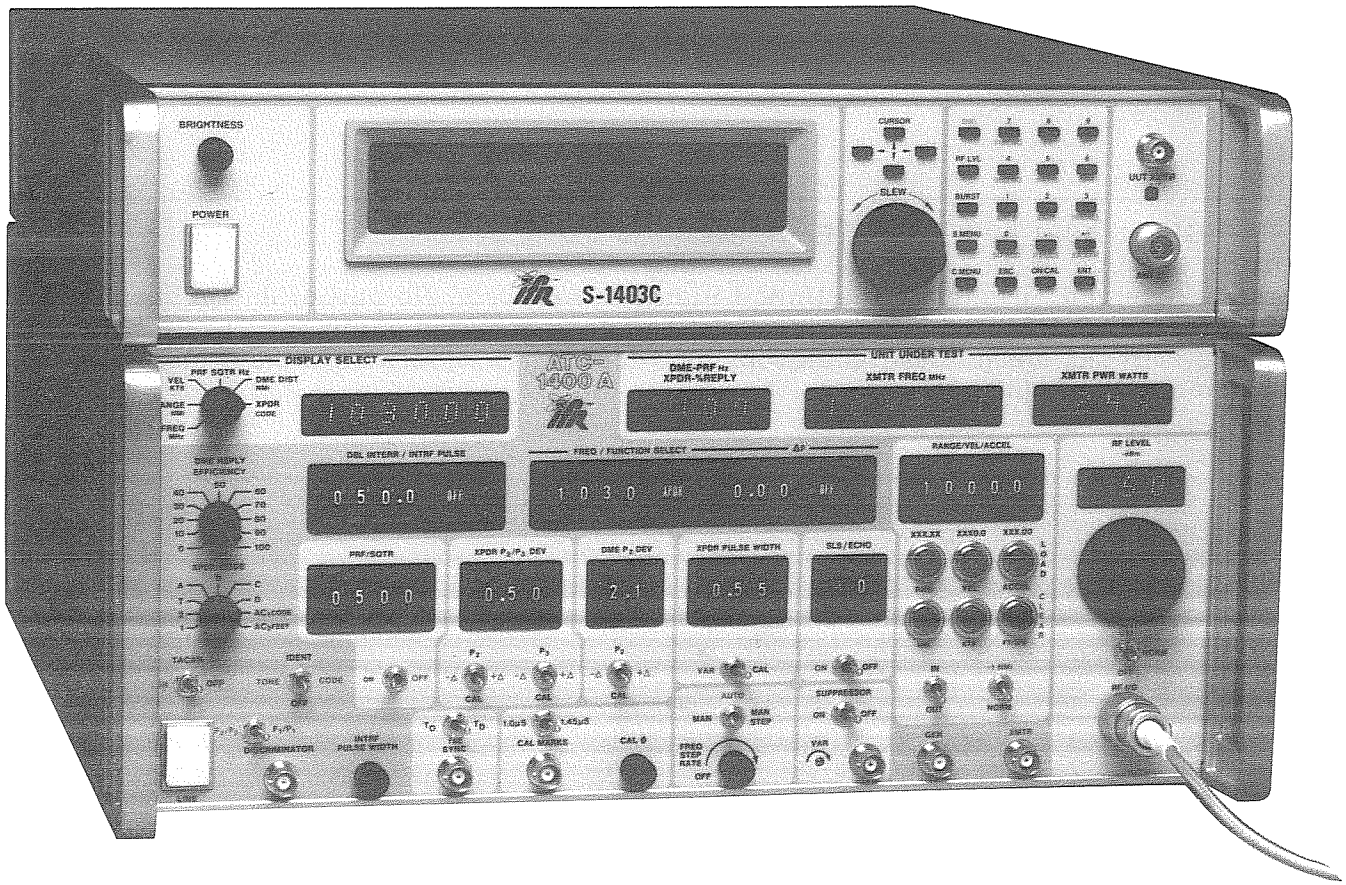
SYSTEMS, INC.

OPERATION MANUAL

MODE S
TEST SYSTEM



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OPERATION MANUAL
MODE S TEST SYSTEM

PUBLISHED BY
IFR SYSTEMS, INC.
Wichita, Kansas

WARNING

HIGH VOLTAGE EQUIPMENT

THIS EQUIPMENT CONTAINS CERTAIN CIRCUITS AND/OR COMPONENTS OF EXTREMELY HIGH VOLTAGE POTENTIALS, CAPABLE OF CAUSING SERIOUS BODILY INJURY OR DEATH. WHEN PERFORMING ANY OF THE PROCEDURES CONTAINED IN THIS MANUAL, HEED ALL APPLICABLE SAFETY PRECAUTIONS.

RESCUE OF SHOCK VICTIMS

1. DO NOT ATTEMPT TO PULL OR GRAB THE VICTIM.
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER.
3. IF YOU CANNOT TURN OFF ELECTRICAL POWER, PUSH, PULL OR LIFT THE VICTIM TO SAFETY USING A WOODEN POLE, ROPE OR SOME OTHER DRY INSULATING MATERIAL.

FIRST AID

1. AS SOON AS VICTIM IS FREE OF CONTACT WITH SOURCE OF ELECTRICAL SHOCK, MOVE VICTIM A SHORT DISTANCE AWAY FROM SHOCK HAZARD.
2. CALL FOR DOCTOR AND/OR AMBULANCE, IMMEDIATELY.
3. IF BREATHING HAS STOPPED; ADMINISTER CARDIO-PULMONARY RESUSCITATION (CPR), AS NEEDED.
4. IF VICTIM IS BREATHING, ATTEMPT TO CONTROL ALL SERIOUS BLEEDING.
5. KEEP VICTIM WARM, QUIET AND FLAT ON HIS/HER BACK.

CAUTION: INTEGRATED CIRCUITS AND SOLID STATE DEVICES SUCH AS MOS FETS, ESPECIALLY CMOS TYPES, ARE SUSCEPTIBLE TO DAMAGE BY ELECTROSTATIC DISCHARGES RECEIVED FROM IMPROPER HANDLING, THE USE OF UNGROUNDED TOOLS AND IMPROPER STORAGE AND PACKAGING. ANY MAINTENANCE TO THIS UNIT MUST BE PERFORMED WITH THE FOLLOWING PRECAUTIONS:

- BEFORE USE IN A CIRCUIT, KEEP ALL LEADS SHORTED TOGETHER EITHER BY THE USE OF VENDOR-SUPPLIED SHORTING SPRINGS OR BY INSERTING LEADS INTO A CONDUCTIVE MATERIAL.
- WHEN REMOVING DEVICES FROM THEIR CONTAINERS, GROUND THE HAND BEING USED WITH A CONDUCTIVE WRISTBAND.
- TIPS OF SOLDERING IRONS AND/OR ANY TOOLS USED MUST BE GROUNDED.
- DEVICES MUST NEVER BE INSERTED INTO NOR REMOVED FROM CIRCUITS WITH POWER ON.
- PC BOARDS, WHEN TAKEN OUT OF THE SET, MUST BE LAID ON A GROUNDED CONDUCTIVE MAT OR STORED IN A CONDUCTIVE STORAGE BAG. REMOVE ANY BUILT-IN POWER SOURCE, SUCH AS A BATTERY, BEFORE LAYING PC BOARDS ON A CONDUCTIVE MAT OR STORING IN A CONDUCTIVE BAG.
- PC BOARDS, IF BEING SHIPPED TO THE FACTORY FOR REPAIR, MUST BE PACKAGED IN A CONDUCTIVE BAG AND PLACED IN A WELL-CUSHIONED SHIPPING CONTAINER.

CAUTION: THE USE OF SIGNAL GENERATORS FOR MAINTENANCE AND OTHER ACTIVITIES CAN BE A SOURCE OF ELECTROMAGNETIC INTERFERENCE TO AVIATION RECEIVERS, WHICH CAN CAUSE DISRUPTION AND INTERFERENCE TO AERONAUTICAL SERVICE OUT TO A DISTANCE OF SEVERAL MILES.

CAUTION: USERS OF THIS EQUIPMENT SHOULD SCRUTINIZE ANY OPERATION WHICH RESULTS IN RADIATION OF A SIGNAL (DIRECTLY OR INDIRECTLY) AND ENSURE COMPLIANCE WITH INSTRUCTIONS IN FAA CIRCULAR AC 170-6C, DATED FEBRUARY 19, 1981.

RECORD OF REVISIONS

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INTRODUCTION - MODE S TEST SYSTEM

This manual contains the information necessary to install, evaluate and operate the Mode S Test System consisting of the S-1403C Test Auxiliary (with or without the Multi-Level Diversity option installed) and ATC-1400A Transponder/DME Test Set. The Mode S Test System Operation Manual is designed for use with the ATC-1400A Operation Manual.

It is strongly recommended that personnel be thoroughly familiar with the contents of this manual and the contents of the ATC-1400A Operation Manual before attempting to operate this equipment.

ORGANIZATION

This manual is divided into five sections as follows:

CHAPTER 1 - OPERATION

- Section 1 - DESCRIPTION (physical and mechanical description of S-1403C)
- Section 2 - OPERATION (installation; description of controls, connectors and indicators; performance evaluation; general operating procedures and remote operation)
- Section 3 - SPECIFICATIONS
- Section 4 - SHIPPING
- Section 5 - STORAGE

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CHAPTER ONE

MODE S TEST SYSTEM

OPERATION MANUAL

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LIST OF ILLUSTRATIONS

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SECTION 2 - OPERATION

1. Installation

A. General

The Mode S Test System is a bench test set requiring continuous ac power to operate. Installation of the Mode S Test System includes connecting the S-1403C Test Auxiliary with the ATC-1400A Transponder/DME Test Set, powering up the system and accomplishing a pre-operational system calibration.

Refer to 1-2-2, Figure 6 for S-1403C controls, connectors and indicators called out in 1-2-1 (alphabetic characters). Refer to 1-2-2, Figure 17 for ATC-1400A controls, connectors and indicators called out in 1-2-1 (numeric characters).

B. Safety Precautions

The following safety precautions must be observed during installation and operation. IFR Systems, Inc. assumes no liability for failure to comply with any safety precaution outlined in this manual.

(1) Complying with Instructions

Installation/operating personnel should not attempt to install or operate the Mode S Test System without reading and complying with instructions contained in this manual. All procedures contained in this manual must be performed in exact sequence and manner described.

(2) Grounding Equipment and Power Cord

WARNING: ALL EQUIPMENT CHASSIS CABINETS MUST BE CONNECTED TO AN ELECTRICAL GROUND TO MINIMIZE SHOCK HAZARD.

WARNING: DUE TO POTENTIAL SAFETY HAZARDS, USE OF THREE-PRONG TO TWO-PRONG ADAPTOR PLUG(S) IS NOT RECOMMENDED.

The power cord is equipped with standard three-prong plug which must be connected to a properly grounded three-prong wall receptacle. It is the customer's responsibility to:

- Have qualified electrician check wall receptacle(s) for proper grounding.
- Replace any standard two-prong wall receptacle(s) with properly grounded three-prong receptacle(s).

(3) Operating Safety

Due to potential for electrical shock within test equipment, remove covers only when performing the Installation Calibration in 1-2-1F. Use common sense and caution when working around test equipment with the covers removed. Component replacement and internal adjustments must be made by qualified personnel only. Refer to Mode S Test System Maintenance Manual for maintenance procedures.

(4) CAUTION and WARNING Labels

Exercise extreme care when performing operations preceded by a CAUTION or WARNING label. CAUTION labels appear where possibility of damage to equipment exists. WARNING labels denote conditions where bodily injury or death may result.

C. Power Requirements

The Mode S Test System operates over a voltage range of 105 to 120 or 210 to 250 VAC (at 50 to 400 Hz). No internal wiring changes are required before applying ac power to the Test Auxiliary. Ensure LINE SELECT Switch (N) setting on S-1403C rear panel matches input line voltage. Instantaneous surge current at power up is <50 A. Input current varies to maintain constant power over the input voltage range (approximately 30 W), so it is important the fuses selected have the correct rating for proper operation. Recommended fuse ratings are listed in 1-2-1, Table 1.

CAUTION: F2 - LINE SUPPLY FUSE HAS A CRITICAL TIME DELAY AND MUST BE REPLACED WITH A PROPERLY TIMED FUSE TO AVOID POSSIBLE DAMAGE TO THE S-1403C TEST AUXILIARY.

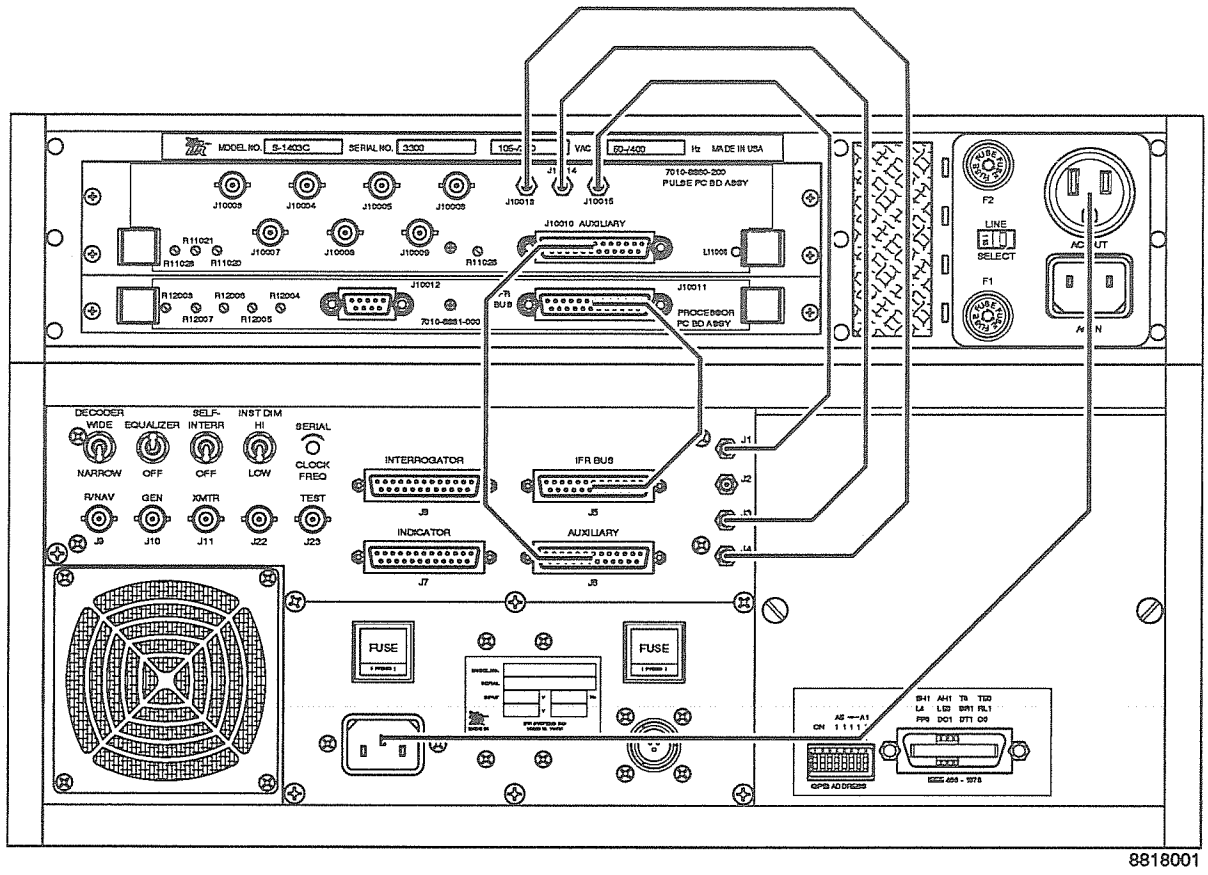
INPUT VOLTAGE	F1 - AC IN FUSE	F2 - LINE SUPPLY FUSE
105 to 120 VAC	3.0 A, 250 V Fast Blo (IFR PN: 5106-0300-600) (Bussman AGC3)	0.5 A, 250 V Reg Blo (IFR PN: 5106-0000-026) (Bussman MDL1/2)
220 to 250 VAC	3.0 A, 250 V Fast Blo (IFR PN: 5106-0300-600) (Bussman AGC3)	0.25 A, 250 V Reg Blo (IFR PN: 5106-0000-025) (Bussman MDL1/4)

Recommended Fuse Ratings
Table 1

D. Installation Procedure

STEP	PROCEDURE

1. Place ATC-1400A on bench.
2. Place S-1403C on top of ATC-1400A.
3. Connect two 25-pin type D ribbon cables and three SMB-to-SMB coaxial cables to Test Sets as shown in 1-2-1, Figure 1.
4. Connect ATC-1400A ac power cable as shown in 1-2-1, Figure 1.
5. Perform Power-up Procedure according to 1-2-1E.
6. Calibrate Mode S Test System according to 1-2-1F. Perform Installation Calibration any time S-1403C or ATC-1400A is replaced.



S-1403C to ATC-1400A Interconnections
Figure 1

The Mode S Test System can be installed in either bench-top or rack-mount fashion. All IFR Systems, Inc., test sets are normally shipped from the factory with plastic feet installed for bench-top installation. Kits required are listed in 1-2-1, Table 2.

KIT REQUIRED	INSTRUMENT	IFR SYSTEMS PART NUMBER
Rack-Mount	ATC-1400A S-1403C	7001-7636-800 7001-6740-800
Bench-Top/Stack-Mount	ATC-1400A S-1403C	7005-6743-000 One kit required per Mode S System

Installation Kits
Table 2

CAUTION: SPECIAL CARE MUST BE TAKEN TO AVOID RESTRICTION OF AIR FLOW TO INTAKE VENT WHEN INSTALLING INSTRUMENT IN EITHER BENCH-TOP OR RACK-MOUNT FASHION.

E. Power-up Procedure

The Mode S Test System is configured for one-touch power control. When the ATC-1400A LINE Switch (35) is ON, the S-1403C POWER Switch (G) controls power to the S-1403C Test Auxiliary and ATC-1400A Transponder/DME Test Set.

STEP	PROCEDURE

1. Connect female end of S-1403C ac power cable to AC IN Connector (L) on rear panel of S-1403C. Connect male end of ac power cable to standard 3-pin grounded power receptacle.

