Maintenance Manual

EDACS®

GPS SIMULCAST
MASTR© III STATION

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ERICSSON

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NOTE

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

NOTICE!

IMPORTANT SAFETY INFORMATION

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Ericsson Inc. assumes no liability for the customer's failure to comply with these standards.

1. SAVE THIS MANUAL - It contains important safety and operating instructions.

2. Before using this equipment, please follow and adhere to all warnings, safety and operating instructions located on the product and in the manual.

3. DO NOT expose equipment to rain, snow or other type of moisture.

4. Care should be taken so objects do not fall or liquids do not spill into the equipment.

5. DO NOT expose equipment to extreme temperatures. See Specifications.

6. DO NOT use auxiliary equipment not recommended or sold by Ericsson GE. To do so may result in a risk of fire, electric shock or injury to persons.

7. GROUND THE EQUIPMENT-To minimize shock hazard, the station equipment cabinet must be connected to an electrical ground.

   The equipment supplied is equipped with three-conductor AC power cords. These power cords must be plugged into approved three-contact electrical outlets with the grounding wires firmly connected to an electrical ground (safety ground) at the power outlet. The power cords must also meet International Energy Commission (IEC) safety standards.

8. To reduce risk of damage to electrical cords, pull by plug rather than cord when disconnecting a unit.

9. Make sure all power cords are located so they will not be stepped on, tripped over or otherwise subjected to damage or stress.

10. An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, ensure:

    a. The pins on the plug of the extension cord are the same number, size, and shape as those of the plug on the power supply.

    b. The extension cord is properly wired, in good condition, and

    c. The wire size is large enough for the AC ampere rating of unit.

11. DO NOT operate equipment with damaged power cords or plugs - replace them immediately.

12. DO NOT operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

13. To reduce risk of electric shock, unplug unit from outlet before attempting any maintenance or cleaning.

14. DO NOT operate this product with covers or panels removed. Refer all servicing to qualified service personnel.

15. Use only fuses of the correct type, voltage rating and current rating as specified in the parts list. Failure to do so can result in fire hazard.

16. GROUNDING AND AC POWER CORD CONNECTION - To reduce risk of electrical shock use only a properly grounded outlet. The system components are equipped with electric cords having an equipment grounding conductor and a grounding plug. Be sure all outlets are properly installed and grounded in accordance with all local codes and ordinances.

17. DANGER - Never alter the AC cord or plug. Plug into an outlet properly wired by a qualified electrician. Improper connection or loss of ground connection can result in risk of an electrical shock.

18. **ELECTROSTATIC DISCHARGE SENSITIVE COMPONENTS** - This station contains CMOS and other circuit components which may be damaged by electrostatic discharge. Proper precaution must be taken when handling circuit modules. As a minimum, grounded wrist straps should be used at all times when handling circuit modules.

NOTE

Due to the danger of introducing additional hazards, do not substitute parts or perform any unauthorized modifications to the station.

GENERAL SPECIFICATIONS

ELECTRICAL

Power Supply

AC Input Power	10 Amperes @ 120 Vac (20%) 60 Hz) or 5 Amperes @ 230 Vac (15%) 50 Hz
Standby Battery (Optional)	13.8 Vdc @ 100 AH minimum

Station

Transmit Power	100 watts
Duty Cycle (EIA)	Transmit and Receive - 100% (continuous)
Metering	Provided through Handset or TQ-0619 Utility Software
Service Speaker	1 watt @ 8 ohms
Service Microphone	Transistorized, Dynamic

MECHANICAL

	Cabinet	Rack
Height	83 inches	86 inches
Width	22.5 inches	20.7 inches
Depth	20.25 inches	19.25 inches
Weight (with 4 stations)	585 Lbs	595 Lbs
Shipping weight	615 Lbs	640 Lbs
Rack Units (1.75 inches)	41 RU	45 RU
Antenna Connections	Type N	

ENVIRONMENTAL

Ambient Temperature	-30 C to +60 C (-22 F to + 140 F)
(for full spec performance)	(-22 F to 140 F)
Humidity (EIA)	90% at 50 C (122 F)
Altitude	Operable to 15,000 feet
	Shippable to 50,000 feet

INTERFACE

Line Input (line to transmitter)

Line Terminating Impedance	600 ohms (4-wire)
Line Input Level (adjustable)	-10 dBm Nominal
Frequency Response	300 Hz to 3000 Hz, 1 dB

INTRODUCTION

This manual provides an overview of the MASTR III station as used in EDACS GPS Simulcast applications. Instructions to setup and align the equipment after installation or after having been replaced on site are included. Also included is the complete MASTR III Maintenance Manual containing application drawings, interconnection diagrams and circuit descriptions. The MASTR III Combination manual (LBI-38775) contains equipment assembly and application drawings for all MASTR III applications. Refer to the applications listing in LBI-38775 for specific simulcast drawing applications.

As shipped from the factory, the station equipment, including the power supplies, are installed in the equipment rack. The equipment may be mounted in standard 69 or 83-inch cabinets and/or 86, or 108 inch open racks, the 86 inch open rack being the most common.

Installation instructions for a typical EDACS Simulcast System, including rack mounting and grounding instructions, are included in the EDACS Simulcast System Installation Manual.

Refer to LBI-39130 for complete Simulcast System Alignment Procedures.

RELATED PUBLICATIONS

MASTR III Systems	LBI-38775
800 MHz RF Package	LBI-39025
Power Supply	LBI-38551
Antenna Systems	LBI-38983
EDACS Interface Panel	LBI-39198
Emergency Power (Battery Charger)	LBI-38625
GETC Simulcast Station GETC	LBI-39200
MASTR III PC PROGRAMMER	LBI-33536
MASTR III Utility Handset	LBI-38599
MASTR UTL (Software)	TQ-0619
MS EDITOR	TQ-0653
MASTR III Station Alignment For GPS Simulcast Systems	LBI-39130
Release Notes	SRN-1060
Power Supply	LBI-38551
RF Package (800 MHz)	LBI-39025
Voice Guard System Manual	LBI-38600

STATION DESCRIPTION

The typical EDACS Simulcast Station consists of a 86-inch open rack equipped with four MASTR III stations, an EDACS Interface Panel, and four **G**eneral **E**lectric **T**runking **C**ards (**GETC**). A 69-inch rack typically contains three MASTR III stations. One GETC is provided for each station. Each station includes a transmitter/receiver shelf, transmitter power amplifier, and station power supply. The assemblies are mounted in open racks or cabinets. Figure 1 shows a typical MASTR III Simulcast Station rack.

TRANSMITTER/RECEIVER SHELF

The MASTR III Transmitter/Receiver Shelf (T/R) contains the station control electronics. The station control electronics consist of a backplane board, power module, system module, and an interface board. The backplane also connects the RF section which consists of the receiver synthesizer module, first IF module, second IF module, and the transmit synthesizer module.

TRANSMITTER POWER AMPLIFIER

The transmitter power amplifier amplifies the input signals received from the T/R shelf and transmits them. An automatic temperature controlled cooling fan is used to maintain normal operating temperatures.

STATION POWER SUPPLY

In AC systems, the station power supply (19A149979P1, P2) provides all necessary power to operate the station, including dc power for the power amplifier and ac power for the fan assembly. It supplies 26.0 Vdc at 15 amperes and 13.0 Vdc at 3 amperes to the station from either a 120 Volt or 230 Volt ac source.

STATION GETC

The station GETC provides control and interface capability between the Simulcast Control Point and the MASTR III station and other trunked stations at the same site. In Bypass-Mode, the station GETC controls the trunking operation locally.

The GETC shelf assembly contains the GETC logic board, GETC interface board, and regulator assembly. All components are mounted in a tray and enclosed in a shelf. The GETC interface card buffers and converts the signal transfer levels (TTL to RS-232 or RS-232 to TTL) to/from the multiplex equipment and base station. It also includes lightning and tran-

sient voltage protection. The GETC assembly is mounted in a slide out shelf 1 rack unit high (1.75 inches)

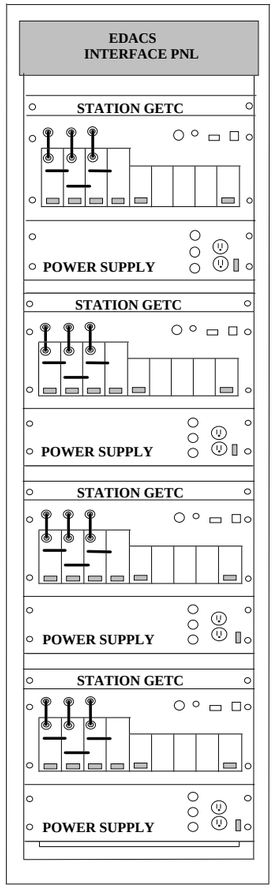


Figure 1 - Typical Simulcast Repeater Station (86-Inch Open Rack)

Refer to GETC Maintenance Manual LBI-38894 for installation and removal instructions. GETC configuration information is provided in LBI-39075.

EDACS INTERFACE PANEL

The EDACS interface panel allows quick and easy interconnections of all audio and control functions in an Enhanced Digital Access Communications System. The interface panel provides the ability to couple control functions of multiple stations on single 25 pair cables.. This panel also provides interrack wiring to common connector panels in other racks.

REMOTE OPERATION

The station always operates as a “remote” station for audio routing, Voice, Tx Data, PTT and A/D controls. These controls are received from the multiplex equipment, enter through the GETC interface card and are directed to the proper point in the station.

INSTALLATION

UNPACKING EQUIPMENT

Upon receipt of the EDACS Simulcast Station Equipment, examine each carton. If any damage is detected, note the damage on the Bill of Lading.

Move the cartons to the site location. Unpack the equipment and carefully inspect each item. If there is any damage to the equipment, contact the carrier immediately and have their representative verify the damage. If you fail to report the shipping damage immediately, you may forfeit any claim against the carrier.

While unpacking the equipment, check the contents against the packing list to verify that all equipment has been received.

MODULE/ASSEMBLY REPLACEMENT

Assembly replacement involves identifying the defective unit, (power supply, power amplifier, T/R shelf, etc.) removing the ac input power and then removing the unit from the rack. After removal, install the new or repaired unit in reverse order.

CAUTION

All repairs must be made by certified electronics technicians. Do not replace components or modules with power applied.

Refer to the replacement procedures given below and, if needed, to the assembly diagrams in LBI-38775. Refer to Figure 1 for assembly/module location.

