AEROSPACE & FLIGHT TEST RADIO COORDINATING COUNCIL
616 E 34th Street North, Wichita, KS 67219
Telephone: (316) 821-9516 Fax: (316) 838-0015

AEROSPACE & FLIGHT TEST RADIO COORDINATING COUNCIL

EXPERIMENTAL LICENSE (or) SPECIAL TEMPORARY AUTHORITY (STA)
COORDINATION TERMS AND CONDITIONS

All requests for frequency coordination by AFTRCC are subject to the terms and conditions detailed below. A ***MEMORANDUM*** describing the proposed operational requirements, including detailed signal transmission characteristics, ***MUST*** accompany a ***completed*** and ***signed*** copy of this form. *A copy of the FCC license application should be included whenever possible but will not serve as a replacement for the required memorandum.*

NOTE: PROPRIETARY DATA/CLASSIFIED INFORMATION SHOULD NOT BE SUBMITTED.

If this form has been received by the applicant in response to a coordination request, this form must be completed, signed and returned per the attached instructions ***before AFTRCC can continue processing the request***.

Date of Request: 3-10-2016 Identity Control Number (ICN): _____
(To be completed by AFTRCC)

Name of Applicant: Roberto Soto Email roberto.soto@l-3com.com

Please Reference the Requested City(ies), State(s), and Date(s) of Operation:

Orlando, Florida

August 2016 and continue to intermittently test through August 2018.

AFTRCC provides recommendations to the Federal Communications Commission (FCC) for non-government use of flight test voice and telemetry frequencies. AFTRCC's role is strictly advisory; in all cases the FCC makes the decision whether to issue a license.

Applicants are advised that no representations or warranties, express or implied, are made as to the interference-free nature of any given frequency or frequencies which AFTRCC coordinates, or as to whether any given frequency recommendation is best suited for the Applicant's purposes.

Applicants should also be aware that frequencies coordinated by AFTRCC are shared with other users; no one user is entitled to exclusive use of a frequency in any given area. Multiple users may be, and often are, licensed or have government assignments for use of the same frequencies. Hence, notwithstanding FCC issuance of a license to the Applicant, transmission or any given frequency may be subject to day-to-day, hour-by-hour scheduling with Government Area Frequency Coordinators (AFCs) or other agencies.

In return for AFTRCC's processing of the Applicant's request, the Applicant agrees to release and hold harmless AFTRCC, its officers, directors, agents, representatives, and member companies (and their respective officers, directors, employees, owners, and agents) from and against any and all claims, losses, liabilities, damages or expenses which may arise now or in the future as a result of the Applicant's acceptance of AFTRCC's recommendation, or its use of the recommended frequency(ies).

Information supplied in support of a coordination request represents part of the FCC application process. Accordingly, this information is considered public record material.

By the signature of its duly authorized official below, the applicant accepts and acknowledges these limitations and conditions.

Signature: _____

Print Name: Roberto Soto

Title: System Safety Engineer

Date: 3-10-2016

To Whom It May Concern,

We are currently on contract from the Missile Defense Agency (Contract Number: FA8818-08-D-0038-0002) **E-LRALT TN2** within the U.S. Department of Defense to provide a threat representative target for an upcoming missile interceptor test. As part of our test process, we assemble and functionally test the target at our Orlando facility. During test, we capture telemetry from 10 watt L-band and C-band transmitters within the following frequencies 2214.50-2276.50 MHz (62 MH Bandwidth) and 1460.5-1476.5 MHz (16Mh Bandwidth) at a 10W (20W ERP). We are in the process of renewing our FCC and coordination with AFTRCC is needed prior to the renewal. Our current contract calls for testing to start on August 2016 and continue to intermittently test through August 2018. **Through this letter I am requesting an extension to the current frequency coordination**. Any effort to expedite this process would be greatly appreciated.

The purpose for these tests are to determine that a Telemetry link consisting of a variety of sensors, a PCM encoder with encryption, and transmitter has the proper spectrum to satisfy the link margin for a PCM/FM modulated system for a BER of 10E-6 with a signal to noise ratio of 12.4dB.

In order to demonstrate that the system meet the goals, the deviation has to be set correctly and is monitored via a spectrum analyzer along with observing eye-patterns of the demodulated signal. By performing these tests prior to deployment, a minimum power level to achieve these goals can be determined empirically using telemetry test equipment and additional attenuators.

Normally a link budget is performed analytically but performing the analysis empirically will enable us to make better utilization of the available spectrum and reduce the emissions whenever possible.

