

C A T V
RETURN BAND
ALIGNMENT
S Y S T E M

MODEL 6103
Head End Cable
TEst Return
"HECTER"

MODEL 6106
Carrier Generator/
Telemetry Receiver
Field Unit
"HECTER'S PUP"

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MODEL 6103 HECTER

1.0 HECTER SPECIFICATIONS:

DUAL INBOUND RECEIVERS:

Frequency (selected at time of order)	Standard 6 MHz and 29 MHz
Optional Frequency range	5 - 174 MHz
Level range	-10 to +30 dBmV
Level accuracy	± 0.5 dB @ 25° C
Level resolution	0.1 dB

OUTBOUND TELEMETRY CARRIER:

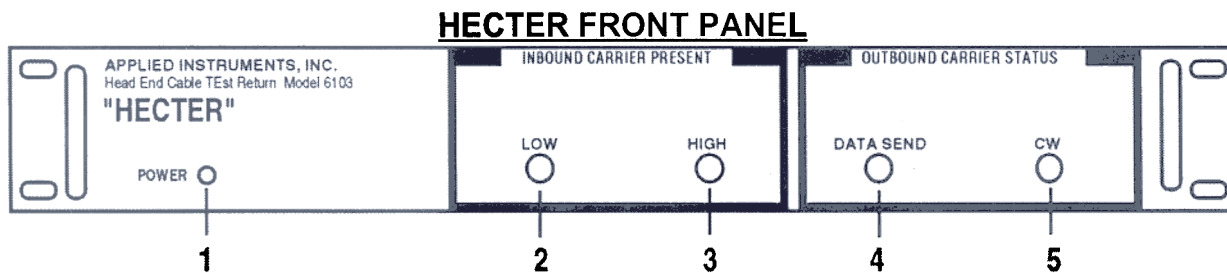
Frequency (Selected at time of order)	Standard 52.0 MHz
Optional frequency range	50 to 500 MHz
RF output level	+30 to +50 dBmV
CW spurious and harmonics	All > 60 dBc

ENCLOSURE:

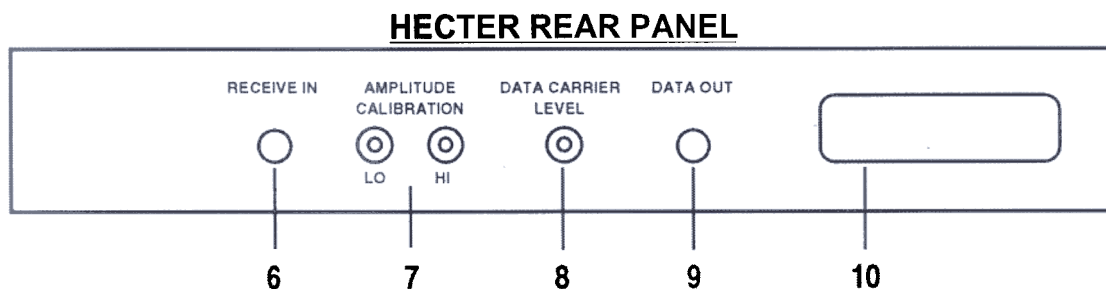
Temperature range	Operating 0° C to 45° C
Power	120/240 ~ 50/60 Hz 0.5/0.25A
Size	19" Rack Mount, 1 3/4"H, 9"D
Weight	7 LBs (3.2 Kg)

2.0 HECTER CONTROLS, INDICATORS, AND CONNECTIONS

This section provides the instructions and information necessary to connect and operate the Model 6103 HECTER.



- 1. Power on indicator LED** - LED illuminates when power has been applied.
- 2. LOW carrier present LED** - LED illuminates when a carrier of the low receive carrier frequency is being received.
- 3. HIGH carrier present LED** - LED illuminates when a carrier of the high receive carrier frequency is being received.
- 4. DATA SEND LED** - LED illuminates when the forward transmitting data carrier is being modulated with the amplitudes of the received LOW and HIGH carriers.
- 5. CW LED** - LED illuminates when there are no LOW and HIGH carriers present, therefore the forward transmitting data carrier is unmodulated.

