NEXRAD Now

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Issue 7

What's inside?

Transition Power Source System

The NEXRAD program has contracted with the Exide Corporation to install a Transition Power Source (TPS). The complete system, which includes the shelter and TPS, is called the Transition Power Maintenance Shelter (TPMS). The TPS utilizes a relatively new concept in generator technology and suits the NEXRAD equipment appropriately. This system will be installed at Department of Defense and National Weather Service sites.

The TPS system is used as a ride-through motor-generator for the NEXRAD equipment at the RDA sites. When the primary power supply is interrupted, an emergency diesel generator is activated to supply power until the primary utility power is repaired or returns on-line. Currently, there is a gap between the interrupt of primary power and the start-up of the backup power supply. During this gap, the TPS supplies the needed power for the critical NEXRAD power load. The critical power load consists of the equipment necessary to operate the RDA (and RPG if co-located) but does not include the site lights and air conditioners or any other environmental power requirements.

The TPS accepts input power from either commercial or generator power sources. It then supplies the site with a continuous source of regulated and isolated voltage. When a loss of input utility power occurs, the TPS provides emergency power for 12 to 25 seconds before its resources are depleted. The diesel generator should assume the load before the critical time elapses.

The TPS is built as an inverted structure; i.e., the stator is the stationary inner portion with the rotor rotating around it. The 3000 pound rotor flywheel system provides the ride-through time period of power during power outages. Under normal power situations, the TPS rotor flywheel spins at 1800 rotations per minute (rpm). When the power is interrupted the TPS continues to provide power by using the inertial energy stored in the rotor. This power will continue to be supplied at precisely 60 Hz until the rotor rpm rate slows to 1575 rpm. It is able to maintain the constant 60 Hz, even though the rotations per minute are decreasing, through a

(Continued on page 2)

Transitional Power Source

(Continued from page 1)

patented concept called "Written Pole Technology." Written Pole Technology rewrites the magnetic poles for the generator to compensate for the varying speeds of the rotor. Before the rotor slows to 1575 rpm, the backup generator should have already automatically started and assumed the load. The backup generator will then supply the TPS with the voltage to spin the rotor to supply the equipment with clean power.

Currently the NEXRAD operator is required to switch to generator power when there is a chance of power outages due to weather in the area. With the advent of TPS, this will no longer be required. The automatic transfer panel, located in the generator shelter, will sense that commercial power has been interrupted and send a command to start the generator. TPS will continue to provide power to the critical RDA (and RPG if co-located) equipment until the generator is ready to assume the load or the ride-through time has elapsed, whichever comes first. This transition will not inhibit RDA operations at all, and operator intervention is not required to switch power sources.

The RDA diesel generator is automatically exercised once a week to ensure that it is operational in case of power outages. If the generator fails to start during a commercial power outage, the TPS cannot do anything to provide power to the site other than use the stored inertial energy to produce power for the 12 to 25 seconds. It is imperative that the RDA generator be well maintained and ready in case of power outages.

The TPS operates in six modes:

Normal: In this mode the load is continuously supplied by the TPS. The diesel generator is not running and commercial power is available.

Emergency: Upon failure of normal utility power, critical load continues to be supplied by the TPS via the diesel generator. There will be no interruption of the critical load upon failure or restoration of either the normal utility source or diesel generator within the critical time period.

Recharge: Upon restoration of the normal or generator power source within the ride-through time, the TPS motor will provide sufficient torque for generator full load output and simultaneously re-accelerate the motor-generator set to synchronous speed. This is an automatic function and will cause no interruption in the critical load.

Shutdown: If power is not restored within the ride-through time, the unit will transfer to auto bypass, the input and output contactors of the TPS will automatically open to disconnect the system and preclude out-of-tolerance conditions. The TPS must then be manually restarted.

Automatic Bypass: The generator output will be normally synchronized with the input frequency. If the input (load) contactor opens for any reason, a signal will be available to the bypass switch, which will connect the load directly to the input line. This is a make-before-break transfer. Manual reloading (to put the system back in line) of the TPS will then be required.

Manual Bypass: If the TPS must be taken out of service for maintenance, the unit is already synchronized, so the manually operated make-before-break auto transfer switch transfers the motor-generator load to utility source without interruption. Once in auto bypass, the maintenance bypass disconnect must then be closed before opening any other disconnect switches.

The main advantage of the TPS system is that

(Continued on page 3)

Transition Power Source

(Continued from page 2)

there is no interruption in RDA operation due to power source transitions. Currently when the power switch is initiated via the RD,A command at the UCP, the RDA loses all power and reboots. This causes a loss of approximately 3 to 5 minutes of RDA operations. With the installation of TPS, the operator will no longer need to issue the RD,A command. If the RD,A command is issued and the automatic transfer panel detects continuous commercial power, the generator will shut down after seven minutes. Updated local operation manuals should reflect the fact that the RD,A command no longer needs to be issued when there is a chance of a power outage. This will all be automated.

The TPS also serves as a power conditioner. In the case of power spikes or brownouts, TPS will condition the power to provide an isolated power source. There are some very expensive electronic boards in the NEXRAD computers that are very sensitive to power fluctuations. TPS will condition the power to protect these boards and thus save RDA down time and save the costs in replacing these boards.

It is suggested operators become familiar with this system. The operator should "tour" the TPMS to see what comprises the system. Your local maintenance staff should be informed on the subject and be able to answer questions. Local policies should be updated to include TPS capabilities. Additional information about TPS can be found on the OSF homepage at http//:www.osf.noaa.gov.

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WSR-88D Solar Calibration

OSF Engineering has completed efforts to generate a practical calibration procedure for the Internal Noise Source (4A25). Proper calibration of the Noise Source is essential for correct measurements of System Noise Temperature on-line (Application software running) and Sun Noise Temperature off-line (RDASOT program running).

