



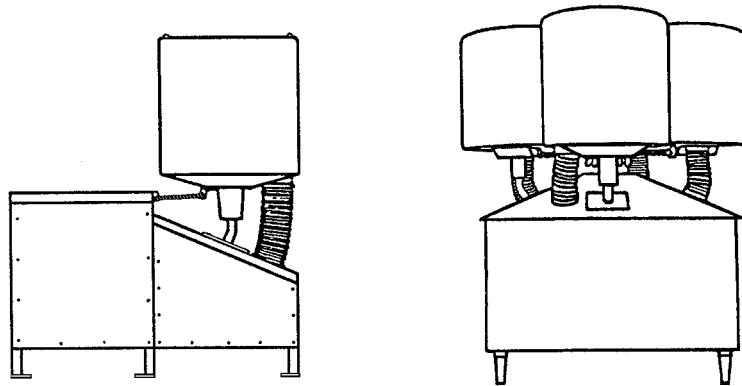
**SKY-TRACKER**<sup>®</sup>  
PROMOTIONAL SEARCHLIGHTS

**MOTORIZED SEARCHLIGHTS**

Models STX-1, STX-4

**INSTRUCTION MANUAL**

Rev. January 2021



*Strong*  
Lighting

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# **NOTICE**

## **PATENT POSITION**

The SkyTracker is a motorized, high-intensity, single or multiple head searchlight system, which was originated by SkyTracker of America, Inc. and is proprietary to Strong Lighting.

Patents owned by Strong Lighting are either issued or pending in this and related concepts.

## **TRADEMARK**

The name "SkyTracker™" is a trademark owned by Strong Lighting.

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## **SKYTRACKER SPECIFICATIONS**

### STX 1

V.AC	I <sub>ac</sub>	V.DC	I <sub>dc</sub>	WATTS	PHASE
208-240	12	22-33	100-60	2 kW	1
208-240	24	25-35	160-115	4 kW	1
208	18	25-35	160-115	4 kW	3

### STX 4

V.AC	I <sub>ac</sub>	V.DC	I <sub>dc</sub>	WATTS	PHASE
208-240	50	20-33	100-60	2 kW	1
208-240	100	25-35	160-115	4 kW	1
208	58	25-35	160-115	4 kW	3

## 1.0 INTRODUCTION

The SkyTracker is an original proprietary lighting system developed specifically for the display advertising industry and related technologies. Each unit is designed with highly reliable mechanical, electrical and optical components to insure extended, trouble-free performance.

An outgrowth from space age and military advanced technology applications, the SkyTracker provides an easily transported base unit for the mounting and control of high intensity searchlight(s). Searchlights for the four-beam system simultaneously move outward and downward from a vertical starting position in a sweeping motion. They continue in a "cloverleaf" pattern, converging momentarily at the vertical position to produce an intense central column of light. The repetitive sweeping motion of the beams can be seen for miles in every direction, pinpointing the location of the attraction.

Each light combines a xenon plasma arc light source with a precision electro-formed metal reflector to produce a collimated beam of white light (virtually identical to sunlight's color temperature of 5600° Kelvin).

**NOTE:** This manual is intended to address the information requirements for all "STX" models. Not all information is appropriate for both the STX4 and the STX1 models, or for all wattage lampheads. Be sure to apply the sections specific to your system.

## 1.1 MODEL DESIGNATION

SkyTrackers are available in four-beam and single beam models, and in different intensity levels. Power requirements vary with model designation (also see section 3.1). The models available and performance characteristics are as follows:

MODEL	NUMBER OF BEAMS	WATTS PER LAMP	CANDLE POWER PER BEAM
STX-4 – 2000	4	2000	208 MILLION
STX-4 – 4000	4	4000	332 MILLION
STX-1 – 2000	1	2000	208 MILLION
STX-1 – 4000	1	4000	332 MILLION

NOTE: The components that differ between the models are identified in the sections that follow.

## 2.0 SAFETY

The concept of achieving maximum safety through knowledge and understanding is basic to SkyTracker equipment. This is applicable to its own personnel, those of the dealer, representative, operator, servicing agency or to any member of the general public who may be exposed to or associated with the operation of a Strong Lighting product.

Safety features and concepts are designed into every Strong Lighting product and component regardless of whether its function is mechanical, electrical, or optical. Since

Strong Lighting has no control over the manner in which its products are installed, operated, maintained, or utilized after the product leaves the manufacturing facility, it can not be held responsible for any injuries resulting from improper installation, use, inadequate maintenance, or any other condition beyond its control.

It is the intent of this manual to call to the attention of the owner, operator, and service technician, any and all hazardous areas or conditions which could lead to operational problems or injury and to outline proper and recommended procedures to prevent any such occurrence.

Throughout this manual, the following nomenclature will be utilized to call to the attention of the reader any potential hazards related to operation or maintenance.

## **CAUTION**

The word **CAUTION** is utilized (preceding certain sections in this manual) to call attention to an area of particular importance, where failure to follow the specified Strong Lighting procedure may result in improper operation of the device. And also, may impair the effectiveness or utility of the device, cause a shortened effective lifetime of components, or in any way lead to premature or ultimate failure of the device to perform to its original design standards and expectations.

The normal warranty will be voided in instances where it is determined that any component of the SkyTracker has been damaged or has failed due to failure to follow procedures or instructions contained in this manual.

## **DANGER**

This designation is utilized preceding any section within this manual where the operations described could expose anyone to the possibility of physical danger or injury of any kind. It is the responsibility of the owner, operator or service technician to become familiar with all such **DANGER** situations, and to follow the specified procedures and instructions explicitly, and to otherwise use all prudent and responsible care to prevent injury.

The completely assembled and operational SkyTracker has all rotating parts (drive motor, drive chain, drive belt, etc.) and all electrical and optical components contained within closed and secured housings. The SkyTracker lampheads move relatively slowly (nominally 6 seconds per cycle). At this slow rate, there is little possibility of being "hit" or injured by the moving SkyTracker lampheads. Some precautions may be taken to avoid the possibility of anyone being "bumped" by the units during operation. It is recommended that, if the unit is operated at ground level in areas where crowds may be present, a rope barrier or equivalent barricade be established to keep the general public away from the moving SkyTracker lampheads.

As is the case with all intense light sources, it is not advisable to look directly into the light source or into the light beam. It is the responsibility of the operator to see that the necessary rope barriers or other barricades are positioned suitably to prevent passers-by or any member of the crowd from looking directly into the light beams from a close distance.

### 3.0 OPERATION OF THE SKY-TRACKER

#### 3.1 INPUT POWER REQUIREMENTS

#### **CAUTION**

Each SkyTracker model has been designed and factory tested to operate satisfactorily with an input power source as specified below. It is the responsibility of the owner/operator to determine that proper input power is provided and to make adjustments or corrections as may be required to provide compliance with the requirements set forth below.

#### **CAUTION**

Polarity and grounds must be checked before cable connections are made to the SkyTracker. Low voltage conditions (less than the minimum levels specified below) may cause damage to the SkyTracker.

MODEL	PHASE	VOLTAGE (±10%V.AC,50/60 Hz)	CURRENT* (CIRCUIT BREAKER REQUIRED)	POWER CABLES*
STX-4 – 2000	1	208-240	50 AMP	# 4 (3)
STX-4 – 4000	1	208-240	100 AMP	# 2 (3)
STX-1 – 2000	1	208-240	12 AMP	# 12 (3)
STX-1 – 4000	1	208-240	30 AMP	# 10 (3)
STX-4 - 4000	3	208	58 AMP	#4 (5)
STX-1 - 4000	3	208	14 AMP	#12 (5)

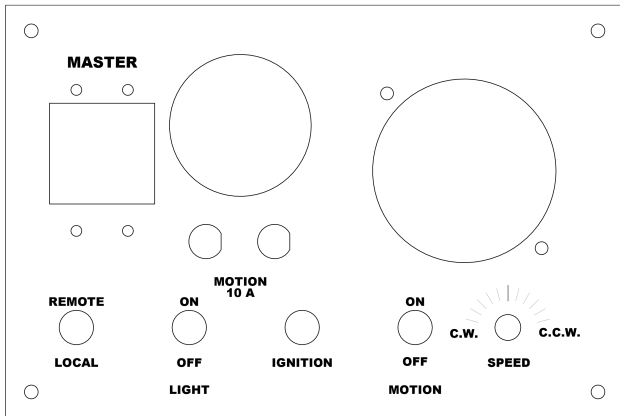
Use 100' (30.5 m) or shorter cables. For cables longer than 100' (30.5 m), go to larger wire sizes.  
 \* Recommended wire sizes; *owner/operator responsible to conform to local codes*

#### 3.2 STARTUP AND SHUTDOWN

The operation of the SkyTracker controls will be explained in this section. The SkyTracker control panel (see Figures 2 & 3) is protected from weather, vandalism, and unauthorized access by means of a locking cover panel.

When the input power supply is connected and the circuit activated, the green pilot lights (identified as “Power”) will light and remain lit so long as all input phases are on (STX4 only).

If a pilot light does not come on, it is an indication that input power is not being supplied to that particular phase. On the STX-4 models, when all three lights are lit, the unit is “powered” and ready to function. STX-1 units do not have pilot lights.

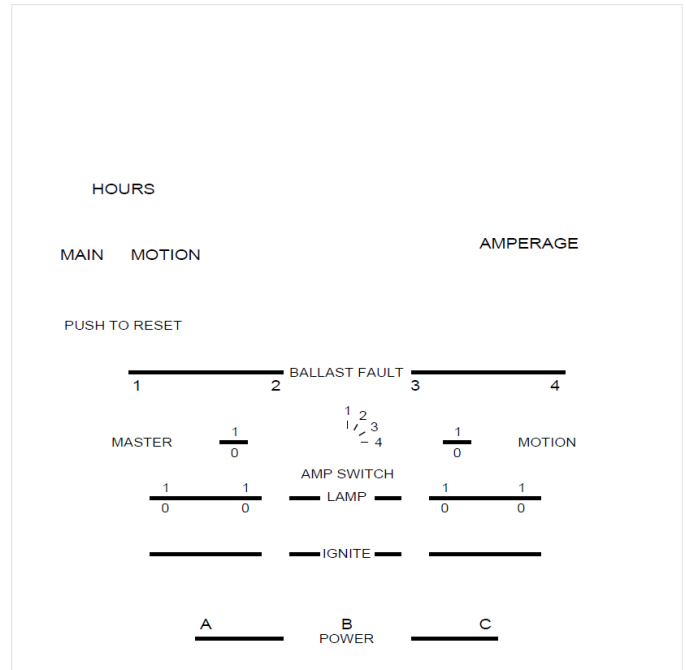


STX-1 CONTROL PANEL (Figure 1)

**NOTE:** It is not detrimental to the SkyTracker units to leave the input power connected (with the pilot lights lit when the unit is not being used, as long as the “Master” and “Motion” switches are in the “OFF” (down) position or the system is supplied with a remote control and fan timer circuit.

### 3.2.1 LIGHTS “ON”

To turn the lights on, move the “Master” switch to the “ON” position up, and set each of the individual lamp switches to “ON” up. **NOTE: If for some reason the heads are not in their upright “Parked” position they will immediately begin to move once the “Master” switch is turned “ON”. They will come to a stop once they reach the “Park” position if the “Motion” switch is “Off”. If the “Motion” switch is “On” the lights will continue to move (STX4 only).** The lights will automatically ignite within 3 to 4 seconds. In the event that the “autostrike” feature of the Sky-Tracker does not function properly (as evidenced by the lamps failing to light within a few seconds); any lamp can be manually lit by momentarily pressing its respective manual start button located on the control panel.



STX-4 CONTROL PANEL (Figure 2)

## **CAUTION**

If the lamp still fails to light, there is a malfunction, which must be corrected. DO NOT hold the manual “IGNITE” button in for more than a fraction of a second. A brief, momentary push is all that is required. Holding the manual start button in for a prolonged period is *not* necessary for lamp ignition, and can result in failure of the igniter components.



### 3.2.2 SELECTIVE OPERATION

To choose not to light a particular lamp of an STX-4, the Control Panel has an individual "Lamp OFF" switch for each head. Operation of this switch will disable the indicated lamp.

### 3.2.3 MOTION "ON"

The motion feature of the SkyTracker is initiated by turning the "Motion" switch to the "ON" position (up).

**NOTE:** If power is interrupted momentarily for any reason and then restored, the motion will automatically resume and each xenon lamp will be re-ignited by "autostrike" or by manually pushing the respective manual start button.

### 3.2.4 SHUTDOWN

To turn the SkyTracker off, basically reverse the procedures noted in the previous sections. The lights can be turned off individually and the motion switch should be left in the on position. Turning "Off" the "Motion" switch while leaving the "Master" switch "On" will allow the heads to come to a full upright position for storage.

**LEAVE THE MASTER SWITCH "ON".** It is necessary, that power continue to be supplied for *at least* 20 minutes after the lamps have been turned off to provide required forced-air cooling for optimum cool-down of the xenon lamps after operation. The STX systems have built-in timers that operate the cooling system for 30 minutes after shutdown so long as main power is available.

If desired, the motion of the SkyTracker may be stopped in any position by turning "Off" the "Motion" switch at the appropriate time. Because of the inertia of the drive mechanism, a small degree of "coasting" will cause the lights to actually stop at a position slightly past the point at which the switch is turned off. Experimentation and practice by the operator can result in stopping the lights in any desired position.

### 3.3 HOUR METER

An hour meter, located at the side of the control panel, is provided to maintain a running record of operational hours. The total hours shown on the meter provide a guide to service intervals as well as recording operational lamp hours (required for lamp warranties. Since four individual xenon lamps are employed on each STX-4 model, accurate lamp hours (for lamp warranty claim purposes may be recorded on separate log sheets, which should be stored with each individual lamp.

Since "Motion" is normally utilized in conjunction with the operation of the xenon lamps, the hour meter serves as a general indication of the total elapsed operating time of the motion drive motor related components.

### **3.4 ELECTRICAL PROTECTION**

Two circuit breakers are provided for protection of the auxiliary and motor circuit. The auxiliary circuit breaker protects the cooling blowers and the control circuits. Each xenon lamp power supply is internally fused. The motion motor is protected with an individual circuit breaker. STX-1 units are provided with a single circuit breaker for all auxiliary circuits, and internal fuses to protect the motor controller.

In the event that any of the above described functions (cooling, lights, and motion) do not operate, the related circuit breaker or fuse should be checked (see Troubleshooting). Resetting the circuit breaker may resolve the problem. Since circuit breakers or fuses are protective devices, failure of a circuit breaker or fuse could indicate an overload or other malfunction. If the circuit breaker or fuse blows again, it is a sign that such a malfunction exists and the cause should be determined and remedied.

#### **CAUTION**

UNDER NO CIRCUMSTANCES SHOULD A CIRCUIT BREAKER OR FUSE OF A HIGHER RATING BE SUBSTITUTED IN AN EFFORT TO CORRECT A "CIRCUIT BREAKER / FUSE BLOWING" PROBLEM. TO DO SO MAY NEGATE THE PROTECTION ORIGINALLY INTENDED, CAUSING SERIOUS COMPONENT FAILURE AND VOIDING THE WARRANTY.

### **3.5 TRANSPORTING**

Certain precautions should be taken before moving a SkyTracker. Before moving a unit, the lamphead(s) should be brought straight upright. In the case of an STX-4, the four lampheads should then be restrained by inserting Transport Cushion 3198124 between the lampheads and strapped together using Transport Strap 3200001.

The STX-4, which weighs up to 1200 pounds (545 kg), is most easily lifted for loading by use of a forklift.

#### **CAUTION**

Insert forks under the bottom of the main frame **ONLY** from the left or right of the control panel, never from the rear or front, to prevent damage to the systems on the bottom of the unit.

The SkyTracker can also be moved by the use of "optional" casters. It can then be winch-loaded onto a trailer or easily placed or relocated at point of use.

#### **CAUTION**

When traveling short distances (such as for rental situations within a city or local area) the lamps may be left in place *IF* the transport vehicle (trailer or small truck) has a soft-riding suspension, preventing any sudden jars. For long-distance transportation, or in any instance when possibility of severe jarring, shock or excessive vibration exists, **AND IN ALL**

INSTANCES OF TRANSPORT VIA COMMON CARRIER, the lamps *must* be removed from the lampheads. The lamps should be carefully packed in their original containers and transported vertically.

Damage to a xenon lamp during transportation, whether in place in a lamp-head or separately packed, is not covered under warranty, nor is any consequential damage.

### **3.6 OPTIONAL DMX CONTROL**

At the time of purchase it is possible to order your STX system with limited DMX controls. A DMX signal can be supplied to turn on or off the lights and a second channel can be used to turn the motion system on and off.

To use your DMX system terminate your DMX source wiring to the installed DMX Relay Board. Set the Dip Switch to the starting DMX channel you would like to use for on/off lamp control. Under no circumstance should you ever adjust Dip Switch number 10.

Lamp ON is executed with the DMX level on the assigned channel rises above 50%. The Xenon lamp will turn OFF when the level is returned to below 50%.

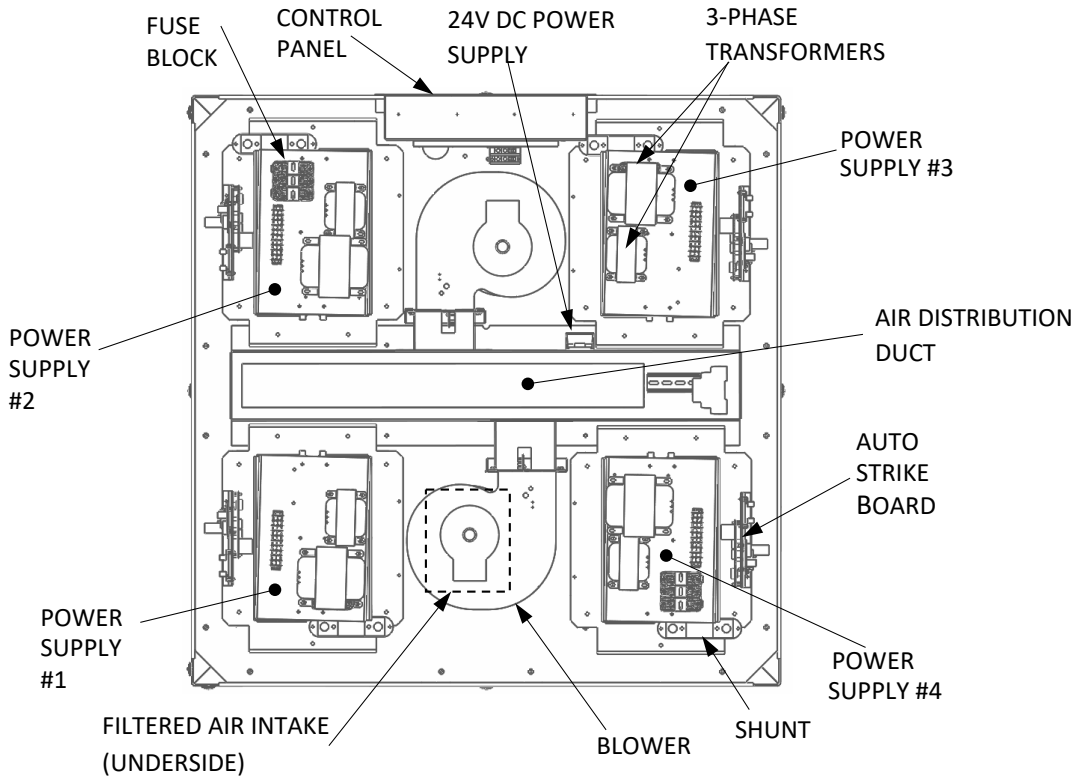
The same conditions hold for Motor Control where motion is started above 50% and is turned OFF below 50%. Once the signal is sent to turn motion OFF, the lamp head will return to a position pointing straight up before the motor stops.

