



AEROSPACE INFORMATION REPORT

AIR1673**REV. A**

Issued 1986-07
Revised 2002-04
Reaffirmed 2013-08

Superseding AIR1673

Aircraft Cargo Door Opening/Sill Details for
Ground Support Equipment Interface

RATIONALE

AIR1673A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

Manufacturers/designers of all aircraft equipped with a pallet/container capability have provided a means of linking the ground loaders/elevators with the aircraft sill for the smoother transfer of pallets and containers into or out of the aircraft holds.

Use of the aircraft attachment points may be used as a means of averting damage to the aircraft door frames and other important parts. Latch-on guarantees fore and aft and vertical alignment of the loader bed with the aircraft doorway, when used in conjunction with the appropriate ground equipment.

This SAE Aerospace Information Report (AIR) has been prepared by SAE Subcommittee AGE-2A to present a review of the current range of aircraft attachment points on wide body aircraft and those narrow body aircraft with a ULD cargo capability. Airline operators, who utilized these facilities, have been faced with a growing number of adaptor bars necessary to suit each type of aircraft and door position. There is also a stowage problem on the elevator compounded by the increasing number of bars necessary to suit each aircraft. Some measure of standardization is obviously desirable.

The adapter bars which have to be fitted to the forward face of the elevators to suit each different type of sill attachment are very heavy and present some handling problems to operators.

Where the same elevator services different aircraft types, these bars may have to be changed many times each day on the ramp.

Alternatively, elevators have to be restricted to servicing specific aircraft types or to those aircraft where a common attachment point already exists.

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<http://www.sae.org/technical/standards/AIR1673A>**

1.1 Purpose:

The purpose of this document is to provide detailed data of the aircraft attachment points at each door position capable of loading pallets or containers on the current aircraft and on new aircraft, where known.

Aircraft designers may utilize this information to enable future designs to fall into one of these categories with a view to keeping the range of elevator adaptor bars to the present level.

The design of the aircraft attachment points is governed by sill design. Two types of attachment provisions for latch-on fittings are available as follows:

1. Special fittings in the vicinity of door latch fittings.
2. Special door latch fittings (spools) as approved for use by the airframe manufacturers.

Ground equipment design objective should be to attempt to incorporate latch-on capability of two or more sill types on their adaptor bars.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 IATA Publications:

Available from IATA, 800 Place Victoria, P.O. Box 113, Montreal, Quebec, Canada H4Z 1M1.

IATA AHM 931	Functional Specification for Lower Deck Container/Pallet Loader
IATA AHM 932	Functional Specification for Main-Deck Container/Pallet Loader

2.2 ISO Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002.

ISO 6967	Aircraft - Wide body aircraft main deck container/pallet loader - Functional requirements
ISO 6968	Aircraft - Wide body aircraft lower deck container/pallet loader - Functional requirements

3. DATA CLASSIFICATION:

1. Airbus A300/310

Lower deck - Figures 1A through 1E

Main deck - Figures 2A through 2C

2. B707/B727

Main deck - Figures 3A through 3B

3. B737

Main deck - Figures 4A through 4B

4. B747

Lower deck - Figures 5A through 5D

Main deck - Figures 6A through 6F

5. B767

Lower deck - Figures 7A through 7F

6. DC8

Main deck - Figures 8A through 8G

7. DC9

Main deck - Figures 9A through 9D

8. DC10/MD11

Lower deck - Figures 10A through 10D

Main deck - Figures 11A through 11E

9. L1011

Lower deck - Figures 12A through 12H

10. L100

Main deck - Figures 13A through 13D

3. (Continued):

11. Airbus A300F/310F

Main deck - Figures 14A through 14B

12. Airbus A319/320/321

Lower deck - Figures 15A through 15F

13. Airbus A330/A340

Lower deck - Figures 16A through 16G

14. B767F

Main deck - Figures 17A through 17B

15. B777

Lower deck - Figures 18A through 18E

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- 3.1 Airbus A300 and A310 - Lower Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 1A through 1E.

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A.300

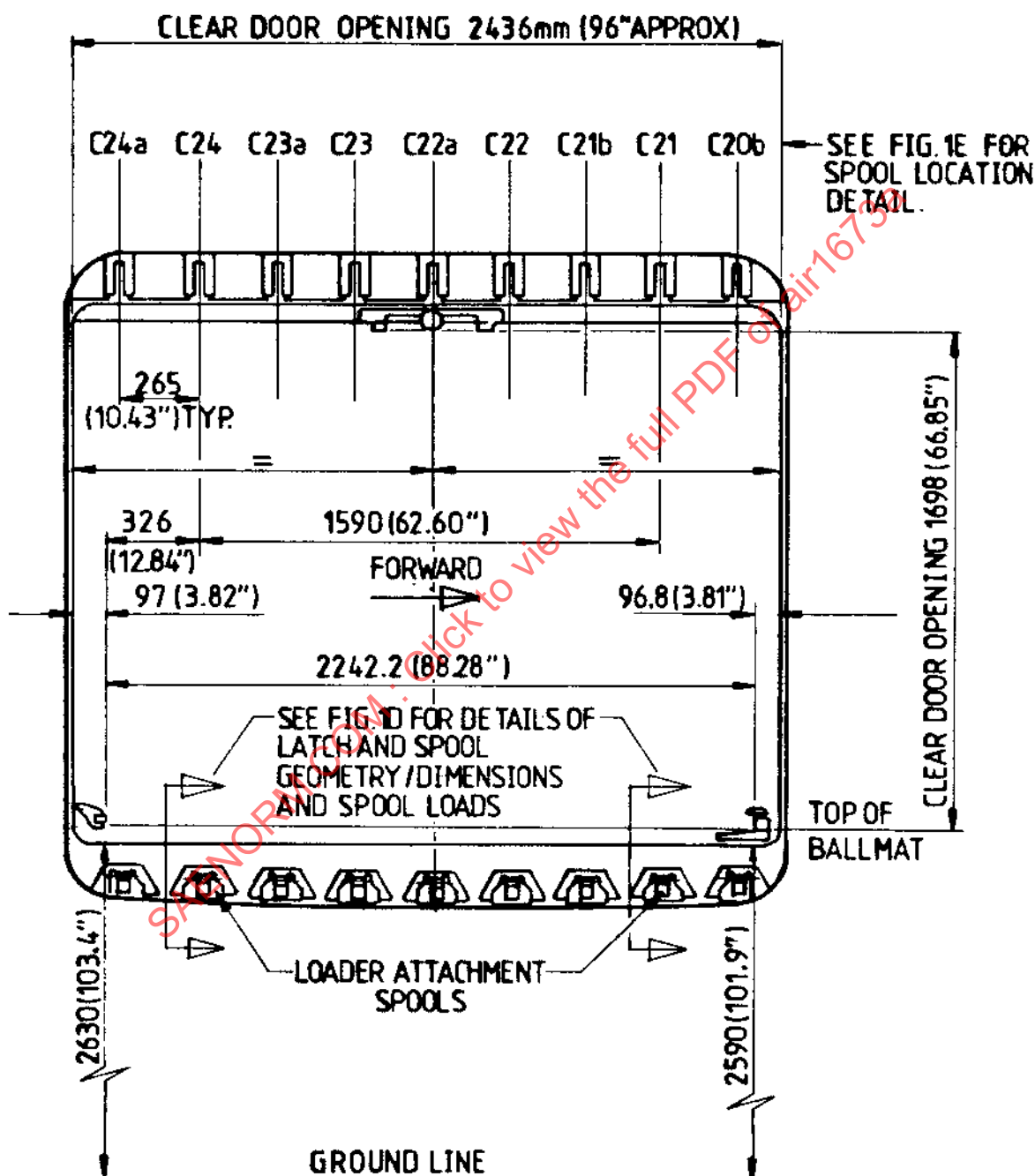


FIGURE 1A - Lower Deck - Hold 1 Door (Pre. Mod. 2295)
A300 Aircraft

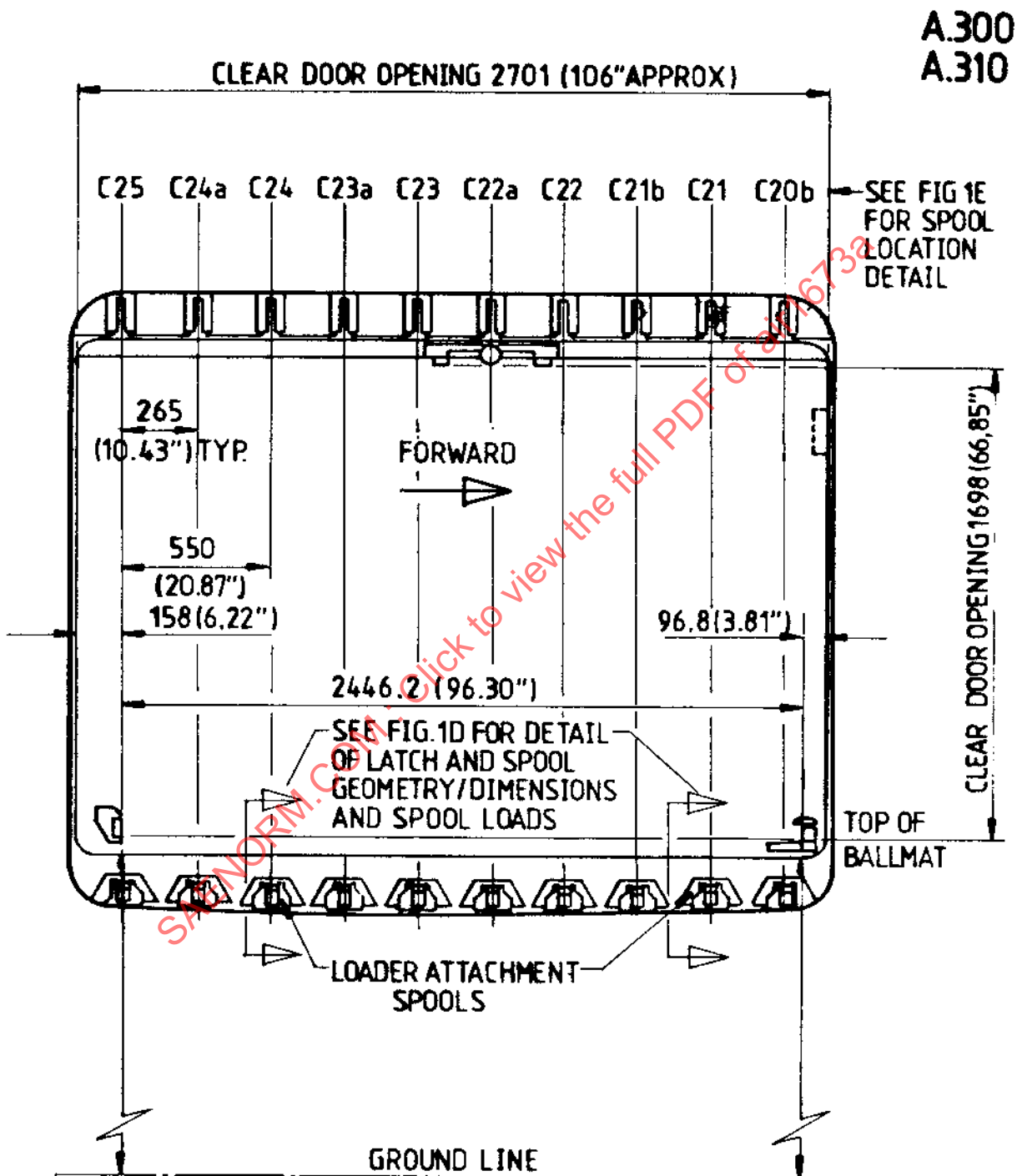


FIGURE 1B - Lower Deck - Hold 1 Door (Post Mod. 2295)
A300 Aircraft and A310 Aircraft

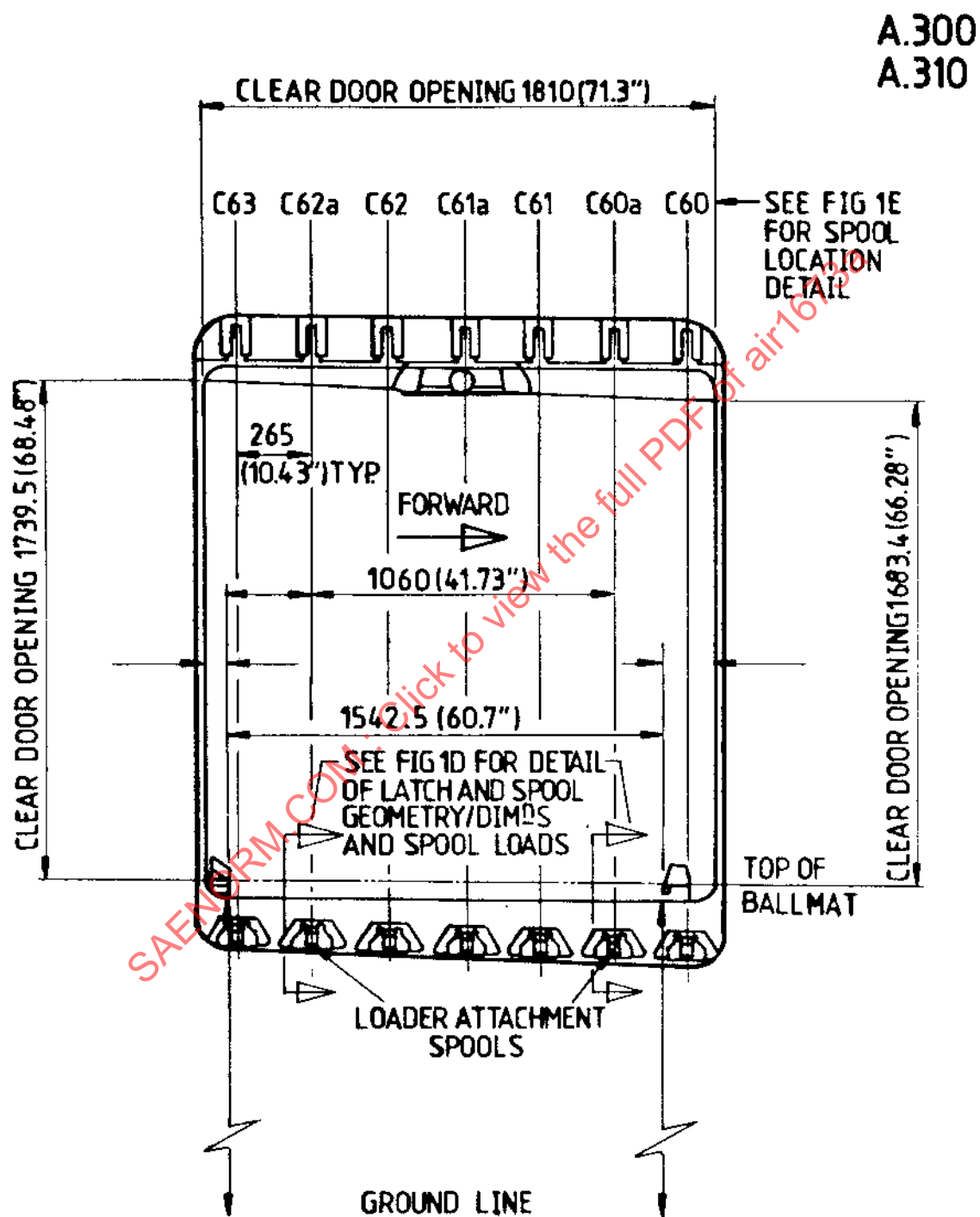


FIGURE 1C - Lower Deck - Hold 2 Door
A300 Aircraft and A310 Aircraft

A.300
A.310

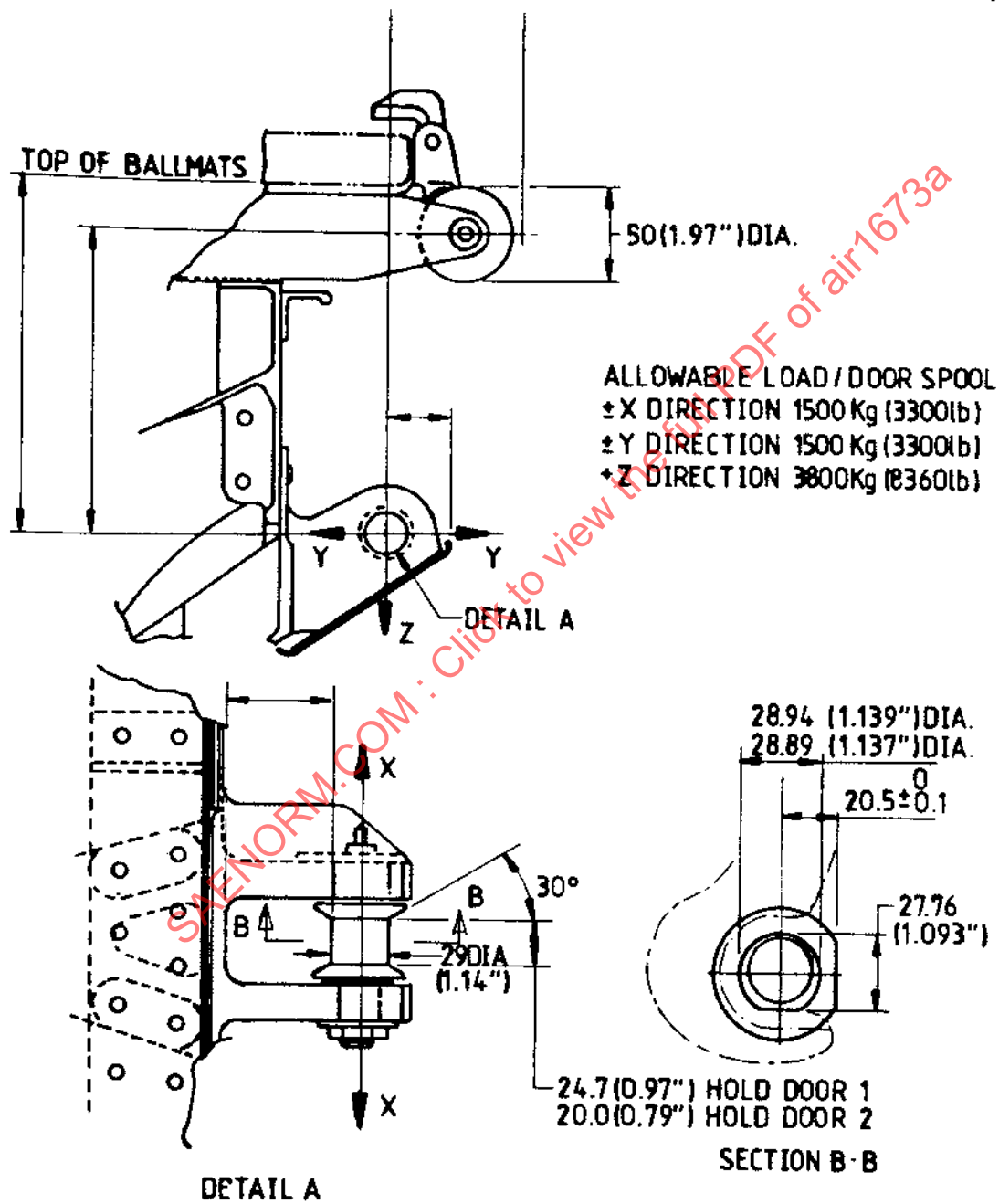


FIGURE 1D - Lower Deck - Hold 1 and 2 Doors
Latch and Spool Geometry/Dimensions
A300 Aircraft and A310 Aircraft

A300
A310

HOLD 1 DOOR

DOOR SPOOL POSITIONS

FRAME SPANT	DISTANCE ABSTAND Y (mm)	DISTANCE ABSTAND Z (mm)
C20b	Y20b = - 1543,52	Z20b = - 2288,32
C21	Y21 = - 1554,89	Z21 = - 2295,15
C21a	Y21a = - 1564,57	Z21a = - 2299,57
C22	Y22 = - 1572,48	Z22 = - 2301,48
C22a	Y22a = - 1578,55	Z22a = - 2300,77
C23	Y23 = - 1583,08	Z23 = - 2297,86
C23a	Y23a = - 1587,46	Z23a = - 2294,76
C24	Y24 = - 1591,84	Z24 = - 2291,65
C24a	Y24a = - 1596,22	Z24a = - 2288,53
C25	Y25 = - 1600,57	Z25 = - 2285,40

HOLD 2 DOOR

DOOR SPOOL POSITIONS

FRAME SPANT	DISTANCE ABSTAND Y (mm)	DISTANCE ABSTAND Z (mm)
C60	Y60 = - 1621,56	Z60 = - 2261,52
C60A	Y60A = - 1612,99	Z60A = - 2259,52
C61	Y61 = - 1603,19	Z61 = - 2255,81
C61A	Y61A = - 1592,17	Z61A = - 2250,40
C62	Y62 = - 1579,94	Z62 = - 2243,31
C62A	Y62A = - 1566,51	Z62A = - 2234,55
C63	Y63 = - 1551,91	Z63 = - 2224,16

FIGURE 1E - Lower Deck - Hold 1 and Hold 2 Doors
Door Spools - Positioning Details
A300 Aircraft and A310 Aircraft

3.2 Airbus A300 and A310 - Main Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 2A through 2C.

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A.300
A.310

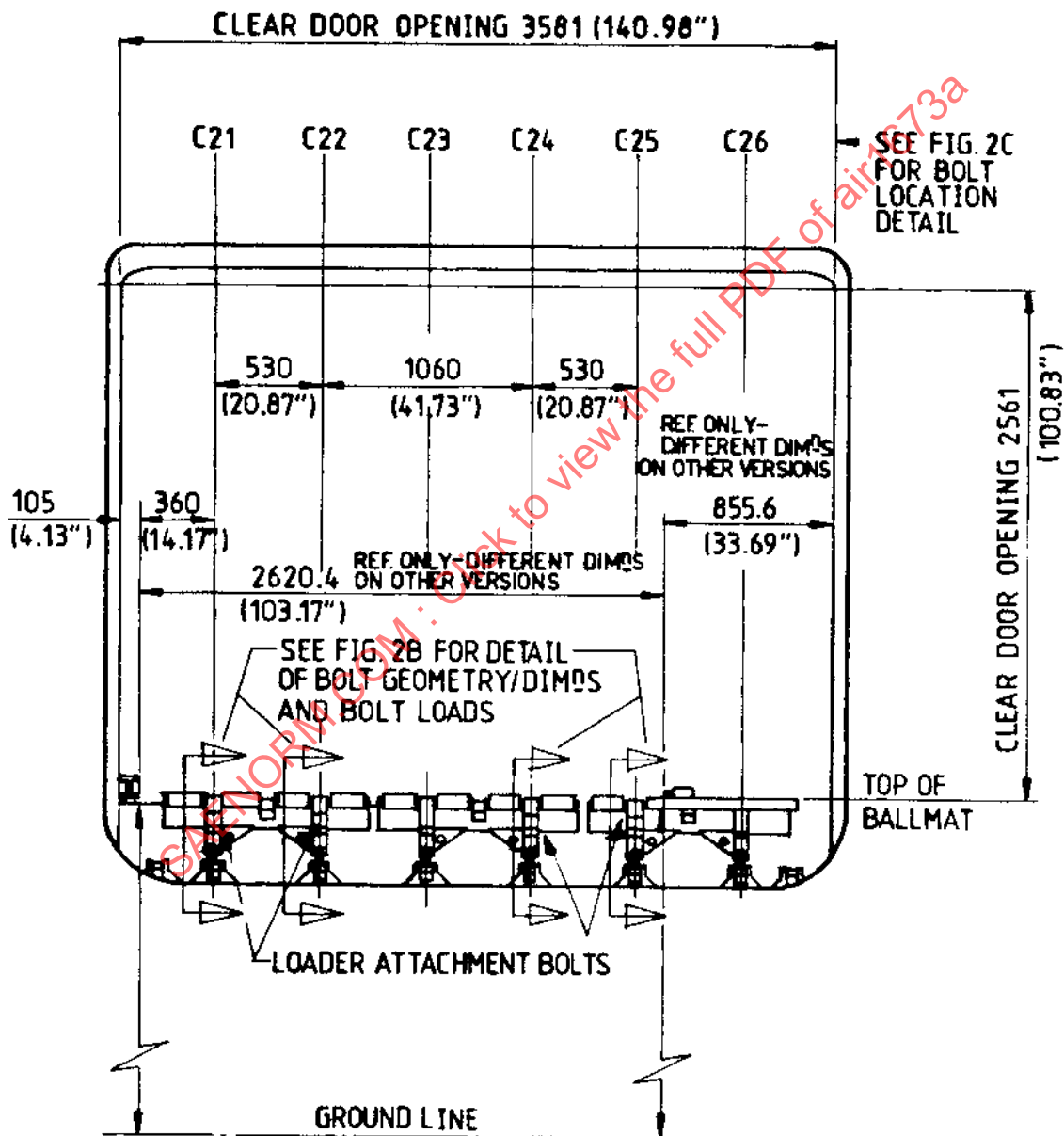
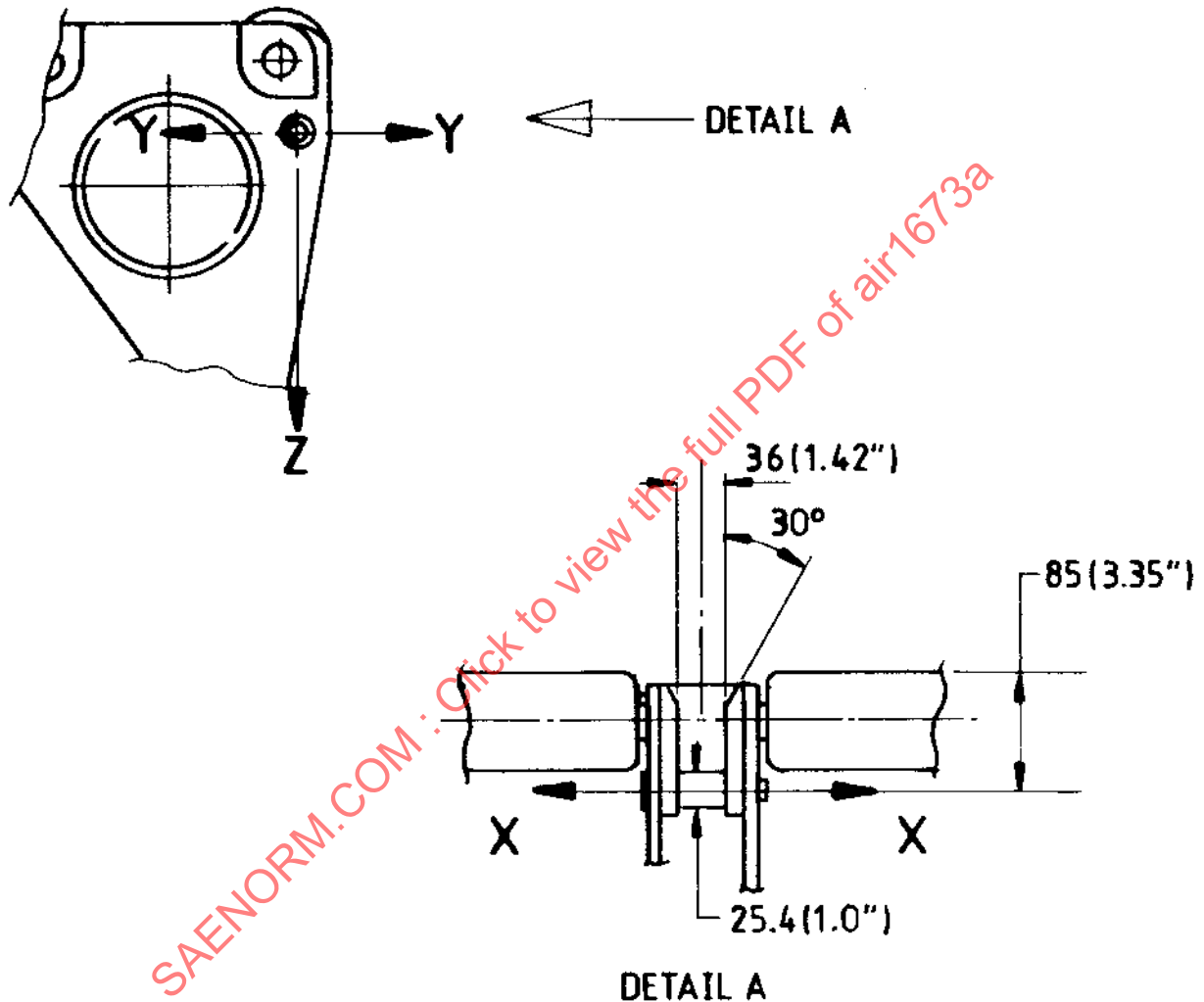


FIGURE 2A - Upper Deck - Cargo Door
A300 - C4 Aircraft and A310 Aircraft

A.300
A.310



ALLOWABLE LOAD / LOADER ATTACHMENT BOLT

± X DIRECTION — Kg (— lb)
 ± Y DIRECTION — Kg (— lb)
 - Z DIRECTION 2700 Kg (5925 lb)

FIGURE 2B - Upper Deck - Cargo Door
 Bolt Geometry and Dimensions
 A300 - C4 Aircraft and A310 Aircraft

A300
A310

FRAME	DISTANCE Y (mm)	DISTANCE Z (mm)
C21	Y21 = 2792	Z21 = 4516,5
C22	Y22 = 2792	Z22 = 4524,6
C23	Y23 = —	Z23 = —
C24	Y24 = 2792	Z24 = 4541
C25	Y25 = 2792	Z25 = 4549
C26	Z26 = —	Z26 = —

(4 POINTS PROVIDED FOR LOADER ATTACHMENT)

FIGURE 2C - Upper Deck - Cargo Door
Bolt - Positioning Details
A300 - G4 Aircraft and A310 Aircraft

