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AMSAFE SEATBELT AIRBAG SYSTEM
V23 SYSTEM

INSTALLATION, HANDLING, AND SHIPPING INSTRUCTIONS

AmSafe Document Number: E510629

Issue: 18-Jul-2018, Rev. P

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REVISION HISTORY

Rev.	Prepared	Approved	Revision Summary	Date
–	F. Armenta	W. Gehret	Initial Issue	10-Feb-2009
A	F. Armenta	J. Magish	Page 1003 – updated page 1003 SDT Diagnostic Check procedures table. Pages 4003-4005 – Removed recommendation that the EMA is disconnected for shipment of seats. Added statement to prevent buckle from being in proximity of the switch.	17-Mar-2009
B	F. Armenta	J. Magish	Updated EMA and Inflator pics; Page 1003 – added warning to disconnect SDT after diagnostic check in order to prevent EMA battery from draining.	11-Nov-2009
C	F. Armenta	J. Magish	Updated nomenclature: Inflatable Lap Belt Assy was Seatbelt Airbag Assembly (SAA); Page 3002 – added EMA torque values to Table	06-Apr-2010
D.	F. Armenta	D. Potter	Updated nomenclature: AmSafe Airbag System (AmSafe Airbag) now AmSafe Seatbelt Airbag. Updated Packing and Shipping Requirements for Inflators: removed statement to use cargo only when shipping; added EX numbers for Autoliv Inflators	07-May-2010
E	F. Armenta	J. Magish	Revision History – removed “Added Section 2000, Inspection/Check.” This section was never added. Page 4007 – Updated Packing and Shipping Requirements for Inflators: removed statement to use cargo only when shipping	30-Jun-2010
F	L. Langston	J. Magish	Reformatted document; added instruction for systems with no activation switch throughout document; removed warnings/cautions with instruction to avoid magnetic fields in vicinity of EMA as this is no longer a valid issue; added MSDS, EX numbers, and weights for ROI inflators.	31-Aug-2010
G	F. Armenta	J. Magish	Added Figure 3 – dual inflator system; referenced dual inflator system throughout document where inflator is referenced. Updated Figure 11 to show locked and unlocked connector position. AmSafe logo updated; nomenclature: AmSafe was AmSafe Aviation.	14-Apr-2011
H	F. Armenta	J. Magish	Updated to reference a structure mounted system; added Figure 4 – Representative Structure Mounted System; added Figures 14 & 15 for detail on expiration date of Inflator and EMA; updated caution statement for mishandling of EMA.	11-Mar-2011

Rev.	Prepared	Approved	Revision Summary	Date
J	F. Armenta	J. Crupi	Table contents updated to reflect any changes; figures and table references updated. Page 4 – inflator and inflator fittings description/operation updated to address inflators that do not require inflator fittings. Page 5 – Figure 6 added to show ACH 2.4 inflator (no inflator fitting). Page 6 – E(5) updated statement to address EMA battery service life. Page 8 – Table 1 updated – added 2.4 inflator weight info. Page 3004 – Figure 11 updated – added 2.4 inflator (no inflator fitting) Page 4008 – F(4) shipping section updated: EX#'s updated and added reference documents; added shipping dept. contact info. Page 4011 – updated Autoliv MSDS Page 4017 – updated ROI MSDS.	23-Jun-2012
K	F. Armenta	J. Crupi	Removed "Record of Revisions" section – it is not required due to "Revision History" section of document. Table of Contents updated to reflect changes in this revision. Add "Cautions and Warnings" Section. Removed installing and removing of seats from the shipping portion of document and added to remove/installation section. Formatted document/corrected typo and formatting errors. Updated/corrected headings of sections. Deleted any redundant information or moved to applicable section.	15-Aug-2013
L	F. Armenta	J. Crupi	Page 8 – Table 1: added Inflator Assemblies to weight list; Page 1005 & 1008 – Step 5: corrected to read "Repeat Step 3 for next seat position."	05-Jun-14
M	D. Potter	ECO01271	Corrected typos and lithium battery chemistry to Lithium Metal Thionyl Chloride.	14-Aug-2017

Rev.	Prepared	Approved	Revision Summary	Date
N	J. Buenger	ECO01451	Page 3004 - 3005: revise step (4). Page 3006: revise the order of steps (4) – (6). Page 3007: revised the order of steps (12) and (13).	28-Sep-2017
P	J. Buenger	ECO02530	Page 1005: added information to refer to the removal, replacement and installation section in step (6) and step 2 in the table at the bottom of the page. Page 1006: added information to refer to the removal, replacement and installation section in step 3 in the table at the top of the page and in step 6 preceding the warning. Page 1007: added information to refer to the removal, replacement and installation section in step 5 in the table at the top of the page and in step 5 preceding the warning. Page 1008: added information to refer to the removal, replacement and installation section in step 3 in the table.	27/JUL/2018

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TABLE OF CONTENTS

CAUTIONS AND WARNINGS

A. CAUTIONS AND WARNINGS

(1) Read all the applicable WARNINGS and CAUTIONS prior to working on AmSafe Seatbelt Airbag Components. These will be repeated where applicable throughout this document.

WARNING: **THE INFLATOR ASSEMBLY IS A STORED GAS/ENERGETIC MATERIAL DEVICE. DEATH OR SERIOUS INJURY MAY BE CAUSED BY MISUSE AND/OR TAMPERING.**

- **DO NOT MISHANDLE OR TAMPER WITH THE PRODUCT IN ANY WAY.**
- **NEVER ATTEMPT TO OPEN THE INFLATOR TO SERVICE THE GAS STORAGE SYSTEM.**
- **NEVER APPLY ELECTRICAL CURRENT TO THE ELECTRONICS CONNECTION.**

WARNING: **INADVERTENT CONNECTION OF SEATBELT HALVES DURING HANDLING OR INSTALLATION COULD CAUSE DEPLOYMENT OF AIRBAG. THE SAFETY TIE PREVENTS CONNECTION OF THE SEATBELT HALVES. THE SAFETY TIE ON THE TONGUE OF AIRBAG BELT MUST NOT BE PERMANENTLY REMOVED UNTIL AMSAFE SEATBELT AIRBAG SYSTEM IS INTEGRATED INTO OEM'S SEAT AND INSTALLED IN AIRCRAFT.**

WARNING: **THE AIRBAG SHOULD NEVER BE ACTIVE WITH AN UNSECURED SEAT OR UNSECURED EMA. THE AMSAFE SEATBELT AIRBAG SYSTEM WILL DEPLOY IF THE EMA OR SEAT RECEIVES AN INPUT ABOVE THE DEPLOYMENT THRESHOLD OF THE SYSTEM. THE DEPLOYMENT THRESHOLD IS EASILY ACHIEVED IF THE EMA IS UNSECURED TO THE SEAT OR IF AN UNSECURED SEAT RECEIVES A SHOCK SUCH AS DROPPING THE SEAT ON THE FLOOR. IT IS VERY IMPORTANT THAT A SEAT WITH AN ACTIVE AIRBAG SYSTEM BE SECURED SUCH THAT IT CANNOT BE DROPPED OR MISHANDLED.**

WARNING: **ALL AMSAFE AIRBAG SYSTEMS WITH A LIFT LATCH BUCKLE HAVE AN ENABLING SWITCH.**

IF THE AMSAFE AIRBAG SYSTEM HAS AN END-RELEASE BUCKLE, IT MAY NOT HAVE AN ENABLING SWITCH. AN AIRBAG WITHOUT AN ENABLING SWITCH IS ALWAYS LIVE, EVEN WITH A DISCONNECTED BUCKLE.

IF THERE IS NO ELECTRICAL CABLE ATTACHED TO THE END-RELEASE BUCKLE, THERE IS NO ENABLING SWITCH AND THE SYSTEM IS LIVE AS SOON AS ALL ELECTRICAL CONNECTIONS ARE MADE.

IF THE ENABLING SWITCH IS NOT PRESENT OR IT IS A STRUCTURE MOUNTED SYSTEM, THE EMA MUST NOT BE CONNECTED TO THE CABLE INTERFACE ASSEMBLY UNLESS THE SYSTEM IS BEING TESTED OR THE SEAT IS INSTALLED ON THE AIRCRAFT. UNDER NO CIRCUMSTANCES SHALL THE EMA BE CONNECTED DURING TRANSPORTATION IF IT IS A NON-ENABLING SWITCH SYSTEM OR STRUCTURE MOUNTED SYSTEM.

CAUTION: **KEEP THE INFLATOR ASSEMBLY AWAY FROM ANY AND ALL THERMAL IGNITION SOURCES, ELECTRIC SPARKS OR FLAME, IMPACT OR MECHANICAL IGNITION SOURCES, OR ELECTRO-STATIC DISCHARGE. AUTO-IGNITION MAY OCCUR WITH THESE SOURCES PRESENT.**

CAUTION: **DO NOT DROP OR MISHANDLE THE EMA. DAMAGE TO THE ELECTRONICS BATTERY OR SENSOR MAY OCCUR. IF THE EMA IS DROPPED OR DAMAGED THERE IS POTENTIAL FOR AN ANOMALY, SUCH AS NOT FUNCTIONING AS INTENDED OR DESIGNED. A DAMAGED OR MISHANDLED EMA COULD BE INJURIOUS TO MAINTENANCE PERSONNEL OR PASSENGERS IF INSTALLED ON THE SEAT. IF DAMAGE OR MISHANDLING IS SUSPECTED, DO NOT INSTALL THE EMA, RETURN IT TO AMSAFE FOR REPLACEMENT. REFER TO RMA PROCEDURES IN SECTION 4000 FOR EMA SHIPPING INFORMATION.**

SYSTEM DESCRIPTION AND OPERATION

1. AMSAFE SEATBELT AIRBAG SYSTEM DESCRIPTION

A. General

The AmSafe Seatbelt Airbag V23 System is a self-contained, modular restraint system specifically designed to improve occupant protection from serious head-impact injury during a survivable aircraft crash, and enhance the occupant's ability to egress the aircraft. The system does not interface to any aircraft systems including the aircraft power supply. The AmSafe Seatbelt Airbag System is designed with built-in safety features to prevent inadvertent deployments that could result in injury to occupants, crew, or maintenance staff.

The AmSafe Seatbelt Airbag System may consist of the following core components:

- Inflatable Lap Belt or Restraint Assembly – 1 per seat/passenger
- Inflator and Inflator Fitting – 1 or 2 each per seat/passenger
- EMA – 1 per seat assembly
- Cable Interface Assembly – 1 per seat assembly

Each AmSafe Seatbelt Airbag seat position requires an Inflatable Lap Belt or Restraint Assembly and Inflator(s) with an Inflator Fitting(s), see Figure 3 for dual Inflator system. Some Inflators do not require an Inflator Fitting. One EMA is used for one seat assembly. The Cable Interface Assembly connects the EMA to the Inflatable Lap Belt or Restraint Assembly.

The AmSafe Seatbelt Airbag V23 System uses a SDT to perform system diagnostics. This is a hand-held device for use by the system installers and airline maintenance crew to test system readiness and is described in Section 1000 of this document.

