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CAMAC-HIGHPOWERED-CRATE

MODEL 6700/6750-SCB
POWER CAMAC CRATE MANUAL

Bi Ra Systems
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Bi Ra Systems

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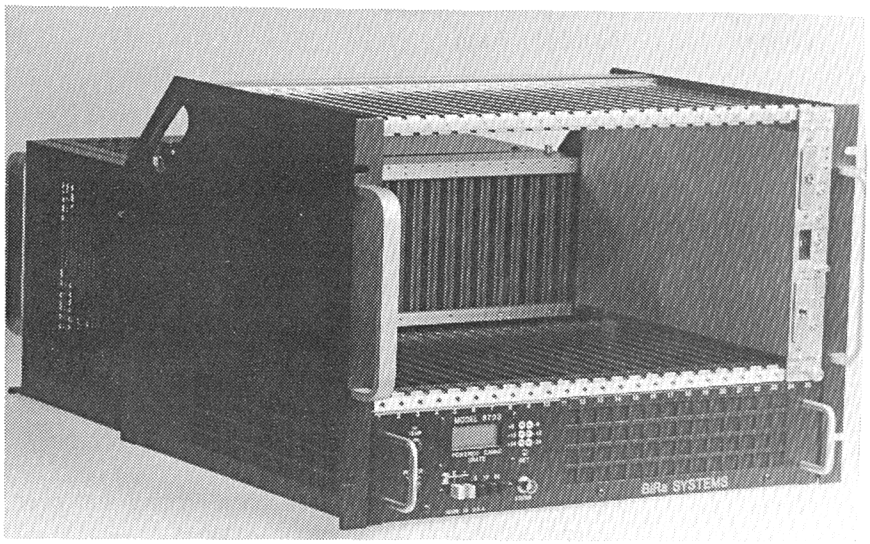
NEW

CAMAC-HIGH POWERED-CRATE

MODEL 6700-SCB
POWER CAMAC CRATE

Main Features:

- 700 Watts total output power
- All voltages, both mandatory and optional (+24, +12, +6, -24, -12, -6)
- Modular power supply with handles, locks automatically into position making insertion and removal safe and easy. No tools required.
- Digital LCD voltage and current metering.
- Blower air-intake filters can be removed in seconds. No tools required.
- Thermal, short circuit and over-voltage protection.
- Ferro-Resonant transformer is utilize to achieve better regulation and stability.



General Description

Bi Ra Model 6700-SCB is a powered CAMAC crate which fully complies with CAMAC specification IEEE-583. This model was designed to meet the users' changing needs and requirements by providing the user a responsive, low cost modular unit. The Model 6700 is made up of three basic components: the crate, the 700 Watt power supply, and the six fan blower.

Crate Description

The crate incorporates the CAMAC dataway with an 86-contact PC edge connector soldered at each station. The crate supports the rear mounted power supply module and houses the removable blower unit. The crate assembly is constructed of reinforced steel and designed for convenience and serviceability. Both the blower unit and power supply can be detached without removing the crate from the rack. Electroless nickel-plated guide rails insure smooth alignment and minimize air obstruction for cooling of the modules.

Power Supply Description

The Model 6700 Power Supply employs the Ferro-Resonant transformer and Darlington transistors to achieve higher efficiency and reliability. The power supply is modular in construction, single connector attachment, and automatically latches into position. The power supply is self-ventilated by a large internal blower (rated at 210 CFM) to maximize cooling area and air flow in order to enhance performance and reliability. The power supply outputs are protected from over-voltage and over-current. Additional features include handles for maneuverability and safety, also instant visibility and easy access to all fuses.

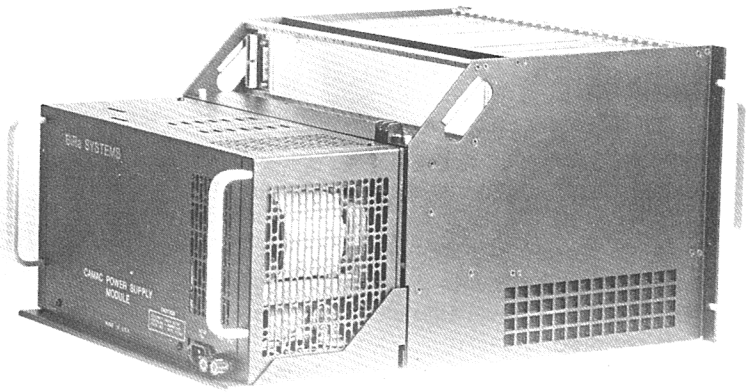
Blower Description

The front-removable six fan blower unit features low-vibration, low-noise, and venturi-type ball-bearing fans to provide good air flow and maximum module ventilation. The blower unit and crate side panels were concurrently designed to insure maxium air-intake.This design allows the user the versatility to use the powered crate as a bench top or rackmounting it. The three large air intake ports house the dust filters which can be removed in seconds without any tools. Front panel indicators include over-temperature warning, a switch-selected digital meter for monitoring all voltages and currents, and voltage test points.

Bi Ra Model 6700-SCB

Crate Specifications

Dimensions: 19" rackmount, 12.25" height, 21.75" depth.
Voltage Meter: Digital meter provides monitoring of all output currents and voltages.
Cooling: Six high capacity fans.
Weight: 39 lb. (17.7 kg)

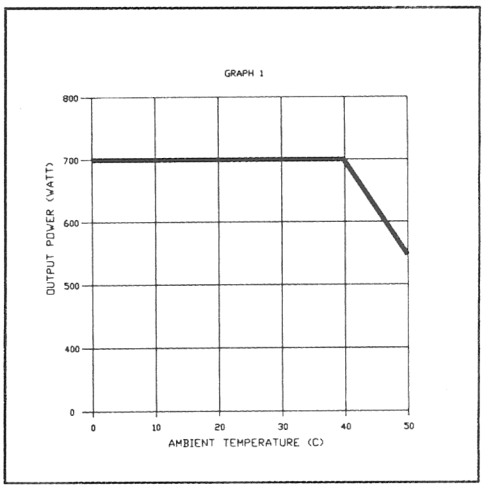


Power Specifications

Total Power: 700W maximum +/-6V,+/-12V, +/-24V combined

Maximum output currents from:
+/- 6V: Up to 60 Amps from either supply.90 Amps combined sum. See Graph 2.
+/- 24V: 8 Amps maximum each. Subtract current drawn by +/- 12 V load.
+/- 12V: 4 Amps maximum each. Derived from +/- 24 V supply.

Note: 1) All models provide current foldback limiting and over voltage crowbar protection for all output voltages.
2) On all models the +/-12V is derived from +/- 24V sources.

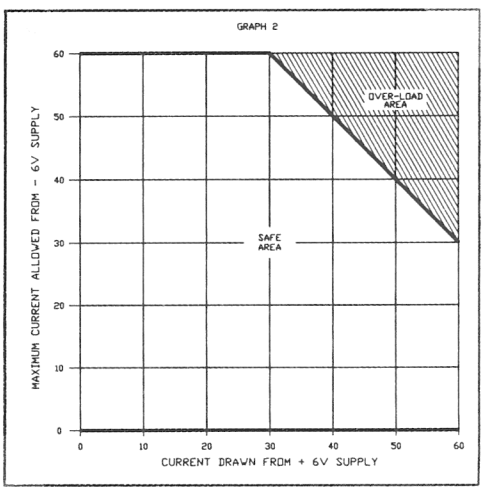


Performance

Ripple: <15 mV peak-to-peak (50MHz bandwidth).
Regulation: +/- 0.01 % line or load (at the sense leads).
Temperature Coefficient: < 0.1 %/degC.
Long Term Stability: < 0.1 %/24 hours at constant load and temperature. Measured after 1-hour warmup.
Tracking: During turn-on all six output voltages rise together. Risetime 10 msec.

General

Overload Protection: All outputs are protected against overload by current limit circuits. Short circuit proof. All outputs switch off within 20 msec of detected overload.
Overvoltage Protection: All outputs are protected against transient overvoltages by high current transient suppressors.
Thermal Protection: A thermal sensor shuts down the supply in the event of a thermal overload. A front-panel thermal overload light on the blower module indicates an overtemperature condition in the power supply.
Operating Range: Full 700 W output from 0 degC to 40 degC ambient temperature. Derate at -15 W/degC above 40 degC. Maximum ambient temperature 50 degC. See graph 1.



Input Voltage: 120V AC 60Hz (103 - 130V AC).
Line Current: 14.2 Amps rms at 120 V.
Weight: 52 lb. (23.6 kg).
Options:
1)NIM holes - Jacking screw holes for NIM modules in both upper and lower guide grills.
2)Status monitor bit
3)7000R-S rackmount power supply, 4ft cable, 640 Watts
4)MODEL 6750-SCB is 6700 Package except input voltage is 220 VAC/ 50Hz,700Watts
5)MODEL 6700-A-SCB 60A shared current in 6700 Package, 580 Watts

MODEL 6700 MANUAL

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DESCRIPTION: MODEL 6700 POWERED CRATE

The Model 6700 is a Powered CAMAC Crate which fully complies with CAMAC specification which fully complies with IEEE-583. The Crate is housed in 12.25" (7u) side panels which provide the mounting hardware for the Blower and Power Supply modules. Both Power Supply and Blower modules are designed for simple plug-in installation with no connectors to attach. Power Module cooling is provided by an internal fan for drawing air from the inside of the relay rack (no air is drawn from the crate blower area). The Blower module contains the crate cooling fans and the current/voltage metering of the Power Supply outputs. Various options are available to this unit and may or may not be installed in the unit. All options are described in this manual and are indicated as options. The maximum output power of the pairs (+/-) are best described as being power limited rather than current limited. With none of the 24V outputs being utilized, considerably more current can be drawn from the 6V outputs than is shown on the specification sheets under normal conditions. However, when operating near the upper limits of input line voltage and temperature, it is best to operate within the specified current limits.

1.00 INSTALLATION:

The blower is inserted at the front of the crate and secured by two latches at the rear of the blower. To release, simply grab blower handles and pull. The power supply module is inserted from the rear of the crate by placing the unit on the support tray and sliding it towards crate to latch. A third latch at the rear of power supply insures positive attachment. To release the power module the rear latch must be released first. The latches on the front of the power supply are released by pushing the two white buttons down that latch the power supply.

2.00 MAIN CHASSIS:

2.10 INPUT POWER SELECTION:

Power is applied to the power supply through a standard international AC receptacle at the rear of the power supply, and to the blower module through fuses F15 and F16. The front panel switch (S1) applies power to the three front blower fans and back to the power supply fan and the three rear fans in the blower units. Power to the transformer goes through the thermal switches Th-3 and Th-4 (one each mounted on positive and negative side of the main heat sink) and under over-temp conditions, power will be removed from the transformer, the power module fan, and three of the blower fans, power will resume when the over-temp condition drops approximately 10 degrees. Thermal warning switch Th-1 and Th-2 (also mounted the main heatsink) will cause the Hi-Temp lamp on the Blower front panel to light when the heatsink temperature approaches within approximately 10 degrees of the Th-3 and Th-4 setting.

Transformer T1 provides three outputs: a heavy current winding for the 6V regulators, a medium current winding for the 24V regulators, and a light duty winding for the regulator boards bias supply. Rectification of the heavy current winding is accomplished with heavy duty half wave rectifiers and should be replaced with the same type. The light current (50mA.) fused winding provides a controlled turn-on and turn-off bias voltage to the regulator boards that effectively eliminates overshoots when turning the power on or off.

2.20 MAIN HEATSINK:

The main heatsink is assembled in two sections, a negative and a positive side. Each side contains the transistors (4 for the 6V, 1 for the 12V, and 1 for the 24V output) and thermal switches described above. Each drive transistor is individually fused at the top of the power module. The fuse tray is assembled with forteen (14) fuses associated with 7 mounted on the positive side and 7 mounted on the negative side.

2.40 POSITIVE REGULATOR BOARD:

The positive regulator board contains four regulator sections: a low power 30V DC supply, a 6V DC supply, a 24V DC supply, and a 12V DC supply.