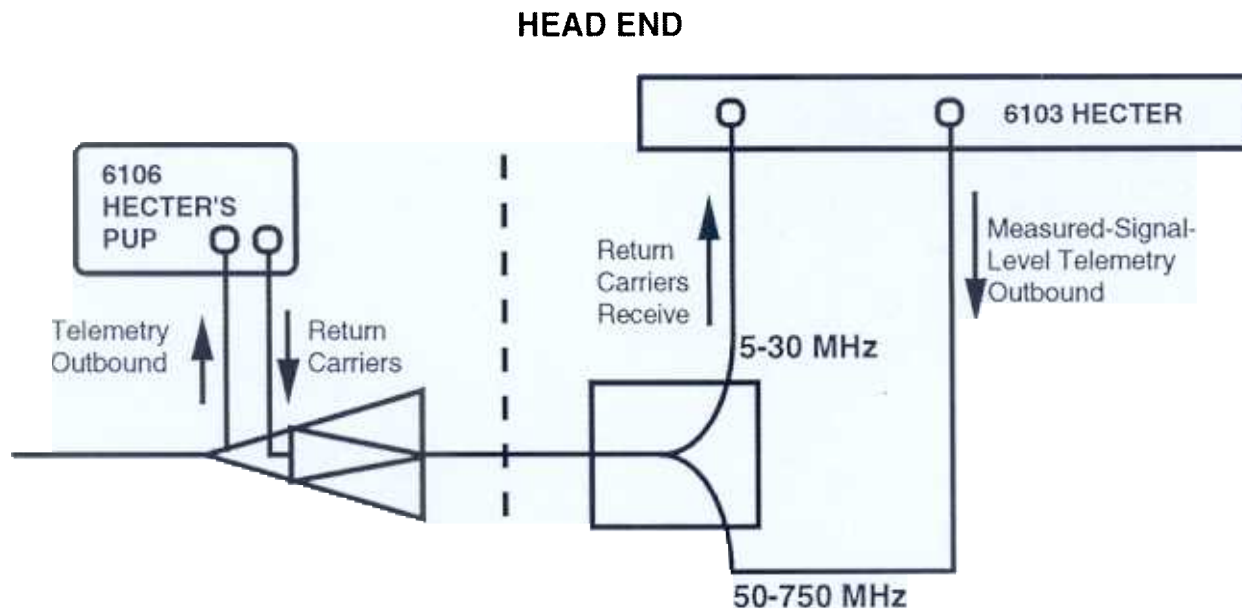


- 6. Receive In RF connector** - Type 'F' connector to receive the return carriers.
- 7. Amplitude calibration** - Adjusts the received amplitude of the incoming RF carriers.
- 8. Data Out level control** - Adjusts the amplitude of the modulated data carrier output.
- 9. Data Out RF connector** - Type 'F' connector, modulated data carrier output.
- 10. A.C. Cord Attachment** - Power attachment receptacle with fuse holder.

3.0 HECTER USED WITH MODEL 6106 HECTER'S PUP

In this configuration, the HECTER Head End Cable TEst Return system consists of a model 6103 HECTER carrier receiver/data modulator (to receive, measure, and transmit the amplitude level of the RF stimulus), and a model 6106 HECTER'S PUP (to provide inbound RF carrier stimulus, and to receive and display the modulated data carrier from the model 6103 HECTER).

