
# User Guide

## Automated Xenon Entertainment Lighting System

# INTRODUCTION

## The Syncrolite System

The Syncrolite Automated Xenon Entertainment lighting system is designed for years of trouble free service when properly operated and maintained. All components are arranged in an efficient package for easy maintenance access to allow for concise and systematic trouble-shooting. Learning the basics of this process, in addition to proper pro gramming and operating procedures, is essential before attempting to operate the system.

This manual is designed for the field technician to use while setting up and running a show. It is also intended for the maintenance of installed systems. This book does not contain all information about the Syncrolite Automated Xenon Entertainment lighting system. For further documentation contact your company or Syncrolite.

Technical Overview

The Syncrolite instruments employ both a Motorola 6800 and 8032 Series microprocessor as the principal components in the unit CPU for DMX operation. Each Xenon unit has five computer controlled, variable parameters employing custom built servomotors with attached optical encoders. Each motor receives positional data via the National LM629 motor control microprocessor on individually corresponding motor driver PC boards mounted in the card cage or electronics top box of the unit. The five motors and motor driver cards control:

1. Beam Size
2. Douser
3. Color Scroller
4. Tilt
5. Pan

Motor Functions

Beam sizing is accomplished by moving the lamp via a focus plate in the reflector and dousing is accomplished by means of venetian blind system in the light path, while color mixing is achieved by placing individual gel filters forming a color scroll in the light path. The scroller provides up to 12 colors. (See reference section for gel string specifications of 7K and 3K scrollers.)

All Syncrolite electronics circuits, external operating software and internal software are proprietary and no schematics are provided, except under disclaimer, for the following components:

SS7K – Rev 3 Electronics Box with:

1. CPU Board
2. Motor Driver Board
3. FET Driver Board
4. Mother Board

SX3K and SX7K Electronics Box with:

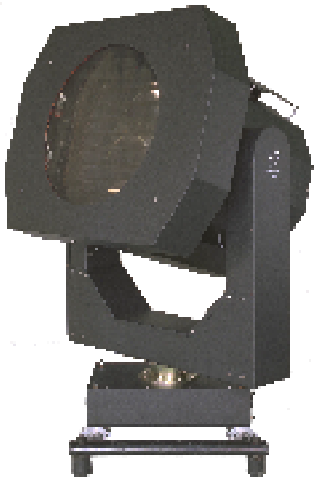
1. CPU Board
2. Motor Driver Boards

If a maintenance problem is traced to one of these circuits, they must be returned to the factory for warranty service or replacement. The incidence of failure of these components is low, but occasionally IC's and/or microprocessors fail and require replacement. Dealer/distributors may call Syncrolite for trouble-shooting as needed.

