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AEROSPACE INFORMATION REPORT

C-15-08
SAE AIR 1673 C-15-10

Issued 7-8-86

Submitted for recognition as an American National Standard

AIRCRAFT CARGO DOOR OPENING/SILL DETAILS FOR GROUND SUPPORT EQUIPMENT INTERFACE

1. **PURPOSE:** The purpose of this report 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 for 2 or more sill types on their adaptor bars.

1.1 Reference Documents:

- 1.1.1 IATA AHM 931, Functional Specification for Lower Deck Container/Pallet Loader.

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1.1.2 IATA AHM 932, Functional Specification for Main-Deck Container/Pallet Loader.

IATA addresses:

Traffic Publications
International Air Transport
Association
2000 Peel Street
Montreal, Quebec
Canada H3A 2R4

Traffic Publications
International Air Transport
Association
26, Chemin de Joinville
1216 Cointrin - Geneve
Switzerland

2. 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 Aerospace Information Report 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 adaptor 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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DATA CLASSIFICATION

1.	Airbus A300/310		
	Lower deck	-	Figs 1A thru 1E
	Main deck	-	Figs 2A thru 2C
2.	B707/B727		
	Main deck	-	Figs 3A thru 3B
3.	B737		
	Main deck	-	Figs 4A thru 4B
4.	B747		
	Lower deck	-	Figs 5A thru 5D
	Main deck	-	Figs 6A thru 6F
5.	B767		
	Lower deck	-	Figs 7A thru 7F
6.	DC8		
	Main deck	-	Figs 8A thru 8G
7.	DC9		
	Main deck	-	Figs 9A thru 9D
8.	DC10		
	Lower deck	-	Figs 10A thru 10D
	Main deck	-	Figs 11A thru 11E
9.	L1011		
	Lower deck	-	Figs 12A thru 12H
10.	L100		
	Main deck	-	Figs 13A thru 13D

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AIRBUS A300 AND A310 - LOWER DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT

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A.300

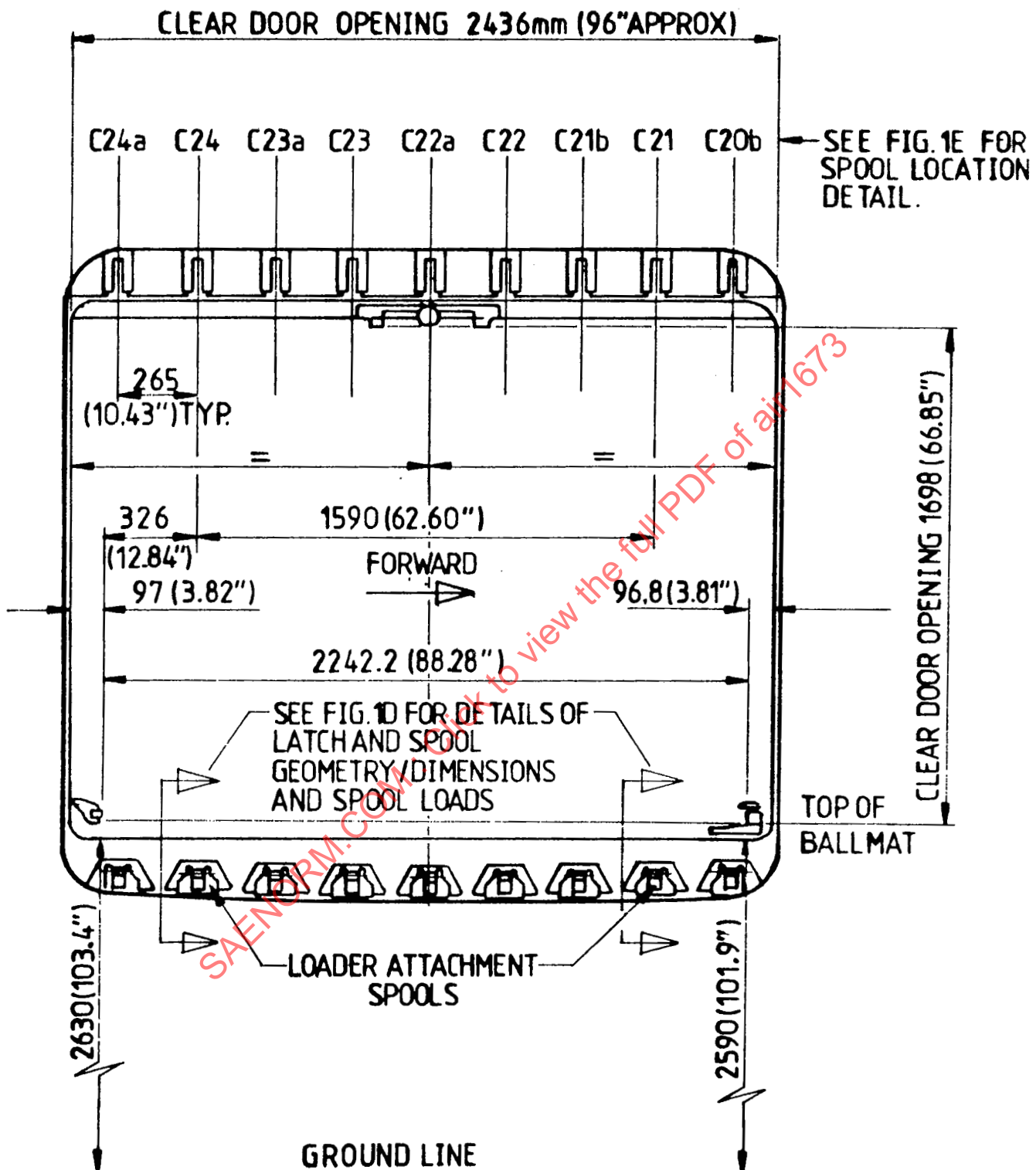


FIG.1A LOWER DECK - HOLD 1 DOOR (PRE. MOD. 2295)
A.300 AIRCRAFT

- 6 -

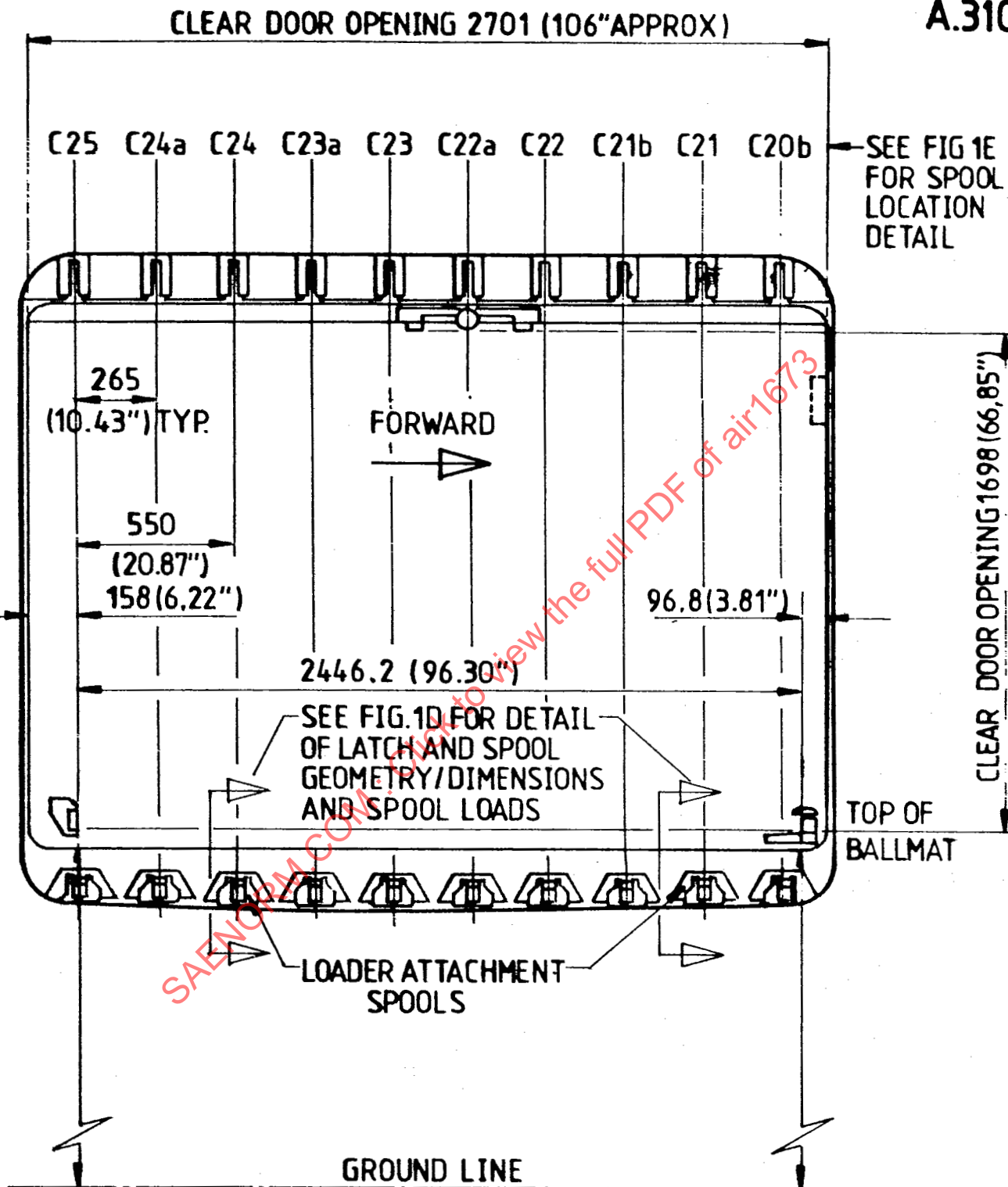
A.300
A.310

FIG.1B LOWER DECK - HOLD 1 DOOR (POST MOD. 2295)
A.300 AIRCRAFT AND A.310 AIRCRAFT.

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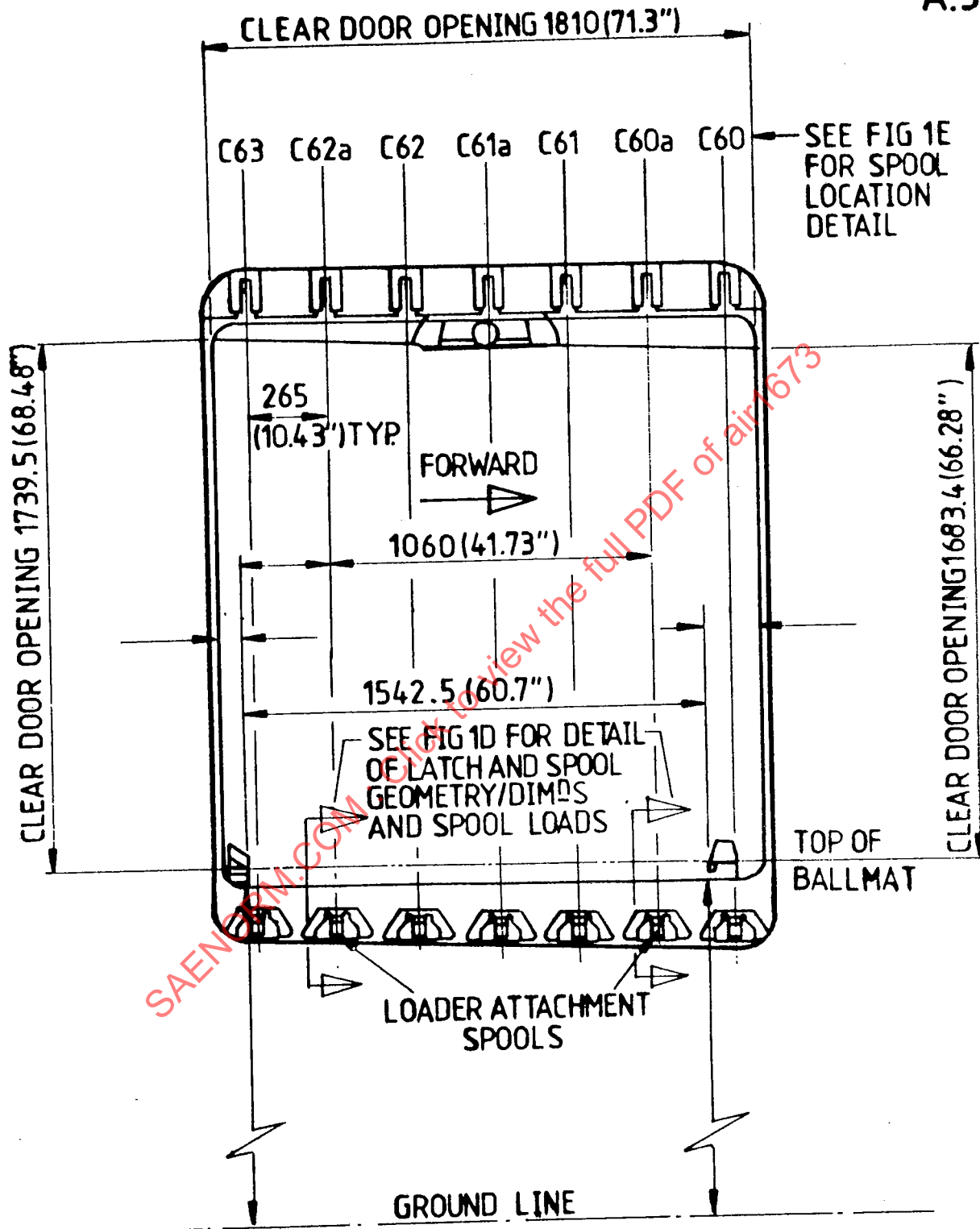
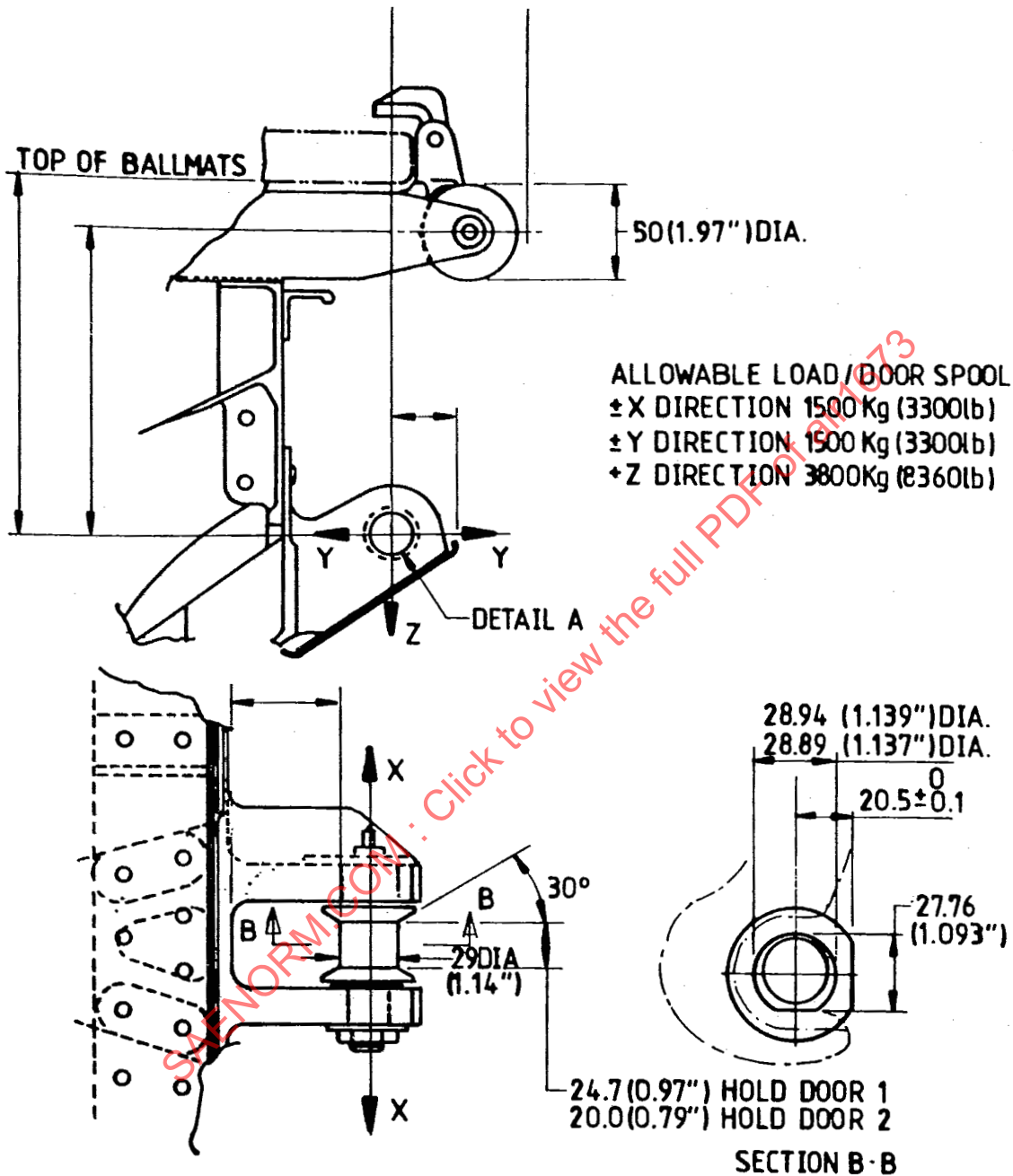
A.300
A.310

FIG.1C. LOWER DECK - HOLD 2 DOOR
A.300 AIRCRAFT AND A.310 AIRCRAFT

A.300
A.310

DETAIL A

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

**FIG.1E- LOWER DECK-HOLD1 AND HOLD2 DOORS
DOOR SPOOLS - POSITIONING DETAILS
A300 AIRCRAFT AND A310 AIRCRAFT**

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**AIRBUS A300 AND A310 - MAIN DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT**

