

---

# Cimarron Technologies Corporation

## MODEL C-MARK I/m

### ANI DECODER – COMPUTER INTERFACE

MOTOROLA MDC-1200® COMPATIBLE

#### Instruction Manual

---



*Copyright 2000 – Cimarron Technologies Corporation, Escondido, CA 92029  
All rights in this material are reserved. No part of this document may be reproduced  
in any way without the express written permission of Cimarron Technologies Corporation.*

Cimarron Technologies Corp. is a Licensee of the Motorola MDC-1200® Protocol Technology  
MDC 1200® is a registered Trademark of Motorola Inc.

**Manual Number 05 52 0000**  
**Rev B**

934 South Andreasen Dr. Suite G  
Escondido, CA 92029-1919  
(760) 738-3282 California and U.S. (800-487-7184) FAX (760) 480-0233  
Email: [Service@cimtechcorp.com](mailto:Service@cimtechcorp.com)

**CIMARRON**  
TECHNOLOGIES

---

## WARRANTY

*Cimarron Technologies Corporation warrants this product to be free from defects in material and workmanship for a period of three years from date of shipment. If a malfunction occurs due to defective material or workmanship, the product will be repaired or replaced (Cimarron's discretion) without charge if returned to the factory*

*This warranty does not apply to any failure or damage caused by accident, neglect, unreasonable use, improper installation, or to alterations or modifications to the unit. Nor does the warranty extend to damage incurred by force majeure (natural causes) such as lightning, fire, floods, or other such catastrophes, nor to damage caused by environmental extremes, power surges and/or transients*

*Cimarron Technologies Corporation makes no other warranty, either expressed or implied, with respect to this product. Cimarron Technologies Corporation specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. Some states or provinces do not allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you.*

*The remedies provided herein are customer's sole and exclusive remedies. In no event shall Cimarron Technologies Corporation be liable for any lost profits, direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.*

## TABLE OF CONTENTS

General .....	Page 3
Description .....	Page 3
Specifications .....	Page 4
Power Up Self Test .....	Page 5
Front Panel .....	Page 5
Typical Radio Interface .....	Page 6
Wiring for Balanced and Single Ended Lines .....	Page 7
Programming Baud Rate .....	Page 8
Programming Example .....	Page 9
Initial Adjustments .....	Page 11
Jumpers – Main PCB .....	Page 12
Encoder Satellite PCB – Jumpers and Switches.....	Page 13
Rear Panel Connections.....	Page 14
RS-232 Output Examples .....	Page 15
Record of Revisions .....	Page 16
Schematics .....	Page 17

## General

---

The C-MARK I/m ANI Decoder, operates in conjunction with mobile and hand-held radio transmitters equipped with MDC 1200<sup>®</sup> compatible remote encoders and encoder/decoders. The C-MARK I/m is intended for computer interface and does not have a display. The unit encodes an Acknowledgement (ACK) to a received Emergency data burst. Routine PTT data bursts are not ACKed.

The unit is used in dispatch centers of public safety, business, industry, transportation, utilities, and other facilities to digitally identify the source of each radio transmission.

## Description

---

The C-MARK I/m is compatible with the MDC 1200<sup>®</sup> format. Decoded messages are immediately reformatted to serial ASCII and forwarded to the associated computer. The computer functions as a listener only.

The CMARK I/m will encode an Acknowledgement to an Emergency message. The encoding is automatically initiated by the CMARK I/m. The encoding is not controlled or initiated by the associated computer. The Emergency ACK message is the only data that the CMARK I/m will encode. The encode function may be disabled by jumper selection.

The unit operates with input signals from either a balanced audio line or a single-ended input.

Selection of the desired Baud rate, ASCII data bit length, stop bits, and parity are via internal dual-inline package (DIP) switches.

The output to the computer also includes a radio channel identification character, as programmed within the C-MARK I/m. One of up to sixteen channel identification characters can be selected by the rocker switches.

A relay provides contact for muting the data burst at the dispatch point during data message reception.

## Specifications

---

<b>Data Format Modulation Type Rate</b>	MDC 1200® FSK (Frequency Shift Key) 1200 bps
<b>Data Input</b>	*Single ended – High Z, 100 mV to 5 V P-P Balanced – 600 Ohm, -10dBm to 0dBm * = factory default
<b>Display</b>	None.
<b>Indicators</b> Red Red Green Yellow	Front Panel LEDs Power On Mute Active Valid Decode Channel Busy
<b>Decoding</b>	PTT and Emergency.
<b>Encoding</b>	Emergency ACK.
<b>Outputs</b> Printer  Data Mute  External Alarms	Serial Output, RS-232C, ASCII Baud Rate – 1200, 2400, 4800, or 9600 Data Bits - 7 or 8 Parity – Odd, Even, or None Handshake – Xon/Xoff or RTS/CTS Connector - 9-Pin Male, D Subminiature  Form C Relay, 1.0A, N.C., N.O., and Ground  EMERGENCY – Open Collector Transistor, sink 500 mA MAN DOWN – n/a STUCK MIC – n/a REQUEST TO TALK – n/a
<b>Dimensions</b>	7.87" x 6.25" x 2.5", (Length x Width x Height)
<b>Weight</b>	3.0 lbs w/wall plug-in power supply (included).
<b>Power Requirements</b> Voltage Current	12 VDC +/- 10% 1A

## Power Up Self Test

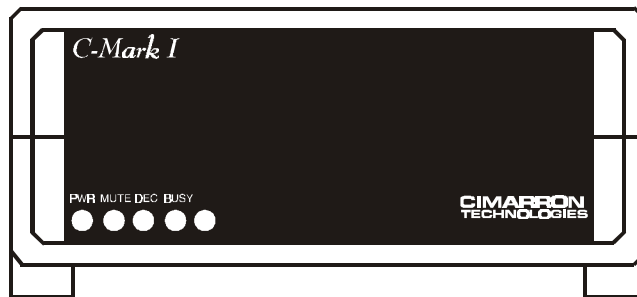
---

A successful power up is indicated by the green PWR led.



