

Reliability Data Collection and Exchange

SPEC2000 Chapter 11

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The Bombardier logo is a dark blue rectangle with the word "BOMBARDIER" in white, bold, uppercase letters. It is positioned in the bottom right corner of the slide, overlaid on a faint, light blue globe background that shows the Americas and parts of Europe and Africa.

BOMBARDIER

Outline



- **Current RIG Activity**
- **SPEC2000 Chapter 11 – what it is**
- **Overview & evolution of SPEC2000 Chapter 11**
- **Reliability Data Records**
- **Protocol for Transmittal**
- **Chapter 13-2 Reliability Metrics**
- **Chapter 15 Delivery Configuration Data**
- **Joint IATA and ATA SPEC2000 Chapter 11 Efforts**
- **Roadmap to the Future**

Current Reliability Interest Group (RIG) Activity

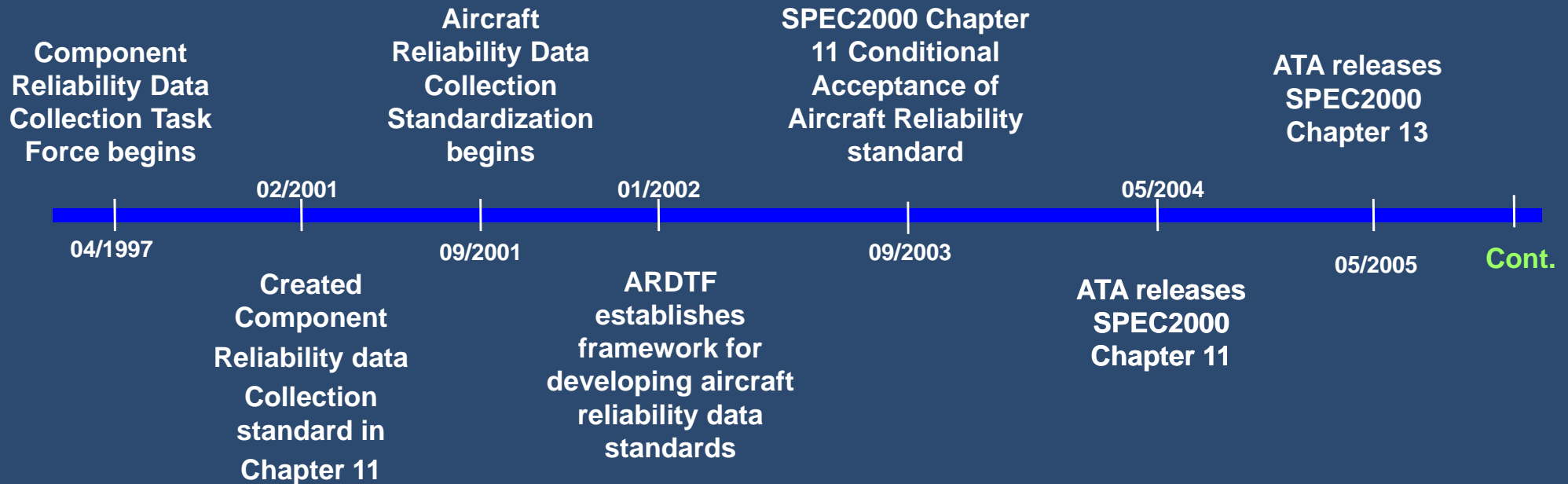
- ❖ **Electronic Logbook Project Team (SPEC2000 Chapter 17)**
 - ◆ Team has been developing data model for exchanging information from e-logbook to ground maintenance systems.
- ❖ **Reliability Data Exchange (SPEC2000 Chapter 11)**
 - ◆ Recently published and refined. Now looking for implementation by airlines to drive benefits
- ❖ **Electronic Teardown Project Team (SPEC2000 Chapter 16)**
 - ◆ Harmonizing old teardown with Shop Findings to create new format for use with electronic airworthiness documents
- ❖ **Delivery Configuration Data (SPEC2000 Chapter 15)**
 - ◆ Developed a DRAFT record reviewed at the Oct 7 – 9, RIG Meeting in Washington DC
- ❖ **Performance Metric Standards (SPEC2000 Chapter 13)**
 - ◆ Reviewed proposed expansion of Section 13-2 (Reliability Metrics) at the Oct 7 – 9, RIG Meeting in Washington DC



SPEC2000 Chapter 11 Overview & Evolution

Operators needed to collect, organize and exchange reliability data between many different organizations : Manufacturers, suppliers, regulatory authorities, each other. An industry standard allowed all parties to do this efficiently and cost effectively.

SPEC2000 Chapter 11/13, Overview & Evolution



Reliability Interest Group has the largest active participation within the SPEC2000 family.

SPEC2000 Chapter 11/13, Overview & Evolution



- ❖ The dedication of resources by many key industry members to the development of this standard has been outstanding, especially given the poor economic climate of our industry.
- ❖ The level of co-operation and open sharing amongst the task force members has been extremely high. There is a strong recognition of the value of the standard creation and this has inspired true commitment from all members.
- ❖ This was the result of a truly global team effort.

SPEC2000 Chapter 11/13, Overview & Evolution



- ❖ **SPEC2000 Chapter 11 – “Aircraft Reliability Data Collection and Exchange”, has been part of ATA Spec2000 since May 2004**
- ❖ **It was endorsed by IATA for use by it’s members in January 2005**
- ❖ **Called out in ISO STEP 10303 / AP 239 PLCS**

SPEC2000 Chapter 11 - What it is



- ❖ **It defines what events constitute the reliability & maintainability landscape of aircraft in the transport business**
- ❖ **It identifies which elements within each event are important to capture**
- ❖ **It defines what each element identified means**
- ❖ **It is a common language that allows aviation industry partners to exchange detailed reliability data easily and cost effectively.**
- ❖ **It defines a protocol for exchanging data – XML**

If your organization subscribes to SPEC2000 for standards such as material procurement, you already have access to the reliability data records in Chapter 11.



