

Jacobsen Declaration Exhibit E

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<?xml version="1.0"?>
<!DOCTYPE decoder-config SYSTEM "decoder-config.dtd">
<!-- Copyright (C) JMRI 2005 All rights reserved -->
<!-- See the COPYING file for more information on licensing and appropriate use -->
<!-- $Id: QSI_Electric.xml,v 1.1 2005/06/17 03:03:33 innkeeper Exp $ -->
<decoder-config>
  <version author="Howard G. Penny" version="1" lastUpdated="20050616"/>

<!-- version 1 - modified for QSI CV.PI.SI format - Howard -->

<decoder>
  <family name="QSI Electric" mfg="QSIndustries" lowVersionID="3" highVersionID="6">
    <model model="BLI GG-1" lowVersionID="3" highVersionID="6" productID="200"/>
  </family>

  <programming direct="yes" paged="yes"
    register="yes" ops="yes"></programming>

  <variables>
    <variable label="Primary Address" CV="1" comment="Short address"
      item="Short Address" default="03">
      <shortAddressVal/></variable>
    <variable label="Vstart" CV="2" default="32"
      tooltip="QSI uses this only if speed tables are used"
      comment="A value of 255 corresponds to 100%">
      <decVal/></variable>
    <variable label="Acceleration Rate" CV="3" item="Accel" >
      <decVal max="31"/></variable>
    <variable label="Deceleration Rate" CV="4" item="Decel">
      <decVal max="31"/></variable>
    <variable label="Max Volts" CV="5" item="Vhigh" default="1"
      tooltip="range 2-255, 1 = not used">
      <decVal min="1" max="255"/></variable>

    <variable label="Manufacturer Version No" CV="7" readOnly="yes"
      item="Decoder Version"><decVal/></variable>
    <variable label="Manufacturer ID" CV="8" readOnly="yes"
      item="Manufacturer" default="113"><decVal/></variable>

    <variable label="Packet Time-out Value" CV="11">
      <decVal/></variable>

    <variable label="Extended Address" CV="17" item="Long Address" >
      <longAddressVal/></variable>

    <variable label="Consist Address" CV="19" mask="XVVVVVVV" item="Consist Address">
      <decVal/></variable>

    <variable label="Consist Direction" CV="19" mask="VXXXXXXXX">
      <enumVal>
        <enumChoice choice="Normal"></enumChoice>
        <enumChoice choice="Reversed"></enumChoice>
      </enumVal></variable>

    <variable label="Consist Address Active For F1" CV="21" mask="XXXXXXXXV"
      tooltip="F1 = Bell; Recommendation: Lead = ON, Mid = OFF, End = OFF">
      <enumVal>
        <enumChoice choice="Locomotive Address Only"/>
        <enumChoice choice="Respond to Consist Address"/>
      </enumVal></variable>
    <variable label="Consist Address Active For F2" CV="21" mask="XXXXXXXXV"
      tooltip="F2 = Horn / Whistle; Recommendation: Lead = ON, Mid = OFF, End = OFF">
      <enumVal>
        <enumChoice choice="Locomotive Address Only"/>
        <enumChoice choice="Respond to Consist Address"/>
      </enumVal></variable>
    <variable label="Consist Address Active For F3" CV="21" mask="XXXXXXXXV"
      tooltip="F3 = Coupler Clash (default); Recommendation: Lead = OFF, Mid = OFF, End = ON">
      <enumVal>
        <enumChoice choice="Locomotive Address Only"/>
        <enumChoice choice="Respond to Consist Address"/>
      </enumVal></variable>
    <variable label="Consist Address Active For F4" CV="21" mask="XXXXXXXX"
      tooltip="F4 = Blower Hiss / Fan (default); Recommendation: Lead = ON, Mid = ON, End = ON">
      <enumVal>
        <enumChoice choice="Locomotive Address Only"/>
        <enumChoice choice="Respond to Consist Address"/>
      </enumVal></variable>
    <variable label="Consist Address Active For F5" CV="21" mask="XXVXXXXX"
      tooltip="F5 = Dynamic Brakes (default); Recommendation: Lead = ON, Mid = ON, End = ON">
      <enumVal>
        <enumChoice choice="Locomotive Address Only"/>
        <enumChoice choice="Respond to Consist Address"/>
      </enumVal></variable>
    <variable label="Consist Address Active For F6" CV="21" mask="XXVXXXXX"
      tooltip="F6 = Doppler (Startup) (default); Recommendation: Lead = ON, Mid = ON, End = ON">

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<enumVal>
  <enumChoice choice="Locomotive Address Only"/>
  <enumChoice choice="Respond to Consist Address"/>
</enumVal></variable>
<variable label="Consist Address Active For F7" CV="21" mask="VXXXXXXX"
  tooltip="F7 = Brake Squeal and Air Brakes (default); Recommendation: Lead = ON, Mid = ON, End = ON">
  <enumVal>
    <enumChoice choice="Locomotive Address Only"/>
    <enumChoice choice="Respond to Consist Address"/>
  </enumVal></variable>
<variable label="Consist Address Active For F8" CV="21" mask="VXXXXXXX"
  tooltip="F8 = Audio Mute (default); Recommendation: Lead = ON, Mid = ON, End = ON">
  <enumVal>
    <enumChoice choice="Locomotive Address Only"/>
    <enumChoice choice="Respond to Consist Address"/>
  </enumVal></variable>

