

CRH SSD  
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## CENTRAL REGION TECHNICAL ATTACHMENT 92-10

## AN APPLICATION OF WXR.SV

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## 1. Introduction

There are many types of information that need to be compiled into alphanumeric or graphical products. Hand-completed alphanumeric products are very time consuming and there are very few ways of creating graphics. Our solution to this problem was to utilize the AFOS application program named WXR.SV written by Harold Opitz of the Ohio River Forecast Center in Cincinnati. This attachment will show what we have done over the last few years in hopes that it may help others.

## 2. What is WXR.SV?

WXR is described by Opitz (1985) as "a hydrologic weather wire and PLT product software package which manipulates decoded SHEF hydrologic data according to runtime command line options."

This package includes a utility program for creating a dictionary/database of observation station information. This database file is called NET.DT. Another program is a S/230 version of the standard SHEF decoder which places the decoded data into a single RDOS file.

After the decoding is complete, WXR uses a master format file to output a weather wire alphanumeric product. An intermediate plot file (PLT) can also be created. The PMOD package (AOD 1983) is used to transform the PLT file into a graphic product displayable on an AFOS GDM.

## 3. Where to Begin.

The place to start is the dictionary/database file (NET.DT). One must compile a list of every reporting station and reference point that may be used. These data should be available from your Service Hydrologist or Cooperative Program Manager. At Topeka we have three different NET files, one for precipitation reporting stations, another for river stations, and finally one for county and forecast zones. Information needed for each point includes the station call letters, alphanumeric station name, station latitude/longitude and a zoom level for plotting purposes.

103 JUN 1992

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103 JUN 1992

The difference between the precipitation and river lists is that flood stage information is included in the river list. Flood stage data are placed in the last columns allowed for the alphanumeric station name. It is not a separate field in the database and looks quite out of place when used in a precipitation report. Figures 1, 2, and 3 show examples of these NET files.

NET files are easily created either by using a PC and then sending the file to AFOS or by using the AFOS ADM. The NET utility then uses the AFOS file to make the NET.DT file. There is a limit of 500 stations per list. A local switch (/L) in the WXR command line determines which Net file is to be used.

#### 4. Data

Any data in SHEF code stored in AFOS can be used to generate a desired product. WXR has the ability to retrieve the SHEF data. The retrieval portion of WXR collects a specified number of versions and then determines what data will be used. This is a rather complex task and leads to the possible inclusion of unwanted data if one is not careful.

To get around this problem, use another AFOS application program named VERCOMP.SV, written by John Hughes of Central Region Headquarters. According to Hughes (1989), this program "retrieves one or more versions of user-specified AFOS alphanumeric products and stores them under a single AFOS key. The program will retrieve a user-specified number of versions of each product or as many versions as have been stored in the past user-specified number of hours." VERCOMP.SV has been very useful, especially when data are needed over a period of hours and the number of reports varies from day to day. VERCOMP.SV makes the collection and decoding process much faster and easier.

#### 5. Determining the Output

Once data have been determined, an output format file is created. This file contains (1) where the output is to be stored, (2) the addressee of the product, (3) the data, (4) stations to be used, and (5) the final format of the product. An example of a format file is shown in Figure 4. These files are named WXR.# where # = A to Z or 0 to 9.

#### 6. Now the Sky is the Limit

With the basics in place, one can start creating products. Some of the products in use at WSFO Topeka include:

A. Six-hourly compilation of precipitation and river reports.

This uses data from the Kansas WSOs, ROSA reports, and GOES platform reports. Two alphanumeric products are output, one for precipitation and the other for river stages. Two graphics display these same data.

B. Daily precipitation report.

This contains ROSA reports and reports called to the NWS offices. An alphanumeric product is sent on the NOAA Weather Wire Service and a graphic is created. The graphic is posted. Reports are no longer individually plotted by hand. This graphic can also be overlaid with other graphics such as flash flood guidance.

C. Daily river stage report.

Here WXR compiles phoned-in reports, ROSA reports, and GOES platform data. Data are arranged by individual rivers or creeks. WXR also computes a 24-hour change in the stage.