2. Press POWER Switch (G) ***ON*** to energize Test Auxiliary and verify POWER Switch (G) illuminates.

3. Press LINE Switch (35) ***ON*** and verify LINE Switch (35) illuminates.

F. Installation Calibration

The Mode S Test System Installation Calibration requires a calibrated S-1403C connected to a calibrated ATC-1400A according to 1-2-1D.

TEST EQUIPMENT: (Refer to Appendix C for Test Equipment Specifications.)

Heterodyne Monitor
Oscilloscope
Power Meter
RF Signal Generator
Spectrum Analyzer

CAUTION: THE FRONT PANEL ASSEMBLY, PULSE PC BOARD ASSEMBLY, PROCESSOR PC BOARD ASSEMBLY AND DIVERSITY MODULE CONTAIN PARTS SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). ALL PERSONNEL PERFORMING INSTALLATION CALIBRATION SHOULD HAVE KNOWLEDGE OF ACCEPTED ESD PRACTICES AND/OR BE ESD CERTIFIED.

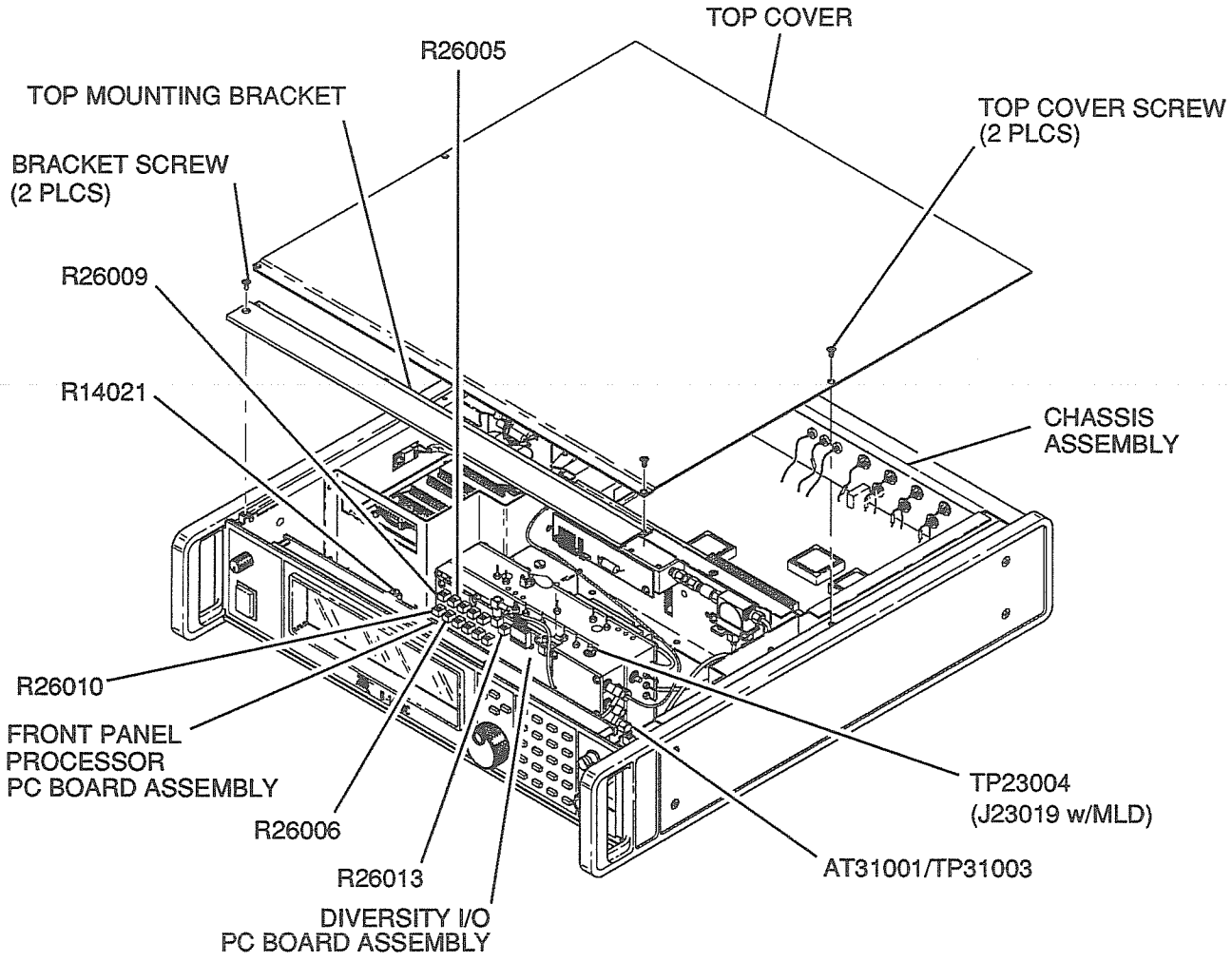
STEP	PROCEDURE

1. Remove power from S-1403C.

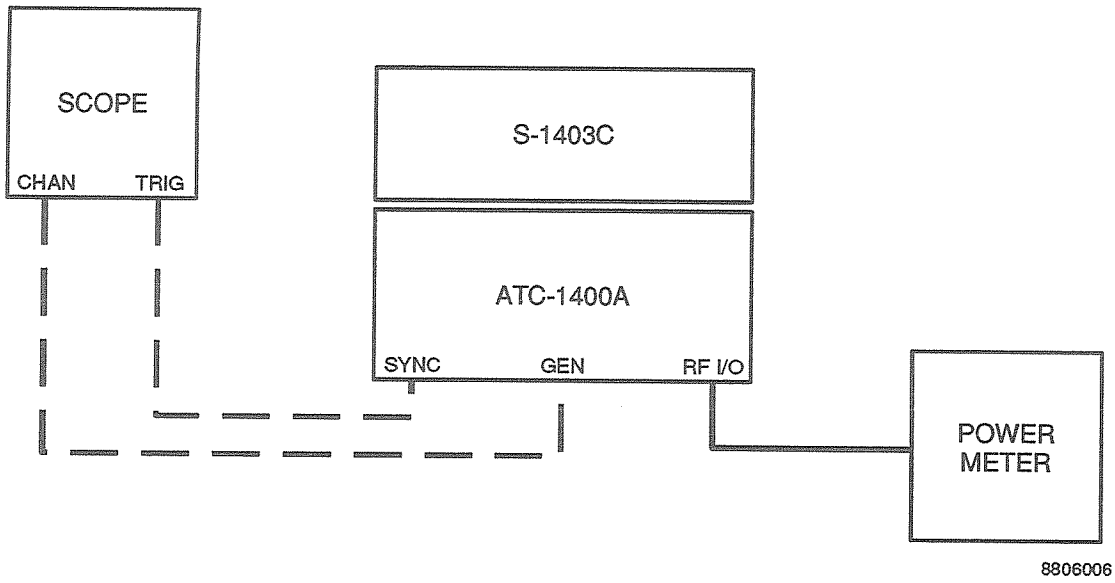
2. Remove two top cover screws and two bracket screws according to 1-2-1, Figure 2.

3. Lift top cover with top mounting bracket from Chassis Assembly. Refer to 1-2-1, Figure 2.

4. Apply power to Mode S Test System.



Installation Calibration Internal Adjustments
Figure 2



Installation Calibration Test Setup #1 Diagram
Figure 3

5. Set ATC-1400A as follows:

CONTROL		SETTING
(7)	CW/NORM/OFF Switch	***NORM***
(18)	SLS/ECHO ON/OFF Switch	***OFF***
(22)	MAN/AUTO/MAN STEP Switch	***MAN***
(25)	XPDR DEV P_3/CAL Switch	***CAL***
(28)	XPDR DEV P_2/CAL Switch	***CAL***
(32)	PRF/SQTR ON/OFF Switch	***ON***
(37)	TACAN ON/OFF Switch	***OFF***
(41)	PRF/SQUITTER Thumbwheels	***0200***
(42)	DBL INTERR/INTRF Thumbwheels	***000.0 OFF***
(45)	FREQ/FUNCTION SELECT Thumbwheels	***1030 XPDR***
(48)	ΔF Thumbwheels	***OFF***

6. Verify S-1403C Control Menu #1 with ***Func: (1) ATC*** is displayed after approximately 30 seconds.

7. Use CURSOR Keys (A) and position cursor to ***RFLvl:*** field.

8. Use Keyboard (B) or SLEW Control (F) to set ***RFLvl:+0.0***.

9. Adjust RF LEVEL Control (6) to read ***00*** on the RF LEVEL -dBm Display (3).

10. Disconnect cable from RF VERNIER OUT Connector (J10013) (GG).

11. Set CW/NORM/OFF Switch (7) to ***CW***.

STEP	PROCEDURE

12. Connect Power Meter (through Power Sensor) to RF I/O Connector (9) as shown in 1-2-1, Figure 3. Record Power Meter reading.

13. Reconnect cable to RF VERNIER OUT Connector (J10013) (GG) and adjust ZERO SCALE Adjust (R11023) (W) to reading recorded in Step 12.

14. Set S-1403C ***RFLvl:+3.0***.

15. Adjust FULL SCALE Adjust (R11021) (X) until Power Meter displays +3.0 dB more than reading recorded in Step 12.

16. Repeat Steps 12 through 15 until no adjustments are required. Verify Power Meter readings are within ±0.05 dBm of each other when cable to RF VERNIER OUT Connector (J10013) (GG) is connected or disconnected.

17. Verify Power Meter reading is -3 dBm (±0.2 dB) when ***RFLvl:*** field is set to -3.0 and +3 dBm (±0.2 dB) when ***RFLvl:*** field is set to +3.0.

18. Press 2ND, FUN NO and "2" Keys in sequence. Verify Control Menu #1 with ***Func: (2) SEQ*** is displayed.

19. Press S MENU Key. Verify Sequence Menu S01 is displayed.

20. Rotate SLEW Control (F) through each sequence menu and press ON/CAL Key to set sequences S02 through S16 OFF.

21. Use CURSOR Keys (A), Keyboard (B) and SLEW Control (F) to set ***S01:FMT D,UF#04*** and ***ADD=17725762***.

22. Press C MENU and "1" Keys in sequence. Verify Control Menu #1 with ***Func: (2) SEQ*** is displayed.

23. Use CURSOR Keys (A) and ON/CAL Key to set ***AntB: ON***.

24. Set CW/NORM/OFF Switch (7) to ***NORM***.

25. Connect GEN Connector (15) to Oscilloscope. Refer to 1-2-1, Figure 3.

26. Connect SYNC Connector (29) to Ext Trigger Input of Oscilloscope. Refer to 1-2-1, Figure 3.

27. Set To/TAC/T_D Switch (30) to ***To***.

28. Adjust DPSK AMPLITUDE BALANCE Adjust (R11026) (P) until P_6 phase shift peaks are relatively even.

29. Rotate ATC-1400A RF LEVEL Control (6) until -50 dBm (-20 dBm if the Multi-Level Diversity option is installed) is displayed on RF LEVEL -dBm Display (3).

30. Set CW/NORM/OFF Switch (7) to ***CW***.

31. Disconnect Power Meter from RF I/O Connector (9).

STEP PROCEDURE

32. Connect Spectrum Analyzer to RF I/O Connector (9).

33. Set ***RFLvl:+0.00***.

34. Set Spectrum Analyzer controls as follows:

CONTROL	SETTING
Span	Zero
Bandwidth	3 MHz
Sweep Rate	5 or 10 µs
Log Scale	1 or 2 dB/Div

35. Set CW/NORM/OFF Switch (7) to ***NORM***.

36. Adjust Spectrum Analyzer for stable display and record signal level as a reference.

    NOTE: Steps 37 and 38 only apply if the Multi-Level Diversity option is installed.

37. Press C MENU and "2" Keys in sequence. Verify Control Menu #2 is displayed.

38. Set ***Brf= -20 dBm*** and ***Brflv=+0.0 dB***.

39. Disconnect Spectrum Analyzer from RF I/O Connector (9) and connect Spectrum Analyzer to ANT B Connector (E).

40. Refer to 1-2-1, Figure 2 and adjust R26013 on the S-1403C Diversity I/O PC Board Assembly to set Spectrum Analyzer signal at reference level recorded in Step 36 (±0.5 dB).

    NOTE: Steps 41 through 49 only apply if the Multi-Level Diversity option is installed.

41. Set CW/NORM/OFF Switch (7) to ***CW***.

42. Disconnect Spectrum Analyzer from ANT B Connector (E).

43. Connect Power Meter to ANT B Connector (E).

44. Verify Power Meter reading is -20 dBm (±1 dB). Record signal level for a reference.

45. Set ***Brflv= +3.0 dB***. Verify Power Meter reading is reference level from Step 44 + 3.0 dB (±0.3 dB). If not, adjust R14021 on Front Panel Processor PC Board Assembly. Refer to 1-2-1, Figure 2.

46. Set ***Brflv=+0.0 dB***. Verify Power Meter reading equals reference from Step 44 (±0.05 dB). If not, adjust R26013 on Diversity I/O PC Board Assembly. Refer to 1-2-1, Figure 2.

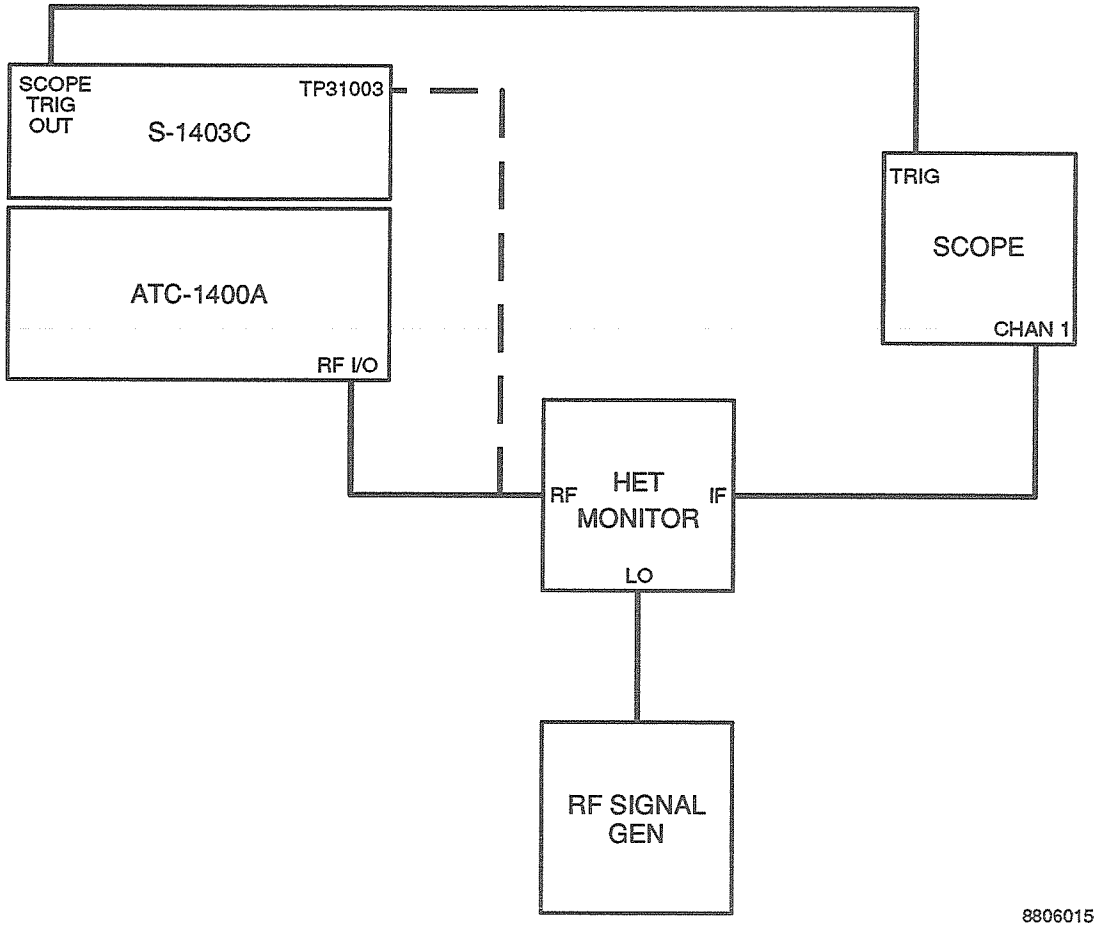
STEP PROCEDURE

47. Repeat Steps 45 and 46 until +3 dB and 0 dB settings are within tolerance without adjustments.

48. Set ***Brflv= -3.0 dB***. Verify Power Meter reading is reference level from Step 44 - 3.0 dB (±0.3 dB).

49. Disconnect Oscilloscope and Power Meter from Mode S Test System.

50. Connect Oscilloscope External Trigger to SCOPE TRIG OUT Connector (AA). Refer to 1-2-1, Figure 4.



Installation Calibration Test Setup #2 Diagram
Figure 4

51. Connect Oscilloscope Channel 1 to Heterodyne Monitor IF Connector. Refer to 1-2-1, Figure 4.

52. Connect Heterodyne Monitor RF Connector to RF I/O Connector (9). Refer to 1-2-1, Figure 4.

53. Connect RF Signal Generator, set for 1030 MHz at +6 dBm, to Heterodyne Monitor LO Connector. Refer to 1-2-1, Figure 4.

STEP PROCEDURE

54. Set CW/NORM/OFF Switch (7) to ***NORM***.

55. Press C MENU and "1" Keys in sequence. Verify Control Menu #1 with ***Func: (2) SEQ*** is displayed.

56. Adjust SPR TIMING Adjust (R12007) (U) until 50% point of P_2 leading edge to SPR center point spacing is between 2.70 and 2.75 µs.

57. Refer to 1-2-1, Figure 5 and set JTB11001 on Pulse PC Board Assembly until 50% point of P_2 leading edge to SPR center point is spaced 2.75 µs (±10 ns).

58. Align 50% point of P_1 (Ant A) with major vertical axis on Oscilloscope for reference.

59. Disconnect Heterodyne Monitor RF Connector from RF I/O Connector. Reconnect Heterodyne Monitor RF Connector to TP31003.

