SwapMyRigs Users Manual

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SwapMyRigs is manufactured and patented by AE4S, LLC

Contact: Bill Jordan AE4S

Address: 422 North Ride
Tallahassee FL 32303

E-Mail: info@swapmyrigs.com

wfjordan4@earthlink.net

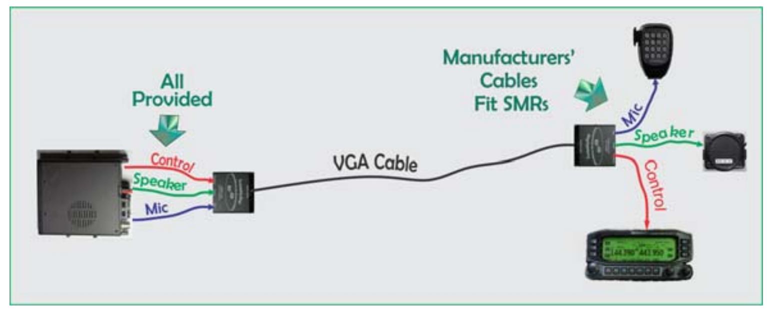
Phone: (850) 385-3779 (Business)
(850) 385-3770 (Residence)
(850) 294-1500 (Cell)

1. **The VGA cable *must* be tight against the DB15 jack. Also, please verify that the jumper settings are correct for your radio as shown on Page 8. Photos of each radio's configuration begin on Page 9.**

2. **Introduction.**

SwapMyRigs ("SMR") consists of two identical modules connected by a single 15-conductor IBM VGA (monitor) cable. One of the modules connects to the microphone, control, and external speaker **jacks** on the transceiver body; the other has jacks for the radio's remote microphone, control unit, and external speaker. The configuration is depicted in **Figure 1**.

Figure 1
SMR configuration with Kenwood TM-D710



3. **SMR Application.**

In **Figure 1**, two short cables (provided, except for the TS-2000 and IC-7100 USB) connect the transceiver's control and microphone jacks to one SMR. (The specific cables provided will depend on the radio.) An audio cable (also provided) connects the transceiver's speaker jack to the SMR. SMRs are compatible with all radios that use standard *Registered Jacks* ("modular jacks") to connect components. Paragraph 4 includes a brief description of Registered Jacks.

The manufacturer's mics and control cables connect directly to the second (remote) SMR. In **Figure 1**, for example, a short 8-conductor cable connects the Kenwood control head to its remote SMR. (Kenwood includes this cable with the TM-D710.) Rather than connecting components with 8-conductor, round cable, consider using flat data cables, which easily slide between upholstery joints and under weatherstripping.

The connecting cables of speakers, such as those sold by SwapMyRigs, have a 1/8th inch compatible plug. A cable that meets IBM VGA specifications connects SMRs. All SwapMyRigs' cables meet theses standards and are available in lengths of 15, 25, 35, 50, 75, 100, and 150 feet.

4. **Registered Jacks.**

   Amateur radio manufacturers generally use one or more Registered Jacks–often called "modular jacks"–to connect transceivers to microphones, speakers and controls. The term "Registered Jack" (RJ) is a consequence of the Bell System's settlement with the Department of Justice in January, 1982, under which the Bell System agreed to divest its local exchange service operating companies in return for the right to enter the computer business, in which it was ultimately unsuccessful. Standardized connections to wireline services were required to give local competitors access to home and office telephone systems. Accordingly, Registered Jacks became the means for standardizing the connection of data and telecommunications devices to service providers. Although technically "RJ" refers to jacks, the term commonly applies to both plugs and jacks.

   Initially, RJ connections were named RJ11, RJ12, RJ21, RJ41, etc. However, they differed only in the number of positions and conductors. For example. the RJ12 jack has six positions and six conductors and is often identified as "6P6C." The RJ11, physically identical to the RJ12, has only four conductors and is identified as 6P4C. Generally, jacks are downward-compatible with plugs having fewer positions. Thus, a 6P6C jack physically accommodates 4P4C plugs but only the inner 4 conductors of a 6P6C jack connect to the 4P4C plug. Similarly, an 8P8C jack accommodates 6P and 4P plugs. Accordingly, SMRs use 8P8C jacks (RJ45) because plugs with fewer positions fit them; i.e., 4P4C, 6P6C, and 8P8C plugs and jacks are compatible with RJ45 jacks.