## Front Panel

---



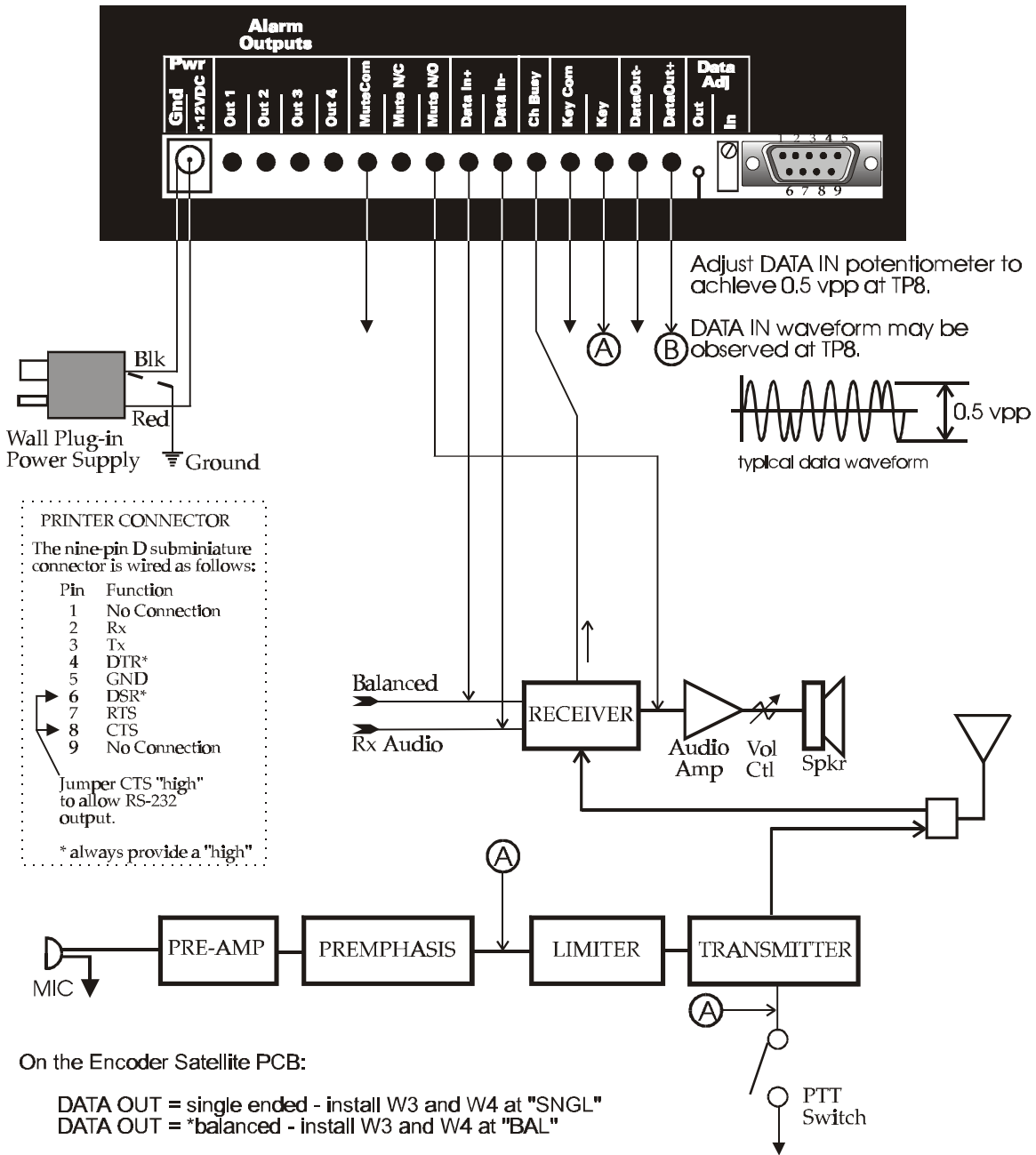
**PWR** - Indicates that 12 VDC is being supplied to the C-MARK I

**MUTE** - When lit, this LED indicates that the C-MARK I has received a valid data burst and that the MUTE relay is active. The MUTE relay will only be active for a short period of time.

