MIL-DTL-38999 key, keyway and backshell positions

Every shell size and polarization letter for Series I, II and III, and every backshell position, drawn the way the EMech WorkBench builders draw them.

What's covered

- Main key and keyway positions for Series I, II and III, plugs and receptacles, every shell size and polarization letter: pages 2 to 7.
- Backshell positions for every shell size of Series I, II, III and IV: pages 8 and 9.
- Not included: Series IV key and keyway positions, which the builders don't draw yet.

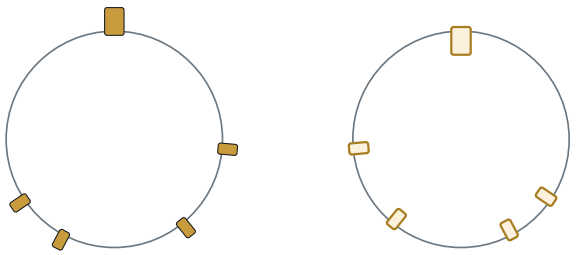
How to read a diagram

- The main key/keyway (the wide mark) is always drawn at 12 o'clock; the 4 minor keys/keyways (the narrow marks) are shown at their true angles from it.
- Plugs show keys: solid marks standing out from the shell. Receptacles show keyways: outlined notches cut into it. A plug and a receptacle are drawn as mirror images, because they face each other when mated.
- Plug angles are drawn clockwise and receptacle angles counterclockwise from the main key/keyway. The spec's tables give the angles' sizes; the direction is the builders' reading of the arcs in figures 5 and 6.
- Series I and II: the polarization letter turns the main key/keyway away from the insert's centerline (and the backshell teeth's reference); Series III keeps it on the reference and turns the minors instead.

Before you release a drawing

- These pages are a convenience copy of the builders' diagrams. Check the current revision of MIL-DTL-38999 and the connector's own specification sheet.

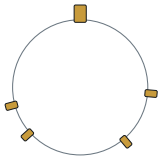
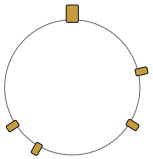
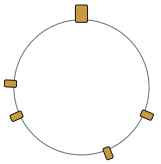
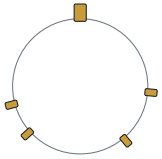
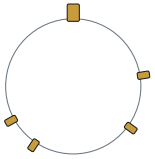
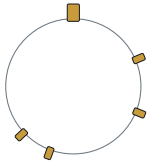
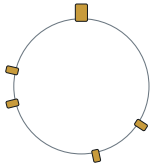
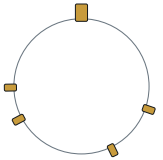
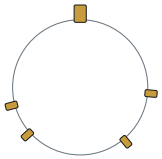
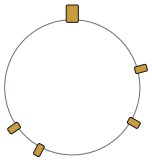
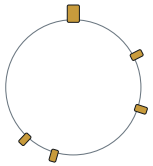
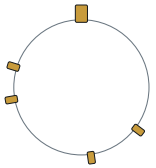
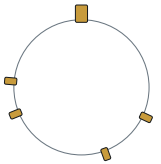
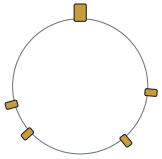
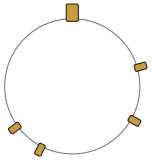
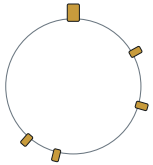
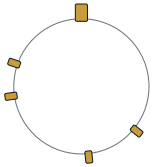
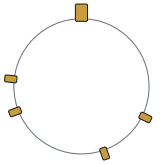
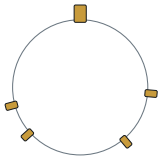
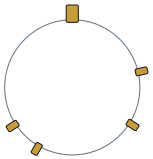
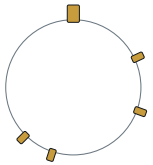
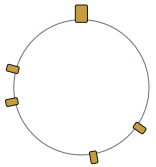
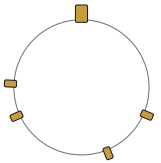
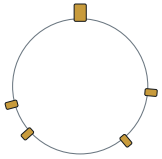
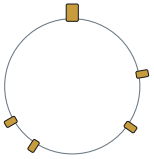
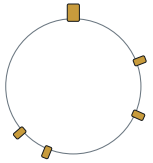
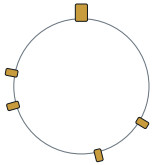
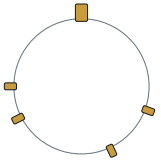
Example: Series III, shell size 15, position N



