

| Cell Name | Short_Description | NumberElements | ID_Array | Type | Units_Cell | Long_Description | CollectionFreq | CollectionFreqUnits | Single_Val_Min | Single_Val_Max |
|--------------------------------|---|----------------|----------|---------|------------|--|----------------|---------------------|----------------|----------------|
| Experiment | Name of Experiment | | | chars | | Experiment Name. Set in ExperimentConfig.txt. Default is TestExp. | | | | |
| Subject | Subject ID | | | chars | | Subject ID. Set in ExperimentConfig.txt. Default is TeSubj. | | | | |
| Frames | simulation frame number | 1 | 0 | int | | Frame counter starts from minisim launch. Frame numbers are recorded from scenario start to end. Frames are incremented 60 times/sec (60 Hz). | | | | |
| Time | Elapsed Simulation time | 1 | 0 | float | | Each frame is 1/60 th of a second (0.016666667 sec) | | | | |
| CFS_Accelerator_Pedal_Position | Accelerator pedal position | 1 | 0 | float | 1 | Normalized value between 1 and 0 | 60 | Hz | 0 | 1 |
| CFS_Auto_Transmission_Mode | Auto Transmission Mode | 1 | 0 | short | 1 | -2 = Park -1 = Reverse 0 = Neutral 1 = First 2 = Second 3 = Drive 4 = Overdrive | 1 | CSSDC | -2 | 4 |
| CFS_Brake_Pedal_Force | Brake pedal force | 1 | 0 | float | lbf | lbf: pound force | 60 | Hz | 0 | 180 |
| CFS_Brake_Pedal_Position | Brake pedal position | 1 | 0 | float | rad | Radians of actuator movement (not supported on miniSim) | 60 | Hz | 0 | 100 |
| CFS_Entertainment_Status | Radio status | | | float | Deg | Units=Degrees | 1 | CSSDC | | |
| CFS_Steering_Wheel_Angle | Steering wheel angle | 1 | 0 | float | Deg | Units=Degrees | 60 | Hz | | |
| CFS_Steering_Wheel_Angle_Rate | Steering wheel angle rate | 1 | 0 | float | Deg/sec | Units=Degrees/sec | 60 | Hz | | |
| CFS_Steering_Wheel_Torque | Steering wheel torque (if equipped) | 1 | 0 | float | ft-lb | Foot-pounds | 60 | Hz | | |
| CFS_Transfer_Case_Mode | Transfer case mode | | | | 1 | 1 = 2H 2 = 4H 3 = Neutral 4 = 4L. Generally defaults to 3 but hardcoded to 1 for CT8 (Heavy Truck Only) | 1 | CSSDC | | |
| CIS_Auxiliary_Buttons | Auxiliary buttons | 20 | 1 | float | 1 | 0 = button is not pressed, 1 = button is pressed. Mapping of physical buttons to this variable are accomplished via the system configuration (hardware.xml). Button 1 is the left wheel button, and button 2 is the right wheel button for driver response (eg Divided Attention scenarios). Buttons 3 and 4 are often used for the up/down paddles on gaming wheels. Buttons 5-10 are reserved for automation. Buttons 11-20 are available for other uses. | 60 | Hz | | |
| CIS_Joystick_Type | Joystick type | 1 | 0 | short | 1 | 0 = ECCI hybrid with analog shifter stalk, 1 = MicroSoft Generic, 2 = Logitech gamepad, 3 = Logitech G25 wheel, 4 = HAPP board hybrid wheel with analog shifter stalk, 5 = Logitech Wingman Formula GP, 6 = Logitech G27 wheel, 7 = ECCI original wheel with paddle shifter | 1 | CSSDC | 0 | 7 |
| CIS_Joystick_Buttons | Joystick Buttons | 1 | 0 | integer | 1 | Combined joystick button press values in bitmap form. Paddle shifter paddles are buttons so their values are reflected here as well. | 1 | CSSDC | | |
| CIS_Cruise_Control | Cruise Control state | 1 | 0 | short | 1 | 0 = Not available 1 = off 2 = On 3 = Set/Accel 4 = Resume 5 = Coast | 1 | CSSDC | | |
| CIS_Horn | Car horn | 1 | 0 | integer | 1 | OnOff, 1=on | 1 | CSSDC | 1 | 2 |
| CIS_Turn_Signal | Turn signals | 1 | 0 | short | 1 | 1 = no turn signal on 2 = left turn signal on 3 = right turn signal on 4 = hazard signals on | 1 | CSSDC | 1 | 4 |
| SCC_Audio_Trigger | Present each time the Audio trigger fires | 1 | 0 | integer | 1 | Contains the Audio File ID from the Instructions.txt file triggered by scenario. values: 0 (clear), 50 (Please take the next exit), 51 (Please take this Exit), 55 (Please follow the signs for Interstate 80 West), 57 (This is the end of your drive.), 350 (alert chime), 1008 (speeding warning) | 1 | CSSDC | | 0 |
