

# **FORENSIC STRATEGY NOTES**

## **SIDELOCK EJECTOR 12 BORE**

## 12 Bore sidelock ejector shot gun (12G SL/E).

What happens when you open and close a 12G SL/E?

Opening The Gun

1. Lever rotates
2. Compresses top lever spring
3. Rotates spindle
4. Spindle cams bolt
5. Bolt disengages
6. Lumps rotate on hinge pin
7. Lumps rotate in action bar
8. Bolt pushes safety-cocking pin
9. Pin pushes safety catch
10. Safety catch moves in slot
11. Safety catch depresses spring
12. Safety bar engages trigger
13. Forend rotates on knuckle
14. Cocking dog L/H engage forend iron
15. Cocking dog R/H engage forend iron
16. Cocking dog L/H rotates
17. Cocking dog R/H rotates
18. Cocking dog L/H lifts L/H hammer
19. Cocking dog R/H lifts R/H hammer
20. Cocking dog spring L/H compresses
21. Cocking dog spring R/H compresses
22. L/H hammer rotates
23. R/H hammer rotates.
24. L/H mainspring compresses
25. R/H mainspring compresses
26. L/H swivel rotates
27. R/H swivel rotates
28. L/H sear engages bent
29. R/H sear engages bent
30. L/H intercepting sear positions
31. R/H intercepting sear positions
32. L/H sear spring compresses
33. R/H sear spring compresses
34. L/H intercepting sear spring compresses

35. R/H intercepting sear spring compresses
36. L/H trigger moves forward
37. R/H trigger moves forward
38. Trigger spring compresses
39. L/H firing pin moves to rear
40. R/H firing pin moves to rear
41. L/H firing pin spring eases
42. R/H firing pin spring eases
43. Drop moves kicker lifter
44. Kicker lifter spring eases.
45. L/H kicker rotates.
46. R/H kicker rotates
47. L/H ejector spring moves on kicker
48. R/H ejector spring moves on kicker
49. L/H extractor levered by cam
50. R/H extractor levered by cam
51. Cam rotates in forend iron
52. Extractors strike retaining screw
53. Barrel lump engages drop.

Closing the gun

1. Lump pushes bolt
2. Bolt moves spindle cam
3. Spindle rotates
4. Top lever rotates
5. Kicker lifter compresses kicker
6. Kicker lifter spring compresses
7. L/H kicker rotates
8. R/H kicker rotates
9. L/H ejector spring compresses
10. R/H ejector spring compresses
11. L/H hammer engages sear
12. R/H hammer engages sear
13. L/H cocking dog drops
14. R/H cocking dog drops

Closing the gun

15. L/H cocking dog spring eases
16. R/H cocking dog spring eases
17. L/H extractor seats
18. R/H extractor seats
19. Top lever spring eases
20. Bolt snaps forward
21. Spindle rotates to battery
22. Forend iron rotates on knuckle
23. Barrel lump rotates on knuckle
24. Barrel lump rotates on hinge pin
25. Barrel lumps rotate in action bar

Stressing 24 components

1. R/H cocking dog axis on screw
2. L/H cocking dog axis on screw
3. L/H ejector kicker axis on pin
4. R/H kicker axis on pin
5. L/H hammer rotates in lock plate
6. R/H hammer rotates in lock plate
7. L/H bridle absorbs hammer axis
8. R/H bridle absorbs hammer axis
9. L/H sear pin rotates in lock plate
10. R/H sear pin rotates in lock plate
11. L/H intercepting sear pin rotates in lock plate
12. R/H intercepting sear pin rotates in lock plate
13. Top lever spring rotates on peg
14. Safety bar travels in stock hole
15. Safety catch spring cams on pin.
16. L/H trigger axis on screw
17. R/H trigger axis on screw
18. Drop screw tensioned by lump engaging
19. L/H swivel turns in hammer and spring
20. R/H swivel turns in hammer and spring
21. Ejector lifter axis on pin.

Before making the crime gun safe consider?

