Custom

TA087-02-0000 Speaker and Channel Change Switch

Service Manual

M087-02-001, Issue 001 July 2000

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About This Manual

Scope This manual contains general, technical and servicing information about the TA087-02-0000.

Errors If you find an error in this manual, or have a suggestion on how it might be improved, please do not hesitate to contact the Technical Writer, Custom Solutions Development, Tait Radio System's Division, Tait Electronics Ltd, P.O. Box 1645, Christchurch, New Zealand.

Technical Information

Any enquiries regarding this manual or the equipment it describes should be addressed in the first instance to Custom Solutions Development, Tait Radio Systems Division, Tait Electronics Ltd, P.O. Box 1645, Christchurch, New Zealand.

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Date Of Issue

M087-02-001 Speaker and Channel Switch
Issue 001 published July 2000

1 Introduction

The TA0087-02-000 Speaker and Channel Switch is a channel change module for T800 Series II Base Stations. It replaces the TA087-01, which was designed to suit the T800 Series I Base Stations. The module requires the T800-08 programmable lead for programming.

The TA0087-02-000 module has the following features:

- Mounts in a standard T800 Series II rack
- Replaces the standard speaker and programming module
- Provides up to 256 programmable channel data entries - 99 for BCD coded entries
- Provides a simple channel change interface with auto-repeating UP/DOWN keys
- Provides opto coupled connection for remote control buttons
- Provides a clear 3 digit 7 segment LED display
- Provides an output connector for changing channels for other modules
- Provides a remote connector for selecting an index value of channel data blocks
- Provides an indication LED for REMOTE mode (See Sec 3.4.2)
- Provides auto revert from local mode
- Contains a unique serial number
- Provides an optional RS232C port for serial channel data output
- Provides a database and programming software
- Provides easy integration to T800 programming software
- Provides Binary or BCD mode, selectable during programming
- Provides programmable input logic: positive or negative

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2 Specifications

Supply	10.8 - 16V
Micro controller	68HC705C8
Dimensions	183 x 59 x 24mm
Weight	250gm
Environment	temperature range: -30 to +60C
	humidity: 95%
Modes	local or remote
No. of channels	Binary : 256
	BCD : 99
External up down inputs	opto coupled with current limitation
Display	3 digit 7 segment display
Programming	T800 ping-pong protocol
Optional	RS232 via 9 way D-socket

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3 Circuit Description

A 68HC705C8 microprocessor provides the required reading and writing of all I/O lines.

8 Logic outputs are generated from Port A of the micro to select the T800 module channels. The signals are available on D Range SK1. A loom to interface to the T800 rack panel comes as standard with the TA087-02-0000.

In remote mode, the processor reads the external inputs via Port B. Inputs can be active high or active low, depending the programming of the TA087-02-0000. A 9 way D-range socket provides easy access. The input ports are protected against positive and negative over voltage.

The serial I/O ports of the processor are used to communicate with the EEprom and to write to the output registers for the 7 segment displays.

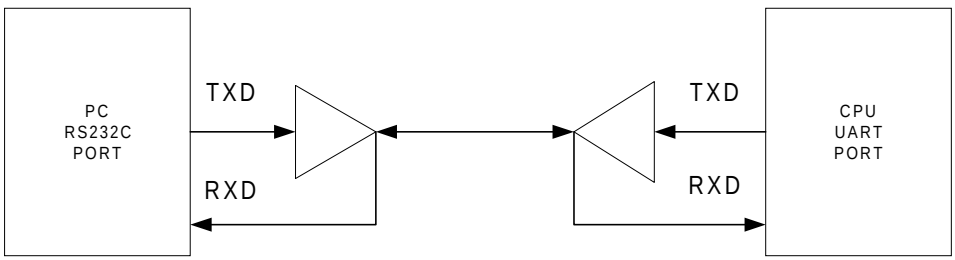
Programming Circuit

Programming takes place via the T800-08 programming cable. This cable limits the RS232 voltages to 5V. The processor in the TA087-02-0000 keeps IC10 (4053 analog switch) in Inhibit mode. An incoming data packet - 9600 baud, 1 stop and start bit - will generate an interrupt on pin 2 (IRQ) of the microprocessor. The processor will respond by changing the inhibit line on IC10 to +5V.

The same line puts an inhibit on the RS232 output into the micro. Control inputs A and B of IC10 are set high. This prevents R70 and R71 loading R62. Control input C, toggled by the incoming serial data packet, switches output Z between 0 and +5V via Z0 and Z1. The resulting signal constitutes the “ping” or RXD to the microprocessor. When the message is finished the serial comms line goes high impedance. The PC is now waiting for a response.

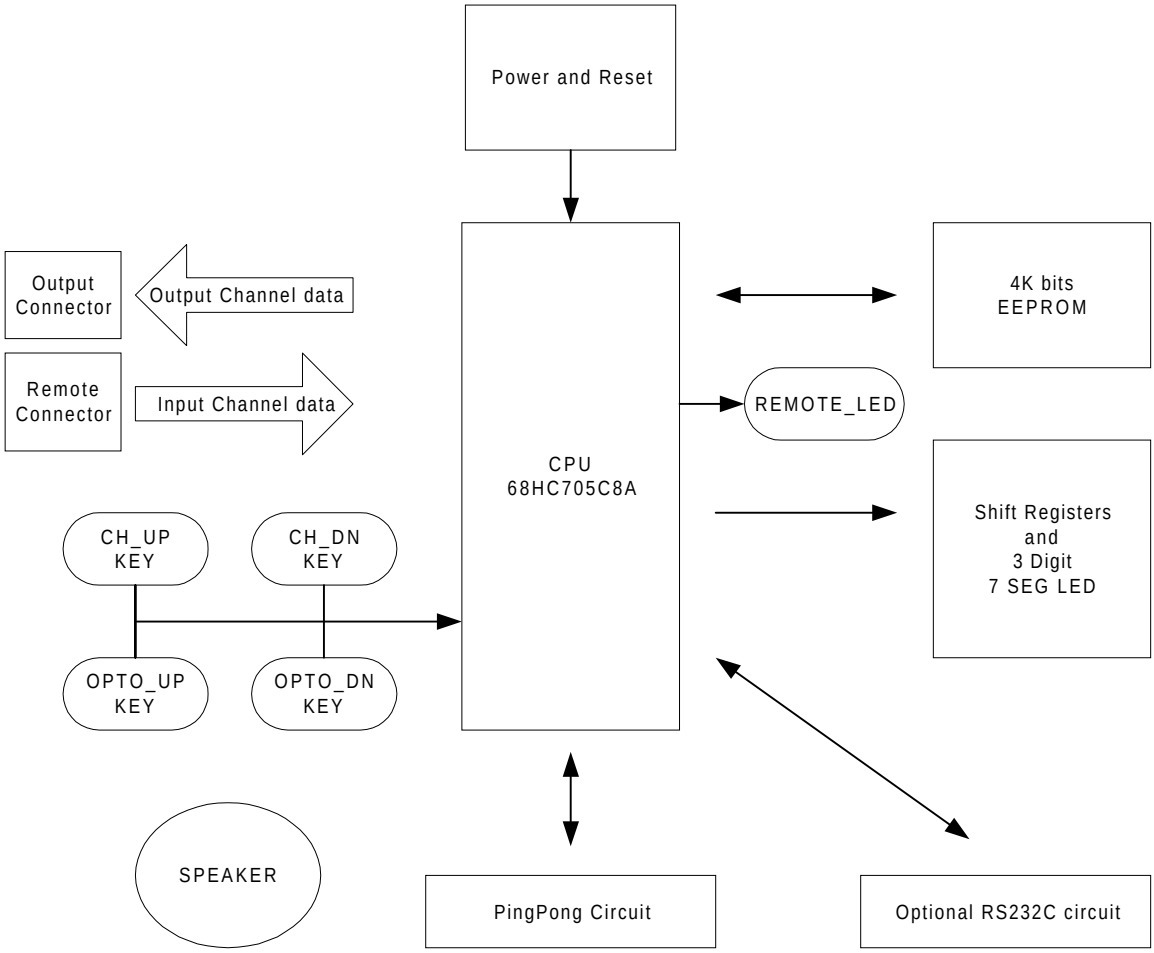
If the data packet contains the correct coding for the unit its processor responds with “pong” by toggling control lines A and B of IC10. The resulting signal at X and Y of IC10 forms the TXD signal.

