Integrated Terminal Weather System (ITWS) Simulator

JVN Communications, Inc.
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User’s Manual

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0.0 INTRODUCTION

Integrated Terminal Weather System Simulator was developed for a purpose of generating ITWS products (described in section 1.0.2).

1.0 OVERVIEW

1.1 Supported ITWS Products

The simulator is capable of playing all of ITWS messages from pre-recorded file and generating only the certain products artificially, which are defined in table 1.0. The messages present in pre-recorded file and artificially generated messages can be mixed in any combination and sent to external user. The time stamp of the messages in the external file is substituted with time of the simulator but timed with original delays and proper order.

1.2 Artificially Generated ITWS Products

Table 1.0

<table>
<thead>
<tr>
<th>No.</th>
<th>Product Name</th>
<th>ITWS Message Name</th>
<th>Message ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Six Level Precipitation</td>
<td>4 – Precipitation Products 5NM, TRACON, 100NM and 200NM</td>
<td>9849 - 9852</td>
</tr>
<tr>
<td>2</td>
<td>Microburst</td>
<td>Microburst TRACON Map Product</td>
<td>9832</td>
</tr>
<tr>
<td>3</td>
<td>Wind Shear</td>
<td>Microburst TRACON Map Product</td>
<td>9832</td>
</tr>
<tr>
<td>4</td>
<td>Gust Fronts and Wind Shifts</td>
<td>Gust Front TRACON Map Product</td>
<td>9833</td>
</tr>
<tr>
<td>5</td>
<td>Storm Cell Motion</td>
<td>4 – Storm Motion – Storm Extrapolated Position Products 5NM, TRACON, 100NM and 200NM</td>
<td>9853 - 9856</td>
</tr>
<tr>
<td>6</td>
<td>Storm Extrapolated Position</td>
<td>4 – Storm Motion – Storm Extrapolated Position Products 5NM, TRACON, 100NM and 200NM</td>
<td>9853 - 9856</td>
</tr>
<tr>
<td>7</td>
<td>Tornado Vortex Signature</td>
<td>Tornado Detections Product</td>
<td>9838</td>
</tr>
<tr>
<td>8</td>
<td>Microburst Alert Panel &amp; ATIS Countdown Timer</td>
<td>Microburst ATIS Panel Message Product</td>
<td>9893</td>
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<tr>
<td>9</td>
<td>Wind Shear Alert Panel &amp; ATIS Countdown Timer</td>
<td>Wind Shear ATIS Panel Message Product</td>
<td>9894</td>
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<tr>
<td>10</td>
<td>Lighting Alert Panel</td>
<td>Airport Lightning Warning</td>
<td>9845</td>
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<td>11</td>
<td>Anomalous Propagation (AP) Alert Panel</td>
<td>Anomalous Propagation (AP) Status</td>
<td>9847</td>
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<tr>
<td>12</td>
<td>Gust Front Alert Panel</td>
<td>Gust Front TRACON Map Product</td>
<td>9833</td>
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<td>Wind Profile Product</td>
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<td>15</td>
<td>Storm Cell Information</td>
<td>Hazard Text Products 5NM, TRACON, 100NM and 200NM</td>
<td>9857 – 9860</td>
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<td>16</td>
<td>Terminal Weather Text</td>
<td>Terminal Weather Normal Text Product and Terminal Weather Special Text Product</td>
<td>9844, 9895</td>
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</table>
2.0 PRODUCTS

2.1 Anomalous Propagation (AP) Alert Panel Product

*Product definitions needed:* propagation section 4.3.9

*Radar definitions needed:* Asr9 or asr9 section 4.2.2

*Messages generated:* Anomalous Propagation (AP) Status Product Message
ITWS Msg ID 9847
Product type 20
Latency 26

*Description:* The AP Status Product is constructed by definition of propagation. Each instance of propagation defines a radar reporting anomalous propagation. If an anomalous propagation needs to be reported by multiple radars it needs to be separately defined for each of those specific radars.

2.2 Gust Front Alert Panel Product

*Product definitions needed:* gustfront section 4.3.3

*Radar definitions needed:* Tdwr or tdwr section 4.2.4

*Messages generated:* Gust Front TRACON Map Product Message
ITWS Msg ID 9833
Product type 2
Latency 3

*Description:* The Gust Front Alert Panel Product is constructed by definition of gustfront. Each instance of gustfront defines a new gust front with independent velocity and heading. If gust fronts are defined in multiple radars the effect is that each of the radars will additionally report gust fronts related to other radars. If a gust front needs to be reported by multiple radars it needs to be separately defined for each of those specific radars.

2.3 Gust Front and Wind Shift Product

*Product definitions needed:* gustfront section 4.3.3

*Radar definitions needed:* Tdwr or tdwr section 4.2.4

*Messages generated:* Gust Front TRACON Map Product Message
ITWS Msg ID 9833
Product type 2
Latency 3
**Description:**
The Gust Front and Wind Shift Product is constructed by definition of gustfront. Each instance of gustfront defines a new gust front with independent velocity and heading. If gust fronts are defined in multiple radars the effect is that each of the radars will additionally report gust fronts related to other radars. If a gust front needs to be reported by multiple radars it needs to be separately defined for each of those specific radars.

### 2.4 Lightning Alert Panel Product

**Product definitions needed:**
lightning section 4.3.5

**Radar definitions needed:**
Adas or adas section 4.2.1

**Messages generated:**
Airport Lightning Warning Message  
ITWS Msg ID 9845  
Product type 23  
Latency 30

**Description:**
The Airport Lightning Warning Product is constructed by definition of lightning. Each instance of lightning defines a sensor location, which is stationary, not a actual lightning strike. The product reports lightning alerts related to multiple radar sites, which don’t have to be defined separately by radar definitions.

### 2.5 Microburst Alert Panel & ATIS Countdown Timer Product

**Product definitions needed:**
mbatis section 4.3.6

**Radar definitions needed:**
Tdwr or tdwr section 4.2.4

**Messages generated:**
Microburst ATIS Panel Product Message  
ITWS Msg ID 9893  
Product type 4  
Latency 11

**Description:**
The Microburst ATIS Panel Product is constructed by definition of mbatis. Each definition of mbatis resets the data of the message to given parameters at the specified time of the simulation.

### 2.6 Microburst Product

**Product definitions needed:**
microburst section 4.3.7

**Radar definitions needed:**
Tdwr or tdwr section 4.2.4

**Messages generated:**
Microburst Product Message  
ITWS Msg ID 9832  
Product type 1  
Latency 2
Description:
The Microburst Product is constructed by definition of microburst. Each instance of microburst defines a new microburst with independent radius and radial loss. If microbursts are defined in multiple radars the effect is that each of the radars will additionally report microbursts related to other radars. If a microburst needs to be reported by multiple radars it needs to be separately defined for each of those specific radars. Look into section 4.3.7, the definition of microburst to find out what’s the difference between microburst and wind shear and how to define them.

