

SECTION XXIX

N8 FREQUENCY SYNTHESIZER (86-708-X)

2/14/2002

INTRODUCTION

The 86-708-X Frequency Synthesizer is a plug-in option card for the Model XL-DC. This option card offers the user four independently programmable frequency synthesizers that provide pulse rates from 8 kPPS through 8192 kPPS in 8 kPPS steps. This card is configured with one of five different output connector options (determined by the -X assembly number). The five versions are as follows:

<u>Assembly #</u>	<u>Output Connector</u>	<u>Signal Type</u>	<u>Mating Connector</u>
86-708-1	Triax (BJ77)	RS-422	Trompeter PL75
86-708-2	Wire-wrap	RS-422	N/A
86-708-3	9 pin-D (fem)	RS-422	9 pin-D (male)
86-708-4	BNC (fem)	TTL/50 ohm	BNC (male)
86-708-5	25 pin-D (fem)	RS-422	25 pin-D (male)

SPECIFICATIONS

Channels Per PCB:	4 channels, independently programmable
Input Reference Frequency:	System 1 MPPS
Output Pulse Rates:	8 kPPS through 8192 kPPS in 8 kPPS steps
Output Drive:	Balanced RS-422 into 100Ω or single ended TTL into 50 ohms (factory set)
Wave Form:	Square wave
Jitter cycle-to-cycle:	<10 nS
Output connectors / Signal Type:	See above

INSTALLATION

No installation is required when the N8 Frequency Synthesizer card is purchased with the receiver. The following installation instructions apply only to installation of the N8 Frequency Synthesizer card after the initial purchase of a Model XL-DC.

ADDRESS SELECT SWITCH

Four position DIP switch SW1 selects the address (0 - 15) of the N8 Frequency Synthesizer card. If more than one N8 card is installed, a different address setting must be used for each card and should, for ease of card identification, be addressed consecutively (address = card number). The N8 Frequency Synthesizer card shares the same address range as "SmartCard" options. In applications where a "SmartCard" option is also installed in the system, a unique address switch setting for the "SmartCard" is required. The option card addresses are set at the factory and are only of concern when a field installation is performed. In situations where a particular N8 card address is desired, it can be set into the SW1 DIP switch as follows:

<u>SW1-3</u>	<u>SW1-2</u>	<u>SW1-1</u>	<u>SW1-0</u>	<u>Address</u>	<u>SW1-3</u>	<u>SW1-2</u>	<u>SW1-1</u>	<u>SW1-0</u>	<u>Address</u>
OFF	OFF	OFF	OFF	0	ON	OFF	OFF	OFF	8
OFF	OFF	OFF	ON	1	ON	OFF	OFF	ON	9
OFF	OFF	ON	OFF	2	ON	OFF	ON	OFF	10
OFF	OFF	ON	ON	3	ON	OFF	ON	ON	11
OFF	ON	OFF	OFF	4	ON	ON	OFF	OFF	12
OFF	ON	OFF	ON	5	ON	ON	OFF	ON	13
OFF	ON	ON	OFF	6	ON	ON	ON	OFF	14
OFF	ON	ON	ON	7	ON	ON	ON	ON	15

FIELD INSTALLATION

The following items are supplied with the N8 Frequency Synthesizer option:

1. N8 Frequency Synthesizer card (86-708-X).
2. Mounting hardware
3. This manual section
4. (EPROM and replacement instructions if required).

Warning: Only a qualified technician should attempt installation of this option. Dangerous voltages are present which can cause electric shock that could result in severe injury or even death. Disconnect all power before disassembling the unit!

The only equipment required for installation is a Phillips screwdriver (and if new software is required, an EPROM extraction tool). Installation requires inserting the N8 Frequency Synthesizer card into an empty option slot.

Remove the cover plate of an empty option slot and save the screws. Slide the option assembly into the guides on the side rails of the slot and firmly press the card into the backplane connector. Secure the option to the chassis with the previously saved screws. If a new EPROM has been provided, install the EPROM into the GPS-XL assembly using the replacement instructions.

OPERATION

The N8 Frequency Synthesizer card generates four independently programmable frequency rates from 8 kPPS through 8192 kPPS in 8 kPPS steps. The frequency of each of the four outputs may be set via the Serial port or from the keypad on XL-DC Models 601 and 602. The setup (frequency selection) for each of the N8 channels is saved in non-volatile memory, and automatically configures the card with the previously stored values at power-on.

NOTE: The N8 frequency outputs will not be stable until the clock's system oscillator has stabilized.

N8 KEYPAD SETUP (XL-DC-601/602)

The N8 Frequency Synthesizer card(s) may be setup with keypad function 44 as follows:

NOTE: Pressing the "Time", "Status", or "Position" keys will immediately exit the function.

