TA348-01 1200/2400 Baud Modem PCB

Service Manual

For Operation in a T201X Radio

M348-01-001

Issue 01

February 2000

About This Manual

Scope This manual contains general, technical and servicing information about the TA348-01.

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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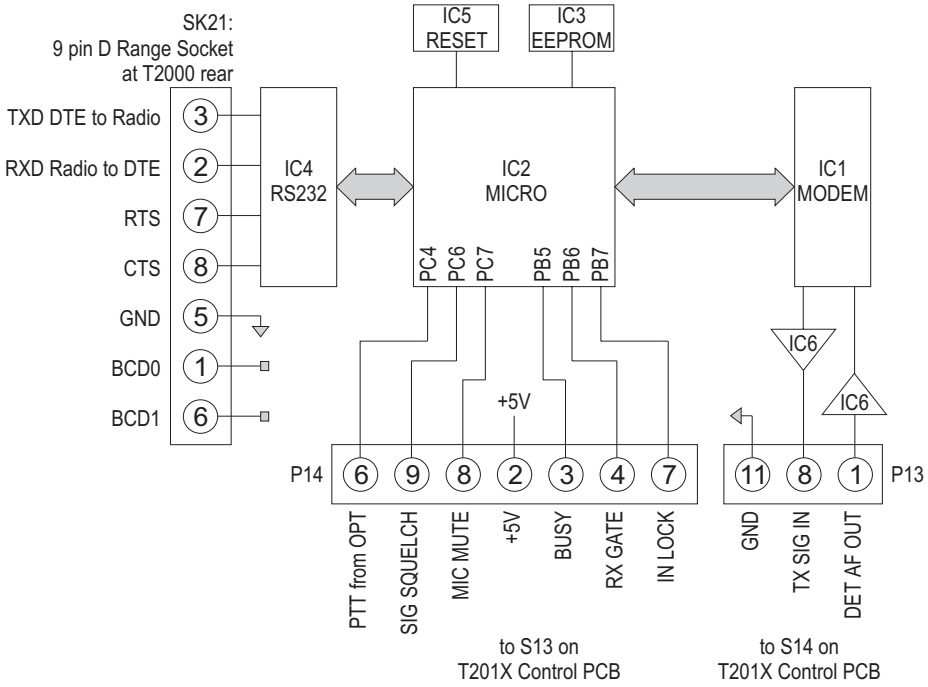
1 Operation

1.1 Introduction

The 1200/2400 baud modem is based on the CML FX469 modem IC controlled by an integral Motorola 68HC805C8 microprocessor.

Connection to the T201X radio is made via the PCB mounted 9 way D Range Socket (S21) at the rear of radio.



1.2 Data Rate Selection

Data Rate selection is set to 2400 baud by default, and can be changed to 1200 baud by removing R19.

Some older versions of the TA348-01 PCB have the I/O Pad S10 connected to pin 39 of the microprocessor (IC2).

Baud Rate	R19 / S10
1200	HIGH (default)
2400	GND

1.3 Data transfer between the TA348-01and the PC

DTE: Data Terminal Equipment: PC

DCE: Data Communications Equipment: TA348-01

In systems with a high data throughput, it may be necessary to connect CTS and use the handshaking between RTS and CTS for proper data flow control. The TA348-01 has one 48 byte data buffer for receive and another 48 byte data buffer for transmit. If the data throughput is less than 48 bytes per transmission, no CTS is required.

The data format is similar to 8 bit asynchronous data. Each byte is sent with a zero start bit, followed by 8 data bits (LSB first), followed by one stop bit.

1.4 Data Flow Control

Data flow control is only applied for data from DTE to the TA348-01. Data from the TA348-01 must be accepted by the PC.

CTS (active high) indicates to the DTE that it may transmit data to the TA348-01. The DTE shall not transmit data when CTS is not asserted. CTS will not be asserted under the following conditions:

1. When the buffer is full
2. When radio is busy
3. Call setup/ preamble being sent

1.5 Operating Modes

The DTE asserts RTS (active high) to indicate data available for transmission. Depending on the way the software operates in the DTE, two scenarios are possible:

1. No handshake with CTS:
   RTS is asserted, data is passed on to the buffer and RTS will be de-asserted immediately following. This scenario requires the data burst to be shorter than the capacity of the buffer
2. Handshake required:
   CTS regulates the data made available to the TA348-01 for transmission.