Power Supply

The power supply is normally mounted beneath the transmitter receiver shelf and secured to the rack by six Phillips head screws, four in the front and two in the back. To replace a power supply, proceed as follows:

1. Turn ac power OFF.
2. Unplug ac power cord from outlet strip on the back of the equipment rack.
3. Unplug power connections from J801 and F801B on back of power supply.
4. Remove the four Phillips head screws from the front panel and two from the power supply support on the back of the rack.

NOTE

Provide support for the power supply when removing the retaining screws.

5. Remove power supply from rack.
6. Reinstall in reverse order

Transmitter Power Amplifier Assembly

The transmitter power amplifier assembly interconnects with the T/R shelf, power supply, and antenna. It is located on the back of the rack directly behind the T/R shelf and is secured to the rack with six Phillips head screws. To replace the power amplifier assembly, proceed as follows:

1. Turn the power supply OFF.
2. Unplug DC power cable F801A from F801B on the back of the power supply.
3. Disconnect the RF front end coaxial cable from the rack mounted receive antenna connector (BNC).
4. Disconnect the transmitter synthesizer coaxial cable from J101 on the transmitter power amplifier (BNC connector).
5. Disconnect transmitter PA output cable from J104 on power amplifier assembly.
6. Unplug the power cable for the fan from P109 on the MASTR III interface board.
7. Remove the six Phillips head screws securing the power amplifier to the rack and remove the power amplifier.
8. Re-install in reverse order.

Transmit/Receive Shelf (T/R)

The T/R shelf interconnects with all components of the station, the GETC board, and the PA fan assembly. It is secured to the rack by four hex head cap screws. A rubber spacer is located between the rack and the shelf assembly. To remove and re-install the T/R assembly, proceed as follows:

1. Turn the power supply OFF.
2. Unplug the DC power cable from P102 on the MASTR III interface board.
3. Disconnect the Rx front end coaxial cable from the rack mounted receive antenna connector or from J2 on the back of the T/R shelf. **NOTE:** if disconnecting the cable from the back of the T/R shelf, first remove the four hex head cap screws and partially slide the shelf out to gain access to the BNC connector.
4. Disconnect the transmitter synthesizer coaxial cable from J101 on the transmitter power amplifier or from J1 on the back of the T/R shelf (BNC connector). **NOTE:** if disconnecting the cable from the T/R shelf, remove the four hex head cap screws and partially slide the shelf out to gain access to the BNC connector.
5. Unplug the GETC interface cables from J101 on the GETC interface module and J6, J7, J10, and J19 on the GETC.
6. Unplug the power sense cable from P103 on the back of the MASTR III interface board.
7. Unplug the control power sense cable from P108 on the MASTR III interface board.
8. Unplug the power cable for the fan assembly from P109 on the MASTR III interface board.
9. Remove the four Phillips head screws securing the T/R shelf to the rack and remove the shelf.
10. Re-install in reverse order.

Station GETC

A station GETC is installed in the equipment rack just above each MASTR III station assembly. Refer to the GETC Configuration manual LBI-39075 for replacement instructions and to SRN-1060 for jumper and dip switch positioning before placing the GETC in service.

EDACS Interface Panel

The EDACS interface panel is mounted on the back of the rack in the top position. Refer to *LBI-39198* for replacement procedures.

ELECTRICAL CONNECTIONS

AC POWER

AC power to the equipment rack is installed during initial installation in accordance with instructions contained in the system installation manual. Typically, the MASTR III station operates from a 120 Vac 60 Hz source. A separate 15-20 ampere circuit should be provided for each station.

If a 240 Vac, 60 Hz source is provided for the station, an external step-down transformer (similar to 19C307148P1) must be used.

For 230 Vac, 50 Hz applications, the station power supply is equipped with a power cord (less connector) to permit connection to an acceptable electric circuit. A plug meeting local electrical codes must be supplied by the customer. Make sure the station power supply is connected to an outlet having the same configuration as the plug. No adapters should be used in this configuration.

GROUND CONNECTIONS

The equipment rack should be connected to a good earth ground. A ground stud is provided for a separate rack ground. Use No. 14 or larger wire (depending on local ordinances and system requirements) for connecting the rack to good building ground. After the ground lead from the power cable is connected to the building ground, verify continuity between building ground and the rack.

The GETC is grounded using the lightening grounding kit in accordance with instructions in the GETC LBI-38894.

MICROPHONE OR UTILITY HANDSET

The local microphone or utility handset may be attached to the station through the MIC port on the front of the T/R shelf (see Figure 3) , the MIC port connections are shown in Figure 2.

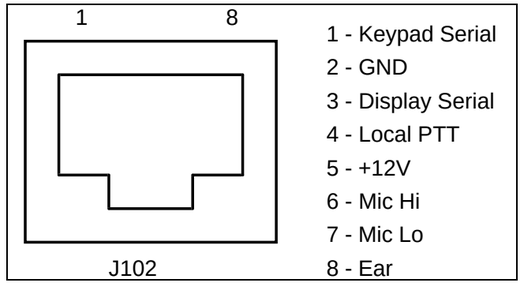


Figure 2 - Microphone Connections

ANTENNA

The transmit and receive antenna cables from the transmitter combiner and the receiver multicoupler may be routed through the top or bottom of the rack directly to the appropriate connector within the station.

STATION SETUP

The MASTR III station comes pre-programmed and ready to install. However, after installing the station, proper operation must be verified and, if necessary, the station must be reprogrammed using PC programmer TQ-3353.

SETUP PROCEDURE

If the Utility Handset is plugged into the MIC connector, it must be removed prior to resetting the system using the PC Programming software. Levels may be adjusted using the MASTRUTL program supplied with the PC Programming package. A RESET (on the power module while pressing one of the VOL UP or DOWN buttons) should be initiated before you begin programming. Refer to Figure 3 below for the test setup diagram.

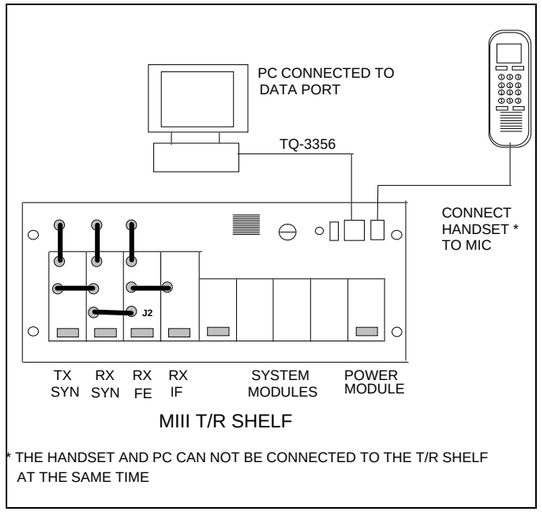


Figure 3 - T/R Shelf Test Connections

1. Verify that the transmit and receive antennas are properly connected. Refer to interconnection diagram 19D903635.

2. Verify that the power cord from the base station is plugged into a 120 Vac, 60 Hz power source.

NOTE

If a 230 Vac, 50 Hz power source is used, connect the locally required plug. If a 240 Vac, 60 Hz power source is used, an external step-down transformer similar to 19C307148P1 must be used.

3. Connect the PC programmer's serial COM port to the DATA PORT on the front of the T/R shelf using TQ-3356 interconnect cable 19B801348P2.

NOTE

If the computer has a 25-pin connector instead of a 9-pin connector, an adapter must be installed. The adapter may be purchased or locally manufactured (See Figure 4). Making your own requires only four wire connections.

4. The squelch control should be set for critical squelch. Unsquelch the receiver by turning the SQUELCH control counter-clockwise while listening for noise in the speaker. It may be necessary to increase the volume control setting. Adjust the SQUELCH control (clockwise) until the noise is no longer heard (squelch just closes).

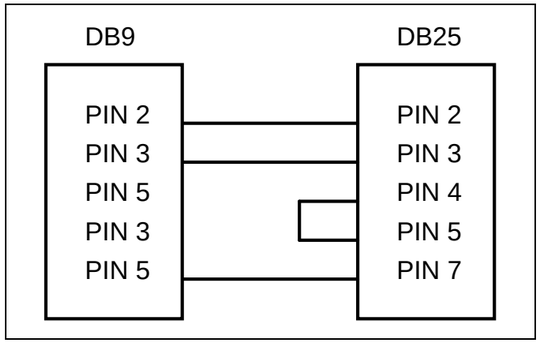


Figure 4 - DB9 To DB25 Adapter Cable

If digital squelch is used, ascending numbers close the squelch while decreasing numbers open the squelch.

5. Adjust the volume control for the desired listening level.

ALIGNMENT PROCEDURE

Complete alignment of the base station was performed prior to shipment. Realignment in the field should not be necessary. If the station parameters must be verified, use the following alignment procedure. The factory assumes the following characteristics when making adjustments:

1. There is no loss or gain for repeated audio deviation.

2. The base station drives the line output at -10 dBm with nominal receive deviation.

3. The signal arrives at the base station at -10 dBm resulting in nominal transmit deviation.

The above signal levels enable the base station to drive the line at -10 dBm with a 1 kHz test tone with 3 kHz deviation applied to the receiver input. The base station transmits a 1 kHz tone with 3 kHz deviation when this signal is applied.

These values may be changed by following the appropriate alignment procedure. For minor adjustments you may want to adjust only one or two digital potentiometers or leave the setting alone. It is important to review the alignment procedure now before proceeding. Figure 5 identifies the potentiometers and gives the default values for each.

NOTE

We suggest that you record the settings of the potentiometers on paper until you're familiar with all the digital potentiometer setting tools.

In addition, the GETC dip switch settings should be recorded for future reference.