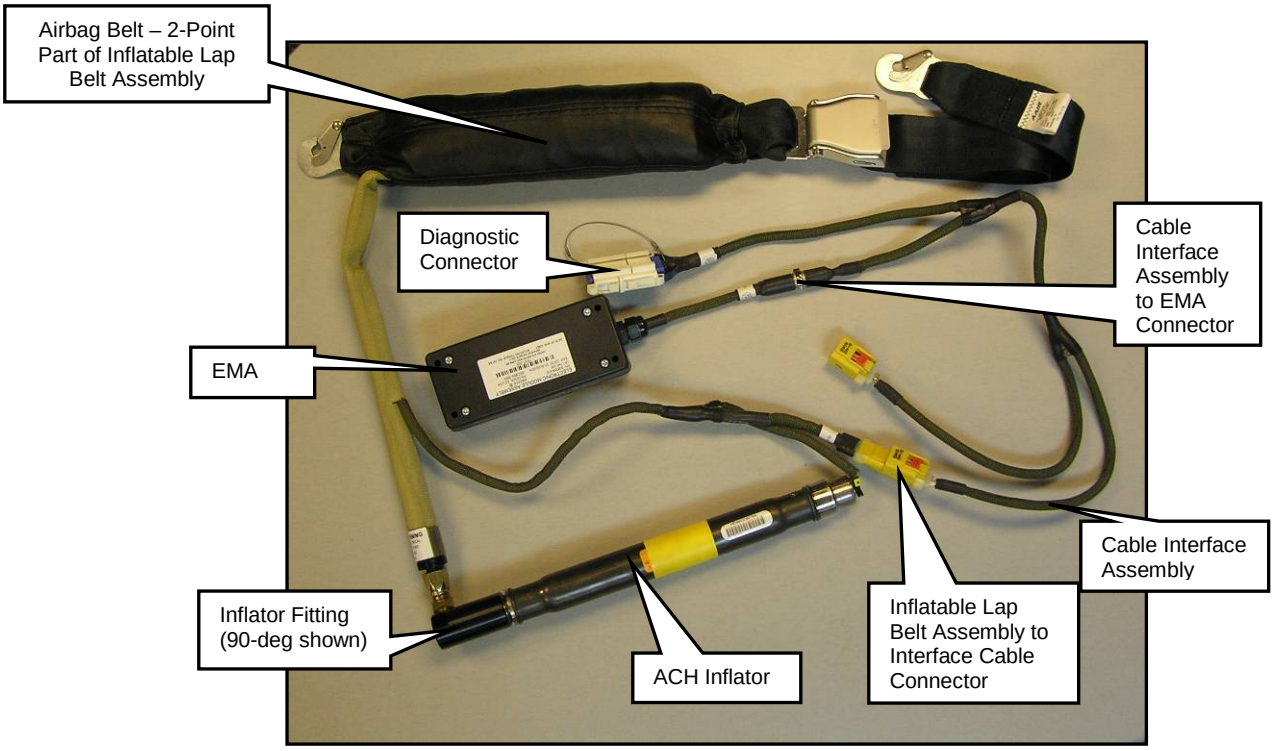

Figure 1: Representative Lift-Latch AmSafe Seatbelt Airbag System V23

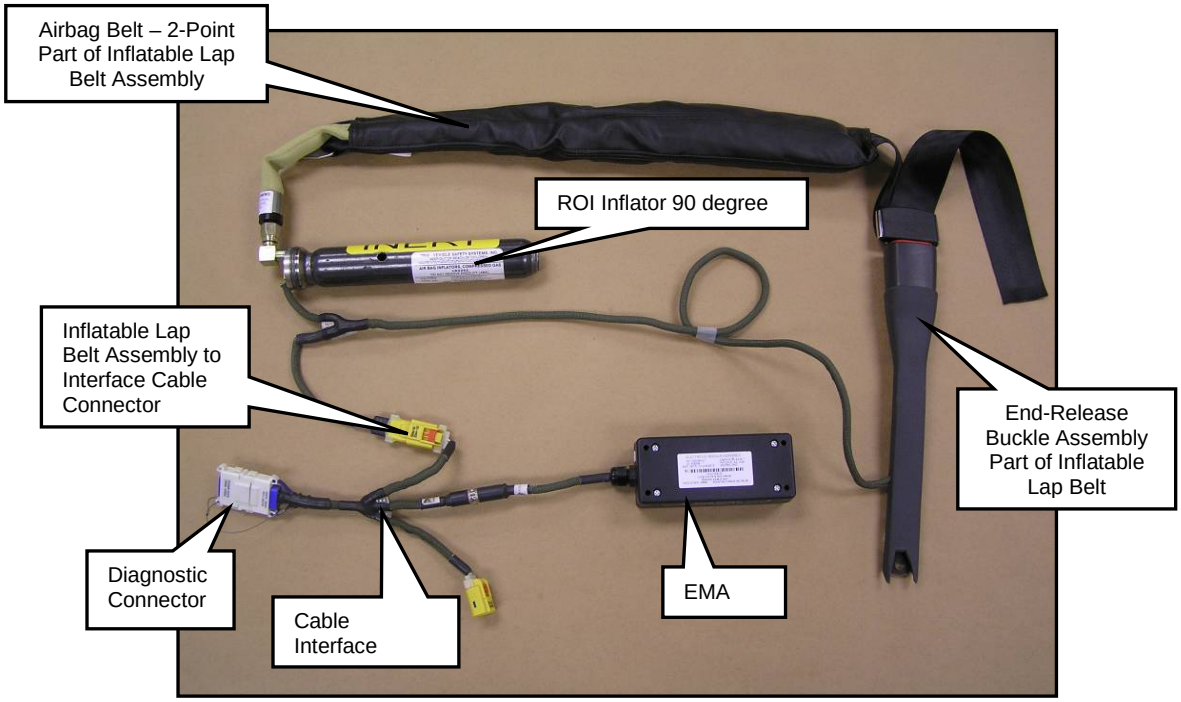

Figure 2: Representative End-Release AmSafe Seatbelt Airbag System V23

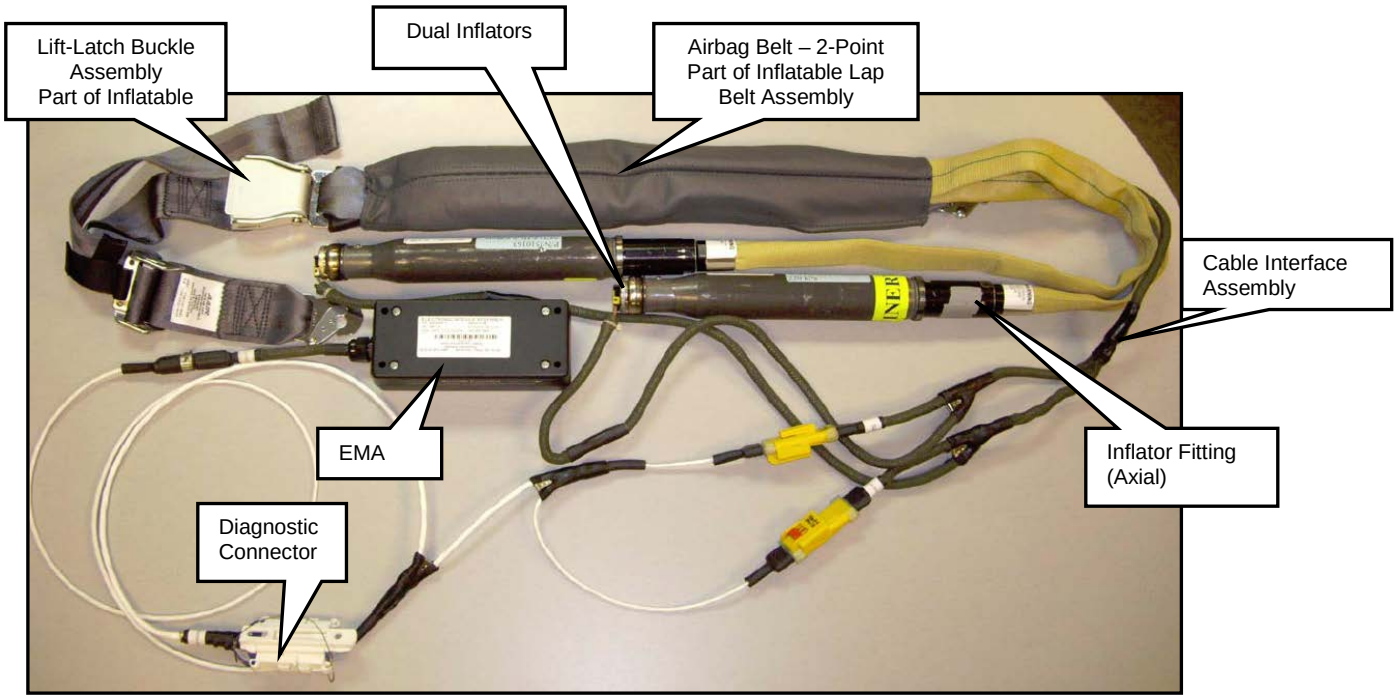

Figure 3: Representative Dual Inflator AmSafe Seatbelt Airbag System

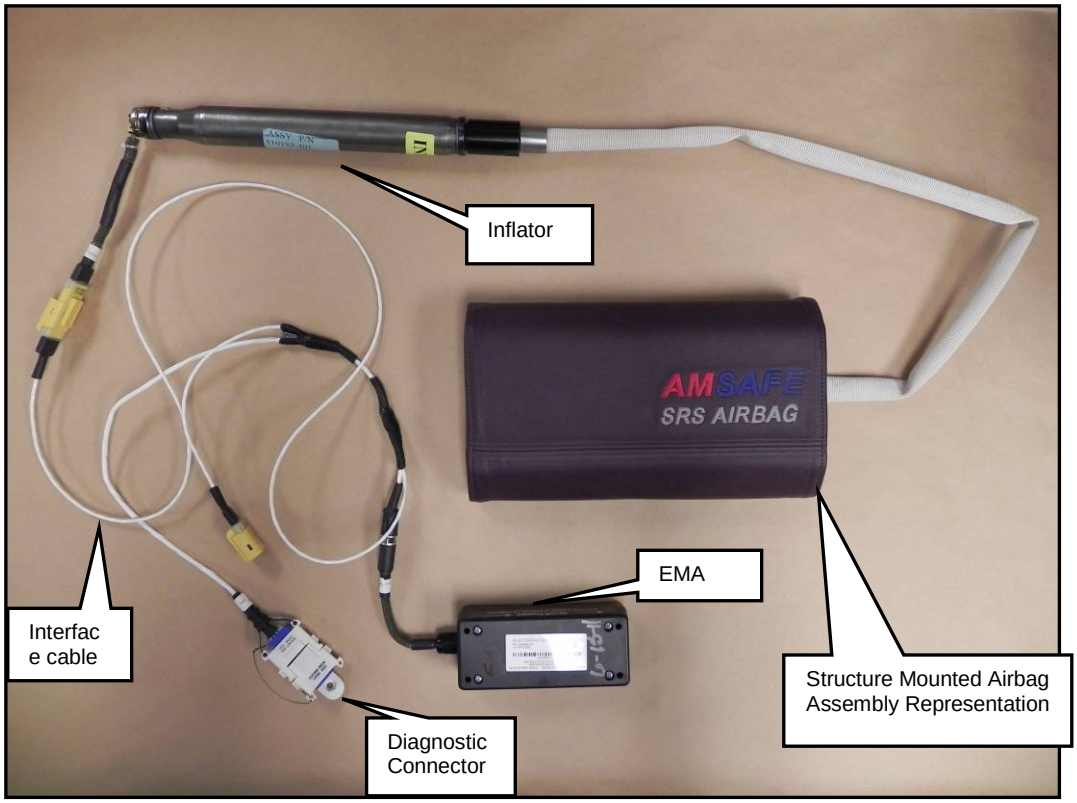

Figure 4: Representative Structure Mounted Airbag System

B. Inflatable Lap Belt or Restraint Assembly

(1) The Inflatable Lap Belt or Restraint Assembly consists of two primary subassemblies; the Airbag Belt and the Buckle Belt. The subassemblies are of the same basic configuration as conventional non-inflatable seatbelts. Figures 1 through 4 identify the primary components of the AmSafe Seatbelt Airbag System.

(2) The airbag belt utilizes a similar tongue or coupling as conventional seatbelts. It may have an attached enabling switch. The buckle side belt uses a lift-latch or end-release buckle. It may include a magnet that closes an enabling switch upon buckling the belt halves together. The enabling switch provides circuit continuity when the two seatbelt halves are connected allowing the EMA to make the system active.

Enabling Switch System: All AmSafe Airbag Systems with lift-latch buckles have enabling switches. If an end-release buckle has a cable that connects to the Cable Interface Assembly, it has an enabling switch. If the two seatbelt halves are not coupled, circuit continuity is not established by the enabling switch and the EMA disables or safes the system.

Non-Enabling Switch System: If the end-release buckle does not have a cable that connects with the Cable Interface Assembly, then it does not have an enabling switch. The system is active as soon as all electrical connections are made.

(3) The airbag belt consists of the airbag unit itself attached to an otherwise conventional seatbelt, gas delivery hose, and electrical connector if an enabling switch is used (for lift-latch buckles). The airbag, gas hose, and seatbelt webbing are all contained within a cover which has a tear seam designed to open allowing the deployment of the airbag when gas pressure is applied.

(4) The gas hose connects to the Inflator via a threaded hose connector. Electrical connectors attach the enabling switch circuitry to the Inflator's squib (Figure 5) and Cable Interface Assembly.

(5) The Inflatable Lap Belt or Restraint Assembly connects to the seat structure with the same mounting provisions as a conventional seatbelt.

(6) The lift-latch tongue and buckle differ from the conventional assemblies such that is neither interchangeable with non-airbag seat parts, nor is it possible to connect the tongue and buckle 180 degrees out of phase. These features preclude the situation where a conventional buckle side assembly is accidentally combined with that of an AmSafe Seatbelt Airbag System.

C. Inflator and Inflator Fitting

(1) The Inflator mounts under the seat to a seat-specific bracket/clamp. One Inflator is required for each passenger; two may be required for some seat installations, such as row-to row or dual inflator systems. An Inflator Fitting may be required depending on the type of Inflator being used; a 90, 45, or 0-degree type depending on installation requirement may be used to attach the Inflatable Lap Belt Assembly hose, after the hose has been routed through the seat, to the Inflator. Figures 5 and 6 identify the Inflator and if required Inflator Fittings.

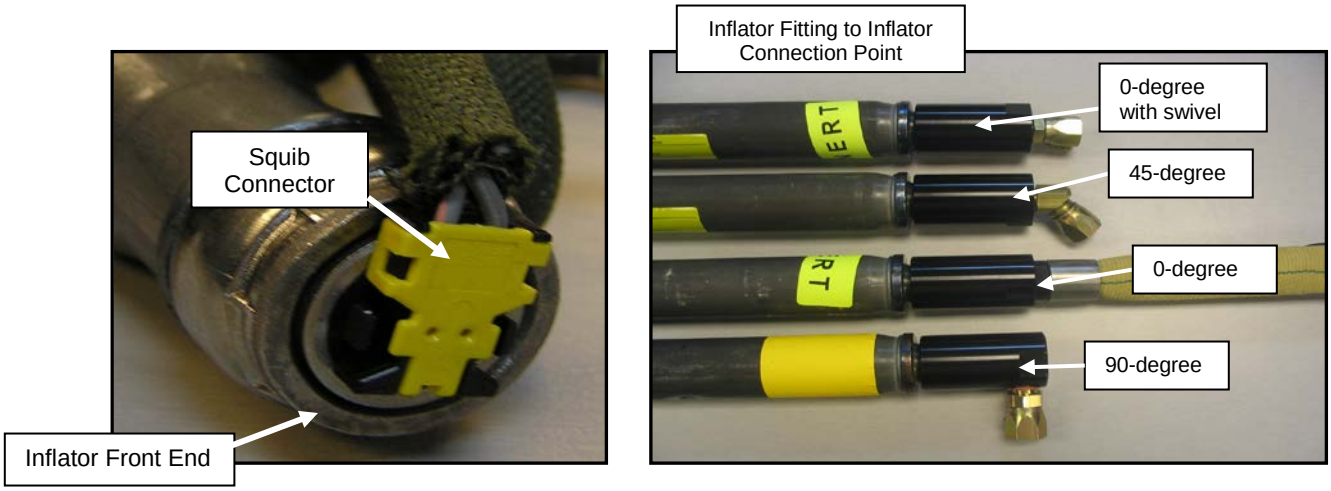

Figure 5: Inflator and Inflator Fittings

Figure 6: ACH 2.4 Inflator (no inflator fitting required)

(2) The Inflator provides inert helium-argon gas to inflate the airbag upon command from the EMA.

(3) Inflator assemblies are susceptible to rust in certain environments; this is considered a normal condition for the Inflator. There is no requirement to remove or protect the Inflator from rust.

D. Cable Interface Assembly

(1) Enabling Switch System: The Cable Interface Assembly (Figure 7) connects the Inflatable Lap Belt or Restraint Assembly or End-Release Buckle to the EMA. Cable lengths are unique to each seat and dependent on the location of the EMA and Inflatable Lap Belt or Restraint Assembly.

Non-Enabling Switch System: The Cable Interface Assembly connects to the EMA and Inflator directly or by means of an extension/LRU cable.

(2) The Cable Interface Assembly attaches to the EMA via a connector located on the EMA pigtail cable (Figure 7).

(3) A diagnostic connector is attached to a leg of the Cable Interface Assembly. This connector is used to interface with the SDT.

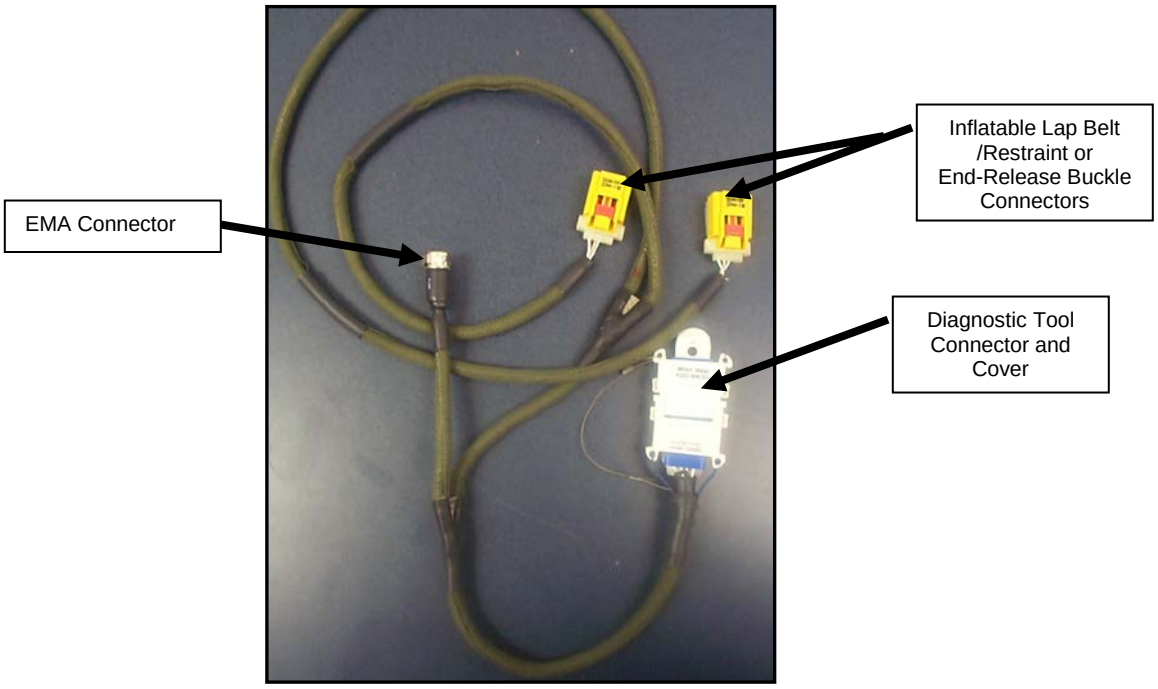

Figure 7: Cable Interface Assembly – Double Seat

E. EMA

(1) The EMA is a small box containing the system electronics, crash sensors, and battery (Figure 8). It should be mounted to hard seat structure to minimize vibration effects on the EMA and to properly transmit the crash pulse to the EMA. The front of the EMA must face aircraft forward. The EMA pigtail is located at the rear of the EMA.

(2) One EMA serves a single, double or triple seat assembly.

(3) The EMA Pigtail Cable has an electrical interface to the Cable Interface Assembly.

(4) The AmSafe Seatbelt Airbag System is designed to protect passengers during emergency landing conditions. Proper deployment of the AmSafe Seatbelt Airbag requires the EMA to recognize and deploy the Inflator at a predetermined deployment threshold. This threshold does not allow inadvertent deployment during normal operations, such as hard landings, luggage or food cart strikes on the seat, and random vibration or windmilling conditions.

(5) The AmSafe Seatbelt Airbag system EMA is battery operated. The EMA battery service life is essentially defined by the refurbishment requirement of the EMA. Under typical operating and environmental conditions, the battery service life is equal to the EMA refurbishment period. The EMA battery is not user-replaceable. Refer to Table 1 for EMA refurbishment period.

Figure 8: EMA Module and Pigtail

F. SDT

(1) To maintain the battery life of the system, there are no self-annunciating diagnostics in the EMA that can negatively impact battery life. A SDT is provided to test the status the AmSafe Seatbelt Airbag. This portable device has been designed for use by personnel after system installation and airline maintenance personnel at predetermined intervals (every 4000 flight-hours).

(2) The SDT is connected to the EMA at the diagnostic connector (Figure 7) to initiate the diagnostic check. The tool provides a pass/fail indication for each seat position. The SDT has a built-in power supply (common 9-volt battery) that does not drain the AmSafe Seatbelt Airbag battery. The SDT battery is replaceable by the user with a standard commercially available 9-volt battery.

G. AmSafe Seatbelt Airbag System Specifications

Table 1: AmSafe Seatbelt Airbag V23 System Specifications

AmSafe Seatbelt Airbag System

Use: Personal Restraint
Type: Restraint System with Passive Protection

Belt Assembly:	Rated Strength (min.):	3000 lbs. (1359 kg)
	Webbing:	Polyester or Nylon
	Color:	Customer specified
	Belt Standard:	TSO-C22g
	Airbag:	Nylon
	Label:	Fabric
	Maximum Length:	42 inches
	Weight:	1.54 pounds (approximate)
	Warranty:	3 years hardware, 1 year fabric
Inflator Assembly:	Required:	1 or 2 per pax
	Inflator assembly:	ACH Cold Gas ROI Cold Gas
	Medium:	Compressed Helium-Argon
	Pressure:	7,400 +/-psig
	DOT Classification:	DOT 9 / UN3268
	Service Life:	10 years from date of manufacture
	Refurbishment:	None
	Weight:	1.63 pounds (ACH 3.0 mole) 1.57 pounds (ACH 3.03 mole) 0.95 pounds (ACH 1.56 mole) 1.06 pounds (ACH 1.84 mole) 1.16 pounds (ACH 2.24 mole) 1.37 pounds (ACH 2.77 mole) 1.56 pounds (ACH 3.02 mole) 1.33 pounds (ACH 2.2 mole) 1.55 pounds (ROI 3.1 mole) 1.27 pounds (ROI 2.3 mole)
	Warranty:	3 years
EMA:	Required:	1 per single, double, or triple seat
	Battery:	Lithium Metal Thionyl Chloride
	Service Life:	14 years from date of manufacture
	Refurbishment:	7 years
	Weight:	.69 pounds
	Warranty:	3 years
SDT:	Required:	Customer defined
	Battery:	Standard 9-volt cell
	System Maintenance:	4000 flight-hours
	Warranty:	3 years
	Calibration:	Annually

TESTING AND FAULT ISOLATION

1. INTRODUCTION

A. Reasons for Testing and Fault Isolation

(1) Testing and Fault Isolation procedures are those performed by seat OEM or aircraft OEM personnel to ensure that the AmSafe Seatbelt Airbag System is performing satisfactorily and, if not, to determine what appropriate action to take.

