MIDIAN ELECTRONICS INC.

Model

AE-1

8 INPUT ALARM ENCODING MODULE
INSTRUCTION MANUAL

Features

- 8 inputs for reporting alarm conditions
- 8 inputs can be programmed for 2 status messages each (open/closed, high/low, on/off, etc.)
- Carrier detect monitors for busy channel lockout
- Can report a single alarm condition to a 2-tone or 5-tone pager
- Reports alarm conditions to a CAD-100/200 using DTMF or 5-tone
- CTCSS encoding
- Adjustable modulation pot
- Connector on one end interfaces to radio; connector on other end interfaces to alarm inputs

Software Version 1.2 Manual Rev. 04.03.18

MIDIAN ELECTRONICS, INC.
To Order: 1-800-MIDIAN'S
2302 East 22nd Street
Telephone: (520) 884-7981
Tucson, Arizona 85713
Fax: (520) 884-0422

SPECIFICATIONS

VOLTAGE/CURRENT

Operating Voltage ..... 5.5-15 VDC
Operating Current ..... <3 mA

OUTPUTS

Output Tones .....Busy and TOT
Momentary Output ..... 100 mA
PTT Output Current ..... 100 mA
Audio Output Level..... 1V RMS
CTCSS/Tone Output Frequencies 000.0-999.9
CTCSS Output Level.....0 to -18 dB relative to ANI tones
Audio Output Impedance 10KΩ/22KΩ

Alarm Inputs

Alarm Digits..... 1-16 digits
Formats.....5-tone: EEA, CCIR, ZVEI, DZVEI, DDZVEI, NATEL, EIA & MODAT DTMF

TIMING

Key-Up Delay (Front Porch) .....0.0-9.9 seconds
Alarm Digit Timing .....0.001-9.999 seconds
Alarm Input Queuing Delay.....0-9 seconds
Alarm Input Debounce.....0.0-9.9 seconds
TX Delay Between Multiple Alarm Inputs ..0.0-9.9 seconds
Min Recommended Encode Time Per Tone .....20 msecs

MECHANICAL

Dim. w/ flying leads.....82" x .86" x ..12"
Dim. w/horiz conn .....82" x 1.0" x .14"
Operating Temperature ..... -30° to +60°C

WARRANTY

Midian Electronics, Inc., warrants this product to be free from defects in material and workmanship for two years from date of shipment. If such malfunction occurs, it will be repaired or replaced (at our option) without charge for materials or labor if returned to the factory. This warranty does not apply to any parts damaged due to improper use--including accident, neglect, unreasonable use, and improper installation--or to unauthorized alterations or modifications of the equipment. It does not extend to damage incurred by natural causes such as lightning, fire, floods, or other such catastrophes, nor to damage caused by environmental extremes, such as power surges and/or transients. It does not extend to microprocessors, if it is determined by Midian that the failure of a micro is due to static damage, application of improper voltages to the unit, or other problems not related to circuit design. In such case or in the case of a desire to update the micro to a different version of software, such request must be specified in writing, and there will be a charge agreed upon by both parties.

This product is warranted to meet published specifications and to operate as specified only when properly installed in radio equipment which complies with U.S. FCC specifications and the applicable radio manufacturer's specifications. Midian Electronics is not responsible for any operational problems caused by system design, outside interference, or improper installation.

Equipment for repair can be returned to the factory without prior written authorization. A brief letter describing the nature of the defect should be included with the merchandise. Repair by other than Midian Electronics, Inc., will void this warranty. In-warranty merchandise must be shipped, freight prepaid, to Midian Electronics. Midian Electronics will return, freight prepaid via UPS ground, the repaired or replaced equipment to purchaser, within the United States. Out-of-warranty repairs will be billed at the rate of $60 per hour, plus replacement parts.

This warranty applies to the original purchaser of the equipment only. Midian Electronics is not liable under this warranty, or any implied warranty, for loss of use or for other consequential loss or damage experienced by the purchaser. Some states do not permit the exclusion or limitation of implied warranties or consequential damages. This warranty provides special legal rights, and the purchaser may have other rights that vary from state to state.

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INSTALLATION INSTRUCTIONS

Installation Note

Midian products utilize CMOS integrated circuits, which are susceptible to damage from high static charges. Be sure to follow standard antistatic procedures when handling, including using grounded workstations and soldering irons and wearing grounding bracelets. Please be careful when selecting wire colors. It is sometimes difficult to distinguish between the gray, black, and brown wire colors under fluorescent lighting. We suggest using Color-Bright/Color-Corrected or incandescent lighting. If in doubt, compare wire positions on board layout for correct color code.

Wire	Function	Instructions
Connector P1		
Black	Ground	Connect to nearest ground point.
Red	5.5 - 15 VDC	Connect to switched B+ in radio.
Brown	COR/COS busy lockout	Connect to point in Squelch or CTCSS circuit that changes logic level when carrier is received. Program desired COR/COS polarity in **COR/COS Polarity** in **Input Control**. A radio whose squelch circuit provides a logic low or logic high can readily turn the COR/COS transistor, Q1, on and off. If the point that this lead is hooked to only makes a minute change in voltage, it will be necessary to adjust the values of R2, R3 and R34 to cause Q1 to change states. If not using COR/COS lead, **COR/COS Polarity** must be programmed to a 1.
Green	TX tone out	Connect to modulator circuit. When generating CTCSS, use CTCSS point in modulator. Use high impedance point in radio. Low-Z will cause low frequency rolloff across C10 and R31. In Low-Z mic circuits, it might be necessary to short R31 or increase C10. Per EIA specification, set CTCSS deviation to 750 Hz - 1 KHz, set ANI to 3.3 KHz of deviation. See Table 3, CTCSS/DCS Attenuation Codes. Set Mod Pot R30 to 3.3 kHz with ANI. Program CTCSS/DCS to 1 kHz.
Blue	Alert tone speaker audio	Connect to high side of speaker. This provides programming beep tones. (Speaker completes ground path for speaker emitter-follower transistor, Q3). **CAUTION: When attaching this lead to a 4 or 8 Ohm speaker, add a 100 Ohm resistor in series with this blue lead to limit current.** When using 20-40 Ohm speakers, the onboard resistor in series with Q3 should be sufficient.
Grey	Program Enable	This pin must be grounded when the power is first turned on to put the unit in programming mode. Begin transferring data from the PC through the KL-3 within 5 seconds of power up.
White	PTT out	Connect to the radio's PTT circuit. Micro now has control of PTT and will key the radio whenever an alarm input is received. Provided the channel is not busy with Busy Lockout enabled. The PTT transistor (Q5) is rated at 100 mA continuous. Use caution when connecting to old radios that use relays with heavy coil currents. Also, install a diode in parallel to the relay coil to eliminate counter EMF or serious damage will result to the microprocessor and void the warranty.
Violet	Alarm input 8	When taken low this input will trransmit the alarm message programmed in register R10A. When taken back high this input will transmit the alarm programmed in register R10B. The numbers can be the same in both registers with a different trailing status digit of perhaps 0 or 1. A CAD-100/200 can display in its status field a message for example: open/closed, on/off, etc.
Orange/White	Programming Input	Connect to KL-3 Programmer.
Orange		Not used in the AE-1.
Yellow/White		Not used in the AE-1.
Grey/White		Not used in the AE-1.