L3 Communications/Coleman Aerospace

7675 Municipal Drive

Orlando, FL 32819

POC: Roberto Soto (407-226-7635)

Frequencies: 1460.5 MHz thru 1476.5

Station Class: FX/XT

Emission: 11M6F7D

Power: 10 watts (20 watts ERP)

Location: Orlando, FL (28-27-12N 81-27-03W)

MIRAD: Fixed

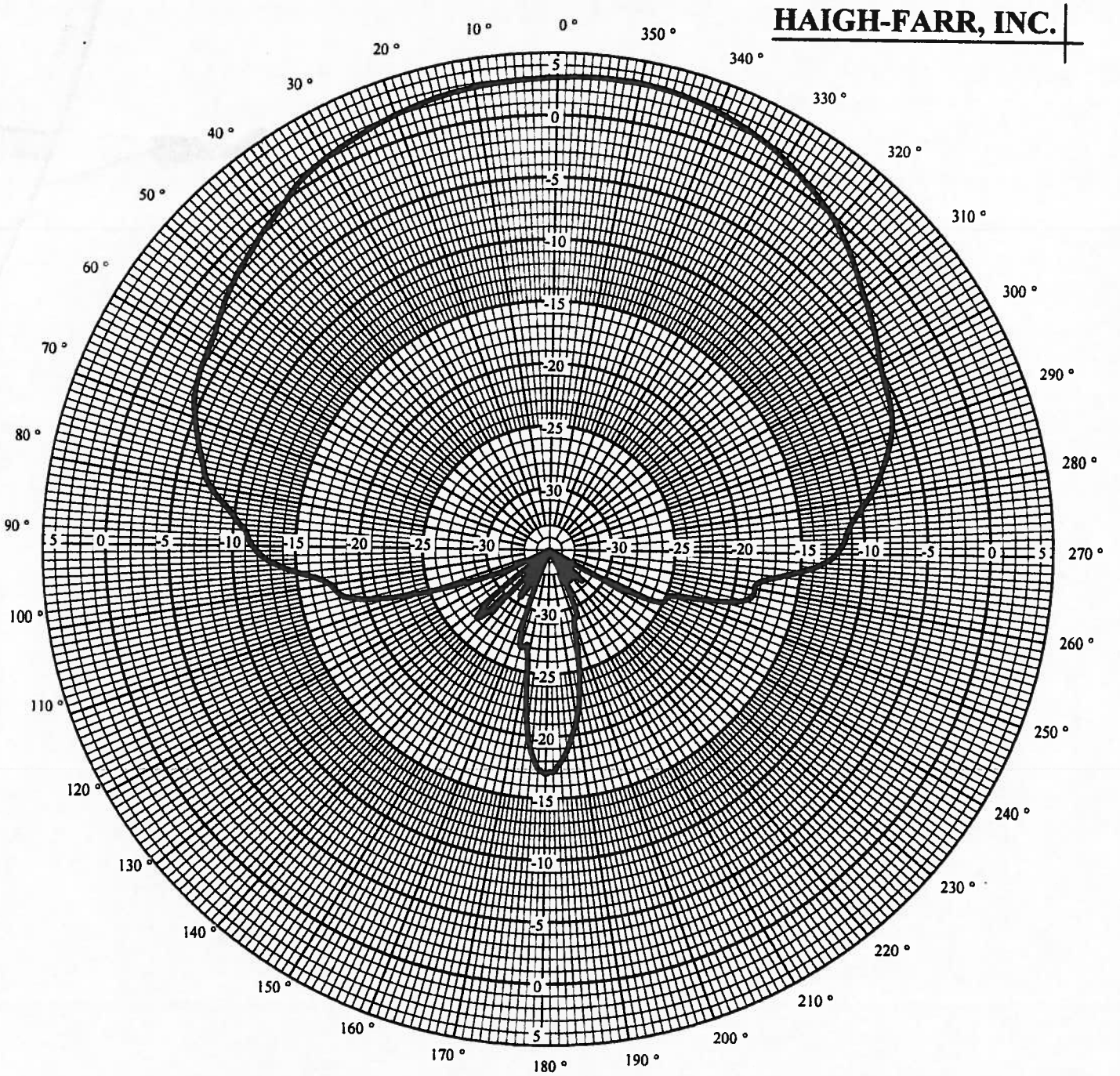
Requested Dates: 2016-08 thru 2018-08

The transmitters are: **(PLEASE, SEE ATTACHMENTS FOR TRANSMITTER SPECS)**

Airborne Telemetry Products Transmitters T-610, (Qty. 2)

