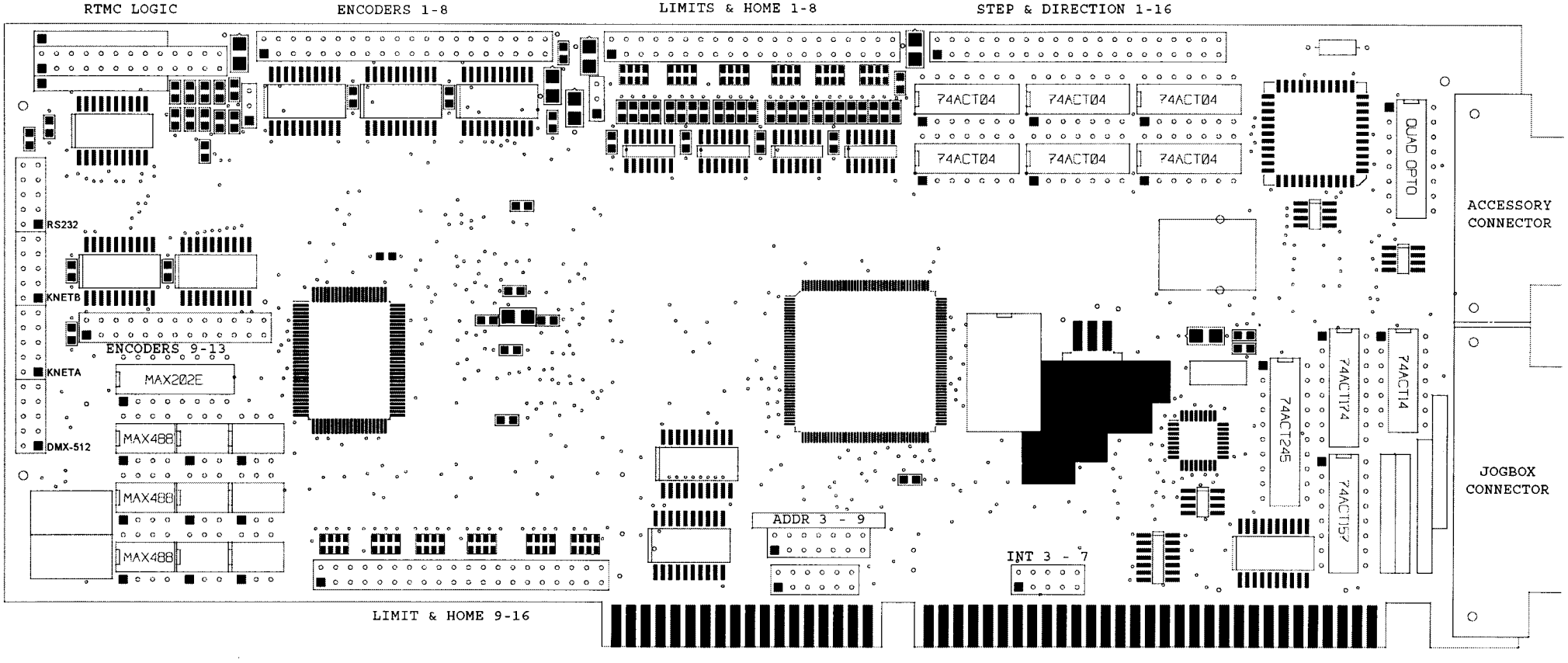

RTMC LOGIC
ENCODERS 1-8
LIMITS & HOME 1-8
STEP & DIRECTION 1-16
74ACT04
74ACT04
74ACT04
74ACT04
74ACT04
74ACT04
QUAD OPTO
ACCESSORY CONNECTOR
RS232
KNETB
ENCODERS 9-13
KNETA
MAX202E
DMX-512
MAX488
MAX488
MAX488
74ACT174
74ACT14
74ACT245
74ACT157
JOGBOX CONNECTOR
ADDR 3 - 9
INT 3 - 7
LIMIT & HOME 9-16