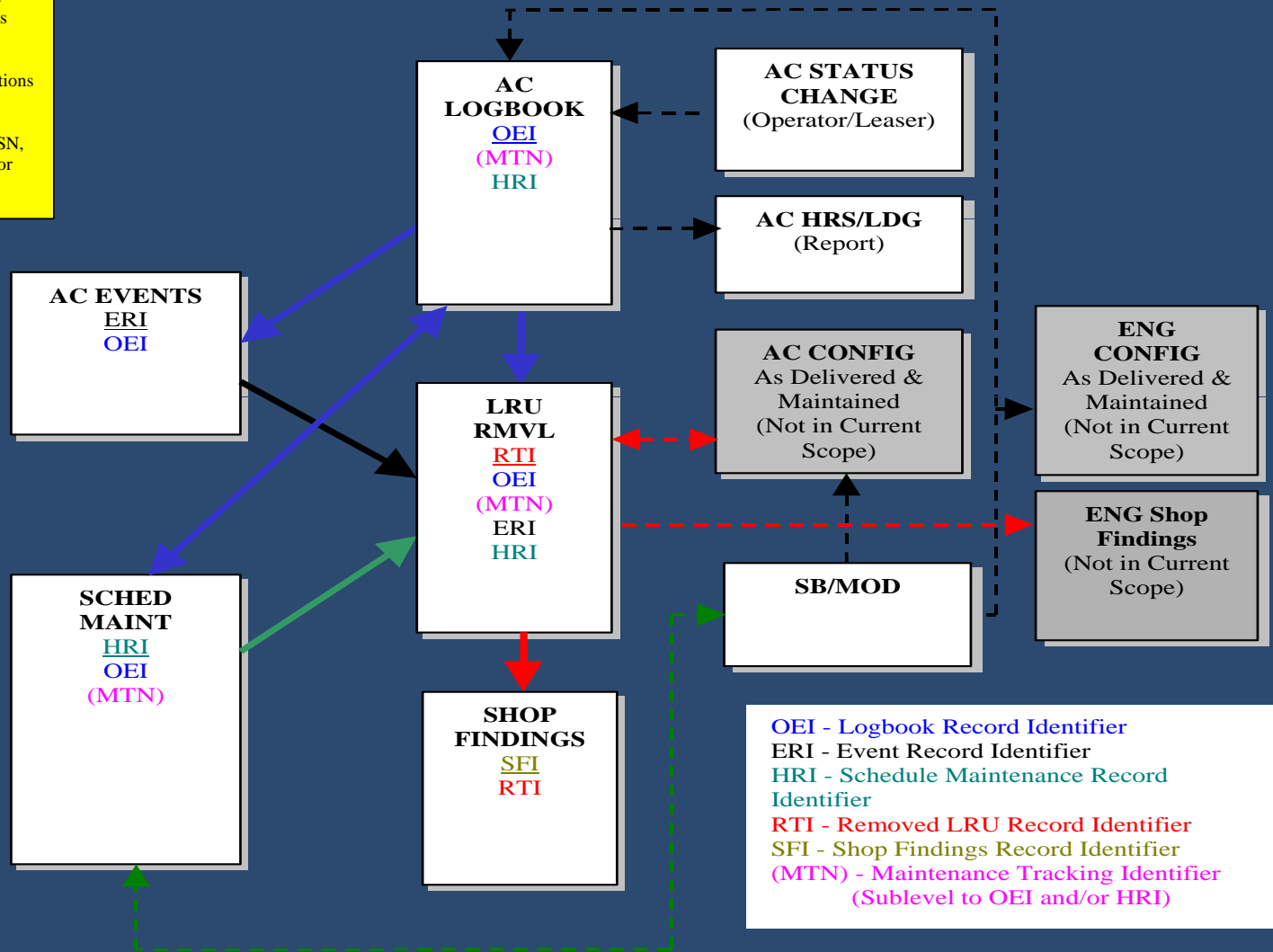
SPEC2000 Chapter 11 Reliability Data Records

SPEC2000 Chapter 11 records types

Solid lines indicate matching fields tying associated records in current records. Underlined TEI represents key field for record.

Broken lines indicate data associations not directly linked.

Combination of CAGE code, PN,SN, Date and MSN is always unique for tracking components.



SPEC2000 Chapter 11 Record Tables



Chapter 11 has 9 records :

❖ LRU Removal record

- ◆ Purpose : Collect details of the components removed from an aircraft as well as reasons for removal and details of component being installed.

❖ Shop Findings record

- ◆ Purpose: Collect detailed component tear down reports from an airline's shop or other repair facilities.

❖ Aircraft Hours and Landings record

- ◆ Purpose: Collect detailed hours, cycles and utilization data from operators. This data can also be used as the basis for MTBUR calculations, etc.

❖ Aircraft Event record

- ◆ Purpose : To capture aircraft event data such as delays, cancellations, incidents, etc.

SPEC2000 Chapter 11 Record Tables



- ❖ **Aircraft Logbook record**
 - ◆ **Purpose : Collect technical/journey log entries such as pilot reports, maintenance corrective action, etc.**
- ❖ **Scheduled Maintenance record**
 - ◆ **Purpose : Collect scheduled (heavy and line) maintenance data, findings and corrective action, and provide reference ability back to the operator's maintenance program.**
- ❖ **Service Bulletin/Modification record**
 - ◆ **Purpose : Provide data on service bulletin/mod incorporation and unincorporation.**
- ❖ **Aircraft Status Change record**
 - ◆ **Purpose : Capture changes in aircraft ownership, operator, long term storage disposition, engine model changes, etc.**
- ❖ **Summary Counts record**
 - ◆ **Purpose : Collect summarized rate and count information on an operator's fleet, e.g. schedule interruption counts by ATA, etc.**

SPEC2000 Chapter 11 Record Tables

Field Name Field Type (Mandatory vs Conditional)

Nbr	Information Level	Data to be Collected (Business Terms)	Data Element (CSDD)	TEI	Condition	Data Type	Size: min/max	Example	Business rules / comments
1	Segment Header "HDR"								The Header Segment is Mandatory. This segment is sent only once per transmission of Aircraft Hours and Landings record.
2		Record Status	Change Code	CHG	Mandatory	AN	1/1	N	The valid codes are N=New; D=Delete; T = Total Replacement
3		Reporting Organization Code	Reporting Organization Code	ROC	Mandatory	AN	3/5	UAL	Should be CAGE or NCAGE code. Use code ZZZZZ if no CAGE/NCAGE is available OR use ICAO code for operator.
4		Reporting Organization Name	Reporting Organization Name	RON	Conditional	AN	1/55	United Airlines	Required if the reporting organization has no CAGE/NCAGE Code.
5		Operator Code	Operator Code	OPR	Mandatory	AN	3/5	UAL	This code should support ICAO 3-digit airline designator for reliability applications. Use ZZZZZ if no ICAO code is available. This element is a KEY field in the record.
6		Operator Name	Company Name	WHO	Conditional	AN	1/55	United Airlines	Represents the name of operator in reliability applications. Mandatory, if operator of the aircraft has no ICAO operator code.

Field Size

Field Definitions

Field Example

Aircraft Event Record



Reporting Organization Code	APU Cumulative Cycles	General Ground Interrupt Indicator
Operator Code	Interruption Code	Delay Time
Airframe Manufacturer Code	Total Number of Consequential Interruptions	Aborted Approach Indicator
Aircraft Model	Airline ATA System Code (Discrepancy/ Symptom)	Emergency Descent Indicator
Aircraft Series	Airline ATA System Code (Maintenance Action)	In-Flight Shutdown Indicator
Aircraft Manufacturer Serial Number	Aircraft Message Code	Substitute Aircraft Indicator
Aircraft Registration Number	Aircraft Message Text	Aircraft on Ground Indicator
Operator Aircraft Internal Identifier	Arrival Station Code	Service Interruption Chargeability Indicator
Aircraft Engine Type	Departure Flight Number	Suspected Maintenance Error Indicator
Engine Position Code	Scheduled Departure Time	Suspected Operational Error Indicator
Engine Serial Number	Actual Departure Time	Technical Incident Indicator
Aircraft Engine Model	Actual Arrival Date	READI Exclusion Indicator (Reference READI Group)
Aircraft Engine Manufacturer Code	Scheduled Arrival Time	Incident Cause Code
Aircraft APU Type	Actual Arrival Time	Consequential Incident Cause Code
Aircraft APU Serial Number	Maintenance Notified Time	Aircraft Event Text
Aircraft APU Model	Maintenance Released Time	Aircraft Event Text (Corrective Action)
Aircraft APU Manufacturer Code	Maintenance Total Downtime	Comment Text
Event Record Identifier	Delay Indicator	Logbook Record Identifier
Incident Occurrence Date	Cancellation Indicator	Install Date of Removed Part
Departure / Reporting Station Code	Diversion Indicator	Removed Part Manufacturer Code
Aircraft Cumulative Total Flight Hours	Air Turnback Indicator	Removed Part Manufacturer Name
Aircraft Cumulative Total Cycles	General Air Interrupts Indicator	Removed Manufacturer Full Length Part Number
Engine Cumulative Hours	Aborted Take-off Indicator	Removed Manufacturer Serial Number
Engine Cumulative Cycles	Return To Gate Indicator	
APU Cumulative Hours		

