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M230LF Chain Gun^â Development

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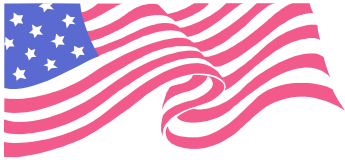


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M230LF Chain Gun[®]

Development

- M230 History
- Features
- Why a Link Fed?
- Design Goals
- Configurations
- M230LF Features



M230 History

- Development begun in 1972 by HHI
 - Externally powered guns had high profile
 - 20mm and 7.62mm Gatling Guns
- Linked WECOM 30mm “DAT” gun
 - 1975, 250K round competitive test
 - Competition was Gatling gun w/ linked WECOM round
- MDHC won gun and YAH64 competition



M230 History

- 1976 DoD gave direction to HHI
 - Re-chamber XM230 to fire ADEN/DEFA rounds for NATO interoperability
 - Contractor given responsibility for development of a family of 30mm rounds
 - M788 (TP)
 - M789 (HEDP)
 - M799



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AH-64A Apache Helicopter

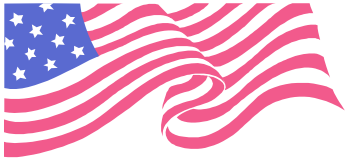




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M230 Chain Gun[®]





Ammunition

30mm x 113mm

M788, TP

- Target Practice
- Round Length (max):
199.75mm
- Case Length: 113mm
- Weight: 352.8g
- Muzzle Velocity (nominal): 805
m/s
- Chamber Pressure (typical):
415 MPa
- Penetration (typical): N/A



Information courtesy of ATK, Alliant Ammunition Systems Co.



Ammunition

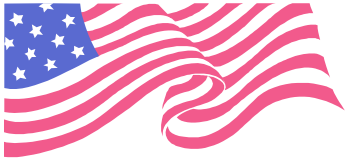
30mm x 113mm

M789, HEDP

- High Explosive Dual Purpose
- Round Length (max):
199.75mm
- Case Length: 113mm
- Weight: 350.5g
- Muzzle Velocity (nominal): 805
m/s
- Chamber Pressure (typical):
415 MPa
- Trace (typical): Available
- Penetration (typical): 25mm
RHA @ 50Á at 500m



Information courtesy of ATK, Alliant Ammunition Systems Co.



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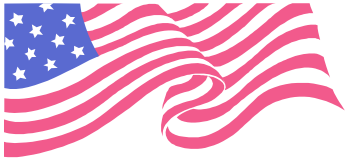
M230

Features

- 30mm x 113mm
 - M788, M789, ADEN, DEFA
 - Electric Primed
- Linear Linkless feed
- Electric Primed Ammo
- Externally powered
 - 115V, 400Hz, 3 Ø, 3 HP
- Chain drive
- 625 ± 25 shot per minute
- Rotating breech bolt

Hydraulic Recoil Dampers

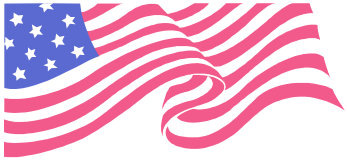
- 3000 lb peak load
- 1.0 inch recoil
- Positive timing



M230

Features

- Weight 131.5 lbs (59.6 kg)
- Small
 - Length: 65.8 Inches (167.6 cm)
 - Width: 10.5 Inches (26.0 cm)
 - Height: 11.2 Inches (28.0 cm)
 - Frontal Area: 55.0 Inches² (354.8 cm²)
- Ease of Maintenance
 - Number of Component Items approx. 120
 - Dry cycle for one minute
 - Remove and replace: Less than 10 minutes



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M230

Features

Characteristics

Barrel Life.....	25,000 Rounds
Rate of Fire.....	625 ± 25 spm
Dispersion.....	<2.0 mil
Power required.....	3.0 hp, 115 Vac, 3 Ph, 400 Hz
Reliability.....	15,000 MRBF
Safety.....	Open Bolt
Ammunition Feed.....	Linkless from right side
Case Eject.....	Left side



Why Link Fed?

- Performance of 30mm x 113mm ammunition
- Increased interest from user community
- M230 single heritage application – Apache
- Installation flexibility
- Commonality with M230 Logistics support



Why Link Fed?

