NEXRAD Now

Spring, 2000

Issue 10

BEWARE: WSR-88D Electrical Load "Creep"

All WSR-88D sites, with the exception of two, currently have an Electrical Distribution System (EDS) which includes 200 Amp utility service combined with an 80 kW Engine-Generator Set (EG). When the EDS for WSR-88D sites was originally designed, this combination was more than adequate. Under original configuration, the maximum steady-state load for single-thread sites was utilizing just over 50% of the capacity of their EDS with redundant sites utilizing just under 75% at maximum steady-state load. Under such conditions, strict control over electrical loads is not necessary because there is adequate "headroom" for outlets and other minor additions.

However, with WSR-88D modifications being made by the OSF and its customers, sites are suffering from electrical load "creep." Improvements regarding climate control, power conditioning, and radar performance have gradually added to the site load resulting in a decrease in headroom. Currently, the maximum steady-state load for a typical single-thread site (typical site refers to one with Bard HVAC units and TPMS installed) utilizes over 75% of the capacity of their EDS with typical redundant sites approaching 100% under maximum steady-state load. Under such conditions, it becomes necessary to be more careful regarding the loads added to the site as well as the basic operation of the baseline loads. OSF Engineering's 8-year Mod Plan currently includes a project to upgrade the EDS of all sites. However, it will take time to receive funding and deploy an upgrade to all sites. Meanwhile, the goal of this article is to offer some suggestions to ensure each WSR-88D site's EDS is prepared to handle the increased electrical load it currently faces.

Site: First of all, there is the obvious piece of advice. Do not leave unnecessary loads on when they are not needed. In the RDA and EG shelter, turn off lights and

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any loads plugged into the utility outlets when they are not in use. If the site has a TPMS shelter, ensure that the lights, loads plugged into utility outlets, and the maintenance room air-conditioning unit are turned off when the shelter is not being occupied.

RDA Shelter: RDA climate control is a large consideration. Most sites continue to utilize the original Bard 5-ton HVAC units for the RDA shelter. Other sites, with special heating/cooling needs have installed alternate HVAC units. Regardless of the HVAC utilized, it is beneficial not to exceed the intended portion of the EDS capacity (a maximum of 50 Amps per phase for total RDA HVAC operation). Any HVAC units which require more than this will consume part of the headroom which was originally available. The thermostats for the RDA HVACs should be set according to EHB 6-550, Table 3-1 (EHB 6-553, Table 3-1 for redundant sites). *DO NOT SET RDA HVAC THERMOSTATS BELOW THE RECOMMENDED SETTINGS.*

...with WSR-88D modifications being made... sites are suffering from electrical load "creep."

Radome: At extreme cold weather sites, heating the radome is of great consideration. WSR-88D sites include one, two, or three heaters in the radome depending on the external environment. The heaters are 10 kW strip heaters which equates to just under 30 Amps of load per phase, per heater. Radome components are specified to operate at outdoor temperatures down to - 40 °C (- 40 °F) according to the NEXRAD Technical Requirements so the heaters were originally intended to heat the radome only during maintenance for personnel comfort. However, after experiencing some pedestal problems some sites now utilize the radome heaters to keep encoders above freezing temperatures and to prevent ice from building up on the exterior of the radome. The OSF released a modification in 1997 which modified all radome heaters to include a thermostat. If a site utilizes the heaters for any reason other than maintenance personnel comfort, it is strongly recommended that this modification be completed and all radome heaters be controlled by thermostat. The thermostats do not have temperature markings, however effort should be made to approximate the turn-on temperature to 0°C (32°F). Thermostats will prevent instances where radome heaters are controlled by breaker and left on even after the external temperature is well above freezing. Leaving the heaters on compounds the problem by actuating the radome exhaust fan to cool the radome which adds even more load. The radome ventilation fan thermostat should be adjusted according to EHB 6-550, Table 3-7 (EHB 6-553, Table 3-6 for redundant sites).

EG Shelter: The EG shelter is critical because it houses the backup power source for the WSR-88D site. As the load on the EG increases, proper maintenance becomes

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even more important. Preventive Maintenance Instruction (PMI) cards regarding the EG shelter and the EG set should be followed closely. Furthermore, the EG shelter room heater thermostat should be set according to EHB 6-550, Table 3-6 (EHB 6-553, Table 3-5 for redundant sites). Also, ensure the EG shelter ventilation system is working properly by performing the procedures in EHB 6-550, Tables 3-4 and 3-5 (EHB 6-553, Tables 3-3 and 3-4 for redundant sites). Proper preventive maintenance and ventilation will ensure unnecessary stress on the engine is avoided.