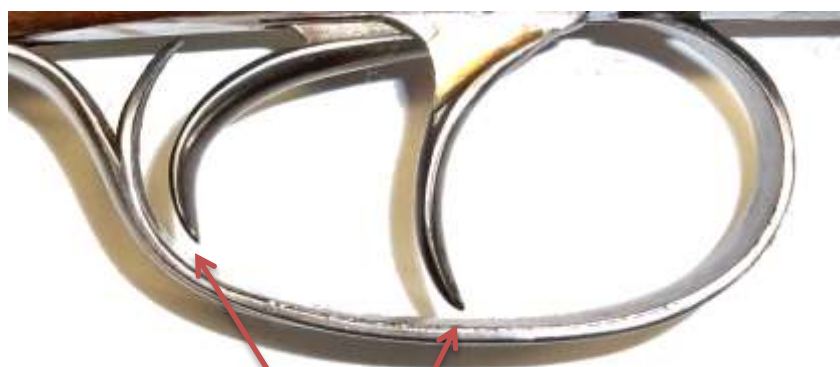
- 1] Photographing:
  - \*Position of top lever
  - \*Position of safety catch
  - \*L/H & R/H lock plate for tumbler position
  - \*Triggers in trigger guard
  - \*If the tumbler axis is plain (without cocking indicator) mark with horizontal line in line with the bore



Position of top lever and safety



Position of tumbler



Triggers in trigger guard fouling?

## 2] Opening the 12G SL/E (Safety)

- Treat the gun as loaded and in a dangerous condition
- Consider if wearing PPE is required
- Advise everyone in the immediate area you are going to take control of the gun
- Select a safe area to point muzzle
- Take control of the gun

### 3] Opening the 12G SL/E (Forensic)

- Opening the gun could result in cocking the action
- Opening the gun could cause a cartridge to eject
- Record the position of each cartridge before it ejects or is removed
- Handle cartridge to recover DNA, finger prints
- Pack unloaded gun for trace examination



Opening the gun



Position of the cartridges

### 4] Examination of 12G SL/E (Forensic)

#### Action

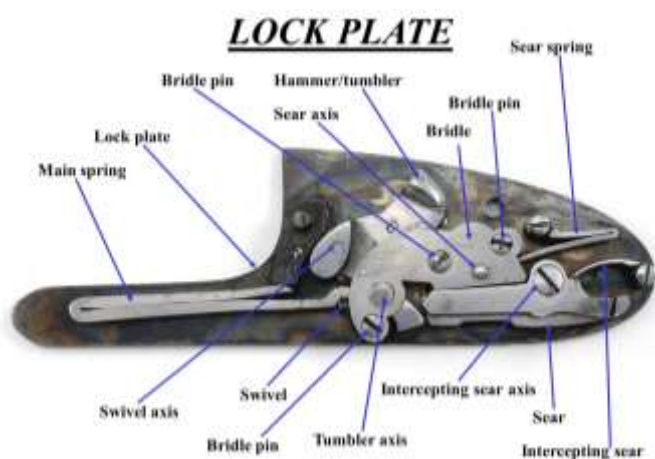
- Condition
- Trigger pull: profile (lengths of pull, weight)
- Triggers: free play on sear
- Triggers: fouling on wood, sear, trigger guard
- Articulated trigger function
- Function of intercepting sears
- Firing pin impressions
- Extractor function: timed correctly
- Ejector mechanism
- Safety function: pressure to engage, engagement on triggers
- Bolt engagement on barrel bites
- Firing pin protrusion
- Firing pin centres
- Tightness, barrels on the face



Trigger free play on sears (with safety disengaged)



Trigger pull positions



Lock plate components



Lock plate sears

Barrels

- Bore: deposits, dimensions, pitting, bulges, rivelling, dents
- Muzzle: choke, deposits, damage
- Chamber: dimensions, condition, forcing cones
- Rim: depth, cartridge headspace
- Length: overall, choke length and type
- Condition: general



Dent



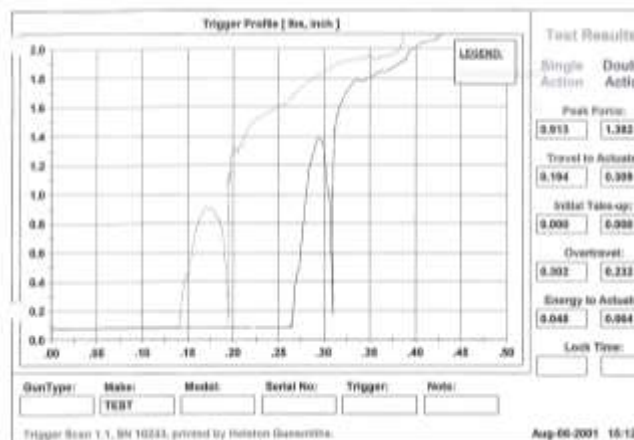
Bulge

5] Tests

- Trigger pull
- Firing pin marks
- Ejector mechanism
- Drop test (careful planning here)



Firing pin marks



Trigger pull profiles

## 6] Destruction of evidence

Opening the gun can destroy evidence, a forensic plan will ensure as much information can be captured as possible, for instance if a shot gun lays next to a suspected suicide victim and the action mechanism on the barrel that has been fired is cocked it is a strong indicator this may not be a suicide!