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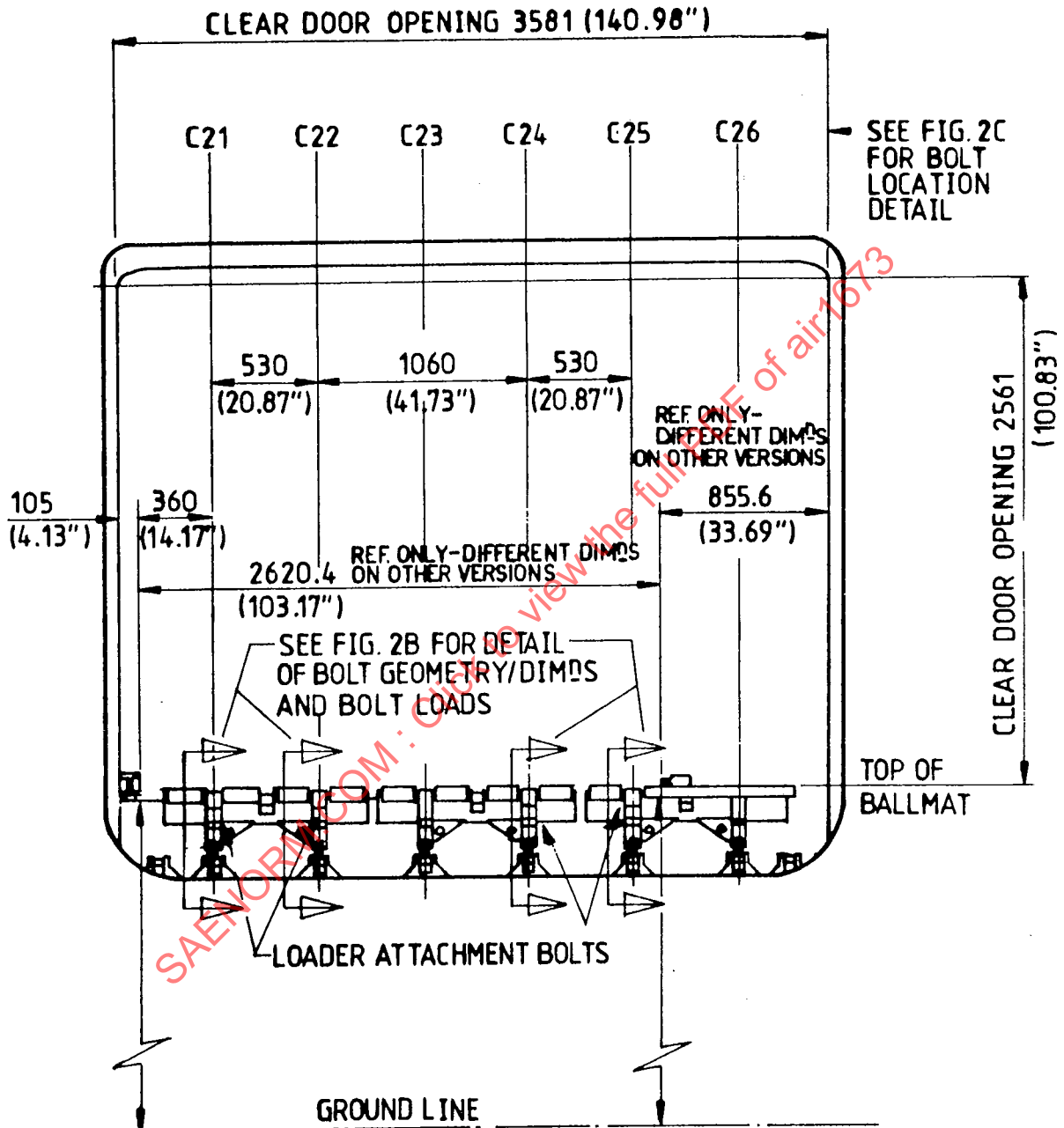
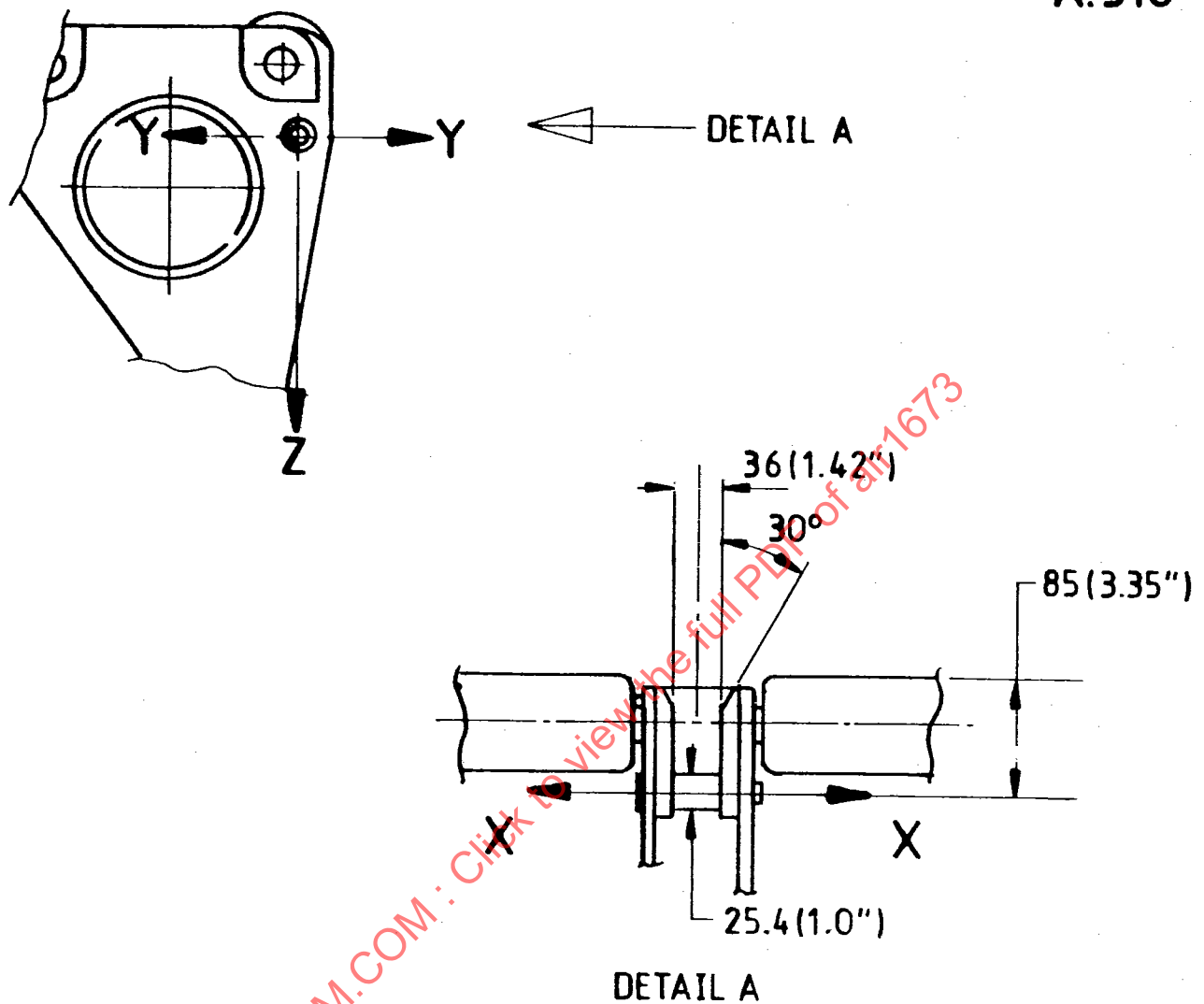
A.300
A.310

FIG. 2A UPPER DECK - CARGO DOOR.
A.300-C4 AIRCRAFT AND A.310 AIRCRAFT.

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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)

FIG. 2C- UPPER DECK - CARGO DOOR
BOLT - POSITIONING DETAILS
A300-C4 AIRCRAFT AND A310 AIRCRAFT

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**BOEING 707 AND 727 - MAIN DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT**

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B.707
B.727

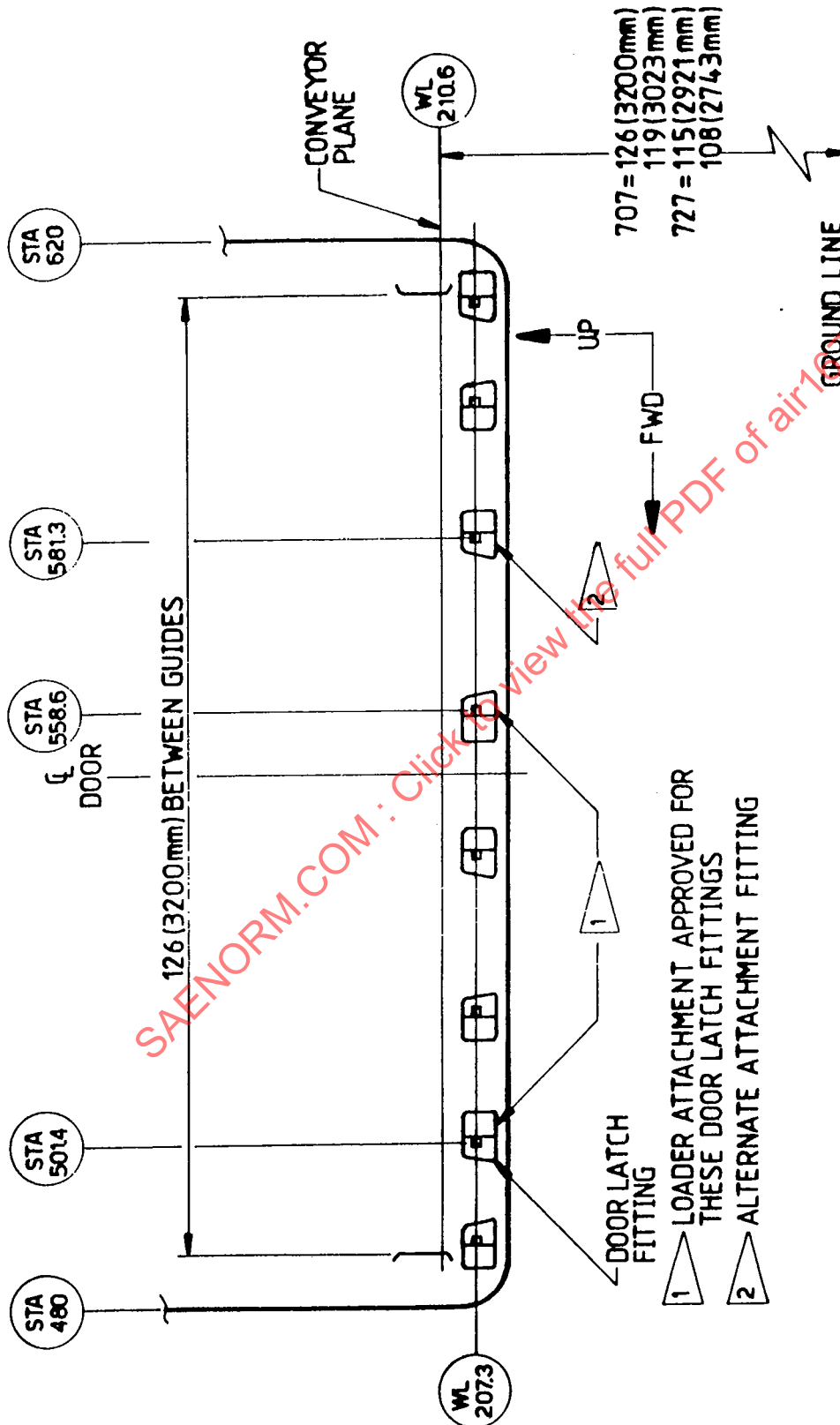
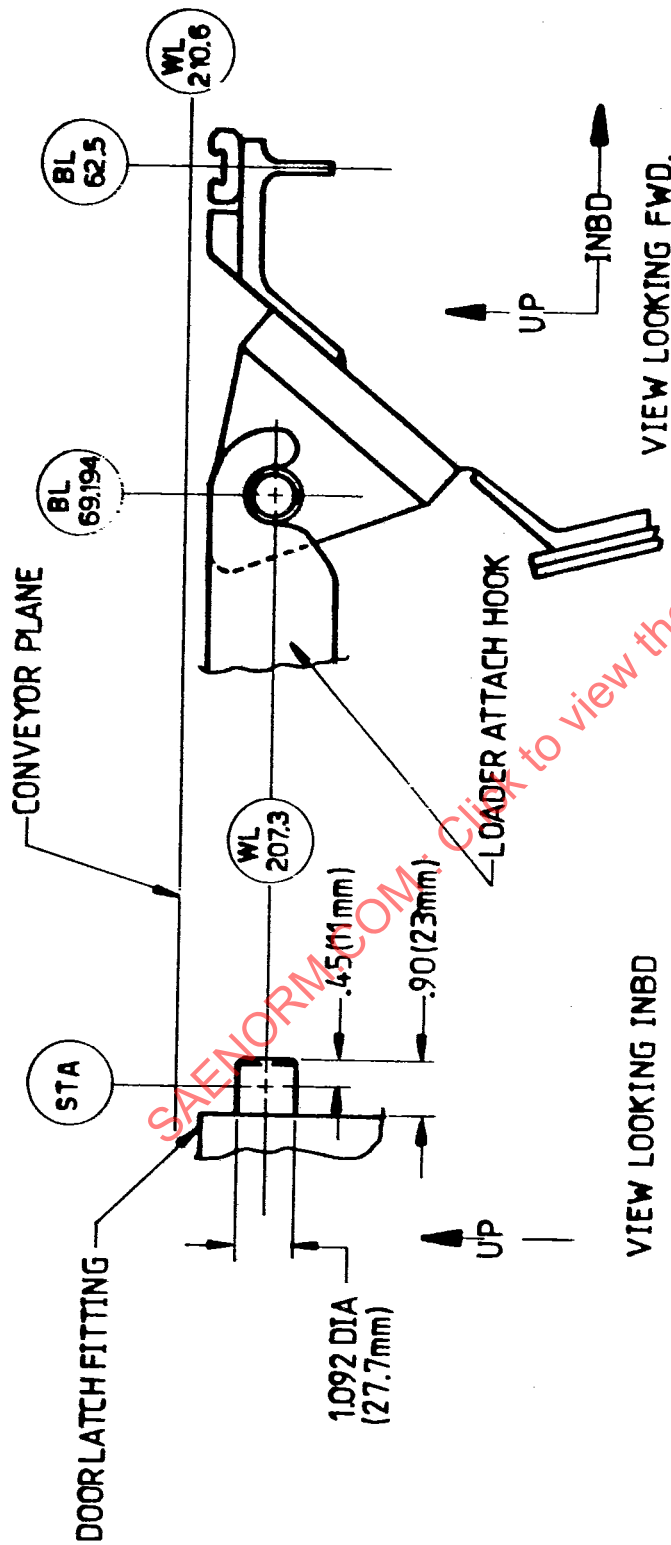


FIGURE 3A
BOEING-707 AND 727 LOADER ATTACHMENT
MAIN DECK CARGO DOOR

B.707
B.727



STA	707				727			
	MAXIMUM LOADS POUNDS (KILOGRAMS)	VERTICAL	FORE/AFT	INBD/OUTBD	VERTICAL	FORE/AFT	INBD/OUTBD	
501.4	2797 (1269)	1000 (454)	1000 (454)	1000 (454)	3140 (1240)	1000 (454)	1000 (454)	
558.6	6978 (3165)	1000 (454)	1000 (454)	1000 (454)	4530 (2055)	1000 (454)	1000 (454)	
581.3	5905 (2678)	1000 (454)	1000 (454)	1000 (454)				

ALL LOADS MAY BE APPLIED SIMULTANEOUSLY

FIGURE 3B
B.707 AND B.727 LOADER ATTACHMENT

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**BOEING 737- MAIN DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT**

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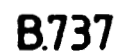
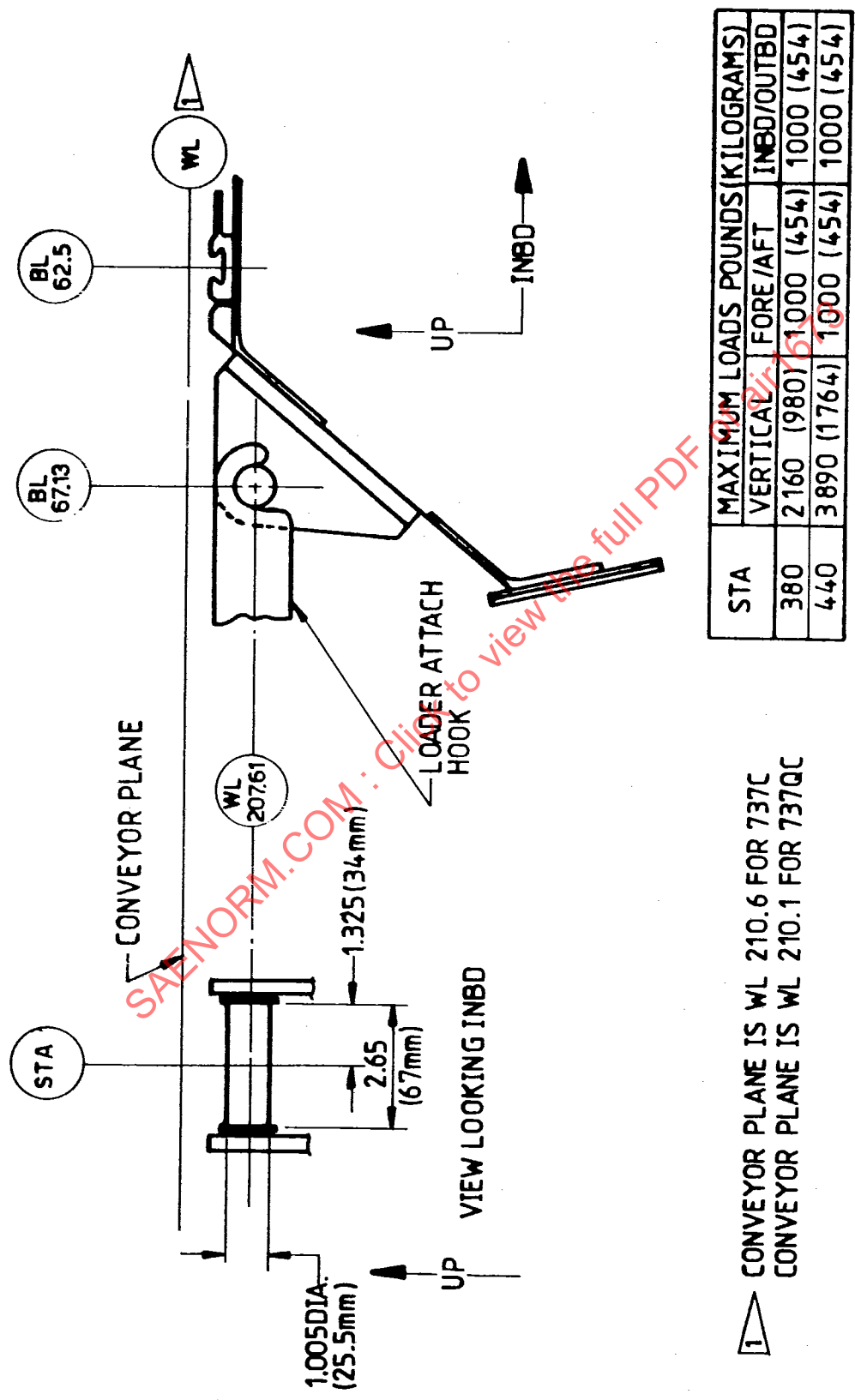


FIGURE 4A
B737 - LOADER ATTACHMENT. MAIN DECK CARGO DOOR

B.737



CONVEYOR PLANE IS WL 210.6 FOR 737C
CONVEYOR PLANE IS WL 210.1 FOR 737QC

FIGURE 4B
B.737 LOADER ATTACHMENT

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**BOEING 747 - LOWER DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT**

