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N.J. 08405

Airplane Tests of Enhanced Emergency Smoke Venting

(SUPPLEMENTAL DATA)

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March 1989



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U.S. Department of Transportation
Federal Aviation Administration

1. Report No. DOT/FAA/CT-89/9-A	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle AIRPLANE TESTS OF ENHANCED EMERGENCY SMOKE VENTING		5. Report Date March 1989	
		6. Performing Organization Code	
7. Author(s) Elliott L. Maylor		8. Performing Organization Report No. D218N301	
9. Performing Organization Name and Address Boeing Commercial Airplanes P.O. Box 3707 Seattle, Washington 98124-2207		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. DTFA03-88-C-00056	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Aviation Administration Technical Center Atlantic City Airport, New Jersey 08405		13. Type of Report and Period Covered Supplemental Data	
		14. Sponsoring Agency Code ACD-240	
15. Supplementary Notes The FAA Contracting Officer's Technical Representatives (COTR) were Thor I. Eklund and James E. Demaree.			
16. Abstract This document contains supplemental data to support DOT/FAA/CT-89/9. It consists of the following appendixes to that report: Appendix A, Test 90-1 Appendix B, Test 90-2 Appendix C, Test 90-3 Appendix D, Smoke Meter Data Appendix E, Acceptance Test Data Sheets, Flow Control Valves			
17. Key Words		18. Distribution Statement This document is not being published for distribution but is on file at the Technical Center Library	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 195	22. Price

**DATA REPORT FOR
FAA CONTRACT DTFA03-88-C-00056
AIRPLANE TESTS OF ENHANCED EMERGENCY
SMOKE VENTING**

Supplements FAA Report No. DOT/FAA/CT-89/9

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FLIGHT TEST ORGANIZATION PLAN OF TEST

TITLE Photo Flights and Miscellaneous EWA Testing

AIRPLANE MODEL
757-200

AIRPLANE CUSTOMER AND TAB NO.
TBC NA001

PLAN AND TEST NUMBER
90-1

DATE CONDUCTED
11-29-88

THIS PLAN OF TEST CONTAINS THE FOLLOWING TEST ITEMS:

T.I. NO.	EWA NO.	TITLE
B1.38.0113	54-42016B	Yaw Damper Control Law Candidate Ground Test
B1.38.0114	54-42016B	Yaw Damper Control Law Candidate Flight Test
B3.14.0070	53-50027B	Landing Gear Hydraulic Pressure Ground Test
B3.13.0059	54-80000B	FAA Smoke Test

PREPARED BY (TEST ENGINEER)

APPROVED BY (OPS GROUP ENGR)

CHECKED BY (PROJECT PILOT)

APPROVED BY (DIR OF FLIGHT TEST)

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - 8Prep James G. Hurlburt 11/16/88
Engineer DateConc Richard M. Hurlburt 11/16/88
Lead Test Ops/Engr DateApp RH Hurlburt 11/16/88
Lead Analysis Engr DateApp BE Chernick 11/16/88
Analysis Supervisor DatePURPOSE OF TEST

To evaluate the potential benefits of an additional forward outflow valve and increased cabin air inflow in evacuating continuous cabin smoke.

REFERENCES

- (a) EWA 54-80000B, "Airplane Tests of Enhanced Emergency Smoke Venting."
- (b) FC 54-80000-01-1, "Installation of High-Flow Control Valves for Tests of Enhanced Emergency Smoke Venting."
- (c) FC 54-80000-02-1, "Outflow Valve Installation (Including Skin Rework)."
- (d) FC 54-80000-03-1, "Auxiliary Control Panel Instl/Checkout, FAA Smoke Test."
- (e) Service Bulletin 757-21-0017.
- (f) Service Bulletin 757-21-0031.
- (g) Service Bulletin 757-21-0034.

CONFIGURATION

The test vehicle is a Model 757-200, Airplane NA001. The References (b) through (d) FCs shall be incorporated which install a 737 type outflow valve (OFV) in the forward cabin, special pack flow control valves to allow increased pack flow, and a portable control panel for the packs and forward OFV in the main cabin.

Also the References (f) and (g) service bulletins must be incorporated (ram air system). The intent of the Reference (e) service bulletin, to close the lightening holes in the sidewall air outler grills, shall be satisfied using speed tape (or equivalent) installed by F & A. However, the service bulletin itself shall not be incorporated.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

CONFIGURATION (Cont'd)

The flight deck door must be installed, and the large opening in the flight deck bulkhead must be sealed with plastic sheeting or equivalent, in order to prevent smoke penetration into the cockpit. Recommend inspecting the bulkhead for other leakage pathways (production or not) and blocking them with foam or by other means if possible.

Finally, the area immediately around the forward OFV should be cordoned off to keep people well clear of the valve (no one should be able to easily touch the OFV while outside the cordoned off area).

SPECIAL EQUIPMENT

- FAA provided smoke densitometers (10) and associated recording equipment (includes a laptop computer)
- FAA provided smoke generator or generators and a smoke mixing chamber with a helium injector and a muffin fan
- One additional Boeing provided smoke generator for backup
- Supply of helium for ground test conditions .014-.019. Helium source must be capable of providing 30 psig @ 100 cfm at the smoke mixing chamber. Helium line must be routed into aircraft through the E/E bay external access hatch, since this will be the only opening in the aircraft during these conditions. There are six of these conditions and each will require a maximum of 14 minutes of continuous helium flow. The operator of the helium supply outside must be on interphone to allow communication with the aircraft
- Video cameras, 2 fixed and 1 mobile, each with IRIG time
- Pressure gauge located in the main cabin reading mix bay static pressure
- Portable breathing apparatus (O₂ or air) for 12 persons in the main cabin, at least 15 minutes per person per condition

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

DATA REQUIRED

- | | |
|--|---|
| Video | - ON, mobile camera positioned per analysis direction |
| FAA Smoke Density
Recording System | - ON |
| Wind Station
(Conditions
.014-.019 only) | - Wind direction and velocity at least once during
each condition |
| Manual
(Flight Deck) | <ul style="list-style-type: none">- Event times- ECS panel switch positions- Production cabin pressure control system
configuration, including aft OFV position- L & R pack flow from EICAS ECS Maintenance page- L & R bleed duct pressure- Airspeed (flight conditions)- Altitude (flight conditions)- Cabin ΔP (flight conditions)- Cabin altitude rate of change (flight conditions)- Tower wind direction and velocity while doors are
open after landing (flight conditions)- Aircraft parked heading while doors are open after
landing (flight conditions) and during ground test
conditions .014-.019 |
| Manual
(Passenger Cabin) | <ul style="list-style-type: none">- Event times- ECS configuration- Forward OFV cabin pressure control system
configuration- Mix bay static differential pressure- Density and movement of smoke |

Still photos of test setup.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS

The engines must be running for all ground test conditions.

Smoke Density Measuring System Checkout - GT

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.001 ✓	Establish the following: ✓ <i>Isolation valve closed</i>
Engines	✓ L & R running (power as required to maintain at least 40 psig bleed duct pressure)
Packs	✓ L & R AUTO (using engine bleeds)
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R ON
Production Cabin Pressure Control System	✓ MAN, OFV fully OPEN
Pack Flow	✓ INTERMEDIATE (100% w/recircs ON) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Aircraft Doors, Openable Windows and Hatches	✓ All CLOSED
Smoke Generator Location	✓ Mid Cabin

Generate smoke until the main cabin is completely filled with dense smoke, or for 10 minutes, whichever occurs first. Check out FAA smoke density measuring system.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Smoke Density Measuring System Checkout - GT (Cont'd)Condition No.Procedure

B3.13.0059.002 ✓

Establish the following:

Engines

✓ L & R running (power as required to maintain at least 40 psig bleed duct pressure)

Packs

✓ L & R AUTO (using engine bleeds)

Trim Air

✓ ON

Temp Selectors

✓ AUTO 75°F

Recirculation Fans

✓ L & R ON

Production Cabin Pressure

✓ MAN, OFV fully CLOSED

Control System

Pack Flow

✓ INTERMEDIATE (100% w/recircs ON) (set at portable control panel in main cabin)

Forward OFV Cabin Pressure

✓ AC MAN, OFV fully OPEN (set at portable control panel in main cabin)

Control System

Flight Deck Door

✓ CLOSED

Aircraft Doors, Openable

✓ All CLOSED

Windows and Hatches

Smoke Generator Location

✓ Mid Cabin

Generate smoke until the main cabin is completely filled with dense smoke, or for 10 minutes, whichever occurs first. Check out FAA smoke density measuring system.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Smoke Density Measuring System Checkout - GT (Cont'd)Condition No.Procedure

B3.13.0059.003 ✓

Establish the following:

Engines

✓ L & R running (power as required to maintain at least 45 psig bleed duct pressure)

Packs

✓ L & R AUTO (using engine bleeds)

Trim Air

✓ ON

Temp Selectors

✓ AUTO 75°F

Recirculation Fans

✓ L & R OFF

Production Cabin Pressure

✓ MAN, OFV fully OPEN

Control System

Pack Flow

✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)

Forward OFV Cabin Pressure

✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)

Control System

Flight Deck Door

✓ CLOSED

Aircraft Doors, Openable

✓ All CLOSED

Windows and Hatches

Smoke Generator Location

✓ Mid Cabin

Generate smoke until the main cabin is completely filled with dense smoke, or for 10 minutes, whichever occurs first. Check out FAA smoke density measuring system.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Smoke Density Measuring System Checkout - GT (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.004 ✓	Establish the following:
Engines	✓ L & R running (power as required to maintain at least 45 psig bleed duct pressure)
Packs	✓ L & R AUTO (using engine bleeds)
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Production Cabin Pressure Control System	✓ MAN, OFV fully <u>CLOSED</u>
Pack Flow	✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)
✓ Forward OFV Cabin Pressure Control System	- ✓ AC MAN, OFV fully <u>OPEN</u> (set at portable control panel in main cabin)
Flight Deck Door	✓ <u>CLOSED</u>
Aircraft Doors, Openable Windows and Hatches	✓ All <u>CLOSED</u>
Smoke Generator Location	✓ Mid Cabin

Generate smoke until the main cabin is completely filled with dense smoke, or for 10 minutes, whichever occurs first. Check out FAA smoke density measuring system.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Buoyant Smoke (Helium Charged) GT

For conditions .014-.019 the helium source is required, and the aircraft must be parked headed into the wind as much as possible. Also, the wind station is required for this group of conditions.

Condition No.Procedure

B3.13.0059.014✓

.014.1✓

Establish the following:

- | | |
|--|--|
| Aircraft Heading | ✓ Into wind ($\pm 30^\circ$) |
| Engines | ✓ L & R running (power as required to maintain at least 40 psig bleed duct pressure) |
| Production Cabin Pressure Control System | ✓ MAN, OFV fully OPEN |
| Packs | ✓ L & R AUTO (using engine bleeds) |
| Trim Air | ✓ ON |
| Temp Selectors | ✓ AUTO 75°F |
| Recirculation Fans | ✓ L & R OFF |
| Pack Flow | ✓ INTERMEDIATE (165%) (set at portable control panel in main cabin) |
| Forward OFV Cabin Pressure Control System | ✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin) |
| Flight Deck Door | ✓ CLOSED |
| Aircraft Doors, Hatches and Openable Windows | ✓ All CLOSED including lower lobe (except the E/E bay access hatch may remain open to allow helium line into airplane) |
| Smoke Generator Location | ✓ Forward Cabin |

Generate helium charged smoke until main cabin is completely filled with dense smoke or for 10 minutes, whichever occurs first. Turn both packs OFF and quickly open both #4 doors. Maintain for two minutes, continuing to generate helium charged smoke. *Record wind*

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Buoyant Smoke (Helium Charged)_GT (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.015 ✓	Establish the following:
Aircraft Heading	- Into wind ($\pm 30^\circ$)
Engines	✓ L & R running (power as required to maintain at least <u>45</u> psig bleed duct pressure)
Production Cabin Pressure Control System	✓ MAN, OFV fully CLOSED
Packs	✓ L & R AUTO (using engine bleeds)
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully OPEN (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Aircraft Doors, Hatches and Openable Windows	✓ All CLOSED including lower lobe (except the E/E bay access hatch may remain open to allow helium line into airplane)
Smoke Generator Location	- Forward Cabin

Generate helium charged smoke until main cabin is completely filled with dense smoke or for 10 minutes, whichever occurs first. Open both #4 doors. Maintain for two minutes, continuing to generate helium charged smoke. When the two minutes is up, turn both packs OFF and continue to generate helium charged smoke for another two minutes.

Photo Smoke Generator

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Buoyant Smoke (Helium Charged) GT (Cont'd)Condition No.Procedure

B3.13.0059.016 ✓

Establish the following:

Aircraft Heading
Engines- Into wind ($\pm 30^\circ$)
✓ L & R running (power as required to maintain at least 40 psig bleed duct pressure)Production Cabin Pressure
Control System
Packs

✓ MAN, OFV fully OPEN

Trim Air
Temp Selectors
Recirculation Fans
Pack Flow✓ L & R AUTO (using engine bleeds)
✓ ON
✓ AUTO 75°F
✓ L & R OFF
✓ INTERMEDIATE (165%) (set at portable control panel in main cabin)Forward OFV Cabin Pressure
Control System

✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)

Flight Deck Door
Aircraft Doors, Hatches and
Openable Windows✓ CLOSED
✓ All CLOSED including lower lobe (except the E/E bay access hatch may remain open to allow helium line into airplane)

Smoke Generator Location

✓ Aft Cabin

Generate helium charged smoke until main cabin is completely filled with dense smoke or for 10 minutes, whichever occurs first. Turn both packs OFF ✓ and quickly open both #1 doors ✓. Maintain for two minutes ✓, continuing to generate helium charged smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Buoyant Smoke (Helium Charged) GT (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.017✓	Establish the following:
Aircraft Heading	- Into wind ($\pm 30^\circ$)
Engines	✓ L & R running (power as required to maintain at least <u>45</u> psig bleed duct pressure)
Production Cabin Pressure Control System	✓ MAN, OFV fully OPEN
Packs	✓ L & R AUTO (using engine bleeds)
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable OFV and pack control panel in main cabin)
Flight Deck Door	✓ CLOSED
Aircraft Doors, Hatches and Openable Windows	✓ All CLOSED including lower lobe (except the E/E bay access hatch may remain open to allow helium line into airplane)
Smoke Generator Location	✓ Aft Cabin

Generate helium charged smoke until main cabin is completely filled with dense smoke or for 10 minutes, whichever occurs first. Open both #1 doors. ✓ Maintain for two minutes, continuing to generate helium charged smoke. When the two minutes is up, turn both packs OFF and continue to generate helium charge smoke for another two minutes.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Buoyant Smoke (Helium Charged) GT (Cont'd)Condition No.Procedure

B3.13.0059.018 ✓

Establish the following:

Aircraft Heading	- Into wind ($\pm 30^\circ$)
Engines	✓ L & R running (power as required to maintain at least <u>40</u> psig bleed duct pressure)
Production Cabin Pressure Control System	✓ MAN, OFV fully OPEN
Packs	✓ L & R AUTO (using engine bleeds)
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Aircraft Doors, Hatches and Openable Windows	✓ All CLOSED including lower lobe (except the E/E bay access hatch may remain open to allow helium line into airplane)
Smoke Generator Location	✓ Mid Cabin

Generate helium charged smoke until main cabin is completely filled with dense smoke or for 10 minutes, whichever occurs first. Turn both packs OFF and quickly open both #1 doors. Maintain for two minutes, continuing to generate helium charged smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Buoyant Smoke (Helium Charged) GT (Cont'd)Condition No.Procedure

83.13.0059.019 ✓

Establish the following:

Aircraft Heading	- Into wind ($\pm 30^\circ$)
Engines	✓ L & R running (power as required to maintain at least 45 psig bleed duct pressure)
Production Cabin Pressure Control System	✓ MAN, OFV fully OPEN
Packs	✓ L & R AUTO (using engine bleeds)
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Aircraft Doors, Hatches and Openable Windows	✓ All CLOSED including lower lobe (except the E/E bay access hatch may remain open to allow helium line into airplane)
Smoke Generator Location	✓ Mid Cabin

Generate helium charged smoke until main cabin is completely filled with dense smoke or for 10 minutes, whichever occurs first. Open both #1 doors. Maintain for two minutes, continuing to generate helium charged smoke. When the two minutes is up, turn both packs OFF and continue to generate helium charge smoke for another two minutes.

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL

		Run	Mark Kempton	Brake:	Win	Garrett		
		Analysis:	Jerry Sanford	Photo:	Al Matthews			
		EICAS						FAA
		Pack	Flow	Bleed	Duct Press			
		L	R	L	R			
1020	Engine	start						
1030	.001	132	114	40	40			
1041	.001	OFF						
1055:55	.002	132	114	40	41			
1001:15	.002	OFF						
		Windy	Jim Chapman					
1208:22	.003	ON		44	44			
1215	.003			43	45			
1217:00	.003	OFF						
1232:15	.004			44	45			
1238:26	.004	OFF	Smoke from	left pack exhaust	during condition	.003f.004		
					from	center wing drain pump		
		Right	Aft Door	does not	completely	open		
			aircraft	handling	158°	Mag		
1303:35	.014	ON						
1304:23	.014	OFF				Mistake on Pack Flow reading		
1314:14	.014.1	ON		43	43			
1319	.014.1	doors open			wind (Mag) 120/5.2	30.54	48.9°	80%
1321	.014.1	OFF					1650	
1331:39	.015	ON		43	43			
34:40	.015	doors open		43	43	wind 130/	8.2	
36:55	.015	pack off				140/		
39:10	.015	pack OFF				130/6.0		(700)
1303:10	.016	ON		40	40			
09:30	.016	packs off, doors open				wind 080/3.2		
11:30	.016	smoke off, off condition				wind 085/5.0		(1500)
1325:00	.017	ON		43	43			
31:00	.017	doors open		43	43	150/3.4	wind	
37:00	.017	packs off						
35:00	.017	OFF						

Windy 123.275

SHEET	1 OF 2	TITLE	FAA Smoke	MODEL	75752000
RECORDER	R P Yeilding		Ground Test	AIRPLANE	N44000
TEST NO	90-1	STA	TD	DOC. NO.	D541N101
DATE	11/29/88			PAGE	90-1- 88

C1

Rosa Heni, born ~~1844~~ Eschbach

Pack	Flow	Bleed	Duct Press
L	R	L	R

1603:30	.018	ON	43	45		
09:45	.018	doors open - packs off			wind	155/2.8
11:45	.018	OFF				180/2.0
1631:19	.019	ON	43	45		(1100)
36:45		doors open			wind	140/5.0
38:45		pack off				
40:45		OFF			wind	160/1.6

FAA:	Thar	I.	James Eklund
	James	E.	Denare
	Ros	Gary	Lium

USAF:	Major	Thomas A. Wawrynowicz
	MSGT	Thomas E. Bell

Staff:	Ellie A. L. Maylan
	Derek Rouse

SHEET 2 OF 2	TITLE FAA Smoke	MODEL 757-200
RECORDER R P Yeilding	Ground Test	AIRPLANE N48001
TEST NO 90-1 STA TD	BOEING	DOC. NO. D541N101
DATE 11/29/88		PAGE 90-1-C2

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

Time	Concl	Fwd or Prod	Mix Bag PS						
		Press Control							
1000XY				Aircraft heading 159° Magnetic.					
102800	.001	Smk ON							
102840	OFF	(Engines not set)							
103125	.001	Smk ON							
103500		Smoke cloud fwd edge advancing very slowly and fairly even floor to ceiling							
103630		Prod	7.4"H ₂ O						
103800		Still no smoke at aft end of cabin (per Cond Ops)							
104130	OFF	Smk OFF	Smoke cloud stayed more or less in mid cabin area						
105550	.002	Smk ON							
105630		Fwd	7.4"H ₂ O						
105730		Smoke is migrating forward towards Fwd OFV fairly rapidly and out OFV							
110115	OFF	Smk OFF	Well break for stop lunch						
115929		Engine start							
120815	.003	Prod	8.6"H ₂ O	Smk ON					
0940		Smoke seems to be moving aft substantially quicker than cond .001 and is remaining mostly on the left side of the aircraft							
121705	OFF	Smk OFF	(cloud was stable - there was practically no forward movement)						
1230XV		Cond support (shop) noted smoke out of one of the pack room air outlets							
123210	.004	Fwd	8.1"H ₂ O	Smk ON					
123330		Smoke moving forward rapidly and out OFV movement is more rapid than cond .002							
125700		Some haze in Door #1 area							
125820	OFF	Smk OFF	(cloud was stable)						
131330	.014	Prod	4.4"H ₂ O	Smk ON w/ Helium					
		this pressure seems low							
130425	OFF	due to low pack flow							
1312XY		due to low pack flow Turns out this pack flow is OK for no reason							
131410	.014.1	Prod	8.8"H ₂ O	Smk ON					
1315XX		3.3"H ₂ O	Smoke is staying in ceiling area and moving aft						
131650		Smoke begins to reach floor area but still reaches ceiling - toward cabin occupants smoke seems even floor to ceiling							

SHEET 1 OF 3		TITLE Smk Evac w/ Fwd CFV & Inc Pack Flow		MODEL 7951250	
RECORDER J Sanford		B5.13.0054		AIRPLANE N14001	
TEST NO. 90-1		STA Cabin		DOC. NO. D541N101	
DATE 29 Nov 88		BOEING		PAGE 90-1-C3	

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

Time	Cond	Fwd or Prod	Mix Bay PS						
		Press Control							
	.014.1 cont								
131930	Opening doors ^(#4)			turning off packs					
2135	OFF	Smk OFF							
133138	.015	Fwd	5.0"H ₂ O	Smk ON					
133215				Smoke barrels out toward OFV -					
				not smoke further aft than the #2 doors					
				and there is not as much stratification					
133440	Opening doors ^(#4)			packs still ON					
	smoke moved rapidly aft, smoke appears to "puff" at								
	forward OFV								
133655	Packs OFF								
133900	OFF	Smk OFF							
1353XX	Reposition of smoke generator to aft end of cabin								
	and unlabeled hold this seal External EE access								
	hatch closed. helium line with tape								
140310	.016	Prod	4.6"H ₂ O	Smk ON					
140430				Smoke migrating forward along ceiling					
				(and aft along floor)					
140535				Smoke up to #2 doors and still moving fwd					
140525				Smoke not quite up to #1 doors					
140728	Opening both #1 doors and turning packs OFF								
140455	Doors #1 now open								
141116	Smoke "really moving" out Door #1 R								
141130	OFF	Smk OFF							
142505	.017	Prod	5.2"H ₂ O	Smk ON					
142615				Smoke moving forward along ceiling					
				but not quite as quickly as cond. 016					
				also as the smoke drops it starts					
				to move aft (as in cond. 016)					
142500				Leading edge of cloud is at video					
				records (between doors 203)					
142400				Smoke cloud leading edge now					
				at #2 doors but very thin					
SHEET 2 OF 3				TITLE Smk Evac GT			MODEL 75752201		
RECORDER J San/nd				83.13.000			AIRPLANE N4001		
TEST NO. 90-1				BOEING			DOC. NO. D541N101		
DATE 29 NOV 88							PAGE 90-1-64		

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

Time	Concl	Fwd or Prnt	Min By	PS					
		Press Control							
		.017 Cont							
143105		Door #1 opening							
143120		Door #1 doors now open. Smoke inundating fwd cabin and lifting #1 door							
143304		Booth Packs OFF - smoke movement doors markedly							
143504		OFF SINK OFF							
160330	.018	Prod 4.4"H ₂ O	Sink ON						
160420									Smoke mainly up to door #1, still thin though
160600									Smoke up to #1 doors but still thin in this area
160725									Smoke in vicinity of door #1 thickening
160820									To mid cabin observer, smoke appears denser in aft cabin than fwd cabin
160945		Open Door #1 and Turn Packs OFF							
161005	#1 door	now open							fwd cabin smoke thinned a little and forward movement along ceiling is evident
161150		OFF SINK OFF							
163115	.019	Prod 5.8"H ₂ O	Sink ON						
163210									Smoke now just fwd of door #2
163400									Smoke up to fwd OFV not quite to the #1 doors
163600									Swift thickening of smoke in fwd cabin
163645		Opening #1 door							
163203	Door #1	doors now open - smoke moving forward, thickening in fwd cabin, and moving out #1 door							
163850		Booth Packs OFF, fwd movement of smoke slowed, smoke thick							
164050		OFF SINK OFF							near ceiling and light near floor
For this test we have bleed 30 Helium bottles down to ~ 500-700 psi each									

SHEET 3 OF 3	TITLE	SMK EVAL GT	MODEL	757B72200
RECORDER J. Sanyal	AIRPLANE	M4001	DOC. NO.	D541N1Q1
TEST NO. 90-1	STA	B3.13.0059	PAGE	90-1-65
DATE 29 Nov 58		BOEING		

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

COND. #	1	2	10:31:35		
001	SMOKE-MID CABIN (LEFT)	2	START - 10:30:15	STOP - 10:41:35	
002	SMOKE-MID CABIN (LEFT)	2	START - 10:55:58	STOP - 11:01:26	
LUNC 17	NON-SMOKING SECTION CAFETERIA	START	11:10:37	STOP - 11:45:00	
003	SMOKE-MID CABIN (LEFT)	2	START 12:08:18	STOP 12:17:10	
	SMOKE CAME AFT ALMOST IMMEDIATELY.				
004	SMOKE-MID CABIN (LEFT)	2	START 12:32:08	STOP 12:38:24	
014	SMOKE-FWD CABIN (CHIMNEY)	2	START 13:03:30	STOP 13:04:14	
		FAN 3.5			
014.1	SMOKE-FWD CABIN (CHIMNEY)	2	START 13:14:19	STOP 13:21:35	
		FAN 3.5 DOORS	13:19:59		
015	SMOKE-FWD CABIN (CHIMNEY)	2	START 13:31:37	STOP 13:38:53	
		FAN 3.5 PACKS OFF	13:36:53		
016	SMOKE-AFT CABIN (CHIMNEY)	2	START 14:03:08	STOP 14:11:34	
		FAN 3.5 DOORS OPEN	14:09:58		
017	SMOKE-AFT CABIN (CHIMNEY)	2	START 14:23:06	STOP 14:35:01	
		FAN 3.5 PACKS OFF	14:33:01		
018	SMOKE-MID CABIN (CHIMNEY)	2	START 16:03:25	STOP 16:11:55	
		FAN 3.5 DOORS OPEN	16:10:01		
019	SMOKE-MID CABIN (CHIMNEY)	2	START 16:31:15	STOP 16:40:45	
		FAN 3.5 PACKS OFF	16:33:25		

USED 1/3 BOTTLES F11.0

SHEET 1 OF 1	TITLE B757 SMOKE EVACUATION	MODEL B757-200
RECORDER THOMAS H. WILKINSON		AIRPLANE N28400
TEST NO 00-1	STA	DOC NO 0541N101
DATE 29 NOV 88		PAGE 90-1-C6

BOEING

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

TIME	COND	AP MIX							
10:25	.001	7.0							
10:30	"	6.2	SMOKE ON	(OFF IN 10 SEC)					
10:32	"	7.8	"	"					
10:35			315' VISIBILITY @ THIS STATION - FLOWING AFT						
10:37			AFT SMOKE INVISIBLE - FUD 2.10' VISION						
10:40			SMOKE CLOUD CONFINED BETWEEN ABOUT						
			STATIONS 850 AND 1300.						
10:40	✓	✓	SMOKE OFF						
DISCUSSION: DECIDED TO STAY ON SMOKE GEN SETTING									
NO. 2.									
10:56	.002	7.4	SMOKE ON						
10:57	↓	↓	SMOKE TO FUD DIVIDER - AFT CLEAR						
11:01	↓	↓	STABLE - SMOKE OFF						
12:08	.003	5.6	SMOKE ON						
12:10	↓	↓	MOVING AFT MOSTLY ON LH SIDE FOR ABOUT						
			100" (TO NO. 4 METER STAND) MAY BE						
			MISSING METER IN RH-SIDE AT-LEAST						
			NO. 4.						
12:13		8.2							
12:16			STABLE AT REAR						
12:17	✓	✓	SMOKE OFF						
12:32	.004	5.1	SMOKE ON						
12:34	↓		NO SMOKE AFT OF 1120 - MIXES ACROSS						
			CABIN - WIDTH IN 2.20" AND TRAVEL.						
12:36		5.0							
12:38	✓	7.9	SMOKE OFF						
12:03	.014	4.4	SMOKE ON	→ OFF	PACKS TOO LOW?? (NO; ON)				
12:14	.014.1	3.8	SMOKE ON	- AT CEILING INITIALLY					
12:15			LOWERING TO 100' FROM CEILING TO 2						
			- AT 900. [1900 BOTTLE HE]						
			[330 FGE "]						
12:17			MED MAKE ALL WAY TO REAR - CLR TO CEILING						
12:20	↓	4.2 → 0	PACKS OFF & DOWN REAR						
12:22	✓	0	SMOKE OFF - SAME MED MAKE AS 12:17						
			[1300 ON HE]						

SHEET 1 OF 3	TITLE FAA SMOKE TEST	MODEL 7537-200
RECORDER MAYLOR		AIRPLANE N/A001
TEST NO. 90-1	STA 1120	DOC. NO. D541N101
DATE 11-29-38	BOEING	PAGE 90-1-67

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

	TIME	COND	MP	MIX						
	1:22	.015	2.0	SMOKE ON - TO CEILING & BACK TO DIVIDER						
				AT STA 680						
	1:24		2.1	NO SMOKE SET AT 1:20						
PM	1:35			AFT DOORS OPEN						
	1:36			SMOKE COMING AFT						
	1:37		8.1 → 0	PACMS OFF - SMOKE DRIFTING						
	1:39	✓	0	SMOKE OFF - HE OFF						
	2:00	.016	4.6							
	2:03		4.6	SMOKE ON - UP TO CEILING						
	2:05			SMOKE FWD ALONG CEILING TO FRONT						
				REASON OF CLOUD SET AT REAR						
	2:06			SOME SMOKE TO FWD DOORS						
				SMOKE HAS SPREAD DOWN TO FLOOR BUT						
				NOT AS HEAVY AS AT CEILING, FLOWING						
				AFT AT WINDOW → FLOOR LEVEL; FWD AT						
				CEILING						
	2:09		4	STOKE AT MID CABIN - FWD, TOO						
	2:10		4.4 → 0	PACMS OFF - DOORS OPEN - SMOKE DRIFTS						
				HEAVY AT CEILING - LIGHTER AT FLOOR						
	2:12	✓	0	SMOKE OFF						
	2:25	.017	8.2	SMOKE ON GOES TO CEILING, COMING						
				FWD AT CEILING						
	2:26			DOWN TO HATCHES						
	2:27		4	COMING AFT PAST STA 1120 NEAR FLR						
	2:28		5.2	THIN AT STA 1120 - CAN SET TO AFT BLND						
	2:29			APPROACHING NO. 2 DOORS						
	2:30			THIN SMOKE TO FWD DOORS						
	2:31		✓	OPEN FWD DOORS - SMOKE FWD AT						
			2.0	CEILING - DRIFTING SLOWLY FWD NEAR FLOOR						
				THICKENING IN AFT CABIN						
	2:33		8.0 → 0	PACMS OFF - ALL SMOKE DRIFTS -						
				GETTING HEAVY AT CEILING						
✓	2:35	✓	0	SMOKE OFF - HE OFF						

SHEET 2 OF 3	TITLE FWD SMOKE TEST	MODEL 757200
RECORDER MAY1.0R		AIRPLANE N1400V
TEST NO. 90-1 STA 1120	BOEING	DOC. NO. D541N101
DATE 11-29-98		PAGE 90-1-98

TIME	COND	UP	MIX						
16:03	.018	4.4		SMOKE ON - TRAVELING BOTH DIRECTIONS					
16:05		4.3		AT CEILING					
16:06				SMOKE TO BOTH ENDS - THIN TO FLOOR					
16:08				LOOK THICKER TO FWD THAN AFT					
16:09				MOVING AFT PRT STA 1120 - GETTING THICKER					
16:10		4.370		THICKER AFT THAN FWD					
16:12	Y	0		PAGES OFF DOORS #1 OPEN					
16:13				THICKENING - DRIFTING S-MORE - COMING DOWN TOWARD FLOOR					
16:14				SMOKE OFF - HE OFF [BOTTLES: 1100+]					
16:32	.019	2.8		SMOKE ON - GOES TO CEILING					
16:33				FLOWING FWD: AFT AT CEILING					
16:34				SPREADING TO FLOOR					
16:35				MED THICK END: AFT					
16:36		2.6		SMK TO FWD DEK					
16:37		3.5		FAIRLY STABLE AT STA 1120					
16:39		8.570		FWD DOORS OPEN - SMK FLOWING FWD					
16:41	Y	0		PAGES OFF - SMOKE DRIFTING THICKENING					
16:42				SMOKE OFF - HE OFF					

SHEET 3 OF 3	TITLE FWD SMOKE TEST	MODEL 757-200
RECORDER MAYLOR	AIRPLANE NAA091	DOC. NO. D541N101
TEST NO. 90-1	STA 1120	PAGE 90-1-C9
DATE 11-29-78	BOEING	

NOV. 29, 1988

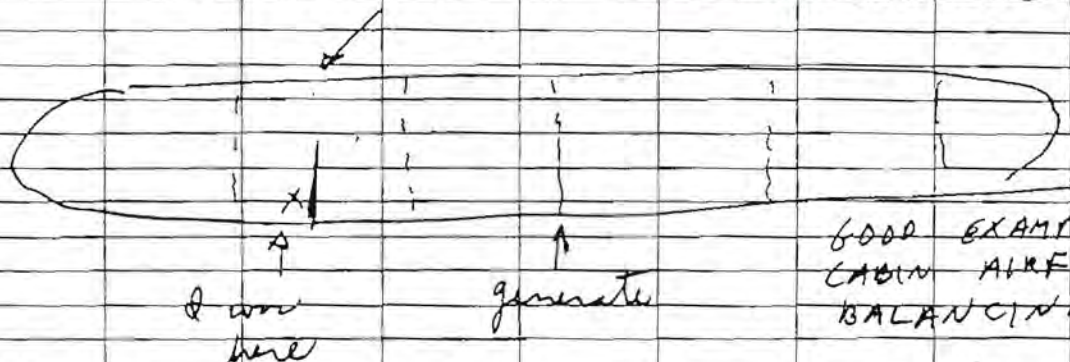
IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

TEST #1 -

Run approx. 10 minutes. Smoke pretty much stayed concentrated at generation point in mid-cabin. Very, very slow diffusion caused by vents fore & aft. Never totally stabilized. Could smell smoke at divider midway between 1st & 2nd smoke stations.

FWD
OUTFLOW
VALVE
CLOSED

100%
PACK
FLOW



TEST #2 -

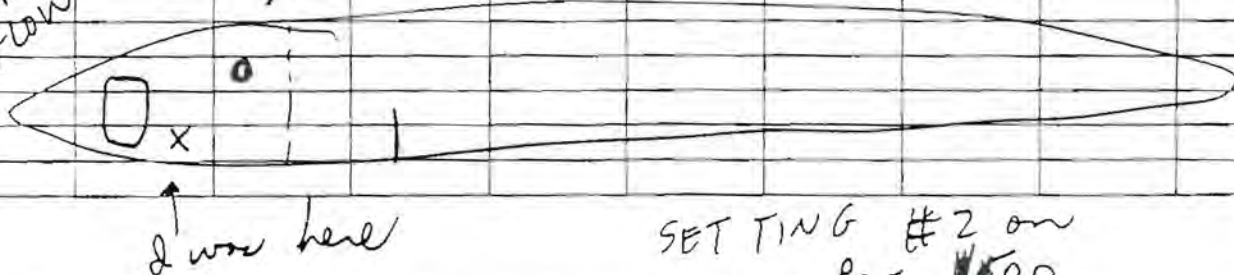
Run slightly more than 5 minutes.

Smoke moved forward from mid point towards forward outflow valve early in the test. Reports from back were that smoke did not go back at all.

Forward smoke stabilized just behind the forward doors.

FWD
OUTFLOW
VALVE
OPEN

100%
PACK
FLOW



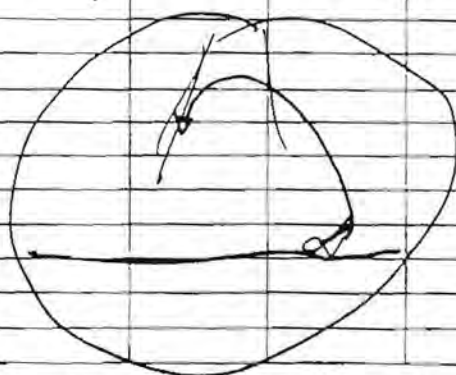
SHEET 1 OF 15	TITLE FAA Smoke GT	MODEL 757-200
RECORDER EKLUND		AIRPLANE N14001
TEST NO. 10-1	STA	DOC. NO. D541N101
DATE 11/29/88		PAGE 90-1-610

TEST # 3 — 9 min (8 min 45 sec) test.

FWO
OUT FLOW
CLOSURE

215 % PACK
FLOW

At first, the center line air distribution duct acted like an air curtain to keep smoke to left hand side. R.H.S filled up at about 7 minutes. Strong fore to aft currents evidenced by bending of smoke generator plume which tilted towards the rear and went up & over the data acquisition people in a spiral fashion. Nothing moved forward of smoke generator.



FRONT TO REAR



I was here.

SHEET 2 OF 15		TITLE FAA Smoke G-T	MODEL 757B280
RECORDER EXLUNP			AIRPLANE N440U
TEST NO. 90-1	STA	BOEING	DOC. NO. D541N101
DATE 11/29/88			PAGE 90-1-611

TEST #4 -

FWD
OUTFLOW
OPEN

215% PPRV
FLOW

By 1 minute, smoke moved
past divider between 1st
& 2nd smoke tree.

By 1 minute 30 sec, smoke
up to but not past front
door

By 3 minutes, getting hazy
between two front doors (R & L)

Re Elliott, aft of cabin clear.

By 4 minutes, haze at front
bulkhead keeps thickening.

By 6 minutes, stabilized
in front.

6 minute 15 sec test.

I was
here



SHEET 3 OF 15	TITLE FAA Smoke GT	MODEL 757BR280
RECORDED EKL/ND		AIRPLANE N111001
TEST NO. 90-1 STA	BOEING	DOC. NO. D54IN101
DATE 11/29/88		PAGE 90-1-C12

14-1

- at 15 sec, smoke moves
fast forward partition towards
rear.

1 minute - strong stratification.
Jets are mixing it with
some haze evident at
window level.

Looking rearward, bottom 2 feet
perfectly clear all the way
to back. At lower levels
smoke recirculating back
through divider at low
level. In rear of airplane,
there was no stratification.

At 4 minutes, still moving
in and back.

At 5 minutes, floor level
up front is hazy.

5 minutes declared stable

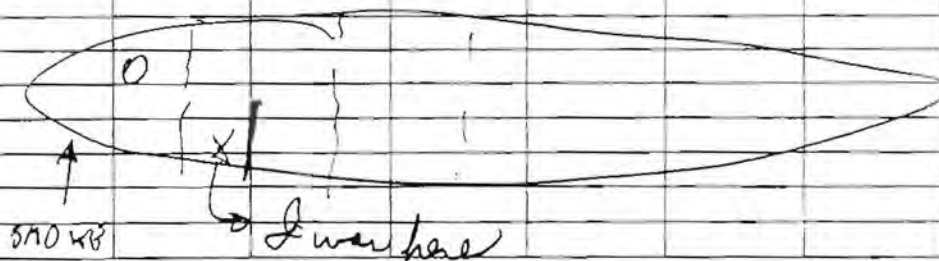
SHEET 4 OF 15		TITLE FAA Smoke GT	MODEL 75792200
RECORDER EKLUND			AIRPLANE N/A1001
TEST NO. 90-1	STA	BOEING	DOC. NO. D541N101
DATE 11/29/88			PAGE 90-1-113

19.2 Door open at 3:20

Helium still coming.

No change evident in front of a/c. lots of smoke flowing out rear door per report.

Conditions in front deteriorated or stayed same during 2 minute evacuation period.



SHEET 5 OF 15	TITLE FAA Smoke GT	MODEL 75752280
RECORDED EKLW/D		AIRPLANE N400Y
TEST NO. 6 70-1 STA	BOEING	DOC. NO. D541N1Q1
DATE 11/29/88		PAGE 90-1-114

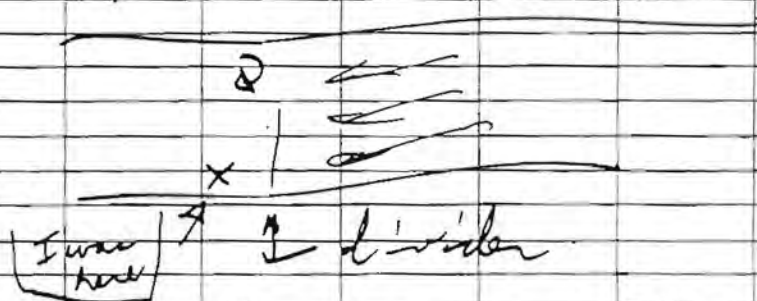
15-1 - In 10 seconds smoke flowing
out fwd outflow valve

CONDITIONS

for
test
PLAN

By 30 seconds, smoke meets
divider but is kept back
by fwd directed axial
flows

1 min 30 seconds, smoke stabilized
in front in recirculation
pattern



2 minutes 45 seconds declared
stable

SHEET 6 OF 15	TITLE FAA Smoke GT	MODEL 737-200
RECORDER EKUNO		AIRPLANE N4801
TEST NO. 90-1	STA	DOC. NO. D541N101
DATE 11/29/88	BOEING	PAGE 90-1-C15

15.2 doors open. Smoke immediately flows back.

Front got worse (bec stratified)

+ you could see haze stratified to rear.

By end of 2 minutes, smoke was to rear doors.

Smoke still going out valve (no smoke seen out window)

15.3 PACKS OFF

2 minute period. Back full of smoke. air flowing fwd along bottom. Bottom of fuselage cleared somewhat it appeared.

WIND 130 at ~ 6 knots.

SHEET 7 OF 15	TITLE FAA Smoke GT	MODEL 747-200
RECORDED EKLUND		AIRPLANE N40011
TEST NO. 90-1 STA	BOEING	DOC. NO. D541N101
DATE 11/29/88		PAGE 90-1-616

16-1 - Smoke appeared highly stratified
over first minute. By
1 min 25 seconds, smoke passed
Smoke tree #2.
1 min 45 sec smoke ahead
of divider at front.
2 min 30 seconds, could still
see rear of a/c along floor.
3 min, gradually filling
front of partition w/ haze.
3 1/2 minutes - gradual deterioration
along length is evident.
5 minutes, Visibility getting worse
throughout.

SHEET 8 OF 15	TITLE FAA Smoke GT	MODEL 777-200
RECORDER EK LUND		AIRLINE NATAL
TEST NO. 90-1	STA	DOC. NO. D541N101
DATE 11/27/88	BOEING	PAGE 90-1-C17

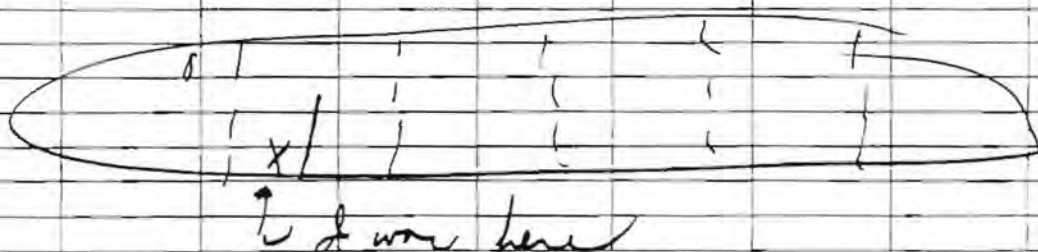
at 6 minutes cabin
called stable (smoke throughout
16-2 a/c, length & height)

6 min 20 - door open

probe off

Not taken about 20 seconds to
open door.

Looking rearward, looks worse &
worse in this period and
smoke moving forward past
partition.



SHEET 9 OF 15	TITLE FAA Smoke GT	MODEL 75752400
RECORDED EKLUND		AIRPLANE MD-80
TEST NO. 90-1 STA	BOEING	DGC. NO. D541N101
DATE 11/29/88		PAGE 90-1-118

17-1 Smoke got to 2nd

~~smoke meter tree~~ to

Up til 3 minutes ceiling
smoke layer seemed to stop
just behind 2nd smoke
tree.

3 minutes 30 seconds, smoke
very light at #2 doors
which are just ahead of
#2 smoke tree.

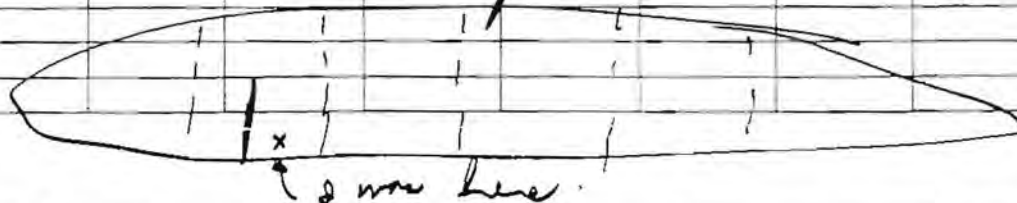
By 5 minutes, smoke light haze
had gone ahead of fuselage partition.

Declared stable at 5 minutes
45 sec.

SHEET 10 OF 15	TITLE FAA Smoke GT	MODEL 75752860
RECOVERER EKLUND		AIRPLANE MA801
TEST NO. 90-1 STA	BOEING	SOC. NO. D541N101
DATE 11/29/88		PAGE 70-1-C19

17-2 At 6 minutes, doors opened.
Smoke started moving rapidly
forward through the aircraft.
Visibility in ~~an~~ around
smoke meter tree #2 and
forward decreased significantly.
(NOTE FWD DOORS OPENED)

17-3 After 8 minutes, doors open
& packs off. Conditions
remained poor in forward
part of aircraft
and appeared even worse
than during 17.2



SHEET 11 OF 15	TITLE FAA Smoke GT	MODEL 787-200
RECORDED EKLVPD		AIRPLANE N4001
TEST NO. 90-1 STA	BOEING	DOC. NO. D541N101
DATE 11/29/88		PAGE 90-1-C20

18-1 At start smoke going rapidly aft & forward.

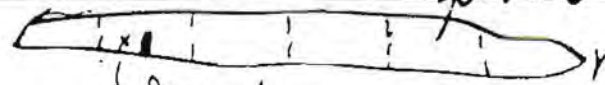
Hit forward divider at 30 sec, smoke at back on ceiling by 1 minute (per report)

At 2 minutes, still relatively light ahead of divider, but very heavy behind.

Looking down the cabin smoke appeared very weakly stratified

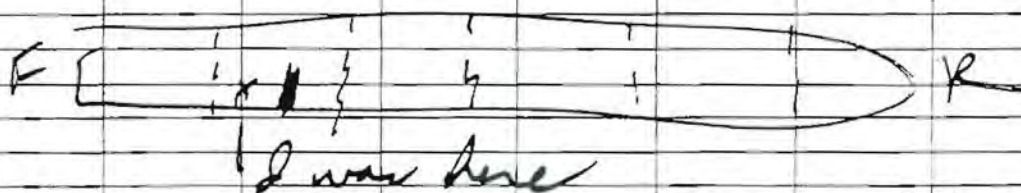
(3 minutes into test)

From front, appeared stable at about 4 minutes with very gradual thickening throughout the aircraft. At 5 minutes, looked stable in front

half of w/c F  R
STABLE AT 6 MIN.

SHEET 12 OF 15	TITLE FAA Smoke GT	MODEL 757-200
RECORDED EK LUND		AIRPLANE 114001
TEST NO. 90-1	STA	DOC. NO. D541N101
DATE 11/29/88	BOEING	
		PAGE 90-1-C21

18-2 Front door open & partition
off at 6 min 20 seconds.
Visibility between front partition
and mid smoke meter tree
deteriorated over 2 minutes.
From my location, I lost sight
of mid smoke meter tree
during this time.



SHEET 13 OF 15		TITLE EAT Smoke G.T	MODEL 757B72201
RECORDED EXLUN D			AIRPLANE N/A701
TEST NO. 904	STA	BOEING	DOC. NO. D541N101
DATE 11/27/88			PAGE 90-1-C22

19-1 Smoke got to partition
at about 30 seconds.

~~From~~

At one minute 30 seconds
you could clearly see smoke
moving forward along ceiling
around first smoke meter
tree.

