

## High Voltage (2000VAC) Testing with a 2115 Benchtop Analyzer

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### Testing Requirements

Many high voltage applications require a 1500VAC to 2000VAC breakdown test on a few circuits. DIT-MCO has engineered a solution providing this testing capability in our smaller, low-cost analyzers. These benchtop wiring analyzers safely apply high voltage to the portion of the assembly requiring high voltage and protect the remaining circuits and analyzer from damage in case of miswiring. This solution reduces the amount of “high” voltage switching reducing the overall cost of the analyzer.

### Overview

The current Model 2115 analyzer performs most of the test functions of the older and larger Model 9500 analyzers in addition to some new functions. These functions include high current continuity tests (3.0 amps), high voltage DC insulation tests at 2000VDC, and AC hipot tests at 2000VAC using special switching cards. In the past, providing switching capable of 2000VAC required large and expensive relays. Not any longer.

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### Description

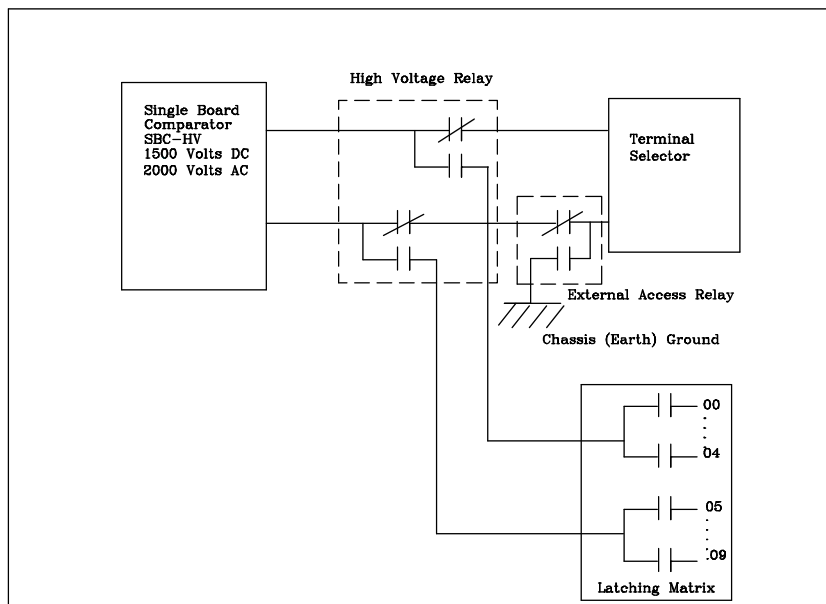
The standard Model 2115 has up to 1000 test terminations in an assembly measuring 20” x 12” x 24” and weighing less than 75 lbs. This unit with the standard Series 17B switching performs all of the above tests except the 2000VAC hipot tests. To obtain this capability requires using the High Voltage Series 41 switching relays DIT-MCO developed. Used in combination with the Series 17B relays, these Series 41 relays provide a cost effective method of testing a product when only a small number of wires/circuits require a 2000VAC test.

The standard S17B switching card contains 50 terminations per card. The chassis allows a total of 20 cards for a total of 1000 terminations. The special “high” voltage switching card using the S41 relay contains 10 switching terminations per card. A typical configuration to test a complex cable assembly with 250 wires requiring a 1500VDC test and 50 wires requiring a 2000VAC test, needs 500 terminations of “low” voltage (S17B) and 100 terminations of “high” voltage (S41) switching. In this configuration, the first 10 slots would contain S17 cards for a total of 500 terminations and the next 10 slots would contain the 10 point cards of “high” voltage switching for a total of 100 terminations.



This configuration mixes both “high/low” voltage switching in the same system. This is safely accomplished by providing the “low” voltage switching with a “Bulk” command while performing “high” voltage tests. If a fault occurs in the “high” voltage circuit under test to a “low” voltage circuit, the error is logged. Both the analyzer and the “low” voltage circuit is protected from damage caused from the breakdown from the “high” voltage as they are shorted together and connected to chassis ground. A block diagram of this configuration is as follows:

### Block Diagram for “Mixed” High/Low Voltage Switching



### Switching System Configuration

The block diagram of the switching system using the shorting technique is shown above. The Single Board Comparator (SBC-HV) is on the left. The stimulus bus connects to the standard Terminal Selector via a set of High Voltage Relays. These relays automatically activate when the AC stimulus is above 1000VAC. The High Voltage Shorting relay also activates and shorts all input addresses of the “low” voltage switching to chassis ground. The actual testing uses 10 point High Voltage Latching Matrix cards. Five (5) addresses 00...04 are bussed together and route to one side of the AC stimulus. The other five (5) addresses 05...09 are bussed together and route to the other side of the AC stimulus. This addressing scheme can extend for additional 10 point LM cards. In the above example of 100 points, this was done for 10 LM cards.

The operation of this “mixed” system allows for standard DIT-MCO commands to be performed on both the “low” voltage switching and “high” voltage switching. The only



difference is in the setup of the “high” voltage switching. It is activated using the standard LM commands of PCK and DRP. A typical test program would contain the standard SBC test parameter statements and analyzer addressing convention. This allows the standard use of the ACT files for product language identification. A typical test program is as follows:

[Typical test program using mixed switching system.

F,SBC,500V,>200M,.5T,2S

C,SBC,1A,<5R,.001T,.05S

D,DIE,2000V,5MA,2S

ACT,ROTOR.UT

F0

C1

C43

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[The following tests use the 2000VAC Breakdown detector and “High Voltage Switching”

PCK,0,1

PCK,0,7

D1000

PCK,0,8

D1000

PCK,0,9

D1000

DRP,0,ALL

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END

## Conclusion

The use of “mixed” switching provides an economical method of testing assemblies/cables when the actual number of points requiring greater than 1000VAC tests is small compared to the total number of terminations. It brings 2000VAC testing to the benchtop environment.