Component Removal Record



OPERATOR CODE	PART POSITION	OPERATING DAY COUNT
AIRFRAME MANUFACTURER CODE	REMOVED OPERATOR PART NUMBER	NHA PART MANUFACTURER CODE
AIRCRAFT MODEL	REMOVED OPERATOR SERIAL NUMBER	NHA MANUFACTURER PART NUMBER
AIRCRAFT SERIES	SUPPLIER CODE	NHA PART NAME
AIRCRAFT MANUFACTURER SERIAL NUMBER	AIRLINE ATA SYSTEM CODE	NHA OPERATOR PART NUMBER
AIRCRAFT REGISTRATION NUMBER	REMOVAL STATION CODE	NHA OPERATOR SERIAL NUMBER
OPERATOR AIRCRAFT INTERNAL IDENTIFIER	AIRCRAFT MESSAGE CODE	SUPPLIER CODE
EVENT RECORD IDENTIFIER	AIRCRAFT MESSAGE TEXT	INSTALLED DATE
AIRCRAFT ENGINE MODEL	MAINTENANCE ACTION TEXT	INSTALLED PART MANUFACTURER CODE
ENGINE SERIAL NUMBER	AIRCRAFT CUMULATIVE TOTAL FLIGHT HOURS	INSTALLED PART MANUFACTURER NAME
ENGINE POSITION CODE	AIRCRAFT CUMULATIVE TOTAL CYCLES	INSTALLED MANUFACTURER SERIAL NUMBER
AIRCRAFT APU MODEL	ENGINE CUMULATIVE HOURS	INSTALLED OPERATOR PART NUMBER
AIRCRAFT APU SERIAL NUMBER	ENGINE CUMULATIVE CYCLES	INSTALLED OPERATOR SERIAL NUMBER
REMOVED LRU RECORD IDENTIFIER	APU CUMULATIVE HOURS	SUPPLIER CODE
REMOVAL DATE	APU CUMULATIVE CYCLES	Time since new
REMOVAL TYPE CODE	LOGBOOK RECORD IDENTIFIER	Cycles since new
REMOVAL TYPE TEXT	MAINTENANCE ACTION	Time since overhaul
REMOVED PART MANUFACTURER CODE	EVENT RECORD IDENTIFIER	Cycles since overhaul
REMOVED MANUFACTURER PART NUMBER	SCHEDULED MAINTENANCE IDENTIFIER	Time since repair
REMOVED MANUFACTURER SERIAL NUMBER	TIME CYCLE REFERENCE CODE	Cycles since repair
REMOVAL REASON TEXT	OPERATING TIME	Time since last installation
ENGINE/APU POSITION IDENTIFIER	OPERATING CYCLE COUNT	Cycles since last installation

Scheduled Maintenance Record

OPERATOR CODE	INSPECTION METHOD DESCRIPTION	CORROSION TEMPORARY PROTECTION SYSTEM VISIBLE INDICATOR
AIRFRAME MANUFACTURER CODE	MAINTENANCE EMPLOYEE SKILL CODE	COMMENT TEXT
AIRCRAFT MODEL	TASK LABOR COUNT	NON ROUTINE TASK LABOR COUNT
AIRCRAFT SERIES	TASK TOTAL LABOR HOURS	NON ROUTINE TASK TOTAL LABOR HOURS
AIRCRAFT MANUFACTURER SERIAL NUMBER	TASK ELAPSED TIME	NON ROUTINE TASK ELAPSED TIME
AIRCRAFT REGISTRATION NUMBER	TASK MATERIAL COST	NON ROUTINE TASK MATERIAL COST
OPERATOR AIRCRAFT INTERNAL IDENTIFIER	TASK TOTAL COST	NON ROUTINE TASK TOTAL COST
SCHEDULED MAINTENANCE IDENTIFIER	INTERNATIONAL CURRENCY	CMR/ALI ITEM NUMBER
OPERATOR SPECIFIC TASK INDICATOR	MAINTENANCE FINDING INDICATOR	CMR/ALI ITEM TITLE
AIRFRAMER MAINTENANCE TASK NUMBER	MAINTENANCE FINDINGS DEFECT CODE	PASSED CMR/ALI ITEM INDICATOR
MAINTENANCE REVIEW BOARD DOCUMENT NUMBER	MAINTENANCE FINDINGS DEFECT DESCRIPTION	LOGBOOK RECORD IDENTIFIER
AIRFRAMER MAINTENANCE TASK TITLE	MAINTENANCE FINDINGS DEFECT TEXT	MAINTENANCE ACTION TRACKING NUMBER
AIRFRAMER TASK CARD/AMM REFERENCE NUMBER	NON ROUTINE TASK REFERENCE	MAINTENANCE ACTION LABOR COUNT
AIRFRAMER TASK CARD TITLE	NON ROUTINE TASK REFERENCE DESCRIPTION	MAINTENANCE ACTION TOTAL LABOR HOURS
OPERATOR MAINTENANCE TASK NUMBER	NON ROUTINE CORRECTIVE ACTION TAKEN TEXT	MAINTENANCE ACTION ELAPSED TIME
OPERATOR MAINTENANCE TASK NUMBER TITLE	MAINTENANCE TASK OUT-OF-SCOPE FINDING INDICATOR	MAINTENANCE ACTION MATERIAL COST
TASK START DATE	MAINTENANCE TASK OUT-OF-SCOPE FINDING DESCRIPTION	MAINTENANCE ACTION TOTAL COST
TASK END DATE	CORROSION LEVEL	INTERNATIONAL CURRENCY
OPERATOR MAINTENANCE CHECK IDENTIFIER	CORROSION TYPE CODE	REMOVAL DATE
OPERATOR MAINTENANCE CHECK INTERVAL	CORROSION TYPE DESCRIPTION	REMOVED PART MANUFACTURER CODE
OPERATOR MAINTENANCE TASK INTERVAL NUMBER	REPAIR APPROVAL REFERENCE	REMOVED MANUFACTURER PART NUMBER
AIRCRAFT CUMULATIVE TOTAL FLIGHT HOURS	AIRFRAME MANUFACTURER MAINTENANCE ZONE	REMOVED MANUFACTURER SERIAL NUMBER
AIRCRAFT CUMULATIVE TOTAL CYCLES	OPERATOR UNIQUE MAINTENANCE ZONE	REMOVED PART POSITION RELATIVE TO POWER PLANT OR
ENGINE CUMULATIVE HOURS	AIRFRAME LEFT HAND/RIGHT HAND POSITION CODE	PART POSITION
ENGINE CUMULATIVE CYCLES	AIRCRAFT FRAME IDENTIFIER	REMOVAL REASON TEXT
APU CUMULATIVE HOURS	AIRCRAFT RIB IDENTIFIER	REMOVED OPERATOR PART NUMBER
APU CUMULATIVE CYCLES	AIRCRAFT SPAR IDENTIFIER	REMOVED OPERATOR SERIAL NUMBER
OPERATING TIME	AIRCRAFT MODEL STRINGER IDENTIFIER	SUPPLIER CODE
OPERATING CYCLE COUNT	AIRFRAME STATION IDENTIFIER	INSTALLED DATE
OPERATING DAY COUNT	AIRFRAME STATION DESCRIPTION	INSTALLED PART MANUFACTURER CODE
PREVIOUS INSPECTION DATE	AIRFRAME VERTICAL REFERENCE NUMBER	INSTALLED MANUFACTURER PART NUMBER
OPERATOR JOB CARD NUMBER	AIRFRAME LONGITUDINAL REFERENCE NUMBER	INSTALLED MANUFACTURER SERIAL NUMBER
OPERATOR JOB CARD TITLE	REPAIR STRUCTURAL MATERIAL TYPE DESCRIPTION	INSTALLED OPERATOR PART NUMBER
INSPECTION METHOD CODE	CORROSION TEMPORARY PROTECTION SYSTEM INDICATOR	INSTALLED OPERATOR SERIAL NUMBER