The practical consequences of this achievement are as follows:

• Correct measurement of System Noise Temp eliminates RDA alarm conditions due to mis-calibrated Internal Noise Sources. In the past, effective trouble-shooting of these alarms was complicated by mis-calibrated Noise Sources leading to costly and unnecessary Receiver Channel LRU replacement.

• Reliable measurement of Sun Noise Temp opens the way for use of RDASOT SUNCHECK Subtest 2 as a means of calibrating all of the RDAs in the entire WSR-88D network using the same signal source, namely the S-band radiation from the sun. While the internally generated test signals do an excellent job of calibrating 99% of the receiving system, Subtest 2 is relied on to calibrate the Antenna, Radome and associated waveguide between the Antenna and the input to the Receiver/Protector. In the present configuration of the WSR-88D system, this is an off-line preventative maintenance investigation procedure which is performed every 84 days. Hopefully, in the future, this calibration will be done periodically on-line.

(Continued on page 4)

NEXRAD Now

Site ID Database

The OSF in conjunction with OSO1 and the sponsoring agencies has developed a NEXRAD site database that will be used to support Engineering Management Reporting System (EMRS), Configuration Management Information System (CMIS), OSF managed retrofits, technical manuals, and our agency customers. We have strived to establish a universal naming convention including site IDs, ICAO IDs, organization codes, etc.

We have expanded the database to include other pertinent information such as site latitude and longitude and tower heights. We will continue to update and improve this database. It is available at our Website:

http://www.osf.noaa.gov/ssb/srchmain.htm.

We encourage you to use this database and email any corrections and suggestions for improvements to Logistics@osf.noaa.gov.

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Solar Calibration

(Continued from page 3)

Beta testing at Des Moines WFO and Vance AFB have yielded very encouraging solar calibration results after each site was calibrated with the newly developed Noise Source procedure. The mean Subtest 2 error was measured to be less than 0.5 dB with a standard deviation also less than 0.5 dB at both sites. Data from Des Moines (a 30 meter tower) and Vance AFB (a 10 meter tower) were collected over a two week period during the summer of 1998.

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Radar Hot? Radar Cold?

Did you know that a reflectivity estimation error as low as 1 dBZ can result in a 15-20% error in precipitation accumulation estimates and can cause a change in estimated hail size of approximately 1/4 inch?

A correctly calibrated radar is the key to accurate reflectivity estimates. The accuracy of these estimates, in turn, determines the accuracy and quality of all reflectivity-based products. The radar's calibration is checked every three months by the local electronic technician as part of a Preventative Maintenance Inspection (PMI). If, during this check, the radar is found to be "out of calibration," the electronic technician will take the RDA off-line and perform corrective actions to ensure the radar is correctly calibrated. But that was then (last PMI date) and this is now. Intervening changes in the operating characteristics of the radar may result in changes that can cause reflectivity estimation errors.

What is the calibration of the radar NOW? During an operational weather event, how do you know the accuracy of the reflectivity estimates? DELTA SYSCAL (CALIB) ***does not*** provide this information and unfortunately the radar does not automatically calculate and display the reflectivity error for you.

To address this issue, a simple procedure for estimating the reflectivity error has been developed by the Operational Support Facility. The procedure to calculate the estimated reflectivity error (while the WSR-88D system remains operational) and a process to adjust operational data interpretation to correct for this error are presented in a paper entitled *An Operational Guide to WSR-88D Reflectivity Data Quality Assurance*. This paper can be found at http://www.osf.noaa.gov/otb/papers/z-error/.

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Standardizing WSR-88D Communications Configurations

You just completed an AWIPS integration or installed an additional PUP moved from another forecast office. Maybe you added a dial line for a NIDS vendor who changed his service recently. Well, all of these involved changing your WSR-88D RPG communications hardware. Sometimes you may have just been adding a modem; others may have needed to add a second modem rack or another VME card or an additional patch panel. The OSF tracks each of these changes. So, when you need a site specific change or when new WSR-88D data distribution is necessary, the OSF can determine the equipment and amount of work needed to make it happen.

Maybe you have asked why it takes "forever" to get a modem to associate your RPG with another PUP. Many people have asked why it takes so long to receive equipment for a communications equipment change. The purpose of this article is to let you know why it has taken so long in the past and what we're doing to improve this situation.

It takes some time to get a change implemented because funds for doing the work have to be made available. With communications, it's not only equipment; communications changes usually require circuit installation and monies for additional recurring communications costs. Your changes also take time because there are a very limited number of people available to do the work and because of the way the change process and support documentation is setup. And there's more.

The main reason it takes so long to get a communications equipment change implemented is due to the number of different communications equipment configurations. There are 91 different communications cabinet configurations. The number of communications cabinet configurations is currently nearly half of the total number of WSR-88D RPGs (184 RPGs).

For every different communications cabinet configuration, there is an Interconnection Diagram (ICD). An ICD is a drawing that shows the equipment layout. For every communications change, the ICD has to be modified and an Engineering Change Notice (ECN) has to be written. An ECN is a form that is placed in the affected drawing folder to record a change, what it was and when it occurred. Every time an ICD is changed due to a communications configuration change, an ECN is written. To reduce the workload required for narrowband communications changes, a new approach is being developed which will reduce the number of ICDs, and likewise the number of ECNs required.

Calculate the number of WSR-88D changes you've seen over the last few years times the number of WSR-88D sites. Multiply that by ten (10). The number calculated is close to the number of baseline drawings,

(Continued on page 6)

Standardizing WSR-88D Communications Configurations

(Continued from page 5)

specifications, and technical manual change pages that must be reviewed & changed every time a piece of WSR-88D hardware is added, subtracted, or modified.

