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MODEL BV-100

PULSED MOLECULAR BEAM VALVE

INSTRUCTION MANUAL

FOR

BV-100V VALVE

AND

BV-100D DRIVER

Newport Corporation
18235 Mt. Baldy Circle
P. O. Box 8020
Fountain Valley, CA 92728-8020

8410

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1.0 INTRODUCTION

The BV-100 Pulsed Molecular Beam Valve is a device for producing short duration, high speed gas pulses. The BV-100 System consists for the BV-100V Valve, BV-100D Driver, and an assortment of accessories and fittings for enhancing the useability and performance of the BV-100V Valve. (See Figure 1 - BV-100 Pulsed Molecular Beam Valve and Accessories.)

In most applications, the BV-100 is used to inject pulses of gaseous material under pressure into a vacuum chamber where the material is studied in an isolated state or mixed with other species. In spectroscopy, the BV-100 generates pulses at supersonic velocities producing molecular beams cooled to as low as 3K, thereby reducing hot band absorption and allowing increased spectral resolution. In studies of molecular collision dynamics, multiple beams are generated to study physical or chemical interaction among different molecules.

2.0 DESCRIPTION

The BV-100 consists of two subassemblies: the BV-100V Valve and the BV-100D Valve Driver. The two are interconnected with an 8 foot cable which can be disconnected at the valve.

2.1 BV-100V VALVE DESCRIPTION

The BV-100V consists of a dual electro-magnetic coil actuator assembly housed in a 1-1/4 inch diameter stainless steel cylinder. The housing is flanged at one end to carry gas inlet ports and electrical feedthru connections. Mounted at the other end is the removable end plate which contains the valve orifice.

The valve is designed to be mounted on a vacuum chamber with the orifice end protruding through a common feedthru fitting (e.g. Cajon Company Ultra-Torr) or one of Newport's BV-F Series feedthru fitting accessories.

The beam valve is divided into two chambers separated by a bellow diaphragm. (See Figure 2 - BV-100V Valve.) The sample gas chamber carries the gas to be metered by the valve. All materials exposed to the sample gas are corrosion resistant (Viton, Teflon, Stainless Steel, Nickel). The backing gas chamber carries an inert gas at a pressure necessary to balance the differential pressure across the bellows diaphragm.

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The actuator assembly drives a polymer seal tip against the orifice to close the valve. Actuator stroke can be controlled from the BV-100D Driver up to its maximum of .015 inches.

The valve is preset at the factory such that with no holding current applied and zero differential pressure across the bellows, the closing force will be zero. With the driver current on in standby, the valve is closed. However, differential pressure of approximately 3psi will open the valve.

2.2 BV-100D DRIVER DESCRIPTION

The BV-100D Driver is an AC linepowered controller which provides proper current level and pulse timing sequence to the two actuator coils in the beam valve.

The driver enclosure is furnished with hardware for rack mounting or it can be used on a bench as it is supplied with rubber feet.

The driver contains an internal pulse rate generator, a trigger delay generator, and timers for coil current pulsewidth and timing control. Front panel controls provide adjustability of pulse rate, pulse delay, pulse intensity and duration.

See Drawing - Block Diagram - BV-100D Molecular Beam Valve in Section 5.1 of Appendix.

2.3 BV-100 ACCESSORIES

BVP Series Endplates

Stainless steel end plates with different orifice diameters and exit face configurations are available as accessories. Unless otherwise specified, the standard end plate, BVP-0.5, is furnished with all valves.

End Plate Model No.	Exit Face Configuration	Orifice Diameter
BVP-0	Flat	None
BVP-0.5	Flat	0.5mm
BVO-1.0	Flat	1.0mm
BVP-0.5C	120° Conical	0.5mm
BVP-1.0C	120° Conical	1.0mm
BVP-0.5CL	30° Conical	0.5mm
BVP-1.0CL	30° Conical	1.0mm

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BV-F Series Fittings

Three styles of high vacuum-compatible feedthru fittings are available to accept the BV-100V. All are furnished with VITON O-ring seals and are fabricated from stainless steel.

BV-FF: Standard 2.75 inch knife-edge vacuum flange.

BV-FW: Weld-on fitting with 1.50-inch tubular end.

BV-FP: 1-1/4 inch NPT male threaded end.

BV-100R Dome-Loaded Pressure Regulator

This is a stainless steel pressure regulator which, when used with an inert auxiliary gas, regulates the pressure of the sample gas to provide a constant controlled differential pressure across the beam valve actuator diaphragm. Its use is recommended when high pressure operation with corrosive sample gasses is required.

OPERATING CHARACTERISTICS:

Maximum Inlet Pressure: 2000psi
Outlet Pressure Control Range: 0 to 150psi
Differential Pressure Control Range: -15 to +15psi

Inlet and Outlet Port: 1/4" NPTF
Auxiliary Inlet Port: 1/8" NPTF

2.4 SPECIFICATIONS

BV-100V Valve

- Pulse Duration: 100 microsec min.
- Beam Intensity: to 10^{22} molecules/steradian-sec
- Repetition Rate: $\leq$50 Hz
- Maximum Pressure: 10 atmosphere
- Maximum Operating Temperature: 100°C
- Orifice Diameter: 0.5mm supplied with valve; optional 1.0mm, blank
- Size: Valve housed in 6" x 1-1/4" diameter package for variable intrusion depth into vacuum port
- Gas Inlet Fittings: 1/8" NPTF Backing gas inlet, 1/16" Tubing sample gas inlet

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BV-100D Valve Driver Unit

- Repetition Rate: 0.5 to 50 Hz, continuously variable
- Pulse Width: 100 microsec to 1 msec
- Pulse Delay: 0.05 to 2 msec
- Beam Intensity: Continuously variable
- Trigger Select: Internal/External/Off
- Input: TTL-compatible External Trigger
- Outputs: TTL-compatible SYNC; Pulse Current Monitor
- Size: 3-1/2"H x 12"D x 10"W Rack Mount
- Power: 115/230 VAC 50-60 Hz, 1 amp
- Control Cable: 8' length

3.0 OPERATION

3.1 OPERATING PRINCIPLES

The valve actuator assembly is comprised of two electromagnet coils separated by a fixed gap with a soft iron disc placed in the gap between the coils. Each coil is placed in a ferrite pot core to close and confine the flux path. A valve actuator stem attached to the iron disk is driven axially about .4mm as current is switched between coils. A polymer seal fitted on the end of the actuator stem opens and closes the valve orifice.

During operation, the "close" coil (coil located nearest the orifice) carries approximately one ampere of steady current to hold the valve in its closed position. At the beginning of an operational cycle, the holding current is turned off in the "close" coil and a 2 ampere current pulse is driven through the "open" coil thus pulling the seal tip away from the orifice and allowing gas to expand out of the valve. The open pulse width is varied by the INTENSITY adjustment to effectively control the length of the actuator stroke and hence the intensity of the pulse.

After the "open" pulse is terminated, the valve will remain open until a "close" pulse is initiated. This delay between "open" and "close" pulses effectively controls the beam pulse duration.

At the end of the "duration" timeout, a "close" cycle is initiated which reapplies the 1 amp hold current along with a 2 ampere "close" pulse. The "close" pulse width is set to approximately 500 microseconds.

A composite coil current waveform can be obtained at the CURRENT MONITOR connector on the front panel. (See paragraph 3.2.2)

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3.2 OPERATING PROCEDURES AND GUIDELINES

3.2.1 GAS SUPPLY CONNECTIONS

Two gas inlet ports are located on the flange plate at the rear of the valve. Both are 1/8-inch NPTF tapped holes and open directly into the backing gas chamber. However, as shipped from the factory, a 1/16" stainless steel sample gas tube leading to the sample gas chamber protrudes from one hole and is covered by tube-like fitting. A fitting to adapt 1/16" tube to 1/8" NPT is supplied as a separate item with the valve. This arrangement allows access to both gas chambers and easy conversion between operation with a single gas supply and operation with dual gas supplies.

Single Gas Operation (Non-Corrosive Gases Only)

If the sample gas to be used in the valve is compatible with materials in the actuator (aluminum, ferrite, iron, bronze, copper, and 60-40 solder) a backing gas supply is not necessary and the sample gas can fill the entire housing floo.ding both sample and backing gas chambers, thereby eliminating differential pressure across the diaphragm. The recommended connection for this mode of operation is shown in Figure 3. If desired, the 1/16" tube can be removed entirely from the valve by simply unscrewing it and withdrawing it from the housing together with its TEFLON seal washer.

CAUTION: The BV-100V valve housing is designed and rated to operate at pressures up to 200psi. Do not exceed this pressure level!!

Dual Gas Supply Operation (Corrosive Gases)

Where the sample gas is corrosive and may damage actuator components, only the sample gas chamber can be exposed to the gas which must be supplied through the 1/16" stainless steel tube. The tube-like fitting located on the flange cover is removed entirely from the flange cover plate and replaced with the 1/16" tube to 1/8-inch NPT fitting supplied with the valve. Note that this fitting slides on over the 1/16" sample tube. The 1/16" sample tube should be attached to the sample gas supply system by a slide-on type connector such as a Cajon Ultra-Torr fitting or equivalent.

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If the sample gas supply operates within ±3psi of atmospheric pressure, the backing gas chamber can be left open exposing it to atmospheric pressure. However, if the supply operates significantly above 1 atmosphere, an inert backing gas will be required to minimize differential pressure across the diaphragm. This can be accomplished by means of a dome-loaded pressure regulator connected as shown in Figure 4. The Newport BV-100R accessory is specifically recommended for this purpose.

CAUTION: The BV-100V valve housing is designed and rated conservatively to operate at pressures up to 200psi. Do not exceed this pressure!!

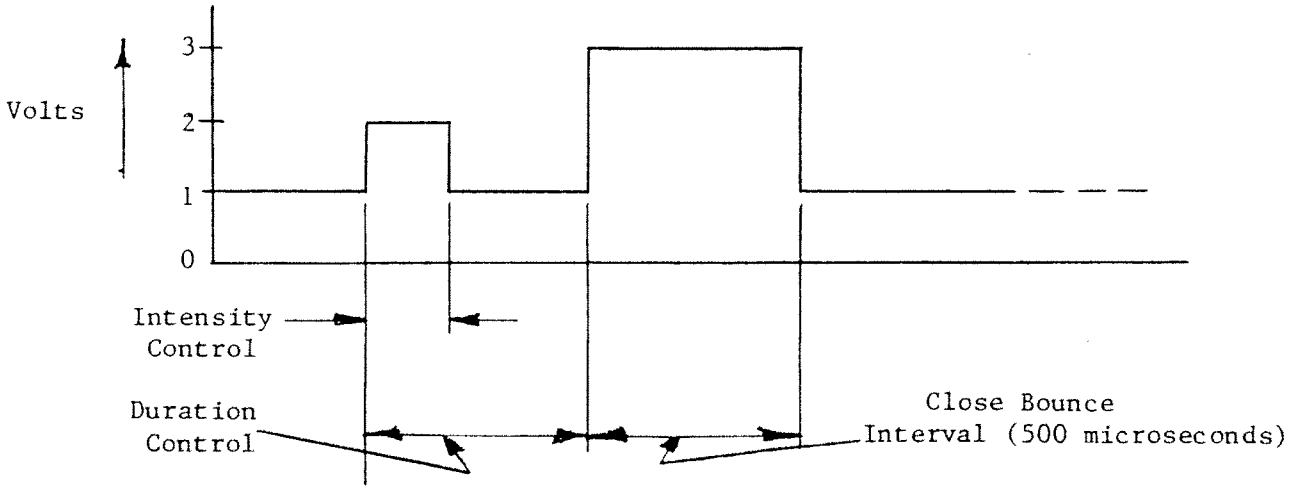
3.2.2 DRIVER CONTROLS AND INDICATORS

Control/Indicator	Function
1. POWER ON Switch	Illuminated AC power switch (must be left on for positive valve seal).
2. INTERNAL RATE Control	Adjusts the pulse rate of the internal generator over a range of 0.5 to 50 Hz.
3. EXTERNAL TRIGGER Connector	This BNC type connector allows triggering of the valve delay and timing sequence from an external signal. Triggering is on the pulse leading edge. Input impedance: 50 ohms. Requires signal level ≥3 volts. Enabled only when TRIGGER SELECT switch is in EXT position.
4. TRIGGER DELAY Switch	A three-position toggle switch which selects the triggering source.
5. TRIGGER DELAY Control	This control varies the delay between trigger pulse and start of valve pulsing sequence over a range of about 50 microseconds to 2 milliseconds.
6. SYNC OUT Indicator	The LED light will flash once for each valve pulse sequence.