D. Flash flood guidance graphics.

With two RFCs serving the state of Kansas and 105 counties in the state, manual plotting would be very time consuming. WXR does it very quickly and easily. The RFCs provide guidance in SHEF format by county and forecast zone. Once the data are received, graphics can be generated. Application programs such as Watchdog or AEX allow the product to be updated as soon as new data are available.

E. Kansas Temperature and Precipitation Table.

In the past, this has always been a time consuming task. With many stations now reporting through the ROSA system, WXR makes the job much easier. Data received via surface observations are manually coded in SHEF and stored in AFOS. This also helps the RFCs to access the information. Once data are available, both the STP table and an STP graphic are generated. This has reduced the time to generate these products by 20 to 30 minutes.

F. Snow data.

Graphic and alphanumeric reports are generated using snowfall and snow depth information that is stored in AFOS in many different locations. This has proven to be a very useful product, especially in post-storm write-ups.

7. Summary

The use of the WXR program has been very beneficial at WSFO Topeka. We are now able to produce useful and high quality products for ourselves and external users. These products are created in a timely, efficient manner without manual intervention.

8. References

Opitz, Harold, 1985: **WXR.SV Version 3.00**, Eastern Region Computer Programs and Problems, NWS ERCP-No. 24 (Revised)

Hughes, J. R., 1989: **VERCOMP.SV Version 2.00**, Central Region Program Note No. 43 (Unpublished).

AFOS Operations Division (AOD), 1983: **PMOD Plotting System for AFOS**, NWS AOD CP83-1, Section 3.3 pgs 3-10 to 3-15.

ID	STATION NAME	LAT	LONG	Z	ID	COUNTY/ZONE NAME	LATLONG Z
ACAK1	ATTICA 6 WNW	3716	98191		KSC153	RAWLINS COUNTY	3943100450
AGAK1	AUGUSTA	3740	96590		KSC155	RENO COUNTY	3752 97460
AGNK1	AGENDA	3943	97263		KSC157	REPUBLIC COUNTY	3943 97230
AGTK1	AUGUSTA	3740	96573		KSC159	RICE COUNTY	3815 97500
AKCK1	ARKANSAS CITY	3704	97023		KSC161	RILEY COUNTY	3913 96300
ALBK1	ALBERT	3827	99011		KSC165	RUSH COUNTY	3822 99030
ALTK1	ALTAMONT	3711	95172		KSC167	RUSSELL COUNTY	3850 98300
ALVK1	ALTA VISTA	3852	96291		KSC169	SALINE COUNTY	3839 97230
ALXK1	ALEXANDER	3828	99332		KSC171	SCOTT COUNTY	3822100350
ANYK1	ANTHONY	3709	98050		KSC173	SEDGWICK COUNTY	3733 97120
ARCK1	ARKANSAS CITY	3703	97040		KSC175	SEWARD COUNTY	3707100340
ARGK1	ARGONIA	3716	97461		KSC177	SHAWNEE COUNTY	3855 95280
ARLK1	ARLINGTON	3754	98111		KSC179	SHERIDAN COUNTY	3918100100
ARNK1	ARNOLD 12 N	3849100010			KSC181	SHERMAN COUNTY	3918101250
ASHK1	ASHLAND	3712	99460		KSC183	SMITH COUNTY	3943 98300
ATDK1	ATWOOD 2 SW	3947101040			KSC185	STAFFORD COUNTY	3755 98250
ATHK1	ATCHISON	3934	95071		KSC187	STANTON COUNTY	3731101350
ATLK1	ATLANTA	3726	96461		KSC189	STEVENS COUNTY	3707101000
ATNK1	ALTON 6ESE	3926	98510		KSC191	SUMNER COUNTY	3707 97120
ATOK1	ALTOONA	3731	95400		KSC193	THOMAS COUNTY	3918100430
ATSK1	ATCHISON KDOT	3934	95070		KSC195	TREGO COUNTY	3850 99400
					KSC197	WABAUNSEE COUNTY	3850 95550
					KSC199	WALLACE COUNTY	3850101300
					KSC201	WASHINGTON COUNTY	3943 96450
					KSC203	WICHITA COUNTY	3822101000
					KSC205	WILSON COUNTY	3728 95250
					KSC207	WOODSON COUNTY	3745 95250
					KSC209	WYANDOTTE COUNTY	3902 94250
					KSZ001	KANSAS ZONE 1	3924101000
					KSZ002	KANSAS ZONE 2	3829100580
					KSZ003	KANSAS ZONE 3	3720101000
					KSZ004	KANSAS ZONE 4	3924 99500
					KSZ005	KANSAS ZONE 5	3829 99520
					KSZ006	KANSAS ZONE 6	3720 99300
					KSZ007	KANSAS ZONE 7	3924 98420
					KSZ008	KANSAS ZONE 8	3829 98460
					KSZ009	KANSAS ZONE 9	3720 98000