| SCC_Custom1 | User Defined | 1 | 0 | float | 1 | Generic utility variable. Typical uses are to store calculations made in scenario for debugging or data reduction purposes. Can also write to these with RouteTable as inputs to scenario. | | Hz | | |
| SCC_Custom2 | User Defined | 1 | 0 | float | 1 | Generic utility variable. Typical uses are to store calculations made in scenario for debugging or data reduction purposes. Can also write to these with RouteTable as inputs to scenario. | | Hz | | |
| SCC_Custom3 | User Defined | 1 | 0 | float | 1 | Generic utility variable. Typical uses are to store calculations made in scenario for debugging or data reduction purposes. Can also write to these with RouteTable as inputs to scenario. | | Hz | | |
| SCC_Custom4 | User Defined | 1 | 0 | float | 1 | Generic utility variable. Typical uses are to store calculations made in scenario for debugging or data reduction purposes. Can also write to these with RouteTable as inputs to scenario. | | Hz | | |
| SCC_Collision_Count | total collisions | 1 | 0 | integer | 1 | Total number of collisions in drive. | | | | |
| SCC_Collision_List_Size | Number of objects collided with | 1 | 0 | integer | | Number of objects collided with | | | | |
| SCC_DataRed_Params | Parameters for Data Reduction Segments | 1 | 0 | chars | | is 10884 chars. ASCII Number | 60 | Hz | | |
| SCC_Collision_Det_Object | | 10 | 0 | short | | Collision object CVED IDs in order of collision | | | | |
| SCC_Collision_Det_Ob_Type | | 10 | 0 | short | | Collision object CVED IDs in order of collision. Array of 10 shorts If the value of SCC_Collision_List_Size is n, only the first n values in this array are valid 1 - trajectory follower (DDOs) 2 - vehicle (can be ADOs or static objs) 7 - traffic signs 9 - obstacle 13 - walker | | | | |
| SCC_Collision_Det_Ob_Solid | | 10 | 0 | short | | SOL ID of object collided with; array lists objects in order of collision. | | | | |
| SCC_DataRed_Segments | Data Reduction Segment Type | 6 | 2 | integer | | Integer >= 0 | 60 | Hz | 0 | |
| SCC_DynObj_AudioVisualState | Bit mask Audio and Visual states | 20 | 3 | integer | | 20 unsigned integers | 60 | Hz | | |
| SCC_DynObj_ColorIndex | Scenario object's color index | 20 | 4 | short | | Scenario object's color index as specified in the sol2.txt file | 60 | Hz | | |
| SCC_DynObj_CvedId | Cved IDs of Scenario Objects | 20 | 5 | integer | | Integer >= 0 | 60 | Hz | 0 | |
| SCC_DynObj_DataSize | Indicates how many valid objects in SCC_DynObj Arra | 1 | 0 | integer | | | 60 | Hz | | |
| SCC_DynObj_HcsmType | Scenario object's HCSM Type | 20 | 6 | integer | | | 60 | Hz | | |
| SCC_DynObj_Heading | Headings of Scenario Objects | 20 | 7 | float | Deg | Units=degrees | 60 | Hz | | |
| SCC_DynObj_Name | Name of scenario object | 640 | 8 | chars | | array of char (reversed, chunked in 4ths) | 60 | Hz | | |
| SCC_DynObj_Pos | Global Position of scenario object, X, Y, Z | 60 | 9 | float | feet | Cartesian coordinate system; As viewed in ISAT, X positive to the East (Right), Y positive to the North (top of screen), Z positive up elevation (out of screen) | 60 | Hz | | |
| SCC_DynObj_RollPitch | Roll and Pitches of Scenario Objects | 40 | 10 | float | Deg | Units=degrees | 60 | Hz | | |
| SCC_DynObj_Solid | Sol IDs of Scenario Objects | 20 | 11 | integer | | Integer >= 0. model objects are assigned unique IDs within the sol2_aux file. | 60 | Hz | | |
| SCC_DynObj_Vel | Velocities of Scenario Objects | 20 | 12 | float | ft/sec | Units=ft/s for DDOs (HcsmType = 1), Units= m/s for ADOs (HcsmType = 10) | 60 | Hz | | |
| SCC_DRT_ReactionTime | Reaction time as calculated by the DRT device for the DRT task | 1 | 0 | float | sec | Units=seconds. If the response does not take place within the detection period (part of the configuration for the DRT device), the value will be -9999.0. Note that the value will be updated to reflect the response time for the current task only after a response is recorded or the duration of the response window has passed. | 60 | Hz | | |
