NEXRAD Now

Issue 5 January, 1998

WSR-88D Software Build 10

As Build 9.0 was being tested and all associated documentation was being prepared for distribution, the planning effort had already begun for the next OSF-developed software release. The WSR-88D System Recommendation and Evaluation Committee (SREC) met with software engineers and other OSF staff in June and October of 1996. The SREC has membership and representation from the NWS, DOD and FAA, thereby allowing each agency to voice their needs and priorities. The purpose of these SREC meetings was to define the recommended software changes to be implemented, define the development schedule and to provide guidance to the OSF Software Engineering Section on issues pertaining to Build 10. The OSF presented the SREC-proposed Build 10 content definition and schedule to the NEXRAD Program Management Committee (PMC) in December 1996. The PMC then gave the OSF approval to proceed with the Build 10 effort.

The agency change requests that are being implemented in Build 10 range from simple repairs of existing defects to significant new capabilities and functional enhancements. This build differs from Build 8.0 and Build 9.0 in that it will contain more enhancements and new functionality

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Each new year brings with it the feeling of excitement and anticipation of things to come. At the OSF, our work is performed in an effort

1998

Happy New Year

to aid our customers in the field. Therefore, we are excited to share with you some of our projects that will be fielded during 1998. Each of these changes should be viewed as a tool to help you in your work and to improve the WSR-88D system as a whole.

Pedestal 5VDC Power Supply

The Engineering Branch at the OSF is working hard to deliver modifications needed in the field. One such modification is the Pedestal Encoder Voltage Level Upgrade. Once installed, this modification promises to eliminate the problem of deficiency in the positive five volts (DC) which is supplied to the azimuth and elevation encoders at the pedestal.

The modification will call for the installation of a new Lambda power supply to be installed in the DCU drawer. The new power supply will provide a dedicated power source for the pedestal encoders. A wiring harness will be installed to supply voltage to the pedestal and wire wrapping will be added to the DAU backplane to facilitate monitoring of the new supply by the RDASC. Once Build 10 is installed, the RDASC will be able to fully monitor the new power supply.

Scheduled for deployment in late March '98, all aspects of the project are proceeding in a timely manner.

Deirdre Jones, Acting Chief,
OSF Hardware Engineering Section

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and less software or system defect repair. In addition, several software changes were required to support some hardware changes. A wide range of people who will benefit from changes to be implemented in Build 10 - forecasters, electronic technicians and maintenance personnel and a variety of end users.

The Build 10 changes can be related to the major functional segments of the WSR-88D system - the RDA, the RPG and the PUP. Some of the major changes or enhancements span across functional areas and involve considerable effort. An example of this is the FAA requirement for a Remote Monitoring System (RMS). The FAA requires this capability to support its operational mission. Major changes at both the RDA and the RPG are necessary to provide the status and control information that will be provided to external FAA systems.

RDA - Highlighted changes for the RDA area of Build 10 include major improvements for Archive Level II playback and recording functions. With Build 10, an operator using the playback capability of the Level II device will be able to find and read for playback a particular scan on any full 8mm tape in less than seven minutes. This will be beneficial to someone operating the system. This same process previously took sixty-five or more minutes to complete, due to the time it took to generate a directory, which is no longer a requirement. Further, for Level II recording purposes, the Man-Machine Interface (MMI) main menu has been changed to display a new tape counter that tells the operator, at the RDA or UCP, which tape (of the 10 possible tapes) has been installed and is being used. Once a tape has been installed and the recording process has begun, three new terms will be displayed for the recording process: (1) CHK LABEL - meaning that the software is checking that the tape is properly labeled, (2) FAST FWD - meaning that the software is fast-forwarding through to the end of tape (end of recorded data), (3) TAPE XFER - meaning that a tape transfer (installation of a new tape) is currently in progress. These three new clarifications will take the guesswork out of the Level II recording process and keep the operator informed about what is happening with their device.

Two new alarms have also been added to the list of Level II alarms which can be viewed by the Operator at either the RDA or UCP. "ARCH II WRITE PROTECTED TAPE ENCOUNTERED" will be added to inform the operator when a write-protected tape has been erroneously loaded into the Level II device. "ARCH II TAPE HEADS REQUIRE CLEANING" is a note to the technician that the Macrolink controller board has sensed that the cassette recorder tape heads are dirty and require cleaning. This is an advanced warning for the technician to clean the tape drive.

The introduction of new hardware capabilities for the WSR-88D has spawned the development of new software

Technical data will be recorded on the Level II tapes at the beginning of each scan in order for research facilities to have full access to all the data, both engineering and meteorological, which can potentially impact a scan on the WSR-88D. The fact that this data is being captured and saved is transparent to the operator at the RDA or UCP (Related article on page 6.)