If the fired cartridge is not in the correct position in the chamber (orientation) this is an indication it could have been ejected and replaced, the position must be recorded in the recovery phase! Testing and comparison will show it is in the correct position which is an indicator that it has not moved since being fired.

Testing trigger pull weights should be undertaken before fired cartridges are produced for comparison on a national data base, this has consequences for the production of samples as well as the testing of the mechanism a strategy is required to ensure the best quality evidence is recovered from this process.

## 7] Triggers

Where a light trigger pull weight is suspected it can be due to a number of factors:

- Poor sear engagement
- Worn sear
- Worn bent
- Failure of sear to engage correctly due to:
  - Rusty mechanism
  - Brindle pinching sear
  - Weak sear spring
  - Sear fouling on wood

A light trigger pull does not indicate it is automatically dangerous, whilst best quality guns may normally regulated to 3 ¾ lb front trigger and 4 ¼ rear, and cheaper makes the models may leave the factory at 5 lb and 6lb respectively, often a customer may be looking to a gunsmith to regulate pulls to 2 ½ lb front and 3 ½ lb back trigger.

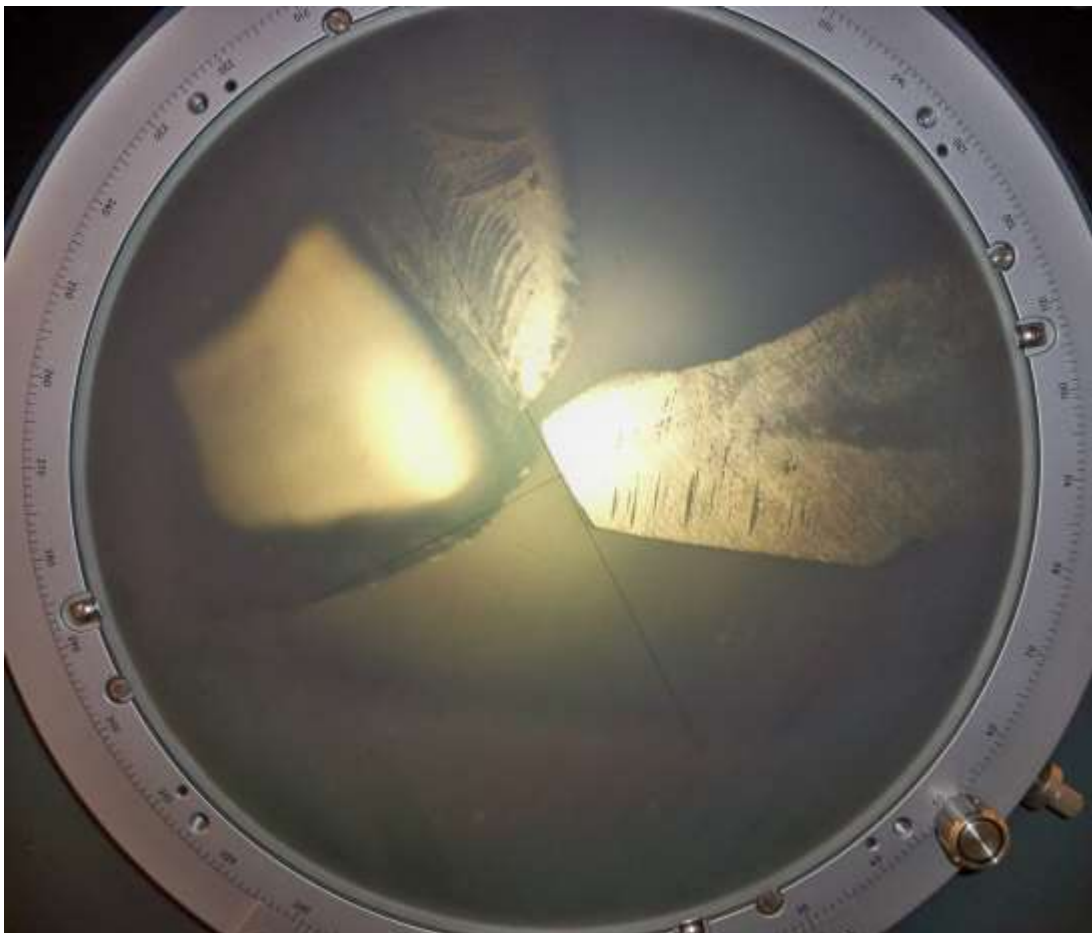


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## 8] Sears

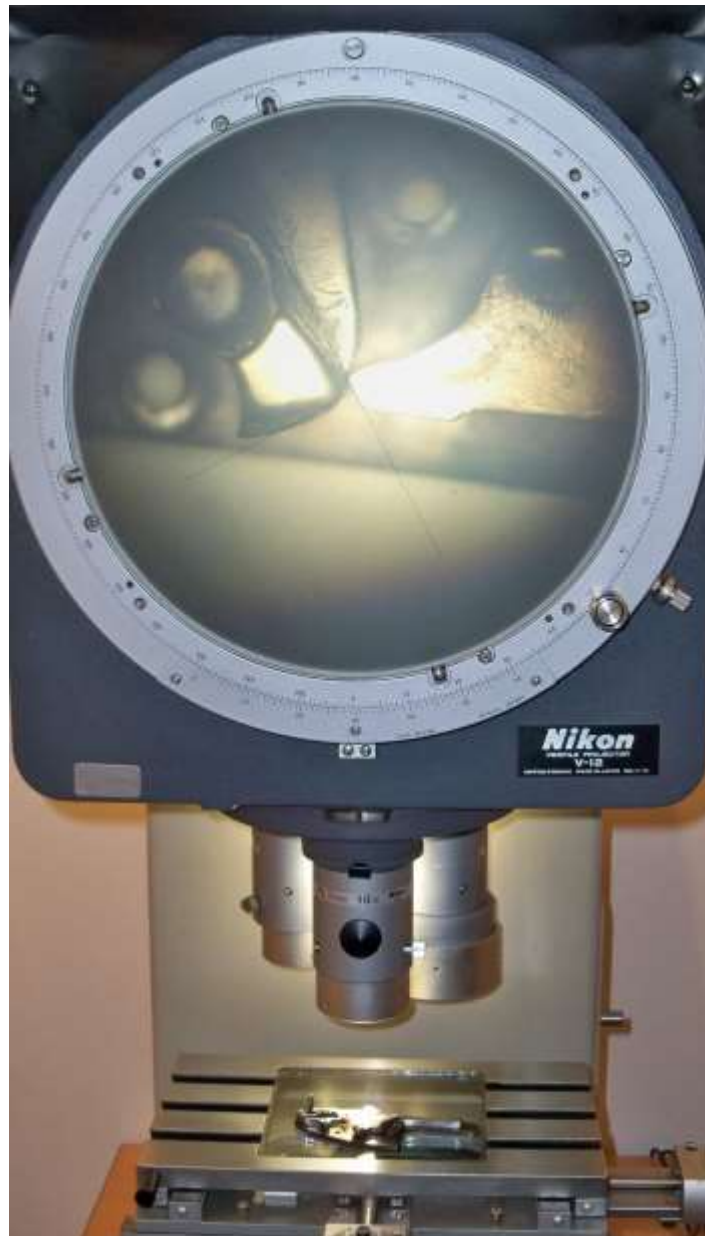
Where a main sear is worn or has been adjusted to a point where if case hardened the adjustment or wear has reached the steel below the hardened surface, continued firing can reduce the sear engagement angle and trigger pull weight with every firing to a point where the sear will not hold the tumbler in the cocked position, or a minor vibration will fire the gun.

Sear engagement can be seen in relation to trigger movement by following the plot on a strain gauge print.



Angles can be measured on a profile projector, and the surface finish under a microscope