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B.747

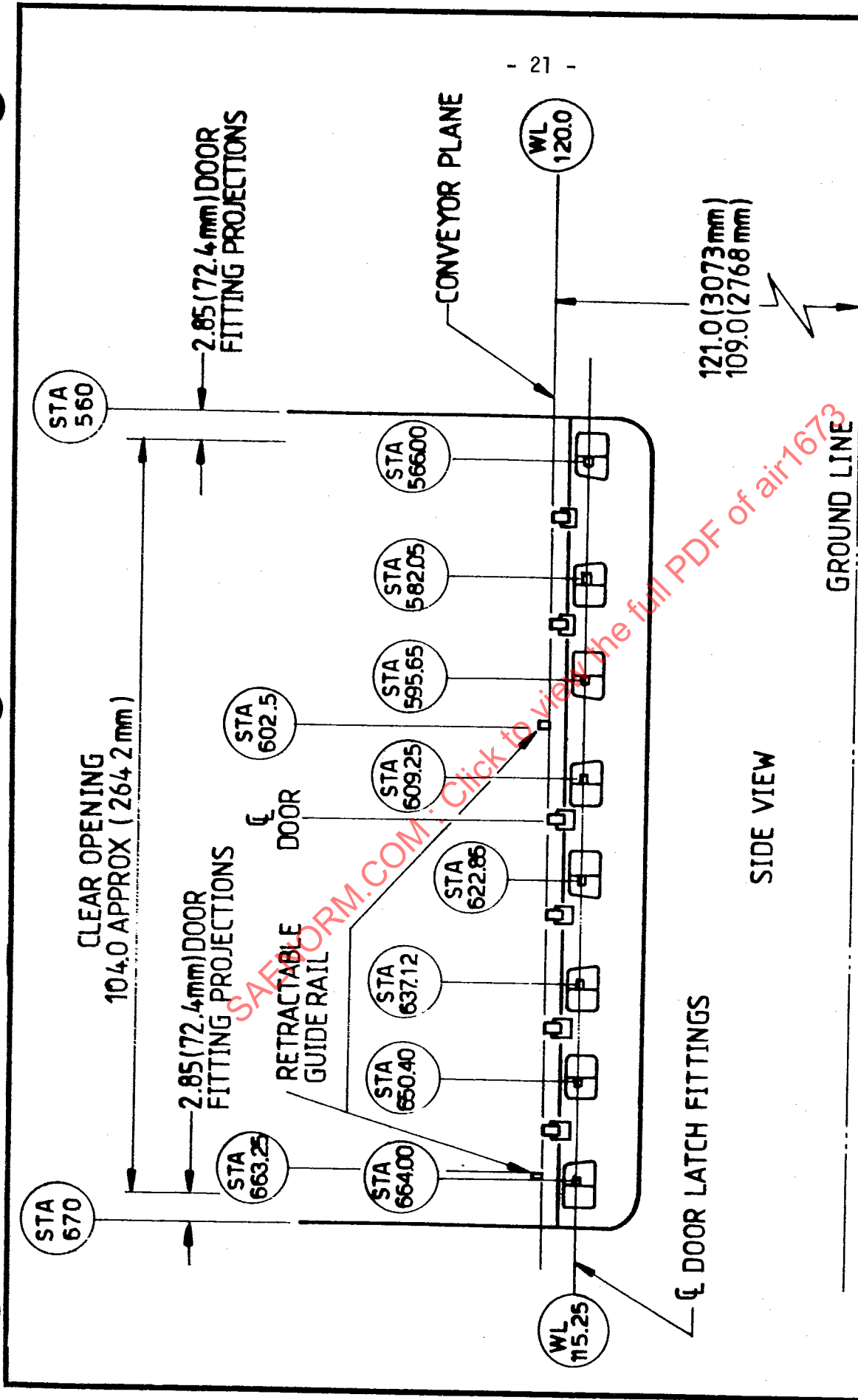


FIGURE 5A
BOEING 747 LOWER LOBE - FORWARD CARGO COMPARTMENT

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B.747

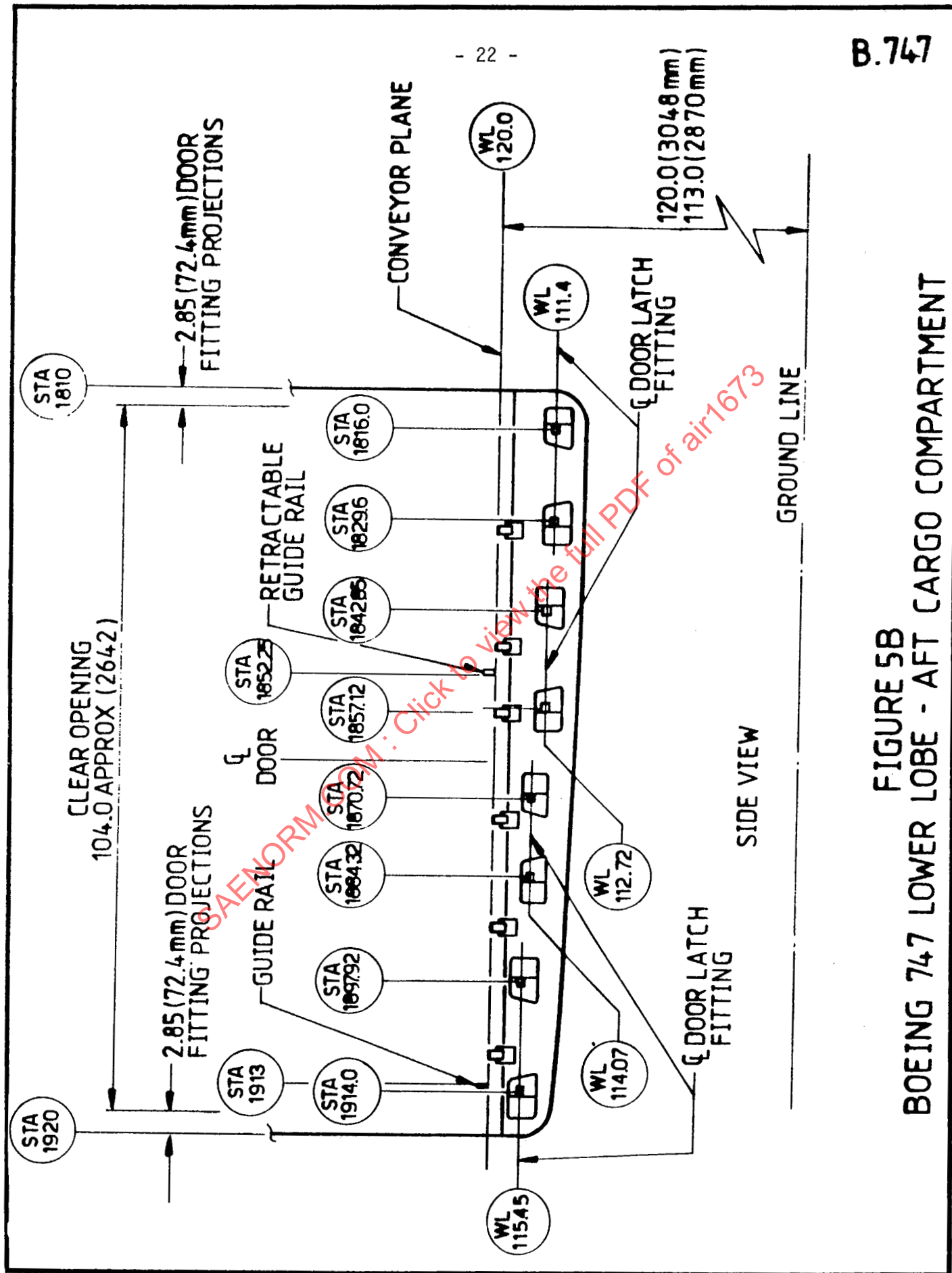


FIGURE 5B
BOEING 747 LOWER LOBE - AFT CARGO COMPARTMENT

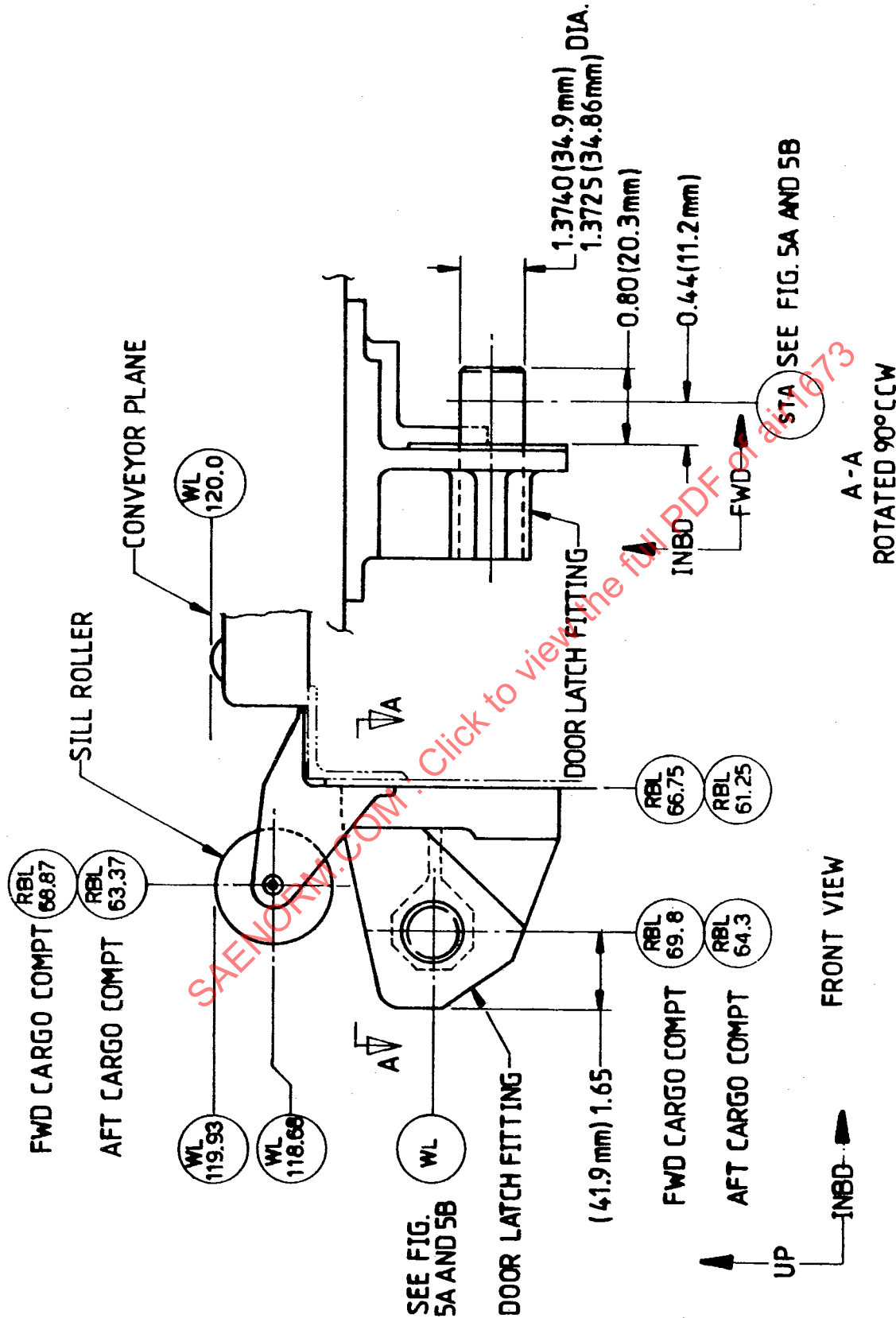
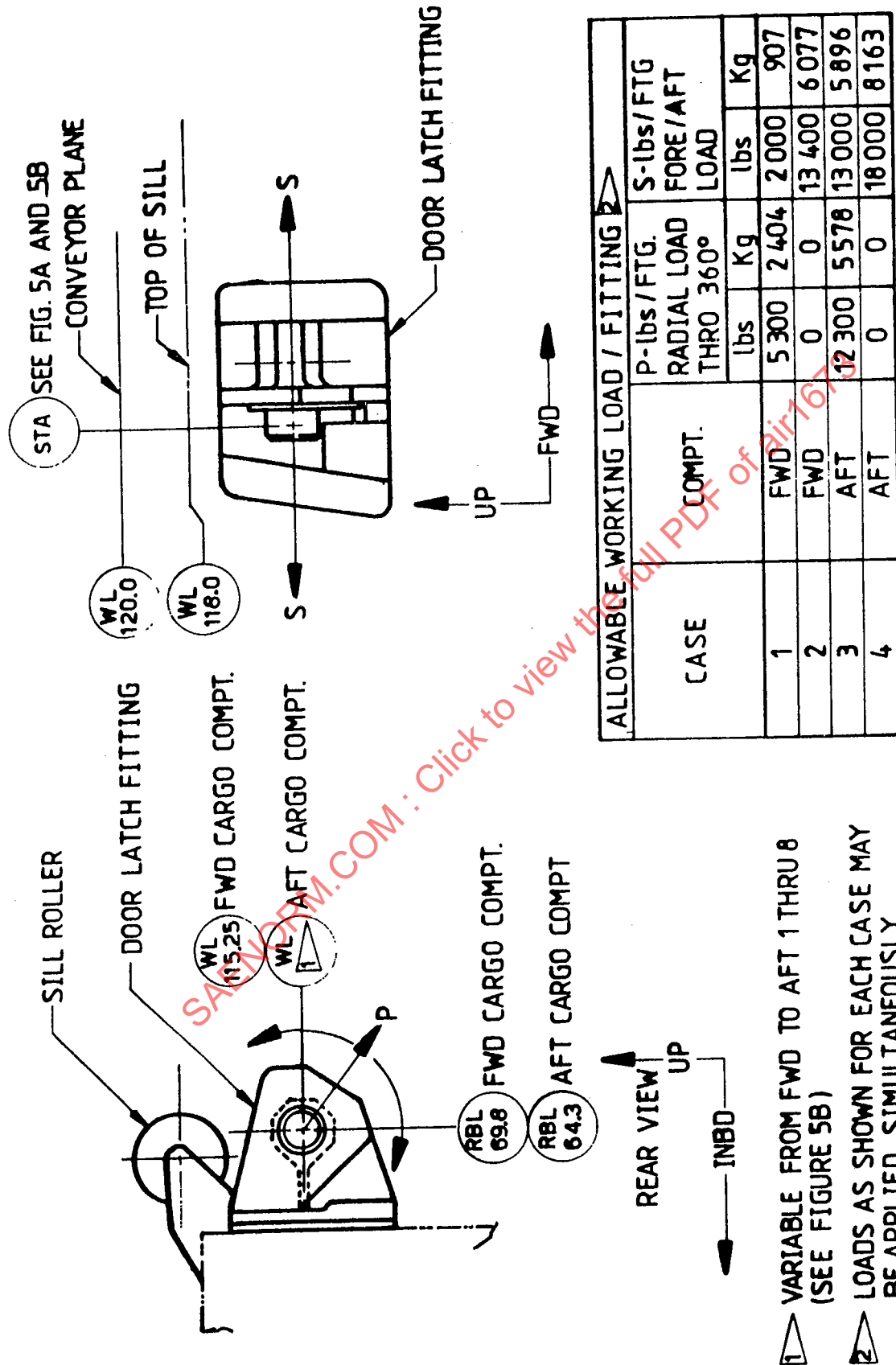


FIGURE 5C
BOEING 747 LOWER LOBE
GENERAL ARRANGEMENT OF DOOR LATCH FITTINGS

- 24 -



B. 747

FIGURE 5D
BOEING 747 LOWER LOBE, ALLOWABLE LOADS

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**BOEING 747 - MAIN DECK, NOSE AND SIDE
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT**

