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UCRL-11702
c.2

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INSTRUMENTATION MODULE SYSTEM

Dick A. Mack, Leo Schifferle, Clayton A. Van Den Heuvel

Lawrence Radiation Laboratory
University of California
Berkeley and Livermore, California

November 25, 1964

Abstract

A versatile system of constructing modular plug-in units is described, together with its associated bin and interconnecting wiring. These units conform to the standard recently developed and adopted by the AEC Committee on Nuclear Instrument Modules.

Introduction

During the past ten years almost every research laboratory and instrumentation manufacturer has developed a system for packaging electronic circuits in modular form. The chief advantages of such a system are the ease of adaptation and interchangeability during the course of an experiment, the time saving effected when replacement is necessary, and the lower cost of updating or expanding various parts of the system.

Two types of modular construction have emerged: That used for computer-type logic circuits, which are designed for little or no local adjustment, control, or observation; and that used for instrumentation of experiments in which continuous observation and control are required. The latter type of packaging has taken on a myriad of forms, each a little different. Only a few characteristics are common to all units: The modules have

1. a front panel,
2. a component mounting board,
3. power or signal connector(s), or both, in the rear, and
4. a method for a bin which in turn can be mounted in a standard 19-in. relay rack.

Beyond this, the interchangeability ceases in practically every case.

An AEC Committee for Nuclear Instrument Modules was formed in February 1964 by representatives of the National Laboratories with the objective of producing a standard module and bin design. By July 1964 a basic design, providing for mechanical and electrical power interchangeability, was adopted. The basic system was described in an AEC report Louis Costrell, Standard Nuclear Instrument Modules, TID-20893, July 1964.

The following report describes a particular design of modules and bins which conforms to the national standard. Another conforming method of construction is being developed at Oak Ridge National Laboratory by George Holt and his associates. Modules constructed by either of these (or any other method of construction conforming to the national standard) may be used interchangeably in any bin designed to the national standard.

Modules are available in two panel heights, nominally 5-1/4 and 8-3/4 in. high. Panel widths are in nominal multiples of 1.35 in., with accommodation for twelve single-width modules in the bin. Also, a 5-1/4-in. module can plug into a 8-3/4-in. -high bin by using an adapter plate.

The system was designed with a view to maximum utilization of the volume available in a 19-in. relay rack. The bin has the maximum width that can be accommodated in a rack if two chassis slides are used. The module has been designed for maximum utilization of the bin by providing:

1. Use of maximum volume within the bin for components and circuit boards.
2. Maximum panel space for mounting controls or connectors.
3. Convenient method of supplying power to modules.
4. The option of "wired-in" interconnections between modules via wires or coaxial cables.

5. Easy accessibility to both sides of component board by removable covers.
6. Adequate shielding under normal laboratory noise conditions.
7. Optional additional shielding for use under conditions of high ambient noise, e. g., near spark chambers.
8. Adequate natural convection cooling for low-dissipation installations, with option of forced-air cooling for use at high ambient temperatures.
9. Protection of components from mechanical damage.
10. Economical fabrication consistent with the above requirements.
11. Availability of panel space at the rear of the unit to allow the use of rear or front connections between modules.

Photographs of the modules and bins are shown in Figs. 1 through 4. Other illustrations are shown in the following groups:

- Group I. Application drawings and schematic diagrams.
- Group II. Construction drawings for 5-1/4-in. modules of various widths.
- Group III. Construction drawings for 5-1/4-in. instrumentation bin.
- Group IV. Construction drawings for 8-3/4-in. instrumentation module.
- Group V. Construction drawings for 8-3/4-in. instrumentation bin.

Electrical Considerations

A prerequisite for electrical compatibility of the system is availability of adequate power, at each module location, of several specified voltages. The potentials of ± 12 and ± 24 volts have been selected as standard and will be available for all modules. Other preferred voltages (e. g., ± 3 and 6V) are available at the user's option. Connection between modules and bins is made via a 42-pin connector mounted at the rear of the module and bin; this "utility" connector, using high-reliability, snap-in-type contacts, allows the use of up to 36 pins and 6 coaxial connections. See Fig. 5.

Signal connections will, in general, be made through coaxial connectors on the front or rear of a module. However, when interconnections are desired between modules in a bin, they can be made by inserting the appropriate leads or coaxial contacts in the utility connector housings. Some pin locations have been assigned by the Committee for a particular use, others are available at the user's option. A list of assignments is shown in Fig. 6.

Bins will initially be wired with only the ± 12 , ± 24 , and signal ground and chassis ground wiring as shown in Fig. 7. Additional wiring can be easily added as needed by use of the snap-in connector pin feature. If desired, pins can likewise be readily removed by use of a tool provided for that purpose.

The maximum resistance drop between the power supply and any bin utility connector should not exceed 19 milliohms. Where this drop is excessive, the power supply remote voltage-sensing leads can be extended to a set of utility connector buses, as shown in Fig. 8. In this configuration the maximum resistance drop between the bin utility connectors and the remote sensing point should not exceed 2 m Ω .

Generally, the wiring between the twelve utility connectors, shown in Fig. 2, will be enclosed in a metal shield affixed to the rear of the bin. This will take the form of either a rear cover (Fig. 9) or a shielded enclosure in a rear-mounting power supply (Fig. 10). In applications in which it is desirable to extend leads from the bin connectors to other chassis, this should be through connectors permanently attached to the rear cover (Fig. 9).

Power Supply

Power can be supplied to the bin by any of three methods.

(a) For light loads it may be convenient to construct power supplies in the form of modules plugging into the front of the bin. Power to the other modules is provided through the rear connectors.

(b) For heavier loads a power supply can be affixed to the rear of the bin. Power supplies are commercially available in this configuration which will supply ± 12 and ± 24 volts each at 1 ampere with $\pm 0.05\%$ combined line and load regulation. The total volume for these supplies is shown in Fig. 10.

(c) A third method of supplying power is from a supply located remotely from the bin and fed through a power connector located on the bin rear shield (Fig. 9).

Several options for ac power control are available. For supplies plugged into the front of bins, switches and indicators can be mounted on the module panels. For supplies attached to the rear of bins, a power control module can be employed as seen in the photograph of Fig. 4 and the schematic diagram of Fig. 11. If front panel control is not required, ac power can be fed directly to the supply at the rear of the bin.

Shielding

Many early bin-module designs did not provide adequate shielding from the electromagnetic radiation present in average laboratory surroundings. In this design shielding is dependent upon the construction of the module rather than of the bin. The top and bottom bin cover plates are primarily for component protection.

Under normal laboratory noise conditions it is usually sufficient to construct modules of aluminum finished with a protective conductive coating such as Iridite. The interconnections between modules should be shielded as described above, with all external signal connections introduced through shielded cable and all power leads fed through suitable line filters.

Where high ambient electrical noise is present--e. g., rf power sources or spark discharges--a number of additional shielding features can easily be added to the modular system. These are pictorially outlined in Fig. 12. In the modules, additional contact-strip material should be mounted along the sides of the front and rear panels to provide good contact to the side panels (see Fig. 13). The most economical method of plating aluminum with a base material to provide low contact resistance over a long period of time is by the use of an "Electroless" nickel solution. Resistances of $3\text{ m}\Omega$ between the corner and sliding cover were measured when this technique was

used. A thickness of 0.0001 in. appears to be adequate for this purpose. Additional plating of other materials can be added as needed.

