

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
- LIGO -
CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Document Type LIGO-T970184-00 - C 26June97
How to Build the Hanford Right Mid Station EPICS Vacuum Controls System
Dave Barker

Distribution of this draft:
Hanford CDS, Operators

This is an internal working note
of the LIGO Project..

California Institute of Technology
LIGO Project - MS 51-33
Pasadena CA 91125
Phone (818) 395-2129
Fax (818) 304-9834
E-mail: info@ligo.caltech.edu

Massachusetts Institute of Technology
LIGO Project - MS 20B-145
Cambridge, MA 01239
Phone (617) 253-4824
Fax (617) 253-7014
E-mail: info@ligo.mit.edu

WWW: <http://www.ligo.caltech.edu/>

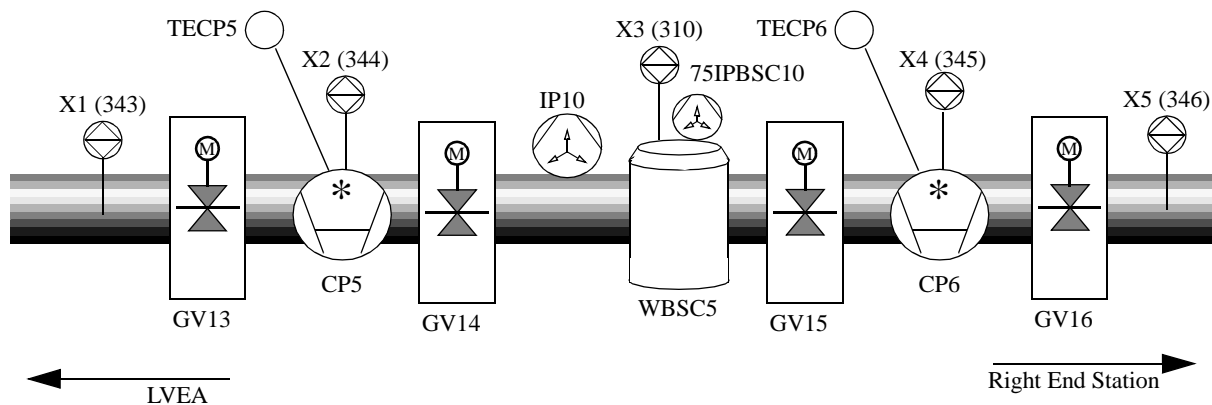
1.0 The Hanford Right Mid Station.

The Hanford Right Mid Vacuum Station is designated MX.
 The Vacuum system comprises:

Table 1: Hanford MX Vacuum Systems.

System	#1	#2	#3	#4	#5
Gauge Pairs	X1	X2	X3	X4	X5
Gate Valve	GV13	GV114	GV15	GV16	
Cryo Pumps	CP5	CP6			
Thermocouples	TECP5	TECP6			
2500l/s Ion Pumps	IP10				
75l/s Ion Pumps	75IP BSC5				

The vacuum equipment is arranged in the following order:



2.0 File Definitions.

Table 2: File Macro Definitions.

Macro	Path
\$(GENERIC)	/opt/ligo/b/epics/apple/Hanford/VE/GENERIC
\$(OPI_GENERIC)	/opt/ligo/b/epics/apple/Hanford/VE/opi/medm/GENERIC
\$(MX_TEST)	/opt/ligo/b/epics/apple/Hanford/VE/hanford61/test
\$(CONFIG_MX_TEST)	/opt/ligo/b/epics/apple/Hanford/VE/CONFIG/MX/test
\$(OPI_MX)	/opt/ligo/b/epics/apple/Hanford/VE/opi/medm/MX
\$(ALH_GEN)	/opt/ligo/b/epics/apple/Hanford/VE/alh/GENERIC
\$(ALH_MX)	/opt/ligo/b/epics/apple/Hanford/VE/alh/MX

3.0 Database Generation.

3.1 Gauge Pairs (GP)

Gauge Pairs have two databases; the main database and the emulation database. Makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. Build the GP system in the \$(MX_TEST) directory with the command:

```
> make GP
```

3.1.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE_GP_GEN.db (gdct generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GP.config linked into the \$(MX_TEST) directory.

