Honeywell

INSTALLATION AND MAINTENANCE

INSTRUCTION MANUAL

TOWER LIGHT CONTROL.

UNIT MODEL NO. MBD 4423F46S

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• • • HUGHEY & PHILLIPS, Inc. • • •

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INSTALLATION AND MAINTENANCE INSTRUCTION MANUAL FOR TOWER LIGHTING CONTROL UNIT MODEL NO. MBD4423F46S HUGHEY & PHILLIPS, INC. BURBANK, CA

INSTRUCTION BOOK NO: A6A0015XM019

BY [illegible]C DATE: 5/29/82

CKD [illegible]C DATE: 5/18/82

APPR WmC DATE: 5/20/82

REV _____ DESCRIPTION _____

INSTALLATION INSTRUCTIONS FOR HUGHEY & PHILLIPS, INC. MODEL NO: MBD4423F46S TOWER LIGHTING CONTROL UNITS

The circuitry of this control unit is of the logic fail-safe design. Some of the control dicruitry in this model is Solid State and is protected by "MOVS" (metal oxide varistor) from surges & transients that could occur on incoming power and the outgoing tower lines.

The fail-safe logic is as follows:

(A) Failure of any component in the photoelectric circuit will result in the tower lights being turned on.

(B) Failure of any component in the Solid State Timer, operating theSolid State Relays, will result in the beacon lamps being turned "ON" steady burning, and an alarm signal to indicate this occurance.

(C) Failure of any component in the alarm circuits will result in an alarm signal.

(D) Failure of input power will result in an alarm. Upon return of input power the alarms will reset without having to recycle control through a day-time-to-nightime cycle.

This Tower Lighting Control Unit is designed to provide the following functions:

1. Photoelectric ON-OFF control of tower lights in accordance with FAA regulations.

2. Flash beacon lamps in accordance with FAA regulations.

3. Provide a signal to indicate power failure to the control.

4. Provide a signal to indicate that the photoelectric unit has turned the tower lights ON in the evening.

5. Provide a signal to indicate that the flasher by-pass circuit has operated.

6. Provide a signal to indicate failure of one or all beacon lamps.

7. Provide a signal to indicate failure of one or more obstruction lamps.

INSTALLATION

INDOOR HOUSING

Mount Lighting Control enclosure on wall by means of suitable wall fasteners placed through keyhole mounting holes. Proper operation of mercury plunger relay requires that the enclosure be mounted in a strict vertical position.

The tower wires enter the housing at the top through the 3/4"-1" knockout provided, and connect to terminal block TB-2. The photocell cable enters the housing at the top through the 1/2" knockout provided and connects to the red/black terminals at the top through the 1/2" knockout provided and connect to terminal block TB-2.

The power source enters the housing at the bottom through the 3/4"-1" knockout provided and connects to terminal block TB-1. The alarm wires enter the housing at the bottom through the 1/2" K.O. provided and connect to terminal strip marked "Alarms" at the lower left of the circuit board.

OUTDOOR HOUSING

Mount the lighting control enclosure on the tower by means of suitable fasteners. Proper operation of the mercury plunger relay requires that the enclosure be mounted in a strict vertical position. The tower wires enter the housing through the 3/4" or 1" conduit provided on either side of the housing and connect to terminal block TB-2. The Load Balance Resistor wires (if used) enter the housing at the side through the 1/2" conduit tap provided and connect to terminal block TB-2.

The power source wires enter the housing at the bottom through the 3/4" or 1" conduit tap provided and connect to terminal block TB-1. The alarm wires enter the housing at the bottom through the 1/2" conduit tap provided and connect to terminal strip marked "Alarms" at the lower left of the circuit board.

PHOTOCELL

The photocell housing should be mounted outdoors facing the north sky. A 21 foot photocell cable is supplied with the indoor lighting control unit. The length of this photocell cable is not critical and may extend up to 250 feet without effecting the operation or adjustment of the photoelectric unit. Nearby obstructions to the north should be avoided even if it necessitates turning the photocell several degrees away from the north. Direct rays of the sun should not be permitted to reach the face of the photocell, and exposure to artifical illumination (such as floodlights, streetlight, headlights, etc.) of more than a few foot-candles must be avoided in order to prevent undesired turn OFF operation.

ALARM CIRCUITS

This control unit provides the following separate alarm signals. The alarm signals are in the form of normally closed contacts.

1. Failure of input power to the unit.

2. Failure of photoelectric unit to turn the lights ON.

3. Malfunction of the Beacon Flasher (by-pass) circuit.

4. Failure of one or more obstruction lamps.

5. Failure of one or more beacon lamps.

DISARMING OF ALARMS

Relay K4 is used to prevent the alarm signal from occuring during lights "OFF" condition (Daytime Operation). The disarming circuit has a time delay of 6-10 seconds built in to allow the alarms to set up when the photoelectric circuit turns the tower lights ON, or in the event of a power failure lasting long enough to allow the alarms to actuate. The return of input power will recycle the disarming circuit allowing the alarms to reset.

