

Bypass Map Generation Guidance

Purpose: The purpose of this document is to provide the requisite knowledge to create a valid Bypass Map.

Background: The Bypass Map identifies the geographic location of ground clutter targets within the normal radar viewing horizon. To generate a Bypass Map, the RDA operates off-line and collects data using a slow rotation rate. This data collection scheme is designed to provide enough samples from each target to ensure detection and classification of non-moving (radial velocity), hard targets. Two adaptable parameters, signal-to-noise ratio and unfiltered-to-filtered ratio, are used to differentiate actual hard ground target clutter return from well-behaved (zero velocity and narrow spectrum width) returns from non-ground based clutter targets.

Signal-to-Noise Ratio (SNR): The SNR is a measure of signal strength relative to the measured background noise.

Unfiltered-to-Filtered (Return) Ratio (CLUT): This ratio is a measure of signal strength prior to clutter suppression relative to the resultant signal strength after clutter suppression.

Radar returns, both meteorological and non- meteorological, that exceed the SNR and CLUT thresholds are considered clutter targets and the gates from which those targets originated are identified (as clutter contaminated) on the Bypass Map.

Bypass maps generated during INCO use the default parameters of SNR=9 and CLUT=9 (Figure 1). Our experience indicates that these default settings result in “noisy” maps that do not adequately identify weaker ground-based targets. These maps cause suppression over too large an area (due to the SNR=9 threshold) which may result in the loss of some meteorological data. Additionally, the CLUT threshold of 9 may prevent the identification of the entire clutter target resulting in “fringing” around the edges of identified ground returns.

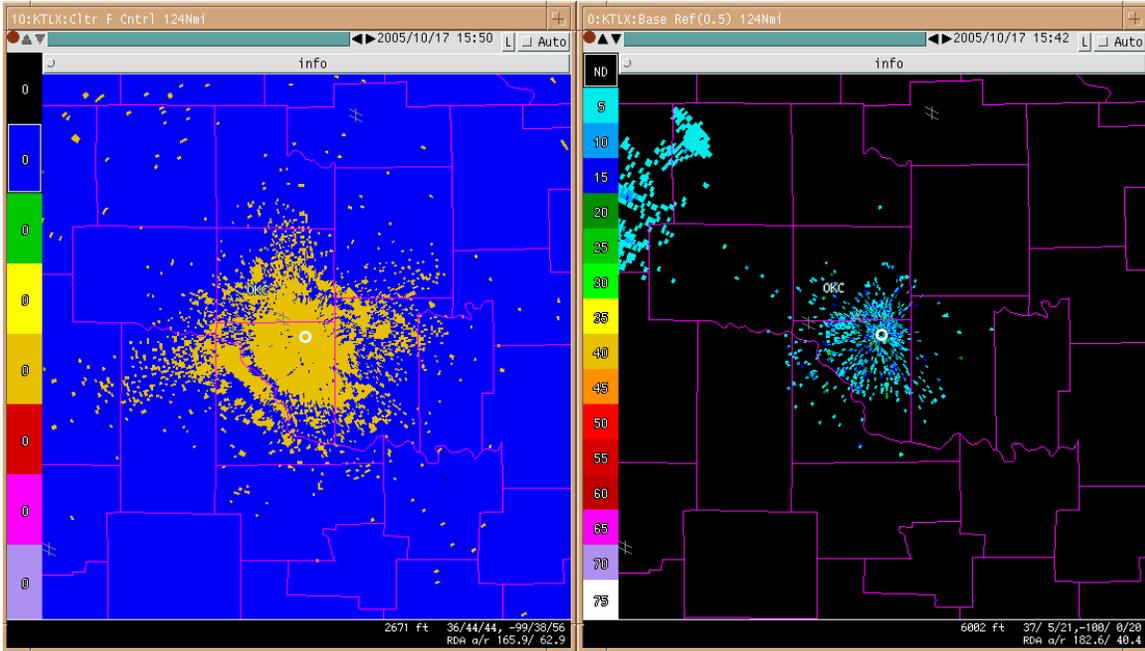


Figure 1: Example of KTLX Bypass Map (Left) with SNR = 9 and CLUT = 9 and Resultant Reflectivity Data Field (Right).

For most sites, the settings of SNR = 24 and CLUT = 3 should optimize the bypass map (Figure 2). The ROC recommends a new map be generated using these settings as soon as possible after INCO.