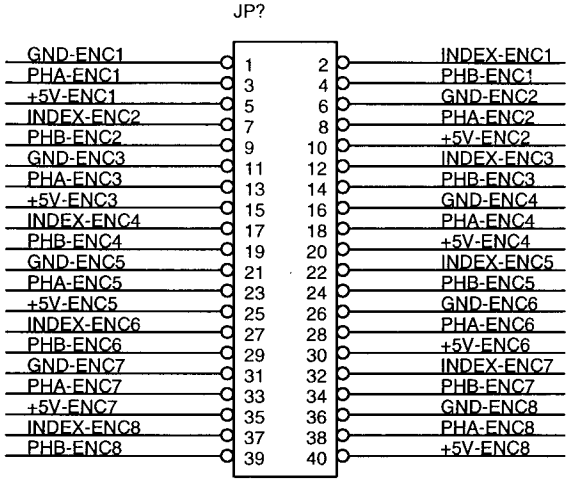
THE VERTICAL THREE PIN JUMPER JUST BELOW PIN ONE OF THE ENCODER 1-8 CONNECTOR SELECTS THE SOURCE OF THE POWER SUPPLIED TO THE "+5V-ENCx" PINS FOR BOTH ENCODER HEADERS.

IF THE CENTER AND BOTTOM PINS ARE JUMPERED, THE "+5V-ENCx" PINS ARE CONNECTED TO THE COMPUTER'S +5 VOLT POWER SUPPLY.

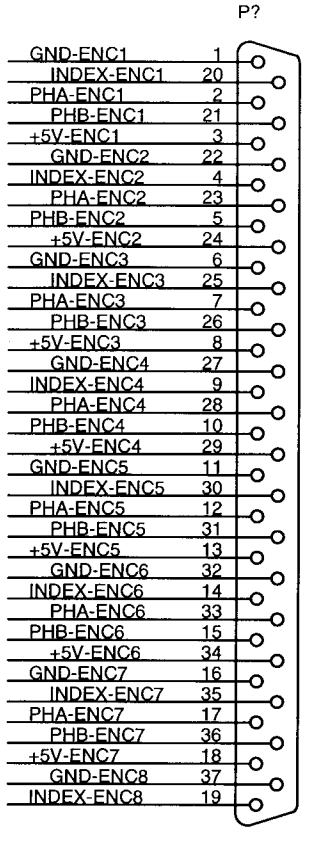
IF NO PINS ARE JUMPERED, NO POWER IS SUPPLIED TO THE "+5V-ENCx" PINS.

AN EXTERNAL ENCODER POWER SUPPLY SHOULD BE USED IF MORE THAN 400 MILLIAMPERES TOTAL IS REQUIRED, OR TO MINIMIZE PROBLEMS WITH NOISE PIPED IN FROM EXTERNAL SOURCES. APPLY THE EXTERNAL GROUND TO THE TOP PIN, AND THE EXTERNAL +5 VOLTS TO THE MIDDLE PIN.

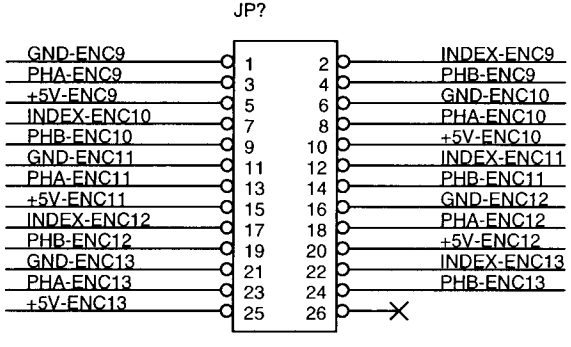
INDEX CONNECTIONS ARE OPTIONAL.



