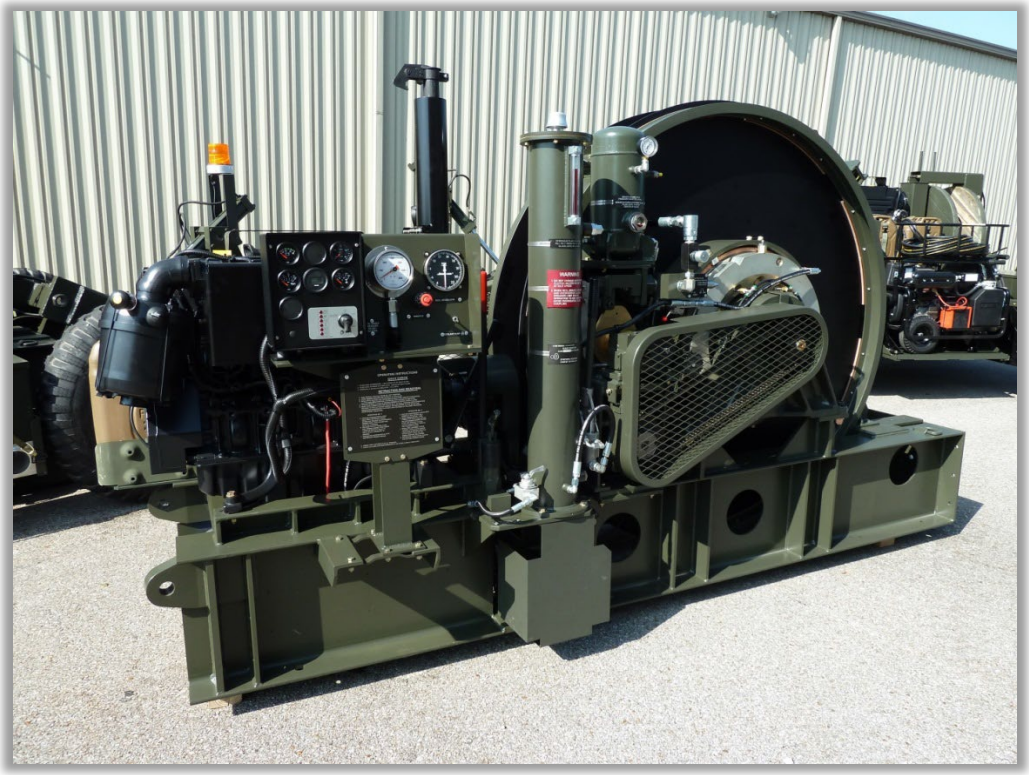
USAF STANDARD BAK-12



AIRCRAFT ARRESTING SYSTEM

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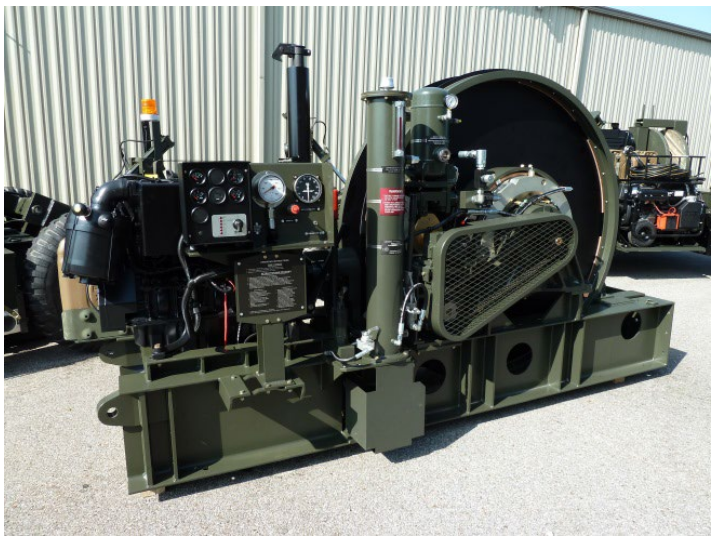
1 General Description

The BAK-12 Aircraft Arresting System (AAS) is the United States Air Force's prime arresting system used to save lives and fighter aircraft by preventing aircraft from overrunning the runway in cases where the pilot is unable to come to a stop during a troubled landing or aborted takeoff operation. The BAK-12 has been in service since the early 1970s, with 5,000+ successful arrestments, in over 60 countries worldwide. The BAK-12 possesses the capability to successfully arrest all modern fighter aircraft currently in operation, making the BAK-12 the standard arresting gear for tail-hook equipped fighters/multinational platforms.