TPMS Shelter: The primary concern in the TPMS shelter is the ventilation system for the TPS unit. It is recommended that the thermostat settings for ventilation and recirculation fans be set according to EHB 6-500 paragraph 3-2.5.6.2. Proper settings of the thermostats will ensure optimal ventilation and will allow the TPS unit to run at its peak electrical efficiency. Furthermore, keep in mind that the window air-conditioning unit located in the maintenance side of the TPMS shelter is not intended to cool the TPS unit. Therefore, when the maintenance side of the shelter is unoccupied, the maintenance air conditioner should be shut off.

Snow Shelter: Remote sites which have snow shelters need to ensure that the loads associated with the living quarters are shut off when the quarters are not being inhabited. All thermostats, for snow shelter ventilation and heating, should be set to reasonable operating temperatures.

Addition of Loads Not in the WSR-88D Baseline: Many sites have already added electrical loads which are not included in the WSR-88D baseline. Examples of non-baseline loads include alternate HVAC installations and semi-permanent storage shelters being wired into the EDS. If a site has already, or is planning to add significant loads to the EDS, significant being any single, two, or three phase load which draws in excess of 10 Amps per phase, the effort should be coordinated with the OSF to ensure no adverse impact to system operation.

By working together, reliable and quality power can be supplied to all WSR-88D radar sites. If you have any questions, concerns, or experience any suspected power related problems, please contact the NEXRAD Hotline at 1-800-643-3363.

1Lt Jamie Coker, USAF
OSF Engineering Branch

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We encourage our readers to submit articles for publication. Please note: *April 21st* is the deadline for submission of articles for the Summer, 2000 issue.

Please email all articles and comments to:

rjackson@osf.noaa.gov

All previous issues of NEXRAD Now can be viewed on the OSF Home Page located at:

http://www.osf.noaa.gov

Director.....Jim Belville
Deputy Director.....Richard Vogt
Editor.....Ruth Jackson

NEXRAD Hoists, Types and Uses

Is the proper hoist assembly being used during maintenance of the WSR-88D? If not, damage to person and/or property could occur.

NEXRAD technicians use two basic types of hoist assemblies to maintain the system on a routine basis. The two types of hoists are distinct and have separate functions. The technicians should know their proper uses, weight limits, and perform annual preventive maintenance to keep the hoists in proper working order. Improper use can easily cause personnel injury, equipment damage, or both.

The first hoist assembly is the chain fall assembly used in the RDA Shelter. Its primary purpose is to lift the klystron and focus coil in and out of the oil tank assembly once the oil tank assembly has been removed from the transmitter cabinet. The chain fall hoist is attached to hoist inserts and eye bolts mounted in the RDA Shelter ceiling, in front of each transmitter cabinet. When not in use, the chain hoist is stored away. The chain fall hoist assembly has a 1/2 ton (1000 lb) capacity with a 10 foot chain. However, due to the RDA Shelter ceiling constraints, the load capacity is limited to 500 pounds. There is a “Caution” label affixed to the ceiling near the ceiling eye bolt reminding technicians of the 500 pound weight limit. Technical Manual NWS EHB 6-511, paragraph 7.6.22 describes the procedure and Figures FO 11-21, sheets 3 and 4, and FO 11-22 depict drawings on the removal and installation of the klystron and focus coil assemblies using the chain fall hoist. The annual preventive maintenance procedure is described in Technical Manuals NWS EHB 6-550, paragraph 3-4.21 or NWS EHB 6-553, paragraph 3-4.19.

The second hoist assembly is the Davit crane outrigger hoist used in the Radome. There are two types of crane or hoist assemblies used in the Radome, similar in function, but their uses are quite different. The Davit hoist (red in color) is made of a heavy gauge steel and has a 400 pound load capacity, as indicated by a sticker affixed to the Davit hoist. The Davit hoist is used to lift material from the ground to the Radome floor, or vice versa, or during the removal and installation of the elevation and azimuth gearboxes or the elevation bearings. Although Technical Manuals NWS EHB 6-513 or 6-514, Appendix A page, lists the 3" O.D. (outside diameter) Davit Hoist with a 500 pound capacity, the 400 pound load limit must not be exceeded.

The other type of hoist used in the Radome is a dull, gray aluminum hoist that only has a 100 pound load rating. The main purpose of this hoist, once mounted in the Elevation Housing Davit holes, is to lift the heavier lifting Davit crane hoist (400 lb load rating) up to the Elevation Housing assembly. The Davit hoist is then mounted in the Elevation Housing and is used to lower or lift elevation and azimuth gearboxes or elevation bearings due to their weight. The aluminum hoist must NEVER be used to lift or lower the gearboxes or elevation bearings as the 100 pound load limit would be exceeded, creating a serious potential for personnel injury or equipment damage.