# The Syncrolite Instruments

**SS7K**

**ST7K**



**SX7K**

**SX3K**

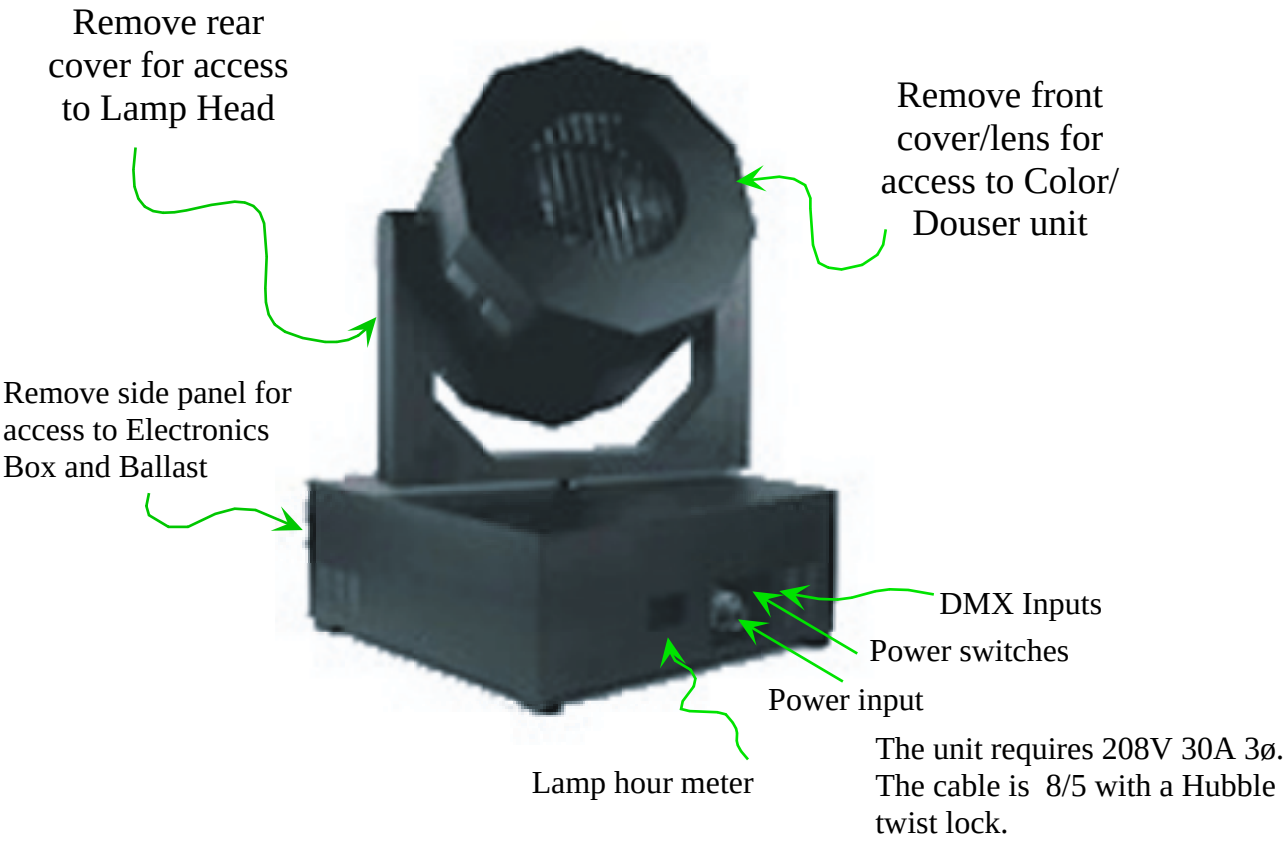
* All Syncrolite instruments are DMX as defined by USITT

# The SS7K

The Syncrolite SS7K utilizes the 7000 watt Ushio or ORC (Hanovia style) Xenon lamps. This DMX controlled unit pans 360˚ to a sensor stop and tilts 270˚. Beam sizing is accomplished by moving the lamp via a focus plate in the reflector. Dousing is accomplished by means of venetian blind system in the light path. Color is achieved by placing individual gel filters forming a color scroll in the light path. The SS7K provides up to 12 colors. (See the spec sheet in the Gel section.)

# SS7K

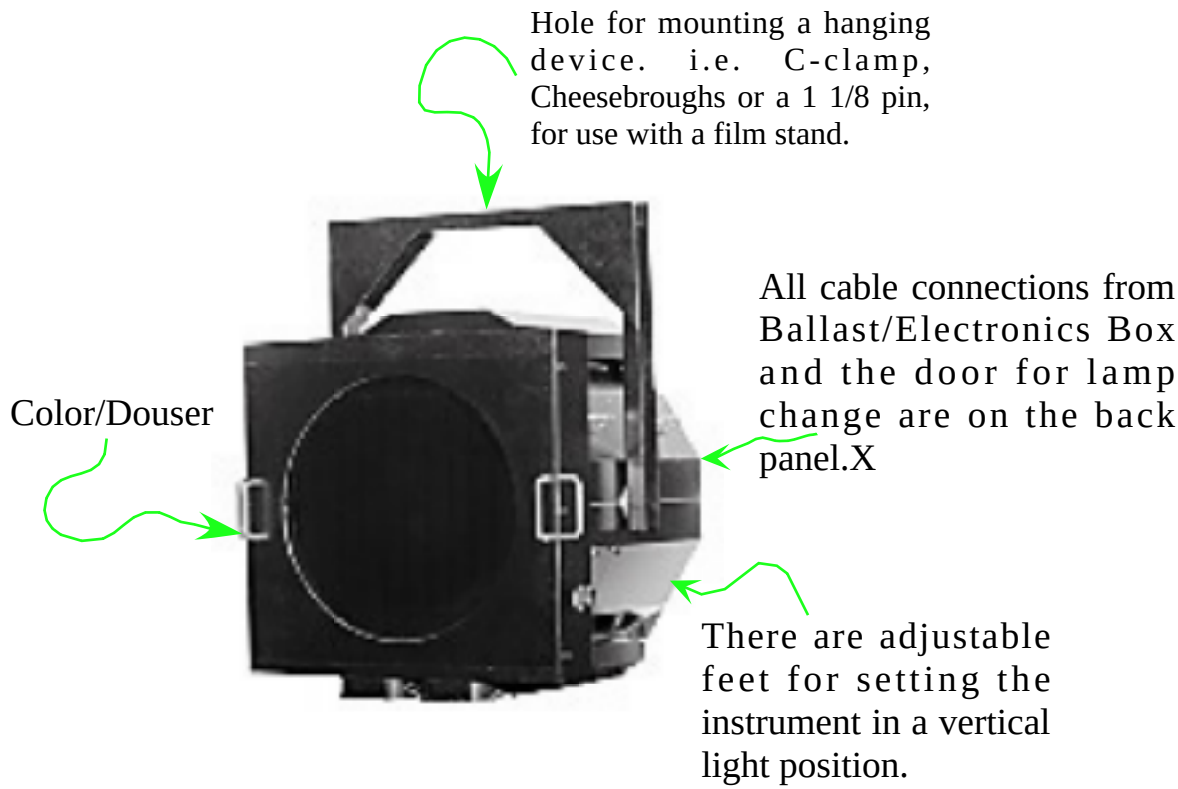
**Is a self-contained unit with ballast, electronics and lamp head in a water tight package.**



