



EMB145 – EMB135

AIRCRAFT
MAINTENANCE MANUAL

TOWBARLESS TOWING - MAINTENANCE PRACTICES

EFFECTIVITY: POST-MOD. S.B. 145-32-0102

1. General

- A. This section gives the procedure to tow the aircraft. The aircraft towing operations are only possible with the aid of a power equipment.
- B. Any of the towing equipment specified in this section can be used at the operator's discretion.
- C. For a safe towing operation, only qualified personnel must operate the tugs specified in this section.
- D. For the procedure to tow the aircraft with a towbar, refer to [AMM TASK 09-10-00-500-801-A/200](#).
- E. The procedures in this section are given in the sequence below. The tasks identified with (♦) are part of the Scheduled Maintenance Requirements Document (SMRD).

TASK NUMBER	DESCRIPTION	EFFECTIVITY
09-10-01-500-801-A	AIRCRAFT TOWING WITH DOUGLAS TBL-50 VEHICLE	POST-MOD. S.B. 145-32-0102
09-10-01-500-802-A	AIRCRAFT TOWING WITH LEKTRO AP8750B-AL VEHICLE	POST-MOD. S.B. 145-32-0102
09-10-01-500-803-A	AIRCRAFT TOWING WITH TLD TPX-100E VEHICLE	POST-MOD. S.B. 145-32-0102
09-10-01-500-804-A	AIRCRAFT TOWING WITH LEKTRO AP8850SDA-AL-100/50 VEHICLE	POST-MOD. S.B. 145-32-0102
09-10-01-500-805-A	AIRCRAFT TOWING WITH GOLDHOFER AST-3 VEHICLE	POST-MOD. S.B. 145-32-0102
09-10-01-500-806-A	AIRCRAFT TOWING WITH LEKTRO 8925 OR 8950 VEHICLE	POST-MOD. S.B. 145-32-0102
09-10-01-500-807-A	AIRCRAFT TOWING WITH TRONAIR JP100 VEHICLE	POST-MOD. S.B. 145-32-0102



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TASK 09-10-01-500-801-A

EFFECTIVITY: POST-MOD. S.B.145-32-0102

2. AIRCRAFT TOWING WITH DOUGLAS TBL-50 VEHICLE

A. General

- (1) This procedure uses vehicle (tug) GSE 397.
- (2) For a safe towing operation, only qualified personnel must operate the TBL-50 vehicle.
- (3) To do this task, you must know all the contents of the TBL-50 Operator's Handbook.

B. References

REFERENCE	DESIGNATION
AMM TASK 05-50-23-200-801-A/600	BRAKE USE DURING TOWBARLESS TOWING OPERATION
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 32-49-01-600-801-A/300	MLG WHEEL TIRE - CHECK AND CHARGE
AMM TASK 32-49-04-600-801-A/300	NLG WHEEL TIRE - CHECK AND CHARGING
S.B.145-32-0057	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 012	Chock - Wheel	To chock the nose and main LG wheels	
GSE 397	Aircraft Towing Vehicle	Aircraft towing	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Tows the aircraft	Driving the towing tug
1	Helps with the task	In the cockpit

I. Preparation

SUBTASK 841-032-B

WARNING: WHEN YOU TOW THE AIRCRAFT, ALL PERSONS MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOWING TRACTOR, NOSEWHEEL, MAINWHEELS, AIRCRAFT FUSELAGE AND WINGS. PERSONS ON THE GROUND CAN BE RUN OVER BY NOSEWHEEL, MAINWHEELS, TOWING TRACTOR, AIRCRAFT FUSELAGE AND WINGS. THIS IS BECAUSE THE AIRCRAFT WILL CHANGE POSITION DURING PUSHBACK AND TOWING. OBEY A SAFE DISTANCE BETWEEN PERSONS ON THE GROUND AND THE EQUIPMENT THAT MOVES. A FATAL INJURY CAN OCCUR.

CAUTION: • DURING TOWING OPERATIONS, A TECHNICIAN MUST STAY IN THE COCKPIT, WITH SEAT BELT, TO SET THE EMERGENCY/PARKING BRAKE (FIGURE 202, DET. B), IF NECESSARY.

- DURING THE TOWING OPERATIONS WITH THE ELECTRICAL SYSTEM ENERGIZED, MAKE SURE THAT THE ELECTRIC MOTOR-DRIVEN HYDRAULIC PUMPS ARE OFF.
- REMOVE ALL TOOLS, EQUIPMENT, AND MATERIALS FROM THE TOWING AREA. MAKE SURE THAT THE AREA IS CLEAN.
- TO PREVENT PEAK LOADS, MAKE SURE THAT THE ACCELERATION AND DECELERATIONS DURING TOWING ARE SMOOTH.
- USE ONLY TBL-50 VEHICLE GSE 397.
- BEFORE THE AIRCRAFT TOWING, MAKE SURE THAT THE VEHICLE IS IN GOOD CONDITIONS FOR OPERATION. FOR MORE DETAILS, REFER TO THE MANUFACTURER'S OPERATOR HANDBOOK.

- (1) Make sure that the emergency/parking brake accumulator is pressurized. Pull and rotate the emergency/parking brake handle (Refer to Figure 202, DET. B) and, with the aircraft energized, make sure that the "BRAKE ON" lights are on (Refer to Figure 202, DET. A and DET. C).

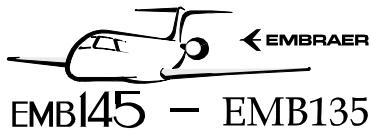
NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Make sure that the safety pins of the landing gear are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).

NOTE: The use of the safety pins on MLG and NLG is optional when you tow or push the aircraft for the flight. This occurs when the aircraft is in position for the flight crew to taxi the aircraft before or after a flight.

- (3) On the circuit breaker panel, open the STEER circuit breaker and attach a DO-NOT-CLOSE tag to it. On aircraft POST-MOD. [S.B.145-32-0057](#), alternatively, set the external steering disengagement switch to the "DISENGAGED" position (Refer to Figure 202, DET. E). Make sure that the "STEER INOP" message comes into view on the EICAS display.

- (4) On the tug, select the cradle operation mode to use the nose landing gear disengaged.



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J. Towing (Figure 201) (Figure 202) (Figure 203) (Figure 204)

SUBTASK 580-032-B

WARNING: • BEFORE YOU CONNECT THE TOWING EQUIPMENT, MAKE SURE THAT THE EMERGENCY/PARKING BRAKE IS SET.

- THE TUG USES THE REAR WHEELS TO STEER. THE TUG OPERATOR MUST KNOW HOW THIS AFFECTS THE HANDLING OF THE UNIT AND BE PREPARED TO TAKE SPECIAL PRECAUTIONS TO PREVENT ACCIDENTS. DURING THE TUG OPERATION, START SLOWLY UNTIL YOU KNOW IN WHICH DIRECTION THE STEER WHEELS ARE AND CORRECT, IF NECESSARY, BEFORE ACCELERATION. WHEN THE STEER WHEELS ARE TURNED, EXAMINE THE REAR AREA OF THE TUG TO MAKE SURE THAT IT IS FREE FROM OBSTRUCTIONS.

- (1) Make sure that the emergency/parking brake is set. If it is not, set the emergency/parking brake handle up (Refer to Figure 202, DET. B).

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Make sure that the tires are in a serviceable condition. If necessary, do the check and charge of tires. Refer to [AMM TASK 32-49-01-600-801-A/300](#) for the main wheel tires and [AMM TASK 32-49-04-600-801-A/300](#) for the nose wheel tires.

- (3) Put the tug in front of and in line with the aircraft nosewheel.

NOTE: Make sure that the seat/console of the tug points at the aircraft.

CAUTION: MAKE SURE THAT THE WHEEL SIZE IS CORRECT BEFORE THE DOCKING WITH THE AIRCRAFT.

- (4) Lower the nosewheel cradle to the ground. Make sure that the cradle is fully lowered.
- (5) Select wheel size small (EMBRAER ERJ 135/145) in the tug dashboard (Refer to Figure 203, DET. A).
- (6) Open the gate of the tug. Make sure that the gate is fully open and the cradle is fully lowered.

CAUTION: BEFORE YOU CLOSE THE GATE, MAKE SURE THAT THE CRADLE AND THE NOSEWHEEL OF THE AIRCRAFT ARE ALIGNED.

- (7) Drive carefully forward to engage and dock with the nosewheel of the aircraft. Make sure that the tug is in the correct position in relation to the nosewheel and that the cradle is aligned with the nosewheel tires (Refer to Figure 204, Position 1).
- (8) Close the gate of the tug. Make sure that the gate is fully closed (Refer to Figure 204, Position 2).
- (9) Release the emergency/parking brake (Refer to Figure 202, DET. B). With the aircraft energized, make sure that the "BRAKE ON" light goes off.

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

WARNING: OBEY THE MAXIMUM LIFT LIMIT (140 mm / 5.5 in) AND DO NOT LIFT THE AIRCRAFT PARTIALLY DISASSEMBLED. IF YOU LIFT THE NOSEWHEEL TOO HIGH, IT CAN CAUSE A CHANGE IN THE AIRCRAFT CENTER OF GRAVITY AND CAUSE THE AIRCRAFT TO TIP ON ITS TAIL.

- (10) Make sure that the area around the aircraft is clean. Lift the nosewheel cradle of the tug.

- CAUTION:**
- DO NOT TOW THE AIRCRAFT AT MORE THAN 24 KM/H (15 MPH).
 - DO NOT PUSH-BACK THE AIRCRAFT AT MORE THAN THE 8 KM/H (5 MPH).
 - GOOD COMMUNICATION BETWEEN THE TOWING TRACTOR OPERATOR AND THE COCKPIT PERSON MUST BE ESTABLISHED BEFORE THE AIRCRAFT IS TOWED.
 - USE THE AIRCRAFT BRAKES TO STOP THE AIRCRAFT ONLY WHEN THERE IS A RISK OF COLLISION OR DAMAGE TO THE AIRCRAFT. GIVE THE TRACTOR OPERATOR A WARNING THAT YOU WILL BRAKE THE AIRCRAFT.
 - DO NOT OVERSTEER. THE MAXIMUM TOWING ANGLE IS 170° TO THE RIGHT AND 170° TO THE LEFT. IF YOU USE MORE THAN THE MAXIMUM TOWING ANGLE, DO A VISUAL INSPECTION ON NOSE LANDING GEAR. IF A PART IS DAMAGED, REPAIR OR REPLACE IT AS APPLICABLE.
 - DURING THE TOWING PROCEDURE, DO NOT BRAKE THE AIRCRAFT. INDEPENDENTLY OF THE SPEED, THIS CAN CAUSE DAMAGE TO THE AIRCRAFT STRUCTURE AND/OR TO THE NOSE LANDING GEAR.

- NOTE:**
- Start and stop with the nose landing gear as near to the 0° position as possible.
 - For longer distances, the aircraft towing is usually done with the tug in reverse, while the aircraft is pulled. But not always, this is the best procedure to do the task.
 - You will usually drive the tug forward and push the aircraft for the final positioning of the aircraft in a hangar or at ramp services.

Make sure that you obeyed all the steps before this and do as follows:

- (a) Tow the aircraft slowly straight ahead before you turn.
- (b) If, during the towing procedure, the aircraft is braked, independently of the speed, check the nose landing gear and its adjacent structure for possible damage. Refer to [AMM TASK 05-50-23-200-801-A/600](#).



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- (c) Complete the aircraft towing in a straight line for a minimum of 3 meters (10 feet) or until the nose wheel is near the center position (approximately 0°).

K. Follow-on

SUBTASK 842-032-B

- (1) Set the emergency/parking brake and, with the aircraft energized, make sure that the "BRAKE ON" lights (DET. A, Figure 202 and DET. C, Figure 202) are on.

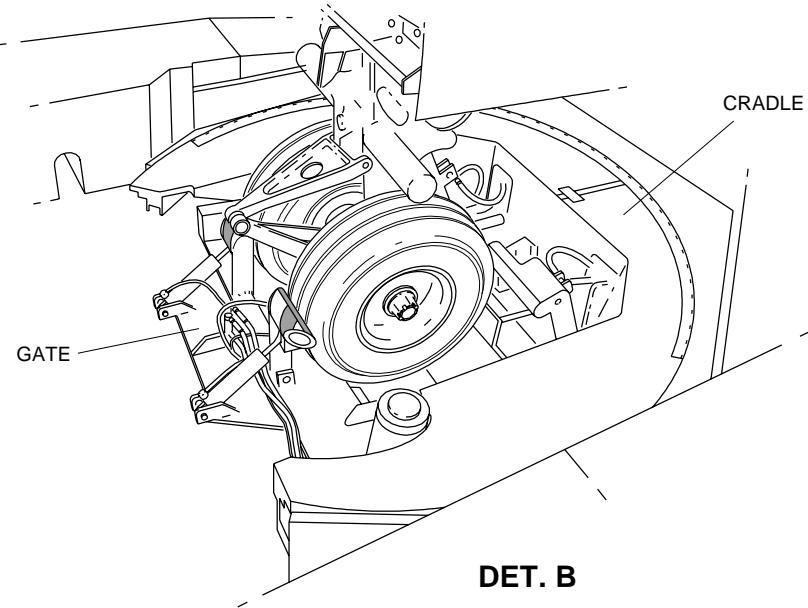
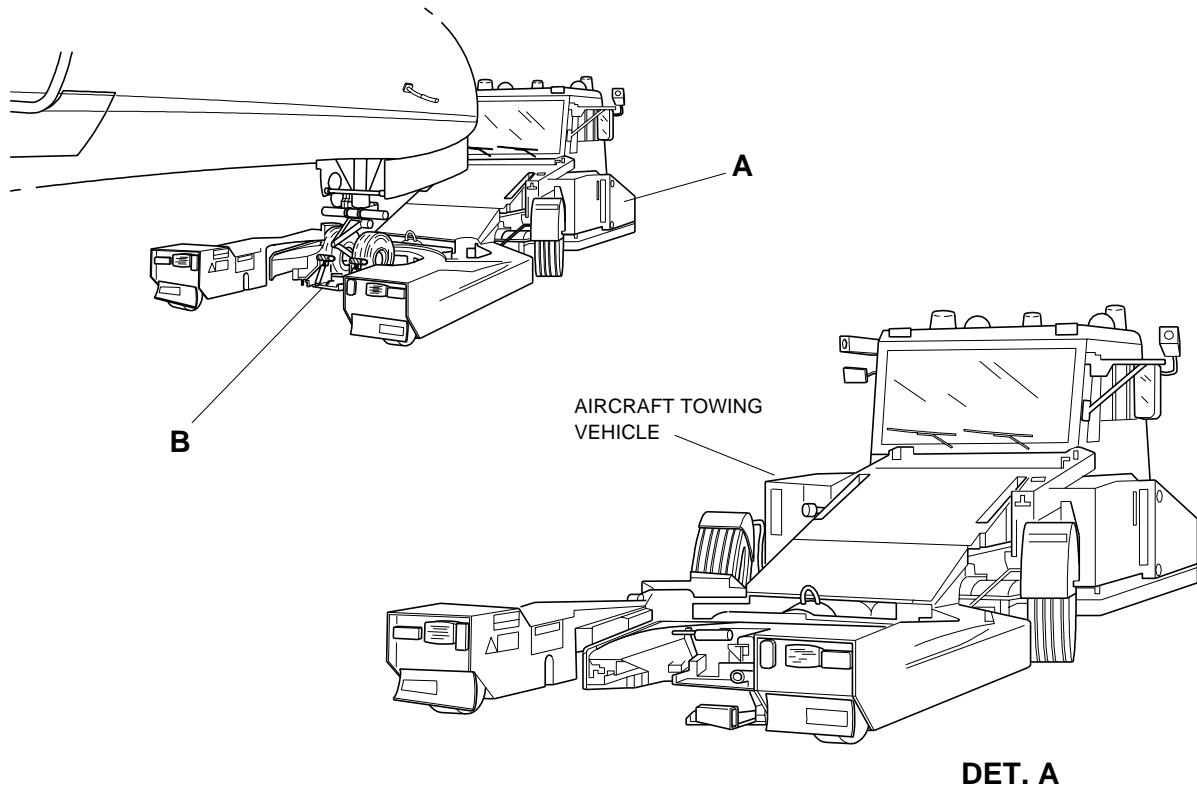
NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Lower the nosewheel cradle until the cradle is on the ground.
- (3) Make sure that the landing gear safety pins are installed correctly ([AMM TASK 32-00-01-910-801-A/200](#)).
- (4) Install the wheel chocks (GSE 012) forward and aft of the wheels on the left and right main landing gears.

CAUTION: BEFORE YOU PRESSURIZE THE HYDRAULIC SYSTEM, MAKE SURE THAT THE NOSEWHEEL IS NEAR THE CENTER POSITION (CLOSE TO 0°).

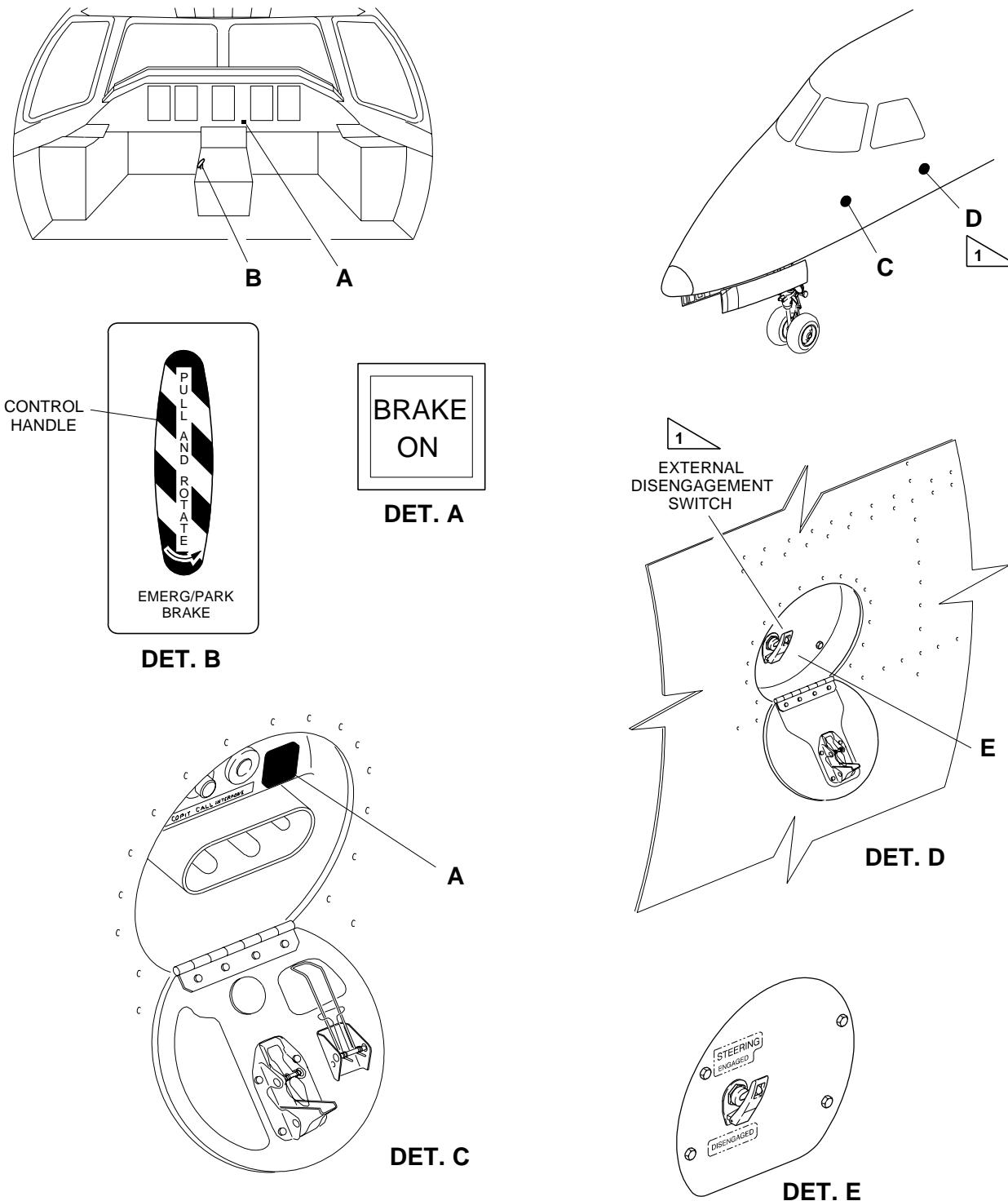
- (5) Open the gate of the tug and make sure that the gate is fully open.
- (6) Remove the tug from aircraft slowly. Make sure that the cradle and the gate are fully clear of the nose landing gear.
- (7) Do a check to make sure that there is no damage to the nosewheel or tires.
- (8) On the circuit breaker panel, remove the DO-NOT-CLOSE tag and close the STEER circuit breaker. Or for aircraft POST-MOD. [S.B.145-32-0057](#), set the external steering disengagement switch to the "ENGAGED" position (Refer to Figure 202, DET. E).

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Aircraft Towing
Figure 201



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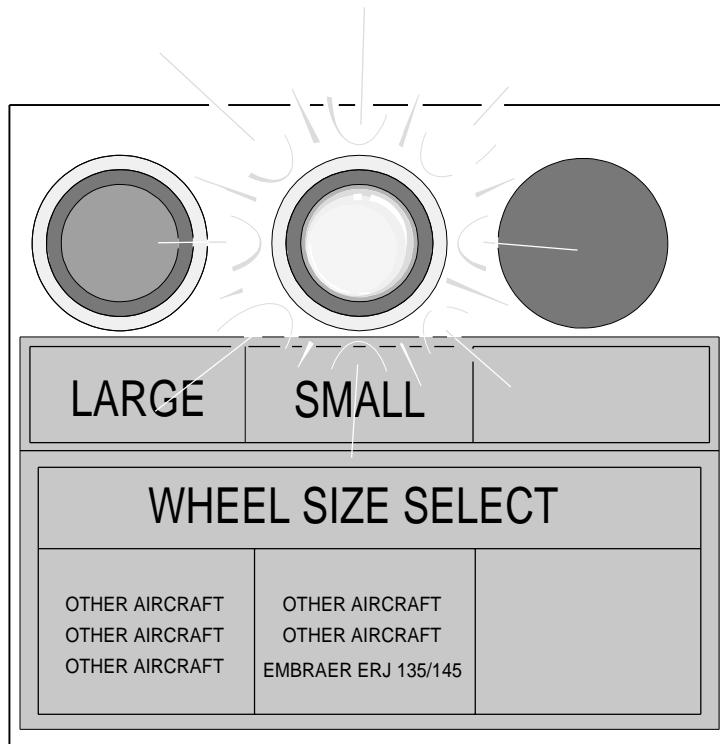
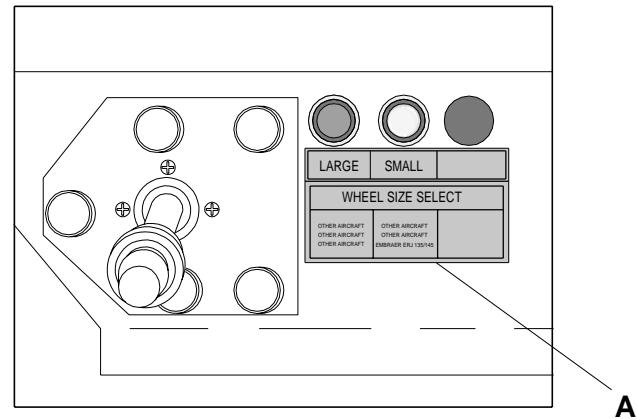
EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Emergency/Parking Brake Handle and Indication
Figure 202



 POST-MOD SB 145-32-0057.