60. Adjust JTB11002 followed by R26010 on Diversity I/O PC Board Assembly to align P_1 with major vertical axis. Refer to 1-2-1, Figure 5 for JTB11002 location.

61. Adjust R26009 on Diversity I/O PC Board Assembly for P_1 pulse width of 800 ns (±10 ns)

62. Verify all sequences are off except for ***S01:FMT D,UF#04*** with ***ADD=17725762***.

63. Adjust JTB11003 followed by R26006 on Diversity I/O PC Board Assembly until 50% point of P_2 leading edge to SPR center point spacing is 2.75 µs (±10 ns). Refer to 1-2-1, Figure 5 for JTB11003 location.

64. Adjust R26005 on Diversity I/O PC Board Assembly until spacing between SPR and next phase transition is 1.0 µs (±10 ns).

65. Press 2ND, SAVE and "1" Keys in sequence.

66. Press POWER Switch (G) ***OFF***. After ≥30 seconds, press POWER Switch (G) ***ON***.

67. Press 2ND, RECALL and "1" Keys in sequence.

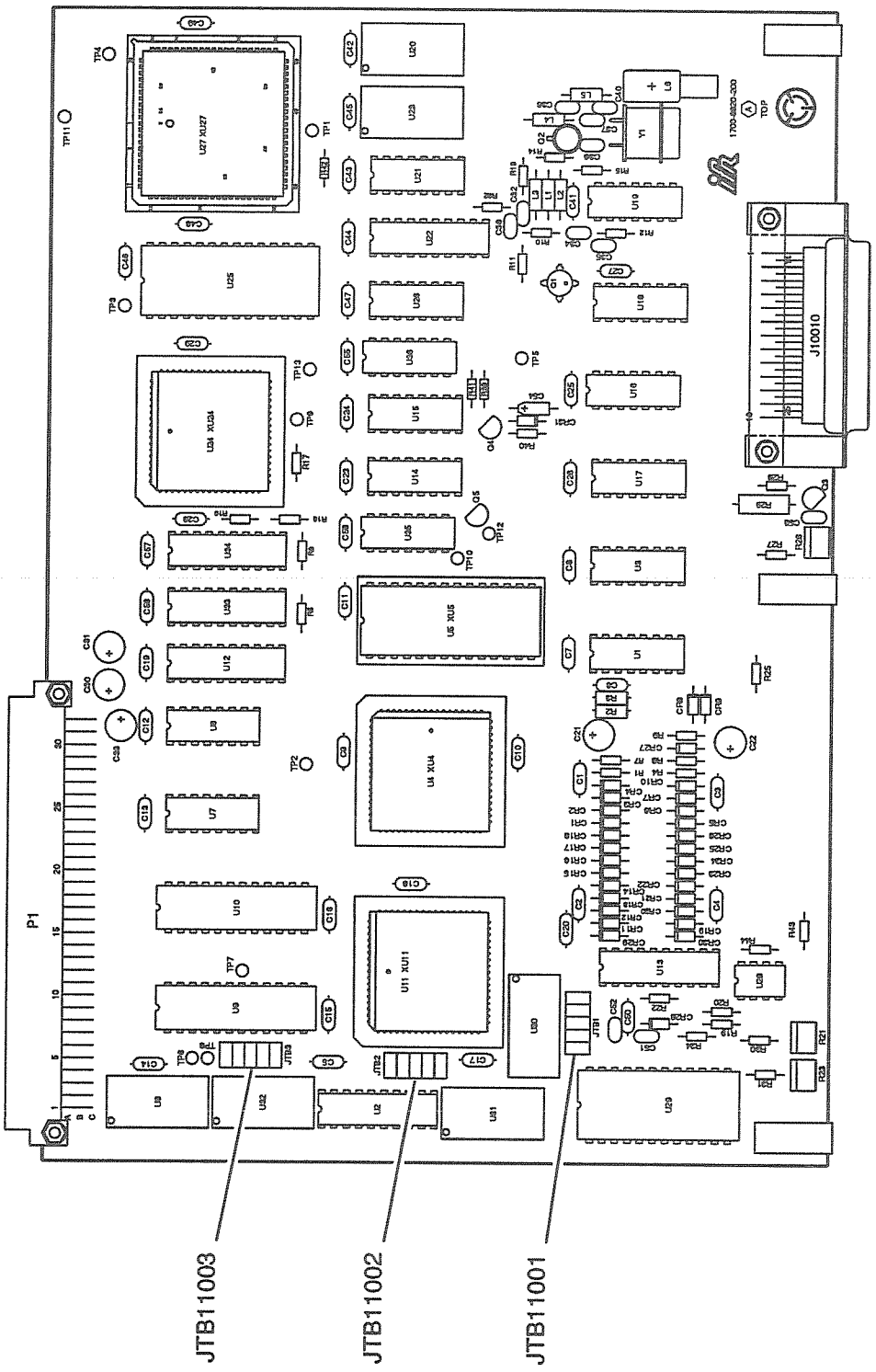
68. Verify P_2 to SPR is 2.75 µs (±25 ns).

69. Remove power from Mode S Test System.

70. Disconnect test equipment.

71. Place top cover with top mounting bracket on Chassis Assembly according to 1-2-1, Figure 2.

72. Tighten two top cover screws and two bracket screws shown in 1-2-, Figure 2.



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Pulse PC Board Assembly Installation Calibration
Figure 5

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Refer to 1-2-2, Figure 6 for S-1403C controls, connectors and indicators (alphabetic character identifiers). Refer to 1-2-2, Figure 17 for ATC-1400A controls, connectors and indicators (numeric character identifiers).

A. S-1403C Front and Rear Panels (Refer to 1-2-2, Figure 6.)

ITEM	DESCRIPTION

A. CURSOR Keys (↑, →, ↓, ←)

Used to select data or control fields for editing. Cursor is shown as an underline below the selected field. After cursor is positioned under the desired field, the Keyboard (B) or SLEW Control (F) is used to edit the field.

B. Keyboard (Refer to 1-2-2B.)

Controls the microprocessor and is used for data entry. A Keyboard entry changes the character at the cursor position and advances the cursor to the next character in that field.

C. UUT XMTR Connector (J10001)

BNC type connector provides detected UUT transmission video received through ANT B Connector (E).

D. UUT XMTR Indicator

LED illuminates when transmitter replies are received through ANT B Connector (E).

E. ANT B Connector (J10002)

N type connector provides access to a second RF channel for diversity testing. The S-1403C transmits interrogation signals through ANT B Connector at a fixed power level unless the Multi-Level Diversity option is installed. The Multi-Level Diversity option provides level control over the signal transmitted through this connector.

F. SLEW Control

Selects data by rotating in either a cw or ccw direction. Entire command and decimal data fields are edited with one SLEW Control entry. Octal data fields are changed one character at a time. SLEW Control input allows rapid advance to desired function or data.

G. POWER Switch

Applies ac power to the S-1403C Test Auxiliary and AC OUT Connector (K).

H. BRIGHTNESS Control

Controls brightness of backlighting to MENU Display (I). Rotating control cw increases brightness and rotating control ccw decreases brightness.

ITEM DESCRIPTION

I. MENU Display

Displays menu as selected on the Keyboard (B). Refer to 1-2-2C for menu descriptions.

J. F2 Fuse

Fuses power to LINE SELECT Switch (N). When LINE SELECT Switch (N) is in 115 VAC position, F2 should be 1.0 A, 250 V Reg Blo. When LINE SELECT Switch (N) is in 230 VAC position, F2 should be 0.50 A, 250 V Reg Blo. Refer to 1-2-1C.

K. AC OUT Connector

Receptacle used for providing power to the ATC-1400A.

L. AC IN Connector

Receptacle used for application of 115 or 230 VAC single phase power to the S-1403C. LINE SELECT Switch (N) must be set to correct position before applying power.

M. F1 Fuse

Fuses power to the S-1403C and AC OUT Connector (K). F1 should be 3.0 A, 250 V Fast Blo. Refer to 1-2-1C.

N. LINE SELECT Switch

Selects the line voltage, 115 or 230 VAC, applied to the S-1403C.

O. IFR BUS Connector (J10011)

25-pin female connector provides communication and control data between the S-1403C and ATC-1400A through IFR BUS Connector (71). Refer to Appendix A for pin-out table.

P. DPSK AMPLITUDE BALANCE Adjust (R11026)

Used during calibration to set a consistent amplitude level for the Mode S interrogation phase reversals.

Q. TEST Connector (J10012)

For IFR Systems Inc. use only.

R. R12004

Not used.

ITEM DESCRIPTION

S. ANT B REPLY DELAY Adjust (R12005)

Used during calibration to set the reply delay measurement standard through ANT B Connector (E).

T. ANT A REPLY DELAY Adjust (R12006)

Used during calibration to set the reply delay measurement standard through RF I/O Connector (9).

U. SPR TIMING Adjust (R12007)

Used during calibration to set timing of the Synchronous Phase Reversal (SPR) occurring in Mode S interrogations.

V. R12003

Not used.

W. ZERO SCALE Adjust (R11023)

Used during calibration to set the zero reference for RF level control provided by the S-1403C.

X. FULL SCALE Adjust (R11021)

Used during calibration to set maximum RF level control provided by the S-1403C.

Y. REF VOLTAGE Adjust (R11020)

Not used.

Z. EXT MOD IN Connector (J10003)

Used to connect an external modulation source. External modulation is accepted any time regardless of Control Menu #2, ***Ext.Mod.In:*** field setting.

AA. SCOPE TRIG OUT Connector (J10007)

Provides a scope trigger for the interrogation or reply times and is controlled by the T_O/TAC/T_D Switch (30). Refer to Appendix A for trigger pulse position.

BB. EXT SYNC IN Connector (J10004)

Used to connect an external sync source. The EXT SYNC IN Connector is enabled from the S-1403C front panel (Control Menu #2) or by remote operation through the GPIB.

ITEM DESCRIPTION

CC. EXT SYNC OUT Connector (J10008)

Provides an external sync pulse and is controlled from the S-1403C front panel (Control Menu #2) or by remote operation through GPIB.

DD. MODE S/ATCRBS DISCRETE OUT Connector (J10005)

Provides an active low 3.0 µs long pulse with leading edge occurring 1.0 µs prior to the Prepulse output leading edge. The Mode S/$\overline{\text{ATCRBS}}$ Discrete pulse is only active when an ATCRBS interrogation is pending.

EE. PREPULSE OUT Connector (J10009)

Provides a 1.0 µs long TTL Prepulse and is controlled from the S-1403C front panel (Control Menu #2) or by remote operation through GPIB.

FF. ANT B VIDEO OUT Connector (J10006)

Provides a digital version of the ANT B reply signal viewed at UUT XMTR Connector (C).

GG. RF VERNIER OUT Connector (J10013)

SMB type connector provides an analog output signal for vernier control over the ATC-1400A RF output level.

HH. MEASUREMENT GATE OUT Connector (J10014)

SMB type connector provides a Pulse Power Measurement Gate (PPMG) pulse to the ATC-1400A. The pulse is controlled from the S-1403C front panel (Control Menu #2) or by remote operation through the GPIB. The PPMG pulse selects a specific ATCRBS or Mode S Reply pulse for UUT power and frequency measurements. Power measurements are displayed on XMTR PWR WATTS Display (1). Frequency measurements are displayed on XMTR FREQ MHz Display (51).

II. DPSK OUT Connector (J10015)

SMB type connector provides the DPSK modulation used in Mode S interrogations. The bipolar level signal through this connector drives the phase modulator in the ATC-1400A.

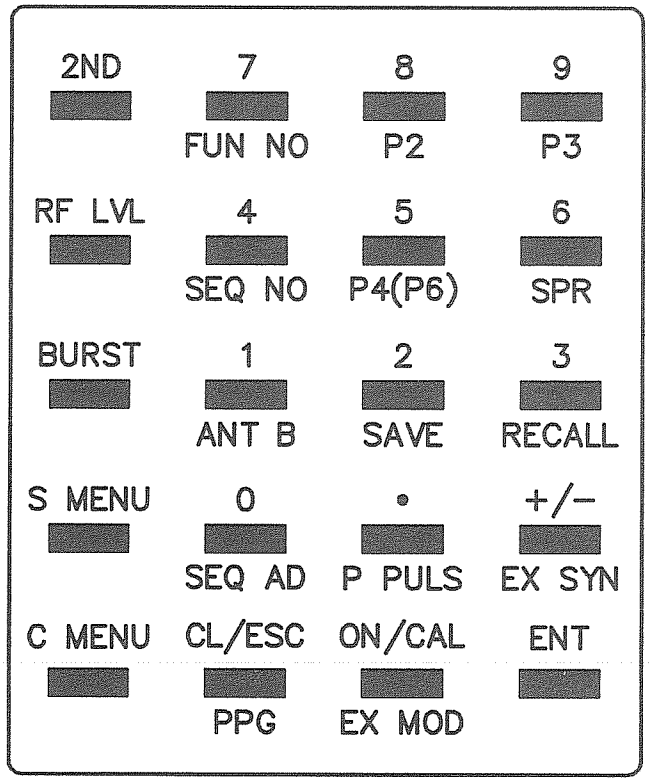
JJ. AUXILIARY Connector (J10010)

25-pin female connector provides timing and pulse signals between the S-1403C and ATC-1400A through AUXILIARY Connector (72). Refer to Appendix A for pin-outs.

KK. 80 MHz Adjust (L11006)

Used only during calibration or maintenance to set edge detect oscillator.

B. Keyboard Definition (Refer to 1-2-2, Figure 7.)



S-1403C Keyboard
Figure 7

The S-1403C Keyboard (B) consists of 20 keys (24 keys mechanically including the CURSOR Keys [A]). The keys allow data entry for selecting test functions, menu formats and field data. Most keys have dual functions. First order functions (shown above each key) are activated by simply pressing the desired key. Second order functions (shown below the key) are activated by pressing the 2ND Key, then the desired second order key. CURSOR Keys (A) are located adjacent to the Keyboard (B) to expedite entering data. Keys are listed below as first order functions with second order functions being the alternative:

2ND Key

The 2ND Key is used to select second order functions. Second order functions are labeled in blue below the respective keys. To activate any second order function, press 2ND Key before selecting the second order function key.

7 or FUN NO Key

The "7" Key is used to enter the number 7 in data fields.

Pressing 2ND, FUN NO and test function number (1 to 7) Keys in sequence displays the corresponding test function menu. Refer to 1-2-2, Table 3 for Test Function Selections.

TEST FUNCTION NUMBER	CONTROL MENU #1 DISPLAY	FUNCTION
1	*Func: (1) ATC*	ATCRBS Only
2	*Func: (2) SEQ*	Mode S Only
3	*Func: (3) ACS*	ATCRBS Only All-Call
4	*Func: (4) ACL*	ATCRBS/Mode S All-Call
5	*Func: (5) INTLCE, Ratio 1:(1 to 999)*	Interlace Ratio of Mode S to ATCRBS
6	*Func: (6) DI, 1st= ___,2nd= ___*	Double Interrogation ATC, ACS, ACL or SEQ for either or both interrogations
7	*Func: (7) BURST, ___,(1 to 999)*	ATC, ACS, ACL or SEQ Functions for 1 to 999 interrogations

Test Function Selections
Table 3

8 or P2 Key

The "8" Key is used to enter the number 8 in data fields.

Pressing 2ND and P2 Keys in sequence moves cursor to the *P2:* field for edit in Control Menu #1. The P2 Key function operates from any menu and causes Control Menu #1 to be displayed, but only if the *P2:* field applies to the current test function.

9 or P3 Key

The "9" Key is used to enter the number 9 in data fields.

Pressing 2ND and P3 Keys in sequence moves cursor to the *P3:* field for edit in Control Menu #1. The P3 Key function operates from any menu and causes Control Menu #1 to be displayed, but only if the *P3:* field applies to the current test function.

RF LVL Key

Pressing the RF LVL Key moves cursor to the *RFLvl:* field for edit in Control Menu #1. The RF LVL (RF Signal Level) Key function operates from any menu and causes Control Menu #1 to be displayed.

4 or SEQ NO Key

The "4" Key is used to enter the number 4 in data fields.

Pressing 2ND, SEQ NO, sequence number (1 to 16) and ENT Keys in sequence displays the current corresponding sequence menu.

5 or P4(P6) Key

The "5" Key is used to enter the number 5 in data fields.

Pressing 2ND and P4(P6) Keys in sequence moves cursor to the ***P4:*** field or ***P6:*** field for edit in Control Menu #1. The P4(P6) Key function operates from any menu and causes Control Menu #1 to be displayed, but only if the ***P4:*** or ***P6:*** field applies to the current test function.

6 or SPR Key

The "6" Key is used to enter the number 6 in data fields.

Pressing 2ND and SPR Keys in sequence moves cursor to the ***SPR:*** field for edit in Control Menu #1. The SPR (Synchronous Phase Reversal) Key function operates from any menu and causes Control Menu #1 to be displayed, but only if the ***SPR:*** field applies to the current test function.

BURST Key

The BURST Key activates the BURST Test Function. When the BURST Test Function is activated, the number of interrogations specified in Control Menu #1 FUNC: field are transmitted at a PRF programmed by the ATC-1400A PRF/SQTR Thumbwheels (41).

NOTE: The BURST Key function is only active when the BURST Test Function is operating.

1 or ANT B Key

The "1" Key is used to enter the number 1 in data fields, selecting memory location number 1 and selecting Control Menu #1.

Pressing 2ND and ANT B Keys in sequence moves cursor to the ***AntB:*** field for edit in Control Menu #1. The ANT B (Antenna B) Key function operates from any menu and causes Control Menu #1 to be displayed.

2 or SAVE Key

The "2" Key is used to enter the number 2 in data fields, selecting memory location number 2 and selecting Control Menu #2.

Pressing 2ND, SAVE and memory location number (1 or 2) Keys in sequence saves all menus (control and sequence menus). After editing from one to all seven test functions, the SAVE Key function is used to save all current information in one of two non-volatile memory locations. Previous information in the corresponding memory location is overwritten.

3 or RECALL Key

The "3" Key is used to enter the number 3 in data fields.

Pressing 2ND, RECALL and memory location number (1 or 2) Keys in sequence recalls all the menu information saved in the corresponding memory location. All functions are executed to assure system operation is updated with the new menus. Control Menu #1 of the test function that was operating when saved, is displayed. If not saved, menu settings at the time of the recall action are lost.