2.7 Six Level Precipitation Product

Product definitions needed:
- precip section 4.3.8
- stormmotion section 4.3.10

Radar definitions needed:
- Asr9 or asr9 section 4.2.2
- NEXRAD or nexrad section 4.2.3
- Tdwr or tdwr section 4.2.4

Messages generated:

AP Indicated Precipitation Product Message
- ITWS Msg ID 9848
- Product type 19
- Latency 26

Precipitation 5NM Product Message
- ITWS Msg ID 9849
- Product type 7
- Latency 14

Precipitation TRACON Product Message
- ITWS Msg ID 9850
- Product type 8
- Latency 15

Precipitation 100NM Product Message
- ITWS Msg ID 9851
- Product type 9
- Latency 16

Precipitation 200NM Product Message
- ITWS Msg ID 9852
- Product type 10
- Latency 17

Description:
The Precipitation Product is constructed by definition of precip. Each instance of precip defines an area of specified precipitation level. Every radar reports a precipitation area only if it is within its range. Therefore there might be situations when the same area if precipitation is reported by more than one radar at the same time and in other cases none of the radars might report certain precipitation areas. The stormmotion definition is needed for the precipitation areas to shift in certain directions. If no stormmotion is defined the precipitation will appear stationary. There are three types of radars that are capable of reporting a precipitation: ASR9, NEXRAD, and TDWR. Every radar reports the precipitation with different precision and on different range. ASR9 has range of 64 nautical miles with precision of 1000 meters. NEXRAD has ranges of 100 and 200 nautical miles with precisions of 1000 and 4000 meters respectively. TDWR has range of 5 nautical miles with precision of 250 meters.
2.8 Storm Cell Information Product

Product definitions needed:

hazard section 4.3.4

Radar definitions needed:

Asr9 or asr9 section 4.2.2
Nexrad or nexrad section 4.2.3
Tdwr or tdwr section 4.2.4

Messages generated:

Hazard Text 5NM Product Message
ITWS Msg ID 9857
Product type 15
Latency 22

Hazard Text TRACON Product Message
ITWS Msg ID 9858
Product type 16
Latency 23

Hazard Text 100NM Product Message
ITWS Msg ID 9859
Product type 17
Latency 24

Hazard Text 200NM Product Message
ITWS Msg ID 9860
Product type 18
Latency 25

Description:
The Hazard Text Products are constructed by definition of hazard. Each instance of hazard defines information for a new cell. A definition of cell information is radar specific. If a cell is in a position that should appear on more than one radar, it needs to be defined separately for each of those specific radars. There are three types of radars that are capable of reporting a hazard text: ASR9, NEXRAD, and TDWR. Every radar reports the hazard text with range specific message. Therefore in order for multiple radars to report the same message, a separate hazard definition must be defined for each of those radars with specific resolution.

2.9 Storm Cell Motion Product

Product definitions needed:

stormmotion section 4.3.10

Radar definitions needed:

Asr9 or asr9 section 4.2.2
Nexrad or nexrad section 4.2.3
Tdwr or tdwr section 4.2.4

Messages generated:

Storm Motion – Strom Extrapolated Position 5NM Product Message
ITWS Msg ID 9853
Product type 11
Latency 18
Storm Motion – Strom Extrapolated Position TRACON Product Message
ITWS Msg ID 9854
Product type 12
Latency 19

Storm Motion – Strom Extrapolated Position 100NM Product Message
ITWS Msg ID 9855
Product type 13
Latency 20

Storm Motion – Strom Extrapolated Position 200NM Product Message
ITWS Msg ID 9856
Product type 14
Latency 21

Description:
The Storm Motion Products is constructed by definition of stormmotion. Each instance of stormmotion resets
to specific values of the global storm velocity and heading at specified time of the simulation. A definition of storm
motion is not radar specific. The active storm motion shifts the entire global map of the precipitation according to the
velocity and heading of the motion. There are three types of radars that are capable of reporting a storm motion:
ASR9, NEXRAD, and TDWR. Every radar reports the storm motion with different precision and on different range.
ASR9 has range of 64 nautical miles with precision of 1000 meters. NEXRAD has ranges of 100 and 200 nautical
miles with precisions of 1000 and 4000 meters respectively. TDWR has range of 5 nautical miles with precision of
250 meters

2.10 Storm Extrapolated Position

Product definitions needed:
stormmotion section 4.3.10
stormextrap section 4.3.11

Radar definitions needed:
Asr9 or asr9 section 4.2.2
Nexrad or nexrad section 4.2.3
Tdwr or tdwr section 4.2.4

Messages generated:
Storm Motion – Strom Extrapolated Position 5NM Product Message
ITWS Msg ID 9853
Product type 11
Latency 18

Storm Motion – Strom Extrapolated Position TRACON Product Message
ITWS Msg ID 9854
Product type 12
Latency 19

Storm Motion – Strom Extrapolated Position 100NM Product Message
ITWS Msg ID 9855
Product type 13
Latency 20

Storm Motion – Strom Extrapolated Position 200NM Product Message
ITWS Msg ID 9856
Product type 14
Latency 21
**Description:**
The Storm Extrapolated Position Product is constructed by definition of stormextrap. Each instance of stormextrap defines a boundary of storm motion front, which will be reported with specific velocity and heading. The defined boundary should correspond to a specific area that should be defined by precip definition, usually of level 3 and up. Similarly as precipitation, a definition of storm extrapolated position is not radar specific. The active storm motion shifts the entire global map of the storm extrapolated position according to the velocity and heading of the motion so that the precipitation and corresponding storm extrapolated position is mapped in the same geographic location. If no stormmotion is defined the storm extrapolated position will appear stationary. There are three types of radars that are capable of reporting a storm extrapolated position: ASR9, NEXRAD, and TDWR. Every radar reports the storm extrapolated position on a different range. ASR9 has range of 64 nautical miles, NEXRAD has ranges of 100 and 200 nautical miles, and TDWR has range of 5 nautical miles. Only the storm extrapolated positions that are visible in those radar ranges are reported by the corresponding radars.

2.11 Terminal Weather Text Product

**Product definitions needed:**
termtext section 4.3.12
stormmotion section 4.3.10

**Radar definitions needed:**
Pdata or pdata section 4.2.5

**Messages generated:**
Terminal Weather Normal Text Product Message
ITWS Msg ID 9844
Product type 28
Latency 35

Terminal Weather Special Text Product Message
ITWS Msg ID 9895
Product type 29
Latency 35

**Description:**
The Terminal Weather Text Product is constructed by definition of termtext. Each instance of termtext resets the data of the message to given parameters at the specified time of the simulation. The definition of the stormmotion is only needed to report current storm velocity and heading. If no storm motion is defined by the default the storm motion will be reported as unavailable.