| SCC_HighRes_Time | High resolution timestamp with sub-millisecond accuracy | 2 | 13 | integer | | Array of two integers (4 bytes*2) that represent a 64-bit unsigned integer timestamp. The first integer represents the lower 4 bytes and the second the upper 4 bytes. | 60 | Hz | | |
| SCC_EventStatus | Status of an event | 1 | 0 | short | | 0 1; 0 means no event is active. 1 means there is an active event. Needs to be set to 1 at least once to indicate the drive has started and run time data reduction, including those overall evaluations and sliding window based evaluations, should be started. *NOTE: atypical use in Platoon scenarios; attempt to use this mechanism to capture collisions when SOL collision IDs are -1; this does not work; this mechanism DOES NOT determine event status for platoon scenarios (see logstreams) | 1 | CSSDC | | |
| SCC_EventNumber | Index of an event | 1 | 0 | short | | {1..20}; A maximum of 20 events can be defined within a scenario. | 1 | CSSDC | | |
| SCC_Eval_Exec_Time | Time since drive started. | 1 | 0 | float | sec | Seconds. The clock starts the first time SCC_EventStatus is set to 1. | 1 | CSSDC | | |
| SCC_Eval_Collisions | Total number of collisions | 1 | 0 | integer | 1 | Total number of collisions so far in the drive (i.e. from when the event status is set to 1 for the first time). | 1 | CSSDC | 0 | |
| SCC_Eval_Max_Speed | Maximum own vehicle speed | 1 | 0 | float | MPH | Maximum own vehicle speed so far. MPH=Miles per hour | 1 | CSSDC | 0 | |
| SCC_Eval_Avg_Speed | Average OV speed | 1 | 0 | double | MPH | MPH=Miles per hour | 1 | CSSDC | 0 | |
| SCC_Eval_SpeedSD | Standard deviation of OV speed | 1 | 0 | double | MPH | MPH=Miles per hour | 1 | CSSDC | 0 | |
| SCC_Eval_Overall_SOLP | Standard deviation of OV lane position | 1 | 0 | double | ft | Standard deviation of OV lane position | 1 | CSSDC | | |
| SCC_Eval_Lane_Departures | Total number of OV lane departures | 1 | 0 | integer | | Lane departures as the LDW system indicates. | 1 | CSSDC | | |
| SCC_Eval_Lane_Departure_Pct | Percentage of time when the OV is considered departed from the lane | 1 | 0 | float | 1 | Values from 0% to 100% | 1 | CSSDC | 0 | 100 |

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|------------------------------------|---|----|---------|---------|-----|--|--|----|-------|---|-----|
| SCC_Eval_Speedings | Total number of occasions when the OV is 5MPH or more above the speed limit | 1 | 0 | short | | | There is a debounce time of 30 seconds. So within 30 seconds of activation the count won't increase even if the OV violates the speed limit multiple times during that time span. | 1 | CSSDC | | |
| SCC_Eval_Speeding_Pct | Percentage of time when the OV is 5MPH or more above the speed limit | 1 | 0 | float | 1 | | 0% - 100%. Debounce time is not used here. It's the actual frame count when the OV violates the speed limit measured against the total frame count of the drive so far. | 1 | CSSDC | 0 | 100 |
| SCC_Eval_Avg_Hdwy | Average distance between OV and a lead vehicle | 1 | 0 | float | ft | | The distance is only averaged among the frames when there is a lead vehicle as reported by the scenario controller. | 1 | CSSDC | | |
| SCC_Eval_Event_Collisions | Number of collisions during an event. | 20 | 14 | integer | | | An event is defined by SCC_Event_Status and SCC_Event_Number. The status needs to be 1 and the number needs to be between 1 and 20. (i.e. within a defined event). *Note: This is NOT TRUE for Platoon scenarios (see logstreams for event definition) | 1 | CSSDC | | |
| SCC_Eval_Event_Max_Speed | Maximum OV speed during an event. | 20 | 15 | float | MPH | | MPH:Miles per hour | 1 | CSSDC | | |
| SCC_Eval_Event_Min_Speed | Minimum OV speed during an event | 20 | 16 | float | MPH | | MPH:Miles per hour | 1 | CSSDC | | |