2.41 LM305H POSITIVE REGULATOR BOARD:

The LM305H positive voltage regulator develops an internal voltage reference of approximately 1.6 volts at pin 5 which is compared with the sensed voltage at pin 6. Pin 3 is the input voltage and pin 4 is ground., The output drive currents is seen at pin 1 and the IR drop between pins 1 & 8 clamps the output drive current at a maximum level. Frequency compensation is set by the size of the capacitor between pins 7 & 6. A capacitor between pins 5 & 4 is used to reduce the amount of noise generated by the internal voltage reference. The LM305 is capable of driving up to 65 amps with the appropriate current amplifiers and frequency compensation networks. However, although the LM305 can be connected such that it will exhibit current limit-foldback characteristics, for output currents in excess of 5 amps it is necessary to provide external circuitry for these functions as the temperature coefficient of the internal circuitry cannot stay within required limits. The LM305's used in this equipment are limited to less than 30mA. Output drive current at pin 1 and have been tested and burned in at that level with a 50V supply. At the 40 amp output of the 6V regulators to a standard CAMAC crate, the LM305 will (with the sense to output resistors removed) regulate to better than .1%.

2.42 POSITIVE BIAS SUPPLY:
The 30V DC supply provides a low noise, low ripple bias volt to the three high current regulator circuits. This supply is designed to control the turn-on and turn-off characteristics of the output regulators and further reduce the ripple and noise beyond the normal ability of the LM305 regulator device used in all four circuits.

2.43 COMMON COMPONENTS:
Various components of the positive regulator board are common to all the regulators. R9 is the common resistor link between all of the sense return lines and ground return and may be replaced with a 1 amp diode if more sensitive regulation is required. D1 is the common crowbar zener reference voltage (6.2). The 30V DC output is common to all the regulator circuits. The 30 volts has a current limit-foldback circuit (R43-45), and will shut down all the regulators if overdriven.

Preload Resistors: Each of the output regulators has a preload resistor which is intended to set the minimum loading of the regulator and serves to reduce or eliminate overshoot problems. The +6V preload is R1 (12-15 ohm) for the +12V and R40 (200 ohm) for the +24V regulator.

2.44 +6 VOLT REGULATOR CIRCUIT:
The 6 volt regulator circuit consists of three sections: the regulator-driver (U1 and Q4), the current limit-foldback circuit (Q5, Q12), and the crowbar circuit (Q6, Q7, & Q9). The regulator U1 provides drive current to Q4 thru the current limit resistor R14. R14 limits the maximum level of drive current to approximately 30mA. Q4 provides drive current the resistors R2, R3, R4, & R5. These resistors provide the drive to the output transistor mounted on the main chassis heatsink.

To improve the efficiency of the 6 volt outputs, a couple of improvements were made to this power supply over older units. The transformer secondary winding was reduced and the drive to the regulator and the output transistors was provided from the 12 volt output and/or the unregulated 6 volt supply through a diode gate. The drive supply from the 12 volt output is before the current sense resistor and does not register on the meter circuit. Under normal conditions, the unregulated 6 volt will be higher than the 12 volt output and provide all the drive current. Under conditions of low line voltage and high output current from the 6 volt regulator, the drive current will come from the 12 volt output. In the +6 volt regulator circuit, the diode gate is D4 (12 volt output) and D3 (6 volt unregulated supply).

2.45 CURRENT LIMIT-FOLDBACK CIRCUIT:
The current limit-foldback operates as follows: Q12 is connected as a diode to clamp the resistor divider string RP1, R6, & R8 to a common point with the sense resistor (R1 on the main chassis) and the load. Transistor Q5 acts as a current shunt to the output of the U1 regulator when the voltage drop across the sense resistor (R1 on the main chassis) exceeds the drop across RP1 & R6. Thus the setting of RP1 controls the point at which the regulator will begin to current limit.

Once the regulator begins to limit, the output voltage will begin to drop and because RP1, R6 & R8 are clamped directly to the output thru Q12, the voltage across RP1, R6 will also drop causing the current limit set point to be reduced and result in the current foldback characteristic. If the load is further increased, the current will continue to drop until it reaches approximately 20% of the rated output. The minimum foldback current is determined by the relationship between the resistor divider string RP1, R6 & R8, a divider string made up of the sense resistor, the load resistance, the resistance of the output lines to the load, and the ratio of the voltage drop across the clamp Q12 to the output voltage.

When troubleshooting a bad regulator, it is always necessary to remove Q5 from the circuit as faults in the current limit circuity are the most common cause of regulator problems and even when operation properly, the current limit circuit will mask other faults in the regulator.

2.46 CROWBAR CIRCUIT:
The crowbar circuit consists of a differential amplifier Q7 & Q9 which compare a 6.2 volt reference to the output voltage across the divider string R17 & R18. As the divider string is sampling the total output voltage including drops in the return and output lines, the trigger point will vary compared to the sensed voltage at the load but should not exceed 7.5 volts in any case. Problems with false triggering generally are caused by over-driving the output lines with excessive combined currents of the 6 volt outputs or bad connections of the output plugs or wiring to the plugs. When the sensed output exceeds the reference voltage, Q9 will drive Q6 sufficient to turn on the SCR. If the regulator circuitry is operative, the regulator will go into foldback current limiting until the supply is turned off. If the regulator circuitry is inoperative, the SCR will blow all the driver fuses.

2.47 +24 VOLT REGULATOR CIRCUIT:
The operation of the +24 volt regulator circuits are identical to the +6V. The regulator U3 drives Q1 thru the current limit resistor R36. Q1 drives the output transistor (mounted on the main chassis heatsink) direct. Q17 & Q14 are the clamp and current shunt of the current limit-foldback circuit. Q15 & Q16 are the crowbar differential amplifier and Q8 is the SCR gate driver.

2.48 +12 VOLT REGULATOR CIRCUIT:
The operation of the +12 volt regulator circuits are identical to the +24V. The regulator U2 drives Q3 thru the current limit resistor R29. Q11 is the current limit clamp and Q10 is the current shunt amplifier. There is no crowbar circuit for the +12 volt output. The 12 volt drive current is derived from the output of the +24 volt regulator before the +24 volt sense resistor. R27 (.15 ohm, 2 watt) is the current sense resistor for the 12 volt output.

2.50 NEGATIVE REGULATOR BOARD:
The negative regulator board contains four regulator sections: a low power -30 volt bias supply, a -6 volt regulator, a -24 volt regulator, and a -12 volt regulator. These circuits operate in the same manner as the positive regulator board circuits except that they are inverted (that is, pnp transistors for npn's) and the basic regulator is slightly different in the way it generates its reference voltage.

2.51 LM304 REGULATOR:
The LM304 negative regulator develops a reference voltage, across the resistor(s) connected between pins 1 & 9, with an internal current source set by the resistor connected between pins 2 & 3. The voltage developed across pins 1 & 9 will be 1/2 the output voltage sensed at pin 8. The output drive is from pin 7 and the maximum current delivered is limited by the resistor connected between pins 6 & 5. The LM304H's used in this equipment are tested and burned in with an input of 50 volts.

2.52 COMMON COMPONENTS:
Components common to all the regulators on the negative board include: R8, the common resistor link between all the sense return lines and ground return, may be replaced with a 1 amp diode if more sensitive regulation is desired, D2 develops the common crowbar zener reference voltage(-6.2). The -30 volt bias supply is common to all the circuits.

Preload Resistors: As on the positive regulator board, there are three preload resistors. R1 (12-15 ohm) is the preload resistor for the -6 volt regulator, R38 (200 ohm) preloads the -24 volt, and R24 preloads the -12 volt regulator.

2.53 -6 VOLT REGULATOR CIRCUIT:
The -6 volt regulator circuit consists of three sections: the regulator-driver (U1, Q5), the current limit-foldback circuit (Q4, Q9), and the crowbar circuit (Q6, Q7 & Q8). The LM304 (U1) regulator gets drive current from the current limit resistor R20 and drives Q5 to provide drive current to the drive resistor bank consisting of R2, R3, R4 & R5. Output voltage adjustment RP3 & R31 develop a reference voltage from the 1 amp current source in U1 set by R10. The reference voltage is compared to 1/2 the voltage seen at pin 8. Frequency compensation is internal and capacitor connected across pins 4 & 5. The capacitor connected across pins 1 & 9 tends to reduce noise generated by the reference current source.

The diode gate which supplies drive current to the -6 volt regulator and output transistors (see explanation under the +6 volt circuit), consists of D3 (drive from the -12 output) and D1 (drive from the unregulated -6 supply).

2.54 CURRENT LIMIT-FOLDBACK CIRCUIT:
The current limit-foldback circuit, consisting of the diode connected clamp Q9, current shunt Q4, and resistor divider string R6, R7, & RP1, operate in the same manner as the +6 volt circuit except for the pnp-npn inversion.

2.55 CROWBAR CIRCUIT:
The operation of the crowbar circuit on the negative regulator board is identical to that of the positive board.

2.56 -24 VOLT REGULATOR CIRCUIT:
The operation of the -24 volt regulator is identical to that of the -6 volt circuit.

2.57 -12 VOLT REGULATOR CIRCUIT:
The -12 volt regulator derives both its supply and drive from the -24 volt output. Both are taken before the -24 volt output sense resistor and are not seen by the meter. The regulator U2 drives the output through Q2. The clamp and shunt amplifier for the current limit-foldback circuit are Q10 and Q11 respectively. There is no crowbar circuit for the 12 volt output and it is possible for the output to go to -24 volts if the driver or regulator circuit is faulty. However, a fault in this circuit will generally cause the output driver to open and the output to go to ground rather than -24 volts R23 (.15 ohm) is causing the -12 to go into current foldback.

3.00 BLOWER MODULE:

3.10 COOLING:

The Blower module contains six fans, each capable of approximately 110 CFM of air drawn through three washable filters housed in the Blower unit. The filters are made of foam and should be removed and cleaned when an accumulation of dirt or dust can be seen. Fans are boxer type and operated from 115V AC line.
The fan tray has dividers to separate the air into three segments so as to provide sufficient air even to a crate that is not completely loaded with modules.

3.20 FRONT PANEL:

The front contains the meter (3 1/5 digit LCD), power switch, Meter switch, test points for all outputs, power on neon indicator lamp, and the HI-TEMP lamp (neon on regular blower, LED on a Status Bit blower). A blower with the Status Bit option will also have BNC connector.

CAUTION: The output voltage test points are connected directly to the output sense leads.

3.30 METERSWITCH:

The meterswitch consists of a printed circuit board, a five button switch assembly, and the components needed to power the LCD meter and equalize the current sense voltage for proper reading on the meter. The resistor-zener diode string, R8 & D2, provide the isolated 9V power required by the LCD voltmeter. The LCD operates at a full scale reading of 199.9 with an input of 1.999 volts. For voltage monitoring, the output sense lead are applied to the 8094ASY output thru a resistor divider network (R9 & R10) which results in a 24.0 reading for 24 volt inputs, 12.0 reading for the 12 volt inputs, and a 06.0 reading for 6 volt inputs. For current monitoring of the 6 volt outputs, the LCD meter will see .010 volts for each amp across the main chassis resistors R1 or R3, resulting in a reading of 01.0. For current monitoring of the 12 volt outputs, the voltages developed across the .15 ohm sense resistors (mounted on the regulator boards) are applied to the 8094ASY output thru a resistor divider network with the same result as with the 24 volt. Components R7 and D1 are not required.

3.40 LCD DIGITAL VOLTMETER:

The LCD Digital Voltmeter consists of a .5" 3 1/5 digit LCD display, a printed circuit board, a 7106 Analog to Digital converter and components needed to provide the user with voltage readings accurate to a tenth of a volt and current readings accurate to two-tenths of an amp. The decimal point is set at the factory to display tenths and is used to establish a floating reference thru R1 & R4. Variable resistor R4 is the reference set point and can be adjusted by the user to effect the most accurate reading against a particular monitor point. The reference is set at the factory to give the most accurate readings against the 6 volt output voltages. If it is desirable to have more accurate reading on a current monitor point, apply the output voltage thru a standard meter shunt, set the R4 for an exact reading by first going to the next points. This should result in an accurate reading for that monitor point but can leave the other monitor points with an accuracy of only two or three tenths.

Test points for all the output voltages are provided on the front directly to the right of the LCD meter. The red test point is meter return with the positive voltages on the left row of white test points and negative voltages on the right row as marked on the front panel.

4.00 CRATE DESCRIPTION:
The Model 6700 CAMAC Crate consists of a Dataway motherboard in a 7U high case. The extra 2U is used to mount a Blower module which provides the metering circuits for the outputs of the Power Supply module and blowers for the cooling air to the crate.