Looking rearward, smoke
looked weakly stratified

II

at $3\frac{1}{2}$ minutes, forward end
a bit hazy.

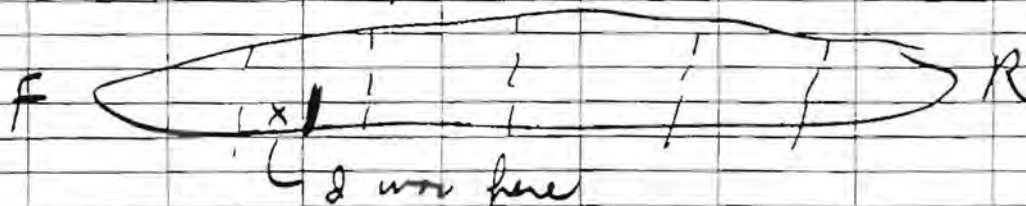
at $4\frac{1}{2}$ minutes, looked stable
with gradual deterioration
in visibility.

Declared stable at 5 minutes 20 sec

SHEET 14 OF 15	TITLE FAA Smoke GT	MODEL 757-300
RECORDER EKLUND		AIRPLANE N18091
TEST NO. 90-1 STA	BOEING	DOC. NO. D541N101
DATE 11/29/68		PAGE 40-1-(2)

19-2 5 min 30 doors opened
 smoke flowing forward even
 at low levels. View looking
 rearward got worse during
 this time period.
 Forward visibility also got
 bad in this period.

19-3 At the time, smoke moving
 forward along ceiling.
 Along bottom visibility
 improving slightly due
 to fresh air flowing in from
 doors along floor. Looking back
 could barely see mid pt smoke trees.



SHEET 15 OF 15	TITLE FAA Smoke CT	MODEL 757B72001
RECORDED EKLUN A		AIRPLANE 100001
TEST NO. 90-1	STA	SOC. NO. D541N101
DATE 11/29/88	BOEING	PAGE 90-1-124

* Indicate date given to T.O.

WIND DATA SHEET - BOEING FIELD

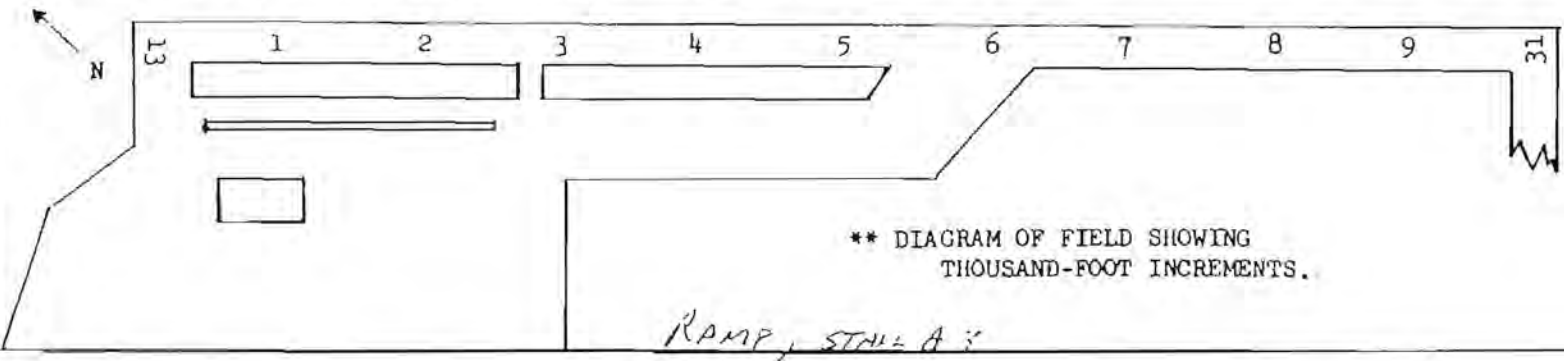
RECORDING WIND STATION FT 2500.2

LATERAL DISTANCE FROM RUNWAY Q 11/2 FEET

ANEMOMETER HEIGHT 13 1/2 FEET

RUN NO.	CONDITION NO.	RUNWAY USED BY A/P	TYPE OF COND	TIME	STATION PRESSURE "Hg	TEMP. °F	*WIND SPEED KNOTS	*WIND DIRECTION MAGNETIC	R _h %	REMARKS	W/STA LOCATION **
1	83.13.0059.014	STAIR A3	GROUND TRIP	1306	30.54	49.8	5.0	135	80	TC	FWD LEFT WING
2				1312	30.54	49.4	4.8	185	80	TC	
3				1317	30.54	48.9	5.6	150	80	TC	
4 *	.014.1			1319	30.54	48.9	5.3	120	80	AT DOOR OPENING	
5	.015			1320	30.55	48.6	5.4	130	80	ACCEL	
6 *				1334	30.55	50.0	8.2	130	82	DOOR OPEN	
7				1337	30.55	49.3	6.0	160	82	DOOR	
8 *				1339	30.55	48.7	6.0	140	82	END .015	
9	.016			1358	30.55	49.8	3.8	110	82	ACCEL	
10				1403	30.55	49.0	4.0	145	82	ON COND TC	
11				1408	30.55	48.5	3.0	130	82	X	
12 *				1410	30.55	48.5	3.0	080	82	TO CALL	
13 *				1412	30.55	48.9	5.0	085	82	END .016	
14	.017			1424	30.55	49.6	3.2	165		ACCEL	

* AT-TIME AIRPLANE PASSED WIND STATION. AT 1334 DOOR OPENING



FT-27R2

A-40

THE BOEING COMPANY
RENTON, WASHINGTON

TITLE Smoke Test
TEST NO. 50-1

757-200
NA001
0541N101

PAGE 1

90-1-085000

FT-27R2

A-41

40-1-C26

WIND DATA SHEET - BOEING FIELD												
RECORDING WIND STATION FT <u>2500</u>												
LATERAL DISTANCE FROM RUNWAY Q <u>N/A</u> FEET <u>RAMP</u>												
ANEMOMETER HEIGHT <u>13 1/2</u> FEET												
CALC	CHECK	APPRO	APPRO	DATE	REVIS	TIME	STATION PRESSURE "Hg	TEMP. °C	*WIND SPEED KNOTS	*WIND DIRECTION MAGNETIC	REMARKS	W/STA LOCATION **
						15	30.5	50.1	3.8	135	TC	Fwd Left 12th
						16	30.55	50.8	3.4	150	TC	
						17	30.55	50.9	3.8	160	DELTA	
						18	30.55	50.4	3.2	165	END 217	
						19	30.54	50.1	3.0	170	DELTA	
						20	30.54	50.4	3.8	140	TC	
						21	30.54	50.1	2.8	155	TC	
						22	30.54	50.0	2.0	150	END 018	
						23	30.54	49.7	2.8	150	DELTA	
						24	30.54	49.4	4.4	170	TC	
						25	30.54	49.6	5.0	140	DOOR OPEN	
						26	30.54	49.2	3.0	130	DELTA	
						27	30.54	48.8	1.6	160	END 019	

* AT-TIME AIRPLANE PASSED WIND STATION. AT T.D. CALL

** DIAGRAM OF FIELD SHOWING THOUSAND-FOOT INCREMENTS.

RAMP STALL 1.3

THE BOEING COMPANY
RENTON, WASHINGTONTITLE Smoke Test
TEST NO. 90-1

N4001

757-200

N4001

54-11801

A 1000

TEST SUMMARY

AIRPLANE:	MODEL 757-200	TAB NA001	CUSTOMER TBC
TEST:	NUMBER 90-1	DATE 11-29-88	
FLIGHT:	NUMBER(S) Ground	TIME Test	CUM. TIME Only
PREPARED BY:	NAME Richard P. Yeilding		

The purpose of this test was to evaluate the potential benefits of an additional forward outflow valve and increased cabin airflow to evacuate cabin smoke.

All ground conditions (.001 to .004 and .014 to .019) were completed.

FLIGHT TEST ORGANIZATION PLAN OF TEST

TITLE Photo Flights and Miscellaneous EWA Testing

AIRPLANE MODEL
757-200

AIRPLANE CUSTOMER AND TAB NO.
TBC NA001

PLAN AND TEST NUMBER
90-2

DATE CONDUCTED
11-30-88

THIS PLAN OF TEST CONTAINS THE FOLLOWING TEST ITEMS:

T.I. NO.	EWA NO.	TITLE
81.38.0113	54-420168	Yaw Damper Control Law Candidate Ground Test
81.38.0114	54-420168	Yaw Damper Control Law Candidate Flight Test
83.14.0070	53-500278	Landing Gear Hydraulic Pressure Ground Test
83.13.0059	54-800008	FAA Smoke Test

PREPARED BY (TEST ENGINEER)

APPROVED BY (OPS GROUP ENGR)

CHECKED BY (PROJECT PILOT)

APPROVED BY (DIR OF FLIGHT TEST)

BOEING : No. 0543N101-001

: Page 90-2-1A1

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

Prep. James Shanley 16 Nov 88 Conc. Michael M. Giddis 11/16/88
Engineer Date Lead Test Ops Engr Date

App. RH Venable 11/15/88 App. BE Chernick 11/16/88
Lead Analysis Engr Date Analysis Supervisor Date

PURPOSE OF TEST

To evaluate the potential benefits of an additional forward outflow valve and increased cabin air inflow in evacuating continuous cabin smoke.

REFERENCES

- (a) EVA 54-80000B, "Airplane Tests of Enhanced Emergency Smoke Venting."
- (b) FC 54-80000-01-1, "Installation of High-Flow Control Valves for Tests of Enhanced Emergency Smoke Venting."
- (c) FC 54-80000-02-1, "Outflow Valve Installation (Including Skin Rework)."
- (d) FC 54-80000-03-1, "Auxiliary Control Panel Instl/Checkout, FAA Smoke Test."
- (e) Service Bulletin 757-21-0017.
- (f) Service Bulletin 757-21-0031.
- (g) Service Bulletin 757-21-0034.

CONFIGURATION

The test vehicle is a Model 757-200, Airplane NA001. The References (b) through (d) FCs shall be incorporated which install a 737 type outflow valve (OFV) in the forward cabin, special pack flow control valves to allow increased pack flow, and a portable control panel for the packs and forward OFV in the main cabin.

Also the References (f) and (g) service bulletins must be incorporated (ram air system). The intent of the Reference (e) service bulletin, to close the lightening holes in the sidewall air outlet grills, shall be satisfied using speed tape (or equivalent) installed by F & A. However, the service bulletin itself shall not be incorporated.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

CONFIGURATION (Cont'd)

The flight deck door must be installed, and the large opening in the flight deck bulkhead must be sealed with plastic sheeting or equivalent, in order to prevent smoke penetration into the cockpit. Recommend inspecting the bulkhead for other leakage pathways (production or not) and blocking them with foam or by other means if possible.

Finally, the area immediately around the forward OFV should be cordoned off to keep people well clear of the valve (no one should be able to easily touch the OFV while outside the cordoned off area).

SPECIAL EQUIPMENT

- FAA provided smoke densitometers (10) and associated recording equipment (includes a laptop computer)
- FAA provided smoke generator or generators and a smoke mixing chamber with a helium injector and a muffin fan
- One additional Boeing provided smoke generator for backup
- Supply of helium for ground test conditions .014-.019. Helium source must be capable of providing 30 psig @ 100 cfm at the smoke mixing chamber. Helium line must be routed into aircraft through the E/E bay external access hatch, since this will be the only opening in the aircraft during these conditions. There are six of these conditions and each will require a maximum of 14 minutes of continuous helium flow. The operator of the helium supply outside must be on interphone to allow communication with the aircraft
- Video cameras, 2 fixed and 1 mobile, each with IRIG time
- Pressure gauge located in the main cabin reading mix bay static pressure
- Portable breathing apparatus (O₂ or air) for 12 persons in the main cabin, at least 15 minutes per person per condition

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

DATA REQUIRED

- | | |
|--|--|
| Video | - ON, mobile camera positioned per analysis direction |
| FAA Smoke Density
Recording System | - ON |
| Wind Station
(Conditions
.014-.019 only) | - Wind direction and velocity at least once during
each condition |
| Manual
(Flight Deck) | - Event times
- ECS panel switch positions
- Production cabin pressure control system
configuration, including aft OFV position
- L & R pack flow from EICAS ECS Maintenance page
- L & R bleed duct pressure
- Airspeed (flight conditions)
- Altitude (flight conditions)
- Cabin ΔP (flight conditions)
- Cabin altitude rate of change (flight conditions)
- Tower wind direction and velocity while doors are
open after landing (flight conditions)
- Aircraft parked heading while doors are open after
landing (flight conditions) and during ground test
conditions .014-.019 |
| Manual
(Passenger Cabin) | - Event times
- ECS configuration
- Forward OFV cabin pressure control system
configuration
- Mix bay static differential pressure
- Density and movement of smoke |

Still photos of test setup.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions

GW for conditions .005 through .013 must be 215K lbs. or less. CG is optional. The Wx Radar should be OFF for this group of conditions since with the left recirculation fan OFF it has no cooling air. ~~Also, "20000" must be set in the ALT SET window of the forward OFV control system (portable control panel in main cabin).~~

NOTE: With the production cabin pressure control system in AUTO 1 or AUTO 2 the "descent" submode is attained as follows: After takeoff, level off at 1,500 feet AGL or higher and maintain level flight (+100 feet) for at least 60 seconds. This will place the cabin pressure control system into the "cruise" submode. After the "cruise" submode is achieved, then descend at least 1,000 feet. This will place the cabin pressure control system into the "descent" submode and it will begin to rate the cabin to the selected LDG ALT. At this point the normal flight profile may be resumed (i.e., climb) though the cabin pressure control system will remain in the "descent" submode.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.005 ✓	Establish the following:
Altitude	✓ 20,000 feet
Airspeed	✓ Holding airspeed
Production Cabin Pressure Control System	✓ AUTO 1, descent submode (see note)
LDG ALT	✓ 1,000 feet BELOW sea level (-8.6 psi ΔP)
AUTO RATE	✓ PIP
Packs	✓ L & R AUTO
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Smoke Generator Location	✓ Forward cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a descent to landing. ✓ Continue generating smoke. ✓ Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF ✓ and promptly open both #4 doors. ✓ Maintain for two minutes, continuing to generate smoke. ✓

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.006✓	Establish the following:
Altitude	✓ 20,000 feet
Airspeed	✓ Holding airspeed
Production Cabin Pressure Control System	✓ MAN, OFV fully CLOSED
Packs	✓ L & R AUTO
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ (set at portable control panel in main cabin)
	✓ Mode - STBY ✓
	✓ CAB RATE - PIP ✓
	✓ CAB ALT - 1,000 feet BELOW sea level (~8.6 psi ΔP)
	✓ FLT/GND - FLT ✓
Flight Deck Door	✓ CLOSED
Smoke Generator Location	✓ Forward cabin

With the cabin ΔP stable, begin generating smoke. ✓ After two minutes, begin a descent to landing. ✓ Continue generating smoke. Reset CAB ALT (forward OFV (960) control system) to the appropriate destination field altitude ✓ to assure the (1160) proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, select GND ✓ on the forward OFV control system, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF ✓ and promptly open both #4 doors. ✓ Maintain for two minutes, continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

Condition No.	Procedure
B3.13.0059.007 ✓ .007,1	Establish the following:
Altitude	✓ 20,000 feet
Airspeed	✓ Holding airspeed
Production Cabin Pressure Control System	✓ MAN, OFV fully CLOSED
Packs	✓ L & R AUTO
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ (set at portable control panel in main cabin) ✓ Mode - STBY ✓ CAB RATE - PIP ✓ CAB ALT - 1,000 feet BELOW sea level (-8.6 psi ΔP) ✓ FLT/GND - FLT
Flight Deck Door	✓ CLOSED
Smoke Generator Location	- Forward cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a rapid descent to 10,000 feet. Reset CAB ALT (forward OFV control system) to 10,000 feet, and CAB RATE to the maximum allowable so the cabin will be depressurized at or soon after reaching 10,000 feet. Continue generating smoke. Upon reaching 10,000 feet, level off and set the pack flow to ~~ULTRA~~ (after deprec) HIGH (215%). Resume holding airspeed. After the cabin is depressurized, reset the forward OFV control system to AC MAN then fully OPEN the OFV. Maintain 10,000 feet for approximately 5 minutes, then resume descent to landing. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, select GND on the forward OFV control system, clear the runway and stop as soon as practical heading into the wind. After stopping, leave packs ON but promptly open both #4 doors. Maintain for two minutes, continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.008 ✓	Establish the following:
Altitude	✓ 20,000 feet
Airspeed	✓ Holding airspeed
Production Cabin Pressure Control System	✓ AUTO 1, descent submode
LDG ALT	✓ 1000 feet below sea level (-8.6 psi ΔP)
AUTO RATE	✓ PIP
Packs	✓ L & R AUTO
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Smoke Generator Location	✓ Aft cabin

With the cabin ΔP stable, begin generating smoke. ✓ After two minutes, begin a descent to landing. Continue generating smoke. ✓ Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after top of descent. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF ✓ and promptly open both #1 doors. ✓ Maintain for two minutes continuing to generate smoke. ✓

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.009 ✓	Establish the following:
Altitude	✓ 20,000 feet
Airspeed	✓ Holding airspeed
Production Cabin Pressure Control System	✓ AUTO 1, descent submode (see note)
LDG ALT	✓ 1,000 feet BELOW sea level (-8.6 psi ΔP)
AUTO RATE	✓ PIP
Packs	✓ L & R AUTO
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Smoke Generator Location	✓ Aft cabin

With the cabin ΔP stable, begin generating smoke. ✓ After two minutes, begin a descent to landing. Continue generating smoke. Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, ^{leave} ~~turn~~ both packs ^{ON} ~~OFF~~ and promptly open both ^{main} ~~fl~~ doors. ✓ Maintain for two minutes, continuing to generate smoke. ✓

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)Condition No.Procedure

B3.13.0059.010 C X Establish the following:

Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- AUTO 1, descent submode (see note)
LDG ALT	- 1000 feet below sea level (-8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Aft cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a rapid descent to 10,000 feet. Reset LDG ALT (production OFV control system) to 10,000 feet, and ~~AUTO~~ RATE to the maximum allowable so the cabin will be depressurized at or soon after reaching 10,000 feet. Continue generating smoke. Upon reaching 10,000 feet, level off and set the pack flow to ULTRA HIGH (215%). Resume holding airspeed. After the cabin is depressurized, reset the production OFV control system to MAN then fully OPEN the OFV. Maintain 10,000 feet for approximately 5 minutes then resume descent to landing. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, leave packs ON but promptly open both #1 doors. Maintain for two minutes continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)Condition No.Procedure

83.13.0059.011 ✓

Establish the following:

Altitude	✓ 20,000 feet
Airspeed	✓ Holding airspeed
Production Cabin Pressure Control System	✓ AUTO 1, descent submode (see note)
LDG ALT	✓ 1,000 feet BELOW sea level (-8.6 psi ΔP)
AUTO RATE	✓ PIP
Packs	✓ L & R AUTO
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Smoke Generator Location	✓ Mid cabin

With the cabin ΔP stable, begin generating smoke. ✓ After two minutes, begin a descent to landing. Continue generating smoke. Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF and promptly open both #1 doors. ✓ Maintain for two minutes, continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight_Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.012	Establish the following:
Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- AUTO 1, descent submode (see note)
LDG ALT	- 1,000 feet BELOW sea level (-8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- ULTRA HIGH (215%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Mid cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a descent to landing. Continue generating smoke. Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF and promptly open both #1 doors. Maintain for two minutes, continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

Condition No.	Procedure
B3.13.0059.013	Establish the following:
Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- AUTO 1, descent submode (see note)
LDG ALT	- 1,000 feet BELOW sea level (~8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Mid cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a rapid descent to 10,000 feet. Reset LDG ALT (production OFV control system) to 10,000 feet, and AUTO RATE to the maximum allowable so the cabin will be depressurized at or soon after reaching 10,000 feet. Continue generating smoke. Upon reaching 10,000 feet, level off and set the pack flow to ULTRA HIGH (215%). Resume holding airspeed. After the cabin is depressurized, reset the production OFV control to MAN then fully OPEN the OFV. Maintain 10,000 feet for approximately 5 minutes, then resume descent to landing. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, leave packs ON, but promptly open both #1 doors. Maintain for two minutes, continuing to generate smoke.

Advance engines
to maintain
43-45 psi bleed
duct pressure

TEST LOG

(FOR USE WITH FTCS)

CHECK IF AIRP. IS
NOT IN FLT. TEST
INVENTORY

AIRPLANE
TAB. NO.

	N	A	0	0	1
--	---	---	---	---	---

TEST DATE 11/30/88

TEST NO. 090-02

TEST STATISTICS

GROUND TEST				
START TIME				

TAKEOFF AIRPORT	FLIGHT NUMBER	TAKEOFF TIME	LANDING TIME	AIRBORNE TIME		NO. OF T&G/S&G LDGS.	TERMINAL AIRPORT
				HRS	MIN		
BFI	1494	0927	1008	00	41		MWH
MWH	1494	1028	1053	00	25		MWH
MWH	1494	1110	1214	01	04		BFI
BFI	1495	1250	1320	00	30		MWH
MWH	1495	1331	1404	00	33		MWH
MWH	1495	1424	1452	00	28		MWH
MWH	1495	1504	1536	00	32		BFI
				:			
				:			
				:			

FLIGHT TIME : PREVIOUS	1959 : 05	THIS TEST	4 : 13	AIRPLANE TO DATE	1963 : 18
------------------------	-----------	-----------	--------	------------------	-----------

TESTING CONDUCTED

[illegible]

PARTICIPANTS

PILOT John Armstrong

COPILOT Jim Jones

FLT. ENGR.

TEST DIRECTOR Richard Yeibling

INSTRUMENTATION

WEIGHTS ENGR.

OTHERS see insurance sheet

Michael M. Hodel
PREPARED BY
655-6146
PHONE

757-200
NA001
D541N101
90-2-131

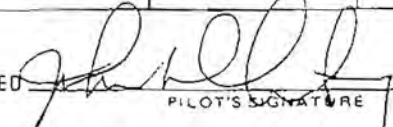
COPY

AIRPLANE INSURANCE RECORD

Sheet Serial No.

Use separate form for each flight and each taxi test made apart from a flight

Date 11/10/89

AIRPLANE MODEL AND SERIES	AIRPLANE REGIS- TRATION MARKS (TAIL NUMBER)	TEST NO. (IF APPLICABLE)	FLIGHT NUMBER	FROM (AIRPORT CODE OR CITY AND STATE)	TO (AIRPORT CODE OR CITY AND STATE)	☐ AIRBORNE TIME ☐ BLOCK TIME	
						HOURS	MINUTES
757-200	N757A	90-2	1494	BFI			
APPROVED  PILOT'S SIGNATURE						TOTAL NUMBER OF PERSONS ABOARD 15	
BOEING EMPLOYEES		FUNCTION/ORG		OTHERS		REPRESENTING	
1 John Armstrong	Pilot / M-8900			1 Thor I. Eklund	FAA		
2 Jim Jones				2 James E. Demarce	"		
3 Richard P Yeilding	TE / M-7965			3 Major Thomas A Wawrynovic	USAF		
4 Brian Bixler				4 MSgt Thomas E Bell	"		
5 Jerry Sanford	Dis / M-7974			5 Russell Kenney	FAA		
6 Tim Tang	I / M-7961			6			
7 Elliott L Maylor	SI-12 / M-7961			7			
8 Derek Rause	SI-12 / M-7961			8			
9 Al Matthews	Pl-1 / M-7954			9			
10 Yang Long	Pl-1 / M-7965			10			
11				11			
12				12			
13				13			
14				14			
15				15			
16				16			
17				17			
18				18			
19				19			
20				20			
21				21			
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23				23			
24				24			
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28				28			
29				29			
30				30			
31				31			
32				32			
33				33			
34				34			
35						757-200	
36						NA001	

BOEING

NO. D541N101

PAGE 90-2-B2



COPY

AIRPLANE INSURANCE RECORD

Sheet Serial No.

Use separate form for each flight and each taxi test made apart from a flight

Date 1 / 1 / 79

AIRPLANE MODEL AND SERIES	AIRPLANE REGIS- TRATION MARKS (TAIL NUMBER)	TEST NO. (IF APPLICABLE)	FLIGHT NUMBER	FROM (AIRPORT CODE OR CITY AND STATE)	TO (AIRPORT CODE OR CITY AND STATE)	☐ AIRBORNE TIME ☐ BLOCK TIME	
						HOURS	MINUTES
757-200	N757A	90-2	1495	BFI			
APPROVED <u>[Signature]</u> PILOT'S SIGNATURE				TOTAL NUMBER OF PERSONS ABOARD 14			
BOEING EMPLOYEES		FUNCTION/ORGN	OTHERS		REPRESENTING		
1	John Armstrong		1	Thor Eklund	FAA		
2	Jim Jones		2	James Demaree	"		
3	Richard Yielding		3	Thomas Wawrynovic	USAF		
4	Randy Speer		4	Thomas Bell	"		
5	Yang Long		5				
6	Jerry Sanford		6				
7	Tim Jang		7				
8	Elliott Maylor		8				
9	Derek Rouse		9				
10	Al Matthews		10				
11			11				
12			12				
13			13				
14			14				
15			15				
16			16				
17			17				
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29			29				
30			30				
31			31				
32			32				
33			33				
34			34		757-200		
35					NA001		
36							

202-071

21 4100 4740 REV 2 75140 1310 R61

(Applicable procedure-8-7900-008)

B-17

BOEING

NO. D541N101

PAGE 90-2-B3

TEST SUMMARY

AIRPLANE:	MODEL 757-200	TAB NA001	CUSTOMER TBC
TEST:	NUMBER 90-02	DATE 11-30-88	
FLIGHT:	NUMBER(S) 1494, 1495	TIME 4+13	CUM. TIME 1963+18
PREPARED BY:	NAME Richard P. Yeilding		

The purpose of this test was to evaluate smoke evacuation with increased cabin airflow and (an additional) forward outflow valve.

Conditions .005, .006, .008, .009, and .011 were completed. Condition .010 was cancelled.

FLIGHT TEST LOADING MANIFEST

MODEL	AIRPLANE REG. NO.	LOADED BY	DATE	TIME	A/P TAB NO.
757-200	N757A	R. O'Farrell	11-29-88	2115	NA001

LOAD NO.	TEST NUMBER	CHECKED BY	DATE	TIME	FLIGHT DATE
36-091	89-46	D. Ruch	11-29-88	2350	130 Nov 88

BASIC WT. & C.G. (FLAPS & WHEELS UP.)	26.1 % MAC	129455 LBS.
POTABLE WATER	53.7 GAL.	447 LBS. TOTAL
FLIGHT CREW	14 CREW	2800 LBS. TOTAL
EQUIPMENT - REMOVABLE		894 LBS. TOTAL
BINS	613 LBS.	
RIBLET FILM	255 LBS.	
SPARE ELECTRONICS BOXES (1)	26 LBS.	
BALLAST-HARD		0 LBS. TOTAL
PASSENGER DECK	0 LBS.	
LWR CARGO FWD.	0 LBS.	
LWR CARGO AFT	0 LBS.	

ZERO WATER ZERO FUEL CONDITION (W & F UP)	25.5 % MAC	133596 LBS.
WATER BALLAST TOTALS	0 GALS	0 LBS. TOTAL
PASSENGER DECK FWD		
GR.	LBS.	
PASSENGER DECK AFT		
GR. 0 0 0 0 0 0	0 LBS.	
LOWER CARGO FWD		
GR.	LBS.	
LOWER CARGO AFT		
GR.	LBS.	

ZERO FUEL, CONDITION (WHEELS & FLAPS UP)	25.5 % MAC	133596 LBS.
TOTAL FUEL ON BOARD	9720 GAL.	66700 LBS. TOTAL
LBS/GAL	TEMP. C	GAGE
TANK LH 6.862	10.0	15000
TANK RH 6.862	10.0	14700
TANK C/W 6.862	10.0	37000
AVERAGE (6.862) (10.0)		

GROSS WEIGHT & C. G. (FLAPS & WHEELS UP)	23.2 % MAC	200296 LBS.
C. G. (FLAPS & WHEELS DOWN)	23.3 % MAC	

CREW LOCATIONS	CREW LOCATIONS
2 254	0 0
2 282	0 0
2 1140	0 0
0 390	0 0
2 656	6 1310
0 656	0 0
0 0	0 0

ZERO FUEL & WATER MOMENT 139321589 LB. IN.

ZERO FUEL CONDITION MOMENT 139321589 LB. IN.


 PILOT'S SIGNATURE

757-200
 NA001
 D541N101
 90-2-4

0924	blockout								
0928	takeoff	DTL7							
Time	Condition	IAS	Alt	AP	AP rate	Blood Press Left	Blood Press Right	Wind	aircraft handling
0947:20	.005	212	2000 ^{FL200}	8.4	0	45	48		
49:20									descent started
50:30			noticeable smoke in cockpit, not a problem yet						
53:00		MWH	ATIS	Yankee	34°F	Winds	340°/16	30.60"	
54:00		175	16,000	6.2	0	24	20		
57:40		150	12,300	5.0	0	23	29	smoke stable	
1001:00		167	8,000	3.0	0	24	30		
04:30		136	3,000	.7	0	45	47		
08:23		Land	MWH					340°/4	
10:08			pack off, doors open						233°
12:55	✓	OFF							
1028			takeoff MWH						
1037:12	.006	210	FL200	8.5	0	45	46		
39:44									descent
40:05			light smoke in cockpit	26	28				
43:00		spoilers	17,000					smoke stable	
47:00		157	12,000	4.8	+300	25	26	gear down	
			no smoke in cockpit						
50:10		152	4,000	1.4	0	25	26		
53:01		Land	MWH					360/3	
55:00			doors open pack off						073°
57:00	✓	OFF							
1110			takeoff MWH						
1118:40	.007	210	FL200	8.5	0	45	46		
20:42		2300				45	45	descent	
22:00		210	11,000	4.5	+2000	32	38	descent	
25:30		210	10,000	.5	+2200	44	45	level	
26:00			ultra High flow, AC Man full open						
28:11								smoke stable - descent	
28:40		194	9,300	0.2	-500	20	22	descent	
30:30		243	7,000	0.2	-2000	25	27		
3400	✓	OFF	condition					Good ops got sinus block	
1214:13	landing	BFI	1214		(2147 Ft)	2133			
1218	block in								

10
36
2154

SHEET	1 OF 2	TITLE	FAA Smoke Flight Test	MODEL	757B2000
RECORDER	Richard Yeilding			AIRPLANE	NA001
TEST NO.	90-2	STA TO		DOC. NO.	D541N101
DATE	11/30/88		BOEING	PAGE	90-2-C2

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

1246	blackout								
1250	takeoff	1250							
Time	Condition	IAS	Alt	AP	AP rate	Blood Press Left	Blood Press Right	Wind	aircraft handling
1305:45	.008	204	FL200	8.5	0	44	46		landing
07:50							start		descent
09:10		189	FL190	7.5	+600	25	29		
10:45				smoke stable,		unrestricted			descent
				no smoke in cockpit					
16:40		148	3,000	2.0	0	25	29		descent
19:50		land	MWH					330/4	070
22:25				doors open, packs off					
24:25	OFF								
1331	takeoff	MWH							
1346:40	.009	210	FL200	8.5	0	43	46		
48:50			FL195	8.4	0	25	27		descent
49:40				no smoke in cockpit					
51:00		160	18,000	7.5	+500	24	26	smoke stable	unrestricted descent
58:20		170	10,000	4.0	0	25	26		
1404:16		land	MWH					340/4	071°
06:40				doors open, packs ON		44	47		
08:50	OFF								
1424	takeoff	MWH							
1438:00	.011	200	FL200	8.5	0	45	45		
40:30							start		descent
43:00		175	18,000	7.0	+500	25	27		descent
46				smoke stabilized					
48:00		165	7,500	3.0	0	24	31		
48:20			7,000			40	44		
48:40			6,500	2.2	0	25	24		
52:16		land	MWH					0/0	
54:52				packs off, doors open (start)					072°
55:15				door open complete					
57:30	OFF								
1504	takeoff	MWH							
1536:25		land	BFI	1536					
1540	blackin			2+13	Flight				

SHEET 2 OF 2	TITLE FAA Smoke Flight Test	MODEL 757B-2000
RECORDER Richard Yelting		AIRPLANE MA001
TEST NO. 90-2 STA TO	BOEING	DOC. NO. D54IN101
DATE 11/30/88		PAGE 90-2-C3

Time	Cond	
092148	Engine Start	
092428	Taxi BFI Runy 13R	
092717	Rolling	
092745	Lift off	
094720	.005	Smk ON Max Bay PS 3.4" H ₂ O
094900		Forward cabin area fairly dense w/ smoke
4930		Begin descent
5000		Smoke reaching to the aft along floor (door 4)
5030		Max Bay PS 3.0" H ₂ O
5230		Max Bay PS 4.0" H ₂ O
5300		Smoke thickest along floor, light near ceiling
5510		Floor to ceiling smoke density beginning to even out but still densest at floor (looking aft)
5640		Max Bay PS 3.5" H ₂ O
5715		Smoke cloud now fairly stable
100340		Vis distance lengthwise $\approx$ 20 ft fwd, 40 ft aft
1200		Smoke cloud still stable - final approach
0823		Touchdown Missed
1005		Pack OFF opening #4 doors
1030		Both #4 doors now open smoke cloud worsening fwd cabin
1250	OFF	Smk OFF (used $\approx$ 1/2 bottle of smoke fluid) ^{second}
1400		#4 R Door stuck open
16XX		#4 R Door now unstick
1550		Taxi
3745		Rolling
3820		Lift off
103713	.006	Smk ON Max Bay PS 7.3" H ₂ O
3900		Only small amount of smoke moving aft, most of smoke is going out fwd CFV, no smoke aft of #2 doors
3940		Begin descent
4100		Max Bay PS 3.0" H ₂ O after descent, was begun smoke density increased slightly but moved no further aft
4200		Smoke cloud stable
4225		Max Bay PS 4.3" H ₂ O

SHEET 1 OF 7	TITLE Smk Evac	MODEL 757B200
RECORDER J Sanford	55-150059	AIRPLANE 114001
TEST NO. 90-2	STACabin	DOC. NO. D541N101
DATE 30 Nov 88	BOEING	PAGE 90-2-C4

Time	Cond	
	.006 Cont	
104600		still no smoke aft of #2 doors, in fact little or no smoke aft of fwd OFV
5230		Mix Bay PS 7.0" H ₂ O
5301		Touchdown Moses
495X		stopped
5500		PicPa OFF opening #4 doors
5510		Both #4 doors now open, smoke density increasing in fwd area but very little migration aft of #2 doors
5640		Smoke cloud back to STA 800 densest at ceiling
5715	OFF	SMK OFF (used $\approx 1/3$ bottle of smoke)
1107XX		Taxi
110935		Rolling
1005		Lift off
111840	.007	Smk ON Mix Bay PS 4.3" H ₂ O
1940		No smoke aft of #2 doors and most of it is in the fwd OFV area
2045		Begin RAPID descent to 3000 feet
2200		No smoke aft of fwd OFV, Mix Bay PS 5.0" H ₂ O
2330		Cab Alt now 4000 feet going up to 2000 fpm
2420		Only very small amount of smoke aft of fwd OFV and none aft of #2 doors
2600		Flow to ULTRA HIGH; Mix Bay PS 11.7" H ₂ O, fwd OFV fully OPEN, 1000 feet altitude, level
2830		Resume descent (Smoke cloud stable)
2720		Mix Bay PS 8.2" H ₂ O
3345	OFF	SMK OFF — Simula Block (2nd Ops), Level 3000 feet
1140XX		Returning to BFI to drop off 2nd Ops — $\approx 1/4$ bottle of smoke used
121406		Touchdown BFI Runway 13R
1815		Stopped Engines shut down
124640		Taxi BFI Runway 13R
5002		Rolling
5027		Lift off

SHEET 2 OF 4	TITLE Smoke Evac	MODEL 77572000
RECORDER J Sanford	1513 0059	AIRPLANE 00000000
TEST NO. 90-2 STA Cabin	BOEING	DOC. NO. D541N101
DATE 30 Nov 55		PAGE 90-2-C5

Time	Cond								
		.009 Cont							
140558	OFF	SINK OFF	(used $\approx 1/4$ bottle of smoke this cond)						
141300	Taxi								
141313	Stop								
141323	Taxi								
141342	Rolling								
141357	Left off								
143800	.011	SMK ON	Max Bay PS	4.2" H ₂ O					
4060		Smoke no further fwd than $\approx$ STA 970							
4036		Begin descent							
4230		Smoke just beginning to reach back to #4 door area, and is now fwd to $\approx$ STA 900 floor area is almost clear (air to about 12" up)							
4520		Max Bay PS 4.5" H ₂ O smoke now moving slowly down towards floor (probably due to person working)							
4715		Smoke cloud fairly stable, leading edge at $\approx$ STA 570 aft edge near #4 door but thin							
5130		Max Bay PS 5.0" H ₂ O final approach							
145215		Touch Down Masea							
5310		Rollout Max Bay PS 3.2" H ₂ O smoke thickening							
5433		Stopped smoke leading edge up to #3 door but quite thin on floor							
5450		Back OFF opening both #1 doors							
5510		Both #1 doors now open, smoke not moving hardly at all - a little fwd movement along ceiling in fwd cabin and aft movement along ceiling in aft cabin							
5700		Layers of smoke now moving fairly quickly fwd along ceiling and out #1 doors							
5735	OFF	SINK OFF (again used $\approx 1/4$ bottle sink this cond)							
150325		Taxi							
150400		Rolling							
0422		Left off							
153624		Touch down BFI Key 13R							
154030		Stopped, engines shut down							
SHEET 4 OF 4			TITLE Smoke Evac				MODEL 75752200		
RECORDER J Sanford							AIRPLANE N78001		
TEST NO. 70-2 STA Cabin							DOC. NO. 5341N101		
DATE 30 Nov 58			BOEING				PAGE 90-2-C7		

IMPORTANT: DO NOT USE BLUE INK, AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

COND #	SMOKE LOC	START SM	STOP SM	DOORS CR			
005	FWD 2 (PAW)	09:47:19	10:12:48	0:10:30	1/2 BOTTLE		
	STA	STA					
006	FWD 2	10:37:10	10:57:10	10:55:05	1/3 BOTTLE		
	STA	STA					
007	FWD 2	11:18:40	11:33:45		1/4 BOTTLE		
	STA	STA		TERMINATE - SIA	1/5 BOTTLE		
008	AFT 2	13:05:42	13:24:30	13:22:44	1/4 BOTTLE		
	#4 DOOR						
009	AFT 2	13:46:40	14:08:54	14:06:59	1/4 BOTTLE		
	#4 L DOOR						
011	MID 2	14:38:00	14:57:31	14:55:10			
	STA 1030						
007	SEAT						

SHEET 1 OF 1	TITLE B757 SMOKE TEST	MODEL B757-200
RECORDER THOMAS R. HAWKINS		AIRPLAN 4420YAC01
TEST NO. 90-2	STA	DOC. NO. D541N101
DATE 30 NOV 88		PAGE 90-2-C8

BOEING

TIME	COND	THE FOLLOWING TIME IS 37 SECS IN ADVANCE OF IR 19
9.54	005	low density smoke remains at lt below 2 4ft STN 1530
9.56		essentially clear at STN 1530
9.57		smoke begins moving aft of STN 1530
10.01		" still about the same as at 9.57
10.03		" light haze smoke of moving aft.
10.09	030	breakdown
10.11	030	smoke a bit more dense at STN 1530
10.11.30	030	Doors open (#4)
		smoke more dense a) at higher levels (at ceiling)
	030	cold air sweeping in at open doors
10.12.30		visibility still good but smoke still dense at higher levels - moving aft.
10.14	006	much more & denser smoke moving aft at higher levels
No smoke at STN 1530 @ that alt (20K) or during desc.		
Opening door (#4) makes no major difference to the fwd smoke cloud even tho it tends to move a bit aft.		
10.58		smoke back at STN 1270 very light haze
Major part of cabin remains totally free or almost free of smoke		
11.23.30	007	Smoke remains fwd of 680 thru depressurization
Condition not completed in order to return to Boeing Field.		
Agreed with Thor Eklund, at his suggestion that 007 could be completed by a good condition (after next landing at Boeing Field).		
1.10.00	008	Smoke remains at very aft end of cabin
1.14.30		Only wisps at STN 1530
		(cold haze begins about 1 frame before fwd of 1530)
1.22.30		On the way smoke more fwd to moderate density @ 1530
1.23.30		Less smoke @ 1530 than 1.22.30
SHEET 1 OF 2		
RECORDER D. Rouse		TITLE FWA Smoke Test
TEST NO. 90-2	STA	MODEL 757-200
DATE 11/30/88		AIRPLANE N74001
		DOC. NO. MA001
		PAGE 0541N101
		90-2-29

008	THE FOLLOWING TIME IS 30 SECS IN ADVANCE OF 1215				
1.25.00	Smoke still not fixed at ≈ 1430				
.009	Then Edlund works to modify this to leave the pack on in the grid we accept.				
1.47.30	Smoke gone				
1.57.00	Smoke light at STN 1530 Seems to have same density, ceiling to floor at aft end of cabin.				
1.52.00	Smoke stops essentially aft of STN 1550				
2.03.15	" still " " " " "				
2.06.20	Smoke moving fwd past 1530				
2.07.00	Smoke moves aft from 1530				
2.08.00	Smoke swirling around at 1530 - very visibility but moderate to heavy density.				
	Then Edlund wants to delete .010 - accepted.				
.011	Smoke remains aft of approx STN 900 10 ft fwd of generator, 2 miles aft				
@ 20K	notice smoke tends to be 2' off the floor & the uniform to the ceiling 10 there is some smogging in the smoke				
	with doors (#1) open smoke moves fwd at ceiling and clears at the floor - STN 740 smoke at upper half of cabin height.				
2.59.30	Smoke seems uniform from generator fwd to about STN 910				

SHEET 2 OF 2	TITLE FAA Smoke test	MODEL 757-200
RECORDER D. Rouse.		AIRPLANE 11/30/88
TEST NO. 90-2	STA	DOC NO. D541N101
DATE 11/30/88	BOEING	PAGE 40-2-C10

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

TIME	COND	AP MIX							
9:47	.005	3.4	SMOKE ON - SPREAD FLR TO CEILING						
9:48			TO STA 600 AFT ALONG FLOOR (THIN)						
9:49			AFT TO REAR ALONG FLR, (THIN)						
9:49:30		3.0	START DESCENT						
9:50		3.0	HEAVY AT FRONT & THIN FRONT AFT						
			ALONG FLOOR						
9:51:30		3.7							
9:52		4.0							
9:53		4.3	SAME SMOKE						
9:54		4.3							
9:55		4.1	STILL PHOTO AT FWD DIVIDER LOOKING AFT						
9:56		3.9	SAME SMOKE						
9:57		3.8							
9:58		4.0	CLOUD MOVING SLOWLY AFT - DIVIDER NEAR						
			RESCURED. STILL THIN IN AFT PART OF						
			INTER						
9:59		4.0							
10:00		4.2	SAME SMOKE						
10:02		4.4	" " BUT SLIGHTLY THICKER						
10:03		4.4							
10:04		4.6	" "						
10:05		4.4							
10:06		4.3	" "						
			AP MIX FLUCTUATES UP TO -1.0 WHEN THROTTLES						
			ARE ADJUSTED						
10:07		4.4							
10:09		4.4	T.D. SMOKE SAME BUT SLIGHTLY THICKER						
10:09:30		3.0	STOPPED						
10:10		0	FAIRLY OFF DOORS OPEN SMOKE THICKER						
			TO ABOUT "MEDIUM" SMOKE DENSE &						
			GETTING SLIGHTLY THICKER						
10:12:30		0	SMOKE OFF						
10:17	.006	7.3	SMOKE ON - GOING TO CFV						
10:19		7.2	ALL SMOKE STAYING FWD OF STA 600 DIVIDER						
10:24:50		3.0	START DESCENT						
10:40		3.0	SMOKE CLOUD SPREAD MORE VERTICALLY BUT						
			STAYING FWD OF 600						
10:42		4.3							
10:44		3.7	DOING FASTER DESCENT						
10:46		4.2	SAME SMOKE - MOVED FWD SOME						
10:49		4.2	" "						
TO NEXT SHEET									
SHEET 1 OF 4			TITLE FAN SMOKE TEST				MODEL 737-200		
RECORDER MAYLOIR							AIRPLANE N/A1001		
TEST NO. 90-2			STA 1120		BOEING			DOC. NO. D541N101	
DATE 11-20-93								PAGE 90-2-C11	

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL

[illegible]

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

TIME	COND	DP	MIX						
13:16	(.008)	4.3	244E	SMOKE					
13:19	(CONT)	4.8	"	"					
13:19:50			T.D.	SAME SMOKE					
13:20:50		2.4	"	"	FWD SLIGHTLY				
13:22:15			STOPPED						
13:22:30		0	PAK OFF	EDDOORS OPEN SMOKE					
				DRIFTING FWD SLIGHTLY (21350)					
13:24:30	✓	0	SMOKE OFF						
13:46:45	.009	7.8	SMOKE ON	- RISING TO CEILING - THIN					
			STAYING AFT						
13:48		7.9	MEDIUM SMOKE CLOUD FILLS WALL TO WALL						
			AND CEILING TO FLR - STAYS AFT						
13:49		7.5	START DESCENT						
13:49:30		3.0	CLOUD COMING SOME FWD TO 21400						
13:50		3.4	SAME SMOKE						
13:51:30		4.0	SPEED-UP DESCENT						
13:52		4.3	SAME SMOKE						
13:53		4.6	"	"					
13:54		4.7	"	"					
13:56		4.5	"	"					
13:58		4.6	"	"					
13:58:30		5.1	"	"					
13:59		5.6	"	"					
14:01		5.8	"	"					
14:02:30		6.6	"	"					
14:03:30		6 TO 10	"	"					
14:04		2.8	"	"					
14:04:17		10 TO 1.9	T.D.						
14:06:21			STOPPED						
14:06:57		9.2	DOORS OPEN - 6746' UP						
14:07:30			SMOKE MOVED SLIGHTLY FWD 21500						
			THIN TO 1120						
14:08:30		9.2							
14:09	✓	0	SMOKE OFF						
[DECIDED IN THE F.A.A. TO SHIP COND .010; GO TO .011]									
14:38	.011	4.2	SMOKE ON	- RISING TO CEILING & FLOWING					
			AFT						
14:40		4.2	SMOKE AT THIS STATION TOO THICK TO SEE.						
14:41		4.2 TO 3.1	START DESCENT						
14:42		3.8	NO CAN SEE.						
(TO NEXT SHEET)									

SHEET 3 OF 4	TITLE F.A.A. SMOKE TEST	MODEL 757-200
RECORDER MAYLOR		AIRPLANE MA601
TEST NO. 90-2 STA 1120	BOEING	DOC. NO. D541N101
DATE 11-30-88		PAGE 9-2-C13

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL

[illegible]

SHEET 4 OF 4	TITLE FAA SMOKE TEST	MODEL 737-200
RECORDER MAYLOR		AIRPLANE 44401
TEST NO. 90-2	BOEING	DGC. NO. D541N101
STA 1120		PAGE 9-2-C14
DATE 11-30-88		

5-1

By 45 seconds, smoke had come back to partition (first class) at 1 min 15 seconds was leaking past partition. By 1 min 30 seconds, the cockpit door not visible from my seat (FWD of bulkhead - LHS seat on aisle). Descent started at something in excess of 2 minutes. At 3 minutes, light smoke aft to aero installation.

At 4 minutes, the front was very cloudy but you could still see all windows. At 4 1/2 further buildup seen back towards CKO and three hugging floor.

At 5 minutes, there was some further deterioration in visibility up front and it became hard to see further windows forward.

SHEET 1 OF 14	TITLE FAA Smoke	MODEL 75752000
RECORDER EK LUND		AIRPLANE N74401
TEST NO. 90-2 STA	BOEING	DOC. NO. D541N101
DATE 11/30/86		PAGE 90-2-C15

By 7 minutes, a definite longitudinal pattern of smoke density seemed to have been well-established. At nine minutes, could hardly see bottom half of smoke tree #1



but overall the front part of aircraft was well stabilized. Some further deterioration in evidence to show by 10 minutes but Elliot said back had been stable several minutes

STABILITY CONSENSUS AT 10 min 20 sec

SHEET 2 OF 4	TITLE FAA Smoke	MODEL 75752200
RECORDER EHLVNA		AIRPLANE N44001
TEST NO. 90-2 STA	BOEING	DOC. NO. D541N101
DATE 11/30/88		PAGE 90-2 x 16

At 12 min 30 seconds looking fwd is clearer but rear is worse.