<variable label="Consist Address Active For FL in Forward" CV="22" mask="XXXXXXXV"
  tooltip="FL(f) = Directional Lighting; Recommendation: Lead = ON, Mid = OFF, End = OFF">
  <enumVal>
    <enumChoice choice="Locomotive Address Only"/>
    <enumChoice choice="Respond to Consist Address"/>
  </enumVal></variable>
<variable label="Consist Address Active For FL in Reverse" CV="22" mask="XXXXXXXV"
  tooltip="FL(r) = Directional Lighting; Recommendation: Lead = ON, Mid = OFF, End = OFF">
  <enumVal>
    <enumChoice choice="Locomotive Address Only"/>
    <enumChoice choice="Respond to Consist Address"/>
  </enumVal></variable>
<variable label="Consist Address Active For F9" CV="22" mask="XXXXXXXV"
  tooltip="F9 = Cruise Ctrl (Shut Down) (default); Recommendation: Lead = ON, Mid = ON, End = ON">
  <enumVal>
    <enumChoice choice="Locomotive Address Only"/>
    <enumChoice choice="Respond to Consist Address"/>
  </enumVal></variable>
<variable label="Consist Address Active For F10" CV="22" mask="XXXXXXXV"
  tooltip="F10 = SMPH Report (Status Report) (default); Recommendation: Lead = ON, Mid = OFF, End = OFF">
  <enumVal>
    <enumChoice choice="Locomotive Address Only"/>
    <enumChoice choice="Respond to Consist Address"/>
  </enumVal></variable>
<variable label="Consist Address Active For F11" CV="22" mask="XXXXXXXV"
  tooltip="F11 = Number Board Lights (default); Recommendation: Lead = ON, Mid = ON, End = ON">
  <enumVal>
    <enumChoice choice="Locomotive Address Only"/>
    <enumChoice choice="Respond to Consist Address"/>
  </enumVal></variable>
<variable label="Consist Address Active For F12" CV="22" mask="XXVXXXXX"
  tooltip="F12 = Cab Lights (default); Recommendation: Lead = OFF, Mid = OFF, End = OFF">
  <enumVal>
    <enumChoice choice="Locomotive Address Only"/>
    <enumChoice choice="Respond to Consist Address"/>
  </enumVal></variable>

<variable label="Consist Acceleration Adjustment" CV="23" mask="XVVVVVVV">
  <decVal max="127"/>
</variable>
<variable label="Consist Acceleration Adjustment Sign" CV="23" mask="VXXXXXXX">
  <enumVal>
    <enumChoice choice="Adjustment Added"/>
    <enumChoice choice="Adjustment Subtracted"/>
  </enumVal></variable>
<variable label="Consist Deceleration Adjustment" CV="24" mask="XVVVVVVV">
  <decVal max="127"/>
</variable>
<variable label="Consist Deceleration Adjustment Sign" CV="24" mask="VXXXXXXX">
  <enumVal>
    <enumChoice choice="Adjustment Added"/>
    <enumChoice choice="Adjustment Subtracted"/>
  </enumVal></variable>

<variable label="Quantum Speed Table" CV="25" item="Speed Table Selection"
  default="2" comment="value is applied">
  <enumVal>
    <enumChoice choice="User Defined Speed Table" value="1"/>
    <enumChoice choice="Linear Curve"/>
    <enumChoice choice="Fast start 1 (close to linear)"/>
    <enumChoice choice="Fast start 2"/>
    <enumChoice choice="Fast start 3"/>
    <enumChoice choice="Fast start 4"/>
    <enumChoice choice="Fast start 5 (greatest curvature)"/>
    <enumChoice choice="Slow start 1 (close to linear)" value="67"/>
    <enumChoice choice="Slow start 2"/>
    <enumChoice choice="Slow start 3"/>
    <enumChoice choice="Slow start 4"/>
    <enumChoice choice="Slow start 5 (greatest curavture)"/>
  </enumVal>

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</enumVal>
</variable>

<variable label="Locomotive Direction" CV="29" mask="XXXXXXXXV">
  <enumVal>
    <enumChoice choice="normal"/>
    <enumChoice choice="reversed"/>
  </enumVal></variable>
<variable label="FL Location" CV="29" mask="XXXXXXXXV"
  item="Speed Step Mode" default="1">
  <enumVal>
    <enumChoice choice="14 speed step format"/>
    <enumChoice choice="28/128 speed step format"/>
  </enumVal></variable>
<variable label="Power Source Conversion" CV="29" mask="XXXXXXXXV"
  item="Analog (DC) Operation" >
  <enumVal>
    <enumChoice choice="NMRA Digital only"/>
    <enumChoice choice="DC conversion enabled"/>
  </enumVal></variable>
<!-- This bit is not used by QSI
<variable label="Advanced Decoder Acknowledgement" CV="29" mask="XXXXXXXXV"
  item="Advanced Ack">
  <enumVal>
    <enumChoice choice="disabled"/>
    <enumChoice choice="enabled"/>
  </enumVal></variable>
-->

<variable label="Speed Table Definition" CV="29" mask="XXXXXXXXV">
  <enumVal>
    <enumChoice choice="Use Straight-Line Response"/>
    <enumChoice choice="Use QSI table or User table in CVs 67 through 94"/>
  </enumVal></variable>
<variable label="Address Format" CV="29" mask="XXVXXXXX">
  <enumVal>
    <enumChoice choice="One byte (short) address"/>
    <enumChoice choice="Two byte (extended) address"/>
  </enumVal></variable>

