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Hanford Site DAQS Rack Layouts and Signal Connections

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1 PURPOSE

This document is intended to describe the Hanford Data Acquisition System (DAQS) equipment layouts and signal connections. It is a supplement to the DAQS Final Design Document LIGO-T980028-00-C Data Collection Units (DCU) are described in section 2, the DAQS controller and EPICS data units in section 3, and the data storage equipment in section 4..

2 DATA COLLECTION UNITS (DCU) AND RACK LOCATIONS

DCU assignments and rack locations are shown in Figure 1:LVEA Rack Locations and DCU Locator Table. The Hanford site has eleven DCU, seven located in the LVEA and one each in the mid and end stations. Individual rack layouts and DCU signal connections are shown in the following subsections.

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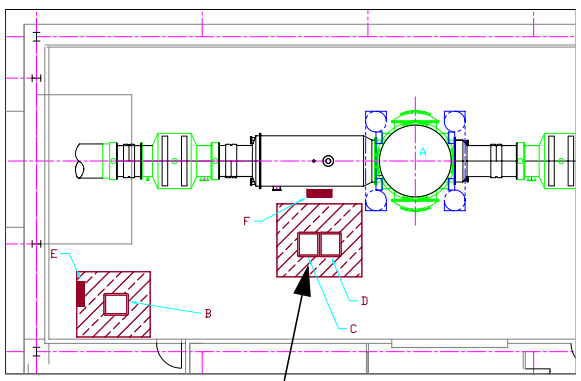

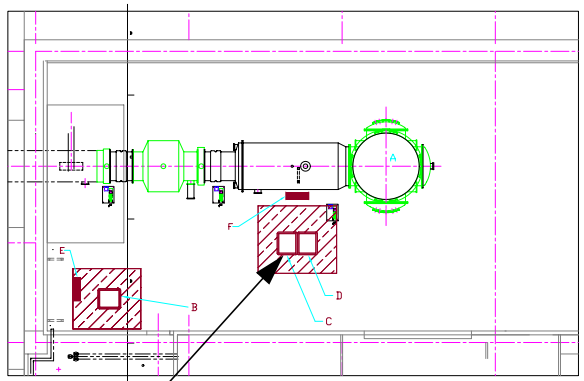

DCU	*Rack*	*Bldg*
H4KDAQS-1	1X22	LVEA
H4KDAQS-2	1X22	LVEA
H4KDAQS-3	1X20	X End
H4KDAQS-4	1Y21	Y End
HPEM-1	1X10	LVEA
HPEM-2	1X10	LVEA
H2KDAQS-1	2X8	LVEA
H2KDAQS-2	2X3	LVEA
H2KDAQS-3	2X3	LVEA
H2KDAQS-4	1X17	X Mid
H2KDAQS-5	1Y18	Y Mid

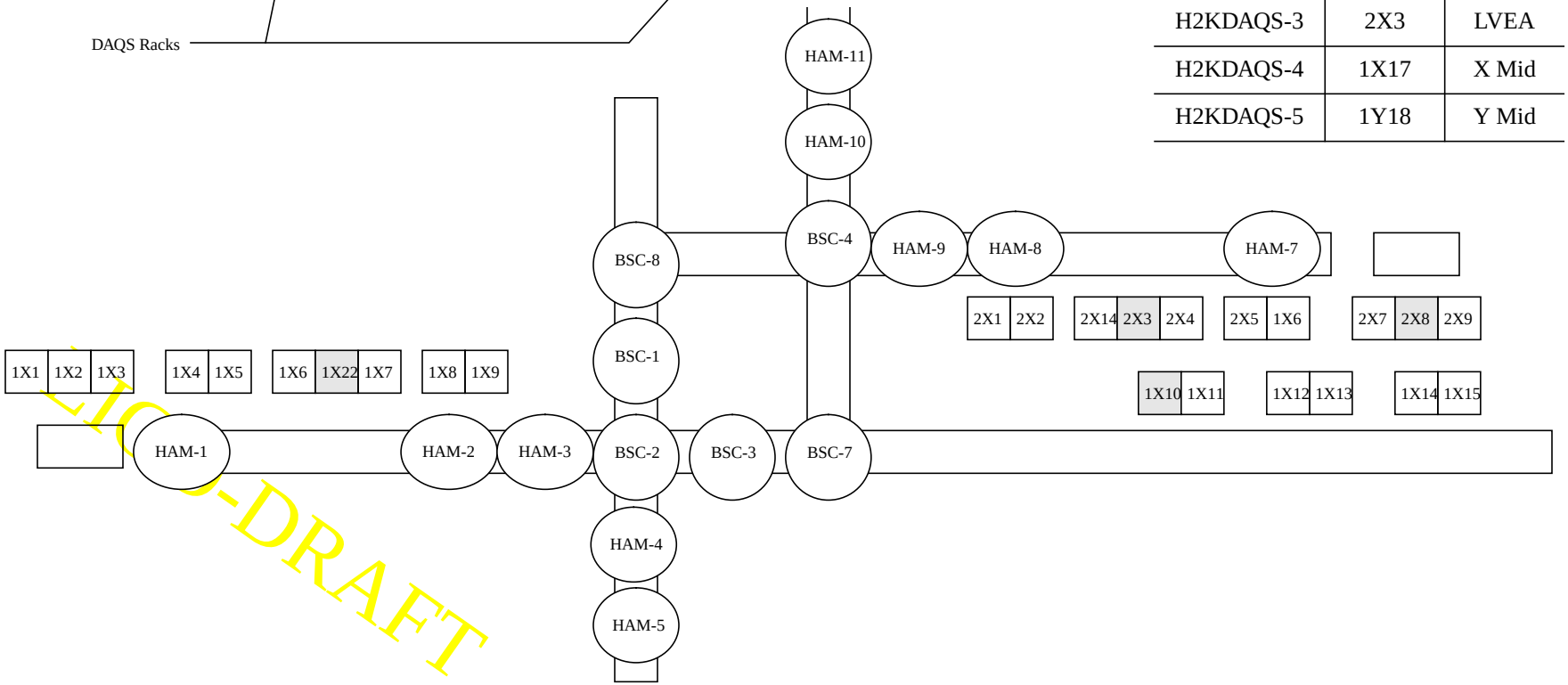

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Figure 1: LVEA Rack Locations and DCU Locator Table

2.1. Rack 1X10, HPEM

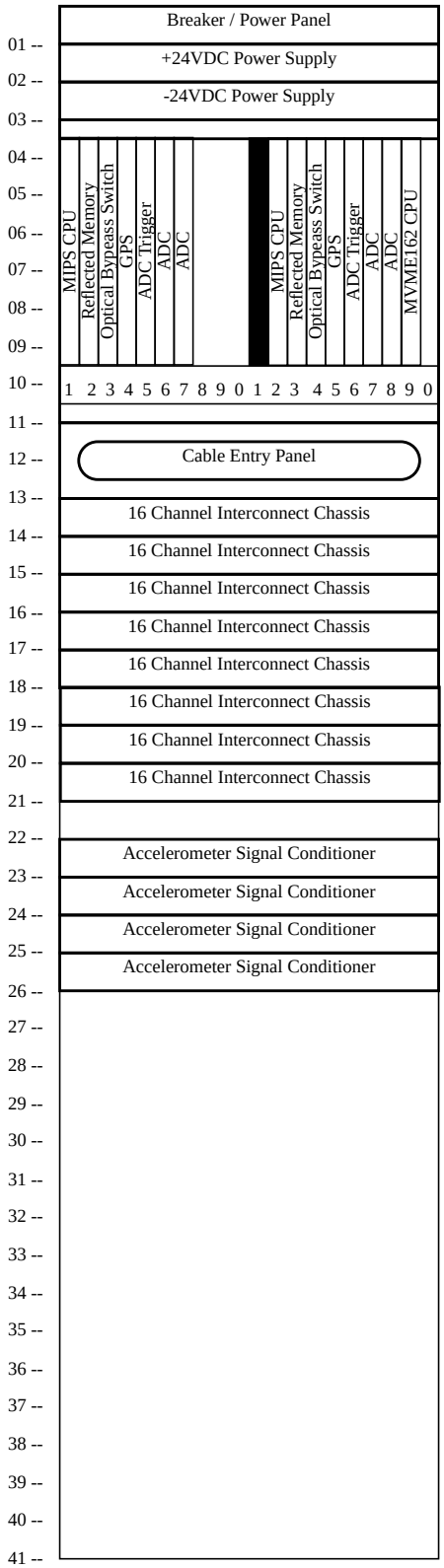

Table 1: DAQS PEM Rack Parts List / Cost

Description	Vendor	Unit	Qty	Extd
Breaker Panel		$600	1	$600
24 VDC Power Supply	Power 10	$1,050	2	$2,100
VME Crate		$3,200	1	$3,200
Cable Entry Panel		$50	1	$50
16 Channel Interconnect	LIGO	$500	8	$4,000
MIPS Processor	Heurikon	$6000	2	$12,000
Reflected Memory (2Mbyte)	VMIC	$7,400	2	$14,800
Optical Bypass Switch	VMIC	$1,200	2	$2,400
GPS		$1,200	2	$2,400
ADC Trigger	LIGO	$400	2	$800
32 Channel ADC	ICS	$16,000	4	$64,000
MVME-162-333 Processor	Motorola	$4500	1	$4,500
NB Rcvrs / Cabling		$30,000	1	$30,000
Total				$140,850

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Rack: **1X10**
DCU: **HPEM-1**
ADC: **1**

CH#	*------*	*Rate*	*Frame*	*Description*
0	HPM :: PEM – ACC_BSC1_1X	2048	yes	accelerometer signal, BSC1, triaxial unit 1, x
1	HPM :: PEM – ACC_BSC1_1Y	2048	yes	accelerometer signal, BSC1, triaxial unit 1, y
2	HPM :: PEM – ACC_BSC1_1Z	2048	yes	accelerometer signal, BSC1, triaxial unit 1, z
3	HPM :: PEM – ACC_BSC1_2X	2048	yes	accelerometer signal, BSC1, triaxial unit 2, x
4	HPM :: PEM – ACC_BSC1_2Y	2048	yes	accelerometer signal, BSC1, triaxial unit 2, y
5	HPM :: PEM – ACC_BSC1_2Z	2048	yes	accelerometer signal, BSC1, triaxial unit 2, z
6	HPM :: PEM – ACC_BSC3_1X	2048	yes	accelerometer signal, BSC3, triaxial unit 1, x
7	HPM :: PEM – ACC_BSC3_1Y	2048	yes	accelerometer signal, BSC3, triaxial unit 1, y
8	HPM :: PEM – ACC_BSC3_1Z	2048	yes	accelerometer signal, BSC3, triaxial unit 1, z
9	HPM :: PEM – ACC_BSC3_2X	2048	yes	accelerometer signal, BSC3, triaxial unit 2, x
10	HPM :: PEM – ACC_BSC3_2Y	2048	yes	accelerometer signal, BSC3, triaxial unit 2, y
11	HPM :: PEM – ACC_BSC3_2Z	2048	yes	accelerometer signal, BSC3, triaxial unit 2, z
12	HPM :: PEM – ACC_BSC2_X	2048	yes	accelerometer signal, BSC2, x
13	HPM :: PEM – ACC_BSC2_Y	2048	yes	accelerometer signal, BSC2, y
14	HPM :: PEM – ACC_BSC2_Z	2048	yes	accelerometer signal, BSC2, z
15	HPM :: PEM – ACC_HAM1_X	2048	yes	accelerometer signal, HAM1, x
16	HPM :: PEM – ACC_HAM1_Y	2048	yes	accelerometer signal, HAM1, y
17	HPM :: PEM – ACC_HAM1_Z	2048	yes	accelerometer signal, HAM1, z
18	HPM :: PEM – ACC_HAM2_X	2048	yes	accelerometer signal, HAM2, x
19	HPM :: PEM – ACC_HAM2_Y	2048	yes	accelerometer signal, HAM2, y
20	HPM :: PEM – ACC_HAM2_Z	2048	yes	accelerometer signal, HAM2, z
21	HPM :: PEM – ACC_HAM3_X	2048	yes	accelerometer signal, HAM3, x
22	HPM :: PEM – ACC_HAM3_Y	2048	yes	accelerometer signal, HAM3, y
23	HPM :: PEM – ACC_HAM3_Z	2048	yes	accelerometer signal, HAM3, z
24	HPM :: PEM – ACC_HAM4_X	2048	yes	accelerometer signal, HAM4, x
25	HPM :: PEM – ACC_HAM4_Y	2048	yes	accelerometer signal, HAM4, y
26	HPM :: PEM – ACC_HAM4_Z	2048	yes	accelerometer signal, HAM4, z
27	HPM :: PEM – ACC_HAM5_X	2048	yes	accelerometer signal, HAM5, x
28	HPM :: PEM – ACC_HAM5_Y	2048	yes	accelerometer signal, HAM5, y
29	HPM :: PEM – ACC_HAM5_Z	2048	yes	accelerometer signal, HAM5, z
30				
31				