Wire	Function	Instructions
Connector P2		
White	Alarm input 1	When taken low this input will trransmit the alarm message programmed in register R03A. When taken back high this input will transmit the alarm programmed in register R03B. The numbers can be the same in both registers with a different trailing status digit of perhaps 0 or 1. A CAD-100/200 can display in its status field a message for example: open/closed, on/off, etc.
Green/White	Alarm input 2	When taken low this input will trransmit the alarm message programmed in register R04A. When taken back high this input will transmit the alarm programmed in register R04B. The numbers can be the same in both registers with a different trailing status digit of perhaps 0 or 1. A CAD-100/200 can display in its status field a message for example: open/closed, on/off, etc.
Yellow	Alarm input 3	When taken low this input will trransmit the alarm message programmed in register R05A. When taken back high this input will transmit the alarm programmed in register R05B. The numbers can be the same in both registers with a different trailing status digit of perhaps 0 or 1. A CAD-100/200 can display in its status field a message for example: open/closed, on/off, etc.
Blue	Alarm input 4	When taken low this input will trransmit the alarm message programmed in register R06A. When taken back high this input will transmit the alarm programmed in register R06B. The numbers can be the same in both registers with a different trailing status digit of perhaps 0 or 1. A CAD-100/200 can display in its status field a message for example: open/closed, on/off, etc.
Black	Alarm input 5	When taken low this input will trransmit the alarm message programmed in register R07A. When taken back high this input will transmit the alarm programmed in register R07B. The numbers can be the same in both registers with a different trailing status digit of perhaps 0 or 1. A CAD-100/200 can display in its status field a message for example: open/closed, on/off, etc.
Brown	Alarm input 6	When taken low this input will trransmit the alarm message programmed in register R08A. When taken back high this input will transmit the alarm programmed in register R08B. The numbers can be the same in both registers with a different trailing status digit of perhaps 0 or 1. A CAD-100/200 can display in its status field a message for example: open/closed, on/off, etc.
Red	Alarm input 7	When taken low this input will trransmit the alarm message programmed in register R09A. When taken back high this input will transmit the alarm programmed in register R09B. The numbers can be the same in both registers with a different trailing status digit of perhaps 0 or 1. A CAD-100/200 can display in its status field a message for example: open/closed, on/off, etc.
----------	Alarm input 8	See P1 connector on previous page.
Green	Ground	Alarm input common ground.

1. OPERATION

1.1. General

The AE-1 is an alarm tone generator and CTCSS encoder module. The AE-1 is controlled by the 8 alarm input leads and the COR/COS busy lockout wire. The PTT keys the radio to transmit the alarm tone sequence and the CTCSS if programmed.

The AE-1 detects a busy channel by monitoring the radio's COR/COS circuit to determine whether the channel is busy. If the channel is busy and an alarm input occurs, the alarm will be delayed until the channel is cleared.

When using status messages with busy lockout enabled (i.e. open/closed, etc.):

A). If an input opens during the busy period an open will be transmitted.

B). If an open/closed occurs during the busy period an open/close will be reported.

C). If an open/closed/open is reported during the busy period only an open will be reported.

D). If an open/closed/open/closed occurs during the busy period only an open/closed will be reported.

A speaker output provides programming tones.

1.2. CTCSS

The AE-1 can be programmed to open repeaters, base stations, or mobile units via one of 51 different subaudible CTCSS codes (38 standard codes plus 13 split codes). See table 2.

Set the modulation tone output adjust pot for 3-4 kHz of deviation for the Touch Tone, 2-tone, 5-tone dialing. If using CTCSS to open a repeater, set its relative level usng table 1 (CTCSS Attenuation Codes). CTCSS modulation should run 750 Hz to 1 kHz.

1.3. Busy Channel Lockout

Government regulations require radio users to open tone squelch and monitor a channel before transmitting. If they do not, they can interfere with other users already on the channel. **Busy Channel Lockout** automatically checks the channel, and will not allow the transmitter to key-up and send alarm status messages until the queuing delay time in Register 02D has been exceeded.

Busy lockout is activated by hooking up the COR wire and programming the desired active COR/COS polarity in register R02G. Also see COR/COS lead in installation section.

1.4. Sending Alarm Messages

The AE-1 is capable of transmitting 2-tone, 5-tone and DTMF. See Table 4, ANI Formats. Each of the 8 inputs has 2 associated registers. The A register when programmed with a number in it will transmit that number when a logic low is received on the input and the debounce time in register R02E has been exceeded. The B register can send another ANI alarm sequence when the logic low is removed from the input causing the input to float high.

Register R02F sets the time between multiple transmissions of ANI alarm sequences. This prevents the first ANI from going out and immediately transmitting another ANI if another input changes state.

