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SECTION 1 - STEP-BY-STEP OPERATIONS

AUTOMATIC TURN ON/OFF

a) The AVL unit should turn on automatically, if screen doesn't come on push screen power button, lower right of screen, make sure blue light is on. If screen still doesn't come on, check clip connection behind screen.

The screen will turn off automatically about 10-15 seconds after mower is turned off.
ADJUST THE BRIGHTNESS/CONTRAST

a) Press the ‘Menu’ button, middle button in lower right side of the touch screen (to the left of the ‘sun’ button).

b) Press the ‘Menu’ button again to toggle down to Brightness.

c) Press the ‘Left’ or ‘Right’ buttons to adjust the Brightness of the screen. These buttons are located along the bottom right side of the touch screen, just left of the ‘Menu’ button.

d) Press the ‘Menu’ button again to toggle down to Contrast. Adjust Contrast just as Brightness above. If the information on the screen is not fitting correctly you can select the ‘Auto Adjust’ option in the menu.
UTILIZE THE MAIN MENU/HOMESCREEN

This is the Main Menu/Home Screen. It is a touch Input Interface where the mower operators will access the live map, end of shift report, set marks, and look at road and weather conditions.

a) Check the Ball in top left to make sure it has an internet connection: green = yes or red = no. Time in top left shows latest GPS lock. If clock doesn’t match current time and/or ‘GPS Time’ is in red (while mower is outside), there will not be an End-of-Shift report and supervisor should be notified.

b) Use the ‘Bright’ or ‘Dark’ button in lower left to change to a brighter screen for daytime. These buttons can also be used as a way to get out of a menu entered by mistake.

c) Select the ‘End Shift’ button before starting mowing operations to ensure the previous shift’s data has been cleared (discussed further in Step 4). The end shift button brings a mower operator to a report of mowing operations during a selected time period. Time, miles and acres mowed are displayed.

d) The ‘Set Mark’ button allows operators to mark locations of noxious weeds, broken or missing signs, pot holes, guard rail hits, and debris.

END PREVIOUS SHIFT

a) Select the ‘End Shift’ button before starting the mowing operations shift to ensure the previous shift’s data has been cleared. Select the ‘Done’ button along bottom of report

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to get pop-up box to clear the shift (shown below). Once the previous shifts data has been cleared, the AVL will produce correct results for the current shift.

START LIVE MAP

a) Go to main menu and select the ‘Live Map’ button.
b) The map cross-hairs should always be centered over the mowers current location.

c) The ‘Stopped’ and ‘Running’ button is used is used to let AVL system know when the center deck is lowered/engaged in active mowing, or raised during times of transport or any time active mowing is not occurring. When the Center Deck is down, click the ‘Stopped’ button, it should turn GREEN and say ‘Running.’ When the Center Deck is up click the ‘Running’ button, it should turn RED and say ‘Stopped.’ This will contribute to the end of shift report and help collect accurate data.

d) The ‘Left Deck Raised’ and ‘Right Deck Raised’ buttons let the AVL system know when the decks are engaged in active mowing or raised during times of transport or any time when active mowing is not occurring. When physically mowing, click on ‘Left Deck Raised’ or ‘Right Deck Raised’ (or both) buttons to start tracking acres mowed, the buttons should turn GREEN and say ‘Left Deck Lowered’ and/or ‘Right Deck Lowered.’

e) See screen shot below. This example shows the mower is running and the Center Deck and Right Deck are actively engaged in mowing.
The live map shows locations of known noxious weeds using pink and red polygons (see screen shot below). The pink polygons specify Thistle and red polygons are for all other noxious weeds, which include the following: Leafy Spurge, Purple Loosestrife, Garlic Mustard, Common Tansy, and others. Mower operators should NOT mow the red and pink mapped areas unless otherwise directed by their supervisor.

Infiltration Basins are shown as green dots, drop inlets as blue dots, and aprons as yellow dots. The operator will use these dots to be aware of drainage structures in the area, and to avoid damaging them.