Rack: **1X10**
DCU: **HPEM-1**
ADC: **2**

CH#	*------*	*Rate*	*Frame*	*Description*
0	HPM :: PEM – ACC_HAM6_X	2048	yes	accelerometer signal, HAM6, x
1	HPM :: PEM – ACC_HAM6_Y	2048	yes	accelerometer signal, HAM6, y
2	HPM :: PEM – ACC_HAM6_Z	2048	yes	accelerometer signal, HAM6, z
3	HPM :: PEM – ACC_PSL_X	2048	yes	accelerometer signal, PSL, x
4	HPM :: PEM – ACC_PSL_Y	2048	yes	accelerometer signal, PSL, y
5	HPM :: PEM – ACC_PSL_Z	2048	yes	accelerometer signal, PSL, z
6	HPM :: PEM – ACC_BSC4_X	2048	yes	accelerometer signal, BSC4, x
7	HPM :: PEM – ACC_BSC4_Y	2048	yes	accelerometer signal, BSC4, y
8	HPM :: PEM – ACC_BSC4_Z	2048	yes	accelerometer signal, BSC4, z
9	HPM :: PEM – ACC_BSC7_X	2048	yes	accelerometer signal, BSC7, x
10	HPM :: PEM – ACC_BSC7_Y	2048	yes	accelerometer signal, BSC7, y
11	HPM :: PEM – ACC_BSC7_Z	2048	yes	accelerometer signal, BSC7, z
12	HPM :: PEM – ACC_BSC8_X	2048	yes	accelerometer signal, BSC8, x
13	HPM :: PEM – ACC_BSC8_Y	2048	yes	accelerometer signal, BSC8, y
14	HPM :: PEM – ACC_BSC8_Z	2048	yes	accelerometer signal, BSC8, z
15	HPM :: PEM – ACC_HAM7_X	2048	yes	accelerometer signal, HAM7, x
16	HPM :: PEM – ACC_HAM7_Y	2048	yes	accelerometer signal, HAM7, y
17	HPM :: PEM – ACC_HAM7_Z	2048	yes	accelerometer signal, HAM7, z
18	HPM :: PEM – ACC_HAM8_X	2048	yes	accelerometer signal, HAM8, x
19	HPM :: PEM – ACC_HAM8_Y	2048	yes	accelerometer signal, HAM8, y
20	HPM :: PEM – ACC_HAM8_Z	2048	yes	accelerometer signal, HAM8, z
21	HPM :: PEM – ACC_HAM9_X	2048	yes	accelerometer signal, HAM9, x
22	HPM :: PEM – ACC_HAM9_Y	2048	yes	accelerometer signal, HAM9, y
23	HPM :: PEM – ACC_HAM9_Z	2048	yes	accelerometer signal, HAM9, z
24	HPM :: PEM – ACC_HAM10_X	2048	yes	accelerometer signal, HAM10, x
25	HPM :: PEM – ACC_HAM10_Y	2048	yes	accelerometer signal, HAM10, y
26	HPM :: PEM – ACC_HAM10_Z	2048	yes	accelerometer signal, HAM10, z
27	HPM :: PEM – ACC_HAM11_X	2048	yes	accelerometer signal, HAM11, x
28	HPM :: PEM – ACC_HAM11_Y	2048	yes	accelerometer signal, HAM11, y
29	HPM :: PEM – ACC_HAM11_Z	2048	yes	accelerometer signal, HAM11, z
30				
31				

Rack: **1X10**
DCU: **HPEM-2**
ADC: **1**

CH#	*------*	*Rate*	*Frame*	*Description*
0	HPM :: PEM – ACC_HAM12_X	2048	yes	accelerometer signal, HAM12, x
1	HPM :: PEM – ACC_HAM12_Y	2048	yes	accelerometer signal, HAM12, y
2	HPM :: PEM – ACC_HAM12_Z	2048	yes	accelerometer signal, HAM12, z
3	HPM :: PEM – ACC_PSL2_X	2048	yes	accelerometer signal, PSL,2km,x
4	HPM :: PEM – ACC_PSL2_Y	2048	yes	accelerometer signal, PSL,2km,y
5	HPM :: PEM – ACC_PSL2_Z	2048	yes	accelerometer signal, PSL,2km,z
6	HPM :: PEM – ACC_BT_1X	2048	yes	accel. sig.,beam tube,triaxial unit 1,x
7	HPM :: PEM – ACC_BT_1Y	2048	yes	accel. sig.,beam tube,triaxial unit 1,y
8	HPM :: PEM – ACC_BT_1Z	2048	yes	accel. sig.,beam tube,triaxial unit 1,z
9	HPM :: PEM – ACC_BT_2X	2048	yes	accel. sig.,beam tube,triaxial unit 2,x
10	HPM :: PEM – ACC_BT_2Y	2048	yes	accel. sig.,beam tube,triaxial unit 2,y
11	HPM :: PEM – ACC_BT_2Z	2048	yes	accel. sig.,beam tube,triaxial unit 2,z
12	HPM :: PEM – ACC_BT_3X	2048	yes	accel. sig.,beam tube,triaxial unit 3,x
13	HPM :: PEM – ACC_BT_3Y	2048	yes	accel. sig.,beam tube,triaxial unit 3,y
14	HPM :: PEM – ACC_BT_3Z	2048	yes	accel. sig.,beam tube,triaxial unit 3,z
15	HPM :: PEM – MIC_BSC4	2048	yes	microphone, BSC4
16	HPM :: PEM – MIC_BSC7	2048	yes	microphone, BSC7
17	HPM :: PEM – MIC_BSC8	2048	yes	microphone, BSC8
18	HPM :: PEM – MIC_HAM7	2048	yes	microphone, HAM7
19	HPM :: PEM – MIC_HAM8	2048	yes	microphone, HAM8
20	HPM :: PEM – MIC_HAM9	2048	yes	microphone, HAM9
21	HPM :: PEM – MIC_HAM10	2048	yes	microphone, HAM10
22	HPM :: PEM – MIC_HAM11	2048	yes	microphone, HAM11
23	HPM :: PEM – MIC_HAM12	2048	yes	microphone, HAM12
24	HPM :: PEM – MIC_PSL	2048	yes	microphone, PSL table,2km ifo
25	HPM :: PEM – MIC_BT1	2048	yes	microphone, beam tube, unit 1
26	HPM :: PEM – MIC_BT2	2048	yes	microphone, beam tube, unit 2
27	HPM :: PEM – MIC_BT3	2048	yes	microphone, beam tube, unit 3
28	HPM :: PEM – MIC_HAM1	2048	yes	microphone, HAM1
29	HPM :: PEM – MIC_HAM2	2048	yes	microphone, HAM2
30	HPM :: PEM – MIC_HAM3	2048	yes	microphone, HAM3
31	HPM :: PEM – MIC_HAM4	2048	yes	microphone, HAM4

Rack: **1X10**
DCU: **HPEM-2**
ADC: **2**

CH#	*------*	*Rate*	*Frame*	*Description*
0	HPM :: PEM – MIC_HAM5	2048	yes	microphone, HAM5
1	HPM :: PEM – MIC_HAM6	2048	yes	microphone, HAM6
2	HPM :: PEM – MIC_PSL	2048	yes	microphone, PSL table
3	HPM :: PEM – MIC_BSC1	2048	yes	microphone, BSC1
4	HPM :: PEM – MIC_BSC2	2048	yes	microphone, BSC2
5	HPM :: PEM – MIC_BSC3	2048	yes	microphone, BSC3
6	HPM :: PEM – MAG_HAM3_X	2048	yes	magnetometer, HAM3, x direction
7	HPM :: PEM – MAG_HAM3_Y	2048	yes	magnetometer, HAM3, y direction
8	HPM :: PEM – MAG_HAM3_Z	2048	yes	magnetometer, HAM3, z direction
9	HPM :: PEM – MAG_BSC1_X	2048	yes	magnetometer, BSC1, x direction
10	HPM :: PEM – MAG_BSC1_Y	2048	yes	magnetometer, BSC1, y direction
11	HPM :: PEM – MAG_BSC1_Z	2048	yes	magnetometer, BSC1, z direction
12	HPM :: PEM – MAG_BSC2_X	2048	yes	magnetometer, BSC2, x direction
13	HPM :: PEM – MAG_BSC2_Y	2048	yes	magnetometer, BSC2, y direction
14	HPM :: PEM – MAG_BSC2_Z	2048	yes	magnetometer, BSC2, z direction
15	HPM :: PEM – MAG_BSC3_X	2048	yes	magnetometer, BSC3, x direction
16	HPM :: PEM – MAG_BSC3_Y	2048	yes	magnetometer, BSC3, y direction
17	HPM :: PEM – MAG_BSC3_Z	2048	yes	magnetometer, BSC3, z direction
18	HPM :: PEM – MAG_C_X	2048	yes	magnetometer, site, x direction
19	HPM :: PEM – MAG_C_Y	2048	yes	magnetometer, site, y direction
20	HPM :: PEM – MAG_C_Z	2048	yes	magnetometer, site, z direction
21				
22	HPM: :: PEM – RFR_1	16384	yes	RF receiver, channel 1
23	HPM :: PEM – RFR_2	16384	yes	RF receiver, channel 2
24	HPM :: PEM – RFR_3	16384	yes	RF receiver, channel 3
25	HPM :: PEM – RFR_4	16384	yes	RF receiver, channel 4
26	HPM :: PEM – NB_RFR_1	16384	yes	narrow band RF receiver, 4km ifo
27	HPM :: PEM – NB_RFR_2	16384	yes	narrow band RF receiver, 2km ifo
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2.2. Rack 2X8, H2KDAQS1