| SCC_Eval_Event_Avg_Speed | Average OV speed during an event | 20 | 17 | double | MPH | | MPH:Miles per hour | 1 | CSSDC | | |
| SCC_Eval_Event_SDLP | Standard deviation of OV lane position during an event | 20 | 18 | double | ft | | ft:feet | 1 | CSSDC | | |
| SCC_Eval_Event_Lane_Departures | Number of OV lane departures during an event. | 20 | 19 | integer | | | | 1 | CSSDC | | |
| SCC_Eval_Event_Lane_Departure_Pct | Percentage of time when the OV is 5MPH or more above the speed limit during an event | 20 | 20 | float | 1 | | | 1 | CSSDC | 0 | 100 |
| SCC_Eval_Event_Avg_Hdwy | Average distance between the OV and a lead vehicle during an event | 20 | 21 | float | ft | | See remarks for SCC_Eval_Avg_Hdwy | 1 | CSSDC | | |
| SCC_Eval_Window_Duration | Lengths of windows preceding the current frame, to be used for run time data reduction | 10 | 22 | float | sec | | A total of 10 windows of different duration can be defined. There is a build up time for the window at the start of the drive as data are being filled in the windows. The length of the build up time is the same as the length of the window. The values during the build up time should be discarded. | 1 | CSSDC | | |
| SCC_Eval_Window_Collisions | Number of collisions in a window of predefined duration preceding the current frame | 10 | 23 | integer | 1 | | | 1 | CSSDC | | |
| SCC_Eval_Window_Avg_Speed | Average OV speed in a predefined window | 10 | 24 | double | MPH | | MPH:Miles per hour | 1 | CSSDC | | |
| SCC_Eval_Window_SDLP | Standard deviation of OV speed in a predefined window preceding the current frame | 10 | 25 | double | MPH | | MPH:Miles per hour | 1 | CSSDC | | |
| SCC_Eval_Window_Lane_Departures | Number of OV lane departures in a predefined window preceding the current frame | 10 | 26 | integer | | | | 1 | CSSDC | | |
| SCC_Eval_Window_Lane_Departure_Pct | Percentage of time when the OV is considered departed from the lane in a predefined window preceding the current frame | 10 | 27 | float | 1 | | | 1 | CSSDC | 0 | 100 |
| SCC_Eval_Window_Speedings | Number of occasions when the OV is 5MPH or more above the speed limit in a predefined window preceding the current frame | 10 | 28 | short | 1 | | See remarks for SCC_Eval_Speedings. | 1 | CSSDC | | |
| SCC_Eval_Window_Speeding_Pct | Percentage of time when the OV is 5MPH or more above the speed limit in a predefined window preceding the current frame | 10 | 29 | float | 1 | | See remarks for SCC_Eval_Speeding_Pct | 1 | CSSDC | 0 | 100 |
| SCC_Eval_Window_Avg_Hdwy | Average distance between the OV and a lead vehicle preceding the current frame | 10 | 30 | float | ft | | See remarks for SCC_Eval_Avg_Hdwy. | 1 | CSSDC | | |
| SCC_Follow_Info | Lead vehicle follow data | 9 | 31 | float | | | An array of 9 floats 1st - identifier (CVED ID) of object -1 if none or error 0 if no ownvehicle 2nd - distance to lead vehicle CG (in feet, Cartesian global coordinates) 3rd - bumper-to-bumper time to lead vehicle (in seconds) 4th - bumper-to-bumper distance to lead vehicle (in feet) 5th - time-to-collision (in seconds) 6th - lead vehicle velocity (ft/s) 7th - x coordinate of lead vehicle 8th - y coordinate of lead vehicle 9th - z coordinate of lead vehicle | 60 | Hz | | |
| SCC_DynObj_HcsmType | Scenario object's HCSM Type | 20 | 32 | integer | | | | 60 | Hz | | |
| SCC_Lane_Depart_Warn | Lane departure warning based on lane definition, not lane markings. Margin is customizable through cell SCC_Lane_Markings as well as cell AUX1_LdwWarningTimedHeadway | 4 | | float | | | <p>Array of 4 floats</p> <p>First element is LDW status: 0=off, 1=monitoring, 2=left depart, 3=right depart</p> <p>Second element is distance between left side of car and left lane (ft)</p> <p>Third element is distance between right side of car and right lane (ft)</p> <p>Fourth element is local heading angle of the car in the lane (deg)</p> <p>There are many ways to achieve lane departure warnings. The built-in method is to look at the first element of SCC_Lane_Depart_Warn cell. It's nominal value is 1. If the outside left corner of the vehicle comes to within some distance of the left lane edge, then it will change to 2. If the outside right corner of the vehicle comes to within some distance of the right lane edge, then it will change to 3.