POWER FAILURE

The coil of K3 is connected across the input power terminals of the control unit. Power Failure to the control unit will allow the contacts of relay K3 to open turning OFF the lights on the lamp connected between terminals "C" and "1" of the "ALARMS" terminal strip.

PHOTOELECTRIC CONTROL CIRCUIT BOARD

The photocelectric circuit board is located approximately in the center of the master circuit board, and is mounted in a printed circuit connector with guides. Operation of the photoelectric unit to turn on the tower lights will cause the contacts of relay K4 to close providing a "Tower Lights ON' signal between "C" and "2" of the "Alarms" terminal strip.

FLASHER "BY-PASS" OPERATE

Operation of the Flasher By-Pass circuit will turn the beacons on continously and will cause the contacts of relay K6 to close providing an alarm signal between terminals "C" and "3" of the "Alarms" terminal strip.

BEACON ALARMS

This control unit provides an alarm signal to indicate the failure of one or both beacon lamps. In series with the beacon lamps is the primary of current transformer T2,T3. The secondary voltage is applied to the input of an Opto-Isolator integrated circuit which in turn drives K7, K8. Variable resistor R12, R16 is a sensitivity control for adjusting the alarm relay to de-energize and give an alarm when one lamp fails this variable resistor has been adjusted at the factory and should not be tampered with. In the event that it has been determined an adjustment is necessary, refer to the section "Theory of Operation and Testing" of this manual.

Failure of the beacon lamp will cause a contact closure to occur between terminals "C: and "4" or "5" of the "Alarms" terminal strip at the bottom of the circuit board. See Note Below.

OBSTRUCTION LIGHTS

In series with the lamps is the primary winding of a current transformer T4,T5. The secondary voltage is applied to the input of an Opto-Isolator integrated circuit which in turn drives K9, and R10 variable resistor R20, and R24 can be adjusted to indicate the failure of 1 lamp (SEE NOTE). This variable resitor has been adjusted at the factory for your specific needs and should not be tampered with. In the event the variable resistor should need adjustments refer to "Theory of Operation and Testing" in this manual. Failure of one or more obstruction lamps will cause a contact closure to occur between terminals "C" and "6" or "7" of the "Alarms" terminal strip at bottom of the circuit board.

NOTE:
Sidelights 1 lamp out of 3
Beacon 1 lamp out of 2

THEORY OF OPERATION AND TESTING

This control unit has been designed incorporating state of the art Solid State circuitry. The total concept of the design is logic fail-safe to guard against any one circuit failure from disabling the lighting of the tower.

The control circuits are mounted on a master circuit board with the photoelectric control on a plug in circuit board for ease of servicing. Likewise, all control relays are plug in, cradle-type readily available at most electronics outlets. All wiring is on the surface of the control panel and all components are removable from the panel which eliminates the necessity of removing the whole panel for servicing.

THEORY OF OPERATION DAYTIME OPERATION

With power applied to the control unit and in daytime operation Photoelectric Control Relay K1 will be deactivated. K1 being deactivated will active power relay K2 a normallly closed mercury relay and alarm disable relay K4. Power failure relay K3 and Flasher Failure relay K5 will alsc be activated. During daytime operation there should be no alarms indicated.

NIGHTTIME OPERATION

When the north sky light drops to approximately 35 foot-candles the photoelectric control circuit will cause relay K1 to deactivate. This in turn will deactivate power relay K2 applying power to the lighting circuits. The alarm disable relay K4, is delayed 6 to 10 seconds to allow the beacon, obstruction light, and beacon flasher by-pass circuits to set up. K4 being delayed also allows the beacon flasher by pass relay K5 to remain activated and start the Solid State Beacon Flasher flashing the beacons.

As soon as the time delay has expired on the alarm disable relay K4, it will deactivate and all alarms are now activated.

BEACON ALARM

The current of the beacon lamps passes through the primary of current transformer T2,T3. There is a voltage transfer to the secondary winding of the current transformer. The variable resistor R12,R16 varies the output voltage so the trip point of K7, K8 may be set. The secondary voltage is then applied to the input of on Opto-Isolator U1, U2 which drives a light emmitting diode, opitically coupled to a darlington amplifier. In order to not have the beacon alarms flashing as the beacon flashes ON and OFF, a storage circuit is incorporated in the darlington amplifier composed of C6,C7 and R10,R14. This time delay is equal to 3-4 seconds. Should a beacon lamp burn out, the secondary voltage of the current transformer will drop to one half voltage and if the variable resistor is adjusted properly there is not sufficient current to the light emmitting diode to cause it to operate. This in turn will off the darlington amplifier, causing the voltage to decay across the filter capacitor, causing the alarm relay to close.

OBSTRUCTION LIGHTS

The circuit for the obstruction lights operates theoretically the same as the beacon circuit.

FLASHER BY PASS OPERATE

Relay K5 is activated during the beacon ON period, and relay K6 is activated during the beacon OFF period.

If a flasher fails in the OFF mode, relay K5 will deactivate, turning the beacon lamps on steady which in turn will cause relay K6 to reactivate closing the alarm contacts.