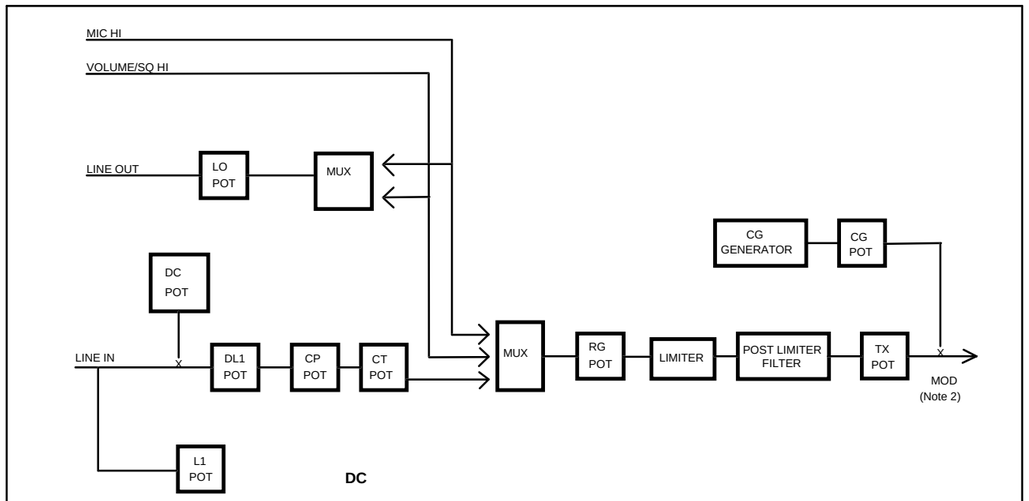
The MIC port may be used for:

- connecting the local microphone equipped with a modular connector and
- connecting the multi-purpose Utility Handset.

Test Equipment Required

The following test equipment is required to align the MASTR III bast station:

- Audio Oscillator
- AC Voltmeter
- RF Signal Generator
- Deviation Monitor
- Utility Handset or PC Computer
- Digital Storage Scope (Tektronix 2232 or equivalent)



	LO POT	DC POT	L1 POT	DL1 POT	CP POT	CT POT	RG POT	TX POT	LOW SPEED DATA/CG POT
Function	Line Out	DSP Line Cancellation	Line In	DSP Line In	DSP Compressor Gain	Compressor Threshold	Repeater Gain	Transmit	Channel Guard
Handset Number Pot Page (Note 3)	1 P-1	5 P-1	3 P-1	6 P-1	7 P-1	2 P-2	2 P-3	2 P-1	4 P-1
Handset Display	P LO	P DC	P LI	P-D1	CP	CT	RG	P TX	P CG
Default Values	22	0 (4W)	0	40 (4W)	1023	32767	1023	150	125

NOTES:
1. VOL/SQ sensitivity: 1000 mV rms - 3 kHz peak deviation (System Module, pin B2)
2. MOD sensitivity: 1000 mV rms - 5 kHz peak deviation (System Module, pin C5)
3. Refer to Handset manual, LBI-38599, for instructions on page selection.

Figure 5 - MASTR III System Module Pot Alignment

Station Test Configuration

When SIMULCAST is selected by the PC Programmer, MASTR III stations are configured for 4-wire audio. A standard test tone is used and is defined as a 245 mVrms tone or -10 dBm across 600Ω load. The maximum test tone level is 775 mVrms or 0 dBm across 600Ω load.

Terminations

At co-located sites, audio connections should be made at the Control Point jackfield to compensate for line losses in the system. At Transmit Sites, terminate the Line input at the Simulcast jackfield (SC/JF).

1. Terminate the audio input with a 600Ω load.
2. Terminate the audio output with a 600Ω load when it is not being used for measurement.
3. Terminate the output of the transmitter with a 150 watt, 50Ω load.

Potentiometer Pre-Settings

1. Set the repeater gain, compressor threshold, compressor gain, and DSP inputs to the values listed below.

Repeater Gain (RG)	1023
Compressor Threshold (CT)	32767
Compressor Gain (CP)	1023
DSP Line Input (DLI)	100

Receiver Pot Alignment

Line Output (LO)

1. Connect test equipment as shown in Figure 6.
2. Apply an "on channel" RF signal to the receiver at a level of -47 dBm (1 mV), modulated with a 1 kHz tone, and deviation set for 3.0 kHz (2.4 kHz NPSPAC).
3. Adjust the LO pot for -10 dBm across 600Ω or 245 mV at the line output at the Site jackfield connector or, if at a co-located site, at the corresponding connector at the Control Point.

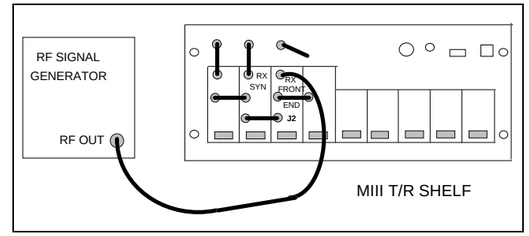


Figure 6 - Test Equipment Setup

Voting Tone Gain (VTG)

1. Remove the RF signal from the receiver and verify that the receiver is squelched.
2. Measure the Voting Tone Level at the Line Output measured at SC/JF T600 (RXV) or if at a co-located Site, measure it at the corresponding point at the Control Point Site. Using the utility handset or PC adjust the Voting Tone Gain (VTG) pot for -10 dBm across 600Ω (245 mV).

Transmitter Deviation Adjustment

Low Speed Data

To set the transmitter deviation for low speed, the station must be placed in the low speed data test mode. (Refer to Figure 7 for GETC dip switch positioning.) The test mode routes receiver audio and low speed data from the GETC to the transmitter. Be sure that the receiver is squelched when making this adjustment because the receive audio (if any) is still routed to the transmitter.

1. Verify the transmitter is terminated with a 150 Watt, 50Ω load.
2. Record the position of the GETC dip switches.
3. Ground the "Bypass" lead (J7-8 on the GETC).
4. Enter the test mode by configuring the GETC dip switches as shown in Figure 7.
5. Activate the test mode by pressing reset button S4 on the GETC.

NOTE

When in the test mode the station GETC keys the transmitter continuously and routes the receiver audio to the transmitter when a signal is present at the receiver.

The transmitter can be unkeyed by setting the Tx Disable switch on the system module to ON.

6. Using the Utility Handset or PC, adjust the Low Speed Data/CG deviation pot for 750 Hz (600 Hz NPSPAC) 10 Hz deviation from the transmitter.

7. Remove the ground from J7-8 to take the station out of the “Bypass” mode.

8. Reconfigure the dip switches to the original settings.

9. Ground the Delay PTT line from the GETC to the station (J6-1 on the GETC) and verify that low speed data from the Simulcast system hardware is being transmitted.

10. Verify that low speed data is 750 Hz (600 Hz NPSAC) 25 Hz.

Transmit Limiter Deviation

The Transmitter (TX) potentiometer adjusts the limit of the level of deviation for all audio into the transmitter except CG/LSD.

NOTE

Leave the low speed data ***on*** while setting the transmit (TX) deviation. The low speed data and transmitter deviation are independent of one another and are summed together for total output deviation. Figure 8 shows a typical waveform for low speed data using the Tektronix Digital Storage Scope.

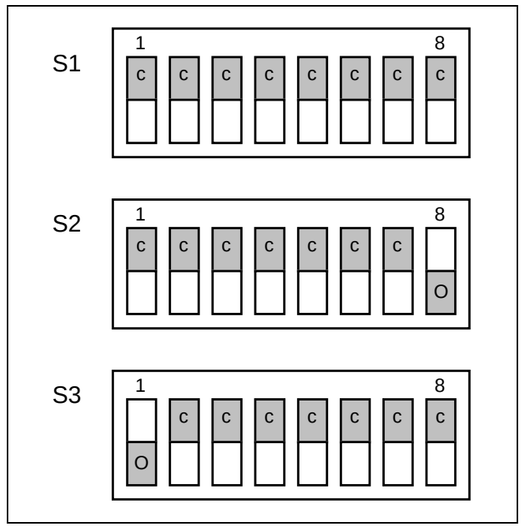


Figure 7 - Test Mode, Low Speed Data/Repeat

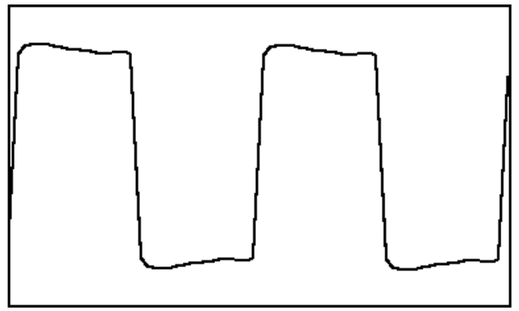


Figure 8 - Low Speed Data Waveform

1. Apply a 1000 Hz tone at 0 dBm or 775 mV rms to the line input at the transmit site audio jackfield T601 (TXV). At the local Site, ground the Delay PTT line (J6-1) and the Detect Disable line (J6-10) on the GETC.

NOTE

If at a co-located site, apply the above test tone to the corresponding Control Point jackfield connector. Key the station by switching the PTT switch and the A/D switch on the Control Panel at the Control Point.

2. Using the Utility Handset or PC, adjust the transmitter deviation pot (TX) for desired maximum system deviation or 4.5 kHz (3.6 kHz NPSPAC) ±100 Hz with low speed data present.

Line Input Sensitivity - DSP Line Input (DLI)

The DSP (Digital Signal Processor) Line Input potentiometer adjusts the transmitter deviation sensitivity to audio on the line input.

NOTE

Steps 1-3 apply when servicing a Transmit Site without the convenience of a servicing technician at the Control Point. Steps 4-6 is an alternate method that apply when performing maintenance at a co-located site or at a Transmit Site when a servicing technician is available at the Control Point.

1. Ground the Delay PTT line (J6-1) and the Detect Disable line (J6-10) on the GETC.

2. Apply a 1000 Hz tone at -10 dBm or 245 mV rms to the line input at the simulcast jackfield.

3. Using the Utility Handset or PC, adjust the DSP Line Input (DLI) for 3.0 kHz (2.4 kHz NPSPAC) 50 Hz deviation.

4. At the Control Point, apply a 1000 Hz tone at -10 dBm or 245 mV rms to the line input at the simulcast jackfield connector.

5. Key the station by switching the PTT switch and the A/D switch on the Control Panel.

6. Adjust the DSP Line Input (DLI) for 3.0 kHz (2.4 kHz NPSPAC) 50 Hz deviation

High Speed Data Deviation (R31)

The High Speed Data Deviation is set using R31 on the GETC board. See Figure 9. When the GETC is in this test mode, audio is routed from the High Speed Data input to the station. No other signals (receiver, line in) will be transmitted. The signal from the GETC to the transmitter is 9600 baud pseudo random data

1. Connect a ground lead to J7-8 (Bypass Mode).

2. Record the position of the GETC dip switches and then reset the switches to the positions shown in Figure 10. Reset the GETC.

3. Check the transmitter deviation and, if necessary, adjust R31 on the GETC board for an average reading of 3.0 kHz (2.4 kHz NPSPAC) 50 Hz deviation.