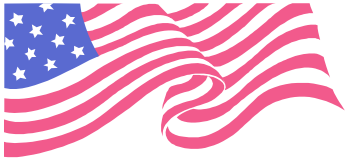
- Large Apache/M230 user base
 - Over 1,100 M230's in service world wide
 - Egypt
 - Greece
 - Israel
 - Japan
 - Netherlands
 - Saudi Arabia
 - Singapore
 - UAE
 - UK
 - **US Army**



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Design Goals f

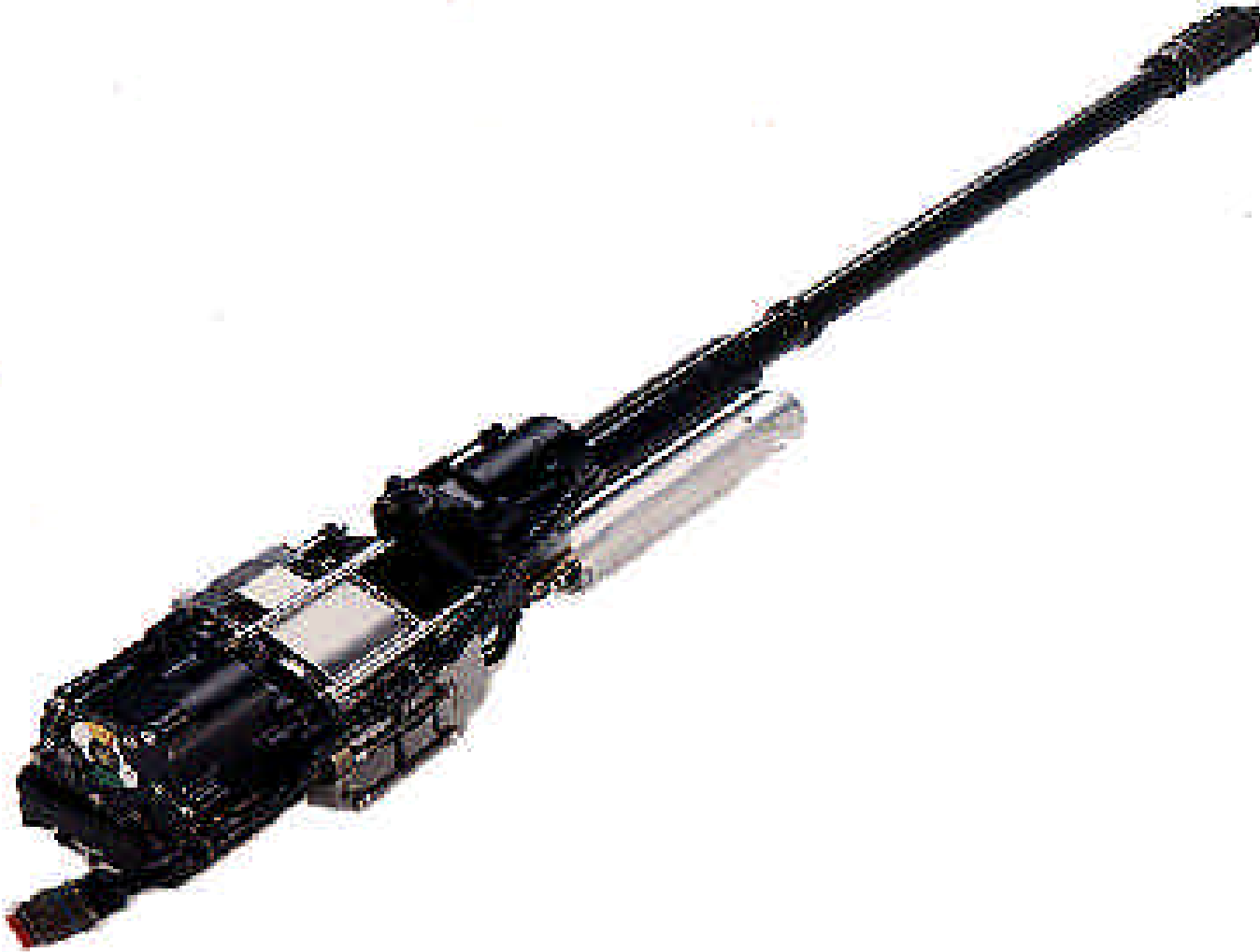
- Integral de-linking feeder
- Compatible with existing MK 12 ADEN link
- Maximize commonality with M230 cannon
- Hang fire protection for man-rated installations
- Rate of fire and recoil loads suitable for medium to light ground or naval applications
- 24 VDC operation
- Compact & simple



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M230LF-1

Single Recoil Adapter





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M230LF-1

Features

- 30mm x 113mm
 - M788, M789, ADEN, DEFA
 - Electric Primed
- Linked ammunition feed
- Electric Primed Ammo
- Externally powered
 - 24 VDC, 1 HP
- Hangfire Safety
- Chain drive
- 200 ± 25 shot per minute
- Rotating breech bolt
- Open bolt firing
- Single Recoil Damper
 - 6,500 lb peak load
 - 0.3 inch recoil
- Positive timing