Shop Report Record

OPERATOR CODE	INCOMING INSPECTION TEXT
AIRFRAME MANUFACTURER CODE	SHOP ACTION TEXT
AIRCRAFT MODEL	SHOP REPAIR LOCATION CODE
AIRCRAFT SERIES	MOD (S) INCORPORATED (THIS VISIT) TEXT
AIRCRAFT MANUFACTURER SERIAL NUMBER	SHOP ACTION CODE
AIRCRAFT REGISTRATION NUMBER	SHOP DISCLOSURE INDICATOR
OPERATOR AIRCRAFT INTERNAL IDENTIFIER	SHIPPED DATE
SHOP FINDINGS RECORD IDENTIFIER	SHIPPED PART MANUFACTURER CODE
SHOP RECEIVED DATE	SHIPPED MANUFACTURER PART NUMBER
RECEIVED PART MANUFACTURER CODE	SHIPPED MANUFACTURER SERIAL NUMBER
RECEIVED MANUFACTURER PART NUMBER	SHIPPED OPERATOR PART NUMBER
RECEIVED MANUFACTURER SERIAL NUMBER	SHIPPED OPERATOR SERIAL NUMBER
SUPPLIER REMOVAL TYPE CODE	SHIPPED MODIFICATION LEVEL
SUPPLIER REMOVAL TYPE TEXT	REMOVAL DATE
FAILURE/ FAULT FOUND	REMOVAL TYPE CODE
FAILURE/ FAULT INDUCED	REMOVAL TYPE TEXT
FAILURE/ FAULT CONFIRMS REASON FOR REMOVAL	REMOVED PART MANUFACTURER CODE
FAILURE/ FAULT CONFIRMS AIRCRAFT MESSAGE	REMOVED MANUFACTURER PART NUMBER
FAILURE/ FAULT CONFIRMS AIRCRAFT PART BITE MESSAGE	REMOVAL REASON TEXT
HARDWARE/ SOFTWARE FAILURE	REMOVED OPERATOR PART NUMBER
RECEIVED OPERATOR PART NUMBER	REMOVED OPERATOR SERIAL NUMBER
RECEIVED OPERATOR SERIAL NUMBER	REMOVAL TRACKING IDENTIFIER
SUPPLIER CODE	SHOP TOTAL LABOR HOURS
INCOMING MODIFICATION LEVEL	SHOP FLOW TIME
SHOP FINDINGS CODE	SHOP MATERIAL COST
RELATED SHOP FINDING RECORD IDENTIFIER	REPAIR PRICE AMOUNT
REPAIR LOCATION NAME	INTERNATIONAL CURRENCY

Logbook Record (Pireps/Mareps)

OPERATOR CODE	AIRCRAFT MESSAGE CODE
AIRFRAME MANUFACTURER CODE	AIRCRAFT MESSAGE TEXT
AIRCRAFT MODEL	AIRLINE ATA SYSTEM CODE (MAINTENANCE ACTION)
AIRCRAFT SERIES	MAINTENANCE ACTION COMPLETION TIME
AIRCRAFT MANUFACTURER SERIAL NUMBER	MAINTENANCE ACTION DEFERRAL REASON TEXT
AIRCRAFT REGISTRATION NUMBER	AUTHORITY DOCUMENT REFERENCE NUMBER
OPERATOR AIRCRAFT INTERNAL IDENTIFIER	DELAY TIME (TECHNICAL DELAYS)
AIRCRAFT ENGINE TYPE	MAINTENANCE ACTION CODE
ENGINE POSITION CODE	DISCREPANCY SYMPTOM CODE
ENGINE SERIAL NUMBER	FINDINGS TYPE CODE
AIRCRAFT ENGINE MODEL	PHASE OF FLIGHT
AIRCRAFT APU TYPE	WORK REQUESTED DESCRIPTION
AIRCRAFT APU SERIAL NUMBER	DISCREPANCY TEXT
AIRCRAFT APU MODEL	MAINTENANCE ACTION TEXT
AIRCRAFT APU MANUFACTURER CODE	COMMENT TEXT
LOGBOOK RECORD IDENTIFIER	Scheduled Maintenance Identifier
MAINTENANCE TRACKING IDENTIFIER	MAINTENANCE ACTION LABOR COUNT
MAINTENANCE ACTION SEQUENCE NUMBER	MAINTENANCE ACTION TOTAL LABOR HOURS
DISCREPANCY OCCURRENCE DATE	MAINTENANCE ACTION ELAPSED TIME
DISCREPANCY ORIGATION TYPE CODE	MAINTENANCE ACTION MATERIAL COST
MAINTENANCE TYPE CODE	MAINTENANCE ACTION TOTAL COST
DEPARTURE / REPORTING STATION CODE	INTERNATIONAL CURRENCY
MAINTENANCE ACTION DATE	SERVICE BULLETIN/ LETTER NUMBER
MAINTENANCE ACTION COMPLETION DATE	MAINTENANCE CHECK IDENTIFIER
MAINTENANCE ACTION STATION CODE	MAINTENANCE CHECK INTERVAL
MAINTENANCE ACTION STATUS CODE	NON ROUTINE TASK REFERENCE
TECHNICAL INCIDENT INDICATOR	NON ROUTINE TASK REFERENCE DESCRIPTION
ETOPS FLIGHT INDICATOR	OPERATOR MAINTENANCE TASK NUMBER
DEPARTURE FLIGHT NUMBER	OPERATOR JOB CARD NUMBER
DEPARTURE DATE	AIRFRAMER MAINTENANCE TASK (MPD ITEM) NUMBER
DEPARTURE TIME	MAINTENANCE REVIEW BOARD DOCUMENT NUMBER
ARRIVAL STATION CODE	AIRFRAMER TASK CARD/AMM REFERENCE NUMBER
AIRLINE ATA SYSTEM CODE (DISCREPANCY/SYMPTOM)	AIRWORTHINESS DIRECTIVE NUMBER

