



**Systems & Electronics Inc.**

# AN/ASH-37 SDRS Structural Data Recording Set

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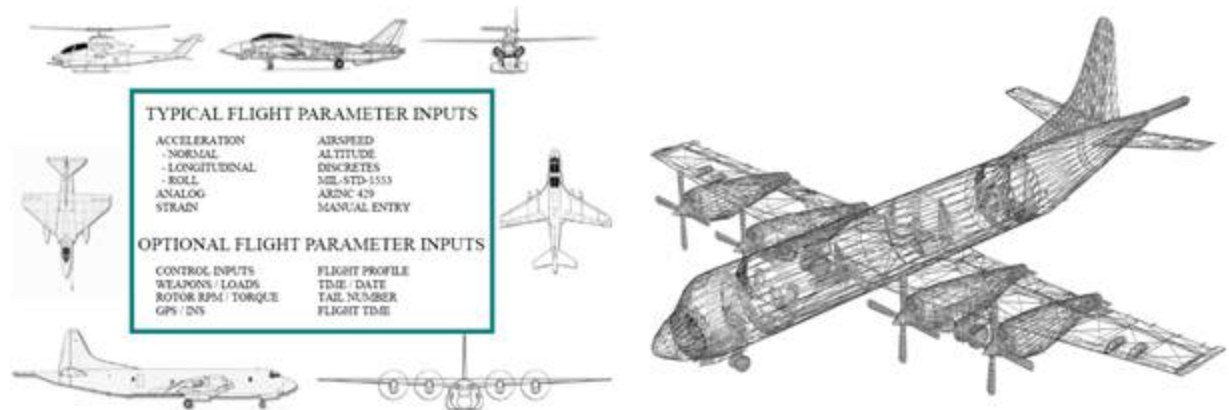
[www.sei-sdrs.com](http://www.sei-sdrs.com)

# Background Information

Systems & Electronics, Inc. (SEI) was established in 1984

Primarily an Engineering Firm that provided Research & Development for Military Programs

AN/ASH-37 Structural Data Recording Set (SDRS) was developed to replace the Counting Accelerometer Group (CAG) and measure additional Usage Parameters important to Service Life Assessment Programs



# System Components

## ACFT Sensors



## Air Data Transducer

## Data Entry Keypad



## RSU Interface



## Remote Storage Unit

## Recorder Converter



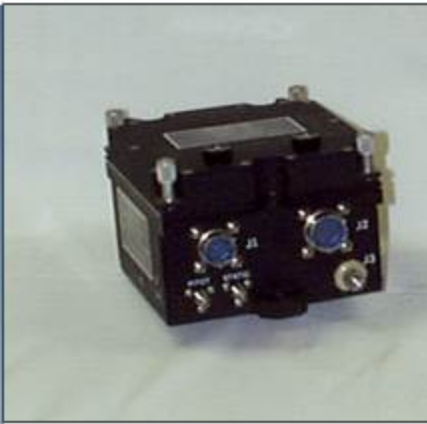
## PCMCIA

# AN/ASH-37 SDRS

1400+ Installed on various platforms

Provides Original Equipment Manufacturer useful data

Enables Operator to view aircraft performance data



# Airframe Experience (fixed wing)

## P-3 Orion

•252 Aircraft

## A-6 Intruder

•323 Aircraft

## CP-140 Aurora

•24 Aircraft

## S-3 Viking

•144 Aircraft

## E-2 Hawkeye

•103 Aircraft

## C-130 Hercules

•100 Aircraft

## F-14 Tomcat

•151 Aircraft

## C-2 Greyhound

•39 Aircraft

# Aircraft Parameters Monitored

## Aircraft Usage Parameters

- Airspeed
- Altitude
- Normal Load (Nz)
- Roll Rate
- Flight Time
- Takeoff & Landing
- Strain Gage
- Surface Deflections
- Control Inputs
- Customer/ Unique Requirements (GPS, Fire Retardant drops, Weapons Loads...)

