

# Donaldson Bell 205A1, UH-1H IBF

*August 1, 2020*

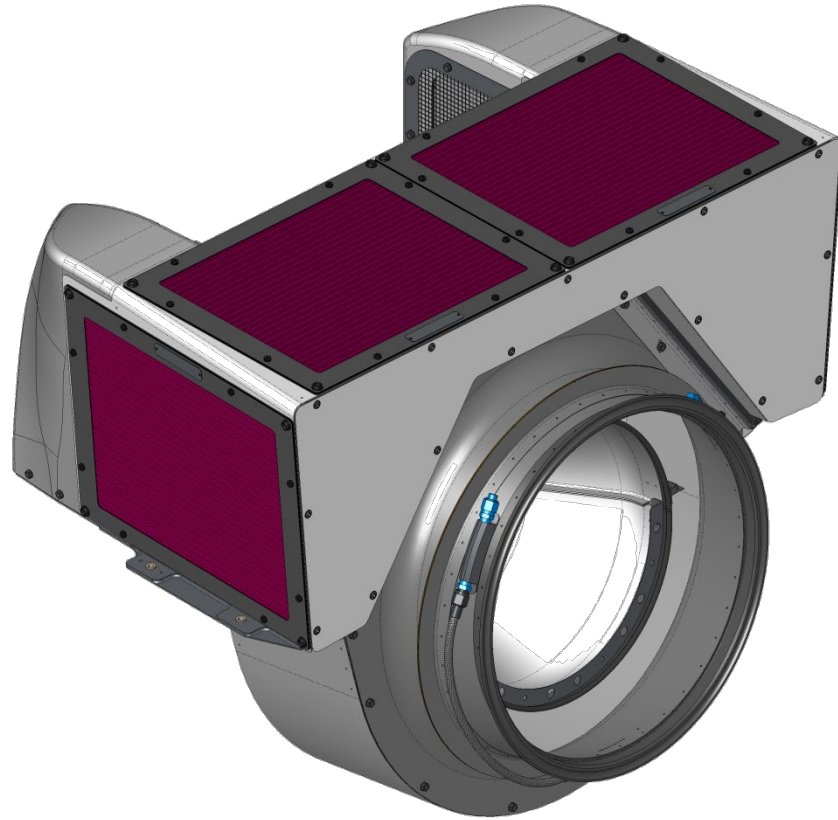
# BELL 205A1, TC UH-1H



# EAGLE SINGLE COMPATIBILITY



# BELL 205 IBF SYSTEM DESIGN



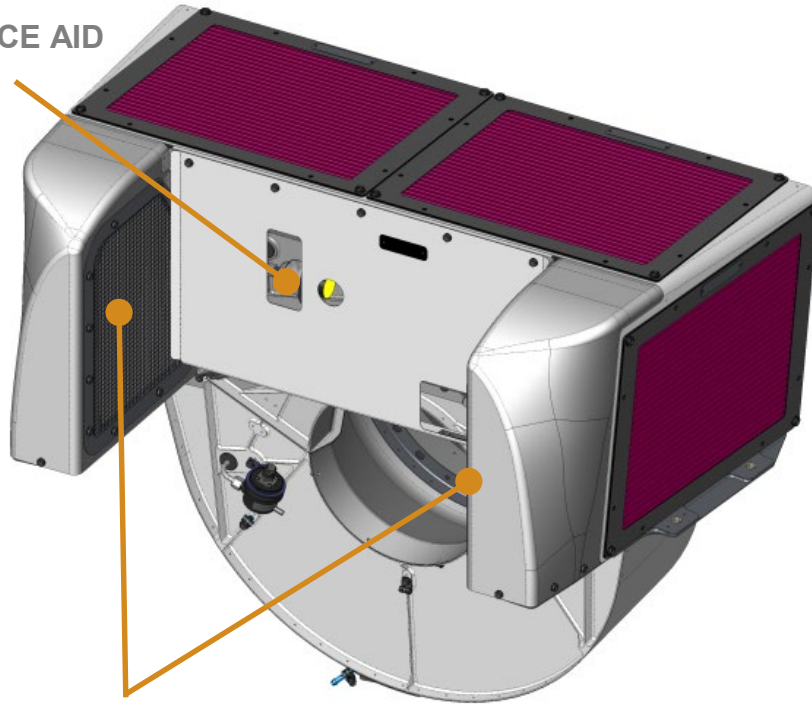
US PATENT 6,595,742





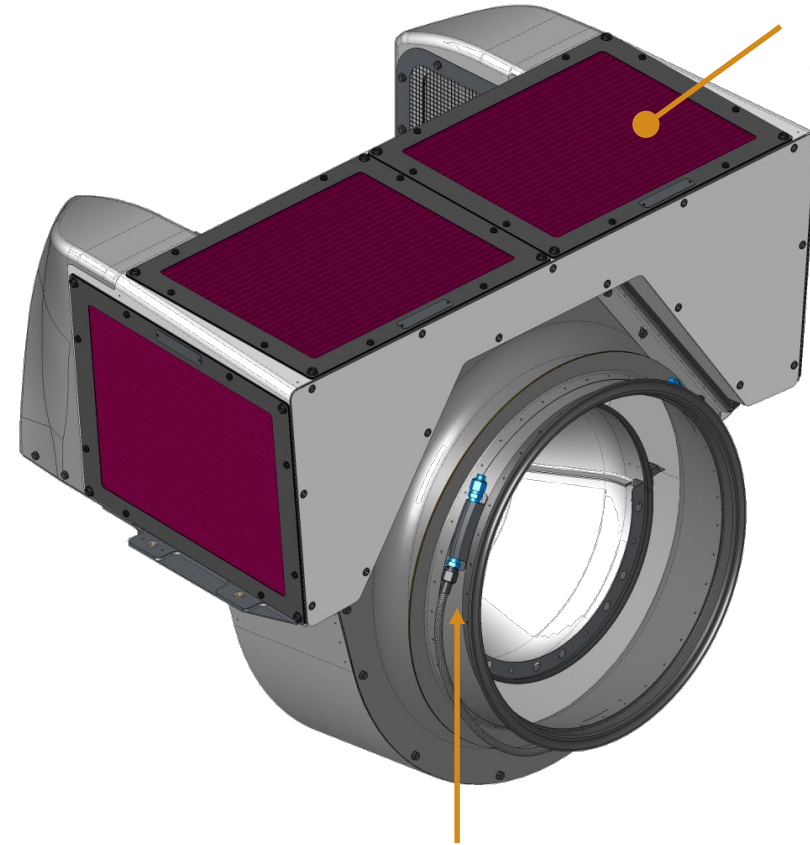
# BELL 205 IBF SYSTEM DETAILS

FILTER MAINTENANCE AID



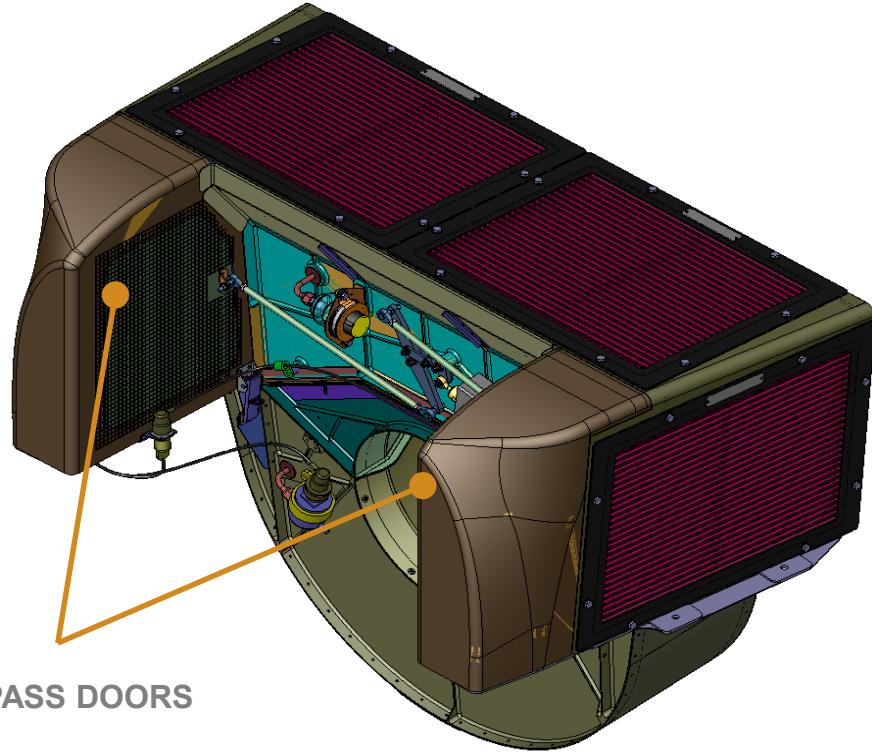
DUAL BYPASS DOORS

INTERCHANGEABLE  
FOD SCREENS  
AVAILABLE



ENGINE WATER  
WASH FITTING

# BELL 205 IBF FILTER BYPASS SYSTEM



DUAL BYPASS DOORS



