



# G-Series Site Equipment

## for ASTRO<sup>®</sup>25 Radio Systems



**GTR 8000 Expandable Site Subsystem**

G-series site equipment products provide feature-rich capability for ASTRO 25 mission critical radio systems. G-series software-defined base radio and site equipment platform allows customers to easily upgrade to future features. Motorola will be developing additional capabilities and functionalities that can be easily added to the station via a software upgrade. The G-series stations are flexible to meet customer's needs for site equipment. It is available in the following configurations:

- GTR 8000 Expandable Site Subsystem
- GTR 8000 Site Subsystem (HPD only)
- GTR 8000 Base Radio (standalone)
- GCP 8000 Site Controller – for multisite (simulcast) systems
- GCM 8000 Comparator – for multisite (simulcast) systems

The G-series stations support the following ASTRO 25 networks configurations:

- ASTRO 25 Trunking
  - Simulcast
  - Site Repeater
- ASTRO 25 High Performance Data

### Overview

- IP based simulcast functionality reduces site complexity – easing installation and service
- Linear Simulcast Modulation provides industry-leading radio coverage with fewer sites
- Compact and integrated hardware occupies three rack units and is designed for efficient use of site space
- Power supplies
  - Support AC & DC in the same unit
  - Standard battery revert and charging eliminates the need for an uninterruptible power supply (UPS) in many installations

G-series products are designed specifically for Motorola's ASTRO<sup>®</sup>25 radio systems. They are designed to support today's robust ASTRO 25 capabilities in Multisite (simulcast), Site Repeater and High Performance Data (HPD) applications as well as new features like IP simulcast. The G-series platform offers exceptional flexibility to fit customer feature

needs and site requirements while offering simplified installation and maintenance.

Motorola has been a leader in providing the best in coverage solutions with Multisite and specifically Linear Simulcast in 700/800 MHz. The G-series base radios now add Motorola's Linear Simulcast for improved coverage in the VHF and UHF bands.

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G-SERIES SITE EQUIPMENT  
for ASTRO®25 Radio Systems

### Design Flexibility

As a software-defined radio the G-series stations provide a lower total cost of ownership by offering the flexibility to add additional capabilities through software upgrades as they become available.

- Six basic modules (FRUs) create the entire G-series platform which can reduce the number of spare and replacement parts stocked
  - Transceiver, Power Amplifier, Power Supply, Fan Module, Site Controller/Comparator module, Expansion Hub
  - FRU modules are hot-swappable allowing servicing and replacement without system or site down-time

- Multisite (simulcast) systems require no field alignment<sup>1</sup> while Site Repeater systems feature greatly simplified alignment procedures with only one alignment process on the GCP 8000 Site Controller
  - Front-accessible LAN ports on G-series hardware makes it easy and efficient to service and upgrade using Customer Service Software (CSS) or Software Download Manager
- Subsystem configurations simplify initial installation and future site expansion or service

<sup>1</sup> Alignment is the tuning of the radio to the specified frequency. Traditional radios stray from the tuned frequency due to extended use or just over time and require regular alignment maintenance to ensure high signal quality and optimal performance

### Configuration-Specific Features

#### GTR 8000 Expandable Site Subsystem

G-series product components are uniquely configured in a flexible self-contained rack.

- Supports ASTRO 25 Integrated Voice & Data (IV&D) systems and 25 kHz High Performance Data (HPD) systems
- Space-efficient modular design integrates up to six GTR 8000 Base Radios, redundant GCP 8000 Site Controllers, and a new site reference distribution interface in one rack or cabinet
- Radio Frequency Distribution System (RFDS) can be integrated into the prepackaged system for most frequency bands

#### GTR 8000 Site Subsystem

A data-only system contained in a single, short, open rack.

- Supports ASTRO 25 25 kHz High Performance Data (HPD) systems only
- Provides HPD coverage equal to voice coverage
- Includes redundant GCP 8000 Site Controllers
- Integrates necessary Radio Frequency Distribution System (RFDS) equipment: duplexer, site preselector, and receiver multicoupler

#### GCP 8000 Site Controller

Maintains communication between Radio Network Gateway (RNG) and base radios at a site.

