



# Data Termination Rack



(DTR)

## Function

This section explains the requirements for the Data Termination Rack (DTR).

## General Summary

All range training network cables are interconnected in the ROCA facilities in enclosed patch panels called DTRs. The DTRs are located in the Large ROC, Small ROC, Large AAR, Small AAR, Control Towers, and CACTF training buildings. The actual building where the DTRs are located is dependent on the type of range. The function of the DTR is to terminate downrange data cabling, bond data cable armored jacket at the facility point of entry, house target network equipment, and provide cable pathways to range control work stations and devices.

The range training network cables shall be completely separated from common user telephone and data connections. The common user cables shall not be interconnected in the DTR. Range training network data cables shall not be interconnected in enclosures or patch panels designated for common user communication systems. All DTRs and Common User enclosures shall be labeled to identify the cable system supported by each enclosure or rack. All common user cable systems shall be installed in accordance with UFC 3-580-01 and local requirements set forth by the local US Army Network Enterprise Command or local authority for telecommunication systems.

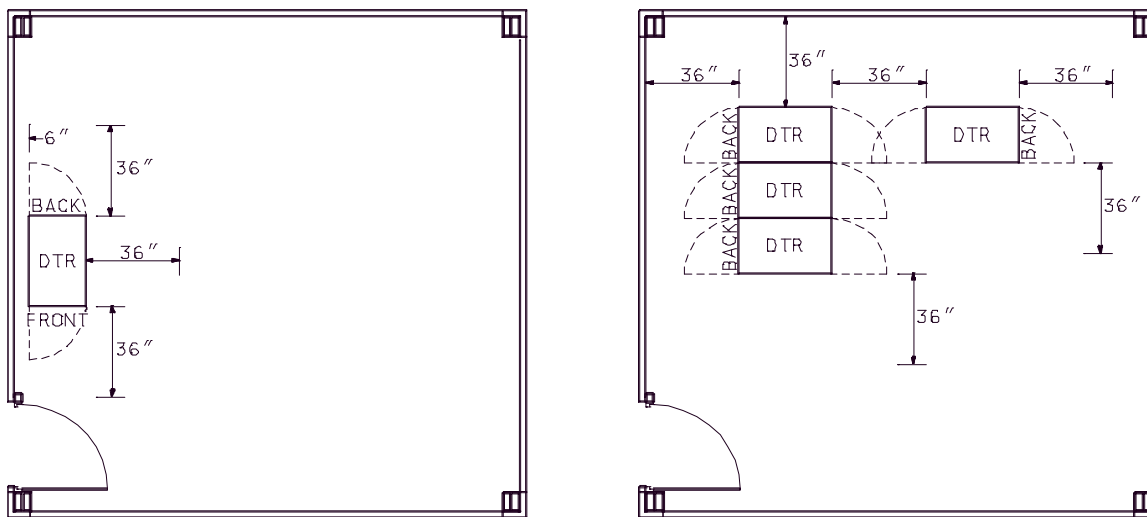
DTR's are provided in different configurations depending on the type of range and type of automated system installed on the range. All DTRs will utilize mounting rails that accommodate 19" wide patch panels and components. The DTRs will be floor mounted or wall mounted depending on the type of range and type of control system installed on the range. Each range shall include at a minimum the number of DTRs required to terminate all cables on the range training network. In some cases floor mounted DTRs should be used instead of wall mounted DTRs as floor mounted DTRs have the capacity to hold more equipment and cable terminations. All DTR enclosures shall be rated for the environment in which they are installed.

## Floor Mounted DTRs

Floor mounted DTRs shall be an industry standard 19" (22" outer dimension), 36" deep, 84" tall enclosed rack. The racks shall be installed such that there is adequate working space around the

rack. For installations in which only one rack is required there shall be a minimum of 36" working space in front, back and one side; the opposite side shall have a minimum of 6" clearance to the nearest wall. For installations where multiple racks are installed racks may be joined at adjacent sides and there shall be a minimum of 36" clearance on the front, back and side not connected to other rack.