FIGURE 1 - NET.PC  
THE PRECIPITATION STATION DIRECTORY

ID	STATION NAME	FS	LATLONG	Z
ACHK1	ACHILLES	83941100433		
ADAK1	ADA 3 ESE	183908	97503	
AGAK1	AUGUSTA	233740	96590	
AGSK1	AUGUSTA 1 WNW	213741	97003	
ALBK1	ALBERT	243828	99013	
ALEK1	ABILENE 1 NW	73856	97143	
ALNK1	ABILENE 8 S	153848	97112	
AMCK1	AMERICUS 2 S	263828	96150	
ARCK1	ARKANSAS CITY	173703	97040	
ARKK1	ARKANSAS CITY 1SE	183704	97022	
ARNK1	ARNOLD 12 N	73849100010		
ATOK1	ALTOONA 2 SW	233729	95410	
BARK1	BARNES 5 N	163947	96510	
BIGK1	BIG HILL LAKE	3716	95291	
BLRK1	BLUE RAPIDS 1 E	263941	96382	
BLTK1	BELOIT	203927	98071	
BOYK1	BOYD	103832	98523	
BRLK1	BURLINGTON	273812	95440	
BRNK1	BARNARD	213912	98023	
BUNK1	BUNKER HILL 7 SW	203848	98470	
BURK1	BURR OAK ND	3954	98151	

FIGURE 2 - NET.RV  
THE RIVER STATION DIRECTORY

FIGURE 3 - NET.ZN  
THE COUNTY AND ZONE DIRECTORY

CR TA 92-10  
MAY 1992

KANSAS PRECIPITATION SUMMARY  
NATIONAL WEATHER SERVICE TOPEKA KS  
T2:T3 T4 D2 M2 D1 Y1

THE FOLLOWING IS A SUMMARY OF PRECIPITATIONS REPORTS FOR THE  
24 HOUR PERIOD ENDING AT 7 AM THIS D3 MORNING.

STATION ID	PCPN	STATION ID	PCPN
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.FORMAT

NM 20 PPP 11

.COMMENT

...NORTHWEST KANSAS...

.STATION

ATDK1 ATWK1 BDCK1 BRWK1 CBKK1 DNSK1 DRSK1 GLD HLCK1  
HLLK1 HOXK1 LNRK1 MCDK1 MNGK1 MRLK1 NTDK1 NRCK1 NRTK1  
OBRK1 RXFK1 SFCK1 STFK1 STDK1 STPK1 WAKK1

.COMMENT

...CENTRAL KANSAS...

.STATION

ABLK1 ALXK1 BKVK1 BNSK1 BRNK1 BSNK1 BUNK1 CATK1 CHPK1  
CHSK1 CLFK1 CPMK1 DURK1 ELLK1 ELMK1 ELWK1 ENTK1 FLOK1  
FLRK1 GENK1 GOEK1 GTAK1 GTBK1 HASK1 HAYK1 HBRK1 HERK1  
HLBK1 INMK1 KANK1 LINK1 LNCK1 LNSK1 LTTK1 NURK1 LYNK1  
MABK1 MARK1 MCCK1 MCPK1 MLBK1 MPSK1 MTRK1 PEAK1 RSL  
SLN SRLK1 WLSK1 WNDK1

.COMMENT

...SOUTH-CENTRAL KANSAS...