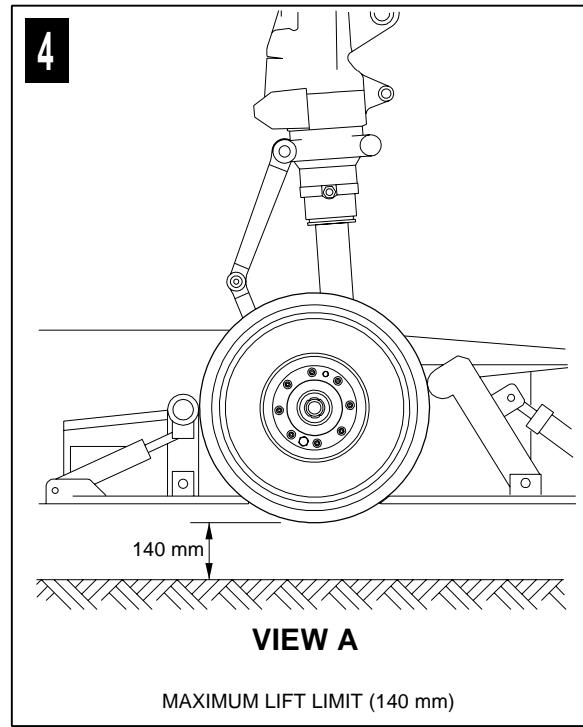
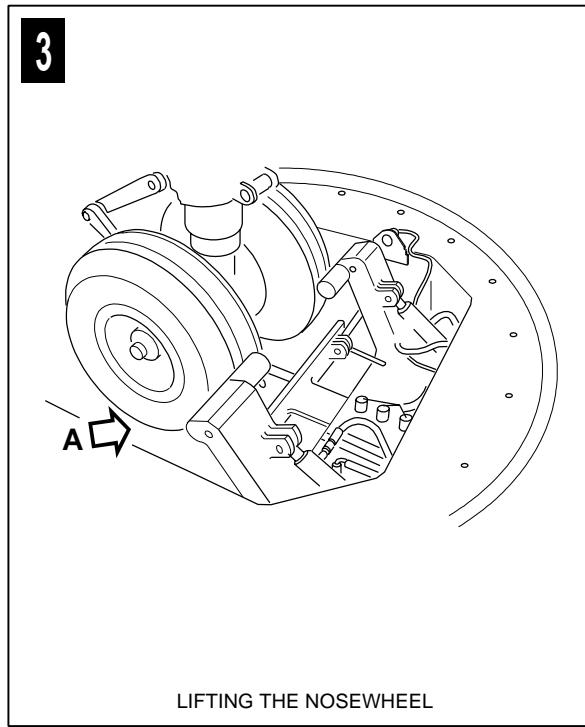
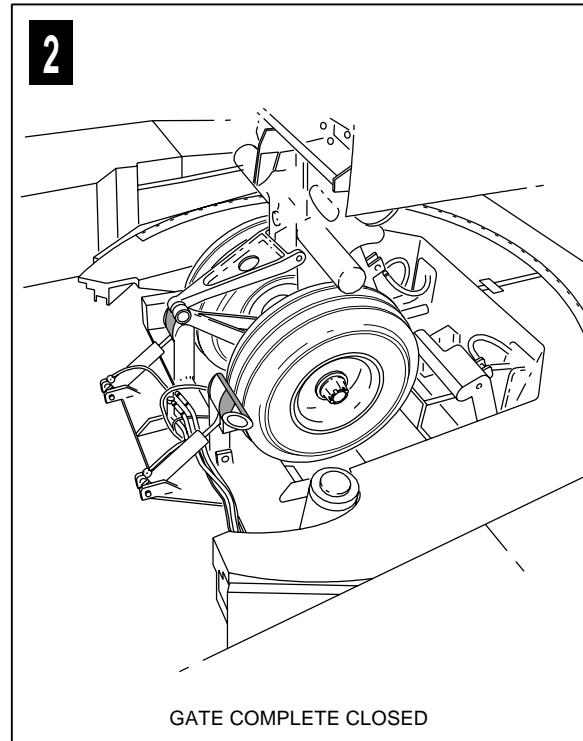
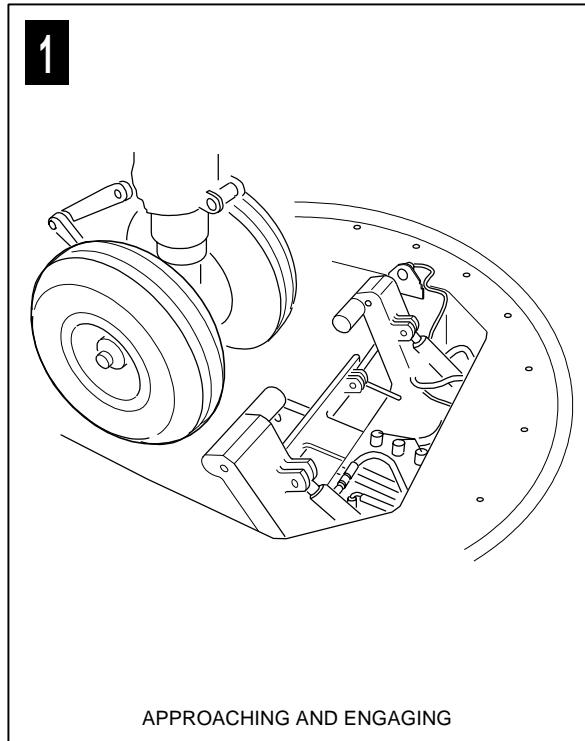
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EFFECTIVITY: POST-MOD. S.B. 145-32-0102
 Tug Dashboard
 Figure 203

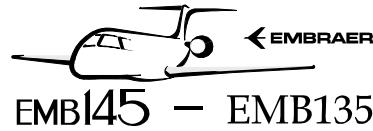

DET. A

EM145AMM090016A.DGN

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Towing Operation
Figure 204



EM145AMM090015A.DGN



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TASK 09-10-01-500-802-A

EFFECTIVITY: POST-MOD. S.B.145-32-0102

3. AIRCRAFT TOWING WITH LEKTRO AP8750B-AL VEHICLE

A. General

- (1) This procedure uses vehicle (tug) GSE 297.
- (2) For a safe towing operation, only qualified personnel must operate the AP8750B-AL vehicle.
- (3) For more details, refer to the CMM of vehicle (tug) GSE 297.

B. References

REFERENCE	DESIGNATION
AMM TASK 05-50-23-200-801-A/600	BRAKE USE DURING TOWBARLESS TOWING OPERATION
AMM TASK 09-10-00-500-801-A/200	AIRCRAFT TOWING
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 32-49-01-600-801-A/300	MLG WHEEL TIRE - CHECK AND CHARGE
AMM TASK 32-49-04-600-801-A/300	NLG WHEEL TIRE - CHECK AND CHARGING
S.B.145-32-0057	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 012	Chock - Wheel	To chock the nose and main LG wheels	
GSE 297	Aircraft Towing Vehicle	Aircraft towing	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Tows the aircraft	Ramp
1	Helps with the task	In the cockpit

I. Preparation

SUBTASK 841-033-B

WARNING: WHEN YOU TOW THE AIRCRAFT, ALL PEOPLE MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOW TRACTOR, NOSE WHEEL, MAIN WHEELS AND AIRCRAFT FUSELAGE AND WINGS. PEOPLE ON GROUND CAN BE RUN OVER BY NOSE WHEEL, MAIN WHEELS, TOW TRACTOR AND AIRCRAFT FUSELAGE AND WINGS. THIS IS BECAUSE THE AIRCRAFT WILL CHANGE POSITION DURING PUSHBACK AND TOWING. OBEY SAFE DISTANCE BETWEEN PEOPLE ON GROUND AND THE EQUIPMENT THAT MOVES. A FATAL INJURY CAN OCCUR.

CAUTION: • DURING TOWING OPERATIONS, A TECHNICIAN MUST STAY IN THE COCKPIT TO SET THE EMERGENCY/PARKING BRAKE (DET. B, FIGURE 202), IF NECESSARY.

- DURING THE TOWING OPERATIONS WITH THE ELECTRICAL SYSTEM ENERGIZED, MAKE SURE THAT THE ELECTRIC MOTOR-DRIVEN HYDRAULIC PUMPS ARE OFF.
- REMOVE ALL TOOLS, EQUIPMENT, AND MATERIALS FROM THE TOWING AREA. MAKE SURE THAT THE AREA IS CLEAN.
- TO PREVENT PEAK LOADS, MAKE SURE THAT THE ACCELERATION AND DECELERATIONS DURING TOWING ARE SMOOTH.
- USE ONLY VEHICLE (TUG) GSE 297 WITH STRUT STRAP (DET. B, FIGURE 205).
- BEFORE THE AIRCRAFT TOWING, MAKE SURE THAT THE VEHICLE IS IN GOOD CONDITIONS FOR OPERATION. FOR MORE DETAILS, REFER TO THE MANUFACTURER OPERATING MANUAL.

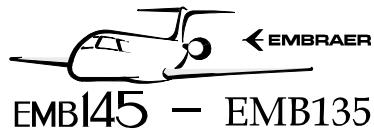
(1) Make sure that the emergency/parking brake accumulator is pressurized. Pull the emergency/parking brake handle (DET. B, Figure 202) and, with the aircraft energized, make sure that the "BRAKE ON" lights (DET. A of Figure 202 and DET. C of Figure 202) are on.

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

(2) Make sure that the safety pins of the landing gear are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).

NOTE: The use of the safety pins on MLG and NLG is optional when you tow or push the aircraft for the flight. This occurs when the aircraft is in position for the flight crew to taxi the aircraft before or after a flight.

(3) On the circuit breaker panel, open the STEER circuit breaker and attach a DO-NOT-CLOSE tag to it. On aircraft POST-MOD. [S.B.145-32-0057](#), alternatively, set the external steering disengagement switch to the "DISENGAGED" position (DET. E, Figure 202). Make sure that the "STEER INOP" message comes into view on the EICAS display.



J. Towing ([Figure 205](#)) ([Figure 202](#))

SUBTASK 580-033-B

WARNING: • **MAKE SURE THAT THE EMERGENCY/PARKING BRAKE IS SET, BEFORE YOU CONNECT THE TOWING EQUIPMENT.**

- **THE TUG USES THE REAR WHEELS TO STEER. THE TUG OPERATOR MUST BE AWARE OF HOW THIS AFFECTS THE HANDLING OF THE UNIT AND BE PREPARED TO TAKE SPECIAL PRECAUTIONS TO PREVENT ACCIDENTS. DURING THE TUG OPERATION, START SLOWLY UNTIL YOU KNOW IN WHICH DIRECTION THE STEER WHEELS ARE AND CORRECT IF NECESSARY BEFORE ACCELERATION. WHEN THE STEER WHEELS ARE TURNED, EXAMINE THE REAR AREA OF THE TUG TO MAKE SURE THAT IT IS FREE FROM OBSTRUCTIONS.**

- (1) Make sure that the emergency/parking brake is actuated. Set the emergency/parking brake handle to up position (DET. B, [Figure 202](#)).

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Make sure that tires are in a serviceable condition. If necessary, do the check and charging of tires, refer to [AMM TASK 32-49-01-600-801-A/300](#) for the main wheel tires and [AMM TASK 32-49-04-600-801-A/300](#) for the nose wheel tires.
- (3) To capture the aircraft forward of the nose wheel, approach the aircraft at walking speed toward the aircraft wheel in line with the direction in which the tires point (the nose wheel direction of travel).
- (4) Stop the tug 1 m (40 in) from the nose wheels. Lower the nose wheel cradle to 50 mm (2 in) above the ground.
- (5) Remove the wheel chock from the nose wheels.
- (6) Lower the nose wheel cradle to the ground.
- (7) Make sure that the tug is in the correct position. If necessary, adjust the side and rear gates to obey the aircraft requirements.
- (8) Unwind enough winch strap to permit the connection of the snap hook (2) to the strut strap (1) held around the nose landing gear leg.
- (9) Connect the snap hook (2) to the strut strap (1). Refer to [Figure 205](#).
- (10) Remove the wheel chocks from the main wheels.

CAUTION: **MAKE SURE THAT THE EMERGENCY/PARKING BRAKE IS RELEASED AND, WITH THE AIRCRAFT ENERGIZED, MAKE SURE THAT THE "BRAKE ON" LIGHTS (DET. A AND DET. C, [FIGURE 202](#)) ARE OFF.**

- (11) Release the emergency/parking brake. Set the emergency/parking brake handle to down (DET. B, [Figure 202](#)).

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (12) Winch the aircraft onto the cradle. Make sure that the nose wheels stay centered on the cradle.

WARNING: DO NOT LIFT THE CRADLE FULLY, UNLESS IT IS NECESSARY TO DROP THE TAIL OF THE AIRCRAFT OR CLEAR AN OBSTACLE. LIFTING THE NOSE WHEEL TOO HIGH CAN CAUSE A SHIFT IN THE AIRCRAFT CENTER OF GRAVITY AND, UNDER SOME CIRCUMSTANCES, CAUSE THE AIRCRAFT TO TIP ONTO ITS TAIL.

- (13) Lift the nose wheel cradle assembly sufficiently to permit it to clear ground or floor obstacles during towing.
- (14) Install the front gate so that it acts as a backup aircraft wheel stop against failure of the winch and winch strap assembly.

CAUTION:

- DO NOT TOW THE AIRCRAFT AT MORE THAN 24 KM/H (15 MPH).
- DO NOT PUSH-BACK THE AIRCRAFT AT MORE THAN THE 8 KM/H (5 MPH).
- EFFICIENT COMMUNICATION BETWEEN TOW TRACTOR OPERATOR AND THE COCKPIT PERSON MUST BE ESTABLISHED BEFORE AIRCRAFT IS TOWED.
- DURING THE TOWING PROCEDURE, DO NOT BRAKE THE AIRCRAFT. INDEPENDENTLY OF THE SPEED, THIS CAN CAUSE DAMAGE TO THE AIRCRAFT STRUCTURE AND/OR TO THE NOSE LANDING GEAR. ONLY WHEN THERE IS A RISK OF COLLISION OR DAMAGE TO THE AIRCRAFT AND IN ACCORDANCE TO THE TRACTOR OPERATOR, USE THE AIRCRAFT BRAKES TO STOP THE AIRCRAFT.
- OBEY THE MAXIMUM RECOMMENDED WIND SPEEDS FOR AIRCRAFT TOWING. REFER TO [AMM TASK 09-10-00-500-801-A/200](#).
- DO NOT OVERSTEER. THE MAXIMUM TOWING ANGLE IS 170° TO THE RIGHT AND 170° TO THE LEFT. IF YOU USE MORE THAN THE MAXIMUM TOWING ANGLE, DO A VISUAL INSPECTION ON NOSE LANDING GEAR. IF A PART IS DAMAGED, REPAIR OR REPLACE IT AS APPLICABLE.

NOTE:

- Start and stop with the nose landing gear as near as possible the 0° position.
- For longer distances, the aircraft towing is usually done with the tug in reverse, while the aircraft is pulled. However, in some conditions, this may not be the best way to do the task.
- You will usually drive the tug forward and push the aircraft for the final positioning of the aircraft in a hangar or at ramp services.

Make sure that all the steps above are obeyed. After that, do the towing as follows:

- (a) Tow the aircraft slowly straight ahead before you turn.
- (b) If, during the towing procedure, the aircraft is braked, independently of the speed, check the nose landing gear and its adjacent structure for possible damage. Refer to [AMM TASK 05-50-23-200-801-A/600](#).
- (c) Complete the aircraft towing in a straight line along a minimum of 3 meters (10 feet) or until the nose wheels are near the center position (approximately 0°).

K. Follow-on

SUBTASK 842-033-B

- (1) Set the emergency/parking brake and, with the aircraft energized, make sure that the "brake on" lights (Figure 202, DET. A and DET. C) are on.

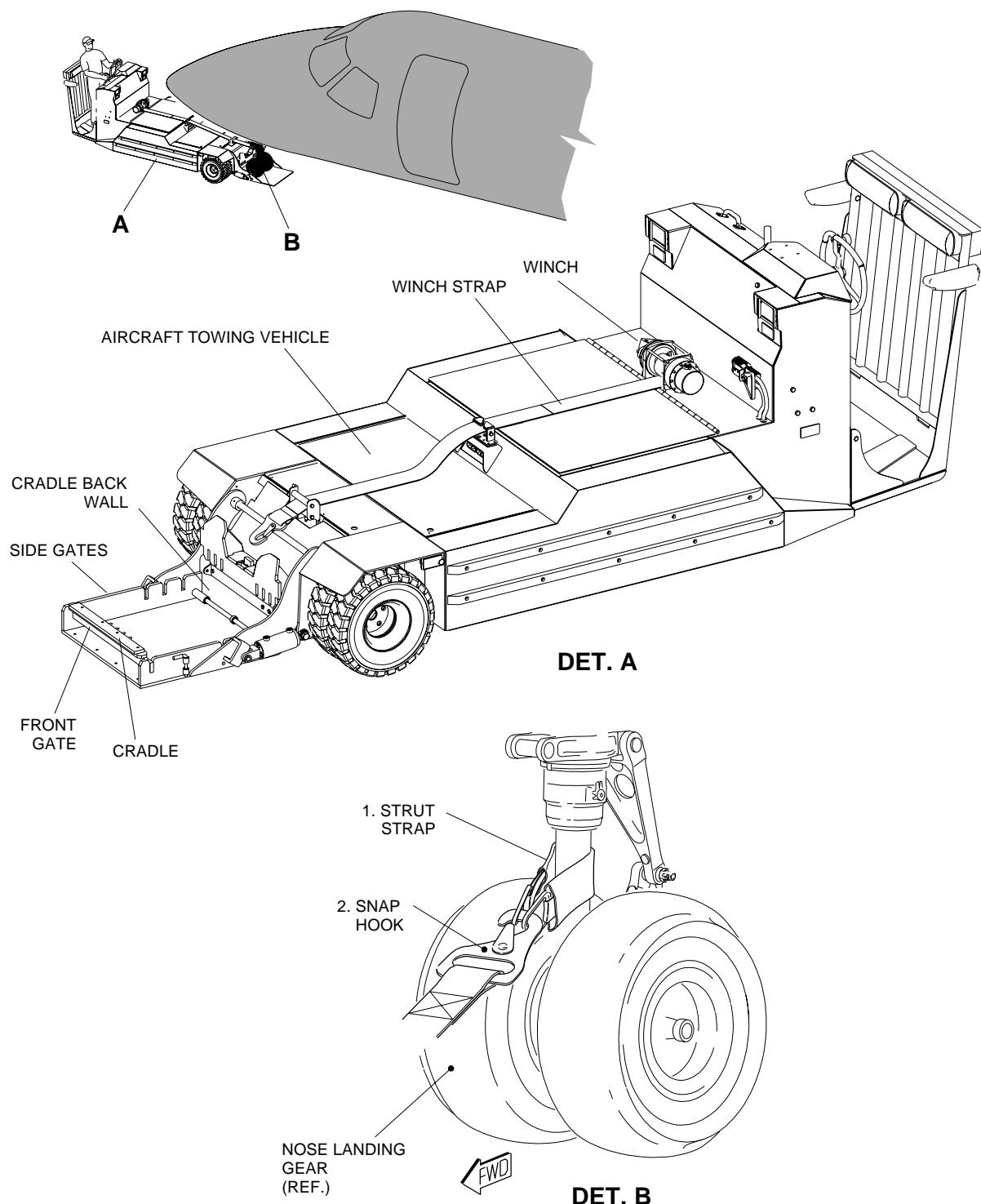
NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Install wheel chocks forward and aft of the aircraft wheels.
- (3) Make sure that the landing gear safety pins are installed correctly ([AMM TASK 32-00-01-910-801-A/200](#)).

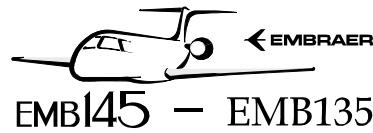
CAUTION: BEFORE YOU PRESSURIZE THE HYDRAULIC SYSTEM, MAKE SURE THAT THE NOSE WHEEL IS CLOSE TO CENTER POSITION (CLOSE TO 0°).

- (4) Remove the front gate from the cradle.
- (5) Lower the nose wheel cradle down to the ground.
- (6) Unwind sufficient winch strap to disconnect the snap hook (2).
- (7) Remove the snap hook (2) from the strut strap (1) held around the nose-landing-gear leg.
- (8) Remove the Towing Vehicle (Tug).
- (9) Back the tug wheel away from the aircraft. Then lift the cradle to full height.
- (10) On the circuit breaker panel, remove the DO-NOT-CLOSE tag and close the STEER circuit breaker. Or, for aircraft POST-MOD. [S.B.145-32-0057](#), set the external steering disengagement switch to the "ENGAGED" position (Figure 202, DET. D and DET. E).

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Aircraft Towing
Figure 205



EM145AMM090018A.DGN



AIRCRAFT MAINTENANCE MANUAL

TASK 09-10-01-500-803-A

EFFECTIVITY: POST-MOD. S.B.145-32-0102

4. AIRCRAFT TOWING WITH TLD TPX-100E VEHICLE

A. General

- (1) This procedure uses the TPX-100E vehicle (tug). This tug is used for pushback and short distance towing.
- (2) For a safer towing operation, only qualified personnel must operate the TPX-100E vehicle.
- (3) To do this task, you must know all the contents of the TPX-100E Operator's Handbook.

B. References

REFERENCE	DESIGNATION
AMM TASK 05-50-23-200-801-A/600	BRAKE USE DURING TOWBARLESS TOWING OPERATION
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 32-49-01-600-801-A/300	MLG WHEEL TIRE - CHECK AND CHARGE
AMM TASK 32-49-04-600-801-A/300	NLG WHEEL TIRE - CHECK AND CHARGING
S.B.145-32-0057	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 012	Chock - Wheel	To chock the nose and main LG wheels	
GSE 494	Aircraft Towing Vehicle	Aircraft towing	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Tows the aircraft	Driving the towing tug
1	Helps with the task	In the cockpit

I. Preparation (Figure 202)

SUBTASK 841-034-B

WARNING: WHEN YOU TOW THE AIRCRAFT, ALL PERSONS MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOWING TUG, NOSE WHEEL, MAIN WHEELS, AIRCRAFT FUSELAGE AND WINGS. PERSONS ON THE GROUND CAN BE RUN OVER BY NOSE WHEEL, MAIN WHEELS, TOWING TUG, AIRCRAFT FUSELAGE AND WINGS. THIS IS BECAUSE THE AIRCRAFT WILL CHANGE POSITION DURING PUSHBACK AND TOWING. KEEP A SAFE DISTANCE BETWEEN PERSONS ON THE GROUND AND THE EQUIPMENT THAT MOVES. A FATAL INJURY CAN OCCUR.