S MENU Key

Pressing the S MENU Key displays the sequence menu last displayed. Sequence Menu S01 is the default menu on power-up.

0 or SEQ AD Key

The "0" Key is used to enter the number 0 in data fields.

Pressing 2ND and SEQ AD Keys in sequence moves cursor to the ***ADD=*** field (uplink format address) for edit in the sequence menu. The SEQ AD (Sequential Address) Key function operates from any menu and causes the last displayed sequence menu or Sequence Menu S01 (default) to be displayed.

• or P PULS Key

The • Key is used to enter the decimal point in data fields.

Pressing 2ND and P PULS Keys in sequence moves cursor to the ***Prepulse:*** field for edit in Control Menu #2. The P PULS (Prepulse) Key function operates from any menu and causes Control Menu #2 to be displayed.

+/- or EXT SYN Key

Pressing the +/- Key displays the plus (+) or minus (-) sign before decimal data. The +/- Key function changes decimal value from positive (+) to negative (-) or vice versa and automatically enters the new value without pressing the ENT Key. The +/- Key function is used after editing the decimal data field.

Pressing 2ND and EXT SYN Keys in sequence moves cursor to the ***Ext. Sync.:Out=*** field for edit in Control Menu #2. The EXT SYN (External Sync output) Key function operates from any menu and causes Control Menu #2 to be displayed.

C MENU Key

Pressing C MENU and menu number (1 or 2) Keys in sequence displays the corresponding control menu.

CL/ESC or PPG Key

Pressing the CL/ESC Key in the middle of an edit (before pressing ENT Key) clears input data and restores previous data. For octal data fields, the CL/ESC Key function resets the entire field to zero.

Pressing 2ND and PPG Keys in sequence moves cursor to the ***Pulse Power Gate:*** field for edit in Control Menu #2. The PPG (Pulse Power Gate) Key function operates from any menu and causes Control Menu #2 to be displayed.

ON/CAL or EX MOD Key

The ON/CAL Key sets control or command fields to a particular mode (***ON*** or ***OFF***, ***CAL*** or ***VAR*** or ***OFF***, ***OFF*** or variable value, ***CAL*** or variable value) depending on the control field.

Pressing 2ND and EX MOD Keys in sequence moves cursor to the ***Ext.Mod.In:*** field for edit in Control Menu #2. The EX MOD (External Modulation input) Key function operates from any menu and causes Control Menu #2 to be displayed.

ENT Key

The ENT Key is used for data entry. The ENT Key is pressed after editing a data field using the Keyboard (B).

C. Display Menu Definition

Three basic menus are shown on the MENU Display (I). Control Menu #1 modifies characteristics of interrogation pulses and shows reply results. Control Menu #2 sets external inputs and outputs while providing power measurement control. Sequence menus load Mode S interrogation information and display reply content. Control fields contain statements controlling testing parameters and data fields contain numbers representing values or information. Fields not used (inactive) in particular functions are blank. Fields used, but not currently being updated or out of range, display dashes.

Errors cause a flashing error message to overwrite the top line of the MENU Display (I) in all menus. When an error occurs, one of the following error messages is displayed:

- **** AP ERROR ****

  Indicates an Address Parity field error or the transponder is replying with an address different than the one in the interrogation. The AP ERROR message is displayed until the next downlink with a valid Address Parity field is received.

- **** DME MODE ****

  Occurs when the FREQ/FUNCTION SELECT Thumbwheels (45) are set to DME function instead of XPDR (transponder) function. The XPDR function is the required setting for Mode S Test System operation.

- **** RECALL ERROR ****

  Occurs when the RECALL Key function is performed for a memory location buffer with no information previously saved. RECALL ERROR could also signify backup battery problems. The RECALL ERROR message is displayed until another key is pressed on the front panel.

- **** DI/INTF ERROR ****

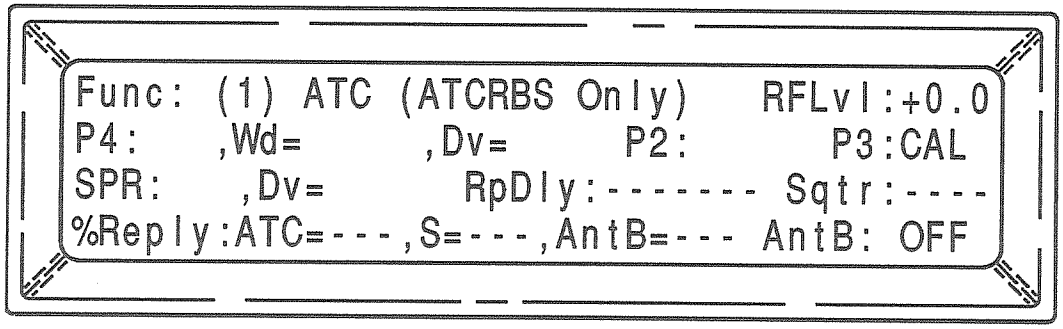
  Occurs when one test set of the Mode S Test System (S-1403C or ATC-1400A) is set for Double Interrogations while the other test set is not. DBL INTERR/INTRF PULSE Thumbwheels (42) selections are monitored by the S-1403C. The DOUBLE position is valid only when the S-1403C is operating in the DI Test Function.

- **** PRF LIMITED ****

  Occurs when the PRF set by ATC-1400A PRF/SQTR Thumbwheels (41) is larger than the PRF limitations defined in 1-3-1.

(1) Control Menu #1

(a) ATC Test Function (Refer to 1-2-2, Figure 8.)



ATC Test Function Control Menu #1
Figure 8

***Func:* Field**

The ATC Test Function is displayed according to 1-2-2, Table 3.

***RFLvl:* Field**

The ***RFLvl:*** field provides RF Level vernier control in addition to the RF LEVEL Control (6). The ***RFLvl:*** field setting combines with the RF LEVEL -dBm Display (3) indication to reflect the Mode S Test System RF Level output through the RF I/O Connector (9). The ***RFLvl:*** field is set between -3.0 and +3.0 dB in 0.1 dB steps.

***P3:* Field**

Controls level of P_3 pulse.

P3:CAL sets P_3 pulse level at 0.0 dB in relationship to P_1.

P3:VAR allows the SLS/ECHO Thumbwheels (50) to adjust P_3 pulse level (only when SLS/ECHO ON/OFF Switch [18] is OFF).

P3:OFF deactivates P_3 pulse.

***RpDly:* Field**

Displays reply delay (P_3 leading edge to F_1 leading edge) in microseconds. The field has a specified range from 2.000 to 4.000 µs with 25 ns resolution and 100 ns accuracy.

***Sqtr:* Field**

Displays time interval between Mode S squitter transmissions. The field ranges from 0.00 to 9.99 seconds with 0.01 seconds resolution.

NOTE: Mode S squitters are unsolicited Downlink Format (DF) 11 transmissions.

***%Reply:* Field**

Displays the percentage of replies received to interrogations transmitted.

NOTE: For all test functions, refer to the S-1403C Control Menu #1 ***%Reply:*** field for valid percent reply information. The DME-PRF Hz/XPDR-%REPLY Display (46) is invalid because Mode S squitter transmissions are included.

The ***%Reply:*** field includes the following subfields:

- ***ATC=* Subfield**

  Displays the percentage of ATCRBS replies received to interrogations transmitted through the RF I/O Connector (9). Range is 0 to 999 with ±1 step accuracy.

- ***S=* Subfield**

  Displays the percentage of Mode S replies received to interrogations transmitted through the RF I/O Connector (9). Range is 0 to 999 with ±1 step accuracy.

- ***AntB=* Subfield**

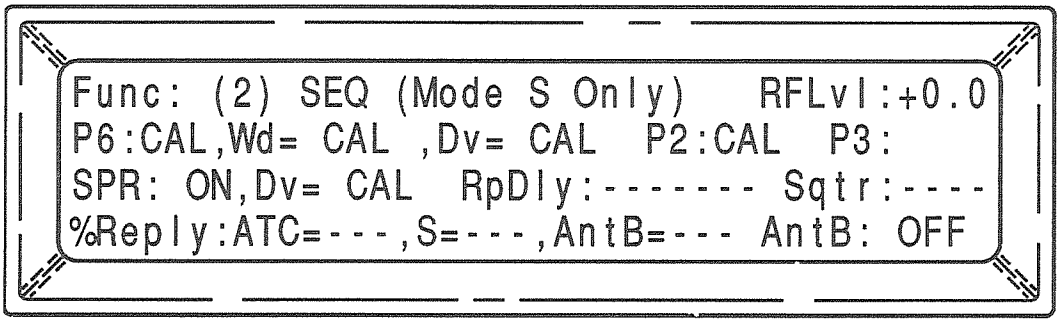
  Displays the percentage of replies received to interrogations transmitted through ANT B Connector (E). Range is 0 to 999 with ±1 step accuracy.

***AntB:* Field**

Activates ANT B Connector (E) and sets the diversity offset value (timing difference from Antenna A transmissions to Antenna B transmissions [P_1 leading edge to P_1 leading edge]). Offset range is -0.95 to +0.95 µs in 0.05 µs steps.

AntB: OFF disables ANT B Connector (E).

(b) Sequence Test Function (Refer to 1-2-2, Figure 9.)



Sequence Test Function Control Menu #1
Figure 9

***Func:* Field**

The SEQ Test Function is displayed according to 1-2-2, Table 3.

***RFLvl:* Field**

Same as ***RFLvl:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***P6:* Field**

Controls P_6 pulse operation in Mode S interrogations.

P6:CAL activates P_6 pulse.

P6:OFF deactivates P_6 pulse.

The two following subfields also control P_6 pulse characteristics:

- ***Wd=* Subfield**

  Controls width of P_6.

  P6:,Wd= CAL sets P_6 width at 16.25 µs for 56-bit data fields and 30.25 µs for 112-bit data fields.

  P6:,Wd= (variable value) adjusts P_6 width ±1.50 µs from CAL width in 0.05 µs steps.

- ***Dv=* Subfield**

  Controls position of P_6.

  P6:,Dv= CAL sets P_6 position at 3.5 µs following leading edge of P_1.

  P6:,Dv= (variable value) deviates P_6 ±1.95 µs from CAL position in 0.05 µs steps.

***P2:* Field**

Controls level of P_2 pulse.

P2:CAL sets P_2 pulse level at 0.0 dB in relationship to P_1.

P2:VAR allows SLS/ECHO Thumbwheels (50) to adjust P_2 pulse level (only when SLS/ECHO ON/OFF Switch [18] is OFF).

P2:OFF deactivates P_2 pulse.

***SPR:* Field**

Controls Synchronous Phase Reversal (SPR) in Mode S interrogations.

SPR: ON activates SPR.

SPR: OFF deactivates SPR.

SPR: field includes the following subfield:

- ***Dv=* Subfield**

  Controls position of SPR.

  SPR:,Dv= CAL sets SPR at 1.25 µs following P_6 leading edge.

  SPR:,Dv= (variable value) deviates SPR ±1.00 µs from CAL position in 0.05 µs steps.

***RpDly:* Field**

Displays reply delay (SPR to P_1 leading edge of reply). The field has a specified range from 126.000 to 130.000 µs with 25 ns resolution and 50 ns accuracy.

***Sqtr:* Field**

Same as ***Sqtr:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

NOTE: Only unsolicited DF11 transmissions >140 µs following SPR are accepted as Mode S squitters.

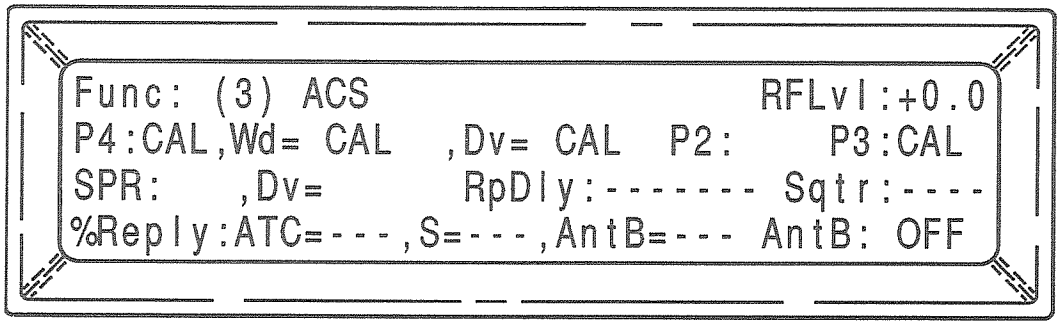
***%Reply:* Field**

Same as ***%Reply:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***AntB:* Field**

Same as ***AntB:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

(c) ACS Test Function (Refer to 1-2-2, Figure 10.)



ACS Test Function Control Menu #1
Figure 10

***Func:* Field**

The ACS (All-Call Short) Test Function is displayed according to 1-2-2, Table 3.

***RFLvl:* Field**

Same as ***RFLvl:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***P4:* Field**

Controls level of P_4 pulse.

P4:CAL sets P_4 pulse level at 0.0 dB in relationship to P_1.

P4:VAR allows SLS/ECHO Thumbwheels (50) to adjust P_4 pulse level (only when SLS/ECHO ON/OFF Switch [18] is OFF).

P4:OFF deactivates P_4 pulse.

The two following subfields also control P_4 pulse characteristics:

- ***Wd=* Subfield**

  Controls width of P_4.

  P4:,Wd= CAL sets P_4 width at 0.8 µs.

  P4:,Wd= (variable value) adjusts P_4 width from -0.60 to +1.95 µs from CAL in 0.05 µs steps.

  NOTE: Because of variable P_4 width control, ACS may function as ACL.

- ***Dv=* Subfield**

  Controls position of P_4 relative to P_1, leading edge to leading edge.

  P4:,Dv= CAL sets P_4 position at 2.0 µs following P_3, leading edge to leading edge.

  P4:,Dv= (variable value) deviates P_4 ±1.95 µs from CAL position in 0.05 µs steps.

***P3:* Field**

Same as ***P3:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***RpDly:* Field**

Displays reply delay (P_3 leading edge to F_1 leading edge of ATCRBS replies or P_4 leading edge to P_1 leading edge of Mode S replies).

Sqtr: Field

Same as ***Sqtr:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

NOTE: Only unsolicited DF11 transmissions >141.8 µs after trailing edge of P_4 are accepted as Mode S squitters. If P_4 is deactivated, any unsolicited DF11 transmissions are accepted as Mode S squitters.

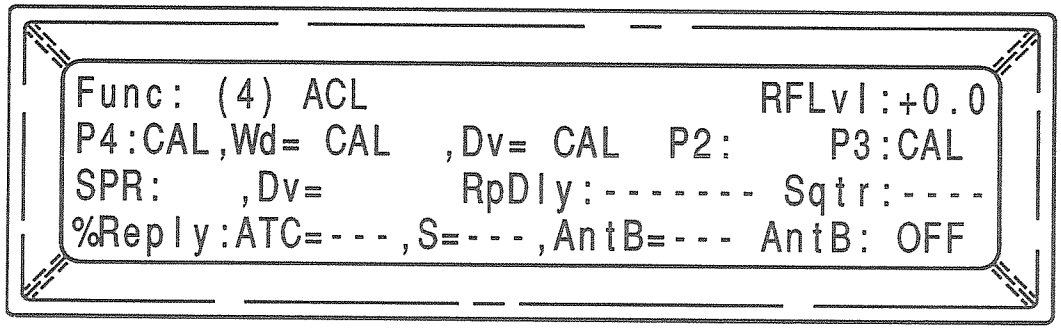
***%Reply:* Field**

Same as ***%Reply:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***AntB:* Field**

Same as ***AntB:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

(d) ACL Test Function (Refer to 1-2-2, Figure 11.)



ACL Test Function Control Menu #1
Figure 11

***Func:* Field**

The ACL (All-Call Long) Test Function is displayed according to 1-2-2, Table 3.

***RFLvl:* Field**

Same as ***RFLvl:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***P4:* Field**

Level and position fields are the same as in ACS Test Function. Refer to 1-2-2C(1)(c). The ***P4:,Wd=*** subfield has the following differences:

- ***P4:,Wd= CAL*** sets P_4 width at 1.6 µs.
- ***P4:,Wd=*** (variable value) adjusts P_4 width from -1.40 to +1.95 µs from CAL in 0.05 µs steps.

  NOTE: Because of variable P_4 width control, ACL may function as ACS.

***P3:* Field**

Same as ***P3:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***RpDly:* Field**

Same as ***RpDly:*** field in ACS Test Function. Refer to 1-2-2C(1)(c).

***Sqtr:* Field**

Same as ***Sqtr:*** field in ACS Test Function. Refer to 1-2-2C(1)(c).

***%Reply:* Field**

Same as ***%Reply:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***AntB:* Field**

Same as ***AntB:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

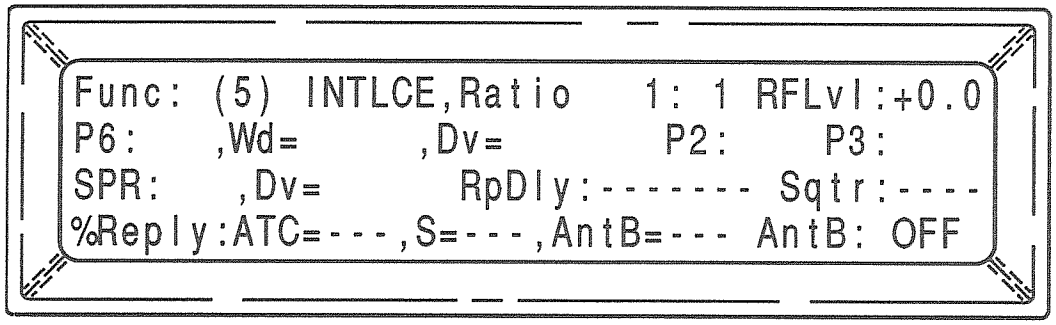
(e) INTLCE Test Function (Refer to 1-2-2, Figure 12.)

***Func:* Field**

The INTLCE (Interlace) Test Function is displayed according to 1-2-2, Table 3. The ***Func:*** field contains the following subfield:

- ***Ratio 1:* Subfield**

  Sets number of ATCRBS interrogations (1 to 999) transmitted for each Mode S interrogation transmitted.