It has been noted that some sites may have a dull, gray galvanized hoist with a 100 pound minimum and 1000/500 pound maximum lifting capacity as a replacement for the aluminum hoist. ALWAYS check the load lifting capacity prior to using any of the hoists.

Hoist installation and replacement procedures are described in Technical Manual NWS 6-514 (for Full Scale Pedestal production sites) or 6-513 (for Limited Production Pedestals), paragraphs 2-4.4.1.7, 2-4.4.1.8, 2-4.4.2, and 2-4.4.3. Figures

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OPUP - Supporting the New AFWA Philosophy

A new WSR-88D Principal User Processor (PUP) for the Air Force weather forecaster is under development. Development of the new system, called Open Systems Principal User Processor (OPUP), is a cooperative effort between the Air Force Weather Agency (AFWA), National Severe Storms Laboratory (NSSL), and Next Generation Weather Radar (NEXRAD) Operational Support Facility (OSF). The basic charter of the OPUP program is four-fold. First, design, develop, and field a scalable computer hardware/software suite, based on open systems technology to replace the aging AFWA PUPs. Second, include all the current PUP's product acquisition, display and manipulation functions. Third, add functionality required to interface with multiple Radar Product Generation (RPG) units and support multiple forecaster missions. Finally, interface with indigenous display equipment to support an integrated, multi-workstation environment. By addressing these requirements, OPUP will fulfill the new radar data display requirements that are a result of the new AFWA weather support philosophy.

The new AFWA support philosophy centralizes weather support into regional hub operations. The Operational Weather Squadrons (OWSs) at the large regional hubs are responsible for theater weather support for areas encompassing several states. The OWS forecast staff will produce synoptic-scale analysis, forecast, and guidance products, as well as point warnings and meteorological watches for DOD resources within the regional area of responsibility. Detailed weather support for in-garrison and deployed flying units will be provided by Combat Weather Teams (CWTs) assigned to individual bases. CWTs will use the synoptic-scale products, point warnings and meteorological watches produced by the OWS along with indigenous data sources and expertise to fine-tune local meteorological watches and warnings, and to produce customized flight and terminal forecast products. Additionally, smaller hub operations at selected locations will provide customized weather support to special-

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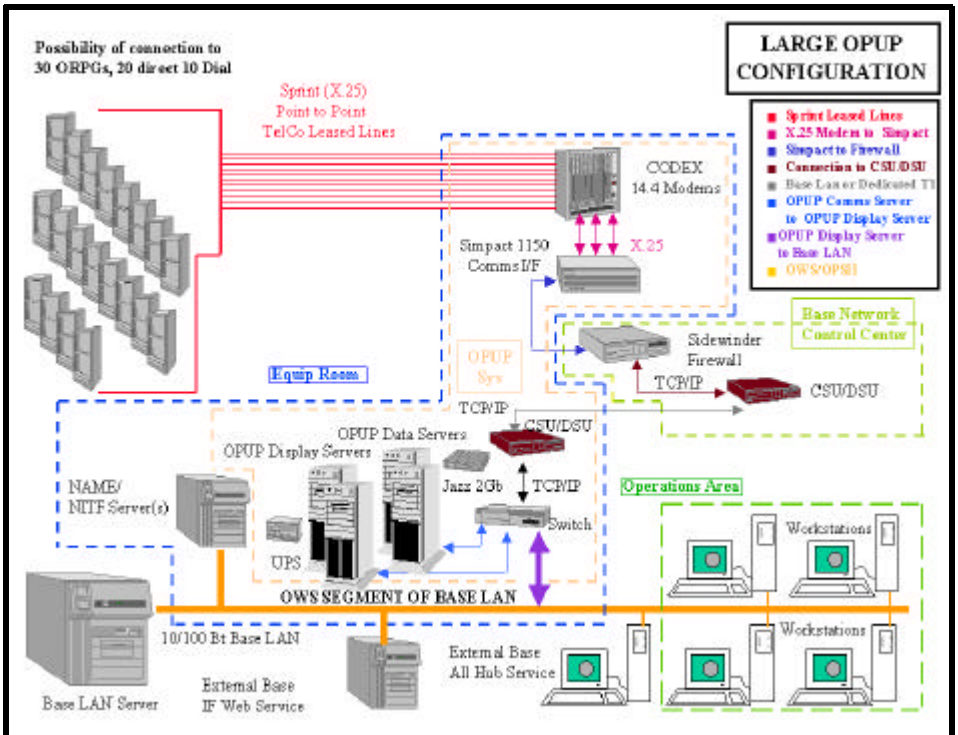

Figure 1 - Proposed Large OPUP hardware configuration.