- CAUTION:**
- ONLY QUALIFIED PERSONNEL MUST OPERATE THE TPX-100E VEHICLE.
 - DURING TOWING OPERATIONS, A TECHNICIAN MUST STAY IN THE COCKPIT, WITH SEAT BELT, TO SET THE EMERGENCY/PARKING BRAKE (FIGURE 202, DET. B), IF NECESSARY.
 - DURING THE TOWING OPERATIONS WITH THE ELECTRICAL SYSTEM ENERGIZED, MAKE SURE THAT THE ELECTRIC MOTOR-DRIVEN HYDRAULIC PUMPS ARE OFF.
 - REMOVE ALL TOOLS, EQUIPMENT, AND MATERIALS FROM THE TOWING AREA. MAKE SURE THAT THE AREA IS CLEAN.
 - TO PREVENT PEAK LOADS, MAKE SURE THAT THE ACCELERATIONS AND DECELERATIONS DURING TOWING ARE SMOOTH.
 - BEFORE THE AIRCRAFT TOWING, MAKE SURE THAT THE VEHICLE IS IN GOOD CONDITIONS FOR OPERATION. FOR MORE DETAILS, REFER TO THE MANUFACTURER'S OPERATOR HANDBOOK.

- (1) Make sure that the emergency/parking brake accumulator is pressurized. Pull and rotate the emergency/parking brake handle (Refer to Figure 202, DET. B) and, with the aircraft energized, make sure that the "BRAKE ON" lights are on (Refer to Figure 202, DET. A and DET. C).

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Make sure that the safety pins of the landing gear are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).

NOTE: The use of the safety pins on MLG and NLG is optional when you tow or push the aircraft for the flight. This occurs when the aircraft is in position for the flight crew to taxi the aircraft before or after a flight.

- (3) On the circuit breaker panel, open the STEER circuit breaker and attach a DO-NOT-CLOSE tag to it. On aircraft POST-MOD. [S.B.145-32-0057](#), alternatively, set the external steering disengagement switch to the "DISENGAGED" position (Refer to Figure 202, DET. D and DET. E). Make sure that the "STEER INOP" message comes into view on the EICAS display.

J. Towing ([Figure 206](#)) ([Figure 207](#)) ([Figure 208](#)) ([Figure 202](#))

SUBTASK 580-034-B

WARNING: • BEFORE YOU CLAMP THE NOSE WHEEL WITH THE TOWING EQUIPMENT, MAKE SURE THAT THE AIRCRAFT EMERGENCY/PARKING BRAKE IS SET.

• THE TUG REAR WHEELS ARE STEERABLE. THE TUG OPERATOR MUST KNOW HOW THIS AFFECTS THE HANDLING OF THE UNIT AND BE PREPARED TO TAKE SPECIAL PRECAUTIONS TO PREVENT ACCIDENTS. DURING THE TUG OPERATION, START SLOWLY UNTIL YOU KNOW IN WHICH DIRECTION THE STEERABLE WHEELS ARE AND CORRECT, IF NECESSARY, BEFORE YOU ACCELERATE THE TUG. WHEN YOU TURN THE STEERING WHEEL, EXAMINE THE REAR AREA OF THE TUG TO MAKE SURE THAT IT IS FREE FROM OBSTRUCTIONS.

- (1) Make sure that the aircraft emergency/parking brake is set. If not, set the emergency/parking brake handle up (Refer to Figure 202, DET. B).

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Make sure that the tires are in a serviceable condition. Do a check of the tires and charge them if necessary. Refer to [AMM TASK 32-49-01-600-801-A/300](#) for the main wheel tires and [AMM TASK 32-49-04-600-801-A/300](#) for the nose wheel tires.
- (3) Approach the tug to the nose wheel with the gates open and the nose wheel cradle in the high position. Refer to Figure 208, step 1.
- (4) Stop the tug aligned with and at approximately two meters from the nose wheel.
- (5) Make sure that the tug rear wheels are in line with the tug forward wheels. Refer to Figure 206, view B.
- (6) Start to lower the nose wheel cradle and select the aircraft model in the dashboard of the tug. Refer to Figure 207.
- (7) Lower the nose wheel cradle fully to the ground.

CAUTION: BEFORE YOU APPROACH THE TUG TO THE AIRCRAFT, MAKE SURE THAT THE GATE IS FULLY OPEN AND THE NOSE WHEEL CRADLE IS FULLY LOWERED.

- (8) Drive carefully forward to engage and clamp the nose wheel. Make sure that the tug is in the correct position in relation to the nose wheel. Refer to Figure 206, view B.

WARNING: OBEY THE MAXIMUM LIFT LIMIT (160 mm/6.3 in) AND DO NOT LIFT THE AIRCRAFT PARTIALLY DISASSEMBLED. IF YOU LIFT THE NOSE WHEEL TOO HIGH, IT CAN CAUSE A CHANGE IN THE AIRCRAFT CENTER OF GRAVITY AND CAUSE THE AIRCRAFT TO TIP ON ITS TAIL.

- (9) After the gate fully closes and the back plate clamps the nose wheel, lift the nose wheel cradle of the tug.

CAUTION: BEFORE RELEASING THE AIRCRAFT EMERGENCY/PARKING BRAKE, THE PERSON IN THE COCKPIT MUST GIVE NOTICE OF IT TO THE TOWING TRACTOR OPERATOR.

- (10) Release the aircraft emergency/parking brake (Refer to Figure 202, DET. B). With the aircraft energized, make sure that the "BRAKE ON" light goes off.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

CAUTION: • DO NOT USE THE TPX-100E TUG FOR LONG DISTANCE TOWING. THIS TUG IS USED FOR AIRCRAFT TOWING (SHORT DISTANCES), PUSHBACK, AND STEERING.

- DO NOT PUSHBACK THE AIRCRAFT AT MORE THAN 6 KM/H (3.7 MPH).
- GOOD COMMUNICATION BETWEEN THE TOWING TRACTOR OPERATOR AND THE PERSON IN THE COCKPIT MUST BE ESTABLISHED BEFORE THE AIRCRAFT IS TOWED.
- DO NOT OVERSTEER. THE MAXIMUM TOWING ANGLE IS 170° TO THE RIGHT AND 170° TO THE LEFT. IF YOU USE MORE THAN THE MAXIMUM TOWING ANGLE, DO A VISUAL INSPECTION ON NOSE LANDING GEAR. IF A PART IS DAMAGED, REPAIR OR REPLACE IT AS APPLICABLE.
- DURING THE TOWING PROCEDURE, DO NOT BRAKE THE AIRCRAFT. INDEPENDENTLY OF THE SPEED, THIS CAN CAUSE DAMAGE TO THE AIRCRAFT STRUCTURE AND/OR TO THE NOSE LANDING GEAR. ONLY USE THE AIRCRAFT BRAKES TO STOP THE AIRCRAFT WHEN THERE IS A RISK OF COLLISION OR DAMAGE TO THE AIRCRAFT. GIVE THE TUG OPERATOR A WARNING THAT YOU WILL BRAKE THE AIRCRAFT, AND BRAKE THE AIRCRAFT IF THE TUG OPERATOR GIVES YOU A WARNING THAT HE/SHE WILL BRAKE THE TUG.

- (11) **NOTE:** Start and stop with the nose landing gear as near to the 0° position as possible.

Make sure that you obeyed all the steps before this one, and do as follows:

- (a) Tow the aircraft slowly in a straight line before you make a turn.
- (b) If, during the towing procedure, the aircraft is braked, independently of the speed, do a check of the nose landing gear and its adjacent structure for possible damage. Refer to [AMM TASK 05-50-23-200-801-A/600](#).
- (c) Complete the aircraft towing in a straight line for a minimum of 3 meters (10 feet) or until the nose wheel is near the center position (approximately 0°).



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K. Follow-on

SUBTASK 842-034-B

- (1) Set the aircraft emergency/parking brake (Figure 202, DET. B) and, with the aircraft energized, make sure that the "BRAKE ON" lights (Figure 202, DET. A and DET. C) are on.

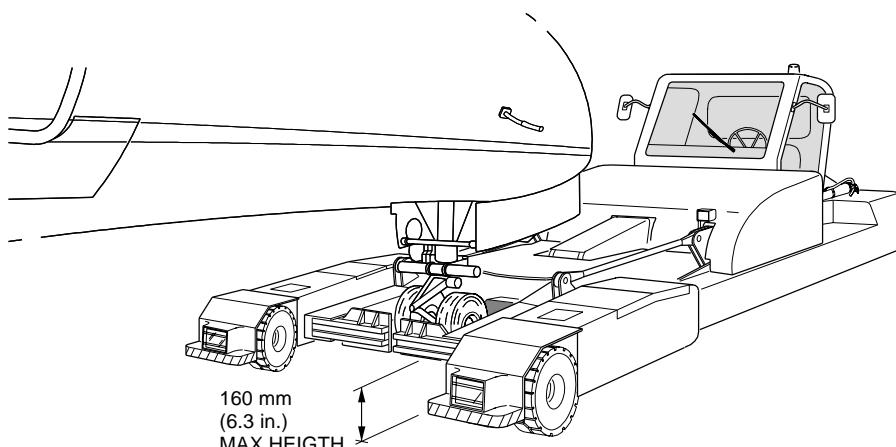
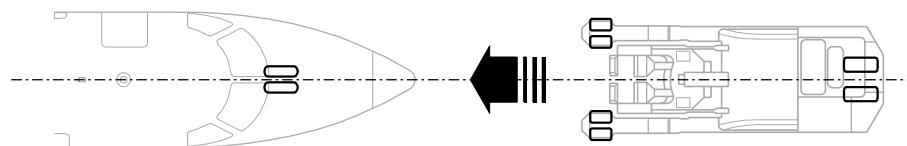
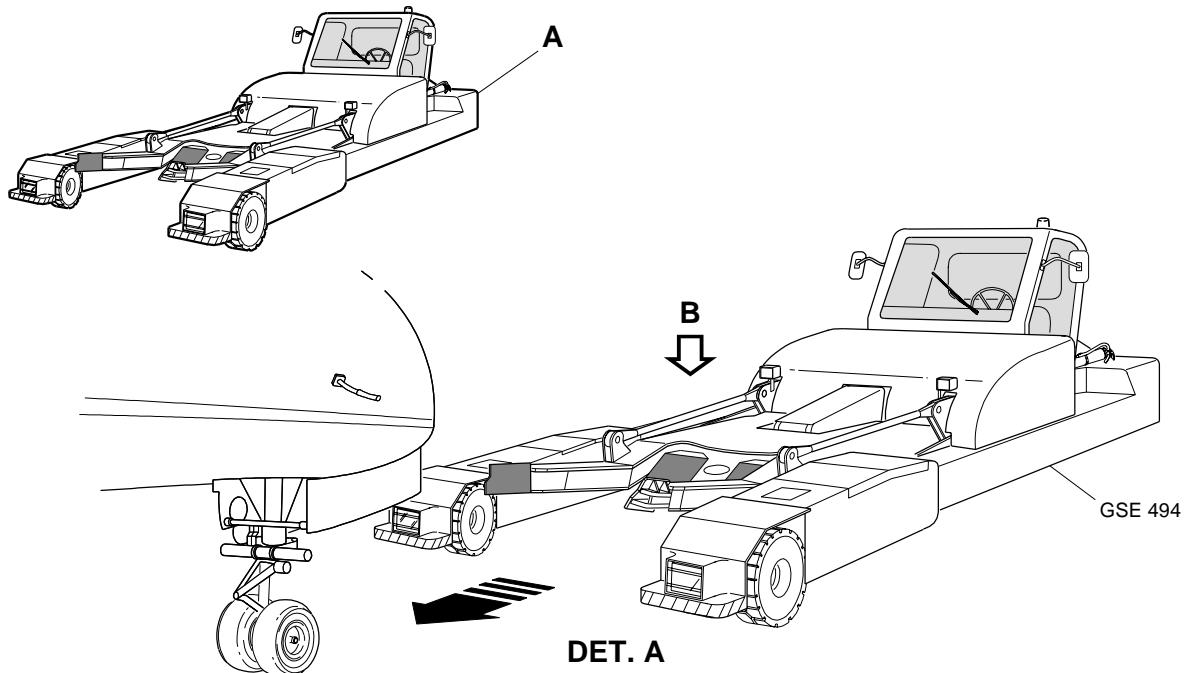
NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Lower the nose wheel cradle until the gate is fully open and the back plate is retracted. Refer to Figure 208, step 5.
- (3) Make sure that the landing gear safety pins are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).
- (4) Install GSE 012 Chock - Wheel in front of and behind the wheels on the left and right main landing gears.

CAUTION: • BEFORE YOU PRESSURIZE THE HYDRAULIC SYSTEM, MAKE SURE THAT THE NOSE WHEEL IS NEAR THE CENTER POSITION (CLOSE TO 0°).
• BEFORE YOU REMOVE THE TUG FROM THE AIRCRAFT, MAKE SURE THAT THE NOSE WHEEL CRADLE IS FULLY LOWERED AND THE GATE IS FULLY OPEN.

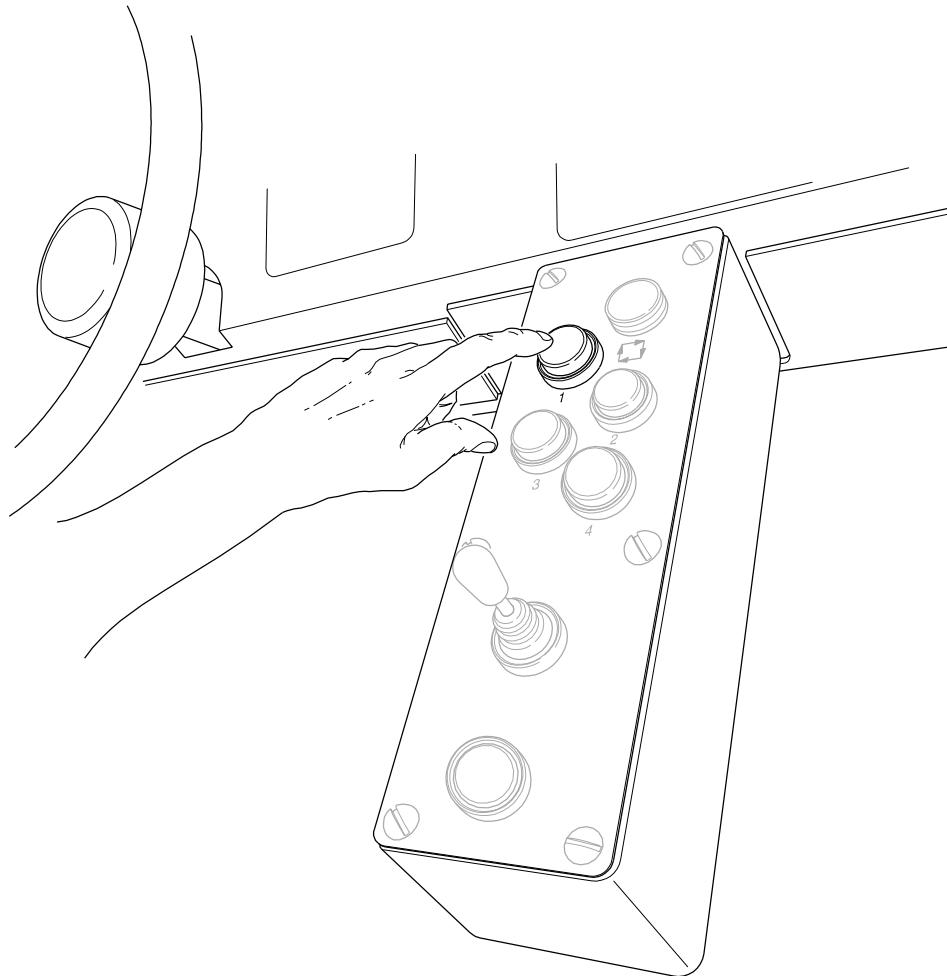
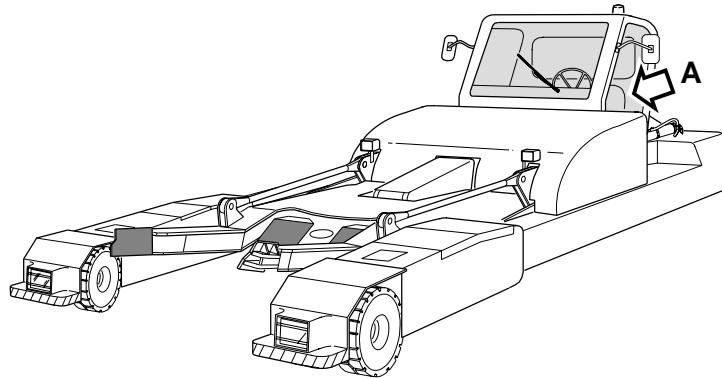
- (5) Remove the tug from aircraft slowly. Make sure that the gate is fully clear of the nose landing gear. Refer to Figure 208, step 5 and step 6.
- (6) Do a check to make sure that there is no damage to the nose wheel or tires.
- (7) On the circuit breaker panel, remove the DO-NOT-CLOSE tag and close the STEER circuit breaker. For aircraft POST-MOD. [S.B.145-32-0057](#), set the external steering disengagement switch to the "ENGAGED" position. Refer to Figure 202, DET. D and DET. E.

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Tug
Figure 206



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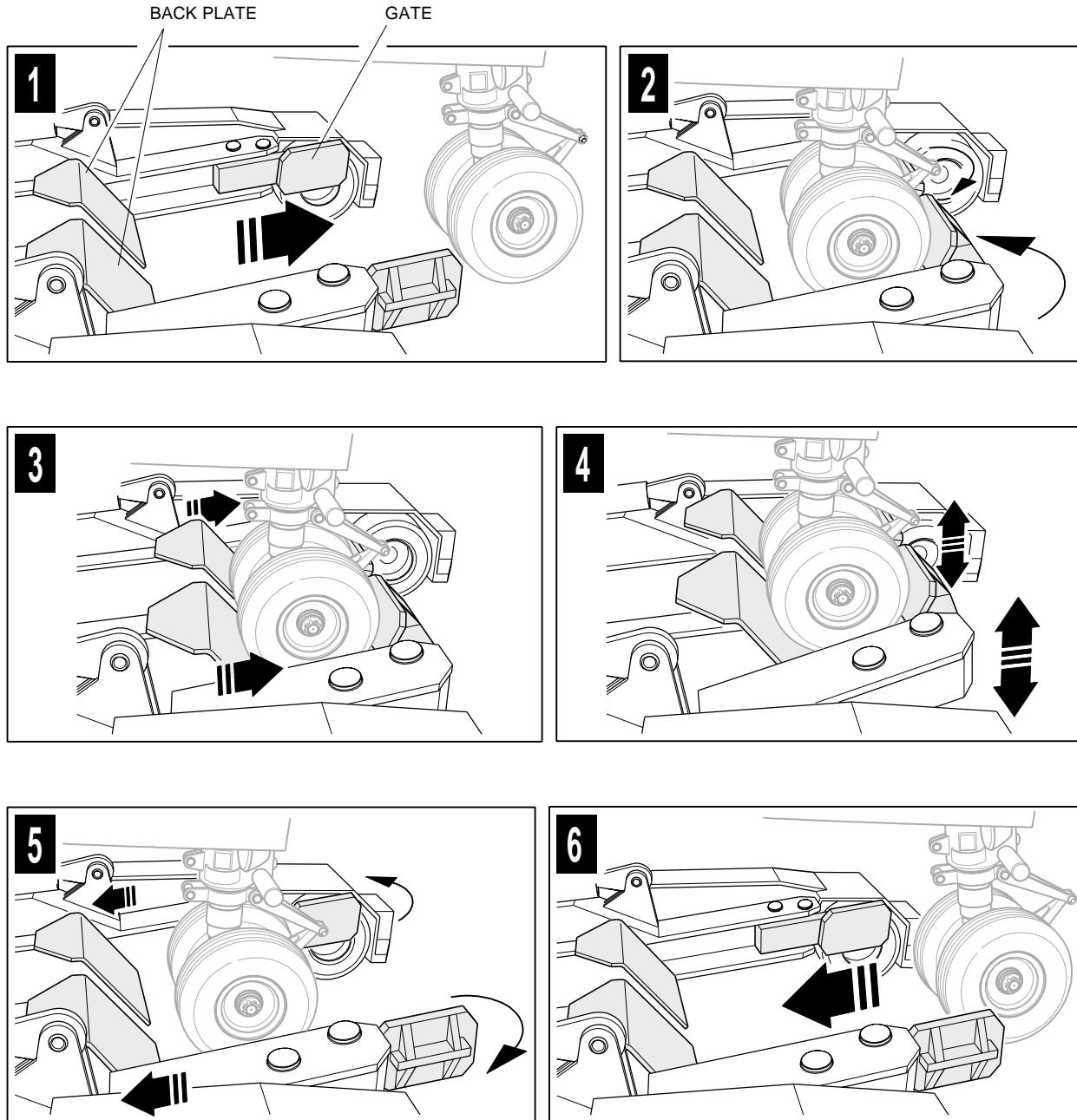
EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Tug Dashboard
Figure 207



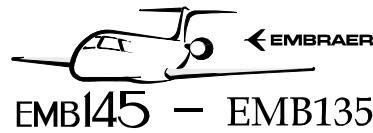
VIEW A

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EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Towing Operation
Figure 208



EM145AMM090022A.DGN



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AIRCRAFT
MAINTENANCE MANUAL

TASK 09-10-01-500-804-A

EFFECTIVITY: POST-MOD. S.B.145-32-0102

5. AIRCRAFT TOWING WITH LEKTRO AP8850SDA-AL-100/50 VEHICLE

A. General

- (1) This procedure uses the Lektro AP8850SDA-AL-100/50 Vehicle.
- (2) For a safer towing operation, only qualified personnel must operate the Lektro AP8850SDA-AL-100/50 Vehicle.
- (3) To do this task, you must know all the contents of the Lektro AP8850SDA-AL-100/50 Vehicle Manufacturer's Operating Handbook.