At 15 minutes, the front seemed somewhat worse and so did the rear. At 18 minutes things looked a bit worse up front but you could see most of smoke station #1. No apparent change front or rear between 18 and 20 minutes.

TD @ 21 min 4 sec.

5.2 STOP @ 22 min 40 seconds

@ 1' 50 sec (PACS OFF/DOORS OPEN)

at this time conditions in front were terrible & could see only 3 windows on my left and 3 on right.

Could only see things about 5 foot distant.

SMOKE OFF @ 25 min 30 seconds.

AIR PACS ON

COULD SEE FWD BULKHEADS BY 29 MINUTES

SHEET 3 OF 14	TITLE FAA Smoke	MODEL 757-253-200
RECORDED EKLUND	BOEING	AIRPLANE N400NA001
TEST NO. 90-2 STA		DOC. NO. D541N101
DATE 11/30/88		PAGE 90-2 C17

→ FROM B₃₅ RHT DOOR OPENED AT 29 min 30 sec

6-1 It start smoke flowing mostly right out outflow valve within 20 seconds with the exception of a small column coming down the floor grille to seat in front of partition and then turning forward. A well stabilized pattern within 1 minute and 30 seconds. Could feel air flowing forward between partition with my right arm. By 4 minutes, there was some thickening but the major column vividly flowing to the upper lobe outflow valve. At 6 minutes, a faster descent rate started and front seemed to clear up a little.

SHEET 4 OF 14		TITLE	FAA Smoke	MODEL	757-2357-200
RECORDER		EXLUND		AIRPLANE	N401NA001
TEST NO.	90-2	STA		DOC. NO.	D541N101
DATE	11/30/80	BOEING		PAGE	90-2-C18

At 9 minutes 30 seconds, the smoke seemed to concentrate more to the front and left, and the center flow and ~~left~~ right flow all the way up to the generator were clear.

At 13 minutes, no change. All smoke still up front.

At 13 min 30 the outflow seemed to open more and the smoke flowed out even faster.

TD @ 15 min 50

Smoke still going out fwd outflow

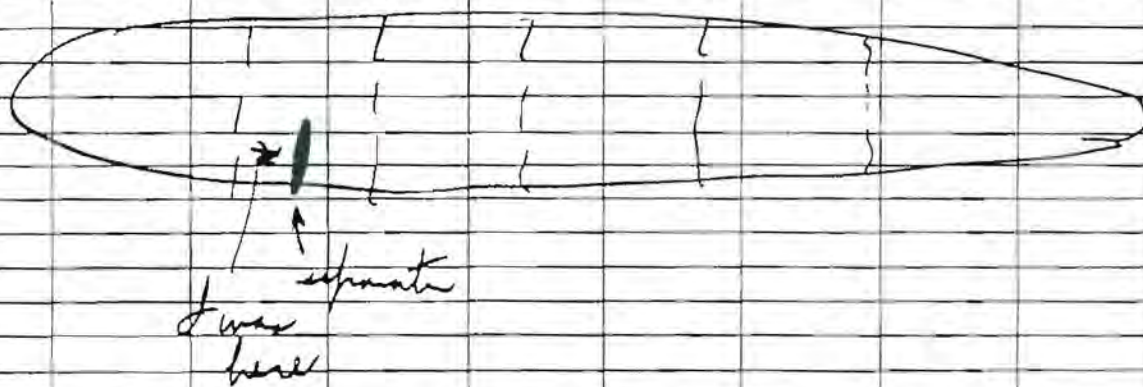
1-2 STOP @ 19 min 40 seconds
Doors open. Front immediately began filling w/ smoke.

SHEET 5 OF 14	TITLE FAA Smoke	MODEL 757-22507-200
RECORDER JKLUND		AIRPLANE N400NA001
TEST NO. 90-2 STA	BOEING	DOC. NO. D541N101
DATE 11/30/88		PAGE 90-2-19

At 18 min 20 seconds, could not see fuel window or first smoke tree

At 19 minutes, front was stratifying a little, but negligible amounts went past the divider position to the rear.

At 20 minutes, smoke off and there had been smoke movement along ceiling aft of separator.



SHEET 6 OF 14	TITLE EAA Snake	MODEL 757-200 7.200
RECORDER EKLUND		AIRPLANE N409VA001
TEST NO. 90-2 STA	BOEING	DOC. NO. D541N101
DATE 4/30/88		PAGE 90-2-C20

7-1 Through 1 minute 30 seconds
 very much like test 6. Most
 smoke going to upper cabin
 outflow. Descent starts at
 2 minutes. Quick Type descent
 At 3 minutes, smoke still
 staying forward. (Very noisy
 in airplane). At 3 min 35
 seconds, smoke rushing
 out outflow very rapidly
 and aircraft felt cold.
 By 4 min 10 seconds, smoke
 still confined forward of
 partition ~~bag~~ behind my seat.
 At 5 minutes 30, smoke still
 in front but appeared a bit
 thicker.

SHEET 7 OF 14	TITLE FAA Smoke	MODEL 757-2267-200
RECORDER EXLUND		AIRPLANE N400NA001
TEST NO. 90-2	BOEING	DOC. NO. D541N101
DATE 11/30/88		PAGE 90-2-C21

at 7 minutes, level off 10,000 feet
and go to ultra high flow.

Not much difference in the
front of aircraft. Smoke
seems to be whipping around
faster, but that is about it.

Declared stable smoke situation
at 8 minutes 30 seconds.

Descent began.

By 10 minutes 30 seconds, the
front smoke had diminished
to about the lowest overall
amount seen there front
smoke scenario.

14 min 45 seconds -

levelled off / medical problem.

20 min 45 seconds ☐ Decide to return to
Basingfield.

SHEET 8 OF 14	TITLE FAA Smoke	MODEL 757-252-200
RECORDER EKLUND		AIRPLANE N404NA001
TEST NO. 90-2 STA	BOEING	DOC. NO. D541N101
DATE 11/30/88		PAGE 40-2-C22

8-7 NOTE: Lost separated time.
 Restarted watch $\approx$ 5 sec after
 TD announced start of descent.
 All discussion here based on that
 as time zero. At 1 min 30 sec
 smoke still remained confined
 well to rear. At 2 min 45 sec
 decision to speed up descent
 because of stabilization of cloud.
 At 6 minutes, smoke cloud
 still stabilized well to rear of
 a/c. No stratification in evidence.
 At 9 minutes, still localized smoke
 way to rear. Can see rear exit
 door sign easily. At 11 minutes still
 no change.



NOTE: Russ Kenney left a/c after test #7.

SHEET 4 OF 14	TITLE FAA Smoke	MODEL 757-200
RECORDER ERLUND		AIRPLANE N40001
TEST NO. 90-7-88	STA	GOC. NO. D541N101
DATE 11/30/88	BOEING	PAGE 90-2-C23

8-2

Note time wrong by ~2 min.

TD 11 min 45 sec

STOP 14 min 5 sec

Smoke gets worse in back
cannot see the rear door exit
sign as distinctly. ~~low~~

Smoke moved forward a little
on floor but stayed mostly
confined to rear

Smoke off at 16 min 30 seconds

SHEET 10 OF 14	TITLE FAA Smoke	MODEL 757-200
RECORDER EKLUND		AIRPLANE NAA1001
TEST NO. 90-2 STA	BOEING	DOC. NO. D541N101
DATE 11/30/88		PAGE 90-2-24

9-1 - Up to 1 min 30 seconds, smoke well to the rear and looks very thin. Descent starts at 2 min 10 seconds.

At 3 minutes smoke still well to rear and looking thin.

At 3 min 10 sec appears to be moving up between rear-most equipment racks. From where I sit (a station 650), things look stable by 4 minutes.

Stable agreed by 4 min 45 sec and descent accelerated. At 6 min 30 sec, smoke still well to rear, and I can read ceiling exit sign for rear doors. Report from ATD that

Note: Mod plan 9-1, 7-2 per my request to leave packs on in ultra flow mode for 2 min evacuation time.

This was based on smoke observations in test 8.

~8:40 PM

SHEET 11 OF 14	TITLE FAA Smoke	MODEL 757-200
RECORDER EK LUNP		AIRPLANE N401A001
TEST NO. 90-2 STA	BOEING	DOC. NO. D541N101
DATE 11/30/88		PAGE 90-2-C25

smoke in rear not as dense as last condition. At 14 min 10 sec stable condition persisted with smoke well to back.

ATP asked TD via Elliot to keep engine power high to maintain bleed duct pressure & ultra flows.

At 14 min 30 sec, things still stable to rear.

At 16 min, things still stable. Can still read rear exit sign.

TD at 17 min 35 sec.

Things still stable in back.

During TAXI smoke appears to thicken in rear.

q-20 STOP at 19 min 45 sec.

Open doors caused smoke to come forward a bit but very thin and slowly.

Thin smoke around station 1100 least visibility through the smoke that advanced is pretty good.

~~ST~~ PACS SHUT DOWN AND VLD 22 min 30 sec.

SHEET 12 OF 14	TITLE FAA Smoke	MODEL 757-2150-200
RECORDER EK LUND		AIRPLANE NA001A001
TEST NO. 90-2 3TA	BOEING	DOC. NO. D54INT01
DATE 11/30/88		PAGE 90-2-226

11-1

By 1 minute, smoke has filled cross section and is moving back. Can see Elliott through smoke at 2 minutes.

Looking rearward from station 360, you can discern a slight rotational movement of the smoke



At 4 minutes, could not see Elliott through the cloud. #3 smoke meter tree very visible in the haze. At 5 min 30 seconds, smoke as far forward as station 870 on left hand side.

TEST #10 CANCELLED BASED ON RESULTS OF 8 AND 9.

SHEET 13 OF 14	TITLE FAA Smoke	MODEL 757-200
RECORDER EKLUNO		AIRPLANE NADA001
TEST NO. 90-2	STA	DOC. NO. D541N101
DATE 11/30/86	BOEING	PAGE 90-2 (27)

At 7 minutes, smoke pretty much stabilized to front and to rear.

At 8 min 20 sec ATD told TD that smoke stabilized.

As long as no one walked through it, the smoke seemed to want to stay a foot off the ground.

Rear reports from rear, the smoke took out in rear well ahead of the #3 door.

At 12 min 45 second, smoke flowed forward to about station 780.

BLOO

SCDS4

FWD

BACKWARD

Then went back at 14 minutes.

TD 14 min 15 sec.

STOP at 16 min 35 sec.

With packs of smoke starts accumulating at injection point & moves forward somewhat.

By 14 minutes Elliot visible

Then 16 min 20 seconds smoke moves forward to #2 door.

SHEET 14 OF 14	TITLE FAA Snake	MODEL 757-200-200
RECORDER EKLUND		AIRPLANE NAA001
TEST NO. 90-2 STA	BOEING	DOC. NO. D541N101
DATE 11/30/88		PAGE 90-2-C28

At 18 min 40 sec, smoke hits #1 door, late flow forward by 19 min 30 sec.

FLIGHT TEST ORGANIZATION PLAN OF TEST

TITLE Photo Flights and Miscellaneous EWA Testing

AIRPLANE MODEL
757-200

AIRPLANE CUSTOMER AND TAB NO.
TBC NA001

PLAN AND TEST NUMBER
90-3

DATE CONDUCTED
12-01-88

THIS PLAN OF TEST CONTAINS THE FOLLOWING TEST ITEMS:

T.I. NO.	EWA NO.	TITLE
B1.38.0113	54-42016B	Yaw Damper Control Law Candidate Ground Test
B1.38.0114	54-42016B	Yaw Damper Control Law Candidate Flight Test
B3.14.0070	53-50027B	Landing Gear Hydraulic Pressure Ground Test
B3.13.0059 ✓	54-80000B	FAA Smoke Test

PREPARED BY (TEST ENGINEER)

APPROVED BY (OPS GROUP ENGR)

CHECKED BY (PROJECT PILOT)

APPROVED BY (DIR OF FLIGHT TEST)

BOEING : No. 0543N101-001

: Page 90-3-A1

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - BPrep. [Signature] 16 Nov 88
Engineer DateConc. [Signature] 11/16/88
Lead Test Ops/Engr DateApp. [Signature] 11/16/88
Lead Analysis Engr DateApp. [Signature] 11/16/88
Analysis Supervisor DatePURPOSE OF TEST

To evaluate the potential benefits of an additional forward outflow valve and increased cabin air inflow in evacuating continuous cabin smoke.

REFERENCES

- (a) EWA 54-80000B, "Airplane Tests of Enhanced Emergency Smoke Venting."
- (b) FC 54-80000-01-1, "Installation of High-Flow Control Valves for Tests of Enhanced Emergency Smoke Venting."
- (c) FC 54-80000-02-1, "Outflow Valve Installation (Including Skin Rework)."
- (d) FC 54-80000-03-1, "Auxiliary Control Panel Instl/Checkout, FAA Smoke Test."
- (e) Service Bulletin 757-21-0017.
- (f) Service Bulletin 757-21-0031.
- (g) Service Bulletin 757-21-0034.

CONFIGURATION

The test vehicle is a Model 757-200, Airplane NA001. The References (b) through (d) FCs shall be incorporated which install a 737 type outflow valve (OFV) in the forward cabin, special pack flow control valves to allow increased pack flow, and a portable control panel for the packs and forward OFV in the main cabin.

Also the References (f) and (g) service bulletins must be incorporated (ram air system). The intent of the Reference (e) service bulletin, to close the lightening holes in the sidewall air outlet grills, shall be satisfied using speed tape (or equivalent) installed by F & A. However, the service bulletin itself shall not be incorporated.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

CONFIGURATION (Cont'd)

The flight deck door must be installed, and the large opening in the flight deck bulkhead must be sealed with plastic sheeting or equivalent, in order to prevent smoke penetration into the cockpit. Recommend inspecting the bulkhead for other leakage pathways (production or not) and blocking them with foam or by other means if possible.

Finally, the area immediately around the forward OFV should be cordoned off to keep people well clear of the valve (no one should be able to easily touch the OFV while outside the cordoned off area).

SPECIAL EQUIPMENT

- FAA provided smoke densitometers (10) and associated recording equipment (includes a laptop computer)
- FAA provided smoke generator or generators and a smoke mixing chamber with a helium injector and a muffin fan
- One additional Boeing provided smoke generator for backup
- Supply of helium for ground test conditions .014-.019. Helium source must be capable of providing 30 psig @ 100 cfm at the smoke mixing chamber. Helium line must be routed into aircraft through the E/E bay external access hatch, since this will be the only opening in the aircraft during these conditions. There are six of these conditions and each will require a maximum of 14 minutes of continuous helium flow. The operator of the helium supply outside must be on interphone to allow communication with the aircraft
- Video cameras, 2 fixed and 1 mobile, each with IRIG time
- Pressure gauge located in the main cabin reading mix bay static pressure
- Portable breathing apparatus (O₂ or air) for 12 persons in the main cabin, at least 15 minutes per person per condition

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

DATA REQUIRED

- | | |
|--|---|
| Video | - ON, mobile camera positioned per analysis direction |
| FAA Smoke Density
Recording System | - ON |
| Wind Station
(Conditions
.014-.019 only) | - Wind direction and velocity at least once during
each condition |
| Manual
(Flight Deck) | <ul style="list-style-type: none">- Event times- ECS panel switch positions- Production cabin pressure control system
configuration, including aft OFV position- L & R pack flow from EICAS ECS Maintenance page- L & R bleed duct pressure- Airspeed (flight conditions)- Altitude (flight conditions)- Cabin ΔP (flight conditions)- Cabin altitude rate of change (flight conditions)- Tower wind direction and velocity while doors are
open after landing (flight conditions)- Aircraft parked heading while doors are open after
landing (flight conditions) and during ground test
conditions .014-.019 |
| Manual
(Passenger Cabin) | <ul style="list-style-type: none">- Event times- ECS configuration- Forward OFV cabin pressure control system
configuration- Mix bay static differential pressure- Density and movement of smoke |

Still photos of test setup.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions

GW for conditions .005 through .013 must be 215K lbs. or less. CG is optional. The Wx Radar should be OFF for this group of conditions since with the left recirculation fan OFF it has no cooling air. ~~Also, "20000" must be set in the ALT SET window of the forward OFV control system (portable control panel in main cabin).~~

NOTE: With the production cabin pressure control system in AUTO 1 or AUTO 2 the "descent" submode is attained as follows: After takeoff, level off at 1,500 feet AGL or higher and maintain level flight (± 100 feet) for at least 60 seconds. This will place the cabin pressure control system into the "cruise" submode. After the "cruise" submode is achieved, then descend at least 1,000 feet. This will place the cabin pressure control system into the "descent" submode and it will begin to rate the cabin to the selected LDG ALT. At this point the normal flight profile may be resumed (i.e., climb) though the cabin pressure control system will remain in the "descent" submode.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.005	Establish the following:
Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- AUTO 1, descent submode (see note)
LDG ALT	- 1,000 feet BELOW sea level (~8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- AC MAN. OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Forward cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a descent to landing. Continue generating smoke. Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF and promptly open both #4 doors. Maintain for two minutes, continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.006	Establish the following:
.106 ✓	Altitude ✓ 20,000 feet
.106 ✓	Airspeed ✓ Holding airspeed
	Production Cabin Pressure ✓ MAN, OFV fully CLOSED
	Control System
	Packs ✓ L & R AUTO
	Trim Air ✓ ON
	Temp Selectors ✓ AUTO 75°F
	Recirculation Fans ✓ L & R OFF
	Pack Flow .106 - Normal/Intermediate .206 ✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)
	Forward OFV Cabin Pressure - (set at portable control panel in main cabin)
	Control System
	Mode - STBY
	CAB RATE - PIP
	CAB ALT - 1,000 feet BELOW sea level (-8.6 psi ΔP)
	FLT/GND - FLT
	Flight Deck Door ✓ CLOSED
	Smoke Generator Location ✓ Forward cabin <i>Station 700</i>

With the cabin ΔP stable, begin generating smoke. ✓ After two minutes, begin a descent to landing. ✓ Continue generating smoke. ✓ Reset CAB ALT (forward OFV (960) control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, select ✓ GND on the forward OFV control system, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF and promptly open both #4 doors. ✓ Maintain for two minutes, continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.007 7.1 ✓	Establish the following:
Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- MAN, OFV fully CLOSED
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- (set at portable control panel in main cabin) - Mode - STBY CAB RATE - PIP CAB ALT - 1,000 feet BELOW sea level (~8.6 psi ΔP) FLT/GND - FLT
Flight Deck Door	- CLOSED
Smoke Generator Location	- Forward cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a rapid descent to 10,000 feet. Reset CAB ALT (forward OFV control system) to 10,000 feet, and CAB RATE to the maximum allowable so the cabin will be depressurized at or soon after reaching 10,000 feet. Continue generating smoke. Upon reaching 10,000 feet, level off and set the pack flow to ULTRA HIGH (215%). Resume holding airspeed. After the cabin is depressurized, reset the forward OFV control system to AC MAN then fully OPEN the OFV. Maintain 10,000 feet for approximately 5 minutes, then resume descent to landing. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, select GND on the forward OFV control system, clear the runway and stop as soon as practical heading into the wind. After stopping, leave packs ON but promptly open both #4 doors. Maintain for two minutes, continuing to generate smoke.

757-200
NA001
D541N101
90-3-48

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
83.13.0059.008	Establish the following:
Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- AUTO 1, descent submode
LDG ALT	- 1000 feet below sea level (~8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Aft cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a descent to landing. Continue generating smoke. Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after top of descent. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF and promptly open both #1 doors. Maintain for two minutes continuing to generate smoke.

757-200
NA001
D541N101
40-3-199

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.009	Establish the following:
Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- AUTO 1, descent submode (see note)
LDG ALT	- 1,000 feet BELOW sea level (-8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- ULTRA HIGH (215%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Aft cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a descent to landing. Continue generating smoke. Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF and promptly open both #1 doors. Maintain for two minutes, continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
83.13.0059.010	Establish the following:
Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure	- AUTO 1, descent submode
Control System	(see note)
LDG ALT	- 1000 feet below sea level (-8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure	- AC MAN, OFV fully CLOSED
Control System	(set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Aft cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a rapid descent to 10,000 feet. Reset LDG ALT (production OFV control system) to 10,000 feet, and AUTO RATE to the maximum allowable so the cabin will be depressurized at or soon after reaching 10,000 feet. Continue generating smoke. Upon reaching 10,000 feet, level off and set the pack flow to ULTRA HIGH (215%). Resume holding airspeed. After the cabin is depressurized, reset the production OFV control system to MAN then fully OPEN the OFV. Maintain 10,000 feet for approximately 5 minutes then resume descent to landing. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, leave packs ON but promptly open both #1 doors. Maintain for two minutes continuing to generate smoke.

757-200
NA001
D541N101
90-3-1111

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
B3.13.0059.011	Establish the following:
Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- AUTO 1, descent submode (see note)
LDG ALT	- 1,000 feet BELOW sea level (~8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Mid cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a descent to landing. Continue generating smoke. Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF and promptly open both #1 doors. Maintain for two minutes, continuing to generate smoke.

757-200
NA001
D541N101
90-3-412

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)

<u>Condition No.</u>	<u>Procedure</u>
83.13.0059.012	Establish the following:
Altitude	✓ 20,000 feet
Airspeed	✓ Holding airspeed
Production Cabin Pressure Control System	✓ AUTO 1, descent submode (see note)
LDG ALT	✓ 1,000 feet BELOW sea level (-8.6 psi ΔP)
AUTO RATE	✓ PIP
Packs	✓ L & R AUTO
Trim Air	✓ ON
Temp Selectors	✓ AUTO 75°F
Recirculation Fans	✓ L & R OFF
Pack Flow	✓ ULTRA HIGH (215%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	✓ AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	✓ CLOSED
Smoke Generator Location	- Mid cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a descent to landing. Continue generating smoke. Reset LDG ALT (production OFV control system) to the appropriate destination field altitude to assure the proper ΔP at touchdown. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, turn both packs OFF and promptly open both #1 doors. Maintain for two minutes, continuing to generate smoke.

757-200 SMOKE EVAC WITH FWD OFV AND INCREASED PACK INFLOW GT & FT - B

(Cont'd)

TEST CONDITIONS (Cont'd)Flight Conditions (Cont'd)Condition No.ProcedureB3.13.0059.013 *CX* Establish the following:

Altitude	- 20,000 feet
Airspeed	- Holding airspeed
Production Cabin Pressure Control System	- AUTO 1, descent submode (see note)
LDG ALT	- 1,000 feet BELOW sea level (~8.6 psi ΔP)
AUTO RATE	- PIP
Packs	- L & R AUTO
Trim Air	- ON
Temp Selectors	- AUTO 75°F
Recirculation Fans	- L & R OFF
Pack Flow	- INTERMEDIATE (165%) (set at portable control panel in main cabin)
Forward OFV Cabin Pressure Control System	- AC MAN, OFV fully CLOSED (set at portable control panel in main cabin)
Flight Deck Door	- CLOSED
Smoke Generator Location	- Mid cabin

With the cabin ΔP stable, begin generating smoke. After two minutes, begin a rapid descent to 10,000 feet. Reset LDG ALT (production OFV control system) to 10,000 feet, and AUTO RATE to the maximum allowable so the cabin will be depressurized at or soon after reaching 10,000 feet. Continue generating smoke. Upon reaching 10,000 feet, level off and set the pack flow to ULTRA HIGH (215%). Resume holding airspeed. After the cabin is depressurized, reset the production OFV control to MAN then fully OPEN the OFV. Maintain 10,000 feet for approximately 5 minutes, then resume descent to landing. Time the descent so that touchdown occurs approximately 20 minutes after leaving 20,000 feet. After touchdown, clear the runway and stop as soon as practical heading into the wind. After stopping, leave packs ON but promptly open both #1 doors. Maintain for two minutes, continuing to generate smoke.

757-200
NA001
D541N101
90-3-A14

COPY

AIRPLANE INSURANCE RECORD

Sheet Serial No.

Use separate form for each flight and each taxi test made apart from a flight

Date 12/1/82

AIRPLANE MODEL AND SERIES	AIRPLANE REGIS- TRATION MARKS (TAIL NUMBER)	TEST NO. (IF APPLICABLE)	FLIGHT NUMBER	FROM (AIRPORT CODE OR CITY AND STATE)	TO (AIRPORT CODE OR CITY AND STATE)	☐ AIRBORNE TIME ☐ BLOCK TIME	
						HOURS	MINUTES
757-200	N1757A	70-3	1476	BFI			
APPROVED <u>John H. [Signature]</u> PILOT'S SIGNATURE						TOTAL NUMBER OF PERSONS ABOARD 13	
BOEING EMPLOYEES		FUNCTION/ORGAN		OTHERS		REPRESENTING	
1	John Armstrong			1	Thor Eklund	FAA	
2	Susan Darcy			2	James Demarce	"	
3	Richard Yilding			3	Thomas Wawrynowic	USAF	
4	Randy Speer			4	Thomas Bell	"	
5	Yang Lang			5			
6	Jerry Sanford			6			
7	Tim Jang			7			
8	Al Matthews			8			
9	Elliott Maylor			9			
10				10			
11				11			
12				12			
13				13			
14				14			
15				15			
16				16			
17				17			
18				18			
19				19			
20				20			
21				21			
22				22			
23				23			
24				24			
25				25			
26				26			
27				27			
28				28			
29				29			
30				30			
31				31			
32				32			
33				33			
34				34			
35							
36							

01 4100 6790 REV 2/75 IAD 1310 P61

(Applicable procedure-B-7900 008)

C-16

BOEING

NO. D541N101

PAGE 90-3-82



TEST SUMMARY

AIRPLANE:	MODEL 757-200	TAB NA001	CUSTOMER TBC
TEST:	NUMBER 90-3	DATE 12-01-88	
FLIGHT:	NUMBER(S) 1496	TIME 1+44	CUM. TIME 1965+02
PREPARED BY:		NAME Richard Yeilding	

This test was the evaluation of smoke evacuation with increased cabin airflow and (an additional) forward outflow valve.

Completed all remaining conditions.
Cabin smoke evacuation performed almost as expected.

FLIGHT TEST LOADING MANIFEST

MODEL	AIRPLANE	REG. NO.	LOADED BY	DATE	TIME	A/P TAB NO.
757-200	N757A		R. O'Farrell	11-30-88	1900	NA001

LOAD NO.	TEST NUMBER	CHECKED BY	DATE	TIME	FLIGHT DATE
37-91	90-3	D. RUCH	12-1-88	0010	112-1-88

BASIC WT. & C.G. (FLAPS & WHEELS UP.)	26.1 % MAC	129455 LBS.
---------------------------------------	------------	-------------

POTABLE WATER	53.7 GAL.	447 LBS. TOTAL
FLIGHT CREW	14 CREW	2800 LBS. TOTAL
EQUIPMENT - REMOVABLE		894 LBS. TOTAL
BINS	613 LBS.	
RIBLET FILM	255 LBS.	
SPARE ELECTRONICS BOXES (1)	26 LBS.	
BALLAST-HARD		0 LBS. TOTAL
PASSENGER DECK	0 LBS.	
LWR CARGO FWD.	0 LBS.	
LWR CARGO AFT	0 LBS.	

ZERO WATER ZERO FUEL CONDITION (W & F UP)	25.5 % MAC	133596 LBS.
---	------------	-------------

WATER BALLAST TOTALS	0 GALS	0 LBS. TOTAL
PASSENGER DECK FWD		
GR.	LBS.	
PASSENGER DECK AFT		
GR. 0 0 0 0 0 0	0 LBS.	
LOWER CARGO FWD		
GR.	LBS.	
LOWER CARGO AFT		
GR.	LBS.	

ZERO FUEL, CONDITION (WHEELS & FLAPS UP)	25.5 % MAC	133596 LBS.
--	------------	-------------

TOTAL FUEL ON BOARD	6652 GAL.				45700 LBS. TOTAL
	LBS/GAL	TEMP. C		STICK	GAGE
TANK LH	6.871	8.0		NA	15100
TANK RH	6.871	8.0		NA	14800
TANK C/W	6.871	8.0		NA	15800
AVERAGE	(6.871)	(8.0)			

GROSS WEIGHT & C. G. (FLAPS & WHEELS UP)	26.5 % MAC	179296 LBS.
--	------------	-------------

C. G. (FLAPS & WHEELS DOWN)	26.6 % MAC	
-----------------------------	------------	--

CREW LOCATIONS	CREW LOCATIONS
2 254	0 0
2 282	0 0
2 1140	0 0
0 390	0 0
2 656	6 1310
0 656	0 0
0 0	0 0

ZERO FUEL & WATER MOMENT 139321589 LB. IN.

ZERO FUEL CONDITION MOMENT 139321589 LB. IN.


 PILOT'S SIGNATURE

757-200
 NA001
 D541N104
 90-3-C1

0850	black out								
0853	takeoff								
Time	Condition	IAS	Alt	AP	AP rate	Blood Press Left	Blood Press Right	Wind	aircraft handling
								28°F	
0909:53	.012	203	FL200	8.5	0	45	46	350/4	
12:10			pitch was +5°	holding	NSpeed		start	descent	
13:13		250	FL180	7.2	+600	26	30	descent	
			no smoke	in cockpit					
15:16		250	13,000	5.2	+500	26	30	descent	
17:30		235	6,000	2.2	0	25	29	descent	
20:00		land	MWH						west
22:15		doors open		packs off				350/4	~270°
22:36		doors fully open							
24:25	✓	OFF							
0930		takeoff	MWH						
0939:00	.106	201	FL200	8.5	0	44	46	0/0	
41:20							start	descent	
43:10		250	15,000	6.4	+400	27	34	descent	
44:00			light smoke	in cockpit					
45:30		244	6,000	2.6	+450	26	32		
47:26		201	3,000	0.9	0	44	45	level	
52:44/53:34		land	MWH					0/0	
53:58		Grd switch position					light smoke	in cockpit	
56:13		packs off, doors open							0700
56:22		doors fully open							
58:20	✓	OFF					no smoke	in cockpit	
1009:1009		takeoff	MWH						
1016:54	.206	199	FL200	8.5	0	44	47		
18:58							start descent		
20:10		250	18,000	7.5	+400	27	30	no smoke	cockpit
22:44		240	13,000	5.6	+400	26	29	descent	
24:00			very light smoke	in cockpit					
26:50		17.7	8,000	3.1	0	24	27	light smoke	descent
31:00		land	MWH						
31:30		Grd switch position							
33:14		pack off door open						0/0	0700
33:33		doors fully open							
35:20	✓	OFF							

SHEET	1 OF 2	TITLE	FAA Smoke	MODE	757572200
RECORDER	Richard Yeilding		Flight Test	AIRPLANE	NA8001
TEST NO.	90-3	STA TO		DOC. NO.	D54IN101
DATE	12/1/88		BOEING	PAGE	90-3-2

Time	Condition	IAS	Alt	AP	AP rate	Blood Press Left	Blood Press Right	Wind	aircraft handling
				Recirc Fans OFF					
	.007.1			Packs → Ultra-High Flow, Auto					
				Production outflow Valve - closed (Manually)					
				Forward outflow Valve - Open (AL-Mod)					
				Engine power to maintain 43-45 blood alt press					
				start smoke					
				open #4 doors (after 5 min stable)					
				wait 2 min					
10 47:03	.007.1	0	1120	0	0	40	43		start
48:30						42	42	0/0	069°
49:30				doors open		41	41		
50:30				fully open		41	41		
52:30				OFF					
1100				takeoff MWH					
1105			Adams ON	load	L = .40	R = .39			climb
1106					L = .40	R = .40			climb
1106:30					L = .42	R = .39			level 16,000
1107					L = .40	R = .40			level 16,000
H33 1132			land	BFI					
1137			block in		1+44	Flight			

SHEET 2 OF 2	TITLE	FAA Smoke Flight Test	MODEL	75752990
RECORDER	Richard Yeilding		AIRPLANE	MAXIM
TEST NO.	90-3	STA TO	DOC. NO.	D541N101
DATE	4/30/88	12/1/88	PAGE	90-3-C5

Time	Concl								
0848X	Engine Start								
085040	Turn BFT Runy 13R								
5310	Rolling								
5330	Lift off								
090950	.012	Smk ON Max Bay PS 8.1"H ₂ O							
1120		Smoke moving aft							
1217		Began descent							
1300		Smoke cloud thickening but still mostly confined to left side around smoke generator, aft edge of cloud still moving aft							
1500		Smoke not moving fwd, Max Bay PS 7.6"H ₂ O							
1545		Only very thin smoke back to just fwd of #4 door							
1715		There is now a thin layer along floor extending fwd to about to #2 door - most of smoke is still aft however							
1900		Max Bay PS 5.0"H ₂ O - final approach							
1955		Touch down Moses							
2030		Rollout Max Bay PS 3.2"H ₂ O (idle power)							
2130		Wisp of smoke momentarily fwd fwd of #2 door							
2200		Stopped							
2212		Packs OFF opening both #1 doors							
2230		Both #1 doors now open smoke cloud thickening in mid cabin but not moving							
2330		Very thin layer of smoke in cabin, moving fwd and out #1 doors							
2415		Smoke area near floor mid of cabin length							
2425	OFF	Smk OFF (used ~ 1/8 bottle of smk this condition)							
2940		Turn							
3010		Rolling							
3040		Lift off							
3857	.106	Smk ON Max Bay PS 4.1"H ₂ O, smoke generator at STA 750 left side pointed left against wall, pack flow INTERMEDIATE (15.5%)							
4025		Definite fwd movement of smoke (no smoke aft of STA 760)							
4125		Began descent some smoke moved 36 ft aft momentarily							
4210		Max Bay PS 3.5"H ₂ O							
4340		Again there is no smoke aft of STA 760							
4440		light smoke in flight deck							
SHEET 1 OF 3		TITLE Smk Evac				MODEL 75752-200			
RECORDED J Sanford						AIRPLANE UNADOT			
TEST NO. 90-3		133.13.0059				SEC. NO. 38-INT01			
DATE 1 Dec 58		BOEING				PAGE 90-5-C4			

Time	Condi	
	106 cont	
094510		Visibility in fwd cabin (between #1 & #2 doors) ≈ 30 ft. Smoke distribution fairly even
4630		Mix Bay PS 5.0"H ₂ O at 4630
4900		Still no smoke aft of STA 760, density fwd stable
5145		at 5145 Mix Bay PS (final approach) 5.0"H ₂ O
5332		Touchdown Massa
5430		Rollout Mix Bay PS 3.5"H ₂ O (idle power)
5550		Stopped
5610		Packs OFF opening both #4 doors
5620		Both #4 doors open
5710		Smoke moving aft upper part of cabin (floor area clear)
5740		Smoke beginning to exit #4 doors
5810		Density fwd area decreasing slightly
5835	OFF	Smoke OFF (3/4 bottle smoke used this cond)
100405		Take
0400		Rolling
0430		Lift off
1650	206	Smoke ON Mix Bay PS ^{8.0"H₂O} same as cond 106 except with pack flow ULTRA HIGH H
1815		Again definite fwd movement of smoke and no smoke aft of STA 760 - 770
1903		Begin descent
2000		Mix Bay PS 5.0"H ₂ O at 2000
2120		Smoke cloud fairly stable, visibility fwd cabin between the #1 & #2 doors now a little better than 30 feet (not quite as dense at stabilization as during cond 106)
2315		Mix Bay PS 6.0"H ₂ O
2425		Very light smoke reported in ply to deck
3010		Mix Bay PS 7.5"H ₂ O final approach

SHEET 2 OF 3	TITLE SMOKE EVAC	MODEL 757-200
RECORDER J. Sanford	BS. 13.00 59	AIRPLANE M10001
TEST NO. 70-3	STA Cabin	DOC. NO. D541N101
DATE 1 Dec 58	BOEING	PAGE 90-3-65

Time	Cond
	.206 cant
103059	Touchdown Gates
3150	Pullout Max Bay PS 3.5"H ₂ O (idle power)
3306	stopped
3310	Both Packs OFF, opening both #4 doors
3330	Both #4 doors open
3400	Smoke migrating aft in upper part of cabin
3430	Density in fwd cabin decreasing slightly, floor area from #2 doors aft is clear
3523	OFF SMK OFF, smoke just beginning to exit #4 doors → (used ~ 1/4 bottle smoke tank condition)
4630	Power up to achieve ~44 psig bleed duct pressure
4703	.007.1 SMK ON Max Bay PS 10.3"H ₂ O aircraft on ground at 4 psig (were simulating the ground portion of COND. no 7)
4830	Smoke entirely confined to fwd OFV area
4935	Both #4 doors opening both #11 doors, Packs still ON
5030	Both #4 doors now open
5115	Max Bay PS 10.2"H ₂ O smoke moving aft but aft edge is not very dense
5200	Smoke now exiting #11 doors
5215	Smoke density forward has been slowly increasing
5230	OFF SMK OFF (used ~ 1/2 bottle smoke tank condition)
5900	Taxi
110022	Rolling
0045	lft off
3304	Touchdown BFI Runy 13 R
3658	Stopped, engines shut down

SHEET 5 OF 3	TITLE SMK Evac	MODEL 757-200
RECORDER J. Sanford	BS.13.0059	AIRPLANE N4001
TEST NO. 90-3	STATION	DOC. NO. D541N101
DATE 1 Dec 58	BOEING	PAGE 90-3 CL

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL

COND. #	SMOKE 2 LOCATION	START SMOKE	STOP SMOKE	DOORS CLOS		
12	MID 1020	09:09:58	09:29:24	09:22:35		1/8 BOTTLE
106	#2 L NOD STA 750	09:38:57	09:58:24	09:56:20		1/4 BOTTLE
206	#2 L NOD ST 750	10:16:51	10:35:24	10:33:33		1/4 BOTTLE
007.1	FWD STA 465	10:47:01	10:52:33	10:50:23	10:52:33	1/8 BOTTLE

SHEET 1 OF 1	TITLE B757 SMOKE TEST	MODEL A 757-200
RECORDED THOMAS A. LAWRENCE	BOEING	AIRPLANE N 84001
TEST NO. 50-3 STA		DOC. NO. D541N101
DATE 1AEC 85		PAGE 90-3-C7

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

TIME	COND	DP MIX	
9:10	.012	5.1	SMOKE ON - SMOKE GOING UP & AFT
9:11		2.1	MOVING AFT ALONG LEFT SIDE OF CABIN - SPREADING TO THIN CLOUD ACROSS WHOLE CROSS SECTION BY 25TH 1300
9:12		0.1-0.4	START DESCENT
9:12:45		4.2	MORE TO CEILING, BUT THIN - AFT END ONLY VISIBLE
9:13:30		7.0	
9:15		7.6	NO SMOKE FWD OF 21000
9:16:30		7.0	SAFELY SMOKE
9:17			MORE SPREADING TO RT SIDE BUT STILL ALL GOES AFT - CLEAR FWD OF 1000
9:18		7.3	A/P TURNS IN BANKS CAUSE GOOD MIX-UP OF FLOORS AROUND 1120
9:19		2.0	
9:20			T.D.
9:20	1073.2		SAME SMOKE
9:21:50		3.7	
9:22		3.8-7.0	STOPPED F.O.P. DOORS PACK OFF
9:24:20		0	SMOKE OFF
9:39	.106	4.1	SMOKE ON RISING TO CEILING MOVING FWD
9:40		4.2	MOSTLY AT CEILING & GOING FWD AFT PART OF CLOUD AT 2100 COMPLETELY CLEAR AFT OF 200
9:41:30		4.2-03.4	START DESCENT SAME SMOKE
9:42:45		4.3	END TO CEILING - ALL SMALL FWD OF 200 CANNOT SEE MORE THAN 2100 FWD OF UNDER
9:45		4.8	SAFELY SMOKE
9:46		4.9	"
9:47		5.0	"
9:48		5.0	"
9:50		5.0	"
9:52		5.0	"
9:53		5.0	"
9:53:30		5.0	T.D.
9:54:40		3.5	"
9:55		3.2	"
9:55:50		3.6	STOPPED
9:56:10		0	PACK OFF DOORS OPEN SMOKE RISES AFT

(TO NEXT SHEET)

SHEET 1 OF 2	TITLE FAA SMOKE TEST	MODEL 757-200
RECORDER MAYLOR		AIRPLANE N/A001
TEST NO. 90-3 STA 1120	BOEING	DWG. NO. D541N101
DATE 12-1-88		PAGE 90-3-C8

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL

TIME	COND	MIX	SMOKE	HT	CEILING	END NOISE FLR
9:57	106	0	SMOKE	HT	CEILING	END NOISE FLR
9:58:20	CONT	0	SMOKE	HT	CEILING	END NOISE FLR
10:16:50	106	3.2	SMOKE	HT	CEILING	END NOISE FLR
10:17		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:19		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:19		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:20		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:21		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:22		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:23		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:24:30		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:26		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:28		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:30		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:31		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:32		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:33:10		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:35		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:36:20		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:37		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:37:30		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:38:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:39:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:40:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:41:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:42:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:43:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:44:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:45:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:46:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:47:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:48:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:49:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:50:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:51:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:52:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:53:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:54:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:55:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:56:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:57:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:58:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
10:59:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:00:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:01:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:02:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:03:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:04:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:05:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:06:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:07:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:08:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:09:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:10:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:11:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:12:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:13:40		3.0	SMOKE	HT	CEILING	END NOISE FLR
11:14:40		3.0	SMOKE	HT	CEILING	END NOISE FLR

C-27

At 8 min 30 seconds, view of rear completely blocked off from my position.

At 9 min, could see rear again. Smoke seems to slosh around with changes of aircraft attitude.

TD at 10 min 5 sec

At 10 min 30 sec, diffuse smoke along floor from #2 doors towards rear. Pretty clear near ceiling.

Stop at 12 min ~~05~~ 15 seconds.

Some smoke seeped past partition at this time.

12-2 12/30 doors open packs off

Smoke accumulating in mid portion at this time but smoke stagnant and not going anywhere.

At 14 minutes smoke was moving along ceiling & out doors.

SHEET 2 OF 8
RECORDER EKLVNP
TEST NO. 90-3 STA
DATE 12/1/88

TITLE FAA Smoke

BOEING

14/30 smoke
MODEL 757-200
AIRPLANE N4001 N4001
DOC. NO. D541N101
PAGE 90-3-C11

after packs turned back on, a lot of thick smoke moved fwd & out of front floor doors. Some lots of smoke accum. & thickened

106-1

Within 30 seconds smoke streaming past partition and diffusely filling front section.

At two minutes, there was a clear visible pattern aft of partition on left side.

By three minutes front was pretty stable.

At four minutes, smoke forward of partition looked a bit denser but still very diffuse.

Estimate smoke moving forward at 5 minutes at 2 feet per second.

Front of partition quite heavy with smoke at 5 min 30 seconds.
(LIGHT SMOKE ON FLIGHT DECK REVERTORS)

At 6 min 30 seconds front smoke concentrated on lower

		TITLE <u>FAA Smoke</u>	
SHEET <u>3</u> OF <u>8</u>		MODEL <u>757-200</u>	
RECORDER <u>EKLUN D</u>		AIRPLANE <u>N4001</u>	
TEST NO. <u>90-3</u> STA		DOC. NO. <u>D541N101</u>	
DATE <u>12/1/88</u>		PAGE <u>90-3 C12</u>	

left hand side. Smoke coming around both sides and under left hand seat in front of partition. At nine minutes, no change from earlier situation. Could not see front of cabin through most of this descent. At 13 min, smoke still denser on left and relatively light on right.

TD at 14 min 40 sec

STOP at 16 min 50 sec

106-2 17 min 20 sec door open fast off

Smoke in front is pretty much stagnant and staying there at this time

at 18 min 20 sec, some slight clearing in front and movement of air into

CAN SEE FRESH AIR COMING INTO FORWARD OUTFLOW VALVE THROUGH

Smoke off at 19 min 20 sec

SHEET 4 OF 8	TITLE FAA Smoke	MODEL 7572900
RECORDER EK LUND		AIRPLANE 747-400
TEST NO. 90-3	STA	DOC. NO. D541N101
DATE 12/1/64	BOEING	PAGE 90-3-43

206-1

Within 20 seconds, smoke flows past partition into front of aircraft. Smoke appears to flow 3 or 4 feet per second forward. Most is on left hand side. At 2 minutes.

30 seconds, smoke in front still diffused and front of cabin still visible. (Descent started just after 2 minutes), At 3 minutes 25 seconds, I lost sight of cockpit door.

Overall situation at 4 minutes 30 seconds was very much like 106-1 (previous test).

At six minutes, smoke on left hand side of front had thickened a bit but overall pattern still similar.



SHEET 5 OF 8	TITLE	540000 W5K1	FAA Smoke	MODEL 7572060
RECORDER EKLUND				AIRPLANE N74801
TEST NO. 90-3				DOC. NO. D54TN101
DATE 12/1/88				PAGE 90-3-04

BOEING

aft of partition looked pretty
clear at 7 min 30 sec (LIGHT
SMOKE REPORTED IN COCKPIT AT
THIS TIME)

At 8 min 15 seconds, smoke reaching
front partition at 3 or 4 feet per
second.

At 10 min 10 seconds, smoke on
LHS of front appeared at least as
heavy as 106-1

At 12 minutes conditions
in front appeared somewhat
during steep descent. (40)

At 13 minutes could see cockpit
door.

TD at 14 min 10 seconds
Conditions in front still better

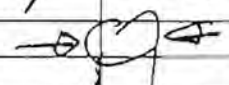
At 15 min 10 sec front had deteriorated
again to bad visibility.

206-2 STOP at 16 min 15 seconds (1 PAGES OF
DOORS OPEN)

SHEET 6 OF 8	TITLE FAA Smoke	MODEL 757-200
RECORDER EKLUND		AIRPLANE N41701
TEST NO. 90-3 STA	BOEING	DOC. NO. D541N101
DATE 12/11/80		PAGE 90-3-C15

During 2 min evac period, conditions in front remain stagnant. Conditions at smoke generation point are stagnant air with local build up of smoke. This smoke then moves gradually forward & probably to rear.

7.1-1 (COMPLETE #7 OF ~~11~~ 11/30/88)

Smoke went out forward outflow valve within 10 seconds of start. At 1 min 30 seconds smoke confined to a donut about 10 feet 

Clearly stable over 1 min to 2 min period. Declared stable

7.1-2 at 2 min 30 sec #4 door opened. Now smoke started to move aft and very little if any smoke going out outflow.

SHEET 7 OF 8	TITLE FAA Smoke	MODEL 757372800
RECORDER EKLUND		AIRPLANE MA8001
TEST NO. 90-3/46 STA	BOEING	DOC. NO. D541N101
DATE 12/1/86		PAGE 90-3-C16

Whole front got diffused &
visibility got way back
in front. Front visibility
got as bad as 100 and 200
during this two minute run.
(THIN SMOKE REPORTED BACK
AS FAR AS STATION 1200)
at 5 minutes, smoke out
aft door. Things also looked
very hazy aft of partition.

SHEET 8 OF 8		TITLE FAA Smoke	MODEL 7157-200
RECORDER 6560 N/D			AIRPLANE N/A001
TEST NO. 90-3	STA	BOEING	DOC. NO. D541N101
DATE 12/1/88			PAGE 90-3-C17

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL.