## Supplemental Parameters

- Date
- Local Time
- Stores Weight, Locations 9-18
- Fuel Weight
- Gross Weight
- Center of Gravity
- Mission Code (configurable)
  - 0 - Training, Fundamentals
  - 1 - Training, Instrument
  - 2 - Patrol
  - 3 - Transport
  - 4 - Functional Check
  - 5 - ASW (with or without stores)
  - 6 - Training, Composite
  - 7 - Search & Long Range
  - 8 - Utility & Medium Range
  - 9 - Other

# P-3 Orion Installations

## Recorder Converter

Installed in the Main Load Center



## Air Data Transducer

Installed in Rack C-3 (P-3C) &  
Electronics Bay 42 (P-3N)

# P-3 Orion Installations

## Data Entry Keyboard

Installed in the Forward Load Center

## Remote Storage Unit

Installed below DEK





# Data Acquisition Cycle

Normal Mission Flight



Aircraft Parameters



Structural Data Recording Set



2 Way Communication



Display Flight Data Contents of Recorder File

Time	Altitude	Speed	Heading	Roll	Pitch	Yaw	Roll Rate	Pitch Rate	Yaw Rate	Roll Acc	Pitch Acc	Yaw Acc
00:00:00	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:01	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:02	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:03	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:04	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:05	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:06	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:07	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:08	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:09	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:10	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:11	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:12	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:13	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:14	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:15	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:16	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:17	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:18	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:19	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:20	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:21	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:22	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:23	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:24	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:25	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:26	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:27	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:28	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:29	1000	100	0	0	0	0	0	0	0	0	0	0
00:00:30	1000	100	0	0	0	0	0	0	0	0	0	0

Data Analysis



Data Processing



Data Captured to PCMCIA

# Example of Data using Strain

RM	PARAM	WOW	TIME	NZ	PDOT	TOTAL_FUEL	AIRSPEED	STR_5	STR_1	STR_2	STR_3	STR_4	DIFF_PRSR	ALTITUDE
V	10		3437.63						286					
P	10		3439.20						429					
V	10		3439.46						333					
P	10		3439.71						429					
V	5	F	3440.30	0.91	0.27	21664	160	-48	333	143	619	198	0.206	838
V	10		3440.34						333					
P	10		3440.55						429					
V	12		3440.75								572			
V	11		3440.75							143				
V	10		3440.78						286					
P	10		3441.03						476					
P	12		3441.03								714			
V	12		3441.70								619			
V	10		3441.72						333					
P	10		3442.29						524					
P	5	F	3442.34	1.22	-0.54	21664	160	-48	476	238	762	149	0.206	838
V	5	F	3442.59	1.05	-0.54	21664	160	-48	333	191	667	198	0.206	838
V	10		3442.61						333					
P	10		3443.14						476					
P	5	F	3443.16	1.25	0.00	21664	160	-48	476	238	762	149	0.206	838
V	10		3444.91						333					
P	10		3445.09						476					
P	12		3445.10								810			
V	10		3445.41						333					
V	12		3446.48								619			
V	5	F	3446.71	0.99	0.00	21664	160	-48	381	191	667	198	0.184	838
P	10		3448.46						476					

Flt: 00009    Flt Time: 2.18    Max Nz: 1.63 - Max Diff. Press.: 1.959    4/27/2011    10:30 AM

# Current Programs using SDRS

Individual Aircraft Tracking

Mission Usage Spectrum Survey

Aging Aircraft and Unique Flight Profiles

Service Life Extension Programs



# Current Programs using SDRS

## Individual Aircraft Tracking

Installed SDRS on each aircraft enables the operator to accurately measure each individual airplane on it's use, performance and mission profile. This helps to compare actual fleet usage to original design profile



US Navy P-3 Orion use IAT to assess fleet

RM	PARAM	WDW	TIME	NZ	RDLL	AIRSPD	STR_1	STR_2	STR_3	DIFF_PRRS	ALTITUDE
R	0	T	0.00				-1238	-1238	-1238		
Z	0	T	0.00	0.99	-12.40	95	0	0	0	0.000	129
E	0	T	0.00	0.99	-0.89	55	-572	-191	-333	0.000	322
RB	0		245.75								
C	0	T	260.03	0.99	-0.89	55	-572	-191	-333	0.000	322
RB	0		296.39								
C	0	T	519.77	0.99	-0.89	55	-572	-191	-333	0.000	322
C	0	T	778.10	1.09	-0.89	55	-572	-238	-381	0.000	322
C	0	T	1036.29	0.99	-0.89	55	-572	-238	-333	0.000	344
T	0	F	1192.63	1.09	-0.89	120	-572	524	572	0.015	215
G	0	F	1206.66	0.99	-2.67	146	-572	619	619	0.073	495
r	0	F	1210.11	1.09	-0.89	154	-572	619	619	0.096	539
C	0	F	1294.64	0.99	11.58	213	-572	762	905	0.812	3062
C	0	F	1553.11	0.99	-0.89	213	-572	667	810	3.833	10191
C	0	F	1811.61	0.99	0.89	213	-572	619	762	5.491	14960
C	0	F	2070.12	0.99	-0.89	195	-572	619	762	5.584	18710
C	0	F	2328.53	0.99	1.78	255	-572	667	762	5.523	19488
C	0	F	2596.98	0.99	1.78	255	-572	667	762	5.522	19331
C	0	F	2845.42	1.09	1.78	240	-572	667	810	5.533	19370