The same alarm ID sequence is usually transmitted in both registers A & B. A 0 and 1 for the last digit in registers A & B can be programmed to mean on/off, open/closed, high/low by programming the CAD-100/200 status message fields. The inputs are capable of sequential or parallel changes on the 8 input lines.

When transmitting alarm messages: DTMF, 5-tone, 2-tone, or even pulse tone or burst tone may be transmitted.

There is a front porch keyup delay programmable from 0.0 to 9.9 seconds that allows a front porch lead in delay time to open a repeater's CTCSS decoder before any alarm ANI is transmitted. To compute the front porch delay time, EIA specs that a CTCSS decoder should open in 250 msec at 100 Hz. The time increases as CTCSS frequencies decrease. Therefore, from the high end frequencies to the low frequency the time could run 100-500 msec. In addition, transmitter synthesizer lock time can also be a consideration and can run from a few milliseconds to 100 msec. Also, E&M leads on microwave systems that can be tied to the repeater can add a 50-100 msec delay. Satellite voting systems can also introduce additional delays.

2. PROGRAMMABLE FEATURES

2.1 Register R01 – Alarm ANI & Tone Time

Registers R01- Alarm ANI Format & Tone Timing:
R01A programs the format from table 4 that the AE-1 will utilize in reporting alarms.

R01B – Tone Time 1:
Enter the time for the first tone. This separate timing makes possible a preamble tone. If nothing is entered industry timings will be used.

R01C – Tone Time 2:

Enter the time for subsequent tones. If nothing is entered here all tones will be encoded for the length that is entered in Tone Time 1 R01B.

2.2 Register 02 – Transmit Parameters

R02A - Front Porch Key-up Delay Time:

It allows the user to program a front porch keyup delay. When transmitting alarm ANIs, the transmitter will key, pause for the repeater lead-in delay, and send the alarm ANI tones. (See section 1.4 for a description of how to compute the front porch keyup delay time.)

R02B – CTCSS Tone Programming:

Enter the 2 digits corresponding to the CTCSS table 2.

R02C – CTCSS Attentuation Code:

This register programs the transmit level of the CTCSS code relative to the alarm ANI modulation level. This is programmed in 2 dB "down" increments in nine steps for a maximum attenuation of 18 dB below the alarm ANI levels. See Table 1 CTCSS Attenuation Codes. Set the modulation pot R30 to 3.3 kHz using the alarm ANI tones. Then, using Table 1, set the CTCSS tone to 800 Hz to 1 kHz of modulation.

R02D – Queuing Signal Delay:

The unit will monitor the channel during a busy period to prevent the AE-1 from keying up and interfering with a conversation in progress. The AE-1 will then key up after the number of seconds programmed in the queuing delay has expired.

R02E – Alarm Input Debounce:

The alarm input debounce applies to all 8 alarm input lines. It prevents them from going off instantaneously on a noisy line. This timing is programmable from 0.0 to 9.9 seconds.

R02F – Transmission Delays Between Multiple Alarm Inputs:

This time separates sequential inputs from going out immediately after each other for the amount of time programmed in this register from 0.0 to 9.9 seconds.

R02G – COR/COS Polarity:

Program the desired polarity in this register that equals the radio's active polarity during the presence of carrier. See COR/COS in installation instructions.

2.3 Register R03-R10 – Alarm Input Registers

Enter the alarm ANI sequences of 1 to 12 digits. Use register A to transmit an alarm sequence when the input goes low. Use register B to program another alarm sequence when the input goes back high (floating). Normally, the alarm ANI sequence in registers A & B can be the same except that the trailing digit can be a 0 or 1 or some other number to indicate logic low or high, open or closed, on or off, etc.

If using a CAD-100/200 the status fields can be programmed to provide a message in the following languages: English, French, German, Italian, Portuguese, Russian, and Spanish.

3. PROGRAMMING

3.1 Programming the AE-1

The AE-1 is programmed using Midian's KL-3 programming software.

Enter the programmable features by following the register programming worksheet into the KL-3 programming software on an IBM-compatible PC.

Connect the serial programmer to the monitor/hook input (orange/white wire). Ground the PTT input (gray wire), and apply power to the unit, and within five seconds, begin sending the serial programming information from the KL-3. The unit will emit one long beep on the side tone wire if it was successfully programmed. If, for any reason, the programming was not successful, check the connections and programming registers and try again.

4. PROGRAMMING TABLES

TABLE 1: CTCSS ATTENUATION CODES

CODE	LEVEL (dB)	CODE	LEVEL (dB)
0	-18	5	-8
1	-16	6	-6
2	-14	7	-4
3	-12	8	-2
4	-10	9	-0

TABLE 2: CTCSS TONE PROGRAMMING CHART

38 STANDARD CTCSS TONES								NON-STANDARD CTCSS SPLITS †	
BCD	**HZ**	**BCD**	**HZ**	**BCD**	**HZ**	**BCD**	**HZ**	**BCD**	**HZ**
00	0.0	10	94.8	20	131.8	30	186.2	39	69.4
01	67.0	11	97.4	21	136.5	31	192.8	40	97.4
02	71.9	12	100.0	22	141.3	32	203.5	41	159.8
03	74.4	13	103.5	23	146.2	33	210.7	42	165.5
04	77.0	14	107.2	24	151.4	34	218.1	43	171.3
05	79.7	15	110.9	25	156.7	35	225.7	44	177.3
06	82.5	16	114.8	26	162.2	36	233.6	45	183.5
07	85.4	17	118.8	27	167.9	37	241.8	46	189.9
08	88.5	18	123.0	28	173.8	38	250.3	47	196.6
09	91.5	19	127.3	29	179.9			48	199.5
								49	206.5
								50	229.1
								51	254.1