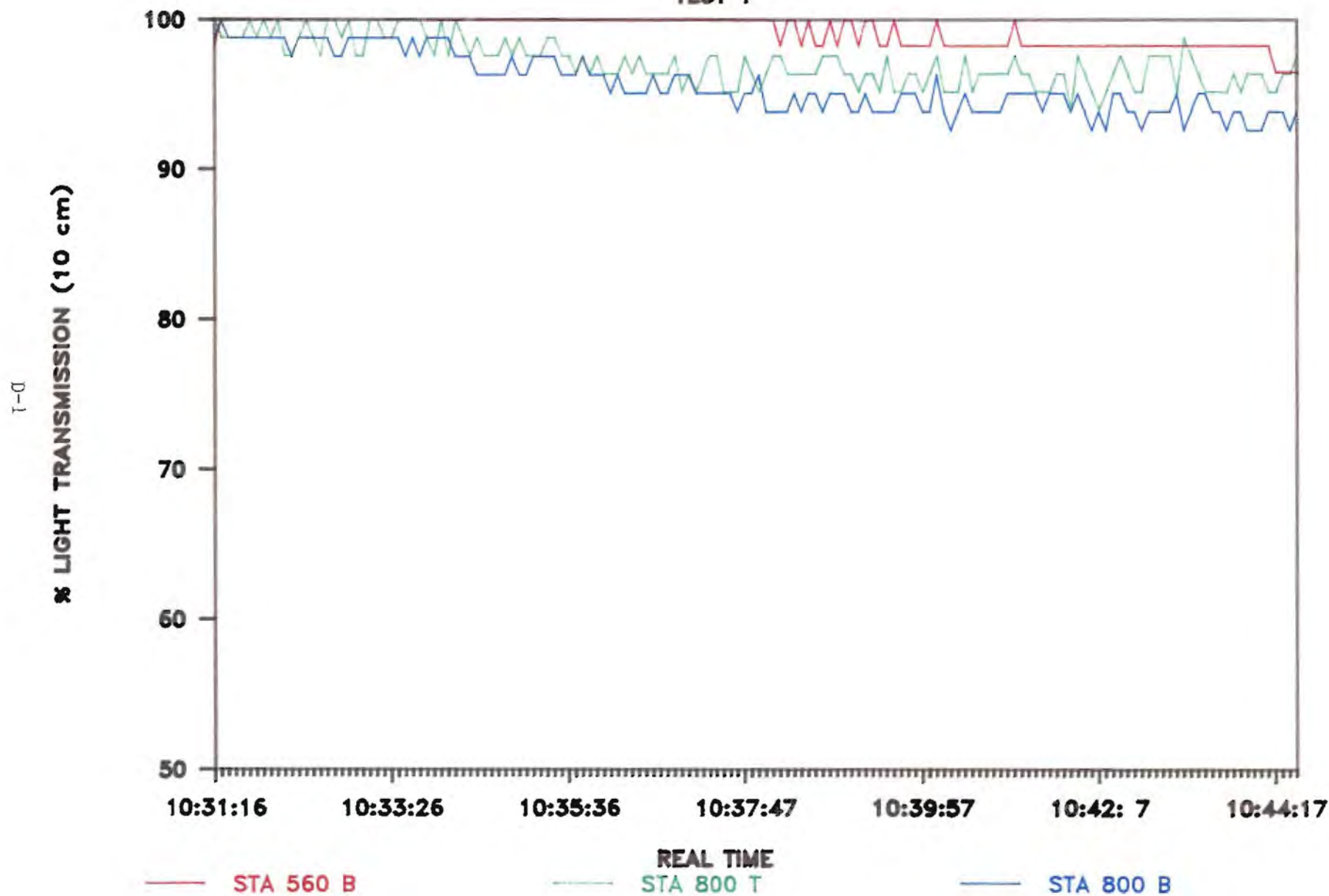
10	5740	TAPES ON FLD
10	5830	RUDDER SWEEP
11	0547	T/O MWL
11	33	LOWD BFI
11	3430	COMPUTER BOMB, REBOOT - occurred when AFU started
11	37	ENGs OFF, PWR SWITCH, computer bombized
		TAPES OFF

FCCFLT ALINC 429 BUS INACTIVE

SHEET 1 OF 1	TITLE FWA SHOCKE POST	MODEL 7857-2200
REORDER T. J	DATA 545000 CHECKOUT	AIRPLANE NA001
TEST NO 90-03	BOEING	DOC. NO D54IN101
DATE 12/1/88		PAGE 90-3-C18

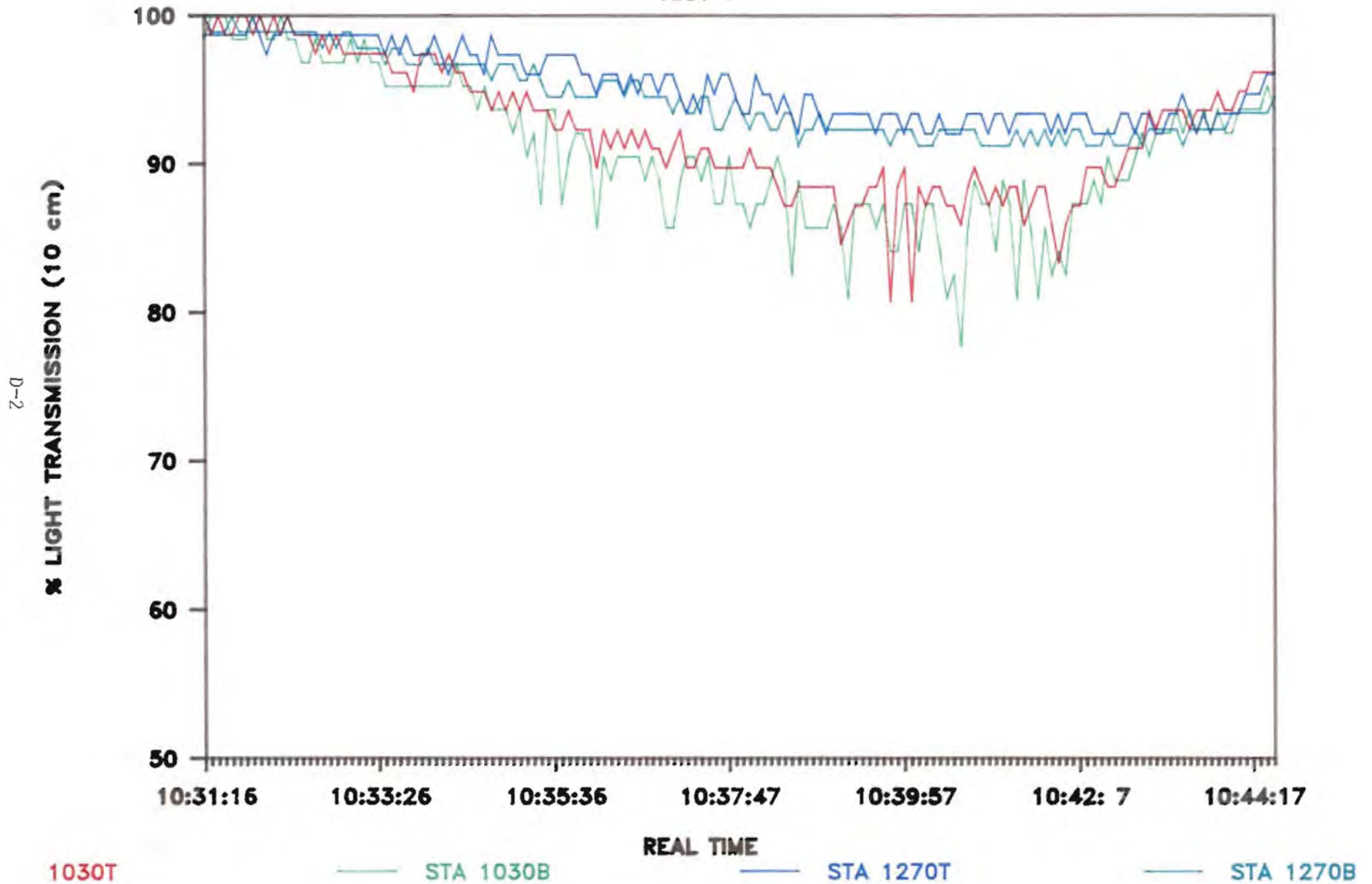
B-757 SMOKE EVACUATION

TEST 1



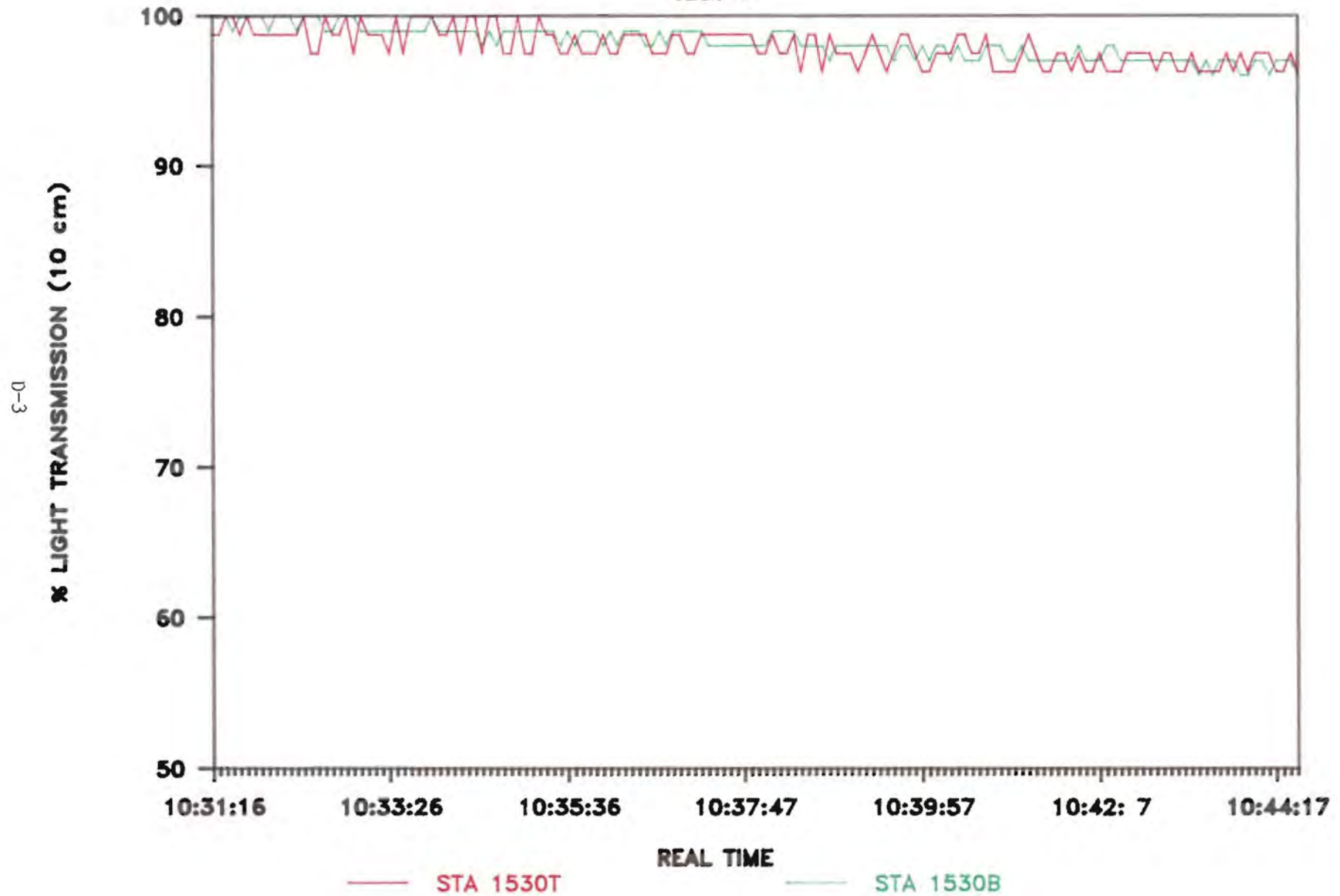
B-757 SMOKE EVACUATION

TEST 1



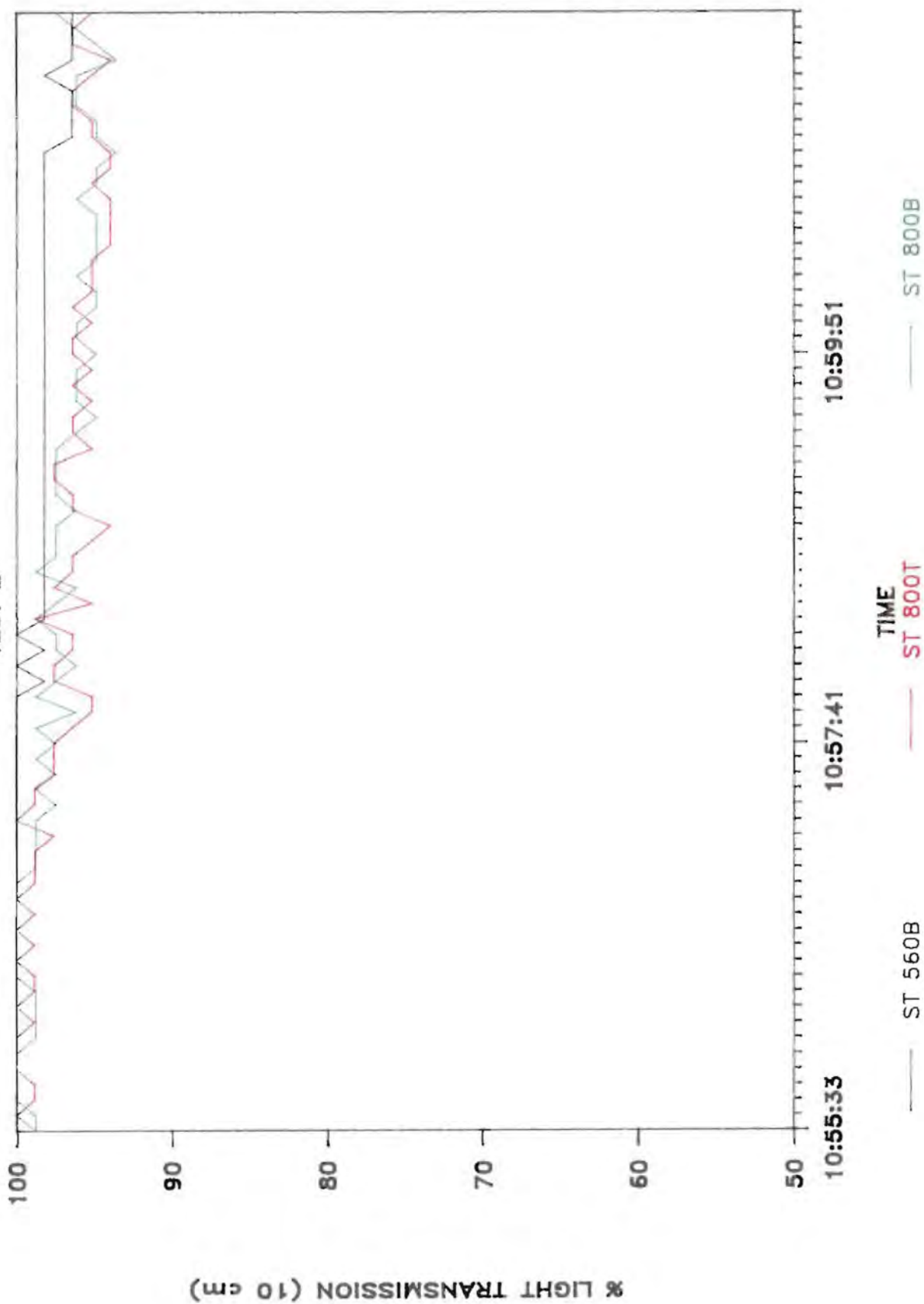
B-757 SMOKE EVACUATION

TEST 1



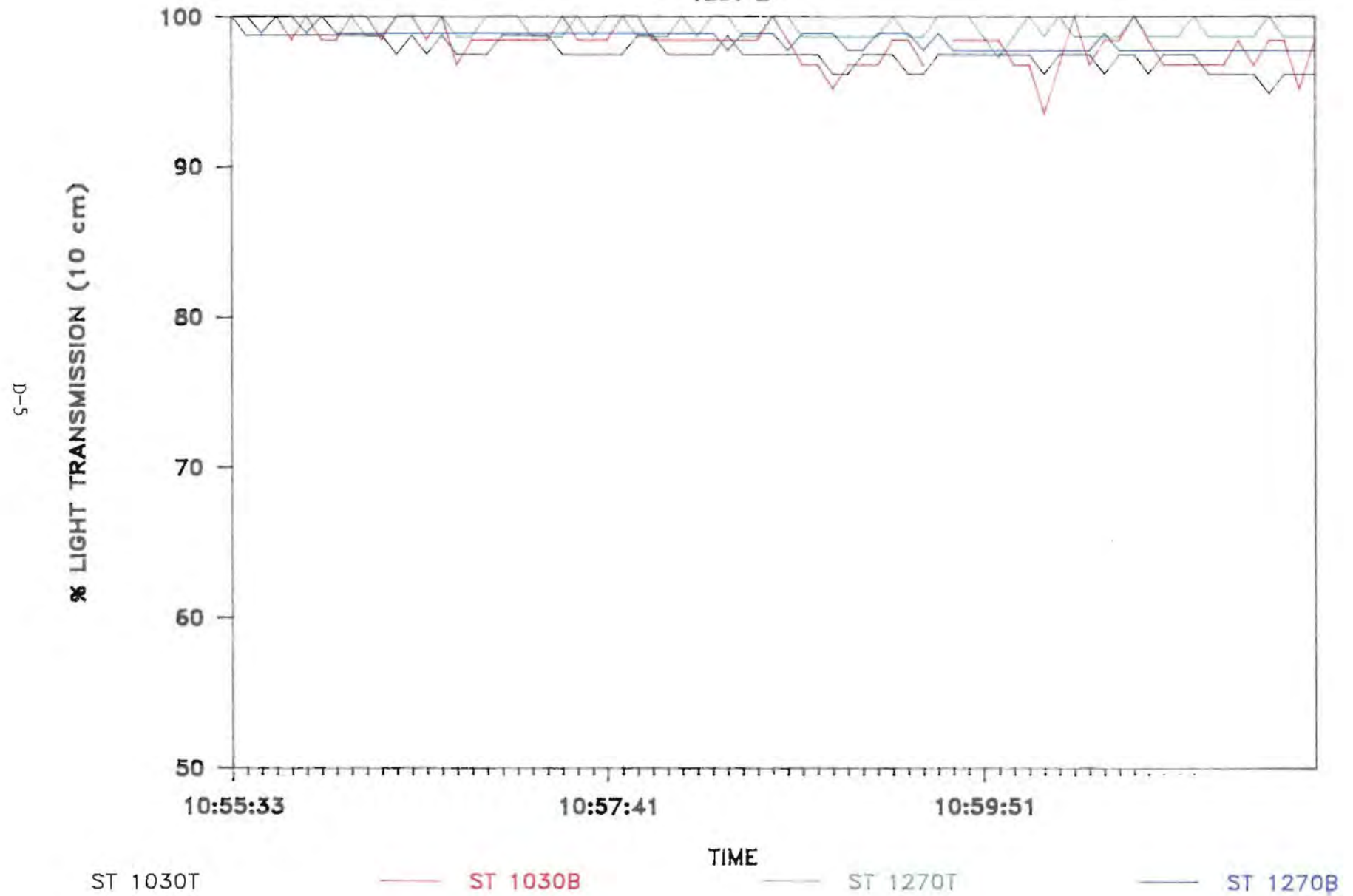
B757 SMOKE EVACUATION

TEST 2



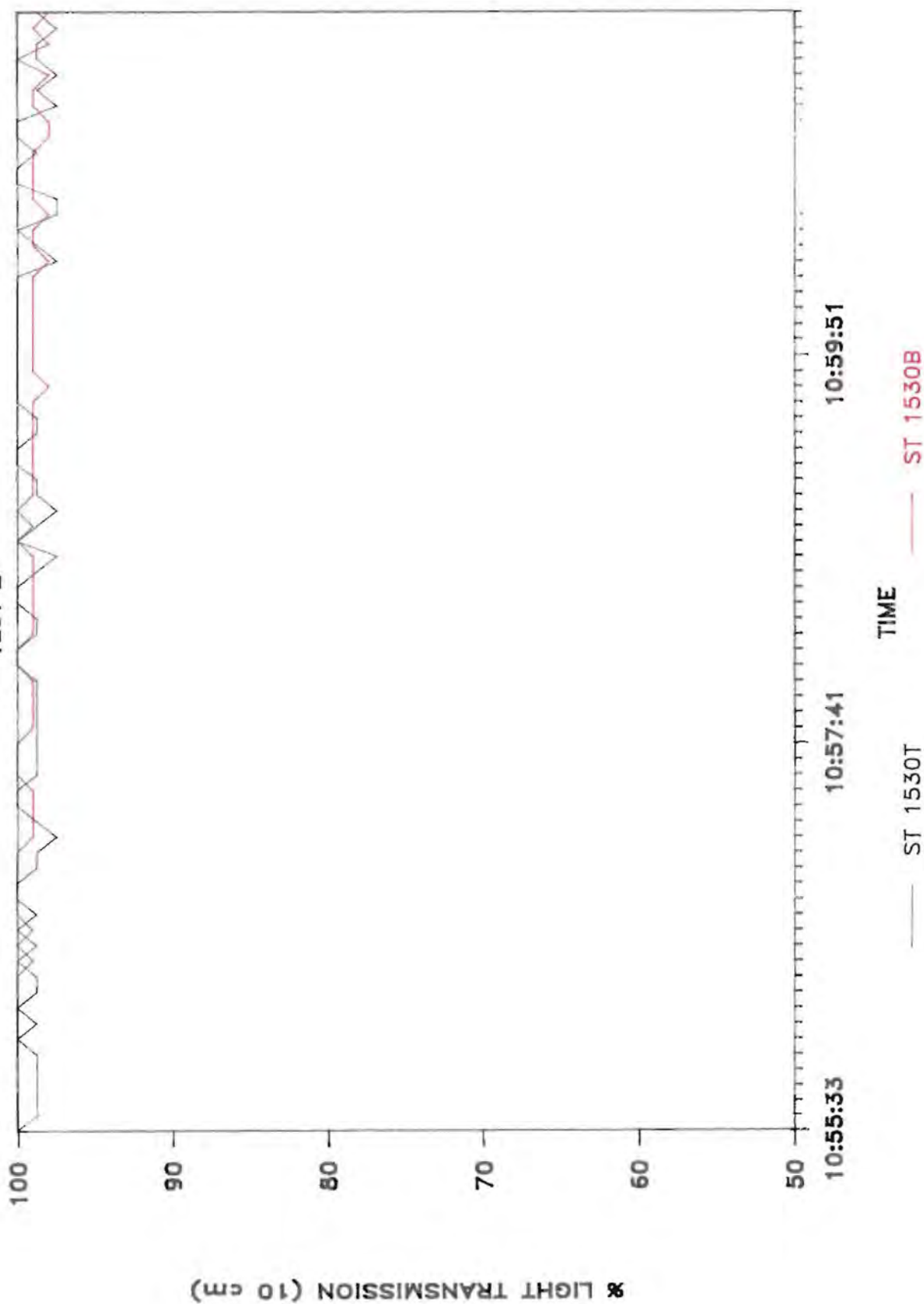
B757 SMOKE EVACUATION

TEST 2



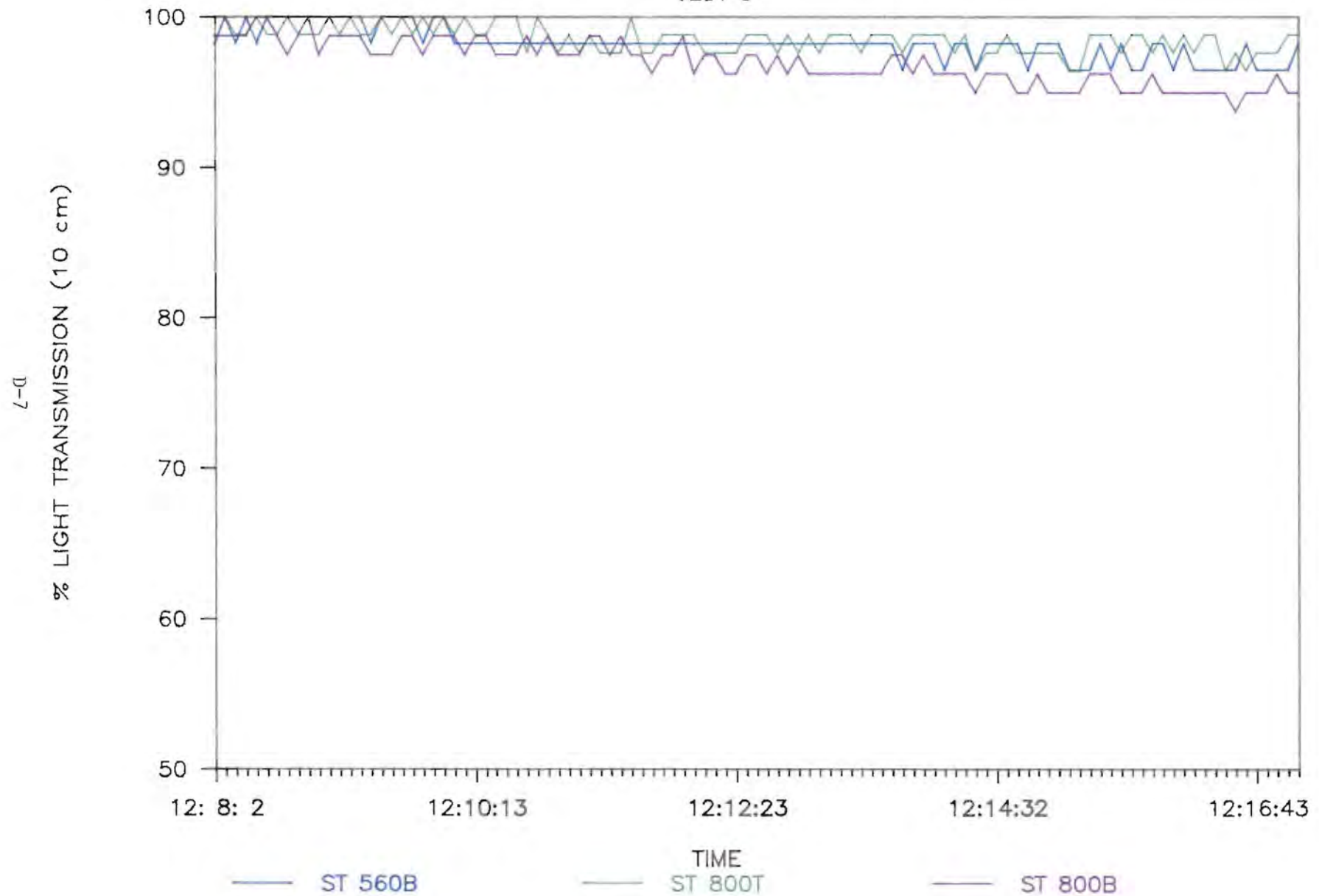
B757 SMOKE EVACUATION

TEST 2



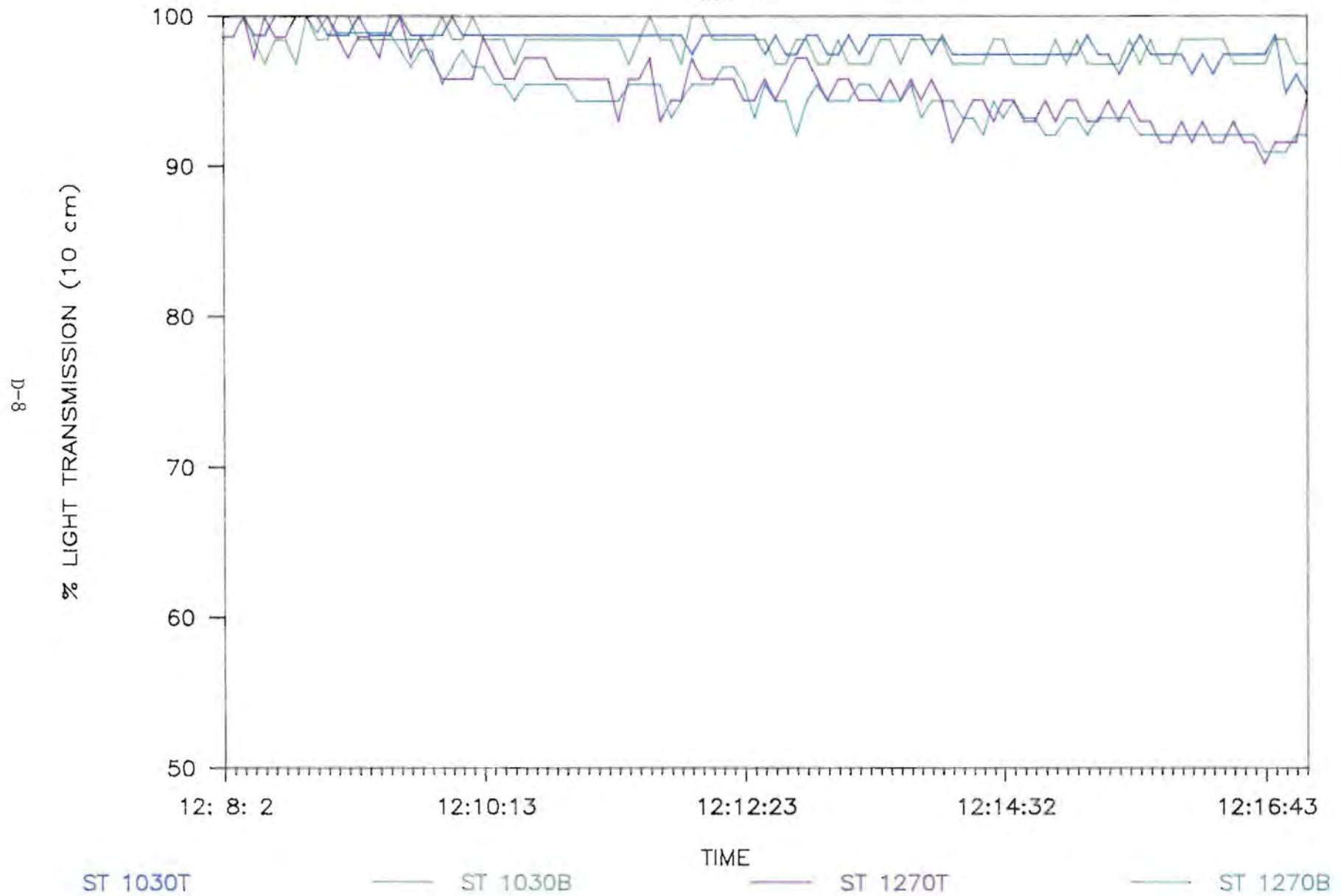
B757 SMOKE EVACUATION

TEST 3



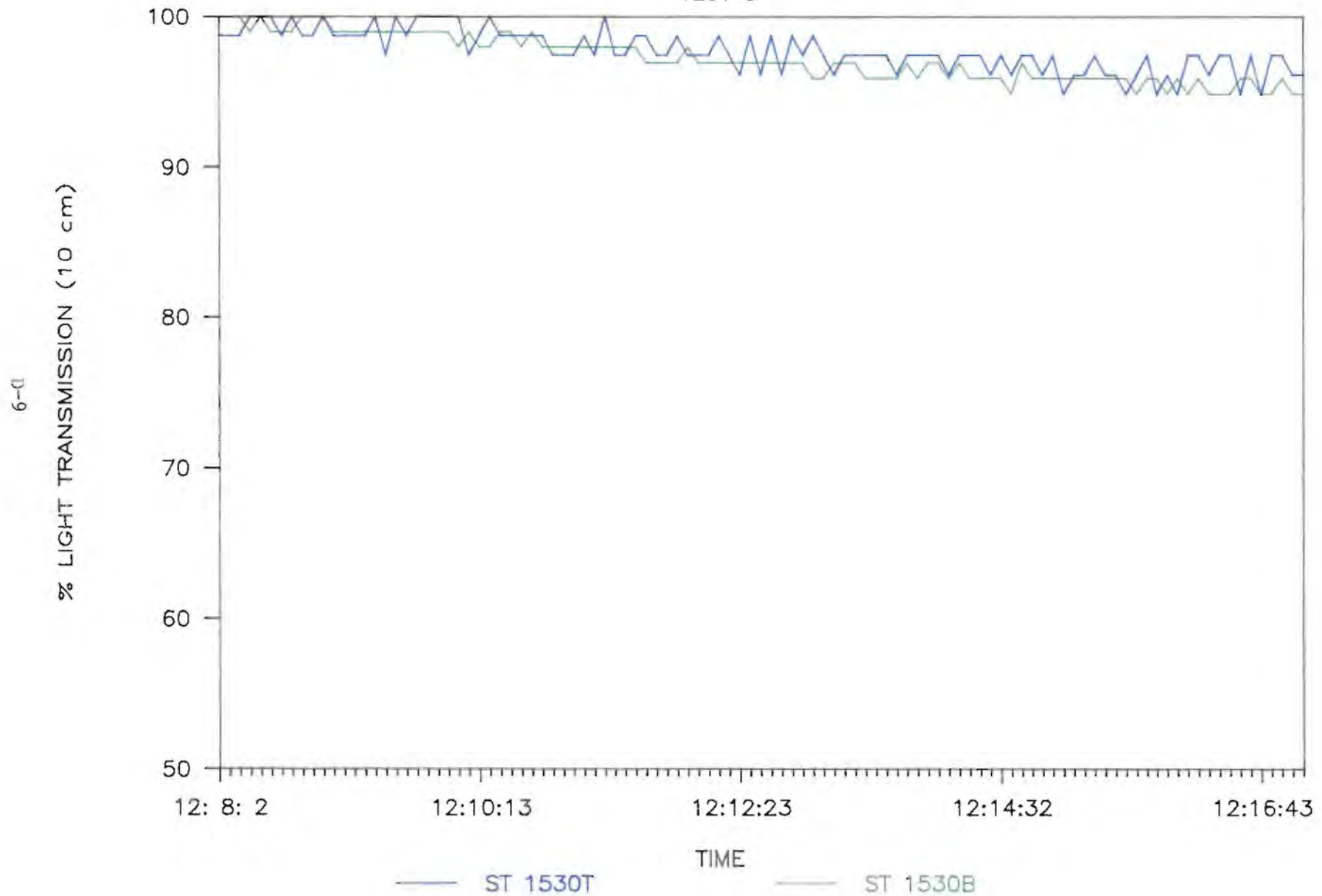
B757 SMOKE EVACUATION

TEST 3



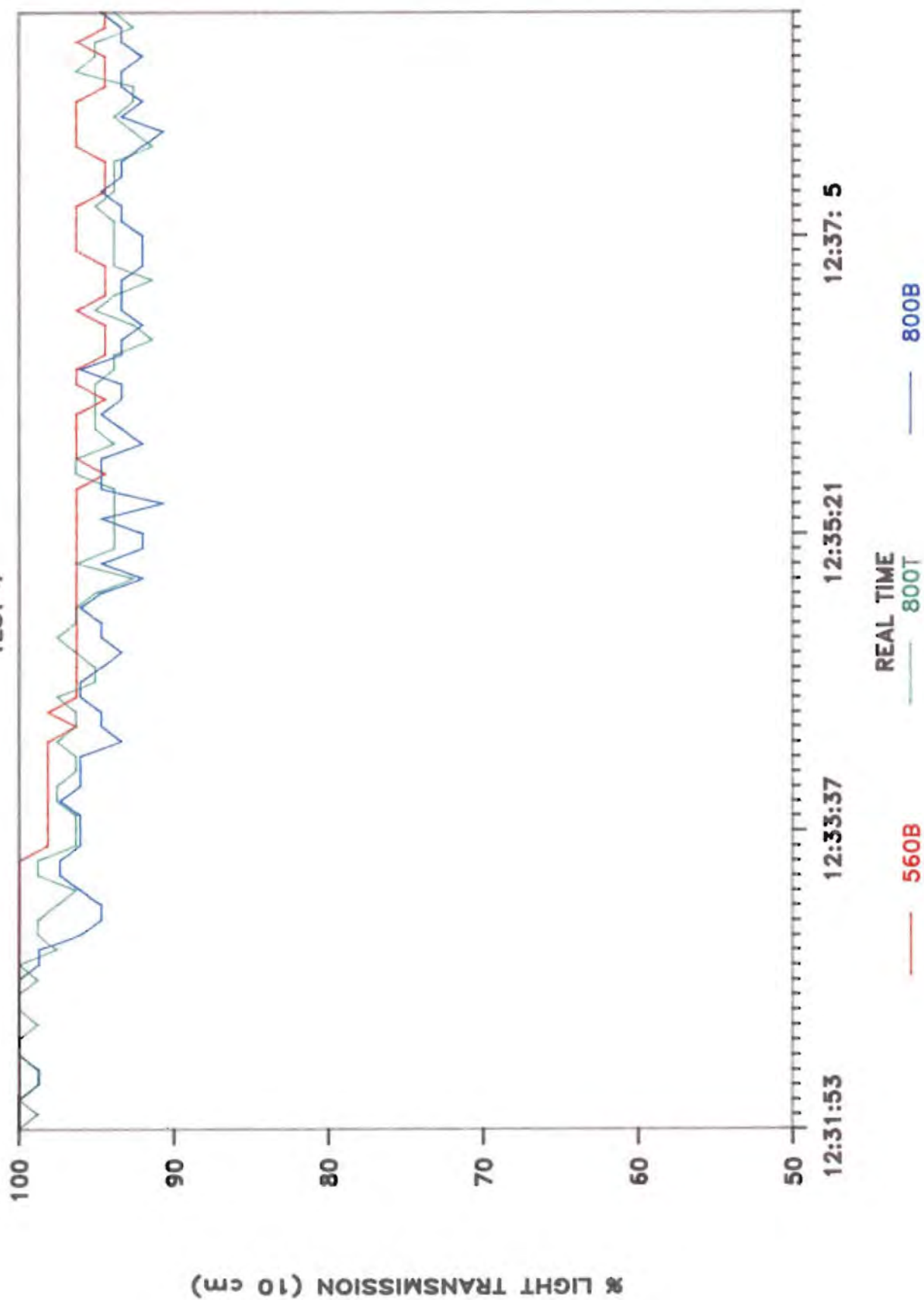
B757 SMOKE EVACUATION

TEST 3



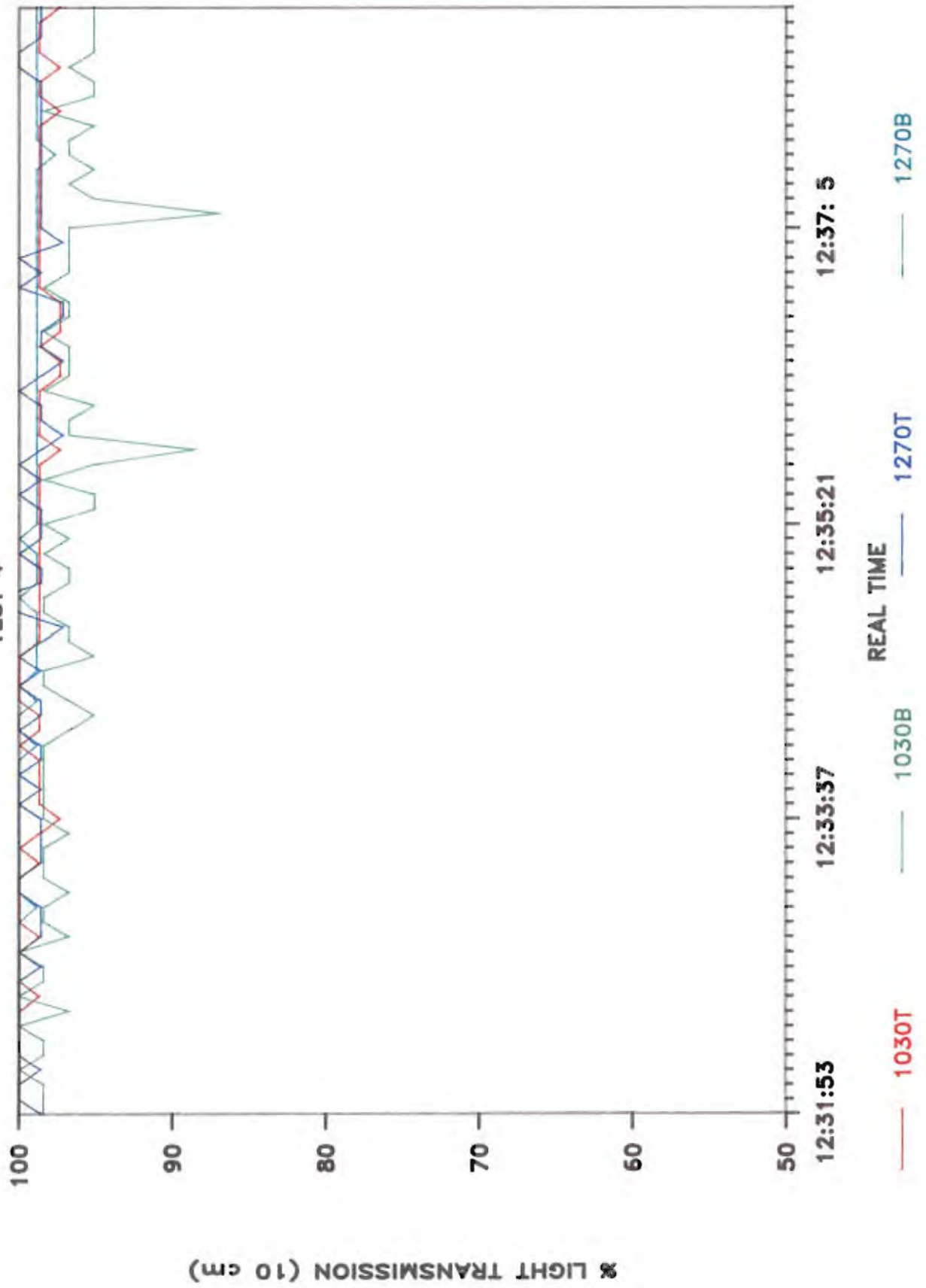
B757 SMOKE EVACUATION

TEST 4



B757 SMOKE EVACUATION

TEST 4

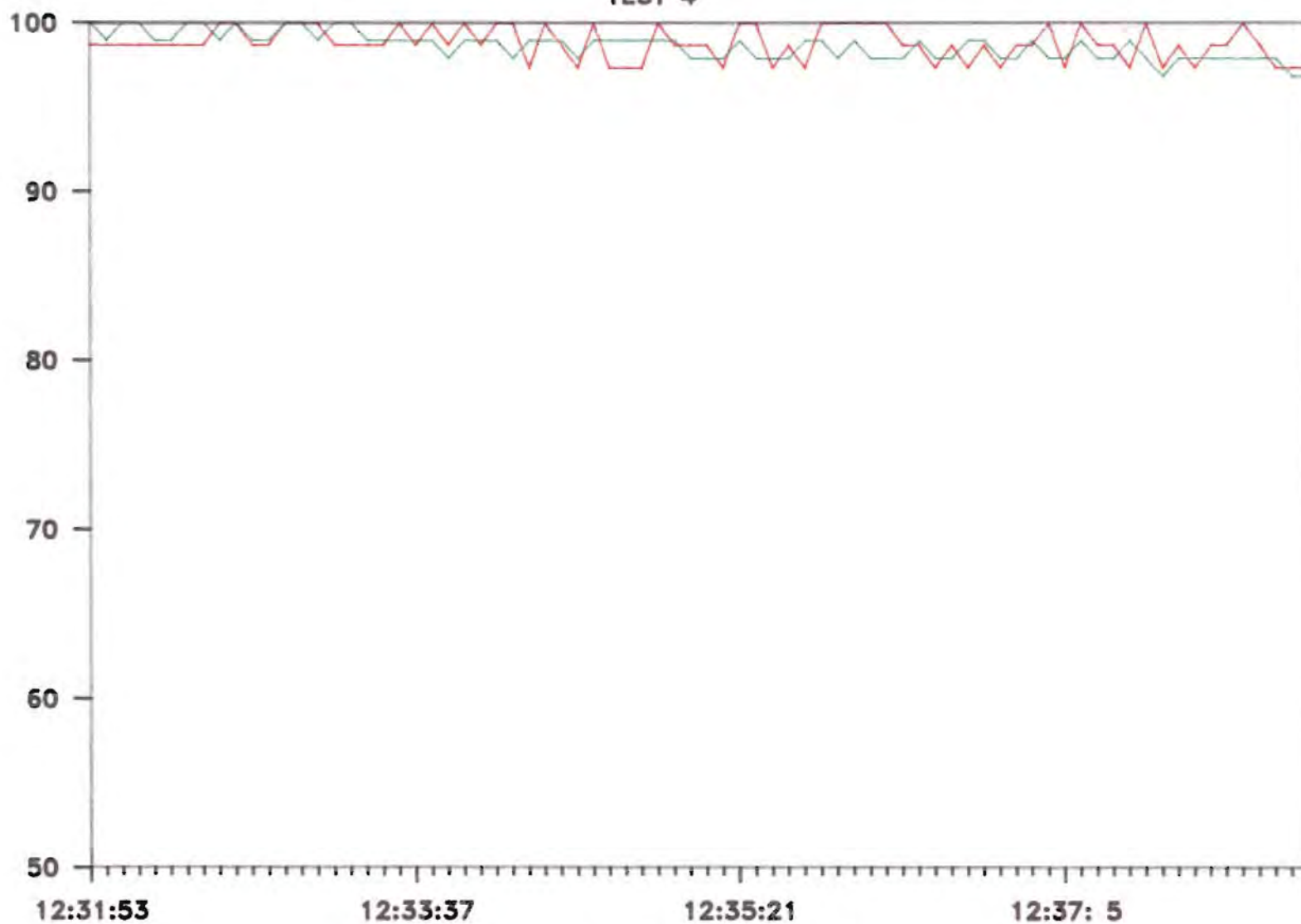


B757 SMOKE EVACUATION

TEST 4

D-12

% LIGHT TRANSMISSION (10 cm)