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M230LF-2 Standard Recoil



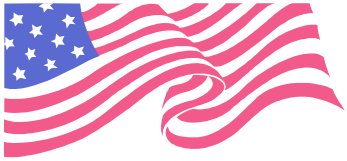


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M230LF-2

Features

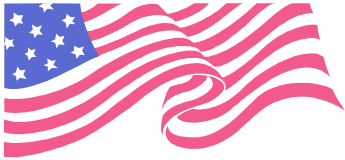
- 30mm x 113mm
 - M788, M789, ADEN, DEFA
 - Electric Primed
- Linked ammunition feed
- Electric Primed Ammo
- Externally powered
 - 24 VDC, 1 HP
- Hangfire Safety
- Chain drive
- 200 ± 25 shot per minute
- Rotating breech bolt
- Open bolt firing
- Hydraulic Recoil Dampers
 - 1,650 lb peak load
 - 1.4 inch recoil
- Positive timing



M230LF

Features

- Weight- 160 lbs (72.7 kg) w/ 60” barrel
- Small
 - Length: 84 Inches (213.4 cm)
 - Width: 10.5 Inches (26.7 cm)
 - Height: 11.4 Inches (29.0 cm)
 - Frontal Area: 55.0 Sq In. (354.8 Sq cm)
- Ease of Maintenance
 - Approximately 65% common with M230

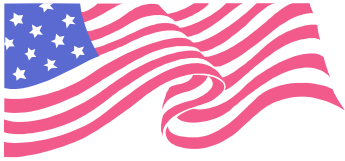


M230LF

Features

Characteristics

Barrel Life.....	25,000 Rounds
Rate of Fire.....	200 ± 25 spm
Dispersion.....	<2.0 mil
Power Required.....	1.0 hp, 24 Vdc
Reliability.....	15,000 MRBF
Safety.....	Hang-fire Safety Mechanism
Ammunition Feed.....	Linked feed from right side
Case & Link Eject.....	Left side



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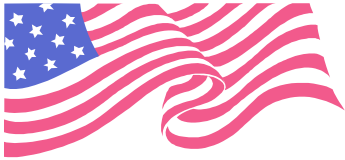
Barrel Comparison

M230

- Length - 42 in (106.7 cm)
- Muzzle velocity
2,624 ft/s (800 m/s)
- Weight-32 lb (14.5 kg)

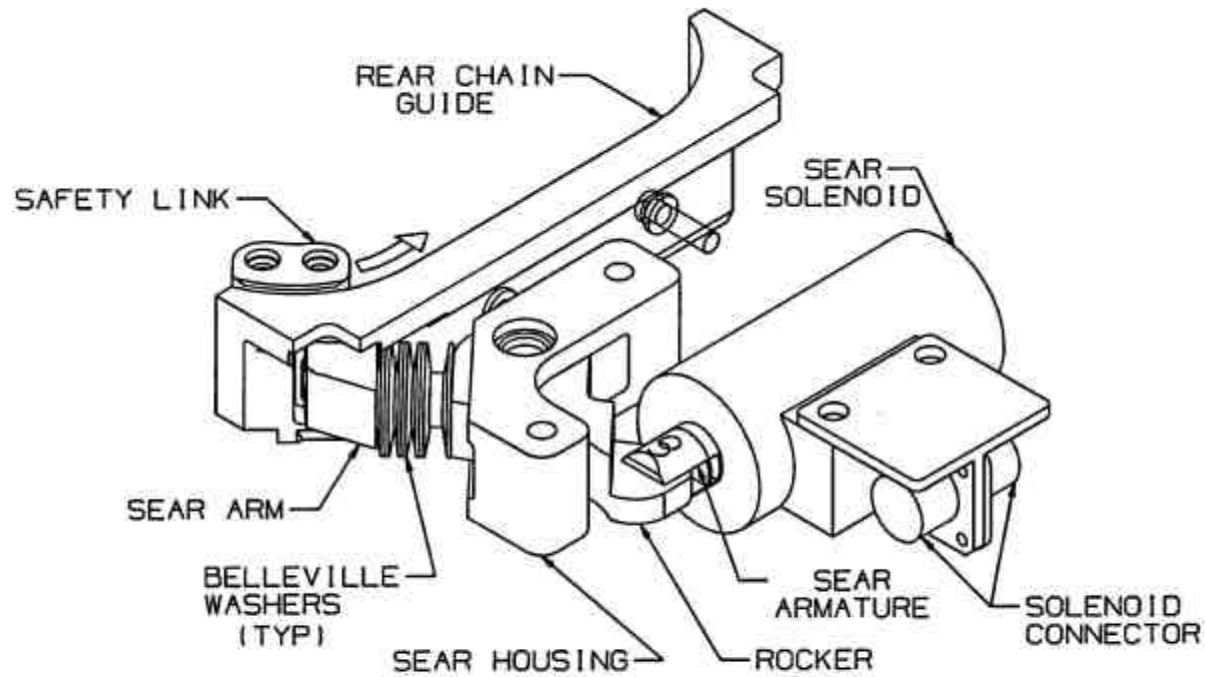
M230LF

- Length - 60 in (152.4 cm)
- Muzzle velocity
2,750 ft/s (838 m/s)
- Weight - 45 lb (20.2 kg)