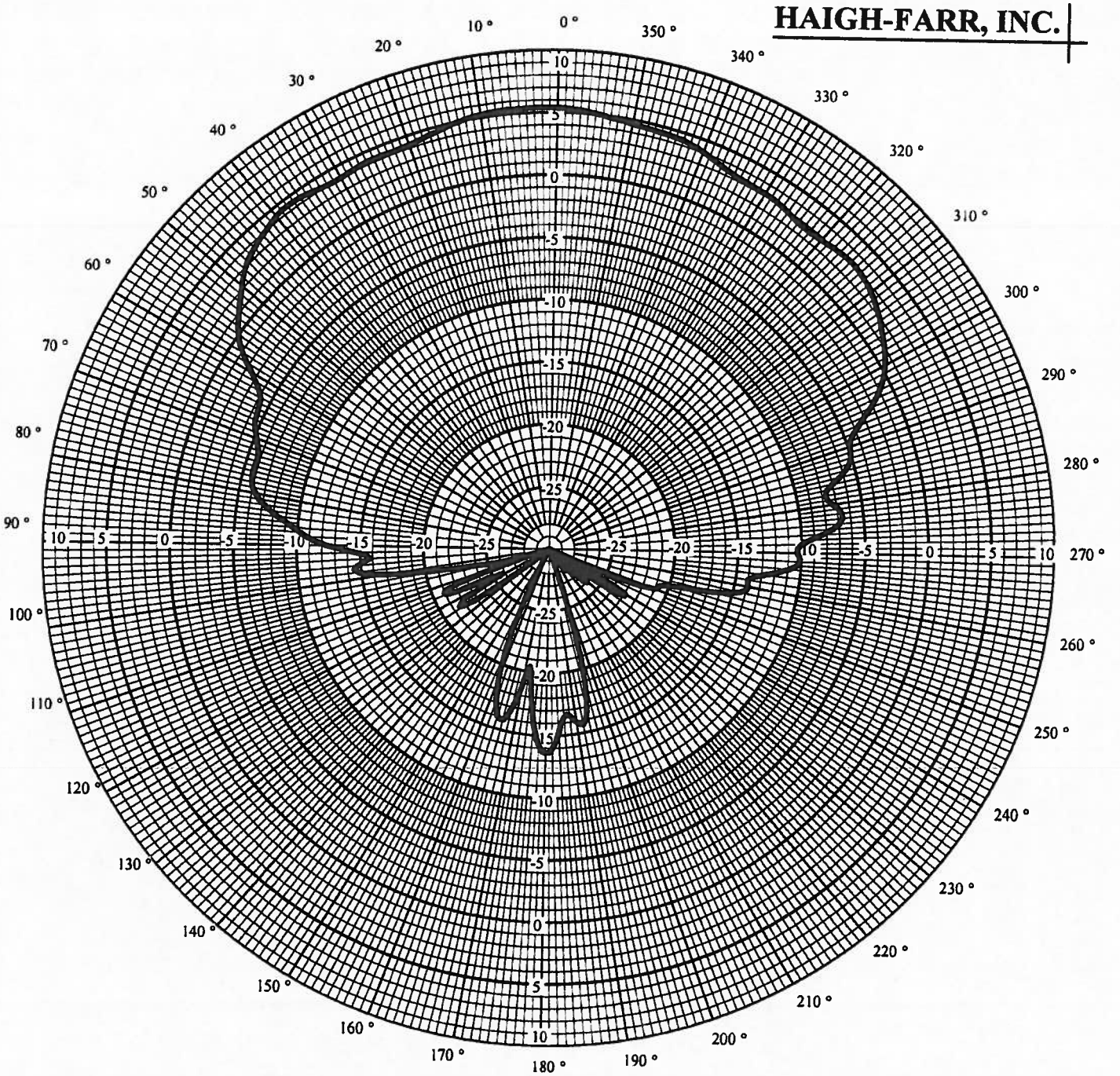
Airborne Telemetry Products Transmitters ST-800, (Qty. 2)

HAIGH-FARR, INC.



	FREQ	VSWR				
MODEL: 72735000			FREQ	1435 MHz	θ	90°
TECHNICIAN: T.B.			ISO	0	ϕ	VAR
COMMENTS: Pre-Envirormental			DATE	19MAR09	SERIAL	4

HAIGH-FARR, INC.



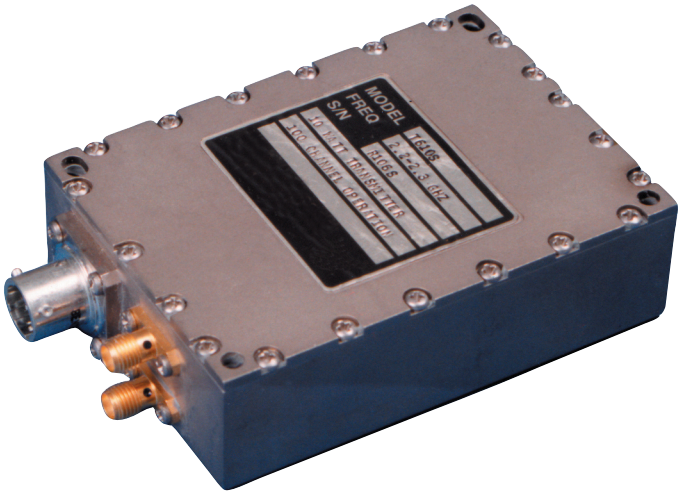
MODEL: 72735000	FREQ	VSWR	FREQ	2200 MHz	θ	90°
TECHNICIAN: T.B.			ISO	0	ϕ	VAR
COMMENTS: Pre-Enviormental			DATE	19MAR09	SERIAL	4