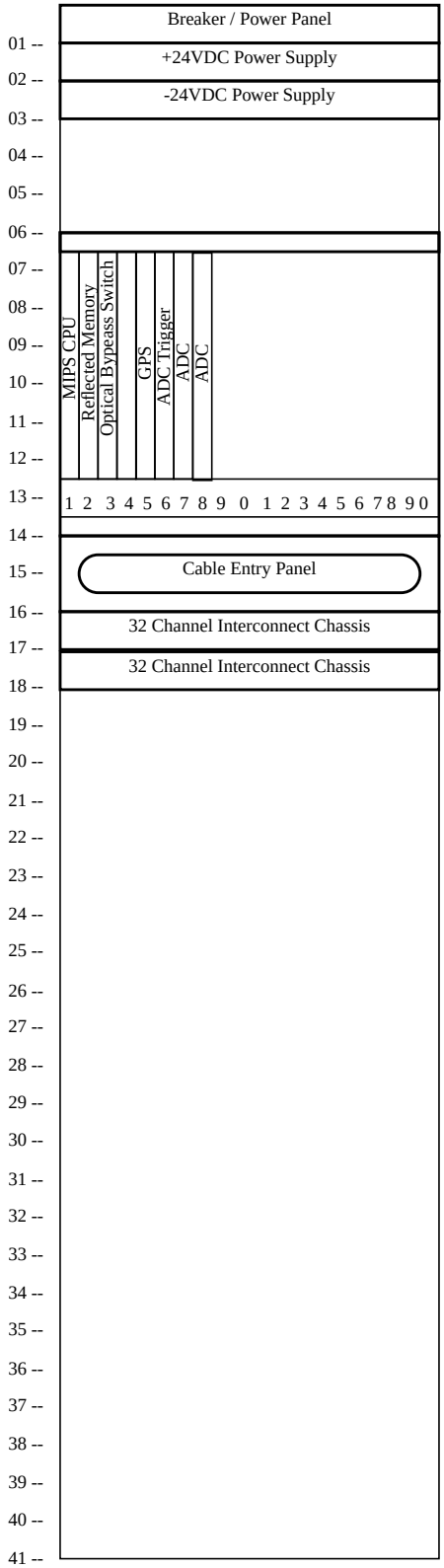

Table 2: DAQS Mid/End Station Rack Parts List / Cost

Description	Vendor	Unit	Qty	Extd
Breaker Panel		$200	1	200
24 VDC Power Supply	Power 10	$1050	2	$2,100
VME Crate		$3,200	1	$3,200
Cable Entry Panel	LIGO	$50	1	$50
GPS		$1,200	1	$1,200
32 Channel Interconnect	LIGO	$800	2	$1,600
MIPS Processor	Heurikon	$6000	1	$6,000
Reflected Memory (2Mbyte)	VMIC	$7,400	1	$7,400
Optical Bypass Switch	VMIC	$1,200	1	$1,200
ADC Trigger	LIGO	$400	1	$400
32 Channel ADC	ICS	$16,000	2	$32,000
Total				$55,350

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Rack: **2X8**
DCU: **H2KDAQS1**
ADC: **1**

CH#	------	*Rate*	*Frame*	*Description*
0	H2 :: IOO – WFS_MM1_D_I	256	no	mode matching sensor 1, disk, I-phase
1	H2 :: IOO – WFS_MM1_R1_I	256	no	mode matching sensor 1, ring segment 1, I-phase
2	H2 :: IOO – WFS_MM1_R2_I	256	no	mode matching sensor 1, ring segment 2, I-phase
3	H2 :: IOO – WFS_MM1_R3_I	256	no	mode matching sensor 1, ring segment 3, I-phase
4	H2 :: IOO – WFS_MM1_D_Q	256	no	mode matching sensor 1, disk, Q-phase
5	H2 :: IOO – WFS_MM1_R1_Q	256	no	mode matching sensor 1, ring segment 1, Q-phase
6	H2 :: IOO – WFS_MM1_R2_Q	256	no	mode matching sensor 1, ring segment 2, Q-phase
7	H2 :: IOO – WFS_MM1_R3_Q	256	no	mode matching sensor 1, ring segment 3, Q-phase
8	H2 :: IOO – WFS_MM2_D_I	256	no	mode matching sensor 2, disk, I-phase
9	H2 :: IOO – WFS_MM2_R1_I	256	no	mode matching sensor 2, ring segment 1, I-phase
10	H2 :: IOO – WFS_MM2_R2_I	256	no	mode matching sensor 2, ring segment 2, I-phase
11	H2 :: IOO – WFS_MM2_R3_I	256	no	mode matching sensor 2, ring segment 3, I-phase
12	H2 :: IOO – WFS_MM2_D_Q	256	no	mode matching sensor 2, disk, Q-phase
13	H2 :: IOO – WFS_MM2_R1_Q	256	no	mode matching sensor 2, ring segment 1, Q-phase
14	H2 :: IOO – WFS_MM2_R2_Q	256	no	mode matching sensor 2, ring segment 2, Q-phase
15	H2 :: IOO – WFS_MM2_R3_Q	256	no	mode matching sensor 2, ring segment 3, Q-phase
16	H2 :: IOO – LENGTH_MODECLEANER	256	yes	control signal for mode cleaner length
17	H2 :: PSL – PMC_DC	16	yes	pre-mode cleaner, DC signal
18	H2 :: PSL – PMC_TRANS	16	yes	pre-mode cleaner, transmitted signal
19	H2 :: PSL – LASER_FREQUENCY_SLOW	256	yes	control signal for frequency stabilization, slow PZT
20	H2 :: PSL – REFCAV_DC	16	yes	reference cavity, DC signal
21	H2 :: PSL – REFCAV_TRANS	16	yes	reference cavity, transmitted signal
22	H2 :: IOO – TEST_IN1	256	no	stimulus after servo feedback split: MC path
23	H2 :: PSL – REFCAV_I	16384	yes	reference cavity, I-phase
24	H2 :: PSL – LASER_FREQUENCY_EOM	16384	yes	control signal for frequency stabilization, electro-opt.
25	H2 :: PSL – LASER_FREQUENCY_FAST	16384	yes	control signal for frequency stabilization, fast PZT
26	H2 :: PSL – LASER_FREQUENCY_AOM	16384	yes	control signal for frequency stabilization, acousto-opt.
27	H2 :: PSL – LASER_POWER	16384	yes	laser power monitor
28	H2 :: PSL – PMC_I	16384	yes	pre-mode cleaner, I-phase
29	H2 :: PSL – LASER_POWER_RAW	16384	yes	raw laser power going to IOO
30	H2 :: PSL – LASER_FREQUENCY_AOM_OFS	16384	no	stimulus for laser frequency offset, AOM
31	H2 :: PSL – LASER_POWER_OFS	16384	no	stimulus for laser power modulation

Rack: **2X8**
DCU: **H2KDAQS1**
ADC: **2**

CH#	***------***	***Rate***	***Frame***	***Description***
0	H2 :: IOO – MODECLEANER	16384	yes	mode cleaner length sensor, I-phase
1	H2 :: IOO – MODECLEANER_Q	16384	yes	mode cleaner length sensor, Q-phase
2	H2 :: IOO – LASER_FREQUENCY_MC	16384	yes	control signal for laser frequency
3	H2 :: IOO – TEST_OUT1	16384	yes	servo test signal after error signal summing junction
4	H2 :: IOO – TEST_OUT2	16384	yes	servo test signal before feedback split MC/laser
5	H2 :: IOO – MODECLEANER_I_OFS	16384	no	stimulus for mode cleaner length error signal
6	H2 :: IOO – LENGTH_MODECLEANER_OFS	16384	no	stimulus for control signal for mode cleaner length
7	H2 :: IOO – TEST_IN2	16384	no	stimulus after servo feedback split: laser path
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2.3. Rack 2X3, H2KDAQS2 & H2KDAQS3

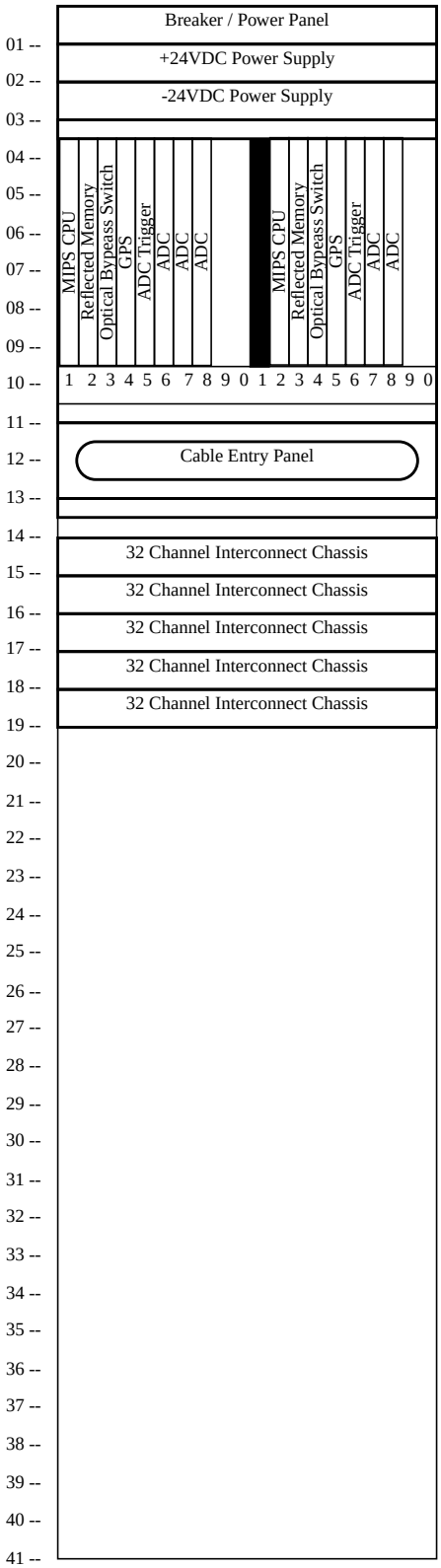

Table 3: DAQS Rack 2X3 Parts List / Cost

Description	Vendor	Unit	Qty	Extd
Breaker Panel		$200	1	$200
24 VDC Power Supply	Power 10	$1050	2	$2,100
VME Crate		$3,200	1	$3,200
Cable Entry Panel		$50	1	$50
32 Channel Interconnect	LIGO	$800	5	$4,000
MIPS Processor	Heurikon	$6000	2	$12,000
Reflected Memory (2Mbyte)	VMIC	$7,400	2	$14,800
Optical Bypass Switch	VMIC	$1,200	2	$2,400
GPS		$1,200	2	$2,400
ADC Trigger	LIGO	$400	2	$800
32 Channel ADC	ICS	$16,000	5	$80,000
Total				$121,950

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Rack: **2X3**
DCU: **H2KDAQS2**
ADC: **1**

