



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AERONAUTICAL SYSTEMS CENTER (AFMC)
WRIGHT-PATTERSON AIR FORCE BASE OHIO

8 May 2007

MEMORANDUM FOR US ARMY TANK-AUTOMOTIVE AND ARMAMENTS COMMAND
ATTN: COL PETER FULLER, PM BCT
SFAE-GCS-BCT-E / MS #325
6501 E. 11 MILE ROAD
WARREN MI 48397-5000

FROM: ASC/ENFC (ATTLA)
2530 Loop Road West
Wright-Patterson AFB OH 45433-7101

SUBJECT: Approval for Airlift of the Stryker Family of Interim Armored Vehicles (IAV)

Note: This memo supersedes previous memo dated 1 March 2007 (same subject) which should be discarded. This revision incorporates the air transport certification of the M1128 Mobile Gun System onboard C-17 and C-5 aircraft with slat armor installed.

1. References:

- (a) 33 FLTS/CC memo, 30 Jan 03, Interim Summary Report, Stryker Interim Armored Vehicles Air Transportability Test Loading (ATTL)
- (b) Memorandum of Agreement Between the US Air Force and the US Army for Air-Transport of the Stryker, 4 Feb 03
- (c) AMC Test 17-165-03 Air Transportability of Stryker Medical Evacuation Vehicle (MEV) on C-130H/J Aircraft, ATTL Final Report, May 03; et al
- (d) AMC Test 17-171-04 Air Transportability Test Load of Stryker Mobile Gun System on C-130E/H Aircraft, ATTL Final Report, Nov 04

2. Based on data and analysis provided through US Army Tank-automotive and Armaments Command (TACOM), and the results of the reference 1(a), (c), and (d) ATTLs, the following ten variant models of the Stryker IAV have been evaluated for air transport certification: the M1126 Infantry Carrier Vehicle, M1127 Reconnaissance/Scout Vehicle, M1128 Mobile Gun System, M1129 Mortar Carrier Vehicle, M1130 Command Vehicle, M1131 Fire Support Vehicle, M1132 Engineer Squad Vehicle, M1133 Medical Evacuation Vehicle, M1134 Anti-Tank Guided Missile Vehicle, and M1135 Nuclear-Biological-Chemical Reconnaissance Vehicle.

a. The ten Stryker Interim Armored Vehicle variants without slat armor installed are technically approved for airlift on USAF C-130, C-17 and C-5. The IAVs can be physically loaded and adequately restrained when reduced for flight on USAF C-130. Air transport onboard C-130 aircraft is contingent upon approval from HQ AMC/A3VX. Prior to loading aboard a C-130, the using MAJCOM should contact HQ AMC/A3VX for approval based on a risk assessment relative to flying this item.

b. The ten Stryker Interim Armored Vehicle variants with slat armor installed are approved for airlift on USAF C-17 and C-5 aircraft. Stryker vehicles with slat armor installed are not approved for C-130 airlift.

3. Following are provisions and limitations which apply to the above approvals.

4. **General**

c. Prior to loading, all electromagnetic interference (EMI) emitters shall be de-energized and all munitions shall be configured or packaged for safe transport.

d. Tire inflation pressures shall be not less than 80 psi nor more than 100 psi. Highway tire inflation pressure (81 psi) should be used. Shipper shall provide correct tire gauge to fit the vehicle tire valve.

e. Immediately prior to loading, vehicle shall be weighed and marked with individual axle weights, total weight, and CG location. CG is measured from the front of the vehicle.

f. Hazardous materials (to include fuel tank level, electric storage batteries, and compressed gas cylinders) shall be in compliance with AFMAN 24-204(I) / TM 38-250. This airlift approval memo is not to be considered as approval for shipment of any hazardous materials. That approval must be granted separately from AFMC LSO/LOT [DSN 787-4503 or (937) 257-4503] through the servicing Air Terminal Operations Center (ATOC).

g. The vehicle shall be capable of being secured after loading to 3G forward, 2G up, and 1.5G aft and laterally, with respect to the aircraft direction of flight. All components mounted on, and equipment stowed inside the vehicle shall be secured by the shipper (Army) to withstand these restraint levels in addition to a potential 4.5G download. Location and rated capacity of all tiedowns shall be indicated on the vehicle or on the data plate.

h. The vehicle shall be transported in a condition that will permit it to withstand a rapid inflight decompression of up to 8.3 psi within ½ second without endangering the aircraft or personnel.

i. Vehicles will not be occupied during flight. Litter patients shall not be airlifted inside the MEV.

j. Any vehicle observed in flight bouncing on its tires, which alternately slackens then snaps chains tight, shall require the use of sleeper shoring thereafter, and shall be reported to ASC/ENFC (ATTLA).