B. References

REFERENCE	DESIGNATION
AMM TASK 05-50-23-200-801-A/600	BRAKE USE DURING TOWBARLESS TOWING OPERATION
AMM TASK 09-10-00-500-801-A/200	AIRCRAFT TOWING
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 32-49-01-600-801-A/300	MLG WHEEL TIRE - CHECK AND CHARGE
AMM TASK 32-49-04-600-801-A/300	NLG WHEEL TIRE - CHECK AND CHARGING
S.B.145-32-0057	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 012	Chock - Wheel	To chock the nose and main LG wheels	
GSE 198	Aircraft Towing Vehicle	Aircraft towing	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Tows the aircraft	Driving the towing vehicle
1	Helps with the task	In the cockpit

I. Preparation

SUBTASK 841-035-B

WARNING: WHEN YOU TOW THE AIRCRAFT, ALL PERSONS MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOWING TUG, NOSE WHEEL, MAIN WHEELS, AIRCRAFT FUSELAGE AND WINGS. PERSONS ON THE GROUND CAN BE RUN OVER BY NOSE WHEEL, MAIN WHEELS, TOWING TUG, AIRCRAFT FUSELAGE AND WINGS. THIS IS BECAUSE THE AIRCRAFT WILL CHANGE POSITION DURING PUSHBACK AND TOWING. KEEP A SAFE DISTANCE BETWEEN PERSONS ON THE GROUND AND THE EQUIPMENT THAT MOVES. A FATAL INJURY CAN OCCUR.

CAUTION: • ONLY QUALIFIED PERSONNEL MUST OPERATE THE GSE 198 AIRCRAFT TOWING VEHICLE.

- DURING TOWING OPERATIONS, A TECHNICIAN MUST STAY IN THE COCKPIT, WITH SEAT BELT, TO SET THE EMERGENCY/PARKING BRAKE (FIGURE 202, DET. B), IF NECESSARY.
- DURING THE TOWING OPERATIONS WITH THE ELECTRICAL SYSTEM ENERGIZED, MAKE SURE THAT THE ELECTRIC MOTOR-DRIVEN HYDRAULIC PUMPS ARE OFF.
- REMOVE ALL TOOLS, EQUIPMENT, AND MATERIALS FROM THE TOWING AREA. MAKE SURE THAT THE AREA IS CLEAN.
- TO PREVENT PEAK LOADS, MAKE SURE THAT THE ACCELERATIONS AND DECELERATIONS DURING TOWING ARE SMOOTH.
- BEFORE THE AIRCRAFT TOWING, MAKE SURE THAT THE VEHICLE IS IN GOOD CONDITIONS FOR OPERATION. FOR MORE DETAILS, REFER TO THE MANUFACTURER'S OPERATING HANDBOOK.

- (1) Make sure that the emergency/parking brake accumulator is pressurized.
- (2) Pull and rotate the emergency/parking brake handle (Figure 202, DET. B) and, with the aircraft energized, make sure that the "BRAKE ON" lights are on (Figure 202, DET. A and DET. C).

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (3) Make sure that the safety pins of the landing gear are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).

NOTE: The use of the safety pins on MLG and NLG is optional when you tow or push the aircraft for the flight. This occurs when the aircraft is in position for the flight crew to taxi the aircraft before or after a flight.

- (4) On the circuit breaker panel, open the STEER circuit breaker and attach a DO-NOT-CLOSE tag to it.

On aircraft POST-MOD. [S.B.145-32-0057](#), alternatively, set the external steering disengagement switch to the "DISENGAGED" position (Figure 202, DET. D and DET. E).

Make sure that the "STEER INOP" message comes into view on the EICAS display.

WARNING: MAKE SURE THAT THE AIRCRAFT EMERGENCY/PARKING BRAKE IS SET, BEFORE YOU CONNECT THE TOWING EQUIPMENT.

- (5) Make sure that the aircraft emergency/parking brake is set. If not, set the emergency/parking brake handle up. Refer to Figure 202, DET. B.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (6) Make sure that the tires are in a serviceable condition. Do a check of the tires and charge them if necessary. Refer to [AMM TASK 32-49-01-600-801-A/300](#) for the main wheel tires and [AMM TASK 32-49-04-600-801-A/300](#) for the nose wheel tires.

- J. Towing ([Figure 209](#)) ([Figure 210](#)) ([Figure 211](#)) [Figure 202](#)

SUBTASK 580-035-B

WARNING: THE TUG REAR WHEELS ARE STEERABLE. THE TUG OPERATOR MUST KNOW HOW THIS AFFECTS THE HANDLING OF THE UNIT AND BE PREPARED TO TAKE SPECIAL PRECAUTIONS TO PREVENT ACCIDENTS. DURING THE TUG OPERATION, START SLOWLY UNTIL YOU KNOW IN WHICH DIRECTION THE STEERABLE WHEELS ARE AND CORRECT, IF NECESSARY, BEFORE YOU ACCELERATE THE TUG. WHEN YOU TURN TUG TO MAKE SURE THAT IT IS FREE FROM OBSTRUCTIONS.

- (1) Set Aircraft Selection Switch of the GSE 198 Aircraft Towing Vehicle for towing the ERJ-145. Refer to [Figure 209](#).
- (2) Approach the GSE 198 Aircraft Towing Vehicle, at walking speed, in the direction of the aircraft nose wheels (in line with the direction the tires are pointing).

NOTE: Walking speed is approximately 4 to 5 km/h (2.5 to 3 mph).

- (3) Stop the tug aligned with and at approximately 1 m (3 ft) from the nose wheel.
- (4) Lower the nose wheel cradle to 5 cm (2 in) above the ground.
- (5) Move slowly the tug vehicle again so that the cradle stops 5 cm (2 in) from the edge of the nose wheel tire.
- (6) Remove the GSE 012 Chock - Wheel from the nose-landing-gear wheels.
- (7) Lower the nose wheel cradle so that it touches the ground.
- (8) Apply the parking brake to the GSE 198 Aircraft Towing Vehicle.
- (9) Make sure that the tug vehicle is correctly positioned.
- (10) Attach one end of the strut strap to the winch strap hook.
- (11) Unwind enough winch strap to permit the installation of the strut strap around the nose landing gear strut.

WARNING: DO NOT CONTACT THE SHINY OLEO SURFACE WITH ANY METAL STRAP FITTINGS. THIS IS TO PREVENT DAMAGE TO THE EQUIPMENT.

CAUTION: DO NOT INSTALL THE STRUT STRAP AROUND THE WHEEL ASSEMBLY. THE STRUT STRAP CAN CAUSE DAMAGE TO THE COMPONENTS DURING THE WINCHING AND TOWING OPERATION.

- (12) Put the strut strap around the nose wheel strut.

NOTE: Make sure that the strap is not twisted or in a position where it can cause damage to any part of the nose wheel assembly during the winching and towing operation

- (13) Adjust the protective sleeve of the strut strap to the center of it.

NOTE: Make sure that only the protective sleeve is in direct contact with the aircraft.

- (14) Attach the other end of the strut strap to the winch strap hook.

NOTE: Make sure that the hook safety latch is correctly attached and that it operates correctly.

- (15) Slowly winch the winch strap. Stop when the winch strap is tight and parallel to the ground.

- (16) Remove the GSE 012 Chock - Wheel from the main-landing-gear wheels.

CAUTION: BEFORE RELEASING THE AIRCRAFT EMERGENCY/PARKING BRAKE, THE PERSON IN THE COCKPIT MUST GIVE NOTICE OF IT TO THE TOWING TRACTOR OPERATOR.

- (17) Release the aircraft emergency/parking brake (Refer to Figure 202, DET. B).

With the aircraft energized, make sure that the "BRAKE ON" light goes off.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (18) Winch the aircraft onto the cradle.

NOTE: Make sure that the nose wheels stay centered on the cradle.

- (19) Winch the aircraft fully onto the cradle until the wheel tires touch the rear gate or stop switch.

WARNING: OBEY THE MAXIMUM LIFT LIMIT (160 mm / 6.3 in) AND DO NOT LIFT THE AIRCRAFT PARTIALLY DISASSEMBLED. IF YOU LIFT THE NOSE WHEEL TOO HIGH, IT CAN CAUSE A CHANGE IN THE AIRCRAFT CENTER OF GRAVITY AND CAUSE THE AIRCRAFT TO TIP ON ITS TAIL.

- (20) Lift the nose-wheel cradle assembly sufficiently to permit it to clear ground or floor obstacles during towing.

NOTE: During the lift operation, monitor the tension on the winch strap. Extend or retract the winch strap as necessary to keep the correct tension on the nose wheel.

- CAUTION:**
- DO NOT TOW THE AIRCRAFT AT MORE THAN 24 KM/H (15 MPH).
 - DO NOT PUSHBACK THE AIRCRAFT AT MORE THAN 8KM/H (5 MPH).
 - GOOD COMMUNICATION BETWEEN THE TOWING TRACTOR OPERATOR AND THE PERSON IN THE COCKPIT MUST BE ESTABLISHED BEFORE THE AIRCRAFT IS TOWED.
 - DO NOT OVERSTEER. THE MAXIMUM TOWING ANGLE IS 170° TO THE RIGHT AND 170° TO THE LEFT. IF YOU USE MORE THAN THE MAXIMUM TOWING ANGLE, DO A VISUAL INSPECTION ON NOSE LANDING GEAR. IF A PART IS DAMAGED, REPAIR OR REPLACE IT AS APPLICABLE.
 - DURING THE TOWING PROCEDURE, DO NOT BRAKE THE AIRCRAFT. INDEPENDENTLY OF THE SPEED, THIS CAN CAUSE DAMAGE TO THE AIRCRAFT STRUCTURE AND/OR TO THE NOSE LANDING GEAR. ONLY USE THE AIRCRAFT BRAKES TO STOP THE AIRCRAFT WHEN THERE IS A RISK OF COLLISION OR DAMAGE TO THE AIRCRAFT. GIVE THE TUG OPERATOR A WARNING THAT YOU WILL BRAKE THE AIRCRAFT, AND BRAKE THE AIRCRAFT IF THE TUG OPERATOR GIVES YOU A WARNING THAT HE/SHE WILL BRAKE THE TUG.
 - OBEY THE MAXIMUM RECOMMENDED WIND SPEEDS FOR AIRCRAFT TOWING. REFER TO [AMM TASK 09-10-00-500-801-A/200](#).

(21) **NOTE:** Start and stop the towing of the aircraft with the nose landing gear as near to the 0° position as possible.

Make sure that you obeyed all the steps before this one, and do as follows:

(a) Release the brake of the GSE 198 Aircraft Towing Vehicle and start the aircraft towing.

(b) Tow the aircraft slowly in a straight line before you make a turn.

NOTE:

- Control the towing speed with the use of the tug vehicle speed-indicator only.

- Do not stop the aircraft in a turn if it is not necessary.

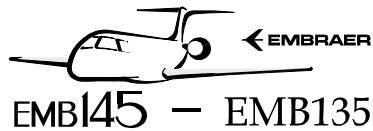
- When you tow the aircraft, always use gradual acceleration and brake application.

- Do not start turning at high speed.

- During slippery conditions, reduce speed and anticipate slower braking reaction.

(c) If, during the towing procedure, the aircraft is braked, independently of the speed, do a check of the nose landing gear and its adjacent structure for possible damage. Refer to [AMM TASK 05-50-23-200-801-A/600](#).

(d) Complete the aircraft towing in a straight line for a minimum of 3 meters (10 feet) or until the nose wheel is near the center position (approximately 0°).



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- (e) When the aircraft is in the correct position, stop the aircraft with the tug vehicle.

K. Follow-on

SUBTASK 842-035-B

- (1) Set the aircraft emergency/parking brake (Figure 202, DET. B) and, with the aircraft energized, make sure that the "BRAKE ON" lights (Figure 202, DET. A and DET. C) are on.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Install GSE 012 Chock - Wheel in front of and behind the wheels on the left and right main landing gears.
- (3) Make sure that the landing gear safety pins are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).

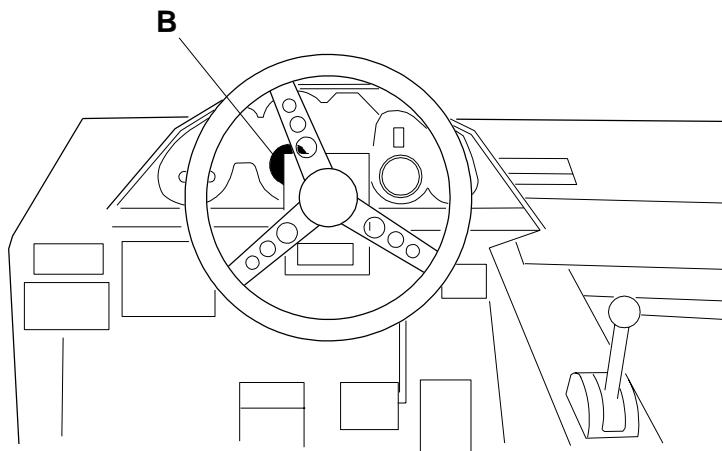
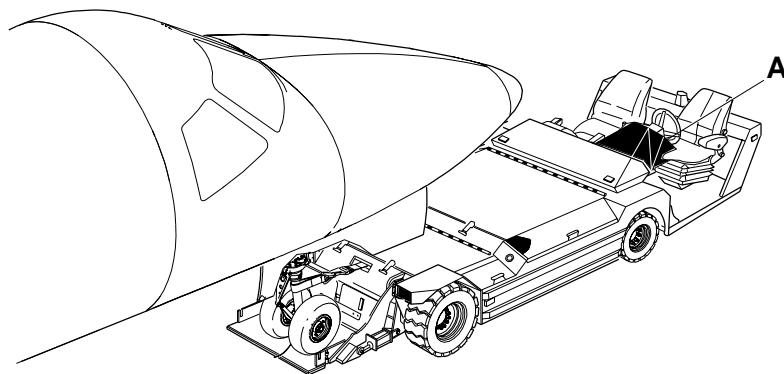
CAUTION: BEFORE YOU PRESSURIZE THE HYDRAULIC SYSTEM, MAKE SURE THAT THE NOSE WHEEL IS NEAR THE CENTER POSITION (CLOSE TO 0°).

- (4) Lower the nose wheel cradle to the ground.
- (5) Unwind sufficient winch strap to disconnect the snap hook.
- (6) Remove the snap hook from the strut strap around the nose-landing-gear leg.
- (7) Wind the remaining winch strap.

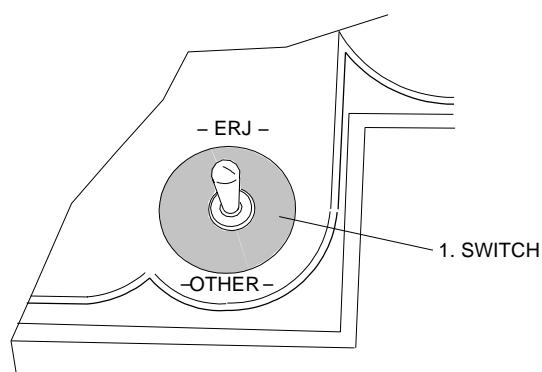
CAUTION: BEFORE YOU REMOVE THE GSE 198 AIRCRAFT TOWING VEHICLE FROM THE AIRCRAFT, MAKE SURE THAT THE NOSE WHEEL CRADLE IS FULLY LOWERED.

- (8) Slowly back the GSE 198 Aircraft Towing Vehicle away from the aircraft nose wheel until the cradle is pulled from under the nose wheel tires.
- (9) Lift the cradle to full height.
- (10) Remove the GSE 198 Aircraft Towing Vehicle.
- (11) Do a check to make sure that there is no damage to the nose wheel or tires.
- (12) On the circuit breaker panel, remove the DO-NOT-CLOSE tag and close the STEER circuit breaker. For aircraft POST-MOD. [S.B.145-32-0057](#), set the external steering disengagement switch to the "ENGAGED" position. Refer to Figure 202, DET. D and DET. E.

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Towbarless- Aircraft Selection Switch
Figure 209



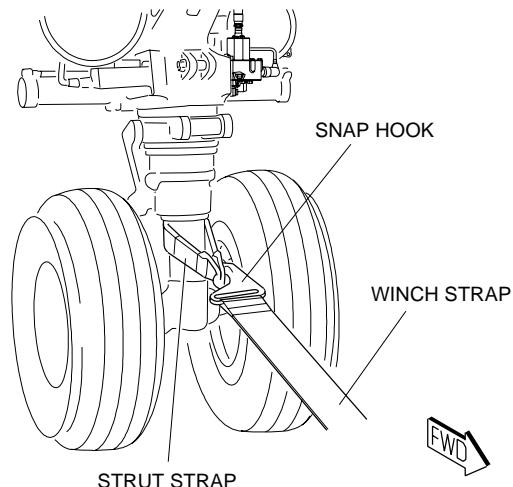
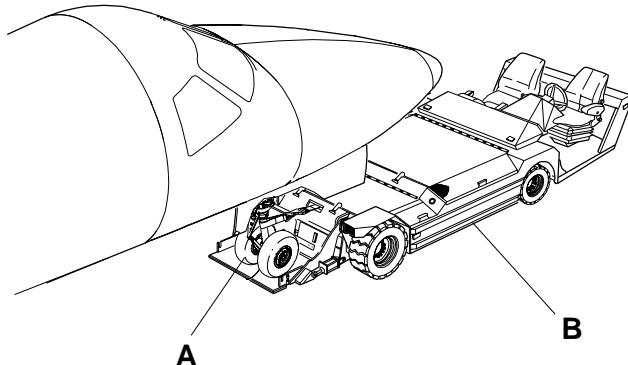
DET. A



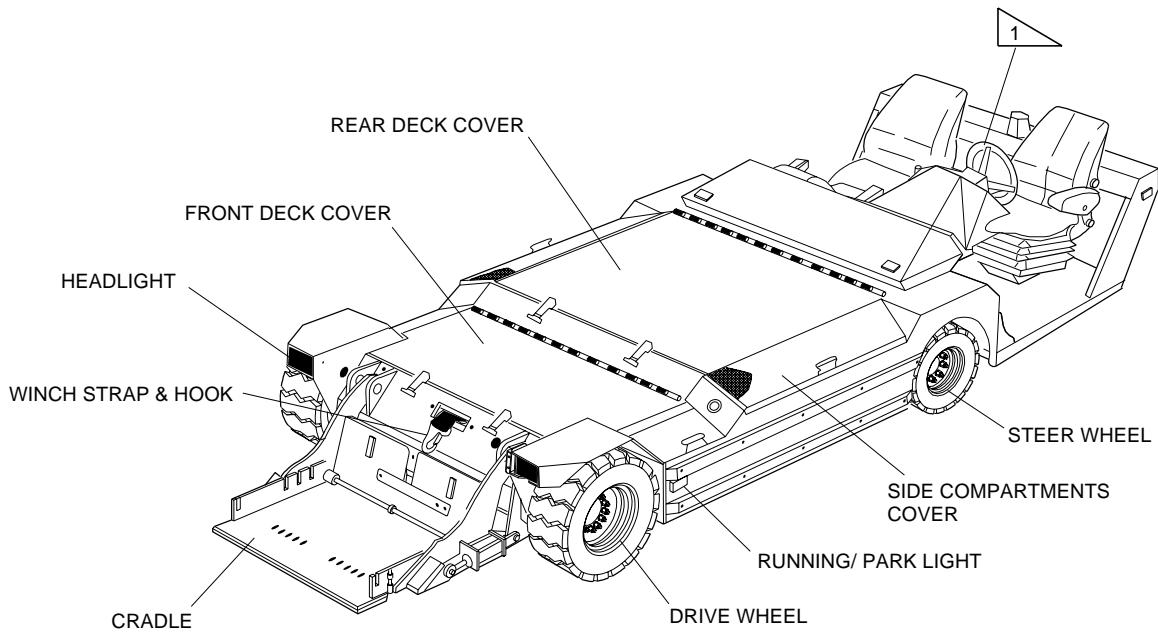
DET. B

EM145AMM090027A.DGN

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Towbarless Procedure - Maintenance Practices
Figure 210



DET. A

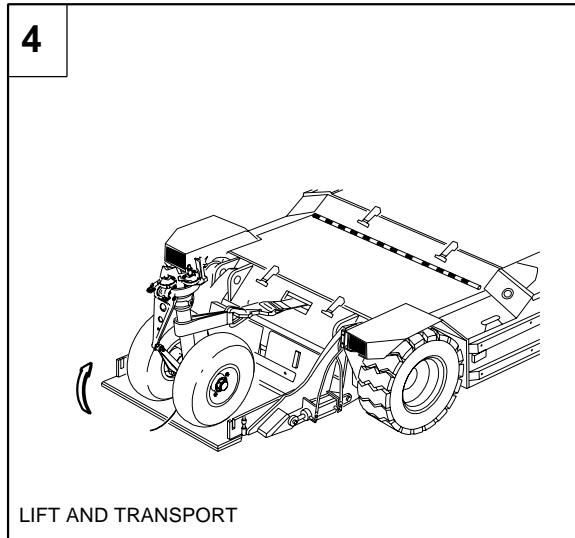
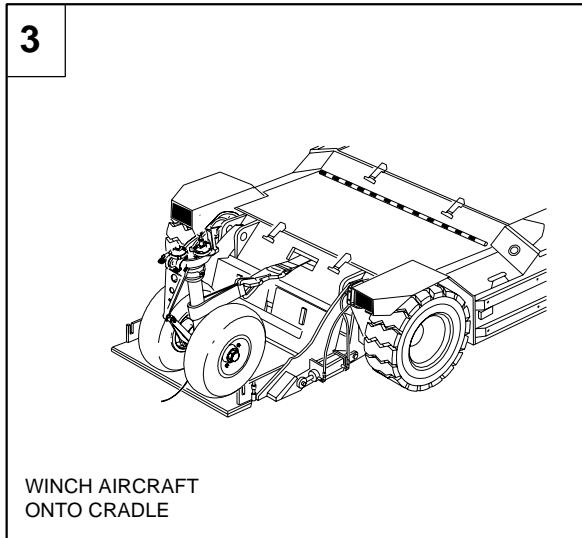
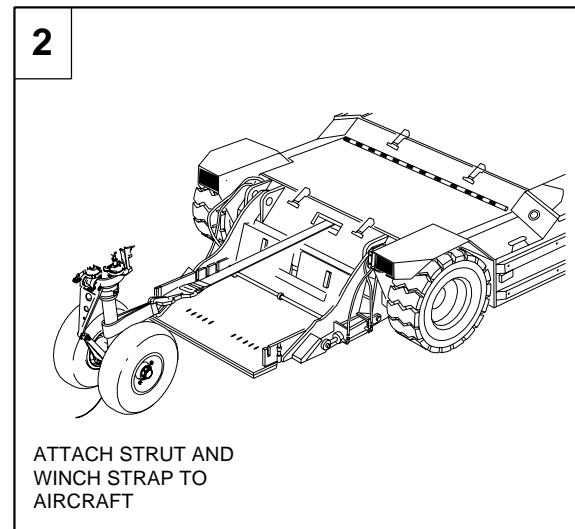
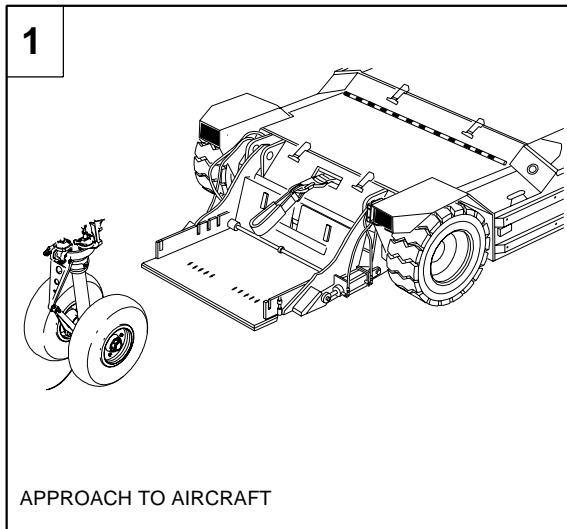


DET. B

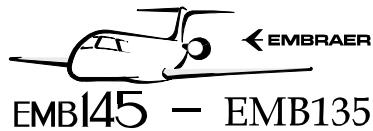
 FOR REFERENCE ONLY – TUG VEHICLE DETAILS MAY CHANGE ACCORDING TO CUSTUMER'S ORDER.