.STATION

ANYK1 ARGK1 ARLK1 ATLK1 BFCK1 BRDK1 CDWK1 CHNK1 CNSK1  
COLK1 DERK1 DRBK1 GEEK1 HAVK1 HDSK1 HESK1 HINK1 HRPK1  
HSSK1 HUTK1 HVLK1 KNGK1 KNSK1 KWAK1 LRNK1 MDKK1 P28  
MEDK1 MTHK1 NORK1 OFFK1 OXFK1 PECK1 PRTK1 PTTK1 PYPK1  
RAGK1 RNYK1 SANK1 STJK1 SUNK1 SWKK1 TRNK1 TRUK1 VACK1  
WELK1 WLDK1 WLMK1 WCTK1 WJBK1 ICT

.COMMENT

...NORTHEAST KANSAS...

.STATION

ATHK1 AXTK1 BEAK1 BLNK1 BLRK1 BLYK1 BNRK1 BRMK1 CENK1  
CRLK1 EFK1 EMMK1 ESTK1 FFKF1 FRAK1 FSTK1 GOFK1 HIAK1  
HLTK1 HOYK1 HRTK1 LLLK1 LOUK1 LVNK1 MHTK1 MRYK1 MSCK1  
MTNK1 MTTK1 ONAK1 ONGK1 OSKK1 POWK1 PRCK1 PRRK1 RDPK1  
SABK1 TNGK1 TRYK1 VLYK1 WDLK1 WETK1 WMGK1

.COMMENT

FIGURE 4 - WXR.P  
A WXR FORMAT FILE

CR TA 92-10  
MAY 1992

KANSAS PRECIPITATION SUMMARY  
NATIONAL WEATHER SERVICE TOPEKA KS  
10:11 AM MON MAR 30 1992

THE FOLLOWING IS A SUMMARY OF PRECIPITATIONS REPORTS FOR THE  
24 HOUR PERIOD ENDING AT 7 AM THIS MONDAY MORNING.

STATION ID	PCPN	STATION ID	PCPN
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...NORTHWEST KANSAS...

NO DATA RECEIVED

...CENTRAL KANSAS...

ABILENE 2 W	0.01	HERINGTON	0.48
DURHAM 3 N	0.35	LINCOLNVILLE	0.50
ELMO 1 SW	0.17	PEABODY	0.11
FLORENCE	0.35	RUSSELL	0.05
GALATIA 1 NW	0.02	SALINA	0.13

...SOUTH-CENTRAL KANSAS...

CALDWELL	0.01	PECK 3 WSW	0.10
HUTCHINSON	0.00	SEDGWICK 1 W	0.20
KINGMAN	0.16	WICHITA	0.20
LARNED	0.09		

...NORTHEAST KANSAS...

CENTRALIA	0.01	MANHATTAN KSU	0.00
EFFINGHAM 1 N	0.12	PERRY 3 NW	0.07
HIAWATHA	0.01	TONGANOXIE 4 ENE	0.21
HOLTON 1 S	T	TROY 2E	0.20
HORTON	0.01		

...EAST-CENTRAL KANSAS...

AUBURN 1 N	0.11	LEBO	0.13
BLUE MOUND	0.67	LYNDON 3 ENE	0.28
COUNCIL GROVE	0.72	MOUND CITY	1.08
CHALK	0.33	MATFIELD GREEN 2 N	0.71
DIAMOND SPRINGS	0.46	OSAGE CITY	0.19
DUNLAP 2 N	0.25	OSAWATOMIE	1.22
ELMDALE 1 NW	0.30	PAOLA	0.63
EMPORIA 3 NW	0.23	READING 2 N	0.10
ESKRIDGE 1 SE	0.13	SAFFORDVILLE	0.17
GARNETT 1 E	0.32	TOPEKA	0.17
GRIDLEY	0.12	WAVERLY	0.15
HARRIS 3 ENE	0.19	WILSEY 1 NNE	0.90
HARVEYVILLE	0.06	WONSEVU	0.36
LAWRENCE KU	0.01		

FIGURE 5 - TOPLCOTOP  
NWWS OUTPUT FROM WXR