5. **C-5 and C-17**

a. IAVs prepared for C-5 and C-17 airlift should not exceed 49,380 lbs each and should not measure more than 322"L x 166"W x 131"H including slat armor.

b. Vehicles should be onloaded with the Height Management System (HMS) at the "highway" setting or at the "air transport" setting. After loading, the HMS should be set to lower the vehicle onto the stops for flight.

c. The Remote Weapon Station (RWS) and weapon may be left in place, but must be secured against unwanted movement per 4.d above. Antennas should be removed or folded as required to not contact the aircraft.

d. Up to three IAVs may be transported on a C-17, and up to four on a C-5.

6. **C-130**

a. IAVs prepared for C-130 airlift shall not exceed the weight and CG limits given in Table 1 below for the indicated aircraft ramp angles. Unless conditions can be controlled, a 15 degree ramp angle should be assumed. Vehicle dimensions should comply with Chart 6-3 below. The shipper shall prepare the vehicle by removal and stowage of external equipment as needed to meet the weight, CG, and dimensional limits with the vehicle's HMS set to the "air transport" configuration. Axle weights shall be measured on level ground in the "air transport" setting and none shall exceed 12,000 lbs.

b. Width measured at the tire bulge (5.5 inches above surface level) shall not exceed 104" at 80 psi.

c. Prior to loading, proper operation of the HMS shall be confirmed by cycling the system from travel settings to the fully lowered position and back up to the "air transport" setting. Vehicle may rise slightly before lowering. The correct suspension height in the "air transport" setting shall then be verified prior to loading by measuring the following heights to the ground level:

- 1) The front bumper attach bolts, left outer and right outer, must be in the range 49.4" to 50.6".
- 2) The center of the square-headed aft pintle plug must be in the range 25" to 27".

Range of height given is for new tires, and will be commensurately less for tire wear.

TABLE 1					
Model Number	IAV Vehicle Name	C-130 Airlift Limits			
		Ramp Angle $\leq 12^\circ$		$12^\circ <$ Ramp Angle $\leq 15^\circ$	
		Vehicle Weight (lbs)	Allowable CG Range from Front Bumper Bolt (in)	Vehicle Weight (lbs)	Allowable CG Range from Front Bumper Bolt (in)
M1126	Infantry Carrier Vehicle (ICV)	up to 36,500	122.0 – 148.4	up to 36,500	122.0 – 145.8
M1127	Reconnaissance/Scout Vehicle (RV)				
M1129	Mortar Carrier (MC) Vehicle	36,501 – 38,500	125.6 – 145.7	36,501 – 38,500	125.6 – 143.5
M1130	Command Vehicle (CV)				
M1131	Fire Support Vehicle (FSV)	38,501 – 40,500	128.8 – 143.6	38,501 – 40,500	128.8 – 141.5
M1132	Engineer Squad Vehicle (ESV)				
M1133	Medical Evacuation Vehicle (MEV)				
M1135	Nuclear-Biological-Chemical Reconnaissance Vehicle (NBCRV)				
M1134	Anti-Tank Guided Missile Vehicle (ATGM)	up to 36,500	122.0 – 146.3	up to 36,500	123.3 – 149.0
		36,501 – 38,500	125.6 – 143.6	36,501 – 38,500	129.3 – 146.6
		38,501 – 40,500	130.6 – 140.8	38,501 – 40,500	134.9 – 144.3
M1128	Mobile Gun System (MGS)	Vehicle Weight (lbs)	Allowable CG Range from Front Surface of Front Bumper Attachment Plate (in) (Bumper Removed)	MGS Not Approved for loading at cargo ramp angles greater than 12°	
		Up to 36,000	128.7 – 139.1		
		36,001 – 38,000	132.2 – 137.3		
		38,001 – 38,250	132.7 – 137.1		
		38,251 – 38,500	133.1 – 136.9		
		38,501 – 38,750	133.5 – 136.7		
		38,751 – 39,000	134.0 – 136.5		
		39,001 – 39,250	134.4 – 136.2		
		39,251 – 39,500	134.9 – 136.0		
		39,501 – 39,750	135.3 – 135.8		
	39,751 – 39,937	135.6 – 135.6			

d. Removal of left and right bump stops from above the 3rd axle from the front of the vehicle is permitted to allow more axle travel and improve load sharing between axles.

e. The vehicles shall be loaded in accordance with the Special Loading Instructions as follows.