1.5.1 No handshake mode

RTS can be de-asserted immediately after data hand-over to the TA348-01. Alternatively, the DTE keeps RTS high. In that case the TA348-01 will send the IDLE signal of continuous ones until RTS disappears. If RTS returns to low before all data is transmitted, the TA348-01 will keep transmitting till the buffer is empty. A small delay of 7mS is added before TX is dropped.

1.5.2 Handshake mode

The TA348-01 responds to RTS by powering up the transmitter and sending a preamble of continuous reversals (starting with 0). Preamble is sent for a period of 80mS followed by two $FF bytes, each with start and stop bits to enable byte synchronization. Following these is a single ASCII SYN byte also with start and stop bits.

At this time the TA348-01 asserts CTS, allowing the DTE to pass data to the TA348-01. CTS will be de-asserted when the buffer is full.

1.5.3 Data Receive

At the receiver, after detection of the carrier, all data is concidered to be preamble until the end of SYN byte. All bytes received subsequently will be passed on to the connected DTE until the carrier is lost.

Note that no flow control is provided from the radio to the PC.

1.6 RS232 Interface

RS232 voltage levels from the TA348-01 are provided by a MAX232 integrated circuit which provides nominal output voltages of ± 10V. The input is compatible with the full range of RS232 voltages (±3V to ±15V).

Typical mobile radios are not full duplex. Most commercial software packages assert RTS continuously, thereby keeping the mobile radio in continuous transmit (till the internal transmit timer stops the transmitter). This prevents a data link between two computers from operating satisfactorily.

A solution to this problem is to connect RTS to DTR on the computer RS232 port. Take into account that the radio needs about 50ms to properly lock onto the channel before data can be transmitted.

Note: The TA348-01 has provision for an RF attenuator to be fitted, this is NOT used in this implementation.

2 RS232 Terminology

TXD carries the data from the DTE to the MODEM

RXD carries data from the MODEM to the DTE

CTS indicates to the DTE that it may transmit data to the MODEM

RTS optionally requests the modem to prepare to transmit data. (See section on handshaking.)