Product Bulletin

T-610

S Band Frequency Agile FM Transmitters

Airborne Telemetry Products



FEATURES

- Low S, Upper S, or Full S Band Coverage
- 8.75 Cubic Inches
- 12 Ounces
- Frequency Agile
- 1/2 MHz Steps
- Meets IRIG Turn-On Time
- Optional CCIR-405 Pre-Emphasis

L3 communications

The L-3 Communications Telemetry-East T-610 series UHF transmitters are 8.75 cubic inch frequency agile wideband telemetry transmitters designed for video and high data rate digital modulation requirements. The units are designed to operate in severe aerospace environments encountered in missiles, targets and RPV's.

Frequency is selectable in 0.5 MHz steps over S, HS, or the Full 200 MHz S-Band by input of binary codes from a remote line or by connecting a prewired programming plug to the unit's MDM-15S frequency select connector. An internal PROM translator option enables custom selection codes or BCD thumbwheel inputs without the need for any additional hardware.

A unique PLL control circuit permits 10 Hz modulation response while still meeting IRIG one second turn-on time requirements. Anti-sweep lock detect circuitry prevents RF radiation until the unit has locked on frequency, thereby eliminating the possibility of interference with other RF signals.

RF originates at full frequency rather than a subharmonic of the output frequency, thus eliminating low-order spurious signals. This scheme also minimizes part count thereby enhancing transmitter reliability.

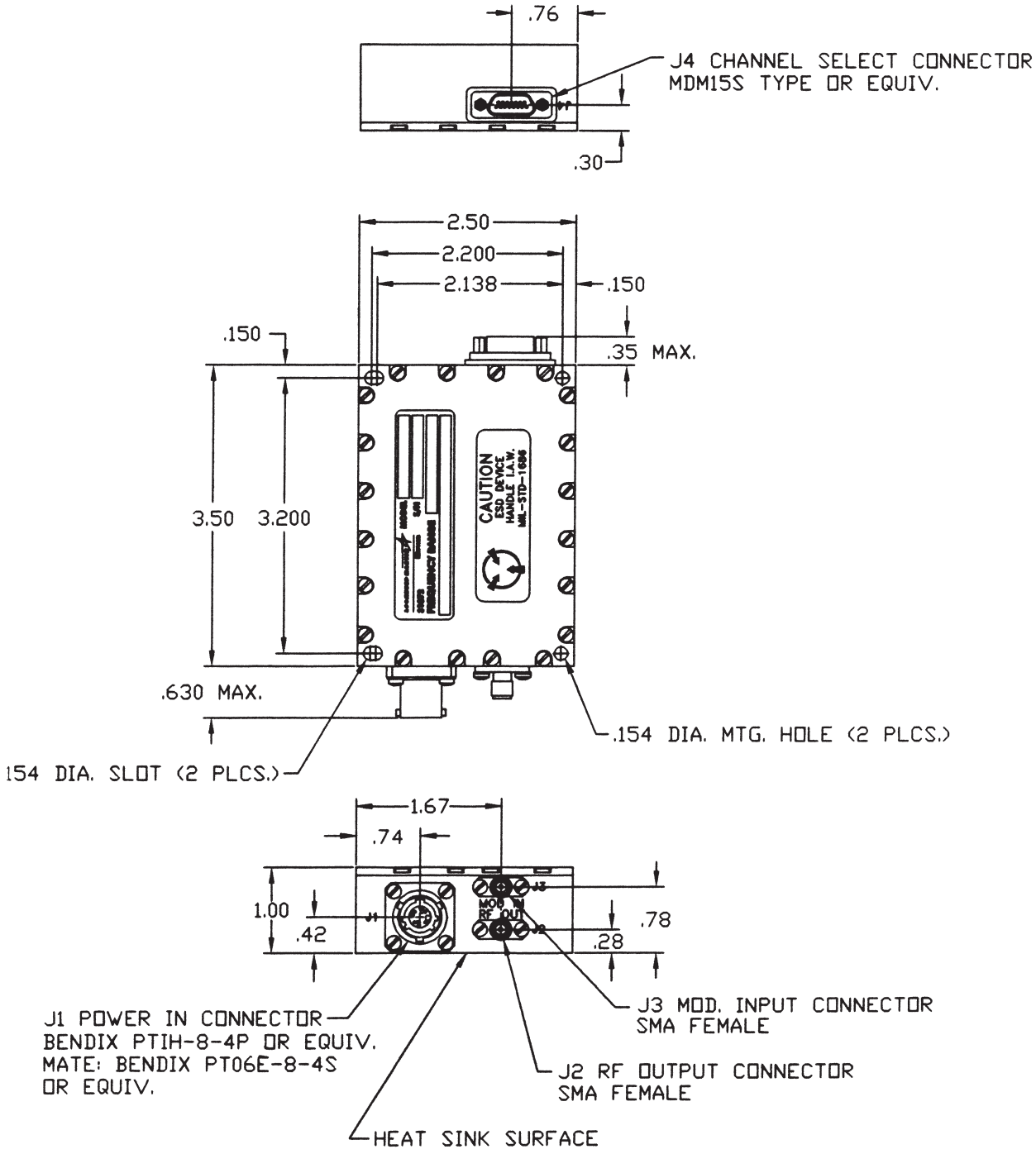
The design accommodates the upgrading of all parts to fully hermetic high-reliability requirements to meet almost any special program needs.

