MIL-STD-1553B DATA BUS HARNESS TESTER – CP300 HT

Description:

Compupower Private Limited has developed the CP300 HT Harness Tester, a low cost, light weight and portable instrument to test the faults in any MIL-STD-1553B Network with ease and High level of confidence.

All measurements are Pass/Fail type tests with proper LED indications. By means of five push-to-test switches, tester can detect shorts, opens, shorts to shield and phase reversal (cross over) on the Bus and Stubs.

The main feature of this Tester is that, these tests can be performed from the LRU/RT ends of the Stub cables because, access to the Couplers and Main Bus itself may be difficult.

Features:

- Easy to use hand held battery operated equipment
- Low cost, light weight and easy to use by single person
- Fast and easy testing with Go/No-Go LED indicators
- Required no Main Bus disconnection
- Detects shorts and opens in the Stubs and in the Main Bus from Stub ports
- Detects shorts to shield in the Bus and Stubs from the Stub ports
- Detects open, short or incorrect value terminators from the Stub ports
- Detects crossovers/phasing errors
- Simple validation procedure
- Increased battery life by way of push-to-test feature of the Tester Base Unit

The CP300 HT consists of two units,

(1) Base unit (CP300 HTB)
(2) Remote unit or Transmitter (CP300 HTR)

Base unit is used for Stub - shield continuity, Stub continuity check, Bus termination check and Bus-shield continuity tests. Both Base unit and Remote unit are used for Phase reversal/crossover test. Both the units are battery powered and work with standard batteries. The battery life is increased by way of push-to-test feature of the tester Base unit, and by keeping the Remote unit in 'Idle mode' when not actually being interrogated by the Base unit for Phase reversal check.

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The following faults can occur in a 1553B network because of crushed cables, failed connector joints or human error.

- Stub/Bus side open.
- Stub/Bus side short.
- Shorts to shield on the Bus and on the Stubs.
- Phase reversal (Swapping of high and low wires resulting in phase change).
- Terminators open/short or sometimes wrong value terminators.

Sequence of tests:

The following test sequence should be followed during tests.

1. Stub-shield short.
2. Stub continuity (DC resistance)
3. Bus Termination.
4. Bus-shield short.
5. Phase reversal/cross over.

Operation:

There are five push-to-test switches (buttons) to carry out the tests. Tests can be carried out by pressing the appropriate PTT's (push-to-test switches). The particular PTT (S1-S5) should be pressed for approximately three seconds to allow the (test) circuit to stabilize to its final value. It is necessary for this equipment (Tester) to carry out the tests in the sequence S1-S5 for unambiguous Pass/Fail result. The operation of the five PTT's S1-S5 are defined below.

Stub to Shield Continuity:

This test is basically a DC insulation resistance test. The resistance between any conductor and shield less than 50KΩ is interpreted as lead-to-shield short and is indicated by Pass (Green)/Fail (Red) LED.

Stub continuity Check:

This test checks for the DC continuity of the stubs. If the DC resistance of the Stub is below 1Ω ±10%, it is interpreted as Stub short and is indicated by a Red LED. If the resistance is above 5Ω ±10%, it is interpreted as Stub open and is also indicated by another Red LED. If the resistance is between 1-5Ω ±10%, it is interpreted as Normal condition and is indicated by a Green LED.

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Bus Termination check:

This function checks for shorts, opens on the Bus conductors. It can test for short, open or wrong termination from a Stub port. The results of the test are indicated by three LEDs.

Note: In case of wrong termination it is assumed that only two types of terminators are possible in a 1553B network (i.e. 78Ω and 3000Ω) the Pass/Fail criterion is differentiated between these two terminators only, even though the specifications of MIL-STD-1553B states that the normal termination is 70-85Ω nominal. The Tester is capable of differentiating wrong termination values below 50Ω as short and above 110Ω as open.

Bus to shield Continuity:

This test checks for any shorts from the Bus HI or Bus LO conductor to shield on the Bus cable. This test is carried out form the Stub (Access to Bus is not required). The Pass/Fail is indicated by Green / Red LEDs respectively.

Phase Reversal Check:

This test is carried out by using both Base unit and Remote unit. Base unit is connected to one Stub cable and the Remote unit connected to another Stub cable which has passed the tests S1-S4. This test determines if there are any phase reversals of the conductors between Remote unit and Base unit of the Tester as explained in the example given below. The Pass/Fail is indicated by Green/Red LEDs respectively.

Example:

In a 1553B network of 10 Stubs, if the Remote unit is connected to any one of the Stubs, say Stub1 which passed tests (S1-S4), and the Phase reversal test is carried out by Base unit from Stub2 through 10 with respect to Stub1, where Remote unit is connected. The following conditions should be analyzed to ascertain the location of the fault.