The utility connectors are shielded by mounting metal hoods around the utility connectors on both the bin and modules, as shown in Fig. 12. The external hood mounted on the bin has fingers to engage the internal hood when mated. The contact resistance between cadmium-plated steel hoods is a few $m\Omega$. To maintain the integrity of the shielding, a crushed metal-wire gasket should be used around the perimeter of the utility-connector rear panel and the attached shield or power supply.

Mechanical Considerations

Sheet metal, extruded aluminum, and die-cast parts are employed in construction of this bin-module system. This combination of materials produces a high-quality system at moderate cost. However, as usage of this system increases, it is expected that further construction refinements and larger production volume will effect considerable savings.

Acknowledgments

This development represents the contributions of many individuals. We wish to thank fellow members of the Committee and the Chairman, Louis Costrell, in particular for the many hours of patient advice and constructive criticism during the evaluation of the present design.

The contributors at the Lawrence Radiation Laboratory are too numerous to list individually; however, Fred Goulding and A. E. Larsh, Jr., have continuously supported the program with their counsel and ideas. Robert Crowe has drawn the majority of the construction drawings.

This work was done under the auspices of the U. S. Atomic Energy Commission.

ZN-4570

Fig. 1. Front view of 8-3/4-in. bin.

ZN-4569

Fig. 2. Rear view of 8-3/4-in. bin.

ZN-4571

Fig. 3. 8-3/4-in. Module, Size 2 width.

ZN-4558

Fig. 4. Power control module.

Group I of illustrations

Application drawings and schematic diagrams

<u>Page number</u>	<u>Figure number</u>	<u>LRL Drawing number</u>	<u>Title</u>
10	5	11X3041 A-4	Connector layout and hardware
11	6	11X3041 A-3	Connector pin assignments
12	7	11X3044 W-1	Basic bin interconnecting wiring
13	8	11X3044 W-2	Bin interconnecting wiring for power supply remote sensing
14	9	11X3044 M-15	Bin read shielded extender
15	10	11X3044 M-16	Bin power-supply outline
16	11	11X3361 S-1	Power control module
17	12	11X3044 A-5	Shielding detail
18	13	11X3053 A-2	Module shielding detail

NOTES:

1. PINS AND COAXIAL CONTACTS SHOWN ARE TYPICAL AND ARE NOT INTENDED TO BE RESTRICTIVE. FOR EXAMPLE, OTHER TYPE IV CONTACTS ACCOMMODATE CABLES OTHER THAN THE RG58/U SHOWN.
2. MOUNT .031 WASHER (4) BETWEEN MODULE AND CONNECTOR WHEN NOT USING HOOD

DWG. N^o IIX3041 A-4

Fig. 5

REAR VIEW
BIN CONNECTOR
AMP NO. 202516-3

PIN	FUNCTION
1	+3 VOLTS
2	-3 VOLTS
3	SPARE BUS
4	RESERVED BUS
5	COAXIAL
6	COAXIAL
7	COAXIAL
8	<200 VOLTS D.C.
9	>200 VOLTS D.C.
10	+6 VOLTS
11	-6 VOLTS
12	RESERVED BUS
13	CARRY NO. 1
14	SPARE
15	RESERVED
16	+12 VOLTS
17	-12 VOLTS
18	SPARE BUS
19	RESERVED BUS
20	SPARE
21	SPARE
22	RESERVED
23	RESERVED
24	RESERVED
25	RESERVED
26	0-30 VOLTS A.C.
27	0-30 VOLTS A.C.
28	+24 VOLTS
29	-24 VOLTS
30	SPARE BUS
31	CARRY NO. 2
32	SPARE
33	115 VOLTS A.C.
34	CLEAN GROUND
35	RESET
36	GATE
37	SPARE
38	COAXIAL
39	COAXIAL
40	COAXIAL
41	115 VOLTS A.C.
42	DIRTY GROUND
G	GROUND GUIDE PIN

REAR VIEW
MODULE CONNECTOR
AMP NO. 202515-3

NOTES:

1. A WIDE VARIETY OF PINS IS AVAILABLE. TO ASSURE INTERCHANGEABILITY THE FOLLOWING REQUIREMENTS APPLY.
(a) PIN TYPES: SINGLE PINS & SOCKETS SHALL BE TYPE III* AT LRL
(b) COAXIAL CONTACTS: SHALL BE TYPE IV.
(c) LENGTH OF SINGLE PINS: "LONG".
(d) SIZE OF SINGLE PINS: NO. 16, (.032") DIAMETER.
(e) SINGLE PIN & SOCKET CURRENT RATING: 13 AMPERES.
(f) IMPEDANCE OF COAXIAL CONTACTS: 50 OHMS.
(g) FINISH: 0.00003 INCH GOLD OVER NICKEL.
2. GUIDE PINS SHALL BE AS SHOWN EXCEPT GROUND GUIDE PIN & SOCKET IS AN OPTIONAL ALTERNATE.
3. PIN HOODS ARE OPTIONAL. 0.031 INCH THICK SPACERS ARE REQUIRED WHEN HOODS ARE NOT USED.

DWG. N° IIX3041 A-3

FRONT VIEW

TOP VIEW

BACK SIDE OF CHASSIS

END VIEW

- NOTES:
1. CAD, PLATE OR IRIDITE FRONT SURFACE.
  2. THE FRONT SURFACE SHALL NOT HAVE A FLATNESS DEVIATION GREATER THAN 0.015 PER FOOT.
  3. DIMENSIONS ARE ABSOLUTE AND INCLUDE PROJECTIONS SUCH AS SCREW HEADS ETC.

LIST OF MATERIAL	
Part No.	Description

SURFACE TREATMENT		IDENTIFICATION	FINISHES	NOTES-UNLESS OTHERWISE SPECIFIED	SHOP CHECKS	SCALE
UNFINISH	□	REMARKS	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	1. REQUIREMENTS ON DIMENSIONS: <i>AS SHOWN</i>	DO NOT SCALE THIS DRAWING	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	2. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	3. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	4. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	5. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	6. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	7. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	8. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	9. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1
FINISH	□	CONT.	FLAT AS SHOWN UNLESS OTHERWISE SPECIFIED	10. BY CHASSIS ONLY ON ALL OTHER SURFACES	LABORATORY	1:1

STANDARD NUCLEAR INSTRUMENTATION
BIN
POWER SUPPLY PACKAGE
10-34

Fig. 10

						SHWN. ON		STD. NUCLEAR INSTRUMENTATION		
						SHWN. ON		BIN, POWER MODULE		
						ACCT. NO.				
						SER. NO.		SCHEMATIC		
						DATE ISSD.		DRWN. BY	DATE	LAWRENCE RADIATION LABORATORY UNIVERSITY OF CALIFORNIA BERKELEY
						DATE REV.		CHKD. BY		
						NO. REQD.		APPR.		
						DEI TO		ENGR.		11X3361 S-1
CHG.	DRWN. BY	CHKD. BY	DATE	CHANGED				D. MACK		

Fig. 11

Fig. 12

NOTES

- ① STD. NUCLEAR INSTRUMENTATION MODULE EXTRUDED CORNER, REF. IIX3052 M-1
- ② CF-100 FINGER STOCK, BERYLLIUM COPPER (EIMAC)
- ③ MODULE REAR PANEL (#2 SHOWN) FOR OTHER WIDTH MODULES SEE PRINT LIST IIX3051 P-1 - (IIX3151 P-1 - 5 1/4" MODULE)
- ④ 5/16" X 1/8" X .030" ANGLE 6.871" LONG (4 PER MODULE)
ELECTROLESS NICKLE PLATE THE 5/16" LEG OF THE ANGLE AND LEAVE THE 1/8" LEG ALUMINUM, AFTER PLATING SPOT WELD ALUMINUM LEG OF ANGLE TO REAR PANEL OF MODULE IN THREE PLACES AND THEN SOT SOLDER CF-100 FINGER STOCK TO NICKLE PLATED LEG OF ANGLE TO PROVIDE RF SHIELD FOR MODULE. (TYP. ALL 4 CORNERS)
- ⑤ ON 5 1/4" MODULE, ABOVE ANGLE IS 5/16" X 1/8" X .030" - 3.371" LONG.

