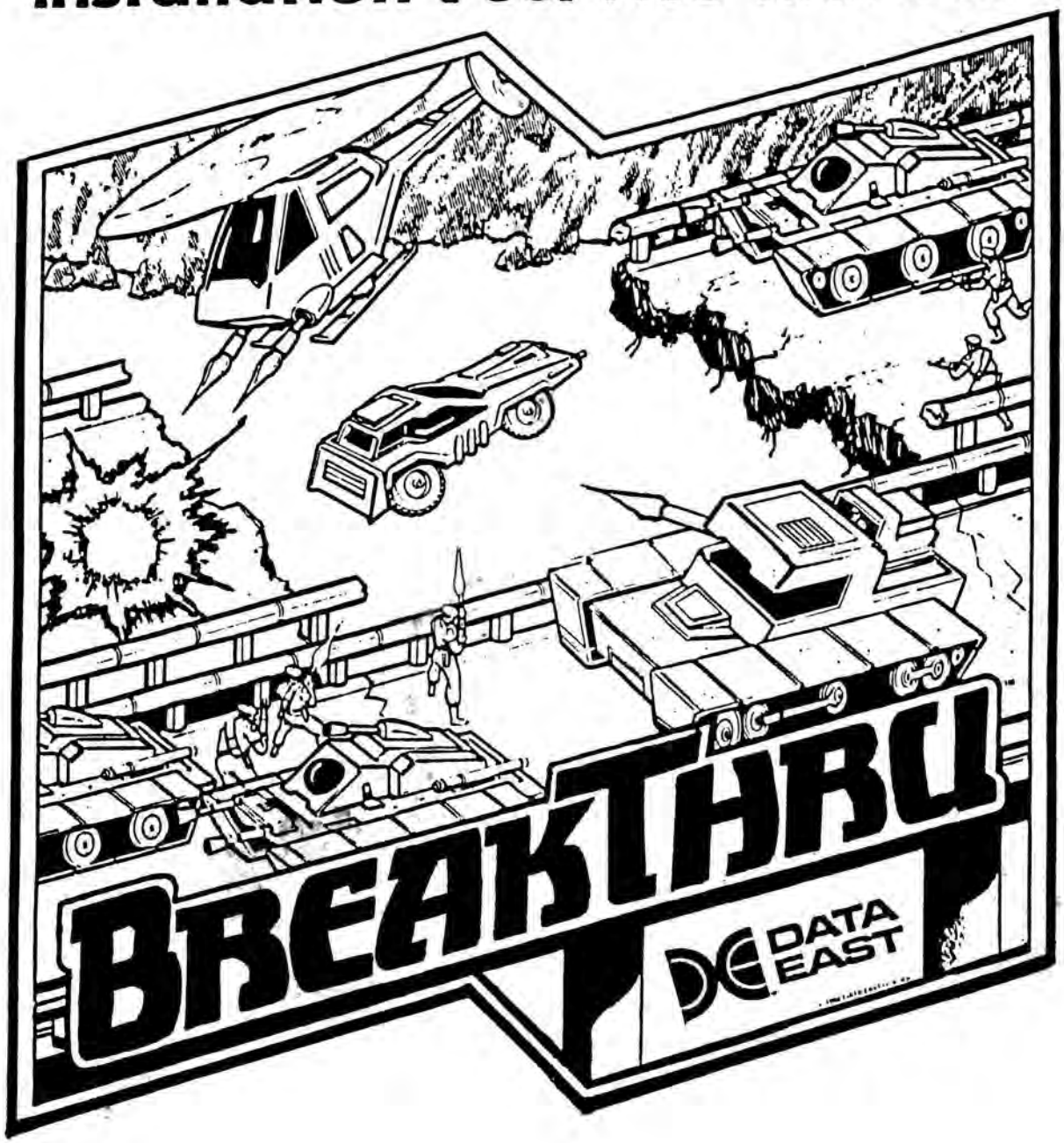
CONVERSION KIT

installation & service manual



DATA EAST USA, INC.
470 Needles Drive
San Jose, CA 95112

780-0036-00

WARNING

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the instructions manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device persuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Thank you for purchasing this Data East Conversion Kit. Your kit includes the following:

1	510-0061-00	PCB ASSEMBLY, BREAK THRU
1	520-0083-00	PCB ASSEMBLY, EMI FILTER DE-0239
1	450-0009-00	JOYSTICK, 4/8 WAY
6	185-0001-00	PUSHBUTTON HOLDER WITH SWITCH
6	240-0001-00	PAL NUT
2	350-0001-02	PUSHBUTTON, SHORT, RED
2	350-0001-04	PUSHBUTTON, SHORT, YELLOW
2	350-0001-00	PUSHBUTTON, SHORT, BLACK
1	830-0020-00	MARQUEE PLEX, BREAK THRU
1	800-0019-00	CONTROL PANEL OVERLAY, BREAKTHRU
2	820-0029-00	SIDE DECAL, BREAK THRU
1	810-0014-00	UNDERLAY CARD, MONITOR, GENERIC
1	406-0029-00	LABEL, INSTRUCTIONS, BREAK THRU
1	820-0028-00	DECAL, LOGO, UNDERLAY CARD
1	036-0013-00	HARNESS, MAIN GENERIC KIT
1	780-0036-00	INSTALLATION & SERVICE MANUAL
1	406-0003-00	LABEL, FCC

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1. IMPORTANT WARRANTY INFORMATION

LIMITED WARRANTY

Data East USA, Inc. ("Seller"), warrants only to the initial purchaser of its products that the items listed below are free from defects in material and workmanship under normal use and service for the warranty periods specified:

1. Printed Circuit Boards (Game Logic) (90) days

No other parts of the Seller's products are warranted.

Warranty periods are effective from the initial date of shipment from Seller to its authorized distributors.

Seller's sole liability shall be, at its option, to repair or replace products which are returned to Seller during the warranty periods specified, provided:

1. Seller is notified promptly upon discovery by buyer that stated products are defective.

2. Such products are properly packaged and then returned, prepaid to Seller's plant.

This warranty does not apply to any parts damaged during shipping or handling, or due to improper installation or usage, or alteration. In no event shall the Seller be liable for any anticipated profits, loss of profits, loss of use, incidental or consequential damages or any other losses incurred by the customer in connection with the purchase of a Data East USA, Inc. product.

WARRANTY DISCLAIMER

EXCEPT AS SPECIFICALLY PROVIDED IN A WRITTEN CONTRACT BETWEEN SELLER AND PURCHASER, THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

2. ADJUSTMENTS & OPTIONS

A. VOLUME CONTROL. The audio volume is adjustable via a trimpot (VR1) on the CPU PCB.

B. OPERATOR SELECTABLE OPTIONS. The Operator Selectable Options can be altered by changing the settings of the Dip Switches found on the CPU PCB. Table 1 and Table 2 outline the available options.

DIP SWITCH 1		1	2	3	4	5	6	7	8
COIN VS CREDIT COIN 1	1 COIN = 1 CREDIT	OFF	OFF						
	1 COIN = 2 CREDIT	ON	OFF						
	1 COIN = 3 CREDIT	OFF	ON						
	2 COIN = 1 CREDIT	ON	ON						
COIN VS CREDIT COIN 2	1 COIN = 1 CREDIT			OFF	OFF				
	1 COIN = 2 CREDIT			ON	OFF				
	1 COIN = 3 CREDIT			OFF	ON				
	2 COIN = 1 CREDIT			ON	ON				
ENEMY VEHICLES	SLOW					OFF			
	FAST					ON			
ENEMY BULLETS	SLOW						OFF		
	FAST						ON		
CONTROL PANEL	TABLE							OFF	
	UPRIGHT							ON	
CABINET TYPE	TABLE								OFF
	UPRIGHT								ON