B. Limitations of Testing and Fault Isolation

(1) The Testing and Fault Isolation procedures described in this section enable installation personnel to quickly inspect the AmSafe Seatbelt Airbag System. This manual does not cover in-depth or component level repair.

C. Scope of Testing and Fault Isolation

(1) Testing and Fault Isolation performed by the Installation personnel on the AmSafe Seatbelt Airbag System consists of inspecting the AmSafe Seatbelt Airbag components, performing diagnostic checks, and returning failed components to AmSafe.

D. Procedures

(1) The procedures for Testing and Fault Isolation are specified in the associated portion of this manual.

(2) The SDT's calibration must be checked yearly. The calibration sticker on the back of the unit will indicate when the SDT needs to be checked. The SDT must be returned to AmSafe for re-calibration. Refer to Section 4000, "SHIPPING, TRANSPORTATION, HANDLING, AND STORAGE," for specific return procedures.

(3) The SDT uses a standard 9-volt battery, which is replaceable by the user. The unit has a built-in, low-battery condition alert. The following table within the AmSafe Seatbelt Airbag Diagnostic Check section will detail this feature and the appropriate corrective action.

(4) If the SDT is dropped, it must be recalibrated.

(5) The test procedures listed in Paragraph 2D of this section starts with the most likely to fail components in order of the test sequence of the SDT.

(6) After a component has been determined to not be at fault, it can be placed back on the seat.

2. AmSafe Seatbelt Airbag Diagnostic Check

A. Scope of AmSafe Seatbelt Airbag Diagnostic Check

(1) The AmSafe Seatbelt Airbag diagnostic check provides a system functional analysis of the AmSafe Seatbelt Airbag circuits as a whole. Fault isolation of the systems components is accomplished by replace-and-retest method.

B. Interval

(1) The AmSafe Seatbelt Airbag Diagnostic Check should be performed after system installation onto the seat, after installation of the seat into the aircraft, and at a minimum of every 4000 flight-hours. Diagnostic checks at a shorter interval will not affect system reliability or operation and will not affect operable life of the system.

C. Equipment and Materials Required

(1) The following items are required for the AmSafe Seatbelt Airbag diagnostic check.

Table 2: SDT Part Numbers

Qty	Description	Part Number	Figure
1	SDT – System with Enabling Switch	508668-201	9
1	SDT – System with Enabling Switch, dual inflators	508987-401	10
1	SDT – System without Enabling Switch	508987-401	10

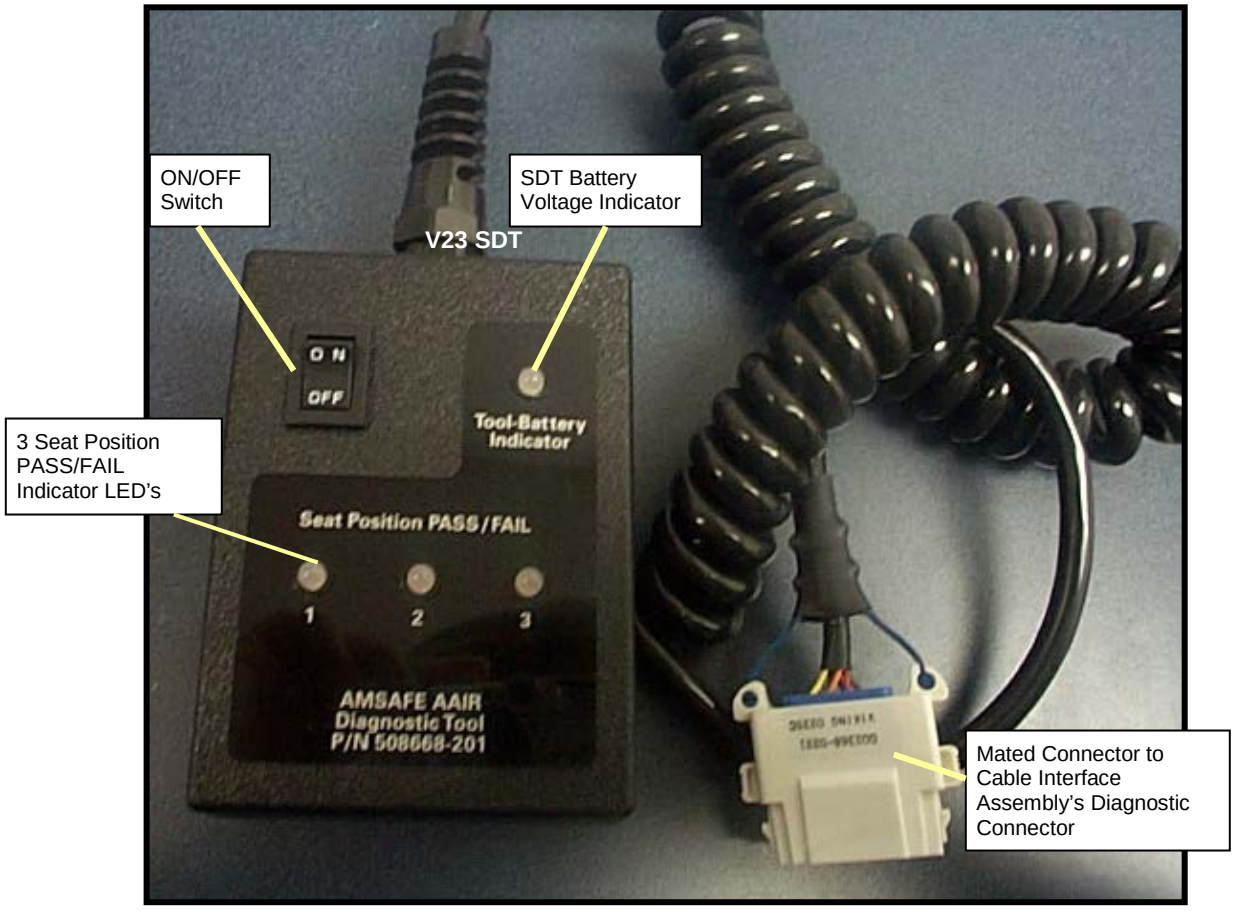

Figure 9: SDT, System with Enabling Switch

Figure 10: SDT, System with a Dual Inflator, Enabling Switch System or a System without an Activation Switch

D. Procedures

System with Enabling Switch & One Inflator:

(1) Use the following instructions to complete the AmSafe Seatbelt Airbag diagnostic check for a system with an enabling switch.

(2) Check all possible electrical connectors within the AmSafe Seatbelt Airbag System. This means check all Cable Interface Assembly connection ends: check EMA pigtail end and connection(s) to all Inflator(s) for proper installation.

(3) Check EMA Pigtail, Cable Interface Assembly and Seat Belt electrical cable for breaks or worn areas and replace, if necessary, before conducting test.

(4) When replacing SDT battery, do not allow debris or foreign objects in the opened battery compartment.

(5) Remove Safety Tie from the Seatbelt Airbag Belt tongue (if installed). After diagnostic test is complete, replace with new Safety Tie (in tongue) only if seat is not installed on aircraft.

(6) Refer to the removal, replacement and installation section to remove and replace components.

WARNING: THE AIRBAG SYSTEM SHOULD NEVER BE ACTIVE WITH AN UNSECURED SEAT OR UNSECURED EMA. THE AMSAFE SEATBELT AIRBAG SYSTEM WILL DEPLOY IF THE EMA OR SEAT RECEIVES AN INPUT ABOVE THE DEPLOYMENT THRESHOLD OF THE SYSTEM. THE DEPLOYMENT THRESHOLD IS EASILY ACHIEVED IF THE EMA IS UNSECURED TO THE SEAT, OR IF AN UNSECURED SEAT RECEIVES A SHOCK SUCH AS DROPPING THE SEAT ON THE FLOOR. IT IS VERY IMPORTANT THAT A SEAT WITH AN ACTIVE AIRBAG SYSTEM (SEATBELT BUCKLED AND ALL CONNECTIONS MADE) IS SECURED SUCH THAT IT CANNOT BE DROPPED OR MISHANDLED.

WARNING: DISCONNECT THE SDT IMMEDIATELY AFTER THE DIAGNOSTIC TEST IS COMPLETE. LEAVING THE SDT CONNECTED TO THE SYSTEM MAY RESULT IN DRAINING OF THE EMA BATTERY.

	ACTION	RESPONSES	FAULT DIAGNOSIS
1	Turn SDT ON/OFF switch to ON. If Battery check is OK, turn SDT OFF.	SDT Battery LED will illuminate green for acceptable power and red for low battery condition.	If red, remove cover on back of SDT and replace with a new, commercially available, 9-volt battery.

Connecting SDT: Confirm all seat positions to be tested are unbuckled. Remove the Diagnostic Connector's protective cap (if applicable) located on the Interface Cable Assembly and connect the V23 SDT connector to the diagnostic connector.

	ACTION	RESPONSES	FAULT DIAGNOSIS
2	Connect SDT to Diagnostic Connector on Cable Interface Assy. Turn SDT ON/OFF switch to ON. • All amber LEDs, go to Step 3.	All three SEAT LEDs will illuminate; amber for a "pass" condition and green, red, or no illumination for a "fail" condition.	Check all connections, especially Cable Interface Assembly. Replace EMA, Inflator and Cable Interface Assy. Refer to the removal, replacement and installation section to remove and replace components. Retest after replacing each part until a "pass" condition is met.

	ACTION	RESPONSES	FAULT DIAGNOSIS
3	Buckle seatbelt. • Single SEAT LED is green, go to Step 4.	A single SEAT LED will illuminate green for a "pass" condition. Other SEAT LEDs will extinguish. All amber illumination, or all extinguished, or red illumination is a "fail" condition.	Replace associated End-Release Buckle Assembly, EMA, Inflator, and Cable Interface Assembly. Refer to the removal, replacement and installation section to remove and replace components. Retest after replacing each part until a green SEAT LED illuminates.
4	Unbuckle seatbelt.		
5	Repeat Step 3 for next seat position.		
6	Unbuckle seatbelt. Turn SDT ON/OFF switch to OFF. If finished testing all seat positions in aircraft disconnect the SDT to prevent EMA battery from draining, replace the diagnostic protective cap or cover. Otherwise, start at Step 2 for next seat test.		AmSafe Seatbelt Airbag System testing complete.

System with Enabling Switch & Dual Inflators:

(1) Use the following instructions to complete the AmSafe Seatbelt Airbag System Diagnostic Check for dual inflator system, SDT P/N 508987-401.

(2) Check all possible electrical connectors within the AmSafe Seatbelt Airbag System. This means check all Cable Interface Assembly connection ends: check EMA pigtail end and connection(s) to all Inflator(s) for proper installation.

(3) Check EMA Pigtail, Cable Interface Assembly and Seat Belt electrical cable for breaks or worn areas and replace, if necessary, before conducting test.

(4) When replacing SDT battery, do not allow debris or foreign objects in the opened battery compartment.

(5) Remove Safety Tie from the Seatbelt Airbag Belt tongue (if installed). After diagnostic test is complete, replace with new Safety Tie (in tongue) only if seat is not installed on aircraft.

(6) Refer to the removal, replacement and installation section to remove and replace components.

WARNING: WHEN REPLACING/RETESTING EMA, DO NOT TEST AN EMA THAT IS NOT SECURED IN THE EMA BRACKET. INADVERTENT SYSTEM DEPLOYMENT MAY OCCUR.

	ACTION	RESPONSES	FAULT DIAGNOSIS
1	Turn SDT ON/OFF switch to ON. If battery check is OK, turn SDT off.	SDT Battery LED will illuminate green for acceptable power and red for low battery condition.	If red, remove cover on back of SDT and replace with new commercially available, 9- volt battery.
2	Verify seatbelt is unbuckled and connect SDT to Diagnostic Connector on Cable Interface Assy.		
3	Set toggle switch to number of inflators connected to an EMA.	Example: If a single restraint uses two inflators, set "# of Seats" Toggle Switch to "2".	
4	Turn SDT ON/OFF switch to ON.	- Battery LED – Green - Sensor LED – Red - Inflator LED – Red	

	ACTION	RESPONSES	FAULT DIAGNOSIS
5	Buckle Seatbelt • All system validation LEDs are green go to step 6.	All three SEAT Validation LEDs will illuminate: green for a "pass" condition or one or more illuminate red for a "fail" condition.	If test fails, check all connections and retest. Replace failed components as indicated on the SDT until a "pass" condition is met. Retest after replacing each component. Replace as follows: - Battery LED – Replace EMA - Sensor LED – Replace EMA - Inflator LED – Replace Inflator Cable, Inflator. If fail condition still exists, replace Interface Cable. Refer to the removal, replacement and installation section to remove and replace components.
6	Turn SDT off.		
7	Repeat Step 4 for next seat position.		
8	Unbuckle seatbelt. Turn SDT ON/OFF switch to OFF. If finished testing all seat positions in aircraft, disconnect the SDT in order to prevent EMA battery from draining and replace the diagnostic protective cap or cover. Otherwise start at Step 2 for next seat test.		AmSafe Seatbelt Airbag System testing complete.

System without Enabling Switch:

WARNING: IF THERE IS NO ELECTRICAL CABLE ATTACHED TO THE BUCKLE, THERE IS NO ENABLING SWITCH, AND THE SYSTEM IS LIVE AS SOON AS ALL ELECTRICAL CONNECTIONS ARE MADE.

(1) Use the following instructions to complete the AmSafe Seatbelt Airbag diagnostic check for a system without an enabling switch.

(2) Check all possible electrical connectors within the AmSafe Seatbelt Airbag System. This means check all Cable Interface Assembly connection ends: check EMA pigtail end and connection(s) to all Inflator(s) for proper installation.

(3) Check EMA Pigtail, Cable Interface Assembly and Seat Belt electrical cable for breaks or worn areas and replace, if necessary, before conducting test.

(4) When replacing SDT battery, do not allow debris or foreign objects in the opened battery compartment.

(5) Refer to the removal, replacement and installation section to remove and replace components.

WARNING: THE AIRBAG SYSTEM SHOULD NEVER BE ACTIVE WITH AN UNSECURED SEAT OR UNSECURED EMA. THE AMSAFE SEATBELT AIRBAG SYSTEM WILL DEPLOY IF THE EMA OR SEAT RECEIVES AN INPUT ABOVE THE DEPLOYMENT THRESHOLD OF THE SYSTEM. THE DEPLOYMENT THRESHOLD IS EASILY ACHIEVED IF THE EMA IS UNSECURED TO THE SEAT, OR IF AN UNSECURED SEAT RECEIVES A SHOCK SUCH AS DROPPING THE SEAT ON THE FLOOR. IT IS VERY IMPORTANT THAT A SEAT WITH AN ACTIVE AIRBAG SYSTEM (ALL CONNECTIONS MADE) IS SECURED SUCH THAT IT CANNOT BE DROPPED OR MISHANDLED.

WARNING: AN AIRBAG SYSTEM WITHOUT AN ENABLING SWITCH IS ALWAYS LIVE, EVEN WITH A DISCONNECTED BUCKLE.

IF THE ENABLING SWITCH IS NOT PRESENT, THEN THE EMA MUST NOT BE CONNECTED TO THE CABLE INTERFACE ASSEMBLY UNLESS THE SYSTEM IS BEING TESTED OR THE SEAT IS INSTALLED ON THE AIRCRAFT.

WARNING: DISCONNECT THE SDT IMMEDIATELY AFTER THE DIAGNOSTIC TEST IS COMPLETE. LEAVING THE SDT CONNECTED TO THE SYSTEM MAY RESULT IN DRAINING THE EMA BATTERY.

	ACTION	RESPONSES	FAULT DIAGNOSIS
1	Turn SDT ON/OFF switch to ON. If Battery check is OK, turn SDT OFF.	SDT Battery LED will illuminate green for acceptable power and red for low battery condition.	If red, remove cover on back of SDT and replace with a new, commercially available, 9-volt battery.
2	Set Toggle Switch (# of Seats/Inflators) to number of seats or inflators connected to an EMA.	If a single restraint uses two inflators, set # of Seats Toggle Switch to "2"	
3	Connect SDT to Diagnostic Connector on Cable Interface Assy. Turn SDT ON/OFF switch to ON. • All System Validation LEDs are green, go to Step 3.	All three System Validation LEDs will illuminate; green for a "pass" condition or one or more illuminate red for a "fail" condition.	If test fails, check all connections and retest. Replace failed component as indicated on the SDT until a "pass" condition is met. Retest after replacing each component. Replace as follows: - Battery LED – Replace EMA - Sensor LED – Replace EMA - Inflator LED – Replace inflator cable, Inflator If fail condition still exists, replace Interface Cable. Refer to the removal, replacement and installation section to remove and replace components.
4	Turn SDT off.		
5	Repeat Step 3 for next seat position.		
6	If finished testing all seat positions in aircraft disconnect the SDT to prevent EMA battery from draining, replace the diagnostic protective cap or cover. Otherwise, start at Step 2 for next seat test.		AmSafe Seatbelt Airbag System testing complete.