2.12 Terminal Winds Table Product

**Product definitions needed:**
wind section 4.3.14

**Radar definitions needed:**
Pdata or pdata section 4.2.5

**Messages generated:**
Wind Profile Product Message
ITWS Msg ID 9837
Product type 26
Latency 33
Description: The Terminal Winds Table Product is constructed by definition of wind. Each instance of wind defines a wind properties at certain altitude. The definitions of wind with different altitudes at the same location (up to 10 altitudes) are grouped to form a location profile (up to 16 profiles).

2.13 Tornado Vortex Signature Product

Product definitions needed:
tornado section 4.3.13

Radar definitions needed:
Nexrad or nexrad section 4.2.3

Messages generated:
Tornado Vortex Signature Product Message
ITWS Msg ID 9838
Product type 21
Latency 28

Description: The Tornado Vortex Signature Product is constructed by definition of tornado. Each instance of tornado defines a new tornado with specific location, velocity and direction. If a tornado is not within a range of any NEXRAD radar it is not reported. The specific NEXRAD radar reports only the tornadoes that are within the range of that NEXRAD.

2.14 Wind Shear Alert Panel & ATIS Countdown Timer Product

Product definitions needed:
wsatis section 4.3.15

Radar definitions needed:
Tdwr or tdwr section 4.2.4

Messages generated:
Wind Shear ATIS Panel Product Message
ITWS Msg ID 9894
Product type 5
Latency 12

Description: The Wind Shear ATIS Panel Product is constructed by definition of wsatis. Each instance of wsatis resets the data of the message to given parameters at the specified time of the simulation.

2.15 Wind Shear Product

Product definitions needed:
microburst section 4.3.7

Radar definitions needed:
Tdwr or tdwr section 4.2.4

Messages generated:
Microburst Product Message
ITWS Msg ID 9832
Product type 1
Latency 2
Description:
The Wind Shear Product is constructed by definition of microburst. Each instance of microburst defines a new wind shear with independent radius and radial loss. If wind shears are defined in multiple radars the effect is that each of the radars will additionally report wind shears related to other radars. If a wind shear needs to be reported by multiple radars it needs to be separately defined for each of those specific radars. Look into section 4.3.7, the definition of microburst to find out what’s the difference between microburst and wind shear and for more detailed parameter definition.

2.16 Wind Shear Ribbon Display Product

Product definitions needed:
- alert section 4.3.1
- alertconf section 4.3.2

Radar definitions needed:
- Tdwr or tdwr section 4.2.4

Messages generated:
Configured Alerts Product Message
  ITWS Msg ID 9840
  Product type 3
  Latency 5, 6, 7, 8, 9, 10, or 31 – depends on product definition (source parameter)

Description:
The Wind Shear Ribbon Display Product is constructed through definition of alertconf and alert. The alertconf defines a message and alert defines alerts to be included in the given message. The source parameter of both alertconf and alert is the bonding link between those definitions, which basically provides the information to alertconf about the alerts that correspond to its definition.

3.0 SCRIPT

3.1 Input Script

The simulator is driven by various definitions, which generally are defined in the input script. Those definitions tell the simulator things like: to what user the output should be sent, whether to use an input file, geographic locations of sites, what radars and what products have to be sent to external users and what parameters they should have. The input script is not required but provides much easier way of defining scenarios and ability to reuse them. Although definitions can be typed in on the terminal while the simulator is running, they cannot be saved for later use.

Table 2.0 – Parts of the script

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input file</td>
<td>Pre-recorded file with ITWS messages</td>
</tr>
<tr>
<td>Output file/device</td>
<td>Destination file, where messages are to be written or the device, where messages are to be sent.</td>
</tr>
<tr>
<td>ITWS Site name</td>
<td>Name of the ITWS site</td>
</tr>
<tr>
<td>Geographical points</td>
<td>Latitude and longitude definitions of projection and radars.</td>
</tr>
<tr>
<td>Global attributes</td>
<td>Definition of projection and start time</td>
</tr>
<tr>
<td>Radar definitions</td>
<td>Define radars and their attributes</td>
</tr>
<tr>
<td>Product enabling/blocking</td>
<td>Define product enabling and blocking</td>
</tr>
<tr>
<td>Product definitions</td>
<td>Define products and their attributes</td>
</tr>
</tbody>
</table>
4.0 SCRIPT COMMANDS

Standards:
- name of radars and airports must be a maximum of 4 alphanumeric characters.
- parameters that get time, use standard time format \texttt{hh:mm:ss}
- \texttt{lat&lon} – latitude followed by longitude, separated by comma with no space. The coordinates must be followed by a character letter l (ASCII 108).
- \texttt{pos} parameter supports both the Cartesian plane coordinates or \texttt{lat&lon} coordinates.

There are four types of radars that this simulator supports: Adas, Asr9, Nexrad and Tdwr. There is also a non-radar object Product Data, which also controls some products. For simplicity its internal name is Pdata.

There are two ways of defining each radar including the non-radar Pdata. By defining the radar with upper case letter, a window is displayed for the given radar and at runtime controls are accessible via GUI (Graphical User Interface). By defining the radar with lower case letter, no window is displayed and at runtime all controls need to be typed in on the terminal.

4.1 Script Commands Overview

4.1.1 Reserved variables:
- \texttt{input}
- \texttt{ItwsSite}
- \texttt{output}

4.1.2 Reserved keywords:
- \texttt{Adas}
- \texttt{Asr9}
- \texttt{microburst}
- \texttt{propagation}
- \texttt{Tdwr}
- \texttt{Adas}
- \texttt{gustfront}
- \texttt{nexrad}
- \texttt{run}
- \texttt{termtext}
- \texttt{Alert}
- \texttt{hazard}
- \texttt{Nexrad}
- \texttt{stormextrap}
- \texttt{tornado}
- \texttt{alertconf}
- \texttt{lightning}
- \texttt{precip}
- \texttt{stormmotion}
- \texttt{wind}
- \texttt{asr9}
- \texttt{mbatis}
- \texttt{projection}
- \texttt{tdwr}
- \texttt{wsatis}

4.1.3 Object specific keywords:
There are also radar specific reserved keywords for each defined radar. Every definition of the radar creates its own radar commands. In order to distinguish a command of specific radar there must be a unique keyword for each defined radar. The radar specific command must be preceded with \texttt{radartype_radarmame} keyword followed by the sub-keyword (a radar specific command).