**SET MARK FEATURE**

The ‘Set Mark’ Button can be used for a number of different reasons during the mowing shift. It can be used to mark ‘Debris’, ‘Guard Rail’ hits, ‘Pot Hole’s’, broken or missing ‘Sign’s’ in the field, and unmapped areas of noxious ‘Weed’s’ during mowing.
operations. This button can be accessed from the AVL Home Screen as well as from the Live Map used during mowing operations. The ‘Bright’ and ‘Dark’ buttons in lower left of AVL screen can be used as an exit button to return to the main screen without making a selection.

If ‘Sign’ is selected, the operator can then choose between ‘Broken Post’, ‘Broken’, or ‘Missing’, as shown below.
If previously unmapped areas of noxious weeds are discovered, operator can mark them using the ‘**Weed**’ button. When selected, the operator can choose from a group of noxious weeds, which have accompanying names and pictures to aid in identification. The choices with photos include the following: Musk/Nodding Thistle, Spotted Knapweed, Leafy Spurge, Wild Parsnip and Common Tansy. These newly located weed areas will then be investigated and mapped.

**END SHIFT/SUBMIT REPORT**

From the Home Screen or the Live Map, the ‘**End Shift**’ button will send the operator to the screen shown below.
From the drop down, select the time period the operator was in the mower. End of Shift report shows data back the selected amount of time. **Please make sure it doesn't overlap with previous shift.** An example end of shift summarizing what mower did in past 8 hours could be the following: mower was actively mowing for 1.4 hours, mowed for 0.4 miles and 1.1 acres were mowed. Operator then selects ‘**Done**’ along bottom to submit their data and clear their shift.

**SECTION 2 - WEATHER INFORMATION**

**CURRENT/FUTURE RADAR**

From the Home Screen, the ‘**Radar and Forecast**’ button for ‘**Radar & Forecast**’ takes the operator to the following screen, which shows the ‘**Current**’ weather radar.
• The radar data refreshes automatically to ensure the operator always has latest info available (operator will see please wait while loading... while data refreshes).

• Operator has color coded radar to show precipitation type: green/yellow/orange for rain, blue for snow, and pink for a rain/snow mix or freezing rain (see below). Radar shows last 2 hours of storm movement.


• The ‘Future’ button shows the same view as ‘Current’ Radar, but adds on about 1 to 2 hours of projected movement of storm. It also displays the Weather Reports larger when zoomed in for easier viewing.

CURRENT/FUTURE RADAR ZOOM

• Operator touches radar to zoom in on an area for a closer look at color coded ‘Current’ or ‘Future’ Radar and to get a better look at latest Weather Report at Airport Weather Stations. First touch zooms in, second touch zooms out.

• These radars are meant for big picture of storm. The operator can use ‘Truck Radar’ for a more local view (shown further below).
• Operator can always see if there is an internet connection (green/red circle), and latest GPS lock (time), located in upper left of screen.

TRUCK RADAR

• Select ‘Truck Radar’ to see a radar image of area. Radar is always centered over the mower as long as it has a good GPS signal. Operator also sees other AVL equipped vehicles (mowers, plow trucks, etc.) on map to help coordinate maintenance.

• Zoom in closer by touching the ‘In’ button on top part of screen. For a wider view, touch the ‘Out’ button. The ‘Reset’ button will bring operator back to the default zoom level.

• The radar automatically updates at least once every 10 min. The radar is color coded to show precipitation type: green/yellow/orange for rain, blue for snow, and pink for a rain/snow mix or freezing rain.

• The ‘Truck Radar’ uses the same precipitation abbreviations that were used in the current/future radar screens (e.g. TS: thunderstorm, RA: rain, DZ: drizzle, etc.).

• If no weather is being reported, the wind direction speed and gust will be reported if the speed or gust is 10mph or greater. If operator zooms out far enough only the radar and AVL equipped vehicle locations will display so things aren’t as cluttered.
Radar will keep selected zoom level even if operator changes to other screens and then back to the ‘Truck Radar.’

FORECAST

The ‘Forecast’ button displays a 12 hour Weather forecast displaying Road Temp/Air Temp/Precipitation Type/Probability/Hourly Snow Rate/Wind Speed/Direction and Gusts.

At first, it displays the forecast for the nearest route(s) to the mowers home truck station, but will use the mower GPS location to change routes once the mower is out and about.

The operator can change to a different route by using the drop down menu along top of the ‘Forecast’ page (described below). Forecast will update at least once per hour.

Always look at ‘Forecast for...’ above the Forecast for correct route, not drop down menu.