REPAIR

1. AMSAFE SEATBELT AIRBAG SYSTEM REPAIR

   A. Scope of the Job

      (1) The primary repair of the AmSafe Seatbelt Airbag System is the removal and replacement of defective subassemblies. The SDT battery will need to be replaced occasionally.

   B. Limitation of the Job

      (1) Disassemble the AmSafe Seatbelt Airbag System only to the level necessary to replace the defective subassembly as determined during the diagnostic check detailed in the "TESTING AND FAULT ISOLATION" section of this manual, starting on Page 1001. When new subassemblies are necessary, refer to the parts list for the correct part numbers, quantities, and attaching hardware.

      WARNING: THE INFLATOR IS A STORED GAS/ENERGETIC MATERIAL DEVICE. SEVERE PERSONAL INJURY OR BODILY HARM MAY BE CAUSED BY MISUSE AND/OR TAMPERING. DO NOT MISHANDLE THE PRODUCT IN ANY WAY. NEVER ATTEMPT TO OPEN THE INFLATOR TO SERVICE THE GAS GENERATION SYSTEM. NEVER APPLY ELECTRICAL CURRENT TO THE ELECTRONICS CONNECTION. DO NOT TAMPER WITH THE INFLATOR IN ANY WAY.

      CAUTION: THE AMSAFE SEATBELT AIRBAG SYSTEM MAY NOT BE DISASSEMBLED OR REPAIRED BEYOND THE LEVEL INDICATED IN WITHIN THE SCOPE OF THIS MANUAL. SCOPE INCLUDES REPAIRS INDICATED IN ALL LISTED, ACTIVE SERVICE BULLETINS AND LETTERS. FURTHER DISASSEMBLY OR REPAIR OF THIS SYSTEM MAY ONLY BE CARRIED OUT BY AMSAFE. AMSAFE IS NOT RESPONSIBLE FOR DAMAGE OR MALFUNCTIONS RESULTING FROM ANY UNAUTHORIZED ATTEMPT TO REPAIR OR DISASSEMBLE THE RESTRAINT SYSTEM.

   C. Equipment and Materials for the Job

      (1) The equipment and materials required for installation and removal of the AmSafe Seatbelt Airbag System are specified in the associated portion of this manual.

   D. Procedures

      (1) Procedures for identifying and diagnosing system failures are specified in the "TESTING AND FAULT ISOLATION" section of this manual starting Section 1000.

      (2) Procedures for replacement are specified in the "REMOVAL AND INSTALLATION PROCEDURE" section of this manual starting in Section 3000.

      (3) To replace the SDT battery, locate and remove battery compartment cover. Remove the battery and replace with a new, standard 9-volt battery. Replace cover.

REMOVAL REPLACEMENT AND INSTALLATION PROCEDURES

1. REMOVAL REPLACEMENT AND INSTALLATION PROCEDURES

A. General Information

(1) This manual, in combination with the seat manufacturer's installation drawings and instructions, provides the necessary detail to remove and install the AmSafe Inflatable Restraint System.

(2) ENABLING SWITCH SYSTEMS: IT IS STRONGLY RECOMMENDED THAT THE BUCKLE HALF OF THE SEATBELT AIRBAG SYSTEM BE FOLDED OVER ON ITSELF, COVERED AND SECURED PRIOR TO MAINTENANCE OF THE SEATS WITH ENABLING SWITCHES. This will protect the buckle from any damage and ensure that the AmSafe Seatbelt Airbag System cannot be accidentally enabled by the buckling of the Inflatable Lap Belt Assembly. If the seat is dropped or receives a significant impact, an enabled system may deploy the airbag, which may result in significant risk of injury to personnel. An alternative method of safing the system is installing a Safety Tie (or equivalent-type tie wrap) through the airbag belt's tongue to prevent buckling of the two seatbelt halves.

(3) NON-ENABLING SWITCH SYSTEMS: DISCONNECT THE EMA BEFORE PERFORMING ANY MAINTENANCE. If the seat is dropped or receives a significant impact, an enabled system may deploy the airbag, which may result in significant risk of injury to personnel.

(4) If seatbelt airbag replacement is not immediately possible, cover the Inflator nozzle to protect from debris.

(5) If removing and reinstalling the seat, comply with aircraft manufacturer's procedures.

WARNING: THE INFLATOR IS A STORED GAS/ENERGETIC MATERIAL DEVICE. SEVERE PERSONAL INJURY OR BODILY HARM MAY BE CAUSED BY MISUSE AND/OR TAMPERING. DO NOT TAMPER WITH OR MISHANDLE THE PRODUCT IN ANY WAY. NEVER ATTEMPT TO OPEN THE INFLATOR TO SERVICE THE SYSTEM. NEVER APPLY ELECTRICAL CURRENT TO THE ELECTRONICS CONNECTION.

WARNING: ENABLING SWITCH SYSTEMS: INADVERTENT CONNECTION OF SEATBELT HALVES DURING MAINTENANCE COULD CAUSE DEPLOYMENT OF AIRBAG. THE SAFETY TIE STRAP PREVENTS CONNECTION OF THE SEATBELT HALVES. THE SAFETY TIE ON THE TONGUE OF AIRBAG BELT MUST NOT BE PERMANENTLY REMOVED UNTIL AMSAFE SEATBELT AIRBAG SYSTEM IS INTEGRATED INTO SEAT OEM'S SEAT AND INSTALLED IN AIRCRAFT.

WARNING: NON-ENABLING SWITCH SYSTEMS: IF THE AMSAFE AIRBAG SYSTEM HAS AN END-RELEASE BUCKLE, IT MAY NOT HAVE AN ENABLING SWITCH. AN AIRBAG SYSTEM WITHOUT AN ENABLING SWITCH IS ALWAYS LIVE, EVEN WITH A DISCONNECTED BUCKLE.

WARNING: **IF THERE IS NO ELECTRICAL CABLE ATTACHED TO THE BUCKLE, THERE IS NO ENABLING SWITCH, AND THE SYSTEM IS LIVE AS SOON AS ALL ELECTRICAL CONNECTIONS ARE MADE.**

WARNING: **IF THE ENABLING SWITCH IS NOT PRESENT, THEN THE EMA MUST NOT BE CONNECTED TO THE CABLE INTERFACE ASSEMBLY UNLESS THE SYSTEM IS BEING TESTED OR THE SEAT IS INSTALLED ON THE AIRCRAFT. UNDER NO CIRCUMSTANCES SHALL THE EMA BE CONNECTED DURING TRANSPORTATION IF IT IS A NON-ENABLING SWITCH SYSTEM.**

WARNING: **THE AIRBAG SYSTEM SHOULD NEVER BE ACTIVE WITH AN UNSECURED SEAT. THE AMSAFE SEATBELT AIRBAG SYSTEM WILL DEPLOY IF THE SEAT RECEIVES AN INPUT ABOVE THE DEPLOYMENT THRESHOLD OF THE SYSTEM. THE DEPLOYMENT THRESHOLD IS EASILY ACHIEVED IF AN UNSECURED SEAT RECEIVES A SHOCK SUCH AS DROPPING THE SEAT OR IF THE SEAT IS HAMMERED INTO POSITION ONTO THE AIRCRAFT SEAT TRACKS.**

CAUTION: **ENABLING SWITCH SYSTEMS: IT IS RECOMMENDED THAT THE BUCKLE-BELT HALF BE COVERED AND SECURED BEFORE ANY OTHER REMOVAL PROCEDURES HAVE BEEN ACCOMPLISHED. THIS PREVENTS THE COUPLING OF SEATBELTS AND INADVERTENT SYSTEM ACTIVATION.**

CAUTION: **DO NOT DROP OR MISHANDLE THE EMA. DAMAGE TO THE ELECTRONICS, BATTERY, OR SENSOR MAY OCCUR. IF THE EMA IS DROPPED OR DAMAGED THERE IS POTENTIAL FOR AN ANOMALY, SUCH AS NOT FUNCTIONING AS INTENDED OR DESIGNED. A DAMAGED OR MISHANDLED EMA COULD BE INJURIOUS TO MAINTENANCE PERSONNEL OR PASSENGERS IF INSTALLED ON THE SEAT. IF DAMAGE OR MISHANDLING IS SUSPECTED, DO NOT INSTALL THE EMA, RETURN TO AMSAFE FOR REPLACEMENT. REFER TO RMA PROCEDURES IN SECTION 5000 FOR EMA SHIPPING INFORMATION.**

B. Field Disposal of Damaged LRUs

(1) Field disposal of damaged LRUs is permitted within the following guidelines.

(a) Warranty LRUs (manufacturer defect) must be returned to AmSafe to claim warranty.

(b) Installation damage LRUs:

(1) Inflator – return to AmSafe for disposal whether stored gas has been deployed or not.
(2) EMA – contains Lithium ion battery; dispose of in accordance with user's disposal policy.
(3) Items containing no hazardous materials and can be disposed of in accordance with operator's disposal policy:

(a) Cable Interface Assembly

(b) Airbag Belt

(c) Buckle Belt

C. Equipment and Materials Required

(1) The following items are required to remove the AmSafe Seatbelt Airbag System.

Table 3: Removal Equipment and Materials

Qty	Description	Part Number
1	Repairman Tool Kit	Standard Issue
2	Safety Glasses	Standard Issue
1	Screwdriver Bit Set, Hex Drive	Standard Issue
1	Torque Wrench, In. Lb. Type	Standard Issue
As Required	Loctite 242 or equivalent	Loctite Corporation

(2) Use the following tables to identify the appropriate torque value, tool, and tool size to use for attaching hardware throughout the removal and replacement process. Associate the appropriate tool/torque on Table 4 by callouts listed throughout instructions.

Table 4: Torque Values and Tool Sizes

Part Description	Tool and Size	Part Number	Torque - In. Lbs. (above run-on torque)
Electronic Module Assembly (EMA)	Torque Wrench, In. Lb type	508358-401 thru -411 508358-413 thru -423 508224-401 thru -411 508224-413 thru -423	30 +/- 2 6 +/- 2 30 +/- 2 6 +/-2

Connection	Tool and Size	Torque - In. Lbs.
Inflator to Inflator Fitting	Torque Wrench, In. Lb type	60 +/-10
Inflatable Lap Belt Assembly to Inflator Fitting	Torque Wrench, In. Lb type	120 +/-10

D. AmSafe Seatbelt Airbag System Removal

(1) Enabling Switch Systems: Access yellow connectors that connect the Inflatable Lap Belt Assembly or Buckle Assembly to Cable Interface Assembly connector(s) (Figure 12) and disconnect by sliding the red locking tab backwards (Figure 13) to the unlocked position. Depress the yellow tab and pull apart both connector halves.

(2) Remove squib connector from the Inflator by squeezing both sides of the connector and gently pulling away from the Inflator (Figure 13).

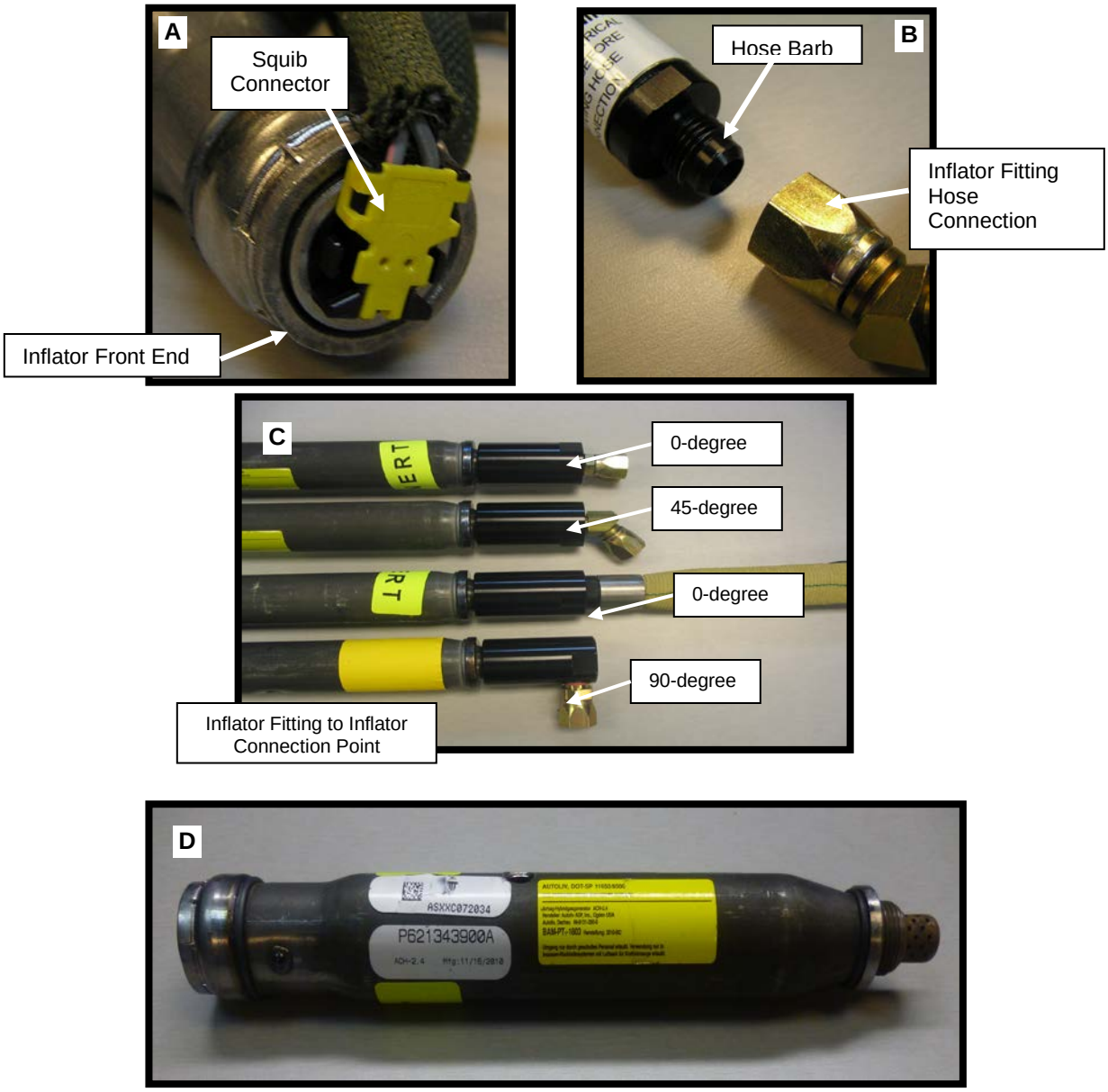

Figure 11: Electrical Connection to Inflator, Hose Connector to Inflator Fitting, Inflator Fittings to Inflators, ACH 2.4 Inflator (no inflator fitting required)

NOTE: THE ACH 2.4 INFLATOR (FIGURE 11D) DOES NOT REQUIRE AN INFLATOR FITTING. THE HOSE CONNECTION SHOWN IN FIGURE 11B IS MADE DIRECTLY TO THE INFLATOR WHEN USING 2.4 INFLATOR.

(3) Remove the Inflator from its mounting hardware (refer to seat OEM installation drawing for specifics on attaching hardware for Inflator).

(4) If the inflator has an Inflator Fitting, disconnect it from the Inflator (Figure 11C). Disconnect the gas hose from the Inflator or Inflator Fitting depending on what type of inflator is being used (Figure 11B). The gas hose barb and the Inflator threads are Loctite 242 coated,

which makes for a very secure fit. Use a second back-off wrench for loosening. A strap wrench is recommended to be used. DO NOT damage crimp end of gas hose or Inflator Fitting if using any type of locking pliers.

CAUTION: IF REPLACEMENT OF THE AIRBAG BELT(S) IS NOT IMMEDIATELY POSSIBLE, COVER THE INFLATOR FITTING GAS HOSE CONNECTOR TO PROTECT FROM DEBRIS.

(5) Remove Airbag Belt and Buckle Belt from seat belt shackles.

(6) Disconnect the Cable Interface Assembly from the EMA by depressing locking mechanism on the Cable Interface Assembly EMA connector (Figures 12) and releasing connector halves.