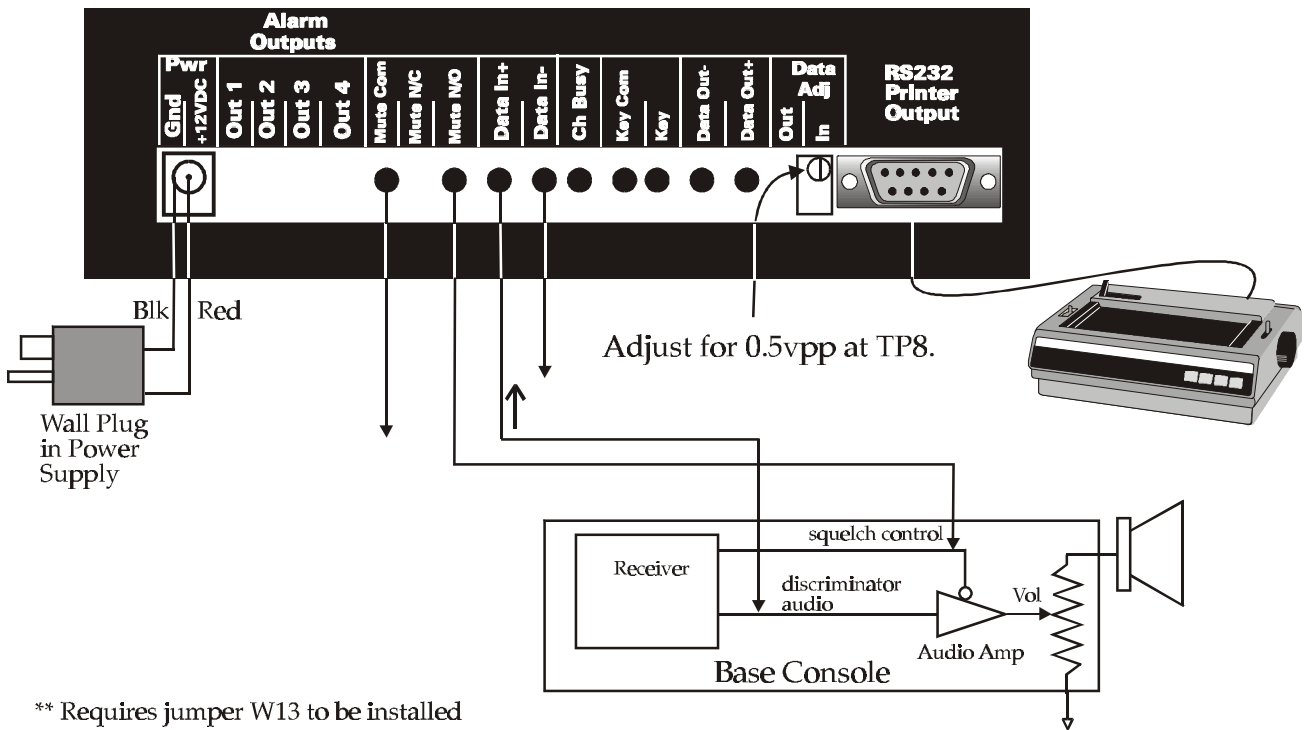
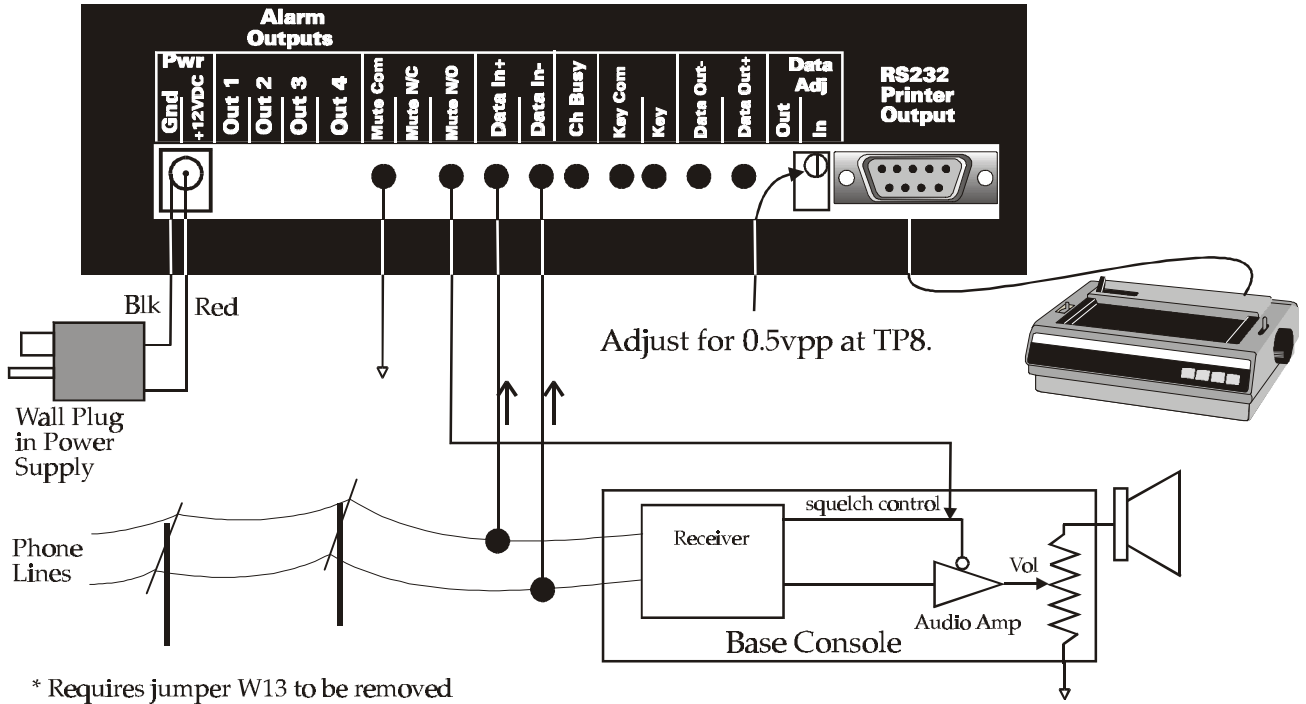
**DEC** - When lit, this LED indicates that the C-MARK I has successfully decoded a data burst.

**BUSY** - When lit, this LED indicates that the radio channel is in use. The C-MARK I will wait for the channel to clear before encoding the EMER ACK.

# Typical Radio Interface



## Wiring for Typical Installations, Balanced and Single Ended Lines




## Programming Baud Rate

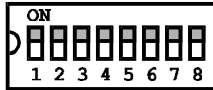
Programming the baud rate for the C-MARK I is accomplished via on-board miniature DIP switches. This procedure is only necessary if the "as shipped" set-up is not correct for a specific customer's requirement.

*If "Setup" is entered, all functions ("bytes") associated with switches 2, 3, and 4 of S2 must be configured and entered.*


S2



S1

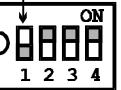


**DEC KEY**




With the top cover removed, locate miniature DIP Switches S1 and S2. If the set-up is to be changed, position all switch positions on S2 to the "ON" position (switches should have been in this position when received).


S2



S1



**DEC KEY**

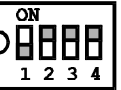


To enter the "Set-Up" mode, move Position 1 to "OFF", the DECODE LED should illuminate, indicating that the unit is in the "Set-Up" mode. Leave this Position "OFF" until the Set-Up procedure is complete.


BAUD, DATA BITS, STOP BITS, PARITY, ANI ID OUT, OUTPUT PROTOCOL - Enter with S2, Position 2

In the following discussion an asterisk (\*), indicates the Standard "As Shipped" configuration. Set **Switch S1** positions to the desired functions, as follows:


S2



S1



**DEC KEY**



S1-1 = Output Protocol (hand shaking)

"ON" = XON/XOFF\*

"OFF" = RTS/CTS

S1-2 = ANI ID to OUTPUT? (is PTT printed?)

"ON" = No

"OFF" = Yes\*

S1-3,4 = Parity

3      4  
"ON ON" = Odd

"OFF ON" = Even\*

"ON OFF" = None

"OFF OFF" = N/A

S1-5 = Stop Bits

"ON" = 1

"OFF" = 2\*

S1-6 = Bits Per Word

"ON" = 7\*

"OFF" = 8

S1-7,8 = Output Baud Rate

"ON ON" = 1200

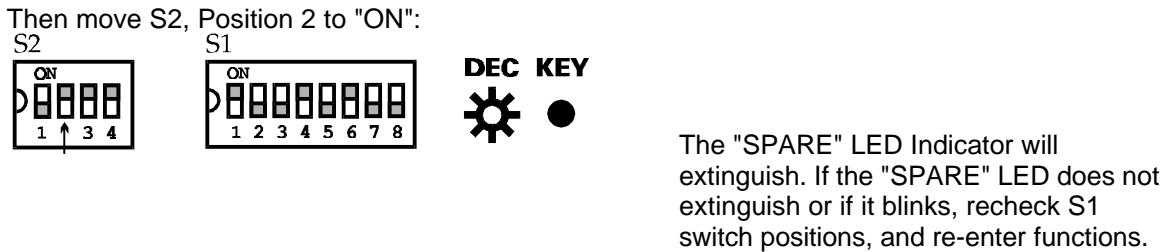
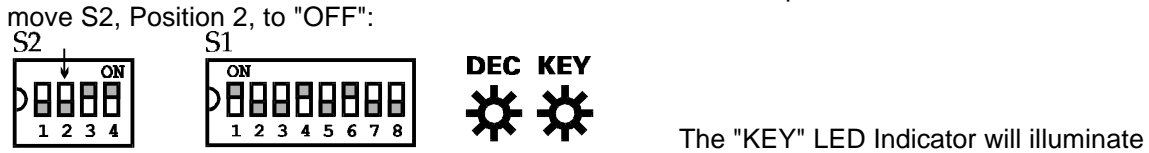
"OFF ON" = 2400