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7. SYNC OUT Connector	This BNC-type connector provides an output pulse the leading edge of which is coincident with the start of a valve pulse sequence. Output level: 4 volts (min), 300 ohms. Pulse width may vary from 50 microseconds to 1 millisecond.
8. INTENSITY Control	This two-digit switch pot controls the open cycle pulse width. The effectively varies how fast and how far the valve opens. The setting corresponds to the open current pulse width in tens of microseconds.
9. DURATION Control	This two-digit switch pot controls the valve open time duration. The setting corresponds to the "close coil current interrupt period in tens of microseconds.
10. CURRENT MONITOR Connector	This BNC-type connector outputs a summed composite of the waveform in both "open" and "close" coils.

Typical Waveform



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3.2.3 OPERATING GUIDELINES

Startup: Forming a Pulsed Jet

1. With the valve installed and connected to the BV-100D Driver, preset the controls on the Driver as follows:

POWER:	On (This holds valve closed.)
TRIGGER SELECT:	Off
INTERNAL RATE:	Counterclockwise (Minimum)
INTENSITY:	00
DURATION:	30

2. Turn on gas supply to the valve after vacuum chamber has reached operating pressure.

3. While monitoring vacuum pressure, move the TRIGGER SELECT switch to INTERNAL RATE and advance the INTERNAL RATE control to the desired pulse rate.

4. Increase the INTENSITY control setting until the desired gas load is achieved. The valve should start opening at about 100 to 250. Should it be desirable to operate with the INTENSITY control above 300, the DURATION control should be advanced. To avoid overlapping open and close pulses, the DURATION setting should always be greater than the INTENSITY setting. Long pulses can be achieved by increasing the DURATION setting after desired pulse intensity is achieved.

4.0 MAINTENANCE/SERVICE

Operation with gases that degrade viton or long use in general may swell or deform the tip-seal. A symptom of this is a valve that will not seal (deformed tip) or one that will not open (swollen). This necessitates a change of tip-seal which is performed as follows:

1. Remove the end plate.

2. Taking care not to stress the bellows, remove the old tip-seal by simply pulling it out of its socket.

3. Cut a three inch length of .070" diameter Viton o-ring stock.

4. Holding the stock like dental-floss, stretch it over the vapors of liquid nitrogen to harden it (a sytrofoam coffee cup is a convenient dewar for this purpose).

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5. Quickly cut the o-ring material in the stretched region and insert the thin cut end into the bellows tip holding it while the material warms and expands.

6. Slide the tip-seal trim tool provided with the valve over the free end of the o-ring stock and fasten to the end of the valve with 2 #2 cap screws used to hold the end plate. (The o-ring that normally seals the circumference of the end plate should be removed for this operation.)

7. Connect the valve to the driver and turn on the power with the TRIGGER SELECT switch in the OFF position.

8. Using a new razor blade, carefully cut the protruding tip-seal flush to the surface of the trim tool. The cut tip-seal must be flat with no serrations or burrs. If necessary, 400 grit wet/dry emory paper can be used to polish the end of the seal.

5.0 APPENDIX

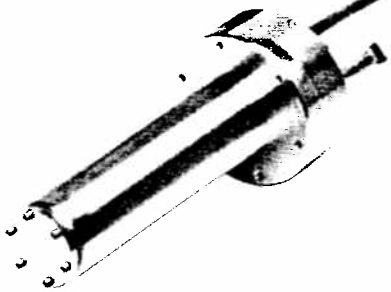
5.1 SCHEMATICS AND ASSEMBLY DRAWINGS

06427 Beam Valve Assembly
06024 Actuator Assembly
02739 Block Diagram BV-100D
05590 Schematic Beam Valve Driver
05598 Assembly Beam Valve Driver

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BV-100D DRIVER



BV-100V VALVE

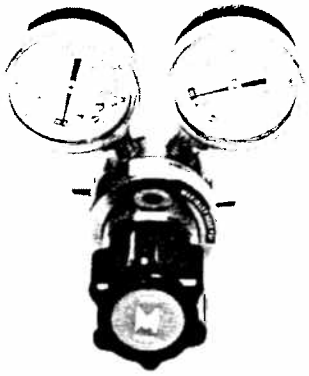
BV-FW

BV-FP

BV-FF



BVF SERIES FITTINGS



BV-100R REGULATOR



BVP SERIES END PLATES

Fig. 1 - BV-100 MOLECULAR BEAM VALVE SYSTEM AND ACCESSORIES

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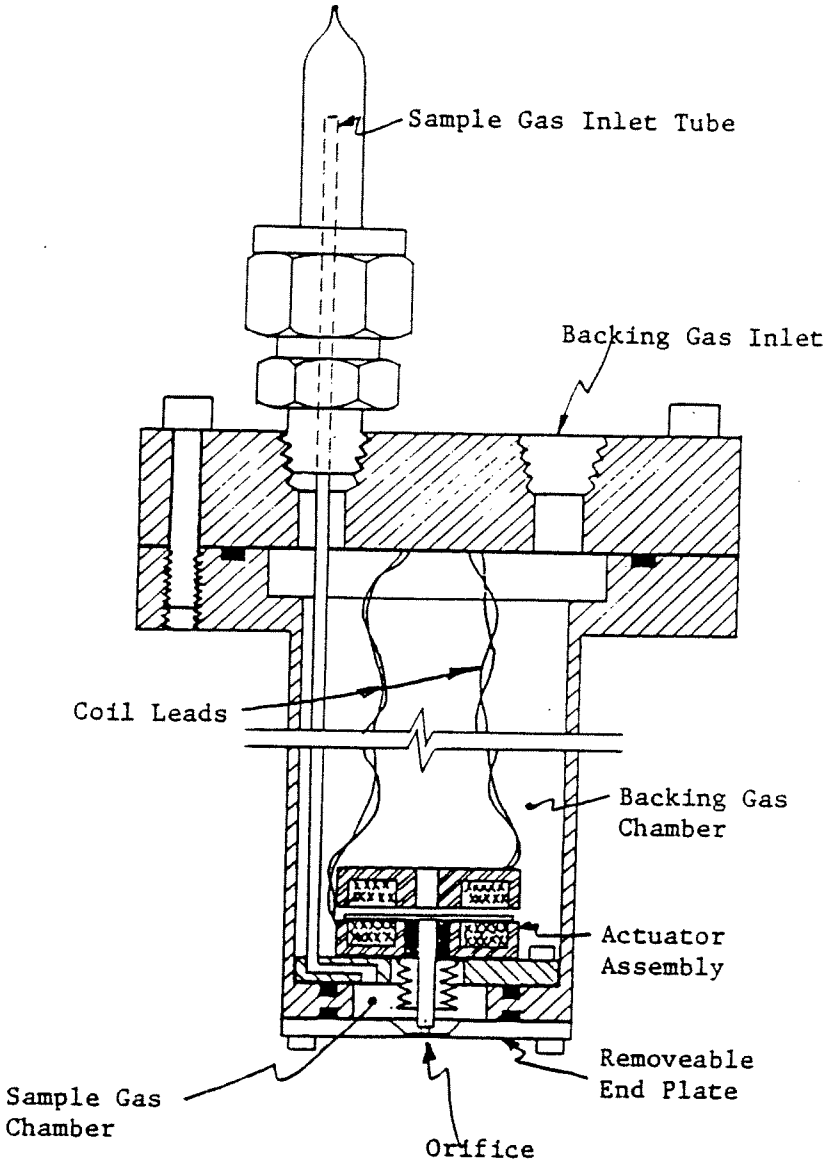


Fig. 2 - BV-100V Valve

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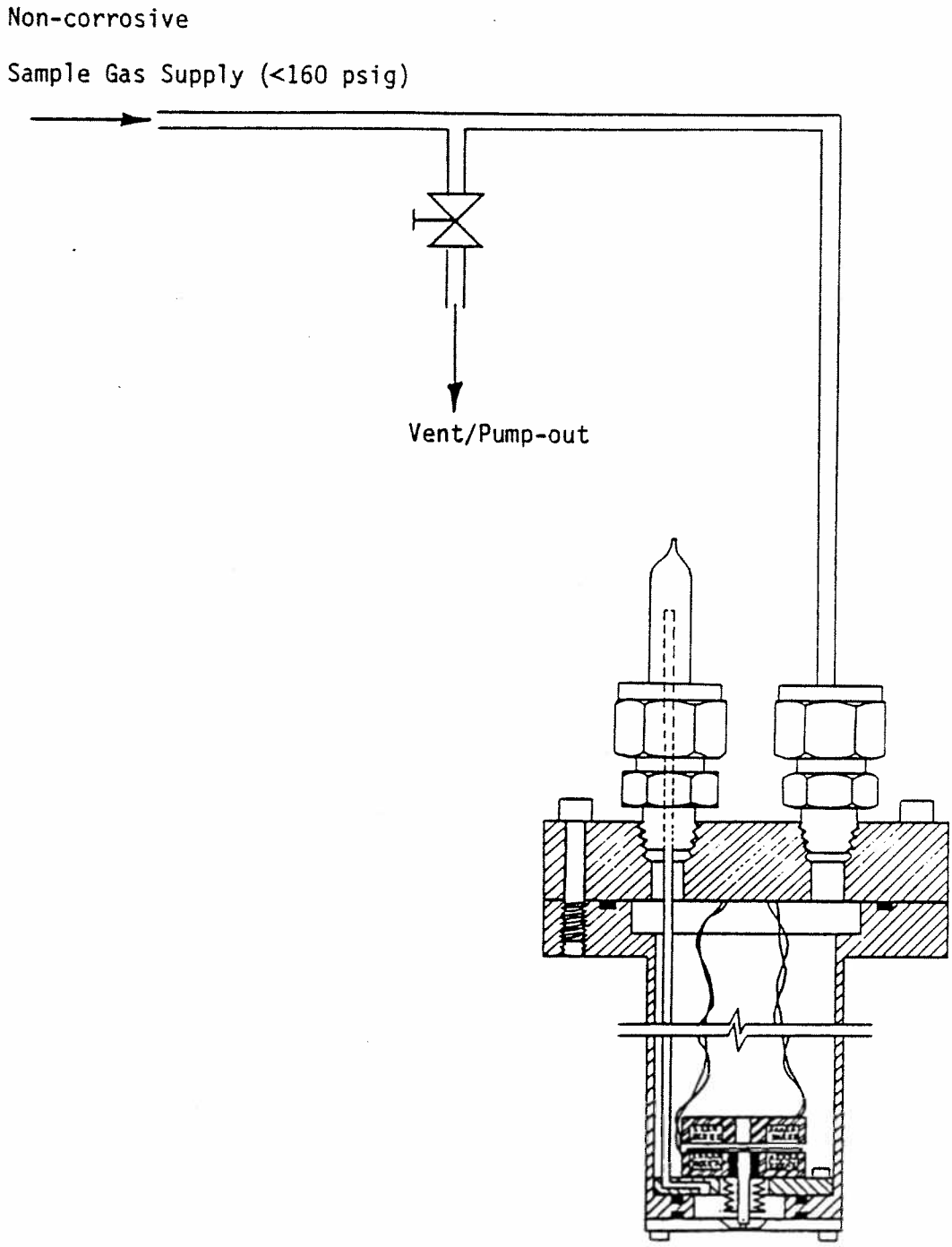