CH#	------	*Rate*	*Frame*	*Description*
0	H2 :: SUS – COIL_ITMX_SUM	16384	yes	coil current readback, ITM X, sum
1	H2 :: SUS – COIL_ITMY_SUM	16384	yes	coil current readback, ITM Y, sum
2	H2 :: SUS – COIL_RM_SUM	16384	yes	coil current readback, RM, sum
3	H2 :: SUS – COIL_BS_SUM	16384	yes	coil current readback, BS, sum
4	H2 :: SUS – COIL_MC1_SUM	16384	yes	coil current readback, mode cleaner 1, sum
5	H2 :: SUS – COIL_MC2_SUM	16384	yes	coil current readback, mode cleaner 2, sum
6	H2 :: SUS – COIL_MC3_SUM	16384	yes	coil current readback, mode cleaner 3, sum
7	H2 :: SUS – COIL_MMT1_SUM	16384	no	coil current readback, mode matching 1, sum
8	H2 :: SUS – COIL_MMT2_SUM	16384	no	coil current readback, mode matching 2, sum
9	H2 :: SUS – COIL_MMT3_SUM	16384	no	coil current readback, mode matching 3, sum
10	H2 :: SUS – COIL_FMX_SUM	16384	yes	coil current readback, FMX, sum
11	H2 :: SUS – COIL_FMY_SUM	16384	yes	coil current readback, FMY, sum
12	H2 :: SUS – COIL_FM1_SUM	16384	no	coil current readback, folding mirror 1, sum
13	H2 :: SUS – COIL_FM2_SUM	16384	no	coil current readback, folding mirror 2, sum
14	H2 :: SUS – COIL_ITMX_UL	2048	yes	coil current readback, ITM X, upper-left
15	H2 :: SUS – COIL_ITMX_UR	2048	yes	coil current readback, ITM X, upper-right
16	H2 :: SUS – COIL_ITMX_LL	2048	yes	coil current readback, ITM X, lower-left
17	H2 :: SUS – COIL_ITMX_LR	2048	yes	coil current readback, ITM X, lower-right
18	H2 :: SUS – COIL_ITMX_S	2048	yes	coil current readback, ITM X, side
19	H2 :: SUS – COIL_ITMY_UL	2048	yes	coil current readback, ITM Y, upper-left
20	H2 :: SUS – COIL_ITMY_UR	2048	yes	coil current readback, ITM Y, upper-right
21	H2 :: SUS – COIL_ITMY_LL	2048	yes	coil current readback, ITM Y, lower-left
22	H2 :: SUS – COIL_ITMY_LR	2048	yes	coil current readback, ITM Y, lower-right
23	H2 :: SUS – COIL_ITMY_S	2048	yes	coil current readback, ITM Y, side
24	H2 :: SUS – COIL_RM_UL	2048	yes	coil current readback, RM, upper-left
25	H2 :: SUS – COIL_RM_UR	2048	yes	coil current readback, RM, upper-right
26	H2 :: SUS – COIL_RM_LL	2048	yes	coil current readback, RM, lower-left
27	H2 :: SUS – COIL_RM_LR	2048	yes	coil current readback, RM, lower-right
28	H2 :: SUS – COIL_RM_S	2048	yes	coil current readback, RM, side
29	H2 :: SUS – COIL_BS_UL	2048	yes	coil current readback, BS, upper-left
30	H2 :: SUS – COIL_BS_UR	2048	yes	coil current readback, BS, upper-right
31	H2 :: SUS – COIL_BS_LL	2048	yes	coil current readback, BS, lower-left

Rack: **2X3**
DCU: **H2KDAQS2**
ADC: **2**

CH#	------	*Rate*	*Frame*	*Description*
0	H2 :: SUS – COIL_BS_LR	2048	yes	coil current readback, BS, lower-right
1	H2 :: SUS – COIL_BS_S	2048	yes	coil current readback, BS, side
2	H2 :: SUS – COIL_MC1_UL	2048	yes	coil current readback, mode cleaner 1, upper-left
3	H2 :: SUS – COIL_MC1_UR	2048	yes	coil current readback, mode cleaner 1, upper-right
4	H2 :: SUS – COIL_MC1_LL	2048	yes	coil current readback, mode cleaner 1, lower-left
5	H2 :: SUS – COIL_MC1_LR	2048	yes	coil current readback, mode cleaner 1, lower-right
6	H2 :: SUS – COIL_MC1_S	2048	yes	coil current readback, mode cleaner 1, side
7	H2 :: SUS – COIL_MC2_UL	2048	yes	coil current readback, mode cleaner 2, upper-left
8	H2 :: SUS – COIL_MC2_UR	2048	yes	coil current readback, mode cleaner 2, upper-right
9	H2 :: SUS – COIL_MC2_LL	2048	yes	coil current readback, mode cleaner 2, lower-left
10	H2 :: SUS – COIL_MC2_LR	2048	yes	coil current readback, mode cleaner 2, lower-right
11	H2 :: SUS – COIL_MC2_S	2048	yes	coil current readback, mode cleaner 2, side
12	H2 :: SUS – COIL_MC3_UL	2048	yes	coil current readback, mode cleaner 3, upper-left
13	H2 :: SUS – COIL_MC3_UR	2048	yes	coil current readback, mode cleaner 3, upper-right
14	H2 :: SUS – COIL_MC3_LL	2048	yes	coil current readback, mode cleaner 3, lower-left
15	H2 :: SUS – COIL_MC3_LR	2048	yes	coil current readback, mode cleaner 3, lower-right
16	H2 :: SUS – COIL_MC3_S	2048	yes	coil current readback, mode cleaner 3, side
17	H2 :: SUS – COIL_MMT1_UL	2048	no	coil current readback, mode matching 1, upper-left
18	H2 :: SUS – COIL_MMT1_UR	2048	no	coil current readback, mode matching 1, upper-right
19	H2 :: SUS – COIL_MMT1_LL	2048	no	coil current readback, mode matching 1, lower-left
20	H2 :: SUS – COIL_MMT1_LR	2048	no	coil current readback, mode matching 1, lower-right
21	H2 :: SUS – COIL_MMT1_S	2048	no	coil current readback, mode matching 1, side
22	H2 :: SUS – COIL_MMT2_UL	2048	no	coil current readback, mode matching 2, upper-left
23	H2 :: SUS – COIL_MMT2_UR	2048	no	coil current readback, mode matching 2, upper-right
24	H2 :: SUS – COIL_MMT2_LL	2048	no	coil current readback, mode matching 2, lower-left
25	H2 :: SUS – COIL_MMT2_LR	2048	no	coil current readback, mode matching 2, lower-right
26	H2 :: SUS – COIL_MMT2_S	2048	no	coil current readback, mode matching 2, side
27	H2 :: SUS – COIL_MMT3_UL	2048	no	coil current readback, mode matching 3, upper-left
28	H2 :: SUS – COIL_MMT3_UR	2048	no	coil current readback, mode matching 3, upper-right
29	H2 :: SUS – COIL_MMT3_LL	2048	no	coil current readback, mode matching 3, lower-left
30	H2 :: SUS – COIL_MMT3_LR	2048	no	coil current readback, mode matching 3, lower-right
31	H2 :: SUS – COIL_MMT3_S	2048	no	coil current readback, mode matching 3, side

Rack: **2X3**
DCU: **H2KDAQS2**
ADC: **3**

CH#	------	***Rate***	***Frame***	***Description***
0	H2 :: SUS – SENSOR_ITMX_UL	64	yes	local sensor, ITM X, upper-left
1	H2 :: SUS – SENSOR_ITMX_UR	64	yes	local sensor, ITM X, upper-right
2	H2 :: SUS – SENSOR_ITMX_LL	64	yes	local sensor, ITM X, lower-left
3	H2 :: SUS – SENSOR_ITMX_LR	64	yes	local sensor, ITM X, lower-right
4	H2 :: SUS – SENSOR_ITMX_S	64	yes	local sensor, ITM X, side
5	H2 :: SUS – SENSOR_ITMY_UL	64	yes	local sensor, ITM Y, upper-left
6	H2 :: SUS – SENSOR_ITMY_UR	64	yes	local sensor, ITM Y, upper-right
7	H2 :: SUS – SENSOR_ITMY_LL	64	yes	local sensor, ITM Y, lower-left
8	H2 :: SUS – SENSOR_ITMY_LR	64	yes	local sensor, ITM Y, lower-right
9	H2 :: SUS – SENSOR_ITMY_S	64	yes	local sensor, ITM Y, side
10	H2 :: SUS – SENSOR_RM_UL	64	yes	local sensor, RM, upper-left
11	H2 :: SUS – SENSOR_RM_UR	64	yes	local sensor, RM, upper-right
12	H2 :: SUS – SENSOR_RM_LL	64	yes	local sensor, RM, lower-left
13	H2 :: SUS – SENSOR_RM_LR	64	yes	local sensor, RM, lower-right
14	H2 :: SUS – SENSOR_RM_S	64	yes	local sensor, RM, side
15	H2 :: SUS – SENSOR_BS_UL	64	yes	local sensor, BS, upper-left
16	H2 :: SUS – SENSOR_BS_UR	64	yes	local sensor, BS, upper-right
17	H2 :: SUS – SENSOR_BS_LL	64	yes	local sensor, BS, lower-left
18	H2 :: SUS – SENSOR_BS_LR	64	yes	local sensor, BS, lower-right
19	H2 :: SUS – SENSOR_BS_S	64	yes	local sensor, BS, side
20	H2 :: SUS – SENSOR_MC1_UL	64	yes	local sensor, mode cleaner 1, upper-left
21	H2 :: SUS – SENSOR_MC1_UR	64	yes	local sensor, mode cleaner 1, upper-right
22	H2 :: SUS – SENSOR_MC1_LL	64	yes	local sensor, mode cleaner 1, lower-left
23	H2 :: SUS – SENSOR_MC1_LR	64	yes	local sensor, mode cleaner 1, lower-right
24	H2 :: SUS – SENSOR_MC1_S	64	yes	local sensor, mode cleaner 1, side
25	H2 :: SUS – SENSOR_MC2_UL	64	yes	local sensor, mode cleaner 2, upper-left
26	H2 :: SUS – SENSOR_MC2_UR	64	yes	local sensor, mode cleaner 2, upper-right
27	H2 :: SUS – SENSOR_MC2_LL	64	yes	local sensor, mode cleaner 2, lower-left
28	H2 :: SUS – SENSOR_MC2_LR	64	yes	local sensor, mode cleaner 2, lower-right
29	H2 :: SUS – SENSOR_MC2_S	64	yes	local sensor, mode cleaner 2, side
30	H2 :: SUS – SENSOR_MC3_UL	64	yes	local sensor, mode cleaner 3, upper-left
31	H2 :: SUS – SENSOR_MC3_UR	64	yes	local sensor, mode cleaner 3, upper-right

Rack: **2X3**
DCU: **H2KDAQS3**
ADC: **1**

CH#	------	*Rate*	*Frame*	*Description*
0	H2 :: SUS – COIL_FMX_UL	2048	yes	coil current readback, FMX, upper-left
1	H2 :: SUS – COIL_FMX_UR	2048	yes	coil current readback, FMX, upper-right
2	H2 :: SUS – COIL_FMX_LL	2048	yes	coil current readback, FMX, lower-left
3	H2 :: SUS – COIL_FMX_LR	2048	yes	coil current readback, FMX, lower-right
4	H2 :: SUS – COIL_FMX_S	2048	yes	coil current readback, FMX, side
5	H2 :: SUS – COIL_FMY_UL	2048	yes	coil current readback, FMY, upper-left
6	H2 :: SUS – COIL_FMY_UR	2048	yes	coil current readback, FMY, upper-right
7	H2 :: SUS – COIL_FMY_LL	2048	yes	coil current readback, FMY, lower-left
8	H2 :: SUS – COIL_FMY_LR	2048	yes	coil current readback, FMY, lower-right
9	H2 :: SUS – COIL_FMY_S	2048	yes	coil current readback, FMY, side
10	H2 :: SUS – COIL_FM1_UL	2048	no	coil current readback, folding mirror 1, upper-left
11	H2 :: SUS – COIL_FM1_UR	2048	no	coil current readback, folding mirror 1, upper-right
12	H2 :: SUS – COIL_FM1_LL	2048	no	coil current readback, folding mirror 1, lower-left
13	H2 :: SUS – COIL_FM1_LR	2048	no	coil current readback, folding mirror 1, lower-right
14	H2 :: SUS – COIL_FM1_S	2048	no	coil current readback, folding mirror 1, side
15	H2 :: SUS – COIL_FM2_UL	2048	no	coil current readback, folding mirror 2, upper-left
16	H2 :: SUS – COIL_FM2_UR	2048	no	coil current readback, folding mirror 2, upper-right
17	H2 :: SUS – COIL_FM2_LL	2048	no	coil current readback, folding mirror 2, lower-left
18	H2 :: SUS – COIL_FM2_LR	2048	no	coil current readback, folding mirror 2, lower-right
19	H2 :: SUS – COIL_FM2_S	2048	no	coil current readback, folding mirror 2, side
20	H2 :: SUS – SENSOR_FMX_UL	64	yes	local sensor, FMX, upper-left
21	H2 :: SUS – SENSOR_FMX_UR	64	yes	local sensor, FMX, upper-right
22	H2 :: SUS – SENSOR_FMX_LL	64	yes	local sensor, FMX, lower-left
23	H2 :: SUS – SENSOR_FMX_LR	64	yes	local sensor, FMX, lower-right
24	H2 :: SUS – SENSOR_FMX_S	64	yes	local sensor, FMX, side
25	H2 :: SUS – SENSOR_FMY_UL	64	yes	local sensor, FMY, upper-left
26	H2 :: SUS – SENSOR_FMY_UR	64	yes	local sensor, FMY, upper-right
27	H2 :: SUS – SENSOR_FMY_LL	64	yes	local sensor, FMY, lower-left
28	H2 :: SUS – SENSOR_MC3_LL	64	yes	local sensor, mode cleaner 3, lower-left
29	H2 :: SUS – SENSOR_MC3_LR	64	yes	local sensor, mode cleaner 3, lower-right
30	H2 :: SUS – SENSOR_MC3_S	64	yes	local sensor, mode cleaner 3, side
31	H2 :: SUS – SENSOR_MMT1_UL	64	yes	local sensor, mode matching 1, upper-left