There is a Route Selection box that the operator can touch to select a different route from the list. It has the 15-18 routes nearest the mowers current location. Touch a route in the list to select it, then touch the ‘Set’ button to change the forecast to the selected route.
Forecast changes to selected forecast. The forecast will change back to the route the mower is currently on after about 1-2 minutes.

CURRENT WINDS

The ‘Cur Winds’ Button is located on the Home Screen. This page allows the operator to monitor current wind speeds and direction around the area to help in their maintenance decision process.

Wind speed is color coded with lower wind speeds in blue/green and higher winds in yellow/orange/red. Speed values are shown on map as well to help determine wind speed.

Wind direction is shown by arrows (arrow pointed down is a north wind). Wind data is updated once per hour and only shows sustained winds, not gusts. There is also a link to NWS weather radar (currently not used) as well as the ‘Radar and Forecast’ button that brings operator to the other radars and weather forecast that were described in detail above.
ROAD/WEATHER CONDITION RESET

Every 2 hours, or if not entered before going to ‘Radar and Forecast’ pages, the operator is prompted to input ‘Road Conditions’ and ‘Weather Conditions.’ The operator updates these through touch inputs whenever it is safe. The operator can also update these inputs sooner by touching ‘Road Conditions’ and ‘Weather Conditions’ buttons on the Home Screen. Press ‘Close’ button on lower left side of screen to return to Home Screen. Please see the screenshots below for examples of the messages regarding expiration of ‘Road Conditions’ and ‘Weather Conditions.’

Any ‘Road Conditions’ and ‘Weather Conditions’ that are entered are valid for 1 hour, and then are ignored to keep from sending incorrect conditions all day if the operator forgets to update conditions. Also, conditions entered will be applied to any route mower travels on during that 1 hour period.
SECTION 3 – DESKTOP REPORTING

Once the mowing data has been submitted, it can be accessed using the desktop dashboard. The dashboard can be found at the following location:

http://avl.dot.state.mn.us/login.php

The user logs into the dashboard to encounter the screen shown below:
VEHICLE HISTORY REPORT

From the home screen, a user can choose from a number of options to find information on a single tractor or multiple tractors. One popular report is the vehicle history report. As shown in the screenshot below, the user can choose a date range, vehicle name/number, and which events to display. Clicking on “Generate History Report” will display the data in a tabular format shown at the bottom of the screenshot.
OUTPUT FOR GOOGLE EARTH

Another option from the vehicle history report is to display a trail of breadcrumbs showing where the specified vehicle traveled during the specified time frame. Clicking “Generate Output for Google Earth” will export the data points recorded during the mowing operations, resulting in a map similar to the screenshot below:
MOWER REPORT

The mower report is another useful option from the dashboard home screen. The mower report allows the user to track the time spent mowing, the distance traveled, and the total acres mowed. Much like the vehicle history report, the user specifies the time frame to be investigated and the vehicle name/number. Clicking “Generate Mower History Report” will display the data in a tabular format shown at the bottom of the following screenshot. In addition to the data mentioned earlier, this report
can also show when mowing decks were raised/lowered, and if the GPS signal was lost at any time. If further analysis is desired, the data table can be exported to Microsoft Excel as an xls file.

**VEHICLE MANAGEMENT (EDITING BY ADMIN. ONLY)**

Vehicle Management information can be accessed from the dashboard home screen by clicking on the truck icon in the lower right. The vehicle management subscreen is shown below:
From this subscreen, two tabs are particularly useful. First, the Vehicle Name and Base tab allows the user to edit information about mower units, including the vehicle name, driver name, home base, etc. The information for the aircard assigned to the vehicle is also displayed here, but that information cannot be changed. The following screenshot shows the Vehicle Name and Base “home.” The “Edit” button opens a window to input the new vehicle data.

From the vehicle management subscreen, the other tab of interest is the AT500/AT400 Tracking tab. Clicking on the tab opens the screen shown below:
This screen shows the vehicle’s name/number, homebase, aircard information, and last contact. Clicking on “Last Contact” twice will sort the units by time, so users can know which units have been active most recently. Clicking on a station name will display all of the units assigned to that station, while clicking on the unit name/number will display a record of all the data points recorded by that unit.
Questions/Feedback

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