NOTE

The data will cause the deviation reading to be less stable than a steady tone. Refer to Figure 11 for a typical eye pattern showing pseudo random data. Use an external oscilloscope when observing the eye pattern.

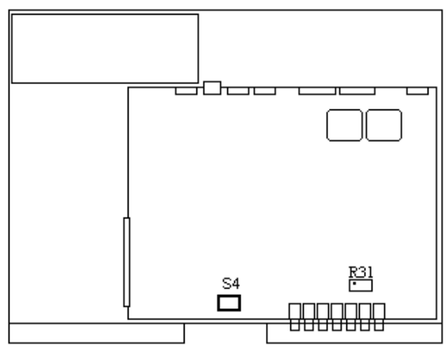


Figure 9 - GETC Shelf

4. Remove the ground from TP201 and reconfigure the GETC dip switches to their original position.

Bypass Deviation

In “Bypass” mode the receiver audio is routed back from the line output on the GETC interface card by the bypass relay to the modulation input to the transmitter.

1. Connect a ground lead to J7-8 (Bypass Mode).

2. Record the position of the GETC dip switches and then reset the switches to the positions shown in Figure 12. Reset the GETC.

3. Apply an “on channel” RF signal to the receiver at a steady signal level of -47 dBm or 1 mV, with a 1 kHz tone at 3.0 kHz (2.4 kHz NPSPAC) of deviation.

4. Measure the transmitter deviation. The deviation should be 3.0 kHz (2.4 kHz NPSPAC) 200 Hz.

5. Disconnect the ground lead to J7-8. Reset GETC dip switches to original recorded position and reset the GETC.

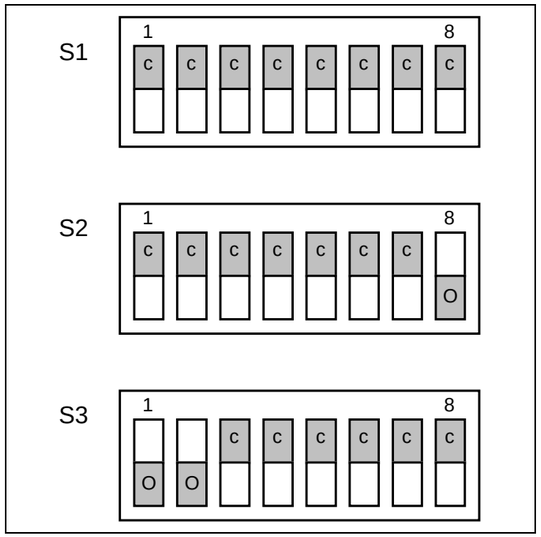


Figure 10 - Test Mode 9600 Baud, Pseudo Random Data

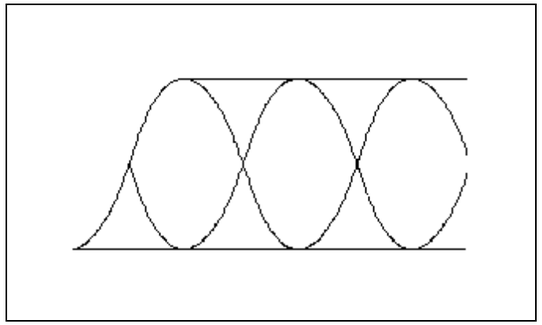


Figure 11 - Eye Pattern, Pseudo Random Data

AUDIO ROUTING AND ADJUSTMENTS

Once the T/R Shelf is installed and programmed properly, audio level adjustments must be made for proper system operation. Level adjustments must be made with the Utility Handset (see LBI-38599) or PC Computer. Except for the power output (R11) there are NO MECHANICAL ADJUSTMENTS TO BE MADE ON THE T/R SHELF.

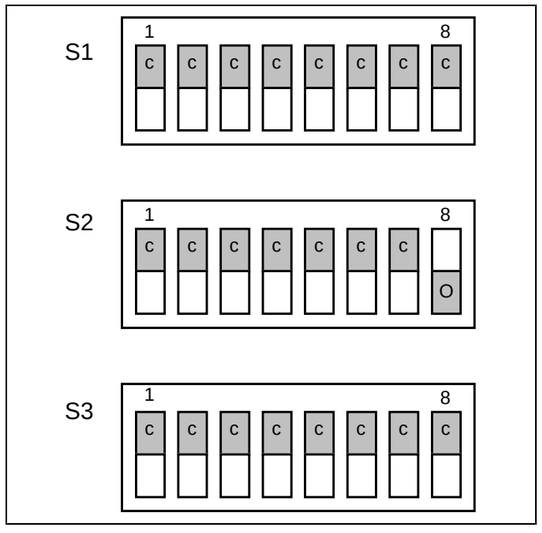


Figure 12 - Test Mode, Repeat

Integrated circuits (ICs) U35 and U36 on the system board are dual electronic potentiometers that are controlled by the microprocessor. IC U15 on the DSP board is also a dual electronic potentiometer controlled by the DSP.

PA Output Power (PA)

1. Connect an RF Power meter (through attenuator if necessary) to the output of the PA at J2. See Figure 13.

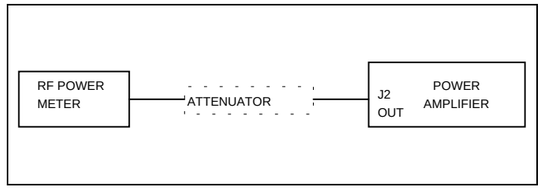


Figure 13 - Power Output Test Setup

2. Key the transmitter and then measure the output power of the PA. If necessary, adjust PA potentiometer R11 on the PA for rated transmit output power.

TEST AND TROUBLESHOOTING PROCEDURES

Refer to the individual equipment manuals for detailed information on maintenance and adjustment procedures. Interconnection diagrams schematics and parts lists are provided in this manual to assist in isolating a problem to a particular piece of equipment.

ACCESSORIES

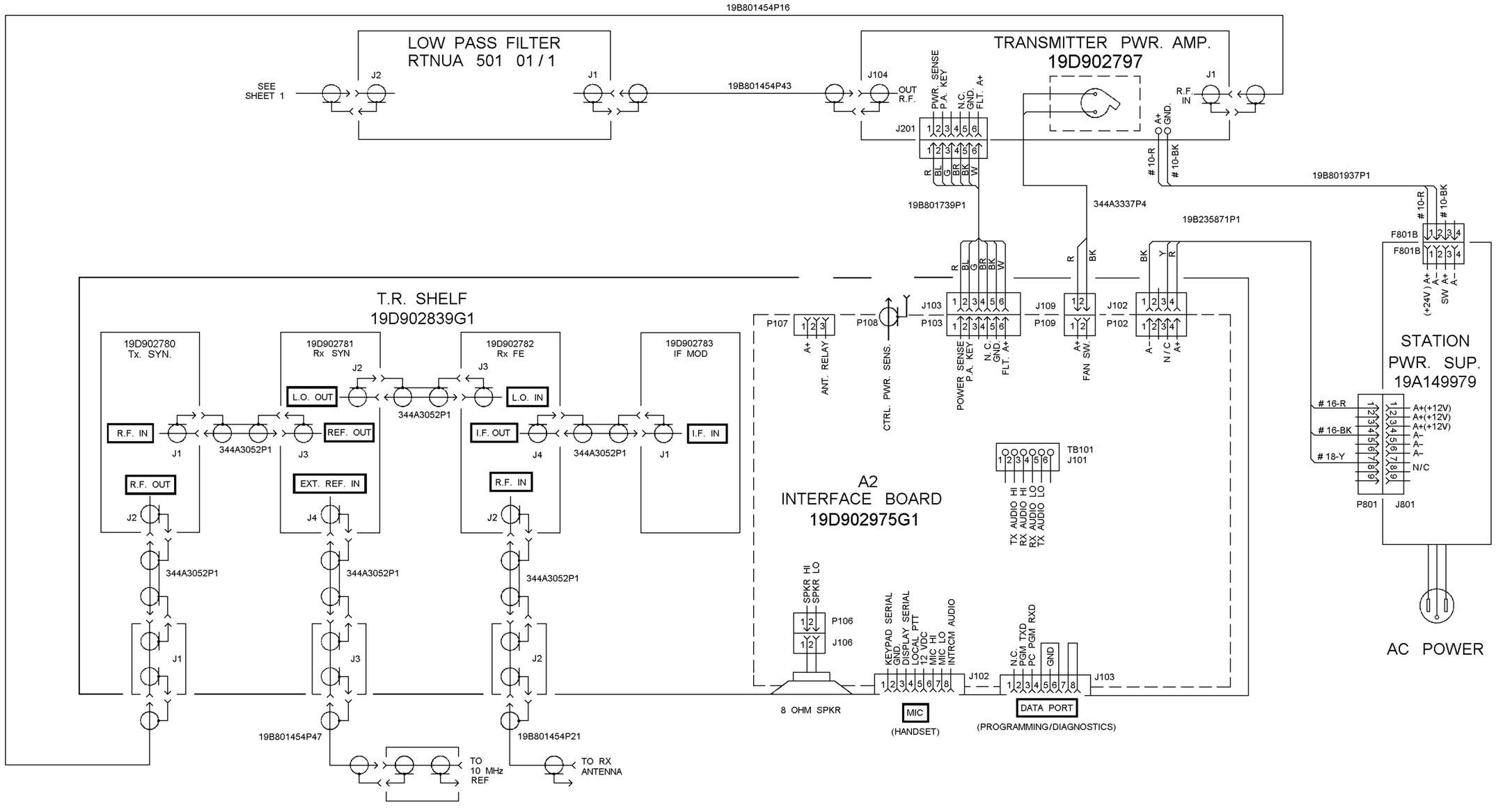
The following accessories for the MASTR III station may be obtained from your local dealer or by calling the Ericsson GE Mobile Communications Inc. After Market Services 24-hour Toll free Number 1-800-368-3277 (USA only) or FAX 1-800-833-7592. Please provide the description and part number or package number when ordering.

