



RM4000 Radio Modem User's Manual and Installation guide

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INTRODUCTION

The RM4000 radiomodem is a versatile 2-way radio interface designed to send data through a users simplex or half duplex radio network. The RM4000 radiomodem is primarily designed to work in conjunction with one of three F.T.S. Fire Weather Data Loggers: WR-62, WR-62A, FWS-11. The RM4000 itself does not collect the data, it simply uploads data from the users data logger, then formats it adding error correction / detection information. Then the formatted data is transmitted through the users radio repeater system, using an FSK (frequency shift keying) technique, to the office base station RM4000. This base station RM4000 then decodes the data, corrects any errors and downloads the data to the Hub Controller computer.

The RM4000 has many features not found in other low cost telemetry equipment:

- Low power consumption
- Error detection and correction
- Rugged water-proof cast aluminum alloy case
- Environmentally sealed military style connectors
- Enclosed transceiver
- Functions as a polled system (allowing shared channel use)

BASIC FUNCTION

The RM4000 will transfer packets of data when polled by the Base Station (or store-and-forward repeater) RM4000. The RM4000 will transmit or receive data on any voice channel in the VHF or UHF band. The RM4000's frequency range and RF power are determined by the make and model of the enclosed transceiver. The RM4000 can also be used as a "Store and Forward" repeater, that is a digital repeater on a simplex channel. You can also transmit through existing voice repeaters to extend range.

WARNING: The audio tones used by this telemetry system sound much like the warning tones of certain types of helicopters. We are aware that most radiomodem systems are used on normal communications channels, and we urge you to make your pilots aware of this when they monitor these channels.

RM4000 ACCESSORIES

SP4000B -Solar Panel Power Supply:

This package consists of a 5 watt Arco solar panel and mounting bracket and separate battery and regulator case. The battery case contains a sophisticated switching power supply, battery charging circuit and gelled electrolyte lead-acid battery. The battery case is a sealed polycarbonate enclosure with environmentally sealed military connectors. The output of this device is a regulated 13.80 volts DC regardless of the battery charge condition or ambient temperature.

CBL-SP-RM-XX -Cable Harness:

These cable harnesses are supplied in several configurations to suit your particular site requirements. The standard harness interconnects the SP4000B, RM4000 and the data logger. These cable harnesses are supplied with environmentally sealed military style connectors.

ANTENNA-2 -5/8 wave Antenna Package:

This package consists of the Larsen 'PO-150' 5/8 wave antenna with four 1/4 wave ground plane radials, an 'L' shaped mounting bracket and a 25 foot cable. Two clamps are supplied to mount the RM4000 on the lower section of the mast. This is an omni directional antenna with 3dB gain.

INSTALLATION PROCEDURES

The following installation procedures assume you have the following:

- F.T.S. Data logger supplied tool kit
- F.T.S. Data logger Installation guide
- F.T.S. SP4000B Installation guide

Please read over all the installation guides before you attempt to set up your equipment. This will also help you coordinate the assembly of all the different pieces of F.T.S. equipment, saving time and effort.

F.T.S. Equipment Required:

- RM4000
- ANTENNA-2 (OR CUSTOM DIRECTIONAL ANTENNA)
- CBL-SP-RM-XX
- SP4000B (MAY BE AT SITE)

Tools Required:

- black tape
- 7/16" wrench
- 1/2" wrench
- 5/16" nut driver
- 5/64" allen key
- standard screw driver
- wire cutters
- leather palmed gloves
- #1 & #2 robertson screw driver
- 10 foot ladder or mast ladder kit ML-61

Optional Equipment:

- hand held transceiver (same channel and RF power)
- voltmeter with test leads
- spare fuses
 - 1 amp AGC RM4000
 - 2 amp AGC RM4000
 - 3 amp AGC SP4000B
 - 4 amp AGC SP4000B

BEFORE YOU LEAVE THE OFFICE

- Write down the serial number of the RM4000. Each RM4000 has its own unique number stamped into the label on its lid.
- If you have a multi-channel transceiver installed in the RM4000 be sure to set it to the correct channel for the remote site. Access to the transceiver can be gained by removing the lid of the RM4000. Do not touch the volume or squelch controls as these have been set by the specially trained (under paid) staff of F.T.S.
- If possible have the new station entered onto the station list of your F.T.S. Hub Controller. This will enable your staff to poll the site before you leave it. For further base station set up information see your DCAMS-3 and RM4000 technical manual. See figure #1 for typical base station set up.
- Check the radio propagation path from the remote site to the repeater for a half-duplex system (or office if system is simplex). Consult a radio communication expert if there is any doubt about the signal quality. You can evaluate the signal quality yourself by following these simple steps:
 - use a hand held transceiver of similar specifications to the one installed in your RM4000. Example:
 - ICOM IC-H12 = 2.5W
 - ICOM ICV200 = 10 W
 - GE CS-510HD = 5.0W
 - Motorola MX-360 = 2.0W
 - contact your office from the remote site with your hand held radio using a unity-gain type of antenna (1/4 wave "rubber duck" or whip antenna).
 - the channel should sound free of static and noise to both you and your office dispatcher.
 - walk around the site while transmitting, then while receiving, your signal should not fade or drop out.
 - if the signal is marginal then you will have problems with the communication of data back to the office.
- Keep in mind that the radio propagation is affected by changes in weather and time of day. A good rule of thumb is to allow a 20dB 'Fade Factor' in the signal level. Unfortunately this can only be measured by a radio technician.

INSTALLATION OF THE ANTENNA-2 ANTENNA PACKAGE

- This procedure should be done before the mast sections are extended.
- The mast extension that supports the wind sensor support arm has two tapped holes near the top.
- Use the bolts provided to secure the antenna mounting bracket in place, antenna mount pointing up.
- It can be bolted on either side of the extension because the antenna is omni directional.
- Worm clamps are provided to secure the antenna bracket to non-standard masts, but be sure the antenna is the tallest point of the metal structure.
- Install the four ground plane radials into the holes in the corners of the antenna base. Secure them with the set screws using the 5/64" allen key.
- Install the one longer driven element in the top of the loading coil, secure with set screw. Note: this element has been trimmed to length by the specially trained staff of F.T.S.
- Connect the 'ANTENNA' end of the antenna cable to the SO-239 connector under the antenna mount.
- Strain relief the antenna cable to the mast extension with black tape. Be sure not to kink the coaxial cable because it will severely degrade its performance.
- Black tape all the cables to the mast at regular intervals as you erect the mast as described in the data logger installation guide.
- Put the two black aluminum clamps aside for later mounting of the RM4000.

INSTALLATION OF THE RM4000 RADIOMODEM

- Remove the two black aluminum clamps from the antenna package.
- Loosen and remove the four bolts located in the tapped holes on the back of the RM4000 case.
- Mount clamps to the one side of the RM4000 case very loosely with two of the four bolts.
- Place the RM4000 against the mast, above the data logger, with its antenna connector pointing up.
- Swivel clamps around the mast, drop them into position and secure with the other two bolts. Tighten all four bolts with 1/2" wench.
- Connect the 'RM4000' end of the antenna cable to the Type 'N' connector on the top of the RM4000 case. Be sure there is no moisture or contaminants in the connector before mating them.
- Ensure a drip loop is provided with the extra cable length. See figure #4.

INSTALLATION OF THE
CBL-SP-RM-XX

- Remove your cable harness from its packing material. (This procedure assumes the site is a standard remote data logger to RM4000 installation).
- Connect the 4 pin bayonet connector to the SP4000B output.
- Connect the 14 pin bayonet connector to the RM4000 multi-function connector. If two 14 pin connectors are on the harness it will be the connector without the red tape
- Connect the remaining connector to the data logger 'POWER/TELEMETRY' connector.
- Coil the extra cable length up neatly and tape it to the mast, well out of reach of rodents. Place drip loops where required.
- Be sure there is no moisture or contaminants in the connectors before mating them. The bayonet style connectors will 'Click' into their lock position after 1/3 of a turn.
- The data logger will now be running off the SP4000 power output (not the data logger's 'D' cells). Check the voltage level with the 'Battery Check' function of the data logger. The voltage level should be 12.7 volts DC for a WR-62 and WR-62A. The voltage level should be 13.7 volts DC for an FWS-11.

OPERATIONAL CHECKS

These operational checks are specific to the style of the data logger used. Determine the model number of data logger and turn to the correct section.

Section:	Model	Page#
	WR-62	12
	WR-62A	13
	FWS-11	14

OPERATIONAL CHECKS

WR-62 INSTALLATION

The cable harness supplied with this model of data logger contains a blue plastic 'TELEMETRY TEST MODULE' box which contains a small internal speaker and a red momentary-action push button switch. This allows the user to listen to the channel the RM4000 is monitoring and initiate a selftest sequence.

-Check that the RM4000 is strobing normally. The RM4000 is strobed on once every 8 seconds to conserve power. You should hear a burst of radio static from the 'TELEMETRY TEST MODULE' every 8 seconds. The speaker is quiet, you may have to press your ear against the box to hear it well. (Note: the strobe interval may be shorter for special systems.)

-**Problem?** If the unit is not strobing see the trouble shooting guide Case #1.

-When the radio channel is clear hold the red 'Selftest' button on the 'TELEMETRY TEST MODULE' down for 8 seconds. You should now hear a whistle from inside the RM4000 case.

-On your hand held radio, set to the same channel as the RM4000, you should hear a 10 second long 2400Hz tone followed by a one second chirp of data. This is the 'Universal Response Header' that has been transmitted.

-Any other RM4000 within range and on the same channel should answer back with alternating tones. These tones can be heard over the speaker in the 'TELEMETRY TEST MODULE'.

-**Problem?** See the trouble shooting guide Case #2.

-The RM4000 will go back to normal strobing operation within two minutes.

-The last check is to have your office poll the site to retrieve the weather data and check full operation. Ensure radio silence during the polling sequence.