- Redundant GCP 8000 Site Controllers ensures continuity of radio coverage
- Supports ASTRO 25 IV&D, Multisite (simulcast) operations and HPD applications

#### GCM 8000 Comparator

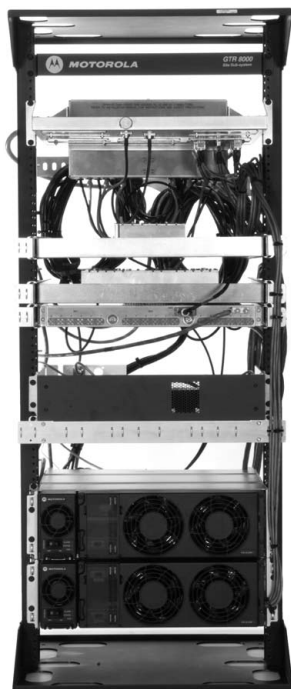
Ensures the broadcast of the best possible voice signal by combining the best parts of a single signal that has been received by multiple sites in a Multisite (simulcast) system.

- Supports ASTRO 25 Multisite (simulcast) operation across all frequency bands
- Bit Error Rate voting methodology ensures highest-quality possible voice signal is broadcast
- GPS timing ensures seamless broadcast of data packets from multiple voice signals

#### GTR 8000 Base Radio

A single rack mountable base radio.

- Supports ASTRO 25 Multisite (simulcast) IV&D and 25 kHz HPD systems
- GTR 8000 Base Radios can be used as direct replacements for QUANTAR or STR 3000 Base Radios<sup>2</sup>
- GTR 8000 Base Radios may be installed in a wide variety of configurations and are not limited to the GTR 8000 Expandable Site Subsystem or GTR 8000 Site Subsystem configurations



**GTR 8000 Site Subsystem**



**GTR 8000 Base Radio /  
GCP 8000 Site Controller /  
GCM 8000 Comparator**

<sup>2</sup> GTR 8000 Base Radio compatibility depends on system software release.

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G-SERIES SITE EQUIPMENT  
for ASTRO®25 Radio Systems