### **CAUTION**

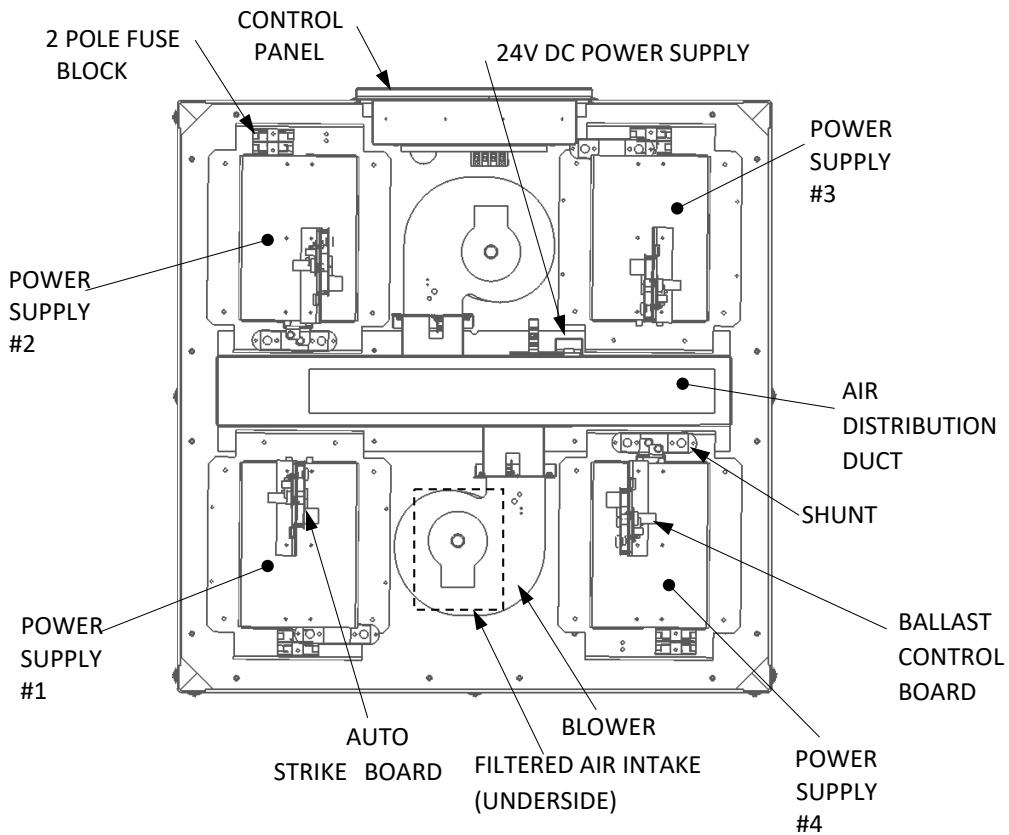
When using DMX Control the Lamp/Light switch must be ON in position order to turn motion ON. It is also then important to recognize that if you turn the lamp OFF motion will stop immediately. So therefore the typical start up sequence would be to turn the Lamp/Light ON, then turn the motion ON. The typical shutdown sequence would be to turn the motion OFF, then turn the lamp OFF.

## 4.0 BASE ASSEMBLY - ELECTRICAL COMPONENTS

To aid in understanding the function of each electrical component, the system is described below .

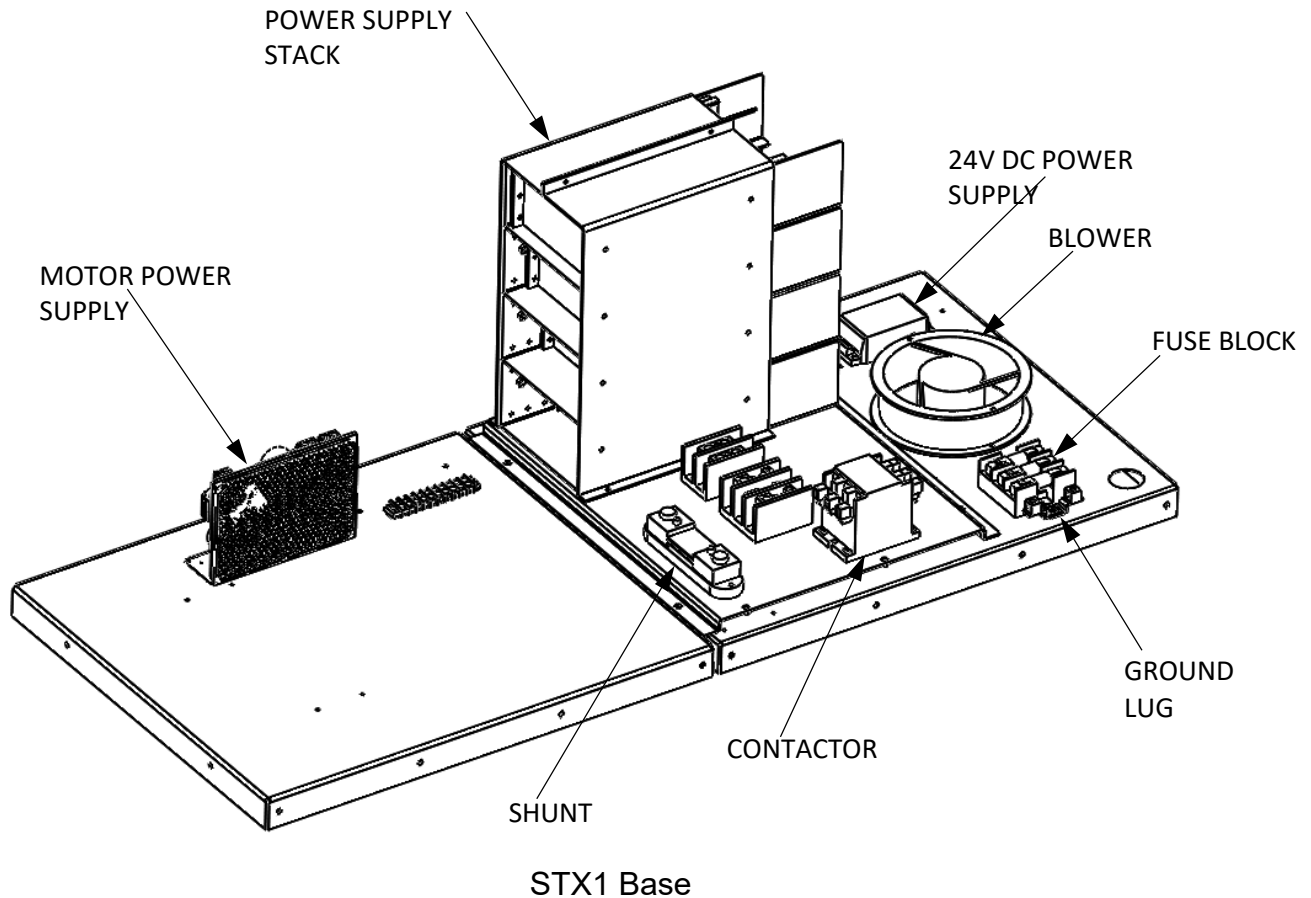


STX4 Three Phase Base



STX4 Single Phase Base

## 4.0 BASE ASSEMBLY - ELECTRICAL COMPONENTS - Continued



The base assembly electrical components which provide DC power for the operation of the xenon light(s) are situated in modular groups(s) and are identified by number as to which lamphouse they relate to.

Access to the electrical components for servicing can be accomplished by the removal of the side panels. The access panels can be removed by unscrewing the fasteners located along the outside edge of the panels.

### 4.1 CONTROL PANEL

The control panel (see Figures 1 & 2) is mounted in a recessed compartment. Access to the control panel components is provided by the removal of four (4) corner screws and then swinging the panel forward and down. If desired, it may be removed by unplugging the indexed plugs, which connect it to the individual power supplies and internal components.

The various input power receptacles, switches, circuit breakers, and hour meter are mounted to the panel and all electrical connections are accessible from the rear of the panel. Details of operation are covered in section 3.2.

## 4.2 MAIN WIRE HARNESS ASSEMBLY

The Wire Harness Assembly provides interconnection between the Control Panel and all electrical components within the base assembly. Each component may be individually disconnected for testing or removal for servicing, by unplugging the indexed connectors from the Wire Harness Assembly.

## 4.3 MOTION DRIVE MOTOR

The STX-4 motion drive motor includes a gear-driven speed reduction unit, which operates on 208/240 volt 60/50 Hz. input and is activated by the "Motion" switch located on the main control panel. STX-1 units are supplied with a DC Servo motor connected to a worm drive. Changes to the speed and direction of the motor can be made via the programming port of the motor. Consult with the factory to make these changes.

## 4.4 COOLING SYSTEM

Blower(s) draw clean air through the bottom filtered inlet, pressurizing the base cabinet. The air then passes over the power supplies, cooling them, and continues through the flexible ducts to the lamphouse(s). With the aid of supplemental blowers in the lamphouses, the air continues through the base plenum, cooling the lamps. Finally, the air exits out the bottom of the lamphouse through screened outlets (see Figure 4).

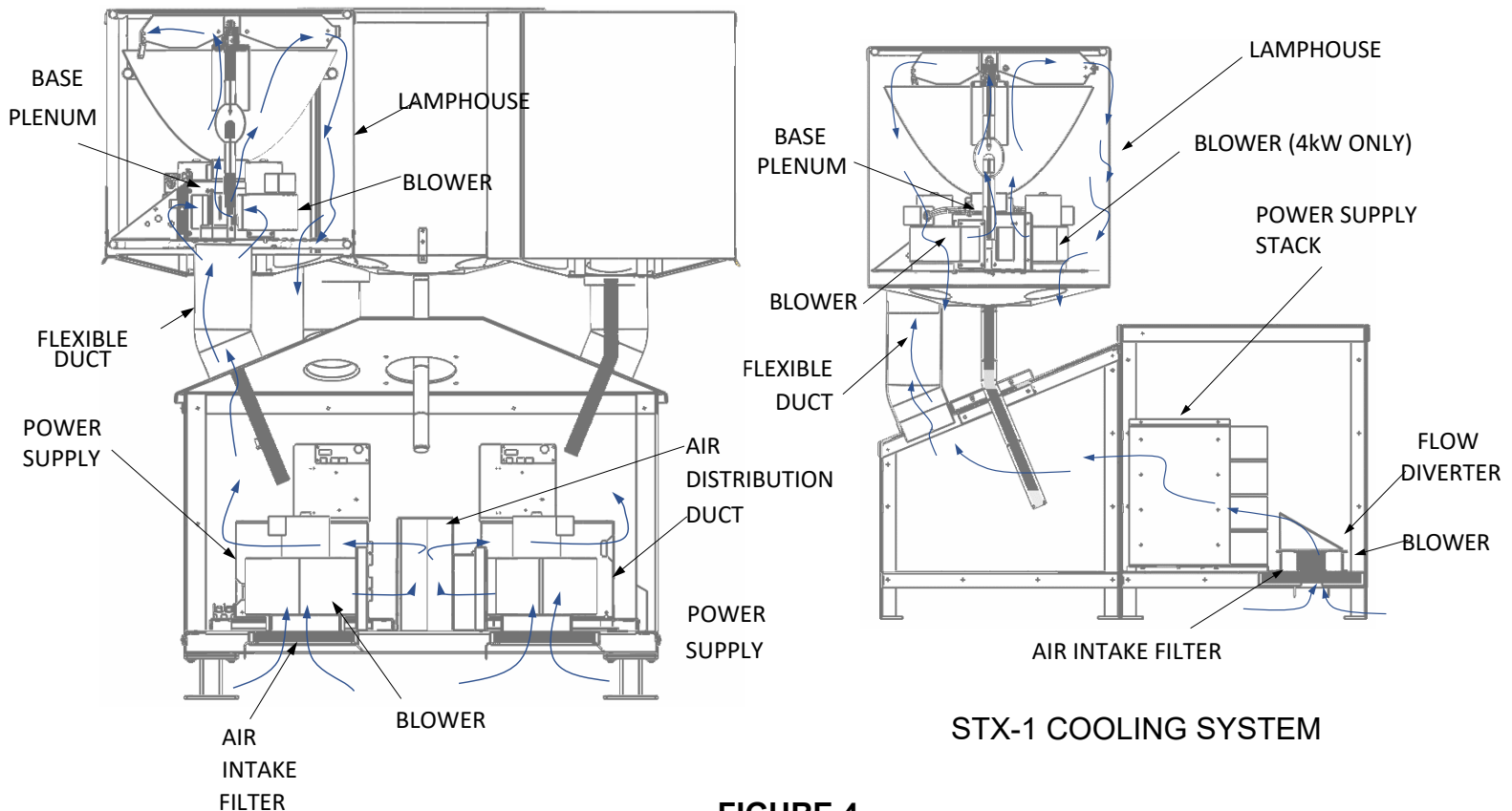


FIGURE 4

## CAUTION

Each lamphhead is protected from overheating by a Thermal Switch. DO NOT override this protection device as premature failure of the lamp may result. The flexible cooling ducts must be in good condition, securely mounted on both ends and with no visible holes in the duct's materials. The base cabinet should also be without holes and with all side panels in place to insure sufficient cooling to each lamphhead.

### **4.5 DC (Direct Current) POWER SUPPLIES**

The DC power supplies are modular units. They consist of four, two or one solid-state module(s) that lower the input voltage down to a range of 25 to 45 volts to operate xenon lamps. They also provide for a higher (125 to 150 DC volts) level required during the ignition phase.

#### **4.5.1 POWER SUPPLY CONTACTORS**

Each power supply is actuated when the "Master" switch on the main control panel is turned to the "ON" position and the individual "Lamp OFF" switch is in the "ON" position. However, if the lamphhead thermal switch is opened due to an over-temperature condition, for that particular head, the power supply will not engage.

#### **4.5.2 CURRENT ADJUSTMENT BOARD**

Each power supply stack is controlled by a printed circuit board with a potentiometer capable of adjusting the current delivered to each xenon lamp. This adjustment is factory set and should only be reviewed when changing lamps.

The power supply is a constant power design that will compensate for input voltage variations and lamp aging without operator assistance.

Output wattage is set at the factory to the appropriate value for the model STX provided.

<u>WATTAGE</u>	<u>CURRENT RANGE</u>	<u>NOMINAL</u>	<u>DO NOT EXCEED</u>
2000	50-90 A.	75 A.	90 A.
4000	90-150 A.	130 A.	150 A.

If input voltages (measured with the SkyTracker in full operation with all lights and motion on) are found to be BELOW the minimum levels specified in section 3.1, damage to components may result and, in particular the motion motor may burn out. If voltages are found to be below the minimum levels, DO NOT OPERATE SKYTRACKER.

Components damaged from low voltage operation will NOT be replaced under warranty. Similarly, if any other components fail (including the xenon lamp power supply) from over-voltage operation, they will NOT be replaced under warranty.

#### **4.5.4 AUTO STRIKE ASSEMBLY – (STX-4 XENON LAMP AUTOMATIC IGNITION)**

The Auto Strike Assembly is a module consisting of a printed circuit board and related components located near each power supply. Functionally, this circuit activates the igniter circuit when it senses that the light has been turned on, but the lamp is not drawing any current. It provides igniter bursts to the lamp and then locks itself out to prevent overloading and potential burn-out of the primary igniter transformer. The auto strike can be re-activated by flipping the “Master” switch off and then back on again or by switching the individual Lamp On/Off switch.

#### **4.5.5 TIMER PBC ASSEMBLY**

STX-1 units are supplied with a printed circuit board assembly that controls Auto Strike action as described above, and a 30 minute cool down timer for units operated by remote or unattended operation. This board is located below the front Control panel.

#### **4.7 DC POWER AND IGNITION CABLES**

Three cables connect the DC power supply and the control system to each lamphouse. In each group the two large, single-conductor cables supply DC current to the lamps, while the center multi-conductor cable supplies AC control voltage, igniter operation and fan power.

### **5.0 BASE ASSEMBLY, MECHANICAL COMPONENTS – STX-4 (5.1 to 5.5)**

Components that are required to provide the unique motion of the SkyTracker STX-4 are contained within the base assembly.

#### **5.1 MOTION DRIVE TRAIN**

The motion drive train provides mounting for the four lamphouses by the motion spindle assemblies, which are timed together by one continuous timing belt. The Number 4 motion spindle assembly (opposite the control panel; see Figure 7) is driven by the reduction gear motor through a chain drive.

### **CAUTION**

DO NOT attempt to rotate the SkyTracker head assemblies by hand unless the chain has been disconnected, as damage may occur to the motion drive train.



## **5.2 MOTION ASSEMBLIES**

The motion assemblies provide both for the oscillating motion of the SkyTracker and mounting support for the lamphouses. Each assembly consists of a “bent shaft,” shaft seal, drive/timing pulley and lower and upper bearing. Bearings in the housing assemblies are permanently lubricated and do not require regular maintenance.

## **5.3 TIMING BELT IDLERS**

The timing belt idlers serve to center the timing belt onto the spindle drive pulleys. The timing belt should not ride on the sides of the drive pulleys, as this condition will cause extraordinary wear to the timing belt. The idlers have been adjusted at the factory and usually do not need re-adjustment.

## **5.4 TIMING BELT TENSIONING ADJUSTMENTS**

Timing belt tensioning is accomplished by two turnbuckles mounted on motion assemblies #1 and #3 which are located to the left and the right of the control panel. To tighten the timing belt, loosen the outermost turnbuckle hexnut and its adjacent locknut.

Then loosen (but do not remove) the four mounting bolts that hold the lower bearing mount to the base and gradually tighten the two turnbuckles equally. The slotted holes in the housing permit this adjustment. The belt tension should be such that its deflection from a straight line (between points of contact with the drive/timing pulley and idler) is between 1/8" and 1/4" (3-7 mm) when a force of 50 lb. (22.6 kg) is applied midway between the drive pulley and idler.