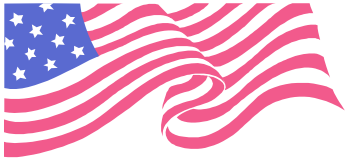


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M230LF Anti-Hangfire Safety

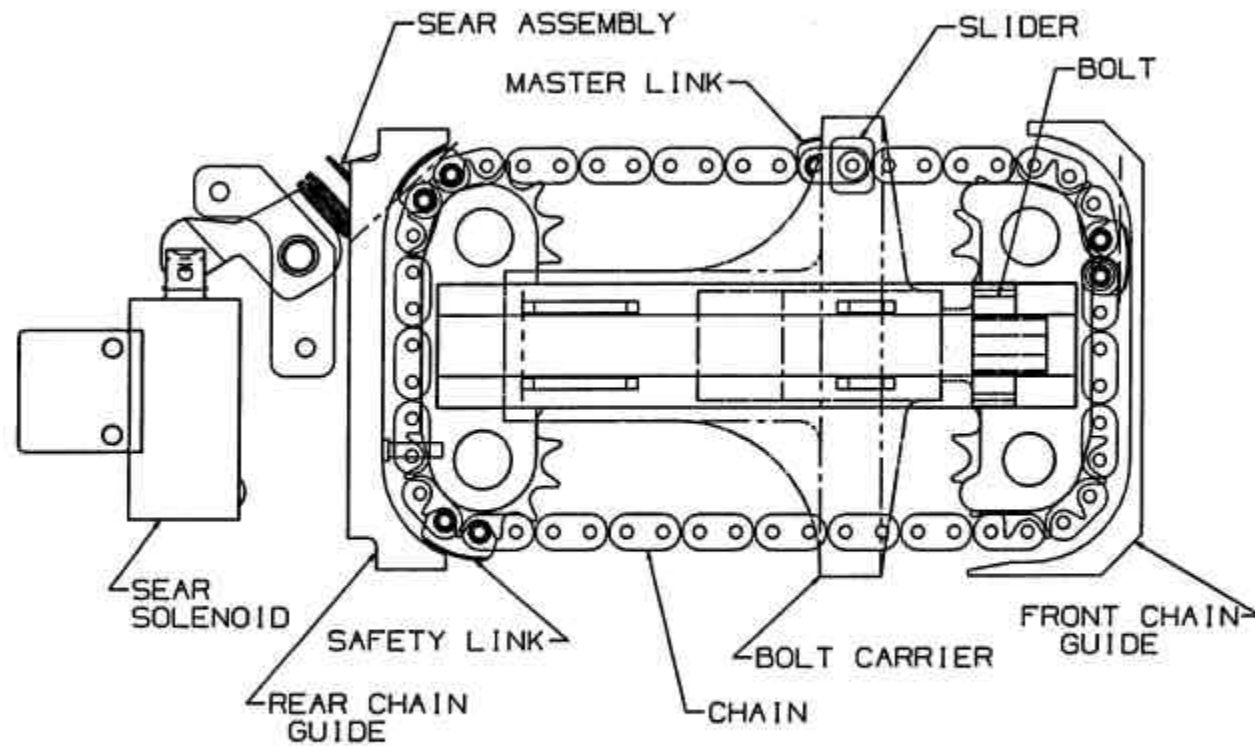


M230LF
HANGFIRE SAFETY
MECHANISM

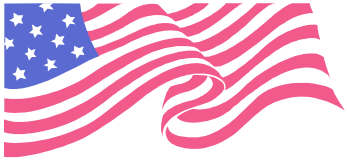