<variable label="FL(f) controls output 1" CV="33" mask="XXXXXXXXV" minOut="1" default="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(f) controls output 2" CV="33" mask="XXXXXXXXV" minOut="2" default="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(f) controls output 3" CV="33" mask="XXXXXXXXV" minOut="3"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(f) controls output 4" CV="33" mask="XXXXXXXXV" minOut="4"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(f) controls output 5" CV="33" mask="XXXXXXXXV" minOut="5"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(f) controls output 6" CV="33" mask="XXVXXXXX" minOut="6"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(f) controls output 7" CV="33" mask="XVXXXXXX" minOut="7"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(f) controls output 8" CV="33" mask="VXXXXXXX" minOut="8"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>

<variable label="FL(r) controls output 1" CV="34" mask="XXXXXXXXV" minOut="1" default="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(r) controls output 2" CV="34" mask="XXXXXXXXV" minOut="2" default="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(r) controls output 3" CV="34" mask="XXXXXXXXV" minOut="3"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(r) controls output 4" CV="34" mask="XXXXXXXXV" minOut="4"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(r) controls output 5" CV="34" mask="XXVXXXXX" minOut="5"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(r) controls output 6" CV="34" mask="XVXXXXXX" minOut="6"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(r) controls output 7" CV="34" mask="VXXXXXXX" minOut="7"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="FL(r) controls output 8" CV="34" mask="VXXXXXXX" minOut="8"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>

<variable label="F1 controls output 1" CV="35" mask="XXXXXXXXV" minOut="1" minFn="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F1 controls output 2" CV="35" mask="XXXXXXXXV" minOut="2" minFn="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F1 controls output 3" CV="35" mask="XXXXXXXXV" minOut="3" minFn="1" default="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F1 controls output 4" CV="35" mask="XXXXVXXX" minOut="4" minFn="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F1 controls output 5" CV="35" mask="XXVXXXXX" minOut="5" minFn="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F1 controls output 6" CV="35" mask="XVXXXXXX" minOut="6" minFn="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F1 controls output 7" CV="35" mask="VXXXXXXX" minOut="7" minFn="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>

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<enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>

<variable label="F12 controls output 7" CV="46" mask="XXXXXXXXV" minOut="7" minFn="12"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F12 controls output 8" CV="46" mask="XXXXXXXXVX" minOut="8" minFn="12"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F12 controls output 9" CV="46" mask="XXXXXXXXXX" minOut="9" minFn="12"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F12 controls output 10" CV="46" mask="XXXXXXXXXX" minOut="10" minFn="12"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F12 controls output 11" CV="46" mask="XXXXXXXXXX" minOut="11" minFn="12"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F12 controls output 12" CV="46" mask="XXXXXXXXXX" minOut="12" minFn="12"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F12 controls output 13" CV="46" mask="XXXXXXXXXX" minOut="13" minFn="12"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>
<variable label="F12 controls output 14" CV="46" mask="VXXXXXXXX" minOut="14" minFn="12" default="1"> <enumVal>
  <enumChoice choice="No"/> <enumChoice choice="Yes"/> </enumVal> </variable>

<variable label="Programming Verbal Acknowledgement" CV="62"
  comment="CV62" item="CV62 QSI Control" default="1">
  <enumVal>
    <enumChoice choice="Disable"/>
    <enumChoice choice="Enable" />
  </enumVal>
</variable>

<!-- need to make this work for indexed CVs as well - TBD -->
<variable label="Verbal CV Inquiry" CV="64" opsOnly="yes" writeOnly="yes"
  comment="CV64" item="Verbal CV Inquiry">
  <decVal/>
</variable>

<variable label="Forward Trim" CV="66" default="128">
  <decVal/>
</variable>

<variable label="Speed Table" CV="67">
  <speedTableVal/>
</variable>

<variable label="Reverse Trim" CV="95" default="128">
  <decVal/>
</variable>

<constant label="PICV" default="49" comment="CV used for Primary Index"/>
<constant label="SICV" default="50" comment="CV used for Secondary Index"/>

<!-- QSI CV.PI.SI formatted items -->

<!-- Sound control -->
<ivariable label="System Volume" CVname="51.0" CV="51" PI="0" default="127" comment="QSI" item="CV51.0">
  <indexedVal max="127"/>
</ivariable>
<ivariable label="Mute Volume" CVname="51.1" CV="51" PI="1" default="0" comment="QSI" item="CV51.1">
  <indexedVal max="63"/>
</ivariable>

<ivariable label="Horn Triggered Doppler" CVname="51.2" CV="51" PI="2" default="1"
  comment="QSI" item="CV51.2bit0" mask="XXXXXXXXV">
  <ienumVal> <ienumChoice choice="No"/> <ienumChoice choice="Yes"/> </ienumVal>
</ivariable>