**GTR 8000 Expandable Site Subsystem**

<b>GENERAL PERFORMANCE</b>	<b>HPD 700/800 MHz</b>	<b>IV&amp;D 700/800 MHz</b>	<b>IV&amp;D UHF: 380-524 MHz</b>	<b>IV&amp;D VHF: 136-174 MHz</b>
Model Number	T7054A	T7054A	T7054A	T7054A
Number of Channels	2-5	1-6	1-6	1-6
Height*	90.4 in. (230 cm)	90.4 in. (230 cm)	90.4 in. (230 cm)	90.4 in. (230 cm)
Footprint (W x D)*	20.5 x 22.8 in. (52 x 58 cm)	20.5 x 22.8 in. (52 x 58 cm)	20.5 x 22.8 in. (52 x 58 cm)	20.5 x 22.8 in. (52 x 58 cm)
Weight (fully configured)*	475 lbs (215 kg)	475 lbs (215 kg)	UHF 380-435 MHz: 430lbs (195kg) UHF 450-512 MHz: 565lbs (260kg)	430 lbs (195 kg)
Temperature Range	-22 to 140 °F (-30 to 60°C)	-22 to 140 °F (-30 to 60°C)	-22 to 140 °F (-30 to 60°C)	-22 to 140 °F (-30 to 60°C)
Power Requirements				
AC	90-264 VAC, 47-63 Hz	90-264 VAC, 47-63 Hz	90-264 VAC, 47-63 Hz	90-264 VAC, 47-63 Hz
DC	43.2-60 VDC	43.2-60 VDC	43.2-60 VDC	43.2-60 VDC
Power Consumption (fully configured)	2500 W	C4FM: 3200 W LSM: 3500 W	C4FM: 3300 W LSM: 3600 W	C4FM: 3500 W LSM: 3000 W
Input/Output Impedance	50 ohms	50 ohms	50 ohms	50 ohms
Antenna Connectors				
Tx	7/16 Female	7/16 Female	7/16 Female	N Female
Rx	N Female	N Female	N Female	BNC Female
Channel Spacing	25 kHz	12.5 kHz	12.5 kHz	12.5 kHz
Modulation				
Tx	64QAM, 16QAM, QPSK	C4FM, LSM	C4FM, LSM	C4FM, LSM
Rx	64QAM, 16QAM, QPSK	C4FM	C4FM	C4FM
Frequency Stability	GPS synchronized	Repeater Site: 100 ppb/2 yr Simulcast (Multisite): External	Repeater Site: 100 ppb/2 yr Simulcast (Multisite): External	Repeater Site: 100 ppb/2 yr Simulcast (Multisite): External
<b>TRANSMITTER (CABINET OUTPUT)</b>				
	<b>HPD 700/800 MHz</b>	<b>IV&amp;D 700/800 MHz</b>	<b>IV&amp;D UHF: 380-524 MHz</b>	<b>IV&amp;D VHF: 136-174 MHz</b>
Frequency Range	762-776, 851-870 MHz	762-776, 851-870 MHz	380-435, 435-524 MHz	136-174 MHz
Average Power output per channel	1-20 W	1-40 W	C4FM: 2-100W (380-450, 512-524 MHz) LSM: 2-110W (380-450, 512-524 MHz) C4FM: 1-33W (450-512 MHz) LSM: 1-30W (450-512 MHz)	C4FM: 2-100 W LSM: 2-60 W
Modulation Fidelity	N/A	5%	5%	5%
EVM	10%	N/A	N/A	N/A
Spurious and Harmonic Emissions Attenuation	90 dB	90 dB	90 dB	90 dB
Emissions Designators	17K7D7D	8K70D1W, 8K10F1E	8K70D1W, 8K10F1E	8K70D1W, 8K10F1E
<b>RECEIVER (TOP OF CABINET)</b>				
	<b>HPD 700/800 MHz</b>	<b>IV&amp;D 700/800 MHz</b>	<b>IV&amp;D UHF: 380-524 MHz</b>	<b>IV&amp;D VHF: 136-174 MHz</b>
Frequency Range	792-825 MHz	792-825 MHz	380-435, 435-524 MHz	136-174 MHz
Sensitivity 1% Bit Error Rate Static (BER)				
64 QAM	-101 dBm	NA	NA	NA
16 QAM	-108 dBm	NA	NA	NA
QPSK	-115 dBm	NA	NA	NA
Sensitivity 5% Bit Error Rate Static (BER)				
C4FM	NA	-123 dBm	-115.5 dBm (380-450, 512-524MHz) -121.5 dBm (450-512 MHz)	-117 dBm
Intermodulation Rejection	75 dB **	80 dB	80 dB	80 dB
Adjacent Channel Rejection	50 dB **	60 dB	60 dB	60 dB
Spurious and Image Response Rejection	90 dB **	100 dB	85 dB (380-435 MHz) 110 dB (450-512 MHz)	90 dB
Intermediate Frequency				
1st	73.35 MHz	73.35 MHz	73.35 MHz	44.85 MHz
2nd	2.16 MHz	2.16 MHz	2.16 MHz	2.16 MHz

\* X882AH 75 Ft Open Rack Option

\*\* Reference signal is QPSK.

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G-SERIES SITE EQUIPMENT  
for ASTRO®25 Radio Systems

**GTR 8000 Expandable Site Subsystem (continued)**

**TRANSMITTER RF DISTRIBUTION SYSTEM**

	<b>700/800 MHz</b>	<b>UHF: 450-512 MHz</b>
Frequency Range	762-776 or 851-870 MHz	450-512 MHz
Insertion Loss (150 kHz spacing)	3.1 dB typ	4.5 dB typ
Tx-Tx Isolation (150 kHz spacing)	32 dB	32 dB

**RECEIVER RF DISTRIBUTION SYSTEM**

	<b>700/800 MHz</b>		<b>UHF: 450-512 MHz</b>	
Frequency Range	792-825 MHz		450-512 MHz	
	Typical	Maximum	Typical	Maximum
Noise Figure	3.8 dB	5 dB	4.6 dB	5.5 dB
Gain	13 dB	-16 to 24 dB adjustable	10 dB	-16 to 24 dB adjustable
3rd Order Output Intercept	21 dBm		19 dBm	
Preselector Bandwidth	792-825 MHz		2 or 3.5 MHz	
RF Input Connector Type	N		N	
RF Output Connector Type	BNC		BNC	

**GCP 8000 Site Controller**

<b>GENERAL PERFORMANCE</b>	<b>HPD</b>	<b>IV&amp;D</b>
Model Number	T7038A	T7038A
Channel Capacity	5	Repeater Site: 28 Simulcast (Multicast): 30
Size (HxWxD)	5.25" x 19" x 18" (133 x 483 x 457 mm)	5.25" x 19" x 18" (133 x 483 x 457 mm)
Weight	40 lbs (18 kg)	40 lbs (18 kg)
Temperature Range	-22 to 140 °F (-30 to 60°C)	-22 to 140 °F (-30 to 60°C)
Rack Option	19" standard rack mountable	19" standard rack mountable
Frequency Stability	GPS Synchronized	Simulcast (Multisite): External Repeater Site: 100 ppb/2 yr