Plug (keys) Receptacle (keyways)

MIL-DTL-38999 Series I: main key and keyway positions, plugs, keys shown

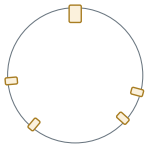
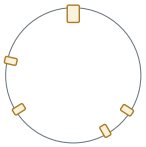
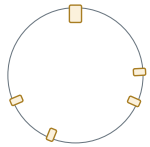
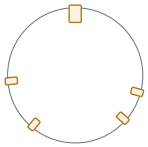
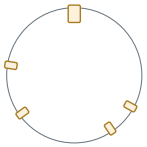
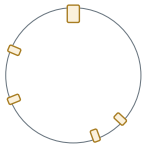
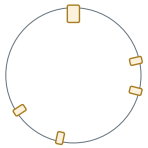
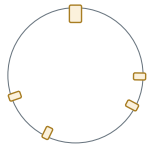
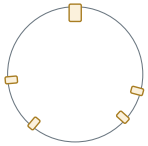
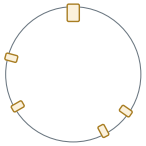
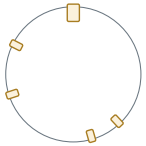
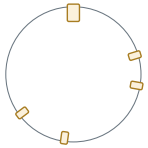
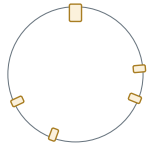
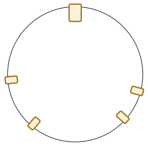
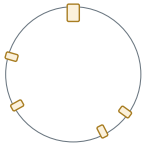
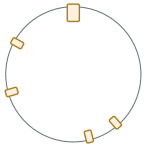
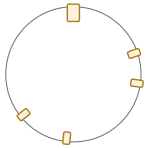
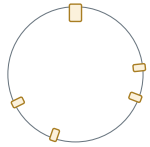
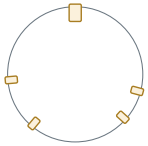
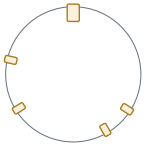
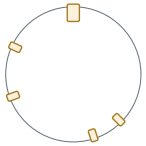
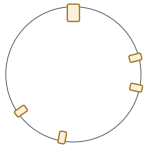
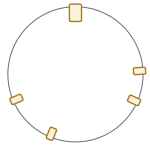
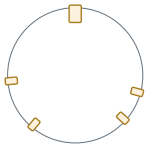
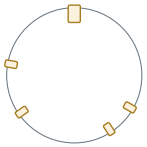
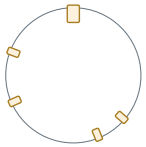
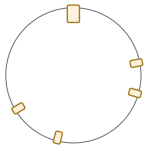
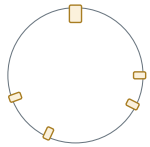
MIL-DTL-38999N w/Amendment 2, figure 5 (pp.100-101), Series I table. Odd shell sizes 9 to 25.

	N (normal)	A	B	C	D
Shell size 9			not offered	not offered	
Shell size 11					
Shell size 13					
Shell size 15					
Shell sizes 17, 19 and 21					
Shell sizes 23 and 25					

The main key/keyway rotates to A, B, C or D; the insert and the 4 minor keys/keyways stay put (3.4.6.3.1, p.20; figure 5 note 3). Figure 5 prints no B or C for size 9.