4.1.4 Sub-keywords common for all radars:
- \texttt{block}
- \texttt{disable}
- \texttt{enable}
- \texttt{unblock}

4.1.5 Radar specific sub-keywords:

4.1.5.1 ADAS specific:
- \texttt{update\_adas}
- \texttt{update\_lightning}

4.1.5.2 ASR9 specific:
- \texttt{update\_asr9}
update_ap_status
update_precip_ap
update_precip_tracon
update_stormmotion_tracon
update_hazard_tracon

4.1.5.3

**NEXRAD specific:**
update_nexrad
update_tornado
update_precip_100nm
update_precip_200nm
update_stormmotion_100nm
update_stormmotion_200nm
update_hazard_100nm
update_hazard_200nm

4.1.5.4

**TDWR specific:**
update_tdwr
update_microburst
update_gustfront
update_conf_alets
update_precip_5nm
update_stormmotion_5nm
update_hazard_5nm
update_mbatis
update_wsatis

4.1.5.5

**Product Data specific:**
update_pdata
update_windprofile
update_term_wx_text

4.2 Radar keyword definitions

4.2.1 **Adas** definition:

Adas name [-airport name]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the radar, must be unique across all radars of the same type.</td>
<td>required</td>
</tr>
<tr>
<td>[-airport name]</td>
<td>name of the airport where this radar is located. (maximum of 4 alphanumeric characters)</td>
<td>0000</td>
</tr>
</tbody>
</table>

**Radar commands:**
Creation of radar keywords is defined in Appendix A.

adas_name block MsgID
If an input file is specified, all the messages of type MsgID from radar ADAS with name name, will be ignored in the input file. (Default)
**adas_name disable**  
MsgID  
The messages of type MsgID from radar ADAS with name name, will NOT be generated and NOT sent to the output.

**adas_name enable**  
MsgID  
The messages of type MsgID from radar ADAS with name name, will be artificially generated based on its definition in the script and sent to the output. (Default)

**adas_name unblock**  
MsgID  
If an input file is specified, all the messages of type MsgID from radar ADAS with name name, will be sent to the output from the input file.

**adas_name update adas**  
All messages from radar ADAS with name name, are forced to be sent to the output with no regard to their next update time. The messages are sent only when they are enabled. (Runtime command)

**adas_name update_lightning**  
The Airport Lightning Warning message (type 9845) from radar ADAS with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

---

4.2.2

**Asr9 definition:**

Asr9 name [-airport name] [-pos lat&lon] [-rot rotation]

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the radar, must be unique across all radars of the same type.</td>
<td>required</td>
</tr>
<tr>
<td>[-airport name]</td>
<td>– name of the airport where this radar is located. (maximum of 4 alphanumeric characters)</td>
<td>0000</td>
</tr>
<tr>
<td>[-pos lat&amp;lon]</td>
<td>– the geographic position of the radar.</td>
<td>projection tangent</td>
</tr>
<tr>
<td>[-rot rotation]</td>
<td>– the degree of rotation off the true north.</td>
<td>0</td>
</tr>
</tbody>
</table>

**Radar commands:**

Creation of radar keywords is defined in Appendix A.

**asr9_name block**  
MsgID  
If an input file is specified, all the messages of type MsgID from radar ASR9 with name name, will be ignored in the input file. (Default)

**asr9_name disable**  
MsgID  
The messages of type MsgID from radar ASR9 with name name, will NOT be generated and NOT sent to the output.

**asr9_name enable**  
MsgID  
The messages of type MsgID from radar ASR9 with name name, will be artificially generated based on its definition in the script and sent to the output. (Default)

**asr9_name unblock**  
MsgID  
If an input file is specified, all the messages of type MsgID from radar ASR9 with name name, will be sent to the output form the input file.
**asr9_name update_asr9**
All messages from radar ASR9 with name name, are forced to be sent to the output with no regard to their next update time. The messages are sent only when they are enabled. (Runtime command)

**asr9_name update_precip_ap**
The AP Indicated Precipitation message (type 9848) from radar ASR9 with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

**asr9_name update_precip_tracon**
The Precipitation TRACON message (type 9850) from radar ASR9 with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

**asr9_name update_propagation**
The Anomalous Propagation Status message (type 9847) from radar ASR9 with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

**asr9_name update_stormmotion_tracon**
The Storm Motion TRACON message (type 9854) from radar ASR9 with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

**asr9_name update_hazrad_tracon**
The Hazard Text TRACON message (type 9858) from radar ASR9 with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

### 4.2.3

**Nexrad** definition:

Nexrad name [-airport name] [-pos lat&lon] [-rot rotation]

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the radar, must be unique across all radars of the same type.</td>
<td>required</td>
</tr>
<tr>
<td>[-airport name]</td>
<td>– name of the airport where this radar is located. (maximum of 4 alphanumeric characters)</td>
<td>0000</td>
</tr>
<tr>
<td>[-pos lat&amp;lon]</td>
<td>– the geographic position of the radar.</td>
<td>projection tangent</td>
</tr>
<tr>
<td>[-rot rotation]</td>
<td>– the degree of rotation off the true north.</td>
<td>0</td>
</tr>
</tbody>
</table>

**Radar commands:**

Creation of radar keywords is defined in Appendix A.

**nexrad_name block** MsgID
If an input file is specified, all the messages of type MsgID from radar NEXRAD with name name, will be ignored in the input file. (Default)

**nexrad_name disable** MsgID
The messages of type MsgID from radar NEXRAD with name name, will NOT be generated and NOT sent to the output.

**nexrad_name enable** MsgID
The messages of type MsgID from radar NEXRAD with name name, will be artificially generated based on its definition in the script and sent to the output. (Default)
nexrad_name unblock  
If an input file is specified, all the messages of type MsgID from radar NEXRAD with name name, will be sent to the output form the input file.

nexrad_name update nexrad  
All messages from radar NEXRAD with name name, are forced to be sent to the output with no regard to their next update time. The messages are sent only when they are enabled (Runtime command)

nexrad_name update_tornado  
The Tornado Detection message (type 9838) from radar NEXRAD with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

nexrad_name update_precip_100nm  
The Precipitation 100NM message (type 9851) from radar NEXRAD with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

nexrad_name update_precip_200nm  
The Precipitation 200NM message (type 9852) from radar NEXRAD with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

nexrad_name update_stormmotion_100nm  
The Storm Motion 100NM message (type 9855) from radar NEXRAD with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

nexrad_name update_stormmotion_200nm  
The Storm Motion 200NM message (type 9856) from radar NEXRAD with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

nexrad_name update_hazard_100nm  
The Hazard Text 100NM message (type 9859) from radar NEXRAD with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

nexrad_name update_hazard_200nm  
The Hazard Text 200NM message (type 9860) from radar NEXRAD with name name, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

4.2.4

Tdwr definition:

Tdwr name [-airport name] [-pos lat&lon] [-rot rotation]

Parameter definition:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the radar, must be unique across all radars of the same type.</td>
<td>required</td>
</tr>
<tr>
<td>[-airport name]</td>
<td>name of the airport where this radar is located. (maximum of 4 alphanumeric characters)</td>
<td>0000</td>
</tr>
<tr>
<td>[-pos lat&amp;lon]</td>
<td>the geographic position of the radar. projection tangent</td>
<td></td>
</tr>
<tr>
<td>[-rot rotation]</td>
<td>the degree of rotation off the true north.</td>
<td>0</td>
</tr>
</tbody>
</table>
**Radar commands:**

Creation of radar keywords is defined in Appendix A.