<b>ELECTRICAL</b>	<b>HPD</b>	<b>IV&amp;D</b>
Power Requirements	AC: 90-264 VAC, 47-63 Hz DC: 43.2-60 VDC	AC: 90-264 VAC, 47-63 Hz DC: 43.2-60 VDC
Power Consumption	AC: 180 W DC: 100W	AC: 150 W DC: 80 W

**GCM 8000 Comparator**

<b>GENERAL PERFORMANCE</b>	<b>IV&amp;D</b>	<b>GENERAL PERFORMANCE</b>	<b>IV&amp;D</b>
Model Number	T7321A	Time Stability	External Reference
Channel Capacity	1 or 2	Power Requirements	90-264 VAC, 47-63 Hz 43.2-60 VDC
Size	5.25" x 19" x 18" (133 x 483 x 457 mm)	Power Consumption	AC, 1 module 150 W AC, 2 modules 180 W DC, 1 module 80 W DC, 2 modules 100 W
Weight	40 lbs (18 kg)		
Operating Temperature Range	-22 to 140 °F (-30 to 60°C)		
Rack Option	19" standard rack mountable		

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G-SERIES SITE EQUIPMENT  
for ASTRO®25 Radio Systems

**GTR 8000 Base Radio**

<b>GENERAL PERFORMANCE</b>	<b>HPD 700/800 MHz</b>	<b>IV&amp;D 700/800 MHz</b>	<b>IV&amp;D UHF: 380-435 MHz UHF: 435-524 MHz</b>	<b>IV&amp;D VHF: 136-174 MHz</b>
Model Number	T7039A	T7039A	T7039A	T7039A
Size (HxWxD)	5.25" x 19" x 18" (133x483x457mm)	5.25" x 19" x 18" (133x483x457mm)	5.25" x 19" x 18" (133x483x457mm)	5.25" x 19" x 18" (133x483x457mm)
Weight	46 lbs (21 kg)	46 lbs (21 kg)	46 lbs (21 kg)	46 lbs (21 kg)
Temperature Range	-22 to 140 °F (-30 to 60°C)	-22 to 140 °F (-30 to 60°C)	-22 to 140 °F (-30 to 60°C)	-22 to 140 °F (-30 to 60°C)
Power Requirements				
AC	90-264 VAC, 47-63 Hz	90-264 VAC, 47-63 Hz	90-264 VAC, 47-63 Hz	90-264 VAC, 47-63 Hz
DC	43.2-60 VDC	43.2-60 VDC	43.2-60 VDC	43.2-60 VDC
Power Consumption	475 W	C4FM: 500W LSM: 550 W	C4FM: 510 W LSM: 560 W	C4FM: 550 W LSM: 460 W
Input/Output Impedance	50 ohms	50 ohms	50 ohms	50 ohms
Antenna Connectors				
Tx	N female	N female	N female	N female
Rx	BNC female	BNC female N female **	BNC female N female **	BNC female N female **
Channel Spacing	25 kHz	12.5 kHz	12.5 kHz	12.5 kHz
Modulation				
Tx	64QAM, 16QAM, QPSK	C4FM, LSM	C4FM, LSM	C4FM, LSM
Rx	64QAM, 16QAM, QPSK	C4FM	C4FM	C4FM
Frequency Stability	External Reference	External Reference	External Reference	External Reference
<b>TRANSMITTER</b>	<b>HPD 700/800 MHz</b>	<b>IV&amp;D 700/800 MHz</b>	<b>IV&amp;D UHF: 380-435 MHz UHF: 435-524 MHz</b>	<b>IV&amp;D VHF: 136-174 MHz</b>
Frequency Range	762-776, 851-870 MHz	762-776, 851-870 MHz	380-435, 435-524 MHz	136-174 MHz
Power output	2-50 W	2-100 W	C4FM: 2-110 W LSM: 2-100 W	C4FM: 2-100 W LSM: 2-60 W
Electronic Bandwidth	Full Bandwidth	Full Bandwidth	Full Bandwidth	Full Bandwidth
Modulation Fidelity	N/A	5%	5%	5%
EVM	10%	N/A	N/A	N/A
Spurious and Harmonic Emissions Attenuation	90 dB	90 dB	90 dB	90 dB
Emissions Designators	17K7D7D	8K70D1W, 8K10F1E	8K70D1W, 8K10F1E	8K70D1W, 8K10F1E
<b>RECEIVER</b>	<b>HPD 700/800 MHz</b>	<b>IV&amp;D 700/800 MHz</b>	<b>IV&amp;D UHF: 380-435 MHz UHF: 435-524 MHz</b>	<b>IV&amp;D VHF: 136-174 MHz</b>
Frequency Range	792-825 MHz	792-825 MHz	380-435, 435-524 MHz	136-174 MHz
Sensitivity 1% Bit Error Rate Static (BER)				
64 QAM	-98 dBm	NA	NA	NA
16 QAM	-104 dBm	NA	NA	NA
QPSK	-111 dBm	NA	NA	NA
Sensitivity 5% Bit Error Rate Static (BER)				
C4FM	NA	-118 dBm	-118 dBm	-118 dBm
Intermodulation Rejection	75 dB*	80 dB	80 dB	80 dB
Adjacent Channel Rejection	50 dB*	60 dB	60 dB	60 dB
Spurious and Image Response Rejection	85 dB*	85 dB 100 dB**	85 dB 100 dB**	90 dB 95 dB**
Intermediate Frequencies				
1st	73.35 MHz	73.35 MHz	73.35 MHz	44.85 MHz
2nd	2.16 MHz	2.16 MHz	2.16 MHz	2.16 MHz