PIN CONNECTIONS

J1	Telemetry (Optional)	Video
A	+28 VDC In	+28 VDC In
B	MOD In	N.C.
C	+28 VDC RTN	+28 VDC RTN
D	MOD RTN (DELETE J3)	N.C.

CHANNEL SELECT CONNECTOR

J4	2200 MHz 2300 MHz	2300 MHz 2400 MHz	2200 MHz 2400 MHz	Step Size
P1	LSB	LSB	LSB	0.5 MHz
P2	—	—	—	1.0 MHz
P3	—	—	—	2.0 MHz
P4	—	—	—	4.0 MHz
P5	—	—	—	8.0 MHz
P6	—	—	—	16.0 MHz
P7	—	—	—	32.0 MHz
P8	MSB	MSB	MSB	64.0 MHz
P9	N.C.	N.C.	N.C.	128.0 MHz
P10-14	N.C.	N.C.	N.C.	—
P15	GND	GND	GND	—



T-610 Mechanical Outline Drawing

SPECIFICATIONS

Output Characteristics

Power Output (min.):	10 watts @ 1.5:1 VSWR
Turn-on Time:	Per IRIG 106-86
Frequency Range (band):	2200-2300 MHz, 2310-2390 MHz and 2200 MHz-2400 MHz
Frequency Selection:	Frequency Agile, 1/2 MHz Steps thru Operating Band. Selection is accomplished by input of binary code via a remote line or a prewired program plug. (See Options)
Frequency Stability:	±0.002%
Output Impedance:	50 ohm nominal
Output Load VSWR:	Isolator Protected

Power Requirements

Voltage:	28 ±4 VDC
Current (max.):	3.5 amp 4.0 amp for the -200
Reverse Polarity:	No Damage from Indefinite Application of –40 VDC
Over Voltage:	+40 VDC, 3 minutes; no damage
Grounding:	Power and Modulation Returns

Modulation Characteristics

Type:	True FM
Sense:	Positive
Input Impedance:	Video = 75 ohm Telemetry = 10k ohm (Other available – specify when ordering)
Frequency Response:	10 Hz to 6 MHz ±1.5 dB (See Options)
Deviation Sensitivity:	User Adjustable, Preset at ±4 MHz/Vp-p ±15% for Video or ±500 kHz/Vrms ±15% for Telemetry (Customer Specified)
Maximum Deviation:	±8 MHz (Consult factory for > ±8 MHz)
Linearity:	2% BSL at 5 MHz Deviation
IFM:	10 kHz peak
IAM:	5% max.
Modulation Distortion:	2% max. at 5 MHz deviation

Environmental

Temperature	
Non-Operating:	–55°C to +100°C
Operating:	–20°C to +70°C Baseplate (See Options)
Vibration	
Random:	20-2000 Hz, 14g rms, 3 axes
Sine:	20-2000 Hz, 20g peak, 3 axes
Shock:	100g, 11 msec, 1/2 sine, 3 axes
Acceleration:	100g, 3 axes
Altitude:	Unlimited
Humidity:	95% RH
EMI:	MIL-STD 461 at 28 VDC, IRIG-106 for Antenna Conducted

Mechanical

Dimensions:	See Outline Drawing
Volume:	8.75 cubic inches
Weight:	12 oz. max.
Connectors:	See Outline Drawing
Pin Connections:	See Outline Drawing

Options (Consult Factory)

Extended Operating Temperature:	–40°C to +85°C
Video Pre-Emphasis:	CCIR-405
Higher Efficiency:	Consult Factory
Extended Frequency Response:	12 MHz (Consult Factory for >12 MHz)
Other Modulation Sensitivity:	Consult Factory
Modulation Return Isolation:	Consult Factory
Frequency Select:	Internal PROM selection by BCD or custom digital codes. DIP switch in lieu of J4
Modulation Input Connector:	SSMA or Modulation input on J1& deletion of J3
Reduced Operating Voltage:	22 VDC Low Line min. for 10 Watt min. output power
RF Output Connector	TNC Female

Specify When Ordering:

Model Number/Frequency Bands:

T-610S	-	2200 MHz - 2300 MHz
T-610HS	-	2310 MHz - 2390 MHz
T-610S-200	-	2200 MHz - 2400 MHz