Pilot commands the bypass door to open to increase engine airflow until clear of debris conditions.

**NOTE:** Aircraft with particle separators must land immediately during heavy debris conditions and do not have the ability to keep flying like aircraft with a barrier filter bypass system.

# IBF FILTER MAINTENANCE AID (FMA)

- Pre and Post flight indication of filter contamination level and maximum pressure drop.
- Allows flexibility for mission planning with predictable service cycles, particularly in high tempo desert environments.
- Verification of post cleaning effectiveness



# IBF FILTER MAINTENANCE AID (FMA)

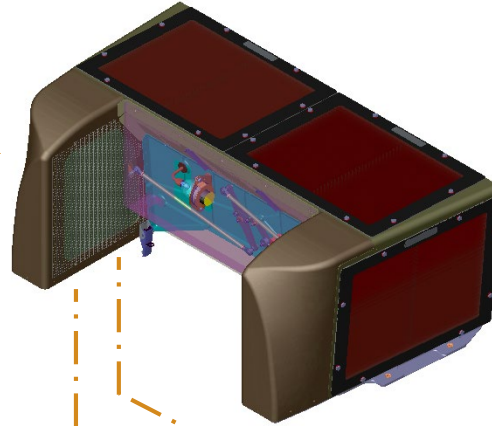
- Provides the ability to meet Condition-Based Maintenance (CBM) between established cleaning intervals, eliminating unnecessary service.
- Measures plenum pressure versus ambient, across the filter system.
- Similar FMA used on other Donaldson IBFs for the Bell 206B, 206L-1/3/4, 407, 430, Leonardo A119, AW139, AW189, Airbus AS350, EC130, MD Helicopters MD500.



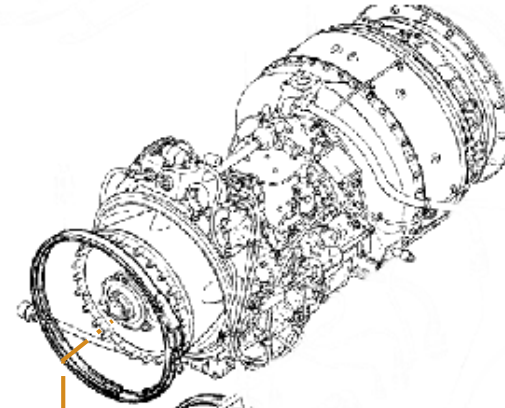


# BELL 205 IBF INSTALLATION

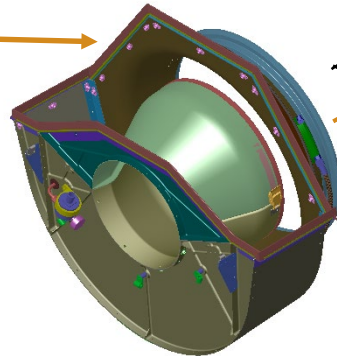
Upper plenum mounted to fixed structural deck.