LIST OF MATERIAL		
ITEM OR PART NUMBER	DESCRIPTION	

IIX3053A-2

				SURFACE TREATMENT	IDENTIFICATION	FINISHES	NOTES—UNLESS OTHERWISE SPECIFIED	SHOP ORDERS	DO NOT SCALE THIS DWG
				SANDBLAST ☐ DEGREASE ☐	PART NO. WHERE SHOWN	SAW CUT ☒	1. TOLERANCES ON DIMENSIONS ±	SERIAL NO.	LAWRENCE RADIATION LABORATORY UNIVERSITY OF CALIFORNIA
				PRIME ☐ COATS ☐	PAINT ☐ ENGRAVE ☐	ROUGH MACHINE ☒	2. BEAM EDGES 1/8" MAXIMUM	DATE ISSUED	
				FINISH ☐ COATS ☐	STAMP ☐ INSCRIBE ☐	AVG. MACHINE ☒	3. 30° CHAMFER ENDS OF ALL SCREW THREADS	DATE	
				OTHER ☐	OTHER ☐	SMOOTH MACHINE ☒	4. 1/16" PITCH THREAD RELIEF WITH ROUND MOUTH TOOL ON ALL MACHINE CUT SCREW THREADS	DATE	
							5. ON WELDMENTS, REMOVE SHARP EDGES, BURS, LOCK SCALE AND WELD SPATTER	NO. REQ'D	
							6. SURFACE COMPARISON OF FINISHES WITH G.1. SURFACE ROUGHNESS SCALE NO. 800/1001 IS ACCEPTABLE	DELIVER TO	IIX3053A-2
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	CHANGES					

STD. NUCLEAR INSTRUMENTATION MODULE REAR SHIELD MOUNTING DETAIL	DATE	4-27-64
	DESIGNED BY	Y. ROY
	DRAWN BY	12/64
	CHECKED BY	
	APPROVED BY	

Fig. 13

Group II of illustrations

Construction drawings for 5-1/4-inch instrumentation module

Page number	Figure number	LRL Drawing number	Title	Number required		
				Size 1	Size 2	Size 3
20	14	11X3153 A-1	Overall assembly	-	-	-
21	15	11X3321 M-5A	Aluminum extrusion sectional	-	-	-
22	16	11X3052 M-1	Extruded corner	4	4	4
23	17	11X3154 M-13	Side covers (right and left)	2	2	2
24	18	11X3053 M-4	Screen covers (top and bottom)#1	2		
25	19	11X3053 M-8	Screen covers (top and bottom)#2		2	
26	20	11X3053 M-11	Screen covers (top and bottom)#3			2
27	21	11X3053 M-13	Side cover fastener bracket	1	1	1
28	22	11X3152 M-1	Front panel #1	1		
29	23	11X3152 M-2	Rear panel#1	1		
30	24	11X3153 M-3	Front panel#2		1	
31	25	11X3153 M-4	Rear panel#2		1	
32	26	11X3153 M-5	Front panel#3			1
33	27	11X3153 M-6	Rear panel#3			1

Change Letter	Drawn By	Check By	Date	CHANGES	MATERIAL ALUMINUM 6063-T5	11X332IM-5A

NOTES:

- 1) FLATNESS - .004/IN.
- 2) STRAIGHTNESS - .0125/FT.
- 3) TWIST - 1/2°/FT.
- 4) ANGULARITY $\pm 1^\circ$
- 5) CORNER & FILLET RADIUS .015 IN
- 6) SURFACE ROUGHNESS .002 IN, MAX

SURFACE TREATMENT	IDENTIFICATION	FINISHES	NOTES—UNLESS OTHERWISE SPECIFIED	SHOP ORDERS	
SANDBLAST ☐ DEGREASE ☐	PART NO. WHERE SHOWN	SAW CUT FLAME CUT SHEAR ☒	1. TOLERANCES ON DIMENSIONS $\pm .006$	SERIAL NO.	DO NOT SCALE THIS DWG.
PRIME _____ COATS _____	PAINT ☐ ENGRAVE ☐	ROUGH MACHINE ☒	2. BREAK EDGES 1/64 MAXIMUM	DATE ISSUED	
FINISH _____ COATS _____	STAMP ☐ INSCRIBE ☐	AVERAGE MACHINE ☒	3. 30° CHAMFER ENDS OF ALL SCREW THREADS	DATE REQ'D	RADIATION LABORATORY UNIVERSITY OF CALIFORNIA
OTHER _____	HEIGHT _____	SMOOTH MACHINE ☒	4. 1½ PITCH THREAD RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT SCREW THREADS	NO. REQ'D	
OTHER _____	COLOR _____		5. ON WELDMENTS, REMOVE SHARP EDGES, BURRS, LOOSE SCALE AND WELD SPATTER	DELIVER TO	11X332IM-5A
	LABEL YES ☐ NO ☐		6. VISUAL COMPARISON OF FINISHES WITH G.E. "SURFACE ROUGHNESS SCALE" NO. 8665947G1 IS ACCEPTABLE.		

RL-330 (Size 1)

ALUMINUM EXTRUSION SECTIONAL,	SHOWN ON	DESIGN ACCOUNT NO. 4271-04	DATE 8-11-64
USED FOR MODULE BRACES IN STD. 8 3/4" &		DRAWN BY CROW	CHECKED BY D
5 1/4" NUCLEAR INSTRUMENTATION BINS			

Fig. 15

PART #	DESCRIPTION
11X3321MS	ALUMINUM EXTRUSION, 6061 T-6

HOLE SCHEDULE	
DESIG.	DESCRIPTION
A	#43 DRILL, .500 MIN THREAD DEPTH (4-40)
B	#52 DRILL, .125 DEEP BOTH ENDS

- NOTE:
1. ALL DIMENSIONS ARE $\pm .006$ UNLESS OTHERWISE STATED.
  2. FINISH IRIDITE #14
  3. INSTALL PIN IN .063 HOLE THAT MATES WITH FRONT PANEL

					SHWN. ON	STD. NUCLEAR INSTRUMENTATION MODULE EXTRUDED CORNER	
					SHWN. ON		
					ACCT. NO.		
					SER. NO.		
					DATE ISSD.	DRWN BY CROW	DATE 7-24-64
					DATE RECD.	CHKD. BY	LAWRENCE RADIATION LABORATORY UNIVERSITY OF CALIFORNIA BERKELEY
					NO. REQD.	APPR.	11X3052 M-1
CHG.	DRWN BY	CHKD. BY	DATE	CHANGES	DEL. TO	ENGR. D. MACK	