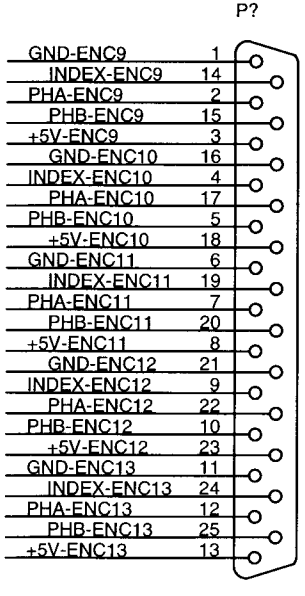
ENCODERS 1-8 HEADER ON CIRCUIT CARD



ENCODERS 1-8 WHEN BROUGHT OUT VIA A RIBBON CABLE TO AN EXTERNAL DB37 CONNECTOR, PIN 1 TO TO PIN1.
NOTE THAT ENCODER 8 IS NOT AVAILABLE WHEN USING A DB37 CONNECTOR



ENCODERS 9-13 HEADER ON CIRCUIT CARD



ENCODERS 9-13 WHEN BROUGHT OUT VIA A RIBBON CABLE TO A DB25 CONNECTOR.

Title	PRELIMINARY KUPER2001-I ENCODER PINOUTS	
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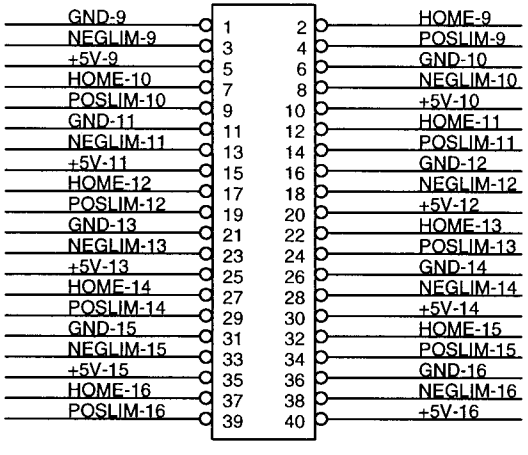
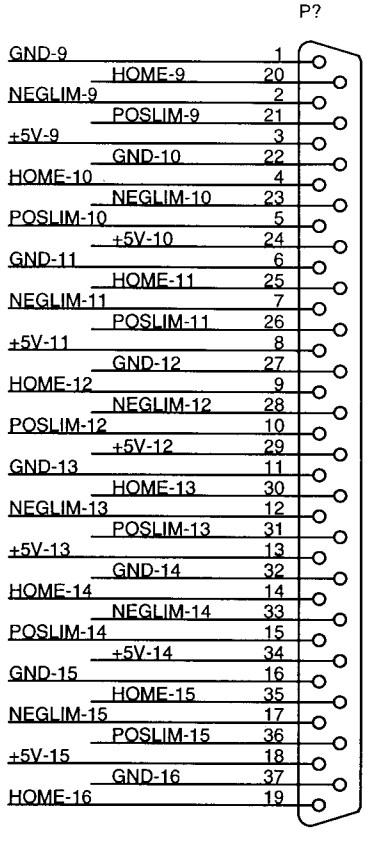
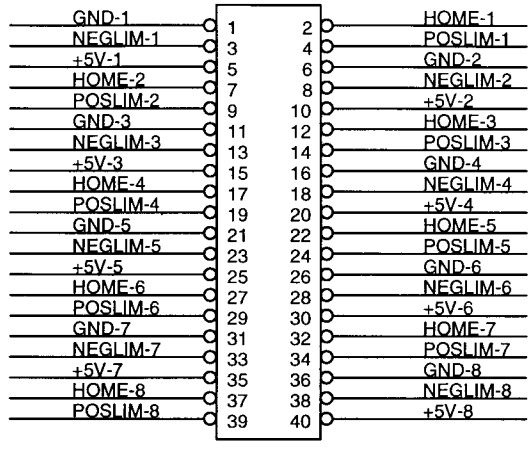