<!-- Sound volumes -->
<ivariable label="Horn" CVname="52.0" CV="52" PI="0" default="11" comment="QSI" item="CV52.0">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Bell" CVname="52.8" CV="52" PI="8" default="11" comment="QSI" item="CV52.8">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Motor" CVname="52.10" CV="52" PI="10" default="11" comment="QSI" item="CV52.10">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Air Pump" CVname="52.16" CV="52" PI="16" default="11" comment="QSI" item="CV52.16">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Cooling Fans" CVname="52.19" CV="52" PI="19" default="8" comment="QSI" item="CV52.19">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Long Air Let-off" CVname="52.21" CV="52" PI="21" default="11" comment="QSI" item="CV52.21">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Short Air Let-off" CVname="52.22" CV="52" PI="22" default="11" comment="QSI" item="CV52.22">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Squealing Brakes" CVname="52.24" CV="52" PI="24" default="11" comment="QSI" item="CV52.24">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Coupler Sounds" CVname="52.34" CV="52" PI="34" default="11" comment="QSI" item="CV52.34">
  <indexedVal max="15"/> </ivariable>
<ivariable label="Air Brakes" CVname="52.37" CV="52" PI="37" default="11" comment="QSI" item="CV52.37">
  <indexedVal max="15"/> </ivariable>

<ivariable label="Output 1 - Forward/Reverse Only" CVname="53.1.0" CV="53" PI="1" SI="0"

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default="96" comment="QSI" item="CV53.1.0" infoOnly="yes">
  <ienumVal>
    <ienumChoice choice="Directional Headlight" value="96"/>
  </ienumVal>
</ivariable>
<ivariable label=" - Neutral Only" CVname="53.1.1" CV="53" PI="1" SI="1"
default="96" comment="QSI" item="CV53.1.1" infoOnly="yes">
  <ienumVal>
    <ienumChoice choice="Directional Headlight" value="96"/>
  </ienumVal>
</ivariable>

<ivariable label="Output 2 - Forward/Reverse Only" CVname="53.2.0" CV="53" PI="2" SI="0"
default="97" comment="QSI" item="CV53.2.0" infoOnly="yes">
  <ienumVal>
    <ienumChoice choice="Directional Reverse Light" value="97"/>
  </ienumVal>
</ivariable>
<ivariable label=" - Neutral Only" CVname="53.2.1" CV="53" PI="2" SI="1"
default="97" comment="QSI" item="CV53.2.1" infoOnly="yes">
  <ienumVal>
    <ienumChoice choice="Directional Reverse Light" value="97"/>
  </ienumVal>
</ivariable>

<ivariable label="Output 3 - Forward/Reverse Only" CVname="53.3.0" CV="53" PI="3" SI="0"
default="3" comment="QSI" item="CV53.3.0" infoOnly="yes">
  <ienumVal>
    <ienumChoice choice="Bell" value="3"/>
  </ienumVal>
</ivariable>
<ivariable label=" - Neutral Only" CVname="53.3.1" CV="53" PI="3" SI="1"
default="3" comment="QSI" item="CV53.3.1" infoOnly="yes">
  <ienumVal>
    <ienumChoice choice="Bell" value="3"/>
  </ienumVal>
</ivariable>

<ivariable label="Output 4 - Forward/Reverse Only" CVname="53.4.0" CV="53" PI="4" SI="0"
default="1" comment="QSI" item="CV53.4.0" infoOnly="yes">
  <ienumVal>
    <ienumChoice choice="Whistle/Horn" value="1"/>
    <ienumChoice choice="_____ place holder not used _____" value="1"/>
  </ienumVal>
</ivariable>
<ivariable label=" - Neutral Only" CVname="53.4.1" CV="53" PI="4" SI="1"
default="1" comment="QSI" item="CV53.4.1" infoOnly="yes">
  <ienumVal>
    <ienumChoice choice="Whistle/Horn" value="1"/>
  </ienumVal>
</ivariable>

<ivariable label="Outout 5 - Forward/Reverse Only" CVname="53.5.0" CV="53" PI="5" SI="0"
default="211" comment="QSI" item="CV53.5.0">
  <ienumVal>
    <ienumChoice choice="Dynamic Brakes" value="5"/>
    <ienumChoice choice="Long Air Let-off" value="9"/>
    <ienumChoice choice="Short Air Let-off"/>
    <ienumChoice choice="Mute" value="64"/>
    <ienumChoice choice="Doppler Shift"/>
    <ienumChoice choice="Headlight" value="98"/>
    <ienumChoice choice="Dim Headlight"/>
    <ienumChoice choice="Reverse Light"/>
    <ienumChoice choice="Automatic Cab Lights"/>
    <ienumChoice choice="Directional Mars Light"/>
    <ienumChoice choice="Mars Light"/>
    <ienumChoice choice="Strobe Mars Light"/>
    <ienumChoice choice="Number Board Lights"/>
    <ienumChoice choice="Directional Headlight + Directional Mars Light" value="107"/>
    <ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
    <ienumChoice choice="Directional Ditch Lights"/>
    <ienumChoice choice="Ditch Lights"/>
    <ienumChoice choice="Strobe Ditch Lights"/>
    <ienumChoice choice="Cruise Control" value="177"/>
    <ienumChoice choice="Scale mph Report and Status Report"/>
    <ienumChoice choice="Coupler Effect" value="211"/>
    <ienumChoice choice="Squealing Brakes" value="215"/>
    <ienumChoice choice="Squealing Brakes + Air Brakes"/>
  </ienumVal>
</ivariable>
<ivariable label=" - Neutral Only" CVname="53.5.1" CV="53" PI="5" SI="1"
default="211" comment="QSI" item="CV53.5.1">
  <ienumVal>
    <ienumChoice choice="Dynamic Brakes" value="5"/>
    <ienumChoice choice="Long Air Let-off" value="9"/>
    <ienumChoice choice="Short Air Let-off"/>
  </ienumVal>