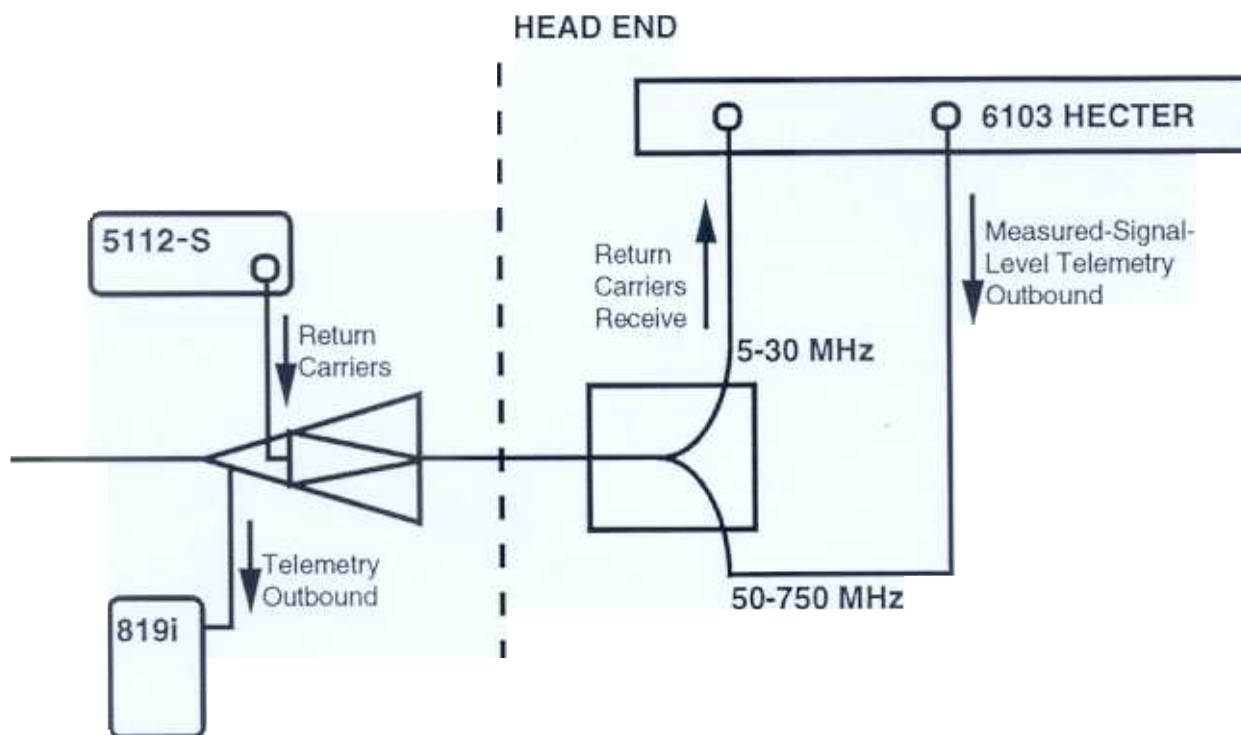
The heart of the system is the Applied Instruments headend receiver/modem model 6103 HECTER. This unit receives two carriers within the return portion of the spectrum (via the model 6106 HECTER'S PUP), measures their amplitudes in dBmV, and transmits this measurement via a modulated carrier in the forward band back to the model 6106 HECTER'S PUP for display. The headend unit measures both carriers and data is transmitted to the model 6106 HECTER'S PUP and displayed real-time, providing a continuous update on return levels (approximately five times a second). Levels can be measured or the effects of return alignment can be seen as the adjustments are being made.



4.0 HECTER USED WITH MODELS 5112 AND 819i

In this configuration, the HECTER Head End Cable Test Return system consists of a model 5112S (to provide inbound RF carrier stimulus), a model 6103 HECTER carrier receiver/data modulator (to receive, measure, and transmit the amplitude level of the RF stimulus), and a model 819i Signal Level Meter with the Data Carrier Receive Option (to receive and display the modulated data carrier from the model 6103 HECTER).

The heart of the system is the Applied Instruments headend receiver/modem model 6103 HECTER. This unit receives two carriers within the return portion of the spectrum (via a Model 5112S), measures their amplitudes in dBmV, and transmits this measurement via a modulated carrier in the forward band to the Applied Instruments Model 819i for display. The headend unit measures both carriers and data is transmitted to the 819i and displayed real-time, providing a continuous update on return levels (approximately five times a second). Levels can be measured or the effects of return alignment can be seen as the adjustments are being made.



5.0 HECTER OPERATION

Operation for either system method (HECTER - HECTER'S PUP or HECTER - MODEL 5112S - MODEL 819i) is similar. In the HECTER - HECTER'S PUP system, the model 6106 HECTER'S PUP provides both the inbound RF stimulus and the data receive-and-display function. In the HECTER - MODEL 5112S - MODEL 819i system, the model 5112S provides the inbound RF stimulus, and the model 819i provides the data receive-and-display function. In both cases, the operation of the model 6103 HECTER is identical.

The **RECEIVE IN** connector of the HECTER is to be attached to a point in the head end where typical return spectrum levels are found. The **DATA OUT** connector of the HECTER should be attached to an input tap point where the data transmitted can gain access to the outbound spectrum. At any point within the return spectrum, inject the RF carriers at the LOW and HIGH frequency, typically 6 and 29 MHz. When the model 6103 HECTER receives either of these carriers, the **LOW** or **HIGH** carrier status L.E.D.s will light, depending on which frequencies are present. At this time, the data out carrier will be modulated with the received amplitudes and transmitted in the forward direction. If the carriers are removed, the model 6103 HECTER will continue to transmit the amplitudes (**Lo, Lo**) for one minute. After the one-minute timeout with no receive carriers present, the **CW** L.E.D. will light and the carrier will be unmodulated.