Fig. 16

Fig. 17

SP. NUCLEAR INSTRUMENTATION MODULE	ON	7-17-04	DATE
SCREEN COVERS (TOP & BOTTOM), FOR ALL	DELIVER BY	02-10-04	DATE
1/350" WIDE STD. MODULES	CHECKED BY		

[illegible]

81
18

DATE	4-27-64	DESIGN BY	W. L. BIV	CHECKED BY	
57D. NUCLEAR INSTRUMENTATION MODULE					
SCREEN COVERS (TOP & BOTTOM) FOR ALL					
STD. 2.704" WIDE MODULES					

Fig. 19

Technical drawing of a rectangular structure. The drawing includes the following dimensions and features:

- Horizontal Dimension:** A dimension line at the top indicates a length of 9.534 ± 0.000 with a tolerance of -0.015 .
- Vertical Dimension:** A dimension line on the left indicates a height of 3.389 ± 0.000 with a tolerance of -0.015 .
- Circular Pattern:** A cluster of small circles is located in the top-left corner of the rectangle. An arrow points from the bottom-left towards this cluster.
- Right Side Detail:** On the far right, a vertical line segment is shown with a dimension of $.050$.

VIX3053 M-11

STD NUCLEAR INSTRUMENTATION MODULE	WORKING DATE	WORK ASSIGNED NO.	DATE
SCREEN COVERS (TOP & BOTTOM) FOR ALL		7-14-64	8-10-64
STD 4 DEEP WIDE MODULES		SAVED BY	CHIEF OF
		LEWIN	

TABLE		
DASH NO.	DIM. "A"	MODULE NO.
- 1	1.000 1.005	1
- 2	2.414 "	2
- 3	3.768 "	3
- 4	5.122 "	4
- 5	6.476 "	5
- 6	7.830 "	6

LIST OF MATERIAL		
ITEM OR PART NUMBER	DESCRIPTION	
	.063 ALUMINUM 5052 H-32	
	F632-1 PEM NUT	2 EA

HOLE SCHEDULE	
DESIG	DESCRIPTION
A	#30 DRILL, INSTALL F632-1 PEM NUTS (2 PLS)
B	#30 DRILL (THRU) 2 PLACES

1113053 M-13

				SURFACE TREATMENT	IDENTIFICATION	FINISHES	NOTES—UNLESS OTHERWISE SPECIFIED	SHOP ORDERS	
				SANDBLAST ☐ DEGRASE ☐	PART NO. WHERE SHOWN	SAW CUT ☒	1. TOLERANCES ON DIMENSIONS $\pm .010$	SERIAL NO.	DO NOT SCALE THIS DWG.
				PRIME ☐ COATS ☐	PAINT ☐ ENGRAVE ☐	LAKE CUT ☐	2. BREAK EDGES 1/16" MAXIMUM	DATE ISSUED	
				FINISH ☐ COATS ☐	STAMP ☐ INSCRIBE ☐	ROUGH MACHINE ☒	3. 30° CHAMFER ENDS OF ALL SCREW THREADS	DATE RECD	
				OTHER ☐	HEIGHT ☐	AVERAGE MACHINE ☒	4. 1/2" PITCH THREAD RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT SCREW THREADS	NO. REQ'D	
				COLOR ☐	COLOR ☐	SMOOTH MACHINE ☒	5. ON WELDMENTS REMOVE SHARP EDGES, BURRS, LOOSE SCALE AND WELD SPATTER	DELIVER TO	
				OTHER ☐	OTHER ☐		6. VISUAL COMPARISON OF FINISHES WITH O.I. SURFACE ROUGHNESS SCALE. NO. 800/100 IS ACCEPTABLE.		
CHANGED BY	PAID BY	CHECK BY	DATE	CHANGES					

DATE	11/13/53
DESIGNED BY	4271-04
CHECKED BY	11/13/53
STD. NUCLEAR INSTRUMENTATION BIN	
MODULE - SIDE COVER FASTENER	
BRACKET	

Fig. 21

LIST OF MATERIAL	
ITEM OR PART NUMBER	DESCRIPTION
1125	ALUM. 6061 T-6

Technical drawing of a mechanical part, showing front, top, and side views with dimensions and tolerances.

Front View (Top):

- Overall width: $5.210^{+0.000}_{-0.010}$
- Distance from left face to center of hole A: $3.870^{+0.005}_{-0.005}$
- Distance from right face to center of hole B: $0.670^{+0.005}_{-0.005}$
- Reference dimension from right face to hole A: 0.125 REF.

Top View (Bottom):

- Overall length: $4.790^{+0.010}_{-0.010}$
- Distance from front face to center of hole B: $1.346^{+0.000}_{-0.005}$
- Distance from front face to center of hole A: $0.673^{+0.005}_{-0.005}$
- Distance from right face to center of hole B: $1.132^{+0.005}_{-0.005}$
- Distance from right face to center of hole A: $0.882^{+0.005}_{-0.005}$
- Reference dimension from right face to hole B: 0.125 REF.
- Distance from right face to hole A: $0.232^{+0.005}_{-0.005}$
- Distance from right face to hole C: $0.210^{+0.005}_{-0.005}$

Side View (Left):

- Overall height: 0.125

				SURFACE TREATMENT		IDENTIFICATION		FINISHES		NOTES—UNLESS OTHERWISE SPECIFIED		SHOP ORDERS			
				SANDBLAST ☐ DEGREASE ☐		PART NO. WHERE SHOWN		SAW CUT FLAME CUT SHEAR		1. TOLERANCES ON DIMENSIONS $\pm .010$		SERIAL NO.		DO NOT SCALE THIS DRAWING	
				PRIME _____ COATS _____		PAINT ☐ ENGRAVE ☐		★		2. BREAK EDGES 1/64 MAXIMUM		DATE ISSUED		LAWRENCE RADIATION	
						STAMP ☐ INSCRIBE ☐		ROUGH MACHINE		3. 30° CHAMFER ENDS OF ALL SCREW THREADS		DATE REQ'D		LABORATORY	
				FINISH _____ COATS _____		OTHER _____		125		4. 1½ PITCH THREAD RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT SCREW THREADS				UNIVERSITY OF CALIFORNIA	
						HEIGHT _____		AVERAGE MACHINE		5. ON WELDMENTS, REMOVE SHARP EDGES, BURRS, LOOSE SCALE AND WELD SPATTER		NO. REQ'D			
				OTHER <u>FRIDITE #14</u>		COLOR _____		65		6. VISUAL COMPARISON OF FINISHES WITH O.E. "SURFACE ROUGHNESS SCALE" NO. 846594701 IS ACCEPTABLE.		DELIVER TO		11X3152M-	
						LABEL _____ YES ☐ NO ☐		SMOOTH MACHINE							
CHANGES															
CHANGE LETTER	DRAWN BY	CHECK BY	DATE												

STD. FRONT PANEL FOR #1 MODULE	SKETCH ON	DESIGN ACCOUNT NO. 4271-04	DATE 9-10-64
FOR STD. 5 1/4" NUCLEAR INSTRUMENTATION		DRAWN BY CROW	
FINI		CHECKED BY	