Control of the RDA by the FAA RMS and Status Data to FAA RMS System is a major undertaking by the RDA software group. This is the implementation of an interface between the WSR-88D system and the FAA RMS. Operational plans require the FAA to be able to control their redundant radars through this RMS portion of the WSR-88D system communicating with the FAA Remote Monitoring and Maintenance System. Status Data will also be delivered on a periodic basis from the RDA to the FAA interface. This new software will only affect FAA WSR-88D systems.

The introduction of new hardware capabilities for the WSR-88D has spawned the development of new software, required to implement the hardware. Additions to the RDA hardware environment include Transition Power System

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(TPS), Pedestal Encoder Voltage Upgrades, and a new Radio Frequency Interference (RFI) Filter. All of these hardware modifications also require software changes. The management and oversight of these hardware changes are being done by OSF Systems Engineering. Software is also being developed, based upon problem reports and requests from the field, to prevent pedestal dynamic faults and false post charge regulator alarms.

Maintenance personnel will appreciate some of the changes being implemented in the RDASOT software. Test functions, involving the Interference Suppression Unit (ISU), will indicate if the ISU is present. The test functions covered by the change are receiver diagnostic subtests 17, 18 and receiver interface output select which involve the ISU. Another modification includes those test functions which have only one subtest and are not diagnostic tests. The subtest control menu has been deleted for these functions - to improve operator interaction and efficiency. For example, when TESTSIG is selected you will go directly to the RADAR SOURCE SELECTION MENU. Another feature with Build 10 will be an automatic LOG to disk upon entering RDASOT. Another change to make the system more user-friendly is that the solar flux data value for Suncheck Subtest 2 will no longer have to be doubled before entering it when prompted.

Some of the major changes... span across functional areas and involve considerable effort

RPG - The changes in the RPG functional segment are quite numerous. Several significant changes are to be implemented in the algorithms and product areas. The Turbulence Algorithm and all of the layer turbulence products will be removed. Further, the existing Tornado Vortex Signature (TVS) Algorithm will be replaced with a brand new NSSL Tornado Detection Algorithm (TDA). During the course of algorithm evaluation, the new TDA was shown to perform better than the current WSR-88D TVS Algorithm. While replacing the current TVS algorithm, the mesocyclone algorithm will no longer be coupled with tornado detection, meaning that there is no longer a requirement for the system to detect a mesocyclone in order to detect a TVS. There will also be changes to Alerts, the Combined Attribute Table and the Meso and TVS products to accompany the new TDA algorithm implementation.

The Lincoln Labs Anomalous Propagation (AP) Removal Algorithm will be implemented. This change should permit us to remove AP from reflectivity data to produce a low-level Layered Reflectivity Maximum (LRM) product. This new product will be Layer Reflectivity Maximum - AP Removed (APR). In addition, there will be another new product, Hybrid Scan Reflectivity (HSR) which will be a graphic display of the hybrid scan reflectivity data used in the precipitation products and the Radar Coded Message.

Build 10 provides several communication changes that improve narrowband communications at both the RPG and the PUP. The maximum data rate for narrowband lines will be increased to 14.4kbps. Another refinement for sites requiring narrowband access to RPGs via satellite is that they can configure their communications lines to satellite via adaptation data. A latent problem with the Formation Card reporting a status of "protocol congestion" and mishandling of this condition has been corrected. This problem occurs at both the RPG and the PUP and effects all four lines on the card. The Formation card stops sending the data it receives from the modem to task S309. However, it will send the data it receives from S309 to the modem. If the problem occurs at a PUP, the product request is sent out. However, the product request or other messages do not go past the Formation card. If the problem occurs at the RPG, the RPG applications will never see

change requests...being implemented... range from simple repairs of existing defects to significant new capabilities

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the product request and so will not send it. This results in the requested products not being received. A software work around was developed to reinitialize the card without operator action when this condition is detected (the four lines on the card will be disconnected for 30 to 60 seconds).

PUP - Build 10 changes in the PUP functional area will correct twenty-three software deficiencies and provide fourteen enhancements. The deficiency fixes will correct task pause conditions, problems in communications and Archive Level IV functional areas, and clarify or correct menu help screens. The enhancements will include changes that support the implementation of the new Tornado Detection Algorithm (TDA), the ability to select a storm cell from the graphic attributes table, two entirely new products, changes to the User Function, communications functional areas, and an increased number of entries on the RPS list. A Command Substitution System (CSS) used to simplify routine backups has also been implemented.