Even though there are 91 communications cabinet configurations, there are only three basic RPG communications cabinet configurations, (NWS, DoD, and FAA). Individual WSR-88D sites use mostly the same communications equipment and differ primarily in the number of connected users. Generic ICDs are being developed to show each basic configuration with all of the available ports fully populated. These diagrams will show the maximum number of communications ports and associated cabling a site could have. The associated cables are physically identical and do not require separate identification with individual numbering.

For each ICD, a table will be associated listing the actual quantities of specific modem types (dial and dedicated), modem racks, adapter panels, and VME cards. The tables will be generated using the current narrowband communications database information that is used to generate site specific narrowband circuit reports and reconfiguration control menu documentation used for equipment installation purposes. Once the generic ICDs with associated tables are in place and the configuration management standardization documentation has been verified, narrowband changes will require less paperwork and less time.

For future WSR-88D system wide narrowband communications changes, considerable cost savings will be realized in the number of hours saved by the reduction of support documentation. A one time system wide communications change savings will cover the one time cost of implementing this standardization change. Accurate communications configuration management data should also contribute to long term cost savings. Finally, lead times on cables and cable costs will decrease, as commercially available unlabeled cables can be purchased.

Some sites will be required to change their communications configuration in order to standardize. A few sites will have to relocate one or two modems to achieve the generic configuration. Some sites will have to add an additional modem rack or patch panel. Although we know that this change does not improve your current equipment performance nor does it provide you with any new functionality, we hope that this article has helped you to know that we are standardizing communications cabinet configurations in order to give you better and faster service for future communications change requests.

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What is That Spike? The Effects of Bistatic Coupling

It's not sunrise. It's not sunset. It most definitely is not a three-body scatter spike (TBSS). So then, "what is this radial of reflectivity emanating from my RDA?" If you've ever asked this question, the answer may lie in the occurrence of bistatic coupling. In a nutshell, the phenomenon occurs when adjacent radars with similar frequencies (less than 10 MHz apart) sample a common target (usually a storm) at the same time and the same altitude. The result is a "spike" of reflectivity, as well as velocity and spectrum width, which emanates from one or both RDAs, passing through the target and extending to the maximum reflectivity range of the radar. (By contrast, a TBSS begins down-radial from the high reflectivity core and is much shorter in length.) The bistatic signal is usually observed sporadically at lower altitudes, but may be observed on several subsequent volume scans lasting for hours. A more detailed description of the process and its impacts follows.

Bistatic signal detection with the WSR-88D —

Radars are classified according to transmitter and receiver antenna configuration. The basic configurations are monostatic with the antenna collocated, bistatic with antennas at two different sites, and tristatic with antennas at three different sites. Inherently, the WSR-88D is a monostatic radar, but under the proper circumstance two sites can actually function together as a bistatic radar.

Consider the geometry shown in Figure 1 depicting two radars pointed at a common target. Transmitter and receiver angles θ_t and θ_r are taken as the angle between the baseline (a line connecting the two radars) and the respective antenna pattern axis. The bistatic angle, β, is taken as the angle between the two patterns. When the target is illuminated by the "transmitter," a portion of the target intercepted power is scattered in the direction of the "receiver" and captured by the receiver antenna.

Normally, the WSR-88D relies on its excellent frequency selectivity to reject received signals other than those from its own transmitter. However, this selectivity is not available if the bistatic transmitter is at or near the same frequency. Unfortunately, there are several clusters of radars in the WSR-88D network operating at the same frequency. One such cluster consists of the radars at Vance AFB OK, Amarillo TX, Dodge City KS, and Ft. Smith AR which operate at 2895 MHz. Another cluster consists of the radars at Tulsa OK, Little Rock AR, and Grand Island NE, which operate at 2890 MHz. Other clusters likely exist in various sectors of the WSR-88D network. Neither the distance between several pairs of these radars nor radar horizon height preclude bistatic coupling when a common target is available.

The bistatic signal level depends on several factors. Probably the dominant factor is the beam alignment. The transmitter and receiver

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What is That Spike?

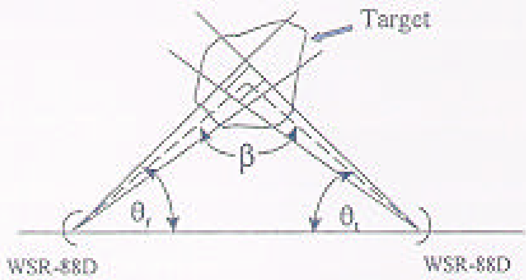


Figure I – Radials from two radars sample a target at the same time. See text for discussion.