Frequency Selection:	Standard Binary, Internal PROM Translator or DIP switch
Modulation Input Impedance:	75 ohm or 10k ohm
Modulation Sensitivity:	Per Customer Requirement
Other Options:	(See Options)

L-3 communications

L-3 Communications Telemetry-East
1515 Grundy's Lane, P.O. Box 729 • Bristol, PA 19007
Telephone: (267) 545-7000 • Fax: (267) 545-0100
E-Mail: sales/mktg@L-3com.com • www.L-3com.com/te

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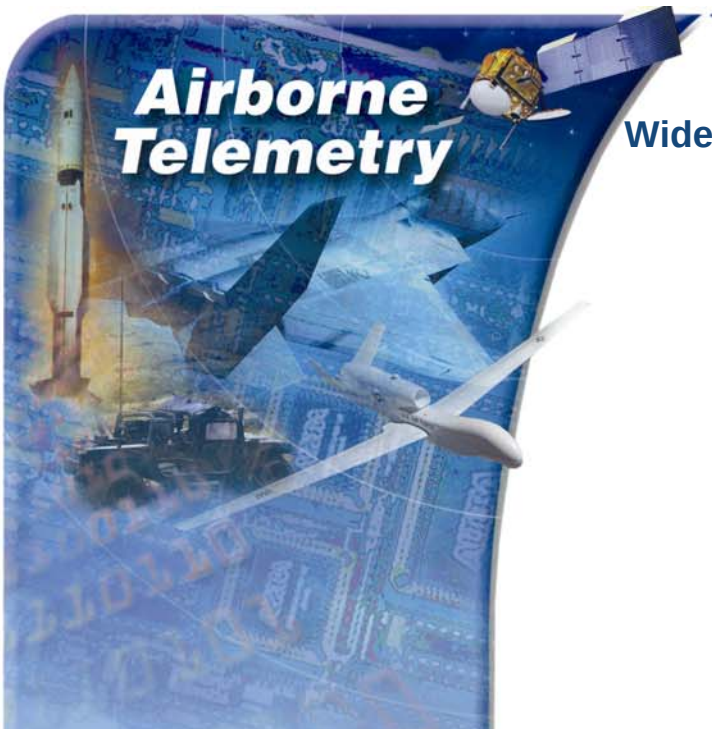
QN-0001.indd/August 2002



ST-800 Series

Wideband Telemetry Microwave Transmitters

Airborne Telemetry Products

FEATURES

- **Minimum Size and Weight**
- **Available in 2, 5, and 10 Watts Minimum Power Output**
- **2200 to 2400 MHz and 1435 to 1534 MHz Frequency Range**
- **Wide Modulation Bandwidth Capabilities**
- **Meets latest IRIG-106 Standards**
- **Crystal Controlled Center Frequency**

DESCRIPTION

The L-3 Communications Telemetry-East ST-800 S/L Series Microwave transmitters are designed for operation in aerospace environments where size and weight efficiency are critical. The ST-800 S/L Series are solid-state, crystal stabilized, true FM telemetry transmitters designed for transmitting wideband digital multiplex signals, video, TTL, differential TTL, and fully isolated (Opto-Coupled). These transmitters are designed for extremely reliable operation when subjected to the severe environmental flight conditions of missiles, space vehicles and aircraft.

The internal modules (modulator, series regulator, power amplifier, and filters) are housed in separate machined enclosures to maximize RF isolation. All units undergo rigorous environmental testing to insure reliable operation while meeting the specification requirements under worse case conditions.

L3 communications
Telemetry & RF Products

Excellence You Can Measure

ELECTRICAL SPECIFICATIONS

Frequency Range:	E/S-Band 2200 to 2300 MHz E/S-Band 2300 to 2400 MHz D/L-Band 1435 to 1534 MHz
Frequency Selection:	The output frequency is selectable in 1 MHz steps over the desired frequency, with optional frequency selection available in 0.5 MHz and 0.25 MHz steps. Frequency is selected by input of binary code via a remote line.
Frequency Stability:	±0.002%
Power Output:	ST-802 S/L 2 Watts min. ST-805 S/L 5 Watts min. ST-810 S/L 10 Watts min.