TABLE 4: ANI, DIAL, TRANSPOND & DECODE MODES

#	MODE	TIME 1	TIME 2	#	MODE	TIME 1	TIME 2
00	NONE	UNUSED	UNUSED	**33**	MOTOROLA N	FIRST TONE	NEXT TONE
01	DTMF	TONE ON	TONE OFF	**34**	MOTOROLA P	FIRST TONE	NEXT TONE
02	2805	DIAL RATE	TAIL TONE	**35**	MOTOROLA Q	FIRST TONE	NEXT TONE
03	1500	DIAL RATE	TAIL TONE	**36**	MOTOROLA R	FIRST TONE	NEXT TONE
04	NONE	UNUSED	UNUSED	**37**	MOTOROLA S	FIRST TONE	NEXT TONE
05	BURST	FREQ	TIME	**38**	MOTOROLA T	FIRST TONE	NEXT TONE
20	MOT GENERAL	FIRST TONE	NEXT TONE	**39**	MOTOROLA U	FIRST TONE	NEXT TONE
21	MOTOROLA A†	FIRST TONE	NEXT TONE	**40**	MOTOROLA V	FIRST TONE	NEXT TONE
22	MOTOROLA B	FIRST TONE	NEXT TONE	**41**	MOTOROLA W	FIRST TONE	NEXT TONE
23	MOTOROLA C	FIRST TONE	NEXT TONE	**45**	GE	FIRST TONE	NEXT TONE
24	MOTOROLA D	FIRST TONE	NEXT TONE	**46**	REACH	FIRST TONE	NEXT TONE
25	MOTOROLA E	FIRST TONE	NEXT TONE	**50**	CCIR	FIRST TONE	NEXT TONES
26	MOTOROLA F	FIRST TONE	NEXT TONE	**51**	EEA	FIRST TONE	NEXT TONES
27	MOTOROLA G	FIRST TONE	NEXT TONE	**52**	EIA	FIRST TONE	NEXT TONES
28	MOTOROLA H	FIRST TONE	NEXT TONE	**53**	ZVEI	FIRST TONE	NEXT TONES
29	MOTOROLA J	FIRST TONE	NEXT TONE	**54**	DZVEI	FIRST TONE	NEXT TONES
30	MOTOROLA K	FIRST TONE	NEXT TONE	**55**	DDZVEI	FIRST TONE	NEXT TONES
31	MOTOROLA L	FIRST TONE	NEXT TONE	**56**	NATEL	FIRST TONE	NEXT TONES
32	MOTOROLA M	FIRST TONE	NEXT TONE	**60**	MODAT	FIRST TONE	NEXT TONES

† - Motorola A is not a Motorola standard.

Notes: When dialing or ANIing with 2805 and 1500 Hz formats, the break tone/make tone ratio is 60/40 at 10 or 20 pps. Time 1 in the chart represents the tone break ratio in the dialing sequence. Therefore, with a 60/40 ratio, the tone break time will be 1.5 times the tone on time. As a result, the tone off times should be 40 and 20 ms at 10 pps & 20 pps, respectively. Set Time 2 to be the tail time. Burst tone ANI frequency range: 1.000 to 3000 Hz; Time range: .001 to 9.999 seconds.

TABLE 5: SEQUENTIAL SINGLE FREQUENCY CODES & TIMINGS									
TONE NUMBER	CODE DIGIT	EUROPEAN FIVE/SIX TONE FREQUENCIES IN HZ						MOTOROLA	
		EEA	CCIR	ZVEI	DZVEI	DDZVEI	NATEL	EIA	MODAT
TONE 0	0	1981	1981	2400	2200	2400	1633	600	637.5
TONE 1	1	1124	1124	1060	970	1060	631	741	787.5
TONE 2	2	1197	1197	1160	1060	1160	697	882	937.5
TONE 3	3	1275	1275	1270	1160	1270	770	1023	1087.5
TONE 4	4	1358	1358	1400	1270	1400	852	1164	1237.5
TONE 5	5	1446	1446	1530	1400	1530	941	1305	1387.5
TONE 6	6	1540	1540	1670	1530	1670	1040	1446	1537.5
TONE 7	7	1640	1640	1830	1670	1830	1209	1587	1687.5
TONE 8	8	1747	1747	2000	1830	2000	1336	1728	1837.5
TONE 9	9	1860	1860	2200	2000	2200	1477	1869	1987.5
REPEAT TONE	R	2110	2110	2600	2400	970	1805	459	487.5
GROUP TONE	G	1055	2400	2800	885	885	1995	2010	---
ALARM TONE	A	2400							
TONE WIDTH (MS)		40±4	100±10	70±15	70±15	70±15	70	33±.5	40±5
SEQ LENGTH (MS)		200	500	350	350	350	350	165	280
MAX INTERTONE TIME (MS)		4	7.5	15	15	15		0	
MIN GAP BEFORE/BETWEEN SEQ (MS)		100	290	140	140	140		33	
ENCODER TOLERANCE		±1%	±8HZ	±1.5%	±1.5%	±1.5%	±1.5%	±.1%	
MUST DECODE BW		±1%	±1%	±1.5%	±1.5%	±1.5%		±16HZ	
MUST REJECT BW		±3%	±3%	±4.5%	±4.5%	±4.5%		NS	

TABLE 6: ONE, TWO & FOUR TONE TIMING SEQUENCE				
FORMAT	CALL SEQUENCE	1ST TONE	GAP	2ND TONE
MOTOROLA 1 + 1 QUICK CALL 2	INDIVIDUAL CALL TONE & VOICE	1 SEC	0	3 SEC
	GROUP CALL	0	0	8 SEC
	TONE ONLY	.4 SEC	0	.8 SEC
	TONE ONLY BATTERY SAVE	2.7 SEC	0	.8 SEC
REACH TWO TONE	REACH SLOW	2 SEC	25 MS	.7 SEC
	REACH FAST	150 MS	25 MS	150 MS
	REACH GROUP CALL TWO TONE	5 SEC	0	0
GENERAL ELECTRIC	GENERAL ELECTRIC TYPE 99	1 SEC	0	1.5 SEC
NEC	GROUP CALL			
A	6 SEC	1 SEC	.25 SEC	3 SEC
B	6 SEC	1 SEC	0	3 SEC
C	4 SEC	1 SEC	0	1 SEC
D	3 SEC	.4 SEC	0	.4 SEC
L	3 SEC	.5 SEC	0	.5 SEC
M	4 SEC	.4 SEC	0	.8 SEC

