

# ACCESSORY EQUIPMENT

HARRIS  
INTERTYPE  
CORPORATION

**GATES®**  
A DIVISION OF HARRIS-INTERTYPE



# Remote Pickup Equipment—150-450 MHz



**M-30BT**

**NOTE:** The M-30BT/TPS and M-20BT/TPS are available with choice of inputs of either 3 microphones, (1 push-to-talk), or 2 microphones (1 push-to-talk) and one 600 ohm line level input. Please specify choice of input configuration.

## AVERAGE COVERAGE OVER FLAT TERRAIN OF M-30BT TRANSMITTER

RECEIVING ANTENNA HEIGHT	ANTENNA COMBINATIONS		EXPECTED COVERAGE IN MILES
	Receiving	Transmitting	
* 75 ft.	5 Element Yagi	Single Ring	9
** 150 ft.	5 Element Yagi	Single Ring	13
* 75 ft.	Stacked 5 Element Yagi's	Single Ring	11
** 150 ft.	Stacked 5 Element Yagi's	Single Ring	15
* 75 ft.	5 Element Yagi	5 Element Yagi	14
** 150 ft.	5 Element Yagi	5 Element Yagi	18
* 75 ft.	Stacked 5 Element Yagi's	5 Element Yagi	16
** 150 ft.	Stacked 5 Element Yagi's	5 Element Yagi	20
** 150 ft.	RA-4 Antenna	Single Ring	10
*** 300 ft.	RA-4 Antenna	Single Ring	14
** 150 ft.	RA-4 Antenna	5 Element Yagi	16
*** 300 ft.	RA-4 Antenna	5 Element Yagi	20

The above measurements are based on a transmitting antenna height of 6 feet above surrounding objects.

### CODE:

- \* Measurement based on length of RG-8U Transmission Line not to exceed 80 ft.
- \*\* Measurement based on length of FHJ4 Transmission Line not to exceed 200 ft.
- \*\*\* Measurement based on length of 7/8" Helix Line not to exceed 350 ft.

## M-20BT SERIES TRANSMITTER

450-460 MHz

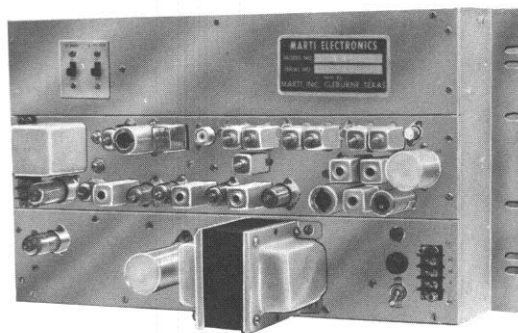
**RF OUTPUT:** 20 watts, continuous.  
**FREQUENCY RANGE:** 450-460 MHz.  
**CRYSTAL MULTIPLICATION:** 108.  
**SPURIOUS EMISSION:** Spurious radiation attenuated at least 60 dB below carrier level. Harmonics suppressed at least 60 dB.  
**FREQUENCY STABILITY:**  $\pm 0.0005\%$ .  
**TEMPERATURE RANGE:**  $-30^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ .  
**MODULATION:** 100F3 Maximum. (Normally adjusted for  $\pm 20$  kHz swing.)  
**AUDIO INPUTS:** Three. One for push-to-talk mike. Two for 50-150 ohm mike inputs or 600 ohm line input.  
**AUDIO INPUT LEVEL:**  $-70$  dB.  
**AUDIO CONNECTORS:** (2) XLR-3-31 and (1) XLR-4-31.  
**POWER REQUIREMENTS:** 120 VAC and 12.6 VDC. (DC Transistorized Power Supply.)  
**MODULATION CONTROL:** Solid State Compressor/Limiter.  
**NOISE LEVEL OF TRANSMITTER:** Better than  $-45$  dB.  
**OVERALL RESPONSE WITH MATCHED RECEIVER:**  $\pm 2$  dB from 60 to 12,500 Hz.  
**DISTORTION:** Less than 3%.  
**FREQUENCIES POSSIBLE:** Two: Max. Spacing 500 kHz.  
**NET WEIGHT:** 17 pounds.  
**DIMENSIONS:** Portable: 14" wide, 10" long, 7" high. Rack Mounted: 19" wide, 10" long, 10 1/2" high.  
**TUBE COMPLEMENT:** 16 Transistors, 6 Diodes, 1 Varactor, 6 tubes.