Antenna Compatibility

Output Impedance:	50 ohms
VSWR (load):	up to infinite to one
Open/Short Protection:	Yes, Internal Isolation

Modulation

Type:	True FM
Sense:	Positive
Input Impedance:	75 ohm nominal, with 30 pF shunt capacitance max. (10K ohm min, with 30 pF shunt capacitance available)
Frequency Response:	10 Hz to 6 MHz ± 1.5 dB (Response in excess of 10 MHz available). Video PreEmphasis (CCIR 405) optional
Deviation:	6 MHz peak
Deviation Sensitivity:	6 MHz/V rms (± 10% STD for 100 MHz BW)
Deviation Linearity:	2.0% at ±6 MHz deviation

Input Power

Voltage:	28 ±4 Vdc
Current:	ST-802 S/L 0.8 A max ST-805 S/L 1.5 A max (w/ALC) ST-805 S/L 1.8 A max ST-810 S/L 3.3 A max
Reverse Polarity Protection:	Yes
Power Return:	Power return common to case
Over Voltage Protection:	Yes

ENVIRONMENTAL SPECIFICATIONS

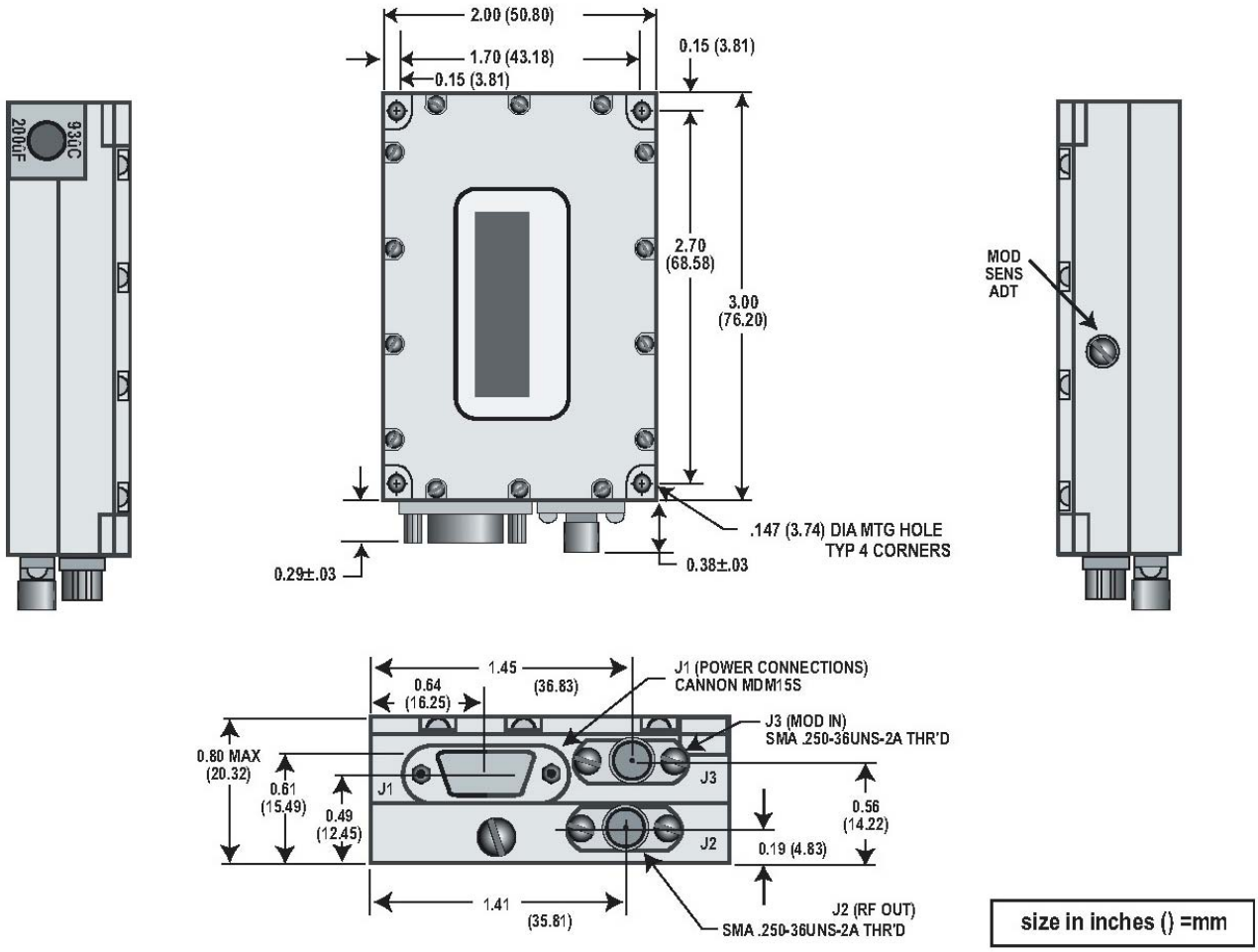
All performance specifications will be met under the following conditions.