INTLCE Test Function Control Menu #1
Figure 12

***RFLvl:* Field**

Same as ***RFLvl:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***RpDly:* Field**

Displays reply delay for ATCRBS only and operates the same as in ATC Test Function.

***Sqtr:* Field**

Same as ***Sqtr:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

NOTE: Only unsolicited DF11 transmissions following ATCRBS interrogations or >140 µs following SPR of Mode S interrogations are accepted as Mode S squitters.

***%Reply:* Field**

Same as ***%Reply:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

***AntB:* Field**

Same as ***AntB:*** field in ATC Test Function. Refer to 1-2-2C(1)(a).

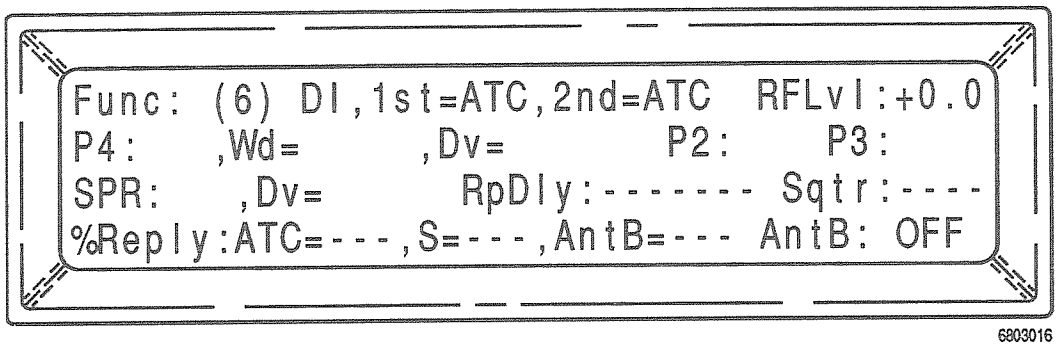
(f) DI Test Function (Refer to 1-2-2, Figure 13.)

***Func:* Field**

The DI (Double Interrogation) Test Function is displayed according to 1-2-2, Table 3. The ***Func:*** field contains the following subfields:

- ***1st=* Subfield**

  Sets test function mode (ATC, SEQ, ACS or ACL) for the first interrogation sent as part of the DI (Double Interrogation) Test Function. The test function mode for the first interrogation determines what control and data fields operate in the DI Test Function.



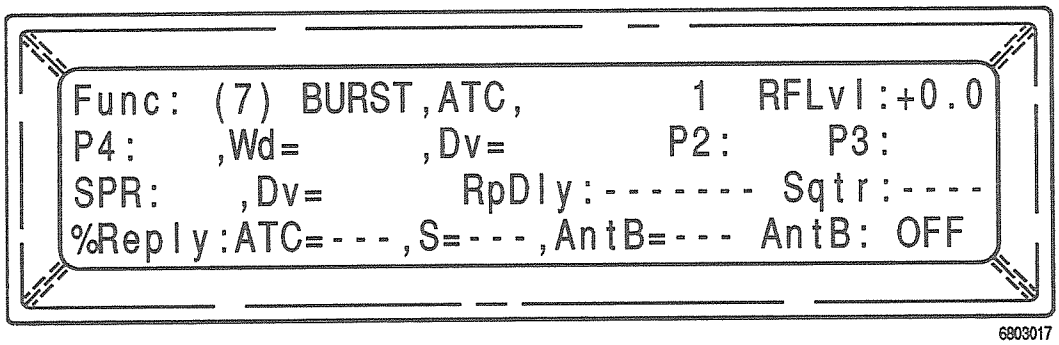
DI Test Function Control Menu #1
Figure 13

- ***2nd=* Subfield**

  Sets test function mode (ATC, SEQ, ACS or ACL) for the second interrogation sent as part of the DI (Double Interrogation) Test Function.

Other fields depend on test function mode selected for first interrogation. All fields except for ***P3:*** operate the same as in the particular test function selected.

(g) BURST Test Function (Refer to 1-2-2, Figure 14.)



BURST Test Function Control Menu #1
Figure14

***Func:* Field**

The BURST Test Function is displayed according to 1-2-2, Table 3. The ***Func:*** field contains the following subfields:

- **Test Function Mode Subfield**

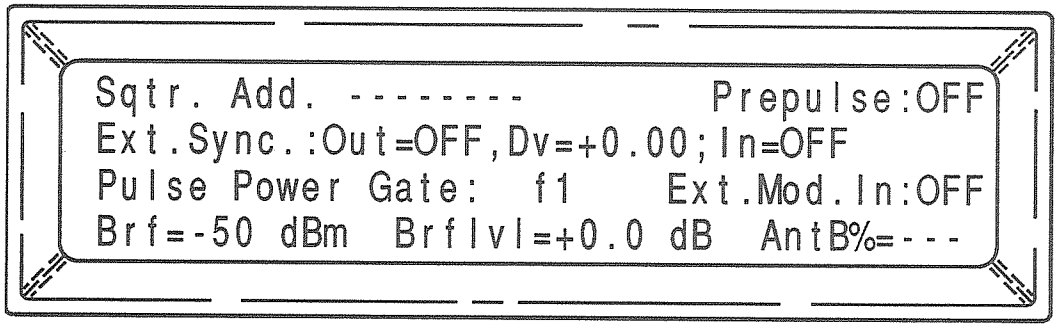
  Sets operating test function mode (ATC, SEQ, ACS or ACL) for the BURST Test Function.

- **BURST Number Subfield**

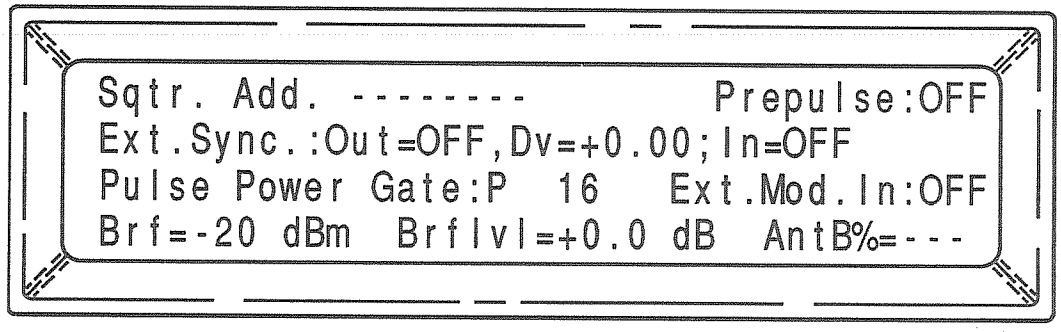
  The BURST Number (BN) is the number of interrogations (1 to 999) transmitted in one BURST Test Function activation.

Other fields depend on test function mode selected. All fields except for ***P3:*** operate the same as in the particular test function selected.

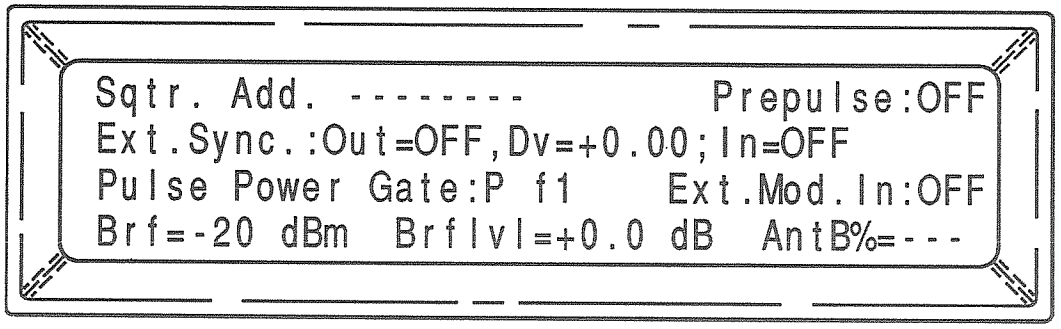
(2) Control Menu #2 (Refer to 1-2-2 Figure 15.)



8803006



8803005



8803007

Control Menu #2
Figure 15

Sqtr. Add. **Field**

Displays in octal form, the 24-bit UUT address received in Mode S squitters.

***Prepulse:* Field**

Activates PREPULSE OUT Connector (EE).

Prepulse:(variable value) adjusts prepulse position from 0 to 260 µs in 1 µs increments prior to leading edge of P_1 in the interrogation.

Prepulse:OFF deactivates PREPULSE OUT Connector (EE).

***Ext. Sync.:* Field**

Controls external synchronous pulses and includes the following subfields:

- ***Out=* Subfield**

  Ext. Sync.:Out= ON activates EXT SYNC OUT Connector (CC) with an external sync pulse output.

  Ext. Sync.:Out=OFF disables EXT SYNC OUT Connector (CC).

- ***Dv=+0.00* Subfield**

  Sets position of external sync pulse output when ***Ext. Sync.:Out= ON***. Position is set from -9.95 to +9.95 in 0.05 µs increments from the leading edge of P_1 of the interrogation.

- ***In=* Subfield**

  Ext. Sync.:,In= ON activates EXT SYNC IN Connector (BB) for an external sync pulse input. P_1 of interrogation occurs 7.0 µs later. ***Ext. Sync.:Out=*** and ***Dv=*** subfields go blank (external sync out not used).

  Ext. Sync.:,In=OFF disables EXT SYNC IN Connector (BB).

***Pulse Power Gate:* Field**

Selects the reply pulse for which power and frequency measurements are taken. Refer to 1-2-2, Table 4. Reply delay determines where to measure selected pulse. For all reply pulses, Pulse Power Measurement Gate (PPMG) is enabled prior to rising edge of the pulse to be measured. Measurement continues until next falling edge of the reply. Pulse Power Measurement is performed by the ATC-1400A and shown on XMTR PWR WATTS Display (1).

NOTE: For the S-1403C to control pulse power measurement, the F_2/P_2 F_1/P_1 Switch (34) is set to F_2/P_2 position.

KEYBOARD or SLEW ENTRY	ATC PULSE	MODE S PULSE	KEYBOARD or SLEW ENTRY	ATC PULSE	MODE S PULSE
1	f1	P1	10	d1	P10
2	c1	P2	11	b2	P11
3	a1	P3	12	d2	P12
4	c2	P4	13	b4	P13
5	a2	P5	14	d4	P14
6	c4	P6	15	f2	P15
7	a4	P7	16	spi	P16
8	x	P8	17	NA	P17
9	b1	P9	18-116	NA	P18-P116

Pulse Power Gate Mnemonics
Table 4

***Ext.Mod.In:* Field**

Ext.Mod.In: ON deactivates internal modulation for RF I/O Connector (9). Only external modulation through EXT MOD IN Connector (Z) is accepted.

NOTE: When Control Menu #2 is set with ***Ext.Mod.In: ON***, percent reply for Antenna B is disabled.

Ext.Mod.In:OFF allows internal and external (if applied) modulation.

***Brf=* Field** (only with Multi-Level Diversity option installed)

Sets attenuation for ANT B Connector (E) and displays the signal level transmitted through ANT B Connector (E). Signal level is set from -80 to -20 dBm (-50 dBm is default value). This field is displayed only when the Multi-Level Diversity option is installed.

***BrfIvl=* Field** (only with Multi-Level Diversity option installed)

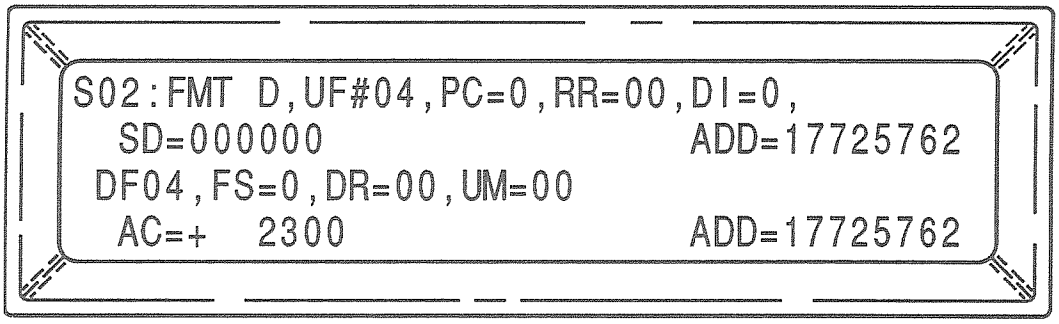
Provides RF Level vernier control of the signal through ANT B Connector (E) in addition to the ***Brf=*** field. The ***BrfIvl:*** field value combines with the ***Brf=*** field setting to provide the total RF Level output through ANT B Connector (E). The ***BrfIvl=*** field is set between -3.0 and +3.0 dB in 0.1 dB steps. This field is displayed only when the Multi-Level Diversity option is installed.

***AntB%=* Field** (only with Multi-Level Diversity option installed)

Same as Control Menu #1 ***%Reply:,AntB=*** subfield.

(3) Sequence Menus (Refer to 1-2-2, Figure 16.)

Sequence menus are only used when transmitting Mode S interrogations. Sequence menus program various Mode S interrogations and look at the content of the Mode S replies. Each activated sequence menu is transmitted as one Mode S interrogation. Interrogations are transmitted in numerical order according to sequence number and repeated for all active sequence menus during any test function involving Mode S interrogations.



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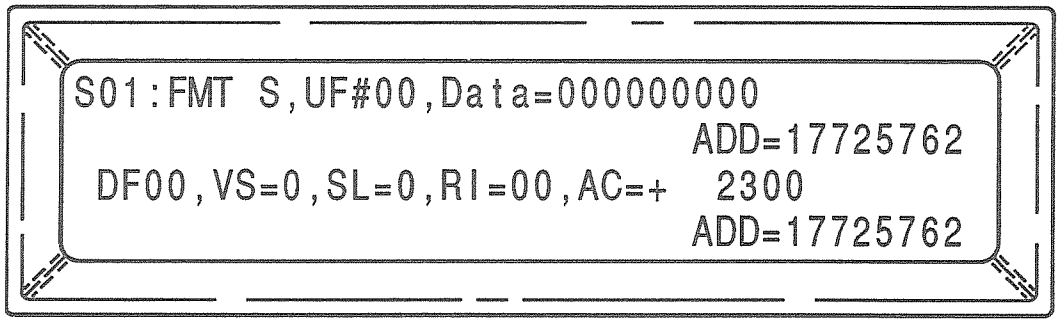
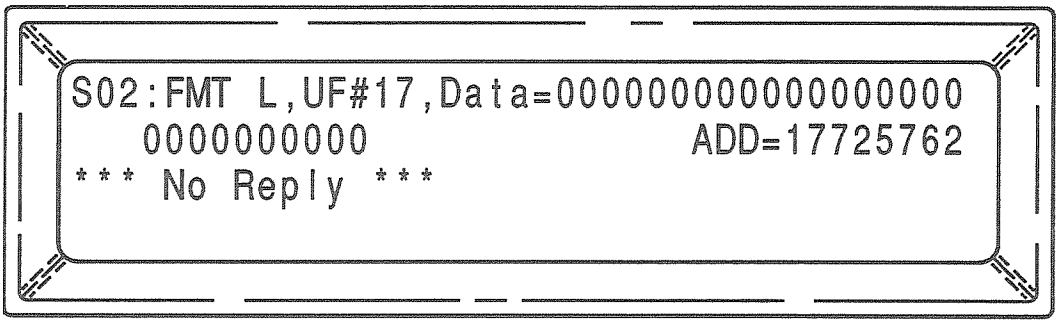


8803001



8803002

Sequence Menu
Figure 16

***S*(sequence number)*:* Field**

Activates or deactivates each sequence menu. The sequence number (1 to 16) represents each available sequence menu.

S*(sequence number)*:OFF deactivates that particular menu.

S*(sequence number)*:FMT activates that particular menu.

Default condition on power up has currently defined (RTCA DO-181; March, 1983) uplink and downlink formats assigned to Sequence Menus S01 through S07. Refer to Appendix B for definition of default sequence menus. Sequence menus are activated or deactivated by positioning the cursor under the *S*(sequence number)*:* field and pressing the ON/CAL Key.

ITEM DESCRIPTION

1. XMTR PWR WATTS Display

   Continuously displays the peak pulse power of the UUT reply pulse selected in the ***Pulse Power Gate:*** field of the S-1403C Control Menu #2.

3. RF LEVEL -dBm Display

   Displays the programmed peak RF power of the ATC-1400A generator in dB below 1 mW.

6. RF LEVEL Control

   Adjusts ATC-1400A RF generator level in 1 dB steps by slowly turning control knob.

7. CW/NORM/OFF Switch

   Controls the signal through the RF I/O Connector (9).

   CW supplies continuous wave signal (RF signal with no modulation) at the frequency selected by FREQ/FUNCTION SELECT Thumbwheels (45) and ΔF Thumbwheels (48). CW setting is used to test the Mode S Test System.

   NORM allows the Mode S Test System to transmit interrogations (modulated RF signal). NORM is the normal setting for Mode S Test System operation.

   OFF disables output.

9. RF I/O Connector (J1015)

   "N" type connector for all interrogation and reply signals to and from the UUT primary antenna (Antenna A [ANT A]) connector.

12. XMTR Connector (J1016)

    BNC type connector provides detected UUT reply pulses for viewing on an oscilloscope.

15. GEN Connector (J1017)

    BNC type connector provides detected interrogation and interference pulses for viewing on oscilloscope.

16. SUPPRESSOR OUTPUT Connector (J1018)

    BNC type connector provides mutual suppression pulses.

ITEM DESCRIPTION

17. SUPPRESSOR ON/OFF Switch

Enables or disables mutual suppression pulses.

NOTE: When suppressor pulse is activated and DOUBLE is selected on DBL INTERR/INTRF PULSE Thumbwheels (42), the first interrogation of a double interrogation is omitted. DBL INTERR/INTRF PULSE Thumbwheels (42) determine delay from suppression pulse to second interrogation.

18. SLS/ECHO ON/OFF Switch

Enables or disables Side-Lobe Suppression (SLS) pulses.

ON adds the P_2 (ATCRBS) or P_5 (Mode S) SLS pulse to the interrogation transmission. The SLS/ECHO Thumbwheels (50) control only the amplitude of the SLS pulse when activated.