Fig. 3 - Connections for Use with Non-corrosive Materials

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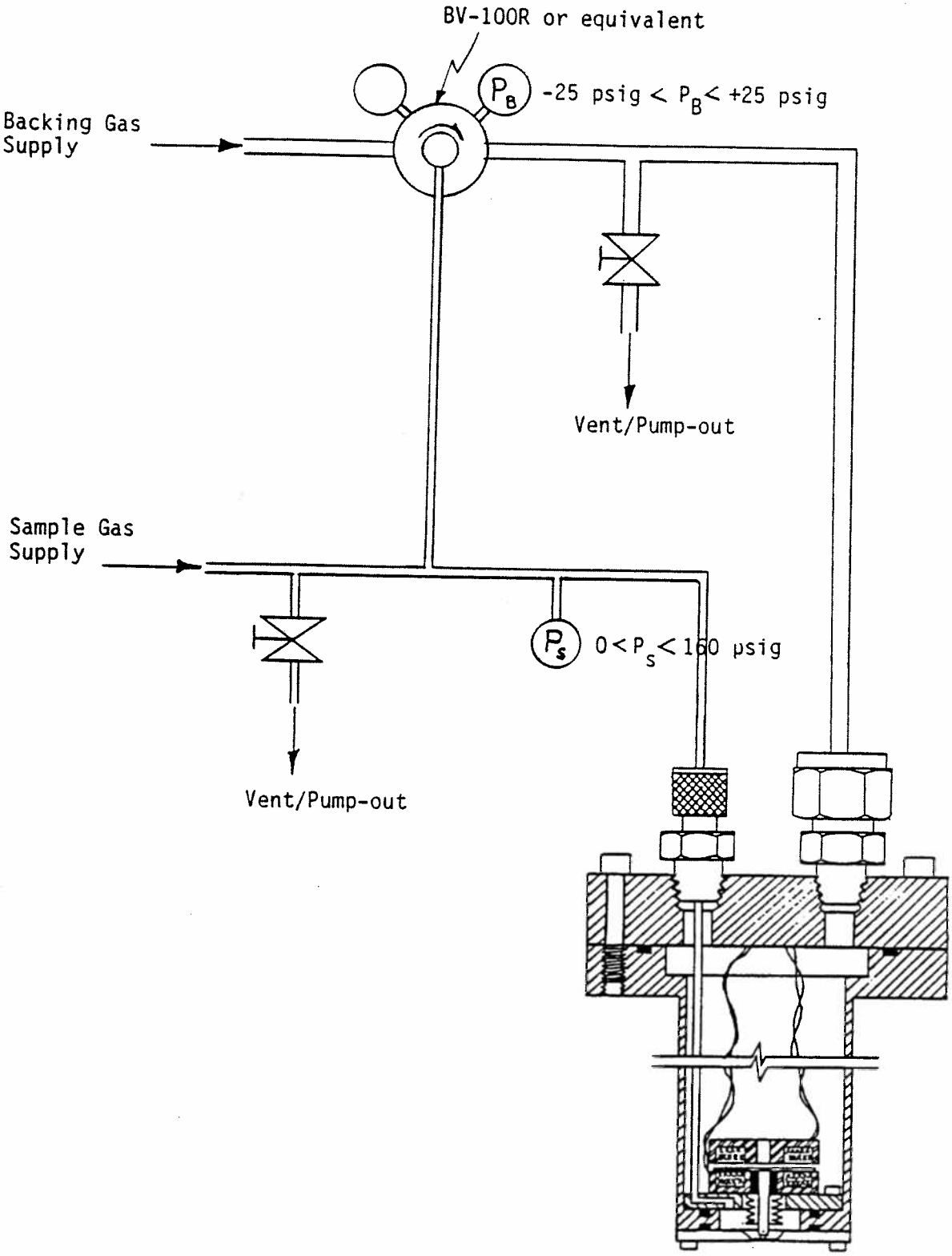


Fig. 4 - Connections for Use with Corrosive Materials

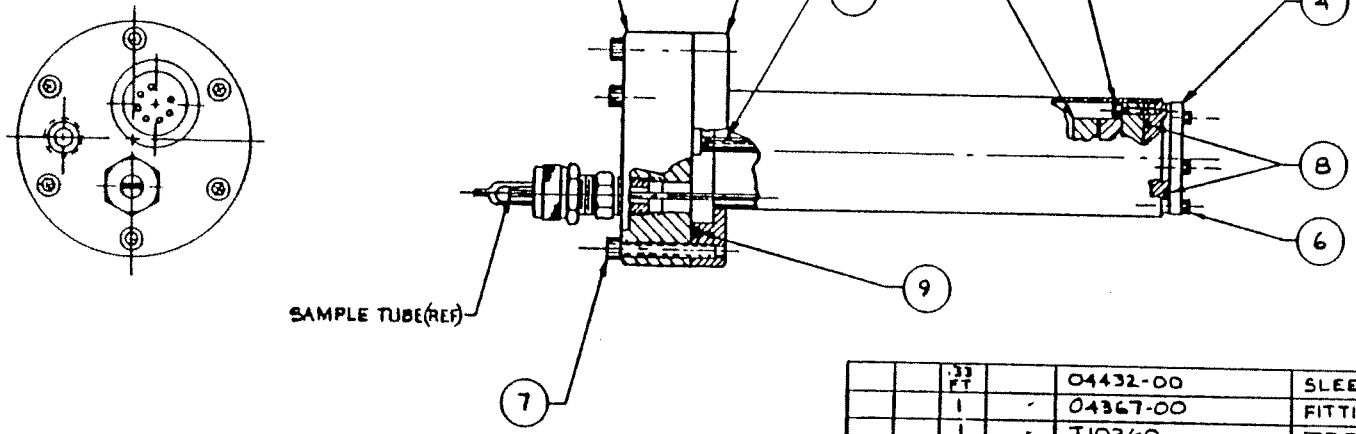
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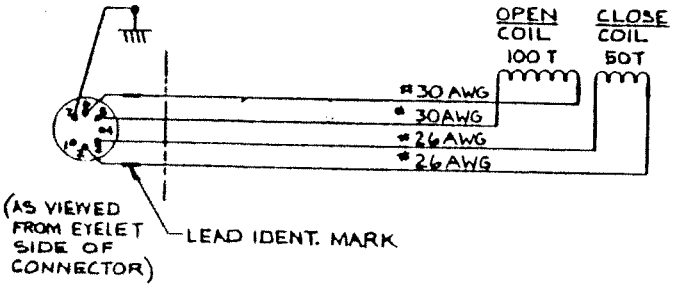
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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	ITEM 4: BVP-0.8 WAS 06029-01 (PICTURE CHANGE TO TUBE FITTING (NUT)	11/21	HK
B	ITEM 10 P/N (WAS) 3674-80-073, ADDED: ITEM 12, NOTE 2. REVISED ELECT SCHEM. V.S.	1-12-84	HK
C	ADDED ITEM 10 & NOTE 3. V.S.	8-5-84	HK

NOTES: UNLESS OTHERWISE SPECIFIED

1. ITEM 11 TO BE BAGGED AND SHIPPED AS A LOOSE PART WITH ASSY
2. ITEM 12 IS USED ON EYELET 2,3,5,6 ONLY. TEFLON SLEEVING IS TO BE COMPLETELY OVER END OF EYELET.
3. ITEM 10 IS TO BE BAGGED AS A LOOSE PART WITH ASSY.





DWG NO. 06427 REV C

QTY REQD PER DASH NO.	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	DATA: SPECIFICATION, SIZES, SUPPLIERS	SEE NOTE	ITEM NO.
			PARTS LIST			
.33 FT		04432-00	SLEEVING, TEFLON	.053 I.D., .012 WALL	2	12
1		04367-00	FITTING, 1/16 TUBE TO	1/8 NPT	1	11
1		T10260	TOOL, TRIM		3	10
1		4568-131-75V	"O" RING, VITON	1.674 I.D. x .103 W. (SIZE 2-131)		9
2		4568-017-75V	"O" RING, VITON	.676 I.D. x .070 W. (SIZE 2-017)		8
6		3674-80-128	SCREW, CAP HD SOC.	.138-32UNC x 1.00 LG - CRES		7
6		3674-80-050	SCREW, CAP HD SOC.	.086-56UNC x .25 LG - CRES		6
6		3674-80-062	SCREW, CAP HD SOC.	.086-56UNC x .38 LG - CRES		5
1		BVP-0.8	PLATE, END			4
1		06024-00	ACTUATOR ASSY			3
1		06423-00	TUBE ASSY			2
1		06420-00	FLANGE ASSY			1

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA

NEXT ASSY | TOP ASSY | MOD NO BY 100

APPLICATION

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TOLERANCES:

.XXX ± .010 — ANGLES ± 0°30'

.XX ± .02 — FRACTIONS ± 1/64

SURFACE FINISH = 63 OR BETTER DEBURR & BREAK ALL SHARP EDGES. DRAWING IN ACCORDANCE WITH ANSI Y14.5-1973

MATERIAL: SEE P/L

CONTRACT NO.