HOLE SCHEDULE	
DESIG	DESCRIPTION
A	DRILL #31, 4 HOLES
B	DRILL #30 DIA. 4 HOLES

LIST OF MATERIAL	
ITEM OR PART NUMBER	DESCRIPTION
	.125 ALUMINUM 6061 T-6

CHANGES				SURFACE TREATMENT		IDENTIFICATION		FINISHES		NOTES—UNLESS OTHERWISE SPECIFIED		SHOP ORDERS	
DATE	CHECK BY	BY	CH. NO.	SANDBLAST ☐ DEGREASE ☐	PART NO. WHERE SHOWN	PAINT ☐ ENGRAVE ☐	SAW CUT	1. TOLERANCES ON DIMENSIONS $\pm .010$	2. BREAK EDGES 1/64 MAXIMUM 3. 30° CHAMFER ENDS OF ALL SCREW THREADS 4. 1 1/2 PITCH THREAD RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT SCREW THREADS 5. ON WELDMENTS, REMOVE SHARP EDGES, BURS, LOOSE SCALE AND WELD SPATTER 6. VISUAL COMPARISON OF FINISHES WITH O.E. "SURFACE ROUGHNESS SCALE" NO. 8669747G1 IS ACCEPTABLE.		DO NOT SCALE THIS DWG.		
				PRIME COATS	STAMP ☐ INSCRIBE ☐	ROUGH MACHINE	250	DATE ISSUED			LAWRENCE RADIATION		
				FINISH COATS	OTHER	AVERAGE MACHINE	125	DATE REQ'D			LABORATORY		
				OTHER TRIDITE #14	HEIGHT	SMOOTH MACHINE	63	NO. REQ'D			UNIVERSITY OF CALIFORNIA		
					COLOR			DELIVER TO			11X3152 M-2		
					LABEL YES ☐ NO ☐								

DATE	DESIGN ACCOUNT NO.	DESIGNED BY	CHECKED BY
4-11-64	4271-04	W. J. R. JON	
STD. REAR PANEL FOR #1 MODULE			
FOR STD. 5 1/4" NUCLEAR INSTRUMENTATION			
BIN			

Fig. 23

[illegible]

Technical drawing of a rectangular plate with dimensions and hole locations. The drawing includes a side view at the top and a front view below.

Side View (Top): Shows a rectangular plate with a width of $.125$. The front and back faces are indicated by arrows labeled 'A' and 'B' respectively.

Front View (Bottom): Shows a rectangular plate with overall dimensions of $5.210^{+.020}_{-.010}$ (width) and $2.700^{+.000}_{-.010}$ (height). The distance from the top edge to the center of the upper holes is $.673$. The distance from the left edge to the center of the left holes is $2.027 \pm .005$. The distance between the centers of the two holes on each side is $2.236 \pm .005$. The distance from the right edge to the center of the right holes is $2.486 \pm .005$. The distance from the bottom edge to the center of the lower holes is $.670 \pm .005$. The distance between the centers of the two holes on each side is $2.10 \pm .005$. The distance from the left edge to the center of the left holes is $3.870 \pm .005$. The distance from the right edge to the center of the right holes is $4.790 \pm .010$. The distance between the centers of the two holes on each side is $.232 \pm .005$. The distance from the top edge to the center of the upper holes is $.125 \text{ REF.}$. The distance from the bottom edge to the center of the lower holes is $.125 \text{ REF.}$.

Hole Locations: There are four holes, two on each side. The holes are labeled 'A' and 'B' at their respective locations. The holes are circular with a diameter of $.125$.

				SURFACE TREATMENT		IDENTIFICATION		FINISHES		NOTES—UNLESS OTHERWISE SPECIFIED		SHOP ORDERS	
				SANDBLAST ☐ GRAZE ☐	PART NO. WHERE SHOWN			LAW. EDGE ☒	1. TOLERANCES ON DIMENSIONS $\pm .010$			TECH. NO.	DO NOT SCALE THIS DR.
				PELINE ☐ COATS	PAINT ☐			FLARE CUT ☒	2. BREAK EDGES 1/8" MAXIMUM			DATE ISSUED	
					STAMP ☐ INSCRIBE ☐			30° CHAMFER EDGES ON ALL SCREW THREADS					
				FINISH ☐ COATS	OTHER ☐			ROUGH MACHINE ☒	3. ITS RICH THREAD RELIEF WITH ROUND NOSE FORM ON ALL MACHINE CUT SCREW THREADS			DATE	
					WEIGHT ☐			FINISH MACHINE ☒	ON WELDMENTS, REMOVE SHARP EDGES, BLURS, LOCUS BLURS AND WEAK SPOTS			DATE	
				OTHER ☒ <u>IR.D.E. #14</u>	COLOR ☐			FINISH MACHINE ☒	4. VISUAL COMPARISON OF FINISHES WITH "F" SURFACE ROUGHNESS SCALE" (NO. 900702) IS ACCEPTABLE			NO. OF DELIVER	
					DATE ☐			FINISH MACHINE ☒					
APPROVED SIGNED CHECK DATE				CHANGES									

STANDARD FRONT PANEL FOR #2 MODULE FOR STD 5 1/4" NUCLEAR INSTRUMENTATION	INSTRUMENT CODE	INSTRUMENT NO.	DATE
		4217-04	7-10-64
		REVISION	BY
		CEON	7-10-64
		CHECKED BY	

Fig. 24

LIST OF MATERIAL		
ITEM OR PART NUMBER	DESCRIPTION	
	125 ALUM. 6061 T-6	

STD REAR PANEL FOR #2 MODULE FOR	MONTHS ON	ORDER ACCOUNT NO	DATE
STD 5 1/4" NUCLEAR INSTRUMENTATION		72-11-04	7-10
		ORDER NO. 080111	64
		CHECKED BY	

HOLE SCHEDULE	
DESIG	DESCRIPTION
A	DRILL #31 4 HOLES
B	F DRILL C'SINK 82° .020 DEEP
	ON REAR OF PANEL, 2 HOLES
C	#52 DRILL 1/16" DEEP, 2 HOLES

LIST OF MATERIAL	
ITEM OR PART NUMBER	DESCRIPTION
	.125 ALUMINUM 6061 T-6

NOTE:
1. ALL CORNERS ARE
90° ± .1° (4)

11X3153 M-5

				SURFACE TREATMENT	IDENTIFICATION	FINISHES	NOTES—UNLESS OTHERWISE SPECIFIED	SHOP ORDERS
				SANDBLAST ☐ DECREASE ☐	PART NO. WHERE SHOWN	SAW CUT	1. TOLERANCES ON DIMENSIONS ± .010	SERIAL NO.
				PRIME ☐ COATS ☐	PAINT ☐ ENGRAVE ☐	FLAME CUT	2. BREAK EDGES 1/64 MAXIMUM	DO NOT SCALE THIS DWD
				FINISH ☐ COATS ☐	STAMP ☐ INSCRIPT ☐	ROUGH MACHINE	3. 30° CHAMFER ENDS ON ALL SCREW THREADS	DATE ISSUED
				OTHER ☐ IRIDITE #14	HEIGHT	ROUGH MACHINE	4. 1/16 PITCH THREAD RELIEF WITH ROUND NOSE	DATE RIG'D
					COLOR	SMOOTH MACHINE	5. ON WEIGHTS, REMOVE SHARP EDGES, BURRS	NO. REQ'D
					LAB. YES ☐ NO ☐	SMOOTH MACHINE	6. VISUAL COMPARISON OF FINISHES WITH Q1 "SURFACE ROUGHNESS SCALE" NO. 8487101-15	DELIVER TO