Figure 2a

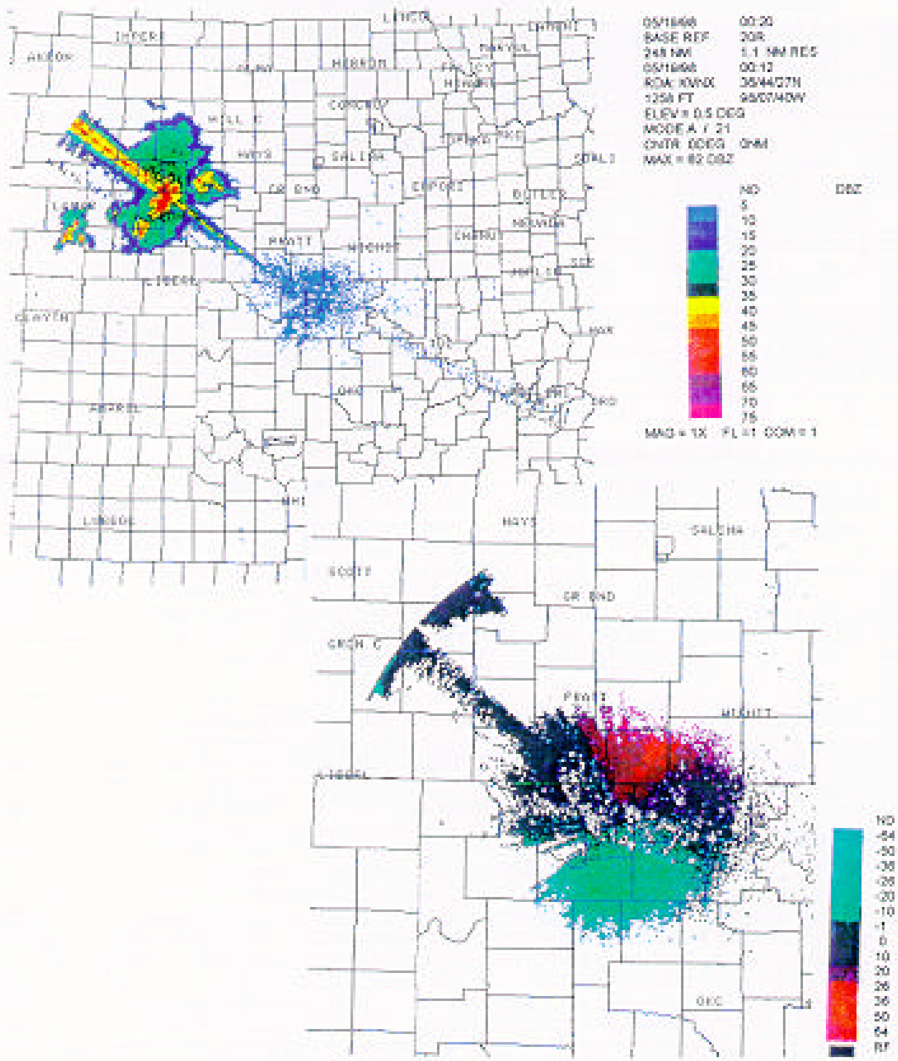


Figure 2a Insert

What is That Spike?

Figure 2b

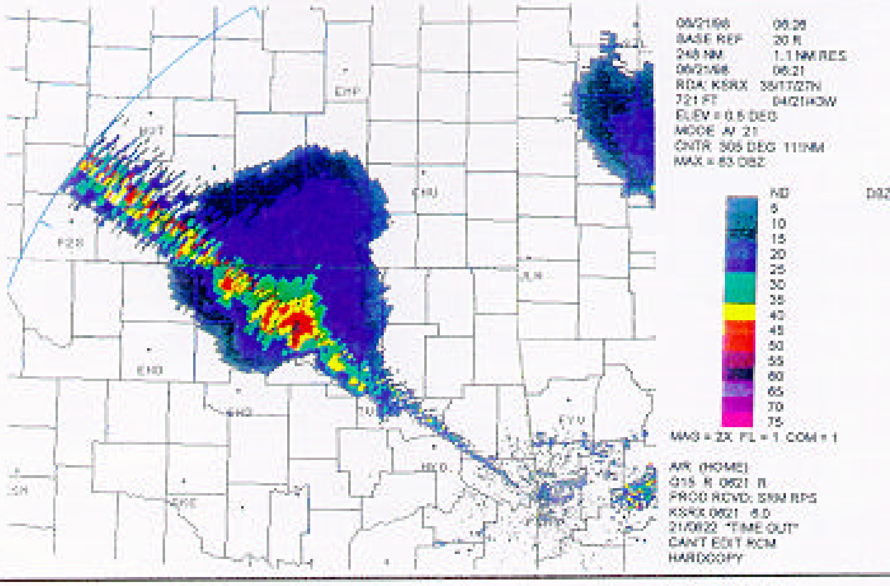
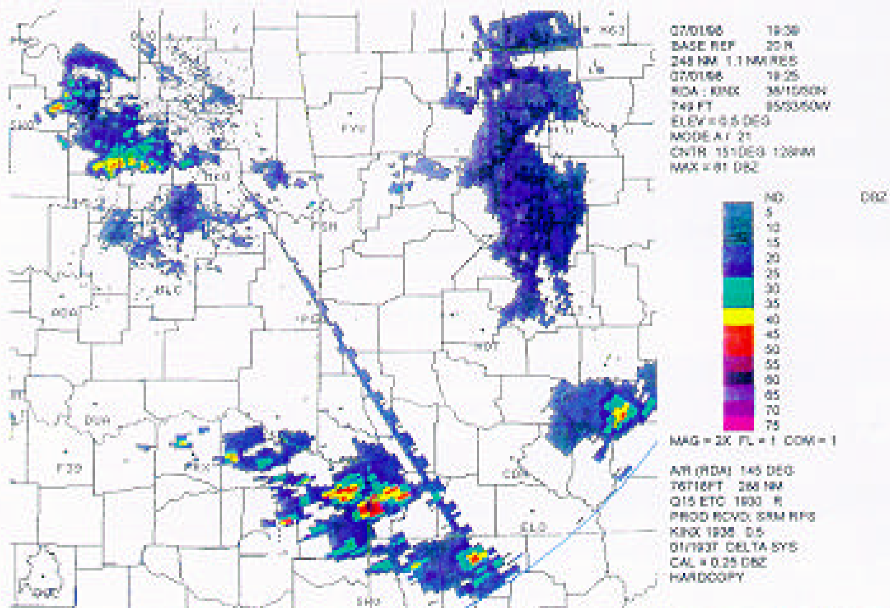