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M230LF Operating Group

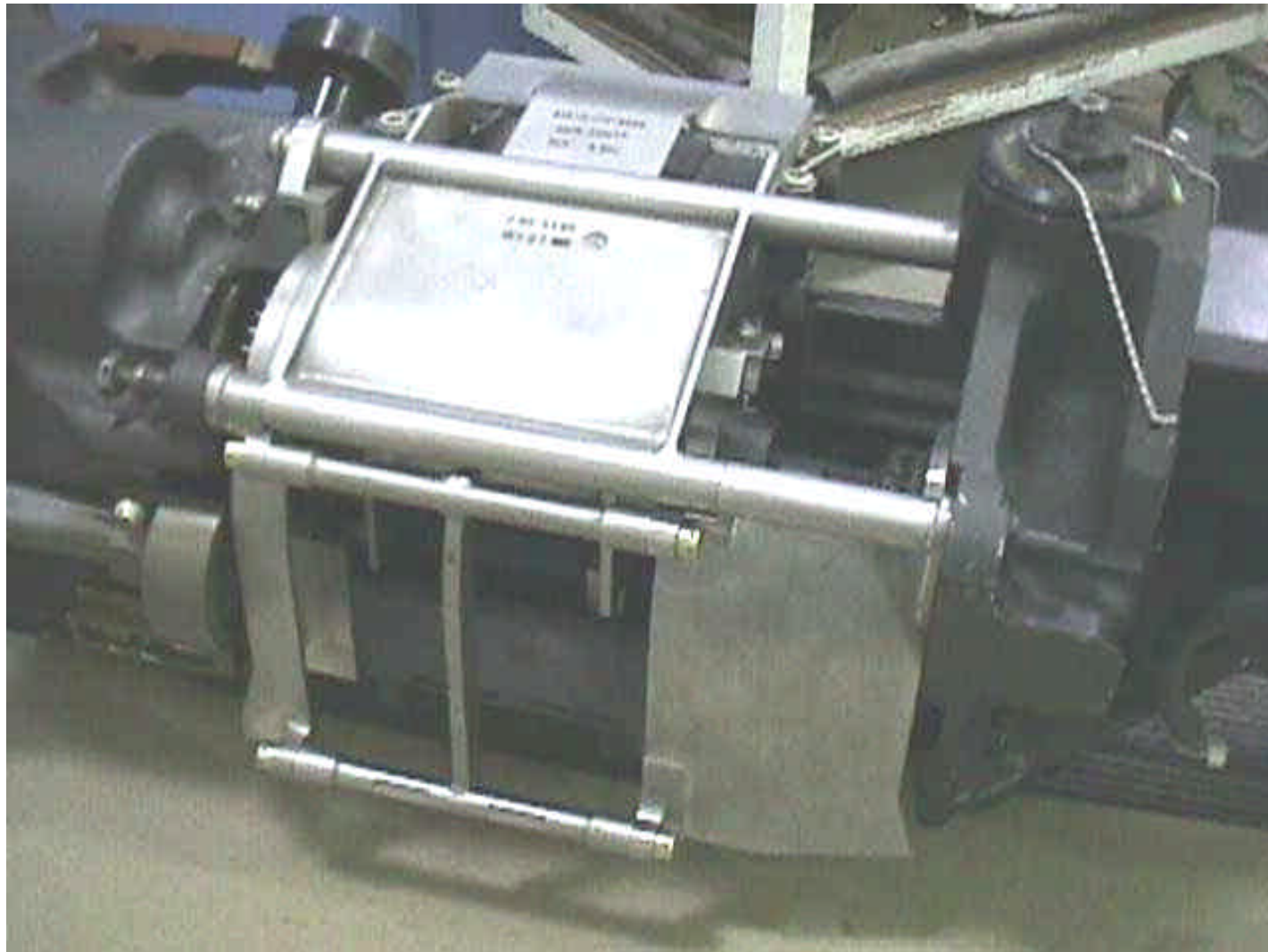


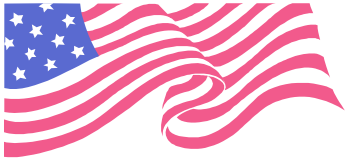
M230LF OPERATING GROUP



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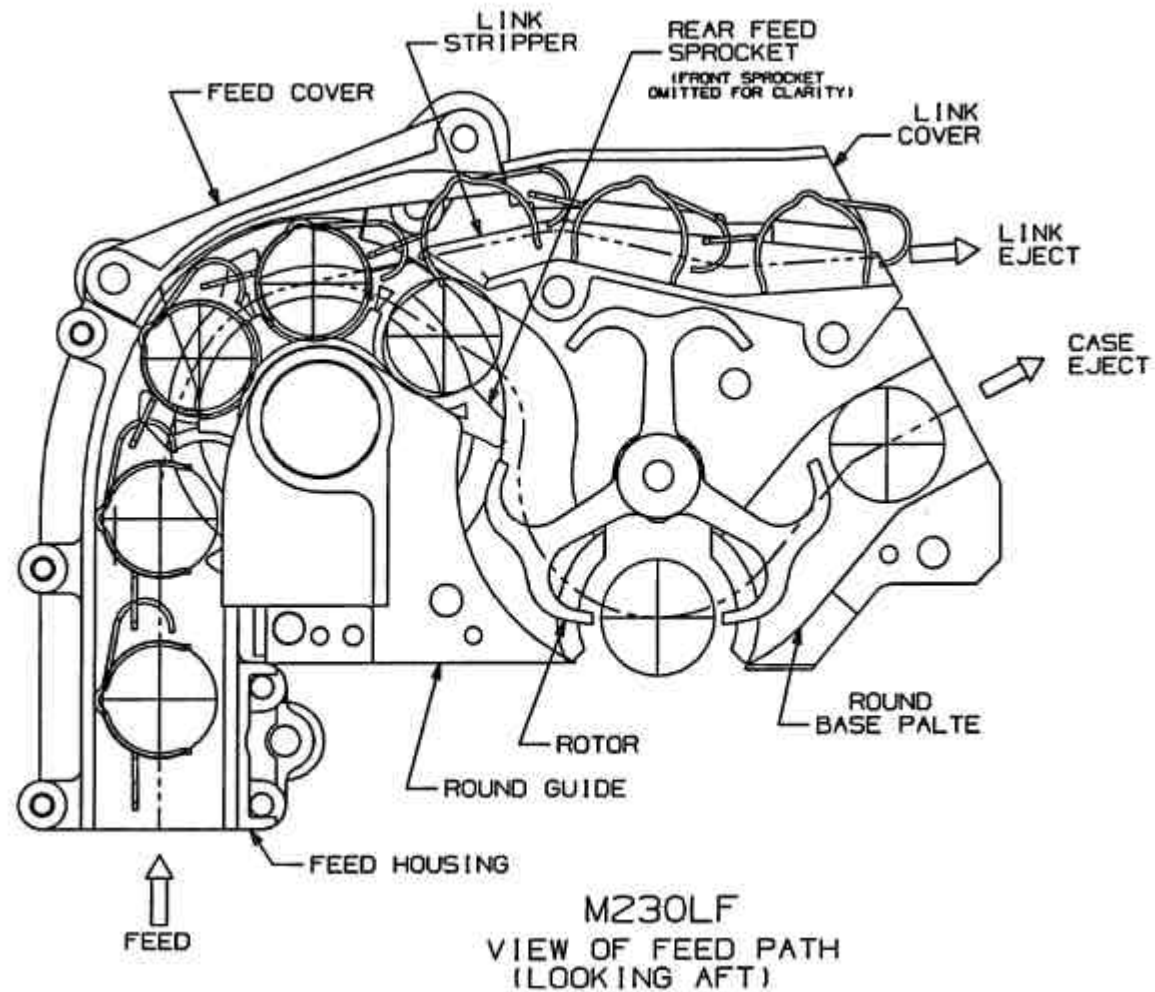
Integral De-linking Feed