</p> <p>The edge of the lane is not where the lane markings are, it's where the edge of the lane definition is. The function allows for some margin inside the lane edge. The value of this margin is customizable through the cell SCC_Lane_Markings as well as through the cell AUX1_LdwWarningTimedHeadway.</p> <p>If AUX1_LdwWarningTimedHeadway = 1, margin = 12 else if AUX1_LdwWarningTimedHeadway = 2, margin = 3 otherwise, margin = 6</p> <p>Then the minimum distance to lane edge to trigger a warning is determined by the margin as well as where the lane marking is. I will give you the defaults since that is what will be used unless someone goes through the trouble to define lane markings throughout the drive.</p> <p>Min_distance_from_left_edge = (2 + margin)/12 feet Min_distance_from_right_edge = margin/12 feet</p> <p>As you can see, the threshold is not symmetrical. This has to do with standard lane marking locations and is intentional.</p> <p>If you don't want to use the built-in mechanism, you can also get a good approximation by simply setting a threshold on SCC_Lane_Deviation, 2nd element. Lane departures will occur around deviations of 3 feet, approximately.</p> | 60 | Hz | | |
| SCC_Lane_Deviation | Deviation of OV from center of lane Units = feet | 4 | 33 | float | 1 | | Array of 4 floats [1st: -1 or -2 (on a crdr) 1 (on a lane) 0 (error)]; [2nd: offset from the center of lane/corridor]; [3rd: width of lane (corridor's width is not reported)]; [4th:Lane/corridor CVED id] | 60 | Hz | 0 | 4 |
| SCC_Spline_Lane_Deviation | Deviation of OV from center of lane computed from lane center points as a continuous spline Units = feet | 4 | unknown | float | 1 | | Array of 4 floats [1st: -1 or -2 (on a crdr) 1 (on a lane) 0 (error)]; [2nd: offset from the center of lane/corridor]; [3rd: width of lane (corridor's width is not reported)]; [4th:Lane/corridor CVED id] | 60 | Hz | 0 | 4 |

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|------------------------------------|--|------------------------|----|---------|------------|--|---|----|----|---|--|
| SCC_LogStreams | Scenario set values | 10 (5 std, 5 extended) | 34 | float | | | Array of 5 floats. Logstreams are values written into the DAQ file through "write to logstream" actions within a scenario. Typical uses are to store calculations made in scenario for debugging or data reduction purposes. Can also write to these with RouteTable as inputs to scenario. | 60 | Hz | | |
| SCC_Over_Speed_Limit | Over speed limit accumulation | 1 | 0 | integer | | | Integer >= 0 | 60 | Hz | 0 | |
| SCC_OwnVeh_Curvature | Road curvature at Own Vehicle's current position | 1 | 0 | float | feet | | Float >= 0, Radius in feet | 60 | Hz | 0 | |
| SCC_Scen_Pos_Hex_Pitch | Pitch of the driver, in scenario coordinates. | 1 | 0 | float | Deg | | not used in minisim | 1 | | | CSSDC |
| SCC_Scen_Pos_Hex_Roll | Roll of the driver, in scenario coordinates. | 1 | 0 | float | Deg | | not used in minisim | 1 | | | CSSDC |
| SCC_Scen_Pos_Hex_X | X position of the motion base hexapod, in scenario coordinates. | 1 | 0 | float | ft | | not used in minisim | 1 | | | CSSDC |
| SCC_Scen_Pos_Hex_Y | Y position of the motion base hexapod, in scenario coordinates. | 1 | 0 | float | ft | | not used in minisim | 1 | | | CSSDC |
| SCC_Scen_Pos_Hex_Yaw | Yaw of the motion base hexapod, in degrees. | 1 | 0 | float | Deg | | not used in minisim | 1 | | | CSSDC |
| SCC_Scen_Pos_Hex_Z | Z position of the driver, in scenario coordinates. | 1 | 0 | float | ft | | not used in minisim | 1 | | | CSSDC |
| SCC_Scen_Pos_TT | Turntable position of the driver, in scenario coordinates. | 1 | 0 | float | Deg | | not used in minisim | 1 | | | CSSDC |