Figure 2c



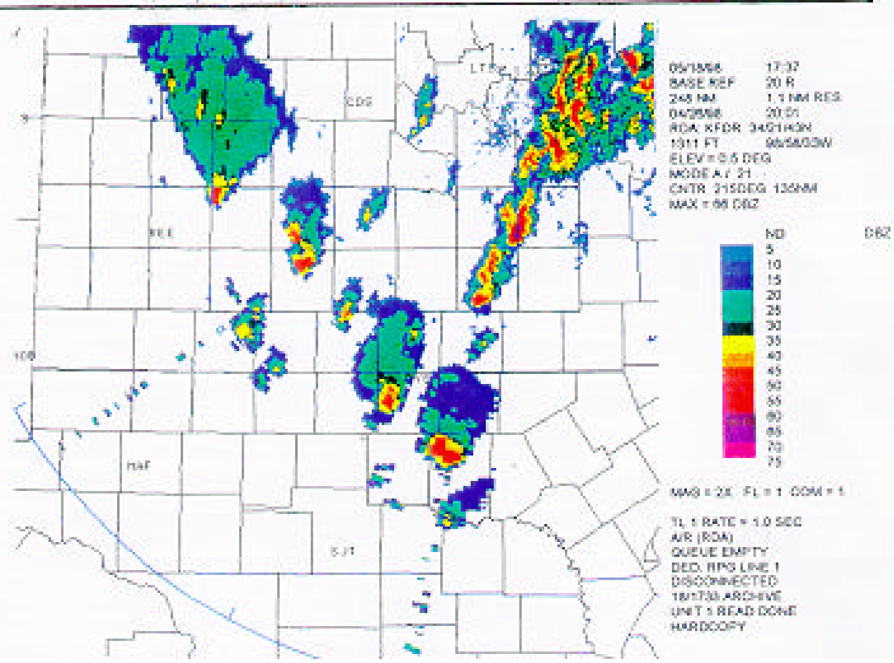


Figure 2d

What is That Spike?

(Continued from page 7)

antenna beams have to be pointed at a common target. In addition, as can be visualized from Figure 1, the sample volume (that volume from which the reflections from the various hydrometers arrive at the receiver port at the same time), varies with the bistatic angle. The bistatic radar cross section of the hydrometers (assuming Rayleigh scattering) is generally smaller than the monostatic cross section and varies with the bistatic angle. However, as the bistatic angle approaches 180 degrees, direct coupling occurs and a forward scatter enhancement (an increase in forward scattered power compared to back scattered) is obtained. This enhancement can be over 20dB for scattering by large water coated ice spheres.

In the case of the bistatic coupling between two WSR-88Ds, the transmitter and receiver are not time synchronized and the bistatic signal is "smeared" in range. It is also subject to a "collapsing" loss (10dB to 20dB) since the 88D signal processing assumes 60 to 100 hits per cell and the typical bistatic signal will be only a few hits per cell. In addition, the signal processing treats the bistatic signal as a monostatic signal and assigns a reflectivity value based on the bistatic power of the apparent range.

Examples of bistatic detection —

In interpreting bistatic coupling, the following characteristics should be kept in mind: 1) The level of coupling is not reciprocal, i.e., for a given situation, the interference level at the two sites is not generally the same. This is due to sample volume and transmitter and receiver range dependency. 2) Except for the forward scatter case, there is usually a substantial reduction in bistatic reflectivity from monostatic reflectivity from a given target. This is again due to sample volume and transmitter range dependency as well as collapsing loss. 3) Level of coupling is highly dependent on antenna alignment on a common volume. With exception of the forward scatter case, good alignment on a common volume occurs rarely in practice. What is usually experienced is partial alignment with only a small fraction of the common volume (shown in Figure 1). With these characteristics in mind, most of the interference is reasonably understood.

An example of bistatic forward scatter is shown in Figure 2a. Coupling is from Dodge City, KS to Vance AFB, OK. Dodge City lies on the 307 degrees radial at 190km from Vance. Vance target az/ran is 307 degrees/96km, almost midway on the baseline. Bistatic angle is 180 degrees and forward scatter enhancement offsets processing loss. Note the range dependency of apparent reflectivity. The weak return along the 115 degree radial, which is the azimuth to the Ft. Smith radar, is probably clear air forward scattering from Ft. Smith. The insert is the corresponding velocity display. Range extent of bistatic coupling results in range folding and obscurations of the velocity.

An example of bistatic coupling at a large bistatic angle is shown in Figure 2b. Coupling is from Vance AFB, OK to Ft. Smith, AR. Vance AFB lies on the 295 degrees radial at 360km from Ft. Smith. Ft. Smith target az/ran is 309 degrees/250km. Bistatic angle is 159 degrees. Coupling at this large bistatic angle exhibits many of the same features as forward scattering.

What is That Spike?

(Continued from page 10)

An example of bistatic coupling at intermediate bistatic angles is shown in Figure 2c. Coupling is to Tulsa from either Little Rock or Ft. Smith but is probably from Little Rock. Little Rock is 146 degrees/215km from Tulsa and bistatic angle is 52 degrees. Note that coupling is not via the strongest cell.

An example of weak coupling is shown in Figure 2d. The receiving station is Frederick, OK. Transmitting station is unknown although the dual radials at 187 degrees and 234 degrees, when considered with the clockwise rotation of all WSR-88D antennas, implies the station is probably east of Frederick. There was little movement of the target cells in this case and coupling persisted for over an hour.

As mentioned earlier, bistatic coupling usually occurs for only a few volume scans due to the temporal instability of the coupling mechanisms. However, on rare occasions when the precipitation echoes are nearly stationary, very stable coupling can occur for long periods of time. In one such case on 7/15/98 around 6pm CDT, coupling from Dodge City to Vance AFB lasted for over two hours (not shown).