4.10 DATAWAY:
The dataway motherboard is a 5 layer multilayer printed circuit board which uses high quality card edge connectors which are soldered at all locations. Damage to the card edge connectors generally occurs at stations 24 & 25 and is due to the insertion of double-width modules which are not properly assemble. Mounting bars for the Dataway provide a cam action which forces alignment of the module card edge but cannot correct for those modules with wide connector strips or a heavy burr on the connector strip. Repair of a Dataway connector is almost impossible and customers are advised to return the Dataway assembly or entire Crate to the factory for repairs.

4.20 GROUNDING:
A two (2) position terminal block is mounted to the rear of the top interface cover to provide customer selection of the system grounding. The two outside positions are wired to the chassis of the Crate, Blower, and Power module. The inside positions are wired to the Clean Earth bus bar and the Power Supply return bus bars. The location is clearly marked on the interface cover. A three position jumper is provided (shipped with all three grounds shorted together) which can be used for selectively shorting any two together.

4.30 JACKING BARS:
The steel jacking bar is tapped and labeled according to the CAMAC specifications and is replaceable. Although we have had very few problems with these in the past, the tapped holes are occasionally stripped and it generally takes less than half an hour to replace the entire bar. An optional NIMs jacking bar can be furnished upon request.

4.40 POWER CONNECTOR:
Due to the increased power requirements (some applications are now using 75 amps from the 6 volt outputs), the number of pins providing the 6 volt power to the Dataway has been increased from 3 to 5 amps. All input voltage and current monitor wiring also go through the power connector to the blower.

5.00 STATUS BIT DESCRIPTION:
The Status Bit Option provides a relay closure to the chassis when any of the monitored voltages, currents, shared currents, and the over-temp thermostat are outside the set tolerance. The reed relay contact is a normally closed contact and will be closed with the power off. The relay contact is open when all inputs are within set tolerances.

5.20 GENERAL:
Power is supplied by the +6 and -6V sense inputs. The positive voltage inputs are applied directly to the High/Low comparator inputs through resistor divider networks. The negative voltage inputs are applied to the comparators through inverting amplifiers with gains less than one. The current shunt inputs are applied first to a level shifting differential amplifier which shifts the common mode level to ground (0 volts), from the level shifting amplifier to an adjustable gain amplifier which provides a 2.31 volt output at the desired maximum load condition Positive current amplifier outputs are applied to the High comparators and to a shared current summing amplifier. The negative current amplifier outputs are applied to the summing amplifier and through an inverting amplifier to a High comparator (sum of both positive and negative currents).

The Hi-Temp thermostat is wired to a pair of comparators, one of which drives the front panel Hi-Temp LED and one which is "ORed" with the other comparator outputs to produce a status bit relay indication. All comparator outputs are "ORed" together to drive the status bit relay driver.

5.30 COMPARATORS:
Two comparators are used, High comparators (comparing the input against a +2.31V reference) and Low comparators (comparing the input against a + 2.31V reference). All comparators (except the Hi -Temp LED driver) cause a status bit indication (relay closure to chassis) if the compared inputs are HIGHer than the High reference or LOWer than the Low reference.

5.40 REFERENCE SOURCE:
The reference source VR-1 and amplifier IC8-1 provides the High/Low references of +2.31 & 2.06 volts respectively. VR-1 provides an output of +2.50V J(nominal) to the unit gain buffer amplifier IC8-1 through a resistor divider network. The output of the amplifier is applied to a resistor divider network to develop the 2.31 and 2.06 volt references.

5.50 VOLTAGE INPUTS:
Positive voltage inputs are applied directly to a High/Low comparator pair through a resistor divider network which results in a +2.18 volt level when the input is at nominal. The negative voltage inputs are applied to a High/Low comparator pair through an inverting amplifier with a negative gain such that the result is +2.18 volts when the input is at nominal. All circuits are identical in operation with circuit differences being only the resistor divider networks. Inputs are clearly marked on the schematic with a "S" suffix (+6S for the positive 6V). Outputs of the comparators are clearly marked as "H" (High), "L" (Low), or "I" (Current). Current designations without polarity marking are the shared current comparator outputs (such as 24I).

5.60 CURRENT INPUTS:
All current monitoring circuitry is identical in operation except for the resistor divider networks at the input sections. The following description will be of the 24V section but will apply to the 6 & 12V sections as well.

Inputs to the current monitoring circuitry is developed across very low ohmic value resistors connected in series with the high end of the power supply outputs and the load. This means that the I+ and I- inputs of the +24V power supply output will have a common mode voltage of +24V under no load condition and rise somewhat higher as the load is increased. Divider networks at the input to the first amplifiers reduce the common mode voltage to a level below the amplifiers supply voltages (±6V). The first amplifier then acts to shift the common mode voltage to ground (0V). R11 is used initially to adjust the output of these level shifting amplifiers to 0V at no load. Outputs of the LS (level shifting) amplifiers are applied to the inputs of adjustable gain (AG) amplifiers which are adjusted to provide a 2.31V output at the maximum load condition desired. Outputs of the positive input sides are positive and negative sides. Outputs of both AG amplifiers are applied to a summing amplifier which will produce a +2.31V output when the absolute sum of the two inputs equals 2.31 volts. The outputs of the negative AG amplifier is also applied to a High comparator through a unity gain inverting amplifier. The output of the positive AG amplifier is applied directly to a High comparator.

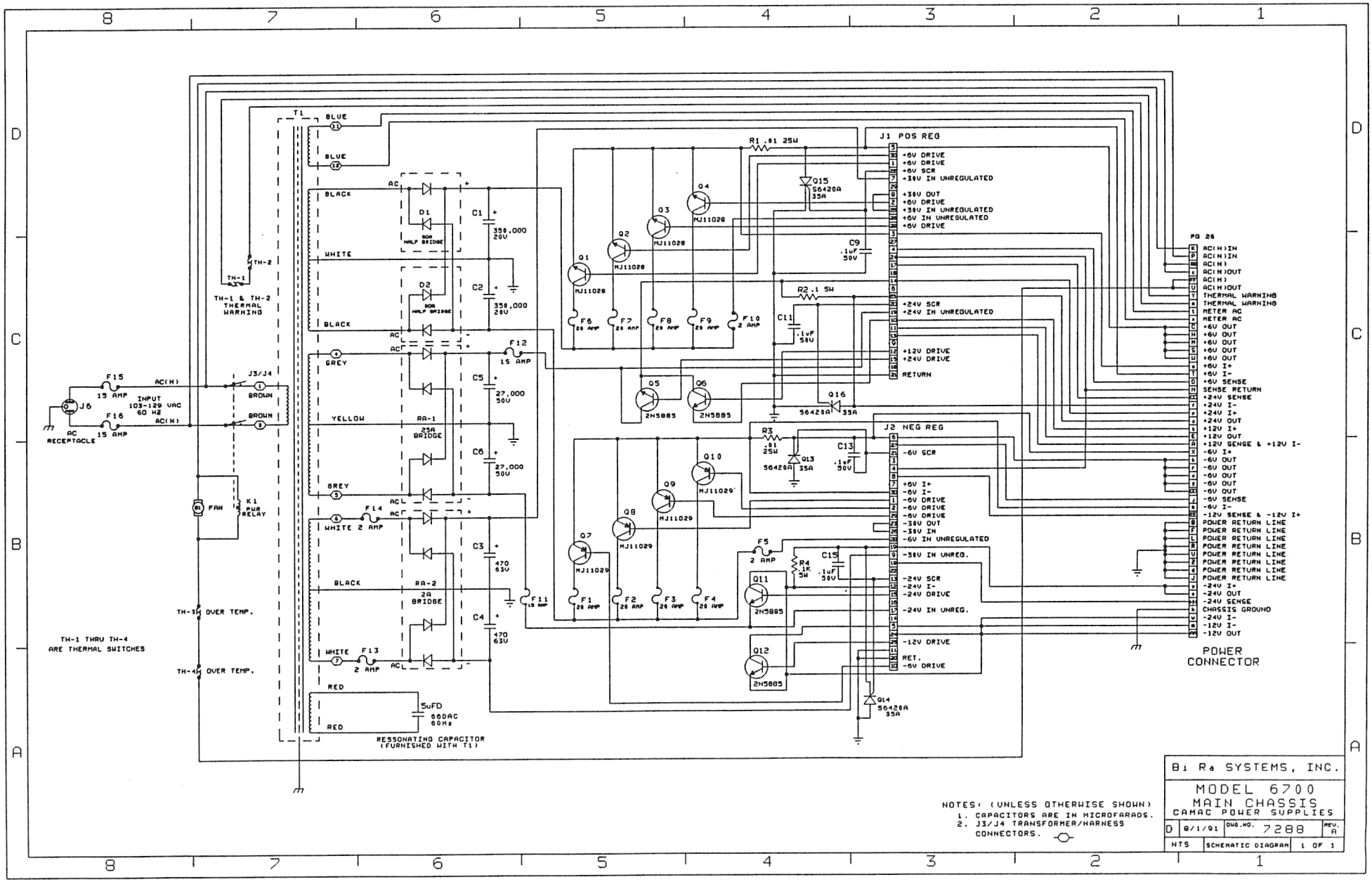
To adjust the amplifiers, first set each LS amplifier to 0V with no load conditions. Adjust each load to the desired maximum load and adjust the individual AG amplifiers until you get a status bit indication. All other current and voltage amplifiers are fixed and require no adjustment.

5.70 TROUBLESHOOTING:
Due to the large number of comparators "ORed" together, it is necessary to check the inputs of each comparator to determine which circuit is in "status bit" of faulty. If the reference voltage is low, one of the comparators is probably loading it and it may be necessary to remove them one at a time until the loading condition is removed.

MODEL 6700
DRAWING & PARTS LIST SECTION

MODEL 6700
PARTS LIST - MAIN CHASSIS
P/N 8062

BiRa P/N	DESCRIPTION	REFERENCE
TS100BHT	Switch Reed 90C degrees C Temp Sense	TH-1, 2
TS120BHT	Switch 115 degrees C Thermal w/BRKT	TH-3, 4
5915 PC	160 CFM	B1
SRDPDT20	Relay DPDT 20A 120V	K1
W7102	Transformer 60HZ Ferroresonnant	T1
X2365	w/5mfd 660 AC 60HZ Resonnating CAP	
IRKD91-04	Diode Half Bridge 90 Amp	D1, D2
BRIDGE25A	Diode Bridge 25 Amp 200 Volt	RA-1
BRIDGE2A	Diode Bridge 2 Amp 200 Volt	RA-2
S6420A	SCR 35 Amp 100V Isolated Stud	Q13,Q14,Q15,Q16
2N5885	Transistor NPN Power	Q6,10,11,12
MJ11028	Transistor Darlington NPN Power	Q1,Q2,Q3,Q4
MJ11029	Transistor Darlington PNP Power	Q5,Q7,Q8,Q9
47OUFA63V	CAP ALUM ELECT 470 mfd 63V	C3,C4
27KUFA50V	CAP ALUM ELECT 27000 UF50VDC	C5,C6
350KUFA20V	CAP ALUM ELECT 350000 UF20VDC	C1,C2
.1UF50V	CAP monolythic ceramic .1mfd 50V	C9,C11,C13,C15
25W.01	Resistor wire wound.01 ohm 25W	R1,R3
5W.1	Resistor wire wound .1 ohm 5W	R2,R4
W28XQ1A15	Fuse circuit breaker 20A	F1,F2
312020	Fuse 20 Amp 3AG	F3,F4,F5,F6,F7,F9
		F10,F11
312015	Fuse 15 Amp 3AG	F8,F12
312002	Fuse 2 Amp 3AG	F13,F14,F15,F16
200277	Power Connector Block	PG26
66100	Female Socket for PG26	PG26
201390	External Hood for PG26	PG26
200833	Guide Pin for PG26	PG26
203964	Guide Socket for PG26	PG26
530654	CONN 30 position PCB mount	J1,J2
207018	CONN receptacle 12 pos. Transformer side (J3)	J3/J4
66098	Male pin for J3	J3/J4
207017	CONN plug 12 pos. Harness side (J4)	J3/J4
66100	Female socket for J4	J3/J4
EAC-302	CONN AC receptacle 15 Amp 250 VAC	J6