After achieving proper belt tension, securely tighten first the turnbuckle locknuts, and then the four bearing housing mounting bolts on each side.

### **CAUTION**

Tightening the timing belt from one side only may alter the synchronization of the four lamphouses, causing them to collide in the “up” position.

Proper timing belt tensioning is important. A loose belt may cause the heads to slip out of synchronization, causing them to strike one other. An overly tightened belt can cause tearing of the reinforcing cords within the belt, leading to premature belt failure.

## **5.5 SPRING ASSEMBLIES**

Each spring assembly consists of pairs of springs that counterbalance the lamphouses. The SkyTracker should not be operated with a broken spring for prolonged periods of time, as this will cause extraordinary wear on the drive system that may result in failure.

A broken spring may be replaced by removing the eyebolt and related spacers on the end of the spring mounting shaft. See the “Detail” drawing on Page 41.

## **CAUTION**

Springs should be replaced with lampheads in an upright position, reducing the tension on the springs.

NOTE: The springs have special screw-on ends with ball joint connectors. When replacing a spring, the rod end and cap must be removed from the broken spring and re-installed on the new spring (includes retaining plugs). After re-assembly and alignment, the steel lock nuts must be tightened to prevent accidental disassembly. See the "Detail" drawing on Page 41.

### **5.6 REMOTE CONTROL**

Both the STX1 and STX4 have built-in remote control capability, On the STX1 there is a terminal block on the control PCB (TB3. On the STX4 this terminal block is located behind the side panel to the left of the front panel controls.

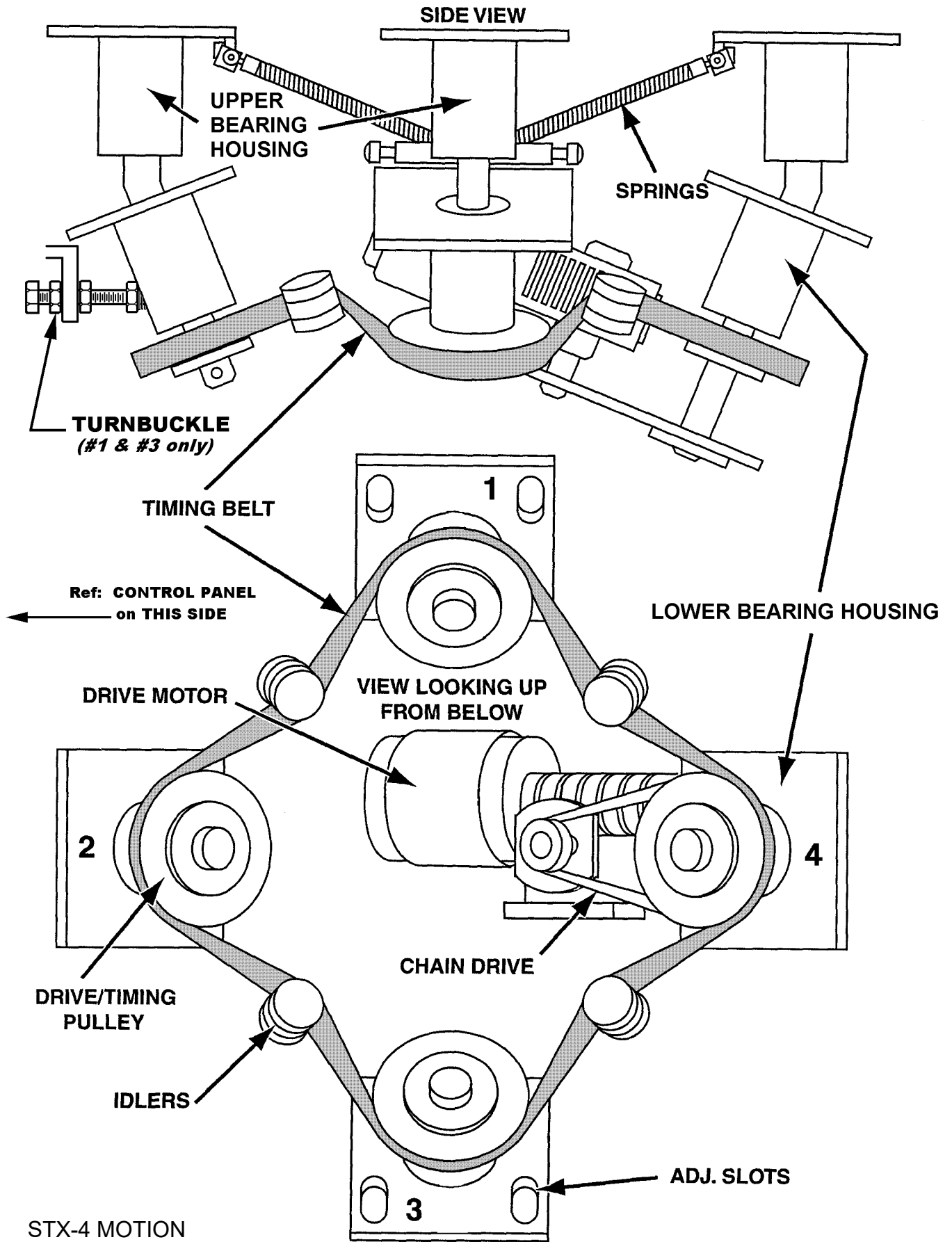
In both cases this is a pair of wires that supply and return a 240VAC control signal to the light. Be sure to supply wiring, a switch closure or relay that is appropriate for this high voltage signal.

To operate the STX1 remotely the front panel Local/Remote switch much be switched to Remote. Once the customer supplied switch/relay is closed the light will strike and the motion will start so long as the "Motion" switch is set "On".

To operate the STX4 remotely the jumpers pre-installed on the terminal block must be removed. This jumper is replaced with wires that connect the customer supplied switch/relay. Once that switch is closed the individual lights will ignite that are set in the "On" position and the Motion will start so long as that switch is set "On". For proper remote operation the Master switch should be left in the "On" position at all times.

When the remote switch/relay is opened the running lights will turn off and the motion will continue until the heads are in the upright position. A 30 minute timer will start that keeps the cooling system operating to ensure proper cooling of the xenon lamps.

See section 11 for installation and operation instructions for STX1 systems with coordinated motion controls.



STX-4 MOTION  
DRIVE SYSTEM  
FIGURE 7

### 5.0.1 BASE ASSEMBLY – MECHANICAL COMPONENTS - STX-1 (5.6 to 5.9)

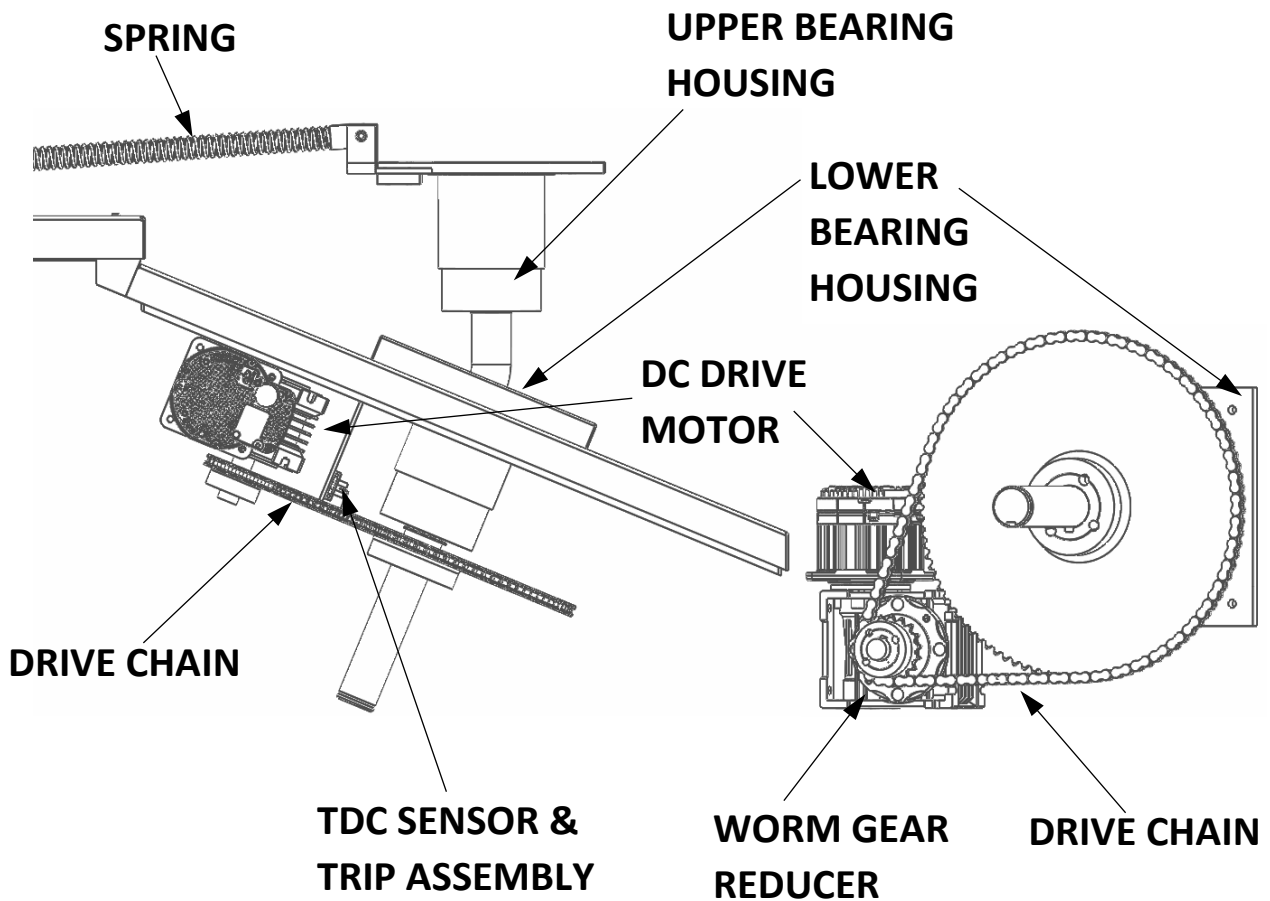
Components that are required to provide the unique motion of the SkyTracker STX-1 are contained within the base assembly.

### 5.0.2 MOTION DRIVE TRAIN

The motion drive train provides mounting for the lamphouse by the motion assembly. The assembly is driven by the reduction gear master by a chain drive (see Figure 7a).

## **CAUTION**

Do not attempt to rotate the SkyTracker head assembly by hand unless the chain drive has been disconnected, as damage may occur.



STX-1 CHAIN DRIVE SYSTEM  
FIGURE 7a

### 5.0.3 MOTION ASSEMBLY

The motion assembly provides for both the oscillating motion of the SkyTracker and mounting support for the lamphouse. The assembly consists of a "bent shaft", shaft seal, drive pulley, and lower & upper bearings. Bearings within the assembly are permanently lubricated and do not require regular maintenance.

### 5.0.4 DRIVE CHAIN TENSION ADJUSTMENT

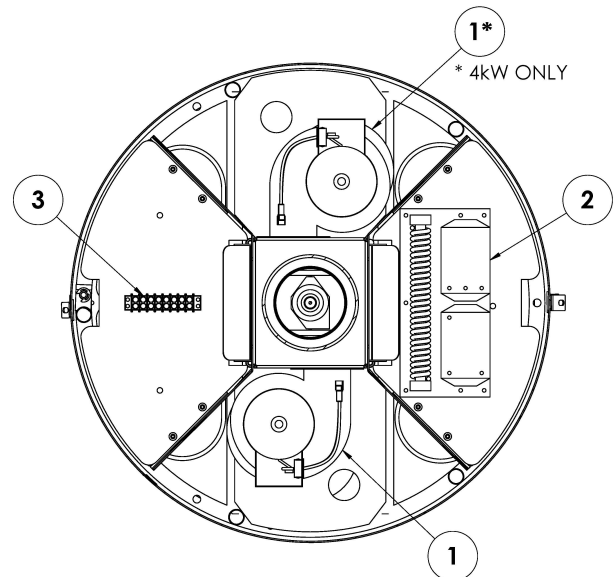
The drive chain may lose tension over time and need adjustment. To adjust the drive tension, loosen the four bolts holding the worm gear/motor to the system frame. **DO NOT REMOVE.** Apply pressure to the motor until deflection of the chain is less than 1/4" (6mm) when force is applied midway between the drive pulley and the motor pulley. After achieving proper tension, tighten the four motor mounting bolts.

## 6.0 LAMPHEAD ELECTRICAL COMPONENTS

All high voltage igniter components, cooling blower(s), thermal switch, and DC power connectors to the xenon lamp are located in the lamphouse (see Figures 8 & 9). The functions of the various components are as follows:

### 6.1 IGNITER SYSTEM

The complete high voltage igniter circuitry is located on the lamphouse base plate. To gain access to the internal electrical components, it is necessary only to unscrew the two latches located at the bottom of the housing. Then, slide the housing upward and away from the tubular frame assembly. With the components exposed, the individual items that make up the igniter system can be accessed.



1. Blower(s)
2. Igniter
3. Terminal Strip

BASE PLATE  
ELECTRICAL COMPONENTS  
**FIGURE 8**

## **DANGER**

Before opening the lamphouse, disconnect all input power to the SkyTracker so that the igniter cannot be accidentally operated. Severe electrical shock can result if the igniter is accidentally operated when these parts are exposed.

### **6.1.1 SOLID STATE IGNITER**

The STX4 and STX1 are now supplied with a next generation solid state igniter. There are no user servicable parts in this igniter. This igniter incorporates the function of a traditional igniter and the function of the auto-strike board or circuit. When the open circuit voltage reaches approximately 150VDC the igniter operates and lights the lamp.

## **6.2 DC POWER CABLES**

The flexible cables that carry the DC power from the Base Assembly to the lamphead enter through the baseplate. The positive (+) input cable is attached at an interconnect point to a similar cable within the lamphead connected to the upper lamp support spider. The spider in turn carries the DC positive (+) power through jumper cables then to the upper lamp adapter which is attached to the front or anode (+) end of the xenon lamp.

The negative (-) DC input cable is attached directly to one end of the R.F. transformer. A short, flexible cable then connects the other end of the R.F. transformer to the end of the lamp, which is the cathode (-) end of the xenon lamp. This cable and all components between the output side of the R.F. transformer and the xenon lamp must be well insulated and maintained at least one inch from any "ground" or conductive components of the lamphead, in order to prevent shorting and/or loss of ignition energy to the lamp.

## **6.3 COOLING BLOWERS**

One or two cooling blowers, depending on the lamphead wattage, are attached to a square plenum, which distributes air to the lamp and rear of the reflector and also provides support for the base (cathode end) of the lamp. Access to this plenum and the base end of the lamp is achieved through removal of four screws securing a cover plate to one side of the plenum.

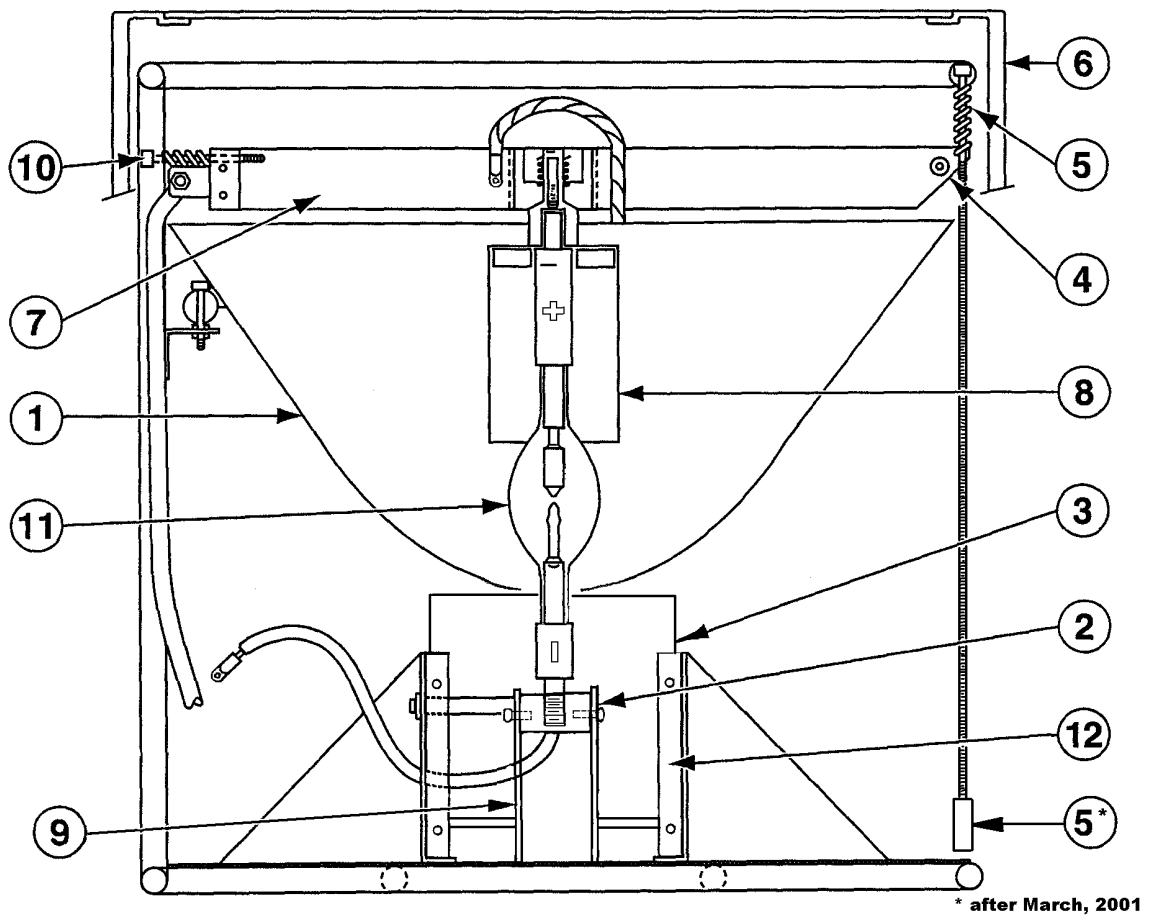
## 6.4 THERMAL SWITCH

Each lamphead is equipped with a Thermal Switch that will detect "High Temperature" conditions. The switch is located on the upper lamp support spider (see Figure 9, Item 7). When the temperature in a lamphead reaches a level that may be harmful to the system, the Thermal Switch will open – turning that particular lamp off.

## 6.5 XENON LAMP (LIGHT SOURCE)

The light source is supplied through the use of a high quality xenon lamp (see Figure 9). The lamp is securely attached to the circuit to minimize mechanical and thermal stresses. Instructions to install and remove the lamp are detailed in sections 8.0 and 9.0.

