BREWER MKIII
SPECTROPHOTOMETER

(DOUBLE SPECTROMETER)

MAINTENANCE AND SERVICE MANUAL

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SCI-TEC Instruments Inc.
1503 Fletcher Road
Saskatoon, Sask. , Canada
S7M 5S5

Phone 306-934-0101
Fax 306-978-2339
Email: info@sci-tec.com

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Should an extended warranty be purchased, then the aforementioned in its entirety is applicable for the entire period of time covered by said extended warranty.

PREFACE

This document has been developed to aid an operator when a Brewer Spectrophotometer stops operating or has changed in operating specifications after leaving SCI-TEC Instruments Inc. (SCI-TEC). It has been developed from the experience of SCI-TEC and present users. The most likely electronic failures and ones which can be repaired in the field have been documented in this manual. Any suggestions on improvements to this manual would be appreciated by SCI-TEC.

1.0 PURPOSE AND APPLICATION

The purpose of this manual is to help the operator diagnose problems with a Brewer Spectrophotometer down to an assembly level, though not necessarily to a component level. The reason is that some components in the assemblies will affect the calibration done at SCI-TEC, and replacement of these may require instrument realignment or re-calibration.

The information in this manual may be applied by reading the procedures and referring to the corresponding drawing located in the back half of this document.

There should be no potentiometers adjusted or set screws removed without completely defining the problem area. If the information in this document is not sufficient, it is recommended that the user contact SCI-TEC before dismantling of any main and sub assemblies.

2.0 EQUIPMENT REQUIRED

1) Voltmeter, either analog or digital, capable of measuring from 1 millivolt to 2000 volts DC.

2) Ohmmeter primarily used for checking continuity of cables.

3) A clip on or in-line current meter.

4) A digital VOM with in line current capabilities of 2 amps is sufficient, rather than items 1,2, and 3. e.g. The DVM supplied with an external UVB Lamp is good and can be used.

5) An oscilloscope may be required (1 millivolt; 20 megahertz bandwidth).

6) An external UVB lamp is very useful when the internal standard lamp appears at fault.

7) A second computer is handy to have available in case the control computer is suspect.

8.) A terminal communications program such as Telix, Procomm, Xtalk or Windows Terminal

3.0 MAJOR EQUIPMENT FAILURES

A major equipment failure is defined as being a condition where the operator finds there is no communication between the Brewer Spectrophotometer and the external IBM compatible personal computer (PC). No commands will go to the Brewer and no information is received by the PC. This can be defined as a "no operation" condition.

3.1 "No Operation" Condition - No Power Indication

It is assumed the BREWER has power as indicated by the GREEN LED light on the instrument. If the light is not illuminated, check that AC power connections to the BREWER (reference Sections 7.1 and 7.2), are correct. If there is still a no-power condition, then remove the BREWER top cover and check if MAIN power supply cover is warmer than ambient. If the cover is not warmer than the instrument, then perhaps the fuse requires replacement, (reference fig. 7.2-2) Check the two visible fuses next to the power supply cover and item 21 from figure 7.1-3.1. Ensure the AC power is disconnected. If any of the fuses need changing, exchange with the appropriate replacement. To check the fuse inside the power supply, first disconnect AC power to the Brewer and then remove the MAIN power supply cover (four 6-32 screws) and measure or visually inspect the fuse and replace if necessary. When re-installing the cover, ensure the connectors P1 and P3 remain connected. If the power supply appears to be normal, then perhaps the LED is defective or a connection is faulty. The main power supply voltages are best checked at testpoints on the Main Electronics board J23 (reference chart Pg 5). When the control computer is given a RESET (RE) command, then the Brewer should respond with the following message to the PC or printer:

```
BREWER OZONE SPECTROPHOTOMETER

#nnnnn

AES SCI-TEC

CANADA

VERSION 1 Jan 01, 1998
```

If the instrument does not reset, the problem is normally in the Brewer. However the PC software can get corrupted so it may be necessary to check that the proper software is installed.

NOTE 1: "SOFTWARE RESET" is used to indicate that the reset instruction (RE) should be issued to the Brewer microprocessor from the control computer. This instruction causes a hardware reset to be generated, (a very long "break" on the line).

NOTE 2: The Brewer PC RS422 Communication is set to 1200 Baud soon after the program is run.

3.2 Trouble Shooting Sequence for "No Operation" Condition

a.) It has been established at this point that there is absolutely no communication between the PC and the Brewer.

b.) A software reset should be attempted after the message "Brewer Failed to Respond" appears on the PC monitor. This is done by pressing RETURN key on the PC. If this fails to establish communications the PC should be re-booted by turning the power off and on.

c.) If there is still no response, the cables should be inspected to ensure that a connector has not been inadvertently removed or accidently pulled out of place. The Data cable to the Brewer from the PC as well as the power cable to the Brewer should be checked. All cables involving the linking of peripherals should be checked to ensure they are plugged in as well. After this has been done another software reset can be done as indicated on the PC.

d.) You can check to ensure that the computer serial port is operating correctly by running a serial communications program such as Telix or Procomm. Remove the RS422 adapter from the back of the computer and connect pins 2 and 3 of the computer serial port together. While running the communications program in full Duplex mode you should see characters echo back on the keys you just typed. Now disconnect the connection to pins 2 to 3 and continue typing, you should not see any characters echo back on the computer screen. You have just confirmed that the computer serial port is operating correctly. If the computer did not echo the characters, the computer serial port is at fault and you must get the computer repaired before any further tests are done. Make sure the serial communications program is on the correct baud rate of 1200 baud and that you are selecting the correct serial port. Refer to the communications program manual for correct operation.

e.) You can now test the functionality of the RS422 adapter at the computer by removing the cable from the RS422 adapter and connecting pin 1 to 3, then typing keys similar to d.) and switching connections to pin 2 to 4 and testing again. Disconnect the wires and you should see no characters echoing back. The RS422 adapter is operating correctly if the previous tests are the same as observed in d.). If not then either the RS422 adapter or the power adapter is at fault. Using a voltmeter, check the output of the power adapter. There should be approximately 9 volts measured by the voltmeter. If the voltage is normal, then replace the present unit with another RS422 adapter and test again. If the tests have passed to this point, then you can test the cabling up to the Main Electronics board. Reconnect the cable to the RS422 adapter and connect it back to the computer. At the communications cable connecting to the surge arrestor box mounted below the Tracker, remove the connection and connect a wire jumper from C to B. Test it similar to d.) and then move the jumper to I to J and test it again. If this section passes the test, reconnect the cable and disconnect the communications cable at the Brewer. Again using wire jumpers connect pins C to B and later switching to I to J using the procedure in d.). If the test passes, reconnect the cable to the Brewer and open the cover of the Brewer. Turn the power off at this time and disconnect the IDC connector J7 and again use a small wire jumper to connect pins 2 to 8 and later connect pins 4 to 6. The pins begin from 1 at the triangle stamped on the side of the connector and increment in odd numbers on the same row (1, 3, 5, 7, 9 on the first row and 2, 4, 6, 8, 10 on the next row, in the same direction).

Confirm correct operation with the serial communications program similar to d.). If the test failed at any point of this cable test procedure, the faulty connection should be repaired before proceeding to the next test. Isolate the location of the break or incorrect wiring using an ohmeter. If all of these procedures have been tested positive then the problem lies in the Brewer Main Electronics Board. Reconnect all the cabling to the instrument and continue to the next test. An alternative test is that each line can then be measured point to point with a ohmmeter. It should then be repaired or replaced if there is a problem. The resistance through the surge arrestor is 10 ohms so that a typical resistance could be 12 ohms from the RS422 adapter to the IDC connector at the Brewer Main Electronics board.

f.) Does the Brewer reset?

f1.) If the reset of the motors is heard and seen, but there is no message sent to the PC, then there is a possibility that, even though the cables between the PC and the Brewer are connected, there may be problem with the line driver chip on the Main Electronics board. Ensure the power is turned off and remove the Main Electronics cover plate and replace the IC, U11 which is on a socket to allow replacement. Make sure you ground yourself to one of the metal brackets on the instrument before touching the electronics board. Leave the cover plate off and turn on the instrument. The motors should be observed to reset and if your computer was left in the serial communications program, you should see the Brewer reset message displayed on the screen of the serial communications program. The problem is now solved and you can exit the communications program and run the Brewer operating program. Check for correct operation using the normal commands.

f2.) A software reset should be attempted after ensuring all connections have been made and Brewer power is on.

f3.) If there is still no operation, there may be a firmware problem where an error has caused the microprocessor board to go into a different operating state. The next section will go into the troubleshooting of the Main Electronics board.

g.) If there was no reset of the motors, there is an indication that a failure has occurred within the Brewer itself, now the functionality of the Main Electronics board can be tested.

h.) Look at the LED light located near the bottom left hand side of the board, it should be flashing slowly in Cosmacmode. Refer to the following table for the different modes of operation.

LED Mode indication	1/4 sec	1/4 sec	1/4 sec	1/4 sec	1/4 sec	1/4 sec	1/4 sec	1/4 sec
Cosmacmode normal operation	on	off	off	off	on	on	on	off
Cosmacmode with configuration missing	on	off	off	off	on	off	on	off
Loadmode waiting for code to be downloaded	on	off	on	off	on	off	on	off
Loadmode with bad flash memory	on	on	on	on	off	off	off	off
Loadmode with good flash memory	on	on	on	on	on	on	on	off
Opmode with configuration present	on	on	off	off	on	on	off	off
Opmode without configuration present	on	on	off	off	on	off	on	off
Checking Flash memory	on	off	on	off	off	off	off	off
Changing from load to cosmac or load mode	on	on	on	on	on	on	on	on

i.) If the motors are observed not to reset and the Brewer message has not been received, then the correct voltages should be confirmed for the power supply on the Main Electronics board

i1.) If no flashing led is displayed and the motors did not reset, confirm the power supply values on J23 with the following chart:

Connector J23 Monitor points	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
	5v	5v	-5v	12v	12v	-12v	24v	2.5v	4.5v

i2.) If the voltages are similar to the above values or the values in the final test record, then continue to determine the mode of operation and to change back to the Cosmacmode.

j.) If the power supply values have changed, or missing altogether, the power connections should be checked. If they look as though they are

normal, and the voltages are still not at proper levels, replacement should be considered. However there may a short circuit in one of the assemblies causing the power supply to be loaded. Shut the power off and disconnect the power connector J1 from the Main Electronics board and from the J4 Lamp control board. Repeat the voltage measurements at the connector and see if all the voltages are present. If the voltages are correct then determine which assembly is at fault by installing the connectors one at a time. Replace the main power supply if necessary, and ensure when first turned on that the assemblies are disconnected to allow setup of voltages to correct values. The main 5 volts monitored at the main board should be set to 5.0 volts with the single potentiometer on the main power supply.

k.) If the flashing LED on the Main Electronics board indicates that it is not in the cosmac mode, then the procedure to change it back to cosmac mode is described below:

Exit the serial communications program and change to the subdirectory c:\bdata\mnn. Type **BREWCMD** [ENTER] and confirm that the instrument has responded and observe what mode it has come up in. The program will display the same mode as the mode observed with the LED lights. Refer to section 7.8 for a more detailed procedure.

If the mode is cosmacmode type **loadmode** [ENTER] , the display should return indicating it is in loadmode. Now type **opmode** [ENTER] and within a few seconds it will be in opmode. Now that it is in opmode, we have some tools to determine if there are any faults leading up to the problem. Type **readlog** [ENTER] to display past error history, each line displayed will be a possible clue to the problem that caused the failure. If motor failures have occurred, the status will tell you which motor and what the failure is. Usually it is a sensor problem or a wiring problem that prevents the motor from resetting. If no problems are displayed, then the system can be placed back into cosmacmode for further testing. In order to return to cosmacmode, the system must be placed in loadmode by typing **loadmode** [ENTER] following the status prompt that it is in loadmode type **cosmacmode** [ENTER] . The motors will reset and within a minute the system will display the status that it is in cosmacmode. Quit the Brewcmd program by typing **quit** [ENTER] .

l.) Run the Brewer operating program by typing **BREWER** [ENTER] to check the correct operation of the instrument.

m.) Select certain routines that you are familiar with and ensure that all functions and data appear normal.

n.) If no communications return when running Brewcmd then there is a fault that cannot be repaired by the Brewer operator. Replace the Main Electronics board with a spare board. Ensure all cables removed are reconnected to the original connectors. Normally the spare Main Electronics board is preloaded with the same parameters as the one in the instrument. Therefore no reprogramming or uploading of the configuration parameters are needed. If the configuration parameters have changed, then refer to the procedure to upload new firmware and configuration data to the board, section 7.8.

n.) If communications to the PC are restored but problems are still experienced for lamp output or highvoltage or pulse counting, go to section 4.0 to further check for problems.

4.0 OPERATING TEST FAILURES

In the Brewer Spectrophotometer, most of the operating tests are done using either the mercury lamp or the standard lamp. If any of the other tests fail, the user should proceed immediately to a mercury lamp test (HG) or a standard lamp test (SL).

A mercury lamp test failure or a standard lamp test failure are two major failures which can occur. In both cases calibration of the instrument may be affected. For the purpose of troubleshooting, these two sections have been separated from the main part of the instrument.

The Light Detection System, is made up of the zenith prism, foreoptics, spectrometer, slitmask and slitmask electronics, PMT, High Voltage Circuitry, High Speed Amp (considered to be part of the PMT) interconnecting harnesses between these units, and finally the Main electronics board which houses the photon counting circuits. Without this section being operational, no testing, or measuring can be done.

4.1 Preliminary Information

There are a few points to remember in the event there is a major failure somewhere in the system, whether it is the Mercury Lamp, Standard Lamp, or Light Detection System.

a.) The error message "`Lamp not on test terminated`" is an indication of a failure, either in the lamps or in the Light Detection System.

b.) Changes in dark count may be symptomatic of a number of problems which may occur in the Brewer. If it begins to increase or becomes erratic, the slitmask may be causing the fault. Note the dark count increases with temperature. It may also indicate motor power supply problems. It can also be used as a monitor for PMT performance. If the dark count changes, there may be a changing optical condition in the Light Detection System. A higher dark count can also be the result of a poor ground somewhere in the system or high humidity inside the instrument. Grounding connections should be checked especially between the PMT housing to the Main Electronics ground and change the desiccant for high humidity locations more often. These items are more applicable in the next section (5.0) but they may be useful in this instance as well.

4.2 Description of Mercury Lamp Circuit

See Figure 7.4-2 for the schematic. The Mercury lamp circuitry is a constant current source designed to keep the current constant throughout the temperature range of the instrument. A voltage regulator connected to a specially selected resistance wire regulates the lamp current with minimal circuitry while improving on the performance of the previous design. In this way the lamp circuit is regulated.

4.3 Trouble shooting Procedures for Mercury Lamp Circuit

a.) The Mercury lamp test Fails and software responds with "lamp not on test terminated".

b.) Retry the test and look through each viewing tube to see if the lamp is on. Ensure the zenith prism and the filter wheels are in the correct position. Observe temperature of instrument. If Brewer temperature is less than -20 degrees Celsius, the lamp may be too cold and may not start illuminating. All that may be required is to turn on the Standard Lamp which will warm the Mercury lamp in extremely cold environments.

c.) If the lamp is on, check filter wheel positions (1,0).

c1.) If the lamp is not on, there is a possibility of a lamp failure, The first step is to perform an AP (A/D voltages printout) test and compare the results with previous tests. Pay particular attention to power supply and HV voltage. The second step is to measure the voltage across the lamp at pins 6 and 9 on P111. (Reference Section 7.6-2.2). The voltage should be approximately 0 volts with the lamp off and 13 volts with the lamp on.

If the voltage is approximately equal to 17 volts, the lamp should be replaced.

4.3.1 Mercury Lamp Replacement

c2.) Before starting disassembly, ensure that the lamp is definitely open circuited with an ohmmeter across pins 6 and 9 of J111 (lamp connector), ensure P111 is disconnected. To replace bulb, loosen the two thumb screws (item 6, Fig 7.6-2.2) and carefully withdraw the lamp holder. Inspect the lamp and replace if defective or has blackened in color. . The SL lamp should also be checked at this time for blackening which could reduce the amount of light from passing through to the fore optics. Do not touch the lamp with bare hands, use a tissue or soft cloth. Ensure the lamp is tight in its socket and cleaned with alcohol after assembly. Re-assemble the lamp by reversing above steps and test the lamp with B1 and HG commands

If there is no voltage across the lamp in the initial measurement, the next step is to monitor the test point while using the Brewer software from the status (ST) menu.

d.) Remove top cover and spectrometer cover and check to see micrometer has not shifted (refer to final test record for the calibrated setting) or the sheet attached to cover. A manual check to ensure micrometer setting is in the correct position is to set filters to position 0,0 (filters out position). Connect a voltmeter to the ratemeter test point E23 on the Main Electronics board and manually scan the micrometer from 0 mm to 10mm. Assuming the slitmask is in HG position (0), HG the lamp is on, and zenith prism is pointing to the lamps then the voltmeter should indicate peaking counts at 3 positions which are the mercury lines. The micrometer should be left in the position of the second largest peak; from the 0mm end of the micrometer. This is the proper position to start a HG test for Ozone/SO2 measurements and which should have a successful conclusion.

e.) At this time another complete mercury lamp test should be attempted. If this test is successful the problem has been located and test results should be accurate. If not there is still a possibility of a PMT failure, slitmask failure or optics failure.

f.) Attempt a standard lamp test. The standard lamp has a much higher intensity and does not depend on the position of the micrometer and slitmask as much as the mercury lamp test.

f1.) If the standard lamp test operates correctly, the printout should be examined carefully to see if any characteristics have changed. If the dark count has increased significantly, this may be an indication that the alignment has changed and may require a mirror adjustment. Check to see if any of the intensities or ratios have changed, which may indicate, that the optics have deteriorated, or the PMT performance or counting has degraded. If the standard lamp test appears to be normal, it is advised the user contact SCI-TEC before proceeding.

f2.) If the standard lamp test is not operational, then it can be assumed that, either there is an optical failure, or a PMT failure. If the mercury lamp test is normal while the standard lamp has failed, this usually indicates a problem with the lamp and the circuitry that controls the lamp.

g.) The high voltage should be measured using a voltmeter and looking at test point E16 on the Main Electronics board. There should be a voltage between 2.5 volts and 5 volts, which has been factory set (see final test record for the setting), and should not be adjusted. This voltage is equal to the actual high voltage divided by 409 . There may be a variation of a volt or two of the high voltage, but the voltage at testpoint should be identical to the final test record value. If they are significantly different, or missing altogether, the high voltage circuit may have failed. This will require a skilled technician for repair or SCI-TEC should be contacted.

h.) If the high voltage appears to be present from the monitor testpoints described in item g, there is a possibility that something has failed in the Light Detection System, reference Section 4.7.

4.4 Description of Standard Lamp Circuit

The standard lamp current regulator is the same as the Mercury lamp circuit except the resistance wire is chosen to regulate the supply current with less variation than the mercury lamp.The circuit keeps the operating current within 3 milliamps over a range of -20 to + 40 degrees Celsius and has a more stable current in the range of 10 to 30 degrees.

4.5 Description of Standard Lamp Failure

The standard lamp is the lamp most used in all of the tests called up by software. Without it, it is impossible to ensure calibration and proper operation of the Brewer Ozone Spectrophotometer. Therefore an external UVB lamp can be very useful in two areas:

1) As a reference to monitor any changes in the standard lamp itself.

2) In the event that the internal standard lamp stops operating, the external standard lamp can be used as the reference.

The software for the standard lamp has been designed to give an error message in the event of a failure. The message is "Lamp not on test terminated". This may not necessarily be the case. There are other factors which can cause a standard lamp failure, even though the lamp remains on. These areas include PMT performance, filterwheel position, Zenith prism position and photon counting electronics as well as I/O electronics used to turn the lamp on and off.

4.6 Trouble-shooting Procedures for Standard Lamp Test Failure

a.) Error message, "Lamp not on test terminated".

b.) Retry the test andif the light is on, it should be seen through the viewing ports to ensure zenith prism is in the proper position. Perform an AP (A/D voltages printout) test and compare results with previous tests, paying particular attention to standard lamp current and voltage. The current channel 14 will go to zero of very close to zero and voltage channel 15 will go higher than 14 volts if the lamp is unplugged or burnt out.

c.) Check to see if the lamp is on. Try the B2 command which turns the lamp on manually and check if the filterwheels and the iris are in the proper position. They should be similar to the positions indicated on the computer display. Retry the test.

c1.) If the test is terminated again.

c2.) Try a mercury lamp test. If the mercury lamp test operates correctly, then the user will know that the Light Detection System is probably operating correctly. If not, a mercury lamp calibration should be done and the Standard Lamp test should be repeated.

c3.) If the mercury lamp test is normal, the spectrometer cover should be removed and another standard lamp test done while observing the slitmask. If the standard lamp fails again while the slitmask is operating correctly, SCI-TEC should be consulted.

c4.) If the mercury lamp test is not normal, there is probably a failure in the counting electronics and section 4.7 of this manual should be consulted.

4.6.1 Standard Lamp Replacement

Before starting disassembly, measure that the lamp is definitely open circuit with an ohmmeter across pins 1 and 5 of J111 (lamp connector). Reference fig. 7.6.2-2, the Standard Lamp is located above the mercury lamp attached to a removable plate. Remove the 4-40 flathead screw (item 16) and withdraw plate. Replace the bulb with a new one ensuring new bulb is not touched with fingers, use a tissue or soft cloth and clean with alcohol after installation. If the bulb is blackend, it should be replaced regardless if it is operational or not.

Re-assemble and install connector and test the lamp with the B2 command, B0 turns off the lamp.

After this another standard lamp test should be tried. If there is no success there is a possibility of circuit failure on the Lamp Control board, or the Main Electronics board. Send the command to turn the Standard Lamp circuit on.

e.) Measure the next testpoint, U14 pin 15. The testpoint should switch from +5 volts to 0 volts as this circuit is turned on and off.

e1.) If this point does not change, the Main Electronics board should be replaced if there is a spare unit available. Otherwise SCI-TEC should be consulted.

e2.) After the board has been replaced, another Standard Lamp test should be done.

e3.) If this test is successful the system should be operating.

e4.) If lamp does not come on, following the replacement of the Main Electronics board then SCI-TEC should be consulted.

f.) If there was no indication of a voltage swing at the lamp control board, there is a possibility that either the I/O cable which connects of the Main Electronics board, to the Lamp Control board is disconnected or has become defective. It should be checked for continuity, using a ohmmeter. If it is good , the lamp Control board should be tested for correct operation, or SCI-TEC should be consulted. The lamp control for the standard lamp is very simple, Q1 pin 2 supplies power to the current regulator VR2. Measure Q1 pin 2 when the standard lamp is commanded on, it should be at 17 volts when on. VR2 pin 2 should be at 12 volts, if it is not at the 12 volt level then the current regulator circuitry is faulty and must be replaced or the complete board must be replaced. Refer to the lamp control board schematic Fig 7.4-2.

g.) Power can be reapplied, and the Standard Lamp test can be re-attempted.

g1.) If the test is again terminated and the voltage at VR2 did change on command, then the user should test the lamp cable for continuity.

h.) If the test was successful, the system should be operating correctly.

4.7 Description of Light Detection System (Rate) Failure

A Light Detection System failure can show up in all of the tests that can be done by the user. In all cases it will be shown on the terminal as a "Lamp Not On Test Terminated" message. However there will be no error indicated if a direct sun is attempted, even though the Light Detection System has failed. The system will continue as though there were no problem.

The Light Detection System is the main section of the Brewer, and is made up of foreoptics, spectrometer, PMT including the high speed amp, and the slitmask and micrometer. Adjustments of any of these assemblies should not be attempted, unless they are specified in this section. Instrument calibration may be affected if they are replaced or readjusted.

4.8 Trouble-shooting Procedures of Light Detection System

a.) If all the tests fail, and the message of "Lamp not on test terminated" is displayed, the user should issue a B2 command to turn the standard lamp on. With the lamp on, inspect the zenith prism, filterwheels, iris and look through the viewing tube to ensure the lamp is on.

b.) If the lamp is on, a complete Standard Lamp test should be done.

b1.) If the test fails, there is a possibility of photon counter circuitry failure. Select the Teletype mode `TT` ENTER in the Brewer program. Remove the cover from the Brewer and the counting circuitry tested by turning off the power. Remove the cable that connects from the high voltage module to the PMT assembly and connect it to the last connector on the Main Electronics Board J22. Turn on the power and enter the command `R,0,7,20:0` ENTER . All the counts should be approximately 2280140 counts. J22 is a pmt simulator and outputs a constant frequency output of 1 megahertz. Turn off the power and replace the cable back to the PMT assembly. Turn on the power to the instrument and then when all the motors have reset, exit out of TT by pressing the Home Key.

b2.) If the test is normal, the system is probably operating correctly.

c.) Check optics and slitmask, is the slitmask operating correctly?

c1.) If there is no operation, the covers should be removed from the Brewer and the spectrometer, and the micrometer inspected. It should be set as listed on the final test records. The optics should be given a visual inspection and the slitmask position should be examined. It can be moved by hand and there should be a "tug" as it moves from one position to the next. If the slitmask moves freely from one position to the next without any indication of a holding current, the I/O cable from the slitmask motor to the slitmask driver circuitry should be inspected and the continuity of this cable should be checked (reference Section 7.9). If it is normal, the motor control micro or the motor driver IC on the Main Electronics board may be faulty. If a Main Electronics board is available it should be inserted in place of the old one, and another test attempted.

c2.) If the slitmask does "pull" into position on each alternate position of the slits and appears to be aligned to the slits, and there is still no indication of counting after attempting another standard lamp test, a failure in the PMT or pre-amplifier board, or faulty components in the foreoptics or photon counter board is possible.

d.) Remove the cover from the Main Electronics board.

d1.) Another standard lamp test should be attempted. Ensure the spectrometer cover has been replaced.

d2.) If this test is successful, measure the high voltage test point E16 and adjust R4 to the value given on the Final Test Record. Also monitor high voltage values from an AP test.

d3.) If this test is unsuccessful and the test points are still wrong, there may be a short in the high voltage line somewhere between the HV module and the actual PMT dynode chain. Care should be taken when inspecting this area because there can be as much as 1800 volts at the connection points. Check the cable for continuity. The cover can be removed from the PMT and measure the actual high voltage at the

connector internal to the cover and next to the high speed amp board. This measurement must be done with a voltmeter rated for 2000 volts or use a highvoltage divider probe.

d4.) If the high voltage is still not as indicated on the final test records, contact SCI-TEC.

e.) If the high voltage is operating correctly, there may be a failure in the high speed amp board. TP1 on the high speed amp board should read -30 millivolts or the value recorded in the Final Manual, (using the HV connector shield as ground). If it does not have the correct value, an adjustment of the on board potentiometer can be attempted. If this test fails, replace the board, if a spare is available.

e1.) If this test point is normal, the photon counter cable should be inspected to see that all connectors are in properly and there are no broken interconnecting wires. Finally if an oscilloscope is available it can be used to monitor testpoint TP4 on the high speed amp board, and then pins 1,2,3,4, and 12,13,14, and 15 of the SN75114N. If these signals are normal, consult SCI-TEC before proceeding further.

e2.) If any of the signals are missing or are not clean square waves, replace this board.

f.) If all of these tests fail, there is a probable optics fault in the system, and consult SCI-TEC before proceeding.

4.9 Description of Slitmask / Stepping motor control

The stepping motor control circuitry provides for the control of each stepping motor through individual motor microprocessors and stepping motor driver integrated circuit. This type of motor control allows the system to move the motors simultaneously and to monitor the sensors more efficiently such that resetting of the motors can be done much more quickly than the orignal Brewer electronics. All of the motor microprocessors are controlled by the main processor through a serial bus called "I²C'. Each motor is optimized for speed and taylored to the each function in the Brewer. The configuration file is included with the control software to allow changes and updates to the system. The procedure is included in the disk which contains thoses files. The configuration file is optimized for each instrument and normally does not require operator modifications unless recommended by SCI-TEC.

4.10 Description of Photon Counter Circuitry

A schematic diagram of the photon counter circuitry is given in section 7.4-1 page 52. The photomultiplier signal which has been amplified, divided and driven by a line driver on the photomultiplier and pulse amplifier board is received by a line receiver on the Main Electronics board. This signal is fed to a pair of redundant binary counters. The counters are each connected to output ports which are in turn connected to the data bus of the system microprocessor.

The main gate is generated by an electronic circuit that provides a very precise gating signal to enable counting for a specific width of time. The microprocessor decides when the pulse counting circuitry is initiated and the circuitry then triggers the gate to allow counting of the photons.

4.11 Description of High Speed Amp Board

The photomultiplier and pulse amplifier board are enclosed inside the photomultiplier subassembly. The sub assembly is designed to allow access to the pulse amplifying circuitry without upsetting the alignment of the PMT or the optics.

The photomultiplier is an EMI 9789QA type. It is enclosed with a magnetic shield that is at the high voltage potential of the photo cathode. A small area on the shield is open to allow light to fall on the cathode. A High voltage power supply provides stepped voltages to the photomultiplier through a resistor divider circuit at the base of the tube. Because differential thermal expansion between the photomultiplier glass and the Teflon base may cause tube breakage under extreme temperature conditions, it is recommended that the photomultiplier housing never be subjected to temperatures of less than -50C or greater than +60C.

The pulse amplifier board is located directly behind the base of the photomultiplier tube. This circuitry accepts the photon pulse signal from the photomultiplier, amplifies the signal, discriminates the signal level from current leakage, divides the amplified photon pulses by four, and finally outputs the signal on a line driver, because the circuitry is extremely sensitive to feedback and RF noise, it is located in close proximity to the photomultiplier.

4.12 Description of Ratemeter, Temperature monitor & High voltage Circuits

a.) See section 4.2 for description of Mercury lamp circuit.

b.) See section 4.5 for description of Standard lamp circuit.

c.) High voltage circuity.

The high voltage (1000-2000 volts) for the photomultiplier (PMT) is provided by a DC-DC converter / high voltage control circuit board.

d.) Ratemeter.

The ratemeter circuit provides a voltage output of the photon count rate. It consists of two parts; the transistor charge pump on the high speed amp board, and the integrator-amplifier on the Main Electronics board. A transistor is connected as a current pump and driven by one of the outputs of the J-K flip flop on the high speed amplifier board. The pulses from the flip flop are integrated by an RC network then scaled by an op-amp.

e.) Temperature monitor

The temperature monitor is a temperature sensitive bridge using YSI linearized thermistors. The bridge output is amplified to produce a suitable scale for the A/D convertor. There are six thermistor circuits available, one of which is located in a hole drilled in the side of the front flange of the PMT housing. Of the other five, they are used to measure points around the instrument as status information. One of the sensors is used to measure the outside temperature.

4.13 Description of the Real time Clock and A/D convertor

The real time clock circuit is a battery backed up clock with integral static random acces memory. A lithium battery is used to keep the clock operating when there is no power applied to the Brewer. The clock also supports the day date and year and is year 2000 compatible.

The A/D converter has a 10 bit conversion resolution and is built into the microprocessor. Analog multiplexers are utilized to select the channel to monitor. The AP routine is the main routine that accesses the data and displays the information on the PC monitor or saves it to a file or prints it on the printer.

5.0 TEST RESULTS OUT OF SPECIFICATION

Whenever any tests are out of specification, (HG,DT,RS,Standard Lamp,) the following should be done or considered.

a.) If the deadtime has increased or decreased significantly, the slitmask may have become misaligned, or a ground in the instrument wiring may have become resistive. In either case, both items should be carefully inspected. Also high humidity inside the instrument may cause abnormal deadtime results.

b.) Lamp output may have deteriorated, and the lamps may require replacement. They can be inspected as mentioned in the previous sections and replaced if a spare assembly is available.

c.) The optical surfaces within the zenith prism may have become smudged with a fingerprint or may have become dusty over a period of time. It should be cleaned, refering to section 6.2.

d.) The micrometer may be "sticking" and not in its exact location after a Mercury Lamp test. It should be inspected and the driving gears may have to be carefully cleaned with tissue and a little alcohol.

e.) Dark count , is a very good characteristic to monitor which is printed out in most tests. When the dark count of an instrument changes, or becomes erratic, a slitmask Run-Stop test should be done to see if there are any changes in the slitmask circuitry. If this does not give any indication of the problem, there may be a ground somewhere which has become resistive, and it should be checked.

f.) The High voltage test can be done, and the results compared to those in the Final Test Records.

g.) In humid or wet environments, the top cover should be removed periodically, to check desiccant condition. The base and spectrometer desiccants can be removed and dried overnight at approximately 60 degrees C if necessary.

h.) If these fail, SCI-TEC should be consulted as to further investigation.

6.0 OPTICS CARE AND CLEANING (Refer to Fig. 7.6.1-1)

6.1 Optics Care

- Never touch the polished surface of optics.

- Hold an optic only by its edges.

- Reduce the need for cleaning optics as much as possible.

6.2 Optics Cleaning

- Always use latex gloves when handling or cleaning optics.

- Do not reuse cleaning materials.

SPECTROMETER MIRRORS, ND FILTERS, QUARTZ PRISMS AND LENSES: In the event of dust, blow off with rubber hand pump (avoid using your breath) or use bottled dry nitrogen to remove particles. In the event of grease or fingerprints, dampen a very soft cloth with methyl ethyl alcohol and wipe gently. NOTE: Wipe marks will almost certainly remain. To remove the wipe marks, dampen a soft tissue with a mixture of ether and isopropyl alcohol and wipe gently. The tissue should be dampened to the extent that while wiping, the mixture evaporates one to two millimeters behind the tissue.

QUARTZ DOME AND EXTERIOR QUARTZ WINDOW: Spray with window cleaner and wipe clean with a soft cloth.

LAMPS: Dampen a soft cloth with methyl or ethyl alcohol and wipe gently.

POLARIZING FILTER: Use only a soft, dry cloth or tissue to remove dirt and finger marks. The filter should always be wiped gently to avoid marring the finish.

DIFFRACTION GRATINGS: Do <u>NOT</u> touch or attempt to clean.

7.0 BREWER REFERENCE DOCUMENTATION

Section 7.1 Overall Assembly and External Cables

Section Overview

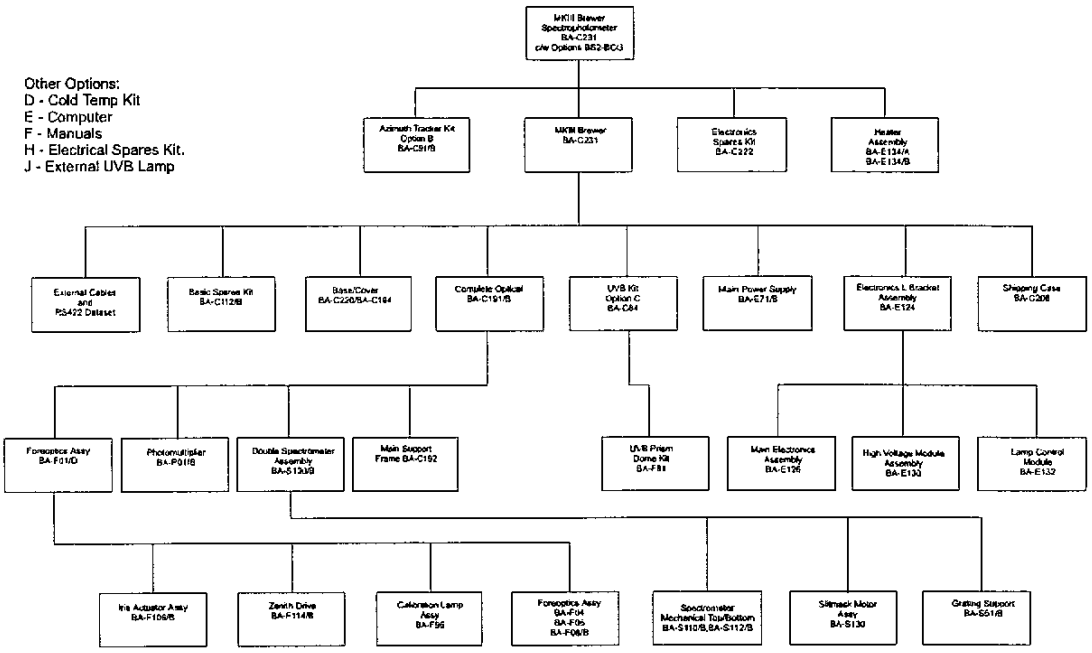
Fig 7.1-1, -2: Configuration Control Diagrams (Family Tree) for the complete MKIII BREWER systems including all possible purchase options

Fig 7.1-3: Basic Brewer Assy (BA-C231).

Fig 7.1-4: Option B Kit (Azimuth Tracker); For futher information see Sec 7.7-1.

Fig 7.1.5 Option C Kit (UVB)

Fig 7.1-6: AC Power cord, BA-W12/A (120V North American)



Brewer Serial Number _____
Customer _____
Date Manufactured _____
Date Delivered _____
SCI-TEC Instruments Inc.