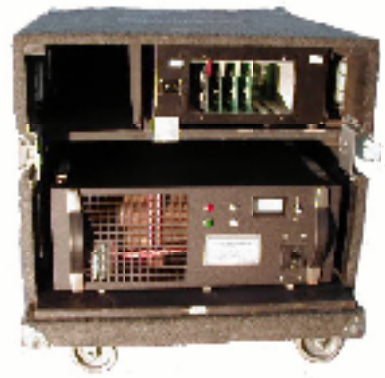

Most fasteners on the skin plates are #2 phillips.

Pan motor is mounted in the base and tilt motor is in the yoke arm. They effect motion by means of direct drive. The 20 amp geared/direct drive servomotors are coupled to the pan and tilt couplers with a keyed shaft and positioned via an optical sensor for optimum operation. They should be checked periodically as part of a normal maintenance routine.

# ST7K

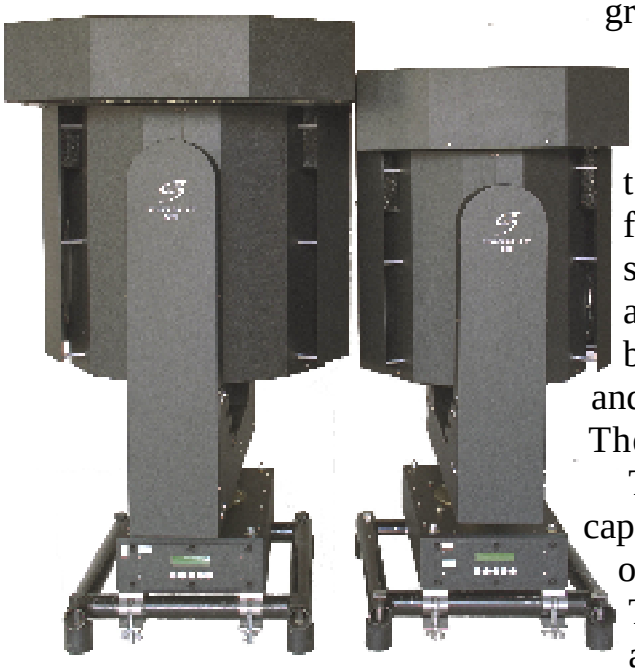



The ST7K is a non moving version of the SS7K. This unit can be flown, set on a flat surface or placed on a film stand. This unit has the same Color/Douser as the moving unit. The Bal last and Electronic boxes are the same as in the SS7K, but are located in an external Ballast electronics case. The lamps DC power, ballast, fans and motor control are connected with a lamphead cable. The ST7K uses the same 30A 3ø 8/5 power cable and unit cable (DMX) as the SS7K unit. The 8/5 cable and unit (DMX) cable are connected at the Ballast/Electronics box with a lamp head cable providing power and control to the lamp head.