The BAK-12 can be installed in multiple configurations to accommodate end-user requirements. Expeditionary installation utilizing anchor stakes, Semi-permanent installations above ground with or without fixed housing on concrete, and Permanent installation in concrete pits below grade. To provide additional setback for wide winged aircraft or reduce runway obstruction within the frangible area, fairlead beams or runway edge sheaves can be utilized. The BAK-12 can also be used as the energy absorber in installations equipped with the ATECH net barrier (BAK-15) designed to arrest aircraft that are not equipped with a tail hook or as a secondary back up if in case of a hook miss in the primary cable system. For such an installation, the pendant is replaced by a net and stanchion systems. The BAK-15 is also available as a combined net barrier/hook cable version.

Each energy absorber braking system is equipped with two hydraulically actuated, rotary friction brakes consisting of rotors, stators, pressure plate, backing plate, and carrier housing. The two energy absorbers in the system are hydraulically synchronized to ensure equal braking pressure during an arrestment and autocorrects during the event of off-center engagements.

The BAK-12 energy absorber is equipped with a diesel engine rewind system combined with a hydraulic clutch that is used to restore the tape to the tape reel and ready the system to its battery mode.

Documentation following each delivery includes all necessary technical manuals to instruct technicians in regards the installation, operation and maintenance of the aircraft arresting system. An operation and maintenance training course is recommended at the time of commissioning.

2 Leading Particulars

Characteristic	Description
Operating Temperature Range (at sea level)	-40 to +125°F (-40 to +52C)
Dimensions Length Width Height	(Energy absorber only) 125 inches 52 inches 67 inches
Weight	7,000 lbs (Energy absorber only)
Energy Absorbing Capacity	98 x 10^6 ft-lb
Runout	1,200 ft
Aircraft Engaging Speed (nominal)	190 knots *According to US Air Force instruction AFI32-1043 190 knots is the dynamic limit for steel cables used in AAS. Random failures will occur at 190 knots and above; therefore 180 knots is established as the working limit for cable engagement systems.*
Rewind System	DEUTZ 65HP diesel engine model D 2011 L04
Rewind Time	3 minutes or less at 1200 ft runout
Purchase Tape Material Width x Thickness Breaking strength	 Nylon 8.5 in x 0.225 in 105,000 lb. minimum
Runway Pendant/Hook Cable Type Dimension Construction Length	18x7 non-spin wire rope 1-1/4 inch diameter To suit runway width
Engagement direction	Bi-directional

3 Design Basis

The BAK-12 AAS was originally designed for stopping aircraft with weights ranging from 5 up to the 35 ton range. During its service life, the BAK-12 has undergone modifications which have improved its performance, such as extended runout, updated cam and pressure setting. As a result, the BAK-12's current performance includes the capability to safely arrest all current fighters, with full certification conducted by the USAF for their operated aircraft (e.g. F-16, F-15, F-35).

The braking system is capable of performing up to 10 years of operational service without any major overhaul, provided correct maintenance procedures are carried out according to the provided manual on schedule and between engagements.

The system is designed to operate under the following environmental conditions:

- Ambient temperatures ranging from -40 to +52 degrees C
- Humidity, all conditions including rain, sleet and snow
- Dust as encountered in desert areas
- Fungus growth as encountered in tropical areas

Rewinding and restore of the brake to operating status after an engagement takes approximately 3 minutes with three technicians.