Rack: **2X3**
DCU: **H2KDAQS3**
ADC: **2**

CH#	------	*Rate*	*Frame*	*Description*
0	H2 :: SUS – SENSOR_FMY_LR	64	yes	local sensor, FMY, lower-right
1	H2 :: SUS – SENSOR_FMY_S	64	yes	local sensor, FMY, side
2	H2 :: SUS – SENSOR_FM1_UL	64	yes	local sensor, folding mirror 1, upper-left
3	H2 :: SUS – SENSOR_FM1_UR	64	yes	local sensor, folding mirror 1, upper-right
4	H2 :: SUS – SENSOR_FM1_LL	64	yes	local sensor, folding mirror 1, lower-left
5	H2 :: SUS – SENSOR_FM1_LR	64	yes	local sensor, folding mirror 1, lower-right
6	H2 :: SUS – SENSOR_FM1_S	64	yes	local sensor, folding mirror 1, side
7	H2 :: SUS – SENSOR_FM2_UL	64	yes	local sensor, folding mirror 2, upper-left
8	H2 :: SUS – SENSOR_FM2_UR	64	yes	local sensor, folding mirror 2, upper-right
9	H2 :: SUS – SENSOR_FM2_LL	64	yes	local sensor, folding mirror 2, lower-left
10	H2 :: SUS – SENSOR_FM2_LR	64	yes	local sensor, folding mirror 2, lower-right
11	H2 :: SUS – SENSOR_FM2_S	64	yes	local sensor, folding mirror 2, side
12	H2 :: SUS – SENSOR_MMT1_UR	64	yes	local sensor, mode matching 1, upper-right
13	H2 :: SUS – SENSOR_MMT1_LL	64	yes	local sensor, mode matching 1, lower-left
14	H2 :: SUS – SENSOR_MMT1_LR	64	yes	local sensor, mode matching 1, lower-right
15	H2 :: SUS – SENSOR_MMT1_S	64	yes	local sensor, mode matching 1, side
16	H2 :: SUS – SENSOR_MMT2_UL	64	yes	local sensor, mode matching 2, upper-left
17	H2 :: SUS – SENSOR_MMT2_UR	64	yes	local sensor, mode matching 2, upper-right
18	H2 :: SUS – SENSOR_MMT2_LL	64	yes	local sensor, mode matching 2, lower-left
19	H2 :: SUS – SENSOR_MMT2_LR	64	yes	local sensor, mode matching 2, lower-right
20	H2 :: SUS – SENSOR_MMT2_S	64	yes	local sensor, mode matching 2, side
21	H2 :: SUS – SENSOR_MMT3_UL	64	yes	local sensor, mode matching 3, upper-left
22	H2 :: SUS – SENSOR_MMT3_UR	64	yes	local sensor, mode matching 3, upper-right
23	H2 :: SUS – SENSOR_MMT3_LL	64	yes	local sensor, mode matching 3, lower-left
24	H2 :: SUS – SENSOR_MMT3_LR	64	yes	local sensor, mode matching 3, lower-right
25	H2 :: SUS – SENSOR_MMT3_S	64	yes	local sensor, mode matching 3, side
26	H2 :: LSC – LASER_FREQUENCY	16384	yes	control signal for laser frequency
27	H2 :: LSC – POWER_ANTISYMM	16384	yes	beam intensity at the antisymmetric port
28	H2 :: LSC – POWER_REFLECTION	16384	yes	beam intensity in reflection
29	H2 :: LSC – POWER_PICKOFF	16384	yes	beam intensity inside the recycling cavity
30	H2 :: LSC – MODULATION_SB	16384	yes	modulation depth of res. sidebands
31				

2.4. Rack 1X22, H4KDAQS1 & H4KDAQS2

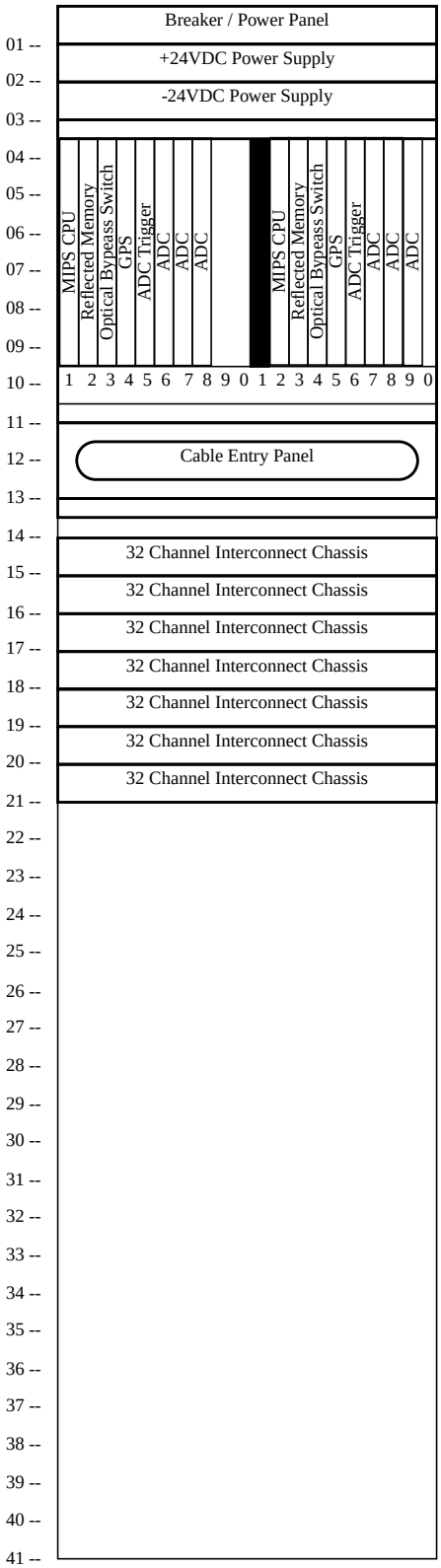

Table 4: DAQS Rack 1X22 Parts List / Cost

Description	Vendor	Unit	Qty	Extd
Breaker Panel		$200	1	$200
24 VDC Power Supply	Power 10	$1050	2	$2,100
VME Crate		$3,200	1	$3,200
Cable Entry Panel		$50	1	$50
32 Channel Interconnect	LIGO	$800	5	$4,000
MIPS Processor	Heurikon	$6000	2	$12,000
Reflected Memory (2Mbyte)	VMIC	$7,400	2	$14,800
Optical Bypass Switch	VMIC	$1,200	2	$2,400
GPS		$1,200	2	$2,400
ADC Trigger	LIGO	$400	2	$800
32 Channel ADC	ICS	$16,000	6	$96,000
Total				$137,950

LIGO-DRAFT

Rack: **1X22**
DCU: **H4KDAQS1**
ADC: **1**

CH#	------	*Rate*	*Frame*	*Description*
0	H1 :: SUS – COIL_ITMX_SUM	16384	yes	coil current readback, ITM X, sum
1	H1 :: SUS – COIL_ITMY_SUM	16384	yes	coil current readback, ITM Y, sum
2	H1 :: SUS – COIL_RM_SUM	16384	yes	coil current readback, RM, sum
3	H1 :: SUS – COIL_BS_SUM	16384	yes	coil current readback, BS, sum
4	H1 :: SUS – COIL_MC1_SUM	16384	yes	coil current readback, mode cleaner 1, sum
5	H1 :: SUS – COIL_MC2_SUM	16384	yes	coil current readback, mode cleaner 2, sum
6	H1 :: SUS – COIL_MC3_SUM	16384	yes	coil current readback, mode cleaner 3, sum
7	H1 :: SUS – COIL_FM1_SUM	16384	no	coil current readback, folding mirror 1, sum
8	H1 :: SUS – COIL_MMT1_SUM	16384	no	coil current readback, mode matching 1, sum
9	H1 :: SUS – COIL_MMT2_SUM	16384	no	coil current readback, mode matching 2, sum
10	H1 :: SUS – COIL_MMT3_SUM	16384	no	coil current readback, mode matching 3, sum
11	H1 :: SUS – COIL_ITMX_UL	2048	yes	coil current readback, ITM X, upper-left
12	H1 :: SUS – COIL_ITMX_UR	2048	yes	coil current readback, ITM X, upper-right
13	H1 :: SUS – COIL_ITMX_LL	2048	yes	coil current readback, ITM X, lower-left
14	H1 :: SUS – COIL_ITMX_LR	2048	yes	coil current readback, ITM X, lower-right
15	H1 :: SUS – COIL_ITMX_S	2048	yes	coil current readback, ITM X, side
16	H1 :: SUS – COIL_ITMY_UL	2048	yes	coil current readback, ITM Y, upper-left
17	H1 :: SUS – COIL_ITMY_UR	2048	yes	coil current readback, ITM Y, upper-right
18	H1 :: SUS – COIL_ITMY_LL	2048	yes	coil current readback, ITM Y, lower-left
19	H1 :: SUS – COIL_ITMY_LR	2048	yes	coil current readback, ITM Y, lower-right
20	H1 :: SUS – COIL_ITMY_S	2048	yes	coil current readback, ITM Y, side
21	H1 :: SUS – COIL_RM_UL	2048	yes	coil current readback, RM, upper-left
22	H1 :: SUS – COIL_RM_UR	2048	yes	coil current readback, RM, upper-right
23	H1 :: SUS – COIL_RM_LL	2048	yes	coil current readback, RM, lower-left
24	H1 :: SUS – COIL_RM_LR	2048	yes	coil current readback, RM, lower-right
25	H1 :: SUS – COIL_RM_S	2048	yes	coil current readback, RM, side
26	H1 :: SUS – COIL_BS_UL	2048	yes	coil current readback, BS, upper-left
27	H1 :: SUS – COIL_BS_UR	2048	yes	coil current readback, BS, upper-right
28	H1 :: SUS – COIL_BS_LL	2048	yes	coil current readback, BS, lower-left
29	H1 :: SUS – COIL_BS_LR	2048	yes	coil current readback, BS, lower-right
30	H1 :: SUS – COIL_BS_S	2048	yes	coil current readback, BS, side
31	H1 :: SUS – COIL_MC1_UL	2048	yes	coil current readback, mode cleaner 1, upper-left