EM145AMM090026A.DGN

EFFECTIVITY: POST-MOD. S.B.145-32-0102
Towbarless - Towing Operation
Figure 211



EM145AMM090025A.DGN



EMB145 - EMB135

AIRCRAFT
MAINTENANCE MANUAL

TASK 09-10-01-500-805-A

EFFECTIVITY: POST-MOD. S.B. 145-32-0102

6. AIRCRAFT TOWING WITH GOLDSCHOFER AST-3 VEHICLE

A. General

- (1) This procedure uses vehicle (tug) GSE 514 - Aircraft Towing Vehicle. For EMB-135/145 it is necessary to use GSE 514 together with the GSE 515 Adapter for Support Bracket.
- (2) For a safe towing operation, only qualified personnel must operate the AST-3 vehicle.
- (3) To do this task, you must know all the contents of the AST-3 Operator's Handbook.

B. References

REFERENCE	DESIGNATION
AMM TASK 05-50-23-200-801-A/600	BRAKE USE DURING TOWBARLESS TOWING OPERATION
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 32-49-01-600-801-A/300	MLG WHEEL TIRE - CHECK AND CHARGE
AMM TASK 32-49-04-600-801-A/300	NLG WHEEL TIRE - CHECK AND CHARGING
S.B. 145-32-0057	-
S.B. 145-32-0057	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 012	Chock - Wheel	To put chocks at the nose and main LG wheels	
GSE 514	Aircraft Towing Vehicle	Aircraft towing	
GSE 515	Adapter for Support Bracket	Aircraft towing	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Tows the aircraft	Driving the towing tug
1	Helps with the task	In the cockpit

I. Preparation

SUBTASK 841-036-B

WARNING: WHEN YOU TOW THE AIRCRAFT, ALL PERSONS MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOWING TRACTOR, NOSEWHEEL, MAINWHEELS, AIRCRAFT FUSELAGE AND WINGS. PERSONS ON THE GROUND CAN BE RUN OVER BY NOSEWHEEL, MAINWHEELS, TOWING TRACTOR, AIRCRAFT FUSELAGE AND WINGS. THIS IS BECAUSE THE AIRCRAFT WILL CHANGE POSITION DURING PUSHBACK AND TOWING. OBEY A SAFE DISTANCE BETWEEN PERSONS ON THE GROUND AND THE EQUIPMENT THAT MOVES. A FATAL INJURY CAN OCCUR.

CAUTION: • FOR EMB-135/145 IT IS NECESSARY TO USE GSE 514 - AIRCRAFT TOWING VEHICLE TOGETHER WITH GSE 515 - ADAPTER FOR SUPPORT BRACKET.

- DURING TOWING OPERATIONS, A TECHNICIAN MUST STAY IN THE COCKPIT, WITH SEAT BELT, TO SET THE EMERGENCY/PARKING BRAKE (FIGURE 202, DET. B), IF NECESSARY.
- DURING THE TOWING OPERATIONS WITH THE ELECTRICAL SYSTEM ENERGIZED, MAKE SURE THAT THE ELECTRIC MOTOR-DRIVEN HYDRAULIC PUMPS ARE OFF.
- REMOVE ALL TOOLS, EQUIPMENT, AND MATERIALS FROM THE TOWING AREA. MAKE SURE THAT THE AREA IS CLEAN.
- TO PREVENT PEAK LOADS, MAKE SURE THAT THE ACCELERATION AND DECELERATIONS DURING TOWING ARE SMOOTH.
- BEFORE THE AIRCRAFT TOWING, MAKE SURE THAT THE VEHICLE IS IN GOOD CONDITIONS FOR OPERATION. FOR MORE DETAILS, REFER TO THE MANUFACTURER'S OPERATOR HANDBOOK.

- (1) Make sure that the emergency/parking brake accumulator is pressurized. Pull and turn the emergency/parking brake handle (Refer to Figure 202, DET. B) and, with the aircraft energized, make sure that the "BRAKE ON" lights are on (Refer to Figure 202, DET. A and DET. C).

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Make sure that the safety pins of the landing gear are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).

NOTE: The use of the safety pins on MLG and NLG is optional when you tow or push the aircraft for the flight. This occurs when the aircraft is in position for the flight crew to taxi the aircraft before or after a flight.

- (3) On the circuit breaker panel, open the STEER circuit breaker and attach a DO-NOT-CLOSE tag to it. An alternative, on aircraft POST-MOD. [S.B. 145-32-0057](#), set the external steering disengagement switch to the "DISENGAGED" position (Refer to Figure 202, DET. E). Make sure that the "STEER INOP" message comes into view on the EICAS display.

J. Towing ([Figure 212](#)) ([Figure 213](#)) ([Figure 214](#)) ([Figure 202](#))

SUBTASK 580-036-B

WARNING: • BEFORE YOU CONNECT THE TOWING EQUIPMENT, MAKE SURE THAT THE EMERGENCY/PARKING BRAKE IS SET.

- THE TUG USES THE REAR WHEELS TO STEER. THE TUG OPERATOR MUST KNOW HOW THIS AFFECTS THE HANDLING OF THE UNIT AND BE PREPARED TO TAKE SPECIAL PRECAUTIONS TO PREVENT ACCIDENTS. DURING THE TUG OPERATION, START SLOWLY UNTIL YOU KNOW IN WHICH DIRECTION THE STEER WHEELS ARE AND CORRECT, IF NECESSARY, BEFORE ACCELERATION. WHEN THE STEER WHEELS ARE TURNED, EXAMINE THE REAR AREA OF THE TUG TO MAKE SURE THAT IT IS FREE FROM BLOCKAGE.

- (1) Make sure that the emergency/parking brake is set. If it is not, set the emergency/parking brake handle up (Refer to Figure 202, DET. B).

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (2) Make sure that the tires are in a serviceable condition. If necessary, do the check of the tires and charge them. Refer to [AMM TASK 32-49-01-600-801-A/300](#) for the main wheel tires and [AMM TASK 32-49-04-600-801-A/300](#) for the nose wheel tires.

- (3) Turn the driver's seat of the tug to backwards.

- (4) Lower the pickup device.

- (5) Select the aircraft model in the dashboard of the tug and push the ENTER button. Refer to [Figure 213](#).

- (6) Make sure that the steering is disengaged and push the bypass-status button on the tug, if this option is available.

CAUTION: THE TUG MUST BE ALIGNED WITH THE LONGITUDINAL AXIS OF THE AIRCRAFT AND CENTERED WITH RESPECT TO THE NOSE LANDING GEAR. REFER TO FIGURE 214, STEP 1.

- (7) Approach the tug to the nosewheel until the pickup device of the tug touches the nosewheel. The tug must be aligned and centralized with respect to the aircraft nosewheel.

- (8) Before you lift the pickup device, refer to AST-3 Operator's Handbook.

CAUTION: BEFORE YOU RELEASE THE AIRCRAFT EMERGENCY/PARKING BRAKE, THE PERSON IN THE COCKPIT MUST GIVE A WARNING TO THE TOWING TRACTOR OPERATOR.

- (9) Release the emergency/parking brake (Refer to Figure 202, DET. B). With the aircraft energized, make sure that the "BRAKE ON" light goes off.

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

CAUTION: OBEY THE MAXIMUM LIFT LIMIT (230 mm / 9 in) AND DO NOT LIFT THE AIRCRAFT PARTIALLY DISASSEMBLED. IF YOU LIFT THE NOSEWHEEL TOO HIGH, IT CAN CAUSE A CHANGE IN THE AIRCRAFT CENTER OF GRAVITY AND CAUSE THE AIRCRAFT TO TIP ON ITS TAIL.

(10) Lift the pickup device. Refer to [Figure 214](#).

CAUTION:

- DO NOT TOW THE AIRCRAFT AT MORE THAN 24 KM/H (15 MPH).
- DO NOT PUSH-BACK THE AIRCRAFT AT MORE THAN THE 8 KM/H (5 MPH).
- GOOD COMMUNICATION BETWEEN THE TOWING TRACTOR OPERATOR AND THE COCKPIT PERSON MUST BE ESTABLISHED BEFORE THE AIRCRAFT IS TOWED.
- USE THE AIRCRAFT BRAKES TO STOP THE AIRCRAFT ONLY WHEN THERE IS A RISK OF COLLISION OR DAMAGE TO THE AIRCRAFT. GIVE THE TRACTOR OPERATOR A WARNING IF YOU WILL BRAKE THE AIRCRAFT.
- DO NOT OVERSTEER. THE MAXIMUM TOWING ANGLE IS 170° TO THE RIGHT AND 170° TO THE LEFT. IF YOU USE MORE THAN THE MAXIMUM TOWING ANGLE, DO A VISUAL INSPECTION OF THE NOSE LANDING GEAR. IF A PART IS DAMAGED, REPAIR OR REPLACE IT AS APPLICABLE.
- DURING THE TOWING PROCEDURE, DO NOT BRAKE THE AIRCRAFT. INDEPENDENTLY OF THE SPEED, THIS CAN CAUSE DAMAGE TO THE AIRCRAFT STRUCTURE AND/OR TO THE NOSE LANDING GEAR.

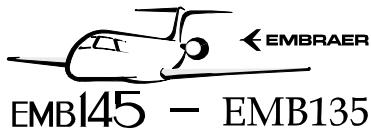
(11) Release the brake of the tug and start the aircraft towing.

NOTE:

- Start and stop with the nose landing gear as near to the 0° position as possible.
- For longer distances, the aircraft towing is usually done with the tug in reverse, while the aircraft is pulled. But this is not always the best way to do this task.

Make sure that you obeyed all the steps before this and do as follows:

- (a) Tow the aircraft slowly straight forward before you turn.
- (b) If during the towing procedure, the aircraft is braked, independently of the speed, do a check of the nose landing gear and its adjacent structure for possible damage. Refer to [AMM TASK 05-50-23-200-801-A/600](#).
- (c) Complete the aircraft towing in a straight line for a minimum of 3 meters (10 feet) or until the nose wheel is near the center position (approximately 0°).



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K. Follow-on

SUBTASK 842-036-B

- (1) Turn the driver's seat backwards.
- (2) Set the emergency/parking brake and, with the aircraft energized, make sure that the "BRAKE ON" lights (DET. A, Figure 202 and DET. C, Figure 202) are on.

NOTE: To prevent hydraulic fluid transference from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (3) Release the aircraft. Refer to AST-3 Operator's Handbook.
- (4) Make sure that the landing gear safety pins are installed correctly ([AMM TASK 32-00-01-910-801-A/200](#)).

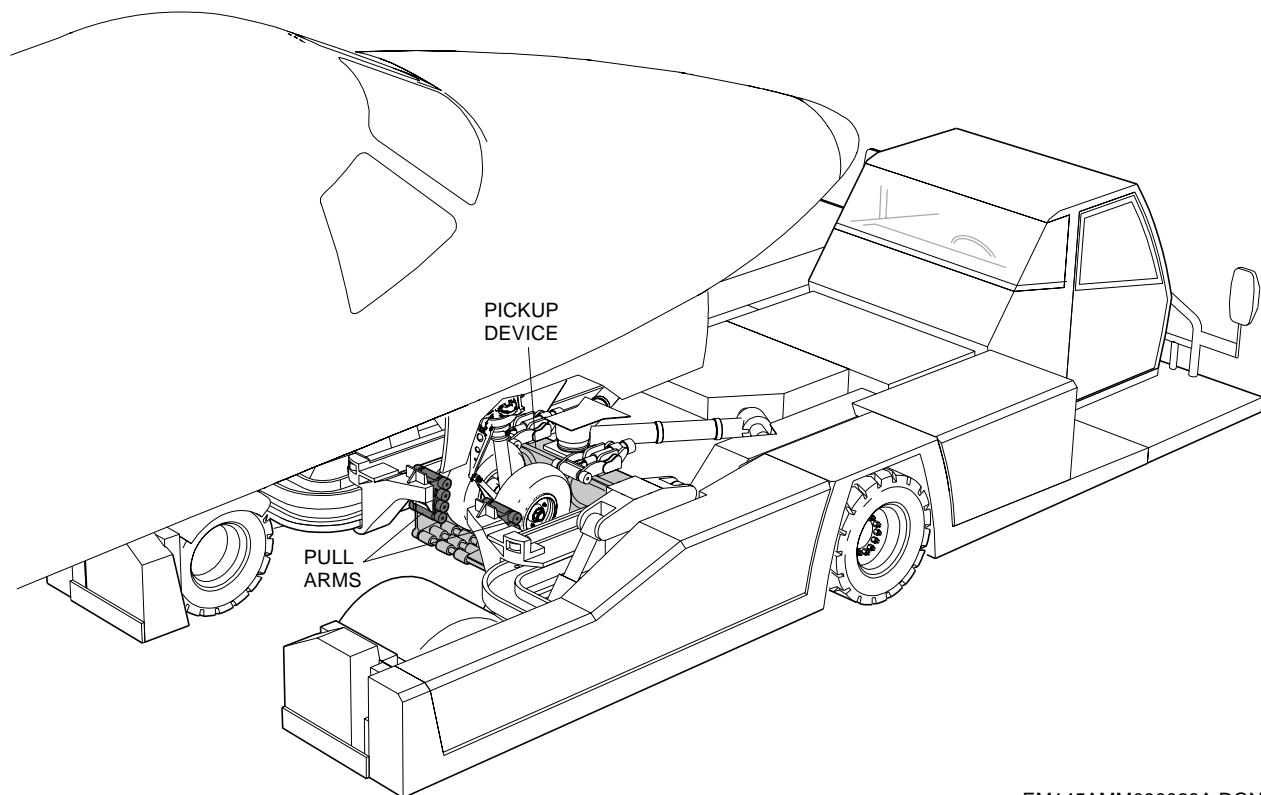
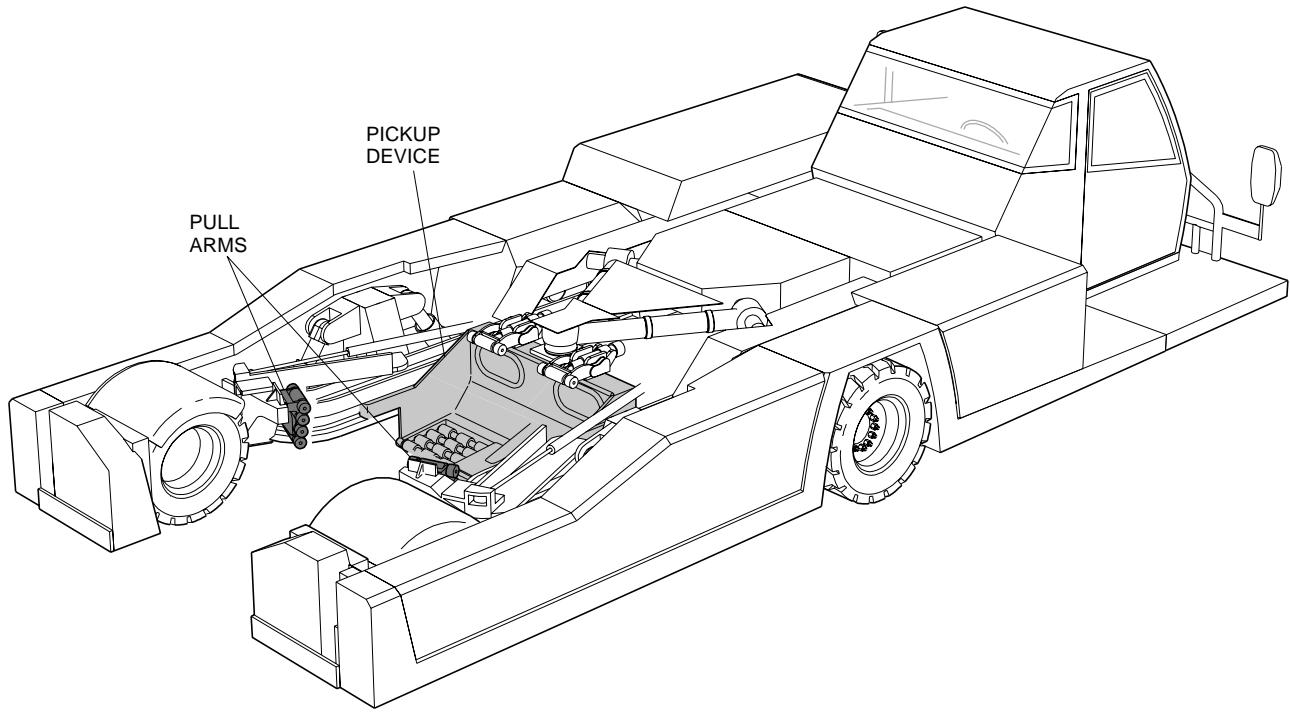
NOTE: The use of the safety pins on MLG and NLG is optional when you tow or push the aircraft for the flight. This occurs when the aircraft is in position for the flight crew to taxi the aircraft before or after a flight.

- (5) Install the wheel chocks (GSE 012) forward and aft of the wheels on the left and right main landing gears.

CAUTION: BEFORE YOU PRESSURIZE THE HYDRAULIC SYSTEM, MAKE SURE THAT THE NOSEWHEEL IS NEAR THE CENTER POSITION (CLOSE TO 0°).

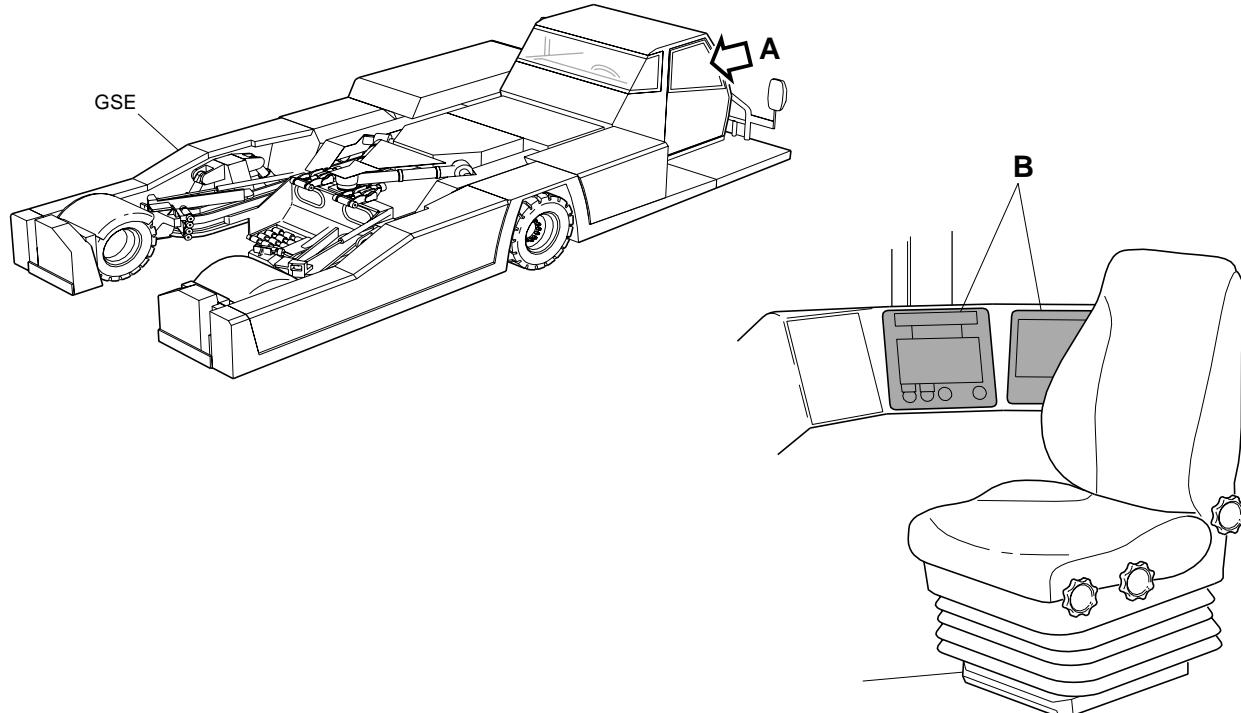
- (6) Make sure that the pull arms extend and the pickup device lowers, then remove the tug from aircraft slowly.
- (7) Do a check to make sure that there is no damage to the nosewheel or tires.
- (8) On the circuit breaker panel, remove the DO-NOT-CLOSE tag and close the STEER circuit breaker. Or for aircraft POST-MOD. [S.B.145-32-0057](#), set the external steering disengagement switch to the "ENGAGED" position (Refer to Figure 202, DET. E).