## 7.0 LAMPHEAD MECHANICAL COMPONENTS



**FIGURE 9**

- |                              |   |
|------------------------------|---|
| 1. Reflector Assembly        | 7. Anode Support Spider                         |
| 2. Cathode Pin Receiver      | 8. Anode Adapter                                |
| 3. Air Plenum                | 9. Lower Lamp Support                           |
| 4. Thermal Switch            | 10. Lamp Centering Adjustment "X" and "Y"       |
| 5. Lamp Focus Adjustment "Z" | 11. Xenon Lamp                                  |
| 6. Housing Assembly          | 12. Insulator Cover Plate (removed for clarity) |

The xenon lamphead has been designed and constructed for ease of operation and serviceability in extreme weather conditions and operates satisfactorily in rain or snow. In operation, the lamphead is slightly pressurized as a result of the cooling air flow, thus aiding in the exclusion of dust or moisture. The basic components are shown in Figure 9.

The two primary components of the lamphead are the deep dish electro-formed parabolic reflector and the xenon lamp (light source). To function efficiently, these components must be mounted in such a manner that the lamp can be carefully positioned with its radiant energy source precisely located at the focal point of the reflector. The lamp must be capable of adjustment as to its relationship with the reflector to optimize the projected beam characteristics. All electrical connection to the lamp must be of low resistance and capable of carrying relatively high currents (50 to 160 Amps) and cooling must be constant and effective to maximize lamp life and minimize electrical conductivity problems that can result from overheating. The components, which accomplish these functions, are noted below.

## **7.1 REFLECTOR ASSEMBLY**

The electro-formed parabolic reflector is precision bonded to a circular support ring, which is turn bolts to the lamphouse tubular frame. If replacement is required, first remove the lamp as noted in section 9.0. Next detach the upper support spider and associated components. Finally, unbolt the reflector from the lamphouse tubular frame.

## **7.2 CATHODE SUPPORT**

The rear, or cathode (-) end of the xenon lamp is supported by slotted lamp guides, which are bolted to the bottom of the air plenum. This allows the lamp to move freely in the vertical axis for beam adjustment and to eliminate strain on the quartz envelope of the lamp.

## **7.3 AIR PLENUM/DUCT**

The air plenum is attached to the base center support baffle and provided a means of ducting and directing the airflow around and over the xenon lamp to the front, or anode (+) end of the lamp

**NOTE:** It is mandatory that heat be properly removed from the anode end of the lamp to avoid damage to its internal seal.

## **7.4 FRONT LAMP HOLDER**

The upper lamp adapter, which is a tubular section surrounding the front portion of the lamp and attaches to the anode (+) end of the lamp, serves a dual purpose. It is the point of attachment to the lamp and also provides a means of removing heat from the lamp by direct conduction. As the heat is conducted outward from the lamp into the front lamp adapter, it spreads outward into the tubular section of the adapter by conduction. It is then removed by convection to the air stream, which has been directed over the lamp by the air duct.



## **7.5 ANODE SUPPORT – SPIDER AND ADJUSTMENT ASSEMBLY**

The upper lamp support also serves a dual purpose. Its construction of highly conductive aluminum permits DC power to be carried from the input cable to the anode end of the lamp with very little loss due to electrical resistance. Additionally, it provides a pivot point, which allows the xenon lamp to be adjusted in the X or Y axis without developing any undesirable bending forces that could stress the quartz envelope of the xenon lamp. Movement of the lamp along the Z axis during focusing is also readily accomplished by the pivoting motion of the upper lamp support.

## **7.6 HOUSING ASSEMBLY**

The housing assembly provides a front closure to the lamphead. A tempered glass window is attached to the housing by means of silicone rubber sealant to provide a watertight seal. The tempered glass window is not affected by temperature shock, (such as rain or snow suddenly applied to the window) even when it is operating at normal temperatures. The high-strength tempered glass also resists accidental breakage resulting from foreign objects striking the glass.

## **8.0 LAMP INSTALLATION**

Upon original delivery or subsequent common carrier transportation of the SkyTracker, the customer will be required to install the xenon lamp into the lampheads. The procedure is as follows:

### **DANGER**

The handling of a xenon lamp may expose the operator or technician to hazards resulting from bursting of the quartz envelope, because of the high internal pressure of the xenon gas.

Bursting may occur if the lamp is dropped or mishandled. The hazard is substantially increased if the lamp is hot from operation, as the gas pressure increases in a manner directly proportional to the increased temperature. Whenever the xenon lamp is removed from its protective cover, and until the installation or removal is complete and the lamphouse window assembly is secured, the operator or technician **MUST** wear protective clothing, including Kevlar™ gloves, acetate face shield, and protective jacket or equivalent. (These items are available from Strong Lighting.) Instructions regarding protective clothing are subject to change by any local or federal agency that may have authority over such matters, dependent on area or point of use of the SkyTracker equipment.

It should be noted that xenon lamps do not “explode” in the normal sense, in that there is no combustible energy-releasing reaction occurring. They merely “burst” like a balloon or a pressure vessel. The hazard is related to the flying particles of glass-like quartz, which are propelled with sufficient force to penetrate normal clothing, eyes, and skin. It can not be over-emphasized that protective clothing, gloves, and eye protection be worn when handling xenon lamps.

## LAMP INSTALLATION STEPS

1. Place the lamphood in the upright vertical position.
2. Remove the housing and set aside.
3. Remove the two 1/4-20 bolts that secure the power jumper cables to the upper lamp adapter (Figure 9, Item 8). Remove the central bolt, washer, and spring assembly that secures the front lamp adapter to the anode support "spider" (Figure 9, Item 7).
4. Inspect reflector for cleanliness and clean if necessary.
5. Carefully remove xenon lamp from shipping container and remove protective cover. (Save the container and packing for future shipping purposes.) Use caution to handle the lamp only from the metal ends. Do not allow fingers to come in contact with the quartz envelope. Finger oils or other foreign material on the quartz envelope can lead to rapid, premature failure. If accidentally touched and contaminated, carefully clean the quartz envelope with tissue moistened with alcohol and then wipe dry with a clean, dry, lint-free cloth.
6. Inspect the upper lamp adapter and end pins of the lamp to make sure that these contact areas are clean and free of corrosion, oxidation or any contaminant which could cause a high resistance electrical joint. Make sure that the clamp screws on the upper lamp adapter are loosened and that the upper lamp adapter will slide freely over the front anode (+) end of the lamp.
7. After sliding the top lamp adapter onto the anode (+) end of the lamp, carefully turn the two components upside down and hold the adapter with the lamp vertically. Then tighten the clamp screws. This will insure that no bending force is applied to the quartz lamp vessel, which could cause an accidental and dangerous bursting if stressed. Tighten the screws carefully, a little at a time, alternating back and forth between each clamp screw until they are completely tight. Carefully check to be sure that the lamp end is not loose within the top lamp adapter clamp.
8. Hold the lamp and upper lamp adapter subassembly carefully by the adapter (continue using caution not to touch or contaminate the quartz lamp envelope). Lower the lamp carefully through the hole in the center of the reflector, using caution not to nick or damage the reflector or bump any portion of the lamp. Carefully insert the cathode end of the

## LAMP INSTALLATION STEPS (continued)

lamp into the lower lamp receiver. Rotate the lamp so that all three leads of the threaded lamp ferrule start. Tighten until the spring pins of the receiver engage the lamp. Apply one-quarter turn to the lamp. Do not overtighten the lamp. Insert the upper lamp adapter pivot bolt/washer/spring assembly into the center of the “spider” and engage the bolt a few turns into the upper lamp adapter.

**NOTE:** If space appears inadequate to accomplish this joining of the spherical pivot points, more space can be provided by adjusting the Z focus screw in a clockwise direction, which moves the spider away from the reflector

9. The top adapter may have to be carefully rotated, so that the two tapped holes on the adapter are symmetrically located with respect to the two spider legs, which are located at a right angle (90 degrees apart). Loosen the two clamp screw as required. This is necessary so that the front power jumper cables can be properly attached. When this positioning has been achieved, the upper lamp adapter attachment bolt/spring assembly may be tightened. *The shoulder bolt should be tightened until it bottoms.* The clamp screws should be tightened if necessary.
10. The front power jumper cables, which conduct power from the spider to the upper lamp adapter, can now be attached. Make sure that the cables are properly positioned within the shadow area of the upper lamp adapter, so that they do not protrude into the light beam (which will cause some loss of light and overheating of the cables). Make sure all connections are tight.
11. Carefully replace the lamphouse cover assembly. Make sure that the window is clean, both inside and out.

The lamphouse is now ready for operation, pending final focusing and adjustment during nighttime conditions.

### 8.1 FINAL FOCUS AND BEAM ALIGNMENT

Final focusing and beam alignment can only be properly accomplished outdoors during nighttime operation.

After each lamphouse has been placed into operation and allowed to warm up for approximately five minutes, the beams can be adjusted and aligned as outlined in the following section.

## LAMP FOCUS PROCEDURE

1. Operate the motion until the lampheads swing *outward* and shut off the motion with the lampheads extended in the outermost position. This provides easier access to the focus adjustments.

The two lamp centering movements (normally described as X and Y adjustments, see Figure 9) are located in the sides of the lamphead. They are approximately three inches down from the top, or window end, of the lamphead and immediately adjacent to the ends of the two spider legs, which are located at right angles to each other (90 degrees apart). To access these points the lamphead cover must be removed. Once exposed use the appropriate adjustment tool (5/32" allen wrench) to adjust the X and Y position of the lamp.

2. With the light operating, the operator should position himself adjacent to either one of the X or Y adjustments so that he can view the beam from that angle, while adjusting the other adjustment. In other words, if he positions himself adjacent to the X adjustment and views the beam from that position, he will be able to visually assess the results of his adjustment of the Y adjustment. The operator should alternately turn the opposite adjustment first clockwise and then counterclockwise to observe the movements of the apparent center of the beam and try to obtain symmetry.

The operator should then move and reposition his body adjacent to the other adjustment, 90 degrees removed, and then adjust the other beam centering adjustment. The combination of movements of these X and Y adjustments should result in a completely symmetrical beam shape when viewed from any position.

3. Focus adjustment (see Figure 9): The focus adjustment is performed on the third leg of the spider assembly. The adjustment screw is accessible from the bottom of the lamphead (Figure 9, Item 5\*). Clockwise rotation of this adjustment will move the lamp forward, or away from the reflector, causing the beam to converge to a narrower appearing beam.

Counterclockwise will cause the lamp to be moved deeper into the reflector, causing a divergence or spread of the beam. The operator will have to judge which type of beam is most suitable for the intended application or use.

4. After adjustment is complete, replace the lamphouse housing.

Since all of the above noted adjustments are spring loaded, there should be little or no free movement or "backlash," nor drifting of the adjustments due to vibration associated with transport. The lamp should remain reasonably well focused for long periods of time. However, as the bulb ages, the cathode tip will burn back and the quartz envelope will darken, and some minor refocusing may be required to maximize performance and appearance.

## 9.0 LAMP REMOVAL

### **DANGER**

Wear all required protective clothing and follow prescribed steps carefully.

1. If the xenon lamp has been in operation, wait *at least* 15 minutes after Lamp shutdown (with blowers operating), before opening the lamphead. This will allow the internal lamp pressure to reduce to a level that is permissible for handling, provided that the specified protective clothing is worn.
2. Reverse the steps of the Lamp Installation Procedure in section 8.0.

## Section 10: Multi Light Synchronization Theory of Operation

### OVERVIEW:

Four STX-1 searchlights synchronized through a programmable relay logic module located in an external control box. A customer supplied switch connected to the four-position terminal block in the external control box allows for remote operation of the lights.

### CONNECTIONS:

Connections must be made from TB2 and TB3 in each individual unit to the control box. TB2\_0 and TB2\_1 must be connected to the relay logic module Q5 to Q8 (e.g., Fixture 1 TB2\_0 to Q5\_1 and TB2\_1 to Q5\_2), and TB3\_0 through TB3\_3 must be connected to the control box terminal board J1 through J4 (all connections are labeled accordingly). Connect fixture 1 to J1, fixture 2 to J2, etc. A remote switch, supplied by the customer, is connected to positions 0 and 1 on the terminal block in the control box.

### REMOTE OPERATION:

#### STX-1 Front Panel

REMOTE/LOCAL Switch:	REMOTE
LIGHT ON/OFF Switch:	ON
MOTION ON/OFF Switch:	ON
MASTER Circuit Breaker:	ON

When the customer supplied remote switch is closed the 24VDC supplied by the power supply in the control box is applied to the programmable relay logic module input IG. When the input IG goes high the outputs Q5 through Q8 are closed. This energizes the fixtures, igniting the lamps and powering the servo motors that drive the motion of the heads. With the factory supplied jumper in place between positions 2 and 3 on TB2, the motion of the heads will start and stop with concurrently with lamp ignition.

The heads are supplied with an optical sensor to detect when they are at top dead center. When a head reaches top dead center, a positive 24VDC signal is sent via the customer supplied cable connected between TB3 on the fixture and its respective connector (J1 through J4) on the terminal board in the control box. This signal passes through the terminal board and is applied to the programmable relay logic module inputs I1 through I4. When a head reaches top dead center the relay module compares its location with location of the other heads. If a head is at top dead center while ANY of the others are not, its motion will stop and wait until all four heads reach top dead center. When all four heads reach top dead center, motion begins on all four heads. Motion is controlled through the relay module outputs Q1 through Q4. These outputs switch the Motor 'A' signal as needed to start and stop the head motion.

This synchronization is only available in the 'REMOTE' configuration.

## LOCAL OPERATION:

When operated in LOCAL mode, lamp ignition is controlled via the LIGHT ON/OFF switch on the front panel.

If motion is desired while in LOCAL, the MOTION ON/OFF switch must be ON, and a jumper must be installed on TB3 between positions 0 and 1.

Head motion will only be available while the lamp is ON.

## 11.0 ROUTINE SERVICE AND MAINTENANCE

### 11.1 PERIODIC MAINTENANCE

Except for unusual conditions of use (dirty environment, flooding, non-passive lamp failure, etc.) the frequency of service and replacement of certain parts and components because of normal wear is directly related to hours of use.

Inspection and preventive maintenance should be performed approximately every 250 hours of use or every 3 months (whichever occurs first). The period can be adjusted according to actual circumstances. The following items are to be included at the time of each periodic servicing:

1. Remove and replace/clean the intake air filter.
2. Inspect and tighten timing belt, idlers, pulleys and sprockets.
3. Inspect and lube the drive motor and chain.
4. Remove, lubricate, and reinstall blower motors.
5. Inspect and tighten, as required, all electrical connections.
6. Tighten all mounting bolts.
7. Inspect all of the flexible cooling ducts.

#### 11.1.2 XENON LAMPHEAD ASSEMBLIES

**NOTE:** See Section 8.0 for safe handling instructions of xenon lamps

1. Remove lamphouse covers and xenon lamps (Section 9.0)
2. Inspect and tighten all electrical connections.
3. Inspect all focus mechanisms. Lubricate focus screws.
4. Clean reflectors and windows.
5. Clean lamp ends. Clean inside contact area of Upper Lamp Adapters, clean contact points on upper lamp support spider.
6. Tighten DC cables.
7. Inspect blower motors for proper air flow; clean impellers and lubricate.
8. Reinstall lamps and replace housings.

Operate the system - Check automatic ignition, thermal switch operation, motion (timing belt and motor) function and pilot lights.

NOTE: The main drive belt should not ride on the sides of the pulleys

Operate and align lamphoods; night-test and refocus all lamps.

Any parts (such as main drive belts, flexible air ducts, switches, etc.) which are found to be worn or in questionable condition, should be replaced to insure trouble-free operation. Xenon lamps should also be replaced as required.



## **CAUTION**

Upon expiration of the lamp warranty (see warranty information packaged with lamp), the possibility of the lamp bursting increases, particularly if the quartz envelope shows signs of excessive darkening.

If bursting occurs, the tempered window may also break and the reflector may become scratched, resulting in a degradation of the lamphead's performance.

For this reason, it is recommended that the xenon lamps be replaced once the specified warranted life span has been reached. Use of a xenon lamp past 125% of warranted life is not recommended.

### **TROUBLESHOOTING GUIDE**

<b><u>PROBLEM</u></b>	<b><u>PROBABLE CAUSE</u></b>	<b><u>WHAT TO CHECK</u></b>
<b>ONE LAMP IS OUT</b>	Auto Strike is non-operational.	Try manual "Ignite" switch.
	Igniter circuit is out.	Try manual "Ignite" and listen for arcing sound.
	Lamp has failed	Inspect lamp for damage.
	AC Input power is out or AC power cord is out.	Check indicator light on panel. Check Aux. circuit breaker.
	Cooling blower(s) in the lamphead is out, causing the thermal switch to open.	Check Aux. circuit breaker.
	Power Supply is out.	Also check DC output (should be 125/165 V.DC prior to ignition).
<hr/>		
<b>ALL (4) LAMPS ARE OUT</b>	All blowers are out, causing thermal switches to open.	Check Aux. circuit breakers.
	All (4) lamps have failed (or are broken).	Check lamps.
	Main base blower air-sail switch is not activating.	Check main blower. Check blower switch.

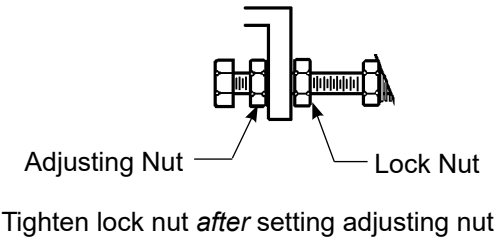
<b>NO MOTION DRIVE</b>	Motor circuit breaker is tripped.	Inspect circuit breaker or reset breaker.
	Timing belt or chain is broken.	Lampheads will move by hand.
	Drive motor has failed.	Test for 220 V.AC at motor connector.
	Main Power lost.	

**LAMPHEADS COLLIDE**

Timing belt has slipped.

Loosen #1 and #3 bearing housings (mounting screws in slotted holes) and turnbuckle lock nuts. Loosen turnbuckle adjusting nuts & reposition belt. Retighten bearing housings, turnbuckle adjusting nuts and lock nut.

TURNBUCKLE



**PROBLEM**

**PROBABLE CAUSE**

**WHAT TO CHECK**

**LAMPHEADS COLLIDE**  
(continued)

- Timing belt has slipped (continued).
- Gear belt pulley has slipped.
- Turnbuckles are not evenly adjusted.

- Loosen hub and re-time bent shafts.
- Loosen #1 and #3 mounts and re-adjust turnbuckles.