Rack: **1X22**
DCU: **H4KDAQS1**
ADC: **2**

CH#	*------*	*Rate*	*Frame*	*Description*
0	H1 :: SUS – COIL_MC1_UR	2048	yes	coil current readback, mode cleaner 1, upper-right
1	H1 :: SUS – COIL_MC1_LL	2048	yes	coil current readback, mode cleaner 1, lower-left
2	H1 :: SUS – COIL_MC1_LR	2048	yes	coil current readback, mode cleaner 1, lower-right
3	H1 :: SUS – COIL_MC1_S	2048	yes	coil current readback, mode cleaner 1, side
4	H1 :: SUS – COIL_MC2_UL	2048	yes	coil current readback, mode cleaner 2, upper-left
5	H1 :: SUS – COIL_MC2_UR	2048	yes	coil current readback, mode cleaner 2, upper-right
6	H1 :: SUS – COIL_MC2_LL	2048	yes	coil current readback, mode cleaner 2, lower-left
7	H1 :: SUS – COIL_MC2_LR	2048	yes	coil current readback, mode cleaner 2, lower-right
8	H1 :: SUS – COIL_MC2_S	2048	yes	coil current readback, mode cleaner 2, side
9	H1 :: SUS – COIL_MC3_UL	2048	yes	coil current readback, mode cleaner 3, upper-left
10	H1 :: SUS – COIL_MC3_UR	2048	yes	coil current readback, mode cleaner 3, upper-right
11	H1 :: SUS – COIL_MC3_LL	2048	yes	coil current readback, mode cleaner 3, lower-left
12	H1 :: SUS – COIL_MC3_LR	2048	yes	coil current readback, mode cleaner 3, lower-right
13	H1 :: SUS – COIL_MC3_S	2048	yes	coil current readback, mode cleaner 3, side
14	H1 :: SUS – COIL_FM1_UL	2048	no	coil current readback, folding mirror 1, upper-left
15	H1 :: SUS – COIL_FM1_UR	2048	no	coil current readback, folding mirror 1, upper-right
16	H1 :: SUS – COIL_FM1_LL	2048	no	coil current readback, folding mirror 1, lower-left
17	H1 :: SUS – COIL_FM1_LR	2048	no	coil current readback, folding mirror 1, lower-right
18	H1 :: SUS – COIL_FM1_S	2048	no	coil current readback, folding mirror 1, side
19	H1 :: SUS – COIL_MMT1_UL	2048	no	coil current readback, mode matching 1, upper-left
20	H1 :: SUS – COIL_MMT1_UR	2048	no	coil current readback, mode matching 1, upper-right
21	H1 :: SUS – COIL_MMT1_LL	2048	no	coil current readback, mode matching 1, lower-left
22	H1 :: SUS – COIL_MMT1_LR	2048	no	coil current readback, mode matching 1, lower-right
23	H1 :: SUS – COIL_MMT1_S	2048	no	coil current readback, mode matching 1, side
24	H1 :: SUS – COIL_MMT2_UL	2048	no	coil current readback, mode matching 2, upper-left
25	H1 :: SUS – COIL_MMT2_UR	2048	no	coil current readback, mode matching 2, upper-right
26	H1 :: SUS – COIL_MMT2_LL	2048	no	coil current readback, mode matching 2, lower-left
27	H1 :: SUS – COIL_MMT2_LR	2048	no	coil current readback, mode matching 2, lower-right
28	H1 :: SUS – COIL_MMT2_S	2048	no	coil current readback, mode matching 2, side
29	H1 :: SUS – COIL_MMT3_UL	2048	no	coil current readback, mode matching 3, upper-left
30	H1 :: SUS – COIL_MMT3_UR	2048	no	coil current readback, mode matching 3, upper-right
31	H1 :: SUS – COIL_MMT3_LL	2048	no	coil current readback, mode matching 3, lower-left

Rack: **1X22**
DCU: **H4KDAQS1**
ADC: **3**

CH#	------	*Rate*	*Frame*	*Description*
0	H1 :: SUS – COIL_MMT3_LR	2048	no	coil current readback, mode matching 3, lower-right
1	H1 :: SUS – COIL_MMT3_S	2048	no	coil current readback, mode matching 3, side
2	H1 :: SUS – SENSOR_ITMX_UL	64	yes	local sensor, ITM X, upper-left
3	H1 :: SUS – SENSOR_ITMX_UR	64	yes	local sensor, ITM X, upper-right
4	H1 :: SUS – SENSOR_ITMX_LL	64	yes	local sensor, ITM X, lower-left
5	H1 :: SUS – SENSOR_ITMX_LR	64	yes	local sensor, ITM X, lower-right
6	H1 :: SUS – SENSOR_ITMX_S	64	yes	local sensor, ITM X, side
7	H1 :: SUS – SENSOR_ITMY_UL	64	yes	local sensor, ITM Y, upper-left
8	H1 :: SUS – SENSOR_ITMY_UR	64	yes	local sensor, ITM Y, upper-right
9	H1 :: SUS – SENSOR_ITMY_LL	64	yes	local sensor, ITM Y, lower-left
10	H1 :: SUS – SENSOR_ITMY_LR	64	yes	local sensor, ITM Y, lower-right
11	H1 :: SUS – SENSOR_ITMY_S	64	yes	local sensor, ITM Y, side
12	H1 :: SUS – SENSOR_RM_UL	64	yes	local sensor, RM, upper-left
13	H1 :: SUS – SENSOR_RM_UR	64	yes	local sensor, RM, upper-right
14	H1 :: SUS – SENSOR_RM_LL	64	yes	local sensor, RM, lower-left
15	H1 :: SUS – SENSOR_RM_LR	64	yes	local sensor, RM, lower-right
16	H1 :: SUS – SENSOR_RM_S	64	yes	local sensor, RM, side
17	H1 :: SUS – SENSOR_BS_UL	64	yes	local sensor, BS, upper-left
18	H1 :: SUS – SENSOR_BS_UR	64	yes	local sensor, BS, upper-right
19	H1 :: SUS – SENSOR_BS_LL	64	yes	local sensor, BS, lower-left
20	H1 :: SUS – SENSOR_BS_LR	64	yes	local sensor, BS, lower-right
21	H1 :: SUS – SENSOR_BS_S	64	yes	local sensor, BS, side
22	H1 :: SUS – SENSOR_MC1_UL	64	yes	local sensor, mode cleaner 1, upper-left
23	H1 :: SUS – SENSOR_MC1_UR	64	yes	local sensor, mode cleaner 1, upper-right
24	H1 :: SUS – SENSOR_MC1_LL	64	yes	local sensor, mode cleaner 1, lower-left
25	H1 :: SUS – SENSOR_MC1_LR	64	yes	local sensor, mode cleaner 1, lower-right
26	H1 :: SUS – SENSOR_MC1_S	64	yes	local sensor, mode cleaner 1, side
27	H1 :: SUS – SENSOR_MC2_UL	64	yes	local sensor, mode cleaner 2, upper-left
28	H1 :: SUS – SENSOR_MC2_UR	64	yes	local sensor, mode cleaner 2, upper-right
29	H1 :: SUS – SENSOR_MC2_LL	64	yes	local sensor, mode cleaner 2, lower-left
30	H1 :: SUS – SENSOR_MC2_LR	64	yes	local sensor, mode cleaner 2, lower-right
31	H1 :: SUS – SENSOR_MC2_S	64	yes	local sensor, mode cleaner 2, side

Rack: **1X22**
DCU: **H4KDAQS2**
ADC: **1**

CH#	------	*Rate*	*Frame*	*Description*
0	H1 :: SUS – SENSOR_MC3_UL	64	yes	local sensor, mode cleaner 3, upper-left
1	H1 :: SUS – SENSOR_MC3_UR	64	yes	local sensor, mode cleaner 3, upper-right
2	H1 :: SUS – SENSOR_MC3_LL	64	yes	local sensor, mode cleaner 3, lower-left
3	H1 :: SUS – SENSOR_MC3_LR	64	yes	local sensor, mode cleaner 3, lower-right
4	H1 :: SUS – SENSOR_MC3_S	64	yes	local sensor, mode cleaner 3, side
5	H1 :: SUS – SENSOR_MMT1_UL	64	yes	local sensor, mode matching 1, upper-left
6	H1 :: SUS – SENSOR_MMT1_UR	64	yes	local sensor, mode matching 1, upper-right
7	H1 :: SUS – SENSOR_MMT1_LL	64	yes	local sensor, mode matching 1, lower-left
8	H1 :: SUS – SENSOR_MMT1_LR	64	yes	local sensor, mode matching 1, lower-right
9	H1 :: SUS – SENSOR_MMT1_S	64	yes	local sensor, mode matching 1, side
10	H1 :: SUS – SENSOR_MMT2_UL	64	yes	local sensor, mode matching 2, upper-left
11	H1 :: SUS – SENSOR_MMT2_UR	64	yes	local sensor, mode matching 2, upper-right
12	H1 :: SUS – SENSOR_MMT2_LL	64	yes	local sensor, mode matching 2, lower-left
13	H1 :: SUS – SENSOR_MMT2_LR	64	yes	local sensor, mode matching 2, lower-right
14	H1 :: SUS – SENSOR_MMT2_S	64	yes	local sensor, mode matching 2, side
15	H1 :: SUS – SENSOR_MMT3_UL	64	yes	local sensor, mode matching 3, upper-left
16	H1 :: SUS – SENSOR_MMT3_UR	64	yes	local sensor, mode matching 3, upper-right
17	H1 :: SUS – SENSOR_MMT3_LL	64	yes	local sensor, mode matching 3, lower-left
18	H1 :: SUS – SENSOR_MMT3_LR	64	yes	local sensor, mode matching 3, lower-right
19	H1 :: SUS – SENSOR_MMT3_S	64	yes	local sensor, mode matching 3, side
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21				
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27	H1 :: LSC – LASER_FREQUENCY	16384	yes	control signal for laser frequency
28	H1 :: LSC – POWER_ANTISYMM	16384	yes	beam intensity at the antisymmetric port
29	H1 :: LSC – POWER_REFLECTION	16384	yes	beam intensity in reflection
30	H1 :: LSC – POWER_PICKOFF	16384	yes	beam intensity inside the recycling cavity
31	H1 :: LSC – MODULATION_SB	16384	yes	modulation depth of res. sidebands

Rack: **1X22**
DCU: **H4KDAQS2**
ADC: **2**

CH#	------					*Rate*	*Frame*	*Description*
0	H1	::	IOO	–	WFS_MC1_R_I	256	no	MC wavefront sensor 1, right segment, I-phase
1	H1	::	IOO	–	WFS_MC1_T_I	256	no	MC wavefront sensor 1, top segment, I-phase
2	H1	::	IOO	–	WFS_MC1_L_I	256	no	MC wavefront sensor 1, left segment, I-phase
3	H1	::	IOO	–	WFS_MC1_B_I	256	no	MC wavefront sensor 1, bottom segment, I-phase
4	H1	::	IOO	–	WFS_MC1_R_Q	256	no	MC wavefront sensor 1, right segment, Q-phase
5	H1	::	IOO	–	WFS_MC1_T_Q	256	no	MC wavefront sensor 1, top segment, Q-phase
6	H1	::	IOO	–	WFS_MC1_L_Q	256	no	MC wavefront sensor 1, left segment, Q-phase
7	H1	::	IOO	–	WFS_MC1_B_Q	256	no	MC wavefront sensor 1, bottom segment, Q-phase
8	H1	::	IOO	–	WFS_MC2_R_I	256	no	MC wavefront sensor 2, right segment, I-phase
9	H1	::	IOO	–	WFS_MC2_T_I	256	no	MC wavefront sensor 2, top segment, I-phase
10	H1	::	IOO	–	WFS_MC2_L_I	256	no	MC wavefront sensor 2, left segment, I-phase
11	H1	::	IOO	–	WFS_MC2_B_I	256	no	MC wavefront sensor 2, bottom segment, I-phase
12	H1	::	IOO	–	WFS_MC2_R_Q	256	no	MC wavefront sensor 2, right segment, Q-phase
13	H1	::	IOO	–	WFS_MC2_T_Q	256	no	MC wavefront sensor 2, top segment, Q-phase
14	H1	::	IOO	–	WFS_MC2_L_Q	256	no	MC wavefront sensor 2, left segment, Q-phase
15	H1	::	IOO	–	WFS_MC2_B_Q	256	no	MC wavefront sensor 2, bottom segment, Q-phase
16	H1	::	PSL	–	PMC_DC	16	yes	
17	H1	::	PSL	–	REFCAV_DC	16	yes	
18	H1	::	PSL	–	REFCAV_TRANS	16	yes	
19	H1	::	PSL	–	LASER_FREQUENCY_SLOW	256	yes	
20	H1	::	PSL	–	PMC_TRANS	16	yes	
21	H1	::	PSL	–	REFCAV_I	16384	yes	
22	H1	::	PSL	–	LASER_FREQUENCY_EOM	16384	yes	
23	H1	::	PSL	–	LASER_FREQUENCY_FAST	16384	yes	
24	H1	::	PSL	–	LASER_FREQUENCY_AOM	16384	yes	
25	H1	::	PSL	–	LASER_POWER	16384	yes	
26	H1	::	PSL	–	PMC_I	16384	yes	
27	H1	::	PSL	–	LASER_POWER_RAW	16384	yes	
28	H1	::	PSL	–	LASER_FREQUENCY_AOM_OFS	16384	no	
29	H1	::	PSL	–	LASER_POWER_OFS	16384	no	
30								
31								