MIL-DTL-38999 Series I: main key and keyway positions, receptacles, keyways shown

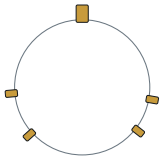
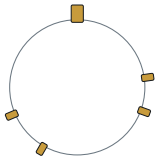
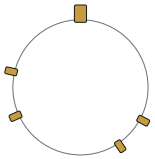
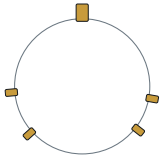
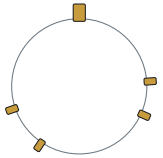
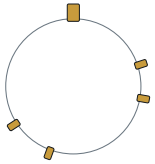
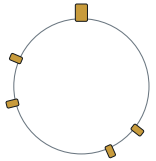
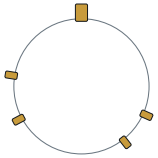
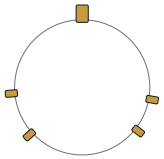
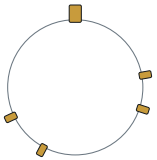
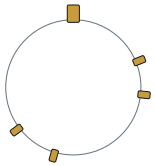
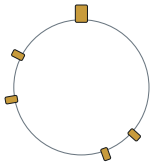
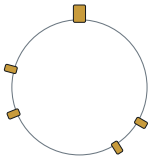
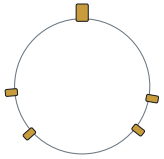
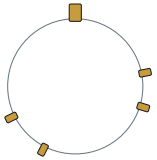
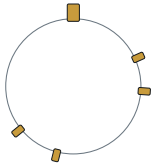
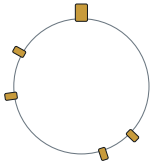
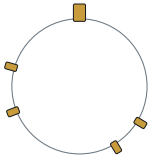
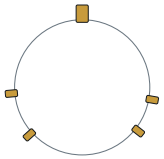
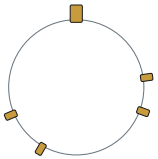
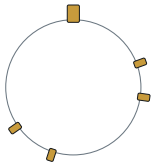
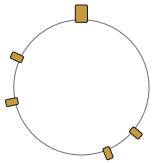
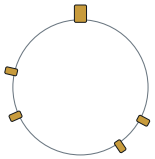
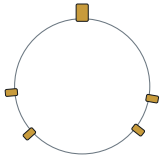
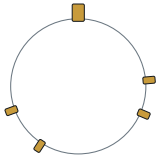
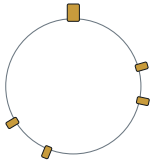
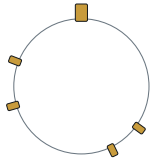
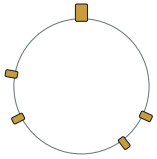
MIL-DTL-38999N w/Amendment 2, figure 5 (pp.100-101), Series I table. Odd shell sizes 9 to 25.

	N (normal)	A	B	C	D
Shell size 9			not offered	not offered	
Shell size 11					
Shell size 13					
Shell size 15					
Shell sizes 17, 19 and 21					
Shell sizes 23 and 25					

The main key/keyway rotates to A, B, C or D; the insert and the 4 minor keys/keyways stay put (3.4.6.3.1, p.20; figure 5 note 3). Figure 5 prints no B or C for size 9.