3.3 Boeing 707 and 727 - Main Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 3A through 3B.

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3a

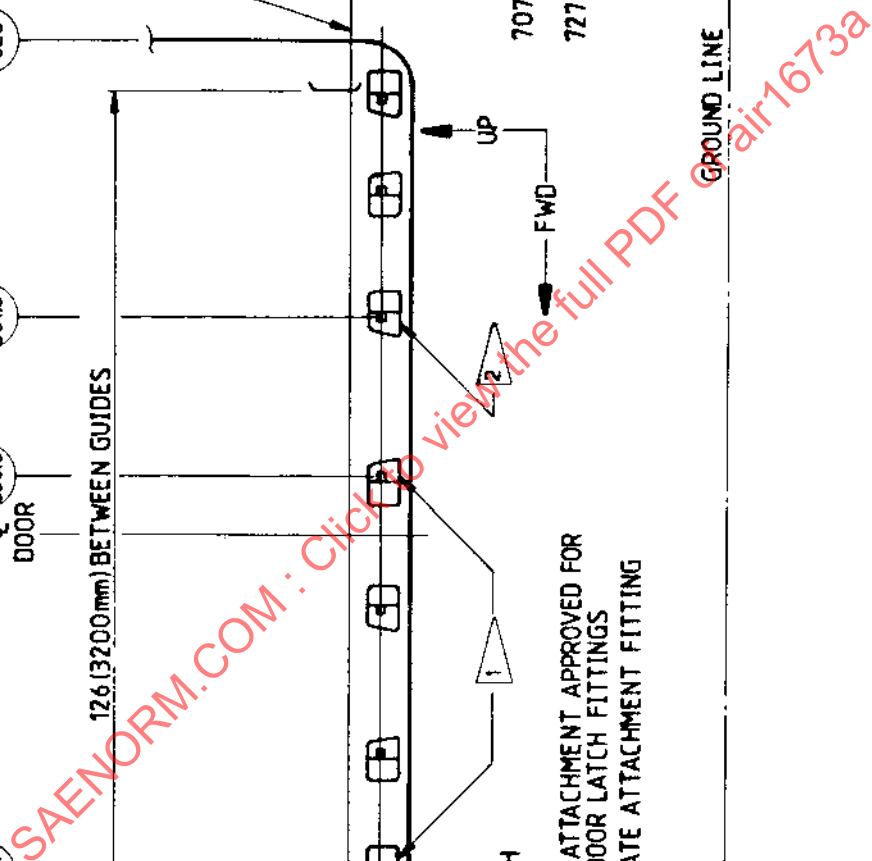


FIGURE 3A - Boeing 707 and 727 Loader Attachment
Main Deck Cargo Door

B.707
B.727

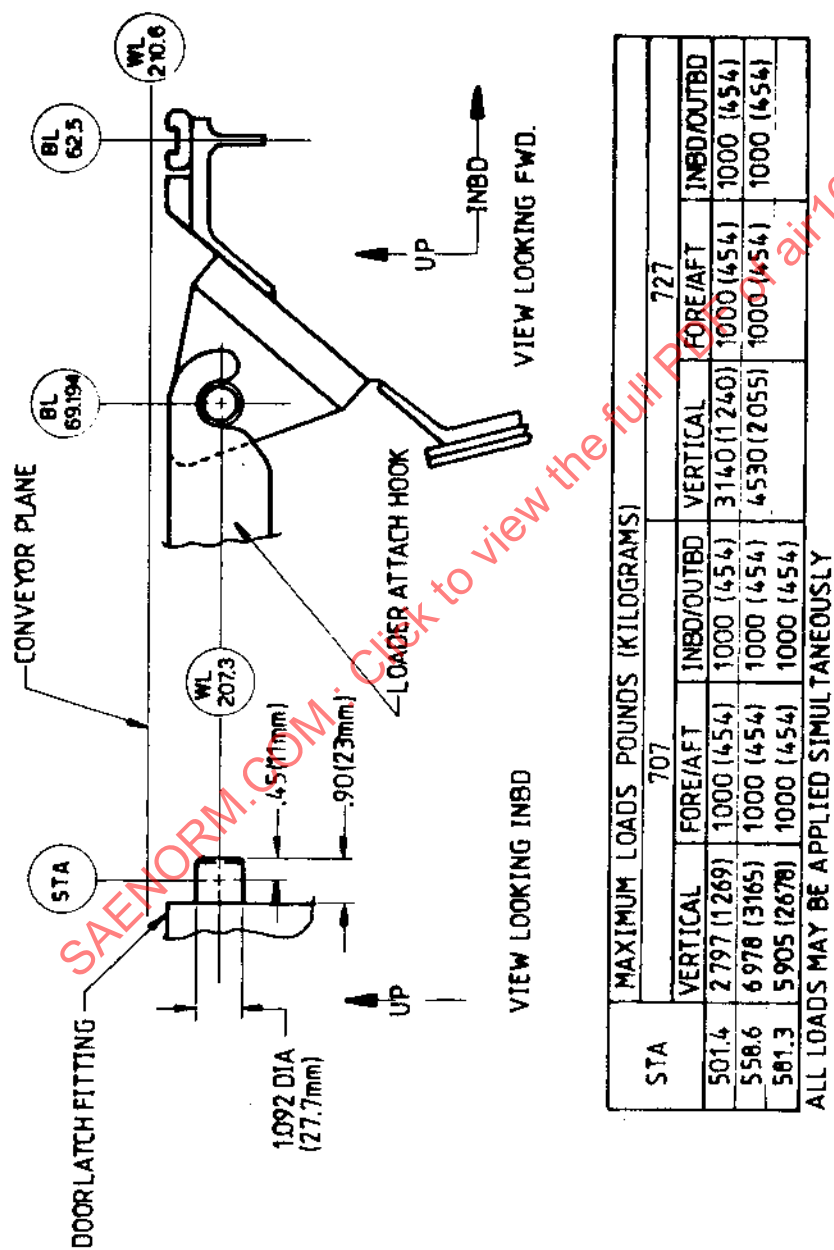


FIGURE 3B - B707 and B727 Loader Attachment

- 3.4 Boeing 737 - Main Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 4A through 4B.

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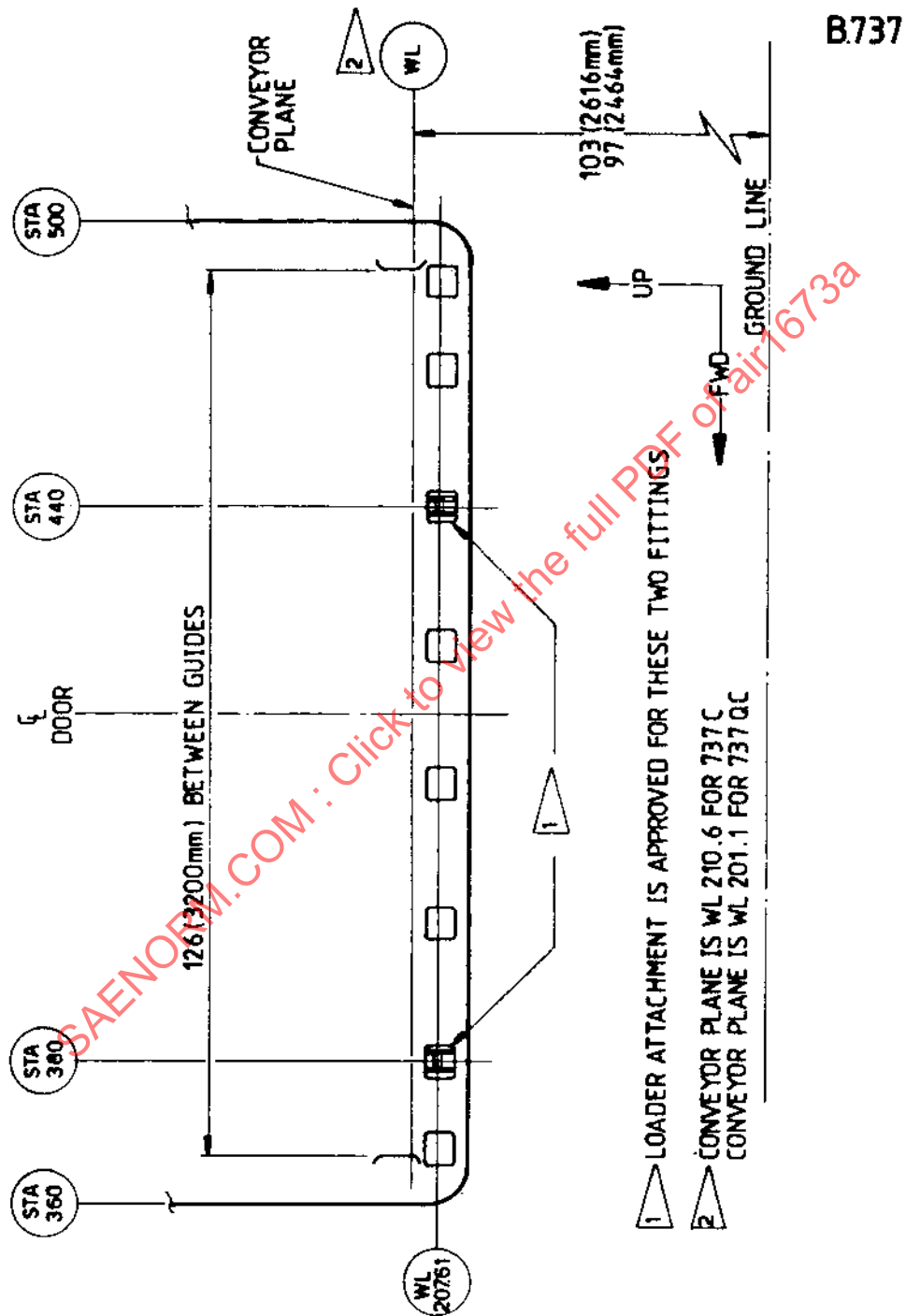


FIGURE 4A - B737 - Loader Attachment
Main Deck Cargo Door

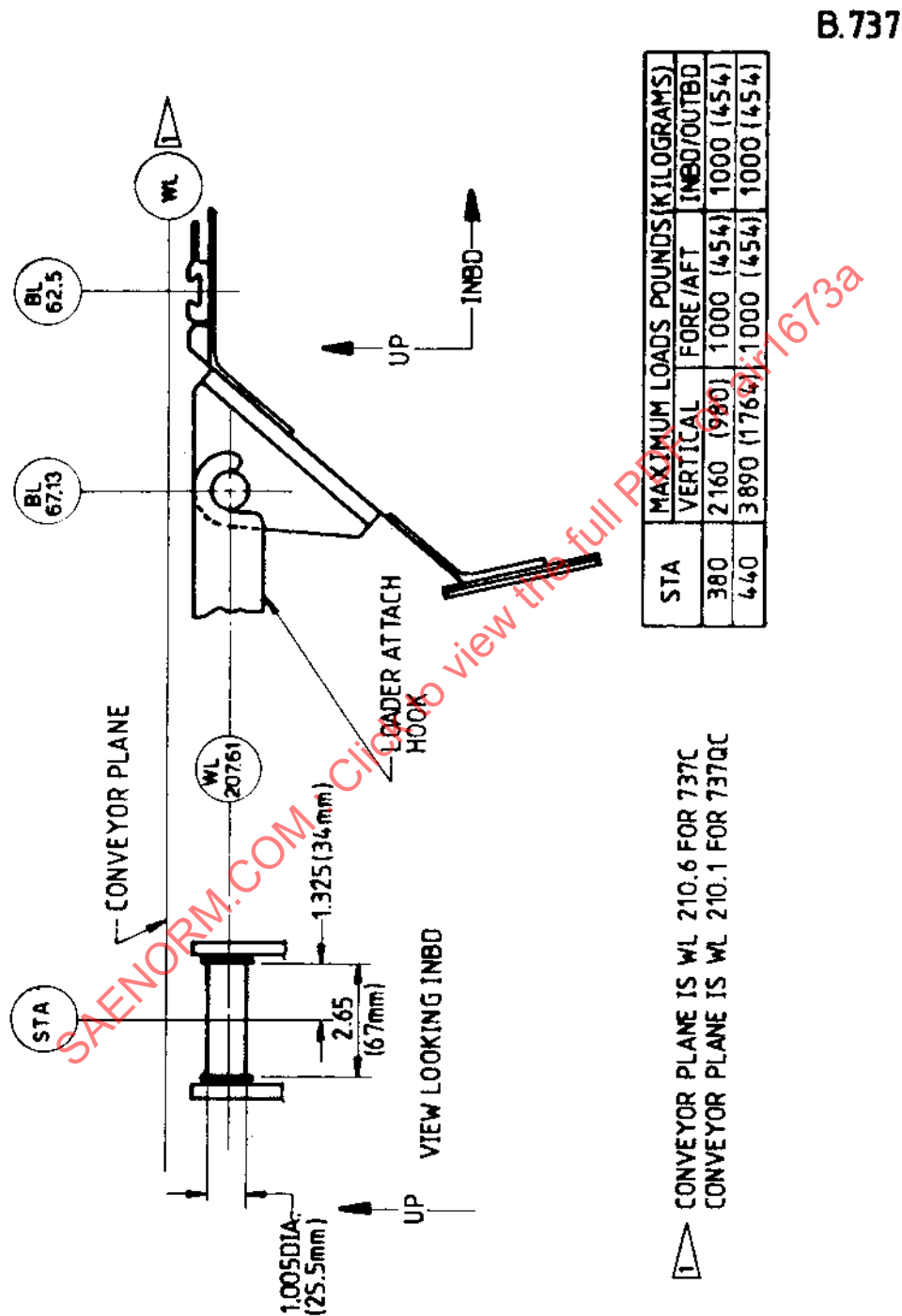


FIGURE 4B - B737 Loader Attachment

- 3.5 Boeing 747 - Lower Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 5A through 5D.

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B.747

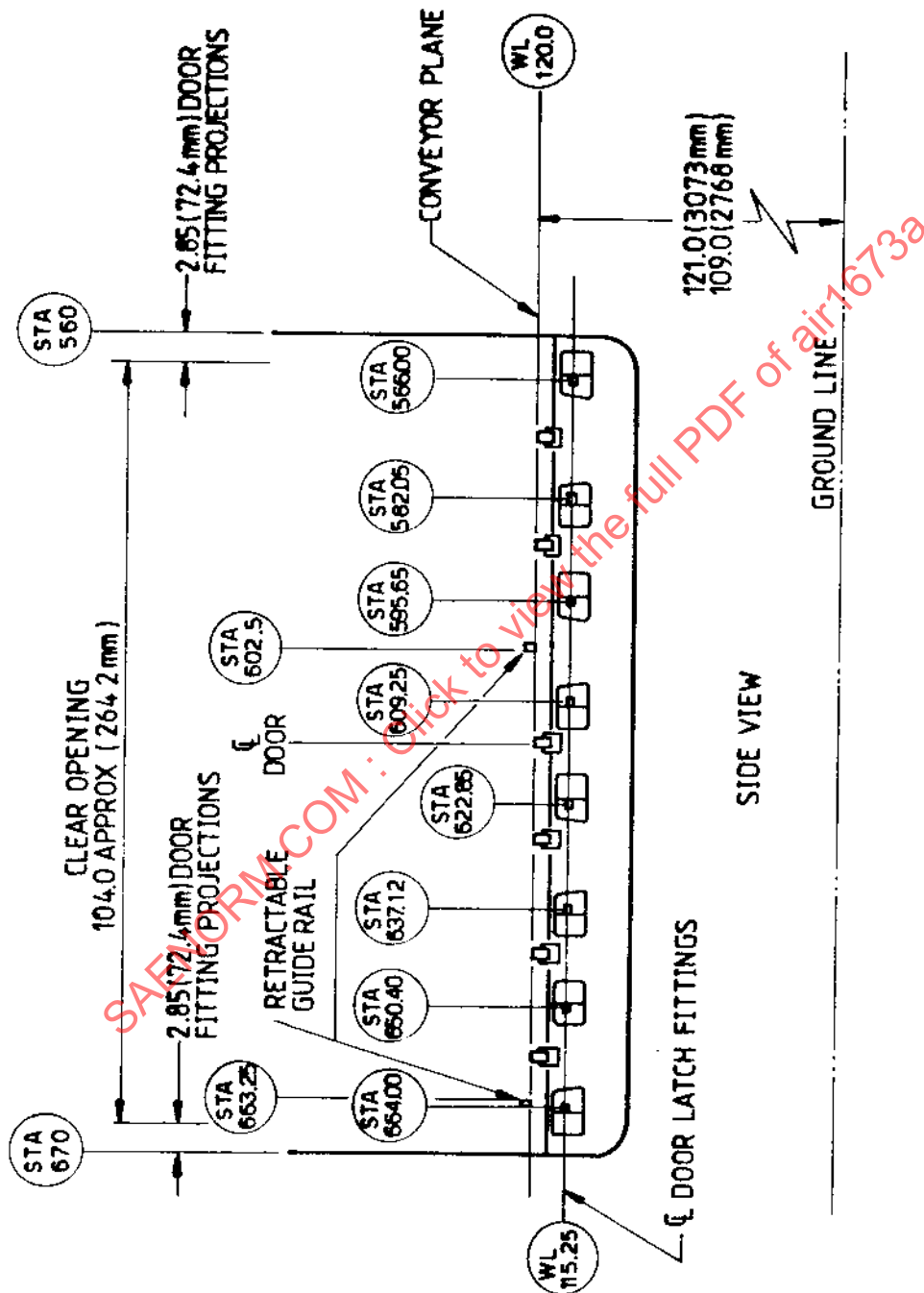


FIGURE 5A - Boeing 747 Lower Lobe Forward Cargo Compartment

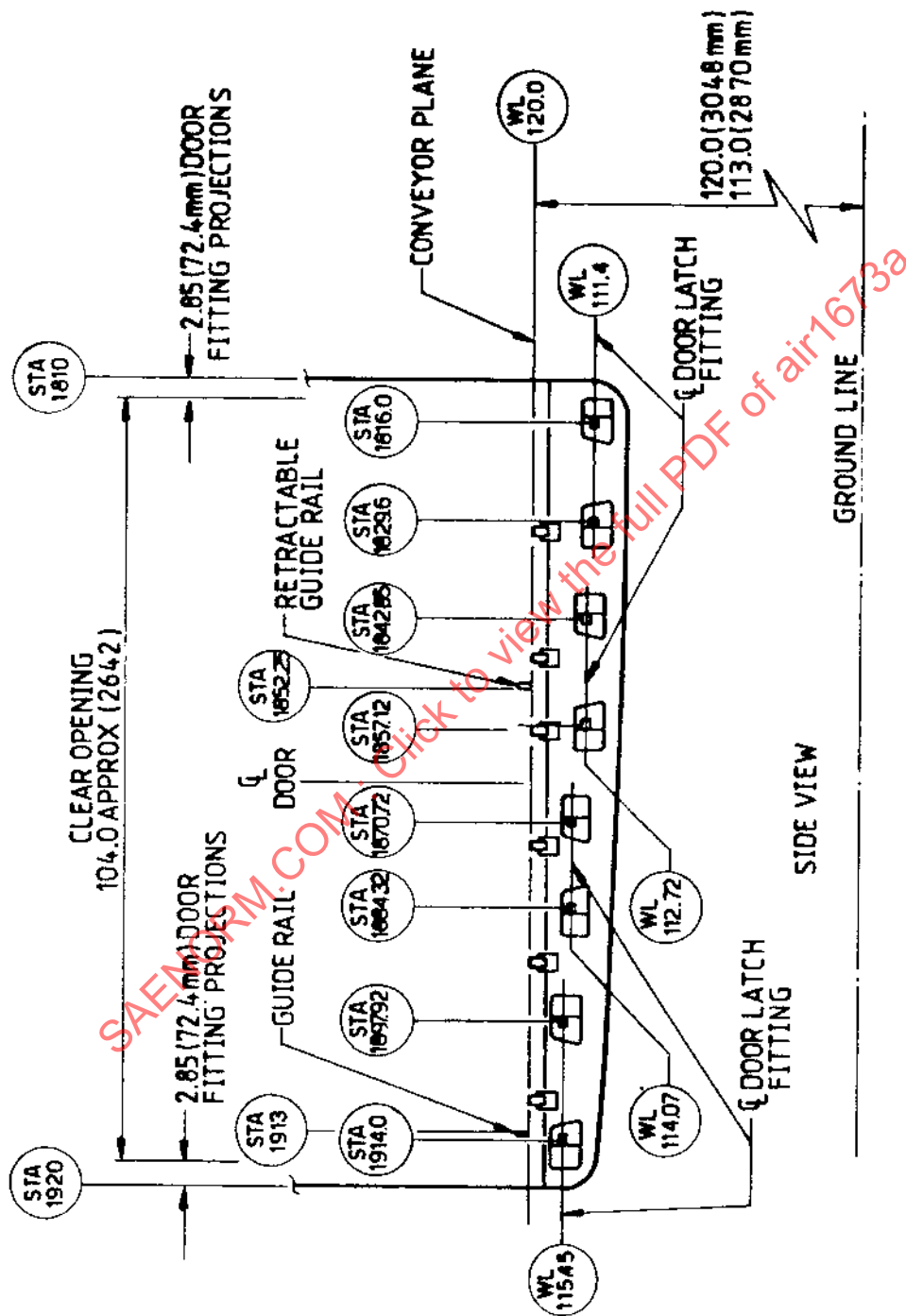


FIGURE 5B - Boeing 747 Lower Lobe
Aft Cargo Compartment

B.747

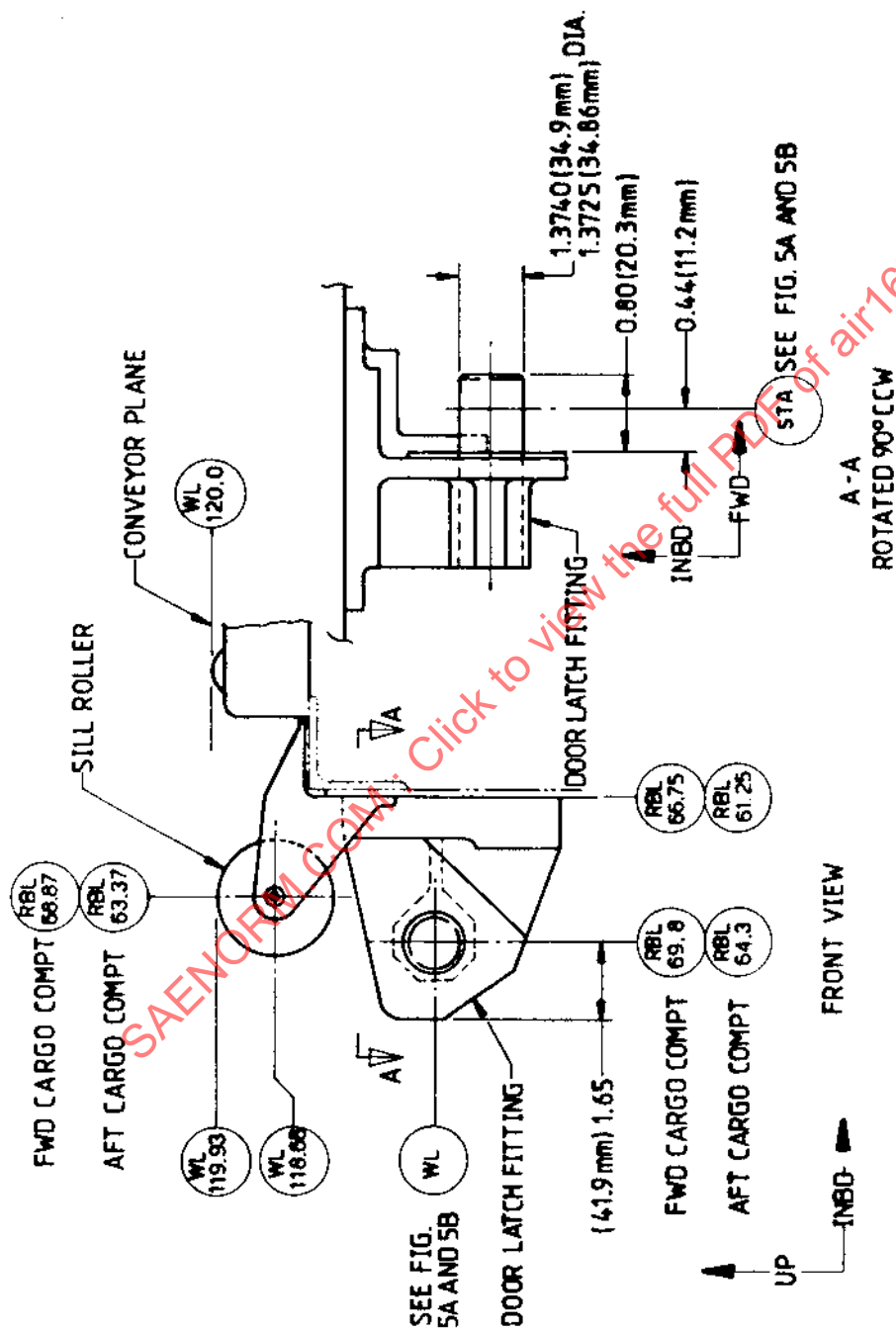


FIGURE 5C - Boeing 747 Lower Lobe
General Arrangement of Door Latch Fittings

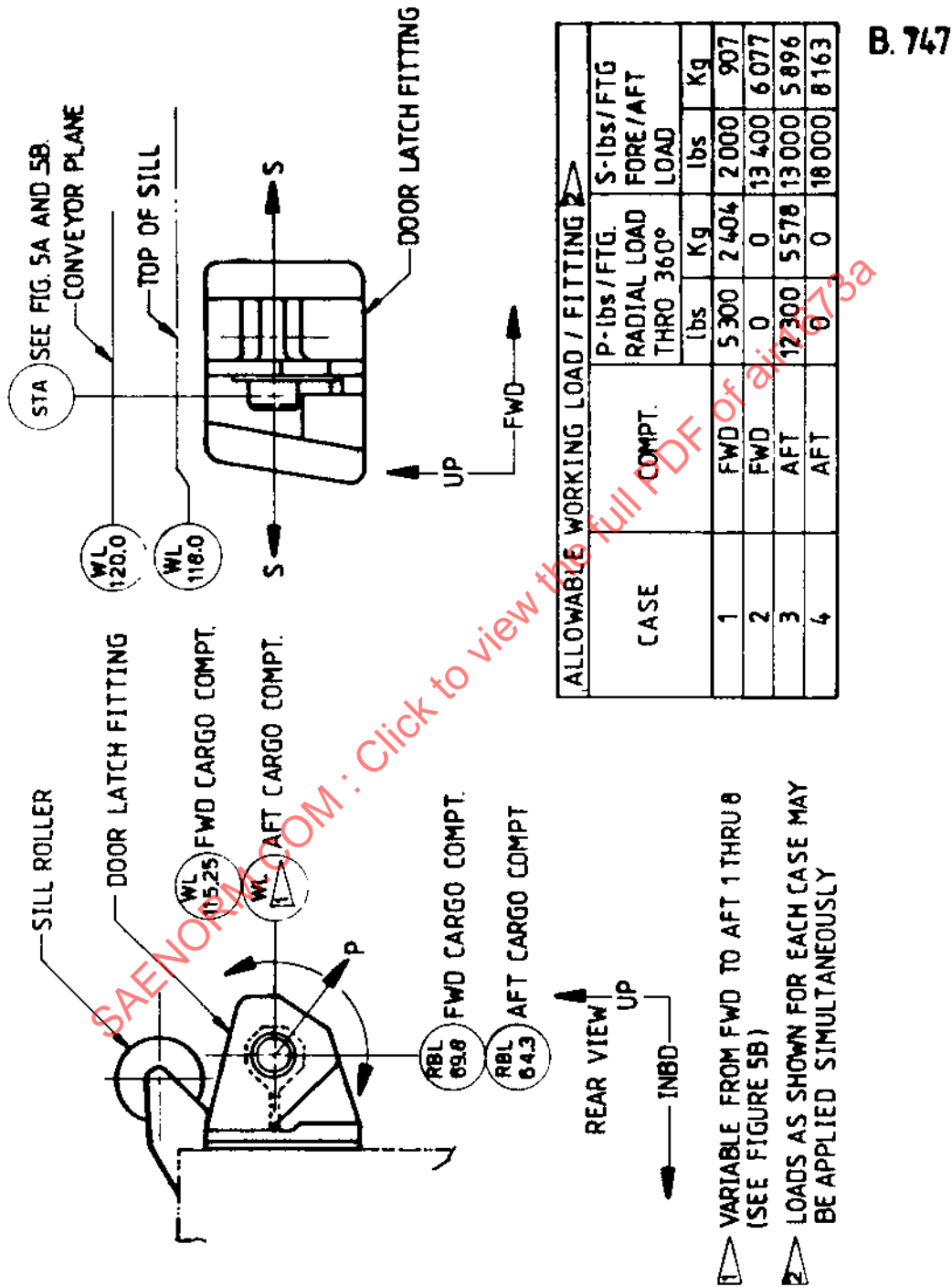


FIGURE 5D - Boeing 747 Lower Lobe Allowable Loads

3.6 Boeing 747 - Main Deck, Nose and Side
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 6A through 6F.

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B.747

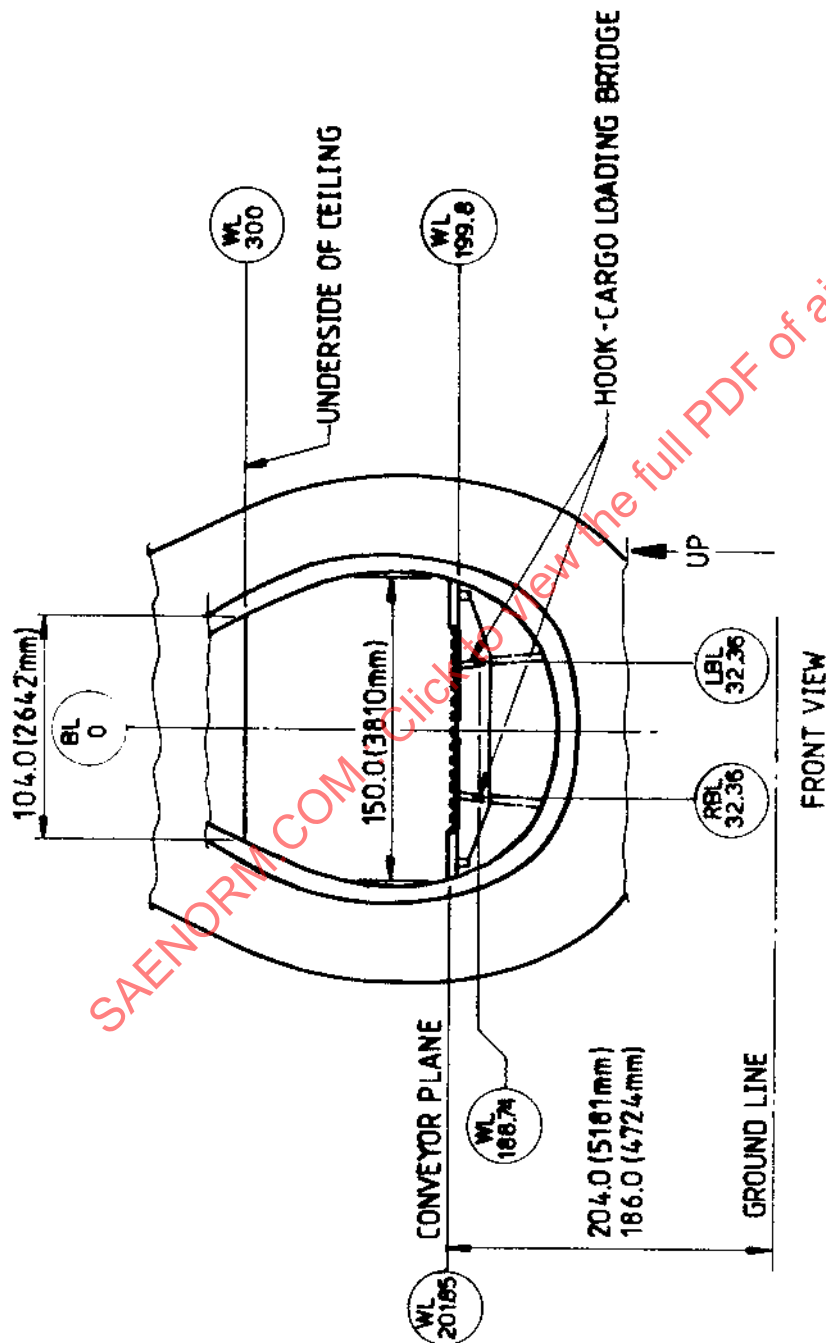


FIGURE 6A - Boeing 747 F and C Main Deck Nose Door
General Arrangement Door Sill Interface