DWN BY CUMMINGS 10 MAY 83

CHK BY HK 6/2/83

RESP ENGR T. Kuyama 6/8/83

DESIGN ACTIVITY APPROVAL HK

NRC newport corporation
18235 Mt. Baldy Circle Fountain Valley, Ca. 92708

BEAM VALVE
MODEL BV-100

SIZE C | CODE IDENT NO | DWG NO. 06427 | REV C

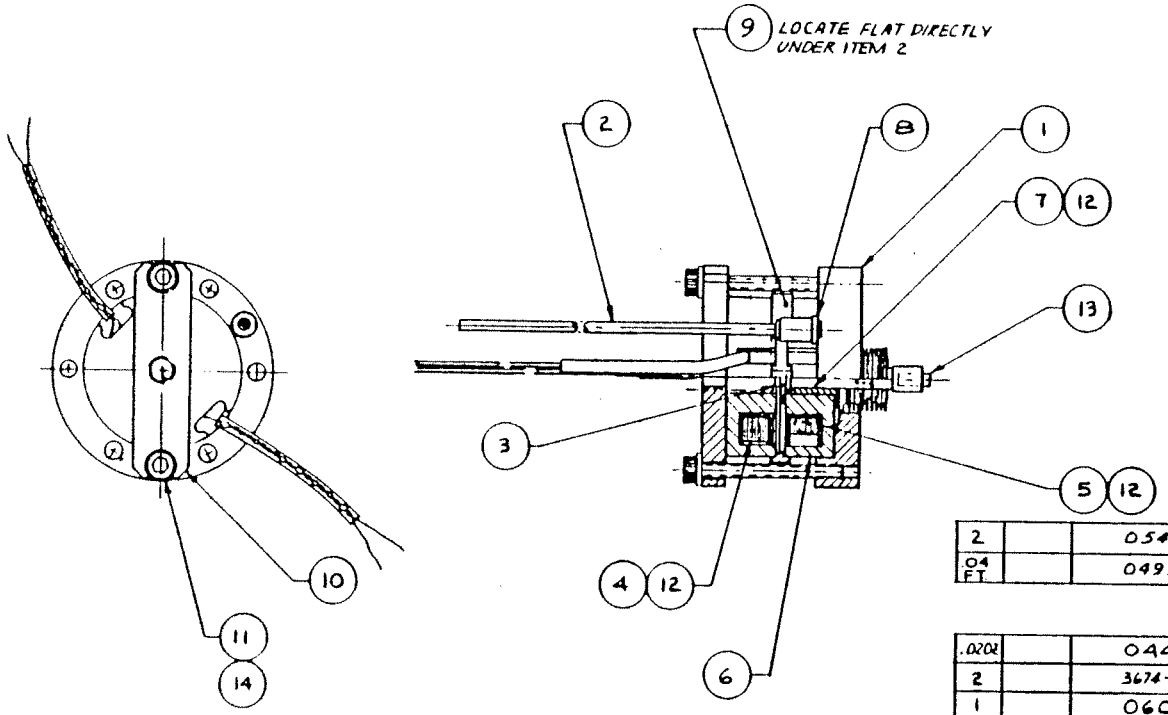
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REV	DESCRIPTION	DATE	APPROVED
A	DELETED NOTE 1., ADDED ITEM 14, ITEM 11 (WAS) 3764-80-058, ITEM 13 (WAS) 06417-00.	1-11-84	
B	ITEM 9 (WAS) 06027-00, 2 REQD	8/11/84	
C	CORRECTED PICTURE, UPDATED P/L	6/7/88	

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2			05416-01	WASHER, SPLIT, STSTL, #2			14
04 FT			04995-01	O-RING, VITON, CORD STK			13
.020Z			04429-00	ADH, RTV 108, SILCON, CLEAR			12
2			3674-80-056	SCW, SHC, STSTL, 2-56 x 3/4			11
1			06028-00	CAP, BLACK			10
1			05491-00	RING, SPACER			9
1			06035-00	WASHER, GAS SEAL, TEFLON			8
1			06033-00	BEARING			7
2			06424-00	CORE, MODIFIED			6
1			06428-01	COIL ASSY			5
1			06428-02	COIL ASSY			4
1			06037-00	DISC/TUBE ASSY			3
1			06418-00	TUBE ASSY, SAMPLE GAS INT.			2
1			06038-00	FLANGE/BELLOWS ASSY			1

PARTS LIST

DWG NO. 06024 REV C

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06427	06427	BV-100

APPLICATION

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XXX ± .0 — ANGLES ± 0 —

XX ± .0 — FRACTIONS ± 0 —

SURFACE FINISH 63 √ OR BETTER DEBURR & BREAK ALL SHARP EDGES. DRAWING IN ACCORDANCE WITH ANSI Y14.5-1973

MATERIAL

CONTRACT NO.

DWN BY CUMMINGS 18 MAY 83

CHK BY HY. L 6-3-83

RESP ENGR T. Kuyawa 6/13/83

DESIGN ACTIVITY APPROVAL

NRC newport corporation
18236 Mt. Baldy Circle Fountain Valley, Ca. 92708

ACTUATOR ASSY - BEAM VALVE

SIZE	CODE IDENT NO	DWG NO.	REV
C		06024	C

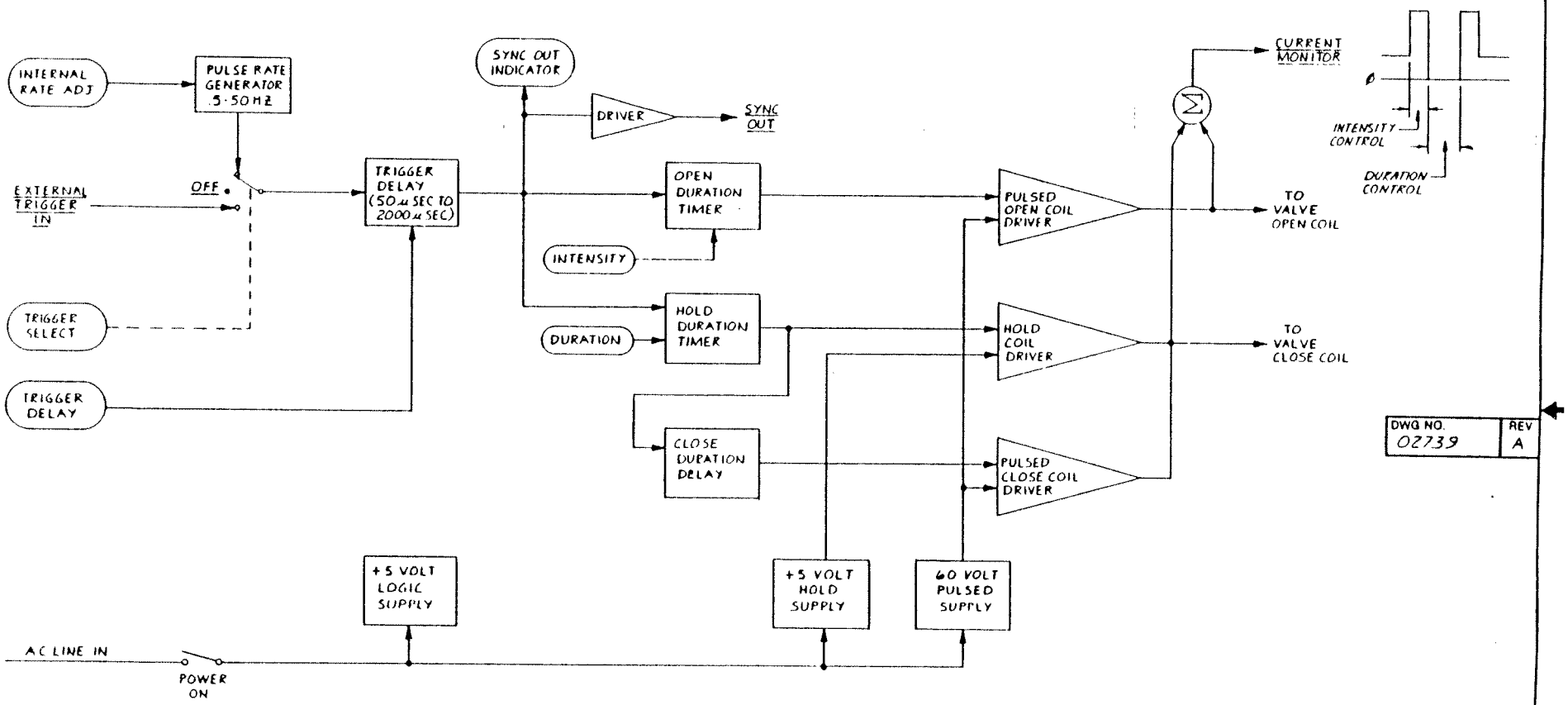
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A	REVISED, SEE ECO # 02759A	8-25-83	

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DWG NO.	REV
02739	A

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					PARTS LIST			
QTY REQD PER DASH NO.								

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA		
05598	05598	BV-100D
NEXT ASSY	TOP ASSY	MOD NO
APPLICATION		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES:
.XXX ± .010 ANGLES ± 0°
.XX ± .02 FRACTIONS ± 1/64
SURFACE FINISH = √ OR BETTER DEBURR & BREAK ALL SHARP EDGES. DRAWING IN ACCORDANCE WITH ANSI Y14.5-1973
MATERIAL

CONTRACT NO.

DWN BY	MDM	6-7-83
CHK BY		
RESP ENGR	[signature]	7/15/83
DESIGN ACTIVITY APPROVAL		

NRC newport corporation
18235 Mt. Baldy Circle, Fountain Valley, Ca 92708

BLOCK DIAGRAM
BV-100D MOLECULAR BEAM VALVE

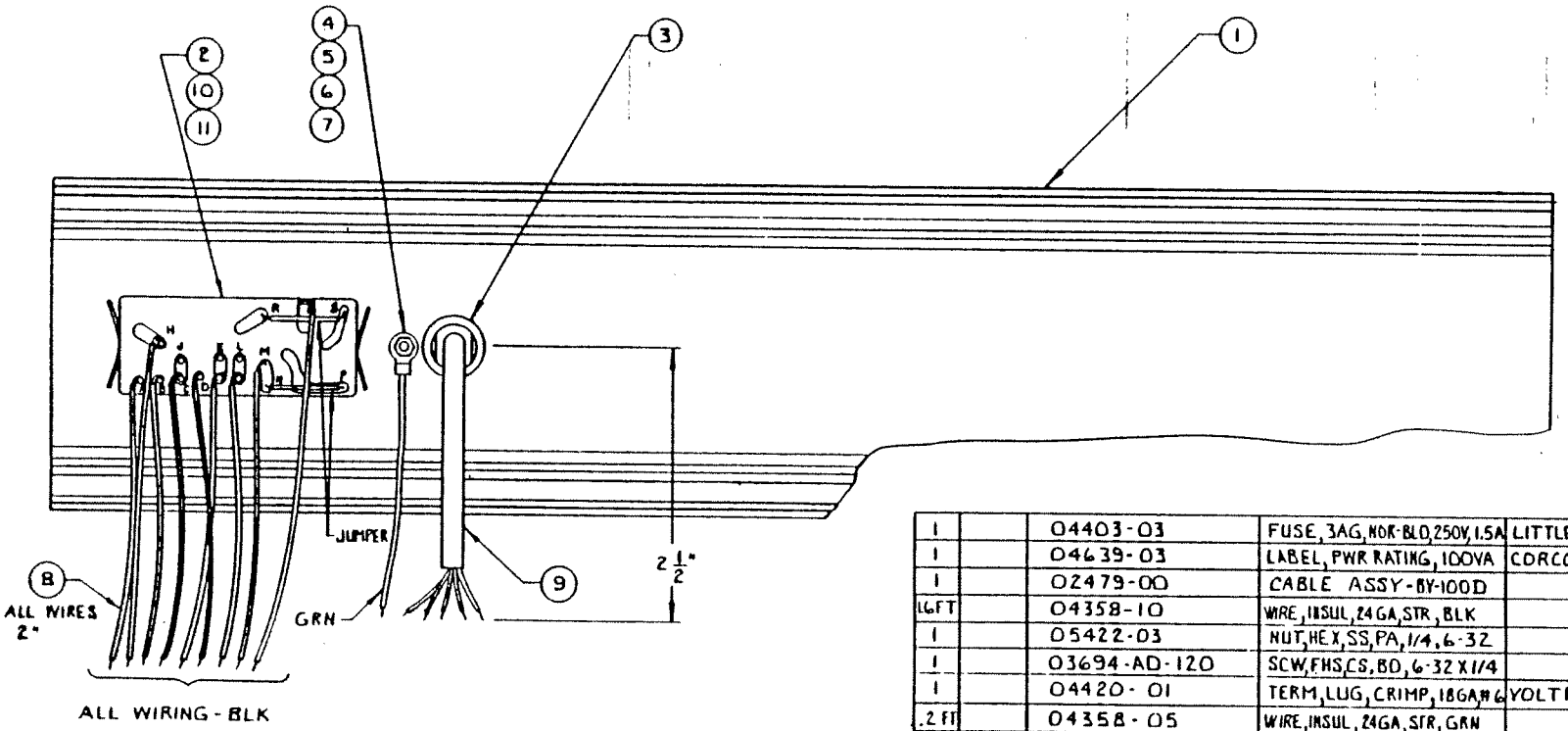
SIZE	CODE IDENT NO	DWG NO.	REV
C		02739	A
SCALE NONE	WT	SHEET 1 OF 1	