At the end of the exchange the microprocessor reverts the inhibit line on IC 10 to high re-establishing communications between the microprocessor and the RS232 chip.



Up-down channel control

The up down buttons on the front panel are directly connected to two ports on the microprocessor. The opto couplers are connected in parallel with these two buttons and will go low when a current of at least 7mA flows through the input diode. Operation of the opto coupler is typically between +12V and a switch to Gnd.



Low voltage protection

A Low Voltage detector has been included in the unit to ensure proper shut down of the microprocessor to protect the database in the EEprom. When the +5V supply drops below 4.75V the output of IC9 switches to Gnd, providing reset to the micro and to the shift registers of the LED displays.

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4 PCB Information

SMD Parts

Ref	IPN	Description
C1	015-26100-08	CAP 100N 10% 50V X7R
C2	015-26100-08	CAP 100N 10% 50V X7R
C5	015-26100-08	CAP 100N 10% 50V X7R
C6	015-26100-08	CAP 100N 10% 50V X7R
C7	015-26100-08	CAP 100N 10% 50V X7R
C8	015-26100-08	CAP 100N 10% 50V X7R
C10	015-26100-08	CAP 100N 10% 50V X7R
*C11	015-26100-08	CAP 100N 10% 50V X7R
C20	016-08470-01	CAP 47U ELEC 16V 6.6*7.3MM SMD
C21	015-22390-01	CAP 39P 5% NPO 50V
C22	015-22390-01	CAP 39P 5% NPO 50V
C23	016-08470-01	CAP 47U ELEC 16V 6.6*7.3MM SMD
C25	015-26100-08	CAP 100N 10% 50V X7R
D1	001-10000-56	DIODE BAW56 DUAL SWITCH COMMON ANODE
D2	001-10000-99	DIODE BAV99 DUAL SW (PIN 3 IS ANODE/CATH)
D3	001-10000-56	DIODE BAW56 DUAL SWITCH COMMON ANODE
D4	001-10000-99	DIODE BAV99 DUAL SW (PIN 3 IS ANODE/CATH)
D13	001-10000-99	DIODE BAV99 DUAL SW (PIN 3 IS ANODE/CATH)
D16	001-10011-74	DIODE MRA4004T3 PWR RECTIFIER 400V 1A CASE
IC1	240-04020-42	SKT SMD FOR A PLCC44 CHIP CARRIER
IC2	002-12504-05	IC X250405C-700 512 BYTE SERIAL EEP-ROM
IC5	002-74905-95	IC 74HC595S 8-BIT SHIFT REG
IC6	002-74905-95	IC 74HC595S 8-BIT SHIFT REG
IC7	002-74905-95	IC 74HC595S 8-BIT SHIFT REG
IC8	002-74912-50	IC 74HC125T QUAD 3-STATE NONIN-VERT BUFFER
IC9	002-10340-64	IC MC34064D-5 LOW VOLTAGE INDICA-TOR
IC10	002-10040-53	IC 4053BD 2CH MUX/DEMUX
IC12	002-10020-59	IC MOC8101 OPTO COUPLER 250VAC
IC13	002-10020-59	IC MOC8101 OPTO COUPLER 250VAC
LK1	SOLDER-LINK	SOLDER LINK
LK2	SOLDER-LINK	SOLDER LINK
Q10	000-10008-48	TRANSISTOR BCW60/BC848 NPN AF
Q11	000-10008-48	TRANSISTOR BCW60/BC848 NPN AF
Q12	000-10008-48	TRANSISTOR BCW60/BC848 NPN AF
Q13	000-10008-48	TRANSISTOR BCW60/BC848 NPN AF
Q14	000-10008-48	TRANSISTOR BCW60/BC848 NPN AF
Q15	000-10008-48	TRANSISTOR BCW60/BC848 NPN AF
Q16	000-10008-48	TRANSISTOR BCW60/BC848 NPN AF
Q17	000-10008-48	TRANSISTOR BCW60/BC848 NPN AF
Q20	000-10003-00	TRANSISTOR BSR30 PNP
Q21	000-10003-00	TRANSISTOR BSR30 PNP
Q22	000-10085-71	TRANSISTOR BC857BW PNP
Q23	000-10085-71	TRANSISTOR BC857BW PNP
Q24	000-10085-71	TRANSISTOR BC857BW PNP
Q25	000-10085-71	TRANSISTOR BC857BW PNP
Q26	000-10085-71	TRANSISTOR BC857BW PNP
Q27	000-10085-71	TRANSISTOR BC857BW PNP
Q28	000-10085-71	TRANSISTOR BC857BW PNP
Q29	000-10085-71	TRANSISTOR BC857BW PNP
REG5V	002-10078-00	IC 78M05CDT 5V POS V REG
R9	036-16100-10	RES 100K 1%
R10	036-16100-10	RES 100K 1%
R11	036-16100-10	RES 100K 1%
R12	036-16100-10	RES 100K 1%
R13	036-16100-10	RES 100K 1%
R14	036-16100-10	RES 100K 1%
R15	036-16100-10	RES 100K 1%
R16	036-16100-10	RES 100K 1%
R17	036-16100-10	RES 100K 1%
R20	036-16100-10	RES 100K 1%
R21	036-15330-10	RES 33K 1%
R22	036-16100-10	RES 100K 1%
R23	036-15470-10	RES 47K 1%
R24	036-15330-10	RES 33K 1%
R25	036-16100-10	RES 100K 1%
R26	036-15470-10	RES 47K 1%
R27	036-15330-10	RES 33K 1%
R30	036-16100-10	RES 100K 1%
R31	036-15470-10	RES 47K 1%
R32	036-15330-10	RES 33K 1%
R33	036-16100-10	RES 100K 1%
R34	036-15470-10	RES 47K 1%
R35	036-15330-10	RES 33K 1%
R36	036-16100-10	RES 100K 1%