B.747

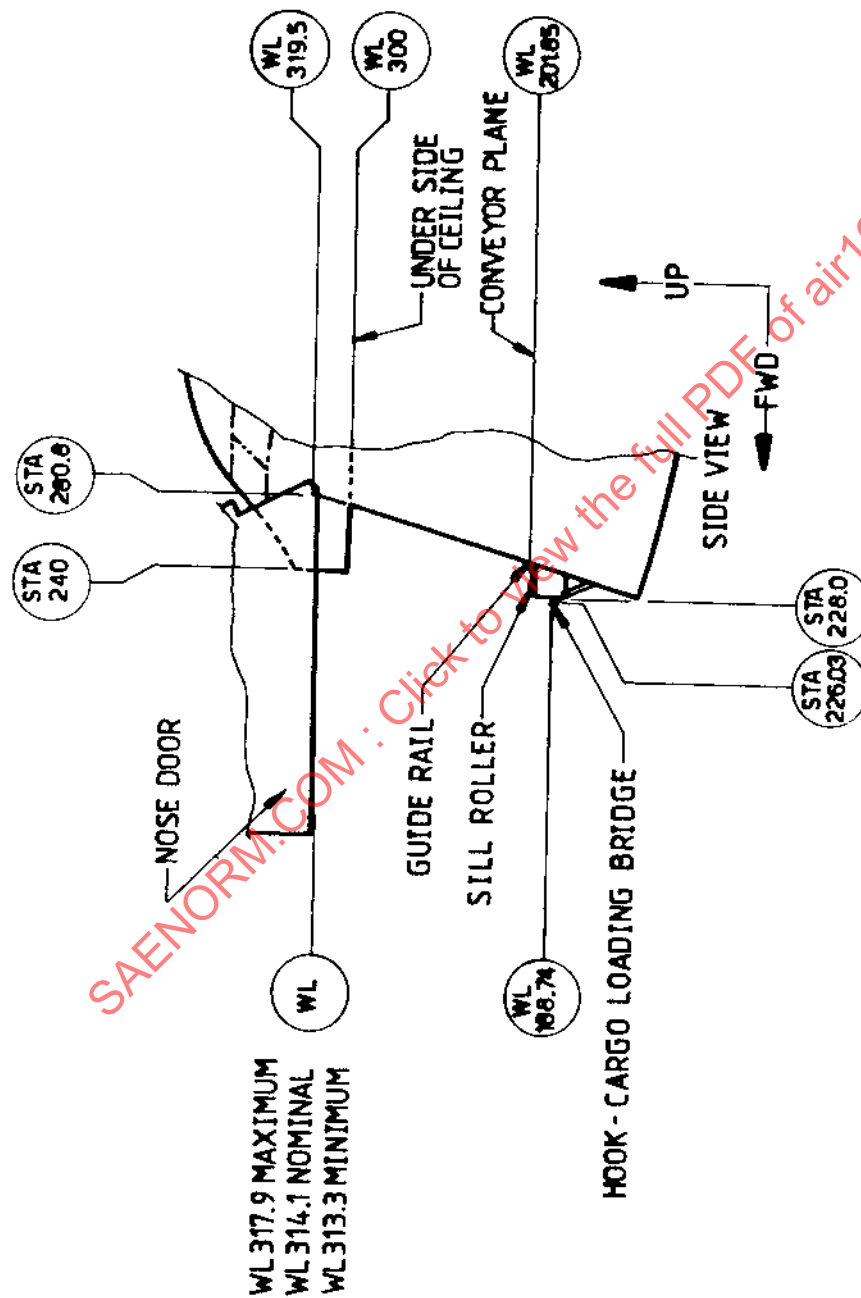
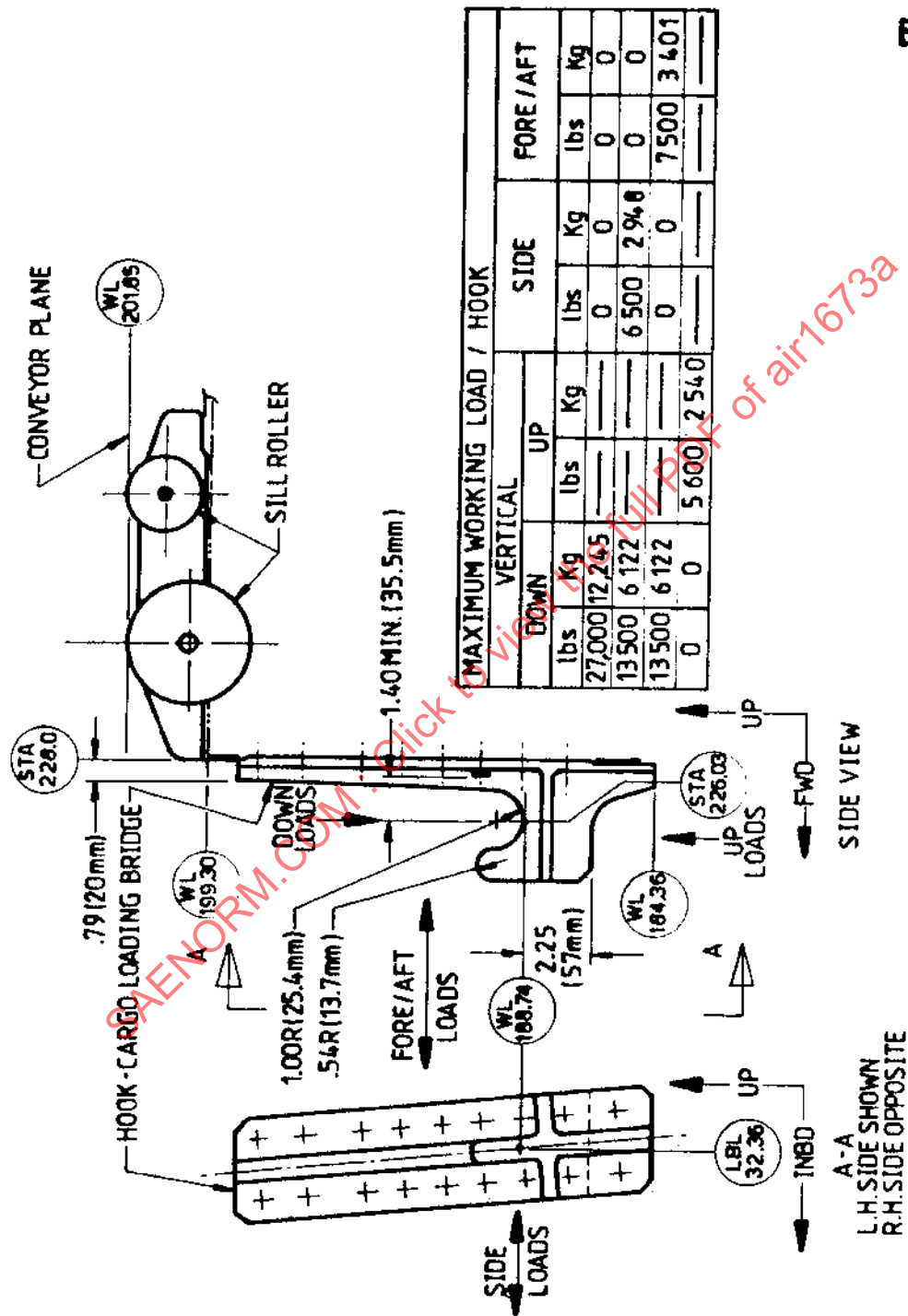


FIGURE 6B - Boeing 747 F and C Main Deck Nose Door Door Sill Interface



B.747

FIGURE 6C - Boeing 747 F and C Main Deck Nose Door
Cargo Loader Hooks

B.747

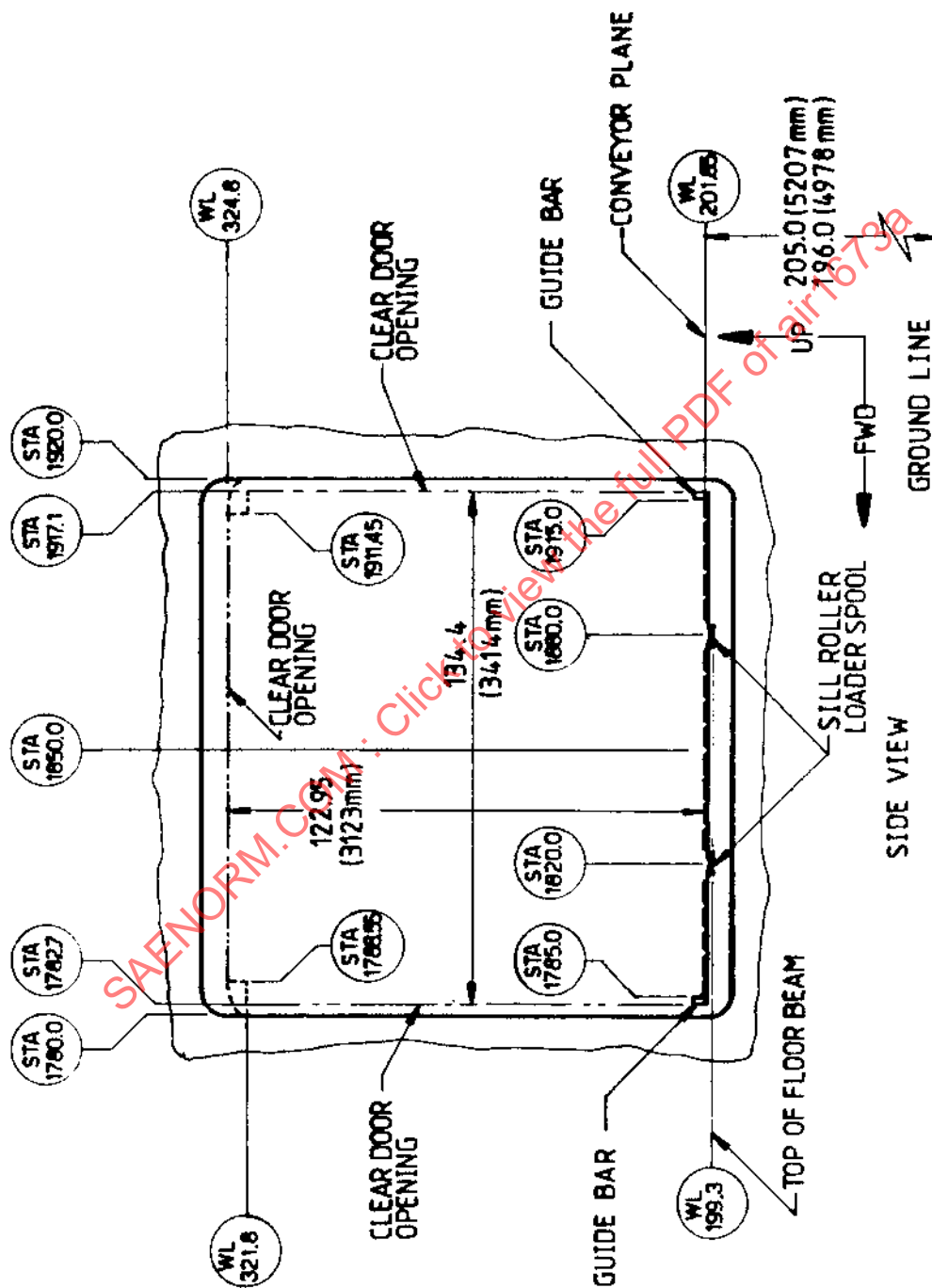


FIGURE 6D - Boeing 747, F, C and Combi Main Deck Side Door

B.747

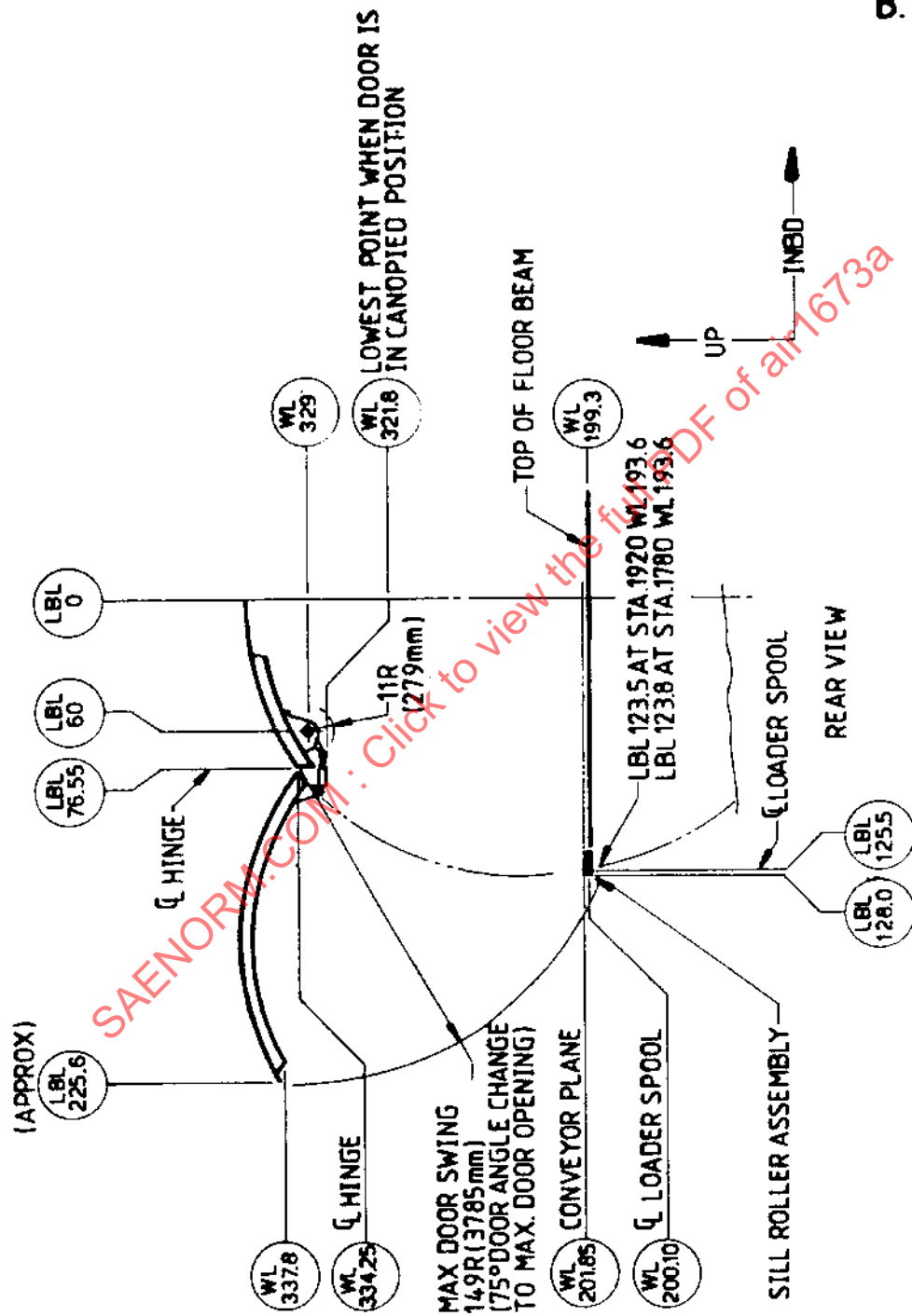


FIGURE 6E - Boeing 747 F, C and Combi Main Deck Side Door Sill Interface

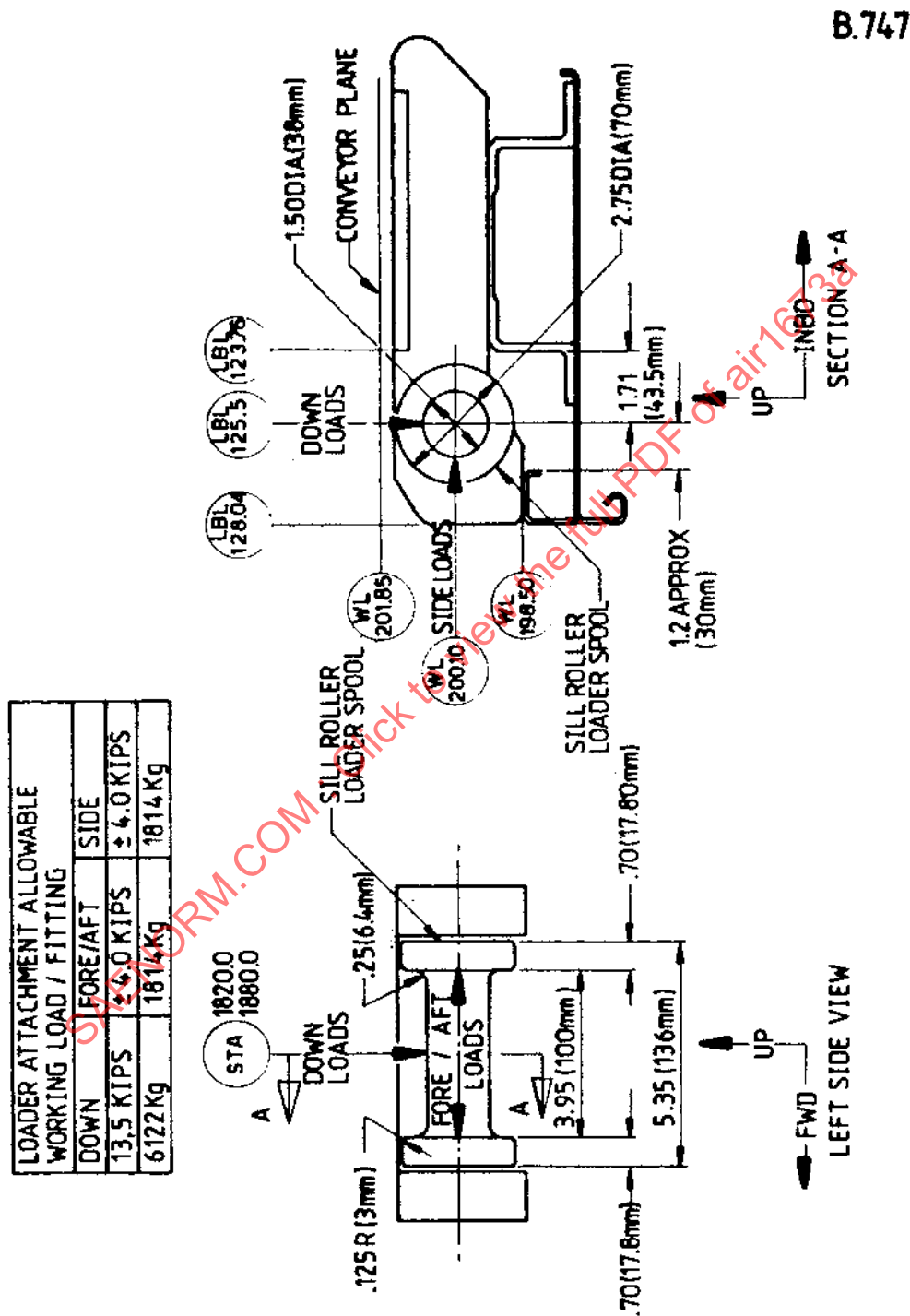


FIGURE 6F - Boeing 747 F, C and Combi Main Deck Side Door Sill Roller Loader Spool and Allowable Loads

3.7 Boeing 767 - Lower Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 7A through 7F.

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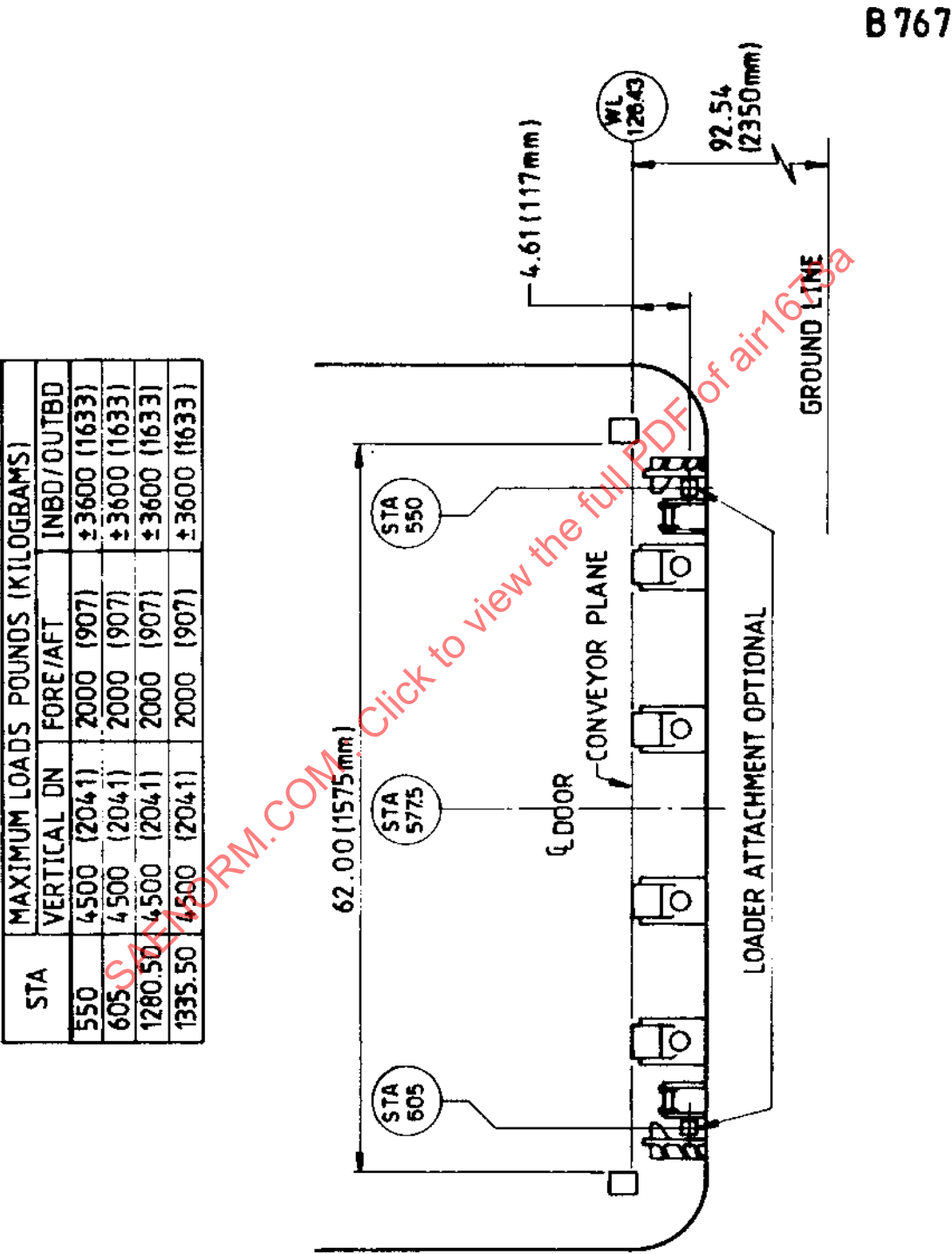


FIGURE 7A - Boeing 767 Forward and Aft Lower Hold
Option for Compatibility of Loaders Used on DC10

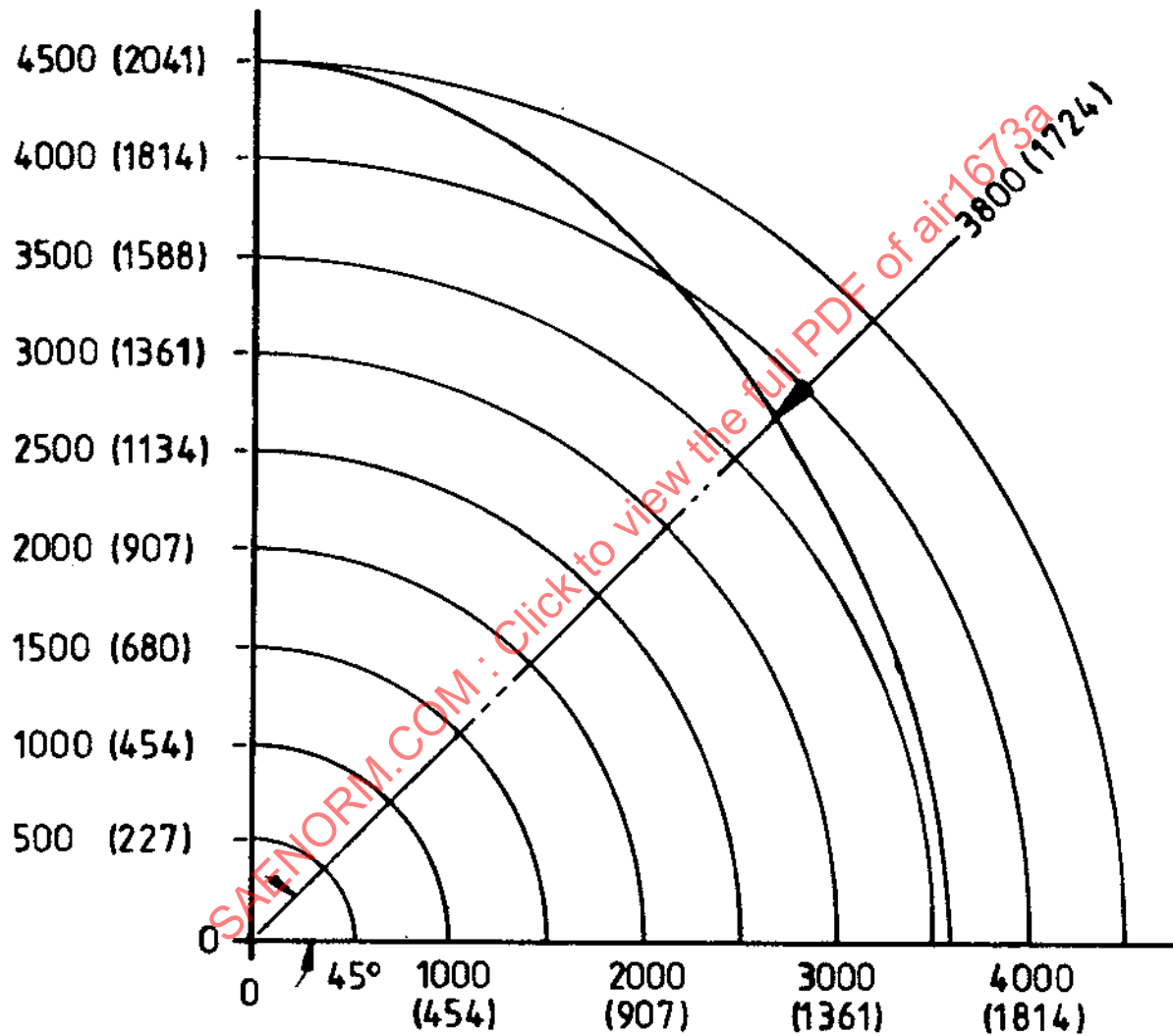
B.767**POLAR LOAD DIAGRAM (ALLOWABLE) - LBS (KILOS)**