- **tdwr_name block** `MsgID`
  If an input file is specified, all the messages of type `MsgID` from radar TDWR with name `name`, will be ignored in the input file. (Default)

- **tdwr_name disable** `MsgID`
  The messages of type `MsgID` from radar TDWR with name `name`, will NOT be generated and NOT sent to the output.

- **tdwr_name enable** `MsgID`
  The messages of type `MsgID` from radar TDWR with name `name`, will be artificially generated based on its definition in the script and sent to the output. (Default)

- **tdwr_name unblock** `MsgID`
  If an input file is specified, all the messages of type `MsgID` from radar TDWR with name `name`, will be sent to the output form the input file.

- **tdwr_name update_tdwr**
  All messages from radar TDWR with name `name`, are forced to be sent to the output with no regard to their next update time. The messages are sent only when they are enabled (Runtime command)

- **tdwr_name update_microburst**
  The Microburst TRACON Map message (type 9832) from radar TDWR with name `name`, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **tdwr_name update_gustfront**
  The Gust Front TRACON Map message (type 9833) from radar TDWR with name `name`, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **tdwr_name update_conf_alerts**
  The Configured Alerts message (type 9840) from radar TDWR with name `name`, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **tdwr_name update_precip_5nm**
  The Precipitation 5NM message (type 9849) from radar TDWR with name `name`, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **tdwr_name update_stormmotion_5nm**
  The Storm Motion 5NM message (type 9853) from radar TDWR with name `name`, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **tdwr_name update_hazard_5nm**
  The Hazard Text 5NM message (type 9857) from radar TDWR with name `name`, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **tdwr_name update_mbatis**
  The Microburst ATIS message (type 9893) from radar TDWR with name `name`, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **tdwr_name update_wsatis**
  The Wind Shear ATIS message (type 9894) from radar TDWR with name `name`, is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)
**Pdata definition:**

\[
\text{Pdata name [-airport name] [-user name] -site_range length -radar_range length}
\]

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the radar, must be unique across all radars of the same type.</td>
<td>required</td>
</tr>
<tr>
<td>[-airport name]</td>
<td>name of the airport where this radar is located. (maximum of 4 alphanumeric characters)</td>
<td>0000</td>
</tr>
<tr>
<td>[-user name]</td>
<td>the name of the user. (maximum of 4 alphanumeric characters)</td>
<td>0000</td>
</tr>
<tr>
<td>-site_range length</td>
<td>the range of the airport in nautical miles.</td>
<td>required</td>
</tr>
<tr>
<td>-radar_range length</td>
<td>the range of the radar in nautical miles.</td>
<td>required</td>
</tr>
</tbody>
</table>

**Radar commands:**

Creation of radar keywords is defined in section 3.1.3.

- **pdata_name block** \( \text{MsgID} \)
  - If an input file is specified, all the messages of type \( \text{MsgID} \) from Product Data with name \( \text{name} \), will be ignored in the input file. (Default)

- **pdata_name disable** \( \text{MsgID} \)
  - The messages of type \( \text{MsgID} \) from Product Data with name \( \text{name} \), will NOT be generated and NOT sent to the output.

- **pdata_name enable** \( \text{MsgID} \)
  - The messages of type \( \text{MsgID} \) from Product Data with name \( \text{name} \), will be artificially generated based on its definition in the script and sent to the output. (Default)

- **pdata_name unblock** \( \text{MsgID} \)
  - If an input file is specified, all the messages of type \( \text{MsgID} \) from Product Data with name \( \text{name} \), will be sent to the output form the input file.

- **pdata_name update_pdata**
  - All messages from radar TDWR with name \( \text{name} \), are forced to be sent to the output with no regard to their next update time. The messages are sent only when they are enabled (Runtime command)

- **pdata_name update_windprofile**
  - The Wind Profile message (type 9837) from Product Data with name \( \text{name} \), is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **pdata_name update_terminal_normal_text**
  - The Terminal Weather Normal Text message (type 9844) from Product Data with name \( \text{name} \), is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)

- **pdata_name update_terminal_special_text**
  - The Terminal Weather Special Text message (type 9895) from Product Data with name \( \text{name} \), is forced to be sent to the output with no regard to its next update time. The message is sent only when it’s enabled. (Runtime command)
4.3 Product keyword definitions

4.3.1 alert definition:

alert name [-t starttime] [-dt deltatime] -source name [-region name]
[-type name] [-value knots] [-first name] [-last name]
[-hdg degrees] [-vel knots] [-sd name] [-rbds name]
[-line number]

Parameter definition:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>the time of the simulation when this product becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>the duration time of this information (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>-source name</td>
<td>source of the alert. (Possible sources: 5 – LLWAS III Alert, 6 – MB Alert Detection, 7 – MB Alert Prediction, 8 – GF Alert Detection, 9 – GF Alert Update, 10 – Alert Runway Configuration, 31 – Airport Wind) This parameter is the link between the alertconf command.</td>
<td>required</td>
</tr>
<tr>
<td>[-region name]</td>
<td>the region ID name (maximum of 7 alphanumeric characters)</td>
<td>null</td>
</tr>
<tr>
<td>[-type name]</td>
<td>the type of the alert (maximum of 4 alphanumeric characters)</td>
<td>null</td>
</tr>
<tr>
<td>[-value name]</td>
<td>a loss or gain value in knots.</td>
<td>0</td>
</tr>
<tr>
<td>[-first name]</td>
<td>first alert location name (maximum of 4 alphanumeric characters)</td>
<td>null</td>
</tr>
<tr>
<td>[-last name]</td>
<td>last alert location name (maximum of 4 alphanumeric characters)</td>
<td>null</td>
</tr>
<tr>
<td>[-hdg degrees]</td>
<td>the direction of LLWAS threshold wind (based on 360°)</td>
<td>999</td>
</tr>
<tr>
<td>[-vel knots]</td>
<td>the speed of LLWAS threshold wind in knots.</td>
<td>99</td>
</tr>
<tr>
<td>[-sd name]</td>
<td>the ID of SD where Ribbon Display is located (maximum of 3 alphanumeric characters)</td>
<td>null</td>
</tr>
<tr>
<td>[-rbdt name]</td>
<td>the ID of RBDT (maximum of 7 alphanumeric characters)</td>
<td>null</td>
</tr>
<tr>
<td>[-line number]</td>
<td>the number of the line where this alert should be displayed.</td>
<td>0</td>
</tr>
</tbody>
</table>

Products affected:
Wind Shear Ribbon Display Product – (see section 2.16)

NOTE:
The alert command requires previous definition of alertconf command. Defining an alert with source has no effect on messages unless alertconf is defined with the same source.