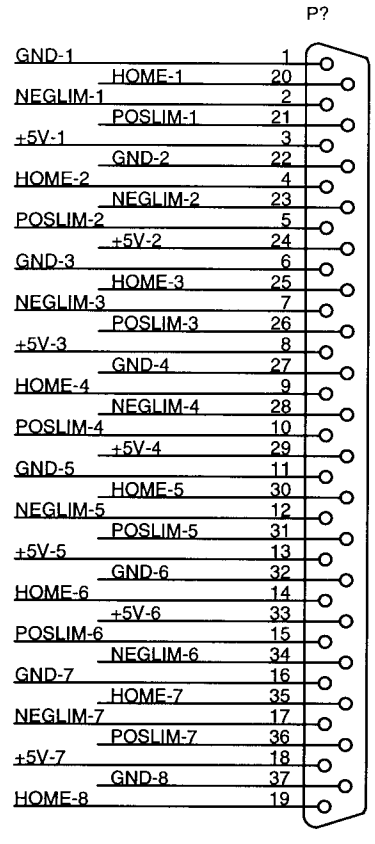
LIMITS & HOME HEADER FOR AXES 9-16



LIMIT & HOME SENSORS FOR AXES 9-16 WHEN BROUGHT OUT VIA A RIBBON CABLE TO A DB37 CONNECTOR. NOTE THAT ONLY GROUND AND HOME ARE AVAILABLE FOR AXIS 16



LIMITS & HOME HEADER FOR AXES 1-8



LIMIT & HOME SENSORS FOR AXES 1-8 WHEN BROUGHT OUT VIA A RIBBON CABLE TO A DB37 CONNECTOR. NOTE THAT ONLY GROUND AND HOME ARE AVAILABLE FOR AXIS 8

Title: PRELIMINARY PINOUTS FOR KUPER2001-I LIMIT AND HOME CONNECTORS		
Size: A	Document Number: sDF98.234-89/9204R-bAH	Rev: 1
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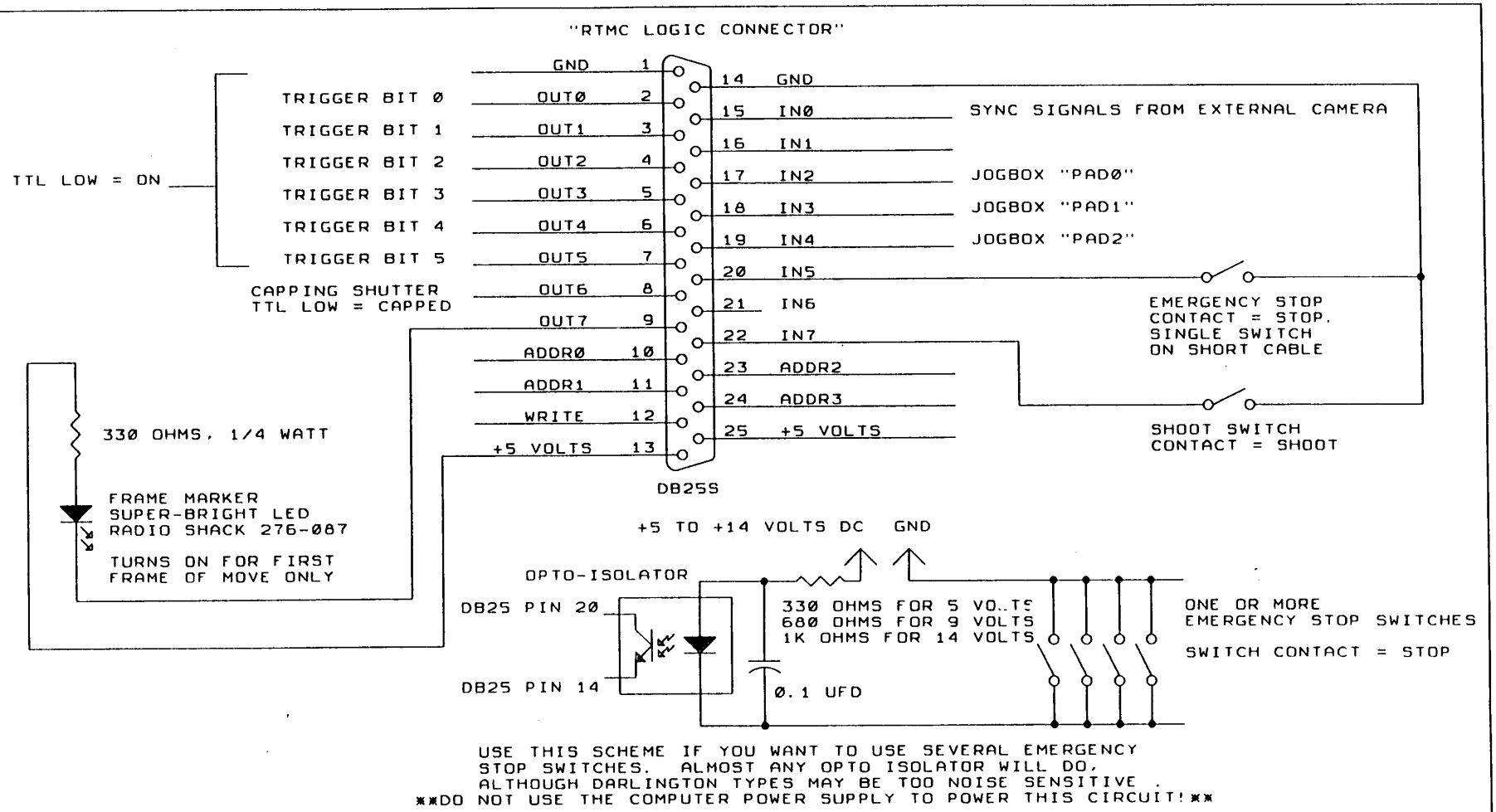

