CONTENTS

VOLUME I

Preface xxi

Acknowledgements xxix

Glossary of Terms and Acronyms xxxv

PART ONE INTRODUCTION

1 Introduction 3

PART TWO FACTS SURROUNDING THE CRASH OF FLIGHT 1363

- 2 Air Ontario Flights 1362 and 1363 15
- 3 Dryden Municipal Airport and Air Ontario Facilities, March 10, 1989 22
- 4 Meteorological Information 28
- 5 Events and Circumstances at the Dryden Municipal Airport Preceding Takeoff 49
- 6 Circumstances Related to the Takeoff and Crash of Flight 1363 79
- 7 The Crash and the Response 93
- 8 Dryden Area Response 101

PART THREE CRASH, FIRE-FIGHTING, AND RESCUE SERVICES

9 Dryden Municipal Airport Crash, Fire-fighting, and Rescue Services 135

PART FOUR AIRCRAFT INVESTIGATION PROCESS AND ANALYSIS

- 10 Technical Investigation 219
- 11 Aircraft Crash Survivability 275
- 12 Fokker F-28, Mk1000, Aircraft Performance and Flight Dynamics 301

VOLUME II

PART FIVE THE AIR CARRIER - AIR ONTARIO INC.

13 Corporate History 389

Austin Airways Limited 389

Air Ontario Limited 394

Austin Airways and Air Ontario Limited: Pre-Merger 395

The Merger into Air Ontario Inc. 398

Change in Ownership: January 1987 398

Merging Austin Airways and Air Ontario Limited 399

Air Ontario Inc. 402

14 Management Organization 408

Management Structure 408

Operational Management: Flight Operations and Maintenance 414

Regulatory Requirements 414

Air Ontario Flight Operations Management 416

Flight Operations: Summary of Structural Changes 416

Personnel Changes 417

Director of Flight Operations Captain Robert Nyman 417

Vice-President of Flight Operations Peter Hill 420

Vice-President of Flight Operations James Morrison 421

Director of Flight Operations Clifford Sykes 422

Vice-President of Operations Bruce Deluce 423

Changes in the Flight Operations Department 424

Maintenance and Engineering Management 426

Management Selection 428

The Selection Process 428

The Appointment of Bruce Deluce as Vice-President of Operations 431

15 The F-28 Program: Planning 436

Introduction 436

Planning the F-28 Program 439

Fleet Rationalization 439

Selecting the F-28 440

Marketing Considerations 443

Approval of the Plan 445

The F-28 Project Plan 447

F-28 Project Team 449

The Role of Transport Canada: Amending Air Ontario's Operating Certificate 451

Air Canada and the F-28 Program Planning 454

The Post-Accident F-28 Pilot Survey 457

16 The F-28 Program: The Auxiliary Power Unit, the Minimum Equipment List, and the Dilemma Facing the Crew of Flight 1363 459

The APU 459

Description 459

Engine Starts 460

Auxiliary Electrical Power: Anti-Skid System 460

Fire Protection: Fire Detection versus Fire Extinguishing 463

Fire-Protection System Test 463

Significance of an Unserviceable APU for Flight 1363 464

Events Leading up to the Unserviceability of the APU 465

March 5 to 9, 1989 465

The Events of March 9, 1989 471

Events Following the Departure of C-FONF from Toronto 474

The Role of SOC 476

Events of March 10, 1989 478

Events at Thunder Bay 480

The MEL: Use and Approval 481

The Role of Maintenance in the Commercial Air Transportation System 481

Unscheduled Maintenance: Defect Rectification and Maintenance Deferral 483

Description 484

Using the Air Ontario F-28 MEL 486

Deferring the Repair of the APU 488

Findings 493

MEL Approval 493

The Role of the Regulator in Approving the MEL 494

Transport Canada's MEL Approval Policy: Recent Developments 499

Air Ontario's Role in the Preparation and Approval of the MEL 500

Findings 503

An Alternative Approach: Air Canada Procedures 504

Air Canada Practice: Operating with an Unserviceable APU 504 Air Canada Practice: Operating without an Approved MEL 504