## M-30BT SERIES TRANSMITTER

152-172 MHz

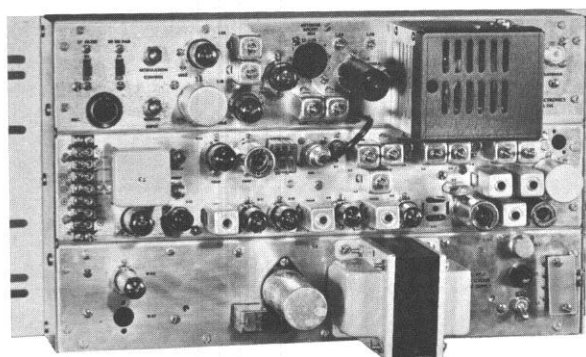
**RF OUTPUT:** 30 watts, continuous.  
**FREQUENCY:** 152-172 MHz.  
**CRYSTAL MULTIPLICATION:** 36.  
**SPURIOUS EMISSION:** Spurious Radiation attenuated at least 70 dB below carrier level. Harmonics suppressed at least 60 dB.  
**FREQUENCY STABILITY:**  $\pm 0.0005\%$ .  
**TEMPERATURE RANGE:**  $-30^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ .  
**MODULATION:** 30 F3 Maximum. (Normally adjusted for  $\pm 7.5$  kHz swing.)  
**AUDIO INPUTS:** Three. One for push-to-talk mike. Two for 50-150 ohm mike inputs or 600 ohm line input.  
**AUDIO INPUT LEVEL:**  $-70$  dB.  
**AUDIO CONNECTORS:** (2) Cannon XLR-3-31 and (1) XLR-4-31.  
**POWER REQUIREMENTS:** 120 Volts AC or 12.6 Volts DC. (Transistorized)  
**MODULATION CONTROL:** Solid State Compressor/Limiter.  
**NOISE LEVEL OF TRANSMITTER:** Better than  $-45$  dB.  
**OVERALL RESPONSE WITH MATCHED RECEIVER:**  $\pm 2$  dB from 60 to 7500 Hz.  
**DISTORTION IN TRANSMITTER:** Less than 3%.  
**FREQUENCIES POSSIBLE:** Two: Max. Spacing 120 kHz.  
**NET WEIGHT:** 16 pounds.  
**DIMENSIONS:** 14" wide, 10" long, and 7" high.  
**TUBE COMPLEMENT:** 16 Transistors, 6 Diodes, 6 Tubes.

Also available with return communications circuit—base to mobile.



## MR-30/150 - 170 RECEIVER

**SENSITIVITY:** 0.6 microvolts or less for 20 dB SNR with low pass filter.  
**FREQUENCY RANGE:** 152-172 MHz.  
**SELECTIVITY:** -100 dB at  $\pm 32$  kHz. -6 dB or less at  $\pm 15$  kHz.  
**SPURIOUS RESPONSE:** All spurious and image responses attenuated at least 90 dB.  
**OVERALL RESPONSE:**  $\pm 2$  dB 60 to 7500 Hz with matching M-30BT transmitter.  
**FREQUENCY STABILITY:**  $\pm 0.0005\%$  with crystal oven.  
**TEMPERATURE RANGE:**  $-30^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ .  
**AUDIO OUTPUT:** +8 VU at 600 ohms.  
**METERING:** Signal strength and VU brought out to test jacks. Visual metering optional.  
**POWER REQUIREMENTS:** 120/240 VAC, 50/60 Hz.  
**DIMENSIONS:** 10½" high, 19" wide, 9" deep.  
**PANEL FINISH:** WE Hammertone Gray.  
**NET WEIGHT:** 20 pounds.



