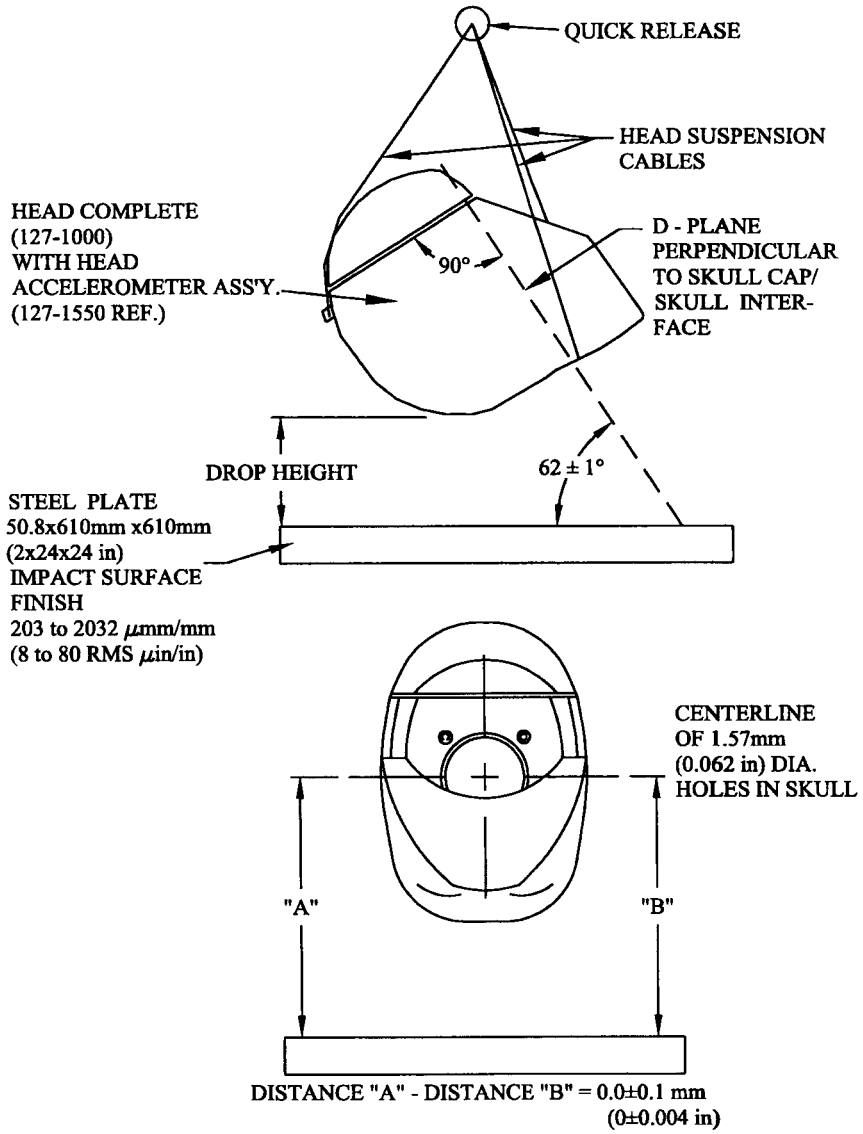
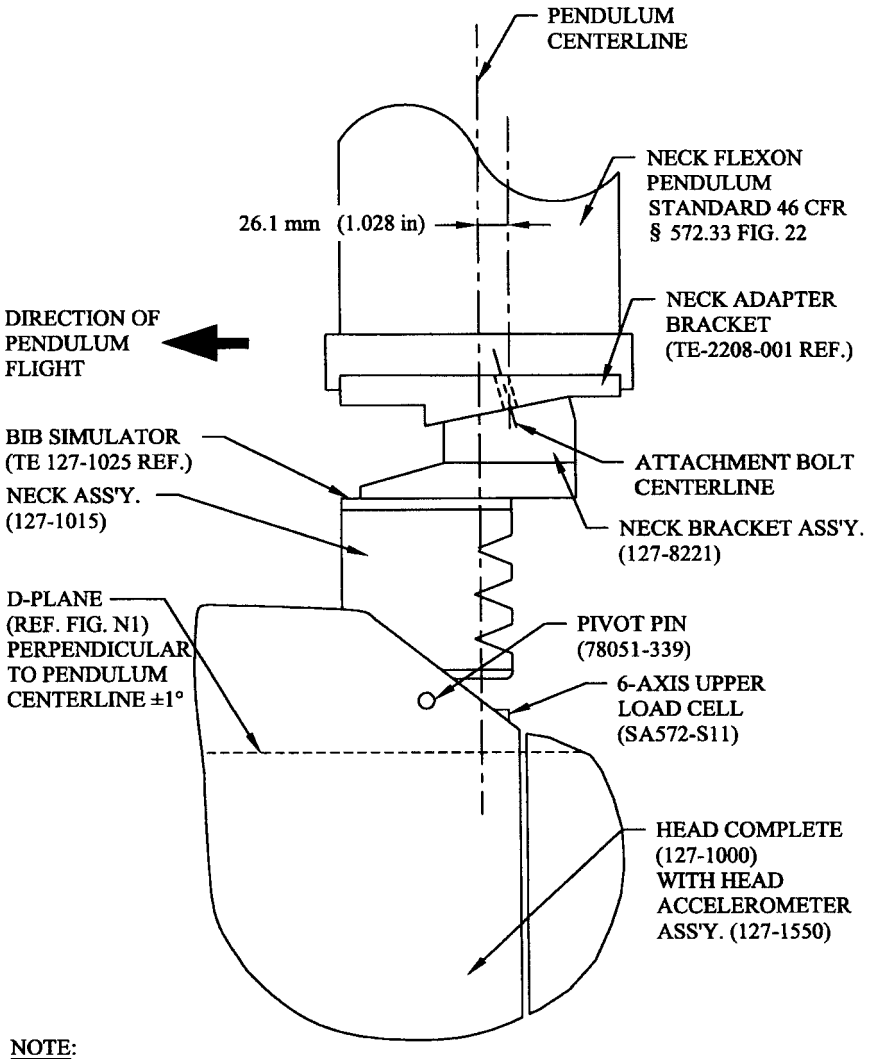