"ON OFF" = 4800

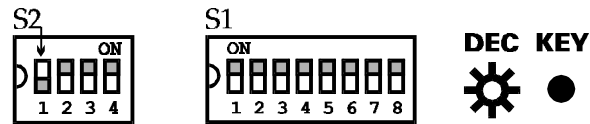
"OFF OFF" = 9600\*

Programming Example:

As an example, the S1 switches below are set for XON/XOFF, ANI ID to OUTPUT "Yes", Even Parity, 2 Stop Bits, 7 Bits Per Word, 9600 Baud:



OUTPUT FORMAT AND RADIO CHANNEL IDENTIFIER CHARACTER - Enter with S2, Position 3  
In the following discussion an asterisk (\*), indicates the Standard "As Shipped" configuration. Set **Switch S1** positions to the desired functions, as follows:



S1, 1-4 = Radio Channel ID character

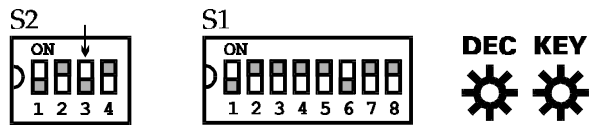
	1	2	3	4	
ON	ON	ON	ON	ON	= 0
OFF	ON	ON	ON	ON	= 1*
ON	OFF	ON	ON	ON	= 2
OFF	OFF	ON	ON	ON	= 3
ON	ON	OFF	ON	ON	= 4
OFF	ON	OFF	ON	ON	= 5
ON	OFF	OFF	ON	ON	= 6
OFF	OFF	OFF	ON	ON	= 7
ON	ON	ON	OFF	ON	= 8
OFF	ON	ON	OFF	ON	= 9
ON	OFF	ON	OFF	ON	= A
OFF	OFF	ON	OFF	ON	= B
ON	ON	OFF	OFF	ON	= C
OFF	ON	OFF	OFF	ON	= D
ON	OFF	OFF	OFF	ON	= E
OFF	OFF	OFF	OFF	ON	= F

S1, 5-6 = Output Format

	5	6	
"ON ON "			= Generic "21 Bit" Format
"OFF ON "			= Cimarron Output Format
"ON OFF "			= BED-31/1207 Output Format*
"OFF OFF "			= NYSP (select STAR fmt "A" below)
S1, 7-8 = Future Use, Leave ON			
	7	8	
	"ON	ON "	

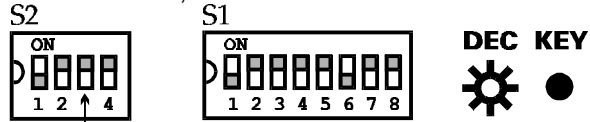
*Note:*  
BED-31/1207 Output Format can accept only ID for Radio Channels of "0" through "7".  
Cimarron and NYSP Output Format can accept "0" through "9" and "A" through "F".  
Radio channel ID selection is meaningless for the Generic 21 Bit Format.

When switch S1 positions are set as desired, move S2, Position 3, to "OFF":



The "SPARE" LED will illuminate.

Then move S2, Position 3 to "ON":

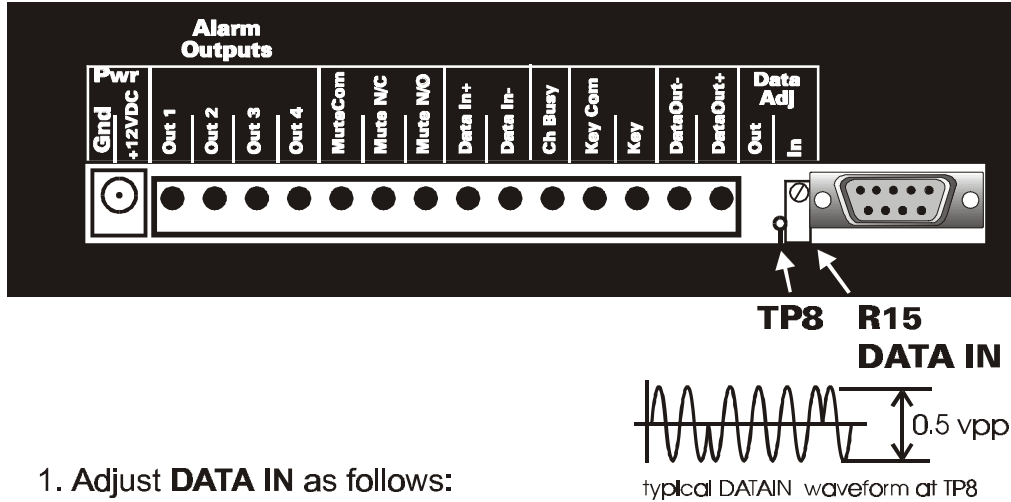


The "SPARE" LED Indicator will extinguish. If the "SPARE" LED does not extinguish or if it blinks, recheck S1 switch positions, and re-enter functions.

To complete programming:

1. Place all S1 switches "ON".
2. Move S2 Position 4 to "OFF" (observe the spare LED illuminate).
3. Move S2 position 4 to "ON".
4. Place S2 switch 1 to "ON".

## Initial Adjustments



1. Adjust **DATA IN** as follows:

With an inbound data burst present, adjust R15 for a 0.5 Vpp signal at TP 8. Make sure the wave is not clipped. Use an oscilloscope for this measurement.

2. Adjust **DATA OUT** on the Encode Satellite board as follows:

Adjust the DATA OUT Potentiometer VR1 so that the Acknowledgement (ACK) data burst deviate the same as voice deviation in your system. Data is only transmitted after the unit receives an EMERGENCY message from a mobile unit. When the EMERGENCY is received, the unit will transmit an ACK burst of data. Although the ACK data burst is quick, it must be adjusted to match voice deviation for maximum reliability. Observe the transmitted data waveform, and insure there is no distortion or clipping.