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B.747

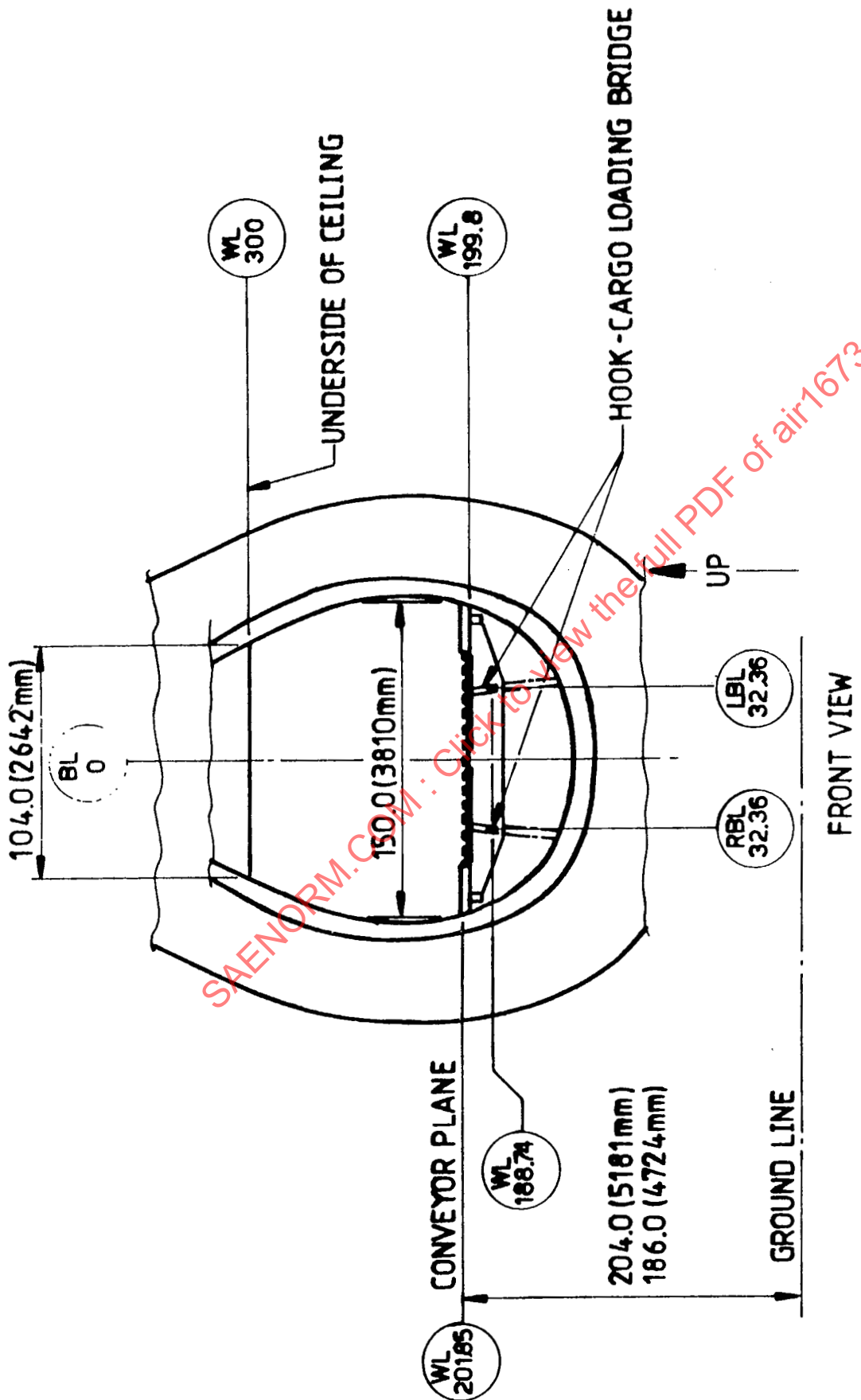


FIGURE 6A
BOEING 747 F AND C MAIN DECK NOSE DOOR
GENERAL ARRANGEMENT DOOR SILL INTERFACE

B.747

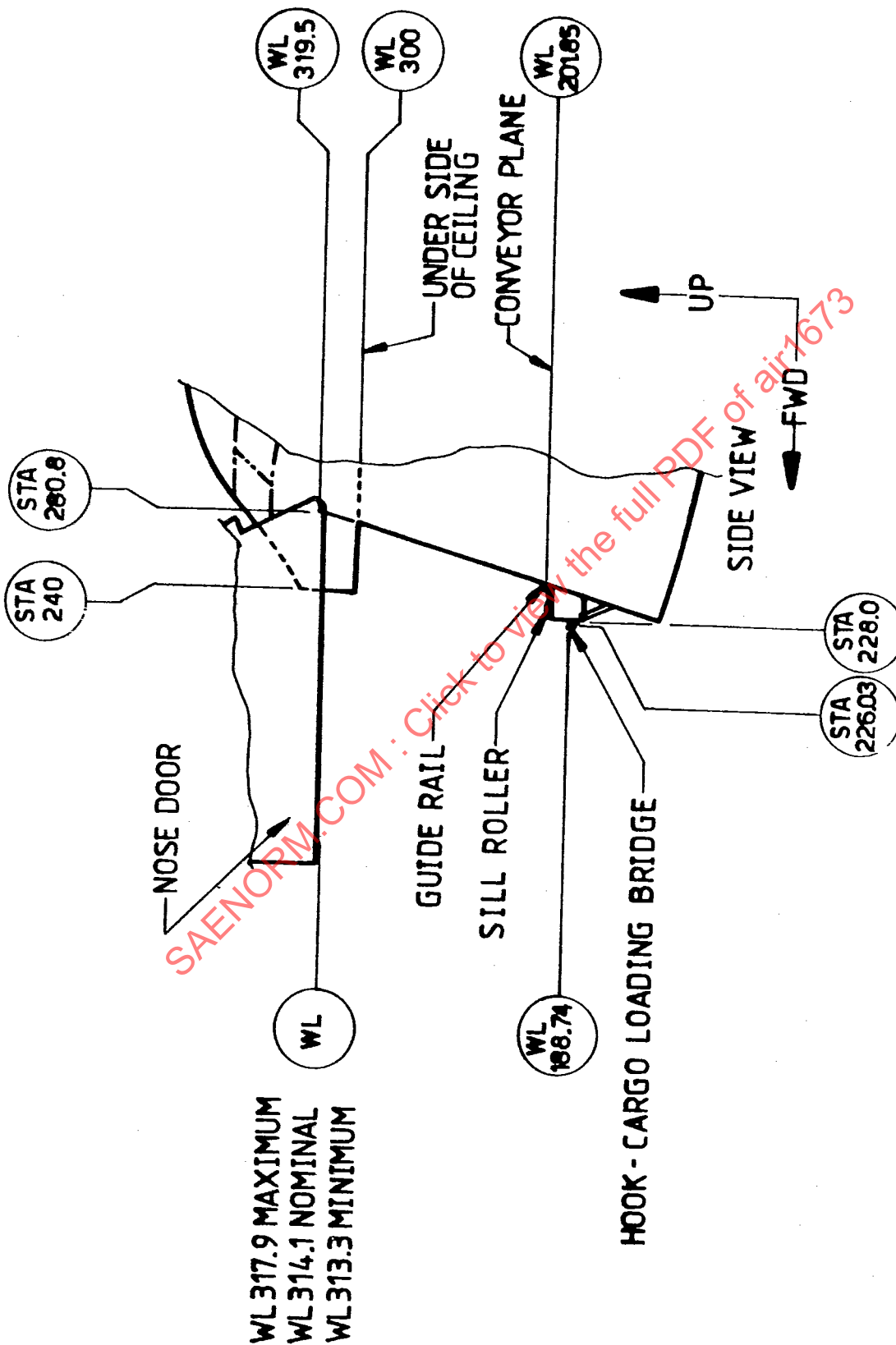


FIGURE 6B
BOEING 747 F AND C MAIN DECK NOSE DOOR
DOOR SILL INTERFACE

B.747

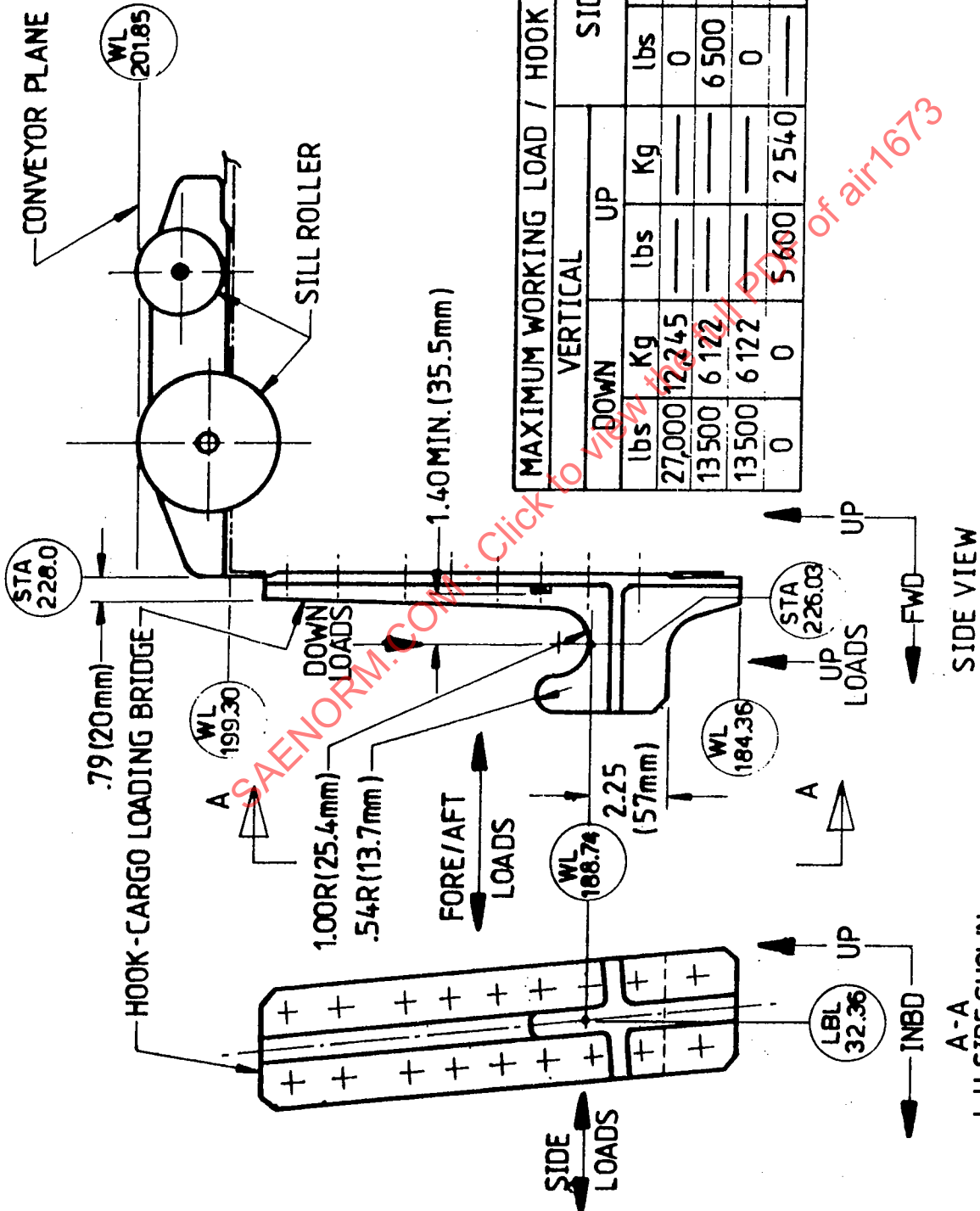


FIGURE 6C
BOEING 747 F AND C MAIN DECK NOSE DOOR
CARGO LOADER HOOKS

B.747

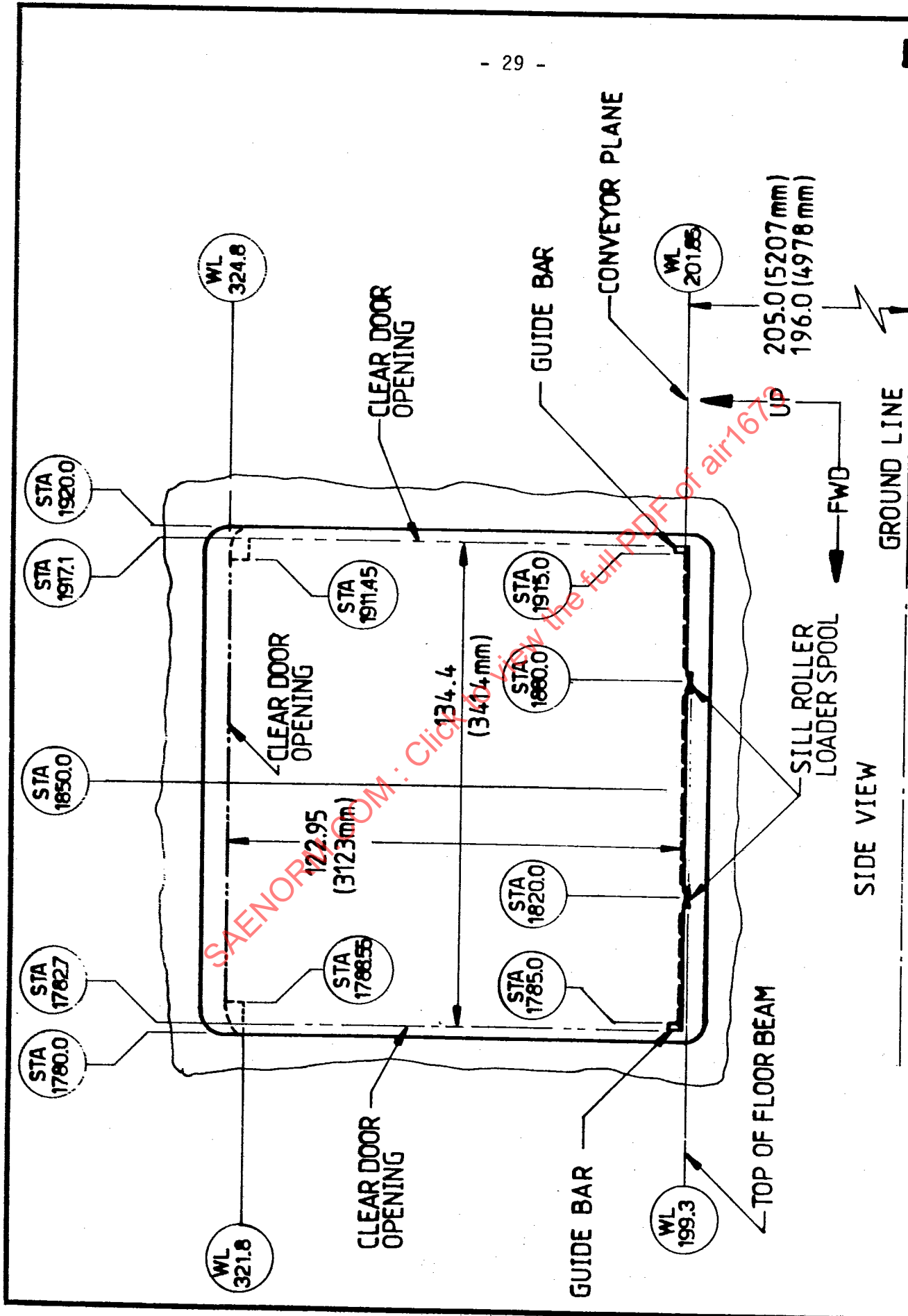


FIGURE 6D
BOEING 747 F/C AND COMBI MAIN DECK SIDE DOOR

FIGURE 6E

B.747

LOADER ATTACHMENT ALLOWABLE WORKING LOAD / FITTING			
DOWN	FORE/AFT	SIDE	
13.5 KIPS	± 4.0 KIPS	± 4.0 KIPS	
6122 Kg	1814 Kg	1814 Kg	

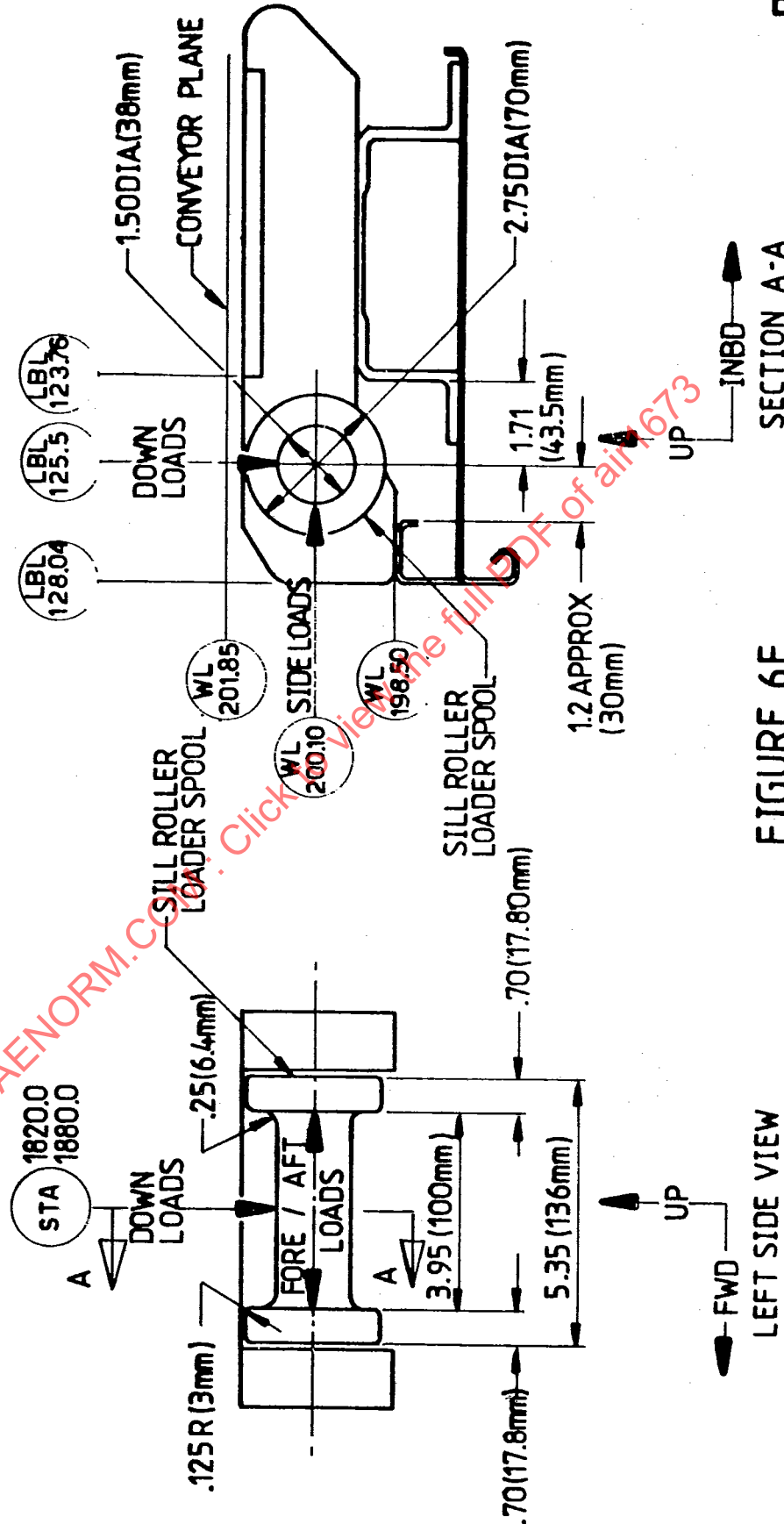


FIGURE 6F
BOEING 747 F.C AND COMBI MAIN DECK SIDE DOOR
SILL ROLLER LOADER SPOOL AND ALLOWABLE LOADS

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**BOEING 767 - LOWER DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT**

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B767

STA	MAXIMUM LOADS POUNDS (KILOGRAMS)		
	VERTICAL DN	FORE/AFT	INBD/OUTBD
550	4500 (2041)	2000 (907)	±3600 (1633)
605	4500 (2041)	2000 (907)	±3600 (1633)
1280.50	4500 (2041)	2000 (907)	±3600 (1633)
1335.50	4500 (2041)	2000 (907)	±3600 (1633)

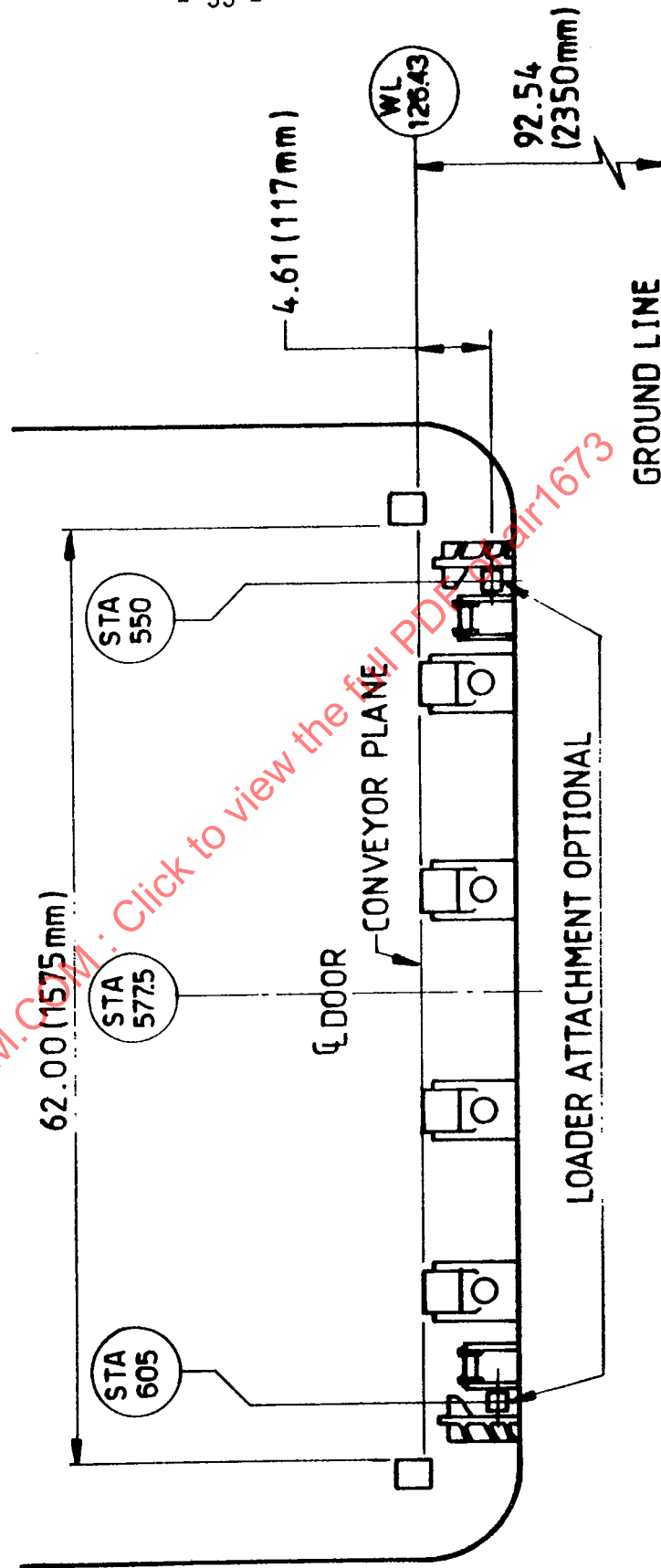


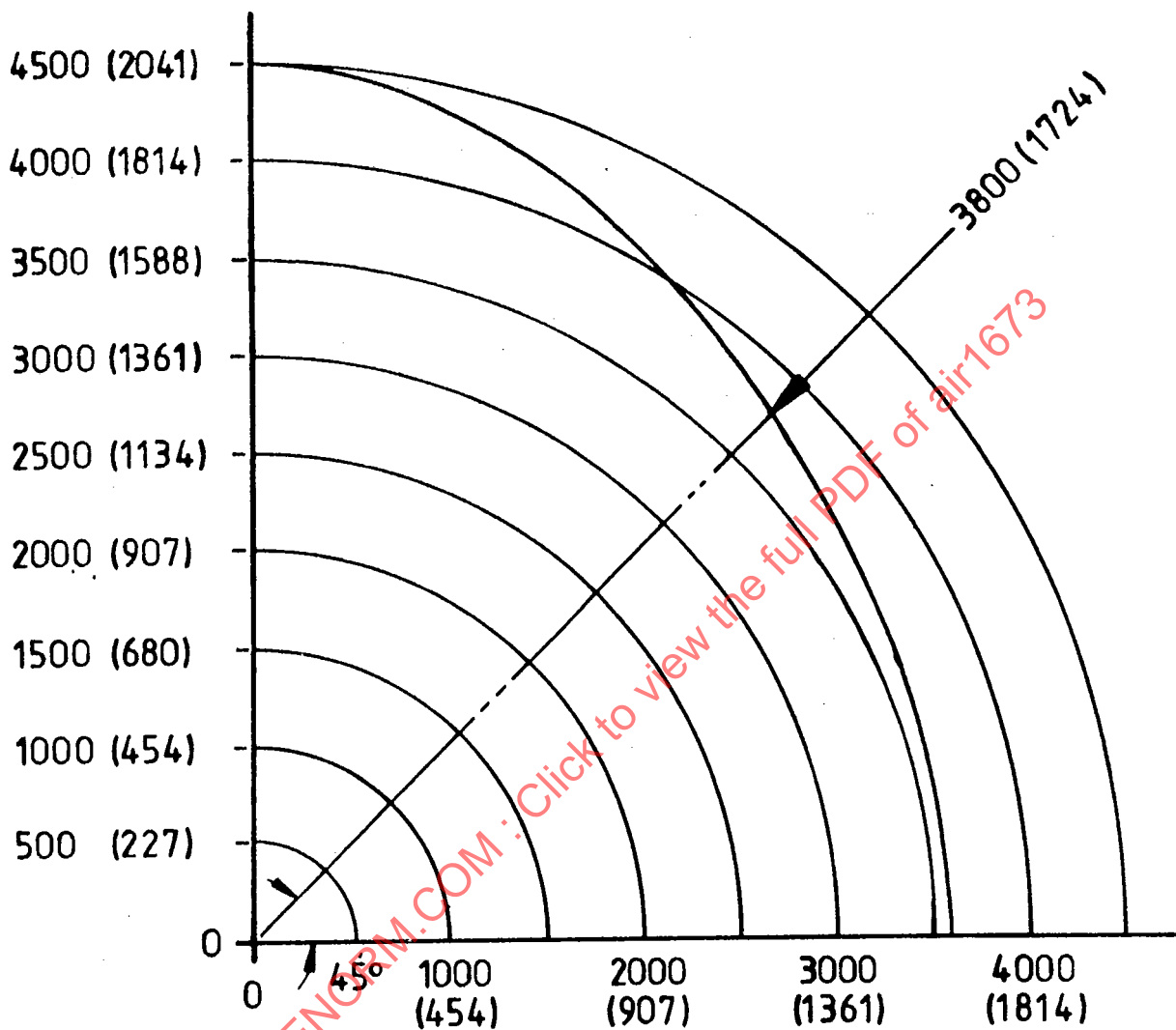
FIGURE 7A
BOEING 767 FORWARD AND AFT LOWER HOLD
OPTION FOR COMPATIBILITY OF LOADERS USED ON DC10

Technical drawing of a loader hook assembly, showing side and top views with dimensions and labels.

Labels and Dimensions:

- CONVEYOR PLANE**: Indicated by a horizontal line.
- RBL (47.70)**: Radius of the bottom of the hook.
- 0.50 (13mm)**: Dimension from conveyor plane to the bottom of the hook.
- 4.61 (117mm)**: Dimension from the conveyor plane to the top of the hook.
- WL 126.43**: Width of the hook at the top.
- WL 121.82**: Width of the hook at the bottom.
- DOOR LATCH FITTING**: Label for the fitting on the side view.
- DOOR LATCH FITTING**: Label for the fitting on the top view.
- 0.50 (13mm)**: Dimension from the door latch fitting to the centerline of the hook.
- 1.75 (45mm)**: Dimension from the centerline of the hook to the centerline of the door latch fitting.
- 1.183 DIA. (30mm)**: Diameter of the door latch fitting.
- 0.25 (6mm)**: Dimension from the centerline of the door latch fitting to the centerline of the hook.
- 1**: Slope indicator for the door latch fitting.
- MINIMUM CLEARANCE BETWEEN LOADER HOOK AND AIRPLANE**: Indicated by a dimension line and a slope indicator.
- UP**: Direction of travel.
- INBD**: Direction of travel.
- STA**: Stationing point.
- A - A**: Section line for the door latch fitting.