T1
BLUE
BLUE
BLACK
WHITE
BLACK
GREY
YELLOW
GREY
WHITE 2 AMP
BLACK
WHITE
RED
RED
5uFD
660AC
60Hz
RESSONATING CAPACITOR
(FURNISHED WITH T1)
D1
D2
50A
HALF BRIDGE
C1
350,000
20V
C2
350,000
20V
C3
470
63V
C4
470
63V
C5
27,000
50V
C6
27,000
50V
RA-1
25A
BRIDGE
RA-2
2A
BRIDGE
F11
15 AMP
F12
15 AMP
F13
2 AMP
F14
AC
TH-1
TH-2
TH-1 & TH-2
THERMAL
WARNING
TH-3 OVER TEMP.
TH-4 OVER TEMP.
TH-1 THRU TH-4
ARE THERMAL SWITCHES
F15
15 AMP
F16
15 AMP
AC(H)
AC(N)
J6
AC
RECEPTACLE
INPUT
103-129 VAC
60 HZ
J3/J4
BROWN
BROWN
FAN
K1
PWR
RELAY
R1 .01 25W
J1 POS REG
+6V DRIVE
+6V DRIVE
+6V SCR
+38V IN UNREGULATED
+38V OUT
+6V DRIVE
+38V IN UNREGULATED
+6V IN UNREGULATED
+6V DRIVE
Q1
MJ11028
Q2
MJ11028
Q3
MJ11028
Q4
MJ11028
Q15
S6420A
35A
C9
.1uF
50V
R2 .1 5W
C11
.1uF
50V
+24V SCR
+24V IN UNREGULATED
+12V DRIVE
+24V DRIVE
RETURN
F6
20 AMP
F7
20 AMP
F8
20 AMP
F9
20 AMP
F10
2 AMP
Q5
2N5885
Q6
2N5885
Q16
S6420A
35A
J2 NEG REG
-6V SCR
R3
.01
25W
Q13
S6420A
35A
C13
.1uF
50V
+6V I+
-6V I-
-6V DRIVE
-6V DRIVE
-6V DRIVE
-38V OUT
-38V IN
-6V IN UNREGULATED
-38V IN UNREG.
-24V SCR
-24V I-
-24V DRIVE
-24V IN UNREG.
-12V DRIVE
RET.
-6V DRIVE
Q7
MJ11029
Q8
MJ11029
Q9
MJ11029
Q10
MJ11029
F1
20 AMP
F2
20 AMP
F3
20 AMP
F4
20 AMP
F5
2 AMP
R4
.1K
5W
C15
.1uF
50V
Q11
2N5885
Q12
2N5885
Q14
S6420A
35A
PG 26
AC(H)IN
AC(H)IN
AC(N)
AC(N)OUT
AC(H)
AC(H)OUT
THERMAL WARNING
THERMAL WARNING
METER AC
METER AC
+6V OUT
+6V OUT
+6V OUT
+6V OUT
+6V OUT
+6V I+
+6V I-
+6V SENSE
SENSE RETURN
+24V SENSE
+24V I-
+24V I+
+24V OUT
+12V I+
+12V OUT
+12V SENSE & +12V I-
-6V I+
-6V OUT
-6V OUT
-6V OUT
-6V OUT
-6V SENSE
-6V I-
-12V SENSE & -12V I+
POWER RETURN LINE
POWER RETURN LINE
POWER RETURN LINE
POWER RETURN LINE
POWER RETURN LINE
POWER RETURN LINE
POWER RETURN LINE
POWER RETURN LINE
-24V I+
-24V OUT
-24V SENSE
CHASSIS GROUND
-24V I-
-12V I-
-12V OUT
POWER
CONNECTOR
NOTES: (UNLESS OTHERWISE SHOWN)
1. CAPACITORS ARE IN MICROFARADS.
2. J3/J4 TRANSFORMER/HARNESS CONNECTORS.
Bi Ra SYSTEMS, INC.
MODEL 6700
MAIN CHASSIS
CAMAC POWER SUPPLIES
D
8/1/91
DWG.NO. 7288
REV. A
NTS
SCHEMATIC DIAGRAM
1 OF 1

6700
PARTS LIST-CRATE INTERCONNECTION
P/N 8054ASY

BiRa P/N	DESCRIPTION	REFERENCE
201358	Power Connector Block	PG25
66098	Male pin for PG25	PG25
202394	Internal Hood for PG25	PG25
200833	Guide pin for PG25	PG25
203964	Guide socket for PG25	PG25
2552323	Connector receptacle 36 position	BC-1
552297	Strain relief for BC-1	BC-1
4532870	Connector 43 position card edge	MOTHER BOARD TO MODULE CONNECTOR

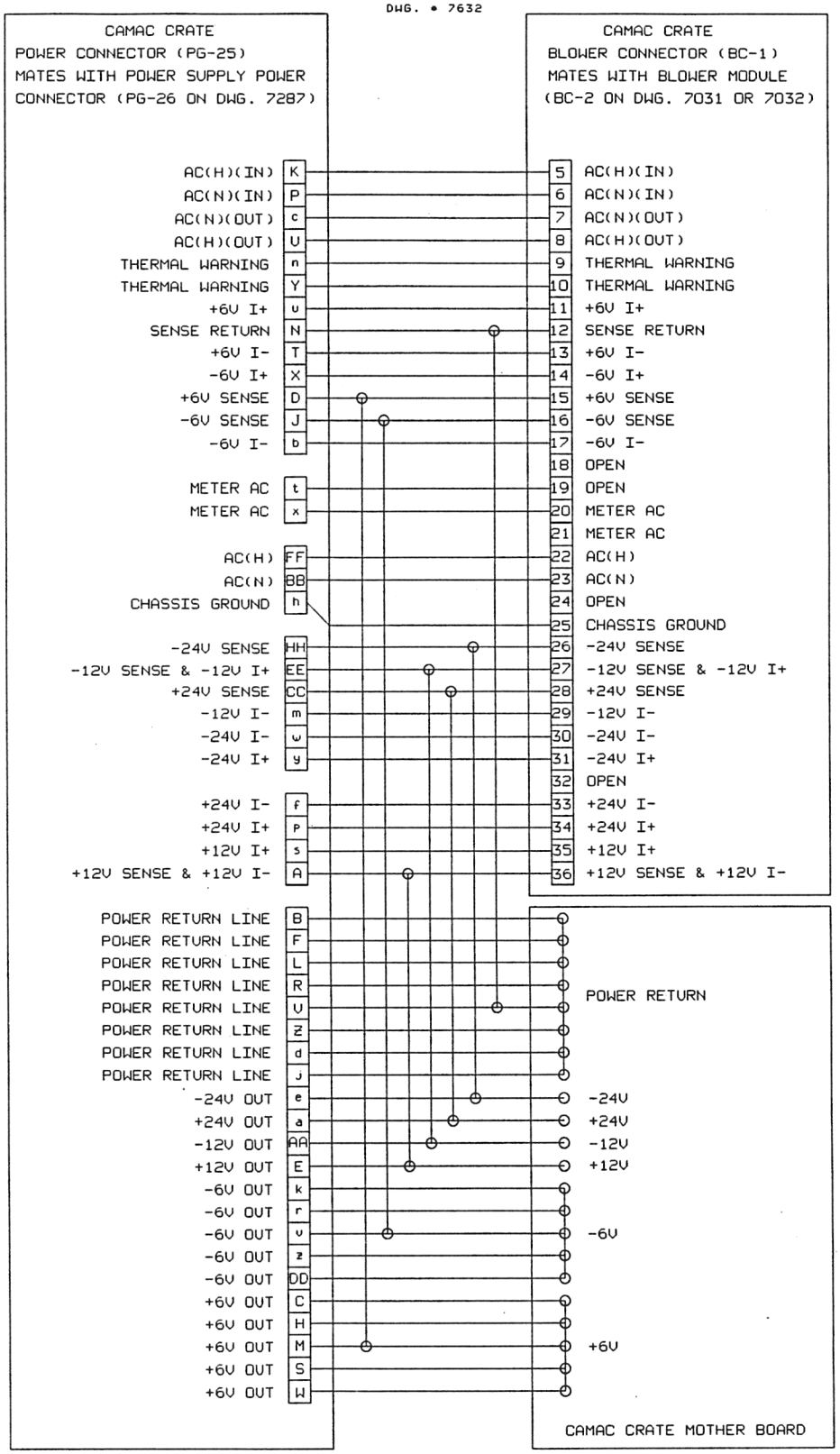
Bi Ra SYSTEMS, INC.

MODEL 6700

CRATE INTERCONNECTION BLOCK DIAGRAM

(POWER CONNECTOR TO BLOWER MODULE AND MOTHER BOARD)

DWG. # 7632



MODEL 6700
PARTS LIST-CRATE TO POWER SUPPLY CABLE
P/N 8112ASY

BiRa P/N	CRATE CONNECTOR	QTY
201390	CONN Hood External 201390-5	1
200277	CONN Block 50-Pin 200277-2	1
200867	CONN Block Jackscrew 200867	2
200833	CONN Block Guide Pin 200833-4	2
203964	CONN Block Guide Socket 203964-2	2
201182AM	CONN Clamp 201182-1	1
66100	CONN Terminal Female 66100-8	50
	POWER SUPPLY CONNECTOR	
202394	CONN Hood Internal 202394-2	1
201358	CONN Block 50-Pin 201358-1	1
200867	CONN Block Jack 200867	2
200833	CONN Block Guide Pin 200833-4	2
203964	CONN Guide Socket 203964-2	2
201182AM	CONN Clamp 201182-1	1
66098	CIONN Terminal Male 66098-8	50

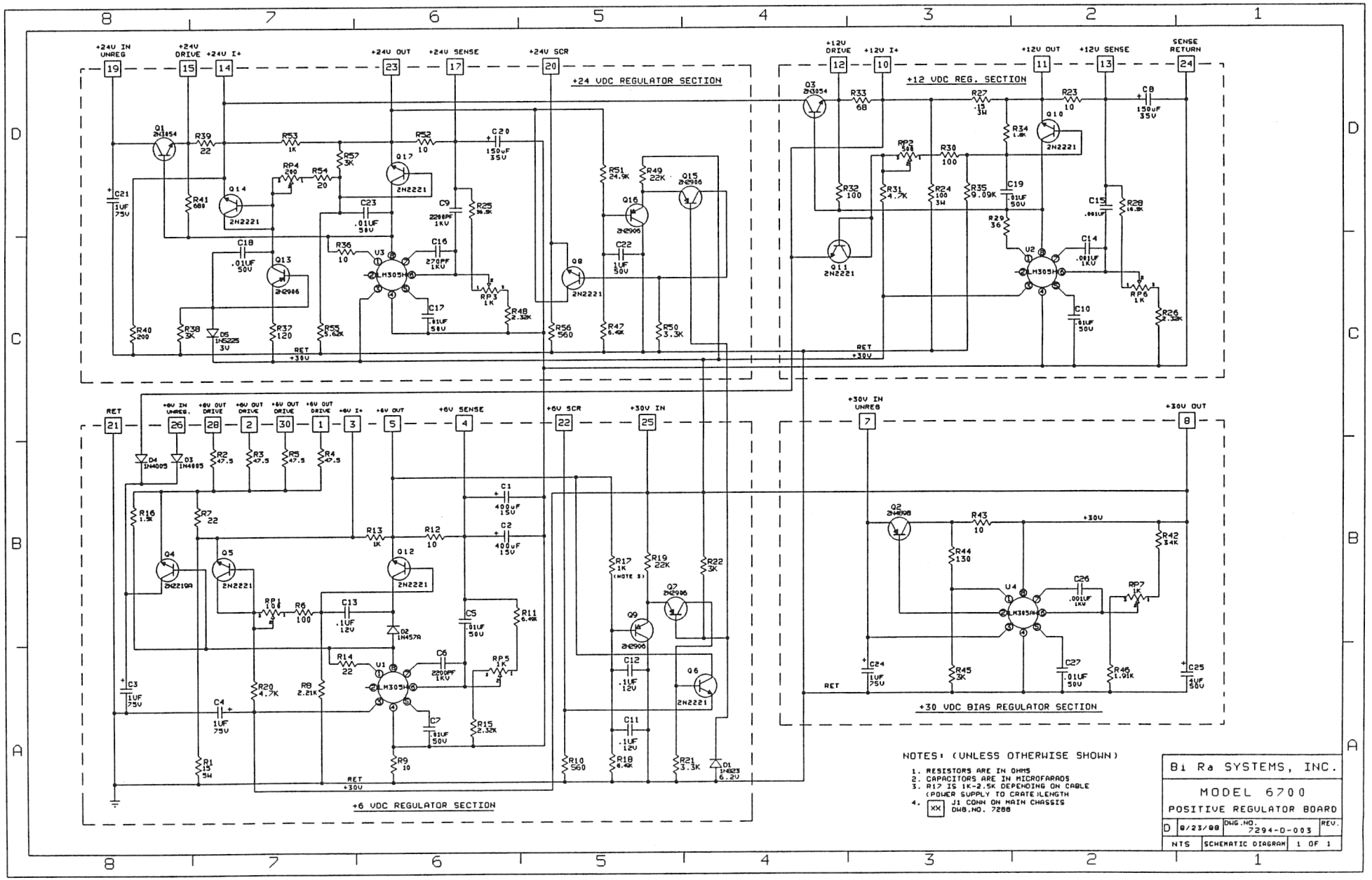
All wires are 16 ga. or 22 ga. stranded hook-up wire.
The cable is a pin to pin (i.e. A to A, B to B, etc.) configuration.
All 50 Pins are utilized.

