

To: X3T9.2 Members
Subject: Small Form Factor
Date: October 9, 1992
From: Dal Allan

As per the recommendation of the September working group, the following is the proposal for an Informative Annex to be added to the SPI draft.

Annex *: Small Form Factor Configurations
(informative).

This annex describes the connector-connector mating alternatives for disk drives of $\leq 2\frac{1}{2}$ ". This information has been developed by the Small Form Factor (SFF) Committee, an industry ad hoc group.

In an effort to broaden the applications for small form factor disk drives, an ad hoc industry group of companies representing system integrators, peripheral suppliers, and component suppliers decided to address the issues involved.

A primary purpose of the SFF Committee was to define the external dimensions of small form factor disk drives so that products from different vendors could be used in the same mounting configurations.

The restricted area, and the connection of drives directly to a motherboard caused the assignment of pins that were not unused. Power is provided to the drives on the same connector as used for the signals, and addresses are set by the receptacle into which the drives are plugged.

These connectors and the additional signals that have been defined are not intended to be used outside the cabinet. In the transition from inside to outside the cabinet, the only signals passed through would be those defined for the A or P cable.

The 50-pin connector that has been widely adopted across industry for SFF drives is a low density 2mm connector which has no shroud. To support 16-bit applications, a 68-pin high density .050" connector was defined.

***.1 50-pin Signal Assignments**

The signals assigned for 50-pin applications is described in Table *-1, and the connector is described in Figure *-1.

***.2 68-pin Signal Assignments**

The signals assigned for 68-pin applications is described in Table *-2, and the connector is described in Figure *-2.

TABLE *-1: 50-pin Signal Assignments

Signal Name	Connector Contact	Conductor	Connector Contact	Signal Name
GROUND	1	1	26	-DB(0)
GROUND	2	3	27	-DB(1)
GROUND	3	5	28	-DB(2)
GROUND	4	7	29	-DB(3)
GROUND	5	9	30	-DB(4)
GROUND	6	11	31	-DB(5)
GROUND	7	13	32	-DB(6)
GROUND	8	15	33	-DB(7)
GROUND	9	17	34	-DB(P)
GROUND	10	19	35	GROUND
* 5V/3.3V GROUND	11	21	36	5V/3.3V (Motor) *
* 12V/5V GROUND	12	23	37	12V/5V *
TERMPWR	13	25	38	TERMPWR
* 12V/5V	14	27	39	12V/5V GROUND *
* 5V/3.3V (Logic)	15	29	40	5V/3.3V (Return) *
* -ADDR #1/GROUND	16	31	41	-A1N
GROUND	17	33	42	SYNC
GROUND	18	35	43	-BSY
GROUND	19	37	44	-ACK
GROUND	20	39	45	-RST
* -ADDR #2/GROUND	21	41	46	-MSG
GROUND	22	43	47	-SEL
* -ADDR #3/GROUND	23	45	48	-C/D
GROUND	24	47	49	-REQ
* VU/GROUND	25	49	50	-I/O

* Pins which are different to those of the A-Cable.

- NOTES: (1) The -ADDR #n/GROUND signals shall be externally grounded.
 (2) If more than one VU signal is required, the -ADDR #n/GROUND signals shall be used. See the recommended circuit to convert a -ADDR #n/GROUND signal to a VU Mode signal.
 (3) If the drive does not support on-board terminators, the TERMPWR signals shall not be connected to the drive.
 (4) Drives may be built for either 3.3V or 5V Logic.