Output files are HVE-MX:Xn.db and HVE-MX:XnS.db (n=1,2,3,4,5).

3.1.2 Emulation Database.

Generic db file is \$(GENERIC)/test/database/VE_GPE_GEN.db (gdct generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GPE.config linked into the \$(MX_TEST) directory.

Output files are HVE-MX:XnE.db (n=1,2,3,4,5).

3.2 Electric Gate Valves (GVE).

Only one main db file. Emulation records are in this file. Makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. GVE requires access to the Gauge Pair configuration files. Build the GVE system with the command:

```
> make GVE
```

3.2.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE_GVE_GEN.db (gdct generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GVE.config linked into the \$(MX_TEST) directory.

Output files are HVE-MX:GVn.db and HVE-MX:GVnS.db (n=13,14,15,16).

3.3 Thermocouples.

Only main db file. Makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. Build the TE system with the command:

```
> make TE
```

3.3.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE_TE_GEN.db (gdct generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:TE.config linked into the \$(MX_TEST) directory.

Output files are HVE-MX:TECPn.db and HVE-MX:TECPnS.db (n=5,6).

3.4 Cryo Pumps.

Two database systems are built, the main database and the emulation database. Makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. Build the CP system with the command:

```
> make CP
```

3.4.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE_CP_GEN.db (gdct generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:CP.config linked into the \$(MX_TEST) directory.

Output files are HVE-MX:CPn.db and HVE-MX:CPnS.db (n=5,6).

3.4.2 Emulation Database.

Generic db file is \$(GENERIC)/test/database/VE_CPE_GEN.db (gdct generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:CPE.config linked into the \$(MX_TEST) directory.

Output files are HVE-MX:CPnE.db (n=5,6).

3.5 2500l/s Ion Pumps.

Only main db file. Makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. Build the IP system with the command:

```
> make IP
```

3.5.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE_IP_GEN.db (gdct generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:IP.config linked into the \$(MX_TEST) directory.

Output files are HVE-MX:IP10.db and HVE-MX:IP10S.db.

3.6 75I/s Ion Pumps.

Only main db file. Makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. Build the 75IP system with the command:

```
> make 75IP
```

3.6.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE_75IP_GEN.db (gdct generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:75IP.config linked into the \$(MX_TEST) directory.

Output files are HVE-MX:75IPBSC5.db and HVE-MX:75IPBSC5S.db.

3.7 Pump Carts.

TBD

3.8 Full List of Database Files.

Table 3: Full database db file list.

System	File #1	File #2	File #3
GP Y1	HVE-MX:X1.db	HVE-MX:X1S.db	HVE-MX:X1E.db
GP Y2	HVE-MX:X2.db	HVE-MX:X2S.db	HVE-MX:X2E.db
GP Y3	HVE-MX:X3.db	HVE-MX:X3S.db	HVE-MX:X3E.db
GP Y4	HVE-MX:X4.db	HVE-MX:X4S.db	HVE-MX:X4E.db
GP Y5	HVE-MX:X5.db	HVE-MX:X5S.db	HVE-MX:X5E.db
GVE GV9	HVE-MX:GV13.db	HVE-MX:GV13S.db	
GVE GV10	HVE-MX:GV14.db	HVE-MX:GV14S.db	
GVE GV11	HVE-MX:GV15.db	HVE-MX:GV15S.db	
GVE GV12	HVE-MX:GV16.db	HVE-MX:GV16S.db	
TE TECP3	HVE-TE:TECP5.db	HVE-TE:TECP5S.db	
TE TECP4	HVE-TE:TECP6.db	HVE-TE:TECP6S.db	
CP CP3	HVE-CP:CP5.db	HVE-CP:CP5S.db	HVE-CPE:CP5.db
CP CP4	HVE-CP:CP6.db	HVE-CP:CP6S.db	HVE-CPE:CP6.db
IP IP9	HVE-IP:IP10.db	HVE-IP:IP10S.db	
75IP 75IPBSC5	HVE-MX:75IPBSC5.db	HVE-MX:75IPBSC5S.db	

3.9 Database Totals.

Table 4: Right Mid Station Totals.