Configuration Control Diagram: Brewer Spectrophotometer MKIII
Number _____
Revision _____
Appd by _____
Date _____

Figure 7.1-1.1

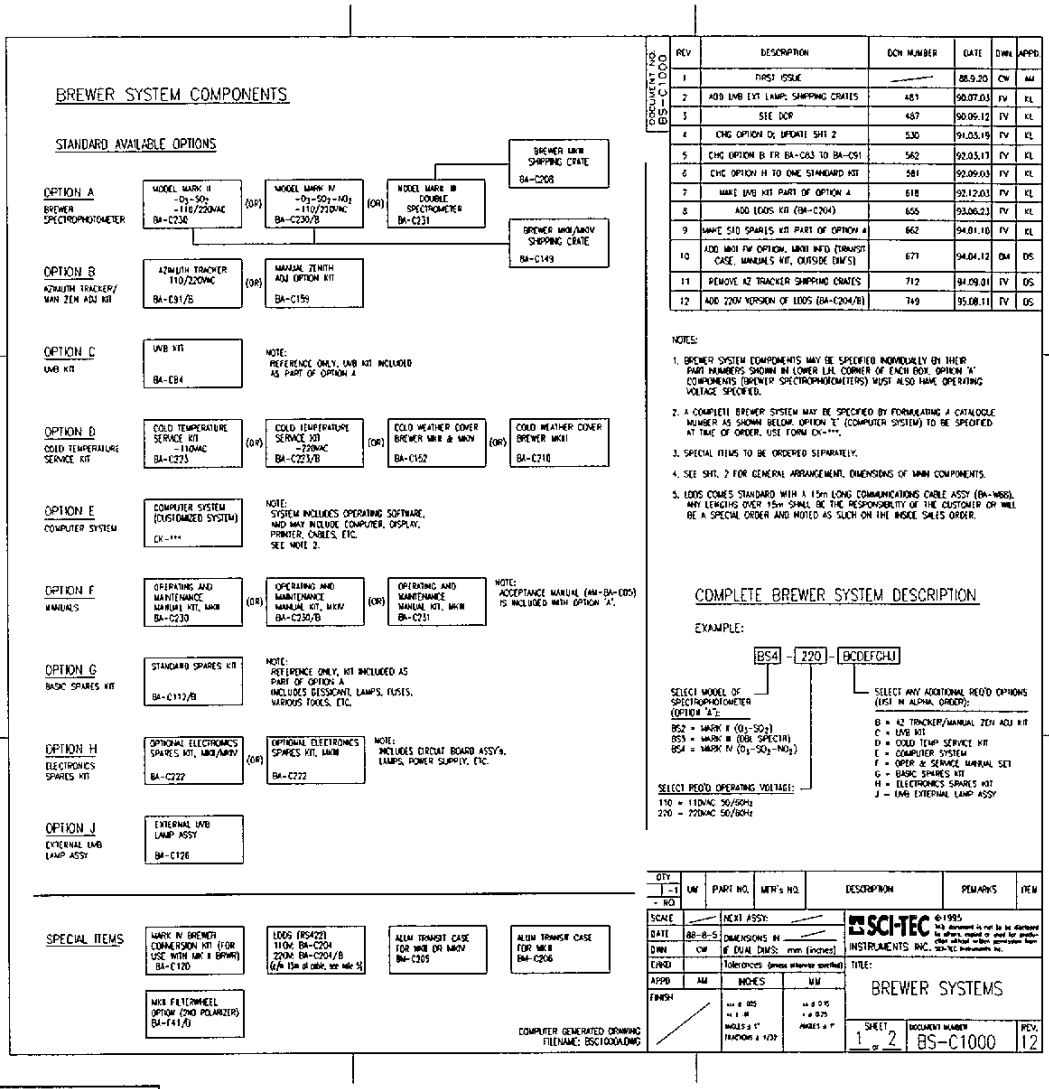
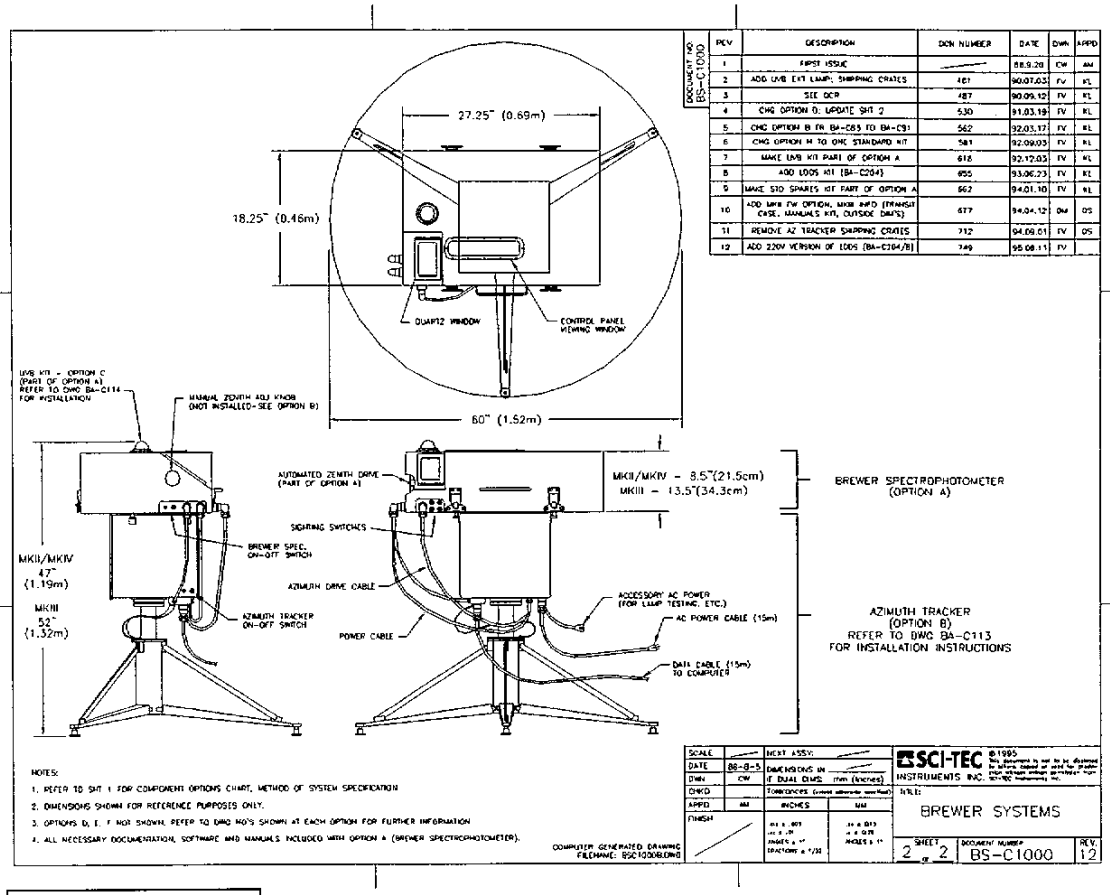

BREWER SYSTEM COMPONENTS
STANDARD AVAILABLE OPTIONS
OPTION A
BREWER SPECTROPHOTOMETER
MODEL MARK III -O3-SO2 -110/220VAC BA-C230
MODEL MARK IV -O3-SO2-NO2 -110/220VAC BA-C230/B
MODEL MARK III DOUBLE SPECTROMETER BA-C231
BREWER MKIII SHIPPING CRATE BA-C208
BREWER MKII/MKIV SHIPPING CRATE BA-C149
OPTION B
AZIMUTH TRACKER/ MAN ZEN ADJ KIT
AZIMUTH TRACKER 110/220VAC BA-C91/B
MANUAL ZENITH ADJ OPTION KIT BA-C159
OPTION C
UVB KIT
UVB KIT BA-C84
NOTE: REFERENCE ONLY, UVB KIT INCLUDED AS PART OF OPTION A
OPTION D
COLD TEMPERATURE SERVICE KIT
COLD TEMPERATURE SERVICE KIT -110VAC BA-C223
COLD TEMPERATURE SERVICE KIT -220VAC BA-C223/B
COLD WEATHER COVER BREWER MKII & MKIV BA-C152
COLD WEATHER COVER BREWER MKIII BA-C210
OPTION E
COMPUTER SYSTEM
COMPUTER SYSTEM (CUSTOMIZED SYSTEM) CK-***
NOTE: SYSTEM INCLUDES OPERATING SOFTWARE, AND MAY INCLUDE COMPUTER, DISPLAY, PRINTER, CABLES, ETC. SEE NOTE 2.
OPTION F
MANUALS
OPERATING AND MAINTENANCE MANUAL KIT, MKII BA-C230
OPERATING AND MAINTENANCE MANUAL KIT, MKIV BA-C230/B
OPERATING AND MAINTENANCE MANUAL KIT, MKIII BA-C231
NOTE: ACCEPTANCE MANUAL (AM-BA-C05) IS INCLUDED WITH OPTION 'A'.
OPTION G
BASIC SPARES KIT
STANDARD SPARES KIT BA-C112/B
NOTE: REFERENCE ONLY, KIT INCLUDED AS PART OF OPTION A INCLUDES DESSICANT, LAMPS, FUSES, VARIOUS TOOLS, ETC.
OPTION H
ELECTRONICS SPARES KIT
OPTIONAL ELECTRONICS SPARES KIT, MKII/MKIV BA-C222
OPTIONAL ELECTRONICS SPARES KIT, MKIII BA-C222
NOTE: INCLUDES CIRCUIT BOARD ASSY's, LAMPS, POWER SUPPLY, ETC.
OPTION J
EXTERNAL UVB LAMP ASSY
EXTERNAL UVB LAMP ASSY BA-C126
SPECIAL ITEMS
MARK IV BREWER CONVERSION KIT (FOR USE WITH MK II BRWR) BA-C120
LOOS (RS422) 110V BA-C204 220V BA-C204/B (c/w 15m pt cable, see note 5)
ALUM TRANSIT CASE FOR MKII OR MKIV BA-C205
ALUM TRANSIT CASE FOR MKIII BA-C206
MKII FILTERWHEEL (OPTION 2ND POLARIZER) BA-F41/B
COMPUTER GENERATED DRAWING FILENAME: BSC1000A.DWG
DOCUMENT NO: BS-C1000
REV | DESCRIPTION | DCN NUMBER | DATE | DWN | APPD
1 | FIRST ISSUE | | 88.9.20 | CW | AM
2 | ADD UVB EXT LAMP; SHIPPING CRATES | 481 | 90.07.03 | FV | KL
3 | SEE DCR | 487 | 90.09.12 | FV | KL
4 | CHG OPTION D; UPDATE SHT 2 | 530 | 91.03.19 | FV | KL
5 | CHG OPTION B FR BA-C83 TO BA-C91 | 562 | 92.03.17 | FV | KL
6 | CHG OPTION H TO ONE STANDARD KIT | 581 | 92.09.03 | FV | KL
7 | MAKE UVB KIT PART OF OPTION A | 618 | 92.12.03 | FV | KL
8 | ADD LOOS KIT (BA-C204) | 655 | 93.06.23 | FV | KL
9 | MAKE SIO SPARES KIT PART OF OPTION A | 662 | 94.01.10 | FV | KL
10 | ADD MKII FW OPTION, MKII INFO (TRANSIT CASE, MANUALS KIT, OUTSIDE DIM'S) | 671 | 94.04.12 | DM | DS
11 | REMOVE AZ TRACKER SHIPPING CRATES | 712 | 94.09.01 | FV | DS
12 | ADD 220V VERSION OF LOOS (BA-C204/B) | 749 | 95.08.11 | FV | DS
NOTES:
1. BREWER SYSTEM COMPONENTS MAY BE SPECIFIED INDIVIDUALLY BY THEIR PART NUMBERS SHOWN IN LOWER LH. CORNER OF EACH BOX. OPTION 'A' COMPONENTS (BREWER SPECTROPHOTOMETERS) MUST ALSO HAVE OPERATING VOLTAGE SPECIFIED.
2. A COMPLETE BREWER SYSTEM MAY BE SPECIFIED BY FORMULATING A CATALOGUE NUMBER AS SHOWN BELOW. OPTION 'E' (COMPUTER SYSTEM) TO BE SPECIFIED AT TIME OF ORDER, USE FORM CK-***.
3. SPECIAL ITEMS TO BE ORDERED SEPARATELY.
4. SEE SHT. 2 FOR GENERAL ARRANGEMENT, DIMENSIONS OF MAIN COMPONENTS.
5. LOOS COMES STANDARD WITH A 15m LONG COMMUNICATIONS CABLE ASSY (BA-W88). ANY LENGTHS OVER 15m SHALL BE THE RESPONSIBILITY OF THE CUSTOMER OR WILL BE A SPECIAL ORDER AND NOTED AS SUCH ON THE INSIDE SALES ORDER.
COMPLETE BREWER SYSTEM DESCRIPTION
EXAMPLE:
BS4 - 220 - BCDEFGHJ
SELECT MODEL OF SPECTROPHOTOMETER (OPTION 'A'):
BS2 = MARK II (O3-SO2)
BS3 = MARK III (DBL SPECTR)
BS4 = MARK IV (O3-SO2-NO2)
SELECT REQ'D OPERATING VOLTAGE:
110 = 110VAC 50/60Hz
220 = 220VAC 50/60Hz
SELECT ANY ADDITIONAL REQ'D OPTIONS (LIST IN ALPHA. ORDER):
B = AZ TRACKER/MANUAL ZEN ADJ KIT
C = UVB KIT
D = COLD TEMP SERVICE KIT
E = COMPUTER SYSTEM
F = OPER & SERVICE MANUAL SET
G = BASIC SPARES KIT
H = ELECTRONICS SPARES KIT
J = UVB EXTERNAL LAMP ASSY
QTY | UM | PART NO. | MFR's NO. | DESCRIPTION | REMARKS | ITEM
SCALE | NEXT ASSY:
DATE | 88-8-5 | DIMENSIONS IN
DWN | CW | IF DUAL DIMS: mm (inches)
CHKD | Tolerances (unless otherwise specified):
APPD | AM | INCHES | MM
FINISH
SCI-TEC INSTRUMENTS INC. ©1995
TITLE: BREWER SYSTEMS
SHEET 1 OF 2 | DOCUMENT NUMBER BS-C1000 | REV. 12

Figure 7.1-2.1



DOCUMENT NO BS-C1000 REV	DESCRIPTION	DCN NUMBER	DATE	DWN	APPD
1	FIRST ISSUE		88.9.28	CW	AM
2	ADD UVB EXT LAMP; SHIPPING CRATES	467	90.07.03	FV	RL
3	SEE DCR	487	90.09.12	FV	RL
4	CHG OPTION D; UPDATE SHT 2	530	91.03.19	FV	RL
5	CHG OPTION B FR BA-C83 TO BA-C91	562	92.03.17	FV	RL
6	CHG OPTION M TO OMC STANDARD KIT	581	92.09.03	FV	RL
7	MAKE UVB KIT PART OF OPTION A	618	92.12.03	FV	RL
8	ADD LOGS KIT (BA-C204)	655	93.06.23	FV	RL
9	MAKE STD SPARES KIT PART OF OPTION A	662	94.01.10	FV	RL
10	ADD MKIII CW OPTION, MKIII AMID (TRANSIT CASE, MANUALS KIT), OUTSIDE DATA)	677	94.04.12	DM	DS
11	REMOVE AZ TRACKER SHIPPING CRATES	712	94.09.01	FV	DS
12	ADD 220V VERSION OF LOGS (BA-C204/B)	749	95.08.11	FV	

Figure 7.1-2.2

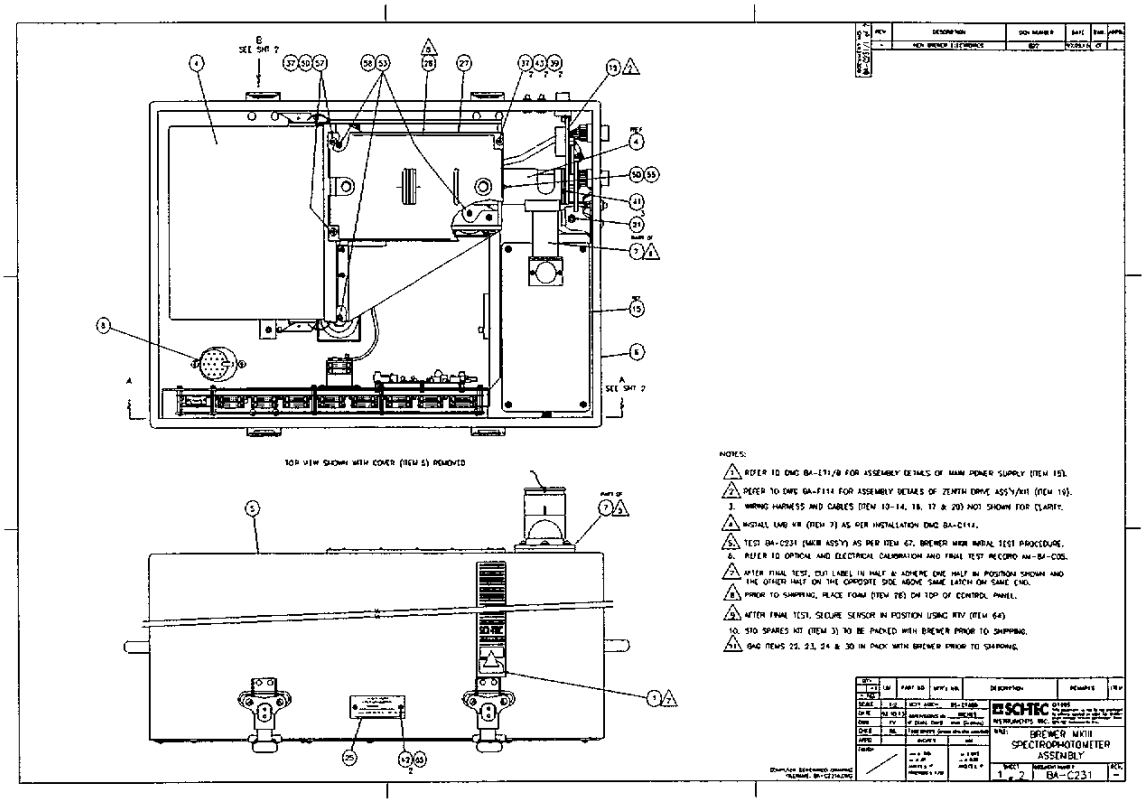


Figure 7.1-3.1

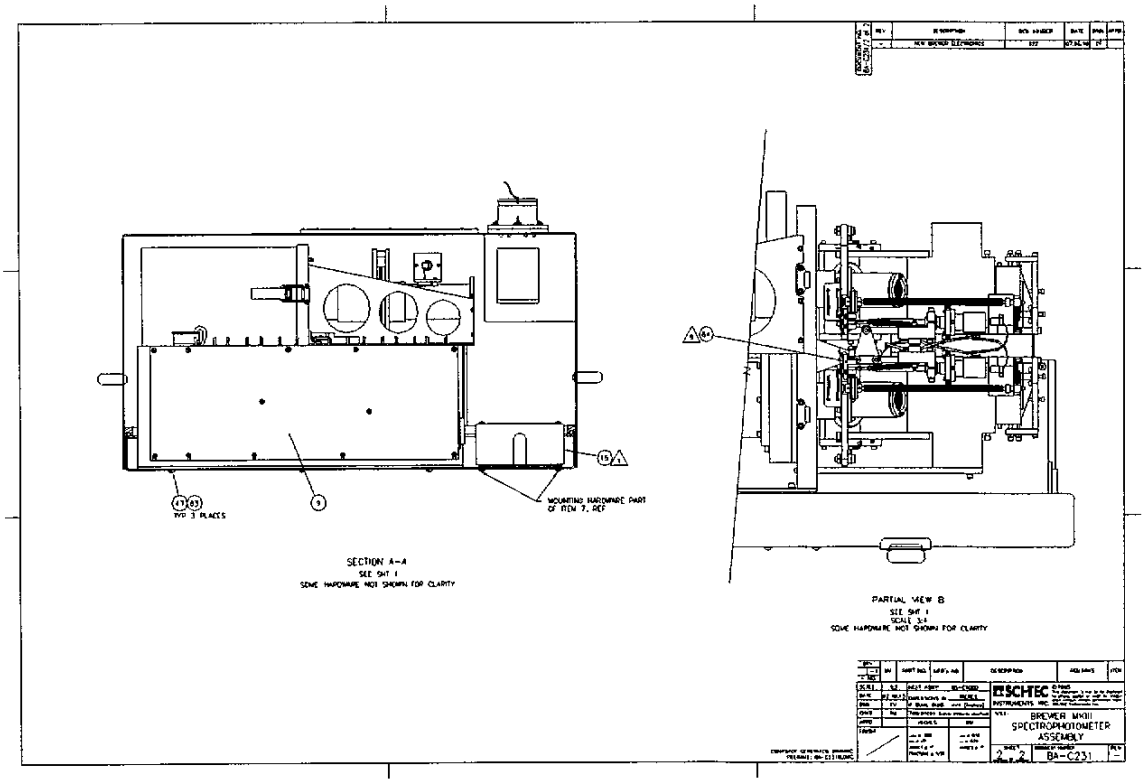


Figure 7.1-3.2

Item no.	BA-C231 Part No.	BREWER MKIII DBL SPECTR Description	Qty.
1	AM-BA-C05	BREWER FINAL TEST MANUAL	1.00
2	BA-C112/B	ST'D SPARES KIT,NEW ELCTR	1.00
3	BA-C208	MKIII SHIPPING CRATE	1.00
4	BA-C194	WEATHERPROOF COVER ASSY	1.00
5	BA-C221	BASE ASSY,NEW ELECT,III	1.00
6	BA-C191/B	MKIII DBL ELEC OPTICAL ASY NEW	1.00
7	BA-C84	UVB KIT	1.00
8	BA-E116	BREWER OPERATING S/W	1.00
9	BA-E124	ELEC PCB BRCKT ASSY,BREW	1.00
10	BA-E71/B	MAIN POWER SUPPLY KIT	1.00
11	BA-F114	ZENITH DRIVE ASS'Y	1.00
12	BA-W76/A	CABLE ASY,MAIN TO MTR 29"	3.00
13	BA-W76/B	CABLE ASY,MAIN TO MTR 27"	4.00
14	BA-W77/A	CABLE ASY,MAIN TO LMP 11"	1.00
15	BA-W77/B	CABLE ASSY,MAIN TO HV 16"	1.00
16	BA-W78	CABLE ASSY,HV BRD TO PMT	1.00
17	BA-W79	THERMISTOR,TEMP PROBE ASY	1.00
18	BA-W82	DC-MAIN/LMP INTRCNCT HARN	1.00
19	BA-W83	LAMP WIRING HARNESS ASSY	1.00
20	BM-C105	NAMEPLATE,ALTERED	1.00
21	BM-C202	SHIPPING FOAM,CNTRL PANEL	1.00
22	BM-C212	LABEL,CE APPROVAL,EMC DIR	1.00
23	BM-C218	MODF'D SCREW,EXT TMP SNSR	1.00
24	BM-C82	CONTROL PANEL - MACH	1.00
25	BREWERQC	QUALITY CHECK LIST	1.00
26	IT-BA-C231	NEW BREW MKIII INITL TEST	1.00
27	12103081	DECAL, SCI-TEC LOGO	1.00
28	12501365-2	DESICANT HLDR CARTRDG ASY	1.00
29	85-80-440	CABLE-TIE MOUNT,3/4"SQ	3.00
30	83-30-450	BUMPER RUBBR 1/8 HOLE, 3/	4.00
31	83-40-485	NUT 4-40 SL RG HX THIN SS	2.00
32	83-51-752	SCRW 2-56 X 1/4 BUTTON HD	2.00
33	83-51-762	SCRW 4-40 X 5/16 BUTTON H	2.00
34	83-51-804	SCREW,8-32 X 1/2 BUTTON H	3.00
35	83-56-143	SCREW,SET 6-32 X 1/4 CUP	3.00
36	83-79-049	SCRW 4-40 X 3/8 HSC SS	3.00
37	83-79-152	SCRW 1/4-28 X 1/2 HSC SS	3.00
38	83-95-008	WASHER #4 FLAT NYLON	1.00
39	83-95-609	WASHER, 1/4 LOCK INT TH S	3.00
40	83-95-786	WASHER, #8 SCREW 3/8 OD X	3.00
41	83-95-604	WASHER #4 LOCK INT TH SS	2.00
42	85-10-145	ADHESIVE, SEALANT LOCTITE	0.50
43	85-10-150	ADHESIVE, SEALANT RTV	0.50

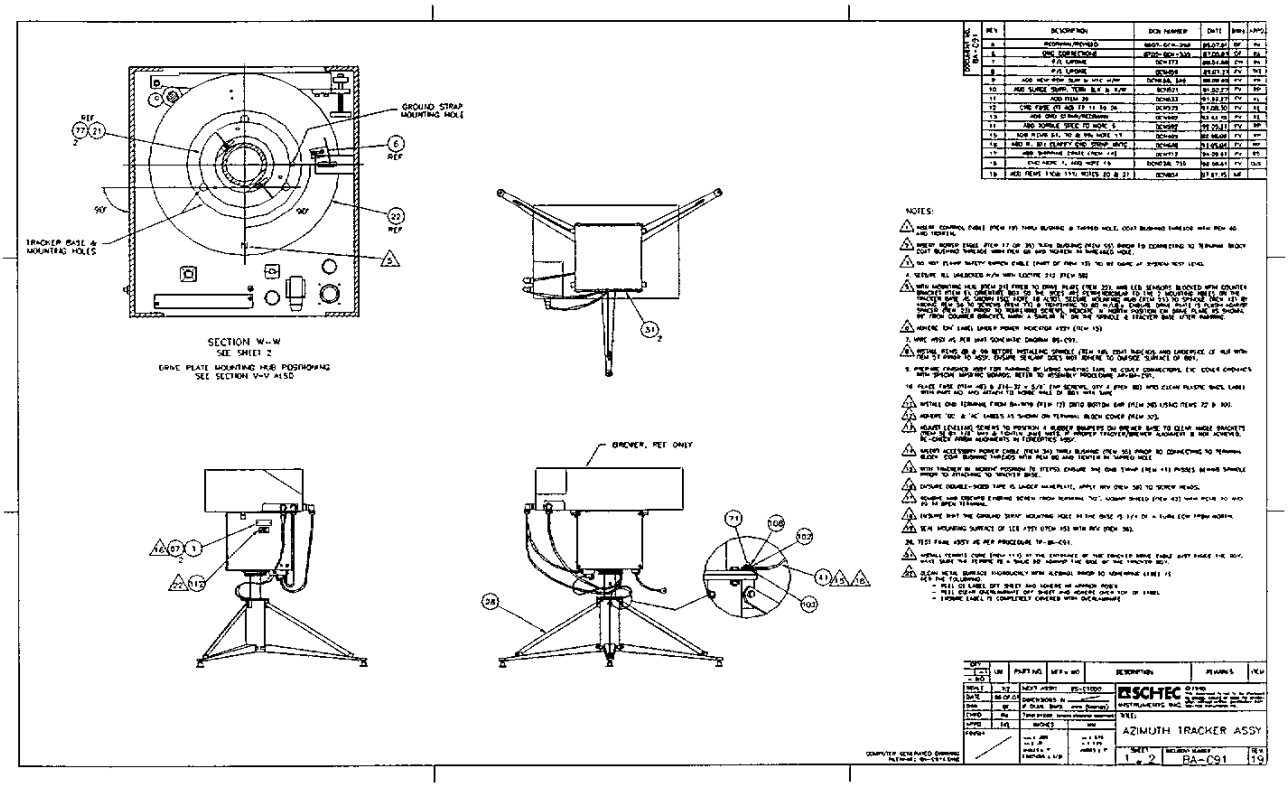


Figure 7.1.4-1

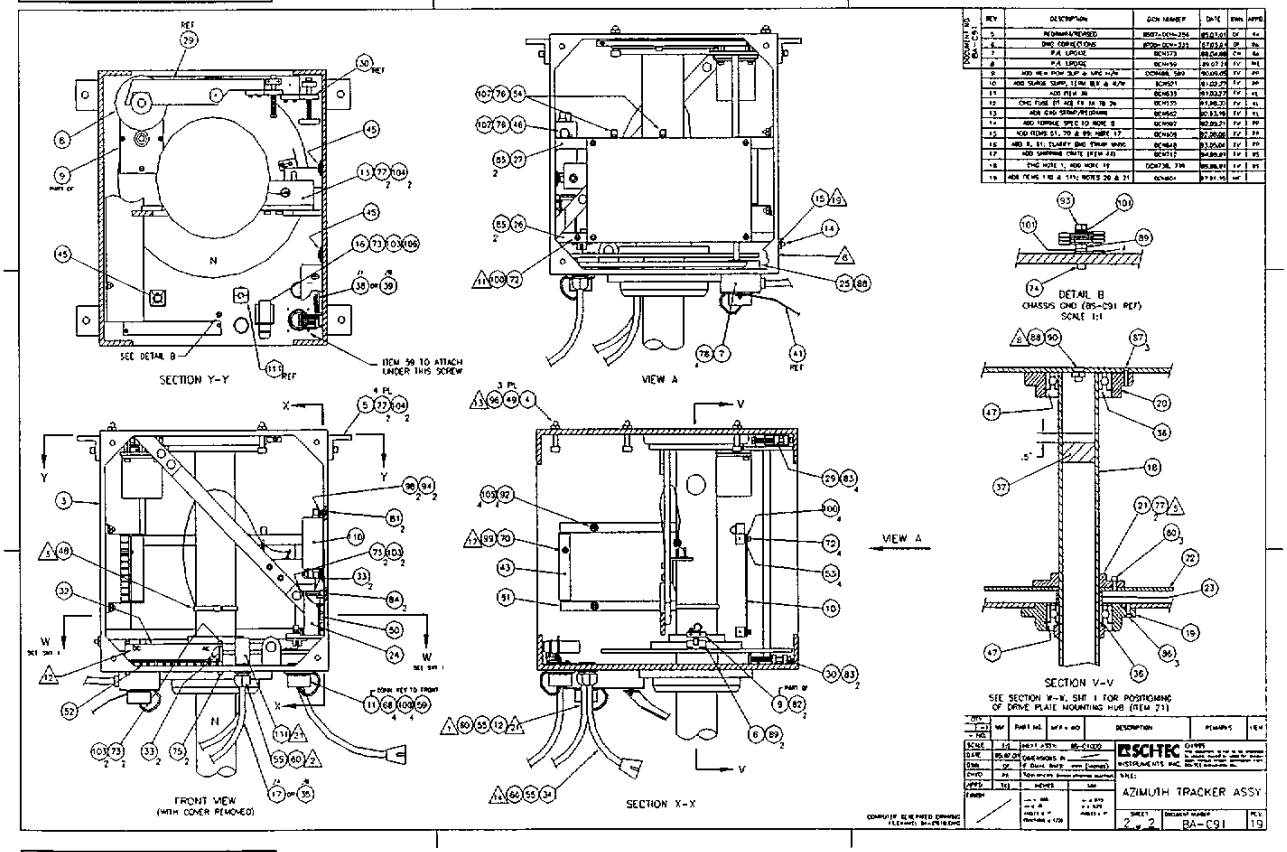
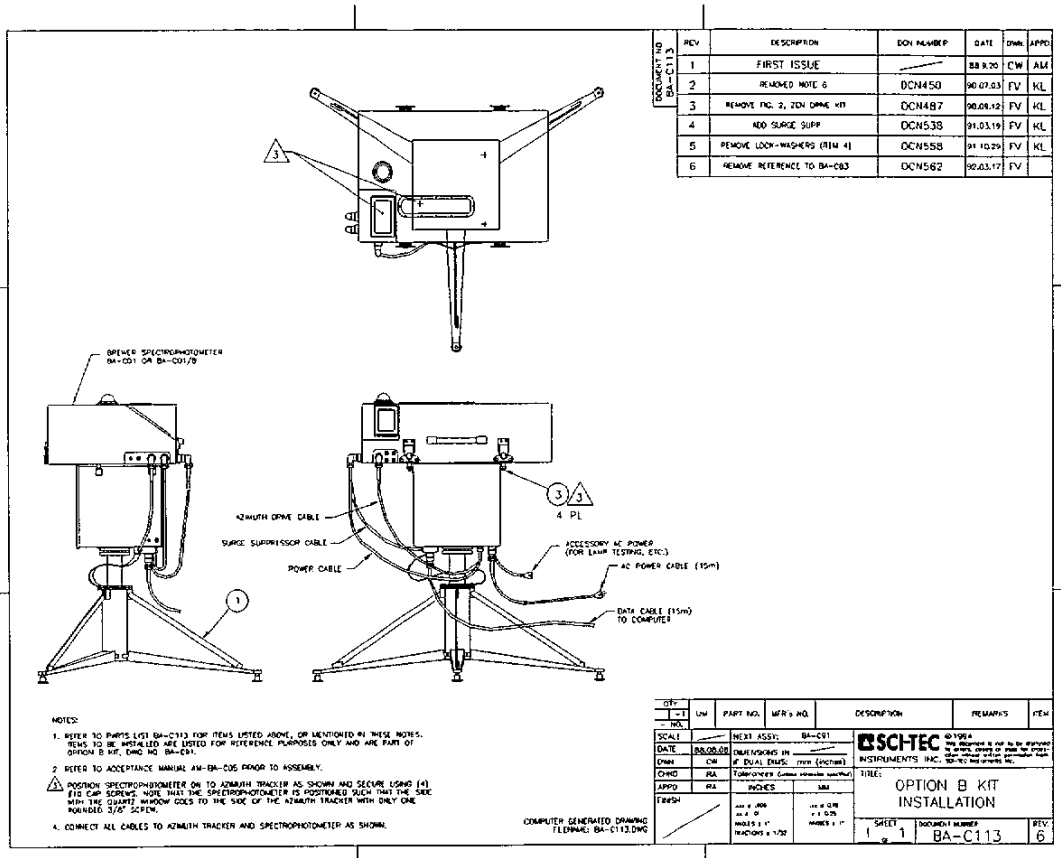


Figure 7.1-4.2

Item No.	BA-C91 Part Number	Description	120V Qty	230V Qty
1	BM-C100	Nameplate, Altered, Azimuth Tracker	1.00	1.00
2	BS-C91	Azimuth Tracker Unit Wiring Diagram	--	--
3	BM-C92	Azimuth Tracker Enclosure	1.00	1.00
4	BM-C93	Adjusting Screw	3.00	3.00
5	BM-C94	Angle Bracket	4.00	4.00
6	BM-C95	Counter Bracket	1.00	1.00
7	BA-W67	RS232 Lightning Protector Assy	1.00	1.00
8	BA-C97	Drive Shaft Assy	1.00	1.00
9	BA-C98	Drive Motor Assy	1.00	1.00
10	BA-C99	PCB Assy	1.00	1.00
11	BA-W18	Power Connector Assy	1.00	1.00
12	BA-W19	Control Cable Assy	1.00	1.00
13	BA-W21	Safety Switch Assy	1.00	1.00
14	BA-W22	Power Switch Assy	1.00	1.00
15	BA-W23	Power Indicator Assy	1.00	1.00
16	BA-W24	Fuse Holder Assy	1.00	1.00
17	BA-W30/A	Power Cable, Azimuth Tracker, 110V	1.00	--
18	D2-1030-002	Azimuth Spindle	1.00	1.00
19	C2-1030-005	Bearing Housing, External	1.00	1.00
20	C2-1030-006	Bearing Housing, Internal	1.00	1.00
21	B2-1030-007/A	Plate Mounting Hub	1.00	1.00
22	C2-1030-008	Drive Plate	1.00	1.00
23	B2-1030-015	Spacer Ring, Short	1.00	1.00
24	BM-C88/B	Terminal Block Shield, 2-1/4" Lg	1.00	1.00
25	A2-1030-019	Drive Bearing Stop	1.00	1.00
26	B2-1030-028	Bottom Mounting Bar, PCB	1.00	1.00
27	B2-1030-029	Top Mounting Bar, PCB	1.00	1.00
28	D1-1030-045	Tracker Stand Assy	1.00	1.00
29	C1-1030-080/A	Short Tension Arm Assy, Azimuth Drive	1.00	1.00
30	C1-1030-081/A	Long Tension Arm Assy, Azimuth Drive	1.00	1.00
31	C1-1030-084	Cover Assy	2.00	2.00
32	BM-C88	Terminal Block Shield, 5-1/4" Lg	1.00	1.00
33	83-09-220	Spacer, Hex, 6-32 x 3/4" Lg	4.00	4.00
34	BA-W58	Accessory Power Cable Assy	1.00	1.00
35	BA-W30/B	Power Cable, Azimuth Tracker, 220V	--	1.00
36	B2-1030-101	Bearing, Altered	2.00	2.00
37	--	Foam Disc, 2-1/2"Dia x 1"Thk	1.00	1.00
38	BA-C166	MOV Assy, 110V	1.00	--
39	BA-C166/B	MOV Assy, 220V	--	1.00
40		Fuse, 4A, 125V, Slow-Blow	1.00	1.00
41	BM-C174	Azimuth Tracker Ground Strap	1.00	1.00
42	BA-C113	Option 'B' Kit Installation (Azimuth Tracker)	--	--
43	BM-C188	Terminal Shield, Azimuth Tracker P/S	1.00	1.00
44	BA-C150	Shipping Crate	1.00	1.00
45	85-80-440	Mount, Cable-Tie, Adhesive Back	3.00	3.00
46	82-20-383	Clamp, 'P', 1/2" x 1/2" x #10	1.00	1.00
47	88-99-780	Retaining Ring, Internal, Spiral Snap	2.00	2.00
48	76-99-445	Hose Clamp, 2-1/2" OD	1.00	1.00
49	83-10-651	O-Ring, 3/8"ID x 9/16"OD x 3/32"Thk	3.00	3.00
50	82-10-470	Terminal Strip, 4 Contact	1.00	1.00
51	87-50-088	Power Supply, Switching, 5VDC, 10A	1.00	1.00
52	82-10-450	Terminal Strip, 12 Contact	1.00	1.00
53	83-09-413	Spacer, 1/4"OD x 1/8"ID x 1/8"LG, AL	4.00	4.00
54	82-20-356	Clamp, 'P', 1/4" x 1/2" x 13/32"	2.00	2.00
55	83-08-100	Bushing, Strain Relief, Liq-Tite	3.00	3.00
56	85-10-150	Adhesive, Sealant (RTV 3145)	1.00	1.00
57	85-10-149	Adhesive, Sealant (RTV 738)	2.00	2.00
58	85-10-145	Adhesive, Sealant (Loctite 242)	2.00	2.00