Temperature:	-20°C to +70°C (-40°C to +85°C available)
Vibration: Sine	20g from 20 to 2000 Hz, 3 axis
Shock:	100g, 1/2 sine, 11 msec
Acceleration:	100g
Altitude:	Unlimited

MECHANICAL SPECIFICATIONS

Dimensions:	2'' x 3'' x 0.80'' excluding connections*
Weight:	7 ounces max
Volume:	4.8 Cu. Inches
Mounting:	6-32 screws, 4 corners
Connectors:	
J-1 Power	MDM-15S
Pin Connections	1 through 8 Freq. Selection 9-PWR RTN 10- SPARE 11- SPARE 12- SPARE 13- +28V 14- PWR RTN 15- PWR RTN
J-2 RF Output	SMA Female
J-3 Modulation Input	SMA Female

ST-800 S/L Series Outline Drawing



OPTIONS*

- Input Impedance
- Field Adjustable Deviation Sensitivity
- Deviation Sensitivity
- Extended Temperature Range
- Modulation Input on Power connector
- Other DC and RF Connectors Available
- Data rates to beyond 20 Mbits/sec with wider deviations and extended bandwidth
- Pre-emphasis for Video Transmission
- Remote Power On/Off Control
- 200 MHz Bandwidth at S Band

NOTE: Options may include additional costs

QUALITY CONTROL and PRODUCT ASSURANCE

The L-3 Communications Telemetry-East ST-800 S/L Series transmitters are manufactured under strict Control procedures in accordance with the requirements of ISO 9001 and MIL-Q 9858. Each assembled unit is fully tested to a comprehensive acceptance test procedure which includes full performance testing at thermal extremes.

ORDERING INFORMATION

When ordering, specify model number and exact operating frequency in megahertz. For special applications or additional information, contact the L-3 Communications Telemetry-East Sales Department in Bristol, PA or your L-3 Communications Telemetry-East sales representative.

www.L-3Com.com/te

1515 Grundy's Lane
Bristol, PA 19007
1-267-545-7000
Fax: 267-545-0100

L3 communications
Telemetry & RF Products

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Roberto Soto, 7675 Municipal Drive, Orlando, FL 32819,

United States of America
FEDERAL COMMUNICATIONS COMMISSION
EXPERIMENTAL
RADIO STATION CONSTRUCTION PERMIT
AND LICENSE

EXPERIMENTAL	WH2XKE
(Nature of Service)	(Call Sign)
XC FX	0582-EX-PL-2014
(Class of Station)	(File Number)

NAME L-3 Communication, Coleman Aerospace

Subject to the provisions of the Communications Act of 1934, subsequent acts, and treaties, and all regulations heretofore or hereafter made by this Commission, and further subject to the conditions and requirements set forth in this license, the licensee hereof is hereby authorized to use and operate the radio transmitting facilities hereinafter described for radio communications in accordance with the program of experimentation described by the licensee in its application for license.

Operation: In accordance with Sec. 5.3(c) of the Commission's Rules

Station Locations

(1) Orlando FL, FL - NL 28-27-12; WL 81-27-03
(2) Orlando FL, FL - NL 28-27-12; WL 81-27-03
(3) Orlando FL (ORANGE), FL - NL 28-27-12; WL 81-27-03

Frequency Information

Orlando FL, FL - NL 28-27-12; WL 81-27-03

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
2214.5-2276.5 MHz	FX	11M6F7D	20 W (ERP)	

Orlando FL, FL - NL 28-27-12; WL 81-27-03

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
1455.5-1476.5 MHz	FX	11M6F7D	20 W (ERP)	

This authorization effective October 02, 2014 and
will expire 3:00 A.M. EST August 20, 2016

FEDERAL COMMUNICATIONS COMMISSION

Frequency Information

Orlando FL (ORANGE), FL - NL 28-27-12; WL 81-27-03

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
420-430 MHz	FX	30K0F3D	1 mW (ERP)	

Special Conditions:

(1) In lieu of frequency tolerance, the occupied bandwidth of the emission shall not extend beyond the band limits set forth above.

(2) Licensee should be aware that other stations may be licensed on these frequencies and if any interference occurs, the licensee of this authorization will be subject to immediate shut down.

(3) This authorization is issued for the express purpose of conducting experimental operations described in the related application and required by the U.S. Government; contract number FA8818-08-D-0038. The use of this radio station in any other manner or for any other purpose will constitute a violation of the privileges herein authorized. Except as subsequently authorized by the Commission, this radio station shall not be operated after the expiration date of the contract designated in the related application and enumerated above.

(4) THIS FREQUENCY ASSIGNMENT IN ONE OF THE BANDS 1435-1525, 2310-2320 AND 2345-2390 MHz WAS COORDINATED PRIOR TO AUTHORIZATION WITH THE EASTERN AREA FREQUENCY COORDINATOR, PATRICK AFB, FLORIDA, WHO ALSO COORDINATED IT, AS APPROPRIATE, WITH AEROSPACE AND FLIGHT TEST RADIO COORDINATING COUNCIL. USE OF THIS FREQUENCY UNDER THE AUTHORITY OF THIS ASSIGNMENT IS SUBJECT TO SUCH FURTHER COORDINATION WITH THE EASTERN AFC, PATRICK AFB, FLORIDA, AS NECESSARY TO ENSURE COMPATIBILITY WITH EXISTING USES.