MIL-DTL-38999 Series II: main key and keyway positions, plugs, keys shown

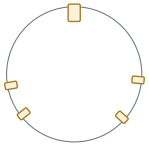
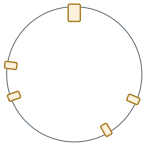
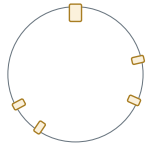
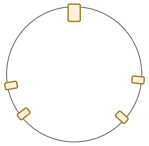
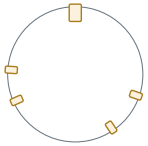
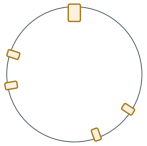
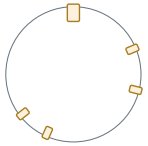
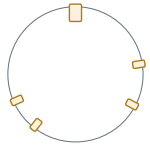
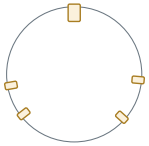
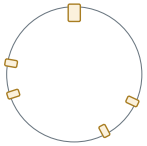
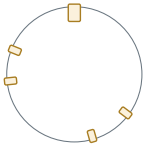
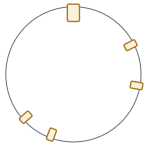
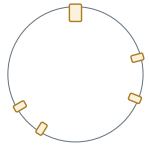
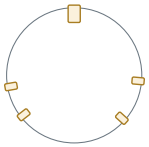
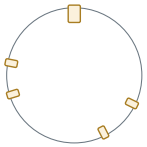
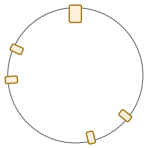
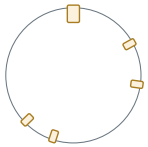
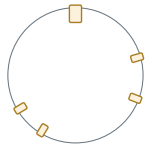
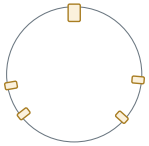
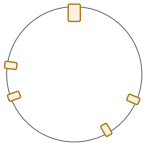
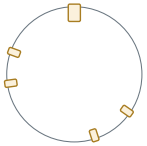
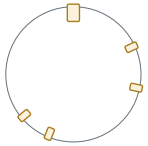
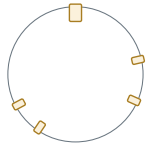
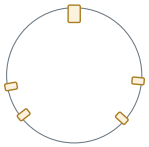
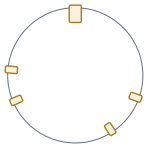
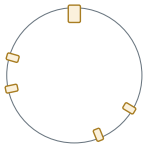
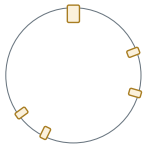
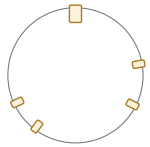
MIL-DTL-38999N w/Amendment 2, figure 5 (pp.100-101), Series II table. Even shell sizes 8 to 24.

	N (normal)	A	B	C	D
Shell size 8			not offered	not offered	
Shell size 10					
Shell size 12					
Shell size 14					
Shell sizes 16, 18 and 20					
Shell sizes 22 and 24					

Same mechanism as Series I. The main key/keyway offsets match Series I at the same accessory size; the minor key/keyway angles don't, so Series II has its own pages. No B or C for size 8.

MIL-DTL-38999 Series II: main key and keyway positions, receptacles, keyways shown

