

UNION SWITCH & SIGNAL

S-3406-EX-1998

rev'd 6-3-98

May 26, 1998

granted 6-4-98

FCC Experimental Licensing Branch
Code EAE
PO Box 358320
Pittsburgh, PA 15251-5315

Dear Sirs:

This submittal is a request for special authorization to operate the rf generating equipment described in detail below for a period of six months commencing on June 1, 1998. Experimental Special Temporary Authorization (see attached) was previously granted for this equipment for the period July 22, 1996 through January 22, 1997. During that time, the equipment was being demonstrated on the North East Corridor for AMTRAK.

Experimental Special Temporary Authorization is currently requested in order to operate the equipment on New Jersey Transit, the Denville Line. The purpose of the operation is to demonstrate the application of enhanced train location and speed control equipment to New Jersey Transit personnel and Federal Railroad Authority (FRA) personnel. Installation of this equipment will result in increased commuter rail efficiency and safety.

The equipment consists of vehicle-mounted antennas and wayside-mounted transponder devices mounted at several locations along the railroad right of way. In operation, the antenna mounted to the locomotive transmits a low power RF signal directed downward beneath the locomotive to energize the transponder devices mounted between the rails as the locomotive passes over them. The transponder devices are passive devices until the locomotive antenna is within close proximity to them, resulting in the transponder responding with a low power RF signal containing digitally encoded information relative to the physical location of the transponder combined with specific instructions for the locomotive. The information received by the locomotive allow for accurate position location, optimum train speed control, insertion of restricted speed zones as required, and increased safety of railroad operations.

Equipment details are as follows:

Antenna:

Manufacturer; AT Signal System AB, Spanga, Sweden

Model Number; L320430010

Power Input; 25 Watts The radiated field strength is as shown on attachment "A"

Frequency; 27.115 MHz.

Emission; P0 (17us on, 3us off)

Antenna Mounting; The antenna is mounted beneath the locomotive, approximately 15 inches above the ground.

Quantity of antennas to be applied; 2

Union Switch & Signal Inc.
1000 Technology Drive
Pittsburgh, PA 15219-3120
Tel. (412) 688-2400 / 1-800-351-1520
Fax (412) 688-2399

An Ansaldo Signal Company

Transponders:

Manufacturer; AT Signal System AB, Spanga, Sweden

Model Number; L320440000

Power Input; Maximum, 13 milliwatts

Frequency; 4.5 MHz

Emission; P0

Antenna Mounting; The transponders are ground mounted.

Quantity of transponders to be applied; 32

Sincerely,



Carrie L. Webber
Project Director

CLW/amh

Cc: File

ANSALDO

1(1)

AT Signal System AB

Rapport

Till / To BSh	Från / From SHd
CC	Referensnr / Reference no U:\LUFT\EMCTOMT_F

Measurements.

Investigation of radiated E-field from transmission system with antenna L32043 0010

Requirements. FCC §18 (ISM) : Measured at 300m frequencies outside the ISM band
(27,12 ± 0,163 MHz) shall not exceed 23,5dB μ V/m
(15 μ V/m)

Requirements. FCC §15 : Measured at 3m frequencies in the ISM band
(27,12 ± 0,163 MHz) shall not exceed 10 000 μ V/m
(80dB μ V/m)

Antenna factor A at 27MHz 14dB (biconical antenna)

Polarization Vertical

Measured in far field 300m resp. 75m

Pout = 20W Red antenna L32043 0010

Mounted 440mm over the ground in an open field, beaming towards the ground. Values measured are for the carrier (27.115MHz).

300m	Screened-side	17 dB μ V	31dB μ V/m
	Plastic-side	14 - 16 dB μ V	28 - 30dB μ V/m
75m	Screened-side	27dB μ V	41dB μ V/m
		24,9dB μ V	38,9dB μ V/m
	Plastic-side	28,5dB μ V	42,5dB μ V/m
		27,5dB μ V	41,5dB μ V/m

The measurements were done with the same biconical test antenna and the worst-case value (loco has two antennas) was -65dBm at 17.5 m. This is equivalent to appr. 71dB μ V/m at 3m.

MINITRANSPONDER

L34000 0000

PRODUCT SPECIFICATION

DOC_S_2.DOC Ed2 931005									
ED	DATE-NO								
SIGNATURES									
ED	DATE-NO	Ed1	940111	Ed2	961030				
SIGNATURES		SHd		SHd					
ATSS		Product spec. Mini transponder				Produktspec. Minibalis			
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General Introduction

The transponder L34000 0000 is a compact transponder intended for installation on sites with a maximum speed of 250km/h . The transponder can work as a fixed telegram or as a controlled telegram transponder . It can be mounted either transversal or longitudinal with respect to the travel direction , witch can be useful where protection rails etc are mounted .

The transponder have a rigid construction in order to withstand heavy mechanical stress , it is not intended to be dismounted in the case of reconditioning of the ballast etc.

To the environment harmful materials has been avoided in the design of the plate .

The capacity of the internal default memory is 180 bits of information , smaller amount of information can also be possible , as the 12 bit system etc .This is only depending of the programming SW used . The transponder can be controlled by an external encoder via a 2 wire cable up to 3km. When the transponder not get any information from the encoder (if it is a fixed transponder or in the case of failure in incomming encoder data) the transponder will send the programmed default information . Programming of the transponder is made with a special tool and can be done in field . The transponder can also be tested and reprogrammed with the same tool , the transponder tester .