\* Reference signal is QPSK.

\*\* Optional Preselector

**DATA SHEET**

G-SERIES SITE EQUIPMENT  
for ASTRO®25 Radio Systems

**GTR 8000 Site Subsystem**

**GENERAL PERFORMANCE INCLUDING RFDS**

Model Number	T7133A
Number of Channels	1
Height	27 RU, 50.4 in. (128 cm)
Footprint (W x D)	20.8 x 24.8 in. (52.8 x 62.9 cm)
Weight	225 lbs (102 kg)
Temperature Range	-22 to 140 °F (-30 to 60°C)
Power Requirements	AC: 90-264 VAC, 47-63 Hz DC: 43.2-60 VDC
Power Consumption	AC: 675W DC: 570W
Input/Output Impedance	50 ohms
Antenna Connectors	N Female
Channel Spacing	25 kHz
Modulation	Tx: 64QAM, 16QAM, QPSK Rx: 64QAM, 16QAM, QPSK
Frequency Stability	GPS synchronized

**TRANSMITTER INCLUDING RFDS**

Frequency Range	762-792, 851-870 MHz
Power output	1-27 W
Electronic Bandwidth	762-776, 851-870 MHz
Error Vector Magnitude	10%
Spurious and Harmonic Emissions Attenuation	90 dB
Emissions Designators	17K7D7W

**RECEIVER INCLUDING RFDS**

Frequency Range	792-825 MHz
Sensitivity 1% Bit Error Rate Static (BER) 64 QAM	-101 dBm
Sensitivity 1% Bit Error Rate Static (BER) 16 QAM	-108 dBm
Sensitivity 1% Bit Error Rate Static (BER) QPSK	-115 dBm
Intermodulation Rejection*	75 dB
Adjacent Channel Rejection*	50 dB
Spurious and Image Response Rejection*	90 dB
Preselector Bandwidth	792-825 MHz
Intermediate Frequencies	1st: 73.35 MHz 2nd: 2.16 MHz

\* Reference signal is QPSK.

**FCC TYPE ACCEPTANCE**

FCC Designation:	Frequency Range	Type	Power Output	Type Acceptance Number
	762-776 MHz	Transmitter	HPD: 2-50 W IV&D: 2-100 W	ABZ89FC5812
	851-870 MHz	Transmitter	HPD: 2-50 W IV&D: 2-100 W	ABZ89FC5810
	792-825 MHz	Receiver	N/A	ABZ89FR5811
	406-435MHz	Transmitter	2-110 W	ABZ89FC4821
	406-435MHz	Receiver	NA	ABZ89FR4822
	435-524 MHz	Transmitter	2-110 W	ABZ89FC4819
	435-524 MHz	Receiver	N/A	ABZ89FR4820
	136-174 MHz	Transmitter	2-100 W	ABZ89FC3790
	136-174 MHz	Receiver	N/A	ABZ89FR3791



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