On the Encoder Satellite PCB:

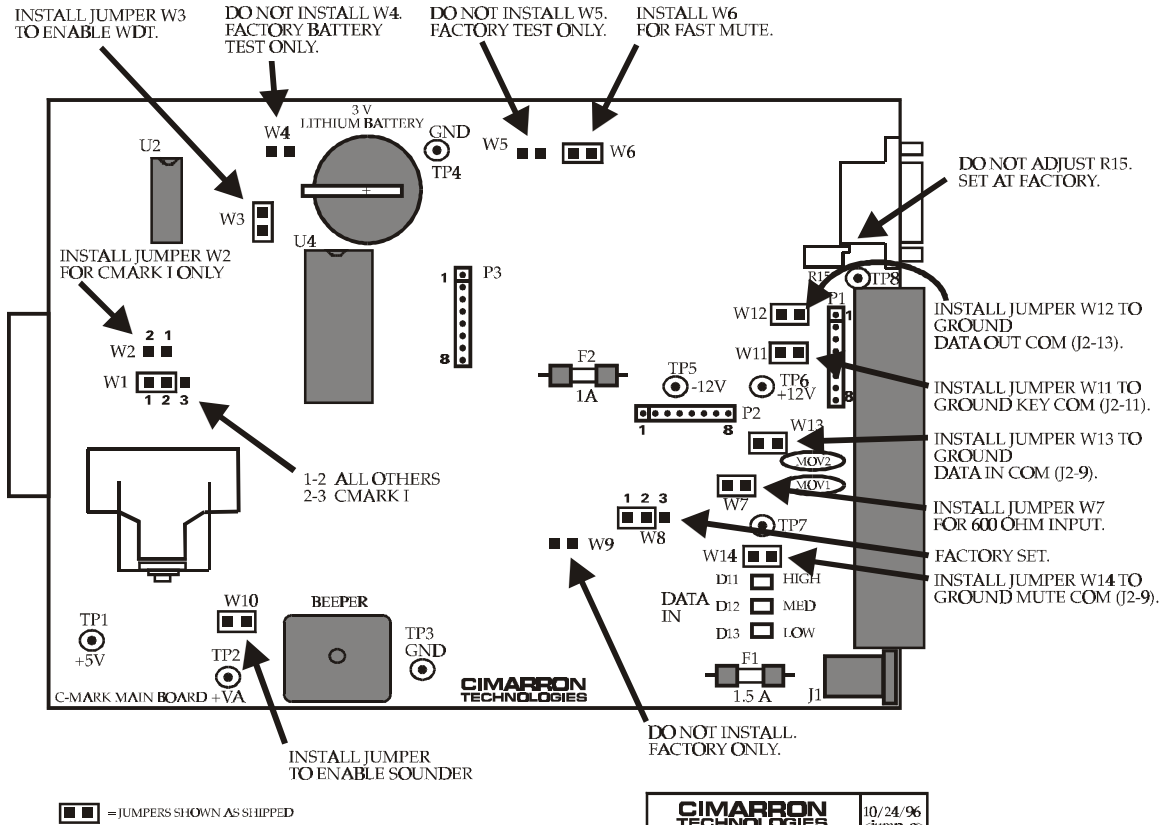
DATA OUT = \*single ended - install W2 1-2 and W3 1-2 and W4 1-2  
 DATA OUT = balanced - install W2 2-3 and W3 2-3 and remove W4

On the Cmark Main PCB:

DATA IN = 100K ohm balanced - remove W7, W13  
 DATA IN = 600 ohm balanced - install W7, remove W13  
 DATA IN = 100K ohm \*single ended - remove W7, install W13

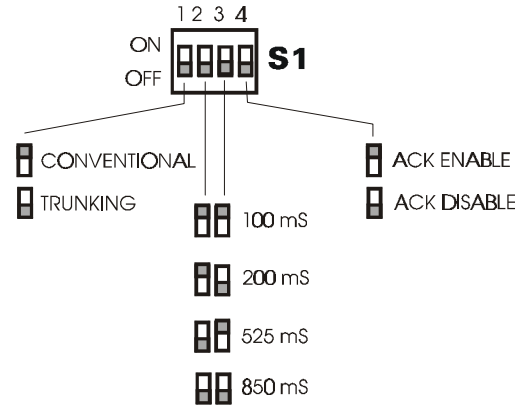
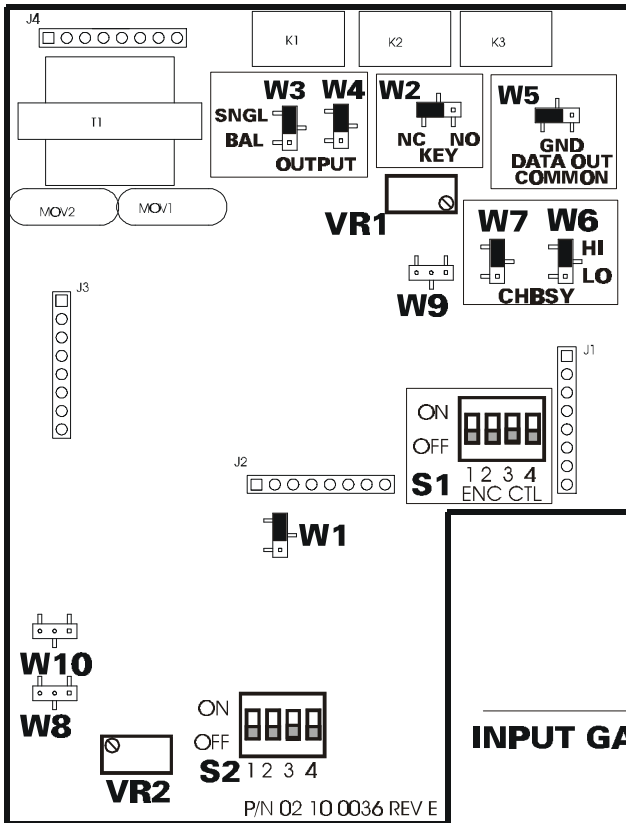
\* = Factory Default, Single Ended for DATA IN and DATA OUT

