

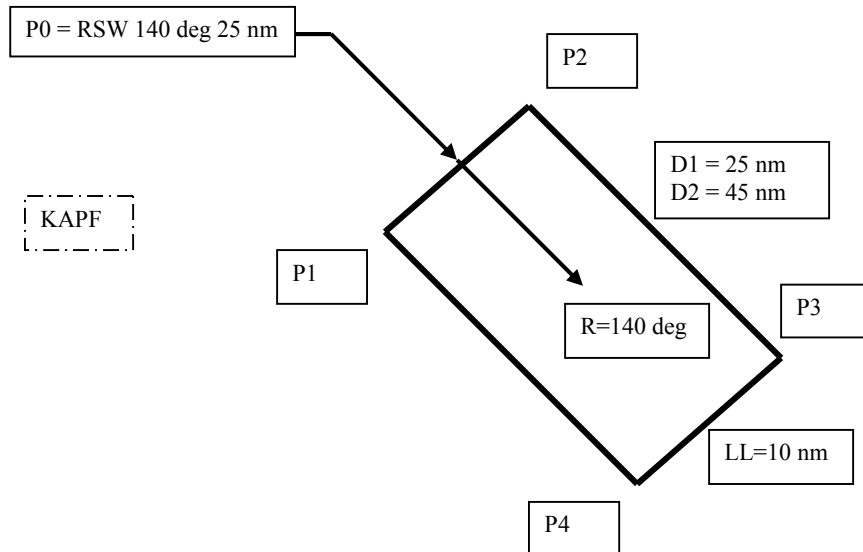
**SPECIFICATION
COMPARISON OF SEARCHING
THE SAME AREA
USING
THE GX50/55/60 CREEPING LINE SEARCH
TO THE
GX50/55/60, GNS480, GNS430, G1000, KLN 94
CROSS TRACK FLIGHT PLAN METHOD
AND THE
G1000 SAR PARALLEL METHOD
OFF THE
LEE COUNTY VORTAC (RSW)
ALONG V35
FROM 25 nm TO 40 nm
SOUTHEAST OF
SOUTHWEST FLORIDA INTERNATIONAL AIRPORT (KRSW)**

CREEPING LINE GENERIC DESCRIPTION, CSP (Start Southwest):

[RSW140] D = 25 to 40 nm, LL = 10 nm, TS = 1.0, CSP = right (RSW = Lee County VORTAC)

Fix = RSW, R = 140 deg, D1 = 25, D2 = 40 nm, LL = 10 nm, TS = 1.0 nm, CSP = right

R = Radial, D1 = Start Distance, D2 = Stop Distance, LL = Leg Length, TS = Track Spacing,
 CSP = Commence Search Point (P1) right or left looking from fix out along the radial



CROSS TRACK FLIGHT PLAN METHOD:

- P0: Fix, Radial, first listed distance or L1 = RSW, 140 degrees, 25 nm
- P1: P0, 140 + 90 degrees, LL/2 = 10/2 = 5 nm (CSP when right + 90; when left - 90)
- P2: P0, 140 - 90 degrees, LL/2 = 10/2 = 5 nm (CSP when right - 90; when left + 90)
- P3: P2, 140 degrees, L2 - L1 = 40 - 25 = 15 nm
- P4: P1, 140 degrees, L2 - L1 = 40 - 25 = 15 nm

GARMIN G1000 SAR:

WAYPOINT	CSP = P1 (Same waypoint as Cross Track Flight Plan Method P1)
PATTERN	PARALLEL
INITIAL DTK	R - 90 = 140 - 90 = 030 (CSP when right - 90; when left + 90)
INITIAL TURN	RIGHT (CSP = right and L2 > L1) or (CSP = left and L1 > L2)
LEG LENGTH	LL = 10 nm
SPACING	TS = 1.0 nm
NO OF LEGS	(D2 - D1)/TS + 1 = (40 - 25) nm / 1.0 nm + 1 = 16

GX50/55/60 CREEPING LINE PATTERN:

- START = FIX = [RSW140] @ 25 nm = RSW 140 radial @ 25 nm = center of 1st search leg
- SPACING = TS = 1 nm
- DIRECTION = R = 140 degrees (creeping line search radial from [RSW140025])
- LEG LENGTH = LL = 10 = 9.9 nm (max available for GX series GPSs)
- START SIDE = LEFT (CSP = RIGHT; START SIDE always opposite if DIRECTION = R)
- Last waypoint = (2 x (D2 - D1) / TS) + 1 = (2 x (40 - 25) nm / 1.0 nm) + 1 = waypoint 31

CROSS TRACK FLIGHT PLAN RATIONAL FOR WAYPOINT NUMBERING:

The selection of P is arbitrary. Use no letter or any combination of letters to differentiate from other similar programs in the G1000 Flight Plan Catalog.