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Aircraft Towing
Figure 212

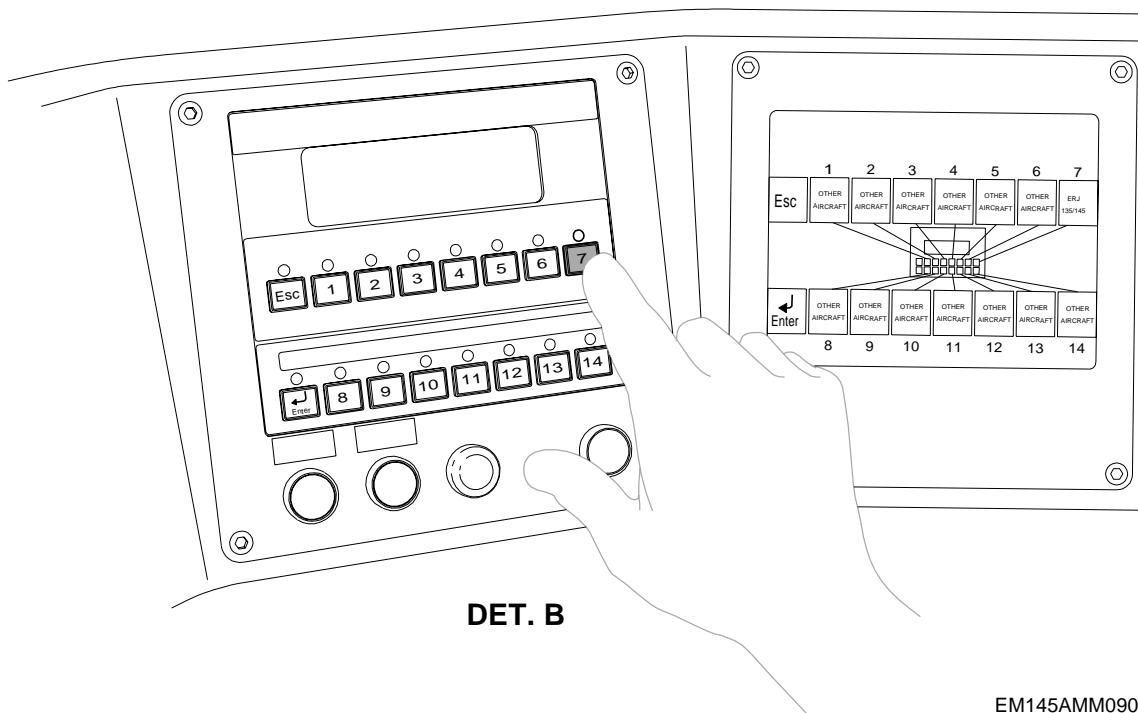


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EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Tug Dashboard
Figure 213



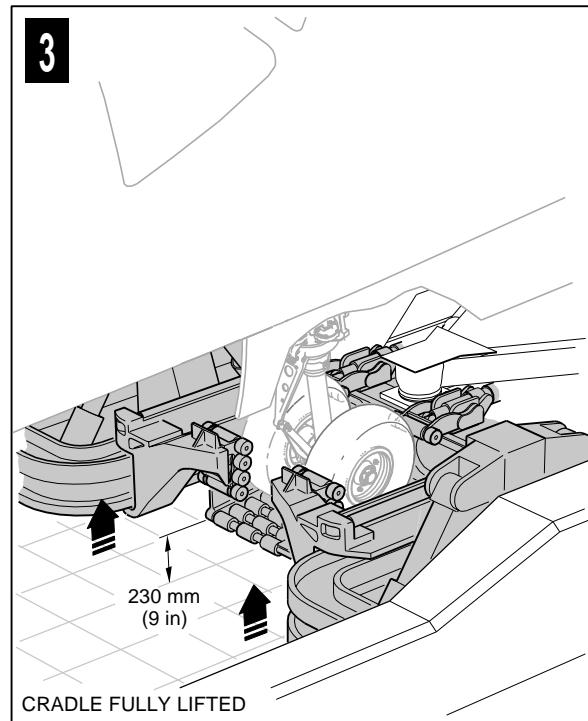
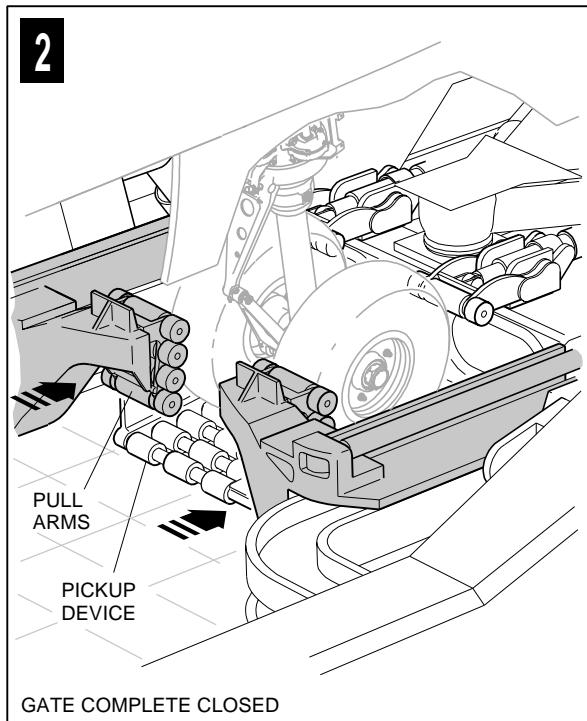
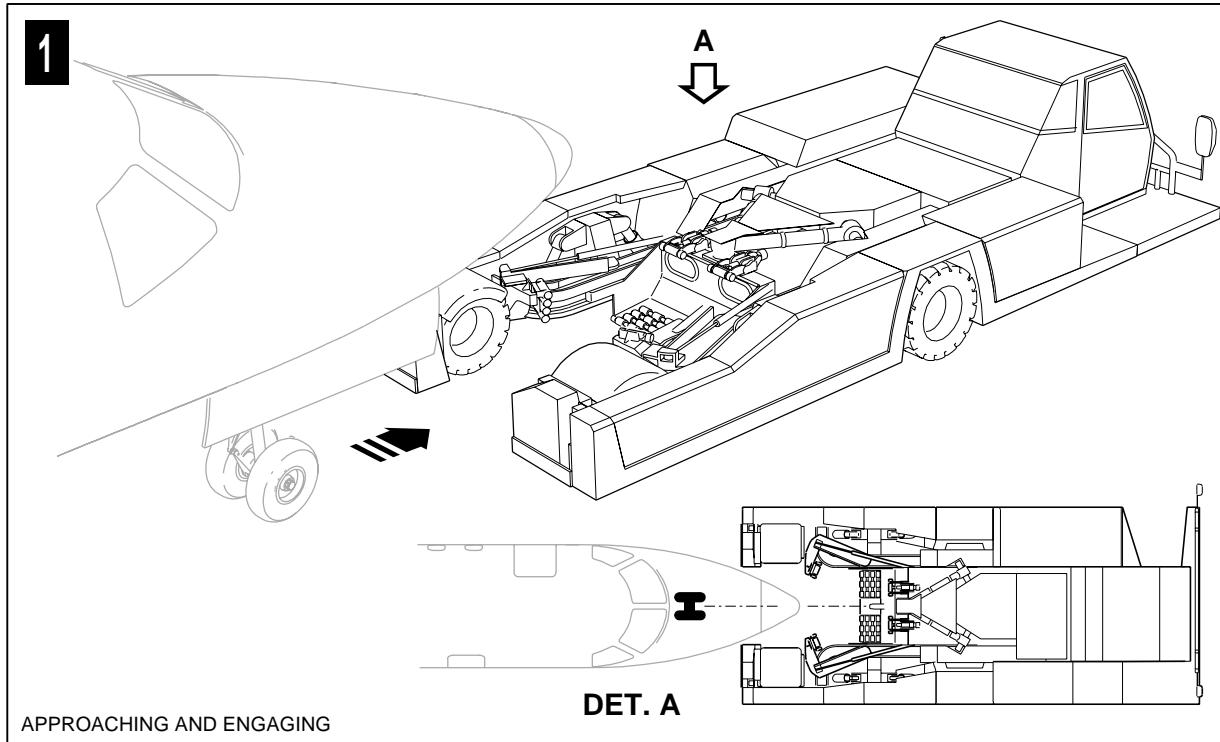
DET. A



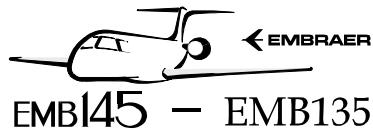
DET. B

EM145AMM090029A.DGN

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
Towing Operation
Figure 214



EM145AMM090030A.DGN



EMB145 - EMB135

AIRCRAFT
MAINTENANCE MANUAL

TASK 09-10-01-500-806-A

EFFECTIVITY: POST-MOD. S.B.145-32-0102

7. AIRCRAFT TOWING WITH LEKTRO 8925 OR 8950 VEHICLE

A. General

- (1) This procedure uses the Lektro 8925 or 8950 Vehicle.
- (2) For a safer towing operation, only qualified personnel must operate the Lektro 8925 or 8950 Vehicle.
- (3) To do this task you must know all the contents of the Lektro 8925 (GSE 597) or 8950 (GSE 585) vehicle manufacturer operating handbook.

B. References

REFERENCE	DESIGNATION
AMM TASK 05-50-23-200-801-A/600	BRAKE USE DURING TOWBARLESS TOWING OPERATION
AMM TASK 09-10-00-500-801-A/200	AIRCRAFT TOWING
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 32-49-01-600-801-A/300	MLG WHEEL TIRE - CHECK AND CHARGE
AMM TASK 32-49-04-600-801-A/300	NLG WHEEL TIRE - CHECK AND CHARGING
S.B.145-32-0057	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 012	Chock - Wheel	To chock the nose and main LG wheels	
GSE 585	Aircraft Towing Vehicle	Aircraft towing	
GSE 597	Aircraft Towing Vehicle	Aircraft towing	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Tows the aircraft	Driving the towing vehicle
1	Helps with the task	In the cockpit

I. Preparation
SUBTASK 841-037-B

WARNING: WHEN YOU TOW THE AIRCRAFT, ALL PERSONS MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOWING TUG, NOSE WHEEL, MAIN WHEELS, AIRCRAFT FUSELAGE AND WINGS. PERSONS ON THE GROUND CAN BE RUN OVER BY NOSE WHEEL, MAIN WHEELS, TOWING TUG, AIRCRAFT FUSELAGE AND WINGS. THIS IS BECAUSE THE AIRCRAFT WILL CHANGE POSITION DURING PUSHBACK AND TOWING. KEEP A SAFE DISTANCE BETWEEN PERSONS ON THE GROUND AND THE EQUIPMENT THAT MOVES. A FATAL INJURY CAN OCCUR.

CAUTION: • ONLY QUALIFIED PERSONNEL MUST OPERATE THE GSE 585 OR GSE 597 AIRCRAFT TOWING VEHICLE.

- DURING TOWING OPERATIONS, A TECHNICIAN MUST STAY IN THE COCKPIT, WITH THE SEAT BELT FASTENED, TO SET THE EMERGENCY/PARKING BRAKE (FIGURE 215, DET. B), IF NECESSARY.
- DURING THE TOWING OPERATIONS WITH THE ELECTRICAL SYSTEM ENERGIZED, MAKE SURE THAT THE ELECTRIC MOTOR-DRIVEN HYDRAULIC PUMPS ARE OFF.
- REMOVE ALL TOOLS, EQUIPMENT, AND MATERIALS FROM THE TOWING AREA. MAKE SURE THAT THE AREA IS CLEAN.
- TO PREVENT PEAK LOADS, MAKE SURE THAT THE ACCELERATIONS AND DECELERATIONS DURING TOWING ARE SMOOTH.
- BEFORE THE AIRCRAFT TOWING, MAKE SURE THAT THE VEHICLE IS IN GOOD CONDITIONS FOR OPERATION. FOR MORE DETAILS, REFER TO THE MANUFACTURER'S OPERATING HANDBOOK.

- (1) Make sure that the emergency/parking brake accumulator is pressurized.
- (2) Pull and turn the emergency/parking brake handle (Figure 215, DET. B) and, with the aircraft energized, make sure that the "BRAKE ON" lights are on (Figure 215, DET. A and DET. C).

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or from system 2 to system 1, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (3) Make sure that the safety pins of the landing gear are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).

NOTE: The use of the safety pins on MLG and NLG is optional when you tow or push the aircraft for the flight. This occurs when the aircraft is in position for the flight crew to taxi the aircraft before or after a flight.

- (4) On the circuit breaker panel, open the STEER circuit breaker and attach a DO-NOT-CLOSE tag to it.

On aircraft POST-MOD. [S.B.145-32-0057](#), alternatively, set the external steering disengagement switch to the "DISENGAGED" position (Figure 215, DET. D and DET. E).

Make sure that the "STEER INOP" message comes into view on the EICAS display.

WARNING: MAKE SURE THAT THE AIRCRAFT EMERGENCY/PARKING BRAKE IS SET, BEFORE YOU CONNECT THE TOWING EQUIPMENT.

- (5) Make sure that the aircraft emergency/parking brake is set. If it is not, set the emergency/parking brake handle up. Refer to [Figure 215](#), DET. B.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or system 2 to system 1, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (6) Make sure that the tires are in a serviceable condition. Do a check of the tires and charge them if necessary. Refer to [AMM TASK 32-49-01-600-801-A/300](#) for the main wheel tires and [AMM TASK 32-49-04-600-801-A/300](#) for the nose wheel tires.

J. Towing ([Figure 215](#)) ([Figure 216](#)) ([Figure 217](#)) ([Figure 218](#))

SUBTASK 580-037-B

WARNING: THE TUG REAR WHEELS ARE STEERABLE. THE TUG OPERATOR MUST KNOW HOW THIS AFFECTS THE HANDLING OF THE UNIT AND BE PREPARED TO TAKE SPECIAL PRECAUTIONS TO PREVENT ACCIDENTS. DURING THE TUG OPERATION, START SLOWLY UNTIL YOU KNOW IN WHICH DIRECTION THE STEERABLE WHEELS ARE AND CORRECT, IF NECESSARY, BEFORE YOU ACCELERATE THE TUG. WHEN YOU TURN TUG TO MAKE SURE THAT IT IS FREE FROM OBSTRUCTIONS.

- (1) Make sure that all settings of this towbarless towing vehicle (GSE585 or GSE597) are correctly adjusted for towing the ERJ-145 aircraft. Refer to the Manufacturer's Operating Manual for more instructions.

- (2) The maximum speed permitted for towing with GSE 585 or GSE 597 is 10 km/h (6 mph), with the limitations below in consideration:
- The ground must be dry or wet concrete or asphalt;
 - For a ground with ice or snow, the maximum speed permitted is 5 km/h (3 mph), if the towing vehicle does not have antiskid system.

- (3) Before the aircraft towing, make sure that you have the towing crew that follows:

- One person in the cockpit to operate the brakes;
- One person to operate the towbarless vehicle.

NOTE: For a safer procedure, Embraer recommends the aid of 4 more persons, as follows:

- One person at the left wing tip and one person at the right wing tip to monitor sufficient clearance during turns;
- One person behind the tail to monitor sufficient clearance during turns;

- One towing supervisor to control the towing operation with visual and radio communication with all the towing crew members at all times. You can use light wands to give signals in low visibility.

- (4) Approach the GSE 585 or GSE 597 Aircraft Towing Vehicle, at walking speed, in the direction of the aircraft nose wheels (in line with the direction the tires are pointing).

NOTE: Walking speed is approximately 4 to 5 km/h (2.5 to 3 mph).

- (5) Stop the tug aligned with and at approximately 1 m (3 ft) from the nose wheel.

(a) The tug vehicle must be in front of and aligned with the aircraft nose wheel.

- (6) Lower the nose wheel cradle to 5 cm (2 in) above the ground.

- (7) Move slowly the tug vehicle again so that the cradle stops 5 cm (2 in) from the edge of the nose wheel tire.

- (8) Remove the GSE 012 Chock - Wheel from the nose-landing-gear wheels.

- (9) Lower the nose wheel cradle so that it touches the ground.

- (10) Slightly lift the cradle until it does not touch the ground.

- (11) Slowly move the tug vehicle again until the cradle lightly touches the nose wheel tire.

- (12) Put the forward/neutral/reverse selector of the tug vehicle in the NEUTRAL position.

- (13) Apply the parking brake to the GSE 585 or GSE 597 Aircraft Towing Vehicle.

- (14) Make sure that the tug vehicle is correctly positioned.

- (15) Make sure that the red light in the towing indication-light box is on.

- (16) Attach one end of the strut strap to the winch strap hook.

- (17) Unwind enough winch strap to permit the installation of the strut strap around the nose landing gear strut.

NOTE: Do not unwind to a point where the winch starts to wind the strap again.

WARNING: DO NOT CONTACT THE SHINY OLEO SURFACE WITH ANY METAL STRAP FITTINGS. THIS IS TO PREVENT DAMAGE TO THE EQUIPMENT.

CAUTION: DO NOT INSTALL THE STRUT STRAP AROUND THE WHEEL ASSEMBLY. THE STRUT STRAP CAN CAUSE DAMAGE TO THE COMPONENTS DURING THE WINCHING AND TOWING OPERATION.

- (18) Put the strut strap around the nose wheel strut counterclockwise.

NOTE: Make sure that the strap is not twisted or in a position where it can cause damage to any part of the nose wheel assembly during the winching and towing operation

- (19) Adjust the protective sleeve of the strut strap to the center of it.

NOTE: Make sure that only the protective sleeve is in direct contact with the aircraft.

- (20) Attach the other end of the strut strap to the winch strap hook.

NOTE: Make sure that the hook safety latch is correctly attached and that it operates correctly.

- (21) Slowly winch the winch strap. Stop when the winch strap is tight and parallel to the ground.

- (22) Remove the GSE 012 Chock - Wheel from the main-landing-gear wheels.

CAUTION: BEFORE RELEASING THE AIRCRAFT EMERGENCY/PARKING BRAKE, THE PERSON IN THE COCKPIT MUST GIVE NOTICE OF IT TO THE TOWING TRACTOR OPERATOR.

- (23) Release the aircraft emergency/parking brake (Refer to Figure 215, DET. B).

With the aircraft energized, make sure that the "BRAKE ON" light goes off.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or system 2 to system 1, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (24) Winch the aircraft onto the cradle.

NOTE: Make sure that the nose wheels stay centered on the cradle.

- (25) Winch the aircraft fully onto the cradle until the wheel tires touch the rear gate or stop switch.

- (26) Install the front gate on the nose wheel cradle to safeguard against failure of the winch and strut strap assembly.

WARNING: OBEY THE MAXIMUM LIFT LIMIT (160 mm / 6.3 in) AND DO NOT LIFT THE AIRCRAFT PARTIALLY DISASSEMBLED. IF YOU LIFT THE NOSE WHEEL TOO HIGH, IT CAN CAUSE A CHANGE IN THE AIRCRAFT CENTER OF GRAVITY AND CAUSE THE AIRCRAFT TO TIP ON ITS TAIL.

- (27) Lift the nose-wheel cradle assembly sufficiently to permit it to clear ground or floor obstacles during towing.

NOTE: During the lift operation, monitor the tension on the winch strap. Extend or retract the winch strap as necessary to keep the correct tension on the nose wheel.

- CAUTION:**
- DO NOT TOW THE AIRCRAFT AT MORE THAN 10 KM/H (6 MPH)
 - DO NOT PUSHBACK THE AIRCRAFT AT MORE THAN 10KM/H (3 MPH).
 - GOOD COMMUNICATION BETWEEN THE TOWING TRACTOR OPERATOR AND THE PERSON IN THE COCKPIT MUST BE ESTABLISHED BEFORE THE AIRCRAFT IS TOWED.
 - DO NOT OVERSTEER. THE MAXIMUM TOWING ANGLE IS 170° TO THE RIGHT AND 170° TO THE LEFT. IF YOU USE MORE THAN THE MAXIMUM TOWING ANGLE, DO A VISUAL INSPECTION ON NOSE LANDING GEAR. IF A PART IS DAMAGED, REPAIR OR REPLACE IT AS APPLICABLE.
 - DURING THE TOWING PROCEDURE, DO NOT BRAKE THE AIRCRAFT. INDEPENDENTLY OF THE SPEED, THIS CAN CAUSE DAMAGE TO THE AIRCRAFT STRUCTURE AND/OR TO THE NOSE LANDING GEAR. ONLY USE THE AIRCRAFT BRAKES TO STOP THE AIRCRAFT WHEN THERE IS A RISK OF COLLISION OR DAMAGE TO THE AIRCRAFT. GIVE THE TUG OPERATOR A WARNING THAT YOU WILL BRAKE THE AIRCRAFT, AND BRAKE THE AIRCRAFT IF THE TUG OPERATOR GIVES YOU A WARNING THAT HE/SHE WILL BRAKE THE TUG.
 - OBEY THE MAXIMUM RECOMMENDED WIND SPEEDS FOR AIRCRAFT TOWING. REFER TO [AMM TASK 09-10-00-500-801-A/200](#).

- (28) **NOTE:** Start and stop the towing of the aircraft with the nose landing gear as near to the 0° position as possible.

Make sure that you obeyed all the steps before this one, and do as follows:

- (a) Make sure that the towing indication lights are green before start to tow.
- (b) Release the brake of the GSE 585 or GSE 597 Aircraft Towing Vehicle and start the aircraft towing.
- (c) Tow the aircraft slowly in a straight line before you make a turn.

NOTE:

- Control the towing speed with the use of the tug vehicle speed-indicator only.

- Do not stop the aircraft in a turn if it is not necessary.
- When you tow the aircraft, always use gradual acceleration and brake application.
- Do not start turning at high speed.
- During slippery conditions, reduce speed and anticipate slower braking reaction.

- (d) If, during the towing procedure, the aircraft is braked, independently of the speed, do a check of the nose landing gear and its adjacent structure for possible damage. Refer to [AMM TASK 05-50-23-200-801-A/600](#).

- (e) Complete the aircraft towing in a straight line for a minimum of 3 meters (10 feet) or until the nose wheel is near the center position (approximately 0°).

NOTE: The function of this step is to:

- Align the steering as close as possible to the zero-degree position and in the range of 76° (maximum angle for steering engagement).
- Prevent loads on the NLG axle that are not necessary.
- Prevent wear of the NLG tires.

- (f) When the aircraft is in the correct position, stop the aircraft with the tug vehicle.

K. Follow-on

SUBTASK 842-037-B

- (1) Set the aircraft emergency/parking brake ([Figure 215](#), DET. B) and, with the aircraft energized, make sure that the "BRAKE ON" lights ([Figure 215](#), DET. A and DET. C) are on.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or system 2 to system 1, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

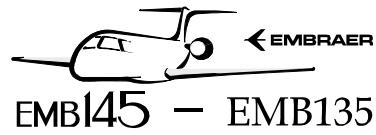
- (2) Install GSE 012 Chock - Wheel in front of and behind the wheels on the left and right main landing gears.
- (3) Make sure that the landing gear safety pins are correctly installed ([AMM TASK 32-00-01-910-801-A/200](#)).

CAUTION: BEFORE YOU PRESSURIZE THE HYDRAULIC SYSTEM, MAKE SURE THAT THE NOSE WHEEL IS NEAR THE CENTER POSITION (CLOSE TO 0°).

- (4) Lower the nose wheel cradle to the ground.
- (5) Unwind sufficient winch strap to disconnect the snap hook.
- (6) Remove the snap hook from the strut strap around the nose-landing-gear leg.
- (7) Unwind the remaining winch strap.

CAUTION: BEFORE YOU REMOVE THE GSE 585 OR GSE 597 AIRCRAFT TOWING VEHICLE FROM THE AIRCRAFT, MAKE SURE THAT THE NOSE WHEEL CRADLE IS FULLY LOWERED.