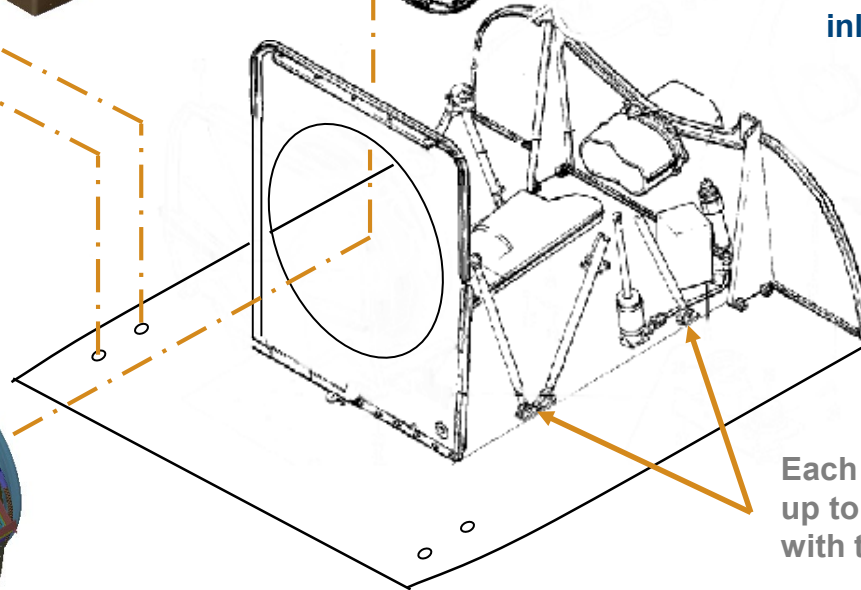
Sealed upper and lower plenum to restrict unfiltered air from entering engine inlet.