Number of db files	37
Number of records	389

4.0 Sequencer Generation.

4.1 Gauge Pairs (GP)

Gauge Pairs have two sequencers; Rate of Rise and RR emulation. Code build makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. Build the GP system with the command:

```
> make GP
```

Source code is moved into \$(MX_TEST)/src. Code compile makefile is in \$(MX_TEST)/src. Recompile the code for the 162 by running make in \$(MX_TEST)/target/mv162/obj.

4.1.1 Rate of Rise.

Generic st file is \$(GENERIC)/test/src/VE_GP_RR_GEN.st.

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GP.config linked into the \$(MX_TEST) directory.

Output files are HVE_MX_XnRR.st (n=1,2,3,4,5).

4.1.2 RR Emulation.

Generic st file is \$(GENERIC)/test/src/VE_GP_RRE_GEN.st

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GPE.config linked into the \$(MX_TEST) directory.

Output files are HVE_MX_XnERRE.st (n=1,2,3,4,5).

4.2 Electric Gate Valves (GVE).

Gate Valves have two sequencers; open and emulation. Code build makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. Build the GP system with the command:

```
> make GVE
```

Source code is moved into \$(MX_TEST)/src. Code compile makefile is in \$(MX_TEST)/src. Recompile the code for the 162 by running make in \$(MX_TEST)/target/mv162/obj.

4.2.1 Open.

Generic st file is \$(GENERIC)/test/src/VE_GVE_OPEN_GEN.st.

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GVE.config.

Output files are HVE_MX_GVnOPEN.st (n=13,14,15,16).

4.2.2 Emulation.

Generic st file is \$(GENERIC)/dev/src/VE_GVEE_GEN.st.

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GVE.config.

Output files are HVE_MX_GVnGVEE.st (n=13,14,15,16).

4.3 Thermocouples.

No Sequencers.

4.4 Cryo Pumps.

Two sequencers per Cryo Pump; Liquid Nitrogen Consumption Rate calculation and its emulation system. Code build makefile is \$(CONFIG_MX_TEST)/makefile linked into the \$(MX_TEST) directory. Build the CP system with the command:

```
> make CP
```

Source code is moved into \$(MX_TEST)/src. Code compile makefile is in \$(MX_TEST)/src. Recompile the code for the 162 by running make in \$(MX_TEST)/target/mv162/obj.

4.4.1 LN2 Rate.

Generic st file is \$(GENERIC)/test/src/VE_CP_LNRATE_GEN.st.

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:CPE.config.

Output files are HVE_MX_CPnLNRATE.st (n=5,6).

4.4.2 Emulation.

Generic st file is \$(GENERIC)/dev/src/VE_CP_LNE_GEN.st.

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:CPE.config.

Output files are HVE_MX_CP4ELNE.st (n=5,6).

4.5 2500l/s Ion Pumps.

No Sequencers

4.6 75l/s Ion Pumps.

No Sequencers

4.7 Pump Carts.

TBD

4.8 Sequencer Code File Totals.**Table 5: C Code Object File List.**

HVE_MX_X1RR.o	HVE_MX_X1ERRE.o
HVE_MX_X2RR.o	HVE_MX_X2ERRE.o
HVE_MX_X3RR.o	HVE_MX_X3ERRE.o
HVE_MX_X4RR.o	HVE_MX_X4ERRE.o
HVE_MX_X5RR.o	HVE_MX_X5ERRE.o
HVE_MX_GV13OPEN.o	HVE_MX_GV13GVEE.o
HVE_MX_GV14OPEN.o	HVE_MX_GV14GVEE.o
HVE_MX_GV15OPEN.o	HVE_MX_GV15GVEE.o
HVE_MX_GV16OPEN.o	HVE_MX_GV16GVEE.o
HVE_MX_CP5LNRATE.o	HVE_MX_CP5ELNE.o
HVE_MX_CP6LNRATE.o	HVE_MX_CP6ELNE.o

5.0 C Code Generation.**5.1 Gauge Pairs.**

C code used for Pirani gauge vacuum calculation. No code generation is needed. Source code is in \$(GENERIC)/test/src and is linked into the \$(MX_TEST)/src directory. Code compile makefile is in the \$(MX_TEST)/src directory. Recompile the code for the 162 by running make in \$(MX_TEST)/test/target/mv162/obj.