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<ienumChoice choice="Mute" value="64"/>
<ienumChoice choice="Headlight" value="98"/>
<ienumChoice choice="Dim Headlight"/>
<ienumChoice choice="Reverse Light"/>
<ienumChoice choice="Automatic Cab Lights"/>
<ienumChoice choice="Directional Mars Light"/>
<ienumChoice choice="Mars Light"/>
<ienumChoice choice="Strobe Mars Light"/>
<ienumChoice choice="Number Board Lights"/>
<ienumChoice choice="Directional Headlight + Directional Mars Light" value="107"/>
<ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
<ienumChoice choice="Directional Ditch Lights"/>
<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Start Up" value="144"/>
<ienumChoice choice="Shut Down"/>
<ienumChoice choice="Scale mph Report and Status Report" value="178"/>
<ienumChoice choice="Coupler Effect" value="211"/>
<ienumChoice choice="Pumps" value="217"/>
</ienumVal>
</ivariable>

<ivariable label="Outout 6 - Forward/Reverse Only" CVname="53.6.0" CV="53" PI="6" SI="0"
default="8" comment="QSI" item="CV53.6.0">
<ienumVal>
<ienumChoice choice="Dynamic Brakes" value="5"/>
<ienumChoice choice="Long Air Let-off" value="9"/>
<ienumChoice choice="Short Air Let-off"/>
<ienumChoice choice="Mute" value="64"/>
<ienumChoice choice="Doppler Shift"/>
<ienumChoice choice="Headlight" value="98"/>
<ienumChoice choice="Dim Headlight"/>
<ienumChoice choice="Reverse Light"/>
<ienumChoice choice="Automatic Cab Lights"/>
<ienumChoice choice="Directional Mars Light"/>
<ienumChoice choice="Mars Light"/>
<ienumChoice choice="Strobe Mars Light"/>
<ienumChoice choice="Number Board Lights"/>
<ienumChoice choice="Directional Headlight + Directional Mars Light" value="107"/>
<ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
<ienumChoice choice="Directional Ditch Lights"/>
<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Cruise Control" value="177"/>
<ienumChoice choice="Scale mph Report and Status Report"/>
<ienumChoice choice="Coupler Effect" value="211"/>
<ienumChoice choice="Squealing Brakes" value="215"/>
<ienumChoice choice="Squealing Brakes + Air Brakes"/>
</ienumVal>
</ivariable>

<ivariable label=" - Neutral Only" CVname="53.6.1" CV="53" PI="6" SI="1"
default="8" comment="QSI" item="CV53.6.1">
<ienumVal>
<ienumChoice choice="Dynamic Brakes" value="5"/>
<ienumChoice choice="Long Air Let-off" value="9"/>
<ienumChoice choice="Short Air Let-off"/>
<ienumChoice choice="Mute" value="64"/>
<ienumChoice choice="Headlight" value="98"/>
<ienumChoice choice="Dim Headlight"/>
<ienumChoice choice="Reverse Light"/>
<ienumChoice choice="Automatic Cab Lights"/>
<ienumChoice choice="Directional Mars Light"/>
<ienumChoice choice="Mars Light"/>
<ienumChoice choice="Strobe Mars Light"/>
<ienumChoice choice="Number Board Lights"/>
<ienumChoice choice="Directional Headlight + Directional Mars Light" value="107"/>
<ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
<ienumChoice choice="Directional Ditch Lights"/>
<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Start Up" value="144"/>
<ienumChoice choice="Shut Down"/>
<ienumChoice choice="Scale mph Report and Status Report" value="178"/>
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<ienumChoice choice="Automatic Cab Lights"/>
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<ienumChoice choice="Strobe Mars Light"/>
<ienumChoice choice="Number Board Lights"/>
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<ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
<ienumChoice choice="Directional Ditch Lights"/>
<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
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<ienumChoice choice="Reverse Light"/>
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<ienumChoice choice="Mute" value="64"/>
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<ienumChoice choice="Headlight" value="98"/>
<ienumChoice choice="Dim Headlight"/>
<ienumChoice choice="Reverse Light"/>
<ienumChoice choice="Automatic Cab Lights"/>
<ienumChoice choice="Directional Mars Light"/>
<ienumChoice choice="Mars Light"/>
<ienumChoice choice="Strobe Mars Light"/>
<ienumChoice choice="Number Board Lights"/>
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<ienumChoice choice="Reverse Light"/>

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<ienumChoice choice="Automatic Cab Lights"/>
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<ienumChoice choice="Mars Light"/>
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<ienumChoice choice="Coupler Effect" value="211"/>
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<ienumChoice choice="Squealing Brakes" value="215"/>
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</ivariable>

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<ienumChoice choice="Reverse Light"/>
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<ienumChoice choice="Mars Light"/>
<ienumChoice choice="Strobe Mars Light"/>
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<ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
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<ivariable label="Outout 10 - Forward/Reverse Only" CVname="53.10.0" CV="53" PI="10" SI="0"
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<ienumChoice choice="Mute" value="64"/>
<ienumChoice choice="Doppler Shift"/>
<ienumChoice choice="Headlight" value="98"/>
<ienumChoice choice="Dim Headlight"/>
<ienumChoice choice="Reverse Light"/>
<ienumChoice choice="Automatic Cab Lights"/>