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

NOTES: UNLESS OTHERWISE SPECIFIED



DWG NO. 05608 REV

QTY REQD PER DASH NO.	-00	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	DATA: SPECIFICATION, SIZES, SUPPLIERS	SEE NOTE	ITEM NO.
1			04403-03	FUSE, 3AG, NOR-BLO, 250V, 1.5A	LITTLEFUSE # 312 003		11
1			04639-03	LABEL, PWR RATING, 100VA	CORCOM # 85-1502		10
1			02479-00	CABLE ASSY-BV-100D			9
LG FT			04358-10	WIRE, INSUL, 24GA, STR, BLK			8
1			05422-03	NUT, HEX, SS, PA, 1/4, 6-32			7
1			03694-AD-120	SCW, FHS, CS, BO, 6-32 X 1/4			6
1			04420-01	TERM, LUG, CRIMP, 18GA #6	VOLTREX # CRS-TO-1806		5
.2 FT			04358-05	WIRE, INSUL, 24GA, STR, GRN			4
1			04293-04	STR RELF, PWR CORD, 1/2 O.D	HEYCO # 1147		3
1			04334-00	CONN, PWR, MALE, 100-240V, W/TAB	CORCOM # 6VJ1		2
1			05560-00	PANEL, REAR - BV-100D			1

PARTS LIST

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA		
05598	05598	BV-100D
NEXT ASSY	TOP ASSY	MOD NO
APPLICATION		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES:
XXX = ± — ANGLES = ± —
XX = ± — FRACTIONS = ± —
SURFACE FINISH = 63 OR BETTER DEBURR & BREAK ALL SHARP EDGES. DRAWING IN ACCORDANCE WITH ANSI-Y14.5-1973
MATERIAL —

CONTRACT NO.

DWN BY	LDW	7-5-84
CHK BY	H Karl	7/26/84
RESP ENGR	T. Kuyama	7/27/84
DESIGN ACTIVITY APPROVAL		

NRC newport corporation
18235 Mt. Baldy Circle, Fountain Valley, Ca 92708

REAR PANEL ASSY-BV-100D

SIZE	CODE IDENT NO	DWG NO.	REV
C		05608	
SCALE 1/1	WT	SHEET 1 OF 1	

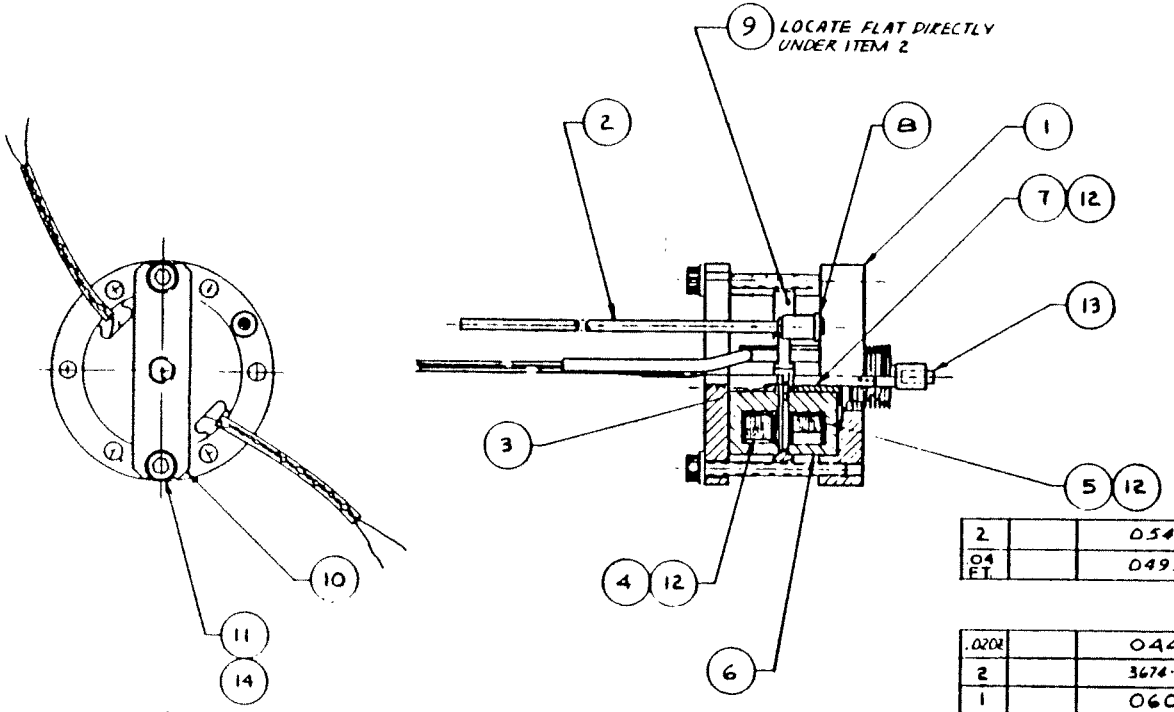
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REVISIONS

REV	DESCRIPTION	TE	APPROVED
A	DELETED NOTE 1., ADDED ITEM 14, ITEM 11 (W 3764-B0-058, ITEM 13 (WAS) 06417-00.	[illegible]-11-84	HK.
B	ITEM 9 (WAS) 06027-00, 2 REQD	A/[illegible]/84	HK.
C	CORRECTED PICTURE, UPDATED P/L	6/[illegible]/93	HK.

NOTES: UNLESS OTHERWISE SPECIFIED



QTY REQD PER DASH NO.		CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	DATA: SPECIFICATION, SIZES, SUPPLIERS	SEE NOTE	ITEM NO
2			05416-01	WASHER, SPLIT, STSTL, #2			14
.04 FT			04995-01	O-RING, VITON, CORD STK			13
.020			04429-00	ADH, RTV 108, SILICON, CLEAR/ST			12
2			3674-B0-056	SCW, SHC, STSTL, 2-56 x 3/4			11
1			06028-00	CAP, BLACK			10
1			05491-00	RING, SPACER			9
1			06035-00	WASHER, GAS SEAL, TEFLON			8
1			06033-00	BEARING			7
2			06424-00	CORE, MODIFIED			6
1			06428-01	COIL ASSY			5
1			06428-02	COIL ASSY			4
1			06037-00	DISC/TUBE ASSY			3
1			06418-00	TUBE ASSY, SAMPLE GAS INT.			2
1			06038-00	FLANGE/BELLOWS ASSY			1

PARTS LIST

DWG NO. 06024 REV C

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA

NEXT ASSY	TOP ASSY	MOD NO
06427	06427	BY-100

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES:

.XXX ± .010 ANGLES ± 0°30'

.XX ± .030 FRACTIONS ± 1/64

SURFACE FINISH = 125 OR BETTER DEBURR & BREAK ALL SHARP EDGES DRAWING IN ACCORDANCE WITH ANSI Y14.5-1973

MATERIAL

CONTRACT NO.

DWN BY CUMMINGS 10 MAY 83

CHK BY HK. 6-3-83

RESP ENGR T. Ruane 6/3/83

DESIGN ACTIVITY APPROVAL

NRC newport corporation
18235 Mt. Baldy Circle, Fountain Valley, Ca 92708

ACTUATOR ASSY - BEAM VALVE

SIZE	CODE IDENT NO	DWG NO.	REV
C		06024	C

SCALE: 2/1 WT SHEET 1 OF 1

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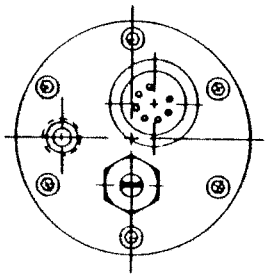
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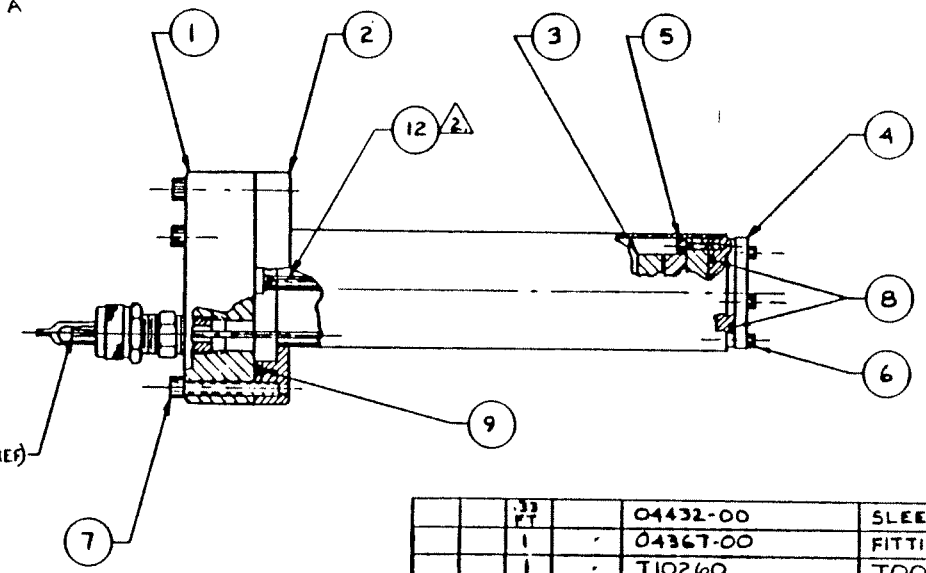
REVISIONS

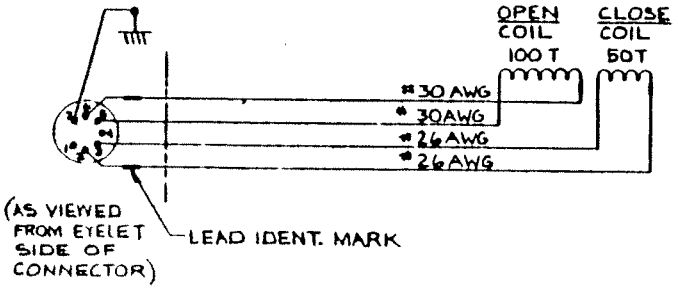
REV	DESCRIPTION	DATE	APPROVED
A	ITEM 4: BVP-0.5 WAS 06029-01 (PICTURE CHANGE TO TUBE FITTING (NUT)	4/4/83	HK
B	ITEM 10 P/N (WAS) 3674-80-073, ADDED: ITEM 12, NOTE 2. REVISED ELECT SCHEM. V.S.	1-12-84	HK
C	ADDED ITEM 10 & NOTE 3. V.S.	8-5-84	HK

NOTES: UNLESS OTHERWISE SPECIFIED

1. ITEM 11 TO BE BAGGED AND SHIPPED AS A LOOSE PART WITH ASSY
2. ITEM 12 IS USED ON EYELET 2,3,5,6 ONLY. TEFLON SLEEVING IS TO BE COMPLETELY OVER END OF EYELET.
3. ITEM 10 IS TO BE BAGGED AS A LOOSE PART WITH ASSY.