Linking Fields



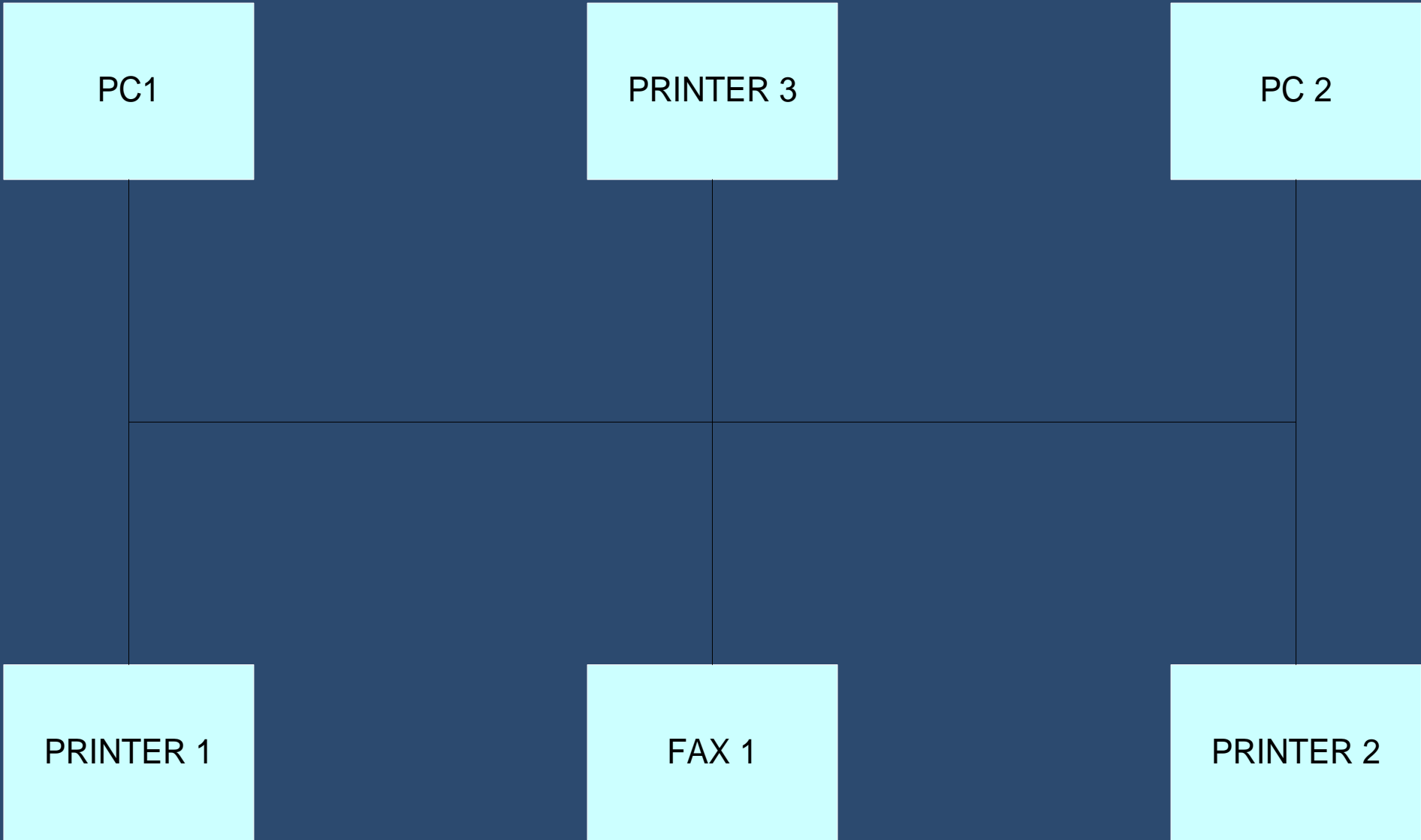
- **Fields have been added to facilitate linking related records**
- **This allows more efficient drill down and analysis to find “root cause” data.**
- **Data is repeated in case of missing records or erroneous linking information**

Linking Fields

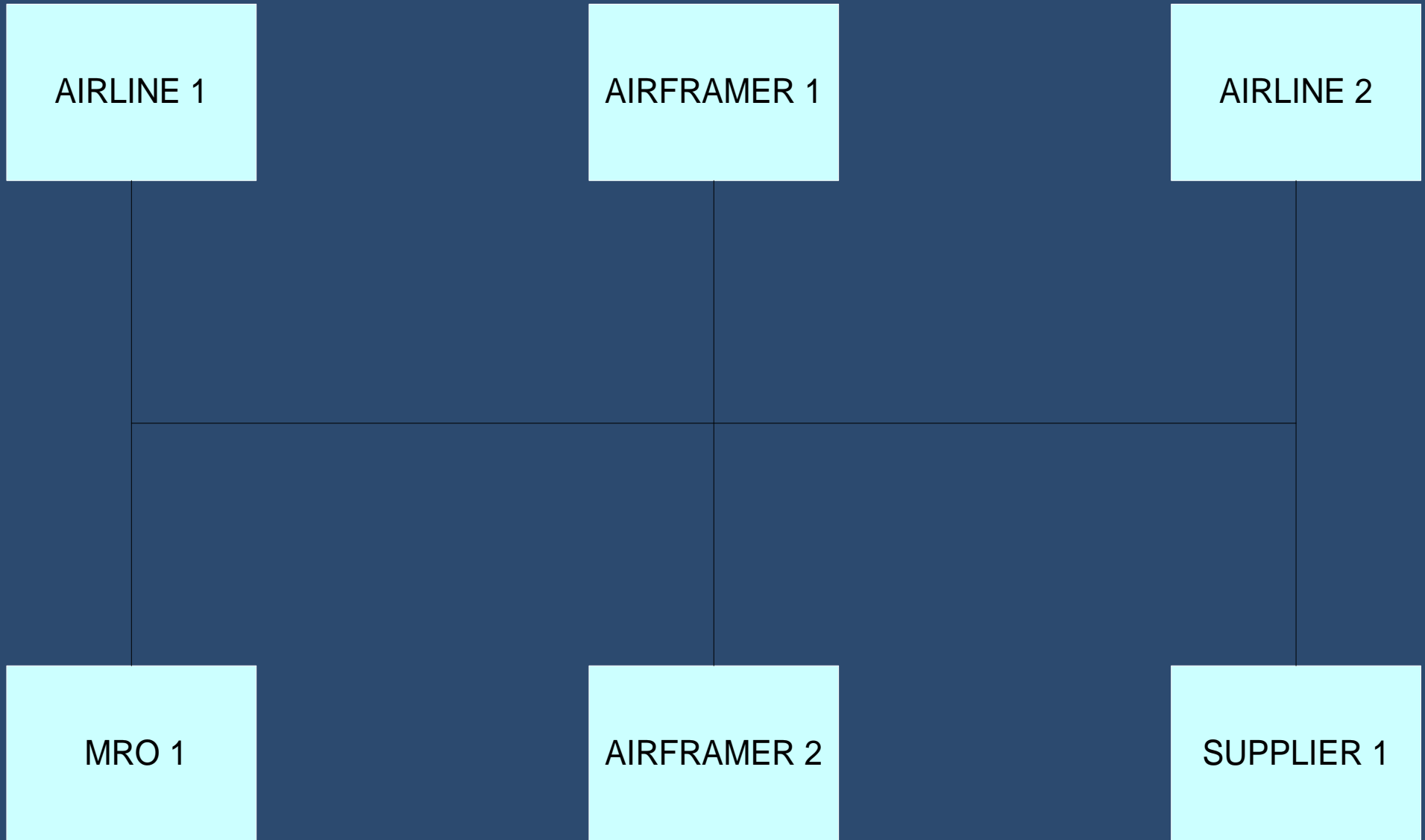
Linking the Event, Logbook, LRU Removal, Shop Report