-**Problems?** See the trouble shooting guide Case #3 or Case #4.

OPERATIONAL CHECKS

WR-62A INSTALLATION

The WR-62A data logger has a small speaker behind the face plate of the recorder. The face plate has a red 'Radiomodem Self Test' momentary-action push button switch in the lower right corner. This allows the user to listen to the channel the RM4000 is monitoring and initiate a selftest sequence.

-Check that the RM4000 is strobing normally. The RM4000 is strobed on once every 8 seconds to conserve power. You should hear a burst of radio static from the hidden speaker every 8 seconds. The speaker is quiet, you may have to press your ear against the faceplate to hear it well. (Note: the strobe interval may be shorter for special systems.)

-**Problem?** If the unit is not strobing see the trouble shooting guide Case #1.

-When the radio channel is clear hold the 'Red Selftest' button on the face plate down for 8 seconds. You should now hear a whistle from inside the RM4000 case.

-Over your hand held radio, set to the same channel as the RM4000, you should hear a 10 second long 1200Hz tone followed by a one second chirp of data. This is the 'Universal Response Header' that has been transmitted.

-Any other RM4000 within range and on the same channel should answer back with alternating tones. These tones can be heard over the speaker.

-**Problem?** See the trouble shooting guide Case #2.

-The RM4000 will go back to normal strobing operation within two minutes.

-The last check is to have your office poll the site to retrieve the weather data and check full operation. Ensure radio silence during the polling sequence.

-**Problems?** See the trouble shooting guide Case #3.

OPERATIONAL CHECKS

FWS-11 INSTALLATION

The cable harness supplied with this model of data logger connects to the RM4000 and the SP4000B. Selection 'E' of the FWS-11's main menu is the "Printer and Technical Menu". This secondary menu allows the user to perform a "Telemetry Test", selection 'E'. The "Telemetry Test" function will initiate an RM4000 self test sequence. Details of this test will be outlined in the following steps.

-Check that the RM4000 is strobing normally. The RM4000 is strobed on once every 7 seconds to conserve power. You should hear a beep from the RM4000 case every 7 seconds. The buzzer is quiet, you may have to press your ear against the case to hear it well. (Note: the strobe interval may be shorter for special systems.)

-**Problem?** If the unit is not strobing see the trouble shooting guide Case #1.

-When the radio channel is clear, use the FWS-11 to initiate the "Telemetry Test". You should now hear a ten second long whistle from inside the RM4000 case.

-The FWS-11 will display the screen shown in figure #5:

-Over your hand held radio, set to the same channel as the RM4000, you should hear a 9 second long 1200Hz tone followed by a two second chirp of data. This is the 'Universal Response Header' that has been transmitted.

-Any other RM4000 within range and on the same channel should answer back with data packets (alternating tones). These tones can be heard over the hand held radio.

-**Problem?** See the trouble shooting guide Case #2(a), (b), (c).

-The RM4000 will go back to normal strobing operation within thirty seconds.

-The FWS-11 will display a screen similar to figure #6 when the "Telemetry Test" is complete:

-The last check is to have your office poll the site to retrieve the weather data and check full operation. Ensure radio silence during the polling sequence.

-**Problems?** See the trouble shooting guide Case #3.

OPERATIONAL CHECKS

FWS-11 INSTALLATION
FROM OFFICE BASE LOCATION

DCAMS V4.00 (data collection and management) enables the user to perform two remote site and one office system tests. These tests are under the "CALL" pull down menu.

The first test is "Get telemetry env." This selection allows the user to check the telemetry environment both locally and at the remote site. After selecting this option you are given the list of all the stations on the station list that have telemetry.

- By selecting the 'Base' one can check the connections between the IBM and the Base RM4000. There will be a three second delay, after initiating the test, before the "Telemetry environment" information is displayed.

-**Problem?** If you get the error message: "Couldn't wake-up radio modem" See the trouble shooting guide Case #5.

- By selecting the Remote site one can check the remote site's environment. There will be a 25 second delay, after initiating the test, before the "Telemetry environment" information is displayed. This longer delay is due the actual call being placed to the field. The base RM4000 will try three times if it does not receive an acknowledgement from the remote.

-**Problems?** If the test fails an error message will be displayed on the IBM. See the trouble shooting guide Case #6.

The second system test "Get station env." allows the user to check the remote FWS-11's environment from the office. After selecting this option a list of stations will be displayed. After selecting a station and initiating the call, there will be a 25 second delay before the "Environment for station:" information is displayed.

-**Problems?** If after 30 seconds the IBM displays the error message "FWS-11 would not wake up within 5 seconds". See the trouble shooting guide Case #7.

TROUBLE SHOOTING GUIDE

WR-62

CASE #1: When the RM4000 is connected to the SP4000B, via the cable harness, there is no burst of static from the 'TELEMETRY TEST MODULE' every 8 seconds.

CAUSE #1: You are not listening closely enough, the speaker only produces a low level of audio.

ACTION #1: Press your ear to the lid of the blue plastic 'TELEMETRY TEST MODULE' and listen closely.

CAUSE #2: There must be a lack of power to the RM4000. The RM4000 will only run off the power from the SP4000B, it will not run off the 'D' cells that power the data logger in a power fail condition.

ACTION #2: Check the SP4000B battery power supply case output. Disconnect the 4 pin bayonet connector and use your voltmeter to measure the output voltage across pins 'A(+)' and 'B(-)'. (Note: the letters are molded into the grey rubber insulator of the connector.) The voltage should be 13.80 volt DC. If the output is not 13.80 volts DC it will be 0 volts DC. This will be because the SP4000B is in its 'Shut Down Mode'. See the SP4000B operating manual for further details.

CAUSE #3: If the SP4000B is producing voltage then the flaw may lie in the cable harness.

ACTION #3: Connect the 4 pin connector back to the SP4000B output. Disconnect the 14 pin bayonet connector from the RM4000. Use your voltmeter to measure the voltage across pin 'K(+)' and 'N,M or L(-)' of the cable end of the 14 pin connector. The voltage should be 13.80 volts DC. If not, the cable is defective and should be replaced or repaired.

CAUSE #4: If the SP4000B and cable harness are supplying power to the RM4000 the flaw must lie in the RM4000 itself.

ACTION #4: Loosen the 4 screws that hold down the RM4000 lid and remove it. (Note: There may be wires connecting the transceiver in the lid to the controller electronics in the case, be careful to support the lid.) There are two fuses located on a small circuit board at the 14 pin connector end of the case. Check them and replace if required. Be sure no moisture has entered the case before resealing the lid. Secure the 4 screws firmly to ensure a watertight seal. Send the RM4000 in for service to F.T.S. if the unit continues to blow fuses.

CAUSE #5: If all the other checks do not locate the problem, then it is possible the speaker in the 'TELEMETRY TEST MODULE' is defective.

ACTION #5: The speaker is not required for the system to function correctly, it is only a trouble shooting aid.

CASE #1 (B): When the RM4000 is plugged into the SP4000B, via the cable harness, there is continuous radio static from the 'TELEMETRY TEST MODULE' speaker.

CAUSE #1: The RM4000 is in the wrong mode of operation. The RM4000 has special test modes that can be enabled by service personnel.

ACTION #1: It is possible the RM4000 has been left in the 'Receive Test Mode'. Access to the test mode jumpers can be gained by removing the RM4000's lid. (Note: There may be wires connecting the transceiver in the lid to the controller electronics in the case, be careful to support the lid). Check that the jumpers are set up as in figure #7.

CAUSE #2: The RM4000 is locked up. This means the RM4000 is not running its firmware correctly and requires a reset.

ACTION #2: Disconnect the 14 pin bayonet connector from the RM4000, wait 30 seconds then reconnect the cable. This should reset the RM4000's firmware. If all the other checks do not locate the problem, send the RM4000 in to F.T.S. for servicing.

CASE #2 : The RM4000 is strobing normally but does not selftest correctly. Unit does not transmit the tones.

CAUSE #1: You did not hold the self test button down for a full 10 seconds.

ACTION #1: Try again, but be sure to the RM4000 is strobing every 8 seconds first. Note: The RM4000 only checks the status of the button during the strobe on interval. Try the selftest procedure again.

CAUSE #2: There must be a flaw in the cable harness of the red selftest button.

ACTION #2: Repair or replace. The selftest function is not required for the system to function correctly. It is only a trouble shooting aid.

CASE #2 (B): The RM4000 transmitted the 10 second tone but no response was heard. The tone would be audible over your repeater system.

CAUSE #1: You are not within range of any other RM4000.

ACTION #1: See the section on Checking the Radio Propagation Path.

CAUSE #2: You have an unusual radio network that isolates the rest of the RM4000's, unless the call originates from the base station RM4000.

ACTION #2: Move on to the final RM4000 operational test.

CAUSE #3: Radio transceiver inside the RM4000 is set to the wrong channel.

ACTION #3: Check the radio is set to the correct transmit and receive frequencies.

CASE #3: The preliminary tests are all successful but the RM4000 does not respond when polled by the office base station.

CAUSE #1: Did you hear the ten second attention tone from the office RM4000 through your repeater system? The tone should have been heard over your hand held radio and the speaker in the 'Telemetry Test Module'.

ACTION #1: The problem must lie in the office set up or your repeater system. Have the office staff confirm the Base RM4000 is transmitting out of the office.

CAUSE #2: While listening to the speaker in the 'TELEMETRY TEST MODULE', have the office poll the site. When the RM4000 wakes up it locks on to the tone and continues to receive until the end of the attention tone, then the unit turns off and does not transmit the data back.

ACTION #2: The serial number entered on the DCAMS station list must be incorrect. Have your office staff compare the RM4000 serial number on the station list to the one on the RM4000 label at your remote site. If it is not an incorrect serial number then the RM4000 failed its signal quality test.

CAUSE #3: While listening to the speaker in the 'TELEMETRY TEST MODULE', have the office poll the site. When the RM4000 wakes up it does not lock on to the tone and does not continue to receive.