Rack: **1X22**
DCU: **H4KDAQS2**
ADC: **3**

CH#	------	*Rate*	*Frame*	*Description*
0	H1 :: IOO – MODECLEANER	16384	yes	mode cleaner length sensor, I-phase
1	H1 :: IOO – MODECLEANER_Q	16384	yes	mode cleaner length sensor, Q-phase
2	H1 :: IOO – LASER_FREQUENCY_MC	16384	yes	control signal for laser frequency
3	H1 :: IOO – TEST_OUT1	16384	yes	servo test signal after error signal summing junction
4	H1 :: IOO – TEST_OUT2	16384	yes	servo test signal before feedback split MC/laser
5	H1 :: IOO – MODECLEANER_I_OFS	16384	no	stimulus for mode cleaner length error signal
6	H1 :: IOO – LENGTH_MODECLEANER_OFS	16384	no	stimulus for control signal for mode cleaner length
7	H1 :: IOO – TEST_IN2	16384	no	stimulus after servo feedback split: laser path
8	H1 :: IOO – LENGTH_MODECLEANER	256	yes	control signal for mode cleaner length
9	H1 :: IOO – TEST_IN1	256	no	stimulus after servo feedback split: MC path
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2.5. Mid & End Stations, Rack 1X17, 1Y18, 1X20, 1Y21

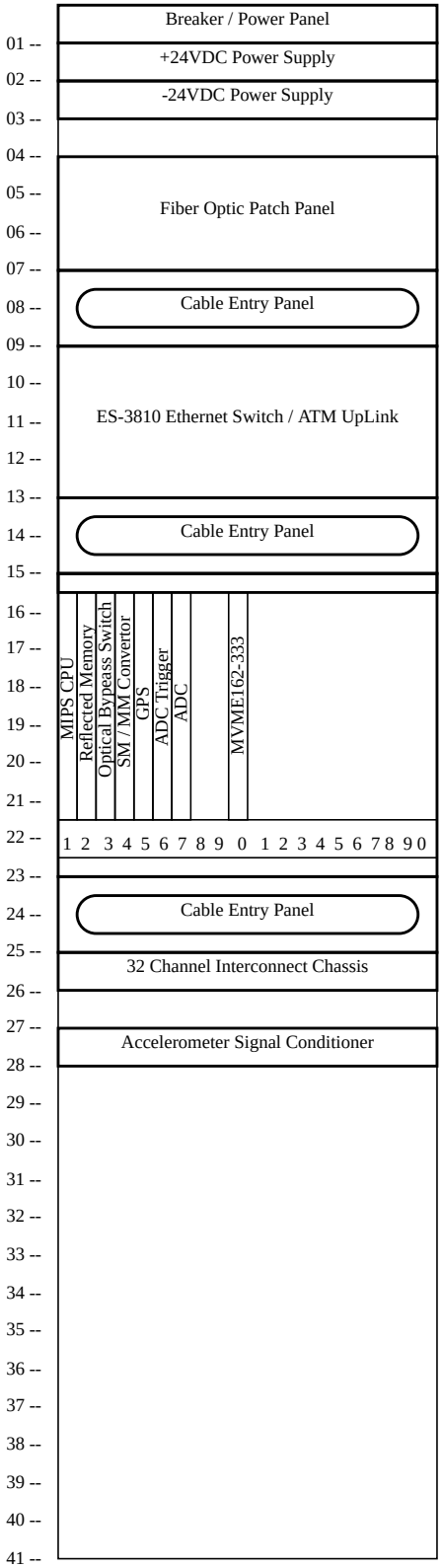

Table 5: DAQS Mid/End Station Rack Parts List / Cost

Description	Vendor	Unit	Qty	Extd
Breaker Panel		$600	1	$600
24 VDC Power Supply	Power 10	$1050	2	$2,100
VME Crate		$3,200	1	$3,200
Cable Entry Panel	LIGO	$50	1	$50
GPS		$1,200	1	$1,200
32 Channel Interconnect	LIGO	$900	2	$1,800
MIPS Processor	Heurikon	$6000	1	$6,000
Reflected Memory (2Mbyte)	VMIC	$7,400	1	$7,400
Optical Bypass Switch	VMIC	$1,200	1	$1,200
Single Mode to Multi-mode Fibre Convertor	VMIC	$6,400	1	$6,400
ADC Trigger	LIGO	$400	1	$400
32 Channel ADC	ICS	$16,000	1	$16,000
MVME162-333 Processor	Motorola	$4,500	1	$4,500
Total				$50,850

LIGO-DRAFT

Rack: **1X17**
DCU: **H2KDAQS4**
ADC: **1**

CH#	------	*Rate*	*Frame*	*Description*
0	H2 :: SUS – COIL_ETMX_UL	2048	yes	coil current readback, ETM X, upper-left
1	H2 :: SUS – COIL_ETMX_UR	2048	yes	coil current readback, ETM X, upper-right
2	H2 :: SUS – COIL_ETMX_LL	2048	yes	coil current readback, ETM X, lower-left
3	H2 :: SUS – COIL_ETMX_LR	2048	yes	coil current readback, ETM X, lower-right
4	H2 :: SUS – COIL_ETMX_S	2048	yes	coil current readback, ETM X, side
5	H2 :: SUS – COIL_ETMX_SUM	16384	yes	coil current readback, ETM X, sum
6	H2 :: SUS – SENSOR_ETMX_UL	64	yes	local sensor, ETM X, upper-left
7	H2 :: SUS – SENSOR_ETMX_UR	64	yes	local sensor, ETM X, upper-right
8	H2 :: SUS – SENSOR_ETMX_LL	64	yes	local sensor, ETM X, lower-left
9	H2 :: SUS – SENSOR_ETMX_LR	64	yes	local sensor, ETM X, lower-right
10	H2 :: SUS – SENSOR_ETMX_S	64	yes	local sensor, ETM X, side
11	H2 :: LSC – POWER_ARMX	16384	yes	beam intensity in transmission of ETM X
12	H2 :: LSC – CALIBRATION_ETMX	16384	yes	photon calibrator photodiode, ETM X
13	HPM :: PEM – SEIS_Ma_X	256	yes	mid station 'a' seismometer, x direction
14	HPM :: PEM – SEIS_Ma_Y	256	yes	mid station 'a' seismometer, y direction
15	HPM :: PEM – SEIS_Ma_Z	256	yes	mid station 'a' seismometer, z direction
16	HPM :: PEM – TILT_Ma_X	256	yes	mid station 'a' tiltmeter, about x
17	HPM :: PEM – TILT_Ma_Y	256	yes	mid station 'a' tiltmeter, about y
18	HPM :: PEM – ACC_BSC5_X	2048	yes	accelerometer signal, BSC5, x
19	HPM :: PEM – ACC_BSC5_Y	2048	yes	accelerometer signal, BSC5, y
20	HPM PEM – ACC_BSC5_Z	2048	yes	accelerometer signal, BSC5, z
21	HPM :: PEM – ACC_BT_4X	2048	yes	accel. sig.,beam tube,triaxial unit 4,x
22	HPM :: PEM – ACC_BT_4Y	2048	yes	accel. sig.,beam tube,triaxial unit 4,y
23	HPM :: PEM – ACC_BT_4Z	2048	yes	accel. sig.,beam tube,triaxial unit 4,z
24	HPM :: PEM – ACC_BT_5X	2048	yes	accel. sig.,beam tube,triaxial unit 5,x
25	HPM :: PEM – ACC_BT_5Y	2048	yes	accel. sig.,beam tube,triaxial unit 5,y
26	HPM :: PEM – ACC_BT_5Z	2048	yes	accel. sig.,beam tube,triaxial unit 5,z
27	HPM :: PEM – MIC_BSC5	2048	yes	microphone, BSC5
28	HPM :: PEM – MIC_BT4	2048	yes	microphone, beam tube, unit 4
29	HPM :: PEM – MIC_BT5	2048	yes	microphone, beam tube, unit 5
30				
31				

Rack: **1Y18**
DCU: **H2KDAQS5**
ADC: **1**

CH#	*------*	*Rate*	*Frame*	*Description*
0	H2 :: SUS – COIL_ETMY_UL	2048	yes	coil current readback, ETM Y, upper-left
1	H2 :: SUS – COIL_ETMY_UR	2048	yes	coil current readback, ETM Y, upper-right
2	H2 :: SUS – COIL_ETMY_LL	2048	yes	coil current readback, ETM Y, lower-left
3	H2 :: SUS – COIL_ETMY_LR	2048	yes	coil current readback, ETM Y, lower-right
4	H2 :: SUS – COIL_ETMY_S	2048	yes	coil current readback, ETM Y, side
5	H2 :: SUS – COIL_ETMY_SUM	16384	yes	coil current readback, ETM Y, sum
6	H2 :: SUS – SENSOR_ETMY_UL	64	yes	local sensor, ETM Y, upper-left
7	H2 :: SUS – SENSOR_ETMY_UR	64	yes	local sensor, ETM Y, upper-right
8	H2 :: SUS – SENSOR_ETMY_LL	64	yes	local sensor, ETM Y, lower-left
9	H2 :: SUS – SENSOR_ETMY_LR	64	yes	local sensor, ETM Y, lower-right
10	H2 :: SUS – SENSOR_ETMY_S	64	yes	local sensor, ETM Y, side
11	H2 :: LSC – POWER_ARMY	16384	yes	beam intensity in transmission of ETM Y
12	H2 :: LSC – CALIBRATION_ETMY	16384	yes	photon calibrator photodiode, ETM Y
13	HPM :: PEM – SEIS_Mb_X	256	yes	mid station 'b' seismometer, x direction
14	HPM :: PEM – SEIS_Mb_Y	256	yes	mid station 'b' seismometer, y direction
15	HPM :: PEM – SEIS_Mb_Z	256	yes	mid station 'b' seismometer, z direction
16	HPM :: PEM – TILT_Mb_X	256	yes	mid station 'b' tiltmeter, about x
17	HPM :: PEM – TILT_Mb_Y	256	yes	mid station 'b' tiltmeter, about y
18	HPM :: PEM – ACC_BSC6_X	2048	yes	accelerometer signal, BSC6, x
19	HPM :: PEM – ACC_BSC6_Y	2048	yes	accelerometer signal, BSC6, y
20	HPM :: PEM – ACC_BSC6_Z	2048	yes	accelerometer signal, BSC6, z
21	HPM :: PEM – MIC_BSC6	2048	yes	microphone, BSC6
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24				
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27				
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29				
30				
31				