# Jumpers - Main PCB



<b>CIMARRON TECHNOLOGIES</b>	10/24/96 sjump.g2
JUMPER LOCATIONS REV G BOARD	1 of 1

# Encoder Satellite PCB – Jumpers and Switches



CONVENTIONAL SYSTEMS

SWITCH (1) ON  
SWITCH (2,3) SELECTS ATTACK DELAY TIME

TRUNKING SYSTEMS

SWITCH (1) OFF  
SWITCH (2,3) SELECTS CHANNEL  
ACQUIRED TIME BEFORE TRANSMIT

**INPUT GAIN**



0 dB

12 dB

24 dB

36 dB

- W1 = Factory Set
- W2 = Key Relay function  
Jumper as required for  
Normally Open or  
Normally Closed.
- W3/W4 = Single/Balanced Output  
Jumper as required.
- W5 = Data Out common  
Install jumper to ground  
Data Out Common.
- W6 = Channel Busy Input Line  
Jumper as required for  
Active Low or Active High.
- W7 = Channel Busy ground  
Install jumper if CHBSY is not used.
- W8 = Factory Set
- W9 = output impedance  
remove for 600 ohm
- W10 = Modulation Test  
With power removed, install jumper and re-apply  
power. Unit will transmit 10 seconds of data to allow  
adjustment of TX deviation.

## Rear Panel Connections

---

### BARRIER STRIP CONNECTOR

#### Pwr

Gnd ..... From Wall Plug in Power Source

+12VDC..... From Wall Plug in Power Source

#### Alarm Outputs

Out 1 ..... Not Used

Out 2 ..... Not Used

Out 3 ..... Emergency - Open Collector, Active - ½ Second Min Low

Out 4 ..... Not Used

#### Data In (from Receiver)

Data In+..... As shipped, jumpered for Balanced signals.

Data In-..... As shipped, jumpered for Balanced signals.

Channel Busy Input..... Jumper selectable for active high or low.

#### Transmitter Keying

Key Com..... Ground

Key..... Jumper selectable for Normally Open or Normally Closed

#### Data Output

Data Out-..... As shipped, jumpered for Balanced output

Data Out+..... As shipped, jumpered for Balanced output

#### Data Adj (Pot screws to right of barrier strip)

Out ..... Not installed. See E/D Sat PCB.

In ..... Set for 0.5vpp at TP8.

### Balanced Audio Input

A level of 0 dBm has been preselected to allow direct connection across the two 600 Ohm input terminals. Use Data Adj to set level to 0.5vpp at TP8.

### Single Ended Input

A wide range of input levels may be used after the DATA IN ADJ pot has been adjusted to produce 0.5vpp at TP8.

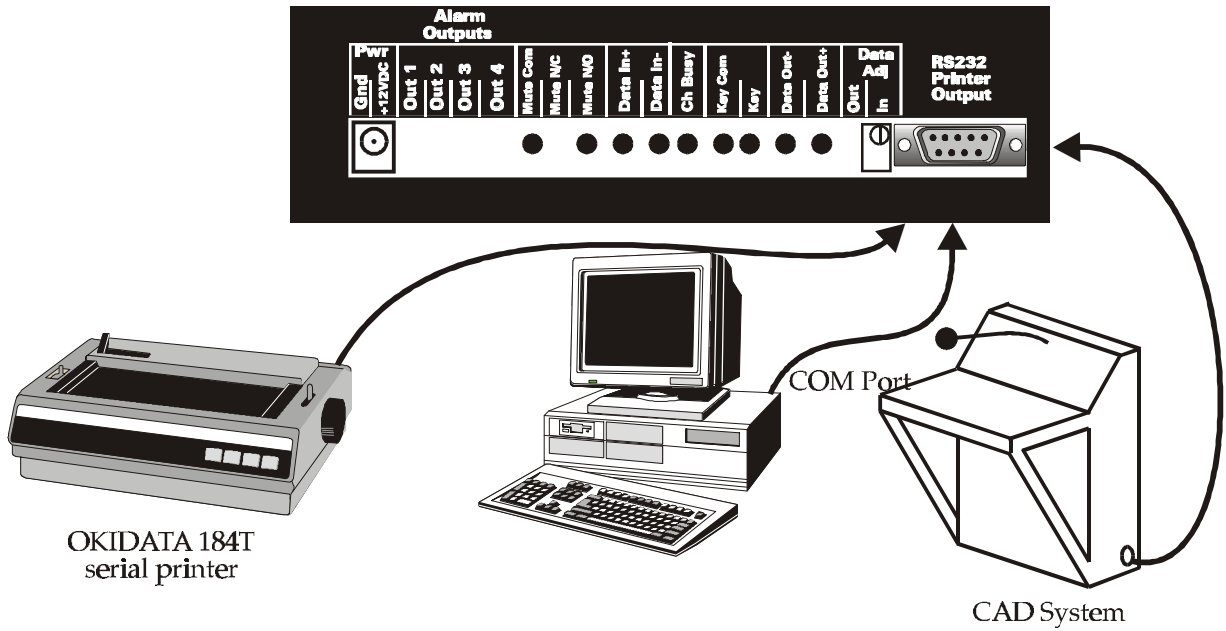
### MUTE Function (to silence the ANI data burst)

The unit is equipped with a data mute output that can be used to momentarily interrupt speaker audio, preventing the data burst from being heard through the receiving radio's speaker.

The speaker audio can be routed in series with the unit's mute relay (via the MUTE N/C and MUTE COM) or the mute relay can shunt a low power audio pre-amplifier signal to ground (via MUTE N/O with MUTE COM attached to audio ground).

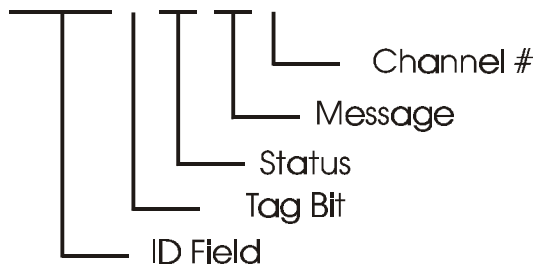
In either configuration, whenever the unit detects a number of leading "preamble" bits in the incoming data burst, the mute relay is activated, disabling speaker audio for the remainder of the data burst (if speaker audio has been connected).