Press "FUNC/ENTR" then "4" "4" and the display will briefly show:

N8 Frequency
Synthesizer

and then will show:

[step 1] N8 Synthesizer
 Card Address xx

where xx is the lowest N8 address (card number) detected. If more than one N8 card is installed in the system, use the up and down arrow keys to scroll through the installed cards. After selecting the desired N8 card, press "FUNC/ENTR" to advance to the next sub-menu and the display will show:

[step 2] N8 Channel 1
 Freq = nnnn K

where nnnn is the current N8 frequency setting for channel 1, K = kPPS. Press the up or down arrow keys to scroll from channel 1 - 4 or directly enter the channel number. After selecting the desired channel, press "FUNC/ENTR" to display the next sub-menu. The display will show:

[step 3] N8 Channel x
 Freq = nnnn K

where x is the previously selected channel and nnnn K is the current frequency setting. Press the up or down arrow keys to scroll through the N8 frequency rates or directly enter the value desired for each digit. The cursor automatically advances to the next position when a number is entered directly. When the display shows the desired frequency setting, press "FUNC/ENTR" to enter and store the setting. The display will briefly show:

N8 Freq Syn
SAVED

If the entry is a viable N8 rate, the menu will jump back to [step 1]. The direct entry values are automatically adjusted to the closest N8 frequency rate. If the direct entry frequency value is not one of the N8's 1024 different rates, the display will show:

[step 4] N8 Adjustment
 Freq = nnnn Yes

where nnnn is the suggested N8 frequency rate. The up and down arrow keys are used to switch between Yes and No. Select Yes and press "FUNC/ENTR" to implement and save the new settings to non-volatile memory -- the menu will then jump back to [step 1]. Select No and press "FUNC/ENTR" to ignore any new settings, maintaining the current setup -- the menu will then jump back to [step 1].

NOTE: Press "Time", "Status", or "Position" to exit function 44.

SERIAL PORT SETUP

Each output on the N8 Frequency Synthesizer card(s) may be setup via the Serial port using Function F44. Use the following ASCII string (upper or lower-case characters) to request the card address(es) of the installed N8 card(s):

F44<SP><CR> (where SP=space, CR=Carriage Return)
and the Serial port will respond with the following ASCII string:

F44 ADDR <XX><CR><LF> (one card installed, XX = card address)
or F44 ADDR <XX> <XX>...<CR><LF> (two or more cars installed)

All installed N8 cards and all channel settings may be requested using the following command:

F44<SP>all (upper or lower case)

and the port will respond with the following (sample card address and frequency rates shown):

F44 01 1 2048 2 4096 3 0008 4 0512<CR><LF> (card # 1)
F44 02 1 1024 2 2048 3 0016 4 1000<CR><LF> (card # 2)
F44 03 1 1000 2 2000 3 4000 4 1000<CR><LF> (card # 3) etc...

The frequency setting of all channel settings on one board may be requested as follows:

F44 03<CR>

and the port will respond with the following:

F44 03 1 2048 2 1000 3 0512 4 0008<CR><LF> (card #3 -- example settings)

The frequency of one of the output channels may be requested as follows:

F44 03 4<CR> (requests card #3 channel #4 setting)

and the port will respond with the following:

F44 03 4 0008<CR><LF> (returns card #3 channel #4 setting)

The frequency of one of the output channels may be set as follows:

F44 02 1 8<CR> (sets card #2 channel #1 to 8 kPPS)

and the serial port will respond with the following ASCII string:

OK<CR><LF>

To set all four channels on a card with one serial string, send the following (example):

F44 01 1 1000 2 2000 3 2048 4 16<CR> (sets card #1 channel #1 to 1000 kPPS,
" channel #2 to 2000 kPPS,
" channel #3 to 2048 kPPS,
" channel #4 to 16 kPPS).

The Serial port responds to input value errors with the following ASCII string:

ERROR 01 VALUE OUT OF RANGE<CR><LF>

The Serial port responds to input syntax errors with the following ASCII string:

ERROR 02 SYNTAX<CR><LF>

FAULT MONITORING

The N8 Frequency Synthesizer has an on-board PLL (32.768 MHz) that is monitored for lock by the GPS-XL processor. When an N8 option card is installed in an XL-DC, Serial and Keypad function 72 (Fault Status) will monitor the N8's PLL status. The following display (Models 601/602) is shown in addition to the standard keypad function 72 screens:

Fault Status Fault Status
N8 PLL: OK or N8 Card XX: BAD (where XX is the address of the bad card)

Serial F72 "Fault Status" function returns the following string when the clock is locked:

F72 Antenna: OK PLL: OK GPS: Locked **N8 PLL: OK** or

F72 Antenna: OK PLL: OK GPS: Locked **N8 Card XX: BAD**

If N8 card address XX PLL is unlocked.

Additionally, Serial and Keypad function 73 (Request/Set Alarm Status/Control) will 'OR' the PLL lock status of all installed N8 cards into Major Alarm group #1 "PLL Synthesizer". The detected fault of either the GPS-XL's PLL (standard) or the N8(s) PLL may assert a Major alarm (if enabled). Refer to Keypad or Serial function 73.