   Some control heads have jacks that, though technically not Registered Jacks, are the same as telephone handsets. Occasionally, the jack is referred to as an RJ22 or RJ25. Kenwood's TM-V71 and TM-D700, the Icom IC-2820, and Yaesu's FTM-400 and FTM-100 use this jack. Cables are provided by the manufacturers and if not, they are included with all SMRs.

5. **Architecture.**

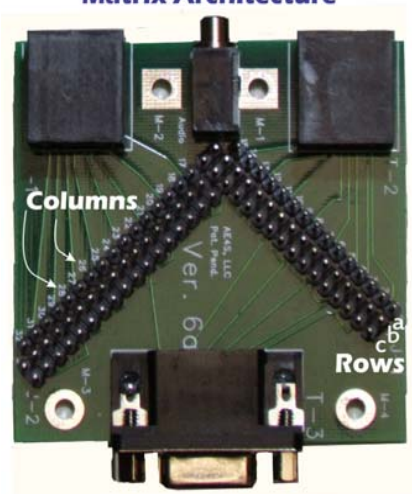
   For all installations, both SMRs are programmed identically. SMR connections are stenciled above each jack. At the transceiver

body, connect the jacks using the cables provided. Should you change rigs, compatible connecting cables will be supplied. (SMR RJ45 jacks do not necessarily require RJ45 plugs. Any RJ plug will fit. An open SMR, showing its RJ45s, is shown in **Figure 4**.)

Figure 2
Dimensions: 2.6" x 2.6" x 0.9"

Figure 4
Open for Programming

Figure 3
Matrix Architecture



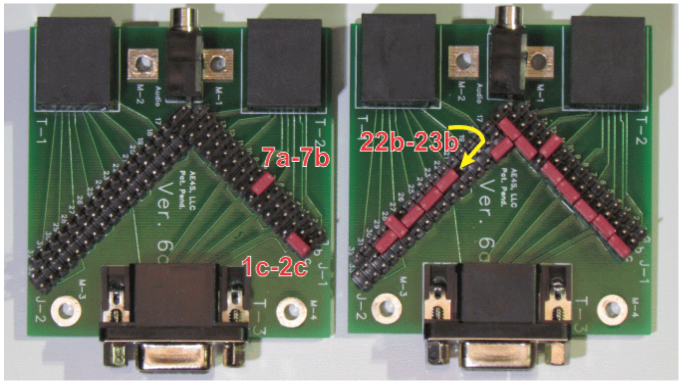
6. **Figure 3** shows the SMR staking pins. They are arranged in a matrix of 32 Columns in 3 Rows plus one 2-pin Column. Rows are labeled **a, b**, and **c**. Columns are labeled **1** through **33**.

   Jumper and shunt settings are available for most if not all current transceivers; the number will increase as new transceivers are released. Research and testing is ongoing.

   Each pin is assigned a Column number and a Row letter, such as "**1a**." Jumper and shunt settings are identified by the two pins connected, such as "**12b-13b**," indicating that Columns **12** and **13** are bridged at Row b. The jumpers shown in the left of **Figure 5** bridge Columns **1** and **2** at Row **c,** and Rows **a** and **b** at Column **7.**

Figure 5

Jumper Location Method



Because each pin is identified by its Column number and Row letter, the name of a jumper bridge is **CR-CR**, the Columns and Rows of the pins connected.

The shunt shown on the right of **Figure 5** connects Columns **22** and **23** at Row **b and** is identified **22b-23b**.

7. **VGA Cables.**

Figure 6

The SMR system relies on IBM- standard VGA cables. The standards include the following:

   a. Sub-D 15-pin Connectors, see **Figure 6**, and
   b. 15 separate and independent conductors.
   c. The 15 conductors are 4 twisted pairs, 3 coaxial cables (totaling six conductors) and one additional conductor.

In general, VGA cables sold for monitors do not meet the standards. The usual failure is combining and grounding the coaxial conductors, pins 6, 7, and 8. Another is the omission of conductor 9, the single unpaired conductor, which is intended for +5 vdc but not used for computer-to-monitor connections.