**REPLACEMENT OF STX-4 TIMING BELT** (Part No. 3105001; see Parts List Fig. 3, Item 27)

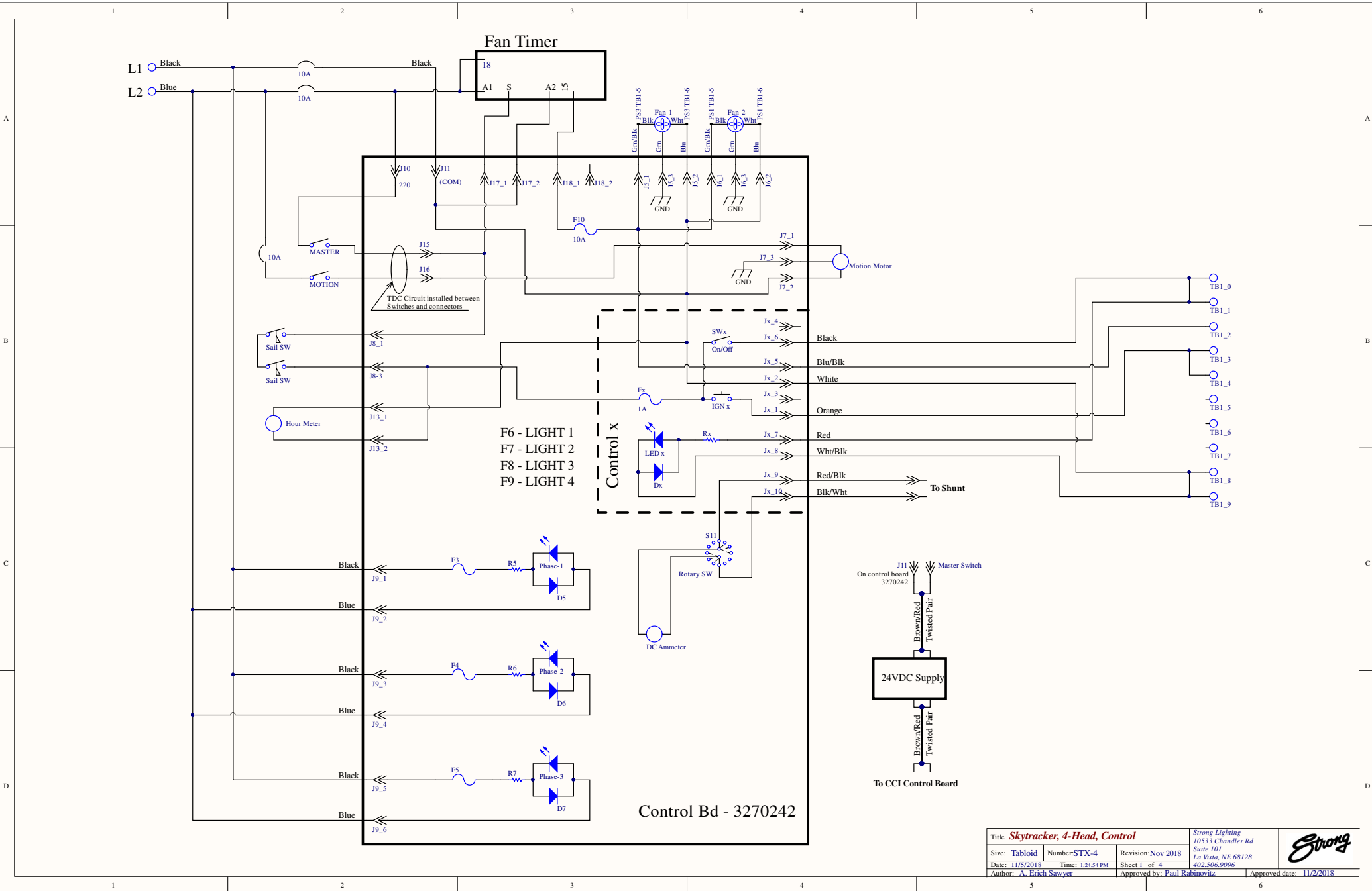
Loosen lower bearing housings #1 and #3 (see Parts List Fig. 3, Item 43). Slide housings upward to relieve belt tension. Remove and discard old timing belt.

Raise all four lampheads to their full upright positions. Insert the 3198124 Transport Cushion between the lampheads and install the 3200001 Transport Strap around the lampheads to secure them in this position.

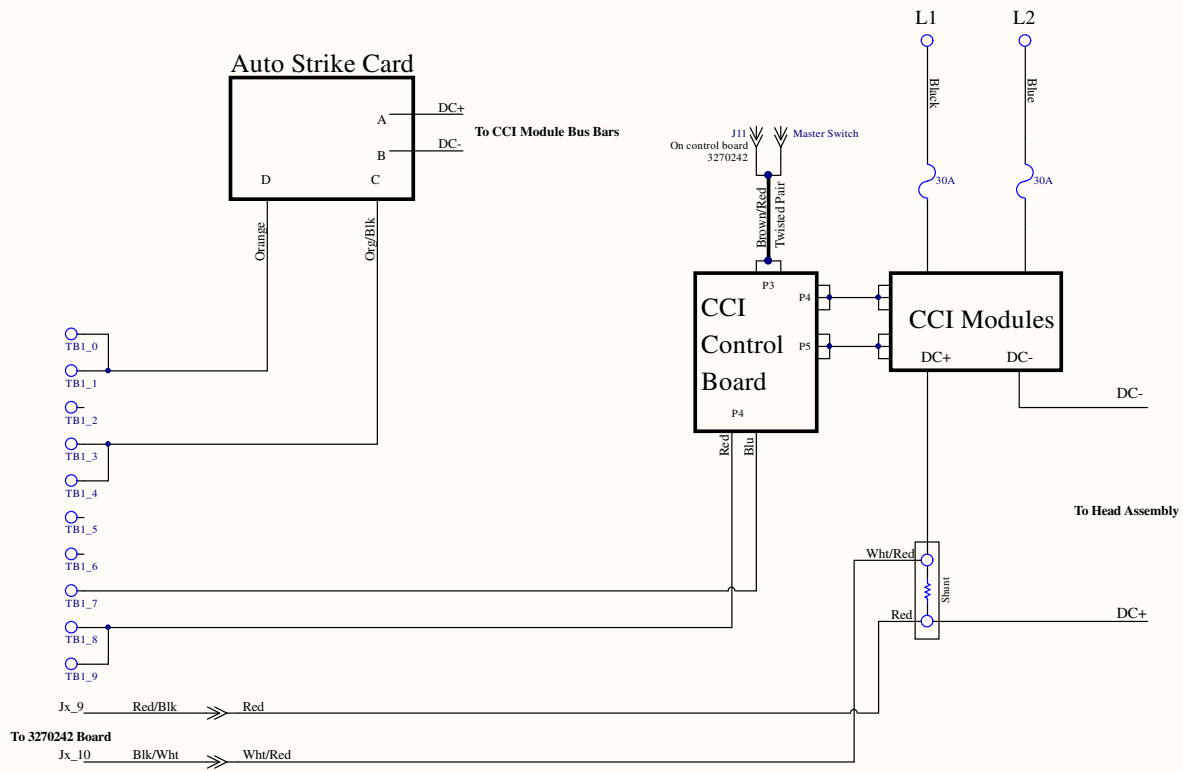
Install the replacement timing belt as illustrated on Figure 7 (Page 14). Make certain the belt is riding in the center of each timing pulley and *not* up on any flanges.

Slide lower bearing housings #1 and #3 down to apply belt tension. Check for timing belt teeth fully engaging timing belt pulleys and re-tighten bearing housings.

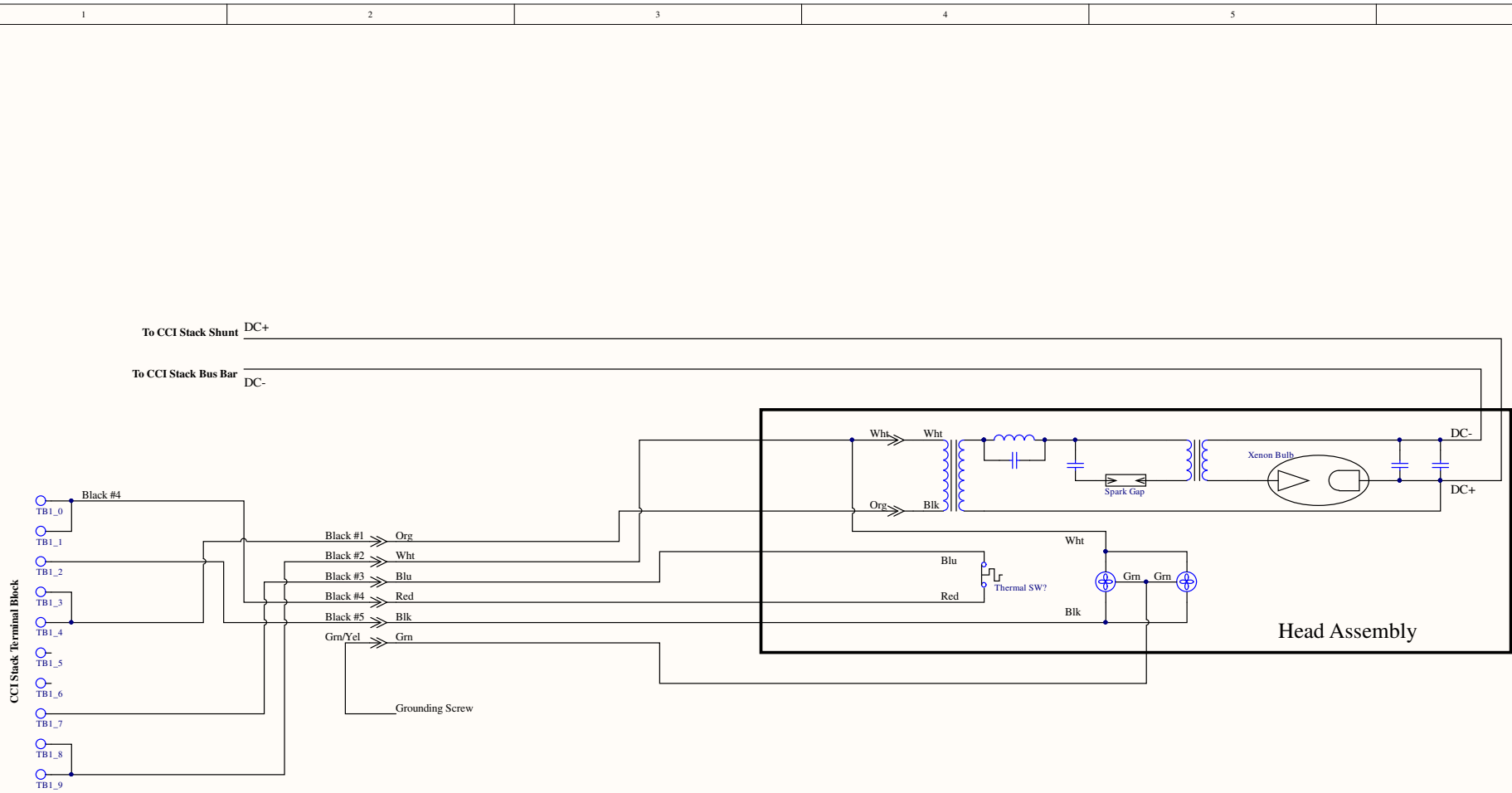
Remove Transport Cushion and Transport Strap. Energize drive assembly and test rotation. Adjust tensioning turnbuckles as required (see above).



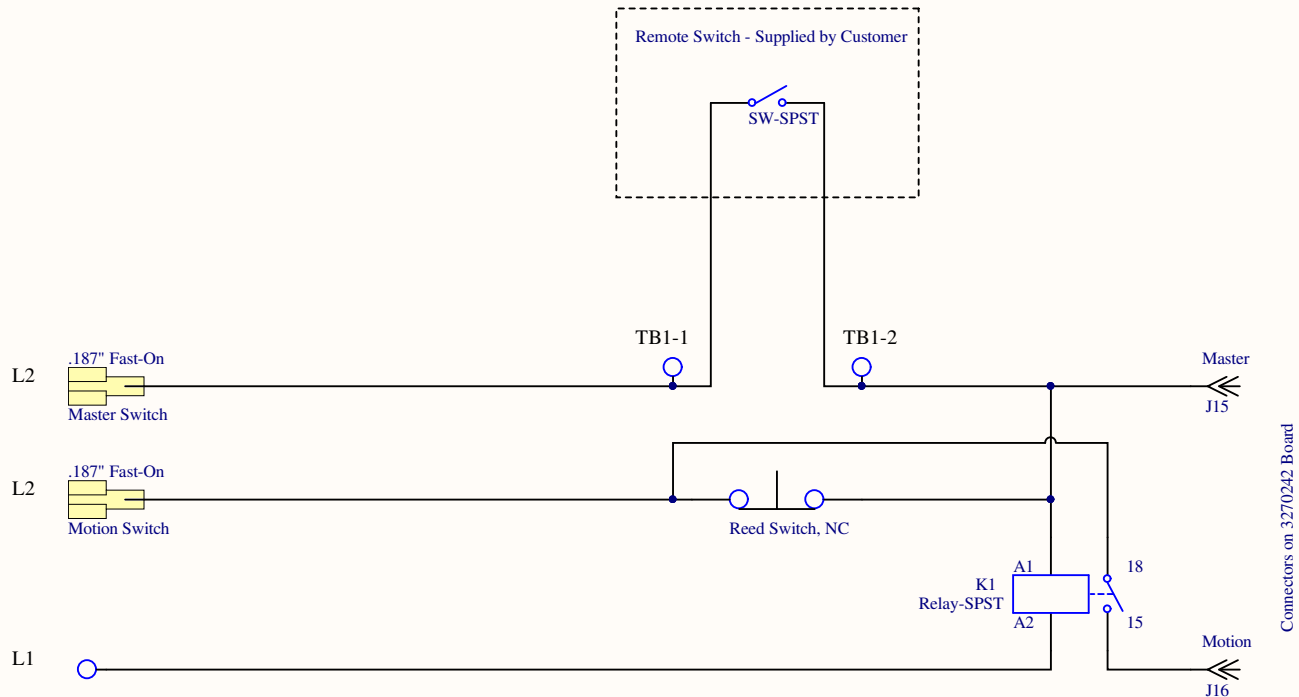
Title <b>Skytracker, 4-Head, Control</b>			Strong Lighting 10533 Chandler Rd Suite 101 La Vista, NE 68128 402.506.9096	
Size: <b>Tabloid</b>	Number: <b>STX-4</b>	Revision: <b>Nov 2018</b>		
Date: <b>11/5/2018</b>	Time: <b>1:24:54 PM</b>	Sheet <b>1</b> of <b>4</b>		
Author: <b>A. Erich Sawyer</b>	Approved by: <b>Paul Rabinovitz</b>		Approved date: <b>11/2/2018</b>	




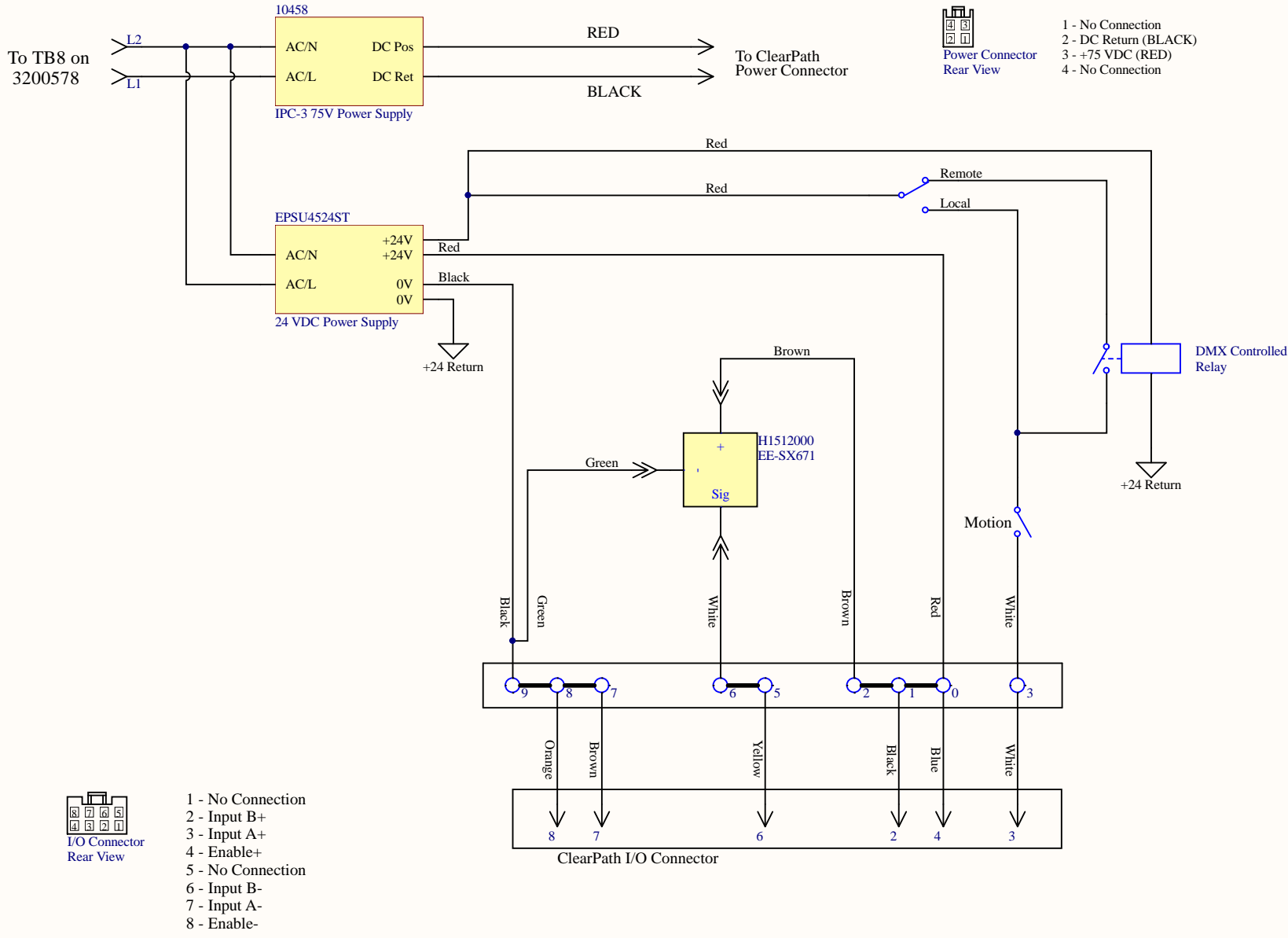
Title <b>CCI Module Stack</b>			Strong Lighting 10533 Chandler Rd Suite 101 La Vista, NE 68128 402.506.9096	
Size: <b>Tabloid</b>	Number: <b>N/A</b>	Revision: <b>Nov 2018</b>		
Date: <b>11/5/2018</b>	Time: <b>1:28:00 PM</b>	Sheet <b>2</b> of <b>4</b>		
Author: <b>A. Erich Sawyer</b>	Approved by: <b>Paul Rabinovitz</b>		Approved date: <b>11/5/2018</b>	