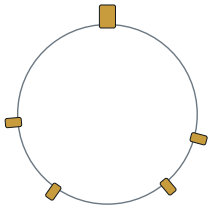
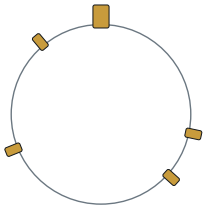
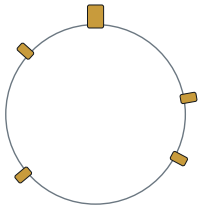
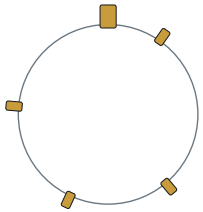
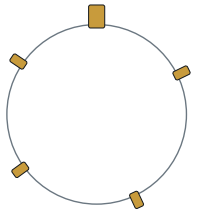
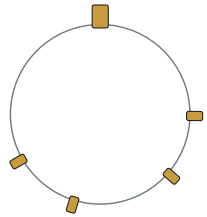
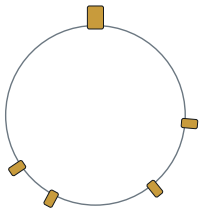
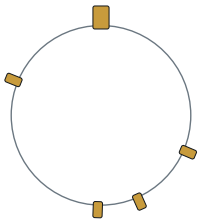
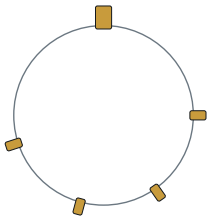
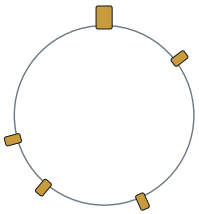
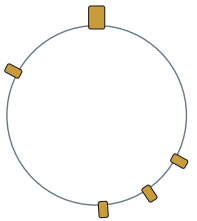
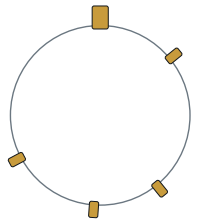
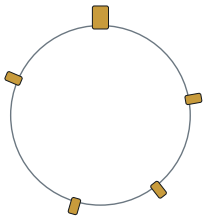
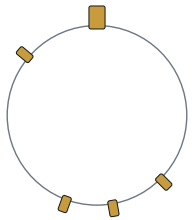
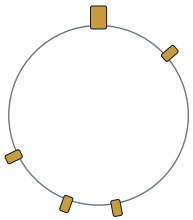
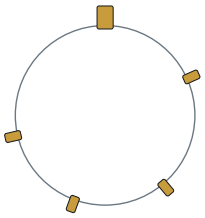
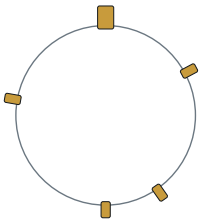
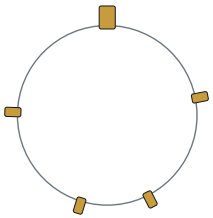
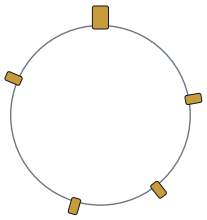
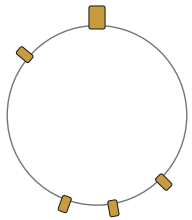
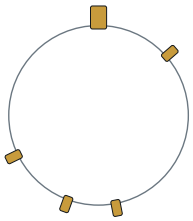
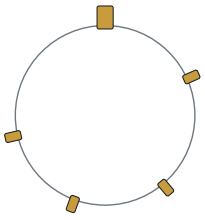
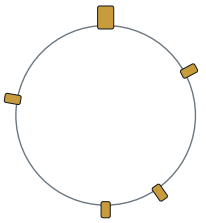
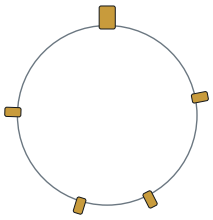
MIL-DTL-38999N w/Amendment 2, figure 5 (pp.100-101), Series II table. Even shell sizes 8 to 24.

	N (normal)	A	B	C	D
Shell size 8			not offered	not offered	
Shell size 10					
Shell size 12					
Shell size 14					
Shell sizes 16, 18 and 20					
Shell sizes 22 and 24					

Same mechanism as Series I. The main key/keyway offsets match Series I at the same accessory size; the minor key/keyway angles don't, so Series II has its own pages. No B or C for size 8.