Operational impact of bistatic coupling —

Although the bistatic coupling is striking when it occurs, the overall operational impact is usually small due to the infrequent occurrence and usual lack of temporal stability. The forward scatter coupling at large bistatic angles and back scattering are the most detrimental since they result in a large intense false echo (the spike). Cases with little temporal and height continuity result in little impact on radar products. However, cases such as shown in Figures 2a and 2b would affect a large number of products. In addition, occurrence of this type of coupling for even a few volume scans could disrupt products such as storm track, weak echo region, VIL, and composite reflectivity. Precipitation products could occasionally see unrealistic accumulations, especially if the affect is present at more than one elevation angle and persists for some time. Since the velocity echo associated with the reflectivity spike is usually range folded, both velocity and storm relative velocity products can be impacted. This may also on occasion impact mesocyclone and tornado vortex recognition in and near the sector where couplings occurs. This could be of significant importance if the bistatic coupling occurs in an area where a velocity couplet is located. If the forecaster is not monitoring the base products as well as the derived products, the bistatic coupling effects may not be recognized and could hamper interpretation.

Mitigation of the bistatic coupling —

The coupling can be mitigated by frequency changes at select sites within the common frequency clusters. An assessment is underway at the OSF on the feasibility of swapping frequencies with other radars in the network. Sites should feel free to contact the OSF Hotline if they suspect they are having problems with bistatic coupling.

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Precipitation Accumulation Processing Improvements

The OSF Software Engineering section has been working diligently to improve the hybrid scan and occultation data files which are used by the precipitation algorithms to account for terrain obstructions. The occultation data is used by the radar to determine the amount of beam blockage from surrounding terrain. The hybrid scan uses the occultation data to determine the correct elevation angle to use in order to clear the blockage. The end goal of our effort is a more accurate software implementation of the scientific specification which will result in improved output from the precipitation accumulation algorithms. This article addresses specific issues concerning the hybrid scan and occultation data files, errors we have found, corrective actions we have taken, and our progress in the corrective action process.

Since the beginning of the NEXRAD program, the hybrid scan and occultation data files were constructed using United States Geological Survey (USGS) terrain elevation data. This data only covers the area within the borders of the United States. This leaves the 31 sites located close to the Canadian and Mexican borders with part of their 230 km range undefined for hybrid scan and occultation data, while the international sites, i.e., Korea, Guam, Okinawa and Azores, are left totally undefined. Additionally, USGS data is dated and limited. For example, plateaus were noted where mountain tops should have been located. To address these particular shortcomings, future occultation data files will be generated using National Imagery and Mapping Agency, Digital Terrain Elevation Data Level 1 (NIMA, DTED Level 1) as the source for terrain elevation data.

Significant implementation errors were also discovered in the occultation file generation source code. These implementation errors generally impact the output of the precipitation algorithm within 29 kilometers for sites located in mountainous areas. A hypothetical case helps to better understand the problems which presently exist; reference Figure 1 (occultation at 0.5 degree elevation) and Figure 2 (hybrid scan elevations). The blockage to the west is a 5000 meter wall located approximately 100 kilometers from the site. There is a 50 meter blockage directly north of the site and within a kilometer of the site. Figure 1 shows the discontinuity and low percentage of blockage because of missing terrain data. Figure 2 reflects the impact this has on the hybrid scan. There is complete blockage to the west and north, but the radar is not using the correct elevation angle to clear the obstacle.

During engineering analysis it was discovered that the terrain elevation table was not being populated correctly with elevation data: 92% of the azimuth/range

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Precipitation Accumulation Processing Improvements