ACTION #3: Check the RM4000's radio is set to the correct receive channel. If no problem is located send the RM4000 in to F.T.S. for service.

CASE #4: The RM4000 responds to the poll, but does not transfer the data successfully to the base station.

CAUSE #1: The RM4000 will send back a short error message if it can not upload data from the data logger. This message should be displayed on the F.T.S. hub controller's screen.

ACTION #1: The message indicates the data logger is unconnected or not responding. Check for 5.0 volts DC on pins 'C' and 'D' of the datalogger telemetry connector. Check the connectors and cable harness. Repair or replace. If the cables are functional then the problem must lie in the data logger, repair or replace.

CAUSE #2: The RM4000 sent back a full data dump but the base station at the office did not copy the transmission successfully.

ACTION #2: The RM4000 may have a defective transmitter or be set to the wrong channel. Correct problem if possible or send the RM4000 to F.T.S. for repair. If the RM4000 is transmitting correctly, but the signal is not heard at the office there may be a problem with your repeater system.

CAUSE #3: The RM4000 sent back a full data dump but the base station hub controller displays the message 'Check Sum in Received Data'. This indicates there were too many errors in the data transmission to be corrected by the base RM4000.

ACTION #3: This indicates the signal from the remote site contained too much background noise or the signal was broken or dropping out. Ensure that radio silence is observed during the polling sequence and try again. If the problem persists read the section on Checking the Radio Propagation Path.

TROUBLE SHOOTING GUIDE

WR-62A

CASE #1: When the RM4000 is connected to the SP4000B, via the cable harness, there is no burst of radio static from the speaker behind the faceplate every 8 seconds.

CAUSE #1: You are not listening closely enough, the speaker only produces a low level of audio.

ACTION #1: Press your ear to the faceplate of the WR-62A and listen closely.

CAUSE #2: There must be a lack of power to the RM4000. The RM4000 will only run off the power from the SP4000B, it will not run off the 'D' cells that power the data logger in a power fail condition.

ACTION #2: Check the SP4000B battery power supply case output. Disconnect the 4 pin bayonet connector and use your voltmeter to measure the output voltage across pins 'A(+)' and 'B(-)'. (Note: the letters are molded into the grey rubber insulator of the connector). The voltage should be 13.80 volt DC. If the output is not 13.80 volts DC it will be 0 volts DC. This will be because the SP4000B is in its 'Shut Down Mode'. See the SP4000B operating manual for further details.

CAUSE #3: If the SP4000B is producing voltage then the flaw may lie in the cable harness.

ACTION #3: Connect the 4 pin connector back to the SP4000B output. Disconnect the 14 pin bayonet connector from the RM4000. Use your voltmeter to measure the voltage across pin 'K(+)' and 'N,M or L(-)' of the cable end of the 14 pin connector. The voltage should be 13.80 volts DC. If not, the cable is defective and should be replaced or repaired.

CAUSE #4: If the SP4000B and cable harness are supplying power to the RM4000 the flaw must lie in the RM4000 itself.

ACTION #4: Loosen the 4 screws that hold down the RM4000 lid and remove it. (Note: There may be wires connecting the transceiver in the lid to the controller electronics in the case, be careful to support the lid.) There are two fuses located on a small circuit board at the 14 pin connector end of the case. Check them and replace if required. Be sure no moisture has entered the case before resealing the lid. Secure the 4 screws firmly to ensure a watertight seal. Send the RM4000 in for service to F.T.S. if the unit continues to blow fuses.

CAUSE #5: If all the other checks do not locate the problem, then it is possible the speaker behind the faceplate of the WR-62A must be defective.

ACTION #5: The speaker is not required for the system to function correctly, it is only a trouble shooting aid.

CASE #1 (B): When the RM4000 is plugged into the SP4000B, via the cable harness, there is continuous static from the speaker behind the faceplate.

CAUSE #1: The RM4000 is in the wrong mode of operation. The RM4000 has special test modes that can be enabled by service personnel.

ACTION #1: It is possible the RM4000 has been left in the 'Receive Test Mode'. Access to the test mode jumpers can be gained by removing the RM4000's lid. (Note: There may be wires connecting the transceiver in the lid to the controller electronics in the case, be careful to support the lid). Check that the jumpers are set up as in figure #7.

CAUSE #2: The RM4000 is locked up. This means the RM4000 is not running its firmware correctly and requires a reset.

ACTION #2: Disconnect the 14 pin bayonet connector from the RM4000, wait 30 seconds then reconnect the cable. This should reset the RM4000's firmware. If all the other checks do not locate the problem, send the RM4000 into F.T.S. for servicing.

CASE #2 : The RM4000 is strobing normally but does not selftest correctly. Unit does not transmit the tones.

CAUSE #1: You did not hold the 'Radio Modem Self Test' button down for a full 10 seconds.

ACTION #1: Try again, but be sure to the RM4000 is strobing every 8 seconds first. Note: The RM4000 only checks the status of the button during the strobe on interval. Try the selftest procedure again.

CAUSE #2: There must be a flaw in the cable harness or the red selftest button.

ACTION #2: Repair or replace. The selftest function is not required for the system to function correctly. It is only a trouble shooting aid.

CASE #2 (B): The RM4000 transmitted the 10 second tone but no response was heard. The tone would be audible over your repeater system.

CAUSE #1: You are not within range of any other RM4000.

ACTION #1: See the section on Checking the Radio Propagation Path.

CAUSE #2: You have an unusual radio network that isolates the rest of the RM4000's, unless the call originates from the base station RM4000.

ACTION #2: Move on to the final RM4000 operational test.

CAUSE #3: Radio transceiver inside the RM4000 is set to the wrong channel.

ACTION #3: Check the radio is set to the correct transmit and receive frequencies.

CASE #3: The preliminary tests are all successful but the RM4000 does not respond when polled by the office base station.

CAUSE #1: Did you hear the ten second attention tone from the office RM4000 through your repeater system? The tone should have been heard over your hand held radio and the speaker behind the face plate of the WR-62A.

ACTION #1: The problem must lie in the office set up or your repeater system. Have the office staff confirm the Base RM4000 is transmitting out of the office.

CAUSE #2: While listening to the speaker behind the faceplate of the WR-62A, the office polls the site. When the RM4000 wakes up it locks on to the tone and continues to receive until the end of the attention tone then the unit turns off and does not transmit the data back.

ACTION #2: The serial number entered on the DCAMS station list must be incorrect. Have your office staff compare the RM4000 serial number on the station list to the one on the RM4000 label at your remote site. If the serial number is correct then the RM4000 must have failed its signal quality test.

CAUSE #3: While listening to the speaker behind the faceplate of the WR-62A, the office polls the site. When the RM4000 wakes up it does not lock on to the tone and does not continue to receive.

ACTION #3: Check the RM4000's radio is set to the correct receive channel. If no problem is located send the RM4000 in to F.T.S. for service.

CASE #4: The RM4000 responds to the poll, but does not transfer the data successfully to the base station.

CAUSE #1: The RM4000 will send back a short error message if it can not upload data from the data logger. This message should be displayed on the F.T.S. hub controller's screen.

ACTION #1: The message indicates the data logger is unconnected or not responding. Check the connectors and cable harness. Repair or replace. If the cables are functional then the problem must lie in the data logger, repair or replace.

CAUSE #2: The RM4000 sent back a full data dump but the base station at the office did not copy the transmission successfully.

ACTION #2: The RM4000 may have a defective transmitter or be set to the wrong channel. Correct problem if possible or send the RM4000 to F.T.S. for repair. If the RM4000 is transmitting correctly, but the signal is not heard at the office there may be a problem with your repeater system.

CAUSE #3: The RM4000 sent back a full data dump but the base station hub controller displays the message 'Check Sum in Received Data'. This indicates there were too many errors in the data transmission to be corrected by the base RM4000.

ACTION #3: This indicates the signal from the remote site contained too much background noise or the signal was broken or dropping out. Ensure that radio silence is observed during the polling sequence and try again. If the problem persists read the section on Checking the Radio Propagation Path.

TROUBLE SHOOTING

GUIDE FWS-11

CASE #1: When the RM4000 is connected to the SP4000B, via the cable harness, there is no beep from the RM4000 case every 7 seconds.

CAUSE #1: You are not listening closely enough, the buzzer only produces a low level of audio.

ACTION #1: Press your ear to the case of the RM4000 and listen closely. Don't do this if the temperature is below freezing!

CAUSE #2: There must be a lack of power to the RM4000. The RM4000 will only run off the power from the SP4000B, it will not run off the 'D' cells that power the data logger in a power fail condition.

ACTION #2: Check the SP4000B battery power supply case output. Disconnect the 4 pin bayonet connector and use your voltmeter to measure the output voltage across pins 'A(+)' and 'B(-)'. (Note: the letters are molded into the grey rubber insulator of the connector). The voltage should be 13.80 volt DC. If the output is not 13.80 volts DC it will be 0 volts DC. This will be because the SP4000B is in its 'Shut Down Mode'. See the SP4000B operating manual for further details.

CAUSE #3: If the SP4000B is producing voltage then the flaw may lie in the cable harness.

ACTION #3: Connect the 4 pin connector back to the SP4000B output. Disconnect the 14 pin bayonet connector from the RM4000. Use your voltmeter to measure the voltage across pin 'K(+)' and 'N,M or L(-)' of the cable end of the 14 pin connector. The voltage should be 13.80 volts DC. If not the cable is defective and should be replaced or repaired.

CAUSE #4: If the SP4000B and cable harness are supplying power to the RM4000 the flaw must lie in the RM4000 itself.

ACTION #4: Loosen the 4 screws that hold down the RM4000 lid and remove it. (Note: There may be wires connecting the transceiver in the lid to the controller electronics in the case, be careful to support the lid.) There are two fuses located on a small circuit board at the 14 pin connector end of the case. Check them and replace if required. Be sure no moisture has entered the case before resealing the lid. Secure the 4 screws firmly to ensure a watertight seal. Send the RM4000 in for service to F.T.S. if the unit continues to blow fuses.