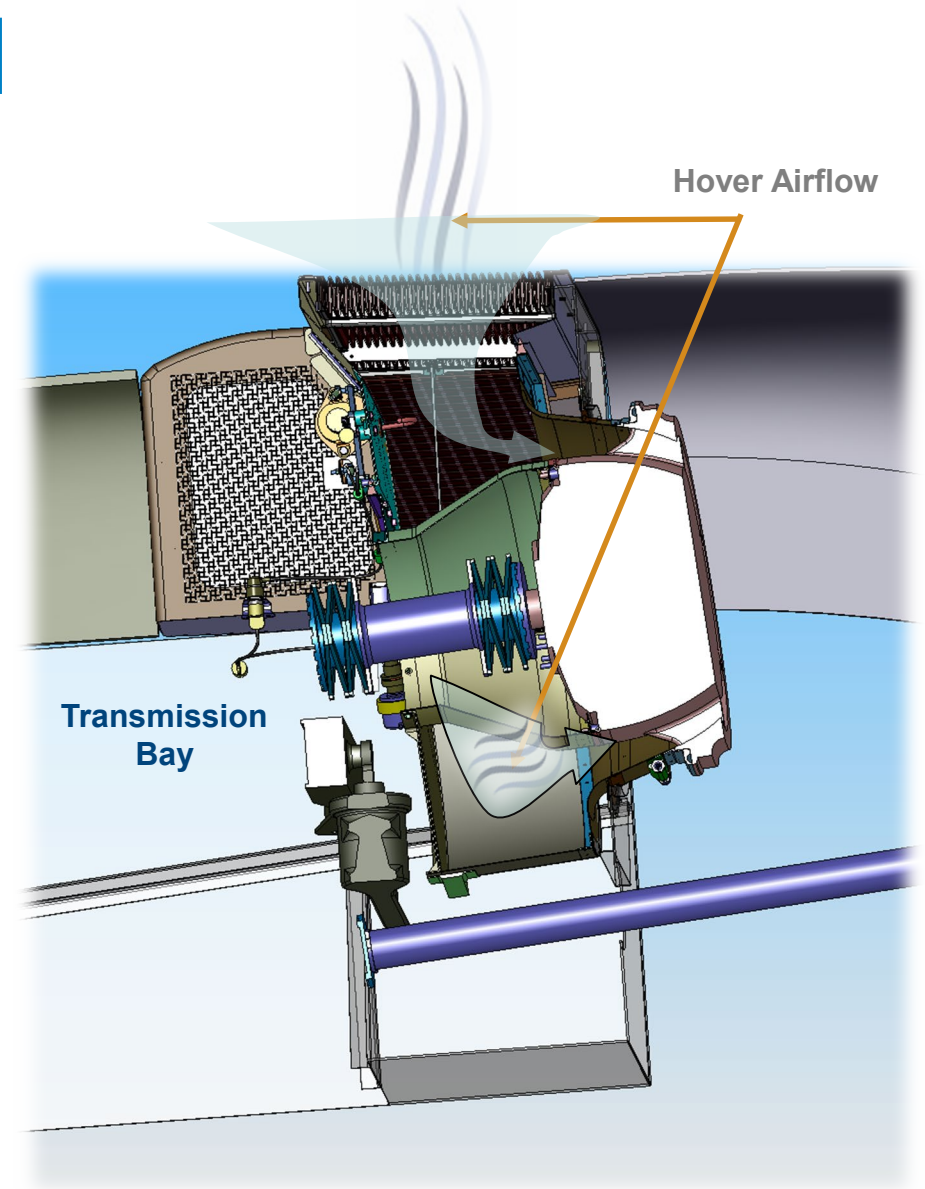
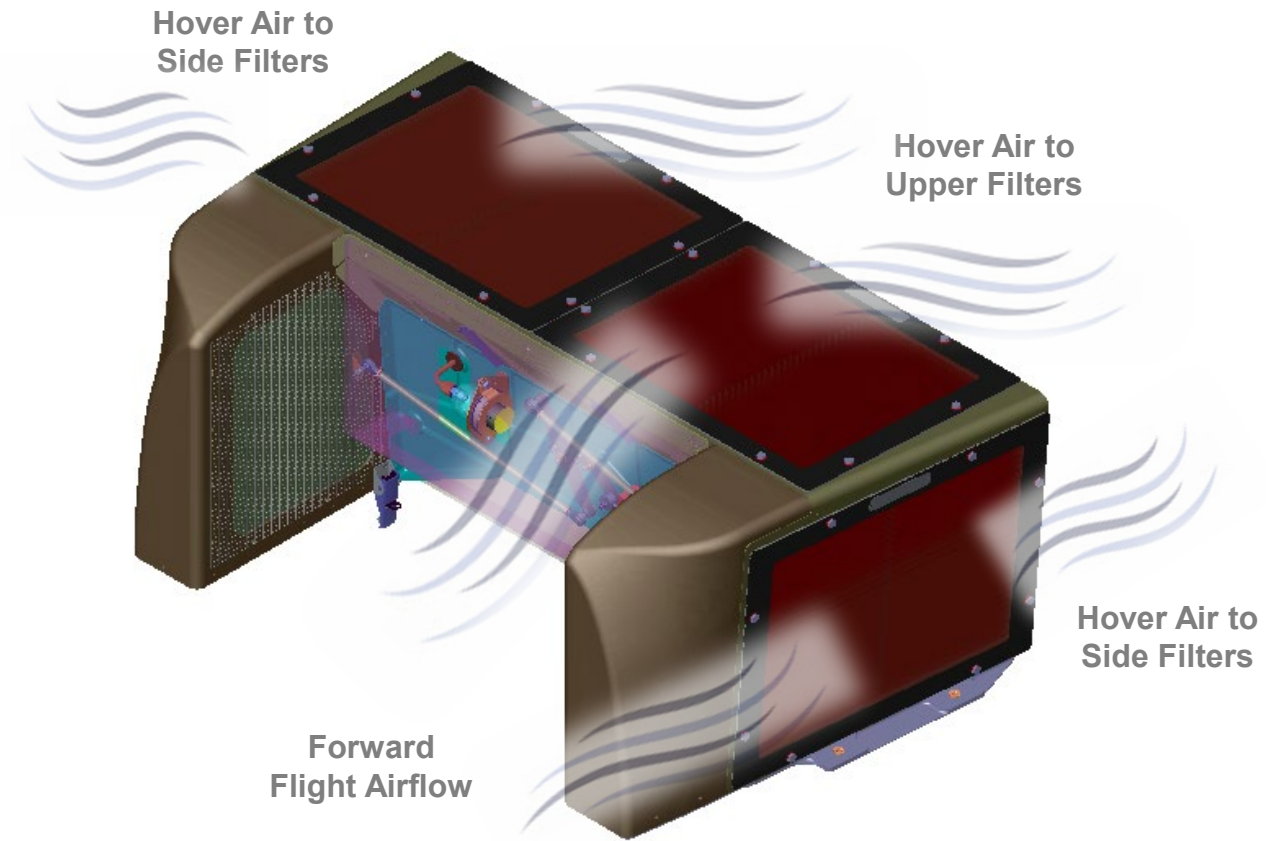
Lower plenum mounted to engine. Different engine shimming adjustments on individual aircraft shift position of lower plenum to adjust for aircraft to aircraft variations.