Rack: **1X20**
DCU: **H4KDAQS3**
ADC: **1**

CH#	*------*	*Rate*	*Frame*	*Description*
0	H1 :: SUS – COIL_ETMX_UL	2048	yes	
1	H1 :: SUS – COIL_ETMX_UR	2048	yes	
2	H1 :: SUS – COIL_ETMX_LL	2048	yes	
3	H1 :: SUS – COIL_ETMX_LR	2048	yes	
4	H1 :: SUS – COIL_ETMX_S	2048	yes	
5	H1 :: SUS – COIL_ETMX_SUM	16384	yes	
6	HPM :: PEM – ACC_BSC9_1X	2048	yes	accelerometer signal, BSC9, triaxial unit 1, x
7	HPM :: PEM – ACC_BSC9_1Y	2048	yes	accelerometer signal, BSC9, triaxial unit 1, y
8	HPM :: PEM – ACC_BSC9_1Z	2048	yes	accelerometer signal, BSC9, triaxial unit 1, z
9	HPM :: PEM – ACC_BSC9_2X	2048	yes	accelerometer signal, BSC9, triaxial unit 2, x
10	HPM :: PEM – ACC_BSC9_2Y	2048	yes	accelerometer signal, BSC9, triaxial unit 2, y
11	HPM :: PEM – ACC_BSC9_2Z	2048	yes	accelerometer signal, BSC9, triaxial unit 2, z
12	HPM :: PEM – MIC_BSC9	2048	yes	microphone, BSC9
13	HPM :: PEM – MAG_BSC9_X	2048	yes	magnetometer, BSC9, x direction
14	HPM :: PEM – MAG_BSC9_Y	2048	yes	magnetometer, BSC9, y direction
15	HPM :: PEM – MAG_BSC9_Z	2048	yes	magnetometer, BSC9, z direction
16	H1 :: SUS – SENSOR_ETMX_UL	64	yes	
17	H1 :: SUS – SENSOR_ETMX_UR	64	yes	
18	H1 :: SUS – SENSOR_ETMX_LL	64	yes	
19	H1 :: SUS – SENSOR_ETMX_LR	64	yes	
20	H1 :: SUS – SENSOR_ETMX_S	64	yes	
21	HPM :: PEM – SEIS_Ea_X	256	yes	end station 'a' seismometer, x direction
22	HPM :: PEM – SEIS_Ea_Y	256	yes	end station 'a' seismometer, y direction
23	HPM :: PEM – SEIS_Ea_Z	256	yes	end station 'a' seismometer, z direction
24	HPM :: PEM – TILT_Ea_X	256	yes	end station 'a' tiltmeter, about x
25	HPM :: PEM – TILT_Ea_Y	256	yes	end station 'a' tiltmeter, about y
26	H1 :: LSC – POWER_ARMX	16384	yes	beam intensity in transmission of ETM X
27	H1 :: LSC – CALIBRATION_ETMX	16384	yes	photon calibrator photodiode, ETM X
28				
29				
30				
31				

Rack: **1Y21**
DCU: **H4KDAQS4**
ADC: **1**

CH#	*------*	*Rate*	*Frame*	*Description*
0	H1 :: SUS – COIL_ETMY_UL	2048	yes	
1	H1 :: SUS – COIL_ETMY_UR	2048	yes	
2	H1 :: SUS – COIL_ETMY_LL	2048	yes	
3	H1 :: SUS – COIL_ETMY_LR	2048	yes	
4	H1 :: SUS – COIL_ETMY_S	2048	yes	
5	H1 :: SUS – COIL_ETMY_SUM	16384	yes	
6	HPM :: PEM – ACC_BSC10_1X	2048	yes	accelerometer signal, BSC10, triaxial unit 1, x
7	HPM :: PEM – ACC_BSC10_1Y	2048	yes	accelerometer signal, BSC10, triaxial unit 1, y
8	HPM :: PEM – ACC_BSC10_1Z	2048	yes	accelerometer signal, BSC10, triaxial unit 1, z
9	HPM :: PEM – ACC_BSC10_2X	2048	yes	accelerometer signal, BSC10, triaxial unit 2, x
10	HPM :: PEM – ACC_BSC10_2Y	2048	yes	accelerometer signal, BSC10, triaxial unit 2, y
11	HPM :: PEM – ACC_BSC10_2Z	2048	yes	accelerometer signal, BSC10, triaxial unit 2, z
12	HPM :: PEM – MIC_BSC10	2048	yes	microphone, BSC10
13	HPM :: PEM – MAG_BSC10_X	2048	yes	magnetometer, BSC10, x direction
14	HPM :: PEM – MAG_BSC10_Y	2048	yes	magnetometer, BSC10, y direction
15	HPM :: PEM – MAG_BSC10_Z	2048	yes	magnetometer, BSC10, z direction
16	H1 :: SUS – SENSOR_ETMY_UL	64	yes	
17	H1 :: SUS – SENSOR_ETMY_UR	64	yes	
18	H1 :: SUS – SENSOR_ETMY_LL	64	yes	
19	H1 :: SUS – SENSOR_ETMY_LR	64	yes	
20	H1 :: SUS – SENSOR_ETMY_S	64	yes	
21	HPM :: PEM – SEIS_Eb_X	256	yes	end station 'a' seismometer, x direction
22	HPM :: PEM – SEIS_Eb_Y	256	yes	end station 'a' seismometer, y direction
23	HPM :: PEM – SEIS_Eb_Z	256	yes	end station 'a' seismometer, z direction
24	HPM :: PEM – TILT_Eb_X	256	yes	end station 'a' tiltmeter, about x
25	HPM :: PEM – TILT_Eb_Y	256	yes	end station 'a' tiltmeter, about y
26	H1 :: LSC – POWER_ARMY	16384	yes	beam intensity in transmission of ETM X
27	H1 :: LSC – CALIBRATION_ETMY	16384	yes	photon calibrator photodiode, ETM X
28				
29				
30				
31				

3 DAQS CONTROLLER AND EPICS DATA COLLECTION (EDCU) / EPICS DATA SERVER UNITS (EDSU)

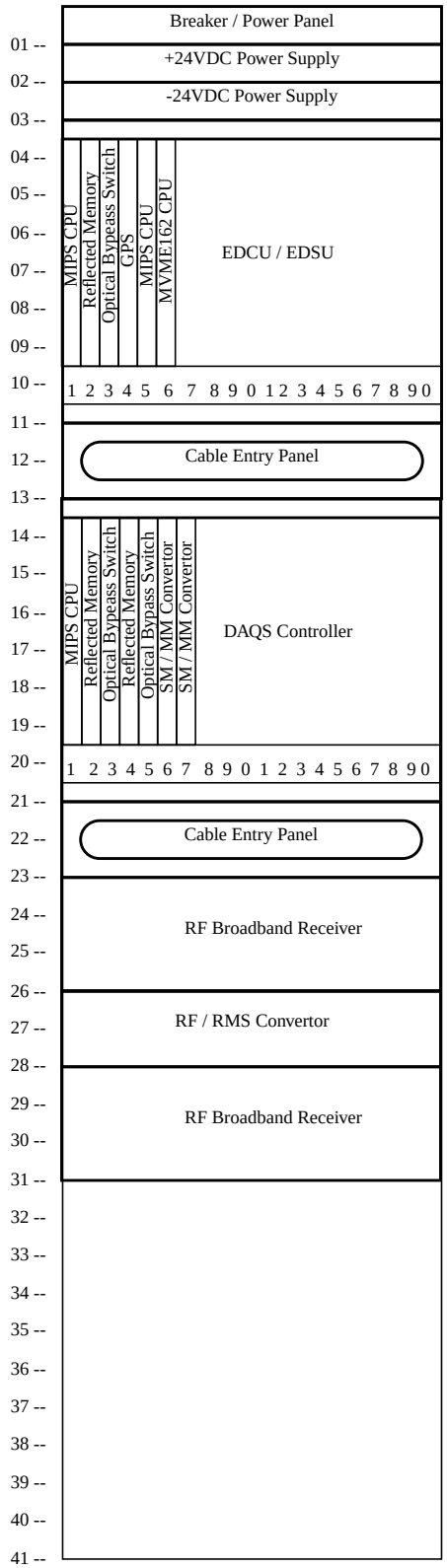

Table 6: DAQS Controller / EDCU /EDSU Parts List / Cost

Description	Vendor	Unit	Qty	Extd
Breaker Panel		$600	1	$600
24 VDC Power Supply	Power 10	$1,050	2	$2,100
Cable Entry Panel		$50	1	$50
MIPS Processor	Heurikon	$6000	3	$18,000
Reflected Memory (4Mbyte)	VMIC	$9,200	3	$27,600
Optical Bypass Switch	VMIC	$1,200	3	$3,600
SM / MM Convertor	VMIC	$6,400	2	$12,800
MVME-162-333 Processor	Motorola	$4500	1	$4,500
RF / RMS Convertor	LIGO	$5,000	1	$5,000
Total				$74,250

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4 DAQS DATA STORAGE SYSTEM

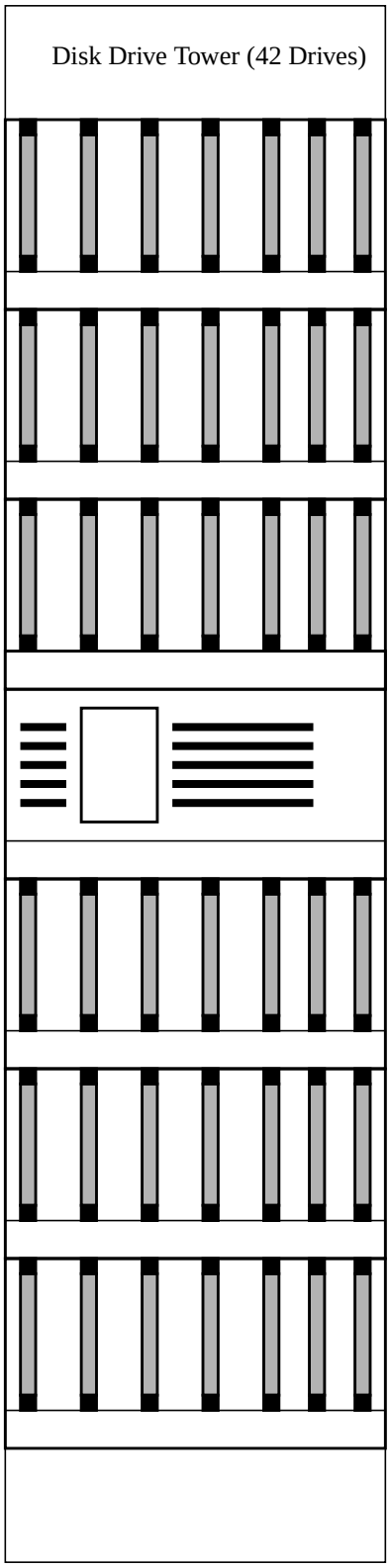
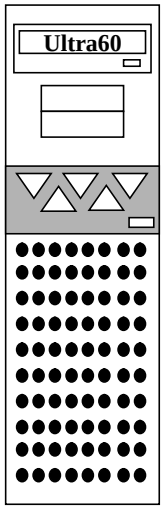
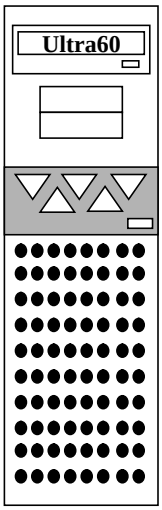


Table 7: DAQS Data Storage System Components / Cost

Description	Vendor	Unit	Qty	Extd
372GB RAID	Cybernetics	$93,370	1	$93,370
Ultra 60	Sun	$23,000	2	$46,000
Reflected Memory (4Mbyte)	VMIC	$9,200	2	$18,400
Total				$157,770





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