FIGURE 7B-1

B.767

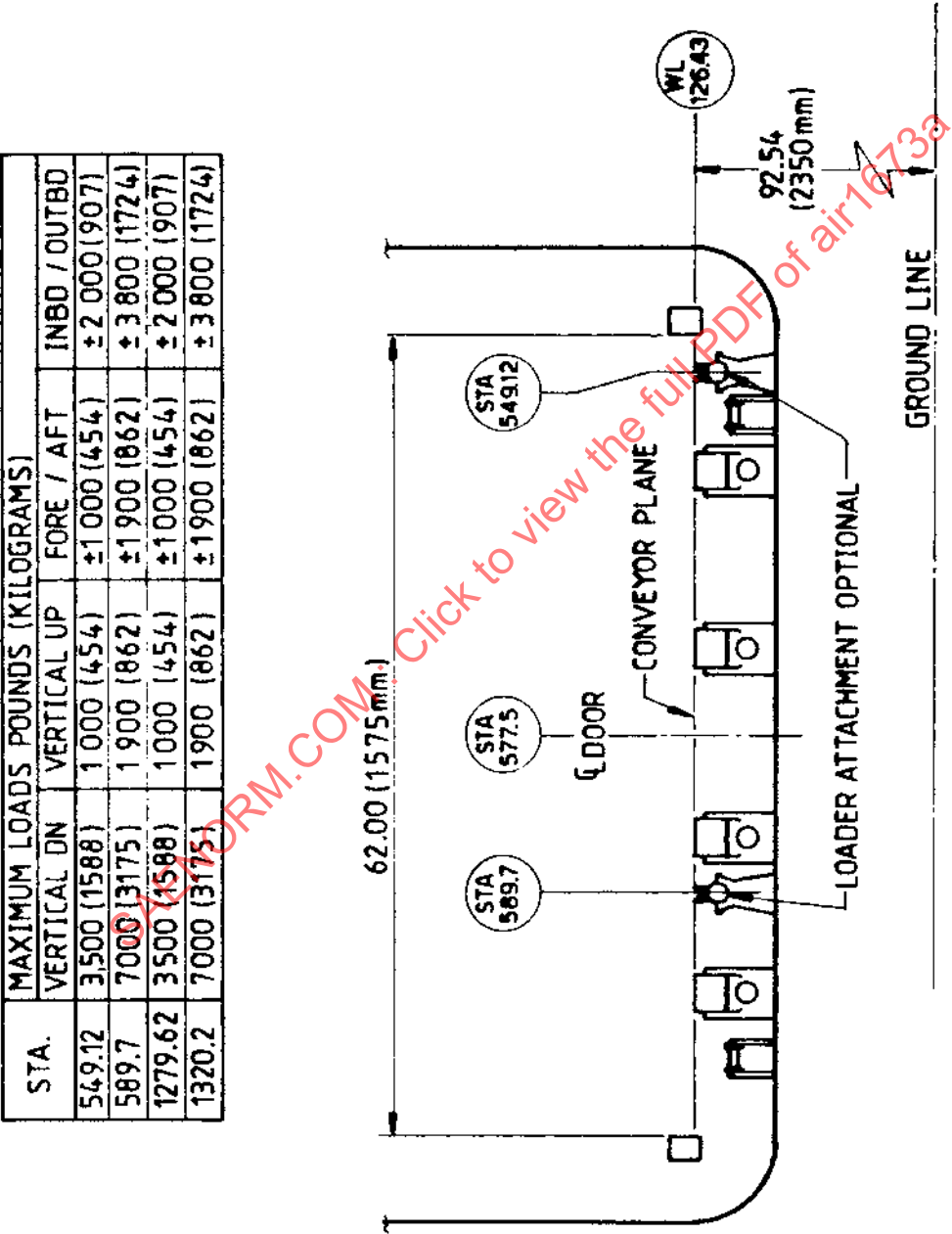


FIGURE 7C - Boeing 767 Forward Lower Hold
Option for Compatibility of Loaders Used on L1011

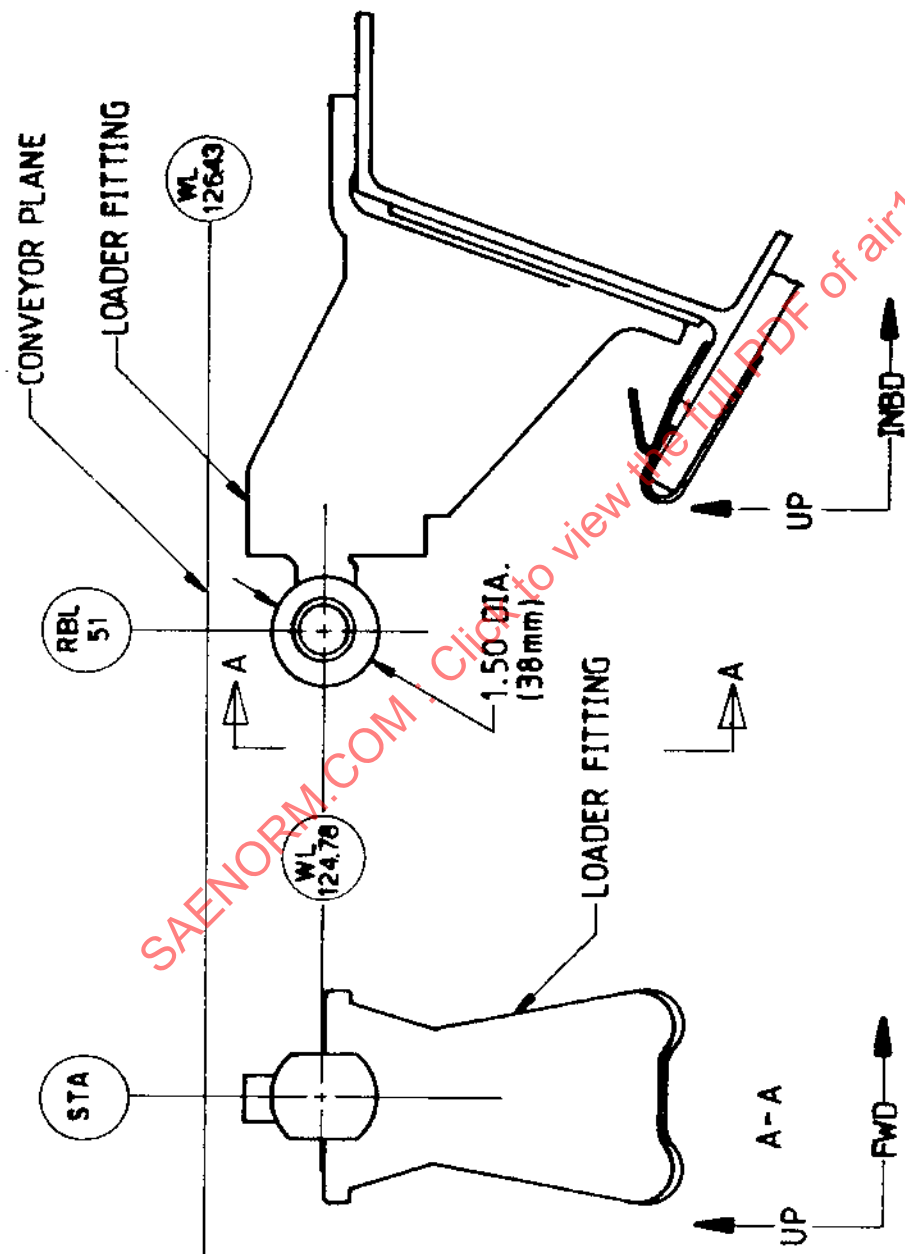
B.767

FIGURE 7D - Boeing 767 Forward and Aft Lower Hold
Option for Compatibility of Loader Used on L1011

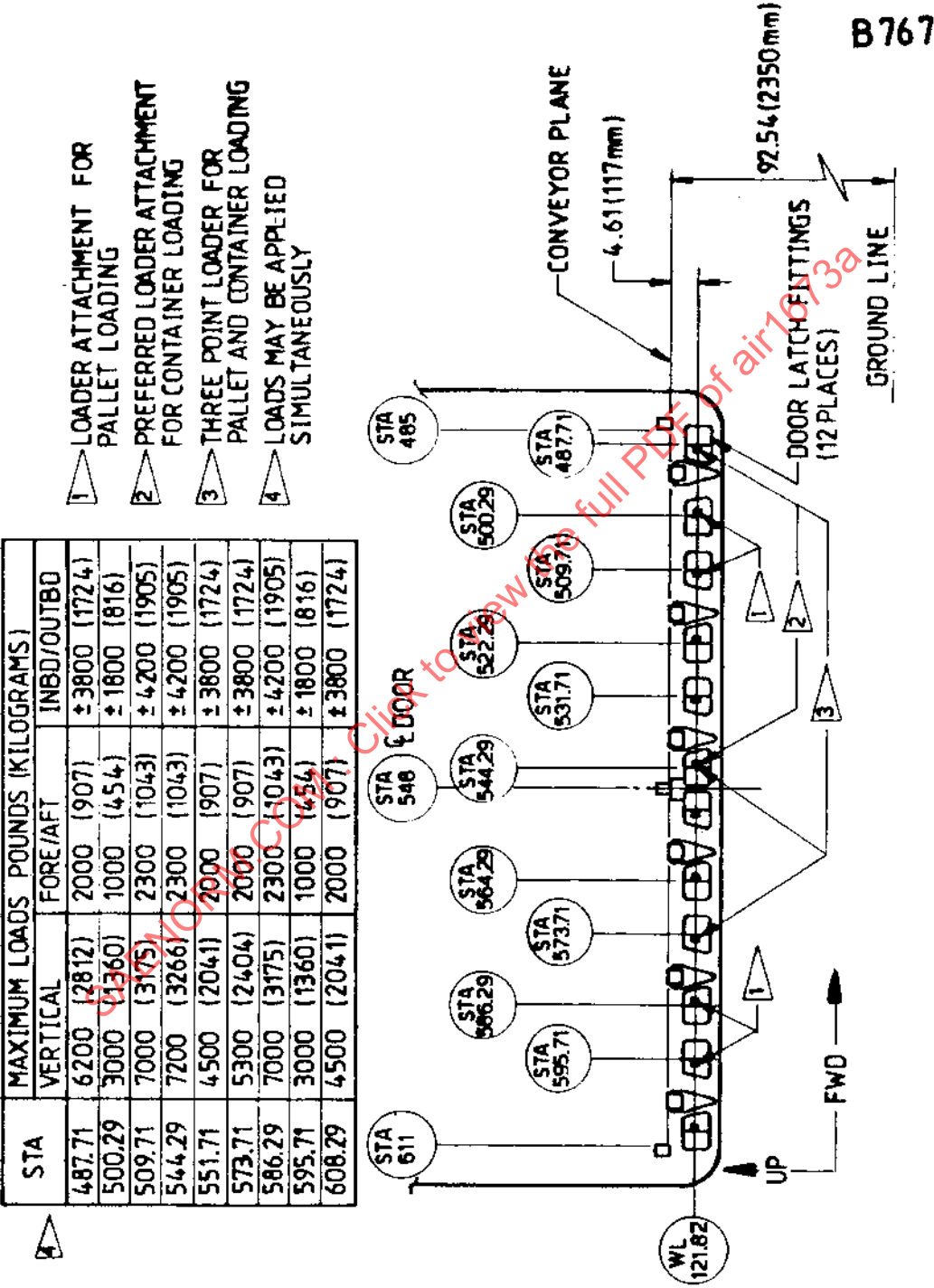


FIGURE 7E - Boeing 767 Forward Lower Hold Wide Door Option

B.767

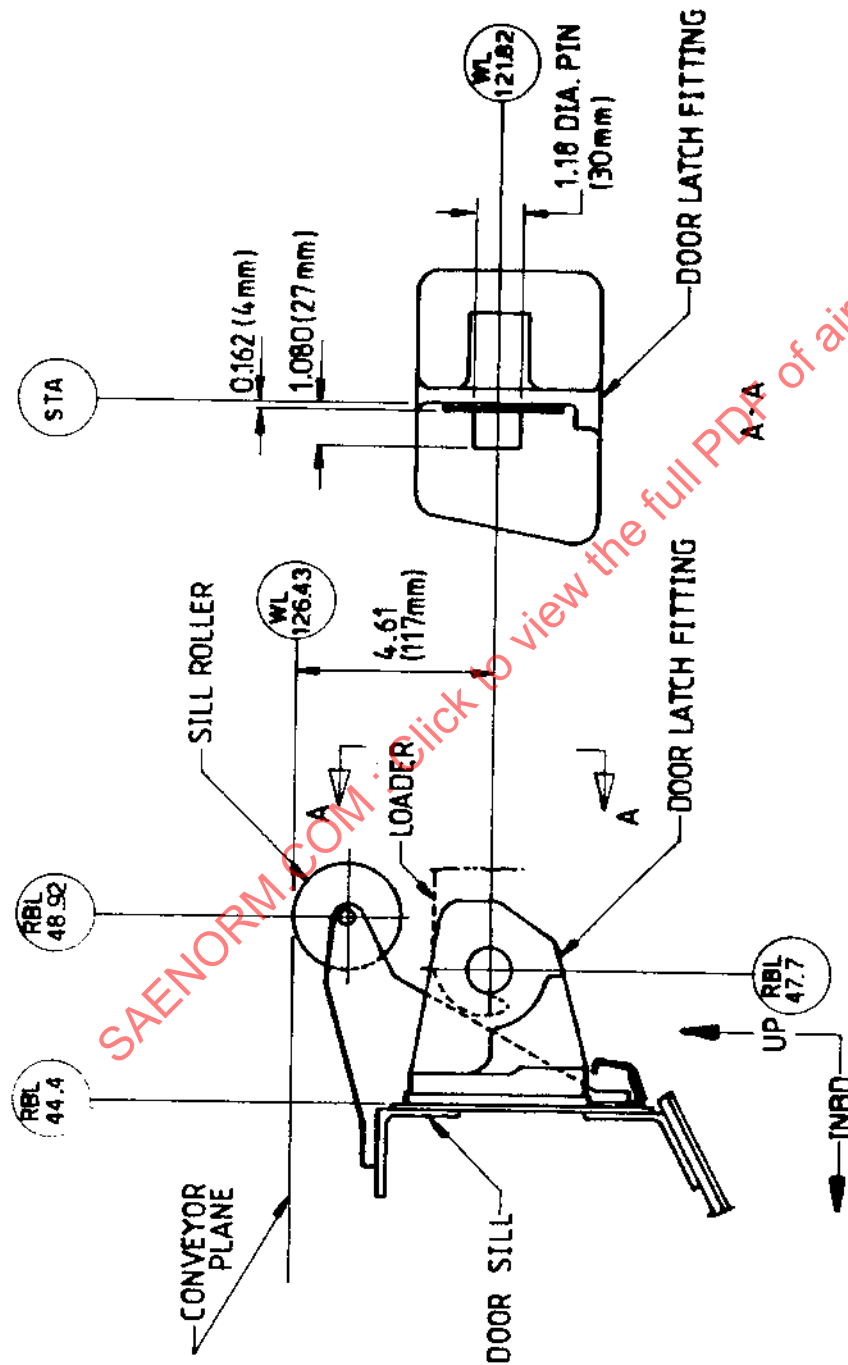


FIGURE 7F - Boeing 767 Forward Lower Hold - Wide Door Option
General Arrangement of Ground Loader Latch On Fitting

3.8 Douglas DC8 - Main Deck
Cargo Door Sill Attachment Fitting
Detail for Ground Loading Equipment:

See Figures 8A through 8G.

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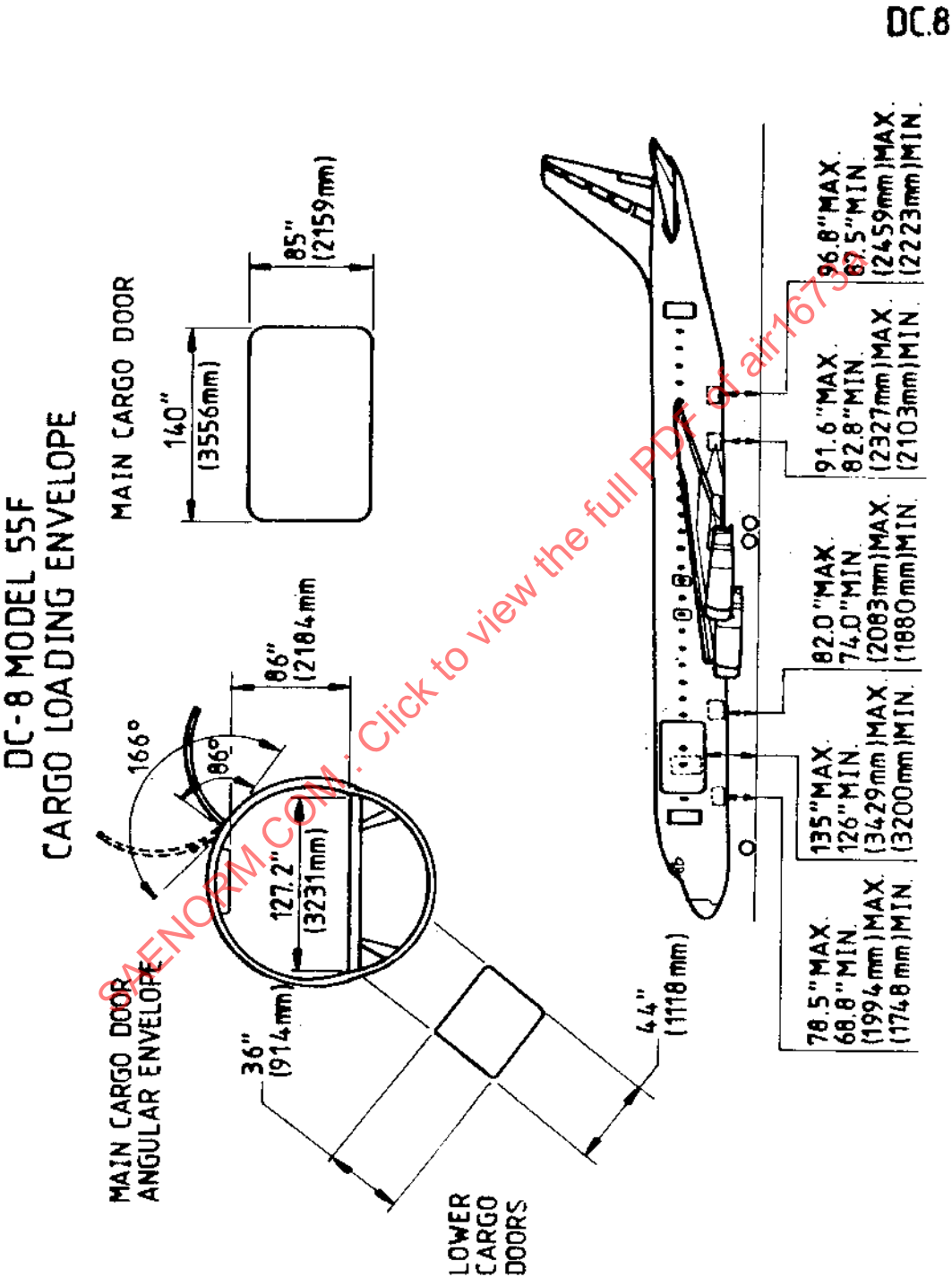
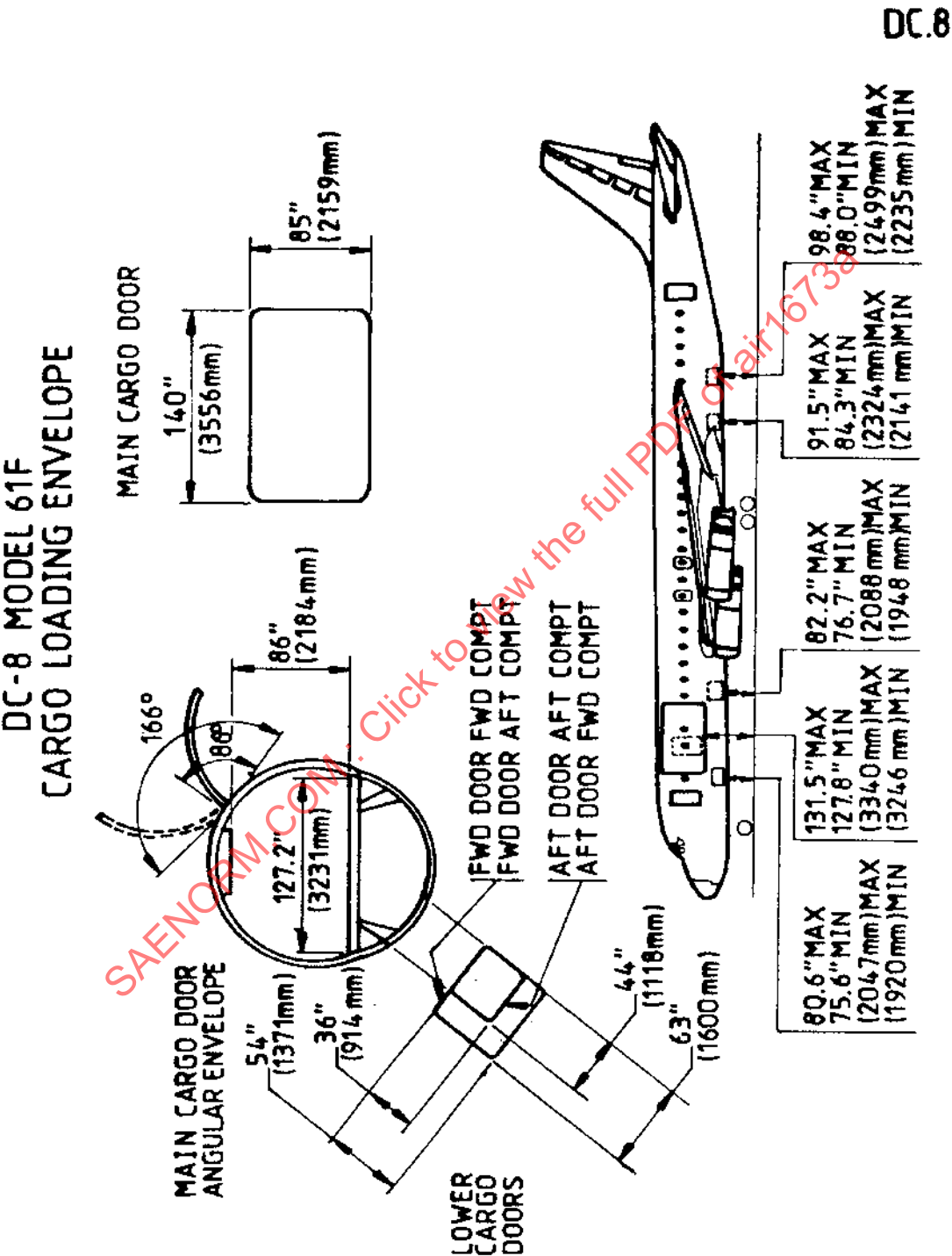