For instructional consistency sake, use 1 for the Commence Search Point (CSP), 2 for the end of the first search track, 3 for the next corner of the search area perimeter, and 4 for the remaining corner. This is for a four sided search area. For a polygon, keep numbering the additional corners in sequence. This standardization makes building the flight plan intellectually easy.

G1000, GNS 430, and KLN94 flight plan for four sided search area:

```
2 > 3 > 4 > 1 > 2
P2 > P3 > P4 > P1 > P2
A2 > A3 > A4 > A1 > A2
X2 > X3 > X4 > X1 > X2
CL2 > CL3 > CL4 > CL1 > CL2
DC2 > DC3 > DC4 > DC1 > DC2
```

In its simplest form the Cross Track Flight Plan for the G1000, GNS 430, and KLN94 is waypoint 2 around the search perimeter to 2.

The 1 > 2 leg is the last leg of the flight plan, because the G1000, GNS 430, and KLN94 do not offer waypoint suspension alone 24/7. Using OBS mode suspends waypoint sequencing, and also deletes the search area perimeter. The G1000 and GNS 430 will not permanently delete flight plan legs flown or bypassed on the moving map display.

For the KLN94, if the OBS mode or the DIRECT TO functions are ever used, the moving map will delete bypassed or flown legs. However, if a new copy of the flight plan is activated from the flight plan catalog, the bypassed and flown legs will return.

GNS 480, and GX50/55/60 flight plan for four sided search area:

```
1 > 2 > 3 > 4 > 1
P1 > P2 > P3 > P4 > P1
A1 > A2 > A3 > A4 > A1
X1 > X2 > X3 > X4 > X1
CL1 > CL2 > CL3 > CL4 > CL1
DC1 > DC2 > DC3 > DC4 > DC1
```

In its simplest form the Cross Track Flight Plan for the GNS 480, and GX50/55/60 is waypoint 1 around the search perimeter to 1.

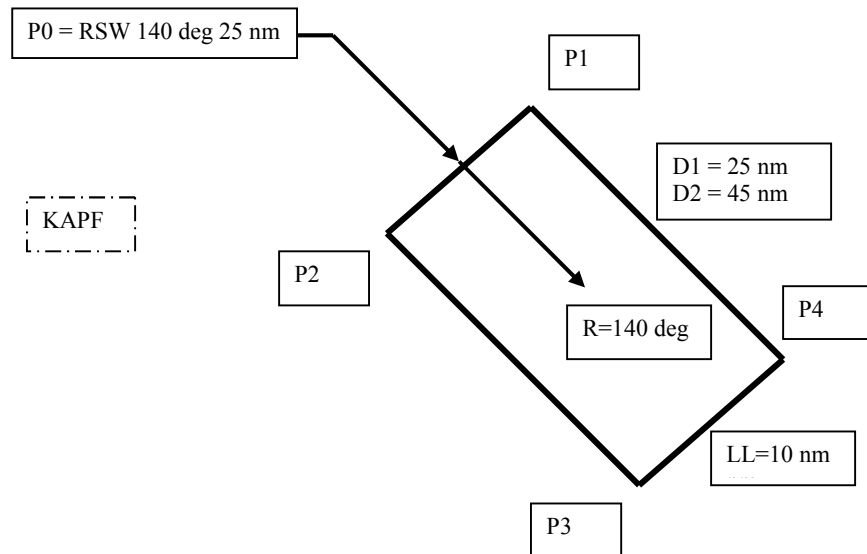
For these GPSs, the flight plan sequencing can be suspended alone 24/7 allowing the 1 > 2 leg be first. Making the 1 > 2 leg last will not work for these GPSs, because they remove all flight plan legs bypassed or flown. When on the 1 > 2 flight plan leg, suspend waypoint sequencing.