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Ref	IPN	Description
R37	036-15470-10	RES 47K 1%
R40	036-15330-10	RES 33K 1%
R41	036-16100-10	RES 100K 1%
R42	036-15470-10	RES 47K 1%
R43	036-15330-10	RES 33K 1%
R44	036-16100-10	RES 100K 1%
R45	036-15470-10	RES 47K 1%
R46	036-15330-10	RES 33K 1%
R47	036-15470-10	RES 47K 1%
R50	036-16100-10	RES 100K 1%
R52	036-16100-10	RES 100K 1%
R53	036-17100-10	RES 1M0 1%
R54	036-15100-10	RES 10K 1%
R55	036-13100-10	RES 100E 1%
R56	036-13470-00	RES 470 5%
R57	036-16100-10	RES 100K 1%
R61	036-16100-10	RES 100K 1%
R62	036-14470-10	RES 4K7 1%
R63	036-16100-10	RES 100K 1%
R64	036-16100-10	RES 100K 1%
R65	036-13560-10	RES 560 1%
R66	036-16100-10	RES 100K 1%
R70	036-14470-10	RES 4K7 1%
R71	036-14470-10	RES 4K7 1%
R73	036-15100-10	RES 10K 1%
R74	036-15100-10	RES 10K 1%
R75	036-13100-10	RES 100E 1%
R76	036-13470-00	RES 470 5%
R77	036-15100-10	RES 10K 1%
R81	036-16100-10	RES 100K 1%
R82	036-16100-10	RES 100K 1%
R83	036-16100-10	RES 100K 1%
R84	036-15100-10	RES 10K 1%
R85	036-15100-10	RES 10K 1%
R86	036-13560-10	RES 560 1%
R87	036-13560-10	RES 560 1%
R90	036-13560-10	RES 560 1%
R91	036-13560-10	RES 560 1%
R92	036-13560-10	RES 560 1%
R93	036-13560-10	RES 560 1%
R94	036-13560-10	RES 560 1%
R95	036-13560-10	RES 560 1%
R96	036-13560-10	RES 560 1%
R97	036-13560-10	RES 560 1%
R100	036-13560-10	RES 560 1%
R101	036-13560-10	RES 560 1%
R102	036-13560-10	RES 560 1%
R103	036-13560-10	RES 560 1%
R104	036-13560-10	RES 560 1%
R105	036-13560-10	RES 560 1%
R106	036-13560-10	RES 560 1%
R107	036-13560-10	RES 560 1%
R110	036-13560-10	RES 560 1%
R111	036-13560-10	RES 560 1%
R112	036-13560-10	RES 560 1%
R113	036-13560-10	RES 560 1%
R114	036-13560-10	RES 560 1%
R115	036-13560-10	RES 560 1%
R116	036-15100-10	RES 10K 1%
R117	036-15100-10	RES 10K 1%
R118	036-15100-10	RES 10K 1%
R119	036-15100-10	RES 10K 1%
R120	036-15100-10	RES 10K 1%
R121	036-15100-10	RES 10K 1%
R122	036-15100-10	RES 10K 1%
R123	036-15100-10	RES 10K 1%
X1	274-10014-00	XTAL FILTER 4mHz

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Non-SMD Parts

Ref	IPN	Description
DOWN	232-00010-23	PUSH BUTTON SWITCH MOMENTARY
IC1	002-20068-07	IC MC68HC705C8FN 1-TIME PROG MICRO (MECH PART)
LED1	008-00020-10	LED HLMP-7503 7 SEGMENT DISPLAY COMMON CATHODE
LED2	008-00020-10	LED HLMP-7503 7 SEGMENT DISPLAY COMMON CATHODE
LED3	008-00020-10	LED HLMP-7503 7 SEGMENT DISPLAY COMMON CATHODE
PL3	240-04023-00	RJ11 SOCKET BULK HEAD
REMOTE	008-00010-11	LED HLMP-1385 3mm RED DIFFUSE HI EFFICIENCY 10MCD
SK1	240-04020-54	SKT 16WAY 2X8 AMP MICRO MATCH TOP ENTRY
SK1A	240-02020-15	SKT 15WAY DRANGE TOP ENTRY ATDB50015FA55T1G
SK2	240-02020-28	SKT 9WAY DRANGE TOP ENT HAS MTG HARDWARE
SK3	240-04020-53	SKT 6WAY 2X3 AMP MICRO MATCH TOP ENTRY
SK4	240-02020-28	SKT 9WAY DRANGE TOP ENT HAS MTG HARDWARE
SPEAKER	240-00020-72	HEADER PLUG 2WAY AMP ULTREX TOP ENTRY
SPK1	252-00010-55	SPEAKER 40MM 16E
UP	232-00010-23	PUSH BUTTON SWITCH MOMENTARY

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Mechanical Parts

IPN	Description
319-30051-00	SPACER
240-00020-53	PLIUG 6W 2X3 FLAT CABLE
205-00010-13	FLAT CABLE
220-01587-01	PCB RJ11 B/HD RACK DUAL SER II
232-00010-23	SWITCH KEYBD SPST NONLATCH
201-00030-04	WIRE T/C 7/0.2MM PVC YELLOW
201-00030-10	WIRE T/C 7/0.2MM PVC BLACK
240-04020-76	SKT RECEP CRIMP 4 ULTREX HOUS
369-01039-00	ADHESIVE RING 40MM (ORCA SPKR)
240-04020-72	SKT HOUSING 2W CORD MTG ULTREX
232-02021-00	KEYTOP A4M2326 BLACK UP/DOWN
312-01041-00	LENS A3M2286 LED DISPLAY WINDO
316-06522-01	PNL FRT TA087-01 SII SCRND CMP
316-06666-00	PNL FRT SUB-CHASSIS PCB 8mm
349-00020-55	SCRW M3*8 P/P T/T BLCKZNC CHRM
352-00010-08	NUT M3 COLD FORM HEX ST BZ
232-00020-23	KEYBASE 6MM SQ 4 232-00010-23
219-02661-00	CABLE FOR TA087-XX TO SII RACK
219-02698-00	T800-15-XXXX SPKR/PROGRAM LEAD

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Grid References

Device	PCB	Circuit
C1	2:B5	1-J5
C2	2:C4	1-L4
C5	1:D10	1-P9
C6	1:C11	1-P7
C7	1:B11	1-P4
C8	1:B7	1-R0
C10	2:B4	1-K2
*C11	1:A5	1-Q2
C20	2:A9	1-H0
C21	2:B4	1-H1
C22	2:B5	1-H1
C23	2:D9	1-J0
C25	2:B9	1-J0
*C36	1:B4	1-P2
*C37	1:B4	1-P2
*C43	1:B4	1-R2
*C44	1:B4	1-R2
D1	1:A3	1-H7
D1	1:A3	1-H7
D2	1:A3	1-H8
D2	1:A3	1-H8
D3	1:A2	1-K7
D3	1:A2	1-L7
D4	1:A3	1-L8
D4	1:A3	1-L8
D13	2:B4	1-H1
D13	2:B4	1-J0
D16	2:A8	1-G0
DOWN	1:B8	1-M1
IC1	2:C6	1-G2
IC2	2:C4	1-L3
IC5	2:D11	1-N8
IC6	2:B11	1-N5
IC7	2:A11	1-N3
IC8	1:B6	1-N1
IC8	1:B6	1-R0
IC8	1:B6	1-N2
IC8	1:B6	1-N1
IC8	1:B6	1-G1
IC9	1:B11	1-L5
IC10	2:B4	1-K0
*IC11	1:A4	1-Q1
IC12	2:A4	1-J7
IC13	2:A3	1-M7