## MR-100/450 - 460 RECEIVER

**SENSITIVITY:** 0.6 microvolts or less for 20 dB SNR with low pass filter.  
**FREQUENCY RANGE:** 450-460 MHz.  
**SELECTIVITY:** -90 dB at  $\pm 120$  kHz. -6 dB or less at  $\pm 40$  kHz.  
**SPURIOUS RESPONSE:** All spurious and image response attenuated at least 85 dB.  
**OVERALL RESPONSE:**  $\pm 2$  dB, 60 to 12,500 Hz with matched M-20BT Transmitter.  
**FREQUENCY STABILITY:**  $\pm 0.0005\%$  with crystal oven.  
**TEMPERATURE RANGE:**  $-30^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ .  
**AUDIO OUTPUT:** +8 VU at 600 ohms.  
**METERING:** Signal strength and VU brought out to test jacks.  
**POWER REQUIREMENTS:** 120/240 VAC, 50/60 Hz.  
**DIMENSIONS:** 10½" high, 19" wide, 9" deep. Panel finish grey.  
**NET WEIGHT:** 20 pounds.

## ORDERING INFORMATION TYPICAL ONE-WAY PACKAGES

### 150 MHz

- 1 — M-30BT/TPS Transmitter Portable-mobile, 30 watt, broadcast-quality with c/w tubes, crystal and tuned. 120 VAC and 12.6 VDC ..... 731-0045
- 1 — TPS-TC mobile control for M-30BT/TPS transmitter ..... 731-0047
- 1 — ASP-143 bumper mount for MA-1 antenna ..... 710-0087
- 1 — MA-1 Mobile Single Ring Antenna ..... 710-0089
- 1 — PA-1 Portable Single Ring Antenna ..... 710-0088
- 1 — MR-30/150-170 Receiver, Rack Mount, broadcast-quality continuous-duty, with tubes, crystal and tuned. 120 VAC. 600 ohm output ..... 731-0046
- 1 — RA-4 4-bay Base Antenna ..... 710-0086
- 150 — Feet FHJ4-50B Heliac foam filled, ½", jacketed transmission line ..... 618-0171
- 2 — 44AU UHF jack, for use with FHJ4-50B ..... 620-0301
- 1 — PG-4A pigtail, 4' RG-8A/U cable with plugs ..... 731-0218
- 1 — PG-4B pigtail, 4' RG-8A/U cable with connectors ..... 731-0182

### 450 MHz

- 1 — M-20BT/TPS Transmitter, Portable-mobile, 20 watt, broadcast-quality, continuous-duty, with c/w tubes, crystal and tuned. 120 VAC and 12.6 VDC ..... 731-0254
- 1 — TPS-TC mobile control for M-20BT/TPS transmitter ..... 731-0047
- 1 — ASP-406 Rooftop antenna, mobile, vertically, polarized ..... 710-0111
- 1 — MR-100/450-460 Receiver, Rack Mount, broadcast-quality, 120 VAC. 600 ohm output ..... 731-0187
- 1 — ASP-313 Base Antenna, colinear, 6 dB gain ..... 710-0112
- 2 — ASP-320 Mounting Clamps for ASP-298 and ASP-313 ..... 710-0113
- 150 — Feet FHJ5-50A heliac, 7/8", 50 ohm jacketed ..... 618-0172
- 2 — 45AU UHF jack, for use with FHJ5-50A ..... 620-0317
- 1 — PG-4B pigtail, 4' RG-8A/U cable with connectors ..... 731-0182
- 1 — PG-4C pigtail, 4' RG-8U with UG-21C/U and UG-23B/U connectors ..... 731-0257

### ACCESSORIES

- SR-90R Turner microphone, carbon, for local control of M-25C ..... 720-0187
- RMC-1C remote control console, solid state, complete with transistors, power supply ..... 731-0199
- DFT Dual frequency kit for M-30BT, M-30BT/TPS and M-30BT/CD, less crystal ..... 731-0162
- DFR Dual Frequency kit for MR-30BT/150-170 and M-25/150-170C, less crystal ..... 731-0163
- XT-1A Hi-Accuracy Crystal for M-30BT/TPS, M-30BT/CD and M-25C ..... 731-0165
- XR-1A Hi-Accuracy Crystal for MR-30BT/150-170 and M-25/150-170C ..... 731-0166

# Studio-Transmitter Link—890-960 MHz



The Model PCL-303 Studio-Transmitter Link provides a high-quality audio channel between a broadcast studio and a remote transmitting site.

It has been developed specifically for application in broadcast service. Designed for continuous service, it operates in accordance with Subpart E, Part 74, of the FCC Rules and Regulations. It is available for all STL bands—domestic and foreign.