Range training network cables shall enter floor mounted DTRs from the bottom. In floor mounted DTRs installed in Control Tower, the training network data cable's armored jacket shall be bonded to ground inside the DTR. There shall be a minimum of 10 ft service loop provided in the DTR. The service loop and armor bond should be installed in a manner that will maximize the amount of space in the DTR for the installation of patch panels and target networking equipment.



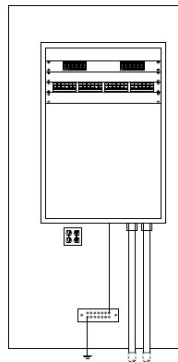
**Example Floor Mounted DTR Installations (Not to Scale)**

## Wall Mounted DTRs

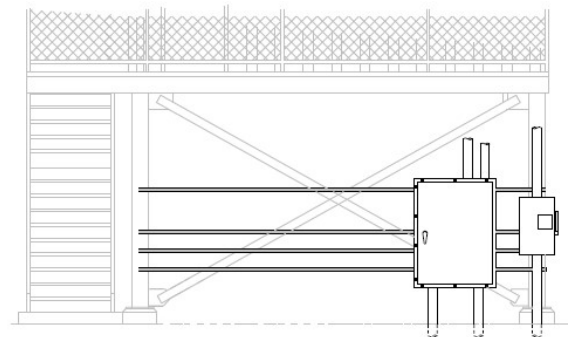
The wall mounted shall be an industry standard 19" wide (23.4" outer dimension), 30" deep with a height to provide a minimum of 24 rack units of space. The DTR shall be hinged on one side to allow access to the rear of the components installed in the rack. The DTR shall be installed on a 4' wide x 8' tall fire retardant treated wood backboard. The backboard must bear the manufacturer's stamp, and if the backboard is painted the manufacturer's fire rated stamp must remain visible.

For wall mounted DTRs installed in Control Towers where the Control Room is not at ground level there shall be an enclosure installed at ground level interconnected with the DTR. The exterior enclosures shall be a 48" tall x 36" wide x 12" deep NEMA 4 enclosure. All downrange cables shall be routed to this enclosure. Provide a service loop for the data cables inside this enclosure. From this enclosure the cables shall be routed to the DTR in two 3" conduits. The

enclosure should be installed directly beneath the DTR to allow for a straight conduit run between the DTR and the ground level exterior enclosure.



**Wall Mounted DTR**



**Exterior Enclosure**

## CACTF Training Buildings

The DTR for the CACTF training buildings shall be an industry standard NEMA 12, 19" (23" outer dimension), 31.5" deep, 79" tall rack. The racks shall be installed such that there is adequate working space around the rack. For installations in which only one rack is required there shall be a minimum of 36" working space in front, back and one side; the opposite side shall have a minimum of 6" clearance to the nearest wall. For installations where multiple racks are installed racks may be joined at adjacent sides and there shall be a minimum of 36" clearance on the front, back and side not connected to other rack.

## Location

DTRs are located in ROCs, AARs, Control Towers, and CACTF training buildings. All data cables for downrange targets, cameras, and other training equipment which utilize the range training network shall be terminated in a DTR. Careful consideration shall be given when populating the DTRs so the amount of space consumed is at a minimum to allow for future equipment installed by the target vendor. See the section for each building type to see additional information as to number of DTRs required for each building type. For instrumented and urban ranges there will be additional DTRs for range instrumentation equipment provided by future. There shall be power and grounding provisions provided for all DTRs to include future DTRs as identified in the building layout included in each building type section.

## Data

The method that data cables enter DTRs is dependent upon the type of building. For DTRs installed in ROCs, AARs and Control Towers the cables will be routed under the racks. For the CACTF training buildings the data cables shall be routed through the top of the rack. In these racks where the cables route through the top the NEMA 12 rating of the DTR should not be violated due to the opening in the top for the cables. For wall mounted racks a separate enclosure will be required for all ranges where the DTRs are installed in Control Rooms that are not at

ground level. The downrange cables will route into these enclosures before routing and terminating in the wall mounted DTR.