DIP SWITCH 2		1	2	3	4	5	6	7	8
NUMBER OF LIVES	THREE	OFF	OFF						
	FIVE	ON	OFF						
	ONE	OFF	ON						
	NINETY-NINE	ON	ON						
BONUS LIVES	20000/30000 PTS			OFF	OFF				
	20000/40000 PTS			ON	OFF				
	10000/20000 PTS			OFF	ON				
	20000/ NONE			ON	ON				
MONITOR PICTURE	NORMAL						OFF		
	FLIP						ON		
SWITCHES 5, 7, & 8 = ALWAYS OFF						OFF		OFF	OFF

3. CONVERSION SUMMARY

One of the most important considerations determining the success of your conversion will be the condition of the machine you are converting. Obviously, if the monitor is dull in the original game, it will be no better with the conversion installed. If you have a choice, select a machine that has an instruction manual and/or good primary wiring diagrams. You MUST select a machine that has previously been certified as conforming to Part 15, Subpart J, of the FCC regulations. It it mandatory that the primary wiring contain a good noise filter in order to prevent conducted radio frequency interference.

Since it is extremely important that all visible graphics, original manufacturer's name (other than the Serial Number tag), logo's, etc., are to be removed or covered by new graphics, a proper choice of cabinet in this phase of the conversion will save you much time.

Make sure that the integrity of the cabinet is such that the converted game will not be a vandals dream. Review the control panel to identify what changes will be required so that you will be prepared. It may be necessary to drill holes in the control panel for pushbuttons, etc. before applying the new overlay. See figure 1 for suggested control layout.

The BREAK THRU game is designed to operate with a COLOR RASTER MONITOR, mounted in a HORIZONTAL position. The BREAK THRU PCB generates NEGATIVE COMPOSITE SYNC. The POWER SUPPLY requirements are: +5 volts @ 7 Amperes, and +12 volts @ 1 Ampere.

It is mandatory that the cabinet be wired to conform with all National and Local Electrical Code requirements before the conversion is attempted. The system must have adequate noise filtering on the AC line to prevent unwanted conducted radio frequency interference. "Adequate" is defined as a filter having both common mode and differential mode filtering with a current capacity of at least 1 1/2 amperes.

According to the FCC and various other agencies, every video game must be clearly and permanently LABELED with the name and address of the Original Manufacturer, Date of Manufacture (or serial number), Voltage rating, Current rating, Suitability for indoor or outdoor use, and unit model number. In addition, the FCC requires that, after conversion, the unit must be labeled with a suitable warning stating that radio frequency interference may result from use in a residential area. An acceptable warning sticker is enclosed in your kit.

IT IS THE RESPONSIBILITY OF THE INDIVIDUAL PERFORMING THE CONVERSION TO INSURE THAT ALL LABELING REQUIREMENTS ARE CONFORMED WITH!

4. COSMETICS

All components that contain the Original Manufacturer's name (other than the serial number plate), graphics, logos, or game play information must be removed or covered by some means. Do not destroy the Display Plex or the Control Panel as these items may have to be used or modified for your conversion.

A cardboard underlay has been provided to be placed under a clear Display Plex. You will install the game instruction decal on to this underlay card. If the existing Display Plex has silkscreened artwork on it, you will need to strip it clean (lacquer thinner is usually effective) or replace it with a clear plex. If necessary, trim the cardboard underlay, with a razor blade, down to the size of the Display Plex. Install the Instruction Decal and the Underlay Logo Decal as shown in figure 2.

The control panel overlay supplied in this kit is designed to allow the player controls to be placed in a variety of positions. First, strip off the original controls and the overlay and then thoroughly clean and deburr the control panel. If necessary, drill out any required holes in the control panel. The new overlay has a strong adhesive on one side of it, so be sure you know how you want it positioned before peeling off the paper backing and applying it to the panel. When applying the overlay, smooth it out from the center to the edges, being sure remove all trapped air bubbles. Trim any excess material, and material from mounting holes, with a razor blade or sharp knife.