OPUP and AFWA

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ized customers. OPUP is being designed to provide radar data support for these varied missions.

Scalability was a significant design challenge faced by the OPUP program. The OPUP design must allow for enough processors to support the multi-user, multi-radar environment of the large hubs, as well as scale down to cost-effectively support the single radar, single workstation CWT. Figure 1 illustrates the proposed Large OPUP hardware configuration designed to support hub operations, while Figure 2 is the proposed Small OPUP configuration intended for CWT operations.

Contrast the hardware layout in Figure 1 with that in Figure 2. The configuration in Figure 2 is planned for single radar/workstation support required by the CWTs. (Note: The location of the modems and routers will be site dependent.)

Notice that the OPUP does not have its own workstations/displays. Part of the AFWA Reengineering effort is to consolidate the various weather observation, analysis, and forecast tools onto consolidated workstations instead of having a separate workstation for each data source, as in the past. The consolidated workstations will be provided by the OPS II (N-TFS at CWT locations) and will receive all weather data, including radar products, from servers located on the LAN. This consolidated workstation concept will streamline the forecast process by putting all the required information at the forecaster's fingertips. Leveraging against this concept, each hub will be populated with numerous workstations where forecasters, responsible for the various portions of the overall OWS mission, can display, manipulate, and analyze data while preparing their respective forecast products.

The two previous figures only show example hardware configurations. The exact hardware configuration will be site dependent. The major factors affecting the specific configuration for each site are the number of associated RPGs accessed by that site and the total number of forecaster workstations serviced by OPUP.

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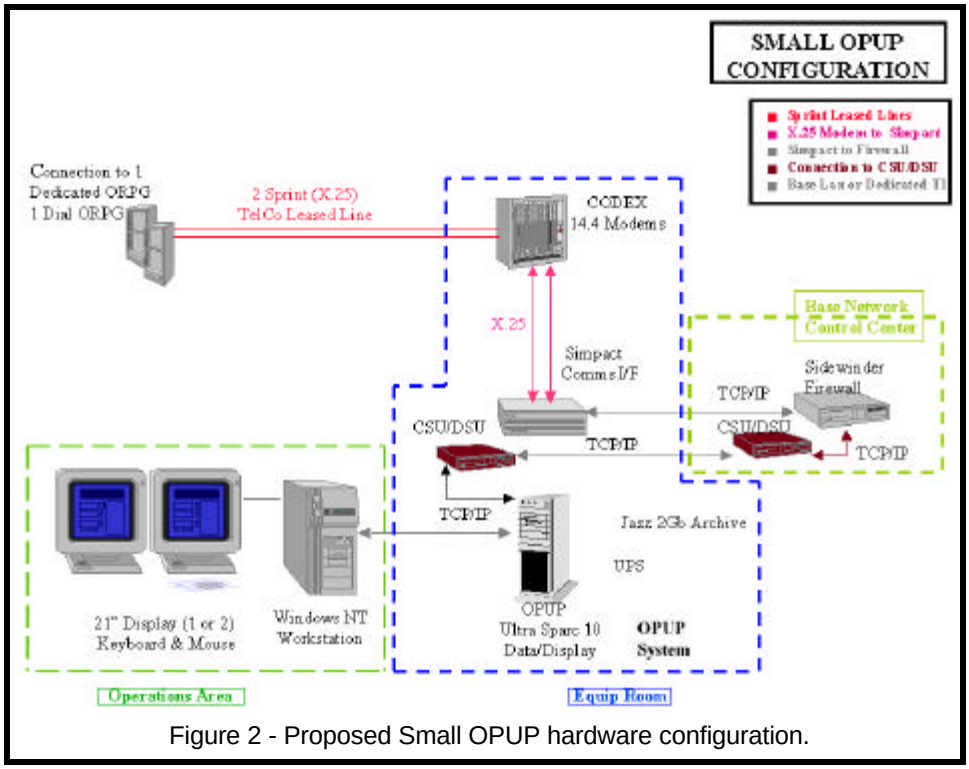

Figure 2 - Proposed Small OPUP hardware configuration.

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After addressing the hardware scalability issue, the next major issue was the required functionality and the impacts of the multi-radar, multi-user environment on product acquisition, display, and manipulation. Building on the tried and true reputation of the legacy PUP, the team is implementing virtually all the functionality resident in the legacy PUP. However, the new support paradigm drives additional requirements. For example, the OPUP will support dedicated communications to multiple RPGs and maintain separate Routine Product Set (RPS) lists, one-time requests, and meteorological alert criteria for each RPG.