FIGURE 8A



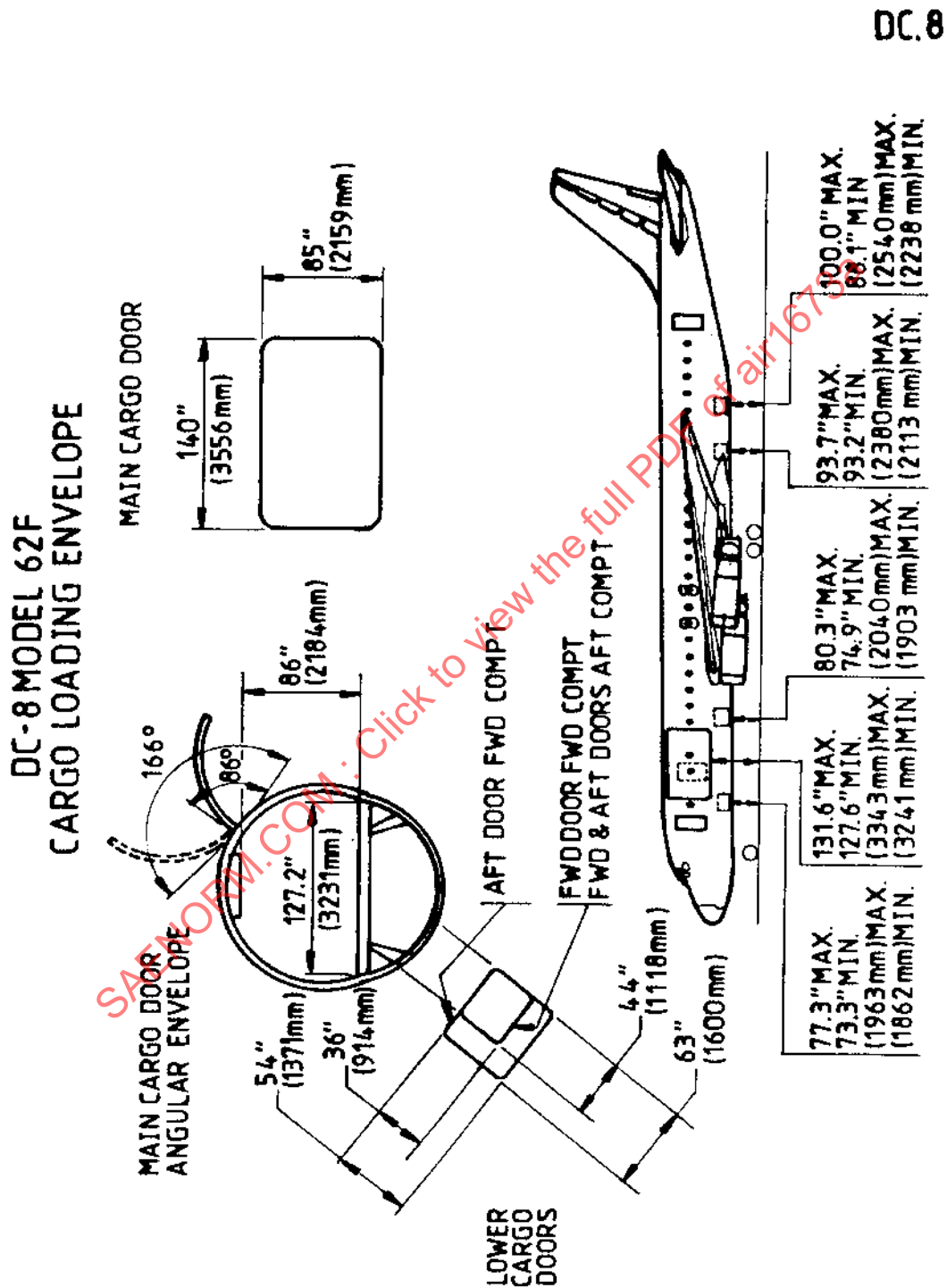


FIGURE 8C

DC.8

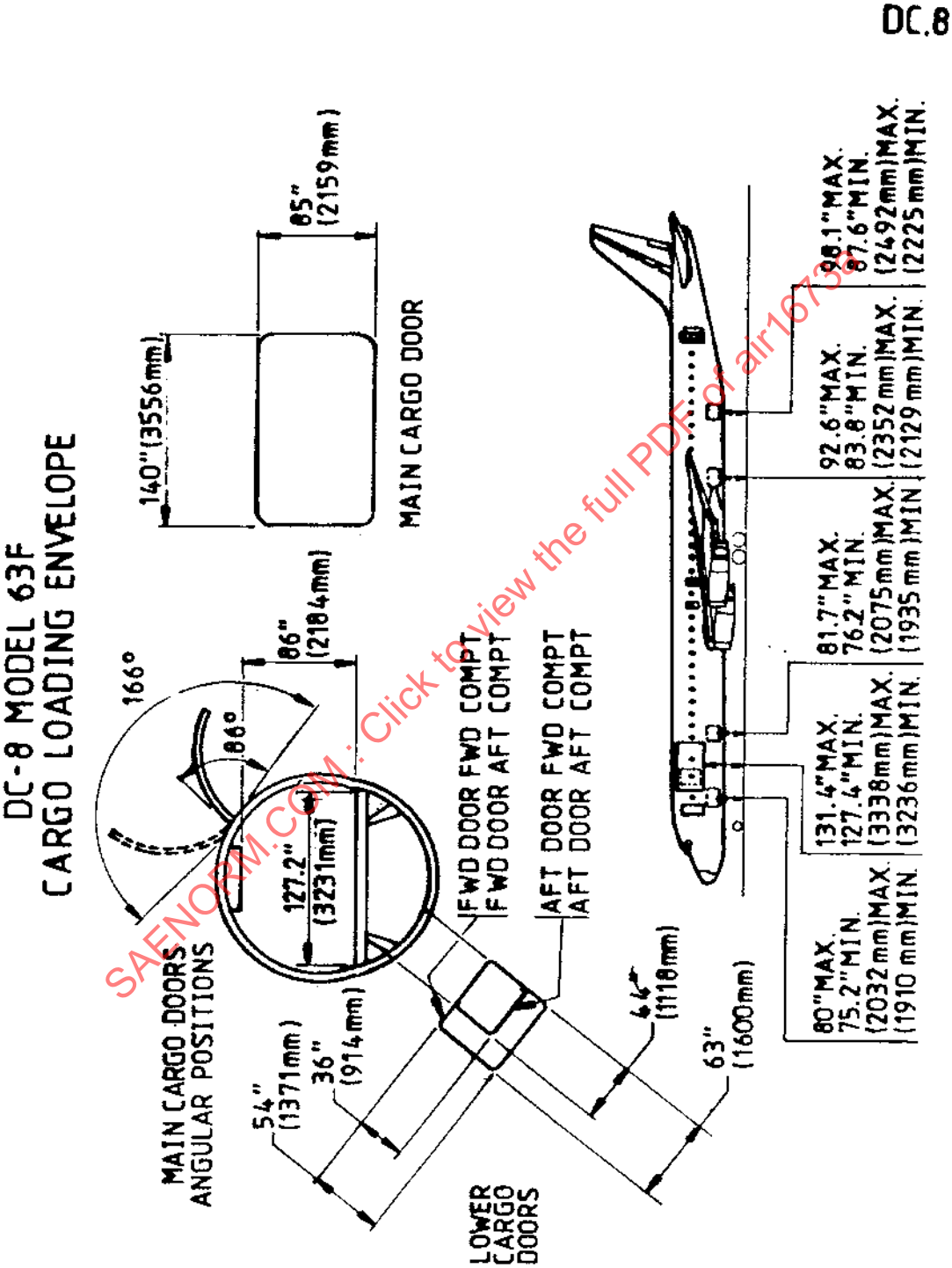


FIGURE 8D

DC.8

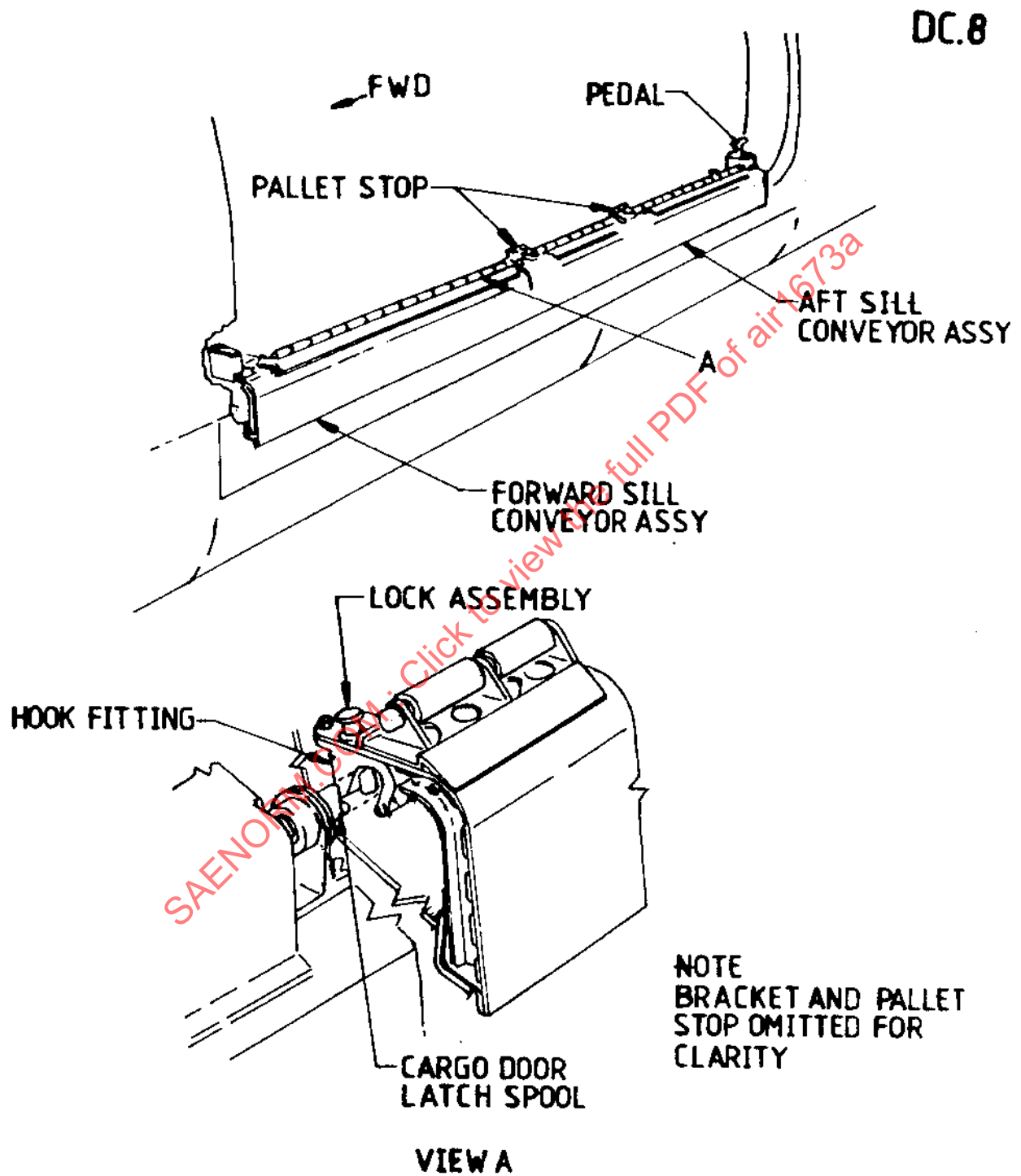


FIGURE 8E - DC8 Main Cabin Cargo Door
Sill Conveyor - Removable

DC8

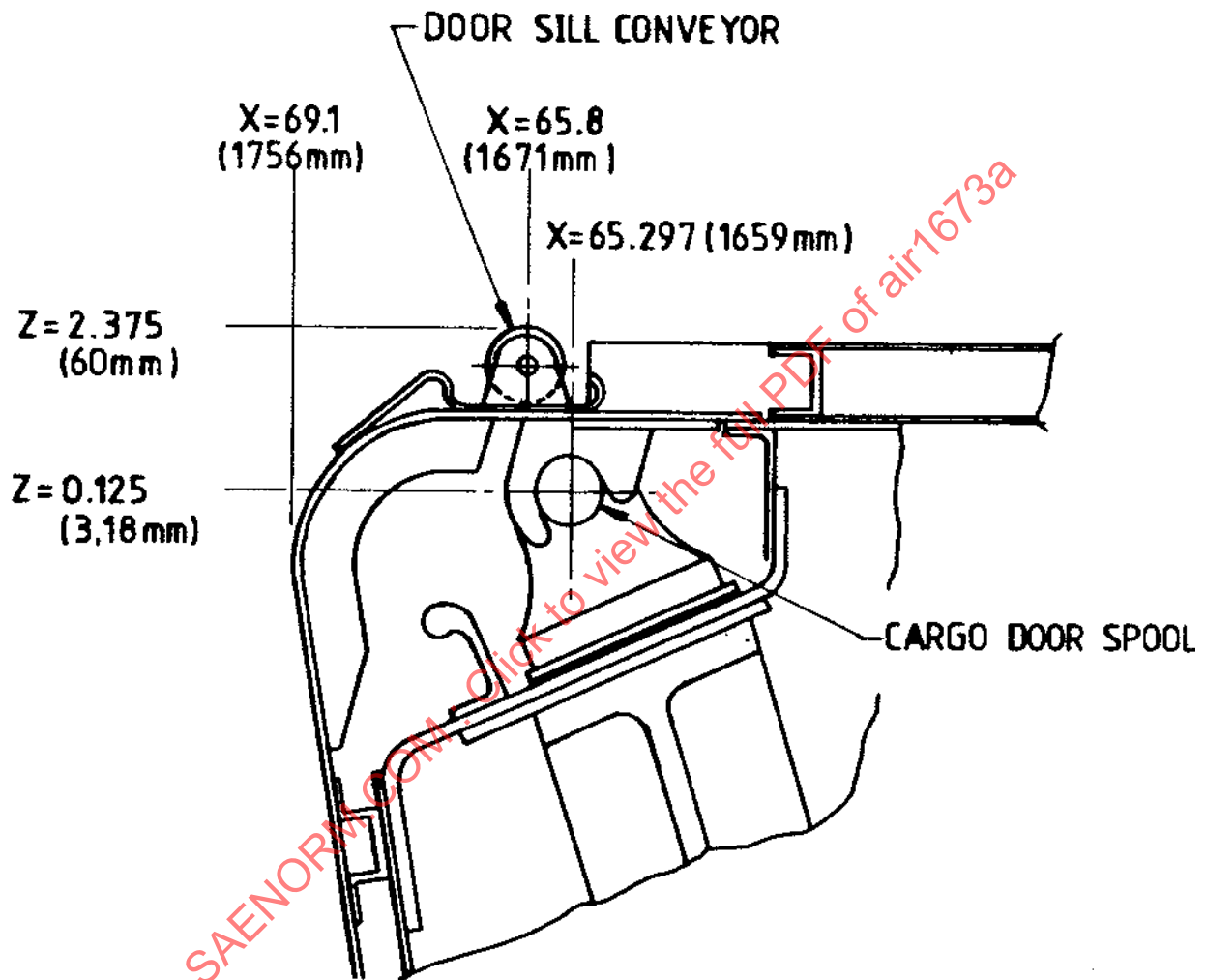


FIGURE 8F - DC8 Cross Section Through Main Cabin
Door Sill Conveyor - Removable

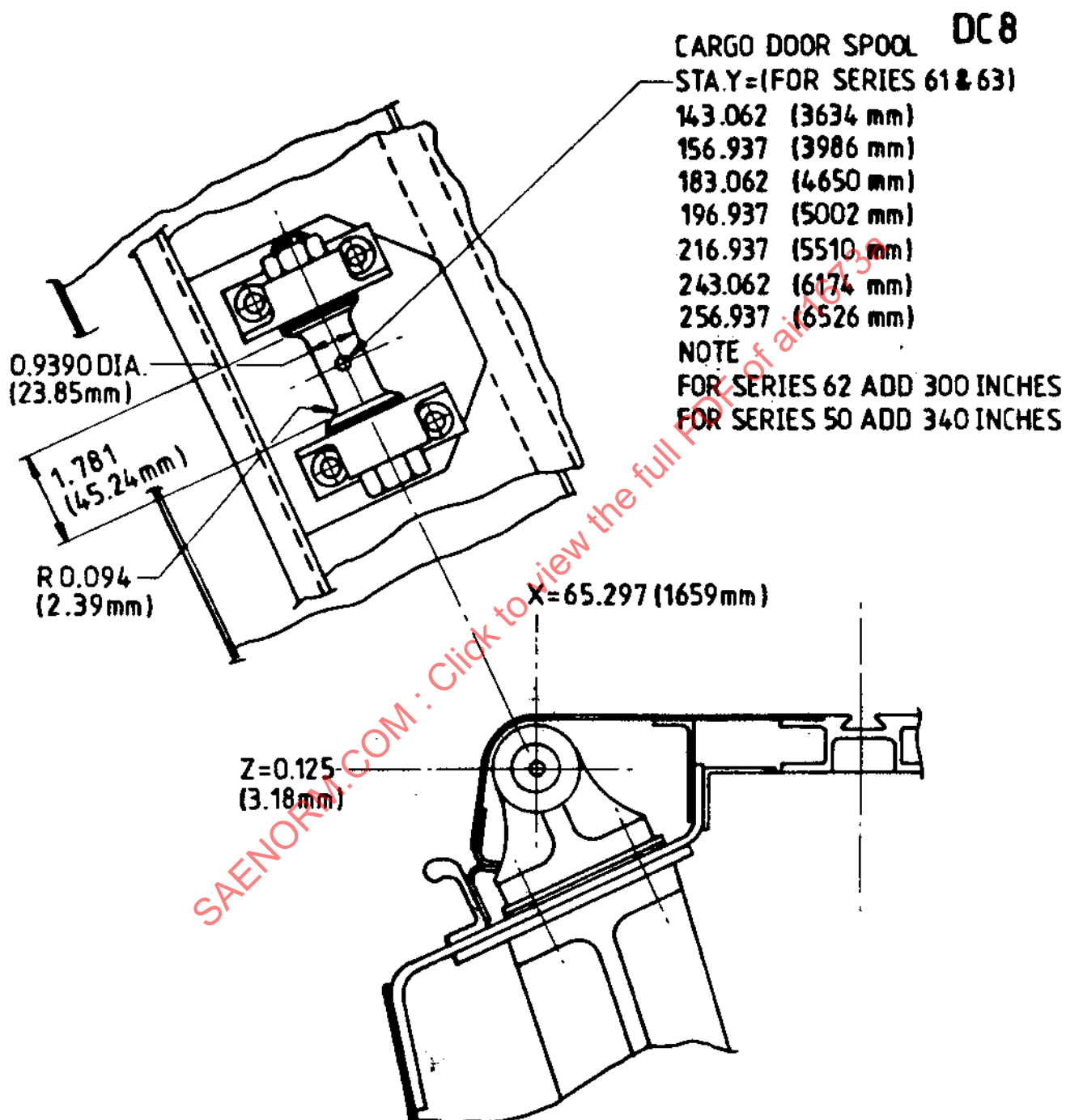


FIGURE 8G - DC8 Cross Section Through Main Cabin Door Jamb

3.9 Douglas DC9 - Main Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 9A through 9D.

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DC.9

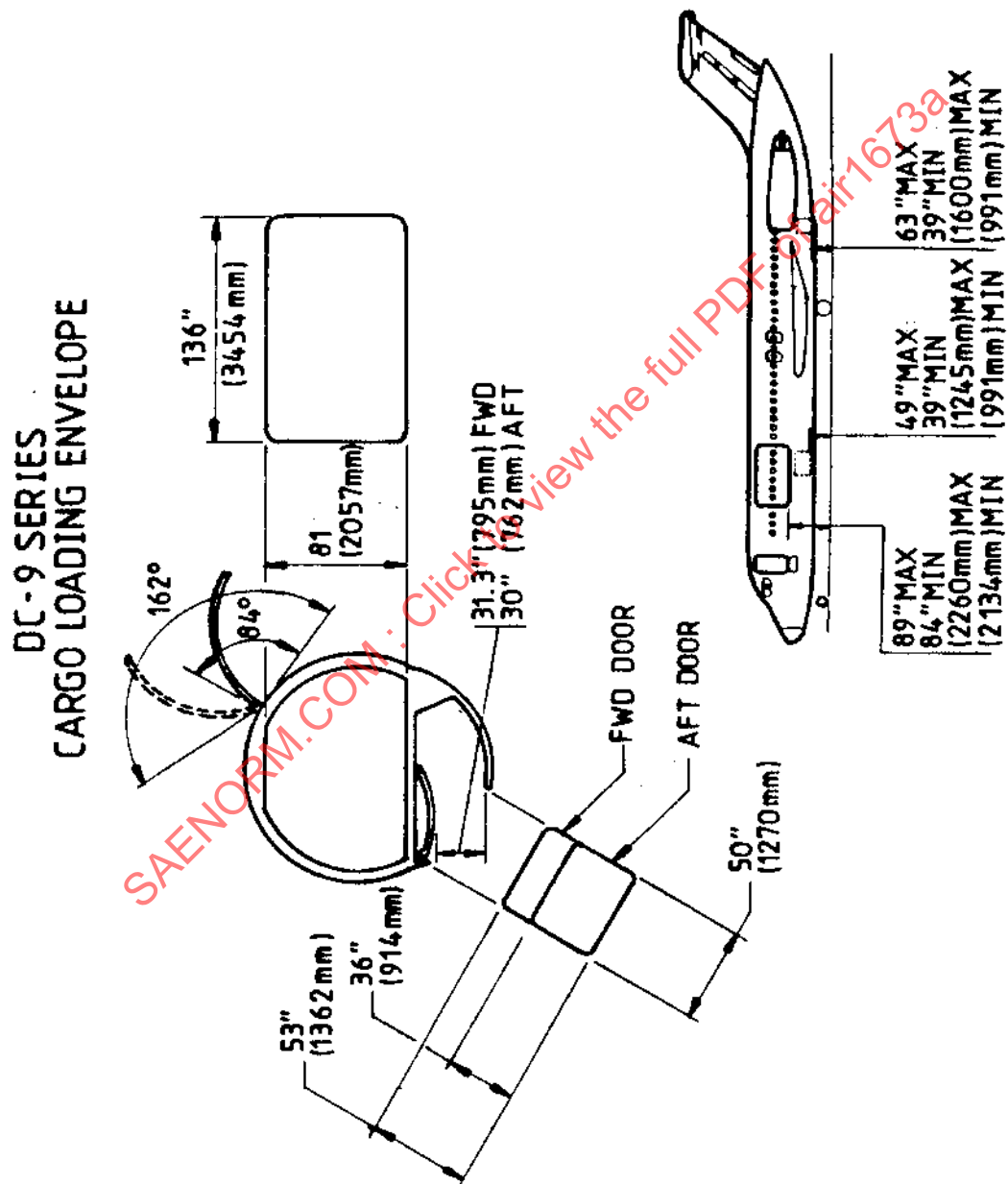


FIGURE 9A

DC.9

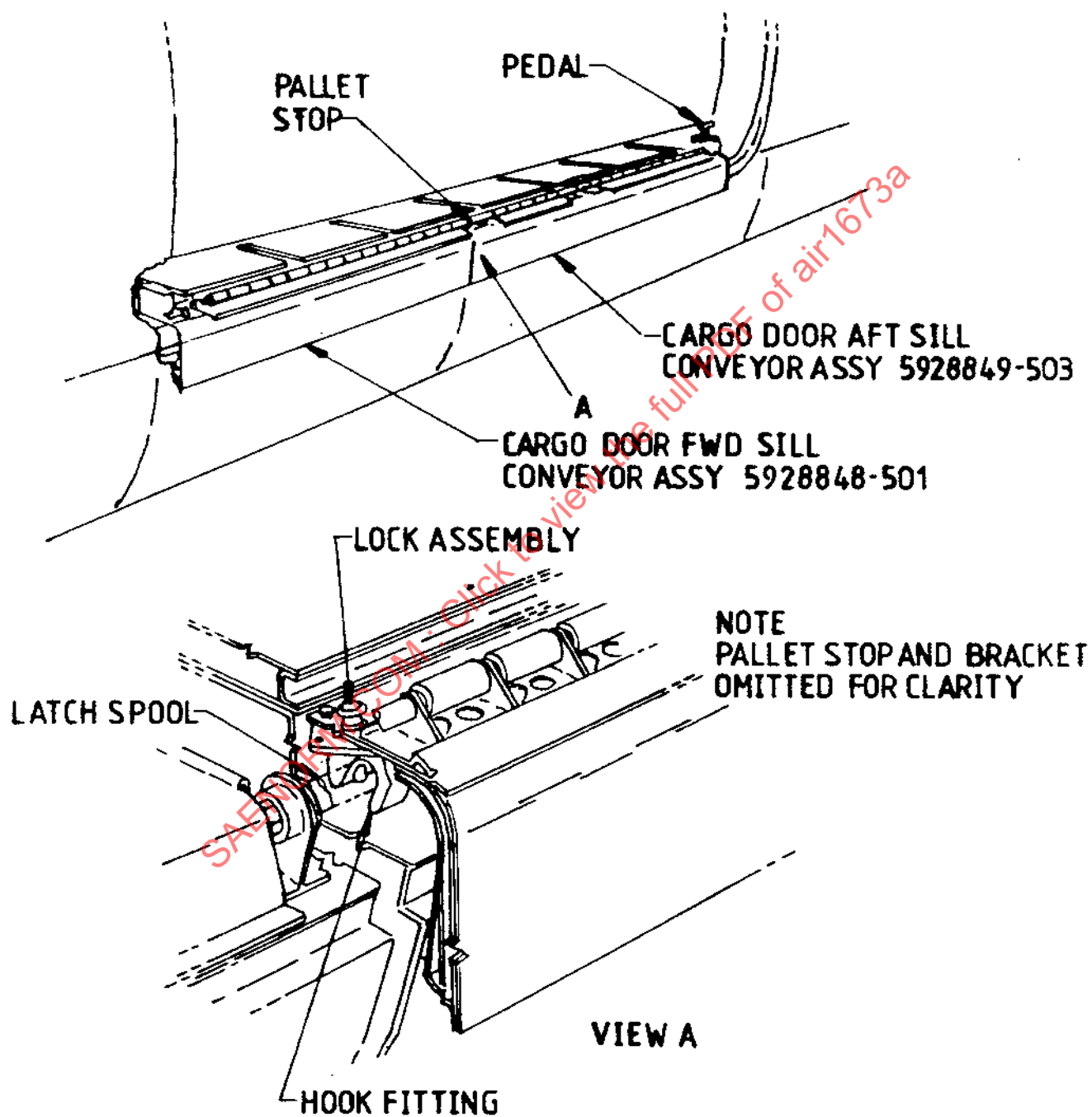


FIGURE 9B - DC9 Main Cabin Cargo Door
Sill Conveyor - Removable

DC 9

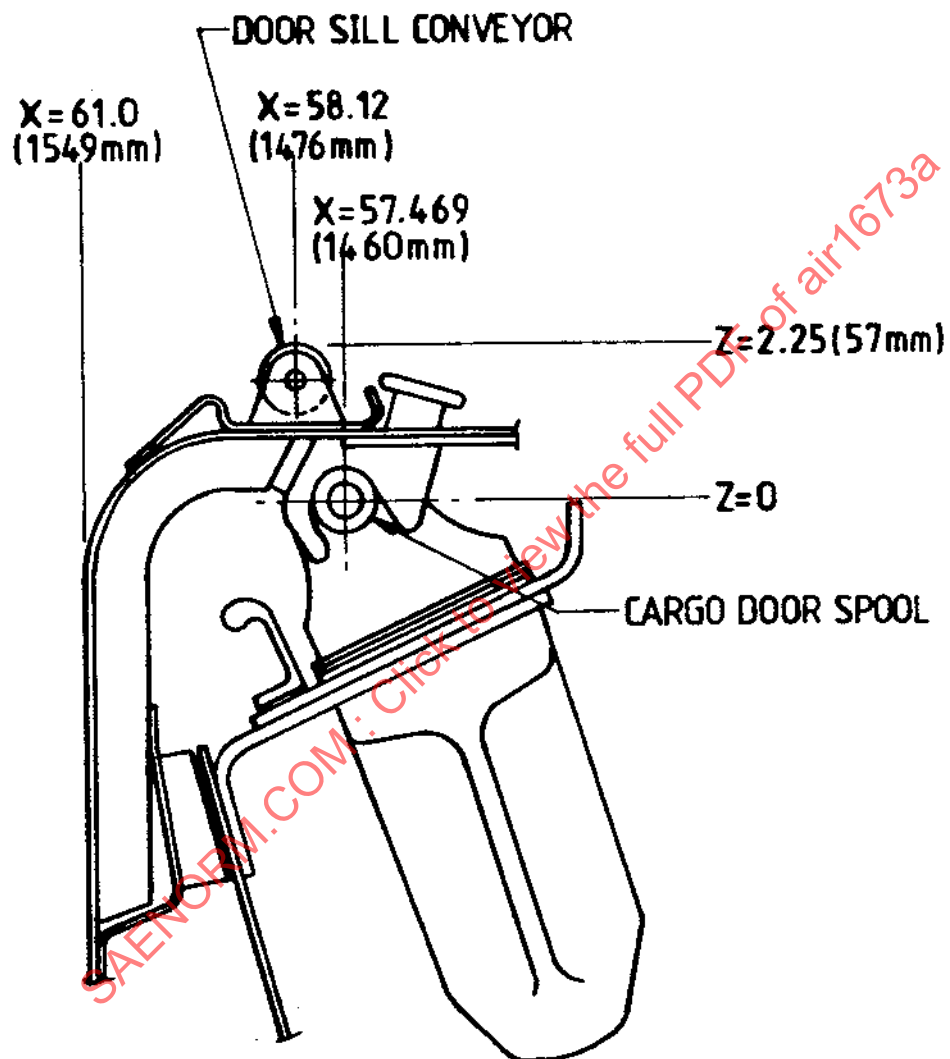


FIGURE 9C - DC9 Cross Section Through Main Cabin
Door Sill Conveyor - Removable

DC 9

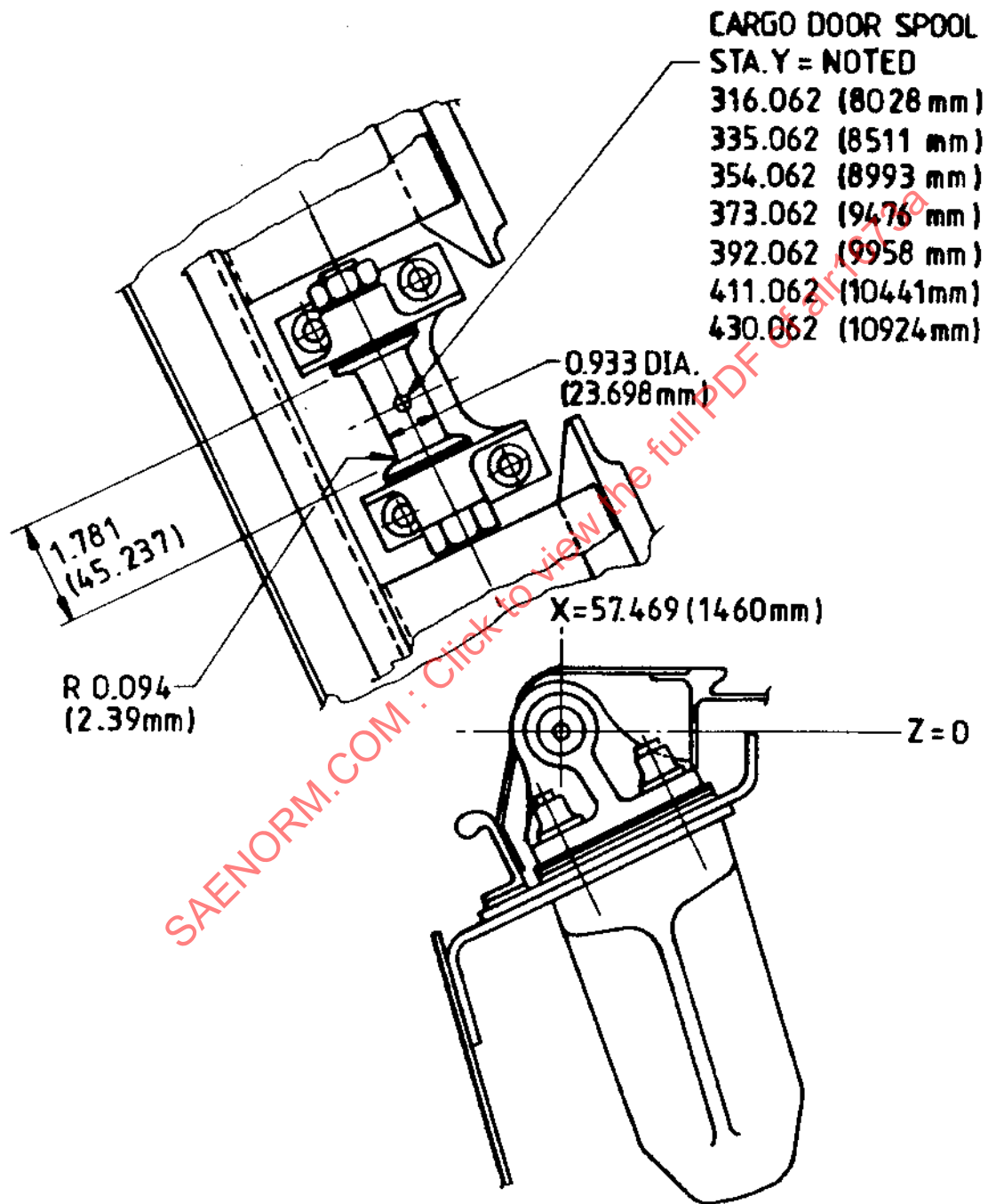


FIGURE 9D - DC9 Cross Section Through Main Cabin Door Jamb

- 3.10 Douglas DC10 - Lower Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 10A through 10D.