A new 8 way joystick is provided with the kit. Appropriate color pushbuttons, button holders, and pal nuts are supplied. The pushbuttons require a 1 1/8 inch diameter mounting hole.

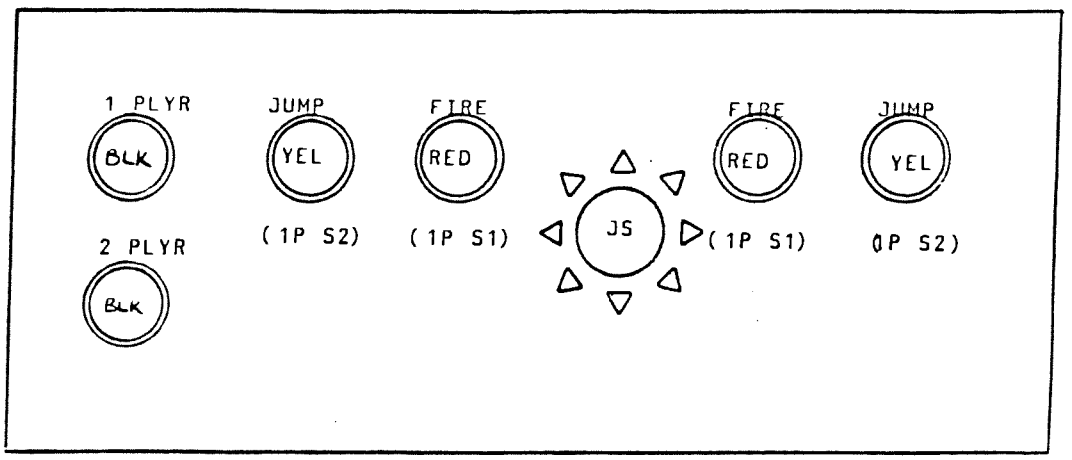


FIGURE 1. RECOMMENDED CONTROL PANEL LAYOUT

5. INSTALLATION INSTRUCTIONS

A. General Instructions

Your conversion kit has been supplied with a main harness which connects the EMI Filter/Adaptor PCB to the various places in the game in which you are converting. Each wire has been labeled as to its function. If in doubt, refer to the Main Harness Diagram on page 6.

1. Follow all instructions in this manual relating to selecting a game to install this conversion into.

2. Mount the new Logic PCB set in a convenient location. An EMI cage is not necessary for this conversion, but the use of the EMI Filter/Adaptor PCB is MANDATORY!

3. Plug the EMI Filter/Adaptor PCB into the BREAK THRU PCB as shown on page 6.

4. Plug the Generic Main Harness onto the EMI Filter/Adaptor PCB.

5. Neatly route all of various main harnessing around the cabinet to the proper destination points and terminate as required. Refer to the Specific Wiring Procedures on page 7 for details.

6. When you are certain that you have made all the connections properly, turn on the main power and wait for the monitor to warm up. Watch for any signs of smoke or cracking noises indicating a problem. You may have to adjust your monitor to center the picture or enhance the colors. MEASURE AND ADJUST THE +5 VOLT POWER SUPPLY AT THIS TIME!

When you have finished converting your game, be sure to attach the FCC WARNING label to the rear of the cabinet. Failure to do so is a violation of the FCC regulations.