Title <b>Skytracker Head Assembly</b>			Strong Lighting 10533 Chandler Rd Suite 101 La Vista, NE 68128 402.506.9096	
Size: <b>Tabloid</b>	Number: <b>STX-4</b>	Revision: <b>Nov 2018</b>		
Date: <b>11/5/2018</b>	Time: <b>1:31:59 PM</b>	Sheet <b>3</b> of <b>4</b>		
Author: <b>A. Erich Sawyer</b>	Approved by: <b>Paul Rabinovitz</b>		Approved date: <b>11/5/2018</b>	




Title <b>Architectural TDC Stop Circuit</b>		Strong Lighting 10533 Chandler Road La Vista, NE 68128 402.506.9096	
Size: Letter	Number: N/A	Revision: N/A	
Date: 11/2/2018	Lang: ENG	Sheet 1 of 1	
Author: A. Erich Sawyer	Approved By: P. Rabinovitz	Approved Date: 10/29/2018	

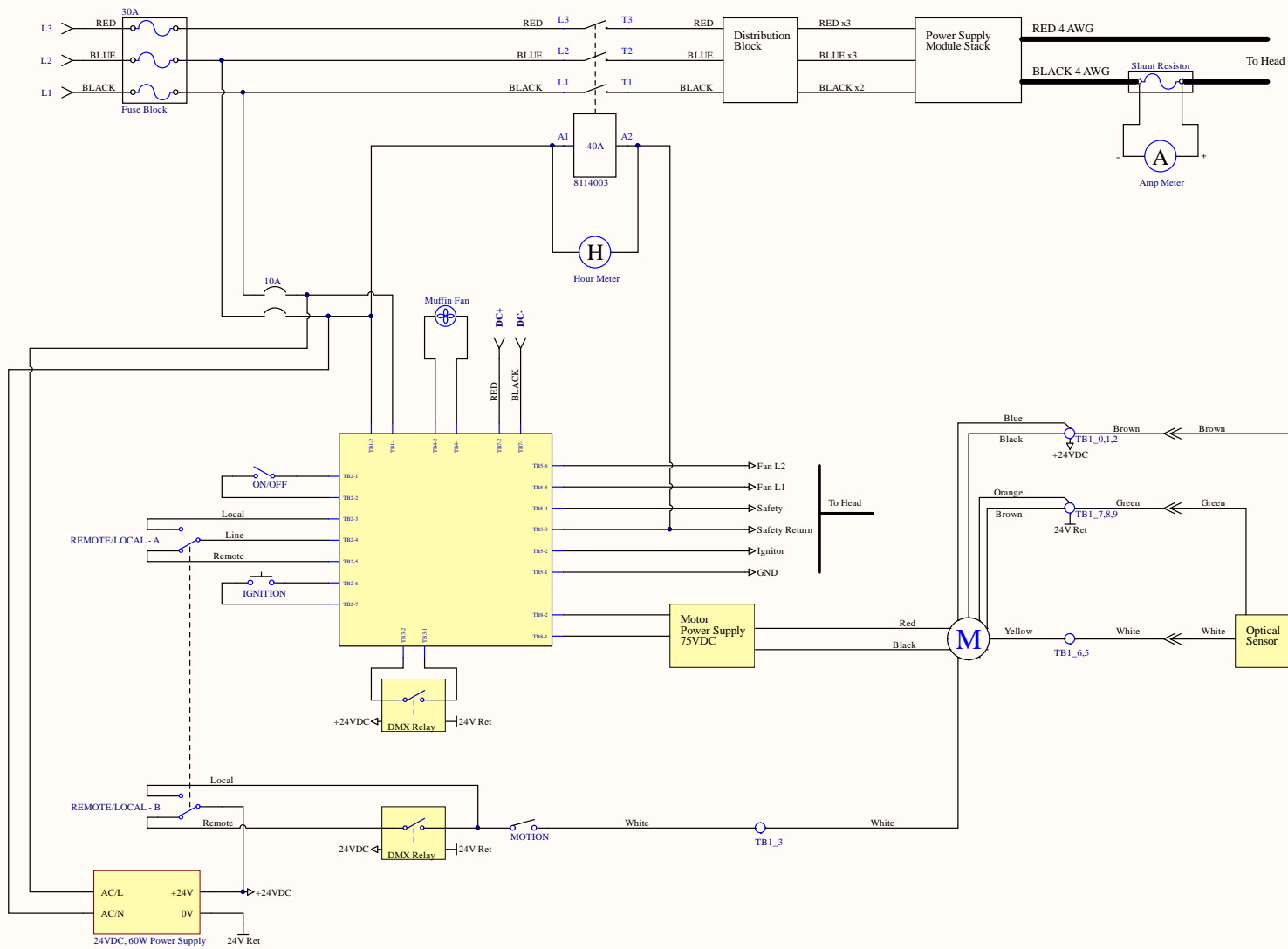


- 1 - No Connection
- 2 - DC Return (BLACK)
- 3 - +75 VDC (RED)
- 4 - No Connection



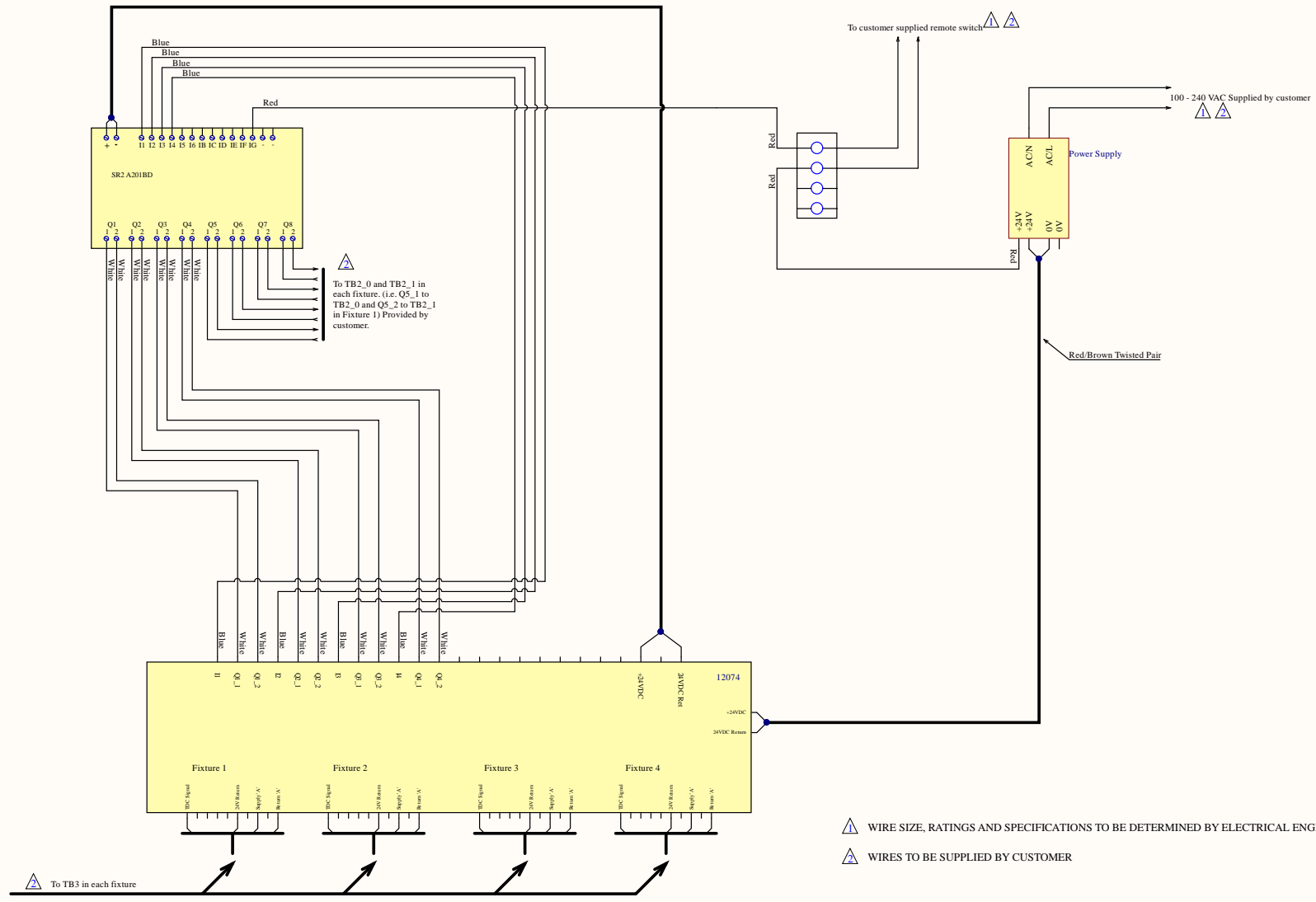
- 1 - No Connection
- 2 - Input B+
- 3 - Input A+
- 4 - Enable+
- 5 - No Connection
- 6 - Input B-
- 7 - Input A-
- 8 - Enable-

Title <b>ClearPath Motor Wiring</b>			Strong Lighting 10533 Chandler Road La Vista, NE 68128 402.506.9096	
Size: Letter	Number: STX-1	Revision: Universal Std		
Date: 3/2/2020	Lang: ENG	Sheet 1 of 1		
Author: A. Erich Sawyer	Approved By: P. Rabinovitz	Approved Date: 20 Feb 2020		

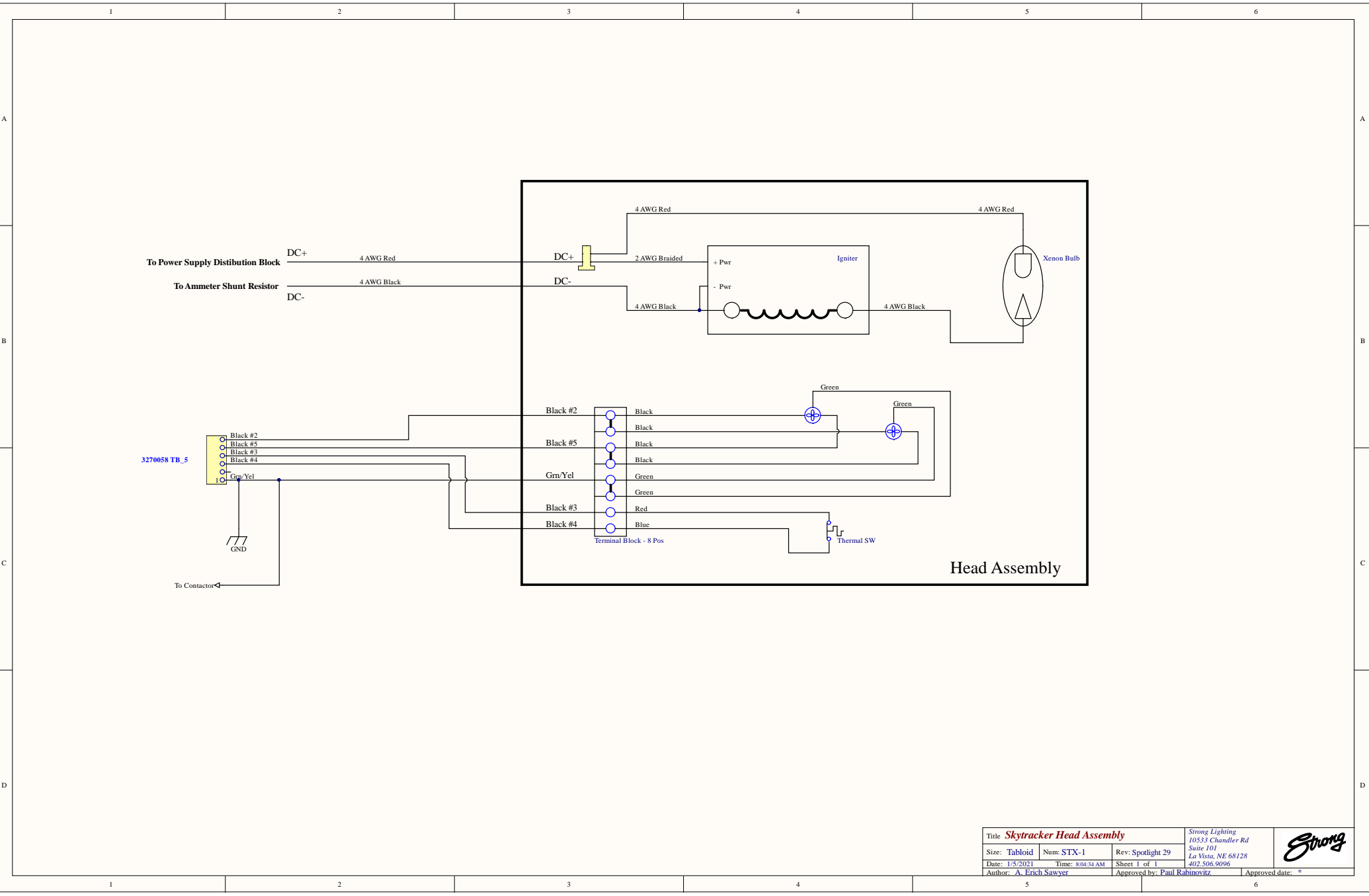


Title <b>Power Distribution</b>			Strong Lighting 10533 Chandler Rd Suite 101 La Vista, NE 68128 402.506.9096	
Size: Tabloid	Number: STX-1	Revision: Universal		
Date: 3/2/2020	Time: 7:57:59 AM	Sheet: 1 of 1		
Author: A. Erich Sawyer	Approved by: Paul Rabinovitz		Approved date: *	



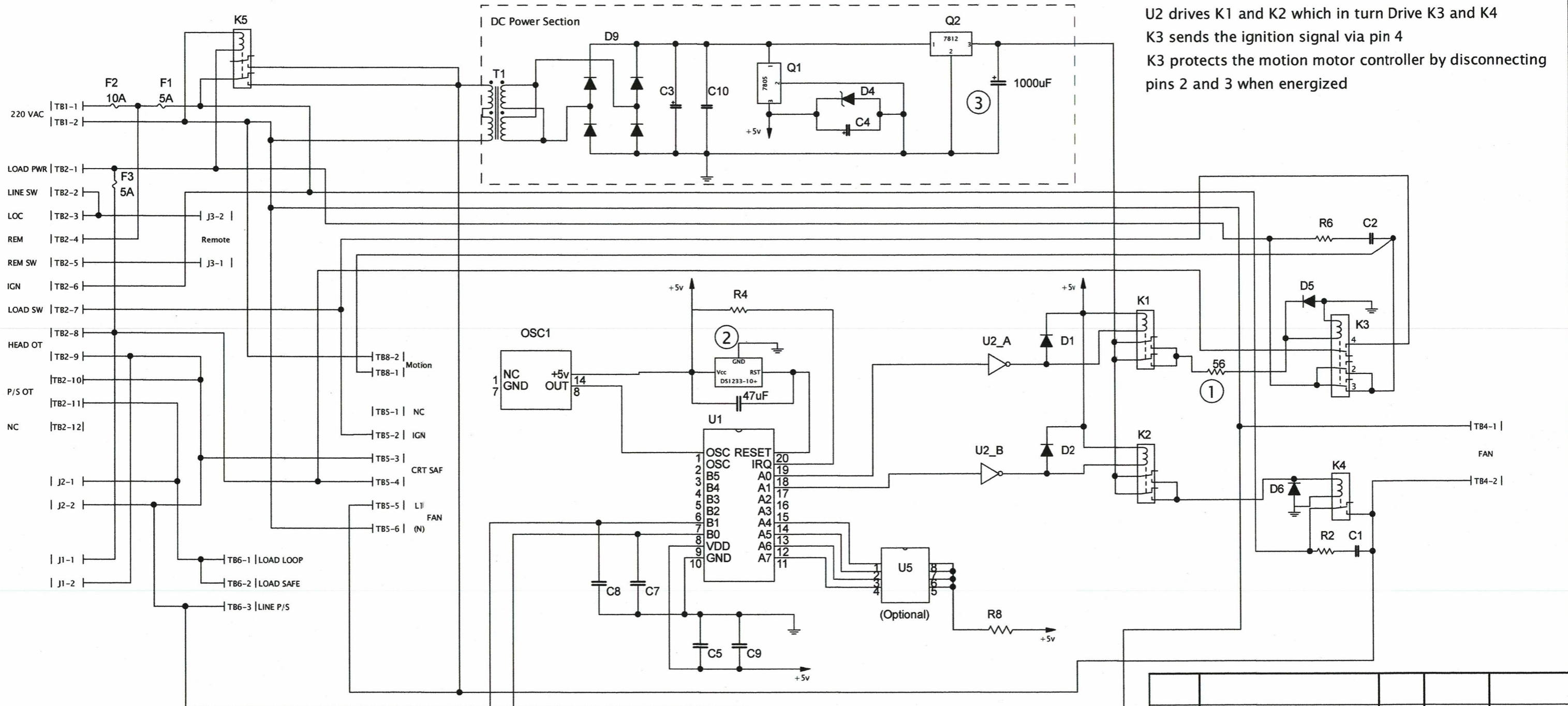


Title <b>Control Box</b>			Strong Lighting 10533 Chandler Rd Suite 101 La Vista, NE 68128 402.506.9096		
Size: <b>Tabloid</b>	Number: <b>12088</b>	Revision: <b>Spotlight 29</b>			
Date: <b>1/5/2021</b>	Time: <b>8:01:40 AM</b>	Sheet <b>1</b> of <b>1</b>	Approved by: <b>Paul R.</b>		Approved date: <b>14 May 2019</b>



Title <b>Skytracker Head Assembly</b>		Strong Lighting 10533 Chandler Rd Suite 101 La Vista, NE 68128 402.506.9096	
Size: <b>Tabloid</b>	Num: <b>STX-1</b>	Rev: <b>Spotlight 29</b>	
Date: <b>1/5/2021</b>	Time: <b>8:04:34 AM</b>	Sheet <b>1 of 1</b>	Approved by: <b>Paul Rabinovitz</b>
Author: <b>A. Erich Sawyer</b>	Approved date: <b>*</b>		

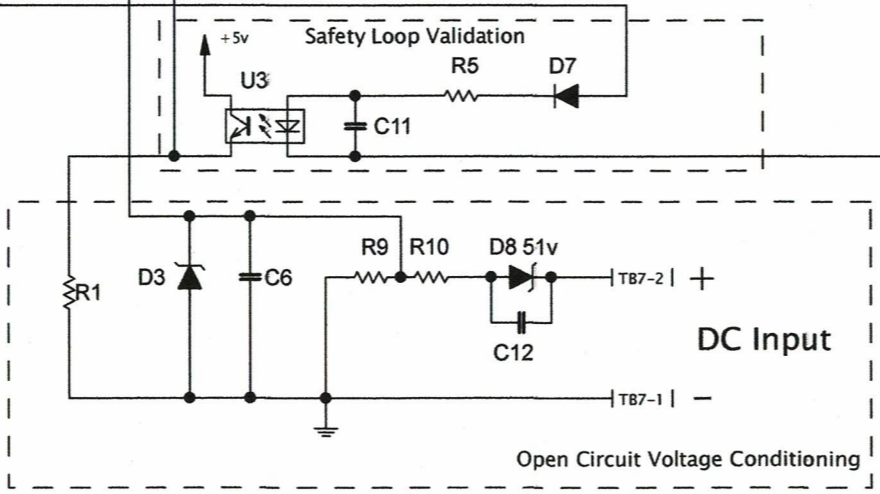




U2 drives K1 and K2 which in turn Drive K3 and K4  
 K3 sends the ignition signal via pin 4  
 K3 protects the motion motor controller by disconnecting pins 2 and 3 when energized

**NOTES:**

- ① Trace cut and 56 Ohm resistor installed
- ② R3 removed and DS1233-10+ installed
  - Pin 1 (GND) attached to D4 anode
  - Pin 2 (RESET) to R3 hole connected to U1\_20
  - Pin 3 (Vcc) to R3 hole connected to other side of R3 space
  - A 47uF capacitor jumpers pins 2 & 3
- ③ 1000uF, 35v, AER connected across Q2 pins 2 & 3



Rev.	Revision	Auth.	Date	Sign.
-		P.R.	1/15/18	

Responsible dep. <b>Production</b>	Technical reference <b>Paul Rabinovitz</b>	Created <b>A. Erich Sawyer</b>	Approved <b>P. Rabinovitz</b>		
		Document type <b>Schematic</b>	Document status <b>In-Process</b>		
		Title, supplementary title <b>Skytracker</b>	<b>3200578</b>	Rev.	-
		<b>Timer and Ignition Assembly</b>	Date of issue <b>1/15/2018</b>	Lang. <b>ENG</b>	Sheet <b>1/1</b>

# XENON LAMP HISTORY RECORD

Strong Lighting

Date Installed	Mfr. & Serial No.	Date Removed	Elapsed Hours



## EQUIPMENT WARRANTY

Beamlight, LLC, doing business as Strong Lighting, (“Manufacturer”) agrees that its products shall be free from defects in materials and workmanship for a period of one year, from the date of original shipment from its factory. This warranty is nontransferable and applies to the original purchaser (“Owner” or “Buyer”) only. Said warranty will not apply if equipment is used in conditions of service for which it is not specifically intended. The Manufacturer is not responsible for damage to its apparatus through improper installation, physical damage or poor operating practice.