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DC 10

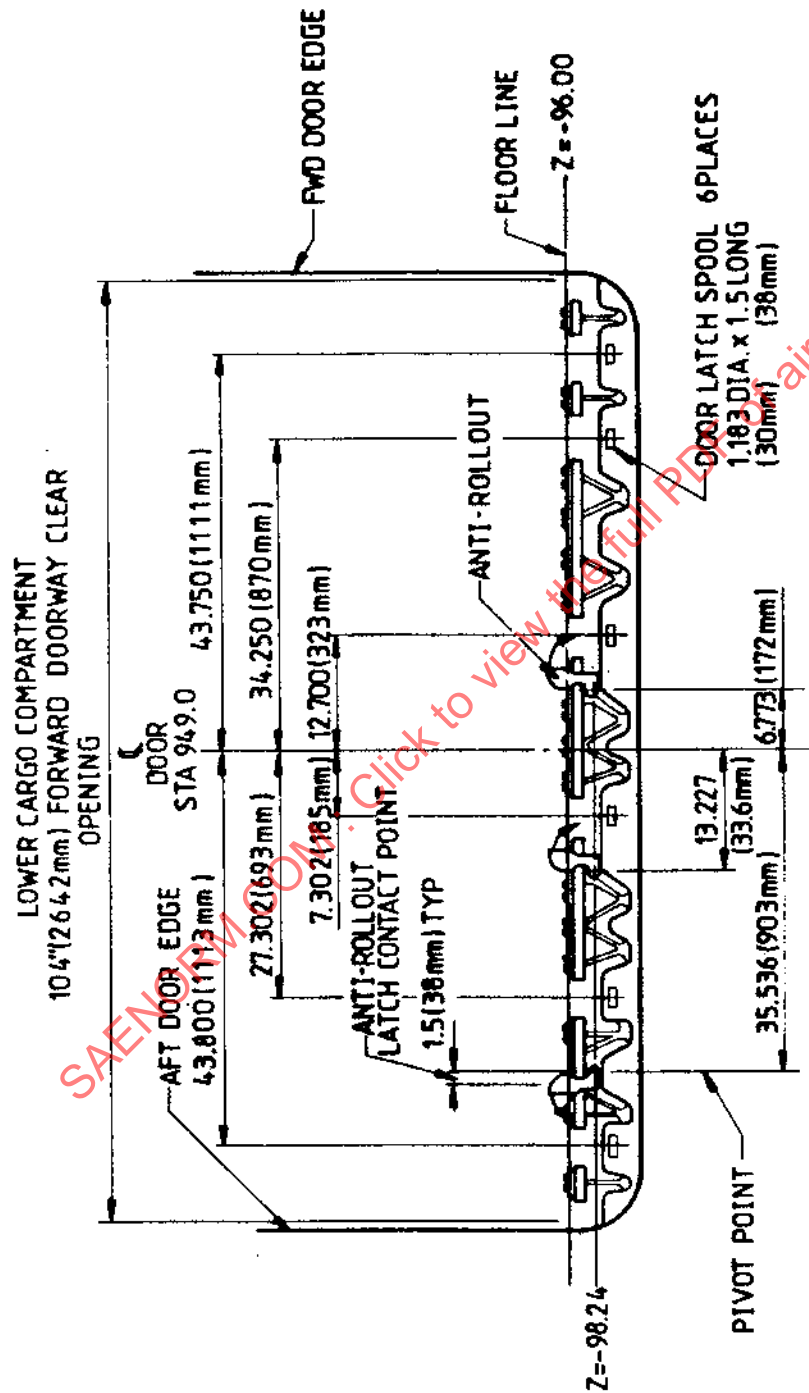


FIGURE 10A - DC10 Lower Compartment Door

DC10

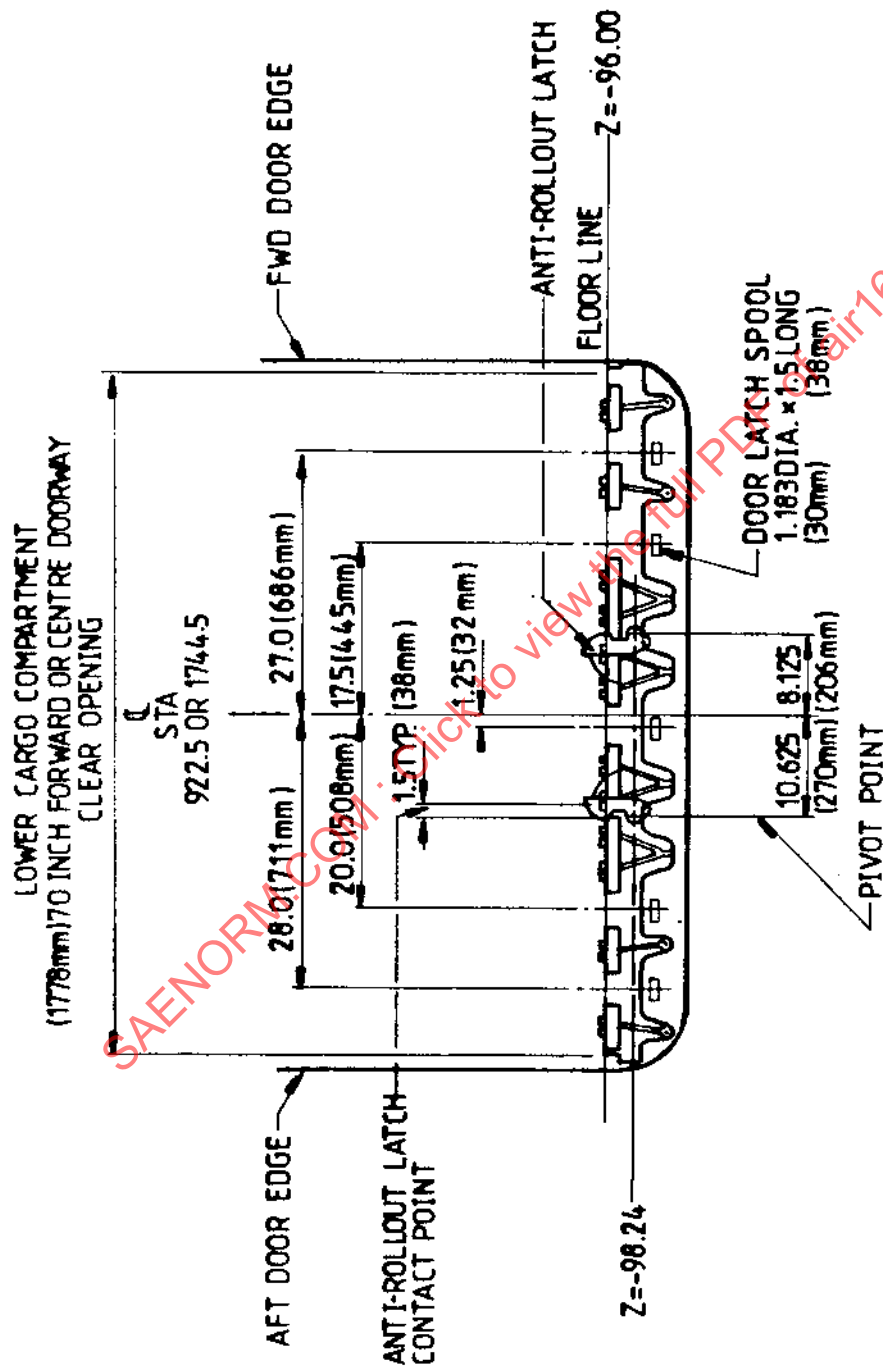


FIGURE 10B - DC10 Lower Compartment Door

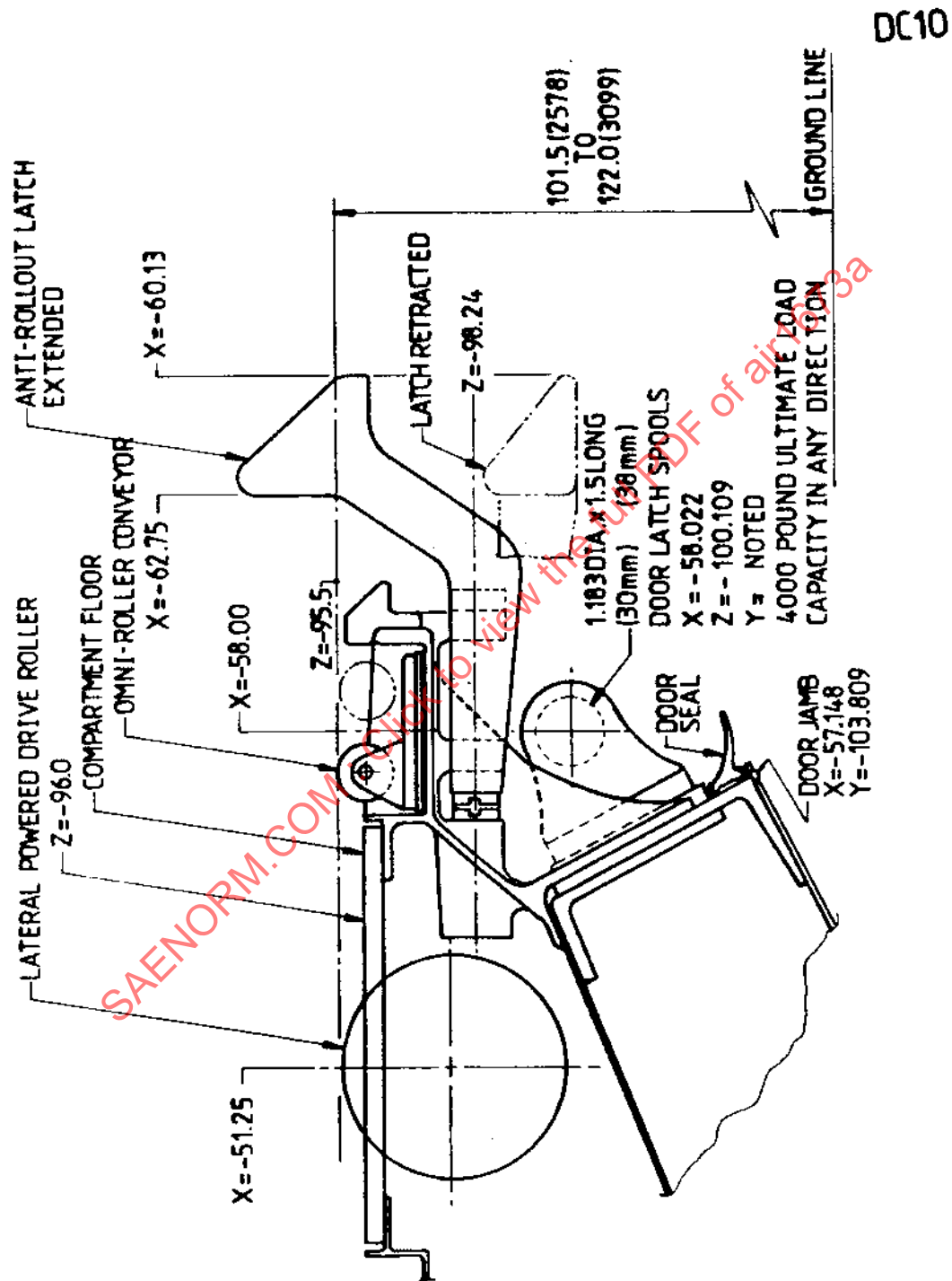
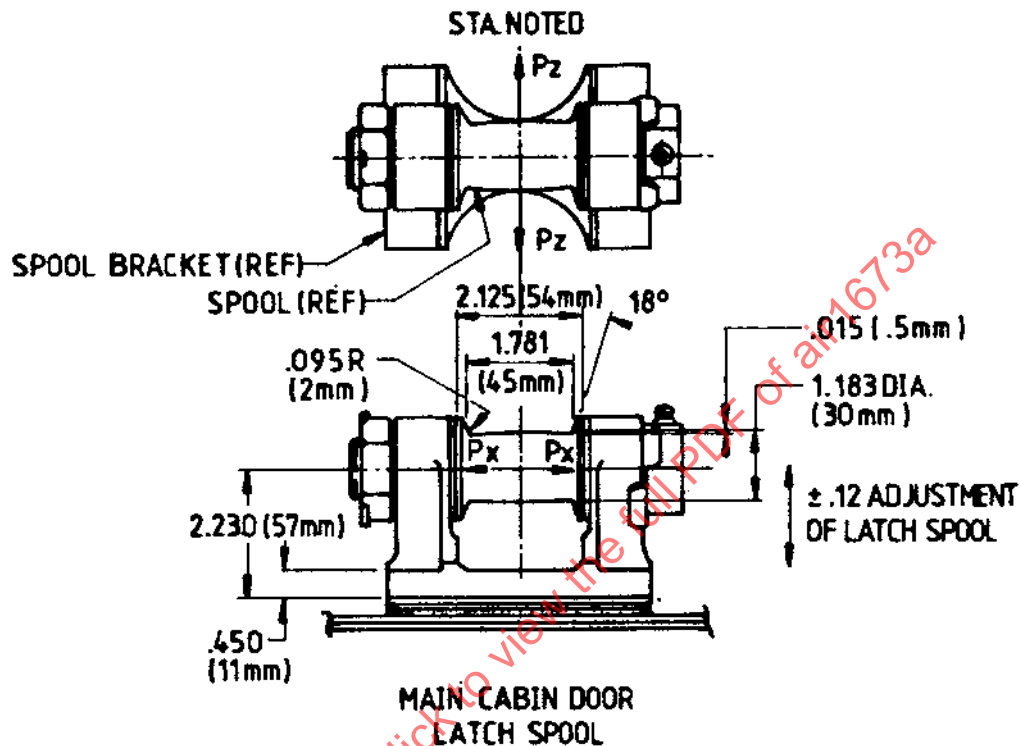


FIGURE 10C - DC10 Cross Section Through Lower Cargo Door Jamb

DC 10



NOTE

VARIATION FROM TABLE 1 WILL REQUIRE APPROVAL FROM DOUGLAS AIRCRAFT STRUCT. MECH. GROUP.

ULT = L5 (LIMIT DESIGN)

TABLE 1 - LATCH SPOOL LOAD CAPABILITY, POUNDS UPPER CARGO DOOR (SERIES 300F)								
SPOOL NO & STA	±PzULT	±PxULT	±PzULT	±PxULT	±PzULT	±PxULT	±PzULT	±PxULT
N01 - 632.292	15 000	10 000	15 000	5 000	0	0	0	0
N02 - 644.792	15 000	0	15 000	5 000	0	0	0	0
N03 - 666.292	15 000	0	15 000	0	0	4 500	12 000	1 500
N04 - 692.292	15 000	0	15 000	0	0	0	0	0
N05 - 712.292	15 000	0	15 000	0	0	4 500	12 000	1 500
N06 - 737.708	15 000	0	15 000	5 000	0	0	0	0
N07 - 757.708	15 000	10 000	15 000	5 000	0	0	0	0
CASE 1 - COMBINED ULT. LOADS		CASE 2 - COMBINED ULT. LOADS		CASE 3 - COMBINED ULT. LOADS		CASE 4 - COMBINED ULT. LOADS		

FIGURE 10D - DC10 Door Spool Loads

- 3.11 Douglas DC10 - Main Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 11A through 11E.

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DC10

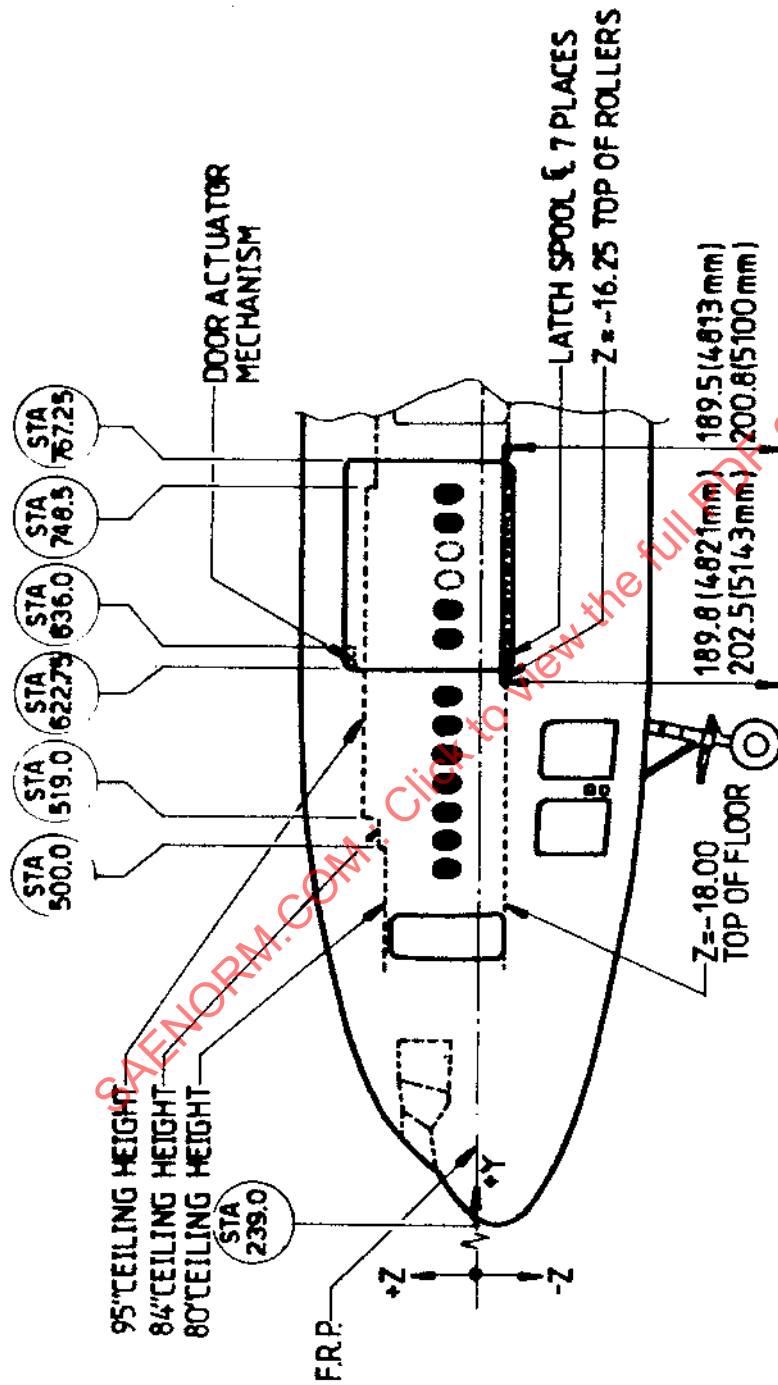


FIGURE 11A - DC10 Main Deck Cargo Door

DC10

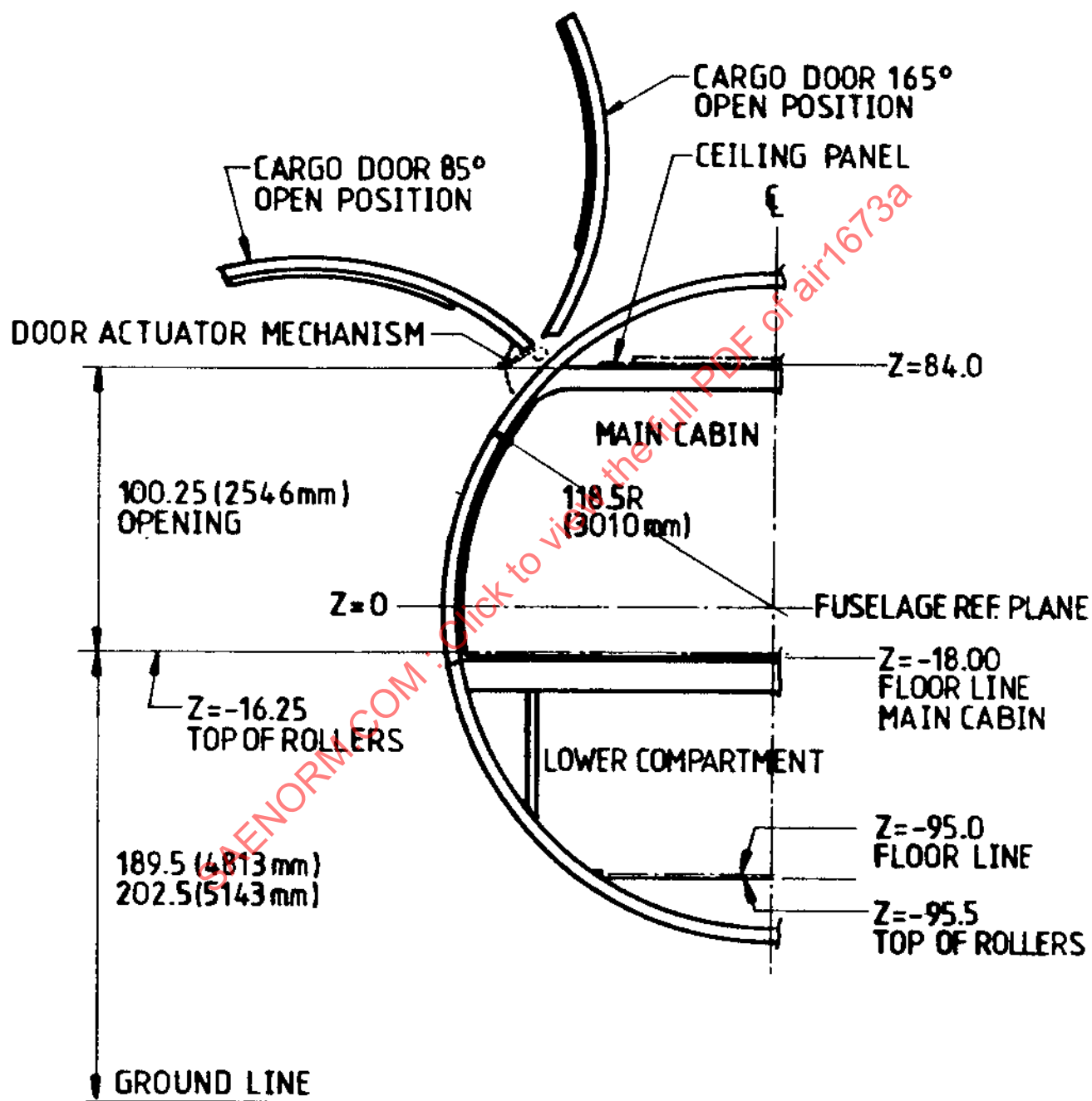


FIGURE 11B - DC10 Cross Section

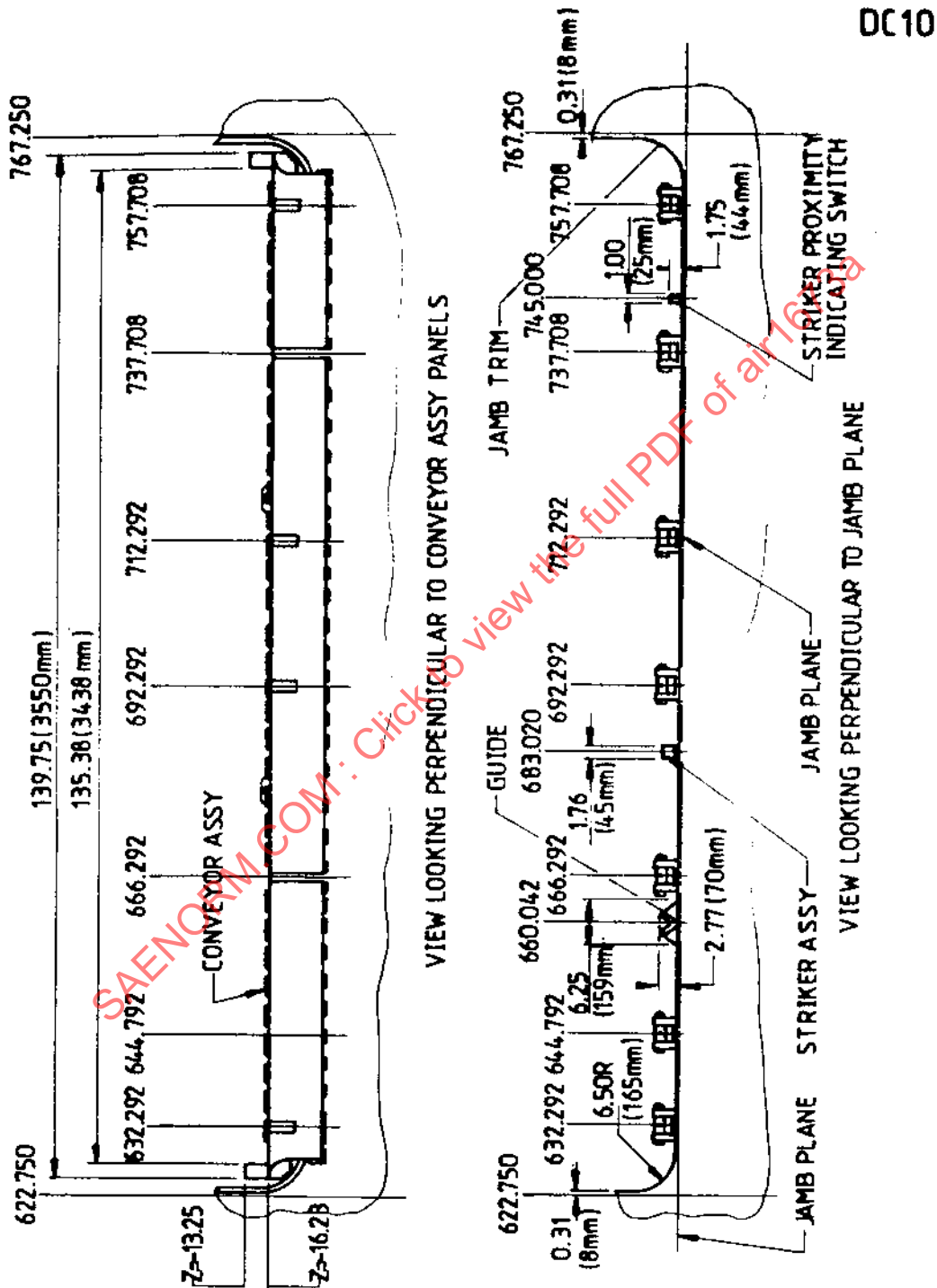


FIGURE 11C - DC10 Main Cabin Door Jamb

DC10

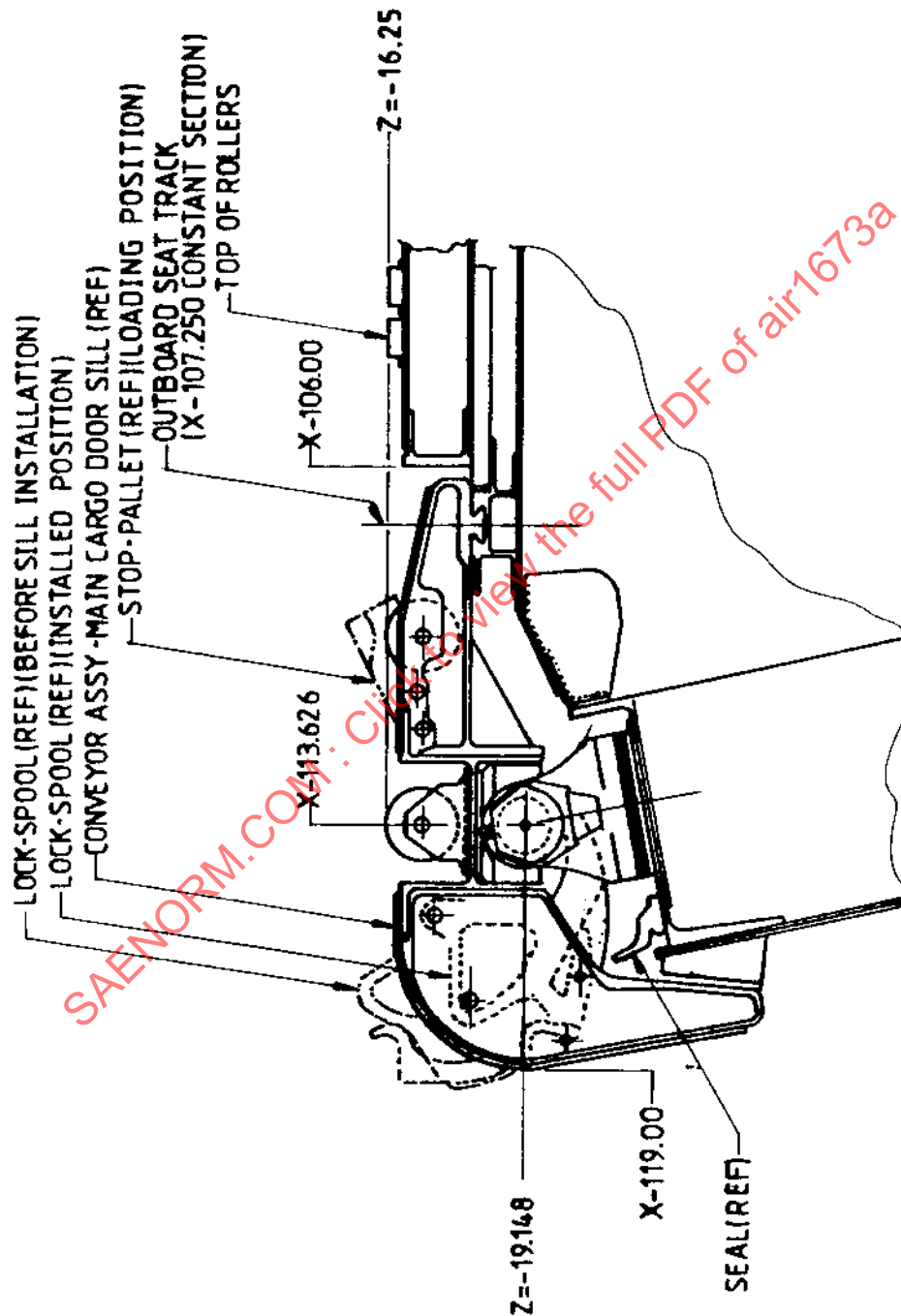


FIGURE 11D - DC10 Cross Section Through Main Cabin Door Sill Conveyor Removable

DC10

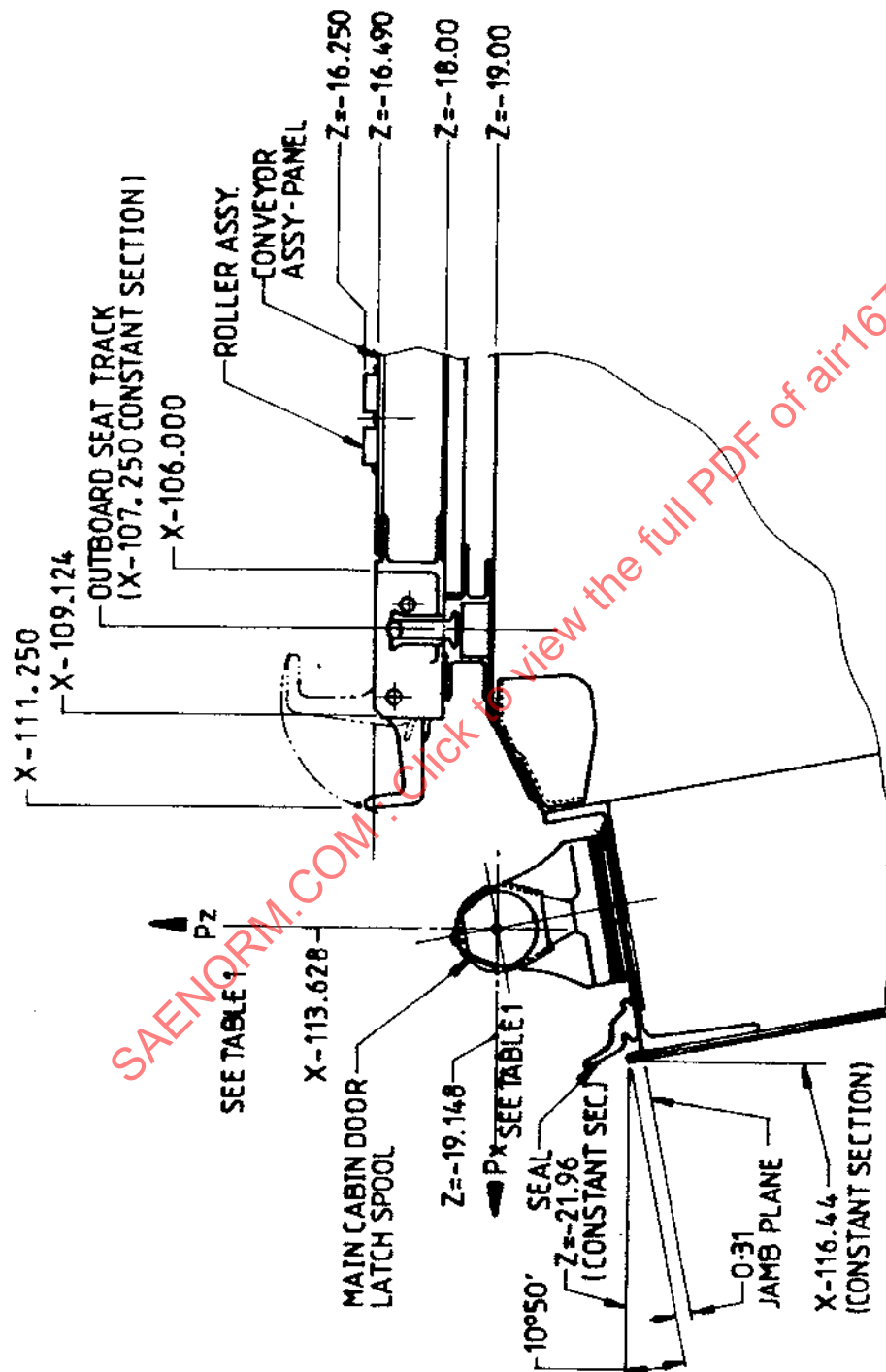


FIGURE 11E - DC10 Cross Section Through Main Cabin Door Jamb

- 3.12 Lockheed L1011 Tristar - Lower Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment
(Including Wide Cargo Door Option):

See Figures 12A through 12H.