Figure N 2

NECK FLEXION TEST SET-UP SPECIFICATIONS



NOTE:
PENDULUM SHOWN IN VERTICAL ORIENTATION

Figure N 3

NECK EXTENSION TEST SET-UP SPECIFICATIONS

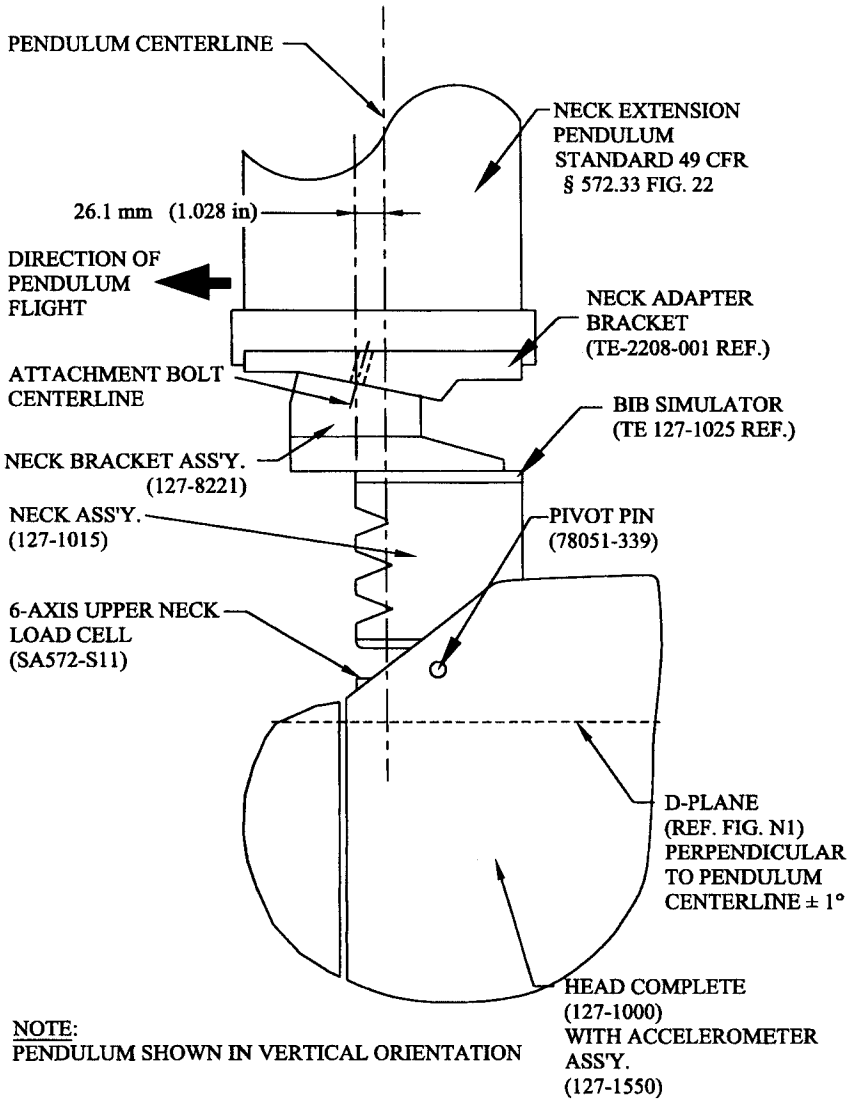
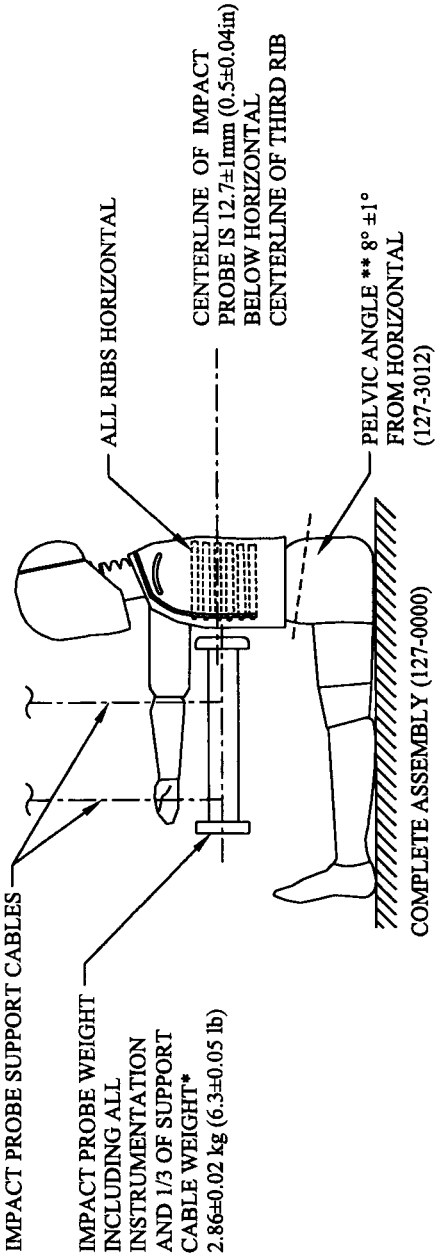