MODEL 6700
PARTS LIST-POSITIVE REGULATOR BOARD
P/N 8083ASY

BiRa P/N	DESCRIPTION	REFERENCE
.01UFD50V	CAP Ceramic Rectangular Monolithic	C5,7,10,17-19,23,27
.1UFD50V	CAP Ceramic disk	C11-C13
.5W1.5K	RES Carbon film 5% .5W	R16
.5W1.8K	RES Carbon film 5% .5W	R34
.5W100R	RES Carbon film 5% .5W	R32
.5W10R	RES Carbon film 5% .5W	R9,12,23,43,52
.5W130R	RES Carbon film 5% .5W	R44
.5W1K	RES Carbon film 5% .5W	R13,R53
.5W22OR	RES Carbon film 5% .5W	R37
.5W22K	RES Carbon film 5% .5W	R19,R49
.5W22R	RES Carbon film 5% .5W	R7,36,39
.5W36R	RES Carbon film 5% .5W	R29
.5W3.3K	RES Carbon film 5% .5W	R21,R50
.5W3K	RES Carbon film 5% .5W	R22,38,45,57
.5W4.7K	RES Carbon film 5% .5W	R20,R31
.5W560R	RES Carbon film 5% .5W	R10,R56
.5W680R	RES Carbon film 5% .5W	R41
.5W68R	RES Carbon film 5% .5w	R33
1000PFBM	CAP Blue Max	C14,15,26
160UFWS50V	CAP Wet Slug	C8,C20
1N4005	DIODE Silicon Rectified	D3,D4
1N457A	DIODE	D2
1N5225	DIODE Zener 3.OV	D5
1N823	DIODE Zener 6.2V T/C	D1
1UF50VBM	CAP Blue Max	C22
1UFT75V	CAP Tentulum	C3,4,21,24
2200PFD	CAP Ceramic	C6,C9
270PFD1KV	CAP Ceramic	C16
2N2219A	TRANSISTOR NPN TO39	Q4
2N2221	TRANSISTOR NPN TO18	Q5,6,8,10-12,14,17
2N2905	TRANSISTOR PNP TO18	Q7,9,13,15,16
2N3054	TRANSISTOR NPN MEM DWG.	Q1,Q3
2N4898	TRANSISTOR	Q2
390UFWS10V	CAP Wet Slug	C1,C2
3W.100RWW	RES Wire Wound	R24
3W.15RWW	RES Wire Wound	R27
43P-1K	RES Trimpot 1K	RP3,RP5,RP6
4UFA50V	CAP Aluminum Electrolytic	C25
5W15RWW	RES Wire Wound	R1
5W200RWW	RES Wire Wound	R40
63P-1K	RES Trimpot 1K	RP7
63P-200R	RES Trimpot 200R	RP1,RP4
63P-500R	RES Trimpot 500R	RP2
LM305AH	REGULATOR Voltage TO-5 CAN	U4
LM305H	REGULATOR Voltage TO-5 CAN	U1-U3

MODEL 6700
PARTS LIST-POSITIVE REGULATOR BOARD
P/N 8083ASY

BiRa P/N	DESCRIPTION	REFERENCE
RN55D1.91K	RES Precision 1%	R46
RN55D100R	RES Precision 1%	R6,R30
RN55D16.5K	RES Precision 1%	R28
RN55D1K	RES Precision 1%	R17
RN55D2.32K	RES Precision 1%	R15,R26,R48
RN55D20R	RES Precision 1%	R54
RN55D24.9K	RES Precision 1%	R51
RN55D34K	RES Precision 1%	R42
RN55D6.49K	RES Precision 1%	R11,R18,R47
RN55D7.5K	RES Precision 1%	R55
RN55D8.25K	RES Precision 1%	R8
RN55D9.09K	RES Precision 1%	R35
RN65D36.5R	RES Precision 1%	R29
RN65D47.5R	RES Precision 1%	R2-R5
RN65D75R	RES Precision 1%	R14

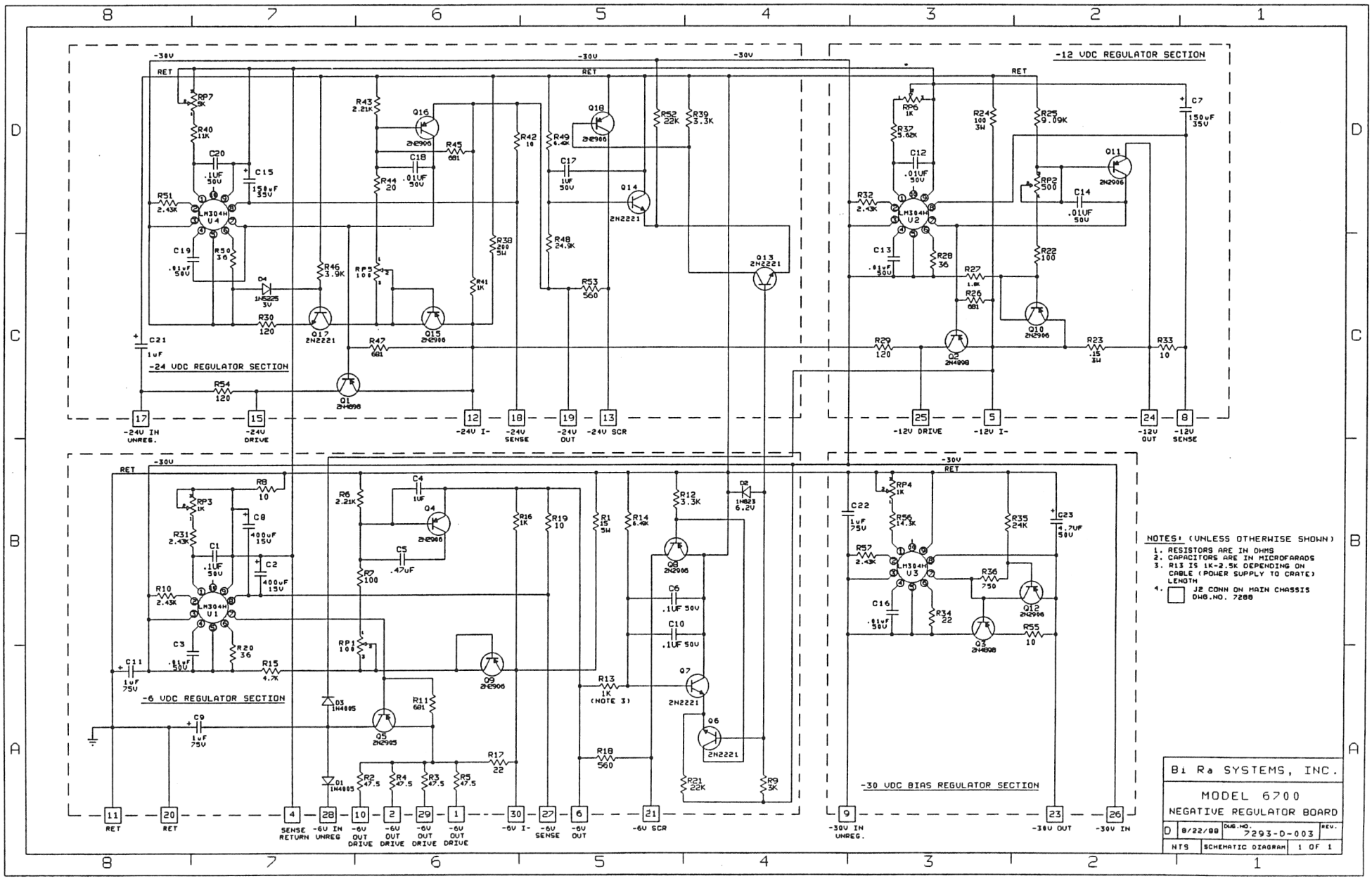

+24V IN UNREG
+24V DRIVE
+24V I+
+24V OUT
+24V SENSE
+24V SCR
+24 VDC REGULATOR SECTION
+12V DRIVE
+12V I+
+12V OUT
+12V SENSE
SENSE RETURN
+12 VDC REG. SECTION
RET
+30V
+6V IN UNREG.
+6V OUT DRIVE
+6V I+
+6V OUT
+6V SENSE
+6V SCR
+30V IN
+6 VDC REGULATOR SECTION
+30V IN UNREG
+30V OUT
+30 VDC BIAS REGULATOR SECTION
NOTES: (UNLESS OTHERWISE SHOWN)
1. RESISTORS ARE IN OHMS
2. CAPACITORS ARE IN MICROFARADS
3. R17 IS 1K-2.5K DEPENDING ON CABLE (POWER SUPPLY TO CRATE) LENGTH
4. XX J1 CONN ON MAIN CHASSIS DWG.NO. 7288
Bi Ra SYSTEMS, INC.
MODEL 6700
POSITIVE REGULATOR BOARD
D
8/23/88
DWG.NO. 7294-D-003
REV.
NTS
SCHEMATIC DIAGRAM
1 OF 1

MODEL 6700
PARTS LIST - NEGATIVE REGULATOR BOARD
P/N 8082ASY

BiRa P/N	DESCRIPTION	REFERENCE
.01UFD50V	CAP Ceramic Rectangular Monolithic	C3,12,14,16,18,19
.1UFD50V	CAP Ceramic	C1,C6,C10,C20
.47UFBM	CAP Blue Max	C5
.5W1.8K	RES Carbon film 5% .5W	R27
.5W10R	RES Carbon film 5% .5W	R8,19,33,42,R55
.5W12OR	RES Carbon film 5% .5W	R29,R30,R54
.5W1K	RES Carbon film 5% .5W	R16,R41
.5W22K	RES Carbon film 5% .5W	R21,R52
.5W22R	RES Carbon film 5% .5W	R17,R34
.5W24K	RES Carbon film 5% .5W	R35
.5W3.3K	RES Carbon film 5% .5W	R12,R39
.5W3.9K	RES Carbon film 5% .5W	R46
.5W36R	RES Carbon film 5% .5W	R28
.5W3K	RES Carbon film 5% .5W	R9
.5W4.7K	RES Carbon film 5% .5W	R15
.5W56OR	RES Carbon film 5% .5W	R18,R53
.5W75OR	RES Carbon film 5% .5W	R36
.5W680R	RES Carbon film 5% .5W	R11,R26,R45,R47
16OUF5OV	CAP Tantalum	C7,C15
1N4005	DIODE Silicon Rectifier	D1,D3
1N5225	DIODE Zener 3.OV	D4
1N823	DIODE Zener 6.2V T/C	D2
1UF50VBM	CAP Blue Max	C4,C17
1UFT5OV	CAP Tantalum	C9,C11,C21,C22
2N2221	TRANSISTOR NPN TO18	Q6,7,13,14,Q17
2N2905	TRANSISTOR Silicon Switch	Q5
2N2906	TRANSISTOR PNP T018	Q4,8,12,15,16,Q18
2N4898	TRANSISTOR	Q1,Q3
390UFWS10V	CAP Wet Slug	C2,C8
3W.100RWW	RES Wire Wound	R24
3W.15RWW	RES Wire Wound	R23
43P-1K	RES Trimpot 1K	RP3,RP6
43P-5K	RES Trimpot 5K	RP7
4UFA50V	CAP Aluminum Electrolytic	C23
5W15RWW	RES Wire Wound	R1
5W200RWW	RES Wire Wound	R38
63P-2K	RES Trimpot 2K	RP4
63P-500R	RES Trimpot 500R	RP2
LM204H	REGULATOR Voltage TO-5 CAN	U3
LM304H	REGULATOR Voltage TO-5 CAN	U1,U2,U4
63P-100R	RES Trimpot 100R	RP5
63P-200R	RES Trimpot 200R	RP1
RN55D100R	RES Precision 1%	R7,R22,R50
RN55D11K	RES Precision 1%	R40
RN55D14.3K	RES Precision 1%	R56