1. No Phase reversal: If the Base unit indicates Pass throughout all the Stubs with respect to the Stub where Remote unit is connected.

2. Phase reversal: If the Base unit indicates Fail in one or few Stub locations with respect to the Remote unit, then the Phase reversal is on those Stub(s) where the Base unit shows Fail (Red) LED indication.

If the Base unit indicates Fail indication on all the Stubs with respect to the Remote unit, then the Phase reversal is on the Stub where the Remote unit is connected.

Note1: If any failure is detected any where in the sequence S1-S5, user should not proceed to the next test(s) in the sequence without rectifying that particular fault in the network, without that, it can lead to ambiguous or incorrect results. (Eg.: when Bus short (S3 fail) and Bus shield short (S4 fail) exist, S4 test will show Green giving misleading result).

Note2: The patch cords used for testing should not have any break connectors in between.

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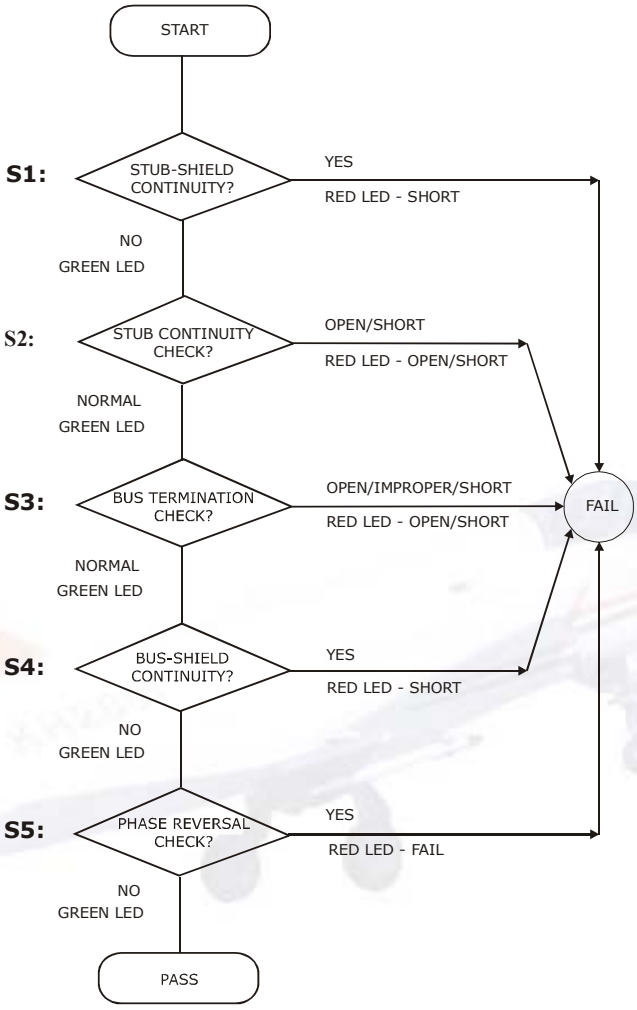
TEST SEQUENCE FLOW CHART



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SPECIFICATIONS:

LED Indication:

STUB-SHLD CONTINUITY	GREEN = PASS RED = FAIL
STUB CONTINUITY	RED = OPEN (>5Ω) GREEN = NORMAL (1-5Ω) RED = SHORT (<1Ω)
BUS TERMINATION	RED = OPEN/WRONG (>110Ω) GREEN = NORMAL (50-110Ω) RED = SHORT (<50Ω)
BUS-SHLD CONTINUITY	GREEN = PASS RED = FAIL
PHASE REVERSAL	GREEN = PASS RED = FAIL
BATTERY LOW	RED (Base Unit, <6.2V) FLASHING RED (Remote unit, <5.4V)

Current Ratings:

Base unit	75mA max
Remote unit	≤5mA (without transmission) ≤20mA (with transmission)
Test Method	PUSH-TO-TEST
Batteries	Standard 9V Alkaline or Rechargeable Ni-MH.
Battery charger	Input 230VAC, 50Hz.
Charging time	6-8 Hours
Connector	BJ 77 (Trompeter)
Storage Temp.	0°C to 50°C
Operating Temp.	10°C to 50°C
Size	Base unit (196 X 100 X 40)mm Remote unit (157 X 84 X 30)mm
Accessories (supplied)	1. Harness tester validation Jig (Model: CP300 HTV) 2. Two patch cords with PL 75 at both ends 3. Ni-cad multi cell charger

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