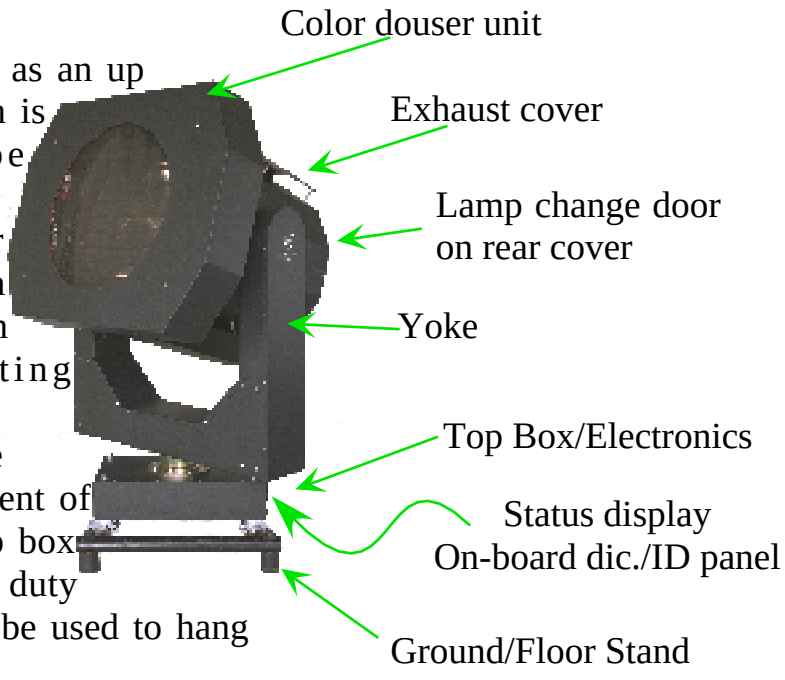


# SX7K / SX3K

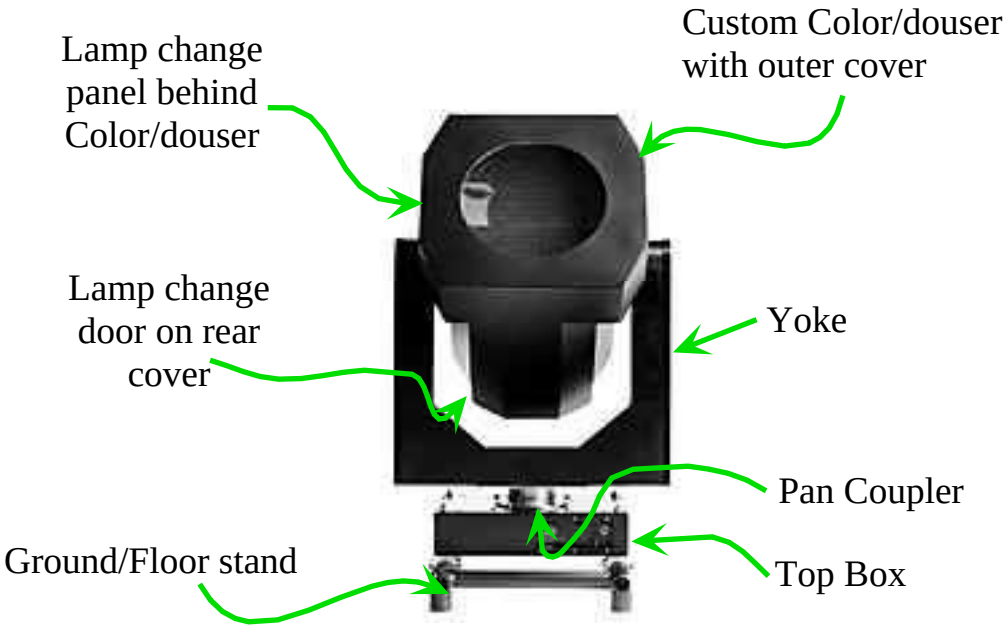
The SX7K/SX3K are very versatile instruments. They are lighter in weight and can be ground mounted or hung on most standard truss. The electronics are housed inside the top box of the unit. This instrument makes use of our new touch panel. From this panel, you have control of all functions of the light, including lamp strike and calibration of encoders. Pan and tilt motors are mounted in the top box and tilt arm assembly respectively and effect motion by means of direct drive. The SX3K units pan 540° and tilt 250°. The venetian blind douser has strobe capabilities. The color is achieved with use of a custom scroller capable of 12 colors. The ballast is separate and is mounted on a rolling case for ease of placement. It can be flown close to the the unit or placed up to 200' away. The DC lamp power is delivered to the instrument through #2 cable. The DMX fan power, and motor power in a special unit multi cable. There are pin out drawings in the Reference section.