Device	PCB	Circuit
LED1	1:C10	1-R8
LED2	1:B10	1-R6
LED3	1:B10	1-R3
LK1	2:A7	1-J5
LK2	2:D7	1-K5
PL3	2:	1-P0
Q10	2:A7	1-E8
Q11	2:B7	1-E7
Q12	2:B7	1-D7
Q13	2:B7	1-D6
Q14	2:C7	1-C6
Q15	2:C7	1-C6
Q16	2:C7	1-B5
Q17	2:D7	1-B5
Q20	1:A3	1-J8
Q21	1:A3	1-L8
Q22	1:D4	1-E3
Q23	1:D4	1-E3
Q24	1:D4	1-D2
Q25	1:D2	1-D2
Q26	1:D3	1-D1
Q27	1:D3	1-C1
Q28	1:D3	1-C1
Q29	1:D3	1-B0
R9	1:B11	1-L6
R10	1:C5	1-B3
R11	1:D5	1-B3
R12	1:D5	1-B2
R13	1:D5	1-B2
R14	1:D5	1-B1
R15	1:D5	1-B1
R16	1:D5	1-B1
R17	1:D5	1-B0
R20	2:B9	1-E8
R21	1:D4	1-E3
R22	2:B9	1-E8
R23	2:B7	1-F8
R24	1:D4	1-D3
R25	2:B9	1-D7
R26	2:B7	1-E7
R27	1:D4	1-D2
R30	2:C9	1-D7
R31	2:B7	1-E7
R32	1:D2	1-D2

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Device	PCB	Circuit
R33	2:C9	1-C6
R34	2:B7	1-D6
R35	1:D3	1-C2
R36	2:C9	1-C6
R37	2:C7	1-D6
R40	1:D3	1-C1
R41	2:C9	1-B5
R42	2:C7	1-C6
R43	1:D3	1-B1
R44	2:C9	1-B5
R45	2:C7	1-C5
R46	1:D3	1-B0
R47	2:D7	1-B5
R50	1:B6	1-G5
R52	2:B6	1-G5
R53	2:B5	1-H2
R54	2:A4	1-H7
R55	1:A3	1-J8
R56	2:A3	1-J7
R57	1:D7	1-K5
R61	2:B6	1-J5
R62	2:B4	1-J1
R63	1:B5	1-J4
R64	1:B7	1-N1
R65	2:B9	1-J5
R66	2:C4	1-K4
R70	2:B5	1-L1
R71	2:B5	1-L0
R73	2:A3	1-L7
R74	2:B9	1-L2
R75	1:A2	1-L8
R76	2:A3	1-L7
R77	2:C9	1-L2
R81	2:C4	1-M4
R82	2:C4	1-M4
R83	2:C4	1-M4
R84	1:B5	1-P2
R85	1:B5	1-P2
R86	2:C11	1-P9
R87	2:D10	1-P8
R90	2:D10	1-P8
R91	2:C11	1-P6
R92	2:C11	1-P6
R93	2:B11	1-P6
R94	2:B11	1-P4
R95	2:A10	1-P4
R96	2:A10	1-P3
R97	2:D10	1-Q9
R100	2:D10	1-Q8
R101	2:D10	1-Q8
R102	2:C11	1-Q6
R103	2:B11	1-Q6

Device	PCB	Circuit
R104	2:B11	1-Q6
R105	2:B10	1-Q4
R106	2:A10	1-Q4
R107	2:A10	1-Q3
R110	2:D10	1-Q8
R111	2:D10	1-Q8
R112	2:C11	1-Q6
R113	2:B11	1-Q6
R114	2:A10	1-Q4
R115	2:A10	1-Q4
R116	1:C4	1-E3
R117	1:C4	1-E2
R118	1:C4	1-D2
R119	1:C2	1-D2
R120	1:C3	1-D1
R121	1:C3	1-C1
R122	1:C3	1-C0
R123	1:C3	1-B0
REG5V	2:A9	1-H0
REMOTE	1:B9	1-J4
SK1	2:C9	1-A9
SK1A	2:B8	1-B9
SK2	2:D6	1-D9
SK3	2:C4	1-E9
SK4	2:A6	1-G9
SPEAKER	2:B2	1-L1
SPK1	2:	1-M0
UP	1:C8	1-M2
X1	2:A4	1-H2