## CMARK I RS-232 Output Examples



BED-31/1207 Output Format:

```
<LF>1807200031<CR>
<LF>0001000011<CR>
<LF>0002000011<CR>
<LF>0008000011<CR>
<LF>0016000011<CR>
```



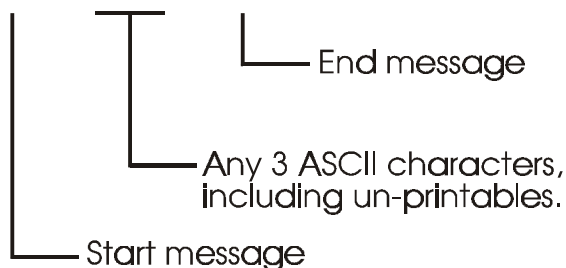
Cimarron Translated Output Format:

```
<LF>18072A1<CR>
<LF>00011E1<CR>
<LF>00020M1<CR>
<LF>00083R1<CR>
<LF>00162A1<CR>
```



Generic 21 Bit Output Format:

```
<STX>ccc<ETX>
```



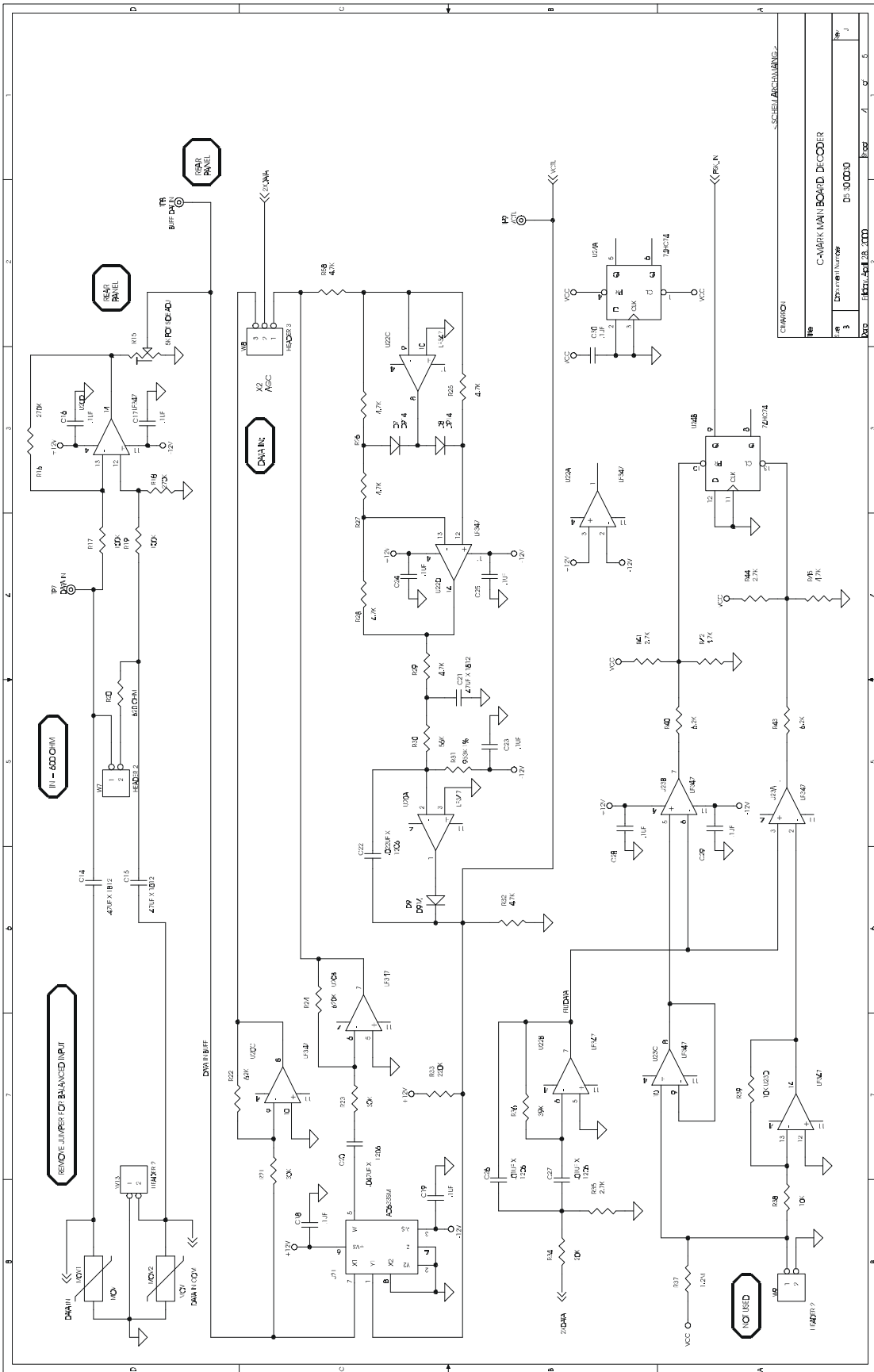
## Record of Revisions

Revision Number	Date	Section	Page(s) #	Notes
A	9/28/00			Re-organized manual for Word/PDF.
B	3/8/01			Added Encode documentation. License text to front cover.