Expendable items such as lamps, gels, beam shaping films and the like are not covered by this warranty and are only covered to the extent that the original manufacturer of that item offers. All warranty claims that arise for these items are a matter exclusively between Buyer and the original manufacturer.

If any device is found to be defective under the warranty, the Buyer should notify the Manufacturer. Such equipment will be repaired or replaced, at Manufacturer’s option, free of all charge except transportation, F.O.B. Manufacturer’s factory. Any such repair or replacement by the Manufacturer shall constitute fulfillment of all obligations to the Owner. This warranty does not include travel expense, troubleshooting expense, labor charges associated with field service calls, and disassembly or reassembly of the lamp system. Should such a repair or replacement require an on-site service call, the Owner shall bear the responsibility for all costs and associated expenses. The Manufacturer does not assume responsibility for any unauthorized repairs to its products and any defective and unauthorized parts or repairs shall void this warranty.

This warranty is the only warranty given with the Manufacturer’s products. There are no warranties of merchantability of fitness for a particular purpose or other warranties or representations of any kind, express or implied, which are made with respect to these products. The remedies of the Owner set forth in this warranty are exclusive. In no event shall the Buyer be entitled to recover for incidental, special or consequential damages, arising from the sale or use of these products, including but not limited to loss of profits or revenue, other commercial losses, inconvenience, delay, labor, repairs, or other cost of rental or replacement equipment.

SkyTracker Lamphed Assembly

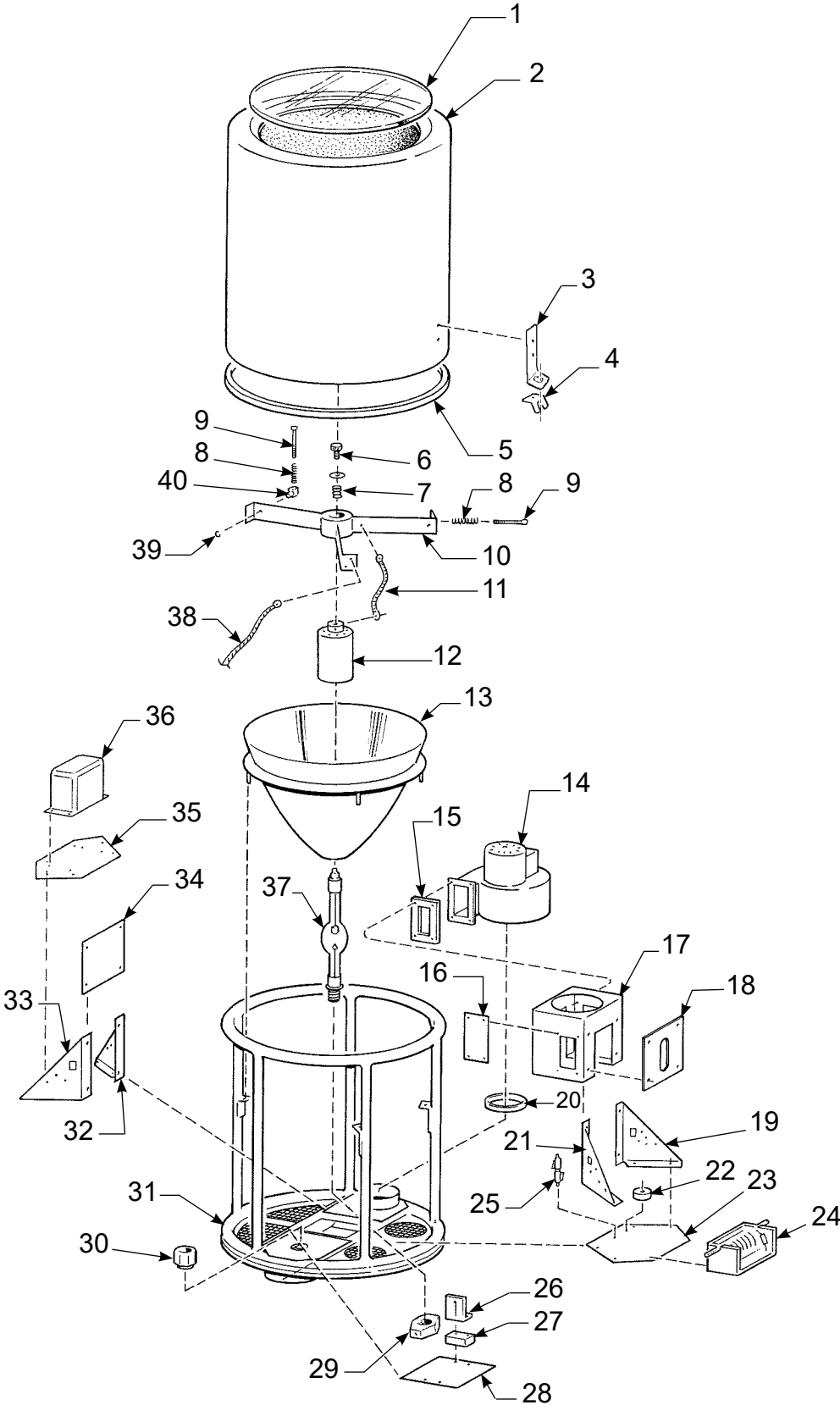


FIGURE 1

## PARTS LIST

Figure 1

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	3198097	Cover Lens, Glass
-	7198004	RTV Silicone Sealant (3 oz. Tube)
2	3200532	Lamphead Housing, Metal
3	3200337	Housing Latch (2 req'd.)
-	3240463	Nut Plate, Latch (not shown)
-	3250024	Lamphead Housing Assembly (Items 1-3, 5)
4	3200338	Catch (mounts to Item 31; 2 req'd.)
5	3198098	Lower Gasket, Trimlock (incl. with 3250024)
6	4151767	Shoulder Bolt, 5/16 x 3/4" 1/4-20 Thrd.
-	4317102	Flatwasher, 5/16"
7	3158006	Compression Spring, .720" x .75"
8	3158005	Compression Spring, .300" x 2.0"
9	4151216	Screw, 10-32 x 2" Socket Head
10	3250013	Lamp Support Spider
-	3161007	Thermal Switch
11	3250244	Positive Lead (2 req'd.)
12	3250177	Radiation Shield & Anode Clamp
13	3250435	Assembly, Parabolic
14	3250055	Blower, 220 V.AC, 50/60 Hz. (2 req'd. for 4 kW)
15	-	No longer used
16	3240091	Cover Plate
17	3240088	Blower Box
18	3220031	Insulator Plate
19	3240084	Support Bracket, Right
-	3200850	Phenolic Insulator Block, RF Trap
20	3220030	Ring, Blower Coupling
21	3140083	Support Bracket, Left
22	39110000	Capacitor
23	3240089	Base Plate, Lower Lamp Support
24	3250053	RF Coil Assembly
-	3250036	Capacitor Assembly, RF Trap
25	3161018	Spark Gap
26	3198076	Mounting Bracket, Cathode Receiver (2 req'd.)
27	3220029	Spacer Block, Bracket (2 req'd.)
28	(ref.)	Plate (welded to Item 31 Frame)
29	3250050	Cathode Receiver, Threaded
30	3198163	Strain Relief Bushing
31	3240098	Frame, Welded Assembly
-	3250051	Base Molding, Plastic (glued to Item 31)
32	3240083	Support Bracket, Right

**PARTS LIST, Figure 1 (continued)**

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
33	3240084	Support Bracket, Left
-	3200850	Insulator Block, 1/2" Phenolic (not shown)
34	3240090	Blower Input Cover
-	3240091	Blower Port Cover (not shown), 2 kW only
35	3200851	Transformer Mounting Plate
36	3200864	High Voltage Transformer Assy
37	3130241	Xenon Lamp, 2 kW Type XT
37	3130242	Xenon Lamp, 4 kW Type XT
38	3250244	Positive Lead
-	3198078	Negative Lead (to Power Supply; not shown)
39	3198075	Snap Ring
40	3200288	Focus Block
-	3200266	Focus Rod, 1/4-20 x 19.75" (not shown)
-	3200265	Lower Spacer, Focus Rod (not shown)
	3270070	Wire Harness Assembly (not shown)



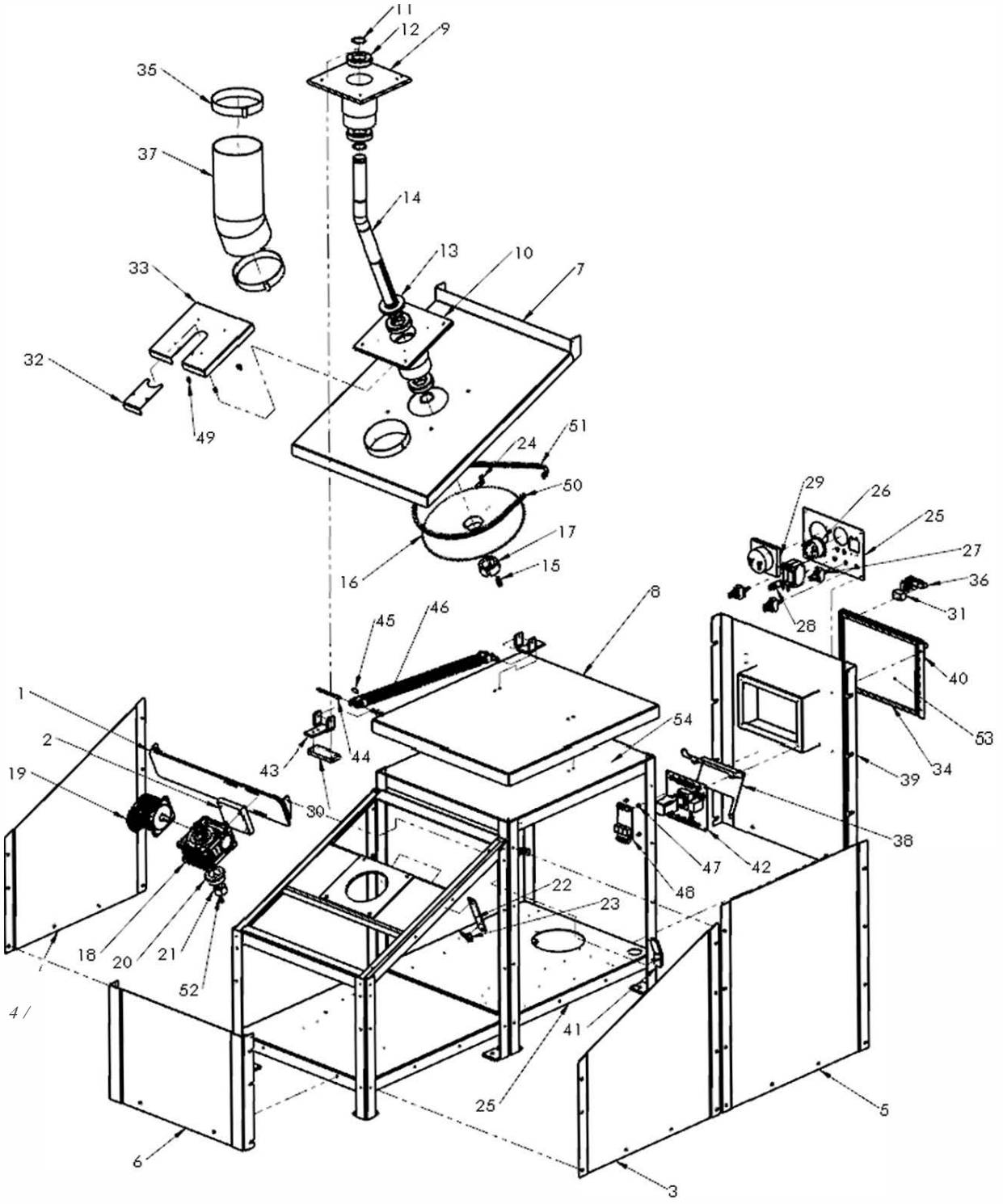


FIGURE 2

## PARTS LIST

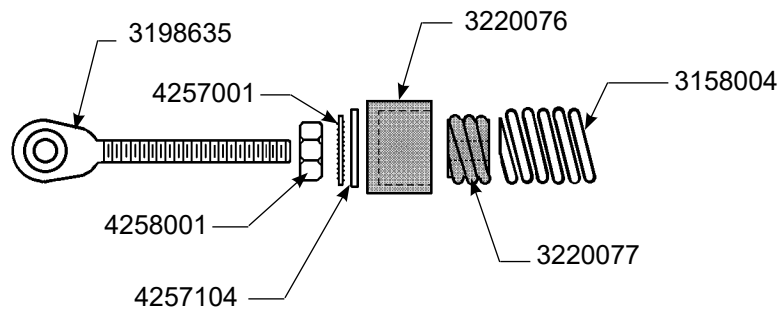
Figure 2

ITEM	PART NO.	DESCRIPTION
1	3220091	MOTOR MOUNTING PLATE
2	9700244	MOTOR ADAPTOR PLATE
3	3240264	LEFT SIDE PANEL, MOTOR HOUSING
4	3240263	RIGHT SIDE PANEL, MOTOR HOUSING
5	3240207	SIDE PANEL, WITH LOGO (2 REQ'D)
-	3134024	SKYTRACKER LOGO, SELF-ADHESIVE
6	3240262	END PANEL, MOTOR HOUSING
7	3240260	TOP COVER, MOTOR HOUSING
8	3240257	TOP COVER PLATE
9	3220098	UPPER BEARING HOUSING
10	3220097	LOWER BEARING HOUSING
11	3148001	SNAP RING
12	3104005	BALL BEARING
13	3136005	SEAL
14	3200420	BENT SHAFT, LAMPHEAD
15	3200795	KEY 5/16 SQ X 1 1/4 SKYTRACKER
16	3159003	DRIVEN SPROCKET, 96 TOOTH
17	3107005	TAPER BUSHING
18	10460	WORM GEAR TRANSMISSION
19	10457	DRIVE MOTOR
20	10607	DRIVE SPROCKET, 10 TOOTH
21	10608	TAPER BUSHING
22	9700271	SENSOR MOUNT BRACKET
23	H1512000	SENSOR HARNESS
24	9700270	SENSOR TRIP BRACKET
25	3200962	PLATE, INSTRUMENT PANEL (LESS COMPONENTS)
26	3132001	ELAPSED TIME METER
27	3161048	TOGGLE SWITCH (3 REQ'D)
28	3161030	PUSHBUTTON SWITCH
29	8132009	AMMETER
30	3220175	BRACKET MOUNTING PLATE
31	3200898	DOOR LATCH BLOCK
32	3200894	BEARING PLATE COVER, SMALL
33	3200893	BEARING PLATE COVER
34	3200891	CONTROL PANEL ACCESS DOOR, STX-1
35	4110045	DUCT CLAMP (2 REQ'D)
36	3118008	DOOR LATCH
37	3126003	FLEXIBLE AIR DUCT
38	3240220	STAND-OFF BRACKET
39	3200965	END PANEL, WELDED ASSEMBLY
40	3200892	ACCESS DOOR HINGE

**PARTS LIST, Figure 2 (continued)**

ITEM	PART NO.	DESCRIPTION
41	9700275	MOTOR PLATE CLAMP
42	3200578	PCA TIMER & IGNITION CONTROL
43	3240187	SPRING RETAINING BRACKET
-	4252500	SCR SHCS 1/4-20 x 2-1/2 SS
44	3156002	SPACER 1/4 X 1/4 SST (4 REQ'D)
45	3156003	SPACER 1/4 X 1/2 SST (2 REQ'D)
-	4257104	FLATWASHER, 1/4
-	4258002	HEX NUT, 1/4-20 SS
46	3158004	EXPANSION SPRING
46a	3198635	EYEBOLT & BALL JOINT ASSEMBLY
-	3220077	SPRING RETAINER, THREADED
-	3220076	CAP, ALUMINUM
-	3250502	TENSION ASSEMBLY (ITEMS 30, 43-46)
47	4198049	STANDOFF, #4-40 X 1/2" FF NYLON (4 REQ'D)
48	9700276	DMX RELAY
49	4198073	STANDOFF, #6-32 X 1/2" MF AL (4 REQ'D)
50	3198118	CHAIN, #35 ROLLER
51	3198119	MASTER LINK, #35 ROLLER CHAIN
52	-	KEY, 6MM SQ X 1" SKYTRACKER
53	6139001	NAME & DATA PLATE
54	3240258	BASE FRAME, WELDED ASSEMBLY
-	3200327	CONTROL PANEL ASSEMBLY (ITEMS 25-28)
-	3270114	WIRE HARNESS TOP BOARD TO HEAD (NOT SHOWN)
-	9700236	WIRE HARNESS HRPS TO HEAD - OLD STYLE (NOT SHOWN)