MAINTENANCE AND TROUBLESHOOTING

The N8 Frequency Synthesizer option has been designed to provide maintenance-free operation. Under normal use, it will require no calibration or adjustment. Before assuming a malfunction, first be certain that the unit using the N8 Frequency Synthesizer card is functioning properly. Verify that all connectors are secure. If the N8 Frequency Synthesizer card does not appear to be operating properly, please contact a TrueTime Customer Service Representative.

N8 FREQUENCY TABLE **8 kHz - 4096 kHz**

0	256	512	768	1024	1280	1536	1792	2048	2304	2560	2816	3072	3328	3584	3840
8	264	520	776	1032	1288	1544	1800	2056	2312	2568	2824	3080	3336	3592	3848
16	272	528	784	1040	1296	1552	1808	2064	2320	2576	2832	3088	3344	3600	3856
24	280	536	792	1048	1304	1560	1816	2072	2328	2584	2840	3096	3352	3608	3864
32	288	544	800	1056	1312	1568	1824	2080	2336	2592	2848	3104	3360	3616	3872
40	296	552	808	1064	1320	1576	1832	2088	2344	2600	2856	3112	3368	3624	3880
48	304	560	816	1072	1328	1584	1840	2096	2352	2608	2864	3120	3376	3632	3888
56	312	568	824	1080	1336	1592	1848	2104	2360	2616	2872	3128	3384	3640	3896
64	320	576	832	1088	1344	1600	1856	2112	2368	2624	2880	3136	3392	3648	3904
72	328	584	840	1096	1352	1608	1864	2120	2376	2632	2888	3144	3400	3656	3912
80	336	592	848	1104	1360	1616	1872	2128	2384	2640	2896	3152	3408	3664	3920
88	344	600	856	1112	1368	1624	1880	2136	2392	2648	2904	3160	3416	3672	3928
96	352	608	864	1120	1376	1632	1888	2144	2400	2656	2912	3168	3424	3680	3936
104	360	616	872	1128	1384	1640	1896	2152	2408	2664	2920	3176	3432	3688	3944
112	368	624	880	1136	1392	1648	1904	2160	2416	2672	2928	3184	3440	3696	3952
120	376	632	888	1144	1400	1656	1912	2168	2424	2680	2936	3192	3448	3704	3960
128	384	640	896	1152	1408	1664	1920	2176	2432	2688	2944	3200	3456	3712	3968
136	392	648	904	1160	1416	1672	1928	2184	2440	2696	2952	3208	3464	3720	3976
144	400	656	912	1168	1424	1680	1936	2192	2448	2704	2960	3216	3472	3728	3984
152	408	664	920	1176	1432	1688	1944	2200	2456	2712	2968	3224	3480	3736	3992
160	416	672	928	1184	1440	1696	1952	2208	2464	2720	2976	3232	3488	3744	4000
168	424	680	936	1192	1448	1704	1960	2216	2472	2728	2984	3240	3496	3752	4008
176	432	688	944	1200	1456	1712	1968	2224	2480	2736	2992	3248	3504	3760	4016
184	440	696	952	1208	1464	1720	1976	2232	2488	2744	3000	3256	3512	3768	4024
192	448	704	960	1216	1472	1728	1984	2240	2496	2752	3008	3264	3520	3776	4032
200	456	712	968	1224	1480	1736	1992	2248	2504	2760	3016	3272	3528	3784	4040
208	464	720	976	1232	1488	1744	2000	2256	2512	2768	3024	3280	3536	3792	4048
216	472	728	984	1240	1496	1752	2008	2264	2520	2776	3032	3288	3544	3800	4056
224	480	736	992	1248	1504	1760	2016	2272	2528	2784	3040	3296	3552	3808	4064
232	488	744	1000	1256	1512	1768	2024	2280	2536	2792	3048	3304	3560	3816	4072
240	496	752	1008	1264	1520	1776	2032	2288	2544	2800	3056	3312	3568	3824	4080
248	504	760	1016	1272	1528	1784	2040	2296	2552	2808	3064	3320	3576	3832	4088
256	512	768	1024	1280	1536	1792	2048	2304	2560	2816	3072	3328	3584	3840	4096