If a flasher fails in the ON mode, relay K6 will deactivate, closing the alarm contacts.

TESTING

After the tower light circuits have been checked for shorted or grounded conductors and all connection have been made secure, apply power to the lighting control unit. Assuming daytime conditions (light level at the photocell above the 58 foot-candles) the tower lights will be turned "OFF" by the photo-control. After power has been applied for 1 to 2 minutes with the tower lights"OFF" turn the tower lights "ON" by covering the photocell window with your hand or some dark object in order to reduce the light level below 35 foot-candles (alternatively disconnect one of the photocell leads from terminals marked photocell "BLK" and "RED".

The"LIGHTS ON" alarm circuit will operate within one to three minutes, thus indicating normal night-time operation.

Now remove the covering from the photocell window turning the lights "OFF". The alarm circuits will now perform their normal functions.

TURN ON ADJUSTMENT

Each unit is factory adjusted to turn the tower lights "ON" at approximatley 30 foot-candles and "OFF" at approximately 58 foot-candles of north sky intensity. If it is determined necessary to adjust this setting a potentometer R6 is provided on the master PCB. If it is desired to have the tower lights come on earlier, turn the control slowly in a counter-clockwise direction. To have the tower lights come on later, turn the control slowly in a clockwise direction. The turn-OFF point will be approximately 28 foot-candles higher than the turn-ON point. A very slight change in the setting of this control will change the turn-ON point several foot-candles.

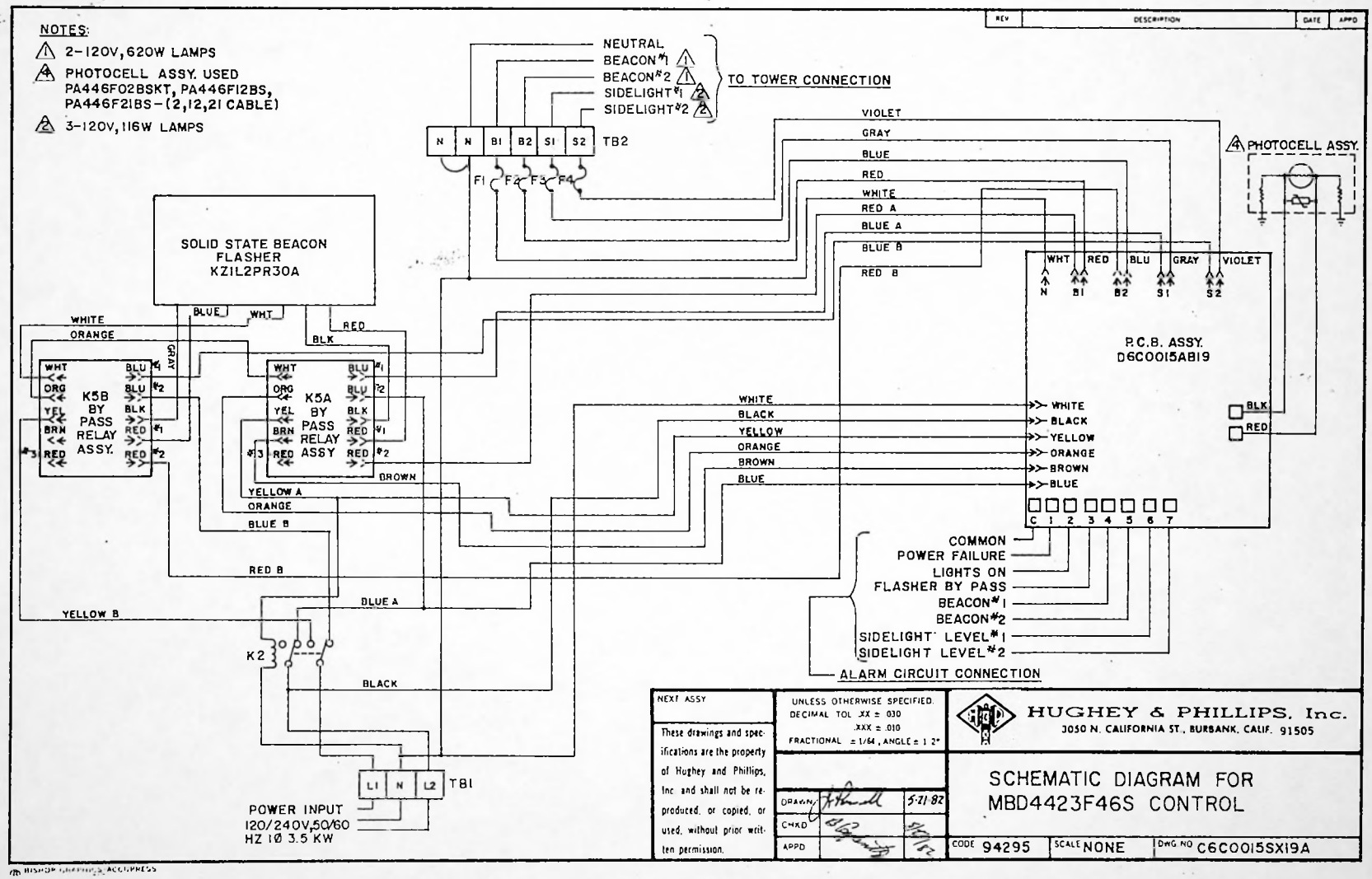
If it is suspected that a failure has occurred in either the photo board or photocell the following test procedure is suggested. Open one of the leads going to the photocell the lights should come ON, then short the terminals (red-black). The light should go out. If operation occurs the problem is in the photocell. If this operation does not occur remove plug in photo board and insert test side of board back in socket. If the insertion in this test position causes the lamps to transfer "OFF" to "ON" the trouble is on the Photo Board. If still inoperative K1 or it's associated circuitry is the problem.