DWG NO. 06427 REV C

QTY REQD PER DASH NO.			CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	DATA: SPECIFICATION, SIZES, SUPPLIERS	SEE NOTE	ITEM NO.
		.33 FT		04432-00	SLEEVING, TEFLON	.053 I.D., .012 WALL	2	12
		1	"	04367-00	FITTING, 1/16 TUBE TO	1/8 NPT	1	11
		1	"	T10260	TOOL, TRIM		3	10
		1	"	4568-131-75V	"O" RING, VITON	1.674 I.D. x .103 W. (SIZE 2-131)		9
		2	"	4568-017-75V	"O" RING, VITON	.676 I.D. x .070 W. (SIZE 2-017)		8
		6	"	3674-80-128	SCREW, CAP HD SOC.	.138-32UNC x 1.00 LG - CRES		7
		6	"	3674-80-050	SCREW, CAP HD SOC	.086-64UNC x .25 LG - CRES		6
		6	"	3674-80-062	SCREW, CAP HD SOC.	.086-56UNC x .38 LG - CRES		5
		1	"	BVP-0.5	PLATE, END			4
		1	"	06024-00	ACTUATOR ASSY			3
		1	"	06423-00	TUBE ASSY			2
		1	"	06420-00	FLANGE ASSY			1

PARTS LIST

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA

NEXT ASSY	TOP ASSY	MOD NO
		BV-100

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES:

XXX ± ▲ — ANGLES ± ▲ —

XX ± ▲ — FRACTIONS ± ▲ —

SURFACE FINISH = 63 OR BETTER DEBURR & BREAK ALL SHARP EDGES. DRAWING IN ACCORDANCE WITH ANSI Y14.5-1973

MATERIAL

SEE P/L

CONTRACT NO.

DWN BY CUMMINGS 10 MAY 83

CHK BY HK 6/2/83

RESP ENGR T. Bryant 6/2/83

DESIGN ACTIVITY APPROVAL HK

NRC newport corporation

BEAM VALVE
MODEL BV-100

SIZE	CODE IDENT NO	DWG NO.	REV
C		06427	C

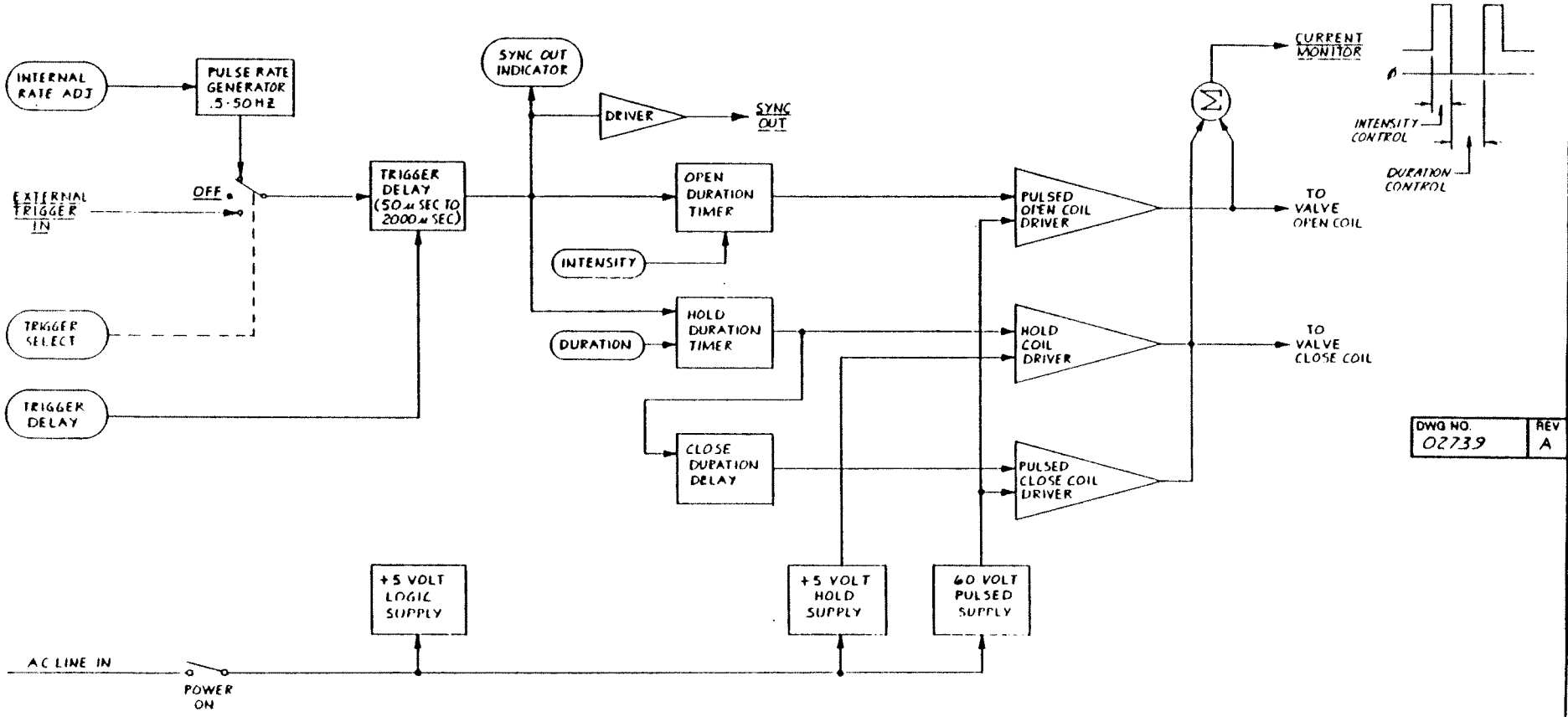
SCALE: FULL WT SHEET 1 OF 1

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	REVISED, SEE ECO # 02739A	8-25-86	[illegible]

NOTES: UNLESS OTHERWISE SPECIFIED



DWG NO.	REV
02739	A

QTY REQD PER DASH NO.	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	DATA: SPECIFICATION, SIZES, SUPPLIERS	SEE NOTE	ITEM NO.

PARTS LIST

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA		
05598	05598	BV-100D
NEXT ASSY	TOP ASSY	MOD NO
APPLICATION		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES:
.XXX ± .0 ANGLES ± 0
.XX ± .0 FRACTIONS ± 0
SURFACE FINISH = √ OR BETTER DEBURR & BREAK ALL SHARP EDGES. DRAWING IN ACCORDANCE WITH ANSI-Y14.5-1973
MATERIAL

CONTRACT NO.

DWN BY	ADM	6-7-83
CHK BY		
RESP ENGR	[signature]	7/15/83
DESIGN ACTIVITY APPROVAL		

NRC newport corporation
18235 Mt. Baldy Circle Fountain Valley, Ca 92708

BLOCK DIAGRAM
BV-100D MOLECULAR BEAM VALVE

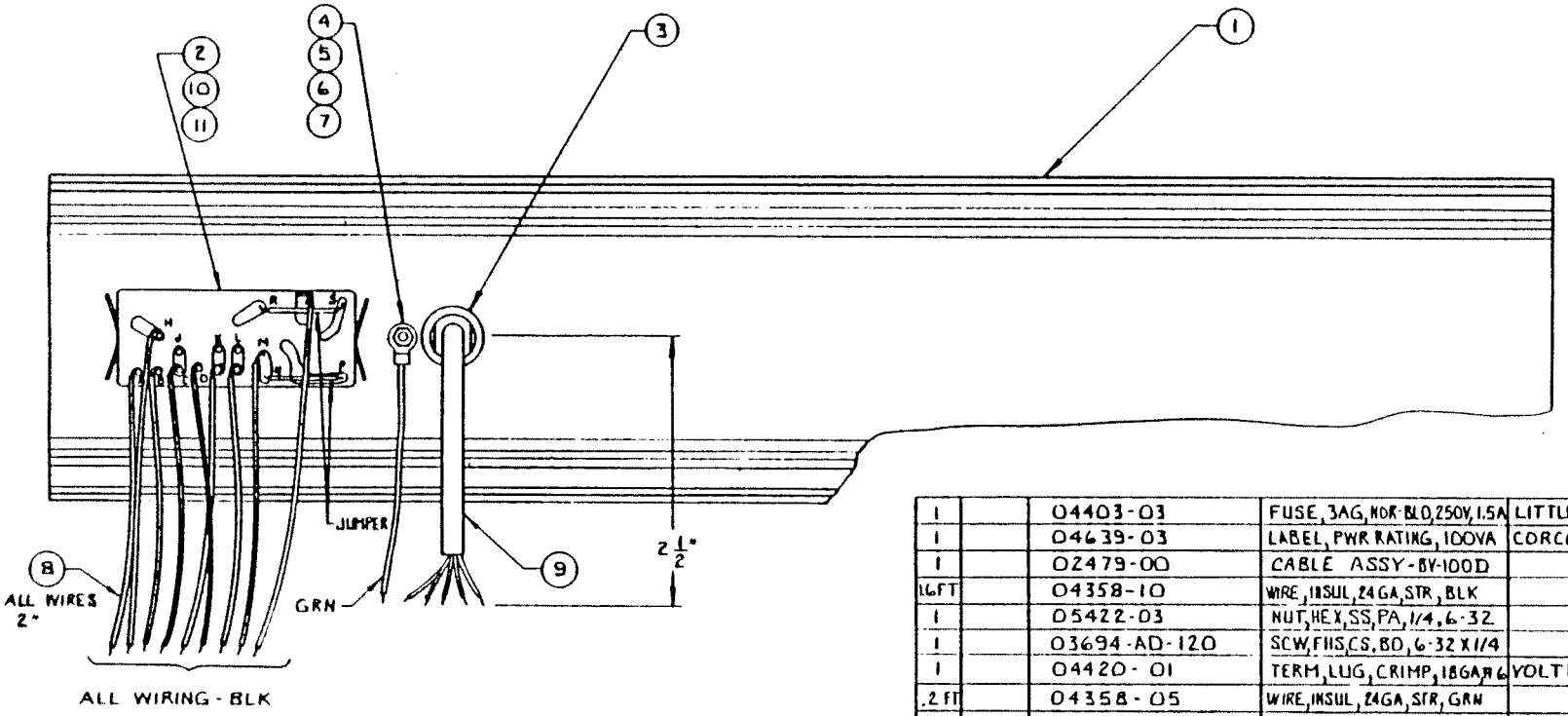
SIZE	CODE IDENT NO	DWG NO.	REV
C		02739	A
SCALE NONE	WT	SHEET 1 OF 1	

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

NOTES: UNLESS OTHERWISE SPECIFIED



DWG NO 05608 REV

QTY REQD PER DASH NO.		CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	DATA: SPECIFICATION, SIZES, SUPPLIERS	SEE NOTE	ITEM NO
				PARTS LIST			
1			04403-03	FUSE, 3AG, NOR-BLO, 250V, 1.5A	LITTLEFUSE # 312 003		11
1			04639-03	LABEL, PWR RATING, 100VA	CORCOM # 85-1502		10
1			02479-00	CABLE ASSY-BV-100D			9
1.6FT			04358-10	WIRE, INSUL, 24GA, STR, BLK			8
1			05422-03	NUT, HEX, SS, PA, 1/4, 6-32			7
1			03694-AD-120	SCW, FHS, CS, BD, 6-32 X 1/4			6
1			04420-01	TERM, LUG, CRIMP, 18GA #6	YOLTREX # CRS-T0-1806		5
.2 FT			04358-05	WIRE, INSUL, 24GA, STR, GRN			4
1			04293-04	STR RELF, PWR CORD, 1/2 O.D	HEYCO # 1147		3
1			04334-00	CONN, PWR, MALE, 100-240V, W/TAB	CORCOM # 6VJ1		2
1			05560-00	PANEL, REAR-BV-100D			1
		-00					

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA

NEXT ASSY	TOP ASSY	MOD NO.
05598	05598	BV-100D

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES:

.XXX ± .010 — ANGLES ± 0° 30' —

.XX ± .02 — FRACTIONS ± 1/64 —

SURFACE FINISH 63 √ OR BETTER DEBURR & BREAK ALL SHARP EDGES. DRAWING IN ACCORDANCE WITH ANSI-Y14.5-1973

MATERIAL —

CONTRACT NO.