STD. FRONT PANEL FOR #3 MODULE
For STD 51' NUCLEAR INSTRUMENTATION
BIN

Fig. 26

[illegible]

				SURFACE TREATMENT		IDENTIFICATION		FINISHES		NOTES—UNLESS OTHERWISE SPECIFIED		SHOP ORDERS	
☐	☐	☐	☐	SANDBLAST ☐ DR-FRASE ☐	PART NO. WHERE SHOWN	PAINT ☐ ENGRAVE ☐	LOW CUT	☒	1. TOLERANCES ON DIMENSIONS <u>±.010</u>	1. SERIAL NO.			
☐	☐	☐	☐	PRIME ☐ COAT ☐	STAMP ☐ INSCRIBE ☐	ROUGH MACHINING	☒	2. BREAK EDGES 1/8" MAXIMUM	2. 3RD CHAMFER EDGES OF ALL NEW THREADS	2. DATE			
☐	☐	☐	☐	FINISH ☐ COATS ☐	OTHER ☐	AVERAGE MACHINING	☒	3. 1/8" ROUN. THREAD BLT. WITH YOUNG HISS INVERT	3. LOOK FOR ALL MACHINING CUT	3. QTY			
☐	☐	☐	☐	HEIGHT ☐	WEIGHT ☐	SMOOTH MACHINING	☒	4. ON WEIDMILL. REMOVE SHARP EDGS., RUFFS, 4. DOOR SCALE AND WELD SPATTER	4. VISUAL COMPARISON OF REFINISHES WITH Q1	4. QTY			
☐	☐	☐	☐	COLOR ☐	OTHER ☐	SMOOTH MACHINING	☒	5. SURFACE ROUGHNESS SCALE: NO. 60-120-150 IS ACCEPTABLE	5. SURFACE ROUGHNESS SCALE: NO. 60-120-150 IS ACCEPTABLE	5. QTY			
☐	☐	☐	☐	DATE	CHANGES	LAST ☐ YES ☐ NO ☐				6. DELIVER			

STANDARD REAR PANEL FOR #3 MODULE FOR STD. 54" NUCLEAR INSTRUMENTATION	INSTRUMENT ID#	INSTRUMENT NO.	DATE
		24411-04	9-11
		REVISION 6A	6A
		CONTROL NO.	

Fig. 27

Group III of illustrations

Construction drawings for 5-1/4-inch instrumentation bin

<u>Page number</u>	<u>Figure number</u>	<u>LRL Drawing number</u>	<u>Title</u>	<u>Number required</u>
35	28	11X3143 A-1	Overall assembly	-
36	29	11X3144 A-2	Cross-section assembly	-
37	30	11X3044 M-10	Top view and module guide detail	-
38	31	11X3053 M-9A	Module guide (top and bottom)	24
39	32	11X3321 M-1A	Aluminum extrusion for front frame braces	-
40	33	11X3321 M-2A	Aluminum extrusion for rear frame braces	-
41	34	11X3321 M-3A	Aluminum extrusion for front and rear main frame braces	-
42	35	11X3044 M-5	Main frame, front top	1
43	36	11X3044 M-13	Main frame, front bottom	1
44	37	11X3044 M-8	Punched screen, top and bottom bin covers	2
45	38	11X3044 M-7	Main frame, rear top	1
46	39	11X3044 M-6	Main frame, bottom rear	1
47	40	11X3144 M-2	Front frame brace	2
48	41	11X3144 M-5	Side covers (right side)	1
49	42	11X3144 M-6	Side cover (left side)	1
50	43	11X3144 M-1	Rear frame brace	2
51	44	11X3044 M-4	Rear connector panel	1

Fig. 31

DATE	8-12-64
DESIGN ACCOUNT NO.	4271-04
DRAWN BY	CPW
CHECKED BY	TD
SHOWN ON	
ALUMINUM EXTRUSION FOR FRONT FRAME BRACES ON STD. 8 3/4" OR 5 1/4"	
NUCLEAR INSTRUMENTATION BIN	

Fig. 32

DESIGN ACCOUNT NO.	DATE
4271-04	8-11
DRAWN BY	CRAW
CHECKED BY	D
SHOWN ON	
ALUMINUM EXTRUSION FOR REAR	
FRAME BRACES ON STD. 8 3/4" OR 5 1/4"	
NUCLEAR INSTRUMENTATION BIN	

Change Letter	Drawn By	Check By	Date	CHANGES	MATERIAL ALUMINUM 6063-T5	11X3321M-3A

NOTES:

- 1) FLATNESS - .004/IN
- 2) STRAIGHTNESS - .0125/FT.
- 3) TWIST - $1/2^\circ$ /FT.
- 4) ANGULARITY - $\pm 1^\circ$
- 5) CORNER & FILLET RADIUS .015 IN
- 6) SURFACE ROUGHNESS .002 IN MAX

SURFACE TREATMENT	IDENTIFICATION	FINISHES	NOTES—UNLESS OTHERWISE SPECIFIED	SHOP ORDERS	
SANDBLAST ☐ DEGREASE ☐	PART NO. WHERE SHOWN	SAW CUT FLAME CUT SHEAR ☒	1. TOLERANCES ON DIMENSIONS $\pm .006$	SERIAL NO.	DO NOT SCALE THIS DWG.
PRIME COATS	PAINT ☐ ENGRAVE ☐	ROUGH MACHINE ☒	2. BREAK EDGES $1/64$ MAXIMUM	DATE ISSUED	RADIATION LABORATORY
FINISH COATS	STAMP ☐ INSCRIBE ☐	AVERAGE MACHINE ☒	3. 30° CHAMFER ENDS OF ALL SCREW THREADS	DATE REQ'D	UNIVERSITY OF CALIFORNIA
OTHER	OTHER	SMOOTH MACHINE ☒	4. $1\frac{1}{2}$ PITCH THREAD RELIEF WITH ROUNDED NOSE TOOL ON ALL MACHINE CUT SCREW THREADS	NO. REQ'D	11X3321M-3 A
HEIGHT	COLOR		5. ON WELDMENTS, REMOVE SHARP EDGES, BURRS, LOOSE SCALE AND WELD SPATTER	DELIVER TO	
LABEL YES ☐ NO ☐			6. VISUAL COMPARISON OF FINISHES WITH G.E. "SURFACE ROUGHNESS SCALE" NO. 8665947G1 IS ACCEPTABLE.		