FIGURE 7B
BOEING 767 FORWARD AND AFT LOWER HOLDS
OPTION FOR COMPATIBILITY OF LOADERS USED ON DC10



POLAR LOAD DIAGRAM (ALLOWABLE) - LBS (KILOS)

FIGURE 7B-1

STA.	MAXIMUM LOADS POUNDS (KILOGRAMS)			
	VERTICAL DN	VERTICAL UP	FORE / AFT	INBD / OUTBD
549.12	3500 (1588)	1000 (454)	±1000 (454)	±2000 (907)
589.7	7000 (3175)	1900 (862)	±1900 (862)	±3800 (1724)
1279.62	3500 (1588)	1000 (454)	±1000 (454)	±2000 (907)
1320.2	7000 (3175)	1900 (862)	±1900 (862)	±3800 (1724)

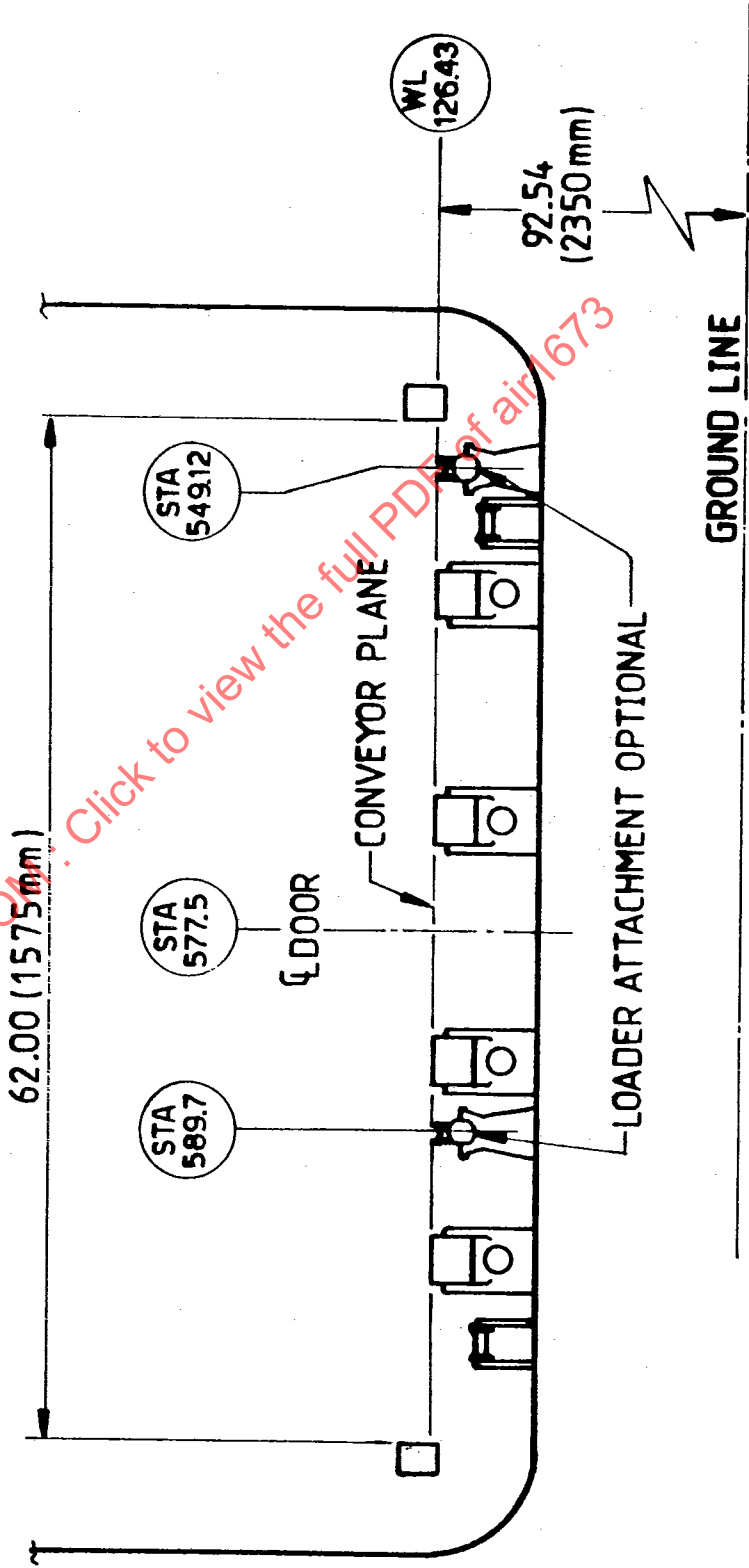


FIGURE 7C
BOEING 767 FORWARD LOWER HOLD
OPTION FOR COMPATIBILITY OF LOADERS USED ON L1011

B. 767

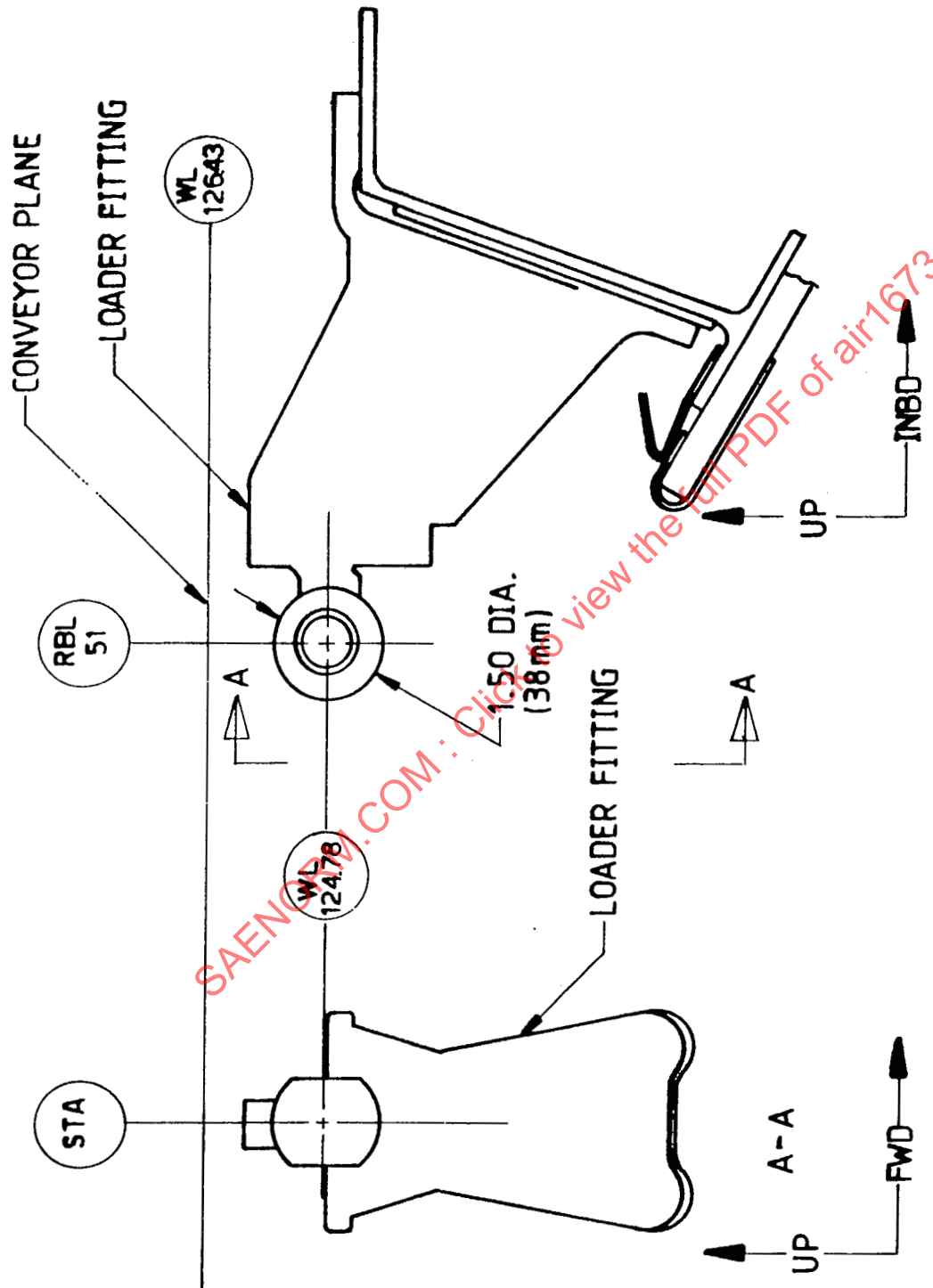


FIGURE 7D
BOEING 767 FORWARD AND AFT LOWER HOLD
OPTION FOR COMPATABILITY OF LOADER USED ON L1011

B767

- 1 $\triangle$ LOADER ATTACHMENT FOR PALLET LOADING
- 2 $\triangle$ PREFERRED LOADER ATTACHMENT FOR CONTAINER LOADING
- 3 $\triangle$ THREE POINT LOADER FOR PALLET AND CONTAINER LOADING
- 4 $\triangle$ LOADS MAY BE APPLIED SIMULTANEOUSLY

STA	MAXIMUM LOADS POUNDS (KILOGRAMS)	
	VERTICAL	INBD/OUTBD
487.71	6200 (2812)	2000 (907)
500.29	3000 (1360)	1000 (454)
509.71	7000 (3175)	2300 (1043)
544.29	7200 (3266)	2300 (1043)
551.71	4500 (2041)	2000 (907)
573.71	5300 (2404)	2000 (907)
586.29	7000 (3175)	2300 (1043)
595.71	3000 (1360)	1000 (454)
608.29	4500 (2041)	2000 (907)

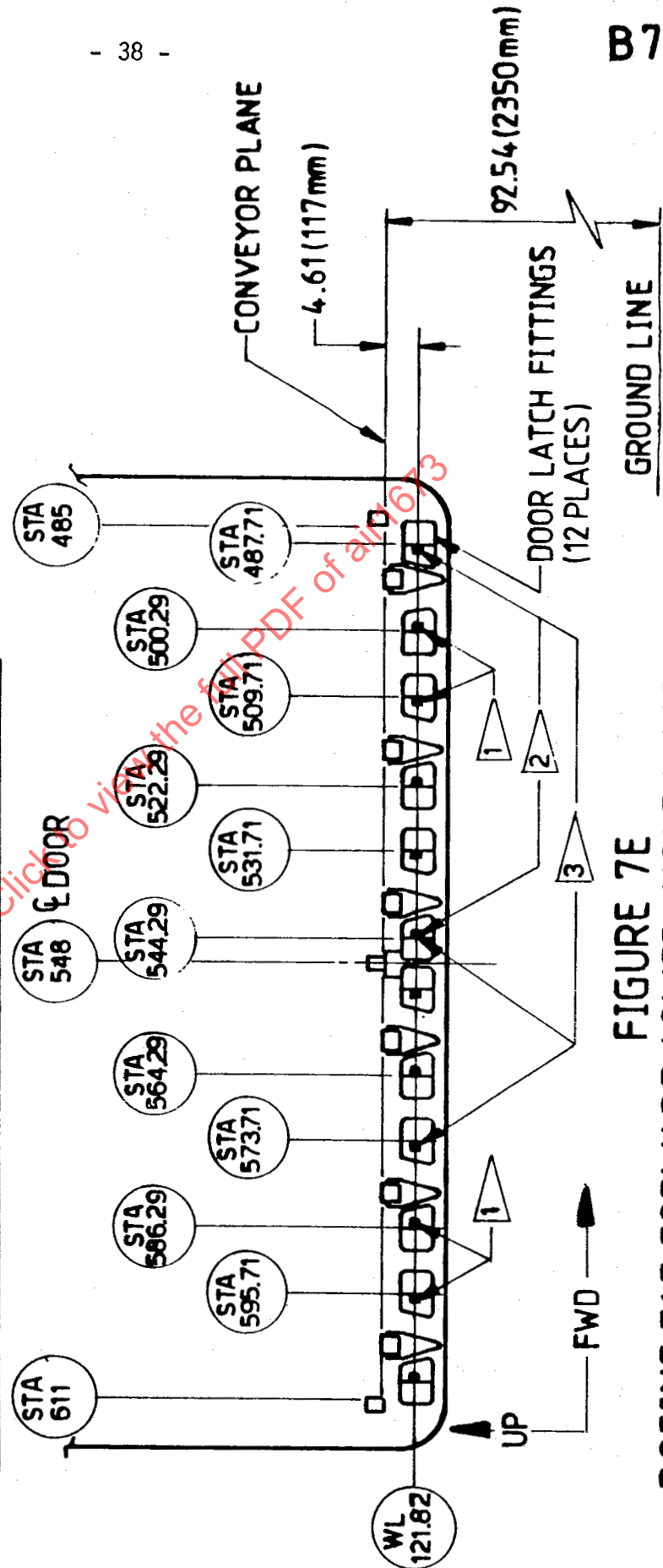


FIGURE 7E
BOEING 767 FORWARD LOWER HOLD WIDE DOOR OPTION

B.767

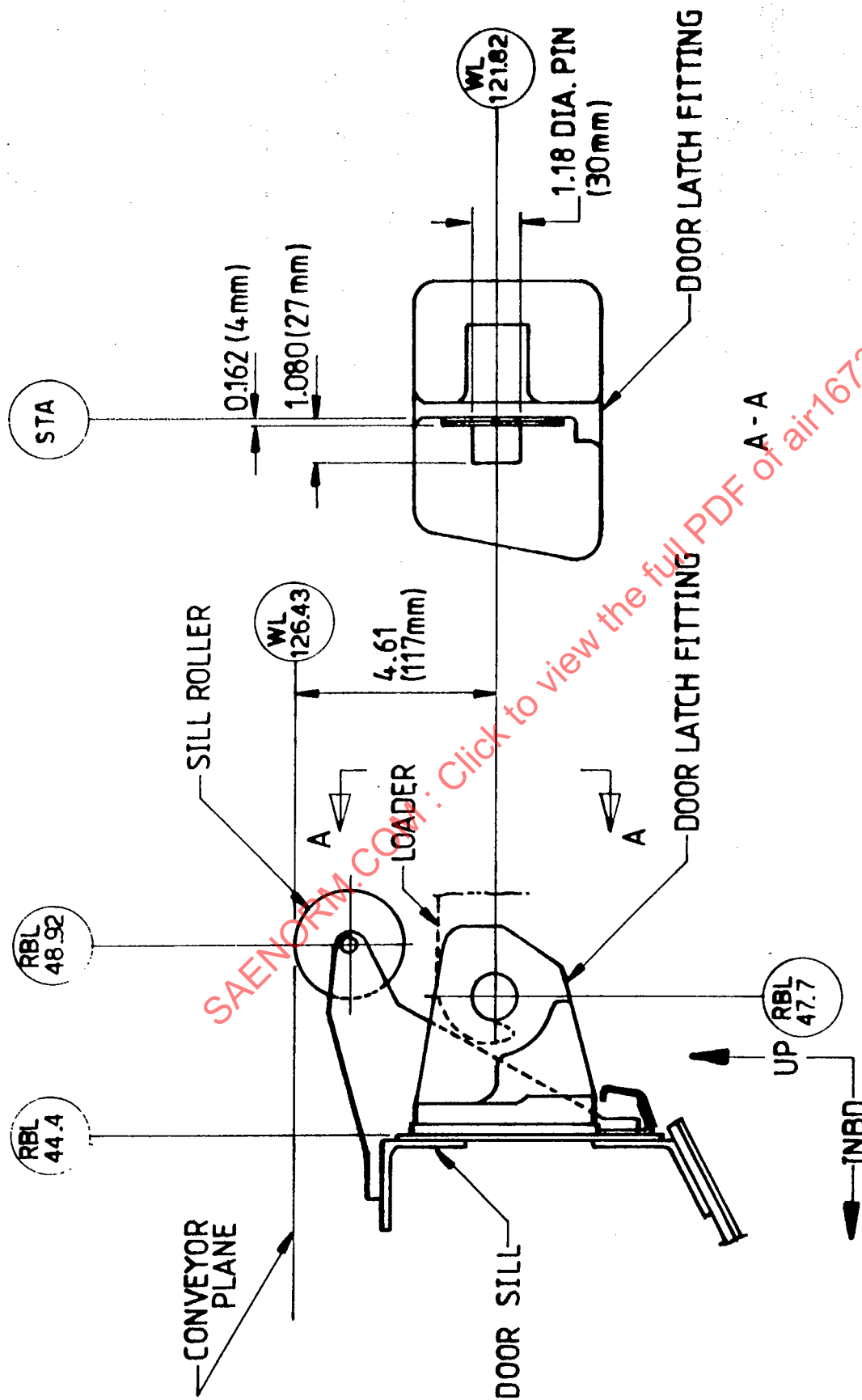


FIGURE 7F
BOEING 767 FORWARD LOWER HOLD-WIDE DOOR OPTION
GENERAL ARRANGEMENT OF GROUND LOADER LATCH ON FITTING

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DOUGLAS DC-8 - MAIN DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAIL FOR GROUND LOADING EQUIPMENT

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DC-8 MODEL 55F CARGO LOADING ENVELOPE