N8 FREQUENCY TABLE
4096 kHz - 8192 kHz

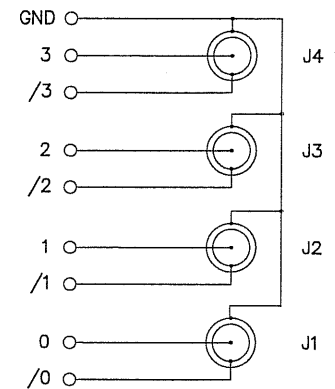
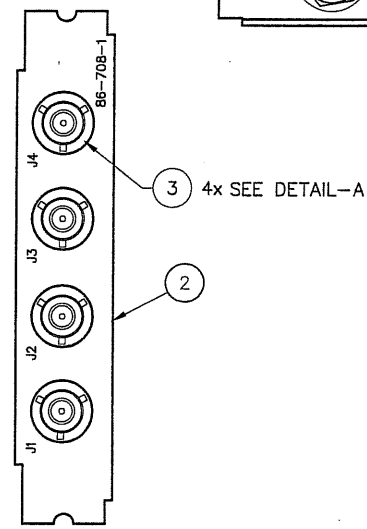
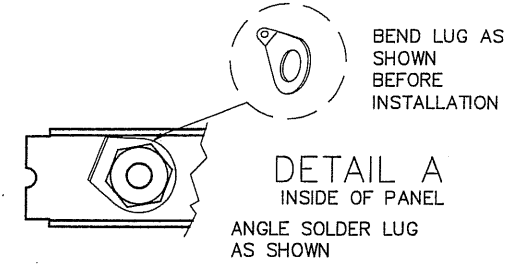
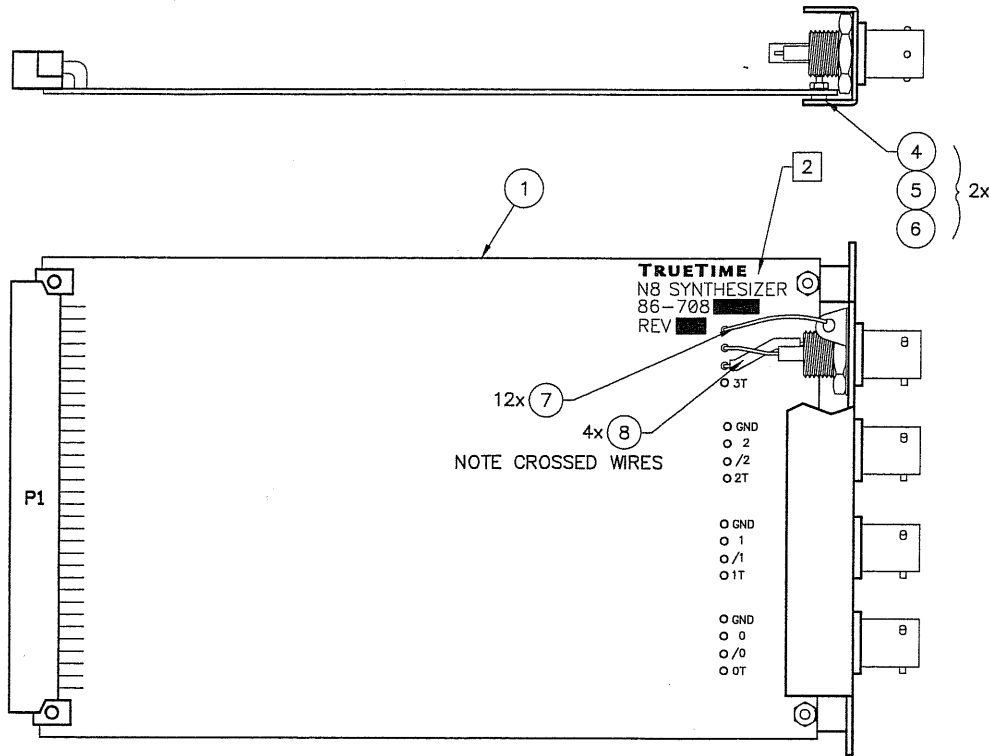
4096	4352	4608	4864	5120	5376	5632	5888	6144	6400	6656	6912	7168	7424	7680	7936
4104	4360	4616	4872	5128	5384	5640	5896	6152	6408	6664	6920	7176	7432	7688	7944
4112	4368	4624	4880	5136	5392	5648	5904	6160	6416	6672	6928	7184	7440	7696	7952
4120	4376	4632	4888	5144	5400	5656	5912	6168	6424	6680	6936	7192	7448	7704	7960
4128	4384	4640	4896	5152	5408	5664	5920	6176	6432	6688	6944	7200	7456	7712	7968
4136	4392	4648	4904	5160	5416	5672	5928	6184	6440	6696	6952	7208	7464	7720	7976
4144	4400	4656	4912	5168	5424	5680	5936	6192	6448	6704	6960	7216	7472	7728	7984
4152	4408	4664	4920	5176	5432	5688	5944	6200	6456	6712	6968	7224	7480	7736	7992
4160	4416	4672	4928	5184	5440	5696	5952	6208	6464	6720	6976	7232	7488	7744	8000
4168	4424	4680	4936	5192	5448	5704	5960	6216	6472	6728	6984	7240	7496	7752	8008
4176	4432	4688	4944	5200	5456	5712	5968	6224	6480	6736	6992	7248	7504	7760	8016
4184	4440	4696	4952	5208	5464	5720	5976	6232	6488	6744	7000	7256	7512	7768	8024
4192	4448	4704	4960	5216	5472	5728	5984	6240	6496	6752	7008	7264	7520	7776	8032
4200	4456	4712	4968	5224	5480	5736	5992	6248	6504	6760	7016	7272	7528	7784	8040
4208	4464	4720	4976	5232	5488	5744	6000	6256	6512	6768	7024	7280	7536	7792	8048
4216	4472	4728	4984	5240	5496	5752	6008	6264	6520	6776	7032	7288	7544	7800	8056
4224	4480	4736	4992	5248	5504	5760	6016	6272	6528	6784	7040	7296	7552	7808	8064
4232	4488	4744	5000	5256	5512	5768	6024	6280	6536	6792	7048	7304	7560	7816	8072
4240	4496	4752	5008	5264	5520	5776	6032	6288	6544	6800	7056	7312	7568	7824	8080
4248	4504	4760	5016	5272	5528	5784	6040	6296	6552	6808	7064	7320	7576	7832	8088
4256	4512	4768	5024	5280	5536	5792	6048	6304	6560	6816	7072	7328	7584	7840	8096
4264	4520	4776	5032	5288	5544	5800	6056	6312	6568	6824	7080	7336	7592	7848	8104
4272	4528	4784	5040	5296	5552	5808	6064	6320	6576	6832	7088	7344	7600	7856	8112
4280	4536	4792	5048	5304	5560	5816	6072	6328	6584	6840	7096	7352	7608	7864	8120
4288	4544	4800	5056	5312	5568	5824	6080	6336	6592	6848	7104	7360	7616	7872	8128
4296	4552	4808	5064	5320	5576	5832	6088	6344	6600	6856	7112	7368	7624	7880	8136
4304	4560	4816	5072	5328	5584	5840	6096	6352	6608	6864	7120	7376	7632	7888	8144
4312	4568	4824	5080	5336	5592	5848	6104	6360	6616	6872	7128	7384	7640	7896	8152
4320	4576	4832	5088	5344	5600	5856	6112	6368	6624	6880	7136	7392	7648	7904	8160
4328	4584	4840	5096	5352	5608	5864	6120	6376	6632	6888	7144	7400	7656	7912	8168
4336	4592	4848	5104	5360	5616	5872	6128	6384	6640	6896	7152	7408	7664	7920	8176
4344	4600	4856	5112	5368	5624	5880	6136	6392	6648	6904	7160	7416	7672	7928	8184
4352	4608	4864	5120	5376	5632	5888	6144	6400	6656	6912	7168	7424	7680	7936	8192