CAUSE #5: If all the other checks do not locate the problem, then it is possible the buzzer inside the RM4000 is defective.

ACTION #5: The buzzer is not required for the system to function correctly, it is only a trouble shooting aid.

CASE #1 (B): When the RM4000 is plugged into the SP4000B, via the cable harness, there is continuous beeping from the RM4000 case.

CAUSE #1: The RM4000 is in the wrong mode of operation. The RM4000 has special test modes that can be enabled by service personnel.

ACTION #1: It is possible the RM4000 has been left in the 'Receive Test Mode'. Access to the test mode jumpers can be gained by removing the RM4000's lid. (Note: There may be wires connecting the transceiver in the lid to the controller electronics in the case, be careful to support the lid). Check that the jumpers are set up as in figure #7.

CAUSE #2: The RM4000 is locked up. This means the RM4000 is not running its firmware correctly and requires a reset.

ACTION #2: Disconnect the 14 pin bayonet connector from the RM4000, wait 30 seconds then reconnect the cable. This should reset the RM4000's firmware. If all the other checks do not locate the problem, send the RM4000 into F.T.S. for servicing.

CASE #2 : The RM4000 is strobing normally but does not selftest correctly.

CAUSE #1: You did not initiate the "Telemetry Test" function of the FWS-11 correctly.

ACTION #1: Try again, but be sure to the RM4000 is strobing every 7 seconds first. If there is a problem, the FWS-11 will display one of the following screens. Follow the 'Checks' recommended on the screen in figure #8.

The screen in figure #8 indicates the solar panel's power pack has no output voltage. As a result the RM4000 has no power and can not communicate to the FWS-11. Check the SP4000B's output as per the instructions in Case #1. Check the cable to both the SP4000B and the RM4000.

The screen in figure #9 indicates the solar panel's power pack has no output voltage. As a result the RM4000 has no power and can not communicate to the FWS-11. Check the SP4000B's output as per the instructions in Case #1. Check the cable to the SP4000B. The cable from the FWS-11 to the RM4000 is intact. This has been deduced by the fact the voltage is 0.8 not 0.0.

The screen in figure #10 indicates the solar panel's power pack has the correct output voltage. As a result the RM4000 has power but can not communicate to the FWS-11. Check the RM4000's connections and cable. There may be an electronic defect in the RM4000 that requires servicing.

The screen in figure #11 indicates there are no other RM4000 radio modems with in radio contact of this remote site. The RM4000 transmitted the 8 second tone but no response was heard. The tone would be audible over your repeater system.

CAUSE #1: You are not within range of any other RM4000.

ACTION #1: See the section on Checking the Radio Propagation Path.

CAUSE #2: You have an unusual radio network that isolates the rest of the RM4000's, unless the call originates from the base station RM4000.

ACTION #2: Move on to the final RM4000 operational test.

CAUSE #3: Radio transceiver inside the RM4000 is set to the wrong channel.

ACTION #3: Check the radio is set to the correct transmit and receive frequencies.

CASE #3: The preliminary tests are all successful but the RM4000 does not respond when polled by the office base station.

CAUSE #1: Did you hear the nine second attention tone from the office RM4000 through your repeater system? The tone should have been heard over your hand held radio.

ACTION #1: The problem must lie in the office setup or your repeater system. Have the office staff confirm the Base RM4000 is transmitting out of the office.

CAUSE #2: While listening to the hand held radio, have the office poll the site. When the RM4000 wakes up it locks on to the tone and continues to receive until the end of the attention tone, then the unit turns off and does not transmit the data back. The buzzer in the RM4000 will beep while the unit is receiving.

ACTION #2: The serial number entered on the DCAMS station list must be incorrect. Have your office staff compare the RM4000 serial number on the station list to the one on the RM4000 label at your remote site. If the serial number is correct then the RM4000 must have failed its signal quality test.

CAUSE #3: While listening to the hand held radio, have the office poll the site. When the RM4000 wakes up it does not lock on to the tone and does not continue to receive. The RM4000's buzzer beeps for only one second, it doesn't stay on.

ACTION #3: Check that the RM4000's radio is set to the correct receive channel. If no problem is located send the RM4000 in to F.T.S. for service.

CASE #4: The RM4000 responds to the poll, but does not transfer the data successfully to the base station.

CAUSE #1: The RM4000 will send back a short error message if it can not upload data from the data logger. This message should be displayed on the F.T.S. Hub Controller's screen.

ACTION #1: The message indicates the data logger is unconnected or not responding. Check the connectors and cable harness repair or replace. If the cables are functional then the problem must lie in the data logger, repair or replace.

CAUSE #2: The RM4000 sent back a full data dump but the base station at the office did not copy the transmission successfully.

ACTION #2: The RM4000 may have a defective transmitter or be set to the wrong channel. Correct problem if possible or send the RM4000 to F.T.S. for repair. If the RM4000 is transmitting correctly, but the signal is not heard at the office there may be a problem with your repeater system.

CAUSE #3: The RM4000 sent back a full data dump but the base station hub controller displays the message 'Check Sum in Received Data'. This indicates there were too many errors in the data transmission to be corrected by the base RM4000.

ACTION #3: This indicates the signal from the remote site contained too much background noise or the signal was broken or dropping out. Ensure that radio silence is observed during the polling sequence and try again. If the problem persists read the section on Checking the Radio Propagation Path.

CASE #5: The RM4000 could not be awakened by the IBM.

CAUSE #1: The RM4000 is not connected to the correct COM port on the IBM.

ACTION #1: Check the connectors and cable harness. Repair or replace.

CAUSE #2: The RM4000 is not connected to power.

ACTION #2: Check that the RM4000's cable harness is plugged into its power source. If the power is connected, loosen the 4 screws that hold down the RM4000 lid and remove it. (Note: There may be wires connecting the transceiver in the lid to the controller electronics in the case, be careful to support the lid.) There are two fuses located on a small circuit board at the 14 pin connector end of the case. Check them and replace if required. Be sure no moisture has entered the case before resealing the lid. Secure the 4 screws firmly to ensure a watertight seal. Send the RM4000 in for service to F.T.S. if the unit continues to blow fuses.

CASE #6: See trouble shooting guide CASE #3.

CASE #7: The RM4000 responds to the poll, but the IBM displays the error message "FWS-11 would not wake up within 5 seconds".

CAUSE #1: The RM4000 sent back a short error message because it could not upload data from the data logger. This message was displayed on the F.T.S. Hub Controller's screen.

ACTION #1: The message indicates the data logger is unconnected or not responding. Check the connectors and cable harness. Repair or replace. If the cables are functional then the problem must lie in the data logger, repair or replace.