Each engine mount shimmed up to .300 inch to align engine with transmission.

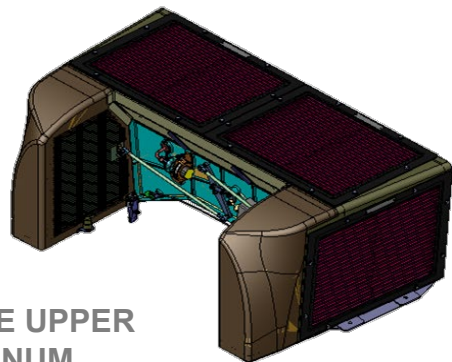


# BELL 205 IBF FLOW PATH

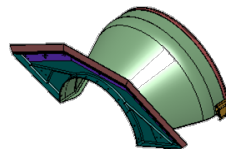


# BELL 205 ACCESS IN FIVE STEPS

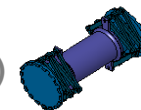
REMOVE UPPER  
PLENUM  
(4 BOLTS)



REMOVE UPPER  
INNER DUCT ASSY  
(4 LATCHES)

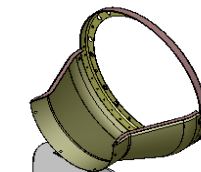


REMOVE OEM  
DRIVE SHAFT  
(2 V-BAND CLAMPS)



&

REMOVE LOWER  
DRIVESHAFT  
COVER ASSY  
(4 BOLTS,  
4 STUD NUTS)