TABLE 7: MOTOROLA CODE PLAN

FIRST DIGIT	CODE TYPE																				
	A*	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W
1	11	11	11	11	11	11	11	11	11	11	11	23	23	23	24	24	25	34	34	35	46
2	22	22	22	22	22	13	13	13	14	14	15	22	22	22	22	22	22	43	43	53	64
3	33	33	12	12	12	33	33	33	41	41	51	33	33	33	42	42	52	33	33	33	56
4	44	12	44	15	21	44	31	31	44	44	16	44	32	32	44	44	26	44	44	36	44
5	55	13	14	55	16	31	55	16	55	16	55	32	55	26	55	26	55	55	36	55	55
6	66	21	21	21	66	14	15	66	15	66	66	24	25	66	25	66	66	35	66	66	66
7		31	41	51	61	41	51	61	45	61	61	42	52	62	45	62	62	45	63	63	45
8		23	24	25	26	34	35	36	54	46	56	34	35	36	54	46	56	54	46	56	54
9		32	42	52	62	43	53	63	51	64	65	43	53	63	52	64	65	53	64	65	65

* A is not a Motorola Standard.

TABLE 8: MOTOROLA GENERAL ENCODING PLAN

FIRST DIGIT OF PAGER CODE	TONE A GROUP	TONE B GROUP
1	1	1
2	2	2
3	1	2
4	4	4
5	5	5
6	2	1
7	4	5
8	5	4
9	2	4
0	4	2

TABLE 9: MOTOROLA REED GROUPS

TONE NUMBER	REED GROUP 1		REED GROUP 2		REED GROUP 3		REED GROUP 4		REED GROUP 5		REED GROUP 6	
	REED CODE	FREQ HZ	REED CODE	FREQ HZ	REED CODE	FREQ HZ	REED CODE	FREQ HZ	REED CODE	FREQ HZ	REED CODE	FREQ HZ
1	111	349.0	121	600.9	138	288.5	141	339.6	151	584.8	191	1153.4
2	112	368.5	122	634.5	108	296.5	142	358.6	152	617.4	192	1185.2
3	113	389.0	123	669.9	139	304.7	143	378.6	153	651.9	193	1217.8
4	114	410.8	124	707.3	109	313.0	144	399.8	154	688.3	194	1251.4
5	115	433.7	125	746.8	160	953.7	145	422.1	155	726.8	195	1285.8
6	116	457.9	126	788.5	130	979.9	146	445.7	156	767.4	196	1321.2
7	117	483.5	127	832.5	161	1006.9	147	470.5	157	810.2	197	1357.6
8	118	510.5	128	879.0	131	1034.7	148	496.8	158	855.5	198	1395.0
9	119	539.0	129	928.1	162	1063.2	149	524.6	159	903.2	199	1433.4
0	110	330.5	120	569.1	189	1092.4	140	321.7	150	553.9	190	1122.5

TABLE 10: GE TYPE 99 TABLE I

GROUP	A	B	C
TONE #	FREQ	FREQ	FREQ
1	592.5	607.5	712.5
2	757.5	787.5	772.5
3	802.5	832.5	817.5
4	847.5	877.5	862.5
5	892.5	922.5	907.5
6	937.5	967.5	952.5
7	547.5	517.5	532.5
8	727.5	562.5	577.5
9	637.5	697.5	622.5
0	682.5	652.5	667.5
DIA	742.5 HZ		

TABLE 11: GE Type 99 Table II

100'S	TONE REED GROUPS FOR	
DIGIT	1ST TONE	2ND TONE
0	A	A
1	B	A
2	B	B
3	A	B
4	C	C
5	C	A
6	C	B
7	A	C
8	B	C

TABLE 12: REACH TWO-TONE SEQUENTIAL -- FAST OR SLOW

1ST DIGIT OF CODE	GROUP FOR 1ST TONE	GROUP FOR 2ND TONE
1	A	C
2	C	A
3	B	D
4	D	B
5	A	D
6	D	A
7	A	E
8	E	A
9	B	E
0	E	B

TABLE 13: REACH TWO-TONE & SINGLE TONE PAGING FREQUENCIES

TONE	GROUP A		GROUP B		GROUP C		GROUP D		GROUP E	
NUM	CHN	FREQ	CHN	FREQ	CHN	FREQ	CHN	FREQ	CHN	FREQ
1	11	2704	21	1912	26	1608	36	1137	46	804
2	12	2612	22	1847	67	1553	37	1098	47	776
3	13	2523	23	1784	68	1500	38	1061	48	750
4	14	2437	24	1723	69	1449	39	1025	49	725
5	15	2354	25	1664	30	1400	40	990	50	700
6	16	2274	26	1608	31	1352	41	956	51	676
7	17	2196	27	1553	32	1306	42	923	52	653
8	18	2121	28	1500	33	1261	43	892	53	631
9	19	2049	29	1449	34	1219	44	862	54	609
0	20	1980	30	1400	35	1177	45	832	55	588

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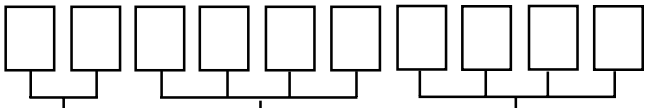
AE-1 PROGRAMMING WORKSHEET

To be used with Midian's KL-3 Programmer

R01: ANI Format & Tone Lengths (10 digits)

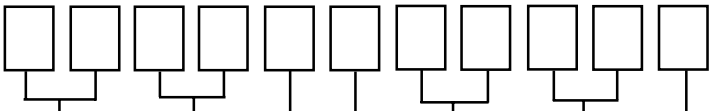


A). Alarm ANI Format (00-60, see table 4)
Enter the two digits that corresponds to the format from table 4.

B). Time 1 (0.000-9.999 seconds)
Enter the time for the first tone. This separate timing makes possible a preamble tone. If nothing is entered, industry standard timings will be used.

C). Time 2 (0.000-9.999 seconds)
Enter the time for subsequent tones. If nothing is entered here, all tones will be encoded for the length that is entered in Time 1.