Service Microphone.....	SZZM3B
Utility Handset.....	SPK9024
RF Extender Card.....	19A903197G2
System Module Extender Card.....	19A903197G1
U-link (BNC-to-BNC Coax Link).....	344A3052P1
PC Programming Software.....	TQ-3353
Programming Cable (DB9M-DB9F).....	TQ-3356
RF Module Test Fixture.....	TQ-0650
MASTR UTL (Maintenance Software).....	TQ-0619
MS Editor.....	TQ-0653

MAINTENANCE

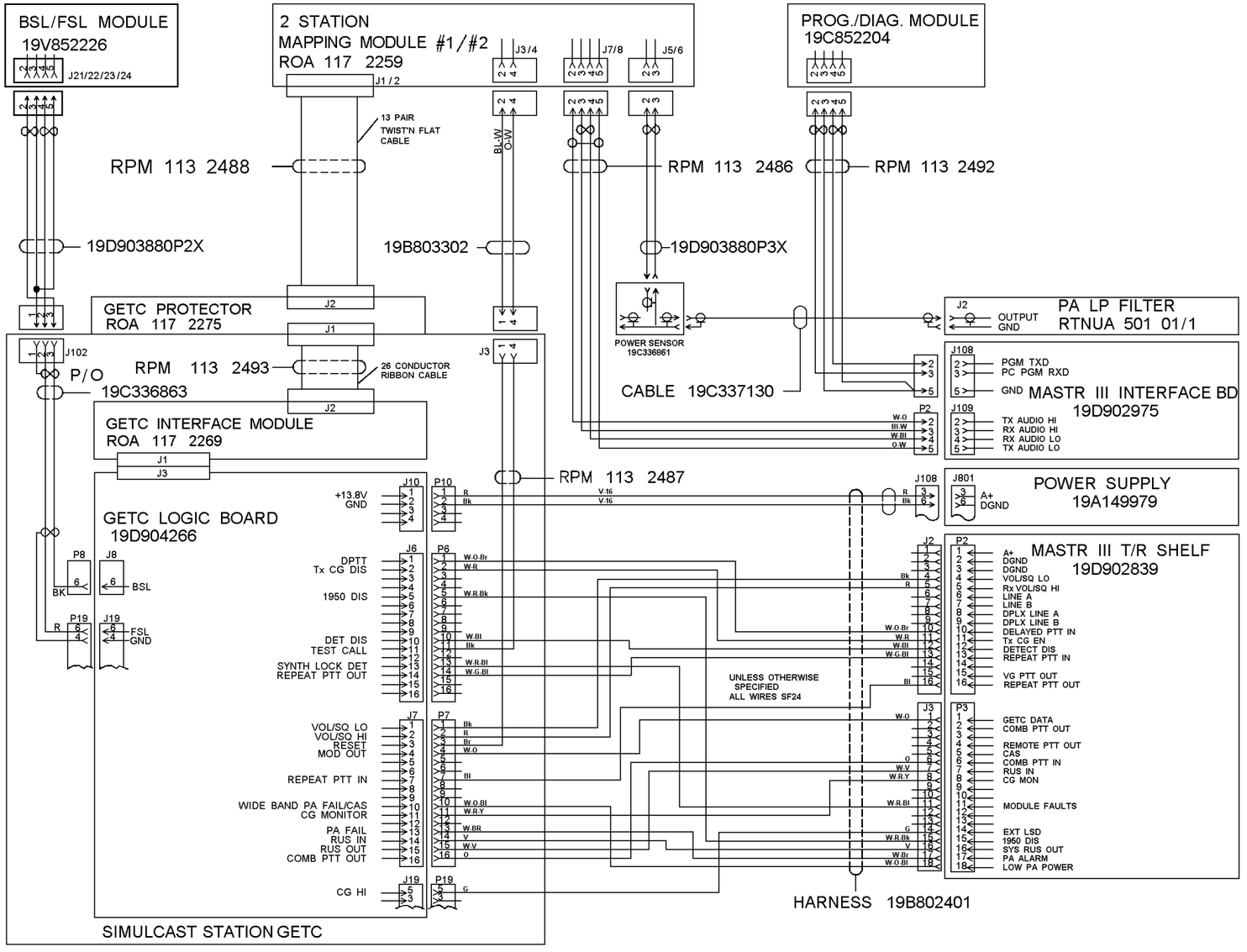
Table 1 - Routine Maintenance

MAINTENANCE CHECKS	INTERVAL BETWEEN CHECKS
Transmission Line - Check for positive indication of pressure on tramsmission line pressure guage (if applicable).	6 Months
NOTE: Complete the TDR or Return Loss Sweep procedure **TDR Test:** Checks line continuity, line length, line loss, checks for opens or shorts and indicates distance to open or short, and indicates whether the end of the line is open or shorted. Compare the results of this test with the results recorded during initial installation.	12 Months
Return Loss Sweep: Provides an indication of antenna operability and transmission line performance. Checks antenna resonance and line return loss.	12 Months
Antenna - Check antenna and mast for mechanical stability.	6 Months
Mechanical Inspection - visually check cables, plugs, sockets, terminal boards and components for good electrical connections. Checks for tightness of nuts, bolts and screws to make sure that nothing is working loose from its mounting.	6 Months
Cleaning - Use a vacuum cleaner to remove dust if any has accumulated inside the cabinet	6 Months
Power Output- Check transmitter for rated power output.	12 Months
Frequency Check - Check transmitter frequency and deviation.	12 Months



MASTR III Station Interconnect

(193D1248, Sh. 2, Rev. 1A)



MASTR III GETC/Station Interconnect

(193D1248, Sh. 1, Rev. 1A)

GPS SIMULCAST STATIONS
INTERACK CABLES

PART 1 - 83" CABINET/86" RACK

PROGRAMMING/DIAGNOSTIC MODULE (Prog/Diag Mod)

CHANNEL NO.	FROM	TO	CABLE
1/13	MASTR III Interconnect Board J108	Prog/Diag Mod J1	RPM1132492/4
2/14	MASTR III Interconnect Board J108	Prog/Diag Mod J2	RPM1132492/3
3/15	MASTR III Interconnect Board J108	Prog/Diag Mod J3	RPM1132492/2
4/16	MASTR III Interconnect Board J108	Prog/Diag Mod J4	RPM1132492/1
5/17	MASTR III Interconnect Board J108	Prog/Diag Mod J5	RPM1132492/4
6/18	MASTR III Interconnect Board J108	Prog/Diag Mod J6	RPM1132492/3
7/19	MASTR III Interconnect Board J108	Prog/Diag Mod J7	RPM1132492/2
8/20	MASTR III Interconnect Board J108	Prog/Diag Mod J8	RPM1132492/1
9/21	MASTR III Interconnect Board J108	Prog/Diag Mod J9	RPM1132492/4
10/22	MASTR III Interconnect Board J108	Prog/Diag Mod J10	RPM1132492/3
11/23	MASTR III Interconnect Board J108	Prog/Diag Mod J11	RPM1132492/2
12/24	MASTR III Interconnect Board J108	Prog/Diag Mod J12	RPM1132492/1

BSL/FSL MODULE

CHANNEL NO.	FROM	TO	CABLE
1/5/9/13/17/21	Station GETC J102	BSL/FSL MOD J21	19D903880P23
2/6/10/14/18/22	Station GETC J102	BSL/FSL MOD J22	19D903880P22
3/7/11/15/19/23	Station GETC J102	BSL/FSL MOD J23	19D903880P21
4/8/12/16/20/24	Station GETC J102	BSL/FSL MOD J24	19D903880P20

MAPPING MODULE #1

CHANNEL NO.	FROM	TO	CABLE
1/5/9/13/17/21	GETC PROT J2	Map. Mod. #1 J1	RPM1132488/4
	TURBO BRKT J3	Map. Mod. #1 J3	19B803302P3
	PA SENSOR	Map. Mod. #1 J5	19D903880P35
	MASTR III Interface Board J109	Map. Mod. #1 J7	RPM1132486/5
2/6/10/14/18/22	GETC PROT J2	Map. Mod. #1 J2	RPM1132488/3
	TURBO BRKT J3	Map. Mod. #1 J4	19B803302P5
	PA SENSOR	Map. Mod. #1 J6	19D903880P33
	MASTR III Interface Board J109	Map. Mod. #1 J8	RPM1132486/4

MAPPING MODULE #2

CHANNEL NO.	FROM	TO	CABLE
3/7/11/15/19/23	GETC PROT J2	Map. Mod. #2 J1	RPM1132488/2
	TURBO BRKT J3	Map. Mod. #2 J3	19B803302P2
	PA SENSOR	Map. Mod. #2 J5	19D903880P32
	MASTR III Interface Board J109	Map. Mod. #2 J7	RPM1132486/3
4/8/12/16/20/24	GETC PROT J2	Map. Mod. #2 J2	RPM1132488/1
	TURBO BRKT J3	Map. Mod. #2 J4	19B803302P1
	PA SENSOR	Map. Mod. #2 J6	19D903880P31
	MASTR III Interface Board J109	Map. Mod. #2 J8	RPM1132486/2

(3350A1875, Sh. 1 & 2, Rev. 1)

BSL/FSL MODULE TO SIMULCAST GETC CABLE 19D903880P2X

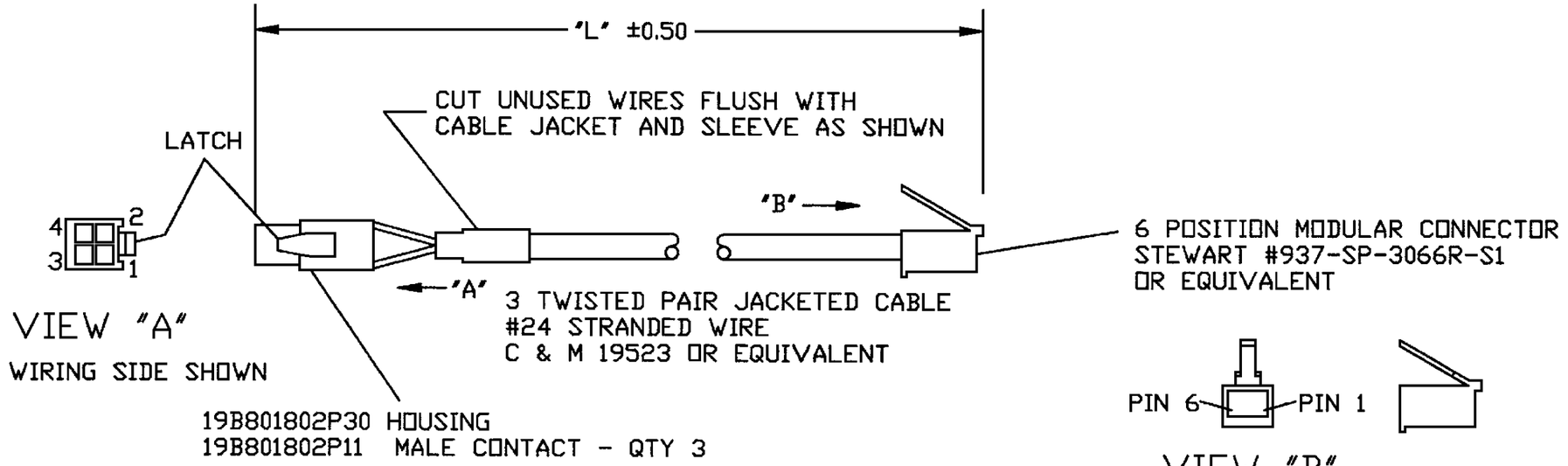
CABLE #20	GETC DATA TO SITE CONTROLLER (STN CAB)	CABLE	20	21	22	23	24	25	26	27
	GETC DATA TO SERIAL LINK (STN CAB)		20"	44"	60"	76"	87"	97"	132"	180"
	DB-9 IS A MALE CONNECTOR									
P01-2	DB-9, PIN 3									
P01-3	PB-9, PIN 1									
P01-4	DB-9, PIN 2									
P01-5	DB-9, PIN 1 (TWO WORE TO PIN 1)									