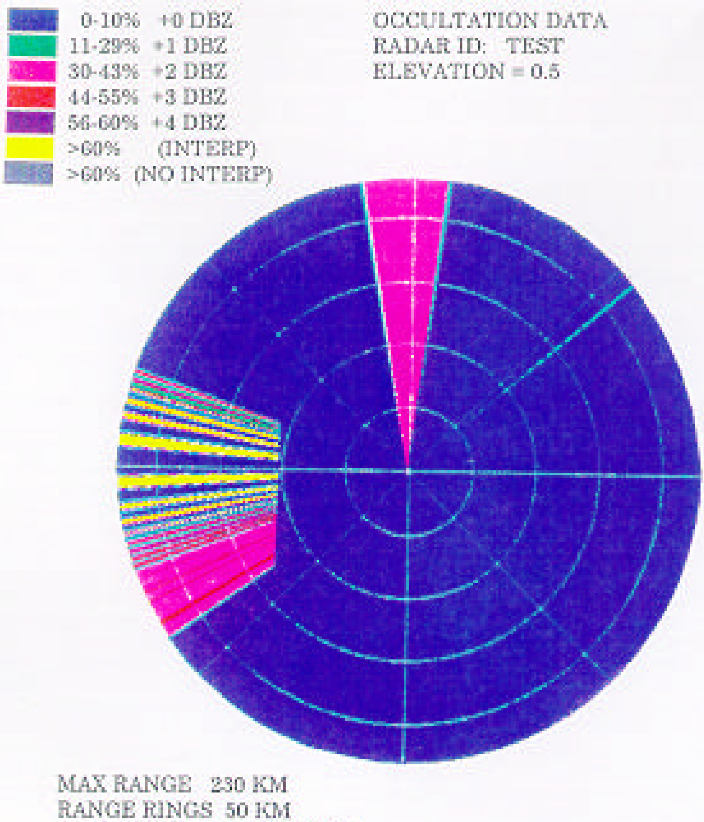

FIG 1

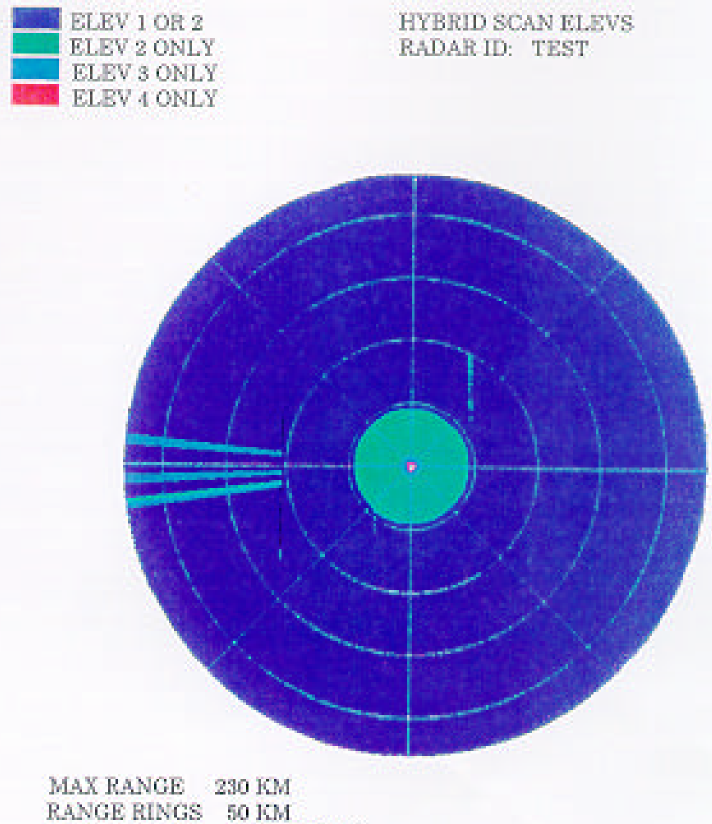

FIG 2

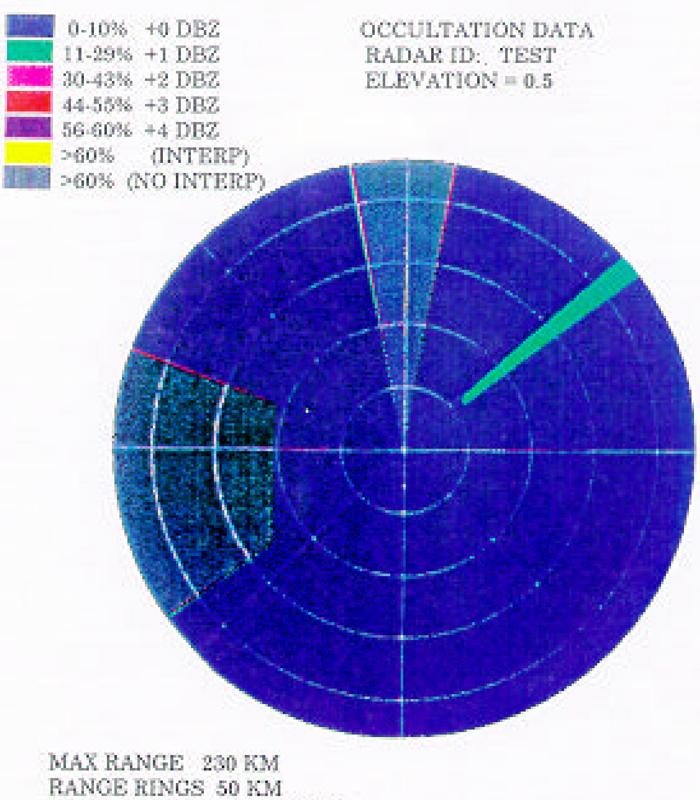

FIG 3

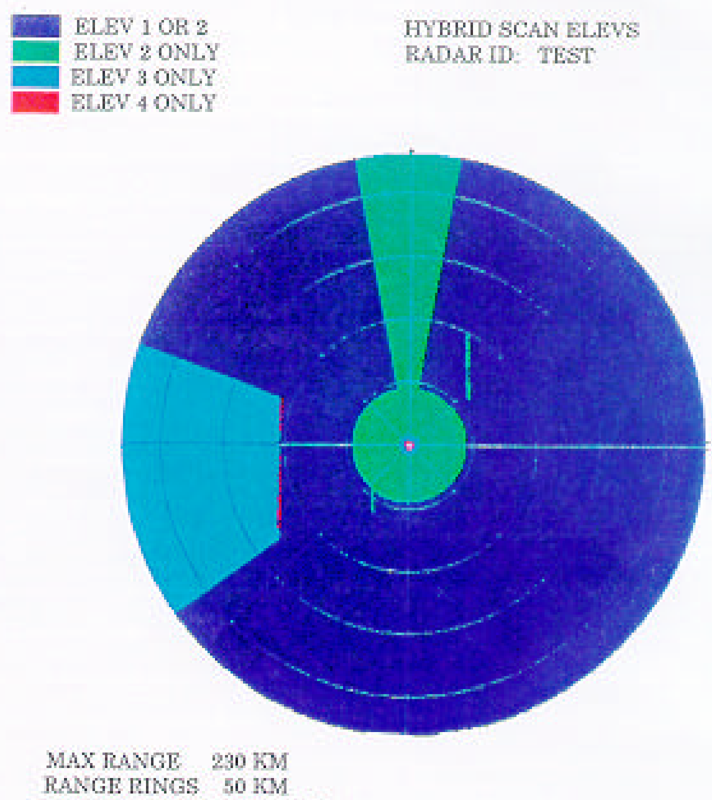

FIG 4

Precipitation Accumulation Processing Improvements

bins within 1 kilometer were left undefined, 68% at 2 kilometers, 49% at 3 kilometers, 34% at 4 kilometers, and 24% at 5 kilometers. These undefined bins were being populated with a technique that went out in range until a value was found and used. This method smeared the data and lost important terrain features which could cause radar beam blockage. This was a very important step because the hybrid scan and occultation data files are created from this table. This impacts precipitation detection close to the site since the beam blockage calculations close in were being based on terrain data which was misplaced or nonexistent.