FUSE PROTECTION

Fuses are provided to protect the beacon, and side light circuits from damage due to shorted or grounded conductors, on the tower. The fuses will also prevent an overload on one circuit from extinguishing all of the tower lights.

REPLACEMENT PARTS LIST
MODEL NO. MBD4423F46S
MICROWAVE TOWER LIGHTING CONTROL UNIT

ITEM NO.	PART NO.	DESCRIPTION
K5A,K5B	A6C0015AG	K5 RELAY PCB ASSEMBLY
SSBF	KZ1L2PR30A	SOLID STATE BEACON FLASHER 120V
K2	KA121AV3022E	RELAY DPDT 25A 120V
F3,F4	FUFNM50G251	FUSE, 5A 250V
F1-F2	FUKTK150601	FUSE, 15A 600V
PCB	B6P0004A	PHOTOCELL PLUG IN BOARD ASSEMBLY
PCBMB	D6C0015AB19	P.C.B. MOTHER BOARD ASSEMBLY
CDS	PA446F	PHOTOCELL W/FACE PLATE


NOTES:
1 2-120V, 620W LAMPS
4 PHOTOCELL ASSY. USED PA446F02BSKT, PA446F12BS, PA446F21BS-(2,12,21 CABLE)
2 3-120V, 116W LAMPS
REV
DESCRIPTION
DATE
APPD
NEUTRAL
BEACON #1
BEACON #2
SIDELIGHT #1
SIDELIGHT #2
TO TOWER CONNECTION
N N B1 B2 S1 S2 TB2
F1 F2 F3 F4
VIOLET
GRAY
BLUE
RED
WHITE
RED A
BLUE A
BLUE B
RED B
4 PHOTOCELL ASSY.
SOLID STATE BEACON FLASHER KZIL2PR30A
WHT RED BLU GRAY VIOLET
N B1 B2 S1 S2
R.C.B. ASSY. D6C0015AB19
WHITE
ORANGE
BLUE
WHT
RED
BLK
GRAY
K5B BY PASS RELAY ASSY.
K5A BY PASS RELAY ASSY
WHT ORG YEL BRN RED
BLU BLU BLK RED RED
#1 #2 #3
BROWN
YELLOW A
ORANGE
BLUE B
RED B
YELLOW B
BLUE A
K2
BLACK
WHITE
BLACK
YELLOW
ORANGE
BROWN
BLUE
BLK
RED
C 1 2 3 4 5 6 7
COMMON
POWER FAILURE
LIGHTS ON
FLASHER BY PASS
BEACON #1
BEACON #2
SIDELIGHT LEVEL #1
SIDELIGHT LEVEL #2
ALARM CIRCUIT CONNECTION
L1 N L2 TB1
POWER INPUT
120/240V,50/60
HZ 1Ø 3.5 KW
NEXT ASSY
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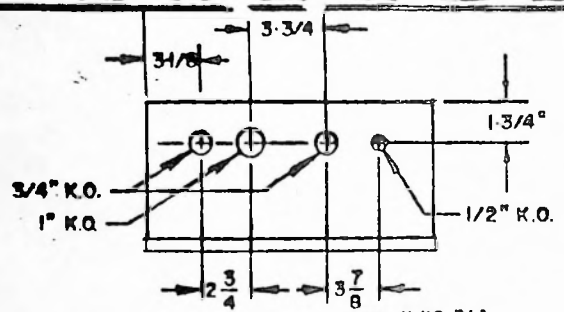
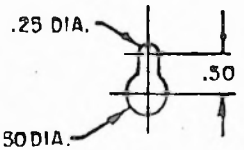
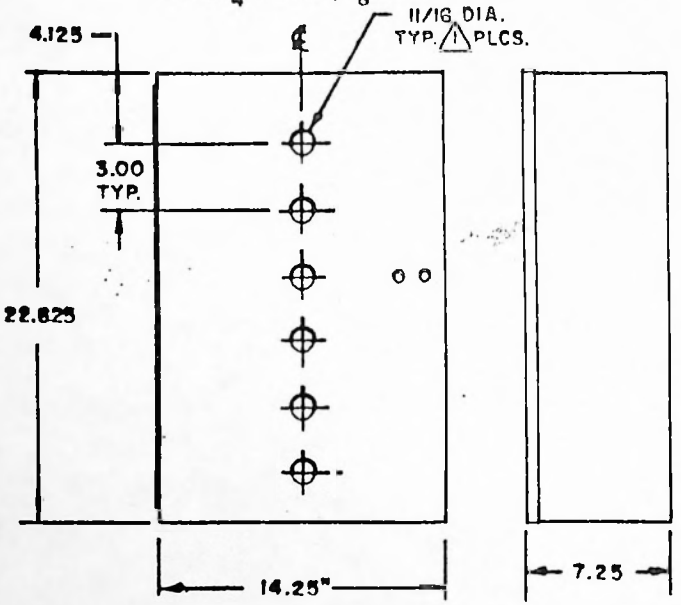
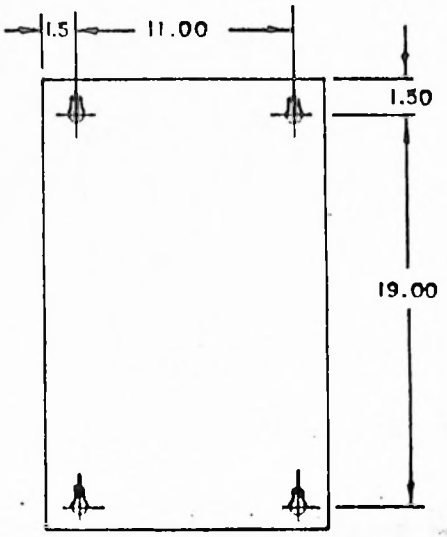
UNLESS OTHERWISE SPECIFIED.
DECIMAL TOL .XX ± 030
.XXX ± 010
FRACTIONAL ± 1/64, ANGLE ± 1 2°
DRAWN
CHKD
APPD
5-21-82
HUGHEY & PHILLIPS, Inc.
3050 N. CALIFORNIA ST., BURBANK, CALIF. 91505
SCHEMATIC DIAGRAM FOR MBD4423F46S CONTROL
CODE 94295
SCALE NONE
DWG NO C6C0015SX19A