Item No.	Part Number	Description	120V Qty	230V Qty
59	81-15-154	Cap & Chain, For #18 Receptacle	1.00	1.00
60	85-10-147	Adhesive Sealant, Pipe Thread	1.00	1.00
61	82-10-484	Jumper, Terminal Block	5.00	5.00
62	83-25-890	Term, Ring Tongue, #18-22AWG, #6, Insul	18.00	18.00
63	99-31-483	Wire, Hookup, #18AWG, IRR PVC, Red	1.00	1.00
64	99-31-482	Wire, Hookup, #18AWG, IRR PVC, Black	3.40	3.40
65	99-31-484	Wire, Hookup, #18AWG, IRR PVC, Green	2.00	2.00
66	99-31-481	Wire, Hookup, #18AWG, IRR PVC, White	2.25	2.25
67	83-51-752	Screw, 2-56 x 1/4"Lg, Btn Hd, Hex, SS	2.00	2.00
68	83-51-763	Screw, 4-40 x 3/8"Lg, Btn Hd, Hex, SS	4.00	4.00
69	83-51-762	Screw, 4-40 x 5/16"Lg, Btn Hd, Hex, SS	2.00	2.00
70	83-51-765	Screw, 4-40 x 1/2"Lg, Btn Hd, Hex, SS	1.00	1.00
71	83-79-152	Screw, 1/4-28 x 1/2"Lg, Skt Hd, Cap, SS	1.00	1.00
72	83-79-051	Screw, 4-40 x 1/2"Lg, Skt Hd, Cap, SS	5.00	5.00
73	83-79-068	Screw, 6-32 x 3/8"Lg, Skt Hd, Cap, SS	5.00	5.00
74	83-79-075	Screw, 6-32 x 1"Lg, Skt Hd, Cap, SS	1.00	1.00
75	83-79-073	Screw, 6-32 x 3/4"Lg, Skt Hd, Cap, SS	2.00	2.00
76	83-79-082	Screw, 8-32 x 3/8"Lg, Skt Hd, Cap, SS	3.00	3.00
77	83-79-114	Screw, 10-32 x 1/2"Lg, Skt Hd, Cap, SS	12.00	12.00
78	83-79-077	Screw, 6-32 x 1-1/4"Lg, Skt Hd, Cap, SS	4.00	4.00
80	83-79-116	Screw, 10-32 x 5/8"Lg, Skt Hd, Cap, SS	7.00	7.00
81	83-87-194	Screw, 8-32x1/2"Lg. Flt Hd, Hex, SS	2.00	2.00
82	83-87-165	Screw, 4-40 x 1/2"Lg, Flt Hd, Hex, SS	2.00	2.00
83	83-87-181	Screw, 6-32 x 5/8"Lg, Flt Hd, Hex, SS	4.00	4.00
84	83-87-182	Screw, 6-32 x 3/4"Lg, Flt Hd, Hex, SS	2.00	2.00
85	83-87-209	Screw, 10-32 x 1/2"Lg, Flt Hd, Hex, SS	4.00	4.00
86	83-87-211	Screw, 10-32 x 5/8"Lg, Flt Hd, Hex, SS	3.00	3.00
87	83-87-214	Screw, 10-32 x 1"Lg, Flt Hd, Hex, SS	3.00	3.00
88	83-87-233	Screw, 1/4-28 x 5/8"Lg, Flt Hd, Hex, SS	2.00	2.00
89	83-40-261	Nut, 6-32 x 5/16, Hex, Steel Plated	1.00	1.00
90	83-40-326	Nut, 1/4-28 x 7/16, Hex, Steel Plated	1.00	1.00
91				
92	83-40-278	Nut, 8-32 x 1/4 x 3/32 Thk, Hex, SS	4.00	4.00
93	83-40-486	Nut, 6-32, Self Locking, Hex, SS	1.00	1.00
94	83-40-283	Nut, 8-32 Std. Hex Pattern, SS	2.00	2.00
95				
96	BM-C121	Jamb Nut, Altered, 3/8-24, Hex	3.00	3.00
97				
98	83-95-606	Washer, #8, Internal Tooth Lock, SS	2.00	2.00
99	83-95-626	Washer, #4, External Tooth Lock, SS	1.00	1.00
100	83-95-604	Washer, #4, Internal Tooth Lock, SS	9.00	9.00
101	83-95-605	Washer, #6, Internal Tooth Lock, SS	2.00	2.00
102	83-95-631	Washer, 1/4, External Tooth Lock	2.00	2.00
103	83-95-749	Washer, #6, Split Lock, SS	5.00	5.00
104	83-95-752	Washer, #10, Split Lock, SS	10.00	10.00
105	83-95-750	Washer, #8, Split Lock, SS	4.00	4.00
106	83-95-013	Washer, #6, Flat, SS	1.00	1.00
107	83-95-019	Washer, #8, Flat, SS	3.00	3.00
108	83-95-028	Washer, 1/4, Flat, SS	1.00	1.00
109	83-25-996	Terminal, Female Disc, Red	4.00	4.00
110	76-05-005	Filter, Interference,Power Line EMI	1.00	1.00
111	88-99-224	Ferrite, Split, EMI Suppression	1.00	1.00
112	BM-C212	Label, CE Approval, EMC Directives	1.00	1.00
113	AP-BA-C91	Azimuth Tracker Paint Masking Procedure	-	-
114	TP-BA-C91	Azimuth Tracker Ass'y Adjustment and Test Procedure	-	-



DOCUMENT NO BA-C113	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	APPD
	1	FIRST ISSUE		88.9.20	CW	AM
	2	REMOVED NOTE 6	DCN450	90.07.03	FV	KL
	3	REMOVE ITEMS 2, 20N DRIVE KIT	DCN487	90.09.12	FV	KL
	4	ADD SURGE SUPP	DCN538	91.03.19	FV	KL
	5	REMOVE LOCK-WASHERS (ITEM 4)	DCN558	91.10.29	FV	KL
	6	REMOVE REFERENCE TO BA-C83	DCN562	92.03.17	FV	

Figure 7.1-4.3

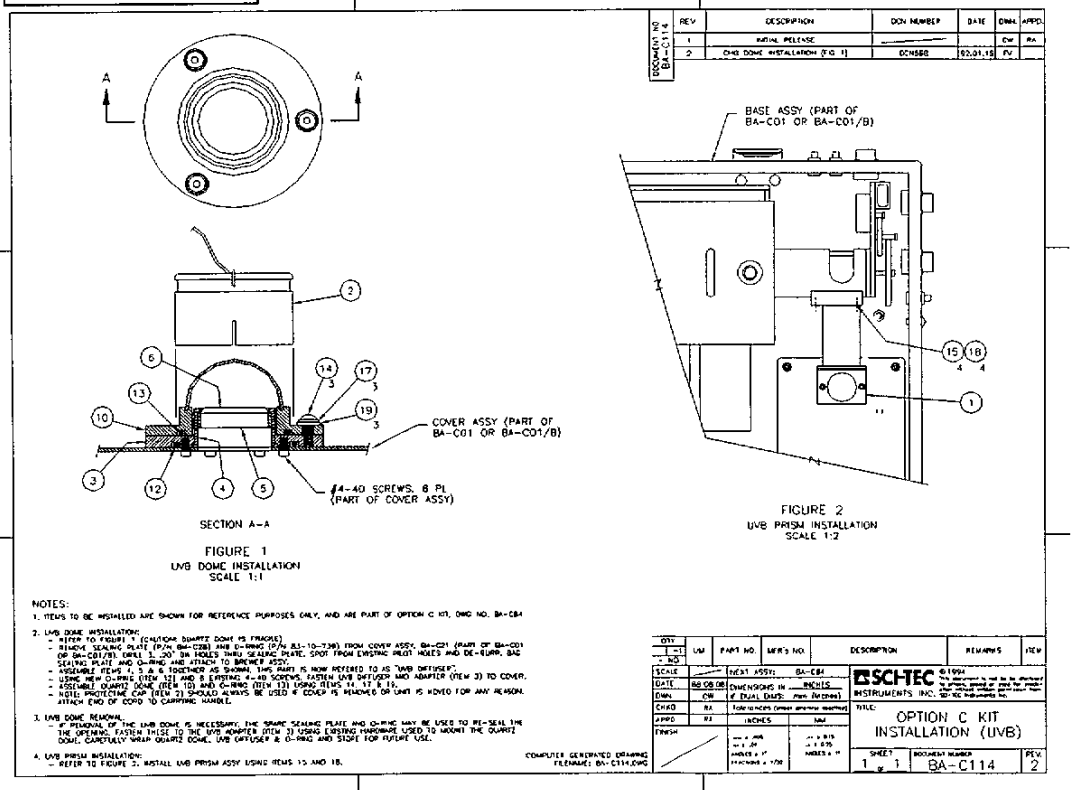


FIGURE 1
UVB DOME INSTALLATION
SCALE 1:1

FIGURE 2
UVB PRISM INSTALLATION
SCALE 1:2

DOCUMENT NO BA-C114	REV	DESCRIPTION	DCN NUMBER	DATE	DWN	APPD
	1	INITIAL RELEASE			CW	RA
	2	CHG DOME INSTALLATION (FIG 1)	DCN588	92.01.15	FV	

Figure 7.1-5.1

	BA-C113	Option 'B' Kit Installation	
Item No.	Part No.	Description	Qty
1	BA-C91	Azimuth Tracker Assy	1.00
3	83-79-116	Screw, 10-32 x 5/8"Lg, Skt Hd, Cap, SS	4.00

	BA-C84	Option 'C' Kit (UVB)	
Item No.	Part No.	Description	Qty
1	BA-F81	UVB Prism Assy	1.00
2	BM-C175	UVB Dome Cap	1.00
3	BM-C37	UVB Adaptor	1.00
4	BM-C38	UVB Dome Light Diffuser Holder	1.00
5	BM-C39	UVB Retaining Ring	1.00
6	BM-C40	UVB Diffuser	1.00
10	10-15-101	Quartz Hemisphere, 50mm MTD	1.00
12	83-10-739	O-Ring, 2-1/4"ID x 2-1/2"OD x 1/8, #228	1.00
13	83-10-737	O-Ring, 2"ID x 2-1/4"OD x 1/8, #226	1.00
14	83-51-834	Screw, 10-32 x 1/2"Lg, Btn Hd Hex, SS	3.00
15	83-79-052	Screw, 4-40 x 9/16"Lg, Skt Hd Cap, SS	4.00
17	83-95-787	Washer, #10, Sealing	3.00
18	83-95-748	Washer, #4, Split Lock, SS	4.00
19	83-95-023	Washer, #10, Flat, SS	3.00
20	BA-C114	Option C Kit Installation	--

	BA-C114	Option C Kit (UVB) Installation	
Item No.	Part No.	Description	Qty
1	BA-F81	UVB Prism Assy	1.00
2	BM-C175	UVB Dome Cap	1.00
3	BM-C37	UVB Adaptor	1.00
4	BM-C38	UVB Dome Light Diffuser Holder	1.00
5	BM-C39	UVB Retaining Ring	1.00
6	BM-C40	UVB Diffuser	1.00
10	10-15-101	Quartz Hemisphere, 50mm MTD	1.00
12	83-10-739	O-Ring, 2-1/4"ID x 2-1/2"OD x 1/8, #228	1.00
13	83-10-737	O-Ring, 2"ID x 2-1/4"OD x 1/8, #226	1.00
14	83-51-834	Screw, 10-32 x 1/2"Lg, Btn Hd Hex, SS	3.00
15	83-79-052	Screw, 4-40 x 9/16"Lg, Skt Hd Cap, SS	4.00
17	83-95-787	Washer, #10, Sealing	3.00
18	83-95-748	Washer, #4, Split Lock, SS	4.00
19	83-95-023	Washer, #10, Flat, SS	3.00
20	BA-C84	Option C Kit	--

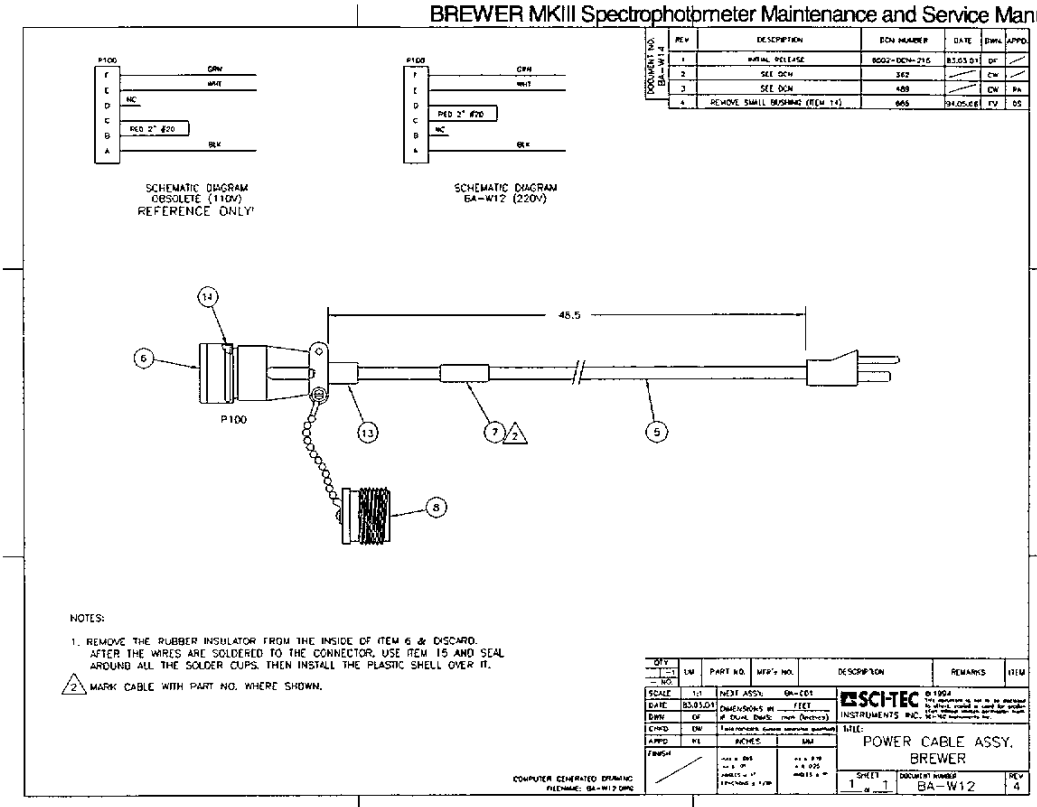


Figure 7.1-6

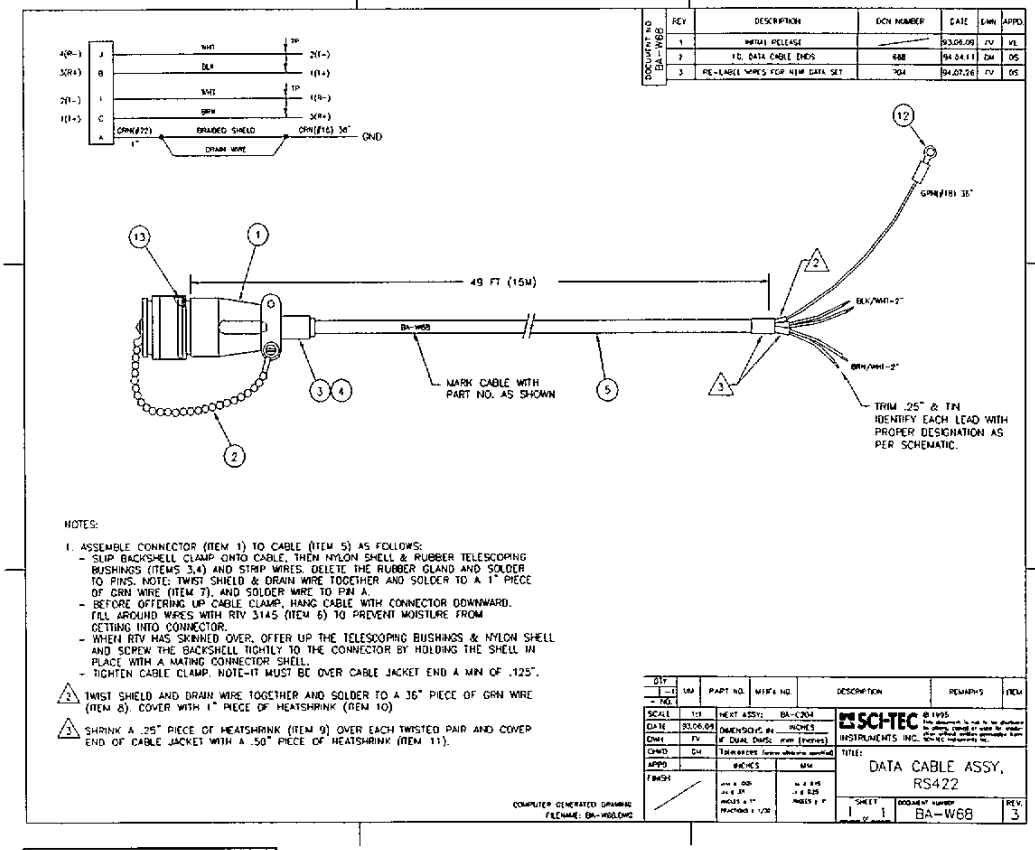


Figure 7.1-7

Item No.	BA-C222 Part No.	Brewer Electronics Spares Kit Description	Qty
1	12501365-2	Dessicant Cartridge	1.00
2	70-10-015	Dessicant Bag	1.00
6	BA-C99	Azimuth Tracker PCB Assy	1.00
7	BA-E103/B	Power Supply Assy	1.00
8	BA-P23	High Speed Amp PCB Assy	1.00
9	BA-E124	Elec PCB Brckt Assy, Brew	1.00
12	93-70-401	Standard Lamp	3.00
13	93-70-406	Lamp, HG Germicidal	3.00
14	87-50-088	Power Supply, Switching, 5VDC, 10A	1.00

Item No.	BA-C112/B Part No.	Brewer Standard Spares Kit Description	Qty
1	12501365-2	Dessicant Cartridge	1.00
2	70-10-013	Dessicant Humidity Indica	2.00
3	70-10-015	Dessicant, 4 Unit, Tyvek Bag	3.00
4	93-70-401	Lamp Tungsten Halogen 20W	2.00
5	93-70-406	Lamp, HG Germicidal (GTL3)	2.00
6	83-79-116	Scrw 10-32 X 5/8 HSC SS	4.00
7	91-15-217	Fuse, 5A, 250V, FB, FAST-BLOW	2.00
8	91-15-220	Fuse, 1A, 250V, FB, 5X20MM	2.00
9	91-15-280	Fuse, 4A, 125V, SB, 5X20MM	2.00
10	92-22-050	Tool, Ins/Extr D-Con Pin	1.00
11	92-90-002	Tool, Hex Key, 0.035"	1.00
12	92-90-020	Tool, Hex Key Kit, Ball Pt	1.00

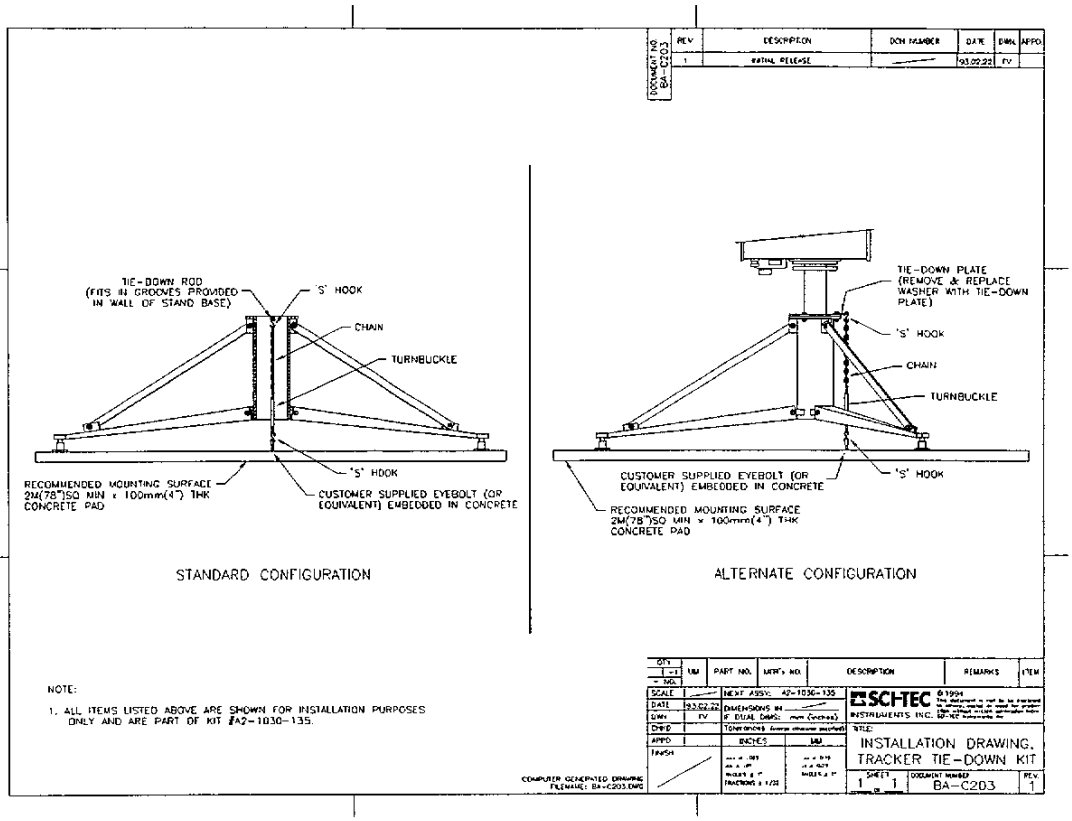

DOCUMENT NO BA-C203
REV
DESCRIPTION
DCN NUMBER
DATE
DWN
APPD
1
INITIAL RELEASE
93.02.22
FV
TIE-DOWN ROD (FITS IN GROOVES PROVIDED IN WALL OF STAND BASE)
'S' HOOK
CHAIN
TURNBUCKLE
'S' HOOK
RECOMMENDED MOUNTING SURFACE 2M(78")SQ MIN x 100mm(4") THK CONCRETE PAD
CUSTOMER SUPPLIED EYEBOLT (OR EQUIVALENT) EMBEDDED IN CONCRETE
STANDARD CONFIGURATION
TIE-DOWN PLATE (REMOVE & REPLACE WASHER WITH TIE-DOWN PLATE)
'S' HOOK
CHAIN
TURNBUCKLE
CUSTOMER SUPPLIED EYEBOLT (OR EQUIVALENT) EMBEDDED IN CONCRETE
'S' HOOK
RECOMMENDED MOUNTING SURFACE 2M(78")SQ MIN x 100mm(4") THK CONCRETE PAD
ALTERNATE CONFIGURATION
NOTE:
1. ALL ITEMS LISTED ABOVE ARE SHOWN FOR INSTALLATION PURPOSES ONLY AND ARE PART OF KIT #A2-1030-135.
QTY
UM
PART NO.
MFR'S NO.
DESCRIPTION
REMARKS
ITEM
SCALE
NEXT ASSY: A2-1030-135
DATE
93.02.22
DWN
FV
CHKD
APPD
TRASH
SCI-TEC
INSTRUMENTS INC.
TITLE:
INSTALLATION DRAWING, TRACKER TIE-DOWN KIT
SHEET 1 OF 1
DOCUMENT NUMBER BA-C203
REV 1

Figure 7.1-8

BREWER REFERENCE DOCUMENTATION

Section 7.2 Power Supply and Harness

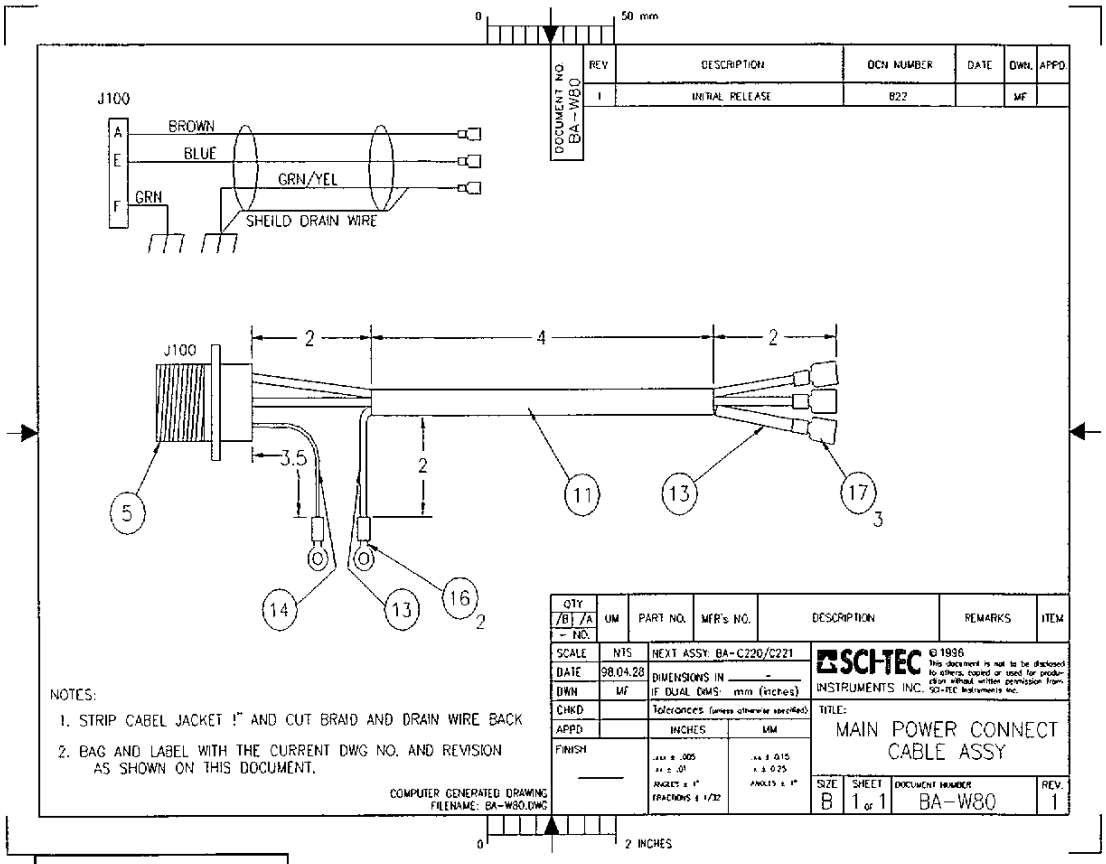


Figure 7.2-1

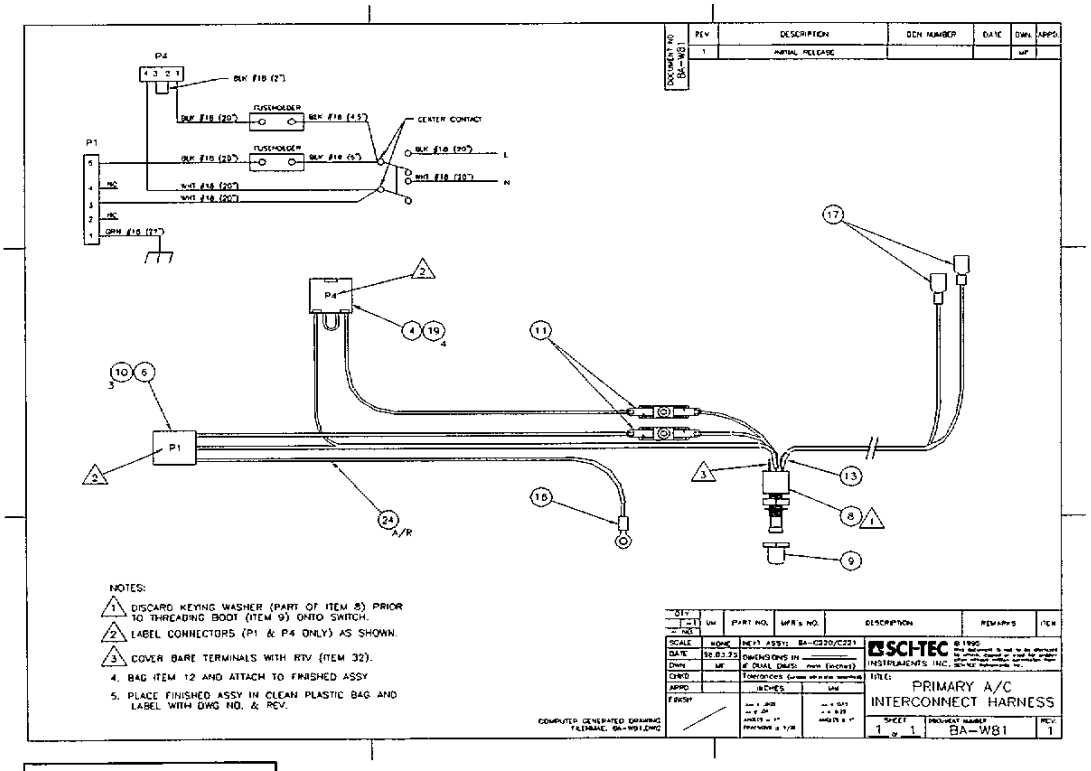


Figure 7.2-2

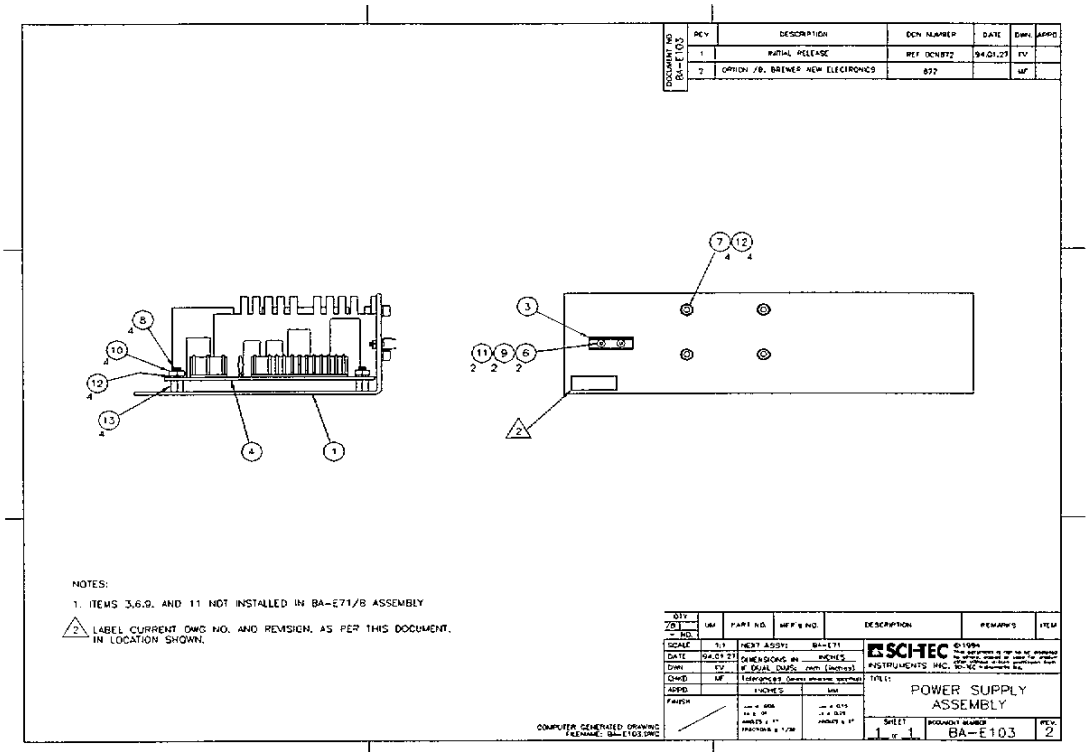


Figure 7.2-2.1

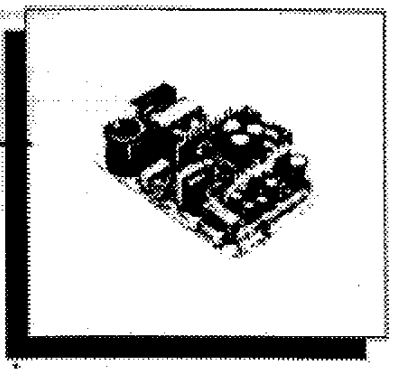
Item No.	BA-E103/B Part No.	Power Supply Assembly Description	Qty
1	BM-E102	Mounting Bracket, Power Supply	1.00
2			
3	89-90-220	Mounting Clip, Axial Lead Resistor	--
4	87-50-098	Power Supply, 80W, O/P,Switch,+-15V	--
5	87-50-099	Power Supply, 80W, O/P,Switch,+-12V	1.00
6	83-51-752	Screw, #2-56 x 1/4"Lg, Btn Hd Hex, SS	--
7	83-79-068	Screw, #6-32 x 3/8"Lg, Skt Hd Hex, SS	4.00
8	83-85-724	Screw, #6-32 x 5/8"Lg, Flt Hd, 100Deg, SS	4.00
9	83-40-219	Nut, #2-56 x 3/16", Hex, SS	--
10	83-40-261	Nut, #6-32 x 5/16", Hex, SS	4.00
11	83-95-603	Washer, #2, Internal Tooth Lock, SS	--
12	83-95-605	Washer, #6, Internal Tooth Lock, SS	8.00
13	83-09-210	Spacer, Threaded, #6-32 x 1/4"Lg, Hex	4.00

NFS80 SERIES
80 Watt Universal Input Switching Power Supplies

* Balanced-current auxiliary outputs
* Universal input voltage
* Overvoltage protection
* Short circuit protection with auto-recovery
* 80 watts continuous, 110 watts peak output power
* Two year warranty
* Recommended for new designs

ELECTRO SOURCE

NEW!



The NFS80 series consist of universal input, four output switching power supplies useful in motor or line driver applications. The equally rated or "balanced" outputs will each deliver up to 3A continuous and 5A peak output current. Furthermore, these supplies will deliver 80 total continuous watts with natural convection cooling, or 110 watts with forced air cooling. For starting loads such as disk drives, they will deliver 110 peak watts.

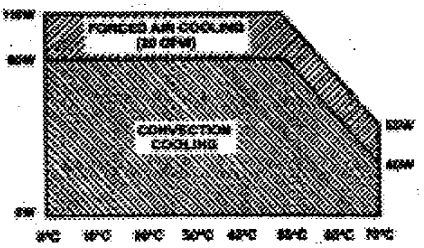
Universal input allows the supply to operate from any line voltage throughout the world without a switch or jumper setting. The NFS80 series is approved by UL, CSA and VDE, and its built-in line filter reduces conducted noise below FCC and VDE limit B.

Model Number	Output Voltage[1]	Minimum	Output Currents Maximum[2]	Maximum[3]	Peak[4]	Ripple P-P[5]	Total Regulation[6]
NFS80-7602	+5V (A)	1A	3A	1.5A	20A	50mV	±2%
	+24V (B)	0A	2A	2.5A	3A	240 mV	+10%-5%
	+12V (C)	0A	2.5A	3A	6A	120mV	±3%
	-12V (D)	0A	2.5A	3A	6A	120mV	±3%
NFS80-7606	+5V (A)	1A	3A	1.5A	20A	50mV	±2%
	+24V (B)	0A	2A	2.5A	3A	240mV	+10%-5%
	+15V (C)	0A	2.5A	3A	6A	150mV	±3%
	-15V (D)	0A	2.5A	3A	6A	150mV	±3%

Notes:
(1) The floating fourth output (D) can be referenced as either positive or negative.
(2) Natural convection cooling.
(3) Forced air cooling, 30 CFM @ 1 atmosphere.
(4) Peak output current lasting less than 60 seconds with duty cycle ≤ 10%. During peak loading, outputs may exceed total regulation limits.
(5) 20 MHz bandwidth, peak-to-peak, measured differentially.
(6) Total regulation is defined as the static output regulation at 25°C, including initial tolerance, line voltage within stated limits, load currents within stated limits, and output voltages adjusted to their factory settings. Also, for stated regulation on the +24V output, $(\Delta V/\Delta I) \leq 5$.

Operating Temperature Limits and Output Power Range

For optimum reliability, no part of the heatsink should exceed 110°C, and no semiconductor case temperature should exceed 115°C. CAUTION: make primary circuit thermal measurements approximately one second after disconnecting line power to minimize shock hazard and damage to thermal measurement equipment.



COMPUTER PRODUCTS A

7 Elkins Street • South Boston • MA 02127 • Phone 617-464-6800 • Fax 617-464-6812

Figure 7.2-2.2

SPECIFICATIONS

Parameter	Condition	Limits
Input Voltage		85VAC to 264VAC
Input Frequency Range		47Hz to 440Hz
Input Surge Current	Cold start 115VAC 230VAC	17A max 34A max
Conducted RFI		FCC limit B, VDE limit B
Safety Ground Leakage Current	115VAC, 60 Hz 230VAC, 50Hz	0.5 mA maximum 0.8 mA maximum
Line Regulation	Low line to high line, full load	±0.1% max
Overshoot/Undershoot	Turn-on	None
Transient Response	+5V output, 2.5A to 6A load change	150mV transient, settling to 1% in 1mS
Temperature Coefficient	All outputs	0.02%/°C
Overvoltage Protection Threshold	+5V output	6.25V ±0.75V
Output Voltage Adjustability	+5V output	±3%
Total Output Power	50°C ambient temperature Continuous, convection cooling forced air cooling Peak	65 watts 110 watts 130 watts
Holdup Time	230VAC input 180VAC input 115VAC input 90VAC input	80W 110W 140mS 100mS 80mS 50mS 55mS 17mS 18mS 6mS
Efficiency	115VAC input, 50W	70% typical
Operating Frequency	ON, 90 to 264VAC 110W, 90 to 264VAC	100 to 250 kHz 20 to 70 kHz
Altitude	Operating Non-operating	10,000 feet max 40,000 feet max
Temperature	Operating Non-operating	0°C to 50°C -40°C to +85°C
Relative Humidity	Non-condensing	5% to 95%
Vibration	Three orthogonal axes, random vibration, 10 minute test for each axis	2.4G rms (operating) 5Hz to 500Hz
MTBF	MIL-HDBK 217E, 25°C	125,000 hr
Weight		1.9 lb (0.8 Kg)

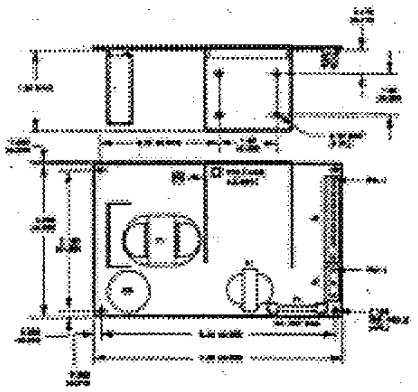
PIN CHART — CONNECTOR

J1

Pin 1	AC Ground	AC Ground	Molex 09-50-3051 with second and fourth pins removed
Pin 2	AC Neutral	AC Neutral	
Pin 3	AC Hot	AC Hot	

J2

Pin 1	+5.1V	+5.1V	Molex 09-50-3131 Mating connector: Molex 2139 series housing with 2878 series crimp terminal.
Pin 2	+5.1V	+5.1V	
Pin 3	+5.1V	+5.1V	
Pin 4	Return	Return	
Pin 5	Return	Return	
Pin 6	Return	Return	
Pin 7	Return	Return	
Pin 8	+12V	+12V	
Pin 9	+12V	+12V	
Pin 10	-12V Ref	-12V Ref	
Pin 11	-12V	-12V	
Pin 12	Removed for key		
Pin 13	+24V	+24V	



(7) Pins 10 and 11 are a floating output, which can be referenced as either positive or negative. Pin 10 is positive with respect to pin 11. Either pin 10 or 11 must be connected to Return (pins 4-7) for proper operation.

