Fitting 2 Remote Heads to a T2020 Radio.

Issue No.:   AN016-01

Author: TEA Engineering

General

- A 2nd remote head can be fitted to a T2020 and a with some modifications carried out as described below.
- The T2000 serial data lines are paralleled, compensating level loss by resistor changes.
- The Microphone audio from the 2nd remote head is brought to the mic. amp through a separate input than the mic. audio from the local remote head to prevent interaction and loading.
- Speaker audio is preset to approx. 3 watts at 1kHz audio and is individually controlled at each extension speaker by a 25R wire wound pot.
- The 2nd remote head is connected to the radio via the rear DB9 connector.
- Depending on the wire gauge of the shielded extension cable used, the 2nd remote head can be operated at a distance from 25m to 50m.
  No guarantee is given for noise free operation on a distance above 50 meters (Noise on TX audio is most likely and separate supply for 2nd remote head would be required. Try also 47-100uF/25V cap between Ground & 13.8V wire at 2nd remote head side).

Parts (per radio with 2nd rem. head):   (KIT: T2000-809)

The parts required are as follows:

1 x A2020-CH, T2020 Remote Head incl. loom cable.
1 x 302-05211-00 Remote Head mtg. bracket (also IPN 303-30064-00).
2 x 350-01007-00 Thumb Screws for mtg. bracket.
1 x 252-00010-37, T2000 microphone with curly cord & 6way mod. plug.
1 x 252-00010-02, Mic. hanger clip.
1 x T2000-05, T2020 ext. speaker incl. mtg. bracket.
1 x 240-02010-10, 2way spkr. cord mnt. socket.
2 x 240-00020-56, plug 8way 2row (2x4) cord mtg. IDC Microma.
1 x 036-13680-00, 680R SMD 0805 chip resistor.
1 x 036-15100-00, 10K SMD 0805 chip resistor.
1 x 036-15820-00, 82K SMD 0805 chip resistor.
1 x 036-05470-00, 1/8W 47K resistor.
2 x 25R 3W wire wound pot, ALTRONICS, # R2152, $4.96.
2 x 15mm Knobs for pots, ALTRONICS, # H6040, $0.53, or DS, P7100,P7022.
2 x DB9 female socket (rear of radio & extension cable), ECQ # DE09S.
2 x DB9 male plug (2nd remote head & extension cable), ECQ # DE09P.
4 x DB9 covers, ECQ, # P3090, $0.36 each.
2 x DB9 socket mounting screws (ECQ, # 7SS1A).
2 x DB9 interlocking nuts (ECQ, # CDV18).
8 core shielded 7 x .2 cable, ECQ # B2108CSE, $75.60/100m.
6 x Ferrite Beads (4x5mm).
35cm of 8way flat ribbon cable.

Procedure

Wiring 2nd REMOTE HEAD TO T2020:

- Open circuit both Microphones through PTT switch (In Microphones, remove hookswitch resistor & black wire completely. Disconnect brown Mic. earth wire from small I/F PCB and solder onto free middle pin of PTT switch).
- Fit 25R wirewound pots to both external speakers.
- Modify 2nd Control Head: Short R741 (33K) to increase Mic. O/P level.
- Fit DB9Male to 2nd remote head loom, cut at approx. 50cm length.
  (fit twin flex speaker wires to DB9M, terminated into spkr. socket).
- Fit DB9Female socket to rear of radio.
- Remove 8way loom from S9 to S9B.
- Make new loom cable to fit from S9B (clayton head I/F) to S9 on Control PCB, using 8pin micromatch plugs (15cm between plugs) and run remaining 20cm of loom to DB9F connector.
- Wire DB9 connectors as per table below.
- Fit DB9F and DB9M connectors to extension cable as per table below.

Modify T2020 Control Board as Follows:

- Short R500 (470R) (increase TXD drive to heads).
- Change R545 (47K) to 10K (increase RXD drive into radio).
- Change R658 (150K) to 82K (2nd mic. audio I/P).
- Change R691 (2K2) to 680R (2nd mic. audio (I/P balance).
- Remove R652 (10K) (open circuit VOL AF to audio PA).
- Short R644 (1M0) out (increase Beep level).
- Fit 47K 1/8W resistor between S9/Pin 6 and S2/Pin 1 (preset audio).