REV	DESCRIPTION	DATE	APPD



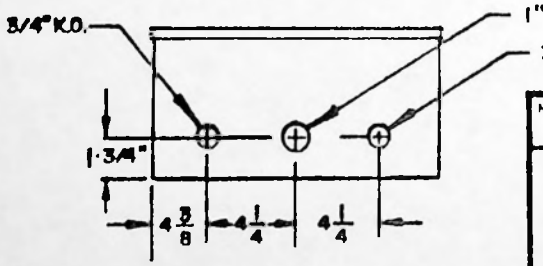






⚠

HSI41807CS – NO IND. LAMPS
HSI41807CSL1 – 1 IND. LAMP
HSI41807CSL2 – 2 IND. LAMP
HSI41807CSL3 – 3 IND. LAMP
HSI41807CSL4 – 4 IND. LAMP
HSI41807CSL5 – 5 IND. LAMP
HSI41807CSL6 – 6 IND. LAMP



MATERIAL : 14 GA. CRS P/N ASA48120AS
FINISH: GRAY CRINKLE PAINT

NEXT ASSY

UNLESS OTHERWISE SPECIFIED:
DECIMAL TOL .XX ± .030
.XXX ± .010
FRACTIONAL ± 1/64, ANGLE ± 1/2°

DRAWN	R.D.T.	OCT.
CHKD		25
APPD		1976

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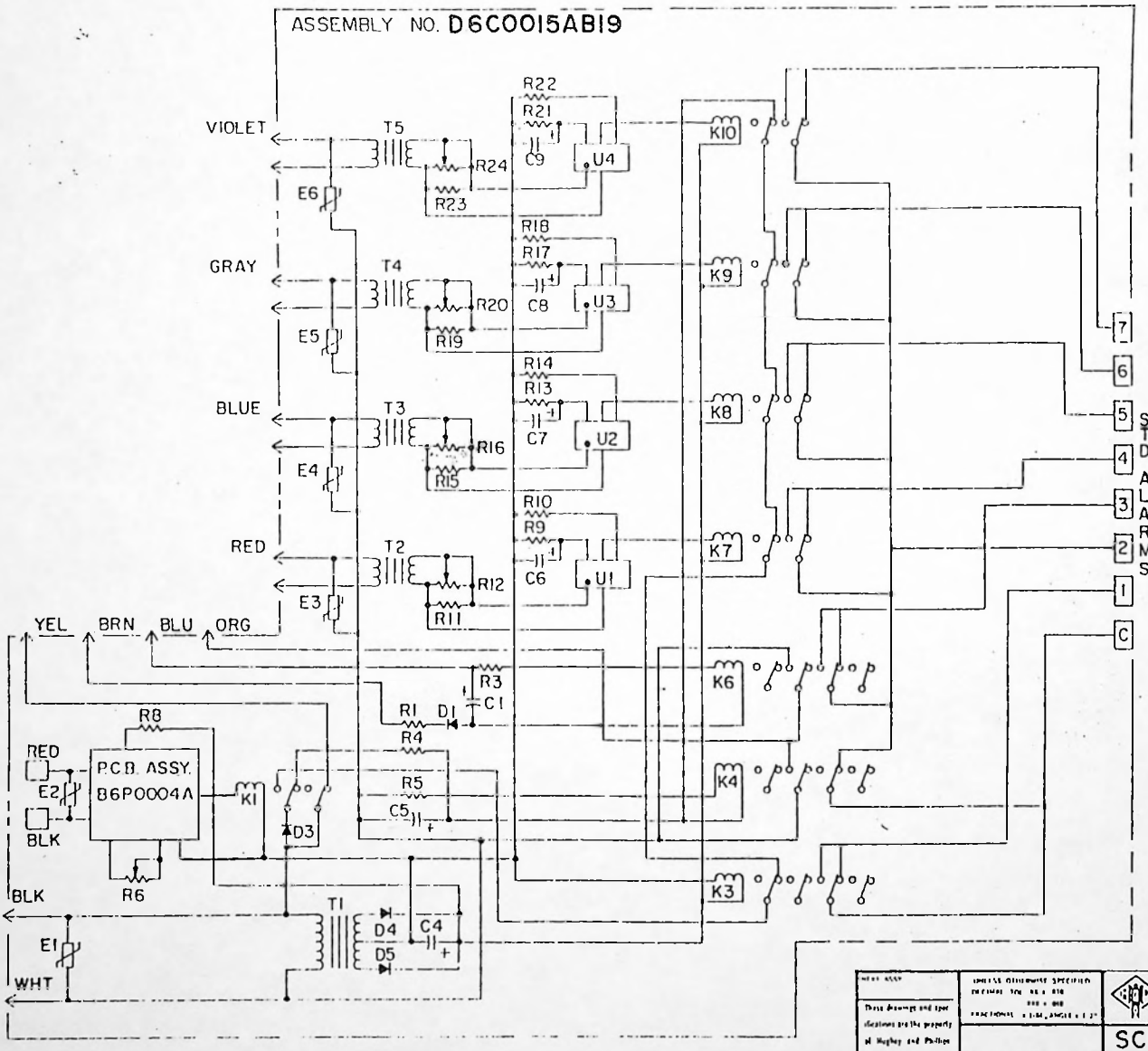
3050 N. CALIFORNIA ST., BURBANK, CALIF. 91505

INDOOR HOUSING HSI41807CS

CODE 94295 | SCALE ——— | DWG NO HSI41807CS

ASSEMBLY NO. D6C0015AB19



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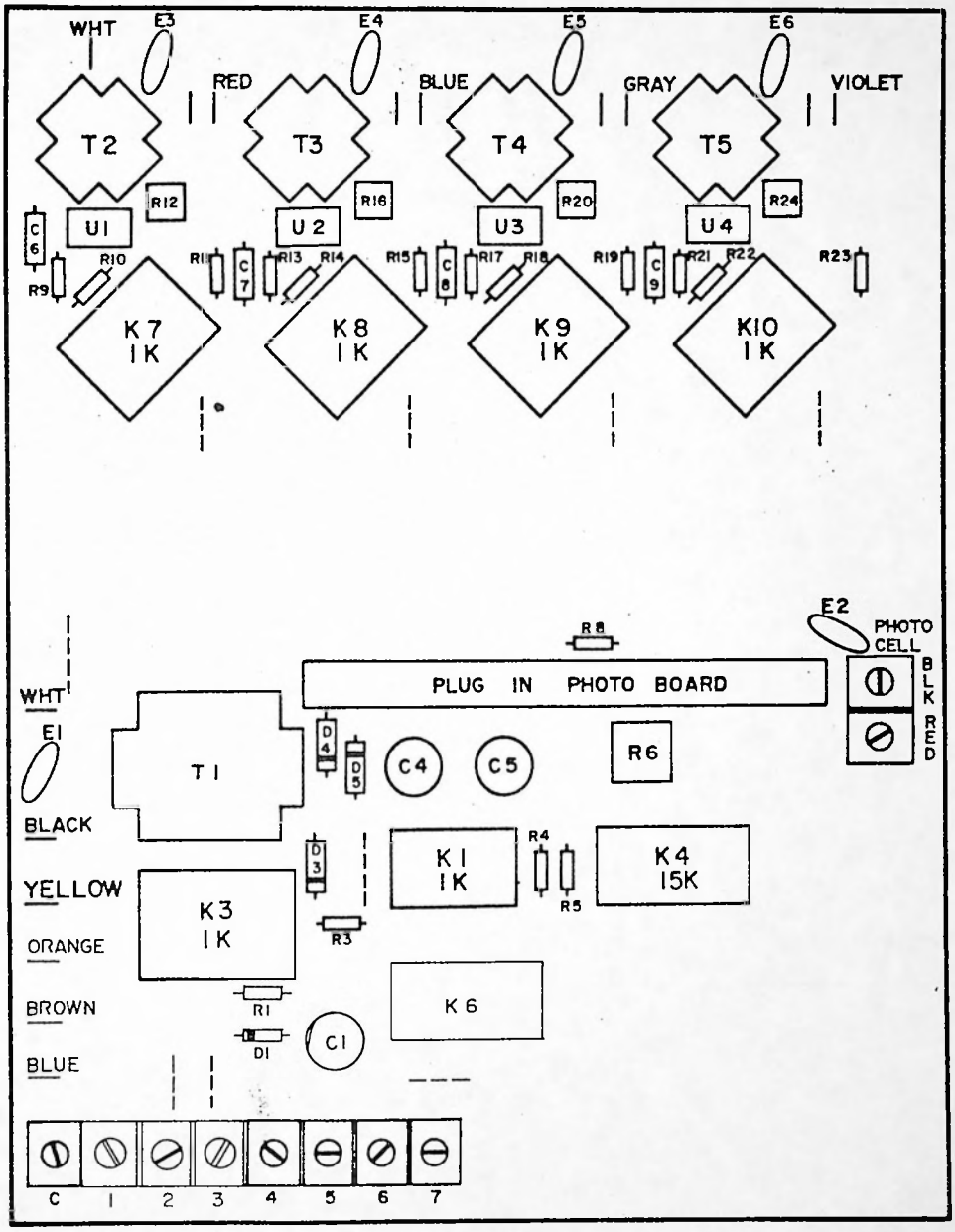
SCHEMATIC MOTHER BRD.