MAPPING MODULE TO SIMULCAST STATION CABLE 19D903880P3X

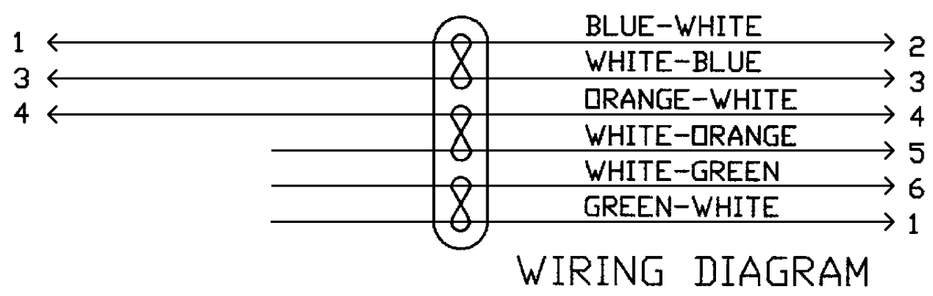
CABLE #30	POWER MONITOR TO SENSOR (STN CAB)	CABLE	30	31	32	33	34	35
	PHONO CONNECTOR -- VOLTREX 5-005		20"	44"	60"	76"	87"	97"
	(MATES WITH SWITCHCRAFT 3501FP)							
	ONE JACKETED TWISTED PAIR							
P01-2	PHONO CENTER PIN							
P01-3	PHONO CASE							
P01-4								
P01-5								

MASTR III STATION
83 INCH CABINET/86 INCH RACK
PARTS LIST

Symbol	Part Number	Description
		- - - -86" RACK- - - -
	19D902964P1	86 Inch Rack.
	19A149981G1	Hardware Kit.
	19C337003P5	Rail, mounting.
	19C337452G3B	Rack Assembly.
	19A130031G44	Hardware Kit.
		- - - -83" CABINET- - - -
	19D902663G1	83-inch cabinet.
	19C337428G1	Door (Part of Cabinet).
	19C337428G2	Door (Part of Cabinet).
	19B801476P1	Cover
	19D417623G4	Ericsson label.
	19B209539P1	Lock, rim.
	19B209539P2	Lock, rim.
	19B209539P3	Key, Lock, rim. Lock, rim.
	19B226318P2	Plate.
	19A130031G12	Hardware Kit.
		- - - - - CABLES - - - - - -
	19B235871P1	Power Cable: Station Power Supply (J801) to T/R Shelf (A2-P102).
	19B801454P43	RF Cable: Low Pass Filter (J1) to Power Amplifier (J104).
	19B801937P1	Power Cable: Power Supply to Power Amplifier.
	19B801739P1	Control Cable: Power Amplifier to T/R Shelf (Interface Board).
	19B801454P16	RF Cable: T/R Shelf (J2) to Power Amplifier (J1).



PART	"L" DIM
1	36
2	60
3	84
4	108
5	72

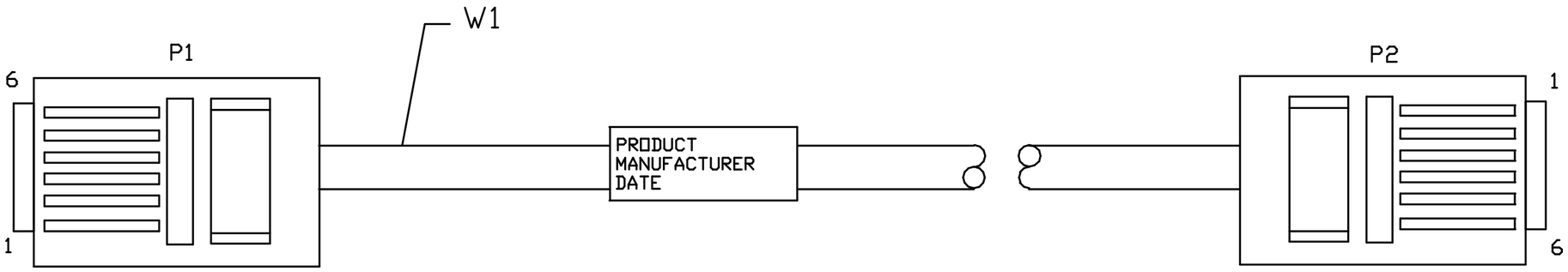


NOTES:

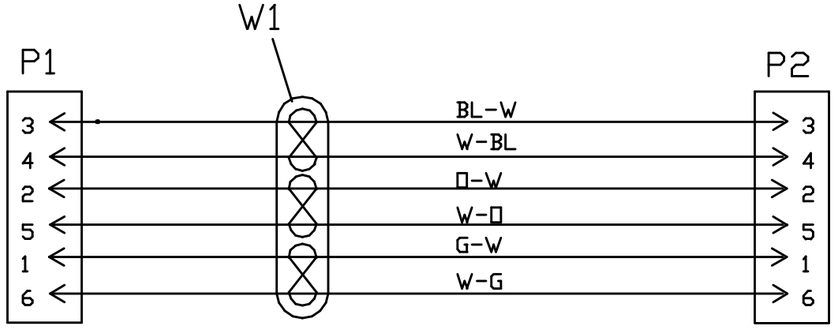
1. CABLE LENGTH IS IN INCHES
2. LENGTH IS MEASURED OVER CONNECTORS
3. ALL CONNECTORS SHALL PROVIDE INSULATION SUPPORT
4. CABLE SHALL BE MARKED WITH EGE DRAWING AND PART NUMBER
5. CABLE ASSEMBLY OPERATING TEMPERATURE RANGE -20 TO +80 DEG C.

Mapping Module To GETC

(19B803302, Rev. 2)



WIRING DIAGRAM

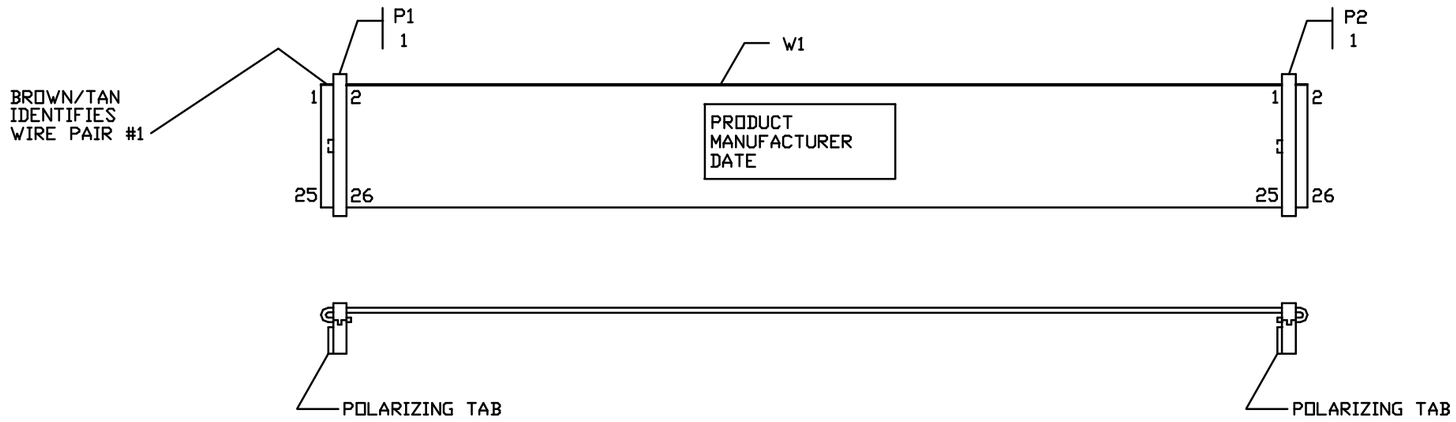


MATERIAL LIST				
ITEM	ERICSSON PART NO. (FOR REF. ONLY)	VENDOR PART NO. (OR EQUIVALENT)	DESCRIPTION	QTY
P1		STEWART 937-SP-3066R-SL	6 POSITION MODULAR PLUG	1
P2		STEWART 937-SP-3066R-SL	6 POSITION MODULAR PLUG	1
W1		C & M 19523 OR EQUIVALENT	#24 STRANDED WIRE	12 IN

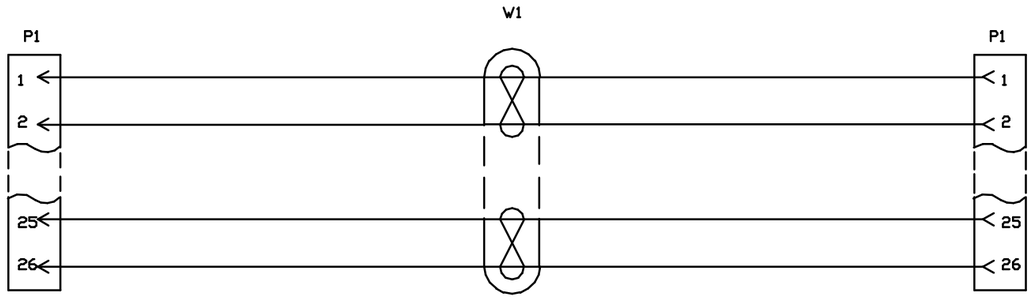
PRODUCT CODE PURCHASED	DESCRIPTION
RPM 113 2486/1	12 INCH GPS SIMULCAST DATA CABLE
RPM 113 2486/2	24 INCH GPS SIMULCAST DATA CABLE
RPM 113 2486/3	60 INCH GPS SIMULCAST DATA CABLE
RPM 113 2486/4	72 INCH GPS SIMULCAST DATA CABLE
RPM 113 2486/5	96 INCH GPS SIMULCAST DATA CABLE