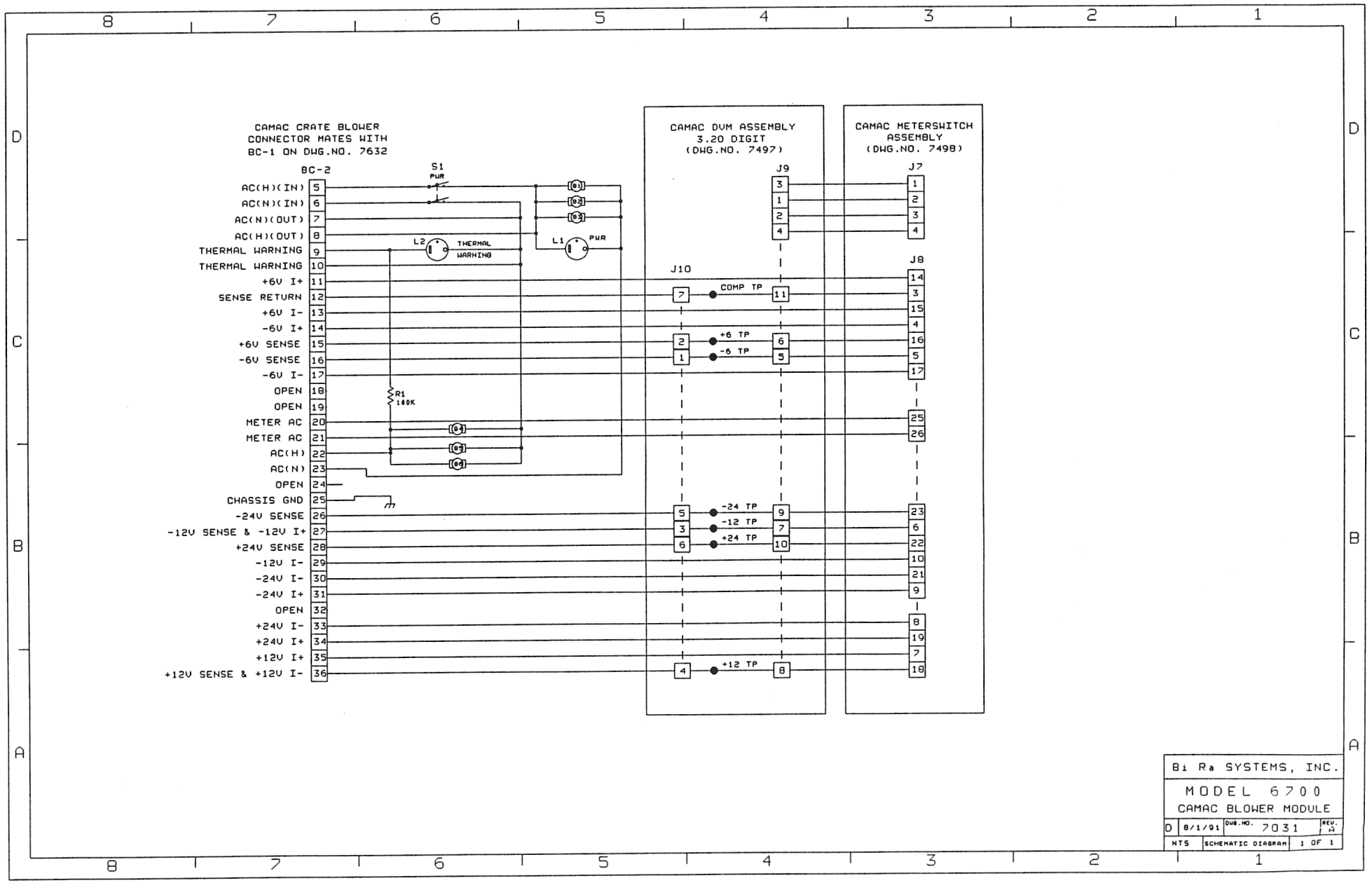
MODEL 6700
PARTS LIST - NEGATIVE REGULATOR BOARD
P/N 8082ASY (continued)

BiRa P/N	DESCRIPTION	REFERENCE
RN55D1K	RES Precision 1%	R13
RN55D2.43K	RES Precision 1%	R10,31,32,51,R57
RN55D20R	RES Precision 1%	R44
RN55D24.9K	RES Precision 1%	R48
RN55D5.62K	RES Precision 1%	R37,R43
RN55D6.49K	RES Precision 1%	R14,R49
RN55D8.25K	RES Precision 1%	R6
RN55D9.09K	RES Precision 1%	R25
RN65D47.5R	RES Precision 1%	R2-R5
RN65D75R	RES Precision 1%	R20


-24 VDC REGULATOR SECTION
-12 VDC REGULATOR SECTION
-6 VDC REGULATOR SECTION
-30 VDC BIAS REGULATOR SECTION
-30V
RET
-24V IN UNREG.
-24V DRIVE
-24V I-
-24V SENSE
-24V OUT
-24V SCR
-12V DRIVE
-12V I-
-12V OUT
-12V SENSE
RET
RET
SENSE RETURN
-6V IN UNREG
-6V OUT DRIVE
-6V OUT DRIVE
-6V OUT DRIVE
-6V OUT DRIVE
-6V I-
-6V SENSE
-6V OUT
-6V SCR
-30V IN UNREG.
-30V OUT
-30V IN
NOTES: (UNLESS OTHERWISE SHOWN)
1. RESISTORS ARE IN OHMS
2. CAPACITORS ARE IN MICROFARADS
3. R13 IS 1K-2.5K DEPENDING ON CABLE (POWER SUPPLY TO CRATE) LENGTH
4. JZ CONN ON MAIN CHASSIS DWG.NO. 7288
Bi Ra SYSTEMS, INC.
MODEL 6700
NEGATIVE REGULATOR BOARD
D
8/22/98
DWG.NO. 7293-D-003
REV.
NTS
SCHEMATIC DIAGRAM
1 OF 1

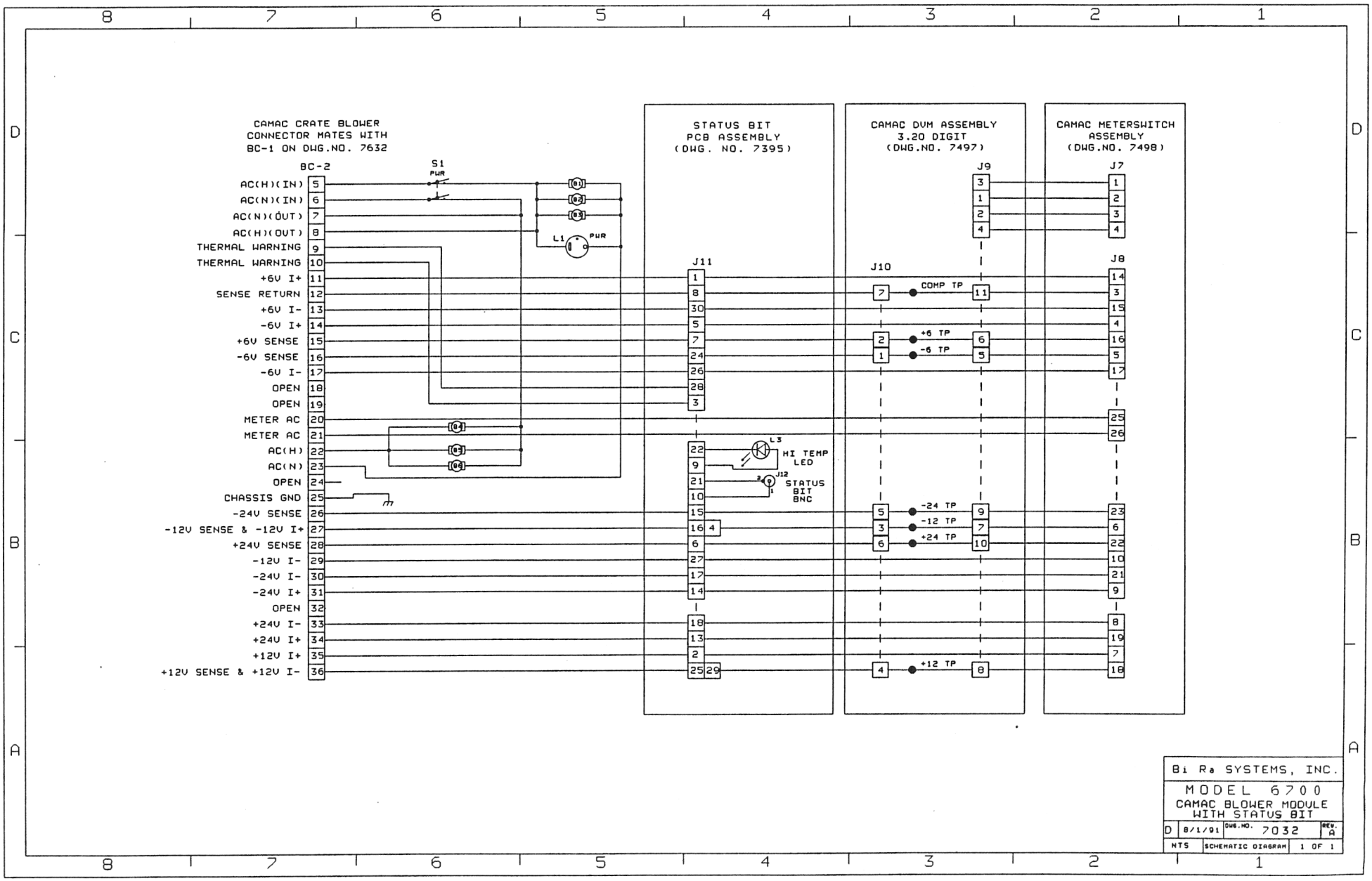
MODEL 6700
PARTS LISTS - BLOWER MODULE
P/N 8116

BiRa P/N	DESCRIPTION	REFERENCE
.5W100K	Resistor carbon film 5% .5 Watt	R1
2313YL	LED neon yellow panel mount	L1
2311R	LED neon red panel mount	L2
7561DPST	Switch toggle DPST	S1
552302	Connector plug 36 position	BC-2
552297	Strain relief for BC-2	BC-2


CAMAC CRATE BLOWER
CONNECTOR MATES WITH
BC-1 ON DWG.NO. 7632
BC-2
AC(H)(IN) 5
AC(N)(IN) 6
AC(N)(OUT) 7
AC(H)(OUT) 8
THERMAL WARNING 9
THERMAL WARNING 10
+6V I+ 11
SENSE RETURN 12
+6V I- 13
-6V I+ 14
+6V SENSE 15
-6V SENSE 16
-6V I- 17
OPEN 18
OPEN 19
METER AC 20
METER AC 21
AC(H) 22
AC(N) 23
OPEN 24
CHASSIS GND 25
-24V SENSE 26
-12V SENSE & -12V I+ 27
+24V SENSE 28
-12V I- 29
-24V I- 30
-24V I+ 31
OPEN 32
+24V I- 33
+24V I+ 34
+12V I+ 35
+12V SENSE & +12V I- 36
S1
PWR
L2
THERMAL WARNING
L1
PWR
R1
100K
CAMAC DVM ASSEMBLY
3.20 DIGIT
(DWG.NO. 7497)
CAMAC METERSWITCH
ASSEMBLY
(DWG.NO. 7498)
J9
J7
J10
J8
COMP TP
+6 TP
-6 TP
-24 TP
-12 TP
+24 TP
+12 TP
Bi Ra SYSTEMS, INC.
MODEL 6700
CAMAC BLOWER MODULE
D 8/1/91 DWG.NO. 7031 REV. A
NTS SCHEMATIC DIAGRAM 1 OF 1