CD indicates that the modem is receiving valid data carrier

RI indicates that the modem or radio has received a call

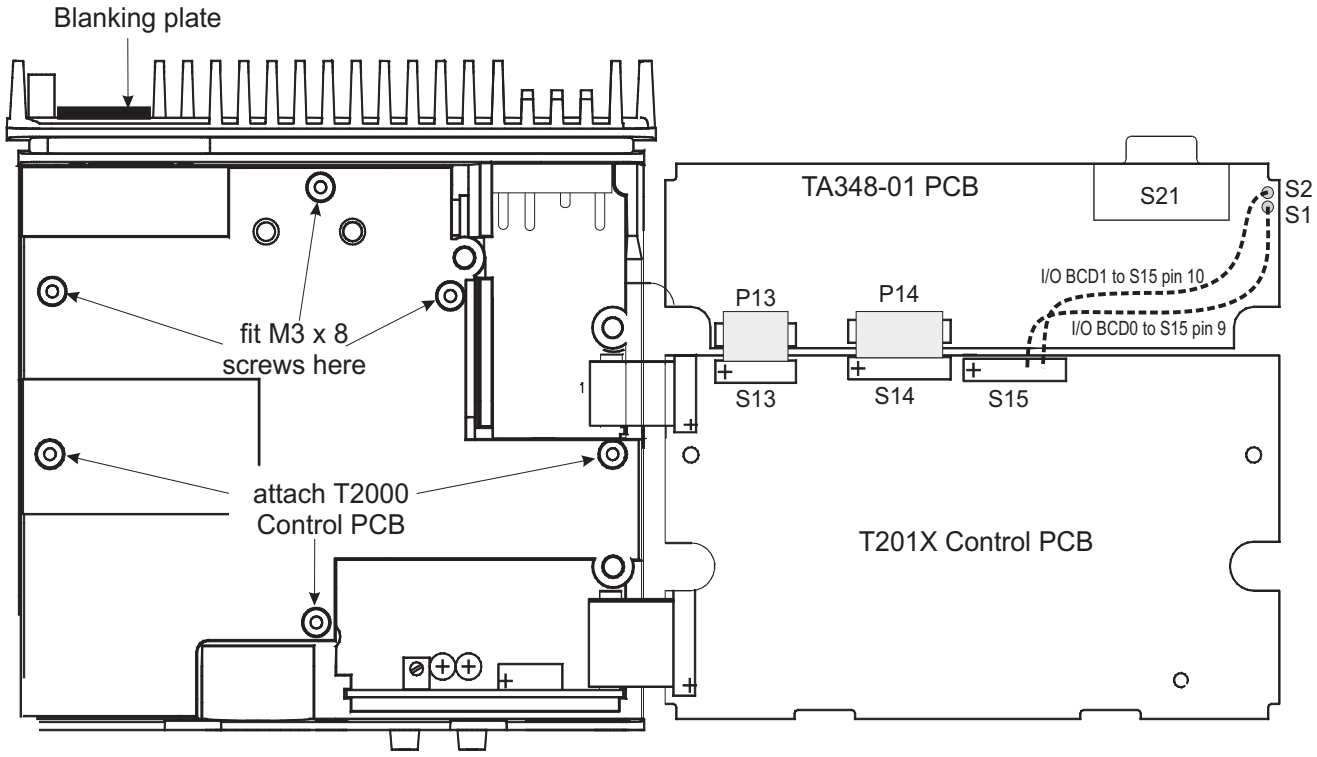
DTR Data terminal ready. Indicates to the modem that the DTE is alive.

DSR Data set ready. Indicates to the DTE that the modem is alive.

The DTE shall not transmit data to the modem when CTS is not asserted. When the DTE wishes to send data, it must assert RTS and wait for CTS to be asserted.

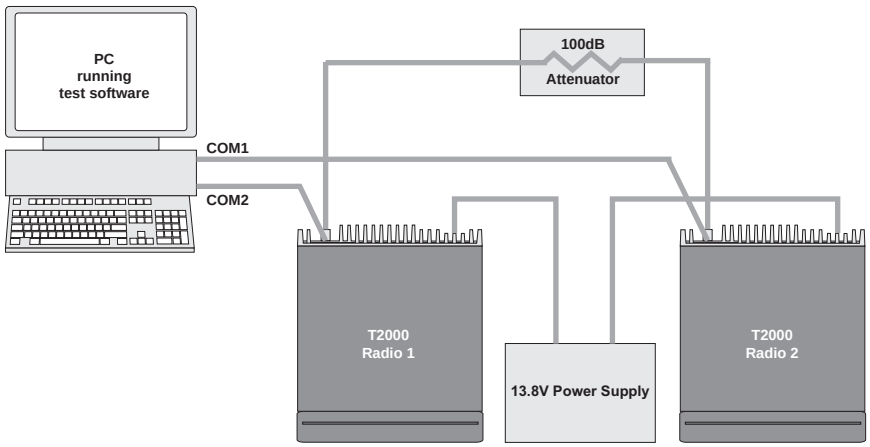
3 Installation

1. Remove the four screws and the top cover of the radio.
2. Unclip the D Range blanking plate at the rear of the radio.
3. Unscrew the T2000 Control PCB and fold out.
4. Position the TA348-01 PCB and connect the micromatch connectors for P13 and P14 to S13 and S14 on the Control PCB.If BCD access is required, solder wires from:
   I/O BCD0 (S1) on the TA348-01 PCB to S15 pin 9 on the Control PCB
   I/O BCD1 (S2) on the TA348-01 PCB to S15 pin 10 on the Control PCB
5. Fold the Control and TA348-01 PCBs back towards the radio.
6. Screw down the Control PCB using the screws that were taken out.
7. Screw down the TA348-01 PCB using the three M3 x 8 taptite screws IPN 349-00020-23.
8. Replace the top cover and attach.