(8) All dimensions are in inches and (mm).

(9) Either metallic or non-metallic standoffs can be used in all four mounting holes without affecting VDE safety approval. The diameter of metal standoffs, if used, must not exceed 0.212".

(10) The heat sink is grounded, and allows system grounding when mechanically connected to the system chassis. Alternatively, the ground pad enclosing the mounting hole near J1 allows system grounding through a metal standoff to the system chassis.

(11) It is always advisable to attach the power supply heat sink to another thermal dissipator (such as a chassis, a finned heat sink, etc.). The resulting temperature decrease of heat sink-mounted components will improve power supply lifetime.

(12) The supply must be mechanically supported using the PCB mounting holes, and may be additionally supported by the heat sink mounting holes.

Figure 7.2-2.3

BREWER REFERENCE DOCUMENTATION

Section 7.3 Internal Cabling

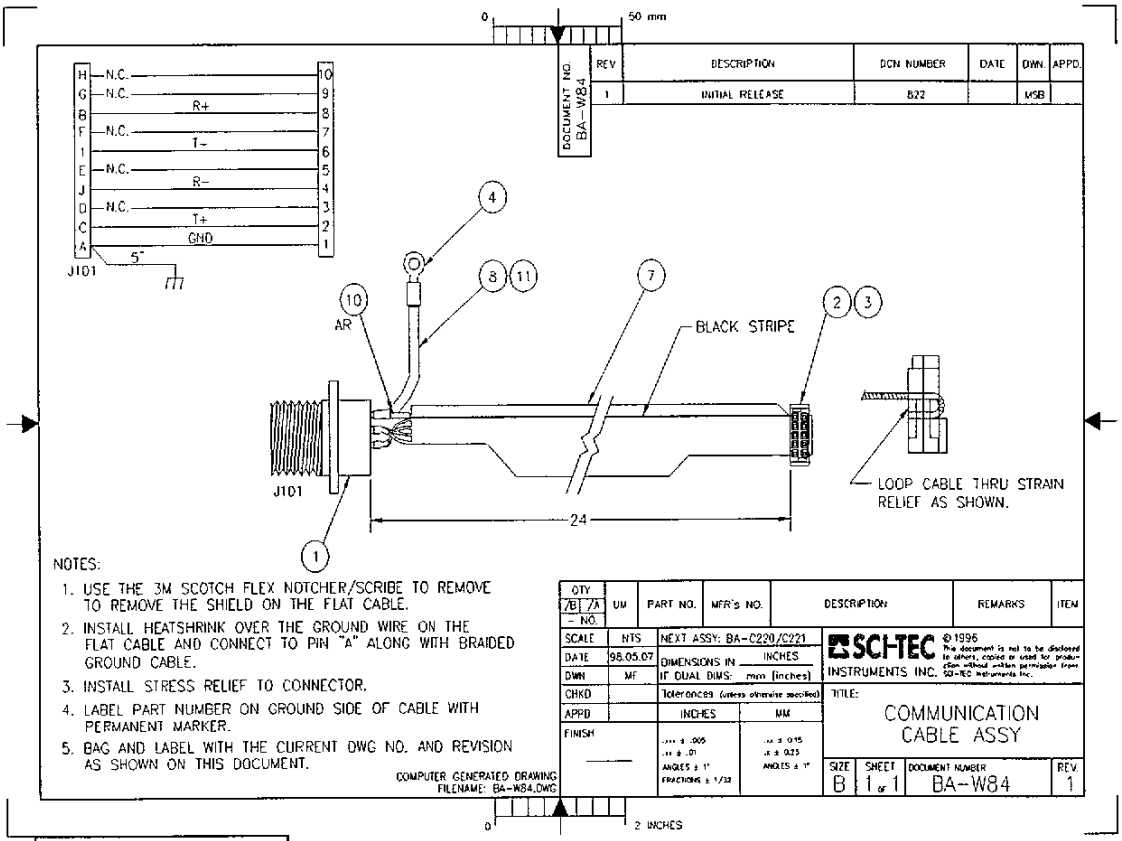


Figure 7.3-1

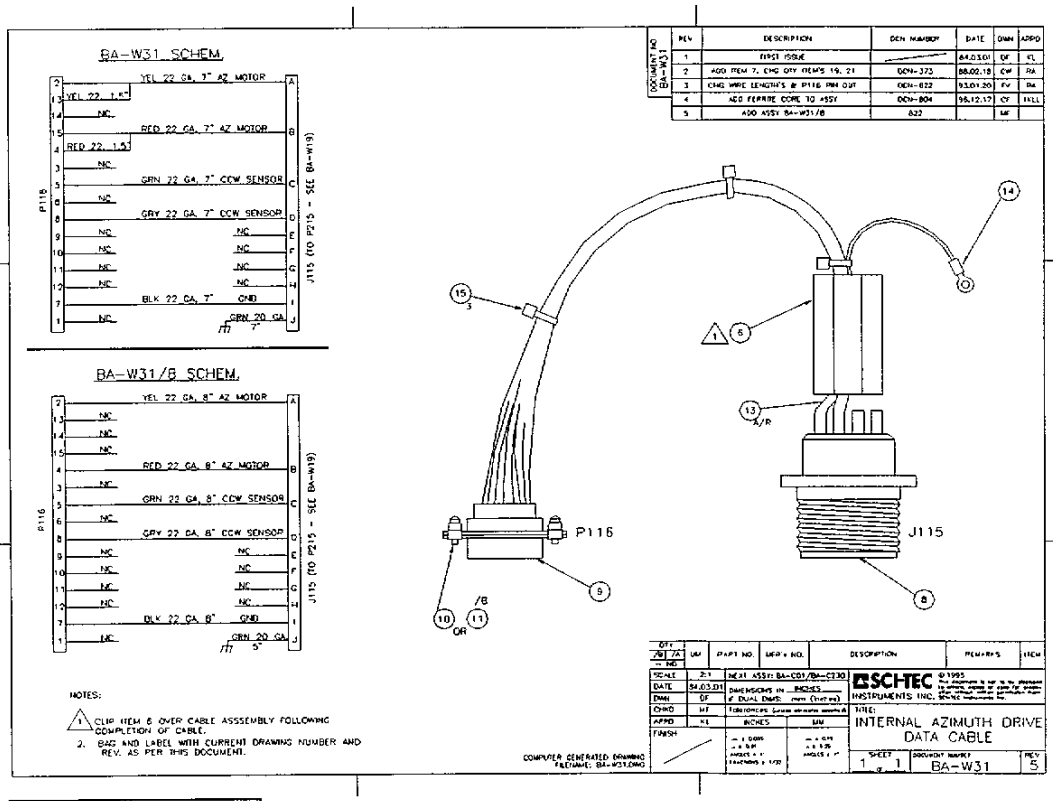


Figure 7.3-2

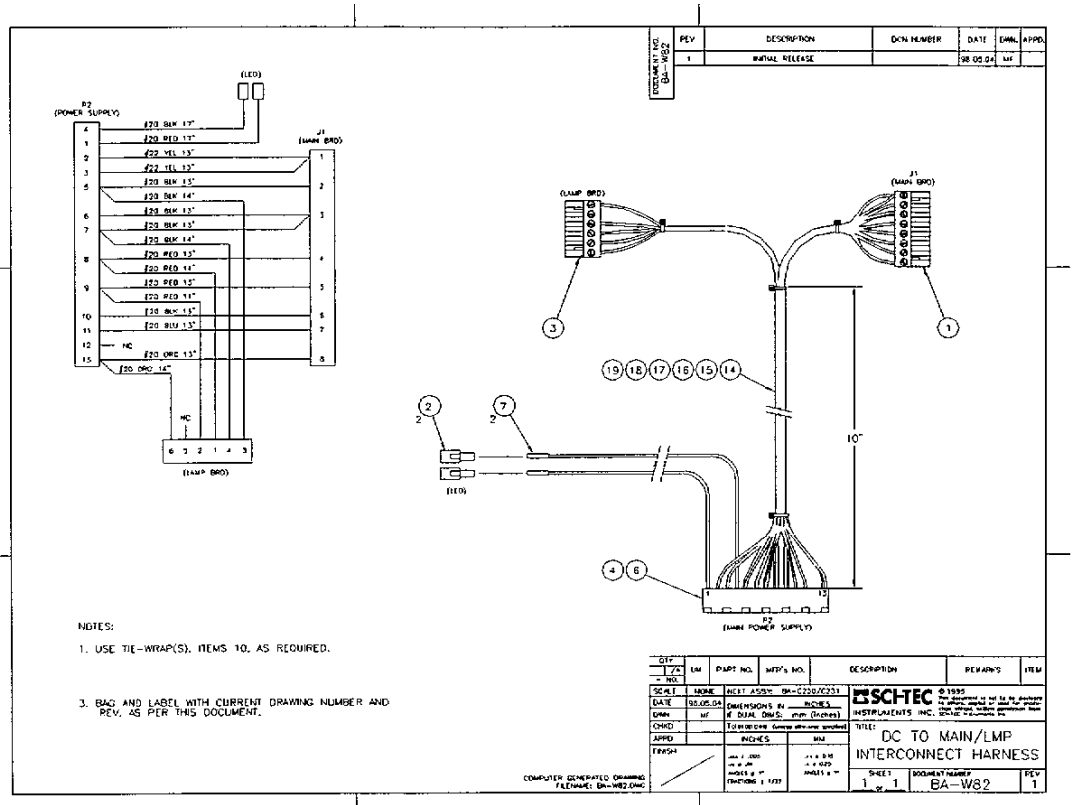


Figure 7.33

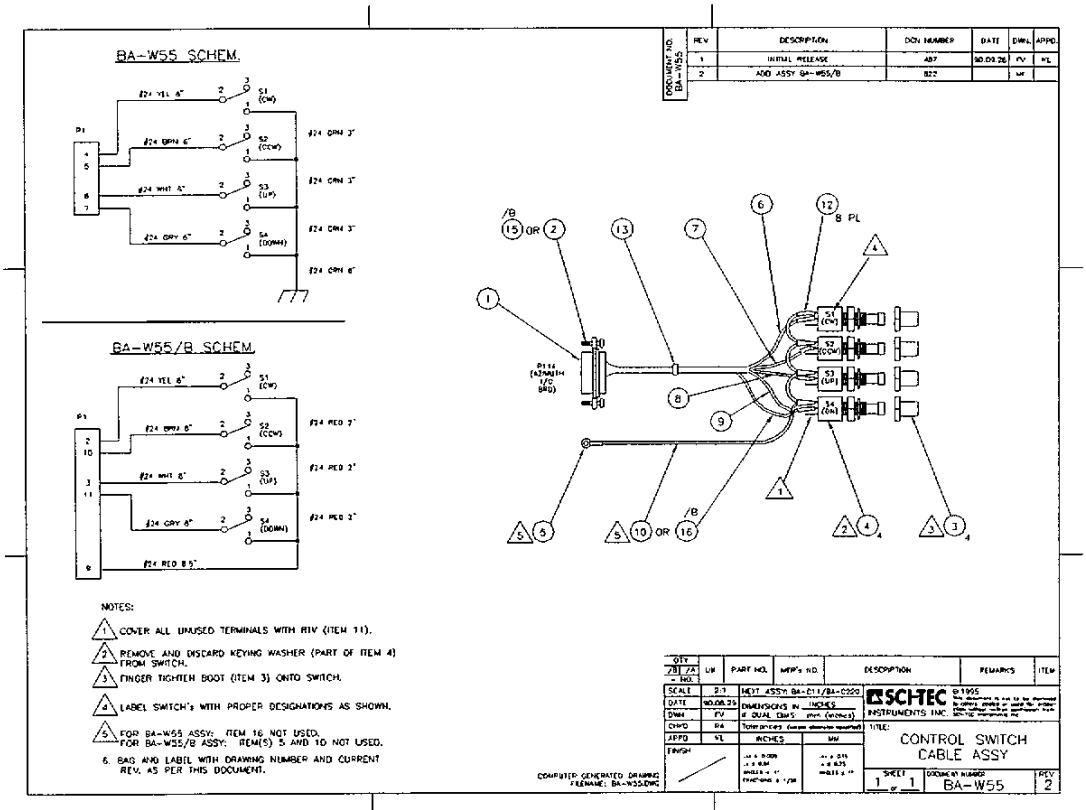


Figure 7.3-4

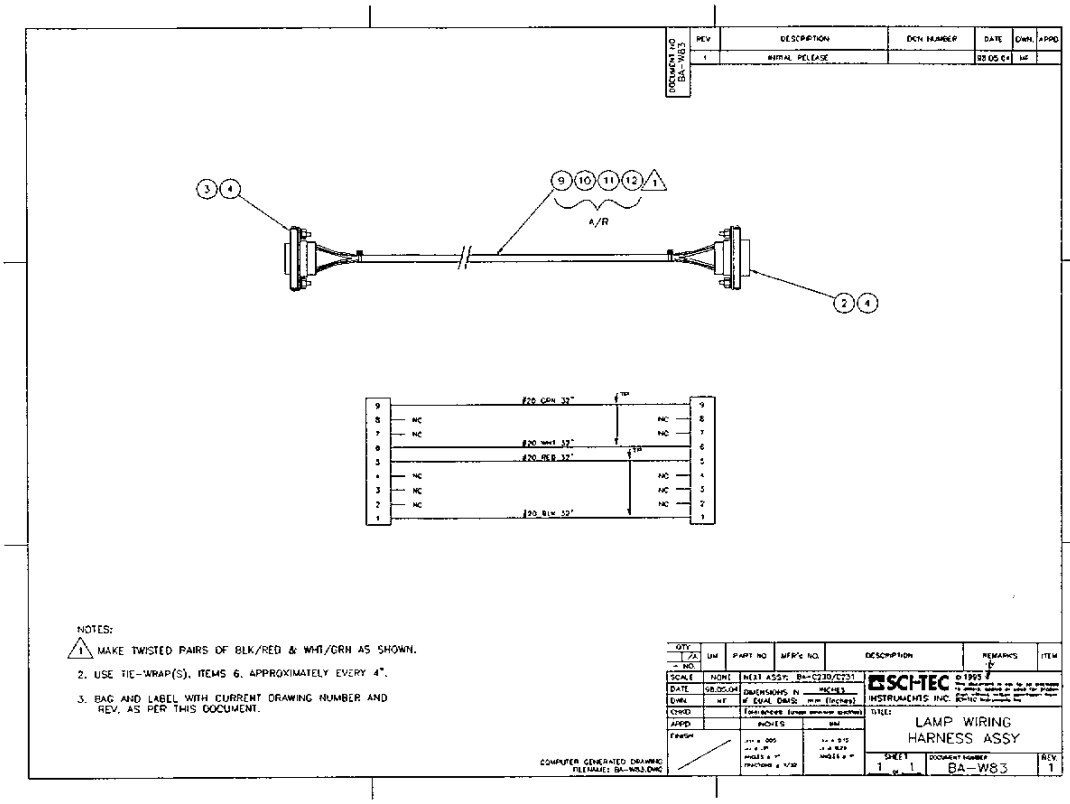


Figure 7.35

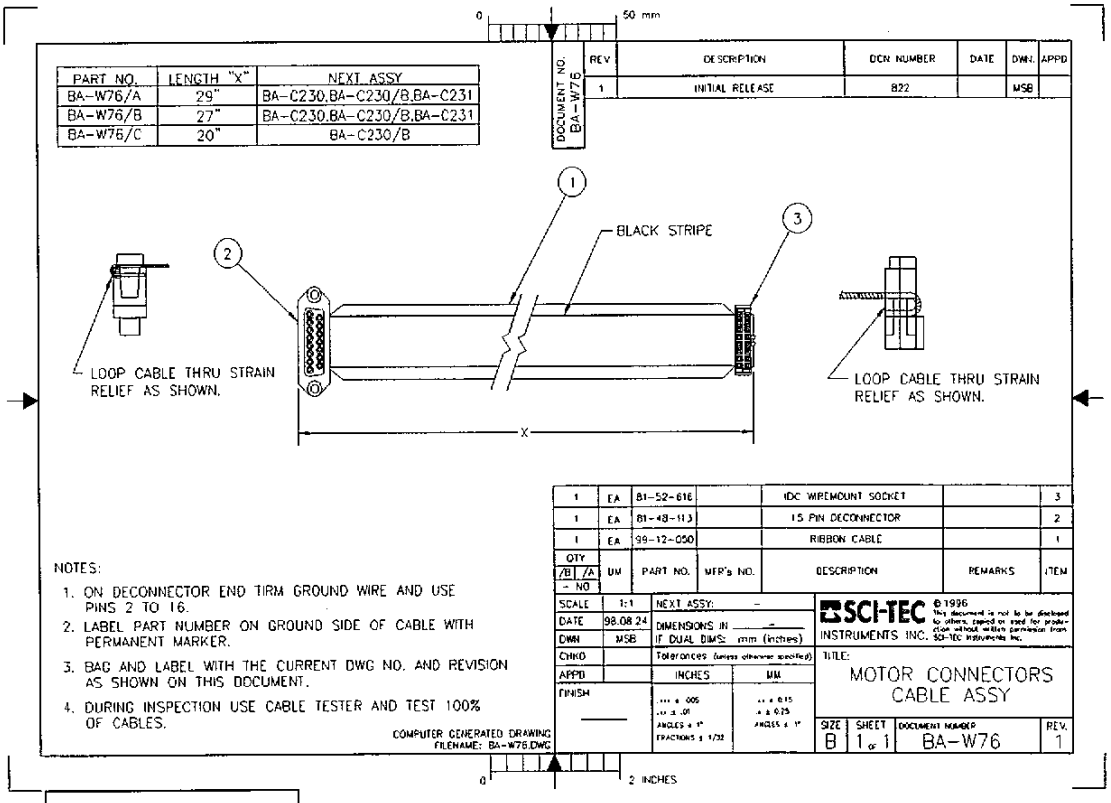


Figure 7.3-6

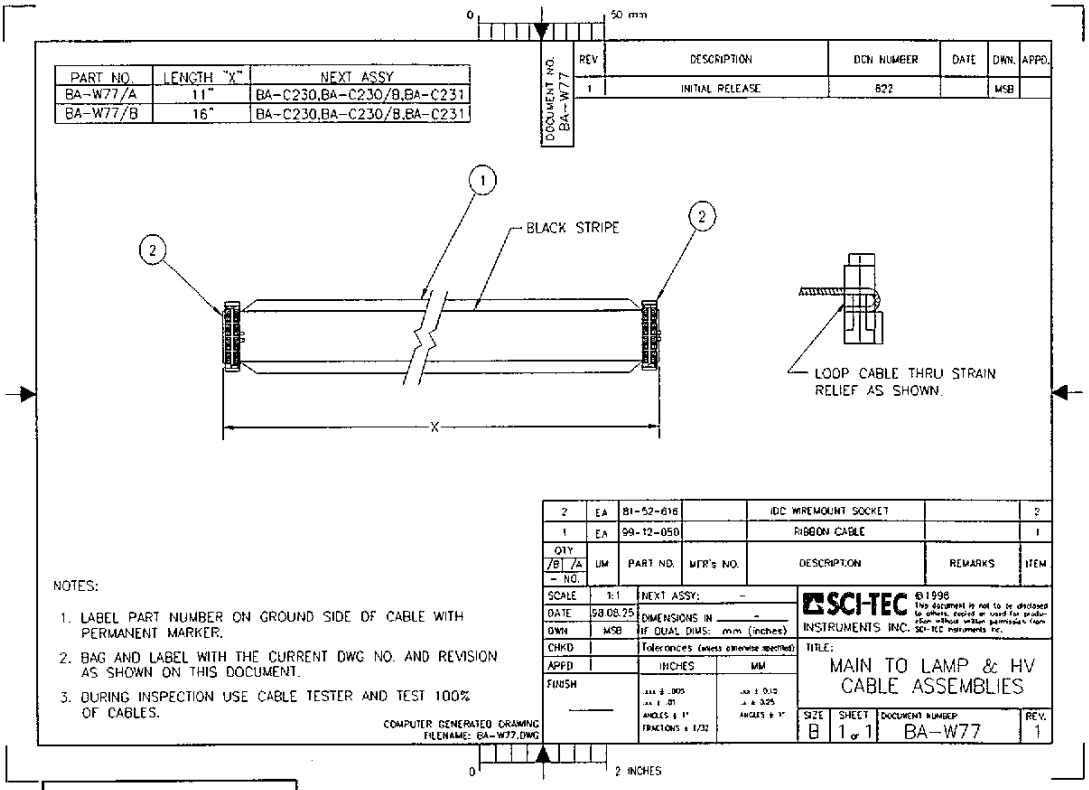


Figure 7.3-7

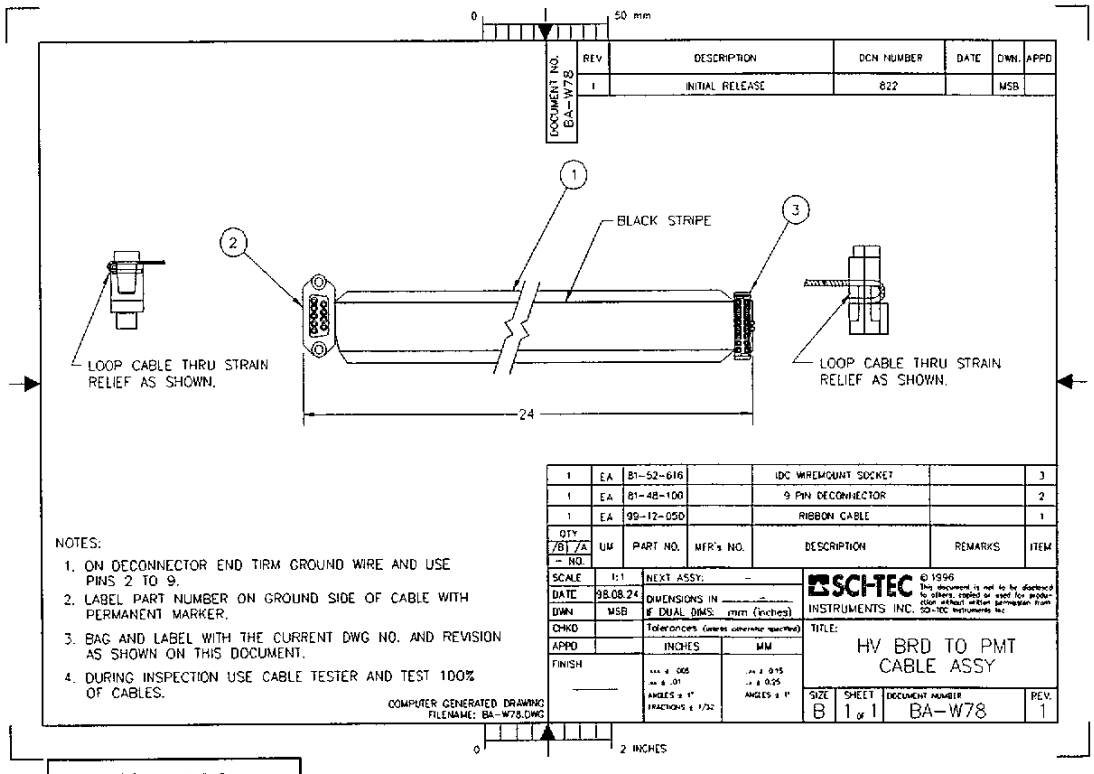


Figure 7.3-8

BREWER REFERENCE DOCUMENTATION

Section 7.4 Electronics Schematics

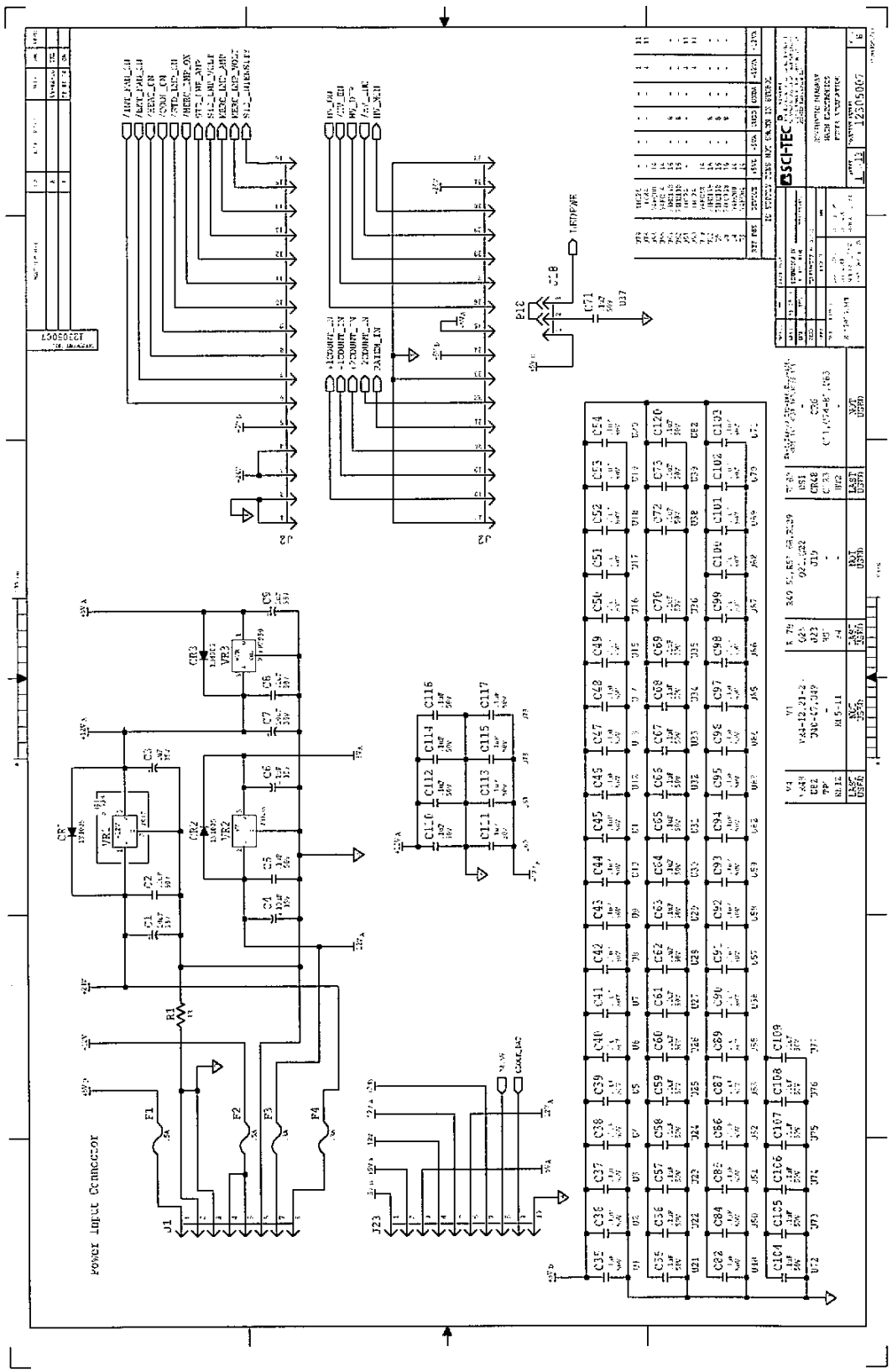
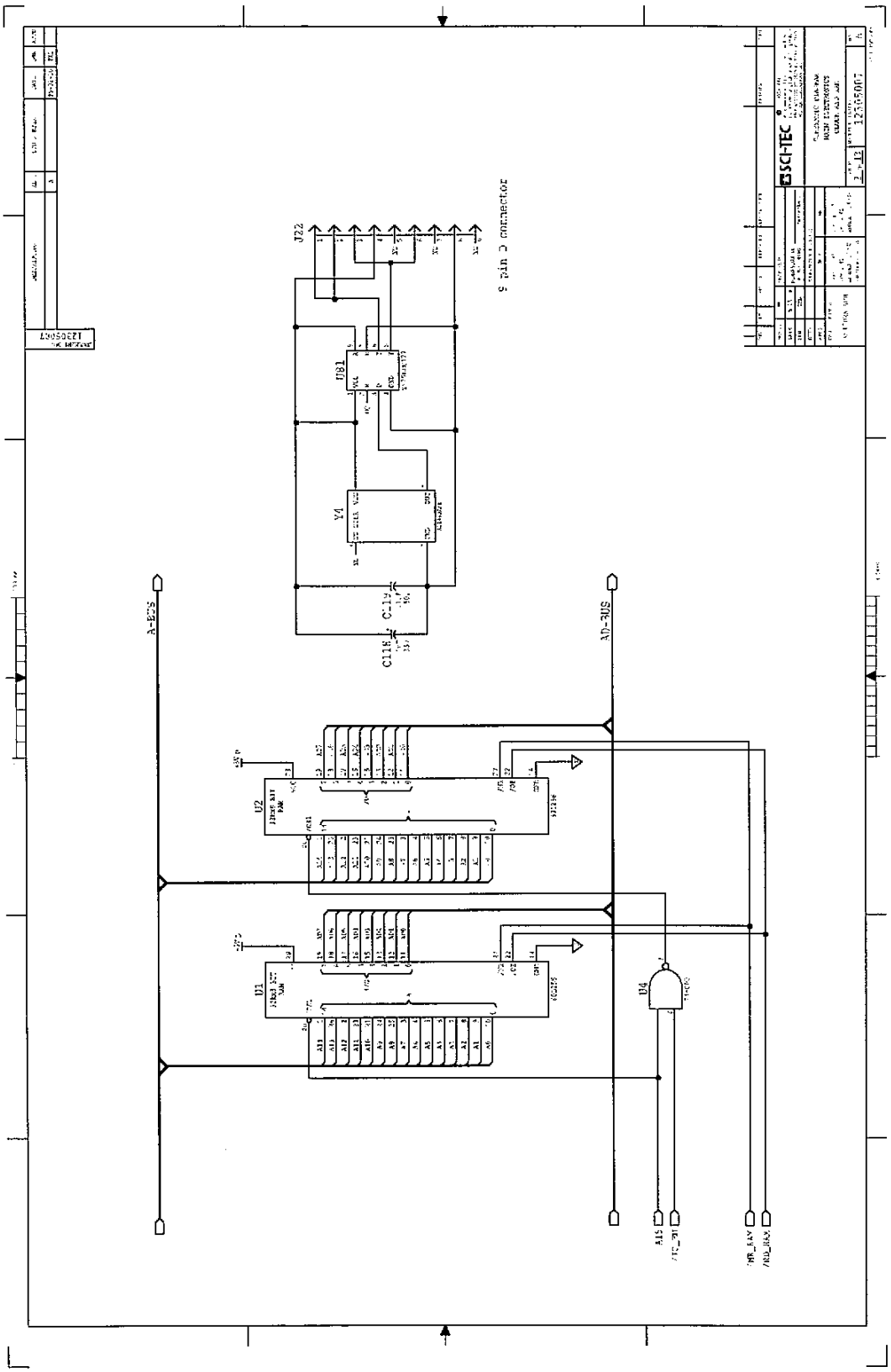
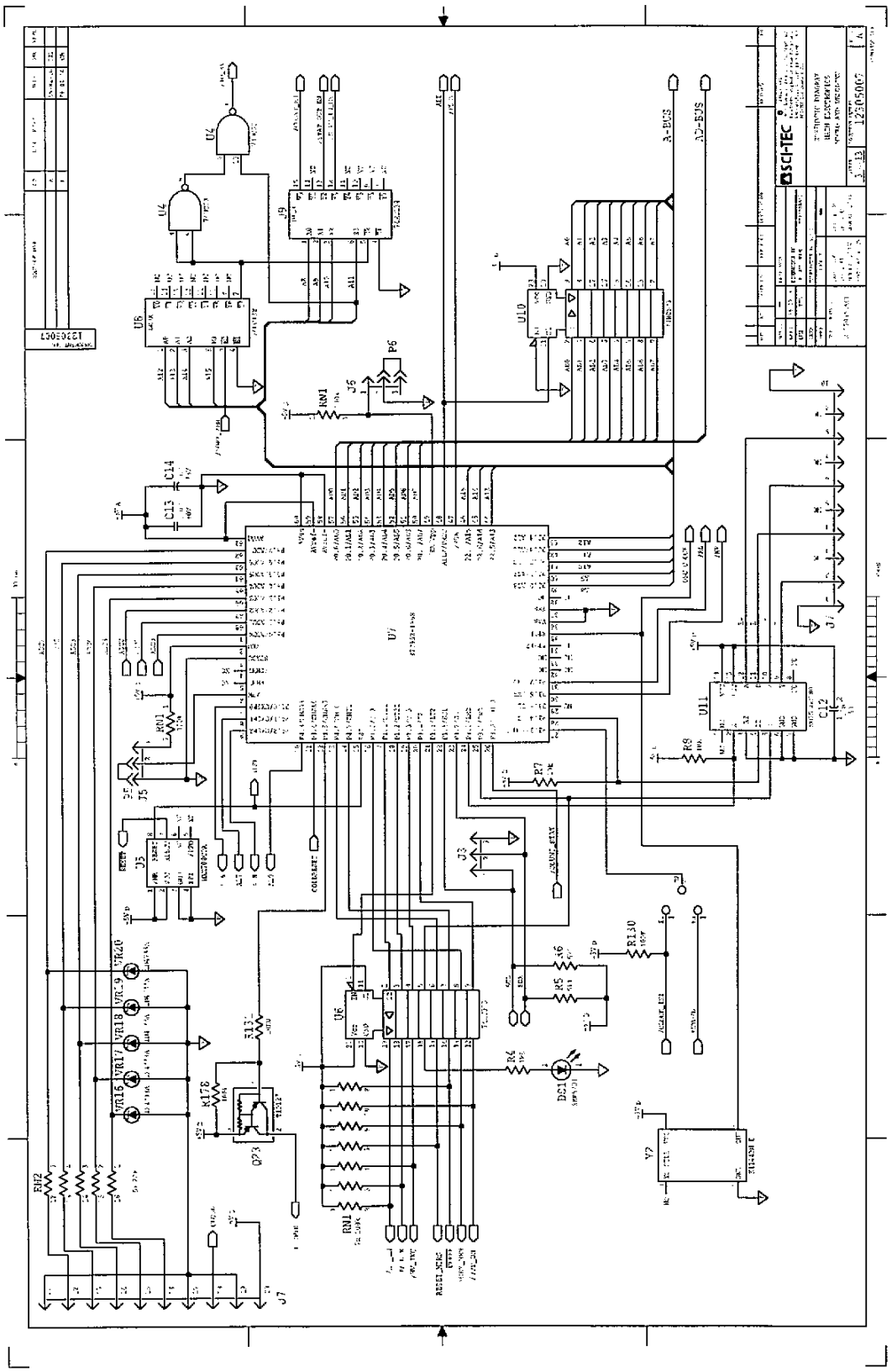
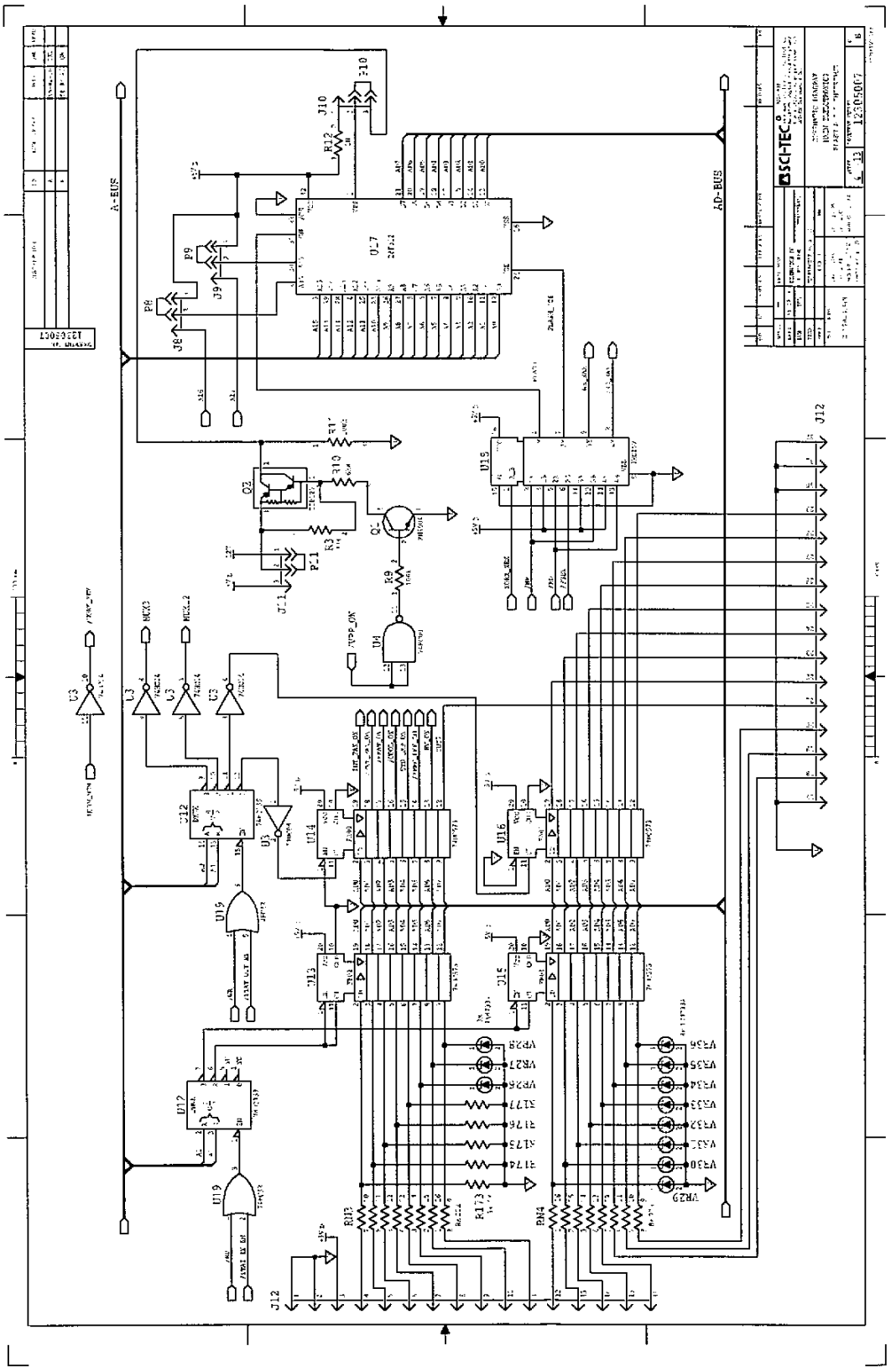
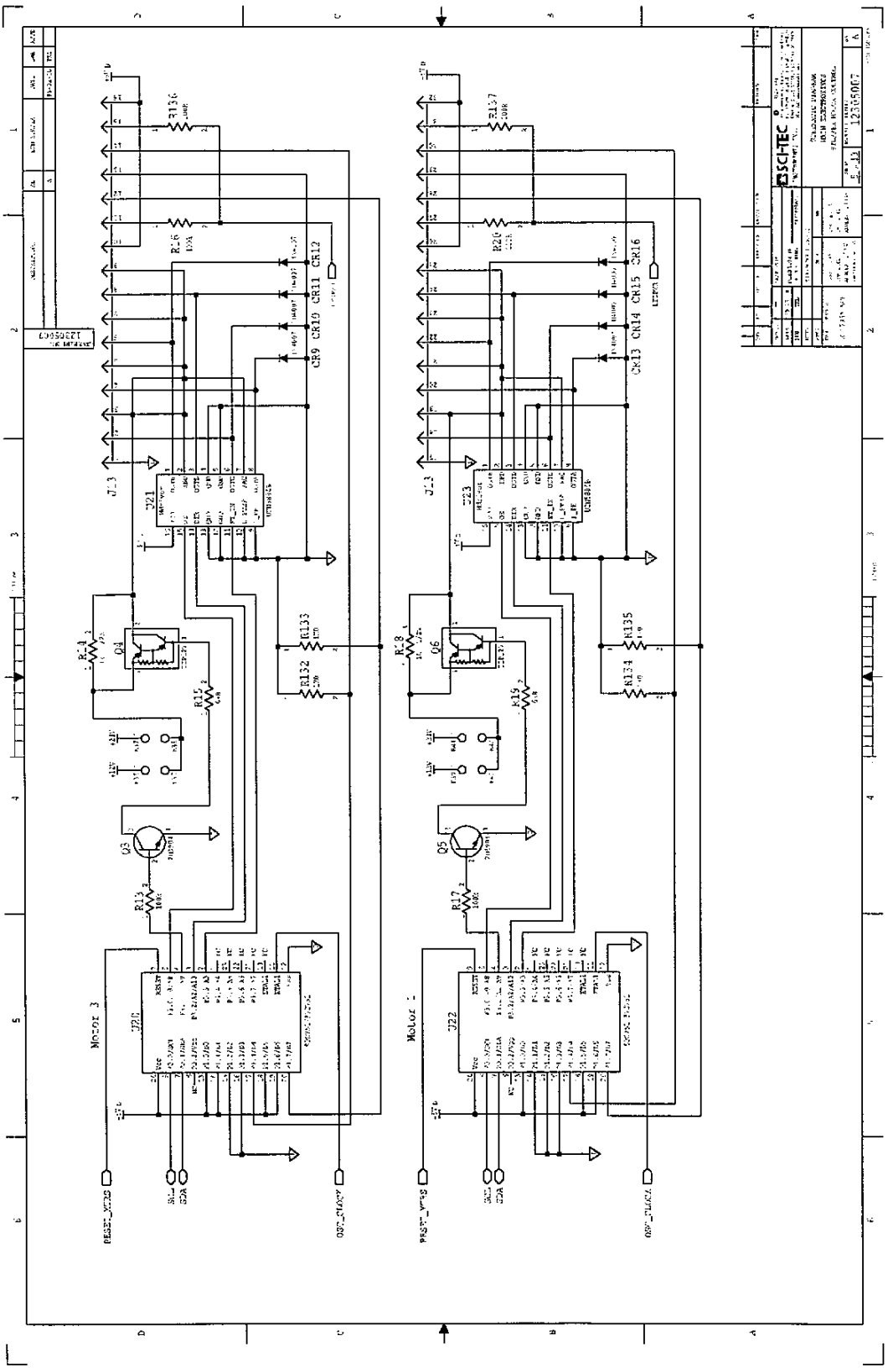