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L1011

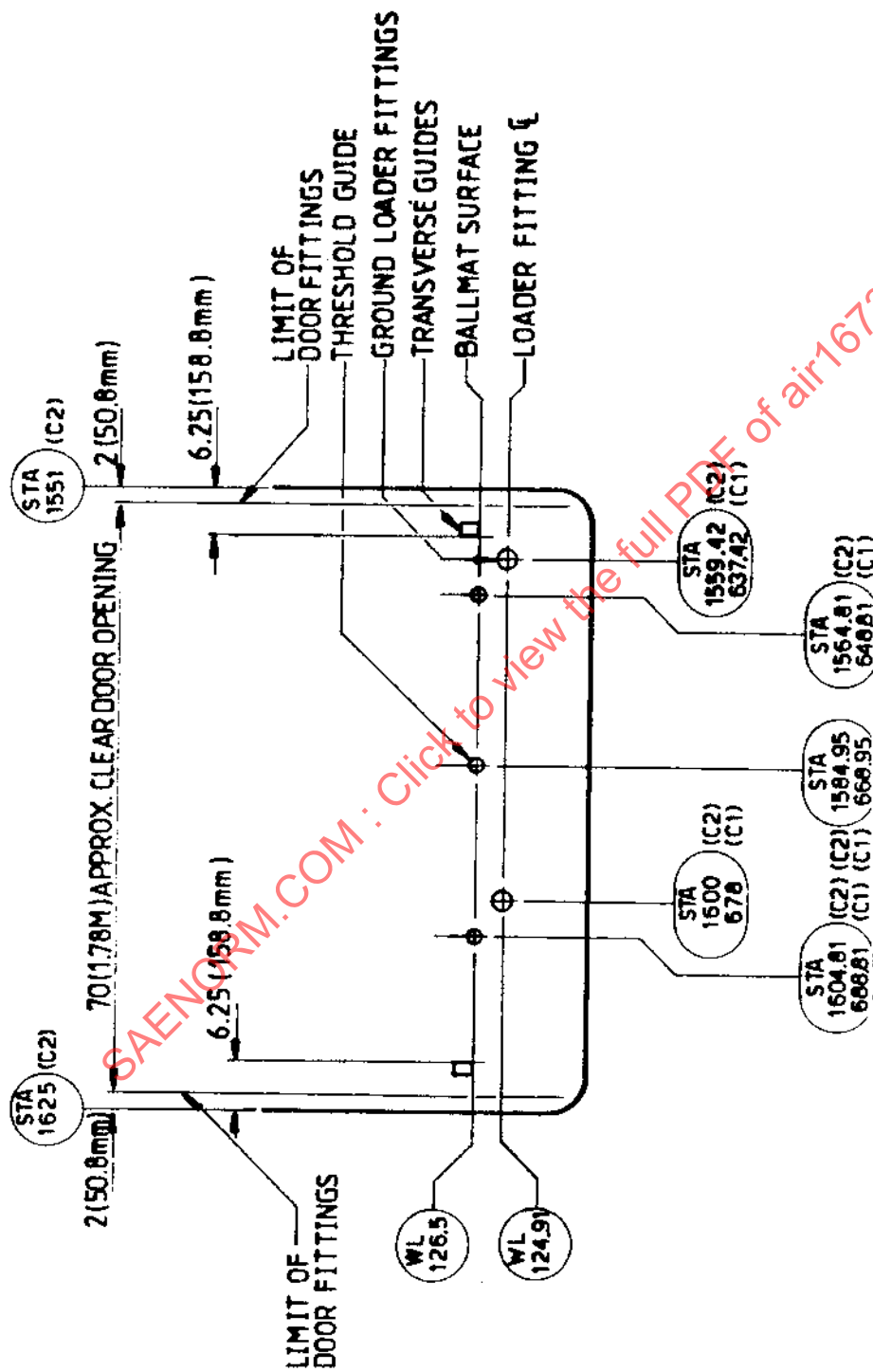


FIGURE 12A - Tristar Lower Hold (C1 and C2)

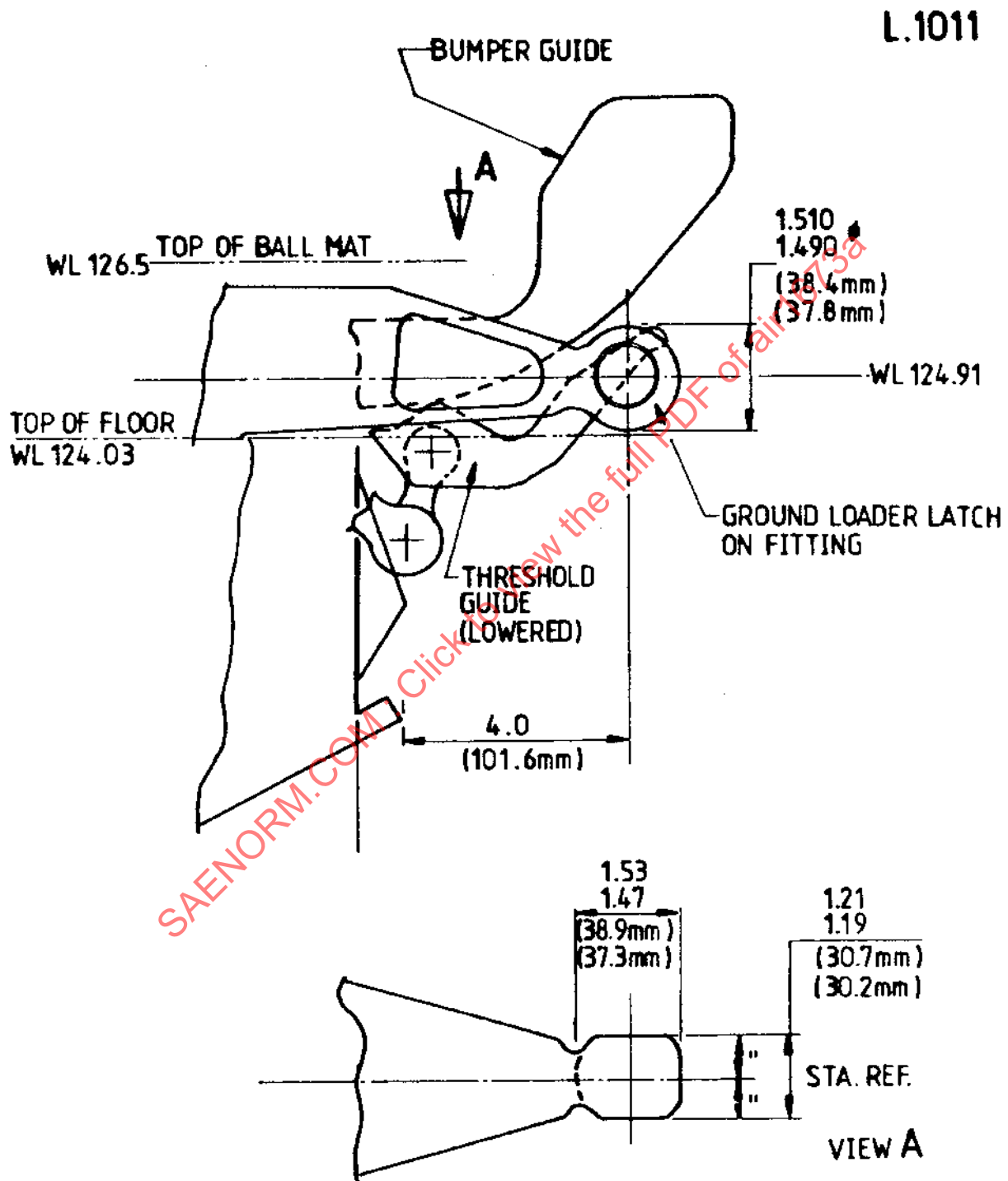
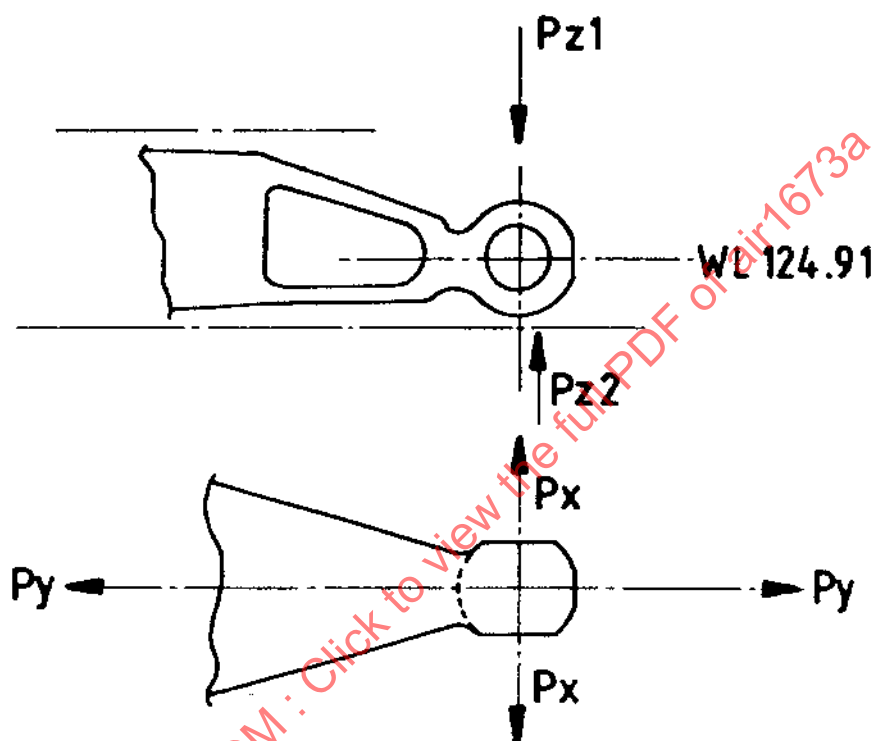


FIGURE 12B - Tristar Lower Hold C1 and C2 -
General Arrangement of Ground Loader Latch on Fittings

L.1011

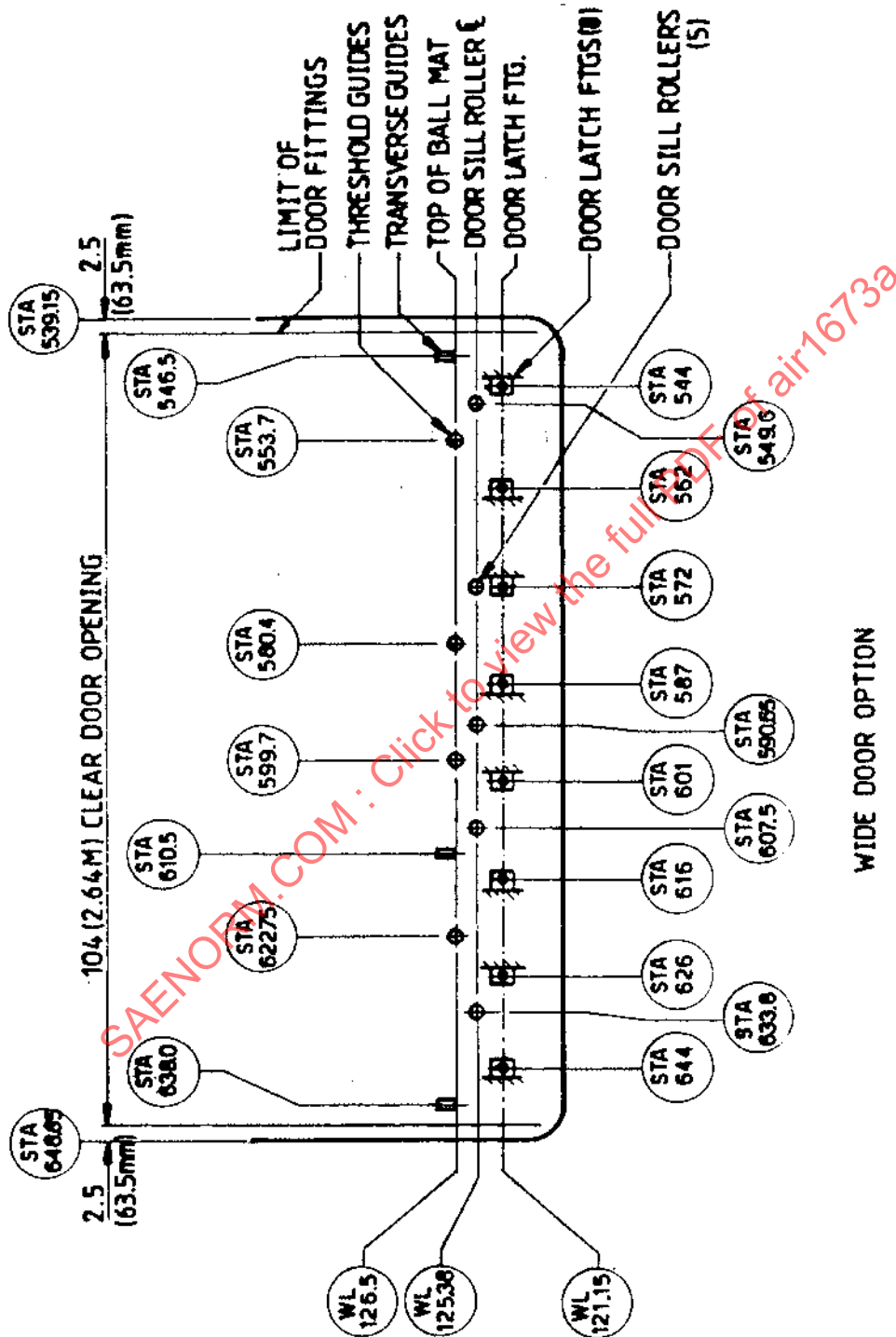
LOADER ATTACHMENT ALLOWABLES TRISTAR LOWER DECK



- ▷ FITTING A BRITISH AIRWAYS DRG. NO. IPC 1987 E
 FITTING B " " " " IPC 1987 F
 FITTING C " " " " IPC 2663

	LOAD	LOCKHEED DRG. 880112	MODIFIED FITTING A	MODIFIED FITTING B	MODIFIED FITTING C
lb	Px	2667	2570	2570	2570
	Py	3000	5465	7895	10000
	Pz1	6500	4500	6500	8240
	Pz2	1667	2570	2570	2570
kg	Px	1212	1168	1168	1168
	Py	1364	2484	3589	4545
	Pz1	2955	2045	2955	3745
	Pz2	758	1168	1168	1168

FIGURE 12C - Tristar Lower Deck (C1 and C2)



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FIGURE 12D - Tristar Lower Hold (CIA)
British Airways Only

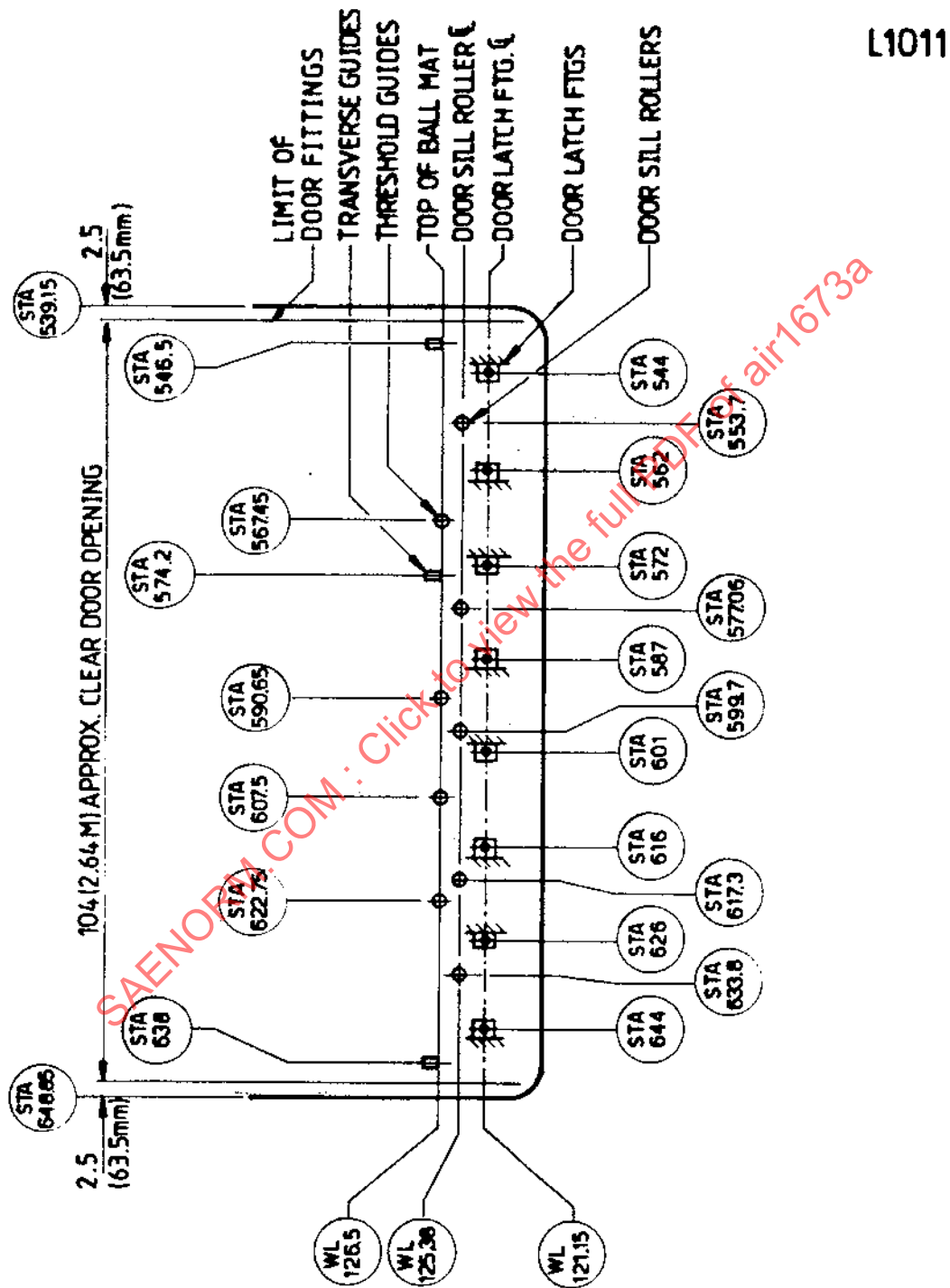
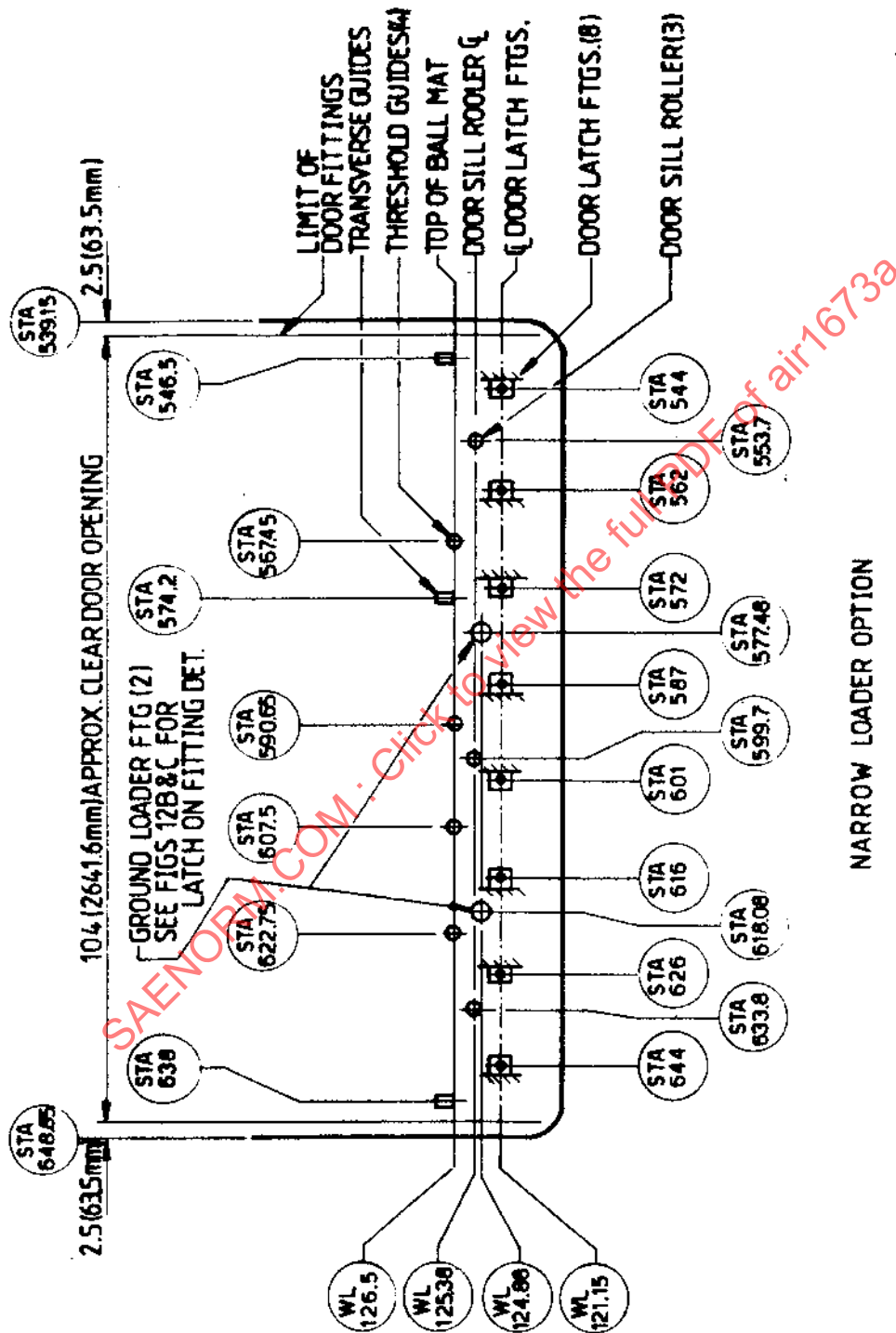


FIGURE 12E - -500 Tristar Lower Hold (CIA)



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FIGURE 12F - -500 Tristar Lower Hold (CIA)

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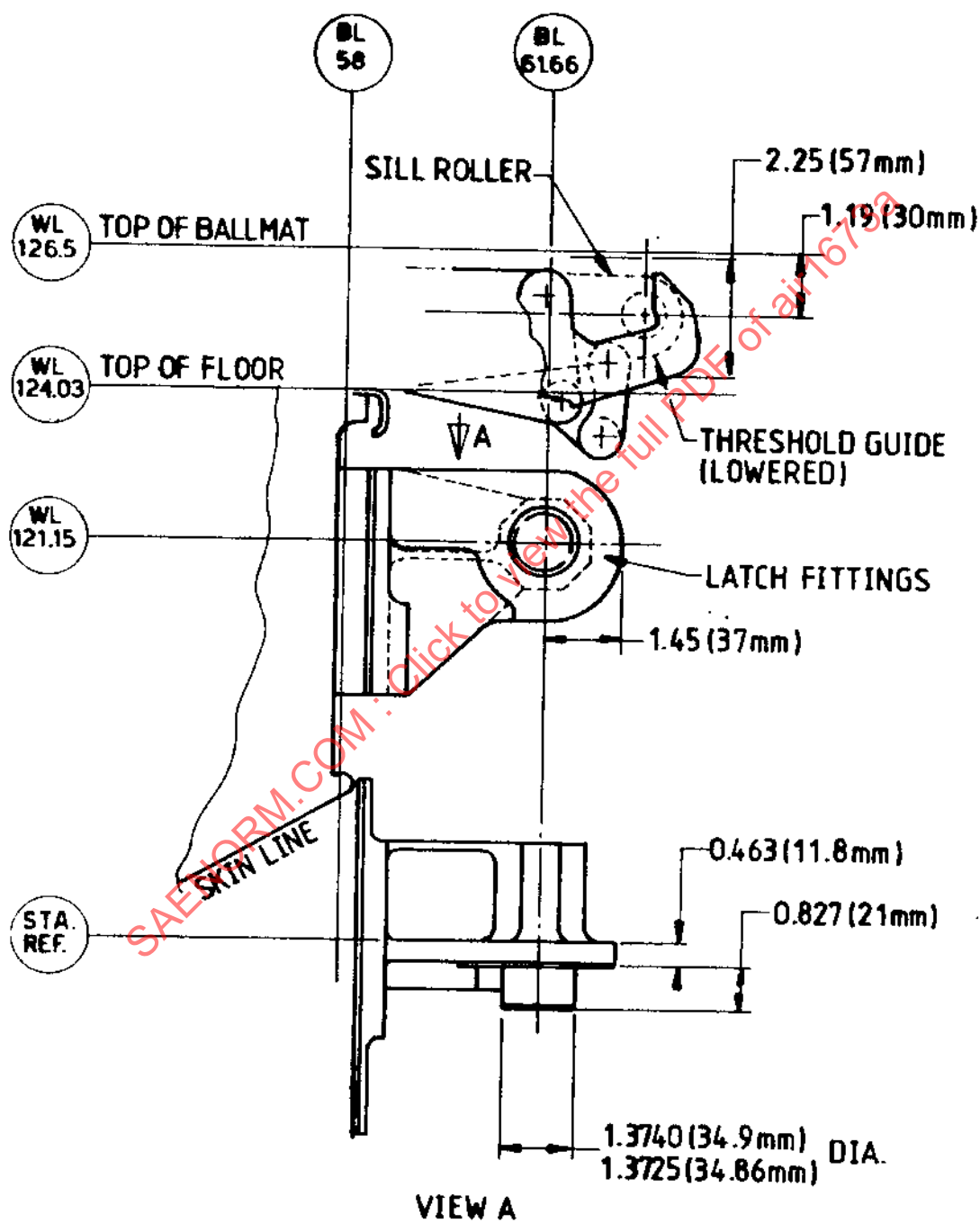
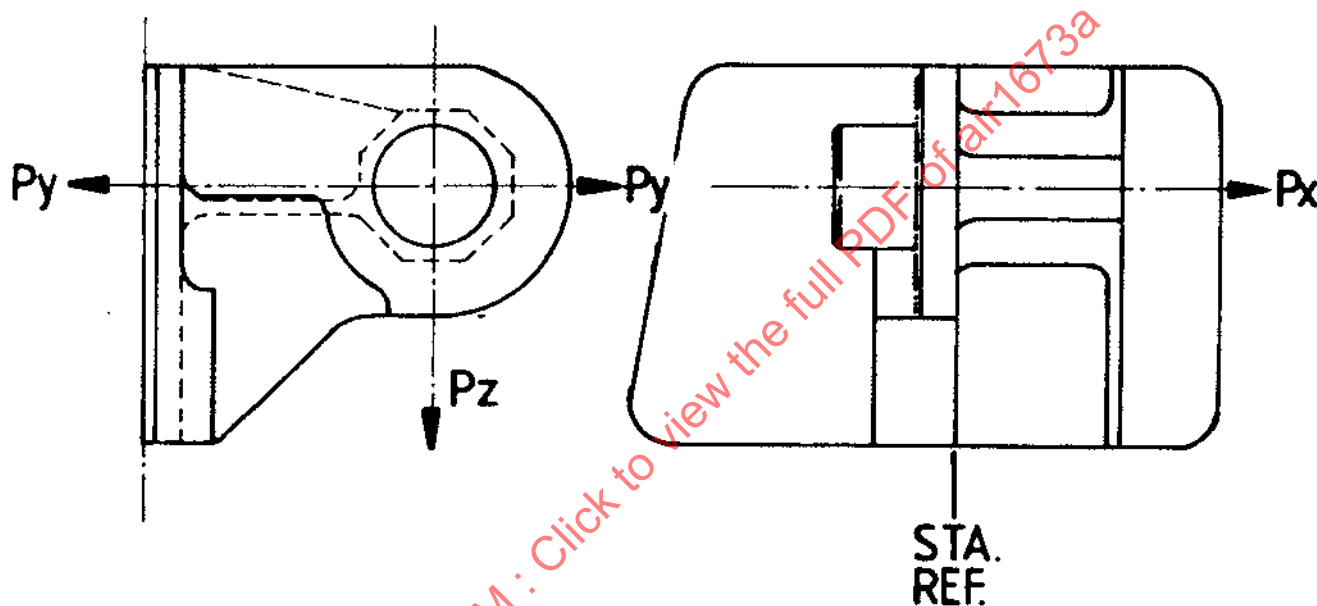


FIGURE 12G - Tristar Lower Hold CIA
General Arrangement of Door Latch Fittings

L.1011



ALLOWABLE LATCH FITTING LOADING LIMITS

STN. REF.	LOAD	CONDITION 1		CONDITION 2		CONDITION 3	
		lb	kg	lb	kg	lb	kg
562	Px	3577	1626	5375	2443	0	0
	Py	3570	1623	3570	1623	0	0
	Pz	13855	6300	7553	3433	9000	4090
626	Px	3248	1476	5375	2443	0	0
	Py	3264	1484	3264	1484	0	0
	Pz	12575	5716	6547	2976	9000	4090

FIGURE 12H - Tristar Lower Hold CIA

- 3.13 Lockheed L100 - Main Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 13A through 13D.