ASSY. 120VAC

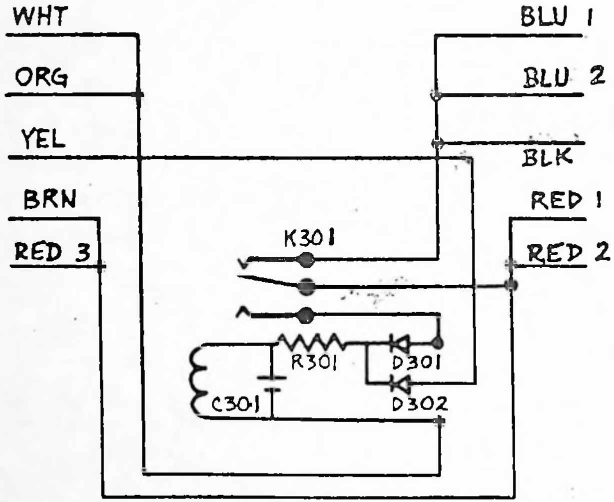
94295 A6C0015SX19



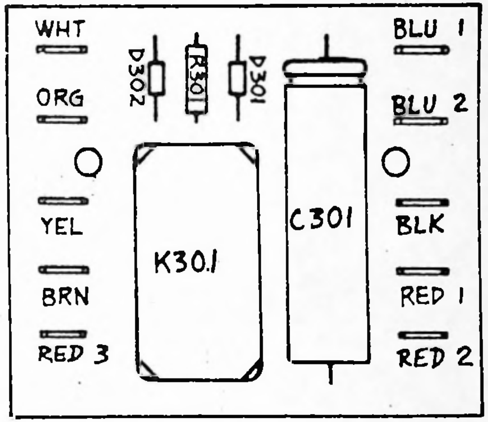
STD ALARMS

NEXT ASSY	UNLESS OTHERWISE SPECIFIED DECIMAL TOL .XX ± .030 .XXX ± .010 FRACTIONAL ± 1/64, ANGLE ± 1/2°	HUGHEY & PHILLIPS, Inc. 3050 N. CALIFORNIA ST., BURBANK, CALIF. 91505	
These drawings and specifications are the property of Hughey and Phillips, Inc. and shall not be reproduced, or copied, or used, without prior written permission	DRAWN [illegible] 10-21-81	PARTS LAYOUT FOR MOTHER BOARD	
	CHKD		
	APPD		
		CODE 94295 SCALE NONE	DWG. NO B6C0015AB09

[redacted]	[redacted]	[redacted]	[redacted]
A	ADDED EXTRA BLU & RED TIE POINTS	3/82	



SCHEMATIC



REPLACEMENT PARTS

	ITEM NO.	PART NO.	DESCRIPTION	QTY.
PBC		A6C0015AE	P.C. BOARD	1
C301		CE506A151E18	CAP. ELEC., 50 MFD, 150 VDC	1
R301		RC20GA71CJ	RESISTOR, 470Ω, 1/2 W, 5%	1
D302 D301		DRS01IN4007	DIODE - 1N4007	2
K301		KA110DV2012J	RELAY, 110 VDC, SPDT., 20A	1