THIS IS THE "RTMC LOGIC CONNECTOR"

THE DB25S CONNECTOR IS CONNECTED RTMC16 CARD "H1"
VIA A 25 WIRE FLAT CABLE. PIN 26 OF H1 IS IGNORED.
PIN 1 OF H1 (THE PIN NEAREST THE "H1" LEGEND ON THE BOARD)
IS CONNECTED TO PIN 1 OF THE DB25S CONNECTOR.

THE CAMERA HOME AND EMERGENCY STOP CIRCUITS ARE NOT REQUIRED

ALL SIGNALS ARE TTL LEVEL. BE CAREFUL NOT TO LET THESE SIGNALS
COME IN CONTACT WITH EXTERNAL VOLTAGES OR METALLIC OBJECTS .

AS SHOWN, THE EMERGENCY SWITCH CIRCUIT IS INTENDED FOR USE
WITH A SINGLE SWITCH ON A SHORT CABLE.

FOR COMPLEX EMERGENCY STOP CIRCUITS, USE AN OPTO-ISOLATOR TO
PROTECT THE COMPUTER FROM DANGEROUS EXTERNAL VOLTAGES AND
ELECTRICAL NOISE.

ALL THE ACCESSORIES SHOWN ARE OPTIONAL,
ALTHOUGH THE SHOOT SWITCH IS ESSENTIAL
FOR ANIMATION.

KUPER CONTROLS
505-263-5949 FAX 505-298-3272

Title
SIMPLE ACCESSORY SCHEME

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"LTC TIMECODE IN +" AND "LTC TIMECODE IN -" ARE CAPACITOR ISOLATED FROM THE COMPUTER GROUND. FOR BEST NOISE IMMUNITY, DO NOT CONNECT EITHER OF THESE SIGNALS TO THE COMPUTER OR BOARD GROUNDS.

"LTC TIMECODE OUT" IS REFERENCED TO BOARD GROUND.

"VIDEO IN" IS REFERENCED TO BOARD GROUND. EITHER COMPOSITE VIDEO OR SYNC ONLY MAY BE USED, IN EITHER PAL OR NTSC FORMAT.

"VIDEO OUT" IS REFERENCED TO BOARD GROUND. IT IS THE "VIDEO IN" SIGNAL, WITH TEXT INFORMATION INSERTED. THIS SIGNAL IS ONLY PRESENT WHEN A "VIDEO IN" SIGNAL IS BEING RECEIVED.

"FLASH OPTO ISO +" AND "CAP OPTO ISO +" ARE THE COLLECTORS OF OPTO ISOLATED TRANSISTORS, CONNECTED THROUGH 160 OHM RESISTORS. "FLASH/CAP COMMON" IS CONNECTED TO THE EMITTERS. DO NOT CONNECT EITHER OF THESE SIGNALS TO THE COMPUTER OR BOARD GROUNDS.