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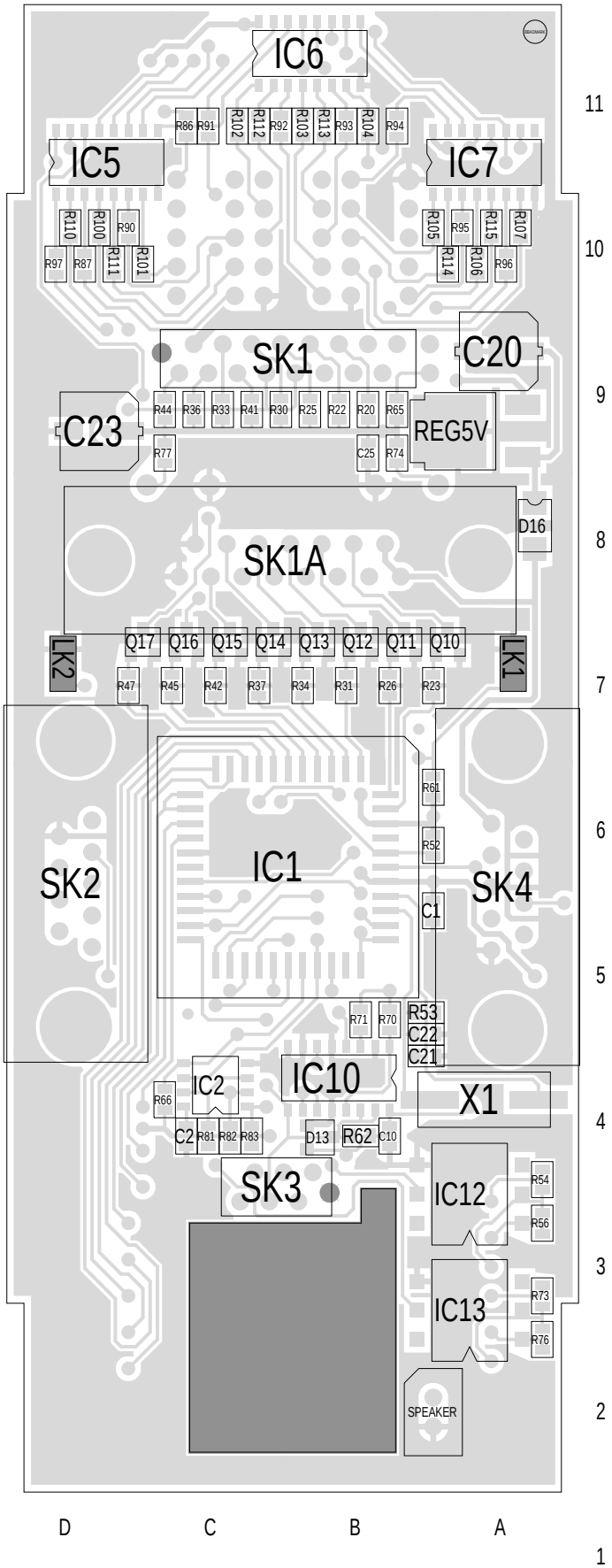
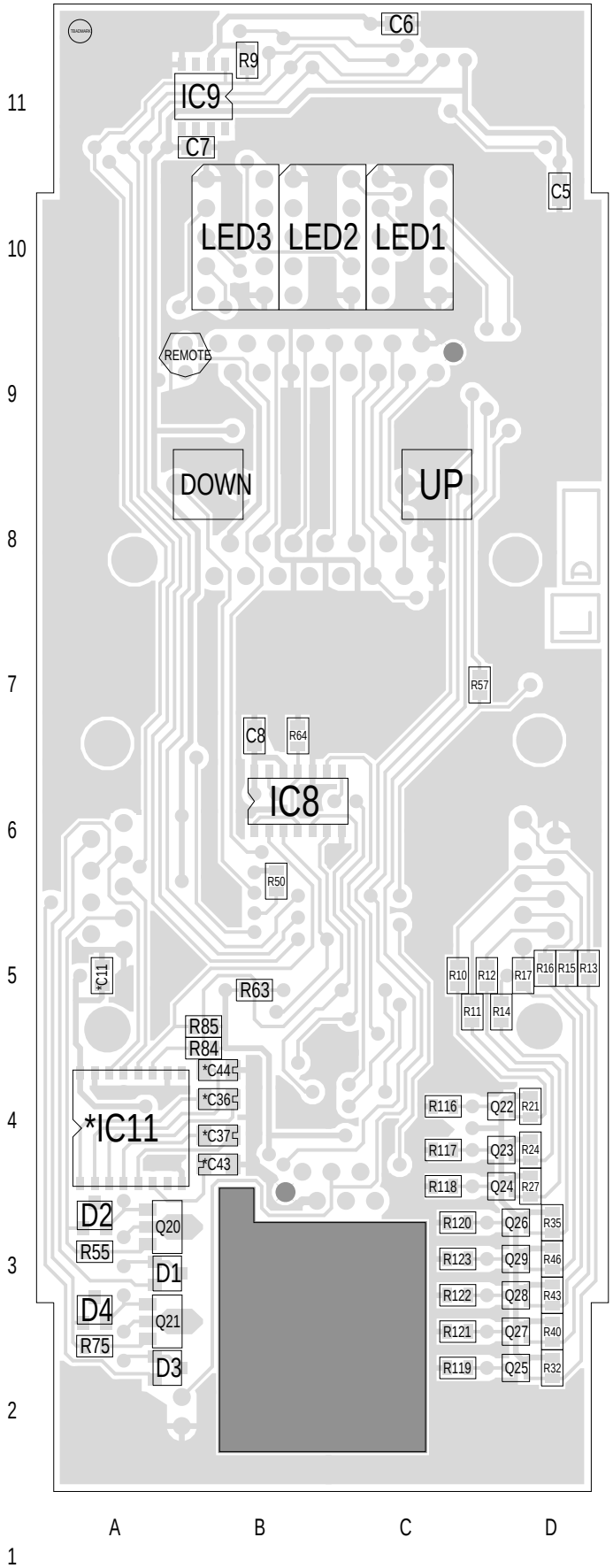


TA087-02-0000 PCB IPN 227-08701-02 Bottom Side



TA087-02-0000 PCB IPN 227-08701-02 Top Side

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SK1 2X8 WAY TOP ENTRY SKT

SK1A 15 WAY DRANGE SKT

SK2 SKT 9 WAY DRANGE TOP ENT

SK3 SKT 6WAY TOP ENT
SOCKET RJ11 BULKHEAD

SK4 SKT 9 WAY DRANGE TOP ENT

TBADMARK BADMARK

BBADMARK BADMARK

CH-SELECT-1

CH-SELECT-2

CH-SELECT-3

CH-SELECT-4

CH-SELECT-5

CH-SELECT-6

CH-SELECT-7

CH-SELECT-8

Q10 BC848 R20 100K R23 47K

Q11 BC848 R22 100K R26 47K

Q12 BC848 R25 100K R31 47K

Q13 BC848 R30 100K R34 47K

Q14 BC848 R33 100K R37 47K

Q15 BC848 R36 100K R42 47K

Q16 BC848 R41 100K R45 47K

Q17 BC848 R44 100K R47 47K

SK4 OPTO-KEY-UP+

SK4 OPTO-KEY-UP-

D2 BAV99 R55 100E Q20 BSR30 R54 10K R56 470

D1 BAV99 D1 BAV56 BAV56

KEY-UP IC12 250VAC

SK4 OPTO-KEY-DOWN+

SK4 OPTO-KEY-DOWN-

D4 BAV99 R75 100E Q21 BSR30 R73 10K R76 470

D3 BAV99 D3 BAV56 BAV56

KEY-DOWN IC13 250VAC

RESET

MC34064D IC9 LVI R9 100K

IC1 68HC705C8FN

RESET VPP VCC IRQ TCAP PA7 PA6 PA5 PA4 PA3 PA2 PA1 PA0 PB7 PB6 PB5 PB4 PB3 PB2 PB1 PB0 PD7 TCMP SS/PD5 SCK/PD4 MOSI/PD3 MISO/PD2 TDO/PD1 RDI/PD0 PC7 PC6 PC5 PC4 PC3 PC2 PC1 PC0 OSC1 OSC2 GND

C1 100N R50 100K R52 100K R53 1M X1 4M C21 39P C22 39P

LK1 LK2 R61 100K R63 100K R65 560E R57 100K R66 100K

REMOTE RED HI DIFF

IC2 X250405C EPROM

SI SCK SO WP CS HOLD GND

C2 100N R81 100K R82 100K R83 100K

IC5 74HC595 SHIFT REG

IC6 74HC595 SHIFT REG

IC7 74HC595 SHIFT REG

C5 C6 C7 100N

R86 R87 R90 R97 R100 R101 R110 R111 560E

R91 R92 R93 R102 R103 R104 R112 R113 560E

R94 R95 R96 R105 R106 R107 R114 R115 560E

LED1 HDSP-7503

LED2 HDSP-7503

LED3 HDSP-7503

IP8 IP7 IP6 IP5 IP4 IP3 IP2 IP1

R10 R11 R12 R13 R14 R15 R16 R17 100K

Q22 BC857W R21 33K R116 10K

Q23 BC857W R24 33K R117 10K

Q24 BC857W R27 33K R118 10K

Q25 BC857W R32 33K R119 10K

Q26 BC857W R35 33K R120 10K

Q27 BC857W R40 33K R121 10K

Q28 BC857W R43 33K R122 10K

Q29 BC857W R46 33K R123 10K

IC8 74HC125

D13 BAV99

78M05CDT REG5V VREG VIN VOUT GND

D16 400V C20 47U C23 47U C25 100N

+13V8 SK1 SK1A SK4

C10 100N R62 4K7 IC10 4053BD R70 4K7 R71 4K7

SERIAL-COM

SPEAKER 2 WAY PLUG SPK1 16OHM

SK3 SERIAL-COM SPKR+ GND

SPKR+ SK1

UP PUSH BUTTON

DOWN PUSH BUTTON

R74 10K R77 10K R84 10K R85 10K R64 100K

IC8 74HC125

C11 100N C36 1U0 TANT C37 1U0 TANT C43 1U0 TANT C44 1U0 TANT

IC11 MAX232 C1+ C1- C2+ C2- V+ 5/10V+ 5/10V- T2IN T1IN R1OUT R2OUT T2OUT T1OUT R1IN R2IN GND

RS232-TXD RS232-RXD GND

PL3 6 EDGE CONN PINS

C8 100N

QTY: 1.0	IPN: 002-20068-07	IC MC68HC705C8FN 1-TIME PROG MICRO (MECH PART)				