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<ienumChoice choice="Directional Mars Light"/>
<ienumChoice choice="Mars Light"/>
<ienumChoice choice="Strobe Mars Light"/>
<ienumChoice choice="Number Board Lights"/>
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<ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
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<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Cruise Control" value="177"/>
<ienumChoice choice="Scale mph Report and Status Report"/>
<ienumChoice choice="Coupler Effect" value="211"/>
<ienumChoice choice="Squealing Brakes" value="215"/>
<ienumChoice choice="Squealing Brakes + Air Brakes"/>
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</ivariable>
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<ienumChoice choice="Headlight" value="98"/>
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<ienumChoice choice="Number Board Lights"/>
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<ienumChoice choice="Shut Down"/>
<ienumChoice choice="Scale mph Report and Status Report" value="178"/>
<ienumChoice choice="Coupler Effect" value="211"/>
<ienumChoice choice="Pumps" value="217"/>
</ienumVal>
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<ienumChoice choice="Short Air Let-off"/>
<ienumChoice choice="Mute" value="64"/>
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<ienumChoice choice="Headlight" value="98"/>
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<ienumChoice choice="Reverse Light"/>
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<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Cruise Control" value="177"/>
<ienumChoice choice="Scale mph Report and Status Report"/>
<ienumChoice choice="Coupler Effect" value="211"/>
<ienumChoice choice="Squealing Brakes" value="215"/>
<ienumChoice choice="Squealing Brakes + Air Brakes"/>
</ienumVal>
</ivariable>
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<ienumVal>
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<ienumChoice choice="Mute" value="64"/>
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<ienumChoice choice="Number Board Lights"/>
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<ienumChoice choice="Directional Ditch Lights"/>
<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Start Up" value="144"/>
<ienumChoice choice="Shut Down"/>
<ienumChoice choice="Scale mph Report and Status Report" value="178"/>
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<ienumChoice choice="Pumps" value="217"/>
</ienumVal>
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<ivariable label="Outout 12 - Forward/Reverse Only" CVname="53.12.0" CV="53" PI="12" SI="0"
default="178" comment="QSI" item="CV53.12.0">
<ienumVal>
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<ienumChoice choice="Long Air Let-off" value="9"/>
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<ienumChoice choice="Mute" value="64"/>
<ienumChoice choice="Doppler Shift"/>
<ienumChoice choice="Headlight" value="98"/>
<ienumChoice choice="Dim Headlight"/>
<ienumChoice choice="Reverse Light"/>
<ienumChoice choice="Automatic Cab Lights"/>
<ienumChoice choice="Directional Mars Light"/>
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<ienumChoice choice="Number Board Lights"/>
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<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Cruise Control" value="177"/>
<ienumChoice choice="Scale mph Report and Status Report"/>
<ienumChoice choice="Coupler Effect" value="211"/>
<ienumChoice choice="Squealing Brakes" value="215"/>
<ienumChoice choice="Squealing Brakes + Air Brakes"/>
</ienumVal>
</ivariable>

<ivariable label=" - Neutral Only" CVname="53.12.1" CV="53" PI="12" SI="1"
default="178" comment="QSI" item="CV53.12.1">
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<ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
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<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Start Up" value="144"/>
<ienumChoice choice="Shut Down"/>
<ienumChoice choice="Scale mph Report and Status Report" value="178"/>
<ienumChoice choice="Coupler Effect" value="211"/>
<ienumChoice choice="Pumps" value="217"/>
</ienumVal>
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<ivariable label="Outout 13 - Forward/Reverse Only" CVname="53.13.0" CV="53" PI="13" SI="0"
default="105" comment="QSI" item="CV53.13.0">
<ienumVal>
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<ienumChoice choice="Long Air Let-off" value="9"/>
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<ienumChoice choice="Mute" value="64"/>
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<ienumChoice choice="Reverse Light"/>
<ienumChoice choice="Automatic Cab Lights"/>
<ienumChoice choice="Directional Mars Light"/>
<ienumChoice choice="Mars Light"/>
<ienumChoice choice="Strobe Mars Light"/>
<ienumChoice choice="Number Board Lights"/>