CREEPING LINE GENERIC DESCRIPTION, CSP (Start Northwest):

[RSW140] D = 25 to 40 nm, LL = 10 nm, TS = 1.0, CSP right (RSW = Lee County VORTAC)

Fix = RSW, R = 140 deg, D1 = 25, D2 = 40 nm, LL = 10 nm, TS = 1.0 nm, **CSP = left**

R = Radial, D1 = Start Distance, D2 = Stop Distance, LL = Leg Length, TS = Track Spacing,
CSP = Commence Search Point (P1) right or left looking from fix out along the radial



CROSS TRACK FLIGHT PLAN METHOD:

- P0: Fix, Radial, first listed distance or L1 = RSW, 140 degrees, 25 nm
- P1: P0, 140 – 90 degrees, LL/2 = 10/2 = 5 nm (**CSP when left – 90; when right + 90**)
- P2: P0, 140 + 90 degrees, LL/2 = 10/2 = 5 nm (**CSP when left + 90; when right – 90**)
- P3: P2, 140 degrees, L2 – L1 = 40 – 25 = 15 nm
- P4: P1, 140 degrees, L2 – L1 = 40 – 25 = 15 nm

GARMIN G1000 SAR:

WAYPOINT	CSP = P1 (Same waypoint as Cross Track Flight Plan Method P1)
PATTERN	PARALLEL
INITIAL DTK	R + 90 = 140 + 90 = 230 (CSP when right + 90; when left – 90)
INITIAL TURN	LEFT (CSP = left and L2 > L1) or (CSP = right and L1 > L2)
LEG LENGTH	LL = 10 nm
SPACING	TS = 1.0 nm
NO OF LEGS	$(D2 - D1) / TS + 1 = (40 \text{ nm} - 25 \text{ nm}) / 1.0 \text{ nm} + 1 = 16$

GX50/55/60 CREEPING LINE PATTERN:

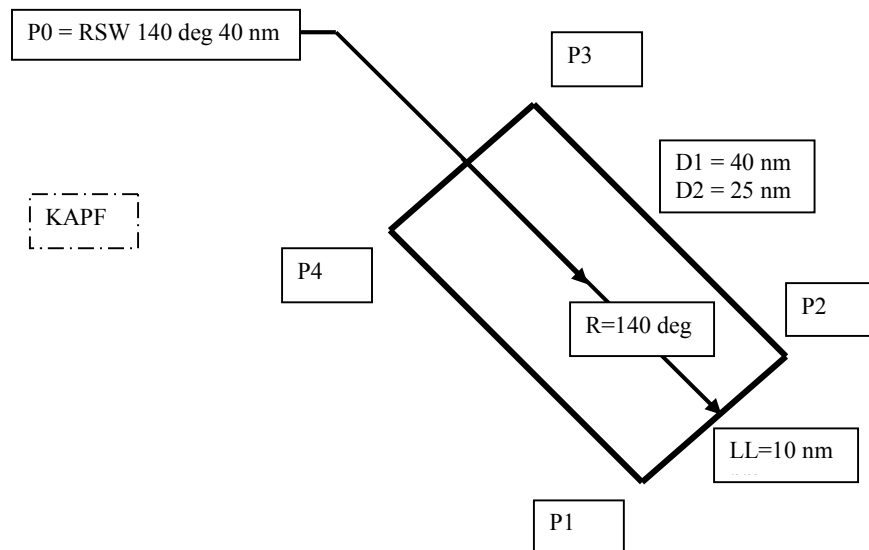
- START = FIX = [RSW140] @ 25 nm = RSW 140 radial @ 25 nm = center of 1st search leg
- SPACING = TS = 1 nm
- DIRECTION = R = 140 degrees (creeping line search radial from [RSW140025])
- LEG LENGTH = LL = 10 = 9.9 nm (max available for GX series GPSs)
- START SIDE = **RIGHT (CSP = LEFT; START SIDE always opposite if DI RECTION = R)**
- Last waypoint = $(2 \times (D2 - D1) / TS) + 1 = (2 \times (40 - 25) \text{ nm} / 1.0 \text{ nm}) + 1 = \text{waypoint 31}$

CREEPING LINE GENERIC DESCRIPTION, CSP (Start Southeast):

[RSW140] D = 25 to 40 nm, LL = 10 nm, TS = 1.0, CSP right (RSW = Lee County VORTAC)

Fix = RSW, R = 140 deg, **D1 = 40 nm, D2 = 25 nm**, LL = 10 nm, TS = 1.0 nm, CSP = right