OSF Software Engineering... works diligently to correct problems encountered in the field

A few PUP sites have reported a "paused task" when attempting to archive the local map set or a task will pause when the ERASE OVERLAYS graphic tablet box is selected for a clear screen. Both of these problems have been corrected. Software fixes in the communications functional area include corrections to prevent dial out lines from staying connected for long periods of time without data transfer, corrections to prevent inadvertent comm-related messages after a return to normal line state (following a line noisy condition), and the automatic reinitialization of communication lines when data flow has stopped. Also, a software modification prevents the inadvertent deletion of all dial out requests when a comm line error occurs.

Help menu corrections or clarifications will improve information regarding auxiliary maps, product names and IDs, hardware implementation, and alerting. Also, the problem of not displaying product received messages while using the training mode function was corrected.

Enhancements supporting TDA changes include the redesign of the TVS graphic attributes table, a slight increase in the size of the red inverted triangle (TVS symbol), and a new open red inverted triangle representing an elevated TVS (ETVS) becomes an operator selectable display. Another enhancement allows the operator to select a storm cell of interest with the cursor from the graphic attributes table. Then, by selecting a recenter/magnify function, the operator may redisplay the product with a display center at the selected storm cell. New products include an Layer Reflectivity Maximum (LRM) with removal of anomalous propagation from the lowest layer, and a Hybrid Scan Reflectivity product.

The Examine feature of User Functions has been improved by providing some additional information relating to one-time product requests. Information such as data levels, resolution, elevation angle, RPG, and time is displayed when a User Function is examined. Improvements to the communications area are consistent with those being implemented at the RPG and will include the capability to increase the data rate to 14.4kbps and a selectable communication option to alter the frame size of data transmissions. The maximum number of entries on the PUP RPS list has been increased from 20 to 31. Also, a CSS module called BACKFILE was implemented which will accomplish some routine backup's from disk to tape of specific predetermined files.

Maintenance personnel will appreciate some of the changes being implemented

OSF Software Engineering continues to work diligently to correct problems encountered in the field. As many of these changes as possible have been incorporated into Build 10, while still maintaining the eighteen month deployment schedule as set forth by the PMC. The Build 10 software release is scheduled for deployment in late summer of 1998.

Bill Armstrong, Chief
OSF Software Engineering Section

Remote Maintenance Subsystem for FAA Redundant WSR-88Ds

As a part of the effort to reduce expenditures for maintenance manpower, the FAA is conducting an agency-wide installation of Remote Maintenance Monitoring Systems (RMMS) on its equipment such as air traffic control radars, navigational aids, and FAA WSR-88D radars. The design work for that portion of RMMS which pertains to the WSR-88D, the Remote Monitoring Subsystem (RMS) was performed by the New Systems Group in the Weather Products Branch, AOS-250, located at the FAA's Mike Monroney Aeronautical Center in Oklahoma City.

The RMS for the WSR-88D consists of a PC utilizing a Windows NT operating system and software developed by FAA engineers. This machine is connected to and monitors portions of the transmitter, the receiver, the RDASC, and the RPG, and controls some radar functions. One of these interfaces consists of a board containing opto-isolators (optical circuits which provide isolation between the RMS computer and the radar) and custom designed control cables from the opto-isolator board to the various portions of the radar. These cables provide monitoring of various system parameters, such as power supply voltages, failure lights, etc., and provide command and control of some radar functions to the RMS computer. Other interfaces include communication with the RDA and the RPG software that provide system status information to the RMS and allow the RMS to execute commands. The WSR-88D software was modified by the OSF (as a part of the Build 10 software release) for this purpose.

The prototype RMS system is almost fully installed on the test bed radar at the OSF in Norman. Following testing and the final approval of the design, the FAA will conduct a beta test at Kauai, HI. After Build 10 software is released, full-scale installation of the RMS at all 12 FAA WSR-88D sites will begin.

Rob Stokes,
OSF Hardware Engineering Section

Clutter Contamination:
The Problem Far Reaching, The Solution Simple!

As all of us that use the WSR-88D should know by now, unsuppressed clutter is a problem that effects the reliability of data presented on the base products, as well as causing detrimental effects on ALL downstream algorithms. An operator could argue that he/she knows the information being displayed is return from anomalous propagation (AP) and nothing needs to be done. Unfortunately this is not true. The results of improper clutter suppression affect ALL users of the WSR-88D data, including the DOD, DOT, DOC and other users (TV stations, universities, etc.)

The most important benefit of proper clutter suppression is the improved accuracy of the WSR-88D base data estimates. The more accurate the base data estimates, the more reliable the output from downstream processing and algorithms, resulting in more accurate base and derived products. Two excellent papers that cover the important topic of clutter suppression are available via the Internet. The first of these is, *An Introduction to WSR-88D Clutter Suppression, and Some Tips for Effective Suppression Utilization,* written by Stephen M. Goss and Joe N.Chrisman, located at http://www.osf.noaa.gov/otb/papers/goss/cltrgoss.pdf. The second, *WSR-88D Clutter Suppression and Its Impact On Meteorological Data Interpretation*, by Chrisman, Rinderknecht and Hamilton, can be found at http://www.osf.noaa.gov/otb/otbcltr/cltrtocs.htm. We suggested that UCP operators review these papers and that all offices become pro-active in the proper application of clutter suppression **EVERY** time AP is evident on the radar.