NOTE: Interrogation and SLS pulses are inhibited when DBL INTERR/INTRF PULSE Thumbwheels (42) are set to INTERF+ or INTERF-.

OFF disables SLS and allows the SLS/ECHO Thumbwheels (50) to control other pulse amplitudes if selected.

19. SUPPRESSOR VAR Adjustment

Adjusts voltage level of mutual suppression pulse from +3 to +27 V.

20. XPDR PULSE WIDTH VAR/CAL Switch

VAR selects a variable interrogation pulse width set by the XPDR PULSE WIDTH Thumbwheels (49). Only the widths of P_1, P_2 (if selected) and P_3 (if applicable and selected) are controlled by this switch.

CAL selects an interrogation pulse width of 0.8 µs.

22. MAN/AUTO/MAN STEP Switch

Set to MAN position for Mode S Test System operation.

23. CAL Ø Control

Adjusts the phase of calibration (timing) pulses with respect to interrogation pulses. Rotating control cw delays calibration pulses and enables the operator to align calibration pulses with reply pulses.

ITEM DESCRIPTION

25. XPDR DEV P_3/CAL Switch

    -Δ advances position of P_3 pulse from nominal, by value selected on XPDR P_2/P_3 DEV Thumbwheels (44), in microseconds.

    CAL sets P_3 pulse to nominal position. Refer to Appendix F. XPDR P_2/P_3 DEV Thumbwheels (44) do not deviate P_3 pulse.

    +Δ delays position of P_3 pulse from nominal, by value selected on XPDR P_2/P_3 DEV Thumbwheels (44), in microseconds.

26. CAL MARKS Connector (J1019)

    BNC type connector provides an output for the calibration pulses set by the 1.0 µS/1.45 µS Switch (27) and aligned by the CAL Ø Control (23).

27. 1.0 µS/1.45 µS Switch

    Selects 1.0 µs calibration pulses for Mode S replies or 1.45 µs calibration pulses for ATCRBS replies. Calibration pulses are transmitted through the CAL MARKS Connector (26).

28. XPDR DEV P_2/CAL Switch

    -Δ advances position of the P_2 pulse from nominal, by value selected on the XPDR P_2/P_3 DEV Thumbwheels (44), in microseconds.

    CAL sets P_2 pulse (SLS in ATCRBS) to nominal position. XPDR P_2/P_3 DEV Thumbwheels (49) do not deviate P_2 pulse.

    +Δ delays position of the P_2 pulse from nominal, by value selected on the XPDR P_2/P_3 DEV Thumbwheels (44), in microseconds.

29. SYNC Connector (J1020)

    BNC type connector provides active low oscilloscope sync pulse set by T_O/TAC/T_D Switch (30). Sync pulse is 17.5 µs prior to P_1 of the interrogation for T_O position and coincidental with P_3 of the interrogation for T_D position.

30. T_O/TAC/T_D Switch

    Controls sync pulse positions through the SYNC Connector (29) and the SCOPE TRIG OUT Connector (AA).

    T_O positions sync pulse for viewing interrogation pulses on oscilloscope.

    TAC is not used by the Mode S Test System.

    T_D positions sync pulse for viewing reply or second interrogation (DI Test Function) pulses on oscilloscope.

ITEM DESCRIPTION

31. INTRF PULSE WIDTH Control

    Adjusts width of interference pulse from 0.2 µs to 5 µs.

32. PRF/SQTR ON/OFF Switch

    Enables or disables interrogation transmissions through the RF I/O Connector (9).

33. DISCRIMINATOR Connector (J1021)

    BNC type connector provides discriminated RF input pulses used to calculate individual reply pulse frequencies. The discriminator produces noise when no RF is present.

34. F_2/P_2 F_1/P_1 Switch

    F_2/P_2 enables PPMG control by the S-1403C in Control Menu #2. The ATC-1400A measures power and frequency for the pulse selected in the ***Pulse Power Gate:*** field.

    F_1/P_1 enables ATC-1400A to measure power and frequency of the F_1 or P_1 pulse of the reply. PPMG control by the S-1403C is disabled.

35. LINE Switch

    Applies external ac power to the ATC-1400A.

37. TACAN ON/OFF Switch

    Set to OFF position for Mode S Test System operation.

38. XPDR MODE Control

    Selects interrogation mode by setting nominal P_3 pulse position for ATCRBS and All-Call interrogations. All modes (1, 2, T[Test], A[3], B, C and D) are operational. Modes A and C are the primary modes of ATC Test Function and All-Call Test Function (ACS or ACL) operation.

    NOTE: In Mode S Test System operation, AC_1 is the same as A and AC_2 is the same as C. DISPLAY SELECT Readout (43) displays Mode C altitude in feet when DISPLAY SELECT Control (40) is in XPDR CODE position and AC_2 is selected on XPDR MODE Control.

ITEM DESCRIPTION

40. DISPLAY SELECT Control

Sets the DISPLAY SELECT Readout (43). Only three positions are valid in Mode S Test System operation.

FREQ MHz displays interrogation RF relating to settings on FREQ/FUNCTION SELECT Thumbwheels (45) and ΔF Thumbwheels (48).

PRF/SQTR Hz displays the PRF as set by the PRF/SQTR Thumbwheels (41).

XPDR CODE displays the octal form of code received in ATCRBS replies. When XPDR MODE Control (38) is in AC_2 position, Mode C altitude is displayed in feet.

41. PRF/SQTR Thumbwheels

Selects interrogation rate in Hz. For DI Test Function, interrogation rate is twice the thumbwheels value.

42. DBL INTERR/INTRF PULSE Thumbwheels

OFF is normal operating position and regular interrogations are transmitted.

INTERF- transmits an interference pulse with each interrogation. Thumbwheels determine interference pulse position in microseconds prior to leading edge of P_1 of the interrogation.

INTERF+ transmits an interference pulse with each interrogation. Thumbwheels determine interference pulse position in microseconds following the leading edge of P_1 of the interrogation.

DOUBLE selects double interrogation when S-1403C is in DI Test Function. Thumbwheels determine spacing between interrogations.

NOTE: **** DI/INTRF ERROR *** is displayed on MENU Display (I) when DOUBLE is selected on DBL INTERR/INTRF PULSE Thumbwheels and S-1403C is not in DI Test Function.

NOTE: When DOUBLE is selected on DBL INTERR/INTRF PULSE Thumbwheels and suppressor pulse is activated by SUPPRESSOR ON/OFF Switch (17), the first interrogation is omitted. Thumbwheels determine delay from suppression pulse to second interrogation.

43. DISPLAY SELECT Readout

Displays ATC-1400A transmitting frequency, PRF or UUT reply code data as selected, on the DISPLAY SELECT Control (40).

44. XPDR P_2/P_3 DEV Thumbwheels

Deviates position, in microseconds, of P_2 and/or P_3 pulse from nominal according to XPDR DEV P_2/CAL Switch (29) and/or XPDR DEV P_3/CAL Switch (25).

ITEM DESCRIPTION

45. FREQ/FUNCTION SELECT Thumbwheels

Set to XPDR function for Mode S Test System operation. Frequency is set from 962 to 1213 MHz (1030 MHz nominal).

46. DME-PRF Hz/XPDR-%REPLY Display

Displays total UUT percent reply, but is inaccurate because Mode S squitters are included. For accurate percent reply, refer to S-1403C Control Menu #1, ***%Reply:*** field.

48. ΔF Thumbwheels

Deviates ATC-1400A transmitting frequency -9.99 to +9.99 MHz from frequency set on FREQ/FUNCTION SELECT Thumbwheels (45).

49. XPDR PULSE WIDTH Thumbwheels

Sets width, in microseconds, of selected P_1, P_2, P_3 and P_5 pulses.

50. SLS/ECHO Thumbwheels

Selects amplitude of SLS pulses (P_2, ATCRBS or P_5, Mode S) when SLS/ECHO ON/OFF Switch (18) is ON.

Selects amplitude of P_2, P_3 or P_4 if set to VAR in appropriate S-1403C Control Menu #1 field and the SLS/ECHO ON/OFF Switch (18) is OFF.

Selects amplitude of interference pulses when activated by DBL INTERR/INTRF PULSE Thumbwheels (42) regardless of SLS/ECHO ON/OFF Switch (18) setting.

Range is from -19 to +9 dB with respect to level of P_1 of the interrogation.

51. XMTR FREQ MHz Display

Continuously displays average frequency of RF pulses received in UUT replies. Pulses measured are selected by S-1403C Control Menu #2, ***Pulse Power Gate:*** field when F_2/P_2 F_1/P_1 Switch (34) is set to F_2/P_2 position. Only the frequency of F_1, ATCRBS or P_1, Mode S is measured and displayed when F_2/P_2 F_1/P_1 Switch (34) is set to F_1/P_1 position.

53. GPIB Connector

24-pin female connector conforming to IEEE Standard 488-1978 for interface of general purpose programmable instrumentation.

54. GPIB ADDRESS Dip Switches

Eight segment DIP switch used for setting IEEE-488 bus address for remote control mode of operation.

ITEM DESCRIPTION

57. AC INPUT Connector

    Connects ac power from S-1403C to ATC-1400A.

66. SELF-INTERR/OFF Switch

    Set to OFF for Mode S Test System operation.

71. IFR BUS Connector (J9105)

    25-pin female connector provides communication and control data between the ATC-1400A and S-1403C through IFR BUS Connector (O).

72. AUXILIARY Connector (J9106)

    25-pin female connector provides timing and pulse signals between the ATC-1400A and S-1403C through AUXILIARY Connector (JJ).

73. DABS INPUT Connector (J9101)

    SMB type connector receives DPSK modulation from the S-1403C through DPSK OUT Connector (II). The bipolar DPSK signal modulates the ATC-1400A RF signal to provide Mode S interrogations.

75. EXTERNAL MEASUREMENT GATE Connector (J9103)

    SMB type connector receives the PPMG pulse from the S-1403C through MEASUREMENT GATE OUT Connector (HH). The PPMG pulse triggers the ATC-1400A to measure UUT reply pulse power and frequency. Power measurements are displayed on XMTR PWR WATTS Display (1). Frequency measurement is displayed on XMTR FREQ MHz Display (51).

76. RF LEVEL INPUT Connector (J9104)

    SMB type connector receives additional RF level control from the S-1403C through RF VERNIER OUT Connector (GG). The ±3 dB vernier controls the signal level transmitted through RF I/O Connector (9).

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3. Performance Evaluation

A. General

The Performance Evaluation verifies S-1403C display and Mode S Test System front panel control operation. The Performance Evaluation Procedure is a covers-on test designed to give the user a high level of confidence the Mode S Test System is operating properly. Use the Performance Evaluation when the operating condition of the Mode S Test System is in question or when orientation to the Mode S Test System is desired (new or infrequent user). The Performance Evaluation Procedure requires approximately three hours to perform.

Refer to 1-2-2, Figure 6 for S-1403C (alphabetic character identifiers) controls, connectors and indicators. Refer to 1-2-2, Figure 7 for S-1403C Keyboard (B) references. Refer to 1-2-2, Figure 17 for ATC-1400A (numeric character identifiers) controls, connectors and indicators.

B. Pre-Operational Conditions

Read all steps prior to performing the Performance Evaluation Procedure.

Connect the S-1403C to the ATC-1400A according to 1-2-1D.

C. Test Equipment Requirements

Appendix C contains a comprehensive list of test equipment suitable for performing the Performance Evaluation Procedure. Other test equipment meeting the specifications listed in Appendix C may be substituted for the recommended models.

NOTE: For certain procedures in this manual, the test equipment listed in Appendix C may exceed the minimum required specifications.

D. Corrective Maintenance Program

Performance checks provide a method for validating specific hardware, software and signal operation. Should the performance checks confirm incorrect operation, the S-1403C must be recalibrated according to the S-1403C Maintenance Manual or returned to an Authorized Repair Station.

E. Test Record

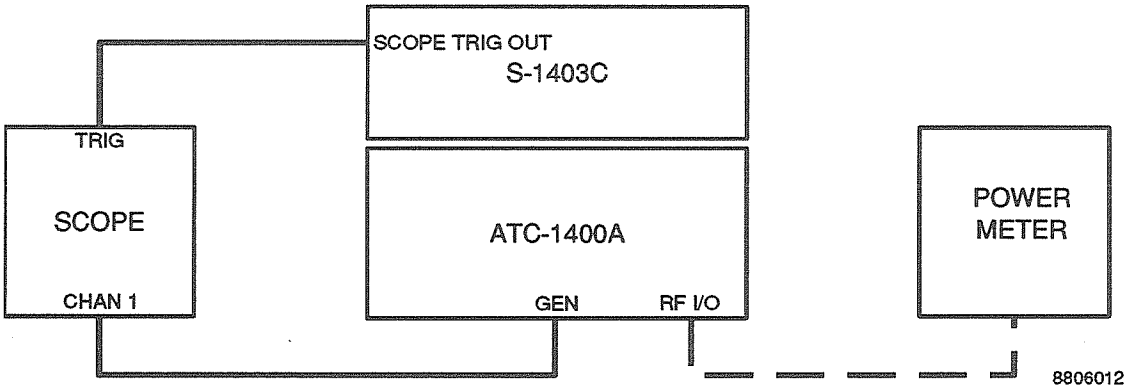
A Performance Evaluation Data Sheet is provided for recording the results obtained while performing the Performance Evaluation Procedure.

NOTE: It is recommended the technician reproduce copies of the Performance Evaluation Data Sheet, rather than use the copy in this manual.

F. Performance Evaluation Procedure

TEST EQUIPMENT:
1 Dual Pulse Generator
1 Oscilloscope
1 Power Meter
1 Spectrum Analyzer

STEP PROCEDURE



Test Function and RF Level Tests Setup Diagram
Figure 18

INITIAL CONDITIONS AND SETTINGS

1. Set ATC-1400A as follows:

CONTROL		SETTING
(7)	CW/NORM/OFF Switch	***NORM***
(18)	SLS/ECHO ON/OFF Switch	***OFF***
(22)	MAN/AUTO/MAN STEP Switch	***MAN***
(25)	XPDR DEV P_3/CAL Switch	***CAL***
(28)	XPDR DEV P_2/CAL Switch	***CAL***
(32)	PRF/SQTR ON/OFF Switch	***ON***
(37)	TACAN ON/OFF Switch	***OFF***
(38)	XPDR MODE Control	***C***
(40)	DISPLAY SELECT Control	***PRF SQTR Hz***
(41)	PRF/SQUITTER Thumbwheels	***0200***
(42)	DBL INTERR/INTRF Thumbwheels	***000.0 OFF***
(45)	FREQ/FUNCTION SELECT Thumbwheels	***1030 XPDR***
(48)	ΔF Thumbwheels	***OFF***
(66)	SELF-INTERR/OFF Switch	***OFF***

NOTE: Remaining ATC-1400A controls do not require initial settings.

2. Connect GEN Connector (15) to Oscilloscope Channel 1 input according to 1-2-3, Figure 18.

3. Connect Oscilloscope External Trigger to SCOPE TRIG OUT Connector (AA) according to 1-2-3, Figure 18.

STEP PROCEDURE

4. Apply power to Mode S Test System.

S-1403C TO ATC-1400A COMMUNICATION

5. Verify MENU Display (I) shows the Firmware Version screen for less than 30 seconds.

6. After initialization period has ended, verify MENU Display (I) shows Control Menu #1 for ATC Test Function. Refer to 1-2-2, Figure 8.