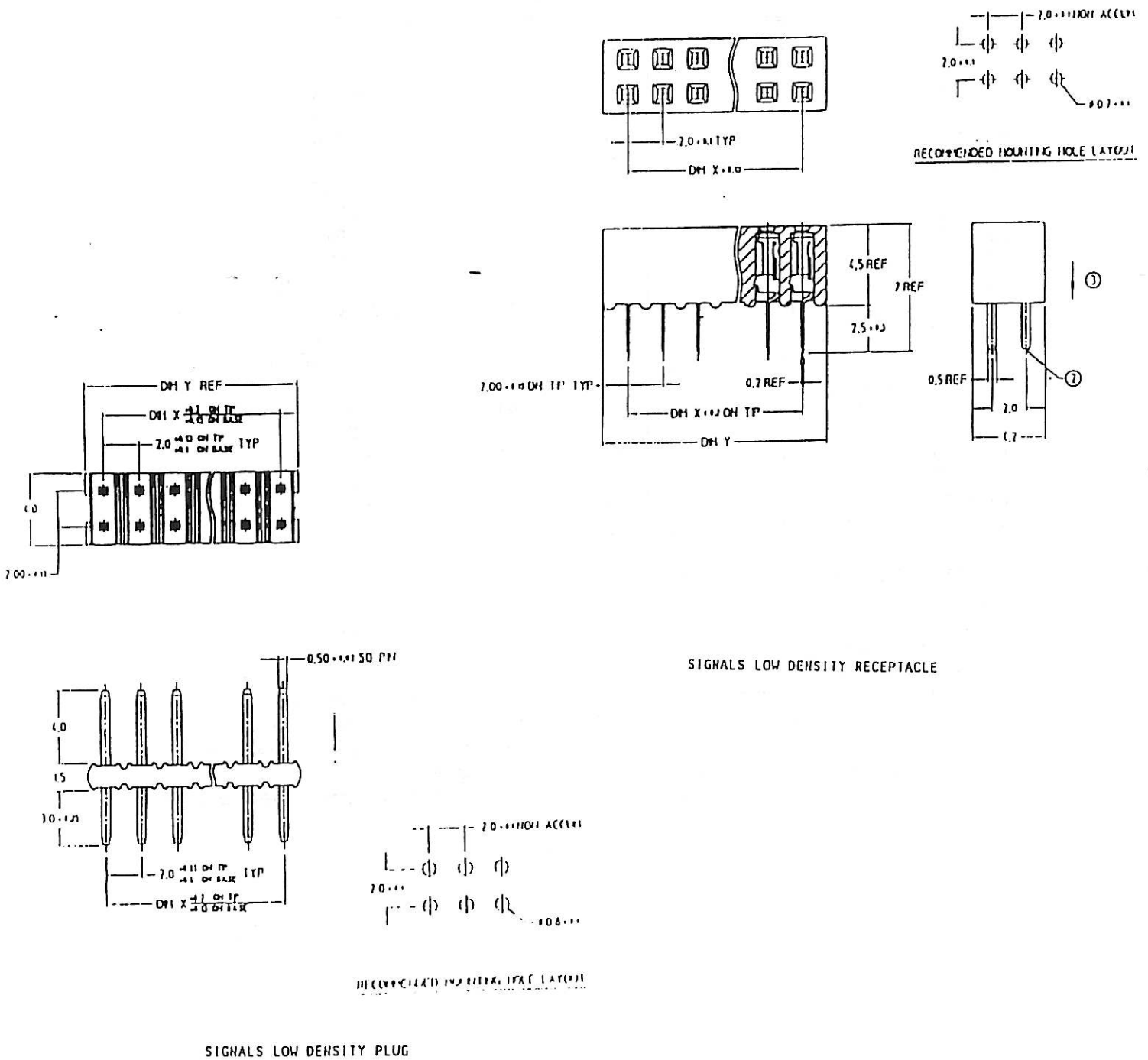


FIGURE *-1: 50-pin Connector

TABLE *-2: 68-pin Signal Assignments

Signal Name	Connector Contact	Conductor	Connector Contact	Signal Name
GROUND	1	1	2	-DB(12)
GROUND	2	3	4	-DB(13)
GROUND	3	5	6	-DB(14)
GROUND	4	7	8	-DB(15)
GROUND	5	9	10	-DB(P1)
GROUND	6	11	12	-DB(0)
GROUND	7	13	14	-DB(1)
GROUND	8	15	16	-DB(2)
GROUND	9	17	18	-DB(3)
GROUND	10	19	20	-DB(4)
GROUND	11	21	22	-DB(5)
GROUND	12	23	24	-DB(6)
GROUND	13	25	26	-DB(7)
GROUND	14	27	28	-DB(P)
* 5V/3.3V GROUND	15	29	30	5V/3.3V (Motor) *
* 12V/5V GROUND	16	31	32	12V/5V *
TERMPWR	17	33	34	TERMPWR
TERMPWR	18	35	36	TERMPWR
* 12V/5V	19	37	38	12V/5V GROUND *
* 5V/3.3V (Logic)	20	39	40	5V/3.3V (Return) *
* -ADDR #1/GROUND	21	41	42	-ATN
GROUND	22	43	44	SYNC
GROUND	23	45	46	-BSY
GROUND	24	47	48	-ACK
GROUND	25	49	50	-RST
* -ADDR #2/GROUND	26	51	52	-MSG
GROUND	27	53	54	-SEL
* -ADDR #3/GROUND	28	55	56	-C/D
GROUND	29	57	58	-REQ
* -ADDR #4/GROUND	30	59	60	-I/O
GROUND	31	61	62	-DB(8)
GROUND	32	63	64	-DB(9)
GROUND	33	65	66	-DB(10)
GROUND	34	67	68	-DB(11)

* Pins which are different to those of the P-Cable.

- NOTES: (1) The -ADDR #n/GROUND signals shall be externally grounded.
 (2) If VU signals are required, the -ADDR #n/GROUND signals shall be used. See the recommended circuit to convert a -ADDR #n/GROUND signal to a VU Mode signal.
 (3) If the drive does not support on-board terminators, the TERMPWR signals shall not be connected to the drive.
 (4) Drives may be built for either 3.3V or 5V Logic.
 (5) 8 bit drives which are connected to the P-cable shall leave the following signals open: -DB(P1) and -DB(8) through -DB(15). All other signals shall be connected as defined.