NOTE: The data carrier is present at all times, only the modulation status will change (i.e. modulated or unmodulated) upon the presence or absence of the return receive carriers.

5.1 HECTER CALIBRATION

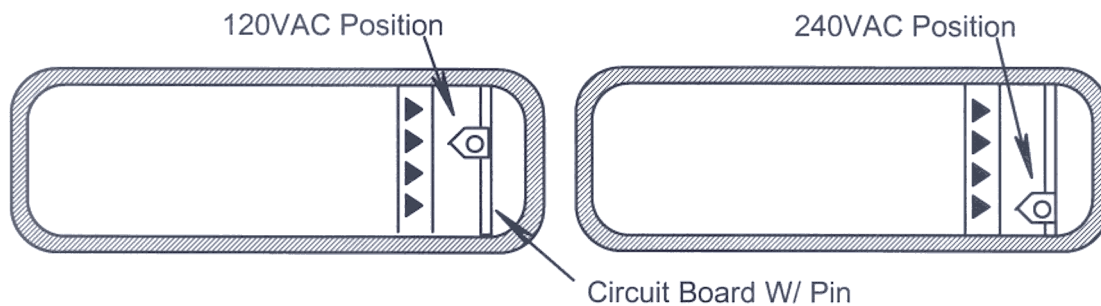
The rear panel of the model 6103 HECTER has two adjustment potentiometers for calibrating the receivers. If it becomes necessary to correct the receiver's calibration, perform the following steps:

- 1) Connect the data receive input of a model 6106 HECTER'S PUP or a model 819i w/Data Receive capability to the data output of the model 6103 HECTER.
- 2) Insert into the **RF IN** connector a signal of known amplitude, preferable at +10 dBmV, at the frequency of the LO receiver.
- 3) Read the resulting level on the data-receiving device (i.e. the HECTER'S PUP or the 819i). Adjust, if necessary, the LO potentiometer to cause the display to read the level of the known signal.
- 4) Repeat for the receiver's HI frequency. Lock the adjustment locking nuts.

5.2 HECTER LINE VOLTAGE SELECTION

The AC receptacle can be set for the available AC line voltage, either 120VAC or 240VAC. To set the desired voltage, remove the AC line cord from the AC input receptacle. Remove the fuseholder cover. Remove the vertical printed circuit board with a needle-nose pliers or similar tool; a fair amount of force will be necessary. Rotate the white plastic pin so that it is pointing **opposite** the desired line voltage nomenclature, i.e. opposite 120 for 120VAC or opposite 240 for 240VAC. Re-insert the printed circuit board in the same manner it was removed, insuring the white plastic pin points to the left as shown below. Press firmly to insure the board is fully seated. Install the proper fuse (120VAC - 1/2A, 240VAC - 1/4A.) in the fuse holder cover and insert the cover onto the AC receptacle. The white plastic pin should protrude through the hole of the fuseholder cover to indicate the line voltage selected.

NOTE: *Although there are adjustment holes for 100VAC and 220VAC, these settings are not available on this unit. Use only 120VAC or 240VAC.*



MODEL 6106 HECTER'S PUP

6.0 HECTER'S PUP SPECIFICATIONS:

INBOUND CARRIER GENERATOR:

Frequency (selected at time of order)	Standard 6 MHz and 29 MHz
Optional Frequency range	5 - 174 MHz
RF output	Individually adj., +36 to +56 dBmV
Amplitude stability	0.5 dB /setting
Spectral purity	>60 dBc
Residual hum	<0.1%
Frequency accuracy	>0.01% or 5kHz

TELEMETRY RECEIVER:

Frequency	52.0 MHz standard
Optional frequency range	50 to 500 MHz
Receive amplitude range	-20 to +40 dBmV

DUAL LCD READOUT:

Display	Simultaneously displays the headend signal level reading of the inbound carriers at the headend. Update rate > five times per second, displays battery charge information upon turn-on, gives automatic Lo battery information while in use.
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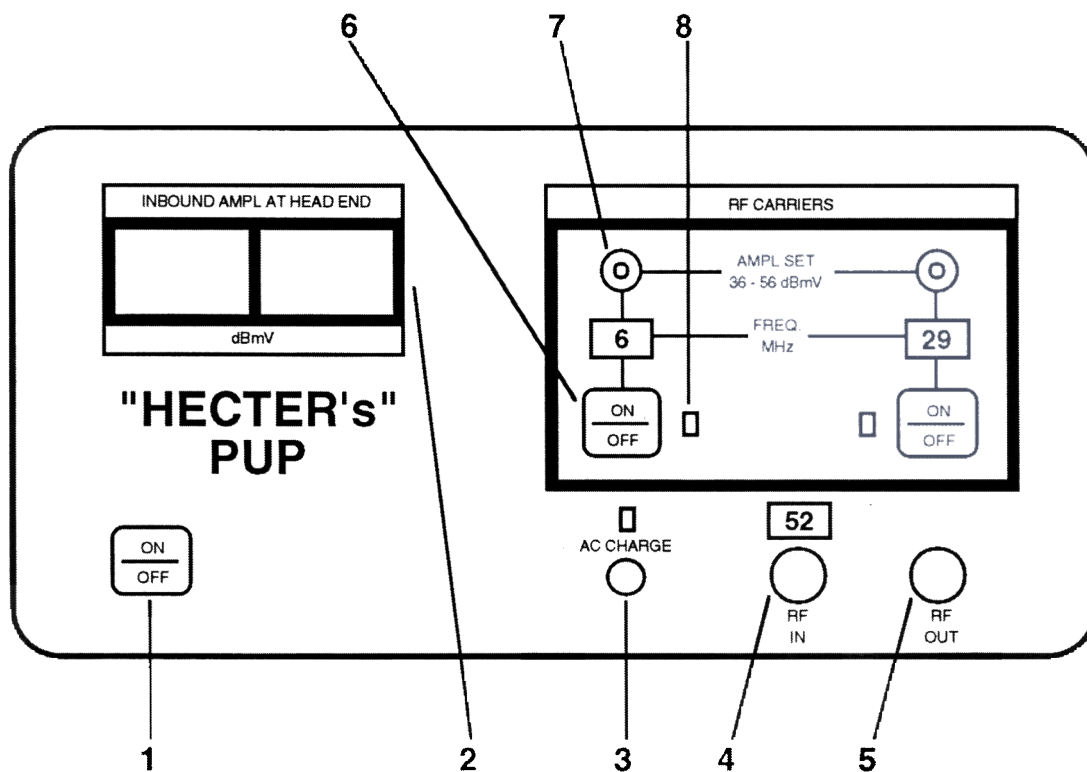
ENCLOSURE:

Temperature range	Operating -17° C to 50° C
Power	Ni-cad battery pack. Rechargeable from wall transformer.
Battery life	>10 hours continuous use
Size	4"H x 10"W x 7.25D
Weight	4.5 LBs (2.1 Kg)

7.0 HECTER'S PUP CONTROLS, INDICATORS, AND CONNECTIONS

This section provides the instructions and information necessary to connect and operate the model 6106 HECTER'S PUP.

HECTER'S PUP FRONT PANEL



1. Power on button - Press to power the unit.

2. Dual reading L.C.D. display - The LO frequency received data is displayed on the left side, and the HI frequency received data is displayed on the right side.