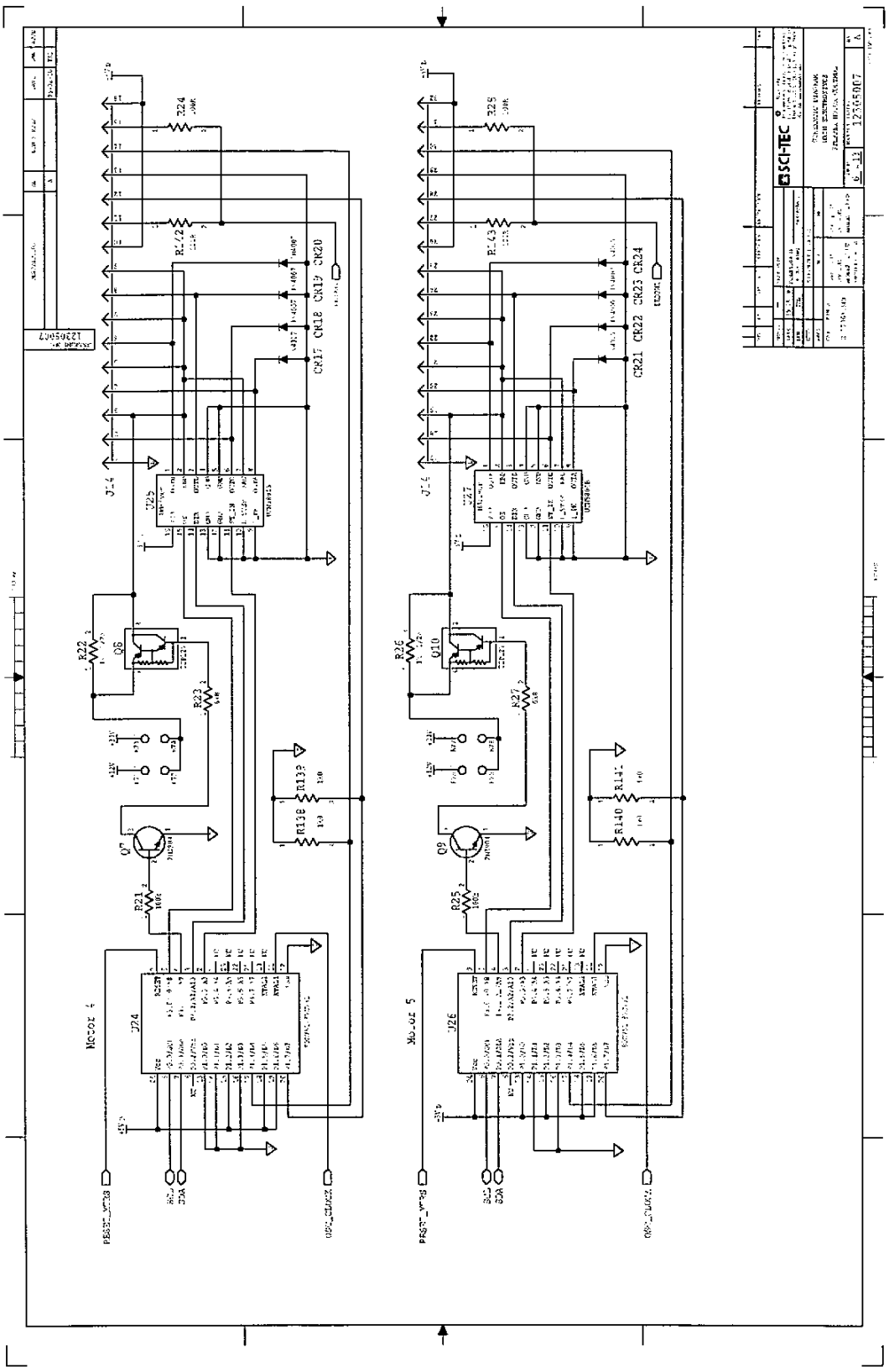
Figure 7.4-1

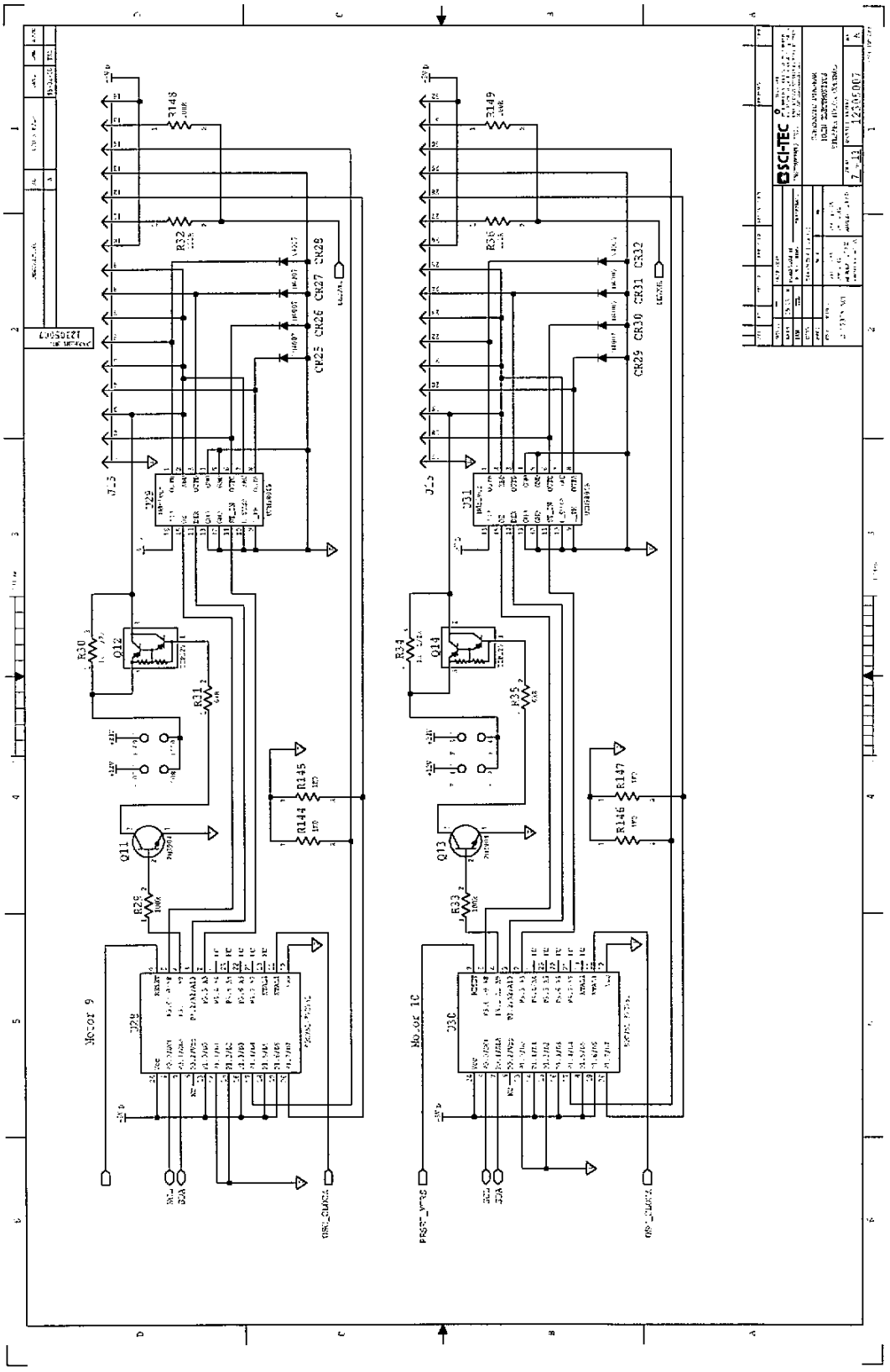

9 pin D connector
J22
A-BUS
AD-BUS
U2
U1
U4
Y4
C118

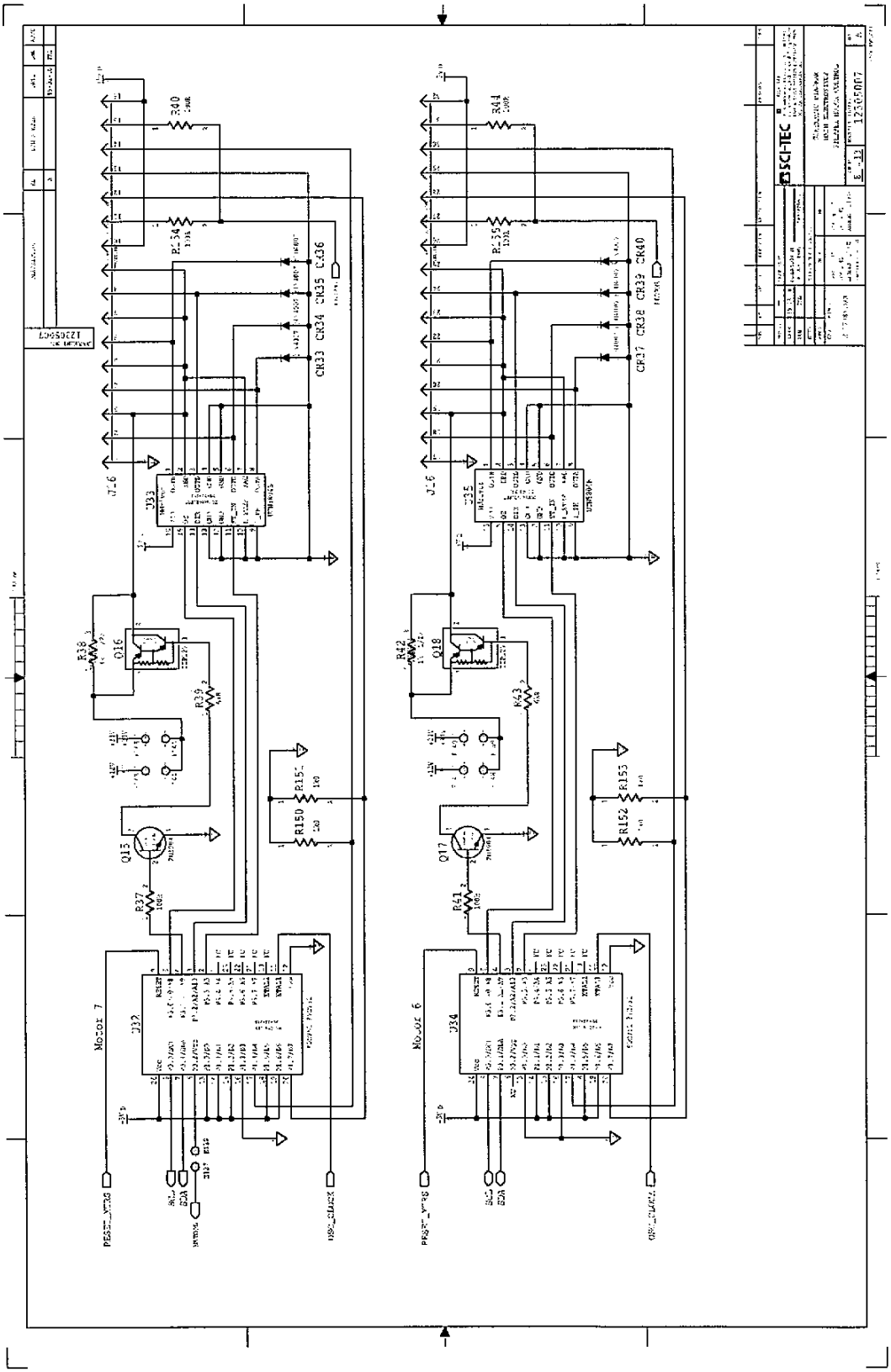


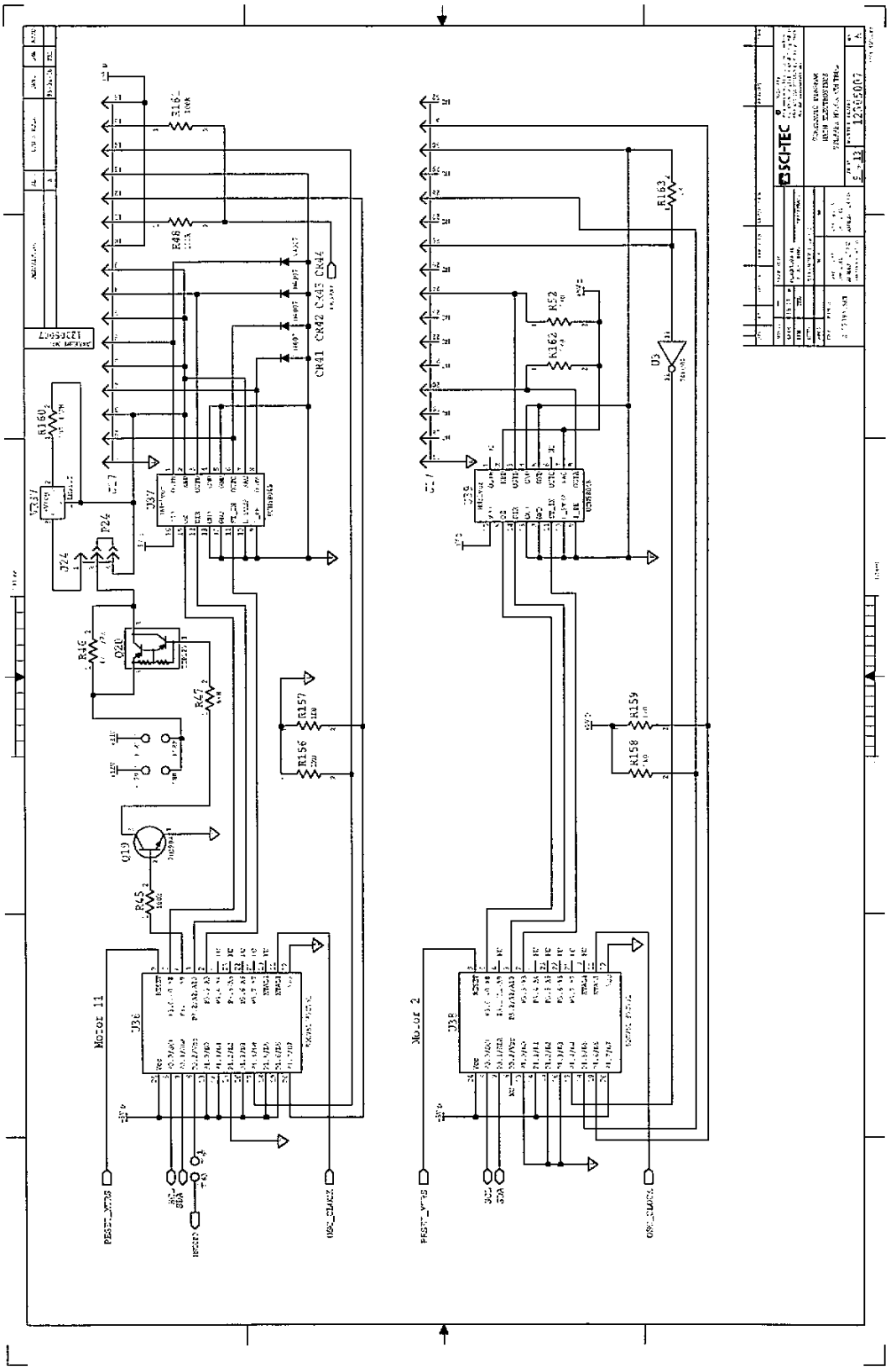


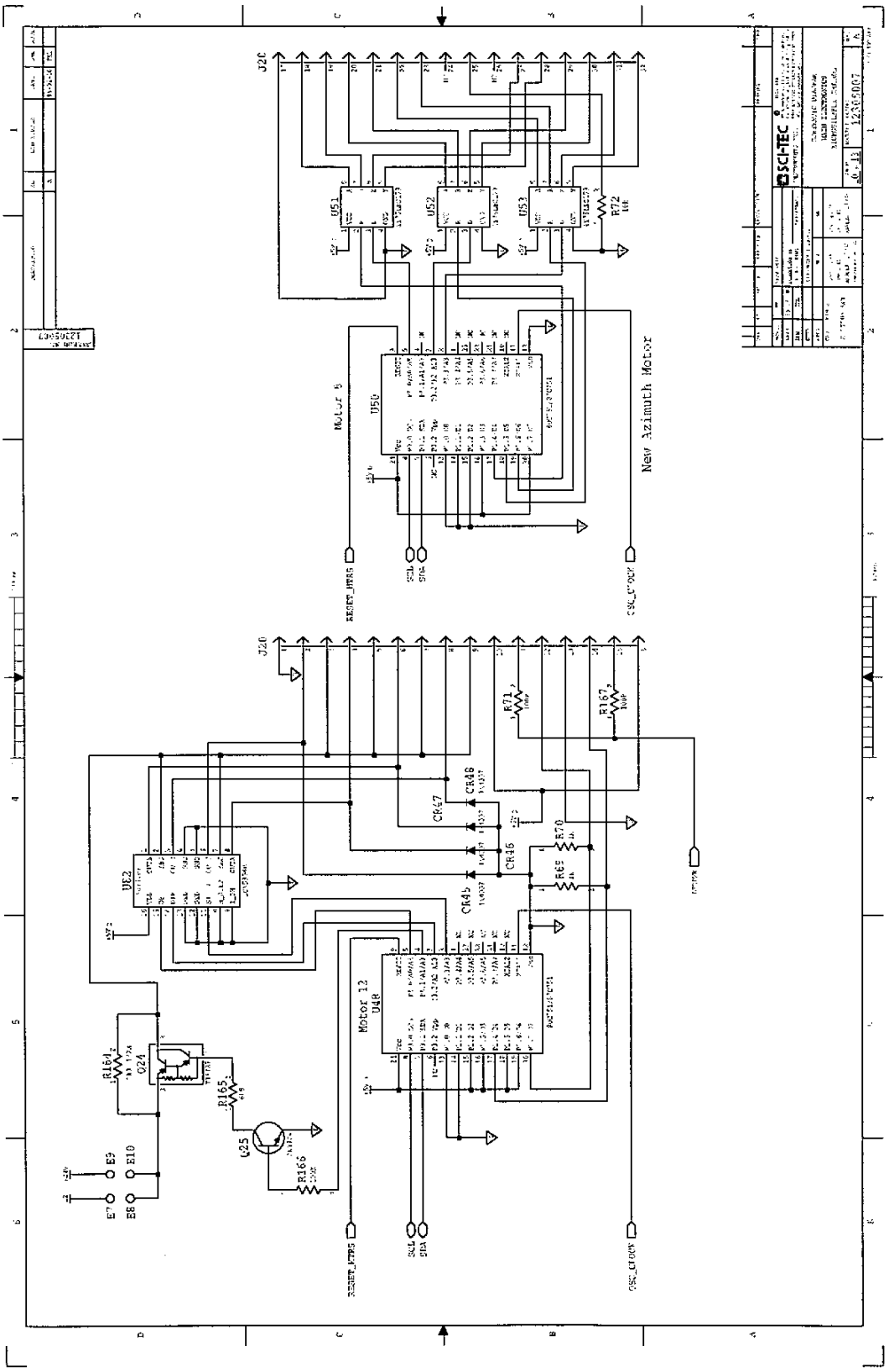


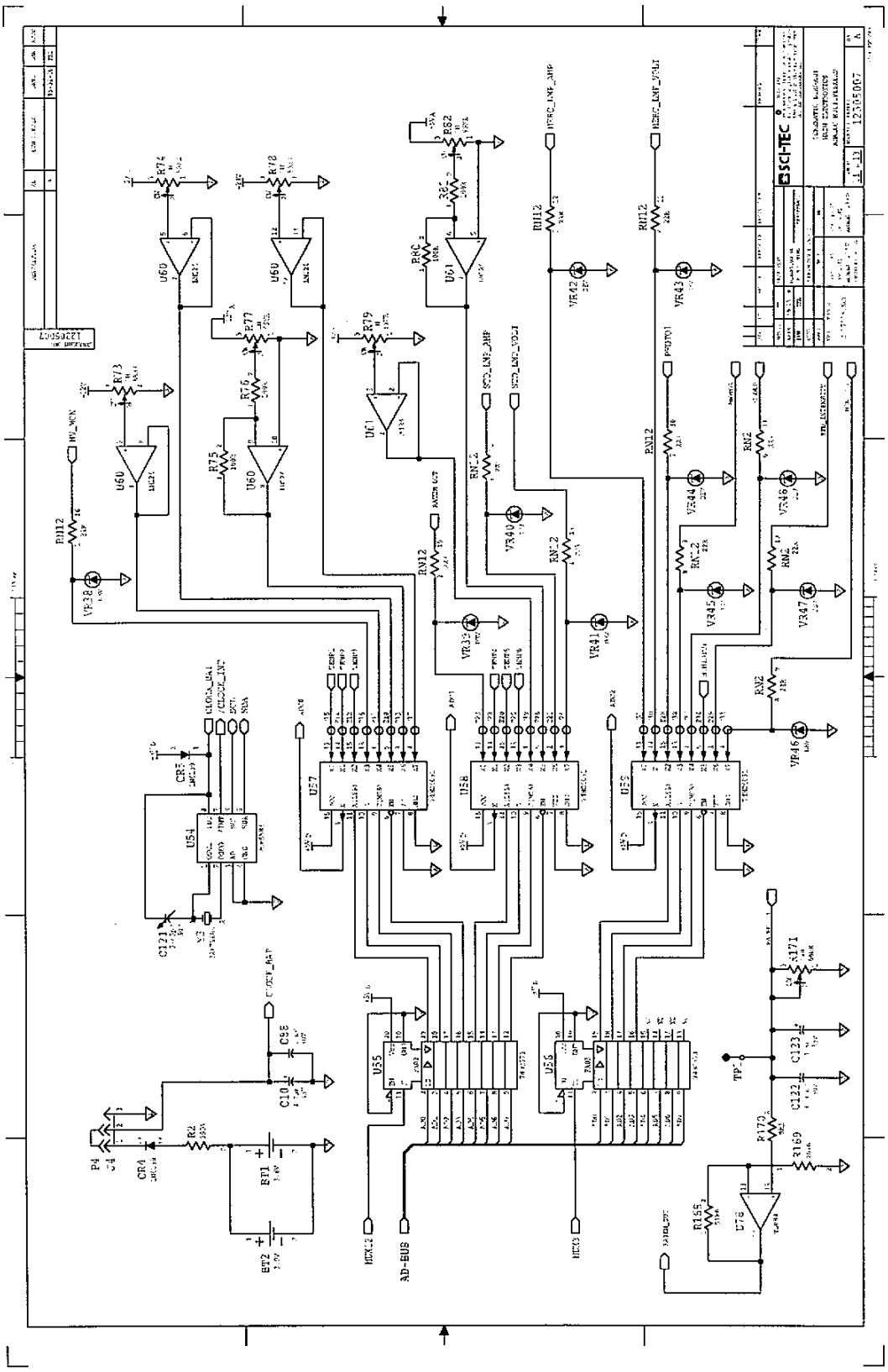


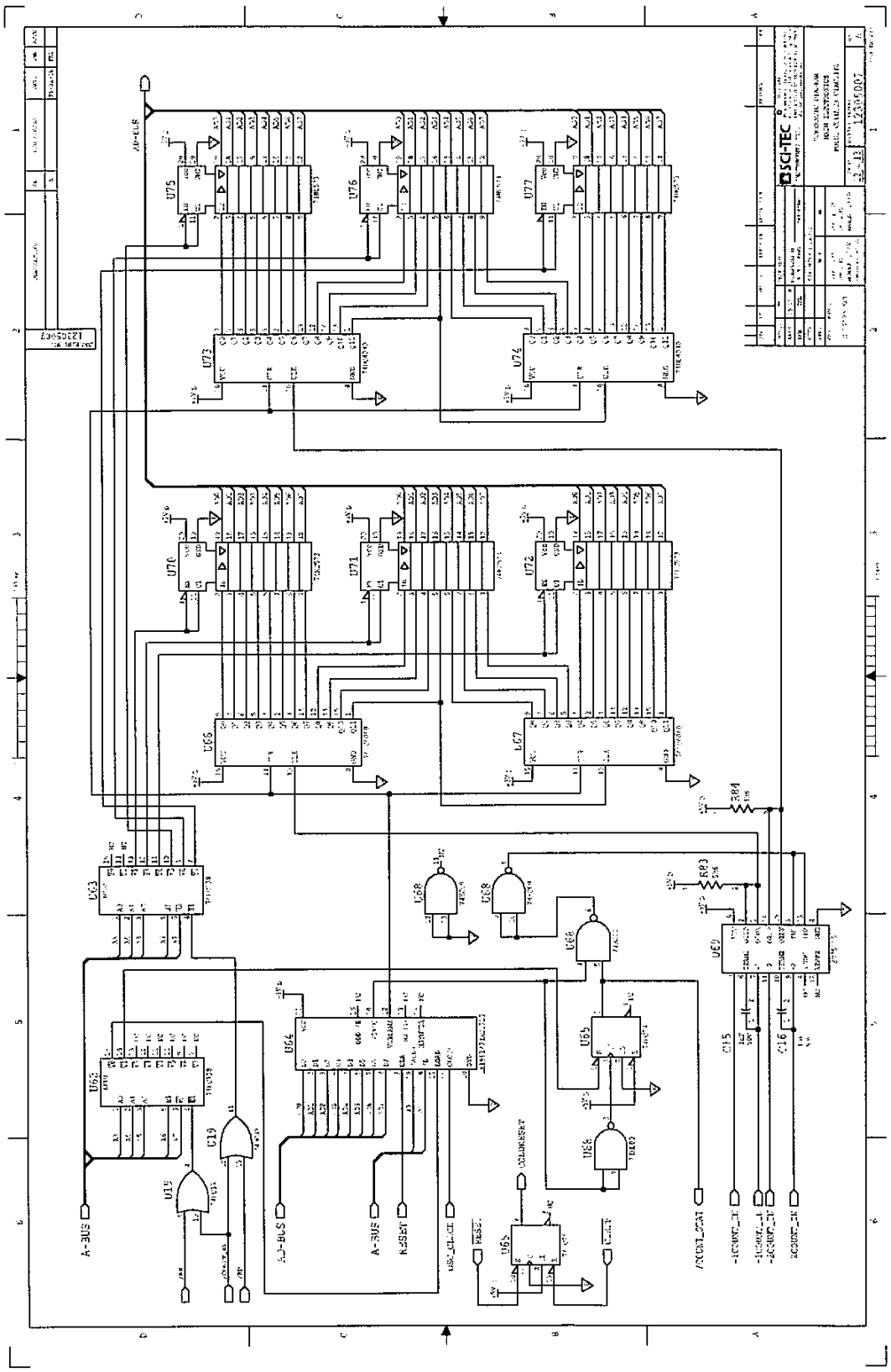


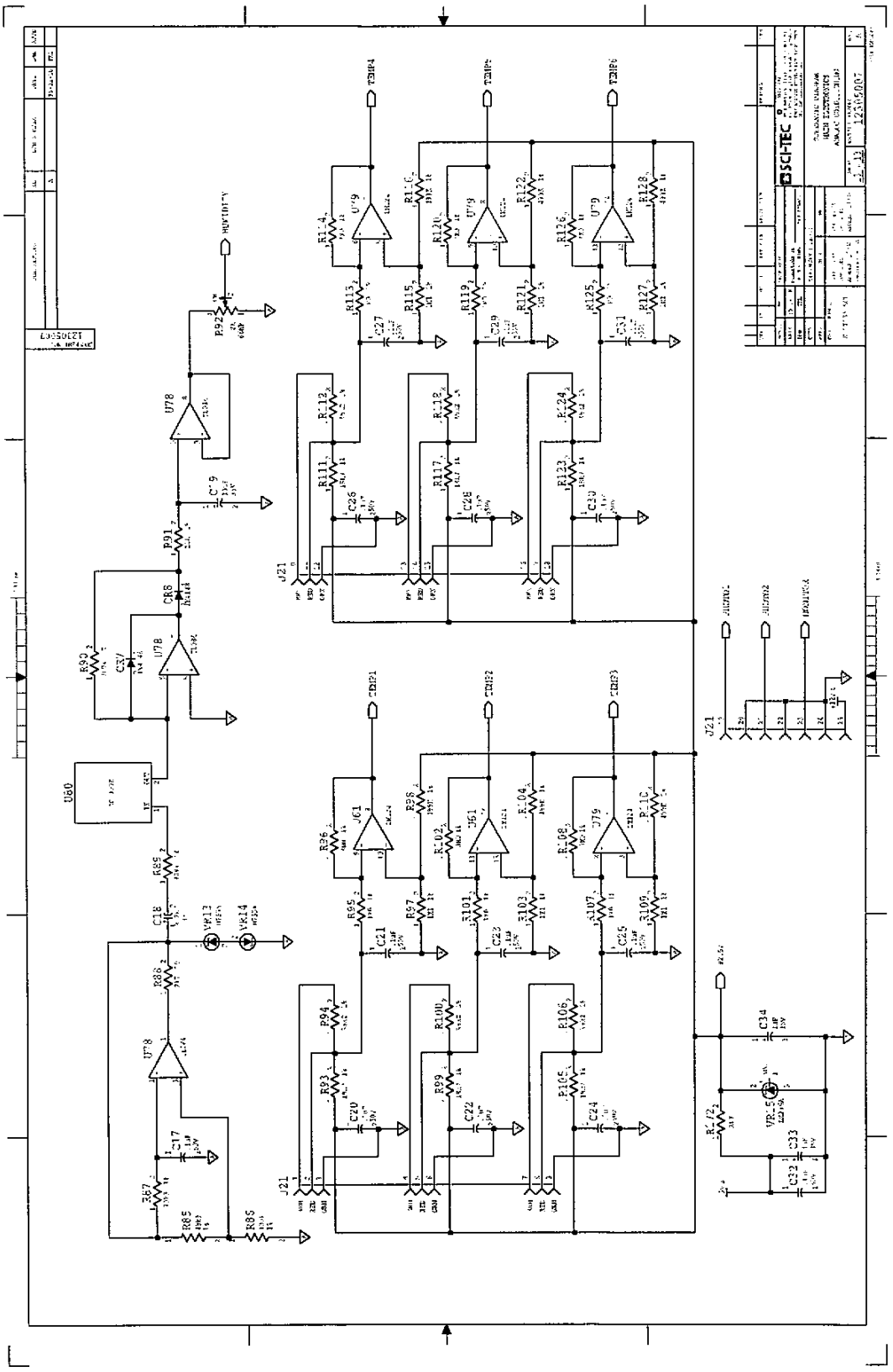

R40
R34
CR33 CR34 CR35 CR36
J16
J33
R38
Q16
R39
R157
R150
Q15
R37
Motor 7
J32
R44
R35
CR37 CR38 CR39 CR40
J16
J35
R42
Q18
R43
R153
R152
Q17
R41
Motor 6
J34


Motor 11
Motor 2
R163
R162
R157
R156
R159
R158
R160
R46
R47
R45
Q20
Q19
CR41
CR42
CR43
CR44
U5


J20
U51
U52
U53
R72
10k
U50
Motor 6
New Azimuth Motor
J20
R71
R167
CR48
CR47
CR46
CR45
R70
R69
U52
Motor 12
U48
R164
Q24
R165
Q25
R166
E9
E10
E7
E8