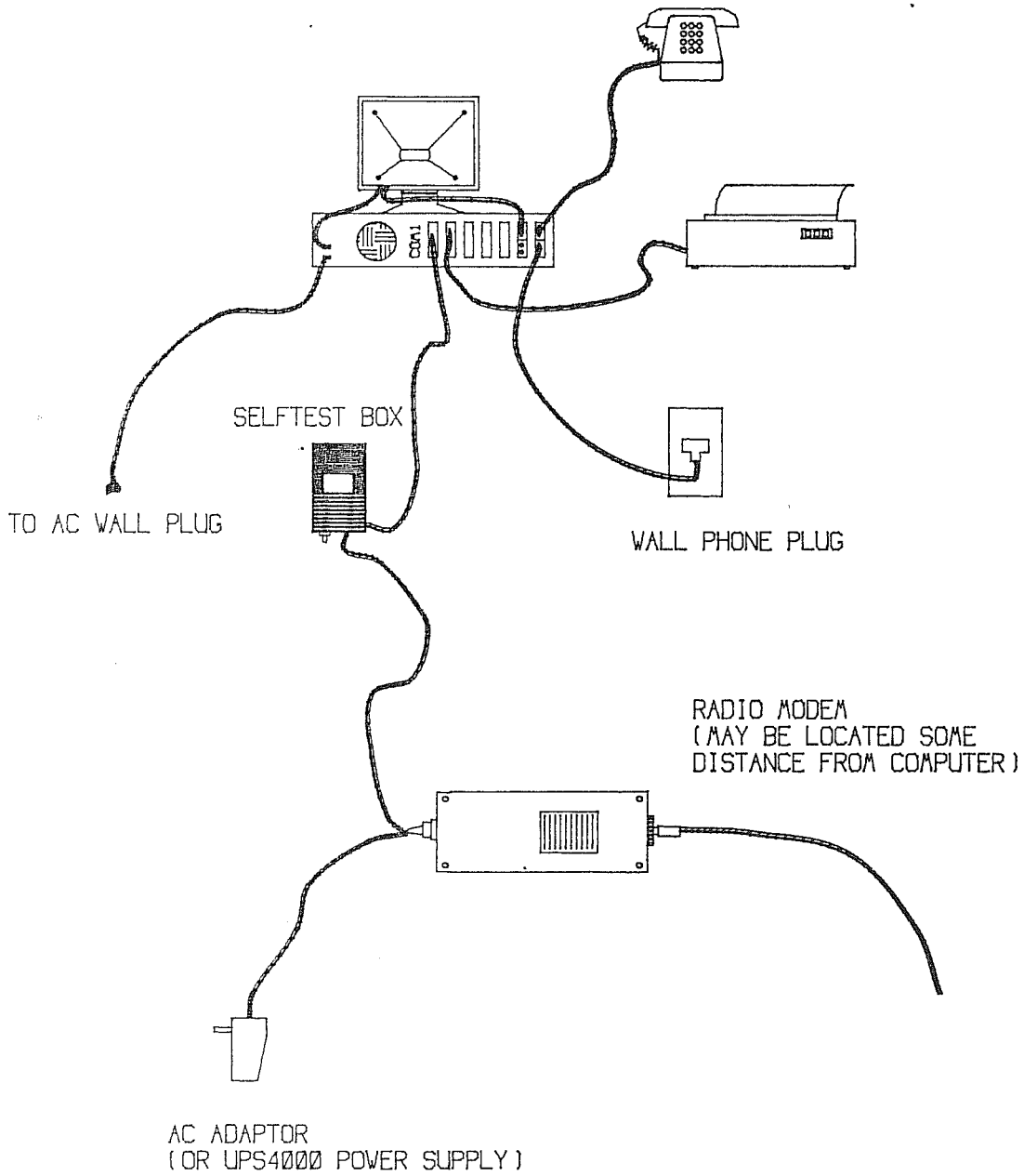


FIGURE 1

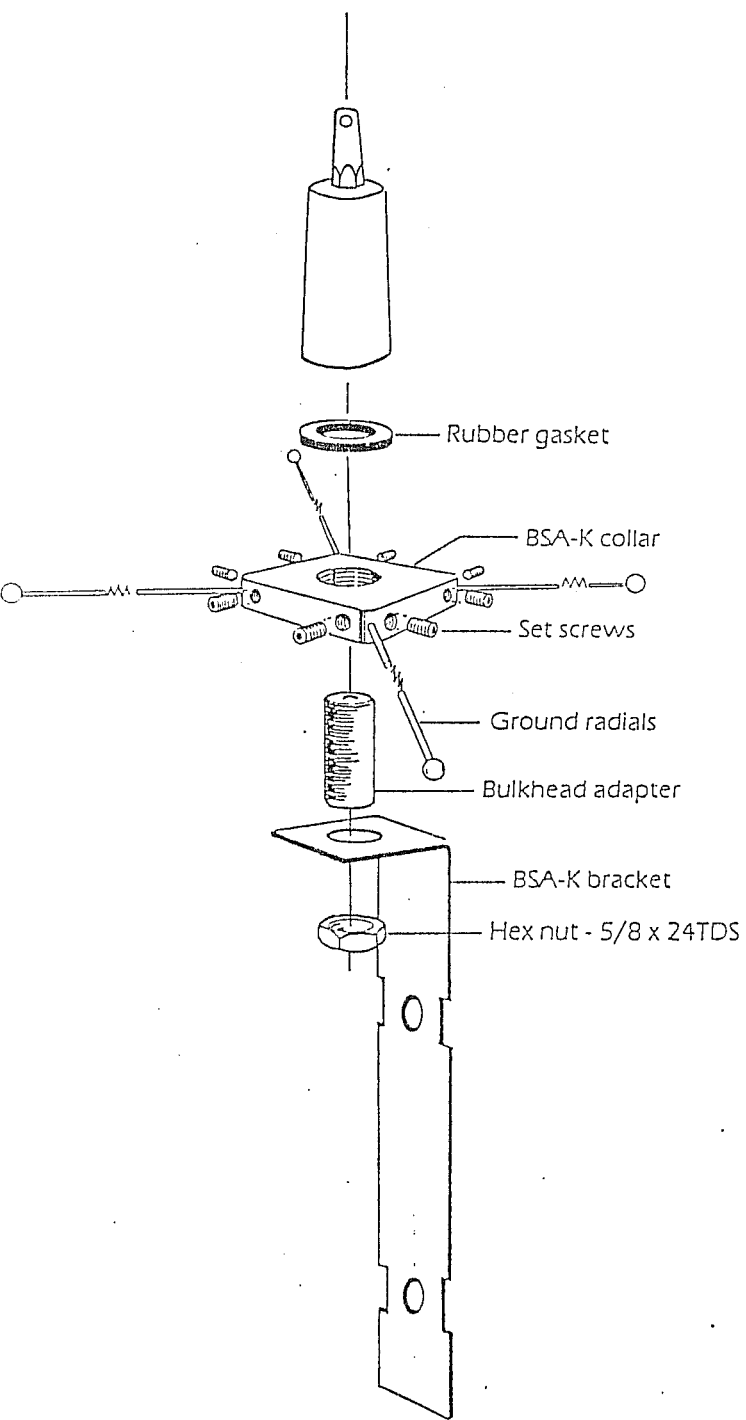
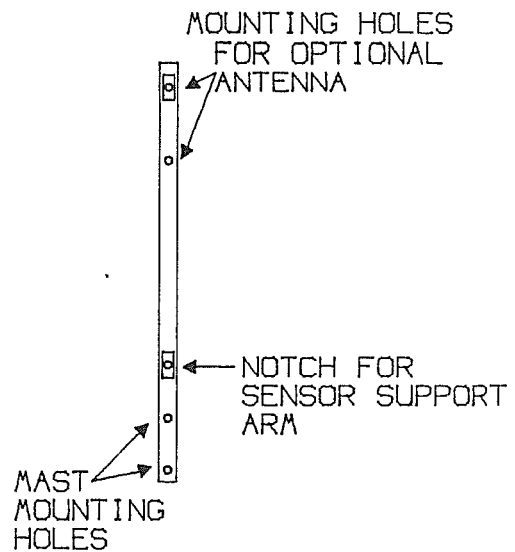
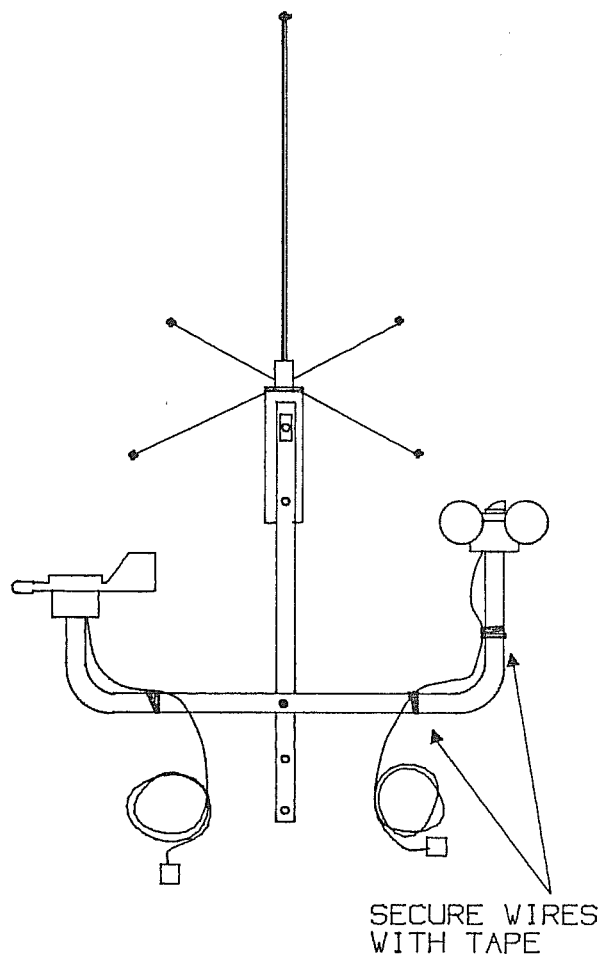