Mapping Module To MASTR III Interface Cable RPM1132486

(RPM1132486, Sh. 1 - 5, Rev. A)



WIRING DIAGRAM

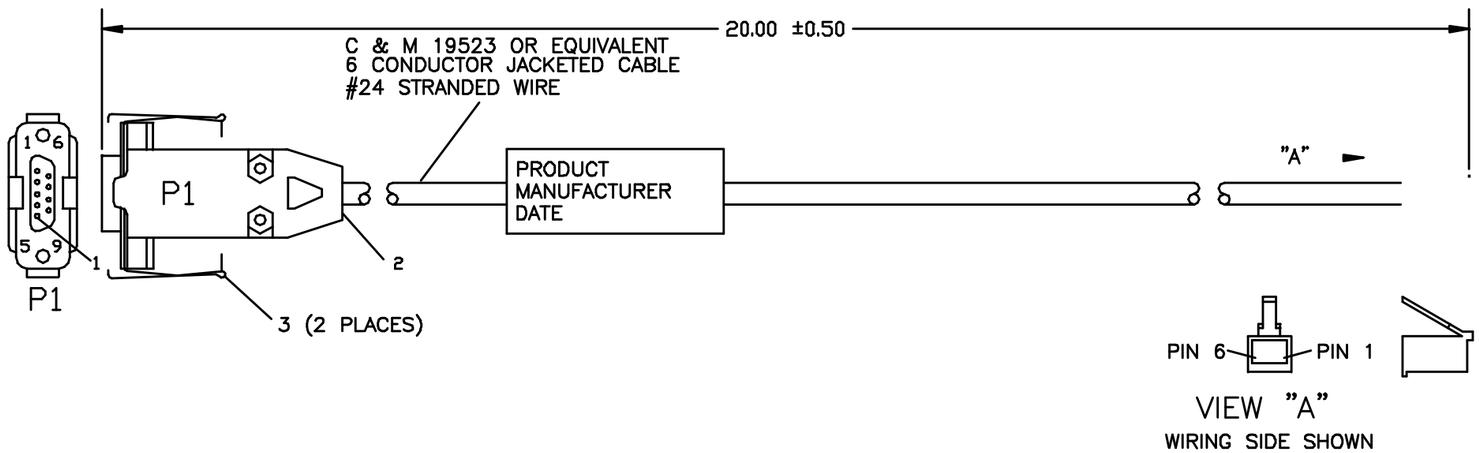


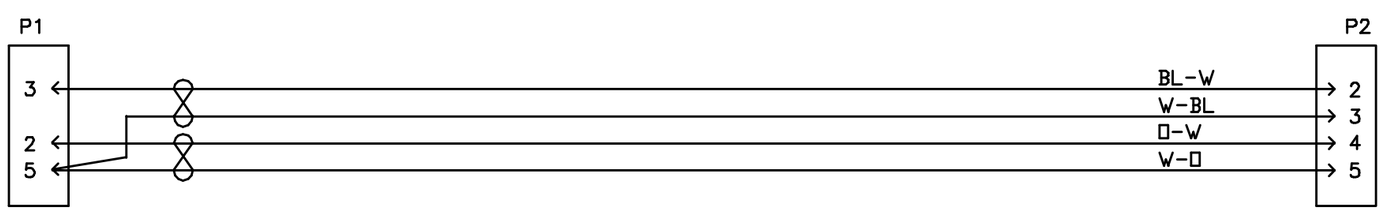
MATERIAL LIST				
ITEM	ERICSSON PART NO. (FOR REF. ONLY)	VENDOR PART NO. (OR EQUIVALENT)	DESCRIPTION	QTY
P1		AMP 746288-6	26 PIN HEADER	1
P2		AMP 746288-6	26 PIN HEADER	1
W1		SPECTRA 843-132-2801-026	13 PAIR TWIST'N FLAT	20
1		AMP 499252-3	STRAIN RELIEF	2

PRODUCT CODE PURCHASED	DESCRIPTION
RPM 113 2488/1	20 INCH GPS SIMULCAST DATA CABLE
RPM 113 2488/2	40 INCH GPS SIMULCAST DATA CABLE
RPM 113 2488/3	60 INCH GPS SIMULCAST DATA CABLE
RPM 113 2488/4	80 INCH GPS SIMULCAST DATA CABLE

Mapping Module To GETC Protector Cable RPM1132488

(RPM1132488, Sh. 1 - 4, Rev. A)





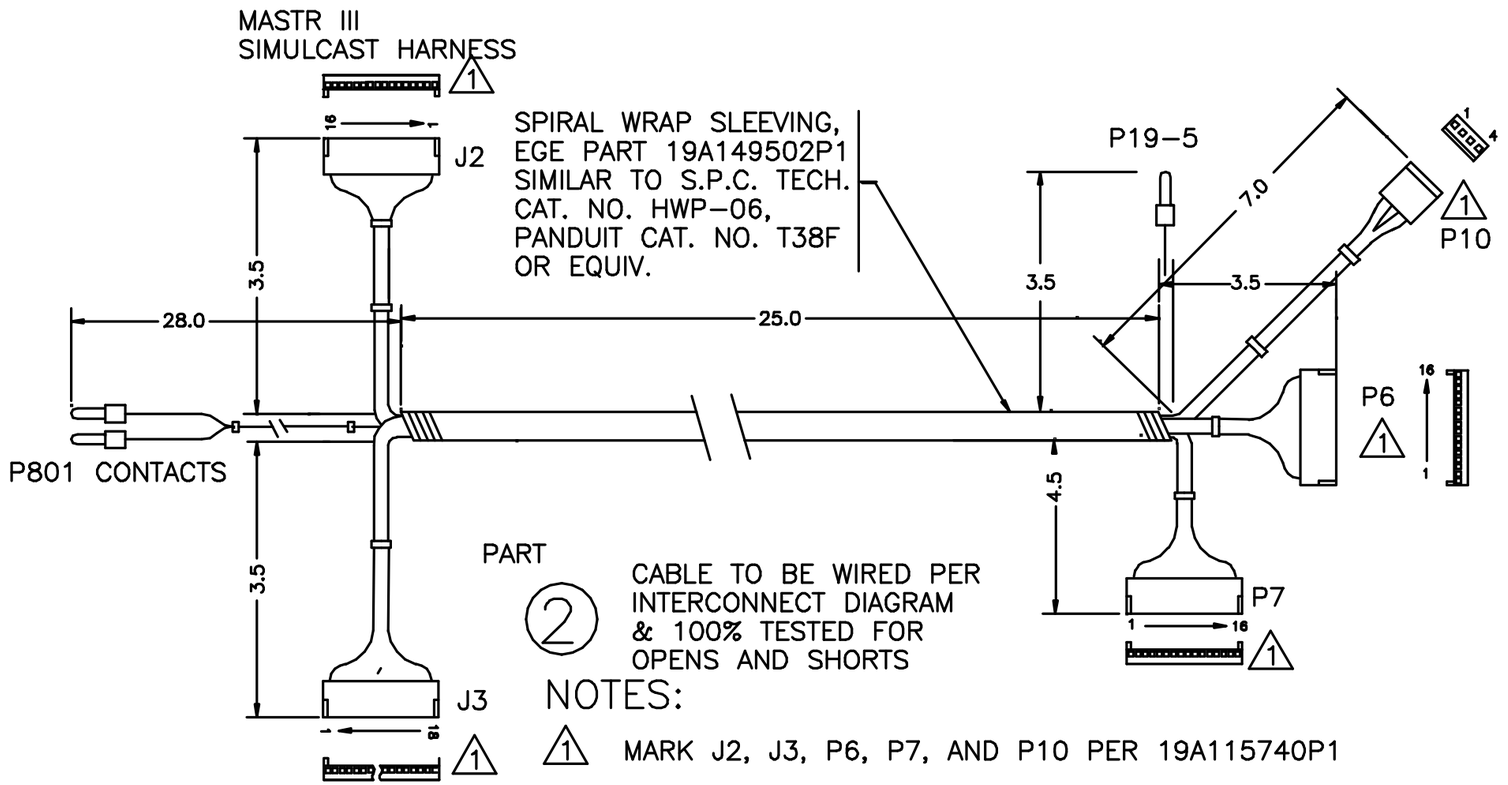
WIRING DIAGRAM

MATERIAL LIST				
ITEM	ERICSSON PART NO. (FOR REF. ONLY)	VENDOR PART NO. (OR EQUIVALENT)	DESCRIPTION	QTY
P1		AMP 205204-1	CONNECTOR	1
P2		STEWART 937-SP-3066R-SL	6 POSITION MODULAR CONNECTOR	1
1		AMP 1-745254-4	CONTACT, PIN, CHAIN	3
2		AMP 745854-5	HOUSING	1
3		AMP 745255-2	SPRING LATCH KIT	1

PRDUCT CODE PURCHASED	DESCRIPTION
RPM 113 2492/1	CABLE, DATA, SIMULCAST, 20 INCH LENGTH
RPM 113 2492/2	CABLE, DATA, SIMULCAST, 44 INCH LENGTH
RPM 113 2492/3	CABLE, DATA, SIMULCAST, 60 INCH LENGTH
RPM 113 2492/4	CABLE, DATA, SIMULCAST, 76 INCH LENGTH