REV/ISS	AMENDMENTS	DRAWN	CHKD	D.O.	APVD	DATE
1A	SECONDPROTOTYPE	M.HALL	C.PARK	M.HALL	JACKSON	07/04/00
P1	PROTOTYPE	M.HALL	P.V.D.M.	D.ELDER	S.CRAGG	09/05/94

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TA087-02-0000
SPEAKER & CHANNEL SWITCH BOARD

IPN:	ISSUE:	ID:
227-08701-02	A	2.SC. 1

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO.SHEETS:
TA087-01	C.P.	a008712a	11-May-00	1

5 Cable and Connector Specifications

Programming and speaker connector

The programming connector uses the 6 pin RJ11 connector (PL3).

Pin No.	Description
1	N/C
2	N/C
3	SERIAL_COMM
4	SPEAKER_+IVE
5	GND
6	N/C

Channel output connector

The channel output connector uses two connectors, one 16 pin micromatch connector (SK1) and one 15 pin D-range connector (SK1A).

16 pin micromatch (SK1)		15 pin D-range (SK1A)	
Pin No.	**Description**	**Pin No.**	**Description**
1	CH-SELECT-8	1	GND
2	GND	2	CH-SELECT-6
3	CH-SELECT-6	3	CH-SELECT-7
4	CH-SELECT-5	4	N/C
5	CH-SELECT-7	5	N/C
6	CH-SELECT-4	6	N/C
7	SPEAKER_+IVE	7	N/C
8	CH-SELECT-3	8	+13V
9	SPEAKER_+IVE	9	GND
10	CH-SELECT-2	10	CH-SELECT-5
11	GND	11	CH-SELECT-4
12	CH-SELECT-1	12	CH-SELECT-3
13	GND	13	CH-SELECT-2
14	N/C	14	CH-SELECT-1
15	+13V	15	+13V
16	N/C		

Channel input connector

The channel input connector uses a 9 pin D-range connector (SK2).

Pin No.	Description
1	IP1
2	IP2
3	IP3
4	IP4
5	IP5
6	IP6
7	IP7
8	IP8
9	GND

Opto-coupled remote control and Optional serial channel data output connector

This connector uses the 9 pin D Range connector (SK4) - optional in later models.

Pin No.	Description
1	+13V
2	RS232-TXD
3	RS232-RXD
4	OPTO_KEY_UP+
5	GND
6	OPTO_KEY_UP-
7	OPTO_KEY_DOWN+
8	OPTO_KEYDOWN-
9	N/C

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6 Installation

1. Mount the module in the rack in the allocated slot and connect it to the rack via the 219-02661-00 cable supplied. The cable plugs into the BACKPLANE PCB at the rear of the rack.
2. Set the 8 pin DIP switches located on the BACKPLANE PCB to OFF
3. Ensure that the receiver and transmitter modules are programmed to the correct frequencies with PGM800Win.
4. To program the Channel Change module use the standard T800 Series II programming cable to connect to a PC. Run PGM S/W: TA2213A914 under Windows. Refer to the Programming section, if more detailed information is required.
5. If the module needs to be set up for external channel selection and monitoring, refer to Operation section.

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7 Operation

The TA087-02-0000 module operates either in Local Mode or in Remote Mode. The mode in which the module powers up is determined by the module programing.

If no channel data have been programmed into the module, the display will blink "E" and the keys will not operate.

If a channel label exceeds 999, the display will show "- - -".

If the channel label is set to “BLANK”, the display will show "_ _ _".

Local Mode

If Local Mode is set in the programming software, the module will power up in Local Mode.

In Local Mode, channel selection takes place via the up and down buttons. When either button is pressed the displays starts blinking with the new channel selected and remains blinking for 3 seconds after release of the button. When the blinking times out, the actual channel information is downloaded to the outputs of the module.

Following the highest channel, the display shows "- - -" for 3 seconds and then wraps around to the first channel, and visa versa.

When Remote Mode was programmed the module will revert to Local Mode when either Up or Down button is pressed.

To change from Local Mode to Remote Mode

Manual

Select "- - -" with the up down buttons and release the button. After 3 seconds the module will change to REMOTE Mode.

Automatic

When the Remote Revert Time is set to 0 during programming, the module will not automatically revert to Remote mode. If the Remote Revert Time is set to any other non-zero value, the module will revert to Remote Mode. The time window is between 0 and 255 minutes. This feature avoids the situation whereby the technician forgets to revert the module to Remote, rendering the base station inoperable.

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Remote Mode

A red LED on the front panel of the module indicates the Remote Mode

To Select Remote Mode

Automatically

At Power up if the Remote Mode was set during programming

From Local Mode when the Remote Revert Time was set to a non zero value during programming

Manually

From Local mode, select "- - -" with the up and down buttons and release the buttons. After 3 seconds the module will change to Remote Mode.

Inputs in Remote Mode

The module accepts 8 binary / BCD inputs in the Remote mode with standard or polarity reversed logic levels. The inputs are available on a 9 way D Range Socket PL2.

pin 1: Ch Select 0

pin 2: Ch Select 1

. . . . . .

pin 8: Ch Select 7

pin 9: Gnd

Logic 1 = high (5V or higher) or open collector. The module provides 10k pull up to +5V. Logic 0 is 0V

For Binary input with standard logic

CH 0 00000000

CH 1 00000001

. . . . . .

CH 127 01111111

For BCD input with standard logic

CH 0 0000 0000

CH 1 0000 0001

. . . . . .

CH 127 1001 1001

If the value of the remote inputs is higher than the highest channel programmed in the module, the display will display the programmed default label and outputs the programmed default channel.

Outputs in Remote Mode

Channel select outputs to the radio follow the T800 format

The optionally available RS232 output to read the channel label of the current channel, is at present only available in hardware. Specification of the communication protocol is yet to be specified.

Speaker

The speaker in the TA0087-02-0000 is automatically connected to the Back Plane of the T800 rack. For reasons of convenience the speaker signals are also available on the programming connector at the back of the of the TA087-2-0000 module via a 6 way micromatch connector, or at the front via the RJ11 connector.

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8 Programming

Requirements

- IBM compatible PC with 800x600 screen resolution running Windows95 or better
- T800 Programming lead
- PGM087: TA2213A914

1. 1. Run TA2213A914.EXE.

The Home Page looks as follows:

Com Port select

Select "Communications" on the Menu Bar, select "Comport" and select "Com1 or Com2".

Printing

Select "File" and "Print" on the Menu Bar and

Poll Rack

Click on " **Poll Rack** " to show the equipment in the rack. The list is display only.