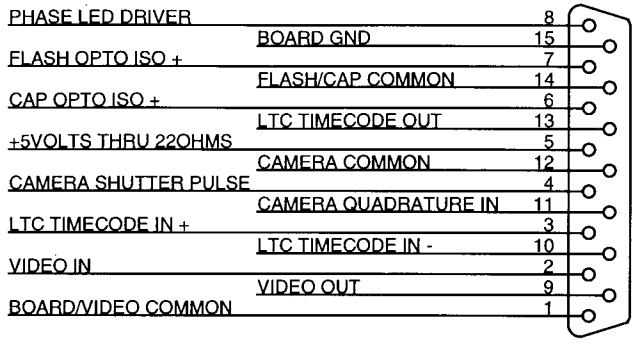
"CAMERA SHUTTER PULSE" MAY BE ANY ONCE-PER-FRAME, LOGIC SIGNAL, FROM APPROXIMATELY 5 TO 24 VOLTS.

"CAMERA QUADRATURE IN" IS EITHER THE A OR B PHASE FROM AN ENCODER ATTACHED TO THE CAMERA MOTOR. SIGNAL HIGH SHOULD BE BETWEEN 5 AND 24 VOLTS. THE COMMON IS SHARED BETWEEN "CAMERA SHUTTER PULSE" AND "CAMERA QUADRATURE IN." BOTH SIGNALS ARE OPTICALLY ISOLATED AND NO CONNECTION SHOULD BE MADE TO BOARD OR COMPUTER GROUND.

THE "CAMERA QUADRATURE IN" CONNECTION IS OPTIONAL WHEN SYNCING TO EXTERNAL CAMERAS. ITS USE ENHANCES THE ABILITY OF THE MOTION CONTROL TO TRACK RAPIDLY SLEWING CAMERAS.

"PHASE LED DRIVER" PROVIDES A CONVENIENT PHASING SIGNAL FOR CALIBRATING THE PHASE RELATIONSHIP BETWEEN AN EXTERNAL CAMERA AND THE MOTION CONTROL. CONNECT THIS SIGNAL DIRECTLY TO THE POSITIVE SIDE OF AN ULTRA-BRIGHT LED, AND THE NEGATIVE SIDE OF THE LED TO BOARD GROUND. DRIVE IS APPROXIMATELY 20 MILLIAMPERES AT 5 VOLTS. NO RESISTOR IS REQUIRED.

P?



ACCESSORY CONNECTOR

THE FOLLOWING SIGNALS ARE NEW TO THE KUPER2001-I ACCESSORY CONNECTOR. ALTHOUGH THIS SLIGHTLY MODIFIED CONNECTOR SHOULD BE COMPATIBLE WITH MOST ACCESSORY CABLES AND DEVICES BUILT FOR THE OLDER RTMC48 CARD, PLEASE VERIFY THAT THERE ARE NO CONFLICTING SIGNALS PRESENT ON THESE PINS:

PIN 8, PHASE LED DRIVER
PIN 9, VIDEO OUT
PIN 11, CAMERA QUADRATURE IN

PIN 13 IS NOW LTC TIMECODE OUT. ON THE RTMC48 CARD, PIN 13 WAS THE "CAP-" OPTO ISOLATOR OUTPUT. IT IS IMPORTANT THAT ANY WIRE PREVIOUSLY CONNECTED TO PIN 13 BE MOVED TO SHARE PIN 14.