Jim Keeney, Meteorologist Instructor,
Operations Training Branch

Level II Enhancements for Build 10.0

The new software release called Build 10.0 will provide several enhancements to the operation of the Archive Level II device that will make the system more robust. The following enhancements, many of which are transparent to the operator, will be provided by the new software:

Automatic 8mm Tape Repair & Re-initialization

Build 10 provides automatic 8mm tape recovery and repair following power failures or abnormal power interruptions. In the past, if a power failure or abnormal interruption occurred while the software was writing a label to the 8mm tape, the result was a tape with a label, but no data or a tape with an incomplete label. Upon power recovery, the software would eject the faulted tape and replace it with a new tape, assuming a jukebox is installed. In Build 10, the software will recognize the faulty tape and repair it, instead of ejecting it, by writing a new tape label. This new feature will save the operator the hassle of having to re-initialize used tapes. This also applies to degaussed tapes or demagnetized tapes.

New Level II Status Reports

The Level II status field on both the RPG UCP and the RDA MMI has been enhanced to provide the operator with the current status of the 8mm tape processing to the maximum extent possible. In the past, very limited information about the status of the 8mm tape was available to the UCP operator; the technician at the RDA MMI had the same limited information. New statuses are provided in Build 10. When Level II recording is enabled:

CHECK LABEL - meaning that the software is checking for a correctly labeled tape and if no label exists, it re-initializes the tape by writing a new label.

FAST FORWARD - meaning that the software is now fast-forwarding to the end of previously written data in order to begin writing new data. In the old days of GEN DIR, this process could take 1.5 hours on a nearly full tape. With software Build 10, this process now takes less than seven minutes on a full tape. Incidentally, the term GEN DIR no longer exists, and the software no longer has to generate a directory.

LOADED - meaning that the software is correctly positioned in order to write new data.

RECORD - the software is recording data to tape.

New Tape Counter

The Build 10 software provides a tape counter at both the RPG UCP and the RDA MMI which allows the Operator to keep track on which tape from the jukebox is currently being used. This new tape counter runs from Tape #1 to Tape #10, which is the maximum number of tapes that can be installed in the jukebox tape-handling device.

New Level II Alarms

Two new Level II alarms have been added in software Build 10 to assist the technician in maintaining the Level II hardware:

"ARCH II TAPE HEADS REQUIRE CLEANING" - meaning that the software has been monitoring the Exabyte recording device and is reporting that the hardware bit has been set that indicates that the device tape heads need cleaning. Once the correct tape-head cleaner has been used, this alarm should go away.

Build 10.0 should provide a more stable operation of the Level II device

"ARCH II WRITE-PROTECTED TAPE ENCOUNTERED" - meaning that the software has encountered an 8mm tape that is write-protected. This tape is ejected if recording data has been enabled.

A FIX for Using Degaussed Tapes

In the past, there have been problems reported in the field when trying to use degaussed tapes; the problems seemed to fall into two categories: (1) not being able to initialize the tape or a perceived problem that the tapes were not blank, and (2) that degaussed tapes caused software errors. In Build 10, the software has been adjusted to handle suspected degaussed tape problems by: (1) re-initializing the tapes and writing the correct tape labels automatically without operator intervention, and (2) giving the hardware enough time to keep-up with the software (which was causing the software errors).

In summary, Build 10 will provide a more stable operation of the Level II device, and the operator should have a better idea of what the device is doing during the Level II recording process. The new software should also facilitate the use of degaussed tapes.

Robert Rivera
OSF Software Engineering Section

OSF Engineering Transmitter Test Bed Operational

A stand alone Transmitter Test Bed became operational at Norman, OK on 15 October 1997. It consists of an operational transmitter UD3, air ducting which simulates the real thing, an external Cross Guide coupler and High Power Dummy Load driven by an OSF/ENG-designed Transmitter Control Unit (TCU). It is being used to perform basic research into some of the remaining transmitter operational and reliability problems without tying up the other developmental systems which are heavily used for software development. A second TCU of the same design is planned for deployment at the National Reconditioning Center (NRC). The NRC transmitter test bed will provide a platform for prolonged "burn-in" tests and/or testing capability for intermittent problems without taxing their limited system test capability.

It is being used to perform basic research into some... transmitter operational and reliability problems without tying up the other developmental systems...