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M230LF Feed Path

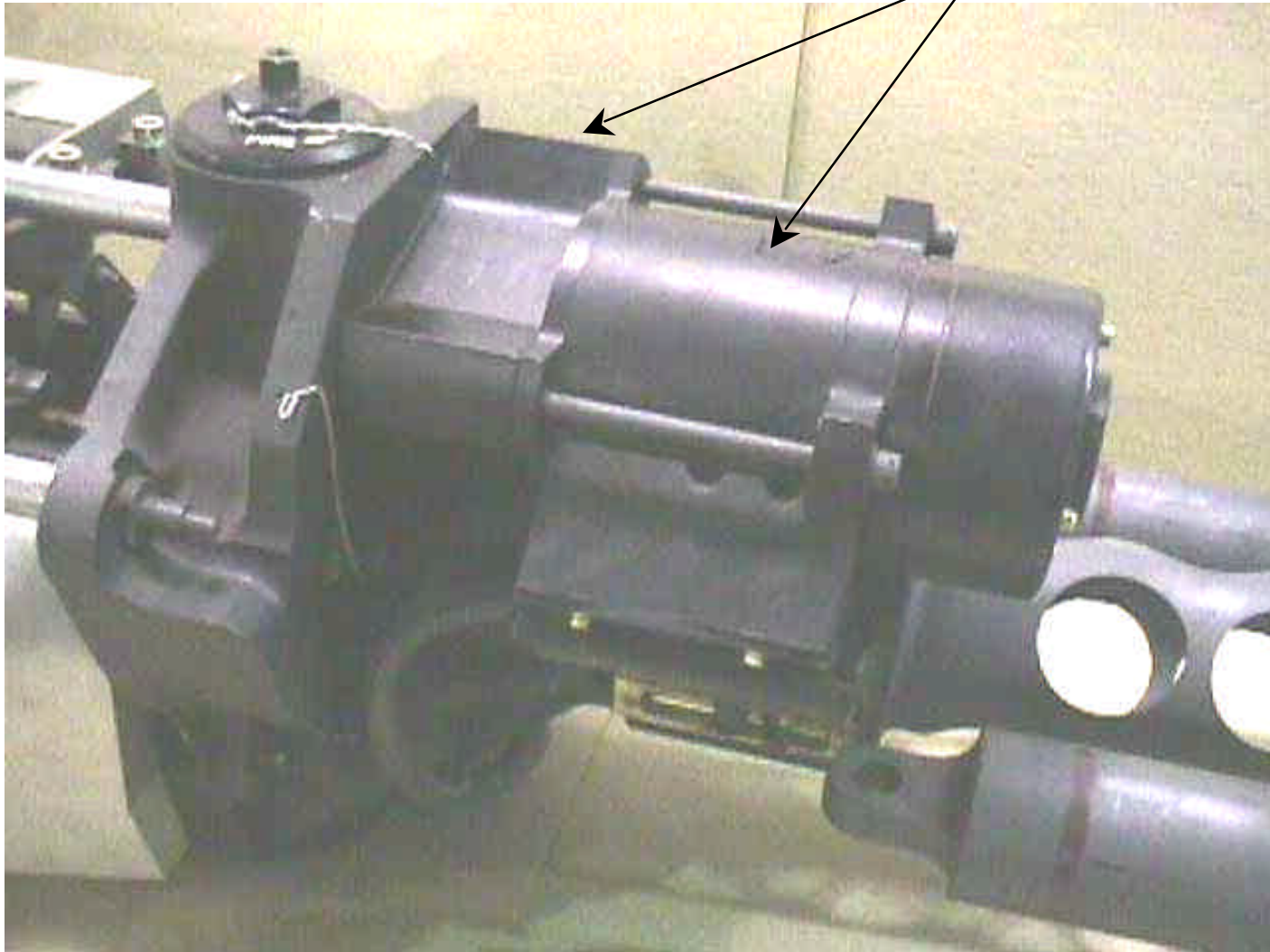




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24 Vdc Motor Operation

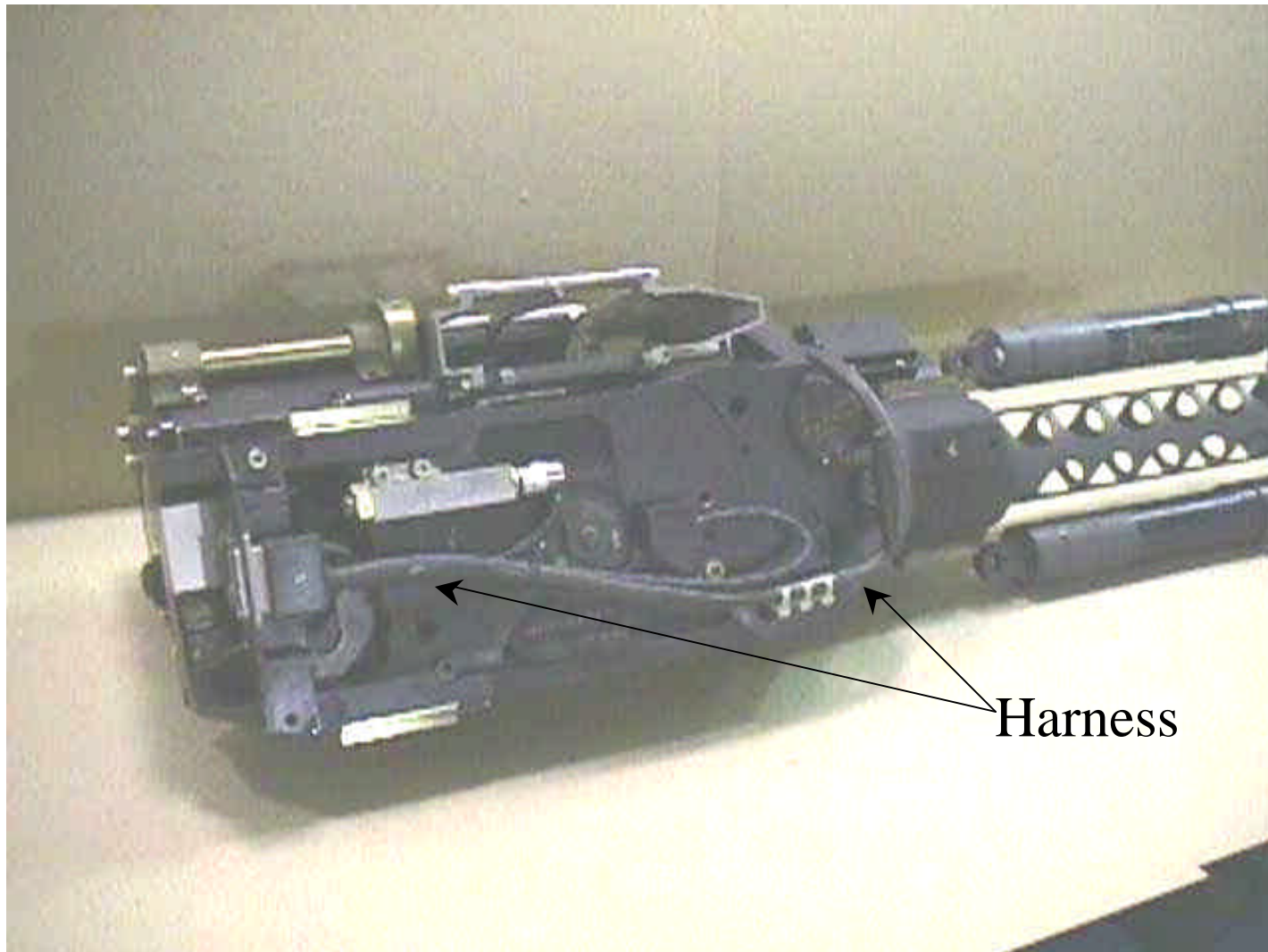
Motor with clutch

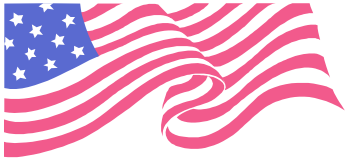




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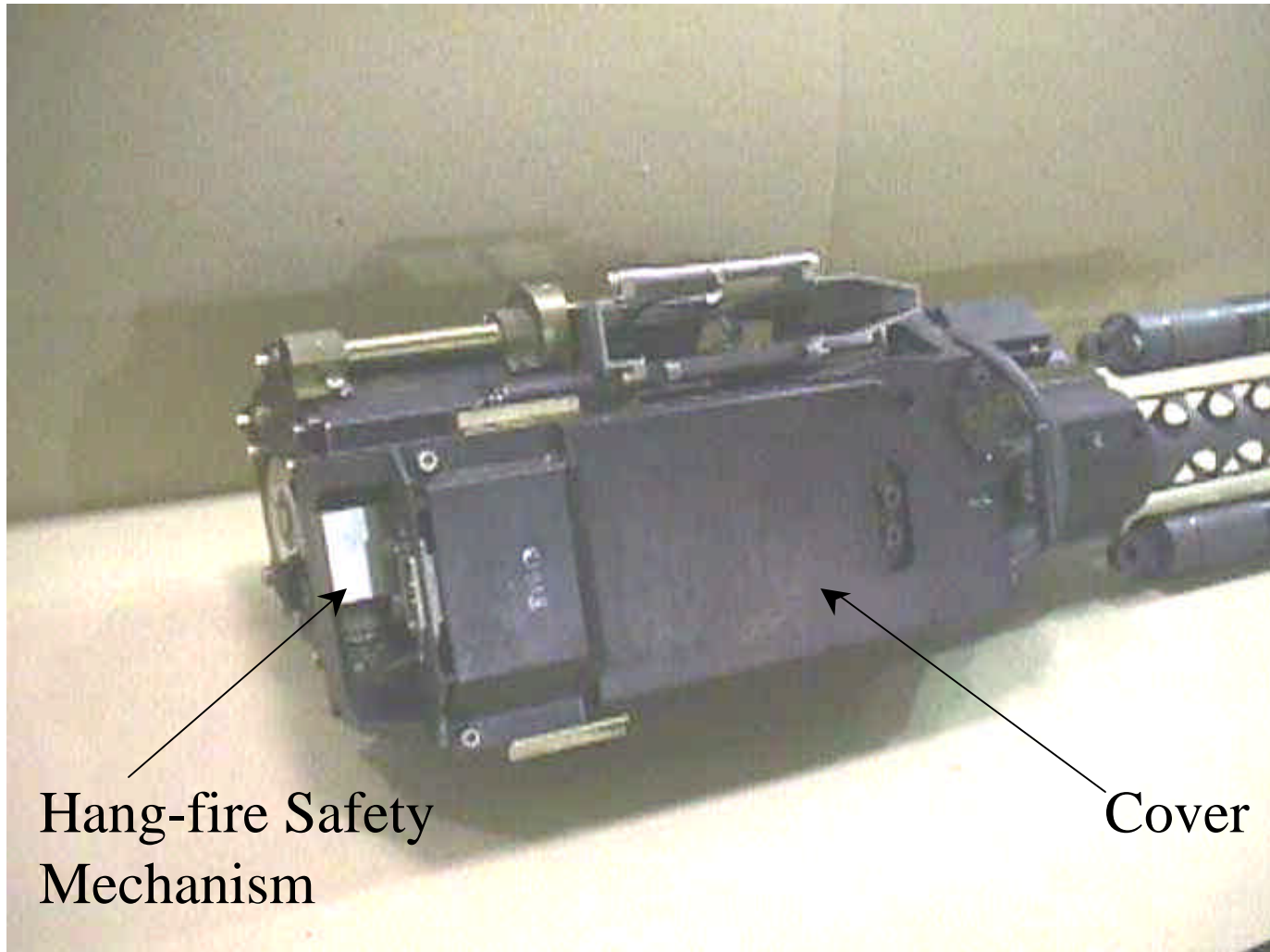
Integral wire harness





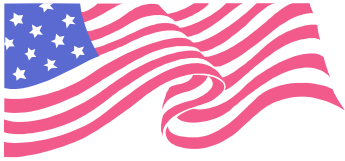
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Protective cover for Integral Wire Harness



Hang-fire Safety
Mechanism

Cover



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Summary

M230LF- 1 & M230LF-2

- Proven Chain Gun[®] technology and reliability
- Compact Link feed design
- Positive Hang fire protection
- Potent 30mm x 113mm ammunition
- Suitable for medium to light applications
- 24 Vdc operation
- Commonality with existing M230 Chain Gun[®]



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M230LF-1 Ground Vehicle Application





M230LF-2 Light Vehicle Application





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M230LF-2 Boat Application





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M230 & M230LF in Action