4.3.2 alertconf definition:

alertconf name [-t starttime] [-dt deltatime] -source name -runway name
[-wind_hdg degrees] [-wind_vel knots] [-gust_vel knots]
[-radar_imp flag] [-llwas_imp flag]

Parameter definition:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the definition must be unique.</td>
<td>required</td>
</tr>
</tbody>
</table>
### Parameter Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>the duration time of this information (information expires at start time + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>-source name</td>
<td>source of the alert. (Possible sources: 5 – LLWAS 3 Alert, 6 – MB Alert Detection, 7 – MB Alert Prediction, 8 – GF Alert Detection, 9 – GF Alert Update, 10 – Alert Runway Configuration, 31 – Airport Wind)</td>
<td>required</td>
</tr>
<tr>
<td>-runway name</td>
<td>the runway configuration name (maximum of 31 alphanumeric characters)</td>
<td>required</td>
</tr>
<tr>
<td>[-wind_hdg degrees]</td>
<td>the direction of wind (based on 360°)</td>
<td>999</td>
</tr>
<tr>
<td>[-wind_vel knots]</td>
<td>the speed of the wind in knots.</td>
<td>99</td>
</tr>
<tr>
<td>[-gust_vel knots]</td>
<td>the speed of the gusts in knots.</td>
<td>99</td>
</tr>
<tr>
<td>[-radar_imp flag]</td>
<td>state of the radar (1 – impaired, 0 – not impaired)</td>
<td>0</td>
</tr>
<tr>
<td>[-llwas_imp flag]</td>
<td>state of the LLWAS (1 – impaired, 0 – not impaired)</td>
<td>0</td>
</tr>
</tbody>
</table>

**Products affected:**
- Wind Shear Ribbon Display Product – (see section 2.16)

### 4.3.3 gustfront definition:

```
gustfront name [-t starttime] [-dt deltatime] -radar name -id number [-hazard knots] [-pos point_list] [-vel knots] [-hdg degrees]
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>the duration time of this information (information expires at start time + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>-radar name</td>
<td>name of the radar that is reporting.</td>
<td>required</td>
</tr>
<tr>
<td>-id number</td>
<td>the gust front ID number. (Any positive number)</td>
<td>required</td>
</tr>
<tr>
<td>[-hazard knots]</td>
<td>the wind shear hazard or change in velocity.</td>
<td>0</td>
</tr>
<tr>
<td>[-pos point_list]</td>
<td>the list of points in quadratic plane and projection as reference point representing the gust front shape. (Exp: -pos “{1,2}{2,3}{2,3,4}”)</td>
<td>null</td>
</tr>
<tr>
<td>[-vel knots]</td>
<td>the speed of the gust front in knots.</td>
<td>0</td>
</tr>
<tr>
<td>[-hdg degrees]</td>
<td>the direction in which the gust front is moving (based on 360°)</td>
<td>0</td>
</tr>
</tbody>
</table>

**Products affected:**
- Gust Front Alert Panel – (see section 2.2)
- Gust Fronts and Wind Shifts Product – (see section 2.3)
### 4.3.4 hazard definition:

```plaintext
hazard name [-t starttime] [-dt deltatime] -res type [-pos lat&lon]
         [-hail flag] [-lightning flag] [-storm flag] [-echo value]
```

#### Parameter definition:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>the duration time of this information (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>-res type</td>
<td>type of resolution of radar. (5NM, TRACON, 100NM, or 200NM)</td>
<td>required</td>
</tr>
<tr>
<td>[-pos lat&amp;lon]</td>
<td>the geographic position of the hazard cell.</td>
<td>projection tangent</td>
</tr>
<tr>
<td>[-hail flag]</td>
<td>indication of presence of hail. (YES - present or NO - unavailable)</td>
<td>null</td>
</tr>
<tr>
<td>[-lightning flag]</td>
<td>indication of presence of lightning. (YES - present or NO - unavailable)</td>
<td>null</td>
</tr>
<tr>
<td>[-storm flag]</td>
<td>indication of presence of sever storm circulation. (YES - present or NO - unavailable)</td>
<td>null</td>
</tr>
<tr>
<td>[-echo value]</td>
<td>the value of echotop. Altitude is denoted in thousands of feet. (NO - not present, altitude, or altitude+).</td>
<td>null</td>
</tr>
</tbody>
</table>

**Products affected:**

Storm Cell Information Product – (see section 2.8)

### 4.3.5 lightning definition:

```plaintext
lightning name [-t starttime] [-dt deltatime] [-airport name]
              [-pos lat&lon] [-radius length] [-state state]
```

#### Parameter definition:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>the duration time of this information (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>[-airport name]</td>
<td>name of the airport where this radar is located. (maximum of 3 alphanumeric characters)</td>
<td>null</td>
</tr>
<tr>
<td>[-pos lat&amp;lon]</td>
<td>the geographic position of the radar.</td>
<td>projection tangent</td>
</tr>
<tr>
<td>[-radius length]</td>
<td>the length of radius in nautical miles of the warning area.</td>
<td>5</td>
</tr>
<tr>
<td>[-state state]</td>
<td>the warning state of the region (1 - ON, 0 - OFF)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Products affected:**

Lightning Alert Panel Product – (see section 2.4)
4.3.6 **mbatis** definition:

```
mbatis name [-t starttime] [-id name] -radar name [-source source]
[-status state] [-timer minutes]
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-id name]</td>
<td>id name of the microburst ATIS alert.</td>
<td>null</td>
</tr>
<tr>
<td>-radar name</td>
<td>name of the radar that is reporting. A TDWR radar with same radar name must be defined, otherwise a message with the alert off is generated.</td>
<td>required</td>
</tr>
<tr>
<td>[-source source]</td>
<td>source of input that triggered the state. (0 – Alert, 1 – PIREP Entry, 2 – PIREP Withdrawal, 3 – Timer)</td>
<td>0</td>
</tr>
<tr>
<td>[-status state]</td>
<td>state of the panel. (0 – OFF, 1 – Countdown, 2 – Active)</td>
<td>0</td>
</tr>
<tr>
<td>[-timer minutes]</td>
<td>number of minutes to countdown. (valid ONLY when status is Countdown)</td>
<td>20</td>
</tr>
</tbody>
</table>

**Products affected:**

Microburst Alert Panel & ATIS Countdown Timer Product – (see section 2.5)