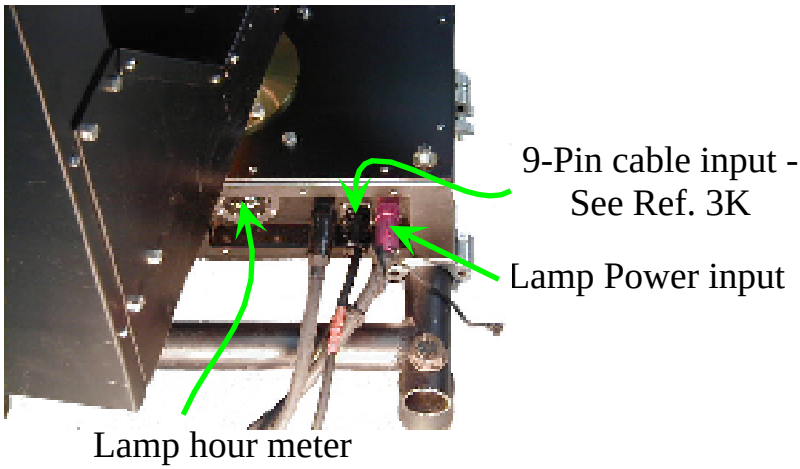
The SX3K/SX7K can be used as an up light or a Skylight. The beam is very powerful and can be focused from a very tight beam to a very wide flood. The floor stand for placing the light on any flat surface is included in the road case. The mounting hardware is bolted through the base of the instrument. The vertical and horizontal alignment of the cheeseboroughs on the top box are the same size as Medium duty truss, or Mini beam. This can be used to hang the instrument.



# SX3K & SX7K



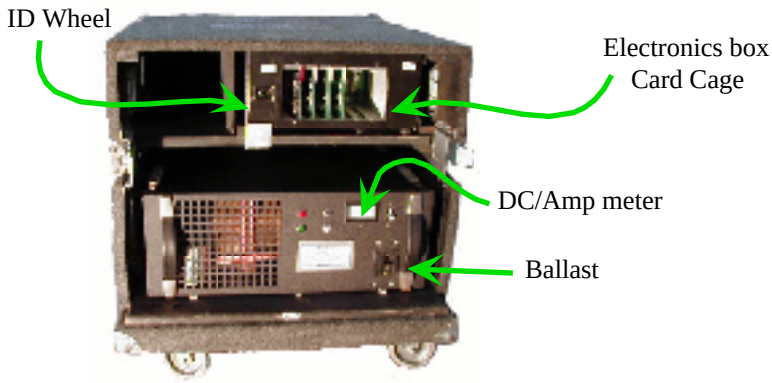

The SX7K uses the same lamp as the SS7K. This unit is in a smaller package than the SS7K ideal for roof tops and other elevations that can be handled without cranes . The Top Box and electronics are the same as the one used in the SX3K.