6-1. **STRYKER (INTERIM ARMORED VEHICLE) SPECIAL LOADING INSTRUCTIONS for C-130**

6-2. **GENERAL.** The IAV exceeds accepted limits for routine loading on C-130 aircraft. Side and top clearances are very critical and floor loading limits must be controlled through the loading procedure. The shipper must specifically prepare each variant in order to meet loading axle limitations. The STRYKER has a unique Height Management System (HMS). The HMS allows the driver to adjust the vehicle's height for different conditions. C-130 airlift will use the "Air Transport" and "On the Stops" modes. The "Air Transport" mode is used to meet axle weight limitations during onloading/offloading. After the STRYKER is loaded and prior to the loadmaster restraining it, the driver will lower the vehicle down to the "On the Stops" position. "On the Stops" increases the height of the egress path over the top of the vehicle. The aircraft commander shall complete an in-depth analysis of mission fuel planning and fuel management, limiting wing fuel (wing relieving fuel), aircraft maneuver limitations, and allowable cabin load. The driver is allowed to accompany the vehicle during all flights. Aircraft/squadron/group/wing commanders, or MAJCOM/DO may authorize additional passengers. The maximum number of passengers is strictly limited to the vehicle's crew complement; see Chart 6-3 below. Level of passenger authorization is determined by mission complexity.

WARNING: The egress path is over the top of the vehicle. Egress paths under the vehicles are not acceptable.

6-3. DESCRIPTION.

CHART 6-3

Variant	Length Max	Width Max	Height Max	Max # of Passengers Authorized
Infantry Carrier Vehicle (ICV)	288 inches	113 inches	106 inches	11 (2 vehicle crew + 9 infantry)
Command Vehicle (CV)	288 inches	113 inches	106 inches	4
Mobile Gun System (MGS)	298 inches	113 inches	106 inches	3
Mortar Carrier (MC) Vehicle	287 inches	113 inches	106 inches	4
Reconnaissance Vehicle (RV)	288 inches	113 inches	106 inches	4
Medical Evacuation Vehicle (MEV)	289 inches	113 inches	106 inches	5
Engineer Support Vehicle (ESV)	288 inches	113 inches	106 inches	11 (2 vehicle crew + 9 infantry)
Anti-Tank Guided Missile (ATGM)	270 inches	113 inches	106 inches	4
Fire Support Vehicle (FSV)	288 inches	113 inches	106 inches	4
Nuclear-Biological-Chemical Reconnaissance Vehicle (NBCRV)	298 inches	113 inches	106 inches	4

6-4. SPECIAL EQUIPMENT. Not required.

6-5. AIRCRAFT PREPARATION.

- a. Remove and stow all wheel well seats, seat lower support brackets, and seat upper support tubes.
- b. Derig and stow any centerline seats installed aft of the second (fourth--CC-130J) centerline seat stanchion.
- c. Fold and stow all sidewall seats aft of FS 300 (LS 500-- CC-130J).

NOTE: Loadmasters may lower some of these seats and use them after the vehicle is loaded.

- d. Remove (invert on C/CC-130J) and stow all ramp and main floor roller conveyor sections.

CAUTION: Do not stow C-130E/H conveyor sections more than three high on top of the outboard dual rails alongside the vehicle.

- e. Remove and stow any life support overhead rack that is located aft of FS 357 (LS 557--CC-130J) and extends inboard of the dual rail vertical restraint lips.
- f. Close and lock both paratroop doors.
- g. Retract all dual rail vertical restraint fittings/hold downs and all dual rail locks.

- h. Lower the ramp to the ground and install two auxiliary ground loading ramps in their outermost positions.
- i. Turn on as many cargo compartment lights as the tactical situation allows.

CAUTION: Do not load or unload the STRYKER under NVG conditions.

NOTE: Additional exterior lighting is highly recommended during night operations.

- j. The loadmaster shall brief the entire loading team (minimum of four personnel, one of which may be the loadmaster) of the critical clearances (vehicle sides, top, and wheels at dual rail level,) and assign guides to monitor those critical clearances. Two guides shall position themselves inside the aircraft, one on each side immediately forward of the vehicle. Two more guides shall position themselves, one on each side, immediately aft of the vehicle. The guides will reposition themselves as the vehicle moves in/out of the aircraft. One of the inside guides shall maintain intercom contact with the outside marshaller guide. The loadmaster will maintain intercom contact.

WARNING: Personnel will not attempt to go alongside the vehicle while any part of the vehicle is inside any portion of the aircraft during onloading/offloading.

- k. The loadmaster shall brief the vehicle driver and marshaller guide on hand signals used during onloading/offloading.

6-6. VEHICLE PREPARATION.

- a. The loadmaster shall inspect the vehicle's general condition in accordance with TO 1C-130A-9CL-1/1C-130J-9CL-1.
- b. The driver shall ensure the vehicle reconfiguration and preparation are completed prior to aircraft loading.

CAUTION: Do not deflate tires for onloading/offloading.

6-7. ONLOADING.