R02: Transmit Parameters (12 digits)



A). Key-Up Delay (0.0-9.9 seconds)
Enter a front porch key-up delay of 0.0 to 9.9 seconds. When dialing, the transmitter will key, pause for the lead-in key-up delay, & then send the tones.

B). CTCSS Tone Programming (00-51, See table 2)
Enter the 2 digits corresponding to the CTCSS code from table 2.

C). CTCSS Attentuation Code (0-9, See table 1)
Enter the 1 digit corresponding to the CTCSS modulation level from table 1.

D). Queuing Signal Delay (0-9 seconds)
The unit will monitor the channel during busy and after it has gone idle for the time entered here it will then transmit the alarm sequences. See table 4.

E). Alarm Input Debounce (0.0-9.9 seconds)
Program the time from 0 to 9 seconds that the emergency input must remain low before the emergency ANI is sent.

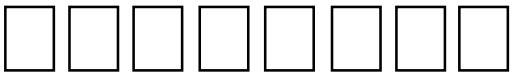
F). Transmission Delays Between Multiple Alarm Inputs (0.0-9.9 seconds)

G). COR/COS Polarity (0=GND, 1=V+)
Enter the digit corresponding to the radio's COR/COS polarity in the <u>active</u> state.

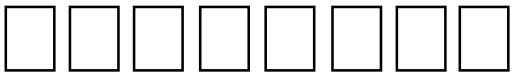
For R03-R10: Logic Low = Ground; Logic High = Float (ungrounded)

R03: Alarm ANI Input #1 (1-12 digits)

R03A). Enter the logic low alarm ANI sequences of 1- 12 digits.

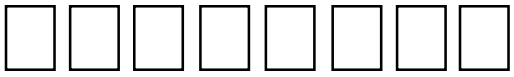


R03B). Enter the logic high alarm ANI sequences of 1-12 digits.

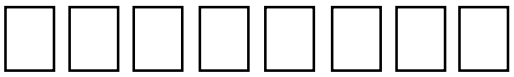


R04: Alarm ANI Input #2 (1-12 digits)

R04A). Enter the logic low alarm ANI sequences of 1- 12 digits.

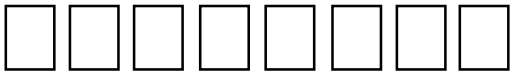


R04B). Enter the logic high alarm ANI sequences of 1-12 digits.

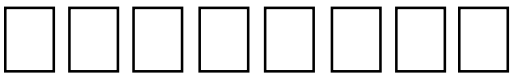


R05: Alarm ANI Input #3 (1-12 digits)

R05A). Enter the logic low alarm ANI sequences of 1- 12 digits.

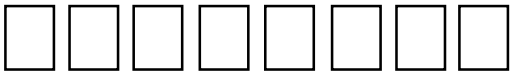


R05B). Enter the logic high alarm ANI sequences of 1-12 digits.

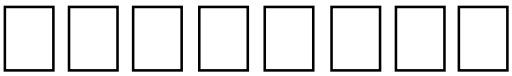


R06: Alarm ANI Input #4 (1-12 digits)

R06A). Enter the logic low alarm ANI sequences of 1- 12 digits.

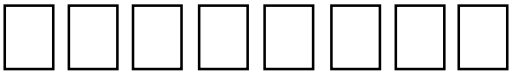


R06B). Enter the logic high alarm ANI sequences of 1-12 digits.

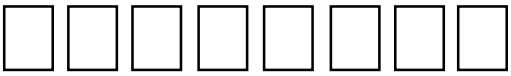


R07: Alarm ANI Input #5 (1-12 digits)

R07A). Enter the logic low alarm ANI sequences of 1- 12 digits.

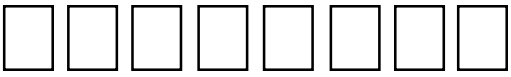


R07B). Enter the logic high alarm ANI sequences of 1-12 digits.

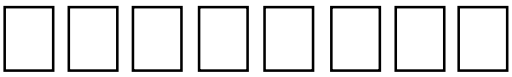


R08: Alarm ANI Input #6 (1-12 digits)

R08A). Enter the logic low alarm ANI sequences of 1- 12 digits.

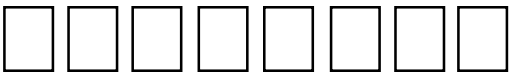


R08B). Enter the logic high alarm ANI sequences of 1-12 digits.

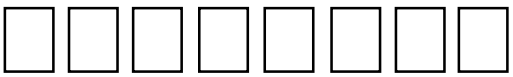


R09: Alarm ANI Input #7 (1-12 digits)

R09A). Enter the logic low alarm ANI sequences of 1- 12 digits.

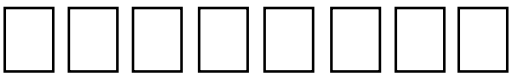


R09B). Enter the logic high alarm ANI sequences of 1-12 digits.