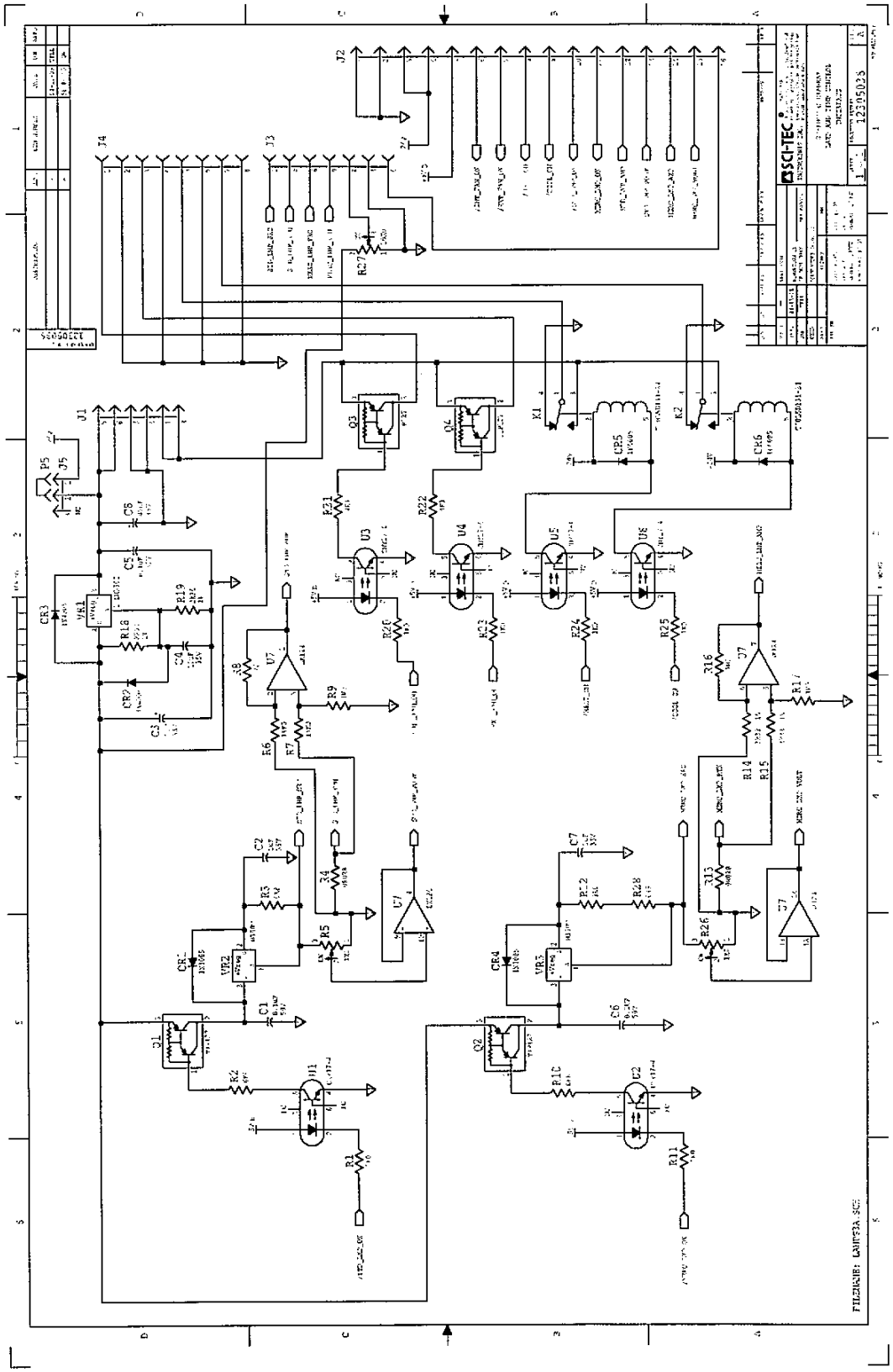


Figure 7.4-2

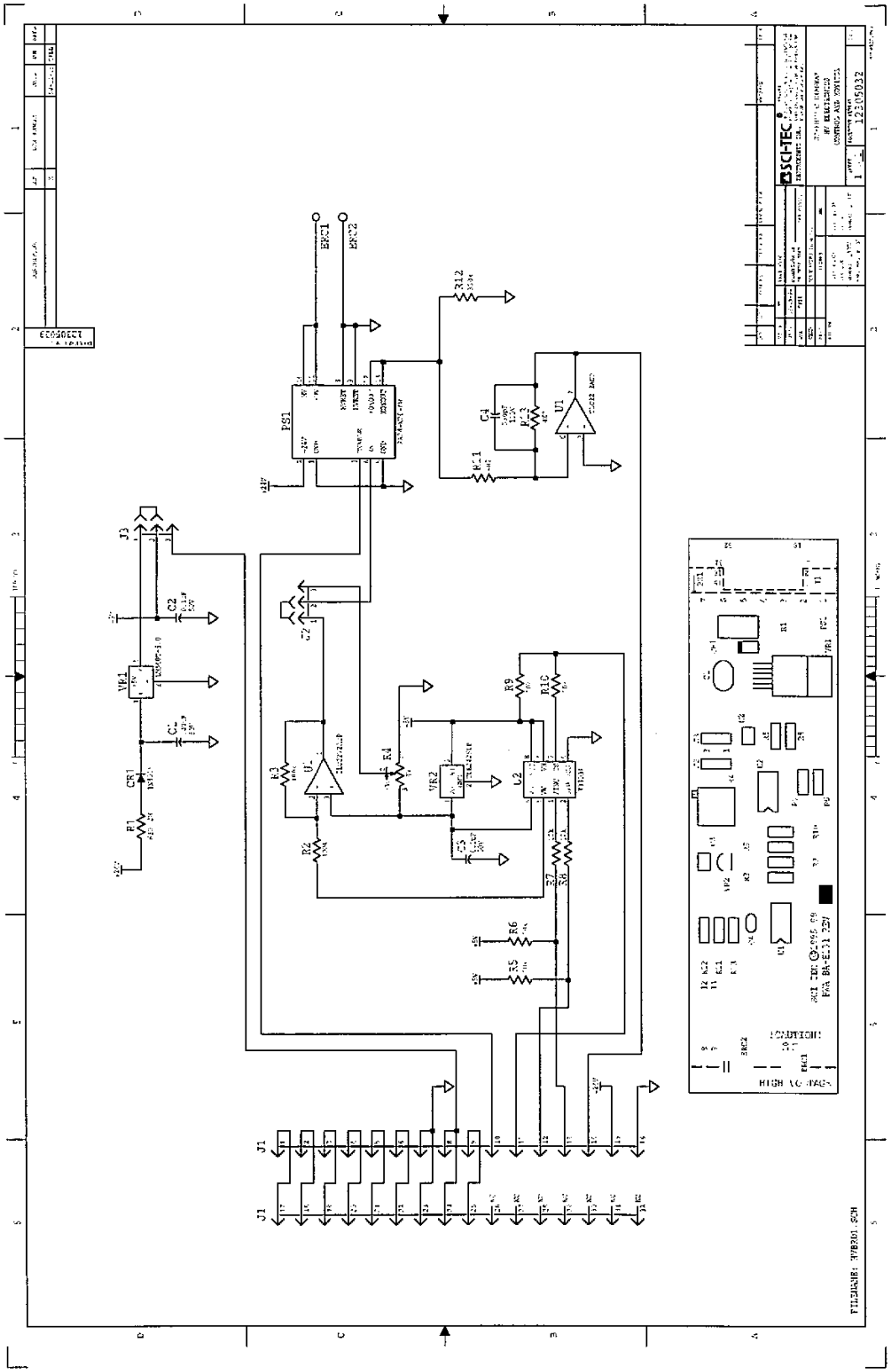
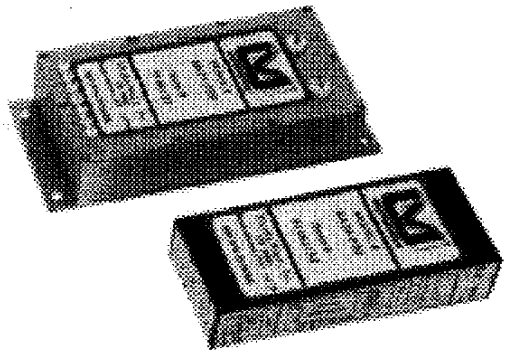


Figure 7.4-3

"F" SERIES

HIGH VOLTAGE POWER SUPPLY ACCESSORY

- Output Ripple Filter
- Output Test Point
- Optional Flying Lead
- Mates with "A" Series Power Supplies



GENERAL INFORMATION:

The "F" Series of Ripple Stripper™ Output Filters provide significant ripple reduction. While adding only 4000 pF of output capacitance and increasing output impedance by < 650 ohms, output ripple is reduced > 100 times! Also included is an Output Test Point and an Output Current Monitor feature. A High Voltage Shielded output cable is available as an optional feature.

HIGH VOLTAGE OUTPUT FILTER:

Strips the output ripple on Mu-Metal Shielded "A" Series High Voltage Power Supplies down to :

2A12	2Kv	4WATT	< 0.001%Vp-p
2A24	2Kv	20WATT	< 0.002%Vp-p
4A12	4Kv	4WATT	< 0.0005%Vp-p
4A24	4Kv	20WATT	< 0.0015%Vp-p
6A12	6Kv	4WATT	< 0.0015%Vp-p
6A24	6Kv	20WATT	< 0.0015%Vp-p

HIGH VOLTAGE OUTPUT:

Square .025" pins are used for high voltage output and high voltage return. These pins can be used for PCB mounting or direct wiring. An optional High Voltage Output Flying Lead is available.

HIGH VOLTAGE TEST POINT:

A 100 megohm divider provides a 100:1 test point output on a 2 pin header. This test point has an output impedance of 1.11 megohm and is calibrated for use with a 10 megohm input impedance meter. Overall accuracy is ± 2.5% with a temperature coefficient of ± 250 ppm per °C.

For applications requiring a different scale factor, such as a DAC compatible design, an external impedance may be added in parallel with the output.

OUTPUT CURRENT MONITOR:

The "F" Series have a feature where the output current of the high voltage multiplier can be monitored by reading the voltage appearing between Output Monitor pin 3 and Signal Ground pin 5. Detailed information is described on applications note "AP-13".

SHIELDING:

All models are available with optional wrap-around Mu-Metal Shielding. This shielding attenuates magnetic and electrostatic emissions, while shielding ripple reduction circuitry from outside noise.

MECHANICAL:

The "F" Series accessories are designed to be added to the basic "A" module at the factory prior to encapsulation. The combined package is 6.35 In^3. As always, a Chassis Mount metal package is also available.

ENVIRONMENT:

The "F" Series meets all environmental specifications for temperature, shock & vibration as the "A" series.

ULTRAVOLT
C.S. 9000
RONKONKOMA, NY 11779
800-876-POWER
FAX 516-363-2423
"Making High Voltage Easier"

Figure 7.4-4

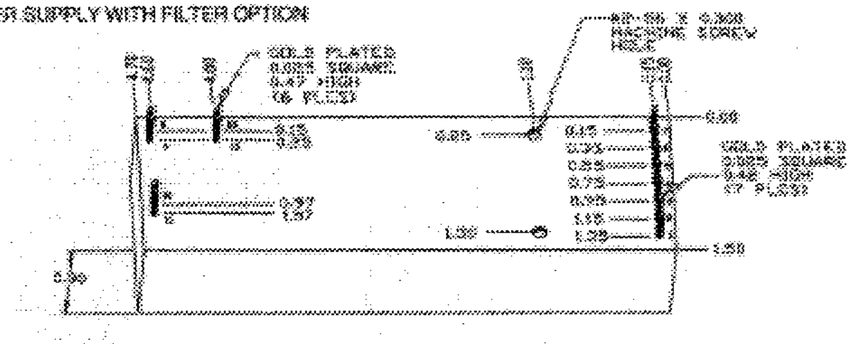
"F" SERIES

HIGH VOLTAGE POWER SUPPLY ACCESSORY

PLASTIC CASE: POWER SUPPLY WITH FILTER OPTION

CONSTRUCTION:
Epoxy Filled DAP Box
Certified to MIL-M-14F
SDG-F

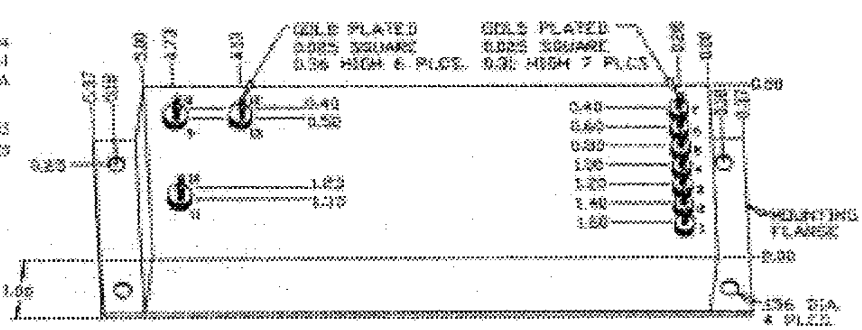
TOLERANCE:
Overall ± 0.030
Pin to Pin ± 0.005



METAL CASE: POWER SUPPLY WITH FILTER OPTION

CONSTRUCTION:
Epoxy Filled Aluminum Box
Chem Film per MIL-C-5541
Class 1A

TOLERANCE:
Overall ± 0.032
Pin to Pin ± 0.005



Connections

1 - Input PWR Return
2 - Positive PWR Input
3 - Output Current Monitor
4 - Enable
5 - Signal Return
6 - Remote Adjust
7 - Reference
8 & 9 - H.V. Return
10 & 11 - H.V. Output
12 & 13 - Output Test Point
All grounds joined internally. Power supply mounting points isolated from internal grounds by [illegible]

Ordering Information

Case	Plastic Case - [illegible]	Std
	Aluminum Case	-C
Shield	Mu Metal Shield	-M

Example: 2A12 – P 4 – F – C

- C — Option (Case)
- F — Ripple Stripper™ Filter


ohmic instruments co.
508 August Street, Easton, Maryland 21601
(410)820-5111 (800)826-7713 Fax (410)822-9633
WebSite: http://www.thomasregister.com/ohmic
E-Mail: ohmic@skipjack.bluecrab.org
BIOMEDICAL & ENVIRONMENTAL SENSORS, INSTRUMENTS & CONTROLS SINCE 1946
ABSOLUTE HUMIDITY TRANSMITTER - AHT-200 SERIES
THERMAL CONDUCTIVITY PROBE PROVIDES VOLTAGE OUTPUT DIRECTLY PROPORTIONAL TO MOISTURE & OTHER GASES
REPEATABLE & DURABLE
PERFORMS WHERE OTHER HUMIDITY SENSORS FAIL
RANGE: 0-130g/M3 (0-100% RH)
OUTPUT: 0-5 or 0-10VDC
24VDC OPERATION
OPERATION TO 200°C (400°F)
IMMUNE TO MOST PHYSICAL & CHEMICAL CONTAMINANTS
OPERATION IN FULLY SATURATED ENVIRONMENTS
IDEAL FOR INDUSTRIAL PROCESS DRYING
MEASUREMENT & CONTROL OF THE MASS TO VOLUME RATIO OF WATER VAPOR
AHT-200 Series transmitters overcome many of the limitations of humidity sensors that cannot be used or fail prematurely in industrial applications. Unlike other humidity sensors which rely on surface or bulk moisture absorption, the sensor used by the AHT-200 Series utilizes thermal conductivity.
The sensor consists of two matched NTC (Negative Temperature Coefficient) thermistors, one is hermetically glass encapsulated in dry nitrogen, the other is exposed to the environment. When a voltage is applied, more heat is dissipated from the sealed thermistor resulting in operation at a lower temperature than the exposed element. The difference in temperature (ΔT) between the two thermistors is proportional to the absolute humidity of the surrounding environment measured in grams per cubic meter or grains per pound. Absolute humidity can be converted to other psychrometric units such as %RH, PPMv, PPMw, and Dew Point. In addition, if the absolute humidity and temperature is known, the enthalpy (total heat content of air or mixtures in Kilojoules per Kilogram or BTU's per Pound) can be determined.
AHT-200 Series transmitters are not limited to the measurement of water vapor. Any gas concentration can be determined by utilizing the measurement of the difference in thermal conductivity with respect to dry nitrogen.
AHT-200 Series transmitters are used to control the process drying of wood, paper, textiles, chemicals and food products. In addition, they are ideal for applications where moisture levels must be maintained to optimum levels such as in cooling, chemical production, the inlets of turbines, battery production and fuel cell operation. Contact our engineers to discuss your requirements.
WARRANTY
All products manufactured by OHMIC Co. are warranted to be free of defects in material and workmanship for one year after delivery. Any equipment found to be defective within this period will be repaired or replaced free of charge.

Figure 7.4-5

SPECIFICATIONS

Range	0-150g/M³
Output	0-10VDC
Power Supply	15-28VDC
Accuracy	±2g/M³ @ 20g/M³ & 40°C
Repeatability	±0.5VDC
Stabilization Time	120 Seconds After Power is Applied
Response Time	60 Seconds for 90% Change
Operating Temperature	-20 to +200°C For Sensor 0 to 40°C For Electronics
Insulation Resistance	>50MΩ @ 500VDC For Sensor
Material	Aluminum Sensor Housing, Steel Enclosure, Rubber Insulated Cable with 22 AWG Wire (3-Conductor) & Fiberglass Circuit Card.

Relationship Between Absolute Humidity, Relative Humidity & Mixing Ratio

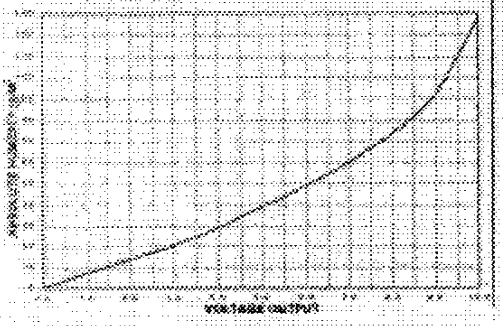
(1) $\%RH = \frac{1000}{E_s}$

(2) $AH = \frac{E}{(1+0.00366T)T}$

(3) $MR = \frac{0.622E}{P_a - E}$

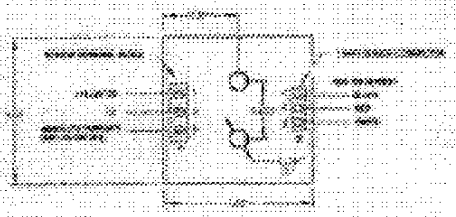
%RH = Percent Relative Humidity
AH = Absolute Humidity in g/M³
MR = Mixing Ratio in Kg of Water Vapor per Kg of Air
E = Actual Water Vapor Pressure in Air in Pascals
Es = Saturation Water Vapor Pressure in Air in Pascals
Pa = Atmospheric Pressure in Pascals
(1 Atmosphere = 101,325 Pa)
T = Temperature in Celsius

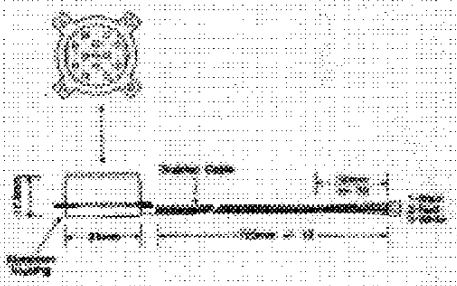
Absolute Humidity vs Voltage Output



DIMENSIONS

AHT-220-01
Printed Circuit Card & Remote Probe





Ordering Information

AHT-220-01: Absolute Humidity Transmitter for OEM Applications. Consists of Printed Circuit Board with Remote Probe. Probe Equipped with 72Bmm Stainless Steel Braided Cable. (Specify Output: 0-5 or 0-10VDC)

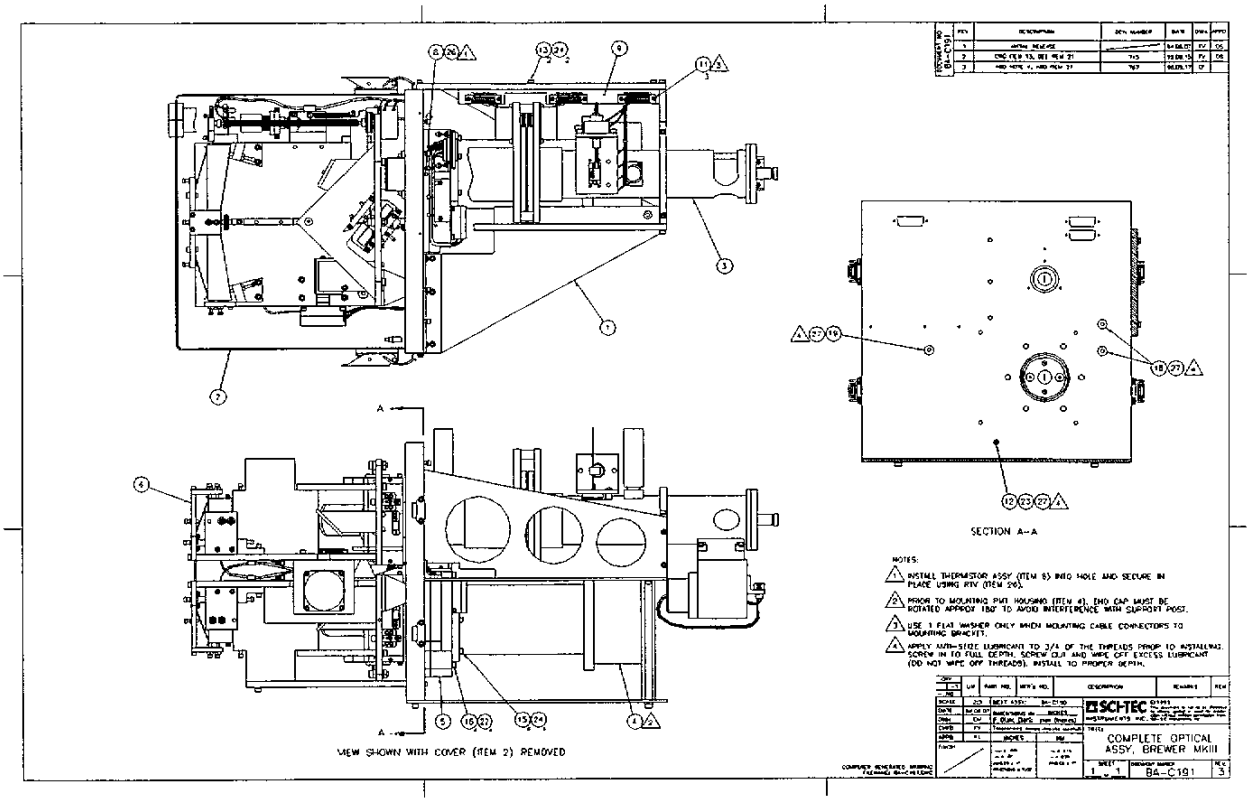
In addition, OHMIC's capabilities include custom product design as well as the supply of many standard %RH and Temperature Transmitters for HVAC, commercial & industrial applications. Contact our engineers for a recommendation on the humidity sensor and controls best suited to your application.

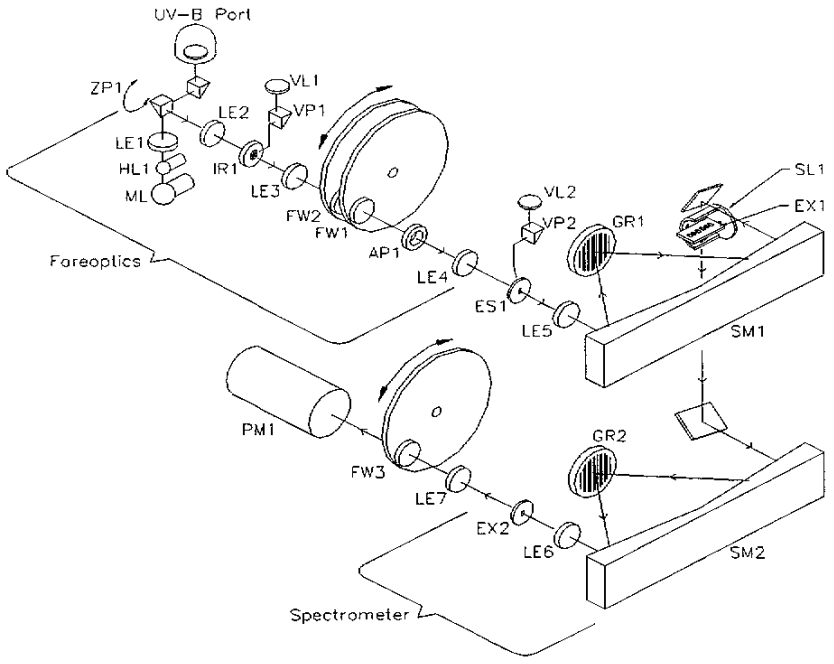
ohmic instruments co.
509 August Street, Easton, Maryland 21601
(410)820-2111 (800)638-7713 Fax (410)822-8633
Website: http://www.thomasregister.com/olhmin
E-Mail: ohmic@skipjack.bluecrab.org

BREWER REFERENCE DOCUMENTATION

Section 7.

Section 7.6 Optics


SECTION A-A
VIEW SHOWN WITH COVER (ITEM 2) REMOVED
NOTES:
1. INSTALL THERMISTOR ASSY (ITEM 8) INTO HOLE AND SECURE IN PLACE USING RTV (ITEM 26).
2. PRIOR TO MOUNTING PMT HOUSING (ITEM 4), END CAP MUST BE ROTATED APPROX 180° TO AVOID INTERFERENCE WITH SUPPORT POST.
3. USE 1 FLAT WASHER ONLY WHEN MOUNTING CABLE CONNECTORS TO MOUNTING BRACKET.
4. APPLY ANTI-SEIZE LUBRICANT TO 3/4 OF THE THREADS PRIOR TO INSTALLING. SCREW IN TO FULL DEPTH. SCREW OUT AND WIPE OFF EXCESS LUBRICANT (DO NOT WIPE OFF THREADS). INSTALL TO PROPER DEPTH.
SCI-TEC
COMPLETE OPTICAL ASSY, BREWER MKIII
BA-C191


UV-B Port
ZP1
VL1
VP1
LE2
LE1
HL1
ML
IR1
LE3
FW2
FW1
AP1
LE4
Foreoptics
VL2
VP2
GR1
SL1
EX1
ES1
LE5
SM1
PM1
FW3
LE7
GR2
EX2
LE6
SM2
Spectrometer

Item No.	BA-C191/B Part No.	Brewer Complete Optical Assy Description	Qty
1	BA-C192	MAIN FRAME ASSY	1.00
2	BA-C196	LIGHT COVER ASSY	1.00
3	BA-F01/B	FORE OPTICS ASSY	–
4	BA-P01/B	PHOTOMULTPLY HOUSING ASSY	1.00
5			
6	BA-S120	DOUBLE SPECTROMETER ASSY, MKIII	–
7	BA-F01/D	FORE OPTICS ASSY	1.00
8	BA-W52	THERMISTOR ASSEMBLY	–
9	BM-C70	OPTIONS CONN BRACKET	1.00
10	BA-W79	THERMISTOR, TEMP PROBE ASSY	1.00
11	BA-S120/B	DBL SPCTRM NEW ASSY MKIII	1.00
12	81-90-620	LOCK, CONN SLIDE LOCK POS	3.00
13	83-79-072	SCREW 6-32 X 5/8 HSC SS	1.00
14	83-79-070	SCREW 6-32 X 1/2 HSC SS	2.00
15	83-79-114	SCREW 10-32 X 1/2" LG, SKT HD CAP,SS	2.00
16	83-79-119	SCREW 10-32 X 1" LG, SKT HD CAP,SS	4.00

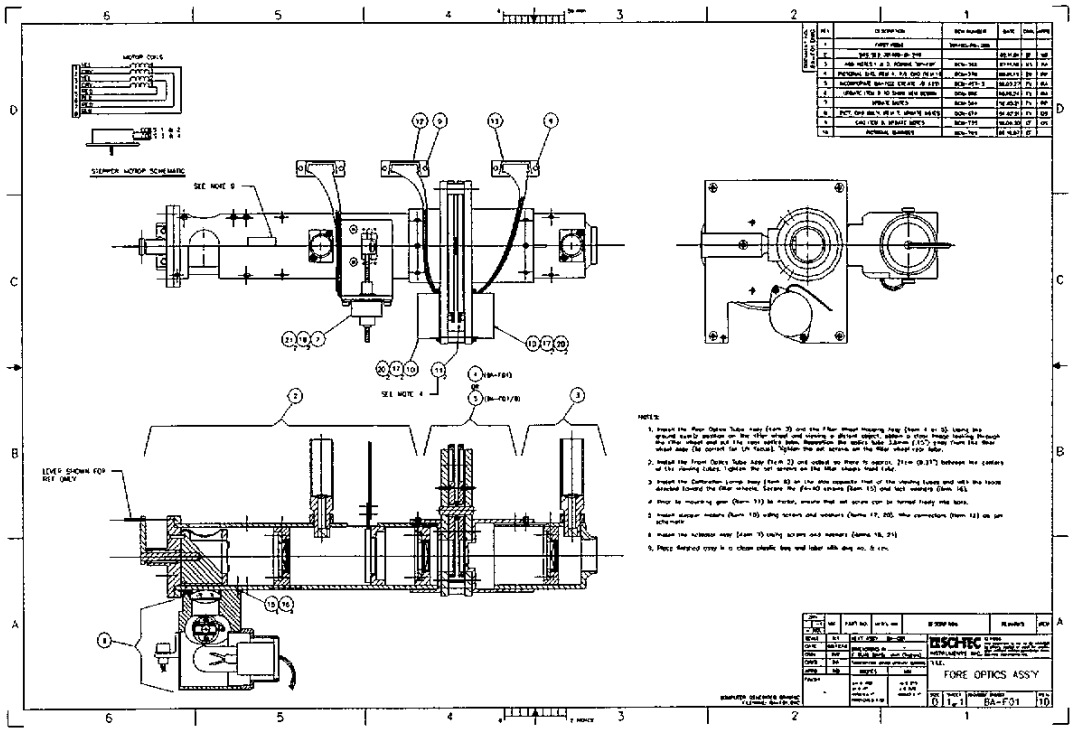


Figure 7.6-2.1

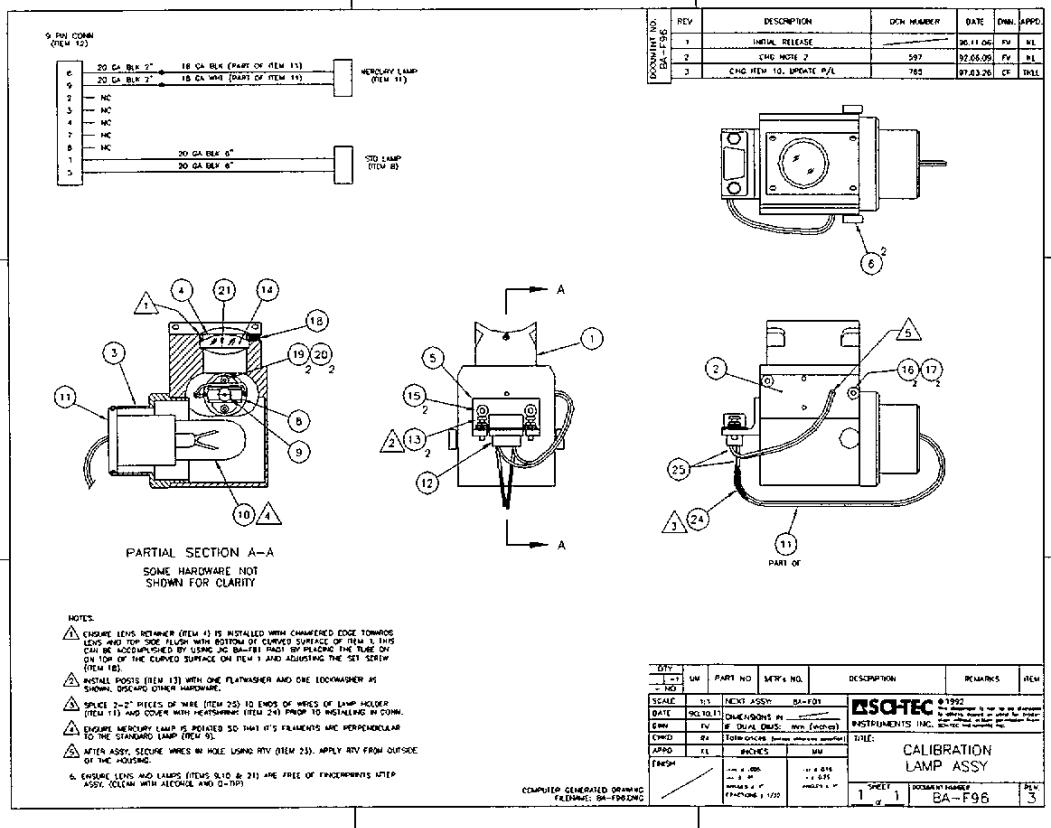


Figure 7.6-2.2

BA-F01 FORE OPTICS ASSY

Item No.	Part No.	Description	Qty
1			
2	BA-F04	Front Optics Tube Assy	1.00
3	BA-F06	Rear Optics Tube Assy	1.00
4	BA-F08	Filter Wheel Housing Assy	--
5	BA-F08/B	Filter Wheel Housing Assy	1.00
6	BA-F96	Calibration Lamp Assy	1.00
7	BA-F106	Iris Actuator Assy	--
8	BA-F106/B	Iris Actuator Assy, New	1.00
9	81-90-630	Lock, Conn Sl Ret	2.00
10	50-10-030	Motor Stepper PPS-0-380 1	2.00
11	88-85-653	Gear, 24T, 48P, 1/8F, 1/8B, NY	2.00
12	81-46-124	Conn 'D' 15 Cir M Crimp B	2.00
13			
14			
15	83-79-048	Screw, Mach 4-40 x 5/16 HX	4.00
16	83-95-748	Washer, #4, Split Lock, SS	4.00
17	83-79-047	Screw 4-40 x 1/4 HSC SS	4.00
18	83-51-786	Scrw 6-32 x 5/8 Button HD	2.00
19			
20	83-95-604	Washer, #4, Internal Tooth Lock, SS	4.00
21	83-95-605	Washer, #6, Internal Tooth Lock, SS	2.00