The TCU is designed to take the place of the WSR-88D Hard Wired Signal Processor Synchronizer card 5A10A5. The "heart" of the TCU is a Xylinks integrated circuit. It functions as a state machine that supplies the set of seven precisely timed triggers necessary to make the transmitter work properly. Some of the salient characteristics of the test bed are:

* Programmed for all existing combinations of Pulse Width (PW) and Pulse Repetition Frequency (PRF).
* Capability for easy implementation of future "Custom" PW/PRF combinations.
* Operation in the continuous mode is available now. Operation in the "batch" mode is planned as an enhancement.
* An Interval mode of operation permitting from 1 to 250 iterations of the control trigger sequence.
* Maximum cost-effective use of existing WSR-88D Line Replaceable Units (Frequency Generator, Power Supplies, etc.) to reduce starting costs and ensure future logistical support.

The test bed is being used for the following investigations:

* Test of a resistor equalization network for the Back swing diode stack 3A12A3.
* Test of reliability fixes to the Focus Coil Power Supply 3PS2.
* Test of reliability fixes for the Trigger Amplifier 3A11.
* Study of Post Charge Regulator 3A8 reliability problem.
* Study of Modulator "noisy" operation.
* Study of problem with Wide Pulse operation.

Rich Ice, Section Chief,
OSF Hardware Engineering

Algorithms Survey Information

The OSF Applications Branch is interested in your opinions concerning the performance of Build 9 meteorological algorithms on the WSR-88D. As a continuing effort in soliciting your opinions, we request that one or more forecasters from your site complete an algorithm performance survey form. Survey information can be provided via the World Wide Web at http://www.osf.noaa.gov/app/osfsurvey.htm.

If you have any questions, please contact Bob Lee at (405) 366-6530 ext. 2300.

Bob Lee
OSF Applications Branch

A New Spin on Tornado Detection

The OSF's Applications Branch has coded the National Severe Storms Laboratory's (NSSL) Tornado Detection Algorithm (TDA) for inclusion in the WSR-88D Build 10 software release. (Field sites that have used either NSSL's WDSS or WATADS software may already have some familiarity with the TDA.) Here we briefly describe some of the major differences between TDA and the old TVS algorithm, TDAs operation and skill, and some ongoing work within the branch and elsewhere to fine-tune TDAs performance. (Note: the TVS nomenclature has been retained.)

For starters, the new TDA is no longer part of the mesocyclone algorithm. Build 10 software may detect a TVS without a mesocyclone also being detected.

Second, the new algorithm may identify more TVSs. The overall skill will increase, compared to the old algorithm, but there will also be an increase in the number of false alarms. OSF and NSSL algorithm developers will be providing users with guidance on tuning the performance through adaptable parameter studies.

Third, the TVS product may display an open inverted red triangle in addition to the more familiar solid red triangle. The inverted open triangle indicates a TVS signature aloft and is called an elevated TVS or ETVS. The red triangles are also slightly larger than before.

Fourth, the algorithm attempts to match all TVSs or ETVSs to the nearest storm. However, if there is no storm within 20 km, two question marks "??" are displayed for the storm ID.

Fifth, the new TDA uses 30 adaptable parameters instead of just two. With the default adaptable parameter settings, the new TDA algorithm systematically searches all velocity data within 100 km of the radar and below 10 km height AGL for moderate gate-to-gate velocity differences (11 m/s) between adjacent radials that lie in regions of reflectivity that are greater than 0 dBZ. The velocity differences (pattern vectors) must have an implied cyclonic rotation. At least three pattern vectors in close proximity are required to form two-dimensional features. At least three two-dimensional features must correlate vertically in order to have a three-dimensional feature. Finally, the three-dimensional features are tested against thresholds of velocity differences, height, and depth to determine if any are either TVSs or ETVSs.

Applications Branch personnel, NSSL algorithm developers, and some field forecasters are now in the process of developing alternate sets of adaptable parameters from studies on a large, geographically diverse data set of tornadic events. These adaptable parameter sets will allow URCs to tailor the sensitivity of the TDA algorithm to station preferences and regional storm types. This is important because the new tornado algorithm contains 30 adaptable parameters and it is imperative that algorithm developers provide as much information as possible about TDAs performance so that field personnel can choose which adaptable parameter set will best satisfy operational needs of URC committee members.

...the new TDA is no longer part of the mesocyclone algorithm

Currently, developers have defined a Default Set which optimizes overall algorithm performance and a Minimized Set which will make the TDA perform similarly to the old TVS Algorithm. It is anticipated that more sets will be available in time for the release of Build 10, including a set for Tropical Cyclone/Low-topped Convection, a set for Mini-SuperCells, and a Middle-Ground set which will lower the False Alarm Rate at the expense of some overall performance.