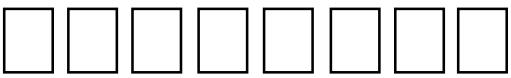


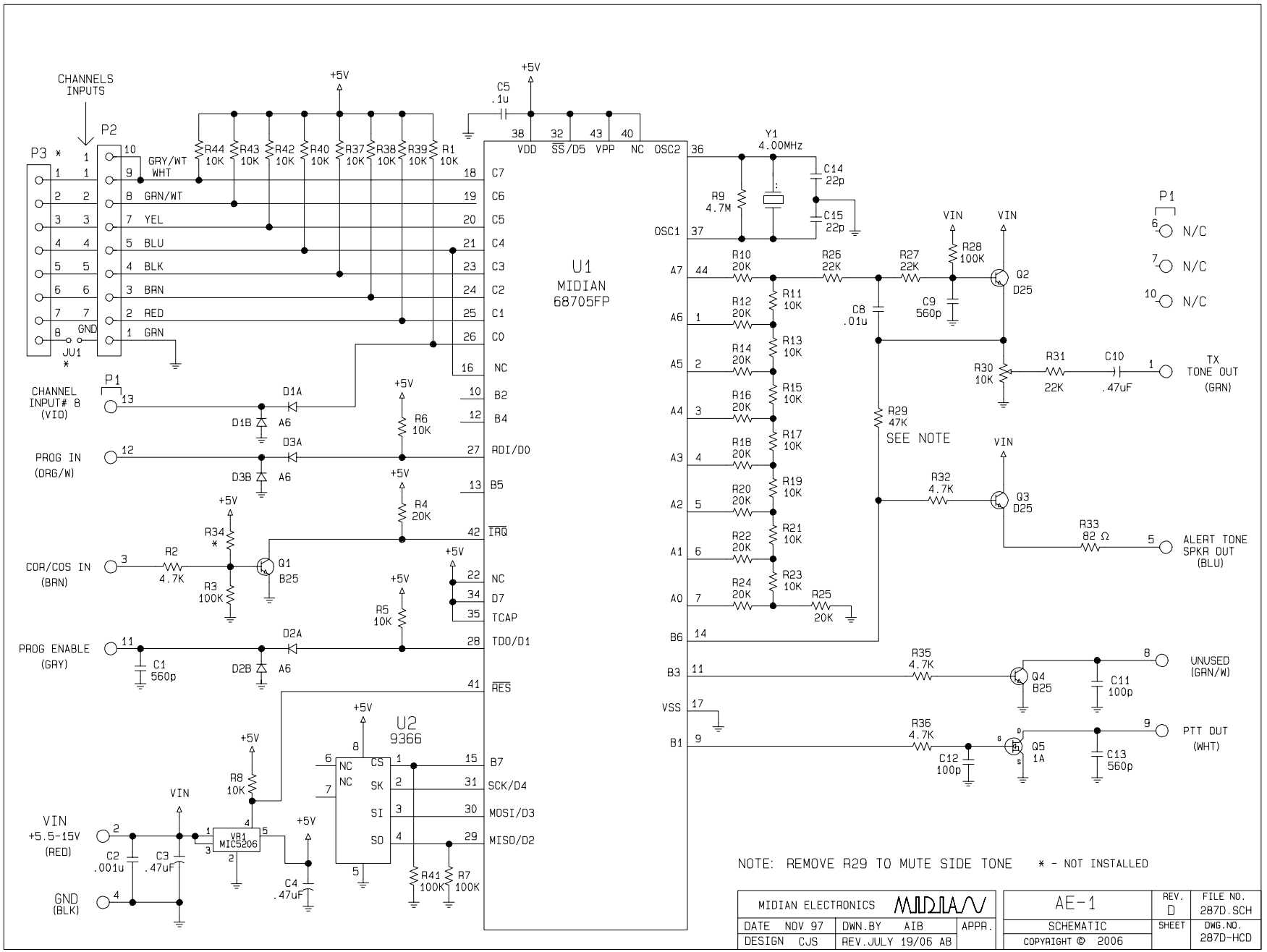
R10: Alarm ANI Input #8 (1-12 digits)

R10A). Enter the logic low alarm ANI sequences of 1- 12 digits.



R10B). Enter the logic high alarm ANI sequences of 1-12 digits.