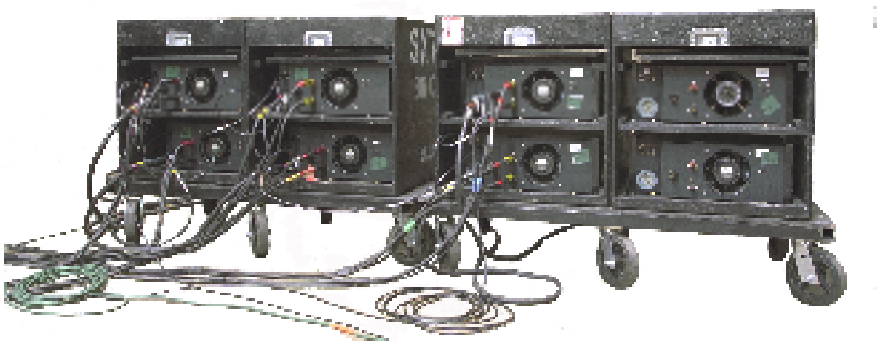
# Ballast and Electronics Box

## SS7K / ST7K

The SS7K Electronics box is the same as the one built into the ST7K. Except in the ST7K there are no Fet motor driver cards for pan and tilt. They have been removed and two slots in the ST7K card cage are blocked so that they can not be installed. Both units are addressed by the wheel ID switches on the front of the box. The input for the lamp head, motors and fans are on the back of the box. There are separate connectors for each of the motor functions. Each are labeled and pin blocks are used to prevent use of the wrong cable. The ballast provides AC output for the Electronics box, and a DC power for the lamp and strike feedback from the ballast to indicate lamp on to CPU.




## SX7K



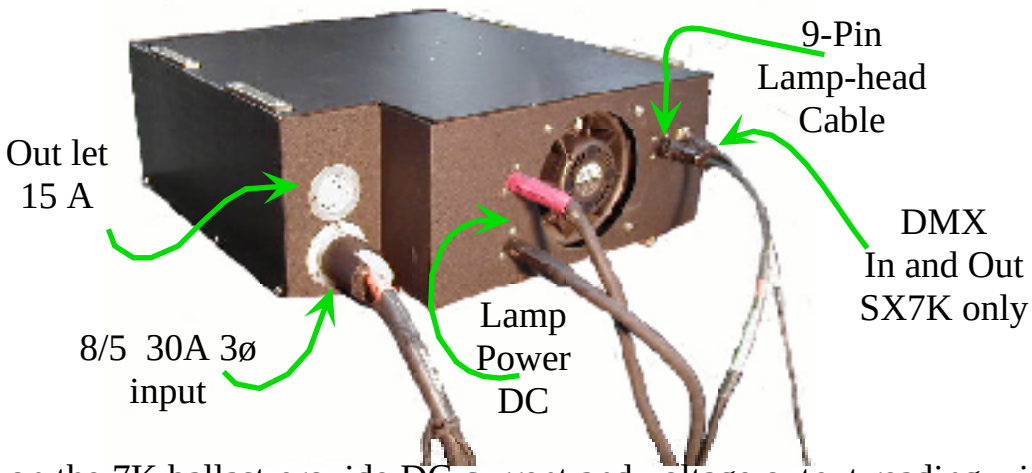
Magnetic ballast

SX3K

# Ballasts

The SS7K, ST7K, SX7K and SX3K use a Syncrolite custom built Magnetic ballast from LP Associates. It has been modified to operate for the Syncrolite systems. Please read the operating manual for this high voltage high current device and handle with extreme care. Metering of DC outputs should read as follows:

SS7K/ST7K/SX7K 163 DC amps @ 43V to deliver 7000 watts
SX3K 95-100 DC amps @ 34V to deliver 3000 watts




**Note:**

1. Meters on the 7K ballast provide DC current and voltage output reading with a toggle switch.
2. Magnetic ballasts are sensitive to cable lengths in an overall system and may result in voltage drops. Assuming your AC input power is properly balanced and a true 120-208V, you can expect a 5-10% lamp power output drop for each 100' of cable from ballast to lamp head. This may be compensated for by raising or lowering the taps inside the ballast. Only certified technicians should do this.

3. Certain older SS7K's employ the Ballantyne switching ballast – please refer to the manual. These ballasts are in factory rental stock only.

# Control

## DMX512 COMMUNICATION FORMAT

DMX512 is a serial digital communication protocol created specially for controlling lights and is specified by USITT standard. The data is transmitted asynchronously in a serial format using 422 differential pair data link. The standard provides for communicating with 512 channels (each channel having 8-bits). The data to each channel is transmitted sequentially starting with the first and ending with the last implemented, see Figure 2. This means that DMX512 is of variable length and only data that is necessary is transmitted, therefore making the update time shorter if a smaller number of lights or channels is implemented.

In DMX512 systems, the data is transmitted in 8-bit words preceded by a start-bit followed by two stop-bits, the Baud-rate is 250 kilobits per second (250 KBaud). The first 8Bits of data have special meaning, they denote the "start code." This code signifies one of 256 different start codes making the 512 data words to follow unique. The start-code for dimmers is set to Zero (0), leaving all other 255 start-codes available. Using all of the start codes and all of the channels available DMX512 can implement a grand total of (256 start-codes X 512 channels per start-code = 131,072 Total channels). There is a "break" or silence for a period of 88.0 uSec and then all the data is retransmitted again.