7. Set FREQ/FUNCTION SELECT Thumbwheels (45) to ***TAC Y***.

8. Verify **** DME MODE *** error indication flashes in top line of MENU Display (I).

9. Set FREQ/FUNCTION SELECT Thumbwheels (45) to ***XPDR***.

10. Verify MENU Display (I) shows ATC Test Function Control Menu #1.

ATC TEST FUNCTION

11. Set T_O/TAC/T_D Switch (30) to ***T_O***.

12. Verify P_1 leading edge to P_3 leading edge is 21.0 µs (±10 ns).

13. Position XPDR MODE Control (38) to ***A***.

14. Verify P_1 leading edge to P_3 leading edge is 8.0 µs (±10 ns).

15. Press 2ND, P3 and ON/CAL Keys in sequence to set Control Menu #1 ***P3:VAR***.

16. Adjust SLS/ECHO Thumbwheels (50) and verify P_3 level changes accordingly.

17. Press ON/CAL Key to set Control Menu #1 ***P3:OFF***.

18. Verify P_3 is not displayed on Oscilloscope.

19. Press ON/CAL Key to set Control Menu #1 ***P3:CAL***.

20. Set SLS/ECHO ON/OFF Switch (18) to ***ON*** and SLS/ECHO Thumbwheels (50) to ***+0***.

21. Verify P_1 leading edge to P_2 leading edge is 2.0 µs (±10 ns).

22. Adjust SLS/ECHO Thumbwheels (50) and verify P_2 level changes accordingly.

23. Set XPDR DEV P_2/CAL Switch (28) to -Δ.

24. Adjust XPDR P_2/P_3 DEV Thumbwheels (44) and verify P_2 position changes accordingly.

25. Set XPDR DEV P_2/CAL Switch (28) to +Δ.

STEP PROCEDURE

26. Adjust XPDR P_2/P_3 DEV Thumbwheels (44) and verify P_2 position changes accordingly.

27. Set XPDR DEV P_2/CAL Switch (28) to ***CAL***.

28. Set XPDR DEV P_3/CAL Switch (25) to $-\Delta$.

29. Adjust XPDR P_2/P_3 DEV Thumbwheels (44) and verify P_3 position changes accordingly.

30. Set XPDR DEV P_3/CAL Switch (25) to $+\Delta$.

31. Adjust XPDR P_2/P_3 DEV Thumbwheels (44) and verify P_3 position changes accordingly.

33. Set XPDR DEV P_3/CAL Switch (25) to ***CAL***.

34. Set XPDR PULSE WIDTH VAR/CAL Switch (20) to ***VAR***.

35. Adjust XPDR PULSE WIDTH Thumbwheels (49) and verify P_1, P_2 and P_3 pulse widths change accordingly.

36. Set SLS/ECHO ON/OFF Switch (18) to ***OFF***.

SEQ TEST FUNCTION

37. Press 2ND, FUN NO and "2" Keys in sequence.

38. Verify MENU Display (I) shows Control Menu #1 for SEQ Test Function. Refer to 1-2-2, Figure 9.

39. Press S MENU Key.

40. Verify Sequence Menu S01 displays UF00 defined format. Refer to Appendix B, Figure 1.

41. Use SLEW Control (F) to enter Sequence Menu S02.

42. Verify Sequence Menu S02 displays UF04 defined format. Refer to Appendix B, Figure 2.

43. Press ON/CAL Key to set ***S02:OFF***.

44. Use SLEW Control (F) to enter Sequence Menu S03.

45. Verify Sequence Menu S03 displays UF05 defined format. Refer to Appendix B, Figure 3.

46. Press ON/CAL Key to set ***S03:OFF***.

47. Use SLEW Control (F) to enter Sequence Menu S04.

STEP	PROCEDURE

48. Verify Sequence Menu S04 displays UF11 defined format. Refer to Appendix B, Figure 4.

49. Press ON/CAL Key to set ***S04:OFF***.

50. Use SLEW Control (F) to enter Sequence Menu S05.

51. Verify Sequence Menu S05 displays UF16 defined format. Refer to Appendix B, Figure 5.

52. Press ON/CAL Key to set ***S05:OFF***.

53. Use SLEW Control (F) to enter Sequence Menu S06.

54. Verify Sequence Menu S06 displays UF20 defined format. Refer to Appendix B, Figure 6.

55. Press ON/CAL Key to set ***S06:OFF***.

56. Use SLEW Control (F) to enter Sequence Menu S07.

57. Verify Sequence Menu S07 displays UF21 defined format. Refer to Appendix B, Figure 7.

58. Press ON/CAL Key to set ***S07:OFF***.

59. Use SLEW Control (F) to enter Sequence Menu S08.

60. Verify Sequence Menu S08 displays UF00 defined format. Refer to Appendix B, Figure 8.

61. Press ON/CAL Key to set ***S08:OFF***.

62. Use SLEW Control (F) to verify Sequence Menus S09 through S16 are ***OFF***. Press ON/CAL Key if necessary.

63. Return to Sequence Menu S01 and verify ***S01:FMT D, UF#00***.

64. Verify P_1 leading edge to P_2 leading edge is 2.0 µs (±10 ns).

65. Verify P_1 leading edge to P_6 leading edge is 3.5 µs (±10 ns).

66. Verify P_2 leading edge to Synchronous Phase Reversal (SPR) is 2.75 µs (±10 ns).

67. Press 2ND, P2 and ON/CAL Keys in sequence to set Control Menu #1 ***P2:VAR***.

68. Adjust SLS/ECHO Thumbwheels (50) and verify P_2 level changes accordingly.

69. Press ON/CAL Key to set Control Menu #1 ***P2:OFF***.

70. Verify P_2 is not displayed on Oscilloscope.

STEP PROCEDURE

71. Press ON/CAL Key to set Control Menu #1 ***P2:CAL***.

72. Press 2ND, P4(P6) and ON/CAL Key to set Control Menu #1 ***P6:OFF***.

73. Verify P_6 is not displayed on Oscilloscope.

74. Press ON/CAL Key to set Control Menu #1 ***P6:CAL***.

75. Press CURSOR Key (→) (A) and ON/CAL Key to set Control Menu #1 ***P6:CAL,Wd= +0.00***.

76. Use SLEW Control (F) to adjust ***P6:,Wd=*** field from negative to positive and verify P_6 width varies accordingly.

77. Press ON/CAL Key to set Control Menu #1 ***P6:CAL,Wd= CAL***.

78. Press CURSOR Key (→) (A) and ON/CAL Key to set Control Menu #1 ***P6:CAL,Wd= CAL,Dv=+0.00***.

79. Use SLEW Control (F) to adjust ***P6:,Dv=*** field from negative to positive and verify P_6 position changes accordingly.

80. Press ON/CAL Key to set Control Menu #1 ***P6:CAL,Wd= CAL,Dv= CAL***.

81. Set SLS/ECHO ON/OFF Switch (18) to ***ON*** and SLS/ECHO Thumbwheels (50) to ***+0***.

82. Verify P_5 SLS pulse overlaps SPR.

83. Adjust SLS/ECHO Thumbwheels (50) and verify P_5 level changes accordingly.

84. Press 2ND, SPR and ON/CAL Keys in sequence to set Control Menu #1 ***SPR:OFF***.

85. Verify SPR is not displayed on Oscilloscope.

86. Press ON/CAL Key to set Control Menu #1 ***SPR: ON***.

87. Press CURSOR Key (→) (A) and ON/CAL Key to set Control Menu #1 ***SPR: ON,Dv=+0.00***.

88. Use SLEW Control (F) to adjust ***SPR:,Dv=*** field from a negative to positive value and verify P_5 and SPR positions change accordingly.

89. Press ON/CAL Key to set Control Menu #1 ***SPR: ON,Dv= CAL***.

90. Set SLS/ECHO ON/OFF Switch (18) to ***OFF***.

ACS TEST FUNCTION

91. Press 2ND, FUN NO and "3" Keys in sequence.

STEP PROCEDURE

92. Verify MENU Display (I) shows Control Menu #1 for ACS Test Function. Refer to 1-2-2, Figure 10.

93. Verify P_1 leading edge to P_4 leading edge is 10.0 µs (±10 ns).

94. Verify P_4 width is 0.8 µs (±10 ns).

ACL TEST FUNCTION

95. Press 2ND, FUN NO and "4" Keys in sequence.

96. Verify MENU Display (I) shows Control Menu #1 for ACL Test Function. Refer to 1-2-2, Figure 11.

97. Press 2ND, P4(P6) and ON/CAL Keys to set Control Menu #1 ***P4:VAR***.

98. Adjust SLS/ECHO Thumbwheels (50) and verify P_4 level changes accordingly.

99. Press ON/CAL Key to set Control Menu #1 ***P4:OFF***.

100. Verify P_4 is not displayed on Oscilloscope.

101. Press ON/CAL Key to set Control Menu #1 ***P4:CAL***.

102. Verify P_4 pulse width is 1.6 µs (±10 ns).

103. Press CURSOR Key (→) (A) and ON/CAL Key to set Control Menu #1 ***P4:CAL,Wd=+0.00***.

104. Use SLEW Control (F) to adjust ***P4:,Wd=*** field from a negative to positive value and verify P_4 width varies accordingly.

105. Press ON/CAL Key to set Control Menu #1 ***P4:CAL,Wd= CAL***.

106. Press CURSOR Key (→) (A) and ON/CAL Key to set Control Menu #1 ***P4:CAL,Wd= CAL,Dv=+0.00***.

107. Use SLEW Control (F) to adjust ***P4:,Dv=*** field from negative to positive and verify P_4 position varies accordingly.

108. Press ON/CAL Key to set Control Menu #1 ***P4:CAL,Wd= CAL,Dv= CAL***.

INTLCE TEST FUNCTION

109. Press 2ND, FUN NO and "5" Keys in sequence.

110. Verify MENU Display (I) shows Control Menu #1 for INTLCE Test Function. Refer to 1-2-2, Figure 12.

111. Verify ATCRBS pulse pattern consists of P_1 and P_3.

112. Use Δtime start to reference P_1 leading edge.

STEP PROCEDURE

113. Use Δtime stop to verify P_1 of Mode S interrogation occurs 200 µs (±10 ns) following P_1 of the ATCRBS interrogation.

114. Verify Mode S pulse pattern consists of P_1, P_2 and P_6.

115. Press CURSOR Key (→) (A) and "2" Key to set Control Menu #1 ***INTLCE,Ratio 1: 2***.

116. Verify two ATCRBS interrogations occur between Mode S interrogations.

DI TEST FUNCTION

117. Press 2ND, FUN NO and "6" Keys in sequence.

118. Verify * ***DI/INTF ERROR*** * indication flashes in top line of MENU Display (I).

119. Set DBL INTERR/INTRF PULSE Thumbwheels (42) to ***200.0 DOUBLE***.

120. Set PRF/SQTR Thumbwheels (41) to ***100***.

121. Verify MENU Display (I) shows Control Menu #1 for DI Test Function. Refer to 1-2-2, Figure 13.

122. Verify first interrogation ATCRBS pulse pattern consists of P_1 and P_3.

123. Press CURSOR Key (→) (A) and ON/CAL Key to set Control Menu #1 ***DI,1st=SEQ***.

124. Verify first interrogation Mode S pulse pattern consists of P_1, P_2 and P_6.

125. Press ON/CAL Key to set Control Menu #1 ***DI,1st=ACS***.

126. Verify first interrogation ATCRBS Only All-Call pulse pattern consists of P_1, P_3 and short P_4.

127. Press ON/CAL Key to set Control Menu #1 ***DI,1st=ACL***.

128. Verify first interrogation ATCRBS/Mode S All-Call pulse pattern consists of P_1, P_3 and long P_4.

129. Press ON/CAL Key to set Control Menu #1 ***DI,1st=ATC***.

130. Use Δtime start to reference P_1 leading edge.

131. Use Δtime stop to verify P_1 of second interrogation occurs 200 µs (±15 ns) following P_1 of the first interrogation.

132. Verify second interrogation ATCRBS pulse pattern consists of P_1 and P_3.

133. Press CURSOR Key (→) (A) and ON/CAL Key to set Control Menu #1 ***DI,2nd=SEQ***.

134. Verify second interrogation Mode S pulse pattern consists of P_1, P_2 and P_6.

STEP PROCEDURE

135. Press ON/CAL Key to set Control Menu #1 ***DI,2nd=ACS***.

136. Verify second interrogation ATCRBS Only All-Call pulse pattern consists of P_1, P_3 and short P_4.

137. Press ON/CAL Key to set Control Menu #1 ***DI,2nd=ACL***.

138. Verify second interrogation ATCRBS/Mode S All-Call pulse pattern consists of P_1, P_3 and long P_4.

BURST TEST FUNCTION

139. Press 2ND, FUN NO and "7" Keys in sequence.

140. Verify **** DI/INTF ERROR *** indication flashes in top line of MENU Display (I).

141. Set DBL INTERR/INTRF PULSE Thumbwheels (42) to ***200.0 OFF***.

142. Verify MENU Display (I) shows Control Menu #1 for BURST Test Function. Refer to 1-2-2, Figure 14.

143. Press CURSOR Key (→) (A) twice to move cursor under ***BURST,***(BURST Number)" subfield.

144. Press "5", "0", "0" and ENT Keys in sequence to set ***BURST,ATC, 500***.

145. Press BURST Key to activate BURST Test Function.

146. Verify ATCRBS interrogation is displayed on Oscilloscope for five seconds.

147. Press "2", "5" and "0" Keys to set ***BURST,ATC, 250***.

148. Press CURSOR Key (←) (A) and ON/CAL Key to set ***BURST,SEQ, 250***.

149. Set PRF/SQTR Thumbwheels (41) to ***50***.

150. Press BURST Key to activate BURST Test Function.

151. Verify Mode S interrogation is displayed on Oscilloscope for five seconds.

ANT A RF VERNIER

152. Press 2ND, FUN NO and "1" Keys in sequence to enter ATC Test Function Control Menu #1.

153. Connect Power Meter to RF I/O Connector (9) according to 1-2-3, Figure 18.

154. Set CW/NORM/OFF Switch (7) to ***CW***.

155. Press RF LVL, "0" and ENT Keys in sequence to set Control Menu #1 ***RFLvl:+0.0***.

STEP PROCEDURE

156. Adjust RF LEVEL Control (6) until RF LEVEL -dBm Display (3) reads ***04*** (-4 dBm).

157. Record Power Meter reading for reference level.

158. Adjust SLEW Control (F) to set Control Menu #1 ***RFLvl:+3.0***.

159. Verify Power Meter displays Step 157 reference level + 3.0 dB (±0.3 dB).

160. Adjust Slew Control (F) to set Control Menu #1 ***RFLvl:-3.0***.

161. Verify Power Meter displays Step 157 reference level - 3.0 dB (±0.3 dB).

162. Disconnect Power Meter from RF I/O Connector (9).

NOTE: Steps 163 through 172 pertain to S-1403C Test Auxiliaries without the Multi-Level Diversity option installed. Steps 173 through 194 pertain to S-1403C Test Auxiliaries with the Multi-Level Diversity option installed.

ANT B RF LEVEL TEST (without MLD option installed)

163. Connect Spectrum Analyzer to RF I/O Connector (9).

164. Adjust RF LEVEL Control (6) until RF LEVEL -dBm Display (3) reads ***50*** (-50 dBm).

165. Adjust SLEW Control (F) to set Control Menu #1 ***RFLvl:+0.0***.

166. Set Spectrum Analyzer as follows:

CONTROL	SETTING
Span	Zero
Bandwidth	3 MHz
Sweep Rate	5 or 10 µs
Log Scale	1 or 2 dB/Div

167. Set CW/NORM/OFF Switch (7) to ***NORM***.

168. Adjust Spectrum Analyzer for stable display and record signal level as reference.

169. Press 2ND, ANT B and ON/CAL Keys in sequence to set Control Menu #1 ***AntB:*** field to numerical value.

170. Disconnect Spectrum Analyzer from RF I/O Connector (9).

171. Connect Spectrum Analyzer to ANT B Connector (E).

172. Verify level equals Step 168 reference (±1 dB).

STEP PROCEDURE

ANT B RF LEVEL (with MLD option installed)

173. Connect Spectrum Analyzer to RF I/O Connector (9).

174. Adjust RF LEVEL Control (6) until RF LEVEL -dBm Display (3) reads ***20*** (-20 dBm).

175. Adjust SLEW Control (F) to set Control Menu #1 ***RFLvl:+0.0***.

176. Set Spectrum Analyzer as follows:

CONTROL	SETTING
Span	Zero
Bandwidth	3 MHz
Sweep Rate	5 or 10 µs
Log Scale	1 or 2 dB/Div

177. Set CW/NORM/OFF Switch (7) to ***NORM***.

178. Adjust Spectrum Analyzer for stable display and record signal level as reference.

179. Press 2ND, ANT B and ON/CAL Keys in sequence to set Control Menu #1 ***AntB:*** field to numerical value.

180. Disconnect Spectrum Analyzer from RF I/O Connector (9).

181. Connect Spectrum Analyzer to ANT B Connector (E).

182. Press C MENU and "2" Keys to enter Control Menu #2.

183. Verify Control Menu #2 ***Brf=-20 dBm*** and ***Brflvl=+0.0 dB***. If not, use CURSOR Keys (A) and SLEW Control (F) to set fields.

184. Verify level is equal to Step 178 reference (±0.5 dB).

185. Disconnect Spectrum Analyzer from ANT B Connector (E).

186. Connect Power Meter to ANT B Connector (E).

187. Set CW/NORM/OFF Switch (7) to ***CW***.

188. Record Power Meter reading for reference level.

189. Use CURSOR Keys (A) and SLEW Control (F) to set Control Menu #2 ***Brflvl=+3.0 dB***.

190. Verify Power Meter reading is equal to Step 188 reference level + 3.0 dB (±0.3 dB).

191. Use CURSOR Keys (A) and SLEW Control (F) to set Control Menu #2 ***Brflvl=-3.0 dB***.

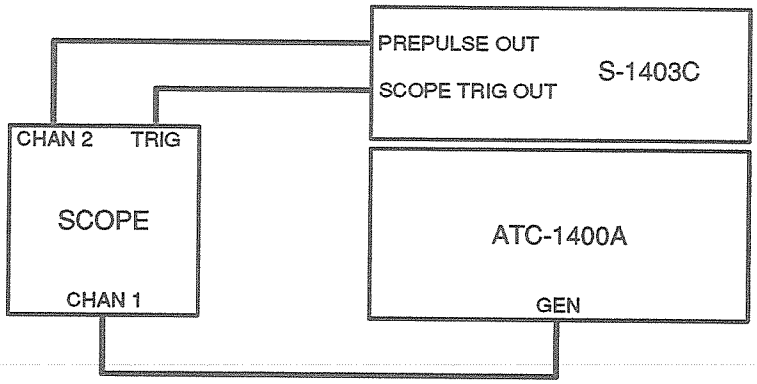
STEP PROCEDURE

192. Verify Power Meter reading is equal to Step 188 reference level - 3.0 dB (±0.3 dB).

193. Disconnect Power Meter from ANT B Connector (E).

194. Set CW/NORM/OFF Switch (7) to ***NORM***.

PREPULSE



Prepulse Test Setup Diagram
Figure 19

195. Set PRF/SQTR Thumbwheels (41) to ***200***.

196. Connect PREPULSE OUT Connector (EE) to Oscilloscope Channel 2 input according to 1-2-3, Figure 19.

197. Press 2ND, P PULS and ON/CAL Keys in sequence to activate Control Menu #2 ***Prepulse:*** field.

198. Press "0" and ENT Keys in sequence to set Control Menu #2 ***Prepulse: 0***.

199. Verify prepulse is coincident with P_1 (±100 ns).

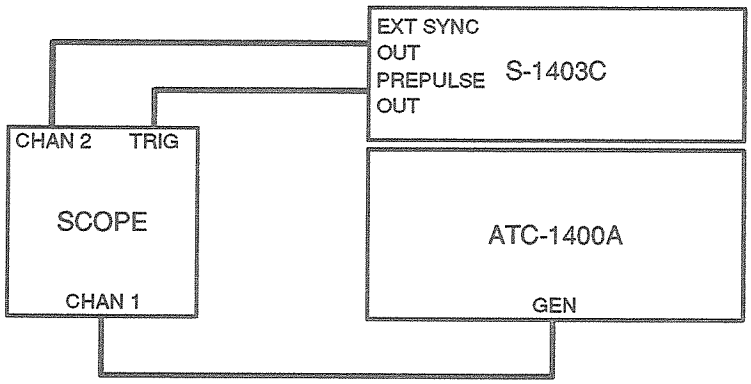
200. Use SLEW Control (F) to set Control Menu #2 ***Prepulse:260***. Verify P_1 leading edge moves to 260 µs following prepulse leading edge (±100 ns).