Wiring DB9F to Rear of Radio: (fit ferrite beads over all wires at DB9)

2nd REM. Extension

DB9	FUNCTION	COLOUR	CABLE COLOUR	T2000 WIRING
1	+13.9Vsw.	Violet	Violet	S2/Pin 8 (Control PCB)
2	Data Gnd.	Blue	Blue	S9/Pin 2
3	RXD radio	Green	Green	S9/Pin 3
4	TXD radio	Yellow	Yellow	S9/Pin 4
5	Ground	Orange	Orange	S9/Pin 5
6	N.C.	---	---	----
7	N.C. I/P	Brown	Brown	S13/Pin 2 (Control PCB)
8	Spkr. audio	Spkr. flex	Grey	P3/Pin 4 (rear DC plug)
9	Spkr. Gnd	Spkr. flex	Black/Braid	P3/Pin 2 (rear DC plug).

NOTE: Fit Ferrite beads over all wires to DB9F socket in radio.

External Speakers Volume Control:

- Fit 25R wirewound pot to each remote head's external speaker for local audio volume
  control.

NOTE: If minimum preset audio at speakers is required, fit 4R7 5W resistor between bottom
  of pot to audio ground.

S9 LOOM:

Pin 1	-	Pin 1	-	Pin 1
Pin 2	-	Pin 2	-	Pin 2
Pin 3	-	Pin 3	-	Pin 3
Pin 4	-	Pin 4	-	Pin 4
Pin 5	-	Pin 5	-	Pin 5
Pin 6	-	Pin 6		
Pin 7	-	Pin 7		
Pin 8	-	Pin 8		

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Label Control Heads:

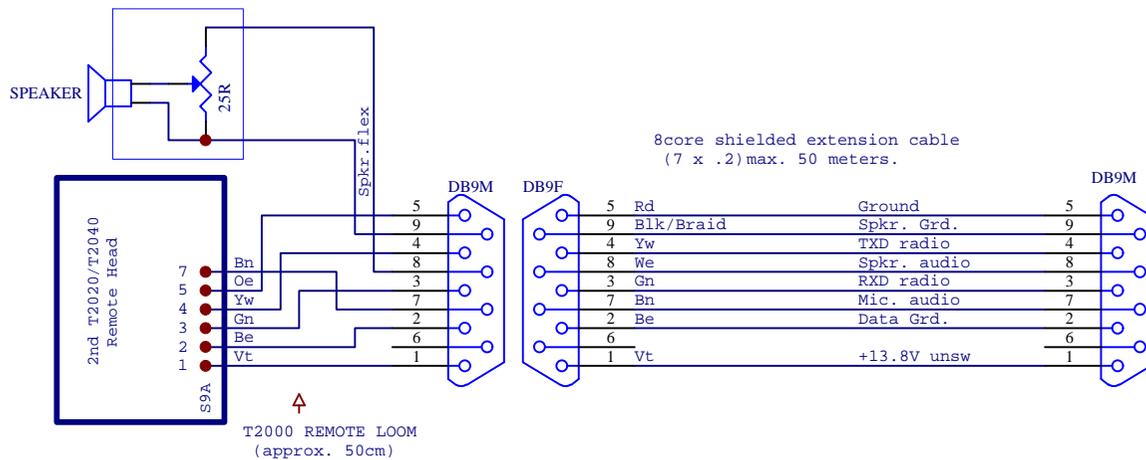Main control head: **MASTER**
2nd control head : **SLAVE**

Maximum Cable Lengths:

- Max. resistance per wire to be no more than 4 Ohms (50 Ohms if separate DC plugpack is
  used on 2nd remote head and un-switched +13.8V is not connected to 2nd head.

- LENGHTS USING STANDARD CABLE:

CABLE TYPE	OHMS/METER	MAX CABLE LENGTH
10 x .12	.17/m	25m
7 x .16	.13/m	30m
7 x .2	.086/m	50m.

Attachment: T2000CTL.S05 (Wiring schematic).

SPEAKER

25R

Spkr.flex

2nd T2020/T2040
Remote Head

7 Bn
5 Oe
4 Yw
3 Gn
2 Be
1 Vt

S9A

T2000 REMOTE LOOM
(approx. 50cm)

DB9M   DB9F

5   5 Rd   Ground   5
9   9 Blk/Braid Spkr. Grd.   9
4   4 Yw   TXD radio   4
8   8 We   Spkr. audio   8
3   3 Gn   RXD radio   3
7   7 Bn   Mic. audio   7
2   2 Be   Data Grd.   2
6   6   6
1   1 Vt   +13.8V unsw   1

8core shielded extension cable
(7 x .2)max. 50 meters.