MIL-DTL-38999 Series III: main key and keyway positions, plugs, keys shown

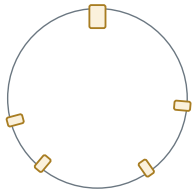
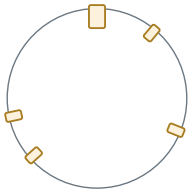
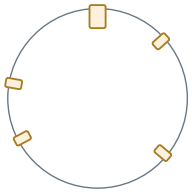
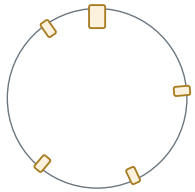
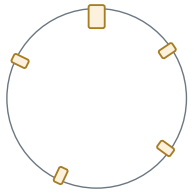
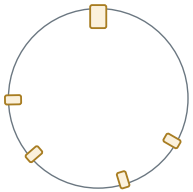
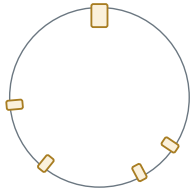
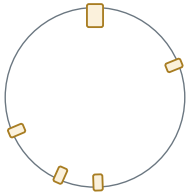
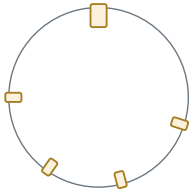
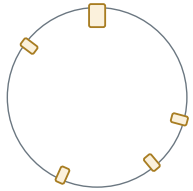
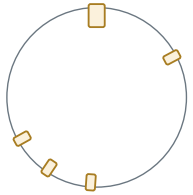
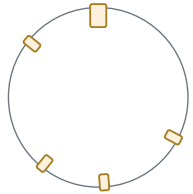
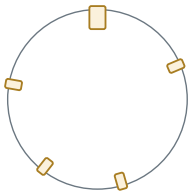
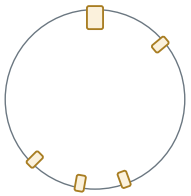
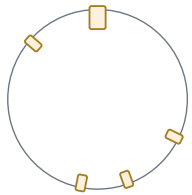
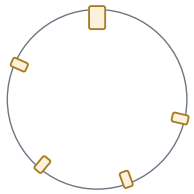
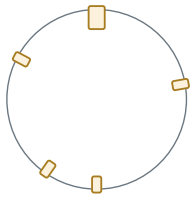
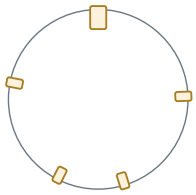
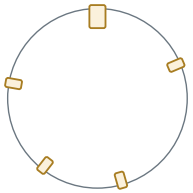
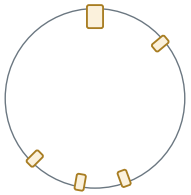
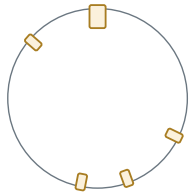
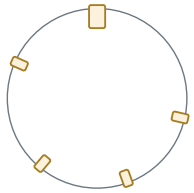
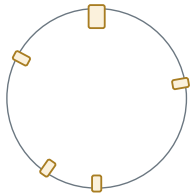
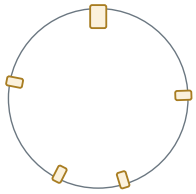
MIL-DTL-38999N w/Amendment 2, figure 6 (pp.102-103). Odd shell sizes 9 to 25.

	N (normal)	A	B	C	D	E
Shell size 9						
Shell sizes 11, 13 and 15						
Shell sizes 17 and 19						
Shell sizes 21, 23 and 25						

The main key/keyway stays fixed; the 4 minor keys/keyways rotate for A to E (figure 6 note 5). Sizes 17/19 and 21/23/25 print the same angles.

MIL-DTL-38999 Series III: main key and keyway positions, receptacles, keyways shown

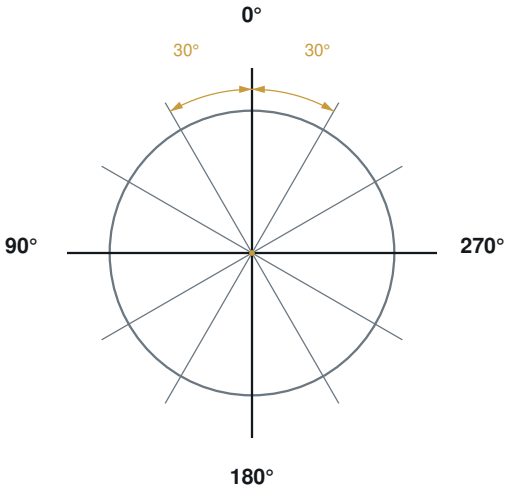
MIL-DTL-38999N w/Amendment 2, figure 6 (pp.102-103). Odd shell sizes 9 to 25.

	N (normal)	A	B	C	D	E
Shell size 9						
Shell sizes 11, 13 and 15						
Shell sizes 17 and 19						
Shell sizes 21, 23 and 25						

The main key/keyway stays fixed; the 4 minor keys/keyways rotate for A to E (figure 6 note 5). Sizes 17/19 and 21/23/25 print the same angles.

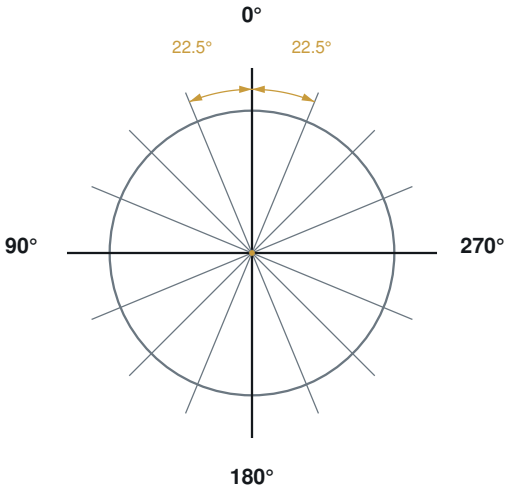
Backshell positions: shell sizes 9 to 19

The builders' Backshell orientation images: a line at every position the anti-rotation teeth allow, with the step dimensioned either side of 0°.