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REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	ECO 1829; PRODUCTION RELEASE	09/04/02	<i>[Signature]</i>



CONNECT GND LUGS AS SHOWN

- 2** STAMP ASSEMBLY NUMBER AND REVISION LEVEL.
- ASSEMBLE PER ASSEMBLY REQUIREMENTS DOCUMENT 421-11.

NOTES: UNLESS OTHERWISE SPECIFIED

FILENAME: 86-708-1
DATE: 09-04-02

APPROVALS		DATE	TRUETIME ASSEMBLY, N.8 SYNTHESIZER (TRIAx)		REV	
DRAWN BY	RKLEIN	03/97				
CHECKED BY	DLG	04/97				
APPROVED BY	MDK	4/10/02				
NEXT ASSY			SIZE	CODE IDENT NO.	DRAWING NO.	REV
			B		86-708-1	A
SCALE NONE				SHEET 1 OF 1		

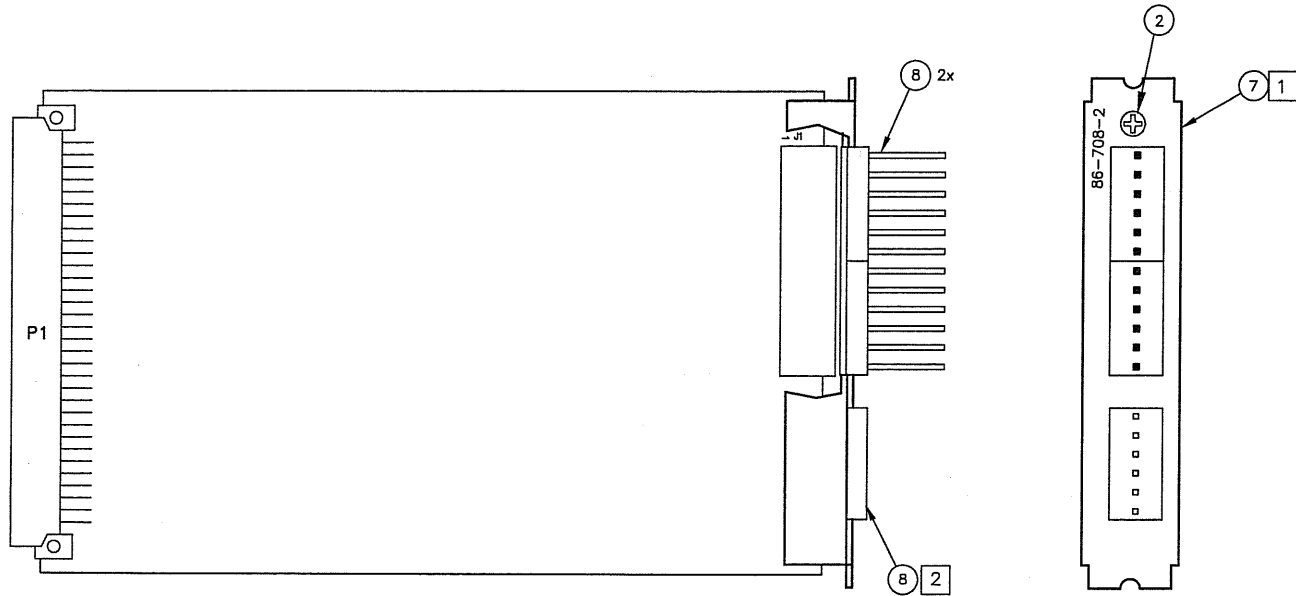
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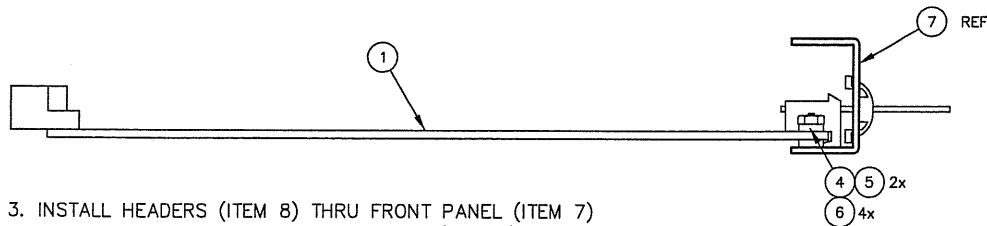
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REVISIONS

REV	DESCRIPTION	DATE	APPROVED