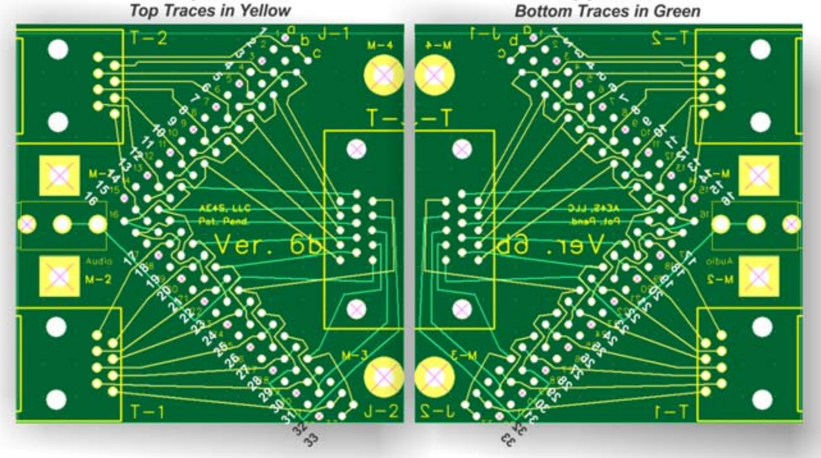
Another problem with some cables is the use of aluminum instead of copper conductors. The resistance of aluminum cables almost always exceeds the requirements of SMR installations.

8. **The SMR Circuit Board and Schematic.**

The SMR circuit board is shown in **Figure 7**.

Figure 7

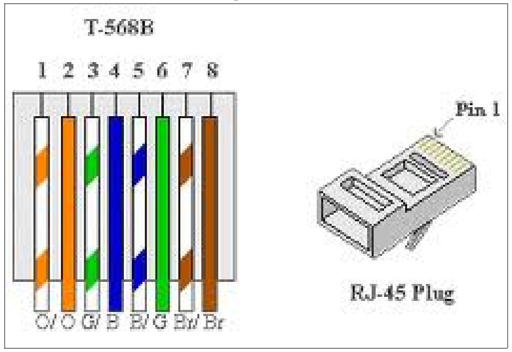
Top Side *Top Traces in Yellow* **Copper Side** *Bottom Traces in Green*



The circuit is designed so that each RJ45 input conductor can be routed to as many as 4 VGA output conductors plus ground.

Perhaps the most difficult aspect of jumpering for a new rig is determining the radio's pinouts. Microphone pinouts are almost always shown in the operator's manual. However, the numbering of the conductors is inconsistent among manufacturers. Furthermore, it is hard to tell if the manual's depiction is from the inside looking out or the outside looking in. The same is true when researching a radio schematic for the control pinouts. Typically, both the main unit and the control head pinouts are shown, so the inside-outside problem becomes more complex; the main unit may be from the inside out and the control head from the outside in, increasing the potential for error.

Figure 8



The pin numbering is also problematic. Manufacturers, Kenwood in particular, number their RJ45 and RJ12 jacks opposite the industry standard shown in **Figure 8**. Equipment damage is always a consideration if manufacturers' drawings are misinterpreted.

9. **Jumper and Shunt Settings.**

Jumper and shunt settings for specific transceivers are shown in **Figure 10**. Connections joined by jumpers rather than shunts are identified by a red **J**. The maximum tested separations are identified. Those with "*" were measured only with 15' VGA cables during early testing.

Each configuration is depicted below and on pages 9 through 12.