A significant improvement was realized in the occultation data and hybrid scan information by properly populating the terrain elevation table. These results, using test data, can be seen in Figures 3 and 4. Note in Figure 3, that the 5000 meter blockage is now accurately represented, as is the 50 meter blockage to the north. Also, a 500 meter blockage to the north-east becomes more pronounced. All of these are correctly represented in the hybrid scan, Figure 4. By comparing these two sets of data it becomes clear that some of the occultation data and hybrid scan information previously provided to the algorithms were deficient.

The next step was to merge this terrain elevation table with another table containing cultural data (non-terrain features such as towers, buildings, trees, etc.) which could cause radar beam blockage. A sample of these cultural tables showed they were all initialized to 0. Subsequently no cultural data (which could cause radar beam blockage) was included in the process. OSF Software Engineering is looking for a source of cultural data and has ordered some from NIMA for evaluation. The missing cultural data has some impact on the hybrid scan and occultation data files and existing beam blockages may not be properly reflected in these files.

During the generation of the terrain elevation table, the site elevation was determined using the terrain elevation data. Large errors occurred due to the poor quality of the terrain data and the method used to calculate the site elevation. During site analysis, the OSF Applications Branch compiled a list of differences between the actual and the calculated site elevations. The differences ranged from + 123.2 meters to -70.4 meters. Visualize placing the radar tower in a 70 meter hole. This would cause extensive beam blockage. Next, visualize placing the tower on a 123 meter artificial hill and consider how this would reduce the beam blockage. We have placed the exact site elevation for each RDA in a site information file which is read into the process, thereby eliminating calculation errors.

Because of OSF Engineering's extensive

(Continued on page 15)

Precipitation Accumulation Processing Improvements

(Continued from page 14)

analysis and programming efforts, we now have the capability to produce a realistic terrain elevation table with the NIMA data and accurate site elevation. The Software Engineering staff has created updated files for all of the sites. WSR-88D users will benefit from the improvements made to the hybrid scan and occultation data files. The combination of OSF Software Engineering's refinements and the work done by OSF Applications Branch (Terrain Based PPS Modification) should result in improved precipitation algorithm outputs.

We are in the process of investigating the impact of another potential problem with the hybrid scan and occultation data files. Some time ago Software Engineering initiated a configuration change request which pointed out that a site had a latitude and longitude in the RPG adaptation data which differed from the one the OSF used to produce the hybrid scan and occultation data files for the site. We have initiated a FAX Back requesting that the sites provide us with the latitude, longitude and site height values residing in their adaptation data files. Field responses have revealed that fifteen sites have site location coordinate differences of 4 or more seconds. One site has reported over a one half mile difference. These sites are being contacted with adaptation data corrections relating to site coordinates. We are also investigating the potential impact to the occultation and hybrid scan data, and RPG processing when the coordinates do not match.

The changes described in this article, which include use of more accurate terrain data and the use of accurate site elevations, should result in a marked improvement in the output of the precipitation accumulation, for sites which have beam blockage close to the site. As we continue to refine the occultation data file generation software, any additional problem areas will be repaired and reported to you in future articles.

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NEXRAD Now is a periodical of the WSR-88D Operational Support Facility.

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The upcoming issue of *NEXRAD Now* is scheduled for release in June, 1999. We encourage our readers to submit articles for publication. *Please note:* May 7th is the deadline for submission of articles for the June, 1999 issue.

Please send all comments and articles via e-mail to: rjackson@osf.noaa.gov

WSR-88D Level II Recorder

The Level II Recording equipment (UD16) consists of five assemblies mounted in the RDA equipment rack. Two main assemblies include the cartridge handling subsystem (CHS) often referred to as the "Jukebox," and cartridge tape subassembly (CTS) often referred to as the "8mm Tape Drive."

REF DES	DESCRIPTION	PART NUMBER	NSN
16A1	RECORDING SYSTEM	831005-025	6660-01-456-2056
16A1A1	CARTRIDGE TAPE SUBASSEMBLY	EXB8500	7025-01-388-7619
16A1A2	CARTRIDGE HANDLING SYSTEM	EXB-10I	7025-01-376-7887

Field electronic technicians will now have the option of ordering the combined unit (16A1) or they can still order the individual subassemblies (16A1A1 or 16A1A2). A new National Stock Number (NSN) has been cataloged for the combined unit, and these units are now available from the National Logistics Supply Center (NLSC) in Kansas City (see the table above). The WSR-88D field maintenance technical manuals are being updated to reflect the combined unit and will soon be released to the field.

By ordering the combined unit, the field site will get an assembled unit that has been calibrated and tested together at the National Reconditioning Center (NRC). The combined unit can be removed and replaced in five minutes. The hope is that the combined unit, besides being quicker and easier to install (5 minutes instead of 25) will also have fewer failures. A significant reduction in failures is anticipated because of the calibration and testing which is done on the combined unit at the NRC during the repair process. The "no defect found" and "received defective" rates should be reduced as well.

In contrast, the individual subassemblies, after repair and testing, are disassembled and each part is put in stock at NLSC under its individual NSN. There is no guarantee that two units tested together will be shipped together. In order for the field technician to repair the Level II Recording System, both parts must be disassembled and reassembled before reinstalling them in the WSR-88D. The estimated remove and replace time is 25 minutes.

The obvious drawback to the combined unit is the cost. Analysis of the cost differential demonstrates that the increased cost of the combined unit will be offset by the continuous need to replace the individual units in the field which don't work together because of calibration problems. It has also been observed from analysis of ordering history that most field sites have required both the cartridge handling subsystem (CHS) and cartridge tape subassembly (CTS) when maintenance is performed.

So, the next time that maintenance is needed on the Level II Recording System, you now have a choice.

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