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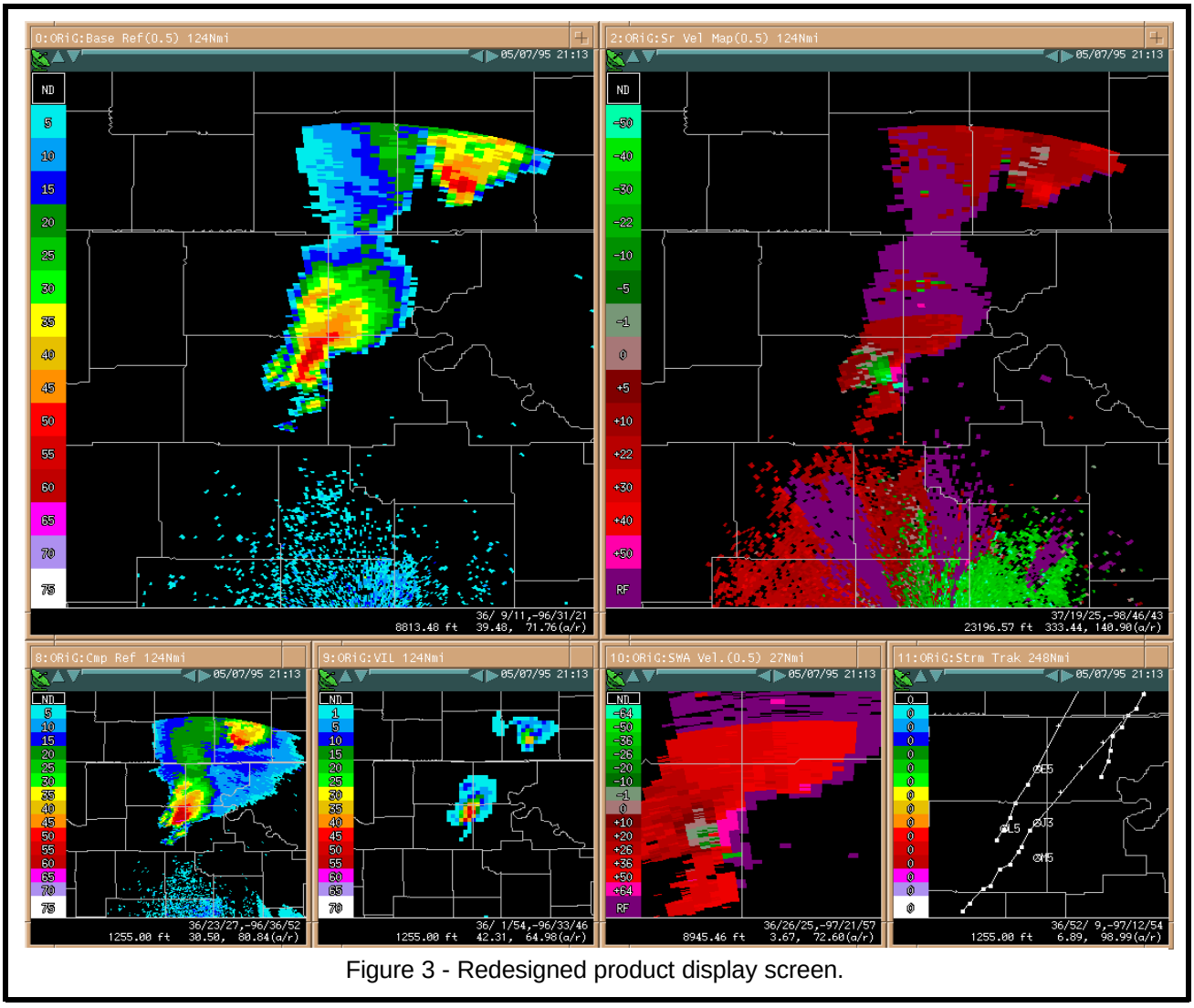

Figure 3 - Redesigned product display screen.

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Another innovation is the redesigned product display screen format (see Figure 3). The legacy PUP hardware limited the display to a maximum of 4 products per screen. The new display technology employed by OPUP will allow up to 12 independent product display windows per screen. Each of these windows is an "autonomous" display. The size and screen location can be specified for each window. The product type, source RPG and color pallet can also be selected, independent of any other window. Additionally, each product can be manipulated without affecting any other product in any other window. However, to simplify multiple window manipulations, the operator can use the "Linked Windows" function to simultaneously perform the same display manipulation on any number of windows.

Figure 3 shows one popular display configuration -- 2 large display windows and 4 small ones. Remember, the OPUP supports 12 display windows. The configuration in Figure 3 also has 12 windows. In this case, under each large window (upper left and right windows) there are 3 other windows, fully populated with specified products and available for viewing with the click of a mouse button.