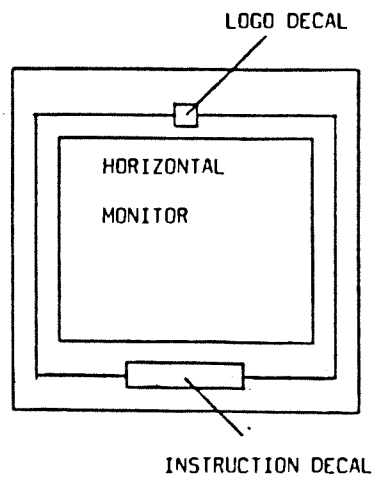
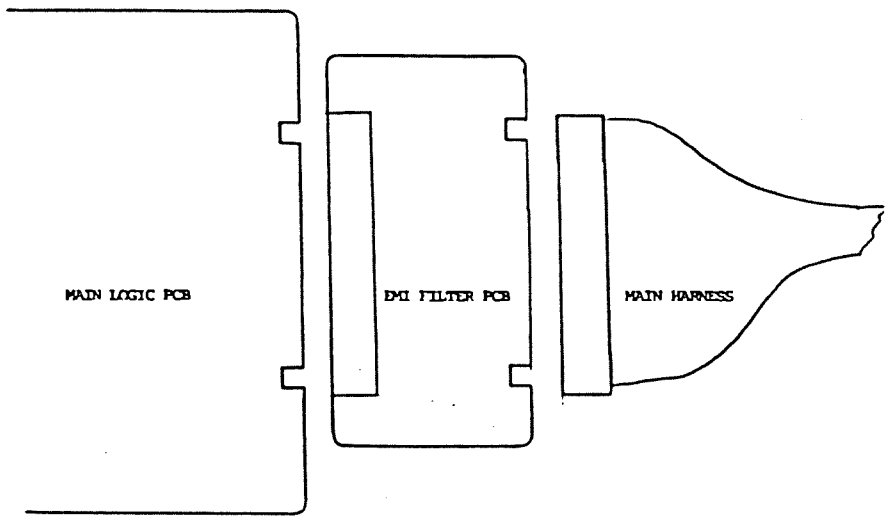


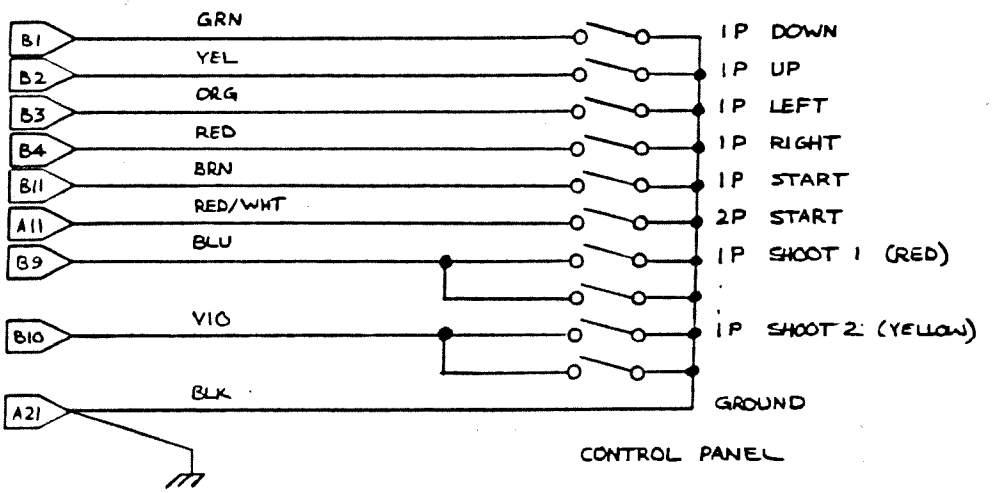
FIGURE 2. APPLYING THE INSTRUCTION AND LOGO DECALS TO THE UNDERLAY CARD.