4 Testing

1. Setup the equipment as shown below. Note that the PC needs two serial COM ports.



2. Connect the 9 way D Range at the rear of Radio 1 to COM1 on the PC.
3. Connect the 9 way D Range at the rear of Radio 2 to COM2 on the PC.
4. Program the radios so that RX1 = TX2 and RX2 = TX1.
5. Under Windows 95, run COMMS_TESTER_107.exe
6. Select appropriate baud and data rate.
7. Follow the instructions.

5 TA348-01 PCB Information

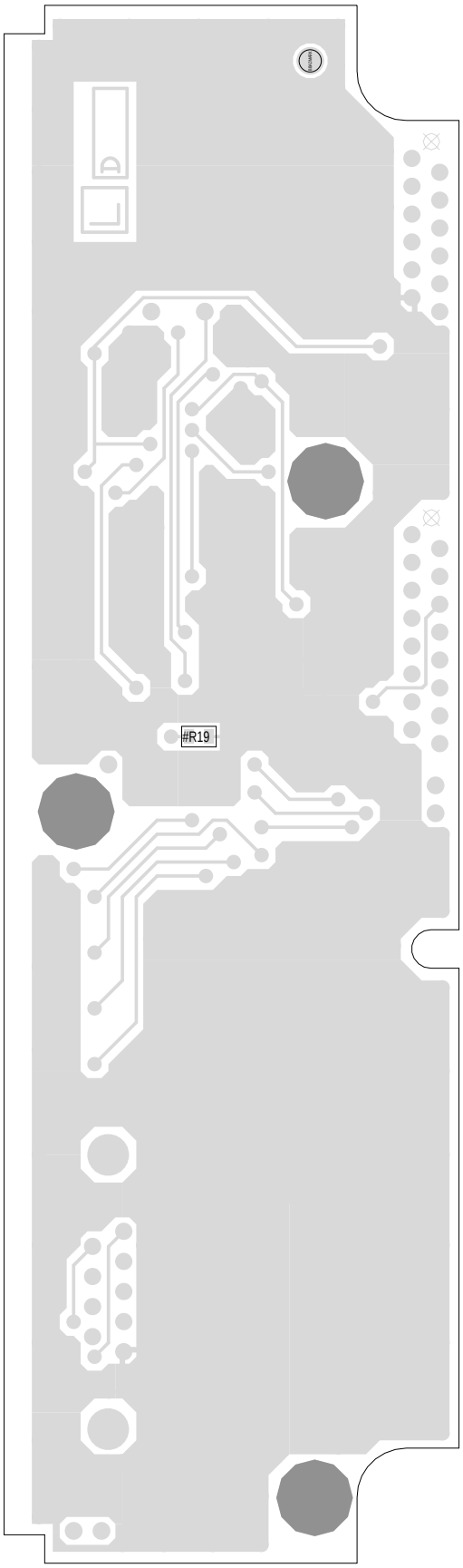
5.1 SMD Parts List

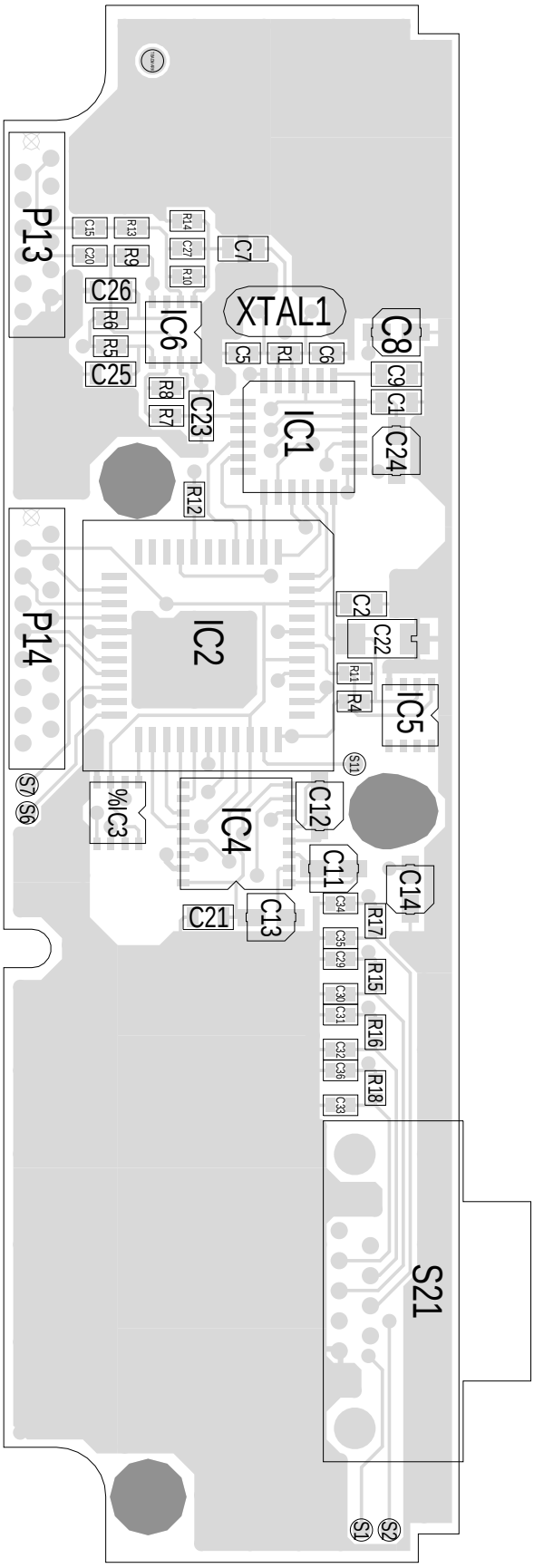
Ref	IPN	Description
C1	015-06100-08	CAP 100N 10% 50V X7R
C2	015-06100-08	CAP 100N 10% 50V X7R
C5	015-22220-01	CAP 22P 5% NPO 50V
C6	015-22330-01	CAP 33P 5% NPO 50V
C7	015-06100-08	CAP 100N 10% 50V X7R
C8	016-07100-01	CAP 1U0 ELEC 16V 4*5.7MM SMD
C9	015-06100-08	CAP 100N 10% 50V X7R
C11	016-08100-01	CAP 10U ELEC 16V 4*5.7MM SMD
C12	016-08100-01	CAP 10U ELEC 16V 4*5.7MM SMD
C13	016-08100-01	CAP 10U ELEC 16V 4*5.7MM SMD
C14	016-08100-01	CAP 10U ELEC 16V 4*5.7MM SMD
C15	015-25100-08	CAP 10N 10% 50V X7R
C20	015-25100-08	CAP 10N 10% 50V X7R