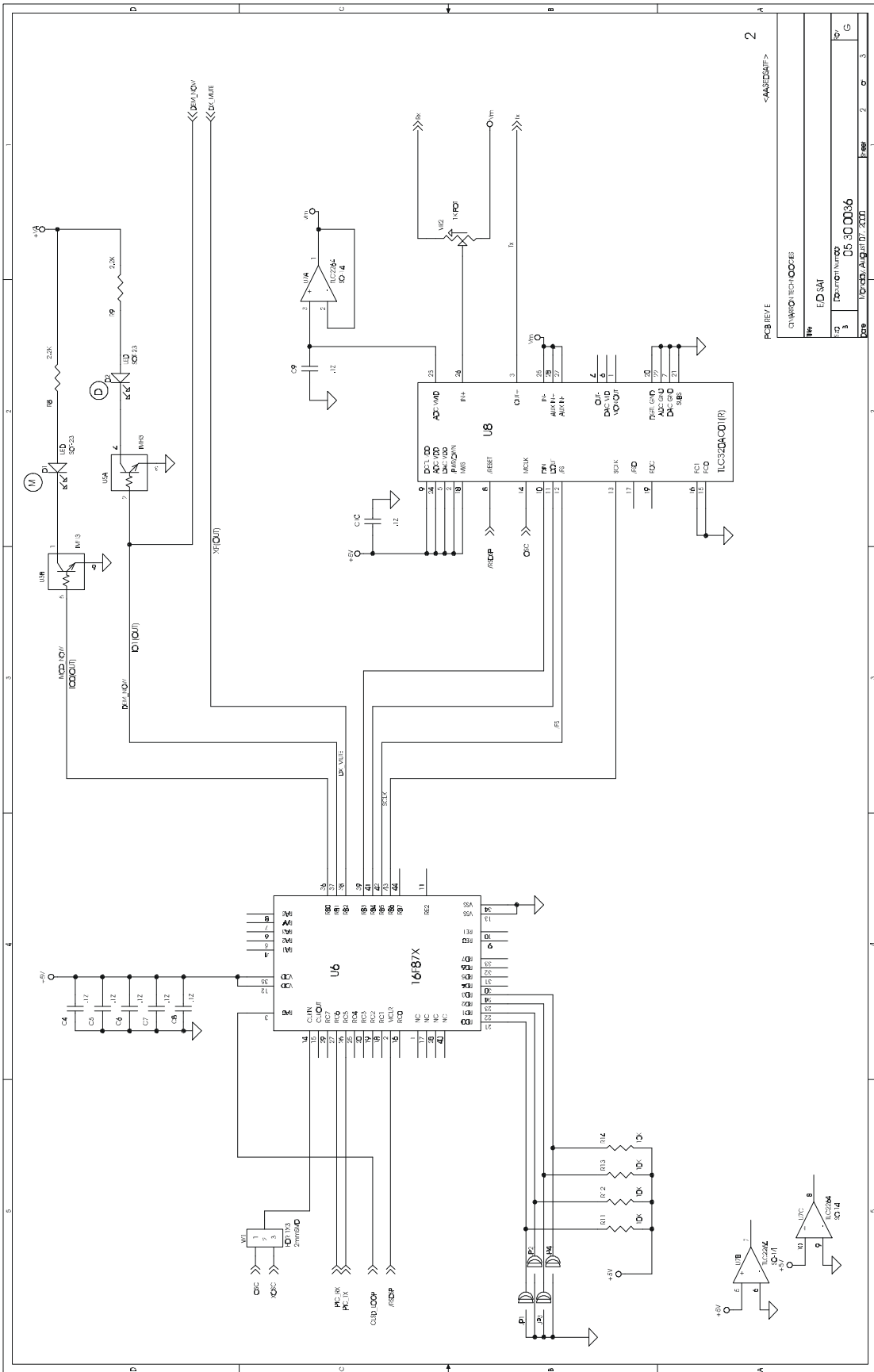












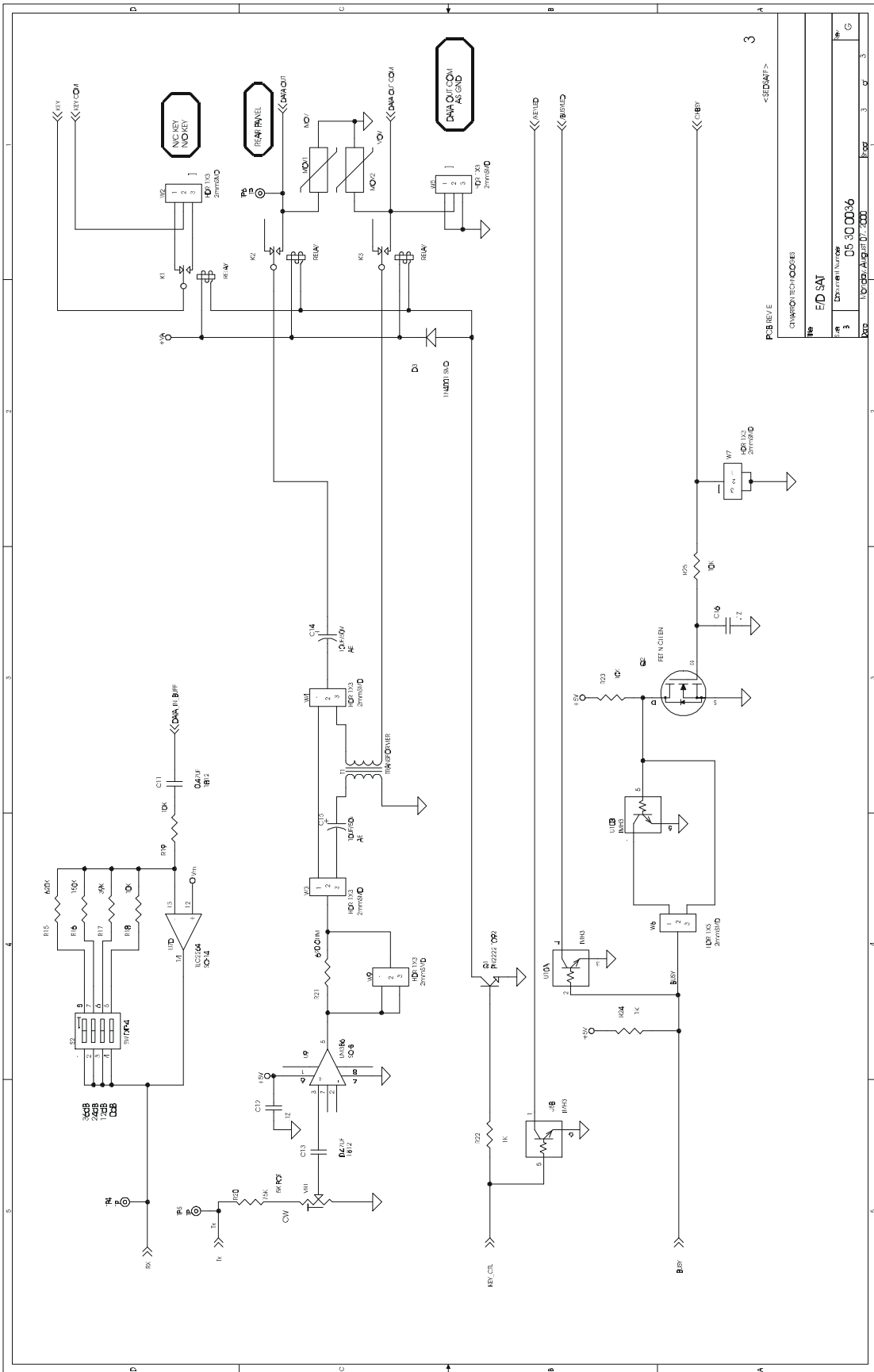
PCB REV E

CHANGING HISTORY

REV	ED 541
DATE	2009/11/03
DESIGNER	05.30.00.06
DATE	NOV 03 10:17:30 AM

2

1 2 3



PCB REV E

CHAMPION TECHNOLOGIES

FD SAT

Rev	3	DATE	05/30/00
By	NOBODY	APP'D BY	NOBODY

<SHEET>