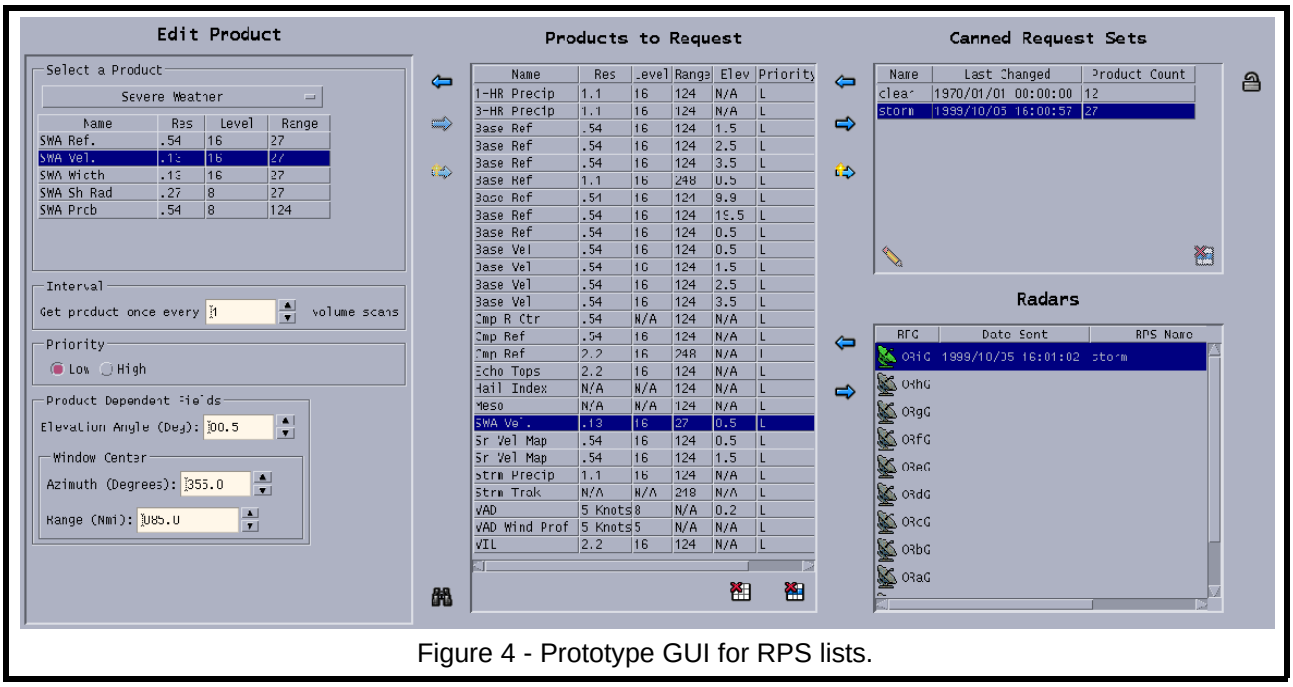

Figure 4 - Prototype GUI for RPS lists.

Streamlining and simplifying the human-computer interface is another main objective of the OPUP team. To address this goal, a graphical user interface (GUI) is being designed for the OPUP. The GUI replaces the graphics tablet and menu-driven Applications Terminal of the legacy PUP and provides intuitive interaction with "windows-style" icons and buttons to streamline OPUP control, product requests, and

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Level II Recorder Troubleshooting Tips

The following article was provided by the National Reconditioning Center (NRC) Systems Operations Center Weekly Report for the week of September 11, 1999. It is a good reminder that DEBUG information for Level II recorders was sent to all sites in August 1998. If the DEBUG information has not been tried, we recommend that it be tried the next time work is performed on the Level II recorders.

The Level II system is the most trouble-prone equipment in NWS today.

The Level II system is the most trouble-prone equipment in NWS today. NRC is providing the following five-step procedure as a suggestion to assist technicians when troubleshooting Level II. The procedures will give the site technician more information about the failure and provide helpful information to NRC if the unit does not come back on-line. If the unit still has to be returned, it would be helpful to NRC if the DEBUG findings were reported on the H14 return tag.

(1) When the Level II unit fails, a good starting point is to install 10 new tapes. This may correct the problem or at least eliminate tapes as a source of the problem.

(2) Run the Exabyte Premium 18c cleaning tape through the drive at least two times. (The more times this tape deck is cleaned with this cleaning tape the better.) Observe the green indicator light on the front of the tape drive to ensure the cleaning tape is not used up. A good indication of this, once the cleaning tape is cued up, is 14 flashes at 1-second intervals between each flash. The complete cleaning cycle will take about 35-40 seconds.