DWN BY	LDW	7-5-84
CHK BY		7/26/84
RESP ENGR	T. Ruyman	7/27/84
DESIGN ACTIVITY APPROVAL		

NRC newport corporation
18235 Mt Baldy Circle Fountain Valley, Ca 92708

REAR PANEL ASSY-BV-100D

SIZE	CODE IDENT NO	DWG NO.	REV
C		05608	

SCALE 1/1 WT SHEET 1 OF 1

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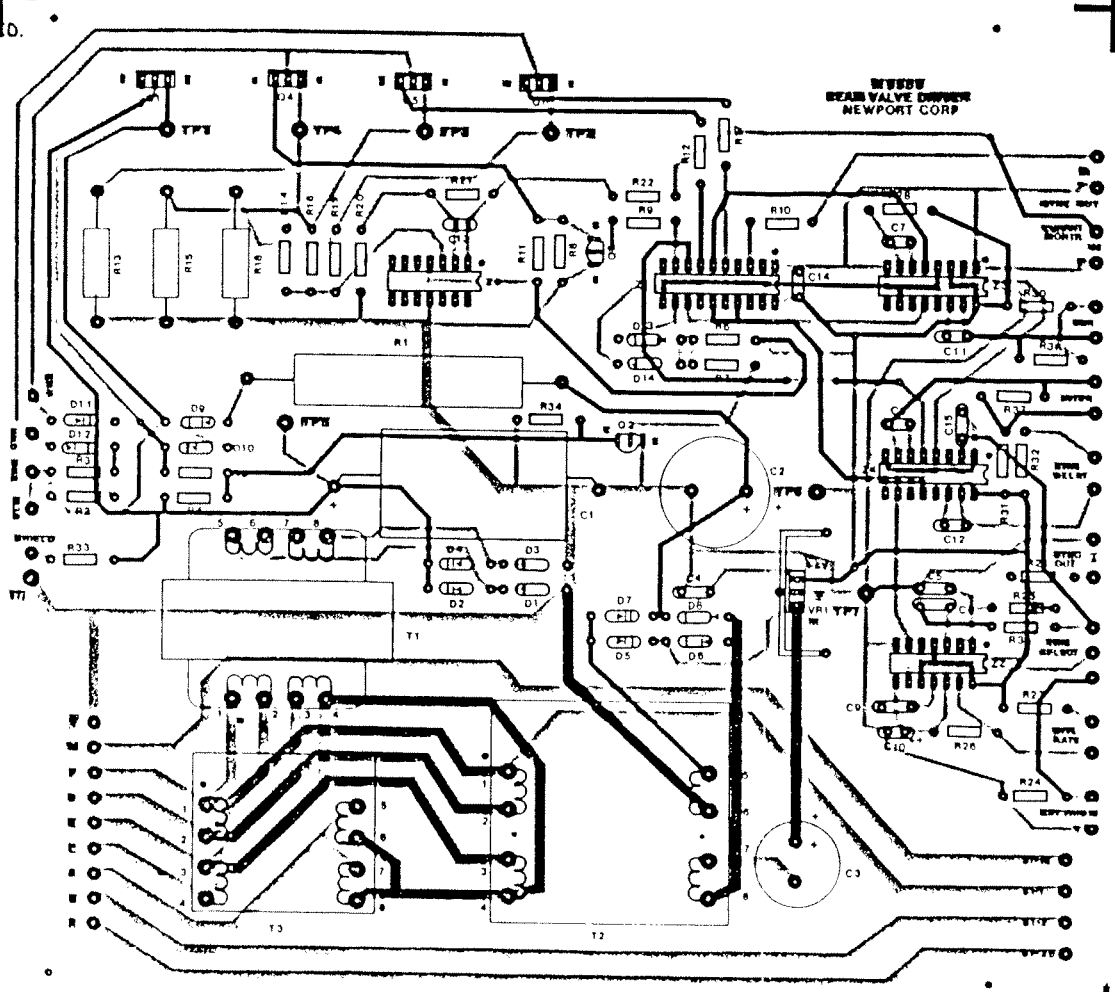
PART IS EXPRESSLY PROHIBITED WITHOUT WRITTEN CONFIRMATION
A PRINCIPAL MEMBER OF MANAGEMENT AT NEWPORT RESEARCH CORP

TES: UNLESS OTHERWISE SPECIFIED.

.CH DWG NO. 05590

LL RES. ARE CARB FILM
/4 W, 5%.

REV	DESCRIPTION	DATE	APPROVED



PARTS LIST

CODE IDENT	PART OR IDENTIFYING NO.	DESCRIPTION	DATE APPROVED

05558	05598BV1000		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES

DRAWN LOW 1/11/88
CHECKED WM 1/29/88
ENGINEER TMK 1/29/88

newport corporation

PCB, BM VLV DR-
CKT TR

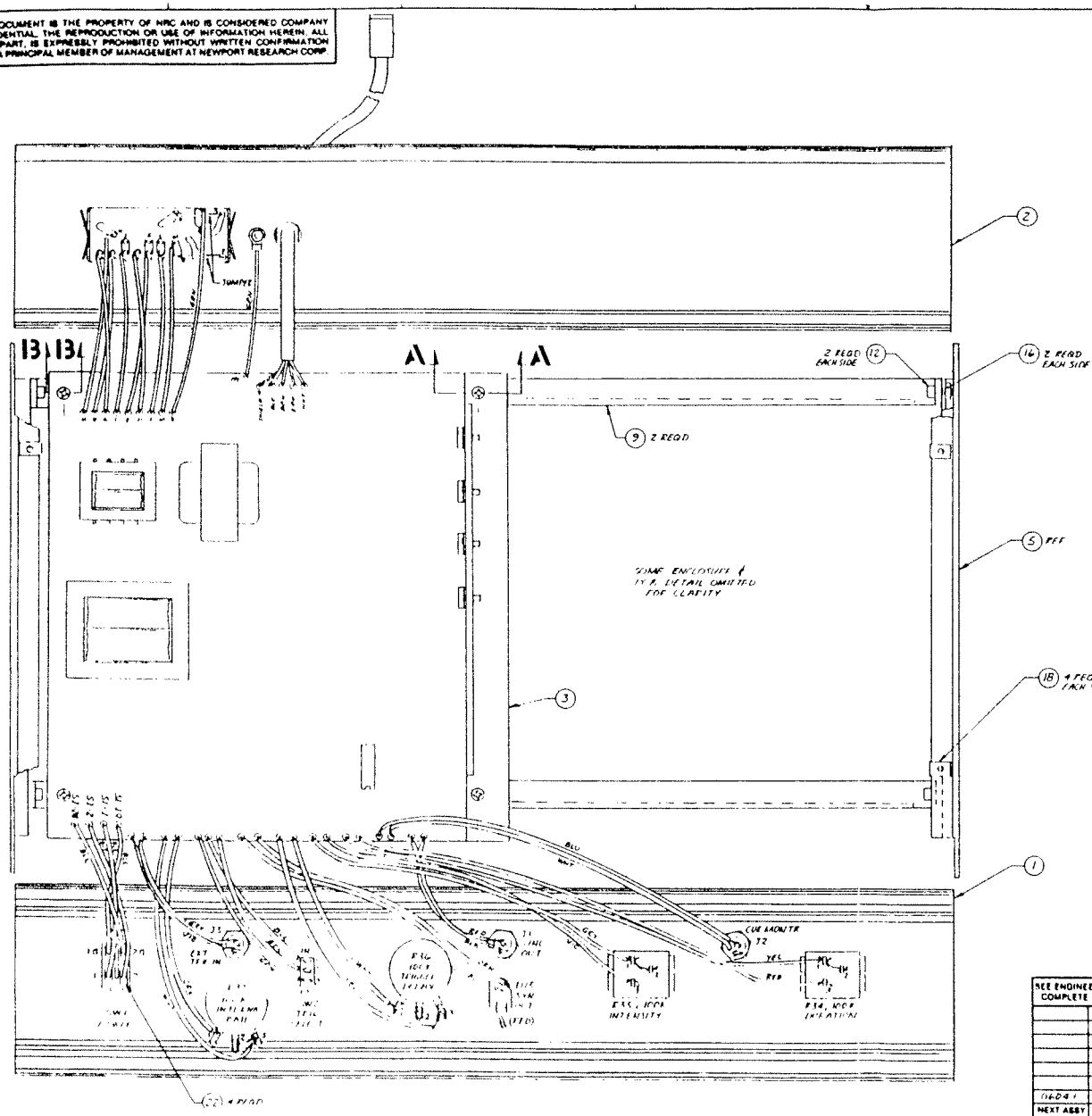
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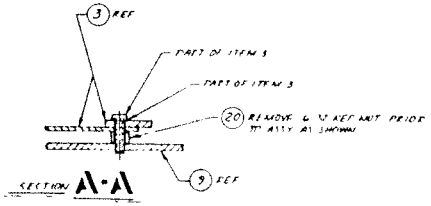
SCALE 2/1 | SHEET 1 OF 1

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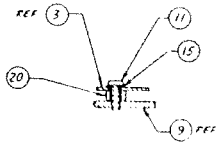
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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	SEE ECO # 05598A	4-7-88	[illegible]





SECTION A-A
2 PLCS



SECTION 13-13
2 PLCS

QTY REQD PER DASH NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	DATA SPECIFICATION SIZES SUPPLIERS	SEE NOTE	SH	DES ZONE	ITEM NO
			PARTS LIST					

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	CONTRACT NO
	TOLERANCES	DWN BY N.A.
	SURFACE FINISH 125 OR BETTER DEBURR & BREAK ALL SHARP EDGES DRAWING IN ACCORDANCE WITH ANSI Y14.5 1973	CHK BY
	MATERIAL	RESP ENGR
		DESIGN ACTIVITY APPROVAL

060461	060461	BY 10004
NEXT ASSY	TOP ASSY	MOD NO.
APPLICATION		

NRC newport corporation
2230 Martin Avenue, Santa Ana, CA 92705

ECRAA VALVE DRIVE ASY.