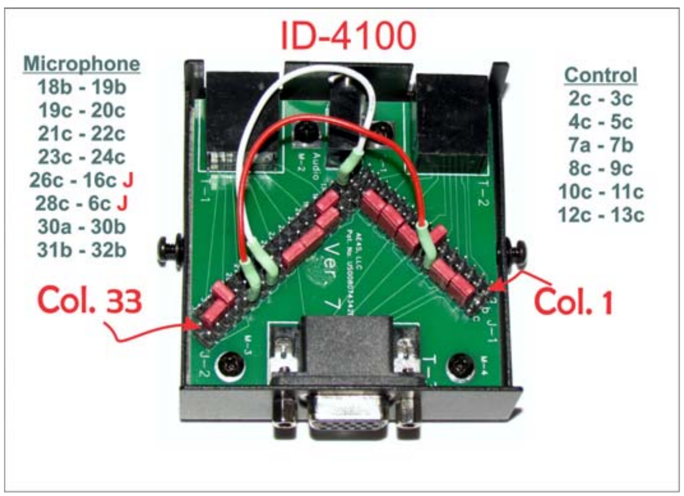


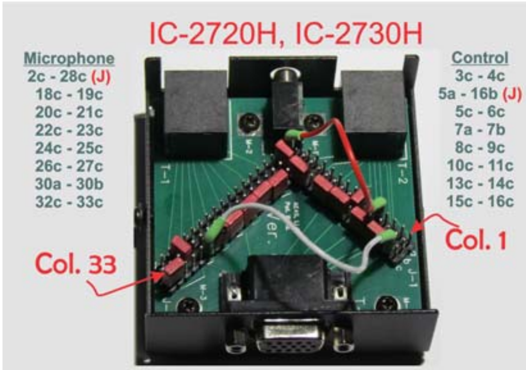
Figure 10
Bridge and Jumper Settings

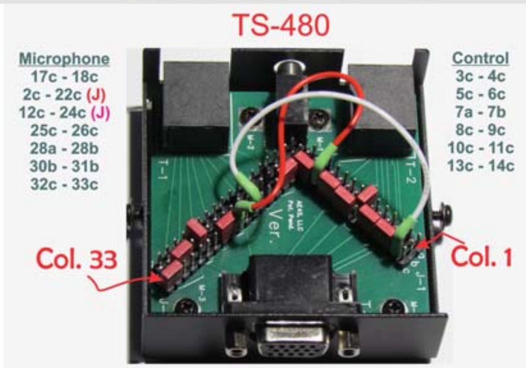
	Kenwood TM-D710 D710G/V71	Yaesu FT-857	Yaesu FT-7-8xxx	Yaesu FT-891	Kenwood TS-2000	Yaesu FTM-350	Yaesu FTM-400	Icom ID-880H	Icom IC-2720H IC-2730	Icom IC-2820H	Kenwood TM-D700	Kenwood TS-480	Icom IC-7100	Icom ID-5100	Icom ID-4100
1	1c-19c J	—	APRS †	††	—	1c-2c	—	—	2c-28c J	—	—	—	1c-2c	2c-3c	2c-3c
2	3c-4c	2c-3c	2c-3c	2c-3c	—	3a-3b	—	2c-3c	3c-4c	—	—	3c-4c	3c-4c	4c-5c	4c-5c
3	5c-6c	4c-5c	4c-5c	4c-5c	5c-14c J	4c-5c	5b-6b	5a-5b	5c-6c	4c-5c	5b-6b	5c-6c	5c-10c J	28c-6c J	7a-7b
4	7c-8c	7a-7b	6c-7c	7a-7b	7a-7b	6c-22c J	7b-8b	7a-7b	7a-7b	7a-7b	7a-7b	7a-7b	7c-8c	7c-8c	8c-9c
5	9c-10c	9b-10b	9a-9b	9b-10b	8c-9c	7c-8c	6c-22b	8b-9b	8c-9c	8c-9c	8b-9b	8c-9c	9c-17c J	9c-10c	10c-11c
6	11a-11b	11b-12b	11b-12b	11b-12b	11c-12c	9c-10c	9c-10c	10b-11b	10c-11c	10c-11c	10b-11b	10c-11c	10b-11b	11c-12c	12c-13c
7	12c-13c	13b-14b	13b-14b	13b-14b	—	11c-12c	11c-12c	12b-13b	13c-14c	—	—	13c-14c	13a-13b	13c-14c	—
8	14c-15c	—	—	—	—	13c-14c	—	—	5a-16b J	—	—	—	15b-16b	26c-16c J	—
9	17c-18c	17c-18c	—	17c-18c	18c-19c	15a-15b	—	17b-18b	15c-16c	18b-19b	17b-18b	17c-18c	18b-19b	18c-19c	18b-19b
10	—	19c-20c	19b-20b	19c-20c	20c-21c	17c-11a	17c-11a	19b-20b	18c-19c	20b-21b	—	—	19c-20c	20c-21c	19c-20c
11	2c-22c J	21c-22c	21b-22b	22c-23c	10b-22b	19c-20c	19b-20b	21b-22b	20c-21c	22b-23b	21b-22b	2c-22c J	21c-22c	22c-23c	21c-22c
12	24b-25b	23c-24c	24a-24b	24b-25b	21b-24b	24a-24b	24a-24b	23b-24b	22c-23c	24b-25b	23b-24b	12c-24c	23c-24c	24c-25c	23c-24c
13	26b-27b	25c-26c	10b-26c J	26c-27c	26b-27b	25c-26c	25b-26b	25b-26b	24c25c	26b-27b	25b-26b	25c-26c	25c-26c	-	26c-16c J
14	28a-28b	27c-28c	27b-28b	28b-29b	28a-28b	27c-28c	27b-28b	27b-28b	26c-27c	28b-29b	28a-28b	28a-28b	27c-28c	30a-30b	28c-6c J
15	29b-30b	30a-30b	29b-30b	30a-30b	29b-30b	29c-30c	30b-31b	30a-30b	30a-30b	30a-30b	29b-30b	30b-31b	30a-30b	31b-32b	30a-30b
16	—	32c-33c		32c-33c	31b-32b	—	—	31b-32b	32c-33c	31b-32b	31b-32b	32c-33c	32c-33c	-	31b-32b
Tested Separation	75'	75'	100'	100'	100'	75'	90'	15' *	100'	25'	100'	100'	175'	100'	65'