(3) Type "PO OFF" and "PO ON" commands at the radar data acquisition (RDA) unit to do a bus reset on the small computer system interface bus. This is to clear any bus-related conflicts that may impede operation of the Level II. After the RDA comes up, type "TERP" to terminate the applications' software. Next, bring up the DEBUG diagnostic by typing "RDAUP,,,, A" at the maintenance console. Refer to Engineering Handbook (EHB) 6-560, appendix A, for DEBUG procedures.

(4) With the 10 new tapes installed in the jukebox, let the first tape load into the tape drive, then activate the Level II and monitor the system console watching for any error condition reported from DEBUG. The DEBUG routine outputs a lot of data, and the error code is shown in byte 28. Be careful picking byte 28 out of the data. EHB 6-560, appendix A, page 5, gives a good example to follow. Make sure you wait for loaded status before going into operate during this troubleshooting procedure.

(**5)** If DEBUG reports an error, follow the Exabyte EXA-8500 manual, chapter 21, appendix D, "Fault System Code," and appendix E, "Error Recovery Procedure," to bring the system back on line.

Using DEBUG for the first time may be confusing, so feel free to call the WSR-88D Hotline at 1-800-643-3363 for help.

Chuck Maples
National Reconditioning Center

WSR-88D Parts Usage

The Parts Usage Reports were initiated in 1996 to assist the WSR-88D Systems' partnership agencies in developing support budgets and to provide information to customers on the quantities and types of repairable spare parts being issued each month from the National Logistics Supply Center (NLSC) in Kansas City to sites throughout the WSR-88D network. The Parts Usage Reports evolve as new needs and requirements for information are identified.

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The WSR-88D Parts Usage Reports depict National Weather Service (NWS) Supply System (Consolidated Logistics System (CLS)) spare parts issues as of the end of each month. An issue is defined as a routine or emergency requisition line item with shipment complete (SC) status in CLS. Please remember that the Parts Usage Reports reflect only repairable spare parts issued each month from the NWS supply system, and the data is not necessarily indicative of parts failure. Further analysis would be required to determine why individual parts or types of parts are being requested by field users. The following information about the Parts Usage Reports may be useful in understanding the content of the reports:

- Usage is based on repairable stock items issued from CLS on routine and emergency requisitions.
- Issues of expendable stock items (throw-away after use) are not included in the summaries.
- The Agencies are distinguished as follows:
  - DOD: All Department of Defense operational WSR-88D Systems and Principal User Processors (PUPs).
  - DOC: All Department of Commerce, National Weather Service operational WSR-88D Systems and PUPs.
  - DOT: All Department of Transportation, Federal Aviation Administration operational WSR-88D Systems and PUPs.
  - SPEC: NWS HQ and NSSL.
  - TRI: Keesler AFB Training Center, NWS Training Center, Operational Support Facility, and the National Reconditioning Center non-operational WSR-88D Systems and PUPs.
- The costs reflected in the Parts Usage Reports are CLS REPAIR costs - the net amount paid by the customer when a repairable part is ordered and the replaced unserviceable part is returned for repair to the NWS National Reconditioning Center.

The reports have not been available for the past several months due to needed data calculation modifications and to allow the WSR-88D Operational Support Facility (OSF) time to further automate the monthly report process. With these tasks accomplished, the WSR-88D System Parts Usage Reports for the month ending January 2000 have been completed and are available on the OSF homepage at URL www.osf.noaa.gov/products.htm. The following are brief descriptions of these reports:

NEW FEATURE **- Custom Advanced Queries -** This query was developed to allow the user to search more specific information than provided in the parts usage report. The user is allowed to retrieve information pertaining to an Org Code, Description, Part Number, Stock Number, ASN or a combination of two items for a specific date range, e.g., the number of Trigger Amplifiers ordered for Central Region from October 31,

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Parts Usage

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1999 to December 31, 1999. This query is NOT case sensitive and when searching on ASN the "R400" is NOT required. The user is then prompted to select the sorting criteria and to select the fields he wants to view. The user can view, print or download the query results. To download the results, the user must have Excel 97 or a later version.

REPORT 1 - WSR-88D Parts Usage and Cost Summaries. This report area consists of one data report and eight graphics as follows:

WSR-88D Parts Usage and Cost by Agency Report - This report provides the past 26 months of cost and usage data depicted by month. The user may select the agency desired for display. Parts costs are calculated using the repair price in the NWS supply system on the day following the monthly cut off date (last day of the month) for the report.

WSR-88D Parts Usage by Agency Graph - This line graphic is a summary of all agencies' actual parts usage by month for the past 12 months.