C21	015-06100-08	CAP 100N 10% 50V X7R
C22	014-08100-00	CAP 10U 16V 20% TANT SMD CHIP
C23	015-06100-08	CAP 100N 10% 50V X7R
C24	016-07100-01	CAP 1U0 ELEC 16V 4*5.7MM SMD
C25	015-06100-08	CAP 100N 10% 50V X7R
C26	015-06100-08	CAP 100N 10% 50V X7R
C27	015-23470-08	CAP 470P 10% X7R 50V
C29	015-23150-01	CAP 150P 5% NPO 50V
C30	015-23150-01	CAP 150P 5% NPO 50V
C31	015-23150-01	CAP 150P 5% NPO 50V
C32	015-23150-01	CAP 150P 5% NPO 50V
C33	015-23150-01	CAP 150P 5% NPO 50V
C34	015-23150-01	CAP 150P 5% NPO 50V
C35	015-23150-01	CAP 150P 5% NPO 50V
C36	015-23150-01	CAP 150P 5% NPO 50V
IC1	002-20046-90	IC FX469LS FFSK CODEC MODEM
IC2	240-04020-42	SKT SMD FOR A PLCC44 CHIP CARRIER
IC3	002-12502-50	IC X25C02 SPI SERIAL EEPROM
IC4	002-10002-32	IC MAX232 / RS232 RECEIVER/ XMITTER
IC5	002-10340-64	IC MC34064D-5 LOW V INDICATOR
IC6	002-10003-58	IC 358D DUAL OP AMP
R1	036-17100-00	RES 1M0 5%
R4	036-16100-00	RES 100K 5%
R5	036-16100-00	RES 100K 5%
R6	036-16100-00	RES 100K 5%
R7	036-15100-00	RES 10K 5%
R8	036-15100-00	RES 10K 5%
R9	036-14470-00	RES 4K7 5%
R10	036-15560-00	RES 56K 5%