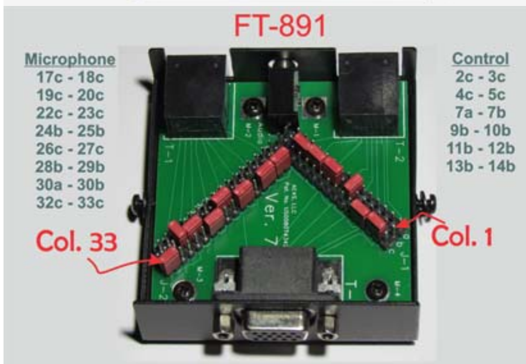
J Jumper * Tested only at 15'

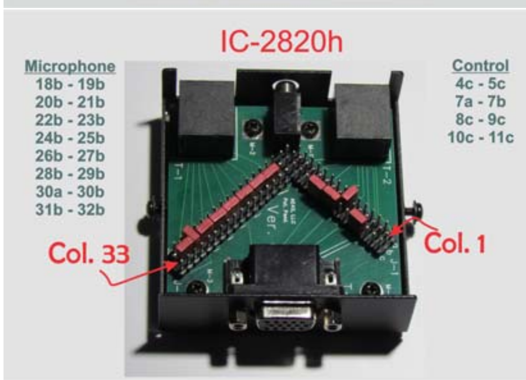
† With optional cables, connects directly to Argent and Byonics APRS units.

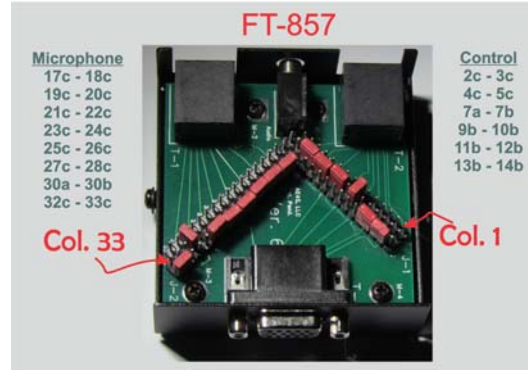
†† IC-7100 can be jumpered to extend the USB port to a remote computer.