5.1.1 Pirani Vacuum.

Source code is \$(GENERIC)/test/src/VE_GP_PIRANI_CVT_TORR.c

No generation needed. This code is re-entrant and only one copy of the object code is required on the IOC.

Output file is in \$(MX_TEST)/test/target/mv162/obj directory, file is VE_GP_PIRANI_CVT_TORR.o.

5.2 Electric Gate Valves.

No C Code.

5.3 Thermocouples.

No C Code.

5.4 Cryo Pumps.

C code used to perform pump LN2 level control. No code generation is needed. Source code is in \$(GENERIC)/test/src and is linked into the \$(MX_TEST)/src directory. Code compile makefile is in the \$(MX_TEST)/src directory. Recompile the code for the 162 by running make in \$(MX_TEST)/test/target/mv162/obj.

5.4.1 Pump LN2 Level Control.

Source code is \$(GENERIC)/test/src/VE_CP_LVLCTRL.c

No generation needed. This code is re-entrant and only one copy of the object code is required on the IOC.

Output file is in \$(MX_TEST)/test/target/mv162/obj directory, file is VE_CP_LVLCTRL.o.

5.5 2500l/s Ion Pumps.

No C Code.

5.6 75l/s Ion Pumps.

C code used to convert Pump Current to Vacuum. Used for the ion pumps in the 75IP systems and in the Gate Valve systems. Source code is in \$(GENERIC)/test/src and is linked into the \$(MX_TEST)/src directory. Code compile makefile is in the \$(MX_TEST)/src directory. Recompile the code for the 162 by running make in \$(MX_TEST)/test/target/mv162/obj.

5.6.1 Pump current to vacuum conversion.

Source code is \$(GENERIC)/test/src/VE_GVE_AMPS_TO_TORR.c

No generation needed. This code is re-entrant and only one copy of the object code is required on the IOC.

Output file is in \$(MX_TEST)/test/target/mv162/obj directory, file is VE_GVE_AMPS_TO_TORR.o.

5.7 Pump Carts.

TBD.

5.8 C Code File Totals.

Table 6: C Code Object File List.

VE_GP_PIRANI_CVT_TORR.o
VE_CP_LVLCTRL.o
VE_AMPS_TO_TORR.o

6.0 MEDM Screens Generation.

6.1 Gauge Pairs (GP).

Gauge Pairs have three displays; main, simulation and emulation. Makefile is \$(OPI_MX)/makefile, build the GP displays with the command;

```
make GP
```

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory.

6.1.1 Main.

Generic adl file is \$(OPI_GENERIC)/VE_GP_GEN.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GP.config.

Output file is \$(OPI_MX)/HVE-MX:Xn.adl (n=1,2,3,4,5).

6.1.2 Simulation.

Generic adl file is \$(OPI_GENERIC)/VE_GP_GEN_S.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GP.config.

Output file is \$(OPI_MX)/HVE-MX:XnS.adl (n=1,2,3,4,5).

6.1.3 Emulation

Generic adl file is \$(OPI_GENERIC)/VE_GP_GEN_E.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GPE.config.

Output file is \$(OPI_MX)/HVE-MX:XnEE.adl (n=1,2,3,4,5).

6.2 Electric Gate Valves (GVE).

Gate Valves have two displays; main and emulation. Makefile is \$(OPI_MX)/makefile, build the GVE displays with the com-

mand;

make GVE

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory.

6.2.1 Main.

Generic adl file is \$(OPI_GENERIC)/VE_GVE_GEN.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GVE.config.

Output file is \$(OPI_MX)/HVE-MX:GVn.adl (n=13,14,15,16).

6.2.2 Emulation.

Generic adl file is \$(OPI_GENERIC)/VE_GVE_GEN_E.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:GVE.config.

Output file is \$(OPI_MX)/HVE-MX:GVnE.adl (n=13,14,15,16).