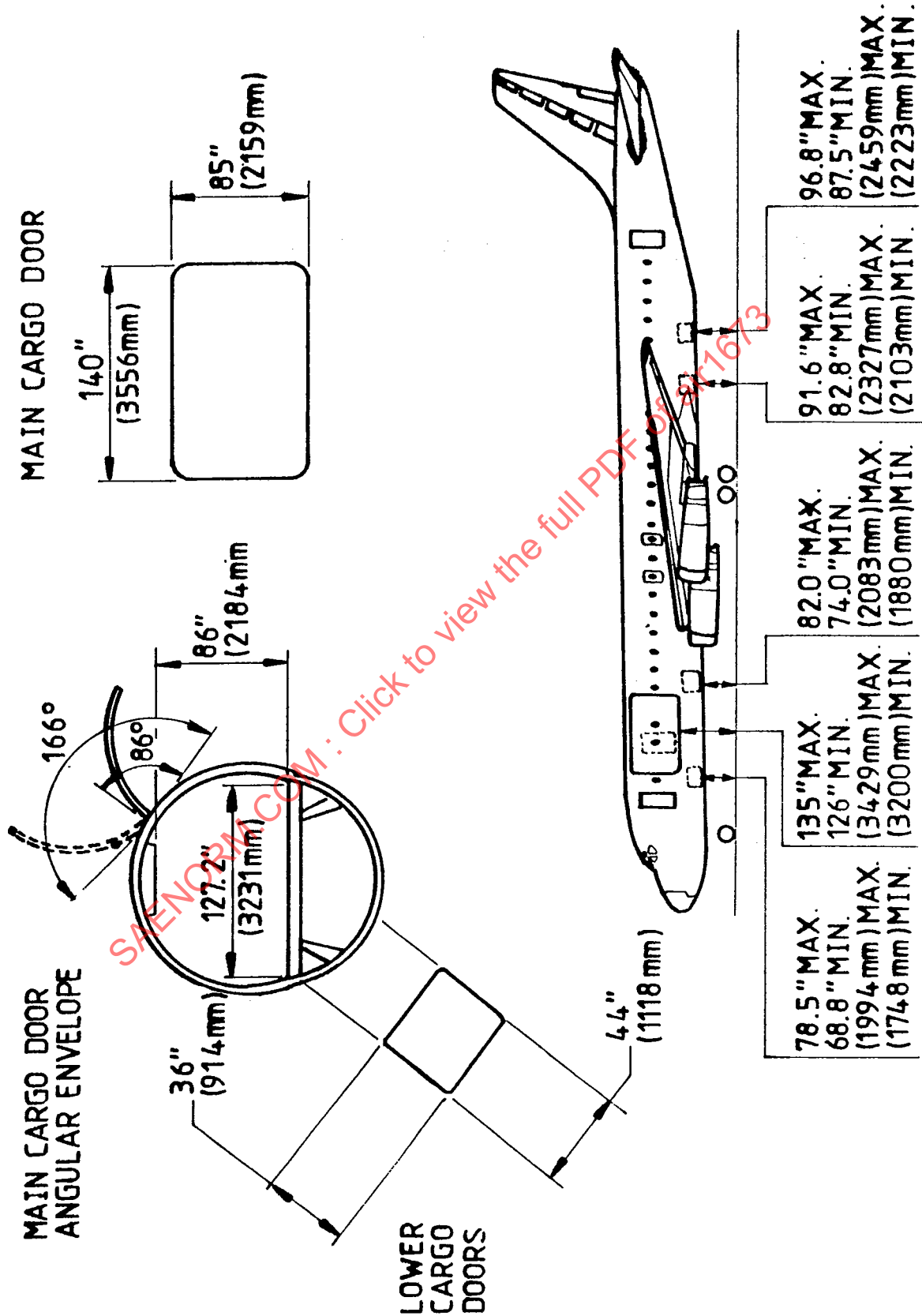


FIGURE 8A

DC-8 MODEL 61F
CARGO LOADING ENVELOPE

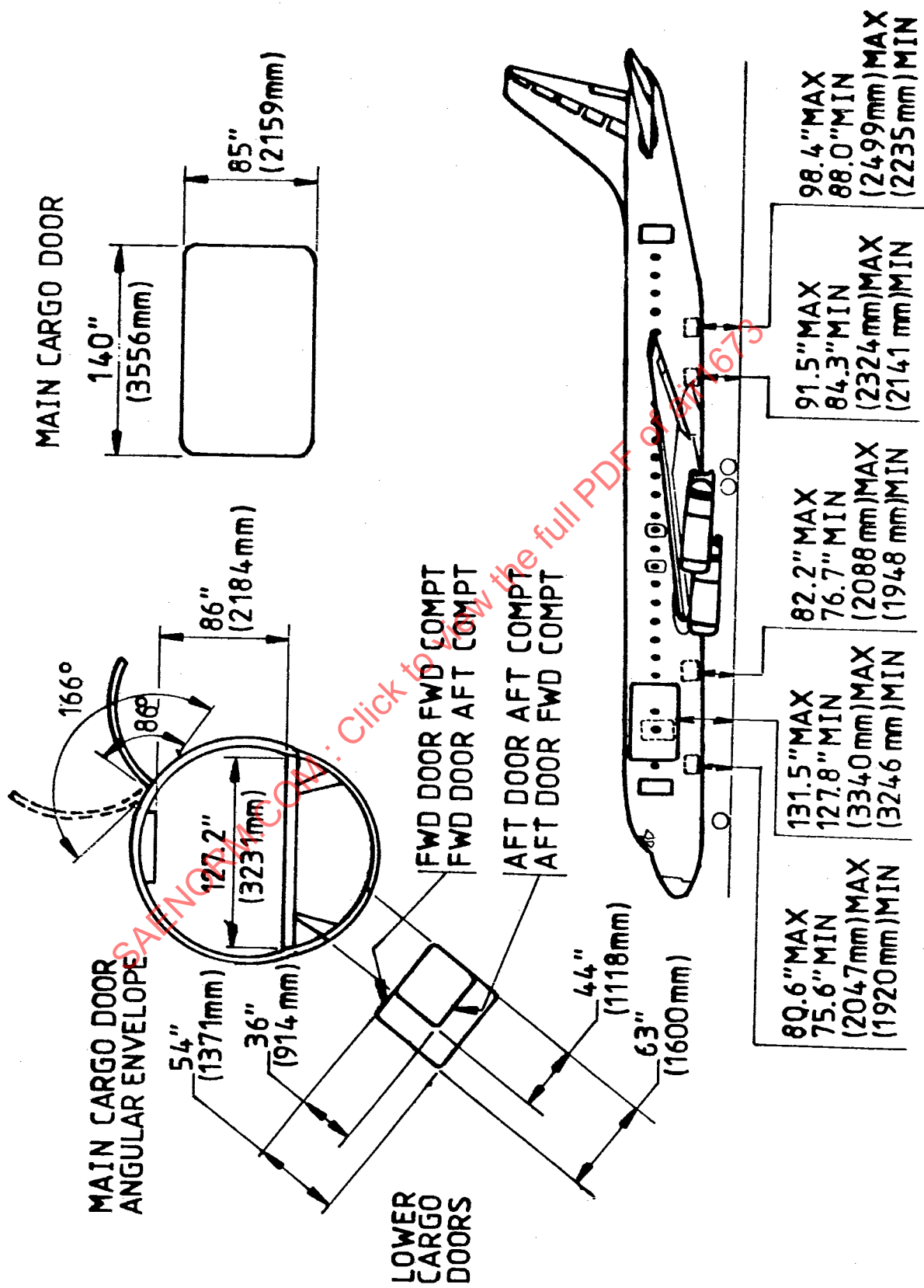


FIGURE 8B

DC-8 MODEL 62F CARGO LOADING ENVELOPE

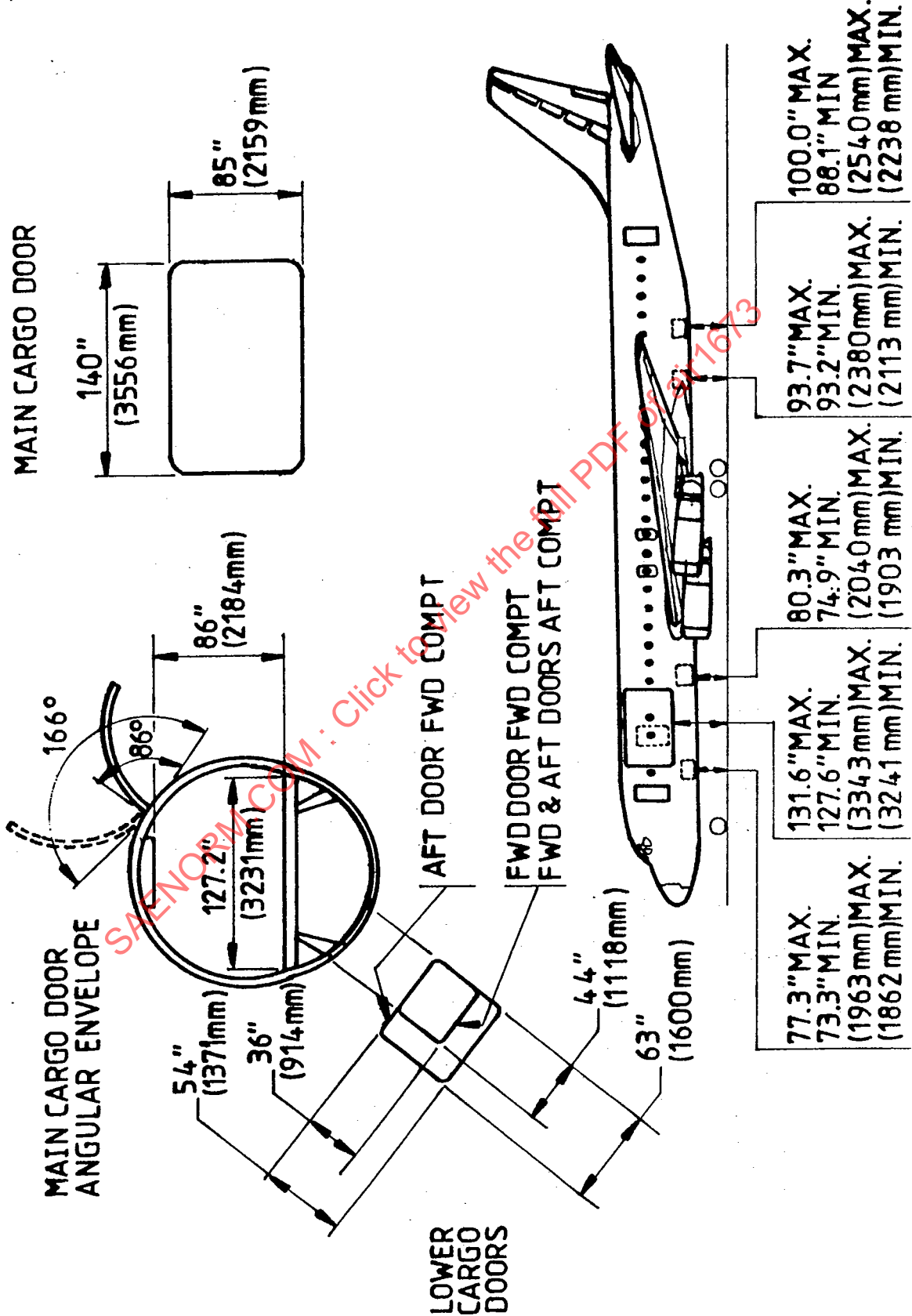


FIGURE 8C

DC-8 MODEL 63F CARGO LOADING ENVELOPE

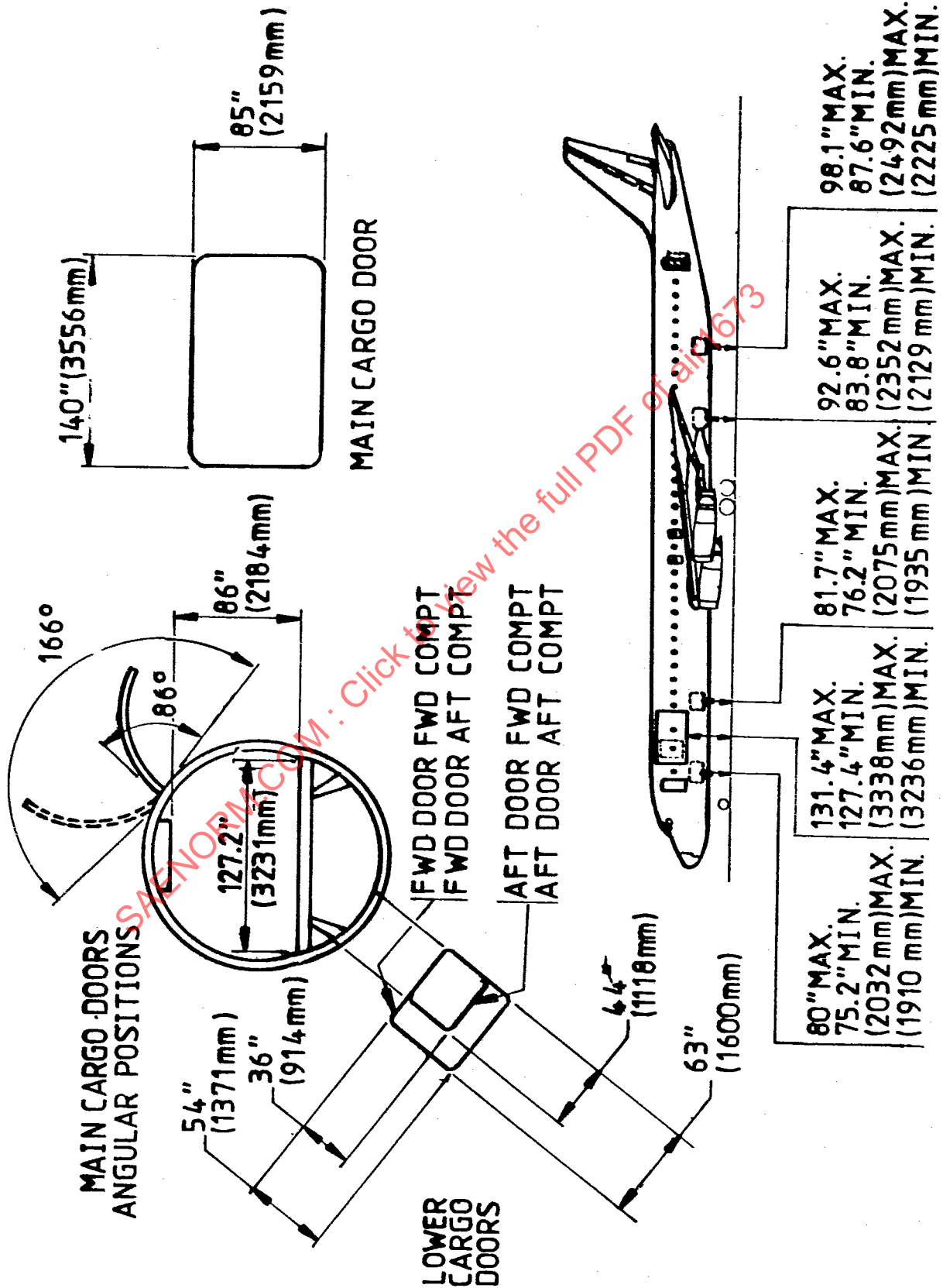


FIGURE 8D

- 45 -

DC.8

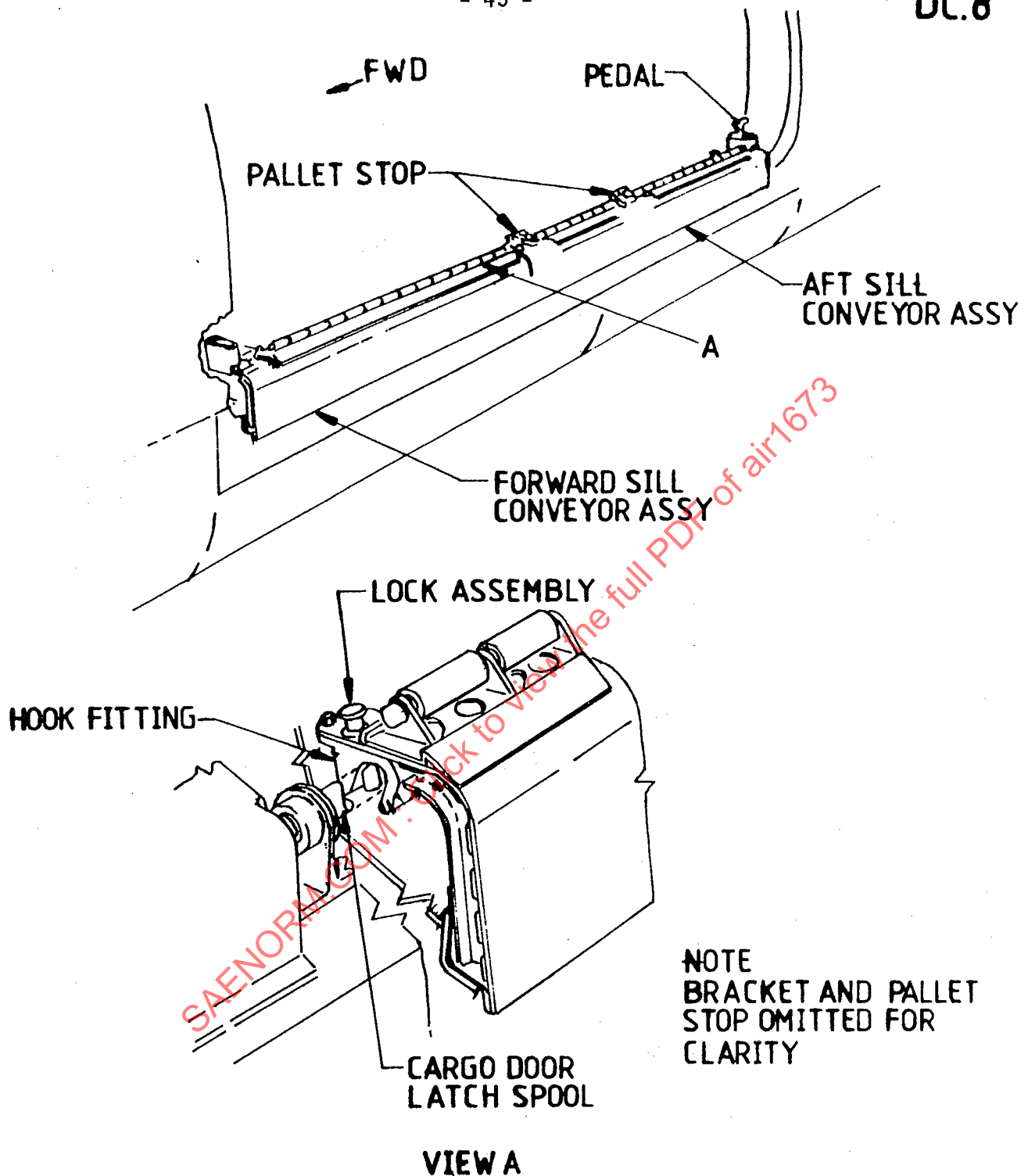


FIGURE 8E
DC-8 MAIN CABIN CARGO DOOR
SILL CONVEYOR - REMOVABLE

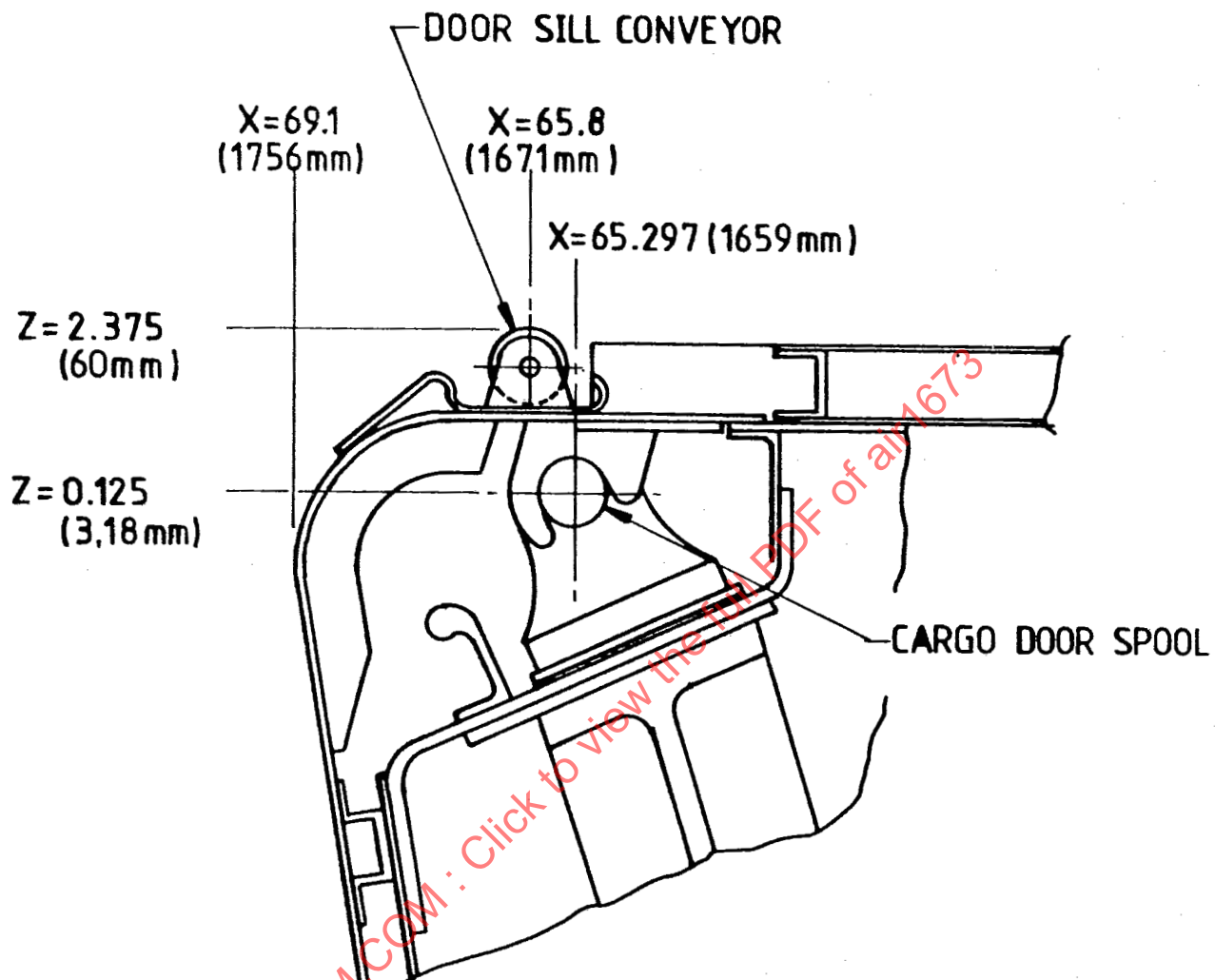


FIGURE 8F
DC-8 CROSS SECTION THRU MAIN CABIN
DOOR SILL CONVEYOR - REMOVABLE

- 47 -

DC 8

CARGO DOOR SPOOL
STAY=(FOR SERIES 61 & 63)

143.062 (3634 mm)

156.937 (3986 mm)

183.062 (4650 mm)

196.937 (5002 mm)

216.937 (5510 mm)

243.062 (6174 mm)

256.937 (6526 mm)

NOTE

FOR SERIES 62 ADD 300 INCHES

FOR SERIES 50 ADD 340 INCHES

0.9390 DIA.
(23.85mm)1.781
(45.24mm)R0.094
(2.39mm)

X=65.297 (1659mm)

Z=0.125
(3.18mm)

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FIGURE 8G
DC-8 CROSS SECTION THRU MAIN CABIN
DOOR JAMB

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DOUGLAS DC9 - MAIN DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT