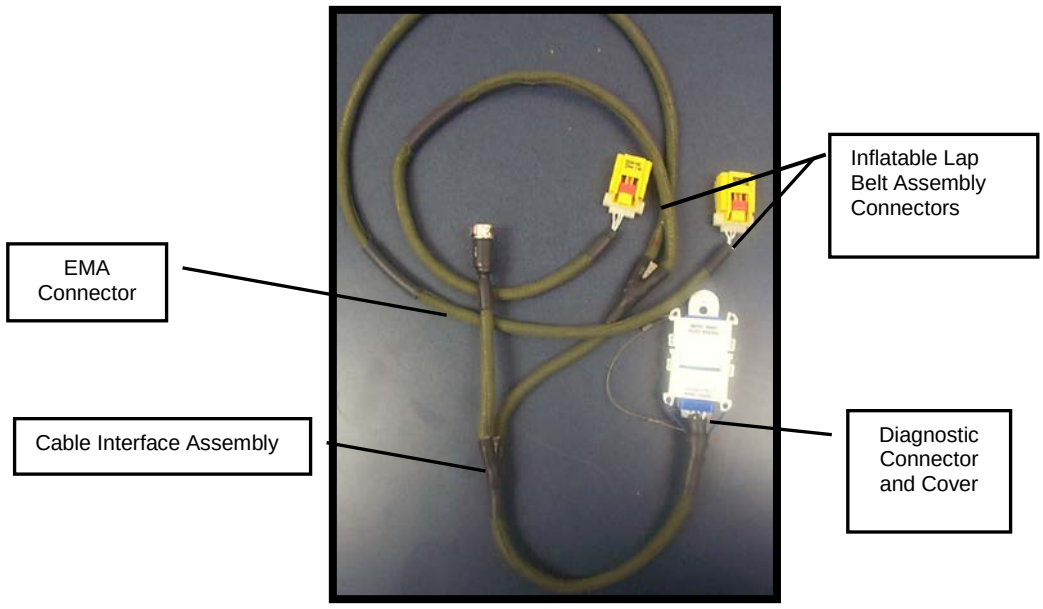

Figure 12: Cable Interface Assembly

Figure 13: Inflatable Lap Belt Assembly Connector

(7) Remove Cable Interface Assembly from seat.

(8) Remove EMA from mounting brackets. Refer to seat OEM installation drawing for installation details.

E. AmSafe Seatbelt Airbag V23 System Installation

(1) Remove the end cap plug (if new Inflatable Lap Belt Assembly) from Two-Point Airbag Belt gas hose and discard. DO NOT REMOVE Safety Cable Tie on the airbag connector tongue at this time (if installed).

CAUTION: CHECK ORIENTATION OF TWO-POINT SEATBELT AIRBAG BELT(S) BEFORE ROUTING GAS HOSE INTO INFLATOR FITTING. THE AIRBAG COVER MUST PRESENT AWAY FROM OCCUPANT (WARNING LABEL ORIENTATION IS ON INSIDE TOWARDS OCCUPANT).

(2) Route gas hose through seat per seat OEM installation drawing.

(3) Apply a thin, even coat of Loctite 242 thread locking compound onto the threaded end of the Inflator before attaching to Inflator Fitting. If no Inflator Fitting, apply it onto the threaded end of the gas hose barb before attaching it to the Inflator.

(4) Connect gas hose from Two-Point Airbag Belt(s) to Inflator Fitting (Figure 11B) using required in/lbs torque (Ref. Table 4 for torque value). The Inflator Fitting connector fitting is a pressure fitting which must be fully seated onto the gas hose barb for an air-tight fit.

(5) Connect Inflator Fitting to Inflator (Figure 11B) or gas hose barb to Inflator using required in/lbs torque (Ref. Table 4).

(6) Apply a thin, even coat of Loctite 242 thread locking compound onto the gas hose barb.

(7) Attach Squib Connector(s) (Figure 11A) to Inflator(s). Orient connector as shown in Figure 11A and seat into front end of inflator until it locks in place.

NOTE: DO NOT DAMAGE ANY PORTION OF SERIAL NUMBER ON INFLATOR WHEN MOUNTING.

(8) Secure the Inflator and Inflator Fitting (if installed) onto the seat. Refer to seat OEM installation drawing for mounting bracket details.

(9) Insert EMA into mounting hardware and secure. The arrow on the EMA label should face aircraft forward (Figure 14). Refer to seat OEM installation drawing for mounting bracket details and torque values, or reference Table 4 for torque values.

(10) Connect EMA to Cable Interface Assemblies EMA connector (Figures 1 and 2). The connectors are keyed. Align connector halves and seat fully until they lock.

Figure 14: EMA Installation Orientation

(11) Install the Cable Interface Assembly per the seat OEM's installation drawing and instructions.

(12) Secure Two-Point Airbag Belt(s) to seat shackle.

(13) Connect Cable Interface Assembly connector(s) to Inflatable Lap Belt Assembly, Buckle Assembly or extension cable connector(s). Connect mated halves together in proper orientation and slide Red Locking Tab forward to locking position (Figure 13).

(14) Connect the Buckle Belt to seat shackle.

(15) If installed, remove Safety Cable Tie from airbag buckle tongue before performing functional testing.

(16) Perform functional test on system. Refer to Section 1000 – Testing and Fault Isolation for testing procedures.

F. Installation of Seats Equipped with AmSafe Seatbelt Airbag System

WARNING: IF INSTALLED, DO NOT REMOVE THE SAFETY TIE FROM THE AIRBAG TONGUE UNTIL THE SEAT IS INSTALLED IN THE AIRCRAFT.

WARNING: DO NOT CARRY SEAT BY THE AMSAFE SEATBELT AIRBAG SYSTEM. THIS MAY CAUSE DAMAGE TO THE SYSTEM THAT MAY REQUIRE REPLACEMENT OF COMPONENTS.

(1) Install seats in aircraft per seat OEM and aircraft OEM instructions.

(2) Non-Enabling Switch Systems: Connect EMA and Cable Interface Assembly on seats with Non-Enabling Switch System.

(3) Remove any protective coverings that may be present on the Airbag Belt and Buckle Belt.

(4) Inspect the Airbag System to ensure all connections are made and the EMA is securely mounted to the seat frame.

(5) Perform a system diagnostics test verify that the AmSafe Seatbelt Airbag System is operational. Follow procedures shown in the Testing and Fault Isolation Section of this document (Section 1000). The AmSafe Seatbelt Airbag System equipped seat is now ready for use.

G. Removal of Seats Equipped with AmSafe Seatbelt Airbag System

NOTE: IF REMOVAL OF AMSAFE SEATBELT AIRBAG EQUIPPED SEAT IS REQUIRED, BE SURE TO FIRST COVER THE AIRBAG BELT TO KEEP FROM ACCIDENTAL DAMAGE TO THE AIRBAG BELT COVER.

(1) Safe the system by installing a Safety Tie (or equivalent type tie wrap) through the airbag belt's tongue to prevent buckling of the two seatbelt halves.

(2) The BUCKLE HALF OF THE SEATBELT AIRBAG SYSTEM SHOULD BE FOLDED OVER ON ITSELF, COVERED AND SECURED PRIOR TO REMOVAL OF THE SEAT. This will protect the buckle from any damage and ensure the AmSafe Seatbelt Airbag System cannot be accidentally enabled by the buckling of the Inflatable Lap Belt Assembly or proximity to the belt tongue.

SHIPPING, TRANSPORTATION, HANDLING, STORAGE PROCEDURES

1. INTRODUCTION

A. Reasons for Shipping, Transportation, Handling, and Storage Procedures

(1) The purpose of this section is to ensure that all persons associated with the handling, shipping, transporting, and storage of this product are fully cognizant of the safety issues required and that all necessary shipping and transportation regulations are known and observed.

B. Limitations of Shipping, Transportation, Handling, and Storage Procedures

(1) The recommended practices in this section are stated as guidelines only. AmSafe makes no claim by this document to be the complete and official document for shipping, handling, and storage of the AmSafe Seatbelt Airbag Inflator. All parties involved in the receiving, transporting, handling, and storage of this product are required to obtain their own personnel training based upon local regulations, and ensure that all necessary local regulations are followed regarding the handling of this product.

C. Scope of Shipping, Transportation, Handling, and Storage Procedures

(1) This section is concerned with the AmSafe Seatbelt Airbag EMA, Inflator, and Inflatable Lap Belt Assembly. The Inflator is a stored gas/energetic material device.

D. Procedures

(1) The procedures for Shipping, Transportation, Handling, and Storage are specified in the associated portion of this manual. General notes, warnings, and cautions are provided below:

WARNING: THE AIRBAG SYSTEM SHOULD NEVER BE ACTIVE WITH AN UNSECURED SEAT. THE AMSAFE SEATBELT AIRBAG SYSTEM WILL DEPLOY IF THE SEAT RECEIVES AN INPUT ABOVE THE DEPLOYMENT THRESHOLD OF THE SYSTEM. THE DEPLOYMENT THRESHOLD IS EASILY ACHIEVED IF AN UNSECURED SEAT RECEIVES A SHOCK SUCH AS DROPPING THE SEAT.

WARNING: FAILURE TO COMPLY WITH ALL RELEVANT DANGEROUS GOODS REGULATIONS REGARDING THE SYSTEM MAY RESULT IN CIVIL OR CRIMINAL PENALTIES.

WARNING: THE AMSAFE SEATBELT AIRBAG SYSTEM INFLATOR IS A STORED, GAS/ENERGETIC MATERIAL DEVICE. SEVERE PERSONAL INJURY OR BODILY HARM MAY BE CAUSED BY MISUSE AND/OR TAMPERING. DO NOT MISHANDLE OR TAMPER WITH THE PRODUCT IN ANY WAY. NEVER ATTEMPT TO SERVICE THE SYSTEM. NEVER APPLY ELECTRICAL CURRENT TO THE ELECTRONICS CONNECTION.

WARNING: **ALL AMSAFE AIRBAG SYSTEMS WITH LIFT-LATCH BUCKLES HAVE ENABLING SWITCHES. IF THE AMSAFE AIRBAG SYSTEM HAS AN END-RELEASE BUCKLE, IT MAY NOT HAVE AN ENABLING SWITCH. AN AIRBAG SYSTEM WITHOUT AN ENABLING SWITCH IS ALWAYS LIVE, EVEN WITH A DISCONNECTED BUCKLE.**

IF THERE IS NO ELECTRICAL CABLE ATTACHED TO THE BUCKLE, THERE IS NO ENABLING SWITCH, AND THE SYSTEM IS LIVE AS SOON AS ALL ELECTRICAL CONNECTIONS ARE MADE.

IF THE ENABLING SWITCH IS NOT PRESENT OR IT IS A STRUCTURE MOUNTED SYSTEM, THEN THE EMA MUST NOT BE CONNECTED TO THE CABLE INTERFACE ASSEMBLY UNLESS THE SYSTEM IS BEING TESTED OR THE SEAT IS INSTALLED ON THE AIRCRAFT. UNDER NO CIRCUMSTANCES SHALL THE EMA BE CONNECTED DURING TRANSPORTATION IF IT IS A NON-ENABLING SWITCH SYSTEM OR IT IS A STRUCTURE MOUNTED SYSTEM.

CAUTION: **KEEP THE INFLATOR AWAY FROM ANY AND ALL THERMAL IGNITION SOURCES, ELECTRIC SPARKS OR FLAME, IMPACT OR MECHANICAL IGNITION SOURCES, OR ELECTRO-STATIC DISCHARGE. AUTO IGNITION MAY OCCUR WITH THESE SOURCES PRESENT. INFLATOR'S AUTO-GAS RELEASE IS AT ABOUT 190°C.**

NOTE: AMSAFE SEATBELT AIRBAG SYSTEM INFLATOR SHALL BE HANDLED ONLY BY QUALIFIED PERSONS WITH AWARENESS TRAINING IN HAZMAT/DANGEROUS GOODS SHIPPING REQUIREMENTS.

NOTE: THE INFLATOR IS CLASSIFIED BY THE U.S. DOT AS CLASS 9, AIR BAG INFLATORS, UN3268.

NOTE: THE AUTOLIV MATERIAL SAFETY DATA SHEET (MSDS), AIRBAG INFLATOR, HYBRID CURTAIN, TAKES PRECEDENCE, WHERE CONFLICTING, OVER THIS DOCUMENT (SEE SECTION 4000).

2. TRANSPORTING SEATS EQUIPPED WITH THE AMSAFE SEATBELT AIRBAG SYSTEM

A. Reasons for Transporting Seats Equipped with AmSafe Seatbelt Airbag System

(1) The purpose of this section is to ensure that all persons associated with the transporting seats with the AmSafe Seatbelt Airbag System installed are fully cognizant of the safety issues required and that all necessary shipping and transportation regulations are known and observed.

B. Limitations of Transporting Seat Equipped with AmSafe Seatbelt Airbag System

(1) The recommended practices in this section are stated as guidelines only. AmSafe makes no claim by this document to be the complete and official document for transporting seats with AmSafe Seatbelt Airbag System installed. All parties involved in the receiving, transporting, handling and storage of seats with installed AmSafe Seatbelt Airbag Systems are required to obtain their own personnel training based upon local regulations and ensure that all necessary local regulations are followed regarding the handling of seats with this product installed.

C. Scope of Transporting Seats Equipped with AmSafe Seatbelt Airbag System

(1) This section is concerned with seats equipped with AmSafe Seatbelt Airbag System.

D. Procedures

(1) The procedures for Transporting Seats Equipped with AmSafe Seatbelt Airbag Systems are specified in the associated portion of this manual. General notes, Warnings and Cautions are provided below.

WARNING: **FAILURE TO COMPLY WITH ALL RELEVANT DANGEROUS GOODS REGULATIONS REGARDING THE SYSTEM MAY RESULT IN CIVIL OR CRIMINAL PENALTIES.**

CAUTION: **KEEP THE INFLATOR AWAY FROM ANY AND ALL THERMAL IGNITION SOURCES, ELECTRIC SPARKS OR FLAME, IMPACT OR MECHANICAL IGNITION SOURCES, OR ELECTRO-STATIC DISCHARGE. AUTO IGNITION MAY OCCUR WITH THESE SOURCES PRESENT. INFLATOR'S AUTO-GAS RELEASE IS AT ABOUT 190°C.**

NOTE: AMSAFE SEATBELT AIRBAG SYSTEM INFLATOR SHALL BE HANDLED ONLY BY QUALIFIED PERSONS WITH AWARENESS TRAINING IN HAZMAT/DANGEROUS GOODS SHIPPING REQUIREMENTS.

NOTE: THE INFLATOR IS CLASSIFIED BY THE U.S. DOT AS CLASS 9, AIR BAG INFLATORS, UN3268.

NOTE: ONCE THE INFLATOR IS INSTALLED IN ITS INTENDED LOCATION FOR USE (SEAT), THE ASSEMBLY THAT CONTAINS THE INFLATOR IS NOT REGULATED BY DOT.

E. Preparing for Shipment

(1) Upon completion of AmSafe Seatbelt Airbag system installation on a seat, perform a system diagnostics test to verify the AmSafe Seatbelt Airbag system has been installed correctly and is operational. Be sure to follow the procedures for Testing and Fault Isolation for the AmSafe Seatbelt Airbag system.

(2) Enabling Switch Systems: Safe the system for handling and shipping by installing a Safety Tie (or equivalent-type tie wrap) through the airbag belt's tongue to prevent buckling of the two seatbelt halves.

(3) Non-Enabling Switch Systems: Safe the system for handling and shipping by disconnecting the EMA.

(4) Enabling-Switch Systems: THE BUCKLE HALF OF THE SEATBELT AIRBAG SYSTEM SHOULD BE FOLDED OVER ON ITSELF, COVERED AND SECURED PRIOR TO MAINTENANCE OF THE SEAT. This will protect the buckle from any damage and ensure that the AmSafe Seatbelt Airbag System cannot be accidentally enabled by the buckling of the Inflatable Lap Belt Assembly or proximity.

F. Packaging

(1) Packaging of seats with AmSafe Seatbelt Airbag installed does not require any special procedures. An airbag equipped seat can be packaged the same as a seat without the AmSafe Seatbelt Airbag system.

(a) Any protective covering applied to the seat to prevent scratches or marring should be extended to the airbag belt to provide protection to its cover during transport. This would also protect against accidental buckling or switch closure due to proximity.

(b) If the Buckle Belt is adjustable, fold over the buckle belt on itself, cover and secure to prevent any kind of shipping damage. This would also protect against accidental buckling or switch closure due to proximity.

G. Exterior Labels and Markings

(1) No labels or markings are required beyond what is used for seats without the AmSafe Seatbelt Airbag system.

3. RETURNING AMSAFE SEATBELT AIRBAG COMPONENTS AND RMA PROCEDURES

A. Reasons for the Job

(1) The purpose of properly returning AmSafe Seatbelt Airbag System components is to allow the components to be tested and repaired as required, and to track failed components through the Repair/Maintenance system.

B. Limitations of the Job

(1) AmSafe Seatbelt Airbag components must be routed to AmSafe to ensure they are tested and repaired by qualified repair technicians and returned to service by a licensed repairperson. Refer to 3E for customer service processing and phone numbers.

C. Scope of the Job

(1) The failed components must be forwarded to the appropriate repair station by the appropriate personnel.

D. Equipment and Materials for the Job

(1) Paragraphs F and G contain details of shipping requirements for the Inflator as well as for all other AmSafe Seatbelt Airbag components. Please refer to these appropriate sections for information.

E. RMA Procedures

(1) For Return Material Authorization (RMA) number, contact a Customer Service Sales Analyst at (602) 850-2850, or by email at customerservice@amsafe.com. Identify customer's name, location, contact person, and phone number. Request from the customer service representative a Return Material Authorization number (RMA) for either an AmSafe Seatbelt Airbag repair/replacement component, calibration check, or for re-calibration of the AmSafe Seatbelt Airbag SDT.

(2) Mark and identify RMA number on the package label. Mailing address will be provided by customer service at time of contact for either AmSafe Seatbelt Airbag component and/or SDT.