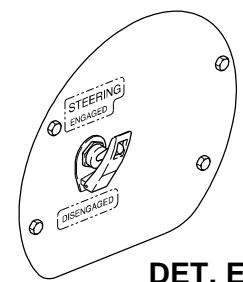
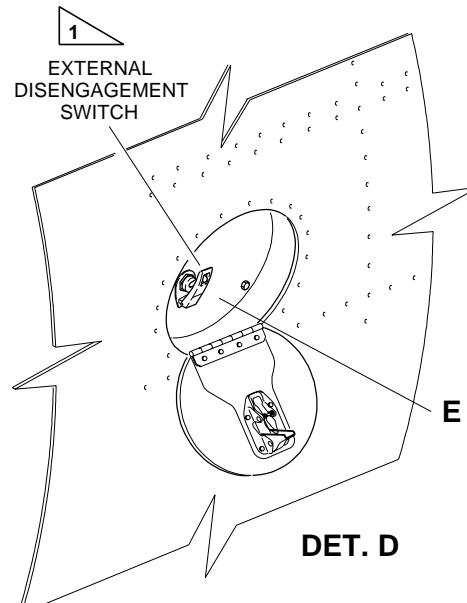
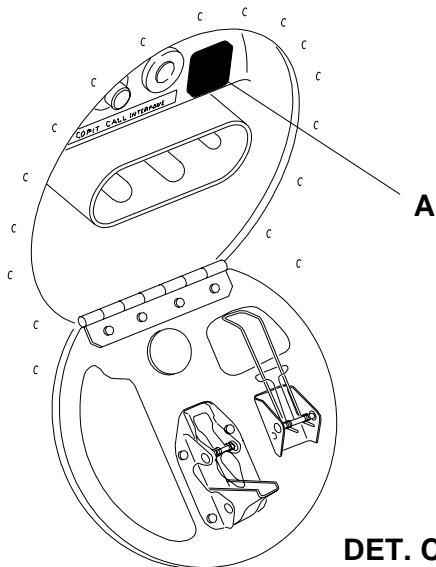
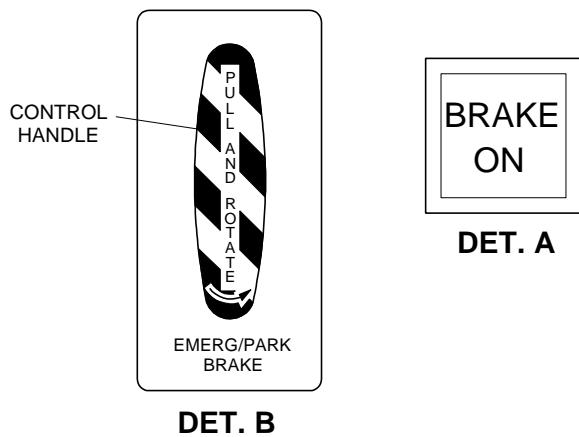
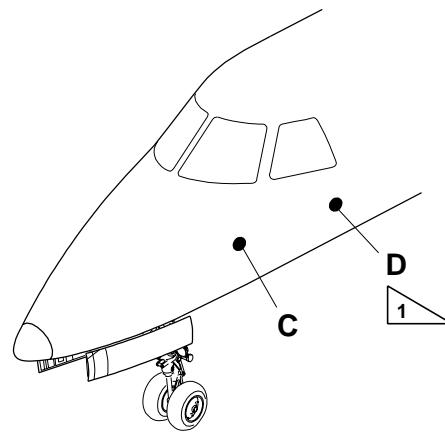
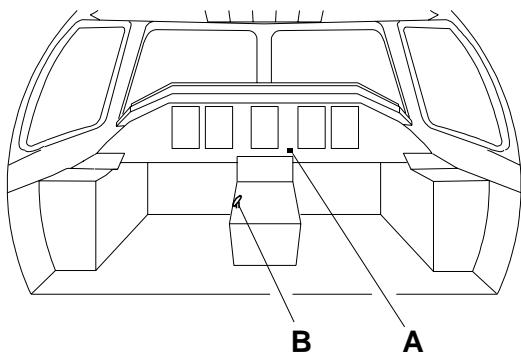
- (8) Slowly back the GSE 585 or GSE 597 Aircraft Towing Vehicle away from the aircraft nose wheel until the cradle is pulled from under the nose wheel tires.
- (9) Lift the cradle to full height.
- (10) Remove the GSE 585 or GSE 597 Aircraft Towing Vehicle.
- (11) If the nose wheels are not in the zero-degree position, align them with the zero-degree in the NLG.
- (12) Do a check to make sure that there is no damage to the nose wheel or tires.



AIRCRAFT
MAINTENANCE MANUAL

- (13) On the circuit breaker panel, remove the DO-NOT-CLOSE tag and close the STEER circuit breaker. For aircraft POST-MOD. [S.B.145-32-0057](#), set the external steering disengagement switch to the "ENGAGED" position. Refer to [Figure 215](#), DET. D and DET. E.

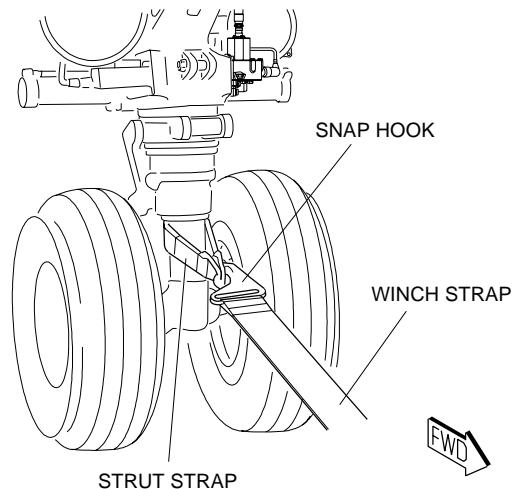
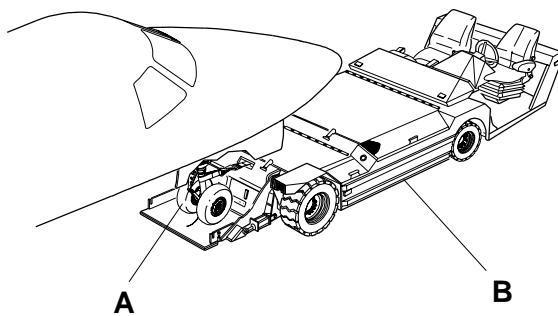
EFFECTIVITY: POST-MOD. S.B. 145-32-0102
 Emergency/Parking Brake Handle and Indication
 Figure 215



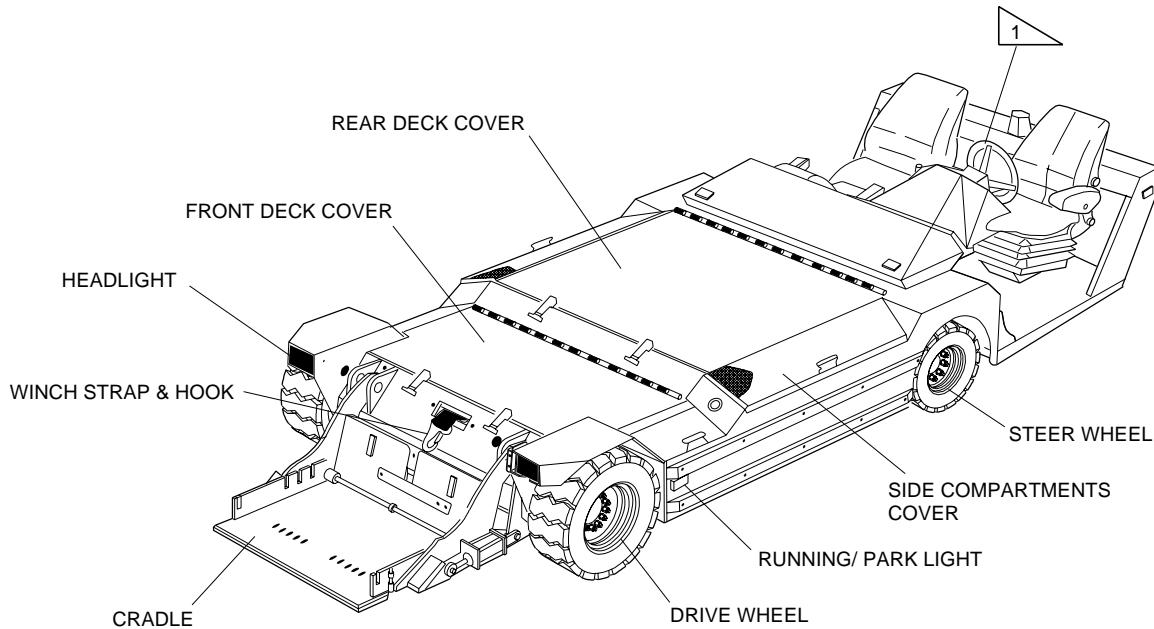
1 POST-MOD SB 145-32-0057.

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EFFECTIVITY: POST-MOD. S.B. 145-32-0102
GSE 585- Maintenance Practices
Figure 216



DET. A

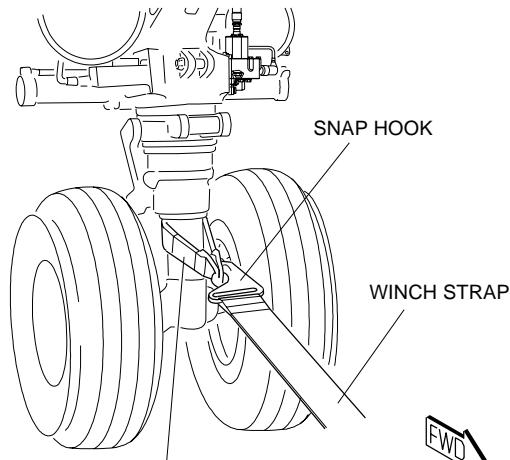
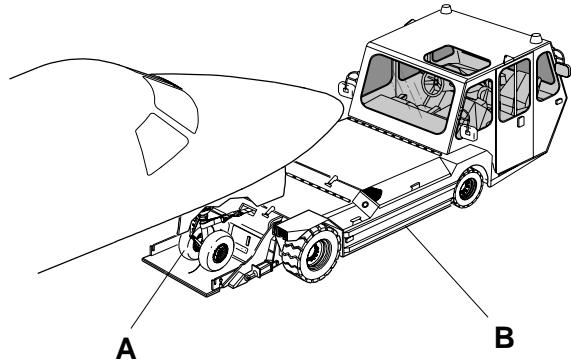


DET. B

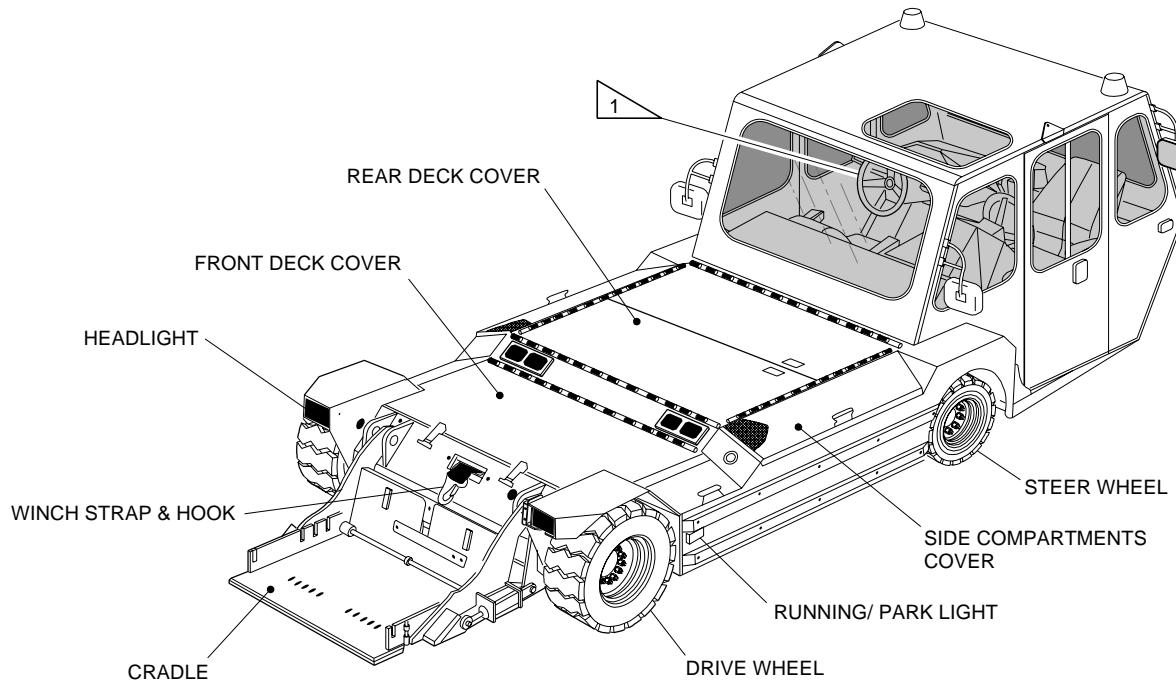
 FOR REFERENCE ONLY – TUG VEHICLE DETAILS MAY CHANGE ACCORDING
TO CUSTOMER'S ORDER.

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EFFECTIVITY: POST-MOD. S.B. 145-32-0102
GSE 597- Maintenance Practices
Figure 217



DET. A



DET. B

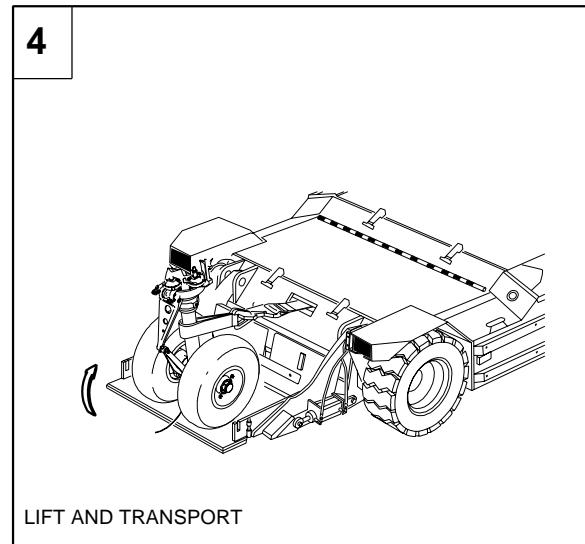
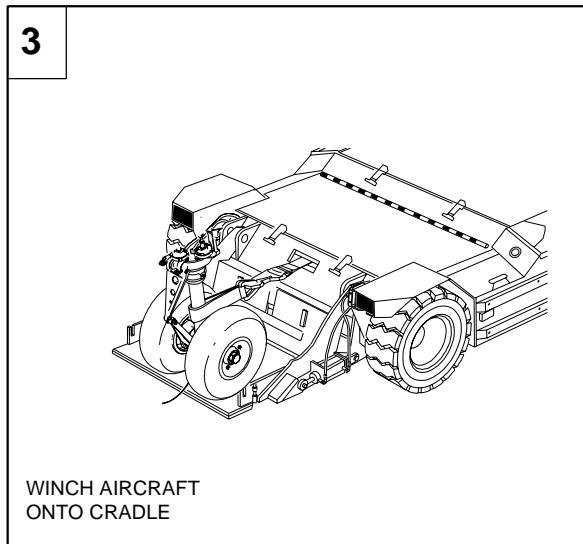
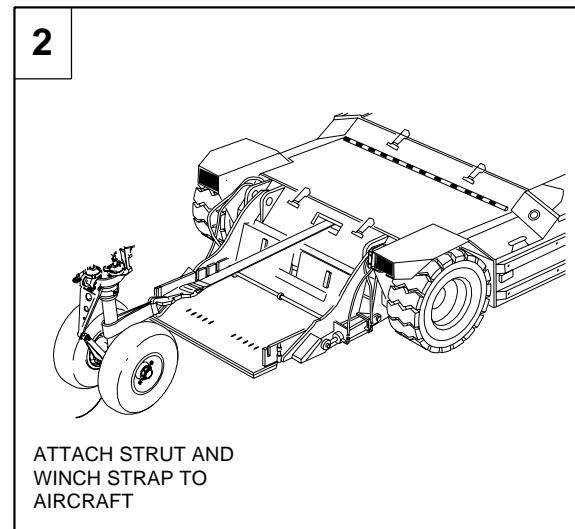
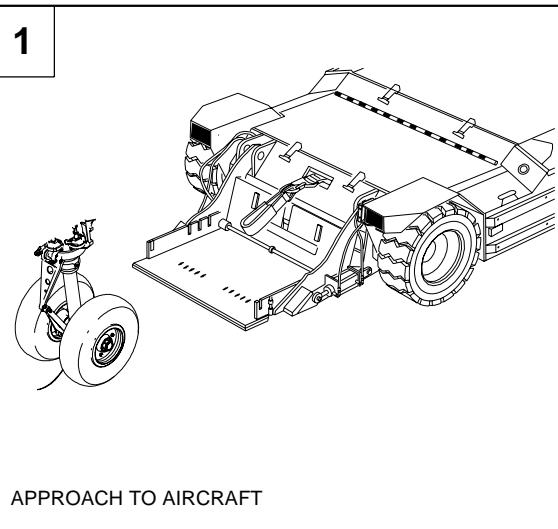
 FOR REFERENCE ONLY – TUG VEHICLE DETAILS MAY CHANGE ACCORDING TO CUSTOMER'S ORDER.

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EFFECTIVITY: POST-MOD. S.B. 145-32-0102

Towbarless - Towing Operation

Figure 218



EM145AMM090036A.DGN



EMB145 – EMB135

AIRCRAFT
MAINTENANCE MANUAL

TASK 09-10-01-500-807-A

EFFECTIVITY: POST-MOD. S.B. 145-32-0102

8. AIRCRAFT TOWING WITH TRONAIR JP100 VEHICLE

A. General

- (1) This procedure uses the tronair JP100 vehicle.
- (2) For a safer towing operation, only qualified personnel must operate the Tronair JP100 vehicle.
- (3) To do this task you must know all the contents of the Tronair JP100 (GSE 595 or GSE 596) vehicle manufacturer operating handbook.

B. References

REFERENCE	DESIGNATION
AMM TASK 05-50-23-200-801-A/600	-
AMM TASK 32-00-01-910-801-A/200	-
AMM TASK 32-49-01-600-801-A/300	-
AMM TASK 32-49-04-600-801-A/300	-
Figure 201, DET. B	-
Figure 201, DET. D and DET.E	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Tows the aircraft Driving the towing vehicle	
1	Helps with the task in the cockpit	cockpit

I. Preparation

SUBTASK 840-012-B

WARNING: WHEN YOU TOW THE AIRCRAFT, ALL PERSONS MUST STAY OUT OF THE DANGEROUS AREAS AROUND THE TOWING TUG, NOSE WHEEL, MAIN WHEELS, AIRCRAFT FUSELAGE AND WINGS. PERSONS ON THE GROUND CAN BE RUN OVER BY NOSE WHEEL, MAIN WHEELS, TOWING TUG, AIRCRAFT FUSELAGE AND WINGS. THIS IS BECAUSE THE AIRCRAFT WILL CHANGE POSITION DURING PUSHBACK AND TOWING. KEEP A SAFE DISTANCE BETWEEN PERSONS ON THE GROUND AND THE EQUIPMENT THAT MOVES. A FATAL INJURY CAN OCCUR.

CAUTION: • ONLY QUALIFIED PERSONNEL MUST OPERATE THE GSE 595 OR GSE 596 AIRCRAFT TOWING VEHICLE.

- DURING TOWING OPERATIONS, A TECHNICIAN MUST STAY IN THE COCKPIT, WITH SEAT BELT, TO SET THE EMERGENCY/PARKING BRAKE (Figure 201, DET. A), IF NECESSARY.
- DURING THE TOWING OPERATIONS WITH THE ELECTRICAL SYSTEM ENERGIZED, MAKE SURE THAT THE ELECTRIC MOTOR-DRIVEN HYDRAULIC PUMPS ARE OFF.
- REMOVE ALL TOOLS, EQUIPMENT, AND MATERIALS FROM THE TOWING AREA. MAKE SURE THAT THE AREA IS CLEAN.
- TO PREVENT PEAK LOADS, MAKE SURE THAT THE ACCELERATIONS AND DECELERATIONS DURING TOWING ARE SMOOTH.
- BEFORE THE AIRCRAFT TOWING, MAKE SURE THAT THE VEHICLE IS IN GOOD CONDITIONS FOR OPERATION. FOR MORE DETAILS, REFER TO THE MANUFACTURER'S OPERATING HANDBOOK.

- (1) Make sure that the emergency/parking brake accumulator is pressurized.
- (2) Pull and rotate the emergency/parking brake handle Figure 201, DET. B and, with the aircraft energized, make sure that the "BRAKE ON" lights are on Figure 201, DET. A and DET. C.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (3) Make sure that the safety pins of the landing gear are correctly installed AMM TASK 32-00-01-910-801-A/200 .

NOTE: The use of the safety pins on MLG and NLG is optional when you tow or push the aircraft for the flight. This occurs when the aircraft is in position for the flight crew to taxi the aircraft before or after a flight.

- (4) On the circuit breaker panel, open the STEER circuit breaker and attach a DO-NOTCLOSE tag to it.

On aircraft POST-MOD. S.B.145-32-0057, alternatively, set the external steering disengagement switch to the "DISENGAGED" position (Figure 201, DET. D and DET.E). Make sure that the "STEER INOP" message comes into view on the EICAS display.

WARNING: MAKE SURE THAT THE AIRCRAFT EMERGENCY/PARKING BRAKE IS SET, BEFORE YOU CONNECT THE TOWING EQUIPMENT.

- (5) Make sure that the aircraft emergency/parking brake is set. If not, set the emergency/parking brake handle up. Refer to Figure 201, DET. B.

NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.

- (6) Make sure that the tires are in a serviceable condition. Do a check of the tires and charge them if necessary. Refer to AMM TASK 32-49-01-600-801-A/300 for the main wheel tires and AMM TASK 32-49-04-600-801-A/300 for the nose wheel tires.

- (7) On the tug, select the cradle operation mode to use the nose landing gear disengaged.

J. Towing [\(Figure 219\)](#) [\(Figure 220\)](#) [\(Figure 221\)](#)

SUBTASK 580-043-B

WARNING: THE TUG REAR WHEELS ARE STEERABLE. THE TUG OPERATOR MUST KNOW HOW THIS AFFECTS THE HANDLING OF THE UNIT AND BE PREPARED TO TAKE SPECIAL PRECAUTIONS TO PREVENT ACCIDENTS. DURING THE TUG OPERATION, START SLOWLY UNTIL YOU KNOW IN WHICH DIRECTION THE STEERABLE WHEELS ARE AND CORRECT, IF NECESSARY, BEFORE YOU ACCELERATE THE TUG. WHEN YOU TURN TUG TO MAKE SURE THAT IT IS FREE FROM OBSTRUCTIONS.

- (1) Make sure that all settings of this towbarless towing vehicle (GSE 595 or GSE 596) are correctly adjusted for towing the ERJ-145 aircraft. Refer to the Manufacturer's Operating Manual for more instructions.

- (2) The maximum speed permitted for towing with GSE 595 or GSE 596 is 8 km/h (5 mph), with the limitations below in consideration:

- (a) The ground must be dry or wet concrete or asphalt;
- (b) For a ground with ice or snow, the maximum speed permitted is 5 k/h (3 mph), if the towing vehicle does not have antiskid system.

- (3) Before the aircraft towing, make sure that you have the towing crew that follows:

- (a) One person in the cockpit to operate the brakes;
- (b) One person to operate the towbarless vehicle.