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DC.9

DC-9 SERIES CARGO LOADING ENVELOPE

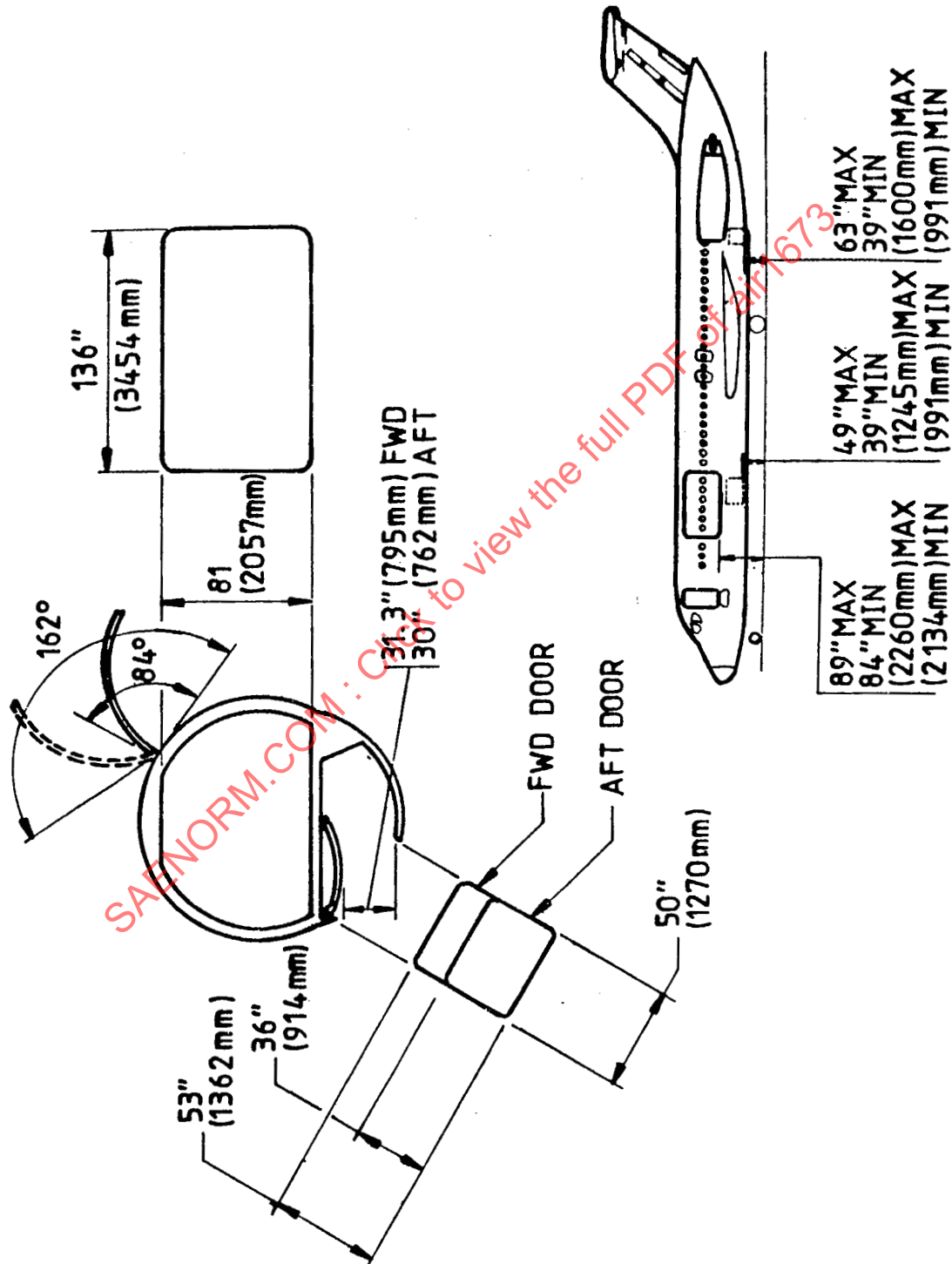


FIGURE 9A

- 50 -

DC.9

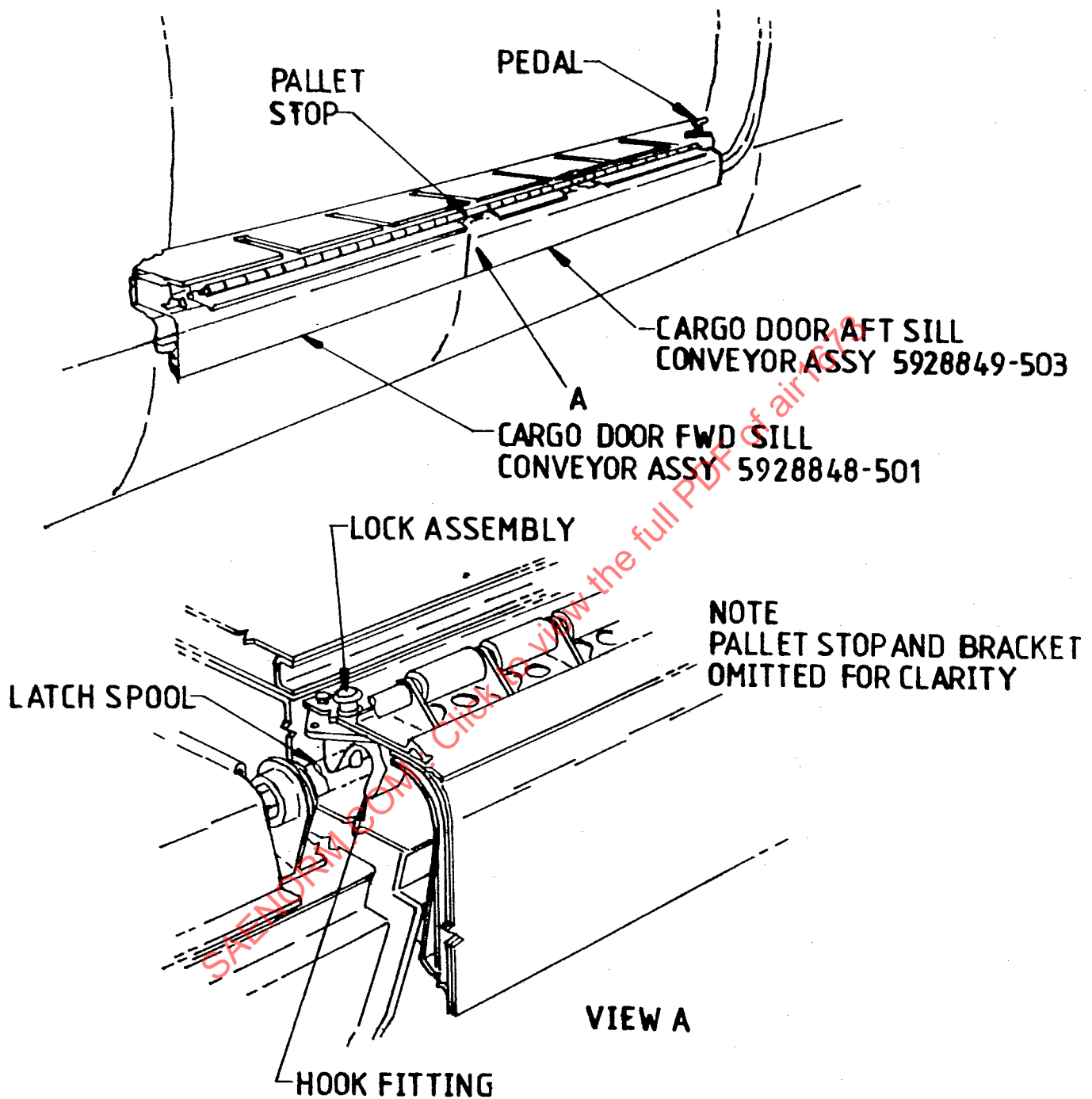


FIGURE 9B
DC-9 MAIN CABIN CARGO DOOR
SILL CONVEYOR-REMOVABLE

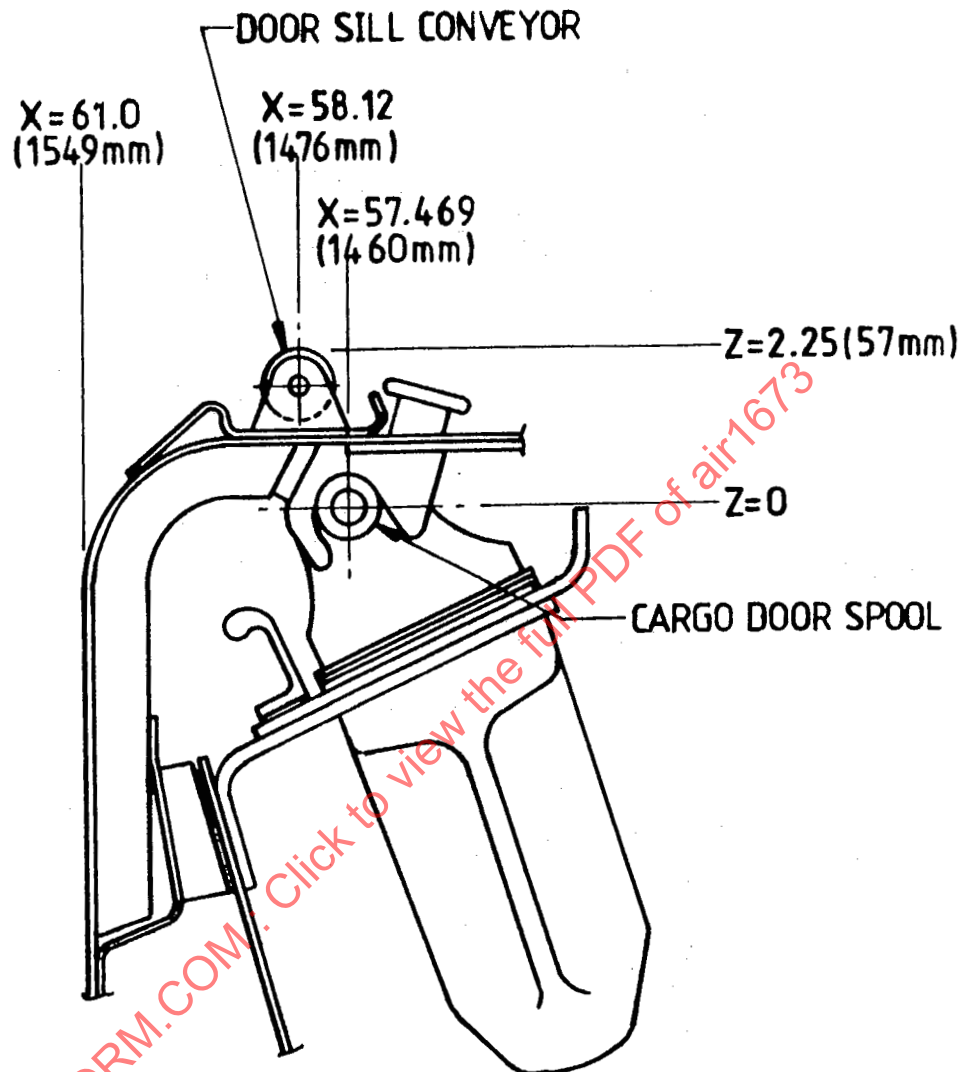


FIGURE 9C
DC-9 CROSS SECTION THRU MAIN CABIN
DOOR SILL CONVEYOR - REMOVABLE

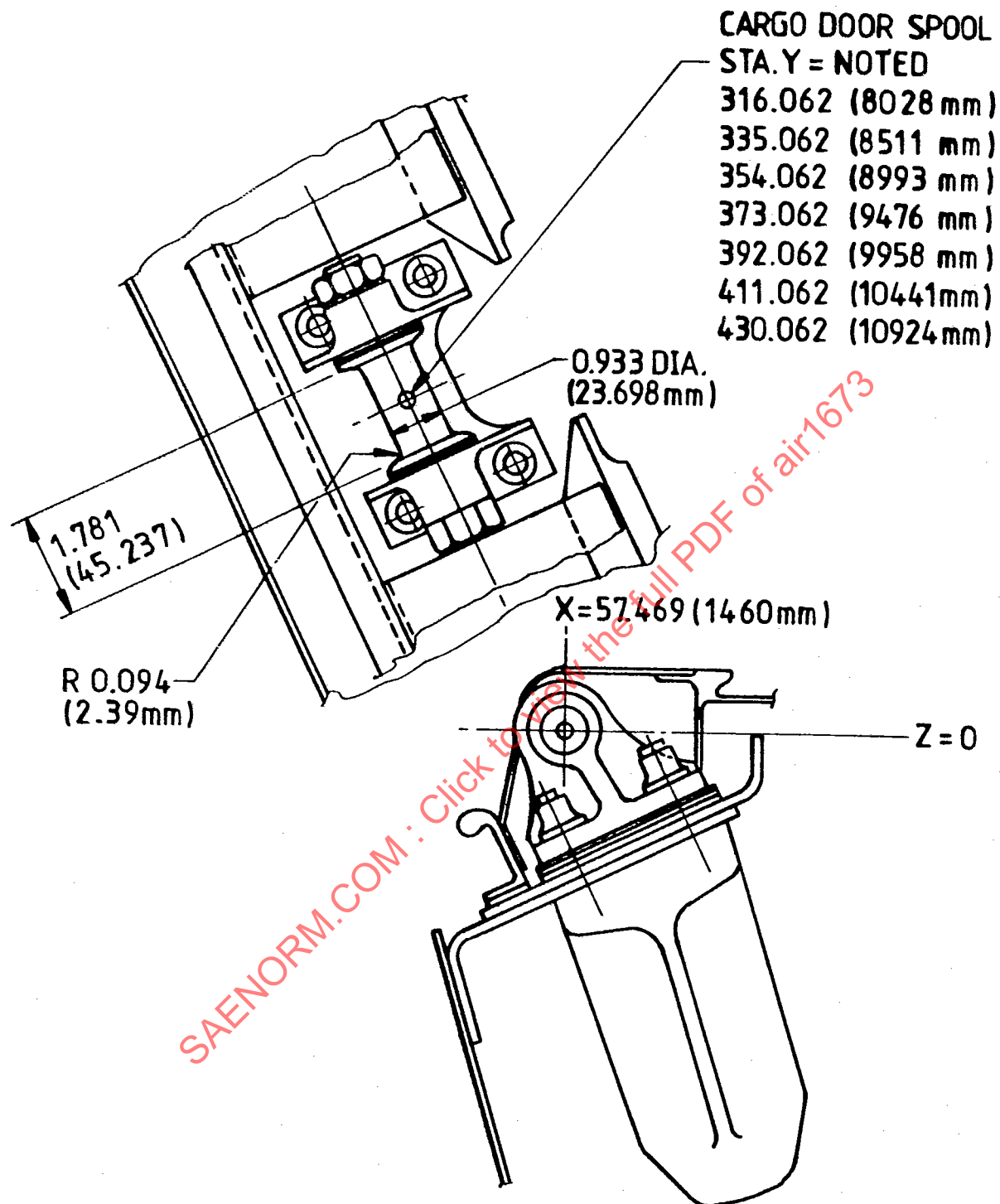


FIGURE 9D
DC-9 CROSS SECTION THRU MAIN CABIN
DOOR JAMB

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DOUGLAS DC10 - LOWER DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT

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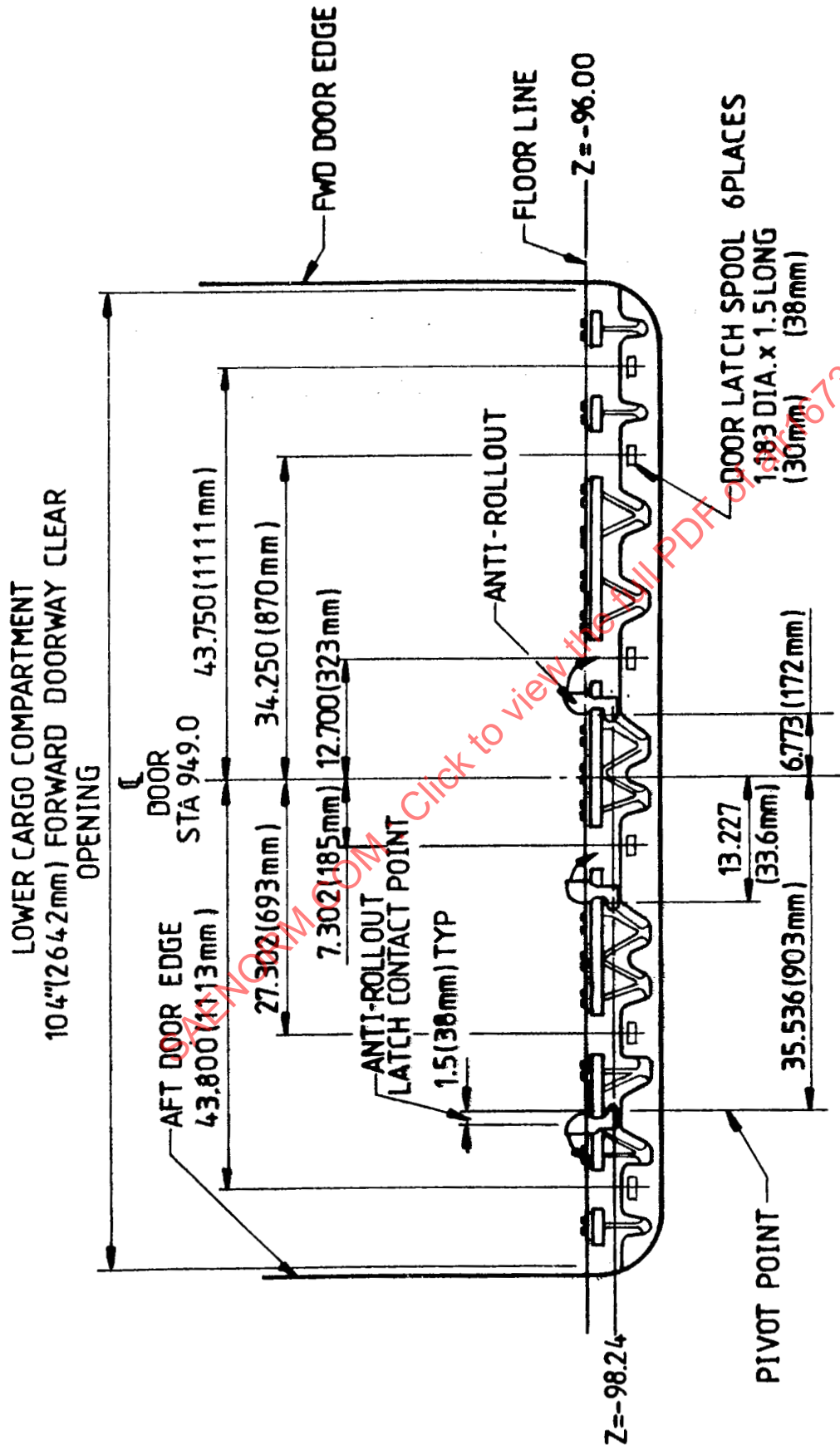