- a. The loadmaster will complete the aircraft preparation.
- b. Raise front hatch cover and verify that "AIR TRANS" switch is in the UP position. Verify that the vehicle is in 8-wheel drive.
- c. Back the vehicle into the aircraft.
- d. Align the vehicle's centerline with the aircraft's centerline.

CAUTION: Centerline alignment is critical since side clearances may be as little as 1 inch per side.

- e. Marshal the vehicle into the aircraft. Make the vehicle movement as slow as possible. Make steering and alignment corrections as small as possible. Do not permit vehicle tires to contact the aircraft's restraint rail system. Closely monitor clearances overhead and to the sides.

WARNING: Personnel will not attempt to go alongside the vehicle while any part of the vehicle is inside any portion of the aircraft during onloading.

- f. Once vehicle is on the horizontal, driver MUST switch to 4-WHEEL DRIVE (ensure vehicle moves at least 3 feet to disengage 8-wheel drive).

- g. Load the vehicle so that all of the axles are between FS 337 and FS 682 (LS 562 and LS 832-- CC-130J) for flight.
- h. Instruct the driver to engage parking brake and lower the vehicle to its "On the Stops" position for flight. (THIS TAKES 3 MINUTES AND HMS LIGHTS MUST BE SOLID BEFORE POWERING OFF. BEWARE OF EXHAUST FUMES. VENTILATE AIRCRAFT.) Verify that HMS lights are solid.
- i. Shut down vehicle.
- j. Restrain the vehicle in accordance with Section IV of TO 1C-130A-9/1C-130J-9. Use the aft 25,000 lb tiedown chain fittings for fwd restraint, but do not cross the 25,000 lb chains.
- k. Position the aircraft maintenance ladder forward of and against the vehicle so that it can serve as an egress aid. Restrain the ladder in position.
- l. Prior to aircraft engine start, the loadmaster shall brief the passenger(s) on the emergency exits. The loadmaster shall conduct a physical egress drill beginning with the passenger(s) seated forward of the vehicle and exiting from the troop doors after traversing over the vehicle's top. The loadmaster will emphasize the need to stay away from the aircraft propellers during an egress.

WARNING: The unique emergency egress pathway over the top of this vehicle requires a hands-on egress rehearsal by the passenger(s). The rehearsal will include exiting through the paratroop doors and the crew entrance door. During engine running onloads, the passenger(s) will proceed to but not exit the crew entrance door and paratroop doors. In the event of an actual emergency egress, do not bypass any serviceable emergency exit forward of the vehicle.

6-8. OFFLOADING.

- a. The loadmaster will complete the aircraft preparation.
- b. Raise and secure all seats aft of the aircraft wheel well.
- c. Remove the aircraft maintenance ladder from its position on forward end of the vehicle. Stow and secure the ladder.
- d. Remove all restraint prior to vehicle power up. Verify that HMS lights are solid. Instruct the driver to reconfigure the vehicle's height from the "On the Stops" position to the "Air Transport" position.
- e. The driver will raise the vehicle to its "Air Transport" position prior to moving out of the aircraft. (THIS TAKES UP TO 4 MINUTES. BEWARE OF EXHAUST FUMES. VENTILATE AIRCRAFT.)
- f. Loadmaster will re-measure the vehicle heights just as was done prior to loading, per paragraph 6.c.

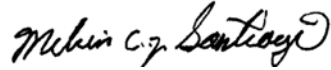
NOTE: If the vehicle cannot be raised from the stops after flight, the shipper shall be responsible for providing all shoring necessary to shallow the ramp angle to less than 9 degrees (per TO 1C-130A-9 Figure 4-13) and shall reduce the vehicle weight as needed to permit safe unloading.

- g. Marshal the vehicle out of the aircraft. Move the vehicle as slow as possible. Make steering and alignment corrections as small as possible.


WARNING: Personnel will not attempt to go alongside the vehicle while any part of the vehicle is inside any portion of the aircraft during offloading.

7. The shipper shall give a copy of this memo to the ATOC representative when the item is presented for airlift. This memo shall be part of the official cargo manifest documentation package and will be briefed to the aircraft loadmaster prior to loading this item

8. Our point of contact for this project is Mr. Jon Lay at (937) 255-1821 (DSN 785-1821) or email: jon.lay@wpafb.af.mil or email: ATTLA@wpafb.af.mil . Please refer to file number 2002.05.17 regarding this memo.



Reviewed by: Mr. Melvin C.J. Santiago
Aerial Delivery Technical Expert
Crew Systems Branch



Approved by: Mr. Vic Santi
Technical Advisor
Crew Systems Branch

cc:
HQ AMC/A3V
HQ USTRANSCOM
SDDC TEA
330 ACSSS/GFEA
657 AESS/ENJ