| SCC_Scen_Pos_X_Crossbeam | X Crossbeam position of the driver, in scenario coordinates. | 1 | 0 | float | in | | not used in minisim | 1 | | | CSSDC |
| SCC_Scen_Pos_Y_Carriage | Y Carriage position of the driver, in scenario coordinates | 1 | 0 | float | in | | not used in minisim | 1 | | | CSSDC |
| SCC_Total_Speed_Limit | Total number of increments collected at 60 Hz (frame count) | 1 | 0 | integer | | | Integer >= 0 | 60 | Hz | 0 | |
| SCC_Under_Speed_Limit | Under speed limit accumulation (frame count) | 1 | 0 | integer | | | Integer >= 0 | 60 | Hz | 0 | |
| SCC_Within_Speed_Limit | Within speed limit accumulation (frame count) | 1 | 0 | integer | | | Integer >= 0 | 60 | Hz | 0 | |
| TPR_Surface_Tire_Friction_Ind | Type of surface the tire is in contact with (up to 10 tires as on a Class 8 truck) | 10 | 35 | short | | | 0 - Intersections and drivable off-road; 14 - Road; 20 - Shoulder | 1 | | | CSSDC |
| VDS_ABS_Operating_Flag | Flag to enable/disable ABS system | 1 | 0 | short | | | 0 - ABS system disabled; 1 - ABS system enabled | 1 | | | CSSDC |
| VDS_Acc_Pedal_Pos_Backdrive | Acceleration pedal position backdrive | 1 | 0 | float | | | not used in minisim | 60 | Hz | | |
| VDS_Brake_Torque | The brake torque at each wheel | 4 | 36 | float | N-m | | N-m; Newton-meter. Order of brakes as shown in Figure 1. See Figure 1 in document [R02] last page. | 60 | Hz | | |
| VDS_BrkPdl_Fr_Ftrd | VDS filtered version of CFS_Brake_Pedal_Force | 1 | 0 | float | lb | | lb; Pounds | 60 | Hz | | |
| VDS_Chassis_CG_Accel | Chassis CG Acceleration (X, Y, Z Global) Coordinates | 3 | 37 | float | ft/(sec^2) | | As viewed in ISAT, X positive to the East (Right), Y positive to the North (top of screen), Z positive up elevation (out of screen) | 60 | Hz | | SA this element is not correct based on DAQ review |
| VDS_Chassis_CG_Ang_Vel | Chassis CG angular velocity | 3 | 38 | float | Deg/sec | | Rotational velocity about the axes of the Global Coordinate system. | 60 | Hz | | |
| VDS_Chassis_CG_Orient | Chassis CG orientation | 3 | 39 | float | Deg | | Rotational orientation about the axes of the Global Coordinate system. | 60 | Hz | | |
| VDS_Chassis_CG_Position | Chassis CG position (SAECoordinates; see https://www.researchgate.net/figure/SAE-Vehicle-Axis-System_fig3_323573937) | 3 | 40 | double | ft | | As viewed in ISAT, X positive to the East (Right), Y positive to the North (top of screen), Z positive up elevation (out of screen) | 60 | Hz | | NOTE atypical use of Y,X,Z coordinates |
| VDS_Chassis_CG_Vel | Chassis CG velocity (x,y,z) | 3 | 41 | float | fps | | It's 3 components are longitudinal, lateral, and vertical, in the SAE coordinate system. X is forward, Y is right, Z is down. | 60 | Hz | | |
| VDS_Coeff_Fric | Coefficient of friction currently being used by dynamics | 1 | 0 | float | | | Coefficient of friction currently being used by dynamics[R02]. Terrain type 14 - 0.50; Terrain type 20 - 0.65; Terrain type 25 - 0.50 | 60 | Hz | | |
| VDS_Eyepoint_Orient | Eye point orientation in global coordinate system | 3 | 42 | float | Deg | | Rotational orientation about the axes of the Global Coordinate system. | 60 | Hz | | |
| VDS_Eyepoint_Pos | Eye point position in global coordinate system | 3 | 43 | double | ft | | As viewed in ISAT, X positive to the East (Right), Y positive to the North (top of screen), Z positive up elevation (out of screen) | 60 | Hz | | |
| VDS_Head_Pt_Angular_Vel | Angular velocity of head point | 3 | 44 | float | Deg/sec | | Rotational velocities around the driver's headpoint with respect to a local coordinate system at the headpoint. X is along vehicle axis (positive forward), Y is transverse (positive to left), Z is positive down. Headpoint location with respect to vehicle CG is in the SOL2 file. | 60 | Hz | | |
