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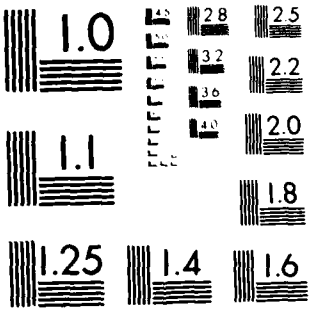

1842 EEG TR 83-18-EX

AFCC TECHNICAL REPORT

FEASIBILITY OF REMOTING BRITE II VIA FIBER OPTICS

TRACALS AND ELECTRONIC SYSTEMS BRANCH
1842 ELECTRONICS ENGINEERING GROUP (AFCC)
SCOTT AIR FORCE BASE, ILLINOIS 62225

30 SEPTEMBER 1983

1842 ELECTRONICS ENGINEERING GROUP

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The 1842 Electronics Engineering Group (EEG) has the mission to provide communications-electronics (C-E) systems engineering and consultive engineering support for AFCC. In this respect, 1842 EEG responsibilities include: Developing engineering and installation standards for use in planning, programming, procuring, engineering, installing and testing C-E systems, facilities and equipment; performing systems engineering of C-E requirements that must operate as a system or in a system environment; operating a specialized Systems Technical Applications Facility to analyze and evaluate new digital technology for application to the Defense Communications System (DCS) and other special purpose systems; operating a facility to prototype systems and equipment configurations to check out and validate engineering-installation standards and new installation techniques; providing consultive C-E engineering assistance to HQ AFCC, AFCC Divisions, AFCC Engineering Installation Center (EIC), MAJCOMS, DOD and other government agencies.

APPROVAL PAGE

This report has been reviewed and is approved for publication and distribution.

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EXECUTIVE SUMMARY

This report is in response to tasking from EIC/EIW to determine the feasibility and method by which the BRITE II system could be remoted using fiber optics (FO). Research of the system technical order and measurements of the signal characteristics show the use of FO remoting is feasible. This report provides a recommended configuration for a FO remoting system.

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1.0 BACKGROUND.

1.1 The BRITE II system provides the control tower operators a TV display of the airport surveillance radar (ASR) and beacon information shown on the indicators in the operations center. The various signals (videos, trigger and azimuth reference) are carried by land lines (coaxial and multi-conductor cables) or a microwave link from the operations center to the control tower. The land lines are susceptible to electromagnetic interference, lightning, EMP and are limited in distance (12,000 feet). The microwave link is susceptible to electromagnetic interference, EMP, EW and is limited to line-of-sight siting of the transmitter/receiver pairs. The use of fiber optics eliminates these problems/limitations.

2.0 FEASIBILITY.

2.1 The signals carried by the BRITE II remoting system are identical to those carried by the ASR/Beacon remoting system. Previous studies of remoting the ASR/Beacon using FO and several prototype systems have demonstrated the feasibility. The 1842 EEG TR 83-17-EX, Feasibility of Remoting ASRs via Fiber Optics, provides more details.

3.0 METHOD.

3.1 As general information the land line remoting system, now used for the majority of the BRITE II systems, is illustrated in Figure 1. The amplifier (AM-6458/G) is used as a line driver for the video signals being remoted by coaxial cables. The compensator (CN-1382/G) brings the received signals back to the level required by the indicator. The azimuth reference data is provided by either synchro signals (requiring a 10 conductor cable) or ACP/ARP pulses.

3.2 As requested the possibility of changing the BRITE II configuration to simplify remoting was investigated. Moving the Indicator/TV Camera and Control Box from the control tower to the operations center would leave only the TV video to be remoted to the control tower TV monitor. However, this configuration would require the operator in the control tower to coordinate the Control Box settings with the operator in the operations center via telephone. HQ/AT (Air Traffic Services) informed us that this procedure would not be acceptable.

3.3 The recommended FO remoting system configuration would replace the amplifier and land lines with a separate FO link for each video signal (See Figure 2). The FO modems, which are currently being obtained through ALC, will have orderwire channels. We believe the azimuth reference pulses (ACP and ARP) and the radar trigger can be sent over the orderwire channel. This allows each FO link to carry two signals. The FO modems have unity gain with the input level limited to 1 volt. This eliminates the need for the amplifier and, in fact, would require an interface to attenuate the signals to the 1 volt level. The orderwire channel has a 600 ohm balanced input/output impedance and would also require an impedance matching circuit.