Click on " **Exit** " to return to the Home Page

Read System

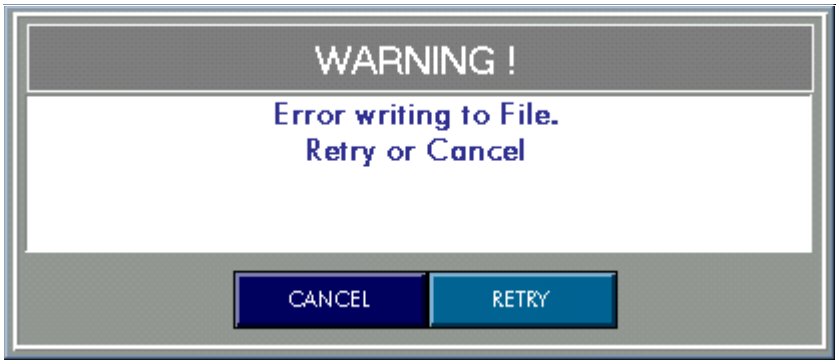
This button will bring up a selection screen, displaying the TA0087 modules only.

Select the TA0087 module you want the address by clicking on its serial number. The click on " **OK** ".

The program will now link to the module. The LED display of the TA0087 module will show " -L- ". The programming software will display a green field " linked" to the module selected.

Following a successful read the System Page will be displayed

In the event an error is made with changes the following warning message will be displayed



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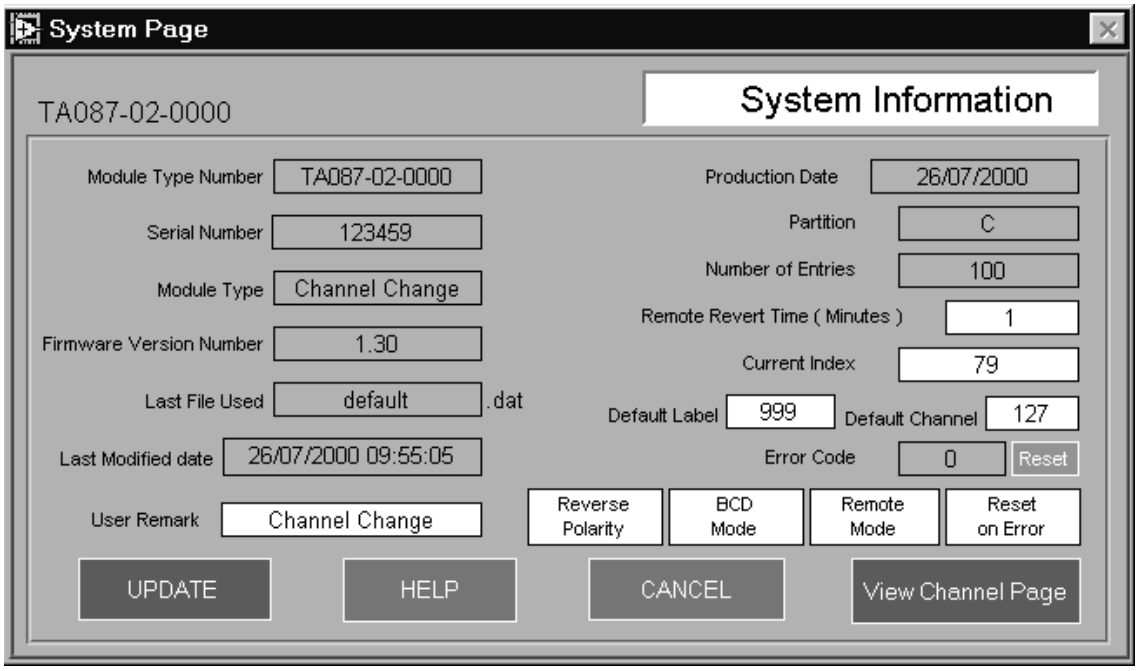
System Page



User modifiable fields are white, others are grey

Remote Revert Time

Enter any value between 0 and 255. The number entered gives in minutes the time the module takes to revert to Remote Mode after the module was put in Local Mode.

When 0 is entered the module will not revert to Remote Mode.

Current Index

This field determines the channel the TA0087 will point to upon power up in Local Mode. The number relates to the first column of channel data information. Click on " **View Channel Data** " for a quick glance.

Rerverse Polarity

BCD Mode

Local Mode or Remote Mode

Selection of the mode by this button determines the operating mode upon power up.

Reset on Error

The software of the TA0087 module checks for processing errors and records the nature of the error. If the Reset on Error flag is set to " **No Reset on Error** ", the module will stop operating, display " Exx ". The module will exit this mode either by a power cycle or by the reset directive from the programming software. Refer to " **Restart Module** " on the home page.

If the Reset on Error is chosen, the module will store the error code and reset its processor. *Will it still work?*

The following fields will be automatically updated

" **Last File used** "

" **Last Modified Date** "

" **Number of Entries** "

Update

When changes to the System Page are complete, click on the " **Update** " button. The software holds the information but does not write to the TA0087 module.

Exit

Click on " Exit " to return to the Home Page without saving any changes made.

View Channel Data

This button brings up the Channel Data Page, provided it has been opened before by the " **Read Channel Data** " on the Home Page.

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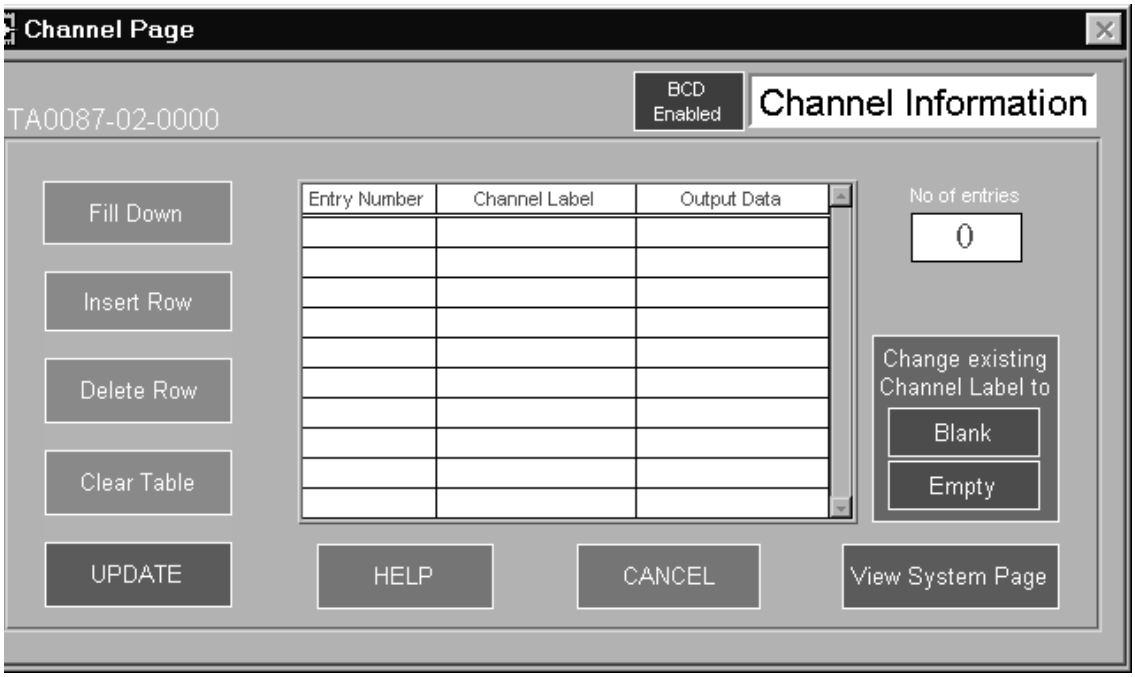
Channel Data Page

Click on the " **Read Channel Data/All** " button on the Home Page. The display will look as follows



It will take about 20 seconds to read and display a channel information page with 64 for entries.