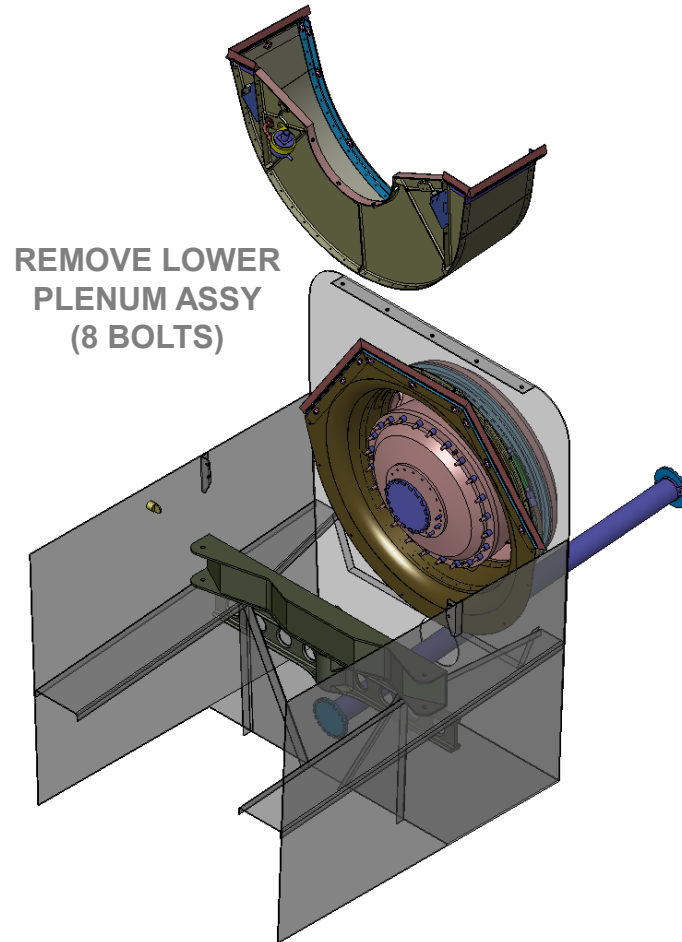


STEP 1

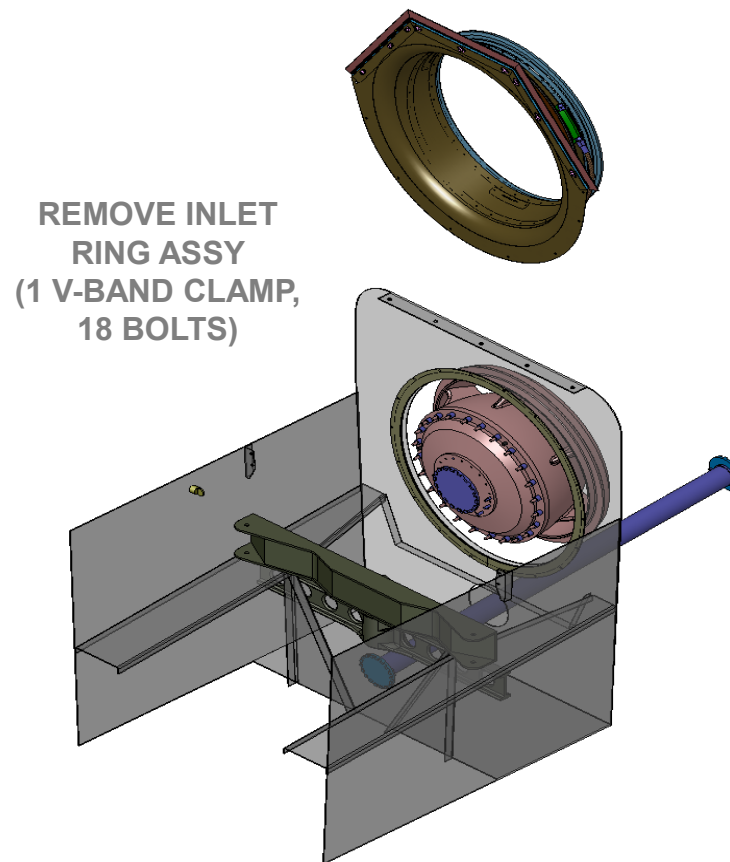
STEP 2

STEP 3

# BELL 205 ACCESS IN FIVE STEPS



STEP 4



STEP 5



# BELL 205 COMPONENT WEIGHTS

COMPONENT	EST. WEIGHT (Lbs.)
4 Filters**	19.6
Upper Plenum Assy	16.1
Upper Inner Duct Assy	1.7
Lower Plenum Assy	6.1
Inlet Ring Assy	7.7
TOTAL	51.2*

\*IPS & DRAIN WEIGHT – 65 LBS

\*\*WEIGHT OF DIRT NOT INCLUDED

# IBF FEATURES

- Sealed plenum design composed of sheet metal, machined aluminum and composite parts.
- Donaldson IBF replaces Engine Air Particle Separator (EAPS), Improved Particle Separator (IPS) or FOD screen assemblies.
- Upper plenum houses 4 filters and mounts to aircraft structure similar to IPS.
- Compression seal between upper and lower plenum.
- Actuator driven dual bypass doors, actuator common with Donaldson Bell 407 and 206L-3/4 IBF systems.
- Lower plenum mounts to engine front face.
- Dual bypass door to eliminate distortion in bypass operational mode.
- System disassembles in 5 pieces.
- Quick release latches and fasteners are used.



# IBF BENEFITS: PERFORMANCE

## MAXIMUM ENGINE DEBRIS/FOD PROTECTION

Allows consistent flight operations and extends engine time on wing. Improved protection over an inertial design and significantly better protection than a FOD screen.

## IMPROVED AIRFLOW

Pleated barrier filter element provides improved air flow versus inertial separation vortex/swirl tubes typical with IPS.