4 Description of Function and Design

4.1 Brake System Components

The Braking system's function is to bring the aircraft to a safe controlled stop during the event of an emergency landing/aborted takeoff. One friction brake assembly is mounted on each side of the tape reel assembly of the BAK-12 energy absorber. The brakes are actuated by the hydraulic control system and described below.

Each brake assembly consists of:

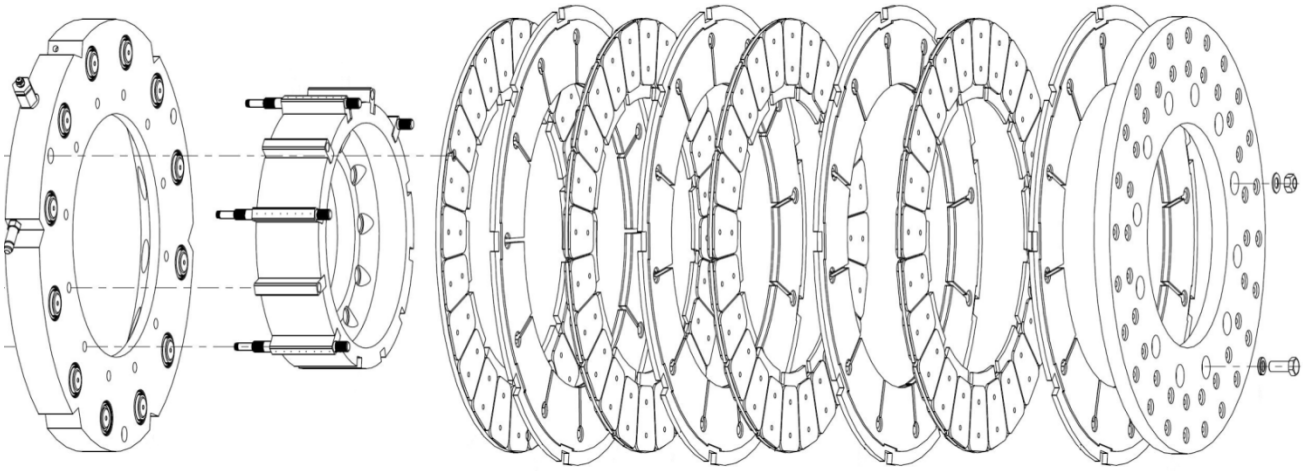
1. A brake carrier and torque tube supported by the tape reel pillow block.