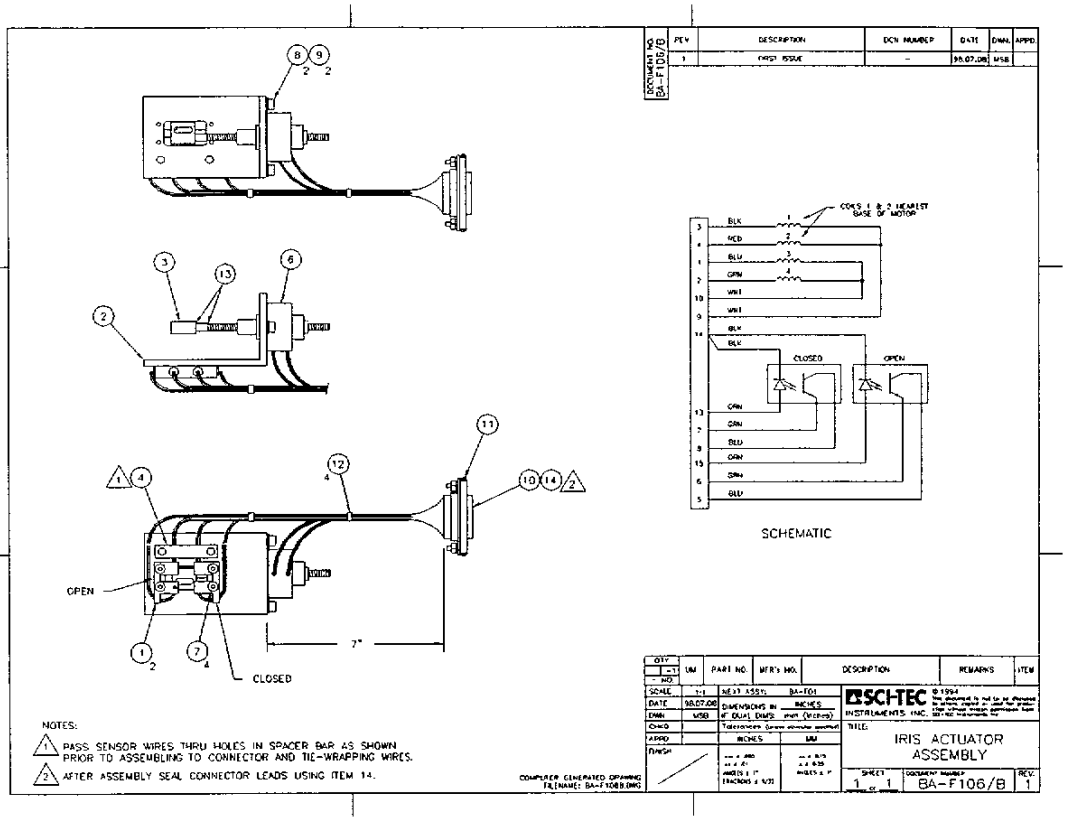


Figure 7.6-2.3

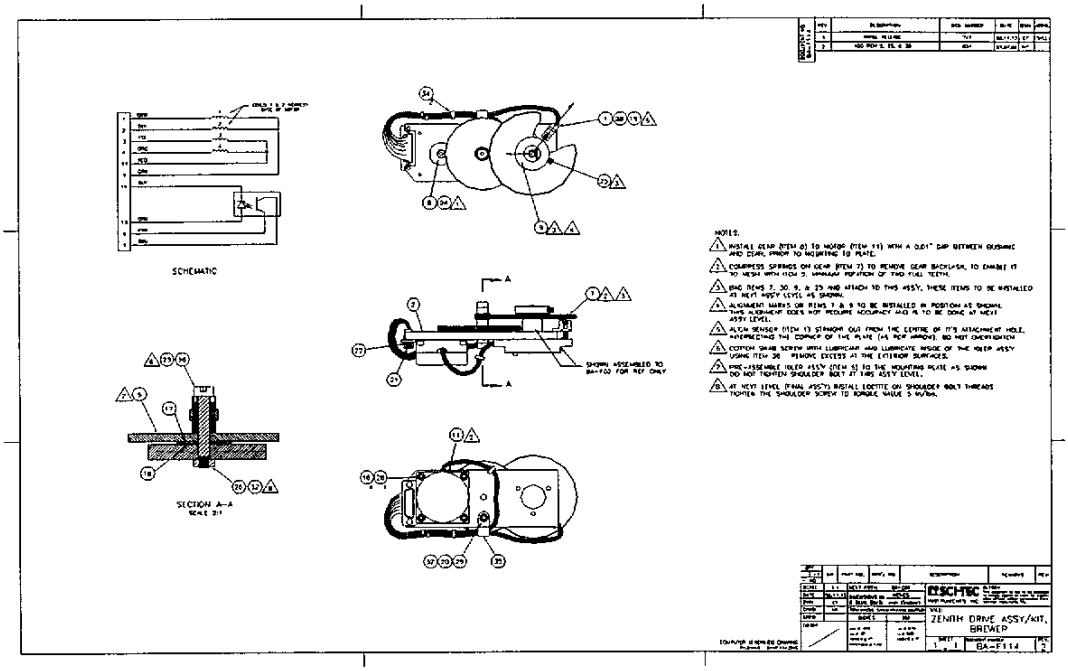


Figure 7.6-2.4

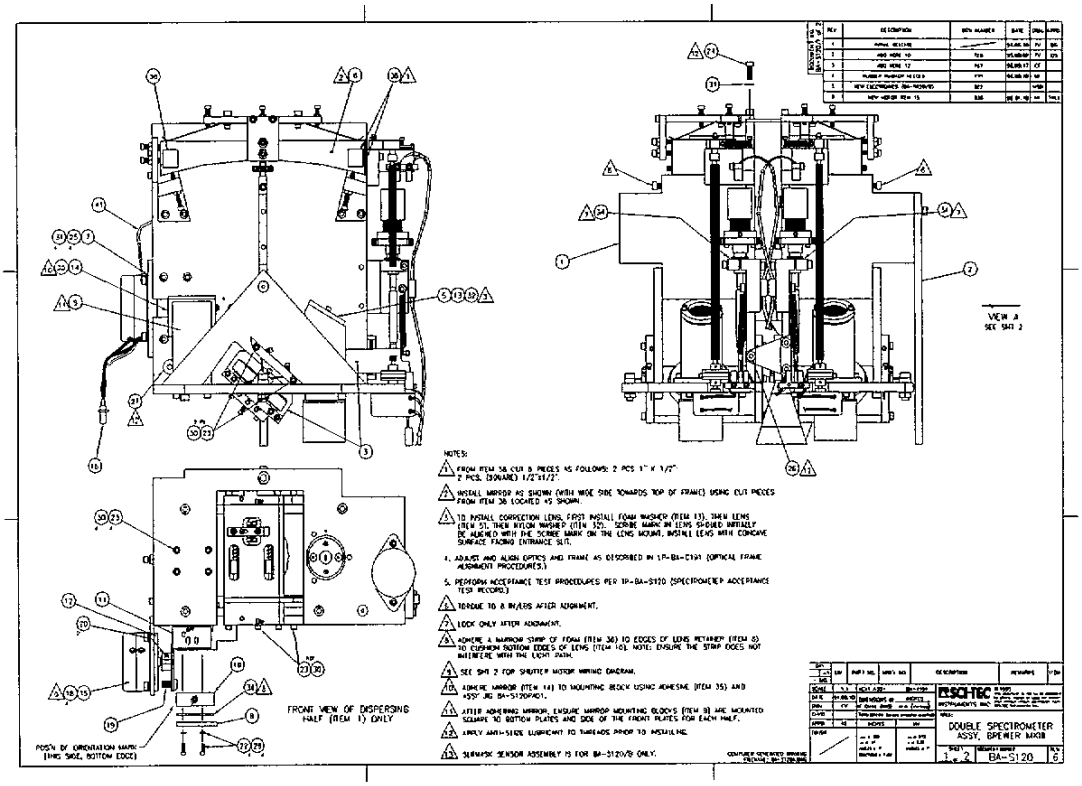


Figure 7.6-3.1

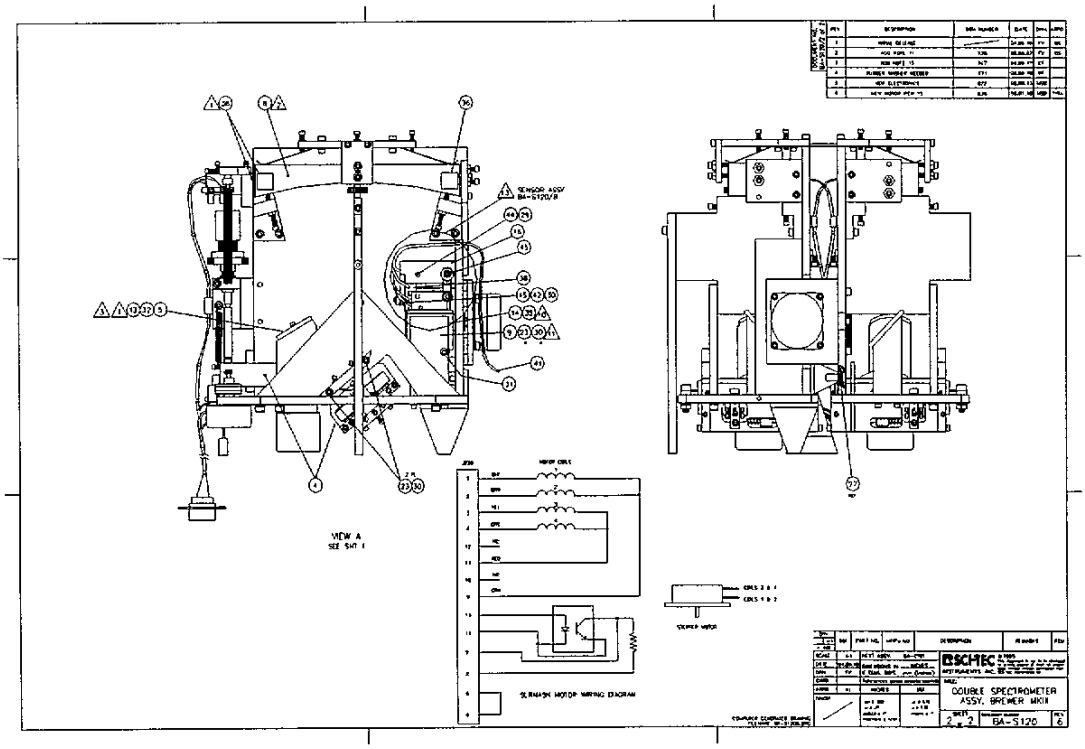


Figure 7.6-3.2

BA-S120/B DOUBLE SPECTROMETER ASSEMBLY

Item No.	Part No.	Description	Qty
1	BA-S110	SPECTR MECH ASSY,DISPERSG	1.00
2	BA-S112	SPECTR MECH ASSY,RE-COMBINING	-
3	BA-S115/A	GRATING SUPPT ASSY, DISPERSING	1.00
4	BA-S115/B	GRATING SUPPT ASSY, RE-COMBINING	1.00
5	BM-S42	CORRECTION LENS	2.00
6	BM-S47	SPHERICAL MIRROR	2.00
7	BM-S130	SLITMASK MOTOR MOUNT , MKIII	1.00
8	BM-S88	LENS RETAINER	1.00
9	BM-S92	MIRROR MOUNT	2.00
10	BM-S94	PLANO-CONCAVE QUARTZ LENS	1.00
11	BM-S129	EXIT SLITMASK, MKIII	1.00
12	BM-S127	SLITMASK MOTOR MOUNTING BLOCK	2.00
13	BM-S121	WASHER, CORRECTION LENS	2.00
14	10-14-010	FLAT MIRROR, 1.5" x 1.5" x 3mm	2.00
15	50-10-033	MOTOR, STEPPER, 12V,48 STEP	1.00
16	81-46-124	CONN "D" 15 CIR M CRIMP B	1.00
18	83-79-067	SCREW 6-32 X 5/16 HX	4.00
19	83-51-802	SCREW,8-32 X 3/8 BUTTON H	1.00
20	83-79-047	SCREW 4-40 X 1/4 HSC SS	2.00
21	83-78-046	SCREW, MACH, 6-32x3/4 HX	1.00
22	83-79-027	SCREW, 2-56 X 1/4 HSC SS	4.00
23	83-79-051	SCREW 4-40 X 1/2 HSC SS	17.00
24	83-79-068	SCREW 6-32 X 3/8 HSC SS	1.00
25	83-79-070	SCREW 6-32 X 1/2 HSC SS	4.00
26	83-87-179	SCREW,6-32X1/2 FL HD HS SS	1.00
27	83-87-211	SCREW,MACH 10-32X5/8 FH H	1.00
29	83-95-747	WASHER #2 SPLIT LOCK SS	5.00
30	83-95-748	WASHER #4 SPLIT LOCK SS	18.00
31	83-95-749	WASHER #6 SPLIT LOCK SS	9.00
32	83-95-830	WASHER, SPECIAL 7/8 ID X1	2.00
33	85-10-905	ANTI-SEIZE LUBRICANT	2.00
34	85-10-145	ADHESIVE SEALANT (LOCTITE 242)	0.10
35	85-10-150	ADHESIVE SEALANT (RTV 3145)	2.00
36	98-10-010	SHEET, CLOSED CELL NEOPRENE, 1/16"	4.00
37	88-09-122	RES, 100 K, 1/4 W, 5%, CARBON	1.00
38	89-70-030	SENSOR, OP SW, SLOT 0.003" APR	1.00
39	99-20-028	SLEEVING HEAT SHRNK 0.093	0.13
40	99-20-025	SLEEVING HEAT SHRNK 0.046	1.20
41	85-80-450	TIE-CABLE 4-1/8X0.1 NYL 18	4.00
42	83-51-763	SCREW, 4-40 X 3/8 BUTTON H	1.00
43	83-51-765	SCRW 4-40 X 1/2 BUTTON HD	1.00
44	83-51-754	SCRW 2-56 X 3/8 BUTTON HD	1.00
45	BM-S132	SLITMASK SENSOR MNTG NUT MKIII	1.00
46	BM-S131	SLITMASK SENSOR MNTG BLK MKIII	1.00
47	BM-S112/B	SPECTR MECH ASSY,RE-COMBINING	1.00
48	BM-S93	SHUTTER STOP	1.00
49	83-95-011	WASHER #4 FLAT SS	1.00
50	83-79-044	SCREW, MACH 6-32 X 1/2 HX	1.00
51	83-40-257	HUT 6-32 HX HYLON	1.00

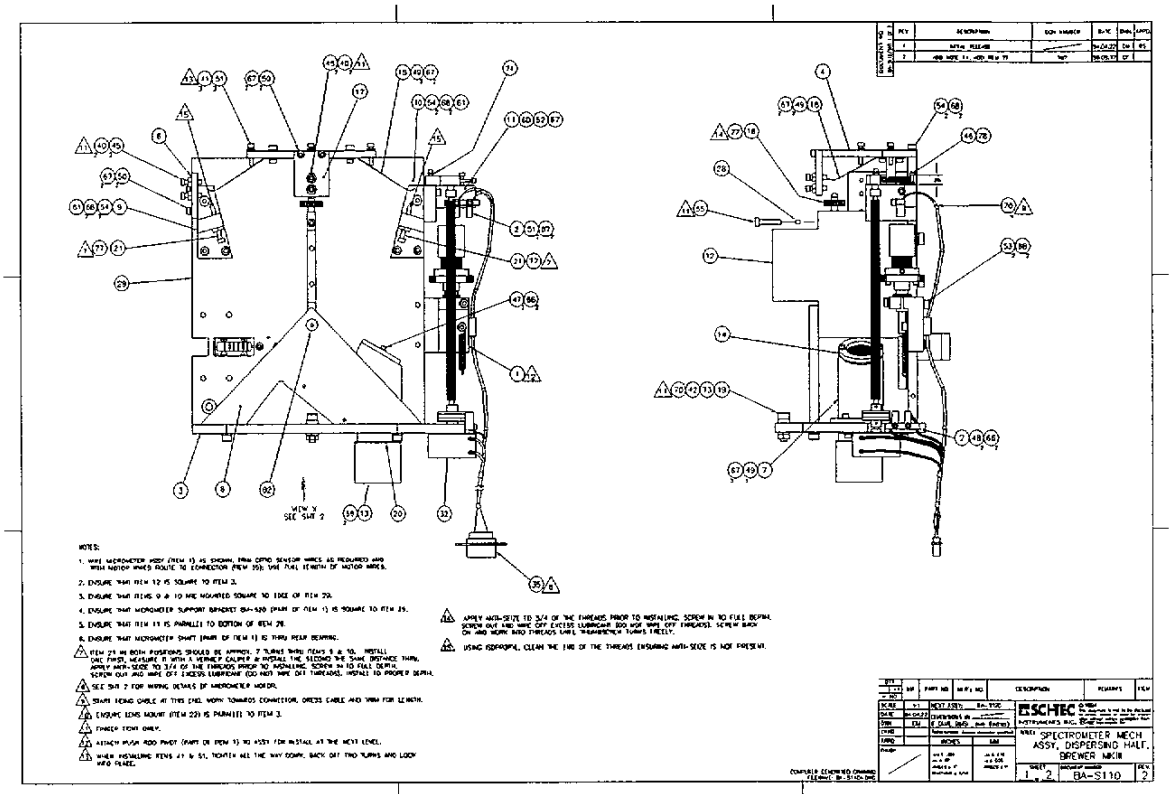


Figure 7.6-3.3

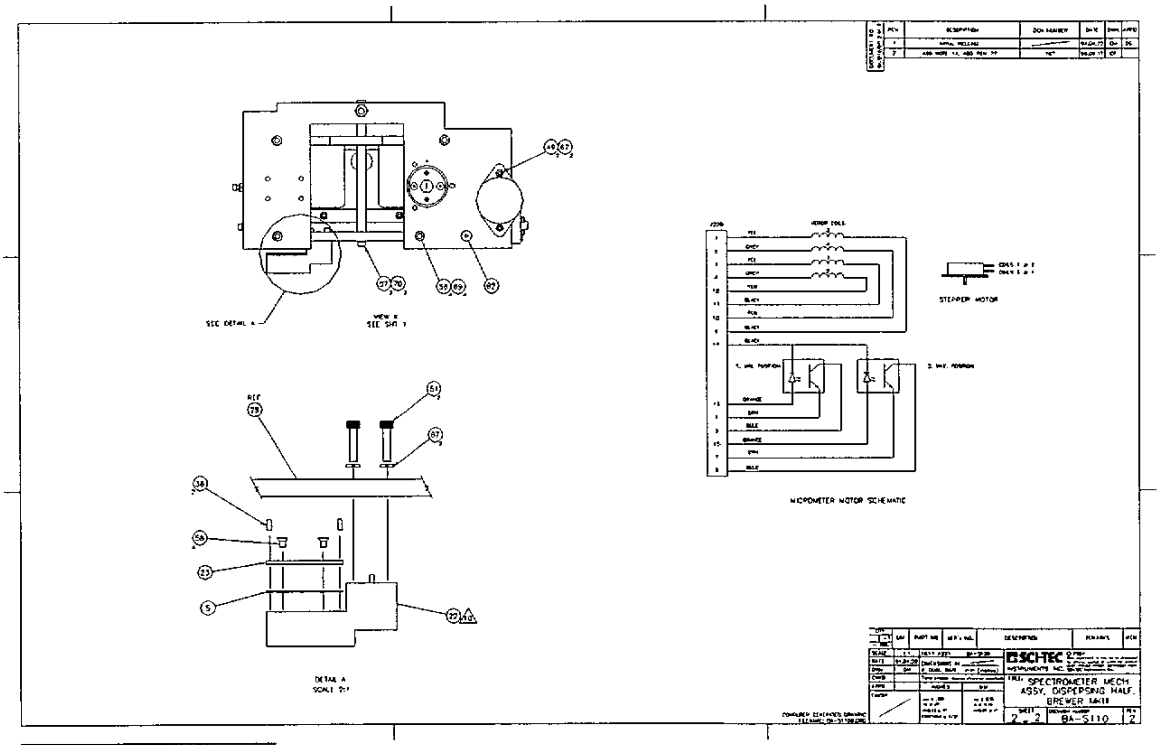


Figure 7.6-3.4

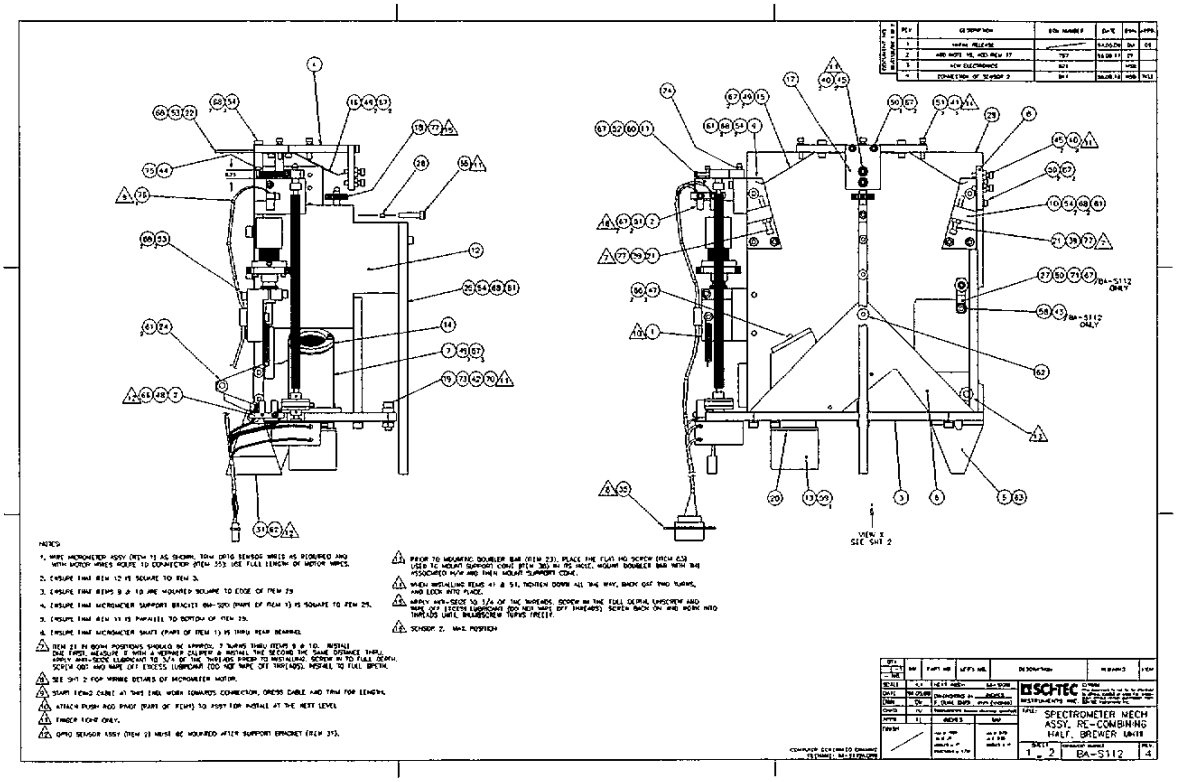


Figure 7.6-3.5

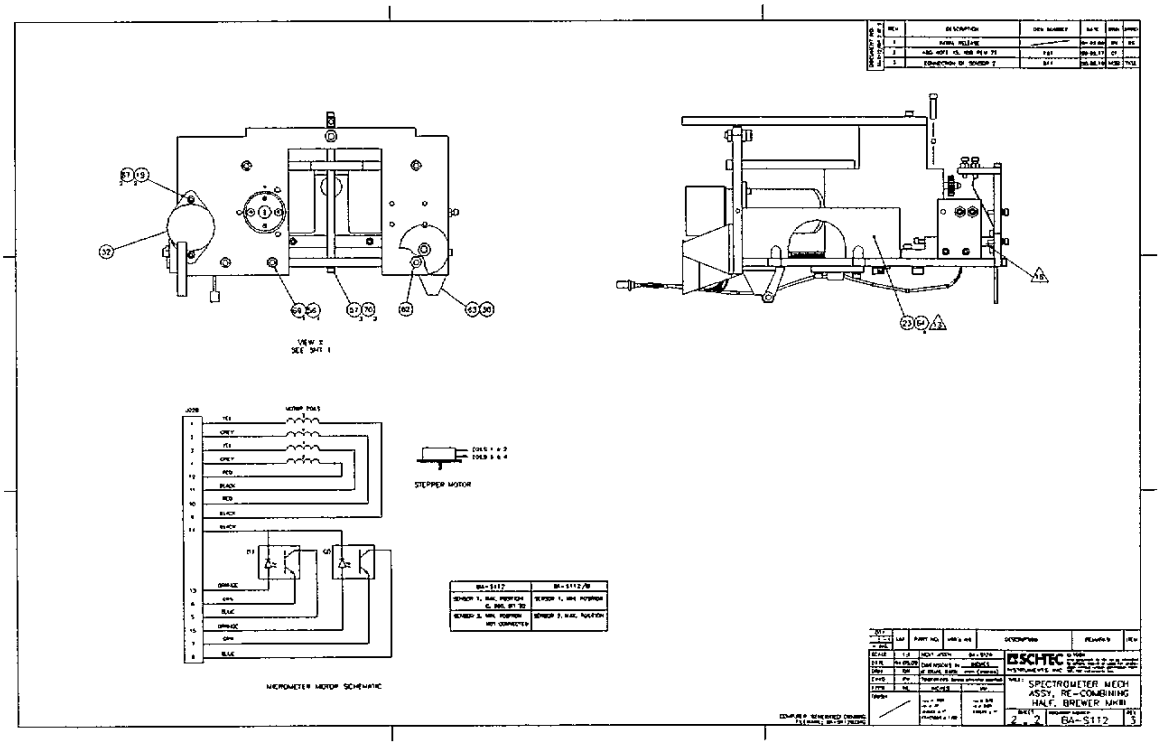


Figure 7.6-3.6

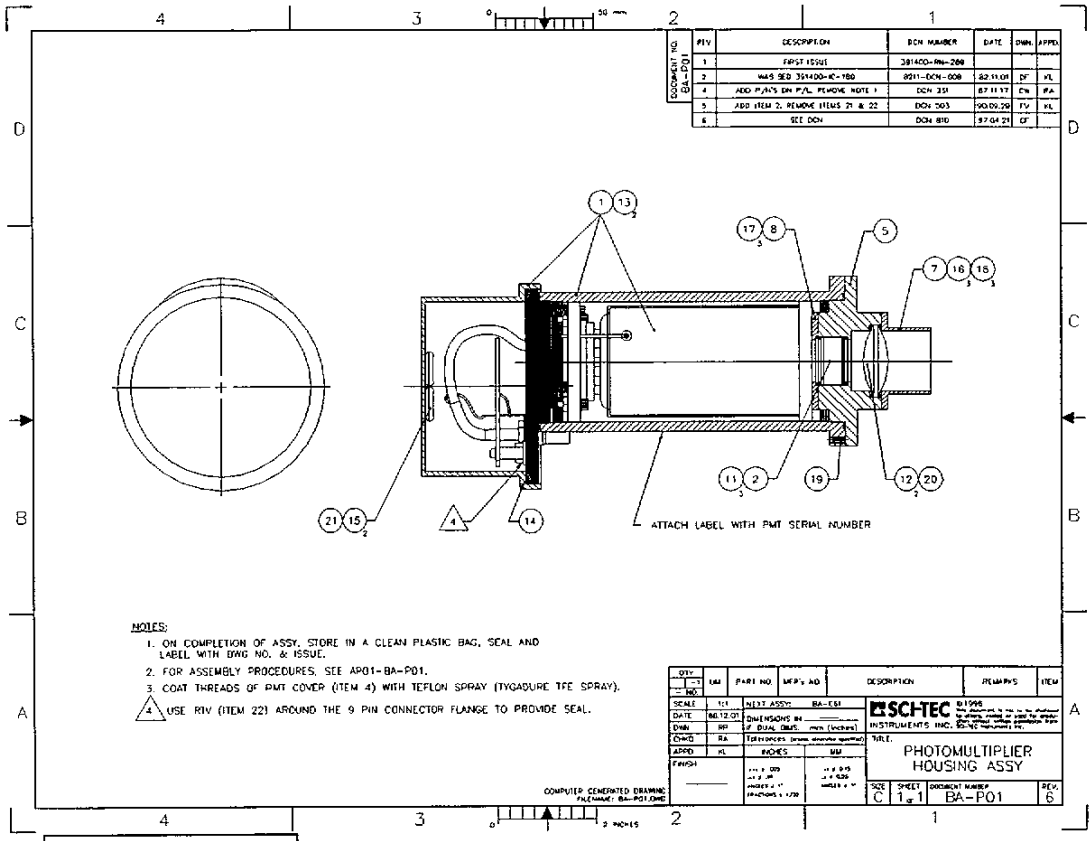


Figure 7.6-4.1

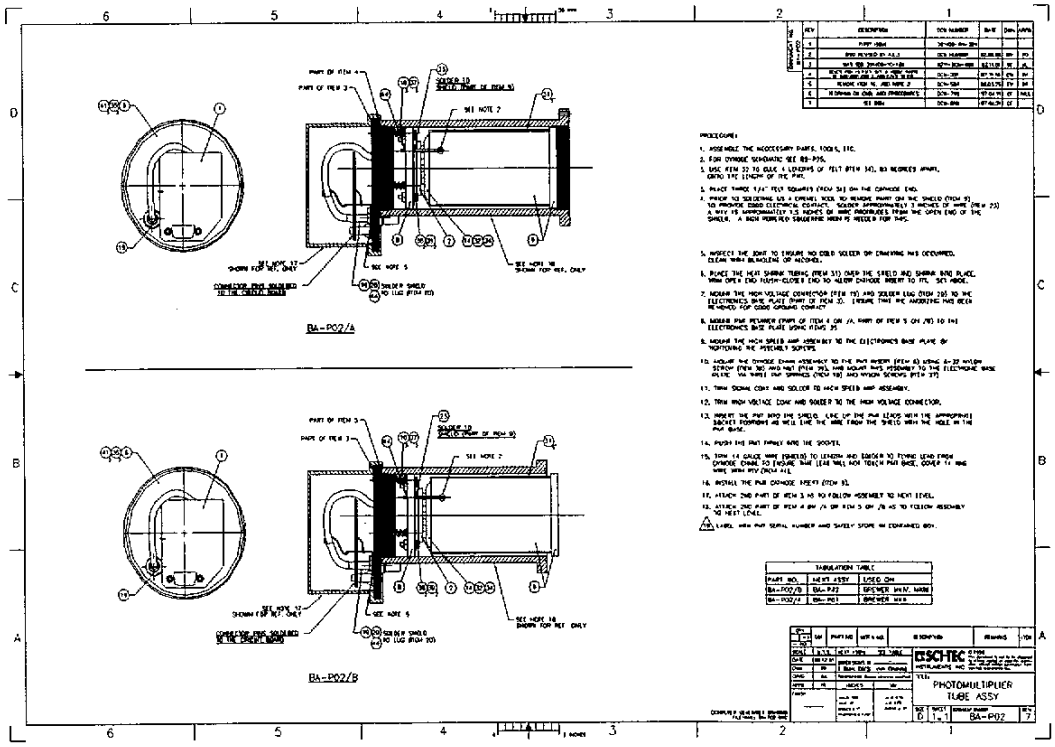
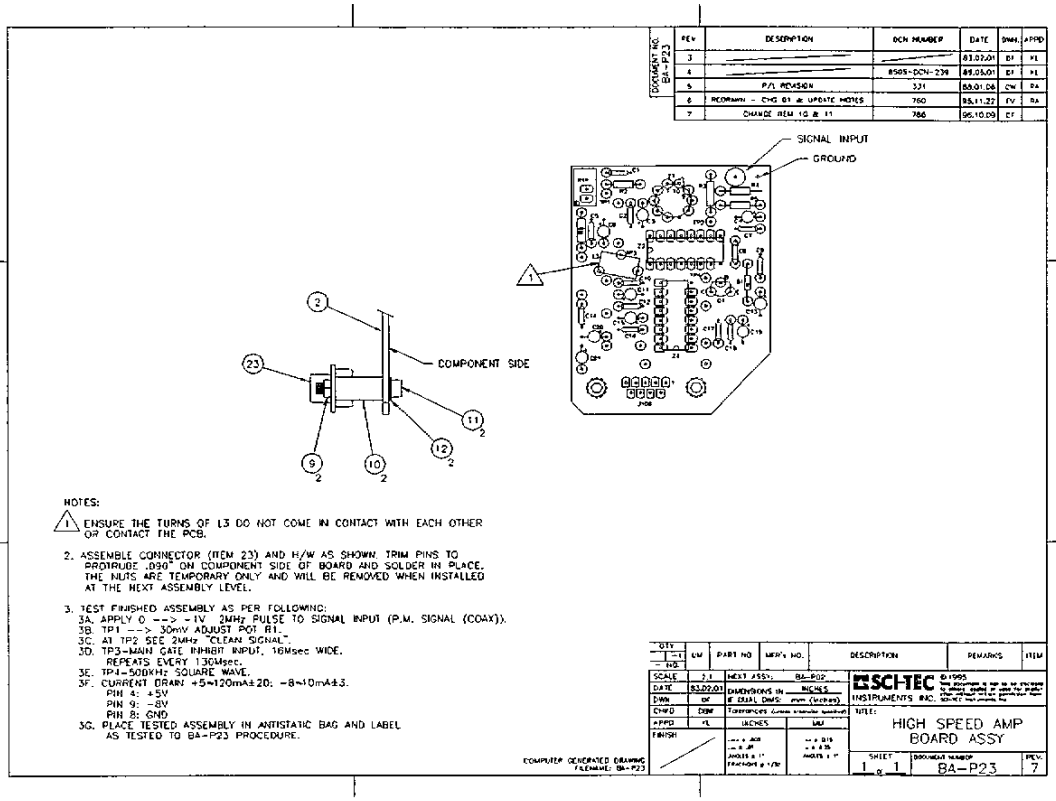


Figure 7.6-4.2

BA-P01 PHOTOMULTIPLIER HOUSING ASSY

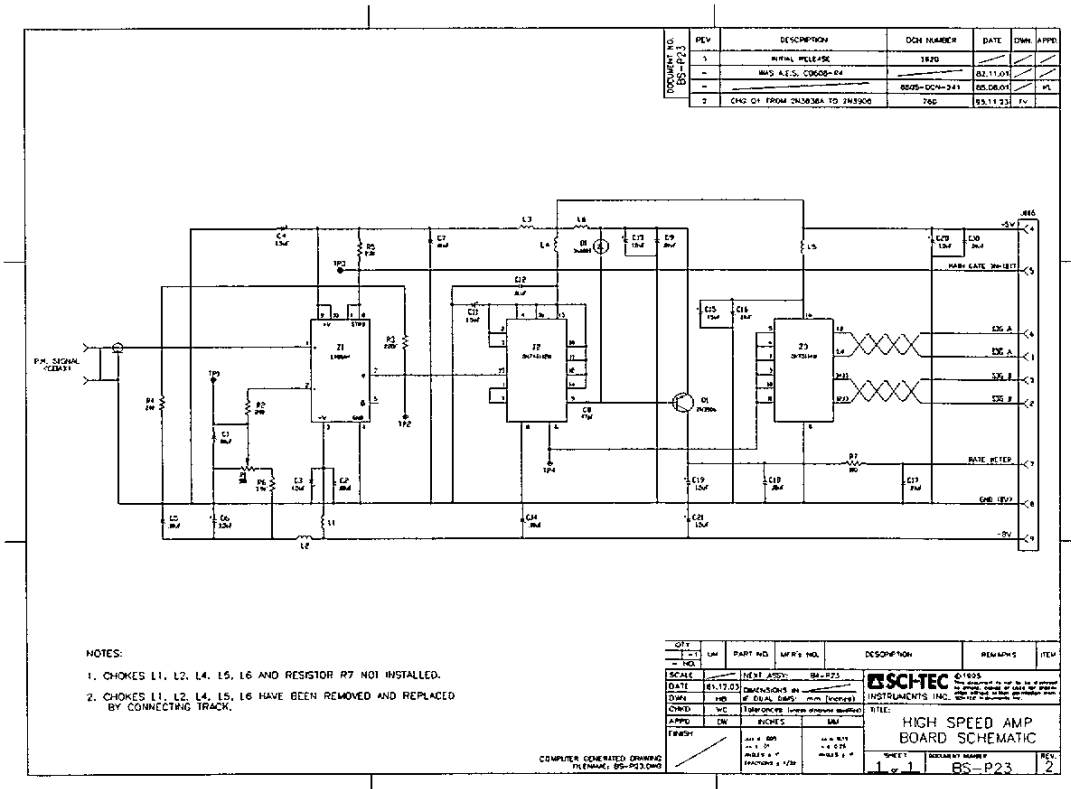
Item No.	Part No.	Description	Qty
1	BA-P02	Photomultiplier Tube Assy	--
2	BA-P46	Ultraviolet Filter	--
3	BA-P02/C	Photomultiplier Tube Assy	1.00
4			
5			
6			
7	BM-P16	Lens Retainer & Light Trac	1.00
8	BM-P17	Filter Retainer	1.00
9	85-10-790	Sealant, Contr Volatility	0.10
10			
11	83-10-620	O-ring, #020, 7/8x1x1/16 N.B.R.	--
12	83-10-628	O-ring, #028, 1 3/8x1 1/2x1/16 N.B.R.	2.00
13	85-41-115	Label, Adhesive, 3/8"x1 1/4"	1.00
14			
15	70-10-012	Dessicant 2164 Minipax T 1.56gm - 900/gal	2.00
16	83-95-748	Washer, #4 Split Lock, SS, Med Pat. 316	3.00
17	83-87-161	Screw, Mach. 4-40x1/4, FH, HX, SC, 82D, SS	3.00
18	83-51-762	Screw, 4-40x5/16 Button HD, HX. Soc. Cap, SS	3.00
19	83-56-143	Screw,Set, 6-32x1/4 Cup PT, SS, HX. Soc.	1.00
20	10-10-020	Lens,Bi/CX G1 FSD QTZ,38.1 mm D,38.1 mm FL.	1.00
21	85-80-385	Adhes Transfer Tape 0.75"	3.00



NOTES:

1. ENSURE THE TURNS OF L3 DO NOT COME IN CONTACT WITH EACH OTHER OR CONTACT THE PCB.
2. ASSEMBLE CONNECTOR (ITEM 23) AND H/W AS SHOWN. TRIM PINS TO PROTRUDE .090" ON COMPONENT SIDE OF BOARD AND SOLDER IN PLACE. THE NUTS ARE TEMPORARY ONLY AND WILL BE REMOVED WHEN INSTALLED AT THE NEXT ASSEMBLY LEVEL.
3. TEST FINISHED ASSEMBLY AS PER FOLLOWING:
   3A. APPLY 0 --> -1V, 2MHz PULSE TO SIGNAL INPUT (P.M. SIGNAL (COAX)).
   3B. TP1 --> 30mV ADJUST POT R1.
   3C. AT TP2 SEE 2MHz "CLEAN SIGNAL".
   3D. TP3-MAIN GATE INHIBIT INPUT, 16Msec WIDE. REPEATS EVERY 1.30Msec.
   3E. TP1-500KHz SQUARE WAVE.
   3F. CURRENT DRAIN +5=120mA±20; -8=10mA±3.
   PIN 4: +5V
   PIN 9: -8V
   PIN 8: GND
   3G. PLACE TESTED ASSEMBLY IN ANTISTATIC BAG AND LABEL AS TESTED TO 8A-P23 PROCEDURE.

Figure 7.6-4.3



NOTES:

1. CHOKES L1, L2, L4, L5, L6 AND RESISTOR R7 NOT INSTALLED.
2. CHOKES L1, L2, L4, L5, L6 HAVE BEEN REMOVED AND REPLACED BY CONNECTING TRACK.

