S-1403DL/MLD *Mode S Accessory Unit*

The S-1403DL/MLD provides a complete test solution for Mode S and Mode S "Datalink" capable transponders

- *Easy to operate*

- *Control via IEEE.488 GPIB v13 or ATC-1400A*

- *Support for MTL, COMM C and COMM D*

- *User defined screens for user specific tests*

- *Two-year limited warranty*

IFR is a leader in the design, manufacture and marketing of Avionics test systems.

The S-1403DL/MLD Mode S accessory unit is designed to interface with the ATC-1400A Transponder/DME Test Set. The S-1403DL/MLD/ATC-1400A (Mode S Test System) simulates an ATCRBS/Mode S equipped Secondary Surveillance Radar (SSR) ground station. The Mode S Test System provides pulse and Differrential Phase Shift Keying (DPSK) modulated signals for testing Air Traffic Control Radar Beacon Systems (ATCRBS) and Mode Select (Mode S) transponders.

Operation

The S-1403DL/MLD Mode S accessory unit supports the new Mode S Data Link and ADS-B (extended DF17 squitter). The "DL" is backward compatible with the "C" model. Current ATE programs implemented on the S-1403C will operate with the S-1403DL/MLD without program changes. The unit provides additional pulse code modulation, as specified by RTCA/DO-181 to the ATC-1400A for testing ATCRBS and Mode S transponders, including Data Link and ADS-B. The MLD (Multi Level Diversity) function is available for testing Mode S transponders with MLD requirements. The S-1403DL/MLD may also be used as a stand-alone unit to perform limited Mode S tests.

Interconnect

The S-1403DL/MLD may be hard mounted to the ATC-1400A using supplied hardware. Electrical interface to the ATC-1400A is via the IFR and AUX buses using two 25-way interconnect cables and three SMB-to-SMB coaxial cables. Line power is switched through the S-1403DL/MLD for synchronized power-up of both test sets.

Standard Features

- *Over 30 new screens, including support for MTL, Comm C and Comm D formats*

- *Remote Operation via IEEE 488.2-1987 or RS-232*

- *Rapid updating of data fields using continuous rotation "SLEW" knob or keypad*

- *Rear panel interconnects for control and signal monitoring*

- *Control of P_2, P_3, P_4 and P_6 width, offset and amplitude*

- *Fixed frequency/fixed level RF output for diversity antenna testing*

- *Mode S interrogation rates up to 2500 PRF burst*

- *Onboard GPIB interface to increase the speed of ATE test routines*

- *Battery back-up memory for storage of additional test data*

- PRF generator from 99.999 sec to 2600 Hz

- Flash memory for easy firmware upgrades

S-1403DL/MLD Specifications

Control Menu Functions

Mode Select (Pulse Variable)

ATC

ATC-1400A only provides the pulse modulation (A, C, etc.). The Accessory unit will measure and display Reply Delay for ATC modes.

SEQ

Mode S interrogations are provided from the Accessory unit (outputs the stored sequence). PRF selection is made from the ATC-1400A front panel switches. The ATC-1400A transponder mode select switch is overridden.

ACS

ATCRBS All-Call short

PRF selection is made from the ATC-1400A front panel switches.

ACL

ATCRBS/Mode S All-Call long

PRF selection is made from the ATC-1400A front panel switches.

INTLCE

Set ratio of Mode S interrogations (from the sequence menu) to ATCRBS interrogations

NOTE: Mode S interrogations are interlaced with a fixed delay of 400 ps following P_1.

DI

Set double interrogation modes (any combination of ATCRBS, All-Call and Mode S).

NOTE: Enable and DI delay are controlled by the ATC-1400A front panel switches.

BURST

Program the BURST key to output ATC, ACS, ACL or SEQ formats, followed by the BURST number value of 1 to 999.

P4/P6 Control

All-Call modes (P4)

Width

Calibrated at 0.8 μs for P_4 (short) and 1.6 μs for P_4 (long). Variable independent of P_1, P_2 and P_3 from 0.2 to 2.75 μs in 0.05 μs steps for P_4 (short) and from 0.2 and 3.55 μs for P_4 (long).

Deviation

Independently variable ±1.95 μs relative to CAL position in 0.05 μs steps

Amplitude

Variable from -19 to +6 dB in 1 dB increments

NOTE: SLS control "ON" on the ATC-1400A overrides the variable amplitude.

Accuracy: ±0.3 dB for -10 to +3 dB

Rise Time

50 to 90 ns

Fall Time

50 to 200 ns

Mode S (P6)

Width

Calibrated at 16.25 or 30.25 μs (56 or 112 phase reversals), variable ±1.5 μs in 0.05 μs steps

Deviation

CAL at 3.5 μs following P_1, variable ±1.95 μs in 0.05 μs steps

SYNC Phase Reversal

Control

ON / OFF

Deviation

Calibrated at 2.75 μs after the rising edge of P_2 (CAL). Variable from +1.75 to +3.75 μs relative to the rising edge of P_6 in 50 ns steps (All DPSK data will deviate accordingly.)