From the operational maintenance standpoint, multicircuit metering has been provided. Utilizing front panel meters, all significant circuits can be measured at the turn of a knob. The equipment is furnished with rack-mounted slides for easy inspection. Interstage shielding is used where required, with equipment covers—top and bottom—being provided for each unit.

**TRANSMITTER:** The true, direct FM principle of modulation is employed in these STL transmitters. To ensure the required output frequency stability, a thoughtfully-engineered auto-

matic frequency control (AFC) system is utilized. Here's how it works:

An extremely stable basic oscillator is modulated with a pair of variable capacitance (varicap) diodes. The frequency of this basic FM oscillator (approximately 78 MHz) is divided by 1024 using a binary divider chain which employs high-speed, integrated circuit (IC) elements.

This divided output is phase compared to the output of a reference crystal (oven-controlled) oscillator, and the resultant error voltage is used to phase lock the basic oscillator to the crystal. Low-frequency modulation components have negligible effect on the AFC lock as a result of the high-frequency division ratio (1024) employed in the basic oscillator. The phase-locked output of the direct FM basic oscillator is multiplied and power amplified; in the PCL-303 it is further tripled to the output frequency with a parametric multiplying diode.

An RF cavity filter at the transmitter output attenuates spurious signals to at least 60 dB below rated power output, and



an integral sampling probe feeds a panel meter to continuously monitor relative output power. A quiet, dependable, blower fan cools the final transistor power chain. The fully-regulated and protected power supply is self-contained and maintains stable power output with line voltage variations from 105 VAC to 130 VAC.

An input audio filter removes unwanted program components above 17 kHz. This effectively reduces the crosstalk (in all multiplex channels) which may be caused by spurious high-frequency noise in the program line.

Standard 75 microsecond pre-emphasis is also incorporated in the program input. BNC connectors, for inserting remote control and SCA subcarriers, and a 5-pin connector, used when the STL transmitter is remotely controlled, appear on the rear of the chassis.

**RECEIVER:** This is a conventional double-conversion, crystal-controlled, superheterodyne receiver with a self-contained, regulated power supply. Signals from the antenna input are passed through a five-cavity RF pre-selector which is used

ahead of a low-noise, input mixer diode (Schottky barrier type).

The first IF (72 MHz) section consists of a three-stage FET amplifier employing AGC and designed for low noise and medium bandwidth characteristics. The second IF section (10.7 MHz) is an amplifier exhibiting exceptionally sharp skirts and linear phase characteristics. These characteristics are achieved by a ten-pole, active filter slightly overcoupled to give the desired response. Less distortion to high-frequency modulation components are ensured by this design. The ratio detector affords better rejection of impulse noise and adjacent channel interference.

The audio section, utilizing an operational amplifier, is a wide-band, low-noise, low-distortion type amplifier incorporating a 75 microsecond de-emphasis network. A carrier-operated squelch relay silences all output should the carrier be lost or if the power fails. Contacts for external carrier alarm use are located on the back of the chassis, as are the two BNC connectors for subcarrier outputs. A 600 ohm output-to-line transformer and a 17 kHz low-pass elliptical filter complete this section.

## SYSTEM SPECIFICATIONS

**FREQUENCY RESPONSE:**  $\pm 1/2$  dB from 30 Hz to 15,000 Hz.

**DISTORTION:** Less than 0.5% from 50 Hz to 15,000 Hz.

**SIGNAL-TO-NOISE RATIO:** Better than 68 dB (-65 dB for PCL-202) below 100% modulation.

**MODULATION CAPABILITY:** One program and two subcarrier channels.

**PRIMARY POWER SOURCE:** 120/240 VAC,  $\pm 10\%$  50-60 Hz.

**PANEL SPACE REQUIRED:** 5 1/4" x 19"—transmitter or receiver.

## OPERATING SPECIFICATIONS

### TRANSMITTER

**TYPE:** Direct FM.

**RF OUTPUT:** 7 watts minimum; 8 watts maximum into nominal 50 ohm load—Type N female connector.

**FREQUENCY STABILITY:** Better than 0.001% (0° to 55°C); Crystal mounted in temperature controlled oven.

**MULTIPLICATION:** 12 times basic oscillator frequency.

**AM NOISE:** Better than 75 dB below carrier reference.

**DEVIATION:**  $\pm 40$  kHz for 100% modulation.

**SPURIOUS EMISSIONS:** More than 60 dB below carrier.

**AUDIO INPUT:** 600 ohms balanced; +10 dBm for 100% modulation.

**MULTIPLEX INPUTS:** Two BNC connectors provided for subcarrier channels in 25-100 kHz spectrum; approximately 1.0 volt rms for 20% deviation.