REAL TIME

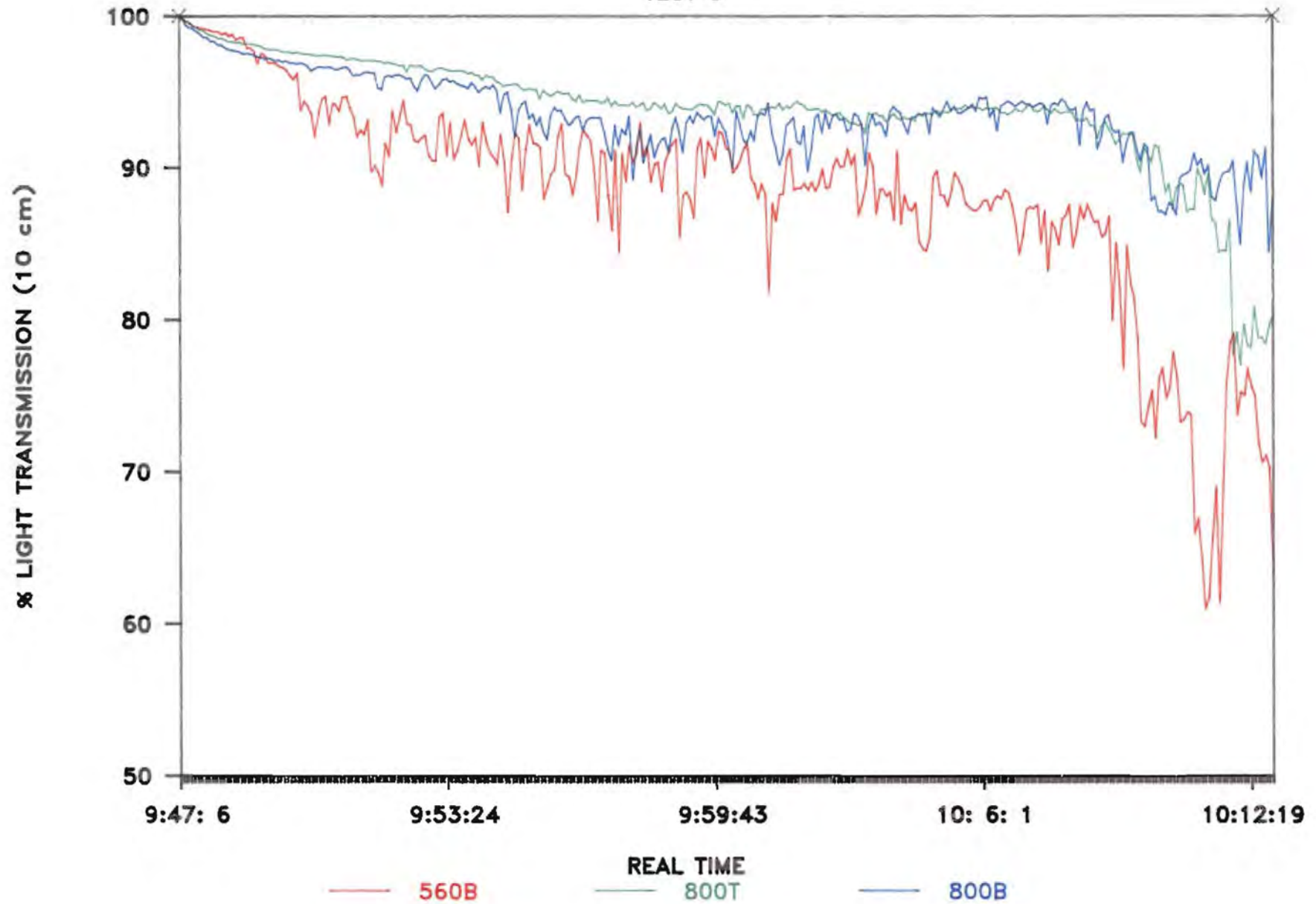
— 1530T

— 1530B

B757 SMOKE EVACUATION

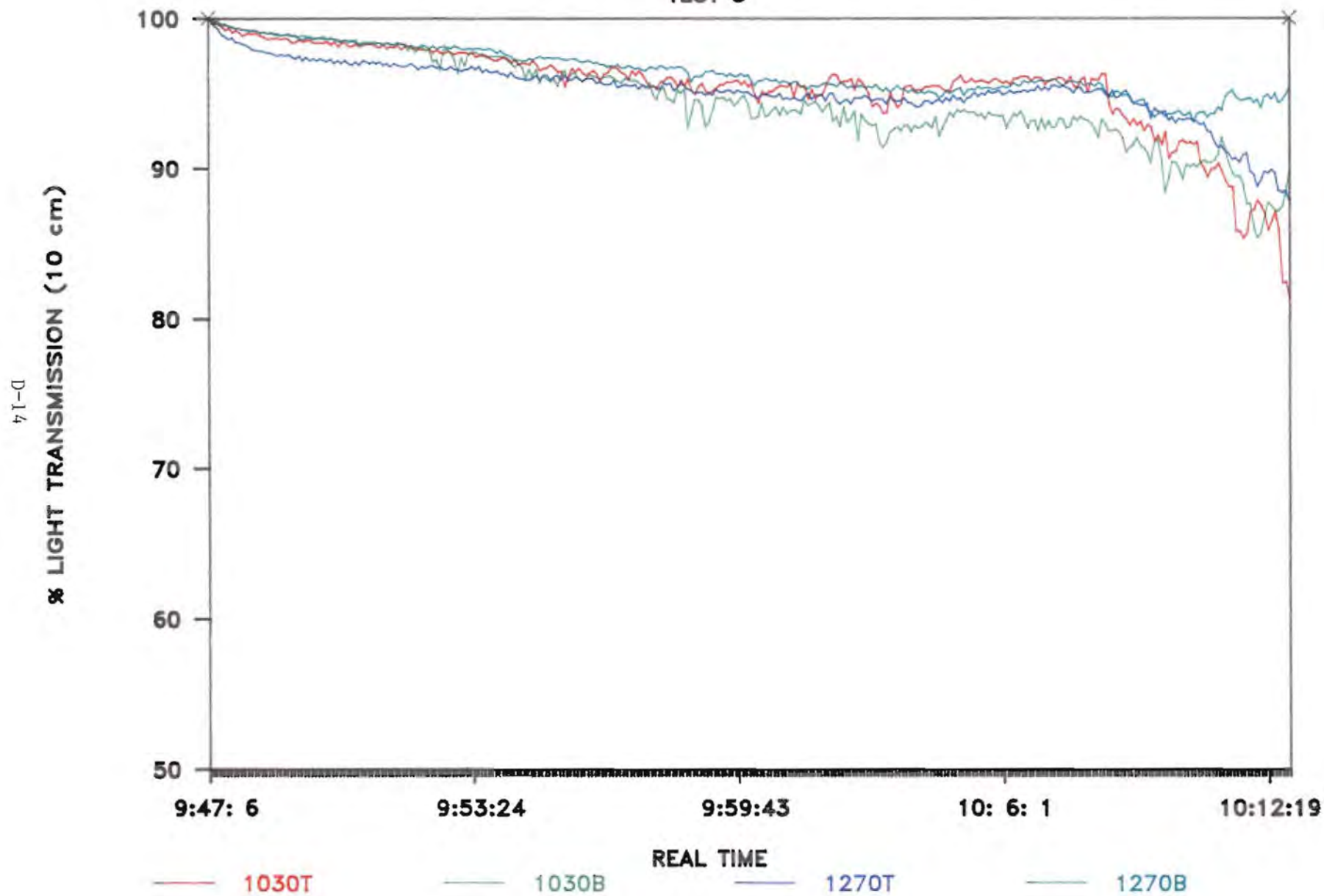
TEST 5

D-13



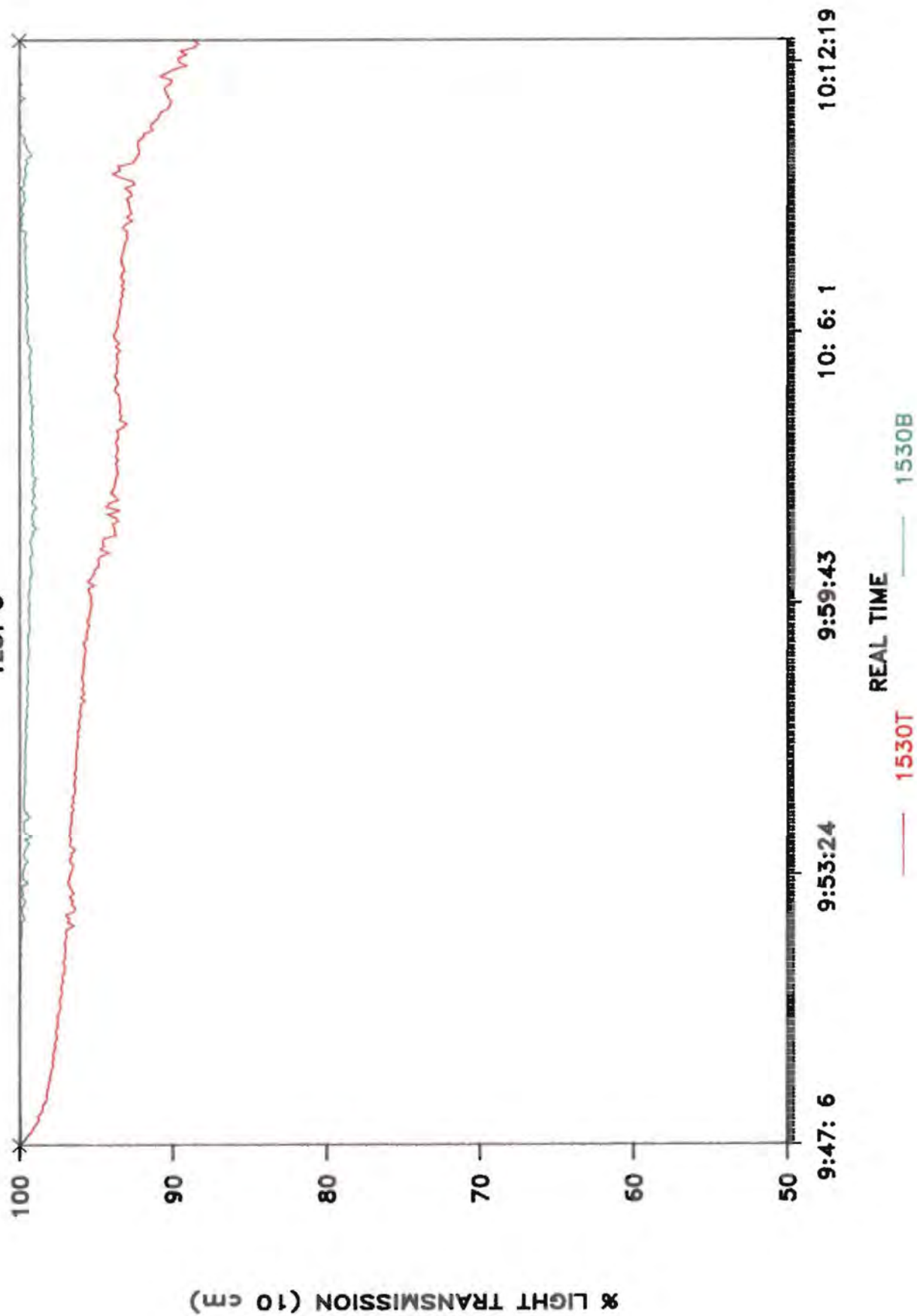
B757 SMOKE EVACUATION

TEST 5



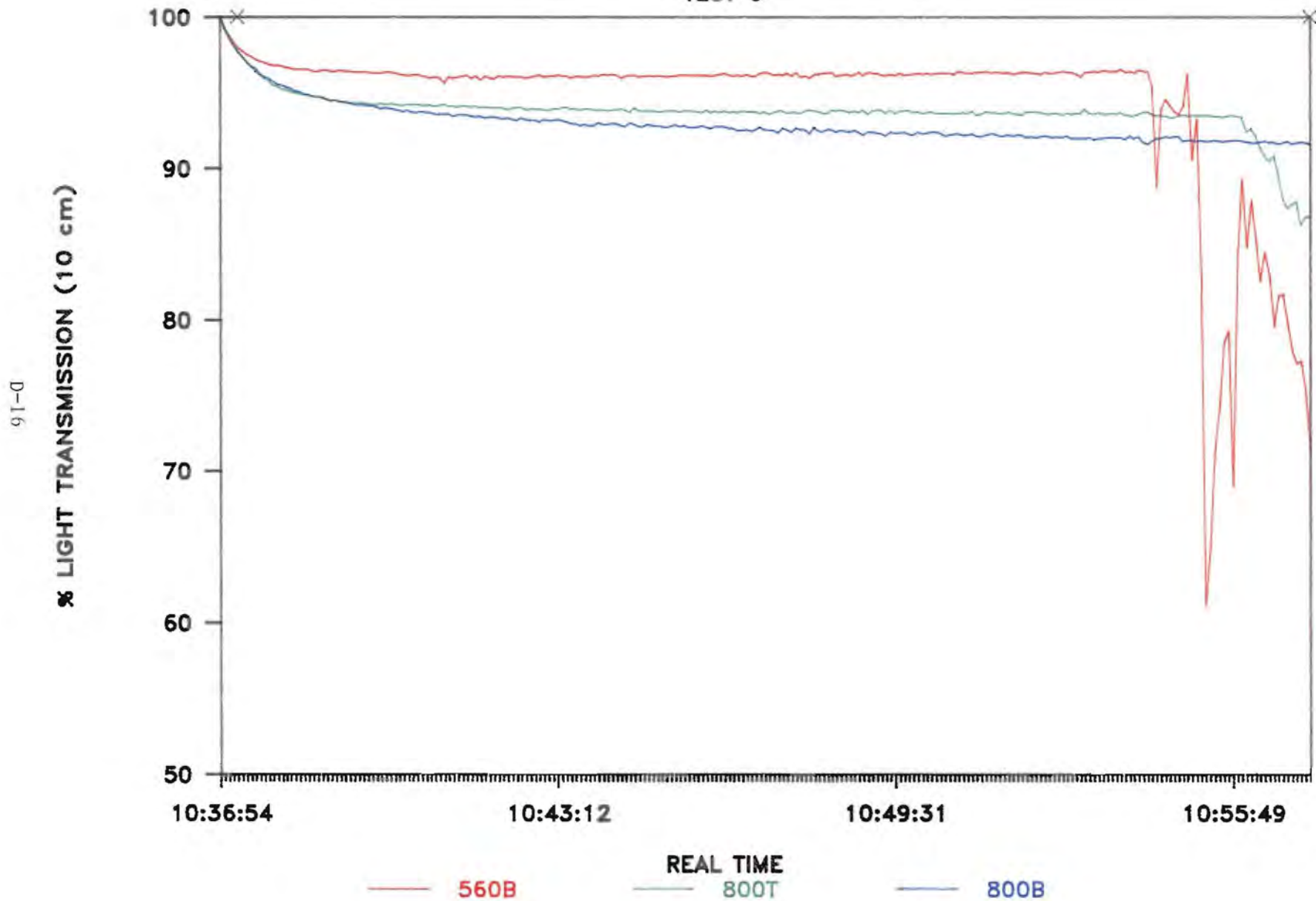
B757 SMOKE EVACUATION

TEST 5



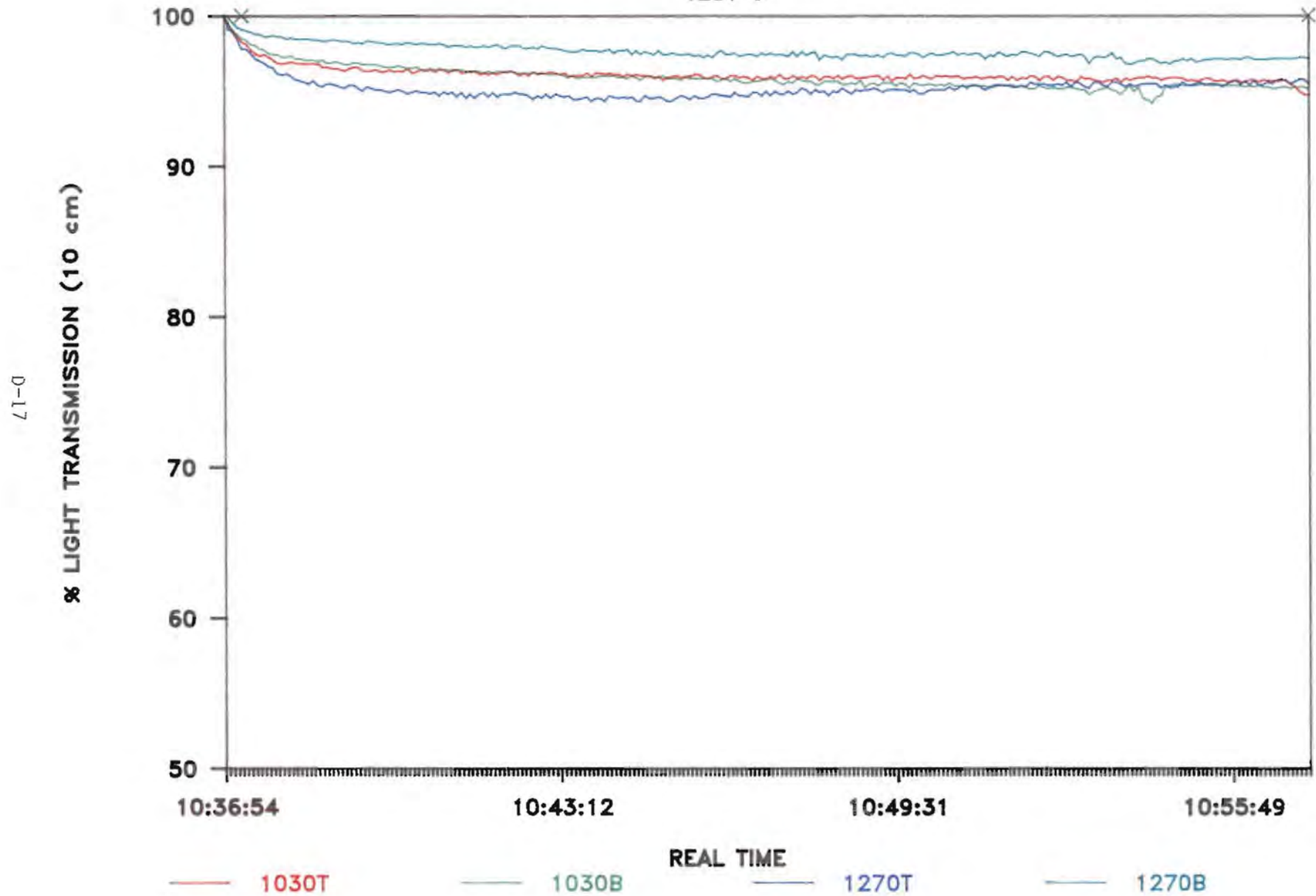
B757 SMOKE EVACUATION

TEST 6



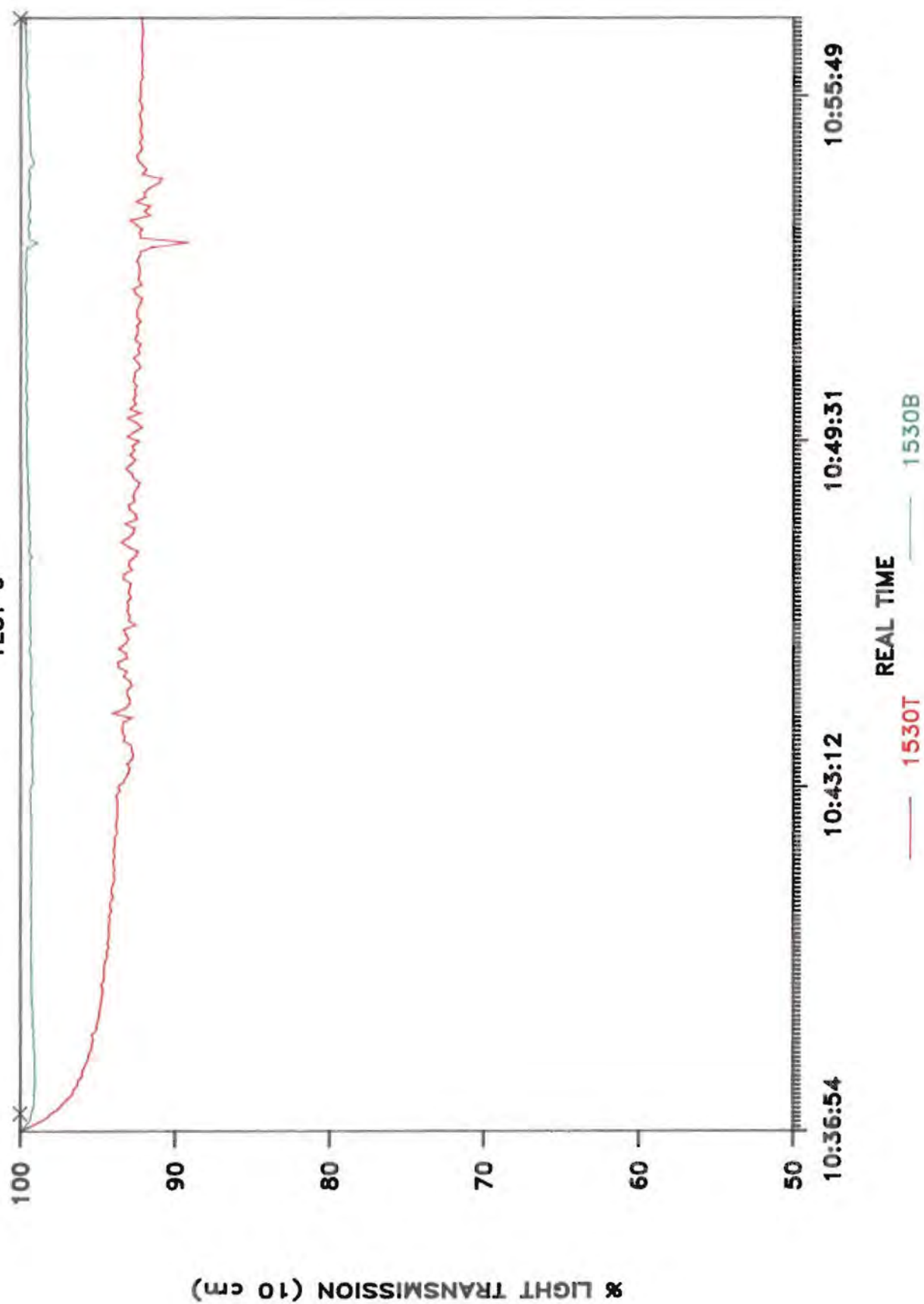
B757 SMOKE EVACUATION

TEST 6



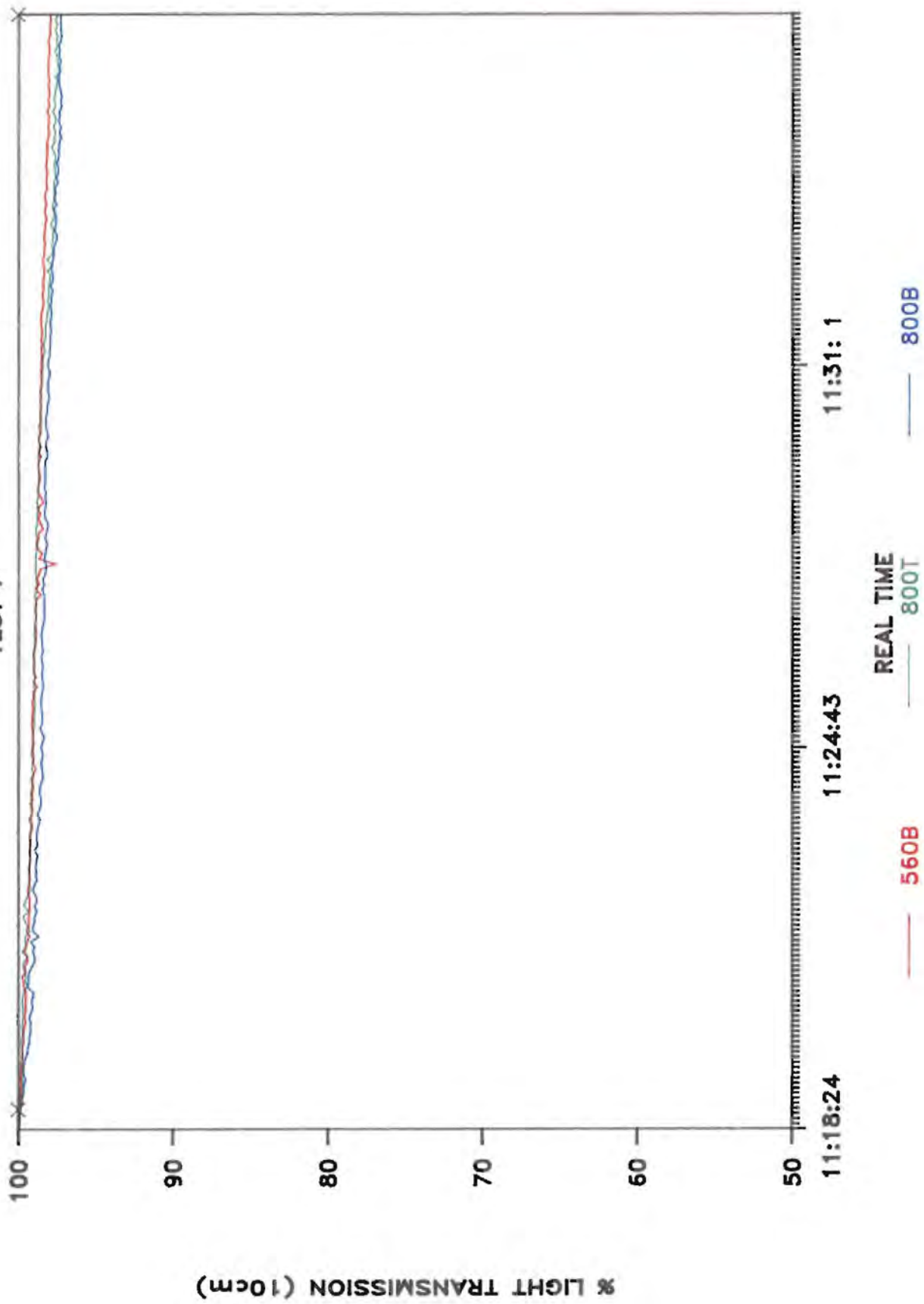
B757 SMOKE EVACUATION

TEST 6



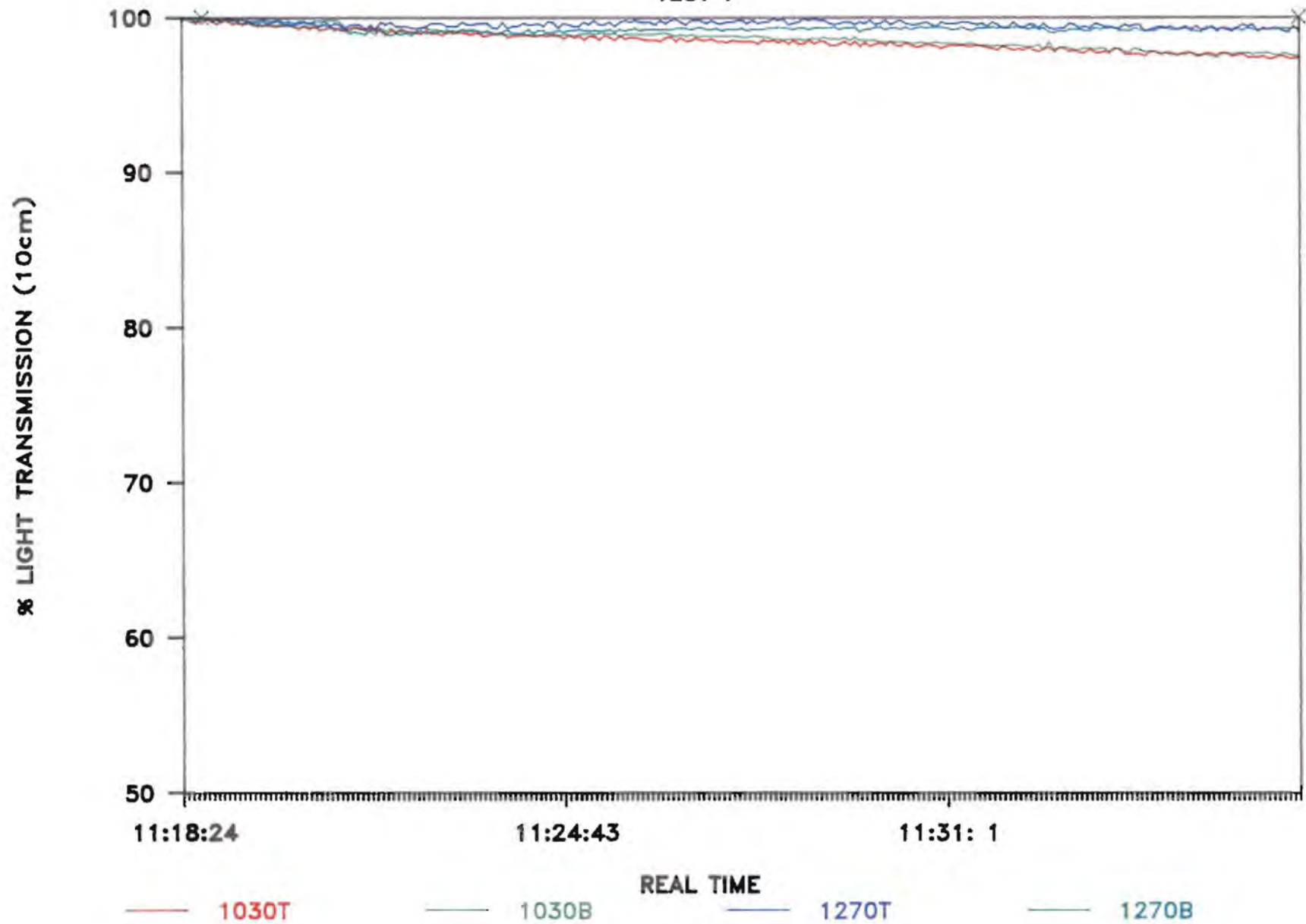
B757 SMOKE EVACUATION

TEST 7



B757 SMOKE EVACUATION

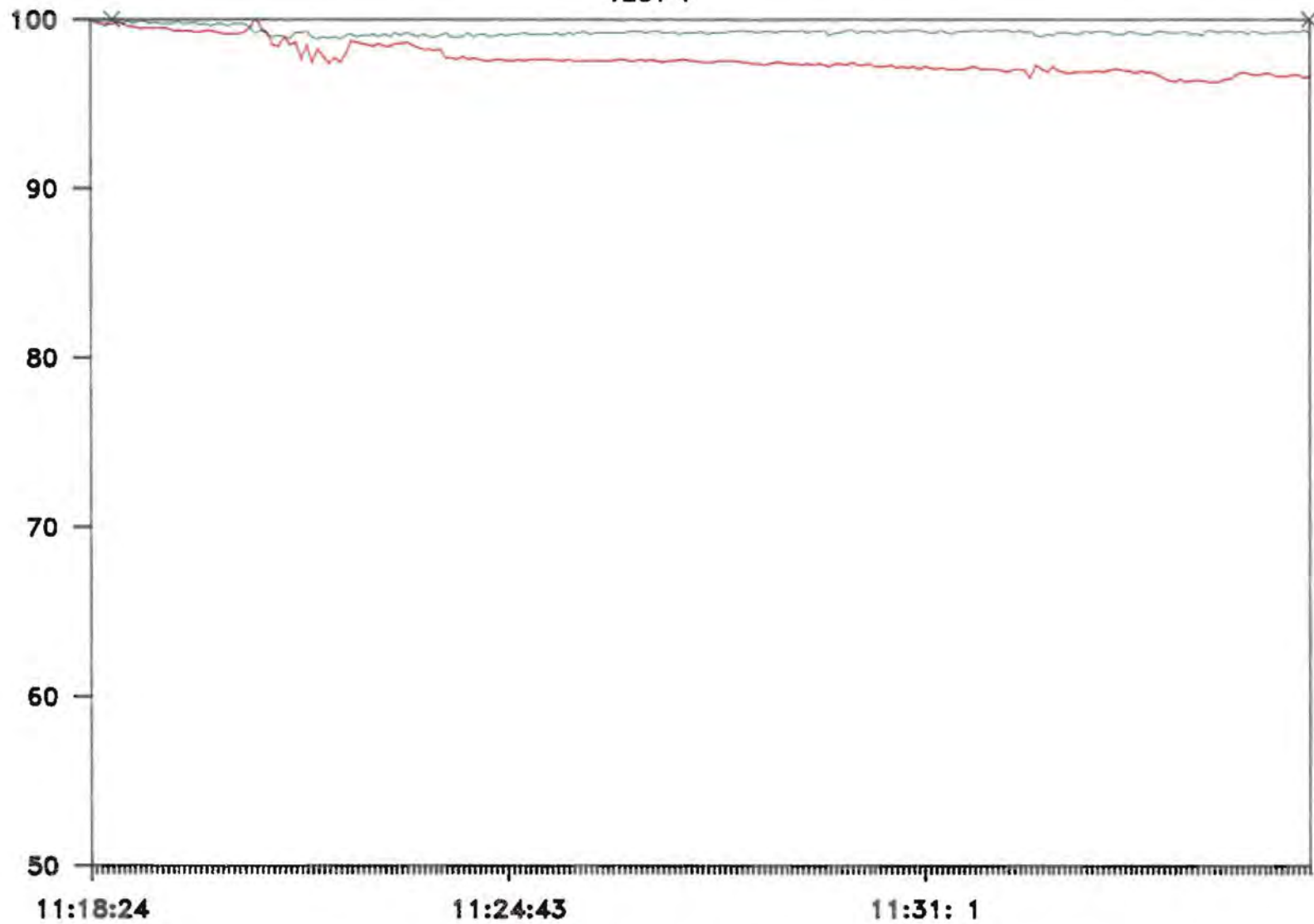
TEST 7



B757 SMOKE EVACUATION

TEST 7

12-0
% LIGHT TRANSMISSION (10cm)