WSR-88D Cost Summary by Agency Graph - This line graphic is a summary of all agencies' actual parts costs by month for the past 12 months.

The following graphics depict a further breakout of each agency's parts usage and cost averages by month for WSR-88D Systems and PUPs. Calculation of these averages is dependent on WSR-88D Configuration Baseline data which shows how many systems and how many PUPs are owned by each agency at the end of every month.

- **WSR-88D DOC Parts Usage Average Per System and Per PUP Graph**
- **WSR-88D DOC Parts Usage Cost Average Per System and Per PUP Graph**
- **WSR-88D DOD Parts Usage Average Per System and Per PUP Graph**
- **WSR-88D DOD Parts Usage Cost Average Per System and Per PUP Graph**
- **WSR-88D DOT Parts Usage Average Per System and Per PUP Graph**
- **WSR-88D DOT Parts Usage Cost Average Per System and Per PUP Graph**

REPORT 2 - This report area consists of one graphic as follows:

WSR-88D Parts Usage With Trend Line - This graphic depicts actual parts usage per month for the past 12 months for all systems and PUPs.

REPORT 3 - This report area consists of two tabular reports as follows:

Top Ten Most Frequently Replaced Repairable Parts for the Past Twelve Months - This report is a list of the repairable items and the number of each which have been shipped from the NWS supply system most frequently during the past year.

Top Ten Most Frequently Replaced Expendable Parts for the Past Twelve Months - This report was recently added and it consists of a list of the expendable and consumable items and the number of each which have been shipped from the NWS supply system most frequently during the past year. Although expendable and consumable item usage data is not contained in any of the other Parts Usage Reports, we believe that the data in this new report will be useful to engineering staff.

REPORT 4 - This report area consists of nine tabular reports as follows:

Top Ten Usage by WSR-88D Subsystem for the Past Twelve Months for:

- Unit Designation (UD)1 - Equipment Shelter

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OPUP and AFWA

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display manipulations. Figure 4 is the prototype GUI to define, edit, store, and invoke RPS lists. Additionally, this GUI allows the definition and transmission of a single one-time request (OTR) and/or a OTR set to any WSR-88D world-wide.

A spiral development plan is being implemented to ensure that OPUP is deployed early enough to meet the rapidly maturing mission requirements of the OWSs. This plan provides an initial operational capability (IOC) to the four major CONUS OWSs (Shaw, Scott, Davis-Monthan, and Barksdale) in the summer of 2000. Full operational capability (FOC) for all remaining OWSs and CWTs is scheduled to begin in early FY03. FOC will include connectivity with the OPS-II and base LANs at OWSs and CWTs.

The OPUP will be the new baseline WSR-88D display system. Therefore, like the current PUP, the OPUP will be fully supported by the WSR-88D OSF support staff. This support will include 24-hour/day Hotline assistance, new software builds providing new and improved functionality, and hardware upgrades.

The multiple-user real-time support provided by OPUP represents a major technological leap forward in radar data display systems. Access to multiple RPGs, RPG-specific alert registration and product requests, workstation-independent product manipulation, and a user-friendly graphical user interface will enable OPUP to provide unparalleled radar support to today's Air Force Weather Warriors.

Joe Chrisman
OSF Engineering Branch

NEXRAD Hoists

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2-26, 2-27, and 2-32 (6-514) or 2-27 and 2-29 (6-513) depict drawings of Davit hoist tube locations and eye bolts.

The annual preventive maintenance procedures for the hoists are described in Technical Manuals NWS EHB 6-550, paragraph 3-4.22 or NWS EHB 6-553, paragraph 3-4.20, as well as NWS EHB 6-503-2 Preventive Maintenance Inspection Work Cards, Card 2-045.

Although Technical Manuals NWS EHB 6-514 and 6-513 describe procedures for use of a Gantry hoist, with a 5-ton lift capacity, this hoist is not used by NEXRAD technicians in the performance of routine maintenance.

Mike Karbowski
MACA/OSF System Documentation

Parts Usage

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Assembly

- UD2 - Antenna/Pedestal
- UD3 - Transmitter
- UD4 - Receiver
- UD5 - RDA Data Processor Cabinet
- UD21 - RPG Data Processor Cabinet
- UD22 - RPG Communication Cabinet
- UD41 - RPGOP Processor/Communication Cabinet
- Remaining UD Locations

If further information is needed or you wish to discuss the content of the Parts Usage Reports, please contact Jill Stichler or Kimberly Hare of the OSF at (405) 366-6540 extension 3230 or 3222.

Jill Stichler, Logistics Section Chief
OSF System Support Branch