**SOLID-STATE DEVICES:** All silicon: 15 transistors (JEDEC), 14 diodes, 5 varicaps, 11 IC's, 1 varactor.

**POWER SUPPLY:** Fully regulated, self-contained.

**COOLING:** Convection and forced.

**DIMENSIONS:** 5 1/4" x 19" x 16".

### RECEIVER

**TYPE:** Superheterodyne—double conversion and crystal controlled.

**ANTENNA INPUT:** Nominal 50 ohms impedance—Type N female connector.

**SENSITIVITY:** Less than 3 microvolts for 20 dB quieting. Requires only 35 microvolt signal for 60 dB quieting.

**SELECTIVITY:** 200 kHz.

**AUDIO OUTPUT:** 600 ohms balanced; +10 dBm.

**MULTIPLEX OUTPUTS:** Two BNC connectors; 1.0 volt peak-to-peak per subcarrier for 20% subcarrier injection at transmitter.

**SOLID-STATE DEVICES:** All silicon: 19 diodes, 21 JEDEC registered transistors (18 bi-polar, 3 field effect), 1 IC.

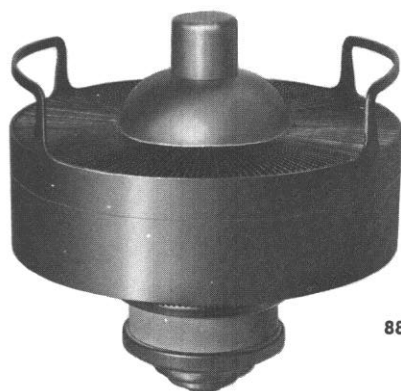
**POWER SUPPLY:** Zener regulated—self-contained.

**DIMENSIONS:** 5 1/4" x 19" x 14".

# Transmitting and Receiving Tubes



8806



8807



4CX5000A



833-A

## FAST-MOVING INVENTORY

Gates carries thousands of tubes in inventory—which, because of fast turnover, are always fresh. This is of vital importance, particularly for large transmitting tubes, where long shelf periods can make tubes gaseous. Listed below are a few of the popular tube types in stock—many others are also on hand. All tubes carry full warranty.

## HOW TO ORDER

Tubes may be ordered from Quincy, Houston, or New York. Shipment will be made as you direct—air freight, rail express, etc. Prices are no more at Gates—and you have the assurance of tube freshness. Please place your order by tube type and IBM number. Example: Type 3CV30000H3-----374-0108.

### TRANSMITTING TUBES

Type	Number	Type	Number
3CV30000H3	374-0108	833A	374-0039
3CX2500A3	374-0094	845	374-0040
3CX2500F3	374-0093	866A	374-0042
4-125A	374-0008	872A	374-0043
4-250A	374-0009	885	378-0008
4-400A	374-0010	1612	370-0146
4CX250B	374-0081	1622	370-0149
4CX300A	374-0014	6076	374-0050
4CX1000A	374-0015	6146	374-0051
4CX3000A	374-0074	6360A	374-0054
4CX5000A	374-0016	6528	370-0160
4CX10000D	374-0077	7480	374-0107
4CX15000A	374-0097	8008	374-0058
4X250B	374-0019	8806	374-0118
575A	374-0026	8807	374-0119
673	374-0027	8122	374-0096
807	374-0030	8792	374-0117
810	374-0031	7289	374-0115
813	374-0034	WL5891	374-0067