| VDS_Head_Pt_Specific_Force | Head point specific forces | 3 | 45 | float | G | | In G's, with respect to a local coordinate system at the driver's headpoint. X is along vehicle axis (positive forward), Y is transverse (positive to left), Z is positive down. Headpoint location with respect to vehicle CG is in the SOL2 file. | 60 | Hz | | |
| VDS_Load_Torque | Wheel torque due to external forces | 1 | 0 | float | ft-lb | | ft-lb; foot-pounds | 60 | Hz | | |
| VDS_Num_Grids | Number of grids used for each contact patch | 1 | 0 | short | 1 | | Ask NADS for details. | 1 | | | CSSDC |
| VDS_Num_Tires | Number of tires on vehicle | 1 | 0 | short | 1 | | 0-10 | 60 | Hz | 0 | 10 |
| VDS_Steering_torque_Backdrive | Commanded Steering Wheel Torque | 1 | 0 | float | ft-lb | | ft-lb; foot-pounds (not supported in minisim) | 60 | Hz | | |
| VDS_Tire_Ground_Contact | The tire/terrain contact location | 20 | 46 | float | ft | | In feet, a vector with two elements (x,y) for each tire, representing the point where the tire contacts the ground with respect to vehicle CG. The tires are listed with front right first, front left second, rear right third, rear left fourth. | 60 | Hz | | |
| VDS_Tire_Rot_Vel | Tire rotational velocity | 10 | 47 | float | Deg/sec | | | 60 | Hz | | |
| VDS_Tire_Slip_Angle | Tire slip angle | 10 | 48 | float | Deg | | with respect to vehicle longitudinal axis. | 60 | Hz | | |
| VDS_Tire_Slip_Ratio | Tire slip ratio | 10 | 49 | float | 1 | | 0-1 normalized | 60 | Hz | 0 | 1 |
| VDS_Tire_Weight_On_Wheels | Tire weight on wheels | 10 | 50 | float | lbf | | lbf; Pound force | 60 | Hz | | |
| VDS_Veh_Eng_RPM | Engine revolutions per minute | 1 | 0 | float | rpm | | rpm; revolutions per minute | 60 | Hz | | |
| VDS_Veh_Eng_Torque | Engine torque | 1 | 0 | float | ft-lb | | ft-lb; foot-pounds | 60 | Hz | | |
| VDS_Veh_Heading | Vehicle heading | 1 | 0 | float | Deg | | North is 0 deg. Positive CCW as viewed from above. | 60 | Hz | | |
| VDS_Veh_Speed | Vehicle speed | 1 | 0 | float | MPH | | MPH; Miles per hour | 60 | Hz | | |
| VDS_Veh_Trans_RPM | Transmission revolutions per minute | 1 | 0 | float | rpm | | rpm; revolutions per minute | 60 | Hz | | |
| VDS_VibrForce | Commanded Vibration Forces | 4 | 51 | float | Gs | | Gs; Force expressed in g's (not supported in minisim) | 60 | Hz | | |
| VDS_Wheel_Center_Heading | Heading angle of wheel | 10 | 52 | float | Deg | | | 60 | Hz | | |
| VDS_Wheel_Center_Velocity | Translational velocity of wheel center | 30 | 53 | float | ft/sec | | | 60 | Hz | | |
| VDS_Wheel_Spin | Wheel spin | 10 | 54 | float | rad/sec | | | 60 | Hz | | |
| VDS_Wheel_Spin_Angle | Rotational position of tire, in radians | 10 | 55 | float | rad | | | 60 | Hz | | |
| VDS_Wheel_Steer_Angle | Road wheel angle | 10 | 56 | float | rad | | | 60 | Hz | | |
| VDS_Right_Warning_Light | Electronic Stability Control (ESC) on icon | 1 | 0 | integer | 1 | | 1 - off; 2 - on (not supported on minisim) | 60 | Hz | | |
| VDS_Speedometer_Backdrive | Speedometer backdrive | 1 | 0 | integer | MPH | | | 60 | Hz | | CSSDC |
| VDS_DRV_Frame_No | Drive File Frame No. | 1 | 0 | integer | | | recorded data used in a driver input playback file - special application | 60 | Hz | | |
| VDS_DRV_Joystick_Type | Drive File Joystick Type | 1 | 0 | short | | | recorded data used in a driver input playback file - special application | 60 | Hz | | |
| VDS_DRV_Steering_Wheel_Angle | Drive File Steering Wheel Angle | 1 | 0 | float | | | recorded data used in a driver input playback file - special application | 60 | Hz | | |
| VDS_DRV_Steering_Wheel_Angle_Rate | Drive File Steering Wheel Angle Rate | 1 | 0 | float | | | recorded data used in a driver input playback file - special application | 60 | Hz | | |
| VDS_DRV_Transmission_Gear | Drive File Transmission Gear | 1 | 0 | short | | | recorded data used in a driver input playback file - special application | 1 | | | CSSDC |
| VDS_DRV_Auto_Transmission_Mode | Drive File Auto Transmission Mode | 1 | 0 | short | | | recorded data used in a driver input playback file - special application | 1 | | | CSSDC |