201. Disconnect PREPULSE OUT Connector (EE) from Oscilloscope Channel 2 input.

202. Disconnect SCOPE TRIG OUT Connector (AA) from Oscilloscope External Trigger.

EXT SYNC OUT

203. Connect Oscilloscope External Trigger to PREPULSE OUT Connector (EE) according to 1-2-3, Figure 20.



Ext Sync Out Test Setup Diagram
Figure 20

204. Use SLEW Control (F) to set Control Menu #2 ***Prepulse: 12***.

205. Connect EXT SYNC OUT Connector (CC) to Oscilloscope Channel 2 input according to 1-2-3, Figure 20.

206. Press 2ND, EXT SYN and ON/CAL Keys in sequence to set Control Menu #2 ***Ext.Sync.:Out= ON***.

207. Press CURSOR Key (→) (A) to move cursor under Control Menu #2 ***Ext.Sync.:,Dv=*** subfield. Verify ***0.00*** is displayed.

208. Set Oscilloscope for External Trigger with both active channels displayed. Verify Ext Sync pulse is coincident with P_1 (±100 ns).

209. Use SLEW Control (F) to set ***Ext.Sync.Out= ON,Dv=+9.95***.

210. Verify Ext Sync pulse follows P_1 accordingly.

211. Press +/- Key to change ***Ext.Sync.Out= ON,Dv=-9.95***.

212. Verify Ext Sync pulse precedes P_1 accordingly.

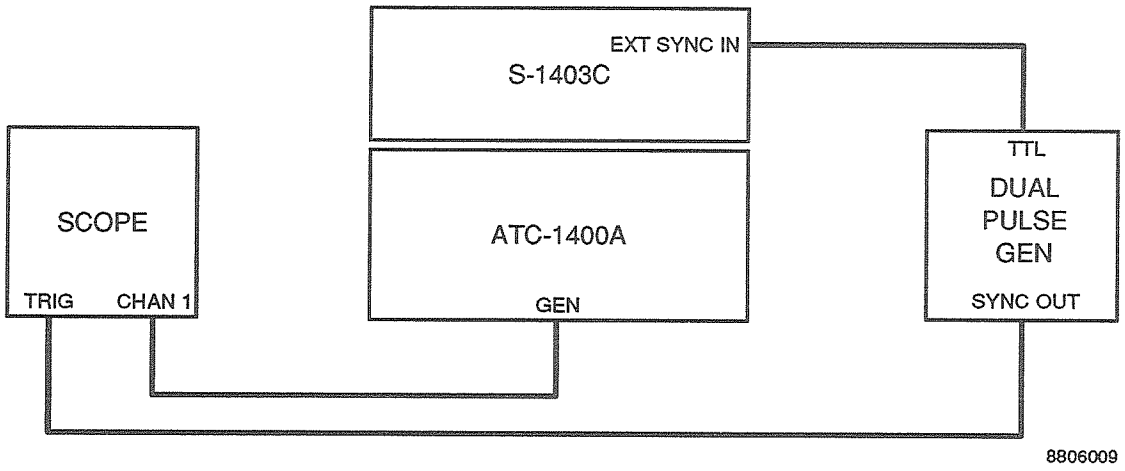
213. Disconnect PREPULSE OUT Connector (EE) from Oscilloscope External Trigger.

214. Disconnect EXT SYNC OUT Connector (CC) from Oscilloscope Channel 2 input.

EXT SYNC IN

215. Press CURSOR Key (→) (A) and ON/CAL Keys in sequence to set Control Menu #2 ***Ext.Sync.:,In= ON***.

216. Verify Control Menu #2 ***Ext.Sync.:Out=*** and ***Ext.Sync.:,Dv=*** subfields blank out.



Ext Sync In Test Setup Diagram
Figure 21

217. Connect Dual Pulse Generator TTL Output to EXT SYNC IN Connector (BB) according to 1-2-3, Figure 21.

218. Connect Dual Pulse Generator Sync Out to Oscilloscope External Trigger according to 1-2-3, Figure 21.

219. Set Dual Pulse Generator to Single Pulse Output and Internal Sync.

220. Verify P_1 occurs approximately 7.0 µs after Oscilloscope trigger.

221. Vary Dual Pulse Generator PRF Control.

222. Verify interrogation rate tracks Dual Pulse Generator PRF.

223. Press ON/CAL Key set Control Menu #2 ***Ext.Sync.:,In=OFF***.

224. Disconnect Dual Pulse Generator Sync Out from Oscilloscope External Trigger.

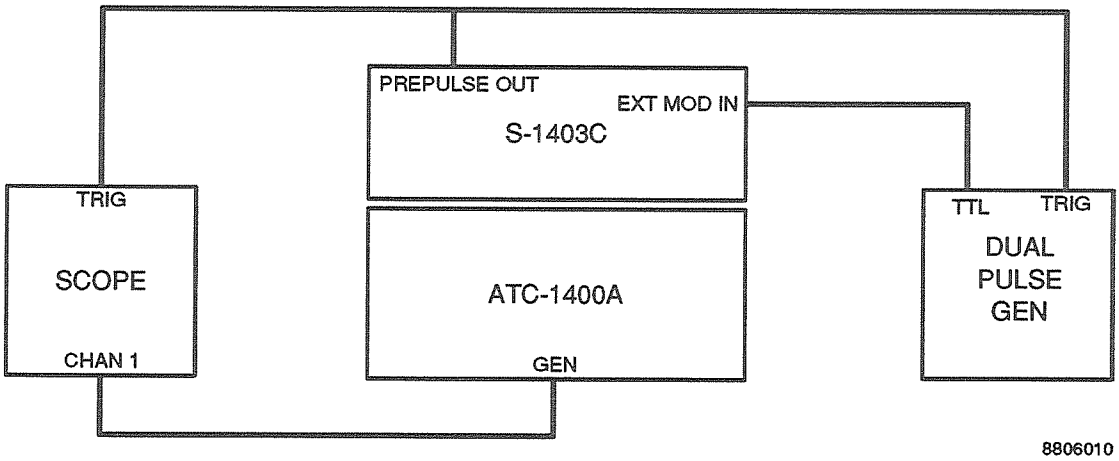
225. Disconnect Dual Pulse Generator TTL Output from EXT SYNC IN Connector (BB).

EXT MOD IN

226. Connect PREPULSE OUT Connector (EE) to Dual Pulse Generator Trigger input and Oscilloscope External Trigger according to 1-2-3, Figure 22.

227. Select External Trigger mode on Dual Pulse Generator. Set for dual pulse output.

228. Connect Dual Pulse Generator TTL Output to EXT MOD IN Connector (Z) according to 1-2-3, Figure 22.



Ext Mod In Test Setup Diagram
Figure 22

229. Press 2ND, EX MOD and ON/CAL Keys in sequence to set ***Ext.Mod.In: ON.***

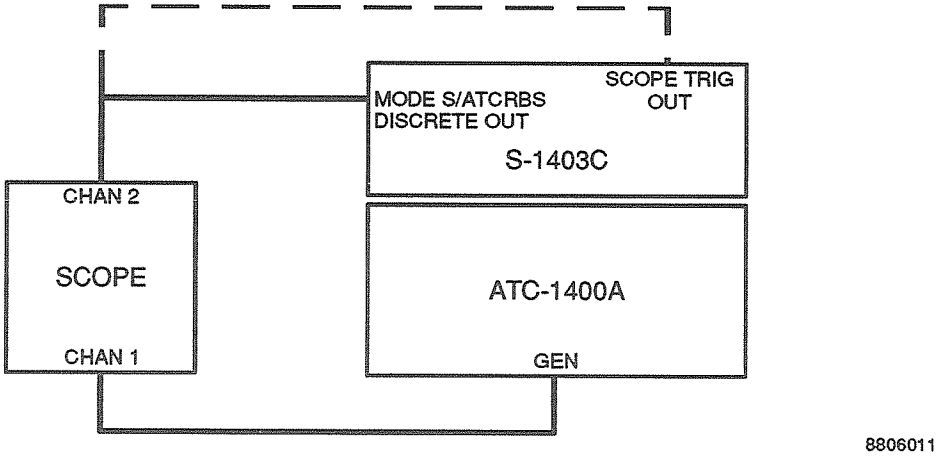
NOTE: The EX MOD Key and ON/CAL Key is the same key.

230. Verify the pulses present at GEN Connector (15) coincide with Dual Pulse Generator output.

231. Press ON/CAL Key to set ***Ext.Mod.In:OFF.***

232. Disconnect Dual Pulse Generator from S-1403C and Oscilloscope.

MODE S/ATCRBS DISCRETE



Mode S/ATCRBS Discrete and Scope Trigger Tests Setup Diagram
Figure 23

STEP	PROCEDURE

233. Press 2ND, FUN NO and "5" Keys in sequence to enter INTLCE Test Function Control Menu #1.

234. Press C MENU and "2" Keys in sequence to enter Control Menu #2.

235. Press CURSOR Key (→) (A) and "1" Key to set Control Menu #1 ***INTLCE,Ratio 1: 1.***

236. Connect MODE S/ATCRBS DISCRETE OUT Connector (DD) to Oscilloscope Channel 2 according to 1-2-3, Figure 23. Select Oscilloscope Internal Trigger Channel 2, negative slope.

237. Verify 3.0 µs wide TTL active low pulse occurs 1.0 µs prior to P_1.

SCOPE TRIGGER

238. Disconnect Oscilloscope Channel 2 input from MODE S/ATCRBS DISCRETE OUT Connector (DD) and reconnect to SCOPE TRIG OUT Connector (AA) according to 1-2-3, Figure 23. Select Oscilloscope positive slope trigger.

239. Set T_O/TAC/T_D Switch (30) to ***T_O***.

240. Verify scope trigger pulse leading edge occurs before P_1 of ATCRBS interrogation.

241. Verify scope trigger pulse trailing edge occurs after P_3 of ATCRBS interrogation.

242. Set T_O/TAC/T_D Switch (30) to ***T_D***.

243. Verify scope trigger pulse leading edge occurs after ATCRBS interrogation and prior to P_1 of Mode S interrogation.

244. Verify scope trigger pulse trailing edge occurs around 132 µs following P_1 of Mode S interrogation.

245. Remove power from the Mode S Test System.

246. Disconnect test equipment.

G. Performance Evaluation Data Sheet

The following data sheet may be reproduced by individual users.

TECHNICIAN: _____ DATE: _____

ATC-1400A S/N: _____ S-1403C S/N: _____

STEP	DATA	RESULT
	S-1403C to ATC-1400A COMMUNICATION	
5.	Firmware Version screen displayed <30 seconds	_____ (√)
6.	ATC Test Function Control Menu #1 displayed	_____ (√)
8.	**** DME MODE **** error displayed	_____ (√)
10.	ATC Test Function Control Menu #1 displayed	_____ (√)
	ATC TEST FUNCTION	
12.	Mode C P_3 position from P_1 21.0 µs (19.99 to 21.01 µs)	_____
14.	Mode A P_3 position from P_1 8.0 µs (7.99 to 8.01 µs)	_____
16.	P_3 level varies.	_____ (√)
18.	P_3 is deactivated.	_____ (√)
21.	P_2 position from P_1 2.0 µs (1.99 to 2.01 µs)	_____
22.	P_2 (SLS) level varies.	_____ (√)
24.	P_2 (SLS) position moves closer to P_1.	_____ (√)
26.	P_2 (SLS) position moves away from P_1.	_____ (√)
29.	P_3 position moves closer to P_1.	_____ (√)
31.	P_3 position moves away from P_1.	_____ (√)
35.	P_1, P_2 (SLS) and P_3 pulse widths vary.	_____ (√)
	SEQ TEST FUNCTION	
38.	SEQ Test Function Control Menu #1 displayed	_____ (√)
40.	Sequence Menu S01 displays UF00.	_____ (√)

STEP	DATA	RESULT
42.	Sequence Menu S02 displays UF04.	_____(√)
45.	Sequence Menu S03 displays UF05.	_____(√)
48.	Sequence Menu S04 displays UF11.	_____(√)
51.	Sequence Menu S05 displays UF16.	_____(√)
54.	Sequence Menu S06 displays UF20.	_____(√)
57.	Sequence Menu S07 displays UF21.	_____(√)
60.	Sequence Menu S08 displays UF00.	_____(√)
26.	P_2 (SLS) position moves away from P_1.	_____(√)
62.	S09 through S16 are ***OFF***.	_____(√)
63.	Sequence Menu S01 displays ***S01:FMT D, UF#00***.	_____(√)
64.	P_2 position from P_1 2.0 µs (1.99 to 2.01 µs)	_____
65.	P_6 position from P_1 3.5 µs (3.49 to 3.51 µs)	_____
66.	SPR position from P_2 2.75 µs (2.74 to 2.76 µs)	_____
68.	P_2 level varies.	_____(√)
70.	P_2 is deactivated.	_____(√)
73.	P_6 is deactivated.	_____(√)
76.	P_6 width varies.	_____(√)
79.	P_6 position varies.	_____(√)
82.	P_5 (SLS) overlaps SPR position.	_____(√)
83.	P_5 (SLS) level varies.	_____(√)
85.	SPR is deactivated.	_____(√)
88.	P_5 (SLS) and SPR positions vary.	_____(√)
	ACS TEST FUNCTION	
92.	ACS Test Function Control Menu #1 displayed	_____(√)
93.	P_4 position from P_1 10.0 µs (9.99 to 10.01 µs)	_____
94.	P_4 width 0.8 µs (0.79 to 0.81 µs)	_____

STEP	DATA	RESULT
	ACL TEST FUNCTION	
96.	ACL Test Function Control Menu #1 displayed	_____ (√)
98.	P_4 level varies.	_____ (√)
100.	P_4 is deactivated.	_____ (√)
102.	P_4 width 1.6 µs (1.59 to 1.61 µs)	_____
104.	P_4 width varies.	_____ (√)
107.	P_4 position varies.	_____ (√)
	INTLCE TEST FUNCTION	
110.	INTLCE Test Function Control Menu #1 displayed	_____ (√)
111.	ATCRBS pulse pattern consists of P_1 and P_3.	_____ (√)
113.	P_1 of Mode S interrogation position from P_1 of ATCRBS interrogation 200 µs (199.99 to 200.01 µs)	_____
114.	Mode S pulse pattern consists of P_1, P_2 and P_6.	
116.	Two ATCRBS interrogations occur between Mode S interrogations.	_____ (√)
	DI TEST FUNCTION	
118.	**** DI/INTF ERROR **** indication displayed	_____ (√)
121.	DI Test Function Control Menu #1 displayed	_____ (√)
122.	First interrogation ATCRBS pulse pattern consists of P_1 and P_3.	_____ (√)
124.	First interrogation Mode S pulse pattern consists of P_1, P_2 and P_6.	_____ (√)
126.	First interrogation ATCRBS Only All-Call pulse pattern consists of P_1, P_3 and short P_4.	_____ (√)
128.	First interrogation ATCRBS/Mode S All-Call pulse pattern consists of P_1, P_3 and long P_4.	_____ (√)
131.	P_1 of second interrogation position from P_1 of first interrogation 200 µs (199.985 to 200.015 µs)	_____
132.	Second interrogation ATCRBS pulse pattern consists of P_1 and P_3.	_____ (√)

STEP	DATA	RESULT
134.	Second interrogation Mode S pulse pattern consists of P_1, P_2 and P_6.	_____(√)
136.	Second interrogation ATCRBS Only All-Call pulse pattern consists of P_1, P_3 and short P_4.	_____(√)
138.	Second interrogation ATCRBS/Mode S All-Call pulse pattern consists of P_1, P_3 and long P_4.	_____(√)
	BURST TEST FUNCTION	
140.	* ***DI/INTF ERROR*** * indication displayed	_____(√)
142.	BURST Test Function Control Menu #1 displayed	_____(√)
146.	ATCRBS interrogation displayed for 5 seconds	_____(√)
151.	Mode S interrogation displayed for 5 seconds	_____(√)
	ANT A RF VERNIER	
157.	-4 dBm Power Meter reference level	_____
159.	Step 157 reference level + 3.0 dB (±0.3 dB)	_____
161.	Step 157 reference level - 3.0 dB (±0.3 dB)	_____
	ANT B RF LEVEL TEST (without MLD option installed)	
168.	-50 dBm Spectrum Analyzer reference level	_____
172.	ANT B level = Step 168 reference level (±1 dB)	_____
	ANT B RF LEVEL TEST (with MLD option installed)	
178.	-20 dBm Spectrum Analyzer reference level	_____
184.	ANT B level = Step 178 reference level (±0.5 dB)	_____
188.	-20 dBm Power Meter reference level	_____
190.	Step 188 reference level + 3.0 dB (±0.3 dB)	_____
192.	Step 188 reference level - 3.0 dB (±0.3 dB)	_____
	PREPULSE	
199.	Prepulse position coincident with P_1 (±100 ns)	_____
200.	P_1 position 260 µs after prepulse (259.9 to 260.1 µs)	_____

STEP	DATA	RESULT
	EXT SYNC OUT	
207.	Ext Sync pulse is not deviated.	_____ (√)
208.	Ext Sync pulse position coincident with P_1 (±100 ns)	_____
210.	Ext Sync pulse follows P_1	_____ (√)
212.	Ext Sync pulse precedes P_1	_____ (√)
216.	Control Menu #2 ***Ext.Sync.:Out=*** and ***Ext.Sync.:,Dv=*** subfields blank out.	_____ (√)
	EXT SYNC IN	
220.	P_1 position ≈7.0 µs after Oscilloscope trigger	_____ (√)
222.	Interrogation tracks Dual Pulse Generator PRF.	_____ (√)
	EXT MOD IN	
230.	GEN Connector pulses coincide with Dual Pulse Generator output.	_____ (√)
	MODE S/ATCRBS DISCRETE	
237.	3.0 µs wide Mode S/$\overline{\text{ATCRBS}}$ discrete pulse occurs 1.0 µs prior to P_1.	_____ (√)
	SCOPE TRIGGER	
240.	T_O scope trigger leading edge occurs before P_1 of ATCRBS interrogation.	_____ (√)
241.	T_O scope trigger trailing edge occurs after P_3 of ATCRBS interrogation.	_____ (√)
243.	T_D scope trigger leading edge occurs after ATCRBS interrogation and before Mode S interrogation.	_____ (√)
244.	T_D scope trigger trailing edge occurs around 132 µs after P_1 of Mode S interrogation.	_____ (√)

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