F. Packaging and Shipping Requirements – Inflator

WARNING: **FAILURE TO COMPLY WITH ALL RELEVANT DANGEROUS GOODS REGULATIONS REGARDING THE INFLATOR MAY RESULT IN CIVIL OR CRIMINAL PENALTIES.**

NOTE: FOR REGULATED MATERIALS TRANSPORTATION – COMPLIANCE WITH APPLICABLE TRANSPORTATION REQUIREMENTS IS STRICTLY THE RESPONSIBILITY OF THE END USER AND NOT OF AMSAFE.

(1) Use the original packaging material in which the Inflator was received, if available and when it is in a serviceable condition. The Inflator must be shipped in a container which is DOT approved having been UN tested and marked under UN Performance Oriented Packing (POP). A new UN POP container may be requested in the RMA process.

(2) External Packaging

(a) Use only UN POP shipping container.

(3) Exterior Labels and Markings

(a) Labels

1. The exterior container shall be labeled durably and legibly to show at least:
   - All appropriate hazmat labels per Title 49 CFR Section 172.400.
   - All appropriate labels required by country of shipping origin.

(b) Markings

1. The exterior container shall be marked durably and legibly to show at least:
   - All appropriate hazmat markings per Title 49 CFR Section 172.300.
   - All appropriate markings required by country of shipping origin.

2. Markings such as RMA number and ship-to/from addresses shall be placed to avoid loss or obstruction during opening and closing of the container.

(4) Shipping

(a) Any person performing shipping functions for the Inflator must be trained in accordance with the requirements contained in Title 49 CFR Section 172.700.

(b) All local and relevant international handling, shipping, transporting regulations must be followed.

(c) Ship the component to AmSafe address as determined from previous paragraph 3E.

(d) EX Numbers for shipping Inflators:

INFLATOR P/N	DESCRIPTION	EX NUMBER
507592-401	TRW, ROI, 3.0 Mole	EX2001100059
508795-401 508794-401	TRW, ROI-V2, 2.3 & 3.1 Mole, 90 Degree Fitting	EX2004030191
508792-401	TRW, ROI-V2, 2.3 MOLE	EX2007020369
510385-401	TRW, ROI-V2, 2.3 MOLE 45 Degree Fitting	EX2007020372

INFLATOR P/N	DESCRIPTION	EX NUMBER
508793-401	TRW, ROI-V2, 3.1 MOLE	EX2007020371
510226-401	Autoliv, ASH 2.2	EX2000020021
510184-401 510183-401	Autoliv, ACH 2 to 2.2 Family	EX2009080441
511077-401 511450-401 511452-401 511454-401 511456-401 511878-401	Autoliv, ACH 2.3 to 2.5 Family	EX2009080443
511482-401	ARC, ADC-58, 1.20 Mole (from Morgantown, KY)	EX2011121271
511482-401	ARC, ADC-58, 1.20 Mole (from Reynosa, Mexico)	EX2009080150
511482-401	ARC, ADC-58, 1.20 Mole (from Xi'an, China)	EX2008050101
511482-401	ARC, ADC-58, 1.20 Mole (from Knoxville, TN)	EX2000060075

(e) Material Safety Data Sheets for all inflator assemblies can be found at the end of this document. Contact Shipping Department any questions regarding shipping @ shipping@amsafe.com or (602) 850-2768.

G. Packaging and Shipping Requirements – AmSafe Seatbelt Airbag Components except the Inflator

NOTE: FOR REGULATED MATERIALS TRANSPORTATION – COMPLIANCE WITH APPLICABLE TRANSPORTATION REQUIREMENTS IS STRICTLY THE RESPONSIBILITY OF THE END USER AND NOT OF AMSAFE.

(1) Use the packaging material in which the AmSafe Seatbelt Airbag System was received, if available and when it is in a serviceable condition. If not serviceable, new materials of the same quality and size shall be used.

(2) Cushioning

(a) "Peanut" type foam materials shall not be used for packaging AmSafe Seatbelt Airbag System components. Peanut-shaped foam can migrate in the container, causing the item to shift to the container side and be subject to shipping and handling damage.

(b) Use a minimum of three inches of cushioning material to prevent movement of the item within the container.

(3) External Packaging

(a) Shipping container shall be of same quality, type, and size as unit shipped new.

(4) Exterior Marking

(a) The exterior container shall be labeled, tagged or marked durably and legibly to show at least:

- Ship-to/from address
- RMA Number
- EMA – Lithium cells or batteries may be transported by ground or air. If being transported by ground, proper labeling identifying the battery must be present. If being transported by air, it must be done so as Class 9 Material.

(c) RMA number and ship-to/from addresses shall be placed to avoid loss or obstruction during opening and closing of the container.

(5) Shipping

(a) All local and relevant international handling, shipping, transporting regulations must be followed.

(b) Ship the component to AmSafe address as determined from previous paragraph 3E of this section. Consult your supervisor for the correct shipment method applicable at your location.

(c) Contact Shipping Department any questions regarding shipping @ shipping@amsafe.com or (602) 850-2768.

4. STORAGE

A. Inflator

(1) The Inflator shall be stored in cool and dry environments. Acceptable storage temperature should not exceed 200 degrees F (93-degrees C). The Inflator should be protected from sunlight, dust, moisture, and other contamination.

(2) The Inflator shall be protected from excessive EMI/RFI/ESD environments.

(3) The Inflator shall be handled and stored by a person trained in the requirements associated with dangerous goods.

(4) Observe all local storage regulations. Store only in a controlled area.

(5) The maximum continuous storage time for the Inflator is 10 years from date of manufacture. The service life of the Inflator Assembly (expiration date) is determined by the date of manufacture shown on the AmSafe label, not the Autoliv label. See Figure 15. If the EMA has been reworked or refurbished, the label will show an expiration date and should be removed and returned to AmSafe for disposal (once it has reached its expiration date).

NOTE: ONCE THE INFLATOR IS INSTALLED IN ITS INTENDED LOCATION FOR USE (SEAT), THE ASSEMBLY THAT CONTAINS THE INFLATOR IS NOT REGULATED BY DOT.

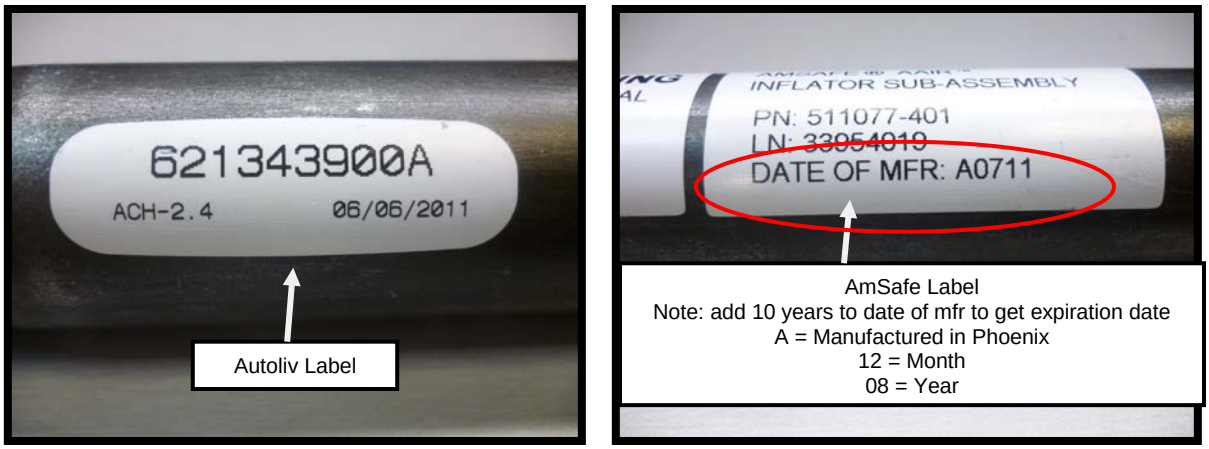

Figure 15: Inflator Label

B. EMA

(1) The EMA shall be stored in cool and dry environments. Acceptable temperature range is -22 to +131°F (-30° to +55°C). The EMA should be protected from sunlight, dust, moisture, and other contamination

(2) The EMA shall be protected from excessive EMI/RFI/ESD environments.

(3) Observe all local storage regulations. Store only in a controlled area.

(4) The maximum continuous storage time for the EMA is 14 years calculated from the AmSafe date of manufacture (Figure 16). At seven years, the EMA should be returned to AmSafe for refurbishment.

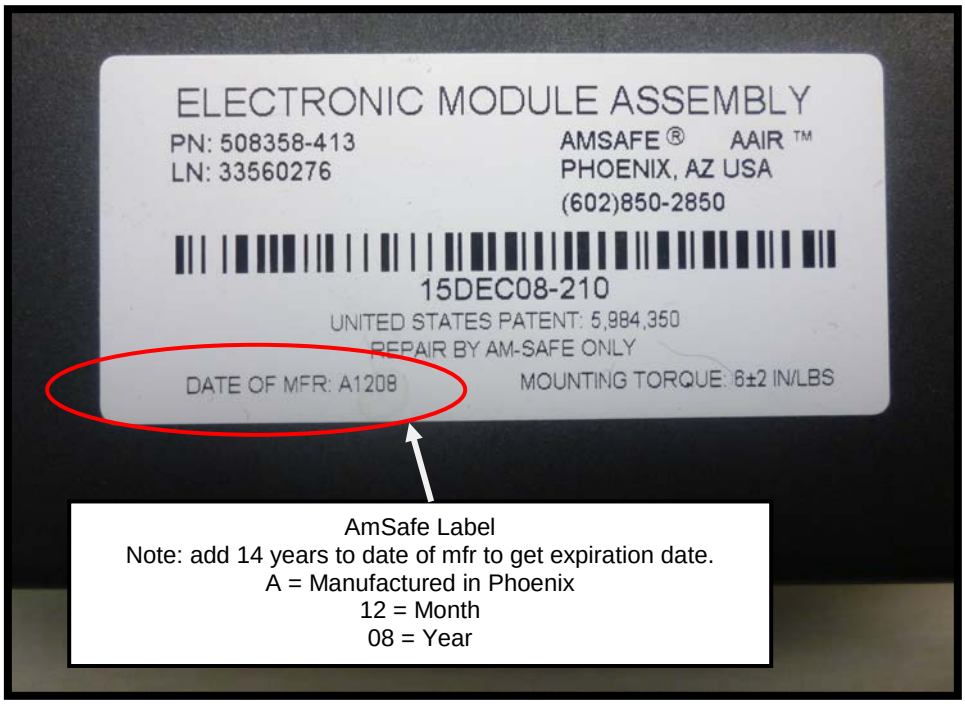

Figure 16: EMA Label

NOTE: IF THE INFLATOR HAS BEEN REWORKED OR REFURBISHED THERE WILL BE AN EXPIRATION DATE ON THE LABEL. EXPIRATION DATE IS LABELED MMYY: MM = MONTH YY = YEAR. IN THIS CASE THE LABEL WILL ALSO SHOW THE ORIGINAL DATE OF MANUFACTURE OR ORIGINAL SERIAL NUMBER, IDENTIFIED AS: ODM: A27SEP11-12 = SEPTEMBER 27, 2011.

C. Inflatable Lap Belt or Restraint Assembly

(1) The Inflatable Lap Belt Assembly shall be stored in cool and dry environments. Acceptable temperature range is -22 to +131°F (-30° to +55°C). The Inflatable Lap Belt Assembly should be protected from sunlight, dust, moisture, and other contamination.

5. AUTOLIV MSDS FOR AIRBAG INFLATOR, HYBRID CURTAIN

Autoliv

MSDS NO. 075
Revision 07
April 29, 2010

MATERIAL SAFETY DATA SHEET
AUTOLIV AMERICAS

1.0 Identification of the Substance/Preparation and of the Company	
Product Name:	HYBRID CURTAIN INFLATOR
Synonyms/Programs	ACH-2.0, 2.1, 2.2, 4.1, ACH-2.2 EV, ACH-2.0b, 2.1b
Company Identification:	Autoliv Americas Regional Health, Safety & Environmental 3350 Airport Road Ogden, UT 84405 USA
Autoliv (24 Hour)	(435) 734-6835
Chemtrec USA (Emergency)	(800) 424-9300

2.0 Hazards Identification

Emergency Overview:

The tamper-resistant, sealed metal container poses no risk of chemical exposure before deployment. If the inflator is incinerated, broken, drilled into or electric current is connected to the lead wires, a physical hazard may exist during deployment or if installed improperly. ACH-2 curtain inflators contain a high pressure mixture of helium and argon gas. ACH-2 EV curtain inflators contain a high pressure mixture of helium and argon gas and a small amount of pyrotechnic material. Do not drill, break, or breech the steel container.

NOTE: If inflator is ruptured and igniter material is present, or individuals are exposed to repeated deployments, as experienced in a testing situation without safe and adequate engineering controls,

For ACH-2.2 EV inflators see Autoliv MSDS # 042, Air Bag Inflator Igniter Generant (MIP-1191) for additional information.

Potential Health Effects	None expected when used as intended. Effluent gases from multiple deployments in testing situations may cause skin, eye, or mucous membrane irritation. Effluent gases in these situations must be effectively controlled through engineering systems designed and tested to remove applicable contaminants or PPE that will accomplish the same effect.
Human Health Effects and Symptoms of Overexposure	
Inhalation	None expected when used as intended.
Skin Contact	None expected when used as intended.
Eyes	None expected when used as intended.
Ingestion	None expected when used as intended.
Carcinogenicity	None expected when used as intended.
Medical Conditions Aggravated by Exposure	None expected when used as intended.
Target Organs	Not available
Potential Environmental Effects	Not available

Autoliv Americas
3350 Airport Road
Ogden, Utah 84405

3.0 Composition/Information on Ingredients					
Ingredients	**Cas No.**	**EC No.**	**% by Wt.**	**EU Classification**	**EU R-Phrases**
ACH-2.0, 2.1, 2.2, 4.1, 2.0b, 2.1b					
Steel Casing & Hardware	NA	NA	92-97		
Argon	7440-37-1	231-147-0	3-5		
Helium	7440-59-7	231-168-5	1-3		
ACH-2.2 EV					
Steel Casing & Hardware	NA	NA	92-97		
Argon	7440-37-1	231-147-0	3-5		
Helium	7440-59-7	231-168-5	1-3		
MIP-1191	NA	NA	<1	F, Xn	R2, 10, 34, 36/37/38 S2, 13, 16, 23, 24/25, S36/37/39

4.0 First-aid Measures	
Inhalation	None expected when used as intended.
Eyes	None expected when used as intended.
Skin	None expected when used as intended.
Ingestion	None expected when used as intended.

5.0 Fire Fighting Measures	
Suitable Extinguishing Media	Water may be used to cool unburned material
Unsuitable Extinguishing Media	NA
Special Exposure Hazards	This device will be activated at temperatures greater than 266°F (130°C).
Products of Combustion	Can produce water, carbon dioxide, carbon monoxide, argon, oxygen, helium, and hydrogen.
Protection of Firefighters	Fight surrounding fire at a distance until material has burned
Special Protective Equipment for Firefighters	NA

6.0 Accidental Release Measures	
Personal Precautions	If inflator is ruptured and gas generant is present, use impervious gloves, safety goggles, dust mask, safety shoes, and flame treated clothing when cleaning spills.
Environmental Precautions	NA
Methods For Clean-up and Containment	When handled and installed properly, no spills or leaks should occur. If inflator is ruptured and gas generant is present. Clean up with non-sparking tools. Avoid spark, static electricity, and open flame. Avoid raising dust. Ventilate area. Wash spill site with water after material pick-up is complete.

7.0 Handling and Storage	
Handling	Avoid spark, ESD, impact, friction and open flame. Post deployment, the surface of the inflator may have trace amounts of particulate and is usually hot. Residue may be irritating to the skin, eyes and mucous membranes. Latex or nitrile under leather gloves or equivalent is recommended if handling hot fired inflators.
Storage	Store away from high temperatures, open flame, static electricity, and other ignition sources. Store in accordance with federal, state, and local regulations. Recommend storage at ambient temperatures.

8.0 Exposure Control/Personal Protection			
Exposure Limit Values	**OSHA-PEL**	**ACGIH-TLV**	**Other Limits**
ACH-2.0, 2.1, 2.2, 4.1, 2.0b, 2.1b			
Steel Casing & Hardware	NE	NE	NA
Argon	NE	NE	NA
Helium	NE	NE	NA
ACH-2.2 EV			
Steel Casing & Hardware	NE	NE	NA
Argon	NE	NE	NA
Helium	NE	NE	NA
MIP-1191	NE	NE	NA

Engineering Controls	Effluent gases from multiple ignition testing situations may cause skin, eye or respiratory irritation. Use approved engineering controls to minimize exposure to effluent gases. Use approved personal protective equipment as a short-term control until engineering controls are adequate.
Personal Protective Equipment	
Respiratory Protection	For multiple deployment testing situations use a NIOSH approved respirator.
Hand Protection	Nitrile, Latex or equivalent gloves.
Eye Protection	Safety glasses or goggles.
Skin Protection	Avoid skin contact with gas generant.
General Hygiene Responsibilities	Use good personal hygiene at all times.