**DETAIL, Item 46a**



3158004	Expansion Spring
3198635	Eyebolt & Ball Joint
3220076	Cap
3220077	Spring Retainer, Threaded
4257001	Lockwasher, 1/4"
4257104	Flatwasher, 1/4"
4258001	Hexnut, 1/4-20

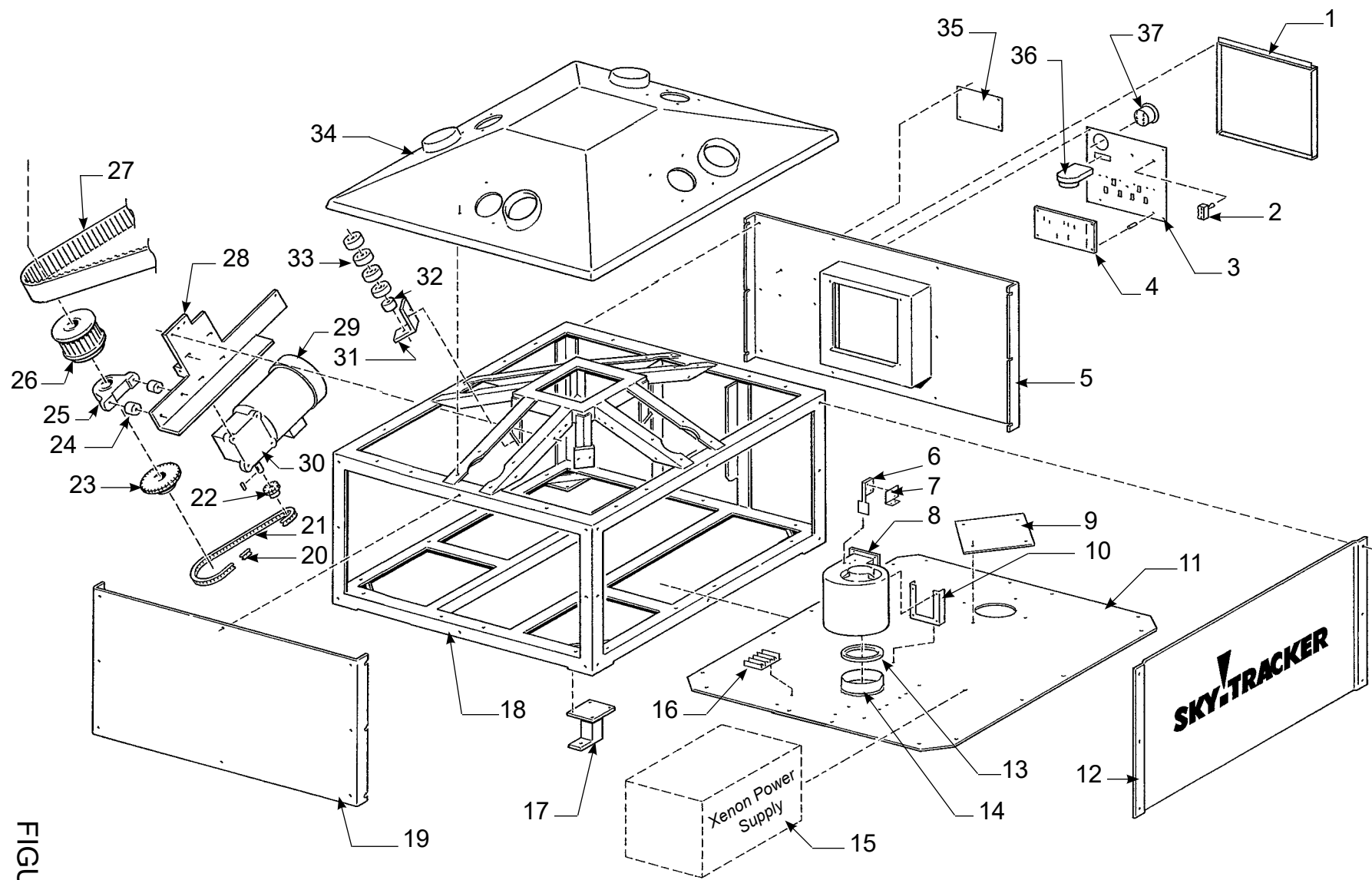


FIGURE 3

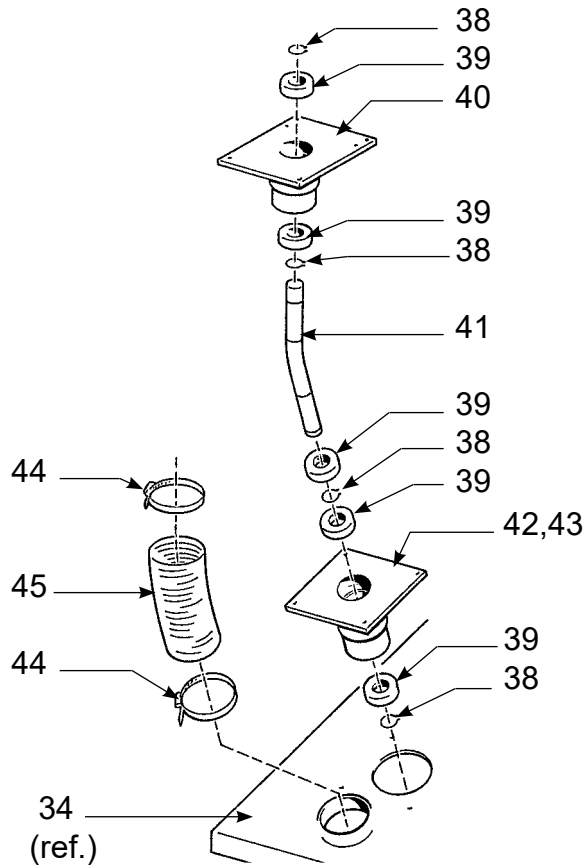
STX-4 Base Assembly

## PARTS LIST

Figure 3

<u>Item</u>	<u>Part No.</u>	<u>Description</u>
1	3200955	Hinged Access Door
2	3172002	Toggle Switch
3	3200961	Instrument Panel Plate (less Components)
4	3270242	Printed Circuit Board Assembly (208/230 V.AC)
4	3270322	Printed Circuit Board Assembly (380/440 V.AC)
-	2121016	Fuse, 1 A. 250 V. (4 req'd.)
5	3200957	Operator's Side Panel
6	85109000	Air Flow Switch
7	2240854	Switch Mounting Bracket
8	1102001	Blower, 230 V.AC, 50/60 Hz.
9	-	No longer used
10	3200059	Mounting Flange
11	3240524	Floor Plate
12	3240528	Side Panel (2 req'd.)
13	3198121	Blower Intake Gasket (order 2 feet)
14	3220107	Blower Coupling Collar
15	---	Xenon Power Supply (see Figure 5 and 6, requires 4
16	3162044	Terminal Block
17	3240526	Base Leg, Welded Assembly (4 req'd.)
18	3200308	Base Frame, Welded Assembly
19	3240527	End Panel, Off-Operator's Side
20	3198248	Master Link, Roller Chain
21	3200867	Roller Chain, (28) link length
22	3159001	Drive Sprocket, 10 Tooth
23	3220085	Driven Sprocket, 36 Tooth
24	3220139	Spacer (2 req'd.)
25	3104002	Pillow Block
26	3143001	Drive Pulley, Timing Belt
27	3105001	Timing Belt
28	3240596	Motor Mounting Bracket
29	3133024	Drive Motor (208/230 V.AC, 60 Hz.)
29	3133012	Drive Motor (380/440 V.AC, 50 Hz.)
30	3220084	Gearbox Assembly
31	3240338	Bracket & Stud Assembly
-	3220087	Stud Bushing (not shown)
32	3220126	Spacer
33	3104004	Ball Bearing (4 req'd.)
34	3200895	Top Cover
35	-	No longer used
36	8132009	Ammeter
37	3132001	Elapsed Time Meter

**PARTS LIST, Figure 3 (continued)**



<u>Item</u>	<u>Part No.</u>	<u>Description</u>
38	3148001	Retaining Ring
39	3104005	Ball Bearing
40	3220098	Upper Bearing Housing*
-	4253000	Mounting Screw, 1/4-20 x 3" Hex Head
-	4257000	Split Lockwasher, 1/4"
-	4257102	Flatwasher, 1/4"
41	3200422	Bent Shaft, Short (3 req'd)
41	3200421	Bent Shaft, Long (1 req'd.)
-	3136005	Seal (not shown; above Item 39 Bearing)
42	3220097	Lower Bearing Housing, Round Mounting Holes
43	3220096	Lower Bearing Housing, Slotted Mounting Holes
-	4251001	Mounting Screw, 1/4-20 x 1" Hex Head
-	4257000	Split Lockwasher, 1/4"
-	4257102	Flatwasher, 1/4"
44	4110045	Hose Clamp
45	3200793	Flexible Air Duct, 14-inch length
-	3270114	Wire Harness Top Board to Head (not shown)
-	9700236	Wire Harness HRPS to Head - Old Style (not shown)

\* See Figure 2, Item 26 and Items 31-33 for Springs & Brackets

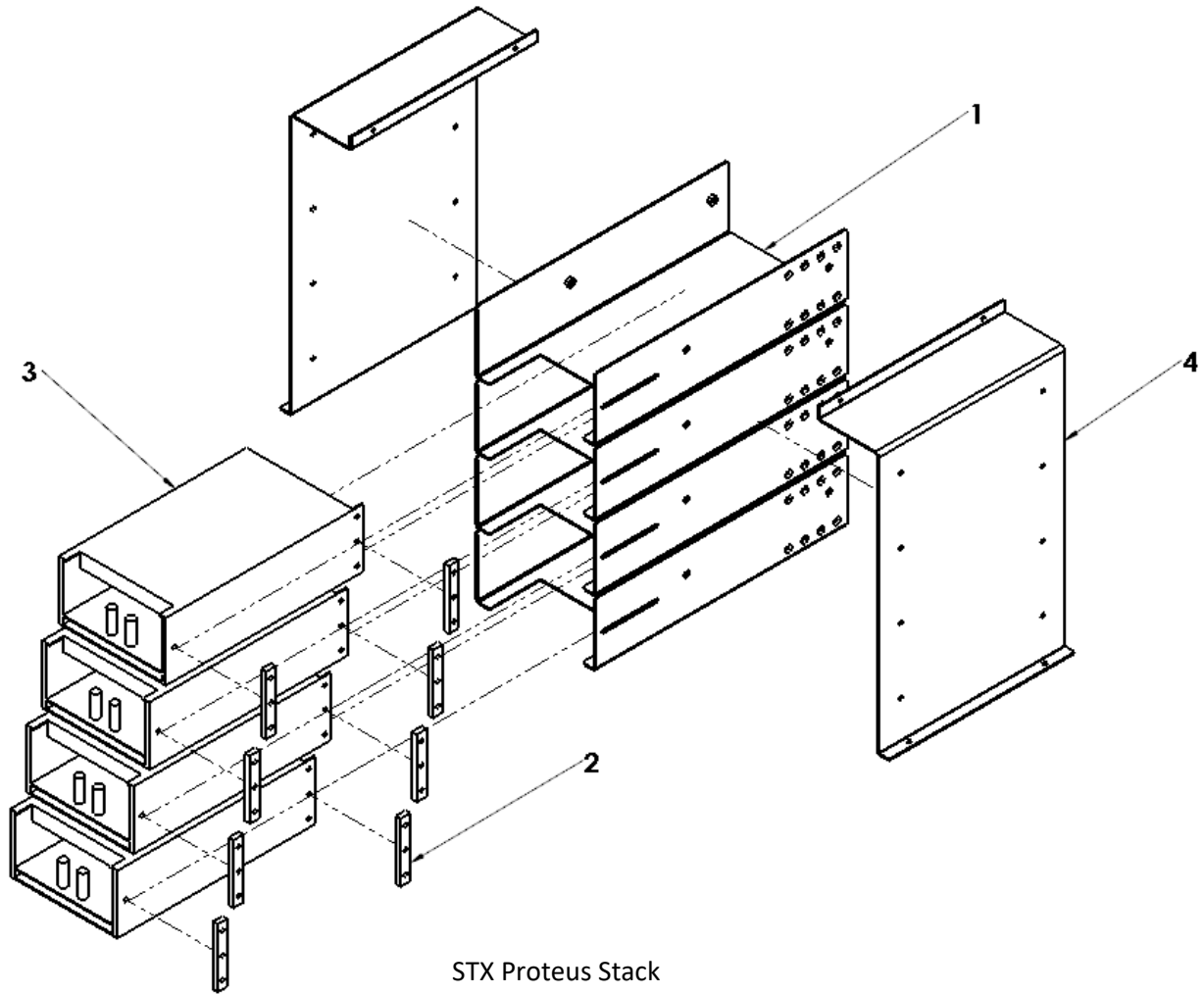


FIGURE 5

**PARTS LIST**  
Figure 5

ITEM	PART NO.	DESCRIPTION
1	9700192	POWER SUPPLY TRAY
2	9700191	MODULE SPACER
3	9700198	POWER SUPPLY 1000W XENON
4	9700193	POWER SUPPLY TOWER SHELL

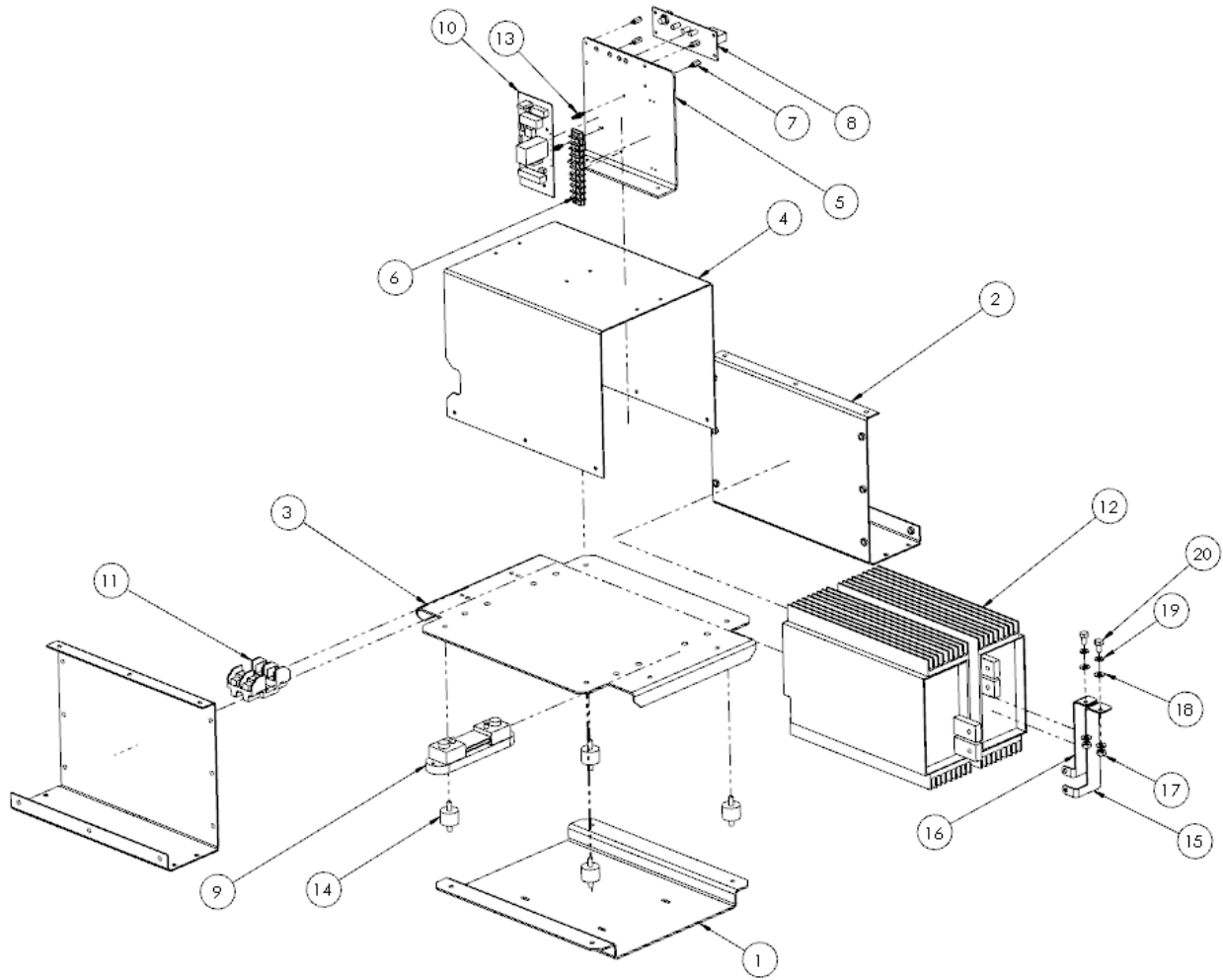


FIGURE 6

STX CCI Stack



## PARTS LIST

Figure 6

1

ITEM	PART NO.	DESCRIPTION
	9700006	4K BALLAST BASE PLATE
2	9700005	VERTICAL BALLAST ADAPTOR
3	9700007	BALLAST MOUNTING PLATE
4	9700008	4K BALLAST COVER
5	9700081	TERMINATION PANEL POWER SUPPLY SIX
6	ETBL375	10X 2 POST TERMINAL BLOCK
7	9700112	1/2 SPACER
8	3200574	PCA BALLAST CONTROL BOARD 240V
9	81247000	SHUNT
10	9700093	PCA AUTO STRIKE BOARD SKYTRACKER
11	9700103	FUSE HOLDER
12	EBL2CCI0	SBEAM CCI BALLAST +2000W
13	3915500	SUPPORT PCB THREADED
14	9700092	3/4 SPACER
15	SS4K60816	B3 BUSS BAR - POSITIVE 4K
16	SS4K60817	B3 BUS BAR- NEGATIVE 4K
17	4258003	NUT HEX 1/4-20 BRASS
18	4257100	WASHER 1/4 FLAT BRASS
19	4257001	WASHER LOCK 1/4 NOM S
20	4250502	BOLT 1/4-20 X 1/2 BRASS