MEL Approval and Use: Governing Legislation 506

Operating without an Approved MEL 510

Findings 522

Recommendations 527

17 The F-28 Program: Lack of Ground-Start Facilities at Dryden 529

Findings 533

Recommendations 533

18 The F-28 Program: Spare Parts 534

Governing Legislation 534

Serviceability Difficulties 535

Plan to Provide Spares 536

THY Spares Package 537

Parts Situation as F-28 Entered Revenue Service 541

Ongoing Spares Provisioning 544

Spare Parts: How Much Is Enough? 549

Findings 551

Recommendations 552

19 The F-28 Program: Flight Operations Manuals 553

Terminology 553

Manuals in Use on C-FONF on March 10, 1989 554

Flight Operations Manual 555

Aircraft Flight Manual 564

Aircraft Operating Manual 564

Flight Attendant Manual 577

Legislative Requirements 580

Findings 583

Recommendations 586

20 The F-28 Program: Flight Operations Training 588

Terminology and Regulatory Requirements 588

Flight Crew Training 591

F-28 Ground School Training 591

Aircraft Contamination 592

Cold-Soaking Phenomenon 597

Runway Contamination 600

F-28 Aircraft Flight Training 605

Captain George Morwood 605

First Officer Keith Mills 606

Aircraft Flight Simulators 606

F-28 Line Indoctrination Training 609

Company Check Pilot 609

Air Ontario's Need for Company Check Pilots 610

The Role of Captain Castonguay 613

Deficiencies Identified by Captain Castonguay 615

Captain Castonguay's Recommendations 617

Cockpit and Crew Resource Management Training 618

Cabin Attendant Training 622

Initial Training: Flight Attendant Hartwick 623

Recurrent Training: Flight Attendant Hartwick 624

Practical Training: Flight Attendant Hartwick 624

Flight Attendant Licensing: CUPE Proposal 627

Ground-Handling Personnel Training 627

Regulatory Requirements and Guidelines 627

Dryden Flight Centre Training 628

Aircraft Fuelling: Training 633

Findings 633

Recommendations 638

21 The F-28 Program: Operational Practices – Hot Refuelling and Aircraft Ground De-icing 640

Hot Refuelling 640

Air Ontario Policy 641

Air Canada Policy 647

Findings 648

Aircraft Ground De-icing 650

The Clean Aircraft Concept: Interim Recommendation No. 2 650

Air Ontario's Policy on Flights in Icing Conditions 651

Winter Operations Advisories 654

Air Ontario Memorandum on F-28 De-ice/Anti-ice Instructions 655

De-Icing of Aircraft Nearer to Runway End: Interim Recommenda-

tions – Second Interim Report 659

National Resource Specialist – Aircraft Ground De-Icing/Anti-Icing 660

Findings 660

Recommendations 663 Hot Refuelling 663 Aircraft Ground De-icing 663

22 The F-28 Program: Flight Attendant Shoulder Harness 665

The Forward Flight Attendant Station of C-FONF 667

Governing Legislation 670

Design and Manufacturing Criteria 670

United States Operational Standards 672

Application of Standards to New Aircraft 672

Application of New Standards to Existing Aircraft 672

New Seat, Safety Belt, and Shoulder Harness Requirements (1980) 673

The Canadian Approach to the Shoulder Harness Issue 673

Amending the Aircraft Seats, Safety Belts, and Safety Harnesses Order 675

The Role of ATAC 675

The Role of Air Ontario 678

Findings 683

Recommendations 686

23 Operational Control 687

The Purpose of Operational Control 687

Operational Control and Operations Control 688

Operational Control: Governing Legislation 689

Approved Flight Watch System 690

Operational Flight Plan 690

Qualifications for Persons Exercising Operational Control 691

The Operating Certificate 692

Pilot Self-Dispatch System versus Full Co-authority Dispatch System 694 Air Ontario's Hybrid Dispatch System 695

Co-authority Dispatch System: Classification Proposal 696

Dispatcher Training 697

Dispatcher Training at Air Ontario 697

Air Canada's Dispatcher Training 701

Operational Flight Plan: Flight Release 703

Ability of Air Canada To Provide Flight Dispatch Expertise to Air Ontario 710

The Flight Release Requirement 710

Reliance of Air Ontario Pilots on Flight Releases 711

The Flight Release for Flight 1362/1363, March 10, 1989 713

Deteriorating Dryden Weather and Air Ontario SOC 717

Overfly Options 721

Captain Morwood and the Flight Release 722

The Thunder Bay Station Stop: Passengers versus Fuel 724

The Performance of Air Ontario SOC: Conclusions 728

Licensing and Training of Dispatchers 732

Report of the Dubin Commission of Inquiry on Aviation Safety 733

CALDA's Application for Licensing of Dispatchers 733

ICAO and Licensing of Dispatchers 735

Canadian Position 735

Licensing and Labour Relations 736

CALPA Position 737

United States Licensed Dispatchers and FAR Provisions 737

Findings 738

Recommendations 741

24 Flight Safety 744

Introduction 744

Legislative Requirements 747

Air Ontario's Flight Safety Organization 749

Background 749

The Development of Air Ontario's Flight Safety Organization 753 Three Case Studies in the Effectiveness of Air Ontario's Flight Safety