Angles can be measured in relation to the centre of the tumbler/ sear axis using the vernier on the profile projector

Taking bore swabs at an early stage can remove the possibility of estimating the fired cartridge case length (in an investigation where the fired cases are not to be found at the scene).



Deposits left after firing a 2" RTO cartridge in a 2 3/4 " chamber

Barrel condition must be recorded, dents and bulges are easy to see, small ones require a trained eye.

In the case of a large dent did this occur after firing? To test the hypothesis consider making a similar dent in a test gun fire it (remotely) and see what happens!

9] Removing of mechanism from the wood



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Consider tightening a screw (after the recording position as found), then recording the position when tight, this allows you to return the screw to the position as found on re-assembly, be aware this has forensic consequences.

This requires thought with regard to the destruction of evidence, where a shot gun could have malfunctioned due to internal rust, or loose screws that hold the mechanism together, a strategy is required for the stripping process.

Position of screws must be recorded.

- 10] Screws, pins and springs can be handed on a double barrel side by side shot gun, incorrect assembly where a screw is transposed can have forensic consequences.



Left hand screws and springs normally have a mark

### Summary

Above are some random notes to think about when considering a strategy for the recovery and subsequent forensic examination of a 12 bore SL/ E shot gun, it is by no means comprehensive but may help with the thought process.

When unfamiliar with a firearm mechanism familiarise yourself by using a firearm of the same make or model to conduct any operations where the outcome could assist in forming a comprehensive strategy.