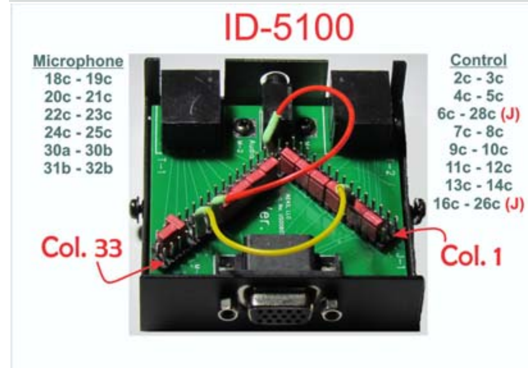

IC-2720H, IC-2730H
Microphone
2c - 28c (J)
18c - 19c
20c - 21c
22c - 23c
24c - 25c
26c - 27c
30a - 30b
32c - 33c
Control
3c - 4c
5a - 16b (J)
5c - 6c
7a - 7b
8c - 9c
10c - 11c
13c - 14c
15c - 16c
Col. 33
Col. 1

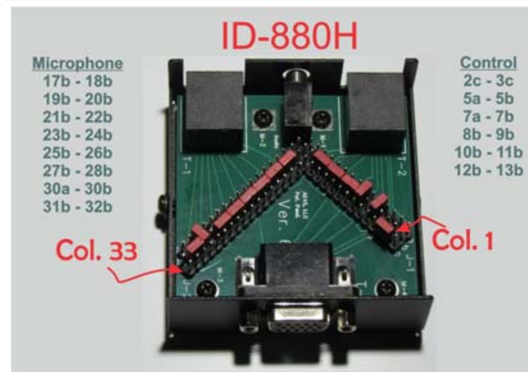

TS-480
Microphone
17c - 18c
2c - 22c (J)
12c - 24c (J)
25c - 26c
28a - 28b
30b - 31b
32c - 33c
Control
3c - 4c
5c - 6c
7a - 7b
8c - 9c
10c - 11c
13c - 14c
Col. 33
Col. 1

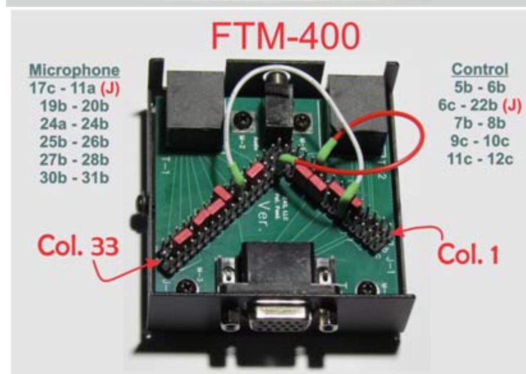

FT-891
Microphone
17c - 18c
19c - 20c
22c - 23c
24b - 25b
26c - 27c
28b - 29b
30a - 30b
32c - 33c
Control
2c - 3c
4c - 5c
7a - 7b
9b - 10b
11b - 12b
13b - 14b
Col. 33
Col. 1

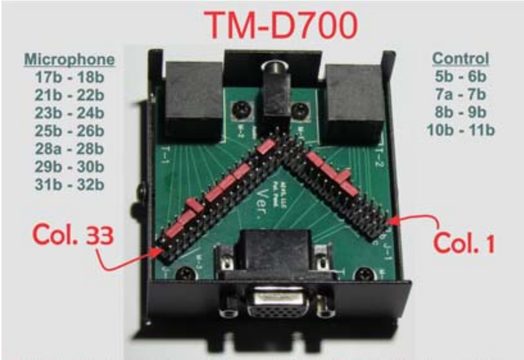

IC-2820H
Microphone
18b - 19b
20b - 21b
22b - 23b
24b - 25b
26b - 27b
28b - 29b
30a - 30b
31b - 32b
Control
4c - 5c
7a - 7b
8c - 9c
10c - 11c
Col. 33
Col. 1


FT-857
Microphone
17c - 18c
19c - 20c
21c - 22c
23c - 24c
25c - 26c
27c - 28c
30a - 30b
32c - 33c
Control
2c - 3c
4c - 5c
7a - 7b
9b - 10b
11b - 12b
13b - 14b
Col. 33
Col. 1