SLS

SLS control on the ATC-1400A disables all other pulse amplitude control and enables the SLS pulse.

Width

Fixed at 0.8 μs, accuracy ±100 ns

Position

For ATC and ALL CALL functions, 2.0 μs. For Mode S, fixed relationship to Sync Phase Reversal from -0.4 μs before SPR to +0.4 μs following SPR

Amplitude

Variable from -19 to +6 dB in 1 dB increments

Accuracy: (Same as P_4)

Relay Delay

ATCRBS

Measures delay from P_3 to F_1 to a resolution of 25 ns

Accuracy: ±100 ns

Mode S

Measures delay from the SYNC phase reversal to the first preamble pulse of the reply to a resolution of 25 ns

Accuracy: ±50 ns

% Reply

ATC

0% to 127% in 1% steps. Displays percent of valid replies that are ATCRBS only

SEQ

0% to 127% in 1% steps. Displays percent of valid replies that are Mode S only

Ant. A

Displayed on ATC-1400A front panel

Ant. B

0% to 127% in 1% steps. Displays percent of valid replies that return through antenna B
Accuracy +1, -0 counts

Decoder

Decodes downlink data and generates parity information which is compared to the "AP" field to check errors

Squitter

Indicates Squitter period from 0 to 9.99 seconds in 10 ms steps
Accuracy ±0.5 ms

Address

Mode S address selectable from 1 to 2 to the 24th Power

Sequence Menu

Sequence Menu

The Sequence Menu allows the input of Uplink Formats in a programmable sequence of up to 16 items. Downlink Formats are read-only.

Uplink Format

UF00, UF04, UF05, UFll, UF16, UF20 and UF21 are predefined field locations per Table B-3 of the Operation/Maintenance Manual. Formats "S" and "L" are user defined 56-bit and 112-bit words consisting of 5 bits octal formatted data, 27 and 83 bits (S/L) of octal information data, and 24 bits of octal UUT data.

Downlink Format

DF00, DF04, DF05, DF11, DF16, DF20 and DF21 are predefined field locations per Table B-3 of the Operation/Maintenance Manual. Formats "S" and "L" are three fields of generic data consisting of 5 bits of octal formatted data; 27 or 83 bits of octal information data and 24 bits of octal address data.

Additional Functions

RF Level

"RFLvl" key followed by a number will raise or lower the ATC-1400A RF level by 3.0 dB in 0.1 dB steps.

Accuracy ±10%

Ant. B

Used to enable or disable the second RF output for diversity testing

Frequency

1030 MHz accuracy 0.001%

RF Level

-20 to -83 dBm

(-50 dBm fixed S-1403DL option)

Accuracy

±1 dB relative to the ATC-1400A output at -50 dBm

General

Calibration Interval

1 year

AC Supply

100 to 120 VAC, 220 to 240 VAC, 50 Hz to 60 Hz, ≤+10% of the nominal voltage

48 W maximum (163 W maximum with ATC-1400A)

AC Output

Line output, fused at 3 A and switched

ENVIRONMENTAL

Temperature

5° to 40°C

Relative Humidity

≤80% for temperatures up to 31°C, decreasing linearly to 50% at 40°C (Non condensing)

Altitude

≤4000 m (13,124 ft)

Electromagnetic Compatibility

Complies with the limits in the following standards:

EN 55011 Class B

EN50082-1

Safety

Complies with EN 61010-1:1993 for class 1 portable equipment and is for use in a pollution degree 2 environment. The instrument is designed to operate from an installation category 1 or 2 supply.

Dimensions

425 mm wide, 467 mm deep, 89 mm high

16.8 in. wide, 18.4 in. deep, 3.5 in. high

Weight

6.75 kg (15 lbs.)

Versions and Accessories

When ordering please quote the full ordering number information.

Ordering Numbers
Versions

1403-110	S-1403DL/MLD Mode S Transponder, 110 VAC operation
1403-220	S-1403DL/MLD Mode S Transponder, 220 VAC operation
1403MLD-110	S-1403DL/MLD Mode S with Level Diversity, 110 VAC operation
1403MLD-220	S-1403DL/MLD Mode S with Level Diversity, 220 VAC operation

Accessories (Supplied)

Line Cord

AUX Bus Interface Cable

IFR Bus Interface Cable

Operation Manual

3 x RF Coaxial Interface Cable

Line Cord from ATC-1400A to S-1403DL/MLD

All IFR Avionics products delivered with Factory Certificate Of Calibration

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