SIGNAL	PIN
FREQ 0 (-)	1
FREQ 0 (+)	2
FREQ 1 (-)	3
FREQ 1 (+)	4
FREQ 2 (-)	5
FREQ 2 (+)	6
FREQ 3 (-)	7
FREQ 3 (+)	8
GROUND	9,10,11,12




3. INSTALL HEADERS (ITEM 8) THRU FRONT PANEL (ITEM 7) BEFORE SECURING PANEL TO PC BOARD (ITEM 1).

2 REMOVE 6 PINS FROM HEADER (ITEM 8) AS SHOWN.

1 REMOVE ALL SILKSCREENING ON PANEL (ITEM 7) AS SHOWN. LABEL AS SHOWN.

NOTES: UNLESS OTHERWISE SPECIFIED

FILENAME: \86\708-2
DATE: 05-24-99

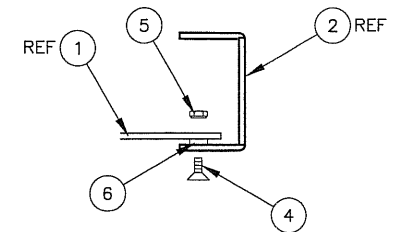
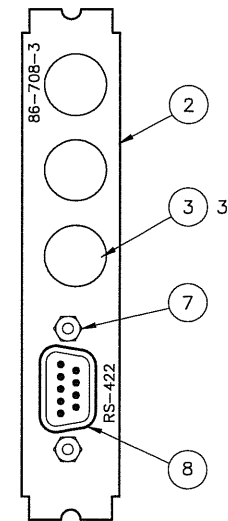
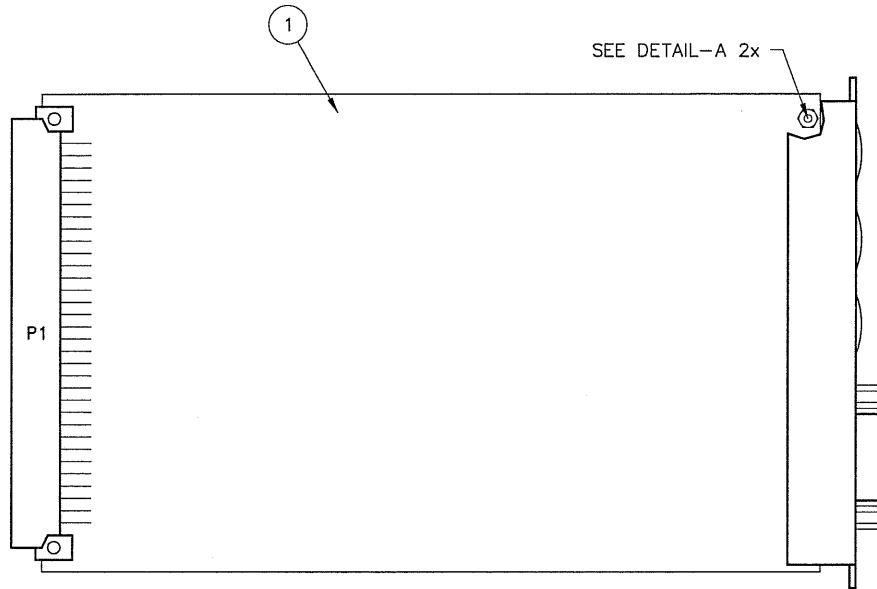
CONTRACT NO.		 <small>Where Customer Satisfaction is our Highest Priority</small> 2835 Duke Ct. Santa Rosa, CA 95407	
APPROVALS	DATE		
DRAWN BY RNR	05/99		
CHECKED BY			
APPROVED BY <i>DJR</i>		5/99	
NEXT ASSY		SIZE B	CODE IDENT NO. 86-708-2
		DRAWING NO.	REV N/C
		SCALE NONE	SHEET 1 OF 1