DESIGN ACCOUNT NO.	DATE
4271-04	8-11-64
DRAWN BY	CROW
CHECKED BY	D
SHOWN ON	
ALUMINUM EXTRUSION FOR FRONT AND REAR MAIN FRAME BRACES ON STD. 8 $\frac{3}{4}$ "	
5 $\frac{1}{4}$ " NUCLEAR INSTRUMENTATION BIN	

RL-330 (Size 1)

Fig. 34

Fig. 35

Fig. 36

100-443888-1000

Fig. 38

Fig. 39

Fig. 41

Fig. 42

Fig. 43

Fig. 44

Group IV of illustrations

Construction drawings for 8-3/4-inch instrumentation module

Page number	Figure number	LRL Drawing number	Title	Number required		
				Size 1	Size 2	Size 3
53	45	11X3053 A-1	Overall assembly	-	-	-
54	46	11X3053 M-5	Side covers	-	-	-
55	47	11X3052 M-3	Front panel #1	1		
56	48	11X3052 M-2	Rear panel #1	1		
57	49	11X3052 M-7	Front panel #2		1	
58	50	11X3052 M-6	Rear panel #2		1	
59	51	11X3053 M-9	Front panel #3			1
60	52	11X3053 M-10	Rear panel #3			1
also 21	15	11X3321 M-5A	Aluminum extrusion sectional	-	-	-
22	16	11X3052 M-1	Extruded corner	4	4	4
24	18	11X3053 M-4	Screen covers (top and bottom) #1	2		
25	19	11X3053 M-8	Screen covers (top and bottom) #2		2	
26	20	11X3053 M-11	Screen covers (top and bottom) #3			2
27	21	11X3053 M-13	Side cover fastener bracket	1	1	1

HOLE SCHEDULE	
DESIG	DESCRIPTION
A	DRILL #31 (4 HOLES)
B	F DRILL USINK 82°.020 DEEP ON REAR OF PANEL (2 HOLES)
C	#52 DRILL 1/16" DEEP (4 HOLES)

LIST OF MATERIAL	
ITEM OR PART NUMBER	DESCRIPTION
	.125 ALUMINUM 6061 T-6

NOTE:
1. ALL CORNERS ARE
90° ± 1° (4)

REAR VIEW

CHANGES				SURFACE TREATMENT		IDENTIFICATION		FINISHES		NOTES—UNLESS OTHERWISE SPECIFIED		SHOP ORDERS	
CHANGES	DRAWN	CHECK	DATE	SANDBLAST	DECREASE	PART NO. WHERE SHOWN	SAW CUT	1. TOLERANCES ON DIMENSIONS ±.010	SERIAL NO.	DO NOT SCALE THIS DWG.			
LETTER	BY	BY		PRIME	COATS	PAINT	FLAME CUT	2. BREAK EDGES 1/16" MAXIMUM	DATE ISSUED	LAWRENCE RADIATION			
				FINISH	COATS	STAMP	SHEAR	3. 30° CHAMFER ENDS OF ALL SCREW THREADS	DATE REQ'D	LABORATORY			
				OTHER		INSCRIBE	ROUGH MACHINE	4. 1 1/2 PITCH THREAD RELIEF WITH ROUND NOSE	NO. REQ'D	UNIVERSITY OF CALIFORNIA			
				IRIDITE #14			AVERAGE MACHINE	5. ON WELDMENTS, REMOVE SHARP EDGES, BURRS, LOOSE SCALE AND WELD SPATTER	DELIVER TO	11X3052M-3			
							SMOOTH MACHINE	6. VISUAL COMPARISON OF FINISHES WITH Q.E. "SURFACE ROUGHNESS SCALE" NO. 866594701 IS ACCEPTABLE.					

DATE	2/27/62	DESIGN ACCOUNT NO.	4271-84	SHOWN ON	MODULE
DRAWN BY	LEON	CHECKED BY		STD. FRONT PANEL FOR #1 MODULE	
FOR STD. 8 3/4" NUCLEAR INSTRUMENTATION					
BIN					

Fig. 47

HOLE SCHEDULE	
DESIG.	DESCRIPTION
A	DRILL #31, 4 HOLES
B	DRILL #30 DIA, 4 HOLES

ITEM OR PART NUMBER	LIST OF MATERIAL	
	DESCRIPTION	
	.125 ALUMINUM 6061 T-6	

				SURFACE TREATMENT	IDENTIFICATION	FINISHES	NOTES—UNLESS OTHERWISE SPECIFIED	SHOP ORDERS	
				SANDBLAST ☐ DEGREASE ☐	PART NO. WHERE SHOWN	SAW CUT ☒	1. TOLERANCES ON DIMENSIONS $\pm .010$	SERIAL NO.	DO NOT SCALE THIS DWG.
				PRIME ☐ COATS ☐	PAINT ☐ ENGRAVE ☐	FLAME CUT ☐	2. BREAK EDGES 1/64 MAXIMUM	DATE ISSUED	LAWRENCE RADIATION
				FINISH ☐ COATS ☐	STAMP ☐ INSCRIBE ☐	SHEAR ☐	3. 30° CHAMFER ENDS OF ALL SCREW THREADS	DATE REQ'D	LABORATORY
				OTHER ☐ TRIDITE #14	OTHER ☐	ROUGH MACHINE ☒	4. 11½ PITCH THREAD RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT SCREW THREADS	NO. REQ'D	UNIVERSITY OF CALIFORNIA
					HEIGHT ☐	AVERAGE MACHINE ☒	5. ON WELDMENTS, REMOVE SHARP EDGES, BURRS, LOOSE SCALE AND WELD SPATTER	DELIVER TO	11X3052 M-2
					COLOR ☐	SMOOTH MACHINE ☒	6. VISUAL COMPARISON OF FINISHES WITH G.E. "SURFACE ROUGHNESS SCALE" NO. 866394701 IS ACCEPTABLE.		
					LABEL ☐ YES ☐ NO ☐				

STD. REAR PANEL FOR #1 MODULE	DESIGN ACCOUNT NO.	DATE
FOR STD. 3 3/4" NUCLEAR INSTRUMENTATION	4271-04	4-11-64
BIN	DRAWN BY	7-27
	CHECKED BY	6-2

Fig. 48

LIST OF MATERIAL		
ITEM OR PART NUMBER	DESCRIPTION	
	.125 ALUMINUM 6061 T-6	

NOTE:
1. ALL CORNERS ARE
90° ± 1° (4)

REAR VIEW

					SURFACE TREATMENT	IDENTIFICATION	FINISHES	NOTES—UNLESS OTHERWISE SPECIFIED	SHOP ORDERS	
					SANDBLAST ☐ DEGREASE ☐	PART NO. WHERE SHOWN	SAW CUT FLAME CUT SHEAR *	1. TOLERANCES ON DIMENSIONS ± _____ 2. REAR EDGES 1/64 MAXIMUM 3. 30° CHAMFER ENDS OF ALL SCREW THREADS 4. 1½ PITCH THREAD RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT SCREW THREADS 5. ON WELDMENTS, REMOVE SHARP EDGES, BURRS, LOOSE SCALE AND WELD SPATTER.	SERIAL NO. DATE ISSUED DATE REQ'D NO. REQ'D DELIVER TO	DO NOT SCALE THIS DWG. LAWRENCE RADIATION LABORATORY UNIVERSITY OF CALIFORNIA IHX3052 M-1
					PRIME _____ COATS _____	PAINT ☐ ENGRAVE ☐ STAMP ☐ INSCRIBE ☐	ROUGH MACHINE = 25/ = 12/ AVERAGE MACHINE = 63 SMOOTH MACHINE = 125/ ✓			
					FINISH _____ COATS _____	OTHER _____				
					HIGHT _____	COLOR _____				
					OTHER IRIDITE # 14	LABEL YES ☐ NO ☐				
NAMES JONES	DRAWN BY	CHECK BY	DATE		CHANGES					