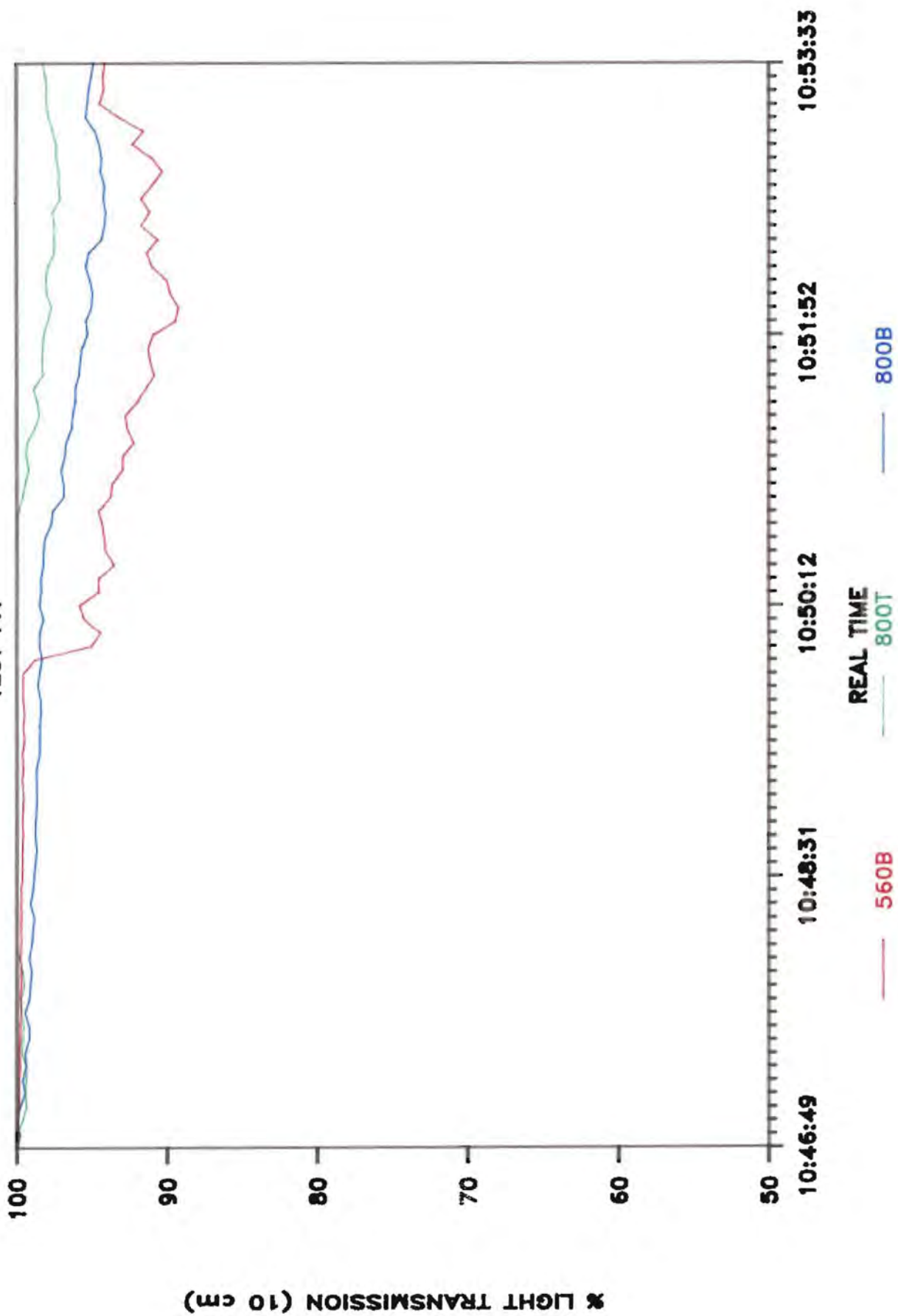
REAL TIME

1530T

1530B

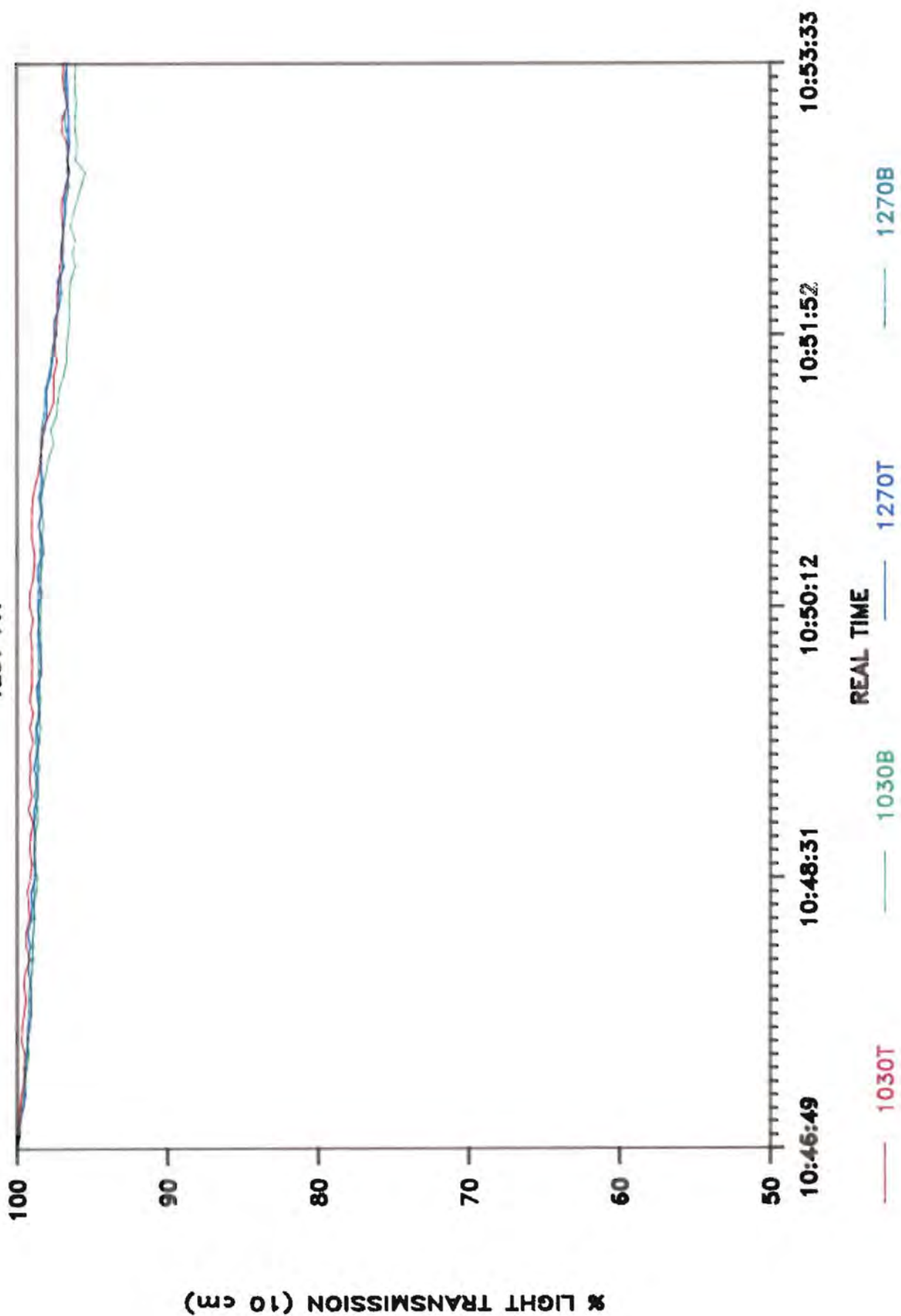
B757 SMOKE EVACUATION

TEST 7.1



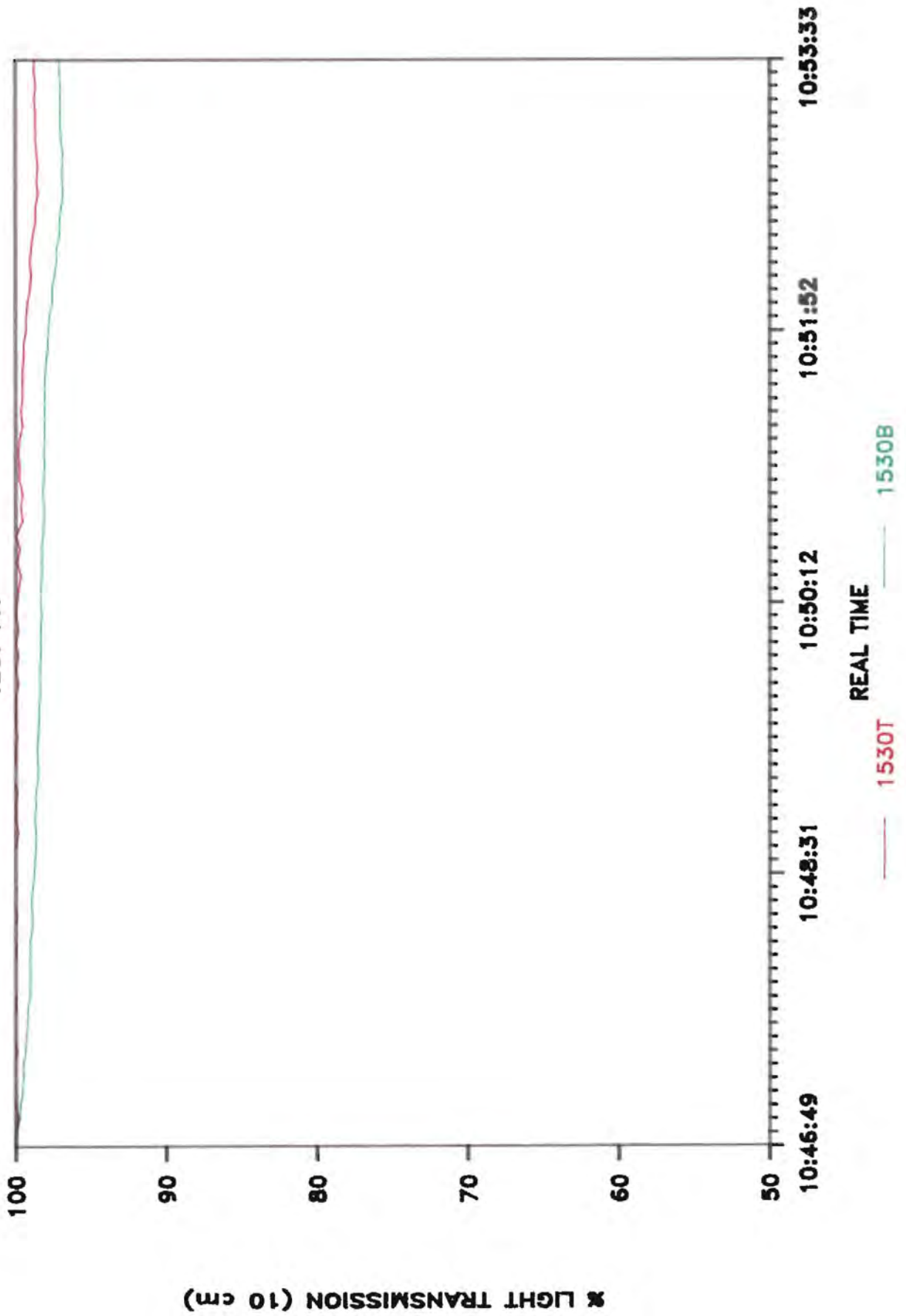
B757 SMOKE EVACUATION

TEST 7.1



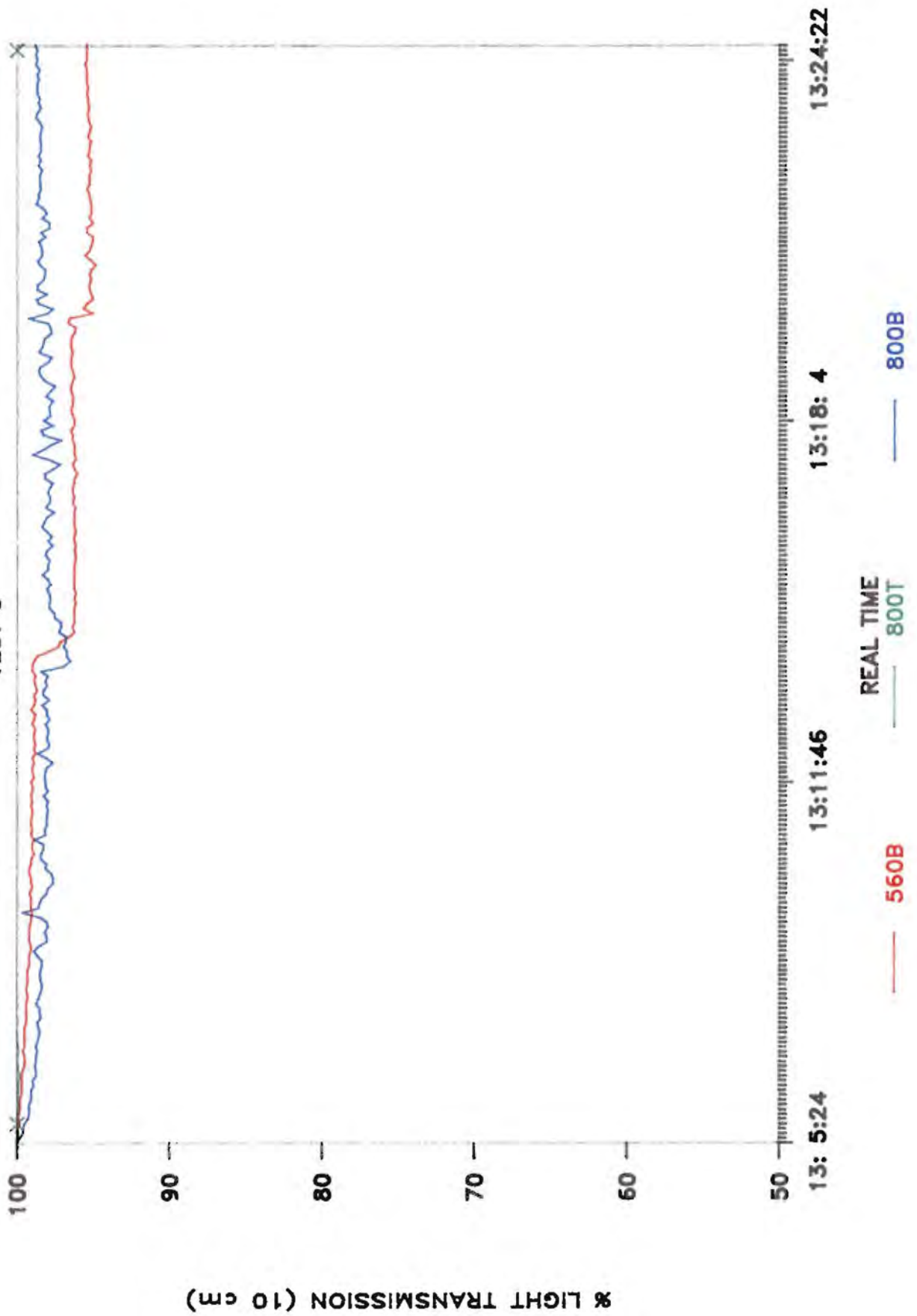
B757 SMOKE EVACUATION

TEST 7.1



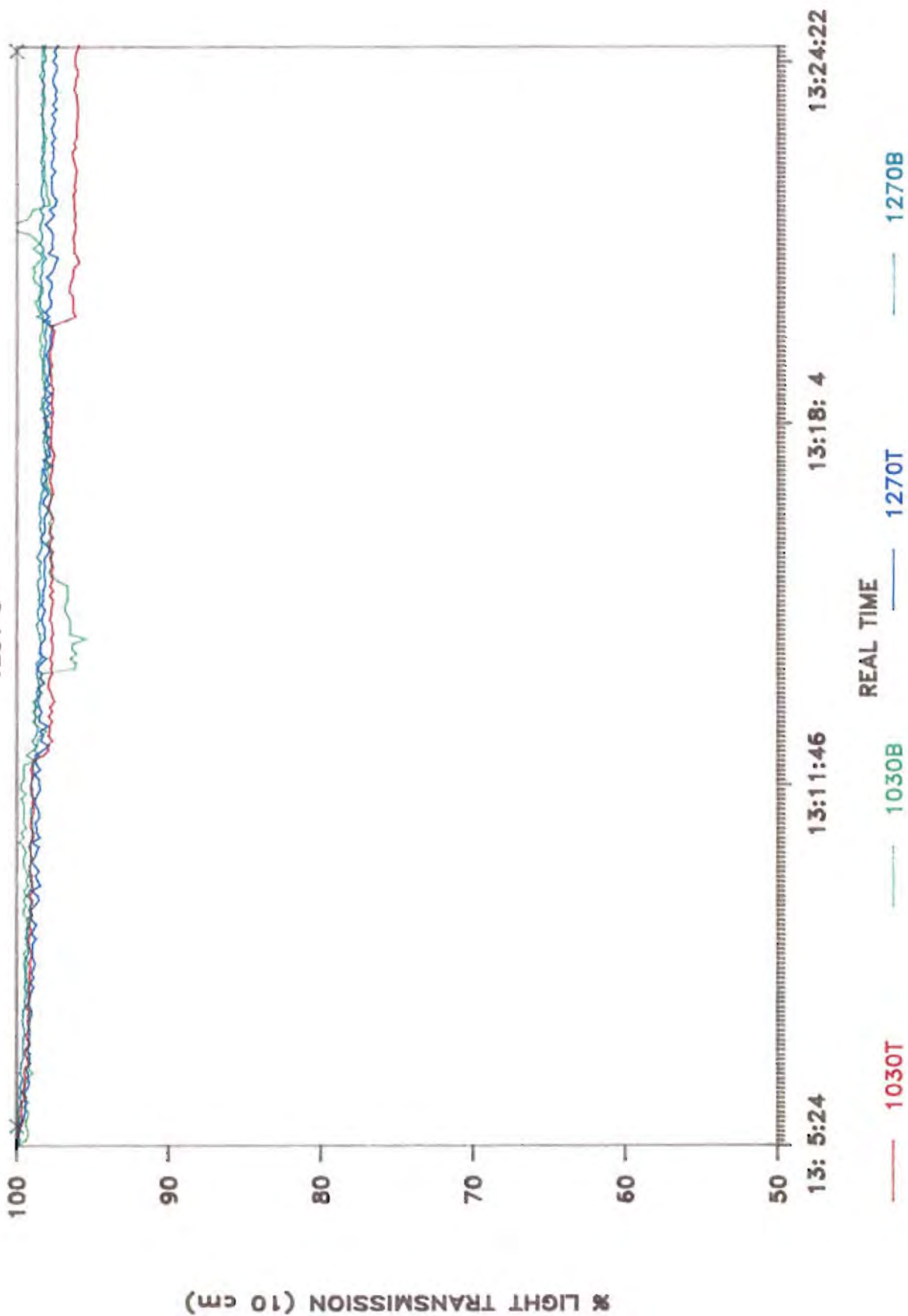
B757 SMOKE EVACUATION

TEST 8



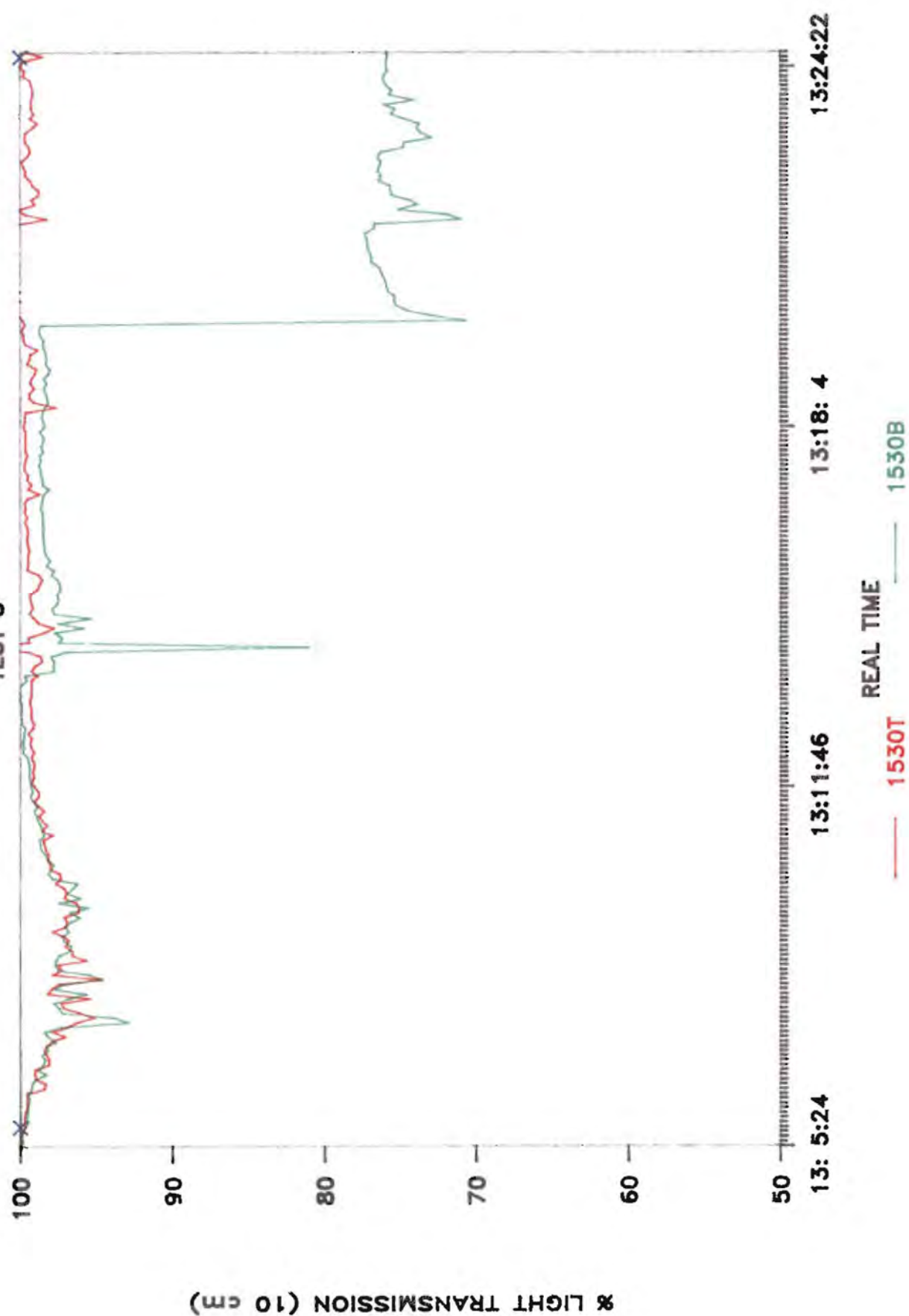
B757 SMOKE EVACUATION

TEST 8



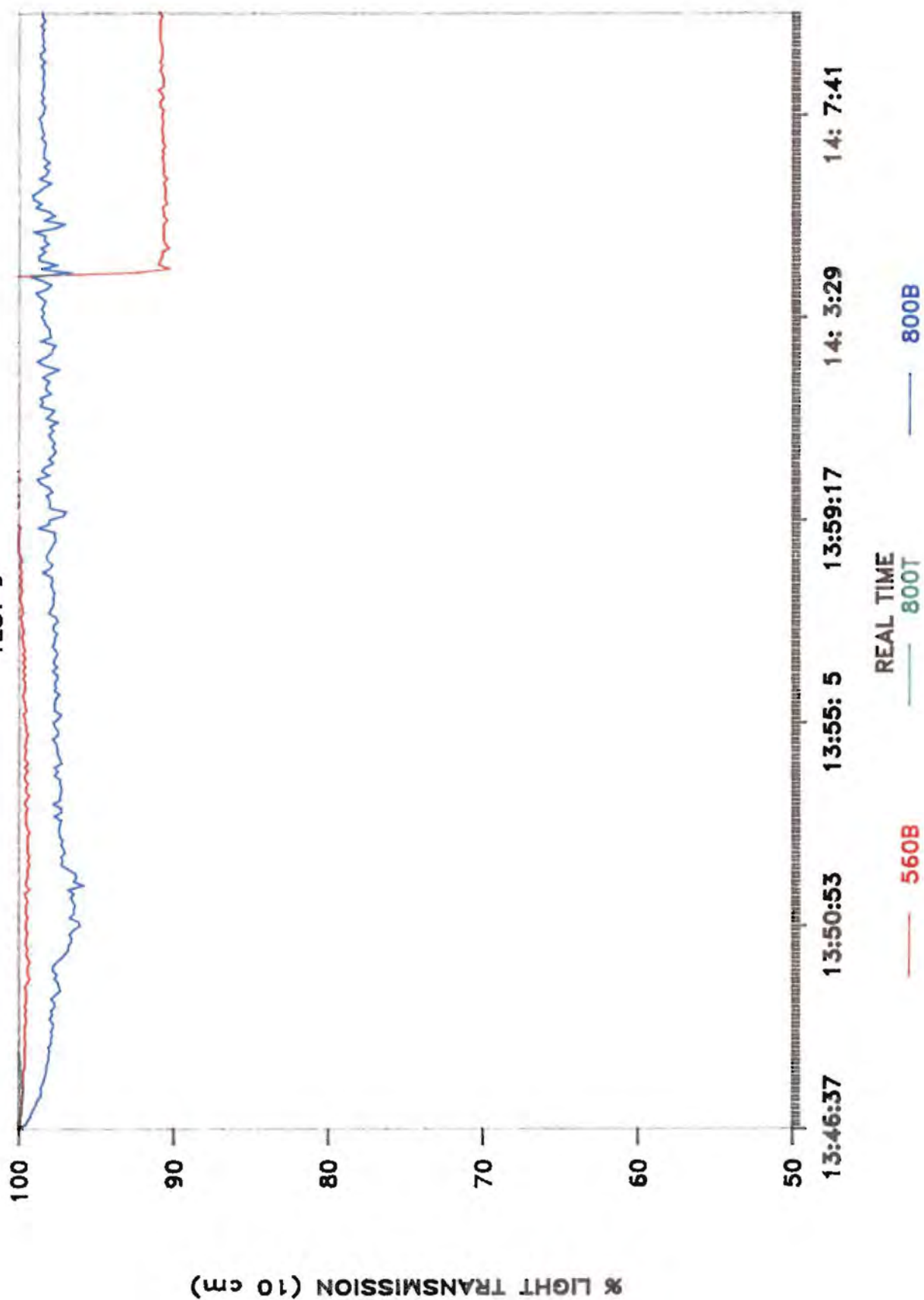
B757 SMOKE EVACUATION

TEST 8



B757 SMOKE EVACUATION

TEST 9

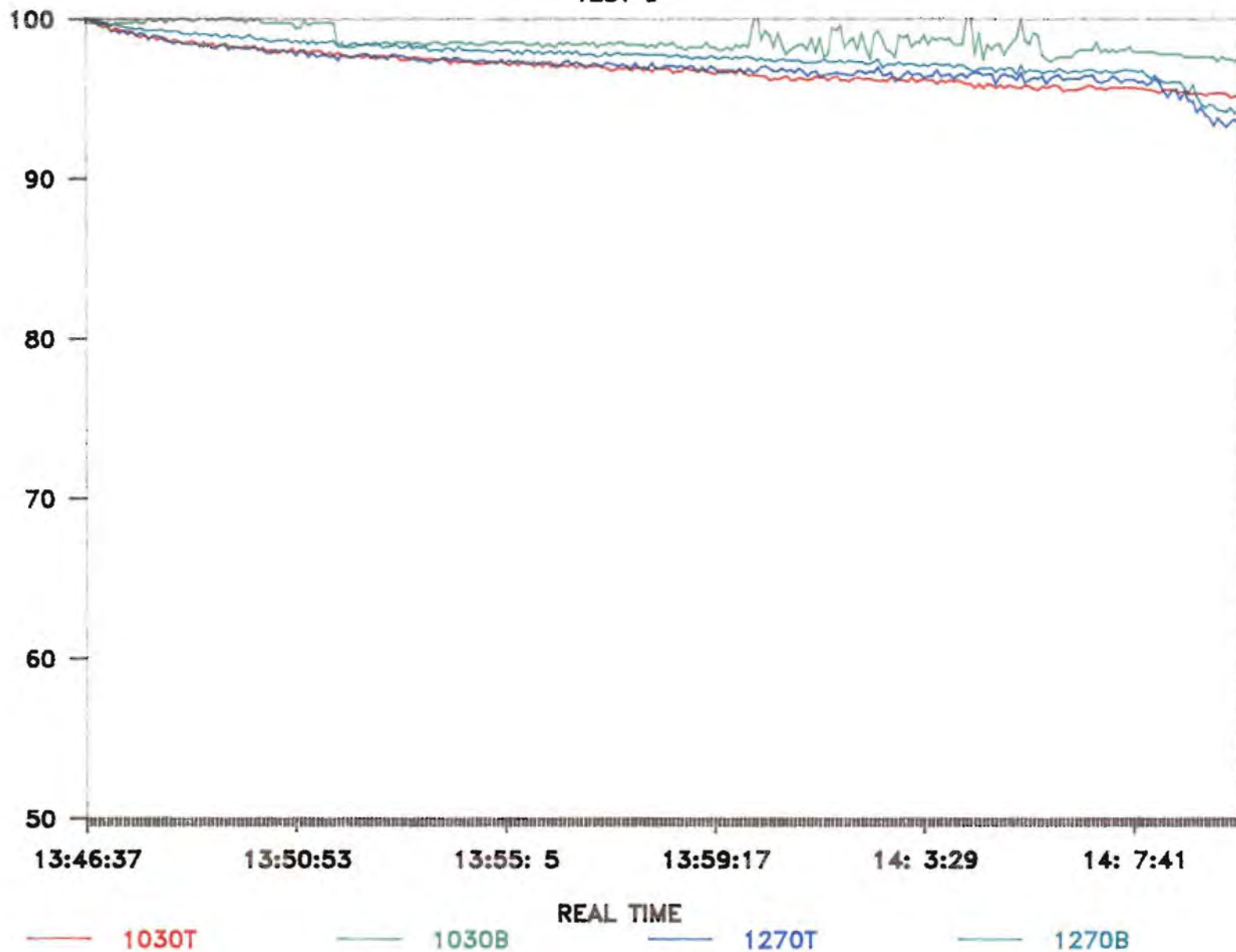


B757 SMOKE EVACUATION

TEST 9

D-29

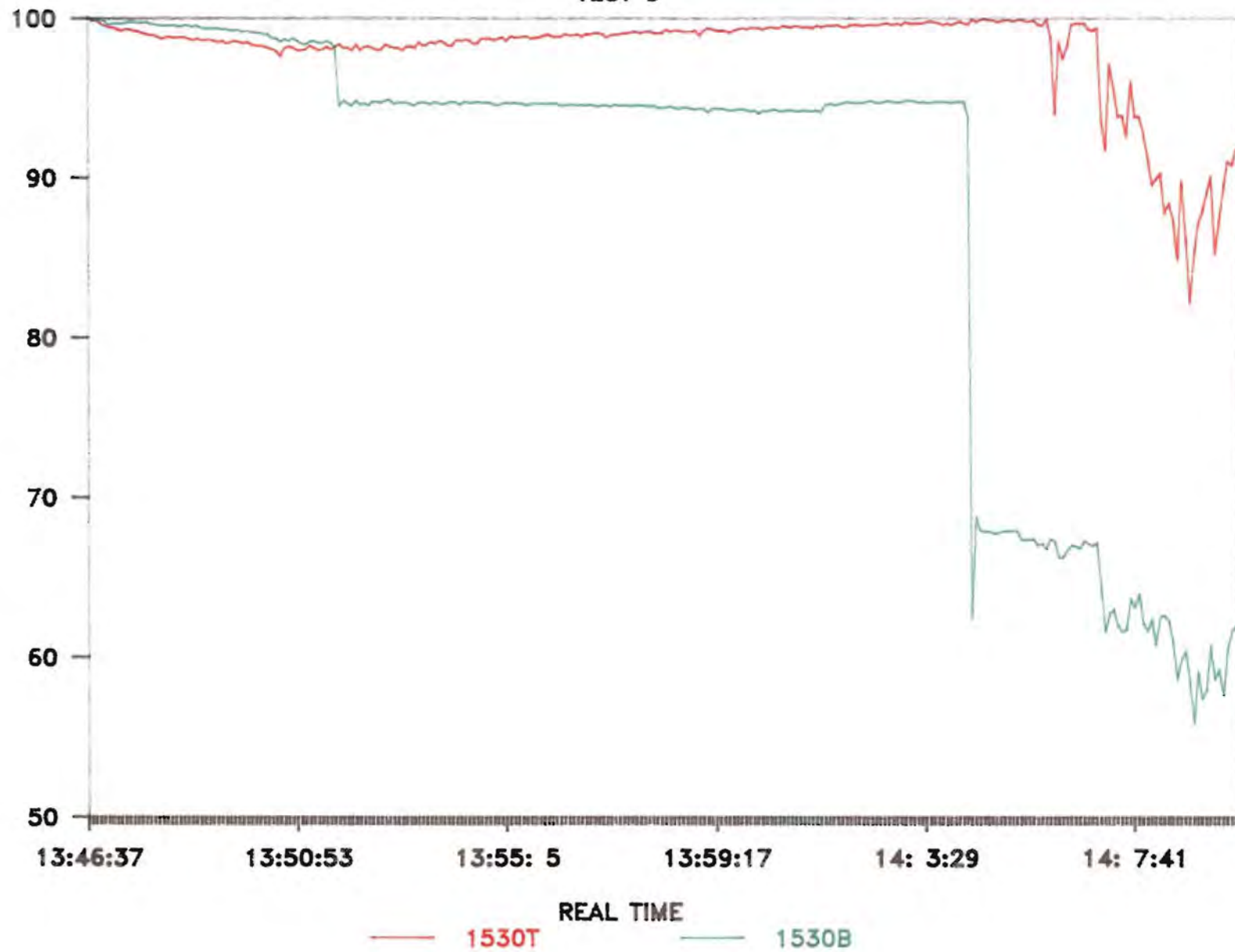
% LIGHT TRANSMISSION (10 cm)



B757 SMOKE EVACUATION

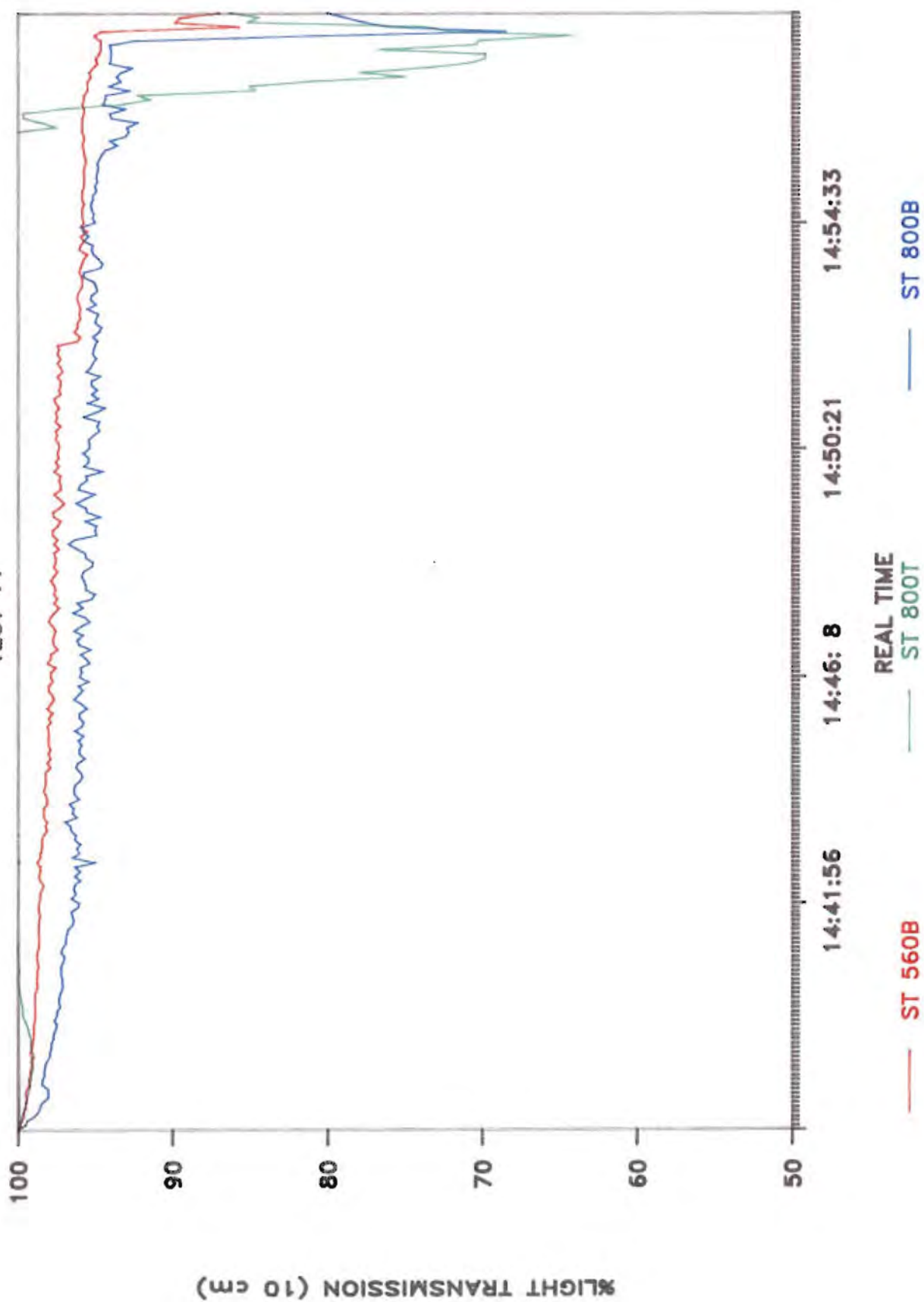
TEST 9

D-30
% LIGHT TRANSMISSION (10 cm)