CHANNELS INPUTS
P2
P3 *
JU1 *
GRY/WT
WHT
GRN/WT
YEL
BLU
BLK
BRN
RED
GRN
GND
R44 10K
R43 10K
R42 10K
R40 10K
R37 10K
R38 10K
R39 10K
R1 10K
+5V
C5 .1u
U1
MIDIAN
68705FP
VDD
SS/D5
VPP
NC
OSC2
OSC1
Y1
4.00MHz
R9 4.7M
C14 22p
C15 22p
C7
C6
C5
C4
C3
C2
C1
C0
NC
B2
B4
RDI/D0
B5
IRQ
NC
D7
TCAP
TDO/D1
RES
B7
SCK/D4
MOSI/D3
MISO/D2
A7
A6
A5
A4
A3
A2
A1
A0
B6
B3
VSS
B1
R10 20K
R11 10K
R12 20K
R13 10K
R14 20K
R15 10K
R16 20K
R17 10K
R18 20K
R19 10K
R20 20K
R21 10K
R22 20K
R23 10K
R24 20K
R25 20K
R26 22K
R27 22K
R28 100K
R29 47K
SEE NOTE
R30 10K
R31 22K
R32 4.7K
R33 82 Ω
R34 *
R35 4.7K
R36 4.7K
C8 .01u
C9 560p
C10 .47uF
C11 100p
C12 100p
C13 560p
Q1 B25
Q2 D25
Q3 D25
Q4 B25
Q5 1A
VIN
P1
N/C
N/C
N/C
TX TONE OUT (GRN)
ALERT TONE SPKR OUT (BLU)
UNUSED (GRN/W)
PTT OUT (WHT)
CHANNEL INPUT# 8 (VID)
PROG IN (ORG/W)
COR/COS IN (BRN)
PROG ENABLE (GRY)
D1A
D1B
D3A
D3B
D2A
D2B
A6
R6 10K
R4 20K
R5 10K
R2 4.7K
R3 100K
C1 560p
U2
9366
NC
NC
CS
SK
SI
SO
R41 100K
R7 100K
R8 10K
VB1
MIC5206
C2 .001u
C3 .47uF
C4 .47uF
VIN
+5.5-15V
(RED)
GND
(BLK)
NOTE: REMOVE R29 TO MUTE SIDE TONE
* - NOT INSTALLED
MIDIAN ELECTRONICS
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REV.JULY 19/06 AB
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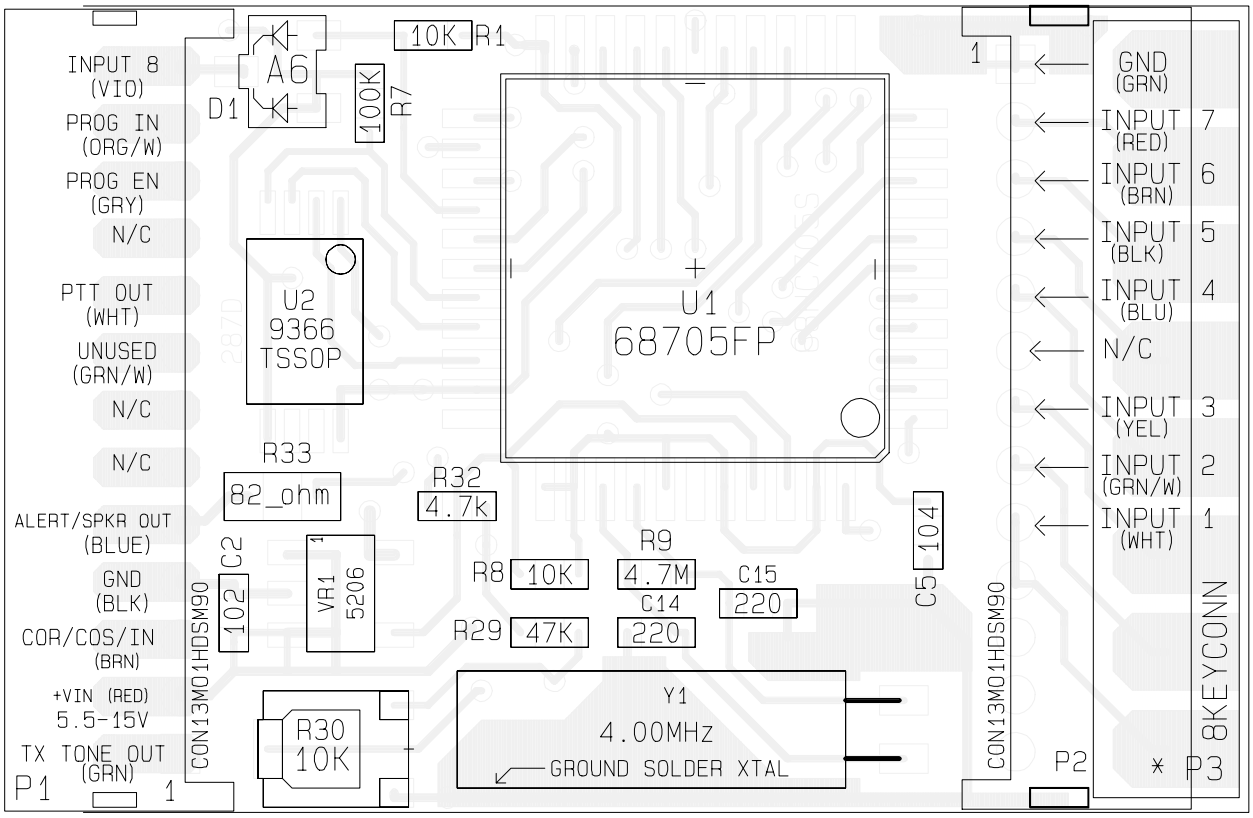
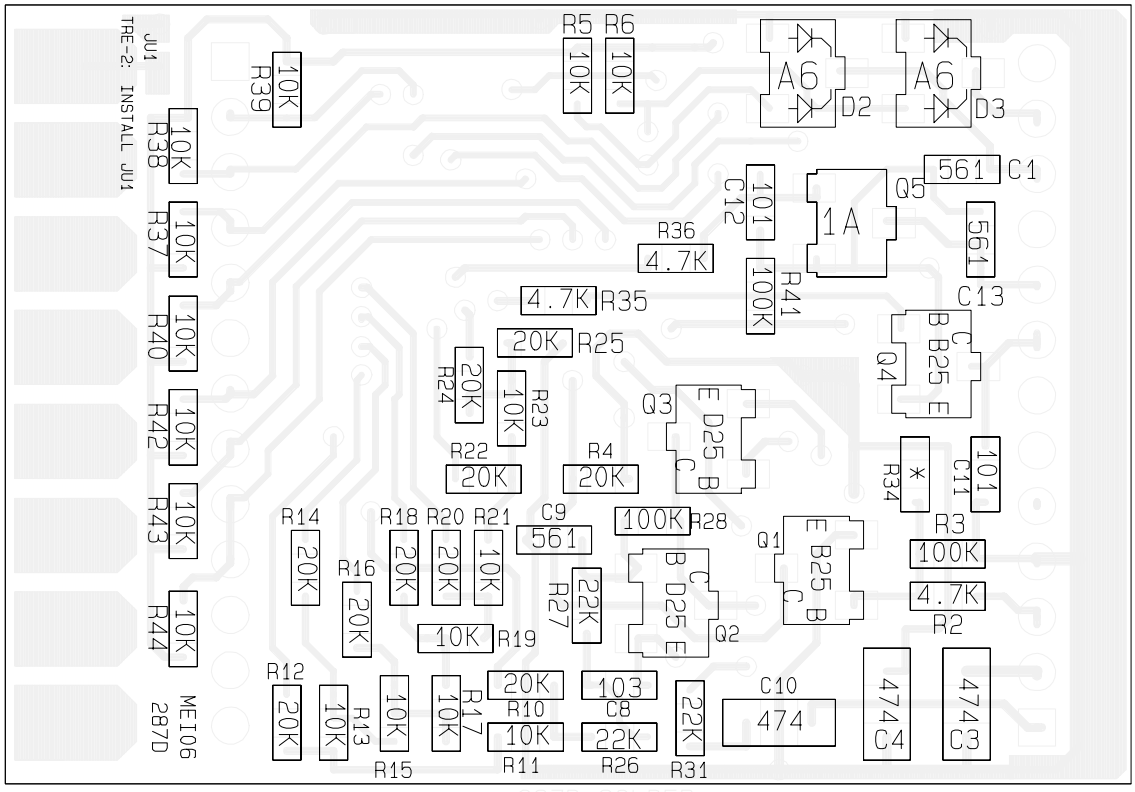
FILE NO. 287D.SCH
DWG.NO. 287D-HCD





* NOT INSTALLED

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DESIGN CJS	REV.JULY 19/06 AB		COPYRIGHT © 2006		