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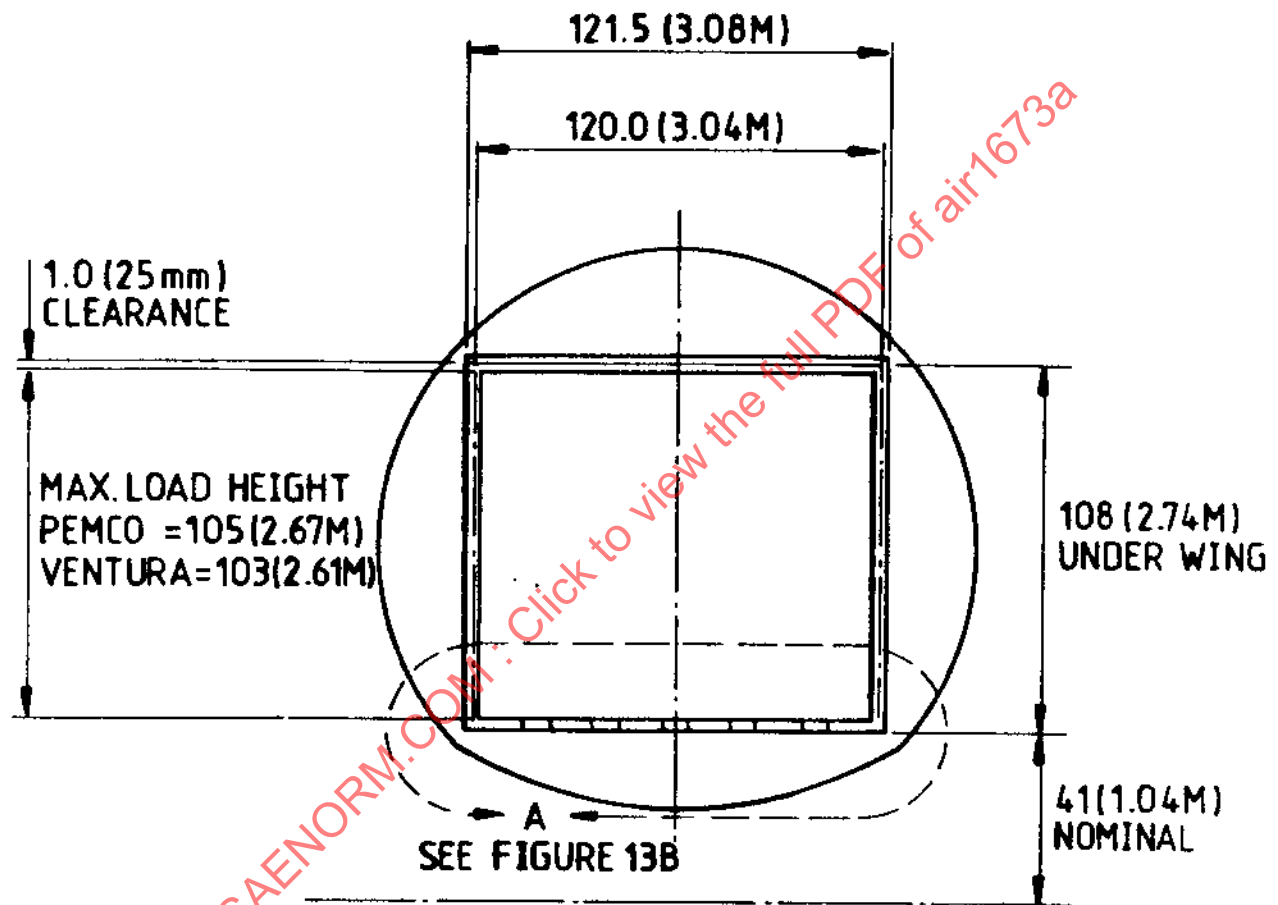
L100

FIGURE 13A - L100 Loading Clearance Envelope

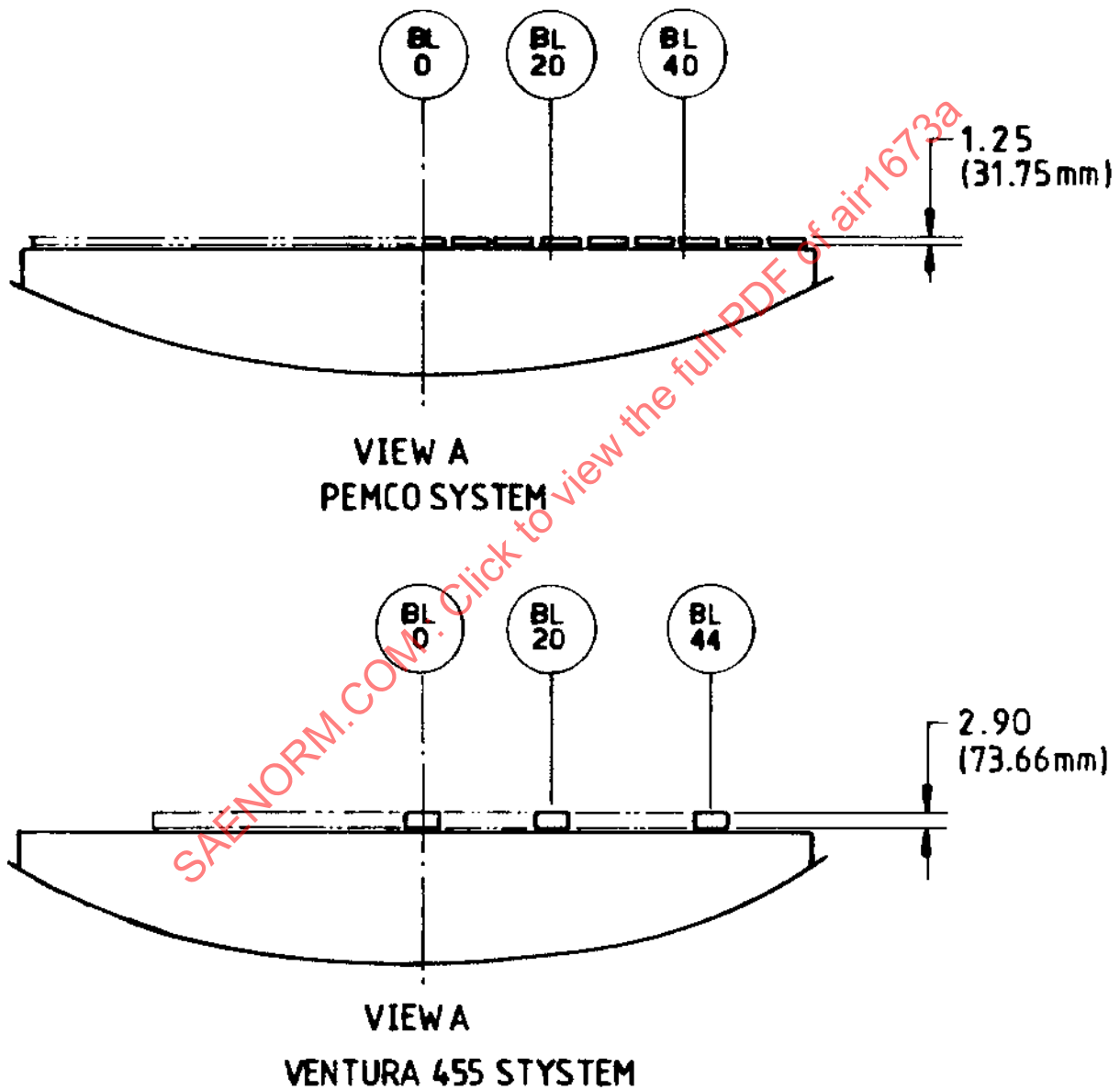
L.100

FIGURE 13B - L100 Loading Clearance Envelope

L.100

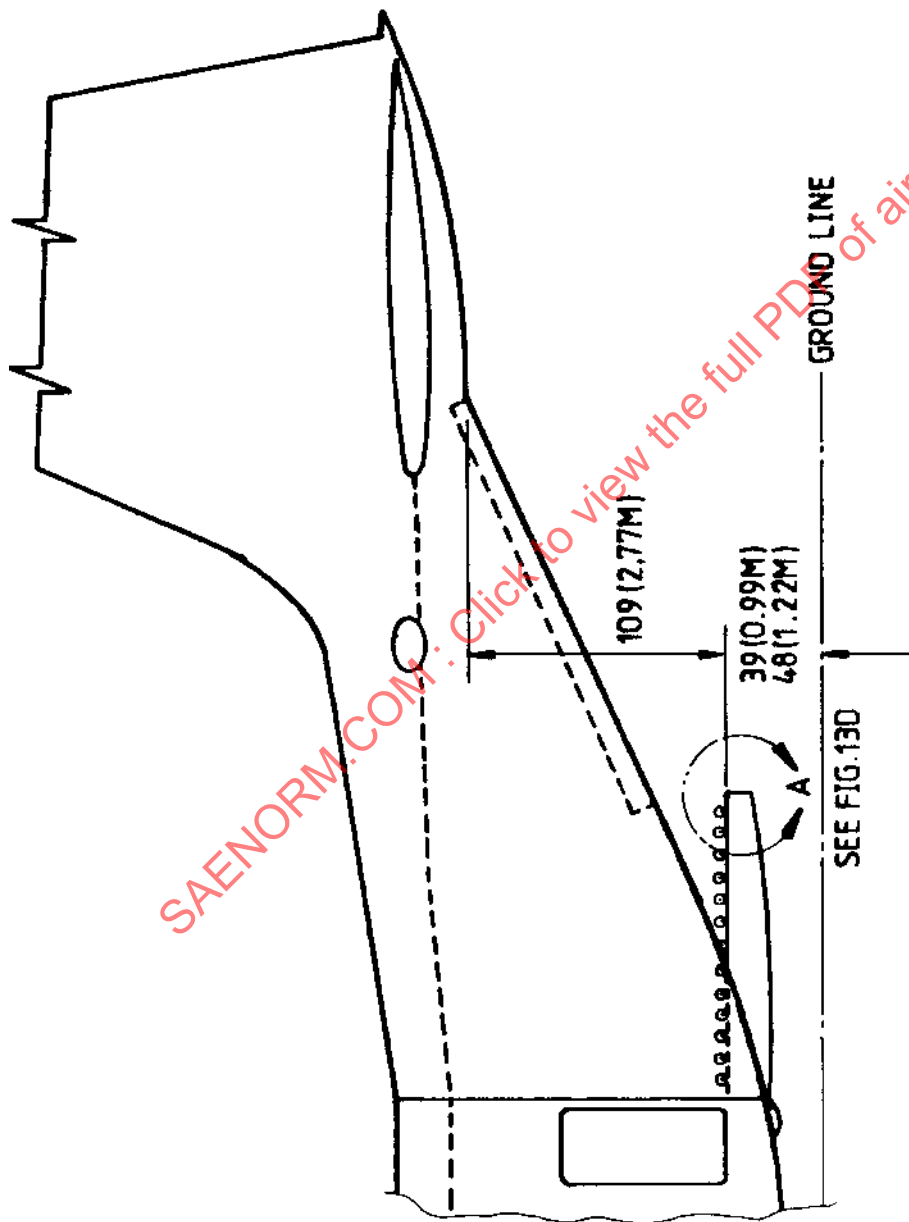


FIGURE 13C - L100 Threshold Heights

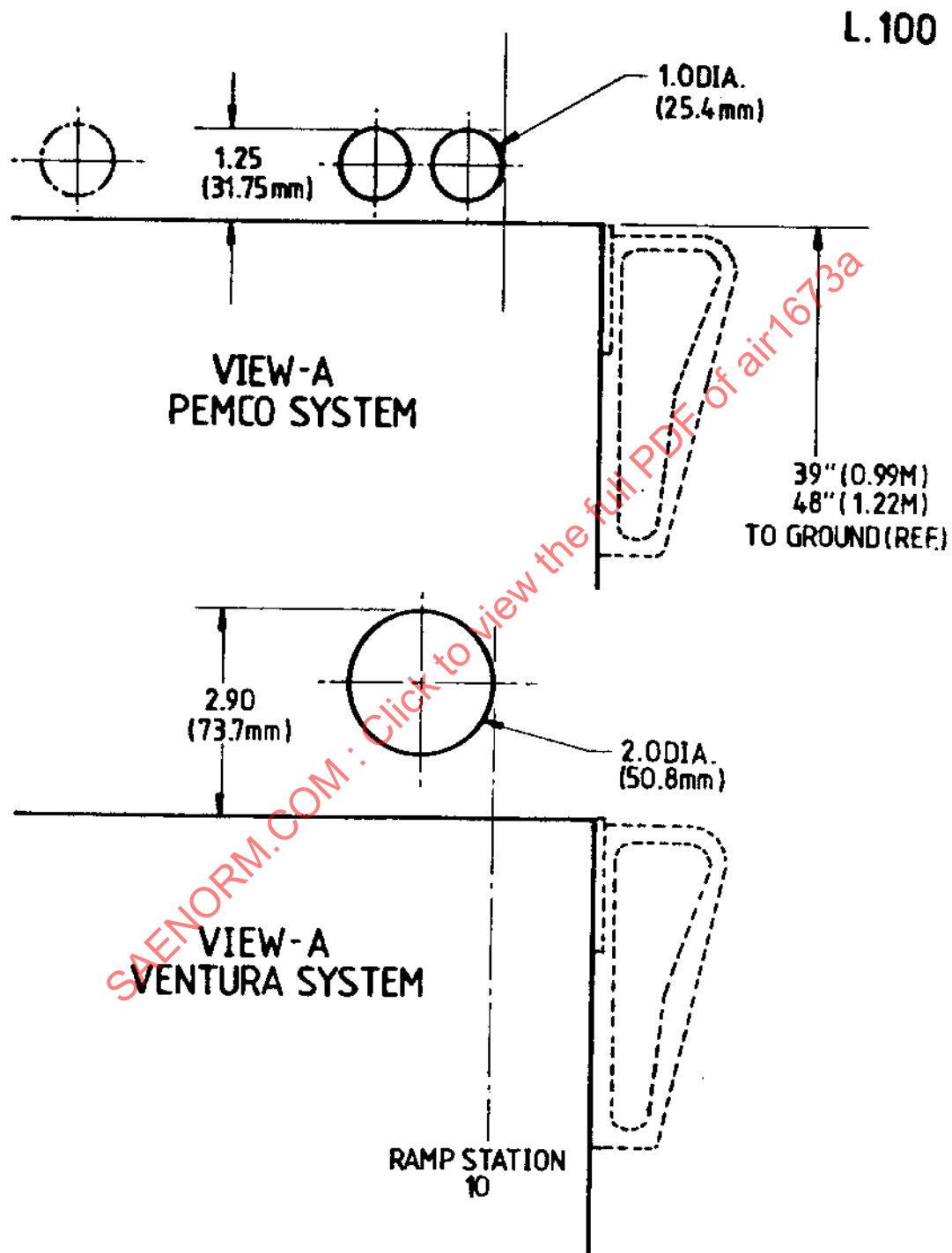


FIGURE 13D - L100 Threshold Heights

- 3.14 Airbus A300F and A310F - Main Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 14A through 14B.

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A300F
A310F

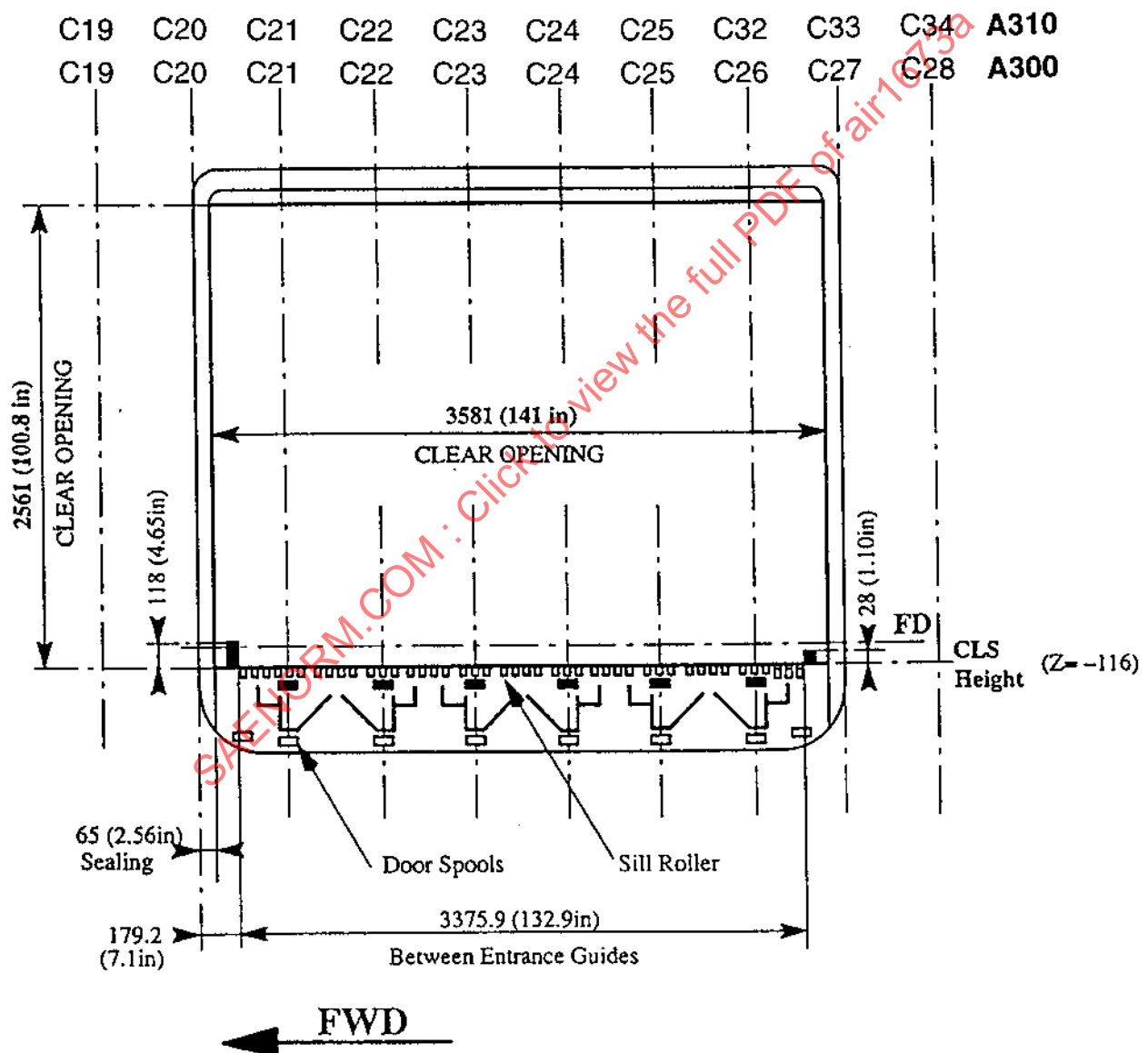


FIGURE 14A - Main Deck Cargo Door
A300F Aircraft and A310F Aircraft

A300F

A310F

Loader Interface		A300	A310
Frame see FIG 14 A	Distance from AD Y (mm/in)	Distance from Ground Z (mm/in)	Distance from Ground Z (mm/in)
C21	2887 / 113.7	4573 / 179.1	4573 / 180
C26 / 32	2887 / 113.7	4573 / 181.2	4573 / 180

The letters **Z** and **Y** give the dimensions of the sill rollers from AD and the distance from ground under MRW-conditions. For reference of the loader alignment there are two respective dimensions given at frame C21 and C26/32. The distance from ground of all sill rollers can be evaluated by linear method between these two points.

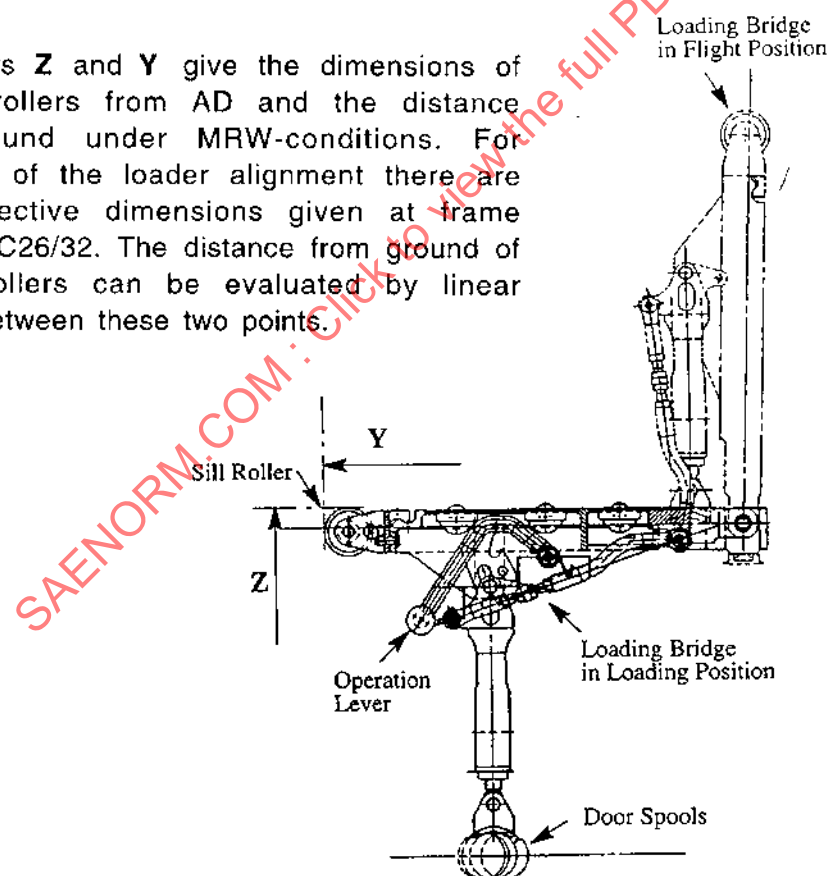


FIGURE 14B - A300F and A310F Cross Section Through Main Cabin
Door Sill Conveyor - "Fly-Away" Type
Bumper Type Loader Only (No Loader Attach Points)

- 3.15 Airbus A319/320/321 - Lower Deck
Cargo Door Sill Attachment Fitting
Details for Ground Loading Equipment:

See Figures 15A through 15F.

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A319

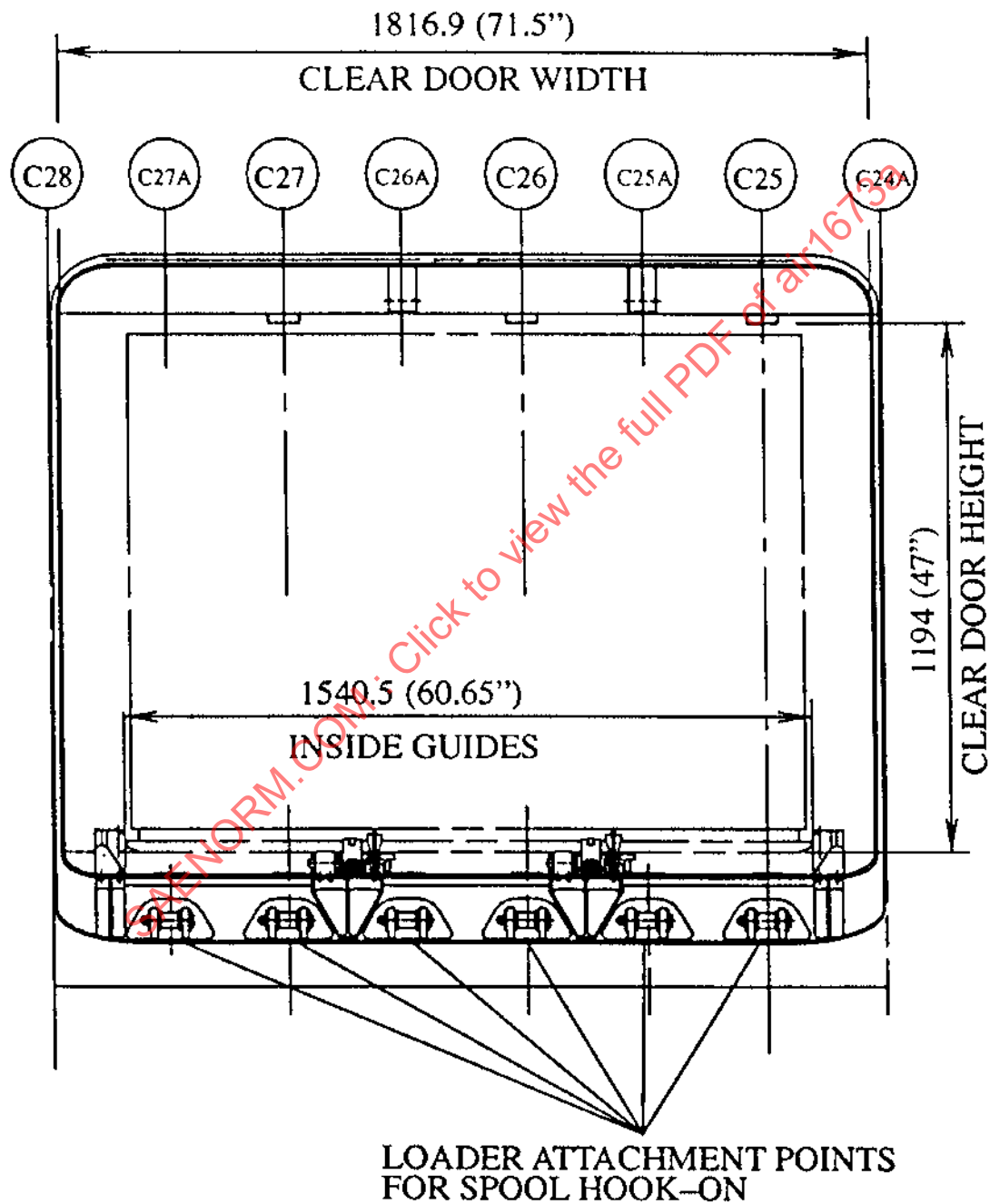


FIGURE 15A - Lowr Deck - Compartment 1 Fwd Cargo Door
A319 Aircraft

A319

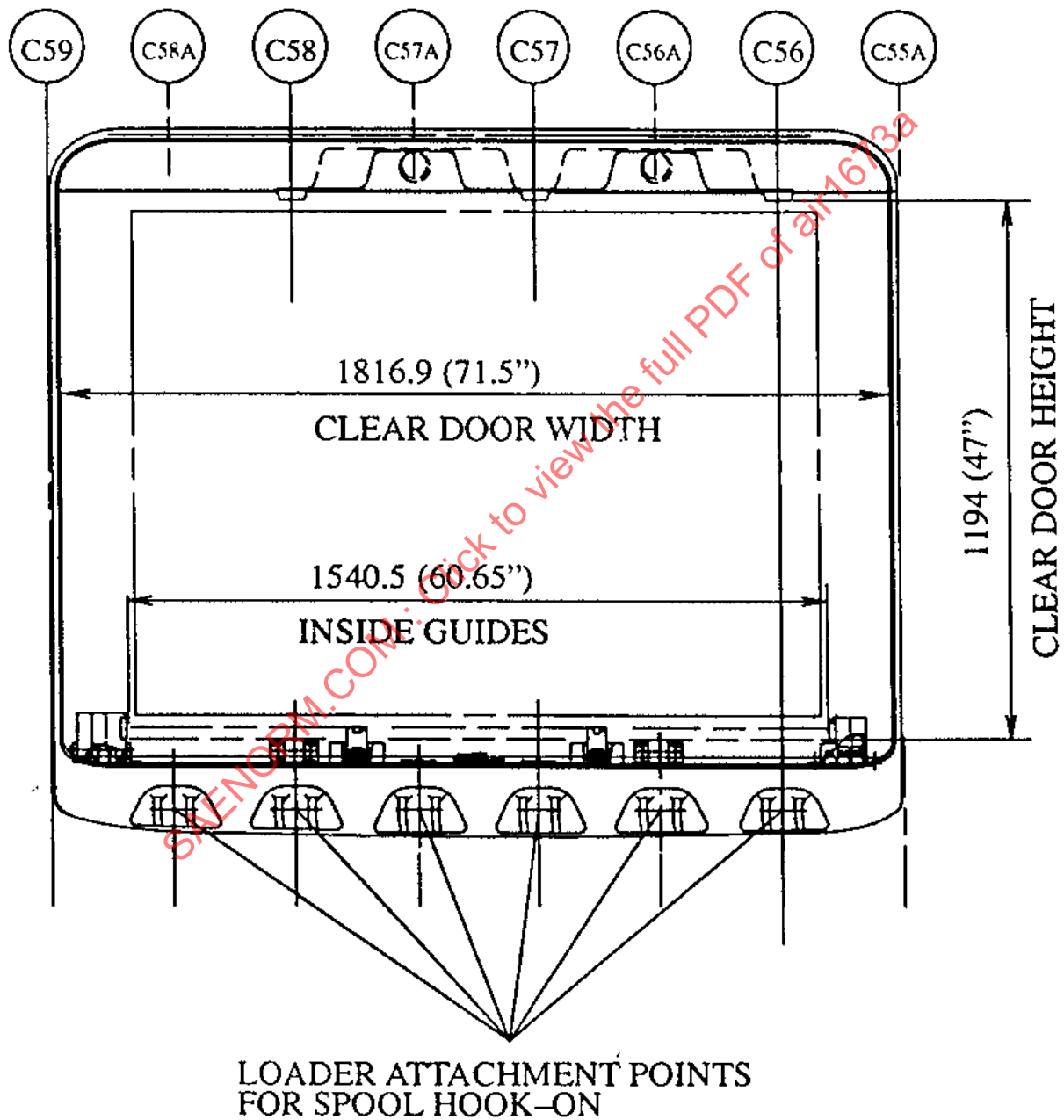


FIGURE 15B - Lower Deck - Compartment 4 Aft Cargo Door
A319 Aircraft