2. A pressure plate with metallic wear pads for contact with the first of the sintered metallic rotors.

3. The rotors, which are keyed to the tape reel through the brake drum.

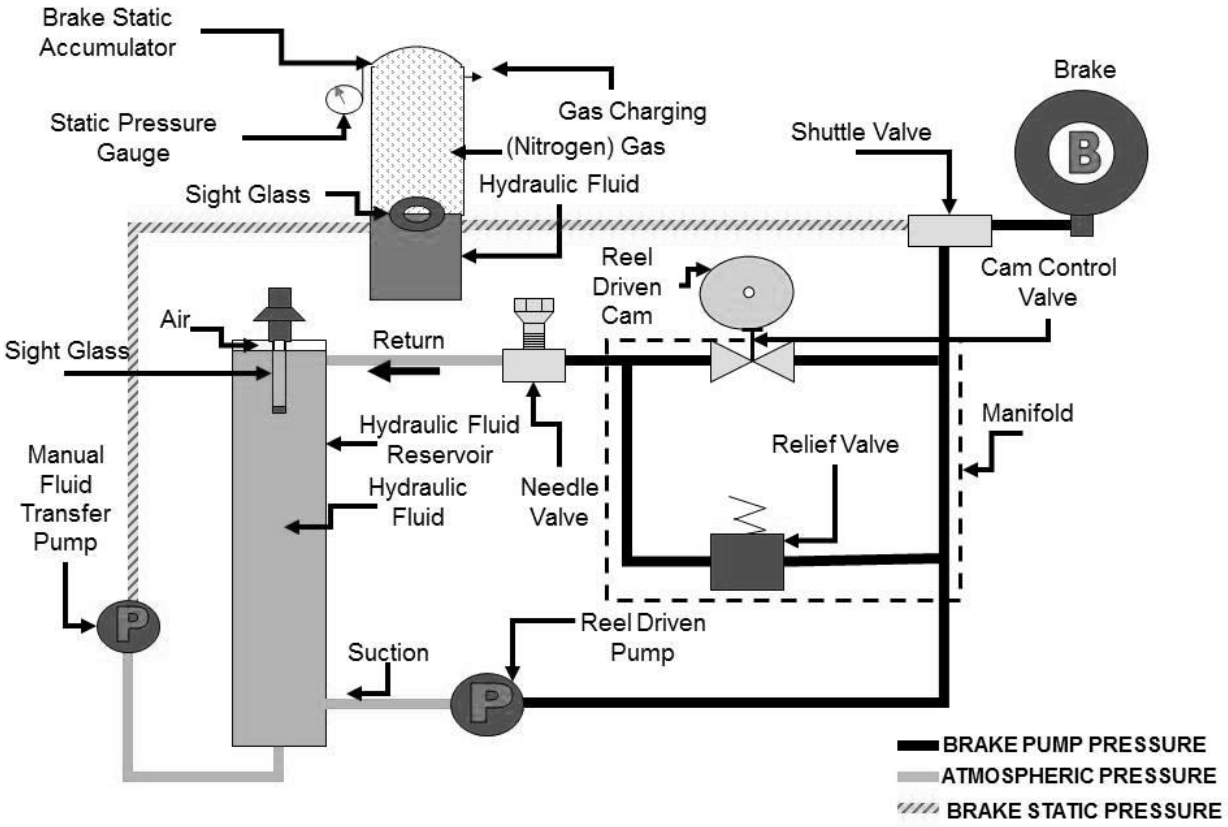
4. The stators, with wear pads on both surfaces and keyed to the torque tube.