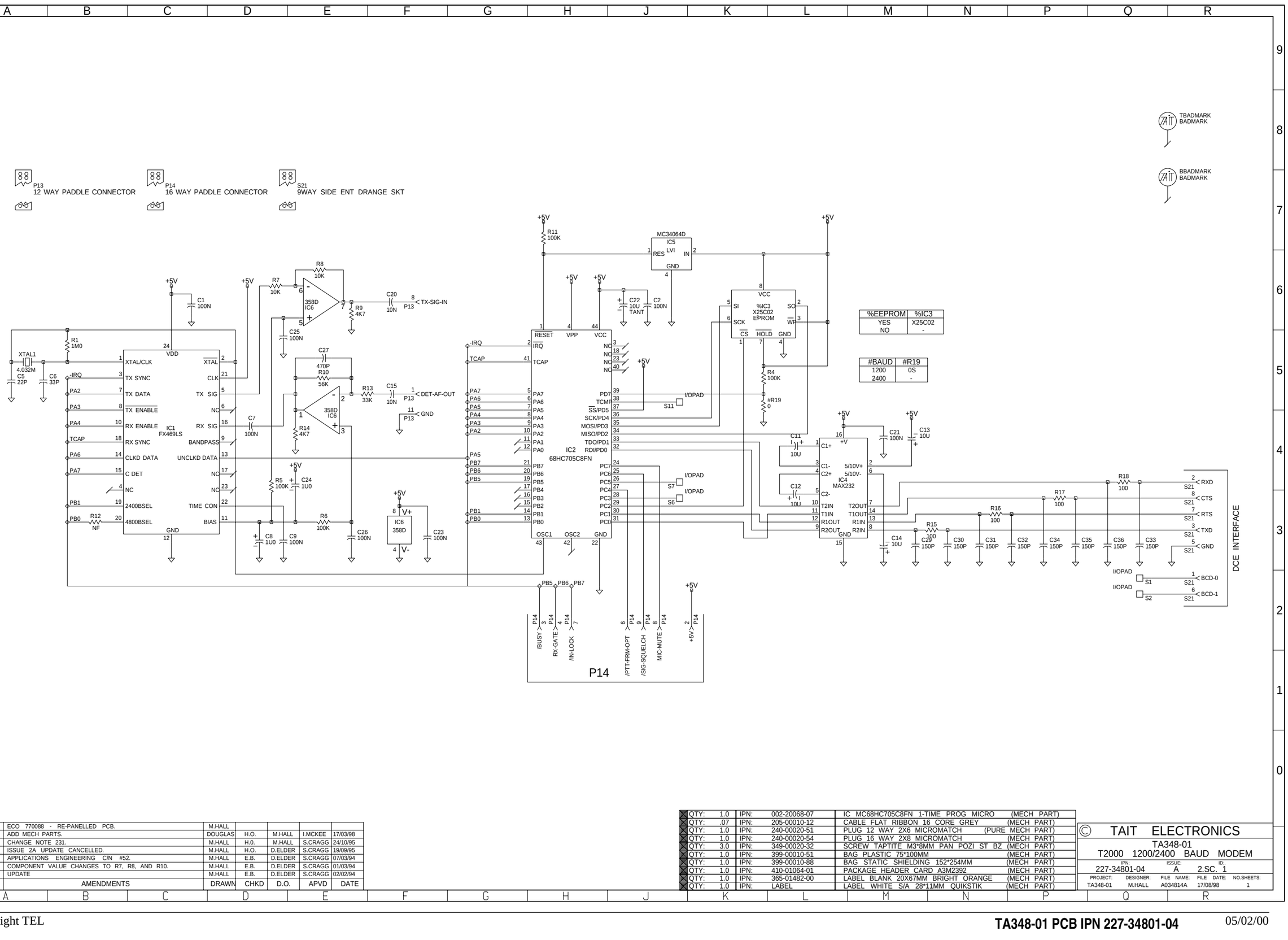
Ref	IPN	Description
R11	036-16100-00	RES 100K 5%
R12	036-1XXX0-00	RES SIT VALUE
R13	036-15330-00	RES 33K 5%
R14	036-14470-00	RES 4K7 5%
R15	036-13100-00	RES 100 5%
R16	036-13100-00	RES 100 5%
R17	036-13100-00	RES 100 5%
R18	036-13100-00	RES 100 5%
#R19	036-10000-00	RES ZERO OHM 5%