Organization 758

Incident No. 1: November 20, 1986 – HS-748 – Kingston, Ontario 758

Incident No. 2: December 15, 1987 – HS-748 – Toronto, Ontario 760

Incident No. 3: April 4, 1989 – F-28 – Toronto, Ontario 768

Captain Ronald Stewart's Post-Accident Survey of F-28 Pilots 771 Air Canada's Flight Safety Organization, and Its Involvement with Air Ontario 777

Background 777

Categorization of Aviation Occurrences at Air Canada 778

Air Canada Internal Incident-Reporting Procedures 780

Flight Safety: Relationship between Air Carrier and Regulator 781

Air Canada's Assistance to Air Ontario 782

Air Canada's Operational Review of Air Ontario (Autumn 1989) 784

General Conclusions 785

Findings 786 Recommendations 788

25 Management Performance 790

Certification 792

Approval of the Air Ontario F-28 Program 794

The Planning and Implementation of the F-28 Program 796

The Performance of Captain Joseph Deluce, F-28 Project Manager and Chief Pilot 800

The Role of Senior Flight Operations Managers 802

Air Ontario Management Selection: "Best Man for the Job" 805 Regulatory Requirements 809

Findings 813

Transport Canada's Review of the Air Ontario F-28 Program 813 Air Ontario Management Supervision of the F-28 Program 814 Recommendations 816

26 The Role of Air Canada: Parent/Subsidiary Implications 818

The Coming of Deregulation 820

The Regulated versus the Deregulated Aviation Industry 821

The Impact of Deregulation 824

Control of the Feed 826

Minority versus Majority Equity Interest 830

Implications of Common Employment 831

The Commercial Relationship 835

Common Livery 836

Interiors 836

Use of Air Canada's AC Designator 836

Standards of Service 837

Timetables 837

Computer Services 837

Telephone Answering 838

Ticketing 838

Ground-Handling 838

Aircraft Services 838

Advertising 839

Aeroplan 839

The Operational Relationship 841

Auxiliary Power Unit 842

The Introduction of Jet Service 843

Minimum Equipment List 843

Manuals 844

Aircraft Defects (Snags) 845

Refuelling 845

De-icing 846

Operational Control and Flight Planning: Air Canada versus Air

Ontario 847

Dispatcher Training 849

Flight Safety Overview 850

Operational Review 850

Flight Safety Organization 852

Parent-Feeder Operational Standards 852

Conclusions 853

VOLUME III

PART SIX TRANSPORT CANADA

- 27 Organization 857
- 28 Conditions at Transport Canada in the Early 1980s 867
- 29 Economic Deregulation and Deficit Reduction 870
- 30 The Effects of Deregulation and Downsizing on Aviation Safety 881
- 31 Aviation Regulation: Resourcing Process 916
- 32 Audit Program 944
- 33 Audit of Air Ontario Inc., 1988 953
- 34 Operating Rules and Legislation 1000
- 35 Company Check Pilot 1015
- 36 Contracting Out, Waivers, and Spot Checks 1023
- 37 Safety Management and the Transport Canada Organization 1030

PART SEVEN HUMAN FACTORS

- 38 Crew Information 1055
- 39 Crew Coordination and the Communication of Safety Concerns by Passengers 1071
- 40 Human Performance: A System Analysis 1096

PART EIGHT LEGAL AND OTHER ISSUES BEFORE THE COMMISSION

41 The Aviation Accident Investigation Process in Canada 1143

- 42 Aviation Incident and Occurrence Reporting and the Issue of Pilot Confidentiality 1165
- 43 Objection to Production of Documents, Based on a Confidence of the Queen's Privy Council, Section 39, Canada Evidence Act, R.S.C. 1985, c.C-5 1187
- 44 Inquiries Act, R.S.C. 1985, c.I-11, Section 13 1192

PART NINE CONSOLIDATED RECOMMENDATIONS

Interim Report, 1989 1203 Second Interim Report, 1990 1204 Final Report 1208

GENERAL APPENDICES

- A Order in Council 1247
- B Counsel and Representatives for Parties with Standing 1250
- C Parties Granted Full, Limited, and Special Participant Status and Observer Status 1253
- D Witnesses Appearing before the Inquiry 1254
- E Inquiry Schedule 1275
- F Letter from the Chief Coroner for Ontario, July 15, 1991 1277
- G Time Sequence of Events Surrounding the Crash 1280
- H Summary of Fatalities and Survivor Injuries 1294
- I Minutes of Debriefing Meetings, Town of Dryden, March 13 and 16,1989 1301
- J U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 120-51, Cockpit Resource Management Training, Dated December 1, 1989 1319
- K Transport Canada Response to the Interim Recommendations of the Second Interim Report, Dryden Commission of Inquiry 1327
- L Letter of Notice Sent by Commission Counsel to Affected Parties, re: Inquiries Act, R.S.C. 1985, c.I-11, Section 13 1334
- M Rulings 1337