6.3 Thermocouples.

Thermocouples have two displays;main and simulation. Makefile is \$(OPI_MX)/makefile, build the TE displays with the command;

make TE

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory.

6.3.1 Main.

Generic adl file is \$(OPI_GENERIC)/VE_TE_GEN.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:TE.config.

Output file is \$(OPI_MX)/HVE-MX:TECPn.adl (n=5,6).

6.3.2 Simulation.

Generic adl file is \$(OPI_GENERIC)/VE_TE_GEN_S.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:TE.config.

Output file is \$(OPI_MX)/HVE-MX:TEnS.adl (n=5,6).

6.4 Cryo Pumps.

Cryo Pumps have three displays; main, simulation and emulation. Makefile is \$(OPI_MX)/makefile, build the CP displays with the command;

make CP

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory.

6.4.1 Main.

Generic adl file is \$(OPI_GENERIC)/VE_CP_GEN.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:CP.config.

Output file is \$(OPI_MX)/HVE-MX:CPn.adl (n=5,6).

6.4.2 Simulation.

Generic adl file is \$(OPI_GENERIC)/VE_CP_GEN_S.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:CP.config.

Output file is \$(OPI_MX)/HVE-MX:CPnS.adl (n=5,6).

6.4.3 Emulation

Generic adl file is \$(OPI_GENERIC)/VE_CP_GEN_E.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:CPE.config.

Output file is \$(OPI_MX)/HVE-MX:CPnEE.adl (n=5,6).

6.5 2500/s Ion Pumps.

Large ion pumps have two displays;main and simulation. Makefile is \$(OPI_MX)/makefile, build the IP displays with the command;

make IP

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory.

6.5.1 Main.

Generic adl file is \$(OPI_GENERIC)/VE_IP_GEN.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:IP.config.

Output file is \$(OPI_MX)/HVE-MX:IP10.adl.

6.5.2 Simulation.

Generic adl file is \$(OPI_GENERIC)/VE_IP_GEN_S.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:IP.config.

Output file is \$(OPI_MX)/HVE-MX:IP10S.adl.

6.6 75I/s Ion Pumps.

75I/s ion pumps have two displays;main and simulation. Makefile is \$(OPI_MX)/makefile, build the 75IP displays with the command;

make 75IP

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory.

6.6.1 Main.

Generic adl file is \$(OPI_GENERIC)/VE_75IP_GEN.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:75IP.config.

Output file is \$(OPI_MX)/HVE-MX:75IPBSC5.adl.

6.6.2 Simulation.

Generic adl file is \$(OPI_GENERIC)/VE_75IP_GEN_S.adl (MEDM generated).

Configuration file is \$(CONFIG_MX_TEST)/HVE-MX:75IP.config.

Output file is \$(OPI_MX)/HVE-MX:75IPBSC5S.adl.

6.7 Pump Carts.

TBD

6.8 MEDM File Totals.

Table 7: MEDM File List.

HVE-MX:X1.adl	HVE-MX:X1S.adl	HVE-MX:X1EE.adl
HVE-MX:X2.adl	HVE-MX:X2S.adl	HVE-MX:X2EE.adl
HVE-MX:X3.adl	HVE-MX:X3S.adl	HVE-MX:X3EE.adl
HVE-MX:X4.adl	HVE-MX:X4S.adl	HVE-MX:X4EE.adl
HVE-MX:X5.adl	HVE-MX:X5S.adl	HVE-MX:X15EE.adl
HVE-MX:GV13.adl	HVE-MX:GV13E.adl	
HVE-MX:GV14.adl	HVE-MX:GV14E.adl	
HVE-MX:GV15.adl	HVE-MX:GV15E.adl	
HVE-MX:GV16.adl	HVE-MX:GV16E.adl	
HVE-MX:TECP5.adl	HVE-MX:TECP5S.adl	
HVE-MX:TECP6.adl	HVE-MX:TECP6S.adl	
HVE-MX:CP5.adl	HVE-MX:CP5S.adl	HVE-MX:CP5EE.adl
HVE-MX:CP6.adl	HVE-MX:CP6S.adl	HVE-MX:CP6EE.adl
HVE-MX:IP10.adl	HVE-MX:IP10S.adl	
HVE-MX:75IPBSC5.adl	HVE-MX:75IPBSC5S.adl	

Total number of adl files=37.