FIGURE 2



MAST EXTENSION



COMPLETE ASSEMBLY

FIGURE 3

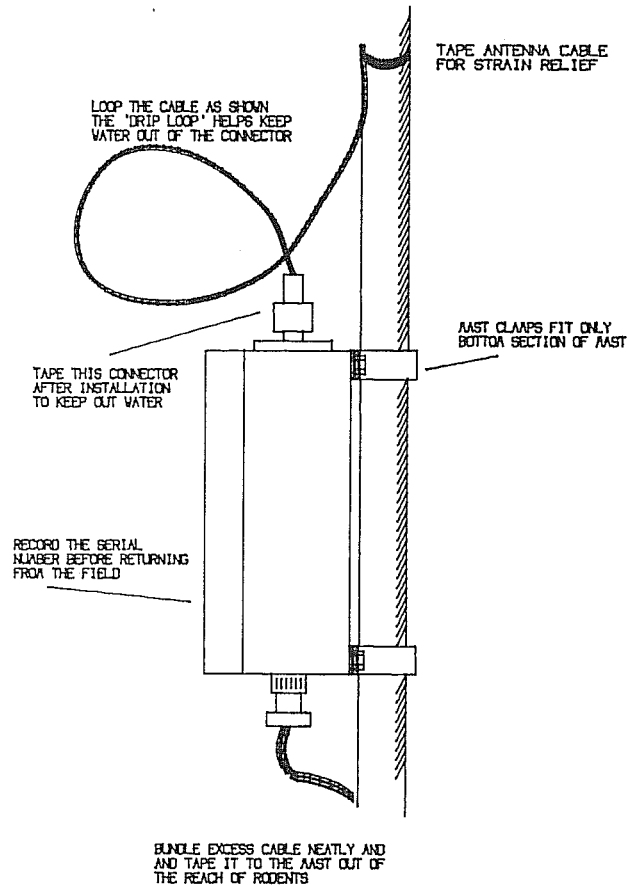


FIGURE 4

```
Telemetry Self - Test
Telemetry battery voltage = 13.8 -- OK
Telemetry awake -- sending request
Request accepted -- waiting for reply

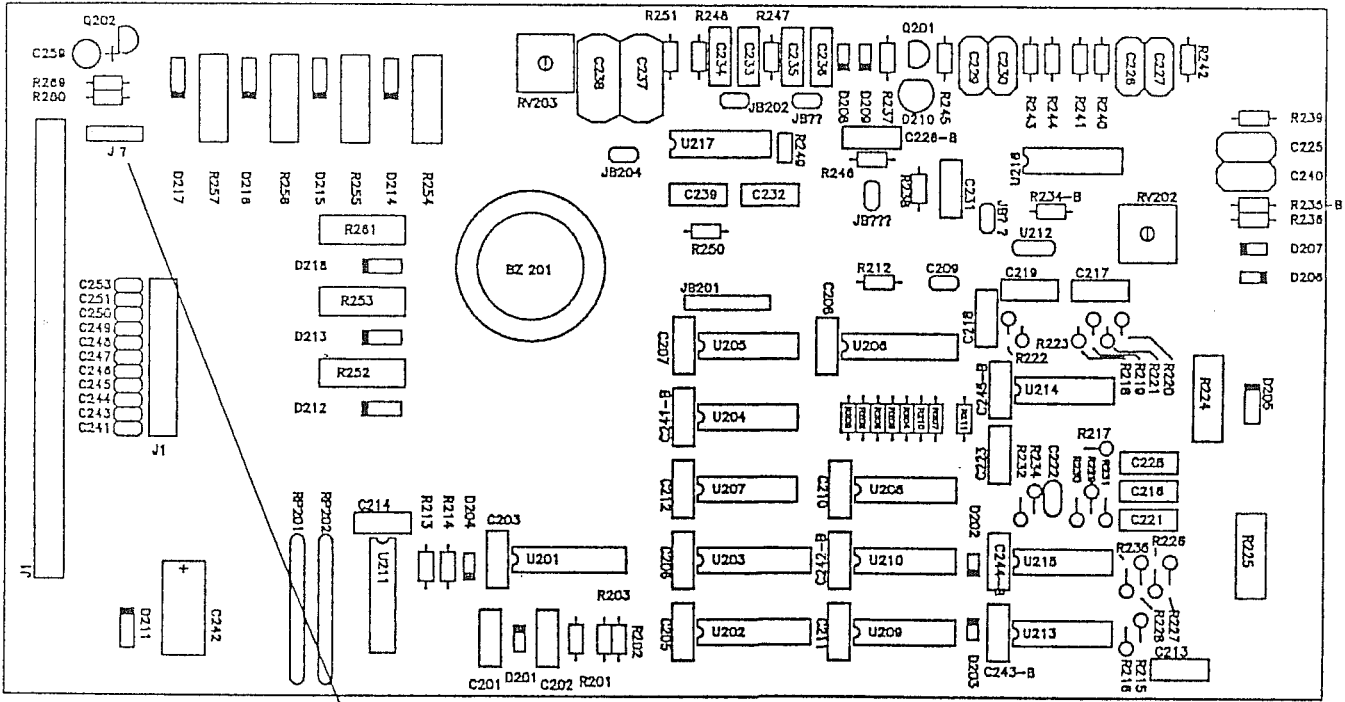
RETRY      PRINTER/TECHNICAL MENU  MAIN MENU
```

FIGURE 5

```
Free RAM = 1FEA
RM4000 Version 06 Rev 18 Address 4321
There have been 0157 Strokes
The time is now 82/06/10/09:20:01
1234
Above are the stations that are in range

RETRY      PRINTER/TECHNICAL MENU  MAIN MENU
```

FIGURE 6



SELFTEST MODE JUMPER BLOCK

NORMAL OPERATION



ANALOG LOOPBACK TEST MODE

SAME FUNCTION AS BUTTON ON SELFTEST BOX



RECEIVER ON ONLY

FIGURE 7

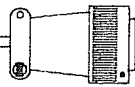
SP4000B OUTPUT CONNECTOR
4 PIN MALE 510-4P



BELDEN #8762
10 FEET

BELDEN #9536
5 FEET

COLOR CODE RED



RM4000 CONNECTOR
14 PIN FEMALE 510-14S

SP4000B OUTPUT 510-4P	
PIN A	CLEAR
PIN B	13.8 VDC O/P
PIN C	CHASSIS GND
PIN D	EXT. CHARGE I/P
	N/C
	DRAIN
	CHASSIS GND

WR-62A TELEMETRY CONNECTOR
14 PIN FEMALE 510-14S

RM-4000 CONNECTOR 510-14S			
PIN #	TO WR-62A	TO SPB	RM4000 FUNCTIONS
PIN A	GREEN	N/C	RM AUDIO O/P
PIN B	N/C	N/C	RIA AUDIO I/P
PIN C	N/C	N/C	RTS I/P
PIN D	WHITE	N/C	TX DATA O/P
PIN E	BLUE	N/C	DSP O/P
PIN F	BLUE	N/C	SELF TEST I/P
PIN G	N/C	N/C	CTS I/P
PIN H	BROWN	N/C	DATA I/P
PIN I	RED	N/C	CLOCK O/P
PIN J	BLACK	CLEAR	POWER I/P
PIN K	DRAIN	BLACK	CHASSIS GND
PIN L	N/C	N/C	CHASSIS GND

WR-62A TELEMETRY CONNECTOR 510-14S		
PIN #	TO RM4000	VR62A FUNCTION
PIN A	GREEN	AUDIO I/P
PIN B	N/C	EXT PVR I/P
PIN C	RED	EXT PVR I/P
PIN D	BLACK & DRAIN	CHASSIS GND
PIN E	N/C	RTS JUNCTION (TO A)
PIN F	BLUE	DATA SELF TEST O/P
PIN G	N/C	DATA JUNCTION (TO H)
PIN H	BROWN	DATA O/P RS232
PIN I	WHITE	RTS I/P
PIN J	N/C	DATA JUNCTION (TO N)
PIN K	N/C	NO CONNECTION
PIN L	N/C	RTS JUNCTION (TO E)
PIN M	N/C	DATA JUNCTION (TO K)

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```
Telemetry Self- Test
Telemetry battery voltage = 0.0 LOW
Check: All Connections
      Cables to solar power pack
      Solar power pack output voltage
Can't wake up telemetry -- test ended

RETRY      PRINTER/TECH MENU      MAIN MENU
```

FIGURE 8

```
Telemetry Self- Test
Telemetry battery voltage = 0.8 LOW
Check: All Connections
      Cables to solar power pack
      Solar power pack output voltage
Can't wake up telemetry -- test ended

RETRY      PRINTER/TECH MENU      MAIN MENU
```

FIGURE 9

```
Telemetry Self- Test
Telemetry battery voltage = 13.8 - OK
Can't wake up telemetry -- test ended
Check: All connections
      Cables to telemetry