During TDAs development, algorithm performance and default parameters were considered optimized when the Critical Success Index (CSI) was highest. Using default values, Mitchell (1998, Weather and Forecasting, in press) showed TDA to have a POD = 43, an FAR = 48, and a CSI = 31. Other comparison studies by Mitchell (1997, AMS Radar Conference) show that the old TVS Algorithm has a POD = 3, a FAR = 0, and a CSI = 3. Obviously, there will be a major change in the operational approach to using the TDA versus the old TVS Algorithm. For the old TVS Algorithm, the algorithm rarely identified a TVS (i.e. low POD),

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RDA/RPG REMOTE ACCESS TERMINALS

The OSF will provide remote access for all NWS and DOD single thread WSR-88D systems through a planned retrofit program in mid 1998. The program is a convenient and standard method to remotely access WSR-88D Radar Data Acquisition (RDA) and Radar Product Generator (RPG) computers. The program is intended for maintenance purposes and to reduce system down-time. From almost any location, maintenance personnel will be able to operate the UCP and RDA Man-Machine Interface (MMI) control interfaces including the OS 32 System Console, Applications Software, and Control Diagnostic System (CDS).

Remote access will be established by replacing the Human Computer Interface (HCI) for the existing RPG known as the Unit Control Position (UCP) with a personal computer (PC). Remote access will further be established by replacing the HCI for the existing RDA known as the RDA MMI with a PC. The PCs replacing the HCIs will contain hardware and software to permit remote access to existing functionality. The new PCs will be 166MHz machines running a Windows 95 operating system, and two other software packages including terminal emulation software called Pc-Passport and a communication software package called PcAnywhere. Site security will be maintained through password management by responsible maintenance personnel in accordance with the RDA/RPG Remote Access Security Policy.

Preparation for a retrofit of this size has been lengthy due to... planning for hardware integration of the PCs... loading the software... and preparing documentation

Remote functionality will be available from the PC in the UCP position (located in the weather office) to the PC in the RDA MMI position, from the PC in the RDA MMI position to the PC in the UCP position, and from another laptop or other type computer to either of the PCs. Any laptop or other computer used to access the new PCs must have a modem, run a 386SX or faster processor, MS/DOS 3.3 or later, Windows 3.1 or Windows 95, and have at least 2 MB available RAM for appropriate communications software installation.

Preparation for a retrofit of this size has been lengthy due to a number of considerations such as planning for hardware integration of the PCs and loading the software, and preparing documentation to reflect the addition of these PCs to the WSR-88D baseline specifications and technical manuals. Assembly of modification kits will take several hours per kit, so the remote terminals will be assembled and deployed over a period of two months, beginning in May 1998.

Rich Ice, Section Chief,
OSF Hardware Engineering

Tornado Detection

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but if a TVS was identified, then the circulation was likely tornadic or about to be (i.e. extremely low FAR). Using default adaptable parameters, the new TDA algorithm may identify several TVSs in one volume scan during severe weather events. The user should then use other information (e.g. knowledge of environment, other algorithms, and spotter information) to discriminate between those which are actually producing or about to produce a tornado.

David Zittel, Mark Fresch, Robert Lee
OSF Applications Branch
and DeWayne Mitchell

Transition Power Maintenance Shelter Status

A transition power system is coming your way soon! The Transition Power Maintenance Shelter (TPMS) contract, designed to provide a rotary Uninterruptable Power System (UPS) and maintenance facility for DOC and DOD sites, was awarded in late September. The transition power unit is designed to work with the existing engine generator and provides a ride-through capability sufficient for the generator to start supplying power before the radar goes off-line. Most WSR-88D sites will receive a 12 X 24 foot shelter containing the Rosel Motor Generator set, an electrically powered sanitary facility, a workbench and storage units. Some remote sites that already have shelters will receive only the rotary UPS. At present, there are no plans to equip FAA sites, but contract options are included in the event the FAA desires to retrofit their present UPS systems.

We are currently in a phase of engineering development and design, with plans for full production to begin in late Spring or early Summer of 1998

Exide Electronics of Raleigh, North Carolina is the Prime Contractor. They will be performing all system development and subcontract management. Major subcontractors are Precise Power Corp. for the rotary machine, Fiberbond for the shelters, and Lowe-North for the site construction and installation. Note that the last two subcontractors have a proven track record having participated in the NEXRAD deployment. We are currently in a phase of engineering development and design, with plans for full production to begin in late spring or early summer of 1998. So far, the OSF team has enjoyed tremendous support and assistance from the National Weather Service and Air Force customers. This has truly become a team effort among our agency customers. For example, all four CONUS NWS regions sent their facility engineering representatives to the Preliminary Design Review that occurred on December 10th and 11th. With their help, the government and Exide were able to resolve many engineering issues on the spot. We also appreciate the support of the Raleigh, North Carolina WFO staff for volunteering their WSR-88D for use as a test site providing access to the Exide engineering staff. This action will definitely help keep the program on track!