# IBF BENEFITS: VALUE

## RETURN ON INVESTMENT (ROI)

- Less premature engine removals, meet the expected engine TBO
- Long-life 4,500 flight hour filter assemblies (15 cleanings; 300-hour intervals)
- Reduction in corrosive salt air entering engine
- Engine overhaul cost reduction due to elimination of erosion and contamination on all rotating and pneumatic components
- Reduced maintenance time with improved plenum access.
- Common Line Replaceable Units (LRU) for mixed IBF fleets.
- Bleed air system maintenance eliminated with IBF



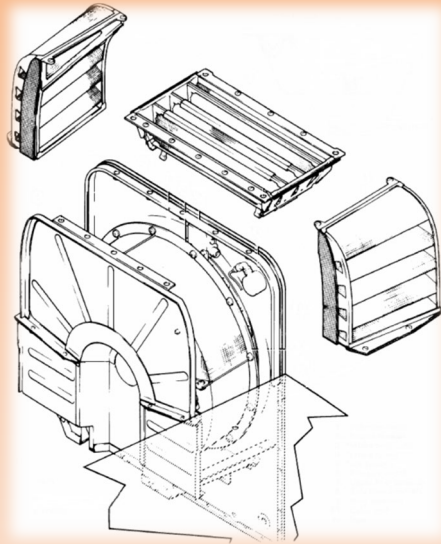


# IBF OPERATIONAL CONSIDERATIONS

- Improved power margin for high/hot operations and confined landing zones. Certified for operation with basic inlet charts.
- Engine performance retention after barrier filter installation.
- Inlet air bypass system backup not available with IPS; added safety feature.
- Certified for flight in falling and blowing snow IAW helicopter manufacturers flight manual requirements.
- Improved engine inlet and drive shaft access.
- Common components with other Donaldson IBF systems.
- Integrated engine water wash capability does not require filter removal.
- Over 10 pounds lighter than IPS.



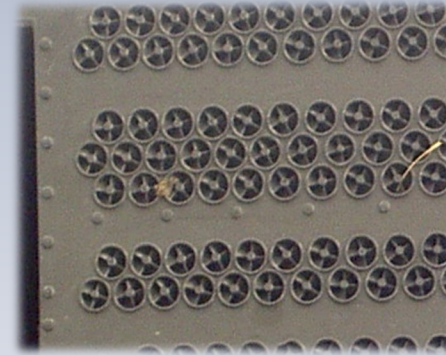
# PREVIOUS 205 EAPS & IPS SYSTEMS



**Pleated Screen/Foam Filters  
With FOD Screen**



**Inertial Particle Separator  
With Pleated Screen**



**Improved Particle Separator  
(61 Lbs)**

# IBF COMPARATIVE BENEFITS

- Engine Air Particle Separators (EAPS) utilize traditional inertial particle separation technology. Barrier Filters (BF) use current technology and state of the art integration.
- BF does not require the use of engine bleed air. EAPS does require engine bleed air which reduces engine power available.
- Engine bleed air system maintenance is eliminated. Reduced chance of engine stall from leaking valves and lines.
- Inertial separation vortex/swirl tubes routinely become clogged with straw, leaves and bugs degrading performance; Barrier filter immune to this type debris clogging and operates without degradation.



# IBF COMPARATIVE BENEFITS

- Barrier filters (BF) have significantly higher separation efficiency than inertial separators. BF typically >99% capture efficient on ISO Coarse & Fine dust, inertial separator typically <96% capture efficiency on ISO Coarse dust and far less on ISO Fine dust.
- BF are effective regardless of engine power setting; inertial separators (PS) are only effective when they have adequate engine bleed air; PS adequacy typically available above flight idle power setting.
- Significant decrease in fine sand ingestion reduces engine erosion damage from offsite landings/unprepared sites; BF virtually eliminate concern about ramp FOD ingestion.





# Thank You

Donaldson Company, Inc.  
Aerospace & Defense Group

[www.DonaldsonAerospace-Defense.com](http://www.DonaldsonAerospace-Defense.com)

North America +1-877-314-9640  
[aerospace.americas@donaldson.com](mailto:aerospace.americas@donaldson.com)  
Europe +33 1 30866698  
[aerospace.emea@donaldson.com](mailto:aerospace.emea@donaldson.com)



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