Programming/DIAGNOSTIC Module RPM1132492

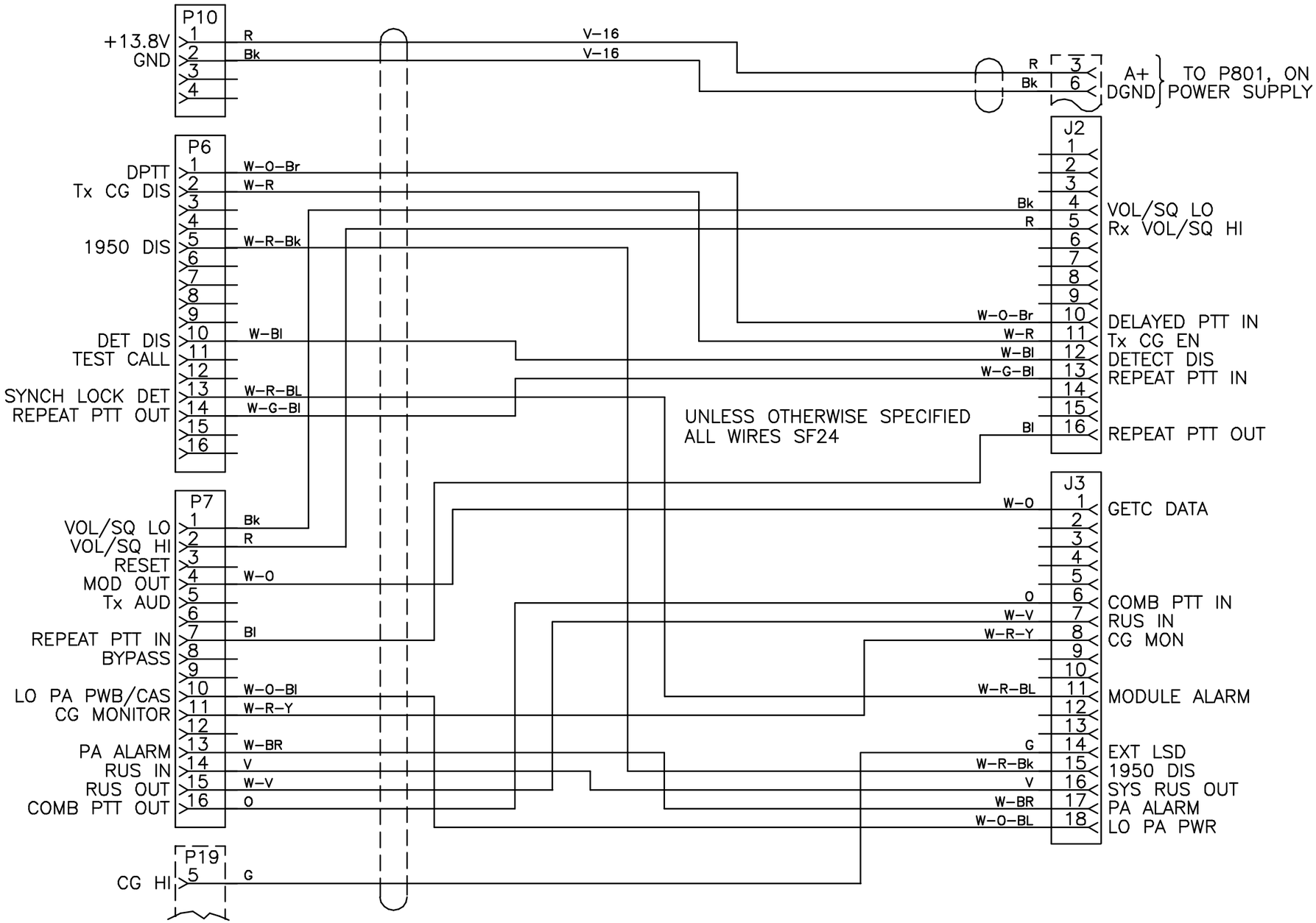
(RPM1132492, Sh. 1 - 4, Rev. P1A)



J3	P19-5 CONTACT	J2,P6 & P7	P10	P801 CONTACTS	WIRE DESCRIPTION
EGE PART NO. 19A700041P44 SIMILAR TO MOLEX CAT. NO. 22-01-2185 CONTACTS EGE PART NO. 19A704779P26, SIMILAR TO MOLEX CAT. NO. 08-55-0101 OR EQUIVALENTS	EGE PART NO. 19A704779P26 SIMILAR TO MOLEX CAT. NO. 08-55-0101 OR EQUIVALENT	EGE PART NO. 19A700041P42 SIMILAR TO MOLEX CAT. NO. 22-01-2165 CONTACTS EGE PART NO. 19A704779P26, SIMILAR TO MOLEX CAT. NO. 08-55-0101 OR EQUIVALENTS	EGE PART NO. 19A116659P17 SIMILAR TO MOLEX CAT. NO. 09-50-3041 CONTACTS EGE PART NO. 19A116781P3, SIMILAR TO MOLEX CAT. NO. 08-50-0105 OR EQUIVALENTS	EGE PART NO. 19B209288P2 SIMILAR TO MOLEX. CAT. NO. 02-09-2101, OR EQUIV.	SF24 WIRE, EGE PART NO. 19A115871 #24 AWG (19 STRANDS OF #36 WIRE) 600 VMS @ -25° TO +85° C. TEMP. RANGE V16 WIRE, EGE PART NO. 19A116850 #16 AWG (26 STRANDS OF .010 DIA. WIRE) 600 VRMS @ -40 TO +105° C. TEMP.RANGE UL1015

MASTR III Simulcast GETC Cable Harness 19B802401

(19B802401, Sh. 3, Rev. 7)



MASTR III Simulcast GETC Cable Harness 19b802401

(19B802401, Sh. 4, Rev. 7)

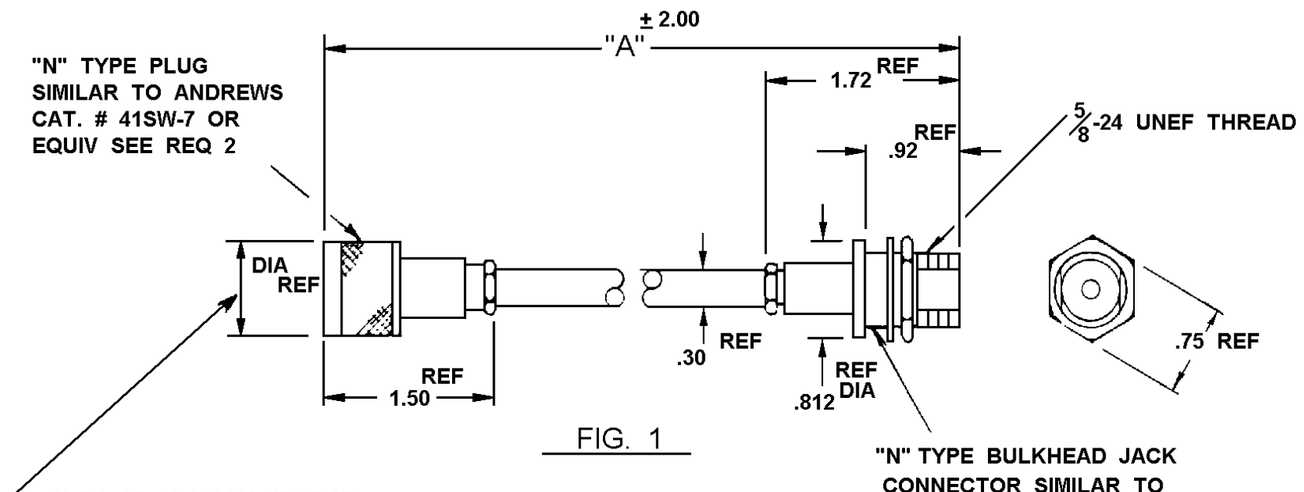
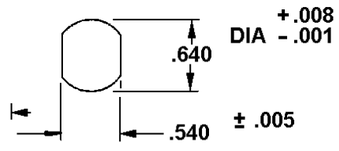


FIG. 1

PART NO.	FIG. NO.	DIM. "A"
1	1	25.00



RECOMMENDED MOUNITNG HOLE
FOR BULKHEAD JACK

REQUIREMENTS

1. CABLE
   CABLE TO BE 1/4" SUPERFLEXIBLE HELIAX®
   CABLE, ANDREWS CORP. CAT# FSJ1-50 OR APPROVED EQUIVALENT.
   IMPEDANCE - 50 OHM
   MAX FREQUENCY - 19GHZ
   PEAK POWER RATING - 5KW
   AVERAGE POWER RATING - 0 MHz = 3.42KW
   100 MHz = 1.04KW
   1000 MHz = .291KW
   2000 MHz = .193KW

   ATTENUATION
   1 MHz = .175 DB/100 FT.
   10 MHz = .561 DB/100 FT.
   100 MHz = 1.85 DB/100 FT.
   1000 MHz = 6.59 DB/100 FT.
   2000 MHz = 9.97 DB/100 FT.

   MECHANICAL . . . OPERATING TEMP RANGE -40 TO + 80˚C
   OD OF FINISHED CABLE = .30
   CENTER CONDUCTOR & SHIELD MAT'L = COPPER
   MIN BEND RADIUS = 1 INCH
   CABLE WEIGHT - .055 LB/FT
   DIELECTRIC MAT'L - FOAMED POLYETHYLENE

2. TYPE N PLUG TO SIMILAR TO ANDREWS CAT. # 41SW7 OR EQUIVALENT.
   COUPLING NUT MATERIAL TO BE BRASS, NICKEL PLATED.
   CENTER CONTACT TO BE BRASS GOLD PLATED 30 u INCHES MIN. THICKNESS IN CONTACT MATING AREA OVER NICKEL UNDERPLATE.
   SHIELD CONTACT TO BE SILVER PLATED OVER NICKEL UNDERPLATE.

   NOMINAL IMPEDANCE = 50 OHMS
   DIELECTRIC MAT'L - TEFLON

3. TYPE N BULKHEAD JACK TO BE SIMILAR TO ANDREWS CAT. #41SN-7 OR EQUIVALENT, NOMINAL IMPEDANCE TO BE 50 OHM.
   - BODY MAT'L TO BE BRASS SILVER PLATED OVER NICKEL OR COPPER UNDERPLATE.
   - CENTER CONDUCTOR TO BE PHOSPHOR BRONZE OR BERYLLIUM COPPER PLATING TO BE 30 u INCHES MIN GOLD OVER NICKEL UNDERPLATE IN CONTACT MATING AREA.
   - DIELECTRIC MATERIAL TO BE TEFLON
   - CONNECTOR TO BE FURNISHED WITH BRASS MOUNTING NUT & PHOSPHOR BRONZE LOCKWASHER WITH SILVER PLATED FINISH.
   - GASKET MAT'L TO BE SILICON RUBBER.

4. PERMISSIBLE TO SUBSTITUTE ANDREW CABLE ASSEMBLY VFX1-NMNF-2FT (CRIMP TYPE N CONNECTOR).

POWER SENSOR TO POWER AMPLIFIER CABLE 19C337130

(19C337130, Rev. 3)