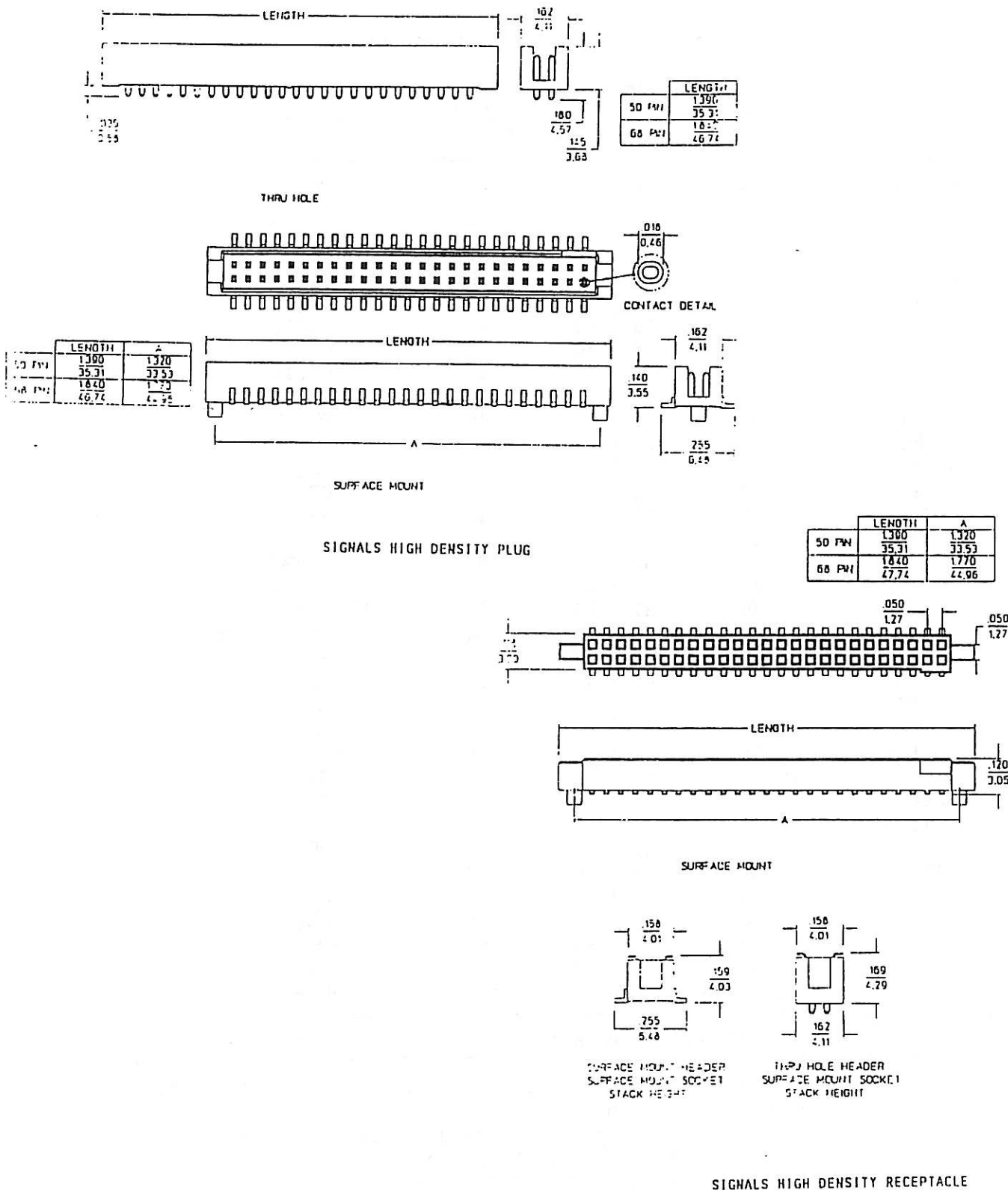


FIGURE *-2: 68-pin Signals Connector

*.3 Mixed Voltages

A drive designed for 3.3V applications may be plugged into a receptacle designed to accept a drive designed for 5V applications, with 12V lines for additional power. It is not required that the drive operate, but it is recommended that precautions be taken to prevent damage to the drive.

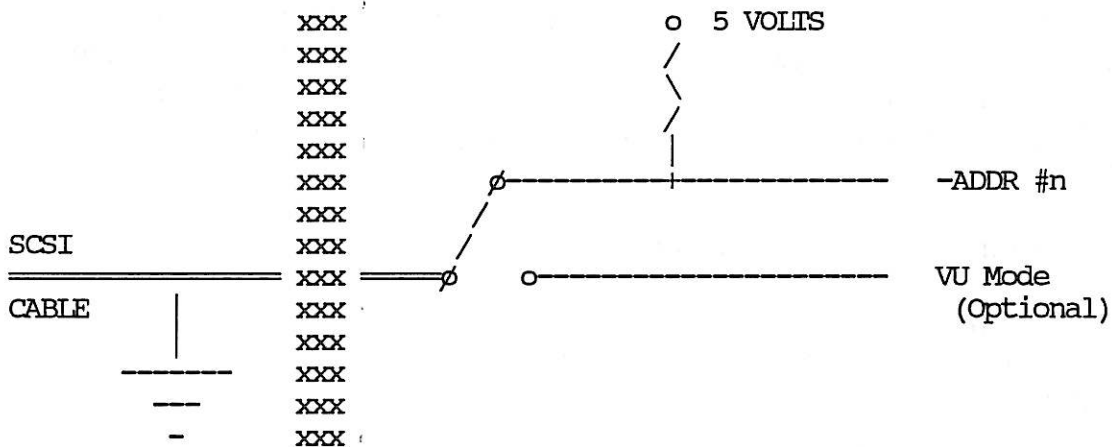
A drive designed for 5V applications may be plugged into a receptacle designed to accept a drive designed for 3.3V applications, with 5V lines for additional power. It is not anticipated that damage could occur to the drive, but it is likely to fail in an undetermined manner.

*.4 -ADDR #n/GROUND and VU Mode Operation

When tests are being run, the address functions are not in use. In VU Mode a vendor can use the signals for any test or diagnostic purpose wished.

The circuit illustrated below is an example of how to:

- Allow mixing of drives which support address recognition via the receptacle into which it is inserted with those that do not. The setting of the switch determines whether the drive responds to the local address in the receptacle or by some other means such as jumper addresses on the drive.
- Permit the VU Mode capability (which is optional) to be compatible with addressing uses. If VU Mode is supported a 2-way switch is required.



NOTE: The -ADDR #n/GROUND signal shall be grounded externally from the drive.

FIGURE *-3: SUPPORT OF VU MODE BY -ADDR#n/GROUND SIGNAL