RETRY      PRINTER/TECH MENU      MAIN MENU
```

FIGURE 10

```
Free RAM = 1FEA
RM4000 Version 06 Rev 18 Address 4321
There have been 0157 Strobes
The time is now 82/06/10/09:20:01
There are no other stations in range
```

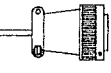
FIGURE 11



BELDEN #8762 20 FEET

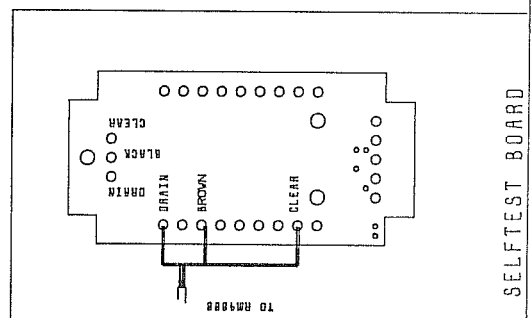
BELDEN #8762 15 FEET

RM4000 CONNECTOR
14 PIN FEMALE 510-14S



SP4000B OUTPUT CONNECTOR
4 PIN MALE 510-4P

SP4000B OUTPUT 510-4P	
PIN A	CLEAR
PIN B	BLACK
PIN C	N/C
PIN D	DRAIN
	13.8 VDC O/P
	CHASSIS GND
	EXT CHARGE I/P
	CHASSIS GND



SELFTEST BOARD

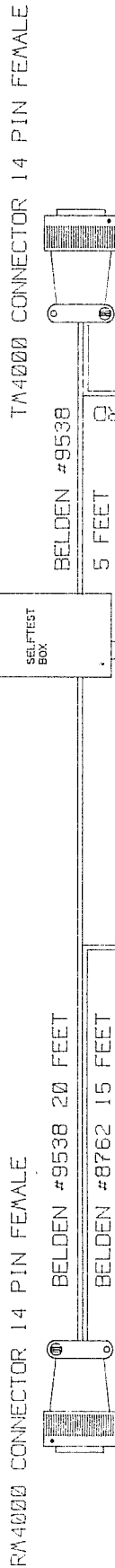
RM-4000 CONNECTOR 510-14S		RM4000 FUNCTIONS	
PIN #	TO SLFTST TO SPB		
A	BLACK	N/C	RM AUDIO O/P
B	N/C	N/C	RM AUDIO I/P
C	N/C	N/C	RTS I/P
D	N/C	N/C	TX DATA O/P
E	N/C	N/C	DSR O/P
F	CLEAR	N/C	SELF TEST I/P
G	N/C	N/C	CTS I/P
H	N/C	N/C	DATA I/P
I	N/C	N/C	CLOCK O/P
J	N/C	N/C	POWER I/P
K	N/C	N/C	CHASSIS GND
L	DRAIN	BLACK	CHASSIS GND
M	N/C	N/C	CHASSIS GND
N	N/C	N/C	CHASSIS GND

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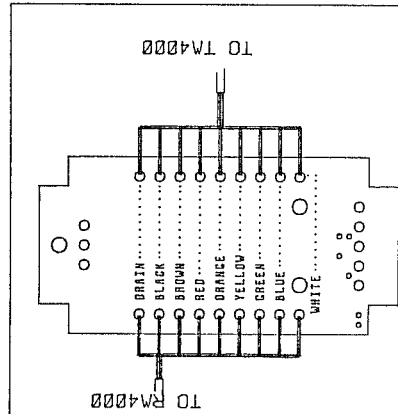


RA-4000 CONNECTOR 510-14S		RA4000 FUNCTIONS	
PIN #	TO SLEFST TO SPB	PIN #	FUNCTIONS
P1	BROWN	RA	AUDIO O/P
P2	N/C	RTS	I/P
P3	GREEN	TX	DATA O/P
P4	YELLOW	DSR	O/P
P5	N/C	SELF	TEST I/P
P6	BLUE	PTS	O/P
P7	JUMPER 1	DATA	I/P
P8	WHITE	CLOCK	O/P
P9	N/C	POWER	I/P
P10	ORANGE	CHASSIS	GND
P11	RED	CHASSIS	GND
P12	DRAIN	CHASSIS	GND
P13	BLACK	CHASSIS	GND
P14	BLACK	CHASSIS	GND

SP4000B OUTPUT 510-4P	
PIN A	CLEAR
PIN B	BLACK
PIN C	N/C
PIN D	DRAIN
PIN E	13.8 VDC O/P
PIN F	CHASSIS GND
PIN G	EXT CHARGE I/P
PIN H	CHASSIS GND

SP4000B CONNECTOR
4 PIN MALE

TM4000 OR TM4000CD CONNECTOR 510-14S			
PIN #	TO SELFTEST	TEL CORD	TM4000(CD) FUNCTIONS
P1	N/C	RED	TELEPH RING
P2	ORANGE	GREEN	TELEPH TIP
P3	WHITE	N/C	PWR I/P
P4	GREEN	N/C	NO CONNECT
P5	YELLOW	N/C	DATA I/P (FROM RA)
P6	N/C	N/C	RTS I/P (TO RA)
P7	RED	N/C	DATA O/P (TO RA)
P8	BROWN	N/C	RESERVED I/P
P9	N/C	N/C	EXT CLOCK O/P
P10	BROWN	N/C	RTS O/P (TTL)
P11	N/C	N/C	TELEPH BLACK
P12	BLUE	N/C	DATA I/P (WR)
P13	N/C	N/C	TELEPH YELLOW
P14	BLACK & DRAIN	N/C	CHASSIS GND



NOTE: THIS CABLE CAN BE USED WITH BOTH
TM4000 AND TM4000CD.

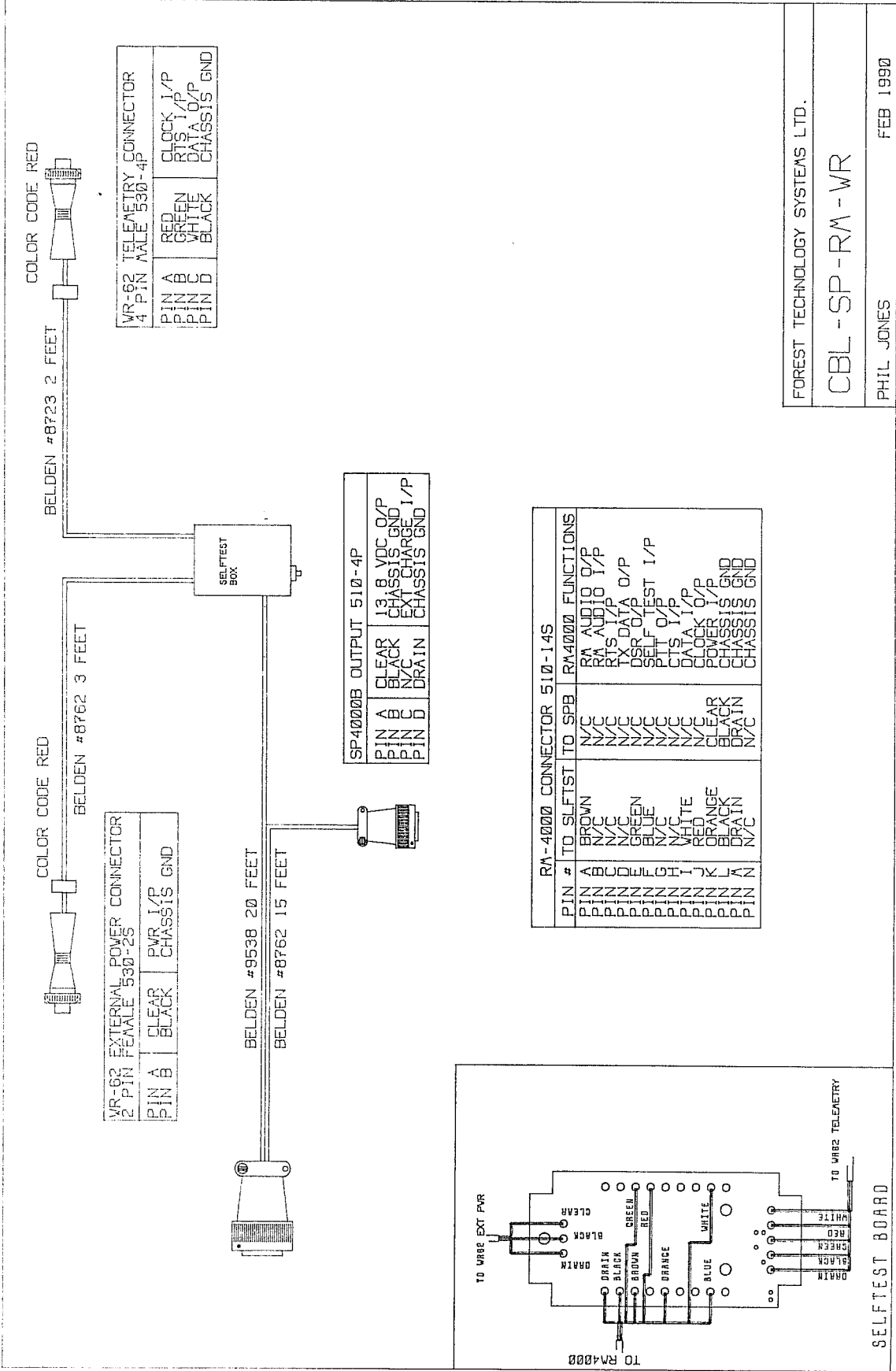
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SELFTEST BOARD

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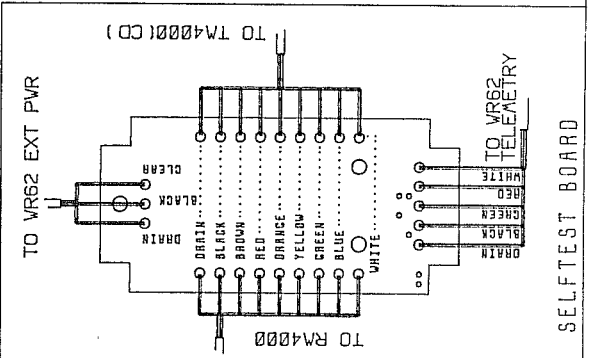
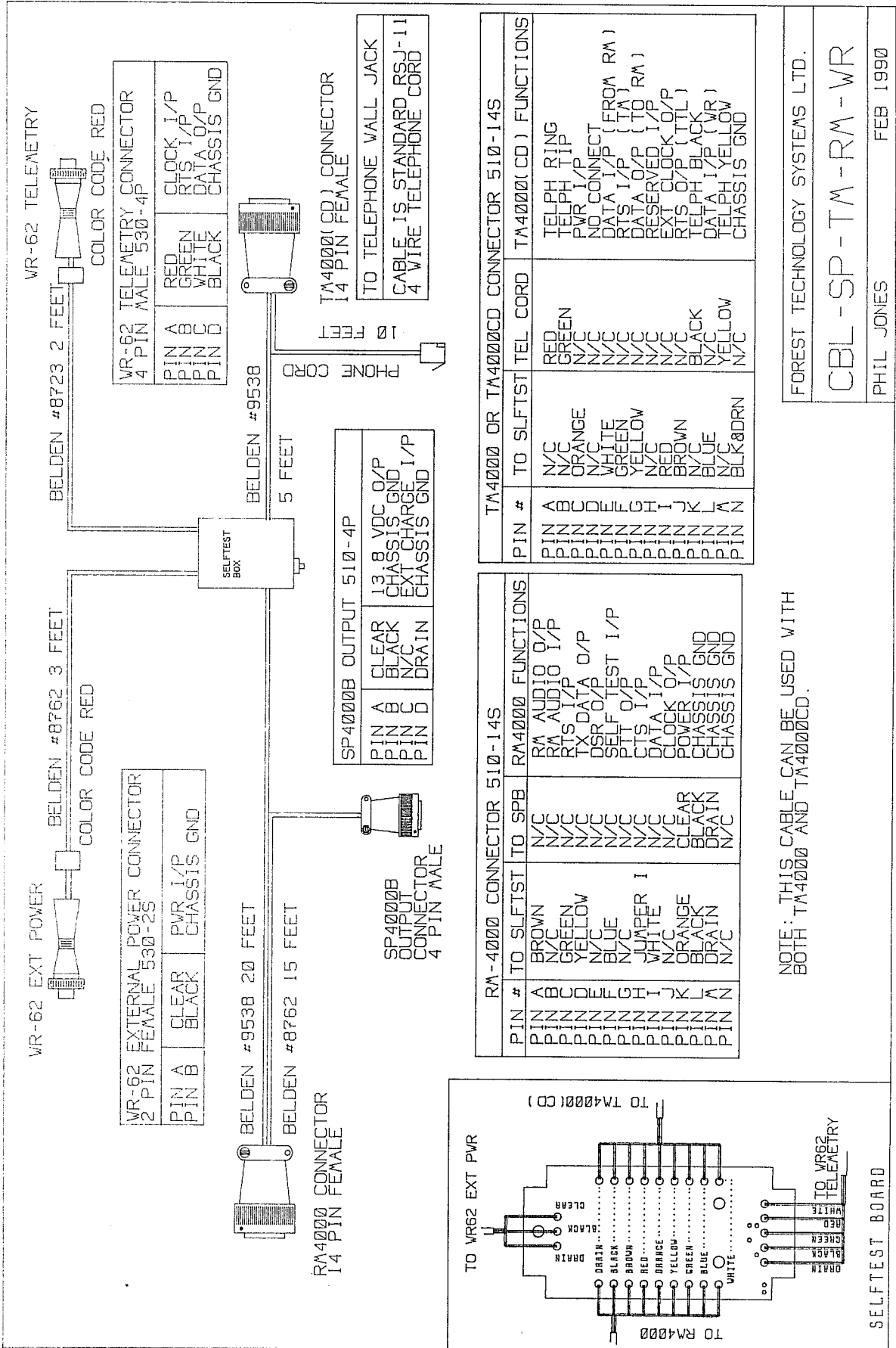


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WR-62 EXTERNAL POWER CONNECTOR 2 PIN FEMALE 530-25	
PIN A	CLEAR
PIN B	BLACK
	PWR I/P
	CHASSIS GND

WR-62 TELEMETRY CONNECTOR 4 PIN MALE 530-4P	
PIN A	RED
PIN B	GREEN
PIN C	WHITE
PIN D	BLACK
	CLOCK I/P
	RTS I/P
	DATA O/P
	CHASSIS GND

SP4000B OUTPUT 510-4P	
PIN A	CLEAR
PIN B	BLACK
PIN C	N/C
PIN D	DRAIN
	13.8 VDC O/P
	CHASSIS GND
	EXT CHARGE I/P
	CHASSIS GND

PIN #	TO SLFTST	TO SPB	RM4000 FUNCTIONS
PIN A	BROWN	N/C	RM AUDIO O/P
PIN B	N/C	N/C	RM AUDIO I/P