File: 00011    File Time: 6:01    Max Nz: 1.48    Max Diff. Press: 5.584    9/30/2010 9:45 AM

Lockheed Martin  
Qualified & Approved

SAFE Report Compliant

# Current Programs using SDRS

## Mission Usage Spectrum Survey

Installed SDRS on a designated set of aircraft performing operations in varied roles in order to get an estimate of how aircraft operate in differing mission profiles.

	OP TEST		SAR		TRAINING		Worst	Army A/L
<i>Maneuver</i>	353	109	462	465	689	718	0.21	0.03
<i>Auto Entry/Rec</i>	0.03	0.05	0.09	0.13	0.21	0.13	0.21	0.03
<i>PPD</i>	4.15	4.52	1.43	1.14	1.95	2.21	4.52	2.50
<i>30 deg Turn</i>	3.22	4.05	2.42	2.06	4.11	4.24	4.24	8.33
<i>45 deg Turn</i>	1.82	2.97	1.97	1.93	0.81	0.62	2.97	1.33
<i>60 deg Turn</i>	0.02	0.08	0.17	0.35	0.01	0.01	0.35	0.25
<i>Moderate Pullout</i>	0.26	0.14	0.18	0.19	0.09	0.16	0.26	0.28
<i>Severe Pullout</i>	0.04	0.06	0.00	0.01	0.02	0.00	0.06	0.03
<i>Dive</i>	0.77	0.57	0.12	0.11	0.13	0.13	0.77	2.32
<i>Run-On Landing</i>	0.01	0.13	0.11	0.03	0.25	0.04	0.25	0.10
<i>Total</i>	10.32	12.57	6.48	5.94	7.58	7.56	13.64	15.17

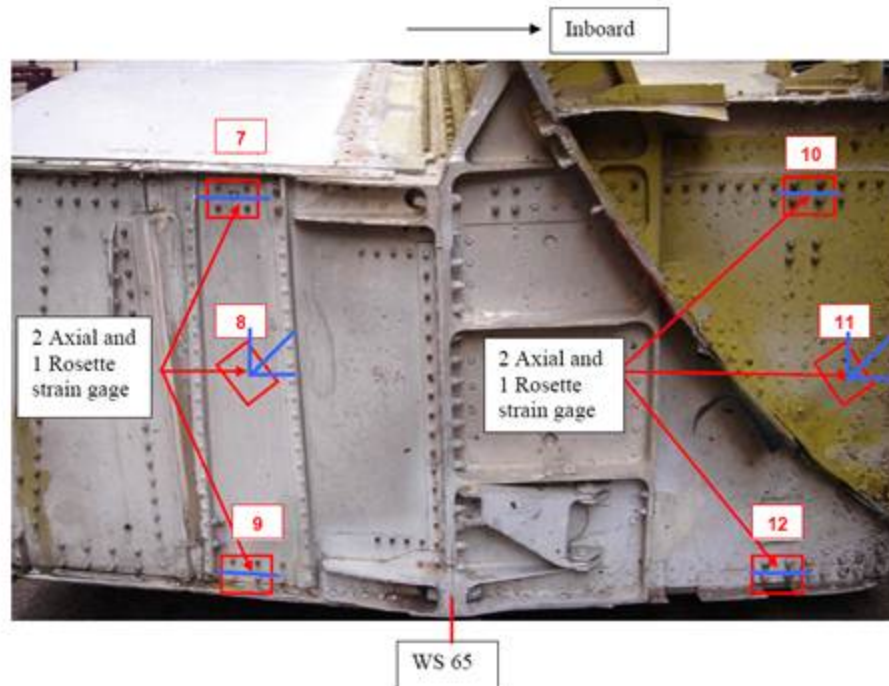


US Air Force HH-60G Survey on 6 aircraft

# Current Programs using SDRS

## Aging Aircraft / Unique Flight Profile

Installed SDRS on aircraft flying longer than originally scheduled by the OEM and flying different mission profiles than originally anticipated.