We have a long way to go however. The OSF is responsible for the design of the remote site installations which are almost all in Western Region and Central Region. There are a number of design and schedule actions awaiting resolution. We appreciate the cooperation and support of those two regions. For the sites that are to receive the full TPMS system, there will be a period of construction and acceptance that will require your support and cooperation. Each Region and site will have an opportunity to review the proposed design for installation at their sites. Due to contractual requirements and schedule management however, this review time will be fairly short. We will appreciate a quick turnaround for the reviews.

The next major event is the second Program Management Review to be held in Raleigh on January 14, 1998. The Critical Design Review (CDR) is currently planned for sometime in February. All interested members of the tri-agency team will receive e-mail notification of the date and location of the CDR. Anyone with questions is encouraged to call either Mr. Roger Hall of the System Support Branch at (405) 366-6540 x3244 or Mr. Rich Ice of the Engineering Branch at (405) 366-6520 x4230.

Rich Ice, Section Chief,
OSF Hardware Engineering

1998 DEPOT LEVEL PREVENTIVE MAINTENANCE INSPECTIONS

The January-October 1998 PMI schedule continues at an exciting pace! Initial PMI trips are scheduled for 38 sites, including 5 DOD sites and 12 DOT sites. This will leave just six sites that have not had an initial PMI visit yet, and the "oldest" of those became operational in May 96. Those last six will be visited in 1999, thereby completing our first full cycle of PMI visits in a three year period.

In addition, 18 sites are scheduled during this same nine months to have their radome recoated plus a second PMI of the entire tower/radome. Due to the availability of the PMI teams, funding, and the success of the paint tests, we started the recoating a year earlier than had been initially envisioned. The first five sites that were recoated in 1997 (Miami, Melbourne, Sterling, State College, and Houston) have all expressed very encouraging words about the new appearance of their radome. With Tampa Bay and Jacksonville undergoing recoating in December as this newsletter is being published, hopefully they will be two more satisfied "customers".

Successful panel replacements at Tulsa (26 panels), Eureka and Sterling (one panel each) and repairs at Kadena during the Fall of '97 illustrate our commitment to preserving the radome structure. Panel replacements are already scheduled for Nashville, and other sites such as Reno and Beale AFB are being evaluated.

The FY98 Radome & Tower PMI schedule is as follows:

(Please note: Each site is followed by the projected dates the PMI team will be at their site, and then followed either by the month/year the site was accepted or if recoating the radome and replacing panels are included.)

1. OCTOBER 6 - OCTOBER 25, 1997

STERLING, VA
10/06/97-10/16/97 REPLACE PANEL, RECOAT, & PMI

STATE COLLEGE, PA
10/17/97-10/25/97 RECOAT, CHECK LEAKS, & PMI

2. OCTOBER 27 - NOVEMBER 21, 1997

BEALE AFB, CA
10/27/97-11/02/97 (7/96)

SAN JOAQUIN VAL,CA
11/03/97-11/09/97 (3/95)

EDWARDS AFB, CA
11/10/97-11/16/97 (5/95)

SANTA ANA MTS, CA
11/17/97-11/21/97 (6/96)

3. NOVEMBER 3 - NOVEMBER 18, 1997

HOUSTON, TX
11/03/97-11/12/97 RECOAT & PMI

CORPUS CHRISTI, TX
11/13/97-11/18/97 (5/96)

4. DECEMBER 1 - DECEMBER 19, 1997

TAMPA BAY, FL
12/01/97-12/10/97 RECOAT & PMI

JACKSONVILLE, FL
12/11/97-12/19/97 RECOAT & PMI

5. JANUARY 5 - JANUARY 30, 1998

SOUTH KAUAI, HI
01/05/98-01/11/98 (10/94)

MOLOKAI, HI
01/12/98-01/18/98 (1/94)

KOHALA, HI
01/19/98-01/25/98 (9/96)

SOUTH SHORE, HI
01/26/98-01/30/98 (6/96)

6. JANUARY 5 - JANUARY 23, 1998

LAKE CHARLES, LA
01/05/98-01/14/98 RECOAT & PMI

AUSTIN/SAN ANTONIO,TX
01/15/98-01/23/98 RECOAT & PMI

7. FEBRUARY 2 - FEBRUARY 20, 1998

SLIDELL, LA
02/02/98-02/11/98 RECOAT & PMI

JACKSON, MS
02/12/98-02/20/98 RECOAT & PMI

8. FEBRUARY 9 - MARCH 6, 1998

SAN ANGELO, TX
02/09/98-02/15/98 (6/95)

MIDLAND, TX
02/16/98-02/22/98 (3/96)