FIGURE N 4

THORAX IMPACT TEST SET-UP SPECIFICATIONS



* 1/3 CABLE WEIGHT NOT TO EXCEED 5% OF THE TOTAL IMPACT PROBE WEIGHT
** PELVIS LUMBAR JOINING SURFACE

FIGURE N 5

TORSO FLEXION TEST SET-UP SPECIFICATIONS

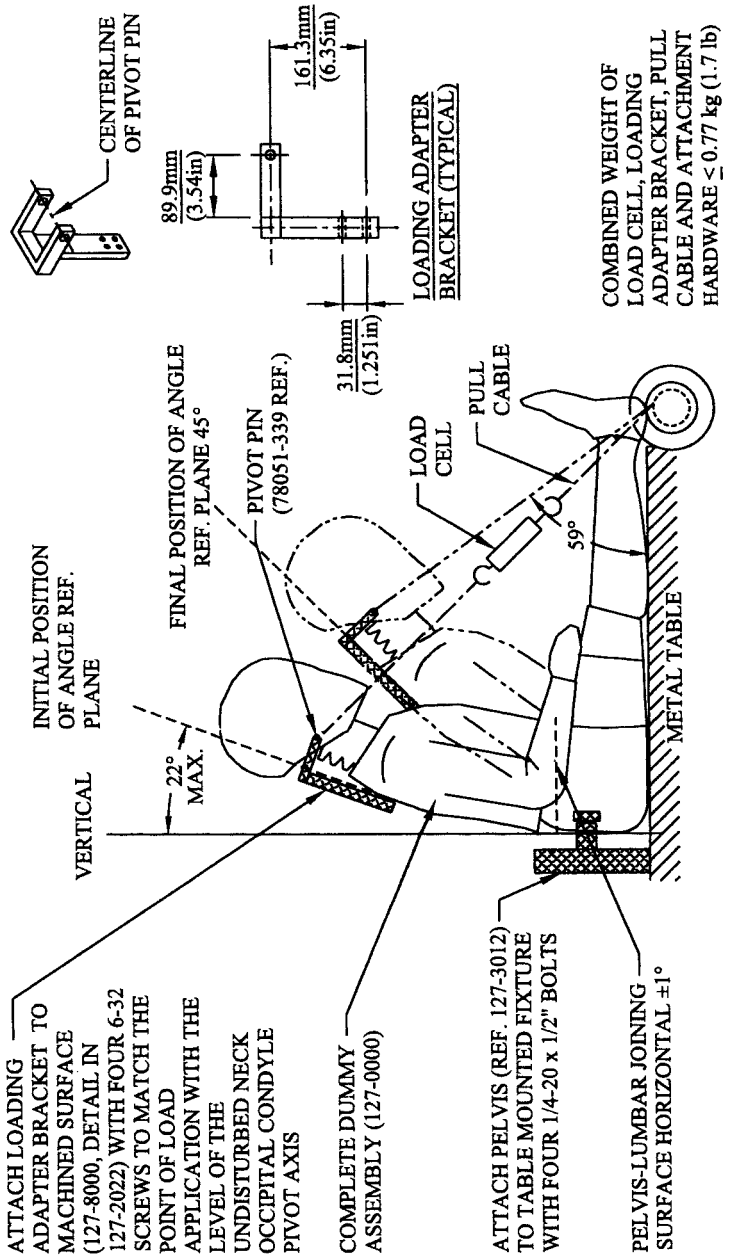


Figure N 6

KNEE IMPACT TEST SET-UP SPECIFICATIONS