The DMX512 throughput varies with the number of lights implemented. Using the maximum number gives:

( 11bits/word ) ( 512 words/block ) ( 4.0E-6 sec/bit )

+ ( 88.0E-6 delay ) = 22.62E-3 seconds/block

[( 8 bits ) ( 512 words )] / ( 22.62E-3 seconds/block )

= 181.1 KBaud of Throughput

DMX Parameter Assignments: the following table shows DMX protocols for all Syncrolite units.

| DMX # | FUNCTION | NOTES |
|---|---|---|
| Base | Pan Course | X |
| Base +1 | Pan Fine | XL |
| Base +2 | Tilt Course | Y |
| Base +3 | Tilt Fine | YL |
| Base +4 | Dimmer | Mechanical Douser |
| Base +5 | Focus | Mechanical Lamp Travel |
| Base +6 | Color | Scroller |
| Base +7 | Command Word | Used for commands, i.e. strike |
| Base +8 | Command Execute | Reset, Sleep and Wake-up |

| COMMAND | COMMAND WORD | COMMAND EXECUTE | |
|---|---|---|---|
| | STEP 1 | STEP 1 | STEP 2 |
| Lamp Strike | 43 | 86 | 171 |
| Lamp Kill | 85 | 86 | 171 |
| Wake-up | 127 | 86 | 171 |
| Reset/Calibrate | 169 | 86 | 171 |
| Sleep | 211 | 86 | 171 |

Note: These commands can be made and used in a macro, palette, library or cue.
All numbers are true DMX decimal values (0 thru 255).

All Syncrolite units are addressed as a unit in a show. There DMX starting numbers must meet the 9 channel setup. The starting DMX number for each unit can not be picked at random. Please refer to the DMX card or the chart to find the starting DMX number fore each unit number.

Base Address depends on unit ID#. 9 bytes per unit as follows:

| Unit # | Base Address |
|---|---|
| 1 | 1 |
| 2 | 10 |
| 3 | 19 |
| 4 | 28 |
| 5 | 37 |
| 6 | 46 |
| 7 | 55 |
| 8 | 64 |

ETC.....

For your convenience we are including a DMX card. This card has all of the channel numbers and the command for all Syncrolites.

# DMX Chart

| INS # | PAN | | TILT | | Dowser | Beam | Color | C W | C E |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 3 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 4 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| 5 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
| 6 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 |
| 7 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 |
| 8 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 |
| 9 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 |
| 10 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| 11 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |
| 12 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 |
| 13 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 |
| 14 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 |
| 15 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 |
| 16 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 |
| 17 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 |
| 18 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 |
| 19 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 |
| 20 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 |
| 21 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 |
| 22 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 |
| 23 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 |
| 24 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 |
| 25 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 |
| 26 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 |
| 27 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 |
| 28 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 |
| 29 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 |
| 30 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 |
| 31 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 |
| 32 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 |
| 33 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 |
| 34 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 |
| 35 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 |
| 36 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 |
| 37 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 |
| 38 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 |
| 39 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 |
| 40 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 |
| 41 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 359 |
| 42 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 |
| 43 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 |
| 44 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 |
| 45 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 |
| 46 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 |
| 47 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 |
| 48 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 |
| 49 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 |
| 50 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 |
| 51 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 |
| 52 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 |
| 53 | 479 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 |
| 54 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 |
| 55 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 |
| 56 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 |

# Operating Voltage

Most Syncrolite Xenon instruments are single voltage machines and will operate on 120V only. Before operating the system, check the power by metering the 3 phase at the plug to be sure of correct operating voltage. European units are 240-380, 50Hz at the ballast level input, but transformers inside the ballast provide motor, fans and electronics power to the lamp head at 120-208V.

Each 7K lamp needs 30A 3 phase. Each 3K lamp needs 20A 3 phase.

Always check your power source at the panel box and your cam-locks with a voltage meter before connecting the distribution unit. The ballast of the units are sensitive to power fluctuation and will shut off the unit to prevent damage to the lamp or motors. If the voltage is incorrect you can cause severe damage to the ballast and the light.

If you have questions or need more detailed information down load the other parts of the Manual.

Or give Syncrolite a call

214-350-7696