Total number of channels monitored and/or controlled = 846.

7.0 Alarm Handler Generation.

7.1 Gauge Pairs.

Generic alh config include file is \$(ALH_GEN)/VE_GP_GEN.alhConfig linked into \$(ALH_MX). MX Vacuum template file is \$(ALH_MX)/VacTemplate.alhConfig. Makefile is \$(ALH_MX)/makefile, build the Alarm Handler files with the command;

make

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory. Output file for the MX system is MX.alhConfig.

7.2 Thermocouples.

Generic alh config include file is \$(ALH_GEN)/VE_TE_GEN.alhConfig linked into \$(ALH_MX). MX Vacuum template file is \$(ALH_MX)/VacTemplate.alhConfig. Makefile is \$(ALH_MX)/makefile, build the Alarm Handler files with the command;

make

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory. Output file for the MX system is MX.alhConfig.

7.3 Gate Valves.

Generic alh config include file is \$(ALH_GEN)/VE_GVE_GEN.alhConfig linked into \$(ALH_MX). MX Vacuum template file is \$(ALH_MX)/VacTemplate.alhConfig. Makefile is \$(ALH_MX)/makefile, build the Alarm Handler files with the command;

make

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory. Output file for the MX system is MX.alhConfig.

7.4 Cryo Pumps.

Generic alh config include file is \$(ALH_GEN)/VE_CP_GEN.alhConfig linked into \$(ALH_MX). MX Vacuum template file is \$(ALH_MX)/VacTemplate.alhConfig. Makefile is \$(ALH_MX)/makefile, build the Alarm Handler files with the command;

make

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory. Output file for the MX system is MX.alhConfig.

7.5 2500l/s Ion Pumps.

Generic alh config include file is \$(ALH_GEN)/VE_IP_GEN.alhConfig linked into \$(ALH_MX). MX Vacuum template file is \$(ALH_MX)/VacTemplate.alhConfig. Makefile is \$(ALH_MX)/makefile, build the Alarm Handler files with the command;

make

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory. Output file for the MX system is MX.alhConfig.

7.6 75l/s Ion Pumps.

Generic alh config include file is \$(ALH_GEN)/VE_75IP_GEN.alhConfig linked into \$(ALH_MX). MX Vacuum template file is \$(ALH_MX)/VacTemplate.alhConfig. Makefile is \$(ALH_MX)/makefile, build the Alarm Handler files with the command;

make

Configuration files are symbolic linked from \$(CONFIG_MX_TEST) to the current directory. Output file for the MX system is MX.alhConfig.

7.7 Pump Carts.

TBD

7.8 Final Files

The output from alh generation is a single alh config file for the entire building.

Table 8: Alarm Handler Configuration File List.

MX.alhConfig

Total number of channels monitored for alarm activity on Right Mid Station = 39.

8.0 SAMMI Screens Generation.**8.1 Gauge Pairs.**

TBD

8.2 Thermocouples.

TBD

8.3 Gate Valves.

TBD

8.4 Cryo Pumps.

TBD

8.5 2500l/s Ion Pumps.

TBD

8.6 75l/s Ion Pumps.

TBD

8.7 Pump Carts.

TBD

9.0 BURT Generation.**9.1 Gauge Pairs.**

TBD

9.2 Thermocouples.

TBD

9.3 Gate Valves.

TBD

9.4 Cryo Pumps.

TBD

9.5 2500l/s Ion Pumps.

TBD

9.6 75l/s Ion Pumps.

TBD

9.7 Pump Carts.

TBD

10.0 Archiver Generation.

10.1 Gauge Pairs.

TBD

10.2 Thermocouples.

TBD

10.3 Gate Valves.

TBD

10.4 Cryo Pumps.

TBD

10.5 2500l/s Ion Pumps.

TBD

10.6 75l/s Ion Pumps.

TBD

10.7 Pump Carts.

TBD