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REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	CAR 1232	09/29/98	
B	CAR 1378	01/21/99	<i>Don</i>



DETAIL-A

SIGNAL DB-9

FREQ 0 (-)	-1
FREQ 0 (+)	-2
FREQ 1 (-)	-3
FREQ 1 (+)	-4
FREQ 2 (-)	-5
FREQ 2 (+)	-6
FREQ 3 (-)	-7
FREQ 3 (+)	-8
GROUND	-9

1. LABEL REAR PANEL AS SHOWN.
 NOTES: UNLESS OTHERWISE SPECIFIED.

FILENAME: \86\708-3
 DATE: 01-21-99

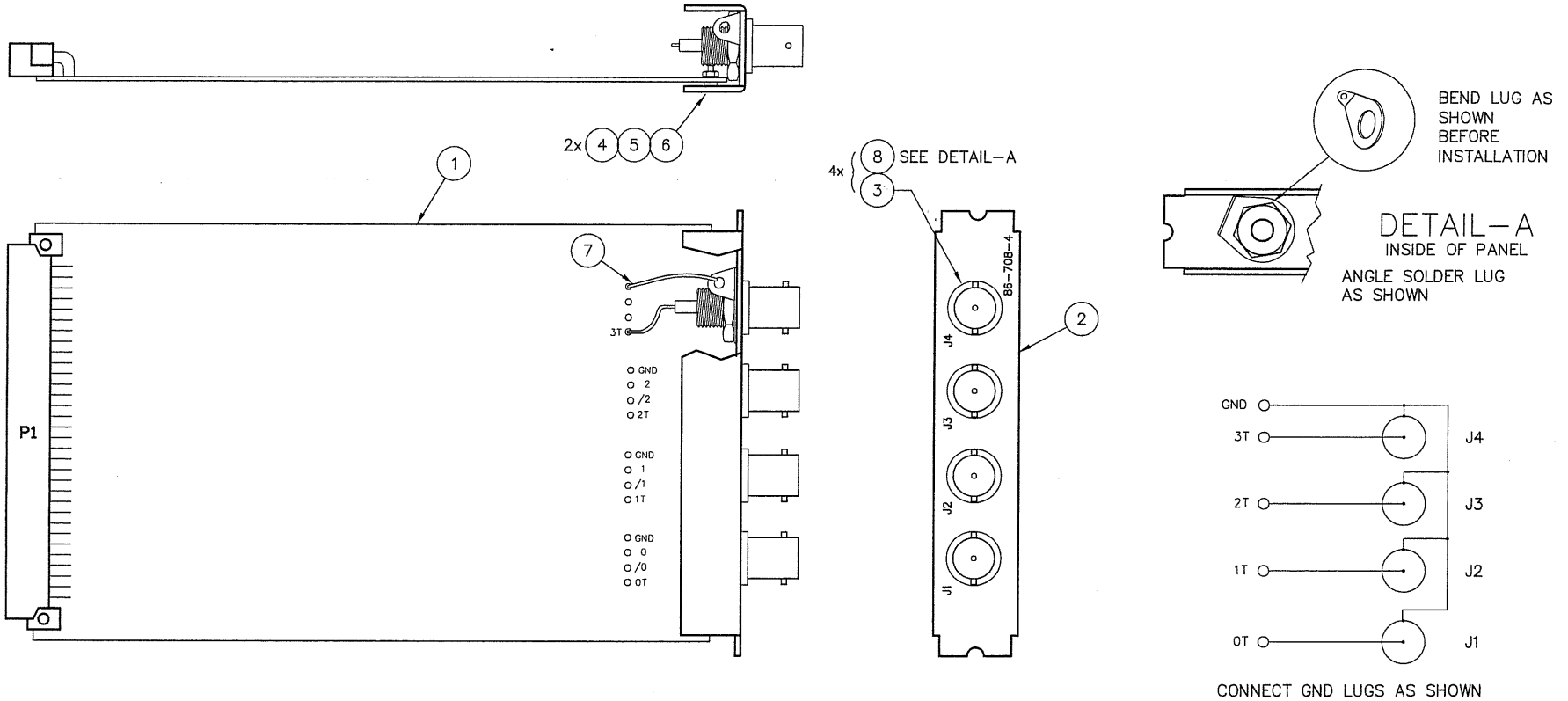
CONTRACT NO.			
APPROVALS	DATE		
DRAWN BY SEIFERT	5/97		
CHECKED BY			
APPROVED BY <i>Don</i> 5/99		ASSEMBLY N8 9-PIN	
NEXT ASSY			
SIZE	CODE IDENT NO.	DRAWING NO.	REV
B		86-708-3	B
SCALE NONE		SHEET 1 OF 1	