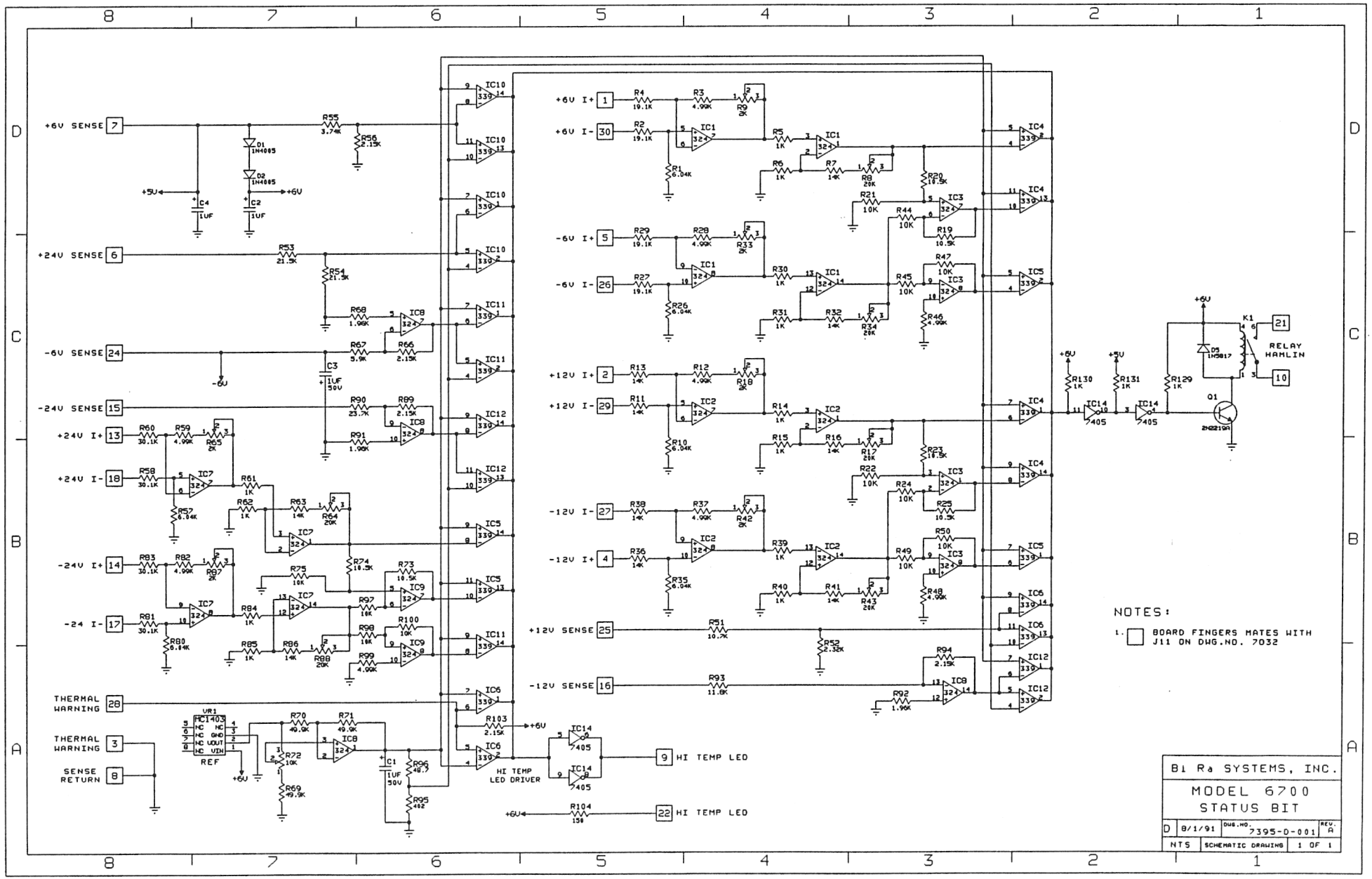
MODEL 6700
PARTS LIST - STATUS BLOWER MODULE
P/N 8122

BiRa P/N	DESCRIPTION	REFERENCE
2311R	neon yellow panel mount	L1
552302	Connector plug 36 position	BC-2
552297	Strain relief for BC-2	BC-2
640440-4	Connector housing 4 position	J7,J9
640440-8	Connector housing 8 position	J8,(3ea.),J9,J10
530654	Connector 15 position 30 pin PCB	J11
BNC31-221	BNC Connector	J12


CAMAC CRATE BLOWER
CONNECTOR MATES WITH
BC-1 ON DWG.NO. 7632
BC-2
AC(H)(IN) 5
AC(N)(IN) 6
AC(N)(OUT) 7
AC(H)(OUT) 8
THERMAL WARNING 9
THERMAL WARNING 10
+6V I+ 11
SENSE RETURN 12
+6V I- 13
-6V I+ 14
+6V SENSE 15
-6V SENSE 16
-6V I- 17
OPEN 18
OPEN 19
METER AC 20
METER AC 21
AC(H) 22
AC(N) 23
OPEN 24
CHASSIS GND 25
-24V SENSE 26
-12V SENSE & -12V I+ 27
+24V SENSE 28
-12V I- 29
-24V I- 30
-24V I+ 31
OPEN 32
+24V I- 33
+24V I+ 34
+12V I+ 35
+12V SENSE & +12V I- 36
S1
PWR
L1
PWR
STATUS BIT
PCB ASSEMBLY
(DWG. NO. 7395)
J11
L3
HI TEMP
LED
J12
STATUS
BIT
BNC
CAMAC DVM ASSEMBLY
3.20 DIGIT
(DWG.NO. 7497)
J9
J10
COMP TP
+6 TP
-6 TP
-24 TP
-12 TP
+24 TP
+12 TP
CAMAC METERSWITCH
ASSEMBLY
(DWG.NO. 7498)
J7
J8
Bi Ra SYSTEMS, INC.
MODEL 6700
CAMAC BLOWER MODULE
WITH STATUS BIT
D
8/1/91
DWG.NO. 7032
REV. A
NTS
SCHEMATIC DIAGRAM
1 OF 1

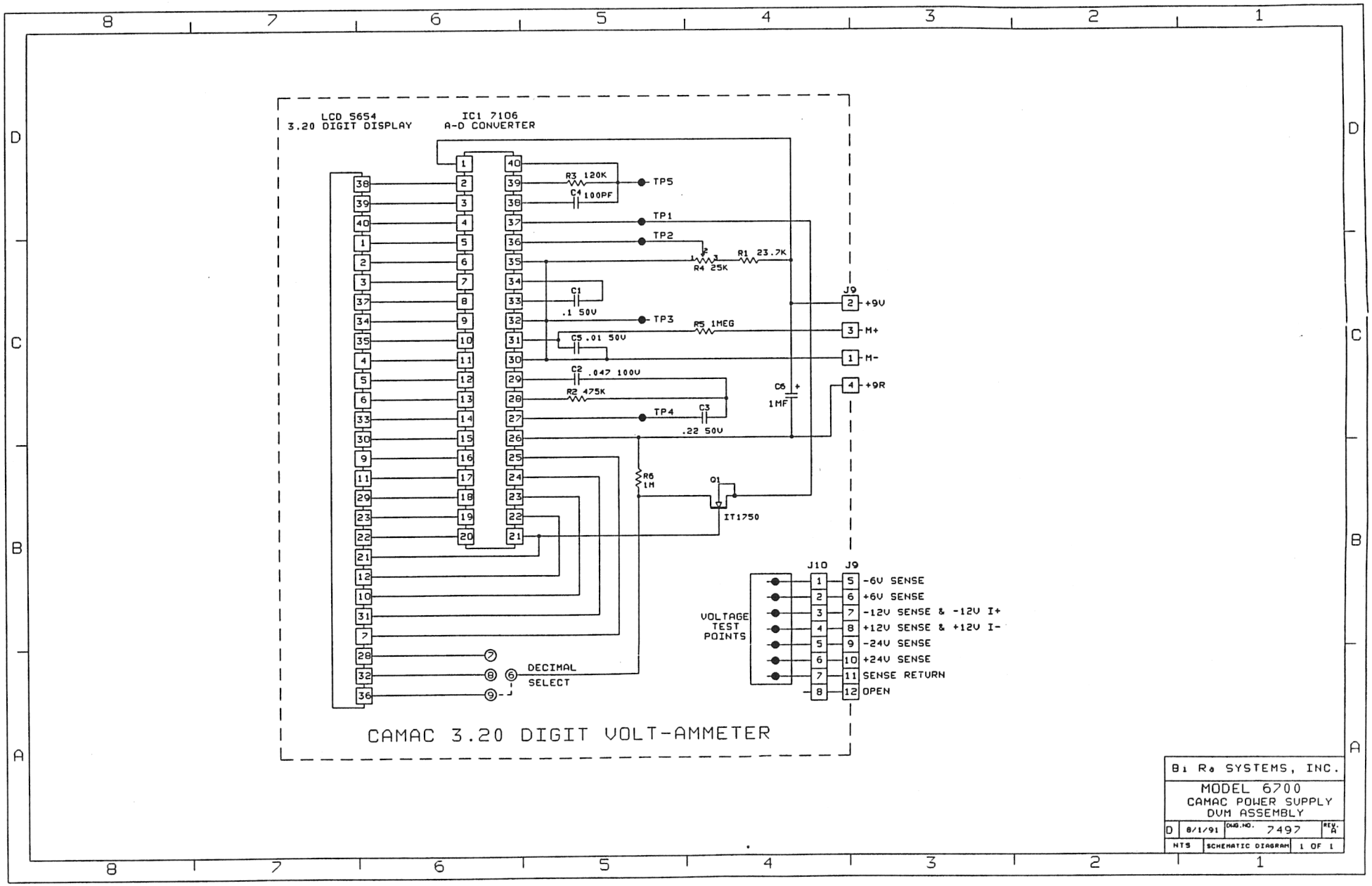
MODEL 6700
PARTS LIST - STATUS BIT BOARD
P/N 8030ASY

BiRa P/N	DESCRIPTION	REFERENCE
RN55D1.96K	Resistor precision 1%	R68,91,92
RN55D10.5K	Resistor precision 1%	R19,20,23,25,73,R74
RN55D10.7K	Resistor precision 1%	R51
RN55D10K	Resistor precision 1%	R21,22,24,44,45,47,49,50,75,97,98,R100
RN55D11.8K	Resistor precision 1%	R93
RN55D14K	Resistor precision 1%	R7,11,13,32,36,38,63,86
RN55D15OR	Resistor precision 1%	R104
RN55D19.1K	Resistor precision 1%	R2,4,27,29
RN55D1K	Resistor precision 1%	R5,6,14,15,16,30,31 39,40,41,61,62,84,85 R113
RN55D2.15K	Resistor precision 1%	R54,56,66,89,94,103
RN555D2.32K	Resistor precision 1%	R52
RN55D21.5K	Resistor precision 1%	R53
RN55D23.7K	Resistor precision 1%	R90
RN55D3.74K	Resistor precision 1%	R55
RN55D30.1K	Resistor precision 1%	R58,60,81,83
RN55D4.99K	Resistor precision 1%	R3,12,28,37,46,48,59,82,99
RN55D402R	Resistor precision 1%	R95
RN55D48.7R	Resistor precision 1%	R96
RN55D49.9K	Resistor precision 1%	R69,70,71
RN55D5.9K	Resistor precision 1%	R67
RN55D6.04K	Resistor precision 1%	R1,10,26,35,57,80
63P-10K	Resistor trimpot 10K ohm	R72
63P-20K	Resistor trimpot 20K ohm	R8,17,34,43,64,88
63P-2K	Resistor trimpot 2K ohm	R9,18,33,42,65,87
1UFT50V	CAP tantalum	C1,2,3,4
1N4005	Diode silicon rectifier	D1,2
1N5817	Diode 1 amp SCHOTTKY	D5
2N2219A	Transistor NAN TO18	Q1
LM324N	QUAD OP-Amp	IC1,2,3,7,8,9,
MC1403U	2.5 Volt Reference	VR1
UA339PC	QUAD comparator	IC4,5,6,10,11,12
7405	HEX Inverter	IC14
SRRD5V	Relay reed 5V DC 10v AC	K1