EVENT		LOGBOOK		REMOVAL		SHOP	
ERI	EV930630	OEI	LG41106	RTI	RM10774	SFI	SH38440
OEI	LG41106	ATA	2310	OEI	LG41106	RTI	RM10774
ROC	LTX	DOT	11-Aug-01	OPR	LTX	OPR	LTX
OPR	LTX	AMC	Q400	AMC	Q400	AMC	Q400
AMC	Q400	AIN	4232	AIN	4232	AIN	4232
ICD	P	ROC	LTX	ASN	6-2311-3-0020	MPN	EVR716-11-0350A
DTA	2311	OPR	LTX	MFR	32AXV	SER	4689709A-02062
ATA	231101	LOC		MPN	EVR716-11-0350A	RED	11-Aug-01
IOD	11-Aug-01	DOC	P	SER	9709A02062	RRC	U
AIN	4232	MCC	11-Aug-01	ATA	231101	FFC	Y
DLY	1	MAH	3.5	TTY	U	FCR	Y
TCI	3			RED	11-Aug-01	MRD	15/08/2001
DTM	0.53			CPI	2	MFR	32AXV
				CTH	3576	SHP	25/10/2001
				CTY	4301		
DCT	#2 comm will not receive	DCT	#2 VHF: TX-CARRIER ONLY RX-STATIC-UNREADABLE. NO VOICE AT ALL.	RET	VHF TRANSCEIVER - STATIC-RT UNREADABLE.	DCT	VHF TRANSCEIVER - STATIC-RT UNREADABLE.
MNT	Replaced transceiver.	MNT	REMOVED & REPLACED VHF TRANSCEIVER. CONDUCTED TEST IAW TASK 23-11-00-710-801. TEST GOOD.			INT	"Power supply failure: Unrelated. Replaced. Intermittent. MX19 OUT - 3522;911M26 - Fault code present: Unrelated. Intermittent. DPU FC 11101;999 - Unit sent to XXX; CONFIRMED DEFECT. DPU BOARD REPROGRAMMED.

Standard Protocol (Local Area Network)



SPEC2000 Ch 11 - Standard Protocol for Reliability & Maintenance Data Exchange



SPEC2000 Ch 11 - Standard Protocol for Reliability & Maintenance Data Exchange

Airline
or
MRO
Database

Spec2000 Chapter 11

Used by
Airframers,
Airlines, Suppliers
And M R & O's

Spec2000 Chapter 13

Airline Partner Databases

Airframer Databases

Supplier Databases

Engine Manufacturer
Databases

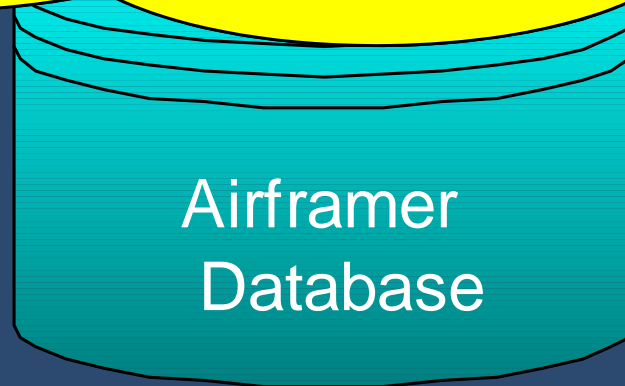
Regulatory Databases

Any BUSINESS or
APPLICATION that
requires Reliability and
Maintenance data
exchange



SPEC2000 Chapter 13-2 Reliability Metrics

It is the goal of SPEC2000 Chapter 13 to standardize the definitions of reliability metrics so as to indicate the use of reliability data