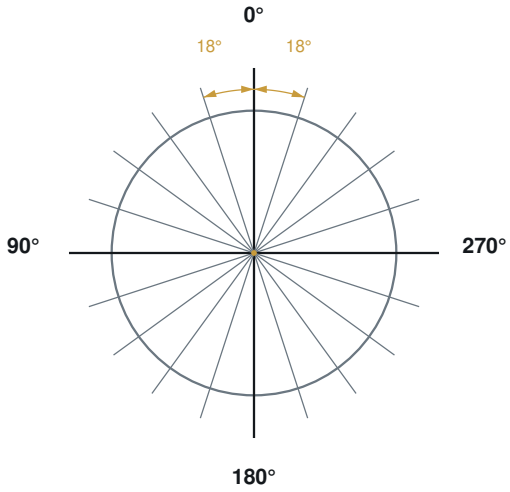
Series I and III size 9 · Series II size 8

12 teeth: a position every 30°



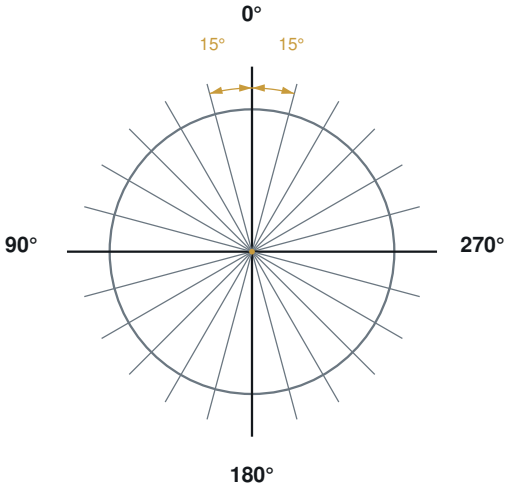
Series I, III, IV size 11 · Series II size 10

16 teeth: a position every 22.5°



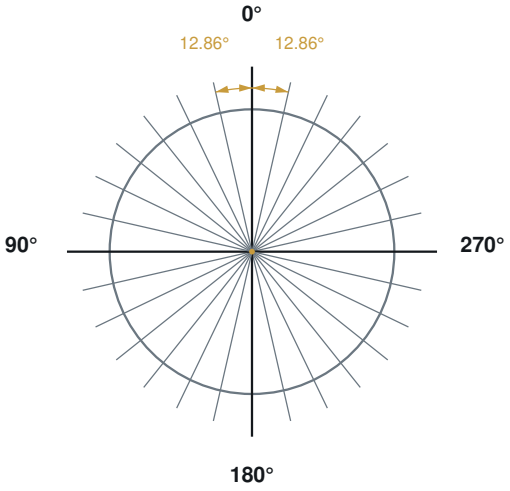
Series I, III, IV size 13 · Series II size 12

20 teeth: a position every 18°



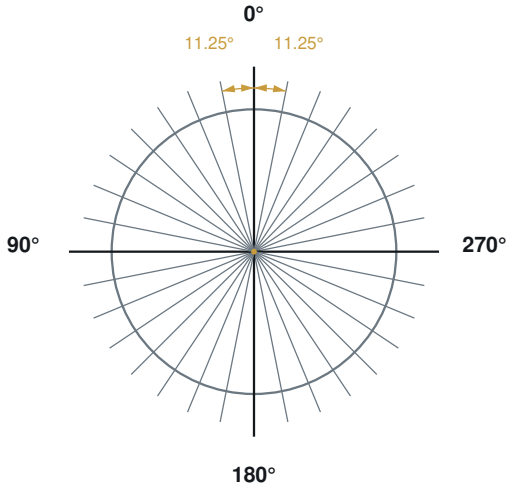
Series I, III, IV size 15 · Series II size 14