4.3.7 **microburst** definition:

```
microburst name [-t starttime] [-dt deltatime] -radar name [-pos1 lat&lon]
[-pos2 lat&lon] [-radius length] [-loss knots] [-det det_flag]
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>the duration time of this information (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>-radar name</td>
<td>name of the radar that is reporting.</td>
<td>required</td>
</tr>
<tr>
<td>[-pos1 lat&amp;lon]</td>
<td>the geographic position of the microburst or wind shear.</td>
<td>projection tangent</td>
</tr>
<tr>
<td>[-pos2 lat&amp;lon]</td>
<td>the geographic position of the microburst or wind shear. Not used when det_flag is set to 0.</td>
<td>projection tangent</td>
</tr>
<tr>
<td>[-radius length]</td>
<td>the length of radius in nautical miles of the microburst or wind shear.</td>
<td>0</td>
</tr>
<tr>
<td>[-loss knots]</td>
<td>the maximum velocity loss across the microburst or wind shear. If loss is less than 30 a wind shear is produced, if loss is greater or equal to 30 a microburst is produced.</td>
<td>0</td>
</tr>
<tr>
<td>[-det det_flag]</td>
<td>the detection mode flag (1 – detection mode, 0 – prediction mode).</td>
<td>1</td>
</tr>
</tbody>
</table>

**Products affected:**

Microburst Product – (see section 2.6)
Wind Shear Product – (see section 2.15)
4.3.8 **precip** definition:

```
precip name [-level level] [-pos point_list]
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-level level]</td>
<td>– level of precipitation value 0 – 6, 7 – attenuated, 8 – AP detected, 9 – bad value, 15 – no coverage.</td>
<td>0</td>
</tr>
<tr>
<td>[-pos point_list]</td>
<td>– the list of points in quadratic plane with projection as reference point representing the area covered by the precipitation of level specified. (Exp: -pos “{1,2}{2,3}{2.3,4}”)</td>
<td>null</td>
</tr>
</tbody>
</table>

**Products affected:**
Six Level Precipitation Product – (see section 2.7)

4.3.9 **propagation** definition:

```
propagation name [-t starttime] [-dt deltatime] -radar name [-state flag] [-tas1 tas1_value] [-tas2 tas2_value] [-tas3 tas3_value]
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>– the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>– the duration time of this information. (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>-radar name</td>
<td>– name of the radar that is reporting.</td>
<td>required</td>
</tr>
<tr>
<td>[-state flag]</td>
<td>– indicates whether an editing radar exists for this ASR9. (0 – no editing, 1 – editing)</td>
<td>0</td>
</tr>
<tr>
<td>[-tas1 tas1_value]</td>
<td>– threshold, area and search values. (exp. –tas1 “{3,13,0}”)</td>
<td>null</td>
</tr>
<tr>
<td>[-tas2 tas2_value]</td>
<td>– threshold, area and search values.</td>
<td>null</td>
</tr>
<tr>
<td>[-tas3 tas3_value]</td>
<td>– threshold, area and search values.</td>
<td>null</td>
</tr>
</tbody>
</table>

**Products affected:**
Anomalous Propagation (AP) Alert Panel Product – (see section 2.1)

4.3.10 **stormmotion** definition:

```
stormmotion name [-t starttime] [-vel knots] [-hdg degrees]
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>– the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>– the duration time of this information. (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>[-vel knots]</td>
<td>– the speed of the storm in knots.</td>
<td>0</td>
</tr>
</tbody>
</table>
Parameter Description Default Value
[-hdg degrees] – the direction in which the storm is moving (based on 360°) 0

**Products affected:**
Storm Cell Motion Product – (see section 2.9)
Terminal Weather Text Product – (see section 2.11)

4.3.11

**stormextrap** definition:

stormextrap name -id ID_num [-pos point_list]

Parameter definition:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>-id ID_num</td>
<td>– identifier identifying the storm</td>
<td>required</td>
</tr>
<tr>
<td>[-pos point_list]</td>
<td>– the list of points in quadratic plane with projection as reference point representing the front of the storm. (exp: -pos &quot;{1,2}{2,3}{2.3,4}&quot;&quot;)</td>
<td>null</td>
</tr>
</tbody>
</table>

**Products affected:**
Storm Extrapolated Position Product – (see section 2.10)

4.3.12

**termtext** definition:

termtext name [-t starttime] [-dt deltatime] [-alert name] [-value value] [-storms storm_list] [-next_alert name] [-next_start time]

Parameter definition:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>– the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>– the duration time of this information (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>[-alert name]</td>
<td>– 3 character alert code (MBA – microburst, WSA – wind shear, HVY – heavy precipitation, HVF – expected heavy precipitation).</td>
<td>null</td>
</tr>
<tr>
<td>[-value value]</td>
<td>– the value of the alert, (microburst – loss in knots, wind shear – loss in knots if negative and gain in knots if positive, precipitation – level of precipitation 0 – 6)</td>
<td>0</td>
</tr>
<tr>
<td>[storms storm_list]</td>
<td></td>
<td>null</td>
</tr>
<tr>
<td>[-next_alert name]</td>
<td>– 3 character alert code, pretends only to precipitation (HVY – heavy precipitation, MOD – moderate precipitation).</td>
<td>null</td>
</tr>
<tr>
<td>[-next_start time]</td>
<td>– the time of the simulation when the next alert is expected.</td>
<td>0</td>
</tr>
</tbody>
</table>

**Products affected:**
Terminal Weather Text Product – (see section 2.11)
4.3.13 **tornado** definition:

`tornado` name [-t starttime] [-dt deltatime] [-vel knots] [-hdg degrees]
[-pos lat&lon] [-vel_valid flag] [-hdg_valid flag]

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>– the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>– the duration time of this information (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>[-vel knots]</td>
<td>– the speed of the tornado in knots.</td>
<td>0</td>
</tr>
<tr>
<td>[-hdg degrees]</td>
<td>– the direction in which the tornado is moving (based on 360°)</td>
<td>0</td>
</tr>
<tr>
<td>[-pos lat&amp;lon]</td>
<td>– the geographic position of the tornado.</td>
<td>projection tangent</td>
</tr>
<tr>
<td>[-vel_valid flag]</td>
<td>– validity of tornado velocity (1 – valid, 0 – invalid)</td>
<td>1</td>
</tr>
<tr>
<td>[-hdg_valid flag]</td>
<td>– validity of tornado heading (1 – valid, 0 – invalid)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Products affected:**

Tornado Vortex Signature Product – (see section 2.13)

4.3.14 **wind** definition:

`wind` name [-t starttime] [-dt deltatime] -location name -row num -col num
[-alt feet] [-hdg degrees] [-vel knots] [-qual quality]

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>– the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-dt deltatime]</td>
<td>– the duration time of this information (information expires at starttime + deltatime)</td>
<td>simulator end time</td>
</tr>
<tr>
<td>-location name</td>
<td>– profile location name.</td>
<td>required</td>
</tr>
<tr>
<td>-row num</td>
<td>– profile row number.</td>
<td>required</td>
</tr>
<tr>
<td>-col num</td>
<td>– profile column number.</td>
<td>required</td>
</tr>
<tr>
<td>[-alt feet]</td>
<td>– altitude above mean sea level measured in feet.</td>
<td>0</td>
</tr>
<tr>
<td>[-vel knots]</td>
<td>– the speed of wind in knots.</td>
<td>0</td>
</tr>
<tr>
<td>[-hdg degrees]</td>
<td>– the direction of wind (based on 360°)</td>
<td>0</td>
</tr>
<tr>
<td>[-qual flag]</td>
<td>– wind estimate quality flag (0 – good, 1 – valid, 2 – invalid)</td>
<td>0</td>
</tr>
</tbody>
</table>