STD, FRONT PANEL FOR #2 MODULE	SHOWN ON	REGION ACCOUNT NO.	DATE
FOR STD. 8 ³ / ₄ " NUCLEAR INSTRUMENTATION		4271-04	8-7
FINI		DRAWN BY	64
		CHECKED BY	

LIST OF MATERIAL	
ITEM OR PART NUMBER	DESCRIPTION
	.125" ALUMINUM 6061 T-6

				SURFACE TREATMENT		IDENTIFICATION		FINISHES		NOTES—UNLESS OTHERWISE SPECIFIED		SHOP ORDERS		DO NOT SCALE THIS DRAWING	
				SANDBLAST ☐ DEGREASE ☐		PART NO. WHERE SHOWN		SAW CUT		1. TOLERANCES ON DIMENSIONS $\pm .010$		SERIAL NO.			
				PRIME _____ COATS _____		PAINT ☐ ENGRAVE ☐		FLAME CUT		2. BREAK EDGES 1/64 MAXIMUM		DATE ISSUED			
						STAMP ☐ INSCRIBE ☐		SHEAR		3. 30° CHAMFER ENDS OF ALL SCREW THREADS		DATE REQ'D		LAWRENCE RADIATION	
				FINISH _____ COATS _____		OTHER _____		ROUGH MACHINE		4. 1/2" PITCH THREAD RELIEF WITH ROUND NOSE TOOL ON ALL MACHINE CUT SCREW THREADS				LABORATORY	
						HEIGHT _____		AVERAGE MACHINE		5. ON WELDMENTS, REMOVE SHARP EDGES, BURRS, LOOSE SCALE AND WELD SPATTER		NO. REQ'D		UNIVERSITY OF CALIFORNIA	
				COLOR <u>IRIDITE #14</u>		COLOR _____		63/		6. VISUAL COMPARISON OF FINISHES WITH Q.S. "SURFACE ROUGHNESS SCALE" NO. 8065947G IS ACCEPTABLE.		DELIVER TO		<u>11X3052 M-6</u>	
				OTHER _____		LABEL YES ☐ NO ☐		SMOOTH MACHINE							
CHANGES															

Fig. 50

HOLE SCHEDULE	
DESIGN	DESCRIPTION
A	DRILL #31 (4 HOLES)
B	DRILL C/SINK B2, .020 DEEP
C	ON REAR OF PANEL (2 HOLES)
C	SLDRILL 1/16" DEEP (4 HOLES)

LIST OF MATERIAL	
ITEM OR PART NUMBER	DESCRIPTION
	.125 ALUMINUM 6061 T-6

NOTE:
1. ALL CORNERS ARE
 $90^\circ \pm .1^\circ (4)$

11X3053 M-9

REAR VIEW

				SURFACE TREATMENT	IDENTIFICATION	FINISHES	NOTES—UNLESS OTHERWISE SPECIFIED	SHOP ORDERS
DESIGN	DATE	CHECK	DATE	LANDLIFT ☐ DEGRADE ☐	PART NO. WHERE SHOWN	SAW CUT ☒	1. TOLERANCES ON DIMENSIONS $\pm .010$	SERIAL NO.
				PRIME ☐ COATS ☐	PAINT ☐ ENAMEL ☐	FLAME CUT ☒	2. BEVEL EDGES 1/64" MAXIMUM	DATE ISSUED
				FINISH ☐ COATS ☐	STAMP ☐ INSCRIBE ☐	SHEAR ☒	3. 30° CHAMFER ENDS OF ALL SCREW THREADS	DATE
					OTHER	ROUGH ☒	4. 1/8" PITCH THREAD RELIEF WITH ROUND NOSE	NO. OF D
					RIGHT	MACHINE ☒	5. ON WELDMENTS, REMOVE SHARP EDGES, BURS, 100% SCALE AND WELD SPATTER	DELIVER
					COLOR	AVERAGE ☒	6. VISUAL COMPARISON OF FINISHES WITH D.F. "SURFACE ROUGHNESS SCALE" NO. 8449401 IS ACCEPTABLE	10
					OTHER ☒ IRIDITE #12	SMOOTH ☒		
					LABEL ☐ YES ☐ NO ☐	MACHINE		

STD. FRONT PANEL FOR #3 MODULE	DATE	1271-04
FOR STD. 8 3/4" NUCLEAR INSTRUMENTATION	DATE	1271-04
	DATE	1271-04
	DATE	1271-04

Fig. 51

DATE	4/27/64	NO. DRAWING	3	MODULE	STD. REAR PANEL FOR #3
DESIGNED BY	W. J. BOW	CHECKED BY	W. J. BOW	DATE	4/27/64
FOR STD. B-34 NUCLEAR INSTRUMENTATION					
BIN					

LIST OF MATERIAL	
ITEM OR PART NUMBER	DESCRIPTION
	125ALUMINUM 6061 T6

NO.	DESCRIPTION
A	DRILL #31 (6 HOLES)
B	DRILL #30 DIA (4 HOLES)

SURFACE TREATMENT		IDENTIFICATION		FINISHES		NOTES-UNLESS OTHERWISE SPECIFIED		SHOP ORDERS	
ANODIZE	☐	REMARKS	☐	PAINT NO. WHITE SHOW	☐	1. TOLERANCES ON DIMENSIONS ±.010	2. BREAK EDGES 1/4" MAXIMUM	DATE	1/1/64
PRIME	☐	COAT	☐	STAMP	☐	3. 30° CHAMFER END OF ALL SCREW THREADS	4. 100% ON ALL MACHINE CUT SURF. FINISH	TIME	1/1/64
FINISH	☐	COAT	☐	OTHER	☐	5. 100% ON ALL MACHINE CUT SURF. FINISH	6. 100% ON ALL MACHINE CUT SURF. FINISH	NO.	1/1/64
CHROME PLATE #14	☐	HIGHT	☐	AVG. FINISH	☐	7. 100% ON ALL MACHINE CUT SURF. FINISH	8. 100% ON ALL MACHINE CUT SURF. FINISH	ACC.	1/1/64
CHANGES		DATE		BY		REVISION		REVISION	

Fig. 52

Group V of illustrations

Construction drawings for 8-3/4-inch instrumentation bin

Page number	Figure number	LRL Drawing number	Title	Number required
62	53	11X3043 A-2	Overall assembly	-
63	54	11X3044 A-1	Cross-section assembly	-
64	55	11X3044 M-2	Front frame brace	2
65	56	11X3044 M-3	Side cover (right side)	1
66	57	11X3044 M-14	Side cover (left side)	1
67	58	11X3044 M-1	Rear frame brace	2
also				
37	30	11X3044 M-10	Top view and module guide detail	-
38	31	11X3053 M-9A	Module guide (top and bottom)	24
39	32	11X3321 M-1A	Aluminum extrusion for front frame braces	-
40	33	11X3321 M-2A	Aluminum extrusion for rear frame braces	-
41	34	11X3321 M-3A	Aluminum extrusion for front and rear main frame braces	-
42	35	11X3044 M-5	Main frame front top	1
43	36	11X3044 M-13	Main frame front bottom	1
44	37	11X3044 M-8	Punched screen top and bottom bin covers	2
45	38	11X3044 M-7	Main frame, rear top	1
46	39	11X3044 M-6	Main frame, rear bottom	1
51	44	11X3044 M-4	Rear connector panel	1

Fig. 54

Fig. 55

Fig. 57

[illegible] [illegible]

Fig. 58

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