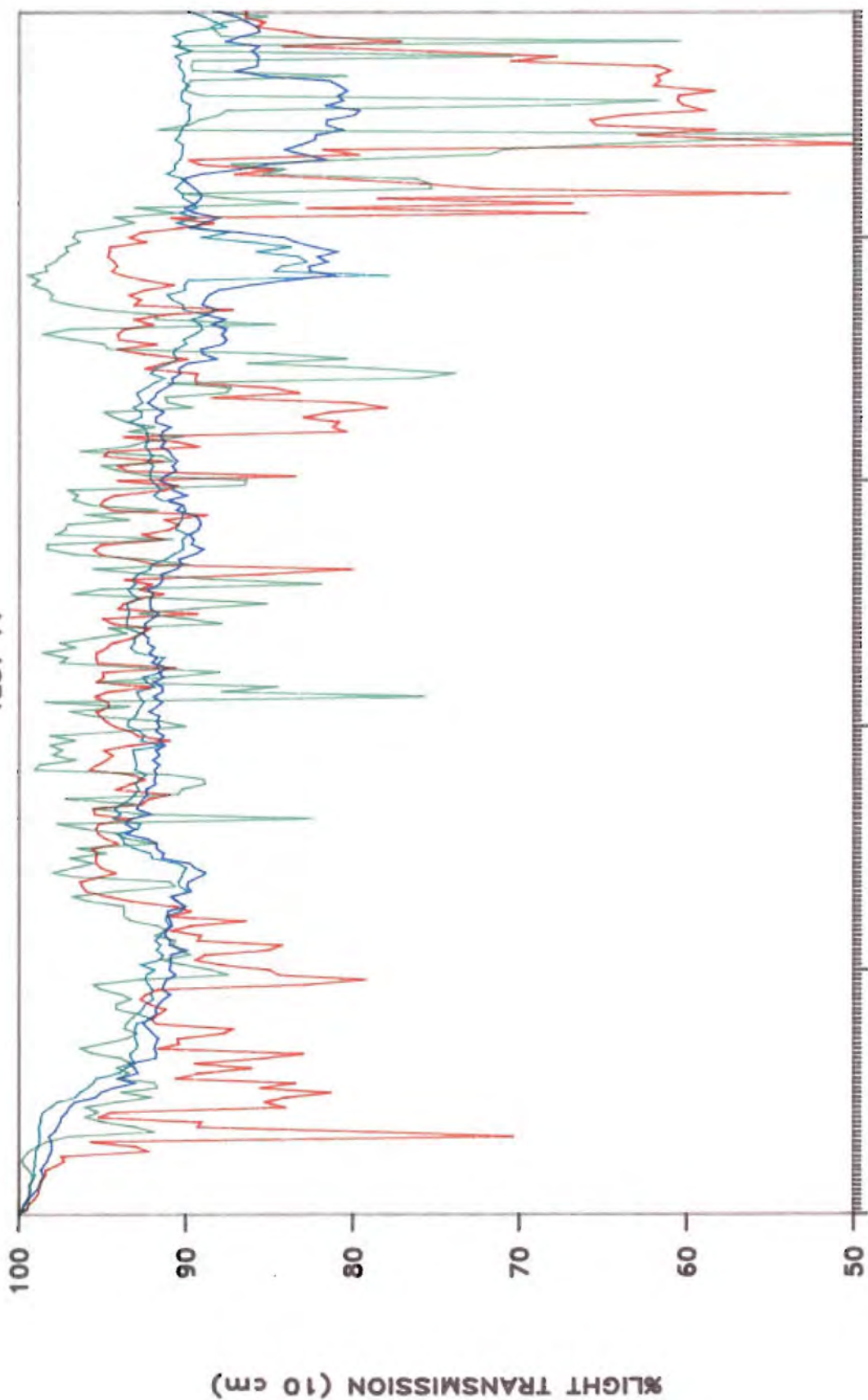
B757 SMOKE EVACUATION

TEST 11



B757 SMOKE EVACUATION

TEST 11



ST 1030T

ST 1030B

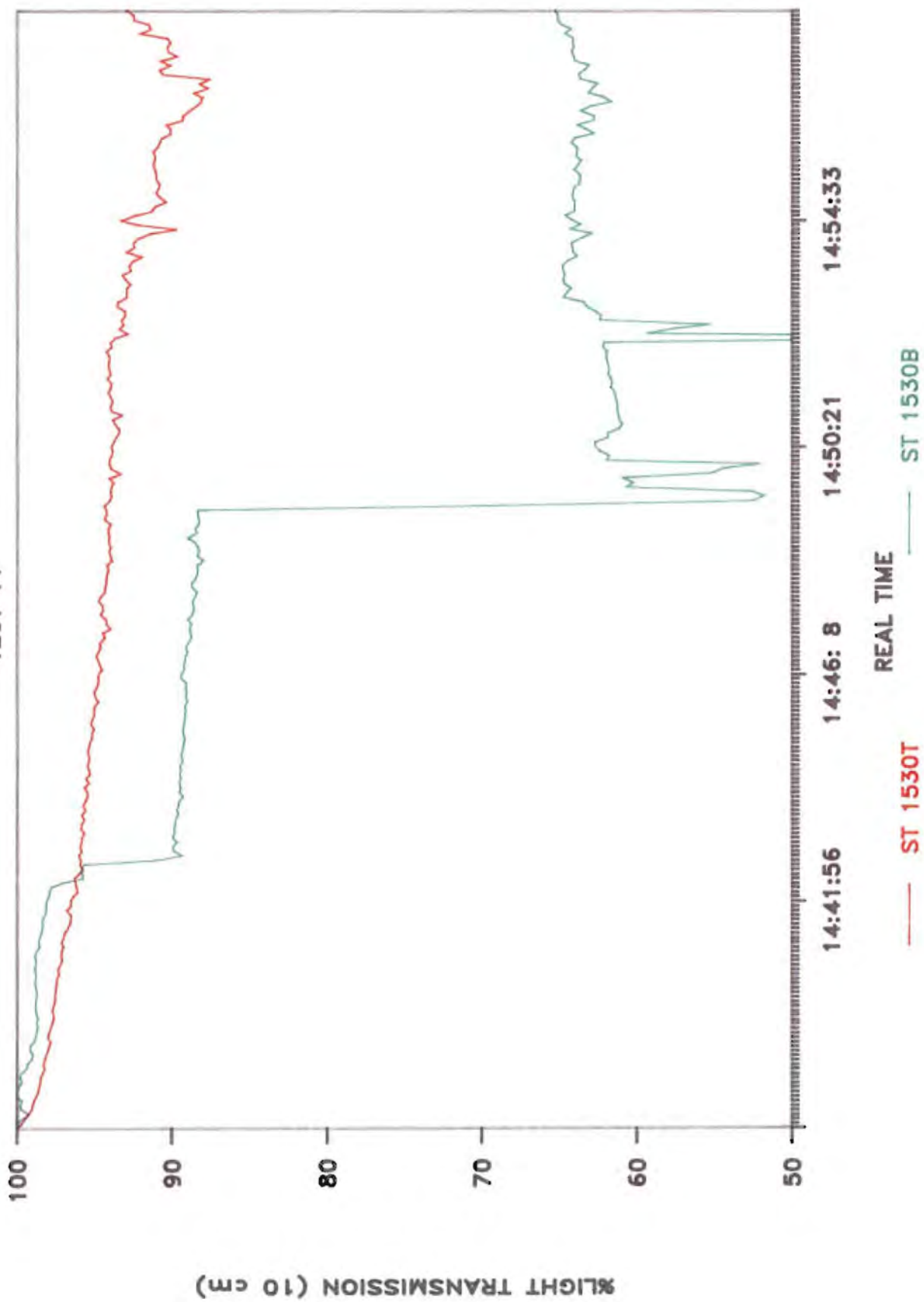
REAL TIME

ST 1270T

ST 1270B

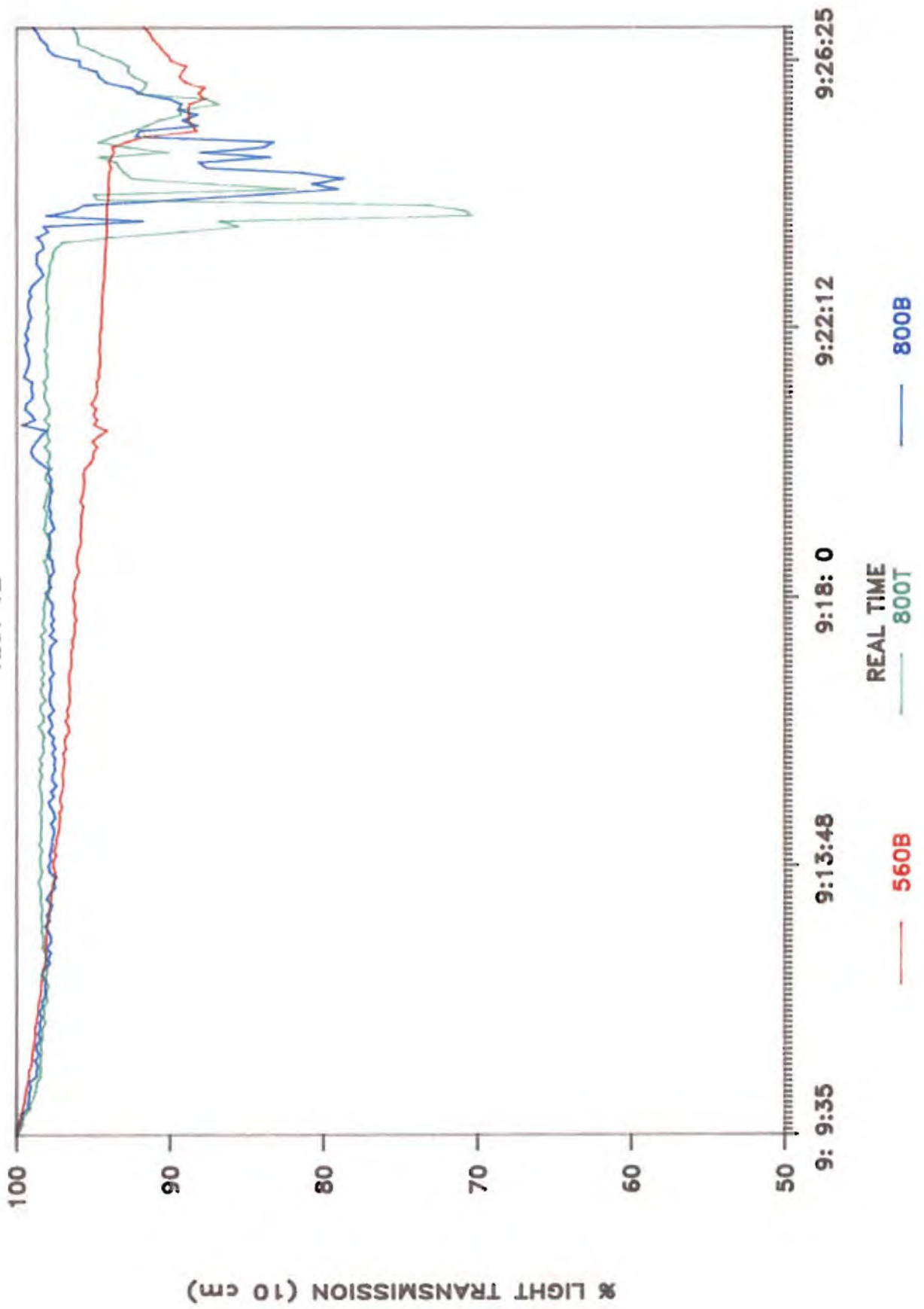
B757 SMOKE EVACUATION

TEST 11



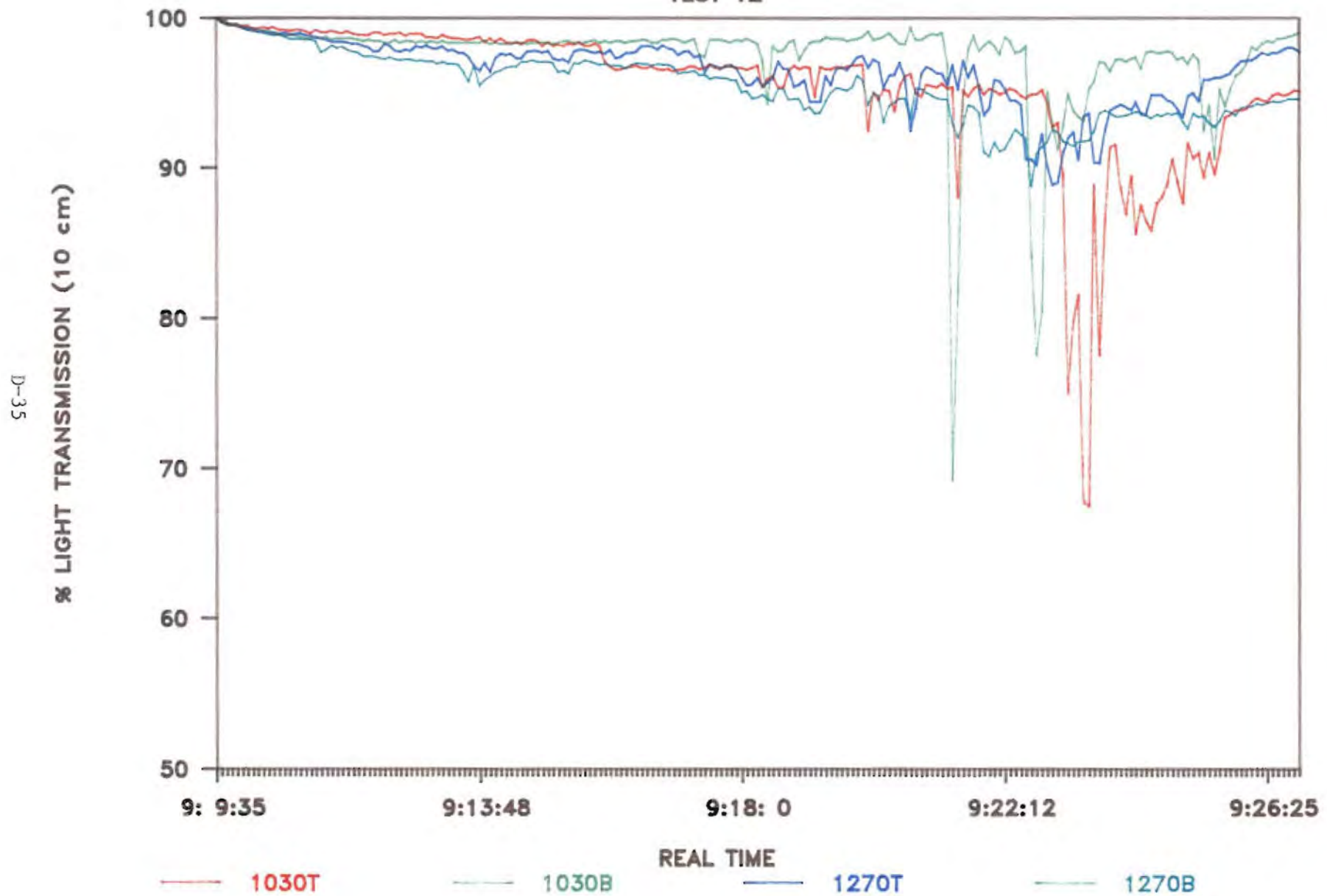
B757 SMOKE EVACUATION

TEST 12



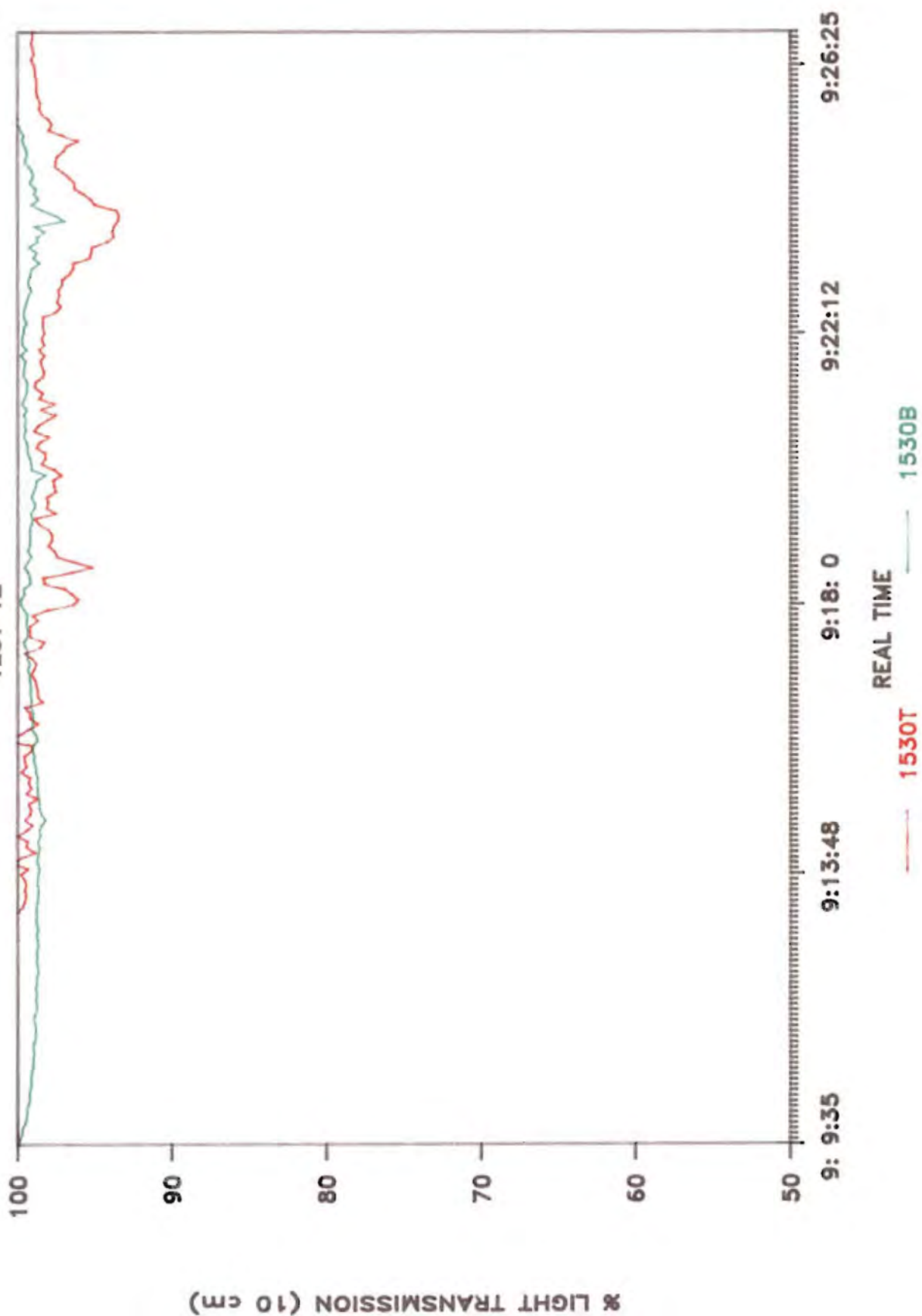
B757 SMOKE EVACUATION

TEST 12



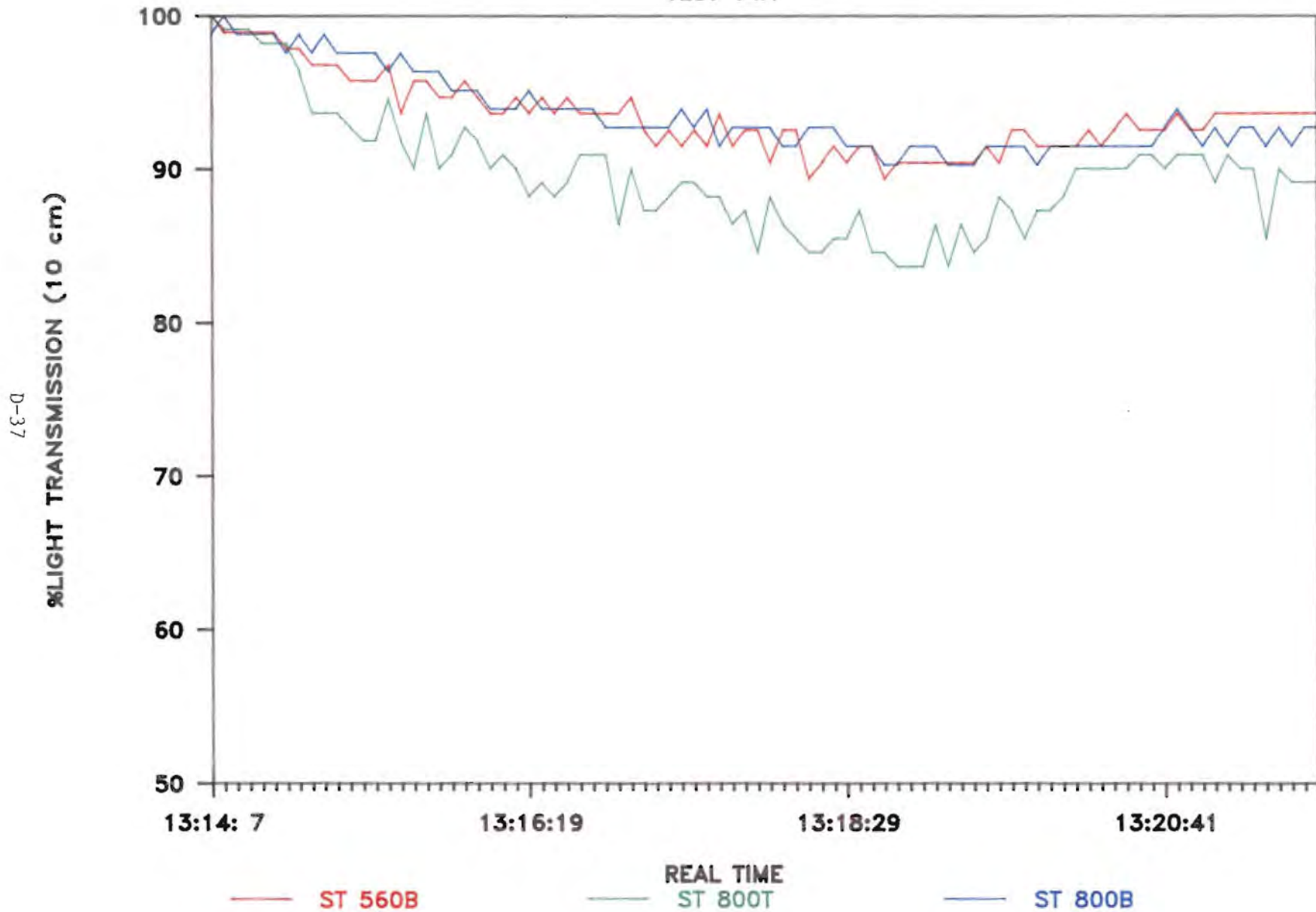
B757 SMOKE EVACUATION

TEST 12



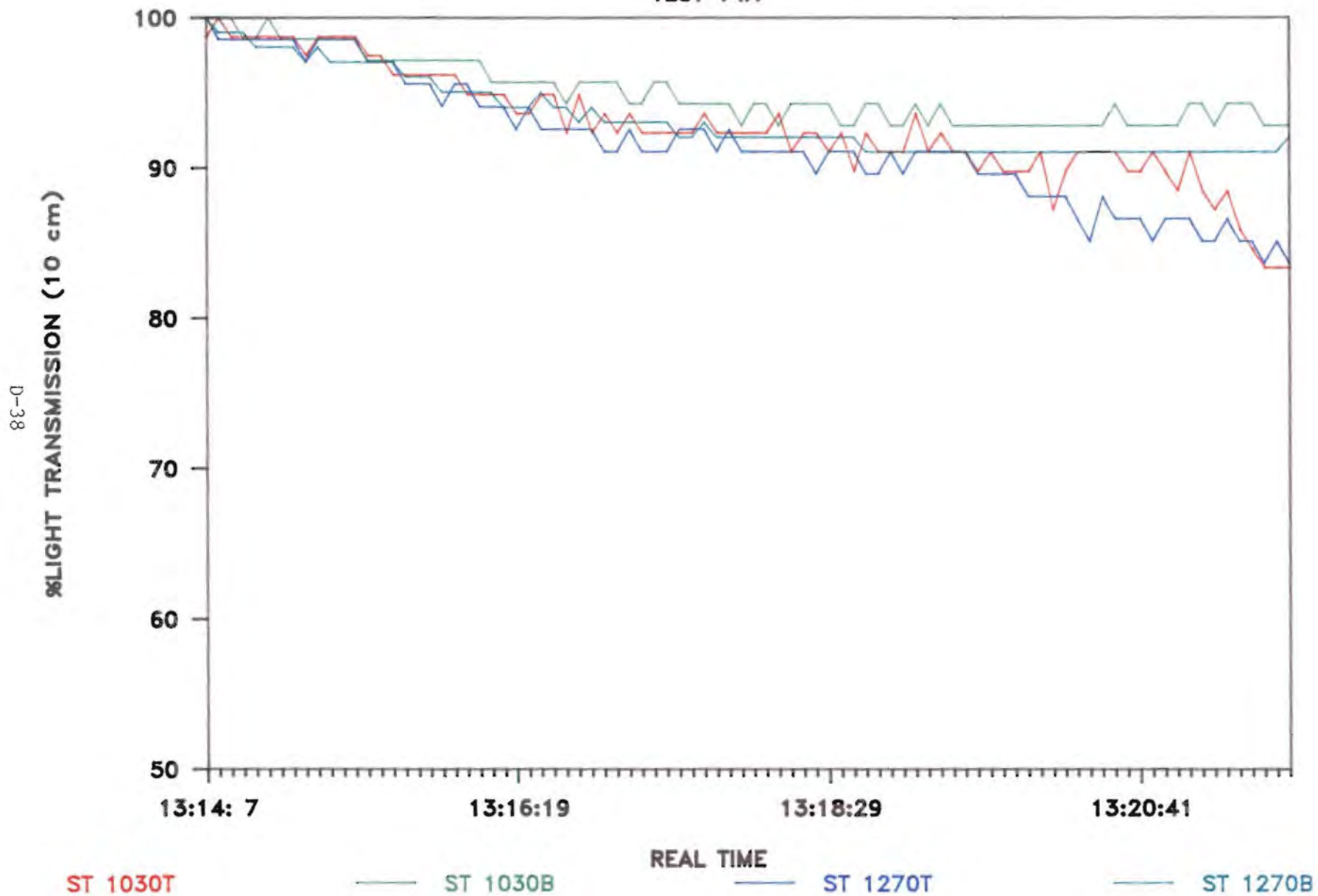
B757 SMOKE EVACUATION

TEST 14A



B757 SMOKE EVACUATION

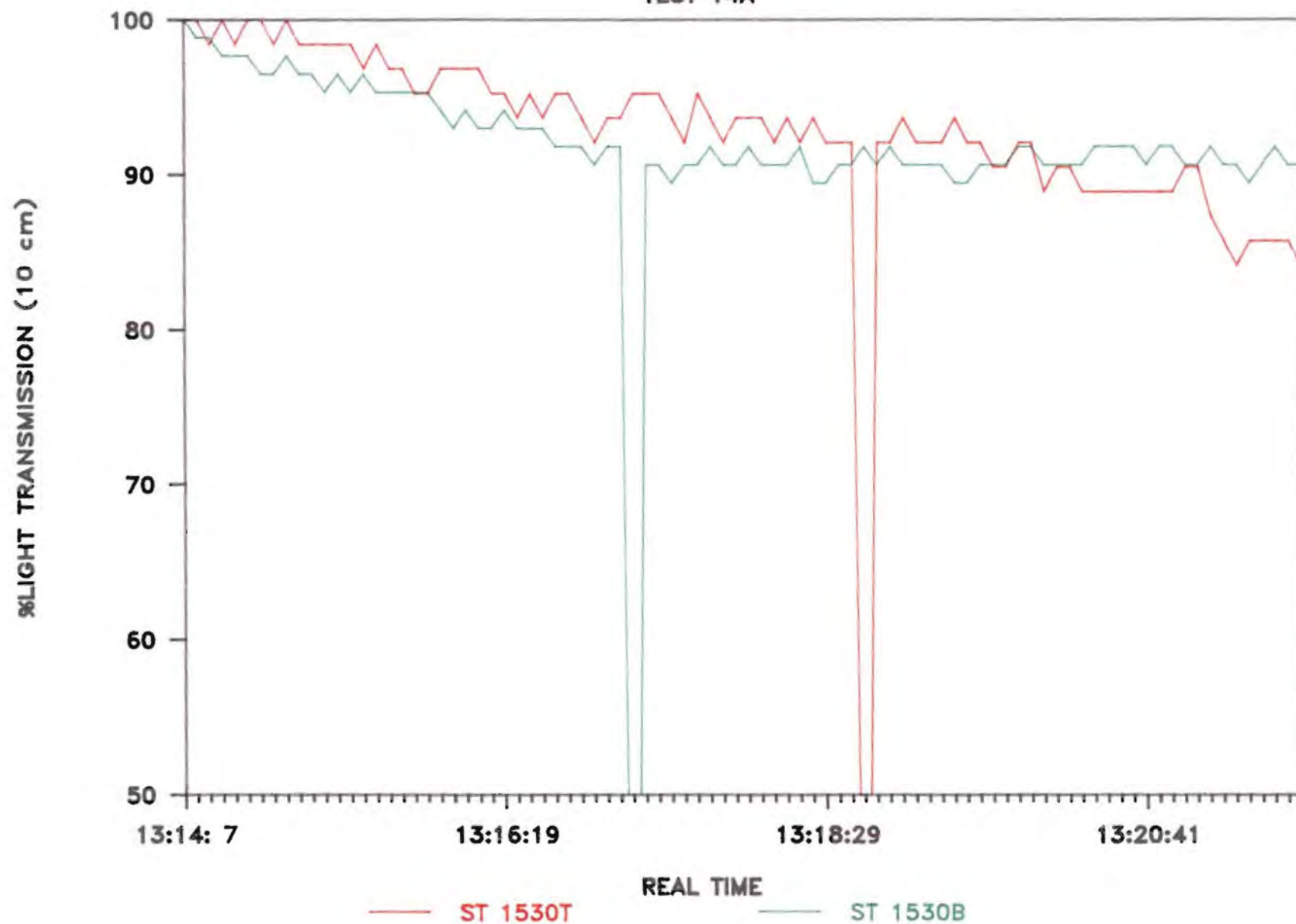
TEST 14A



B757 SMOKE EVACUATION

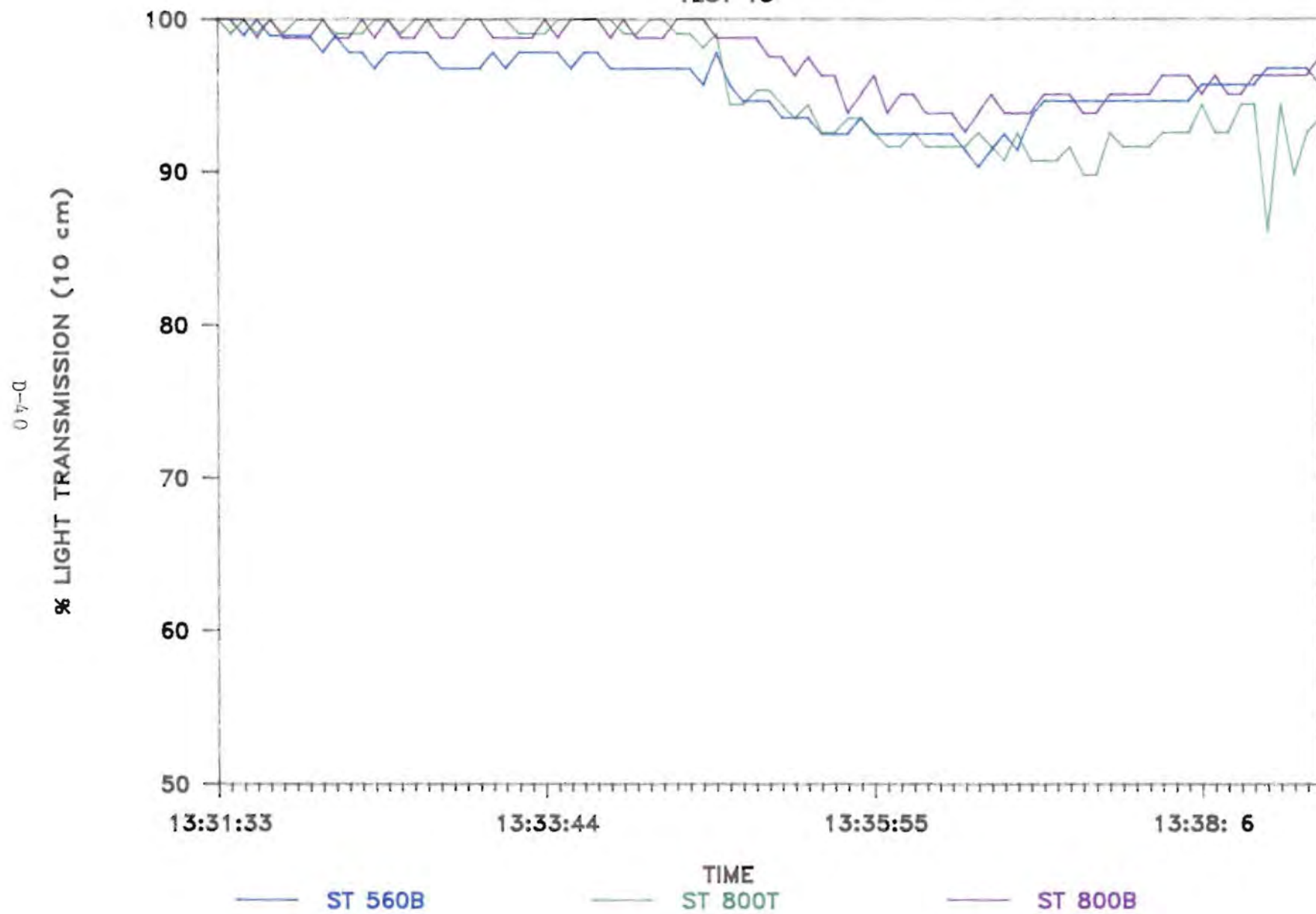
TEST 14A

D-39



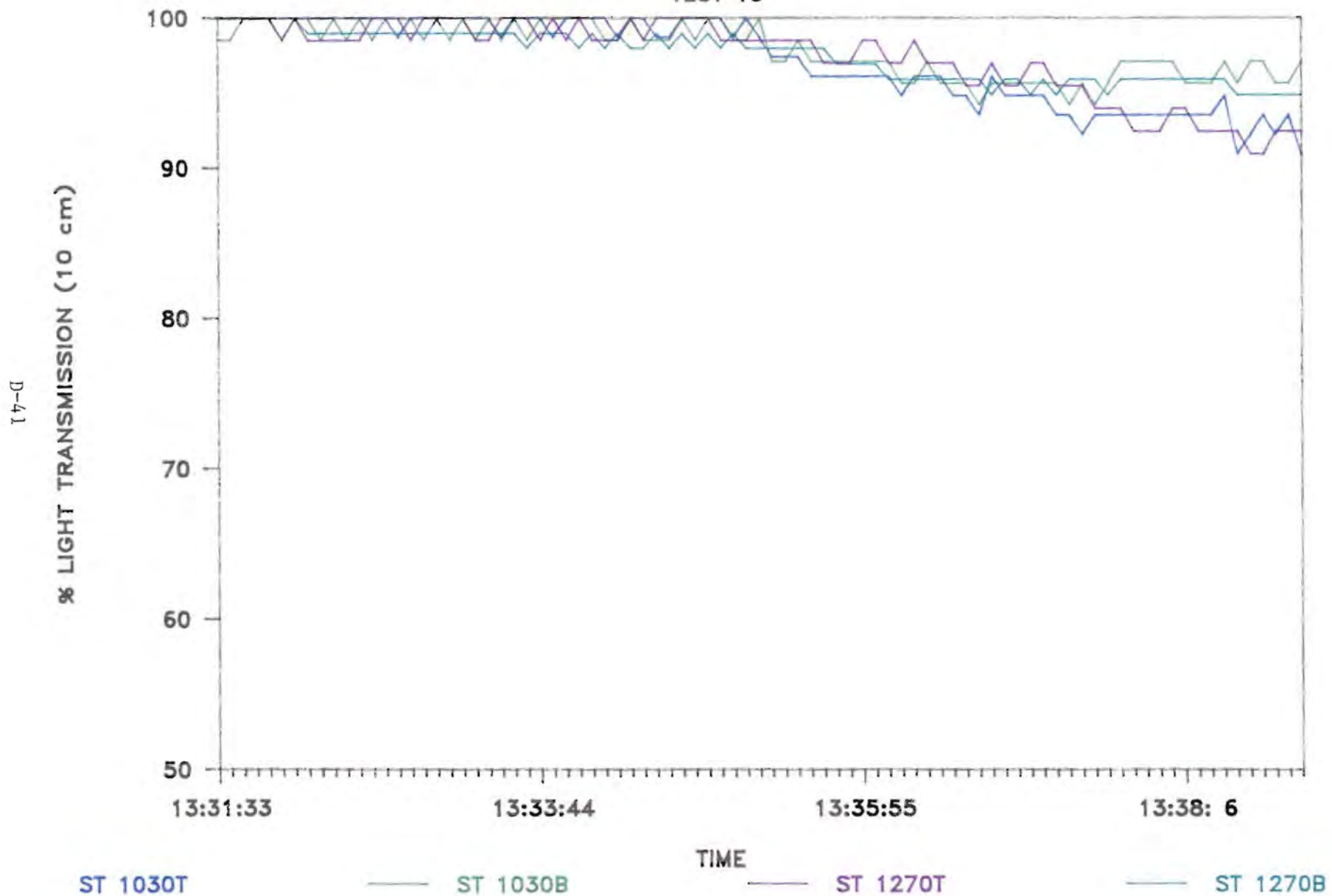
B757 SMOKE EVACUATION

TEST 15



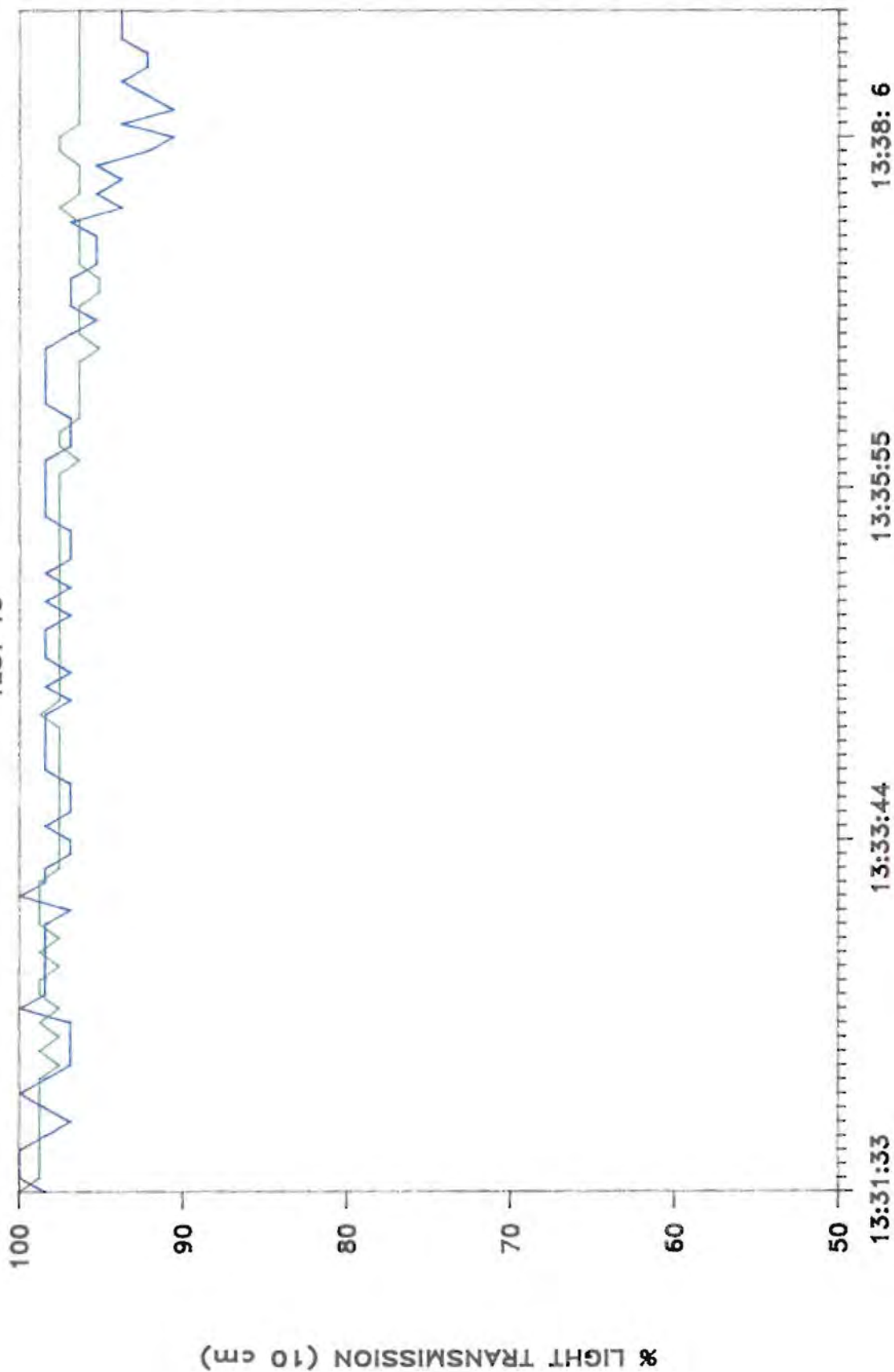
B757 SMOKE EVACUATION

TEST 15



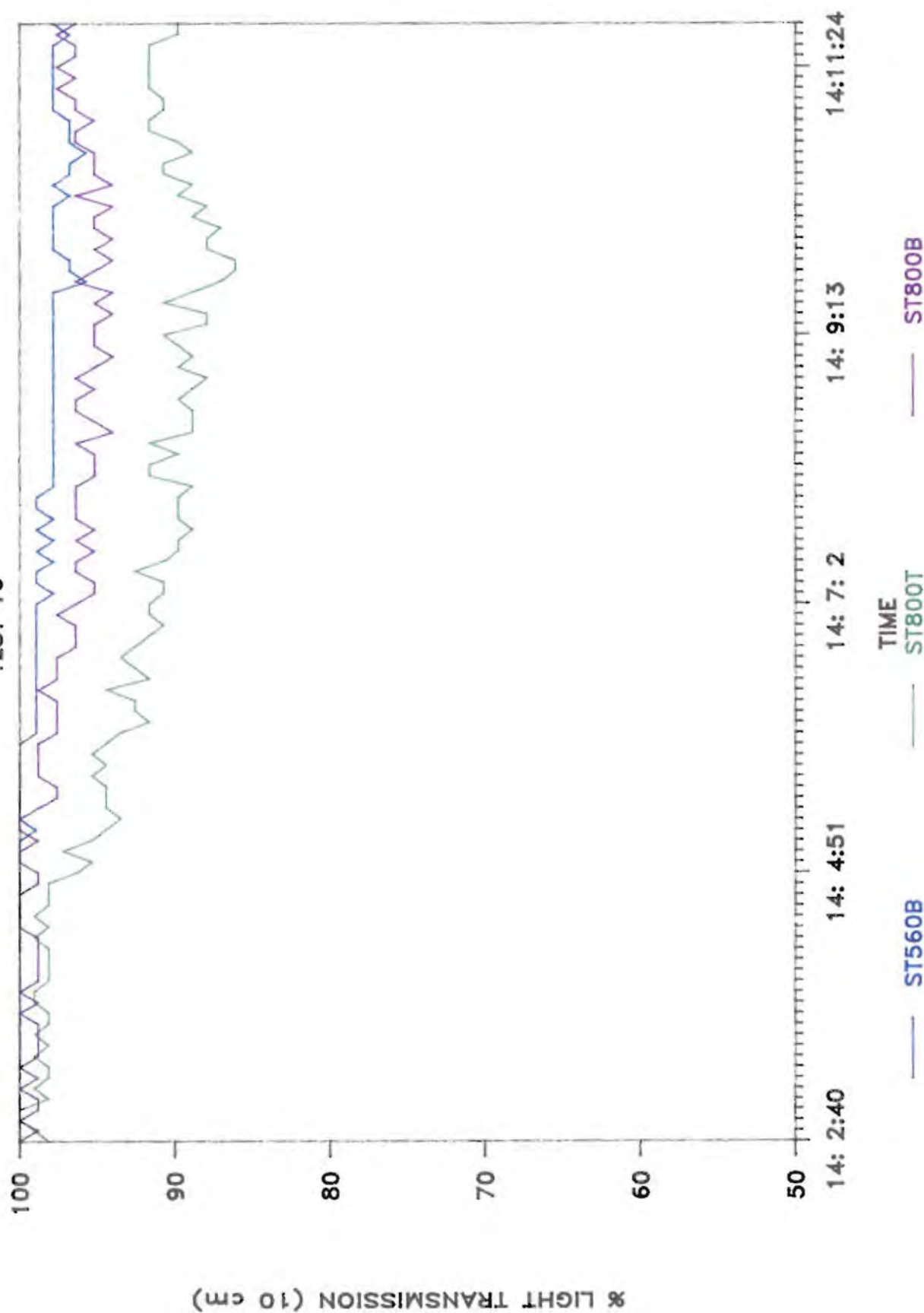
B757 SMOKE EVACUATION

TEST 15



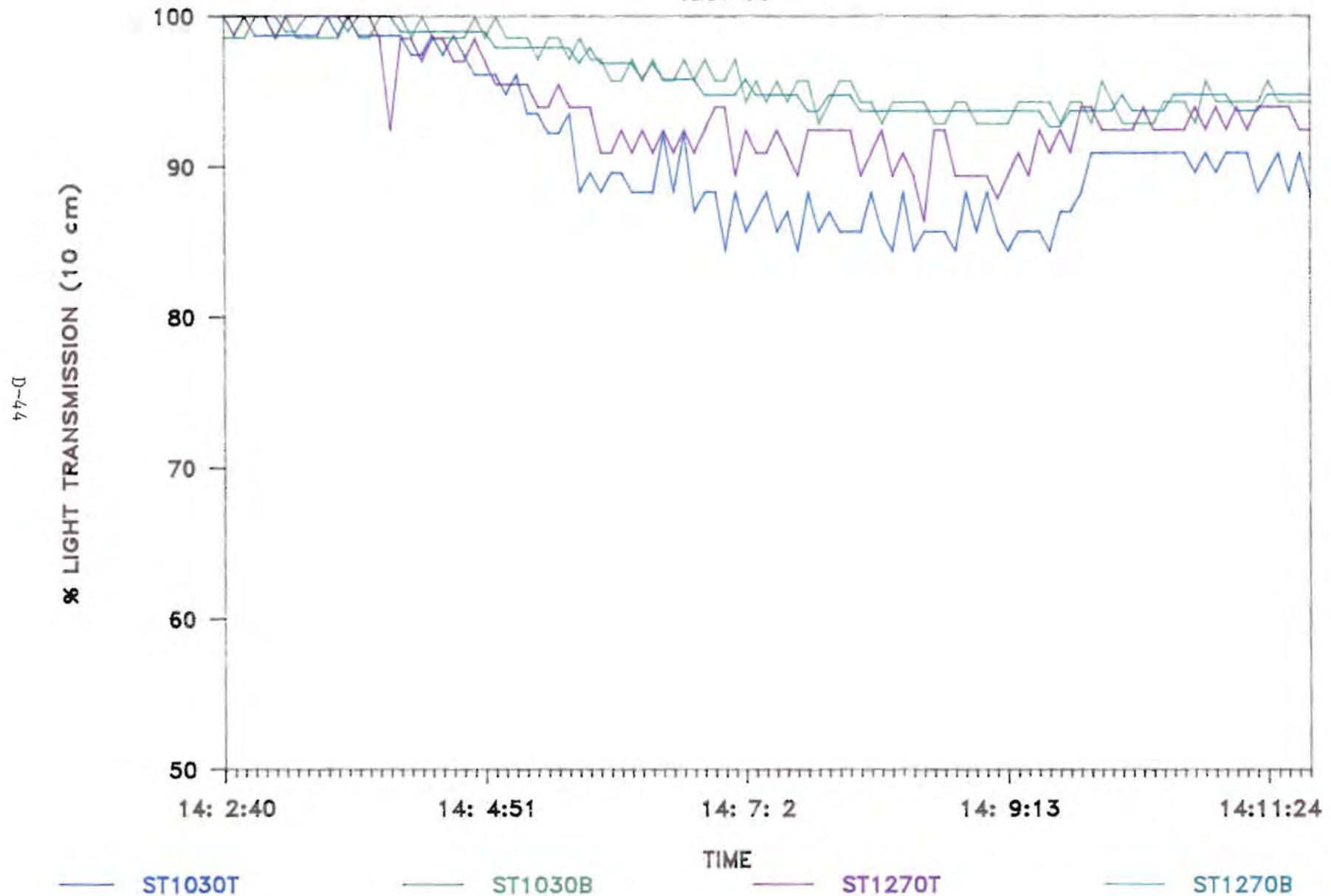
757 SMOKE EVACUATION

TEST 16



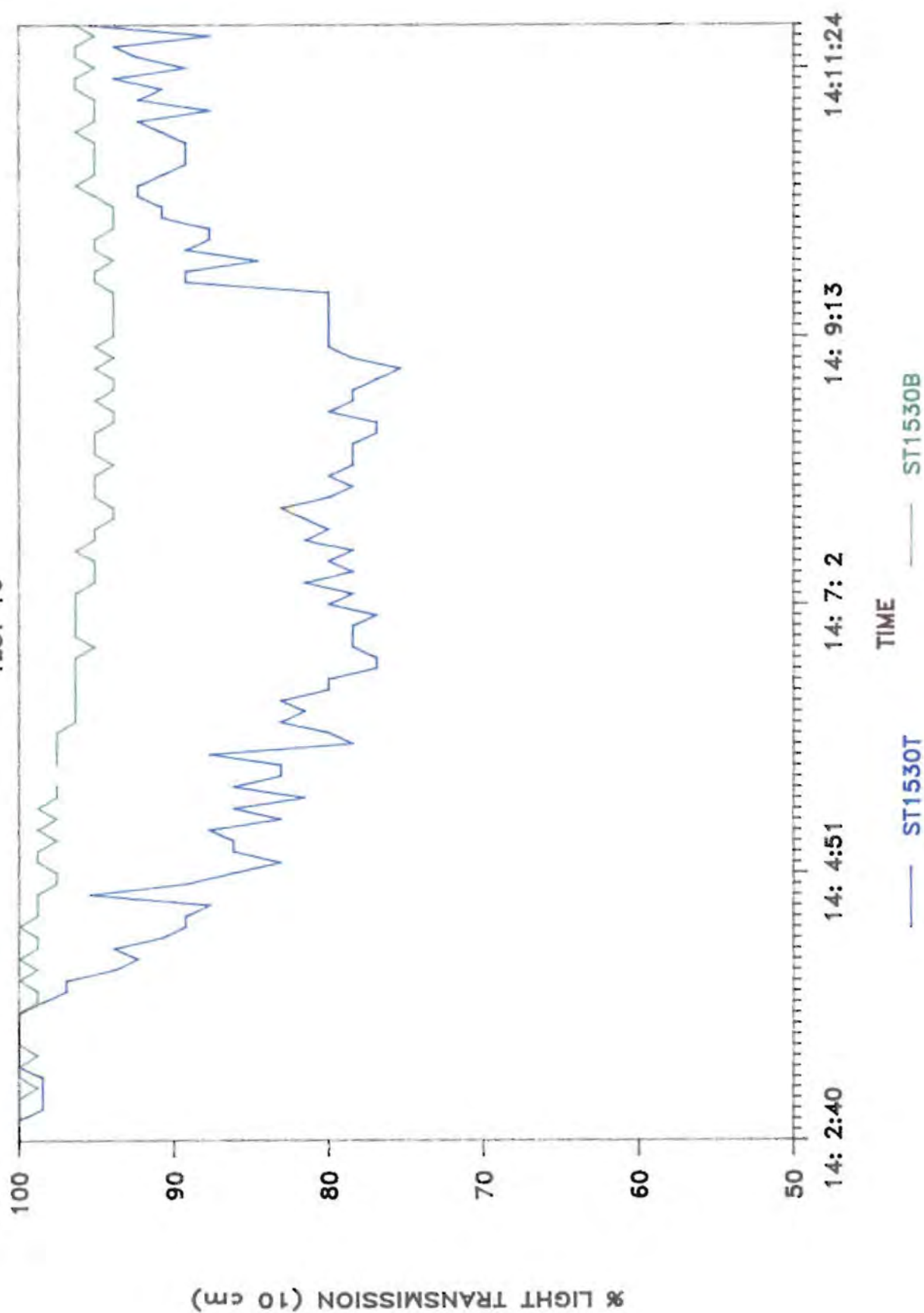
757 SMOKE EVACUATION

TEST 16



757 SMOKE EVACUATION

TEST 16

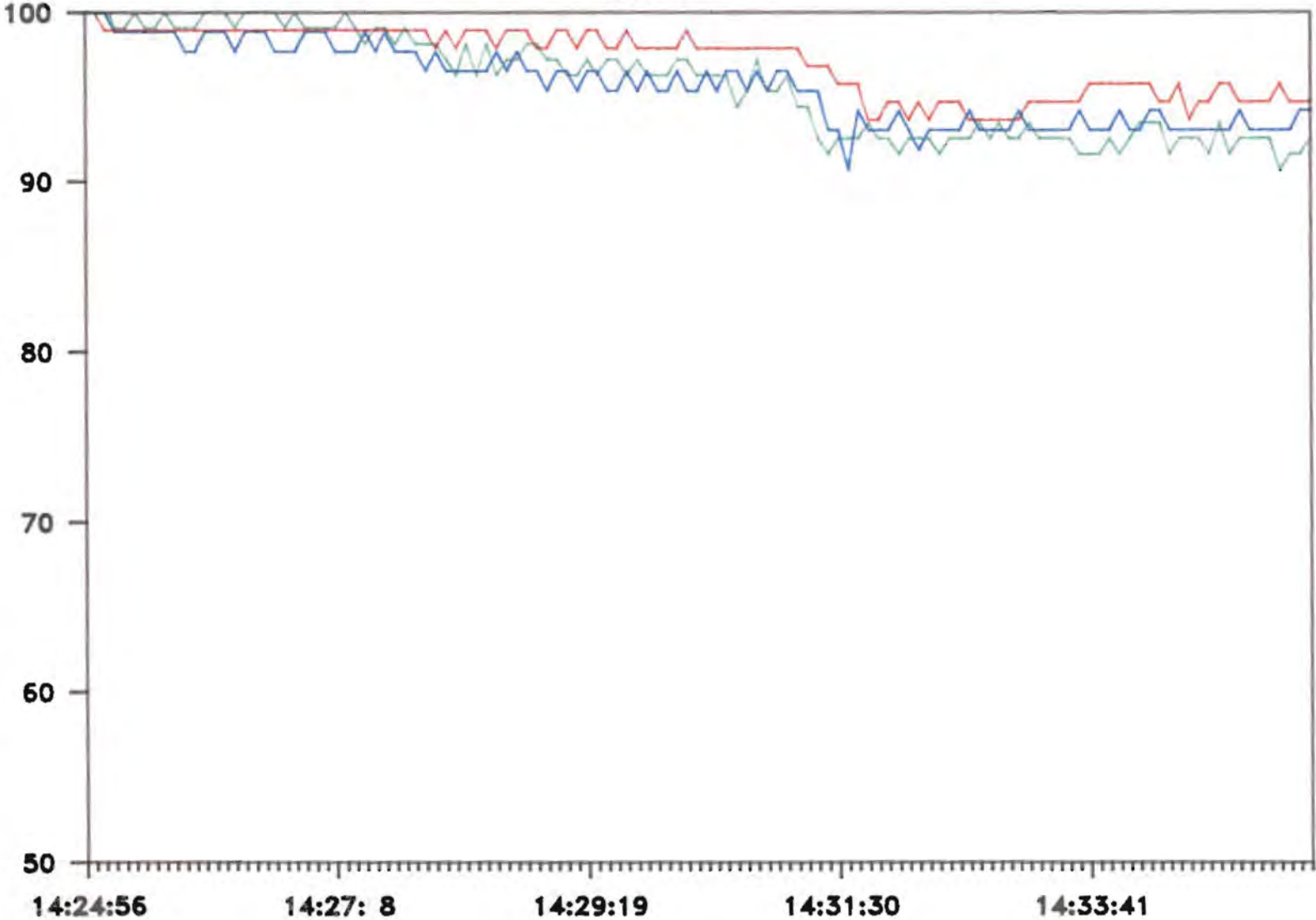


B757 SMOKE EVACUATION

TEST 17

97-D

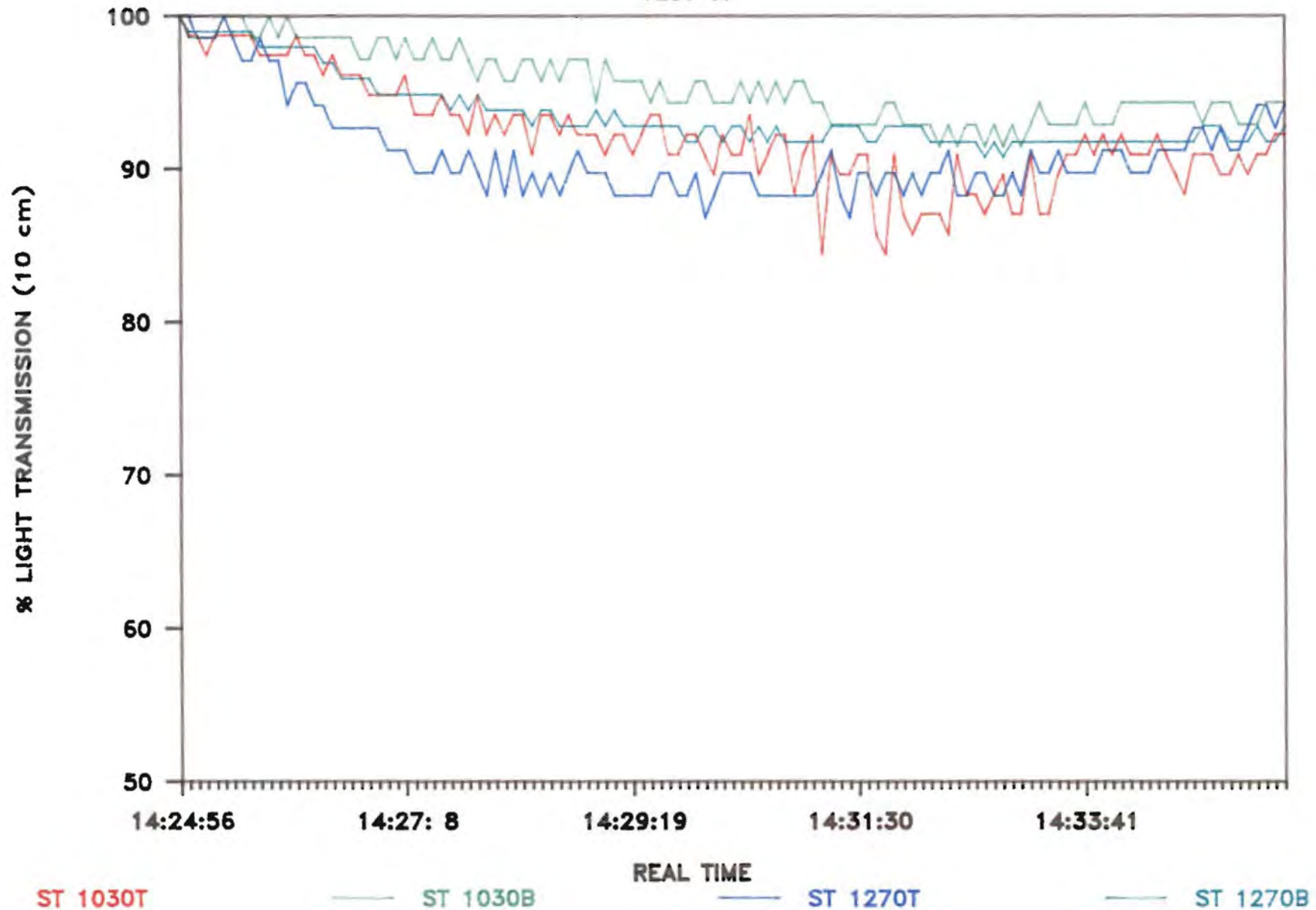
% LIGHT TRANSMISSION (10 cm)