9.0 Physical and Chemical Properties	
General Information	
Appearance, Physical Form	Sealed metallic canister with molded plastic
Color	Varies
Odor	None
Important Health, Safety and Environmental Information	
Boiling Point	Not Applicable
Melt Point/Freeze Point	Not Applicable
Flash Point	Not Applicable
Flammability	Not Applicable
pH	Not Applicable
Solubility In Water	Not Applicable

Specific Gravity	Not Applicable
% Volatile by Weight	Not Applicable
Vapor Pressure	Not Applicable
Vapor Density	Not Applicable
Partition Coefficient: n-octonal/water	Not Applicable
Evaporation Rate	Not Applicable
Explosive Properties	Not Applicable

10.0 Stability And Reactivity	
Stability	Sealed unit is stable when used as designed.
Conditions To Avoid	Sparks, static electricity, open flame and hot temperatures.
Incompatible Materials	None in present form.
Hazardous Decomposition Products	May release carbon dioxide and trace amounts of carbon monoxide and hydrogen.
Possibility of Degradation to Unstable Products	Not Determined

11.0 Toxicology Information	
Acute Effects:	
Oral LD_{50}	Not applicable in present form.
Dermal LD_{50}	Not applicable in present form.
Inhalation	Not applicable in present form.
Eye Irritation	Not applicable in present form.
Skin Irritation	Not applicable in present form.
Sensitization	Not applicable in present form.
Chronic Effects:	
Carcinogenicity	Not applicable in present form.
Mutagenicity	Not applicable in present form.
Reproductive Effects	Not applicable in present form.
Developmental Effects	Not applicable in present form.

12.0 Ecological information	
Ecotoxicity	Not Available
Mobility in Environment	Not Available
Persistence and Degradability	This device is sealed and under normal conditions poses no exposure hazard to human health or the environment. California Use Only: Special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate
Bioaccumulative Potential	Not Available

13.0 Disposal Considerations
Autoliv is in the unique position to offer its recycling services for air bag module units, individual inflators, and pretensioners to customers, suppliers, manufacturers, dealers and dismantlers Guidance on proper requirements for recyclable Air Bag materials is available from Promontory Airbag Recycling Center (PARC) by calling 1-800-667-4079 within the U.S. and Canada or 1-435-471-3315. Arrangements **must** be made with Autoliv to accept the recyclable items prior to shipment.

14.0 Transport Information	
This MSDS is not intended to have all required shipping information.	
Identification number	UN3268
Proper shipping name	Air bag Inflators
Hazard Classification	Class 9
Packaging Group	PGIII
DOT Approval Number	Specific to the individual program
For further information contact:	Autoliv Logistics Services 3350 Airport Road Ogden, UT, 84405

15.0 Regulatory Information	
OSHA Status	Manufactured article
TSCA Chemical Inventory:	The components of this product are listed on the Toxic Substance Control Act (TSCA) inventory.
CERCLA Reportable Quantity, 40 CFR 302:	No
EPCRA Section 302, Extremely Hazardous Substances:	No
EPCRA Section 311/312, Hazard Category:	Yes
EPCRA Section 313, Toxic Chemicals:	Yes
RCRA INFORMATION:	Please see Section 13 Disposal Considerations for recycling information. Otherwise, dispose of in accordance with all federal, state or provincial and local regulations.
Information for Community	Not Determined
EU Classifications	F, Xn
EU Phrases	S2 Keep out of reach of children S4 Keep away from living quarters S15 Keep away from heat S16 Keep away from sources of ignition S23 Do not breathe effluents S33 Take precautionary measures against static S37 Wear suitable gloves S47 Keep at temperature not exceeding 266°F (130°C) S59 Refer to manufacturer for recycling

16.0 Other Information	
Supplier Information	The environmental, health and safety information contained herein is given in compliance with statutory obligations and relates only to the substance/preparation described in this material safety data sheet. This material safety data sheet is provided for information only, and is not intended to create or imply any representation, agreement or warranty, whether express or implied, except to the extent required by applicable law. The environmental, health and safety information contained herein is believed to be accurate based on our current knowledge. It remains the sole responsibility of the customer to provide a safe workplace and to

	comply with all applicable laws and regulations. Nothing contained herein is to be construed as a recommendation for use in violation of any patent or of applicable laws or regulations.			
HMIS Ratings	Health - 0	Flammability- 0	Reactivity- 1	PPE- X
History				
Reason For Issue	Revision of MSDS			
Prepared By	Autoliv Regional Industrial Hygiene			
Approved By	Autoliv Regional Health, Safety & Environmental			
Approval Date	04/29/10			
Supersedes Date	03/08/10			
Supersedes Revision	06			

6. ROI MSDS FOR AIRBAG INFLATOR

MATERIAL SAFETY DATA SHEET

AIRBAG INFLATION DEVICE CONTAINING AN IGNITER / INERT GAS

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

COMPANY IDENTIFICATION: AmSafe Aviation Inflatable Restraints (AAIR®) 1043 N. 47th Avenue Phoenix, AZ USA 85043 602-850-2850	**EMERGENCY TELEPHONE NO.** Chemtrec: 1-800-424-9300 Outside USA: 703-527-3887 (Collect calls accepted)
TRADE NAME: AAIR Inflation Device – ROI	**MSDS NUMBER:** E508779 – Revision B
CHEMICAL NAME: Mixture of ZPP (Zirconium, Potassium Perchlorate), Binder, and a High Pressure Cylinder containing an Inert Gas	**SYNONYMS:** Inflation Device, Airbag Inflator, ROI
PREPARED BY: AmSafe Aviation, Inflatable Restraints, Phoenix, AZ	**DATE OF ISSUE/REVISION:** Initial Issue: September 25, 2003 Revision A: July 15, 2004 Revision B: November 3, 2006

2. INGREDIENTS

The chemical materials listed below for the Ignition Charge are present in amounts of less than 290 mg. The chemical materials in the Ignition Charge are present internal to the Airbag Inflator Assembly in a sealed system which is considered an article under the provision of OSHA's Hazard Communication Standard. Under normal and expected conditions of use, there is no contact with these materials.

Component	CAS #	Percent	ACGIH (TLV)	OSHA (PEL)	Units
A. Ignition Charge: < 290 mg					
Zirconium*	7440-67-7	45-60	5 (T) 10 (STEL)	5 (T)	mg/M^3
Potassium Perchlorate	7778-74-7	40-55	10 (T) 3 (R)	15 (T) 5 (R)	mg/M^3
Binder	Not Est.	2	Not Est.	Not Est.	Not Est.
B. Inflator Gas					
The inflator gas is a member of the noble gas family and is classified as a simple asphyxiant. It is contained in a small high pressure (< 7500 psi) cylinder.					
* = Exposure limits are based on the zirconium content of total particulate matter. T = Total particulate matter; STEL = Short Term Exposure Limit (15 minutes), R = Respirable fraction of particulate matter.					

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

The Igniter Charge may be ignited by excessive heat, severe impact, or contact with live electrical circuitry. These components are sealed inside a metal module and, therefore, contact is unlikely. The Igniter Charge is gray solid with no odor. Dusts or particulates from ruptured modules may cause irritation of eyes, skin, mucous membranes, and respiratory tract. Wear appropriate personal protective equipment. Keep individuals not involved in the cleanup out of the area. Eliminate all potential sources of ignition, such as excessive heat and live electrical circuitry. Pick up released materials with anti-static, non-sparking implements and place in appropriate containers for disposal. If materials or modules are involved in a fire situation, evacuate all personnel to a safe distance and allow fire to burn unless life or property is threatened. If life or property is threatened by fire, use large quantities of water. Do not allow product or runoff water to enter storm or sanitary sewers, ground water, or soil.

THE HEALTH EFFECTS DESCRIBED BELOW ARE THOSE ASSOCIATED WITH THE CHEMICAL COMPONENTS OF THE IGNITER CHARGE AND INFLATOR GAS SYSTEMS. THESE COMPONENTS ARE IN SEALED SYSTEMS. THE IGNITER CHARGE CONTAINS LESS THAN 290 MG OF MATERIAL. THE AMOUNT OF MATERIAL PRESENT IN ONE INFLATOR WOULD NOT BE EXPECTED TO CAUSE THE EFFECTS LISTED BELOW UNDER INGESTION, INHALATION, OR CHRONIC AND CARCINOGENICITY.

POTENTIAL HEALTH EFFECTS:

Eye: May cause irritation of the eyes.

Skin contact: May cause irritation of the skin.

Skin Absorption: Not known to be absorbed through the intact skin.

Ingestion: Not expected to be an important route of entry into the body. May cause gastrointestinal distress.

Inhalation: Dusts may cause irritation of the mucous membranes and respiratory tract. The inflator gas is a simple asphyxiant and acts by displacing the oxygen in an area.

Chronic and Carcinogenicity: Prolonged exposures may cause dermatitis. Perchlorates can affect the utilization of iodine by the thyroid gland. Long term, high level exposures to perchlorates may cause symptoms of thyroid dysfunction such as goiter. Perchlorates may also covert hemoglobin to methemoglobin and block the oxygen transport mechanism of the blood. There is some evidence that ingestion of large quantities of perchlorates can cause kidney and lymph node damage and, in extreme cases, damage to the blood forming organs. See Section 11.

The components of the product have not been listed as carcinogens or potential carcinogens. Pre-existing skin, kidney, blood, and thyroid conditions may possibly be aggravated by exposure to the components of the Igniter Charge.

4. FIRST AID MEASURES

Inhalation: Remove exposed person to fresh air. If breathing is difficult, oxygen may be administered. If breathing has stopped, artificial respiration should be started immediately. Seek medical attention.

Eyes: Flush with tepid water for at least 20 minutes holding the eyelids wide open. Seek medical attention if irritation develops.

Skin: Wash thoroughly with mild soap and water. Seek medical attention if irritation develops. Remove any contaminated clothing and launder thoroughly before reuse.

Ingestion: Not expected to be an important route of entry into the body. If large amounts of the product are ingested, give 2 glasses of water. Never give anything by mouth to an unconscious person. Seek medical attention.

5. FIRE FIGHTING MEASURES

Igniter Charge and Output Charge

FLASH POINT: NA LEL: 0%* UEL: 100%* AUTO IGN. TEMP.: ≥750° F. (≥400° C)
* = Self oxidizing at elevated temperatures.

Unless life or property is threatened, do not fight fires involving the Ignition Charge. The area should be evacuated and all personnel kept well up wind. If life or property is threatened by fire, use large quantities of water. Do not allow product or runoff water to enter storm or sanitary sewers, ground water, or soil. Intact modules in or near fires should be cooled with a water spray or fog to prevent possible detonation.

A self-contained breathing apparatus operating in the positive pressure mode and full fire fighting gear should be worn for combating fires.

6. ACCIDENTAL RELEASE MEASURES

Intact inflators should be picked up and placed in appropriate containers. Released propellant should be picked up with anti-static tools and placed in DOT approved containers for disposal. Avoid contact with live or static electrical sources. Releases of propellant may be reportable to local, state, and/or federal authorities.

7. HANDLING AND STORAGE

The air bag igniter is a Class 1.4 Explosive and should be handled and stored accordingly. Do not store with or near incompatible materials cited in Section 10. Do not use or store near open flames, other source of ignition, where there is the possibility of contact with live electrical equipment or circuitry, where there is the possibility of the buildup of static charges, or where there is excessive ambient heat (≥ 140 °F). Where dusty conditions may exist, electrically conductive floors and shoes are recommended to prevent the buildup of static charges.

8. EXPOSURE CONTROL - PERSONAL PROTECTION

ENGINEERING CONTROLS: Not normally required. Inflators are sealed units.

RESPIRATORY: Not normally required. If exposures to propellant exceed the limits cited in Section 2, use, as a minimum, a NIOSH approved *1/2* facepiece respirator with R-95 or P-100 cartridges. Consult a professional industrial hygienist or your respiratory protective equipment supplier for selection of the proper equipment. The evaluation of the need for respiratory protection should be determined by a professional industrial hygienist.

EYE PROTECTION: Safety glasses with sideshields are recommended.

PROTECTIVE GLOVES: Not normally required for product. Inflators are sealed units and there should be no exposure to the propellant mixture. Hand protection appropriate to the operation being performed should be worn.

GENERAL: No other personal protective equipment is generally required.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE & PHYSICAL STATE: Igniter Charge is a Gray Solid

MELT POINT: NA - Decomposes

VAPOR DENSITY (AIR = 1): NA

OCTANOL/WATER PARTITION COEFFICIENT: ND

VAPOR PRESSURE: NA

EVAPORATION RATE BuOAC = 1: NA

ODOR: None

BULK DENSITY: = 2

% VOLATILE BY VOLUME: Not Volatile

BOILING POINT: NA - Decomposes

% SOLUBILITY (H_2O): 485 g/L @ 68° F (20 °C) - Potassium Perchlorate.
Zirconium is insoluble in water.

pH: NA

OTHER: Inflators contain a high pressure cylinder, < 7500 psi, which contains a noble gas.

10. STABILITY AND REACTIVITY

STABILITY & POLYMERIZATION: Hazardous polymerization will not occur.

INCOMPATIBILITY (CONDITIONS TO AVOID): Product contains a strong oxidizing agent. Do not store with or near sources of ignition, live electrical circuitry, organic materials, strong acids, or reducing agents. Do not subject to excessive friction or mechanical shock.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or combustion may produce smoke, oxides of carbon, and zirconium and possibly low molecular weight organic species whose composition and toxicity have not been evaluated.

SPECIAL SENSITIVITY: The product may self-ignite at temperatures in excess of 750° F (400° C). The product may also be ignited by contact with live electrical circuitry and/or severe mechanical shock. The inflator contains a high pressure gas cylinder that contains an inert gas that will emit high pressure gas if the cylinder is exposed to heat.

11. TOXICOLOGICAL INFORMATION

Detailed toxicological studies have not been conducted on either the Igniter or Output Charge. While specific toxicity data can not be found, the acute toxicity of the materials is expected to be greater than 2000 to 3000 mg/kg. The chronic health effects information cited in Section 3 was obtained from the Canadian Center for Occupational Health & Safety.

12. ECOLOGICAL INFORMATION

Detailed studies on the environmental fate of the product have not been conducted. However, care should be taken to prevent entry of the product into the environment.

13. DISPOSAL CONSIDERATIONS

Dispose of used or waste Igniter Charge and Inflator Gas in accordance with all federal, state, and local regulations pertaining to the management of RCRA regulated wastes (40 CFR 261, 262, and 268).

14. TRANSPORTATION INFORMATION

DOT proper shipping name for the Inflation Device: Air bag inflators, Class 9, UN3268.

15. REGULATORY INFORMATION

The components of the product are not reportable under Section 313 of the Superfund Amendments and Reauthorization Act of 1986.

OSHA Hazard Communication Categories: Irritant, Blood, Kidney, Thyroid, and Skin Hazard.

SARA Hazard Categories: Acute Hazard, Chronic Hazard.

The Output Charge would be classified as a reactive hazardous waste: (D003) by the EPA.

16. OTHER INFORMATION

Not Est. = Not Established; NA = Not Applicable; ND = Not Determined.

All components of the product are included in the Toxic Substances Control Act (TSCA) inventory.

IMPORTANT SAFETY NOTICE: The information in the Material Safety Data Sheet relates only to the specific material(s) described herein and does not relate to use in combination with any other material or substance or in any process. We believe that the information contained herein is current as of the date of issue of this Material Safety Data Sheet. ***Because the use of this information and these opinions and the conditions of use of this product are not within the control of AMSAFE Aviation, AAIR Division, it is the user's obligation to determine the conditions of safe use of the product.***

Users of this product should study this Material Safety Data Sheet and become aware of the product hazards and safety information before using the product. Users should also notify their employees, agents, and contractors regarding information contained in this Material Safety Data Sheet and any product hazards and safety information in order to provide safe use of this product.

REVISION LOG

Revision	Date	Approved	Description
NC	25Sep2003	MCR	Initial Release
A	15Jul2004	MCR	Revised Title. Section 2 - Ingredients: > Data placed in Table Format. Section 3 - Hazards Identification: > Revision to "Emergency Overview"; deleted description of Igniter as Class 1.4G explosive. Igniter is NOT classified separately from the Inflation Device, DOT has classified the complete Inflation Device as Class 9.
B	3Nov2006	TG	Title Page, Company Identification and Prepared by – Changed company address and phone number. Header and Footer - Company name format changed and logo.

Autoliv

MSDS NO. 120
Revision 02
February 9, 2012

MATERIAL SAFETY DATA SHEET
AUTOLIV AMERICAS

1.0 Identification of the Substance/Preparation and of the Company	
Product Name:	STORED GAS CURTAIN AIR BAG INFLATOR (PNP-487)
Synonyms/Programs	ACH-2.3, ACH-2.4, ACH-2.4L, ACH-2.5
Company Identification:	Autoliv Americas Regional Health, Safety & Environmental 3350 Airport Road Ogden, UT 84405 USA
Autoliv (24 Hour)	(435) 734-6835
Chemtrec USA (Emergency)	(800) 424-9300

2.0 Hazards Identification

***Emergency Overview*:**

The tamper-resistant, sealed metal container poses limited risk of chemical exposure before deployment. It **may** cause some skin and respirable irritation after deployment. If inflator is incinerated, broken, drilled into, crushed, or electric current is connected to lead wires, a physical hazard may exist. This inflator contains high-pressure Argon gas and a small percentage by weight of gas generant. *Do not* drill, break, or breach the steel container.