NOTE: For a safer procedure, Embraer recommends the aid of 4 more persons, as follows:

- One person at the left wing tip and one person at the right wing tip to monitor sufficient clearance during turns;

- One person behind the tail to monitor sufficient clearance during turns;
- One towing supervisor to control the towing operation with visual and radio communication with all the towing crew members at all times. You can use light wands to give signals in low visibility.

CAUTION: DURING THE TOWING OPERATIONS, A TECHNICIAN MUST STAY IN THE COCKPIT TO SET THE EMERGENCY/PARKING BRAKE, IF NECESSARY. AND ALL PERSON IN THE COCKPIT MUST BE IN A SEAT AND THE SEATBELT MUST BE FASTENED.

(4) To go near the aircraft, do as follows:

- (a) When the towbarless towing vehicle (GSE 595 or GSE 596) is 10 m (33 ft) away from the aircraft, it must move at a slow speed in the direction of the aircraft nose wheel (aligned in the direction in which the tire points).

NOTE: Slow speed is approximately 4 to 5 km/h (2.5 to 3 mph).

- (b) Stop the towbarless towing vehicle approximately 1 m (3 ft) from the NLG. The towbarless towing vehicle must be in front of and aligned with the aircraft nose wheel.

NOTE: Make sure that the towbarless towing vehicle is correctly aligned with the aircraft NLG before you engage and dock the aircraft. Refer to Figure 202, Sheet 1.

- (c) Lift the steering console to the full up position.

NOTE: For this, use the sliding release lever on the right hand side of console.

- (d) Push the cradle down button until movement stops.

- (e) Push the cradle down and cradle open button at the same time until cradle movement stops.

- (f) Drive the towbarless towing vehicle towards the NLG while you center the white rollers with the NLG tires.

- (g) If the NLG is not aligned with the aircraft body, align the towbarless towing vehicle with the angle of the NLG.

- (h) Push the cradle up button until movement stops. The cradle must be in the full up position to move the aircraft.

- (i) Lower the steering console.

NOTE: With the cradle up and the driver sitting in the seat, the towbarless towing vehicle will have the power available for pushing or towing.

(5) To tow the aircraft, do as follows:

WARNING: DO NOT APPLY THE AIRCRAFT BRAKES WHEN AIRCRAFT IS BEING TOWED WITH A TOWBARLESS TOW VEHICLE. IF BRAKES ARE APPLIED, DAMAGE WILL OCCUR TO THE NOSE LANDING GEAR, TOWING VEHICLE AND MAINTENANCE PERSONNEL CAN BE INJURED.

CAUTION: DURING THE TOWING OPERATION, DO NOT STEER THE NOSE LANDING GEAR MORE THAN 140 DEGREES. IF YOU DO, THE TOWBARLESS VEHICLE CABIN CAN HIT THE FUSELAGE AND CAUSE DAMAGE TO THE AIRCRAFT.

- (a) Make sure that the towing indication lights are green before you start to tow.
- (b) Set the cabin to the normal position, release the brakes of the towbarless towing vehicle and start to tow.

NOTE: You must apply the handbrake when the tractor is in neutral gear or when it stops.

- (c) Do the steps that follow:
 - 1 Do an inspection to see if the aircraft emergency/parking brake is applied during the towing procedure with the vehicle connected to the aircraft, independently of the vehicle speed AMM TASK 05-50-23-200-801-A/600.

NOTE: Braking the aircraft during the towing operation is not permitted unless in emergency conditions.

CAUTION: DURING THE TOWING OPERATION, DO NOT STEER THE NOSE LANDING GEAR MORE THAN 140 DEGREES. IF YOU DO, THE TOWBARLESS VEHICLE CAN HIT THE FUSELAGE AND CAUSE DAMAGE TO THE AIRCRAFT.

- 2 During the towing procedure, carefully monitor the zero reference on the NLG. Refer to [Figure 221](#).

NOTE: You can use the towing point as a reference to see when the NLG steering angle is near the maximum permitted value.

- 3 Tow the aircraft slowly and in a straight line before you try to turn.
- 4 Complete the aircraft pushback in a straight line for a minimum of 3 m (10 ft).

NOTE: The function of this step is to:

- Align the steering as near as possible to the zero-degree position and in the range of 76 ° (maximum angle for steering engagement);
- Prevent loads on the NLG axle that are not necessary;
- Prevent wear of the NLG tires.

- 5 Do not stop the aircraft in a turn if it is not necessary;

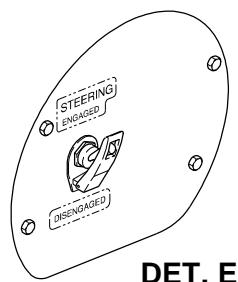
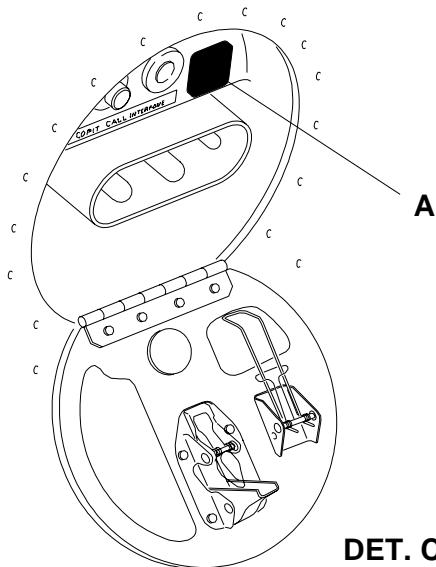
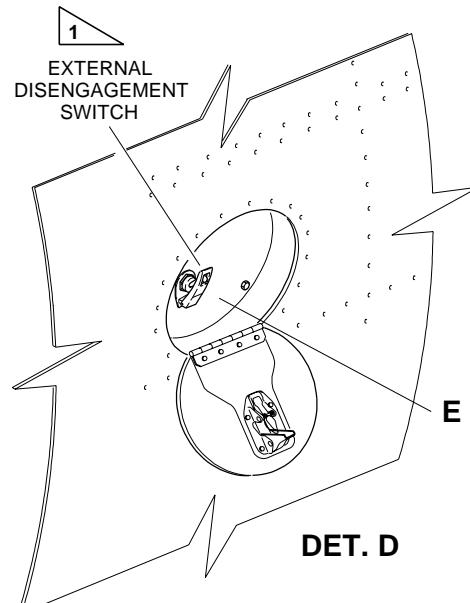
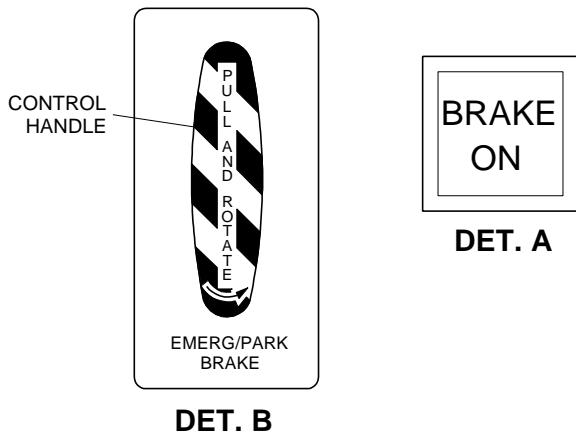
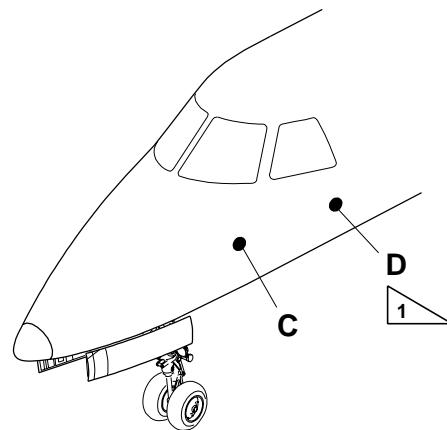
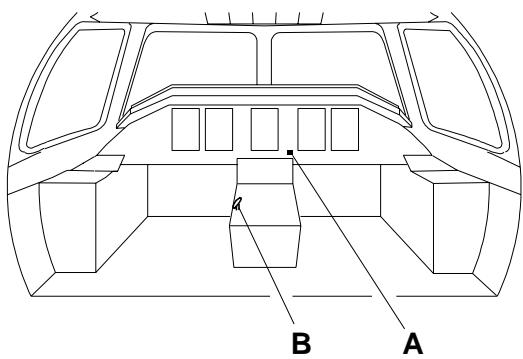
- 6 When you move the aircraft, always use gradual acceleration and brake application;
 - 7 Do not start turns at high speed;
 - 8 During slippery conditions, reduce speed and anticipate slower braking reaction.
 - 9 When the aircraft is in the correct position, stop the aircraft with the towbarless towing vehicle (GSE 595 or GSE 596).
- (6) To undock the aircraft from the towbarless towing vehicle, do as follows:
- (a) Lift the steering console to full up position.
NOTE: Use the sliding release lever on the RH side of console.
 - (b) To release the aircraft, push the cradle down button until movement stops.
NOTE: Do not use the towbarless towing vehicle foot brake during release.
 - (c) To open cradle push the cradle down and cradle open button at the same time.
NOTE: Hold the two buttons until cradle movement stops.
 - (d) Drive straight away from the aircraft. Do not try to turn the towbarless towing vehicle until the cradle is fully clear of the aircraft tires.
 - (e) Push the cradle close button until movement stops.
 - (f) Push the cradle up button until movement stops.
 - (g) Lower the steering console.

K. Follow-on

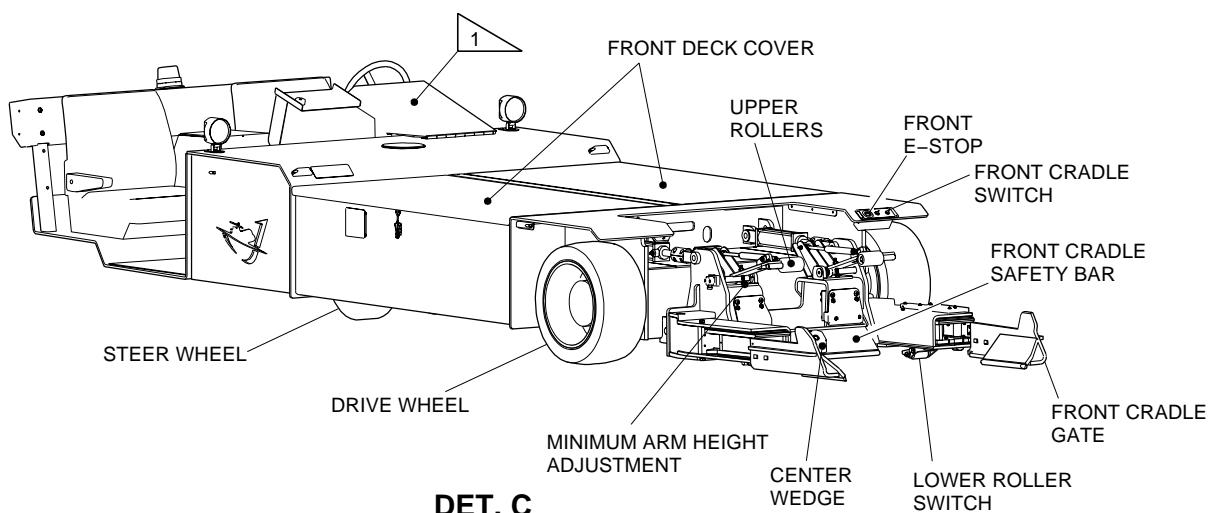
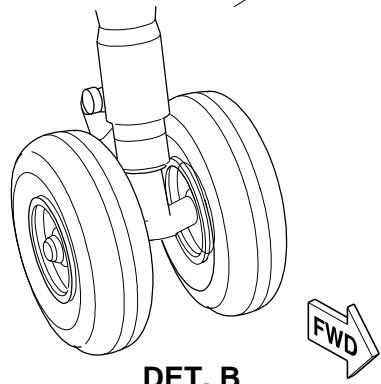
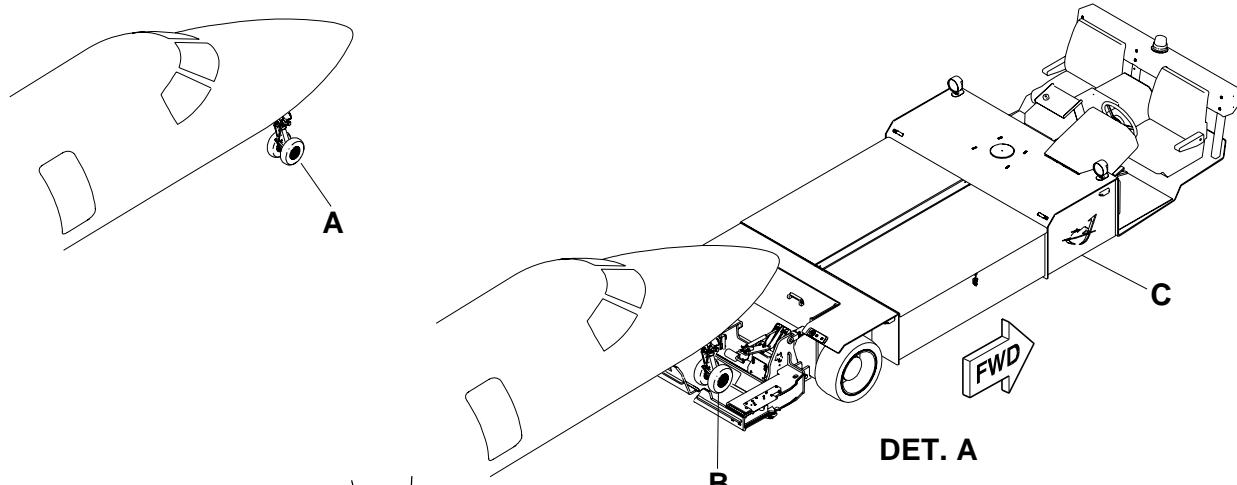
SUBTASK 840-013-B

- (1) Set the aircraft emergency/parking brake Figure 201, DET. B and, with the aircraft energized, make sure that the "BRAKE ON" lights Figure 201, DET. A and DET. C are on.
NOTE: To prevent hydraulic fluid transfer from system 1 to system 2 or vice versa, first apply brakes with the pedals and then pull or release the emergency/parking brake handle.
- (2) Install GSE 012 Chock - Wheel in front of and behind the wheels on the left and right main landing gears.
- (3) Make sure that the landing gear safety pins are correctly installed AMM TASK 32-00-01-910-801-A/200.
- (4) On the circuit breaker panel, remove the DO-NOT-CLOSE tag and close the STEER circuit breaker. For aircraft POST-MOD. S.B.145-32-0057, set the external steering disengagement switch to the "ENGAGED" position. Refer to Figure 201, DET. D and DET. E.

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
AIRCRAFT TOWING WITH TRONAIR JP100 VEHICLE
 Figure 219



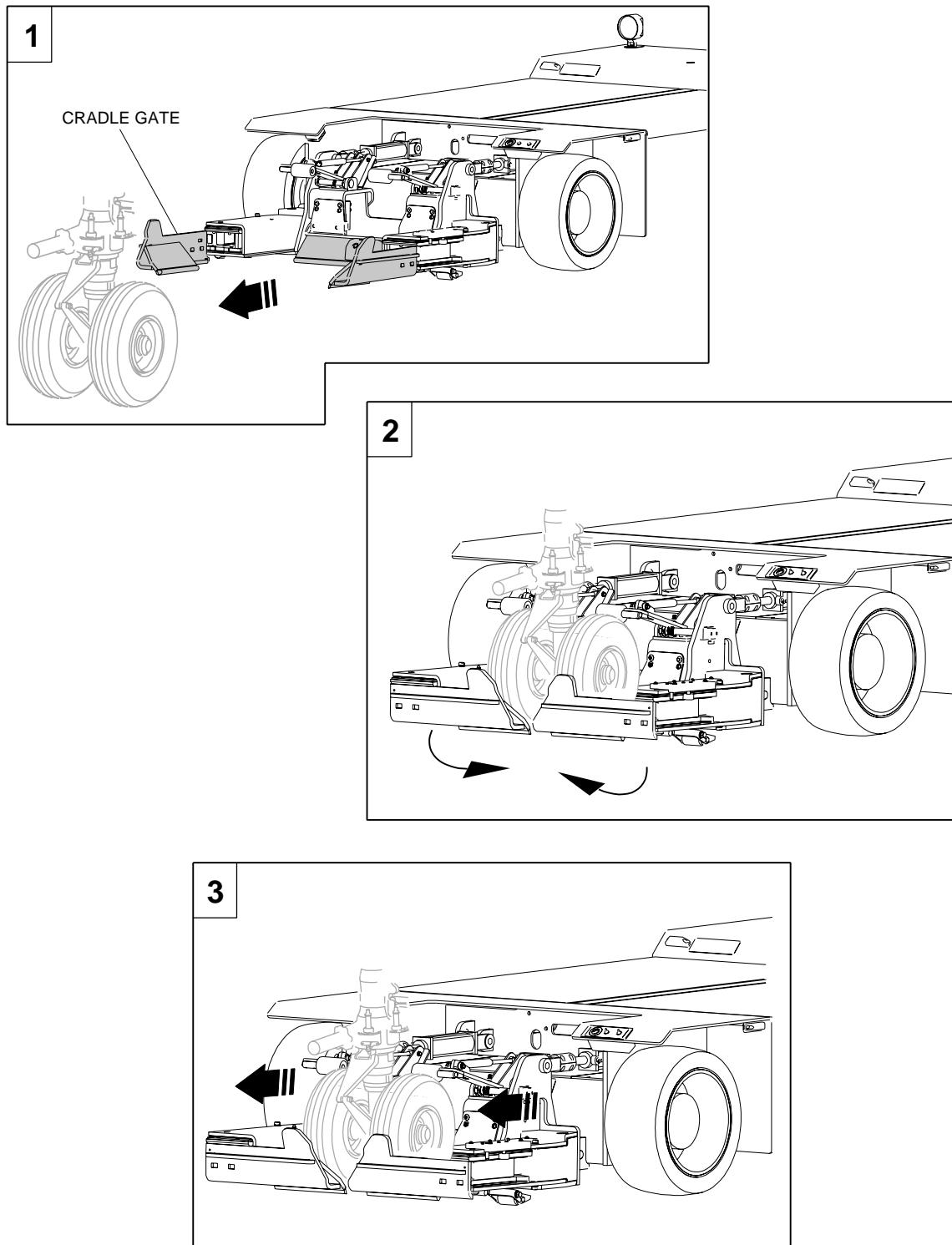
EFFECTIVITY: POST-MOD. S.B. 145-32-0102
AIRCRAFT TOWING WITH TRONAIR JP100 VEHICLE
 Figure 220



FOR REFERENCE ONLY – TOWBARLESS TOWING VEHICLE DETAILS MAY CHANGE ACCORDING
TO CUSTOMER'S ORDER.

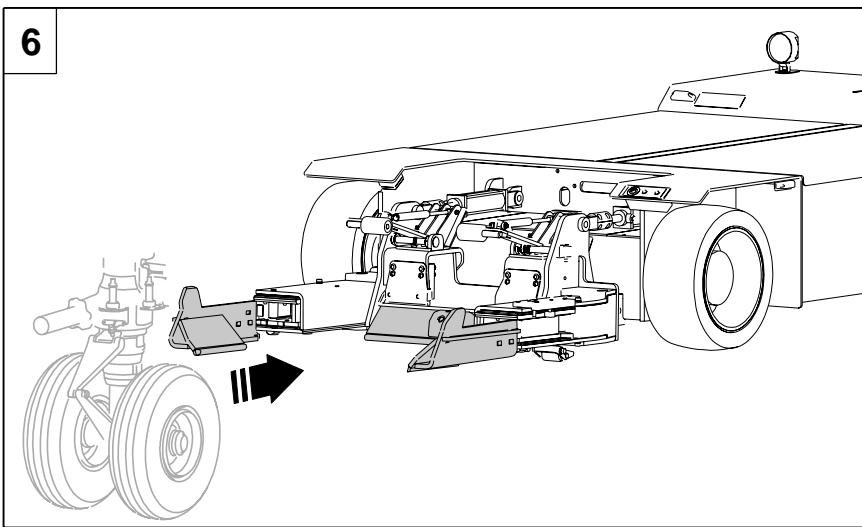
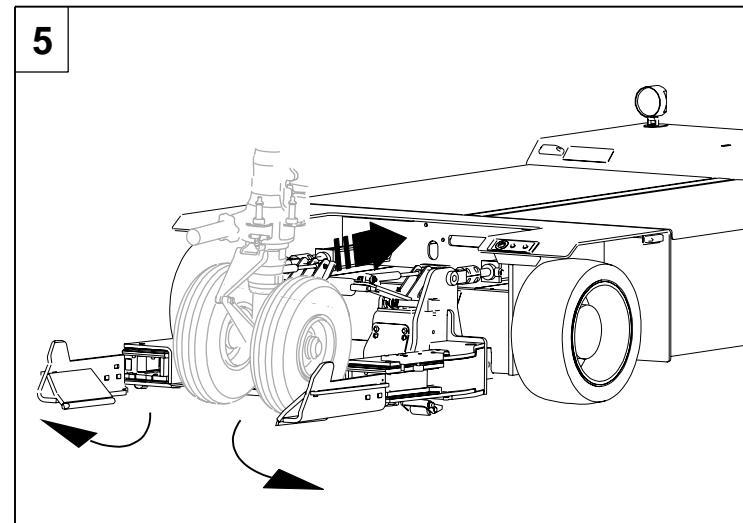
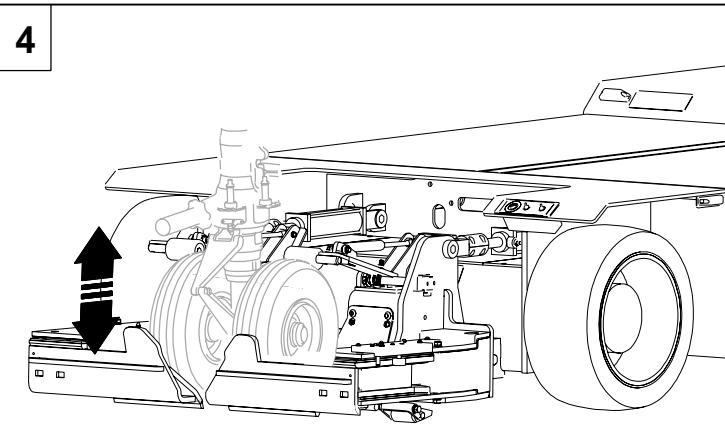
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EFFECTIVITY: POST-MOD. S.B. 145-32-0102
AIRCRAFT TOWING WITH TRONAIR JP100 VEHICLE
 Figure 221 - Sheet 1



SK145AMM090003A.DGN

EFFECTIVITY: POST-MOD. S.B. 145-32-0102
AIRCRAFT TOWING WITH TRONAIR JP100 VEHICLE
Figure 221 - Sheet 2



SK145AMM090004A.DGN