— ST 560B — ST 800T — ST 800B

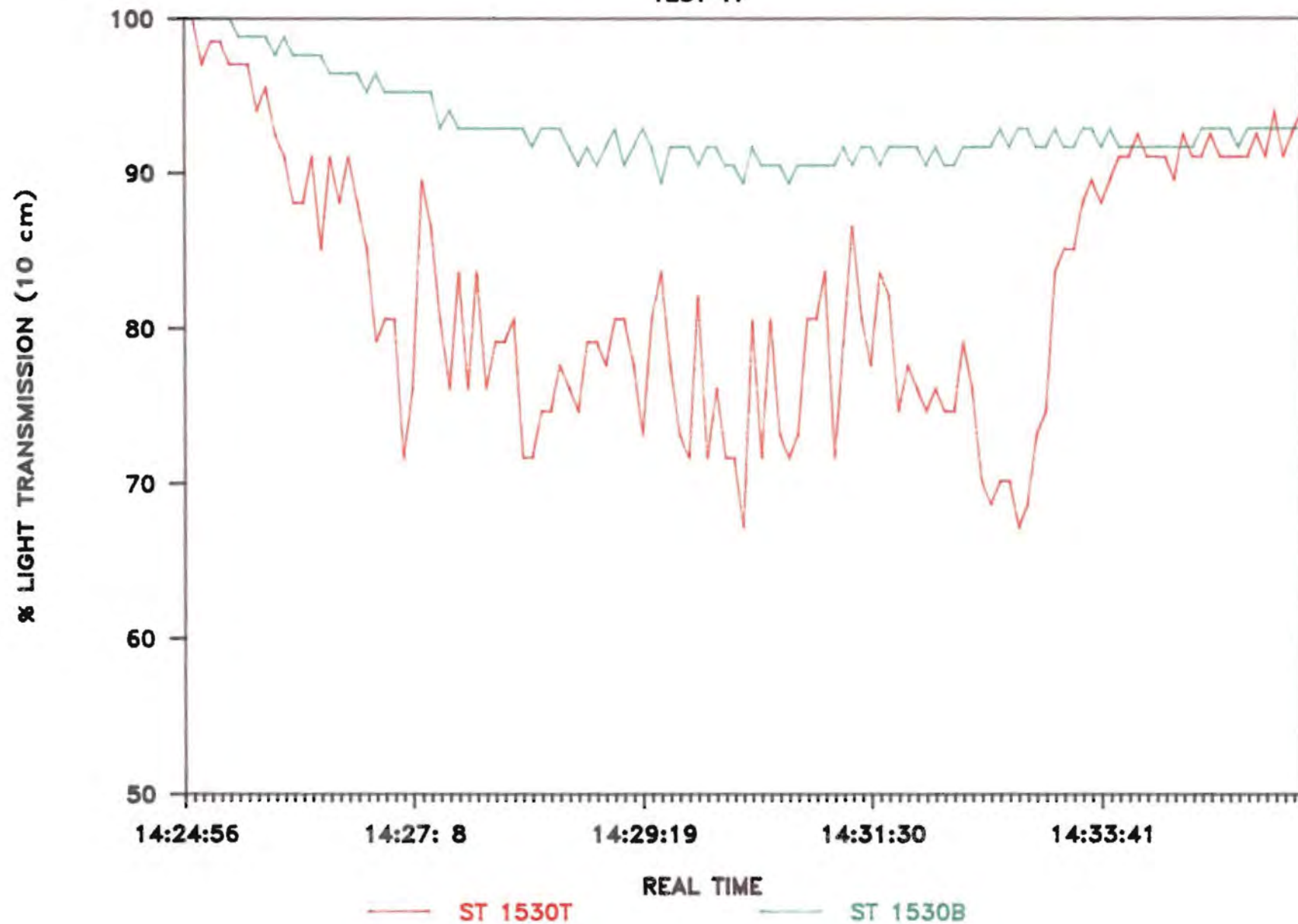
B757 SMOKE EVACUATION

TEST 17



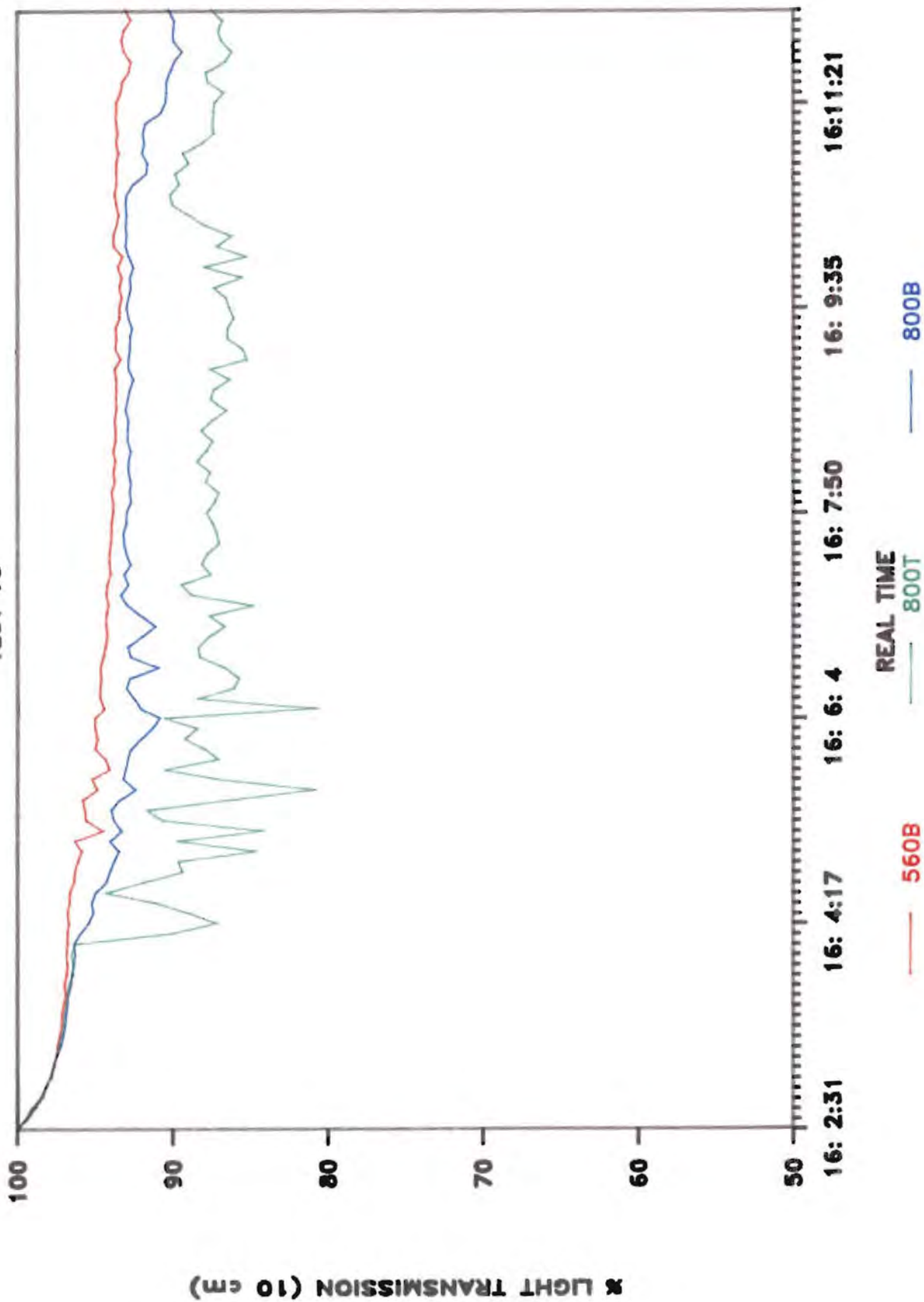
B757 SMOKE EVACUATION

TEST 17



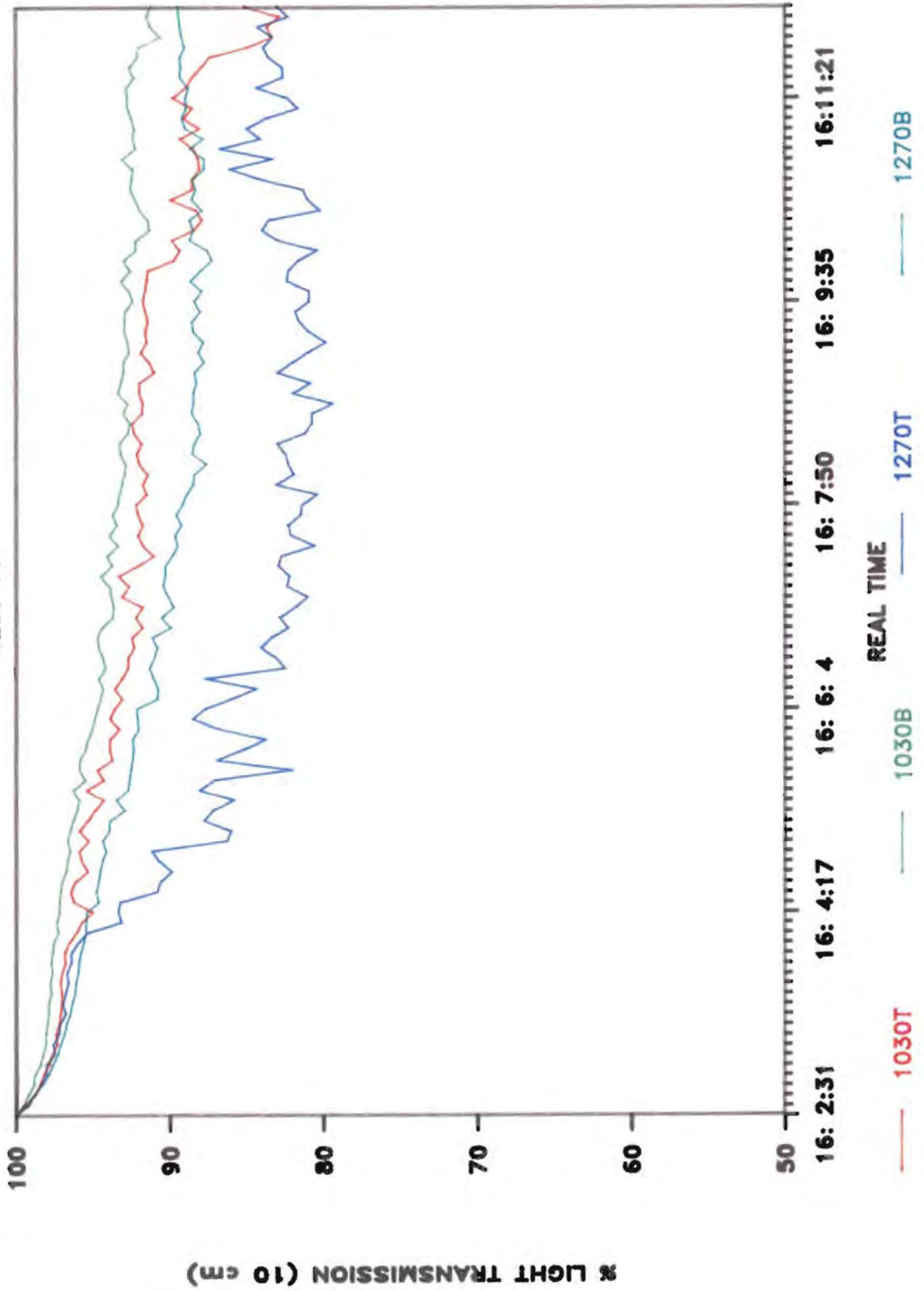
B757 SMOKE EVACUATION

TEST 18



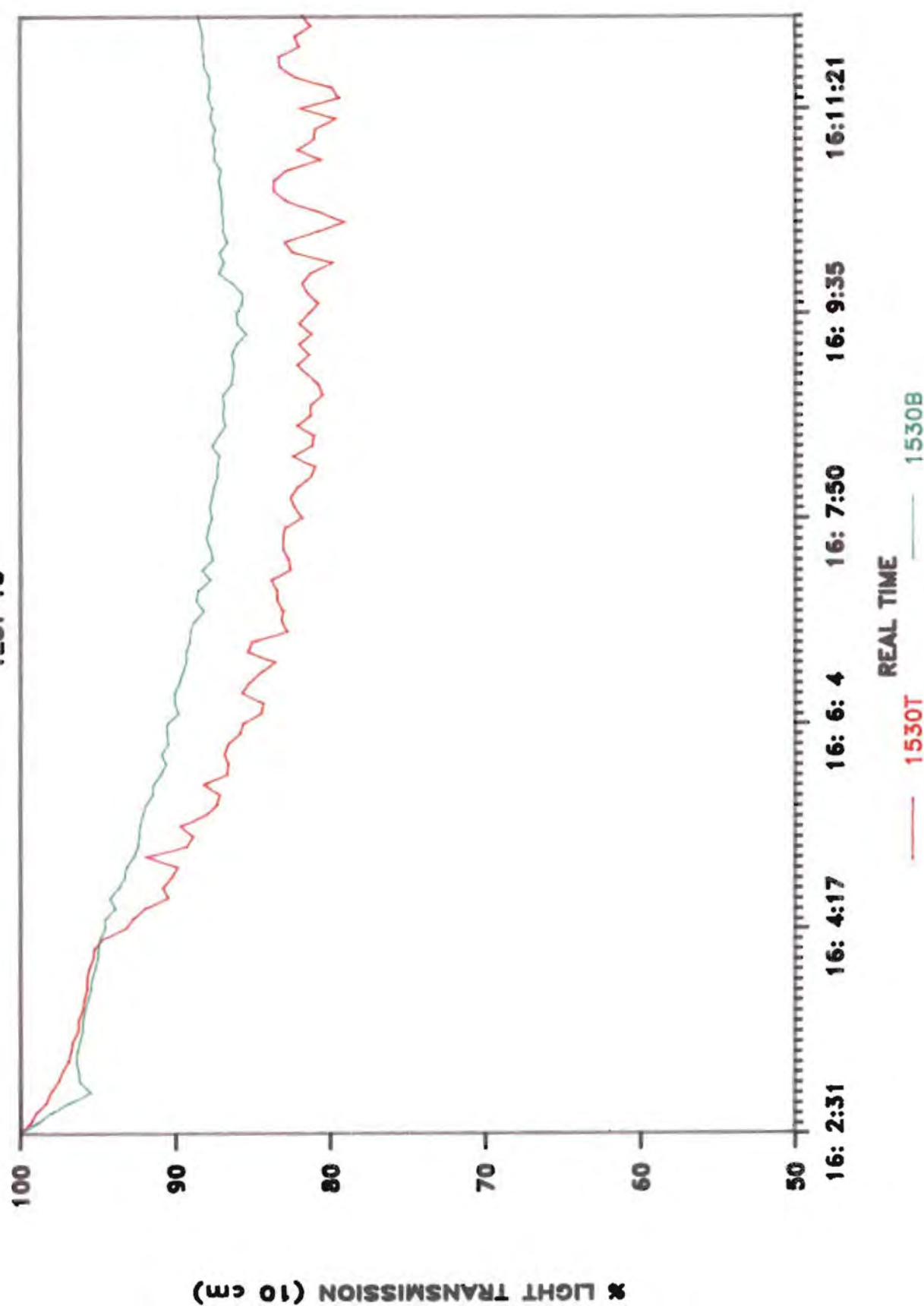
B757 SMOKE EVACUATION

TEST 18



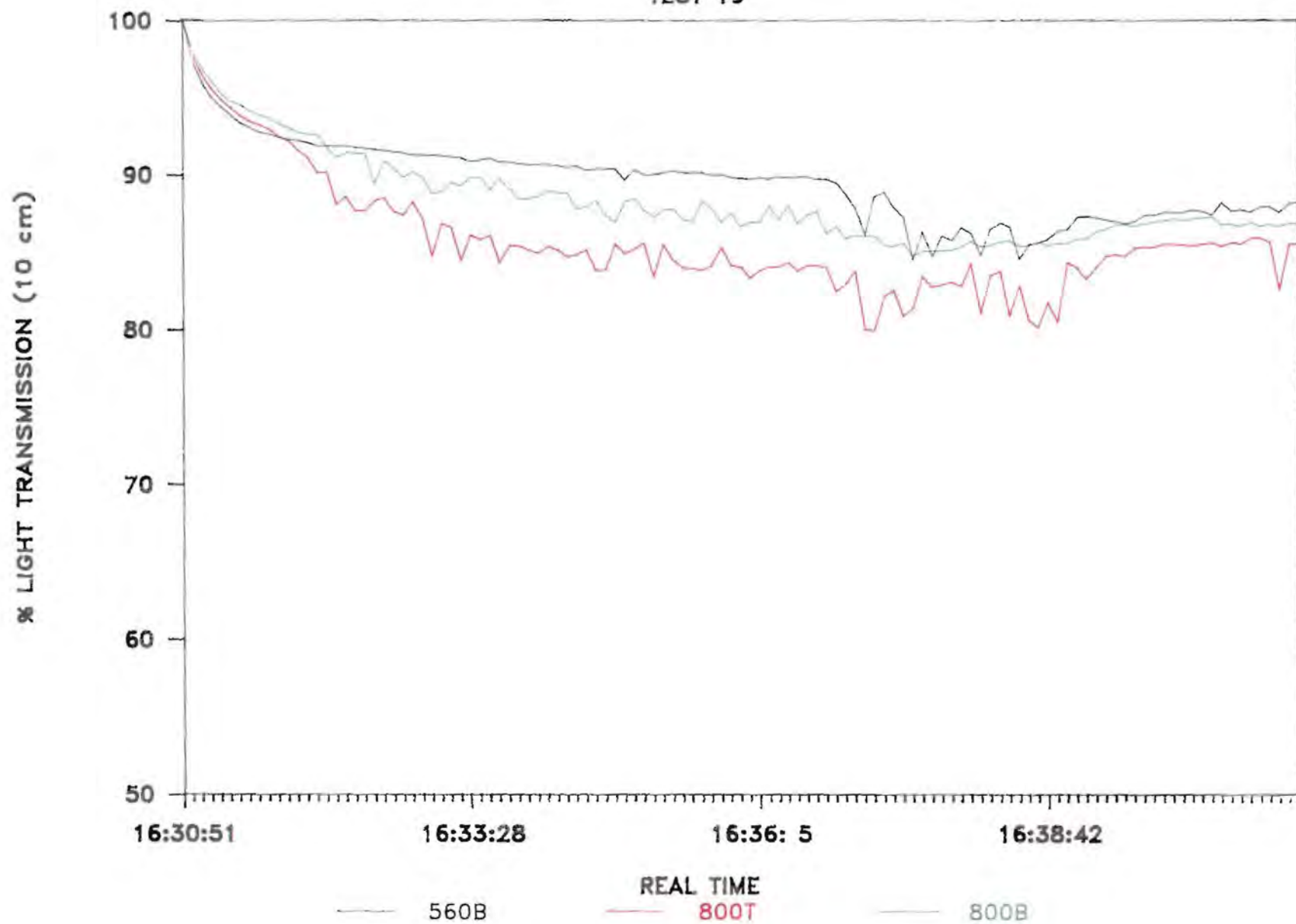
B757 SMOKE EVACUATION

TEST 18



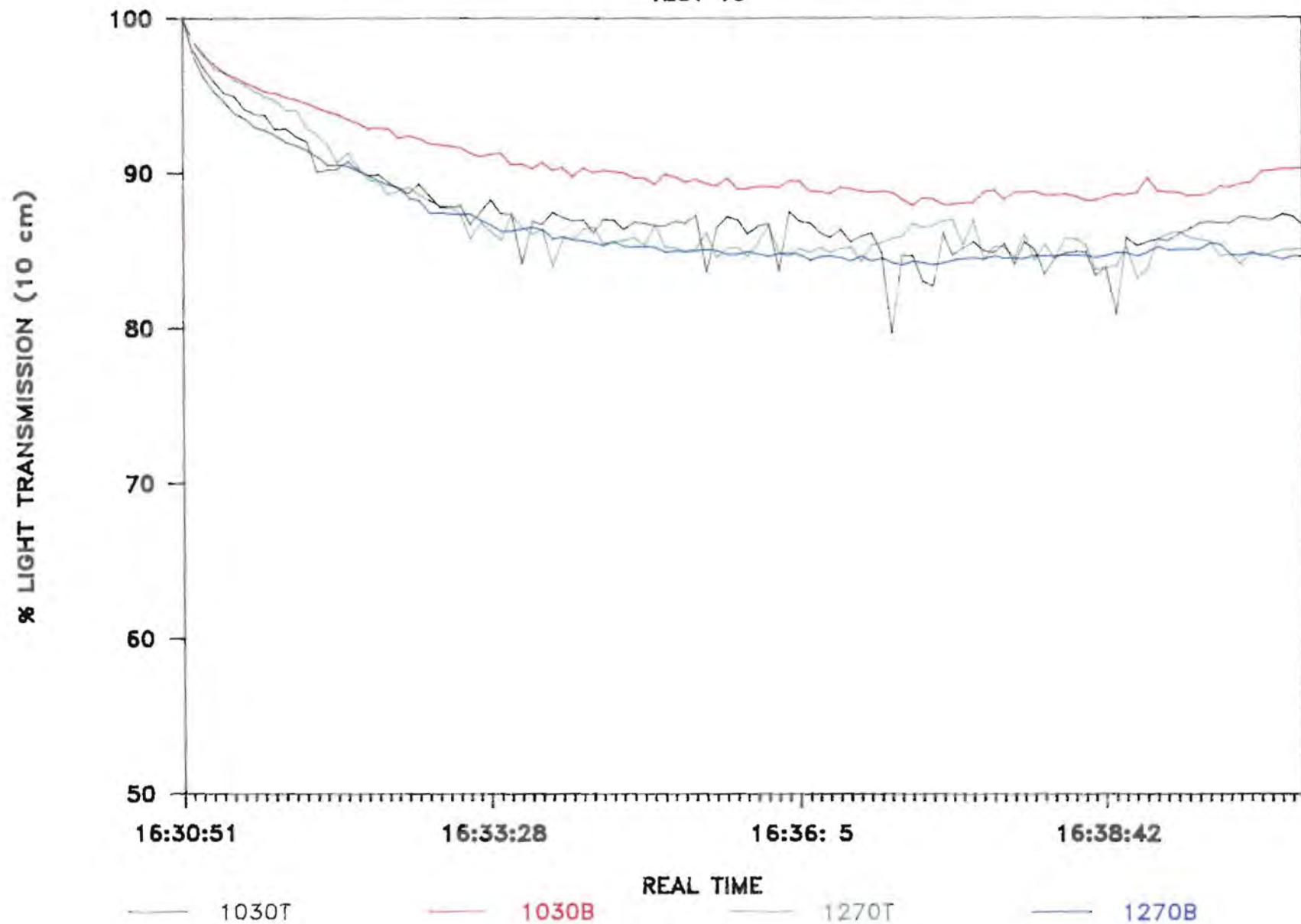
B757 SMOKE EVACUATION

TEST 19



B757 SMOKE EVACUATION

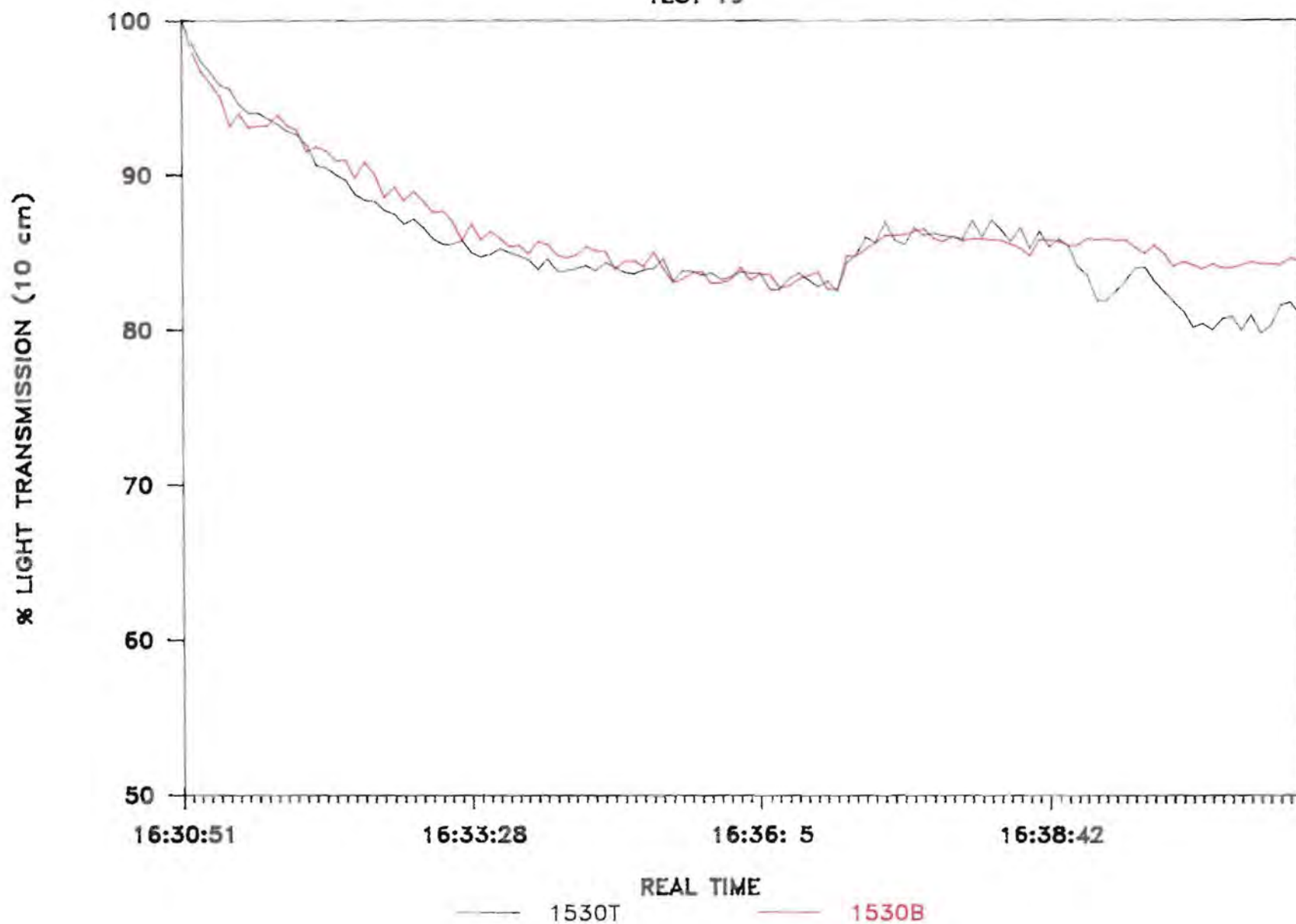
TEST 19



B757 SMOKE EVACUATION

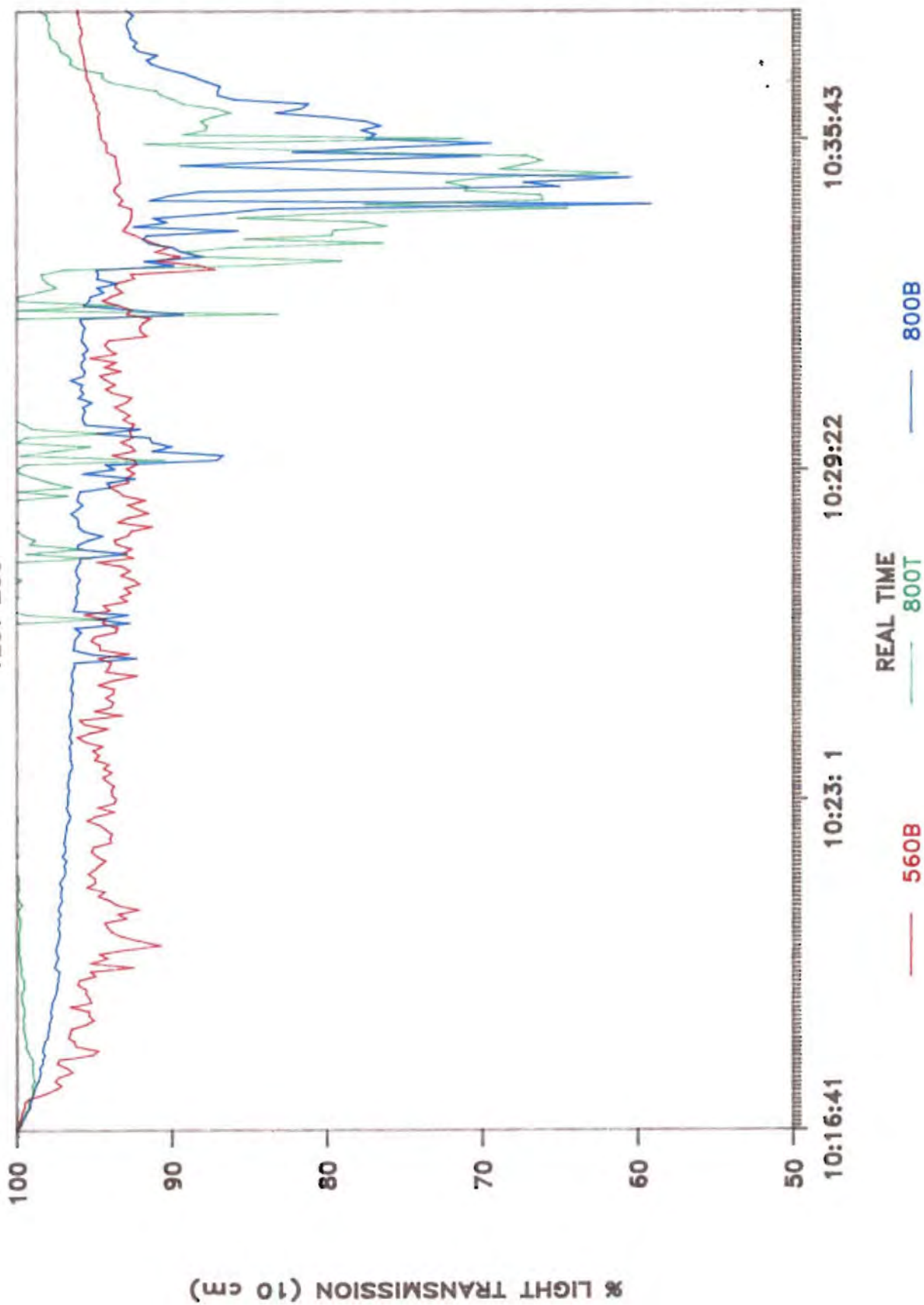
TEST 19

D-54



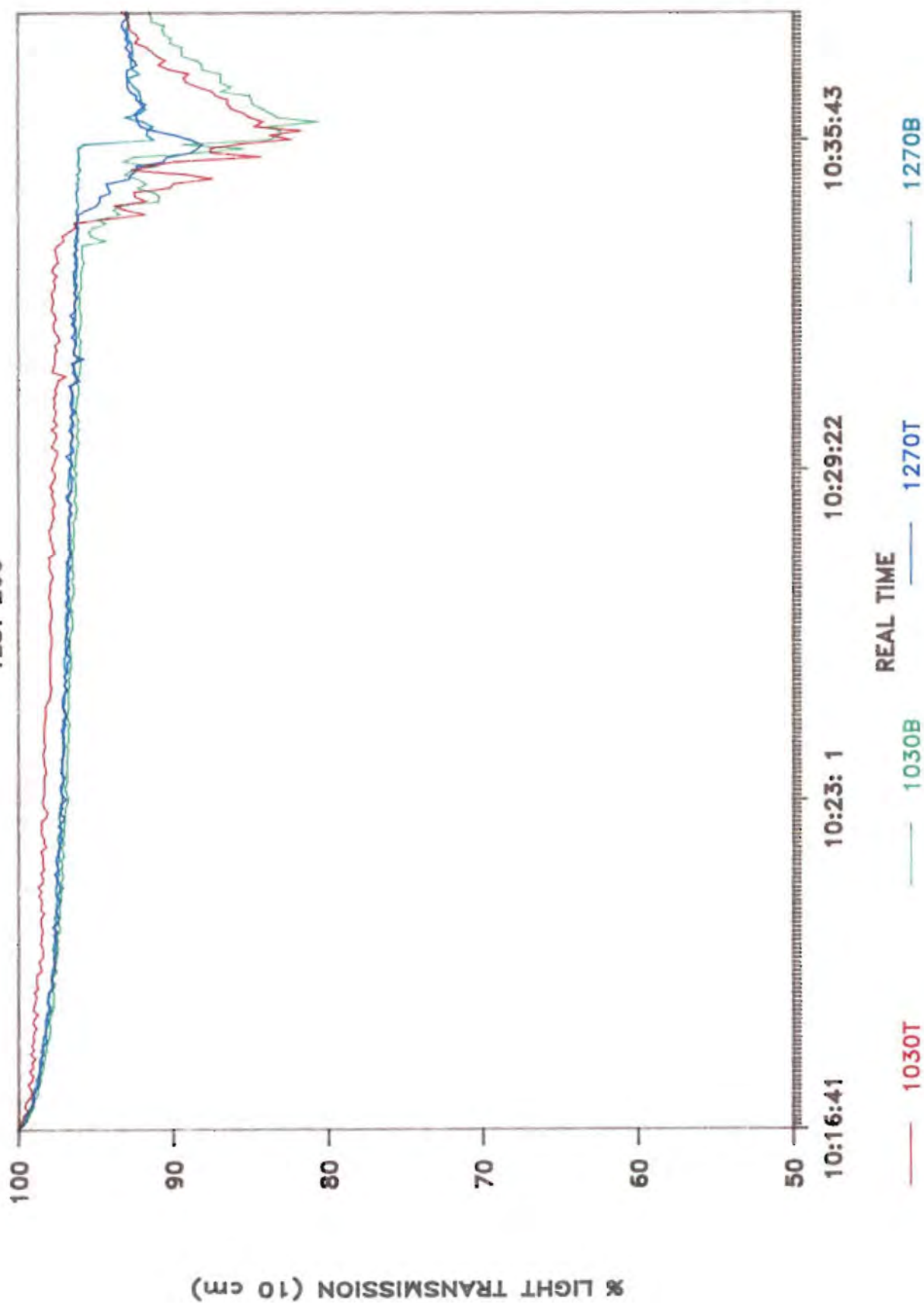
B757 SMOKE EVACUATION

TEST 206



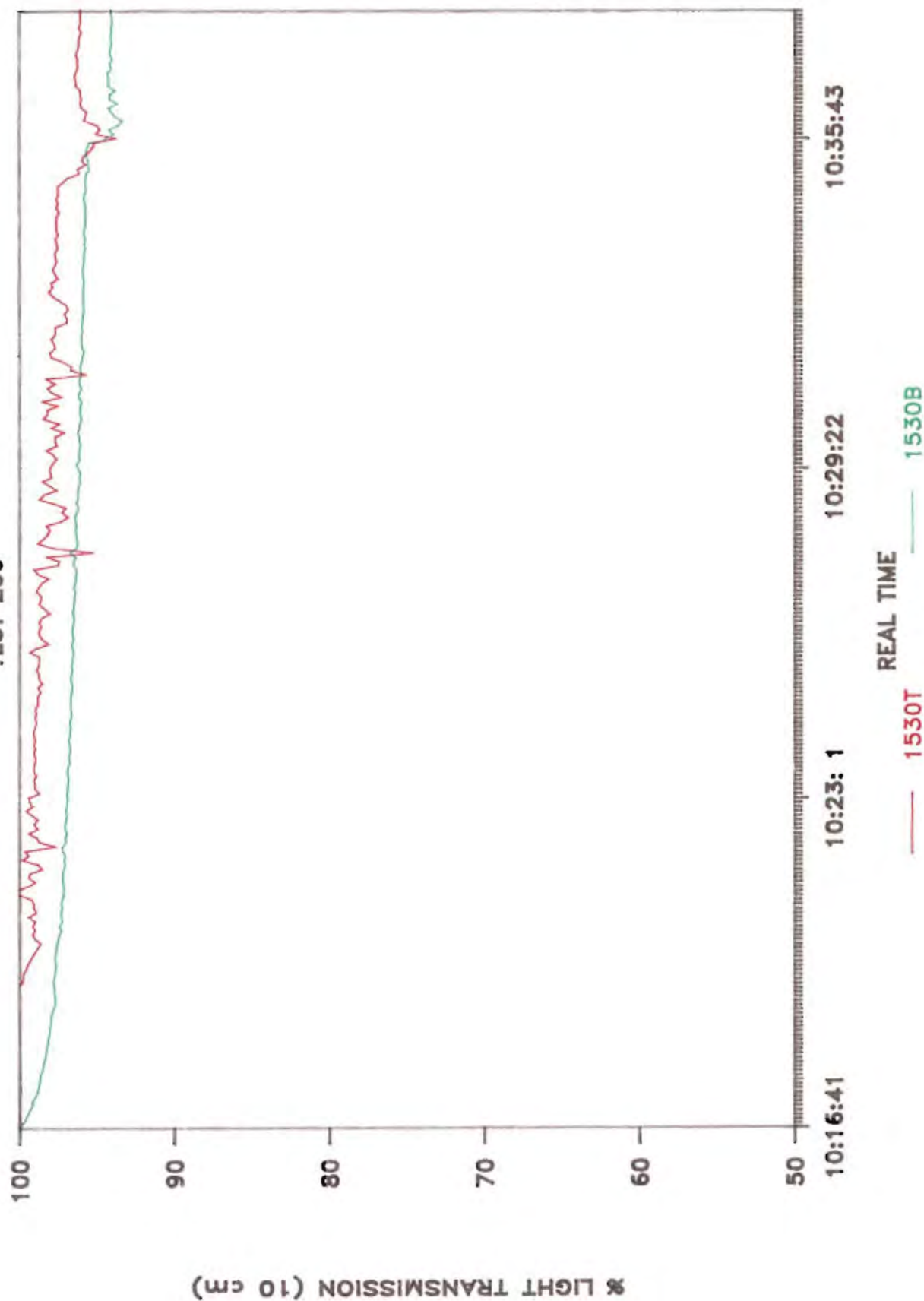
B757 SMOKE EVACUATION

TEST 206



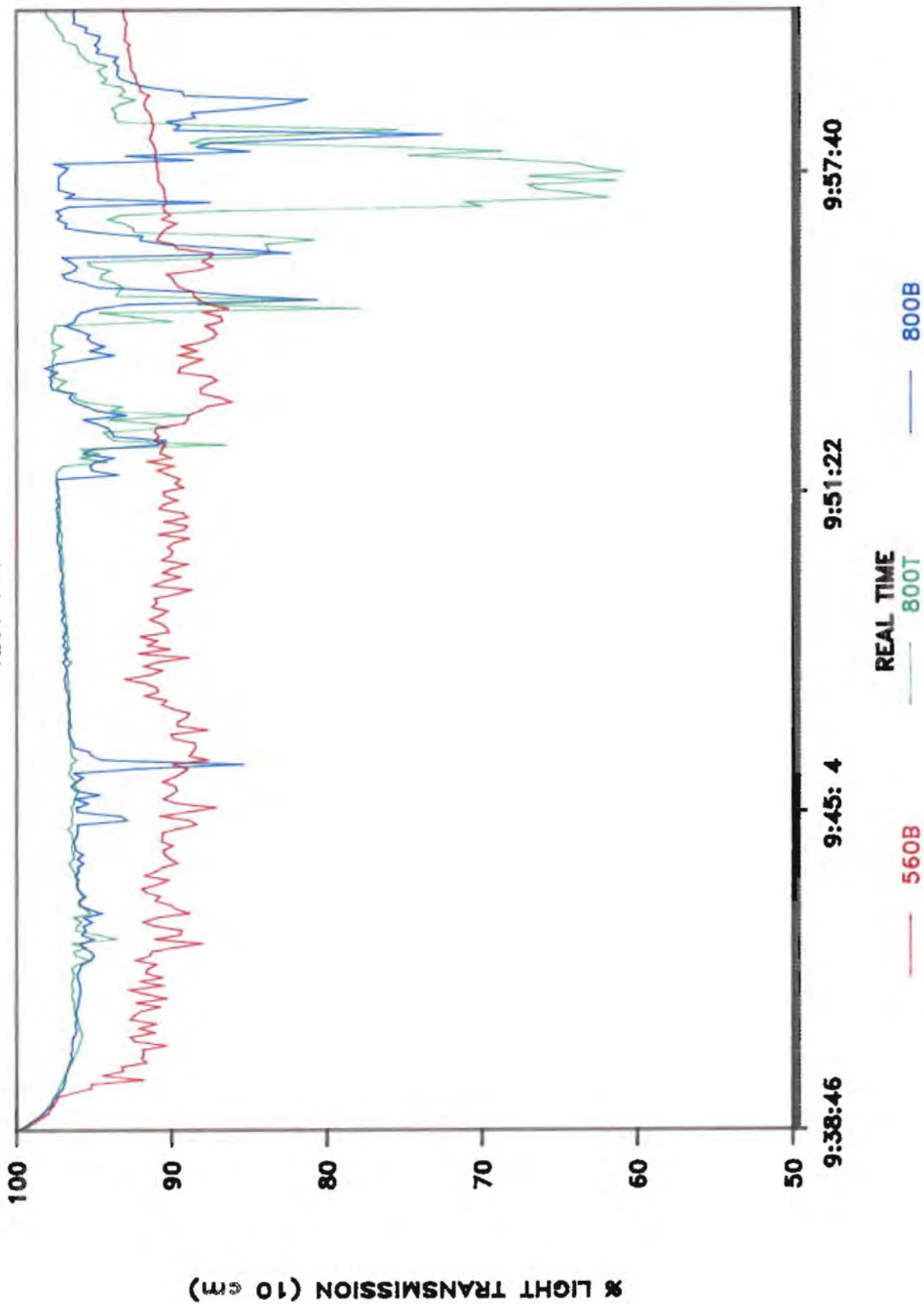
B757 SMOKE EVACUATION

TEST 206



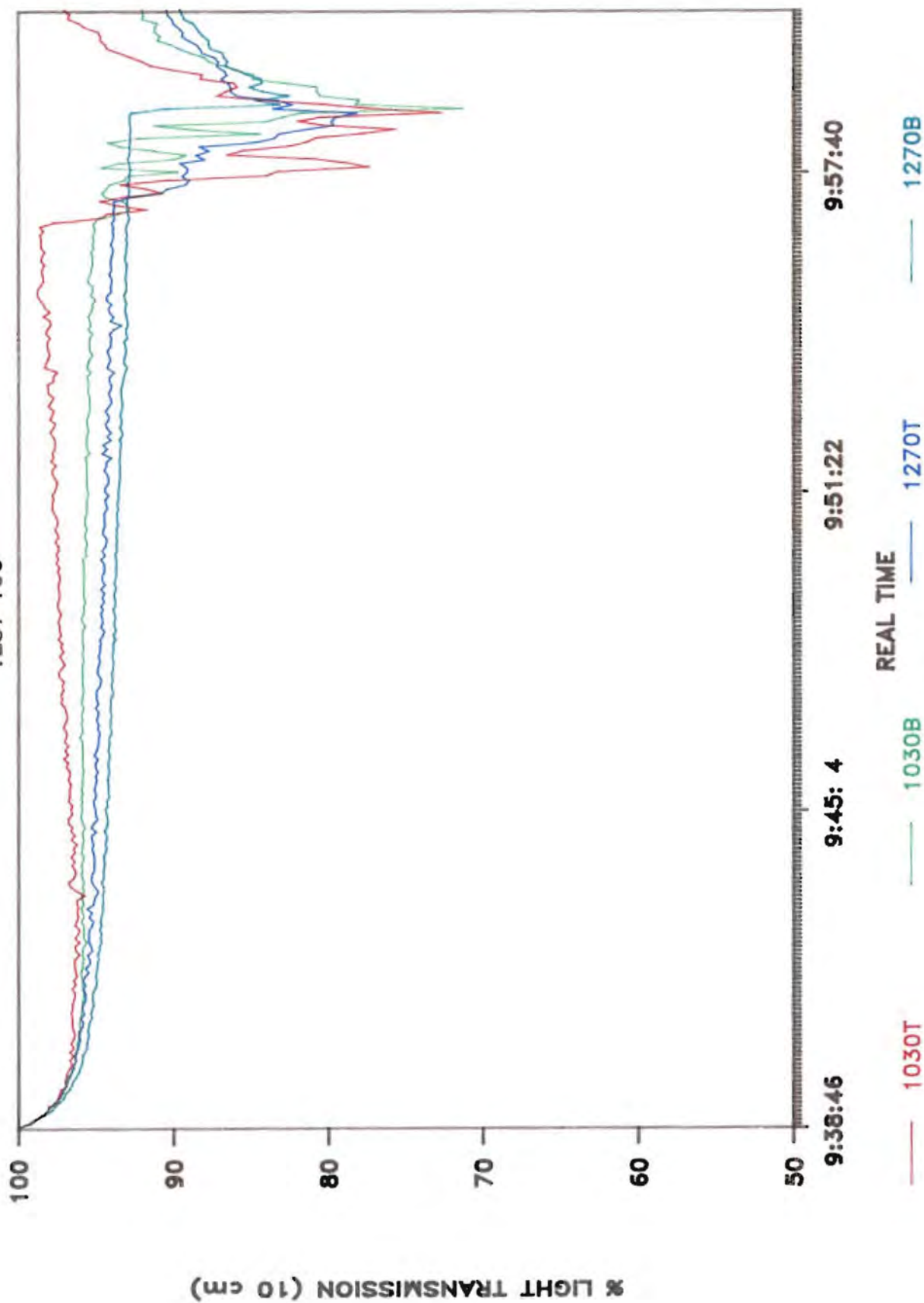
B757 SMOKE EVACUATION

TEST 106



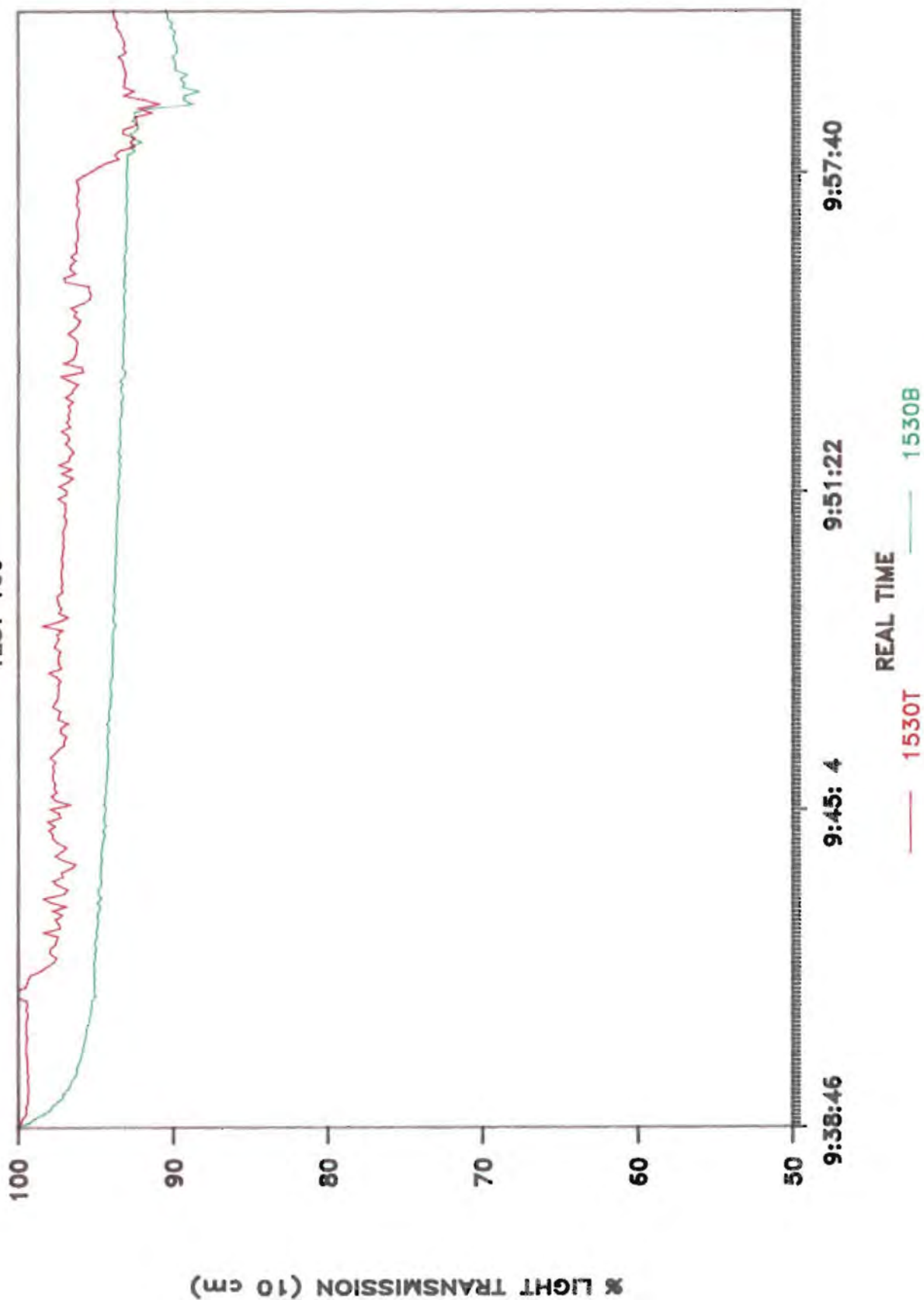
B757 SMOKE EVACUATION

TEST 106



B757 SMOKE EVACUATION

TEST 106



ACCEPTANCE TEST DATA SHEET

OS-396550-1

1185-873509

Unit S/N 2850

Test Date 10-13-88

GARRETT PART 396550 - 1

ATP-396550, Rev. NC

Instrumentation, Accept ✓

TESTED BY R. White

STATION NO. 414

AMBIENT TEMPERATURE 75 °F

AMBIENT PRESSURE 28.4 INHG ABS

Test
Procedure
Paragraph

- 4.2 Insulation Resistance: Accept ✓ (40 Mohm Min)
4.3 Dielectric Strength: Accept ✓ (2 mA Max)
4.3.4 Insulation Resistance: Accept ✓ (40 Mohm Min)
4.4 Bonding and Grounding:

	Lug 1		Lug 2		Pins	
	Current amp	Voltage (5.0 mV Max) mV	Current amp	Voltage (5.0 mV Max) mV	Current amp	Voltage (15 mV Max) mV
Solenoid B	<u>1.00</u>	<u>1.89</u>	<u>1.00</u>	<u>1.88</u>	<u>1.00</u>	<u>11.44</u>
Solenoid A	<u>1.00</u>	<u>4.44</u>	<u>1.00</u>	<u>4.40</u>	<u>1.00</u>	<u>14.50</u>
Torque Motor	<u>1.00</u>	<u>1.11</u>	<u>1.00</u>	<u>1.10</u>	<u>1.00</u>	<u>11.0</u>

4.7 Port Leakage: 1.60-5.25 lb/min, Actual 2.5 lb/min

4.8 Position Indicator Switch: Accept ✓

4.9 Proof Pressure: Accept ✓

4.11 Functional:

Cond.	Ambient Pressure inHg abs	Downstream Pressure psia	Inlet Pressure psia	TM Current: 0 mA Solenoid A: 0 Vdc Airflow		TM Current: 0 mA Solenoid A: 28 vdc Airflow		TM Current: 100 ±3 -0 mA Solenoid A: 28 vdc Airflow	
				Required	Actual	Required	Actual	Required	Actual
1	5.05 ±0.5	21.3 ±1.0	25.4 ±1.0	54.5 ±3.5	<u>52.5</u>	90.0 ±5.0	<u>85.5</u>	117.0 ±5.0	<u>114.5</u>
2	5.05 ±0.5	21.3 ±1.0	52.5 ±1.0	54.5 ±3.5	<u>54.5</u>	90.0 ±5.0	<u>85.0</u>	117.0 ±5.0	<u>112.1</u>
3	8.5 ±0.5	25.0 ±1.0	29.4 ±1.0	58.5 ±3.5	<u>57.4</u>	96.5 ±5.0	<u>93.3</u>	126.0 ±5.0	<u>123.2</u>
4	8.5 ±0.5	25.0 ±1.0	54.2 ±1.0	58.5 ±3.5	<u>58.6</u>	96.5 ±5.0	<u>92.0</u>	126.0 ±5.0	<u>121.3</u>
5	14.95 ±0.5	30.4 ±1.0	52.3 ±1.0	68.0 ±3.5	<u>68.3</u>	112.5 ±5.0	<u>108.8</u>	146.0 ±5.0	<u>143.3</u>
6	Lab Ambient	35.7 ±1.0	59.7 ±1.0	71.5 ±3.5	<u>69.6</u>	117.0 ±5.0	<u>112.2</u>	153.5 ±5.0	<u>148.6</u>

4.12 Manual Operation: (Condition 6)

4.12.1 Manual Control Solenoid B, Cycle Accept ✓
Continuity Pins 1 and 2 (Closed-position switch), Accept ✓

4.12.2 Manual Override, Cycle Accept ✓
Torque: 50 lb-in. Max, Actual 20 lb-in.
Continuity Pins 1 and 2 (Closed-position switch), Accept ✓

4.13 Closing Time: (Condition 6)

2.0 sec Max, Actual 1.0 sec (Solenoid A energized, Solenoid B momentarily energized with 18 ±1 Vdc);
0.9 sec (Solenoid A de-energized, Solenoid B momentarily energized with 18 ±1 Vdc)

4.14 Case Leakage: 0.32 lb/min Max, Actual 2.048 lb/min

UNIT ACCEPT/REJECT

153
87

OCT 13 '88

P/N- 396550-1

Flow Control

S/N 285

DATE 11-7-58

BAR 30.01

AMB PRESS HGA	DOWN STREAM PRESS PSIA	INLET PRESS PSIA	TEMP °F UP/STR.	PRESS PSIG. UP/STR.	A P " H ₂ O	FLOW ACT.	FLOW TOL	SOL. A.	TORQUE MOTOR AMPS	AMB TEMP 170±10
5.05 ±.5 24.9	21.3 ±1	25.4 ±1	353	11.0	7.0	51.7	51 TO 58	DE-ENG	0 Ø	167
5.05 ±.5 24.9	21.3 ±1	52.4 ±1	350	33.0	3.4	51.7	51 TO 58		Ø	172
8.5 ±.5 21.5	25. ±1	29.4 ±1	350	1.7	7.2	56.2	55 TO 62		Ø	166
8.5 ±.5 21.5	25 ±1	54.2 ±1	352	29.5	4.1	57.5	55 TO 62		Ø	179
14.95 ±.5 15.0	30.4 ±1	52.3 ±1	348	37.5	5.8	67.4	65.5 TO 72.5		Ø	178
AMB	35.7 ±1	59.7 ±1	351	45.5	5.6	71.0	6.8 TO 7.5		Ø	165

P/N. 396550-1

Flow Controller

S/N 285

DATE 11-7-88

BAR 30.01

AMB PRESS " HGA	DOWN STREAM PRESS PSIA	INLET PRESS PSIA	TEMP °F UP/STR.	PRESS PSIG. UP/STR.	A.P " H ₂ O	FLOW ACT.	Flow TOL	SOL. A. ENG	TORQUE MOTOR AMPS	AMB. TEMP 170°F
5.05 ± .5 24.9	21.3 ± 1	25.4 ± 1	353	11.3	20.0	88.2	85 TO 95	ENG 28VDC	0 Ø	167
5.05 ± .5 24.9	21.3 ± 1	52.5 ± 1	353	37.9	9.2	85.0	85 TO 95		Ø	172
8.5 ± .5 21.5	25.0 ± 1	29.4 ± 1	352	15.2	20.0	94.6	91.5 TO 101.5		Ø	165
8.5 ± .5 21.5	25.0 ± 1	54.2 ± 1	349	40.2	10.5	93.0	91.5 TO 101.5		Ø	180
14.95 ± .5 15.0	30.4 ± 1	52.3 ± 1	351	37.6	15.2	109.2	107.5 TO 117.5		Ø	178
AMB ₁	35.7 ± 1	59.7 ± 1	351	45.1	14.5	114.1	112 TO 122		Ø	185

P/N. 396550-1

Flow Control

S/N 285

DATE 11-7-88

BAR 30.01

AMB PRESS HGA	DOWN STREAM PRESS PSIA	INLET PRESS PSIA	TEMP °F UP/STR.	PRESS PSIG. UP/STR.	AP "H ₂ O	FLOW ACT.	FLOW TOL	SOL. A. ENG	TORQUE MOTOR AMPS	AMB TEMP °F
5.05 ±.5 24.9	21.3 ±1	25.4 ±1	350	12.8	36.0	122.0	112 TO 122	28 VDC	100 +3 -0 103.1	169
5.05 ±.5 24.9	21.3 ±1	52.5 ±1	345	38.0	17.7	118.8	112 TO 122		101.9	171
8.5 ±.5 21.5	25.0 ±1	29.4 ±1	351	16.1	36.7	131.0	121 TO 131		101.3	165
8.5 ±.5 21.5	25.0 ±1	54.2 ±1	350	40.8	19.6	127.9	121 TO 131		101.3	168
14.95 ±.5 15.0	30.4 ±1	52.3 ±1	354	35.3	27.2	147.0	141 TO 151		101.2	170
AMB	35.7 ±1	59.7 ±1	353	45.5	26.3	151.2	148.5 TO 158.5		101.1	175

ACCEPTANCE TEST DATA SHEET

DS-396550-1

1185-873509-001
873510

Unit S/N 2950
2850
Test Date 10-12-88

GARRETT PART 396550 - 1

ATP-396550, Rev. NC

Instrumentation, Accept ✓

TESTED BY Ed White

STATION NO. 414

AMBIENT TEMPERATURE 75 °F

AMBIENT PRESSURE 28.4 IN-HG ABS

Test
Procedure
Paragraph

- 4.2 Insulation Resistance: Accept ✓ (40 Mohm Min)
4.3 Dielectric Strength: Accept ✓ (2 mA Max)
4.3.4 Insulation Resistance: Accept ✓ (40 Mohm Min)
4.4 Bonding and Grounding:

	Lug 1		Lug 2		Pins	
	Current amp	Voltage (5.0 mV Max) mV	Current amp	Voltage (5.0 mV Max) mV	Current amp	Voltage (15 mV Max) mV
Solenoid B	<u>1.00</u>	<u>1.97</u>	<u>1.00</u>	<u>2.00</u>	<u>1.00</u>	<u>6.62</u>
Solenoid A	<u>1.00</u>	<u>4.40</u>	<u>1.00</u>	<u>4.36</u>	<u>1.00</u>	<u>12.50</u>
Torque Motor	<u>1.00</u>	<u>1.67</u>	<u>1.00</u>	<u>1.66</u>	<u>1.00</u>	<u>12.12</u>

- 4.7 Port Leakage: 1.60-5.25 lb/min, Actual 2.5 lb/min
4.8 Position Indicator Switch: Accept ✓
4.9 Proof Pressure: Accept ✓
4.11 Functional:

Cond.	Ambient Pressure inHg abs	Downstream Pressure psia	Inlet Pressure psia	TM Current: 0 mA		TM Current: 0 mA		TM Current: 100 ± 3 mA	
				Solenoid A: 0 Vdc Airflow		Solenoid A: 28 vdc Airflow		Solenoid A: 28 vdc Airflow	
				Required	Actual	Required	Actual	Required	Actual
1	5.05 ± 0.5	21.3 ± 1.0	25.4 ± 1.0	54.5 ± 3.5	<u>51.5</u>	90.0 ± 5.0	<u>85.4</u>	117.0 ± 5.0	<u>117.6</u>
2	5.05 ± 0.5	21.3 ± 1.0	52.5 ± 1.0	54.5 ± 3.5	<u>53.6</u>	90.0 ± 5.0	<u>85.7</u>	117.0 ± 5.0	<u>115.7</u>
3	8.5 ± 0.5	25.0 ± 1.0	29.4 ± 1.0	58.5 ± 3.5	<u>56.5</u>	96.5 ± 5.0	<u>93.8</u>	126.0 ± 5.0	<u>128.1</u>
4	8.5 ± 0.5	25.0 ± 1.0	54.2 ± 1.0	58.5 ± 3.5	<u>59.1</u>	96.5 ± 5.0	<u>93.9</u>	126.0 ± 5.0	<u>127.6</u>
5	14.95 ± 0.5	30.4 ± 1.0	52.3 ± 1.0	68.0 ± 3.5	<u>65.1</u>	112.5 ± 5.0	<u>107.6</u>	146.0 ± 5.0	<u>142.2</u>
6	Lab Ambient	35.7 ± 1.0	59.7 ± 1.0	71.5 ± 3.5	<u>68.5</u>	117.0 ± 5.0	<u>112.5</u>	153.5 ± 5.0	<u>149.2</u>

- 4.12 Manual Operation: (Condition 6)
4.12.1 Manual Control Solenoid B, Cycle Accept ✓
Continuity Pins 1 and 2 (Closed-position switch), Accept ✓
4.12.2 Manual Override, Cycle Accept ✓
Torque: 50 lb-in. Max, Actual 15 lb-in.
Continuity Pins 1 and 2 (Closed-position switch), Accept ✓
4.13 Closing Time: (Condition 6)
2.0 sec Max, Actual 1.2 sec (Solenoid A energized, Solenoid B
momentarily energized with 18 ± 1 Vdc);
1.0 sec (Solenoid A de-energized, Solenoid B
momentarily energized with 18 ± 1 Vdc)
4.14 Case Leakage: 0.32 lb/min Max, Actual 0.052 lb/min

UNIT ACCEPT/REJECT

??? OCT 15 '88

P/N- 396550-1

Flow Control

S/N 295

DATE 11-7-88

BAR 30.00

AMB PRESS HGA	DOWN STREAM PRESS PSIA	INLET PRESS PSIA	TEMP °F UP/STR.	PRESS PSIG. UP/STR.	AP "H ₂ O	FLOW ACT.	FLOW TOL.	SOL. A.	TORQUE MOTOR AMPS	AMB TEMP 170±10
5.05 ±.5 24.9	21.3 ±1.	25.4 ±1	353	10.3	7.3	52.1	51 TOL 58	DE-ENG	0 Ø	
5.05 ±.5 24.9	21.3 ±1	52.4 ±1	347	37.8	4.0	56.1	51 TOL 58		Ø	
8.5 ±.5 21.5	25. ±1	29.4 ±1	317	14.7	7.3	56.6	55 TOL 62		Ø	171
18.5 ±.5 21.5	25 ±1	54.2 ±1	350	29.8	14.6	61.2	55 TOL 62		Ø	169
14.95 ±.5 15.0	30.4 ±1	52.3 ±1	350	37.2	5.7	66.5	65.5 TOL 72.5		Ø	180
AMB	35.7 ±1	59.7 ±1	351	45.2	5.9	72.7	6.8 TOL 75		Ø	172

P/N. 396550-1

FLOW CONTROLLER

S/N 295

DATE 11-7-78

BAR 30.00

AMB PRESS " HGA	DOWN STREAM PRESS PSIA	INLET PRESS PSIA	TEMP °F UP/STR.	PRESS PSIG. UP/STR.	A P " H ₂ O	FLOW ACT.	FLOW TOL	SOL. A. ENG	TORQUE MOTOR AMPS	AMB TEMP 170±10
5.05 ±.5 249	21.3 ±1	25.4 ±1	350	11.4	19.5	87.4	8.5 TO 9.5	ENG 28VDC	0 Ø	171
5.05 ±.5 249	21.3 ±1	52.5 ±1	349	37.2	9.6	87.0	8.5 TO 9.5		Ø	174
8.5 ±.5 21.5	25.0 ±1	29.4 ±1	351	15.1	20.2	95.0	91.5 TO 101.5		Ø	171
8.5 ±.5 21.5	25.0 ±1	54.2 ±1	347	40.0	11.1	95.5	91.5 TO 101.5		Ø	169
14.95 ±.5 15.0	30.4 ±1	52.3 ±1	347	37.5	14.7	107.6	107.5 TO 117.5		Ø	1801
AMB ₁	35.7 ±1	59.7 ±1	353	44.8	14.9	115.2	112 TO 122		Ø	175

PLN- 396550-1

Flow Control

SN 295

DATE 11-7-88

BAR 30.00

AMB PRESS HGA	DOWN STREAM PRESS PSIA	INLET PRESS PSIA	TEMP °F UP/STR.	PRESS PSIG. UP/STR.	AP "H ₂ O	FLOW ACT.	FLOW TOL	SOL. A. ENG	TORQUE MOTOR AMPS	AMB TEMP °F
5.05 ±.5 24.9	21.3 ±1	25.4 ±1	341°	12.4	38.5	125.5	112 TO 122	28 VDC.	100 +3 -0 102.1	101.2
5.05 ±.5 24.9	21.3 ±1	52.5 ±1	345	38.6	18.5	122.1	112 TO 122		101.7	173
8.5 ±.5 21.5	25.0 ±1	29.4 ±1	355	16.2	39.7	135.5	121 TO 131		100.7	171
8.5 ±.5 21.5	25.0 ±1	54.2 ±1	350	40.6	21.1	132.5	121 TO 131		101.0	170
14.95 ±.5 15.0	30.4 ±1	52.3 ±1	351	38.7	27.9	148.1	141 TO 151		101.1	180
AMB	35.7 ±1	59.7 ±1	354	45.1	27.3	156.9	148.5 TO 158.5		102.8	180