FIGURE 10A
DC10 LOWER COMPARTMENT DOOR

DC10

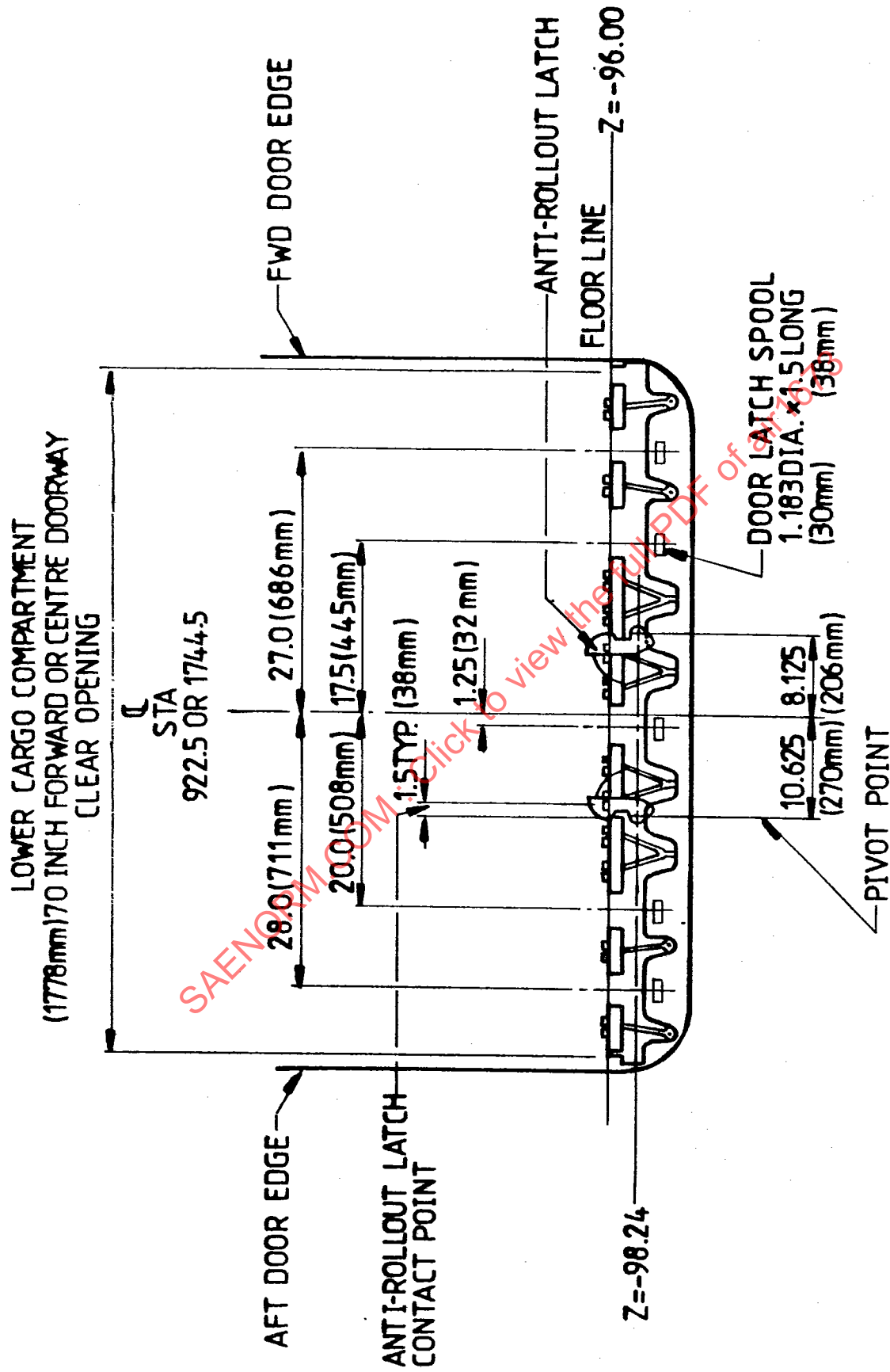


FIGURE 10B
DC10 LOWER COMPARTMENT DOOR

DC10

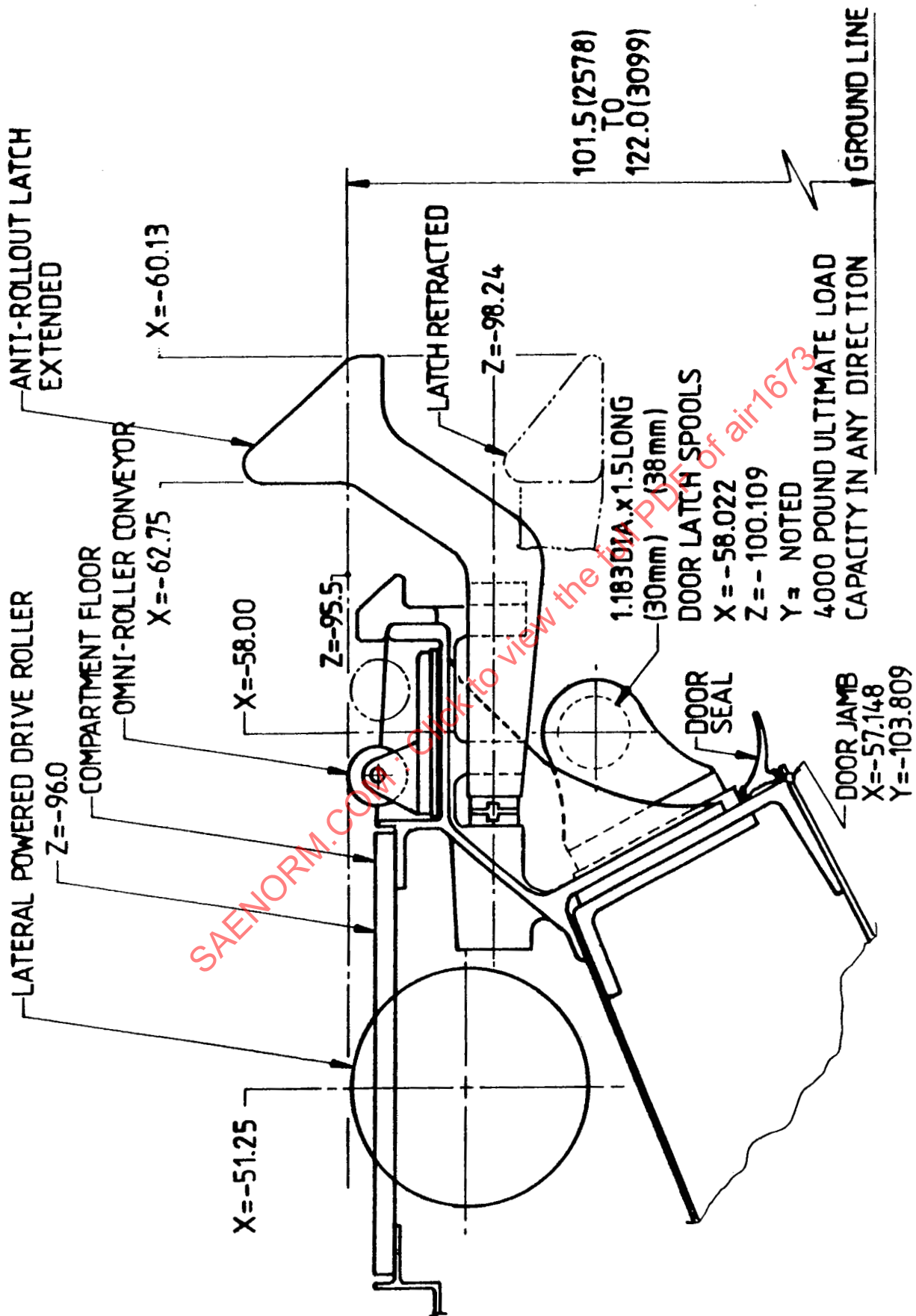
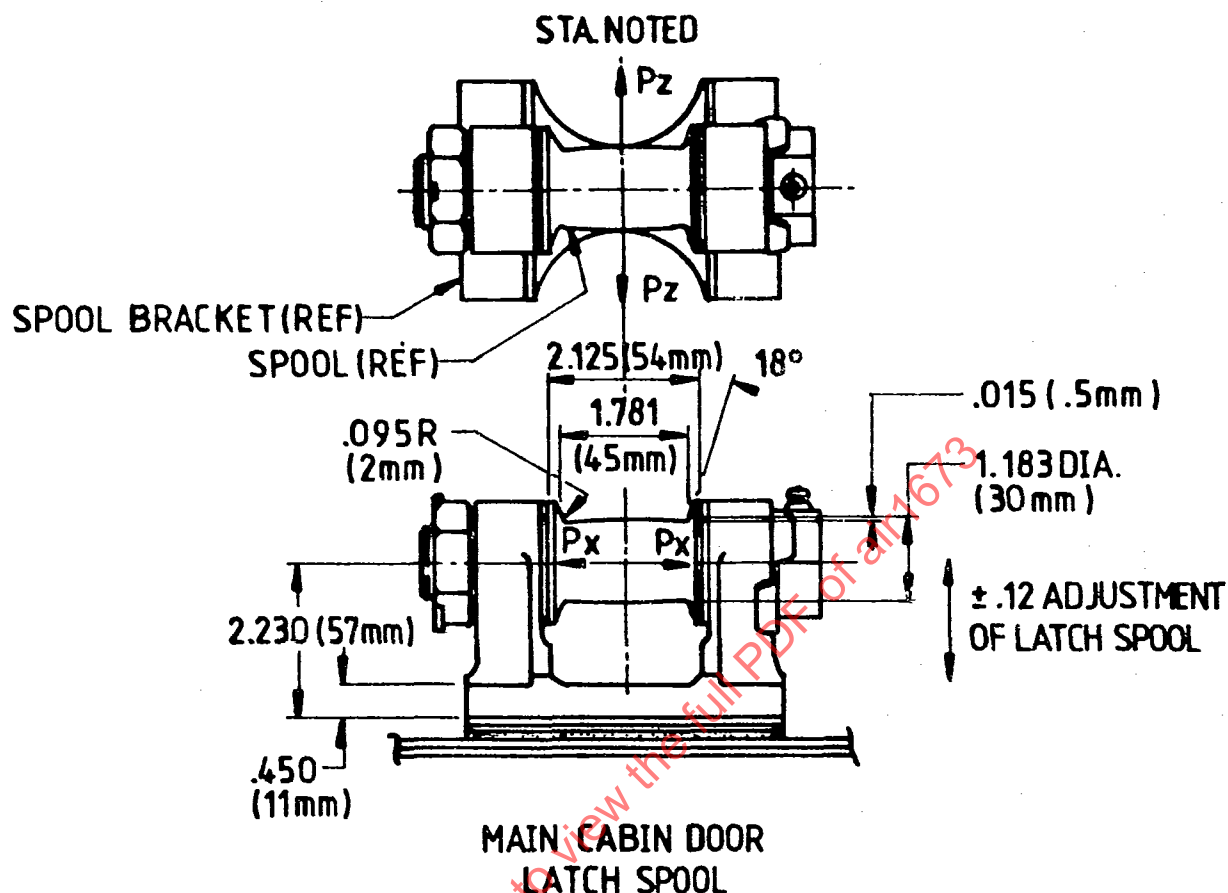


FIGURE 10C
DC10 CROSS SECTION THRU LOWER CARGO DOOR JAMB

DC 10

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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
NO 1 - 632.292	15 000	10 000	15 000	5 000	0	0	0	0
NO 2 - 644.792	15 000	0	15 000	5 000	0	0	0	0
NO 3 - 666.292	15 000	0	15 000	0	0	4 500	12 000	1 500
NO 4 - 692.292	15 000	0	15 000	0	0	0	0	0
NO 5 - 712.292	15 000	0	15 000	0	0	4 500	12 000	1 500
NO 6 - 737.708	15 000	0	15 000	5 000	0	0	0	0
NO 7 - 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		

FIG. 10D - DC 10 DOOR SPOOL LOADS

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DOUGLAS DC10 - MAIN DECK
CARGO DOOR SILL ATTACHMENT FITTING
DETAILS FOR GROUND LOADING EQUIPMENT

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DC10

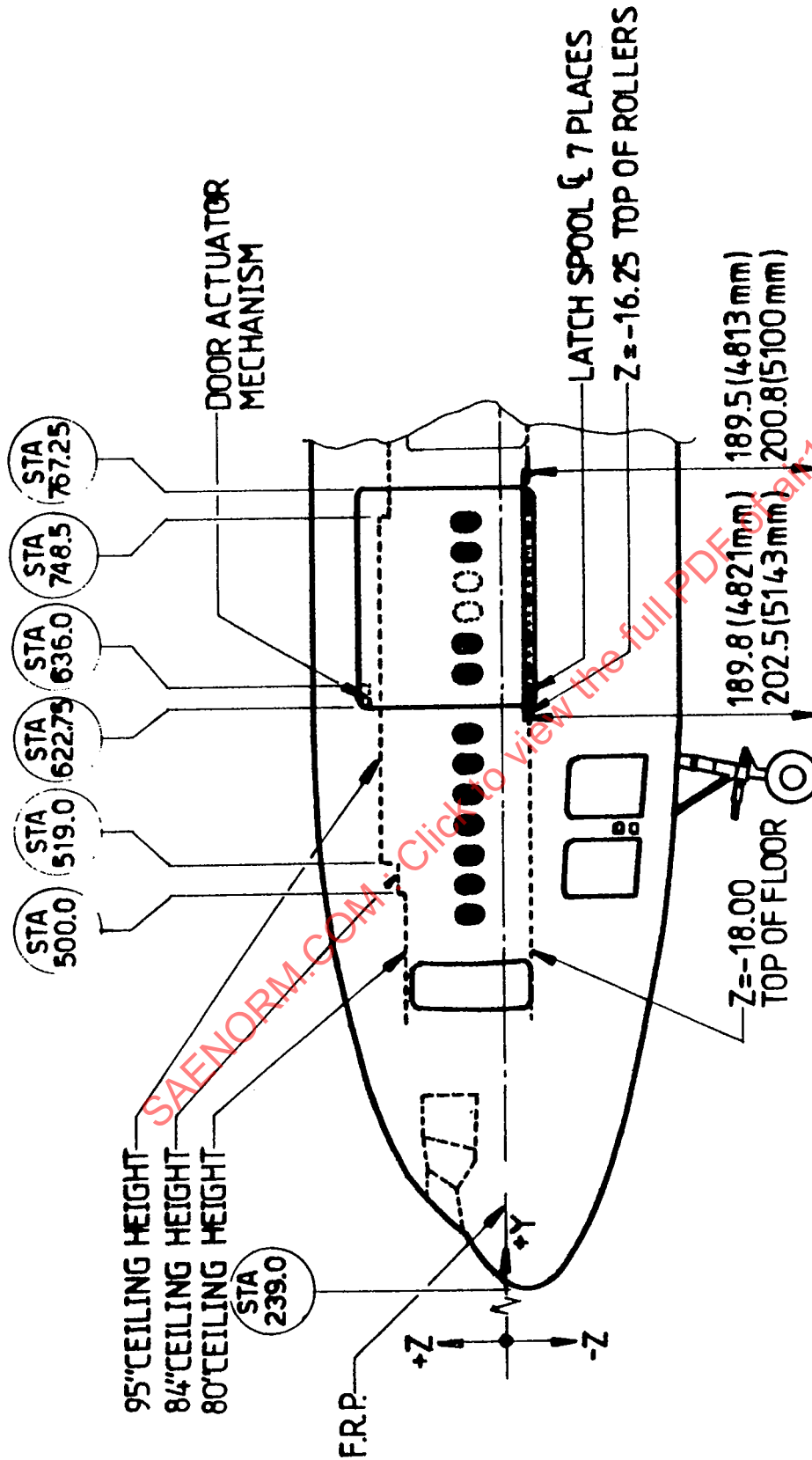


FIGURE 11A
DC-10 MAIN DECK CARGO DOOR

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DC10

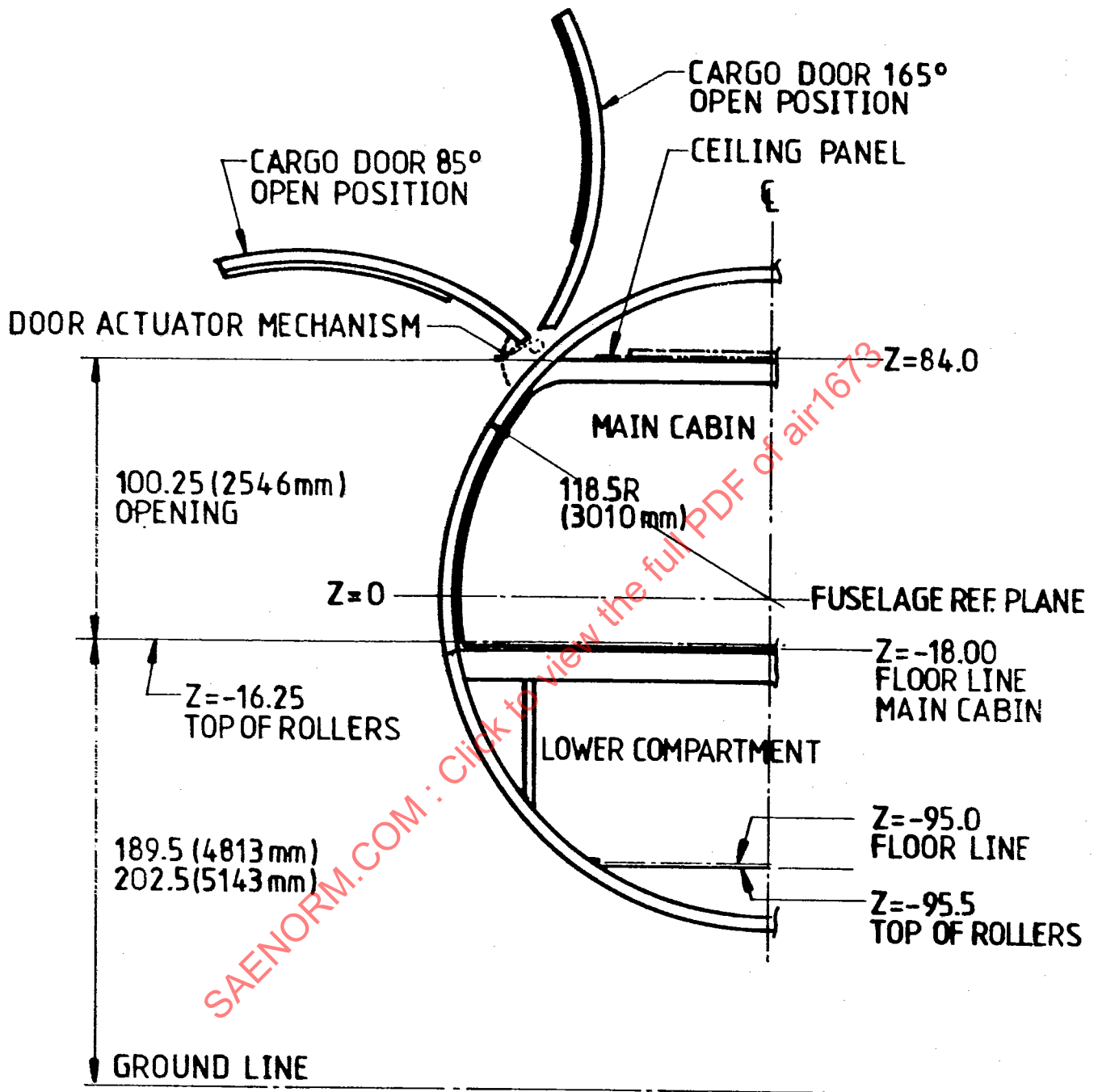
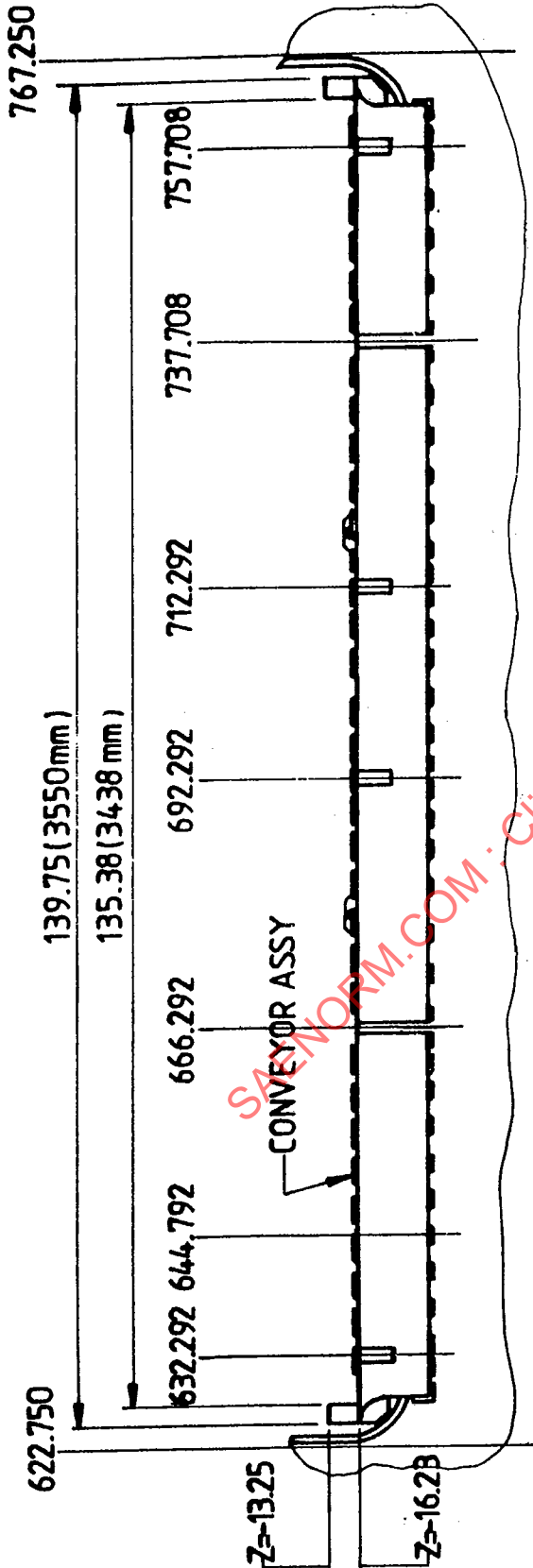
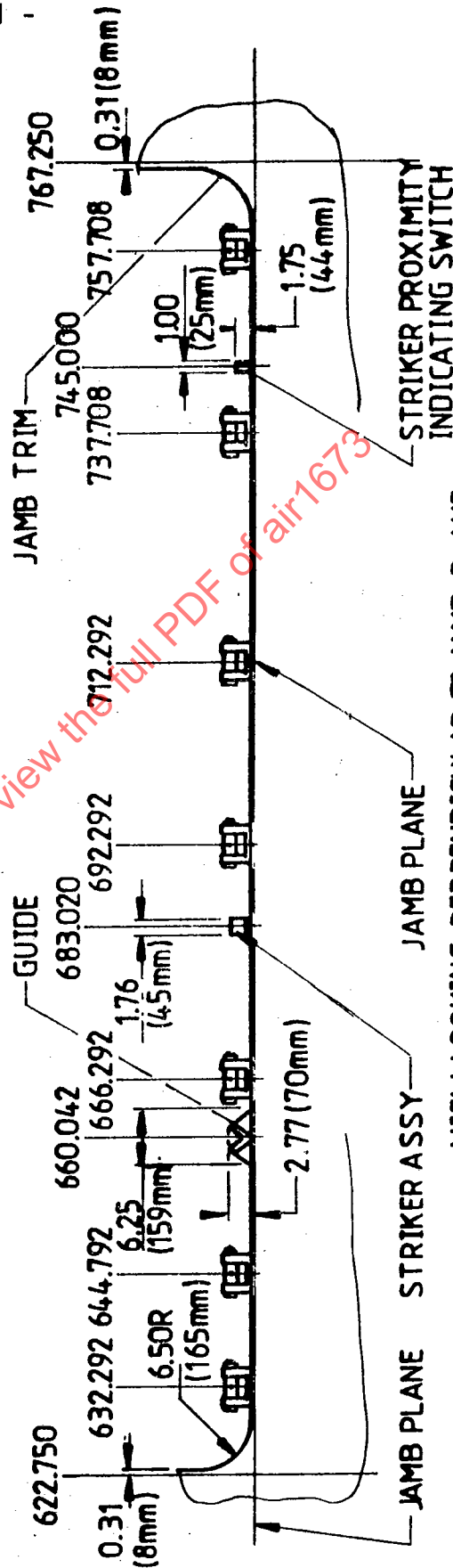


FIGURE 11B
DC10 CROSS SECTION

DC10



VIEW LOOKING PERPENDICULAR TO CONVEYOR ASSY PANELS



VIEW LOOKING PERPENDICULAR TO JAMB PLANE

FIGURE 11C

DC10 MAIN CABIN DOOR JAMB