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<ienumChoice choice="Directional Headlight + Directional Mars Light" value="107"/>
<ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
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<ienumChoice choice="Ditch Lights"/>
<ienumChoice choice="Strobe Ditch Lights"/>
<ienumChoice choice="Cruise Control" value="177"/>
<ienumChoice choice="Scale mph Report and Status Report"/>
<ienumChoice choice="Coupler Effect" value="211"/>
<ienumChoice choice="Squealing Brakes" value="215"/>
<ienumChoice choice="Squealing Brakes + Air Brakes"/>
</ienumVal>
</ivariable>
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    <ienumChoice choice="Mute" value="64"/>
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    <ienumChoice choice="Directional Mars Light"/>
    <ienumChoice choice="Mars Light"/>
    <ienumChoice choice="Strobe Mars Light"/>
    <ienumChoice choice="Number Board Lights"/>
    <ienumChoice choice="Directional Headlight + Directional Mars Light" value="107"/>
    <ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
    <ienumChoice choice="Directional Ditch Lights"/>
    <ienumChoice choice="Ditch Lights"/>
    <ienumChoice choice="Strobe Ditch Lights"/>
    <ienumChoice choice="Start Up" value="144"/>
    <ienumChoice choice="Shut Down"/>
    <ienumChoice choice="Scale mph Report and Status Report" value="178"/>
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    <ienumChoice choice="Pumps" value="217"/>
  </ienumVal>
</ivariable>
<ivariable label="Outout 14 - Forward/Reverse Only" CVname="53.14.0" CV="53" PI="14" SI="0"
default="101" comment="QSI" item="CV53.14.0">
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    <ienumChoice choice="Long Air Let-off" value="9"/>
    <ienumChoice choice="Short Air Let-off"/>
    <ienumChoice choice="Mute" value="64"/>
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    <ienumChoice choice="Headlight" value="98"/>
    <ienumChoice choice="Dim Headlight"/>
    <ienumChoice choice="Reverse Light"/>
    <ienumChoice choice="Automatic Cab Lights"/>
    <ienumChoice choice="Directional Mars Light"/>
    <ienumChoice choice="Mars Light"/>
    <ienumChoice choice="Strobe Mars Light"/>
    <ienumChoice choice="Number Board Lights"/>
    <ienumChoice choice="Directional Headlight + Directional Mars Light" value="107"/>
    <ienumChoice choice="Directional Headlight + Directional Ditch Lights"/>
    <ienumChoice choice="Directional Ditch Lights"/>
    <ienumChoice choice="Ditch Lights"/>
    <ienumChoice choice="Strobe Ditch Lights"/>
    <ienumChoice choice="Cruise Control" value="177"/>
    <ienumChoice choice="Scale mph Report and Status Report"/>
    <ienumChoice choice="Coupler Effect" value="211"/>
    <ienumChoice choice="Squealing Brakes" value="215"/>
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  </ienumVal>
</ivariable>
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    <ienumChoice choice="Short Air Let-off"/>
    <ienumChoice choice="Mute" value="64"/>
    <ienumChoice choice="Headlight" value="98"/>
    <ienumChoice choice="Dim Headlight"/>
    <ienumChoice choice="Reverse Light"/>
    <ienumChoice choice="Automatic Cab Lights"/>
    <ienumChoice choice="Directional Mars Light"/>
    <ienumChoice choice="Mars Light"/>
    <ienumChoice choice="Strobe Mars Light"/>
    <ienumChoice choice="Number Board Lights"/>
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  </ienumVal>

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        <ienumChoice choice="Ditch Lights"/>
        <ienumChoice choice="Stobe Ditch Lights"/>
        <ienumChoice choice="Start Up" value="144"/>
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        <ienumChoice choice="Coupler Effect" value="211"/>
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</ivariable>

<ivariable label="Ditch Light Hold Time (seconds)" CVname="55.110.5" CV="55" PI="110" SI="5" default="5"
comment="QSI" item="CV55.110.5" mask="XXXVVVVV">
    <indexedVal max="31"/> </ivariable>

<ivariable label="Throttle Mode" CVname="56.4" CV="56" PI="4" default="1"
comment="QSI" item="CV56.4" mask="XXXXXVV">
    <ienumVal>
        <ienumChoice choice="Standard Throttle Control"/>
        <ienumChoice choice="Speed Control"/>
        <ienumChoice choice="Regulated Throttle Control"/>
    </ienumVal>
</ivariable>

<ivariable label="Speed Step to Scale MPH Scale Factor" CVname="56.10" CV="56" PI="10" default="64"
comment="QSI" item="CV56.10">
    <indexedVal max="128"/> </ivariable>

<ivariable label="Chuff Interval Scale Factor" CVname="56.12" CV="56" PI="12" default="32"
comment="QSI" item="CV56.12">
    <indexedVal max="128"/> </ivariable>

<!-- CV 56.129 Engine ID Access (for ops mode) - TBD -->

<!-- CV 56.254 About Quantum Decoder -->
<ivariable label="Product Model High Byte" CVname="56.254.4" CV="56" PI="254" SI="4"
readOnly="yes" comment="QSI" item="CV56.254.4"> <indexedVal/> </ivariable>
<ivariable label="Product Model Low Byte" CVname="56.254.5" CV="56" PI="254" SI="5"
readOnly="yes" comment="QSI" item="CV56.254.5"> <indexedVal/> </ivariable>
<ivariable label="Firmware Build Number" CVname="56.254.8" CV="56" PI="254" SI="8"
readOnly="yes" comment="QSI" item="CV56.254.8"> <indexedVal/> </ivariable>
<ivariable label="Firmware Build Date.Month" CVname="56.254.10" CV="56" PI="254" SI="10"
readOnly="yes" comment="QSI" item="CV56.254.10"> <indexedVal/> </ivariable>
<ivariable label="Firmware Build Date.Day" CVname="56.254.11" CV="56" PI="254" SI="11"
readOnly="yes" comment="QSI" item="CV56.254.11"> <indexedVal/> </ivariable>
<ivariable label="Firmware Build Date.Year" CVname="56.254.12" CV="56" PI="254" SI="12"
readOnly="yes" comment="QSI" item="CV56.254.12"> <indexedVal/> </ivariable>

<!-- CV 56.255 Play Build Information (for ops mode) -->
<ivariable label="Play Product Identifier" CVname="56.255_0" CV="56" PI="255"
opsOnly="yes" writeOnly="yes" infoOnly="yes"
comment="QSI" item="CV56.255_0" default="0">
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<ivariable label="Firmware Build Date.Day" CVname="56.255_1" CV="56" PI="255"
opsOnly="yes" writeOnly="yes" infoOnly="yes"
comment="QSI" item="CV56.255_1" default="1">
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<ivariable label="Firmware Build Date.Year" CVname="56.255_2" CV="56" PI="255"
opsOnly="yes" writeOnly="yes" infoOnly="yes"
comment="QSI" item="CV56.255_2" default="2">
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</variables>