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PR 3441	10/29/99	DAA
B	ECO 1694	03/04/02	<i>[Signature]</i>



1. LABEL PANEL AS SHOWN.
 NOTES: UNLESS OTHERWISE SPECIFIED

FILENAME: 86-708-4
 DATE: 03-04-02

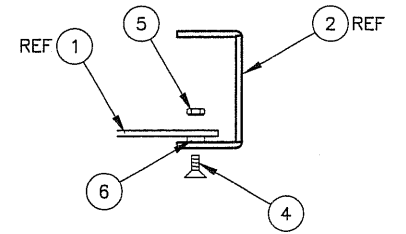
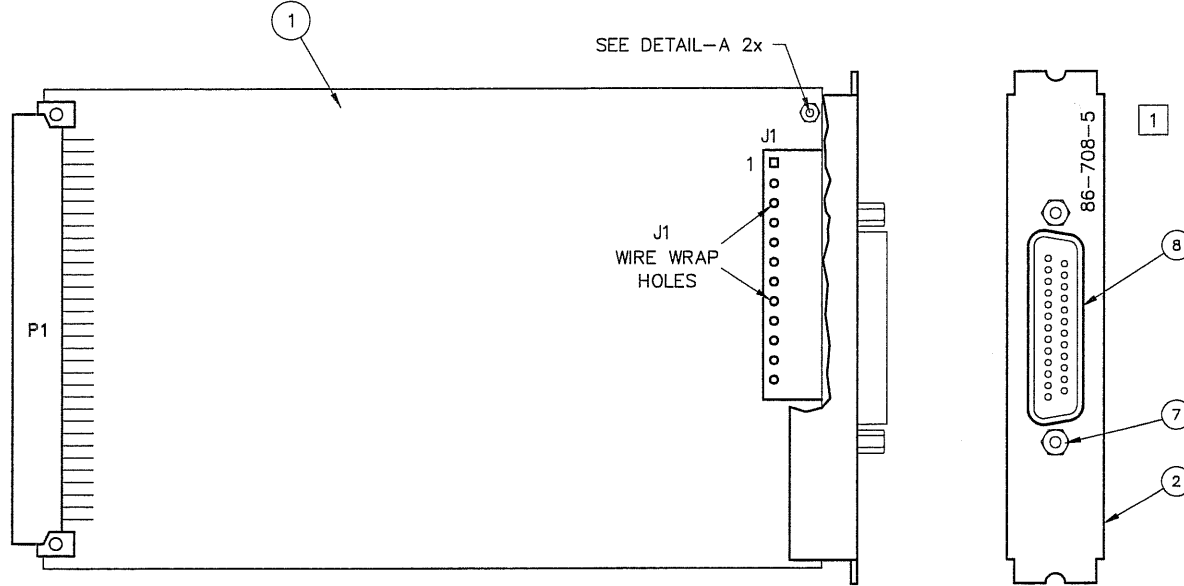
CONTRACT NO.		 TRUETIME ASSEMBLY, N8 BNC		SIZE	CODE IDENT NO.	DRAWING NO.	REV
APPROVALS	DATE			B		86-708-4	B
DRAWN BY RNR	03/99			SCALE NONE		SHEET 1 OF 1	
CHECKED BY	DATE						
APPROVED BY DAA	04/99						
NEXT ASSY							

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



DETAIL-A

SIGNAL	DB-25	J1 (W/W)
FREQ 0 (-)	-1 TO	1
FREQ 0 (+)	-2 TO	2
FREQ 1 (-)	-3 TO	3
FREQ 1 (+)	-4 TO	4
FREQ 2 (-)	-5 TO	5
FREQ 2 (+)	-6 TO	6
FREQ 3 (-)	-7 TO	7
FREQ 3 (+)	-8 TO	8
GROUND	-9 TO	9

WIRING PIN OUT

CONTRACT NO.				
APPROVALS	DATE			
DRAWN BY JMS	05/00			
CHECKED BY				
APPROVED BY <i>Jra</i> 5/00		ASSEMBLY N8 25-PIN		
NEXT ASSY	SIZE B			CODE IDENT NO.
SCALE NONE		SHEET 1 OF 1		

1 LABEL REAR PANEL AS SHOWN.
NOTES: UNLESS OTHERWISE SPECIFIED.

FILENAME: \86\708-5
DATE: 05-05-00