



G-Series Site Equipment

for ASTRO[®]25 Radio Networks

Motorola's ASTRO 25 networks are designed to meet the current and future customer requirements for Project 25 solutions. The G-series portfolio of products: RF stations, site controllers and comparators, are designed with flexibility and ease of service.



GTR 8000 Expandable Site Subsystem

Flexible configurations

The G-series stations support the following configurations:

- Project 25 Phase 1 Integrated Voice & Data (IV&D) Trunking
 - Simulcast
 - Site Repeater
- High Performance Data
- X2-TDMA and Dynamic Dual Mode
 - 2-slot TDMA capability
 - Dynamic talkgroup allocation between P25 Phase 1 and TDMA
- RF configurations
 - IP simulcast functionality reduces site complexity
 - Linear Simulcast Modulation provides industry-leading radio coverage with fewer sites in 700/800MHZ, UHF, & VHF

Software defined architecture – easy to adapt equipment

- Base station, comparator, and site controller share common hardware
- Reconfigured hardware to meet different requirements, trunking, trunking simulcast
- Configurable Information Assurance capabilities – central logging, port security, back up and recovery
- Add new capabilities with a software download as they are developed – TDMA, mutual aid, and conventional operation
- Installation and service costs are minimized with common hardware platforms

Compact design for efficient use of site space

- Compact and integrated hardware is designed for efficient use of site space
- Expandable Site Subsystem offers six base radios and TX & RX peripherals in one vertical rack
- Standalone configurations occupy only three rack units of site space.
- Power supply supports AC & DC in the same unit
- Standard battery revert and battery charging capability in the G-series common Power Supply eliminates the need for an uninterrupted power supply (UPS) in many installations saving valuable site space

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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 alignment¹ 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

¹ 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

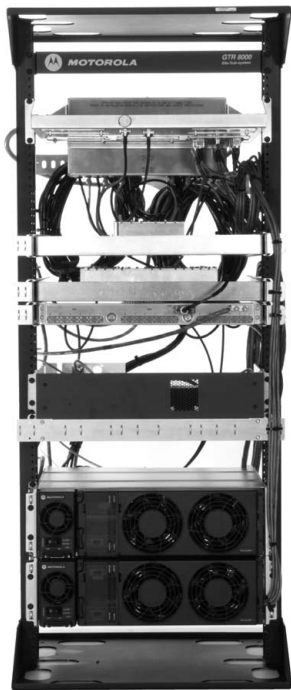
Ensures the broadcast of the best possible voice signal by combining the best parts of a single signal that has been received by multiple sites in a Multisite (simulcast) system.

- 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 Radios²
- 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

² 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

| GENERAL PERFORMANCE | HPD 700/800 MHz | IV&D 700/800 MHz | IV&D UHF: 380-524 MHz | IV&D VHF: 136-174 MHz |
|---------------------------------------------|------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| 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 |
| TRANSMITTER (CABINET OUTPUT) | | | | |
| | HPD 700/800 MHz | IV&D 700/800 MHz | IV&D UHF: 380-524 MHz | IV&D VHF: 136-174 MHz |
| 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, 8K70D7WQ, 8K10F7W, 8K10F1D | 8K70D1W, 8K10F1E | 8K70D1W, 8K10F1E |
| RECEIVER (TOP OF CABINET) | | | | |
| | HPD 700/800 MHz | IV&D 700/800 MHz | IV&D UHF: 380-524 MHz | IV&D VHF: 136-174 MHz |
| 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.

*** Specifications apply to FDMA & X2-TDM Software operations

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G-SERIES SITE EQUIPMENT
for ASTRO®25 Radio Systems

GTR 8000 Expandable Site Subsystem (continued)

TRANSMITTER RF DISTRIBUTION SYSTEM

| | 700/800 MHz | UHF: 450-512 MHz |
|-----------------------------------|------------------------|------------------|
| 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

| | 700/800 MHz | UHF: 450-512 MHz |
|----------------------------|-------------|------------------|
| Frequency Range | 792-825 MHz | 450-512 MHz |
| | Typical | Typical |
| | Maximum | Maximum |
| Noise Figure | 3.8 dB | 4.6 dB |
| Gain | 13 dB | 10 dB |
| 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

| GENERAL PERFORMANCE | HPD | IV&D |
|---------------------|----------------------------------------|----------------------------------------------------------------|
| 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 |

| ELECTRICAL | HPD | IV&D |
|--------------------|---------------------------------------------|---------------------------------------------|
| 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

| GENERAL PERFORMANCE | IV&D | GENERAL PERFORMANCE | IV&D |
|-----------------------------|-------------------------------------------|---------------------|-------------------------------------|
| 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 | 150 W 180 W |
| Weight | 40 lbs (18 kg) | AC, 1 module | 150 W |
| Operating Temperature Range | -22 to 140 °F (-30 to 60°C) | AC, 2 modules | 180 W |
| Rack Option | 19" standard rack mountable | DC, 1 module | 80 W |
| | | DC, 2 modules | 100 W |

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G-SERIES SITE EQUIPMENT
for ASTRO®25 Radio Systems

GTR 8000 Base Radio

| GENERAL PERFORMANCE | HPD 700/800 MHz | IV&D 700/800 MHz | IV&D UHF: 380-435 MHz UHF: 435-524 MHz | IV&D VHF: 136-174 MHz |
|---------------------------------------------|-----------------------------------|---------------------------------------------------|-------------------------------------------------------|-----------------------------------|
| 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 |
| TRANSMITTER | HPD 700/800 MHz | IV&D 700/800 MHz | IV&D UHF: 380-435 MHz UHF: 435-524 MHz | IV&D VHF: 136-174 MHz |
| 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 8K70D7WQ, 8K10F7W, 8K10F1D | 8K70D1W, 8K10F1E | 8K70D1W, 8K10F1E |
| RECEIVER | HPD 700/800 MHz | IV&D 700/800 MHz | IV&D UHF: 380-435 MHz UHF: 435-524 MHz | IV&D VHF: 136-174 MHz |
| 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

*** Specifications apply to FDMA & X2-TDM Software operations

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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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R3-11-2034F