R = Radial, D1 = Start Distance, D2 = Stop Distance, LL = Leg Length, TS = Track Spacing,
CSP = Commence Search Point (P1) right or left looking from fix out along the radial



CROSS TRACK FLIGHT PLAN METHOD:

- P0: RSW, 140 degrees, **40 nm**
- P1: P0, 140 + 90 degrees, LL/2 = 10/2 = 5 nm (CSP when right + 90; when left - 90)
- P2: P0, 140 - 90 degrees, LL/2 = 10/2 = 5 nm (CSP when right - 90; when left + 90)
- P3: P2, 140 + 180 = 320 degrees, L1 - L2 = 40 - 25 = 15 nm (D1 > D2: + or - 180 degrees)
- P4: P1, 140 + 180 = 320 degrees, L1 - L2 = 40 - 25 = 15 nm (D1 > D2: + or - 180 degrees)

GARMIN G1000 SAR:

WAYPOINT	CSP = P1 (Same waypoint as Cross Track Flight Plan Method P1)
PATTERN	PARALLEL
INITIAL DTK	R - 90 = 140 - 90 = 030 (CSP when right - 90; when left + 90)
INITIAL TURN	LEFT (CSP = left and L2 > L1) or (CSP = right and L1 > L2)
LEG LENGTH	LL = 10 nm
SPACING	TS = 1.0 nm
NO OF LEGS	(D1 - D2)/TS + 1 = (40 nm - 25 nm)/ 1.0 nm + 1 = 16

GX50/55/60 CREEPING LINE PATTERN:

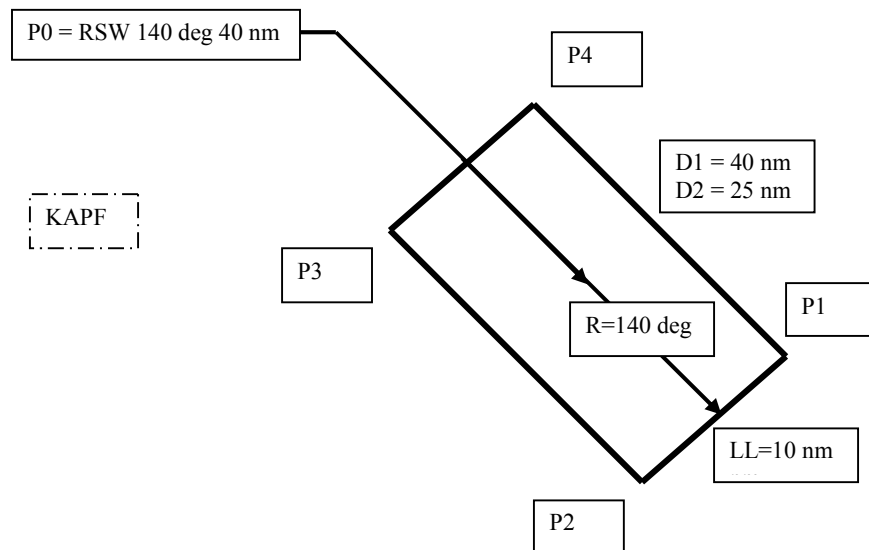
- START = FIX = [RSW140] @ 45 nm = RSW 140 radial @ 45 nm = center of 1st search leg
- SPACING = TS = 1 nm
- DIRECTION = R = 140 + 180 degrees (D1 > D2: + or - 180 degrees)
- LEG LENGTH = LL = 10 = 9.9 nm (max available for GX series GPSs)
- START SIDE = LEFT (CSP = same, if DIRECTION = R + or - 180 degrees)
- Last waypoint = (2 x (D1 - D2) / TS) + 1 = (2 x (40 - 25) nm / 1.0 nm) + 1 = waypoint 31

CREEPING LINE GENERIC DESCRIPTION, CSP (Start Northeast):

[RSW140] D = 25 to 40 nm, LL = 10 nm, TS = 1.0, CSP right (RSW = Lee County VORTAC)

Fix = RSW, R = 140 deg, **D1 = 40 nm, D2 = 25 nm**, LL = 10 nm, TS = 1.0 nm, **CSP = left**

R = Radial, D1 = Start Distance, D2 = Stop Distance, LL = Leg Length, TS = Track Spacing,
CSP = Commence Search Point (P1) right or left looking from fix out along the radial



CROSS TRACK FLIGHT PLAN METHOD:

P0: RSW, 140 degrees, **40 nm**

P1: P0, 140 - **90** degrees, LL/2 = 10/2 = 5 nm (when CSP = **right + 90**; when left - 90)

P2: P0, 140 + **90** degrees, LL/2 = 10/2 = 5 nm (when CSP = **right - 90**; when left + 90)

P3: P2, 140 + **180** = 320 degrees, L1 - L2 = 40 - 25 = 15 nm (**D1 > D2: + or - 180 degrees**)

P4: P1, 140 + **180** = 320 degrees, L1 - L2 = 40 - 25 = 15 nm (**D1 > D2: + or - 180 degrees**)

GARMIN G1000 SAR:

WAYPOINT	CSP = P1 (Same waypoint as Cross Track Flight Plan Method P1)
PATTERN	PARALLEL
INITIAL DTK	R + 90 = 140 + 90 = 230 (CSP when right + 90; when left - 90)
INITIAL TURN	RIGHT (CSP = right and L2 > L1) or (CSP = left and L1 > L2)
LEG LENGTH	LL = 10 nm
SPACING	TS = 1.0 nm
NO OF LEGS	$(D2 - D1)/TS + 1 = (40 \text{ nm} - 25 \text{ nm}) / 1.0 \text{ nm} + 1 = 16$

GX50/55/60 CREEPING LINE PATTERN:

START = FIX = [RSW140] @ 45 nm = RSW 140 radial @ 45 nm = center of 1st search leg
SPACING = TS = 1 nm

DIRECTION = **R = 140 + 180 degrees (D1 > D2: + or - 180 degrees)**

LEG LENGTH = LL = 10 = 9.9 nm (max available for GX series GPSs)

START SIDE = LEFT (CSP = same, if DIRECTION = R + or - 180 degrees)

Last waypoint = $(2 \times (D1 - D2) / TS) + 1 = (2 \times (40 - 25) \text{ nm} / 1.0 \text{ nm}) + 1 = \text{waypoint } 31$

[RSW140] D = 25 to 40 nm, LL = 10 nm, TS = 1.0, CSP = right (RSW = Lee County VORTAC)

Fix = RSW, R = 140 degree, D1 = 25, D2 = 40 nm, LL = 10 nm, TS = 1.0 nm, CSP = right

**R = Radial, D1 = Start Distance, D2 = Stop Distance, LL = Leg Length, TS = Track Spacing,
CSP = Commence Search Point (P1) right or left looking from fix out along the radial**

GX50, GX55, & GX60 Creeping Line:

START = FIX = [RSW140025] = RSW 140 radial @ 25 nm = center of 1st search leg
SPACING = TS = 1 nm
DIRECTION = R = 140 degrees (creeping line search radial from [RSW140] @ 25 nm)
LEG LENGTH = LL = 10 = 9.9 nm (max available for GX series GPSs)
START SIDE = LEFT (CSP = RIGHT; START SIDE always opposite if DIRECTION = R)
Last waypoint = $(2 \times (D2 - D1) / TS) + 1 = 2 * 15 \text{ nm} / 1 \text{ nm} + 1 = \text{waypoint } 31$

GNS480, GX50/55/60 Cross Track Flight Plan Method:

Flight Plan = P1 > P2 > P3 > P4 > P1

P0 = FIX = [RSW140025] = RSW 140 radial @ 25 nm
P1 = FIX; R+90; @ 0.5 x LL = P0 (140 + 90) degree radial @ 0.5 x 10 nm {CSP=R}*
P2 = FIX; R-90; @ 0.5 x LL = P0 (140 - 90) degree radial @ 0.5 x 10 nm {CSP=R}*
P3 = P2; R; @ D2 - D1 = P2 140 degree radial @ 15 nm
P4 = P1; R; @ D2 - D1 = P1 140 degree radial @ 15 nm
Increment cross track error by TS = 1 nm. Last cross track error = D2 - D1 = 15 nm

G1000, GNS430 & KLN 94 Cross Track Flight Plan Method:

Flight Plan = P2 > P3 > P4 > P1 > P2

P0 = FIX = [RSW140025] = RSW 140 radial @ 25 nm = center of 1st search leg
P1 = FIX; R+90; @ 0.5 x LL = P0 (140 + 90) degree radial @ 0.5 x 10 nm {CSP=R}*
P2 = FIX; R-90; @ 0.5 x LL = P0 (140 - 90) degree radial @ 0.5 x 10 nm {CSP=R}*
P3 = P2; R; @ D2 - D1 = P1 140 degree radial @ 15 nm
P4 = P1; R; @ D2 - D1 = P4 140 degree radial @ 15 nm
Increment cross track error by TS = 1 nm. Last cross track error = D2 - D1 = 15 nm