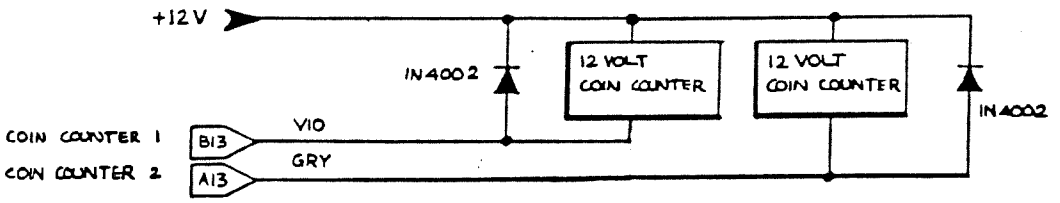
B. Main Harness Wiring Diagram

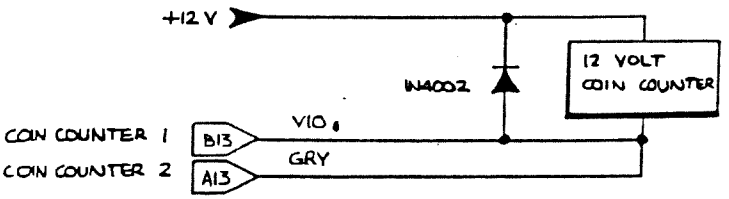
	COMPONENT SIDE			SOLDER SIDE			
WIRE COLOR	Pin Nos	KEL	Signal	Pin Nos	KEL	Signal	WIRE COLOR
GRN	1	B1	1P DOWN	A	A1	2P DOWN	
YEL	2	B2	1P UP	B	A2	2P UP	
ORG	3	B3	1P LEFT	C	A3	2P LEFT	
RED	4	B4	1P RIGHT	D	A4	2P RIGHT	
	5	B5	1P SHOOT 3	E	A5	2P SHOOT 3	
	6	B6		F	A6		
	7	B7		H	A7		
	8	B8		J	A8		
BLU	9	B9	1P SHOOT 1	K	A9	2P SHOOT 1	
VIO	10	B10	1P SHOOT 2	L	A10	2P SHOOT 2	
BRN	11	B11	1P GAME SELECT	M	A11	2P GAME SELECT	RED/WHT
GRN	12	B12	COIN 1	N	A12	COIN 2	RED
VIO	13	B13	COIN COUNTER 1	P	A13	COIN COUNTER 2	GRY
BLU/WHT	14	B14	TV.B	R	A14	TV.G	GRN/WHT
WHT/BLK	15	B15	SYNC.	S	A15	TV.R	RED/WHT
	16	B16		T	A16		
WHT	17	B17	SPEAKER +	U	A17	SPEAKER -	BLK/WHT
ORG	18	B18	+12V	V	A18	-5 V	BLU
RED	19	B19	+ 5 V	W	A19	+ 5 V	RED
RED	20	B20	+ 5 V	X	A20	+ 5 V	RED
BLK/WHT	21	B21	TV.GND	Y	A21	GND	BLK
BLK	22	B22	GND	Z	A22	GND	BLK

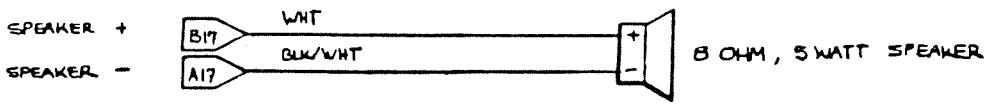


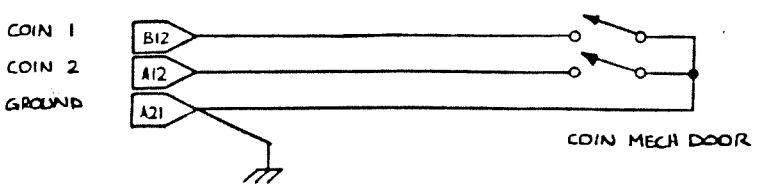
C. Specific Wiring Procedures

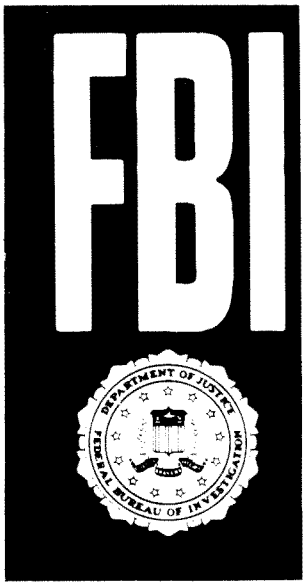












WARNING

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The Federal Bureau of Investigation investigates allegations of criminal copyright infringement.