EL PASO, TX
02/23/98-03/01/98 (4/95)

TUCSON, AZ
03/02/98-03/06/98 (3/96)

9. MARCH 2 - MARCH 20, 1998

TALLAHASSEE, FL
03/02/98-03/11/98 RECOAT & PMI

BIRMINGHAM, AL
03/12/98-03/20/98 RECOAT & PMI

(Continued on page 12)

1998 Depot Level PMI

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10. MARCH 16 - MARCH 30, 1998
LAJES, AZORES
03/16/98-03/22/98 (11/96)
SAN JUAN, PR
03/23/98-03/30/98 (6/96)
11. MARCH 30 - APRIL 17, 1998
ATLANTA, GA
03/30/98-04/08/98 RECOAT & PMI
KNOXVILLE, TN
04/09/98-04/17/98 RECOAT & PMI
12. APRIL 13 - MAY 15, 1998
NCL, MI
04/13/98-04/19/98 (2/96)
LACROSSE, WI
04/20/98-04/26/98 (2/96)
DULUTH, MN
04/27/98-05/03/98 (8/95)
FARGO, ND
05/04/98-05/10/98 (1/96)
MINOT AFB, ND
05/11/98-05/15/98 (7/94)
13. APRIL 27 - MAY 19, 1998
MEMPHIS, TN
04/27/98-05/06/98 RECOAT & PMI
NASHVILLE, TN
05/07/98-05/19/98 REPLACE PANELS, RECOAT, & PMI
15. JUNE 1 - JUNE 26, 1998
RAPID CITY, SD
06/01/98-06/07/98 (12/95)
NORTH PLATTE, NE
06/08/98-06/14/98 (1/96)
GRAND JUNCTION, CO
06/15/98-06/21/98 (11/95)
RIVERTON, WY
06/22/98-06/26/98 (9/95)
16. JULY 6 - JULY 24, 1998
BUFFALO, NY
07/06/98-07/12/98 (9/95)
BURLINGTON, VT
07/13/98-07/19/98 (8/96)
CARIBOU, ME
07/20/98-07/24/98 (9/95)

NEXRAD Now is a periodical of the WSR-88D Operational Support Facility.
Director.....James Belville
Deputy Director.....Richard Vogt
Editor .....Ruth Jackson
The next issue of *NEXRAD Now* is scheduled for release in May, '98. The deadline for submission of articles for that issue is April 3rd. We encourage all readers of *NEXRAD Now* to submit articles for publication. Please submit comments and articles via e-mail to rjackson@osf.noaa.gov

17. JULY 6 - AUGUST 21, 1998
NOME, AK
07/06/98-07/12/98 (10/96)
BETHEL, AK
07/13/98-07/19/98 (11/95)
KING SALMON, AK
07/20/98-07/26/98 (9/95)
ANCHORAGE, AK
07/27/98-08/02/98 (11/93)
FAIRBANKS, AK
08/03/98-08/09/98 (10/93)
MIDDLETON, AK
08/10/98-08/16/98 (10/96)
SITKA, AK
08/17/98-08/21/98 (8/96)
18. AUGUST 3 - AUGUST 21, 1998
CAMP HUMPHREYS,KOREA
08/03/98-08/09/98 (12/95)
KUNSAN, KOREA
08/10/98-08/16/98 (2/96)
KADENA, JAPAN
08/17/98-08/21/98 (4/96)
19. AUGUST 31 - SEPTEMBER 25, 1998
CEDAR CITY, UT
08/31/98-09/06/98 (10/96)
FLAGSTAFF, AZ
09/07/98-09/13/98 (11/95)
YUMA, AZ
09/14/98-09/20/98 (7/96)
SAN DIEGO, CA
09/21/98-09/25/98 (3/96)
20. AUGUST 31 - SEPTEMBER 18, 1998
DENVER, CO
08/31/98-09/09/98 RECOAT & PMI
PUEBLO, CO
09/10/98-09/18/98 RECOAT & PMI
21. SEPTEMBER 28 - OCTOBER 9, 1998
SPOKANE, WA
09/28/98-10/04/98 (2/96)
PENDLETON, OR
10/05/98-10/09/98 (2/96)
22. SEPTEMBER 28 - OCTOBER 16, 1998
OMAHA, NE
09/28/98-10/07/98 RECOAT & PMI
HASTINGS, NE
10/08/98-10/16/98 RECOAT & PMI

SITES NOT SCHEDULED YET FOR INITIAL PMI:

DOC:		**DOD:**	
KEY WEST, FL	(7/96)	MOODY AFB, GA	(5/96)
FT SMITH, AR	(5/97)	FT DRUM, NY	(11/97)
HUNTSVILLE, AL	(7/97)		
FT WAYNE, IN	(9/97)		

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