GARMIN G1000 SAR Parallel Search Method:

PATTERN = PARALLEL
WAYPOINT = P1 = same P1 waypoint based on P0 in the G1000 Cross Track Error method
INITIAL DTK = R-90 = 140 - 90 = 050 degrees {CSP=R}*
INITIAL TURN = RIGHT (right turn at the end of the first search leg) {CSP=R}
LEG LENGTH = LL = 10 nm
SPACING = TS = 1 nm
NO OF LEGS = D/TS + 1 = 15 nm / 1 nm + 1 = 16

*** If CSP = L, then R+90 becomes R-90, and R-90 becomes R+90**

ENTRY POINT (CSP) DEFINITION:

Commence Search Point (CSP) (US SAR Manual definition) is the actual start of all searches.

GNS480, GX50/55/60, Cross Track Flight Plan Method NOTE:

Flight plan must begin and terminate with the Commence Search Point and waypoint sequencing must be suspended on first leg. The GNS480 and the GX50/55/60 GPSs do not lose the search perimeter on the map display when waypoint sequencing is SUSPENDED. The GNS430W waypoint sequencing has to be suspended with OBS mode, and the white lines connecting corner waypoints are lost; however, the corner waypoint markers remain. All these GPSs drop waypoint markers and white lines for legs flown or bypassed.

G1000 & GNS430 Cross Track Flight Plan Method NOTE:

Flight plan must begin and end of the first search leg, and fly direct to the CSP, the next to last waypoint, to activate the last leg. These systems work due to waypoint sequencing stops on the last leg, and the legs flown and bypassed are not dropped from the map. These systems will lose the search perimeter when waypoint sequencing is suspended by the OBS mode.

GNS430-ASPEN-GMX20 Combination Cross Track Flight Plan Method NOTE:

The GNS430 dictates the order of the flight plan. The GMX20 imports its current position and flight plan from the GNS430; however, flight plan legs bypassed or flown are deleted from the GMX20 moving map. Only the P1 to P2 leg will show on the GMX20 moving map. However, the search area perimeter will show on the GNS430 moving map and the ASPEN display. Unlike the G1000, the ASPEN will not give a cross track numerical read out when the CDI goes full scale; therefore, the numerical cross track error will have to read off the GNS430. The GNS430 NAV pages 1 and 2 can be set up to provide cross track error (XTE). The GMX20 will provide TRK info, but not cross track info. The GMX20 in Track UP mode will provide visual cues if the cross track error is increasing or decreasing. If the magenta line representing the P1 to P2 leg is slanting toward the depicted aircraft, the cross track error is decreasing. If slanting away, the cross track error is increasing. If vertical, the cross track error is remaining constant.

KLN94 Cross Track Flight Plan Method NOTE:

The principles for the G1000 and GNS430 (without WAAS) apply to the KLN94 with one exception. If the DIRECT-TO function is used, the white lines connecting the waypoint corner markers will not return when P1, CSP, is reached. However, when a KLN94 flight plan is activated, the nearest leg in the flight plan nearest to present position will go active. Therefore, activating the search flight plan from the Flight Plan Catalog near the CSP will work.

GX50/55/60 GPS Creeping Line Search NOTES:

The first search leg is shown as a half leg from FIX, waypoint 0. To fly a complete first leg with creeping line searches, enter search LEG LENGTH nm from waypoint 1 with zero cross track error. At LEG LENGTH nm Waypoint 1, Waypoint 0 will be half way. The maximum LEG LENGTH for the GX GPS Creeping Line is 9.9 nm.

If CSP = LEFT and DIRECTION = R, then specify Start **RIGHT** Side

If CSP = RIGHT and DIRECTION = R, then specify Start **LEFT** Side

If DIRECTION = R + or - 180 degrees, then CSP = START SIDE

The GX convention of RIGHT and LEFT is based on flying toward START (Waypoint 0, FIX) in the same DIRECTION in the GX Creeping Line specification. This is the direction of the turn from Waypoint 0 to Waypoint 1, the end of the first search leg.