Reliability Analysis & Reports

Reliability Data Exchange and Collection

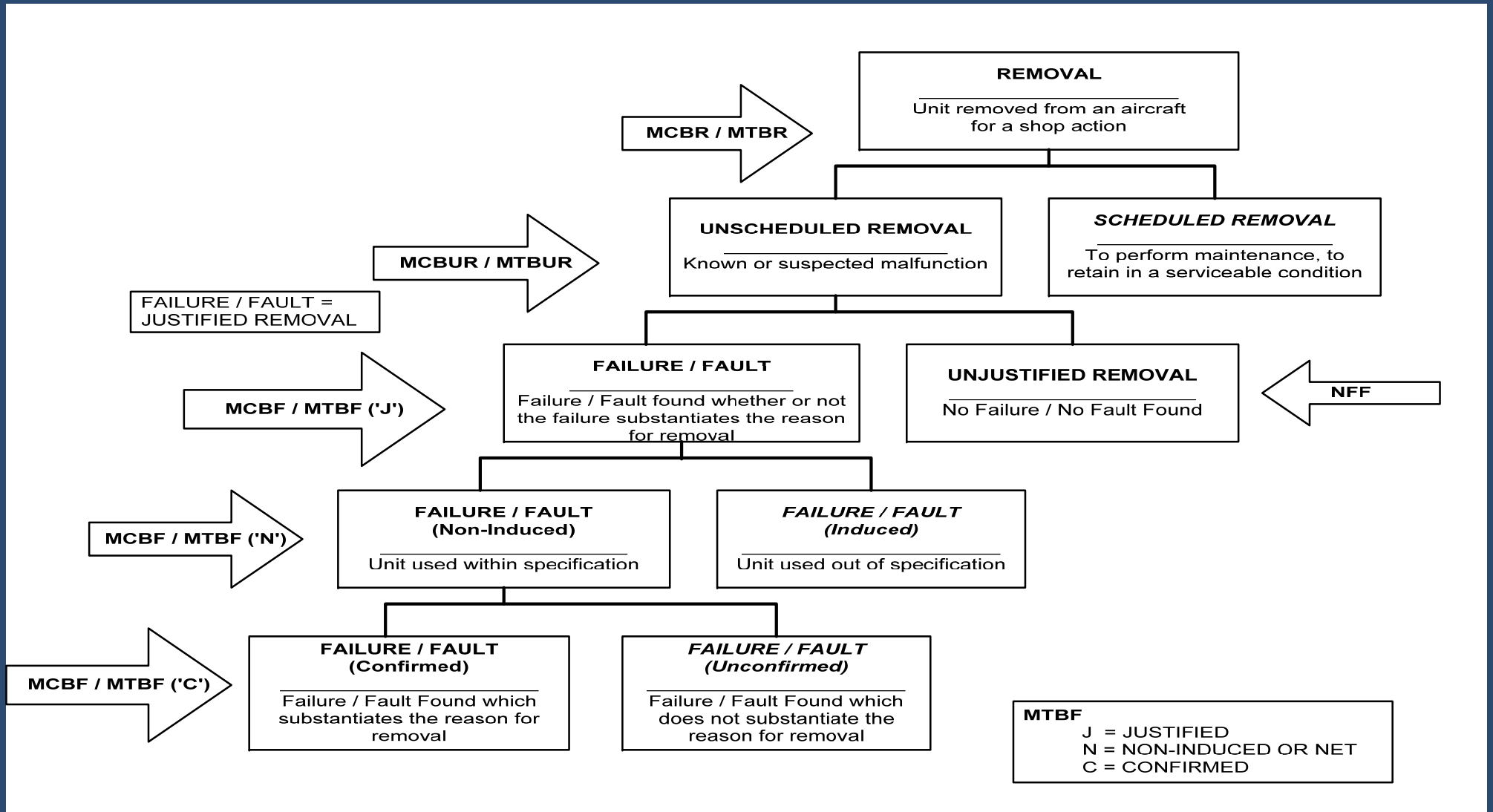


In Scope



Out of Scope

Chapter 13-2 Reliability Metrics



Chapter 13-2 Reliability Metrics

Mean Time Between Removals - MTBR

A performance figure calculated by dividing the total unit flying hours accrued in a period by the number of unit removals (scheduled plus unscheduled) that occurred during the same period.

MTBR = ((Quantity Per Aircraft) multiplied by (Flight Hours)) divided by Total Removals (Unscheduled plus scheduled)

$$MTR = ((TQA \times FHL) / TRS)$$

Mean Cycles Between Removals - MCBR

Similar to MTBR, but with cycles instead of hours.

$$MCR = ((TQA \times FCL) / TRS)$$

Mean Time Between Unscheduled Removals - MTBUR

A performance figure calculated by dividing the total unit flying hours accrued in a period by the number of unit unscheduled removals that occurred during the same period.

MTBUR = ((Quantity Per Aircraft) multiplied by (Flight Hours)) divided by Total Unscheduled Removals

$$MTU = ((TQA \times FHL) / CUC)$$

Mean Cycles Between Unscheduled Removals - MCBUR

Similar to MTBUR, but with cycles instead of hours.

$$MCU = ((TQA \times FCL) / CUC)$$

Chapter 13-2 Reliability Metrics

Mean Time Between Failure - Justified - MTBF (J)

A performance figure calculated by dividing the total unit flying hours (airborne) accrued in a period by the number of justified unit failures that occurred during the same period.

MTBF (J) = ((Quantity Per Aircraft) multiplied by (Flight Hours)) divided by (Number Of Justified Component Removals)

$$MFJ = ((TQA \times FHL) / TJF)$$

Mean Cycles Between Failure - Justified - MCBF (J)

Similar to MTBF(J), but with cycles instead of hours.

$$MCJ = ((TQA \times FCL) / TJF)$$

Mean Time Between Failure - Non-induced - MTBF (N)

A performance figure calculated by dividing the total unit flying hours (airborne) accrued in a period by the number of non-induced unit failures that occurred during the same period.

MTBF (N) = ((Quantity Per Aircraft) multiplied by (Flight Hours)) divided by (Total Number of Non-induced Component Removals)

$$MBN = ((TQA \times FHL) / TNF)$$

Mean Cycles Between Failure - Non-induced - MCBF (N)

Similar to MTBF(N), but with cycles instead of hours.

$$CNF = ((TQA \times FCL) / TNF)$$

Chapter 13-2 Reliability Metrics

Mean Time Between Failure - Confirmed - MTBF (C)

A performance figure calculated by dividing the total unit flying hours (airborne) accrued in a period by the number of confirmed unit failures that occurred during the same period.

$MTBF (C) = ((\text{Quantity Per Aircraft}) \times (\text{Flight Hours})) \div (\text{Total Number of Confirmed Component Removals})$

$MFC = (TQA \times FHL) / TCF$

Mean Cycles Between Failure - Confirmed - MCBF (C)

Similar to MTBF(C), but with cycles instead of hours.

$MCF = (TQA \times FCL) / TCF$

No Fault Found Rate

The rate of unscheduled removals determined to have no fault for a particular component.

$NFF = (\text{Total Number of Unscheduled Removals Returned to Shop Determined to have No Fault}) \div (\text{Total Unscheduled Removals Returned to Shop})$

$NFF = TUN / CUC$

Time Since Installation at Removal

The time accumulated on a given item at time of removal since the item was last installed.

(Aircraft Hours at Removal) minus (Aircraft Hours at Installation).

$TSR = OTT (\text{at removal}) - OTT (\text{at installation})$

Cycles Since Installed at Removal

The number of cycles accumulated on a given item at time of removal since the item was last installed.

(Aircraft Cycles at Removal) minus (Aircraft Cycles at Installation).

$CSI = OPC (\text{at removal}) - OPC (\text{at installation})$

Chapter 13-2 Reliability Metrics

4.13 Dispatch Reliability (DR)

4.13.1 Definition

Dispatch Reliability is the percentage of revenue departures that do not incur a primary technical delay greater than 15 minutes, or a primary technical cancellation.

4.13.2 Formula

$$DR = \left\{ 1 - \frac{\sum x_i}{\sum MDR_i + \sum y_i} \right\} * 100\%$$

Where:

If (DLY = 1 or CNX = 1) and (ICD = P or ICD not provided) and (REI ≠ Y), $x_i = 1$

If CNX = 1, and TCI is provided, $y_i = TCI$

If CNX = 1 and TCI is not provided $y_i = CNX$

4.14 Dispatch Interruption Rate (DIR)

4.14.1 Definition

Dispatch Interruption Rate is the percentage of revenue departures that incur a primary technical delay greater than 15 minutes, or a primary technical cancellation.

4.14.2 Formula

$$DIR = \left\{ \frac{\sum x_i}{\sum MDR_i + \sum y_i} \right\} * 100\%$$

Where:

If (DLY = 1 or CNX = 1) and (ICD = P or ICD not provided) and (REI ≠ Y), $x_i = 1$

If CNX = 1, and TCI is provided, $y_i = TCI$

If CNX = 1 and TCI is not provided $y_i = CNX$

Chapter 13-2 Reliability Metrics



Delay Rate (DeR)

Delay Rate is the percentage of revenue departures that incur a primary technical delay greater than 15 minutes.

Schedule Reliability (SR)

Schedule Reliability is the percentage of revenue departures that do not incur a primary technical delay (greater than 15 minutes), primary technical cancellation, diversions or air turn back

Cancellation Performance (CP)

Cancellation Performance is the percentage of revenue departures that do not incur a primary technical cancellation.

Cancellation Rate (CR)

Cancellation Rate is the percentage of revenue departures that incur a primary technical cancellation.

Mean Time To Failure (MTTF)

A component performance rate calculated by dividing the sum of on-aircraft flying hours of each unit which has experienced a failure by the total number of failed units.