### RECEIVING TUBES

Type	Number	Type	Number
OA2	370-0144	6CA7	370-0066
OA3/VR75	370-0005	6CD6GA	370-0069
OD3/VR150	370-0008	6L6GC	370-0086
GZ34/5AR4	370-0133	6SH7	370-0093
5BP1A	378-0003	6SJ7	370-0094
5R4GY	374-0020	6SQ7	370-0098
5U4GB	370-0017	6V6GT	370-0102
5V4GA	370-0230	6X4	370-0105
5Y3GT	370-0020	6X5GT	370-0106
5749	370-0153	6080	370-0158
5879	370-0155	6386	370-0213
6AH6	370-0027	12AT7	370-0112
6AL5	370-0030	12AU7A	370-0195
6AS7GA	370-0036	12AX7	370-0116
6BG6GA	370-0052	12AY7	370-0117
6C5	370-0065	12BY7A	370-0123



# Semiconductor Directory

The following is a list of transistors, silicon diodes and Zener diodes, used in Gates manufactured products. When ordering please specify the type number of the item followed by the Gates part number.

[illegible]

## FCC AND FAA SPECIFICATIONS

This chart illustrates the requirements for the standard lighting of antenna towers and supporting structures in accordance with "Indicated paragraphs of FCC Form 715 and FCC Rules Part 17", and "FAA Standards for Marking and Lighting Obstructions to Air Navigation, Sept. 1962".

Aeronautical study by the FCC and FAA may determine that other than standard lighting is required for a specific tower installation. The FCC Construction Permit will specify the required lighting for each installation and should be carefully checked for this information.

Antenna structures over 1500 feet up to and including 2100 feet in height above the ground shall be lighted in accordance with FCC Sections 17.34 through 17.37.

OVERALL HEIGHT 1351 TO 1500 FT. FCC ¶ No's. 3.10, 19.21, FAA SPEC. "A-10". Standard lighting requires 3 Beacons, 15 Obstruction Lights (20 for square tower), and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 1201 TO 1350 FT. FCC ¶ No's. 3.9, 18.21, FAA SPEC. "A-9". Standard lighting requires 4 Beacons, 12 Obstruction Lights (16 for square tower), and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 1051 TO 1200 FT. FCC ¶ No's. 3.8, 17.21, FAA SPEC. "A-8". Standard lighting requires 4 Beacons, 9 Obstruction Lights (12 for square tower), and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 901 TO 1050 FT. FCC ¶ No's. 3.7, 16.21, FAA SPEC. "A-7". Standard lighting requires 3 Beacons, 12 Obstruction Lights (16 for square tower), and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 751 TO 900 FT. FCC ¶ No's. 3.6, 15.21, FAA SPEC. "A-6". Standard lighting requires 3 Beacons, 9 Obstruction Lights (12 for square tower), and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 601 TO 750 FT. FCC ¶ No's. 3.5, 14.21, FAA SPEC. "A-5". Standard lighting requires 2 Beacons, 6 Obstruction Lights (8 for square tower), and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 451 TO 600 FT. FCC ¶ No's. 3.4, 13.21, FAA SPEC. "A-4". Standard lighting requires 2 Beacons, 4 Obstruction Lights (8 for square tower), and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 301 TO 450 FT. FCC ¶ No's. 3.12, 21, FAA SPEC. "A-3". Standard lighting requires 1 Beacon, 4 Obstruction Lights, and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 151 TO 300 FT. FCC ¶ No's. 3.11, 21, FAA SPEC. "A-2". Standard lighting requires 1 Beacon, 2 Obstruction Lights, and Beacon Flasher. Photo-Electric Control is required.

OVERALL HEIGHT 21 TO 150 FT. Standard lighting requires 1 Double Obstruction Light.

### DAILY INSPECTION

FCC § 17.47 requires that the licensee . . . (1) shall make an observation of the tower lights at least once each 24 hours, either visually or by observing an automatic . . . indicator or alternatively (2) shall provide an automatic alarm system . . . All lights shall burn continuously or shall be controlled by a light sensitive device . . .

### LAMP SOCKET VOLTAGES

FCC § 17.34 and FAA "Standards for Marking and Lighting Obstructions to Air Navigation, Sept. 1962" specify that the lamp socket voltage correspond to or be within 3% of the rated voltage of the lamp used.

### CABLE SUPPORTS

The National Electric Code specifies that conductors in vertical runs shall not be supported by terminals . . . and that cable supports shall be provided in each vertical run, and at intervals not greater than 100 ft.