NOTE: If inflator is ruptured and gas generant is present, or individuals are exposed to repeated deployments, as experienced in a testing situation without safe and adequate engineering controls, see Autoliv MSDS # 118, Air Bag Inflator Generant (PNP-487) for additional information.

The ACH-2.4L inflator is wrapped with a composite fiber. The composite fiber wrap is cured and poses no additional hazards. Do not attempt to remove the composite layer.

Potential Health Effects	None expected when used as intended. Effluent gases from multiple deployments in testing situations may cause skin, eye, or mucous membrane irritation. Effluent gases in these situations must be effectively controlled through engineering systems designed and tested to remove applicable contaminants or PPE that will accomplish the same effect.
Human Health Effects and Symptoms of Overexposure	
Inhalation	None expected when used as intended.
Skin Contact	None expected when used as intended.
Eyes	None expected when used as intended.
Ingestion	None expected when used as intended.
Carcinogenicity	None expected when used as intended.
Medical Conditions Aggravated by Exposure	None expected when used as intended.
Target Organs	Not available.
Potential Environmental Effects	Not available.

3.0 Composition/Information on Ingredients					
Ingredients	**Cas No.**	**EC No.**	**% by Wt.**	**EU Classification**	**EU R-Phrases**
Steel casing & hardware	NA	NA	> 85	NA	NA
PNP-487 gas generant	NA	NA	< 10	F, Xn	R2, 10, 34, 36/37/38
Argon	7440-37-1	231-147-0	< 15	NA	NA
Helium	7440-59-7	231-168-5	< 10	NA	NA

4.0 First-aid Measures	
Inhalation	None expected when used as intended.
Eyes	None expected when used as intended.
Skin	None expected when used as intended.
Ingestion	None expected when used as intended.

5.0 Fire Fighting Measures	
Suitable Extinguishing Media	Water may be used to cool unburned initiator material.
Unsuitable Extinguishing Media	NA
Special Exposure Hazards	This device will be activated at temperatures greater than 266°F (130°C).
Products of Combustion	Can produce nitrogen gas, argon gas, helium, water, and oxides of carbon and nitrogen. May produce trace amounts of ammonia and metal fumes.
Protection of Firefighters	Fight surrounding fire at a distance until material has burned.
Special Protective Equipment for Firefighters	NA

6.0 Accidental Release Measures	
Personal Precautions	Use impervious gloves, safety goggles, dust mask, safety shoes, and flame treated clothing when cleaning spills.
Environmental Precautions	NA
Methods For Containment and Clean-up	When handled and installed properly, no spills or leaks should occur. If a spill or leak occurs, sweep the material and contain in a suitable container for disposal. Use non-sparking tools. Avoid spark, static electricity, friction, impact and open flame. Avoid raising dust. Follow all current and applicable laws and regulations.

7.0 Handling and Storage	
Handling	Avoid spark, ESD, impact, friction and open flame. Use good grounding techniques. Post deployment, the surface of the inflator may have trace amounts of particulate and is usually hot. Residue may be irritating to the skin, eyes and mucous membranes. Latex under leather gloves or equivalent is recommended if handling hot fired inflators.
Storage	Store away from high temperatures, open flame, static electricity, and other ignition sources. Do not store in or expose to direct sunlight. Store in accordance with federal, state, and local regulations. Recommend storage at ambient

	temperatures.

8.0 Exposure Control/Personal Protection			
Exposure Limit Values	**OSHA-PEL**	**ACGIH-TLV**	**Other Limits**
Steel casing & hardware	NE	NE	NA
PNP-487 gas generant	NE	NE	NA
Argon	NE	NE	NA
Helium	NE	NE	NA

Engineering Controls	Use local ventilation to minimize exposure to dust. Effluent gases from multiple ignition testing situations may cause skin, eye or respiratory irritation. Use approved engineering controls to minimize exposure to effluent gases. Use approved personal protective equipment as a short-term control until engineering controls are adequate.
Personal Protective Equipment	
Respiratory Protection	For multiple deployment testing situations use a NIOSH approved respirator.
Hand Protection	Nitrile, Latex or equivalent gloves.
Eye Protection	Safety goggles.
Skin Protection	Avoid skin contact with initiator material.
General Hygiene Responsibilities	Use good personal hygiene at all times.

9.0 Physical and Chemical Properties	
General Information	
Appearance, Physical Form	Sealed metallic canister with molded plastic
Color	Varies
Odor	None
Important Health, Safety and Environmental Information	
Boiling Point	Not Applicable
Melt Point/Freeze Point	Not Applicable
Flash Point	Not Applicable
Flammability	Not Applicable
pH	Not Applicable
Solubility In Water	Not Applicable
Specific Gravity	Not Applicable
% Volatile by Weight	Not Applicable
Vapor Pressure	Not Applicable
Vapor Density	Not Applicable
Partition Coefficient: n-octonal/water	Not Applicable
Evaporation Rate	Not Applicable
Explosive Properties	Not Applicable

10.0 Stability And Reactivity	
Stability	Sealed unit is stable when used as designed. May become unstable if heated.
Conditions To Avoid	Sparks, static electricity, open flame and hot temperatures.
Incompatible Materials	None in present form.
Hazardous Decomposition Products	Nitrogen gas, water, and oxides of carbon and nitrogen. May produce trace amounts of ammonia and metal fumes.
Possibility of Degradation to Unstable	Not Determined

Products	

11.0 Toxicology Information	
Acute Effects:	
Oral LD_{50}	Not applicable in present form.
Dermal LD_{50}	Not applicable in present form.
Inhalation	Not applicable in present form.
Eye Irritation	Not applicable in present form.
Skin Irritation	Not applicable in present form.
Sensitization	Not applicable in present form.
Chronic Effects:	
Carcinogenicity	Not applicable in present form.
Mutagenicity	Not applicable in present form.
Reproductive Effects	Not applicable in present form.
Developmental Effects	Not applicable in present form.

12.0 Ecological information	
Ecotoxicity	Not Available
Mobility in Environment	Not Available
Persistence and Degradability	**Perchlorate Material – Special Handling May Apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate**
Bioaccumulative Potential	Not Available

13.0 Disposal Considerations

Autoliv is in the unique position to offer its recycling services for air bag module units, individual inflators, and pretensioners to customers, suppliers, manufacturers, dealers and dismantlers.

Guidance on proper requirements for recyclable air bag materials is available from Promontory Airbag Recycling Center (PARC) by calling 1-800-667-4079 within the U.S. and Canada or 1-435-471-3315. Arrangements **must** be made with Autoliv to accept the recyclable items prior to shipment.

14.0 Transport Information	
This MSDS is not intended to have all required shipping information.	
Identification number	UN3268
Proper shipping name	Air bag Inflators
Hazard Classification	Class 9
Packaging Group	PGIII
DOT Approval Number	Specific to the individual program
For further information contact:	Autoliv Logistics Services 3350 Airport Road Ogden, UT, 84405

15.0 Regulatory Information	
OSHA Status	Manufactured article
TSCA Chemical Inventory:	The components of this product are listed on the Toxic Substance Control Act (TSCA) inventory.
CERCLA Reportable Quantity, 40 CFR	No

302:	
EPCRA Section 302, Extremely Hazardous Substances:	No
EPCRA Section 311/312, Hazard Category:	Yes
EPCRA Section 313, Toxic Chemicals:	No
RCRA INFORMATION:	This product as described in this MSDS could meet the definition of RCRA Reactive Hazardous (D003) under 40 CFR 261.23. Other regulations may apply. Please check federal, state or provincial and local regulations.
Information for Community	Not Determined
EU Classifications	F, Xn
EU Risk Phrases	R2 Risk of explosion by shock, friction, fire R44 Risk of explosion if heated
EU Safety Phrases	S2 Keep out of reach of children S4 Keep away from living quarters S15 Keep away from heat S16 Keep away from sources of ignition S23 Do not breathe effluents S33 Take precautionary measures against static S37 Wear suitable gloves S59 Refer to manufacturer for recycling

16.0 Other Information				
Supplier Information	The environmental, health and safety information contained herein is given in compliance with statutory obligations and relates only to the substance/preparation described in this material safety data sheet. This material safety data sheet is provided for information only, and is not intended to create or imply any representation, agreement or warranty, whether express or implied, except to the extent required by applicable law. The environmental, health and safety information contained herein is believed to be accurate based on our current knowledge. It remains the sole responsibility of the customer to provide a safe workplace and to comply with all applicable laws and regulations. Nothing contained herein is to be construed as a recommendation for use in violation of any patent or of applicable laws or regulations.			
HMIS Ratings	Health - 0	Flammability- 0	Reactivity- 1	PPE- X
History				
Reason For Issue	Revision of MSDS			
Prepared By	Autoliv Regional Industrial Hygiene			
Approved By	Autoliv Regional Health, Safety & Environmental			
Approval Date	2/9/12			
Supersedes Date	12/21/09			
Supersedes Revision	01			

Autoliv

MSDS NO. 025
Revision 7
November 13, 2006

MATERIAL SAFETY DATA SHEET
Autoliv North America

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME.....AIR BAG INFLATOR, HYBRID SIDE IMPACT & CURTAIN
SYNONYMS/PROGRAMS .....ASH-2.0, ASH-2.1, ASH-2.2, ACH-1.0, ACH-1.1, & ACH-1.1A
PRODUCT CODE .....MSDS No. 025
SUPPLIER/MFG. .....Autoliv North America
Attn: HazCom Coordinator M/S A16630
3350 Airport Rd.
Ogden, UT 84405 USA
AUTOLIV (24 HOUR) .....(435) 734-6835
CHEMTREC USA (EMERGENCY) ..(800) 424-9300

*Note – This inflator is a manufactured article.

2. TYPICAL COMPOSITION

INGREDIENTS	%	CAS No.[1]	OSHA-PEL[2]	ACGIH-TLV[3]
Metallic container	90-95%	NA*	NA*	NA*
Argon	5-10%	7440-37-1	NE**	NE**
Nitrous Oxide	<1-3%	10024-97-2	NE**	50ppm

1 Chemical Abstracts Service Number
2 Occupational Safety and Health Administration - Permissible Exposure Limit
3 American Conference of Governmental Industrial Hygienists - Threshold Limit Value
* Not applicable due to form
** Not established

3. HAZARDS IDENTIFICATION

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EMERGENCY OVERVIEW

The tamper-resistant, sealed metal container poses no risk of chemical exposure before deployment. If the inflator is incinerated, broken, drilled into or electric current is connected to the lead wires, a physical hazard may exist during deployment or if installed improperly. Some ASH-2, Side Impact and ACH-1, Curtain inflators contain a high-pressure mixture of argon, helium, and nitrous oxide gas. *ASH-2.2, ACH-1.0, ACH-1.1, and ACH-1.1A inflator configurations have a small amount of pyrotechnic material that has a dry extruded plastic shape and possess no dust or spill hazard.* Do not drill, break, or breech the mild steel container.

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POTENTIAL HEALTH EFFECTS

ROUTE(S) OF ENTRY ..... None expected when used as intended.

HUMAN HEALTH EFFECTS AND SYMPTOMS OF OVEREXPOSURE

INHALATION ..... Effluent gases from multiple deployment testing situations may cause skin, eye, or mucous membrane irritation. Otherwise, none expected when installed as intended.
SKIN CONTACT ..... None expected when installed as intended.
EYES ..... None expected when installed as intended.
INGESTION ..... None expected when installed as intended.
CARCINOGENICITY ..... None expected when installed as intended.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE ..... None expected when installed as intended.

4. FIRST AID MEASURES

INHALATION ..... None expected when installed as intended.
EYES ..... None expected when installed as intended.
SKIN ..... None expected when installed as intended.
INGESTION ..... None expected when installed as intended.

5. FIRE FIGHTING MEASURES

FLASH POINT ..... Not Applicable
AUTO IGNITION TEMPERATURE ..... Compressed gas overcomes rupture disk, which releases gas/pressure at approximately 266°F (130°C). Pyrotechnic material ignites (second event) at approximately 356°F (180°C). Initiator ignites at approximately 527°F (275°C)
EXPLOSION LIMITS ..... Not applicable
EXPLOSION HAZARD ..... Not applicable
EXTINGUISHING MEDIA ..... Water, dry chemical, and carbon dioxide.
SPECIAL FIRE FIGHTING PROCEDURES ..... This device will be activated by extended exposures to temperatures above 266°F (130°C) and if activated produces, carbon dioxide, water vapor, argon, nitrous oxide, and trace amounts of carbon monoxide and nitric oxide. Use normal firefighting techniques to contain fire.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK PROCEDURES ..... When handled properly, no spills or leaks should occur. Avoid spark, static electricity, and open flame.

7. HANDLING AND STORAGE

STORAGE TEMPERATURE ..... Temperature not to exceed 200°F (93°C).

HANDLING AND STORAGE PRECAUTIONS ..... Inspect unit for damage following shipment and prior to installation. Store damaged or defective units in a cool dry place in accordance with Federal, State, and Local regulations. Use good grounding techniques. Store away from high temperatures, open flame, and static electricity sources. Recycling this and other inflators may be accomplished through Autoliv. For information, call or write to the address on page 1.

POST-DEPLOYMENT HANDLING GUIDELINES ..... Wash hands after handling inflator & module components.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EFFLUENT GASES ..... Effluent gases from multiple deployment testing situations may cause skin, eye or mucous membrane irritation. Use approved engineering controls to minimize exposure to effluent gases. Use approved personal protective equipment as a short-term control until engineering controls are adequate.

EYE PROTECTION REQUIRED ..... Safety goggles
SKIN PROTECTION ..... Latex or equivalent gloves.
RESPIRATORY/VENTILATION ..... NIOSH approved respirator
EXPOSURE LIMITS ..... Refer to section 2

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM ..... Sealed metallic canister
COLOR ..... Dark gray/brown/black
ODOR ..... None
BOILING POINT ..... Not applicable
MELT POINT/FREEZE POINT. ..... Not applicable
PH ..... Not applicable
SOLUBILITY IN WATER ..... Not applicable
SPECIFIC GRAVITY ..... Not applicable
% VOLATILE BY WEIGHT ..... Not applicable
VAPOR PRESSURE ..... Not applicable
VAPOR DENSITY ..... Not applicable
BULK DENSITY ..... Not applicable
COEFFICIENT OF WATER/ OIL DISTRIBUTION ..... Not applicable
EVAPORATION RATE ..... Not applicable

10. STABILITY AND REACTIVITY

STABILITY..... Sealed unit is stable when used as designed.
HAZARDOUS POLYMERIZATION..... Will not occur.
INCOMPATIBILITIES..... Not applicable
DECOMPOSITION PRODUCTS..... Carbon dioxide, water vapor, argon, oxygen, nitrous oxide, and trace amounts of carbon monoxide and nitric oxide.
CONDITIONS TO AVOID..... Sparks, static electricity, open flame, and temperatures greater than 266°F (130°C).

11. TOXICOLOGICAL INFORMATION

INHALATION..... Not applicable in present form.
INGESTION..... Not applicable in present form.
SKIN & EYE IRRITATION..... Not applicable in present form.
MUTAGENICITY..... Not applicable in present form.

12. ECOLOGICAL INFORMATION

Perchlorate Material – Special Handling May Apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate

13. DISPOSAL CONSIDERATIONS

Autoliv is in the unique position to offer its recycling services for air bag module units, individual inflators, and pretensioners to customers, suppliers, manufacturers, dealers and dismantlers.

Guidance on proper requirements for recyclable air bag materials is available from Promontory Airbag Recycling Center (PARC) by calling 1-800-667-4079 within the U.S. and Canada or 1-435-471-3315. Arrangements **must** be made with Autoliv to accept the recyclable items prior to shipment.

14. TRANSPORTATION INFORMATION

This MSDS is not intended to be a shipping document. For further shipping information contact:

Autoliv Logistics Service
3350 Airport Rd
Ogden Utah, 84405

AUTOLIV NORTH AMERICA (24 HOUR) Number: (435) 734-6835

15. REGULATORY INFORMATION

OSHA Status:..... This product meets the definition of an article. Individual chemical components are hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
TSCA Chemical Inventory:..... The components of this product are listed on the Toxic Substances Control Act (TSCA) inventory.

RCRA Information: ..... Please see Section 13 Disposal Considerations for recycling information. Otherwise, dispose of in accordance with all federal, state or provincial and local regulations.

16. OTHER INFORMATION

The environmental, health and safety information contained herein is given in compliance with statutory obligations and relates only to the substance/preparation described in this material safety data sheet. This material safety data sheet is provided for information only, and is not intended to create or imply any representation, agreement, or warranty, whether express or implied, except to the extent required by applicable law. The environmental, health and safety information contained herein is believed to be accurate based on our current knowledge. It remains the sole responsibility of the customer to provide a safe workplace and to comply with all applicable laws and regulations. Nothing contained herein is to be construed as a recommendation for use in violation of any patent or of applicable laws or regulations.

HMIS by NPCA Criterion
In present form the following ratings apply:
Health 0
Flammability 0
Reactivity 1
PPE X

HISTORY
REASON FOR ISSUE ..... Revision of MSDS # 025
PREPARED BY ..... Autoliv Regional Industrial Hygiene
APPROVED BY ..... Autoliv Regional Health, Safety & Environmental
APPROVAL DATE ..... November 13, 2006
SUPERSEDES DATE ..... October 25, 2006
SUPERSEDES REVISION 6