Only one type of data cable shall be run into the DTR. For example, if it is determined that fiber optic cable is required for some targets; then only fiber optic cable shall be used from the DTR. This will limit the type of equipment supplied by the target vendor to one media type. All fiber optic cables entering the DTR shall be terminated in “SC” connector type patch panels, and all CAT 5E or better cables shall be terminated in RJ-45 connector patch panels. The patch panels shall be installed in the top rack unit spaces of the DTR to allow the maximum amount of space for the installation of target control equipment installed by the target vendor.

## Power

Power requirements for DTRs vary depending on the type of range.

### Non-instrumented ranges

The DTRs for these ranges should be supplied power via two dedicated 20-amp circuits to a quad outlet. Outlets should be located inside or under each DTR.

### Instrumented ranges

Provide power to DTRs in the ROC/AAR from the UPS fed panelboard. In both the ROC and AAR communication room each DTR should be supplied power via two dedicated 20-amp circuits to a quad outlet located in outlet boxes flush with the raised floor. The outlets boxes shall be compatible with the raised floor. Provide 6’ ft flexible conduit whips to the outlets installed in the raised floor to allow the raised floor panels to be removed without disconnecting power to the outlets. The outlets in the raised floor panels shall be located to where the outlets are underneath and accessible to each DTR. There are multiple racks in the ROC/AAR communication room that will be provided by future instrumentation contractors. Power should be supplied to each of these future racks. Careful coordination should be done during the design and construction of these ranges to ensure power is supplied to the locations required for the future DTRs.

### CACTF ranges

In both the ROC and AAR communication room each DTR should be supplied power via two dedicated 20-amp circuits to a quad outlet located in outlet boxes flush with the raised floor. The outlets boxes shall be compatible with the raised floor. Provide 6’ ft flexible conduit whips to the outlets installed in the raised floor to allow the raised floor panels to be removed without disconnecting power to the outlets. The outlets in the raised floor panels shall be located to where the outlets are underneath and accessible to each DTR. There are multiple racks in the ROC/AAR communication room that will be provided by future instrumentation contractors. Power should be supplied to each of these future racks. Careful coordination should be done during the design and construction of these ranges to ensure power is supplied to the locations required for the future DTRs.

Provide power to the DTRs located in each CACTF training building via two dedicated 20-amp circuits to a quad outlet located on the floor inside each DTR.

## Live Fire Shoothouse (AAR only)

In the AAR for the shoothouse the DTR is provided by the Shoothouse instrumentation vendor. Provide power to the future DTR via NEMA L5-30R outlets. There is no ROC for a live fire shoothouse.

## Ventilation

Proper ventilation of equipment installed inside the DTRs is essential to the successful operation of the range. Design consideration should be given to the ventilation of the equipment installed inside the DTR and the ventilation for the room housing the DTR. The room HVAC requirements are provided in the section for each building. In some instances the DTR shall be provided with integral exhaust fans in the top of the enclosure to ensure the equipment adequately ventilated.

CACTF training buildings will have rack coolers which will be provided and installed by the OPA contractor. Additional power will be required to these racks that require rack coolers, coordinate the power requirements for the rack coolers with PEO-STRI. A 1” hole should be provided in the electrical room wall at floor level to the exterior of the building for routing of an OPA contractor provided and installed flexible hose from the rack cooler.

## Grounding

Each DTR shall be provided with an integral copper bus bar. Provide a minimum size of green insulated #6 AWG grounding conductor to DTR grounding bus bar from the Telecommunication Main Ground Bus bar (TMGB). For ranges where the OPA contractor will provide additional racks, ensure that there is a means for their racks to be grounded to the TMGB.