US Department of Agriculture, Forest Service use the data to ensure that safety is the highest priority while flying their aircraft beyond it's original design and service life.

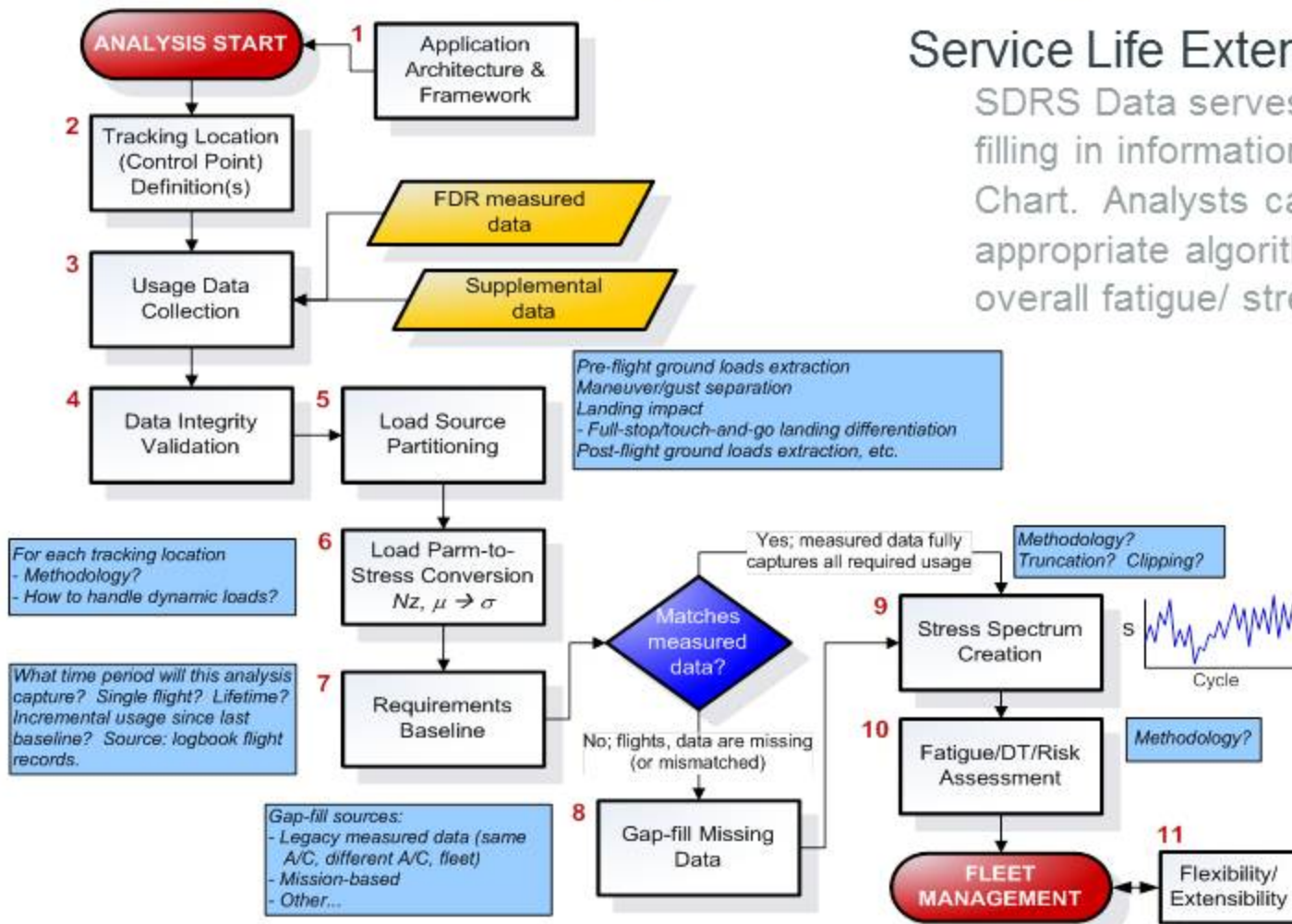


Photo courtesy of Avenger Aircraft and Services

# Current Programs using SDRS

## Service Life Extension Program

SDRS Data serves an important role in filling in information into the SLEP Flow Chart. Analysts can apply the appropriate algorithms to determine overall fatigue/ stress information.





**Systems & Electronics Inc.**

**Thank you!**

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Vice President

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