3. AC charge jack - Insert wall charger to charge batteries. L.E.D. will light when AC voltage is present.

4. Data In RF connector - Type 'F' connector to receive the modulated data carrier.

5. Carriers Out RF connector - Type 'F' connector, RF carriers output.

6. RF Carrier on/off control - controls RF carrier on/off.

7. RF Carrier amplitude control - controls amplitude of RF carrier.

8. RF Carrier on/off L.E.D - LED illuminates when the RF carrier is on.

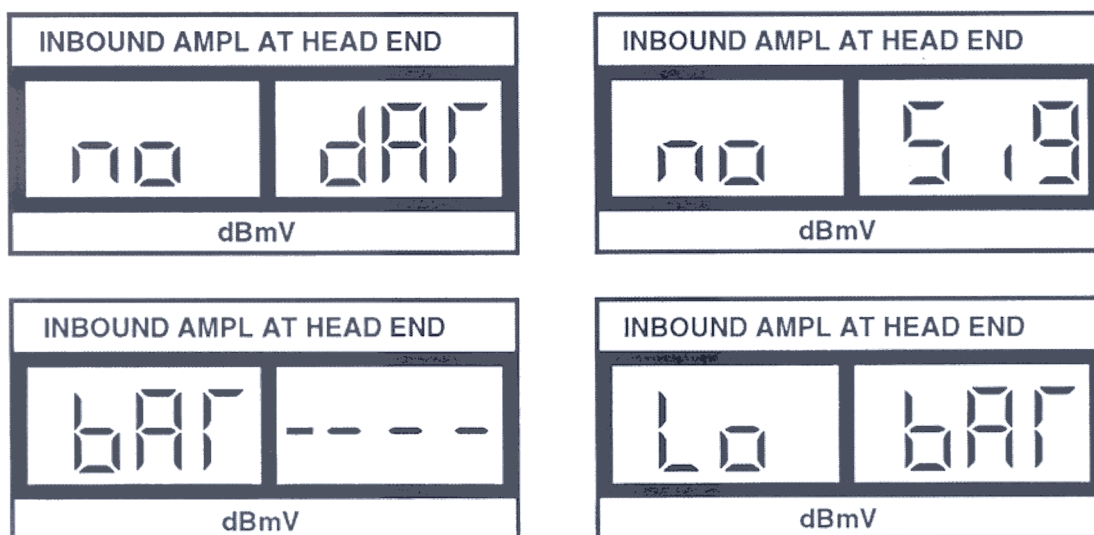
8.0 HECTER'S PUP OPERATION

In the HECTER - HECTER'S PUP system, the HECTER'S PUP provides both the inbound RF stimulus and the data receive-and-display function. The **RF IN** connector of the model 6016 HECTER'S PUP is to be attached to a point in the system where the outbound data transmission can be found. The **RF OUT** connector of the model 6016 HECTER'S PUP should be attached to a input tap point to feed the inbound RF carriers to the model 6013 HECTER at the headend. When the model 6103 HECTER receives either of these carriers, the LOW or HIGH carrier status L.E.D.s will light, depending on which frequencies are present. At this time, the data out carrier will be modulated with the received amplitudes and transmitted in the forward direction. If the carriers are removed, the model 6103 HECTER will continue to transmit the amplitudes (**Lo, Lo**) for one minute. After the one minute timeout with no receive carriers present, the CW L.E.D. will light and the carrier will be unmodulated.

NOTE: The data carrier is present at all times, only the modulation status will change (i.e. modulated or unmodulated) upon the presence or absence of the return receive carriers.

The model 6106 HECTER'S PUP will display **no Sig** when there does not exist a data carrier of sufficient signal strength. If a signal of sufficient strength is present, but not modulated with data, **no Dat** will be displayed. Upon turn on, the battery level will be displayed for four seconds, or until another button is pressed. To determine the battery voltage when using the model 6106 HECTER'S PUP, simply press the on/off button twice (to turn the unit off, then back on). The battery level will again be displayed. **Lo bAT** will flash when the battery is low.

NOTE: When the unit is powered up, both RF carriers will be OFF.



Displays showing: no data, no signal, battery level, and low battery level.

8.1 HECTER'S PUP AUTOMATIC SHUTOFF

The model 6106 HECTER'S PUP will automatically shut off after approximately four minutes. This is to conserve battery life in the event the unit is accidentally left in the ON state. At times, however, the unit may wish to be left unattended while the RF carriers are used in system troubleshooting. The four minute timeout may be disabled and replaced with a 120 minute timeout by using a special power-up method. To select the 120 minute auto shutoff timeout, press **and hold** either RF carrier ON/OFF button *before* applying power via the POWER button. Keep the RF carrier ON/OFF button pressed while applying power. The unit will sense the closed switch and select the 120 minute auto shutoff mode. The LCD display will show 120 for a short period of time to indicate the longer shutoff period. The 120 minute auto shutoff timeout must be selected each time this feature is desired; simply powering the unit normally (without pressing and holding either RF carrier button) will power up the unit using the normal 4 minute auto shutoff timeout.

NOTE: The initial RF carrier button press-and-hold will NOT cause the carrier to be energized. This is to prevent the carrier from being applied simply upon powering the unit. The held button needs to be released and re-pressed to activate the RF carrier.

NOTE: To protect the battery from excess discharge, a low battery shutoff has been incorporated into the unit. This feature shuts the unit off in the event the battery becomes too discharged to properly power the unit. Also, NI-CAD batteries can have their useful life shortened by discharging them beyond their design limits. If the 120 minute auto shutoff has been selected, the unit will still "LOW BATTERY" shut off if the battery level fall too low within the selected 120 minutes.



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