+6V SENSE 7
+24V SENSE 6
-6V SENSE 24
-24V SENSE 15
+24V I+ 13
+24V I- 18
-24V I+ 14
-24 I- 17
THERMAL WARNING 28
THERMAL WARNING 3
SENSE RETURN 8
+6V I+ 1
+6V I- 30
-6V I+ 5
-6V I- 26
+12V I+ 2
+12V I- 29
-12V I- 27
-12V I+ 4
+12V SENSE 25
-12V SENSE 16
HI TEMP LED DRIVER
9 HI TEMP LED
22 HI TEMP LED
RELAY HAMLIN
21
10
NOTES:
1. BOARD FINGERS MATES WITH J11 ON DWG.NO. 7032
BI Ra SYSTEMS, INC.
MODEL 6700
STATUS BIT
D 8/1/91 DWG.NO. 7395-0-001 REV. A
NTS SCHEMATIC DRAWING 1 OF 1

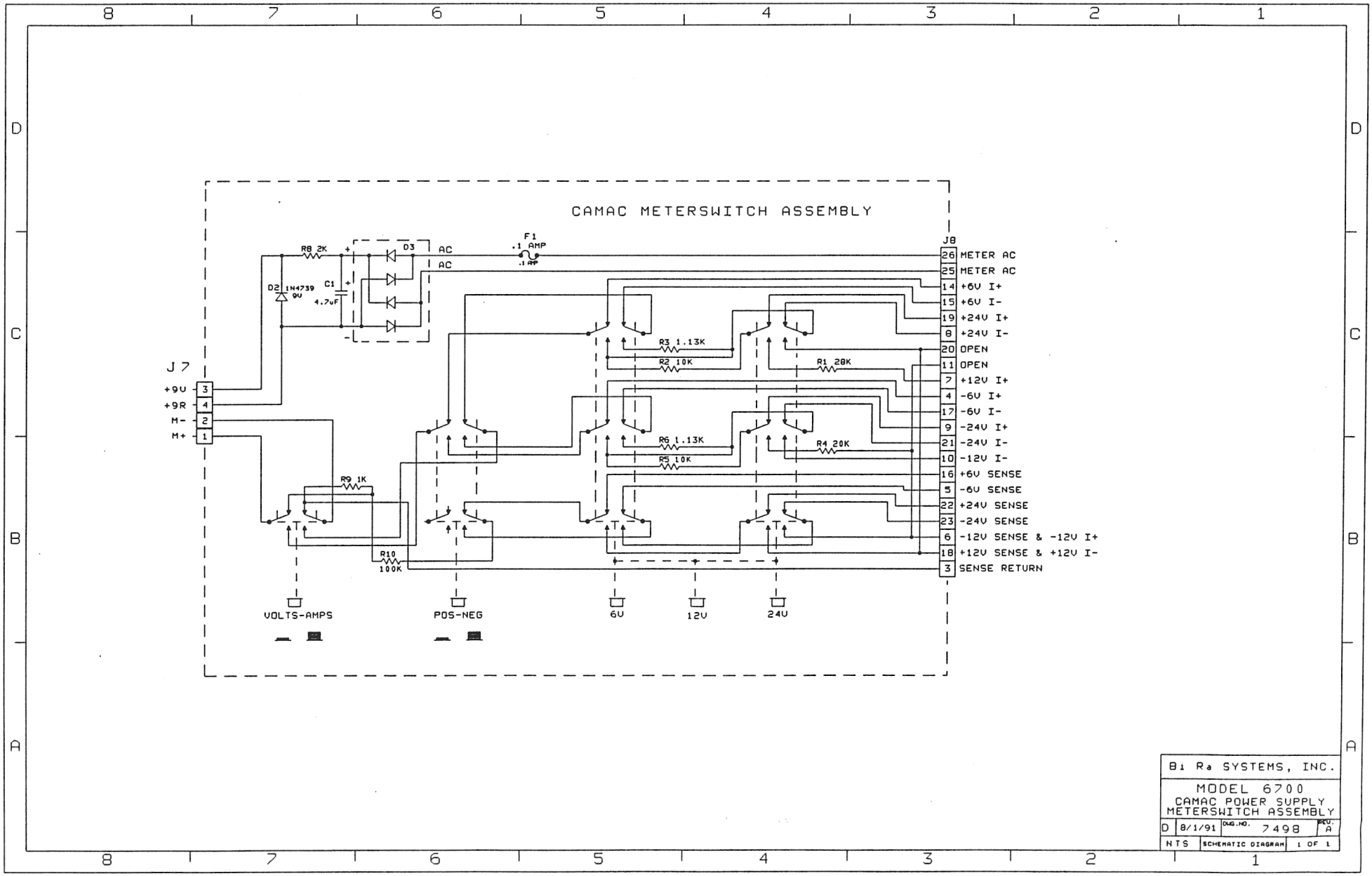
MODEL 6700
PARTS LIST - DVM ASSEMBLY
P/N 8069ASY

BiRa P/N	DESCRIPTION	REFERENCE
.1UFM50V	CAP mylar .1mfd 50V	C1
.047UFM100V	CAP mylar .047mfd 100V	C2
.22UFP50V	CAP polypropolene .22pfd 50V	C3
100PFD	CAP ceramic 100pfd 1KV	C4
.01UFD50V	CAP ceramic .01mfd 50V	C5
1UFT50V	CAP tantalum 1mfd 50v	C6
RN55D23.7K	Resistor precision 1%	R1
RN55D475K	Resistor precision 1%	R2
RN55D120K	Resistor precision 1%	R3
43P-25K	Resistor Trimpot 25K	R4
RN55D1MEG	Resistor precision 1%	R5,R6
IT1750	Transistor MOS	Q1
ADC7106	ADC 3 1/5 Digit	LC1
LCD5654	LCD display 3 1/5 Digit	J9
640454-4	Connector header 4 pin	J9(1ea.)
640454-8	Connector header 8 pin	J10(1ea.)


LCD 5654
3.20 DIGIT DISPLAY
IC1 7106
A-D CONVERTER
R3 120K
C4 100PF
TP5
TP1
TP2
R4 25K
R1 23.7K
C1
.1 50V
TP3
R5 1MEG
C5 .01 50V
C2 .047 100V
R2 475K
TP4
C3
.22 50V
C6
1MF
R6
1M
Q1
IT1750
J9
+9V
M+
M-
+9R
J10
J9
VOLTAGE TEST POINTS
-6V SENSE
+6V SENSE
-12V SENSE & -12V I+
+12V SENSE & +12V I-
-24V SENSE
+24V SENSE
SENSE RETURN
OPEN
DECIMAL SELECT
CAMAC 3.20 DIGIT VOLT-AMMETER
Bi Ro SYSTEMS, INC.
MODEL 6700
CAMAC POWER SUPPLY
DVM ASSEMBLY
D
8/1/91
DWG.NO. 7497
REV. A
NTS
SCHEMATIC DIAGRAM
1 OF 1

MODEL 6700
PARTS LIST - METERSWITCH ASSEMBLY
P/N 8095ASY

BiRa P/N	DESCRIPTION	REFERENCE
RN55D10.10K	Resistor precision 1%	R2,R5
RN55D1.13K	Resistor precision 1%	R3,R6
RN55D2K	Resistor precision 1%	R8
RN55D128K	Resistor precision 1%	R1
RN55D120K	Resistor precision 1%	R10
RN55D1K	Resistor precision 1%	R9
RN55D97.6K	Resistor precision 1%	R4
4.7UFA50V	CAP aluminum electrolytic 4.7mfd 50	C1
1N4739	Diode zener 9.1V	D2
BRIDGE2A	Diode bridge 2 amp 200 Volt	D3
312100	Fuse AGC .1 amp	F1
H7MDG	METERSWITCH	SWITCH
B-305-BC	Switch button BLACK	SWITCH
B-305-GY	Switch button GRAY	SWITCH
B-305-WT	Switch button WHITE	SWITCH
640454-4	Connector header 4 pin	J7
640454-8	Connector header 8 pin	J8(ea.)


CAMAC METERSWITCH ASSEMBLY
J7
+9U 3
+9R 4
M- 2
M+ 1
R8 2K
D3
AC
AC
F1
.1 AMP
.1 AMP
D2 1N4739 9V
C1 4.7uF
R3 1.13K
R2 10K
R1 28K
R6 1.13K
R5 10K
R4 20K
R9 1K
R10 100K
VOLTS-AMPS
POS-NEG
6V
12V
24V
J8
26 METER AC
25 METER AC
14 +6V I+
15 +6V I-
19 +24V I+
8 +24V I-
20 OPEN
11 OPEN
7 +12V I+
4 -6V I+
17 -6V I-
9 -24V I+
21 -24V I-
10 -12V I-
16 +6V SENSE
5 -6V SENSE
22 +24V SENSE
23 -24V SENSE
6 -12V SENSE & -12V I+
18 +12V SENSE & +12V I-
3 SENSE RETURN
Bi Ra SYSTEMS, INC.
MODEL 6700
CAMAC POWER SUPPLY
METERSWITCH ASSEMBLY
D 8/1/91 DWG.NO. 7498 REV. A
NTS SCHEMATIC DIAGRAM 1 OF 1

WARRANTY GUIDE

WARRANTY

Equipment manufactured by Bi Ra Systems for use in the United States is warranted against defects in design, workmanship, and materials for a period of one (1) year from the date of shipment. Bi Ra Systems will repair or replace, at its option, any such equipment found to be defective on a return to factory basis. Repair charges will be applicable after the warranty period has expired. Transportation charges for shipping the equipment to Bi Ra Systems shall be paid by the customer, while transportation charges for the return of the repaired equipment will be paid by Bi Ra Systems. Priority shipping methods are available at the customer's expense. SOFTWARE products by Bi Ra Systems are furnished under the terms and conditions of a separate Software Product License Agreement is warranted for a period of ninety (90) days from the date of shipment to conform to the Software Product Description (SPD) applicable at the time of purchase. This warranty is contingent upon the proper use of the software as detailed in the Software Product License Agreement and is limited to the remedy of any non-conformance of the Software to the SPD. **PRODUCTS PURCHASED BY BI RA SYSTEMS FOR RESALE WILL CARRY THE ORIGINAL EQUIPMENT MANUFACTURER'S WARRANTY, IF ANY.**

These warranties shall not apply to equipment or software that has been modified or serviced by other than a Bi Ra Systems or an authorized distributor service engineer.

All warranties are contingent upon proper use of the product or system. These warranties will not apply (i) if adjustment, repair or parts replacement is required because of accident, unusual physical, electrical, or electro-magnetic stress, neglect, misuse, failure of electric power, air conditioning, humidity control, transportation, failure to rotating media not furnished by Bi Ra Systems, operation with media not meeting or not maintained in accordance with Bi Ra Systems specification or causes other than ordinary use; or (ii) if the product or system has been modified by the purchaser; or (iii) where Bi Ra Systems serial numbers or warranty date decals have been removed or altered. In addition to the forgoing, any application on-site warranty will not apply (i) if prerequisite equipment (as specified by Bi Ra Systems price list, equipment specifications, or contracts) is missing, or (ii) if the product or system has been installed by the purchaser without the supervision of or prior written approval of Bi Ra Systems. Equipment may contain used parts which are equivalent to new in performance when used in the equipment. **BI RA SYSTEMS MAKES NO WARRANTY OR MECHANTABLILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER WARRANTY EITHER EXPRESSED OR IMPLIED, EXCEPT AS IS EXPRESSLY SET FORTH HEREIN.**

Outside the United States, the equipment warranty is limited to the replacement of the equipment and excludes shipping, insurance, taxes, forwarders' fees, customs, or any other charges.
THE WARRANTY PERIOD MAY VARY IN COUNTRIES OUTSIDE THE UNITED STATES. CONTACT BI RA SYSTEMS OR YOUR LOCAL AUTHORIZED DISTRIBUTOR FOR SPECIFIC WARRANTY DETAILS.

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The purchaser's exclusive remedy or any claim of any kind for loan or damage connected with, or resulting from the design, manufacture, sale, delivery, resale, or repair or use of any products furnished by Bi Ra Systems including but not limited to any claim of negligence or other breach, shall be the repair or replacement, F.O.B. factory, of the product or part thereof giving rise to such claim. Bi Ra Systems liability for such repair or replacement shall in no event exceed the contract price allocable to the products or part which gives rise to the claim. **BI RA SYSTEMS SHALL IN NO EVENT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**