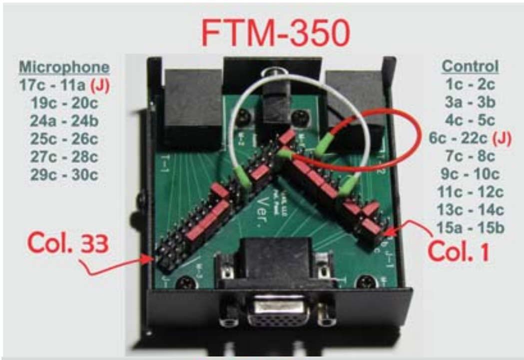

ID-5100
Microphone
18c - 19c
20c - 21c
22c - 23c
24c - 25c
30a - 30b
31b - 32b
Control
2c - 3c
4c - 5c
6c - 28c (J)
7c - 8c
9c - 10c
11c - 12c
13c - 14c
16c - 26c (J)
Col. 33
Col. 1

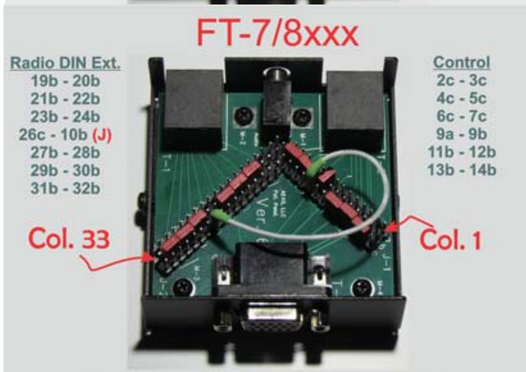

ID-880H
Microphone
17b - 18b
19b - 20b
21b - 22b
23b - 24b
25b - 26b
27b - 28b
30a - 30b
31b - 32b
Control
2c - 3c
5a - 5b
7a - 7b
8b - 9b
10b - 11b
12b - 13b
Col. 33
Col. 1


FTM-400
Microphone
17c - 11a (J)
19b - 20b
24a - 24b
25b - 26b
27b - 28b
30b - 31b
Control
5b - 6b
6c - 22b (J)
7b - 8b
9c - 10c
11c - 12c
Col. 33
Col. 1

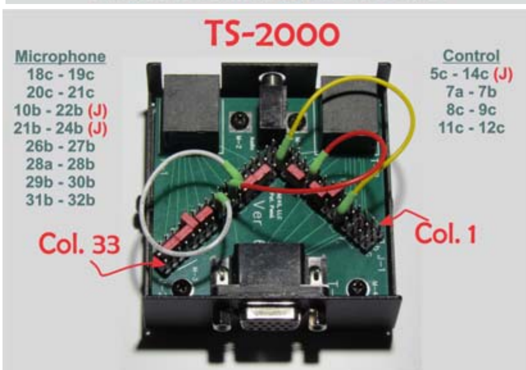


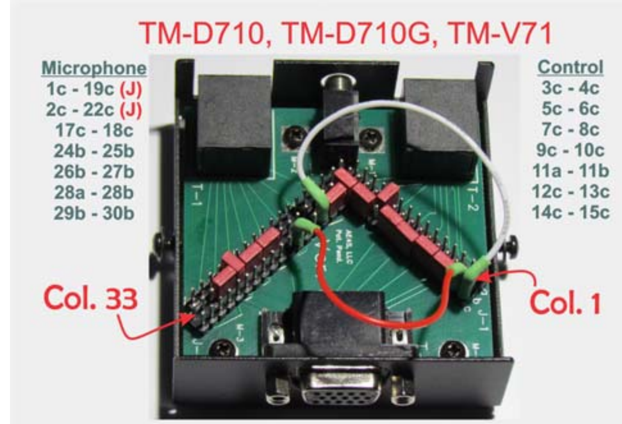
SMR to Control Head requires an RJ45 to RJ22 cable (supplied).





Jumpered for extending ARPS & Control





All Kenwood TM-D710 and TM-V71s have the same transceiver body; only the controls differ. Accordingly, their SMRs are identical. However, the control connections differ. The TM-V71 has a unique 4-conductor RJ-22 phone handset jack. SMRs ordered for TM-V71s include an additional 5-foot cable for connecting the control's RJ22 jack to the SMR's RJ45. (To upgrade to a TM-D710 just substitute the RC-D710's RJ45 connecting cable for the 5-foot one included with the SMR.)