| VDS_DRV_Accelerator_Pedal_Position | Drive File Accelerator Pedal Position | 1 | 0 | float | | | recorded data used in a driver input playback file - special application | 60 | Hz | | |
| VDS_DRV_Brake_Pedal_Force | Drive File Brake Pedal Force | 1 | 0 | float | | | recorded data used in a driver input playback file - special application | 60 | Hz | | |
| VDS_DRV_Joystick_Buttons | Drive File Joystick Buttons | 1 | 0 | integer | | | recorded data used in a driver input playback file - special application | 1 | | | CSSDC |
| SOP_DriveMode | | 1 | 0 | short | | | 0 = regular drive, 1 = recording, 2 = playback | 1 | | | CSSDC |
| SOP_PlaybackFileName | Playback File Name | 256 | 57 | chars | | | 256 chars, name of the playback file. The file is in binary format and its name has an extension of ".drv". | 1 | | | CSSDC |
| SCC_Visual_Database | | 256 | 58 | chars | | | name of BU file in use | | | | |

| Cell Name | Short Description | NumberElements | ID Array | Type | Units Cell | Long Description | CollectionFreq | CollectionFreqUnits | Single_Val_Min | Single_Val_Max |
|---|--|----------------|----------|---------|------------|------------------|----------------|---------------------|----------------|----------------|
| NOTE: AutoDrive is not part of the standard miniSim installation, it is a licensed option | | | | | | | 60 | Hz | | |
| CFS_AutoDriver_Command | Command hotkey from outside dynamics | 1 | 0 | short | | | | | | |
| CFS_AutoDriver_SetSpeed | Override set from outside dynamics | 1 | 0 | float | mph | | | | | |
| CFS_Autonomous_Control_Mode_Override | Auto-driver override mask bit 0: steering bit 1: gas bit 2: brake | 1 | 0 | integer | | | | | | |
| SCC_External_Driver | Define external driver 0: none 1: external driver like keyboard or commands through ISAT Expression Triggers. 2: external driver like sub-system(software) which controls AD | 1 | 0 | integer | | | | | | |
| SCC_AutoDriver_Mode | Mode of autodrivr 0: off 1: on | 1 | 0 | integer | | | | | | |
| SCC_AutoDriver_Command | Command hotkey from scenario w Drive at the speed limit p Brake to a stop j Adjust speed down by 5 mph k Adjust speed up by 5 mph a Change lanes to the left if possible d Change lanes to the right if possible W Set the next turn direction to straight A Set next turn direction to left D Set next turn direction to right p Pullover to the side of the road 1 Style coefficient = 0.0 2 Style coefficient = 0.2 3 Style coefficient = 0.4 4 Style coefficient = 0.6 5 Style coefficient = 0.8 6 Style coefficient = 1.0 | 1 | 0 | short | | | | | 0 | 1 |
| SCC_AutoDriver_SetSpeed | Any positive real number | 1 | 0 | float | mph | | | | | |
| SCC_AutoDriver_ISAT_HI_Interface | | 1 | 0 | integer | | | | | | |
| SCC_AutoDriver_ONOFF_ISAT | | 1 | 0 | integer | | | | | | |
| SCC_AutoDriver_GasBrake_Status | | 1 | 0 | integer | | | | | | |
| VDS_AutoDriver_Command | Effective command hotkey output from dynamics | 1 | 0 | char | | | | | 0 | 180 |
| VDS_Steering_Wheel_Angle | Effective steering wheel angle output from dynamics | 1 | 0 | float | degrees | | | | 0 | 100 |
| VDS_Accelerator_Pedal_Position | Effective throttle pedal output from dynamics range 0 - 1 | 1 | 0 | float | lbf | | | | | |
| VDS_Brake_Pedal_Force | Effective brake force output from dynamics | 1 | 0 | float | | | | | | |

Lead expression

$$(X_{\text{lead}} - X) / \text{vel}$$

Distance to lead is also known as headway

TTC expression

Time to collision equation is something like:

$$(X_{\text{lead}} - X) / (V_{\text{lead}} - \text{vel}) \quad (\text{I might have the sign wrong})$$

In words, it is range over range rate.

| Date | Initials | Description | Source |
|------------|----------|--|---|
| 11/20/2023 | SA | Add borders for pdf export | |
| 9/29/2023 | SA | Add Notes page | Info from Chris S. |
| 9/18/2023 | SA | Add AutoDrive cells from AutoDrive documentation | N:\MiniSim_FAQ_Support\AutoDrive_Docs\manAD-EXTERNAL.pdf |