PIN C	GREEN	N/C	RTS I/P
PIN D	YELLOW	N/C	TX DATA O/P
PIN E	N/C	N/C	DSP O/P
PIN F	BLUE	N/C	SELF TEST I/P
PIN G	N/C	N/C	PTT O/P
PIN H	JUMPER 1	N/C	DATA I/P
PIN I	WHITE	N/C	CLOCK I/P
PIN J	ORANGE	N/C	POWER I/P
PIN K	BLACK	N/C	CHASSIS GND
PIN L	DRAIN	N/C	CHASSIS GND
PIN M	N/C	N/C	CLEAR
PIN N			BLACK
PIN O			DRAIN
PIN P			N/C

PIN #	TO SLFTST TEL CORD	TM4000(CD) FUNCTIONS
PIN A	N/C	TELEPH RING
PIN B	ORANGE	TELEPH I/P
PIN C	N/C	PWR I/P
PIN D	N/C	NO CONNECT
PIN E	WHITE	DATA I/P (FROM RM)
PIN F	GREEN	RTS I/P (TA)
PIN G	YELLOW	DATA O/P (TO RM)
PIN H	N/C	RESERVED I/P
PIN I	N/C	EXT CLOCK O/P
PIN J	BROWN	RTS O/P (TTL)
PIN K	N/C	TELEPH BLACK
PIN L	BLUE	DATA I/P (WR)
PIN M	N/C	TELEPH YELLOW
PIN N	BLK&DRN	CHASSIS GND

NOTE: THIS CABLE CAN BE USED WITH BOTH TM4000 AND TM4000CD.

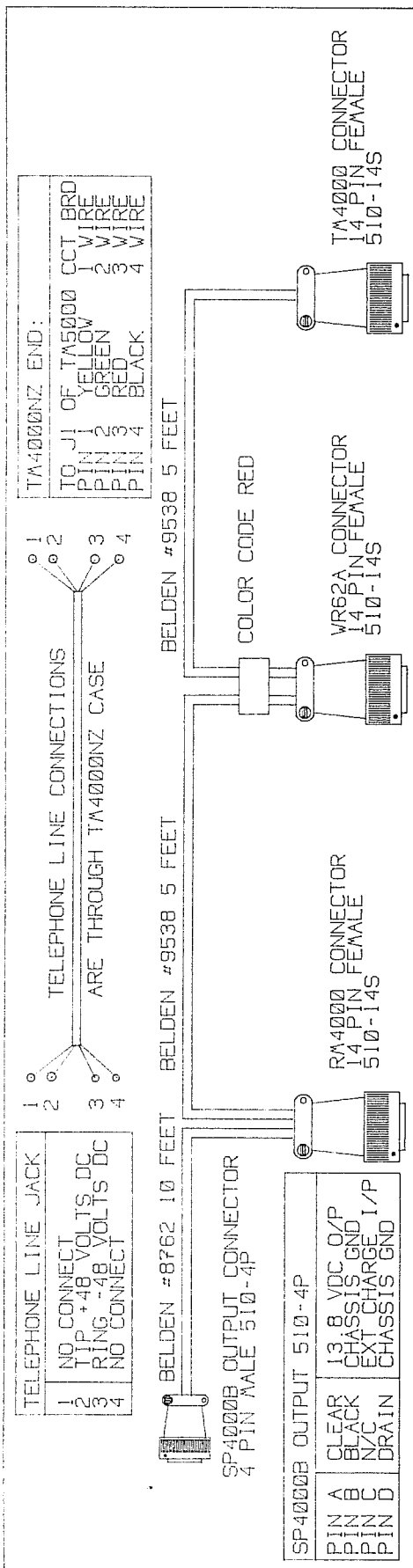
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CBL-SP-TM-RM-WR

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SELFTEST BOARD



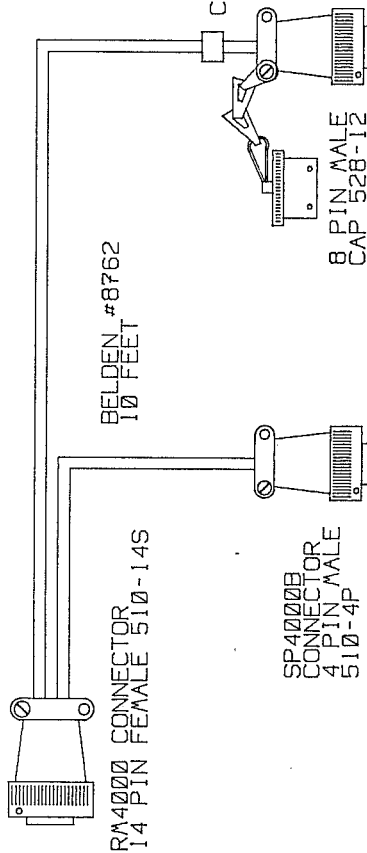
RM-4000 CONNECTOR 510-14S		WR-62A TELEMETRY CONNECTOR 510-14S	
PIN #	TO SPB	PIN #	TO RM4000
P1	BROWN	P1	BROWN
P2	N/C	P2	ORANGE
P3	WHITE	P3	RED
P4	GREEN	P4	BLACK & DRAIN
P5	N/C	P5	N/C
P6	N/C	P6	BLACK & DRAIN
P7	BLUE	P7	WHITE
P8	N/C	P8	BLUE
P9	N/C	P9	YELLOW
P10	N/C	P10	N/C
P11	N/C	P11	N/C
P12	N/C	P12	N/C
P13	N/C	P13	N/C
P14	N/C	P14	N/C

RM-4000 CONNECTOR 510-14S		WR-62A TELEMETRY CONNECTOR 510-14S	
PIN #	FUNCTIONS	PIN #	FUNCTIONS
P1	RM AUDIO O/P	P1	AUDIO I/P
P2	RM AUDIO I/P	P2	EXT PWR I/P
P3	RTS DATA O/P	P3	EXT PWR I/P
P4	DSR O/P	P4	CHASSIS GND
P5	SELF TEST I/P	P5	RTS JUNCTION (TO A)
P6	RTS O/P	P6	RM SELF TEST O/P
P7	RTS I/P	P7	DATA JUNCTION (TO H)
P8	DATA I/P	P8	DATA JUNCTION (TO G)
P9	CLOCK O/P	P9	DATA O/P RS232
P10	POWER I/P	P10	DATA JUNCTION (TO N)
P11	CHASSIS GND	P11	NO CONNECT
P12	CHASSIS GND	P12	RTS JUNCTION (TO E)
P13	CHASSIS GND	P13	DATA JUNCTION (TO K)
P14	CHASSIS GND	P14	

• NOTE: RESERVED FOR USE IN CANADA

RM-4000 CONNECTOR 510-14S		RM-4000 FUNCTIONS	
PIN #	TO FWS-11 TO SPB		
PIN 1	N/C	RM AUDIO O/P	
PIN 2	N/C	RM AUDIO I/P	
PIN 3	N/C	RTS I/P	
PIN 4	GREEN	TX DATA O/P	
PIN 5	N/C	DSR O/P	
PIN 6	N/C	SELF TEST I/P	
PIN 7	N/C	PTT O/P	
PIN 8	N/C	CTS I/P	
PIN 9	W/PER. K	DATA I/P	
PIN 10	WHITE	CLOCK O/P	
PIN 11	N/C	POWER I/P	
PIN 12	RED	CHASSIS GND	
PIN 13	BLACK	CHASSIS GND	
PIN 14	BROWN	CHASSIS GND	
PIN 15	N/C		

BELDEN #8723
5 FEET



SP4000B
CONNECTOR
4 PIN MALE
510-4P

SP4000B OUTPUT 510-4P	
PIN	
PIN A	CLEAR
PIN B	CHASSIS GND
PIN C	EXT CHARGE I/P
PIN D	CHASSIS GND

INTERCONNECT TO TM4000 OR FWS-11 TELEMETRY 520-128S	
PIN	
PIN A	N/C
PIN B	DRAIN
PIN C	GREEN
PIN D	WHITE
PIN E	N/C
PIN F	BLACK
PIN G	RED
PIN H	N/C
	CTS I/P
	CHASSIS GND
	DATA I/P
	DATA O/P
	RTS O/P
	SIGNAL GND
	EXT PWR I/P
	NO CONNECT

COLOR CODE GREEN

FWS-11 TELEMETRY CONNECTOR
8 PIN FEMALE 520-128S

NOTE: IF CABLE IS USED FOR AN RM4000
STORE AND FORWARD SITE (CBL-SP-RA)
BE SURE TO CAP THE FWS-11 TELEMETRY
CONNECTOR.