DB9M

DB9F
at rear
of Radio

Ferrite
Beads

S9   8
     7   2
              1

8way Loom

Loom

T2020

(T2040/T2050: Fit
Delay PCB as per JI-35.x)

Bk   P3
Bk

Rear DC Skt.
(inside radio view)

Bn

2
S13   1

Control PCB
(solderside view)

1st T2020/T2040
Primary
Remote Head

ext. Spkr.

25R
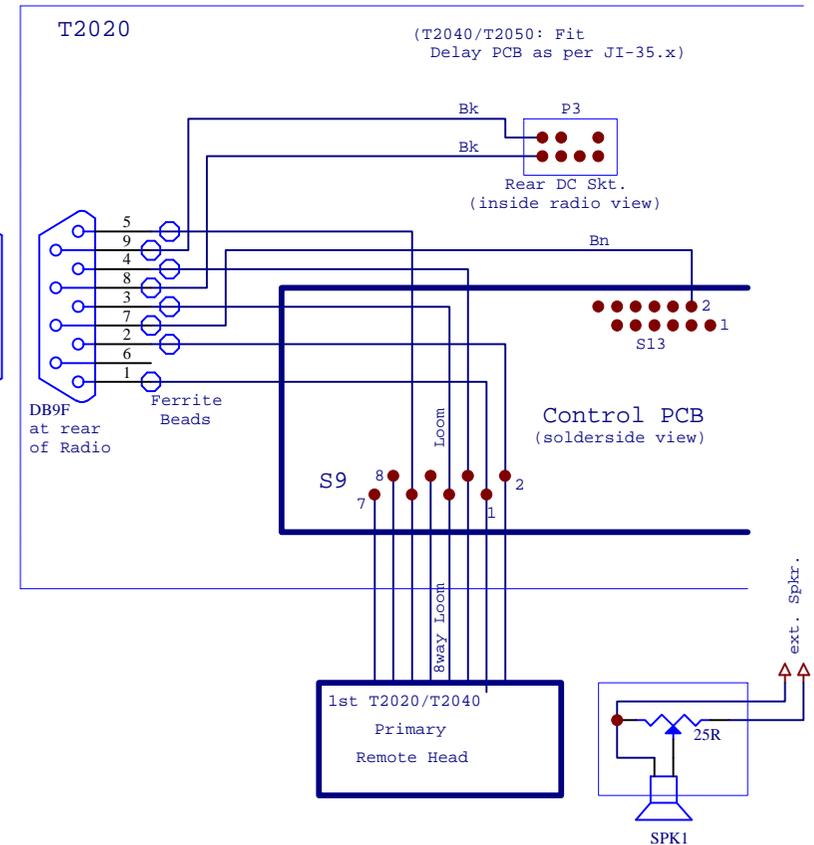
SPK1

2nd REMOTE HEAD:

- Short R741 (33K) SMD (increase Mic. audio level).

T2020   CTRL. PCB:

- Short R500 (470R) SMD (increase TXD to heads).
- Change R545 (47K) to 10K SMD (increase RXD drive into radio).
  NOTE: Max 50R wire resistance in TXD/RXD/Data lines).
- T2020/T2050: Short R644 (1M0) SMD out (increase Beep level).
  T2040: Short R618 (1M0) SMD out.
- Change R658 (150K) to 82K SMD (2nd. mic. audio I/P).
- Change R691 (2K2) to 680R SMD (2nd. mic. audio I/P balance).
- Remove R652 (10K) (open cct. VOL AF to audio PA).
- Fit 47K 1/8W resistor between S9/Pin 6 and S2/Pin 1 (preset speaker audio). - Open circuit both microphone inserts thru PTT switch.
- For T2040/T2050 2nd Rem. Head data delay on switch on, ref. JI-35.x Job Instructions (latest issue).

EXTERNAL SPEAKERS:

- Fit 25R wirewound pot to each ext. spkr. for local volume control.
   NOTE: For minimum preset audio at speakers, fit 4R7 5W resistor
           between bottom of pot to audio ground.

Refer Fitting Instruction: JI-35.x

ISSUE	ALTERATION	DATE	APPVD		
5	T2050 addition	08/08/95	R.V.	DEPT.	ENG.
4	Amendments	25/02/94	R.V.	DRAWN	VO
3	Amendments	16/02/94	R.V.	CHKD	VO
2	Amendmends	06/09/93	R.V.	SCALE	N.T.S.
1	ORIGINAL	17/08/93	R.V.	PRINT	A4
ISSUE	ALTERATION	DATE	APPVD	SHEET	1 OF 1

TAIT ELECTRONICS (AUST) PTY LTD

TITLE:
FITTING 2 REMOTE HEADS
TO T2020 / T2040 / T2050

DRWG. NO:
T2000CTL.S05