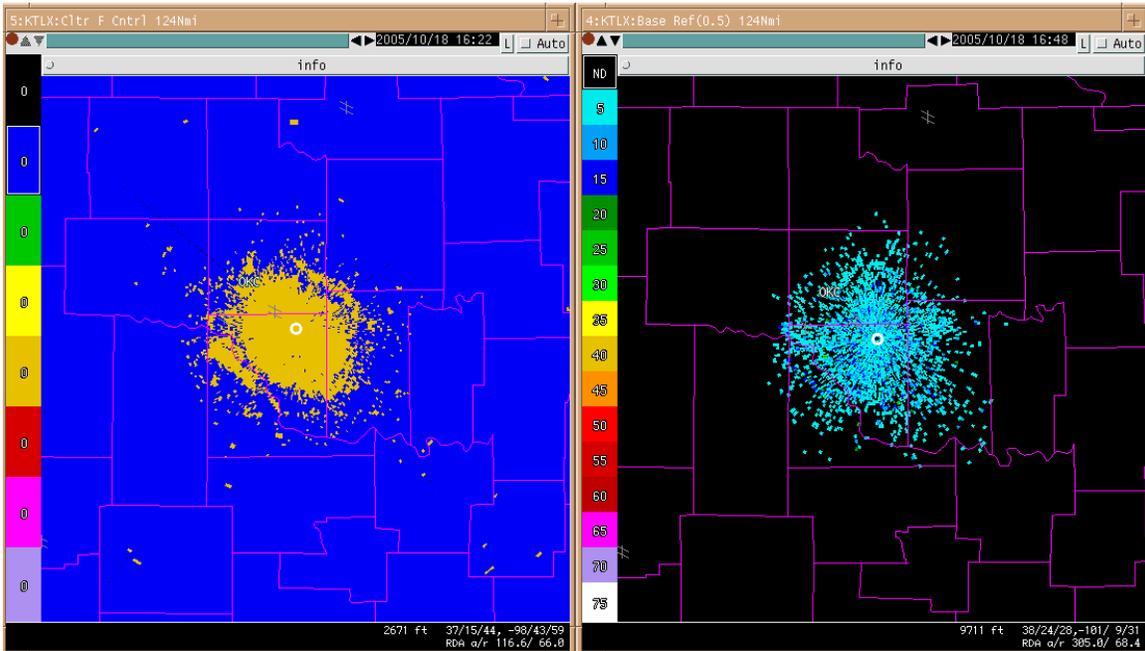


Figure 2: Example of KTLX Bypass Map (Left) with SNR = 24 and CLUT = 3 and Resultant Reflectivity Data Field (Right).

Process: The following paragraphs touch on the most important aspects to consider when generating a new Bypass Map.

Why:

1. The Bypass Map generated during INCO likely *does not* adequately identify the areas of the normal ground pattern.

OR

2. Since the last Bypass Map was generated, the radar clutter horizon has changed. This may be due to seasonal changes or local manmade construction projects.

No matter the cause, the need for a new Bypass Map can be easily seen when, under normal beam propagation conditions for the season and with the Bypass Map in control, clutter is apparent in the base products.

When: Select a day when the atmospheric conditions are representative of the “average” conditions expected for the upcoming season. For example, if during the upcoming season the atmosphere will not be dominated by a surface-based inversion – then *do not* generate a Bypass Map when a strong surface-based inversion is present – generate a Bypass Map on a day when the atmosphere is well mixed and near-normal beam propagation conditions exist.

How: This section deals with the adjustment of the SNR and CLUT parameters to tailor the identification of clutter targets based on the character of the ambient return.

NOTE: For the mechanical, step-by-step Bypass Map generation procedure, follow the instructions provided in the ORDA technical manual.

The SNR threshold is used to discount weak targets, focusing on higher power returns.

The CLUT threshold is used to differentiate weak meteorological/biological targets from high-power clutter targets.

Together these two thresholds are used to customize the identification of ground clutter targets. That being said, these thresholds should be used in concert to optimize clutter target identification. For best results, modify the SNR and CLUT thresholds using the guidance provided in the following table.

Bypass Map Generation Guidance Table

State *	Change SNR (dB)	Change CLUT (dB)
Default setting of SNR=9 and CLUT=9	24	3
Too much areal coverage identified as ground return in the near field	24	6
Not enough areal coverage of ground return or distant ground targets not identified	15	3
Too much “noise” outside area of known ground targets	21	3

NOTE: Once completed, look at the new map and make sure it is representative of the local terrain and does not appear too “noisy.” If it looks good (reflects the normal ground clutter patten for the site), invoke it and compare it to the 0.5° base products to ensure the ground clutter targets are being adequately addressed. Depending on how the map appears, and how well it addresses (filters) ground targets, use the table, above, to identify the problem (State*) and generate another map using the recommended parameter settings. If you have questions or concerns, or would like a second opinion on the validity of your newly generated Bypass Map, contact the NEXRAD Hotline at 1-800-643-3363 for additional guidance.