24 teeth: a position every 15°



Series I, III, IV size 17 · Series II size 16

28 teeth: a position every 12.86°



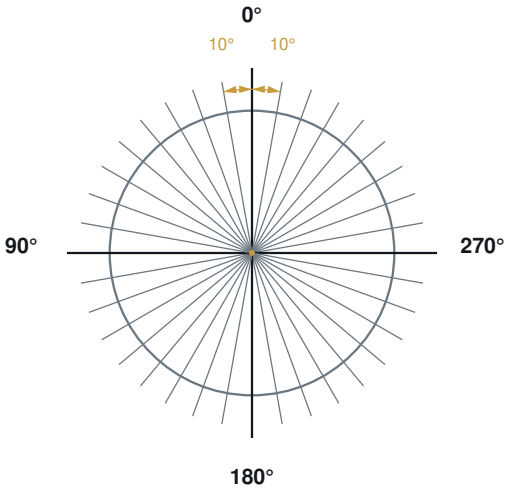
Series I, III, IV size 19 · Series II size 18

32 teeth: a position every 11.25°

How to read these diagrams: see the next page.

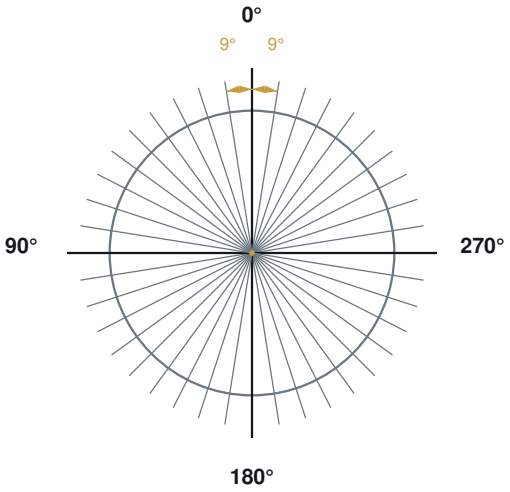
Backshell positions: shell sizes 21 to 25

The builders' Backshell orientation images: a line at every position the anti-rotation teeth allow, with the step dimensioned either side of 0°.



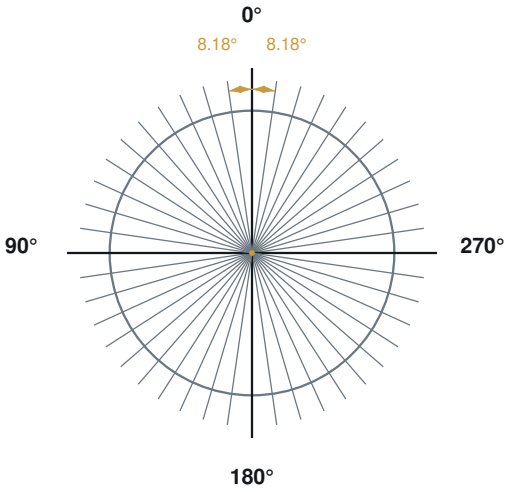
Series I, III, IV size 21 · Series II size 20

36 teeth: a position every 10°



Series I, III, IV size 23 · Series II size 22

40 teeth: a position every 9°



Series I, III, IV size 25 · Series II size 24

44 teeth: a position every 8.18°

How to read these diagrams

- Each line is a position the backshell can take: 360° divided by the number of anti-rotation teeth (MIL-DTL-38999N w/Amendment 2, figures 8, 9 and 10, column NN; MIL-C-85049A table IX).
- 0° is the projection on the vertical centerline, within 2°. Series III and IV: datum -G- (figure 10 note 6), the main key/keyway on Series III; for Series IV, find -G- in figure 7 for your polarization. Series I and II: the insert centerline (figure 8 note 7, figure 9 note 6), which is the main key/keyway only in position N.
- Angles run counterclockwise, as the builders draw them. The diagrams don't say which end the connector is seen from: say so on your drawing.
- The tooth count is the same in every series at the same accessory size, so one diagram covers each pair of sizes. Series IV has no size 9.