SIZE	CODE IDENT NO	DWG NO	REV
D		05598	A
SCALE 1/1	WT	SHEET 2 OF 2	

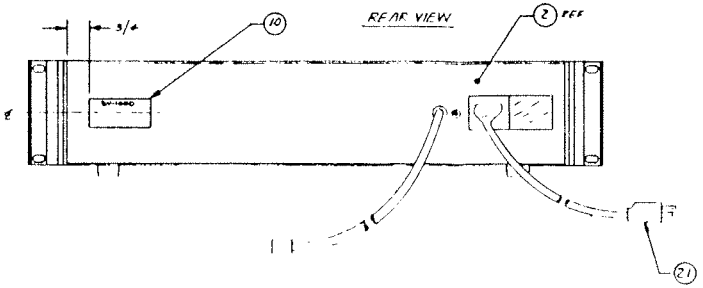
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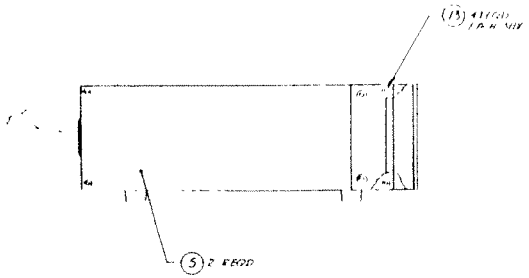
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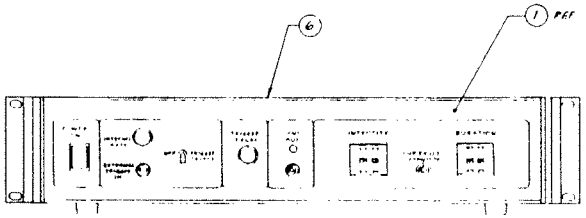
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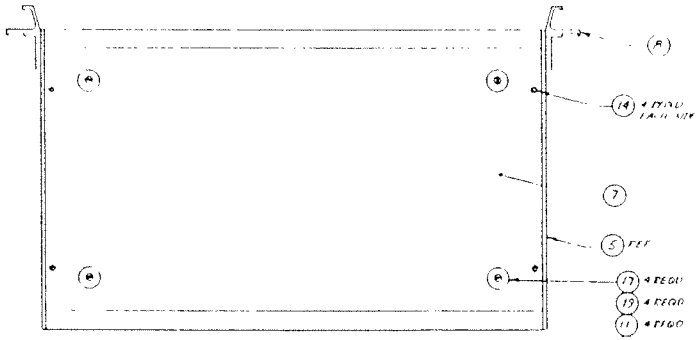
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	[illegible]	[illegible]	[illegible]

NOTES: UNLESS OTHERWISE SPECIFIED









ITEM NO	DES	SH ZONE	SEE NOTE	DATA SPECIFICATION SIZES SUPPLIERS	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	CODE IDENT	QTY REQD PER DASH NO
								00
31					WIRE, PWR, COPPER, INSULD, 22 GA	04153-04	177	
32					WIRE, SIGNAL, STRANDED, INSULD, 22 GA	04158-10	277	
33					WHT	-09	177	
30					GRY	-08	177	
29					VIO	-07	177	
28					BLU	-06	177	
27					GRN	-05	177	
26					YEL	-04	177	
25					ORN	-03	177	
24					RED	-02	277	
23					BRN	-01	177	
22				H.N. SMITH # 5009	CONN, RECEPTACLE, 7 PIN, PWR	04592-01	4	
21				RELIEN # 17250	CONT ASSY, MFG (MALE, GND, SOCKET)	04585-00	1	
20				H.N. SMITH # 9207	SPACER, END, AL, 1", 2-56 UNC W	05627-02	4	
19				H.N. SMITH # 2193	REAMER, PIN, SIZE #1, 4.0" OD	04589-02	4	
18				TINNERMAN # (999) 440 Z4	NUT, CLIP, ELCMT # 40, 25% HT	04519-00	8	
17					NUT, SQ, 6-32, STEEL	05422-04	4	
16				(UNITED) # 6M-87-8 (AMCO) 7-MC 6 DIA 6-32)	STUD, MACH, CHCU, SS, 1 1/4" LG, 6-32	01373-01	4	
15					WASHR, FLT, SST, #10, .4" OD	05424-01	6	
14					SCW, FHS, SS, 82°, 6-32 x 5/16	6-32 AD-075	A	
13					SCW, FHS, SS, 82°, 6-32 x 1/2	36-32-AD-124	9	
12					SCW, SHC, SS, RD, 6-32 x 3/8	36-32-AD-122	4	
11					SCW, PAN, PH, SS, 6-32 x 1/2	05493-27	4	
10					PLATE, IDENT, REAR PANEL	04609-00	1	
9					REF, DR, SIDE, RIVETED	05573-00	2	
8					HANDLE, KIT, RACK MTG, 7 PC	05492-01	1	
7					ENCL, LOWER, REAR, RIVETED	05568-00	1	
6					ENCL, LOWER, TOP, RIVETED	05563-00	1	
5					ENCL, SIDE, RIVETED	05569-00	2	
4					FLANGE			
3					PCB ASSY, RIVETED	05568-00	1	
2					REAR PANEL ASSY, RIVETED	05604-00	1	
1					FRONT PANEL ASSY, RIVETED	05571-00	1	

PARTS LIST

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
XXX ± .— ANGLES ± .—
XX ± .— FRACTIONS ± .—
SURFACE FINISH 125 OR BETTER DEBURR & BREAK ALL SHARP EDGES DRAWING IN ACCORDANCE WITH ANSI Y14.5 1973

MATERIAL

CONTRACT NO

DWN BY [illegible] 7-7-80
CHK BY [illegible]
RESP ENGR [illegible]
DESIGN ACTIVITY APPROVAL

NRC newport corporation
[illegible]

FRONT VIEW ASSY A

SIZE D | CODE IDENT NO | DWG NO 05595 | REV A
SCALE 1/2 | WT | SHEET 1 OF 2

APPLICATION		
NEXT ASSY	TOP ASSY	MOD NO.
DO NOT USE	DO NOT USE	DO NOT USE

REV STATUS OF SHEETS	REV	A	A
	SHEET	1	2

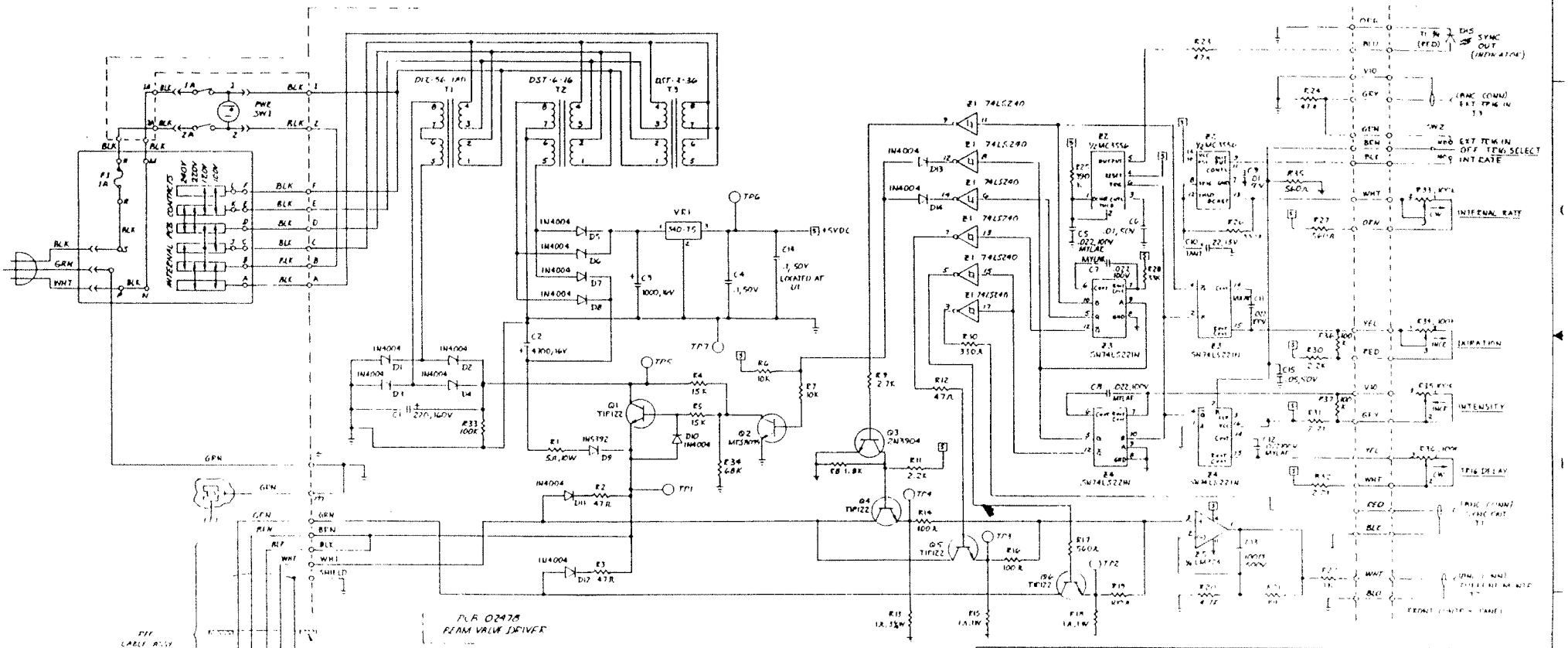
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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	SEE ECO # 05590A	10 SEP	

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTOR VALUES ARE IN OHMS, 1/4 W, 5%
2. ALL CAPACITOR VALUES ARE IN MICROFARADS
3. PCB, PCR ASSY DWG NO. 05588.



I.C. PINS NOT USED	
I.C	PINS
U1	2, 4, 13, 15
U3	11, 13
U4	11, 13
U5	5A, 7, 8, 9, 10, 12, 13, 14

I.C. PWR PINS		
I.C	+5VDC	GND
U1	20	4, 10, 16
U2	8, 16, 14	7
U3	3, 16	1, 8, 9
U4	3, 16	1, 8, 9

QTY REQD PER DASH NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	DATA SPECIFICATION SIZES SUPPLIERS	SEE NOTE	SH	DES ZONE	ITEM NO
			PARTS LIST					

SEE ENGINEERING RECORDS FOR COMPLETE APPLICATION DATA

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
.XX = ±.01 ANGLES = ±1°
.XX = ±.005 FRACTIONS = ±1/64
SURFACE FINISH = 63 OR BETTER DEBURR & BREAK ALL SHARP EDGES DRAWING IN ACCORDANCE WITH ANSI Y14.5 1973

NEXT ASSY	TOP ASSY	MOD NO.
05598	05598	REVISION
APPLICATION		

MATERIAL

CONTRACT NO

DWN BY	NDM	7/4/94
CHK BY		
RESP ENGR		
DESIGN ACTIVITY APPROVAL		

NRC newport corporation
1791 Kellogg Avenue, Carlsbad, CA 92008

HEXARTIC REMA VALVE DRIVER

SIZE	CODE IDENT NO	DWG NO	REV
D		05590	A
SCALE NONE	WT	SHEET 1 OF 1	

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