**Products affected:**

Terminal Winds Table Product – (see section 2.12)
4.3.15  

**wsatis** definition:

\`\`wsatis` name [-t starttime] [-id name] -radar name [-source source] [-status state] [-timer minutes] \`

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>– name of the definition must be unique.</td>
<td>required</td>
</tr>
<tr>
<td>[-t starttime]</td>
<td>– the time of the simulation when this information becomes active.</td>
<td>simulator start time</td>
</tr>
<tr>
<td>[-id name]</td>
<td>– id name of the wind shear ATIS alert.</td>
<td>null</td>
</tr>
<tr>
<td>-radar name</td>
<td>– name of the radar that is reporting. A TDWR radar with same radar name must be defined, otherwise a message with the alert off is generated.</td>
<td>required</td>
</tr>
<tr>
<td>[-source source]</td>
<td>– source of input that triggered the state. (0 – Alert, 1 – PIREP Entry, 2 – PIREP Withdrawal, 3 – Timer)</td>
<td>0</td>
</tr>
<tr>
<td>[-status state]</td>
<td>– state of the panel. (0 – OFF, 1 – Countdown, 2 – Active)</td>
<td>0</td>
</tr>
</tbody>
</table>

**Parameter**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>[-timer minutes]</td>
<td>– number of minutes to countdown. (valid ONLY when status is Countdown)</td>
<td>20</td>
</tr>
</tbody>
</table>

**Products affected:**

Wind Shear Alert Panel & ATIS Countdown Timer Product – (see section 2.14)

4.4  

**Other keyword definitions**

4.4.1  

**input** definition:

\`\`set input filepath \`

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>filepath</td>
<td>– a valid path and file name of an input file</td>
<td>required</td>
</tr>
</tbody>
</table>

4.4.2  

**ItwsSite** definition:

\`\`set ItwsSite sitename \`

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>sitename</td>
<td>– name of site, must be limited to 3 alphanumeric characters.</td>
<td>required</td>
</tr>
</tbody>
</table>
4.4.3 **output** definition:

```plaintext
set output filepath | udp:IPaddress/UDPport | udp:host/UDPport
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>filepath</td>
<td>– a valid path and file name of an output file, or IP address followed by UDP port, or host name followed by UDP port. If case of specifying a UDP port the IP address or host name must be preceded with <code>udp:</code> token.</td>
<td>required</td>
</tr>
</tbody>
</table>

4.4.4 **projection** definition:

```plaintext
set projection type -tangent lat&lon
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>– type of projection.</td>
<td>required</td>
</tr>
<tr>
<td>-tangent lat&amp;lon</td>
<td>– latitude/longitude position of the origin of the projection.</td>
<td>required</td>
</tr>
</tbody>
</table>

4.4.5 **run** definition:

```plaintext
run [deltatime]
```

**Parameter definition:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>[deltatime]</td>
<td>– the time for which the simulator should run. Omitting the this parameter causes the simulator to start automatically.</td>
<td>required</td>
</tr>
</tbody>
</table>

**Note:**

By specifying the parameter `deltatime` the simulator will generate the defined products as fast as possible with proper time stamp but without delays between messages. This functionality is helpful in creating the source files for later playback. Make sure that the output device is not an UDP port; otherwise port will be flooded with messages.

5.0 THE SIMULATOR

5.1 Starting the program

There are several ways of running the simulator, depending on the features that are needed. The most common is to start the simulator with a predefined script. It is always a good idea to define all product definitions in the script. The script provides great reusability and convenience. On the terminal execute:

```plaintext
wss script_path&filename
```

This will bring the main simulator window and a window for each radar object, if any, defined in the script. If the command `run` (section 4.4.5) was used in the script the simulation will start automatically, in other case press START button on the toolbar to start simulation.

Another way of launching the simulator program is to use graphical TCL/TK interpreter. Start the interpreter using `itkwish` command. Then on its terminal a main window needs to be included by executing:

```plaintext
source /usr/local/bin/wss
```
If an input script is available it needs to be included also by executing:

```
source script_path&filename
```

If an input script is not wanted all definitions need to be typed in on the terminal, as they would be defined in the script. This approach requires more knowledge about simulator’s command syntax. It is also much more difficult to create a scenario without mistakes because once a product or radar is defined there is no way of deleting it without restarting the simulator. To start the simulation press the start button or execute the `run` command on the terminal.

5.2 Ending the program
To stop the simulation simply exit the program by pressing EXIT button on the toolbar or by executing `exit` command on the terminal. There is no stop function, which would enable to stop simulation without exiting the program unless a `run` command with specified duration time of simulation is used. But keep in mind that this cases the simulator to work as fast as possible to generate all the messages with timing them with proper delays.

5.3 GUI Features

5.3.1 Main Window
Main window provides statistics about all the messages being outputted by the simulator. The statistics counts are combined totals of artificial messages and messages played from the input file. There are also information about miscellaneous messages and error encountered in the input file.

![Main Window](image)

5.3.2 Radar Object Windows
There are 5 different radar objects that the simulator supports. For each defined object a separate window is displayed containing controls for its specific messages. Similarly like main window, the object windows provide statistics about the messages being generated but only related to its specific object.

![Object Window](image)
Object Window Controls enable easily to update the desired message at any time, restrict the generation of artificial messages by enabling/disabling desired messages, and force the blocking of messages from the input file, which are already defined artificially. To block undefined messages that are played from the file check the **Block undefined** option on the Main Window.

**Image 5.3 – Object Window Controls**

5.3.3 **Simulator Information Window**

The Simulator Information Window provides information about defined radar objects and products. It shows which products are enables/disabled, blocked/unblocked, its effective time and associated radars. To view the current information about products and radar object defined press INFO button on the toolbar.

**Image 5.4 – Information Window**
APPENDIX A

6.1 Examples of constructing object specific keywords
Given that a radar was defined:
  asr9_dal or Asr9_dal
  then its radar specific keyword is:
  asr9_dal
  and an examples of a keyword with sub-keyword is
  asr9_dal_block 9850
  asr9_dal_disable 9854

6.2 Example of setting input
set input /daw/dal2.itws
where dal2.itws is a file containing prerecorded ITWS messages.

6.3 Examples of setting output
set output /daw/temp.itws
set output udp:172.26.111.247/4100
set output udp:localhost/9

6.4 Example of setting projection
projection stereographic -tangent 32.847110,-96.851770

NOTE: the last character is a letter l