5.2 Non SMD Parts List

Ref	IPN	Description
P13	219-02656-00	LOOM ASSEMBLY 12 WAY OPTION BOARD
P14	219-02659-00	LOOM ASSEMBLY 16 WAY OPTION BOARD
S21	240-00010-45	SKT 9WAY DRANGE SIDE ENTRY PTH MTG HOLES
XTAL1	274-00010-49	CRYSTAL 4.032MHZ 70PPM
	002-20068-07	IC MC68HC705C8AFN OPT MICRO
	349-00020-32	SCREW T/T M3X8MM P/POZ BZ


#R19


P13
P14
IC1
IC2
IC3
IC4
IC5
IC6
XTAL1
C8
C24
C26
C25
C23
C12
C11
C14
C21
C13
C22
S21
S1
S2
S6
S7
S11
R12



REV/ISS	AMENDMENTS	DRAWN	CHKD	D.O.	APVD	DATE
4A	ECO 770088 - RE-PANELLED PCB.	M.HALL				
3D	ADD MECH PARTS.	DOUGLAS	H.O.	M.HALL	I.MCKEE	17/03/98
3B	CHANGE NOTE 231.	M.HALL	H.O.	M.HALL	S.CRAGG	24/10/95
3A	ISSUE 2A UPDATE CANCELLED.	M.HALL	H.O.	D.ELDER	S.CRAGG	19/09/95
1A	APPLICATIONS ENGINEERING C/N #52.	M.HALL	E.B.	D.ELDER	S.CRAGG	07/03/94
0B	COMPONENT VALUE CHANGES TO R7, R8, AND R10.	M.HALL	E.B.	D.ELDER	S.CRAGG	01/03/94
0A	UPDATE	M.HALL	E.B.	D.ELDER	S.CRAGG	02/02/94

QTY:	IPN:	
1.0	002-20068-07	IC MC68HC705C8FN 1-TIME PROG MICRO (MECH PART)
.07	205-00010-12	CABLE FLAT RIBBON 16 CORE GREY (MECH PART)
1.0	240-00020-51	PLUG 12 WAY 2X6 MICROMATCH (PURE MECH PART)
1.0	240-00020-54	PLUG 16 WAY 2X8 MICROMATCH (MECH PART)
3.0	349-00020-32	SCREW TAPTITE M3*8MM PAN POZI ST BZ (MECH PART)
1.0	399-00010-51	BAG PLASTIC 75*100MM (MECH PART)
1.0	399-00010-88	BAG STATIC SHIELDING 152*254MM (MECH PART)
1.0	410-01064-01	PACKAGE HEADER CARD A3M2392 (MECH PART)
1.0	365-01482-00	LABEL BLANK 20X67MM BRIGHT ORANGE (MECH PART)
1.0	LABEL	LABEL WHITE S/A 28*11MM QUIKSTIK (MECH PART)

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TA348-01
T2000 1200/2400 BAUD MODEM

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227-34801-04	A	2.SC. 1

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO.SHEETS:
TA348-01	M.HALL	A034814A	17/08/98	1