Figure 7.6-4.4

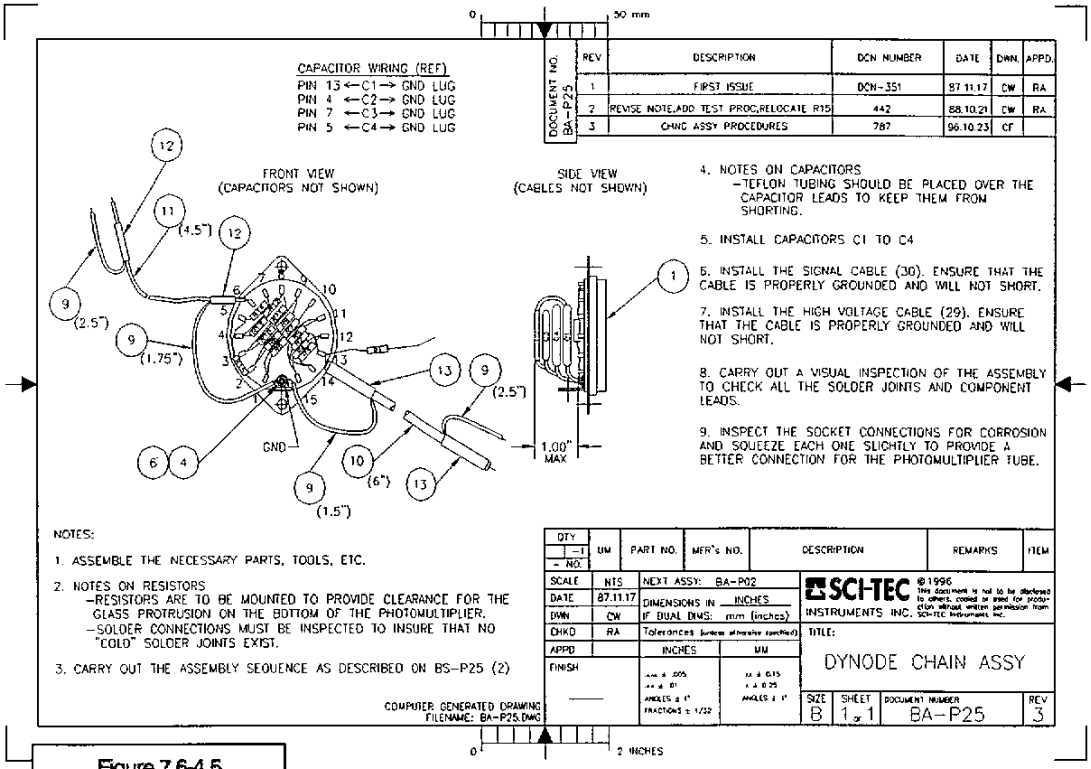


Figure 7.6-4.5

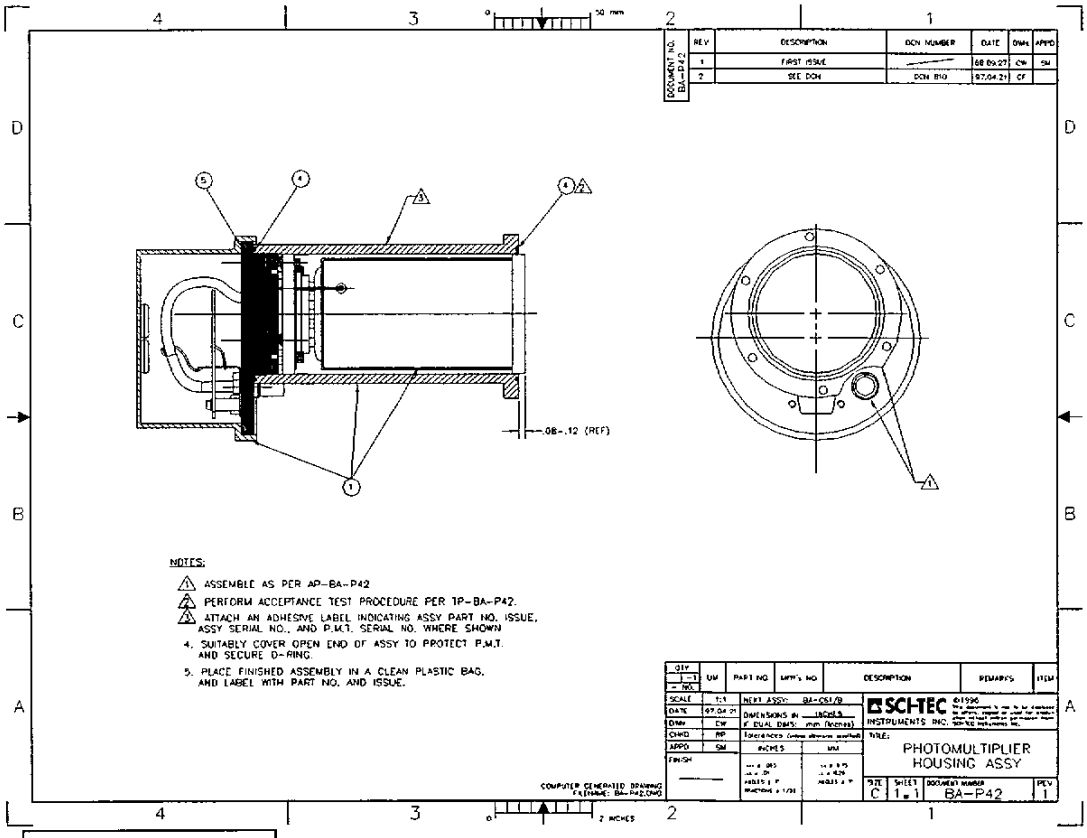


Figure 7.6-4.6

BREWER REFERENCE DOCUMENTATION

Section 7.7 Brewer Options

7.7.1 Option B - Azimuth Pointing System

- Azimuth Tracker and Stand 7.7-1.1
- Azimuth Tracker Unit Schematic C91 7.7-1.2
- Azimuth Tracker Board Schematic 7.7-1.3
- Azimuth Motor Wiring W20 7.7-1.4
- Azimuth Power Supply Specifications 7.7-1.5

Reference Acceptance Manuall Sec 2.1 thru 2.5 for setup and maintenance information.

7.7.2 Option C - UVB F81 7.7-2.1

Reference Fig 7.1-5 of this manual for further information on Option C.

CAUTION: Quartz Hemisphere (UVB Dome) is fragile. Ensure UVB Dome is removed and packed separately when the Brewer is transported.

7.7.3 Heater Option - C223 7.7-3.1

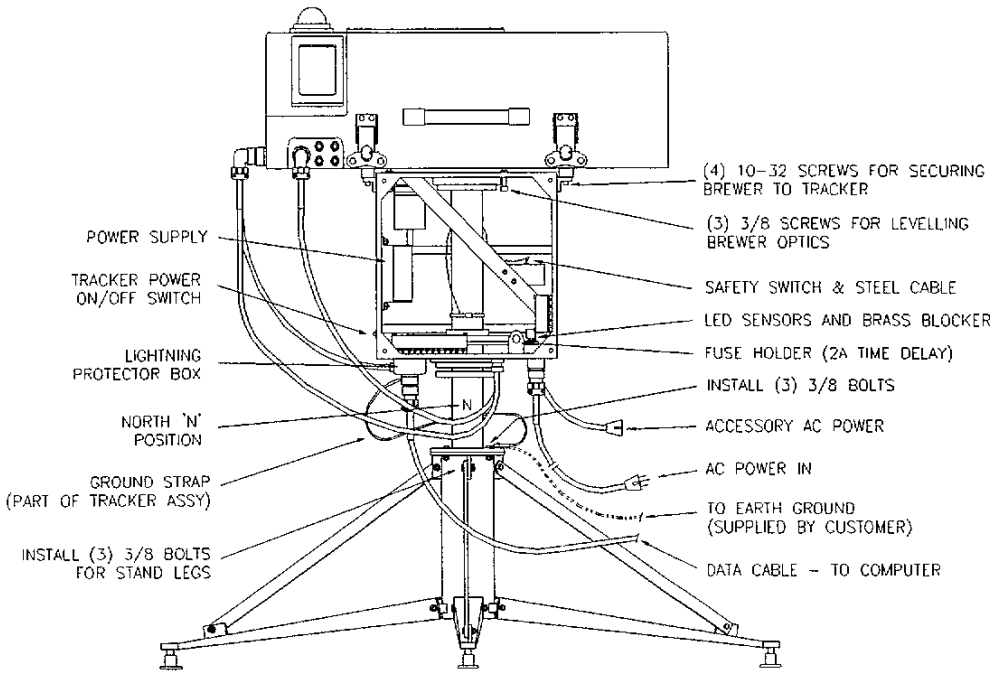


Figure 7.7-1.1

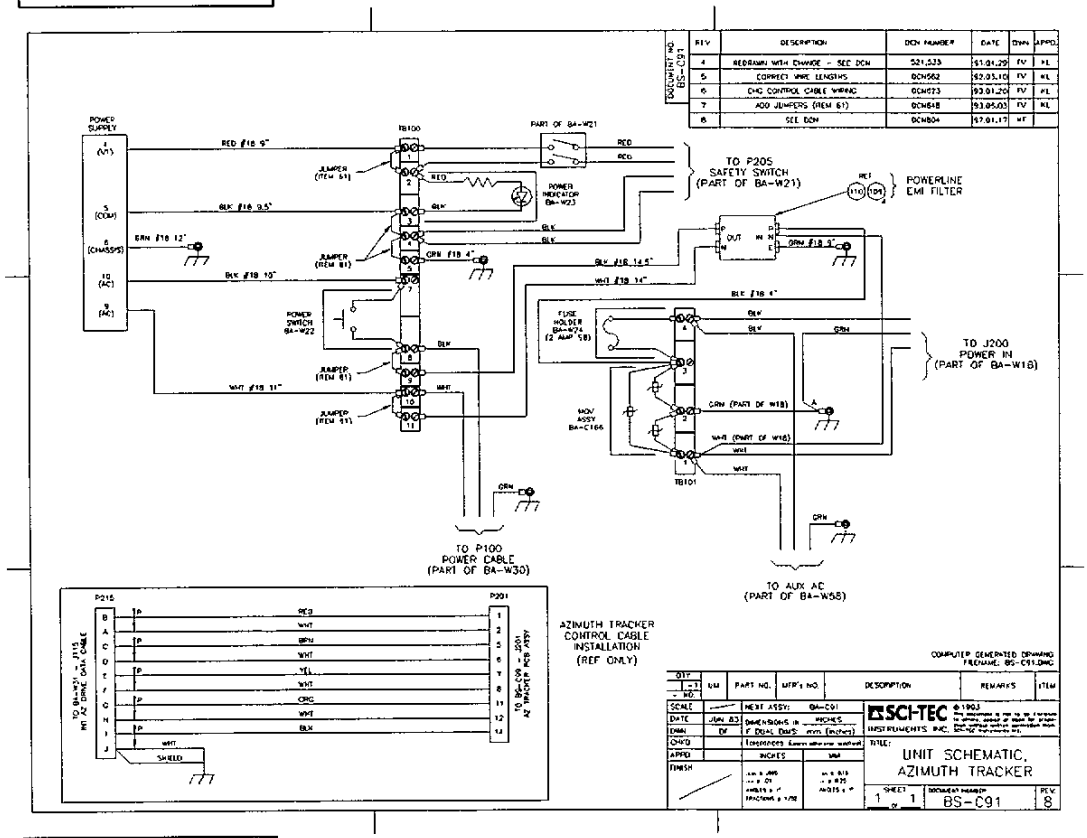


Figure 7.7-1.2

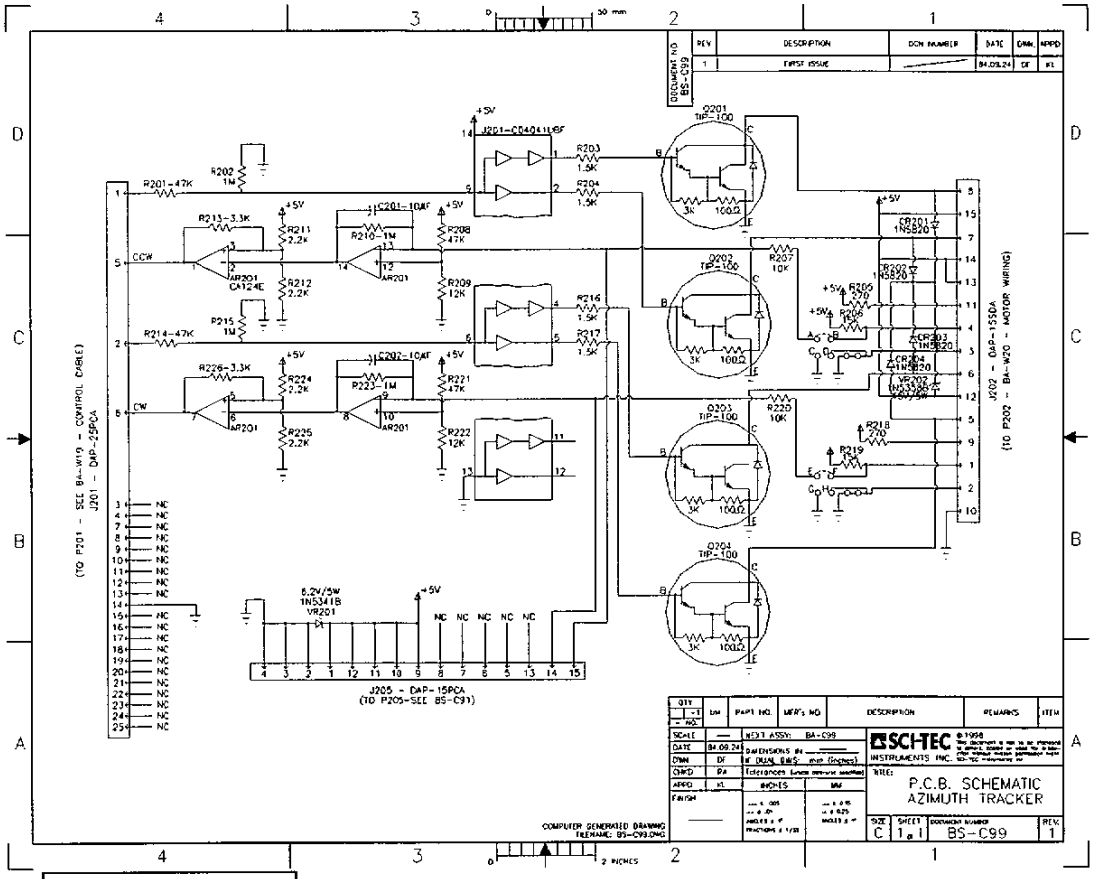


Figure 7.7-1.3

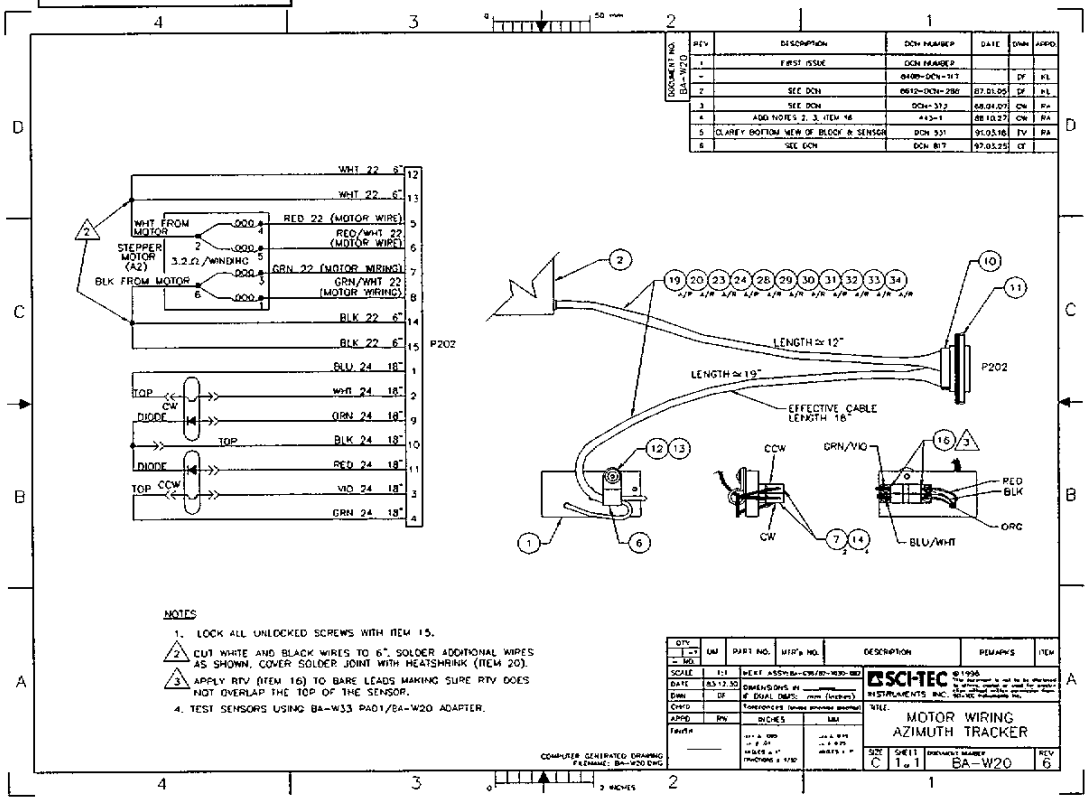


Figure 7.7-1.4

I D E A S T H A T P O W E R T E C H N O L O G Y

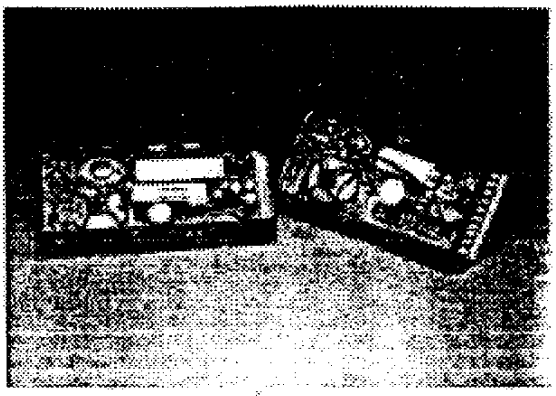
VT 50/VX 50
TECHNICAL DATA

CONVERTER CONCEPTS

SCI-TEC # 87-50-086
(VT50-141-10/XA)

FEATURES

- 50 Watt Switching Power Supply
- Single, Dual and Triple Output
- AC/DC or DC/DC Models Available
- Best Low DC Input-High Power Output Ratio
- Overvoltage Limit Protection
- UL Recognized



SPECIFICATIONS

Efficiency AC Input:
Single Output: 75% Typical 70% Min.
Multiple Output: 70% Typical 65% Min.
Efficiency DC Input:
Single Output: 75% Typical 68% Min.
Multiple Output: 70% Typical 60% Min.
Turn-On Overshoot: None
Turn-On Surge Current: Limited by active soft-start to 5A 1st cycle
Turn-On Time: 100 msec.
Hold-Up Time: 90 VAC Input (low line) 12 msec.
115 VAC Input (nominal line) 20 msec.
250 VAC Input 180 msec.
Ripple: 20 mV pk-pk Max.
Switching Noise: 2 MHz @ 20 kHz Rep. Rate; 100 mV pk-pk or 1%
Transient Response: 0.5V excursion for 50% to 100% or 100% to 50% load change with return to regulation in 2 msec. Load change 1 A/μ sec.
Operating Temp: –20°C to + 60°C Base Plate Full Load. –20°C to +55°C Free Air Full Load. Derate linearly to 30% output at 80°C
Temperature Coefficient: 0.02%/°C
Storage Temp: –55°C to + 85°C
Isolation:

	Input	
Hipot	AC	DC
Input to Output	1.5kVAC	850 VDC
Input to Case	1.5kVAC	850 VDC
Output to Case	850 VDC	850 VDC

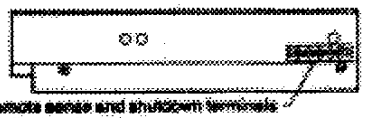
Shock & Vibration: Designed to withstand normal commercial shock and vibration conditions.
Short Circuit Protection: Current limited for overload and short circuit protection.
Multiple Output Regulation Specifications:
Regulation: Line, All Outputs: .3%
Regulation: Load, Output No. 1: 20% Load—Full Load 1%
Regulation: Load, All Other Outputs: 50 ma—Full Load 1.5%

	% of Full Load Current				
Output #1 load current	20	35	50	75	100
Each Auxiliary load current	50	75	100	100	100

Size: VT 50 2.063" x 4.38" x 8.063" (52.4 x 106.4 x 204.8 mm)
Size: VX 50 2.125" x 3.561" x 8.000" (54.0 x 91.0 x 203.2 mm)
Weight: 2.0 lbs. (0.91 kg)

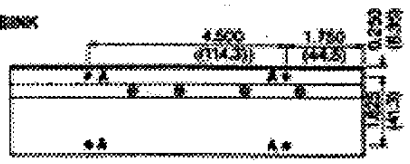
MECHANICAL DIMENSIONS

VT 50 OPEN FRAME & ENCLOSED MODULES
Four No. 6 mounting screws recommended

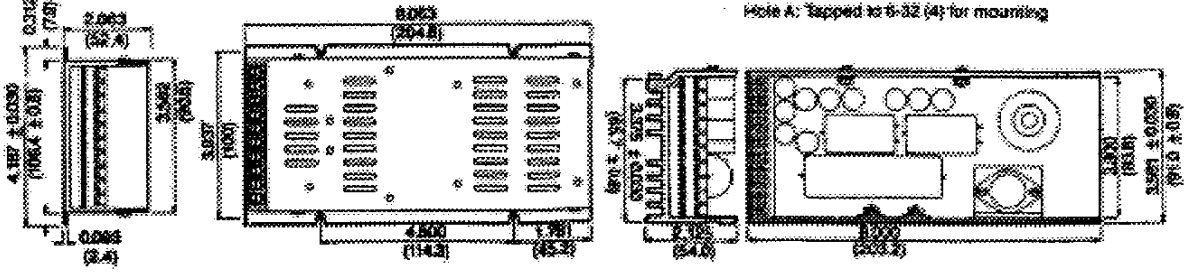


Optional remote sense and shutdown terminals
2–56 spade lug terminal block

VX 50 HEATSINK MODULES



Note A: Tapped to 6-32 (4) for mounting



Dimensions shown in inches. Dimensions in parentheses ( ) indicate millimeters. Tolerance ± 0.010 (0.3 mm) unless otherwise noted.

Figure 7.7-1.5

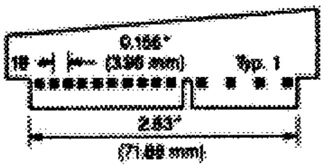
VT 50/VX 50

CONVERTER CONCEPTS

TERMINATION OPTIONS

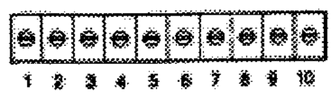
SCI-TEL #87-50-088 (VT50-141-10/XA)

SQUARE PINS (OPTIONAL)



18. V3 Output
17. V4 Output
16. V4 Output
15. V2 Output
14. V2 Output
13. V1 Output
12. V1 Output
11. Ground
10. Ground
9. Chassis
8. Keyslot
7. −V Input
6. NC
5. +V Input
4. NC
3. AC Input
2. NC
1. AC Input

4-40 TERMINAL BLOCK (STANDARD)



TYPICAL

1. V3 Output
2. V4 Output
3. V2 Output
4. V1 Output
5. Return
6. Chassis
7. −DC Input
8. +DC Input
9. AC Input
10. AC Input

REMOTE SENSE AND LOGIC SHUTDOWN

1. RS +
2. RS −
3. LS +
4. LS −

Caution:
Shutdown Current 20mA max.

INPUT AND OUTPUT RANGES

INPUT VOLTAGE RANGE (SERIES SPECIFIC)

Input Option	Input Voltage Range AC	Input Voltage Range DC	Frequency (in Hz)	Input Fuse (User Provided)
1	90-250	100-350	44-440	1.0A Slow Blow Fuse
2		10-40		10.0A Slow Blow Fuse
3		20-60		5.0A Slow Blow Fuse

OUTPUT RANGE (SERIES SPECIFIC)

Model No.	Output	Volts	Amps	Adjustment
14	V1	+5	0-10	±10%
16	V1	+12	0-5	±10%
17	V1	+15	0-4	±10%
18	V1	+28	0-2	±10%
22	V1 V3	+5 −5	1.5-9 .05-1	±10% ±5% Fixed

Model No.	Output	Volts	Amps	Adjustment
24	V1 V2	+5 +12	1.6-8 .05-1	±10% ±5% Fixed
26	V1 V3	+12 −12	.6-3 .05-1	±10% ±5% Fixed
27	V1 V3	+15 −15	.4-2 .05-1	±10% ±5% Fixed
32	V1 V2 V3	+5 +12 −5	1.2-6 .05-1 .05-1	±10% ±5% Fixed ±5% Fixed
34	V1 V2 V3	+5 +12 −12	1-5 .05-1 .05-1	±10% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	1-5 .05-.5 .05-.5	±10% ±5% Fixed ±5% Fixed

SELECTING A UNIT: VT 50/VX 50

Series	Total Power	—	No. of Outputs	Output Range	Input Range	—	Package	Termination	/	Group 1 Options	Group 2 Options
X	X	—	X	X	X	—	X	X	/	X	X
VT Standard VX [illegible]	50		1 2 3	2 4 6 7 8 See series specific output range	1 2 3 See series specific input range		0 Open Frame 1 Enclosed 2 P.C. Board	0 Terminal Block 1 Square Pin 2 Wire Leads Only		A B C D E F G H I J K See group 1 chart	A B C D E F G See group 2 chart

GROUP 1 OPTIONS	[illegible]	[illegible]	[illegible]	[illegible]
A	*			
B		*		
C			*	
D				*
E	*	*		
F	*		*	
G	*			*
H		*	*	
I		*		*
J	*	*	*	
K	*	*		*
X	No Options			

GROUP 2 OPTIONS	[illegible]	[illegible]	[illegible]
A	*		
B		*	
C			*
D	*	*	
E	*		*
F		*	*
G	*	*	*
X	No Options		

For all U.L. recognized products, the application criteria is available at customer request. This material will give additional guidelines for installation and operation as per Underwriters Laboratory.

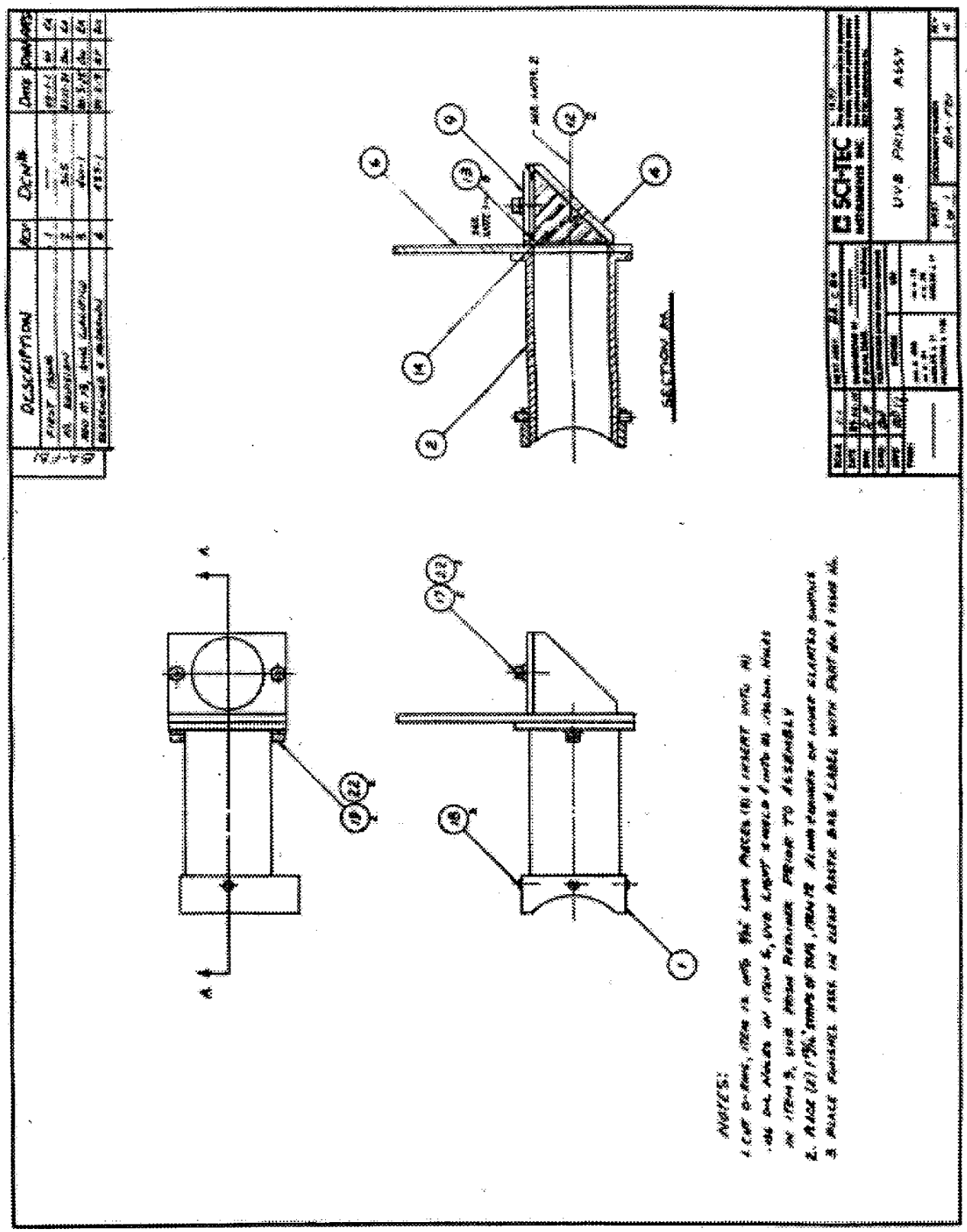


Figure 7.7-2.1

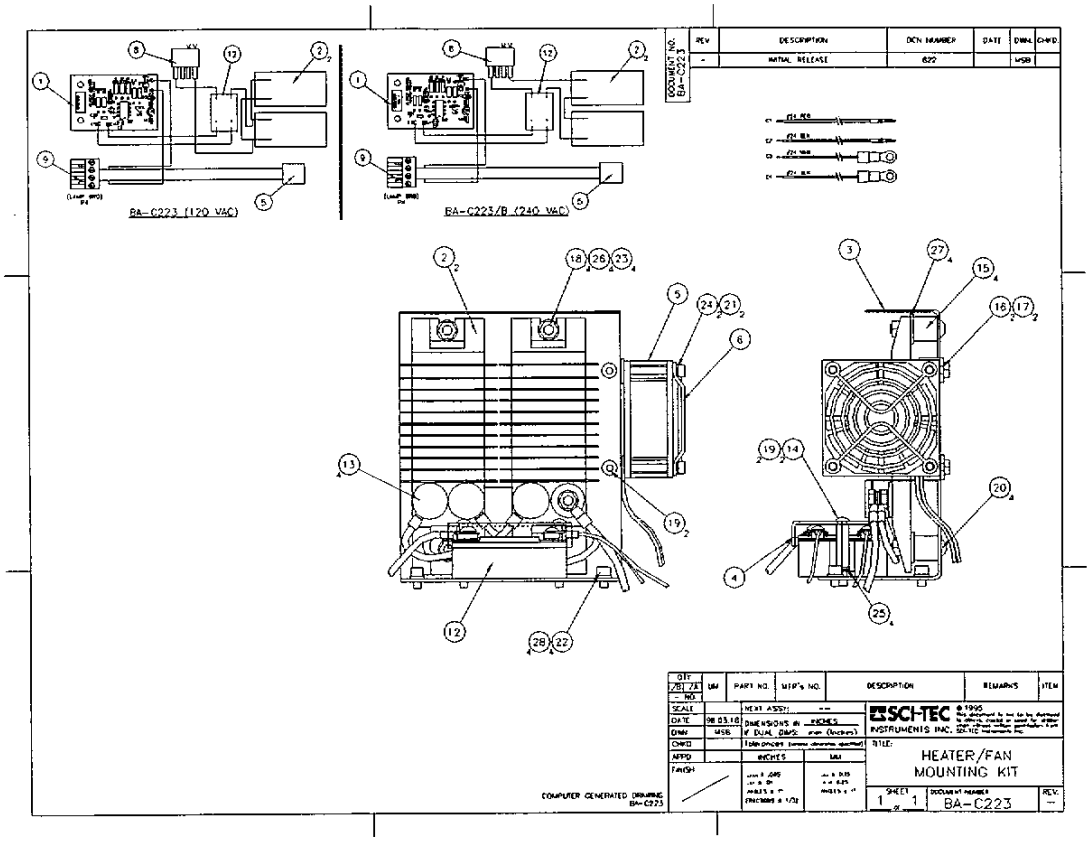

BA-C223 (120 VAC)
BA-C223/B (240 VAC)
HEATER/FAN
MOUNTING KIT
BA-C223
SCI-TEC

Figure 7.7-3.1

Section 7.8 Main Electronics Firmware / Configuration Loading procedures

This procedure is used to upload new firmware for the New Brewer Electronics or to update the configuration files stored in flash memory. The only time this procedure is required is if the firmware has been corrupted due to electrical surges or the memory had been replaced or if the configuration has changed due to some physical changes to the sensor settings or position stops.

Restore Back to COSMAC Mode

In certain circumstances where the signal line is placed in a permanent Break signal condition, the Brewer will continually try to reset but eventually it has determined that there is a problem and it will halt trying to reset and go into Loadmode. This fault can happen when the RS422 cable has been incorrectly wired or has shorted together to simulate a break condition. To confirmm that the processor is actually in loadmode, remove the weather proof cover of the Brewer and look down into the Main electronics board between the cover plate and the microprocessor board. You should see a flashing LED light and if it is in loadmode, it will be flashing quickly in 1/4 second intervals. The procedure to restore the system back to the Cosmacmode of operation is as follows:

Exit out of the Brewer operating program to Dos

Take the supplied configuration disk and put it into the computer used to reconfigure the Brewer.

Copy the files from the floppy disk **a:\bdata\nnn** to the **c:\bdata\nnn** subdirectory using the command

copy a:\bdata\nnn*.* c:\bdata\nnn ENTER

Change to the directory c:\bdata\nnn by typing the command **cd \bdata\nnn** ENTER

Run the program Brewcmd.exe by typing **brewcmd** ENTER This program is a utility to allow the user to communicate to the Brewer Microprocessor and change operating modes or upload files.

If all the connections are correct, the display will reply that Brewer responded and at what baud rate it is communicating at. **[using load mode at 9600 baud; on port 1; tracing is off]**

It is expected that it will be in Loadmode but it could be in Opmode as well.

To return it to its normal operating mode, type **cosmacmode** ENTER

The instrument will reset itself by resetting all of its motors and the display will display the following with other status information.

Motors Initializing.

When the instrument has completed resetting all of the motors, the display will now respond to low level commands.

Exit out of the Brewcmd program by typing **quit** ENTER and the computer will have returned to the dos prompt.

Run the Brewer operating program and then ensure the time and date is correct.

New Configuration Upload

If hardware changes have been made such as removing the zenith drive gear or adjusting the micrometer drive sensor mask, then correct values for zero offset and other parameters must be uploaded to the instrument for it to operate correctly. The procedure to upload the new configuration file is listed below:

The configuration file that describes the characteristics of the instrument is named BREWnnn.cfg. The nnn will be the instrument number. This file is an ASCII text file that describes all the technical parameters of this particular instrument. This very same file should be uploaded to any replacement Brewer Main Electronics board following the physical installation of the board. A spare Brewer Main Electronics board will normally be sent with the latest configuration file stored at SCI-TEC. If the customer has changed any parameters in the field, it will not be configured into that board and the customer will have to upload the latest file as described below:

Change to the directory c:\bdata\nnn by typing the command
cd \bdata\nnn ENTER

Run Brewcmd.exe by typing **brewcmd** ENTER

[using coamacmode at 1200 baud; on port 1; tracing is off] should be displayed

Type **loadmode** ENTER to change modes.

Waiting for the mode change to complete and when complete, the display will display **[using load mode at 1200 baud; on port 1; tracing is off]**

Go into Opmode by typing **opmode 9600** ENTER

Trying Operating mode at 9600 baud is displayed until the display will display **[using operating mode at 9600 baud; on port 1; tracing is off]**

Send the configuration file to the microprocessor by typing **putcfg brewnnn.cfg** ENTER (nnn is the instrument number)

Wait approximately one minute to transfer

Type **readlog** ENTER to clear the log buffer

Type **useconfig** ENTER motors should now reset

When complete **readlog** ENTER to see if errors were encountered. Contact SCI-TEC if the log displays a problem.

Type **save** [ENTER] a number should appear. This tell you how many configuration writes you have left.

If the number is '1' then the next time a configuration is sent, the top firmware must be written to Flash memory and the configuration area is cleared to allow another 4 blocks of configuration files.

Go to Load mode by typing **loadmode** [ENTER]

Waiting for mode change to complete and
Trying load mode at 9600 baud is displayed until the display will display **[using load mode at 9600 baud; on port 1; tracing is off]**

Go into Cosmacmode by typing **cosmacmode** [ENTER]

Reading Cosmac mode reset message

Waiting for mode change to complete

Trying Cosmac mode at 1200 baud

Motors Initializing

These are some of the messages seen while going into the Cosmac mode.

Motors should reset and it is ready to run the brewer operating program

type **quit** [ENTER] to get out of Brewcmd

To run the Brewer operating program type **BREWER** [ENTER]

Uploading new Firmware and configuration files.

As SCI-TEC develops new firmware and features, it is now possible for the customer to upgrade the firmware without having to open the cover to the Brewer. The New Electronics has incorporated Flash electrically erasable program memory and the system is capable of being updated from the PC. The procedure below will provide a step by step process to upload the firmware and also upload the configuration file which is erased when the new firmware is loaded.

This disk is supplied with the instrument when first delivered or will be sent out to the customer when firmware updates are done.

Copy the new top.bin or topv#r#.bin firmware file received from SCI-TEC to the **c:\bdata\nnn** subdirectory.

Change to the directory c:\bdata\nnn by typing the command
cd \bdata\nnn [ENTER]

Run Brewcmd.exe by typing **brewcmd** [ENTER]

Eventually the following statement is displayed:

[using cosmac mode at 1200 baud; on port 1; tracing is off] should be displayed. If the command **help** ENTER is entered, a list of available commands will be displayed.

Type **loadmode** ENTER to change modes.

Eventually the following statement is displayed:

[using loadmode at 1200 baud; on port 1; tracing is off]

Type **loadmode 4800** ENTER

Eventually the following statement is displayed:

[using loadmode at 4800 baud; on port 1; tracing is off]

Type **load top.bin** or **topv#r#.bin** ENTER

Wait until this task is completed (this will take a few minutes).

The display will display some messages below:

Erasing Flash memory

Writing file top.bin to flash .....

The display will show 112 moving dots to show its progress

Exit from the program by typing **exit** ENTER

Turn off the power of the instrument for approximately 10 seconds and turn it back on.

Run the Brewcmd program by typing **brewcmd** ENTER Go into Opmode by typing **opmode 9600** ENTER

Waiting for mode change to complete is displayed and eventually the fan turns on if the heater option is ordered and the display will eventually display **[using opmode at 9600 baud; on port 1; tracing is off]**

Type **readlog** ENTER to display any errors encountered.

Send the configuration file to the microprocessor by typing **putcfg brewnnn.cfg** ENTER

Wait a 1.5 minutes to transfer

Type **readlog** ENTER to clear the log buffer and see if any errors occurred during the configuration installation.

Type **useconfig** ENTER motors should now initialize.

When complete **readlog** ENTER to confirm everything is ok

Type **save** ENTER a number should appear. This tell you how many configuration writes you have left.

The number is '4' should be displayed.

Go to Load mode by typing **loadmode** ENTER

The display will eventually display **[using load mode at 9600 baud; on port 1; tracing is off]**

Go into Cosmacmode by typing **cosmacmode** ENTER

A number of messages will appear and eventually the motors should initialize and it is ready to run the brewer operating program and display **[using cosmac mode at 1200 baud; on port 1; tracing is off]**

type **quit** ENTER to get out of Brewcmd

To run the Brewer operating program type **BREWER** ENTER