MTTF_j MTTF_n MTTF_c

Mean Time To Unscheduled Removal (MTTUR)

A component performance rate calculated by dividing the sum of on-aircraft flying hours of each unit which has experienced an unscheduled removal by the total number of unscheduled removed units.

Component Unscheduled Removal Rate (URR)

The URR of a particular component type is defined as the number of unscheduled removals performed per 1000 flight-hours flown by that component type.

Chapter 13-2 Reliability Metrics

Pirep Rate (PRR)

Count of technical logbook write-ups (pilot, cabin, cargo) by a particular parameter (such as 2-digit ATA) per 1000 flight-hours or per 100 cycles.

PRRh PRRc

Time Since Repair

The time period accumulated on an item at the time of removal since the item was last repaired.

Cycles Since Repair

The cycles accumulated on an item at the time of removal since the item was last repaired.

Time Since Overhaul

The time period accumulated on an item at the time of removal since the item was last overhauled.

Cycles Since Overhaul

The cycles accumulated on an item at the time of removal since the item was last overhauled.

Time Since New

The time period accumulated on an item at the time of removal since the item was new.

Cycles Since New

The cycles accumulated on an item at the time of removal since the item was new.

Chapter 13-2 Reliability Metrics



Time Since Last Shop Visit

The time period accumulated on an item at the time of removal since the item was last sent to a shop for repairs.

Cycles Since Last Shop Visit

The cycles accumulated on an item at the time of removal since the item was last sent to a shop for repairs.

Time Since Last Check

The time period accumulated on an item at the time of removal since the item was last subjected to a maintenance check.

Cycles Since Last Check

The cycles accumulated on an item at the time of removal since the item was last subjected to a maintenance check.

Discussions on Availability metrics – still in discussion

Chapter 13-2 Reliability Metrics



❖ Technical Delay and Cancellation Exclusion List

- ◆ During the Dec 2007 ATA Reliability Interest Group meeting in Houston the READI Exclusion List was accepted by the Airframers (Airbus, Boeing, Bombardier and Embraer) as the industry standard exclusion list that they will use to code delays and cancellations – as it represented the consensus of the airlines.
- ◆ The process of documenting this in SPEC2000 is in work.



Spec2000 Chapter 15

Delivery Configuration Data

Chapter 15, Delivery Configuration Data



- ❖ **The purpose of this record type is for detailing a list of installed parts on an aircraft as delivered to an operator. It is to be completed by an aircraft manufacturer to be exchanged with an operator or from an operator to another operator/lessor.**
- ❖ **Discussed at October RIG meeting in DC. More discussions before final acceptance.**



Joint IATA and ATA SPEC2000

Chapter 11 Efforts

Joint IATA and ATA SPEC2000 Chapter 11 Efforts



- ❖ IATA (International Air Transport Association) has been working to identify a number of significant cost reduction initiatives in airline Maintenance and Engineering

1) Maintenance Program Improvement Initiative

- Objective: Accelerate airplane maintenance program optimization and interval escalations through standardized collection and reporting of findings

2) Reliability and Maintainability Improvement Initiative

- Objective: Introduce system and component reliability improvements for major cost drivers through standardized Service Bulletin incorporation reporting

Joint IATA and ATA SPEC2000 Chapter 11 Efforts



❖ IATA Maintenance Cost Task Force (MCTF)

- ◆ IATA has re-named the former IATA PPM (Production Performance Measurement) effort in an attempt to re-energize and enhance maintenance cost data collection
- ◆ Determined to use industry standards as much as possible
- ◆ IATA's MCTF has begun working with the ATA to begin using SPEC2000 Chapter 11 as the method to collect maintenance and repair cost data

Joint IATA and ATA SPEC2000 Chapter 11 Efforts



IATA and ATA are jointly looking at expanding the maintenance cost data collection capability of ATA SPEC2000 Chapter 11 to satisfy the needs of IATA MCTF

Why IATA MCTF and ATA SPEC2000 Chapter 11?

- ◆ Maintenance Cost is directly related to aircraft maintenance
- ◆ To properly understand and analyze maintenance cost it is necessary to understand the maintenance that was performed
- ◆ IATA recognizes that ATA SPEC2000 Chapter 11 is rapidly becoming the industry standard for collecting and exchanging aircraft and component reliability, maintenance and repair data
- ◆ IATA endorsed ATA SPEC2000 Chapter 11 in Jan. 2005.



Roadmap to the Future

Roadmap to the Future

Industry Adoption in 2008

2005 Refined the Standard

- Developed much tighter industry cooperation toward refining the reliability and maintenance data standard
- Held our first Maintenance Information Software provider meeting
- Learned we need more information to convince the industry to follow our lead to use ATA SPEC2000 Chapters 11 and 13 as the industry standard data exchange protocol

1997 ~ 2004 Developed Reliability & Maintenance Data Exchange Standard (ATA SPEC2000 Chapter 11)

- ◆ Airbus, Boeing, Bombardier, Dassault and Embraer began working together on SPEC2000 Chapter 11
- ◆ Changed data exchange paradigm from data protection to data sharing
- ◆ SPEC2000 Chapter 11 published by the ATA in May 2004
- ◆ SPEC2000 Chapter 11 received IATA endorsement in Jan 2005

2006 ~ 2008 Industry Application

- Airbus and Boeing are able to accept SPEC2000 Chapter 11 formatted data
- Participate in regional meetings to share our collective SPEC2000 Chapter 11 implementation value propositions, benefits and lessons learned
- In 2008 the following companies intend to use SPEC2000 Chapter 11 as the primary means to exchange Reliability and maintenance data

Ability to share standard and accurate data with minimum transaction cost or effort

Companies that Intend to Comply with SPEC2000 Chapter 11 in 2008

- ❖ Airbus
- ❖ Boeing
- ❖ Bombardier
- ❖ Dassault
- ❖ Embraer

- ❖ Air Canada
- ❖ Continental
- ❖ Delta
- ❖ FedEx (plus or minus mid 2008)
- ❖ Lufthansa Technik
- ❖ SAS
- ❖ Turkish Airlines
- ❖ Virgin Atlantic Airways
- ❖ WestJet

- ❖ BAE Systems
- ❖ C&D Aerospace
- ❖ Goodrich Wheels and Brakes
- ❖ Hamilton Sundstrand
- ❖ Honeywell
- ❖ Moog
- ❖ Nabtesco
- ❖ Panasonic
- ❖ Parker
- ❖ Rockwell Collins
- ❖ Smiths
- ❖ Thales

- ❖ Edatasystems
- ❖ EmpowerMX
- ❖ MIRO
- ❖ Maintenix (MXi)
- ❖ RussellAdams
- ❖ SAP (2010)
- ❖ Swiss Aviation Software (AMOS)
- ❖ Teradata
- ❖ TRAX
- ❖ Ultramain



Summary

Summary - An Opportunity for Growth



- ❖ This specification indicates the direction of the industry.
- ❖ The expanded set of data elements will improve the quality of the response that the airframer and supplier can provide to operators.
- ❖ Airframers have jointly championed the rapid implementation of SPEC2000 Chapter 11 throughout industry.
- ❖ Trading partners will select from various optional elements to make the most cost effective choices.
- ❖ The RIG has worked with several software companies to ensure specification will be incorporated in whichever software third-party provider operators may choose.



Questions?