5. The backing plate.



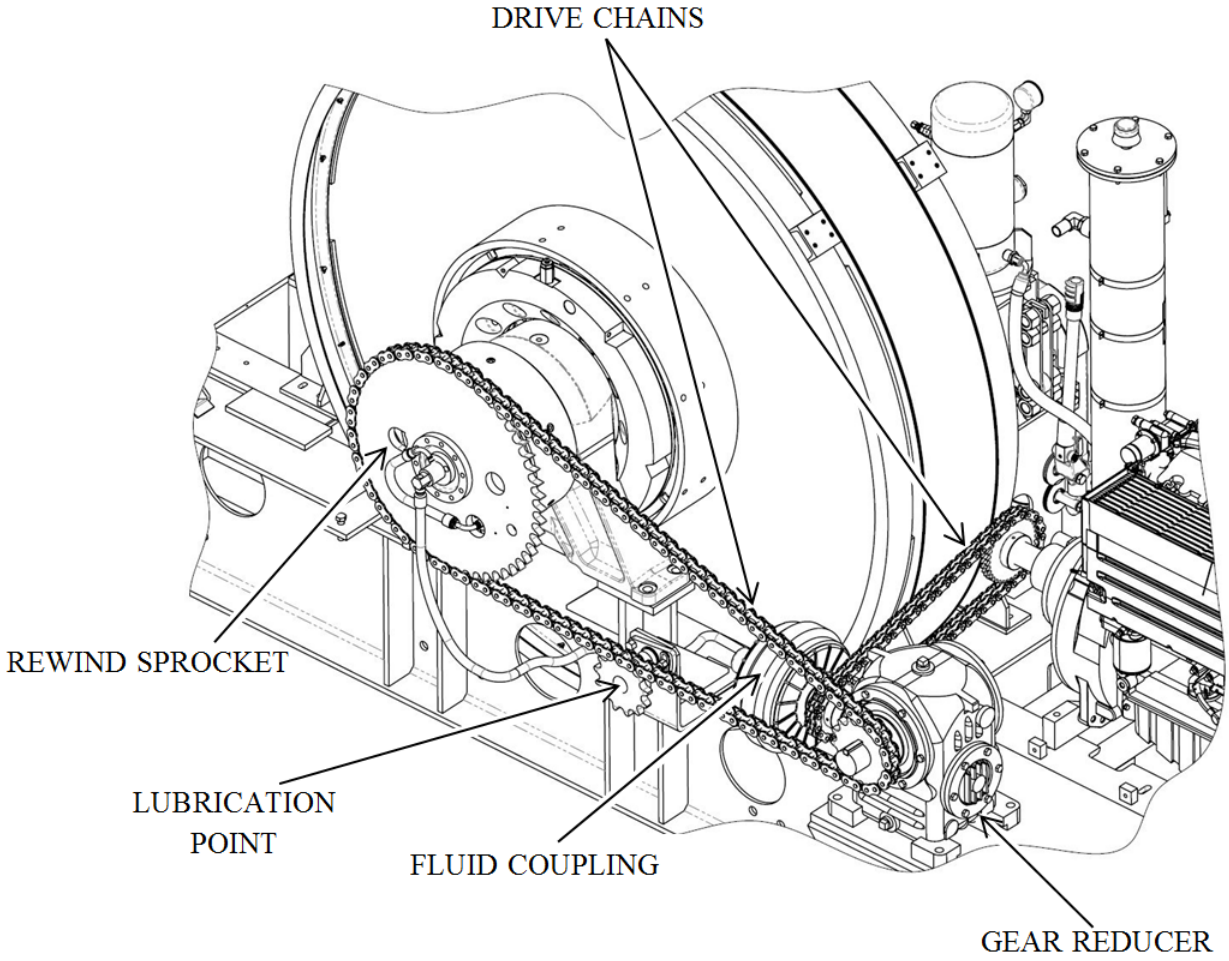
4.2 Hydraulic Control System

The BAK-12 energy absorber incorporates a hydraulic control circuit to provide suitable brake pressures for specific aircraft weight ranges. This adaptive control system will regulate brake pressure with respect to aircraft velocity, position, and weight. As the hydraulic pump develops pressure proportional to aircraft speed and the cam-actuated valve regulates pressure passed on to the brakes according to aircraft progress within the arrestment cycle. The overall brake pressure level is set by a needle valve to provide for large range of aircraft weight.



4.3 Rewind System

The BAK-12 rewind system utilizes the DEUTZ 65HP diesel engine. The multi-fuel DEUTZ possesses a significant amount of lower end torque, extended engine life, faster rewind time, and flex fuel (JP-8 and Diesel) capability. In addition, the rewind system includes a hydraulically actuated clutch which decreased tape rewind time, and reduces wear on gear boxes.



5 Periodic Maintenance and Inspection

In order to maintain the arresting system in peak operating condition, regularly required inspections and preventative maintenance actions are required. In addition to the periodic inspection and preventive maintenance, the BAK-12 AAS shall be overhauled every ten years or 500 arrestments, whichever occurs first.

Operation	**Interval**
1. Replace pendant/hook cable	Maximum 36 months
2. Crop end of tape	Every 6 months
3. Turn tape end for end	Every 24 months
4. Synchronize units and proof test hydraulic system	Every 3 months
5. Perform functional check-out	Monthly
6. Clean entire equipment	As needed
7. Replace tape	Maximum 48 months
8. Change rewind engine air filter	Every 6 months
9. Change rewind engine oil filter	Every 6 months
10. Bleed brakes	Weekly
11. Bleed clutch	Weekly
12. Bleed maximum brake pressure gauge	Weekly
13. Drain rewind engine exhaust moisture trap.	Weekly
14. Anchor inspection per paragraph	Every 10 years

6 System Installation Types

The BAK-12 AAS supports multiple installation types, where the semi-permanent (above grade on concrete foundations) and permanent (below grade in concrete pits) are the two most common. Either of these installation types can be used with additional supporting equipment to meet the need of end user requirements.

For set-back installations the standard tape guide system for the runway edge is the Fairlead Beam. Additionally there are means of expeditionary on-grade installations using earth anchors and fairlead beams, although this configuration is rarely used, it's recommended to use the Mobile Aircraft Arresting System (MAAS) as it is better-suited for expeditionary installations.