3.4 The equipment and cost estimates are based on four active FO links as shown in Figure 2. A remoting distance of 2.5 Km (8,200 feet) is used for cost estimates. A six-fiber cable would provide two spare fibers.

Equipment/Cable	Quantity	Unit Cost
Modem Rack with Power Supply	2 ea	$ 1,350
FO Modems	4 ea	5,000
Cable (six fiber)	2.5 Km	6,000
Total Cost:		$ 37,700

4.0 RECOMMENDATIONS.

4.1 Recommend a project be established to prototype a FO remoting system for the BRITE II. This would determine the interface requirements (attenuation and impedance matching), and installation/alignment procedures.

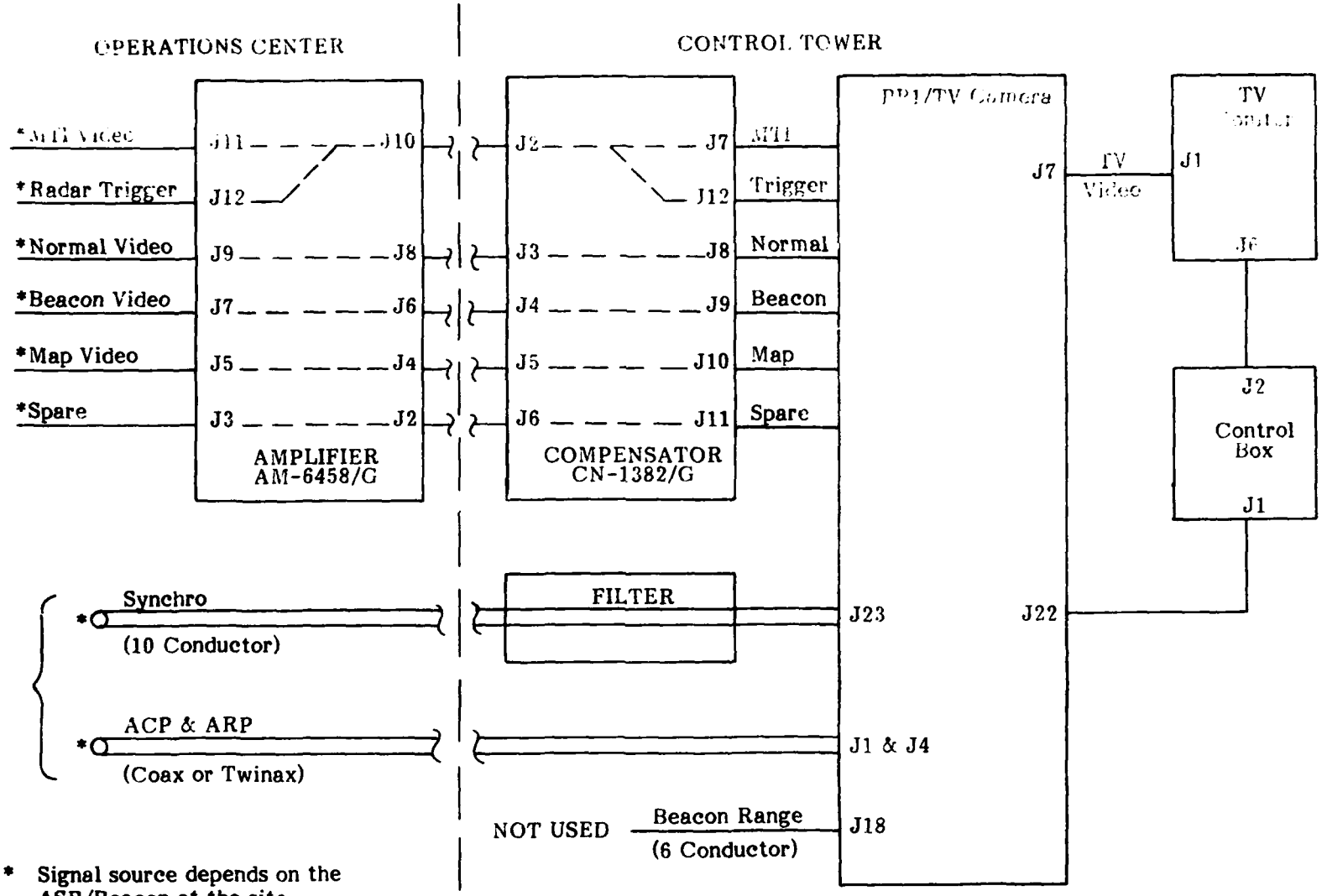
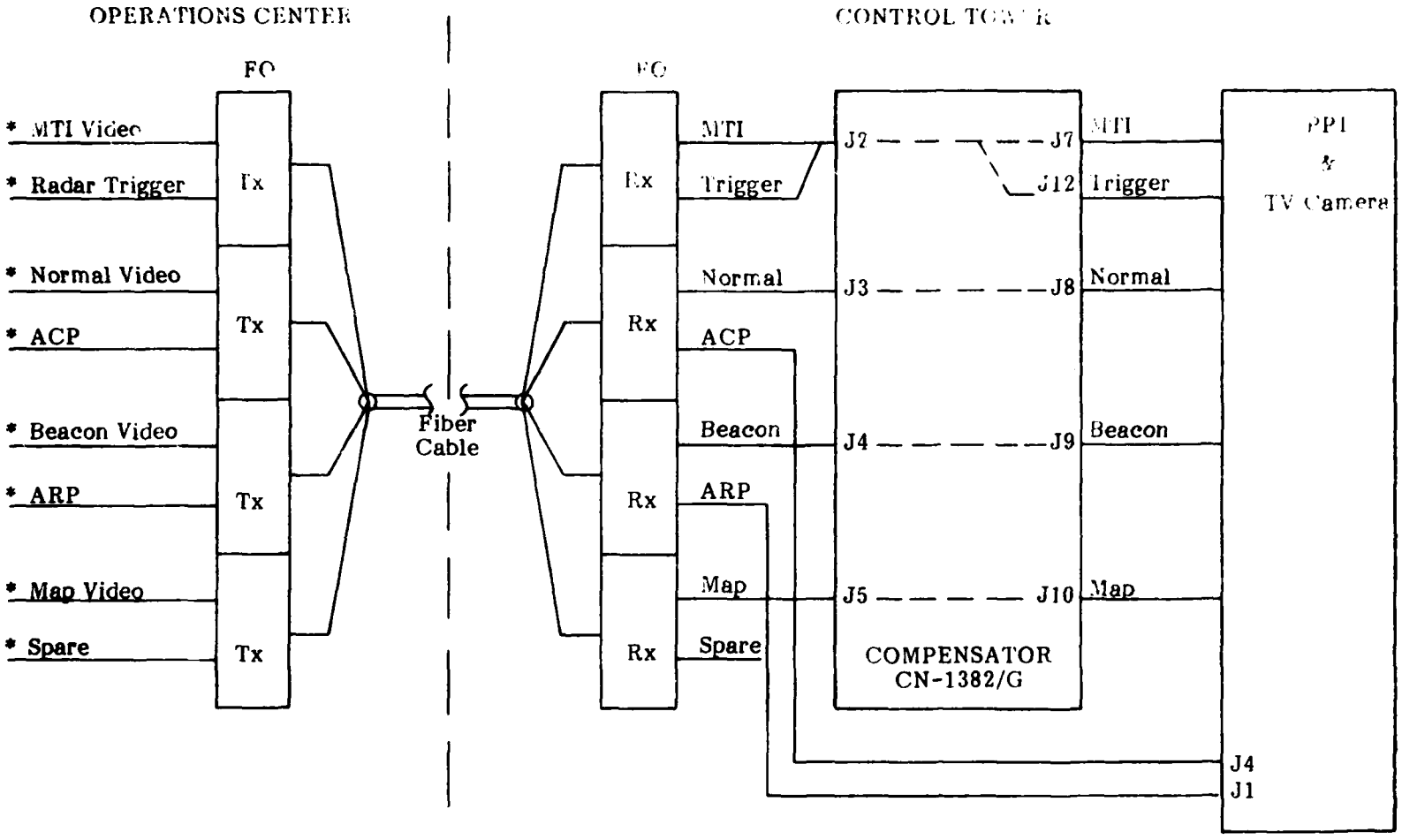


Figure 1. Land Line Remoting System



* Signal source depends on the ASR/Beacon at the site.

Note: a. Trigger, ACP and ARP require impedance matching circuits.

b. The negative side of the balanced output must be used for the trigger.

Figure 2. FO Remoting System

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