The first column on the page shows a numeric listing of all channels entered, which is automatically updated when changes are made. The number in this list is used on the System Page for the " **Current Index** "

The second column requires input from the operator to show the channel labels. The column accepts any number between 0 and 999. Alphanumeric characters will not be accepted.

Multiple entries are allowed. The program will display a warning message at the first multiple entry. If the message is ignored, no further warnings for multiple entries will pop up. Otherwise the warning message will keep coming.

In the third column the operator has to enter the actual channel number to input to the RF modules. Any value between 0 and 127 will be accepted. There will be no multiple entry warnings for this column.

Channel Labels

Add a row

To add a channel to the list places the cursor below the last entry in any column. Use SHIFT-ARROW to move to the other columns and enter data as required. The first column will automatically adjust.

Insert a row

Place the cursor in the field below the line to be inserted and click on " **Insert Line** ".

Edit the new Line as above.

Delete a row

Place the cursor in any field of the line to be deleted and click on " **Dell Line** ". The first column will update itself automatically. Make sure that the " **Current Index "** is still correct.

Clear Table

Clears all three columns

Update

As with the System page the program stores the changes but does not write to the module as yet. The program returns to the Home Page for further instructions.

Exit

Click on " Exit " to return to the Home Page without saving any changes made.

View System Data

This button brings up the System Data Page. Note that this display is view only.

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Home Page

Program the module

Click on the " **Write System** ", " **Write Channel** " or " **Write All** " to reprogram the module as required.

" **Write System** " updates the System Page only.

" **Write Channel** " updates the Channel Data plus the " N**umber of Entries "** and the " **Last programmed date and time** " of the System Page.

Following completion of a write the display will show " Write OK " or " Write Fail ".

When fail, try again. Otherwise refer to the service manual for trouble shooting.

Link/Unlink

Click on "Link " to display a list of TA0087 modules one can link to. Click on the serial number to link to a module.

Click on Unlink for the opposite

Restart

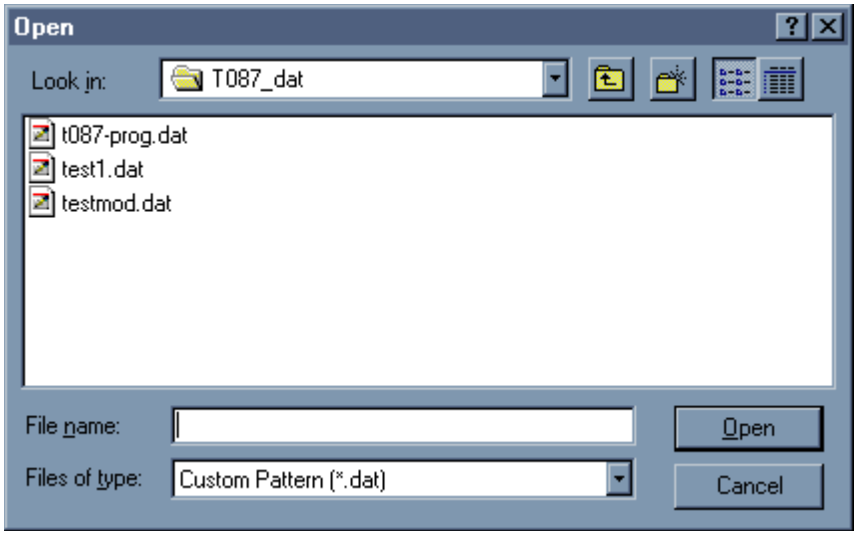
This button reboots the CPU in the TA0087.

New / Clear

Resets all variables in the program to allow you to start from scratch starting with the System Page.

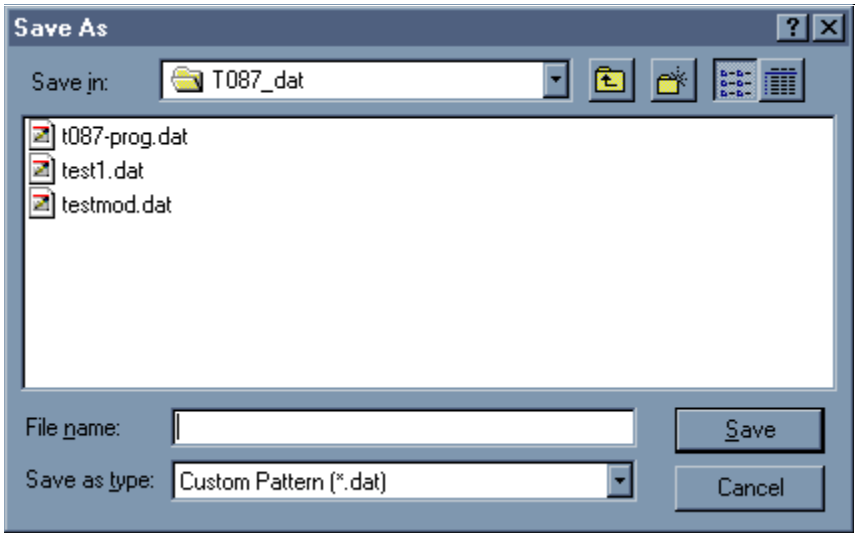
Open File

Standard Windows feature



Save to File

Standard Windows feature



The remaining " Display ... " buttons display as described and cannot be modified by the operator.

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9 Fault Finding

Supply problems

The unit derives its power from the T800 rack plane PCB.

Check for 13.8V and +5V at in and output of the regulator IC at C20 and C23.

1. Without +13.8V at C20 check cable and T800 rack plane PCB.
   If no +5V, check VREG for levated temperature. A short on the board will cause the regualtor to heat up. A faulty regulator will be cold. Replace regulator as required.
2. 5V regulator voltage low: Disconnect all cables - except the power cable. Check for components heated up. Use your judgement to either replace the component or check it's output for overloaded conditions. Also check for dry joints on inputs.

No channel selection

The unit does not respond to neither local nor remote inputs.

1. Check database by reading the unit. If OK skip 2 and 3
2. Check reset input of microprocessor. Make sure input level is +5V. If not check power supply and follow up with procedure for 5V reg.
3. Check oscillator running at 4MHz. Replace Xtal first followed by micro if still not succesfull.
4. Check IRQ input should be +5V. If not work your way back through IC8 and IC 10 to the serial com input. Make sure that the inhibit input at IC10-6 is 0V.
5. Check logic levels for up and down signals on the processor IC1 pin26 & pin 27. If low check opto-couplers.

No Display

1. Check the programming of the unit
2. Check for presence of Data, Clock Latch Enable on IC5, 6 and 7, while toggling the up down buttons.
3. No RS232 response

RS232 is not yet supported in software

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10 IC Data Sheets

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