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SIGNATURES		SHd		SHd					
ATSS		Product spec. Mini transponder				Produktspec. Minibalis			
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Specification

Max. speed	:	250km/h Worst case ; independent of mounting direction (transversal or longitudinal) and reduced antenna (L32044 0000)
Dinmensions	:	Length 425 mm Width 250 mm Height 40 mm
Weight	:	5,6 Kg
Hardware	:	Fibre glass reinforced polyester .
Environment	:	Temperature range -40 - +70 °C Humidity 0 - 100 % Water Water proof up to 400mm of water. Chock 50g 3*2000 bumps raisetime 2ms (2000 bumps in each direction , X,Y,Z) Debries : Water >100 mm Oil >1 mm Ballast , gravel >100 mm Exposure to ultra violet light >20 years Electrical stress 25 kVac (wire on top of unit) Surge protection IEC 571
MTBF	:	>1E-06 hours
Programming:		ATSS programmer L34100 0000 or eqv. (See L34000 1160T) Reprogrammable 500 times (within safety) .
Maintenance	:	No maintenance , units shall not be repaired . (See L34000 1160T)
Mounting	:	Horizontal on sleeper , either direction . (Details se L34000 1150T) Two boults and washers into Sleeper. (M12 recommended)
General	:	Compatible with ABB EBICAB900 and EBICAB700 system .

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REQUIREMENT SPECIFICATION

OBJECT: MINITRANSPONDER
L34000 0000

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Techn.dep.			

Approved by	Name	Signature	Date
Techn.dep			
Proj.dep			
Q dep.			

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ATSS		REQUIREMENT SPECIFICATION				KRAVSPECIFIKATION			
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This document is part of the product documentation in conformance with ATSS Q2004-4 Design control, -5 Document control and -8 Product identification and traceability.

It defines all requirements necessary to design and verify the product.

References:

Customer requirements documents:	System Spec. for HI ATP	L12001 1010T
	HI-proj.ICSS HE-1244	
Other requirements documents to be used:	Transmission system spec.	L103001020T,
	ABB Signal /Huges Spec.	No.1063 / HML222 (ASIC)
Functional compatible with ABB		

Detail requirements:

Electrical requirements

*Field levels refere to Reference loop L33003 9408P . Ref level 600mV.

Down link:

Centre frequency:	27.115MHz
Sensivity variations:	Transponder spread; 1.4dB
	Environmental spread; 1.6dB
Max input field at 200mm vertically from antenna, no side offset:	3600mV*
Min input field for saturation , at 430mm vertical, 180mm transversal	
offset and 160mm longitudinal offset, from antenna :	400mV*
Min input field for operation , at 430mm vertical , 180mm transversal	
offset and 160mm longitudinal offset, from antenna :	200mV*.
Min detected modulation level at max input level	40%
Min pulse width:	1uS
Startup time:	< 1mS prefere <0,5mS

Up link:

Centre frequency:	4.3 - 4.55MHz
Min field at 430mm vertical distance ,180mm transversal and	
160mm longitudinal offset ,saturated mode:	8mV*
Operational area below saturation:	>5dB prefere 6dB
Transmission bitrate:	50kb/s
Pulse definition:	"0" = signal , "1" = no signal
Ripple (energy pulses):	<1.5dB
Pulse Q -6dB:	5 +/- 0.5uS
Unwanted spuriors 30 - 230MHz , at 10m distance	40dB(µV/m)
230 - 1000MHz , at 10m distance	47dB(µV/m)
Contact length	320bit / 200km/h / 50kHz
ASIC (Telegram arcitecture)	Spec no. 1063 / HML222

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Interface to encoder:

Compatible with ABB

Spec no. 1063 / HML222

Serial link

Balanced ,floating

Galvanic isolated

Max discontinuous voltage @300uS

100Vdc

AMI-code current loop

"0" = no current

"1" = current

Bit rate

50kHz

Pin configuration:

J =

Encoder

K =

Encoder

Interface to programming:

Compatible with ABB

Spec no. 1063 / HML222

Pin configuration

A =

V +

B =

Data in

C =

PE

D =

Clock in

E =

V PROG

F =

P MODE

G =

VDD

H =

VSS (0V)

Mechanical requirements

Length

425mm = 16.73 in.

Width

250mm = 9.84 in.

Height

40mm = 1.57 in.

Weight

<10kg

Programming connection:

Compatible with ABB

Connector:

Amp. 162-5021-12-10P

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Environmental requirements

Temperature range	-40- +70gC
Shock	50g 3*1000 bumps
Vibration	10g 1- 1000Hz 3*2h
Humidity	10-95%
Water tight to	>400mm
Debris:	
Water	100mm
Oil	1mm
Iron ore dust	10mm
Sand , ballast, gravel	100mm
Ultra - violet light radiation resistant	20 years tropical
Surge protection	IEC 571
Electrical stress from wire on top of transponder	25kV AC

EMC , EMI Refer to requirement on unwanted spurious radiation , while , when transponder is activated no possible external forces can be present , which can interfere the function of the system .

Installation requirements

2. *M12 bolts from top of transponder.

Maintenance requirements

MTBF	HI spec. 80kh	Target	2Mh
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Safety requirements

Fail safe as per ATC2 definition

According to : HI- proj.ICSS HE-1244 Vol.1 Para. 5.14.3.5

Other requirements

Standards to be used

Component in full military environmental range (-55/ +125gC, RH 0-95%)

ATSS approved standard range of SMD components.

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