Title: PRELIMINARY KUPER2001-I ACCESSORY CONNECTOR		
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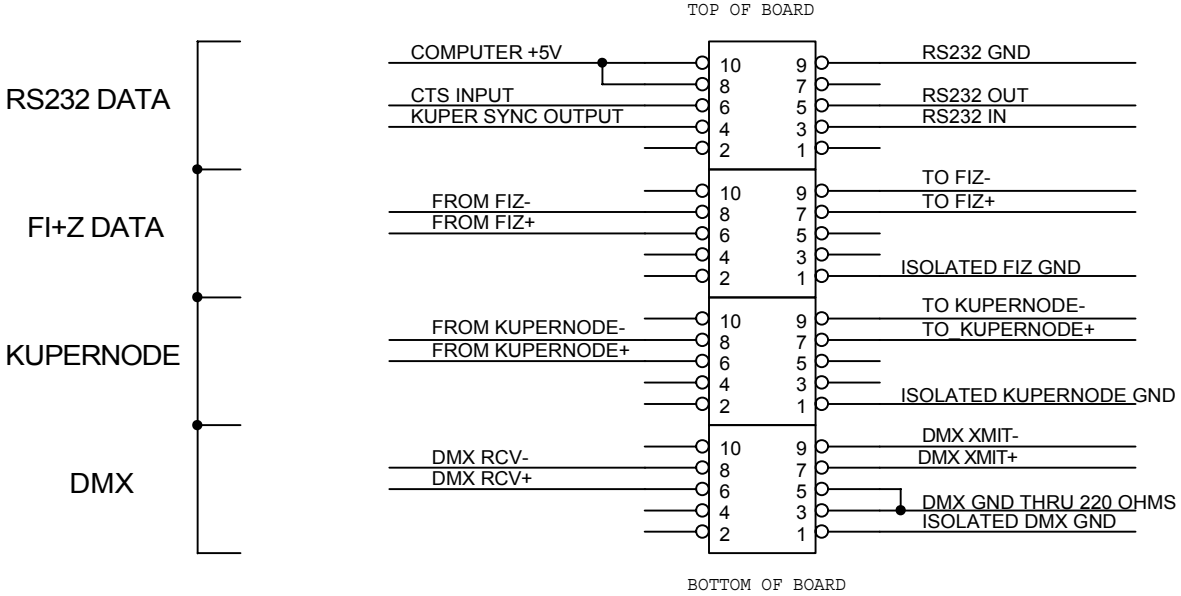
THIS STACK OF FOUR, 10 PIN HEADERS REPRESENTS THE 40 PIN SERIAL CONNECTOR ON THE KUPER2001-I CARD. THIS IS THE ONLY VERTICAL HEADER ON THE CARD. NOTE THAT ALL PIN 1's ARE TOWARDS THE BOTTOM OF THE CARD.

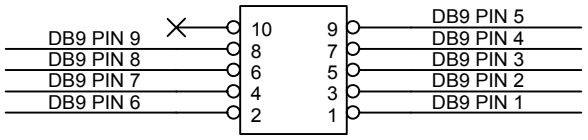


THE 40 PIN SERIAL CONNECTOR CAN BE BROUGHT OUT TO DB9 CONNECTORS VIA A 40 PIN RIBBON CABLE BY SPLITTING THE CABLE INTO FOUR, 10 PIN SECTIONS, AND THEN REMOVING THE TENTH STRAND OF EACH. NORMALLY A MALE DB9 IS USED FOR THE RS232 CHANNEL, AND FEMALE DB9'S FOR ALL THE OTHER CHANNELS.

IMPORTANT...THE DMX GND IS ISOLATED FROM ALL OTHER GROUNDS. DO NOT MAKE ANY CONNECTION BETWEEN DMX GROUND AND ANY OTHER GROUND. THE DMX GROUND CONNECTION SHOULD BE CARRIED AS A WIRE INSIDE THE SHIELDED DMX CABLE. DO NOT CONNECT THE DMX GROUND TO THE CABLE SHIELD.

THE KUPERNODE AND FIZ GROUNDS ARE SHARED, BUT ISOLATED FROM ALL OTHER GROUNDS.

THE RS232 GROUND SHARES THE COMPUTER GROUND.



THIS DRAWING SHOWS HOW THE HEADER PINOUTS RELATE TO DB9 PINOUTS WHEN THE 40 PIN HEADER IS SPLIT AND BROUGHT OUT TO CRIMP-ON DB9 CONNECTORS.

Title: KUPER2001-I SERIAL CONNECTOR		
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