NEXT ASSY

UNLESS OTHERWISE SPECIFIED
DECIMAL TOL .XX ± .030
.XXX ± .010
FRACTIONAL ± 1/64, ANGLE ± 1/2°

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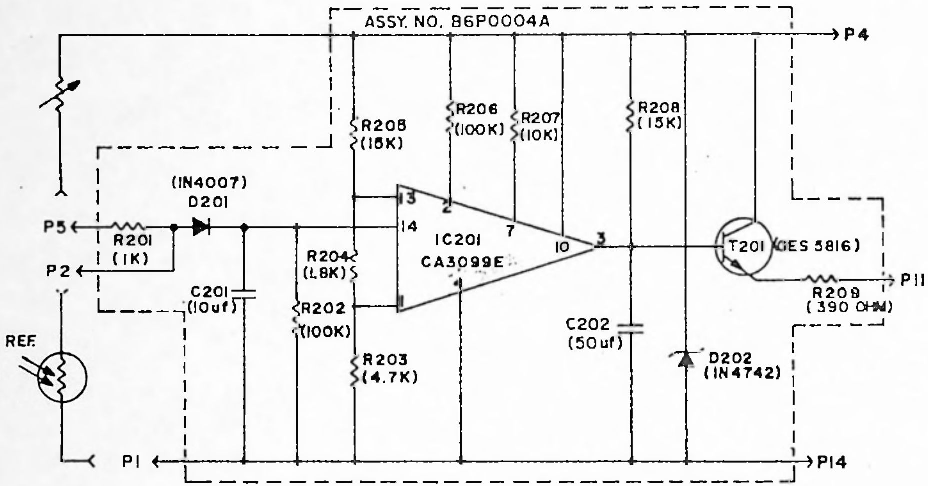
SCHEMATIC & PARTS LAYOUT & PARTS LIST FOR K5 RELAY MODULE, 120 VAC

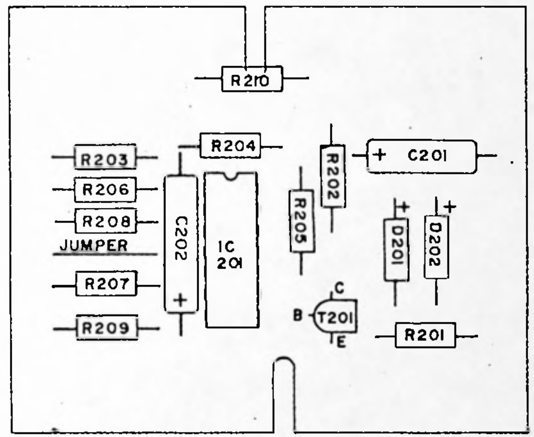
DRAWN	Victor Pichman	12/5/79
CHKD		12/79
APPD	N Kuscha	11/4/80

CODE 94295 | SCALE | DWG. NO A6C0015SX03

REV	DESCRIPTION	DATE	APPD
D	REVISED & REDESIGNED P C BOARD ADDED SCHEMTIC FOR REV. A-C SEE OBSOLETE DWG. SAME NUMBER	5/21/81	WMC
E	ADDED C202 50uf. 25VDC CAPACITOR CHANGED R208 FROM 1.2K TO 15K	8/4/81	WMC



SCHEMATIC DIAGRAM



PARTS LAYOUT

ITEM	PART NUMBER	DESCRIPTION
C202	CE506A250C08	CAPACITOR ELECT. 50MFD 25VDC
PBC	A6A0404A	PRINTED CIRCUIT BOARD (REV. A)
T201	XTGE5816	TRANSISTOR GES5816
R210	RC07G122BJ	RESISTOR COMP. 1.2K 1/4W 5%
R209	RC07G391BJ	RESISTOR COMP 390 OHM 1/4W 5%
R208	RC07G153BJ	RESISTOR COMP 15K 1/4W 5%
R207	RC07G103BJ	RESISTOR COMP 10K 1/4W 5%
R206	RC07G104BJ	RESISTOR COMP 100K 1/4W 5%
R205	RC07G153BJ	RESISTOR COMP 15K 1/4W 5%
R204	RC07G182BJ	RESISTOR COMP 1.8K 1/4W 5%
R203	RC07G472BJ	RESISTOR COMP 4.7K 1/4W 5%
R202	RC07G104BJ	RESISTOR COMP 100K 1/4W 5%
R201	RC07G102BJ	RESISTOR COMP 1K 1/4W 5%
IC201	XZCA3099E	INT. CIRC. CA3099E
D202	DZS01IN4742A	ZENER DIODE 12V 10% IN4742A
D201	DRS01IN4007	DIODE SILICON IN4007
C201	CE106A350B05	CAPACITOR ELECT. 10MFD. 35VDC

NEXT ASSY

UNLESS OTHERWISE SPECIFIED
DECIMAL TOL .XX ± .030
.XXX ± .010
FRACTIONAL ± 1/64, ANGLE ± 1/2°

DRAWN	[illegible]	5/21/81
CHKD	[illegible]	5/21/81
APPD	[illegible]	[illegible]

HUGHEY & PHILLIPS, Inc.
3050 N. CALIFORNIA ST., BURBANK, CALIF. 91505

PHOTO CONTROL PLUG-IN ASSY. FOR MICROWAVE LIGHTING CONTROL (MBC TYPE)

CODE 94295 | SCALE NONE | DWG NO B6P0004A