<resets>

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PI="128" SI="51" default="113" item="CV56.128.51"/>
<ifactReset label="Reset Individual Sounds" CVname="56.128.52" CV="56"
PI="128" SI="52" default="113" item="CV56.128.52"/>
<ifactReset label="Reset Function Output Mappings" CVname="56.128.53" CV="56"
PI="128" SI="53" default="113" item="CV56.128.53"/>
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PI="128" SI="55" default="113" item="CV56.128.55"/>
<ifactReset label="Reset QSI Configuration" CVname="56.128.56" CV="56"
PI="128" SI="56" default="113" item="CV56.128.56"/>
<ifactReset label="Reset all standard NMRA CV's" CVname="56.128.253" CV="56"
PI="128" SI="253" default="113" item="CV56.128.253"/>
<ifactReset label="Reset all QSI CV's" CVname="56.128.254" CV="56"
PI="128" SI="254" default="113" item="CV56.128.254"/>
<ifactReset label="Reset all CV's" CVname="56.128.255" CV="56"
PI="128" SI="255" default="113" item="CV56.128.255"/>

</resets>
</decoder>

<pane name="Sound / Volume Control">

```

```

<column>
  <row>
    <column>
      <label label=" "/>
      <label label="If nothing shows up in this tab, upgrade to JMRI 1.7.1"/>
      <label label="When programming in Ops-mode, see note on QSI Misc. tab"/>
      <label label=" "/>
      <display item="CV51.0" format="hslider" tooltip="Sets CV 51.0 (0 - 127)"/>
      <label label=" "/>
      <display item="CV51.1" format="hslider"/>
      <label label=" "/>
    </column>
    <column>
      <display item="CV51.2bit0" format="checkbox"/>
      <label label=" "/>
    </column>
  </row>
</column>
</row>
  <separator/>
  <label label=" "/>
</row>
  <column>
    <display item="CV52.0" format="hslider"/>
    <label label=" "/>
    <display item="CV52.8" format="hslider"/>
    <label label=" "/>
    <display item="CV52.10" format="hslider"/>
    <label label=" "/>
    <display item="CV52.16" format="hslider"/>
    <label label=" "/>
    <display item="CV52.19" format="hslider"/>
  </column>
  <column>
    <label label=" "/>
  </column>
  <column>
    <display item="CV52.21" format="hslider"/>
    <label label=" "/>
    <display item="CV52.22" format="hslider"/>
    <label label=" "/>
    <display item="CV52.24" format="hslider"/>
    <label label=" "/>
    <display item="CV52.34" format="hslider"/>
    <label label=" "/>
    <display item="CV52.37" format="hslider"/>
  </column>
</row>
<label label=" "/>
</column>
</pane>

<pane name="Function Output">
  <column>
    <row>
      <column>
        <label label=" "/>
        <label label="If nothing shows up in this tab, upgrade to JMRI 1.7.1"/>
        <label label="When programming in Ops-mode, see note on QSI Misc. tab"/>
        <label label=" "/>
        <separator/>
        <label label=" "/>
        <label label="The first four Outputs are pre-assigned and can't be changed"/>
        <label label="Do NOT assign a Function to more than one Output"/>
        <label label=" "/>
      </column>
    </row>
    <separator/>
    <label label=" "/>
  </row>
  <column>
    <display item="CV53.1.0"/>
    <display item="CV53.2.0"/>
    <display item="CV53.3.0"/>
    <display item="CV53.4.0"/>
    <display item="CV53.5.0"/>
    <display item="CV53.6.0"/>
    <display item="CV53.7.0"/>
    <display item="CV53.8.0"/>
    <display item="CV53.9.0"/>
    <display item="CV53.10.0"/>
    <display item="CV53.11.0"/>
    <display item="CV53.12.0"/>
    <display item="CV53.13.0"/>
    <display item="CV53.14.0"/>
  </column>

```



```

        <column>
          <display item="CV53.1.1"/>
          <display item="CV53.2.1"/>
          <display item="CV53.3.1"/>
          <display item="CV53.4.1"/>
          <display item="CV53.5.1"/>
          <display item="CV53.6.1"/>
          <display item="CV53.7.1"/>
          <display item="CV53.8.1"/>
          <display item="CV53.9.1"/>
          <display item="CV53.10.1"/>
          <display item="CV53.11.1"/>
          <display item="CV53.12.1"/>
          <display item="CV53.13.1"/>
          <display item="CV53.14.1"/>
        </column>
      </row>
    <label label=" "/>
  </column>
</pane>

<pane name="Indexed CVs">
  <column>
    <label label=" "/>
    <label label="If nothing shows up in this tab, upgrade to JMRI 1.7.1"/>
    <label label="When programming in Ops-mode, see note on QSI Misc. tab"/>
    <label label=" "/>
    <indxcvtable/>
  </column>
</pane>

<pane name="QSI Misc.">
  <column>
    <label label="When programming in Ops-mode, set Verbal Acknowledgement to disable"/>
    <label label=" "/>
    <display item="CV62 QSI Control"/>
    <label label=" "/>
    <label label="When in Ops-mode"/>
    <label label="Enter a CV you wish to hear and press -- Write changes on sheet"/>
    <label label=" "/>
    <display item="Verbal CV Inquiry"/>
  </column>
</pane>
</decoder-config>

```